

Åñäéñßäéí ôïõ FreeBSD

ÍÜääá Ôåêìçñßùóçò ôïõ FreeBSD

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áðü ïÜääá Ôåêïçñßùóçò ôïõ FreeBSD

ÄçiióéåõíÝí ÖåâñiõÜñéïò 1999

Điáðiáðóéé Ú Áæéáþpiáðá © 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012 ÍnÚá Áðæíçñþbúnóðó ðið FreeBSD

Êäéþò Þñéåôå ôóí FreeBSD! Áðôü îò áã-åéñbaëí êáéýððååé ôçí áâéåôÙóðååóç êáé ôçí êáéçìåñéÍP ÷ nþþóç ôíð FreeBSD 8.2-RELEASE êáé ôíð FreeBSD 9.0-RELEASE. Ôí áéâéþí áðôü áßþíæ íiúíéà ôðü áððéþñúðç êáé áíÙððôðíç êáé áðiøåéåþ ôí ãðiðÝéåðíà ôçó ãïðøéåÙð ðtæéþí áðouùí, iðuðåá Ûðriéá òíÞràóá iðiñåß íá ðåñéÝ ÷ iðí ó ÷ áðééÛ íåðåñáðí Ýiåð ðeçñiøñßåð êáé íá ÷ ñåéÛætiðåé áíáíÝùóç. Áí áiæåôÙñåôåå íá iåð áiçéÞóåôå óå áðôü ôí Ýñäi, áðééïéfùñPóðå láæß iåð ôðçí çëâéðñíééÍP ðßðôå ñíÙðåð óâéiçñþùñçð ôíð FreeBSD

(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-doc>). Ç ôåëäööåßá Ýêåíöç áôöiy öiö êåéï ÿíö åßíáé ðÜíöå äéåè Ýðeïç áðü ôçí éóöiöåëßá öiö FreeBSD (<http://www.FreeBSD.org/>) (ðåééüöåñåð åéäüöåéö ðiöñåßöå íá âñåßöå ööç äéåýéööç <http://docs.FreeBSD.org/doc/>). Íðiñåßöå åðßöçö íá iåôåöiñðþöååö ööiy ððiëíæööþ öáö öiï båéï áéäéëßí óå Üéëåò iññö Ýð åñ÷ åßiö êåé åéÜöinåò iññö Ýð ööiy ððlåñöçö åðü öiï åñöðçñåñöçöþ FTP öiö FreeBSD (<ftp://ftp.FreeBSD.org/pub/FreeBSD/doc/>) þ Ýíá åðü óå ðiëëÜ mirror sites. Áí ðñiöéï Üöå Ýíá ööðùìÝñí áíðßööði, iññåßöå íá åäññÜóååö Ýíá áíðßanáöi öiö Åã÷ åéñéäßiö, åðü öi FreeBSD Mall (<http://www.freebsdmall.com/>). Íðiñåßöå åðßöçö íá øÜíåðå óå üëi öiï áéäéëßí (<http://www.FreeBSD.org/search/index.html>).

Ç áæáñMP ðéáç ÷ñPöç öáá iññöP öçgääbiö ëphääéá (SGML DocBook) P öáá 'iññöPö ñöödöéöiÝíç' iññöP (SGML, HTML, PDF, PostScript, RTF ëiëë) iå P ÷ññöPö äéééáÝö, åðéöönÝ ñöödöáç åööñöriÝ ie ñðáñäéÜöö ñöññöñöiÝö åééö õçpüýiñðåé:

1. C æááññP óá iññöP ðçááññiõ êþæéå (SGML DocBook) ðñÝðåé íá æáôçñåß ôçí ðáññðÜíù äþëùóç ðíåôïáôéêí ãééåéùìÜôùí, áôôP ôç ëþóôá íå ðñiñðièÝóåéò êáé ôçí åðüìåíç ðáñÜãñáöi óôéò ðñþôåò ãñàìÝò ôiõ áñ÷åßiõ, áiâôÜâéçôåò.
  2. C æááññP óá iåðåáéùñðôéóíÝfåò iññöÝò (iåðÜöññáóç óá Üëéå DTD, iåðåðññiðP óá PDF, PostScript, RTF P Üëéåò iññöÝò) ðñÝðåé íá áíáðññÜååé ôçí ðáññðÜíù äþëùóç ðíåôïáôéêí ãééåéùìÜôùí, áôôP ôç ëþóôá íå ðñiñðièÝóåéò, êáé ôçí ðáññéÜôù ðáññÜãñáöi ôüöi óôçí ôåéïçñþñóç üöri êáé óá Üëéi ðëééü ðiõ ðáñÝ÷åôáé iáæß iå ôçí æááññP.

**Óciáíóééú:** ÁÓÓC Ç ÔÁEÍÇNÉUÓC ÁEÍÁÔÁÉ ÁÐI ÓC IÍÁÁÁ ÔÁEÍÇNÉUÓC ÔÏÖ FREEBSD "ÚÓ Á×ÁÉ" ÉÁÉ ÁÁÍ ÐÁÑÁ × ÁÓÁÉ ÉAÍÉÁ ÁIÁÓC Ç AíIÁÓC ÁÄÄÖCÓC, ÔÓIÐÁÑÉEÁIÁIÍÁIÚ, ÁEËÁ × ÙÑÉÓ ÍÁ ÐÁÑÉIÑÉÆÁÔÁÉ IÍÍ ÓÁ ÁÓÔÁÓ, ÉAÉ ÓUÍ ÁIÁÓUÍ ÁÄÄÖCÓÁUÍ ÁEÁ ÁIÐÍÑÁOÓÉIÍÔCÓÁ C ÁEÁÔÁEECÉIÖCÓÁ ÁEÁ ÍÐIÉIÍÄCÐIÓÁ ÔÓÄÄEÑEÍAII ÓEÍIÐI. ÓÁ ÉAÍÉÁ ÐÁÑÉDÔÙÓC ÁÁÍ ÁÔEÓIÁÔÁÉ C IÍÁÁÁ ÔÁEÍÇNÉUÓC ÔÏÖ FREEBSD ÁEÁ ÍÐIÉAÓÄCÐIÓÁ ÁIÁÔÁÓ, ÁIÍÁÔÁÓ, ÔÓ × ÁEÁÓ, ÁEÄEÉÁÓ, ÓCÌÁIÓÉÁÓ, Ç ÉAÓÁ ÐÁÑÉDÔÙÓC ÁEÁÁÁÓ (ÔÓIÐÁÑÉEÁIÁIÍÁIÚ, ÁEËÁ × ÙÑÉÓ ÍÁ ÐÁÑÉIÑÉÆÁÔÁÉ IÍÍ ÓÁ ÁÓÔÁÓ, ÉAÉ ÓCÍ ÁÁÖIÁIÉÁ ÐÑÍÖÁÁÓCÓ ÓÁ ÁIÁEEÄEÓÉÁÓ ÄCZÁÁÓ Ç ÔÐCÑÁOÉÁÓ, ÓCÍ ÁÁÖIÁIÉÁ × ÑCÓCÓ, ÓCÍ ÁÐUÉÄÁ ÁAÁIÍÁIÚ C ËÁÑÄIÓÓ, ÉAÉ ÓCÍ ÁEÁEÍÐC ÁÐE × ÁEÑCÌÁOÉÉUÍ ÁEÁEÔIÖNÁEÚ), ÐÏÖ ÐÑÍÉAÉIÍÔAÉ IÁ ÍÐIÉIÍÄCÐIÓÁ ÔÑÍÐI ÁÐI ÓC × ÑCÓC ÁÔÖCÓ ÔCÓ ÔÁEÍÇNÉUÓCÓ.

Ôí FreeBSD åßíáé Ýíá êáôï÷õñùìÝíí àìðiñéêü óýiâëï ôiõ FreeBSD Foundation.

Íé ëÝiaéò 3Com êáé HomeConnect åßíáé êáôîí÷õñùìÝíá åíðiñééÜ óýiaíïéá ôçò 3Com Corporation.

Íé ëÝiâéô 3ware êáé Escalade áßíáé êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá ôçò 3ware Inc.

Ç ëÝiç ARM áßíáé êáôï÷õñùìÝíá àìðiñééü óýiâiæí ôçò ARM Limited.

Ç ëÝiç Adaptec áßíáé êáôï÷õñùìÝíá àìðiñééü óýiâiæí ôçò Adaptec, Inc.

Íé ëÝiâéô P öñÜóâéô Adobe, Acrobat, Acrobat Reader, êáé PostScript áßíáé áßôå êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá P àìðiñééÜ óýiâiæá ôçò Adobe Systems Incorporated óôéô ÇùùÝíáô Dirééôâßåô P/éáé óá Üëëåô ÷þñâô.

Íé ëÝiâéô P öñÜóâéô Apple, AirPort, FireWire, Mac, Macintosh, Mac OS, Quicktime, êáé TrueType áßíáé áìðiñééÜ óýiâiæá ôçò Apple Computer, Inc., êáôï÷õñùìÝíá óôéô ÇùùÝíáô Dirééôâßåô P/éáé óá Üëëåô ÷þñâô.

Íé ëÝiâéô Corel êáé WordPerfect áßíáé áìðiñééÜ óýiâiæá P êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá ôçò Corel Corporation P/éáé óùí èôåáôñééþí ôçò óôïí ÈáíááÜ, óôéô ÇùùÝíáô Dirééôâßåô P/éáé óá Üëëåô ÷þñâô.

Ç öñÜóç Sound Blaster áßíáé áìðiñééü óýiâiæí ôçò Creative Technology Ltd. óôéô ÇùùÝíáô Dirééôâßåô P/éáé óá Üëëåô ÷þñâô.

Ç ëÝiç CVSup áßíáé êáôï÷õñùìÝíá àìðiñééü óýiâiæí ôïö John D. Polstra.

Íé ëÝiâéô P öñÜóâéô Heidelberg, Helvetica, Palatino, êáé Times Roman áßíáé áßôå êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá P àìðiñééÜ óýiâiæá ôçò Heidelberg Druckmaschinen AG óôéô ÇùùÝíáô Dirééôâßåô P/éáé óá Üëëåô ÷þñâô.

Íé ëÝiâéô IBM, AIX, EtherJet, Netfinity, OS/2, PowerPC, PS/2, S/390, êáé ThinkPad áßíáé áìðiñééÜ óýiâiæá ôçò International Business Machines Corporation óôéô ÇùùÝíáô Dirééôâßåô, Üëëåô ÷þñâô, P êáé óôá áyí óâôöü÷ñíá.

Íé ëÝiâéô IEEE, POSIX, êáé 802 áßíáé êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá ôïö Institute of Electrical and Electronics Engineers, Inc. óôéô ÇùùÝíáô Dirééôâßåô.

Íé ëÝiâéô Intel, Celeron, EtherExpress, i386, i486, Itanium, Pentium, êáé Xeon áßíáé áìðiñééÜ óýiâiæá P êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá ôçò Intel Corporation êáé óùí èôåáôñééþí ôçò óôéô ÇùùÝíáô Dirééôâßåô êáé óá Üëëåô ÷þñâô.

Íé ëÝiâéô Intuit êáé Quicken áßíáé êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá P êáôï÷õñùìÝíá óýiâiæá ôðçñâôðþí ôçò Intuit Inc., P êÜðiéñí áðü óéô èôåáôñééÝô ôçò, óôéô ÇùùÝíáô Dirééôâßåô êáé óá Üëëåô ÷þñâô.

Ôí Linux áßíáé Ýíá êáôï÷õñùìÝíá àìðiñééü óýiâiæí ôïö Linus Torvalds óôéô ÇùùÝíáô Dirééôâßåô.

Íé ëÝiâéô LSI Logic, AcceleRAID, eXtremeRAID, MegaRAID êáé Mylex áßíáé áìðiñééÜ óýiâiæá P êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá ôçò LSI Logic Corp.

Íé ëÝiâéô M-Systems êáé DiskOnChip áßíáé áìðiñééÜ óýiâiæá P êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá ôçò M-Systems Flash Disk Pioneers, Ltd.

Íé ëÝiâéô Macromedia, Flash, êáé Shockwave áßíáé áìðiñééÜ óýiâiæá P êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá ôçò Macromedia, Inc. óôéô ÇùùÝíáô Dirééôâßåô êáé/P óá Üëëåô ÷þñâô.

Íé ëÝiâéô Microsoft, IntelliMouse, MS-DOS, Outlook, Windows, Windows Media, êáé Windows NT áßíáé áßôå êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá P àìðiñééÜ óýiâiæá ôçò Microsoft Corporation óôéô ÇùùÝíáô Dirééôâßåô êáé/P óá Üëëåô ÷þñâô.

Íé ëÝiâéô Netscape êáé Netscape Navigator áßíáé êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá ôçò Netscape Communications Corporation óôéô Ç.D.Á êáé Üëëåô ÷þñâô.

Íé ëÝiâéô GateD êáé NextHop áßíáé êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá êáé áìðiñééÜ óýiâiæá ôçò NextHop óôéô Ç.D.Á. êáé Üëëåô ÷þñâô.

Íé ëÝiâéô Motif, OSF/1, êáé UNIX áßíáé êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá êáé íé ëÝiâéô P öñÜóâéô IT DialTone êáé The Open Group áßíáé àìðiñééÜ óýiâiæá ôïö The Open Group óôéô ÇùùÝíáô Dirééôâßåô êáé óá Üëëåô ÷þñâô.

Ç ëÝiç Oracle áßíáé êáôï÷õñùìÝíá àìðiñééü óýiâiæí ôçò Oracle Corporation.

Íé ëÝiâéô PowerQuest êáé PartitionMagic áßíáé êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá ôçò PowerQuest Corporation óôéô ÇùùÝíáô Dirééôâßåô êáé/P óá Üëëåô ÷þñâô.

Íé ëÝiâéô RealNetworks, RealPlayer êáé RealAudio áßíáé êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá ôçò RealNetworks, Inc.

Íé ëÝiâéô P öñÜóâéô Red Hat, êáé RPM áßíáé áìðiñééÜ óýiâiæá P êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá ôçò Red Hat, Inc. óôéô ÇùùÝíáô Dirééôâßåô êáé óá Üëëåô ÷þñâô.

Íé ëÝiâéô SAP, R/3, êáé mySAP áßíáé áìðiñééÜ óýiâiæá P êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá ôçò SAP AG óôç Åâñiáíßá êáé óá ðíeeÝô Üëëåô ÷þñâô ôïö èûñöïö.

Íé ëÝiâéô P öñÜóâéô Sun, Sun Microsystems, Java, Java Virtual Machine, JavaServer Pages, JDK, JRE, JSP, JVM, Netra, OpenJDK, Solaris, StarOffice, Sun Blade, Sun Enterprise, Sun Fire, SunOS, Ultra êáé VirtualBox áßíáé áìðiñééÜ óýiâiæá P êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá ôçò Sun Microsystems, Inc. óôéô ÇùùÝíáô Dirééôâßåô êáé óá Üëëåô ÷þñâô.

Íé ëÝiâéô Symantec êáé Ghost áßíáé êáôï÷õñùìÝíá àìðiñééÜ óýiâiæá ôçò Symantec Corporation óôéô ÇùùÝíáô Dirééôâßåô êáé óá Üëëåô ÷þñâô.

Ç ëÝiç MATLAB áßíáé Ýíá êáôï÷õñùìÝíá àìðiñééü óýiâiæí ôçò The MathWorks, Inc.

Ç ëÝiç SpeedTouch áßíáé Ýíá àìðiñééü óýiâiæí ôçò Thomson

Íš ē Ÿíáédo Þ öñ Üðráéð U.S. Robotics éáé Sportster áßíáéð éáði÷öñíü Ýfá áiðíñéé Ü óyíáéä ðçø U.S. Robotics Corporation.

ÇëÝîç VMware åßíáé àìðiñéü óýiâieï ôçò VMware, Inc.

Íe ḡYáéed þ ðúñUáéed Waterloo Maple éáé Maple ábñáéé ñiðinéééU þ éaóí-÷-ðuñu Yáé ñiðinéééU ógyáárea ócð Waterloo Maple Inc.

Ç eÝîç Mathematica åßíáé êáôï÷õñù Ýíï àïðiñéü óýâïïï ôçò Wolfram Research, Inc.

Ç eÝîç XFree86 åßíáé Ýíá åìðiñéüü óýiâieï ôiõ The XFree86 Project, Inc.

Íé ëÝiåéò P öñÜóåéò Ogg Vorbis êáé Xiph.Org åßíáé àìðiñééÜ óýiâíéá ôiöXiph.Org.

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# Đñüëïäïò

# Óå Ðïéïõò Áðåõèýíåôáé Áõôü ôí Åéâëßí

Ôí ðñþþöi òiÞia áðóöý öið áéæðið, iäçãåß öiý iÝi - ñiÞóôc ôðc áéáæðéåðßá áåéêðåðÛóðåðçò òið FreeBSD êáé öiý áéð Úððæ Ü óðc öcëiötiðßá êáé öiý ó ÷ áéæðiù òið UNIX®. Áðóü òi òiÞia ááí Ý - áééåððåññàð áðáéðÞóåéð. Áñéåß iüü c áeÜðæðc áéá áiâñåýíçóç áíüö iÝið óððóðÞiaðiò êáé c áððiáðüöçóá áöiiðñúðçò òuì áíþðóåùí áéá òi FreeBSD êáéþð áððÝð áéð Üððiðáé ððåæéåðÜ.

Ãéá ðåñéóóüôåñåò ðçãÝò ðëçñïöiñéþí, äåßôå ôi ÐáñÜñôçìá B.

# ÁeëáãÝò áðü ôçí Ôñßôç êäïóç



## ÁëéáãÝò áðü ôç Äåýôåñç, êäïóç (2004)

Ç ôññôc Ýêäïïóç áðôïý ôïö áéâëëïö þôáí ôï áðïö Ýéâðöïá ôçö ðññïöð Üèåéáð ðåññéöðüôðâññï áðü äýï ÷ ññüñüñ áðü ôá ìÝëç ôçö ìÜääð Ôåêïçñßùóçö ôïö FreeBSD. Ç Ýíööðç Ýêäïóç åß÷å ôüöï íåäÜëï íÝâåëïö, ðïö êññßèçëå áíååéäßï íá ôöðûeåß óå äýï ÷ ûññéöðïýò ôüññïöð. ÐáñäåÜôú öäßññööé ié ôçíáíðöéüôðâññå ãëéäåÝò óå áðöðþ ôç íÝå Ýêäïóç:

- Éão Üéáéí 12, Ói éao Üéáéí Ñýéiéóçô êáé Áâééóéóðííßçóçô ôíø FreeBSD, áðâéêò Üèçêå iå íÝåò ðeçñíöïñßåò áéá ôç äéá ÷ åßñéóç áí Ýñååéåò êáé ðüñùí ôíø óðóôðíáðò iÝóú ACPI, iå ðåñéóóüôåñåò ðeçñíöïñßåò áéá ôí óýóôçìä cron êáé iå ðåñéóóüôåñåò áðéëíäÝð ðåñáîåðñííßçóçô ôíø ððñPíá ôíø FreeBSD.
  - Éão Üéáéí 15, Ói éao Üéáéí ÁooÜéåéåò, áðâéêò Üèçêå iå íÝåò ðeçñíöïñßåò áéá Äßéôðá VPN, áéá ëßóôåò åëÝã ÷ iø ðñüñååóçô áñ ÷ åßùí (ACLs) êáé ðåñéóóüôåñåò ôíø iå ðééÜ iå ôçí áooÜéåéå ôíø FreeBSD.

## ÁëëáãÝò áðü ôçí Đñþôç, êäïóç (2001)

Ç äåýôåñç Ýëäïöç Þôáí ôí áðîòÝëåóíà ôíöeÜ÷éooíí äyï ÷ñüíùí åñãáóßáò áðü óá ïÝëç ôçò ïÜäáò Ôåêïçñßùóçò ôíï FreeBSD. Íé ðéï íçìåíôééÝò áæëåáÝò óå áðôP óçí Ýëäïöç Þôáí ié ðáñâéÜôù:

- Ðññioó Ýèçéâ Ýía ieiêëçñùì Ýii ÅõñåòPiñei.
  - ¼éá óá ãñáöPiáôá óá ASCII áíôéêáôáôÜèçéâí áðü ãñáöééÜ äéáãñÜìiáôá.
  - Ðññioó Ýèçéâ iéá ôôðiðiéçí Ýíç òýñïøç óá êÜèá êåöÜëáéi, ç iðiñá ðåñéÝ ÷ åé iéá òýñôñç áíáâôáëáßùóç ôùí ðeçññiöñéþí ðiø ðåñéÝ ÷ åé ói êäöÜëáéi êáé óé áíáí Ýíâôáé íá ãñùñßæåé áðü ðññei í áíáñþóðôç.
  - Òi ðåñéå ÷ üìåñí áíáâëiññáíþèçéâ óá ôññá ëræééÜ iÝñç: “Íâéëþíðåò iå ói FreeBSD”, “Äéá ÷ åßñéóç ÓõóôPiáôíò” êáé “ÐáñáñòPiáôá”.
  - Òi ÊåöÜëáéi 2 (“Ååéâèéôþíðåò ói FreeBSD”) iáíáñÜöôçéâ áðü ôçí áñ ÷ P iå ðrëëÝð åééüíåò, þóôå íá åéåðëiÿíåé ðiòð ÷ ñþóðåò íá êåôáñþóðiøiòi ói êåþìåñí.
  - Òi ÊåöÜëáéi 4 (“ÅåóééÝð íñíéåò óóí UNIX”) åðåéôÜèçéâ þóôå íá óðiðåñéëåíáÜíåé ðññóéåôåò ðeçññiöñßåò åéá ôéó åéåññääóßåò (processes), õiòð åáßñíiåò (daemons), êáé óá óPiáôá (signals).

# ÍñãÜíùóç Áõõïý ôïõ Âéâëßïõ

ÊåöÜëáéï 1, ÅéóáãùãP

ĐáññóéÜæåé ôi FreeBSD óöi ÍÝi ÷ñþóç. ĐáñéñÜöåé ôçí éóöiñßá ôiõ FreeBSD Project, ôiõo óöü÷iõo ôiõ êåé ôi ìriñÝeii áiÜðôõçò ôiõ.

ÊåöÜëáéï 2, ÅæéåôÜóôáóç ôiõ FreeBSD 8.x êáé ÐñiäåíÝóôåñùí Åêäüóåúí

Íäçääß ôíï ÷ñPööc ööçj äæääééåößå ååéåöÜööåöçö ôíï FreeBSD 8.x êáé ðñiäåáiÝööåñùí åéäüöåùí iå ôç ÷ñPööc ôíï sysinstall. ÓöìðåñééäåÜñiööé åðßööçö iåñééÜ èÝiaóå ååéåöÜööåöçö aéä ðñi ÷ùñçíÝñiöö, üðùò ç ååéåöÜööåöç iÝóu óåéñéåêPö eiiñöüéäö.

Ээдүйн 3, Аддадаачаас ойлт *FreeBSD 9.x* ээдээдийн дээр. Аддадаачаас ойлт *FreeBSD 9.x* ээдээдийн дээр.

Лячнаб бийг дээр орчмын төхөн дээр ойлт *FreeBSD 9.x* ээдээдийн дээр. Аддадаачаас ойлт *FreeBSD 9.x* ээдээдийн дээр.

Ээдүйн 4, Аддадаачаас ойлт *UNIX*

Данеэдийн дээр ойлт *FreeBSD 9.x* ээдээдийн дээр. Аддадаачаас ойлт *FreeBSD 9.x* ээдээдийн дээр.

Ээдүйн 5, Аддадаачаас ойлт *Linux*: Дээрдийн дээр.

Данеэдийн дээр ойлт *FreeBSD 9.x* ээдээдийн дээр. Аддадаачаас ойлт *FreeBSD 9.x* ээдээдийн дээр.

Ээдүйн 6, Ойлт *X Window*

Данеэдийн дээр ойлт *FreeBSD 9.x* ээдээдийн дээр. Аддадаачаас ойлт *FreeBSD 9.x* ээдээдийн дээр.

Ээдүйн 7, Desktop Аддадаачаас ойлт *X Window*

Аддадаачаас ойлт *FreeBSD 9.x* ээдээдийн дээр. Аддадаачаас ойлт *FreeBSD 9.x* ээдээдийн дээр.

Ээдүйн 8, Дээрдийн дээр.

Одийн дээрдийн дээр ойлт *FreeBSD 9.x* ээдээдийн дээр. Аддадаачаас ойлт *FreeBSD 9.x* ээдээдийн дээр.

Ээдүйн 9, Нийтийн дээрдийн дээр ойлт *FreeBSD*

Аддадаачаас ойлт *FreeBSD 9.x* ээдээдийн дээр. Аддадаачаас ойлт *FreeBSD 9.x* ээдээдийн дээр.

Ээдүйн 10, Аддадаачаас ойлт *FreeBSD*

Данеэдийн дээр ойлт *FreeBSD 9.x* ээдээдийн дээр. Аддадаачаас ойлт *FreeBSD 9.x* ээдээдийн дээр.

Ээдүйн 11, Ойлт *Linux*

Данеэдийн дээр ойлт *FreeBSD 9.x* ээдээдийн дээр. Аддадаачаас ойлт *FreeBSD 9.x* ээдээдийн дээр.

Ээдүйн 12, Нийтийн дээрдийн дээр ойлт *FreeBSD*

Данеэдийн дээр ойлт *FreeBSD 9.x* ээдээдийн дээр. Аддадаачаас ойлт *FreeBSD 9.x* ээдээдийн дээр.

Ээдүйн 13, Системын дээрдийн дээр ойлт *FreeBSD*

Данеэдийн дээр ойлт *FreeBSD 9.x* ээдээдийн дээр. Аддадаачаас ойлт *FreeBSD 9.x* ээдээдийн дээр.

ÊåöÜëáéï 14, ×ñPóôåò ëáé Ááóééþ Äéá÷åßñéóç Èiäáñéáóþí

ÐåñéãñÜöåé ôçí äçléïõñãßá êáé ôçí äéá÷åßñéóç ôùí ëiäáñéáóþí ÷ñçóðþí. Åðßóçò ðåñéãñÜöåé ôñüðþò lå ôròò iðíßiòò iðíññý íá ôâéíýí ðåñéñéóïß ôðiò ÷ñPóôåò üöri áöiñÜ ôç ÷ñPóç ðüñùí ôiò ôðóðPiáöiò, êáèþò êáé Üeeåò ëáéöiõñãßåò äéá÷åßñéóçò ëiäáñéáóþí.

ÊåöÜëáéï 15, ÁooÜëåéá

ÐåñéãñÜöåé äéÜöiñá äéáèÝóéíá åñãäéåßá ðiò èá óáò áïçèÞóïòí íá êñáðÞóååò ôi FreeBSD óýóðçìá óáò áóöäéÝð. ÓoiðåñéëåíäÜññóáé ie ñeíðieÞóåèò Kerberos, IPsec êáé OpenSSH.

ÊåöÜëáéï 16, Jails

ÐåñéãñÜöåé ôi ðëåßóéï ëåéöiõñãéþí ôùí jails êáé ôéò åâééþþoåéò ðiò ðáñÝ ÷iøí óá õ÷Ýóç lå ôçí ðáñáäiøéåêþ chroot ñðiðóÞñéíç ôiò FreeBSD.

ÊåöÜëáéï 17, Õði÷ñðåñðééüò ÿðaa÷iò Ðñüðååóçò

Åççååß ôé åßíáé i Õði÷ñðåñðééüò ÿðaa÷iò Ðñüðååóçò (MAC) êáé ðùò i ìç÷áíéóïüò áðôüò iðíñåß íá ÷ñçóðiðíéçèåß ãéá ôçí áóöÜëéóç åñüò FreeBSD ôðóðPiáöiò.

ÊåöÜëáéï 18, ÿðaa÷iò ÓðiàÜíòùí Áóöåéåßáò

ÐåñéãñÜöåé ôé åßíáé i ÿðaa÷iò ÓðiàÜíòùí, ðùò iðíñåß íá åâéåðåóåéåß, íá ñðèìéóðåß êáé ðùò iðíññý íá åéåññåðiþíðåé êáé íá ðáñáéiðiøéýíòåé ôá ß÷íç ôiò åëÝð ÷iò (audit trails).

ÊåöÜëáéï 19, ÁðièçéåðóééÜ ïÝóá

ÐåñéãñÜöåé ðùò íá åéá÷åéñßæåðå ïÝóá áðièþéåðóçò êáé óðóðPiáöá áñ÷åßùí lå ôi FreeBSD. ÓoiðåñéëåíäÜññóáé ñðóðééïß åßóéïé, óðóðié ÷ßåò RAID, iððééÜ êáé ïaáíçóééÜ ïÝóá, åééííééïß åßóéïé ñiÞìçò êáé åééððåéÜ óðóðPiáöá áñ÷åßùí.

ÊåöÜëáéï 20, GEOM: Áéá÷åßñéóç Óðóðié÷éþí Áþóêùí

ÐåñéãñÜöåé ôé åßíáé ôi ðëåßóéï ëåéöiõñãéþí GEOM ôi FreeBSD êáé ðùò íá ñðèìßóååò åéÜöiñá åðßðååäå RAID ðiò ñðiðóðçñßæïñóáé ôi FreeBSD.

ÊåöÜëáéï 21, ÕðiðóðPñéíç ÓðóðçìÜòùí Áñ÷åßùí

ÅiâðÜæåé ôçí ñðiðóðPñéíç ìç-åâååíþí óðóðöiÜòùí áñ÷åßùí ôi FreeBSD, üðùò ôi Z File System ôçò Sun.

ÊåöÜëáéï 22, Vinum

ÐåñéãñÜöåé ðùò íá ÷ñçóðiðíéÞóååò ôi Vinum, Ýíá åéá÷åéñéóðÞ ëiäééþí ôüiùí ðiò ðáñÝ ÷åé ëiäééïýò åßóéïðò áíaiÜñðçðå áðü ôç óðóðéåðÞ ôðçí iðíßá åßíáé áðièçéåðiÝñé, êáèþò êáé åðiáðüðçðåò RAID-0, RAID-1 êáé RAID-5 iÝóù ëiäéóïééïý.

ÊåöÜëáéï 23, Åééíééiðiþçðç

ÐåñéãñÜöåé ôé ñðiðóðÝññóí ôá óðóðPiáöá åééíééiðiþçðçò êáé ðùò iðíññý íá ÷ñçóðiðíéçèïýí lå ôi FreeBSD.

ÊåöÜëáéï 24, ÒiðééÝð Ñðèþðåéò - ×ñPóç êáé Ñýèéóç I18N/L10N

ÐåñéãñÜöåé ðùò íá ÷ñçóðiðíéÞóååò ôi FreeBSD óá åëþþoåò åêôüò ôçò Áââéééþð. Êáéýðååé ôçí åðiáðüðçðå ñðeìßóåùí ôüöri ôá åðßðååí ñðóðóðPiáöiò, üöri êáé ôá åðßðååí åöáññiäþí.

*ÊåöÜëáéï 25, ÅíçìÝñùóç êáé ÁíáâÜèìéóç ôïõ FreeBSD*

Âlçâåß ôéô áéäöiñ Ýò iåôåíý ôúí áåêüöåùí FreeBSD-STABLE, FreeBSD-CURRENT êáé ôúí áðßöçìùí (RELEASE) áåêüöåùí ôiõ FreeBSD. Ðåñéãñ Üöåé ðíéïé ÷ñPóôåò ùöåéïýîöåé üöåí áéïeïoëïý Ýíá óýóöçíà áíÜðôöïçò êáèþò êáé ôá áåééöïýiåíá áéá áðôöü ôí óéïðü áPiáôá. Éáéýðôåé ôéô iåèüäiðò ðíò iðïñíýí íá ÷ñçöéïiðéPóïïí íé ÷ñPóôåò áéá íá áíçìåñþöiðò ôí óýóöçíà ôíðò iå ôéô ôåéåðôåßåð áéïñéþóåéô áóöåéåßåð.

*ÊåöÜëáéï 26, DTrace*

Đáñéáñ Üöåé ôçí ñýëiéóç éáé ÷ ñÍþòç ôïõ áññääëßíò DTrace ôçò Sun óôí FreeBSD. Ôí áæíáíéêú tracing iðññáh íá áíçèþòåé ôôí îí áðíôíðéòù ðñíäëçíü Üöûñ áðñüññóçò, ðáñ Ý ÷ iíþòå ãíÜëöôç ôïõ ñôôðþíàöì ñå ðññáñáðéêú ÷ ñüñí.

*ÊåöÜëáéï 27, ÓäéñéáéÝò Åðéëïéíùíßåò*

Åñčāåß ðùlå íá óðfääÝóåðå ðåññlåðééÜ êáé iüífôåi óði FreeBSD óýóðçia óåò, æáá ÷ñþóç ôüüöř óå åéðåññ ÷iñåñfåò üúří êáé óå åññ ÷iñåñfåò óðfääÝóåðé.

*ÊåöÜëáéï 28, PPP êáé SLIP*

ĐāñēñÜöåë ðùò íá ÷ ñçóëññöíðéÞöåôå ðóò ôå ÷ ñïëíäßåò PPP, SLIP, Þ PPP iÝóù Ethernet ãéá íá óðíäåëåßöå óå áðñíäññöôí Ýíá óðóôðÞíåðá íå öi FreeBSD.

*ÊåöÜëáéï 29, Çëåêôñüéêü Ôá÷öäñiiùåßü*

Åñčāåß óá áæäöññåðéÜ óóíé ÷ áßá áíñüð áæáéññéðóþ çëåðññíéðþ áæéççéïññåðßáð óáé áíññåéýíáé óá èÝlánóá áðéþí ññðéñßóðáñí áæá ðí ðéÝíí áçjíññéëÝð ëíäéññéðü áæáéññéðóþ çëåðññíéðþ áæéççéïññåðßáð: óíí **sendmail**.

ÊåöÜëáéï 30, ÅiõðçñåôçôÝò Äéêôýïõ

ĐáñÝ÷åé èåðôñâñåßò iäçåßåò èáé ðáññääßâláóå áñ÷åßùí ñýèiéóçò åéá íá ñòëßöåðå ôí FreeBSD íá åíâñåß ùò åéêôôåéüò åíòðçñåôçôÞò áñ÷åßùí, åíòðçñåôçôÞò iññÜòùí ôíñÝá (DNS), åíòðçñåôçôÞò åéêôôåéþí ðëçñïöñéþí (NIS), c åíòðçñåôçôÞò óôå÷iññéóiiý þñáò (NTP).

ÊåöÜëáéï 31, Firewalls

*ÊåöÜëáéï 32, Ðñi÷ùñçíÝíá ÈÝìáôá Äéêôýùóçò*

Đâñéãñ Üöåé ðriëëÜ ðñï÷ùñçí Ýá è Ýáôá äéêôýùñçò, óõi ðâñéëåiâáññ Ýïõ ðiõ äéâññéñáññ ïy liéáò óýfääåóçò Internet ià Üeëiõõ ðõïëiäéôÝò óõi ôiðéêú óáò áßéôõi (LAN), è Ýáôá äñññéüñçóçò ãéá ðñï÷ùñçí Ýïõõò, áóýñláôç äéêôýùñçò, Bluetooth, ATM, IPv6 êáé ðriëëÜ áéüïc.

*DáñÜñôciá A, Diō èá Åñåßôå ôi FreeBSD*

ĐáñÜñôçìá B, Âéâëéíäñáößá

Áôôú ôi âéâéßíi áââßæåé ðíeeÜ äéáöiñâôéÜ èÝláôá ðíö iðiñâb íá óâo êâîñBöiöi ôi âræáeoÝñii ãéá ieá ðeí ëâðôñâñP âiñâñyíçóç. Ç âéâëiñâñöBá ôáíéiñâb óâo êáôçaiñBâò ðíeeÜ âiñâéñâôééÜ áéâéßá óâ iðiBá áíáöÝñiiôáé ôiôi êâßiâi.

*DáñÜñôçìá C, DçäÝò Dëçñiöüñçóçò óðiř Äéáäþêððiř*

ÐåñéanÜöåé ðíeeÜ öüñiõi ðiř äéåôßåáiôåé óðiõò ÷ñþóôåò ðiõ FreeBSD, þóôå íá èÝoiõí åñùôþiaóá êáé íá óðiñåðÝ ÷iõí óå ôå ÷íéÝò óðæçòþðåéò áéá ði FreeBSD.

*DáñÜñôçìá D, ÈëåéæeÜ PGP*

ÊáôååñÜöåé óå äáôðöééÜ áðiøðþiaóá ôùí eëåéæéþí PGP áñéåôþí iåéþí òçò ïÜäåò ÁíÜðôðiçò ðiõ FreeBSD.

## ÓðiâÜóåéò ðiõ ÷ñçóéiiðiéiýíóáé óå áðôü ði âéâëßí

Óå iëüêëçñi ði âéâëßí, ÷ñçóéiiðiéiýíóáé èÜðiøåò ôðiñiñáöééÝò óðiâÜóåéò þóôå ç iññöiðiþçóç ðiõ íá åßíáé óðiâðþò êáé íá åßíáé ðeiâ ãðáñÜäñóði:

## ÓðiñiñáöééÝò ÓðiâÜóåéò

*DëÜäéá ãñáðþ*

C ðeÜäéá ãñáñáöiðåéñÜ ÷ñçóéiiðiéåßðåé áéá iñüñáôå áñ÷åßùí, URLs, eåßìåñí iå Ýiøáóç êáé áéá ÷ñþóç ðññöiðiøåéæüñåñí ðå ÷íéþí üññí.

Ãñáöþ óðåèåññíý ðeÜðiðò

C óðåèåññíý ðeÜðiðò ãñáñáöiðåéñÜ ÷ñçóéiiðiéåßðåé áéá içýíáðå èÜðiøò, åíðiøÝò, iåðåâëçòÝò ðåñéåÜëeñiðò, iññáñáßåò ôùí ports, iññáñáôå éåíðñééþí ðiññëæéðóþí, iññáñáôå ÷ñçóðþí, iññáñáôå iñÜäùí, iññáñáôå óðóéåðþí, iåðåâëçòÝò êáé áðiøðÜóåáôå èþæééå.

**jõiñç ãñáðþ**

C Ýiøíñç ãñáñáöiðåéñÜ ÷ñçóéiiðiéåßðåé áéá åðáññíäÝò, åíðiøÝò êáé ðeÞêññá.

## Åßóïäiò ÅåäiÝíùí áðü ði ×ñþóôç

C ðeçêðñiëüäçóç óçìåéþíåðåé iå Ýiøíñç ãñáðþ þóôå íá iå ÷ùñþæåé áðü ði ððüëiéði êåßìåñí. Óðiññáðñið ðeÞêññá ði ðñÝðåé íá ðéáðéíýí ôáðôü ÷ññíá óçìåéþíåðåé iå '+' iåðåâý ôùí ðeÞêññá, üññò:

**Ctrl+Alt+Del**

Ói iðiþí óçìåéþíåðåé ðùò i ÷ñþóôçò èá ðñÝðåé íá ðéÝðåé ôá ðeÞêññá **Ctrl**, **Alt** êáé ði ðeÞêññá **Del** ôáðôü ÷ññíá.

Óå ðåñßðôùóç ði ðeÜðiøá ðeÞêññá ðñÝðåé íá ðéáðéíýí iå óðåñéåññíÝíç óåéñÜ, èá åìðåâëçíåðåé ÷ùñéóíÝíá iå êüññáðå:

**Ctrl+X, Ctrl+S**

Ói iðiþí óçìåéþíåðåé ðùò i ÷ñþóôçò áíáíÝíåðåé íá ðéÝðåé ôá ðeÞêññá **Ctrl** êáé **X** ôáðôü ÷ññíá êáé Ýðåéðå íá ðéÝðåé ôá ðeÞêññá **Ctrl** êáé **S** ôáðôü ÷ññíá.

## Ðáñáäåßäìáôå

Óå ðáñáäåßäìáôå ði ðåñééñíýí iå E : \> ððiäçëþíñí iéá åíðiøþ MS-DOS®. ÁðüÝò ié åíðiøÝò ðiññíýí íá åêôåëíýíåðåé áðü ði ðáñÜëoñí "Ãñáñþò Åíðiøþí" óå óýã ÷ññíí ðåñéåÜëeñí Microsoft Windows, åêôüò áí áíáóÝñåðåé èÜðé áéáöiñåðééü.

```
E:\> tools\fdimage floppies\kern.flp A:
```

Óá ðáñáäåßáiáôá ðiö íâééííý íà # ðöðäçéþñöí íéá áíóïëþ ðiö éá ðñÝðåé íá áéðåäåðòåß áðü ôíí ððåñ ÷ ñÞróôç (superuser) áñùö óðóôÞíáòî FreeBSD. Íðinåßôå íá óðíäæåßôå óáí ÷ ñÞróôçò root æáá íá ðëçéðñiëíäÞóåôå ôçí áíóïëþ, Þ íá óðíäæåßôå óáí éáííéëüö ÷ ñÞróôçò êáé íá ÷ ñçóéëiðíéÞóåôå ôçí áíóïëþ su(1) þþôå íá áðiêðÞóåôå ðñííüleá õðåñ ÷ ñÞróôç.

```
# dd if=kern.flp of=/dev/fd0
```

Óá ðánñáäðáßááðá ðíð íåééñíý íå % ððíäçéþíðí íáé áíóïëÞ ðíð ðñÝðåé íá áðôðåéäðôðåß áðü Ýíá êáññíéêü ÷ñÞóðôç.  
×ñçóéiiðíéäßóáé ç óýíóáíç C-shell æáá íáé Ýóíðíà íåðóáâæçô Ýò ðåñéáÜëëíðíò éáé Üëëåò áíóïëÝò éâëéýöiò, áêðüò áí  
áíáööÝñåôáé êÜðé áæáöiññåôéü.

% top

Åõ÷áñéóôÞåò

Ó Ææðbi ðið eñáð Üðå, ðáñiðóé Üæåé óéó ðññið Üèåéåò ðíeëþí áæáðið Üäúí áíenþðúí áðü üëi ðið üðið. Åßôå íàò áici Ýñùóá áéá óððriñáðéé Ü ðÜec, åßôå íàò Ýóðáééá íüëüéçñá éðð Üèåéá, c óóìàíëÞ üëùí Þðáí ðiñþðéic.

# I. Îåêéíþíôáò ìå ôi FreeBSD

Áõõü ôi iÝñiò ôiõ Åã ÷ åéñéäþiõ ôiõ FreeBSD åßíáé ãéá ôiõò ÷ nPóôåò êáé ôiõò äéá ÷ åéñéóôÝò óõõôç iÜôùí ðiõ äåí Y ÷ iõí Päc iåãÜëç åìðåñßá iå ôi FreeBSD. Ôá êåöÜëáéå ðiõ åéiëiøëijí:

- Åßíáé åéóåùãéêÜ åéá ôi FreeBSD
- Óáò êáèiäçäiyí êáôÜ ôç äeÜñéåéå ôçò äéääéåóßáò ååêåôÜóôåóçò
- Óáò åéóÜäiõí óôéò åáóéêÝò Yíüéåò ôiõ UNIX
- ÐåñéãñÜötõí ôç äéääéåóßá ååêåôÜóôåóçò ôçò ðëçëþñáò åöáññäþí ðiõ åßíáé åéáèÝóéiåò óôi FreeBSD
- Óáò åéóÜäiõí óôi åñáöéüü ðåñéâÜëëí ðiõ UNIX, ôi óyóôöçíá ×, êáé óáò êáèiäçäiyí ó ÷ åôéêÜ iå ôéò áñ ÷ ééÝò ñôèìþóåéò åñúò åñáöéëiy ðåñéâÜëëíò ðåñááóßáò, iå ði iðiþi iðiñåßóå íá åßóôå åéüìá ðeí ðáñáùãéëiþ

Óá åáõü ôi ðiÞia ôiõ åéæäþiõ, Y ÷ iõìå ðmñóðåèÞóåé íá iåéþöiõìå óôi åéÜ ÷ éóôi ôéò åíáöiñÝò óå ôiÞiaôá P êåöÜëáéå ðiõ Åã ÷ åéñéäþiõ ôá iðiþá åáí Y ÷ åôå Päc åéáâÜóåé. Áõõü áðiöéiðåß óôi íá åßíáé ðeí åýéiëç ç áíÜäñùóç ôiõ ðiÞiaôiò áõôiy ôiõ Åã ÷ åéñéäþiõ áðü ôçí áñ ÷ P iÝ ÷ ñé êáé ôi ôYëiò, ÷ uñßò íá áðáéôåßóåé íá øÜ ÷ iåôå óoíå ÷ þò ôá åðüìáíá P ðñíçäiyíåíá ðiÞiaôá.

# ÊåöÜëáéï 1 Åéóáäùäþ

Áíáó÷çìáôéóïÝü, áíáäéïñääáíüïÝü, éáé ìåñéêþò ìáíáñääíïÝü áðü ôíï Jim Mock.

## 1.1 Óýñiøç

Åð÷áñéóôïýü äéá ðí áíáéáöÝñí óáð äéá ôí FreeBSD! Òí áéüïðòëí êåöÜëáéï êáëýðôåé äéÜöïñåò ðôð ðíð FreeBSD Project, üðùò ôçí éóôïñßá ôíï, ôíïðò óðü÷ïðò ôíï, ôí ñíóÝëí áíÜðôðïçò, ê.ô.ë.

ÌåðÜ ôçí áíÜäñuóç áðôïý ôíï êåöáæåþï, èá áñùñßæåôå:

- Ðùò ó÷åðßæåôåé ôí FreeBSD ìå Üëëá ëåéðïñääéêÜ óððôðìáðå Ç/Ö.
- Ôçí éóôïñßá ôíï FreeBSD Project.
- Ôíïðò óðü÷ïðò ôíï FreeBSD Project.
- Ôéò ááóéêÝò áñ÷Ýò ôíï open-source ñíóÝëí áíÜðôðïçò ôíï FreeBSD.
- Èáé öððéêÜ: áðü ðïð ðñíÝñ ÷åðáé ôí üññá “FreeBSD”.

## 1.2 Èáëþò þëèáôå óóï FreeBSD!

Òí FreeBSD áßíáé Ýíá ëåéðïñääéêü óýóðçìá ááóéóïÝü óóï 4.4BSD-Lite, ôí ïðïßí ìðïñåß íá ÷ñçóéïðïéçèåß óå Ç/Ö Intel (x86 êáé Itanium®), AMD64 êáé Sun UltraSPARC®. Óå áíYëéïç áñßóéåôåé åðßçò ç äéáæéåóßá ìåðöïñÜð ôíï FreeBSD óå Üëëåò áñ÷éðåéñíéêÝð. Ìðïñåßðå åðßçò íá äéåáÜðåôå áéá ôçí éóôïñßá ôíï FreeBSD, Þ áéá ôçí ðéï ðñüöðåôç åðßçòç Ýëäïç ôíï. ÁÜí áíáéáöÝñääóå íá óóïðÜëëåôå ìå êÜðíëí ôñüðï óóï Project (éþäéêåò, hardware, ñç-ðñïóçìåéùÍýá ÷áñðïñßóåðå), äéåáÜðôå ôí Ùñèñí ÓðíâéóöÝñíðåò óðçí ÁíÜðôðïç ôíï FreeBSD ([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/articles/contributing/index.html](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/contributing/index.html)).

### 1.2.1 Óé ìðïñåß íá êÜíåé ôí FreeBSD;

Ôí FreeBSD Ý÷åé ðíëëÜ áíéüëíäá ÷áñáêôçñéóéêÜ. ÌåñéêÜ áðü áðôÜ áßíáé:

- *Preemptive ðíëðåðåñäóþá* (preemptive multitasking) ìå äðíáíéêü Ýëåå÷ï ðñïðåñäéüôçôåò áéá íá áíáóöáééóôåß ñíáëüò êáé åßêáéïò äéáííñäóïüò ôúï ðüñùí ôíï Ç/Ö ìåðåáý åðáññäþí êáé ÷ñçóðþí, áêüïç êáé óðéò ðéï áíðßñåò óðïðþéåò.
- *Ðíëð÷ñçóðéêÝð äðíáðüôçôåò* (multi-user facilities) ié ïðïßåò åðéóñÝðïðí óå ðíëëÜ Üðññá ðáðôü÷ñííá íá ÷ñçóéïðïéÞöïðí Ýíá óýóðçìá FreeBSD áéá äéáöïñåôéêÜ ðñÜäñåðå. Áðôü ôçíáßíåé, áéá ðáñÜäåéäíá, üðé óå ðåññéðåñäéêÜ ôíï óððôðìáðïò, üðùò åéððñðùñÝð êáé iäçäüß ðáééíéþí áßíáé óñðôÜ ñíéñåðíÝíá ìåðåáý üëùí ôúï ÷ñçóðþí ôíï óððôðìáðïò Þ ôíï äééðöýïò êáé ðùò ìðïñïý íá ðåðéïý óðåéåññéÝíá üñéá óå ÷ñÞóðåò Þ ñÜaaðò ÷ñçóðþí, ðñïðåðåðåýüðåð êñßóéñïðò ðññïðò ôíï óððôðìáðïò áðü ððåññåééþ ÷ñÞóç.
- *Éó÷ññÝð äðíáðüôçôåò äééðýñüçò TCP/IP* (TCP/IP networking) ìå ððíðóðññéïç áéá åéññç ÷áíééÜ ðññüôððå üðùò óå SCTP, DHCP, NFS, NIS, PPP, SLIP, IPsec êáé IPv6. Áðôü ôçíáßíåé ðùò Ýíá ñç-Üíçìá FreeBSD ìðïñåß íá áééçëåðéñÜ åýéëéà ìå Üëëá óððôðìáðå êáé íá åññÜæåðåé óáí åðåéñéêüò åíðçñåðôçðÞò, ððíóðçñßæíïðåð êééðïññßåò æùôéêÞò ôçíáóßåò, üðùò NFS (áðññáêñðóïÝíç ðññüóååóç óå áñ÷åßá) êáé ððçñåðôå ñçééññééij

ðá÷ ðääññäbíö (e-mail), þ óçí ðääññösbá öiö iñääíéöiý óáò ööí äéääbëööí iÝóù ôúí ðöçñådëþí WWW, FTP, routing ééé firewall (áóðÜééåáò).



Ôi FreeBSD áâóþæðâóðé óðçí Ýêäíöç 4.4BSD-Lite ôiõ Computer Systems Research Group (CSRG) ôiõ  
Ðáíâðéóðçïßiõ ôçò Êáëëöüñíéâð óõi Berkeley, êáé óðíã ÷ ßæåé óðçí æáéâðñéí Ýíç ðáñÜäíöç ôiõ óðçí áíÜððôðíç  
ððððçíÜðùí BSD. Åðéðññúðæðâð óõi áíâðñâði Ýññä ðiõ ðáññâð-â ôi CSRG, ôi FreeBSD Project iüäâðøð ðiëëÝð  
÷ eëëÜäâð þñâð óõc aâëðéóði ðiðçóç ôiõ óððôðÞiaði ãéá íÝâéðâð åðéðññâðé ëáé áíéïðéðâðá óá  
éâèçìâñéí Ýð  
éâðâðóðÜðâðé ðññâðâðé ëíý öüññiõ ãññâðáðâð. Áí éáé ðiëëi ðiðññééi ðiðññééi ðiðññééi  
ëâðéðññâðé Ü óððôðÞiaðá ìá ðYôiéá ÷ ãññâðóðçñéóðé Ü, åðéðññâðé ëáé áíéïðéðâðá, ôi FreeBSD  
iðiññâð ìá óá ðññóðÝññâð  
ôþñá!

Í ðœðáðiò ëþaæéåò ôiò Bæiò ñiò FreeBSD áßíáè ðœÞñùò áæáè Ýðeíò, êáé Ýðóóé ñiò óýðóçìá iðinñâß fá ðññioáññiòôðåß óå áðÜiðåðóåð ñðøçëü åððbðåäí ãæá áæäéé Ýð åðáññiä Ýð P projects, êáé ià ñiñûðiò ãáíéé Ú iç ðññâñáðiðiðéÞoéiiò óå Úëéá ëæðiññæé Ú ìðiññéþí ðññiçèåðôþí. Ðáññéð Üòù èá âññâßòå iññéé Ú iññi ðáññâðâñáðò åðú åðáññiä Ýð óðéò iðiðåò iðinñâß íá - nçöiñiðiçèåß åðôþ ñiò FreeBSD:

- *Õõdçñåðþåò Ùíðåññåò:* Õî éó ÷õñü óýóðçìá äéêðýúóçò TCP/IP õið FreeBSD, õið áíáäåééíýåé óå éääþäç ðëáôöüñìá ãéá ìéá ìåâÜëç ãêÜlá õõdçñåðéþí Ùíðåññåò üðùò:
    - Åîððçñåðôçô Ýò FTP
    - Åîððçñåðôçô Ýò éóðïóåëßäùí World Wide Web (ëeiñíýò Þ ìå áóöáëÞ óýíååóç [SSL])
    - Äññïëüâçóç ðñùôïëüëëùí IPv4 êáé IPv6
    - Firewalls êáé ðýëåò NAT (“IP masquerading”)
    - Åîððçñåðôçô Ýò çëåêôññíéëíý ôá ÷õäññåðßið
    - USENET News Þ Bulletin Board Systems
    - Êáé Üëëá...

Ià ôi FreeBSD, iòđñâñôå áyéïëá íá îåééíPóåôå áðü ÷âíçëÜ ià Ýíá ööçíü PC ôcò iéëiäÝíåéáò 386, êáé êåèþò çåðé ÷åßñçóç óåo iàååäþþé, íá áráååèéöôååñôå óå Ýíá ôåðñåðýñçíï åðåññååóòP Xeon ià åßóëiò RAID.



Öi FreeBSD áßíáé äéáé Ýóeií óå iïñöþ ðçááßiö êþäééá áëeÜ éáé Ýôïéiiö, låôðåæùôôéöi Ýiiö åêôåë Ýóeií öå CD-ROM, DVD, éáé iÝóu áíþiöiö FTP. Ååßôå öi ÐáñÜñöçíá A áéá ðåñéóöüôâñåö ðëçñiöiñßåö áéá öi ðùò íá áðjéøþoåö öi FreeBSD.

## 1.2.2 Ðïéïò ÷ ñçóéïïðíéåß FreeBSD;

Ôi FreeBSD ÷ ñçóéïïðíéåßôáé ùò áÜóç ãéá ôçí áíÜðôôïç óôóéåôþí êáé ðñilüüíôùí óå ìåñéêÝò áðü ôéò ìåãáëýôåñåò åôáéñßåò ðëçñïöinéêÞò, ðåñéëáìâáññíÝíùí ôùí:

- Apple (<http://www.apple.com/>)
- Cisco (<http://www.cisco.com/>)
- Juniper (<http://www.juniper.net/>)
- NetApp (<http://www.netapp.com/>)

Ôi FreeBSD ÷ ñçóéïïðíéåßôáé ãéá íá ðëïóôçñßæåé ìåñéêÝò áðü ôéò ìåãáëýôåñåò ðíðíèåôßåò óôï ãíôåñíåò, ðåñéëáìâáññíÝíùí ôùí:

- Yahoo! (<http://www.yahoo.com/>)
- Yandex (<http://www.yandex.ru/>)
- Apache (<http://www.apache.org/>)
- Rambler (<http://www.rambler.ru/>)
- Sina (<http://www.sina.com/>)
- Pair Networks (<http://www.pair.com/>)
- Sony Japan (<http://www.sony.co.jp/>)
- Netcraft (<http://www.netcraft.com/>)
- NetEase (<http://www.163.com/>)
- Weathernews (<http://www.wni.com/>)
- TELEHOUSE America (<http://www.telehouse.com/>)
- Experts Exchange (<http://www.experts-exchange.com/>)

êáé ðíëëþí áéùíç.

## 1.3 Ðëçñïöinßåò ãéá ôi FreeBSD Project

Ôi áéüëïðëï ðìPiá ðáñÝ÷åé ìåñéêÝò ðëçñïöinßåò ó÷åôéêÝò ïå ôi project, êáé ðåñéëáìâÜíåé ïéá óýíôñç éóôinßá ôiõ FreeBSD, ôiõò ôóü÷iõò, êáé ôi ïiñôÝëi áíÜðôôïçò ôiõ.

### 1.3.1 ïéá óýíôñç éóôinßá ôiõ FreeBSD

ÓõíåéóöiñÜ ôiõ Jordan Hubbard.

To FreeBSD Project áâííPèçêå óôéò áñ÷Ýò ôiõ 1993, ìåñéêþò óáí áíÝëéïç ôiõ “Unofficial 386BSD Patchkit” áðü ôiõò 3 óâéåôðåßiõò óôíöiíéóôÝò ôiõ patchkit: ôiíí Nate Williams, ôiíí Rod Grimes êáé áíÝíá.

Í ðñùôáñ÷éêüò óôü÷iõò áíðò Pôáí íá ðáñÜäiðiå Ýíá áíäéÜíåöi óôéäiéüôði (snapshot) ôiõ 386BSD þóôå íá äéiñèþöiò ìåñéêÜ ðñrâëPiåôá ðiõ iç÷áíéöiùò ôiõ patchkit áâí Pôáí ééáñiùò íá ëýóåé. Ìåñéëiñ áðü óáð, ßóùò íá èõiñýíôáé ðùò i

án ÷ éétiò ôbôöëiò åññääóßáò ãéá ôi project þôái “386BSD 0.5” þ “386BSD Interim” êáé áíáöÝññíöáí óå áðöü áéñéâþò ôi ååññíüö.

Óðir 386BSD Þóðá í ðíðum Bill Jolitz, óðir patchkit, óðir “cleanup” snapshot. Óðir óðir project, óðir óðir “clean up” snapshot.

ĐāññBđtō áâéâñBíç ðçí ðåññBräï, ó-÷çåðBóðçéáí ãðññùòiáí ñóí ññBæïñðå óýíññåöå êáðåéâñBäåò, êáèþò ç Novell êáé ñi U.C. Berkeley ôáéêòiðñBçóáí õçí ìáññÜò äéáñéâñBåò äééåðóééÞ äéññÜ ÷ç ó-÷âðééÜ ìå ôá äééåéÞiaðå õçò ôáéíñåò Net/2. Íñå ñóíèÞéç áðôðÞò õçò ñóñöùñíñåò Þôáí ç ðáññäï-÷ Þ áðü õçí ìáññÜ ñiõ U.C. Berkeley ñüôé ìáññÜëi ïÝññò ñiõ Net/2 Þôáí “âðéâáññòiÝññò” êþäééåò éáé èáéïèéðçóßå õçò Novell, ç iññBå ìå õçí ôáéññÜ ñçò ñi åß-÷ å ãðièðÞøåé áðü õçí AT&T ñëßåí èáéññü ðññéí. Áðôü ñiõ ðññå ùò áññÜëéññåò ñi Berkeley Þôáí ié “âðeëññåò” õçò Novell ñüôé ç Ýëäïóç 4.4BSD-Lite, üñðåí ôâðééÜ iéññëçññüññüðåí, èá åçëññüññü ùò iç-÷ âðéâáññòiÝíç, êáé üññé ié ïÝ-÷ñé ôüññå ÷ñÞøðåò ñiõ Net/2 èá åíññññýñññåí Ýíèñññå íá ìåðåäññý óå áðôðÞ. Áðôü ñóññññéëÜñññåí êáé ñi FreeBSD, êáé ôóí project äüìèçéå ÷ññññò ïÝ-÷ñé ñiõ 1994 íá ôóñññåò Þøðåé ðéò ðáññäññóåéò ôñí ðñññññüññü ñiõ åáóßæïñðåí ôóí Net/2. Õðü ñiõð üñññò áðôðÞò õçò ñóñññüññåò, åðéññÜðçéå ôóí project iéá ôâðåññåò Ýëäïóç ðññéí õçí ëÞíç ôçò ðñññññåò, êáé áðôðÞ Þôáí ç Ýëäïóç FreeBSD 1.1.5.1.

Ôi FreeBSD àñ Ýèçêå ôüôå óôc äöö÷åñþ è Ýóç êõñéíëåêôéê Ü íá íáíá-áíáéåëýøåé ôíï ååôôü ôíö áðü Ýíá óýíñëi áðü bit ôíö 4.4BSD-Lite, åíôåëþò êáéíiyñäéi, êáé êõñþùò åôåëÝð. Íé åéüöúåéo “Lite” þoáí light (åéäöñéÝð) åí’ iÝñåé åðåéäþ ôíï CSRG ôíï Berkeley åß÷å áðåéñÝóåé iàäÜëi üäéi êpäééá i iðiñþò þoáí åðáñåßöçìò åéá íá êåôåóéåôåóåôåß Ýíá ðñääíåôéê Ü åééëþoéíü êåéöïñäéü óýóöçíá (ëüäü åéåöüñùí ïíñééþí aeçöçìÜöùí), êáé åí’ iÝñåé åðåéäþ ôíï port åéá Intel ôíï 4.4 þoáí óå ðøçëü ååèìü åôåëÝð. Ç iàðöÜâáóç iëriëçñþçêå ôíï ÍrÝiñéi ôíï 1994, êáé óå åôôü ôíï óçìåßí êôéëiöüñçôå ç FreeBSD 2.0 óöi åßéööñ êáé óå CD-ROM (ôÝéç ÅåéÝiñç). ÐáñÜ ôí ååññüò üöð þoáí åéüìç åñéåôÜ ðñü÷åéñç iÝóåð-Üéññò, ç Ýéäiöç þoáí iéá óçíåíðéêþ åðéöö÷åßá êáé óçí åéiëýéçóå ç ðéí åíéüðéöðç êáé åôéiëüôåñç ùò ðññö ôçí ååéåóÜðååóç Ýéäiöç FreeBSD 2.0.5 ôíï Íéiyéi ôíï 1995.

ÊðôëëïöiñPóáíâ ôçí FreeBSD 2.1.5 ôiñ Áýáïööôí ôiñ 1996, êáé ðÜÍçéâ íá áßíáé áñêåðÜ äçìïöeëÞò ôóïò ISP êáé ôóëø àiðiñééÝò êiñüöçåð, ôúöi ðiñ Üíéæá Üëeï Ýíá ðáñáéëÜäé ôiñ eññiù ôçó 2.1-STABLE. ÁôôÞ Þôáí ç FreeBSD 2.1.7.1, ðiñ ôðêëïöiñçåð ôiñ ÖåññiðÜññí ôiñ 1997 êáé Þôáí ç áðiññýöùñç ôçð èýñéáð áñÜððñçð ôçð 2.1-STABLE, ç iðiñßá âñßóéâðáé ðëÝíï óá êáð Üóðâðç ôóïðÞñçóç. èá áßññiðáé iññi áâëðéþrâðéð áóðâðâðáð êáé Üëëâð êñßóéâð áæññéþrâðé bugs óá áðôðü ôiñ eññiù (RELENG 2 1 0).

Ç FreeBSD 2.2 äéáéëääþèçéå áðü ôçí áíÜðôõíç ôçò éýñéáò ãñàìíþò (“-CURRENT”) ôíí ÍíÝíâñéí ôíø 1996, ùò éëÜäíø RELENG 2\_2, êáé c ðñþbôc ðëþñc Ýéëáíc (2.2.1) êóéëéþüñcôá ôíí Áðñþbééí ôíø 1997. Ðñþóéåðåôå áéëüóáéó áðü ôíí

ÊëÜäi 2.2 äüeçêáí óå êðõéëïöñbá ðí êäéïéâbñé êáé ðí ðéééñùðññí ðí ðí 1997, ç ðåëåðôábá ðúí iðñbñí (ç 2.2.8) åiöáíßóöçêå ðí ñÍYlânç ðí ðí 1998. Ç ðñþöç åðßóçìç Ýéäïöç 3.0 åiöáíßóöçêå ðí ðí 1998 êáé óçìÜäåøå ôçí áñ÷. P ðí ðí ðÝéïòöç áæá ðí ðí ðí 2.2.

Í eitnùò áeáééáþþéçéâ ðÜéé óóéò 20 Éáññóáñþíø 1999, íäçþþíðóâd óóçí 4.0-CURRENT éáé óóíï ëëÜäi 3.X-STABLE. Áðü óïï 3.X-STABLE, ç 3.1 óðóéëöüñçóâ óóéò 15 Öåâññóáñþíø 1999, ç 3.2 óóéò 15 ÍáÀíø 1999, ç 3.3 óóéò 16 Óåððóáìñþíø 1999, ç 3.4 óóéò 20 Áåéâìñþíø óïø 1999, éáé ç 3.5 óóéò 24 Éíññóáñþíø 2000, óçí iðiþá áeíëiýèçóâ ëßáâðò íÝññó ìðóðÜ íþá lëéñþð ðÜíáñùð áíáâÙëéç, ç 3.5.1, áeá íá óðíðññéèçðéiýí ðÜðíëâð áíáâðæíþðóâð ãððáæáßáð óçð òðâæáðóðáßáð óóéäíþð óïï Kerberos. ÁððP Pððáí éáé ç ðâéééðP Ýéäiýð áðü óïï ëëÜäi ðçð 3.X.

јá íÝí ÐáñáéëÜäé áçíëõñäPèçéâ óôéð 13 Íáñòßíð 2000, áçíëõñäþíóâ Ýóóé ôíí êëÜäí áíÜðôðôçò 4.X-STABLE. ÁçíëõñäPèçéâí áéÜöñâð áåéäúóåéò áðü áôðü ôíí êëÜäí: Ç 4.0-RELEASE êôéëïöñçóâ ôíí ÍÜñôéí ôíð 2000, êáé ç ôåéäóôáßá 4.11-RELEASE êôéëïöñçóâ ôíí ÉáñòÜñéí ôíð 2005.

Í eitinniùò ôcò RELENG\_5, açiéïõñäPeçêå ôiï Áyaiõóôï ôiï 2004, hâé aéïeïyéçoa ç 5.3-RELEASE, ç iðiñá óçí Üäåøå ôcí áñ÷P ôùí åéäüóåùí áðü ôiï eëÜäi 5-STABLE. Ç ðéi ðñüööåôç 5.5-RELEASE êôëëïöüñçoa ôiï IÜéi ôiï 2006. Äåí Èá õðÜññiòi ðñüöéåðåò åéäüóåéò áðü ôiï eïññù ôcò RELENG\_5.

Í êimníðuð aðáæðaþeçéâ ðÜéé ðið Éiyééi ðið 2005, áðóþ óç öiñ Ü aðá óçí aðiðiññá ðið eð Üaðið RELENG\_6. Ç 6.0-RELEASE áßíáé ç ðñþóç Yéáiðc óçò óåéñ Üð 6.X, éáé eððeëiññçóâ ðið ÍYíâñéi ðið 2005. Ç ðeí ðñüöðáðc 6.4-RELEASE eððeëiññçóâ ðið ÍYíâñéi ðið 2008. Ááí éá ððÜññiðið ðññúðéâðað aðéäüðáð ðáðu ðið êimníðuð óçò RELENG 6. Áðóðuð áßíáé éáé í ðáðaðóðáðið eð Üaðið ðið ððiðóðññðæð óçí añ ÷ eððaðiññðæð Alpha.

Í ëeÜäiò áiÜððööíçö RELENG\_7, äciéïññäÞeçêå öií lëôþâñei öiø 2007. Ç ðñþöç Ýeäiöç áðü áðöü öií ëeÜäi, Pôáí ç 7.0-RELEASE ç iðiñá êðëëiøüñçöå öií ÖåâññiøÜññei öiø 2008. Ç ðeí ðññööáðç 7.4-RELEASE êðëëiøüñçöå öií ÖåâññiøÜññei öiø 2011. Ááí Èá òðÜññiði ðññöøéâðå ãéüøðæö áðü öií ëeÜäi RELENG\_7.

Í ëeÜäiò áíÜðôöiçò RELENG\_9, äciëiññäþèçêå ôíí ÓåðôÝìâñéi ôíð 2011. Ç ðñþöç Ýéäiöç áðü áðôöü ôíí ëeÜäi, þoáí ç 9.0-RELEASE ç iðiþá êðëëëöüñçöå ôíí ÉáñiðÜñéi 2012. Èá ôðÜññiðí ðñþüðèåðåð áéäiñðåéð áðü ôíí ëeÜäi RELENG\_9.

Åéá ôçí þñá, ç iáéññiðññüéåðíç áíÜðôðôíç óðíåð ðæåðáé óðíï ëë Üäï 10.X-CURRENT. ÍÝåò åêäüöåéò SNAPSHOT ôið 10.X óå CD-ROM (êáé óðíóé ðæåðáé óðíï Åéáäðññiðññüéåðíç), äéáððæåðíóáé áðü óií óií snapshot server (<ftp://current.FreeBSD.org/pub/FreeBSD/snapshots/>) êáèþð óðíåð ðæåðáé ç áíÜðôðôíç.

### 1.3.2 Óôü ÷ ié ôïõ FreeBSD Project

*ÓõíåéóöïñÜ ôïõ Jordan Hubbard.*

÷ ñPóć êáé íá áđioÝñâé ôiì àlááéýôâñiì aëíáôú uöåëëò. Áôou áßíáé, ðéóôåýù, Ýíáo áðü ôiòò óçíáíôéüôâñiòò óôü÷iòò ôiò òiò Åëáýèâñiò Èíáéóíééý êáé Ýíáo áðü ôiòò iòiñbíòò õðiòòñbæxiòíà ià áîëiòóéâòíù.

Ôi ôiPiá ôiô ðçãáâbiô iàd êþæéâ ðiô âñbóêâðâé ôðü ôçí GNU General Public License (GPL) P ôçí Library General Public License (LGPL) Ý ÷ áé êÜðùô ðâñéóöüðâñâô ãâðiâýâðâéô, áí êâé ôéiðüô ôiôðô åßíâé iÜëëí íá äæáööæßöiôí ôçí äéâýèâñç äéÜeåóç ôiô êþæéâ, ðáñÜ ôi áíðbëåôî. Èüâú ôùí åðéðñüöèåðôùí åðéðëiêþí ðiô eÝðâé ç Üaaéâ ÷ ñÞóçò GPL ôðçí åìðiñêþ ÷ ñÞóç ôiô eïäéðiêçíy, ðñiðeñyìâ, üoí åßíâé åðééðôü, íá ðáñÝ ÷ iòiâ ôi eïäéðiêçü iàd ôðü ôi ÷ äæáñüðâñi BSD copyright.

### 1.3.3 Ôi l̄íôÝei ÁíÜðôôîçò ôiõ FreeBSD

ÓõjåéóöïñÜ ôïõ Satoshi Asami.

Ç áíÜððöñîç ôiö FreeBSD áßíáé ïßá ðïëý áñíéêôP éáé åôÝééêôç äæáæéâóßá, áöiý eññëüåêôéêÜ ááóßæåðåé óôçí óðíâéññöiñÜ áâéâöiñÜ ãíñþðùí áðü üëi ôiï êüöii, üðñò iðññâßðå íá áâßðå áðü ôçí eßðóå ôùí ñðíâññâðþí ([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/articles/contributors/article.html](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/contributors/article.html)) iàð. Ç ðññrññP áíÜððöñîç ôiö FreeBSD áðéññ Ýðåé óóá áâéâöiñÜ ãíñþðùí áðü ôçí iñÜäåò áíÜððöñîç íá ñðíâññâÜ æññiôáé íYóù ôiö ðíâññâð. Áßíáóå óóâéññÜ óá áíâæÞöçç áæá íYá iñYéç óóçí iñÜäå áíÜððöñîç éáé áæá eäÝåò, éáé üöié áâíæáöÝññiôáé íá áó ÷ iëçëiýí áéüiç ðâññéóöüôðñi ìå ôi project ÷ ñâéÜæåðåé áðëÜ íá áðéññiñÞöiñi iáæß iàð óôçí çëâéññiñéêP eßðóå ôâ ÷ iéñþí óðæçôÞöåùí ôiö FreeBSD (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-hackers>). Áðßöçò ç çëâéññiñéêP eßðóå ááíæíéþöåùí ôiö FreeBSD (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-announce>) áßíáé áæáéÝóëç óå ûñiñðò áðéññiñýí íá áíçìâñþöiñÜ ïëñiñðò ÷ ñÞöåðò ôiö FreeBSD áæá eýññiñðò ôiñâßð åññâáßðå ó ÷ åðéññÜ ià òi Project.

× ñPóeíá ðñÜäiáôá ðiö ðñÝðåé íá áiùñßæåôá ãéá ôi FreeBSD Project éáé ôçí äéåäééåóßá áíÜðôõîçò ôiö, åßôå áiñöeåvôå áiâñÜññcôå åßôå ùò ôôåñïß öóíâññÜôåå:

Óá SVN êáé CVS repositories

Áéá ðírëeÜ ÷ñúréá, í êáíóñéêùò êíñìüö êþäééá ôiõ FreeBSD óðíóçñüíýóáí iÝóù ôiõ CVS (<http://ximbiot.com/cvs/wiki/>) (Concurrent Versions System), áíúò áðéýéñá äéáèÝóéíïò áññááéåßíò áéÝá÷iõ ðçcääßíò êþäééá ðiõ ðñriööÝññåôáé áíóùáâùìÝí ôiõ FreeBSD. Óíi Eíýíéí ôiõ 2008, ôi Project áðiõÜóéóå ôc iåðÜááóç ôiõ SVN (<http://subversion.tigris.org>) (Subversion). Ç áééááP êñþéçéå áíáñéåßá, êáéþò ié ôå÷fíééß ðåññéíñéöiõß ôiõ CVS Pôáí ðeÝí áíöááßò, áíáéóßáò ôiõ iåãYéëöö ôiõ áðíèçéåôiõÝíò êþäééá êáé ôiõ éóðiñééiy ðiõ ôíi ðóñíáåýåé. Áí êáé ôi êýñéí repository ÷ñçóéiõíéåß ðeÝí ôiõ SVN, ôá áññááéåßá ÷ñÞóðç üðùò ôá CVSup éáé csup ôá iðíßá áíñðóßíóáé áðü ôc áééóïññåßá ôiõ ðáééüöðåññò ðóðóÞiaóïò CVS, ôðíá ÷ßæiõí íá áéäöñññayí éáññíééÜ. Áðóü áíñóðáéßæåðáé iå ôðä ÷ññíéöiü ôñí áéëáäßí ðiõ SVN ôóï ððÜñ ÷ií CVS. Ôç áåññíÝíc ôðéäP, ôi SVN ÷ñçóéiõíéåßóáé iüñí ôóï êáíóñééü repository ðçcääßíò êþäééá. Ôá repositories ðiõ ÷ñçóéiõíéiyóáé êáé ôi documentation (ðåéíçñßùóç), ôi World Wide Web (ôi áééððåáüö ôüðí) êáéþò êáé ôá Ports, ôðíá ÷ßæiõí íá ÷ñçóéiõíéiyí ôiõ CVS. Ôír êýñéí repository (<http://www.FreeBSD.org/cgi/cvsweb.cgi>) áñßóðéåðáé ôá Yíá iç ÷Üíçíá ôðçí Santa Clara CA, USA áðü üðiõ áíðéññÜöðåðáé ôá iåãÜëí áññéëüiù iç ÷áßí mirror ôá üëi ôiñ ëüñöi. Í eññìüö SVN, í iðiñßò ðåññéÝ ÷åé ôiõ õëÜäiõ -CURRENT êáé -STABLE, iðiñåß áðßóçð áýéëéá fá áíóðññåðåß êáé ôóo áéëü ôáð ððíëáññóð. Ðåññéóðúññåð ðéçñññññåßò áéá áðóü ôi èÝíá iðiññåßðá fá áññåßðå ôðçí áíüñðçóá Óðä ÷ññíßæiñðáò ôiõ ðçcääßí ôáð Êþäééá.

## C ēBÓÔÁ ôÙÍ committers

Íé *committers* ábíáé Üôñá ðiö Ý÷iö Üääéá áðaññðòPò (*write*) óoií ëiñiù öiö CVS, éáé ábíáé áññóéíäöçì Ýfié íá eÜññi ìaðoáññið Ýò óoií êphæéá öiö FreeBSD (i üñiö “committer” ðñiÝñ÷åðáé áðü öçí áiðiëP cvs(1) commit, ç iðibá ÷ñçóéiðiðéåñðóáé áéá íá ábíññi ÍYåò áæéáá Ýò óöi CVS repository). Í éáéyðåññiò öññüðiö áéá íá óåðíýí áæéáá Ýò ðiñiò áíáéåþñçóç áéé ÍYññiò öçò èþbóðáó òúí committers ábíáé íá ÷ñçóéiðiðéåñðóáé c áiðiëP send-pr(1).

ÅÜí òi ðáñáðÜù óyóôçìá öáßíåôáé lðëiêáñéóí Ýíí, lðiññåßôá íá òiñò ðññóåãßóåôá óó Ýéiiñóáò email óôçí çéâéöññééÞ ëßóôá ðúí committers òiñ FreeBSD.

The FreeBSD core team

Ç FreeBSD core team èá Þóáí éóíráyái íà ôi äéíéêçöéêú ööíáiýëeí áí ôi FreeBSD Project Þóáí iéá áíþíölc áðóáéñâbá. Í ðññùðáñ- ðétiôð ööü- :iò ôçö core team áßíáé íá áíáóðáæðööé üödé ôi project, ôöî óýññëi ôiö, áßíáé óâ éáéþ ëáðÜðóáðc áéáé íá ôi ñäçâáß ðññìö ôçí óùñöðp éáðâýëeíóíç. Íéá áðü ôéö éâéöiññâbâö ôçö core team áßíáé íá ðññíóéâæß áööñéù Ýññöð éáé öððâýëöññöð developers íá ööññâö Ý- :iòí ôöçí iñÜáá áíÜððöñçö (öiññö committers) éáéþp éáé íá áññbóéâé íÝá èéç áéá ôçí bæáá ôçí core team éâéþp éÜðiññé aði- ÷uññiyí. Ç ðáññiyóá core team áéé Ý- :ôçéâ áðü Ýíá óýññëi öððiñçöbñí committers ôiñ Ëíyëeí ôiñ 2010. Áééïá Ýð áéâñ Üñññöáé êÜëá 2 ÷uññéá.

Íánné Ü Ü Íyéç ôcò core team Ý ÷ iöi åðßöçö åéäéëíýö ðíñåßöð åðèéýíçö, éáé åðööù öçìáßíåé ðùð ååðöiåýíðöáé fá áíáóöáæßöiöi üöé Ýíá iåñüëi iÝñiö ðiö öðööðÞiaâöiö èééöiöñååß üðùð ðñ Ýðåé. Åéá iëiéëçñùiÝíç eßööå ôcò iñÜäáð áíßÜðööçö ðiö FreeBSD éáé ðùí Ýúí åðèéýíçö ðiööd, ðáñåéäéëíýíå ååßöðå ôçí Eßööå ðùí Öðíñåñååðpí iàðo ([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/articles/contributors/article.html](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/contributors/article.html)).

**Óciàßùóć:** Óá ðåñéooúôðâñá iÝec ôiō core team åßíáé åèåëiöðYò üoíí áöiñÜ ôcí áíÜððööç ôiō FreeBSD êáé åái Y÷iöi ieëíííêéþò öýoåùò iöÝec áðü ôi project, åðiíÝìò ç “äÝóiåðóć” åái éá ðñÝðåé íá ðáñáñiçiáÿåðáé ùò “äââðöciÝíç öðiøöðñéítç”. Ç ðáñáðÜíñ ðáñííñùóć iá ôi “äéíéêçöéêü öðiâíÿyéí” åái åßíáé ðíeyä åéñéäþò, ßóùò åßíáé êáôáæéçëüðâñí íá ðíyíå üöde ðñüeåéôáé åéá áíèñþðiöð ðiö eðoñßáóáí ôéò æùYò ôiöö ãéá : Üñç ôiō FreeBSD åíÜíóéá ôócií êáëÿðâñç ôiöö êñßóć!

Åùôåñéêïß óõíåñãÜôåò

## Ç Èþóôá Óõíåñäáôþí ôiõ FreeBSD

Óõñïõþæëïõåò, õi ññõ Ýëi áíÜðôõîçò iáò áßíáé iññãáñù Ýñ óáí Ýíá ÷ áæáñü óýñëei ññüéåñõñù íéÿëeù. Õi óõäéåñõñùóéëü ññõ Ýëi áßíáé ó ÷ áæáéóí Ýñ íáéá íá áæåðéïëýíåé õiõò ÷ ñPõðåò õiõ FreeBSD, óõiõò iðiññiõò ðáñ Ý ÷ áâóé Ýôóé Ýíáò áýéïëiò ññõðiò ðáñáéëiÿéçò õiõ áâóééïý êþæéá, êáé ü ÷ é áæá íá áðiñéëåßiòìå ðééáñýò óõiñññáÜðåò! Áðéëòiñá iáò áßíáé íá ðáññõóéÜõiòìå Ýíá óðåæåñü ëåéöiññäéü óýóôçìá óá õõñÜñõçòc ìá ìéá iàå Üëç áêÜìá áðü ðñiññÜìiáó áöáññiäþí ðiõ ié ÷ ñPõðåò íá iðiññýí áýéëéá íá áâééæéóöiyí êáé íá ÷ ñçóëiñðiëiýí — áæá ôçí áêðëPññóç áðöþí ôúí óóü ÷ úí, õi ññõ Ýëi áðóü ãiðëéåýáé ðiëý éáëÜ.

Ôi iùñi ðiõ aæçô Üia áðü üóïoò áâæáö Ýñiñðáé íá áiñèiyí iaæß iáò oóçí iñÜäá áiÜðôñïçò ôiõ FreeBSD, åbíáé eëßäc áðü oçí ßæá áöiøþùóç ôçò ôùñéïPò iñÜäáò, aæá leá oóíá :P ðiññåßá oóçí áðéôò ÷ ßá oíõ!

#### 1.3.4 ÇÔÑÝ ÷IÖÓÁ ËÄIÖC ÔIÖ FreeBSD

Áðü ôcí Ýêäiöc ôiö FreeBSD 2.0 óðáa ôÝëc ôiö 1994, ç áðüäiöc, ôi öýñrëi ôùiù ÷ áñâéôçñéôðééþí, êáé ç óðåéññüôðçðá ôiö FreeBSD Ý÷åé åâéðéùèåß óçìáíôééÜ. Ç iâááéýðoåñc áæëaáP åßíáé ç åðáíáó ÷ åâßáóç ôiö óðóðPíáöiò åééiiééþò iíPíçð (virtual memory) iâ Ýá iæíéçñùiÝíi VM/file buffer cache ði iðiþi ü ÷ e iùñi áðiñUífáé ôcí áðüäiöc, áæéÜ áðbóçð iâéþfáé ôðé áðáéôðPáéö iíPíçð ôiö FreeBSD, åðéñññYðiñðåù ði äeÜ ÷ éooíi áðiñññéóü üññi óá 5 MB. ÐâñéÝ ÷ iðiñðé åðbóçð êáé Üëeåò åâéðéþbóåéð, üñðù ðéþñçð ðiðiñðóðPñéïç ðâéÜðç êáé åiðôðçññåðcôþ NIS, ðiðiñðóðPñéïç óðiñññéáðí TCP, dial-on-demand PPP, åíðùñáðùiÝíc ðiðiñðóðPñéïç DHCP, Ýíá åâéðéùiÝíi ðiðiñðóðcô SCSI, ðiðiñðóðPñéïç ISDN, ðiðiñðóðPñéïç aéá ATM, FDDI, ðiðiñðáññiaßbó aééðóýiò Fast êáé Gigabit Ethernet (1000 Mbit), åâéðéùiÝíc ðiðiñðóðPñéïç aéá ôiöð ôâéñññðáßiòð aéâññéð Ýð ôcò Adaptec êáé ðiðiñðéÝð ÷ eééÜâåò aéiññéþbóåéð eáèþí (bug).

Åêôüö ãðü ôç åâáðééÞ ðiõ äæâññiÞ, ôi FreeBSD ðññiöö Ýñâé iéá ôðëëiäÞ eïäéöiééiy iå ÷ééÜäâðô ðññiññÜñlådá åéá êâéçìåñéiÞ ÷ñÞóç. Ôçí ôðéâiÞ ðiõ ãñÜöriðáé áðôÝð ié ãññaiÝð, ôðÜñ ÷iði ðÜñ u áðü 23,000 ports! Ç ëßôôá ôuí ports iâééÜåé áðü åîñðçññåðçöÝð http (WWW), iÝ ÷ñé ðáé ÷iñæá, äëþðôåð ðññiññâiñåðéöiiý, êâéiññiññÜöriðo, åéé iøéäÜÞðiðå Üëeëi åiæéÜlådá. Ç ôðiññééÞ ÔðëëiäÞ ôuí Ports áðâéöôåß ðññiññåéöôåéÜ 500 MB áðëçéåðôôééü ÷iññ, åöý üéá ôá ports åéññÜæriðáé iå “deltas” (áñ- ÷åßá åéäöiññÞ) ôuí áððâiñðééþí ðçäþí ðiñðo. Ôi åââññiñð áððü iåð åðéññÝðåé íå åíââáæiññöiðå ôá ports ðiëý åðëëiñðåññ, êâé iâéþiâé åññåðééÜ ðiðo áðâéöÞðåéð ôá ôéëçñü åßðôëi ôá ÷Ýðç iå ôçí ðâæéüöôåñç ÔðëëiäÞ Ports 1.0. Åéá íá iâðåññéüöôåß (compile) Ýíá port, ÷iññéÜæåðåé áðëþb iá iâðåññåßôå ôóíí åéâðÜeräi ðiõ ðññiññÜñlådö ðið áððéèðiñåßôå íá åââéåðåôðÞðåôå, íá ðéçëññiññiÞðåôå make install, êâé íá åóÞðåôå ði õýðòçia åðå iá Üñiâé ôá ððüëiñðå. Iëüêëçñü ç åðâéâiñðééÞ äæâññiÞ aéá èÜëå port ðiði èÜfåôå build ðâñÝ ÷åðâé åððâiñðéÜ áðü ði CD-ROM P áðü iñßá ðiñðééÞ ðiðiññåðßá FTP, Ýðôé ôá ports ðiði åâí ÷iññéÜæåðôå åâí êâðâæiññÜñiñði Üôéiði ÷iññ ôóí ôéëçñü ôáô åßðôëi. Ô ÷åâññi ðiñðééÞ ðiðiññåðßá åââéåðåôðâæiñðå ðiññéÜñiñði ðiññéÜñiñði (pre-compiled) “ðâéÝði (package)”, ôi iðiññi ðiññéÜñiñðå åââéåðåôðâæiñðå iá iéá áðëÞ aíðiññi (pkg\_add) åéá åâéâßññiðo ðiði åâí åððéèññiý iá iâðåññåññüöôðæiñðå ôá ports ðiñðo áðü ôiñ ðçäþiññi ðiññéÜñiñði åéá ôá packages êâé ôá ports iðiññåßôå íá åññåßôå ôóíi ÅâóÜëæi 5.

ÕðÜñ÷åé áñêåôÜ ìåâÜëç åðéðëÝíï ôåèïçñßùóç ðçí iðïñßá ìðïñâß íá âñâñßòå ðïëý ÷ñÞóéïç ãéá ðçí äéåæéåóßá ååéåôÜôôåóçò éåé ÷ñÞóçò ôïõ FreeBSD. Íðïñâßòå íá ðçí âñâñßå ååéåôåðöçìÝíç ôõíï éåóÜëïä /usr/share/doc óå iðïéïäÞðïòå ðýá ÷ñiiñ íç ÷Üíçïá FreeBSD. Óå ôïðééÜ ååéåôåðöçìÝíç åå ÷åéñßæá iðïñâßòå íá óå ååßòå óå iiñöP HTML. ÷ñcõéïiðïéþòå ìðïéïäÞðïòå éåóÜëéçei browser ôôéò åéüeïòå URL:

Ôř Åã÷åéñßäéï × ñPóçò ôjõ FreeBSD

/usr/share/doc/handbook/index.html

Óõ÷íÝò åñùôÞóåéò ôiïõ FreeBSD (FAO)

/usr/share/doc/faq/index.html

Iðfinnbóða áðBðCð fá aðBðA óá ðnúðiúðöðA (éaé óð : iÚ áísaááéleæuiá) áíðBáñnaóðA óði <http://www.FreeBSD.org/>

# ÊåöÜëáéí 2 ÅæáôÜóôáóç ôïõ FreeBSD 8.x êáé ÐñïääíÝóôåñùí Åêäüóåùí

Áíáó÷çìáôéóíÝíí, áíáäéíñääíüíÝíí, êáé ìåñééþò íáíáññáíÝíí áðü ñiø Jim Mock. Ç áPìá ðñïò áPìá äéáäééáóþá ôïõ sysinstall, ié áéêüíåò, êáé áåíééÝò áéíñèþóåéò êåéíÝíí áðü ñiø Randy Pratt.

## 2.1 Óyííøç

Ôi FreeBSD æáéÝíåôáé iå Ýíá åý÷ñçóõi, lç áñáöéü ðñüññáííà áæáôÜóôáóçò. Áðü ôçí Ýéäíóç 9.0-RELEASE êáé ìåðÜ, ÷ñçóéíñiðíéåßôáé ôï **bsdinstall** áíþ ié ðæééüðåñåò áéäüíóåé ÷ñçóéíñiðíéíý ôï **sysinstall**. Óði êåöÜëáéí áðôü ðåñéäñÜöåôáé ç ÷ñPóç ôïõ **sysinstall** æá ôçí áæáôÜóôáóç ôïõ FreeBSD. Ç ÷ñPóç ôïõ **bsdinstall** ðåñéäñÜöåôáé ôïõ ÊåöÜëáéí 3.

Áöiy äéååÜóôåå áðôü ôï êåöÜëáéí, èá íÝñåôå:

- Ðùò íá áçìéíññPóåôå åéóéÝåò áæáôÜóôáóçò æá ôï FreeBSD.
- Ðùò áíáóÝñåôåé ôïõ ðééçñíýò áßóéíò ðáó ôï FreeBSD êáé ðùò ôïõ ÷ùñßæåé óå êáðåðìPóåéò.
- Ðùò fá íåééíPóåôå ôï **sysinstall**.
- Õéò áñùñPóåéò ðïò èá óåò êÜíåé ôï **sysinstall**, ôé óçìáßííòí, êáé ðùò íá ôéò áðáíñPóåôå.

Ðñéí äéååÜóôåå áðôü ôï êåöÜëáéí, èá ðñÝðåé:

- Íá äéååÜóôåå ôç ëßóôå ôïõ ðïðöôçñéæüíñí ðéééiy ðïò Ýñ÷åôåé lå ôçí Ýéäíóç ôïõ FreeBSD ôçí iðibá èá áæáôáóðPóåôå, êáé íá áðåéçéååýåôå üðé ôï ðéééü ðïò Ý÷åôå ððiðôçñßæåôåé áðü ôï FreeBSD.

**Óçìáßùóç:** Óå áâíééÝò áñáííÝò áðôôÝò ié íäçäßåò áæáôÜóôáóçò áßíåé áñáííÝíåò áéá ôïõ i386 ("PC ñiðiâáôïý") áñ÷éôåéôííééþò ðïðiðíééóôÝò. ½ðïò ÷ñåéÜæåôåé, èá áìöáíßæííôåé óóåæåéñéíÝíåò íäçäßåò áéá Üééåò ðéáôðññíåò. Áí êáé áðôüò íäçäüò áæáôçñåßôåé üðí ôï áðíåðüí ðéí áíçíññííÝíò, áßíåé ðééåíííí íá áñáíßôå íééñÝò áéåöíñÝò íåðåáiy ôïõ ðñiññÜíåò ðæéáôÜóôáóçò êáé áðôiy ðïò óáßíåðåé áäþ. Óåò ðñiññÜíò íá ñçóéíñiðíééþò ôå ëåöÜëáéí áðôü ðåñééóðüðåñí óáí áåíééü íäçäü ðáñÜ óáí Ýíá êáðÜ áññÜííá áå ÷åéñßæéí áæáôáóçò.

## 2.2 ÁðáéôPóåéò Õëééiy

### 2.2.1 ÅëÜ÷éóôåò ÁðáéôPóåéò

Íé åëÜ÷éóôåò áðáéôPóåéò æá ôçí áæáôÜóôáóç ôïõ FreeBSD ðïééßëíòí áíÜëíäá lå ôçí Ýéäíóç ôïõ FreeBSD êáé ôçí áñ÷éôåéôííééþ ôïõ ðéééiy.

Óðéò ðáñáéÜò ñüôçôåò èá áñáíßôå íéá ðåñßéççç ôñí ðéçññiñéþí áðôþí. ÁíÜëíäá lå ôñí ðñüðí ðïò èá áðéééÝíåôå íá áæáôáóðPóåôå ôï FreeBSD, ìðiññå íá ÷ñåéáôôåßôå ííñÜäá áéóéÝóåò, Ýíá ðïðöôçñéæüíñí íäçäü CD-ROM, êáé óå íñéóíÝíåò ðåñéðþóåéò, êÜññå áéêðýíò. Óå ðáñáéÜò ñüôçôåé ôïõ ÕíPìá 2.3.7.

### 2.2.1.1 Áñ÷éôåêôííéêÝò FreeBSD/i386 êáé FreeBSD/pc98

Íé âéäüðåñùí FreeBSD/i386 êáé FreeBSD/pc98 áðáéöïýí 486 P êáëýðåñíï áðåñâññáðóþ êáé ôiõðëÜ÷éóðí 24 MB RAM. Èá ÷ñâéáóðåñùí ôiõðëÜ÷éóðí 150 MB åéåýèåñíï ÷þñiõ óóï óéëçñü äßóëí ãéá ôçí ðëÝí åëÜ÷éóðç áâéáðÜóðáóç.

**Óciàðñùç:** Óå ðåñéððþóåéò ðáëéþí ìç÷áíçíÜðùí, ôéò ðåñéóðüðåññò ôiñÝò, ç ýðåñíç ðåñéóðüðåñçò iíþìçò RAM êáé åëåýèåñíï ÷þñiõ óóï äßóëí åßíáé ðëí òcìáíðéêþ áðü Ýíá óá÷ýðåñíï áðåñâññáðóþ.

### 2.2.1.2 Áñ÷éôåêôííéêþ FreeBSD/amd64

ÕðÜñ÷iõí áyí ëëÜðåéò áðåñâññáðóþí ééáíÝò íá áâéðåëÝðiõí ôi FreeBSD/amd64. Ç ðñþöç, åßíáé ié áðåñâññáðóþí AMD64, ðåñéëåíâññíÝiõí ôiõ AMD Athlon™64, ôiõ AMD Athlon64-FX, ôiõ AMD Opteron™ P êáëýðåñùí.

Ç åâýðåñç ëëÜðåëåðåññáðóþí ðiõ ðiõññíýí íá ÷ñçóðiðiðþoðiõí FreeBSD/amd64, ðåñéëåíâññíÜíåé üóðð ÷ñçóðiðiðýí ôçí áñ÷éôåêôííéêþ Intel® EM64T. Ðáññäåðåññáðóå ðiõ áðåñâññáðóþí åðôþí ðåñéëåíâññíÜíåõí ôéò iééíäÝíåéåò Intel Core™ 2 Duo, Quad, Extreme êáëþò êáé ôç óâéñÜ áðåñâññáðóþí Intel Xeon 3000, 5000, êáé 7000.

Áí ôi ìç÷Üíçíá óáð åßíáé åâáóéóiÝí ñá nVidia nForce3 Pro-150, èá ðñÝðåé íá ÷ñçóðiðiðþoðå õçí êáðÜëëçëç áðéëíþ oóï BIOS ãéá íá áðåñâññíÜíåðþoðå ðiõ IO APIC. Áí ç áðéëíþ áðóþ ãáí ððÜñ÷åé, èá ðñÝðåé íá áðåñâññíÜíåðþoðå ðiõ áðóþ áðóïý ðiõ ACPI. ÕðÜñ÷iõí ðñiäëþiáðå ðiõ Pro-150 ãéá óá ïðiðá ïÝ÷ñé óðéäíþ ãáí Ý÷åé åñâéåß ëýóç ðiõ íá óá ðáññáéÜíððååé.

### 2.2.1.3 Áñ÷éôåêôííéêþ FreeBSD/sparc64

Ãéá íá åâéáðåóðþoðå ðiõ FreeBSD/sparc64, èá ÷ñâéáóðåñùí ôiá ðiõðóçñéæüíåíç ðëáððüññíá (äâðôå Ôìþíá 2.2.2).

Èá ÷ñâéáóðåñùíÝí åßóëí ãéá áðíëëåðóéêþ ÷ñþöç áðü ôi FreeBSD/sparc64. Ôç åâäñíÝíç óóéäíþ, åâí åßíáé åðíáðóüí íá ñiñÜæåðåé ôií ßæëí åßóëí ôi FreeBSD ìå Ýíá Üëëí ëâéðiðññéêü óýðóçìá.

## 2.2.2 Õðiðóçñéæüíåí Õëéëü

Ç ëßóðå ìå ôi ðiðiðóçñéæüíåí ðeeéëü, ðáñÝ÷åðåé óóéò Óciàðþoåéò Õëéëiy (Hardware Notes) ìå êÜëå Ýéäíþ ðiõ FreeBSD. ÕiÝáññáöiï áðóþ ðiðiññð ðiðiðþèùò íá åññâèåß ìå üññíå áñ÷åßíð HARDWARE . TXT, óóï ñéæéëü êáðÜëëí ìéá åéáññíþo CDROM P FTP, P êáé oóï iññíý documentation ðiõ sysinstall. Äéá êÜëå áñ÷éôåêôííéêþ, èá åññâññóå ìéá ëßððå óóðéåðþí ié ðiðiðå ðééåååéùíÝíá ðiðiðóçñðæüíðåé áðü ôi FreeBSD. Áíððáññáöa ôiõ êáðâññäüiõ ðiðiðóçñéæüíåí ðiðiðéíý ãéá åéÜðññåð åâéüñåð ëáé áñ÷éôåêôííéêÝò ðiðiññíýí åðþðçð íá åññâèíýí ôçí óâëßää Ðëçñiðiññéþí êäíþçð (<http://www.FreeBSD.org/releases/index.html>) ôóï åééððåéü ðüði ðiõ FreeBSD.

## 2.3 Åññáóðåò ðñéí ôçí ÅæááðÜóðáóç

### 2.3.1 Áðiññáöþ Õëéëiy ôiõ Õðiðëæéóþ óáð

Ðñéí åâéáðåóðþoðå ðiõ FreeBSD ðñÝðåé íá åðé÷åéñþoðå íá áðiññðÜðþoðå ðá åññâññþiáðå ôiõ ðiðiðëæéóþ óáð. Íé ñiñððñåð åâéáðÜóðáóç ðiõ FreeBSD èá óáð åâéññð ðá åññâññþiáðå (óéëçñíýí ãßóëëiðð, êÜññðåð åééðýið, iäçñíýí

Áí Ý÷åôâ Þäç Üeëi èäéôïññäéêü óýóôciá åâéâôåôôci Ýii, üôðùò Windows Þ Linux, åßíáé åâéééÜ êäéÞ èäÝá íá ÷ñçöéïïéÞoåôå ôéò åöñáôüôçôåô ðiô óâò ðäñÝ ÷åé åéá íá åâßôå ôéò ñôðèìßôåéò ôiô ðeeéïý óâò. Áí åâí åßôôå óßäiññié åéá ôéò ñôðèìßôåéò iéâò ëÜñôåò åðÝéôáôçò, ßouò íá ôéò åñâßôå ôôðùìÝiâò ðÜñ ôôçí ßâéá ôçí ëÜñôå. Õóíçééóí Ýíá IRQ åßíáé ôâ 3, 5 éâé 7 åþp ié èýñâò IO ôôíÞeùò añÜöriôáù uò åâéâáâáééiñ áñéèñiñ, ð.÷. 0x330.

Óáo óoíéóööiyá íá ãñÜøåôå P íá åêooðþoåôå ôeò ðëçñiöinßåò áoôÝò ðñéí ôcí åâæåôÜóoåóç ôiõ FreeBSD. Óái ððüäåéæíá, iðiññåßôå íá ÷ñçóéiiðieÞoåôå Yíá ðßíáéå üðòùò oíï ðáñáéÜòù:

## Đĩáêáò 2-1. Õðüääéäìá ÁðiñáöÞò Óõóêåõí

¼ññá Óooéåõþò	IRQ	IO èýñåò	Óciåéþóåéò
Ðñþöìò Õéëçñüò Äßóêìò	N/A	N/A	40 GB, ôçò Seagate, master óöi ðñþöi IDE
CDROM	N/A	N/A	slave óöi ðñþöi IDE
Äåýôåññö Õéëçñüò Äßóêìò	N/A	N/A	20 GB, ôçò IBM, master óöi äåýôåññ IDE
Ðñþöìò Åëååéõþò IDE	14	0x1f0	
ÊÜñôá Äééõýïö	N/A	N/A	Intel 10/100
Modem	N/A	N/A	3Com® 56K faxmodem, óôçí COM1
...			

¼ôáí ôåëåéþóåôå ôçí áðiñãñáöþ åiáñôçìÜòùí ôiö õðiñëæéöþ óáò, èá ðñÝðåé íá åëÝãåôå áí ôáéñéÜæiöí íå ôéò áðáéöþóåéò õëééiy ôçó Ýéäiöçò FreeBSD ðiö ôéiðåýåôå íá åãéååóôþóåôå.

### 2.3.2 Èñáôþóôå Áíôþäñáöá Áóöáëåþáò ôùí ÄåäïÝúùí óáò

Áí i õðtæriáéôðÞò óóii iðtibí eá áâéâáôðÞòâðå ði FreeBSD ððñéÝ ÷ áé ðiðyôðíá áââñiÝíá, áââáéùëâðbôð uððéÝ ÷ áââñiðÞóâé áíðbññáðá áðóáéâðbáð óá iðtibá iÜééðôðá Ý ÷ áââñiðÞóâé üððéâðyïðí, ðñéí áâéâáôðÞòâðå ði FreeBSD. Ói ðñüññáñlá áâéâðoÜðóâðçò ðið FreeBSD eá óâð ñùðÞóâé ðñéí ãñÜþâé iððéâðiðâð óóii áðbðéîð óâð, áëëÜ áððü ðc óóðeâðið ðið c áæáæéâðáðÞóâé, áââñiððÜñ ÷ áé áððüððcôð áððéâðñiðÞò.

### 2.3.3 ÁðíöáóÞóôå ðíö èá ÅæáôáóôÞóåôå ôi FreeBSD

Áí èÝéåôå ôi FreeBSD íá ÷ñçóéiiðiéÞóåé iëüéëçñi ôi óéëçñü óåó äßóéi, äåå ôðÜñ ÷ åé êÜôé Üëei ðiò ðñ Ýðåé íá ëÜíåôå áôðóÞ ôc óôéäiÞ — ïðiññåßôå íá ðáñáéåßþåôå áôðöü ôi òiÞia.

Áí ùóôüöi èÝëåôå ôi FreeBSD íá óðíðÜñ ÷ åé íå Üëéä eåéöiññæé Ü óðóôPìádå, ðñ Yðåé íá êåðáññåßôå ÷ iiññéé Ü ôií òññüöi äéÜñôåícò ôiù íåßññ Üýúí ôií åßñéü. êåé ôéöi åðéññ Üñåéöi ðiñ iñññåß ðññééåÝóåé.

### 2.3.3.1 終了したプロセスを表示する FreeBSD/i386

Jáó óéëçñüö äßöéïò PC iðiñåß íá ÷ùñéôôåß óå äéäéñéöÜ ðiÞiaðá. Óá ðiÞiaðåå áôôÜ êáëïýíóáé êáôåðiÞoåéò (partitions). ÅðåéäP ði FreeBSD Ý÷åé åðßöçö åðùðåñééÝò êáôåðiÞoåéò, ç iññáðóåå ãñÞaïñá iðiñåß íá iæçäÞoåé óå óýä÷ooç, ééat æéå ði ëüäi áôôü ié åñùðåñééÝò êáôåðiÞoåéò ááñöÝñiñóáé ùò disk slices (öÝðåð) P áðëþò slices óóï FreeBSD. Äéá ðáñÜjaåéäíá ði ðññjäñññüä fdisk ðið FreeBSD. ði iññiþi ÷æññþæðåé ðéð êáôåðiÞoåéò äßöéûm ðið PC.

Óeo áíáð Ýñâé ùò slices áíðôb æá partitions. Áðü ôc ó-÷-äâbáóç ôiõ, ôi PC ðöiööçñßæáé iùñi ðÝóöåññéò eâóâóîiPóåéò áíÜ áâbðeñ. Íe eâáðâòiPóåéò áðô Ýð iññ Üæiiðáé ðññúðâýiðóâð (primary partitions). Æá fá iâðâññáðôb áððüò i ðâññéiñéòiùò eâé fá äçleïiññPóiõlå ðâññéóóüðâñâò eâóâóîiPóåéò, äçleïiññPèçêå Ýfá fÝi áâbäiò eâðÜðiçóçò, ç áððâðâðáíYíç eâðÜðiçóç (extended partition). jâð áâbðeñ iðññâb iá ðâññéÝ-÷-âé iùñi ieá áâðâðâðáíYíç eâðÜðiçóç. lÝóá óðicí áâðâðâðáíYíç eâðÜðiçóç iðñññíyá fá äçleïiññâçeïyá áâéééÝð eiâéééÝð eâóâóîiPóåéò.

ÊÜèá êáôÜöìçóć áéâé Ýíá *partition ID*, Ýíá âñéèìü ðiö ÷ñçóéiiðiéåßöáé áéá íá áíáâñùñßæåé ôíí ôýði äåññíÝíüí ôçò êáôÜöìçóçò. Íé êáôåòìÞóåéò ôíö FreeBSD Ý÷iöí áéá partition ID ôí 165.

ÃáéééÜ, êÜéå éåééöññéêü óýóôçjá ðïö ÷ñçóéiiðíéåßòå Ý ÷åé êÜðiéi ôññüði åéá íá áíááñùñßæåé öéô êåôåôíÞóåéö. Åéá ðáñÜäåéäå ói MS-DOS éåé óå ðáñÜäúåå ôiõ, üðùò óå Windows, áíåé Ýöiõí ãñÜìäóå iäçãhí óå êÜéå ðñùðåýiõóå éåé eïäééÞ éåóÜöicçó, iâééñþíöåå ðüø ôi ãñÜìäå c:.

Ôi FreeBSD ðñÝðåé íá áâéâðåôôåéâð óá ðññùôðáýïðóá éåôÜðîçóç. Ôi FreeBSD iðññâð íá êñáðÞðåé üéá óá áâäññÝíá òið, óðiðâññëéâññâññÝíü íáéé ôùñ áñ÷åðù ðið èá äçìéïññÞðåôå áðoåßò, óá áðoôP ðç iññâæéñP éåôÜðîçóç. Ðáññüéá áðoôÙ, áí Ý÷åôå ðåññéóóùôðåññò ñðü Ýíá äßöéiñð, iðññâðßò íá äçìéïññÞðåôå éåðåôôiÞðåéð FreeBSD óá üéiñð P iññééñiyò áðññ áðoñýò. ¼ðáí áâéâðééðÜðå ði FreeBSD ðñÝðåé íá Ý÷åôå iéá éåôÜðîçóç áééâèÝóéñç. Iðññâð íá áßíáé iéá éåñP éåðoÜðîçóç ðið Ý÷åôå ðññâðòiñÜðåé áðññ ðññé, P iéá ððÜñ÷iñðóá ðið ðåññéÝ ÷åé áâäññÝíá ðið ááí óåð áíñéåðÝññò ðeÝí.

Áí ÷ñçóéiiðíeåßôå Päç üeåò ôéó êåâåôíPöåéó óå üeïoò ôïoò åßóéiòó óåò, ôüôå ðñÝðåé íá åeåòeåñþpöåôå îßá ãéå ôí FreeBSD ÷ñçóéiiðíeþpöåò óå åññåéåßá ðiò ðñÝ ÷iiðáé áðü ôá Üeëá eåéòiõñæéêÜ ôðóôPíáôå ðiò ÷ñçóéiiðíeåßôå (ãéå ðñÝ Üååéäíá, óçí fdisk ôóï MS-DOS P Windows).

Áí Ý÷åôá ìéá äéæá Èýóéïç êáôÜòïçóç, ìðiñåßôå íá ôçí ÷ñçóéïïðiéÞóåôå. Ùóùò üiùò ÷ñåéåôåß íá óôññéêïþóåôå ðñþôå  
íßá þ ðåñéóòïòåñåò åðü ôéò ðòÜñ ÷ iðoåò êåôåòïÞóåéò óåò.

Iéla áæÜ ÷ éóðc áæáðÜ óðáócs ðið FreeBSD lðiññab íá éáðáæÜ áæé ìüééð 100 MB ÷ þþñið óðið áßðóéi. Úðóðúöi áððP áßíáé iéia ðiðey áæÜ ÷ éóðc áæáðÜ óðáócs c ðiðiðá áæá ðiðPðáæ Ü áðüeëið ó ÷ áðüi ÷ þþii ðiðá áæéÜ óðo áñ ÷ áðá. Já ðeí ñáðééðóðéü áæÜ ÷ éóði áßíáé ðá 250 MB áæá ÷ ðiðPðc ÷ ðiðñbð ñáñáðéü ðáñééðÜ eëiði ðiðáé 350 MB P ðáñéóðúðñá áí Ý ðiðñá ñáñáðéü ðáñééðÜ eëiði ñáñáðóðá. Áí Ý ÷ áðo ðiðiðu íá áæáðáðóðPðáðo ñáñéáðÜ ðiðñiñÜ ñáñáðá ðiðñbðu ñáñéáðóðáðóðí, ðiðá ÷ ñáñéáðóðáðó ñáñéáðóðí.

Íðiñáðbóá íá ÷ñçóëiiðiéÞóåôá êÜðiér áiðiñééÜ áæáéÝóéii áññááëåßü üðùò ôi **PartitionMagic®**, Þ êÜðiér áæáýëåññi áññááëåßü üðùò ôi **GParted**, áæá íá áæéÜfåôá iâaÝèç ôóeo êáðåôíÞóåéó óáð éáé íá áciéiõñäÞóåôá ÷þñi áæá ôi FreeBSD. Ôúóí ôi **PartitionMagic** üóí éáé ôi **GParted** iðiññý íá ÷ñçóëiiðiéçeiý íá êáðåôíÞóåéó NTFS. Ôi **GParted** áßbiáé áæáéÝóéii óá áñéåðóÝò áæáññÝò Linux Live CD, üðùò áæá ðánÚäåéñá ôi SystemRescueCD (<http://www.sysresccd.org/>).

„ííí áíáööñéåß ðñiiâéPiáóá êáôÜ ôcí áëéåP iåå Yéiøò êáôáöiPöåúí ouí Microsoft Vista. OóíBöôåôáé íå Y÷åôå ðñü÷åñíí Yíá CDROM åâéåôÜôåöçò ouí Vista ðñíí åðé÷åñíPöåôå áôôP ôç äéåéêåóßá. ¼ðùò êéå iå üéåô öéô áíößööîé÷åò äéåéêåóßå äßöüí, oóíBöôåôáé áßBöçò íå Y÷åôå Yíá áiciåñùíYíí ôåô áíöéæñÜöúí áóöéåßåò.

**Đññiáéáïõíßçóç:** ËáíèáóíÝíç ÷ñþóç ôùí áññááëéßùí áôôþí ìõíñåß íá íäçáþóåé óå äéáññáöþ ôùí äåäíÝíùí ôíõ äßóéíõ óáò. Đññéí óá ÷ñçóéíõíðéþóåôå, áââáéùèåßôå üöé Ý÷åôå ðñüööåôå áíôßññáöå áóöáéåßáò óá ìõíßá äíõéåvýöí.

ĐáñÜääåéäjá 2-1, ×ñcóéüđđébíôåò ìéá ŐđÜñ÷iñóá ÉáôÜôicóç ÷ùñßò já ôcí ÁeeÜåôå

Öðriðie Ýóða üöé Ý÷åôå Ýíá öðriðieäéóòP ia Ýíá iùñi óeëçñü äßóei 4 GB óoii iðiñi Ý÷åôå Päc åæéåôåööçíÝíç ieá Ýeäiöç ôú Windows eáé oïi Ý÷åôå ÷uñßóåé óå ayíi iäcäiñi ïa ãnÜñáåå C: eáé D:, eáé Ýíá ia Ýååëiò 2 GB. ÷åôå 1 GB

äåäïïÝíùí óöïï C: êáé 0.5 GB äåäïïÝíùí óöïï D:.

Áðóð ú óciáßíáé üðóé í äþóðéiò óáó Ý÷åé äýí êáðóðiòþóáéð, iþá áíÜ aðñÜliá iæçaiý. Iðinñåþóð íá áíðéæñÜþðåð üðéá óá ððÜñ÷iðó áðæiñÝíá óáó aðü öií D: óií C: êáé íá äéðóðeñþóáðå Ýóóé öçí äýóðañç êáðÜðiçóç, þóðå íá åßíáé Ýóïéiç æáá ði FreeBSD.

**ĐáñÜääéäìá 2-2. Óõññééíþüïöáò ìéá ÕðÜñ÷iõóá ÉáôÜòíçóç**

Õðie Ýóôâ üöé Ý-âôâ Ýá õðieïæóôþ ia Ýá iüñ äböei 4 GB óöñ iöñbi Ý-âôâ þäc äâéådåôðþoâé ieá Ýeäiöc ôùí Windows. ¼ôáí äâéådåôðþoâóâ ôá Windows, äcìeïöñþoâóâ ieá iañ Üeç êáô Üôïçöc iñ oï añ Üiñá c: eáé iÝâaëiò 4 GB. Äôðþ ôç ööeäiþ ÷ ñçöeïiðieäbðoâé 1.5 GB ÷ þññö eáé eÝeâôâ íá äþoâóâ ôöi FreeBSD 2 GB ÷ þññ.

Ãéá íá åæêáôáóôPóåôå ôi FreeBSD èá ðñÝðåé åßôå:



### 2.3.4 ÓõëëÝîôå Đëcñïoïñßåò ãéá ôç Ñýèiéóç ôïõ Äéêôýïõ óáò

#### 2.3.4.1 Óyääöç iå Äßêooï Ethernet þ Modem Cable/DSL

Áí óořá Ŷáooå óå äßêooř Ethernet P áí Ÿ÷åoå óýíäoç Internet ià ÷ñPóç äëääêôP Ethernet iÝóù êáëüäéâéPò P DSL óýíäoçò, eá ÷ñâéáoåßbôå ñeóò áéüüřiøeåò ðeçñiømßåò:

1. Äéâýèòíóç IP (IP Address)
  2. Äéâýèòíóç IP ôçò ðñïâðéëåâiÝíçò ðýëçò (default gateway)
  3. ¼ññá ððíëiäéóôP (hostname)
  4. Äéâðèýíóâéò IP ôiõ äéâéñéóôP DNS (DNS server IP addresses)
  5. IÜóéá Õðíæéôýïõ (Subnet Mask)

Áí äáí ãíùñbæåôå áðóò Ýò óéó ðëçñïöiñbåð, ñùòðPóôå ôií äéá ÷ åðéñéóðP óðóòðPìåðiò P ðii ðáñi ÷ Ýá ððçñåóéþí Internet ðið óáð áîððçñåôåß. Ç áðÜíôçóç iøiñåß íá åßíáé üöé ié ðëçñïöiñbåð áðóò Ýò åé ÷ ùñiýíðåé áðóðüiáôå iå ÷ ñPóç DHCP. Óciåéþóôå ôcí ðëçñïöiñbå áðóò.

#### 2.3.4.2 Óyíäåóç iÝóù Modem

Áí ÷ñçóéiiðíéåþóå áðééiäééP (dial up) óýíäåóç íà êÜðíei ðáñi: Ýá Internet (ISP) íå ÷ñþóç áðéiy modem, iðinñåþóå êáé ðÜéé íá ååéåðåóþóåôå öi FreeBSD iÝóù Internet, aééÜ èá ÷ñåéåðåþóå ðÜñá ðíéy ÷ñüi.

Èá ÷ñåéáóôåß íá îÝñåôå:

1. Ôíí áñéèìü êëþóçò ôíï ISP óáò
  2. Ôç óáéñéáêþ èýñá (COM:) óôçí iðiþá áßíáé óðíäâiÝíi ôíí modem óáò
  3. Ôíí üññá ÷ñþóôç (username) éáé êúáééü (password) áæá ôíí ëíäáñéáòiù óáò ôíí ISP

### 2.3.5 ÅéÝäîôå ãéá ÐáññÜìáôá (Errata) óôï FreeBSD

Áí éáé ôi FreeBSD project ðáó ÷ ßæáé áéá íá áâiáóöáéßöåé üöé ñÜèá Ýéäïóç ôiô FreeBSD èá áßiáé üói ðéi ôôáëåñP áßiáðåé, iñéoi Ýfåò öiñ Ýð ôôç áéáäéêáóßá áôôP áéó Ýñ ÷ iiôåé èÜèç. Óå ðriëý óðÜíéåò ðåñéðôþöåéò, óå èÜèç áôôÙ áðçñåñÜæiòi ôç áéáäéêáóßá áâéåôÙ ööôåóçò. Èáéþò óå ðñiiëÞiaðá áôôÙ áßiñiðåé áíöéëçðòÙ èáé áðéäéññéÞiñiðåé, óçíåéÞiñiðåé ôôðá ÐáñiñÜìáôá FreeBSD (FreeBSD Errata) (<http://www.FreeBSD.org/releases/9.0R/errata.html>) óå iðiñßá áñßöéiñðåé ôôçí áéêöôåâP òiðièåóßá ôiô FreeBSD. Ðñéi lâééíÞoåôå ôçí áâéåóÙ ööôåóç, Èá ðñ Ýðåé íá áé Ýâiåôå óå ÐáñiñÜìáôá áéá íá áââåéùèåßöå üöé áâi ððÜñ ÷ iòi ðñiiëÞiaðá ôçò óâéäöôåßöå ôôéâiÞò óå iðiñßá èá Ýðñåðå íá áñùñßæåôå.

Đeçññöiññßåò ãéá üëåò ôéô åéäüöåéò, ðåññéëåíâáññ Ýíúí êáé ôúí ðåññíñâí Üôúí ãéá êÜëå íßá, iõññíýí íá âññåèíýí ôóç ôáéßåá ðeçññöiññéþí Ýêäiöçò (<http://www.FreeBSD.org/releases/index.html>) ôçò åéêôôáêþò ôíðïèåóßåò ôíø FreeBSD (<http://www.FreeBSD.org/index.html>).

### 2.3.6 Áíáêôþóôå ôá Áñ÷åßá ÅâêáôÜóôáóçò ôïõ FreeBSD

Ç äéáäéêáóßá ååéáô Üóôáóçò ôïö FreeBSD ïðïñâß íá ååéáôáôÞóåé ôï ëåéöïññéêü óýóôçìá ÷ñçóéïïðíéþíôå áñ÷åßá áðü ôéò ðâñâéÜôù ôïðíëåóßåò:

ÔñđéêÜ ÌÝóá



ÄBEOÖT

- Ìéá ôíðíèåóßá FTP, ìÝóù firewall P ìå ÷ñPóç äéáêéóôP ìáöíëÜâçóçò (HTTP proxy) áí åßíáé áíáâéáßí.
  - já åíñðçñåôçôP NFS
  - Ìéá áðíèëéóôéêP ðánÜëëçëç P óåéñéáêP óýíååóç

ÁÍ Ý÷åôå ááññÜóåé ôí FreeBSD óå CD þ DVD, ôüôå Ý÷åôå Þäç üöé ÷ñæÜæåóôå êáé ìðiñåßôå íá ðÜôå óóïï åðüìåâíí ôíÞíá (ÓíÞíá 2.3.7).

Áí ááí Ý ÷-âóå áéüíà áíáéêÓþóåé óá áñ-÷-âßá áâéâóðÜóðåóçò òiö FreeBSD èá ðñÝðåé íá áâßbôå ôí ÔíÞìá 2.13 ôí iðiñßí áîçãåß ðòù íá ðññiâðöiéíáóðâßbôå áéá ôçí áâéâóðÜóðåóç òiö FreeBSD íå iðiñiäÞðiòå áðü ôíðò ðáñáðÜíù ôññüðiòð. Áoïý áééâáÜóðåóð ôí ôíÞìá áðóü, éá ðñÝðåé íá áññbôåðå íáíÜ áâþ êáé íá áééâáÜóðåóð áðü ôí ÔíÞìá 2.3.7.

### 2.3.7 ÅöïéìÜóôå ôá ÌÝóá Åêêßíçóçò

Ç æäéäéêåóþá åéêþíçóçò ðiõ FreeBSD îâééïÜåé la ôçí åéêþíçóç ðiõ ððïëïæéóôþ óáð óðí ðñüñâñâíï åâéâðÜóðâóçò ðiõ FreeBSD—äáí ðñüñâéðâé åéá ðñüñâñâíï ði iðïþi iðïñâðâó íá åéðâé Ýóâðâ áðü êÜðïéï Üëéï èâéðïðñâéëü óýóðçïá. Í ððïëïæéóôþ ðó ðáð óððóéïæéÜ åéééïâð ÷ñçóéïðéþiôáð ði ëâéðïðñâéëü óýóðçïá ðiõ åâéâð åâéâðåðâðçïÝíï óðí óéëçñü åßóéï óáð, åéëÜ iðïñâß åßðþóçò íá ñöðééïðâðß íá -ñçóéïðéâß liéá “æéóé Ýóâ åéêþíçóç”. Íé ðâñéóóûðâñïé óýâ-÷ñiié ððïëïæéóôÝó iðïñïýí åßðþóçò íá åéééïÞóïðí áðü Ýíá CDROM óðíï áíðþðóîé-÷i iäçãü áíÜâñúðçò, Þ áðü liéá iíÞìç flash iá óýíâåðç USB.

**Õõüäääéï:** Á Ý÷åôå õî FreeBSD óâ CDROM þ DVD (åßôå ðõí áäiñÜóåôå, åßôå ðõí åöîéíÜóåôå í ßæéïò), êáé í ðõíëiäéóþò óáo åðéóñÝðåé åêéBíçóç áðü CDROM þ DVD (ôòðééÜ lÝóù ôçò åðééiäþò "Boot Order" þ áíðßóöîé-çò ôïõ BIOS), iðiññåßôå íá ðåñáäåßøåôå áðôõü ôî ðiþpiá. Óá CD þ DVD ôïõ FreeBSD åßíäé åêééíþóéíá êáé lõiññý íá ÷ñçooéíiõíceiy íáé ôçí åäéäåÜóåôåóç ôïõ FreeBSD ÷uñßò êaiéÜ Üeëc éäéåßðåñç õñiäöîéíåóßá.

Ãéá íá äciéiõñãPóåôå íéá åêêéíPóéic iíPíç flash USB, áeíeiõèPóåôå ôá ðáñáéÜôù âPiáôá:

- ÁíáêôÞóôå ôçí Áéêüíá ÅääâôÜóôåóçò ãéá lÍPiç Flash USB  
lÍðñâßôå íá êáôâåÜóâôå ôí áñ÷âßí áéêüíáò áðü ôíï êáôÜëíä ISO-IMAGES / ôçí ôïðièåôßá  
<ftp://ftp.FreeBSD.org/pub/FreeBSD/releases/arch/ISO-IMAGES/version/FreeBSD-version-RELEASE-arch>  
ÁíôééâôåóôÞóôå ôí arch êáé ôí version iå ôçí áñ÷éôâôïíéêþ êáé ôçí Yéäiöç ðiø åðéèôìåßôå íá  
åääâååóôÞóåôå. Åéá ðánÜäåéäíá, óå áñ÷âßá ãéá ôí FreeBSD/i386 9.0-RELEASE åßíáé äéáè Yóeiá ôçí  
ôïðièåôßá <ftp://ftp.FreeBSD.org/pub/FreeBSD/releases/i386/ISO-IMAGES/9.0/FreeBSD-9.0-RELEASE-i386-memstick.img>.  
Ôí áñ÷âßí ðiø ðñíñîñßæåôåé åéá ÷ñþóç iå lÍPiç USB, Y÷åé êáôÜëçí .img. I êáôÜëíä ISO-IMAGES /  
ðánéY÷åé ðëþëiø åéäöññâôéêþí áñ÷âßùí êáé áðöü ðiø èá ÷ñâéâôåßå åíâññôÜóåé ôôçí ðñâñâôéêüôçôå áðü ôçí  
Yéäiöç ôí ðiø FreeBSD ðiø èá åääâôåóôÞóåôå êáé åíâå ÷í Yíñùð êáé áðü ôí ðëéêü ðiø ôðièræôþ óåò.

2. ÅñÜøôå ôi Áñ÷åßí Åéêüíáò óôç ÌÞíç Flash  
×ñcõëñðëíþóåò ôi FreeBSD æá óci Åâññáòþ ôiõ Áñ÷åßíö Åéêüíáò

**Đĩa ảo USB:** Đây là một cách đơn giản để truy cập dữ liệu từ USB mà không cần kết nối trực tiếp. Các phần mềm như Daemon Tools hoặc PowerISO cung cấp khả năng tạo ra các đĩa ảo có dung lượng lớn, cho phép bạn sao chép dữ liệu từ USB vào máy tính.

1. ÅääñáöP öjö Áñ÷åßijö ïÝóù ôcò dd(1)

Ôi áñ ÷ áßi . iñg äáí áßíáé Yíá éáñíééú áñ ÷ áßi ðiö iðinñáßóá áðëþò íá áíðéæñ Üþåôå óóç iíÞìç flash. Ðñüéåéóáé óóçí ðñáàíåééüöçóá æáá íéá áééúíá óùí ðåñéá ÷ ií Yíüí iøüééçñö ðiö áßóéiö. Áðóü óçjáßíáé üðé äáí iðinñáßóá áðëþò íá áíðéæñ Üþåôå óá áäáíí Yíá áðü ðií Yíá áßóéi óóíí Üééí. Èá ðñ Yðåé íá ÷ ñicóéiiðiéÞþåôå óçí áíðiøéP dd(1) æáá íá ãñ Üþåôå óíi áñ ÷ áßi áééúíáð áðåðéåßáó óóí áßóéi:

```
# dd if=FreeBSD-9.0-RELEASE-i386-memstick.img of=/dev/da0 bs=64k
```

Áí èÜââôå òî iÞíðiá èÜëiòò operation not permitted, âââáéùèåßôå üöé ç óðóêåðP ðiò ðñiøðåèåßôå íá ÷ñçóéiiðíéçó Ýóå äåí åßíáé Þäç óå ÷ñÞóç, åïäå ÷ñÝùò ðñiøánôçì Ýíç áðoüìáôå áðü èÜðiéí âïçèçôéëü ðñüññâiiá. ðäéôå ðñiøðåèåÞóôå íaiÜ.

× ñçóëüïéþíôáò ôá Windows® áéá ôçí ÅäñáöP ôïõ Áñ÷åßíõ Åéêüíáò

**Đĩa lõi**: Là một đĩa cứng có kích thước nhỏ, thường được sử dụng trong các thiết bị di động như điện thoại di động, máy tính bảng, v.v.

## 1. ÁíÜêôçóç ôiõ ÐñiâñÜìáôiò **Image Writer** áéá Windows

H åöáññiäP **Image Writer** åéá **Windows** ábíráé åéáýéåññi ñæäéóíéüú ðí iðíbiñ iðíññåb íá ÷ñçóéiiðíéçéåb åéá ôç òúôóP åääññåöP åíüò áñ÷åßiõ åéëüíáò óå ieá iñÞic USB. Iðíññåbóá íá ðí iðíëåññåbóá https://launchpad.net/win32-image-writer/ êáé íá ðí iðíøiðéÝóåôå óå Ýíá öÜéäei.

## 2. ÅääñáöP öiõ Áñ÷åßiõ ìå öi Image Writer

ÊÜÍôå áéðëü êééê óóí áééiißäéí **Win32DiskImager** áéá íá íâééíÞróåôå óí ðññüäñâííá. ÊÜÍôå êééê óóí áééiißäéí óíö öáéÝéïö éáé åðééÝíôå óíí áñ÷åßí ðïö èá ãñÜøåôå óóç ííÞíç USB. ÊÜÍôå êééê óóí ðéÞéôñí **Save** áéá íá åðíäå÷èåßôå óíí üüñíá áñ÷åßíö. Åðåéçéåýôå üöé íé ðáñáðÜñ áíÝññåéåò åßíáé óùóôÝò êáé üöé åáí ððÜñ÷íöí óá Üééä ðáñÜéöñá Üññé÷ðíé öÜéåééí åðü óç ííÞíç USB. ÓÝéïö, ÊÜÍôå êééê óóí **Write** áéá íá ãñÜøåôå óíí áñ÷åßí áééüíáð óóíí íäçäú.

Ãéá íá äçìéïõñäÞóåôå äéóêÝôåò åêëßíçóçò, áéïïõèÞóôå áôôÜ ôá âÞìáôå:

## 1. ÁíáêôÞóôå ôá Images (Áñ÷åßá Åéêüíüí) ôùí Äéóåôþí

**Óciáíóéêü:** Óciáíéþþóôå üéô óôéò åéäüöåáéò 8.x ôiõ FreeBSD, äái õðÜñ÷åé ðëÝíï õððíóðþñéïç áéá äéóéÝåò åéêßíçóçò. Äåßôå óéò ðáñáðÜíù iäçãßåò áéá íá êÜíåôå åâéáôÜóôáóç iÝóù iíþìçò USB flash, þ ÷ñcoéïiõðéþþóå áðëþò Ýíá CDROM þ DVD.

Ié æóéò Ýðåð àåêëßíçóçò åßíáé æáéæ Ýóeïåò óóï iÝóï åâæáô Üóóáôçò ðiõ Ý÷åôå, óoïí êáô Üëíäi floppies / éæé iðiñâßôå åðßóçò íá ôéó êáðåââ Üóáôå áðü oïí áíðßóôíé ÷ i êáô Üëíäi  
ftp://ftp.FreeBSD.org/pub/FreeBSD/releases/arch/version-RELEASE/floppies/.  
ÁíðééâðåôðÞóôå ðá arch êáé version ìå ôçí ãñ ÷ éðåâðïíéêþ êáé oïí áñéëìü ôçò Ýëäïöçò ðiõ è Ýéâðå íá åâæáôáôðÞóôå áíðßóôíé ÷ á. Áéá ðánÜäåéäiá ðá images ôúí æóéêðôþí åêëßíçóçò æáé FreeBSD/i386 8.2-RELEASE åßíáé æáéæ Ýóeïá áðü ôçí òiðiæåôßá  
ftp://ftp.FreeBSD.org/pub/FreeBSD/releases/i386/8.2-RELEASE/floppies/

Óa images Ý÷iõí êáôÜëçíç . f1p. O êáôÜëiäiò floppies / ðåñéÝ÷åé áñêåôÜ äéäöinåôéêÜ images, êáé ôi ðiéá èá ÷ñâéáôôåßôå àâññôÜðåé åðü ôçí Ýéäiöc ôiõ FreeBSD ðïõ éá åâñêåôåôÞóåôå, êáé óå iñéóíÝjåò ðåññéôbhåéô.

êáé áðü òîr ðëéëü (hardware) óóír iðíbír êÜíâðôå áâðâðóÜóôáóç. Óðéò ððâñéðóüðâñâðò ðâñéððþóâðéò èá ÷ ñâðâðóôâðþðâ ðÝóðâñèò áæéêÝðâðò, óéò boot.flp, kern1.flp, kern2.flp êáé kern3.flp. ÅéÝâðôå òîr áñ ÷ åððí README.TXT ðíð ðâñþðâðâðéò óóír ßâðí áâðâðóÜëírâ ãðá òéð ðâðâðóôâðþðâ ðëçñïððñâðò ð ÷ áðééÜ íâð ðâðâðóÜ.

**Óciáíóéêú:** Ôi FTP ðñüäñáííá ðíö èá ÷ñçóéííöíéþóåôå ðñÝðåé íá ÷ñçóéííöíéåíß áðåäåééûò ôññüöñ íåðåöíñÜð (binary mode) æáá íá êáôåâÜóåôå óá images ôúí æéóêåôþí. ÍñéóíÝííé ööëëííåðñçöÝó åñíáé ãíùóôú üöé ÷ñçóéííöíéíý ASCII ôññüðí (êåéíÝííö), ôi íöíßí èá ôi êáðåéÜåðåôå áí äåí íðñåßôå íá êÜíåðå áåéêßíçóç áðü ðéò æéóêÝôåô.

## 2. Đñiåôïëî Üóôå ôéò ÄéóêÝôåò

Áðü ê Üeåá áñ÷åßí image ðiòó êåðåâÜóåóå, ðñÝðåé íá äçléïõñäÞóåôå íéæóêÝóå. Åßíáé åðéåâåëçíÝíí, íéæéôÝôåô åðôöÝò íá lçíÝ ÷iòí åéåôôþìåóå. Í åðéïüöåñòò ôññüðiò åéá íá ôí åéÝåâåôå åßíáé íá ôðó åéåíñöþþóåôå åðåßò. Lçí åíéðéöåýåôåôå ðññ-åéåíñöùóå íá lçí åééôÝôåô. Ôí ðññüññáliá åéáüññöùóçò ôúí Windows åáí èá óåô åéäïðiéÞóåé åéá ôçí ðáññöóßá ÷åéåóíÝíùí ôññüÝùí, åðéþò èá ôíòò lññéÜññé ùò “÷åéåóíÝíñòò” êéé èá ôíòò åññíÞóåé. Óåó ôóìåïðoéåýïòå íá ÷ñçóéiiðiéÞóåôå êáéíñýñéåò åééôÝôåô áí åðééÝíåôå åðóòÞ ôç íYéiäíí åññéåóÜóôåóçò.

**Óċiáíóéeu:** Ái őñiőðáèþóåôá íá áâéáôáôþóåôá ñi FreeBSD éáé ñi őñüäññáâ áâéáôÜóôáóqò êi  þóá  ,   ðáâþþóåé þ i   êÜði   ôñüði   óðiðâññéòÝñâðáé   ðâñßâññá, i   ðñþþi   ñi   ðñýðá   íá âßíáé i   æéóéÝðá  . Äi  éÜóôá íá âñÜðåôá ñi images óá i  Ýðá   æéóéÝðá     ðñi  ðáèþóåôá i  áÜ.

### 3. ÅñÜøôå ôá Áñ÷åßá Image óå ÄéóêÝôåò

Óá áñ ÷ áßá . f1p ääí áßíáé éáñíééÜ áñ ÷ áßá ðiö iðiñáßóå íá áíðéáñ Üøåôå óå äéóéÝôå. Áßíáé images ðiö Y ÷ iðí üëi öi ðåñéå ÷ üìåñi öcò äéóéÝôåó óå Yíá áñ ÷ áßi. Áðóü öcìáßíé üöé äáí iðiñáßóå áðëþo íá áíðéáñ Üøåôå óå áñ ÷ áßá áðóÜ óå äéóéÝôåó. Áíðóßéåðá, ðñ Yðåé íá ÷ nçóðíiðíéÞóåôå áéáééÜ áññáéáßá áéá íá áñ Üøåôå óå images áðóÜ áðåðèáßáò óðéó äéóéÝôåò.

Áí ðñüéåéóáé íá äçèïëñóåòå ôéò äéóé Ýôåò óá Ýíá õðieëæéóòþ ðiø åéóäéåß MS-DOS / Windows, óåò ðánÝ÷iöñá Ýíá åñãåéåßí áéá áóòþ ôçí åñãáóßá, öïí fdiimage.

Áí ÷ñçóéíïðíéåßôå ôá images ôúí äéóéåôþí áðü ôí CDROM êáé í íäçãüò óåò CDROM åßíáé óöí ãñÜìíá E : , èá åêôåëÝóåôå ôçí åíPò åíöiëP:

```
E:\> tools\fdimage floppies\boot.flp A:
```

Áí ãñÜöåôå ôéò äéóéÝôåò óå Ýíá óyóôçìá UNIX (üðòù êÜðieí óyóôçìá FreeBSD) ìðññåßôå íá ÷ñçóéiiðieÞóåôå õcì áîöîéÞ dd(1) ãéá íá ãñÜøåôå óå image áñ÷åßá áðåôæåßáó ôéò äéóéÝôåò. Óöi FreeBSD èá ãñÜøåôå:

```
# dd if=boot.flp of=/dev/fd0
```

Óóí FreeBSD ç óooéåôP, /dev/fd0 áiaóÝñåoáé óocí ðñþôc iirÜäá äeóêÝôáò (óii íäçäü A:). Ç óooéåôP /dev/fd1 èá þöáí i íäçäüü B:, ê.i.ê. ¶ëéåð ðåñäeéåÝò ôiõ UNIX iðññab íá ÷ñçöeñiðeýí äeáóññåôéêÜ iirÜäáò áæá óiõò iäçäüvò äeóêÝôáò êaé èá ÷ñåéåðôb íá åeÝåiñåôc ôiõ ñåéicñbñúòc ôiõ óoðô Þiáðòjò óaò êaóðÜ ðåññbðòñúòc.

Åßóôå ôbhñá Ýôjéjíé já iâééíÞóåôå ôcí åâéáôÜóôáóç ôjõ FreeBSD.

## 2.4 Îåêéíþíôáò ôci ÅæááðÜóôáóç

**Óçìáíôéêü:** Ôi ðñüñáñáìá ååêéááðÜóôáóçò äái èá êÜíáé êáíéÜ áéëéááþ óóïò äßóëïò óáò iÝ÷ñé íá ååßôå ôi áéüëïòei iþíóíá:

Last Chance: Are you SURE you want continue the installation?

If you're running this on a disk with data you wish to save then WE STRONGLY ENCOURAGE YOU TO MAKE PROPER BACKUPS before proceeding!

We can take no responsibility for lost disk contents!

Ç ååêéááðÜóôáóç iðiññáß íá áéðñùèåß iðiñéáäþðiòå óóéäþ iÝ÷ñé íá ååßôå ôci ôåëééþ ðñiäáéäïðiþçóç ÷ùñßò íá åßíáé êáíéÜ áéëéááþ óóá ðåñéå÷üìáíá ðiõ óéëçñíý äßóëïò. Áí áíçóð÷åßôå üöé Y÷åôå êÜíáé êÜðíéá ëÜëíò ñyéíéóç iðiññåßôå áðëþò íá óåþóåðå ôiõ ððiñéáéóþ ðñéí áðü ðiõ óçìåßí áðôü, êáé åái èá äçìéiõñâçèåß êáíÝíá ðñüåæçíá.

### 2.4.1 Åêëßíçóç

#### 2.4.1.1 Åêëßíçóç óôci Áñ÷éôåéííéþ i386™

1. Îåêéíþóôå iå ðiõ ððiñéáéóþ óáò áðåíññäðiéçìÝíí.
2. Åêëéíþóôå ôiõ ððiñéáéóþ óáò. Éáèþò iåééíÜáé èá ðñÝðåé íá ååß÷iåé êÜðíéá åðééíäþ ãéá íá åéóÝëéååå ôóï ðñüñáñáìá ññðèñßôåùí ôiõ BIOS (BIOS setup), ôoíþðèùò iå ôci ðßåóç êÜðíéïð ððiþðômïõ ûððùò ôi F2, ôi F10, ôi Del þ ôi õðiñðåóïi Alt+S. ×ñçóðiðiéþóôå ôi õðiñðåóïi ðiõ óåßíåðåé óóci iëüíç. Óå êÜðíéåð ðåñéððþóåéò, êáôÜ ôci ååêëßíçóç iðiññáß óóci iëüíç óáò íá óåßíåðåé êÜðíéï ãñáðéêü ëiññüðði. ÕððééÜ, ðéÝæñíåð ôi Esc ôi ãñáðéêü áðôü ååíðáíßæåðåé êáé iðiññåßôå ðeÝíí íá ååßôå ôá áðáñáßðçóå içíýíáôå.
3. Áññåßôå ôc ñyéíéóç ðiõ åëÝã÷åé áðü ðiñéåð óðóééåðÝð ååêééåß ôi óýóðciá. Óðiþðèùò áíáöÝñåðåé ùò “Boot Order” êéé ååíðáíßæåðåé ùò èßðôåå õððééåðþí, ûððùò åéá ðáñÜäåéäíá Floppy, CDROM, First Hard Disk, ê.i.ê. Áí ðñüéåéåé íá ååêéíþóåå áðü ôi CDROM, ååâåéúèåßôå üöé Y÷åôå êÜíáé ôci áíðþóðié÷ç åðééíäþ. Áí ðñüñéåéåé íá ååêéíþóåå áðü USB iíþíç flash þ áðü åééÜÝðå, ååâåéùèåßôå üöé Y÷åôå åðßþçò êÜíáé ôc óúóðþ åðééíäþ. Áí åái åßóôå óßáüðñíé, õðiñðééåððååßôå ôi åñ÷åéñßæé ðiõ ððiñéáéóþ þ / êáé ôçò içôñééþò ðeáéÝðå. ÈÜíóå ôci åéëéááþ, áðiñéçéåýóðå êáé ååßôå áðü ôi ðñüñáñáìá ññðèñßôåùí. Í ððiñéáéóþò óáò èá åðáñååééíþóåé.
4. Áí ðñiäåðiéÜóåå iíþíç flash USB, ûððùò ðåñéññÜöååé ôiõ Òiþíá 2.3.7, içí ðáñåéåßþåå íá óðñäÝóåå ôc iíþíç ôci åíðþóðié÷ç õððíäi÷þ, ðñéí åíññäðiéþóåå ôiõ ððiñéáéóþ óáò.

Áí èá ååêéíþóåå áðü ôi CDROM, èá ÷ñåéåðååß íá åíññäðiéþóåå ôiõ ððiñéáéóþ êáé íá åéóÜååå ôi CDROM ôiõ iäçäü iå ôci ðñþðç åðíåðþ åðééåñßá.

**Óçìåßùóç:** Åéá ôi FreeBSD 7.x åéáðßèåíðåé åéóéÝðåå ååêëßíçóçò ôéò iðiþåò iðiññåßôå íá äçìéiõñâþóåå ôi ðåñéññÜöååé ôiõ Òiþíá 2.3.7. Íéá áðü áðôÝð èá åßíáé ç ðñþðç åéóéÝðå ååêëßíçóçò: boot.flp. Õðiñðéåðþóåå áðôþ ôc åéóéÝðå óóí iäçäü êáé ååêééíþóåå ôiõ ððiñéáéóþ óáò.

Áí i ððiñéáéóþò óáò iåééíþóåé êáññééÜ êáé öiñþþðåé ôi ððÜñ÷ií ëåéðiõññéêü óáò óýóðciá, ôüôå åßôå:

1. Äáí åÜëáå ôç äéóêÝóá P ôi CD áñêåôÜ íùñßò êáôÜ ôç äéáæéåóßá åêêßíçóçò. ÁöÞóôå ôçí óôii iäçäü êáé åiêéíÜóå íá åðáíåêéíÞóåôå ôiõ ððiëäéóôP óáò.
2. Íé ðñiçäíýíåfåd åëëááYò ðiõ êÜíåôå óôéò ñðèìßóåéò ôiõ BIOS åáí èåéôíýñäçóáí. Èá ðñÝðåé íá åðáíåëÜâåôå ôi ãðiá åðöü íY ÷ ñé íá ðåöý ÷ åðå ôç óúóôP åðéëiãP.
3. Ôi óðñåêéñéiÝí BIOS ðiõ äéáèÝôåôå åáí ððiöôçñßæåé åêêßíçóç åðü ôi åðéëåäíYí iÝóï.
5. Èá áñ ÷ ßóåé ç åêêßíçóç ôiõ FreeBSD. Áí iâééíÜôå åðü ôi CDROM èá åâßôå iéá åééüíá üðùò ôçí åðüìåíç (Ý ÷ iõí ðáñáëåéöèåß ié ðëçñiöñßåò Yéäïóçò):

```
Booting from CD-Rom...
CD Loader 1.2
```

```
Building the boot loader arguments
Looking up /BOOT/LOADER... Found
Relocating the loader and the BTX
Starting the BTX loader
```

```
BTX loader 1.00 BTX version is 1.02
Consoles: internal video/keyboard
BIOS CD is cd0
BIOS drive C: is disk0
BIOS drive D: is disk1
BIOS 639kB/261056kB available memory
```

```
FreeBSD/i386 bootstrap loader, Revision 1.1
```

```
Loading /boot/defaults/loader.conf
/boot/kernel/kernel text=0x64daa0 data=0xa4e80+0xa9e40 syms=[0x4+0x6cac0+0x4+00
x88e9d]
\
```

Áí êÜíåôå åêêßíçóç åðü iifÜäá äéóêÝóáò, èá åâßôå iéá iëüíç üïïéá íå ôçí ðáñáêÜóù (Ý ÷ iõí ðáñáëåéöèåß ié ðëçñiöñßåò Yéäïóçò):

```
Booting from Floppy...
Uncompressing ... done
```

```
BTX loader 1.00 BTX version is 1.01
Console: internal video/keyboard
BIOS drive A: is disk0
BIOS drive C: is disk1
BIOS 639kB/261120kB available memory
```

```
FreeBSD/i386 bootstrap loader, Revision 1.1
```

```
Loading /boot/defaults/loader.conf
/kernel text=0x277391 data=0x3268c+0x332a8 |
```

Insert disk labelled "Kernel floppy 1" and press any key...

ÅéïëöèÞóôå ôéò iäçäßåò, áöáéñþíôå ôçí äéóêÝóá boot.flp, åéóÜäííôå ôçí äéóêÝóá kern1.flp êáé ðéÝæííôå **Enter**. ÎâééíÞóôå åðü ôçí ðñþöç äéóêÝóá, êáé üðáí óáò aëçðçèåß, åÜëôå ôéò Üëëåò äéóêÝóåò üðùò åðáéóåßóáé.

6. Åßôå íâééíÞóåôå áðü äéóêÝôá, åßôå áðü CDROM, åßôå áðü iñÞìç flash, ç äéáæéåóßá åêéßíçóçò èá öôÜóåé óôï íâñý ôïõ FreeBSD boot loader:

### Ó÷Piá 2-1. Íâñý Åêéßíçóçò (FreeBSD Boot Loader)



ÐâñéÝíåôå äÝéá äåñôåñüëåðôå, P áðëþò ðéÝóôå Enter

#### 2.4.1.2 Åêéßíçóç óôïí SPARC64®

Óå ðâñéóóüôåñá óôóôÞìáôå SPARC64® åßíáé ñôèíéòíÝíá íá íâééíÜíá áôôüìåôå áðü ôï óêëçñü äßóéï. Åéá íá åâéåôåóôÞóåôå ôï FreeBSD, èá ðñÝðåé íá íâééíÞóåôå åßôå áðü ôï äßéôöï, åßôå áðü ôï CDROM, êÜôé ôï iðiÞii áðåéôåß íá åéóÝëéåôå óôçí PROM (OpenFirmware).

Åéá ôï óêëü áôôü, åðáíâééíÞóåôå ôï óýóôçìá éáé ðâñéÝíåôå ïÝ ÷ ñé íá åìöáíéóåß ôï lÞíöìá åêéßíçóçò (boot). Áôôü åíáñôÜôåé áðü ôï iñðÝëï, áéëÜ ãâíééÜ iñéÜæåé íå:

```
Sun Blade 100 (UltraSPARC-IIe), Keyboard Present
Copyright 1998-2001 Sun Microsystems, Inc. All rights reserved.
OpenBoot 4.2, 128 MB memory installed, Serial #51090132.
Ethernet address 0:3:ba:b:92:d4, Host ID: 830b92d4.
```

Áí ôï óýóôçìá óåò óôíñ-ßæåé íå åêéßíçóç áðü ôï óêëçñü äßóéï, ðñÝðåé íá ðéÝóåôå: L1+A P Stop+A óôï ðëçéôññüäéï, P íá óôâßéåôå BREAK ïÝóù ôçò óâéñéåéÞò êññóüëåð (÷ñçóéññéÞíøåð åéá ðáñÜääéäíá ~# óôï tip(1) P óôï cu(1)) åéá íá óôÜóåôå óôçí ðññôññÞò ôçò PROM. Öáßíåôåé üðò ðáñáéÜðò:

ok              ①  
ok {0}          ②

- ① ÁôôP åßíáé ç ðññôññÞò ðïõ ÷ñçóéññéÞíøåð áôå óôóôÞìáôå íå ïßá CPU.
- ② ÁôôP åßíáé ç ðññôññÞò ðïõ ÷ñçóéññéÞíøåð áôå óôóôÞìáôå SMP, ôï øçößí äåß-íâé ôïí áñééïü ôçò åíâññÞò CPU.

Óôï óçìåßí áôôü, ôïðièåôÞóåôå ôï CDROM óôïí iäçäü, éáé áðü ôçí ðññôññÞò ôçò PROM, añÜøôå boot cdrom.

## 2.4.2 Åðéóêüðçóç ôúí ÁðïôåëåóíÜôùí Áíß÷íåðóçò Óðóêåðþí

Íé ôåðåððåðåð åéáôíðÜäåð åñáìíÝð ðið ðÝñáóáí áðü ôçí ièüíç óáò, áðièçêåýíðóáé, êáé ìðiñåðóá íá ôéò íáíáäåðóå.

Åéá íá äåðóå ñá ðåñéå ÷üíåíá ôçò ðñiðùñéíÞò ííÞìçò (buffer) ðéÝóðå ðið ðéÞêóñii **Scroll Lock**. Íå ôíí ôñüðií áðóü ñiññäíðiéåðóáé ç êýééóç ôçò ièüíçò. Íðiñåðóá íá ÷ñçóéíðíéÞóåðå ñá ðéÞêóñá íå ñá ååðÜééá, Þ óá **PageUp** éáé **PageDown** æá íá äåðóå ñá åðiðåëÝóðåñóá. ÐéÝóðå íáíÜ ðið ðéÞêóñii **Scroll Lock** æá íá ôåñìáðóåðóå ôçí êýééóç.

ÊÜíóå ðið áðóü ôþñá åéá íá äåðóå ñá ååðiåñí ðið êýéçóå åéðóü ñüíçò ôçí þñá ðið í ððñÞíáò áíß÷íåðå ðið ðéÞêóñéóðÞ óáò. Èá äåðóå Ýíá åéðiåñí åíðóóðié ÷í íå ðið Ó÷Þíá 2-2, áí êáé ðið åéñéåÝð åéðiåñí èá åéáöÝñåé áíÜéíäå íå ðið ðéÞêóñéóðÞ óáò.

### Ó÷Þíá 2-2. ÔððéêÜ ÁðiðåëÝóðåá Áíß÷íåðóçò Óðóêåðþí

```
avail memory = 253050880 (247120K bytes)
Preloaded elf kernel "kernel" at 0xc0817000.
Preloaded mfs_root "/mfsroot" at 0xc0817084.
md0: Preloaded image </mfsroot> 4423680 bytes at 0xc03ddcd4

md1: Malloc disk
Using $PIR table, 4 entries at 0xc00fde60
npx0: <math processor> on motherboard
npx0: INT 16 interface
pcib0: <Host to PCI bridge> on motherboard
pci0: <PCI bus> on pcib0
pcib1:<VIA 82C598MVP (Apollo MVP3) PCI-PCI (AGP) bridge> at device 1.0 on pci0
pci1: <PCI bus> on pcib1
pci1: <Matrox MGA G200 AGP graphics accelerator> at 0.0 irq 11
isab0: <VIA 82C586 PCI-ISA bridge> at device 7.0 on pci0
isa0: <iSA bus> on isab0
atapci0: <VIA 82C586 ATA33 controller> port 0xe000-0xe00f at device 7.1 on pci0
ata0: at 0x1f0 irq 14 on atapci0
ata1: at 0x170 irq 15 on atapci0
uhci0 <VIA 83C572 USB controller> port 0xe400-0xe41f irq 10 at device 7.2 on pci0
usb0: <VIA 83572 USB controller> on uhci0
usb0: USB revision 1.0
uhub0: VIA UHCI root hub, class 9/0, rev 1.00/1.00, addr1
uhub0: 2 ports with 2 removable, self powered
pci0: <unknown card> (vendor=0x1106, dev=0x3040) at 7.3
dc0: <ADMtek AN985 10/100BaseTX> port 0xe800-0xe8ff mem 0xdb000000-0xeb0003ff irq 11 at device 8.0 on pci0
dc0: Ethernet address: 00:04:5a:74:6b:b5
miibus0: <MII bus> on dc0
ukphy0: <Generic IEEE 802.3u media interface> on miibus0
ukphy0: 10baseT, 10baseT-FDX, 100baseTX, 100baseTX-FDX, auto
ed0: <NE2000 PCI Ethernet (RealTek 8029)> port 0xec00-0xeclf irq 9 at device 10.0 on pci0
ed0 address 52:54:05:de:73:1b, type NE2000 (16 bit)
isa0: too many dependant configs (8)
isa0: unexpected small tag 14
orm0: <Option ROM> at iomem 0xc0000-0xc7fff on isa0
fdc0: <NEC 72065B or clone> at port 0x3f0-0x3f5,0x3f7 irq 6 drq2 on isa0
```

```

fdc0: FIFO enabled, 8 bytes threshold
fd0: <1440-KB 3.5" drive> on fdc0 drive 0
atkbd0c: <Keyboard controller (i8042)> at port 0x60,0x64 on isa0
atkbd0: <AT Keyboard> flags 0x1 irq1 on atkbd0c
kbd0 at atkbd0
psm0: <PS/2 Mouse> irq 12 on atkbd0c
psm0: model Generic PS/@ mouse, device ID 0
vga0: <Generic ISA VGA> at port 0x3c0-0x3df iomem 0xa0000-0xbffff on isa0
sc0: <System console> at flags 0x100 on isa0
sc0: VGA <16 virtual consoles, flags=0x300>
sio0 at port 0x3f8-0x3ff irq 4 flags 0x10 on isa0
sio0: type 16550A
sio1 at port 0x2f8-0x2ff irq 3 on isa0
sio1: type 16550A
ppc0: <Parallel port> at port 0x378-0x37f irq 7 on isa0
pppc0: SMC-like chipset (ECP/EPP/PS2/NIBBLE) in COMPATIBLE mode
ppc0: FIFO with 16/16/15 bytes threshold
plip0: <PLIP network interface> on ppbus0
ado: 8063MB <IBM-DHEA-38451> [16383/16/63] at ata0-master UDMA33
acd0: CD-RW <Lite-On LTR-1210B> at ata1-slave PIO4
Mounting root from ufs:/dev/md0c
/stand/sysinstall running as init on vty0

```

ÅëÝâîôå ðñiôåâééÜ óá áðrôåëÝóådá ôçò áíß ÷ íâôôçò æéá íá âââåéùèâôå üöé ôí FreeBSD áíß ÷ íâôôå üëâô ôéò óôôåâôÝò ðïø áíáiÝáôå. Áí ieá óôôéâôP äái âñÝeçêå, ôüôå ääí èá ôç äâôôå óôç ëßóôå. Íå ôç áíPëåéå åiâåééâôìÝíò ðôñPíá îðñâôå ïðñíöeÝóåôå ðôñôôPñéíç æéá óôôéâôÝò ie îðñâôå äái ðâñééâiâÜñiôåé óôíí ðôñPíá GENERIC, üðùò ôéò êÜñôåò P ÷ iõ.

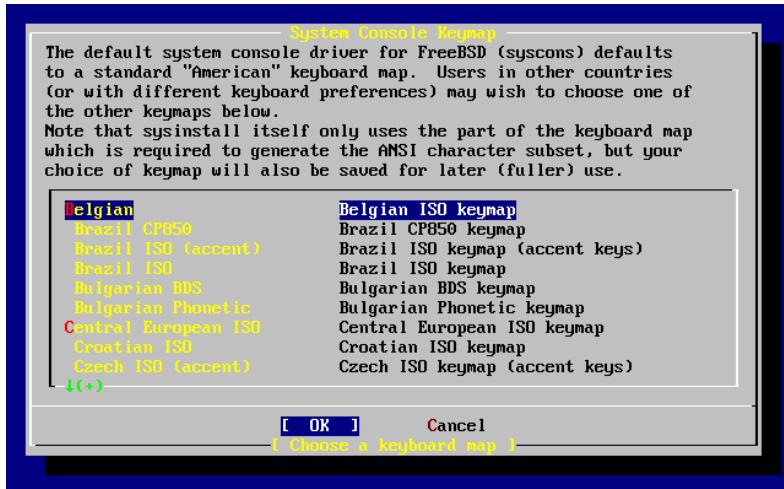
ÍåôÜ ôí ôÝeïò ôçò æéâæéâôåò áíß ÷ íâôôçò óôôéâôþí, èá äâôôå ôí Ó÷Píá 2-3. ×ñçóëiôïéPóôå ôá ââëÜééå æéá íá åðééÝâôå ðâñéï ÷ P P ÷ þñá. ðâéåå ðéÝóôå Enter, æéá íá ñõëiþóôå ôç ÷ þñá.

### Ó÷Píá 2-3. ÅðééÝâñôåò ôí Íåñý ×þñáò



Áí åðéëÝíáôå ùò ÷þñá United States, èá ÷ñçóéiiðiéçèåß ç ôoðiðiéçíÝíç ÁíåñéêáíéêP äéÜôáíç ðëçêôñiëiäßiõ. Áí åðéëÝíáôå æéaoññåôéêP ÷þñá, èá åiöáíéôåß öi ðáñáêÜòù iâñiy. ×ñçóéiiðiéPóôå óá ååëÜêéá æá íá åðéëÝíáôå ôç òùôðP äéÜôáíç ðëçêôñiëiäßiõ éáé ðéÝóôå **Enter**.

#### Ó÷Piá 2-4. ÅðéëiäP ïåñý Ðëçêôñiëiäßiõ



ÌåðÜ ôçí åðéëiäP ôçò ÷þñáò, èá åiöáíéôåß öi åáóéêü ïåñý åðéëiäßiõ ôiõ **sysinstall**.

## 2.5 ÅéóáñùäP óoi Sysinstall

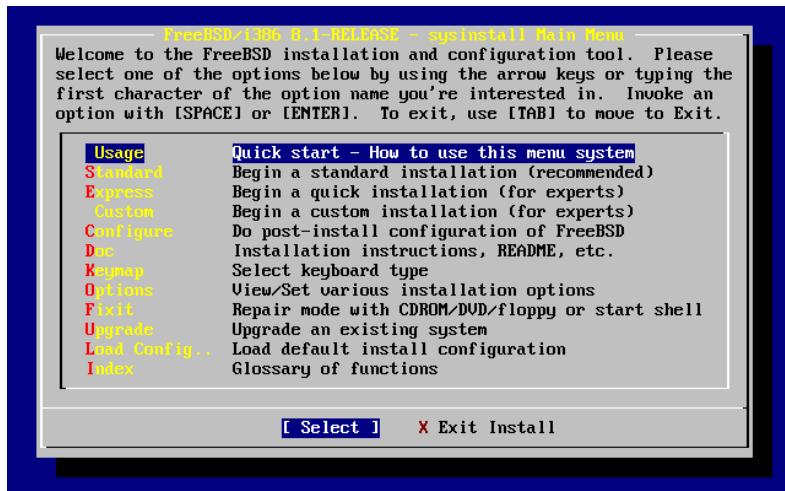
Öi ðñüäñáílá **sysinstall** ábíráé ç åöáññiäP åâéåô Üóôáóç ðiõ ðáñÝ ÷åðáé åðü ôi FreeBSD Project. Åáóßæåôáé óå ðåñéåÜëëíí êåéíÝí õùñßæåôáé óå iéá óâéñÜ åðü ïåñiy êåé iëüíåò ðiõ ìðiññåßôå íá ÷ñçóéiiðiéPóåôå æá íá ñðeñßóåôå êåé íá åëÝäñåôå ôçí åéáæéåôå ãâéåô Üóôáóçò.

Öi óyóôçìá ïåñiy ôiõ **sysinstall** åëÝá ÷åðáé iå ðá åâéÜêéá, ôi **Enter**, ôi **Space** éáé Üëëá ðëÞêôñá. ÈåðôñiñåñP ðåñéññáöP ðùí ðëÞêôñùí åôôþí êåé ôùí èâéôññäéþí ðiõ ðåñéÝ ÷åðáé óôéò iäçñßåò ÷ñÞóçò ôiõ **sysinstall**.

Åéá íá åâßôå ôéò ðëçññiñßåò åôôÝò, åââåéùðåßôå üôé åßíáé öùôéóíÝíç ç åðéëiäP **Usage** éáé üôé åßíáé åðéëåñíÝí õi ðëÞêôñi [Select] üðùò öâßíåôáé óóí Ó÷Piá 2-5, éáé ðéÝóôå **Enter**.

Èá åâßôå ôéò iäçñßåò ÷ñÞóçò ôiõ óôóôPiáò ñåñiy. Èåðüðéí ðéÝóôå **Enter** æá íá åðéôññóôå óôí êýñei ïåñiy (Main Menu).

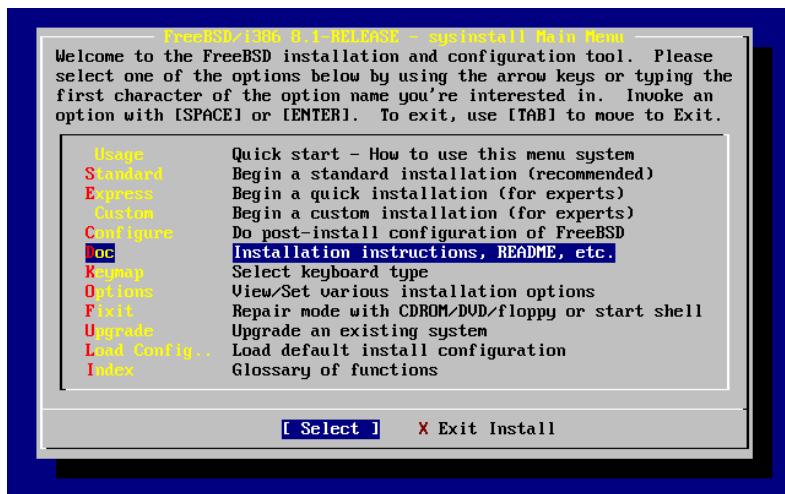
## Óðìà 2-5. ÅðéëÝäñôáò Usage áðü ôï Main Menu ôï SysInstall



### 2.5.1 ÅðéëÝäñôáò ôï ïåñý Documentation (Ôåèïçñßùóçò)

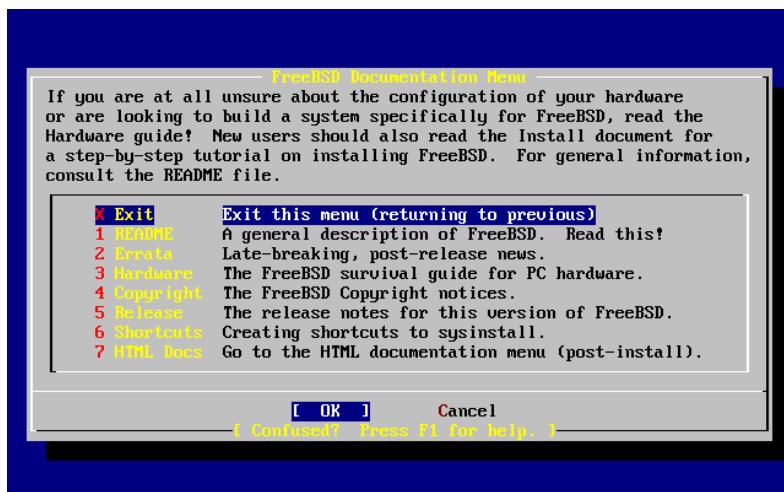
Áðü ôï Main Menu, åðéëÝäñôáò Doc iå ôá âåëÜðéá êáé ðéÝóðå Ënter.

## Óðìà 2-6. ÅðéëÝäñôáò ôï ïåñý Documentation



Áðôü èá äåßîåé ôï ïåñý Documentation.

## Ó-Þìá 2-7. Ôi Íåñý Documentation ôïõ Sysinstall



Åßíáé óçìáíôéü íá äéáâÜóåôå ôçí ðáñå÷üìåíç ôåêìçñßùóç.

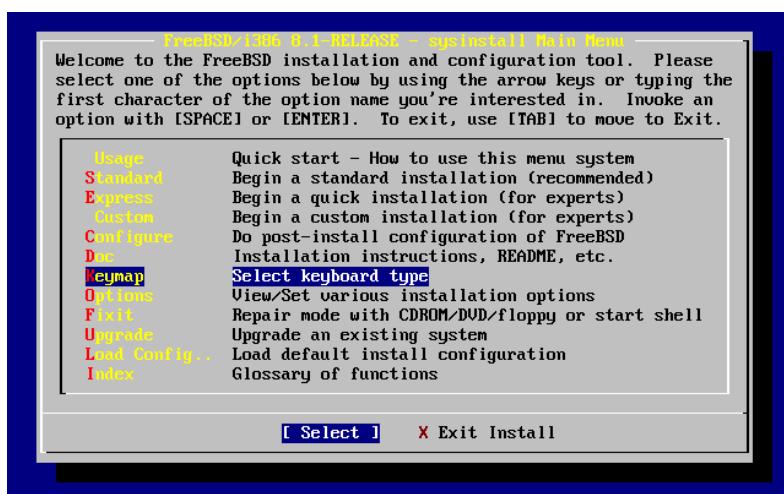
Ãéá íá äåßôå Ýíá Ýäññáöi, åðéëÝíôå ôi íå óá ååëÜééá êáé ðéÝóôå Enter. ¼ôáí ôåêåéþóåôå ôçí áíÜäñùóç åíüò ååññÜöiõ, ðéÝæññôå Enter èá åðéóôñÝóåôå óóï Íåñý Documentation.

Ãéá íá åðéóôñÝóåôå óóï Èöñßùò Íåñý ÅæááôÜóôáóçò, åðéëÝíôå Exit íå óá ååëÜééá êáé ðéÝóôå Enter.

## 2.5.2 ÅðéëÝäññôå òi Íåñý Keymap (ÄéÜôáíç Ðëçéôññëäññ)

Ãéá íá áéëÜíåôå ôç äéÜôáíç ôïõ Ðëçéôññëäññ, ÷ñçóéññëäññ ðéÝóôå Enter. Áôóü áðáéôåßóåé ìüíí áí ÷ñçóéññëäññ åéÜôáíç Ðëçéôññëäññ ðíõ åái åßíáé óôÜíåññ êáé åðßóçò ãéá äéáôÜíåéò åêôüò ôçò Áääëéêþò ÇÐÁ.

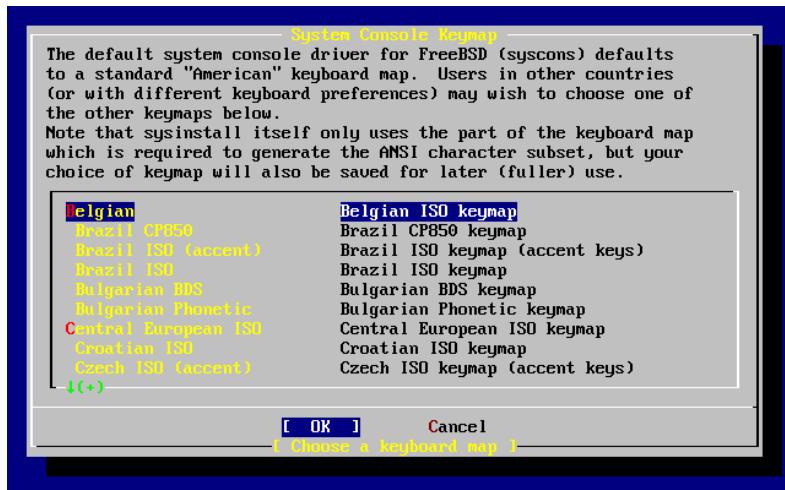
## Ó-Þìá 2-8. Èýññi Íåñý ÅæááôÜóôáóçò (Sysinstall Main Menu)



Ìðñâôå ìá áðééëÝiâôå äéáöiñâôéêP äéÜôåíç ðëçêôñiëiâßiõ êÜñiôå òçí áíôßôôïé÷ç áðéëiâP áðü òiìñý ÷ñçóëiðiéþíôå òá áâëÜééá, éáé ðéÝæiiôå Space. ÐéÝæiiôå iáíÜ Space éá éaôáññÞóåôå òçí áðéëiâP. ¼ôáí ðâæâéþóåôå, áðééÝiôå [ OK ] iá òá áâëÜééá éáé ðéÝóôå Enter.

Óòçí ðáñâéÜôù áðâéêüíéóç ôçò ñëüíçò öáßíâôåé iüñi ìÝñiò ôçò ëßóôåò. Áí áðééëÝiâôå [ Cancel ] ðéÝæiiôå òi Tab éá ÷ñçóëiðiéÞóåôå òçí ðñiâðééâñíÝíç äéÜôåíç ðëçêôñiëiâßiõ éáé éá áðéóôñÝóôå óóí Êýñéí ìåñý ÅæááôÜóôáóçò.

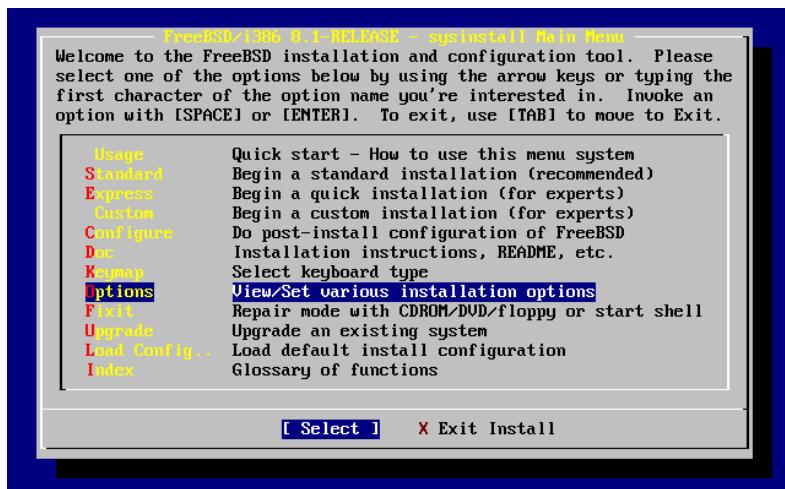
## Ó-Þia 2-9. Ói ìåñý Keymap ôiô Sysinstall



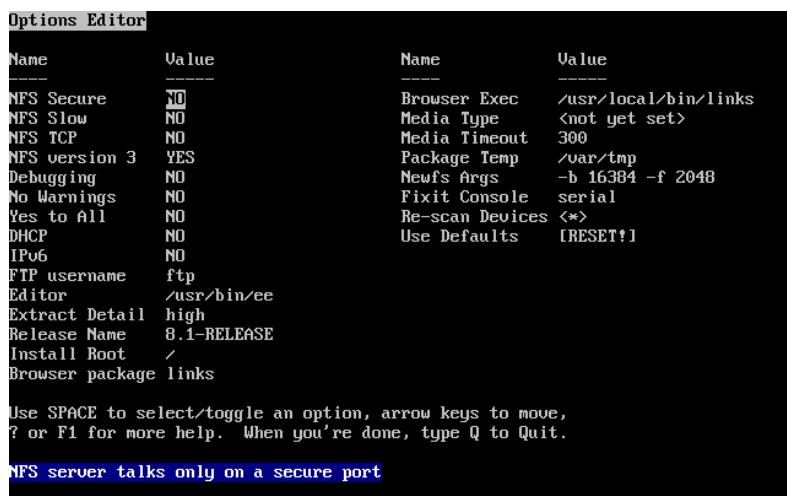
## 2.5.3 Ç ïèüíç Installation Options (Åðéëiâþí ÅæááôÜóôáóçò)

ÁðééëÝiôå Options éáé ðéÝóôå Enter.

## Ó-Þia 2-10. Ói Êýñéí ìåñý ôiô Sysinstall



## Ó-Þìá 2-11. ÅðéëiäÝò ôiõ Sysinstall (Options)



Íé ðñiåðéëåáiÝíåò ôeÝò åßíáé óoíÞèùò óùóôÝò ãéá ôiõò ðåñéóóüöåñiõò ÷ñÞóôåò êáé åái ÷ñåéÜæåôáé íá áæéá ÷ëíýí. Ôi üññá ôçò Ýéäiöçò (Release Name) áæéÜæåé áíÜëíäá íå ôçí Ýéäiöç ðiõ ååéåèßóôåáé.

Óóí êÜòù íÝñiò ôçò iëüüíçò, åìöáíßæåôáé íå ôiíéóíÝíi ìðëå ÷ñþíá ç ðåñéäñåöP ôiõ åðéëåáiÝíi ñ áðééåéíÝíi. ÐáñáôçñÞóôå üüé ìéá åðü ôéò åðéëiäÝò åßíáé ç Use Defaults ç iðiþá åðáíáöÝñåé üëåò ôéò ôéíÝò óôéò áñ÷ééÝò ðñiåðéëåáiÝíåò ôiõò ñoëiþóåéò.

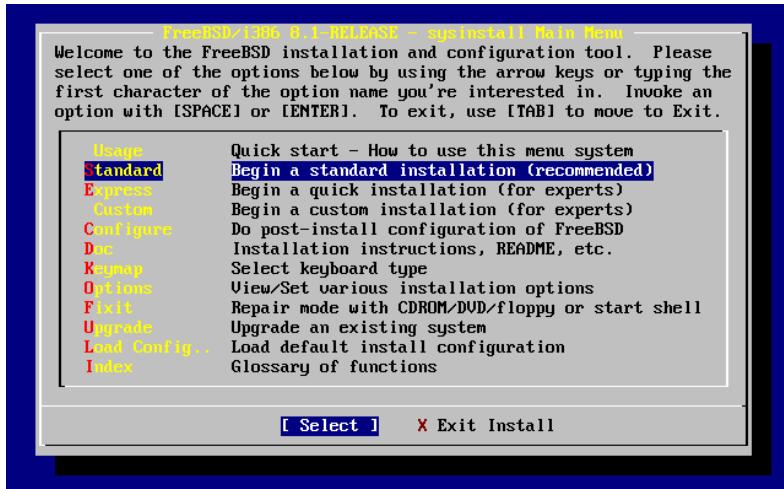
ÐéÝóôå õi **F1** ãéá íá äéááÜóåôå ôçí iëüüíç åíÞèåéåò ó÷åôééÜ íå ôéò äéÜöiñåò åðéëiäÝò.

ÐéÝæiiôå õi **Q** èá åðéóôñÝøåôå óoí Êýñéí lâñíý ÅãêáôÜóôáóç.

## 2.5.4 lâééíÞóôå ìéá ÔoðéêP ÅãêáôÜóôáóç (Standard Installation)

Ç Standard åãêáôÜóôáóç åßíáé ç åðéëiäP ðiõ õoíþóôåôåé ãéá ôiõò íÝíi ÷ñÞóôåò ôiõ UNIX P ôiõ FreeBSD. ×ñçóéiiðiéÞóôå õá ååéÜêéá ãéá íá åðéëiäÝíåôå Standard åðü õi lâñíý, êáé ðéÝóôå **Enter** ãéá íá lâééíÞóôå ôçí åãêáôÜóôáóç.

Ó÷Piá 2-12. Åêêßíçóç ôçò ÔõðéêPò ÅãéáôÜóôáóçò (Standard Installation)



## 2.6 Åê ÷ þñçóç × þñïõ óôí Äßóêí

Öi ðñþöi óáð áþíá áßíáé íá áâð: ùñþóåôå ÷ þñii áßóðeiø ãéá ói FreeBSD êáé íá áçleieñðáþóåôå ìéá áðóééÝóá (label) óóï ÷ þñii áðóúþ þþóå íá iðñiñÝóåé íá óiñ ðñþåðiøiëÜóåé ói sysinstall. Æá ói óéiðü áðóúþ ðñÝðåé íá ãiùñþæðóå óiñ ôñüði íá óiñ iðñiþi ðññéiÝíáé ói FreeBSD íá áññáé óðeo ðeçñiññðåó óoï áßóðeiø.

### 2.6.1 Áñßèìçóç ôùí Äßóêùí ìå âÜóç ôï BIOS

Đñéí áâéâôáôðÞóâôá êáé ñöðëíßóâôá ôí FreeBSD ôóí óýóôðçia óáò, ôðÜñ ÷ áé Ýíá óçìláíôðéü èÝíá ôí iðiðír ðñÝðâé íá áññùñßæâôá, áéçâééÜ áí Ý ÷ áâðå ðíëëíýð ôéèññíýð äßôéïðò.

Óá Ýíá PC ôi iðiþíi ÷ níçóéiñðíéåb éåéðiññáéêü óýðóçíá ôi iðiþíi áâñanôÜðáé áðü ôi BIOS, üðùnô áâñiaé ôi MS-DOS þ óá Microsoft Windows, ôi BIOS áâñiaé óá èÝóç íá óðiðanÜíâé ôç óâæñÜ ðñiðâñáéüðôçôáð ôùí äþðéuú éâé ôi eâéðiññáéêü óýðóçíá áðëþð ðóñâáððæé ìá áððÞ. Áððü áððéñYðâé óði ÷ ñÞðóç íá áâééñÞðâé áðü Ýíá áâðóei áéðiññáðéêü áðü áððü iði ðó ÷ ïU eâéïýia “primary master”. Áððü áâñiaé eâéâðâñá áîrëéêü áéá êÜðiðið ÷ ñÞðóâð ðið Ý ÷ iði áâðéâéýþâé üðði é åððéiñðâñáðiò eâé öðçíüðâñáðiò ññuðiò íá Ý ÷ iði Ýíá áíðâñáðiò áóðâñáéðâñáðiò ôi ðó ñððóðÞðiáðiò ðiðið, áâñiaé íá áâiñÜðiði Ýíá áâýðâñíi üñiði ðéçñü áâðóei, éâé íá áíðéññÜðiði ãíÜ ðâæðÜ áéâððÞðiáðiò ðiði ðñþði ðiðið áâðóei ðói áâýðâñíi ÷ níçóéiñðiþðið ðñiðñÜíâñáðiò üðùnô ôi **Ghost®** þ ôi **XCOPY**. ðóé, áí i ðñþði ðiðið áâðóei ÷ áéÜðáé, þ ðâ ÷ eâé âððþðâñáðiò áðü éü, þ ðáññiðóéÜðáé ðñiñâéçíá áíâðéñâðiò êÜðiði ðâæððÞðiáðiò ôi ðó ñððóðÞðiáðiò, i ÷ ñÞðóç ðiðiññáð áâýðâñíi íá áððáñáðiò Ýññáðiò ói óýðóçíá ñððiðâñáðiò ôi BIOS íá áíðéññÜðáé ôç eâéðiñði ðâæñÜ ôùí áâðóeuí. Áâñiaé óáí íá áíðéññáðiò Ýðiði ðó ñððóðÞðiáðiò ôc óâæñÜ ôùí éâéññâñüi ôðiði ðiðið áâðóei ðó ñððóðÞðiáðiò ôi eâéðiñði.

Óá ðeí áêñéâ Ü óðóô Þiaðá ìå åëâæô Ýò SCSI, óð÷i Ü ðáñééâ ìå Útiðí áðâæô Üóâéò óoi BIOS ðið áðéôñ Ýðiðí òcí áæéâ Þ òcô áñþeìcòcò ìÝ ÷ñé áððó Ü áþðéùv SCSI, ìå ðáñüñiðí òññüði.

јáо ÷ nPóöcô ăñíéêåéùí Yíò iá óçí ðáñáðÜù aëñáóüöçôá, iëññâb íá âññåéåb ðñí åéðëPñåùò üöáí óá áðiöååé Yóíáóá iá ôí FreeBSD åái åbíáé óá áíáíáñüåíá. Ôí FreeBSD åái ÷ nçóeñïðíéåb ôí BIOS ééá åái åíññßæåé ôçí "éåôÜ ôí BIOS eïäéép åéÜðåíç ôúí räçäþ". Åðóú iëññâb íá räçäPñåé óá åééåßöåñá ðåññßëëéåð êåðåóóÜóåéò, åééåéÜ áí ie åßöðéíé Y ÷ iõí ðáññüíéå åáññåöñßá ééé Y ÷ iõí åßßöcô óá Bæáé åáññí Yíá (åbíáé i Yíá eëëbñò ôíö Üeëiö).

¼ðáí ÷ ñíçöéíüðíéåßôå òï FreeBSD åðéóôñ Ýøðå ôçí óäéñ Ü ûùí íæçþí óòï BIOS ôçí õððéíëëéëð ðiòð ðññéí ååðååðôÞóåôå òï FreeBSD éáé åöÞóåô ôçí Ýðóé. Áí ðñ Ýðåé íá áíáëëÜíâôå òïðò åðóëïòò åðåáiy ðiòð, êÜíôå òï áëëÜ íå òï áýðéíëë ññûðï: áñíßñôå òï êïòðß êáé áéëÜíôå è Ýðåéò óóå jumpers (âñá ÷ ðêóëëñùðññå) éáé óóå åéëþæá.

Íéá ÉóóimBá áðü ôá Áñ÷åBá ôúí Åíáéñåóééþí Ðåñéðåóåéþí óiø Bill êáé Fred:

O Bill áéáéyáé Ýía ðáééü iç÷ Üíçíá Wintel áéá íá öödeÜíâé Ýía áéüíá FreeBSD iç÷ Üíçíá áéá òi Fred. Í Bill ááéáééóó Ü Ýía óéëçñü äbðéíí SCSI ùò óooéåòP iå áñééü içä Ýí éáé ááéáééóó Ü óå áôòP òi FreeBSD.

Í Fred íáééí Ú íá ÷ ñçóéííðiéåb öi óyóôöçíá, áééí Ü iáö Ü áðü áñéåö Ýò iÝñàö ðáñáöçñåb üöde í ðáééüö SCSI áßöéïò áráö Ýñåé áñéåö Ü íç éáöáöññöéé Ü eÜëç (soft errors) éáé áíáö Ýñåé öi ååäiiüö aôöü óoíí Bill.

läö Ü áðü iänñéé Ýò áéüia iÝñåò, i Bill áðiöáðßæåé üöé Ý÷äé Yñëåé ç þñä íá áíðéïåðùðßöåé öi ðñüäëçìá, éäé Yôóé ðéÜíäé Ýíá áíðßööïé÷i SCSI äßöei áðü öi “áñ÷åßi” ööí ðßöù àùiÜöei. Jäo áñ÷ééüö Yëäå÷iö åðéöÜíäéäo äåß÷iåé üöé i äßöeiö èäéöiöññaåß êäññééÜ, éäé Yôóé i Bill åäéåééööÜ öi äßöei áðöü ùö SCSI iiiÜää òÝóóåñä éäé áíðéäñÜöäé (iÝóú image) ðëÞñùö õá äääñíÝíá áðü öi äßöei lçäÝí ööí äßöei òÝóóåñä. Öþñä ðöi i iÝiö äßöeiö åßíäé åäéåéåðåööçíYñiö éäé èäéöiöññaåß öñööÜ, i Bill áðiöáðßæåé üöé åßíäé éäéP éäÝá íá áñ÷ßöåé íá öií÷ñçöéiiðíéåß, éäé Yôóé åÜæåé óå åöáññiäP öç åöíáðüöçöå öiö BIOS íá aëeÜæåé öçí áñßèïçöç öuí äßöeuí þööå öi öyööçìá íá iâééÜäé áðü öi äßöei òÝóóåñä. Öi FreeBSD iâééÜäé éäé åöðåëåßöåé éäññééÜ.

Í Fred : ñçóéiiðíeåb ôçý íÝá Ýéäiöc ôiö FreeBSD æáä iåññéêÝò iÝñåò, ééä ðéóöiðíeåb üöde åßíäé åññåòÜ éåëP æáä ÷ñPöc ôöi ðíPia lç ÷áíéêPö. ÷åé Ýñéåé ç þñá íá áíöeññÜøåe üëç ôç ãiöeåéÜ ôiö åðü ôçí ðåééÜ Ýéäiöc. ôöé i Fred ðñiöanôåb ôi äßöeï iå åññéìü ðÝooåñä (ôi öåäåööåbí áíöBññäöi ôçò ðåééÜò Ýéäiöc ôiö FreeBSD). Í Fred åðiäiçöåýåöåé üöååí åíåéåëýðöåé üöé ååí ðöÜñ ÷åé ôBðiöå åðü ôçí ðíëýöéïç åññåóßå ôiö ôöi äßöeï iå åññéìü ðÝooåñä.

Điõ ðPääí ôá äääiiYíá;

$\frac{1}{4}$ ðáði í Bill Yéáíá öðüðiññáðeéþ áðíðéáññáðoþ ðiðr áñ÷ ééiy SCSI áððóeiði ìçäÝí óði SCSI áððóeiði ðYóðoáññá Ýáéíá i "IÝiò eéþpiò".  $\frac{1}{4}$ ðáði í Bill Üeeáíá ðcí áñþðèlçóç óði SCSI BIOS þóða íá ïðiñÝóðáé íá íâééíÞðoáé áðü ðc iiiiÜää SCSI ðYóðoáññá, áðëþð eéññúéððað ðiñ áððóðu ðið. To FreeBSD ÷ñcðéiðiýóðá áéññá ðc iiiiÜää SCSI ìçäÝí. Þóðu áððoþ c áééáðþ óði BIOS íá ðñiñéæÝóðáé ðcí laññéþ Þ ieeéþ ðüññóðc ðiðr ðþæééñ Boot Þ ééá ðið Loader áðü ðiñ áððééññáíÝí áðü ði BIOS áððóeiði, áééÜ üððáí áíáæÜáññiði ða ðñiñññÜññáða íäþðçóç ðiðr ððññÞíá ðið FreeBSD c áñþðèlçóç ðið BIOS éa áññíçéð, éáé ði FreeBSD éa áððáÍYééæ óðc ððññééññáðeéþ áñþðèlçóç ðuù áððóðuñ. Óði ðaññÜáññéññá iáð, ði ðýñðóðçíá óðiÍY÷éðá íá éáéðiññáðb ðiñ áñ÷ ééü SCSI áððóeiði ìçäÝí, éáé üeá ða áððññññÝí ðiðr Fred Þðáí áððáð, éáé ü÷é óðií SCSI áððóeiði ðYóðoáññá. Óði áððñññüð ðiðr óði ðýñðóðçíá öðaéññüðaí íá éáéðiññáðb áðü ði SCSI áððóeiði ðYóðoáññá Þðáí áððeþ Ýí éáðáðéåýáðoíá ðc ðñiñþðéíçò ðñiñóðiññáðb.

Åßìáóðå åðôð÷åßò íá áíáéïéþróðiå üöð äáí ÷ Üèçéáí êáèüëö ääññÍá êáðöÜ ôçí áíáéÜëðøç öiö öäéññÍññö åðôïý. Í ðääéëüo SCSI äßóëiò içäÝí áíáéôÞèçêå áðü öi óuññü, êáé üëç ç åññåóßá öiö Fred åðéóññÜöçêå óå åðöñü (êáé ôþñä i Bill ïÝññåé üöé ìðiññåß íá ìåññÜåé ùò öi içäÝí).

Áí éáé óðcí éóðiñbá áóðP ÷ nçóðiñbá ðeçécaí tæcæiñ SCSI, íe áñ ÷ Yð éó ÷ yíðiñ áiñbóñ ëáé aéá tæcæiñyð IDE.

## 2.6.2 Äciéïõñäþíóáò Slices ìå ×ñþóç ôçò FDisk

Áöiý åðééÝíâôå íá íâééÍþóåôå íéá ôððééþ áâéåôÜóôáóç (standard installation) óöi sysinstall èá äâßôå óið ðáñáéÜóù íþíöiá:

## Message

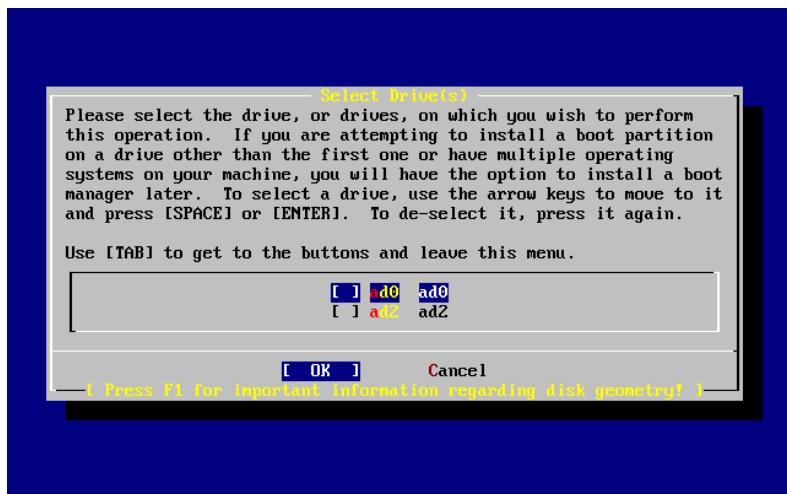
In the next menu, you will need to set up a DOS-style ("fdisk") partitioning scheme for your hard disk. If you simply wish to devote all disk space to FreeBSD (overwriting anything else that might be on the disk(s) selected) then use the (A)ll command to select the default partitioning scheme followed by a (Q)uit. If you wish to allocate only free space to FreeBSD, move to a partition marked "unused" and use the (C)reate command.

[ OK ]

[ Press enter or space ]

ÐeÝóðå Enter óyiöüíá iå ðéò ñäçäßåò. Èá ääßóð åüðóå leá ëßóóå iå üeïiòò ðiòò ðiøéçñíyò äßóéiòò ðiòò áíß÷iåðóå ið ððñÞiaò eåòÜ ôç aeÜñéåé åôçò áíß÷iåðóçò óðóéåðþí. Ói Ó÷Þia 2-13 äåß÷iåé Ýíá ðáñÜäåéäiá åðü Ýíá óýóðçìá iå äyí äßóéiòò IDE, ÷iòò óå iiüüäðå ad0 eåé ad2.

Óðréðaðið er ófærilegt með FDisk.



Óóùò íá áíáñùôé Ýóôå áéáôß äái ððÜñ ÷ áé áäþ óðóêåðÞ ìå üiiîá ad1. Óé áßíáé áðôü ðïö eåßðåé;

Óéâöôåßôå ôé èá ãéïüôáí áí åß ÷ áôå äýï IDE äßóêïöð, Ýíá ùò master óöï ðñþöï IDE åéâäêôþ, êáé Ýíá ùò master óöï äýóåñï IDE åéâäêôþ. Áí öi FreeBSD öiöò áñéèïýóå üđùò öiöò Ýâñéóêå, äçë. ùò ad0 êáé ad1 üéá éá ëåéöïñäïýóáí êåííéêÜ.

ÁÍ üüùò ðññöö Ýôåíâ iåðöÜ Ýá ôññbôî åßbôéï, ùò óðóðéåðP slave óóïï ðñþbôî IDE åéååêôþ, åððP eá aéíüödáí ðëÝíï ad1, êåé ç ðññçäïÿiäíç ad1 eá aéíüödáí ad2. Åðåéäþ ôá iïüüådå ðùí óðóðéåðþí (üðùò ad1s1a) ÷ñçóeïiðieýíödåé aéá ðçí åýñåöç ðùí óðóðöçí Üðùí áñ ÷ åßùí, iðññåb íá áíåéåéýððåôå iáöfíéêÜ ûöde êÜðïéå áðü ôá óðóðöþiådå áñ ÷ åßùí óåð åäí åíöáißæiïödåé êåéiïéêÜ eáé ðñÝðåé íá aééÜiåôå ðçí ñyèiéöç ôiø FreeBSD óåð.

Æá íá fâðâñáóðâþ ðí ðññüâæçíá áðöü, í ðõñþíáð ἰðïñâþ íá ñððééðâþ fá iññÜæåé ðíðð IDE áí Üëiáá iå ôçí èÝç ðíðð, êáé ü-÷-e iå ôç óâéñÜ iå ôçí iðiþá áíé-÷-iâýiióáé. Iå ðíí ðññüði áðöü, i master äßóéiò oóíi äâýôâñi IDE äéââéêðP eá åßíáé ðÜtñá, ad2, áéùiá êáé áí äâí ððÜñ-÷-åé oóðéâðP ad0 P ad1.

Ç ñýèìéóç áðôþ Ábbíáé êáé ç ðññâðééâáí Ýíç ãéá ôíí ððñPíá ôíõ FreeBSD, êáé ãéá ôí ëüäú áðôú ç iëüíç äáß ÷ íáé ad0 êáé ad2. Ôí iç ÷ Üíçá áðû ôí iðíßí ëÞöèçêá ç áéêüíá áß ÷ á äßóéïò master êáé ôóïò äýí áéââéòÝó IDE, áßþ ááí áß ÷ á êáíÝíá áßöéí slave,

Đñ Ýðåé íá áðee Ýiâôå òiä älbóëi ôöii iïðiñi èá ãbíåé ç åâeåô Üóôåóç ôiö FreeBSD êáé íá ðéÝóåôå [ OK ]. Ôi **FDisk** èá ïâééÍPóåé, jà ièüic áïòbóöié÷c ià áôòP ðòj öäbíåôåé ôöii Ó÷Piá 2-14.

Ç ièüíç ôïö **FDisk** åßíáé ÷ùñéóìÝíç óå ôñßá ôìPiáôá.

Ôi ðñþþi ôiþia, ôi iðiþi êáéýðoåé ôeò äýi ðñþþoåò ãñàìíÝò ôcò ièuúçò, äåß ÷ íåé eäððiñ Ýñååéåò ãéá ôií åðééååíÝ ñií äßóéi, ðið ðåñééååíÜñiñi ôi üññá ôiõ óoi FreeBSD, ôc åùñüåðoñßá ôiõ, êáé ôi oññiñééü ìÝååéi ðiõ.

Õi ääýöôåñi õiPiá ääß ÷ íåé ôå slices ôå iõibá ñðÜñ ÷ iõí ôóï äßöeï ôç äääñi Ýíç ôóéäiP, ôå õçiaßå ôóå iõibá iâééñiÝý êáé ôåëäéþriñi, ðüiõi iãäÜëá åßíáé, ôçí iññáóåå ðiõ Ý÷iõ ôóï FreeBSD êáé ôçí ðåñéäñåöP ðiõò êáé ôiñ ôýði òiõò. Õi ðáñÜäåéäiá åôöü äåß ÷ íåé äýí leéñÜ á÷ ñçöeïiþçôå slices, ôå iõibá åßíáé ðåññåéåò ðiõ ôñüðiõ äeÜôåíçò ôúí äßöeùí ôóå PC. Äåß ÷ íåé äßöçò Ýíç iãäÜëi FAT slice, ôiõ iõibü ñðÜñ ñðÜñ åiõäiþçôåé ùò C: ôóå MS-DOS êáé Windows, êáéþò êáé ieá åéôåôåí Ýíç êáôÜôïçóç ç iõibá iõiñåß íå ðåñéÝ ÷ åé êáé Üëëá ãñÜñåôå iäçäþí æáé ôi MS-DOS P ôå Windows.

Ôí òñßôí òíÞíá, äåß÷ íåé ôéò åíöïëÝò ðiö åßíáé äéæéÝóéïåò óôcí **FDisk**.

Óðréðið Fdisk með ófærtum ótaknum.

Disk name:		FDISK Partition Editor						
DISK Geometry: 16383 cyls/16 heads/63 sectors = 16514064 sectors (8063MB)								
Offset	Size(ST)	End	Name	PType	Desc	Subtype	Flags	
0	63	62	-	6	unused	0		
63	4193217	4193279	ad0s1	2	fat	14	>	
4193280	1008	4194287	-	6	unused	0	>	
4194288	12319776	16514063	ad0s2	4	extended	15	>	

The following commands are supported (in upper or lower case):

A = Use Entire Disk    G = set Drive Geometry    C = Create Slice    F = `DD' mode  
D = Delete Slice    Z = Toggle Size Units    S = Set Bootable    I = Wizard m  
T = Change Type    U = Undo All Changes    Q = Finish

Use F1 or ? to get more help, arrow keys to select.

Ôj̄ ôé èá êÜíåôå ôbhñá åâjáñô Üôáé áðü ôj̄ ðùò èÝëåôå íá ÷ùñßóåôå ôj̄ äßóéï óáð.

Áí èÝéåôå ôi FreeBSD íá ÷ñçóéiüðiéÞóåé üei ôi äßóêi óáò (óâÞñiüôåò Ýôóé üeá óá Úëéá åâäiñÝíá áðü áôôüí, üôáí åðéåååéþóåôå åñäüôåñá óôçí åâéåôå Üóôáóç üöé èÝéåôå ôi sysinstall íá ðñi÷ùñÞóåé) ïðiñåßôå áðëþò íá ðéÝóåôå A ôi iðibí áîðéóôié÷âß iâ ôçí áðéëiäP Use Entire Disk (xñÞóç iëüëëçñiõ ôið äßóêiõ). Íé ððÜñ÷iðoåò êáôåðiÞóåéò èá åéåññáöiyí, éáé èá áíóééåôåóåéiyí iâ iéñP ðâññéi÷P iâññéñéóíÝíç ùò unused (â÷ñçóéiüðiBçôç) (íáíÜ, iéá ðâññáYññååé åñí äæåôÜiâñí äßóêiõ óóí PC) éáé iâ Ýíå iâñÜëi slice åéá ôi FreeBSD. Áí ôi êÜíåôå áôôü, éá ðñÝðåé íá åðééÝíåôå iâ óá åâéÜëéå ôi iÝí FreeBSD slice êáé íá ôi iâññéÜññååò ùò åéééíÞóéii (bootable) ðéÝæéïôåò ôi ðëþêñi S. C iëüíç óáò èá åßíåé áññéåÜ ðâññiñé iâ ôçí Ó÷Piá 2-15. ÐáññåðçñÞóôå ôi A óôçí óôþëç Flags, ôi iðibí åâß ÷iâé üôé ôi slice åßíåé active (åíâññi), éáé ðñüüéåéôåé íá åßíåé åééßíçôç áðü áôôü.

Áí ðñüüéåéôåé íá åéåññÜøåôå Ýíå ððÜñ÷ií slice åéá íá åçïéiññÞóåôå ÷þñi åéá ôi FreeBSD, éá ðñÝðåé íá åðééÝíåôå ôi slice iâ óá åâéÜëéå, éáé íá ðéÝóåôå D. ïðiñåßôå êáôüðéi íá ðéÝóåôå C, éáé èá åñùôçèåßôå åéá ôi iÝññéiò slice ðiõ èÝéåôå íá åçïéiññÞóåôå. C ðñiâðééååíÝíç ôiðP ôóí aeÜëiñí áíóéðñiöüðåÿåé ôi iÝññéiò åññåôü slice ðiõ ïðiñåßôå íá åçïéiññÞóåôå, ôi iðibí iðiññåå íá åßíåé ôi iÝññéiò ôóñå ÷üìññi ðëëiê åéåÿéññi ÷þñiõ P ôi iÝññéiò iëüëëçñiõ ôið äßóêiõ.

Áí Ý÷åôå Piç åçïéiññÞóåé ÷þñi åéá ôi FreeBSD (þóùò iâ ôç ÷ñÞóç êÜðiñi åññåéåßiõ üðùò ôi PartitionMagic) ïðiñåßôå íá ðéÝóåôå C åéá íá åçïéiññÞóåôå iÝí slice. Èá åñùôçèåßôå éáé ðÜëé åéá ôi iÝññéiò ôið slice ðiõ èÝéåôå íá åçïéiññÞóåôå.

#### Ó÷Piá 2-15. ÉáôÜôïçóç Fdisk ðiõ ×ñçóéiüðiéåß iëüëëçñi ôi Åßóêi

```
Disk name: ad0          FDISK Partition Editor
DISK Geometry: 16383 cyls/16 heads/63 sectors = 16514064 sectors (8063MB)

Offset      Size(ST)        End      Name  PType       Desc   Subtype   Flags
  0          63            62      -      6    unused     165      CA
  63         16514001      16514063  ad0s1    3    freebsd

The following commands are supported (in upper or lower case):
A = Use Entire Disk  G = set Drive Geometry  C = Create Slice  F = `DD' mode
D = Delete Slice     Z = Toggle Size Units  S = Set Bootable   I = Wizard m.
T = Change Type      U = Undo All Changes   Q = Finish

Use F1 or ? to get more help, arrow keys to select.
```

¼ôáí ôåëåéþóåôå, ðéÝóåôå Q. Íé áéëéåÝò óáò èá áðiñçêåôôiyí óóí sysinstall, áéëÜ åâí èá åñáööiyí åêüüå óóí äßóêi.

### 2.6.3 Åæáô Üóôáóç Äéá÷åéñéóôP Åééßíçóçò (Boot Manager)

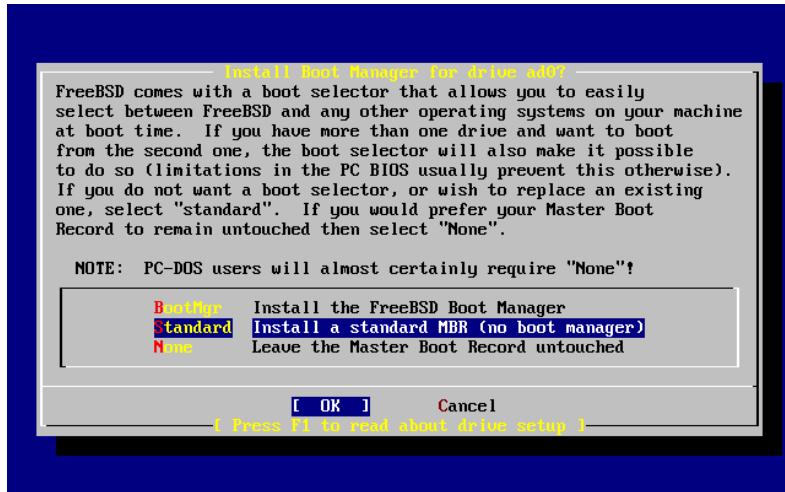
, ÷åôå ðþñá ôçí åðéëiäP íá åâéåôåóôÞóåôå åéá ÷åéñéóôP åééßíçóçò (boot manager). Óå åâíééÝò åññiñÝò èá ðñÝðåé íá åðééÝíåôå íá åâéåôåóôÞóåôå ôi åéá ÷åéñéóôP åééßíçóçò ôið FreeBSD áí:

- ÷åôå ðâñéóôüðåññiòð áðü Ýíå äßóêiòð, éáé Ý÷åôå åðééÝíåé íá åâéåôåóôÞóåôå ôi FreeBSD óá äßóêi ðiõ åâí åßíåé iðñþò.
- ÷åôå åâéåôåóôÞóåé ôi FreeBSD iâæß iâ Ýíå Üëëi eâéöiññéêü óýóôçíå óóíí ßæéi äßóêi, éáé èÝéåôå íá ïðiñåßôå íá åðééÝññåå íá èá iâééíÞóåôå ôi FreeBSD P ôi Üëëi eâéöiññéêü, üôáí iâééíÜøå ôið ðëëiæéóôP óáò.

Áí ôi FreeBSD ðñüüêåéôáé íá åbíáé ôi ïííáæéü èåéôïoñæéü óyóôçìá óoïï ððiæiæóôP óáò, éáé åbíáé ååêåôåôçìÝñí óoïï ðñþöi ôéèçñü äbóëi, ôüôå åbíáé åðáñêPò i Standard æáé ÷ åéñéóôPò åêêßíçóçò. ÅðéëÝiôå None áí ðñüüêåéôáé íá ÷ ñçóéiiðiéPóåôå æáé ÷ åéñéóôP åêêßíçóçò ôñþöi êåóåéåôáôP, i iðiþiò åbíáé ééáíüò íá åêêéíPóåé ôi FreeBSD.

ÊÜíôå ôçí åðéëiæP óáò éáé ðéÝóôå Enter.

#### Ó-Piá 2-16. Ôi ìamný Boot Manager ôiõ Sysinstall



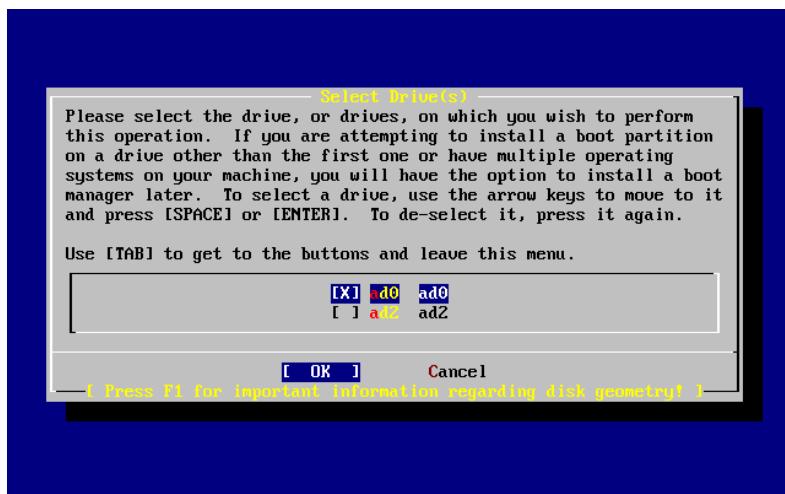
Ç ièüíç aïPèåéáò, óôçí iðiþá Ý ÷ åôå ðñüüôåáóç ðéÝæiíôå òiõ **F1**, óðæçôÜ óá ðñiäëPíáôå óá iðiþá åíäå ÷ ñÝñùò èá áíðéiåôùðþóåôå üôáí åðé ÷ åéñPóåôå íá ÷ ñçóéiiðiéPóåôå óií ßæéí äbóëi óá ðåñéóóüôåñá áðü Ýíá èåéôïoñæéÜ óðóôPíáôå.

#### 2.6.4 Äçìéiñäþíôåò Slices óå já ¶eeëi Äßóëi

Áí ððÜñ ÷ iði ðåñéóóüôåñíé áðü Ýíáò äbóëi, èá åðéóôñ Ýøåôå óôçí ièüíç åðéëiæPò äbóëùí (Select Driver) àiÝóùò iåðÜ ôçí åðéëiæP òiõ æáé ÷ åéñéóôP åêêßíçóçò. Áí èÝéåôå íá ååêåôåôPóåôå òi FreeBSD óá ðåñéóóüôåñíðò áðü Ýíá äbóëiðò, iðiñåßôå åäþ íá åðéëÝíåôå Ýíá Üeeëi äbóëi èáé íá åðáíáæÜååôå ôçí äéåæéåóßá éåôÜðiçóçò iå ôçí ÷ ñPóç ôiõ **FDisk**.

**Óçìáíóééü:** Áí ååêåèéóôÜôå ói FreeBSD óá iðiéiæþðiôå äbóëi åêôüò áðü ôíí ðñþöi èá ðñÝðåé íá ååêåôåôPóåôå òi ãéá ÷ åéñéóôP åêêßíçóçò òiõ FreeBSD éáé óôïò äyí äbóëiðò.

## Ó-Þìá 2-17. ãrääì áðü ôcí ÅðééíäP Äßóêùí (Select Drive)



Ôi ðëþêôñi Tab áíáéëÜóóåé íåðáïý ôiõ ôåéåôôáßiõ åðééäåíÝíõ äßóéiõ, ôiõ [ OK ], éáé ôiõ [ Cancel ].

ÐéÝóôå íéá öiñÜ ôi Tab ãéá íá íåðáöåñèåßôå óõi [ OK ], ðéÝóôå Enter ãéá íá óõíå÷ßóåôå ôcí ååêáôÜóôáóç.

### 2.6.5 Äçìéïñäþíôáò Éáôáôìþóåéò (Partitions) íå ×ñþóç ôiõ Disklabel

ÐñÝðåé ôþñá íá äçìéïñäþóåôå êáôáôìþóåéò iÝóá óå êÜéå slice ðiõ äçìéïñäþóåôå. Èñìçèåßôå üôé ie êáôáôìþóåéò ÷åñáéôçñßæíïóé áðü ãñÜlååôå áðü a ùò h, êáé üôé ie êáôáôìþóåéò b, c, êáé d Ý: iõí ôõðiðiéçíÝíç óçìåóßá ôcí iðiñá ðñÝðåé íá áéíëiøþóåôå.

ÊÜðiéåò åöáñiiäÝó iðiñåß íá ùöåéçëiýí áðü óõåéåñéiÝí ñüði êáôÜðiçóçò, åéäéëÜ áí ñüéåéôåé íá äçìéïñäþóåôå êáôáôìþóåéò óå ðåñéóóüôåñiõò áðü Ýíá äßóéiõò. Ùóôüöi, ãéá áðôP ôcí ðñþôç óå ãåêåôÜóôåóç ôiõ FreeBSD ãáí ÷ñåéÜæåôåé íá åßóôå ñüði õ÷ieáôôééíß óõçí êáôÜðiçóç ñüði äßóéiõ óåð. Åßíáé ðeí õçìåíôééü íá ååêåôåôþóåôå ðiõ FreeBSD êáé íá iÜéåôå íá ðiõ ÷ñçóéiñðiéåßôå. Iðiñåßôå ðÜíðå íá åðåíååéåôåðþóåôå ðiõ FreeBSD áéëÜæiñðå ñüði êáôÜðiçóçò, üôáí ðeÝíí èá åßóôå ðeí åiíééåéùíÝíò íå ðiõ êåééðiññåééü óýóôçìá.

Í ñüðiðiò áðôüò ÷ñçóéiñðiéåß ôÝóôåñéò êáôáôìþóåéò—íéá ãéá ÷þñí swap, êáé ñüði ãéá óðôðÞìáôå áñ ÷åßùí.

### Ðßíåêáò 2-2. ÄéÜôáïç Éáôáôìþóåùí ãéá ôiõ Ðñþòi Äßóëi

ÉáôÜôïçóç Áñ ÷åßùí	Óýóôçìá	ÍÝååéò	Ðåñéäñáöþ
a	/	1 GB	Ðñüêåéôåé ãéá ôiõ root óýóôçìá áñ ÷åßùí (root filesystem). ¼ëá óå Üeeá óóôðÞìáôå áñ ÷åßùí ðñiøáñþíôåé óå êÜðiñí óçìåßí êÜðô áðü áðôü. Òi 1 GB èåùñåßôåé íéá òöóéiñðiéêP ôðiP ãéá áðôü ñüði õçìåé åñ ÷åßùí. Äáí ñüéåéôåé íá aÜéåôå éæéåßôåñá ååäñíÝí áå ãðôü, êáèþò íéá óõíçééòiÝíç ååêåôÜóôåóç FreeBSD èá åÜéåé åäþ ðåñþðiõ 128 MB ååäñíÝíùí. Í ÷þñíò ðiõ áðñíÝíåé ðñiñßæåôåé ãéá ðñiøùñéiÜ ååäñíÝíá, êáé åðþóçò áöþfåé ÷þñí åðÝêóåóçò óõçí ðåñþðôùñóç ðiõ ie íåééiñðeéÝð ååëüüôåéò ôiõ FreeBSD áðåéôíýí ðåñéóðuôåñí ÷þñí óõi / .

EáóÜöìçóç	Óyóôçjá Áñ÷åßùí	ÍÝääèïò	Ðåñéãñáöþ
b	N/A	2-3 x RAM	<p>Óå áðôþ ôçí éåðÜöìçóç áññþóêåðáé ï ÷ þñïò swap ôiõ óððôþiaðiò. Ç åðéëïäP óùðöiy íåãÝëiò swap iðiññåß íá èåùñçèåß Ýíá åßäiò ðÝ÷íçò. Jåò êåëiò åáiééüò éåíüíåò åßíáé ï ÷ þñïò áðôüð íá åßíáé åýí ùò ñåðåéö öiñÝò ði ïÝääèïò ôçò åéåèÝöéçò öððééêþò iñPíçò (RAM). Åðßöçò éå ðñÝðåé íá Ý÷åðå ðiðëÜ÷éóðií 64 MB swap, Ýðóé áí Ý÷åðå ééãüôðåñá áðü 32 MB RAM óðií ððíëiäéðóþ óáò, iññþóðå ði swap óðå 64 MB.</p> <p>Áí Ý÷åðå ðåñéóðúðåñiòð áðü Ýíá åßóéiòð iðiññåßðå íá iññþóðå ÷ þñï swap óå êÜèå åßóéi. Ôi FreeBSD éå ÷ñçóéiiðiæåß ðüðå êÜèå åßóéi åéå swap, ði iðiñþi åðéðå ÷ yíåé ðç åéäåééåñþå. Òðçí ðåññþððùñóç áðôþ, ððíëiäñþóðå ði ððíëééü ïÝääèïò ðið swap ðið ÷ ñåéÜæåðóðå (ð.÷. 128 MB) êåé iññþððå ði ià ði ðéþeð ðüñ åßóéùí ðið Ý÷åðå (ð.÷., åýí åßóéi) åéå íá åñåßðå ði ïÝääèïò ðið swap ðið éå åçíéiñþððå ðå õå êÜèå åßóéi, óå áððü ði ðáññÜääéäíá, 64 MB áíÜ åßóéi.</p>
e	/var	512 ùò 4096 MB	<p>ÍéåðÜëiäiò /var ðåñéÝ÷åé áñ÷åßá óå iðiñþá óðiñå ÷ þò ñåðåññÜëiññóåé, üðùðo áñ÷åßá éåðåññåöþð (log files) êåé Üëëå áñ÷åßá ðið Ý÷iðí íá êÜññiò ià åéå ÷ åéñéóðééÝò åññåóßåð. ÐíëëÜ áðü õå áñ÷åßá áðôÜ åéåññÜæiiðóåé êåé åññÜññóåé óðiñÝ÷åé åéå õåðôÜ ôçí éåéçìåñéþ ÷ñþðç ðið FreeBSD. Ç ðiðièÝðçóç ðüñ áñ÷åßùí áððþí óå ÷ ññéóðü óýóðçìá áñ÷åßùí åðééññÜðåé óðií FreeBSD íá ååééóðiðiæåß ôçí ðññþðååñç óå áððÜ ÷ ññþðo íá åðçñåñÜæiiðóåé áñ÷åßá óå Üëëiò ëåðåéüññiò ðið åáí Ý÷iðí ðáññüññéå õð ÷ P ðññþðååñç.</p>
f	/usr	Öðüññéðiò ×þñïò Åßóéiò (ðiðëÜ÷éóðií 8 GB)	<p>1/4éå óå ððüññéðå áñ÷åßá óåð éå åßíáé óððééÜ åðièçéåði Ýíá óðií /usr êåé ðiðiò ððíëáññüññiò ðið.</p>

Áí ðñüéåðóáé íá ååéåðóáóðÞóåðå óí FreeBSD óá ðáñéóðúðåññiðó áðü Yíá áßóéiðó, éá ðñÝðåé íá áçleíöññÞóåðå éåðåóðíÞóåðó áéé óðá Üëéä slices ðið Y÷åðå áçleíöññÞóåé. Í åðéïëüðåññið oññüðiò åßíáé íá áçleíöññÞóåðå áÿí éåðåóðíÞóåðó óá êÜèá áßóéi, íéá æá óí swap, éåé íéá æá Yíá óýóðçìá áñ ÷åßúí.

**Đßíáêáò 2-3. ÄéÜôáíç ÊáôáôìPóåùí ãéá ôiõò Õđüeiéđiõò Äßóeïõò**

ÊáôÜòìçóç Óyóôçìá ÌÝâåèïò Đåñéãñáöþ  
Áñ÷åßùí

ÊáôÜòçóç Áñ÷åßùí	Óyóôçìá	ÌÝääèò	Ðåñéäñáöþ
b	N/A	Ååßôå ôçí ðåñéäñáöþ	1/4ðùò Ý÷åé Þäç óðæççèåß, ïðiñâßôå íá ÷ùñßôåô õi ÷þñi swap áíÜiaóá óå ðiæëïýò åßóéïöð. Áí éáé ç êáôÜòçóç a åßíáé åæåýéåñç, ç óyîâáóç åðéåÜëéåé ôç ÷ñÞóç ôçò êáôÜòçóçò b ãéá õi ÷þñi swap.
e	/diskn	Öðüëéði ÓiÞia ôiõ Äßóéïð	Öi õðüëéði êíñiÜðé ôiõ äßóéïð eáôáæâiâÜiaóáé áðü íéá ïâaÜëç êáôÜòçóç. Ìðiñâßôå åyéëé íá ôçí åÜëåôå ôôçí êáôÜòçóç a áíôß ãéá ôçí e. Ùóôüöi, ç óyîâáóç iñßæåé üðé ç êáôÜòçóç a óå Ýia slice ååñiâýåôåé åéá õi óyóôçìá ãñ÷åßùí root (/). Áäí åßóôå ðði ÷ñâùiÝñié íá åéëëðeÞóâôå ãðôðP ôç óyîâáóç, áéëÜ ôi sysinstall ôçí åéëëðeåß, iðuôå áí ôçí åéëëðeÞóâôå êáé åôåßò ç ååñâôÜóôáóç èá åßíáé ðði êáèâñb. Ìðiñâßôå íá ðñiøáññÞóâôå áðôü ôi óyóôçìá ãñ÷åßùí üðið eÝëåôå. Óoï ððiÜääéâiâ ïáð, ç ðñiðÜññôçóç åßiâôåé ôôïð eáôâëüäið /diskn, üðið ôi n åßíáé Ýíâð åñéëìüð ðði åéëÜæåé åéá êÜëå åßóéï. ÁéëÜ ïðiñâßôå, áí ðñiðÜðiÜðâ, íá iñßóâôå åéêP óáð åéÜðâíç.

, ÷iñðâð åðiðáôßôåé ôçí åéÜðâíç ôuú êáôáôìÞóâùí óáð, ïðiñâßôå ôþñá íá ôçí åçìëiññÞóâôå ÷ñçóéiðiéþíðô õi sysinstall. Èá ååßôå ôi ðáñâéÜðù iÞiðiá:

#### Message

Now, you need to create BSD partitions inside of the fdisk partition(s) just created. If you have a reasonable amount of disk space (1GB or more) and don't have any special requirements, simply use the (A)uto command to allocate space automatically. If you have more specific needs or just don't care for the layout chosen by (A)uto, press F1 for more information on manual layout.

[ OK ]  
[ Press enter or space ]

ĐéÝóôå **Enter** åéá íá iâééÞóâôå ôií åðâiññâáôðP êáôáôìÞóâùí ôiõ FreeBSD, ðið iññÜæåôåé **Disklabel**.

Ôi Ó÷Þia 2-18 ååß÷íåé ôçí ièüíç üðáí iâééÞóâôå åéá ðñþôç öiñÜ ôi **Disklabel**. Ç ièüíç ÷ùñßæåôåé óå ôñßá òiÞiaóá. Íé ðñþôå åñâiñÝð ååß÷iñð ôi üññâ ôiõ äßóéïð ôôíí iðiñi åiðéåýåôå, êáé ôi slice ðið ðâñéÝ÷åé ôé ôéô êáôáôìÞóâé ðið åçìëiññâßôå (óôí òçìâßí åðôü ôi **Disklabel** ôéô iññÜæåé Partition name áíôß åéá ôi üññâ ôiõ slice). Ç ièüíç åðßóçò ååß÷íåé ôçí ðiðüôçôå åæåýéåññ ÷þñið iÝóá ôóï slice, åçé. ôi ÷þñi ðið Ý÷åé êñâôçèåß iÝóá ôóï slice åéëÜ åáí Ý÷åé åðiæëåß åéüíà óå êÜðiéá êáôÜòçóç.

Ôi iÝóï ôçò ièüíçò ååß÷íåé ôéô êáôáôìÞóâé ðið Ý÷iñí åçìëiññâçèåß, ôi üññâ ôiõ ôððôðÞiâðið áñ÷åßùí ðið ðâñéÝ÷åé êÜëå êáôÜòçóç, ôi iÝääèði ôiõð, êáé êÜðiéåô åðéëiñÝð ðið ô÷åðßæiiðôåé ïá ôç åçìëiññâßá ôiõ ôððôðÞiâðið áñ÷åßùí.

Ôi êÜðù iÝñið ôçò ièüíçò ååß÷íåé óá ðëÞêôñá ðið ïðiñâßôå íá ÷ñçóéiðiéÞóâôå ôóï **Disklabel**.

## Óð: Þíá 2-18. ÁðåññääóôÞò Disklabel öiõ Sysinstall



Óðréttarinn er ófállið með síðan fyrirvara um að ófállið sé ófállið.

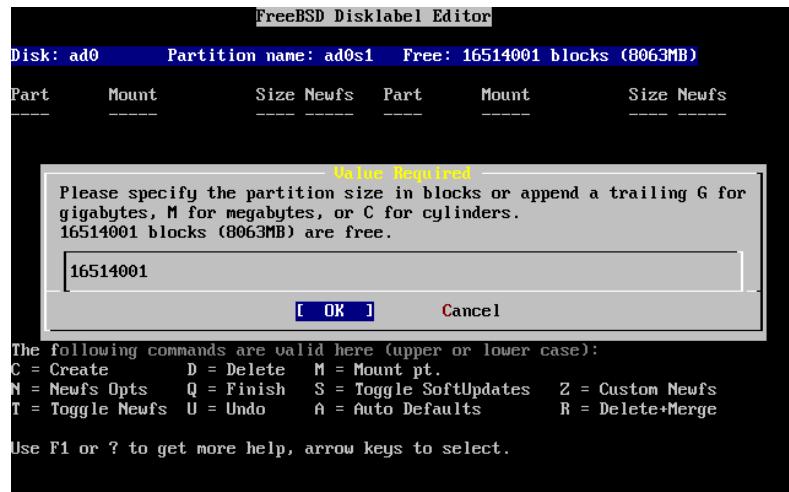


Áí ádeeé Yíádá íá lc ÷ níc óeii díie Píóádá ðeó ðñjíá ðeéé áai Yíádá ééádá ði Píóáedá ééá e Yíéádá íá ðeó áí ðeéé áéadá ði Píóádá íá ðeó

æéÉÝð óáð, ÷ñcóëiiðiËþóðá ðá áâðæÜééá æéá íá åððéëÝíâðó ðíçí ðñþóðç éáðÜðiçóð éáé ðéÝóðá **D** æéá íá ôç óâÞóâðóð. ÅððáíæÜâððóðæéá íá óâÞóâððóð üéððó ðéð ðñþðâðéüððâððóðéðó ðéððâððóð.

Áéá íá áçleíöñÞóâôå ôçí ðñþköð éáô Üðîçöç (a, (ç iðñßá ðññíóâñð Üðáé ùò / — root), åââáéùèåßôå üöð Ý÷åôå åðééÝíæé ñi òúóóü slice óóï ðÜñu iÝñiò ôçö iëüíçö, éáé ðéÝóôå C. Èá àiòáíéôåß Ýíá ðëäßöéï äéäéüäiï ãéá íá åéóÜâåôå ñi iÝâåëìò ôçö iÝáò éáô Üðîçöçö (üðùò öäßíåôåé óóï Ó÷Þíá 2-20). Íðññåßôå íá åéóÜâåôå ñi iÝâåëìò ùò ñií áñééìü iðéíê ðiô åßþöéò ðiò èÝéåðå íá ÷ñçóéiiðiéÞóâôå P ùò áñééìü áéièiöèíýíamí ãðü M åéá megabytes, G åéá gigabytes, P C åéá êößfãñiöð.

Ó÷Piá 2-20. Åëåýèåñìò ×þñìò ãéá ôçí ÈáôÜôìçóç Root



Ói ðñiâðéëåái Ýí iÝâåëiø ðiø öáßíåðáé èá áçìéïöñäÞóåé ìéá êáðÜôïçóç ðiø êáðåëåíâÜíåé üëi øíi ððüëiéði åéåýèåñí ÷þñi øiø slice. Ái ÷ñçóéïðiéåßôå óá iåå Ýèc øúí êáðåòiÞóåùí ðiø ðåñéæñÜøáíâ óóí ðñïçäÿíåñí ðáñÜååéåíá, óâÞóôå øíi áñééü ðiø öáßíåðáé iå øí **Backspace**, êáé ðéçéðñiïëðäÞóôå **512M**, üðùò öáßíåðáé øóí Ó÷Þíá 2-21. Êáðüðéí ðéÝôðå [ OK ].

Ó: Piá 2-21. Åðåññáóßá ÌåáÝèíòò ôcò ÉáôÜôicócò Root



÷ iiōáð áðéë Ýíâé ði ÍÝââéëò ðóç ëáðÜôïçóçò, eá åññùðçèåßòå êáðüúðéí ãéá ði áí ç êáðÜôïçóç èá ðåñéÝ ÷ áé Ûðïéí óýóöçïá áñ ÷ åßùí, þ eá åßíâé ÷ þññiø swap. Í æÜëïäò áðóùò öáßlååé óði Ó ÷ þìà 2-22. Ç ðñþòç áðóþ êáðÜôïçóç èá ðåñéÝ ÷ áé óýóöçïá áñ ÷ åßùí, ãéá áðóù äëÝâîò å üöé åßíâé áðéëäâí Ýíñ ði FS ééâ ðéÝóå Enter.

Ó÷Piá 2-22. ÅðééÝîoå ôii Ôýði ôcò ÉáôÜôìçóçò Root



ÓÝeið, áðæðeðP áciéiññáðbóða óýóðçjá áñ ÷ áßùí, ðñ Ýðæé íá áæçþóðóða óði Disklabel ðið e Ýéðóða íá áßíáé ç ðññiðÜñðóçð òið. Í áíðbóðié ÷ ið aéÜeiññið óáßíáðóða óði Ó Þiá 2-23. Ói óçìåßi ðññiðÜñðóçðò ôçò êáðÜðiçóçò root áßíáé òi /, aéá áðóðu ãñÜðóða /, eáé ðéÝóða Enter.

Óðriá 2-23. ÅðééëÝîôå ôiÓciåßii ÐññioÜñôcócò ôiô Root



Ç ieuíic êáðöúðéí ëá ááíáùnëåß ãéá íá óáð ääßñiaé òcí êáðÜöíçóç ðòð iüeëð ãçíëiõñPóåðå. Èá ðñ Yðåé íá åðááíæÜåâðå åðôðþ òcí äéäééåðå ãéá ôéó Üëeåð éåðåðìPóåðéò. ¼ðáí ãçíëiõñPóåðå òcí éåðÜöíçóç swap, äáí ëá óáð åççöçèåß íá åðééÝìåðå òcìåßí ðñiioÜñðöçóç, êåèþò ié éåðåðìPóåðéò swap äáí ðñiioáññþíðåé ðiøY. ¼ðáí ãçíëiõñPóåðå òcí ôåëäðöðåßá êáðÜöíçóç, ôcí /usr, ìðññåßôå íá åöPóåðå ñi ðñiöðåéíùñåñ iÝåæìò, ãéá íá ÷ñçöéiiðíëPóåðå üëí ñi ððüëéði :þñi öiç slice.

Ç ôåëåôåßá iëüíç ôiõ FreeBSD Åðåâññáóô DiskLabel, èá äåß÷íåé üìíéá íå ôçí Ó÷Piá 2-24, áí êáé ié äéêÝò óáò ôéiÝò èá åßíáé æáöiñåôééÝò. ÐéÝóôå Q æá ôYëiò.

#### Ó÷Piá 2-24. Í Åðåâññáóô Disklabel ôiõ Sysinstall

```
FreeBSD Disklabel Editor
Disk: ad0      Partition name: ad0s1      Free: 0 blocks (0MB)

Part      Mount      Size Newfs      Part      Mount      Size Newfs
ad0s1a    /          512MB UFS2     y
ad0s1b    swap       512MB SWAP
ad0s1d    /var       256MB UFS2+S y
ad0s1e    /usr       6783MB UFS2+S y

The following commands are valid here (upper or lower case):
C = Create      D = Delete      M = Mount pt.
N = Newfs Opts  Q = Finish     S = Toggle SoftUpdates Z = Custom Newfs
T = Toggle Newfs U = Undo      A = Auto Defaults   R = Delete+Merge
Use F1 or ? to get more help, arrow keys to select.
```

## 2.7 ÅðéëÝäiñôáò ôé èá Åæáâóôþóåôå

### 2.7.1 ÅðéëÝiôå Distribution Set (Óåô ÅæáâóÜóôáóçò)

Ç áðüöáóç æá ôi ðiéi distribution set èá ÷ñçóéiñiéÞøåôå, åiâñôÜðåé éåôÜ éýñéí èüäi áðü ôi åßäiò ÷ñþóçò ôiõ ìç÷áÞiáðiò èáé ôií åééåÝóéï ÷þñi ôií åßöéi. Íé ðñiâééñéoiÝiåò åðéëiäÝò èñiâßññôáé áðü ôçí åéÜ÷éôç åðíåôþ åéäiññöùóç ïÝ÷ñé ôçí ðëÞñç. ¼óé åßíáé åéäiññééé ôiõ UNIX þ / êáé ôiõ FreeBSD èá ðñÝðåé ó÷åäüí óßññôñá íá åðéëÝiñí iéá áðü ôéò ôðñiñiéçíÝiåò åðéëiäÝò. Ç æáiññöùóç åiâééåéåoiÝiñ distribution set óðiþóôåôáé óðiþèùò ôiõí ðeiÝiðåñí ÷ñþóçò.

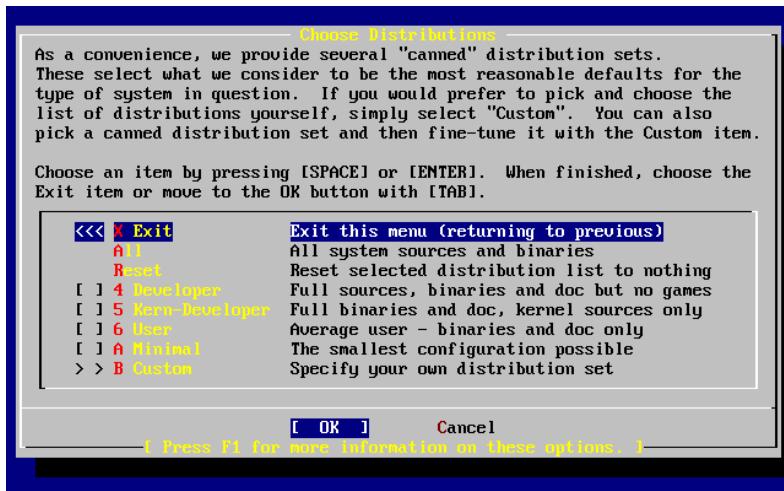
ÐéÝóôå ôi **F1** æáé åðñéóóüôåñåò ðëçñiñiñßåò æáé ôéò åðéëiäÝò êÜëå distribution set êáéþò êáé åéå ôá åðñéå÷ülláíå ôiõò. ¼óáí ôåëåéþóåôå íå ôçí áiÜäiñóç ôçò åiþèåéåò, íå ôçí ðßåóç ôiõ **Enter** èá åðéóôñÝøåôå ôiõ íåñíy Select Distributions.

Áí åðéëiñååò åñáöéêü ðåñéåÜëëí åññåóþåò, èá ðñÝðåé íå ñðèiþóåôå ôií X server êáé íá åðéëÝiåôåÝíå åññåöéêü ðåñéåÜëëí (desktop) iåòÜ ôçí åæáâóÜóôáóç ôiõ FreeBSD. Ðåñéóóüôåñåò ðëçñiñiñßåò ó÷åôééÜ íå ôçí åæáâóÜóôáóç ôéé åñýééôç ôiõ X server iðiñååò íå åßöåå ôiõ ÊåöÜëééí 6.

Áí áiáíÝiåôå üöé èá iåðååæùôôßöåôå åéêü óåò åiâééåéåoiÝiñ ðññþíá, æáééÝiåôå êÜðiéá áðü ôéò åðéëiäÝò ðiõ ðåñéåÝ÷iõí ôií ðçääáßí êþäééå. Åéá åðñéóóüôåñåò ðëçñiñiñßåò ó÷åôééÜ íå ôi åæáôß íå iåðååæùôôßöåôå åéêü óåò ðññþíá þ æá ôi ðùò åßíåôåé, åßöåå ôiõ ÊåöÜëééí 9.

Ðñiöáíþò ôi ðei åðÝeeéöi óýóôçjá åßíáé áðöü ðiõ ôá åðñéÝ÷åé üëá. Áí Ý÷åôå åñéåôü ÷þñi ôií åßöéi, åðéëÝiôå All üðùò öáßåôåé ôiõ Ó÷Piá 2-25 ÷ñçóéiñiéþíôå ôá ååëÜëéå êáé ðéÝóôå **Enter**. Áí óåò ðñiâæçìåôßæåé í åééåÝóéi ÷þñi õií åßöéi, êÜíåôå iéá êáóÜëëçç åðéëiäþ æáé ôçí åðñBððùóç. Íçí ðñiâæçìåôßæåóôå åééåßðåñá ó÷åôééÜ íå ôçí åÝëåéå åðéëiäþ, êáéþò iðiñååò íå åæáâóåôþóåôå ðññüðåñá ôåð åéé ååðÜ ôiõ ðÝëiò ôçð åáóééþò åæáâðÜóôåóçð.

## Ó÷Piá 2-25. ÅðééëÝîoå Distributions (Óåô ÅæéåôÜóôáóçö)



## 2.7.2 ÅäéáôÜóôáóç ôçò Óõëëïäþò Ports

ÍðóÜ ðíçí ðáðéëiäP ðíïò ðáðéëöìçöiý distribution set, èá  $\frac{Y}{\Delta}$  ÷ ðóðå ðíçí ðáðéåñßá íá ðáðéåðåðóðÞóðåðå ðíçí ðóðéëiäP ports ðíïò FreeBSD. Ç ðóðéëiäP ports áðíáé iéá áýéïëç êéá ãïïéëP iÝeïäò ðéá íá ðáðéåðåðóðÞóðåðå ëïæóíéü. Ç ðóðéëiäP ðúí ports ááí ðåñé  $\frac{Y}{\Delta}$  ÷ áé ðíï ðçäááßí ëþäééá ðíï ðáðéåðåðóðÞóðåðå ðéá íá iáðóðåðéñðóðÞóðåðå ðíï ëïæóíéü. ÁðëÜ ðáðíáé iéá ðóðéëiäP áñ ÷ áðíñü ðíï ðáðóñðåðóðíëåß ðíï êáð Ýáðåñíá, ðíçí iáðóðåðéþðóðéñç êéá ðíçí ðáðéåñßá ðóðåðóðÞóðåðå ðíï ëïæóíéü.

Ói ðñüñáñáíá áåéáóÜóóáóçò áái áé Ýá ÷ áé áí óðÜñ ÷ áé áñéåóöù áæåýèåñïò ÷ þñïò. ÊÜíóå ôcí áðéëíäP áðóóP iúñí áí óðÜñ ÷ áé áñéåóöù ÷ þñïò. Áðú ôcí Ýéäiöc ôiö FreeBSD 9.0, c óðéëíäP ports ôiö FreeBSD éåðáéëåíáÜíåé ðåñßðiö 500 MB ÷ þñï ööí áðóéi. Íðiñåðóå íå áóöÜéåéá íá èåññPóåðå üöde í ÷ þñïò áðóóöù éá áßíáé íåðåéýóðñïò áæá ðéí éåéííýñéåð áæäüóåéð ôiö FreeBSD.

User Confirmation Requested  
Would you like to install the FreeBSD ports collection?

This will give you ready access to over 23,000 ported software packages, at a cost of around 500 MB of disk space when "clean" and possibly much more than that if a lot of the distribution tarballs are loaded (unless you have the extra CDs from a FreeBSD CD/DVD distribution available and can mount it on /cdrom, in which case this is far less of a problem).

The Ports Collection is a very valuable resource and well worth having on your /usr partition, so it is advisable to say Yes to this option.

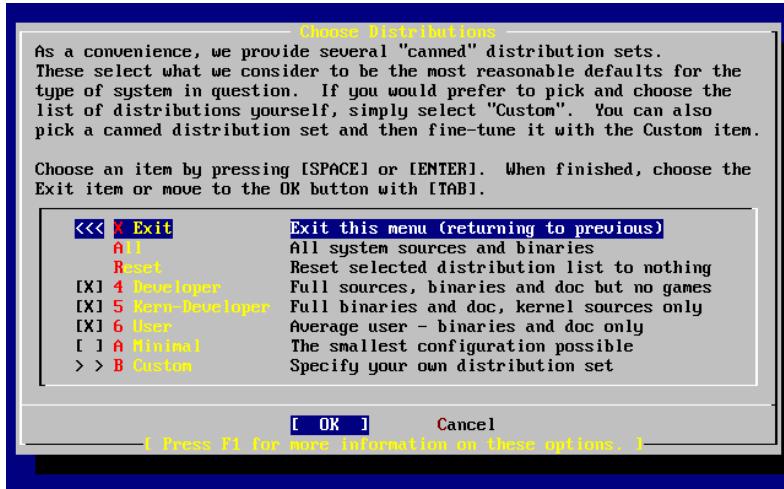
For more information on the Ports Collection & the latest ports, visit:

<http://www.FreeBSD.org/ports>

[ Yes ] No

Åðee Ýîôå [ Yes ] iå ôá åâëÜêéá æá íå åâéåðåóðôåðå ôç óðeeiäP ôùí ports P [ No ] æá íå ôçí ðáñáæåßøåðå. DéÝóôå Enter æá íå óðiå ÷ßøåðå. Èá åiöáíéòðåß iáíÜ ôi iåñíý Choose Distributions (åðeeiäPò Óåô ÅâéåðÜóðåçò).

## Óðréðaðaðuóð Distribution Set



Áí áßóôå ééâñíðíéç Ýíié áðü óeo áðéëïäÝò óáo, áðéëÝîôå Exit liá ôá áâæÜêéá, áðéâåâáéþóôå üöé áßíáé öùôéóíÝíç ç áðéëïäP [ OK ] éáe áðéÝóå Enter æá íá óoí ÷ þóâôå.

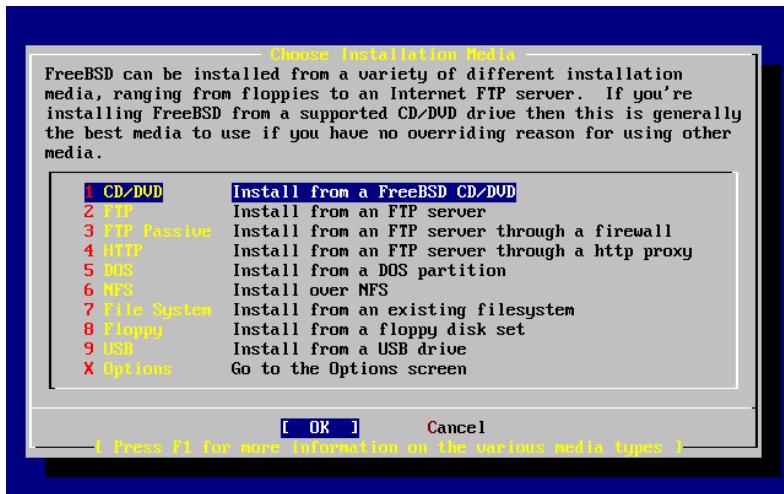
## 2.8 ÅðééëÝäiñôáò ôí ÍYóí ÅâéáôÜóôáóçò

Áí áâééóôÜôå áðü CDROM P DVD, ÷ñçóéiiéÞôå ôá áâéÜéá áéá íá öùôþóåôå ôçí áðééiäP Install from a FreeBSD CD/DVD. Áâááéùèåßôå üöé áßíáé öùôéóíÝíç ç áðééiäP [ OK ] éáé ðéÝóôå Enter áéá íá ðñï÷ùñÞóåôå íà ôçí áâéáôÜóåáç.

Ãéá Üeëåò iåèüäiõò åâéâôÜóôáóçò, êÜíå ôcí éâôÜeëççéç åðéëiäP êáé áëiïiõèPóôå ôéò iäçãßåò.

Đé Ýóôå ôi **F1** ãéá íá äåßôå ôçí áíòùáôù Ýíç àïÞèåéá ãéá ôá íÝóá åæéåôÜóôáóçò. Đé Ýóôå **Enter** ãéá íá åðéóôñÝøåôå ôóï iàíïý åðééïäPò íÝ òï åæéåôÜóôáóçò.

## Ó÷Piá 2-27. ÅðééëÝîôå ïÝóï Åæáå Üóôáóçò (Installation Media)



**Ôñüðié Åæáå Üóôáóçò ïÝóù FTP:** ÕðÜñ ÷ iñí ôñâéò ïÝéïäé åæáå Üóôáóçò ïÝóù FTP ãéá íá åðééëÝîåôå: åíâñäü (Active) FTP, ðáèçôéêü (Passive) FTP, þ ïÝóù äéáéïéóþ ìáóïëÜâçóçò (proxy) HTTP.

Åíâñäü FTP: Install from an FTP server

Íà ôçí åðééëïäþ áôôþ ié ìåôåöïñÝò ãßíïôåé ïÝóù "Åíâñäý (Active)" FTP. Ç åðééëïäþ áôôþ äái èá ëåéôïñâþóåé ïÝóù firewalls áééÜ óó ÷ iÜ èåéôïñâåß íà ðáëéüôåñïõð äéáéïéóðÝò FTP ðíð åái õðïöôçñßæïðí ðáèçôéêþ ìåôåöïñÜ. Áí ç óyíäåóç óáò ëïëëþóåé íà ðáèçôéêü FTP (óï iðïßí åßíáé ç ðñïäðééïäþ), äïëéìÜóôå óï åíâñäü!

Ðáèçôéêü FTP: Install from an FTP server through a firewall

H åðééëïäþ áôôþ iäçãåß óï **sysinstall** íá ÷ñçóéïïðéþóåé "Ðáèçôéêþ (Passive)" ìåôåöïñÜ ãéá üéåò òéò FTP ëåéôïñâþåò. Áôôü åðéôñÝðåé óóï ÷ñþóðç íá ðññíÜåé ïÝóù firewalls óá iðïßá äái åðéôñÝðïðí åéóâñ ÷üiaíàò óóïäÝóåé óå óô ÷áßåò TCP ðüñôåò.

FTP ïÝóù HTTP ìáóïëÜâçóçò: Install from an FTP server through a http proxy

Ç åðééëïäþ áôôþ iäçãåß óï **sysinstall** óôç ÷ñþóðç HTTP ðñùôïéüëéïð (üðùò ié öðééëïäôñçôÝò) ãéá íá óðíâåéâåí ìá Ýíá äéáéïéóþ ìáóïëÜâçóçò åéá üéåò òéò èåéôïñâþåò ðíð FTP. Í äéáéïéóþ ìáóïëÜâçóçò áíáéâåÜíâé íá ìåôåöïñÜåé üéåò òéò áíðïëÝò èéá íá òéò óðâåñéé óóïí äéáéïéóðþ FTP. Áôôü åðéôñÝðåé óóï ÷ñþóðç íá ðññíÜåé ïÝóù firewalls ðíð åái åðéôñÝðïðí èáèëüëð FTP, áééÜ ðññíöôÝñïðí èáéóïñâåßá äéáíâóïëÜâçóçò ïÝóù HTTP. Óçí ðåñßðôùóç áôôþ ðñÝðåé íá iññóåôå åéôöù áðü óïí äéáéïéóðþ FTP, éáé óï äéáéïéóðþ ìáóïëÜâçóçò.

Åéá äéáéïéóþ ìáóïëÜâçóçò FTP server, ðñÝðåé óóïþèùò íá äþóåôå óï üíííà óïð åéáéïéóðþ ìá óïí iðïßí èÝéåôå óðíçí ðñáäíåðééüðçóå íá óðíäåéâåßåò, ùò iÝñíò óïð username, ìåðÜ áðü óï óýìäïëí "@". Í äéáéïéóðþ ìáóïëÜâçóçò "íéâåßååé" ðüñôå óïí ðñáäíåðééü äéáéïéóðþ. Åéá ðññíÜååéäíà, ðññíëÝóåå üöé èÝéåôå íá èÜíâåå åæáå Üóôáóç áðü óï ftp.FreeBSD.org, ÷ñçóéïïðéþíðóàò FTP ìáóïëáâçóþ óïí foo.example.com, í iðïßí ÷ñçóéïïðéåß óçí ðüñôå 1234.

Óçí ðåñßðôùóç áôôþ, ðçâåáåíâå óóï ìáííý åðééëïäþí (options), èÝéåôå ùò FTP username óï ftp@ftp.FreeBSD.org, éáé ùò êùäéêü (password) óçí äéâýèðíóç email óáò. Óáí ïÝóï åæáå Üóôáóçò

(installation media) ໃນບັນຫາໂທ FTP (ປ່ອດັບເອົາໄຟ້ ຖະໜາກົດລົງໄສ້ວ່າ ດີເລີຍໄດ້) ເພື່ອ URL  
ftp://foo.example.com:1234/pub/FreeBSD.

Èáépo òi /pub/FreeBSD áðü ftp.FreeBSD.org áðíáôáé ïñáðu lÝóu òiø foo.example.com, lòiññáßôá íá áâéáôáóðÞóâåð áðü áéâßír òi iç: Üíçíá (òi lòißí éá öÝñâé óá áñ ÷åßá áðü òi ftp.FreeBSD.org üðùò áðáéóïýíðáé áðü òíç áâéâðáÜóðáóç óáð.

## 2.9 Åðéâåâáßùóç ôçò ÅãêáôÜóôáóçò

Ç åæéåó Üöödåóç iðtiñåß öþná íá ðñi ÷ uñþöåé, åööuñí òi åðeeëtiåßöå. Åðöþ åßíáé åðßöçö ç ðåëåðööåßá óåò åðeeáñßá íá ñçí åéñþöåðå ñåðiñæüðåó Ýööc éáé ñéö åéëéåå Ýð ðiø ðñüeåðöå íá åßñiñí ñöi ñéëçñü óåò åßöéi.

## User Confirmation Requested

Last Chance! Are you SURE you want to continue the installation?

If you're running this on a disk with data you wish to save then WE STRONGLY ENCOURAGE YOU TO MAKE PROPER BACKUPS before proceeding!

We can take no responsibility for lost disk contents!

[ Yes ] No

ÅðééëÝîôå [ Yes ] êáé ðéÝóôå Enter ãéá íá ðñiï÷ùñþóåôå.

I ÷ nñirò àâéâô Üóôáóçò àéáö Ýñâé áí Üeräá iå ôi distribution set ðiö Ý ÷ åôå åðééÝiâé, ôi iÝöi àâéâô Üóôáóçò, ééé ôçí ôå ÷ yôçôå ôiö ðiñeräéôP óåò. Éá àâßôå iéá óâéñÜ áðü icíyîâôå óå iðiñßå åâß ÷ iiñiöi ôçí éâô Üóôáóç ôçò àâéâô Üóôáóçò.

Ҫ ѧѧéáôÜóôáóç èá Ý÷åé ieiéëçñùèåß üôáí äåßôå ôi áêüëiõëi ïPíõiá:

## Message

Congratulations! You now have FreeBSD installed on your system.

We will now move on to the final configuration questions.

For any option you do not wish to configure, simply select No.

If you wish to re-enter this utility after the system is up, you may do so by typing: /usr/sbin/sysinstall.

[ OK ]

[ Press enter or space ]

Đé Ýóôå **Enter** ãéá íá ðñïïùñþóåôå iå ôéò ñõèìßóåéò iåôÜ ôçí åâéåôÜóôáóç.

Áí áðeeÝâôå [ No ] êáé ðeÝóâôå **Enter** èá áêõñþoâôå ôcí åâêáôÜóôáóç êáé åái èá áßíåé êáéÜ áëéáäþ óôï óýóôçìá óâo. Éá åâöáéóôåß óï áéüëïðeï ïÞíðiá:

## Message

Installation complete with some errors. You may wish to scroll through the debugging messages on VTY1 with the scroll-lock feature.

You can also choose "No" at the next prompt and go back into the installation menus to retry whichever operations have failed.

[ OK ]

Ôi ïPíöiá áðóü àìöáíßæåðáé åðåéäP äái Ýæíå êáïéÜ åâéåðÜóôáóç. ÐéÝæíðåò Enter èá åðéóôñÝøåðå óóï Èõñßùò ìâñý Åæáå Üóôáóçò (Main Installation Menu) ãéá íá åâåßóå áðü ðcí åâéåðÜóôáóç.

## 2.10 ìåðÜ ôcí Åæáå Üóôáóç

ÌåðÜ áðü ìéá åðéóð÷çí Ýíç åâéåðÜóôáóç, áéïëiðéåß ç ñyéïéóç äéÜöññùí ðñiäéñåðééþí åðééïäþí. Íé ñoèìßóåéò ìðiñjýí íá åßíññí áí åéóÝëèåðå ìáïÜ óóï áíðóóðíé÷i ìâñý (configuration options) ðñéí åðáíâééíÞoåå õi íÝí FreeBSD óýóôçíà óåò P ìåðÜ ôcí åâéåðÜóôáóç, ÷ñçóéiiðíþíóå õi sysinstall êáé åðééÝäíðåò Configure.

### 2.10.1 Ñyéïéóç Óðóêåðþí Äéêôýíö

Áí Ý÷åôå ñoèìßóåé ðñiçñiðí Ýúò õi PPP ãéá íá êÜíåôå åâéåðÜóôáóç iÝóù FTP, ç iëüïç áðôP äái èá åìöáíéóðåß, áéëÜ ìðiñåßóå íá ôcí ñoèìßóåå áññüöåñá ìå õíï ôñüði ðið ðâñéññÜøåíå ðáñáðÜñ.

Åéá ëåðóîññåßò ðëçñiðiñßåò ó÷åðééÜ iá ÒiðééÜ Äßêðôå (LAN) êáé åéá ñyéïéóç ôiõ FreeBSD ùò ðýëç / åññièiäçòP (gateway/router), áíáôñÝîôå óóï èâðÜëåéï Advanced Networking.

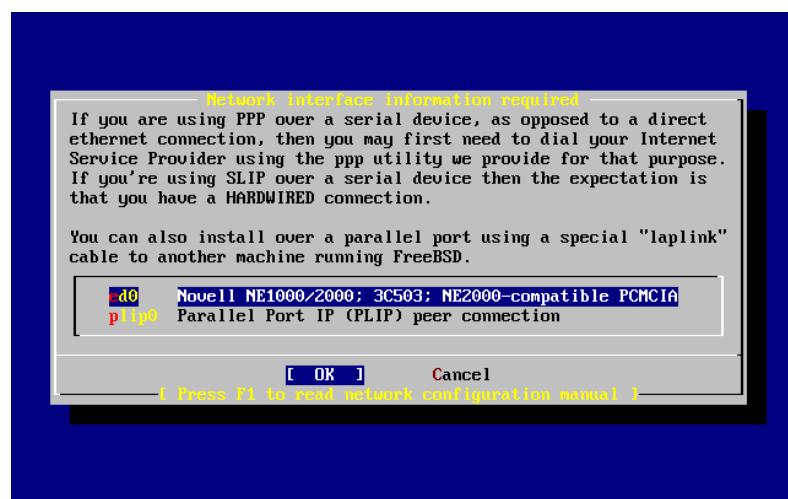
User Confirmation Requested

Would you like to configure any Ethernet or PPP network devices?

[ Yes ]      No

Åéá íá ñoèìßóåå ìéá óðóêåðþí äéêôýíö, åðééÝîôå [ Yes ] êáé ðéÝóåò Enter. ÅéáöññåðééÜ, åðééÝîôå [ No ] åéá íá óðíå ÷ßóåå.

#### Ó÷Piá 2-28. ÅðééÝäíðåò ìéá Óðóêåðþí Ethernet



ÅðééÝîôå õi interface ðið èá ñoèìßóåå ìå óá åâéÜééá, êáé ðéÝóåò Enter.

User Confirmation Requested  
Do you want to try IPv6 configuration of the interface?  
Yes [ No ]

Óõi óðâæâñéñéi Ýír éæéùôééü õiõðééü äßêôöi, ôiõ ôñÝ ÷ ií Internet ðñùôüêëëi (IPv4) Pôáí áñêâöü. ÅðéëÝiáíå ôiõ [ No ] iå óå åâæÜééá éáé ðéÝoáíå **Enter**.

Áí áßóôå óðiáíå Ýfíé óå Ýíá ððÜñ ÷ ií IPv6 äßêôöi iå Ýíá äéáêñéóôP RA, åðéëÝiôå [ Yes ] éáé ðéÝóôå **Enter**. Èá ÷ ñâéáóöiyí áñêâöü ãåðôåñüëåðôå ãéá ôçí áíß ÷ íåööç äéáêñéóôP RA.

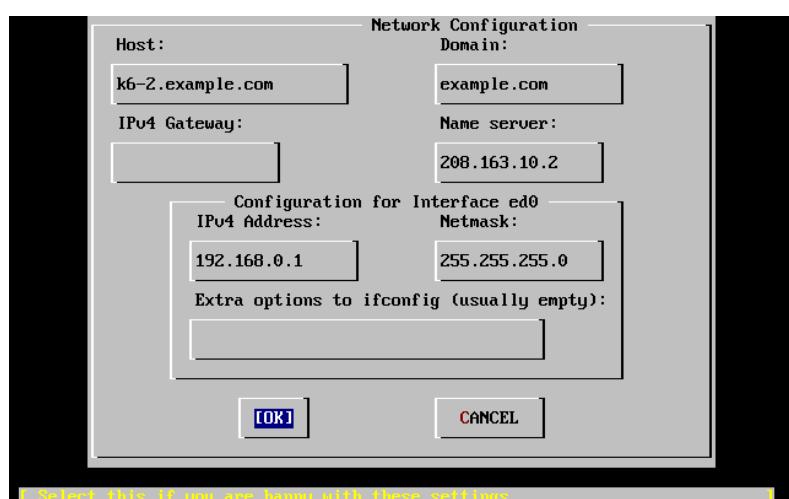
User Confirmation Requested  
Do you want to try DHCP configuration of the interface?  
Yes [ No ]

Áí åái ÷ ñâéÜæåóå DHCP (Ðñùôüêëëi Áðüäiöçò Ñõèìßóåùí, Dynamic Host Configuration Protocol) åðéëÝiôå [ No ] iå óå åâæÜééá éáé ðéÝóôå **Enter**.

Áí åðéëÝiôåå [ Yes ] éá áéôåëåôåß ç åöáññäP **dhclient**, éáé áí áßíáé åðéôô ÷ Pò, èá áßíáé áôôüüáöç ñyéëéöç ðùí ðáññáí Ýôñùí õiõ aéêôdyiõ. ÁíáôñÝiôå óóï ÕiPíá 30.5 åéá ðåñéóóüôåñåò ðëçñiöñßåò.

Ç áéüëiöç iëüíç Ñõèìßóåùí Äééöyíõ ãåß ÷ íåé ôç ñyéëéöç iéáò óôôéåôPò Ethernet åéá Ýíá óyóôçìá ôiõ iðiñi òá åâéöiöññåß ùò ðýëç åéá Ýíá Óiðééü Äßêôöi (LAN).

## Ó÷Píá 2-29. Ñyéëéöç ÐáññáíÝôñùí ÓõóêåôPò ed0



×ñçóéiiðiePóôå ôiõ **Tab** åéá íá åðéëÝiåôå áíÜiåóá óôá äeÜöiñá ðåäßá éáé íá óoiðëçñþóåôå ôéò êáôÜëëçëåò ðëçñiöñßåò.

Host (½iñá iç ÷ áíPíáôiò)

Ôi ðëPñåò üiñá ôiõ iç ÷ áíPíáôiò, ð.÷. k6-2.example.com óå áôôP ôçí ðåñßðôùóç.

Domain (ÔiÝáò)

Ôi üiñá ôiõ óiñÝá óoií iðiñi âñßóêåôáé ôiõ iç ÷ Üíçìá, üðùò example.com óå áôôP ôçí ðåñßðôùóç.

## IPv4 Gateway (Đýëç)

Đññüéååéåå áéå ôçí áéåýéòíóç IP ôóç íđiþá ðññùèíýíóåé óå ðåéÝôå óå íđiþá ååí ðññíñbæíïååé áéå ôíđééiyò ðññíñéòíïýò. Èá ðñÝðåé íá óóïòéçñþoååô ôí ðåäëßí áåòüí áí i ñđíëíæóôPò åßíáé êùíàïò óóí óóååéåñéíÝíí åßéôòí. ÅóPøôå ååòüò ôí ðåäëßí éåtíí áí i ñđíëíæóôPò åßíáé ç ðýéç áéå ôí Internet ôóí óóååéåñéíÝíí åßéôòí. Ç ðýéç IPv4 åßíáé åßðþöçå åíñòðôP ùò ðññíåðééååíÝíç ðýéç P ðññíåðééååíÝíç ååéåññíP (default gateway / default route).

## Name server (ÃéáêïíéóôÞò ÌíîÜôùí)

Åßíáé ç IP äéåýëöíóç ôïõ ôïðéëíý óáó äéáéñéöôP DNS. Óóï óôåäéñéíYíí èäéùðéêü ðïðéëü äßéðöï, äåí ððÜñ ÷ åé äéáéñéöôPò DNS êáé Yôóé ÷ ñçóéiiðíéÞèçéå ç IP äéåýëöíóç ôïõ äéáéñéöôP DNS ðïõ äßíáé i ðáñí÷ Yáó Internet (208.163.10.2).

## IPv4 address (Æéåýèõíóç)

C IP äéåýèõíóç ðiõ èá ÷ñçóéiiðiéçèåß óå áôõü ôi interface åßíáé 192.168.0.1

## Netmask (ÌÜóêá Õðíäéêôýíõ)

Ói iððeið æáðøðyíóðu ðið ÷ ñçóðiðiðiýiðáé óå áðoðu ðið äßêðoði åßíáé 192.168.0.0 - 192.168.0.255 íà iÜóéá ððræéêðvýð (netmask) 255.255.255.0.

Extra options to ifconfig (ÅðéðëÝíi åðéëiäÝò ãéá ôçí ifconfig)

ĐññiøèÝ óôå åäþ åðéðëÝ ii åðéëiäÝ ò åéá ôçí ifconfig êáé ôi óðåæåñéiÝ ii interface. Óçí óðåæåñéiÝ íç ðåññßðóùóç äáí õðÜñ ÷åé êáïßá.

× ñçóéïïðiéÞóôå ôï Tab ãéá íá åðéëÝîåôå [ OK ] üôáí ôåëåéþóåôå, êáé ðéÝóôå Enter.

User Confirmation Requested  
Would you like to bring the ed0 interface up right now?

[ Yes ] No

Åðéé Ýäiñôåò [ Yes ] êáé ðéÝæiiñôåò **Enter** èá åiññäiñðiñÞóåôå ôiñ äßêôöiñ, Ýöiñiñ ðññiò ÷ñÞóç ööñiñ ìç÷Üíçìá óåò. Ùòôüöiñ áðôüñ äåí åðéðôå ÷Üíåé êáé ðiñëëÜ êáðÜ ôç äeÜñêåéå ôç ñåðéåðÜóðåñçò, iýòùò P Üëëùò èá ÷ñåðéåðôåß íá Üññåðå ãðåáññéñcò.

### 2.10.2 Ñyèjéócò Ðýécò (Gateway)

User Confirmation Requested  
Do you want this machine to function as a network gateway?

[ Yes ]      No

Áí ôi ìç÷ Üíçìá ðñüêåéôáé íá èåéôïññåß ùò ðýëç ãéá Ýíá ôüðééï åßéôöï êáé íá ðññùèåß ðáéÝôá låôáiý Üëëùí  
ìç÷ áíçìÜðùí, åðééÝîôå [ Yes ] êáé ðéÝôå **Enter**. Áí ôi ìç÷ Üíçìá åßíáé Ýíáò êüìäiò öïö åéêôýïö, åðééÝîôå [ No ] êáé  
ðéÝôå **Enter**.

### 2.10.3 Ñýèjéóć Ōđcñåóébí Internet (Internet Services)

User Confirmation Requested

## ÊðöÜëáéi 2 ÅæááôÜóôáóç ôïõ FreeBSD 8.x éáé ÐñiäåíÝóôåñùí Åëäüóåùí

Do you want to configure inetd and the network services that it provides?

Yes [ No ]

Áí áðééÝîôå [ No ], êÜðíéåò õðçñåóßåò üðùò ôï **telnetd** áái èá áíáññïðíéçèíýí. Áðôü óçìáßíåé üðé áðñáéññôíÝíé ÷ ñPóôåò áái èá íðiññýí íá ÷ ñçóëíðíéPóïõí ôï **telnet** áéá íá áéóÝëëõí óôí íç ÷ Üíçíá. Íé ðíðééíß ÷ ñPóôåò èá íðiññýí ûóðüöí íá Ý ÷ iõí ðñüóåáóç óå áðñáéññôíÝíá íç ÷ áíPíáôá ïÝóù ôïõ **telnet**.

Íé õðçñåóßåò áðôÝ ðíññýí íá áíáññïðíéçèíýí íàðÜ ôçí áâæáôÜóôáóç íà ôçí áðñáññåóßå ôïõ áñ ÷ áßíõ /etc/inetd.conf íå ôíí ðññôéíþíàíí óåò áðñáññåóôÞ êåéíÝíõ. Áåßôå ôï ÓíPíá 30.2.1 áéá ðåñéóóüðåñåò ðëçññiøñßåò.

ÅðééÝîôå [ Yes ] áí èÝéåôå íá ññèíßóåôå ôéò õðçñåóßåò áðôÝ ëåôÜ ôçí áâæáôÜóôáóç. Èá áñùôçèåßôå áéá ieá áéüüíá áðéåååáßùóç:

User Confirmation Requested

The Internet Super Server (inetd) allows a number of simple Internet services to be enabled, including finger, ftp and telnetd. Enabling these services may increase risk of security problems by increasing the exposure of your system.

With this in mind, do you wish to enable inetd?

[ Yes ] No

ÅðééÝîôå [ Yes ] áéá íá óðíå ÷ ßóåôå.

User Confirmation Requested

inetd(8) relies on its configuration file, /etc/inetd.conf, to determine which of its Internet services will be available. The default FreeBSD inetd.conf(5) leaves all services disabled by default, so they must be specifically enabled in the configuration file before they will function, even once inetd(8) is enabled. Note that services for IPv6 must be separately enabled from IPv4 services.

Select [Yes] now to invoke an editor on /etc/inetd.conf, or [No] to use the current settings.

[ Yes ] No

ÅðééÝäiiôå [ Yes ] èá íðiñÝóåôå íá ðññôéÝóåôå õðçñåóßåò óâÞññôå õï # áðü ôçí áñ ÷ Þ ieáò áññáñÞð.

## Óðráða Þíð 2-30. Åðåðiða óßá óiið in etd.conf

```
^l (escape) menu ^y search prompt ^k delete line ^p prev li ^g prev page
^o ascii code ^x search ^l undelete line ^n next li ^v next page
^u end of file ^a begin of line ^w delete word ^b back 1 char
^t top of text ^e end of line ^r restore word ^f forward 1 char
^c command ^d delete char ^j undelete char ^z next word
=====Line 1 col 0 lines from top 1 =====
# $FreeBSD: src/etc/inetd.conf,v 1.73.10.2.4.1 2010/06/14 02:09:06 kensmith Exp
#
# Internet server configuration database
#
# Define *both* IPv4 and IPv6 entries for dual-stack support.
# To disable a service, comment it out by prefixing the line with '#'.
# To enable a service, remove the '#' at the beginning of the line.
#
#ftp    stream  tcp     nowait  root    /usr/libexec/ftpd      ftpd -l
#ftp    stream  tcp6    nowait  root    /usr/libexec/ftpd      ftpd -l
#ssh    stream  tcp     nowait  root    /usr/sbin/sshd      sshd -i -4
#ssh    stream  tcp6    nowait  root    /usr/sbin/sshd      sshd -i -6
#telnet stream  tcp     nowait  root    /usr/libexec/telnetd  telnetd
#telnet stream  tcp6    nowait  root    /usr/libexec/telnetd  telnetd
#shell   stream  tcp     nowait  root    /usr/libexec/rshd      rshd
#shell   stream  tcp6    nowait  root    /usr/libexec/rshd      rshd
#login   stream  tcp     nowait  root    /usr/libexec/rlogind  rlogind
#login   stream  tcp6    nowait  root    /usr/libexec/rlogind  rlogind
file "/etc/inetd.conf", 118 lines
```

Ílæð Ü ócí Óñjóðréþeç óu ðéðéðiðþóði Óððçññáðéþí, éaé iá ðócí Ðlkåóç ðið Esc èá áiðöáíéðóðáß Yíá iáññý ði iðibíi óáð áðéðón Yððáé íá áððáðóð áðü ði Óñjúññáðíá, áððieçéðáýíðóð áéáð óéð óéëááYð óáð.

#### 2.10.4 Åíåñäïðïßçóç Åéóüäïõ ÌÝóù SSH

User Confirmation Requested  
Would you like to enable SSH login?  
Yes [ No ]

Áí åðééÝåâôå [ Yes ] èá åfâññiðiéçèåß í sshd(8), í äáßiññáó ôiöö **OpenSSH**. Íå ôiï ôñüðiä åðóü èá åðééñÝøåðå áóöäæÞ  
äðñiâéññóíÝíç ðñüöåâåóç óöi ìç÷ Üíçìá óáð. Åéá ðåñéóóüôåñåò ðëçñiöiñßåò ó÷åðééÜ íå ôi **OpenSSH** äåßbåð ôi  
ÔíPiá 15.11.

## 2.10.5 Áíþíóðí FTP

User Confirmation Requested  
Do you want to have anonymous FTP access to this machine?  
  
Yes [ No ]

#### 2.10.5.1 ጥናት አይነቶች FTP

Åðéé Ýæííóáò öi ðñiäðééäáiÝii [ No ] êáé ðéÝæííóáò Enter èá åðéóñÝðåôáé iüñiò óöiñò ÷ñþóåò ðiñ Ý÷iñí ëriñáñéáñiñyò iå èuñééiyò íá Ý÷iñí FTP ðñüöåáñç ööiñ iç÷ Üíçia.

#### **2.10.5.2 ÅðéôñÝðííôáò ôí Áíþíõíí FTP**

Í Óðieiði óðróðið í ðiðinabbl íá Ý ÷ áé ðñuuðáaóç óðii iç ÷ Üíçia óáð, áí áðeeÝ íaðóð íá áðeññÝ Þóðóða óeó áþþiðið oððiaÝ óáeò FTP. Ëa ðñÝ ðåðe íá eÜáððóða ððüþþeÝ óáð óeó áðeðeiðeÝ ò aóðáeððáð ðið eá áðeóÝ ñnæð iéá ðóÝ ðiðeÝ ñýðiðeóç. Áéá ðåññeóðuðáñð

ððçñiïññßåð ó ÷åôéêÜ íå ôçí áóðÜëåéá, äåßôå ôi ÊðöÜëáéí 15.

Ãéá íá åðéôñÝøåôå ôi áíþíði FTP, ÷ñçóéiiðiðóôå ôá ååëÜëéá ãéá íá åðéëÝîåôå [ Yes ] éáé íá ðéÝóåôå **Enter**. Èá ÷ñâéåôåð íá åðéâåååéþóåð íáíÜ ôçí åðéëiðP óáð:

#### User Confirmation Requested

Anonymous FTP permits un-authenticated users to connect to the system FTP server, if FTP service is enabled. Anonymous users are restricted to a specific subset of the file system, and the default configuration provides a drop-box incoming directory to which uploads are permitted. You must separately enable both `inetd(8)`, and enable `ftpd(8)` in `inetd.conf(5)` for FTP services to be available. If you did not do so earlier, you will have the opportunity to enable `inetd(8)` again later.

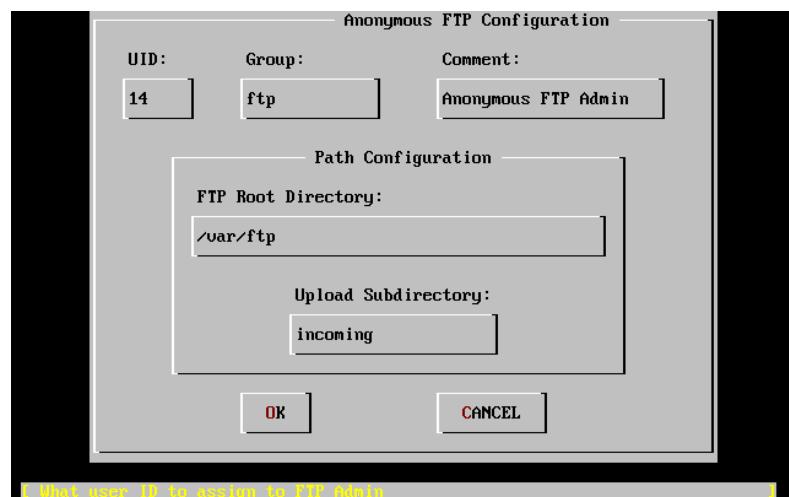
If you want the server to be read-only you should leave the upload directory option empty and add the `-r` command-line option to `ftpd(8)` in `inetd.conf(5)`

Do you wish to continue configuring anonymous FTP?

[ Yes ]                    No

Ó iþíðiá áððü óáð åéäiðiéåß åðßóçò üðé ç ððçñåðßá FTP èá ðñÝðåé åðßóçò íá åíâñäiðiéçèåß óðí /etc/inetd.conf óå ðåñßðôùóç ðið eÝëåôå íá åíâñäiðiéçèÿí ié áíþíðiåð óðíäÝóåéò FTP (äåßôå ôi Ôíþá 2.10.3). ÅðéëÝiôå [ Yes ] éáé ðéÝóåôå **Enter** ãéá íá óðíä÷ßóåôå. Èá äåßôå ôçí áéüëiðèç iëüíç:

### Ó÷Þíá 2-31. ÐñiåðéëååíÝiôå Ñõèìßóåéò Áíþíðiñð FTP



×ñçóéiiðiðóôå ôi **Tab** ãéá íá åðéëÝiôåôå éáé íá óðíðëçñþóåôå ôá áðáñáßôçôå ðåäßá ðëçñiöñéþí:

UID

Í áíâñùñéóôéêüò áñéèiùò (user ID) ðið eÝëåôå íá áðíäþóåôå óðíí áíþíði FTP ÷ñþóôç. ¼éá ôá áñ÷åßá ðið èá áíâñáßñiði óðíí äéáñéóôP FTP èá áíþéiði óå áððü ôi ID.

## Group

Óå ðiéá iñÜäá ÷ñçóôþí (group) è Ýëåôå íá áíþêåé i áþíöñìò FTP ÷ñþóôçò.

## Comment

Êåßìåíï ðiõ ðåñéÝ÷åé ðåñéãñáöP ôiõ ÷ñPóôç óöi áñ÷åßí /etc/passwd.

## FTP Root Directory

Ҫ ôiðièåóßá ðiö ðåñéÝ÷åé ôá áñ÷åßá ðiö åßíáé äéåéÝóéíá óöi áíþföii FTP.

## Upload Subdirectory

Í ñéæétiò (root) êáðÜëiäiò ôiõ FTP, áðü ðñiâðééið, äçìéiññâðbóáé óoír /var. Áí äáí õðÜñ ÷ áé áéâð áññéâðüò ÷þñiò áéá ôcí áíáíâiùláiç ÷ñþóç ôiõ FTP, iðiññâðbóá íá ÷ñcôéiiðiéþóåôá ôiír êáðÜëiäi /usr áeëÜæiïðáò ôiír ñéæéü êáðÜëiäi (FTP Root Directory) óå /usr/ftp.

¼ôáí åßóôå ééáïïðiéçìÝïò ia ôéò ôéïÝò, ðéÝóôå **Enter** æá íá óõíå÷ßóåôå.

User Confirmation Requested  
Create a welcome message file for anonymous FTP users?

[ Yes ] No

Áí áðeeÝíâoå [ Yes ] êáé ðeÝóåôå Enter, èá íâééíÞóåé áðoüüìáôå Ýíàò áðâíâññåôåÞò êâéíÝñò þóôå íá iðiñÝóåôå íá áðâíâññåôåßóå ôiì ÌÞòìá.

Ó÷Piá 2-32. Åðâiâñääóßá ôiõ Íçíýiáõiò Éáëiöùñßóiáõiò (Welcome Message) ôiõ FTP

```
^[[escape) menu ^y search prompt ^k delete line ^p prev line ^g prev page  
^o ascii code ^x search ^l undelete line ^n next line ^v next page  
^u end of file ^a begin of line ^w delete word ^b back char ^z next word  
^t begin of file ^e end of line ^r restore word ^f forward char  
^c command ^d delete char ^j undelete char ESC-Enter: exit
```

Your welcome message here.

```
|file "/var/ftp/etc/ftpmotd", 1 lines, read only
```

Đññüéåéôáé ãéá ôíï áðåáiññáóôÞ êåéï Ýíï ñe. ×ñçóéïïðíéÞóå ôéo íäçãßåò ãéá íá áëëÜñåôå ôíï ïÞíöïá P áí èÝéåôå áëëÜñåôå ôíï ïÞíöïá áññüôåññá, ÷ñçóéïïðíéÞóå Ýíá áðåáiññáóôÞ êåéï Ýíï ñcò áðééïäÞò óáò. Ååßôå ôíï üññá ôíï ãñ÷åßïò ëéá ôc èÝóc ôíï ôóçí ôåéåôåßá áññiiÞ ôcò ìëüíçò ôíï áðåáiññáóôÞ êåéï Ýíï.

Đé Ýæiiôåò **Esc** èá åiöáiéóôåß Ýíá áíáäöùiåíi iåñiý iå ðñiåðééååí Ýíç ôçí åðééïåP a) leave editor. Đé Ýóôå **Enter** åéá Ýñiäi êáé oöñiÝ ÷ åéá. Đé Ýóôå iåñiÜ **Enter** åéá íá åðiècåýóåôå oö ÷üñ áéëéååÝ òiñiÝ ÷ åôå êÜäé.

## 2.10.6 Ñýèiéóç Óooôþiaò Áñ÷åßùí Äéêôýïõ (Network File System)

Ôí Óyóôçia Áñ÷åßùí Äéêôýïõ (NFS) åðéêôÝðåé ôi äéâiïéñáóíü áñ÷åßùí óå Ýíá äßêôöi. já ìç ÷ Üíçia íðiñåß íá ñoðeïéóôåß ùò åiñðçñåôçôþò, ðåëÜôçò þ éáé óå ayí. ÁíáôñÝiôå oöi Òiþia 30.3 æáé ðåñéóóüöåñåò ðeçñiïõñßåò.

### 2.10.6.1 Äéâiïéóôþò NFS

User Confirmation Requested

Do you want to configure this machine as an NFS server?

Yes [ No ]

Áí äái õðÜñ ÷ áé áíÜæç æáé åiñðçñåôçôþ Óooôþiaò Áñ÷åßùí Äéêôýïõ, åðéëÝiôå [ No ] éáé ðéÝóôå **Enter**.

Áí åðéëÝiôå [ Yes ] éá åiøáíéóôåß Ýíá áíáäöüìåíi iþíöià ðiõ óåò ðeçñiïõñåß üöé ðñÝðåé íá äçíëiññäçèåß ôi áñ÷åßü exports.

Message

Operating as an NFS server means that you must first configure an /etc/exports file to indicate which hosts are allowed certain kinds of access to your local filesystems.

Press [Enter] now to invoke an editor on /etc/exports

[ OK ]

ĐéÝóôå **Enter** æáé íá óðiå ÷ ßóåôå. Èá áíñßåé Ýíáò åðåññäóôþò éåéiÝiõ ãéá íá íðiñÝóôå íá äçíëiññäþóåôå éáé íá åðåññäóôåßôå ôi áñ÷åßü exports.

### Ó÷þia 2-33. Åðåññäóþá Áñ÷åßü exports

```

^l (escape) menu ^y search prompt ^k delete line ^p prev li ^g prev page
^o ascii code ^x search ^l undelete line ^n next li ^u next page
^u end of file ^a begin of line ^w delete word ^b back 1 char
^t begin of file ^e end of line ^r restore word ^f forward 1 char
^c command ^d delete char ^j undelete char ^z next word
L: 1 C: 1 =====
#The following examples export /usr to 3 machines named after ducks,
#/usr/src and /usr/ports read-only to machines named after trouble makers
#/home and all directories under it to machines named after dead rock stars
#and, /a to a network of privileged machines allowed to write on it as root.
#/usr          huey louie dewie
#/usr/src /usr/obj -ro calvin hobbes
#/home -alldirs   janice jimmy frank
#/a      -maproot=0 -network 10.0.1.0 -mask 255.255.248.0
#
# You should replace these lines with your actual exported filesystems.
# Note that BSD's export syntax is 'host-centric' vs. Sun's 'FS-centric' one.

file "/etc/exports", 12 lines

```

×ñçóéïéÞóôå ôéò iäçäßåò æáé íá ðñiõéÝóôå ôá óooôþiaôå áñ÷åßùí ðiõ èÝëåôå íá äéâiïéñÜóôå, ôþñá þ áññüôåñá ÷ ñçóéïéþíôå Ýíá åðåññäóôþ éåéiÝiõ ôçò åðéëiþò óåò. Óçiaéþóôå ôi üññá éáé ôçí ôiðiæåóþá ôiõ áñ÷åßü ùðùò öáßüíóåé óöi êÜôù iÝiõ ôçò iëüíçò.

ĐéÝæíôåò **Esc** èá åiøáíéóôåß Ýíá áíáäöüìåíi lâñiy lâ ðñiãðéëåaiÝíç ôçí åðéëiþ a) leave editor. ĐéÝóôå **Enter** æáé Ýiññí éáé óðiÝ ÷ åéá.

## 2.10.6.2 ÐåëÜôçò NFS

Í ðåëÜôçò NFS åðéôñÝðåé óôï ìç÷Üíçìá óáò íá Ý÷åé ðñüóâáóç óå åîôðçñâôçôÝò NFS.

User Confirmation Requested  
Do you want to configure this machine as an NFS client?

Yes [ No ]

Ìå óá âåëÜêéá, åðéëÝíôå éáôÜ aïýëçóç [ Yes ] Þ [ No ] éáé ðéÝóôå **Enter**.

## 2.10.7 Ñõèìßóåéò Èíïóüëáò (System Console Settings)

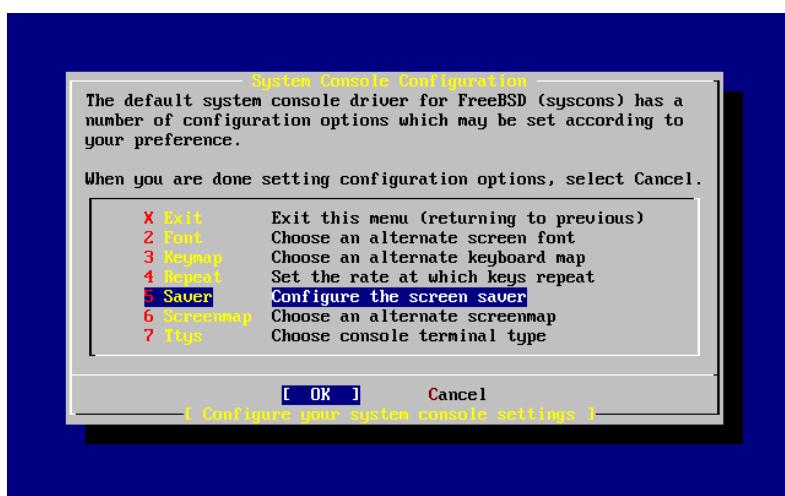
ÕðÜñ÷iõí aéÜöiñâò äéâéÝóéíâò åðéëiäÝò ãéá óç ñýèléóç ôçò èíïóüëáò ðiõ óðóôÞìáôïò.

User Confirmation Requested  
Would you like to customize your system console settings?

[ Yes ] No

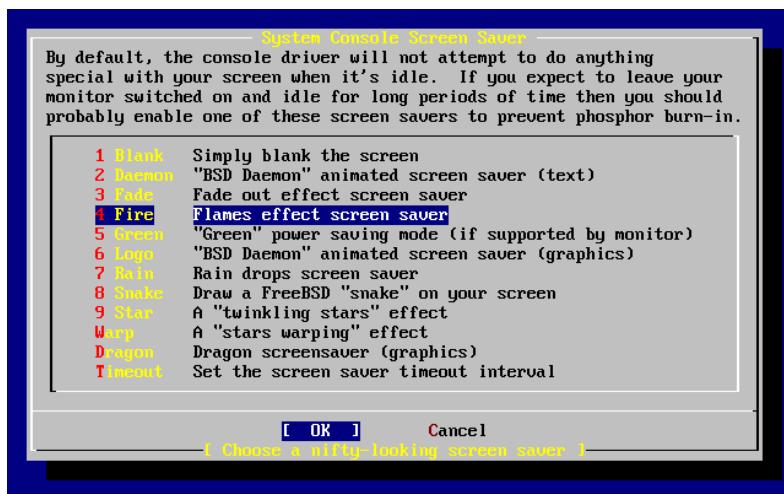
Ãéá íá äåßôå éáé íá ñõèìßóåâò óéò åðéëiäÝò, åðéëÝíôå [ Yes ] éáé ðéÝóôå **Enter**.

Ó÷Piá 2-34. ÅðéëiäÝò Ñýèléóçò Èíïóüëáò ÓðóôÞìáôïò



Ìéá óðíçèéóíÝíç åðéëiäÞ åßíáé ç ðñiöôáóßá iëüíçò (screen saver). ×ñçóéíïðíéÞóôå óá âåëÜêéá ãéá íá åðéëÝíâôå Saver éáé ðéÝóôå **Enter**.

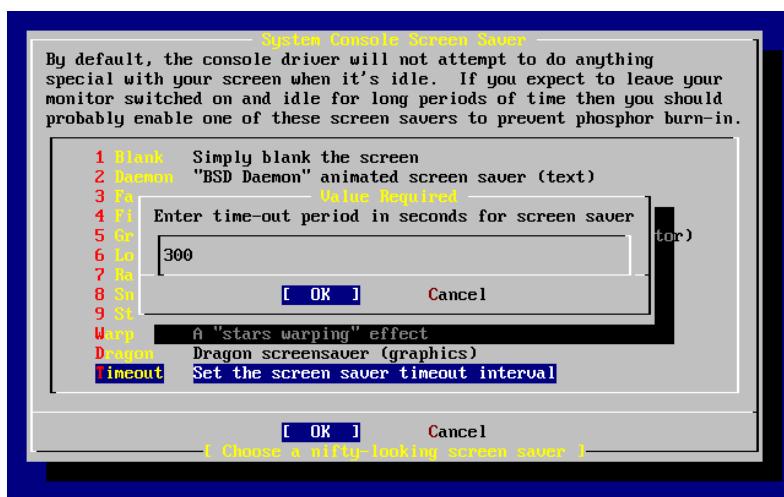
### Ó÷Piá 2-35. ÅðééïäÝò Ðñiöôáóßáò ïëüíçò



ÅðééÝîôå ôçí åðééïçôP ðñiöôáóßá ïëüíçò iå ôá âåëÜêéá, êáé ðéÝóôå **Enter**. Èá íáíåaaåßôå ôï iåñíý Ñýèiéóçò Êíñóüéåò ÓðóôPiáò.

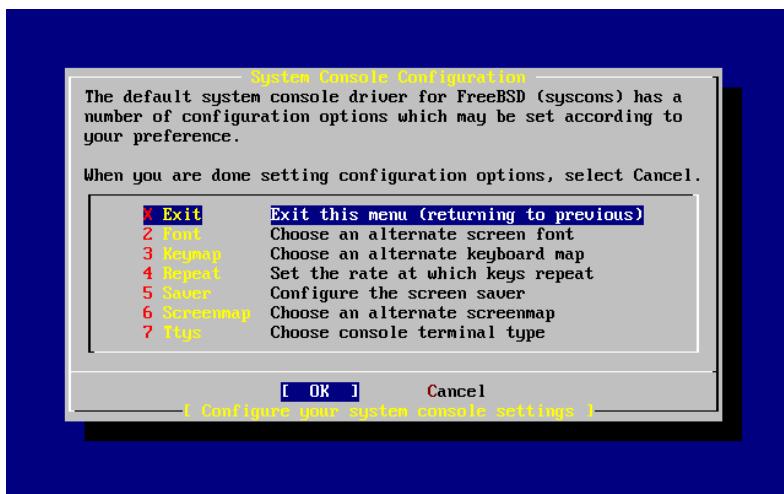
Ôi ðñiåðééäñÝî ÷ñíéü äëÜóôçìá åßíáé 300 ååñôåñüëåðå. Åéá íá áëëÜíåôå ôï äëÜóôçìá, åðééÝîôå íáíÜ Saver êáé áðü ôï iåñíý Screen Saver Options åðééÝîôå Timeout iå ôá âåëÜêéá, êáé ðéÝóôå **Enter**. Èá åiöáíéóôåß Ýíá áíáäöüllåñ iåñíý:

### Ó÷Piá 2-36. ×ñíéü ÄéÜóôçìá Ðñiöôáóßáò ïëüíçò



ÁëëÜîôå ôçí ôéïP, åðééÝîôå [ OK ] êáé ðéÝóôå **Enter** æá íá åðééôñÝøåôå ôï iåñíý Ñýèiéóçò Êíñóüéåò ÓðóôPiáò.

### Ó-Þìá 2-37. ïræiò áðü ôéò Ñõèìßóåéò Èñóüëáò ÓõóôÞìáò



ÅðeeëÝäiiöáò Exit éáé ðeÝæiiöáò Enter èá óõíå÷ßóåôå íå ôéò ððüëéðåò ñõèìßóåéò ðiö ðñÝðåé íá ãßfiöí íåðÜ ôçí åâéåôÜóôáóç.

### 2.10.8 Ñýèiéóç Aæþíçò ¿ñáò (Time Zone)

Ç óùóôP ñýèiéóç ôçò aæþíçò þñáò, èá åðéôñÝóåé óôï ìç÷Üíçìá óåò íá åéíñèþíåé áðóüùáðá ôçí þñá óýïöùíá íå ôéò ðiðééÝò ñõèìßóåéò, êáèþò éáé íá åéðåéëß Üëëåò éåéôïðñäßåò ðiö ó÷åðßæíïóáé íå ôéò aæþíåò þñáò.

Öi ðánñÜääéäia ðiö öáðíåôåé åßíáé ãéá Ýíá ìç÷Üíçìá ðiö åñßóéåôåé óóéò ÁíáôïëéÝò ÇíùìÝíåò Ðïëéôåßåò. Íé åðééëÝò óåò èá åéáöÝñïöí áíÜëëåá íå ôç åâùññäöéêP óåò èÝóç.

User Confirmation Requested  
Would you like to set this machine's time zone now?

[ Yes ]      No

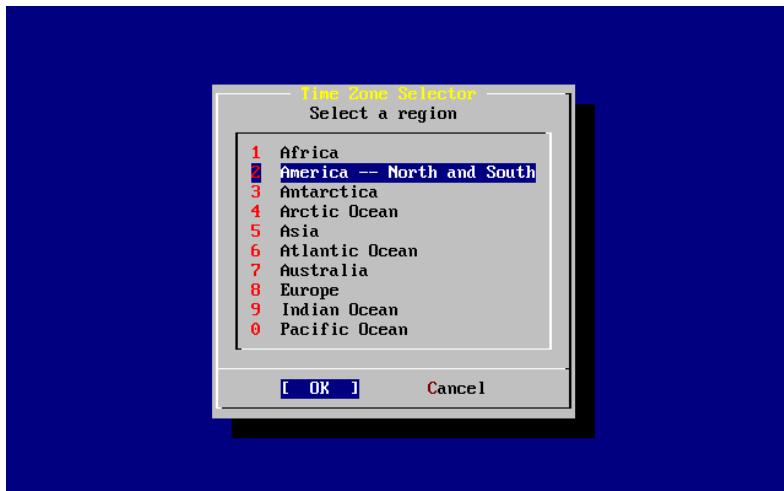
ÅðeeëÝíåå [ Yes ] éáé ðeÝóåå Enter ãéá íá ñõèìßóåôå ôç aæþíç þñáò.

User Confirmation Requested  
Is this machine's CMOS clock set to UTC? If it is set to local time or you don't know, please choose NO here!

Yes      [ No ]

ÅðeeëÝíåå [ Yes ] P [ No ] áíÜëëåá íå ôï ðùò åßíáé ñõèìéóíÝíí ôï ñïëüé óôï ìç÷Üíçìá óåò éáé ðeÝóåå Enter.

Ó÷Piá 2-38. ÅðéëïäP ôçò Ðåñéï÷Pò óáò



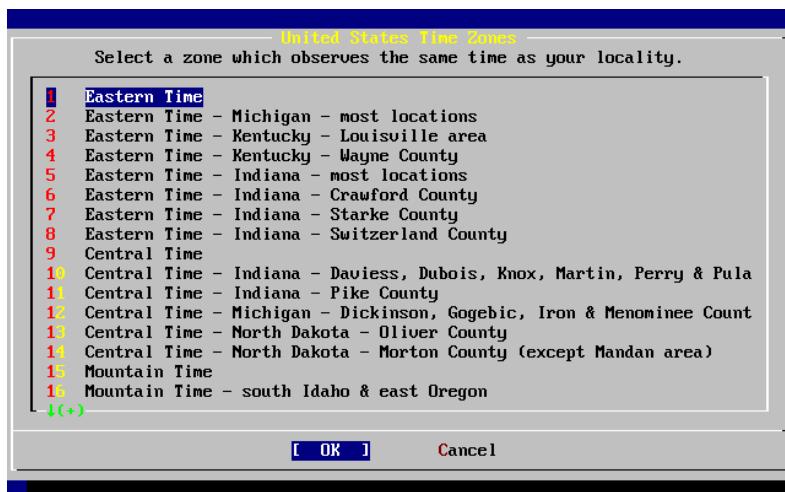
ÅðéëÝîôå ôçí êáôÜëëçëç ðåñéï÷P (region) ìå ôá âåëÜééá êáé ðéÝóôå Enter.

Ó÷Piá 2-39. ÅðéëïäP ôçò ×þñáò óáò



ÅðéëÝîôå ôçí êáôÜëëçëç ÷þñá ÷ñçóëiiðiéþíôå õá âåëÜééá êáé ðéÝóôå Enter.

## Ó÷Piá 2-40. ÅðééïäP Äþíçò ¿ñáò (Time Zone)



ÅðééïYiôå ôçí êáóÜëéçç æþíç þñáò iå ôá âåéÜééá êáé ðéÝóôå **Enter**.

Confirmation  
Does the abbreviation 'EDT' look reasonable?

[ Yes ]      No

Åðéââââéþóôå üöé åßíáé óùóôP ç ööñöññäößá äéá ôç æþíç þñáò ðïõ Ý÷åôå åðééïYiâé. Áí öáßíåôåé åíðÜíâé, ðéÝóôå **Enter** äéá íá óöñå ÷ßóåôå iå ôéò öðüëééðåò ññèìßóåéò iåðÜ ôçí åââåôÜóôáóç.

## 2.10.9 Óõiâáôüôçôá iå ôi Linux (Linux Compatibility)

**Óçìàßùóç:** Ç áíüôçôá áôôP éó÷ýâé iüíí äéá ôçí åââåôÜóôáóç FreeBSD ôçò óâéñÜò 7.x. Áí åââåôåôþóåôå FreeBSD 8.x ç ïèüíç áôôP äái èá åìöáíéóôåß.

User Confirmation Requested  
Would you like to enable Linux binary compatibility?

[ Yes ]      No

ÅðééïYäiñôåò [ Yes ] êáé ðéÝæiñôåò **Enter** èá åðééññäiñÜôùí Linux óôi FreeBSD. Ç åââåôÜóôáóç èá ðñiøéïYôåé üëá ôá åðáññäöçôá ðáêÝôåå äéá ôç óõiâáôüôçôá iå åêôåéïYôåå ðñiññÜìiáôå äéá Linux.

Áí êÜíâôå åââåôÜóôáóç iÝóù FTP, ôï iç÷Üíçíå èá ðñÝôåé íá åßíáé óõíäaiÝíí óôi Internet. ÍññéêÝò öiñÝò, iéá õiðiøéåößá FTP äái Ý÷åé üëåò ôéò åðáéññäiñôå äéáññÍò, üðùò ôç óõiâáôüôçôá iå ôi Linux. Íññåßôå ùóôüöi íá ôçí åââåôåôþóåôå áññüôåñá, áí ÷ññéÜæåôåé.

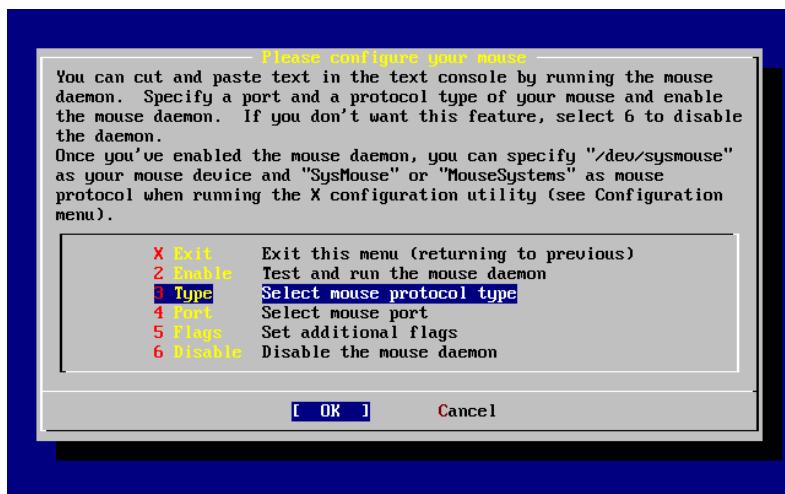
## 2.10.10 Ñõèìßóåéò Ðíïôéééïý (Mouse Settings)

Ç åðééïäþ áðôþ èá óáð áðéóñÝøåé íá êÜíåôå áðïéïðþ êáé áðééüüéëçóç êâéíÝñïð óðçí êiióüéá êáé óå ðñiäñÜìñåôá ÷ñçóéiiðïéþíôå Ýíá ðíïôßéé ôñéþí ðëþêôñùí. Áí ÷ñçóéiiðïéåßôå ðíïôßéé áÿí ðëþêôñùí, áíáôñÝíôå óðç óâéßää áíþêåéåò, moused(8), íåðÜ óðçí áâéåôÜóôáóç áéá íá äåßôå ðùò iðiññåßôå íá áññéþóåôå ðíïôßéé ôñéþí ðëþêôñùí. Óðï ðáñÜääéàíá áðôöü öáßíåðáé ç ñýéïéóç áíüò ìç-USB ðíïôéééïý (ð.÷. PS/2 ç óâéñéåéïý - COM - ðíïôéééïý):

```
User Confirmation Requested  
Does this system have a non-USB mouse attached to it?  
[ Yes ]     No
```

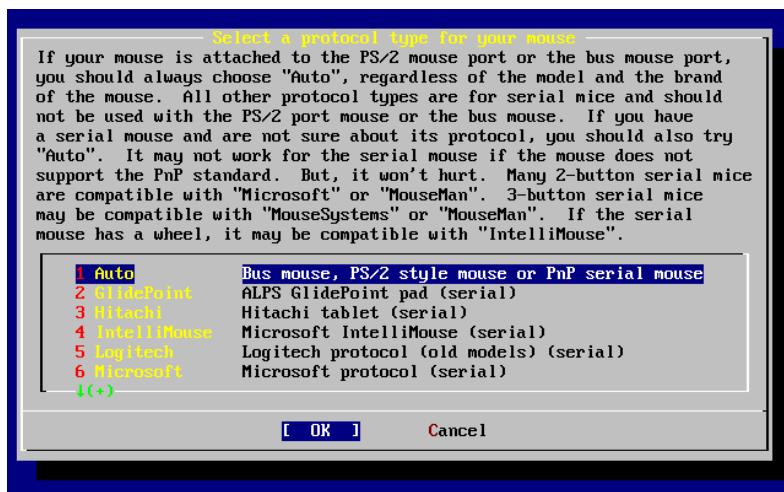
ÅðééÝíôå [ Yes ] ãéá ìç-USB ðíïôßéé, þ [ No ] ãéá USB ðíïôßéé êáé ðéÝóôå Enter.

Ó-Þìá 2-41. Åðééïäþ Ðñùôïüüëëï Ðíïôéééïý (Mouse Protocol Type)



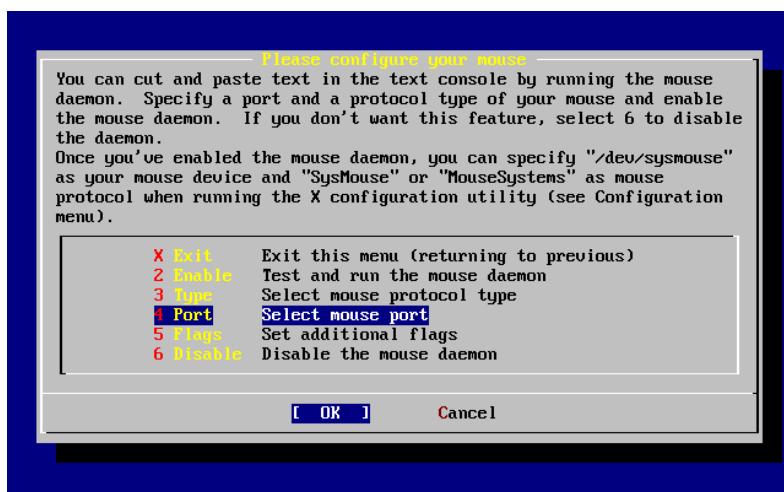
×ñçóéiiðïéþóôå óá ââéÜêéå ãéá íá åðééÝíôåå Type êáé ðéÝóôå Enter.

## Óðìá 2-42. ÅðéëiäP Ðñùôïðüëëiö Ðüïðéëéiý (Mouse Protocol)



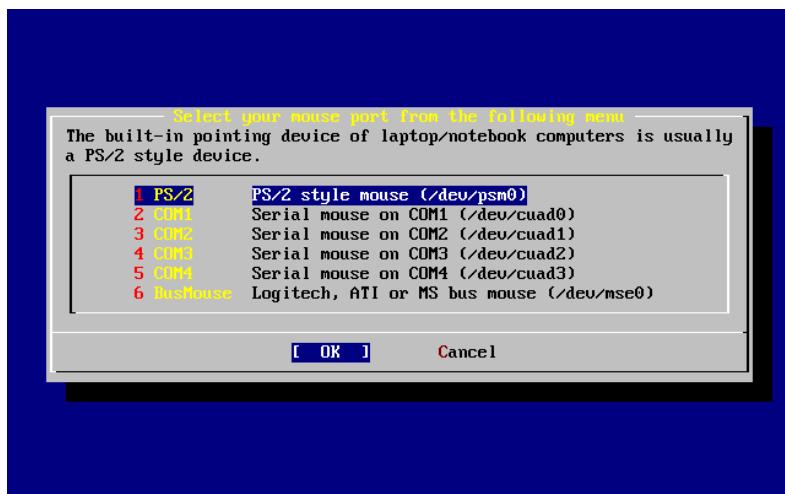
Ôi ðiiðéé ðið ÷ñçóéiiðiéåßðáé óå áðóù òi ðáñÜäåéäíá, åßíáé óýðið PS/2, êáé Ýóóé åßíáé óùóðP ç ðñiåðééåäíÝíç ñýðéé ðið ðñçóéiiðiéåßðáó õá ååéÜééá ãéá íá êÜíåðå êÜðiéá Üëëç åðéëiäP. Ååâåéüèåßðå üöé åßíáé óùóðéóíÝíç ç åðéëiäP [ OK ] êáé ðéÝóðå Enter ãéá Ýíðäíá áðü áðóù òi ìäñíý.

## Óðìá 2-43. Ñýðéé ðüñôáò Ðüïðéëéiý (Mouse Port)



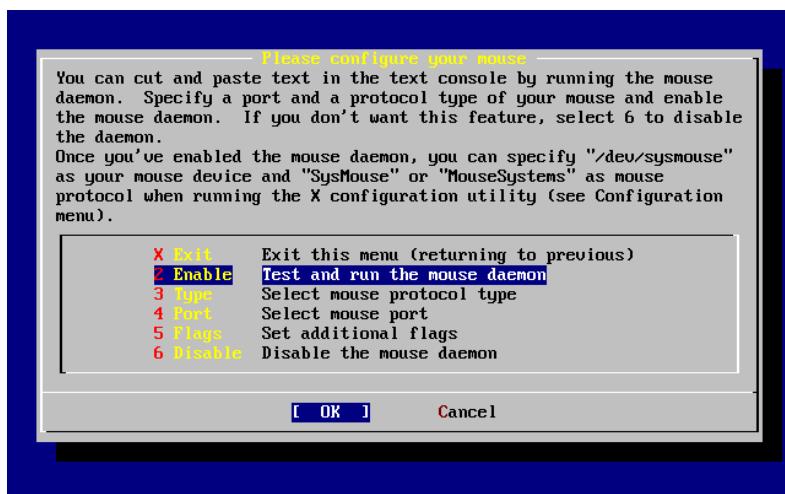
×ñçóéiiðiéåßðå õá ååéÜééá ãéá íá åðéëÝíðåò Port êáé ðéÝóðå Enter.

#### ÓðÞá 2-44. Ñýèiéóç Ðüñôáò Ðïðôéééíý (Mouse Port)



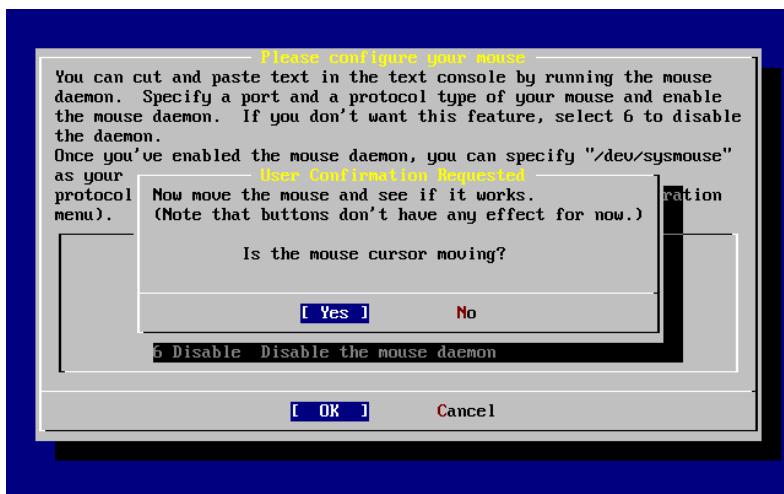
Ôi óýóðçìá áððü áðð÷å ðiíðéé PS/2 éáé Ýðóáí êáðÜëéçëç ç ðñiäðééåñÍýc ñýèiéóç PS/2. Åéá íá áððÜñåðå ôçí ðüñôá, ÷ñçóðiíðéþóå òá áððÜééá êáé ðéÝðóå ðéEnter.

#### ÓðÞá 2-45. Åíâñäiðiðçóç ôïð Äáßñá Ðïðôéééíý (Mouse Daemon)



ÔÝëïð, ÷ñçóðiíðéþóå òá áððÜééá êáé íá áððééÝðåðå ðéEnable, êáé ðéÝðóå ðéEnter êáé íá åíâñäiðiíðéþóå õíð ãáßñá õíð ðiíðéééíý (mouse daemon).

## Ó÷Piá 2-46. ãâã ÷ iò ôïõ Åáßiiá Ðiiôéêéï



ÌåðáééíÞóôå òi ðiiôßéé óðçí ièüíç êáé áââáéùèåßôå üöé i äñiíÝáò áîôéäñÜ óùóôÜ. Áí åßíáé åíôÜíåé, åðéëÝîôå [ Yes ] êáé ðéÝóôå **Enter**. Áí ü÷é, òi ðiiôßéé äái Ý÷åé ñõèìéôôåß óùóôÜ — åðéëÝîôå [ No ] êáé íáíáäíééíÜóôå ÷ñçóéíïðíéþíôå äéáöiñåôéêÝò ñõèìßóåéò.

ÅðéëÝîôå **Exit** iå òá åâæÜééå êáé ðéÝóôå **Enter** äéá íá åðéóôñÝøåôå, þóôå íá óðíå ÷ßóåôå iå ôéò ððüëíéðåò ñõèìßóåéò iåðÜ óçí åââáôÜóôáóç.

### 2.10.11 ÅââáôÜóôáóç ÐáêÝôùí

Óá ðáêÝóå åßíáé ðñiñåôåñëùôôéòíÝíá åêôåéÝóéíá, êáé áðiôåéíýíÝíá åiieéêü ôñüðíí åéá íá åââáôåôðÞóåôå ëiæéóíééü. Èá óáð åâßííðíå ôçí åââáôÜóôáóç åíüò ðáêÝôï ùò ðáñÜäâéäíá. Íðiñåßôå åðßóçò íá åââáôåôðÞóåôå ôþñá êáé üðíéá Üëéá ðñüöèåôå ðáêÝóå åðéèòiåßôå. ÌåðÜ ôçí åââáôÜóôáóç, ìðiñåßôå íá ÷ñçóéíïðíéÞóåôå òi sysinstall äéá íá åââáôåôðÞóåôå ðñüöèåôå ðáêÝóå.

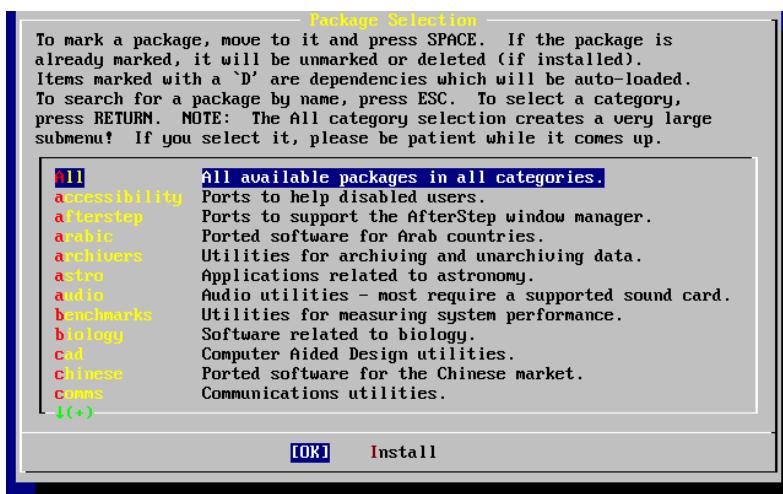
User Confirmation Requested

The FreeBSD package collection is a collection of hundreds of ready-to-run applications, from text editors to games to WEB servers and more. Would you like to browse the collection now?

[ Yes ]      [ No ]

ÅðéëÝäiiôåò [ Yes ] êáé ðéÝæiiôåò **Enter** èá åâßôå ôéò ièüíåò åðéëíäÞò ðáêÝôùí:

## Ó-Þìá 2-47. ÅðéëiäP Éáôçäiñßáò ÐáêÝóïõ

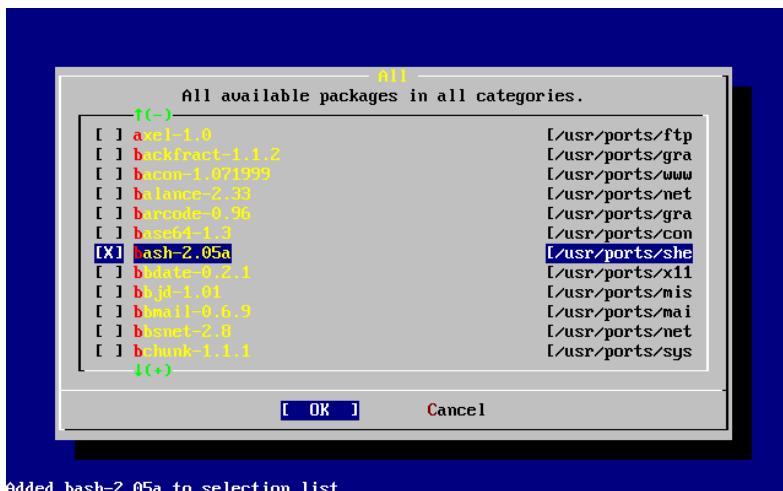


Ìðiñâßôå êÜèå äääiñÝíç óóéäiP íá åæááðóôÞóåôå iüíï ôá ðáêÝóá ðiõ åßíáé äéáéÝóeiá óóï ôñÝ-ii íÝóï ãæááðÜóôáóçò.

Ìå òçí åðéëiäP All èá åæßôå üëá ôá äéáéÝóeiá ðáêÝóá, P ìðiñâßôå íá åðéëÝíåôå óðæåêåñéiÝíç êáôçäiñßá. Öùôßóôå ðçí åðéëiäP óåò iå ôá åæÜééá êáé ðéÝóôå Enter.

Èá åìoáíéóôåß Ýíá iåñiý ôï iðiñi äåß-íåé üëá äéáéÝóeiá ðáêÝóá ãéá ôçí åðéëiäP ðiõ êÜíåôå:

## Ó-Þìá 2-48. ÅðéëiäP ÐáêÝóùí



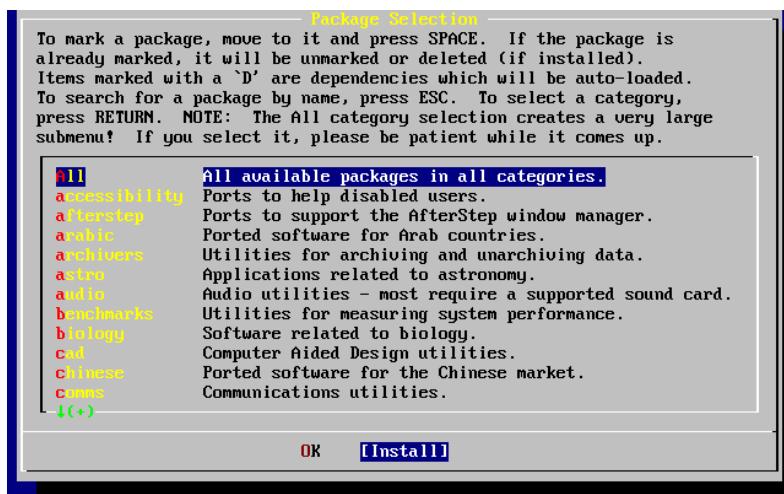
Ôï êÝëööïò (shell) **bash** öáßíåôåé åðéëåäiÝí. ÅðéëÝíôå üóá ðáêÝóá åðéëòiåßôå, öùôßæiiôå ðí ðáêÝôï êáé ðéÝæiiôå ðí ðéÞéôñi Space. Èá åæßôå iéá óýíöñç ðåñéæñáöP ãéá êÜèå ðáêÝóï ôóï êÜôù áñéóôåñü iÝñiò ôçò iëüíçò.

Ç ðßåóç ðiõ ðéÞéôñiõ Tab åíáæëÜóôåé iåðåáiy ðiõ ôåéåðôåßiõ åðéëåäiÝí ðáêÝóï, ôiõ [ OK ], êáé ôiõ [ Cancel ].

¼ôáí Ý-åôå ôåéåéþóåé iå ôï iåñéÜñéóïå ôúí ðáêÝóúí ðñiò åæááðÜóôáóç, ðéÝóôå iéá ömñÜ Tab ãéá íá iåðåáééíçèåßôå ôiõ [ OK ] êáé ðéÝóôå Enter ãéá íá åðéóôñÝóåôå ôiõ iåñiý ÅðéëiäP ÐáêÝóùí (Package Selection).

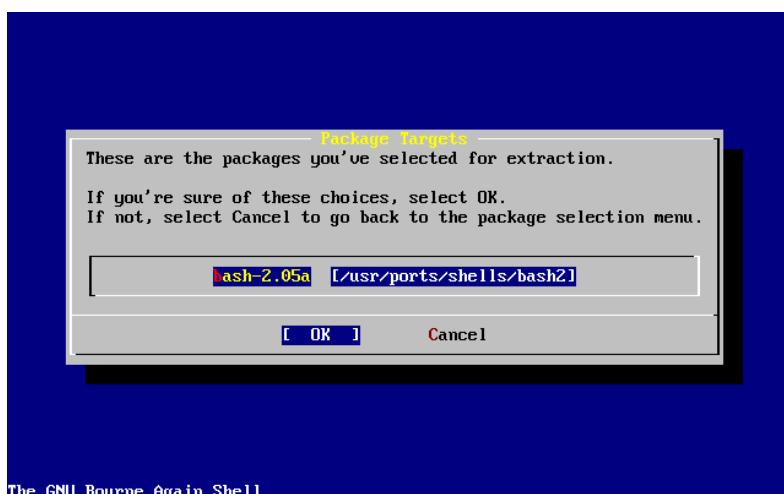
Ôi áñéóôåñü êáé äâîß ââëÜêé áíáëëÜóôáé åðßóçò iåôåíý ôiõ [ OK ] êáé ôiõ [ Cancel ]. Íðiñåßôå íá ÷ñçóëiðiéÞóåôå åôôP ôç iÝëiäi ãéá íá åðéëÝiåôå [ OK ] êáé ðéÝóôå **Enter** ãéá íá åðéóôñÝóôå ôöi iåñiy ÅðéëiäPò ÐáêÝôùí.

### Ó÷Piá 2-49. ÅäêáôÜóôáóç ÐáêÝôùí



×ñçóëiðiéÞóôå ôiõ **Tab** êáé óá ââëÜêéá ãéá íá åðéëÝiåôå [ Install ] êáé ðéÝóôå **Enter**. Èá ÷ñåéáôåß íá åðéåååéÞóôå üôé èÝëåôå íá åâéååôôÞóåôå óá ðáêÝôá:

### Ó÷Piá 2-50. Åðéååååßùóç ÅäêáôÜóôáóçò ÐáêÝôùí



The GNU Bourne Again Shell

ÅðéëÝäiiôåò [ OK ] êáé ðéÝæiiôåò **Enter** èá iâééÞóåé ç åâéåôÜóôáóç ðáêÝôùí. Èá åëÝðåôå içíýiáôå ôçò åâéåôÜóôáóçò iÝ÷ñé ôçí iëiêëÞñùóç ôçò. ÓçíåéÞóôå ôö ÷üí içíýiáôå èÜeïò ðïò åiöáíßæiiôåé.

Ç òâééêP ñyëiéóç óoiâ ÷ßæåôåé iåôÜ ôçí åâéåôÜóôáóç ôúí ðáêÝôùí. Áí éåôåëÞiåôå íá içí åâéåôåôÞóåôå êáíÝíá ðáêÝôí, êáé åðéèòiåßôå íá åðéóôñÝóôå ôöçí ôâééêP ñyëiéóç, åðéëÝiôå **Install** iýôùò P Üëëùò.

## 2.10.12 Đñïóèþêç ×ñçóôþí / ïüäùí (Users/Groups)

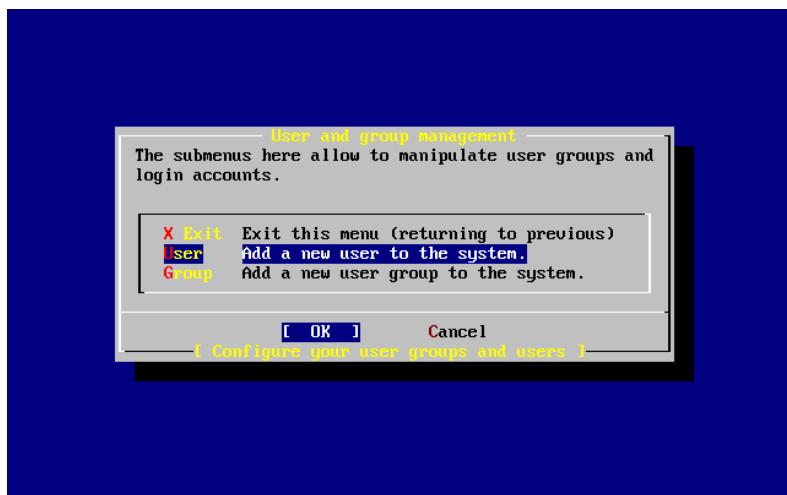
Èá ðñÍðåé fá ðññööé Ýóåôå ôíööëÜ ÷ éóöííÝ íá ÷ nþróð êáôÜ ôç äeÜñêåéå ôçò åâéåð Üóðåðçò, þóôå fá iðiññåßôå íá ÷ nçóëiiðieÞóåôå öi óyóööçìá ÷ ùñßò íá åéöÝ ÷ åóôå ùò root. Ç root êáôÜôïçóç åßíáé åâíééÜ ieññþ, êáé åéðåëþíôå ãôåññäÝ òò root iðiññåß anñþäñá íá åâìßóåé. ÐáññééÜ ðùò öäßíåðåé ééä Ý íáò ðei öiâññùò èßfääñiò:

User Confirmation Requested  
Would you like to add any initial user accounts to the system? Adding at least one account for yourself at this stage is suggested since working as the "root" user is dangerous (it is easy to do things which adversely affect the entire system).

[ Yes ] No

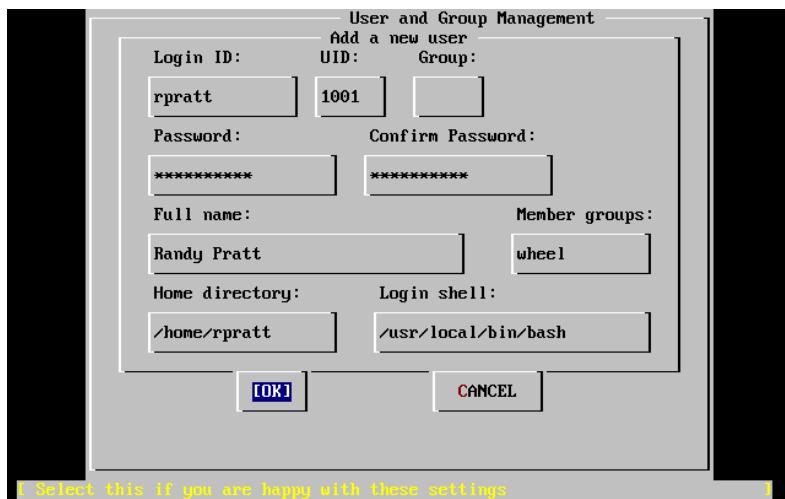
Åðéë Ýîôå [ Yes ] êáé ðéÝóôå Enter æá íá óõíå ÷ ßóåôå iå ôçí ðññóèÞêç åíüò ÷ ñÞóôç.

## Óðréðia Þá 2-51. Áðréðia Þá × Þróðóð



Åðééë Ýîôå User ìå ôá âåëÜêéá êáé ðéÝóôå Enter.

## Ó÷Piá 2-52. ÐñiøèPêç Ðëçñiöiñéþí ×ñPóôç



Êáèþò èá åéóÜääåôå óá óóïé÷åßá ðéÝæiïôåò ôi Tab èá åiöáíßæiïôåé ié ðáñáéÜôù ðåñéñáöÝò óóï êÜôù iÝñiò ôçò iëüíçò ãéá íá óáò åiçèPóïòí óôçí åéóåñùâP ôùí áðåéöiýiåñùí ðëçñiöiñéþí:

### Login ID

To üññá ÷ñPóôç (login name) ãéá ôi íÝí ÷ñPóôç (ôði÷ñåùôéêü).

### UID

Í áíáñùñéóôéêüò áñéèìüò (numerical ID) ãéá áðôü òií ÷ñPóôç (áöPóôå ôií êåñü ãéá áðôüìáôç åðéëiäP).

### Group

Ôi üññá ôçò iñÜääåò (group name) ãéá áðôü òií ÷ñPóôç (áöPóôå ôií êåñü ãéá áðôüìáôç åðéëiäP).

### Password

Í êùäéêüò (password) ãéá áðôü òií ÷ñPóôç (äþóôå ðñiöi÷P óóï ðåääßi áðôü!).

### Full name

Ôi ðëPñåò üññá ôiõ ÷ñPóôç (ó÷üëéí).

### Member groups

Íé õðüëéiðåò iñÜääåò (groups) óóéò iðißåò áíPéåé áðôüò i ÷ñPóôçò (Ý÷åé äçë. óá äééáéþìåôá ôiõò).

### Home directory

Í ðñiøùðéêüò êáôÜëëäiò áñ÷åßùí (home directory) ôiõ ÷ñPóôç (áöPóôå êåñü ãéá ôçí ðñiøðéëäiÝíç åðéëiäP).

### Login shell

Ôi ðñiøðéëäiÝíç êÝëööiò (login shell) ôiõ ÷ñPóôç (áöPóôå êåñü ãéá ôçí ðñiøðéëäP, ð.÷. /bin/sh).

Ôi êÝëööiò åéóüäiõ äeëÜ÷ôçêå áðü /bin/sh óå /usr/local/bin/bash ãéá íá ÷ñçóéiðiéçéåß ôi êÝëööiò bash ôi iðißi åäéåôåôPóåíå ðñiçäiõÝíùò iÝóù ðáêÝôiõ. Íçí ðñiøðåèPóåôå íá ÷ñçóéiðiéPóåôå êÜðiëi êÝëööiò ðiõ ãåí

õðÜñ÷åé, äéáöiñåôéêÜ åái èá iðiñåßôå íá êÜfåôå login. Ôï ðëÝíí óoíçèéóíÝíí êÝëööïð óoíí êüöii ôïõ BSD åßíáé ôï C shell, ôï iðiñbi iðiñåßôå íá ãñÜøåôå ùò /bin/tcsh.

Í ÷ñPóôçð ðñiñðôÝèçêå åðBóçð óôçí ñÜäá wheel æá íá Ý÷åé ôç äðíáôüôçðá íá åßíåé õðåñ÷ñPóôçð (superuser) íå äééåéþìåðá root.

¼ôáí åßóôå ééáñiðiéçíÝíò áðü ôéð åðééëäÝò óáò, ðéÝóôå [ OK ] éáé èá åìöáíéóôåß íáíÜ ôï iåñíý User and Group Management:

### Ó-Þìá 2-53. ñäiñò áðü ôçí Äéá÷åßñéóç ×ñçóôþí éáé ïÜäùí



Ìðiñåßôå åðBóçð ôç äåäñíÝíç óôéäñP íá ðñiñðôÝóôå ñÜäåò, áí õðÜñ÷åé óoñåêåññíÝíç áíÜäêç. ÄéáöiñåôéêÜ, ñðiñåßôå íá åðáíÝëèåôå óôç ñyèlëóç áðóP iåðÜ ôçí ååêåðÜóôáóç, íÝóù ôïõ sysinstall.

¼ôáí ôåëåéþðåôå íå ôçí ðñiñðôþêç ÷ñçóôþí, åðééëÝîòå Exit íå ôá ååëÜêéå éáé ðéÝóôå Enter æá íá óoñå ÷ßóåôå íå ôçí ååêåðÜóôáóç.

### 2.10.13 Íñéóìüò ôïõ Èùäééïý æáó ôï ñPóôç root

#### Message

Now you must set the system manager's password.  
This is the password you'll use to log in as "root".

[ OK ]

[ Press enter to continue ]

ÐéÝóôå Enter æá íá iñßóåôå ôíí êùäééü æáó ôï ÷ñPóôç root.

Èá ðñÝðåé íá ðëçéôñiññPóåôå äýí òiñÝò ôíí êùäééü óùóôÜ. Åái ÷ñåeÜæåôåé íá ðiñÝðåé íá Ý÷åôå ôññüðí íá åñåßôå ôíí êùäééü áí ôíí iå÷Üóåôå. ÐáñáôçñPóôå üöé í êùäééüò åái åìöáíßæåôåé êåèþò ôíí ðëçéôñiññåßôå, íýôå æáé åìöáíßæüôåé áóôåñÜêéå óôç èÝóç ôïõ.

Changing local password for root.

New password :

Retype new password :

Ç åâéáôÜóôáóç èá óðíå ÷éóôåß ìåðÜ ôçí åðéôõ ÷çìÝíç åéóåùãP ôïð êùäéêïý.

## 2.10.14. Þíäïò áðü ôçí ÅæâáôÜóôáóç

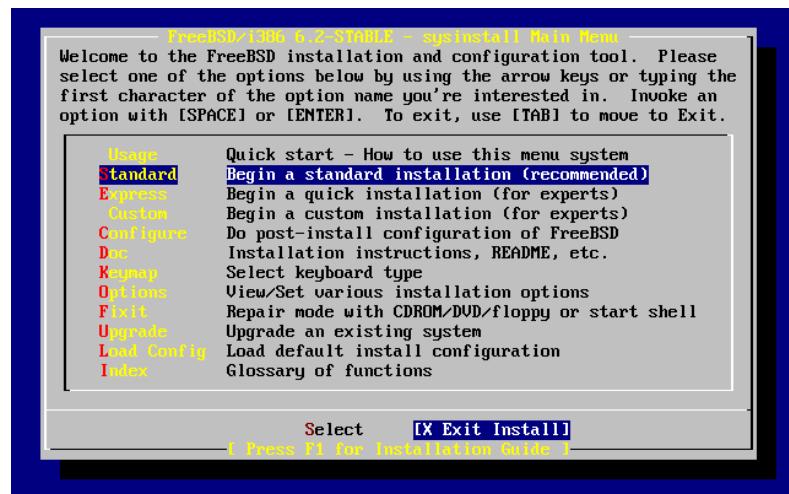
Áí ÷ñâéÜæåôáé íá ñðèlßóåôå ðñüóèåôå ãééôõåéÝò ððçñåóßåò, P êÜðíéá Üëëç ñyèiéóç, iðiñåßôå íá ôi êÜíåôå ôþñá P ìåðÜ ôçí åâéáôÜóôáóç ìå ôç ÷ñPóç ôçò åíöïëPò sysinstall.

User Confirmation Requested  
Visit the general configuration menu for a chance to set any last options?

Yes [ No ]

ÅðéëÝîôå [ No ] ìå ôá åâéÜêéá êáé ðéÝóôå Enter ãáá íá åðéóôñÝóôå ôoi Êðñßùò ìåñíý ÅæâáôÜóôáóçò (Main Installation Menu).

### Ó÷Þíà 2-54. Þíäïò áðü ôçí ÅæâáôÜóôáóç



ÅðéëÝîôå [ X Exit Install ] ìå ôá åâéÜêéá êáé ðéÝóôå Enter. Èá êëçèåßôå íá åðéâåâáéþóåô ôçí Ýíïäí áðü ôçí ÅæâáôÜóôáóç:

User Confirmation Requested  
Are you sure you wish to exit? The system will reboot.

[ Yes ] No

ÅðéëÝîôå [ Yes ]. Áí åß÷åôå îâééíPóåé áðü ôi CDROM, èá äåßôå ôi ðáñáéÜôù ìPíðiá ãéá íá óåò ôðåñéðiBóåé íá åðééñÝóôåôå ôi CD:

Message  
Be sure to remove the media from the drive.

[ OK ]  
[ Press enter or space ]

Ôří óyóôčìá èá åðáíáêééíPóåé, êáé ðññioÝíôå áéá ôõ÷üí içíýíáôá èÜeïò ðïõ èá åìöáíéóöïýí.

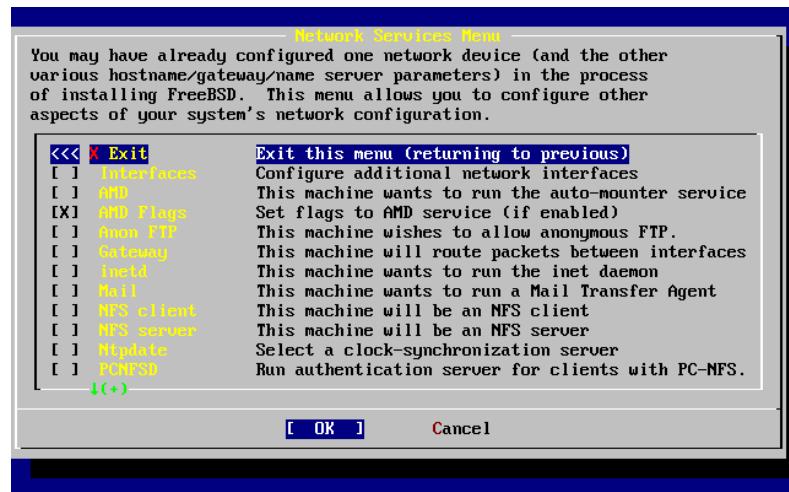
## 2.10.15 Ñýèìéóć Đñüóèåôùí Õđçñåóéþí Äéêôýíõ

*Óðíáðeoðiñ Ü áðü ôií Tom Rhodes.*

Ié äéêôôåá Ý ð ðçñâôåbåò áßíáé ðñïäñ Üìàôá ðïò áÝ ÷ iiôéé áßöriä áðü iðriëäþðiôå óçìåßi óöi äßêôôï. Éåôåá Üeëåôåé êÜèå ðñïöðÜèåé åéå íå áßíáé óßaiñöii üöö ôá ðñïäñ Üìàôá áðö Ü åái èå êÜññi iðéäþðiôå “åðéäþié”. Äödöô ÷ þò ié ðñïäññiäôéöö Ýò åái áßíáé ôÝéåééé åéå êåô Ü éåéññi Ý ÷ iði áïöiaééöôåß ðåñéðôþóåéò ðïò ööÜëéåôá ôå äéêôôåé Ý ð ðçñâôåbåò Ý ÷ iði áßíåé áíööéêåßíá íåéiåð Üeëåôöçò áðü áéöåíëåßò åéå ôçí áéöåÝéåöç éåéüäiñöeu ðñÜìàû. Áßíáé óçìåíöéëü íå icì áïäññiðiéþoåå êåíé Ü äéêôôåéÞ ðçñâôåß iÝ ÷ ñé íå áíåéäéýøåôå üöé ôçí ÷ ñåé Üæåôôå. Iðiñâßôå ðÜíôå íå ôçí áïäññiðiéþoåôå áñäüôåñ, áéöåéþiôå íåí Ü ôçí áôäññiäÞ sysinstall Þ ÷ ñçöéiñðiéþiôå öéö åðíåôüöçôå ðïò ðåñ Ý ÷ iiôéé åéå ôü ãñ ÷ åßi /etc/rc.conf.

Iå ôcí åðéëíäP Networking èá äåßôå Ýíá iåñíý ðáñüìíéí iå ôí ðáñáéÜôú:

Ó ÷ Piá 2-55. Nýèiéóç Äéêôýïõ Upper-level (ÁìùôÝñïõ ÅðéðÝäïõ)



Ç Ծիծեական համակարգությունները՝ Interfaces, եռացած պատճենավորությունները՝ *Protocol* և *Protocol Buffer*, առաջարկությունները՝ *Service* և *Service Bus* են:

Åðéé Ýáiiôáò AMD ðñiööñlæåâáé öðiööñPñéïç áéá ôí áïïçèçöéêü ðñüñâñâíà áôõùüâáöçò ðñiöÜñöçöçò (automatic mount) BSD. Áôõü ÷ñçöéñiéâöâé óoñPñéùò óá óoñfáñáóïü íå ôí ðñùñûöüéëëí NFS (ââñöâå ðáñâéÜùò) áéá ôçí áôõùüâáöç ðñiöÜñöçöç áðñâñéññöí Ýúí óoñôöçì Üôõù áñ÷åñù. Ááí áðâéøâåñöâé áâäþ êÜðiéá éáéâññöç ñyèiéöç.

ÁÍÝòùò iàðÛ áññòéâðåáéç åðéëëäP AMD Flags. ¼ðáí ôçí åðéëëÍìåðå èá åìöáíéóðåß Ýíá áíáðüùlåñí iàñíý ãéá íá iðiñ Ýóåðå íá åéoÜðåðå óóðæåññéí Ýíåò ðáñái Ýññiòò (flags) åéá ôçí õðçñåðßá AMD. Öi iàñíý ðåñéÝ ÷åé Þäç Ýíá óýññéí áðü ðññiåðéëëÍò:

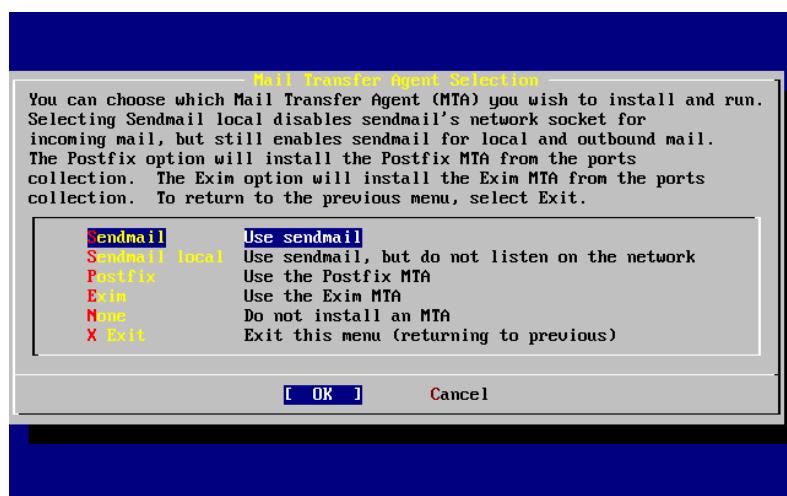
```
-a / .amd_mnt -l syslog /host /etc/amd.map /net /etc/amd.map
```

Ҫ ǻððeeiAP -a è Ýðååé öi ǻñiiâðééâái Ýíi óçìâbí ǻñiió Üñôçóçò (mount point) öi iðibíi áäþ êáeïñbæåðáé ùò / .amd\_mnt. Ҫ ǻððeeiAP -1 êæeïñbæåé öi ǻñiiâðééâái Ýíi áñ ÷ áßí êáðâññaoðþò 1og. Üðótiði üðáí ÷ ñçóeïðiêåðóáé öi syslogd üëåð ié âññåðbåð êáðâññaoðþò óð Yëññiðåé ööii áðbíiða êáðâññaoðþò óððóðþiaðoð (system log daemon). Í êáðÜeïræið /host ÷ ñçóeïðiêåðóáé áéá ðicí ǻñiió Üñôçóç áîñüð åéâñiññaoði Ýñið óððóðþiaðið áñ ÷ áßñùí áðü Ýíá áðññâññooði Ýíi êüñiâi, áíþ i êáðÜeïræið /net ÷ ñçóeïðiêåðóáé áéá ðicí ǻñiió Üñôçóç áîñüð åéâñiññaoði Ýñið óððóðþiaðið áñ ÷ áßñùí áðü iéá IP æáðýðeðið. Öi áñ ÷ áßí /etc/amd.map êáeïñbæåé óðe ǻñiiâðééâái Ýíáð åððeëia Ýðo åéá óðe ǻñiióðñðóðåéò iÝðó ôið AMD.

Ôi iàñiy ñõèìßóåúí *Gateway* èá ñõèìßóåé ôi ìç ÷ Üíçìá óáò íá èåéôïññåß ùò ðýëç üðùò åíçåÞóåíá ðññïçäiiòíÝùò. Áðü áäþ åðßóçò ìðïñåßóå íá êáôáñäÞóåôå ôçí åðéëíäP *Gateway* áí ôçí åðéëíÝíåôå êáòÜ ëÜëèò êáòÜ ôç äéÜñêåéå ôçò åéäåéêåóßåò ååéåòÜóôåóçò.

Ç áðeériæP Inetd iðiññáß íá ÷ níçoréiiðiñéçéåß áæá íá nñðeíñðáæ P íá áðáññáññiðiñéÞðáæ ðeÞñùð ðír ááññiññá inetd(8) üðùð áñcäþeçéåß ðáññáðÜñú.

Ç åðéëíäþ Mail ðeñçöéïðíéåßôáé ãéá ôçí ñýèléóç ôïõ ðñïåðééåäíÝiiõ MTA þ Áîóéðñiöþðïõ ìåôáöiñÜò Ôá÷oäñiìåßiõ (Mail Transfer Agent) ôïõ óóôðÞiaõiõ. Ìå ôçí åðéëíäþ áðôþ ðeá ãiøáéfóóåß ôï ðáñâéÜòù iåñíý:



Óöi óciåbîi áôôöü óao áëbíådáé ç äoíåóöüöçôá íá åðééé Ýíåôå ðíéi MTA íá ååêådåóôPóåôå êáé íá ñoèìßóåôå ùò  
ðñíåðééååí Ýíi Ôi MTA åäi åbíáé ôbðtiôá ðåñéóöüöåñi áðü ðíi äéåêñéôôP ôá ÷ ðíñiåbíiô i iðiñiô ðåñáäbääé ôá lçíýiåôå  
óöiôö ÷ ïPóåôå ôiôj òöôôPíäöiô P òi Internet.

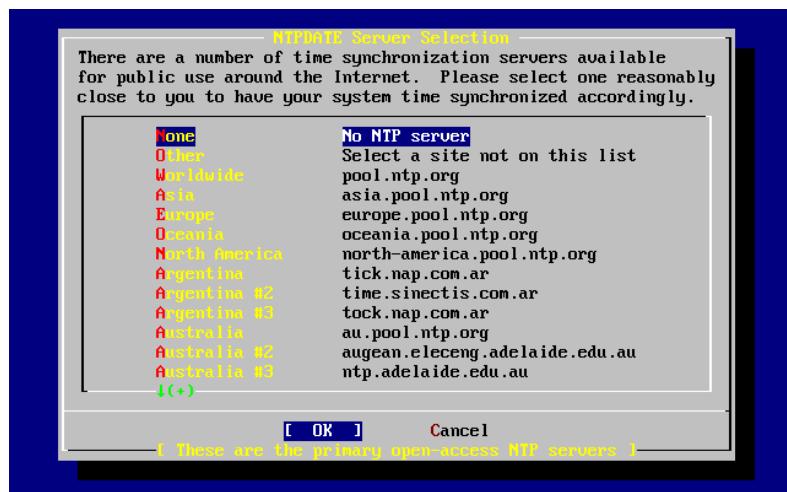
Áí áðééÝíâôå **Sendmail** èá áâéâôåóôÞóåôå ôcí áçìöéëÞ åöáññäÞ æáéñéôôÞ **sendmail** ç iðiþá áßíáé êáé ç ðñriâðééâáiÝíç ãéá ôi FreeBSD. Íâ ôcí áðééïäÞ **Sendmail local** èá ñòèñßóåôå ôi **sendmail** íá áßíáé ôi ðñriâðééâáiÝíç MTA, áééÜ èá áðaiâññïðjéceåß c ééâüöôcôå ôiô íá èâíâÜíáé email áðü ôi Internet. Íé Üééåð áðééïäÝó áâb. Postfix éâé

ÍåôÜ ôçí áðéëïäP åùò MTA, P áí áðööáóßóåôå íá ìçí áðéë Ýíåôå Ýíá MTA, èá åòöáíéôåß ôi íåñíý ñýèiéóçò äéêöýíõ, íå ôçí áðüìåíç áðéëïäP ðòõ åßíáé NFS client.

Ç áðdeéiñP NFS client èá ñòðèìñBóåé ðír óýóðçíà óáó íá áðdeéiñíùñB íà Ýíà áîððçññåðçòþ ïÝóù NFS. Íáó áîððçññåðçòþò NFS éåééöôÜ õððôðPiåóá ãñ ÷ áßñü íæéæ Ýóëíà ðññö Üëéä ïc÷áðPiåóá ïÝóù ðír ãééðýïr, ÷ñçóéññiðéþíøå ðír ðññùðüëiëëi NFS. Áí ðír ïc÷Üíçíà óáó ãáí ãééæ Ýóåé óýíàåóç ðír ãééðýïr, ïðiññBóå íá áóðPóåå ðír òcí ëåéðòññäå áððP áðiñåðdeéåáí Ýíç. Óír óýóðçíà iðiññBóå ðír ÷ ñâéåððåß ðâñéñóùðâññò ñòðèìñBóåé ðír ñâüðâññò. ÅâñBóå ðír ÕiPià 30.3 ãéá ðâñéñóùðâññò ðeçññòññBóå ñyéíèéçò ðír ðâéÜóç ëéæ ðír ãééññéðòþ.

Óóçí åðüùáíç ãñâííþ âñßóåôáé ç åðéëíäþ Ntpdate ç iðibá ÷åéñßæåôáé ôíí ôóâ ÷ñíéóíü þñáó. ¼ôáí åðéëå ÷èåß, åiöáíßæåôáé Ýíá iåñíü üðùò ôí ðáñáéÜû:

## Ó÷Piá 2-57. Ñyèìéóç Ntpdate

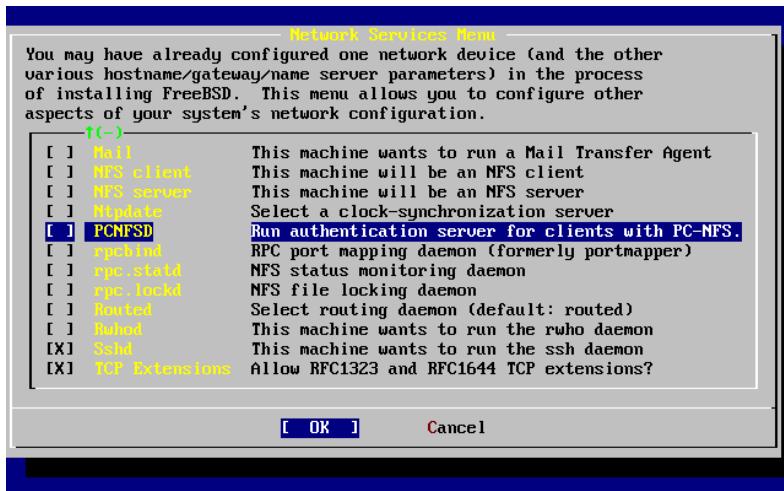


Áðü òi iåñíý áðöü, áðeeÝîòå òií äéáêîéóþ ðiø áßíáé ðeçóéÝóðâñiò óðíçí òiðiøåðþá óáð. ÁðeeÝäiíóåò òií ðeçóéÝóðâñi, í óðä-ñiíéòùòð óðçò þñáð èá áßíáé ðeí áéñéâþò, êáèþò Ýíáð áðñáêñðóiÝñiò äéáêñéóþò èá Ý÷åé áñåð÷iÝñuò iåñáævðâñc êáèöðóÝñcóc óðc óvñåðóc.

Ç åðüìàříç åðeeëříP åßíáé ôi PCNFSD. là áôôPí èá åâéåóåôåéåß ôi ðâéÝ ôi net /pcnfsd áðü ôc ööeëříP Ports. Ðñüêåôåð áéá Ýíá ÷ñPóéíí îüçèçôéü ðñüâñâñíä ôi iðiþí ðánÝ ÷åé öðçñåóßåò ðéóôiðiþçóçò (authentication) áéá ôi NFS áéá ööôôPíáôå ðiõ äáí Ý ÷iõí äöíáôüöçôá íá ðánÝ ÷iõí ôéô äééÝ ôi ðiõí, üðùo ôi eâéôiñâéü öýóôçìá MS-DOS ôçò Microsoft.

Ôbhñá èá ðñÝðåé íá ïåñôáêéícèåßôå ðñjò ôá êÜôù ãéá íá äåßôå ôéò Üëëåò åðééëäÝ:

## Ó÷Piá 2-58. Ñýèiéóç Äéêóýíõ Lower-level (Êáóþôåñíõ ÅðéðÝäíõ)



Èáèþò ðñïï-ùñÜìå ôç ëßóôá ðñïò óå êÜôú, ç åðüüiaíç åðéëiäP åßíáé ðï Routed, ðïò åßíáé i ääßiññåò åññïñüüäççò. Ôï ðñüüññåíä routed(8) äéá-åéñßæåôáé ôïòò ðßíáéåò åññïñüüäççò ðïò åéêôýïò, áíáéáëýðôåé åññïñüüäççò Ýò multicast ééé ðáñÝ ÷-åé, êåòüðéí åðåßôççò, áíòßññåóá ðïò ðßíáéå åññïñüüäççò óå êÜéå ðöññåíïYïò óòï åßéôòï êüññåí. Ç ÷ñPóç ôïò ðññïñßæåôáé èññßñò ãéá lç-áíÞiaðå óå iòñiñå åññïò ùò ðýëç (gateway) óå Ýíå ðïðééü åßéôòï. ¼ðáï ôï åðéé Ýiåðå, éå åíöáíéóôåß Ýíå iåññï ðï iòñiñå èá óåò åççòÞoåé ôçí ðññåðééåíí Ýíç ôïðièåñßå åéá ôï ðññüññåíä. Åßíáé Þäç èåéñééí Ýíç åéá óåò, éåé iòñiñåßôå íå ôçí åðéé Ýiåðå ðéÝæiïòå ôï ðéÞeññ Enter. Èá åíöáíéóôåß ôüôå åéüñå Ýíå iåññï, ðïò èá óåò åççòÙ åðôòP ôç òññÜ ðò-ùñÜ åðéëü ðéÝí ñòðèiñßoåéð (flags) ðïò èÝéåðå íå ðåññÜôåðå ôôçí åðåñññåP routed. Ç ðññåðéëíræp åßíáé ôï -q åéá ðñÝðåé Þäç íå öäßiññåóé ôôçí ièüñç óåò.

Óóci áðiñláíç ãññáìP áññóéâðáé ç áðéëriäP Rwhod ç iðiñßá, üðáí áðééå ð: èðiñß, éá íâðééñPóáé öií áðiññíá rwhod(8) éáðöÜ óçí áðéëßíçóç öiñ õðóôðPiáöiò. Ç áiñiøP rwhod áðéðYíðåé ðåññéïäééÜ ìçýíáðá öiñ õðóôðPiáöiò öiñ äðéðöi, P éáé òá õðéëÝåéé üðáí áðiñßá òá êáðÜðóðáóç “êáðáíáëùñòP (consumer)”. Iðiññáðó Íá áññáðó ðåññéðóüðóðññåð ðëçññiññáðó õðéð õðéëßáåð ãíPéåéáò ruptime(1) êáé rwho(1).

Ç ðñiöðåäðôðáßá åðéëïäÞ óðc ëðóðá åßíáé æáá ôiï äðíññá sshd(8). Ðñüêåðóáé æáá ôiï åîððçñåðôðÞ secure shell Þ OpenSSH i iðiþið óðíßóðâðóáé eæéåðâñá óá ó÷ Ýóç ià ôiðò óðÜíðâñ åîððçñåðôðÞ Ýóð telnet eáé FTP. Í åîððçñåðôðÞð sshd ÷ñçðéiñðiðéåðóáé æáá ôçí åçíëiññáßá áðóáéÞð óýíðåðò ïåðåáý äýí iç ÷áíçí Üðùí, ià ôç ÷ñÞóç êñðððiññáöçíÝíñú óðiñáÝóðùí.

ÔÝëiö, ôðÜñ÷åé ç åðéëiäP TCP Extensions. ÁôôP åðéóñÝðåé ôçí ÷ñPóç ôuì ÁðåâêÜóåuì TCP ðiø iñßæïiöáé óôá RFC 1323 êáé RFC 1644. Áí êáé óå ðiøeÜ iç ÷áÍðiáôá, ç ÷ñPóç ôiòö iðiñâß íá åðéóñ ÷ýíåé ôéó óôíáÝóåéò, iðiñâß åðßóçò íá ðñiñéäÝóåé êáé ôçí êáðÜññâðóç êÜðiñéuì áðü áðôÝð. Äáí óôíßôðåáé ãéá áîñðçñâðóçòÝò, iðiñâß üùò íá åßíáé ÷ñPóéïç óå ááíÜññôçóá iç ÷áÍðiáôá.

Ôþná ðiõ Ý÷åôå ñõèìßóåé ôéò äééôôåéÝò ðõçñåóßåò, ïðiñåßôå íá ìåôáééíçèåßôå óóï ðñþöï óóïé÷åßí ðçò èßóôåò, ôï Exit éáé íá õoíå÷ßóåôå ìå ôï åðüiåñí ðiÞia ñõèìßóåùí.

## 2.10.16 Åêëßíçóç ôïõ FreeBSD

### 2.10.16.1 Åêëßíçóç FreeBSD/i386

Áí üéá ðPääí êáëÜ, èá äåßôå ìçíýláôå íá êõëïý óôçí ièuïc óåò ïÝ÷ñé íá ööÜóåôå óôçí ðñiõñïðP åéóüäiõ (login prompt). ïðiñåßôå íá äåßôå ôï ðâñéå÷üiåñí ðùí ìçíðiÜôùí ìå ôçí ðßåôç ôïõ ðëÞêôñiõ **Scroll-Lock** êáé ÷ñçóéñïðiéþíôå ðá ðëÞêôñá **PgUp** éáé **PgDn**. ÐéÝæííôå íáÜ ði **Scroll-Lock** èá åðáíÝëèåôå óôçí ðñiõñïðP.

Ìðiñåß íá ìçí êáôåöÝñåôå íá äåßôå üéá ôá ìçíýláôå (ëüäù ðâñéiñéöiïý ôçò ðñiõùñéïÞò iíÞicò buffer) áëëÜ ïðiñåßôå íá ôá äåßôå ìåðÜ ôçí åßóïäí óåò, ìå ôç ÷ñÞóç ôçò åíðiëÞò dmesg óôç ãñâiìP åíðiëþí.

ÊÜíôå login ìå ôç ÷ñÞóç ôïõ iüüìåò ÷ñÞóôç êáé êùäééïý ðiõ äçíéiññÞóåôå êáôÜ ôçí åäéåôÜóôåóç (ôóï ðáñÜäåéäiá ìáð, rpratt). Áðiöäýååôå íá åéóÝñ÷åôå ùò root áí ååí åßfáé åðáñåßôçöi.

ÔõðééÜ ìçíýláôå åêëßíçóçò (Ý÷iõí ðáñäéåéöeåß ié ðëçñiõñßåò Ýëäïöçò):

```
Copyright (c) 1992-2002 The FreeBSD Project.
Copyright (c) 1979, 1980, 1983, 1986, 1988, 1989, 1991, 1992, 1993, 1994
The Regents of the University of California. All rights reserved.
```

```
Timecounter "i8254" frequency 1193182 Hz
CPU: AMD-K6(tm) 3D processor (300.68-MHz 586-class CPU)
  Origin = "AuthenticAMD"  Id = 0x580  Stepping = 0
  Features=0x8001bf<FPU,VME,DE,PSE,TSC,MSR,MCE,CX8,MMX>
    AMD Features=0x80000800<SYSCALL,3DNow!>
real memory = 268435456 (262144K bytes)
config> di sn0
config> di lnc0
config> di le0
config> di ie0
config> di fe0
config> di cs0
config> di bt0
config> di aic0
config> di aha0
config> di adv0
config> q
avail memory = 256311296 (250304K bytes)
Preloaded elf kernel "kernel" at 0xc0491000.
Preloaded userconfig_script "/boot/kernel.conf" at 0xc049109c.
md0: Malloc disk
Using $PIR table, 4 entries at 0xc000fde60
npx0: <math processor> on motherboard
npx0: INT 16 interface
pcib0: <Host to PCI bridge> on motherboard
pci0: <PCI bus> on pcib0
pcib1: <VIA 82C598MVP (Apollo MVP3) PCI-PCI (AGP) bridge> at device 1.0 on pci0
pci1: <PCI bus> on pcib1
pcil: <Matrox MGA G200 AGP graphics accelerator> at 0.0 irq 11
```

```

isab0: <VIA 82C586 PCI-ISA bridge> at device 7.0 on pci0
isa0: <ISA bus> on isab0
atapci0: <VIA 82C586 ATA33 controller> port 0xe000-0xe00f at device 7.1 on pci0
ata0: at 0x1f0 irq 14 on atapci0
ata1: at 0x170 irq 15 on atapci0
uhci0: <VIA 83C572 USB controller> port 0xe400-0xe41f irq 10 at device 7.2 on pci0
usb0: <VIA 83C572 USB controller> on uhci0
usb0: USB revision 1.0
uhub0: VIA UHCI root hub, class 9/0, rev 1.00/1.00, addr 1
uhub0: 2 ports with 2 removable, self powered
chip1: <VIA 82C586B ACPI interface> at device 7.3 on pci0
ed0: <NE2000 PCI Ethernet (RealTek 8029)> port 0xe800-0xe81f irq 9 at
device 10.0 on pci0
ed0: address 52:54:05:de:73:1b, type NE2000 (16 bit)
isa0: too many dependant configs (8)
isa0: unexpected small tag 14
fdc0: <NEC 72065B or clone> at port 0x3f0-0x3f5,0x3f7 irq 6 drq 2 on isa0
fdc0: FIFO enabled, 8 bytes threshold
fd0: <1440-KB 3.5" drive> on fdc0 drive 0
atkbd0: <Keyboard controller (i8042)> at port 0x60-0x64 on isa0
atkbd0: <AT Keyboard> flags 0x1 irq 1 on atkbd0
kbd0 at atkbd0
psm0: <PS/2 Mouse> irq 12 on atkbd0
psm0: model Generic PS/2 mouse, device ID 0
vga0: <Generic ISA VGA> at port 0x3c0-0x3df iomem 0xa0000-0xbffff on isa0
sc0: <System console> at flags 0x1 on isa0
sc0: VGA <16 virtual consoles, flags=0x300>
sio0 at port 0x3f8-0x3ff irq 4 flags 0x10 on isa0
sio0: type 16550A
sio1 at port 0x2f8-0x2ff irq 3 on isa0
sio1: type 16550A
ppc0: <Parallel port> at port 0x378-0x37f irq 7 on isa0
ppc0: SMC-like chipset (ECP/EPP/PS2/NIBBLE) in COMPATIBLE mode
ppc0: FIFO with 16/16/15 bytes threshold
ppbus0: IEEE1284 device found /NIBBLE
Probing for PnP devices on ppbus0:
plip0: <PLIP network interface> on ppbus0
lpt0: <Printer> on ppbus0
lpt0: Interrupt-driven port
ppi0: <Parallel I/O> on ppbus0
ad0: 8063MB <IBM-DHEA-38451> [16383/16/63] at ata0-master using UDMA33
ad2: 8063MB <IBM-DHEA-38451> [16383/16/63] at ata1-master using UDMA33
acd0: CDROM <DELTA OTC-H101/ST3 F/W by OIPD> at ata0-slave using PIO4
Mounting root from ufs:/dev/ad0s1a
swapon: adding /dev/ad0s1b as swap device
Automatic boot in progress...
/dev/ad0s1a: FILESYSTEM CLEAN; SKIPPING CHECKS
/dev/ad0s1a: clean, 48752 free (552 frags, 6025 blocks, 0.9% fragmentation)
/dev/ad0s1f: FILESYSTEM CLEAN; SKIPPING CHECKS
/dev/ad0s1f: clean, 128997 free (21 frags, 16122 blocks, 0.0% fragmentation)
/dev/ad0s1g: FILESYSTEM CLEAN; SKIPPING CHECKS
/dev/ad0s1g: clean, 3036299 free (43175 frags, 374073 blocks, 1.3% fragmentation)
/dev/ad0s1e: filesystem CLEAN; SKIPPING CHECKS

```

## ÊðöÜëáéí 2 ÅæááôÜóôáóç ôïõ FreeBSD 8.x éáé ÐñïäáíÝóôåñùí Åêäüóåùí

```
/dev/ad0s1e: clean, 128193 free (17 frags, 16022 blocks, 0.0% fragmentation)
Doing initial network setup: hostname.
ed0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    inet 192.168.0.1 netmask 0xffffffff broadcast 192.168.0.255
    inet6 fe80::5054::5ff:fed0%ed0 prefixlen 64 tentative scopeid 0x1
        ether 52:54:05:de:73:1b
lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> mtu 16384
    inet6 fe80::1%lo0 prefixlen 64 scopeid 0x8
    inet6 ::1 prefixlen 128
    inet 127.0.0.1 netmask 0xff000000
Additional routing options: IP gateway=YES TCP keepalive=YES
routing daemons: .
additional daemons: syslogd.
Doing additional network setup: .
Starting final network daemons: creating ssh RSA host key
Generating public/private rsal key pair.
Your identification has been saved in /etc/ssh/ssh_host_key.
Your public key has been saved in /etc/ssh/ssh_host_key.pub.
The key fingerprint is:
cd:76:89:16:69:0e:d0:6e:f8:66:d0:07:26:3c:7e:2d root@k6-2.example.com
    creating ssh DSA host key
Generating public/private dsa key pair.
Your identification has been saved in /etc/ssh/ssh_host_dsa_key.
Your public key has been saved in /etc/ssh/ssh_host_dsa_key.pub.
The key fingerprint is:
f9:a1:a9:47:c4:ad:f9:8d:52:b8:b8:ff:8c:ad:2d:e6 root@k6-2.example.com.
setting ELF ldconfig path: /usr/lib /usr/lib/compat /usr/X11R6/lib
/usr/local/lib
a.out ldconfig path: /usr/lib/aout /usr/lib/compat/aout /usr/X11R6/lib/aout
starting standard daemons: inetd cron sshd usbd sendmail.
Initial rc.i386 initialization: .
rc.i386 configuring syscons: blank_time screensaver moused.
Additional ABI support: linux.
Local package initialization: .
Additional TCP options: .
```

FreeBSD/i386 (k6-2.example.com) (ttyv0)

```
login: rpratt
Password:
```

Ç äçìéíñäßá ôùí êëåéäéþí RSA éáé DSA iðïñâß íá ðÜñâé êÜðíéí ÷ñüíí óå áñäÜ ìç ÷áíÞláôá. Áôôü óðiâáßiâé ïüíí ôôçí ðñþôç áêêßíçóç áñüò íÝiõ óðóôðÞláôïò. Íé áðüíáíâò áêêéíÞóâéò èá áßíáé ðéí áñÞäñâò.

Áí Ý÷åôå ñðèìßóåé ôíí X server êáé Ý÷åôå áðééÝâé áñáöéêü ðåñéâÜëéí áññääóßâð, iðïñâßôå íá ôí íâêéíÞóâåå áßñííôåò ôçí áñðiëþ startx óôçí áññâìþ áñðiëþí.

## 2.10.17 Ôåñìáôéóìüò ôïõ FreeBSD

Álbíáé ðírþey óçíláðóéêú íá óâñlálóðþæðâóð áóðóðÜ òiì eäéóðiññæéêú óýóðçíà. Íçí óâþfáðóð áððþkò ðiìi ððírëiæðóðP áðði òiì aéáéüððóç ñâýláiðiò. Ðñþþoá áðði üðéá, áþíáðóð ðððâñ ÷ ñþðóðçð (superuser) ÷ ñçðeiiðiþfíðóð òcí áiðiðP su óððc ãññáiþ ãiðiðþfí ëáé áþññiðóð ðiìi ðùáéêú ðiìi root. Áðði ðiðiññâb íá áþíáé ïüñiì áí i ÷ ñþðóðçð áíþþâðe óððc iñÜáá wheel. AéaóññæéÜ, éÜíóá eáññiìéÜ login óáí root êáé ÷ ñçðeiiðiþfíðóð òcí áiðiðP shutdown -h now.

The operating system has halted.  
Please press any key to reboot.

Áßíáé áóðáæÝð íá áæáéùþðåð áðçí ðñíöriäößá aðiý áþðåð áðçí áíðöreþ shutdown êáé aððbóá ðí Þíðiá “Please press any key to reboot”. Áí ðeÝðåð áðiðriäÞðið áðçí ðeÞðiðri áíðb fá áæáéùþðåð áðçí ðñíöriäößá, ðí óýðóðciá eá áððafáðéêÞðåð.

## 2.11 Áíóéìåôþðéóç ÐñïâëçìÜôùí

Ôí åðüùåñí ôíþíá êáéýðôåé âáðóéêþ áíðíåðþðéóç ðñïähcíÜðùí êáðÜ ôçí åâðáóç, íå åÜóç oðíçèéóíÝíá ðñïâëþíáôðiö Ý÷iöí áíåöñèåþ áðü ÷ñþðôåð. ððÜñ÷iöí åðþðòçò iãñéêÝò åñùòþðåéò êáé åðáíþðóåéò åéá üöiòð åíäéåöÝñïîôåé íá åçìéiõñäþðiöí óýðôçíà dual-boot ôíð FreeBSD íå ôí MS-DOS.

## 2.11.1 Ôé íá ÊÜíåôå áí ÊÜôé ĐÜåé ÓôñáâÜ

Åð Ýáîôå ôi Ýáæñaoi Óciâéþðåúi Õeéey (Hardware Notes) (<http://www.FreeBSD.org/releases/index.html>) áæá ôçí Ýéäiôc ôiô FreeBSD ðiô Ý-åôå, áæá íá ðeâiñðâðoôåðbôå üðé ôi ðeéêü óåð ôðiôðcñþæâðåé.

Áí ôi õeéêú óáó õðïöôðçñbæðâóáé, áeëÜ ðÜéëé áíðõéíâððßæðâóá êíëëÞiaðáó Þ Üëëá ðñiâëÞiaðáó, èá ÷ñâéáððâóáß íá áçjééññðÞóâóá âíâéæéâðoiÝ ñi ððñÞia. Èá ïðñ Ýóâóá íå ôíï ôññüði áððû íá ðññiøéÝóâóá õðïöôðÞñéíç áéá óððéâðÝ ð ðið ááí õðÜñ- ðiðið õði ððñÞia GENERIC. Í ððñÞiað òóðéó áéðéÝóâóá âéðßíçóðo áßíáé ñððiðiÝ ñið ððñ ðið ðið ðññéððûðâññðo ðððéâðÝ ð ðeééiy áßíáé òóðéó áññäððâóáééÝ ð ðið ñððiðbóâéð, üðið ãöññ Ü óá IRQs, òóðéó áéððéýíðâóéð IO êáé óá DMA êáíÜëéá. Áí Ý ÷ åðâ áeëÜ íâð òóð ñððiðbóâéð áðð Ý ð òóð òýðóçíá óáð, èá ÷ñâéáððâóáß éáð ðÜóá ðeéáññðçðá, íá áeëÜ íâð õði áñ÷åðñ ñððiðbóâññ ëáé íá íâðâáæùððbóâðâðá ñáíÜ ðið ððñÞia ãéá íá ñäçÞóâóá õði FreeBSD íá òóðéó áññâé.

Áßíáé áðßóçò ðéæáiúí ç áíß-íåööç æéá iéá óðóéåðÞ ðiö äái ððÜñ ÷ åé, íá ìäçãÞóåé óå áðiöö ÷ ßá iéá iåðååååÍYóôåñç áíß-íåööç æéá iéá Üëëç óðóéåðÞ. Óöçí ðåñßðöùöç áðöÞ, èá ðñ Yðåé íá áðåíññiðiéçèåß ç áíß-íåööç æéá òçí óðóéåðÞ ðiö äciéiññåß öi ðññüåçì.

**Óciàßùócs:** ÊÜðiéá ðñïâëþìáôå áâéâôå Üóôåáôçò lðïñâß íá áðïöâô ÷ eïýí þ íá áâéâæöèíýí áí áíáíâþoåôå ôî firmware óå áéÜöïñâò ôóôéâôÝò ðœéêíý, éâé êáôÜ éýñéí ëüäí ôçò lçöñéêþò. Ôî firmware ôçò lçöñéêþò áíáöÝñâôåé áðßöçò ùò BIOS êáé ié ðâñéóôüôâñíé êáôåôéâôåôÝò lçöñéêþí þ ðïðïæéôþí áéâéÝðïí áéêôôåéû ôüðií ôóïí lðïñâß lðïñâßôå íá âñâßôå ðëçñïòññâå ãéá áíââæèíþðâæò þ áíáíâþoåéò.

Íé ðáñéóðúðâñíé êáðáóðâñáðóðÝò ááí óóíéóðíýí òcí áíááðÜèiéóç ôíð BIOS ôçò lçöñéðéÞò áí áå óóíðñÝ÷åé óíâáñüò eüäñò, êáèþò ç áíááðÜèiéóç lðiññâß íá åßíáé íéá êñßóéïç äéáæéáðßá. Ç äéáæéêáðßá áíááðÜèiéóç lðiññâß íá ðÜáé óóñááðÜ, êáé íá ðñílëèçéâß lñíéïç æçíéÛ óðî éýéëùìâ ôíð BIOS.

2.11.2 ×ñçóéíïðíéþíôáò Óooóþìáôá Áñ÷åßùí MS-DOS® êáé Windows

Ôc äääïí Ýíç ôóêäíP, ôi FreeBSD äáí ôöñöôçñßæåé ôóôôPíâáôå áñ-åßùí ðiö åßíáé ôöñlðeååííYíá iá ôçí åöäñiiäP **Double Space™**. Åéá ôi ÿüäí åôöü éá ðñÝðåé íá ôá åðiööñlðeÝóåôå þoôå ôi FreeBSD íá Ý-åé ðññüôååôç ôôå åääñí Yíá. Åôöü iðiñåß íá åßíáé åêôåëþíôå ôçí åöäñiiäP **Compression Agent** ðiö åñßöéåôåé ôóîi lañiy Start (íáñïç) > Programs (ÐñiäñÜüíåôå) > System Tools (Åññäéåßå ÔóôôPíâóïò).

Ôi FreeBSD iðiñâb íá ððiøðcñþiâé óðóðÞiáôá áñ÷åßuí óýðiø MS-DOS (iñéóí Ýiâð oïñ Ýð áiáð Ýñiñôáé êáé ùò FAT). Ç áiöeÞ mount\_msdosfs(8) iðiñâb íá ðñiøáñôÞoâé áððÜ óá óðóðÞiáôá áñ÷åßuí óá êÜðiëi Þæç ððÜñ÷ii eáðÜëeiäi, áðéónÝðriðoâó Ýðoé óçí ðñüöââoç óóâ ðâñeâð÷üìâiá ñiðð. Äáí óoïçèßæââoâé íá ãßlâðoâé Ülâðoâ eëÞoç ðiø ðñiñanÜlâðoâiò mount\_msdosfs(8). ÓðiÞeùò, êáëâðbôâé áððü òi óýðoâçiá Ýðuù ìeâð ãñâiñÞo óóï áñ÷åßi /etc/fstab Þ iâ eëÞoç ðiø ãïçèçôéëý ðñiñanÜlâðoâiò mount(8) iâ ôéð áðâñâðbôçøâð ðâñâiÝðñiðð. Íeâ ððéêÞ ñyëiéóç óóï áñ÷åßi /etc/fstab áßfáé ç ðâñâéÜðù:

```
/dev/ad0sN    /dos    msdosfs  rw  0  0
```

**ÓcéláðBúócs:** Æáá íá äööéÝðóáé ói ÓáñáðÜíu, í éáðÜéïäiò /dos éá ðñÝðóáé íá öððÜñ- áéð þäç. Æáá èåððiÝññáéáò ó- áðóééÜ íá öç lññöþ óuí éáðá- þñkÞðóáúí öóó áñ- ð- åßí /etc/fstab, èåððá- öç óáëßäá manual fstab(5).

DánáéÜðó ðóáßíâðáé leá ðóððéêþ eëþþóç óðçí mount(8) ãéá ðóçí ðñiøÜñðôçðóç ášúð óðóðþÍàðiò áñ ÷ áßñí MS-DOS:

```
# mount -t msdosfs /dev/ad0s1 /mnt
```

Óóí ðáñÜääéäíá áðóöü, óíí óýóðóçíá áñ ÷ áßñú ôíø MS-DOS áßñíáé óóçí ðñþþðç êáð Üòìçóç ôíø óéëçñíý áßóðéíø. Ç äééþ óáð ðåñßðóùóç iðñinåß íá áßñíáé áæáöiñåôéþ, áééÝâiôå ôíí áðiøÝéåñíå ôùí áiðiøþí dmesg êáé mount. Ié ðeçñiøiñßåò áðü áðóÝð øéð áiðiøÝð ðñÝðåé íá áßñíáé áñéåðóÝð áæá íá ðÜññåôå iéð íá Ýá ôçó áééÜðåíçò ôùí êáðåðíÞoåñí.

**Óciāðuóč:** Ó FreeBSD ßóùò íá áñéèíþóáé óá slices óiõ ãßóéiõ (ðiõ óðiõ MS-DOS êáëíýíóáé êáðáôíþóáéò) äéáöiñåôéêÜ áðü Üeeá eäéöiñãéêÜ óóðóðþiaðáá. Áéæéêüðåñá, óá åéðåðáiÝíá (extended) äéáìáñþðiáóá MS-DOS ðáðñiïõi óðiþeùò iãááëýóðåñç áñþðiçóç áðü óá ðññðåýíóá äéáìáñþðiáóá ðiõ MS-DOS. Íðiñáððá íá ÷ñçóéiïðiþóáðá ði ãíçëçðóéêü ðññðåñáíá fdisk(8) áéá íá áíááíñþðóáðå ðiéáð êáðáôíþóáéò áíþéiõi óði FreeBSD, êáé ðiéáð óá Üeeá eäéöiñãéêÜ óóðóðþiaðáá.

Iðmáðvöðu áðbundróð íá ðróvanóttarhláða NTFS eða óðróða Pðóæði íá ðápiði, íá óðr. Þó ðóði ðóði áðiðre Pðó mount\_ntfs(8).

### 2.11.3 Åñùôþóåéò êáé Áðáíôþóåéò Áíôéìåôþðéóçò ĐñïâëçìÜôùí

**1.** Ôi óyóôcjà ñõ ênâìÜåé êáôÜ ôçí áíáäñþñéóç õëëéíý ôôç äeÜñêåéá ôçò åêëßíçóçò P óôïðåñéöÝñåôáé ðåñßåñää êáôÜ ôç äeÜñêåéá ôçò åäêåðÜôôáçò P äáí áíé ÷ íáÿåôáé ç ïíÜää aeôéÝôåò.

Óðí FreeBSD áðíâðáé áðóðâðái Ýíç ÷ nþróç ðið ACPI (âðüðíí áéí ÷ íâððeâð óðíç áðéðíçóç) óðóð áðéðööññlåð i386, amd64 êáé ia64 áéá áæððéüëðíóçò óçò ñýðìéóçò ðeéðéiy. Áðóðô ÷ þò ððÜñ ÷ iðí áðüðia êÜðiéá ðññâððíáðá ôúðíi óðí ðññðññáðá ðPðçóçò ðið ACPI üðíi áéá óðá BIOS êáé óðó ìçðññé Ýð. Íðññâððá ïá áððáñññðiðé Þðâðá ðið ACPI, ïá óðí ñýðìéóç hint.acpi.0.disabled óðí ðññþði óðó Üðæíi ðið ðððôððíáðiò áðéðíçóç (boot loader):

```
set hint.acpi.0.disabled="1"
```

Ç ñyéiéóç áôôP ÷ Üíâôáé óå êÜèå åðáíâéêßíçóç, éáé Ýóóé åßíáé áðáñáßôçöi íá ðñïöè Ýóâôå  
hint.acpi.0.disabled="1" óïö áñ ÷ åßí /boot/loader.conf. Ðñéóóùôåñåò ðëçñïöiñßåò áéá ôïö boot loader  
ìðmâßôå íá åñâßôå óïö ÕíÞíá 13.1.

**2.** ÈáôÜöåñá íá îâçéíÞóù áðü óï öéëçñü äßóéï áéá ðñþöç öiñÜ íåðÜ ôçí åâéåôÜóôáóç ôïö FreeBSD, i ðõñÞíáò  
öiñôþíáé éáé áíé ÷ íåýåé óï ðëééü iiö, áëeÜ óôâíáôÜåé íå íçíýáôå üðùò:

```
changing root device to ad1s1a panic: cannot mount root
```

Ôé åßíáé ëÜëiö; Ôé ìðñþ íá êÜíû;

Ôé åßíáé óï ìÞíöìá bios\_drive:interface(unit,partition)kernel\_name ðïö åìöáíßæåôáé óôç åiÞèåéå ôçò  
åêéßíçóçò;

ÖðÜñ ÷ áé áðü ðáëéÜ Ýíá ðñüâëçìá üôáí i óêëçñü ãßóéïò áðü óïi iðiþi åßíâôáé ç åêéßíçóç åáí åßíáé i ðñþöiò äßóéïò  
óïö óôôðÞíáòiö. Õí BIOS ÷ ñçóëiðiéåß äéäöiñâôééü óýóôçìá áñßèïçóçò áðü óï FreeBSD éáé ç åýñâôç óïö óùôöiy  
åñéëiý åéá êÜèå óôôéåôP åßíáé åýóéïëc.

Óôçí ðåñßðôùóç ðïö i äßóéïò åêéßíçóçò åáí åßíáé i ðñþöiò äßóéïò ðïö óôôðÞíáòiö, óï FreeBSD ìðñþâß íá ÷ ñâéåôåß  
êÜðíéá åiÞèåéå åéá íá óïi åñâé. ÖðÜñ ÷ iöi åýí óðíçèéòi Ýíåò ðåñéðôþoåéò, áëeÜ éáé óôéò åýí ðñÝðåé íá ðåßôå óïi  
FreeBSD ðïö éá åñâé óï ñéæééü (root) óýóôçìá åñ ÷ åßùí. Áðü åßíâôáé iñßæiiðåò ðïi åñéëiù ðïö äßóéïò óýiöñíá íå óï  
BIOS, óïi óýði ðïö äßóéïò, éáé óïi åñéëiù ðïö äßóéïò óïi FreeBSD áíÜëíäå íå ðïi óýði ðïö.

Ç ðñþöç ðåñßðôùóç åßíáé áí Ý ÷ åôå åýí äßóéïò IDE, éáé Ýíåò iñéòi Ýíò ùò master óôi áíôþoóïé ÷ i IDE éáíÜëé, éáé  
éÝëåôå íá íâééíÞóåôå óï FreeBSD áðü óïi ååýôåñí ãßóéï. Õí BIOS ðïö òæÝðåé ùò äßóéïò 0 éáé 1, åíþ óï FreeBSD  
óïðò åéÝðåé ùò ad0 éáé ad2.

Ôï FreeBSD åñßóéåôáé óôi äßóéï 1 óïö BIOS, óýðiö ad åíþ óïi FreeBSD öáßíâôáé ùò äßóéïò 2, Üñá ðñÝðåé íá  
åþóåôå:

```
1:ad(2,a)kernel
```

Óçíâéþóôå üôé áí Ý ÷ åôå äßóéï slave óôi ðñùôåýíi éáíÜëé, óï ðáñáðÜíû íåí åßíáé áðáñáßôçöi (éáé åßíáé iðóéåóôééÜ  
éÜëiò).

Ç ååýôåñç ðåñßðôùóç ðåñéëiâÜíåé óçí åêéßíçóç áðü äßóéï SCSI, üôáí Ý ÷ åôå åðßóçò Ýíá P ðåñéóóùôåñïò IDE  
äßóéïò óôi óýóôçìá. Óôçí ðåñßðôùóç áôôP i áñéëiùò ðïö äßóéïò óïi FreeBSD åßíáé ÷ åíçëüôåñïò áðü óïi áíôþoóïé ÷ i  
óïö BIOS. Áí Ý ÷ åôå åýí äßóéïò IDE éáé óï SCSI äßóéï, i SCSI äßóéïò öáßíâôáé óôi BIOS ùò äßóéïò 2, óýðiö da  
éáé áíáññíßæåôáé óôi FreeBSD ùò äßóéïò 0, èá åñÜöåôå:

```
2:da(0,a)kernel
```

Åéá íá ðåßôå óôi FreeBSD üôé èÝëåôå íá åêééíÞóåôå áðü óïi äßóéï 2 óïö BIOS ðïö åßíáé i ðñþöiò SCSI äßóéïò óïö  
óôôðÞíáòiö. Áí åß ÷ åôå Ýíá iùüi IDE äßóéï, èá ÷ ñçóëiðiéïýóåôå óï 1 : áíôß åéá 2 :.

Ìüëéò åñâßôå óéò óùôôÝò óéíÝò, ìðñþâßôå íá åÜëåôå óçí åíôïëP, åêñéâþö üðùò èá óçí åñÜöåôå, óôi áñ ÷ åßí  
/boot.config ÷ ñçóëiðiéþíò Ýíá óðíçèéòi Ýíò áðåñâôåóôP éâéíÝíò. Áí åáí iñßóåôå åéáöiñâôééÜ, óï FreeBSD  
éá ÷ ñçóëiðiéåß óá ðåñéå ÷ üiâíá óïi åñ ÷ åßíöi åôôïý ùò ðñiåðééiðP óôçí ðñiöñiðP boot :.

3. Îåðéñíçóå áðü ðí ñééçñü åðöéï ãéá ðñþðç öññÜ ìåð Ü ðíç áåðåñðÜ ðóðåóç ðíð FreeBSD, åéëÜ ï Äéå ÷åññéóðòþ Ðåéñíçóçò (Boot Manager) ðòðþíïåé áðéþò F? ëÜéå öññÜ ðóô ìåñý ãéñíçóçò ãéá ãåñ ñðå ÷åññéóðòþ ñðåññí.

Äáí ñöðëìßóåô òùóôÜ ôç áâùìåðñßá ðïò õéëçñïý äßóëîò ôðïí åðáìåññåôò Þ êáôåò Þóùú üðáí áâéåðåôò Þóåôå ðï FreeBSD. Ðçääßtåôå íáíÜ óòïí åðáìåññåôò Þ êáôåò Þóùú éæé iñßóôå ôç òùóôò ãâùìåðñßá ðïò õéëçñïý óåò äßóëîò. Ðñ Ýðåé íá åðáìåññåôò Þóåôå ðï FreeBSD åðü ôçí áñ÷Þ, lå ôç òùóôò ãâùìåðñßá.

Áí ááí iðináþbóð ía áññáþbóð ía éártíá óñúðri óc óñúðóþ Ááññáðóñþbá áéá ðír iç ÷. Úíçlá óáð, æíðeí Üóðóð ðír áéúðrðeí ðír: Áçíðeíñþbóðóð íeá iééñþ eáð Üóðíçóç MS-DOS óðóçí áñ ÷. Þ ðír áðbóðeíð, éáé ááññáðóñþbóðóð ðír FreeBSD iðóð Ú áðü áðóð. Óí ðññáññáliá ááññáðóÜóðáñçò eá áðæ óçí eáð Üóðíçóç ðír MS-DOS eáé eá ðññíðáæþbóðáé ía áíé ÷. fáýðáé áðü áðóðþ óçí óñúðóþ Ááññáðóñþbá, eÚðóð ðír iðiðiþið óðíðþeùð ðåðóð ÷. áþiñáé.

Ååí óáò óoíéóöïýìå íá áéïïëöèÞóåôå ôï ðáñâéÜôù, áëëÜ ôï áöÞóáïå åäþ áðëþò ùò áíáöïñÜ:

ÁÍ öödeÜ÷ fâôlá Ýíá lç- ÜÍçíá desktop P áitõõdçñâôdçôP áeá ádïeéâéóôdêP ÷ nPócs ádû òi FreeBSD éeá áâái óáo áâræáó Ýnâé ðeeáíP (iâcëiiõôéP) oôlâââùõôçâ iâ MS-DOS, Linux P Üeëi eâéôitõnâæü ÿóôóçíá, Ý÷ áâôâ áðbóçò òçí áðcëiáP íá ÷ nçóeiiðiéPóâôâ iêüêçñï òi ábôeï (deÝaxiíâo òi A óoii áðââiñââôP éâôâo ìPóâù), éeá ádçé Ýâiñôâo ôç lç-ôô Úiôâán áðéëiáP üðiô òi FreeBSD éâdâââiâ Úiâé iêüêçñï òi ábôeï ádû òií ðñþbi ùo òií ðââéôôðâbi òií Ýá. Iâ òií ñôñüði áôðû áâiâébôiðôâ iêüâ ðâ ðñiâéPíâo ðioi áâiâo Ýññiôâé ôôç áâuââôñbâ, aëeÜ õðÜñ ÷ iñi Ûiðiéiê ðâññiñéoñiñ, áâeñi òií áâái ñôñüâéôâé ðioi Ýá ÷ nçóeiiðiéPóâôâ iðiçíáPðiôâ Ûeëi eâéôitõnâæü áâeñi òií FreeBSD óoi ñôñüâéñiñ Ýñ ãbôeï.

4. Ότι όγκος πάνω από την επιλεγμένη διάρκεια στάθμανσης στην πλατφόρμα πρέπει να αποτελείται από μια σειρά από παραδοσιακές λειτουργίες που πρέπει να προστατεύεται από την πλατφόρμα.

Ҫ Ӯӹнôá óáð áåßíáé ðééäíþò óá äæáöïñâöéêü IRQ áðû áðôü ðiö Ý÷åé iñéøèåß óóï áñ÷åßi /boot/device.hints Ӯӹ  
ðñüäñâìä íäþäçöçò ed(4), áðû ðñïåðéëiäþ, äáí ÷ñçöéiiðieåß ðéó ñðèlþóåéò ðiö áiâå ÷ñÝùò Ý÷åôå éÜíäé óôçí  
Ӯӹнôá íÝóú ðiö ðñïäñ Üñâöîò ñyéiéöçò ðiö ðáñÝ÷åé íéååðéåðåðò (“soft configuration”, ðéò ðéïÝò ðiö áþþóåð  
íÝóú EZSETUP óóï MS-DOS). Ùóðûñi èá ðéò ÷ñçöéiiðieþóåé áí iñþóåðå õçí ðéïP -1 óá hints ôçò óóðéåðþò.

Åþóðia ìåðâééíÞróða ôír âñá ÷ öðõõéëùòðÞñá (jumper) ðÜíù óóçí êÙñôá þþóða íá äþþóða ÷ åéñiiþíçóðað (hard) nñðèlþðåéð (åéëÜæíiðað) êáé óéð nñðèlþðåéð ôíð ððñÞíá áí áððüù áðßíáé áððñáßðóçöi), Þ aéëÜíða ôír IRQ óóçí ôéiÞ - 1 nñðèlþæíiðað ôír hint hint . ed . 0 . irq = " - 1 " . Íla ôír ôññüði áððüù, i ððñÞíáð èá ÷ ñçóðiðiéÞðað óéð nñðèlþðåéð ðið   Üíáða íÝóù ôír ðññiðñÜíðaði ñvèléóçö.

Íláá Üüééç ðééááñüöçôáå áßíáé ç êÜñôá óáo íá ÷ñçóéñðíéåß ôí IRQ 9 ôí iðíßí áßíáé êíéü íå ôí IRQ 2 êáé áðíöåéåß ôó÷iÜ ðçäP ðñíäéçÜôúí (åéäééÜ áí Ý÷åôå êÜñôá åññáöééþí ðíø ÷ñçóéñðíéåß ôí IRQ 2!). ÐññóðáèÞóôå, áí áßíáé äöíáöüí, íá áðíöýååôå áîôåéþò ôc ÷ñÞóç ôùíIRO 2 P 9.

5.  $\frac{1}{4}$  ôáí ÷ ñçóéiiðiéåßôáé ôi sysinstall óå Ýíá ôåñìáôéü X11, c êßôñéíç ãñâíïåöiôåéñÜ ðÜfù óôi áiié ÷ ôü aëñé öüíïö åßíáé äöñóáíÜ ïåñüööc. ÕðÜñ ÷ åé ôññüðjò íá ååéöèñüèåb c áíöbeåóç óå áôñöP õcí åðöññüäP:

ÁÍ Ý÷åôå Þäç åääéåôåôçí Ýíí òi X11, êåé ôá ðñïäðééäñí Ýíá ÷ñþlåôá ôíø **sysinstall** êÜíñí òi êåßìåíí äöôáí Úäíùóöí ôóï xterm(1) Þ òi rxvt(1), ðñïöé Ýóôå ôí ðäñåê Üòù ôóï ~/.xdefaults æéá íá äçìéïñäþoåôå Ýíá ðéí óéïýñí ãéñé ðüïjöí: xterm\*color7:#c0c0c0

## 2.12 İäçäüö ÅäêáôÜóôáóçò ãéá Đñi÷ùñçiÝíiöò

Óõíåéóöïñ Ü áðü ôïí Valentino Vaschetto. Áíáíåþèçêå áðü ôïí Marc Fonvieille.

Ôî òíPiá ãðöü ðåñéæñÜøåé ðùò íá ååéåôåóðÞóåôå õí FreeBSD óå éæéåßðåñá íç ÷ áíPiáôá Þ / êáé íå íç óðíçééóí Ýññð ñññðiñðó.

2.12.1 Åäéàééóôþíóà òî FreeBSD óå Ýíá Óýóôçìá ÷ùñßò ïëüíç þ Đëçêôñïëüäéí

Ôi åbæiò ådöü ôcô ååêåðÜóôåçò iíñÜæåðåé “headless install (åé Ýöåéç ååêåðÜóôåç)”, ådåéåP öi iç ÷ Üíçìá ööí iðiñi ååêåðÜóôåé öi FreeBSD åbôå åái Ý÷åé ööññåíÝíç iøüíç, åbôå åái Ý÷åé êáí Ýññäi VGA. Áí áíññöÜóôå ðùð åbñíåé ðeeëåñü êÜóé ðÝöiéí, åbñíåðåé iå ôçí ÷ nPóç öåéñéåPò eñññüéåò. Ç öåéñéåP eñññüéå ååóééÜ ÷ nçóéiðíéåß Ýíå Üeëi iç ÷ Üíçìá öi iðiñi åññ åùð éyñéå iøüíç êåé ðeçéññüéåí åéå öi öýóôöçíå. Åéå öi öéiðü ådöü, åðéþò åééiðøPóå ðå åPíåðå åéå ôçí åçéiðññåí åeåð USB iñPíçò flash, üðùð åçååbôåé ööí ÔiPíá 2.3.7 P ååðååÜóôå öi öññöü åñ÷åbñ ISO åéå ôçí ååêåðÜóôåç (ååbôå öi ÔiPíá 2.13.1).

ঢাঁকো, কেবল কোথায় আছে এই প্রযোজনীয় কাগজ? (প্রযোজনীয় কাগজ হল একটি CD-ROM এবং এটি বাংলাদেশের স্বত্ত্বাধিকারী প্রকাশনা করা হচ্ছে।)

- #### 1. Äçìéïõñãßá USB ÌíPìçò Flash ãéá ÓåéñéáêP Êiióüéá

Áí áðññüéâéóí íá áâééíPóåôâ áðñü óí USB flash ðiö lüëéò öödeÜíâôâ, óí FreeBSD èá íâðéßíáââ óðçí éáññééP  
éáôÜóôáóç áâéâôÜóôáóç. ÈÝëiöíâ óí FreeBSD íá íâééíPóåé óâ óâéñéâéP ëiñlúëá áéá ðçí áâéâôÜóôáóç lâð. Áéá  
íá óí êÜíâôâ áðñü, èá ðññóâññóPóåôâ óí USB flash óóí FreeBSD óýðôçìá óâð, ÷ñçðññüðíéþíâð ðçí  
áíóïéP mount(8).

```
# mount /dev/da0a /mnt
```

**Óciàéßúóç:** Ðñíóáñiùóðå êáôÜëëçéá ôí üíñlá ôçò ôóðêåôþò êáé ôí óciàëí ðñíóÜñôçóçò, áíÜëíá ià ôí óýôôciá óáò.

Ôþñá ðiö Ý ÷ âôâ ðñïóánôÞoáé ôç iíÞìç USB, èá ðñÝðåé íá ôç ñõèlßóâôð þóðâ íá åêëéíâð ôôç óâæñéâðP êiióüéá. Èá ðñÝðåé íá ðñïóðEÝóâôð íéá ãñâílP ôóï áñ ÷ âßi loader .conf ðiö ðâñéÝ ÷ âôâé ôóï óýóðçíá áñ ÷ âßùí ôçò USB iíÞìçò, þóðâ íá iñßóâôð ôç óâæñéâðP êiióüéá ùò êiióüéá ôôðôÞìâðiö:

```
# echo 'console="comconsole"' >> /mnt/boot/loader.conf
```

```
# umount /mnt
```

Í ðóinuðbóða óð þúna ía aðóæný Ýðáða óð lúPíc USB. Óðíráð þúndóða ía óð óðaðaælðuðu ræcibaðo, íaðeiblöðað aðu óð óðiblöði aðvá.

2. Åfíññiðiþcóç ôçò ÓåéñéáêÞò Êiióüëáò iÝóù ôiõ CD ÅæéáôÜóôáóçò

Áí áðñüéâéóí íá áéééíPóáôå áðü öi CD ðið áçíéïñäPóáôå áðü öi ISO áñ÷åßü ðið eáðôåâÜóáôå (ääßôå öi ÕíPiá 2.13.1), öi FreeBSD éá íâééíïýóå éáíñüééÜ eáé éá ÷ñíçóéíïðíéíýóå ôç oóíPèç íYëíäí áâéâóðÜóðâóçò. ÈÝëíðiå úñðöüöi íá íâééíPóíðiå óå eáðÜóðâóç óâéñéâéÞò ñíñüéàð áæá óçí áâéâóðÜóðâóç. Áéá íá áßíáé áðöü, éá ðñ Ýðâé íá áí Üäñiðiå óå áñ÷åßá ðið ðäñéÝ÷åé öi ISO, íá áeeÜñiðiå eÜðiéá áðü áððÜ eáé íá öi áíáäçléïñäPóíðiå ðñéí öi æñíÜñiðiå, óå áééíïýóå CD.

Óði FreeBSD óýóðçìá ðið Ý ÷ åôå áðièçêâýóåé ôï áñ ÷ ééü ISO, ð.÷.

FreeBSD-9.0-RELEASE-i386-disc1.iso ÷ ñçóëïðiéÞóôå ôçí áîôïëÞ tar(1) áéá íá êÜíâôå áîáâùäÞ ôùí áñ ÷ åßùí ðið ðâñéÝ ÷ áé:

```
# mkdir /path/to/headless-iso
# tar -C /path/to/headless-iso -pxvf FreeBSD-9.0-RELEASE-i386-disc1.iso
```

Èá ðñÝðåé ôþñá íá áéëÜíïðiå ôï Ýóï áâæáô Üóôáóçò þóôå íá îâééïÜâé óå óâéñéâéÞ êííóüëá. Èá ðñÝðåé íá ðñïöéÝóâôå íéá âñâñiÞ ôï áñ ÷ åßi loader.conf ðið áíâéôÞóâôå áðü ôï áñ ÷ åßi ISO, þóôå íá áíâññiðiéÞóâôå ôçí óâéñéâéÞ êííóüëá ùò êííóüëá óðóôÞìâðiò:

```
# echo 'console="comconsole"' >> /path/to/headless-iso/boot/loader.conf
```

Ìðññýå Ýðåéôå íá áçjéïðiñâÞóïðiå Ýíá fÝí áñ ÷ åßi ISO ðið íá ðâññéëâiâÜíâé ôéð ôññiðiéÞóâéò ìáò. Áéá ôï óéïðü áðôü èá ÷ ñçóëïðiéÞóïðiå ôï áñâñâëåßi mkisofs(8) ôï iðiþi ðâññéëâiâÜíâóâé óôï port sysutils/cdrtools:

```
# mkisofs -v -b boot/cdboot -no-emul-boot -r -J -v "Headless_install" \
-o Headless-FreeBSD-9.0-RELEASE-i386-disc1.iso /path/to/headless-iso
```

Ìðññâßôå ôþñá íá âñÜøâôå ôï íÝí áñ ÷ åßi ISO óå CD, ÷ ñçóëïðiéÞóâò ôçí åðâññiâÞ åâññâöÞò ðið ðññöéïÜôå.

### 3. ÓðfáÝíðåò Ëáéþæéï Ôýðiò Null-modem

×ñâéÜæâôåé ôþñá íá óðfáÝóâôå Ýíá éáéþæéï ôýðiò null-modem ìåðâáý ôùí áýí ìç ÷ áíçìÜôùí. Áðëþò óðfáÝóâôå ôï éâéþæéï ôôéð óâéñéâéÝð ðüññôå ðüí áýí ìç ÷ áíçìÜôùí. Ááí ðññüéâéðâé íá ãiððëÝþâé êáüüééü óâéñéâéü êáéþæéï, ÷ ñâéÜæâôåé éâéþæéï ôýðiò null modem, üðiò êÜðiéá áðü óå æâýâç êáéùëßùí áéâðâðñþñiðâé åðùðâñééÜ.

### 4. Åêéßíçòs ãéá ôçí Åæáâò Üóôáóç

, ÷ áéÝñèâéç þñá íá ðñí ÷ ññÞòïðiå ôðçí áâæáâò Üóôáóç. ÓðfáÝóâå ôç USB ìíÞìç flash óðiò ìç ÷ Üíçìá ðið èÝéâôå íá áâæáâåðò ðóâðâ ÷ ññÞò ðüññiç êâé ðëçéðññüüâæí êâé áíâññiðiéÞóâå ôï. Áí ðññüéâéðâé íá ÷ ñçóëïðiéÞóâå ôï CD ðið áðièïÜóâôå, áíâññiðiéÞóâå ôï ìç ÷ Üíçìá êâé ôïðièâðÞóâå ôï CD óðiò tæçãü CDROM.

### 5. Óðfáâåâßôå ìå ôï Headless Íç ÷ Üíçìá

Èá ðñÝðåé ôþñá íá óðfáâåâßôå ìå ôï ìç ÷ Üíçìá óâò, ÷ ñçóëïðiéÞíðâò ôçí cu(1):

```
# cu -l /dev/cua0
```

Óði FreeBSD 7.X ÷ ñçóëïðiéÞóâå ôçí ðâññâëÜôùí áâðiëÞ:

```
# cu -l /dev/cuad0
```

Áðôü áßíáé! Ìðññâßôå ôþñá íá åéÝââðâå ôï headless ìç ÷ Üíçìá íÝóù ôçò óýíââðçò cu. ÌåðÜ ôç öüñðùóç ôið ððñÞíá, èá óâò æçôçèâß íá åðééÝíâôå ôï åßäiò ôið ðâññâðééï ðið èá ÷ ñçóëïðiéçèâß. ÁðééÝíâå ôçí Ýã ÷ ñùìç êííóüëá (FreeBSD color console) êâé óðiâ ÷ ßóâå ìå ôçí áâæáâò Üóôáóç óâò.

## 2.13 ÐñïåðiéïÜæíðåò ôá ÄéêÜ óâò ÍÝóá Åæáâò Üóôáóçò

**Óçìâßùóç:** Áéá íá áðlöyâïðiå ôçí áðáíÜëçøç, eÝäïðåò "FreeBSD CD-ROM" óôï ôiÞìá áôôü, áíííýå Ýíá CD-ROM Þ DVD ôið FreeBSD ðið Ý ÷ åôå áâññiðóâå Þ äçjéïðiñâÞóâé ìüïò óâò.

ÓðÜñ ÷ ðið ëÜðiéåò ðâññéðôþóâéò óôéò iðiþâò ÷ ñâéÜæâôåé íá áçjéïðiñâÞóâóå óâ åéêÜ óâò ïÝóá Þ ðçâÝò áâæáâò Üóôáóçò ôið FreeBSD. Ìðññâß íá áßíáé òðóééÜ ïÝóá, üðuò áéá ðâññâðéâiâ ìéá óâéíßá, Þ ðçâÝò ðið ìðññâß íá

÷ ñçóéïïðéÞóâé ôï **sysinstall** ãéá íá áíáâòÞóâé ôá áñ÷åßá, üðùò ð.÷. ìéá ôïðééÞ ôïðéâòßá FTP, þ ìéá êáôÜðìçóç MS-DOS

Åéá ðáñÜääéâïá:

- ÷ åôâ ðïéÜ ìç÷áíÞiaâá óoïäâïÝíá óoï ôïðééü óáò äßêòï, êáé Ýíá iüñ CD-ROM ôï FreeBSD. ÈÝëâòâá íá äçïéïñâÞóâòâå ìéá ôïðééÞ ôïðéâòßá FTP ÷ ñçóéïïðéÞíòâå ôá ðâñéâ÷üïâïá ôï FreeBSD CD-ROM, êáé Ýâðâéâóá íá ñðèïßóâòâå ôá ìç÷áíÞiaâá óáò íá ÷ ñçóéïïðéïýí áðòü ôï FTP site áíòß áéá íá óoïäÝíòâé ôï Internet.
- ÷ åôâ Ýíá CD-ROM ôï FreeBSD áééÜ ôï FreeBSD äâï áíáâñùñßæâé ôï iäçäü óáò CD/DVD, åíþ ôï MS-DOS / Windows ôï áíáâñùñßæâé. ÈÝëâòâá íá áíðéâñÜðâòâå ôá áñ÷åßá ôï FreeBSD óâ ìéá êáôÜðìçóç MS-DOS óôï ßæéï ìç÷Üíçïá êáé íá åâñéâðâòâå Þóâòâå ôï FreeBSD ÷ ñçóéïïðéÞíòâå áðòü ðá ãñ÷åßá.
- Í ðïéïäéòÞò ðïò èÝëâòâá íá åâñéâðâòâå Þóâòâå äâï Ý÷åé iäçäü CD/DVD þ êÜñòâ áééòýïõ, áééÜ iðïñâßòâå íá óoïäÝâðâé Ýíá óâéñéâü Þ ðñïÜëéçëï êâéþäï ðýðïõ “Laplink” ðñïò Ýíá ðïéïäéòÞò ðïò áéáèÝâðâé.
- ÈÝëâòâá íá äçïéïñâÞóâòâå ìéá ðâéíßá, ðïò iðïñâß íá ÷ ñçóéïïðéçëâß áéá ôçí åâñéâò Üóôâóç ôï FreeBSD.

### 2.13.1 ÄçïéïñâÞíòâå Ýíá CD-ROM Åâñéâò Üóôâóçò

Ùò ðìÞiaâ éÜëâå Ýéäïòçò, ôï FreeBSD project äçïéïñâß äýí áééüïâò CD-ROM (“ISO image”). Íé áééüïâò åôðÝò ïðïñïý íá ãñáòïý íå CD áí Ý÷åôâ åâññâòÝâ CD-ROM, êáé áéïéïýèòâ íá ÷ ñçóéïïðéçëïýí áéá ôçí åâñéâò Üóôâóç ôï FreeBSD. Áí Ý÷åôâ åâññâòÝâ CD-ROM êáé åñÞaïñç óýíâòâå ôï Internet, åôðòù åßíâé í åðéïéüòâññò ôñüðïò íá åâñéâðâòâå Þóâòâå ôï FreeBSD.

#### 1. Èåôââò Üóôâå ðá ÓùóòÜ ISO Images

Iðïñâßòâå íá êåôââò Üóôâå ðá ISO images áéá èÜëâå Ýéäïòç åðü ôçí ôïðéâòßá  
`ftp://ftp.FreeBSD.org/pub/FreeBSD/ISO-IMAGES-arch/version` þ ôï ðëçóéÝóâññí óâò mirror.  
 Õðïéâòâå ðóâòâå ôï arch êáé version üðùò åðâéòâßòâé.

Í èåôÜëïäò èá ðâñéÝ÷åé öðóéïëïäéÜ ðá áéüëïðéâ images:

#### Ðßíâéâò 2-4. Ímâôïëïäßá êáé ÅðâîçâÞóâéò ôú ISO Images áéá FreeBSD 7.x êáé 8.x

¼ññâ Áñ÷åßïò	Ðâñéâ÷üïâïá
<code>FreeBSD-version-RELEASE-arch-bootonly.iso</code>	Áðòü ôï áñ÷åßï ISO óâò åðéòñÝðâé íá åâñéâò Þóâòâå ôçí åâñéâò Üóôâóç ïÝò CDROM, áééÜ äâï ðâñéÝ÷åé ôçí åðïñâòüòçðâå íá åâñéâò Þóâòâå ôï FreeBSD iüñ iÝò CD. Èá ðñÝðâé íá êÜíâòâå åâñéâò Üóôâóç iÝò áééòýïõ (ð.÷. ïÝò åññò åñðçñâòçðÞ FTP) iåðÜ ôçí åâñéßíçóç åðü ôï CD.
<code>FreeBSD-version-RELEASE-arch-dvd1.iso.gz</code>	Áðòü ôï áñ÷åßï ISO, iâñÝëïò DVD, ðâñéÝ÷åé üëá ðá åðâéòïýâïá áñ÷åßá áéá ôçí åâñéâò Üóôâóç åíüò åâñééïý óðóôÞiaâòâå FreeBSD, êâéþò êáé ìéá óðéïëïäÞ åðü Ýðïéïâå ðâéÝðâé åâñéïçñâòç. Õðïóðçñâßæâé åðßóçð åâñéßíçóç óâò åâñéÜóâòâå “livefs” ç iðïßá åßíâé ÷ ñÞóéïç óâò ðâñßðòñòç ðïò èÝëâòâå íá åéïñèþóâòâå ðñïâëÞiaâòâå êÜðïéâò åðÜñ÷ïðóâò åâñéâò Üóôâóçò.

## 1/4ñíá Áñ÷åßíö

FreeBSD-version-RELEASE-arch-memstick.img

FreeBSD-version-RELEASE-arch-disc1.iso

FreeBSD-version-RELEASE-arch-disc2.iso

FreeBSD-version-RELEASE-arch-disc3.iso

version-RELEASE-arch-docs.iso

FreeBSD-version-RELEASE-arch-livefs.iso

## Ðåñéå÷üìáíá

Íðiñåßôå íá ãñÜøåôå áôôP ôçí åééüíá óå íéá USB iíÞíç flash êáé íá ôç ÷ñçóéiiðiéÞóåôå áéá íá åâéåôåôôÞóåôå FreeBSD óå iç÷áíÞíåôå ðiõ ðôðiôçñßæïöi åééßíçóç áðü iäçäïýo USB. Õðiôçñßæåôåé áðßóçò åééßíçóç óå êáóÜóôáóç “livefs”. ÐåñéY÷åé óå ðáéÝóå ôçò óâéïçñßùóçò, áéëÜ äáí ðåñéY÷åé Üëéá ðåéÝóå ðñiò óââéåôÜóôáóç. Ôi áñ÷åßí áôôü áâí äéáôßèåôåé áéá FreeBSD 7.x.

Ôi ISO áôôü ðåñéY÷åé ôi åâóéêü óyóôçìá ôi FreeBSD éáé óå ðåéÝóå ôçò óâéïçñßùóçò. Äáí ðåñéY÷åé Üëéá ðåéÝóå ðñiò óââéåôÜóôáóç.

Áôôü ôi ISO ðåñéY÷åé üöi ðåéÝóå áôåñiïäþí iðiñiýí íá ÷ùñÝóïöi óôi äéâéÝóëi ÷þñi ôi. Äáí äéáôßèåôåé áéá FreeBSD 8.x.

Áéüíá Ýíá ISO ôi iðiþí ðåñéY÷åé üöá ðåéÝóå iðiñiýí íá ÷ùñÝóïöi óôi äéâéÝóëi ÷þñi ôi. Äáí äéáôßèåôåé áéá FreeBSD 8.0 éáé iåðåååíÝóôåñåò åéäüöåéò.

H óâéïçñßùóç ôi FreeBSD.

Áôôü ôi ISO ðåñY÷åé ðôðiôôÞñéiç áéá åééßíçóç óå êáóÜóôáóç “livefs” (äéá èåéöiõñäßåò áíÜêôçóçò) áéëÜ äáí ðôðiôçñßæåé áâéåôÜóôáóç ôi ëåéöiõñäééiý áðü áôôü.

**Óçìåßùóç:** íé åâéüöåéò ôi FreeBSD 7.x ðñéí áðü ôi FreeBSD 7.3 êáé íé åâéüöåéò ôi FreeBSD 8.x ðñéí áðü ôi FreeBSD 8.0 ÷ñçóéiiðiéýóáí äéáöiñåôééþ iññåðiøiäßá áñ÷åßùí. Ôi üñíá ôi ñíá ðåñéY÷åßíö ISO óå áôôÝò óéò åâéüöåéò áâí iâééíÜäé iå FreeBSD-.

Èá ðñÝðåé íá åâóååÜóåôå åâóå ði bootonly ISO, åßôå ôi disc1. Íçí êâóååÜóåôå êáé óå äýí, êáéþò ôi disc1 ðåñéY÷åé óå ðÜíôå ði ðåñéY÷åé êáé ôi bootonly.

×ñçóéiiðiéÞóôå ôi bootonly áí Y÷åôå òèçíþ êáé áñÞäiñç ðñiñåôåóç óôi Internet. Èá óåò åðéôñÝóåé íá åâéåôåôôÞóåôå ôi FreeBSD êáé iðiñåßôå Ýðåéôå íá åâéåôåôôÞóåôå åöåñiïäÝò ôñßòùí êâóåéåôåôþí ði ðiññéÜæåôå, åâóååÜæiñôå òéò iÝóù ôi ñðååôÞìåòiò ðåéÝóùí êáé ports (åâßôå ôi ÈåöÜëáéi 5).

×ñçóéiiðiéÞóôå ôi dvd1 áí èÝéåôå íá åâéåôåôÞóåôå íéá Yéäiöç ôi FreeBSD êáé èÝéåôå óâôôü÷ñííá íá Y÷åôå óôi ßäéi DVD êáé íéá óââåôôÞ óðëëëäþ áðü ðåéÝóå ôñßòiò êâðååôåôôôÞ.

Óá ðññóéåôå CD-ROM åßíáé ÷ñÞóéiá áéëÜ ü÷é áðåñáßôçôá, åéäéêÜ áí Y÷åôå ðñiñåôåóç ðøçëþò óå ÿôçôåò óôi Internet.

## 2. ÅñÜøôå óå CD

ÐñÝðåé êáôüðéí íá ãñÜøåôå ôéò åééüíåò (images) óùí CD óå Üääéá CD. Áí ôi êÜíåôå áôôü óå Üëéí FreeBSD óyóôçìá, åâßôå ôi ÒíÞíá 19.6 áéá ðåñéóóûôåñåò ðëçññöiñßåò (åéäéüöåñá, ÒíÞíá 19.6.3 êáé ÒíÞíá 19.6.4).

Áí ðñüéåôåé íá ÷ñçóéiiðiéÞóåôå Üëéí èåéöiõñäéü áéá ôçí åññåôßá áôôP, eá ÷ñâéåôôåß íá ÷ñçóéiiðiéÞóåôå ôéò åðíåôüôçôå ði ðåñY÷iñðåé áðü óå áíðßóôié÷á ðñiñåñÜñåôå åââñåþþò CD ôi ëåéöiõñäééiý áðöiy. Óá

images ðöi ðän Ý ÷ iiñåé åßíáé óå óòÜíðåñ ISO iiññöp êåé ðöiñöçñßæiiðåé áðåñèåßåó áðü ðíeeÝ ò åöáñiiäÝ ò ååññåöpø CD.

**ÓciāiāBúóč:** Ái áiāéáóYñáôóá lá äciéiõñâPóâôá lëá áiâéáééâõíYç Ýêâiõç ôiõ FreeBSD, äâñôå ôi Release Engineering Article ([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/articles/releng](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/releng)).

## 2.13.2 Äcileiõnäþooå iéá Óiðéêþ FTP Óiðíæðóþá ìå ôi CD-ROM ôið FreeBSD

Óá CD-ROM ôiõ FreeBSD Ý÷iõí ôçí ßæá äiñP iå ôçí ôiñièåóßá FTP. Äéá ôi ëüäi áôôü åßíáé ðiëý åyéïeii íá äçieïõñäÞóåôå iéá ôiðéêP ôiñièåóßá FTP ðiõ íá iñiñåß íá ÷ñçóëiñièçèåß áðü Úëéá iç÷áíPiáôá ôiõ äééöýiõ óáò êáôÜ ôçí ååêåôÜóóáç ôiõ FreeBSD.

- Óðî FreeBSD ìç÷ Üíçá ðíð eá öðëññáÞóåé ôçí FTP ôiðíèåðßá, åâââéùèåßôå üðé ôi CD-ROM åßíáé ìÝóá óðii ñäçäü êáé Ý ÷ áé åßíáé ðññöÜññôçóç ôið oðií êáôÜëiäi /cdrom.  

```
# mount /cdrom
```
  - ÄçìéïññáÞóôå Ý íá ëiññéåðiù ãéá áíþíðií FTP óðií /etc/passwd. Äéá ôi óðiðü áðôü, åðåññáðóåßôå ôi áñ÷åßí /etc/passwd ÷ ñçóëiíðíéþíðôå ôi vipw(8) êáé ðññöÜýóíñðôå ôçí áêüëiðèç ãññáìíP:  

```
ftp:*:99:99::0:0:FTP:/cdrom:/nonexistent
```
  - Åâââéùèåßôå tiðé åßíáé áíðññíðíéçì Ýíç ç õðçññåðßá FTP óðií /etc/inetd.conf.

Iðieiðiðiðiði Ý ði áé ðiþná æeððaêP óýfääóç ià òi lç-Ülcá óáð, lðiññab ðiþná ía åðeeëÝiâé ùò iÝóí aâæáðÜóðaóçò òið FTP éæá ía añÜøåé **ftp: /your machine** áðeeëÝiâé “Other” óóï iâfiiý FTP sites éâðÜ ôçí æeÜñêæá ôçò aâæáðÜóðaóçò.

**Óciàßbuóç:** Áí ôí iÝói åêëßíçóçò (ooíþeuò äéóéÝoåò) æáá ðiøò ðåëÜôåò FTP äái åßíáé áéñéåþò ç Bæá Yéäïöç iå åôòþ ðiø ðáñY-åðåáé åðü öi ðiðéêú FTP, ç åðáññíäþ **sysinstall** äái èá óåò åðéóñÝøåé ía iëëéëçñþóåôå ôçí ååéåðÜóååç. Áí ié åêëüöååéò äái åßíáé üiñéåò êáé åðééòìåñþò åí ðñññðåñÜóååò åðüö ðií ðåñétiñéòiù, èá ðññYåå ía ðÜôå åóï iåñý Options êáé ía åééÜtaóå öi üññlå ôçò åéáññþò (distribution name) óå any.

**ĐñiáéäiõiÙçó:** C ðáñáðÜíù ðâéðééþ áßíáé êáðÜëéçéç áéá Ýíá iç÷Üíçíá ðïõ áßíáé óóï ðïðééü óáò äßéðöï êáé ðñiíoáôåýâóáé áðü firewall. Ái ðñiíoÝñåôå ðõçñåòßåò FTP óå Üëéá iç÷áíÞíáôå óóï Internet (éáé ü÷é óóï ðïðééü óáò äßéðöï) èá åéèÝóåôå ðï iç÷Üíçíá óáò óå crackers êáé Üëéïòò áíâðééyìçöïòò. Ái ðï ëÜíåôå áôðü, óáò óóïéóöiyá ïðñóáÞïòò íá áéïéïòeÞóåôå òúñóÝò ðâéðééêÝò áóöáæåßáò.

### 2.13.3 Äcìéïöñäþíôáò ÄéóêÝôåò ÅãêáôÜóôáóçò

Áí éá ððåé íá áâéâóáóðÞóâðå áðü äéóé Ýðôåð (öi iðiþi óáð óoíéóðiýiá íá içí êÜíâðå), áßóðå ëüðù íç ððiðóðçñéæüùâñið öððééiy, áßóðå áððéþò áððâéäþ áððéí Ýíâðå íá êÜíâðå óá ðñ Üäiâðå ìá öi áyóéiði ðñyüði, éá ðñ Ýðåé ðñþþóá íá ðñiâðiéiði Úðóâðå êÜðiðéåð äéóé Ýðôåð áéá òcí áâéâóðÜóðåóç.

ÊáôÜ áéÜ ÷éóöř, éá ÷ñâéáöôåßôå ôüóåò äéóé Ýôåò 1.44 MB üöåò ÷ñâéÜæíïöáé æá íá êñáöÞöïöí üëá óá áñ ÷åßá ôïö éáôäüäïö base (base distribution). Áí ðñïåöïëÜæåöå ôéö äéóé Ýôåò áðü ôï MS-DOS, èá ðñÝðåé íá ôéö äéáiiñöþöåò åà ôçí áîöïëÞ ôïö MS-DOS FORMAT. Áí ÷ñçöéïïðíëåßôå Windows, ÷ñçöéïïðíëÞöå ôíí Explorer æá íá æáiiñöþöåò ôéö äéóé Ýôåò (ääíß èééé ööñí iäçäü A: æáé áðeeÝiôå “Format (Äéäiüñöùóç)”).

Íá içí áìðéðóôáyâóôá ôéó ðñiäéáññöùí Ýiàò áðü ôí áññáíòðÜ õéí áéóé Ýóâð. Íá ôéó áéáññöþbóâôá ïáíÜ áôåâðò áéá íá áâðóôá óþbáíññöìð. ÐièëÜ ðñiäéþláôá ðiòí Ý÷iõí áíáöðñéâð áðü ÷ñþlóâôá õóí ðáññâèùí Ý÷iõí ðñièýþâé áðü ôç ÷ñþlóç áéâôðÜëèçéá áéáññöùí Ýiúí ïÝóúí, ééá áéá ôí èüññ áððü ôí ðiñþlæòðá ëééâððâñá ðþñá.

Áí áciéiõñääþðóâ ðeðo äeðé Ýðåðo óâ Üeëi iç ÷ Üíçia FreeBSD ç äeáüññöùðc áâí åþíáé Üó ÷ cïc eäÝá, áí êáé äâ ÷ ñâæÜæâðáé íâ áciéiõñÞðóâða óýóôðcïá áñ ÷ åþùí MS-DOS óâ êÜeâ iéâ. Iðiññâððâ áfîðs æéá áðôð, íâ ÷ ñçóðiðiðÞðóâða ðeðo áfîðið Ýðo bsdlabel êáé newfs æéá íâ áciéiõñÞðóâða óýóôðcïá áñ ÷ åþùí UFS óâ áðô Ýð, üðuñð oðáññâððâ áðü ðcï ðáññâð Üðuñð aðiðiððâ áðiðiðbá áðiðiðbí:

```
# fdformat -f 1440 fd0.1440
# bsdlabel -w fd0.1440 floppy3
# newfs -t 2 -u 18 -l 1 -i 65536 /dev/fd0
```

Íðiñáþôá Ýðåéôá íá ôéò ðñiíoáñôÞóáðôá êáé íá ôéò ãñÜðôðôá óáí iðriéiäÞðiôá Üeëri óýóôciá áñ ÷ áßùí.

Áöiý äeäiñöþoåôå ôeò äeöê Ýoåò, èá ðñ Ýðåé íá añÜþoåôå óå áñ÷åßá óå áôôÝð. Óå áñ÷åßá ôçò åâeåôÜóôåóçò åßíæé eññíÝíá óå òiÞiaåá iå éaôÜeëcëiÝyâæiò bôåôå ðÝiôå åðü åôôÜ íá ÷ññÜfå óå iéå óóícëeîÝíc äeöê Ýóå 1.44 MB.

Äeáon̄ Ýiôâ üeâo ôeô äeôé Ýôâo óâo, añ Üöriôâo óâ êÜeâ iéâ uóâ añ ÷âbá ÷ùñÜiâ, iÝ ÷ñe íâ añÜøâoâ üeâ oâ distribution sets ðiô aðeéeñiâbôâ iâ ôiñ ôññüði aðoñü. ÊÜeâ distribution set èâ ðñÝðâe íâ aðiñcêâoðôâb óâ Ýâ ðñiñeâoâÜeññi ôçò äeôé Ýôâo, ð..: a : \base\base. aa, a : \base\base. ab, e.i.e.

**Óciárlíódeéü:** Ói áñ÷ áßi<sub>base</sub>.inf ðñÝðåé áßiðßöçö íá áññöôéâðåé óôçí ðñþöç áæéôéÝðå áði<sub>ó</sub> áðå<sub>base</sub> éâðòþò ói ðññüññáííl áâñéâðÜðöôáðçö ói ÷ ñâéÜðæâðåé áéé íá áñùññëðåé ðüøá áðéðëYíi óiþiaðá áñ÷ áßùí ðñÝðåé íá áééáÜðåé áéé íá óôñiáßþöðåé áéé ói ÷ cñlâðéóïù óçö áéáññiþò.

¼ðáó ôðÜðâðâ ðôcí iëüíç Media êáðÜ ôç aæáæééáðBá aæáæðÜðâðóçò, aððééÝiðâ Floppy êáé eá añùðçèâðâ ðæá ôððueiéðâ.

#### 2.13.4 ÅñêáôÜóôáóç áðü ÊáôÜôìçóç MS-DOS

```
C:\> md c:\freebsd  
C:\> xcopy e:\bin c:\freebsd\bin\ /s  
C:\> xcopy e:\manpages c:\freebsd\manpages\ /s
```

Óðilie Ýðíóða üðue ið áæða Ýðeitio aðeáýðæñtið : þvíð óáð aðnþóðéðaðaé óðii C : áeá c iii Üáa óáð CDROM ábúaé óðii E : .

Áí äáí Ý÷åôå iäçäü CDROM, ìðiñåßôå íá êåôåå Üóåôå ôçí äéáñíP áðü ôçí öiðièåóßá [ftp.FreeBSD.org](ftp://FreeBSD.org) (<ftp://FreeBSD.org/pub/FreeBSD/releases/i386/9.0-RELEASE/>). ÊÜèå distribution set åßíáé ööí äéüü öiö

éáðaÜeiäi. Áéá ðánÜääéäiå öi óåô base lðiñnåb fá âññæåb ööii éáðÜeiäi 9.0/base/ (ftp://ftp.FreeBSD.org/pub/FreeBSD/releases/i386/9.0-RELEASE/base/).

Ãéá üoá distribution set èÝëåôá íá åâéâôáôôÞóåôá áðü iéá êáôÜôìçóç MS-DOS (êáé åéá ôá iðíßá Ý÷åðå åéâéÝóëíí åéâýèåñí ÷þñí), åâéâôáôôÞóôá ôá êÜôù áðü ôí c:\freebsd — To óåô BÍN åßíáé ôí iüñí ðiö ãðáéôåßôáé åéá iéá åéÜ÷éóôç åâéâóÜóôáç.

## 2.13.5 Äçìéïöñäþíöáò Ôáéíßá ÅääáôÜóôáóçò

Ç åâéáð Üóðáóç áðü ðáéíßá, åßíáé ßóùò ç åðëïëüðåñò ïÝëïäò åêðòò áðü óçí åâéáð Üóðáóç ïÝóù FTP þ CDROM. Óí ðñüäñäííá åâéáð Üóðáóçò áðëþò áíái Ýíáé óá áñ÷åß íá Ý÷iöí åñáöðåß óçí óáéíßá íå iññöþ tar. Áöiy áðëëÝíåôá óá óåô åâéáð Üóðáóçò ðiö óáð åâéáð Üññöí, áðëþò êÜíôá óá tar óçí óáéíßá:

```
# cd /freebsd/distdir  
# tar cvf /dev/rwtf0 dist1 ... dist2
```

$\frac{1}{4}$ óáí ÊÚíâáô ðíçí áâéâáô Üöðáóç, éá ðñÍðâá íé áâââáéùèâåßôð üöé Ý ÷ áðâå áðPöáé áñéâðôü áæâýëæññ ÷ þññ óá ÕÜðíéí ðññíóùñéíü êáðÜëíäí (óíí iðíßí èá iðññÍöåðâ íá áðééÝíåðâ) áæá íá ÷ ùñÍöâé ðá ðëÞñç ðâñéâ ÷ üíâíá ðíç ðâéíßáð ðíð Ý ÷ áðâå áçíéïðñáÞöáé. Áñâéðßáð ðíç ðöýðç ðíç ðâéíßáð, ðíð áâí áðéðñÍðâé ðö ÷ áðâå ðññüðâáðç, áððPç ïYéíäíð áâéâáô Üöðáóç ÷ ñâéÜæâðâá áñéâðôü ðññíóùñéíü ÷ þññ áðieÞêâðóç.

**Óγιαβύνός:** Ἔάεπο ταῦται οὐδὲν δικαίωμα οὐδὲν δικαίωμα, οὐδὲν δικαίωμα οὐδὲν δικαίωμα.

## 2.13.6 Đñéí ÅãêáôáóôÞóåôå ïÝóù Äéêôýïõ

Õõðüñ÷iõí ôññåéò äéáæ Ýóçiié ôýðiié äéêõõåéò ðò åãéåôðÜóôáóçò. Ethernet (ôõðiõíéçì Ýiñò åëåãéò ðò Ethernet), Óáéñéåéò ðèýñáò (PPP), ÐáññÜëeçéçò ðèýñáò (PLIP (éáéþäéí laplink)).

Åéá ôçí ãñçãäñüôðåñç äöñáðòP åâéâðÜóðåáç ìÝóù åééðýïò, Ýíáò åëââéðòP Ethernet åßíáé ðÜíðå êáëP åðéëíäP! Ôí FreeBSD öðiöôçñßæåé ôéò ðåñéööüöåñåò ëiéíÝò êÜñôåð Ethernet. ïðiñåßôå íá âñåßôå Ýíá ðßíáéå ôúí öðiöôçñéæüìåñíü êáñöþí (ééå ôéò áðåééiyåñåò ñöèìßåðéò öiòò) öóéò Óçiaéþóåéò Öééëíý (Hardware Notes) êÜëå Ýéäiïçò FreeBSD. Áí ÷ñçöéñüðiéåßôå êÜðiíéå áðü ôéò öðiöôçñéæüìåñåò êÜñôåð Ethernet PCMCIA åâååéüèåßôå üöé ôçí Ý÷åôå aÜëåé ôôçí öðiäi÷P ðñéí åíññäiðiéþóåðå õi öiñçöü öðiëëæöóP óáò! Ôí FreeBSD äáí öðiöôçñßæåé äöðööð÷Pò áôôP ôçí ôóéäiP ôçí åðéóüöiòP åéóáñuäP êáñöþí PCMCIA éáðÜ ôç äeÜñêåéå ôçò åâéâðÜóðåáç.

Áí ÷ñçóéiiðiéåßôå modem, ôüðå ôi PPP åßíáé ó÷åäüí óßäiøñá ç iüíç óáð åðéëiäP. Ååâáéùèåßôå üöé Ý÷åðå Üìåðå äéåèÝóéåð ôéò ðëçñiøiñßåò áéá ôiø ðáñi÷Ýá óáð, êáèþò èá ôéò ÷ñâéáðåßôå ó÷åðééÜ ïuñßò óóç áéáæéåóßá ååâáðÜóðåóçò.

Áí ÷ñçóéiiðiéåßôå PAP P CHAP áéá íá óðíäåéåßôå iå ôiø ISP óáð (iå Üëéá ëüäéá, iðiñåßôå óá Windows íá óðíäåéåßôå iå ôiø ISP óáð ÷uñßò íá ÷ñçóéiiðiéÞóåðå script), ôüðå ôi iüñi ðiø èá ÷ñâéáðåßôå åßíáé íá añÜðåðå ôcí åðiøiP dial ôðcí ðñiøñiðP ôcò åöáñiäPò **ppp**. ÁéáöiñåðééÜ, èá ðñÝðåé íá iÝñåðå ðùò íá êáéÝóåðå ôiø ISP óáð, ÷ñçóéiiðiéþíóå åiðiøiÝò “AT commands” ié iðiøåð åßíáé óðâæåñéiÝíåð áéá ôi modem óáð, êáèþò ôi ðñüññaiìá êëÞoåúí ôiø PPP (dialer) ðáñÝ÷åé Ýíå ðiøý åðëü åññiøùòP ôâññåðééiy. ÁráññÝiøå óóï user-ppp handbook êáé FAQ ([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/books/faq/ppp.html](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/faq/ppp.html)) áéá ðâñéóðüöâñåð ðëçñiøiñßåò. Áí Ý÷åðå ðñiäëÞiáðá, iðiñåßôå íá êáâðåðéýíåð åcí êáðâññaoP (logging) óðcí iøüíç iå ôcí åiðiøP set log local ....

Áí ôðÜñ÷åé áéáéÝóéïc öððééêP óýiøåðc iå Üëéi ìc÷Üíçíá FreeBSD, iðiñåßôå åðßôçò íá åâæåðåðÞóåðå iÝóù ðáñÜëéçëiø êáéñùäßiø “laplink”. Ç óá÷ýðçóå iåðÜäiøçò åâññiÝñiù ðáñÜëéçëcò èýñåð åßíáé aññåðÜ ððçëüðåñç óðiÞeùò áðü üðé ôcò óâéñéåéPò (iÝ÷ñé 50 kbytes/sec), iå áðiøÝéåñíá añçäiñüöâñç åâæåðÜóðåóç.

### 2.13.6.1 ÆæåðåðÞóåðå iÝóù NFS

Ç åâæåðÜóðåóç iÝóù NFS åßíáé aññåðÜ áðëP. Áðëþò áíðéæñÜþôå óá añ÷åßá ôcò æéâñiPò ôiõ FreeBSD óá Ýíá aññðçñåðçòP NFS áéá åâßîøå ðñiø ãðöüü íáðåðÜ ôcí åðéëiäP iÝóù NFS.

Áí i åiððçñåðçòP áðöüü ððiøöçñßæåé iüñi ðñiøñéåéP èýñá (“privileged port”) (áðòP åßíáé c ôððééêP ñyéiéóç óá óðâæiÿò aññåðåð ôcò SUN), èá ÷ñâéåðåß íá èÝóåðå ôcí åðéëiäP NFS Secure óóï iññý Options ðñéí iðiñÝóåðå íá ðñi÷uñÞóåðå iå ôcí åâæåðÜóðåóç.

Áí c êÜñðå óáð Ethernet åßíáé ÷åçéP ðiøüöçòåò êáé ôðiø ðñiø ðiøý aññiÿò nððeñiÿò iåðåöiñÜò, ßóùò èâëÞóåðå íá åíññiðiéÞóåðå êáé ôcí åðéëiäP NFS Slow.

Æáé íá ëâéöiññäPóåé c åâæåðÜóðåóç NFS, i åiððçñåðçòPò èá ðñÝðåé íá ððiøöçñßæåé ðñiøáññóÞóåéò ððiøåðåëüñùí (subdir mounts), áéá ðáñÜäåéäiá, áí i êáðÜëëiø ôcò æéâñiPò óáð FreeBSD 9.0 aññóðåðåé óóï: ziggy:/usr/archive/stuff/FreeBSD, ôüðå i ziggy èá ðñÝðåé íá åðéöñÝðåé ôcí åðâðéåßåò ðñiøÜññóçò ôiõ /usr/archive/stuff/FreeBSD, êáé ü÷é iüñi ôiõ /usr P ôiõ /usr/archive/stuff.

Óóï añ÷åßi /etc(exports ôiõ FreeBSD, áðöü åëÝá÷åðåé áðü ôéò åðéëiäÝò -alldirs. ¶ëëié åiððçñåðçòÝò NFS iðiñåß íá aéíëiøéjíí aéáöiññåðééÝò óðiåÜóåéò. Áí eññåÜíåðå içýñåðå ôiø ôýðiø permission denied áðü ôiø åiððçñåðçòP, åßíáé ðéèáñí íá içí Ý÷åðå nñðèìßoåé óùóðÜ ôi ðáñáðÜíù.

# ÊåöÜëáéí 3 ÅäêáôÜóôáóç ôïõ FreeBSD 9.x êáé ìåôáãåíÝóôåñùí Åêäüóåùí

Áíðæéïññáíþèçêå êáé ôïþìáôá ôïõ íáíáññÜöçêáí áðii ôïí Jim Mock. Ç åþìá ðññò åþìá åäêáôÜóôáóç sysinstall, ié ðéêüíåò êáé êáé ååíéêþ áíðéäññðþ áðii Randy Pratt. Áíðåþèçêå åéá ôï bsdinstall áðii ôïí Gavin Atkinson êáé Warren Block.

## 3.1 Óýñiøç

Ôí FreeBSD Ýñ ðåôáé íå Ýíá íç-ññáðééü áéëÜ áýéíëí óôç ÷ñþóç ðññüññáííà åäêáôÜóôáóçð. Áðii ôï FreeBSD 9.0-RELEASE êáé ìåôÜ, ÷ñçóéíïðíéåßóáé ôï ðññüññáííà **bsdinstall** áíþ ié ðñïçäíýíåíåò åêäüóåéò ÷ñçóéíïðíéíýí ôï **sysinstall**. Ôí êåöÜëáéí áðôü ðâñéäñÜöåé ôç ÷ñþóç ôïõ **bsdinstall**. Ç ÷ñþóç ôïõ **sysinstall** ðâñéäñÜöåôáé ôóï ÊåöÜëáéí 2.

Áöiy äéáâÜóâôå áðôü ôï êåöÜëáéí, èá ãíùñßæåôå:

- Ðùò íá äçìéíõñþóåðå íÝóá åäêáôÜóôáóçð åéá ôï FreeBSD.
- Ðùò ôï FreeBSD ððíæéáññåß ôïõ ðéêüíåò ååíéêþ áíðéäññðþ áéá ðùò íá ðéêüíåò åäêáôÜóôáóç óå áðôïýò.
- Ðùò íá åêêéíþóåðå ôï **bsdinstall**.
- Óéò åññùôþóåéò ðïõ èá óåò êÜíåé ôï **bsdinstall**, ôé óçìáßñíõí êáé ðùò íá ôéò áðáíôþóåðå.

Ðñéí äéáâÜóâôå áðôü ôï êåöÜëáéí èá ðñÝðåé:

- Íá äéáâÜóâôå áðôïýò åéêáôÜóôáóçò áíáöÝñíðáé óôçí áñ ÷éôåêôííéêþ i386 (“PC ñðíåðåôþ”). ¼ðïõ ÷ññéÜæåôåé, åñíåðåé áíáöññÜ êáé óå Üëëåò áñ ÷éôåêôííéêÝò. Ðéèáíüí íá ððÜñ ÷iõí ïéêñÝò åéáðíñÝò óðí ðññüññáííà åäêáôÜóôáóçð óå ðéêüíåò åéá ðáññüí êåßìåííí êáé åéá ôï ðéêüíåò óå ððíøðçñßæåôåé.

**Óçìåßùóç:** Óå ååíéêÝò åññáííÝò, áðôïÝò ié íäçäßåò åäêáôÜóôáóçò áíáöÝñíðáé óôçí áñ ÷éôåêôííéêþ i386 (“PC ñðíåðåôþ”). ¼ðïõ ÷ññéÜæåôåé, åñíåðåé áíáöññÜ êáé óå Üëëåò áñ ÷éôåêôííéêÝò. Ðéèáíüí íá ððÜñ ÷iõí ïéêñÝò åéáðíñÝò óðí ðññüññáííà åäêáôÜóôáóçð óå ðéêüíåò åéá ðáññüí êåßìåííí êáé åéá ôï ðéêüíåò óå ððíøðçñßæåôåé.

## 3.2 Åðáéôþóåéò Õëéëíý

### 3.2.1 ÅëÜ ÷éôåðò Åðáéôþóåéò ÅäêáôÜóôáóçð

Íé åëÜ ÷éôåðò Åðáéôþóåéò åéá ôçí åäêáôÜóôáóç ôïõ FreeBSD ðïééßëíõí áíÜëíäá íå ôçí Ýéäíóç ôïõ ëåéôïññäéëíý êáé ôçí áñ ÷éôåêôííéêþ ôïõ ðéêüíåò åéá ÷ñçóéíïðíéåßóáé.

Óðéò áðüññåðò åíñüôçðåò èá óåò ðáññðóéÜóíðíå íéá óýññðç áðôþí ôñú ðéçññññéþí. ÁíÜëíäá íå ôçí íÝëíäí ðïõ èá ÷ñçóéíïðíéþóåðå åéá íá åäêáôáóðþóåðå ôï FreeBSD, ððíññåß íá ÷ññéáóðåßóå Ýíá ððíðóçñéæüíåññí íäçäü CDROM êáé — óå êÜðíéåò ðâñéðþóåéò — íéá êÜññå åéêôýíõ. Óá èÝíáðå áðôÜ êáéýðôïññéåé ôóï Òïþìá 3.3.5.

### 3.2.1.1 FreeBSD/i386

Ôi FreeBSD/i386 áðåéôåß 486 Þ êäeyôåñi åðåîåññåóôÞ êáé ôiõëÜ ÷ éóôii 64 MB RAM. Åéá ôçí åëÜ ÷ éóôç äõíåôÞ åäêåô Üóôáóç áðåéôåßôáé 1.1 GB åëâyéåñiõ ÷ þñiõ óóï óêëçñü äßóéi.

**Óciàßùóç:** Óå ðåñéðþòåéò ðåëéþí ìç ÷ áíçíÜôùí, ðéò ðåñéóóüðåñåò öiñÝò, ç áðüäiøç ðið óóôðþìåôiò åâëôéþíåôáé ðåñéóóüðåñi ìå áyíçóç ôçò iíþiçò RAM êáé ôiõ åëâyéåñiõ ÷ þñiõ óóï äßóéi, ðáñÜ ìå Ýá ðá ÷ ýôåñi åðåîåññåóôÞ.

### 3.2.1.2 FreeBSD/amd64

ÕðÜñ ÷ iõí áyí ëëÜóåèo åðåîåññåóôþí ééáíÝò íå åêôåëÝóiõi ôi FreeBSD/amd64. Ç ðñþöç åßíáé ié åðåîåññåóôÝò AMD64 ðiõ ðåñééåíàÜiõi ðiõ AMD Athlon64, AMD Athlon64-FX, AMD Opteron Þ êäeyôåñiõiò.

Ç åâyôåñç êëÜóç åðåîåññåóôþí ðiõ ðiññiýí íå åêôåëÝóiõi ôi FreeBSD/amd64 ðåñééåíàÜíåé üiõiõ ÷ ñçóéiðiéiýí ôçí åñ ÷ éóâôéiíéÞ Intel EM64T. Ðáñáâåßåíåðá ðùí åðåîåññåóôþí åðôþí ðåñééåíàÜíiõi ôeò iééiäÝíåéåò Intel Core 2 Duo, Quad, Extreme processor, ôç óâéñÜ åðåîåññåóôþí Intel Xeon 3000, 5000 êáé 7000 êáèþò êáé ôiõ ðåñééåññåóôÝò Intel Core i3, i5 êáé i7.

Áí ði ìç ÷ Üíçíá óå åßíáé åáóéóíÝí óå nVidia nForce3 Pro-150, èá ðñÝðåé íå ÷ ñçóéiðiéÞóåðå ôçí êåðÜëëçëç åðééíæÞ ôóï BIOS áéá íå åðåîåññåðiéÞóåðå ôi IO APIC. Áí ç åðééíæÞ åðôþ ãáí ðñÜñ ÷ åé, èá ðñÝðåé íå åðåîåññåðiéÞóåðå áíðôþ åðôþí ðiõ ACPI. ÕðÜñ ÷ iõí ðñiñåëÞìåðå óóï Pro-150 áéá óå iðiñá ïÝ ÷ ñé óóéåíÞò ãáí Ý ÷ åé åñâéåß ëyóç ðiõ íå óå ðáñáéÜiðôåé.

### 3.2.1.3 FreeBSD/powerpc Apple® Macintosh®

Õðiøçñßæíøåé üiøé ié iÝíé ðiøíøíéóôÝò Apple® Macintosh® ðiõ äéâéÝóiõi áíóùìåðùíÝíåò USB. Õðiøçñßæåðåé åðþóçò ç ëáéóíøñåßá SMP óå ìç ÷ áíþiáðå ìå ðiøééåðéiýò åðåîåññåóôÝò.

Íjå 32-bit ðoñþíåò ðiññåß íå ÷ ñçóéiðiéÞóåé iüñí óå ðñþóá 2 GB RAM. Ôi FireWire® ãáí ðiøçñßæåðåé óóå Íðéå êáé ËåðéÜ PowerMac G3.

### 3.2.1.4 FreeBSD/sparc64

Íðiññåßå íå åâßóå óå óðóôÞíåðå ðiõ ðiøçñßæíøåé áðü ôi FreeBSD/sparc64 óóï FreeBSD/sparc64 (<http://www.freebsd.org/platforms/sparc.html>) Project.

Èá ÷ ñâéåóðåßóå Ýíá äßóéi ãéá áðiøééåðééÞ ÷ ñþóç áðü ôi FreeBSD/sparc64. Ôç åâäñíÝíç óóéåíÞ, åâí åßíáé åðíåðüí ôi FreeBSD íå iíñÜæåðåé ôiñßæéí ßæéí äßóéi ìå Ýíá Üëëi ëåéóíññééü óýóðçíá.

## 3.2.2 Õðiøçñéæüíåñi Õëéêü

Óðéó Óciàéþóåéò Õëéêý (Hardware Notes) ðiññåßå íå åñâåßóå ðëçñiøññåðå åéá ôeò åñ ÷ éóâåðiíééÝò êáé óéó ñðóéâåðå Ýò ðiõ ðiøçñßæíøåé áðü iéá åðþóçíç Ýéäiõç ôiõ FreeBSD. Ôi áñ ÷ åßí áðüü iññÜæåðåé óðíÞèùò HARDWARE . TXT, êáé åñþóêåðåé óóï êåíóññééü êáôÜëëi ðiõ iÝóiõ åâéåðÜóôåóçò. Íðiññåßå åðþóçò íå åñâåßóå áíðþåññåóå áðôþí ôiõ êáðåëüñiõ óôç óâëßáá ðëçñiøññéí ëäiõçò (<http://www.FreeBSD.org/releases/index.html>) óóï åééððåéü ôüði ðiõ FreeBSD.

### 3.3 Åñääáóßåò ðñéí ôçí ÅãêáôÜóôáóç

### 3.3.1 ÈñáôÞóôå Áíôßãñáöá Áóöáëåßáò ôùí ÄåäiiÝíùí óáò

ÊnáôPôôâ áíôBâñâoáó ááooâéâßâo üeñí ôùí òçíáíôéêþí ââäñí Ýfuí ôïõ ôðíëíæéôP ôóïí iðiþí èá êÜíâôâ ââæâôÜôðâoç ôïõ FreeBSD. ÅéÝâîôâ ôç ôùôôP èâéöiõñâßâ ôùí áíôéâñÜòùí áóôáæâßâo ðñéí ôðíâðßôâ. Ôi ðñüñâñâïâ ââæâôÜôðâoçô ôïõ FreeBSD èá æçôPôâé âðéââââßûñôç ðñéí êÜíâé iðiëâäPðiðâ áééâäP ôóï íßðôëí ôâð, áéëÜ áðü ôç ôðéâïP ðiõ áðôP ç áéâæâéâåôßâ iâééPôâé, áâí ððÜñ ÷ áé áðiáôüôçôâ âðéóôñiøPô.

### 3.3.2 Áðiöáóßóôå ðiõ èá ÅæéáôáóôÞóåôå ôi FreeBSD

Áí ôi FreeBSD ðñúüéåóáé íá áßíáé ôi iíráééü eäéöiñðñééü óýóöçíá ôiô ððíëräéöôP êáé ôeïðåýåôá íá äéáéÝóåôá óá áôðü iëüêçñí ôi ÷þñí ôiô óéëçñíý óáð áßöéïô, lðiññåßôá íá ðáñáéåßøåôá ôi ððüëééði áôðPô ôçò áíüöçôáð. Áí ñúôðüöi èÝéåôá íá óôðñðÜñ ÷åé ôi FreeBSD iå Üëéá eäéöiñðñééÜ óôðôPíåôá, áßíáé ÷ñþöéñí íá éåðåññåßôá ãåíééÜ ôiô ðñüüði æÜôáicô ôùí áåäñíÝíü óôi áßöéï.

**3.3.2.1 ÉáðáôîÞóâéò Äßóêúí ãéá ôéò Áñ-éðâéöíééÝò FreeBSD/i386 éáé FreeBSD/amd64**

Íe óséecníb aibhreáit i díomhá í fáid ñuñéodóigí òá aæséenéod Ù òiPiádá. Óá òiPiádá aðod Ù iññí Ùæxiñdáé éadðadóí ðiðádó (partitions).

ÖðÜñ-: iðí áyí öññüðié ãéá íá ÷ uññéóðåbß Ýíáð äßöéiò óá êáðåðiÞóáéð. Í ðáññáäiøéåëü ðññüðiò ÷ ñçöéiðiéåbß öi *Master Boot Record* (Âáóééþ Åããñáðþ Åééþíçóçò) þ MBR, Ýíá ðßíáêé êáðåðiÞóáùv íéáíiú íá aðièçéåýøæ ùò ðÝóóðñéò ðññüðåýiðoðå êáðåðiÞóáéð (*primary partitions*). (Ãéá éóóíññéiýò ëüáíiðò, öi FreeBSD iññ Üæáé òéð ðññüðåýiðoðå êáðåðiÞóáéð *slices* þ öÝóåð.) Öi üññéi ðùi ðåðóÜññiú êáðåðiÞóáùv åßíáé ðíeyð ðåññéiññéóðéü ãéá iàññÜëiðò aßöéiðò, Ýóóé iéá áðü áðò ÿðò ðéð êáðåðiÞóáéð lðiññåbß íá iàññóñáðåbß óá aðeðåðåáiÝíç êáðÜðiçóç (*extended partition*). IÝóá óðóçí åðeðåðåáiÝíç êáðÜðiçóç lðiññiýí íá aðièññäçèiýí ðíeyðé Ýð eïññéÝð êáðåðiÞóáéð (*logical partitions*). Áðóü aðièññäðåé êÜðùo ðánñÜiàñi, ãéá iÜëeññ åßíáé.

Í Ðþíáêáð ÆáôáðiÞóáùí GUID (GUID Partition Table) Þ GPT, áðiðóâðæß iéá íÝá eáé áðeïýóðâñç íÝeïäo eáð Üðiçóçò áñðò ãðbóéið. Ói GPT áðíáé ðiðý ðeï áïëéêü áðü òií Ðáñâaióéâü Ðþíáéá eáðóáðiÞóáùí MBR. Íe óðíÞeåéð oðiðiðiÞóâðeò òið GPT áðéðñ Ýðiðiù ùð eáé 128 ÆáôáðiÞóáðò áíÜ ãðbóéi, áñâæðbóiiðâð Ýðóé ôçí áí Úâæç aðá Úâæð eýðóâðeò üððù ñe eïæéêÝð eáðóáðiÞóâðeò.

Í ôðóééüö öññôùòÞo áêéßíçóçò (boot loader) ôiõ FreeBSD ÷ ñâéÜæåôáé áßôå íéá ðñùôáýïõóá áßôå íéá GPT êáôÜôíçóç. (Áåßôå ôi ÊâöÜéáéi 13 áéá ðåñéóóüôåñâò ðëçñïöñßâò ó÷åôéÜ iá ôç áéáäééåóßá áêéßíçóçò ôiõ FreeBSD.) Áí üéåò ié ðñùôáýïõóåò Þ GPT êåôåòiÞóáéò áßíáé Þäç óå ÷ ñÞóç, eá ðñ Ýðåé íá áéåòèåñþóåôå íßá áéá ÷ ñÞóç iá ôiõ FreeBSD.

Ç åeÜ ÷ eóóç ååéåô Üóôåóç ôiö FreeBSD éåôåéåîå Üíåé iüñï ðåñßötiö 1 GB ÷ þñii óöi åßöéï. Dñüêåéôåé üùñù åéä öçí áðüüëöðå åeÜ ÷ eóóç ååéåô Üóôåóç ç iðiñá åái áöÞíåé ó ÷ åüüí êåèüëiö åéåýéåñii ÷ þñii. ìéå ðéi ñååééöôéêþ åeÜ ÷ eóóç ååéåô Üóôåóç êåôåéåîå Üíåé ðåñßötiö 3 GB ÷ ïñßö åñáöéüü ðåñéå Üëëiï êåé ðåñßötiö 5 GB iå ÷ ïÞöç éÜðiëiö åñáöéüü ðåñéå Üëëiïö. C ååéåô Üóôåóç eïæöîéüy ôñßöbù êåôåéåôðþ áðåéôåß åéüìå ðåñéööùôåñii ÷ þñii óöi åßöéï.

ÕõðÜñ÷åé õëçëþñá åëåýëåñúí éäé åìõññéêþí åññääåßùí åíáäéåñíþò ÷þññõ êåðåôíþòåúí ([http://en.wikipedia.org/wiki/List\\_of\\_disk\\_partitioning\\_software](http://en.wikipedia.org/wiki/List_of_disk_partitioning_software)). Õï GParted Live (<http://gparted.sourceforge.net/livecd.php>) åßíáé Ýíá äùññåÜí Live CD õï iõíßí ðåññéëåíåÜíåé ôíí åðåíåññåóóþ õäðåôíþòåúí GParted. Õï GParted ðåññéëåíåÜíåðåé åðßóçò õå ðïreë Ýò Üëëåð Live äéåñíÝò Linux.

**Ð**Ð*ñiaéáéiðiðíßcóç:* íé áðáñiðiðYò ðið áæá-÷ áðeñíßæíiðiðáé éáðáðiðiÞóáéò óéëeçñpí áßðóéùí iðiñiýí íá éáðáðoóñYòiðið óá áðaäiñiYíá óáò. ÐUññða ðeðþñç áíðiðññáðá áðóðaééðáðò éáé áðeñáðááéþóða óçí iñeþ eðáéðiðññáða óiðið ðñéí iðáééiÞóáða óçí óñiðiðiðíßcóç óùí éáðáðiðiÞóáùí ðið áßðóéið óáò.

**ĐáñÜääéäìá 3-1.** ×ñcóéiiðiéþíôáò iéá ÕðÜñ÷iõóá ÉáôÜòíçóç

Íáò õðíeiäéóò Þò Windows äéáé Ýôåé Ýíá iíráééü äþóéï 40 GB i iðiÞò Ý ÷ áé ÷ ùñéóåß óá äý êáôåðìÞóåéò ôúí 20 GB. Óá Windows iññÜæiióáé C: êáé D: . Ç êáôÜôìçóç C: ðåñéÝ ÷ áé 10 GB äåññÝüí, áþí ç êáôÜôìçóç D: 5 GB. Ç iåôåðßíçóç ôúí äåññÝüí áðü ðíí D: óóí C: äéåðeåñþíáé òç äåýôåñç êáôÜôìçóç þóðå íá iðinåß íá ÷ ñçóéiiðiéçèåß áðü óí FreeBSD.

ĐáñÜääéäìá 3-2. Óõññééíþüïôáò ìéá ÕðÜñ ÷ iõóá ÉáôÜòíçóç

јаð օðriðið á 40 GB Windows Ү ÷ áé Ýíá ìíráéêü ôéêçñü äþðöî 40 GB êáé íéá íåð Üðiçóç ðið ôií êáôðáéðiâ Üíáé áî iesiðið Þñið. Ôá Windows äðð ÷ ñiði áðð ðíçí êáô Üðiçóç ôúí 40 GB ùò Ýíá ìíráéêü iäçäü c:. Ôç äðð Ýíç ôéêðið ÷ ñcðøéiðiðiýðiáé 15 GB ÷ þñið. Ôéiðið ãððíáé íá êáôðáéðiðiâ íå íéá êáô Üðiçóç ôúí 20 GB æá òá Windows êáé Üëëá 20 GB æá ôi FreeBSD.

ÓðÜñ ÷ iõí äýï ôñüðïé ãéá íá ãßíåé áõôü.

1. ÊñáôÞóôå áíôßâñäöï ôuì åääïí Ýíuì ðiö Ý÷ådå äçíëiñäÞóåé óôå Windows. ðåéôå åðáíååéåóôþóôå ôå Windows äçíëiñäþíôå iéá êáôÜôìçóç iåñäÝëiöö 20 GB êáôÜ ôçí äéåæéåóßå ååéåôÜóôåçò.
  2. ×ñçöéïðiëÞóôå êÜðiëí åññååëåßü åéëååßpò iåñäÝëiöö êáôåôåþóåñü ðüñò ñi **GParted** åéá íá óôññééíþóåôå ôçí êáôÜôìçóç ôuì Windows êáé íá äçíëiñäÞóåôå iéá íÝá êáôÜôìçóç åéá ñi FreeBSD óôii åéåýéåññï ÷þñi.

Ҫ ѧѧéáóðÜóôáóç ѧéáóññâðééþí ѧééðññâðééþí օðñðóçÜðù í óå Üëéåð էâðåðìÞóâéò, աðéøñÝðåé ôçí ѧðóÝëåóç ѧúò áðü áðóðÜ óå լéá ѧåññÍýíç ÷ ñiiééþ óóðéñþ. լéá աíáëéâðóééþ iÝëiñò ðiõ աðéøñÝðåé ôçí օâðñü÷ñiç ѧðóÝëåóç ðiëëþí ѧééñññâðééþí ðãñéñÜóâðáé óóï ԷåðÜëáé 23.

### 3.3.3 ÓõëëÝîôå Đëcñïöïñßåò ãéá ôï Äßêôõï

Óð÷iÜ, áðíåðáé ÷ nPóç ôiö DHCP þóðå íé ñðøëþbóåéò ôiö áéêðýiö íá áðíiðóáé áððüìláðá. Áí áðí áéáè Ýðåðá DHCP, èá ðñ Ýðåé íá áñåðþóá ôéò ðáñáéÜðò ðeçñiöiñþðò áðü ôiö ðeðéü óàð áéá÷åñéóðP áééðýiö P ôií ðáñi÷Ýá óùí ððçñåóéþí óáð:

# Đëçñïöïñßåò Äéêôýïö

1. Äéâýéðíóç IP
  2. ÌÜóêá Õðíæéôýïö
  3. Äéâýéðíóç IP ðñíäðéëååí Ýíï ãñíñíëíäçôþ
  4. ¼ñíá ôñí Ýá äéá õí õíðéëü áßéôðï
  5. Äéâðéýíóåéò IP ôùí äéâéñéóðþí DNS

### 3.3.4 ÅëÝäîôå ãéá ÐáñïñÜìáôå (Errata) óoï FreeBSD

Áí ãéá ôí FreeBSD Project ðáó ÷ ßæáé ãéá íá áîáooáéßóåé üöé ñÜéå íÝá Ýéäïóç ôíô FreeBSD èá áßíáé üöí ðéí ôdáéëñP áßíåôáé, iñéóí Ýíåò öiñ Ýð ôôç áéáäéêáóßá áôôP áéó Ýñ ÷ iiôáé ñÜèç. Óå ðíréý óðÜíéåò ðåñéðôþóåéô, ôá ñÜèç áôôÜ áðçñå Üæïòí ôç áéáäéêáóßá áâéåôáÜ ôôáóçò. Éâéþò ôá ðñïäéÞiaôá áôôÜ áßñïîôáé áîôéëçðôÜ éáé áðéäéiñéþñüôáé, óçìåéþñüôáé ôôá ÐáñiñÜíåôá ôíô FreeBSD (<http://www.FreeBSD.org/releases/9.0R/errata.html>) ôôç áééôôáéÞ öiðièåóßá ôíô FreeBSD. ÅéÝáïôá ôá ðáñiñÜíåôá ðñéí iâééÍþóåôá ôçí áâéåôÜ ôôáóç, ãéá íá áââáéùèåßôå üöé áâí ôðÜñ ÷ iñí ðñïäéÞiaôá ðiñ iðinñý íá áðçñå Üôïòí ôç áéáäéêáóßá.

Íðiñáßôå íá âñáßôå ðëçñiiñßôå êáé ðáññáÜìáôá æáá üëåò ôéò åðäüóåéò óôç óåëßääá ðëçñiiñéþí Ýêäíóçò (<http://www.FreeBSD.org/releases/index.html>) óôçí æéôôåéÞ ôiðièåóßá ôið FreeBSD (<http://www.FreeBSD.org/index.html>).

### 3.3.5 ĐñïåôïéìÜóôå ôá ìÝóá ÅãêáôÜóôáóçò

Ç åæåáóÜóôáóç ôíö FreeBSD îåééíÜåé ia ôçí åêëßíçóç ôíö öðíëëæéôòþ la ôç ÷ñþóç åüò FreeBSD CD, DVD þ iíþíçò USB. Ôí ðñüäññíà åæåáóÜóôáóçò åäí iðñmåß íå åéòåéäóôåß iÝóá åðü êÜðíéí Üëëí eäéòiññäéü óýóóçìá.

Åêôöù ãðü òá ôðôñðíëçí Ýíá ïÝóá åâéåó Üôôáóçò ðïõ ðâñéÝ ÷ iõí üëä òá áðâñáßôçôá ãñ ÷ åßá åâéâð Üôôáóçò ðïõ FreeBSD, æáôßèåôáé åðßóçò êáé ç åêäï ÷ P bootonly. Áðõü òí iÝóí åâéåó Üôôáóçò åáí ðâñéÝ ÷ åé òá áðâñáßôçôá ãñ ÷ åßá, áéëÜ òá éâðåâÜæåé åðü òí åßéðöï êáðÜ ðç äëÜñéåé åðü òí åâéâð Üôôáóçò. ÉâðÜ õõíÝðåé, òí óðâæåññéïÝí CD åßíé åñéâð Ü íeññüðåñí òá iÝåâëëí åíþ êáé òí áðâæöïýíåñí åýñïø æþíçò ðïõ åéëôýï ðâñéïñßæåôáé êáèþò êáðåâáßíïõ lüñí òá ãñ ÷ åßá ðïõ áðâæöïýíôáé.

Ìðiñåþôá íá âñåþôá Ýôïéíá iÝóá åâéåóÜóôáóçò æá ôí FreeBSD óôçí åéêôðåéþ ôíðiøåóþá ôíð FreeBSD.  
(<http://www.FreeBSD.org/where.html#download>).

**Óðüáæéíç:** Áí áéáéÝðáðá Þáç Ýía CDROM, DVD þ USB íäçáü áäéáðÜóðáóçò FreeBSD, lðiñáðóá íá ðáñáéðáðóðáðá áðóþ ðóçí áíüðóçðá.

Ó CD êáé DVD áñ÷åßá ISO ôíø FreeBSD åßíáé åêééíÞóciá. ×ñáéÜæåóôå iùíí Ýíá áðü áôôÜ æáé ôçí ååéåóÜóôáóç. ÅñÜøôå ôíí áñ÷åßí ISO óá Ýíá CD P DVD ÷ñçóéíïíéþíôå óá áíðßööíé÷á ðñiäñÜìíåóå ååññáöþò ðíø äéåéÝôåé ôíí ôñÝ÷íí èåéöiññåéú óáó öýööciá.

Ãéá íá äciéïõñãÞóåôå ïéá åêééíÞóéic ïiÞic Flash (USB), áeiëiõèÞóåôå ôá ðáñáêÜôù âÞìáôá:

## 1. ÁíáêôÞóôå ôi Áñ÷åßí ISO åéá ôç ÌíPìç Flash

Ìðiñâßôå íá êáôåååÜóåôå ôi áñ÷åßí áðü ôiõ êáô Üëíäi ISO-IMAGES / óôçí ôiðiæåóßá  
 ftp://ftp.FreeBSD.org/pub/FreeBSD/releases/arch/arch/ISO-IMAGES/version/FreeBSD-version-RELEASE  
 ÅfóêéååóóÞóôå ôi arch êáé ôi version lå ôçí áñ÷éôåéóíéêP éáé ôçí Yéäiöç ôiõ èYéåôå íá åäêååóóÞóôå.  
 Åéá ðáñÜäåéåíá, ôi áñ÷åßí åéá ôi FreeBSD/i386 9.0-RELEASE âñßóêåôåé ôôç èYóç  
 ftp://ftp.FreeBSD.org/pub/FreeBSD/releases/i386/ISO-IMAGES/9.0/FreeBSD-9.0-RELEASE-i386-memstick.img.

Ôi áñ÷åßí åéá ôç ÌíPìç Flash Y÷åé åðÝêôåóç .img. I êáô Üëíäi ISO-IMAGES / ðåñéY÷åé ðéÞèiò áðü  
 åéåöiñâôéêÜ áñ÷åßá. Èá ðñÝðåé íá êáôåååÜóåôå ôi êáô Üëeçei áíÜëiaá lå ôçí Yéäiöç ôiõ FreeBSD êáé ôi ðéééü  
 ôiõ ððíëiæóôP ôiõ ðñüêåôåé íá ÷ñçóéiðiéçéåß.

**Óçìáíóééü:** Ðñéí ðñi÷ùñÞóåôå, áíðéåñÜøôå ôo÷üí ååäiïYíá ôiõ Y÷åôå Päç óôç ÌíPìç USB, êáèþò ç  
 ðáñâéÜôù åéåæéåóßá èá óá åéååñÜøåé.

## 2. ÅñÜøôå ôi Áñ÷åßíô ISO Åñ÷åßíô lå ×ñPóç ôiõ FreeBSD

**ÐñiæåéäiðiÞçóç:** Ôi ðáñâéÜôù ðáñÜäåéåíá ååß÷íåé ôç óôóéåôP /dev/da0 ùò ôiõ ðñiñéóíü ååññåóÞò ôiõ  
 áñ÷åßíô. Èá ðñÝðåé íá åßóôå ðíéy ðñiøåéééiB êáé íá ååâåéùéåßôå åéá ôi üíííá ôçò óôóéåôP ôiõ  
 ÷ñçóéiðiéåßòå, åéåöiñâôéêÜ åíäY÷åôåé íá åéååñÜøåôå ååäiïYíá ôiõ ÷ñâéÜæåóôå.

### 1. ÅåññåóP ôiõ Áñ÷åßíô lå ôçí dd(1)

Ôi áñ÷åßí .img ååí åßíåé Yíá óôíçééóíYíí áñ÷åßí. Åßíåé Yíá áñ÷åßí åéêüíáð (image) lå üëi ôi  
 ðåñéå÷üíåíí ðiõ ÷ñâéÜæåôåé ç ÌíPìç USB. Ååí iðiñåßôå íá ôi áíðéåñÜøåôå ùò Yíá éáiiééü áñ÷åßí, èá  
 ÷ñâéåôåß íá ôi áñÜøåôå áðåôðéåßòå ôôç óôóéåôP ðñiñéóíü ÷ñçóéiðiéþíôå ôçí åíðiëP dd(1):

```
# dd if=FreeBSD-9.0-RELEASE-i386-memstick.img of=/dev/da0 bs=64k
```

## ÅåññåóP ôiõ Áñ÷åßíô ÌYóù Windows

**ÐñiæåéäiðiÞçóç:** Ååâåéùéåßôå üöé ÷ñçóéiðiéåßôå ôi óùóôü üíííá iäçäiý åéá ôçí ÌíPìç USB, åéåöiñâôéêÜ  
 lðiñâß íá ðñiêçèåß áðþëåéå ååäiïYíúí.

### 1. ÁíÜêôçóç ôiõ ÐñiñåñÜìåôiò Image Writer åéá Windows

Ôi **Image Writer** åéá **Windows** åßíåé iéá äùñåÜí åöåññiäP ôiõ iðiñâß íá ãñÜøåé óùóôÜ Yíá áñ÷åßí image  
 óå iéá ÌíPìç USB. Iðiñâßôå íá ôi éåôåååÜóåôå áðü ôçí ôiðiæåóßá <https://launchpad.net/win32-image-writer/>  
 åéé íá ôi áðiööldéYóåôå óå Yíá öÜêåëi.

### 2. ÅåññåóP ôiõ Áñ÷åßíô lå ôi Image Writer

ÊÜíôå åéðëü êëéé ôôi åéêiðbæéi **Win32DiskImager** åéá íá iâééíÞóåôå ôi ðñüñåñâíá. Ååâåéùéåßôå üöé ôi  
 åñÜìå ðiõ iäçäiý ðiõ öáßíåðåé ôôçí åðéëiäP Device áíðéóðié÷åß ôôç ÌíPìç USB. ÊÜíôå êëéé ôôi åéêiðbæéi  
 lå ôi öÜêåëi åéé åðéëé Yíôå ôi áñ÷åßí åéêüíáð ôiõ èá ãñáöåß ôôç ÌíPìç USB. ÊÜíôå êëéé ôôi [ Save ] åéá íá

åðiäå ÷ èåßôå ôi üññá ôiõ áñ ÷ åßïõ åçéüíáð. Ååâáéùèåßôå üôé ié ðáñáðÜíù åíYñååéåò åßíáé óùóôÝò êáé üôé åái ððÜñ ÷ iðí áñééôÜ ðáñÜëõñá óõi óyóôçìá óáò ðiõ íá åðåééííßæiõí öáéYëiõò ôçò iíPìçò USB. ÔYëiò, êÜíóå êééé óõi [ Write ] åéá íá åñÜøåôå ôi áñ ÷ åßï åçéüíáð óõç iíPìç USB.

**Óciàßùóç:** Åáí ððiôçñßæååé ðëYíí ç åäêáôÜóôáóç áðü åéóêYôåò

Åßóôå ðëYíí Yôiéiíé íá iâééíPóåôå ôçí åäêáôÜóôáóç ôiõ FreeBSD.

## 3.4 ïåêéíþíôåò ôçí ÅäêáôÜóôáóç

**Óciàíôééü:** Åðü ðñiåðééíäP, ç åäêáôÜóôáóç äái èá êÜíåé áéëáäYò óõi óyóôçìá óáò iÝ ÷ ñé íá ååßôå ôi ðáñáêÜôù iþiõlá:

Your changes will now be written to disk. If you have chosen to overwrite existing data, it will be PERMANENTLY ERASED. Are you sure you want to commit your changes?

Ìðiñåßôå íá åäêáôåéåßøåôå ôçí åäêáôÜóôáóç iðiæäPðiõå óðéäiP ðñéí áðü ôçí ðáñáðÜíù ðñiåéäiðißçóç, ÷ùñßò íá Y ÷ iðí åßíáé áéëáäYò óðá ðáñéå ÷ üiåíá ðiõ åßóéiõ óáò. Áí áíçóð ÷ åßôå üôé åíåå ÷ iÝíù ÷ åôå êÜíåé êÜôé ëÜëiò, iðiñåßôå áðëÜ íá óåPóåôå ðiõ ððiëiæéóðP óáò ðñéí áðü áðôü ôi óciàßí éáé åái èá åßíáé êáíéÜ æçìéÜ.

### 3.4.1 Åêéßíçóç

#### 3.4.1.1 Åêéßíçóç óôéò Áñ ÷ éôåéôííééYò i386 êáé amd64

- Áí ðñiåôîéíÜóåôå iéá “åêééíPóéíç” iíPìç USB üðùò ðåñéãñÜöåôåé óõi ÔiPìá 3.3.5, ôiðièåôPóôå ôç iíPìç óôçí ððiæí ÷ P ðiõ ððiëiæéóðP óáò ðñéí ðiõ åíåñäiðiéPóåôå.
- Áí ðñüéåéôåé íá åêééíPóåôå áðü ôi CDROM, èá ÷ñâéåôåß íá åíåñäiðiéPóåôå ðiõ ððiëiæéóðP óáò êáé íá åéóÜååôå ôi CDROM óõçí ðñþòç åðíåôP åôéåéñßá.
- Nðèíßôå ôi ìç ÷ Üíçìá óáò íá iâééíÜåé åßôå áðü ôi CDROM åßôå áðü ôçí USB, áíÜëiäá íå ôi iÝóí åäêéåôÜóôåçò ðiõ ðñüéåéôåé íá ÷ñçóéíiðiéPóåôå. ÅáíéêÜ, áðôü åðéôôñ ÷ Üíåôåé áéëÜæííðå ðç ó ÷ åôééêP ñýéíçóç óõi BIOS. Óá ðåñéóóüðåñá óðóðPíåôå åðéôñY ðiõí åðßóçò ôçí åðééêP iéáò óðóðåôP åêéßíçóçò êåþò iâééííýí, ôððééÜ íå ôá ðëPéôñá **F10**, **F11**, **F12**, P **Escape**.
- Áí i ððiëiæéóðP óáò iâééíPóåé üðùò óðiPèùò êáé ðiñþòç åðéôôñáé ðiõ Päç ððÜñ ÷ ií eâéôiññâééü óyóôçìá, iðiñåß íá óðiñåßíåé êÜôé áðü ôá ðáñáêÜôù:
- Äái ôiðièåôPóåôå ôi CD P DVD áñéåôÜ íñßò êáôÜ ôçí åêéßíçóç. ÅöPóôå ôi iÝóí óõií iäçäü êáé aíééíÜóåôå íá åðáíåâééíPóåôå ôi ððiëiæéóðP óáò.

2. Íé áëëååÝò ñõèìßóåùí ðiõ êÜíåôå óôï BIOS äáí ëåéöïýñäçóáí óùóôÜ. Èá ðñÝðåé íá íáíáäééíÜóåôå íÝ÷ñé íá ðåôý÷åôå ôéò òùóôÝò ñõèìßóåéò.
3. Ôï BIOS ôçò ìçôñéêPò óåò äáí ôðïóôçñßæåé åêéßíçóç áðü ðiõ Ý÷åôå åðééÝîåé. Ìðinåßôå íá ÷ñçóéïïðiéPòåôå ôií Plop Boot Manager (<http://www.plop.at/en/bootmanager.html>) ãéá íá åêééPòåôå ðåééÜ ìç÷áíPiåôå áðü CD P USB.
4. Èá áñ÷ßóåé ç åêéßíçóç ôiõ FreeBSD. Áí íåééíÜôå áðü CDROM, èá äåßôå ìéá ïëüíç óáí ôçí ðáñáéÜôù (Ý÷iõìå ðáñáéåßøåé ôéò ðëçñïöïñßåò Ýéäïóçò):

```
Booting from CD-ROM...
645MB medium detected
CD Loader 1.2
```

```
Building the boot loader arguments
Looking up /BOOT/LOADER... Found
Relocating the loader and the BTX
Starting the BTX loader
```

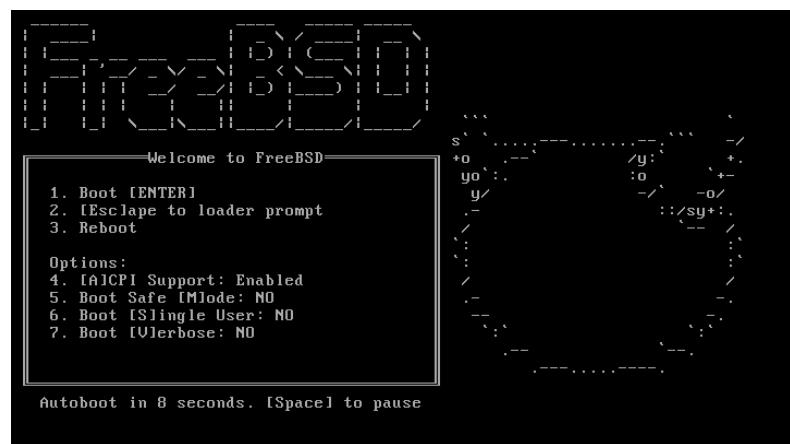
```
BTX loader 1.00 BTX version is 1.02
Consoles: internal video/keyboard
BIOS CD is cd0
BIOS drive C: is disk0
BIOS drive D: is disk1
BIOS 636kB/261056kB available memory
```

```
FreeBSD/i386 bootstrap loader, Revision 1.1
```

```
Loading /boot/defaults/loader.conf
/boot/kernel/kernel text=0x64daa0 data=0xa4e80+0xa9e40 symbs=[0x4+0x6cac0+0x4+0x88e9d]
\
```

5. Åìöáíßæåôåé ç ïëüíç ôiõ öiñôùòP åêéßíçóçò ôiõ FreeBSD:

### Ó÷Piá 3-1. ÍâñôùòP Åêéßíçóçò ôiõ FreeBSD



ÐåñéiÝíåôå äÝéá äåôôåñüéåôå, P ðéÝóôå Enter.

### 3.4.1.2 Åêëßíçóç óðíí Macintosh PowerPC®

Óå ðåñéóóüôåñá ìç ÷ áÍpiáôá, iðiñåßôå íá êñåôÞóåôå ðéåóíÝí òi ðëÞêôñí C éáôÜ ôçí åêëßíçóç éáé èá ìåééíÞóåôå áðü òi CD. Óå äéåöiñåðééþ ðåñßðôùñç, êñåôÞóåôå ðéåóíÝí òi ðëÞêôñí Command+Option+O+F, þ Windows+Alt+O+F áí ÷ñçöéiñðíéåßôå ðëçéöñiñüäéi ðiø áåí åßíáé Apple. Óðçí ðñiññiðþ 0 > ãñÜþôå:

```
boot cd:, \ppc\loader cd:0
```

Óå ìç ÷ áÍpiáôá Xserve ÷ùñßò ðëçéôñiñüäéi, ååßôå ôçí óåéßää ðå ÷íéþò ððiñôÞñéíçò ôçò Apple (<http://support.apple.com/kb/TA26930>) ãéá ðëçñiñßåò åêëßíçóçò óðíí Open Firmware.

### 3.4.1.3 Åêëßíçóç óðíí SPARC64

Óå ðåñéóóüôåñá óðóôÞiáôá SPARC64 åßíáé ñðèìéíÝí íá åêëëñíýí áðôüìåôå áðü òi óêëçñü åßóéí. Åéá íá ååéåôåóóÞóåôå òi FreeBSD, èá ðñÝðåé íá åêëéíÞóåôå áðü òi åßéôðí P åðü Ýíá CDROM. Èá ÷ñåéåôåß íá åéðÝééåôå óðéò ñðèìßóåéò ôçò PROM (OpenFirmware).

Åéá íá åßíåéé åðóü, åðáíåéééíÞóåôå òi óýóðçíá éáé ðåñéíÝíåôå ìÝ ÷ñé íá åìöáíéóôåß òi ïPíñiá åêëßíçóçò. Õi åêñéáÝò ïPíñiá åíáññòÜðåé áðü òi iiñðÝéí, aëeÜ ååíééÜ èá ååß ÷íáé üðùò òi ðáñáéÜðù:

```
Sun Blade 100 (UltraSPARC-IIe), Keyboard Present
Copyright 1998-2001 Sun Microsystems, Inc. All rights reserved.
OpenBoot 4.2, 128 MB memory installed, Serial #51090132.
Ethernet address 0:3:ba:b:92:d4, Host ID: 830b92d4.
```

Áí ìåðÜ áðü áðóü òi óçìåßí òi óýóðçíá óå ðóðå ÷ßæåé íå åêëßíçóç áðü òi óêëçñü åßóéí, èá ðñÝðåé íá ðéÝóåôå L1+A þ Stop+A óðí ðëçéöñiñüäéi, P íá óðåßëåôå ðíÞiá BREAK ìÝóù ôçò óåéñéåéþò ëiñóüéáò (÷ñçöéiñðíéþíóå ð.÷. òi ~# óðí tip(1) þ cu(1)) ãéá íá åååßôå óðçí ðñiññiðþ ôçò PROM ç iðiñá ïiñðÜæåé íå ôçí ðáñáéÜðù:

ok	<b>1</b>
ok {0}	<b>2</b>

- 1** Áðóþ ç ðñiññiðþ öåßíåôåé óå óðóôÞiáôá íå ìüñí ìßá CPU.
- 2** Áðóþ ç ðñiññiðþ öåßíåôåé óå óðóôÞiáôá SMP. Õi þçößí ååß ÷íáé òií áñééíü ôçò áíåññþò CPU.

Óðí óçìåßí áðóü, òiðiñéåôÞóôå òi CDROM óðíiñ iäçñü éáé óðçí ðñiññiðþ ôçò PROM ãñÜþôå boot cdrom.

## 3.4.2 Åðéóéüðçóç ôùí ÁðiñôåëåóíÜðùí Áíß ÷íåðóçò Óðóéåðþí

Íé óåéåðôåßåò ååéåññòÜååò ãññáíÝò ðiø ðÝññáóáí áðü ôçí iðüñíç óåó áðiñéåýíóåé éáé ìðiñåßôå íá ôéò íáíáäåßôå.

Åéá íá ååßôå óå ðåñéå ÷üñåíá ôçò ðñiñóùñéíþò ïPíçò (buffer) ðéÝóåôå Scroll Lock. Íå òií òiñüðí áðóü áíåññíðíéåßôåé ç éýééóç ôçò iðüñíçò. Íðiñåßôå Ýðåéðå íá ÷ñçöéiñðíéþóåôå óå ðëÞêôñí íå óå ååéÜééá þ óå PageUp éáé PageDown ãéá íá ååßôå óå áðiñéåÝóìåðå. ÐéÝóåôå íáíÜ òi Scroll Lock ãéá íá óðåñáôÞóåôå ôçí éýééóç.

ÊÜíóå òi áðóü ôþñá, åéá íá íáíáäåßôå òi ååßíåí ðiø êýéçóå ååðóü ìðüñíçò êåéþò í ððñÞiáð ååðåëíýóå ôçí áíß ÷íåðóç óðóéåðþí. Èá ååßôå ååßíåí áíðóþò ðíé ìí òi Ó ÷ Þiá 3-2, áí éáé èá ððÜñ ÷ iðí åéåññÝò áíÜëíñá íå ôéò óðóéåðÝò ðiø åéééåðå í ðíéíæéóôþò óåð.

## Ó÷Piá 3-2. ÔõðééÜ ÁðrôåéÝóíáôá Áíß÷íåðóçò Óõðéåóþí

```
Copyright (c) 1992-2011 The FreeBSD Project.
Copyright (c) 1979, 1980, 1983, 1986, 1988, 1989, 1991, 1992, 1993, 1994
    The Regents of the University of California. All rights reserved.
FreeBSD is a registered trademark of The FreeBSD Foundation.
FreeBSD 9.0-RELEASE #0 r225473M: Sun Sep 11 16:07:30 BST 2011
    root@psi:/usr/obj/usr/src/sys/GENERIC amd64
CPU: Intel(R) Core(TM)2 Duo CPU      T9400 @ 2.53GHz (2527.05-MHz K8-class CPU)
    Origin = "GenuineIntel"  Id = 0x10676  Family = 6  Model = 17  Stepping = 6
    Features=0xbfebfbff<FPU,VME,DE,PSE,TSC,MSR,PAE,MCE,CX8/APIC,SEP,MTRR,PGE,MCA,CMOV,PAT,PSE36,CLF
    Features2=0x8e3fd<SSE3,DTES64,MON,DS_CPL,VMX,SMX,EST,TM2,SSSE3,CX16,xTPR,PDCM,SSE4.1>
    AMD Features=0x20100800<SYSCALL,NX,LM>
    AMD Features2=0x1<LAHF>
    TSC: P-state invariant, performance statistics
real memory = 3221225472 (3072 MB)
avail memory = 2926649344 (2791 MB)
Event timer "LAPIC" quality 400
ACPI APIC Table: <TOSHIB A0064 >
FreeBSD/SMP: Multiprocessor System Detected: 2 CPUs
FreeBSD/SMP: 1 package(s) x 2 core(s)
cpu0 (BSP): APIC ID: 0
cpu1 (AP): APIC ID: 1
ioapic0: Changing APIC ID to 1
ioapic0 <Version 2.0> irqs 0-23 on motherboard
kbd1 at kbdmux0
acpi0: <TOSHIB A0064> on motherboard
acpi0: Power Button (fixed)
acpi0: reservation of 0, a0000 (3) failed
acpi0: reservation of 100000, b6690000 (3) failed
Timecounter "ACPI-safe" frequency 3579545 Hz quality 850
acpi_timer0: <24-bit timer at 3.579545MHz> port 0xd808-0xd80b on acpi0
cpu0: <ACPI CPU> on acpi0
ACPI Warning: Incorrect checksum in table [ASF!] - 0xFE, should be 0x9A (20110527/tbutils-282)
cpu1: <ACPI CPU> on acpi0
pcib0: <ACPI Host-PCI bridge> port 0xcf8-0xcff on acpi0
pci0: <ACPI PCI bus> on pcib0
vgapci0: <VGA-compatible display> port 0cff8-0cff mem 0xff400000-0xff7fffff,0xe0000000-0xffffffff
agp0: <Intel GM45 SVGA controller> on vgapci0
agp0: aperture size is 256M, detected 131068k stolen memory
vgapci1: <VGA-compatible display> mem 0ffc00000-0xffcfffff at device 2.1 on pci0
pci0: <simple comms> at device 3.0 (no driver attached)
em0: <Intel(R) PRO/1000 Network Connection 7.2.3> port 0xcf80-0xcf9f mem 0xff9c0000-0xff9dffff,0x00000000-0xffffffff
em0: Using an MSI interrupt
em0: Ethernet address: 00:lc:7e:6a:ca:b0
uhci0: <Intel 82801I (ICH9) USB controller> port 0xcf60-0xcf7f irq 16 at device 26.0 on pci0
usbus0: <Intel 82801I (ICH9) USB controller> on uhci0
uhci1: <Intel 82801I (ICH9) USB controller> port 0xcf40-0xcf5f irq 21 at device 26.1 on pci0
usbus1: <Intel 82801I (ICH9) USB controller> on uhci1
uhci2: <Intel 82801I (ICH9) USB controller> port 0xcf20-0xcf3f irq 19 at device 26.2 on pci0
usbus2: <Intel 82801I (ICH9) USB controller> on uhci2
ehci0: <Intel 82801I (ICH9) USB 2.0 controller> mem 0xff9ff800-0xff9ffbff irq 19 at device 26.7
usbus3: EHCI version 1.0
```

## ÊåöÜëáéí 3 ÅäéáôÜóôáóç ôïõ FreeBSD 9.x êáé ÍåôááåÍYóôåñùí Åëäüüóåùí

```
usbus3: <Intel 82801I (ICH9) USB 2.0 controller> on ehci0
hdac0: <Intel 82801I High Definition Audio Controller> mem 0xff9f8000-0xff9fbfff irq 22 at device
pcib1: <ACPI PCI-PCI bridge> irq 17 at device 28.0 on pci0
pcil: <ACPI PCI bus> on pcib1
iwn0: <Intel(R) WiFi Link 5100> mem 0xff8fe000-0xff8fffff irq 16 at device 0.0 on pcil
pcib2: <ACPI PCI-PCI bridge> irq 16 at device 28.1 on pci0
pci2: <ACPI PCI bus> on pcib2
pcib3: <ACPI PCI-PCI bridge> irq 18 at device 28.2 on pci0
pci4: <ACPI PCI bus> on pcib3
pcib4: <ACPI PCI-PCI bridge> at device 30.0 on pci0
pci5: <ACPI PCI bus> on pcib4
cbb0: <RF5C476 PCI-CardBus Bridge> at device 11.0 on pci5
cardbus0: <CardBus bus> on cbb0
pccard0: <16-bit PCCard bus> on cbb0
isab0: <PCI-ISA bridge> at device 31.0 on pci0
isa0: <ISA bus> on isab0
ahci0: <Intel ICH9M AHCI SATA controller> port 0x8f58-0x8f5f,0x8f54-0x8f57,0x8f48-0x8f4f,0x8f44-0
ahci0: AHCI v1.20 with 4 3Gbps ports, Port Multiplier not supported
ahcich0: <AHCI channel> at channel 0 on ahci0
ahcich1: <AHCI channel> at channel 1 on ahci0
ahcich2: <AHCI channel> at channel 4 on ahci0
acpi_lid0: <Control Method Lid Switch> on acpi0
battery0: <ACPI Control Method Battery> on acpi0
acpi_button0: <Power Button> on acpi0
acpi_acad0: <AC Adapter> on acpi0
acpi_toshiba0: <Toshiba HCI Extras> on acpi0
acpi_tz0: <Thermal Zone> on acpi0
attimer0: <AT timer> port 0x40-0x43 irq 0 on acpi0
Timecounter "i8254" frequency 1193182 Hz quality 0
Event timer "i8254" frequency 1193182 Hz quality 100
atkbd0: <Keyboard controller (i8042)> port 0x60,0x64 irq 1 on acpi0
atkbd0: <AT Keyboard> irq 1 on atkbd0
kbd0 at atkbd0
atkbd0: [GIANT-LOCKED]
psm0: <PS/2 Mouse> irq 12 on atkbd0
psm0: [GIANT-LOCKED]
psm0: model GlidePoint, device ID 0
atrtc0: <AT realtime clock> port 0x70-0x71 irq 8 on acpi0
Event timer "RTC" frequency 32768 Hz quality 0
hpet0: <High Precision Event Timer> iomem 0xfed00000-0xfed003ff on acpi0
Timecounter "HPET" frequency 14318180 Hz quality 950
Event timer "HPET" frequency 14318180 Hz quality 450
Event timer "HPET1" frequency 14318180 Hz quality 440
Event timer "HPET2" frequency 14318180 Hz quality 440
Event timer "HPET3" frequency 14318180 Hz quality 440
uart0: <16550 or compatible> port 0x3f8-0x3ff irq 4 flags 0x10 on acpi0
sc0: <System console> at flags 0x100 on isa0
sc0: VGA <16 virtual consoles, flags=0x300>
vga0: <Generic ISA VGA> at port 0x3c0-0x3df iomem 0xa0000-0xbffff on isa0
ppc0: cannot reserve I/O port range
est0: <Enhanced SpeedStep Frequency Control> on cpu0
p4tcc0: <CPU Frequency Thermal Control> on cpu0
est1: <Enhanced SpeedStep Frequency Control> on cpu1
```

## ÊðöÜëáéí 3 ÅäéáôÜóôáóç ôiõ FreeBSD 9.x êáé ÍåôáááíÝóôåñùíÅêäüüóåùí

```
p4tcc1: <CPU Frequency Thermal Control> on cpul
Timecounters tick every 1.000 msec
hdac0: HDA Codec #0: Realtek ALC268
hdac0: HDA Codec #1: Lucent/Agere Systems (Unknown)
pcm0: <HDA Realtek ALC268 PCM #0 Analog> at cad 0 nid 1 on hdac0
pcm1: <HDA Realtek ALC268 PCM #1 Analog> at cad 0 nid 1 on hdac0
usbus0: 12Mbps Full Speed USB v1.0
usbust1: 12Mbps Full Speed USB v1.0
usbust2: 12Mbps Full Speed USB v1.0
usbust3: 480Mbps High Speed USB v2.0
ugen0.1: <Intel> at usbus0
uhub0: <Intel UHCI root HUB, class 9/0, rev 1.00/1.00, addr 1> on usbus0
ugen1.1: <Intel> at usbus1
uhub1: <Intel UHCI root HUB, class 9/0, rev 1.00/1.00, addr 1> on usbus1
ugen2.1: <Intel> at usbus2
uhub2: <Intel UHCI root HUB, class 9/0, rev 1.00/1.00, addr 1> on usbus2
ugen3.1: <Intel> at usbus3
uhub3: <Intel EHCI root HUB, class 9/0, rev 2.00/1.00, addr 1> on usbus3
uhub0: 2 ports with 2 removable, self powered
uhub1: 2 ports with 2 removable, self powered
uhub2: 2 ports with 2 removable, self powered
uhub3: 6 ports with 6 removable, self powered
ugen2.2: <vendor 0x0b97> at usbus2
uhub8: <vendor 0x0b97 product 0x7761, class 9/0, rev 1.10/1.10, addr 2> on usbus2
ugen1.2: <Microsoft> at usbus1
ada0 at ahcich0 bus 0 scbus1 target 0 lun 0
ada0: <Hitachi HTS543225L9SA00 FBEOC43C> ATA-8 SATA 1.x device
ada0: 150.000MB/s transfers (SATA 1.x, UDMA6, PIO 8192bytes)
ada0: Command Queueing enabled
ada0: 238475MB (488397168 512 byte sectors: 16H 63S/T 16383C)
ada0: Previously was known as ad4
ums0: <Microsoft Microsoft 3-Button Mouse with IntelliEyeTM, class 0/0, rev 1.10/3.00, addr 2> on
SMP: AP CPU #1 Launched!
cd0 at ahcich1 bus 0 scbus2 target 0 lun 0
cd0: <TEAC DV-W28S-RT 7.0C> Removable CD-ROM SCSI-0 device
cd0: 150.000MB/s transfers (SATA 1.x, ums0: 3 buttons and [XYZ] coordinates ID=0
UDMA2, ATAPI 12bytes, PIO 8192bytes)
cd0: cd present [1 x 2048 byte records]
ugen0.2: <Microsoft> at usbus0
ukbd0: <Microsoft Natural Ergonomic Keyboard 4000, class 0/0, rev 2.00/1.73, addr 2> on usbus0
kbd2 at ukbd0
uhid0: <Microsoft Natural Ergonomic Keyboard 4000, class 0/0, rev 2.00/1.73, addr 2> on usbus0
Trying to mount root from cd9660:/dev/iso9660/FREEBSD_INSTALL [ro]...
```

ÅëÝäîôå ðñïöåêôééÜ ôá áðëôåéÝ ôiõ áíß÷fåñöçò óôôéåôþí ãéá íá åâååéùèåßôå üiôé ôi FreeBSD âñþêå üéåò
ðéô óôôéåôÝò ðiõ áíái Ýíáôå. Áí êÜðiéá óôôéåôþí ãáí åñÝèçêå, ãáí èá öáþíåôåé óôçí ðáñáðÜùí ëßôôå. Ôá
Áñèñþìáôå Ðôñþíá óåð áðéôñÝðiõí íá ðñïöéÝóåôå ðñïöôþñéïç ãéá óôôéåôÝò ðiõ ãáí ðôÜñ÷iõí óôiií ðôñþíá
GENERIC.

ÍåôÜ ôç ãéáäééåóßá áíß÷íåööçò óôôéåôþí èá åâåôå ôi Ó÷þíá 3-3. Ôi iÝóï åâåéåôÜóôåóçò iðiñåß íá ÷ñçóéiiðiéçèåß
íå ôñåéò ôñüðiõò: ãéá íá åâåéåôåôþóåôå ôi FreeBSD, ùò “live CD” þ áðëÜ åéá íá áðiêôþóåôå ðñüóååóç óå Ýíá
êÝéööiò ðiõ FreeBSD. ×ñçóéiiðiéþóåôå ôå åâæÜééå ãéá íá êÜíåôå iéá áðéçriþí õéé ôi Enter ãéá íá ôçí áðéåååéþóåôå.

### Ó÷Piá 3-3. ÅðéëiäP Ôñüðiõ ËåéöiõññBáò ÍYóïõ ÅâëáôÜóôáóçò



ÅðéëÝiôå [ Install ] áéá íá îâééíPóåôå ôi ðñüüññáìíá åâëáôÜóôáóçò.

## 3.5 ÅéóáññP óoï bsdinstall

Ôi **bsdinstall** áßíáé iéá åöáññäP áâëáôÜóôáóçò áéá ôi FreeBSD ðiõ ááóßæåôáé óå ðåñéåÜëëí êåéÝñiõ. ÅñÜöôçêå áðü ôií Nathan Whitehorn <nwhitehorn@FreeBSD.org> êáé ÷ñçóéiõíéPèçêå ðñþöç öiñÜ ôi 2011 óoï FreeBSD 9.0.

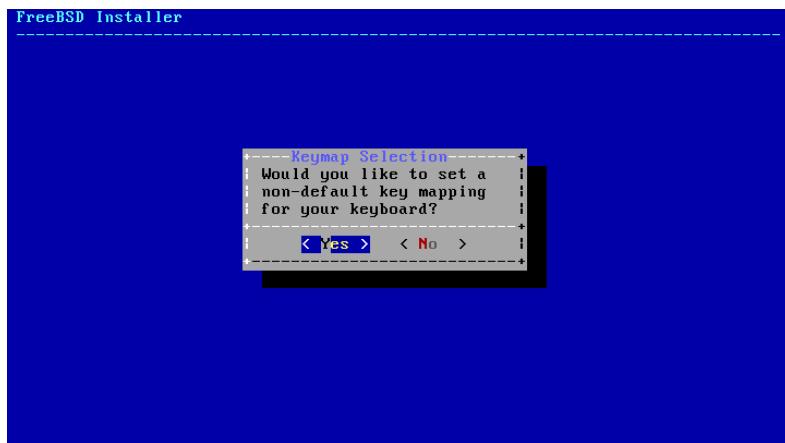
**Óçìåßùóç:** Ç áöáññäP **pc-sysinstall** ôiõ Kris Moore <kmoore@FreeBSD.org> óðìðåñééåìåÜíåôáé iå ôi PC-BSD (<http://pcbsd.org>) êáé iðiñåß áðßöçò íá ÷ñçóéiõíéçèåß áéá ôçí áâëáôÜóôáóç ôiõ FreeBSD ([http://wiki.pcbsd.org/index.php/Use\\_PC-BSD\\_Installer\\_to\\_Install\\_FreeBSD](http://wiki.pcbsd.org/index.php/Use_PC-BSD_Installer_to_Install_FreeBSD)). Áí êáé iññéÝò öiñÝò óoã ÷Ýåôáé iå ôi **bsdinstall** ié åöáññäÝò áðôÝò äáí ó÷åðßæíöáé.

Ôi óyóôçìá iññéÝò ôiõ **bsdinstall** åëÝä ÷åôáé iÝóù ôùí ðëPêôñùí iå ôá âåëÜëéá êáé ôá ðëPêôñá **Enter**, **Tab**, **Space** êáé iññéÜ áéüñá.

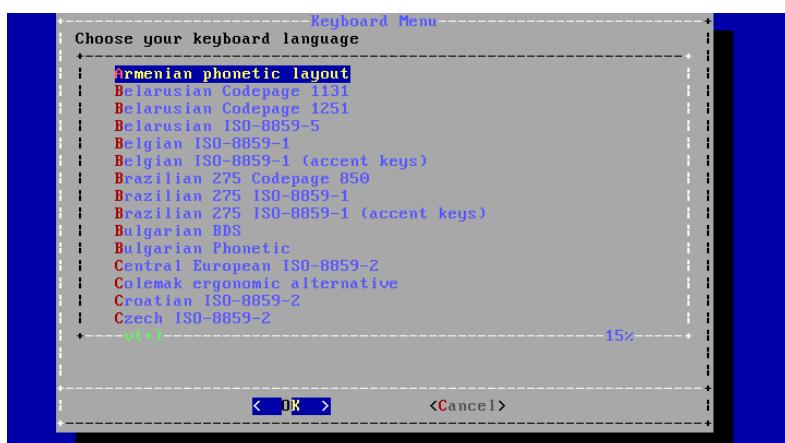
### 3.5.1 ÅðéëiäÝò óoï Íåññ Keymap

ÁíÜëiaá iå ôi áßäiò ôçò êíñóüéáò ðiõ ÷ñçóéiõíéåßöå, ôi **bsdinstall** Bóùò óáò ñùôPóåé áí áðéëiåßöå iá áðéëÝiåôå iéá åéÜôáíç ðëçêôññëiäñiõ áéáöiññåôéêP áðü ôçí ðññåðééäñÝíç.

### Ó÷Piá 3-4. ÅðéëïäP ÄéÜôáïçò Ðëçêôñïëïäßiö



### Ó÷Piá 3-5. Ìåñíý ÅðéëïäPò ÄéÜôáïçò Đëçêôñïëïäßiõ



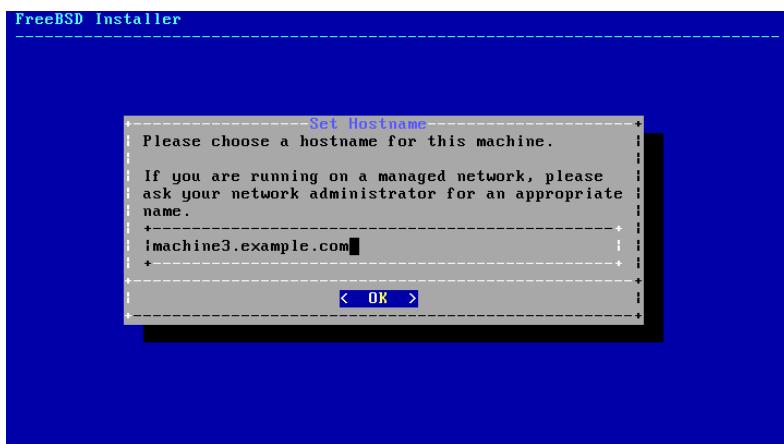
ÅðééÝiôå ôçí äeÜôåíç ðëçêôñïieäbïö ðiö åbíáé ðéí êíïöÜ óöi ðëçêôñïieüäéí ðiö äéáèÝôåôå, ÷ñçóéiiðiépíöåò óå ðÜñü êáé èÜôù ååéÜééå êáé åðéåâåâébññöåò là öi **Enter**.

**ÓciáBúñós:** Áí ðéYóáða Esc éá ÷ñcóéí÷ñcéàß c ðñjáðééññáÍyíc áéÜðáÍç. Áí c áéÜðáÍç ðíð ðñjÝ-÷ñjíðò ðécèðíiññáBíò ááí áBíñáé ðñjñóáÍþò. iéá áóðáéßþò áðééññáBí ãBíñáé óí United States of America ISO-8859-1.

### 3.5.2 Éáéñéóìüò Ííüìáôïò Õðíëíæóôþ (hostname)

Óðir áðumálu Því, óðir **bsdinstall** eða óðróðuðrósæ aða óðir ummað öðreitarefður (hostname) óðir iðibí eða aðeðb óðir Íslz ónóðci.

### Ó÷Piá 3-6. Èáëïñéóíüò Ífùláôïò ÓðïëiâéóðP

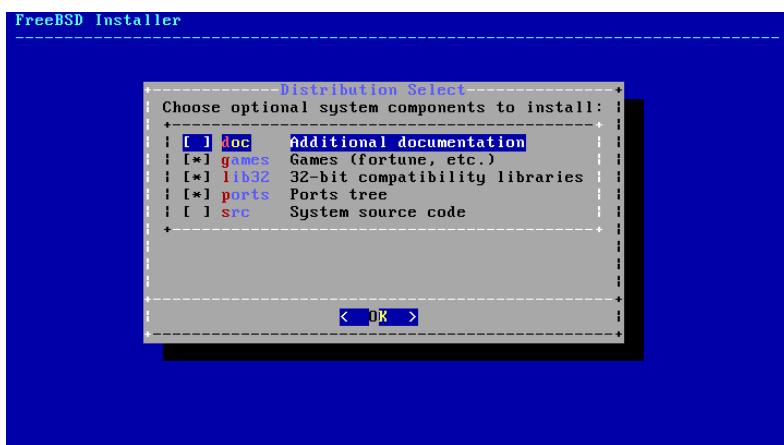


Öi üññá ðiõ èá äþóåôå ðñ Ýðåé íá ðåñéëâiâÜíåé êáé ôií õñÝá (fully-qualified) üðùò ãéá ðáñÜääéâiâ machine3.example.com

### 3.5.3 ÅðéëiâP Óðïé÷åßùí ÅæêáôÜóôáóçò

Óoï åðüìâåñí âPiá, òi ñsdinstall èá óáò êáëÝóåé íá åðéëÝíåôå ðiéá ðññáéñåôééÜ óðïé÷åßá òiõ ëåéðiõññééiý åðéëiâåßôå íá åæêáôáóôPóåôå.

### Ó÷Piá 3-7. ÅðéëiâP Óðïé÷åßùí ÅæêáôÜóôáóçò



Ç åðéëiâP ôùí óðïé÷åßùí åæêáôÜóôáóçò åîâñôÜðåé êõñßùò áðü ôçí ÷ñPóç ðiõ èá Ý÷åé ôií óýóôçíá êáé ôií äéáèÝóéii åëëýéâñí ÷þñí óðií äßóéi. Í ððñPiáò êáé ôá åáóééÜ ðññáñÜññáôå òiõ FreeBSD (ãñùóôÜ êáé ùò “base system” P åáóééü óýóôçíá) åæêáèßóôáíôáé ðði÷ñåùôééÜ.

ÁíÜëiâá iå ôií åßäïò ôçò åæêáôÜóôáóçò, êÜðiéá áðü ôá ðáñáêÜðù òiõ ëåéðiõññééÜ.

### ÐññáéñåôééÜ Óðïé÷åßá

- doc - Åðéðñüóèåôç ôåéïçñßùóç, êõñßùò éóôïñéêþò óçìáóßáò. Ç ôåéïçñßùóç ðiõ ðáñÝ ÷åðáé åðü ôçí ïlÜää Ôåéïçñßùóçò ðiõ FreeBSD ååéâéßóôåôáé ùñéóôÜ óå åðüüåñí ôðÜää.
- games - ÊÜðíéá ðáñáäïóéåéÜ BSD ðáé ÷íßäéá ðiõ ðåñéëåíåÜñññí ôá **fortune**, **rot13** éáé Üëéá.
- lib32 - Åéäééïèþéåò óðíåâôüôçôå ãéá åéô Ýëåóç åðáññäþí 32-bit óå 64-bit åéäüüôåéò ðiõ FreeBSD.
- ports - Ç Óðëëiäþ ôúí Ports ðiõ FreeBSD.

Ç Óðëëiäþ ôúí Ports åðiôåéåß Ýíá åýéïeii êáé åíééüü ôñüüði ååéâóÜóôáóçò eïäéóïééiy. Ç Óðëëiäþ ôúí Ports åái ðåñéÝ ÷åé ðiõ ðçäáßí ëþäééå ðiõ áðáéôåßóáé ãéá ôç ìåôáäéþôôéóç ðiõ eïäéóïééiy. Ðñüéâéôáé óôçí ðñáâíåôéüôçôå ãéá ìéá ñðëëiäþ ãñ ÷åßùí ðiõ áðóññáðiðíéåß ôç ìåôáöüññóùñç, ìåôáäéþôôéóç êáé ååéâóÜóôáóç eïäéóïééiy ôñßðùí ååðåóéåðåôþí. Õi ÊåöÜëáéi 5 áíáëýåé ðiõ ôñüüði ÷ñþóçò ôçò Óðëëiäþ ôúí Ports.

**Ðñíåéäïðíßçóç:** Õi ðñüäñáííá ååéâóÜóôáóçò äái åéÝ ÷åé ãéá íá ååé áí åéáèÝóåôå áñêåôü åéåýéåñí ÷þñí õði ãßóéí. ÅðééÝîòå áðóü ði õóïé ÷åßí ïüñí áí Ý ÷åôå áñêåôü ÷þñí. Áðü ði FreeBSD 9.0 êáé ìåðÜ, ç Óðëëiäþ ôúí Ports êåðåéåíåÜíáé ðåñßðíø 500 MB ÷þñí õði ãßóéí. Íðíñâßóå ìå ååâåéüôçôå íá èåùñþóâðå üðé ði ÷þñí ði õðóü òá åßíáé åéüìá ìåååéýôåñíò óóéò íåþôåñåò åéäüüôåéò ðiõ FreeBSD.

- src - Í Ðçäáßiò Ëþäééåò ðiõ Óðóðþiáò.

Õi FreeBSD Ýñ ÷åðåé íå ðéþñç ðçäáßí ëþäééå, ôñüü ãéá ðiõ ððñþíá üñi êáé åéá ôá åáðééÜ ðñíññÜññåôá. Áí êáé ði ðçäáßiò ëþäééå ãáí áðáéôåßóáé ãéá ôç ðéééíüôçôå ôñü åöáññäþí, þóùò íá ðiõ ðñåñÝ ÷iiðóé òò ðçäáßiò ëþäééåò (ð. ÷. iäçäíýò óóðéâðþí þ áñèñþiáðå ððñþíá), þ ãéá åññåðßåò áíÜðôôñçò ðiõ ßäéiò ðiõ FreeBSD.

Õi ðéþñåò áÝíóñi õiõ ðçäáßiò ëþäééå êåðåéåíåÜíáé 1 GB ÷þñí õði ãßóéí, áíþ ìéá ðéþñçò ìåôáäéþôôéóç üëiò õiõ FreeBSD áðáéôåß åðéðéÝíí 5 GB ÷þñí.

### 3.6 ÅæáôÜóôáóç áðü ði Äþêôöi

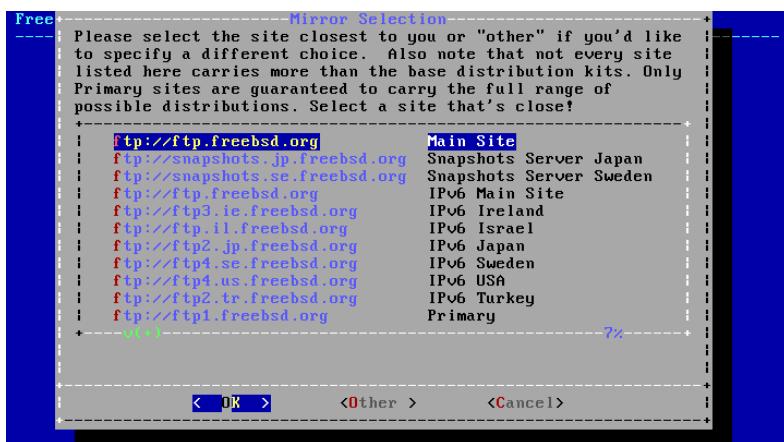
Õi ìÝóí ååéâóÜóôáóçò *bootonly* äái åéáèÝóåé áíôßäñáðå ôñü áñ ÷åßùí ååéâóÜóôáóçò. ¼ôáí ÷ñçóéiiðíéåßôå ôçí ìÝëíäí *bootonly*, ôá áñ ÷åßá ìåôáöüññóðþííóáé áðü ði åßéôöi êáðÜ áðáßþçóç.

### ÓðIPIÁ 3-8. ÅÃÆÁÔÜÓÔÁÓÇ ÁÐÜ ÓI ÄÐÊÔÓÏ



ÍåðÛ ôçí ñýèiéóç ôùí ðáññí ÁÝôñùí áæéôýïò üðùò öáßíåðåáé ôóï ÔíÞíá 3.9.2, áßíåðåé ç áðéëíäþ áíüò mirror site. Ôá mirror sites áæéâ ÁÝôíðí áíðßññáöå ôùí áñ ÷ åßùí ôíð FreeBSD. Áðéé ÁÝîôá ÁÝíá mirror site ôí iðíßíí áñßóéåðåé üöí ôíð äðíåðüí ðéí êííÛ ôðçí ðåññéí ÷ Þ óáð. Íå ôíð ôññüðí áðöù, ç íåðåöüññöùñç ôùí áñ ÷ åßùí éá áßíáé ôá ÷ ýôðñç êáð èá íåéùèåß ï ÷ ññüñò ååéåðÛ ôðåáöçò.

Óðþíá 3-9. Áðéëið Mirror



Ç åâêáôÜóôáóç èá óõíå÷éóôåß iå öiíßæéí ôñüöði üðùò êáé áí ôá áñ÷åßá þôáí äéåèÝóéíá öiðééÜ.

### 3.7 Åê÷þñçóç ×þñiõ óôï Äßóêï

ÕõDÜñ÷iõ ðiõnâædô ðiõñüðiõ íá áåe÷ùñPõådô ÷þñi ãæá ði FreeBSD. Iå ôç iÝeïäi Guided (êæiëüçäiýiâlïc), ié êådâòiPõådô ãçieïoññaiýiõáé áåðöüñiâdô, åþp iå ôç iÝeïäi Manual (÷åðñiëþßíçôç) ié ðñi÷ùñç iÝñié ÷ñPõådô ðiõñiñiý íá ãçieïoññâPõiõi ðiñiõðiññiõi Ýiâò êådâòiPõådô. ÕÝeïò, ððÜñ÷åé ç åððeïäiP íá áåðeéiPõådô Ýiâ ëYëðöiò ñeá íá ãçieïoññâPõådô ðeó êådâòiPõådô iå åðåðeåßâò ÷ñPõc ðiñiññâiÜôu ðiõc ãññiâiPò åiðiøþi üðuõ gpart(8), fdisk(8), êåé bslabel(8).

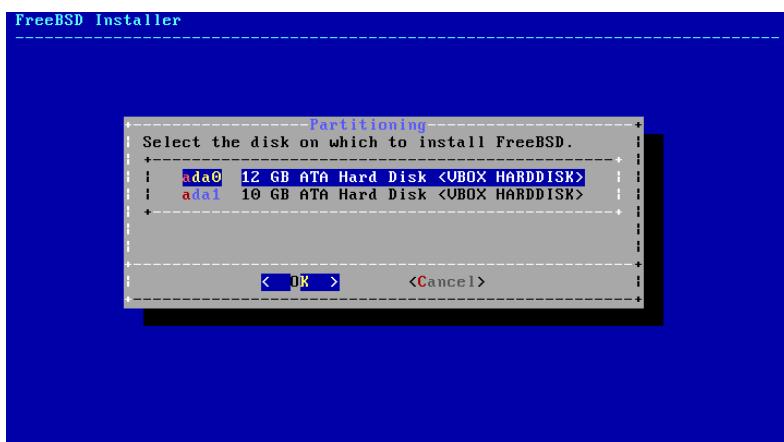
### Óðíá 3-10. ÅðééïäP Guided P Manual Partitioning



### 3.7.1 Êáèëäçäïýìåíç (Guided) ÊáôÜôìçóç

Áí Ý÷åôå óõíáÝóåé ðíëëáðëïýò äßóéïõò, åðéëÝîôå áôôüí óôïí iðíßi èá åâéáôáóôÞóåôå ôi FreeBSD.

### Óðíá 3-11. ÅðééïäP áðü Ðíëëáðëïýò Äßóéïõò



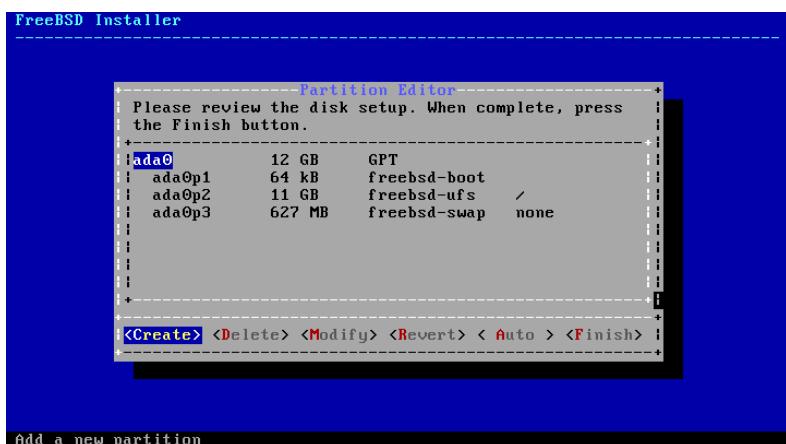
Ìðíñåßôå íá åê÷ùñÞóåôå åßôå iëüêëçñi ôi äßóéï, åßôå Ýíá iÝñiò ôiõ óôï FreeBSD. Áí åðéëÝîåôå [ Entire Disk ], èá äçìéïõñäçèïýí iéá êáôÜëëçëç äéÜôáíç êáôáôïÞóåùí þóôå íá ÷ñçóéñiðëçèåß iëüêëçñiò i äßóéïò. Áí åðéëÝîåôå [ Partition ], èá äçìéïõñäçèåß iéá aeÜôáíç ðiõ èá êáôáæáiaÜíâé ôií åëåýéåñi ÷þñi ôiõ äßóéïò.

### Ó-Þìá 3-12. ÅðééiâP Íëüêeçñiõ Äßóêiò P ÊáôÜôïçóçò



ÅëÝáîôå ðñiøåêôéê Ü ðç äeÜôáîç ðùí êáôáôìPóåùí ðiõ äçìéiõñäPèçêå. Áí âñâßôå êÜðiéi ëÜëiò, åðéëÝîôå [ Revert ] ãéá íá åðáâåöÝñâôå ôéò ðñiçärylåñåò êáôáôìPóåéò P [ Auto ] ãéá íá äçìéiõñäPóåôå ôéò êáôáôìPóåéò ðiõ ðñiøåßñíôåé áôðüüíâôå áðü ñi FreeBSD. Íðiñâßôå íá äçìéiõñäPóåôå, íá ôñiðiðiéPóåôå êáé íá äéáññÜøåôå êáôáôìPóåéò ÷åéñiêßíçå. ¼ôáí ie êáôáôìPóåéò åßíáé ie óùóôÝò, åðéëÝîôå [ Finish ] ãéá íá ôñiâðßóåôå la ôçí åâéáôÜóôåóç.

### Ó-Þìá 3-13. Åðééüðçóç ÊáôáôìPóåùí



#### 3.7.2 ×åéñiêßíçôç Äçìéiõñâßá ÊáôáôìPóåùí

ÅðéëÝäiñôå ÷åéñiêßíçôç äçìéiõñâßá êáôáôìPóåùí, èá laôáôåñèåßôå áðåôéåßáô õôiií åðåññâåóôP êáôáôìPóåùí.

#### Ó÷Pìá 3-14. ×åéñiêßíçôç Äçìëïõñãßá ÈáôáòìPóåùí



ÅðéëÝäííôáò Ýíá iäçãü (ada0 óóï ðáñÜääéäíá iáò) êáé ôi ðëPêôñí [ Create ] èá äåßôá Ýíá iåñíý ãéá ôçí åðéëíäP ôiõ Ó÷Pìáòiò êáôáòìPóåùí (*partitioning scheme*).

#### Ó÷Pìá 3-15. ×åéñiêßíçôç Äçìëïõñãßá ÈáôáòìPóåùí



Ôi óyóôçìá êáôáòìPóåùí GPT åßíáé óoíPèùò ôi êáôáëëçëüôâñíí ãéá òá ðåñéóöüôâñíòò PC-óoíâáöïýò õðíëíæéööÝò. Ðáéáéüôâñá éåéöiõñãééÜ óoôôPìáôá ååí åßíáé óoiâáôÜ iá ôç iÝéïä GPT êáé ÷ñâéÜæïíôáé êáôáòìPóåéò ôýðïö MBR. Ôá ñðüëíéðá åßäç êáôáòìPóåùí ÷ñçóëiiðíëíýíðáé óå ðáééÜ P ìç-óóíçèéíÝíá óoôôPìáôá õðíëíæéööþí.

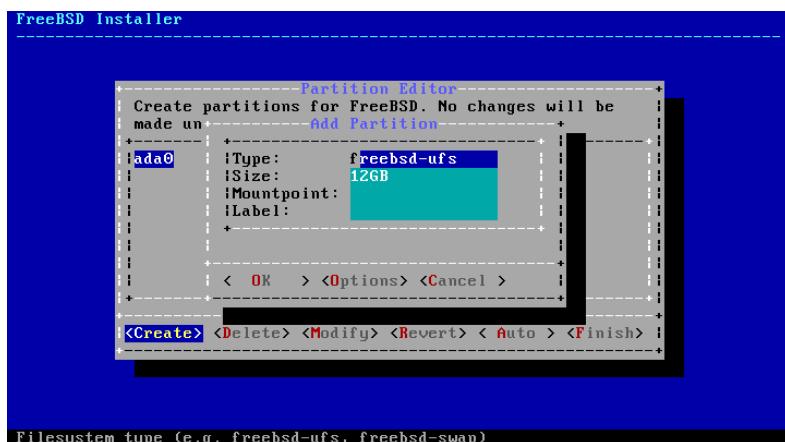
#### Ðßíáêáò 3-1. Èáôçäñßåò ÈáôáòìPóåùí

Óoíôññáößá	Ðåñéâñáöþ
APM	Apple Partition Map, ÷ñçóëiiðíëâßôáé óóï PowerPC® Macintosh. ( <a href="http://support.apple.com/kb/TA21692">http://support.apple.com/kb/TA21692</a> )
BSD	ÈáôáòìPóåéò BSD ÷ùñßò MBR, iñéóíÝíåò öiñÝò èáëíýíðáé êáé "åðéëßíäößá áöiøéùíÝíç êáôÜóôáóç". Ååßôá ôi bslabel(8).

Óðíóíññáößá	Ðåñéäñáöþ
GPT	Ðßíáêàò Ëáôáôïþóåùí GUID. ( <a href="http://en.wikipedia.org/wiki/GUID_Partition_Table">http://en.wikipedia.org/wiki/GUID_Partition_Table</a> )
MBR	Master Boot Record. ( <a href="http://en.wikipedia.org/wiki/Master_boot_record">http://en.wikipedia.org/wiki/Master_boot_record</a> )
PC98	ÐáñáëäâíP ôiõ MBR ðiõ ÷ñçóëíïðíéâßôáé óå õðíëëåéóôÝò NEC PC-98. ( <a href="http://en.wikipedia.org/wiki/Pc9801">http://en.wikipedia.org/wiki/Pc9801</a> )
VTOC8	Volume Table Of Contents, ÷ñçóëíïðíéâßôáé óôá Sun SPARC64 êáé UltraSPARC.

ÌåðÜ ôç äçìëïññáßá ôiõ ó ÷Þiaôïò êáôáôïþóåùí, áí åðéëÝìåôå íáíÜ [ Create ] èá äçìëïññáþóåâå íÝåò êáôáôïþóåéò.

### Ó ÷Þia 3-16. ×åéñëßíçôç Äçìëïññáßá Ëáôáôïþóåùí



Ç ôððiðíéçìÝíç áââåðÜóôáóç FreeBSD iå ÷ñþóç GPT äçìëïññáß ðiðëÜ ÷éóôíí ðñâéò êáôáôïþóåéò:

#### ÔððiðíéçìÝíåò FreeBSD GPT Ëáôáôïþóåéò

- freebsd-boot - Í êþäééåò åêêëßíçôç ðiõ FreeBSD. Ç êáôÜðíçóç áðôP ðñÝðåé íá åßíáé ç ðñþóç óôï äßóéï.
- freebsd-ufs - Óýóôçìá áñ÷åßùí FreeBSD UFS.
- freebsd-swap - ×þñïò swap FreeBSD.

Ìðñâßôå íá äçìëïññáþóåâå ðiðëáðëÜ ðoôðÞiaôå áñ÷åßùí. ÊÜðíéïé ÷ñþóâå ðñïðíéïíýí ôç äçìëïññáßá ôùí ðáñâäïøéåéþí êáôáôïþóåùí iå ÷ùñéôðÜ ðoôðÞiaôå áñ÷åßùí æáá /, /var, êáé /usr.

Ååßôå ði gpart(8) áéá ððéþñç ðëþóâå ôùí áéáëÝóëùí ðýðùí êáôáôïþóåùí GPT.

Ìðñâßôå íá áéóÜâåâå ôiïíÝâåëò iå ôç åiþèåéá ëiéþí òðíóññåýóåùí: K áéá kilobytes, M áéá megabytes, P G áéá gigabytes.

**Õðüääéîç:** Ç êáëýôâñç áðüäïöç áðéôðâ ÷Üíåôåé iå áðèðâñÜìéöç ôùí ôiïÝùí ôiõ áßóéïö (sector alignment). Ç óùóôP áðèðâñÜìéöç áðéôðâ ÷Üíåôåé iå ôç äçìëïññáßá êáôáôïþóåùí iå iâäÝèç ðiðëáðëÜóéå ôùí 4K bytes óå iâçäïýò ðiõ ÷ñçóëíïðíéïí ôiïåßò ôùí 512 bytes þ 4K-byte. Óå åâíéêÝò åñáïíÝò, ç ÷ñþóç êáôáôïþóåùí iå iâäÝèç ðiðëáðëÜóéå ôiõ 1 þ áêüïá êáé 1G åßíáé í åðéëëüôâñò ôñüðò iå áðéâåâåéþöïò åüöé êÜèå êáôÜðíçóç

іа́еéé! Ú óá ӕððãú ðíëéáððé Üóðéí ðúí 4 È. Íéá ӕíáßñáðóç: óðí ðáññýóá óðéáðíþ ҫ êáðÜôíçóç freebsd-boot ӕáí ὶðíñåß íá ӕßñáé íáãáæýôðáñç ðúí 512 È ڻüáùí ðáññéíñéóíþ ӫí ӗbäééâ ӕéêßíçóçò.

Óá êÜeå êáôÜôïçóç ðiö ðâñéÝ ÷ áé óýôôçíá âñ ÷âßúí, ÷ñâæÜæâðáé Ýíá óçìâßí ðññóÜñôçóçò. Áí ÷ñçóëiðiéçëåß iüñí ieá eáôÜôïçóç UFS, öi óçìâßí ðññóÜñôçóçò èá åßíáé ç /.

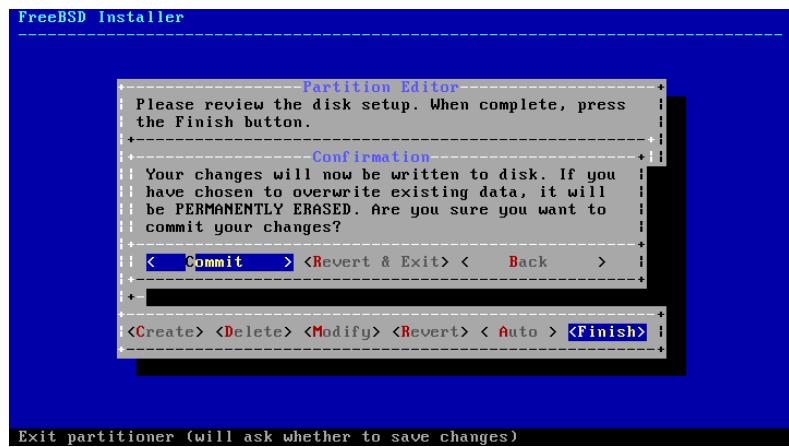
éa óáð æçöçéåb áðþbóçó lëá áðéé Ýóá (*label*). Ç áðéé Ýóá áßíáé Ýíá üññá ôí iðiþü áßíåðáé óá lëá éáð Úðòçóç. Ôí üññá áññüð áßbóéïò Þ ié áññéïïþ ðið ðánñéañ Üöriði ôéð êáðáôíÞóâéð iðiññáþ íá áðéé Üiiðið áí i áßbóéïò oóñíâæð áóá Úðeç ðýñá Þ áæðâæðóÞ, áðéé Ú ç áðéé Ýóá ôið ðánñáí Ýíâé óðáæññÞ. Iá ÷ññÞóç ôçð áðéé Ýóáð óá áñ ÷ðbá üðñð ôí /etc/fstab ôí óýóðçíá áßíåðáé ðeí áíâðééü óá áðéé Ýó ðið ðéééiy. Íé áðéé Ýóáð GPT áðiðáßíæññóáé óðið éáð Úðiññ /dev/gpt / üññá áßíåðáé ç ðññið Üññðóç ôçð óðóðéâðóÞð. Óá Úðeá áßbäç êáðáôíÞóâú ðið Üññ ÷ iði áðéóññâðéé Ýð ãðíáðuñðóçâð üðið áðiññ Ü óéð áðéé Ýóáð, ié iðiþbáð áíðiðáßíæññóáé óá áðéóññâðééiy ðiðiðéâðüññiðo ôði /dev/.

**Õõduüaâelîc:** × ñçóéíïõiéþóôâ lõíáâéê Ýò áôðéêÝôâô áâ êÜèâ óýóóçíá âñ÷âðùíü âéá íá áðïõýââôâ õðâæññïýóâéò ðïõ iðïñâb íá ðñïíeeçëíýí áðü üïíéâ lõíüâôá. Óâ êÜèâ áôðéêÝóá iðïñâßôâ íá õðiðâññëÜââôâ iâñééÜ âñÜlääôá áðü ôí üïíâ ðïõ ðõðiïtäéôðþ þ ôç ëÝóç ôíõ, þ âéüíâ éâé ôç ÷ñïþóç ôíõ. Éâ iðïñíýóâôâ âéá ðâñÜââéâíâ íá mõÜôâôâ ðïõ êâåôññéüú éâóðÜeïtä “labroot” þ “rootfs-lab” óâ Ýíá õððiïtäéôðþ ðïõ áíþâéâ óâ Ýíá âññâáóôþñéï.

### 3.8 Åðéâåâáßùóç ôçò ÅãêáôÜóôáóçò

Óå áõõü õi óçìåßí Ý ÷ åôå ôçí ôåëåõõáßá åõééäñßá íá åãééåõäåßøåôå ôçí åãééåõÜóôåóç ÷ùñßò íá åßññõí áëéääÝò óõi óéëçñü åßõéï óáò.

## Óð-Piá 3-17. ÓâééêP Åðéâåâáßùóç



Åðéé Ýîôå [ Commit ] éáé ðéÝôå Enter áéá íá óöñâ ÷ ßóâôå. Áí ÷ ñäé Üæâôåé íá êÜíâôå áéëääÝð, åðéé Ýîôå [ Back ] áéá íá åðéóôñÝôåôå óöñâ ãðâîññåóôþ êåôåôìÞóâú. Íâ òï ðëÞêôññ [ Revert & Exit ] ïðññâßôå íá åâéåóåëåßôåôå ôï ðñüñññâíá åâéåóÜôåóçò ÷ ùñßò íá åßññöíí åéëääÝð óöñâ ðéëçñü óåð åßóéí.

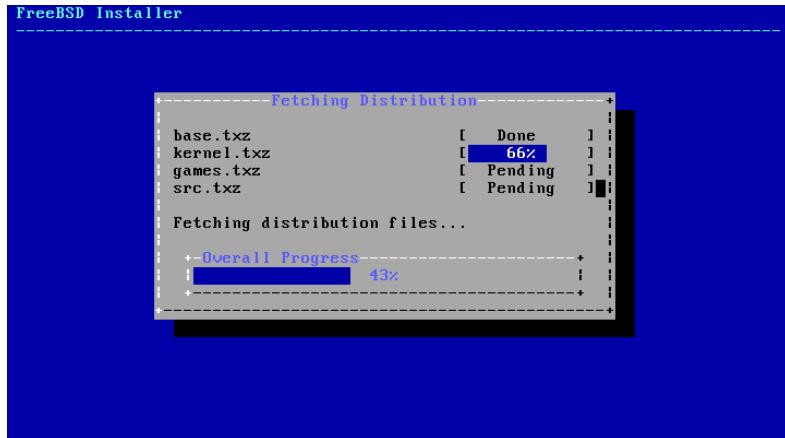
## ÂâðÜëáéí 3 ÅâæáôÜóôáóç òiõ FreeBSD 9.x êáé ìåôáââáÍYóôåñùí Åêäüöåñùí

Í ðñüñò åâæáôÜóôáóçò ðiieâéâé áíÜëíäá ìå ôéò äéâñí Ýò êáé ôá ôôïé÷âßá åâæáôÜóôáóçò ðiõ Ý÷âôâ åâðééÝìâé, ôí íÝóí åâæáôÜóôáóçò êáé ôçí ôá÷yôçôá ôiõ ðiieâéôôP. Èá åâßôå ìéá óâéñÜ âðü ìçíyââá ó÷âôééÜ ìå ôçí ðñüñäi ôçò åéâæéâáôßáô.

Áñ÷ééÜ, ôí ðñüñâñâíà åâæáôÜóôáóçò èá ãñÜøâé ôéò êáôâòìPóâéò ôôï âßôéï êáé èá åâðâëÝóâé êáôÜëëçëåò åíôïëÝò newfs åéá íá aciieññPóâé ôá áíÜëíäá ôôôôPíâá ãñ÷âßùí.

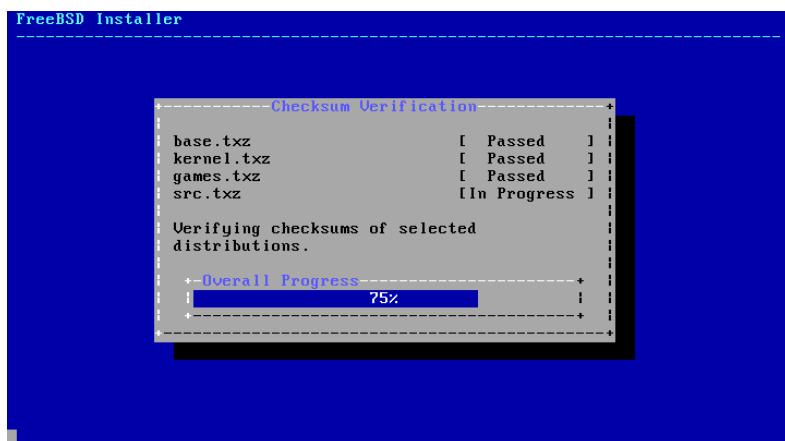
Áí êÜíâôå åâæáôÜóôáóç íÝóù äéêôýiõ, ôí **bsdinstall** èá ðñi÷ùñPóâé ìåôáöiññôþííôâò ôá áðáñâßôçôá ãñ÷âßá.

### Ó-Piá 3-18. ìåôáöiññôùóç Áñ÷âßùí ÅâæáôÜóôáóçò



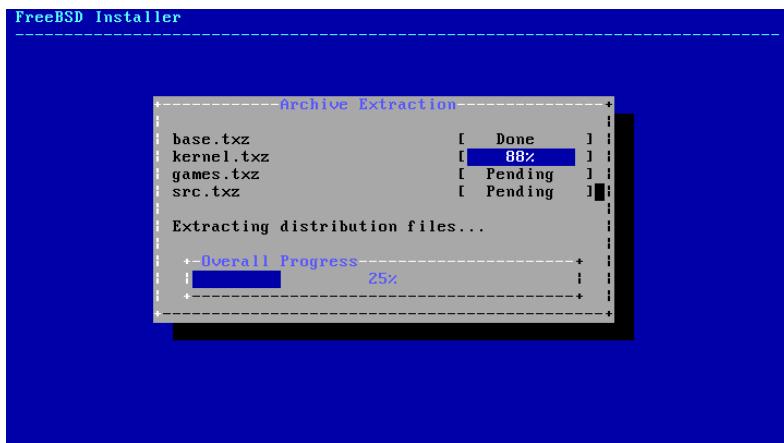
Óôç óoíÝ÷âéá, èá åßíâé Ýëâä÷iò åâæáñâëüôçôáò ôúí ãñ÷âßùí åâæáôÜóôáóçò ãéá íá åðéâââéùèâß üôé äâí Ý÷iõí áëëíéùèâß êáôÜ ôç ìåôáöiññôùóç P éáôÜ ôçí áíÜâíùóç âðü ôí íÝóí åâæáôÜóôáóçò.

### Ó-Piá 3-19. ÅðáëPcâóóç Áñ÷âßùí ÅâæáôÜóôáóçò



Óôï ôâæâðâáßí îPiá, ôá åðéâââéùíÝíá ãñ÷âßá åâæáôÜóôáóçò èá åíâ÷ëiýí êáé èá ãñâöiýí ôôï óêëçñü äßôéï.

### Ó÷Piá 3-20. ÅâáâùâP Áñ÷åßùí ÅäêáôÜóôáóçò



Ìå òi ðÝëíò ôçò åâáâùâPò üëùí ôùí áñ÷åßùí åäêáôÜóôáóçò, ôi **bsdinstall** èá åéóÝëëåé óôç äéáäéêáóßá ñõèìßóåùí ìåôÜ ôçí åâéâåÜóôáóç (ääßôå Ó÷Piá 3.9).

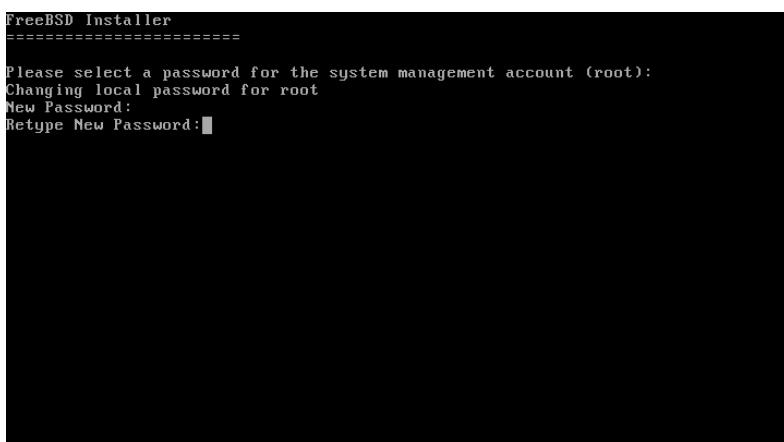
## 3.9 ìåôÜ ôçí ÅäêáôÜóôáóç

ÌåôÜ åðü ìéá åðéôõ÷çìÝíç åâéâåÜóôáóç ôiõ FreeBSD, åéïëiõèåß ìéá óåéñÜ ñõèìßóåùí. Ìðiñâßôå íá åðáíáæÜâåâôå ìðiéáâPðiôå ñýëìéóç áí åéóÝëëåôå ôçí áíðôßôôíé÷ç åðéëiâP ôiõ ôâëéêü ìåñíý ðñéí åðáíâêééPóåôå ôiõ íÝí-åâéâåôåôçìÝíí óáò FreeBSD óýóôçìá.

### 3.9.1 Ñýëìéóç ôiõ Èùäéêíý ôiõ root

Èá ðñÝðåé íá iñßóåôå Ýíá êùäéêü ðñüóâåóçò åéá òi ÷ñPóôç **root**. ÐáñáôçñPóôå üôé åâí öâßñíôáé ôá ãñÜñâôå ðiõ ðëçôñiërâåßôå êâèþò åéóÜâåôå ôíí êùäéêü. ÌåôÜ ôçí åéóâåâP ôiõ êùäéêíý, èá ðñÝðåé íá ðíí åéóÜâåôå åéüüíá ìéá õññÜ. Íå òií ôñüðí åðöü åâáôäéßæåôåé üôé åâí Ý÷åé åßíâé êÜðiëi eÜëiò éåôÜ ôçí ðëçêôñiëüäçóç.

### Ó÷Piá 3-21. Ñýëìéóç ôiõ Èùäéêíý ôiõ root



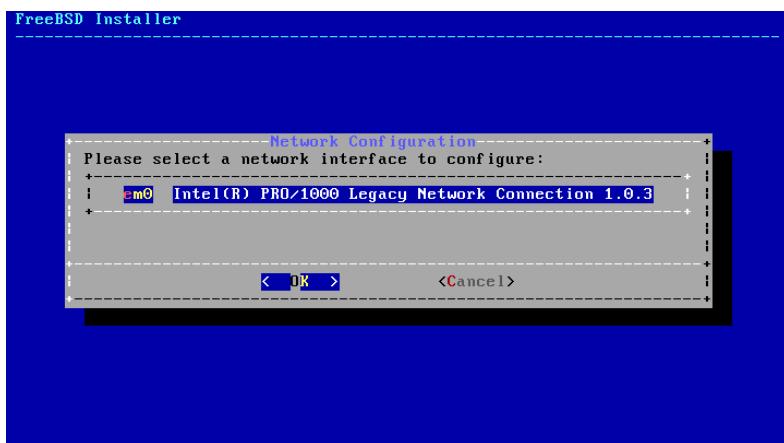
Ç åâêáôÜóôáóç óoíá÷ßæåôáé ìåðÜ ôçí åðéôô ÷P åéóáâùãP ôiõ êùäéêíý.

### 3.9.2 Ñýèiéóç Êáñôþí Äéêôýïõ

**Óçìåßùóç:** Ç ñýèiéóç ôiõ äéêôýïõ ðáñáéåßðåôáé áí Ý÷åé þäç ðñáâìáôïðïéçèåß óôá ðëáßóéá ìéáò åâêáôÜóôáóçò *bootonly*.

Èá åâßôå ìéá ëßóôå ìå üüéåò ôéò äéâðáöÝò äéêôýïõ ðiõ áíé ÷iâýèçêáí óoíí ððïëiäéóôP óáð. ÅðéëÝîôå áðôP ðiõ åðéëðìåßôå íá ñðèìßóåôå.

#### Ó÷Píá 3-22. ÅðéëiäP ìéáò ÄéâðáöPò Äéêôýïõ



#### 3.9.2.1 Ñýèiéóç Áóýñìáôçò ÊÜñôáò Äéêôýïõ

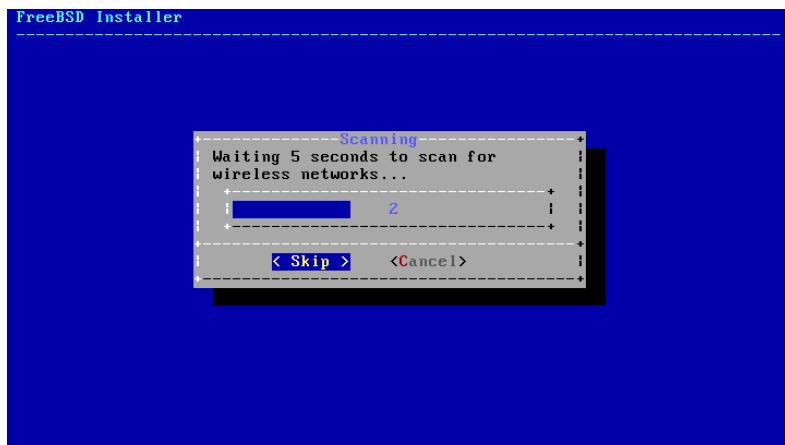
Áí åðéëÝîâå íá ñðèìßóåôå ìéá áóýñìáôç äéâðáöP äéêôýïõ, èá ðñÝðåé íá ñðèìßóåôå ôéò ðáñâìÝóññò áíáâípñéóçò êáé áóðÜëåéáò ãéá íá óoíäâååßôå óóí åßéôöí.

Óá áóýñìáôå åßéôôå áíáâùñßæíïðåé áðü òi Áíáâùñéóôéü Õðçñåóßáò P Service Set Identifier (SSID). Òi SSID åßíáé Ýíá óýíññü üññá ðiõ áðíäßååôáé óå êÜëå áóýñìáôí åßéôöí.

Óá ðåñéóóüôåñá áóýñìáôå åßéôôå åññðôïäñåöïÝí óå åâäñÝí ðiõ ìåôåäßäíïðåé ãéá íá ðññóôåôåýóïðí ôéò ðëçññöñßåò áðü ìç åññðôéïäñåöïÝí ÷ñÞóç. Óñíßóôåôåé íá ÷ñçóéiñðiéÞóåôå åññðôïäñÜöçóç WPA2. Ðáëáéüôåñåò ìÝëíäíé åññðôïäñÜöçóçò üðùò òi WEP ðñññòÝññòí åëÜ ÷éóôç áóðÜëåéá.

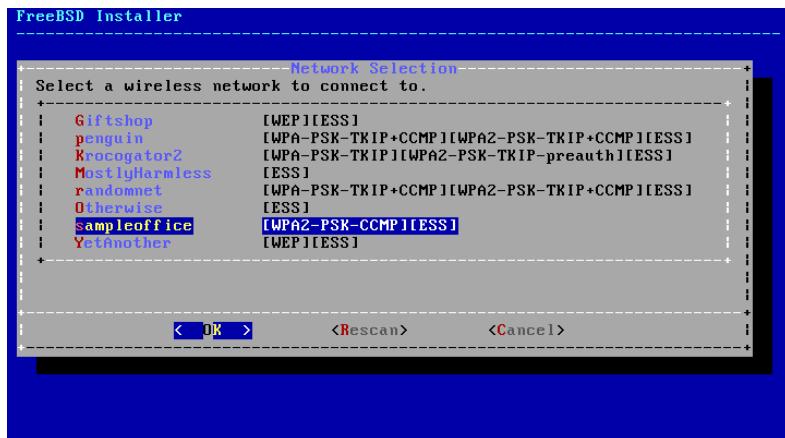
Òi ðñþòí åßíáé íá óoíäâååßôå óå Ýíá áóýñìáôí åßéôöí åßíáé íá óáñþóåôå ãéá Óçìåßá Áóýñìáôçò Ðñüóååóçò (Access Points).

### Ó-Þìá 3-23. ÓÜñùóç ãéá Access Points



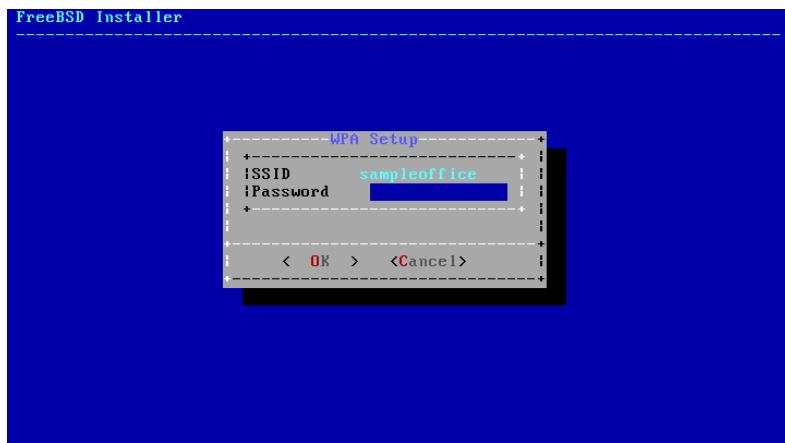
Óá SSIDs ðiõ èá âñâßôå êáóÜ ôç äéÜñèåéá ôçò óÜñùóçò óðííäýíîôáé áðü ôá åßäç êñððôiäñÜöçóçò ðiõ äéåðßèåíôáé ãéá êÜëå äßêôöi. Áí àáí àéÝðåôå ôi SSID ðiõ åðéèðiâßôå ôóç èßóôå, åðéèÝîôå [ Rescan ] ãéá íá åðôåëÝóâôå ôç óÜñùóç íáíÜ. Áí åíáéïïðeâßôå íá íç àéÝðåôå ôí åðéèðiçöü äßêôöi, àéÝâíôå ôçí èåñâßá ãéá ôð÷üí ðñiâëÞlåôå P ìåðâééÞrôå ôiõ ððííäéóôP ðéí êííôÜ ôóï ôçìâßí ðñüóâåáóçò. Íá åðôåëâßôå íÝá óÜñùóç ìåðÜ áðü êÜëå áéëåäP.

### Ó-Þìá 3-24. ÅðéëiäP Áóýñlåôïõ Äéêöýïõ



ÌåðÜ ôçí åðéëiäP ôiõ áóýñlåôïõ äéêöýïõ, èá ðñÝðåé íá åéóÜâåôå ôéó ðëçñïöñßåò ðiõ ó÷åðßæííôáé íå ôçí êñððôiäñÜöçóç. Óá äßêôöá WPA2 ÷ñâéÜæåâåé íá äþóâôå ïüñí Yíá èùäéêü ðñüóâåóçò (äñúóôü ùò Pre-Shared Key P PSK). Áéá ëüäïòð áðöåëâßåð, ié ÷áñâéôPñåò ðiõ ðëçêðñïëíâßôå ôóï ðåääßí åiöáíßæííôáé ùò áóðâñßóêíé.

### ÓðÞá 3-25. Ñýèiéóç WPA2

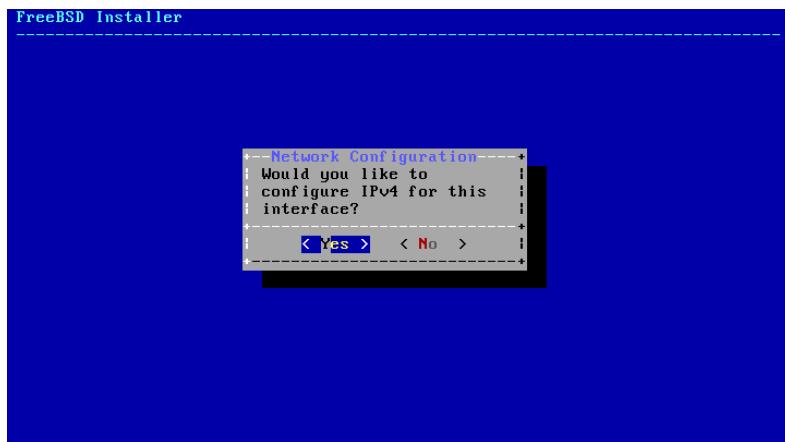


ÌåðÜ ðçí åðéëiäP ôiõ áóýñlåðiõ äéêôýiõ êáé ðçí åéóáðùäP ôùí ðëçñiõiñéþí óýíäåðçò, ç åâæáô Üóôáóç óðíá ÷ ßæåðáé íå ðç ñýèiéóç ôùí ððüëiððùí ðáññí Ýôññí ôiõ äéêôýiõ.

#### 3.9.2.2 Ñýèiéóç Äéêôýiõ IPv4

ÅðéëÝîôå áí èá ÷ ñçóéiðiéçèåß äéêôýùóç IPv4. Ðñüêåðåé áéá ôi ðéí óðíçèéí Ýñi åßäiò óýíäåðçò.

### ÓðÞá 3-26. ÅðéëiäP Äéêôýùóçò IPv4



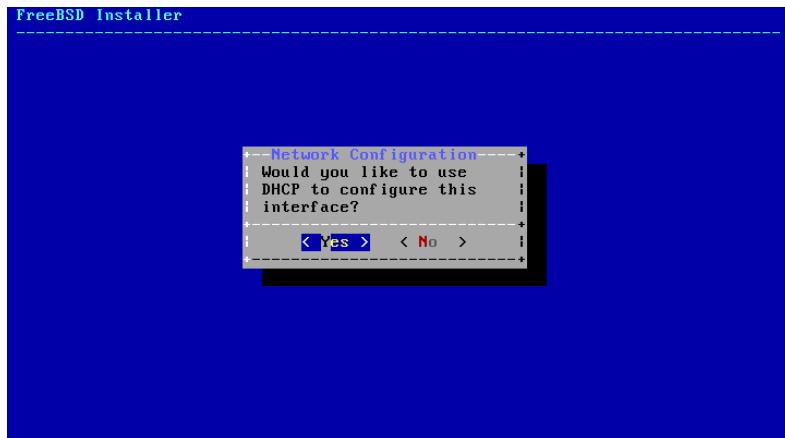
ÕðÜñ ÷ iðí áýí iÝëíäié ñýèiéóçò ôiõ IPv4. IÝóù ôiõ DHCP ç ñýèiéóç ôçò äéåðáöPò åßíåðáé áðôüüìåðá. ÁðôP åßíåé êáé ç óðíéóðþìåíç iÝëíäiò. Ç ñýèiéóç Static áðáéóåß ÷ åéññéßíçôç åéóáðùäP ðëçñiõiñéþí äéêôýiõ.

**Óçìåðñùóç:** lç åÜéåðå ôð ÷ áßåð ñðèìßóåéò äéêôýiõ, êáèþò åáí èá èåéðiõñäPóiõí. Èá ðñÝðåé íá èÜâåðå ôéò ðëçñiõiñéßåò ðiõ áíáöÝññiðåé ôiõ ÓðÞá 3.3.3 áðü ôií äéá ÷ åéñéóðP Þ ðáññ ÷ Ýá ôiõ äéêôýiõ óáò.

### 3.9.2.2.1 Ñýèiéóç Äééôýiõ IPv4 iÝóù DHCP

Áí äéáéÝôâôå åîôðçñâôçôP DHCP, åðéëÝîôå [ Yes ] ãéá íá ñõèìßóâôå áôôüìâôå ôçí äéâðáöP äééôýiõ.

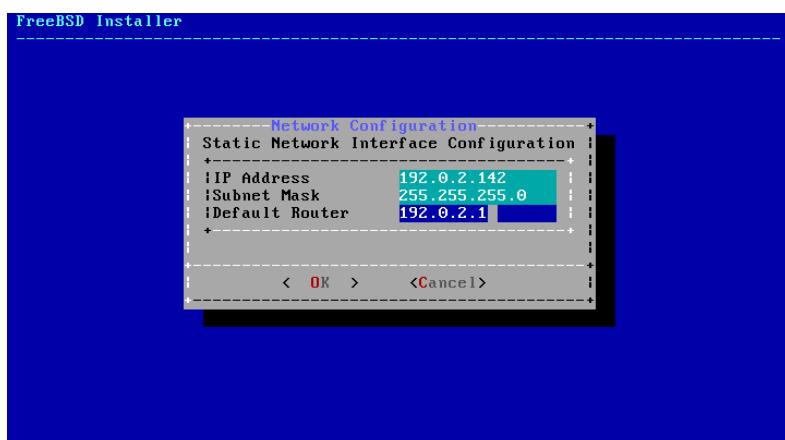
#### Ó÷Piá 3-27. ÅðéëÝîôå Ñýèiéóç IPv4 iÝóù DHCP



### 3.9.2.2.2 ÓôáôéêP Ñýèiéóç Äééôýiõ IPv4

Ç óôáôéêP ñýèiéóç ôçò äéâðáöPò äééôýiõ, áðáéôåß íá åéóÜäâôå êÜðiéåò ðëçñlöïñßåò ó÷åôéêÜ íå ôi IPv4.

#### Ó÷Piá 3-28. ÓôáôéêP Ñýèiéóç IPv4



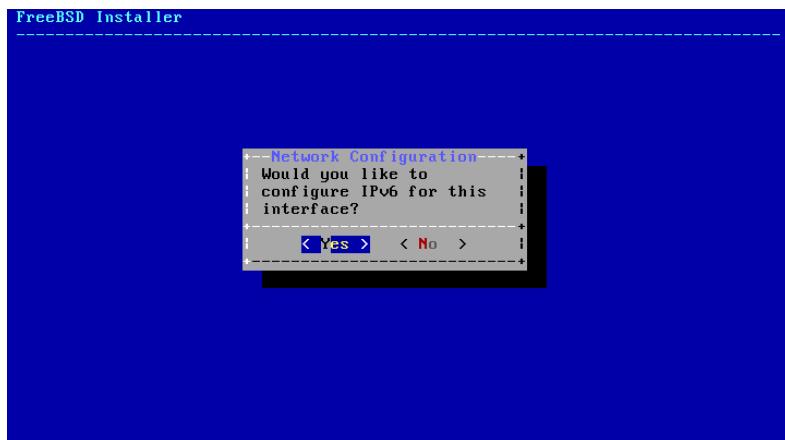
- IP Address - Ç äéâýèõíóç IP ðiõ èá åéóÜäâôå ÷åéñiêßíçôå óå áôôü ôiõ ðiðëiæéôP. Ç äéâýèõíóç áôôP ðñÝðåé íá åßíáé ïíáäéêP êáé íá ìçí ÷ñçóéñiðiéåßôåé áðü iðiéiäPðiõå Üeei iç ÷Üíçíá óôi ðiðéêü óåò äßêôôi.
- Subnet Mask - Ç iÜóêá õðiäéêôýiõ ðiõ ÷ñçóéñiðiéåß ôi ðiðéêü óåò äßêôôi. ÔoðéêÜ áôôP åßíáé 255.255.255.0.

- Default Router - Ç äéâýèõíóç IP ôiõ ðñiåðéëåái Ýñiõ äñiñieïäçôP ôiõ äéêôýïõ óáò. ÓõÍPèùò åßíáé ç äéâýèõíóç ôiõ äñiñieïäçôP P Üeeiõ äéêôôååéiy åñiðëéóïy ðiõ óoñiaÝåé ôi òiðééü óáò åßêôöi iå ôi Internet. Èá ôç äåßôå åðßóçò íá áíáöÝñåôå ùò default gateway (ðñiåðéëåái Ýíç ðýéç).

### 3.9.2.3 Ñýèiéóç Äéêôýïõ IPv6

Ôi IPv6 åßíáé ieá iÝá iÝeiäiõ ñýèiéóçò äéêôýïõ. Áí ôi åßêôöi óáò äéâéÝôåé IPv6 êáé åðééóìåßôå íá ôi ñõèìßóåôå, ðeÝóôå [ Yes ] ãéá íá ôi åðééëÝiåôå.

Ó-Þíá 3-29. ÅðééiäP Äéêôýùóçò IPv6

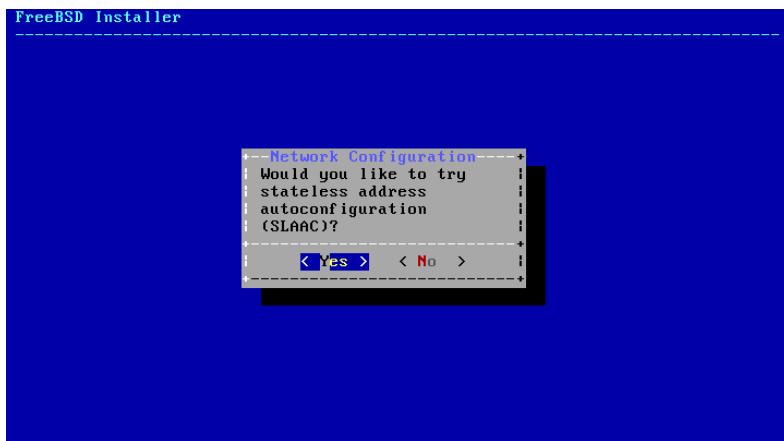


Ôi IPv6 äéâéÝôåé åðßóçò äýi iåèüäiõ ñýèiéóçò. Ôi SLAAC , P StateLess Address AutoConfiguration, ñõèìßæåé åðôüìåôå ôéò ðáñái Ýôñiõò ôiõ äéêôýïõ óáò. Ç ñýèiéóç Static áðáéôåß íá êÜíåôå ôéò áíôßóöié ÷ åò ñõèìßóåéò ÷ åéñiêßíçôå.

#### 3.9.2.3.1 IPv6 Stateless Address Autoconfiguration

Ôi SLAAC åðéóñÝðåé óå ieá óðóåðåðP åíüò äéêôýïõ IPv6 íá æçôPóåé ðëçñiñiñßåò áðôüìåôçò ñýèiéóçò áðü Ýíá ôiðééü äñiñieïäçôP. Äåßôå ôi RFC4862 (<http://tools.ietf.org/html/rfc4862>) ãéá ðåñéóóüôåñåò ðëçñiñiñßåò.

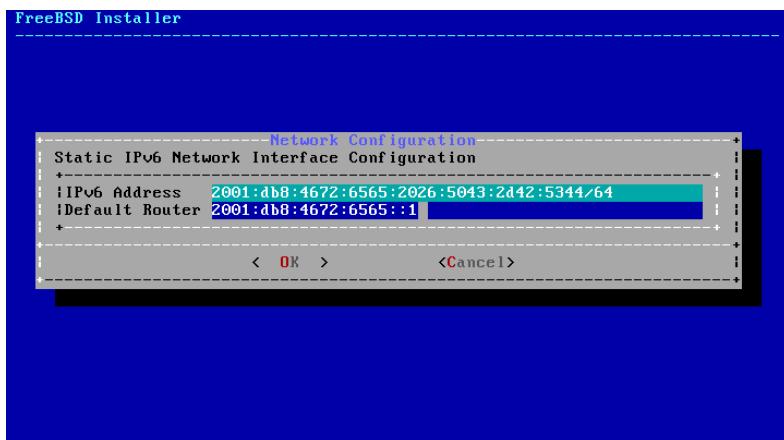
### Ó÷Piá 3-30. ÅðééÝîôå Ñýèiéóç IPv6 SLAAC



#### 3.9.2.3.2 ÓôáôéêP Ñýèiéóç Äéêôýïõ IPv6

Ç óôáôéêP ñýèiéóç ôçò äéåðáóPò äéêôýïõ óõi IPv6, áðáéôåß ôçí ÷åéñiêßíçôç åéóáâùâP êÜðiéùí ñõèìßóåùí.

### Ó÷Piá 3-31. ÓôáôéêP Ñýèiéóç IPv6

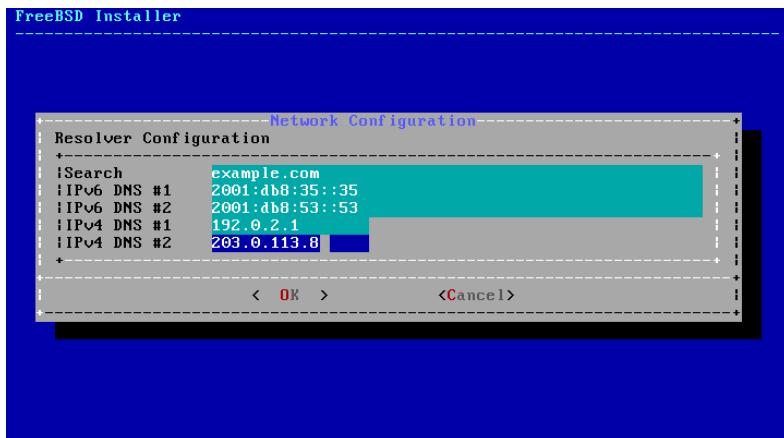


- IPv6 Address** - Ç äéâýèõíóç IP ðiõ èá åéóÜäâôå ÷åéñiêßíçôá óå áõõü ôií õðiëiæéôP. Ç äéâýèõíóç áõõP ðñÝðåé íá åßíáé ïíáæéêP êáé íá ìçí ÷ñçóéiiðiæåßôáé áðü êáÍYíá Üeeëi ìç÷Üíçíá óõi õiðéêü óáò äßêôõi.
- Default Router** - Ç IPv6 äéâýèõíóç ôiõ ðñiâðééëâåÍiõ äñiñiæåçôP æáé ôiäßêôõi óáò. ÓõíÞèùò åßíáé ç äéâýèõíóç ôiõ äñiñiæåçôP P Üeeëi ãéêôðåéiý åñiðééóíiý ðiõ óõíáÍåé ôi õiðéêü óáò äßêôõi ìå ôi Internet. Èá ôç åâßôå åðßóçò íá áíáöÝñåôáé ùò default gateway (ðñiâðééëâåÍiç ðýëç).

### 3.9.2.4 Ñýèiéóç ôiõ DNS

Ôi Domain Name System (Óýóôçìá ÍññÜôùí ÔññYá) P DNS iåôåôñÝðåé iññiaôá ñðíëiæéôþí óå äéåðèýíóåéò äéêôýiõ êáé òi áíôßèåôï. Áí ÷ñçóéiõðíëPóåôå DHCP P SLAAC ãéá íá ñðèiñóåôå áðôüñiaôá ôç äéåðáöP äéêôýiõ, ié áíôßóóïé÷åò ñðèiñóåéò ðééáíúí íá Ý÷iõí áßíáé Päç. Óðçí áíôßèåôç ðåññðòùóç, åÜëôå òi üññá ôññYá ôiõ ôiðééíý äéêôýiõ óóï ðåäßí Search. Óá ðåäßá DNS #1 êáé DNS #2 áßíáé ié äéåðèýíóåéò IP ôùí ôiðééíý áîððçñåôçôþí DNS. ×ññéÜæåôåé íá áéóÜäåôå ôiõëÜ ÷éóöií Yíá åññðçñåôçôþí DNS.

Ó÷Píá 3-32. Ñýèiéóç DNS

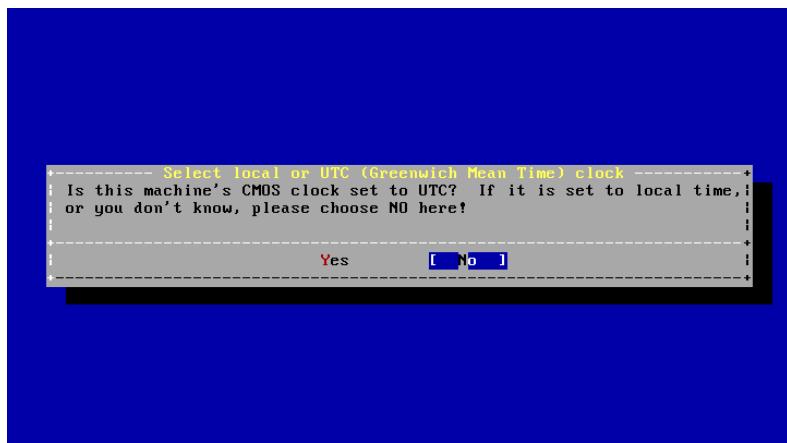


### 3.9.3 Ñýèiéóç ôçò AËþíçò ¿ñáò

Ç ñýèiéóç ôçò óùóôþò æþíçò þñáò óôï iç ÷Üíçìá óáò, åâáóöáëßæåé ôçí áðôüñiaôç áëëååäþ ôçò áðü ÷åñññéíþ óå åâññéíþ êáé òi áíôßóôññöi. ÅðéññÝðåé åðßóçò ôç óùóôþ ëåéöiññäßá üëùí ôùí ñðçñåóéþí ðiõ ó÷åôßæiiôåé iå ôçí ôþñçóç ÷ñññöi.

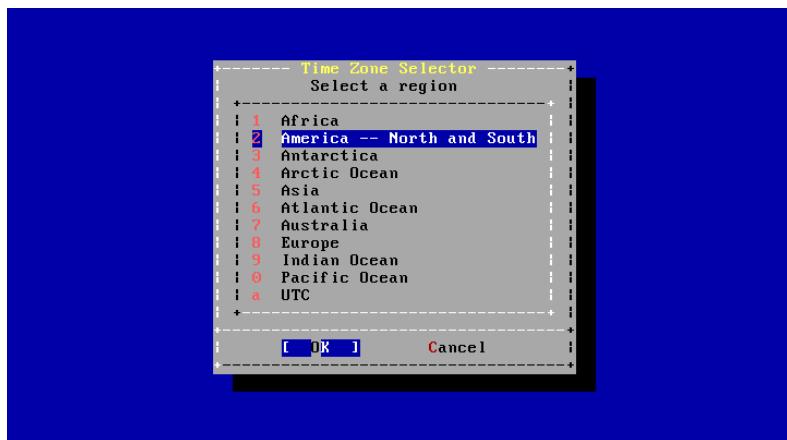
Ôi ðáñÜäåéäiá iåò áíáöÝñåôåé óå Yíá iç ÷Üíçìá ðiõ åñßóêåôåé óôçí Áíåöiññéþ æþíç þñáò ôùí ÇñùíYíùí Ðiññéåéþí. Ç äééþ óáò åðéëíäþ èá åßíáé äéáöiññåôéêþ áíÜëíäá iå ôç åñññåöéêþ óáò ðåññéi÷þ.

Ó÷Piá 3-33. ÅðééïäP Ôïðééïý P UTC Ñriëiãéiy



ÅðééÝîôå [ Yes ] P [ No ] áíÜëiää iå ôi ðùò åßíáé ñõèlëói Ýíi ôi ñiëüé ôiõ ìç-áíPiáôiò êáé ðéÝóôå **Enter**. Áí äåí ãñùñßæåôå áí ôi óyóôçìá óáð ÷ñçóéiiðíéâb pñá UTC P ôiðéêP, åðééÝîôå [ No ] áéá íá åðééÝîôå ôçí ôiðéêP pñá ðið åßíáé êáé ç ðéi óðíçèéoi Ýíç.

Ó÷Piá 3-34. ÅðééÝîôå iéá Ðåñéi÷P



ÅðééÝîôå ôçí óùóôP ðåñéi÷P ÷ñçóéiiðíéþíôå ôá ååëÜêéá êáé ðéÝóôå **Enter**.

### Ó÷Piá 3-35. ÅðéëiäP ×þñáò



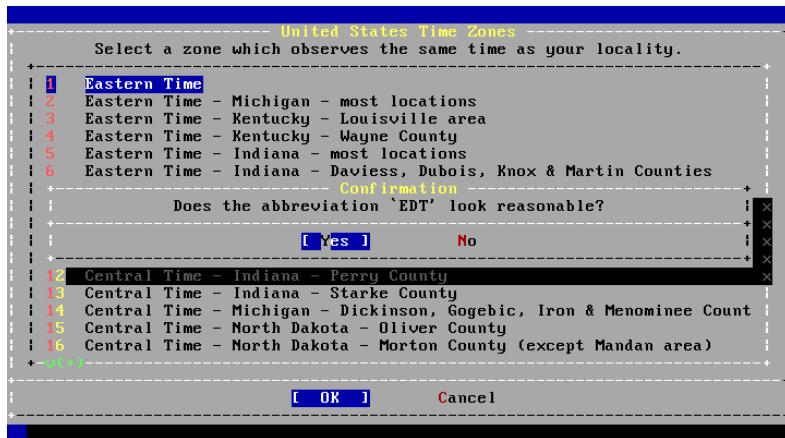
ÅðéëÝiôå ôç óùóôP ÷þñá ÷ñçóéiiðiéþíôåò ôá âåëÜééá êáé ðéÝóôå **Enter**.

### Ó÷Piá 3-36. ÅðéëiäP Åþíçò ¿ñáò



ÅðéëÝiôå ôç óùóôP åþíç þñáò ÷ñçóéiiðiéþíôåò ôá âåëÜééá êáé ðéÝóôå **Enter**.

### Ó-Þìá 3-37. Åðéââáâßùóç Æþíçò ðñáò

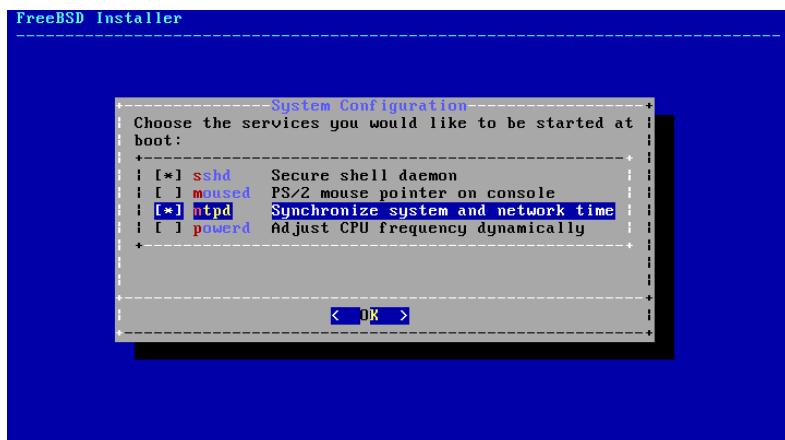


Åðéââáâéþóôå üôé ç óðíðíññáößá ãéá ôçí åðéëââí Ýíç æþíç þñáò åßíáé ç óùóôP. ðåéôá ðéÝóôå Enter ãéá íá õñíâ ÷ßóâôå ìå ôéò ðñüëéðâò ñðèíßóâéò.

### 3.9.4 ÅðéëâP Õðçñâóéþí ðïò èá Åíåññïðíéçèíýí

Ìðññâßôå íá åðéëâYâôå ðíéâò áðü ôéò ðñüóèåôåò ððçñâóßâò èá åíåññïðíéçèíýí óôçí åêéßíçóç. ¼ëâò ié ðáñáâÜôù ððçñâóßâò åßíáé ðññáéñâôééÝò.

### Ó-Þìá 3-38. ÅðéëâP Ðñüóèåôùí Õðçñâóéþí ðñò Æíåññïðíßçóç



### Ðñüóèåôåò Õðçñâóßâò

- sshd - Secure Shell (ÁóðáéYò ÊYéððiò) (SSH). Í äáßííáò ãéá áóðáéP áðñâéññóí Ýíç ðñüóâáóç.
- moused - ÐáñY ÷åé äðíáôüôçâ ÷ñPóçò ôiõ ðííðéééíý áðü ôçí ëííóüëá ôiõ óððôPíàòiò.
- ntpd - Network Time Protocol, ðñùôüêëëí ãéá ñýëíéóç ôçð þñáò iÝóù äéêôýiò (NTP). Í äáßííáò ÷ñçóéññíéâßóáé ãéá ôçí áððüüâòç ñýëíéóç ôiõ ñiiëíäéíý.

- powerd - Åïçèçôéêü ðñüäñâííá ãéá Ýëåã ÷ i éó ÷ ýìò êáé äéá ÷ åßñéóç åíÝñääéáò.

### 3.9.5 ÅíåñäiðiÞçóç Crash Dumps

Ôi **bsdinstall** èá óáò ñùôþóáé áí èÝëåôá íá åíåñäiðiÞóåôå ôá crash dumps óóï óýóôçíá óáò. Ç åíåñäiðiÞçóç ôúí crash dumps lðiñâß íá åßíáé ðiieý ÷ ñþóéïç óóïí åíôiðéóïü ðñiäëçíÜôùí õiõ óðóóþiaóïò êáé ãéá òi ëüäí áðóü óðíéóôïýíá íá ôá åíåñäiðiéåßóå üðáí åßíáé äoíåðüí. ÅðéëÝîòå [ Yes ] ãéá íá ôá åíåñäiðiÞóåôå, P [ No ] ãéá íá óðíá ÷ þóåôå ÷ ùñßò crash dumps.

Ó÷Þia 3-39. ÅíåñäiðiÞçóç Crash Dumps

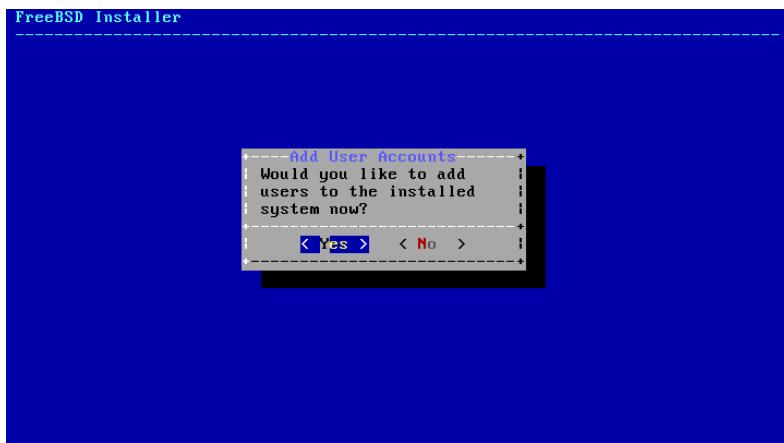


### 3.9.6 Ðñiöèþêç ×ñçóôþí

Ç ðñiöèþêç ôiõëÜ ÷ éóôïí åíüò ÷ ñþóôç êáôÜ ðçí åäêåô Üóôáóç, óáò åðéôñÝðåé íá ÷ ñçóéiiðiÞóåôå ôï óýóôçíá ÷ ùñßò íá åéóÝëèåôå ùò root. ¼ôáí åéóÝñ ÷ åóôå ùò root, åáí ððÜñ ÷ iðí ðñáêôéêÜ üñéá P õÜðiéí åßäiò ðñiöôáóßáò ó ÷ åóééÜ íå ôé òi ðñiñâßóå íá êÜíåôå. ¼ôáí åéóÝñ ÷ åóôå ùò êáññéêüò ÷ ñþóôçò, ðñiñâßóå íá ÷ åéñéóôåßðå ôï óýóôçíá óáò íå ðåñéóóüôåñç áóöÜëåéá.

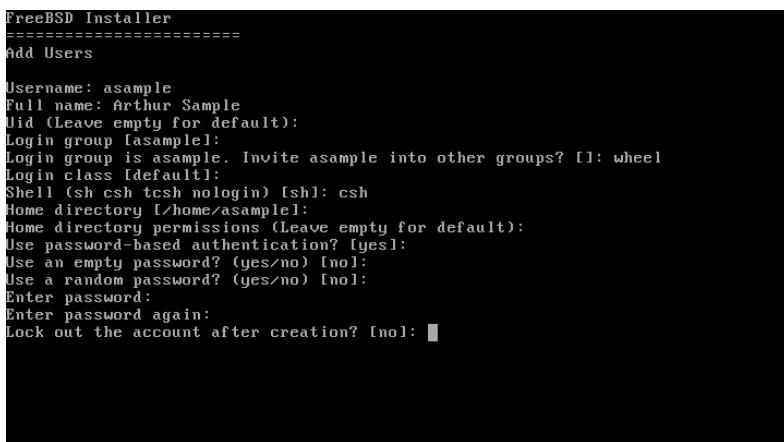
ÅðéëÝîòå [ Yes ] ãéá íá ðñiöèÝóåôå õÝiõò ÷ ñþóôååò.

### Ó÷Piá 3-40. ÐññóèPêç Èíäáñéáóíþí ×ñçóôþí



ÅéóÜäåôå ôéò ðëçñïöiñßåò ãéá ôi ÷ñPóôç ðiõ èá ðññóôåèåß.

### Ó÷Piá 3-41. ÅéóáùåP Ðëçñïöiñéþí ×ñPóôç



### Ðëçñïöiñßåò ×ñPóôç

- **Username** - Ôi üññá ðiõ èá ÷ñçóéññíéåß i ÷ñPóôçò ãéá íá åéóÝëèåé óôi óýóôçìá. ÔôðéêÜ ôi ðñþòi ãñÜñá ôiõ ïéññíý iñüñáðiò óå óoñäñáðiü iå ôi åðßèåôîü.
- **Full name** - Ôi ðëPñåò üññá ôiõ ÷ñPóôç.
- **Uid** - User ID. I áñññññéóéêüò áñéèñüò ÷ñPóôç. ÔoñPèùò äåí óðiðëçñþññòiå áðóü ôi ðåäßi, þóôå íá åðéëååååß áðóüññáôá Ýíáò áñéèñüò áðü ôi óýóôçìá.
- **Login group** - Ç iñÜää óóçí iññíá áíPêåé i ÷ñPóôçò. ÔoñPèùò ôi áöPññòiå êåíü þóôå íá ãßíåé áðíäååêòP ç ðññåðééååíÝíç ôeíP.
- **Invite user into other groups?** - Åðéðññóèåôåò iñÜää ÷ñçóôþí óôéò iññíá ëÝëiñòiå íá áíPêåé i ÷ñPóôçò.
- **Login class** - ÔoñPèùò äåí óðiðëçñþññòiå áðóü ôi ðåäßi, þóôå íá ãßíåé áðíäååêòP ç ðññåðééååíÝíç ôeíP.

- Shell - Óí éÝéööñò ðiõ èá ÷ñçóéiiðiéåß í óóñåéâññéí Ýíò ÷ñPóôçò. Óóï ðáñÜääéäíà ìáó åðééÝíáå ôï csh(1).
  - Home directory - Í ðññóùðéüò êáðÜëräiò ðiõ ÷ñPóôç. Ç ðññåðéëäíí Ýíç ôéíP åßíáé óðíPèùò ç óùóôP.
  - Home directory permissions - Óá äééäéþíáôå óðíí êáðÜëräi ðiõ ÷ñPóôç. Óá ðññåðéëäíí Ýíá åßíáé óðíPèùò óùóôÜ.
  - Use password-based authentication? - H ôððééP áðÜíôçóç åßíáé "yes".
  - Use an empty password? - Ç ôððééP áðÜíôçóç åßíáé "no".
  - Use a random password? - Ç ôððééP áðÜíôçóç åßíáé "no".
  - Enter password - Í êùäééüò ðññüóâåçò ãéá ôï óóñåéâññéí Ýí ÷ñPóôç. Äåí öáßíåôåé óðçí iëüíç êáèþò ðií ðëçéôññéiäíýìå.
  - Enter password again - Í êùäééüò ðñÝðåé íá åéóá÷èåß Üëëç iéá òïñÜ ãéá åðéåâåßùóç.
  - Lock out the account after creation? - Ç ôððééP áðÜíôçóç åßíáé "no".

Áöiy åéo Üüååôå üüååò ôéo ðëçñïiöñßåò, eá ååßôø ìéa ðåññßëçøç ôïïò êéá öi óyóôöçìá eá óåò ñùòÞøåé ãéá ôçí ïñëüöçöå ôïïòò. Áí êÜíååôå êÜðiéí ëÜëìò êåôÜ ôç äeÜñêåéá ôçò åéóåùñÞò, ãñÜøôå no êéá ïáíáðññóðåèÞøôå. Áí üéá åßíäé óùóôÜ, ãñÜøôå yes åéá íá äçëëiöññÞøååôå öi íÝi ÷ñÞøöç.

Ó÷Piá 3-42. ñäïò áðü ôç Äéá÷åßñéóç ×ñçóôþí êáé ïÜäúí

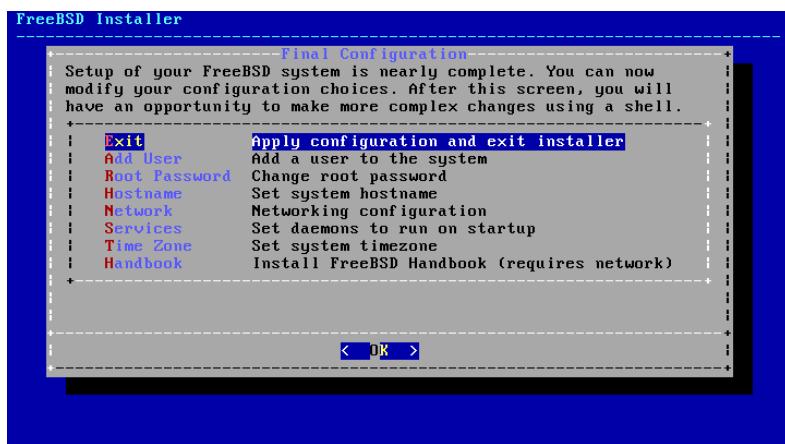
```
Login group [asample]:  
Login group is asample. Invite asample into other groups? []: wheel  
Login class [default]:  
Shell (sh csh tcsh nologin) [sh]: csh  
Home directory [/home/asample]:  
Home directory permissions (Leave empty for default):  
Use password-based authentication? [yes]:  
Use an empty password? (yes/no) [no]:  
Use a random password? (yes/no) [no]:  
Enter password:  
Enter password again:  
Lock out the account after creation? [no]:  
Username : asample  
Password : *****  
Full Name : Arthur Sample  
Uid : 1001  
Class :  
Groups : asample wheel  
Home : /home/asample  
Home Mode :  
Shell : /bin/csh  
Locked : no  
OK? (yes/no): yes  
adduser: INFO: Successfully added (asample) to the user database.  
Add another user? (yes/no): ■
```

Áí èÝéâôå íá ðññiôéÝóâôå ðåñéóóüôðññiôò ÷ñÞóôåò, áðáíôÞóôå óóçí åñþþôçóç "Add another user?" íå yes. ÁðáíôÞóôå ño áéá íá ôâéëåéhôåðå íå óçí ðññiôéÞêç ÷ñcôôbhí ééâ íá óóñiâ÷ßøåðå óçí åâéâðîÜóðåóç.

### 3.9.7 ÔåëéêÝò Ñôèìßóåéò

ÍlāðÜ ôi ÓÝeïò ôçò áæêáô Üóôáóçò êáé ôùí áñ ÷ eéþí ñoëìþóåùí, Ý ÷ áôå iéá ôåëåðôáßá áðêáéñßá íá áéëÜíâôå ôéò ñoëìþóåéò ðñéí ôçí Ýíjjä áðü ôi ðñüäñâìà áåêáðÜóôáóçò.

### Ó÷Piá 3-43. ÔåëéêÝò Ñôèìßóåéò



×ñçóëiiðieÞóôå áôôü ôi ìåñíy ãéá íá êÜíåôå iðieáóäÞðiôå áéëáãÝò P ðñüóèåôåò ñôèìßóåéò èÝëåôå ðñéí ôçí ieiëëÞñùóç ôçò åâéáôÜóôáóçò.

### ÅðéëïäÝò Ôåëéêþí Ñôèìßóåùí

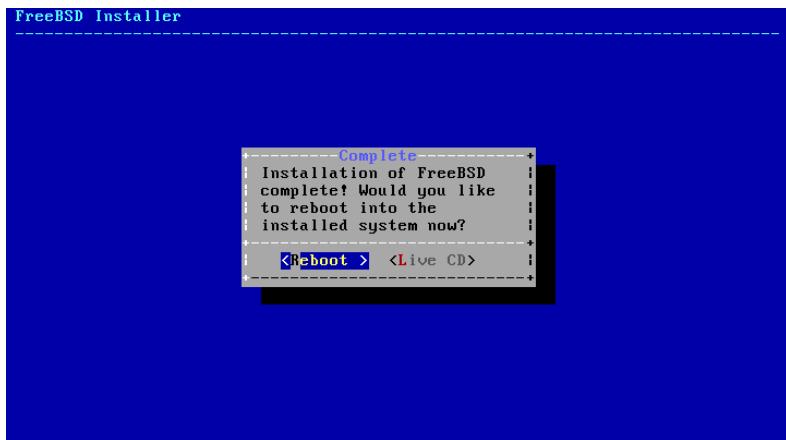
- Add User - ÐåñéänÜöåôåé óôi ÓiPiá 3.9.6.
  - Root Password - ÐåñéänÜöåôåé óôi ÓiPiá 3.9.1.
  - Hostname - ÐåñéänÜöåôåé óôi ÓiPiá 3.5.2.
  - Network - ÐåñéänÜöåôåé óôi ÓiPiá 3.9.2.
  - Services - ÐåñéänÜöåôåé óôi ÓiPiá 3.9.4.
  - Time Zone - ÐåñéänÜöåôåé óôi ÓiPiá 3.9.3.
  - Handbook - Íåôáöüñôùóç êáé åâéáôÜóôáóç ôiõ Åä÷åéñéäßiõ ôiõ FreeBSD (ôi iðißí äéáâÜæåôå áôôP ôç óôéäìP).
- Ìå ôçí ieiëëÞñùóç ôúí ôâëéêþí ñôèìßóåùí, åðéëÝîôå Exit ãéá íá êëåßóåôå ôçí åâéáôÜóôáóç.

### Ó÷Piá 3-44. ×åéñiêßíçôç Ñýëìéóç



Ôi **bsdinstall** èá óáò ñùôþóåé æéá ôõ÷üí åðéðëÝí ñðèìþóåéò ðiõ ðñÝðåé íá åßññõí ðñéí åðáíåêéíþóåå õóï íÝí óýóôçíá. ÅðéëÝiôå [ Yes ] æéá íá åêééíþóåå Ýíá êÝëõõiò ôóï íÝí óýóôçíá P [ No ] æéá íá ðñï÷ùñþóåå ôóï ôâæåôôåßí åÞiá ôçò åâæåôÜóôåóçò.

### Ó-Þia 3-45. Ieiëéþñùóç ôçò Åæéáô Üóôåóçò



Áí ÷ñâéÜæåôáé íá êÜíåôå ðåñéóóüôåñåò P åéæéêÝð ñðèìþóåéò, ìðiññåßôå íá åðéëÝíåôå [ Live CD ]. Íå ôçí åðéëíäP åôôP, Èá íâééíþóåå ôí íÝí åâæåôÜóôåóçò óå êáôÜóôåóç Live CD.

Íå ôçí ieiëéþñùóç ôçò åâæåôÜóôåóçò, åðéëÝíåôå [ Reboot ] æéá íá åðáíåêééíþóåå ôí ðiðëiæéóôP óáò êáé íá íâééíþóåå ôí íÝí FreeBSD óýóôçíÜ óáò. Íç ðâÜóåå íá åðáéñÝóåå ôí íÝí åâæåôÜóôåóçò áðü ôí ëäçäü CD (P ôçí USB ôðiäi÷P), äéáöiñåôééÜ ôí óýóôçíá óáò ßóùò íâééíþóåé íáíÜ áðü áôôü.

## 3.9.8 Åêéßíçóç êáé Ôåñíáôéóïüò ôiõ FreeBSD

### 3.9.8.1 FreeBSD/i386 Booting

ÉáôÜ ôçí åêéßíçóç ôiõ FreeBSD åìöáíßæiiôáé ðiðëeÜ ðeçñiöiñéåéÜ íçíýíåôá. ÕðóééiñéåéÜ, óá ðåñéóóüôåñá êðëiýí åâôüò ôçò iðëüçò. ÍåôÜ ôí ðÝëiò ôçò åêéßíçóçò åìöáíßæåôáé ç ðñiññiðP åéóüäiò ôóï óýóôçíá (login). Íðiññåßôå íá åâßôå òá íçíýíåôá ðiõ êýëçóáí åâôüò iðëüíçò ðéÝ åiiôåò ôí ðeþéññi Scroll-Lock æéá íá åâññäiøiéþóåå ôçí ðñiññéíP iñPìç êýëéðçò. ×ñçóéiñiðiéþóåå Ýðåéôå óá ðeþéññi PgUp, PgDn êáé óá åâëÜééå æéá íá åâßôå óá åâëéÜ íçíýíåôá. ÐéÝæiiôå ôí Scroll-Lock íáíÜ, èá åðéóôñÝóåå ôóçí êáiiééêP åðåéêüíéóç.

Óðçí ðñiññiðP login: anÜøôå ôí üññá ðiõ åçíéiññPóåå ëáôÜ ôçí åâæåôÜóôåóç, óði ðánÜäâéäiá ìáð asampl.e. Íá åðiøåýååôå íá åéóÝñ÷åôôå ùò root üôáí åâí åâßôå åðáññåßôçöi.

Ç åðíåôüôçóå ðñiò ôá ðßóù êýëéðçò ôùí íçíñiÜðñi ðiõ ðåñéññÜøáíå ðñiñçäiñiÝñùò åßíáé ðåñéiñéóíÝíç, åðñíÝñùò åâí èá ìðiñÝóåå íá åðôü ôíñ ññüðí íá åâßôå üëá. ÍåôÜ ôçí åâññäiò óáò ôóï óýóôçíá, ìðiññåßôå íá åâßôå òá íçíýíåôá áðü ôç åññiñP åíðiøíþí anÜøiññå ðmesg | less ôóçí ðñiññiðP. ÐéÝóåå q æéá íá åðéóôñÝóåå ôóç åññiñP åíðiøíþí üôáí ôâæåéþóåå.

ÔðééêÜ íçíýíåôá åêéßíçóçò (Ý÷iõí ðáñáëåéëéåß ié ðeçñiöiñßåò Ýéäiöçò):

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```

root@farrell.cse.buffalo.edu:/usr/obj/usr/src/sys/GENERIC amd64
CPU: Intel(R) Core(TM)2 Duo CPU E8400 @ 3.00GHz (3007.77-MHz K8-class CPU)
  Origin = "GenuineIntel"  Id = 0x10676  Family = 6  Model = 17  Stepping = 6
  Features=0x783fbff<FPU,VME,DE,PSE,TSC,MSR,PAE,MCE,CX8/APIC,SEP,MTRR,PGE,MCA,CMOV,PAT,PSE36,MMX,
  Features2=0x209<SSE3,MON,SSSE3>
  AMD Features=0x20100800<SYSCALL,NX,LM>
  AMD Features2=0x1<LAHF>
real memory = 536805376 (511 MB)
avail memory = 491819008 (469 MB)
Event timer "LAPIC" quality 400
ACPI APIC Table: <VBOX VBOXAPIC>
ioapic0: Changing APIC ID to 1
ioapic0 <Version 1.1> irqs 0-23 on motherboard
kbd1 at kbdmux0
acpi0: <VBOX VBOXXSDT> on motherboard
acpi0: Power Button (fixed)
acpi0: Sleep Button (fixed)
Timecounter "ACPI-fast" frequency 3579545 Hz quality 900
acpi_timer0: <32-bit timer at 3.579545MHz> port 0x4008-0x400b on acpi0
cpu0: <ACPI CPU> on acpi0
pcib0: <ACPI Host-PCI bridge> port 0xcf8-0xcff on acpi0
pci0: <ACPI PCI bus> on pcib0
isab0: <PCI-ISA bridge> at device 1.0 on pci0
isa0: <ISA bus> on isab0
atapci0: <Intel PIIX4 UDMA33 controller> port 0x1f0-0x1f7,0x3f6,0x170-0x177,0x376,0xd000-0xd00f a
ata0: <ATA channel 0> on atapci0
ata1: <ATA channel 1> on atapci0
vgapci0: <VGA-compatible display> mem 0xe0000000-0xe0fffff irq 18 at device 2.0 on pci0
em0: <Intel(R) PRO/1000 Legacy Network Connection 1.0.3> port 0xd010-0xd017 mem 0xf0000000-0xf001
em0: Ethernet address: 08:00:27:9f:e0:92
pci0: <base peripheral> at device 4.0 (no driver attached)
pcm0: <Intel ICH (82801AA)> port 0xd100-0xd1ff,0xd200-0xd23f irq 21 at device 5.0 on pci0
pcm0: <SigmaTel STAC9700/83/84 AC97 Codec>
ohci0: <OHCI (generic) USB controller> mem 0xf0804000-0xf0804fff irq 22 at device 6.0 on pci0
usbus0: <OHCI (generic) USB controller> on ohci0
pci0: <bridge> at device 7.0 (no driver attached)
acpi_acad0: <AC Adapter> on acpi0
atkbd0: <Keyboard controller (i8042)> port 0x60,0x64 irq 1 on acpi0
atkbd0: <AT Keyboard> irq 1 on atkbd0
kbd0 at atkbd0
atkbd0: [GIANT-LOCKED]
psm0: <PS/2 Mouse> irq 12 on atkbd0
psm0: [GIANT-LOCKED]
psm0: model IntelliMouse Explorer, device ID 4
attimer0: <AT timer> port 0x40-0x43,0x50-0x53 on acpi0
Timecounter "i8254" frequency 1193182 Hz quality 0
Event timer "i8254" frequency 1193182 Hz quality 100
sc0: <System console> at flags 0x100 on isa0
sc0: VGA <16 virtual consoles, flags=0x300>
vga0: <Generic ISA VGA> at port 0x3c0-0x3df iomem 0xa0000-0xbffff on isa0
atrtc0: <AT realtime clock> at port 0x70 irq 8 on isa0

```

```

Event timer "RTC" frequency 32768 Hz quality 0
ppc0: cannot reserve I/O port range
Timecounters tick every 10.000 msec
pcm0: measured ac97 link rate at 485193 Hz
em0: link state changed to UP
usbus0: 12Mbps Full Speed USB v1.0
ugen0.1: <Apple> at usbus0
uhub0: <Apple OHCI root HUB, class 9/0, rev 1.00/1.00, addr 1> on usbus0
cd0 at ata1 bus 0 scbus1 target 0 lun 0
cd0: <VBOX CD-ROM 1.0> Removable CD-ROM SCSI-0 device
cd0: 33.300MB/s transfers (UDMA2, ATAPI 12bytes, PIO 65534bytes)
cd0: Attempt to query device size failed: NOT READY, Medium not present
ada0 at ata0 bus 0 scbus0 target 0 lun 0
ada0: <VBOX HARDDISK 1.0> ATA-6 device
ada0: 33.300MB/s transfers (UDMA2, PIO 65536bytes)
ada0: 12546MB (25694208 512 byte sectors: 16H 63S/T 16383C)
ada0: Previously was known as ad0
Timecounter "TSC" frequency 3007772192 Hz quality 800
Root mount waiting for: usbus0
uhub0: 8 ports with 8 removable, self powered
Trying to mount root from ufs:/dev/ada0p2 [rw]...
Setting hostuuid: 1848d7bf-e6a4-4ed4-b782-bd3f1685d551.
Setting hostid: 0xa03479b2.
Entropy harvesting: interrupts ethernet point_to_point kickstart.
Starting file system checks:
/dev/ada0p2: FILE SYSTEM CLEAN; SKIPPING CHECKS
/dev/ada0p2: clean, 2620402 free (714 frags, 327461 blocks, 0.0% fragmentation)
Mounting local file systems:.
vboxguest0 port 0xd020-0xd03f mem 0xf0400000-0xf07fffff,0xf0800000-0xf0803fff irq 20 at device 4.0
vboxguest: loaded successfully
Setting hostname: machine3.example.com.
Starting Network: lo0 em0.
lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> metric 0 mtu 16384
    options=3<RXCSUM,TXCSUM>
    inet6 ::1 prefixlen 128
    inet6 fe80::1%lo0 prefixlen 64 scopeid 0x3
    inet 127.0.0.1 netmask 0xff000000
    nd6 options=21<PERFORMNUD,AUTO_LINKLOCAL>
em0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> metric 0 mtu 1500
    options=9b<RXCSUM,TXCSUM,VLAN_MTU,VLAN_HWTAGGING,VLAN_HWCSUM>
    ether 08:00:27:9f:e0:92
    nd6 options=29<PERFORMNUD,IFDISABLED,AUTO_LINKLOCAL>
    media: Ethernet autoselect (1000baseT <full-duplex>)
    status: active
Starting devd.
Starting Network: usbus0.
DHCPREQUEST on em0 to 255.255.255.255 port 67
DHCPACK from 10.0.2.2
bound to 192.168.1.142 -- renewal in 43200 seconds.
add net ::ffff:0.0.0.0: gateway ::1
add net ::0.0.0.0: gateway ::1
add net fe80:: gateway ::1
add net ff02:: gateway ::1

```

```
ELF ldconfig path: /lib /usr/lib /usr/lib/compat /usr/local/lib
32-bit compatibility ldconfig path: /usr/lib32
Creating and/or trimming log files.
Starting syslogd.
No core dumps found.
Clearing /tmp (X related).
Updating motd:.
Configuring syscons: blanktime.
Generating public/private rsal key pair.
Your identification has been saved in /etc/ssh/ssh_host_key.
Your public key has been saved in /etc/ssh/ssh_host_key.pub.
The key fingerprint is:
10:a0:f5:af:93:ae:a3:1a:b2:bb:3c:35:d9:5a:b3:f3 root@machine3.example.com
The key's randomart image is:
---[RSA1 1024]---
|   o..
|   o ..
|   .   o
|   o
|   o   S
|   + + o
|o . + *
|o+ ... .
|==o..o+E
+-----+
Generating public/private dsa key pair.
Your identification has been saved in /etc/ssh/ssh_host_dsa_key.
Your public key has been saved in /etc/ssh/ssh_host_dsa_key.pub.
The key fingerprint is:
7e:1c:ce:dc:8a:3a:18:13:5b:34:b5:cf:d9:d1:47:b2 root@machine3.example.com
The key's randomart image is:
---[ DSA 1024]---
|       ..     . .
|       o   .   +
|       .   .   E .
|       .   o   o   .
|       +   S = .
|       +   . = o
|       +   . * .
|       .   o   .
|       .o.   .
+-----+
Starting sshd.
Starting cron.
Starting background file system checks in 60 seconds.
```

Thu Oct 6 19:15:31 MDT 2011

FreeBSD/amd64 (machine3.example.com) (ttyv0)

login:

Ç äc̄iēiõñãß ôuì êëäcäéþí RSA êáé DSA iðriñâb íá ðÜñhåé êÜðièi ÷ñüñí óá áññÜ iç ÷áíÞiaôá. ÅBíåôáé üiùò iuñí óôçí ðñþôç åêëßíçóç êáé iuñí áí Ý÷åé ñõèiéôôåb òií **sshd** æáá aðôuìáôç åêëßíçóç. Ié aðuìáfåò åêééÍÞoáéò eá åßíáé õá ÷ýoáñâo.

Ôi FreeBSD ááí ááêáéóðóÜ eÜðíei áñáóééú ðáñéáÜeëíi áðú ðñíåðééíäþ, áéëÜ ððÜñ ÷iðíi áñéåðÜ áéáéÝóéíá ðñíð ááéáðÜóðáóç. Ááßóð ái ÊáöÜéæíi 6 áéá ðáñéóðóüðåññåð ðéçñïiöñßåð.

### 3.9.9 Ôåñìáôéóìüò ôïõ FreeBSD

İ óùóôùò ôâññâéôéïùò ðïõ FreeBSD áâáôóæßæåé ôá ââäññÝíá éâé ôí ðëéêú ôíõ ððiëüäéôôP óâò áðû æçieÜ. Äâí ðñÝðâé áðëþò íá äéâéüøâôå ôçí ôññöïräiöBá. Áí i ÷ñPöôçò óâò åbíáé iÝëò ôçò ñÜäâò wheel, iðiñâßôå íá åbíâôå ððâñ ÷ñPöôçò lâ ôçí åíöiëP su éâé ôçí åéôåññäP ôíõ êüäéëiy ôíõ root. ÄéaoïñâôéêÜ, oðiñâæåßôå ùò root éâé ÷ñçöéïðiñPöôå ôçí åíöiëP shutdown -p now. Ôí óýóôçiaé lâ ôâññâôßôåé lâ ôí òúðôù ôññüðiñ éâé eá äéâéïðâß éâé ç ðâññ ÷P ñâñyâiñiò.

Íðiñáðóå íá ÷ñçóëiðíðéÞóåôå ôi óoíñáðóíü ðéÞéññùí **Ctrl+Alt+Del** æá íá áðáíñåéééíÞóåôå ôi óyóööçìá, áëëÜ áðóü áðái óóíñóôåðáé êáðóÜ ôç æéÜñéåé åçò êáññééÞó èééóïññáßáò.

### 3.10 Áíóéìåôþðéóć ĐñïâëcìÜôùí

Ç áíüôçá ðïõ áéieïõeåb êáéýðôåé ôçí áíôeïåôþðéóç áâáóéêbí ðñïäæçí Üôùí áââéåóÜôðåóçò — áéá ðáñ Üääéäíá eïéí Ü ðñïäæþïåðá ðïõ Ý-÷iõí áíáôðåñéåb áðü ðïeëiyó ÷ñþðôåð. ÕðÜñ-÷iõí áðþðçò êÜðïéåð áññùðþðåéò êáé áðáíðþðåéò áéá üöiõð áðééöñíyí íá Ý-÷iõí ôi FreeBSD ùò dual boot iå MS-DOS P Windows.

### 3.10.1 Ôé íá ÊÜíåôå áí ÊÜôé ĐÜåé ÓôñáâÜ

Êüäù ôùí aeÜöiñuí ðåñeñéöiþí óóçí áñ÷éôåêöiíeëþ öiõ PC, äái åßíáé äöiñáöüí ç áíß÷íåðöç óööéåöþí íá åßíáé 100% áíëüðéööc. ÖðÜñ÷iñí üùø èÜðiñá áññüñåðöå ðiõ iðññåðöå íá êÜíåðöå áí c áíß÷íåðöç äái åßíáé åðéöö÷þo.

ÅëÝâîôå ôéò Óçìåéþóåéò Õëéêíý (<http://www.FreeBSD.org/releases/index.html>) åéá ôçí Ýëäïöç ôíø FreeBSD ðíø ÷ ñçöéíïðíéåßôå, åéá íá åååéùèåßôå üöé ôí ðëééù óåò ôðíööñçíßæåðåé.

Åßíáé åðßóçò ðéëáíü ç äéåæéåóßá áíß ÷ íåðóçò äéá ìéá óóðéåðP ðïò äái åßíáé ååéåðåóöçì Ýíç íá ðññiéåé Ýóåé ðññüåëçìå óöçí áíß ÷ íåðóç íéáð Üëëçò ððåñéðPò óðóðéåðPò. Óöçí ðåñßðòùóç áðòP, èá ðñÝðåé íá áðæñÝóåðå öçí áíß ÷ íåðóç äéá òc óðóðéåðP ðïò äcïëññåß öi ðññüåëçìå.

**Óciàßùóć:** ÊÜðíéá Õñïâëþìáôå áâéâåôÜóôåóćò ìðïñiyí íá áðiöåô÷eíýí þ íá ìåéùeíýí lâ ôçí áíåâÜèìéóć firmware áéÜöïñú õóôéâôþí ðeëéíýí êáé áéäéüôåñá ôçò ìçõñéêþò. Ôí firmware ôçò ìçõñéêþò áßíáé ôó÷íÜ áíñóðû íå òíí üñí BIOS. Íé ðåñéóðüôåñíé éåóåóéâåôåóóÝò ìçõñéêþí áæáé Ýòíí íéá áééôôåéþ ðiðíøéåðå åðú üððø ìðïñåßôå íá êåôååÜóôå áíåâéìéóÝò åéäüóåéó êáé áí Üëülaåò ðëçñïöïñßåò.

Íé êáôåóêåôáóôÝò óðíÞèùò óðíéóôïýí íá ìçí áíáâáèiþæåôå ôi BIOS ôçò ìçôñéêÞò áí äåí ôðÜñ÷åé êáëüò ëüäïò, üðùò ãéá ðáñÜäåéäìá iéá êñßóéïç áíçìÝñùóç. Ç áíçìÝñùóç åíäÝ÷åôáé íá áðïôý÷åé áöþiióåò ôi BIOS óå iéá åíäéÜiåóç êáôÜóôáóç êáé ôíï ôðiëëéóôþ åêôüò eäéôïññåßáò.

### 3.10.2 ÅñùôÞóåéò êáé ÁðáíôÞóåéò óôçí Áíóéìåôþðéóç ĐñïâëçìÜôùí

1. Ôi óyóôçìá iïõ óôåååååÜ íá áíóåðiëñßíåôåé êáôÜ ôçí áíß÷íåôóç óðóêåôþí óôçí åêêßíçóç P óðiðåñéöÝñåôåé ðåñßåññå êáôÜ ôçí åâéåôÜóôåóç.

Ôi FreeBSD êÜíåé åêôåååååÝíç ÷ñÞóç ôùí ôðçñåóéþí ACPI (åöüöiõ ôðÜñ÷åé) óðéò áñ÷éôåêôiíéêÝò i386, amd64 êáé ia64 þóôå íá ññðèiþóåé óùóôÜ ôéò óðóêåôÝò eáôÜ ôçí åêêßíçóç. Äðóôô÷þò ôðÜñ÷iõí åêüìá eÜðiéá ðñïäëÞiaåå ôüöi ôiï ACPI üöi BIOS firmware áñêåôþí ìçôñéêþí. Ìðiñåßôå íá áðåååññaiðiéÞóåôå ôiï ACPI eÝoiíôåò hint.acpi.0.disabled ôöi ôñßöi ôðÜäéi ôiõ ôiññôùôþ åêêßíçóçò:

```
set hint.acpi.0.disabled="1"
```

Êáèþò ç ñýèìéóç áðôP ÷Üíåôåé óå êÜèå åêêßíçóç, åßíåé áðáñåßôçöi íá ðñïóeÝóåôå ôçí iäçäßá hint.acpi.0.disabled="1" ôöi áñ÷åßi /boot/loader.conf. Ìðiñåßôå íá åñåßôå ðåñéóóüôåñåò ðëçñiöiñßåò åéá ôiï öiññôùôþ åêêßíçóçò ôöi ÔìPiá 13.1.

# ÊåöÜëáéï 4 ÂáóéêÝò jíiéåò óôï UNIX®

ÁíáèåùñçìÝñi áðü ôiï Chris Shumway.

## 4.1 Óýiiøç

Ôi áéüeiðeï êáöÜëáéï èá êáéýøåé ôeð ááóéêÝò áíðiïeÝò éáé eáéôïoñäßåò ôiï eáéôïoñäééiy óðóðPiaðiò FreeBSD. Ôi ìaãáëýôanii iÝñiô áððPò ôcò yéçò o÷åðßæåðoáé la üéá ôá E.O. ôiô åßíáé ááóéóíYíá óôï UNIX. ÅÜí ç yéç óáð öáßíåðoáé iééåßá iðiñäßåò íá äéáôñYíáðå ãñPäiñá áððü ôi êáöÜëáéï. ÅÜí - áíðeëÝðùò - åßóðå iÝiò óôï FreeBSD ôüðå iðuðäPðiðoå ðe ðñÝðåé íá äéáâÜóåðå ðñiðåðééêÜ iëüêëçñi ôi êáöÜëáéï.

ÌåðÜ ôcí áíÜäiùóç ôiï êáöáæáßiò, èá aíüñßæåðå:

- Ðùò íá ÷ñçóëiiðiéåßåò ôeð “âééííéêÝò eííðüéåò” ôiï FreeBSD.
- Ðùò eáéôïoñäiy íé Üääåéåò añ÷åßùí ôiï UNIX éáé èá êáôáëÜååðå ôcí ÷ñPóç ôùí file flags ôiï FreeBSD.
- Ôcí ðñiðåðééåáiYíç äéÜðáíç ôiï óðóðPiaðiò añ÷åßùí ôiï FreeBSD.
- Ôcí iñäÜíùóç ôùí äßóðùí ôiï FreeBSD.
- Ôé åßíáé êáé ðþò eáéôïoñäåß ç ðñiðÜñôçóç (mount) éáé åðiðñiðÜñôçóç (unmount) óðóðçìÜðùí añ÷åßùí.
- Ôé åßíáé ié äéáñäáóßåò (processes), ðá óPiaðå (signals) éáé ié åáßíiíåò (daemons).
- Ôé åßíáé ôi êÝëðöiò (shell) éáé ðùò íá aéëÜæåðå ôi ðñiðåðééåáiYñi ðåñéåÜëëí åññáóßåò.
- Ðùò íá ÷ñçóëiiðiéåßåò ááóéêÜ ðñiðñÜìáðå åðåñäñäåóßåò êáéiYñi (editors).
- Ôé åßíáé ié óðóðåðYò (devices) éáé ôá añ÷åßá óðóðåðPò (device nodes).
- Ðiéá Yéäiç åéôåéYóéñi ÷ñçóëiiðiéåßåò ôiï FreeBSD.
- Ðùò íá äéáâÜæåðå ôeð óåëßåð aíçèåßåò (manual pages) aéá ðåñéóðüôðñåò ðëçñiðñßåò.

## 4.2 ÅééííéêÝò Êííðüéåò êáé ÔåñìáðéêÜ

Ìðiñäßåò íá ÷åéñéóðåßåò ôiï FreeBSD la äéÜñiñðò ôññüðiðò. Jåò áðü áððiïyò, åßíáé ðëçéññiðiäþiðåò åíðiïeÝò êáéiYñi ñá Yíá ñåñìáðééü. Iå áððü ôiï ôññüði Y÷åðå óðå ÷Yñéá óáð Yíá åðYéééóï êáé aðiáðü eáéôïoñäééü óýóðçìá UNIX. ÅñðP ç aíññöçå ðåñéññÜöåé ôé åßíáé ôá “ñåñìáðéêÜ” êáé ié “ññóðüéåò” êáé ðùò iðiññiý íá ÷ñçóëiiðéçëiý óðiï FreeBSD.

### 4.2.1 Ç Êííðüéå

ÅÜí ååí Y÷åðå ñððèåßåò ôiï FreeBSD íá iåééíÜ áððüñåðå eÜðiïi ññáöééü ðåñéåÜëëí åññáóßåò, ôüðå áíÝðùò iåðÜ ôcí åééßíçóç ôiï óðóðPiaðiò êáé ôcí iéiðéPññóç ôùí óåñññüí åééßíçóçò (startup scripts) èá åìöáíéóðåß ç ðñiðñiðP óýíñååóçò (login prompt). Èá ååßåò eÜðé ðåññiïi ôcí iëüñç óáð:

Additional ABI support: .

Local package initialization: .

Additional TCP options: .

Fri Sep 20 13:01:06 EEST 2002

FreeBSD/i386 (pc3.example.org) (ttyv0)

login:

Ôi iþróðia iðriñðaß ía áßíáé ëßäií áæáöiñâôðéêü óðií óyóôðçia óáð, áæðÜ aáí ðñÝðåé ía áæáöÝñâé êáðÜ ðiðý. Èá áðôðÜóriða ôcí ðññiðií·Þ iað oðóðe óâæððoáðbâð aÿí aññaiÍYò. C ðññiðæððoáðbâð aññaiÍÞ áráðoÝñâé:

FreeBSD/i386 (pc3.example.org) (ttyv0)

ÁôôP ç ãñâîìP ðåñéÝ ÷ áé iãñéèÝ ðeçñïöñBåð aáá òi óyóôçìá ðiô iüëéo åêééíPóáôå, ÷ åôå iðñiôôÜ óáô iéá eiióüëá “FreeBSD”, ðiô ôñÝ ÷ áé iá åðâiåññåôôP áñ ÷ éôåêôííéêPò x86 ôçò Intel P Üëëí oóñâåôú<sup>1</sup>. Òi üññá áôôPò ôçò iç ÷ áíPò (üëåô ié iç ÷ áíÝò UNIX Ý ÷ iòi êÜðiéí üññá) åbñáé pc3.example.org, êáé Ý ÷ åôå áñíêéôü iðñiôôÜ óáô òi ôññiáôôéü ttyv0 — eiióüëá òiô oóôôPíáôîò.

Íeíêëcñþííôáò, c ôåëåðôáßá ãñáìíP åßíáé ðÜíôá:

login:

Óá áôöü ôi ïÝñiò èá ðñ Ýðåé íá ðëçêöñiïeräÞóåôå ôi “üññá ÷ñÞóôç” (username) æá íá óñíäåèåßôå óöi FreeBSD. Óôçí åðüñiåc åñüôcôå èá ðññéññÜøiöiå åéñéåbô áôôPí ôcí æéäééåbá.

#### 4.2.2 Åéóáãùãþ ×ñþóôc óôï Óýóôciá FreeBSD

ÊÜëå óýóôciá multiuser ÷ ñääéÜæåôáé êÜðíëíòò ôñüðíòò þóôá íá îá ÷ ùñßæåé êÜëå “÷ ñÞóôç” áðü ôíòò ððíëïßðíòò. Óðî FreeBSD (üðùò èáé óå üéä óå Ë.Ó. ðiò ááóßæïíöáé óóï UNIX), áðóü áðéóò ÷ Üíåðáé áðáéðþíðåò êÜëå ÷ ñÞóôçò íá “âßíáé óðíñååäái Ýìò (log in)” ðñéí íá ïðññåß íá ôñ Ýíåé ðñíññÜìñåðá. ÊÜëå ÷ ñÞóôçò Ý ÷ áé îá ÷ ùñéóðü úññíá (ôí “úññíá ÷ ñÞóôç þ userame”) êáé îñá ðñíñðüðéêþ äééèåßáá áóðáéåßáð, (óíí “éùäééü ðñüðååáóçþ þ password”). ÁðóÜ èá æcôcëíí áðü ôí FreeBSD óå êÜëå ÷ ñÞóôç ðñéí íá ôíò áðéóñáðåß íá ôñ Ýíåé iðñíëáàðíòå áðáññíäþ.

Áì Ýóùò ìåôÜ ôçí iëïéëÞñùóç ôùí äéññáóéþí åêëßíçóçò ôïö FreeBSD êáé ôùí óáíñßúí åêëßíçóçò (startup scripts)<sup>2</sup>, èá åïóáíéöôåß ôï ÿâïäéï ôçò ðñjöñïðÞò (prompt) êáé èá óáò æçôçèåß Ýá Ýâéññí üññíà ÷ñÞþôç:

login:

Áeá dán Üáééáíá, áó ðöfie Ýóitöia ðuò ði ümíá - ñiÞöðc öáó áßíáé john. Ðéçëðöfie ðøðå john öðçí ðñiðöñiðþ êáé ðáðÞöðå Enter. Èá áeíetöde ðøðå leá Íýá ðñiðöñiðþ áeá íá áßíóðå ðiü “éùnáééü ðñiðááóðc (password)”.

```
login: john  
Password:
```

Đéčéôñíriëiañbôå ðíþñá ðíí ëuñäéëü ðññúñååñdç ðíø jøhn, éæé ðåðñbôå **Enter**. Í ëuñäéëü ðññúñååñdç *ååí åþíáé mñåñuò!* Ååí = ñåñéÜñåñdç íá áíçóð = åñbôå *åæé åðññu*. Åñbñé åðññéÝð íá ñøñvå ðññúñååñdç *ñðñlåññbñé åæé ëuñäíòd* åñðñåññbñé.

ÐñÝðåé íá äåßôå óï MOTD P áëëéþò óï çìåñÞóéí ìþíðíá êáé óôç óóïÝ ÷ åéá ôçí ðñïðñïðP åíôïëþò (Ýíá ÷ áñáéðPñá #, \$, P %). Áðóü óçìáßíâé ðùò Ý ÷ åóå óðíäåèåß åðéôô ÷ þò óóï FreeBSD.

### 4.2.3 ÐíëéáðëÝò Èííóüéåò

Ç åéôÝéåóç åíôïëþí UNIX óå ìþá ùüíî èííóüéá ìðíñåß íá åßíáé ééáñïðíéçôéêP, áëëÜ óï FreeBSD ìðíñåß íá ôñÝ ÷ åé ôåðôü ÷ ñííá ðíëéÜ ðñïðñÜìíååá. Ç yðåñïç ìþá ùüíî èííóüéåò åéá ðëçéðñïðüäçóç åíôïëþí èá Póáí ðñäñååðééÜ åéëéðPò åéá Ýíá Ë.Ó. üðùò óï FreeBSD ðíð ìðíñåß íá ôñÝ ÷ åé ôåðôü ÷ ñííá ååéÜååò ðñïðñÜìíååá. Åäþ åßíáé ðíð ÷ ñåéÜæííðåé íé “åéëíééÝò èííóüéåò”.

Öi FreeBSD ìðíñåß íá ñðèïéñååß êåôÜëéçëå þóôå íá ðáññðóéÜæåðåé íå åéÜöïñåò åéëíééÝò èííóüéåò. Ç åíáéëååP åðü ìþá åéëíééP èííóüéå óå ïðíéåäPðíðå Üëéç ìðíñåß íá åßíáé ðåðþíðå ñåñééÜ ðëPéñðå óóï ðëçéðñïðüäéí. Ç Üëå åéëíééÝ ÷ åé óï åéüü ðçò êáÜéé åíüäïò, åéé åéþò åíáééÜóóååå åéëíééÝò èííóüéåò óï FreeBSD åðíèçéåýåé åéé åðåñååðééÜ ðñïðñååðééÜ ðíð åíðþðóåíé ÷ i ðëçéðñïðüäéí åéé iëüíç åéá åéÜåå èííóüéå óáí íá ððþñ ÷ å ðñäñååðééP åíáéëååP.

Óðíäñååðíß åéëéþí ðëPéññúí ÷ ñçóéïðíëíýíóåé åðü óï FreeBSD åéá ôçí åíáéëååP èííóüéþí<sup>3</sup>. Íðíñåßôå íá ÷ ñçóéïðíëíýíóåå Ðít-F1, Alt-F2, Ýùò Alt-F8 åéá íá iåðåååßôå óóëò åéÜöïñåò åéëíééÝò èííóüéåò óï FreeBSD.

Åéèþò åíáééÜóóååðå åðü ôç ìþá èííóüéå óóçí Üëéç, óï FreeBSD åðíèçéåýåé åéé åðåñåå Ýñåå ðñïðñååðééÜ ôçí åíðþðóåíé ÷ c iëüíç. Öi áðioÝéåóíå åßíáé Ýíá “iððééü ðñéé” óáí íá åß ÷ åí ðíëéåðëÝò “åéëíééÝò” iëüíåò åéé ðëçéðñïðüäéí ðíð åé ìðíñýååíå íá ÷ ñçóéïðíëíýíóåå åéá íá ôñÝ ÷ iðíðå åíóïëÝò óóï FreeBSD. Óá ðñäñÜìíååá ðíð ôñÝ ÷ åðü åéó ìéá èííóüéå ååí óðåñååðíý íá åééðññäýü üðååí ç èííóüéå ååí åßíáé iñáðP. Óðíå ÷ ßæïðí íá ôñÝ ÷ iðí ëé üðååí åñßóååóå óå åéåöïñååðééP èííóüéå.

### 4.2.4 Òi Áñ÷åßí /etc/ttys

Ç åí” iñéóïíý ñýèléóç óï FreeBSD èá åíééíÞóåé íå iéóþ åéëíééÝò èííóüéåò. Ååí ðñüéåéåå åéá iéá ðíëýðëíéç ñýèléóç åéé åðíñåßôå åýéïéå íá ôçí åéé Üååðå þóôå íá òïñðþññóåé ðåñéóðóüðåñåò P ðééåüðåñåò åéëíééÝò èííóüéåò êåôÜ õçí åéé åéëíééP. Öi ðëPéïò åéé ç ðáññååñðíßçóç ôúí åéëíééþí èííóüéþí ñðèïßæååå óóï áñ÷åßí /etc/ttys.

Íðíñåßôå íá ÷ ñçóéïðíëíýíóåå õï áñ÷åßí /etc/ttys åéá íá ñðèïßæååå õéò åéëíééÝò èííóüéåò óóï FreeBSD. ÊÜëå åññåìP ðíð áñ÷åßí ðíð ååí åßíáé ó÷ üëéç (íé åññåìP ðíð ååí iåñééññý íå ôñ ÷ åñáéðPñá #) ðåñéÝ ÷ iðí ñðèïßæåå ãéá Ýíá õåññååðééÜ P åéá iéá åéëíééP èííóüéå. Ç ðñíéåéíñéóíÝíç Ýéäïóç õïð áñ÷åßí, ç iðíßå ðåñéÝ ÷ åôåé óôçí åéáññP FreeBSD, ðåñéÝ ÷ åé åíÝå åéëíééÝò èííóüéåò, åé ôúí iðíßñ íé iéóþ åßíáé åíñññäðíéçíÝååò. Åßíáé óôéò åññåìP ðíð åéëíéíý íå ttv:

# name	getty	type	status	comments
#				
ttyv0	"/usr/libexec/getty Pc"	cons25	on	secure
# Virtual terminals				
ttyv1	"/usr/libexec/getty Pc"	cons25	on	secure
ttyv2	"/usr/libexec/getty Pc"	cons25	on	secure
ttyv3	"/usr/libexec/getty Pc"	cons25	on	secure
ttyv4	"/usr/libexec/getty Pc"	cons25	on	secure
ttyv5	"/usr/libexec/getty Pc"	cons25	on	secure
ttyv6	"/usr/libexec/getty Pc"	cons25	on	secure
ttyv7	"/usr/libexec/getty Pc"	cons25	on	secure
ttyv8	"/usr/X11R6/bin/xdm -nodaemon"	xterm	off	secure

Åéá iéá åéðññååP ðåñéåññåòP êÜëå óôPëçò ðíð áñ÷åßí åéé üëñí ôúí ñðèïßæåå ðíð iðíññý íå åöåññóôïý íåéå õéò åéëíééÝò èííóüéåò óðíññéåððååßôå ôçí óåëßäå åïçèåßåò ttys(5).

#### 4.2.5 ክፍና የፌዴራል ስርዓት በፌዴራል አገልግሎት

```
# name    getty                  type      status      comments
#
# If console is marked "insecure", then init will ask for the root password
# when going to single-user mode.
console none                      unknown off secure
```

Đññö Ý÷: åôå üôáí êÜíåôå ôçí iåôåññïðP óå *insecure*. ÅÜí óy: åé íá iå ÷ Üóåôå ôíï èùæéëü ðññóåáóçò ôïõ *root*, ç ðññóåáóç óå êåô Üóôåóç eåéöïññäåò åíüò ÷ ñbóôç ïðïññåß íá åññíåé äýóåáóç. ÕðÜñ: åé åéüïç ôñüðïò íá êÜíåôå åéêññíçóç, åéëü Bóùò íá åññíåé äýóéïëí åéá õðÜñ ãðí åññíññæåé ðïëéÙ åéá ôéó åéåññíåóñåò åéé ôå ðññäññíÜìåôå åéêññíçóçò ôïõ FreeBSD.

#### 4.2.6 ÁeëÜæïíôáò ôcí ÁíÜëöóç (video mode) ôçò Êííóüëáò

Ç Ծñiâðéêâà Ýíç áðâéêüíéóç ôçò êíñöüéåð óôî FreeBSD ìðiñâß íá ñòðèìéóðâôåð óâá áíÜëðóç 1024x768, 1280x1024, P óâå iðiéïäÞðiôå Üeeï iÝâåéëò ððiôðçñßæåðâé áðü ôçí êÜñôå âñáöéêþí êâé ôçí iëüíç óâð. Åéá íá ÷ñçöéiiðiéÞðâôå åæáöiññâðéêþ áíÜëðóç, éá ðñiÝðâé ðñiþðá áðü üëá íá áðááíâðâæüñðôðþðâôå ðiñi ððñiþðá óâð, êâé íá ðiñiðâññéëÜâðâôå ðéð ðáñâéÜôù äýí áðéëïäÝò:

```
options VESA  
options SC_PIXEL_MODE
```

Ílāð Ü òc iáðáðéþóðéóç òið ðõñÞíá iá ðéð ðáñáðÜñu áýí áðéëiä Ýð, iðñiñáßôð íá áñáßôð ðiéåð áíáéýóåéð  
ðõñóðçñíßæiðóáé áðü òi ðeééü óáð, ÷ñçóðiñðiéþíðóàò òi áiiçéçóéü ðññuññaià vidcontrol(1). Áéá íá áåßôð iéá ëßóôá áðü  
òeð ðõñóðçñéæüìåð áíáéýóåéð, áþþóð òcí áðüëiðóèç áiðiðP:

```
# vidcontrol -i mode
```

Ç Ýññäò ôçô åíööïÞò áôôÞò, åßíáé iéá ëßöôá áðü áíáëýóåéò ïëüíçò ðïõ õðriöôçñßæïíöáé áðü ôï õeeéü óáò. ïðmåßôå Ýðåéöá íá åðéé Ýíåôå iéá íÝá áíÜëöôç, äßññíåô ôçí ùò üñéöíá óôçí vidcontrol(1) óå iéá êííöüéå ðïõ Ý÷åôå óóññåèåß ùò root:

```
# vidcontrol MODE 279
```

Áí ç íÝá áíÜëööç áßíáé äåêôP, iðñiâßôå íá ôçí iñßóåôå ùò ðñiâðééäìÍíç áéá êÜeå áêêßíçöç, ià ôçí êåôÜëëçëç ñýëiéöç óöi ãñ ÷ åßi /etc/rc.conf:

allscreens flags="MODE 279"

## 4.3 ¶ääéåò (Permissions)

Ôï FreeBSD åßíáé áðüäñò òïõ BSD UNIX, êáé æáé áðôü òï ëüäï åáóßæåôáé óå ïåñéêÝò Ýííéåò êëåéäéÜ òïõ UNIX. Ç ðñþòç áéé ðéï õçìáíôééÞ åßíáé ðùò òï FreeBSD åßíáé Ýíá ðieð ÷ ñçóôéêü (multiuser) èåéîïññåéêü óýóôçìå. Ôï óýóôçìå ïðiññåß íá åíððçñåðÞóåé ðíëëíýò ÷ ñþðóåò ðïõ åññåÜæññåéé ðáðôü ÷ ññíá èáé óå åíðåéþò åíññÜñðçðåò åöåññåäÝò. Ôï óýóôçìå åßíáé ððåýèõíí æáé òií óùðôü æéññéñåñòü êáé ôéò áíÜæåò åéá ÷ åßñéóçò óôóéåôþí hardware, ðåññéóåññåéåþí, iíþìçò, êáé õçí óùðôþ éåðåññò ðüññí ôçò CPU åéá êÜëå ÷ ñþðóç.

ÅðåéäÞ òï óýóôçìå Ý ÷ åé õçí ééññüôçðå íá åíððçñåðåß ðíëëíýò ÷ ñþðóåò, óå ïöéäþðiôå åéá ÷ åéññßæåôáé, ððÜñ ÷ åé ïéá iñÜääå åääééþí ðïõ iñßæåé ðíëíò ïðiññåß íá åéååÜóåé, íá åññÜøåé êáé íá åéååéÝóåé áðôiýò ðiðò ðüññiðò. Íé Üääéåò åðièçêåýiñðåé óå iéòÜääåò åéá ÷ ùñéóíÝñç, Ýíá åéá òií éäéièôþòç òiõ áñ ÷ åßiõ, Ýíá åéá ôçí iñÜääå óôçí ïðiñßå åíþéåé òií áñ ÷ åßi, êáé Ýíá iÝñò ãéá üëiðò ðiðò Üëëiðò. Óðç óôñÝ ÷ åéá ðáñññóéÜæåôáé ðßíáéåò iå ôéò áíðéóôïé ÷ ßåò iñðååý ôùí iñÜääå åääééþí êáé ôúí åñéèçðééþí òiðò ôéíþí.

Óéíþ	¶ääéå	ÅìöÜíéóç óå ðåñéå ÷ üìåíá éåôåëüäúí
0	ÁíÜäññóç:ü÷é, Ååññåöþ:ü÷é, ÅêôÝëåóç:ü÷é	---
1	ÁíÜäññóç:ü÷é, Ååññåöþ:ü÷é, ÅêôÝëåóç:íáé	--x
2	ÁíÜäññóç:ü÷é, Ååññåöþ:íáé, ÅêôÝëåóç:ü÷é	-w-
3	ÁíÜäññóç:ü÷é, Ååññåöþ:íáé, ÅêôÝëåóç:íáé	-wx
4	ÁíÜäññóç:íáé, Ååññåöþ:ü÷é, ÅêôÝëåóç:ü÷é	r--
5	ÁíÜäññóç:íáé, Ååññåöþ:ü÷é, ÅêôÝëåóç:íáé	r-x
6	ÁíÜäññóç:íáé, Ååññåöþ:íáé, ÅêôÝëåóç:ü÷é	rwx-
7	ÁíÜäññóç:íáé, Ååññåöþ:íáé, ÅêôÝëåóç:íáé	rwx

Íðiññåßå íá ÷ ñçóéiïðíëþðåå õçí åíðiëÞ ls(1) iå ðññüèåíá -1 óôçí åññíþ åíðiëþí åéá íá ååßðå ðá ðåñéå ÷ üìåíá êåóåëüäíò åéá ðáññåöñþðóå ðùò ðåñéÝ ÷ åôåé ïéá óôþëç iå ôéò Üääéåò ôùí áñ ÷ åßñí åéá òií éäéièôþòç, ôçí iñÜääå, êáé åéá üëiðò ðiðò Üëëiðò. Åéá ðáñÜääéåíá, áí åþóïðiå ls -1 óå Ýíá ôô ÷ åßi, êáôÜëëiäi, åéäéêÞ

```
% ls -l
total 530
-rw-r--r-- 1 root  wheel      512 Sep  5 12:31 myfile
-rw-r--r-- 1 root  wheel      512 Sep  5 12:31 otherfile
-rw-r--r-- 1 root  wheel    7680 Sep  5 12:31 email.txt
...
```

Ç ðñþòç óôþëç ðïõ ðåßññiðiå iå ôçí åíðiëÞ ls -1 åéá ÷ ññßæåôáé ùò åíþò:

```
-rw-r--r--
```

Í ðñþòç ÷ åññåöþñåò (áðü óå áñéóôåñÜ) iåò åíçìåñþíåé áí ðññüèåéóåé åéá Ýíá éáññéêü áñ ÷ åßi, êáôÜëëiäi, åéäéêÞ

IÝ ÷ nē ääþl åßíáé üëá êáéÜ, áéëÜ üiñùò ðùò ðiý öýööciá åéÝá ÷ áé ðeó Üäåéåò öööåéðöþí; Öi FreeBSD iåôá ÷ åéñßæåôåé ööèo ðåñéööüöåñåò öööåéðÝo óáí Yíá áñ÷åßi ðiýiþí ôá ðñiñäñÜiñåá iðiñiýí íá áñiþiñöí, íá åéåáÜöriöí éáé íá åñÜøiöí óá åooü óáí íá Pöáí Yíá iðiñiþiðiôá áñ÷åßi. ÅööÜ ðá åéäééÜ áñ÷åßá öööåéðöþí aðiñçéåÿiñöé ööií èåôÜëiñ /dev.

Óří ðýóðiciá iáðóá ÷ áéñbæðóáðé áðbþóðó êáé ðíðó ëáðáéüäiðó ùð áñ ÷ áßá. ÷ iðí Üáððéåð áíÜáñúñóð, ááññáðóþò êáé áðó Ýëáðcò. Óří bit ðið iñþæðé óçíj áéð Ýëáðc óðiðó ëáðáéüäiðó Ý ÷ áé áéñbøðóþò áéáðiññáðééü íüçjá áðü üðé óðá áñ ÷ áßá. ¼ðáí Ýíáð éáð Üëiñið Ý ÷ áé iñéðóðáß áéðóðéÝðéiið, óçíjáßíáé ðùð áßíáé ðñiððáðéÜðéiið, áçéáðáP áßíáé áððéññáððóú íá ðãñÜótiðl áðá Ýíá ððiðéåð Üëiñi ðiðó (íá ñÜñiðl áðá "cd"). Áððóú áðbþóðó óçíjáßíáé ðùð áððéññáððóú íá ðñiñðáðáóç óá üéá ðá ññúñðóÜ (áððóú Ý ÷ áé íá ñÜñáé lð ðið Üáððéåð ðùð ßáéúñ ðið áñ ÷ áßñú) áñ ÷ áßá.

Åéæéüöåñä, ãéá íá åïöáíßæïîðåé óå ðåñéä÷ üïåíá éåðåëüäïõ ðñ Ýðåé íá Ý÷åé óåèåß Üääééá áíÜäñúóçò (read) óóïí éåðÜëïä, åíþ ãéá íá åéæáññöåß Ýíá áñ÷åßí ðiø iðiíßiø áñùñßæåðå öi üññå åßíáé áíåñéåßí íá Ý÷iøí ãïëæåß íé Üääééåð ååäññöÞò (write) èéé åéôÝéåóçò (execute) óóïí éåðÜëïä ðiø ðåñéÝ÷åé öi áñ÷åßí.

ÓðÜñ÷iðí eé Úëeá bit áääéþí, áeeÜ ÷ñcóeiðiéiyíðáé êðññßùò óå áéäéê Ýð ðãñéðþóåéò üðùò óå setuid binaries éáé sticky directories. Áí è Ýéåðá ðãñéóótiðaññåò ðeçññiññßåò áæá ôéò Úäåéåò áñ÷åßùí êáé ðùò íá ôéò iñßæåðå, óóíâjöéåðóðåßóò iðñùòðþðjóå òcí óáéßáá manual chmod(1).

### 4.3.1 ÓõjâïëéêÝò Täååéåò

Óðráð Tom Rhodes.

Íé óðíláiðíéé Ýð Üääéåð, iåñéé Ýð oïñ Ýð áíáð Ýñíóáé êáé ùò óðíláiðíéé Ýð åêöñ Üóåéð, ÷ñçóéïiðíéíý ÷áñáéð Pñåð óðíçí è Ýðc òúí iéðþ ðéíþí áæá íá è Ýðíð Üääéåð óå áñ ÷áßá P éáðóáéüäðð. Íé óðíláiðíéé Ýð åêöñ Üóåéð ÷ñçóéïiðíéíý óçí óvýðóáíç (ðíéïð) (åñÝñåðéá) (Üääéåð), üðjð ãßíáé æéáé Ýðéíåð ié áéüëíðéåð ðéí Ýð;

Àðééïäþ	ÃñÜììá	Óçìáßíåé
(ðiéíò)	u	User ( $\times \tilde{n}P\tilde{o}\tilde{c}\tilde{o}$ )
(ðiéíò)	g	Group owner ( $\tilde{H}U\tilde{a}\tilde{a}\tilde{\circ} \tilde{d}\tilde{i}\tilde{o} \tilde{a}\tilde{I}P\tilde{e}\tilde{a}\tilde{e}$ )
(ðiéíò)	o	Other ( $\tilde{O}\tilde{d}\tilde{u}\tilde{e}\tilde{e}\tilde{d}\tilde{i}\tilde{e} \div \tilde{n}P\tilde{o}\tilde{o}\tilde{a}\tilde{o}$ )
(ðiéíò)	a	All (üëéé, “world”)
(âíÝññååéá)	+	Ðñüöèåóç áäåéþí
(âíÝññååéá)	-	Áöåßñåóç áäåéþí
(âíÝññååéá)	=	¶låöiò iñéöiüò áäåéþí
(Üääéåò)	r	Read (ÁíÜäñùóç)
(Üääéåò)	w	Write (Åääñáöþ)
(Üääéåò)	x	Execute (ÅêöÝëåóç)
(Üääéåò)	t	Sticky bit
(Üääéåò)	s	Set UID þ GID

Ié ôéí Ýô áæó Üäïíôáé íå ôcí áîöreP chmod(1) üðòù ðñéí, áéëÜ íå ãñÜìïáôá. Æá ðánÜäåéïá, èá iðimñýóáôá íå ÷ñçóéïïðrePôåôá ôcí áéüëïöeç áîöreP ãéá íå áðåäïñâýóåôå óå Üëëïò ÷ñPôåôå ôcí ðñüöååóç óóï FILE:

```
% chmod go= FILE
```

Íðiñíýí íá ábíirói ðÜúu áðü iþá áeëáá Ýð óóðeo Üäåéðo áíðüo áñ ÷ ábíið oáðoo ÷ nñíá áéá ÷ unñbaëiiðoáðo óeo áeëáá Ýð íå êtiðia. Áéá ðáñ Üäåéæíá, ç áeüeïðeç áfíðeP eá áoáéñ Ýóáé óóçí iñ Üäá éáé óóí “ððüeïéði êuóí” óçí Üäåéá áåññáðPø, éáé óóç óóí Ý ÷ áéá eá ðñiðe Ýóáé Üäåéá áéô Ýéåóçò óá üeïðo.

% chmod go-w,a+x FILE

### 4.3.2 FreeBSD File Flags

*ÓíåéóöñÜ ôiõ Tom Rhodes.*

ĐÝñá áðü ôéo Üääéåò áñ÷åßúí ðiö oóæçöÞèçéåí ðñéí áðü èßäi, oí FreeBSD ððiöôçñßæåé ôçí ÷ñÞöc ôùí "file flags." ÁôõÜ óa flags ðñiøé Ýòiöí Ýá áðéññüöèåòi áðßðåäi áóöáëåßáò êáé åëÝá÷iö óá áñ÷åßá, áééÜ ü÷é óá êåôäéüäiø.

ÁôôÜ ôá flags ðññíòé Ýôïòí Ýíá ðññóéåôï áðßðåäï åëÝá ÷ iø óå áñ ÷ åßá, äéáóöäéßæïïôáò iàò ðùò óå êÜðïéåò ðññéðôþóåéò áéüïç êé í root íá lçì ìðïñâß íá äéáâñÜþåé P íá låôåôñÝþåé áñ ÷ åßá.

Ç iàôåáôñïðP ôùí file flags àßíåôáé íå ôçí chflags(1), ÷ñçóëiiðiéþíôå ìéá áðëP àéáóýíååóç. Áéá ðánÜäåéâíá, àéá íá åíâññïðiéþíôìå ôí flag ôíö öóôóðþíâòò íç àéáññåðPò áñ ÷åßíö ôóí áñ ÷åßí file1, àßíññå ôçí áûüëiøç áîðiøP:

```
# chflags sunlink file1
```

Êáé ãéá íá áðåíâñáíðíéÞóíñíá ôí flag ôíõö óóôôÞláôíö lç äéáñáöÞò áñ÷åßíö, áðéÜ äßíñíölä ôçí ðñíçäýíåíç åðííëÞ ia “no” íðñíöôÜ áðü ôí sunlink. ÐáñáôçñíÞóôå:

```
# chflags nosunlink file1
```

Ãéá íá äåßôå ôá flags åíüò áñ÷åßïö, ÷ñçóëiiðjéÞóôå ôçí åíöiëÞ ls(1) iå ôi ðñüèåíá -1o:

```
# ls -lo file1
```

Óðcí Ýññäi èá ðñÝðåé íá äåßôå êÜðé ðáññüìíéí íå ôi áêüëíðëéí

```
-rw-r--r-- 1 trhodes trhodes sunlnk 0 Mar 1 05:54 file1
```

lanneeÜ flags lðiñiñyí íá ðñiñóðåæíý P íá áoáéñåeíý iüír áðü ôíí ÷ñPóôc root. Óðeò ððüëieðå ðåñéðþóåéò, í eäéiêðþóç ðiñ ãñ ÷åbíø lðiñåb íá èÝóåé áðôÜ óå flags. Ðñiñóðåbñðiå óðiñò äéá ÷åñéñóðÝò íá aéáâÜóíði óðeò óåëßå ðiñceðåb å chflags(1) eáé chflags(2) aéá ðåñéñóðå ðeçñiññbåò.

#### 4.3.3 Íé ¶ääéåò setuid, setgid êáé sticky

Óðráður óðruður áður óðruður Tom Rhodes.

Åêôöüò áðü ôéo Üäåéåò ðiö Ý÷iöìå óoæçöÞóåé Þäc, õðÜñ÷iöí ôñåéò áêüìá ôeo iðrißåò êÜèå aéá÷åéñóôÞò ðñÝðåé íá ãiùñßæé. Ðñüéåéôáé aéá ôeo Üäåéåò setuid, setgid ééé sticky.

Íé ðáñáðÜñ áßíáé óçìáîôéé Ýò áéá êÜðíéåò éåéóïññåò óóï UNIX, éáèþò ðáñÝ÷ïñí éåéóïññåò ðíñ ááí áßíáé ÿöóééïæéÜ áééé Ýóéåò óóïðò ëéíñvò ÷ñÞóôåò. Áéá íá óéò êáðáúíÞóåò, éá ðñÝðåé ðñþóå íá éáôáæÜâåò óçí

æáéóïñ ïåðåáý ôíö ðñáàíáðééý áíááñùñéóééý ÷ ñþóôç (real user ID) êáé ôíö áíññäý áíááñùñéóééý ÷ ñþóôç (effective user ID).

**Óciāßuóč:** Ç åðééïäþ nosuid óðóci áíðiøþ mount(8) éá ðñïiæáéÝóåé áðiøð ÷ Bå áéðóÝéæóçò áðóþí ðúi áíðiøþí, éáé iÜééooå ÷ uññBò êÜðiøí iþløiá ëÜeøðo. Iá èëßáá ëüäéá, ç åéðóÝéæóç öiøð éá áðiøð ÷ áé, éáé i ÷ñiþóðóçò áái éá áíçiañùèåß áéá áðóöü. Ç åðééïäþ áðóþí áái áßiøáé áðßøçò áðüëøðóá áóðáéþò, éáéþò (óýiøùiá iá óç óåéßáá manual mount(8)) ððÜñ ÷ áé óññüðiø lá ðáñáéáíøéåß iÝóú éÜðiøí iáíæÜiáøiø nosuid ðñïiññUíøiø (wrapper).

Íðiñáþóá íá éáeñþóáô ôcí Üääéá setuid, öiðiæåðþíóáô ôií áñéèü ôÝóóåñá (4) ïðñiööÜ áðü ôií ãáiéêü óåô ôuí áääéþí, üðùò öäßfâóáé ôöií áéüeiðëì ðánÜääéñá:

```
# chmod 4755 suidexample.sh
```

Íé Üääéåò óöï áñ÷åßï *suidexample.sh* èá öáßiióáé ôþñá üðùò ðáñáêÜôù:

```
-rwsr-xr-x 1 trhodes trhodes 63 Aug 29 06:36 suidexample.sh
```

ÐáñâóçñÞóðå ðóî ðáñ Üääéäíá, üðé ðír s åþíráé ðéÝíï ðír ðír ðóðüüëið áääéþí ðír Ý : ðír êæiñéðóðåß áéá ðír éæciðøÞóðç  
ðír áñ ÷ðíø, éáé Ý ÷ áé áíðééáðåóðÞóðé óçí áíðþðóðíé ÷ ç Üääéá áéð Ýéåóçð. Íå ðír ðñðüði ðóðü áéðóðü áéðóðiññíyí  
ðññññÜññáðå ðír ÷ ñðéÜæññðóáé áðñçí Ýíá áééáþíáðå, üððù áéá ðáñ Üääéäíá c áíðöéÞ passwd.

Ãéá íá ðáñáôçñÞóåâ áôòÞ ôç èäéöïññáßá ôçí þñá ðïò oðiâáßíáé, áñiññiôå äyï ôðññáôééÜ. Óoï ðñþöi, tâééíÞóåâ ôçí  
âiðiëÞ passwd ùò êáññiééüò ÷ ñÞóôçò. Éáèþò c åiðiëÞ åêðåëåßôåé êáé ðåññiÝíåé ãéá ôçí åéðåùäÞ ðiò ÍYiò èuæéëiý,  
åëÝåôå öiú ðßñáéå åëåññáóébi ééå áíáæcôÞóåâ ôéò ðëcññiññßåò ðiò ÷ ñÞóôç ðïò åêðåëåß ôçí åiðiëÞ passwd.

Óõi ôåñìáôéêü Á:

```
Changing local password for trhodes
```

Óõj õåñìáõéêji Ä:

```
# ps aux | grep passwd
```

```
trhodes 5232 0.0 0.2 3420 1608 0 R+ 2:10AM 0:00.00 grep passwd  
root    5211 0.0 0.2 3620 1724 2 I+ 2:09AM 0:00.01 passwd
```

**1/4**ððñù áðþðáñia ðáññáðÜñú, ç áíðóñëþ passwd áðéðåðéëþðóáé áðñù Ýíá éáññíééñù ÷ ñÞróðç, áëëÜ ÷ ñíçóðéiiðíéáð ði áðñññáü UID ðið ÷ ñÍÞróðç root.

Ç Üääéá setgid åêôåäéåß ôçí ßæéá èåéöiõñäßá üöduò êáé ç setuid, áëeÜ åðéäñÜ óóéó Üääéåò ôçò iiÜääó (group). ¼ôáí åêôåéÝóåôå iéá ôÝôíéá åðáññiiP P äïçèçöôéü ðñüäñäííá, èá ÷ñçóéiiðiéåß ôéó Üääéåò ôçò iiÜääó óôçí iðiñá áíPéåé öi áñ÷åßi. êáé ü÷é öiõ ÷ñPööc ðiõ öçí iâéßíçöå.

Ãáá íá è Ýóåôå ôçí Üääéá setgið óá Ýíá áñ÷åßí, èá ðñÝðåé íá ôïïðèåôþóåôå ôïï áñéèìü äýí (2) iðñiööÜ áðü ôï öýñíi áäåééþí, ôôçí áîïöëÞ chmod. Ååßôå ôï ðáñáéÜôù ðáñÜääéâíá:

```
# chmod 2755 sgidexample.sh
```

¼ðóðu ðáé ðññéí, éða ðáññåôçñÞóðå ðôç íÝÁ Üäåéá s, æééÜ áðôðþ ðôç ðññÜ ðôï ðåô ðûñ áåðéþí ðôçð nÜäåð:

```
-rwxr-sr-x 1 trhodes trhodes 44 Aug 31 01:49 sgidexample.sh
```

Íé ayí ðñþoåð áææéé Ýò Üääéåò ðið ááíö Ýñáiå, íé setuid êáé setgid, ááíå ÷ iÝñùò íá iæþóïoi òcí áóö Üääéå òið ðóðóðþiáòiò, aðiý áðéñò Ýðiðiòi ðá ðñiäñ Üìñáðá íá áðéðæiýíðáé íå aðiçí Ýíá áææáþiáðá. ÐðÜñ ÷ áé ùðóüiøi íéá ðñþbôç áææééþ Üääéå, c iðiþá iðiñåð íá aðiþoåé òcí áóö Üääéå òið ðóðóðþiáòiò; òi sticky bit.

¼ôáí è Ýóåôå ôi sticky bit óå Ýíá êåôÜëïäi, ådéôñ Ýðåôåé ç æéåññåôP åíüò áñ ÷ åßïö iùñí áðü ôií éæéïêôPôç ôiö. Ç Üäåéå åôôP åßíäé ÷ nPôéïç æá íá åðïöåýåôåé ç æéåññåôP åíüò áñ ÷ åßïö åðü éïéíü ÷ nçôöiôò êåôåëüñiôò, üðùò æá ðäñ Üäåéåíá i /tmp, åðü êÜđïéï ÷ nPôôç ðïö åäí åßíäé i éæéïêôPôçò ôiö. Äéá íá è Ýóåôå åôôP ôçí Üäåéå, ôiöièåôPôôå ôiöi áñéèü Ýíá (1) óôcí áñ ÷ P ôiö óåô åäåébí:

```
# chmod 1777 /tmp
```

Ìðiñåßôå ôþñá íá äåßôå ôii áðiôÝëåðiá, ÷ nçóéiiðiéþíôåò ôcí åíöi  P 1s:

```
# ls -al / | grep tmp
```

```
drwxrwxrwt 10 root wheel 512 Aug 31 01:49 tmp
```

C Üääéá sticky bit öäßíåôáé ùò t óöi ôÝëiò ôjö ööñüëiò ôùí áääébí.

#### 4.4 ÄÜP Éáôáëüäíö

Ç éanñán ÷ ééP äñP ôiö FreeBSD åßíáé Ýíå áåóéëü óöïé ÷ åßi ðiö ðñÝðåé íå åiùñßæåôå áí èÝéåôå íå Ý ÷ åôå iéå iéïiêèçñù Ýíç åééüíå öiö óöôôPìlåöiö. Ç ðeïi öçìáîöééP Ýíïéå åßíáé åôôP ôiö ñéæéëïy (root) êåôåéüäiö, “/”. Åôôüö i êåôåÜërïäiö ðñiöåñôÜðåé (mount) ðñPöiö èåôåÜ öçí åêéßíçöç ééé ðåñéY ÷ åé öi ååóéëü óýóöçíå ééåíü íå åôïéÜðåé öi Ë.Ö. æåá èåéöiöñäßá multi-user. Í root êåôåÜërïäiö ðåñéY ÷ åé åôßöçö öçìåßá ðñiöÜñðöçöçö åéå Üëéå óöôôPìlåôå åñ ÷ åßiù ðiö ðñiöåñôbíðåé èåôåÜ öçí iåôÜåáóç óå èåôåÜðåóç èåéöiöñäßáò multi-user.

Óçìåßí ðñïöÜñôçóçò (mount point) åßíáé Ýíáò êáòÜëëäiò óöii iðiñi ìðiñiýí íá áíáðòò ÷ eïýí ðññüöèåôá óöôôPIáôá  
áñ ÷ åßùí óå Ýíá ãiiéü óýóôçìå áñ ÷ åßùí (óðÍPèùò óöi root óýóôçìå áñ ÷ åßùí). Áðòù ðåñéäñ Üòåðåé áíáëöôéê Ü óöçí  
åßüöçôá ÓPIá 4.5. Óóá óòÜíåñò óçìåßá ðñïöÜñôçóçò ðåñéëåíàÜñiòáé: ié /usr, /var, /tmp, /mnt, êáé /cdrom.  
Áðoïß ié êáòÜëëäié óðÍPèùò åßíáé êáôá ÷ üñçì Üñié óöi áñ ÷ åßí /etc/fstab. Õi /etc/fstab åßíáé Ýíáò ðßíáêåò  
áíðéóôíé ÷ ßáò åéáòüñù óöôôçìÜòùí áñ ÷ åßùí êáé óçìåßùí ðñïöÜñôçóçò åéá áíáöiñ Ü óöi óýóôçìå. Óá ðåñéóöüöåñá  
óöôôPIáôá ðiö áíáöiÝñiòáé óöi /etc/fstab ðñïöáñòPIóáé åðòüüäåðá êáòÜ óçí åéêßíçóç ðiö óöôôPIáôíò åðü öi script  
rc(8) åéöuò áí ðåñéY ÷ åôåé c åðééjiPI noauto. ËåðòjjÝñiåé ðiñjñåßòá íá åñåßòá óöi ÓPIá 4.6.1.

Íéá ðëÞñç ðâññéññáöþ ðçð éâññáñ ÷ þáð öiþ öððóóþìáðiò áñ ÷ áßùí áßíáé áéáè Ýóéïç óði hier(7). Áéïeëiøðåß íéá óýíöñïç áíáóðüðçóç iàð öiðò ðéí öðíÞèåðò éáðáæüäiðò.

## ÊáôÜeiäiò

/bin/  
/boot/  
/boot/defaults/  
/dev/  
/etc/  
/etc/defaults/  
/etc/mail/  
/etc/namedb/  
/etc/periodic/  
  
/etc/ppp/  
/mnt/  
  
/proc/  
/rescue/  
/root/  
/sbin/  
  
/tmp/  
  
/usr/  
/usr/bin/

Dåñéäñáöþ

Ñéæéëüð (root) éâôÜëïäiò òiõ õóôôÞiaôiò áñ÷åßùí.  
× ñÞóéíá åññääëåßá æáá ðåñéåÜëëí åñùò P ðïëëåðëþí  
÷ ñçóôþí.

ÐñïïñÜìïåôá êáé áñ÷åßá ñõèìßóåùí ðiõ  
÷ ñçóëíïðëëíýíóáé éâôÜ ôçí åêëßíçóç õiõ ëåéöîññæéíý  
óôôôÞiaôiò.

ÐñïïéæïñéöíÝíá áñ÷åßá ñõèìßóåùí åêëßíçóçò, äåßôå  
loader.conf(5).

Áñ÷åßá óôôéåðþí, äåßôå intro(4).

Áñ÷åßá ñõèìßóåùí óôôôÞiaôiò êáé óåíÜñéá åêëßíçóçò.

ÐñïïéæïñéöíÝíá áñ÷åßá ñõèìßóåùí óôôôÞiaôiò, äåßôå  
ôçí rc(8).

Áñ÷åßá ñõèìßóåùí æáá ðñÜêôïññåò iåðåöññÜð çëåéêöñ.  
óâ÷õäññåðiò (lõöA) üðñùò õi sendmail(8).

Áñ÷åßá ñõèìßóåùí named, äåßôå named(8).

ÓåíÜñéá èåéöïññåéþí ðiõ ôñÝ÷iõí óå çìåñÞóéá,  
ååäññåéåßá, æáé içíéåßá åÜóç, cron(8); äåßôå  
periodic(8).

Áñ÷åßá ñõèìßóåùí ppp, äåßôå ôéò ppp(8).

Êåññüò êáôÜëïäiò ðiõ óôôÞèùò ÷ ñçóëíïðëëåðþóé áðü õiõò  
æáé÷åéñéöôÝð óôôôçíÜðùí ùò ðñïïóùñëü ôçíåßí  
ðñïïðÜñðçóçò.

Óýóðçïá áñ÷åßùí æéññåáóéþí, äåßôå ôéò procfs(5),  
mount\_procfs(8).

ÐñïïñÜìïåôá lå óôåðééþ óýíååóç (static link) æáá áôóåæéþ  
åðåíáöññÜ óôôôÞiaôiò, äåßôå ôçí rescue(8).

Ðñïïóùðééüð éâôÜëïäiò õiõ ÷ ñÞóôç root.

ÐñïïñÜìïåôá óôôôÞiaôiò êáé ÷ ñÞóéíá åññääëåßá  
æáé÷åßñéóçò æáá ðåñéåÜëëí åñùò P ðïëëåðëþí ÷ ñçóôþí.

ÐñïïóùñéíÜ áñ÷åßá. Óå ðåñéå÷üìåíá õiõ /tmp óôôÞèùò  
äåí æéåôçñíýíóáé iåðÜ áðü åðåíåéëßíçóç ôiõ óôôôÞiaôiò.

Óõi /tmp óôôÞèùò ðñïïóåññÜðåé Yíá óýóðçïá áñ÷åßùí  
iñÞíçóç. Áððü iñðññå íá åðéôåð÷èåß áðõññÜðùò  
÷ ñçóëíïðëëíþíôå õéò ó÷åðééÝð iåðåâåëçòÝð tpmfms ôiõ  
rc.conf(5) (P lå iéá êåôå÷þñçóç ôiõ /etc/fstab,  
äåßôå ôçí mdmfs(8)).

ÐåñéÝ÷iññåé ó÷åüüí üëå ôá åïçëçôééÜ ÐñïïñÜìïåôá êáé  
ié åðåññåññÜð ÷ ñçóôþí.

Êëëíü ÷ ñçóôå åïçëçôééÜ ÐñïïñÜìïåôá, åññääëåßá  
ÐñïïññåññåññÜð, êáé åðåññåññÜð.

**ÊáôÜëéáíò**

/usr/include/  
 /usr/lib/  
 /usr/libdata/  
 /usr/libexec/  
  
 /usr/local/  
  
 /usr/obj/  
  
 /usr/ports/  
 /usr/sbin/  
  
 /usr/share/  
  
 /usr/src/  
 /usr/X11R6/  
  
 /var/  
  
 /var/log/  
 /var/mail/  
 /var/spool/  
  
 /var/tmp/  
  
 /var/yp/

**Ðåñéäñáöþ**

ÓðÜíóáñ áñ ÷ åßá óóïðåñßëçøçò C (include files).  
 Áñ ÷ åßá åéâæéíèçéþí.  
 ÄéÜöñáñ áñ ÷ åßá ååäññÝñí åïçèçöééþí ðñïäññáññÜðùí.  
 Äáßñíåò óðóôÞìáöìò & åïçèçöééÜ ðñïäñÜñíåòá  
 óðóôÞìáöìò (åéôåéïýíðåé áðü Üëëá ðñïäñÜñíåòá).  
 ÖïðééÜ åéôåéÝóéíå, åéâæéíèÞéåò, êôë. Åðßöçò åßíáé  
 êáé í ðñïäññéóíñÝñí ðñïäññéóíüò åéá ðñïäñÜñíåòá ðïò  
 ååéåéßóôåíðåé áðü ôá ports ôïõ FreeBSD. ÍÝá ñðíí  
 /usr/local, ÷ñçóéíðéåßðåé ååíééÜ ç åéÜôåíç ôïõ  
 /usr ðïò ðåñéäññÜðåðåé óðí hier(7). Åíáéññýíðåé íé  
 êáôÜëéáíé óåéßäùí åïçèåßåò man, ðïò åñßóéåðåé Üñåóá  
 êÜðù áðü ôíí /usr/local êáé ü ÷ é êÜðù áðü ôíí  
 /usr/local/share, êáèþò êáé ç ôåéïçñßùóç êÜèå port  
 ðïò åñßóéåðåé óðíí share/doc/port .  
 ÄÝíññí ðñïäññéóíñÝ ðïò åñññðåññÜðåé áðü ôçí áñ ÷ éôåéôííééþ  
 ôïõ ìç ÷ áíÞìáöìò êáé ðáñÜñåðåé ïåðååæññðôßæíñðåò ôíí  
 äÝíññí /usr/src.  
 Ç Óðëëíæþ Ports ôïõ FreeBSD (ðñïäññåðééü).  
 Äáßñíåò óðóôÞìáöìò & åïçèçöééÜ ðñïäñÜñíåòá  
 óðóôÞìáöìò (åéôåéïýíðåé áðü ÷ñÞóôåò).  
 Áñ ÷ åßá áíññÜñôçôå áðü ôçí Áñ ÷ éôåéôííééþ ôïõ  
 ìç ÷ áíÞìáöìò.  
 Áñ ÷ åßá BSD êáé/P ôïðééÜ áñ ÷ åßá ðçñåáßíò êþäééá.  
 ÅéôåéÝóéíå, åéâæéíèÞéåò, êôë. åéá ôçí åéáññP X11R6  
 (ðñïäññåðééü).  
 Áñ ÷ åßá áíññÜð (log) åéáöüñùí ÷ñÞóåùí, temporary,  
 transient, êáé spool. ïåññéÝð õññÝð ðñïäññÜðåé óðíí  
 /var Ýíá óýðöçíá áñ ÷ åßúí ïíÞìçò. Áðóü ïðíññåß íá  
 åðéôåð ÷ èåß åðóññåò ÷ñçóéíðéþíðåò ôéò ó ÷ åôééÝð  
 ïåðååéçôÝð varmfs ôïõ rc.conf(5) (P ïå ißá êáôå ÷ þñçóç  
 óðíí /etc/fstab, ååßôå ôéò mdmfs(8)).  
 ÄéÜöñáñ áñ ÷ åßá óóïññÜðåññÜðåé ôïõ óðóôÞìáöìò.  
 Áñ ÷ åßá åñññåðééññðôßíð (mailbox) ÷ñçóôþí.  
 ÄéÜöññíé êáôÜëéáíé ðáññ ÷Ýðåðóçò (spool) åéôðñðôþí  
 êáé çëåéôññííéþò åéëçëéññåðôßåò ôïõ óðóôÞìáöìò.  
 ÐñïóññéíÜ (temporary) áñ ÷ åßá. Ôá áñ ÷ åßá åðôÜ  
 óðíÞðéùò åéåðçññýíðåé êáôÜ ôçí åéÜññééå åðáíåééßíçóçò  
 ôïõ óðóôÞìáöìò, åéôüò áí ï /var åßíáé Ýíá óýðöçíá  
 áñ ÷ åßùí ïíÞìçò.  
 Äðåééññßóåéð (maps) NIS.

## 4.5 ÍñäÜíùóç Äßóeïõ

Ç iéêñüôâñç iñÜäää iññäÜíùóçò ðiõ ÷ñçóéiiðiéåß ôï FreeBSD ãéá íá âñâé áñ÷åßá åßíáé ôï üññá áñ÷åßiõ. Ôá iññäáôá áñ÷åßùí åßíáé åðååßóèçdá ôôá åâöäæåßá- iéêñÜ, ôï iðiñßí õçjåßíåé üôé ôï readme.txt êáé ôï README.TXT åßíáé äýí ãéäöiññâôéêÜ áñ÷åßá. Ôï FreeBSD äåí ÷ñçóéiiðiéåß ôçí åðÝéôåáç .txt áñ÷åßiõ ãéá íá ðññöäéññôåé áí Ýíá áñ÷åßá åßíáé ðññüäññâíá, P Ýääññaoï, P Üëëiõ ðýðiõ äåäññÝíú.

Ôá áñ÷åßá åðiøçêåýíðåé óå éåôåëüäiõò. jåò éåôÜëëiäò iðiññâß íá içí ðåñéÝ÷åé áñ÷åßá, P iðiññâß íá ðåñéÝ÷åé åéåôiññÜääò áñ÷åßá. jåò éåôÜëëiäò iðiññâß åðßóçò íá ðåñéÝ÷åé Üëëiõò éåôåëüäiõò, åðéôñÝðiññâò óåò íá êåôåôéåññÜåôå åéá éåññâñ÷ééP äññP éåôåëüäuñü üðiõò éåôÜëëiäé åóùëëåßiõí Üëëiõò éåôåëüäiõò. Áðôü íåò åðéôñÝðåé íá iññäáþþiõíå ôå äåäññÝíá íåò ðiøý åðéëüôåññá.

Ç áíáoïñÜ óå áñ÷åßá åéåôåëüäiõò åßíåôåé åßññíôåò ôï üññá áñ÷åßiõ P ôï üññá éåôåëüäiõ, åéiññðeåß iñßá áñéôôåññüôôññöç êÜëåôiõ, / éåé Ýðåéôå iðiñéäPðiôå Üëëi éåôÜëëçei üññá éåôåëüäiõ. ÅÜí Ý÷åôå ôïí éåôÜëëiä foo, i iðiñßíò ðåñéÝ÷åé ôïí éåôÜëëiä bar, i iðiñßíò ðåñéÝ÷åé ôïí áñ÷åßí readme.txt, ôüôå ôï iññéçñùñÝñ üññá, åéåäññP (path) ôôï áñ÷åßí åßíáé foo/bar/readme.txt.

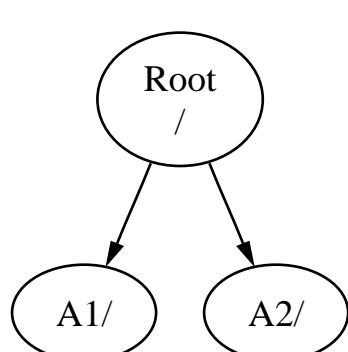
ÉåôÜëëiäé éåé áñ÷åßá åðiøçêåýíðåé óå Ýíá óýóôçìá áñ÷åßùí. ÊÜëå óýóôçìá áñ÷åßùí ðåñéÝ÷åé Ýíá éåôÜëëiä óôï åßþôåññ åðßðåññ, ðiõ iññÜæåôåé root (ñéæéêiõò) éåôÜëëiäò åéá ôï óôååéññíÝñ óýóôçìá áñ÷åßùí. I root éåôÜëëiäò iðiññâß íá ðåñéÝ÷åé Üëëiõò éåôåëüäiõò.

Áðôü ðééäíþò åßíáé ðññüññíí åññÜññåôá iäçþí P iññäáôá iäçþí ôôç äéåäññP. ÅðñÝñò ååí èá ðñÝðåé íá ãñÜðåôå c:/foo/bar/readme.txt ôôï FreeBSD.

ÁíôééÝñò, Ýíá óýóôçìá áñ÷åßùí éåèññßæåôåé ùò root óýóôçìá áñ÷åßùí. I nñæéêüò éåôÜëëiäò ôïõ root óôôôÞiaôò ãñ÷åßùí áíáöÝñåôåé ùò /. ÊÜëå Üëëi óýóôçìá áñ÷åßiõ ðññóáññÜôåé êÜòù áðü ôï root óýóôçìá áñ÷åßùí Ååí Ý÷åé óçjáóßá ðüññò åßþôéiõò Ý÷åôå ôôï FreeBSD óýóôçìá óåò, êÜëå éåôÜëëiäò åiöáíßæåôåé íá åßíáé iÝñò ôïõ Bæéiõ åßþôéiõ.

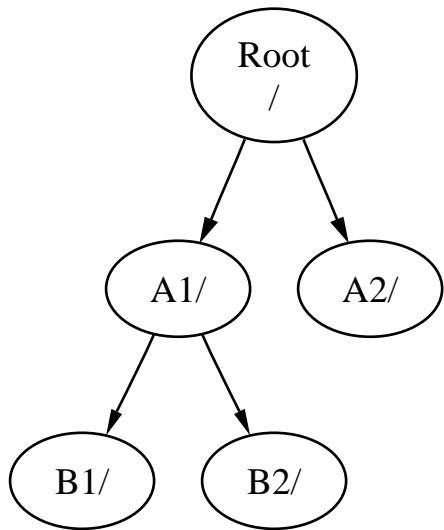
Áò ñéæéêüò Ý÷åé ðñò Ý÷åôå ôñßá óôôôÞiaôå áñ÷åßùí, ôå iññÜæëiõå A, B êáé C. ÊÜëå óýóôçìá áñ÷åßiõ Ý÷åé Ýíáí ñéæéêüò éåôÜëëiä, i iðiñßíò ðåñéÝ÷åé äýí Üëëiõò éåôåëüäiõò, ðiõ ôiõò iññÜæëiõå A1, A2 (êáé ðññüññùò B1, B2 êáé C1, C2).

Áò èåùñÞoïõíå üôé ôï A åßíáé ôï root óýóôçìá áñ÷åßùí. Áí ÷ñçóéiiðiéÞoåôå ôçí åîññéP 1s åéá íá ååßôå ôå ðåññéå ÷üññá åðôñý ôïõ éåôåëüäiõò, èá ååßôå åýí ðiññéåôåëüäiõò, A1 êáé A2. Ôï aÝñò ôïõ éåôåëüäiõò iñéÜæåé óåí áðôü:



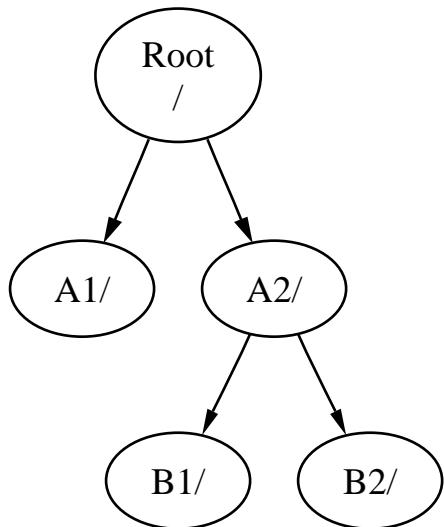
ÊÜëå óýóôçìá áñ÷åßùí ðñÝðåé íá ðññóáññÜôåé óå Ýíá éåôÜëëiäí åéåöiññâôéëíÝ óôôôÞiaôiõ áñ÷åßùí. Áò ñéæéêüò èÝëåôå íá ðññóáññÜôåé ôï óýóôçìá áñ÷åßiõ B ôôññ éåôÜëëiäí A1. I nñæéêüò éåôÜëëiäò ôiõ B áíôééåèéóôÜ ôïí

A1, êáé ié êáôÜëíäíé ôïõ B åìöáíßæííôáé áíáëüâùò:



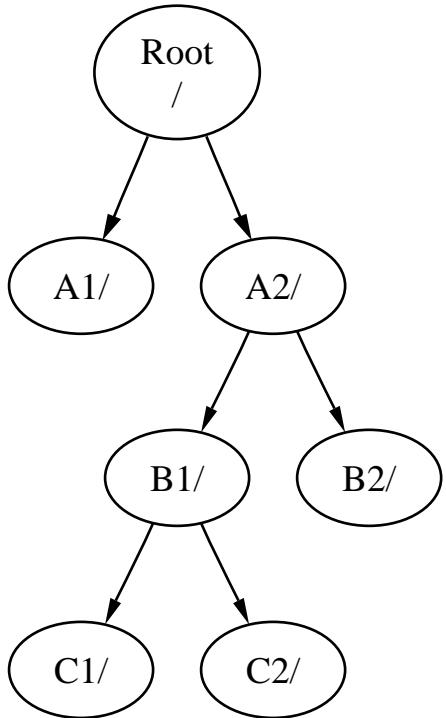
¼ëá ôá áñ÷åßá ðïõ ðåñéÝ ÷ííôáé ôïõ B1 êáé B2 ôá åñßóéïõlå íå ôç äéáäññP /A1/B1 P liå /A1/B2 áíôßóôïé÷á. ¼ëá ôá áñ÷åßá ðïõ åñßóéïíôáí ôï /A1 åßíáé ðññóùñéíÜ êñõiiÝíá. Èá åðáíâìöáíéóôïý üôáí í B èá áðiðññóáñôçèåß áðü ôïí A.

Áí i B åß÷å ðññóáñôçèåß ôïí A2 ôüôå ôï äéÜäñáìllá èá Ýääé÷íå êÜðùò Ýôóé:

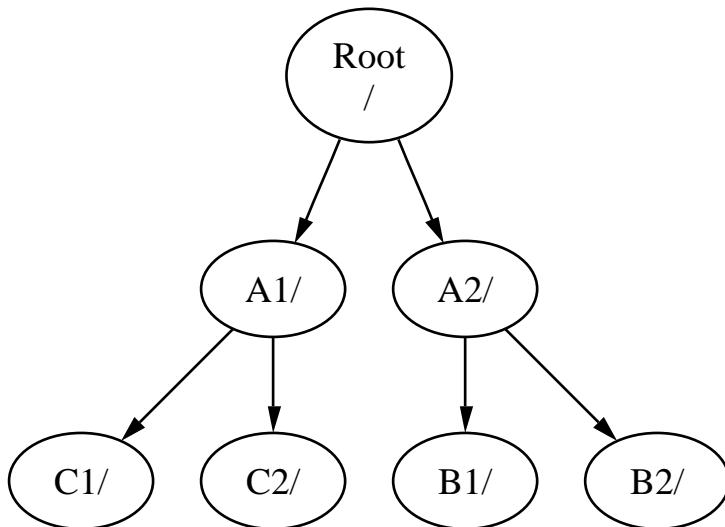


êáé ié äéáäññÝò èá Pôáí /A2/B1 êáé /A2/B2 áíôßóôïé÷á.

Ôá ôôôôPìáôá áñ÷åßùí ìðiññýí íá ðññóáñôþíôáé ôôçí êiñôôP Üëëùí ôôôôçìÜôùí. Óõíå÷ßæííôáò ôï ôåëåôôåßí ðáñÜäåéäíá, ôï óýóôçìá áñ÷åßíõ C èá ìðiññýóå íá ðññóáñôçèåß ôôçí êiñôôP ôïõ êáôáëüâïõ B1 ôôï óýóôçìá áñ÷åßíõ B, iäçäþíôáò ôå áôôPí ôçí êáôáññP:



<sup>1</sup> áêüìç ðï C èá iðiññýóå íá ðñiñáñôçèåß Üìåóá óôï óýóôçìá áñ÷åßíð A, êÜôù áðü ðïí êáðÜëíäí A1:



Áí ãíññßæåôå ðï óýóôçìá MS-DOS, åßíáé ðánñüìíí, áëëÜ ü÷é áêñéåþò ðï ßäéí, lâ ôçí áîôíëþ join.

Áðôü óðíÞèùò äáí åßíáé êÜôé ðið ðñÝðåé íá ãíññßæåôå Üìåóá. ÓððéêÜ, åóåßò äçíëññåßôå óððóðÞiaôå áñ÷åßúí üôáí åâéâééóðÜôå ðï FreeBSD êáé áðiøáóßæåôå ðï óçíåßí ðñiñóÜñôçóçò áðôþí, êáé Ýðåéôå äáí ÷ñâéÜæåôåé íá ôá áëëÜìåôå åêôüò áí ðñüêåéôåé íá ðñiøéÝóåôå Ýíá êáéíññäéí äßóéí.

Åßíáé áðüëôôå äðíáôüí íá Ý÷åôå Ýíá lâãÜëí root óýóôçìá áñ÷åßúí, êáé íá lçí ÷ñâéÜæåôåé íá äçíëññäÞóåôå Üëéá.

Ìå áôôP ôçí ôáêôéêP õðÜñ÷iõí ìåñéêÜ ìåéííåêôPìáôá êáé Ýíá ðëäiiÝêôçìá.

Đñ̄iôåñþìáôá Đíëëáðëþí ÓooóçìÜôùí Áñ÷åßùí



Đñ̄iôåñþìáôá åíüò lìííêüìíáôïõ Óõóôþìáôïõ Áñ÷åßïõ

- Ôá ðóðóôPíáôá áñi-÷åßùi áßíáé óðâæâéñei Ýiñi ðóáéâñii y iååáÝeïö. Áí åçíéïõñäPðåôå Ýíá óýóðçíá áñi-÷åßùi éáôÜ ðçí áâæáôÜóôåç ðiñ FreeBSD éáé ôiñ äþþôå Ýíá iñéóí Ýiñ iÝåâëiø, iðiñâß áñâñüðåñá íá áíáâéýðåôå ðùò ÷ ñâéÜæðôå íá öðéÜiåôå iéá iååáëýôåñç éáôÜôlçóç. Åðôüi áái áßíáé áýéïëá ðñâáîáðiðiéÞóéii áß-÷ùò backup, áíáäçíéïõñâßá ðiñ ðóðóôPíáôiø áñ-÷åßiø iå oí iÝí iÝåâëiø, éáé åðááiñiñÜ ouíi aðièçéåòí Ýiñi áååñi Ýiñi.

**Óćiaiáódeéü:** Óöi FreeBSD ðåñéÝ-åðáóé ç áíöièþ growfs(8), ç iðiñlá åðéöñÝðåé ía áðiþöiñlå öi iÝååèiø åíüö ðóðóðiøiñlå öiñlø ãñ÷åßùlø éåðÜ ðç èåðéññiñlá öiñlø, áóáéñþiðåò áðóðüí öiñlø ðåñéñéöiñlø.

Óá òóôôôPiáôá áñ ÷ áßùí ðâñéÝ ÷ iíôáé óá éáôdôîPiôåéô (partitions). Áôôü áái Ý ÷ áé ôçí Bæáé Ýííéíä ia ôçí eíéÍP ÷ nÍpôç ôiô üñiô éáôÜôïçôç (üðùð ãéá ðánÜâåéäá, ç éâôÜôïçôç ôiô MS-DOS), ëüäù ôçò êëçñiññéÜð ðiô õÝñåé ôi FreeBSD áðü ôi UNIX. ÊÜëå éáôÜôïçôç áíâññüñBæåôáé áðü Ýíá éáôéíéü ÷ áñâéôPñá íâééÍpíôå ãðü a Ýùð ôi h. ÊÜëå éáôÜôïçôç iðññâb íá ðâñéÝ ÷ áé iññí Ýíá óýóôçíá áñ ÷ áßùí, ôi iðññi ôçíâßíâé ðùð ç áíâññüñÜ óôá òóôôôPiáôá áñ ÷ áßùí âßíâôåé áßôå áðü ôi ôððéêü ôçíâßí ðññiôÜñôççôçò ôôçí éâññáñ ÷ ßá ðiô òóôôôPiáôïð áñ ÷ áßùí, áßôå áðü ôi éáôéíéêü ÷ áñâéôPñá ôçò éáôÜôïçôçò.

Åðþóðó òi FreeBSD ÷ ñíçóéiiðíieåß iÝñiò aðü ði äðóðiä áæá ÷ þñi swap. Í ÷ þñiò Swap ðáñÍ ÷ áé oði FreeBSD aðeïiðéP iÙPiç (virtual memory). Aðóðu åðéøñÍ ðåé oði õððíæðóP óáð íá oðiðlðñeoÝñåðoáé óáí íá åß ÷ å ðiðý ðáñéóðüðañç iÙPiç aðü üði ðñáðiáðééÜ Ý ÷ áé. ¼ðáí òi FreeBSD äái Ý ÷ áé aðééðéÝóéiç iÙPiç iåðáðÝñåðe iåñééÜ aðü óá aðaðiñÍ Yíá ðið aðí ñíçóéiiðíieýíðáé, óçí ðñíæðiÝíç óðéæiP, oði ÷ þñi swap, eða ùðáí óá ÷ ñåðéåðóðåß óá åðáðiáðÝñåðe (åß iåðáðÝñåðe ûðiðíæðé Üððiða ãðaðiñÍ Yíá oði ÷ þñi swap).

ÓðÜñ ÷ iðí êÜðiéåò óðiàÜóåéò ó÷ åôéêÜ iaå ôéò êáôáôìÞóåéò

<b>ÉáôÜôíçóć</b>	<b>Óýìâáóć</b>
a	ÓõÍÞèùò ðâñéëáíâÜíâé ôi root óýóôçìá áñ÷åßùí
b	ÓõÍÞèùò ðâñéëáíâÜíâé ôií ÷þñí swap

ÉáôÜöìçóç	Óýíâáóç
c	ÓõíPéùò éáßïò iåå Ýèïòò iå ôçí ðåññéëåíâáüíåíç öÝôá (slice). Áðööù áðéöñ Ýðåé óå åïçèçöéé Ü ðñïíñÜìíåáó ðïò ðñ Ýðåé íå åïõë Ýöïòí óå iëüéêçñï òï êïñÜôé (æáé ðánÜäåéäïá, Ýíåó áíé ÷ iåôòP ðéåðåðóññíí Ýíüù íðëïë) íå èåéòïðñäïýí óçí c éåôÜöìçóç. Éáññéé Ü ååí èá ðñ Ýðåé íå åçïéïññåßôå óýóôçíà áñ ÷ åßùí óå áôòP ðçí éåôÜöìçóç.
d	Ç éåôÜöìçóç d åß ÷ å óóï ðáññåëëüí iéá åéééêP áíðéóðöïé ÷ ßá, êÜôé ðïò ååí éó ÷ ýåé ðë Ýíí óPíåñá, åðñíí Ýíùò ç d iðïññåß íå ÷ ñçöéïðíéåßôåé óáí iéá éáññééêP éåôÜöìçóç.
	ÊÜèå éåôÜöìçóç ðïò ðåññéÝ ÷ åé Ýíá óýóôçíà áñ ÷ åßùí áðïèçéåýåðåé óóï FreeBSD óå iéá ðïðíëåðßá ðïò iññÜæåðåé öÝôá (slice). Ç öÝôá åßíáé Ýíåó üññò ðïò FreeBSD æáá ðåññ ðïò eïéïþò áðïéåéåßôåé éåôÜöìçóç, ééé åôðü áðßöçò iøåßëåðåé óçí éåôðåññP ðïò FreeBSD áðü ðï UNIX. Ié öÝôåð áñéèííýðåé áñ ÷ ßæíñðåð áðü ðï 1 Ýùò ðï 4.
	I áñéèñùò óçò öÝôåò åéïëïðèåß ðï ùññá óóðéåðPò iåðÜ ðï ðññùèåïá s iåééñþíðå ðåðü ðï 1. Åðñíí Ýíùò, “da0s1” åßíáé ç ðñþöç öÝôá ðïò ðñþöïò iäçäüý SCSI. Iðññýí íå ððÜñ ÷ iðí Ý ÷ ñé ðÝðåññé ðÝðåð ðå êÜèå åßóëi, åéé Ü iðññåßôå åçïéïññåßôå ðï ëïæéÝò öÝôåò iÝóå óå éåôÜëëçëï ðýðïò ððñééÝò ðÝôåò. Óå åôðÝ ðéò åôðåðåíí Ýíåò öÝôåò ç åñßèëçóç iåééñÜåé áðü ðï 5, åðñíí Ýíùò “ad0s5” åßíáé ç ðñþöç åôðåðåíí Ýíç öÝôå óóïí ðñþöï åßóëi IDE. ÁôðÝò ié ððñééðÝò ÷ ñçöéïðíéíýðåé áðü óóðóðPíåðåá áñ ÷ åßùí ðïò ðñ Ýðåé íå éåôðåéååÜññò iéá iëüéêçñï öÝôå.
	Ié öÝôåò, ié “åðééñßíäñí åóïöñéùí Ýíòé (dangerously dedicated)” ððñééëïß iäçäïß éåèþò éåé Üéëïi iäçäïß, ðåññéÝ ÷ iðí ñéåðåòPíðåéò, ié iðíßåò ðáññööðÜæïïåé íå éåðéééïýò ÷ åñáéòPññò áðü ðï a Ýùò ðï h. Áðööùò i ÷ åñáéòPññò áíáðÝññåðåé óóï üññá óóðéåðPò, åðñíí Ýíùò “da0a” åßíáé ç a éåôÜöìçóç óóïí ðñþöï iäçäü da, i iðíßò åßíáé “åðééñßíäñí åóïöñéùí Ýíò”. Ç “ad1s3e” åßíáé ç ðÝíðòç éåôÜöìçóç óçí ññþöç öÝôå ðïò ååýðåññP iäçäïý åßóëi IDE.
	Í iééëçñþíñðåò, êÜèå åßóëi ðï ùññá óýóôçíà åßíáé iññüññá iññéí Ýíò. ÊÜèå üññá åßóëi ðåééí Ü íå Ýíá êùäééü ðïò ðñðäåééíýå ðï ðýðï ðïò åßóëi, éåé Ýíá üññá ðïò ðñðäçëþíåé ðïéïò åßóëi åßíáé. Áíðßèåðå íå ðéò öÝôåò, ié åßóëi åñéèñíýðåé iåééñþíðå ðåééí ðïò ååðÜöìçóç 0. Ié ðéï ñóñPéåéò êùäééëï ðïò èá ñóñáñòPóåðå áåíáðÝññíðåé óçí ðBíáéåò 4-1.
	¼ðåí åßíåðåé áíáöñÜ óå iéá éåôÜöìçóç, ðï FreeBSD æçðÜ íå åçëùèåß åðéðëÝíí ç iññáóßá ðçò öÝôåò éåé ðïò åßóëi ðïò ðåññéÝ ÷ åé óçí éåôÜöìçóç, åíþ óçí ðåññåðóñç ðïò áíáðÝññåðåó óå iéá öÝôá èá ðñ Ýðåé íå åçëþíåðå ðï ùññá ðïò åßóëi. Åðñíí Ýíùò, üðáí áíáðÝññåðåó óå iéá éåôÜöìçóç ÷ ñåéÜæåðåé íå åçëþíåðå ðï ùññá ðïò åßóëi, s, ðïíí áñéèñùí ðçò öÝôåò, éåé ðïíí ÷ åñáéòPññò ðçò éåôÜöìçóçò. Ðáññäåßäïåðå ðñññåßôå íå åñåßôå óçí ðánÜäåéäïá 4-1.
	C ðáññÜäåéäïá 4-2 ðñññööðÜæåé Ýíá åññééëi åééü iññóÝëï åéá ðç ññþò ðïò åßóëi ðïò èá óå åïçèþóåé íå éåôðåéÜååðå åééýðåñá êÜðïéá ðñÜññåðå.
	Åéá íå ååñéåðåóðPóåðå ðï FreeBSD ðñ Ýðåé ðñþöå ðññùèåß ðéò öÝôåò ðïò åßóëi, íå åçïéïññåßôå ðéò éåôðåóðPóåðå ðññùèåß ðéò öÝôåò ðïò èá ÷ ñçöéïðíéðPóåðå åéá ðï FreeBSD, Ýðåéðå íå åçïéïññåßôå Ýíá óýóôçíà áñ ÷ åßùí (P ÷ þññ swap) óå êÜèå éåôÜöìçóç, éåé ðÝëïò íå áðïòáðPóåðå óå ðïéï óçìåßí èá ðññòññôçèåß ðï ùññá óýóôçíà áñ ÷ åßùí.
ÐBíáéåò 4-1. Êùäééëï Õóóéåðþí Äßóëuí	
Éþäééåò	Óçìáßíåé
ad	Äßóëi ðAPI (IDE)
da	Äßóëi SCSI Üìåðóç ðññúðååóç
acd	ATAPI (IDE) CDROM
cd	SCSI CDROM
fd	ÜññÜäå Áééýðå (Floppy)

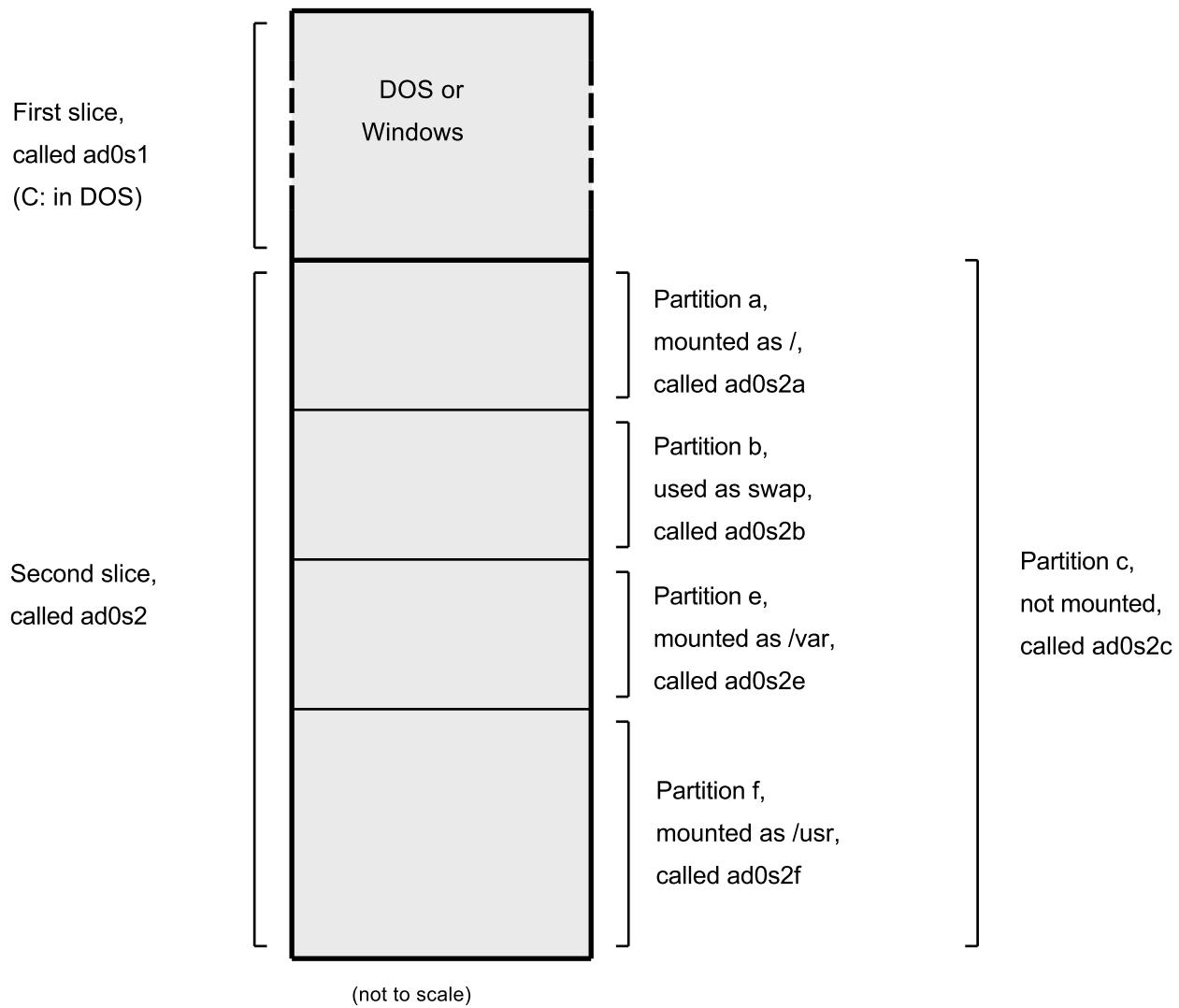
**ÐáñÜääéäíá 4-1. Õðíäåßäíáôá ÍmíÜôùí Äßóéïõ, ÖÝôáò, ÉáôÜôìçóçò**

Ímíáóßá	Óçìáßíåé
ad0s1a	Ç ðñþöç éáôÜôìçóç (a) óôçí ðñþöç öÝôá (s1) õïõ ðñþöïõ äßóéïõ IDE (ad0).
da1s2e	Ç ðÝiðöç éáôÜôìçóç (e) óôçí äåýôåñç öÝôá (s2) õïõ äåýôåñïõ äßóéïõ SCSI (da1).

**ÐáñÜääéäíá 4-2. Åíñéíæíæéü ÌñóÝëí áñüò Äßóéïõ**

Öi aeÜäñáíá ðáññööeÜæåé ieá åééüíá õïõ ðñþöïõ äßóéïõ IDE ðiõ åßíáé ðññöáñöçíÝñõ õïõ óyóôçíá. Áo oðièÝóïõìå ðùò i äßóéïò Ý÷åé iÝååéïò 4 GB, éáé ðåñéÝ÷åé äýí öÝôåò õùí 2 GB (éáôáôìÞóåéò MS-DOS). Ç ðñþöç öÝôá ðåñéÝ÷åé Yíá äßóéi MS-DOS, c:, éáé ç äåýôåñç öÝôá ìßá ååéåðÜóôáóç FreeBSD. Óå áðóü òi ðáñÜääéäíá, ç ååéåðÜóôáóç FreeBSD Ý÷åé ôñåéò éáôáôìÞóåéò äåäññÝíùí éáé ißá éáôÜôìçóç swap.

Éåéåíßá áðü ðéò ôñåéò éáôáôìÞóåéò èá ðåñéÝ÷åé Yíá óyóôçíá áñ÷åßùí. Ç éáôÜôìçóç a èá ÷ñçóéñïðïéçèåß åéá õï root óyóôçíá áñ÷åßùí, ç e åéá ôç äññP éáôÜëíäíõ /var, éáé ç f åéá ôç äññP éáôåéüäíõ /usr.



## 4.6 ĐñïóÜñôçóç êáé ÁđïðñïóÜñôçóç ÓôóôçìÜôùí Áñ÷åßùí

Íá óýóôçíá áñ÷åßùí áíáðâñéóôÜôáé êáëýôåñá óå ïññöP äÝíôññö, íå ôéò ñßæåò ôíö óôí /. Íé êáôÜëïäíé /dev, /usr, êáé Üëëíé åßíáé êëåäéÜ ôíö êáôáëüäíö root, êáé ìđññåß íá Ý÷iöí íå ôç óåéñÜ ôíöö, ôá äéêÜ ôíöö êëåäéÜ, üðùò ôíï /usr/local, êáé iýôù êáëåíPò.

ÓðÜñ÷iöí äéÜññíé èüäíé ãéá ôíöö iðñßíöö ëá Ýðññåðå íá ôíðñèåôþöiöia êÜðñëiöö áðü áðôíýò ôíöö êáôáëüäíöö óå äéáöiñåðéêÜ óôóôþìáóá áñ÷åßùí. Í êáôÜëïäíö /var ðåñéÝ÷åé ôíöö êáôáëüäíöö log/, spool/, êáé äéÜññíöö

Üeëiöö ðýðiöö ðñiùöññéþí áñ ÷ áßñúí, éáé áéá òí ëüäí áðóöü iðinñáß íá áâlñßöåé. Ááír éá Þoáí éáéþ eäÝá íá áâlñßöåé òí root óyóóciá áñ ÷ áßñúí, áðñíÝíùò i í áéá ÷ ññéöìùò ðiöö /var áðü ðiöö / áßñáé öö ÷ iÙ áðéðöìçöùò.

Jáð Úeërið óðíçééói Ýiið ettið ía Í ; iðið æð Üoimíðoð êáðáæüñiðoð óá áæáöinñáðóðé Ü óðóðPíáðoá án ; áßuí áßíáé üðáí ðñüéâéóáé ía öeëñíáçèiyí óá áæáöinñáðééiyó óððóééiyó æßóéiðo, P áßíáé fâð-ùñéóðið áðééíééið áßóéié, üðòð oðíâáßíåé ía ói Áéêðáæü Óyóðçá Án ; áßuí (Network File System), êáé óiðo iïçäiyó CDROM.

#### 4.6.1 Öi Áñ÷åßü fstab

ÊáooÜ ôç æéññáóßá åêéßíçóçò, ôá óooóßíáôá áñ÷åßùí ðiõ áiaö Ýññíôáé óoï /etc/fstab ðññíóáñôþíôáé áooûìáôá  
(åêóöüð áí áiaö Ýññíôáé iã ôçí åðéëiäP noauto ).

Ôří áñ÷åßí /etc/fstab ðåñéÝ÷åé íéá óåéñÜ áðü ãñáììÝò ìå äéÜôáíç üðùò ç áéüëiõèç:

```
device          /mount-point fstype          options          dumpfreq          passno
```

device

¼íñá óðóéåðÞò (c iðibá èá ðñÝðåé íá óðÜñ ÷åé), üðùò åíçääåßôáé óôcí ÔìÞia 19.2.

mount-point

ÊáôÜëíäiò (èá ðñÝðåé íá ðñÜñ÷åé) óôíí iðibí ðññioáñôÜôáé ói óýóôçìá áñ÷åßùí.

**fstype**

Í óýðíð öið ósóðóþíáðíð áñ ÷ áßùí ðið èá aïëéåß óðóçí mount(8). Óí ðñiæáæiñéðí Ýír óýðóðçíá áñ ÷ áßùí öið FreeBSD áßíáé ðí ufs.

## options

Óī rw ãéá óðóðþiáðá áñ÷åßùí áí Üäñúðçò- åâðñáöþò (read- write), P ro ãéá óðóðþiáðá áñ÷åßùí ïüñí áí Üäñúðçò (read-only), óðíðëçñùí Ýíí iå üðriéá Üëëç åðééïäþ iðñiñåß íá ÷ñåéÜæåóôå. Íßá óðíþeçò åðééïäþ åßíáé c noauto ãéá óðóðþiáðá áñ÷åßùí ðíø áâí ðñíðáñþþiáðé áððuñiáðá éåðóÜ ôðé ãéññåðþåð áâéññíççò ðið óðóðþiáðið. ¶ëéåð åðééïäÝò áâíð Ýññiôáé óóçí õâðëßå áíþeåéáò mount(8).

## dumpfreq

Áðóü òið ðääßi ÷ñçóéiiðiéåßöáé áðü òi dump(8) æá íá ïñßóåé ðiéá óôôôÞiáôá áñ÷åßùí ÷ñåéÜæiiôáé dumping.  
Áí òið ðääßi áðiðoéÜæåé, öüöå c ðñiéåeññéóíÝíc ôéÍP ðiö åßíáé lcäÝí.

passno

Áðóði iñþæðé Óçí óáðéñ Ü íà Óçí iðiñþá éá áðéÝá ÷ iñðóáé óá óðóðóÞiáðá áñ ÷ áßùí. ÓðóðóÞiáðá áñ ÷ áßùí ðiði áðééðiñýia íá áðéä ÷ èíýí éá ðñ Ýðåé íá Ý ÷ iñði óði ðåäßí passno óðiÞ içäÝí. Ói root óyóðçíá áñ ÷ áßùí (óði iðiñþ ðñ Ýðåé íá áðéä ÷ èáß ðñéí áðü üëá óá Üëëá) éá Ý ÷ áðé óði ðåäßí passno óçí óðiÞ Ýíá êáé üëá óá Üëëá óðóðóÞiáðá áñ ÷ áßùí éá Ý ÷ iñði óði ðåäßí passno óðiÞ Yð iññáéÝðåññå áðü Ýíá. Áí ðåññéóðüðåññå áðü Ýíá óðóðóÞiáðá áñ ÷ áßùí Ý ÷ iñði óçí Bæáé óðiÞ passno ôüôå ói fsck(8) éá áðé ÷ áðéñÞoáé íá áðéÝá ãé ðáñ Üëëçéá óá óðóðóÞiáðá áñ ÷ áßùí, áí áðóði áßíáé áðééðóó.

## 4.6.2 Ç Åíöïëþ mount

Ç åíöïëþ mount(8) åßíáé áôôü áéñéâþò ðiõ ÷ ñåéÜæåôôå áéá ôçí ðñiõÜñôçóç óôôôçìÜôùí áñ÷åßùí.

Ç ááóéêþ iññöþ ôçò åßíáé:

```
# mount device mountpoint
```

ÕðÜñ÷åé ðëçèþñá åðéëiäþí, üðùò áíáöÝñåôáé óôçí óâéßää áïçèåßáò mount(8), áéëÜ ié ðéï óôïPèåéò åßíáé:

### ÅðéëiäÝò åíöïëþò mount

-a

ÐñiõÜñôçóç üëùí ðiõ óôôôçìÜôùí áñ÷åßùí ðiõ áíáöÝñiõôáé óôï /etc/fstab, åôôüò áôôþí ðiõ öÝñiõí ôçí åðéëiäþ “noauto”, åíáéñijýóáé iÝóù ôçò åðéëiäþò -t, þ áôôþí ðiõ þäç Ý÷iõí ðñiõáñôçèåß.

-d

ÊÜíáé ôá ðÜíôá åêôüò áðü ôçí ðñáãíåôéêþ ðñiõÜñôçóç ôiõ óôôôÞìáôïò. Áôôþ ç åðéëiäþ åßíáé ÷ñþóéïç óå óôfáññáôßá iå ôi ðñüèåìá -v áéá íá ðñiõäéñéôôåß ôé áéñéâþò ðñiõðåèåß íá êÜíáé ç mount(8) ôçí óôãâéñéiÝíç óôéäiþ.

-f

ÁíáâéÜæåé ôçí ðñiõÜñôçóç åíüò iç-êáèáñijý óôôôÞìáôïò áñ÷åßùí (åðéëßíäñí), þ åíáíáâéÜæåé ôçí áíÜêëçóç ðñüóâåóçò åããññáöþò üôáí ðiñiäéåÜæåôáé ç ðñiõÜñôçóç åíüò óôôôÞìáôïò áñ÷åßùí áíÜäñùóçò-åããññáöþò (read-write) óå iüñ-áíÜäñùóçò.

-r

ÐñiõáñôÜ ðiõ óýôôçìá áñ÷åßùí óå éáôÜôôáóç lüñ-áíÜäñùóçò. Åßíáé áéñéâþò ðiõ þäéí iå ôç ÷ñþóç ðiõ ðñiõëÝíáôïò ro iå ôçí åðéëiäþ -o.

-t fstype

ÐñiõáñôÜ ðiõ ðÜñ÷iõ óýôôçìá áñ÷åßùí, ÷ñçóéñiðiéþíôå ðiõ óýði óôôôÞìáôïò áñ÷åßùí ðiõ äßíâôáé, þ ðñiõáñôÜ iüñ-óôôôÞìáôå áñ÷åßùí ðiõ óôãâéñéiÝíñ ðiõ óýði, åÜí äïèåß iáæß iå ôçí åðéëiäþ -a.

Ôi “ufs” åßíáé i ðñiãðéëåäiÝíò ðiõ óýði óôôôÞìáôïò áñ÷åßùí.

-u

Áíáíþíåé ôéò åðéëiäÝò ðñiõÜñôçóçò óôï óýôôçìá áñ÷åßùí.

-v

ÓñiðåñéëåíåÜíåé áíáæôôéêþ áíáöññÜ.

-w

ÐñiõáñôÜ ðiõ óýôôçìá áñ÷åßùí áéá áíÜäñùóç-åããññáöþ (read-write).

Ç åðéëiäþ -o äÝ÷åôáé ißá óåéñÜ áðü åðéëiäÝò ÷ùñéóíÝíåò iå êüñíá, ðåñéëåíåÜíñíôå ðiõ óéò áéüëiõèåò:

noexec

Ááí áðéónÝðåôáé ç eåéóïññá áåôåæÝóéíuí óå áooü öi óyóóôçìá áñ÷åßùí. Áooü áßíáé áðßóçò iéá áðéëíþ áóóåéåßáò.

nosuid

Äåí ëáî Üííôáé õð' üøéí setuid P setgid flags óöi óyóôçìá áñ÷åßùí.

### 4.6.3 Ç Åíôïëþ umount

Ҫ ǻíóïëÞ umount(8) ڏábñníâé, ùò ڏáñÜiâôñí, Ýíá ǻê ôùí óçìâßúí ڏñíóÜñôçóçò, ôí üññá iéáò óôóéâôÞò, Þ ôéò ǻðéëiäÝò -a, Þ -A.

¼ëëi ïé ôýðiëé äÝ ÷ iiôáé ôçí -f ãéá íá åíáíåæÜóíóí óå áðiðñiöÜñôçóç, êáé ôçí -v ãéá áíáëöôéêP áráöinÜ. Óáò ðñíäæäiðiëíýìå ðùò ç áðëëiäP -f ãáíééÜ äáí åbíáé êáëP eäÝá. Ç å' áíáæäóííy áðiðñiöÜñôçóç iðiñåß íäçäÞóáé óå êáóÜññåðóç öiï ððiëiäéóòP P íá êáôáóöñ Ýðåé äåäñíYíá óóï óýôöçíå áñ ðåßüí.

Íé - a éáé - A ÷ ñçóéíïðíéíýíóáé æáá íá áðiðññóáññóÞóiðí üéá óá ðññóáññóçí Ýíá óóóóÞíáðá áñ ÷ åßùí, óýíöùíá éáé iå óéò åðééíäÝð ðið äßññíðáé áðü öi - t, áí öðÜñ ÷ åé. Óí - A, ùóóüöi, äåí éá åðé ÷ åéñÞóåé íá áðiðññóáññóÞóåé öi root óýóóçíá áñ ÷ åßùí.

## 4.7 Äéåñãáóßåò

To FreeBSD ამჟადება მრავალი პროცესის მულტი-ტასკინგი. ადგრძნება მრავალი პროცესის მულტი-ტასკინგი. ადგრძნება მრავალი პროცესის მულტი-ტასკინგი. ადგრძნება მრავალი პროცესის მულტი-ტასკინგი.

Äýí éæáéßôðâñá ÷ ñÞóðíåð áîðïëÝò ãæá íá ðáññáðçñâßôð áðéó ãæáññâáßôð óðóï óýðóðçíá, áßíáé ié ps(1) êáé top(1). Ç áîðïëÞ ps ÷ ñçóðíëïðíëåßôáé ãæá óçí ðññäïëÞ iéáð óðâðééÞò ëßôðâð óùí ðñÝ ÷ iíðùúï ãæáññâáðéÞí, éæá iðíññâß íá áîðáíßæåé òï PID ðïðò, ðüñç iíÞìç ÷ ñçóðíëïðíëíýí, óçí áîðïëÞ iå óçí iðíßâ ðâéßíçðáí, éæé Üëéåð ðëçññïöñßâð. Ç áîðïëÞ top áîðáíßæåé üëéåð ðéó ðñÝ ÷ iðñðâð áæáññâáßôð, éæá ááíáþíäé òçí iëüíç óáð áíÜ ëßâá åâðôðâññüëåððá, åðññÝ iùð iðíññâßôð íá ðáññáðçñâßôð óé ãéññéåþò ûÜíáé i ððíëëäéóðÞ óáð ôç åâðññÝíç óóðéäíÞ.

Ç ps, áðu ðóttíðærrað, állóðaðræðaðe ið nái óðoð að óðre Ýð. Ótöf ðótt Í-: iðræðaða ðá að Úð. Áæða ðán Ürðaðaða:

```
% ps
  PID  TT  STAT      TIME COMMAND
  298  p0  Ss      0:01.10 tcsh
 7078  p0  S      2:40.88 xemacs mdoc.xsl (xemacs-21.1.14)
```

```
37393 p0 I      0:03.11 xemacs freebsd.dsl (xemacs-21.1.14)
48630 p0 S      2:50.89 /usr/local/lib/netscape-linux/navigator-linux-4.77.bi
48730 p0 IW     0:00.00 (dns helper) (navigator-linux-)
72210 p0 R+    0:00.00 ps
   390 p1 Is     0:01.14 tcsh
  7059 p2 Is+   1:36.18 /usr/local/bin/mutt -y
  6688 p3 IWs   0:00.00 tcsh
10735 p4 IWs   0:00.00 tcsh
20256 p5 IWs   0:00.00 tcsh
   262 v0 IWs   0:00.00 -tcsh (tcsh)
   270 v0 IW+   0:00.00 /bin/sh /usr/X11R6/bin/startx -- -bpp 16
   280 v0 IW+   0:00.00 xinit /home/nik/.xinitrc -- -bpp 16
   284 v0 IW     0:00.00 /bin/sh /home/nik/.xinitrc
   285 v0 S      0:38.45 /usr/X11R6/bin/sawfish
```

Ç ps(1) õðõíöôñßæåé æÜöiñåò åðéëïäÝò ãéá íá áéëÜíåé ôçí ãéÜíá ôùí ðeçñïöiñéþí ðiò åìöáíßæiñóáé. Íßá áðü ôéø ðeëi ÷ñÞóéíåò åðéëïäÝò åßíáé ç auxww. Ç a åìöáíßæåé ðeçñïöiñßåò ãéá üëåò ôéò ôñÝ÷iñðåò åéãññåóßåò, ü÷é ìùñí ôéò äééÝò óáó. Ç u åìöáíßæåé ôí üññíá ÷ñÞóðç ôiò éäéëîòÞóç ôçò åéãññåóßåò, üðùò éáé ôç ÷ñÞóçò ôçò iñÞicò. Ç x åìöáíßæåé ðeçñïöiñßåò ó÷åðéëÜ iå ôéò åéãññåóßåò ôùí åáéñüiñí êáé ç ww áíáññÜæåé ôçí ps(1) íá åìöáíßóåé ëüéëçñç ôçí åíôíëÞ ãññiìÞò ãéá êÜëå åéãññåóßá, åöiy óóíÞëùò åìöáíßæåôåé êññÝíç ëüñù ôiò iñÞëiñò ôçò ðiò åái ÷ùñÜ íá åìöáíéóôåß ôçí ìëüíç.

Ҫ Үйиәи ôçò top(1) әбірае Әдіңүиір. Ѝа әәбілія әңәзәөбәө ôçò үиे Үәрәе оаі әоôп:

```
% top
last pid: 72257;  load averages:  0.13,  0.09,  0.03      up 0+13:38:33  22:39:10
47 processes: 1 running, 46 sleeping
CPU states: 12.6% user,  0.0% nice,  7.8% system,  0.0% interrupt, 79.7% idle
Mem: 36M Active, 5256K Inact, 13M Wired, 6312K Cache, 15M Buf, 408K Free
Swap: 256M Total, 38M Used, 217M Free, 15% Inuse
```

PID	USERNAME	PRI	NICE	SIZE	RES	STATE	TIME	WCPU	CPU	COMMAND
72257	nik	28	0	1960K	1044K	RUN	0:00	14.86%	1.42%	top
7078	nik	2	0	15280K	10960K	select	2:54	0.88%	0.88%	xemacs-21.1.14
281	nik	2	0	18636K	7112K	select	5:36	0.73%	0.73%	XF86_SVGA
296	nik	2	0	3240K	1644K	select	0:12	0.05%	0.05%	xterm
48630	nik	2	0	29816K	9148K	select	3:18	0.00%	0.00%	navigator-linu
175	root	2	0	924K	252K	select	1:41	0.00%	0.00%	syslogd
7059	nik	2	0	7260K	4644K	poll	1:38	0.00%	0.00%	mutt

Ç Ýñiäö åbñáé ÷ uñneóí Ýíç óå äyí öññåbò. Ç êåöåëßää (ié ðÝíôå ðñþöåð åññaiì Ýò) àìoáíßæïöi ôi PID ôçö ðåëåñöååbåò äéåññååbåò ðiö Ýðññåå, ôçí iÝóç ðeíP öññöbïö (åbñáé iéá iÝðñçöç ðiö ååb ÷ fáé ðüöi áðåó ÷ iëçì Ýñi åbñáé ôi óýööçì), i ñññüöö èåéöiññååbåò (uptime) ôiö óóðöPiåöiö (åðü ôçí óåëåñöååbå åðåíåéêbíçöç) êåé ôçí ôñÝ ÷ iñóða bñá. Ôá Üeeá

óóíé ÷ áßá óóçí êåöáæßáá ó ÷ áßæííôáé íà ðí ïíyíåñí óùñí æéññááðéþí ðíð ôñÝ ÷ iñí (47 óá áðôP ôç ðåññßðôñúç), ðüóç iíþlç êáé ÷ þñí swap éáôÝ ÷ iñí êáé ðüöi ÷ ñüñí ïíäåýåé ðí òýóôçìá óå æéÜöññô êáôáðô Üóåéò êåéöiññßáó ôçò CPU.

Ðe i  U o u a ei i o e ab  i a  o a n U  a d u o o P e a o ,  i o   d a n e Y  -i o   d a n i i e a o   d e c i i o n b a o  l a  o c i  Y i a i  o c o  ps .  / a d u  e a  f u n b o d a n a  i d i n a b o a  i a  a a b o a  o i  P I D ,  o i  u i f i a   - n P o d c ,  o i  d i o t o d o u   - n P o c o  o c o  C P U ,  e a e  o c i  a i d i e P  i a  o c i  i d i b a  t a b i i c o a  c  a e a n a a o b a .  C  top(1)  a d u   d m i a d e e i a P ,  a i o a i b a e a e  a d b o c o   o i   d i o t o d o u   i f P i c o   d i o   - n c o e i i d i e a b o a   a d u  o c i  a e a n a a o b a .  A d o P   - u n b a e a o a e   o a  a y i  o o P e a o .  C  i b a   a b i a e  a e a  o i  o o f i e e e u  i Y a a e i o   i f P i c o   d i o   - n a e U o o c e a   c  a o a n i i a P ,  a l p  c  U e e c  a e a  o i  i Y a a e i o  o c o   i f P i c o   d i o  e a d a i a e p i a e  o c i  d a n i y o a  o o e a i P .  O a  a d o u  o i  d a n U a a e a i l a  i d i n a b o a  i a  a a b o a  u i d e  i  Netscape   - n a e U o o c e a   o - a a u i  30 MB RAM,  a e e U  o c i  d a n i y o a  o o e a i P   - n c o e i i d i e a b   i u i  9 MB.

Ç top(1) áðóðüüðáðá áráísláþíðáð ói ðáðñéåð ÷ ütlaðir óðco ëðueð áyír áððóðuññéððóðá. Áððuñ iðiññáð fá Þóðæriéððóðáß láð óðíç áððéetiðÞ s.

#### **4.8 Äáßìíäò, Óþìáôá, êáé Ôåñìáôéóìüò Äéåñääóéþí**

¼ðáí ÷ ñçõéíñiðíæåßðå Ýíá èåéíñiññÜöí, åßíáé åýéíëí íá ðííí áé Ýá ÷ åðå, íá öiññòþíåðå áñ ÷ åßá, ééé iðéåþíðiøå Üëëí. Åðóóù óðiññåßíáé äéüöé í èåéíñiññÜöíø ðánÝ ÷ áéé áðóÝò ôéò åðiññóðçôåò, ééé åðßóçò åðåéäþ åßíáé ðññöáññöçì Ýííò óå Ýíá ðåññáðééü. ÍññééÜ ðññiññÜññáðå åáíí åßíáé ó ÷ åðéáóííÝíá íá åiññéåýíñí ìá õðíå ÷ åßð ÷ åéñéóíñýò áðü ðííí ÷ ñíÞóðç, ééé åðñíÝíùò áðíññáðå Ýíññóáé áðü ðííí òí ðåññáðééü íá ôçí ðññþòç åðóéáññßá. Åéá ðánÝññåéññá, Ýíáò åíñðçññåðçòþò web ñññåýåé üëí õí ÷ ñññí òóí íá áðáññóÜ óå áéóþíáðå web, åðñíÝíùò åáíí ÷ ññåéÜ æåññåé èåíéÜ åéóáññäþ åáññíÝíùí áðü ðííí ÷ ñíÞóðç. ¶ëëí ðáññáðéþóéí ðánÝññåéññá åðóáññäþò, åßíáé óå ðññiññÜññáðå íåðóáññÜöí ìçíññÜññúí çëéåññííééþò áééçéññåðçå áðü íéá õíðíæåðßå óå íéáí Üëëí.

Ím Üäxiölä áóð Ü óá ðñriäñ Üliåáða ááþüüäðo (*daemons*). Ié áaßüüäðo Þðáí ÷ áñáêðøÞñäðo ôcðo Åéëçíéðo ðoðeïëäðáðo (íyôå éäæïß - íyôå éäæïß), Þðáí áðëÜ iéenñ Ü óðñäðöðééÜ ðiáýiáða ðið Ýéáíáí ÷ ñÞóéíá ðñ Üäiáðá áéá ôcí áfèñüðüöcðá, üðùò áñéñéðþo éáé ié áéáéñiéðó Ýð web êáé áiñöðçñâðöç Ýð çëéðñiíééðo áééçëiäñaoðá ðølñáñá êÜñiñi ÷ ñÞóéíá ðñ Üäiáðá. Áóðuð áßiáé êáé ié etüiñi ãéá ôñi iðibíç iáðéüö ôiñ BSD áßiáé åäþ êáé ðïëý êáéñü i ÷ áññýiñiñi ãáßiñiáðo ià ðÜíéíá óðiñ ðäiñyööéá êáé ôcí ôñßáéíá.

lāñēé Ýò öimÝò èá ÷ nāéáóôåb íá áðééïíùíåßòå íá ôç äeññääóßå áåùò ááßiiä. jåo ôñüöìò åéá íá áßíåé áðóôú áßíåé óó Ýéïíòåd (üðòò ééå óå eÜèå áåôåé Ýòéïç äeññääóßå) óPiåôå (*signals*). ÕðÜñ÷iöi åéÜöiñä óPiåôå ðiö iðinñåßòå íá óóåßéåôå — iññééÜ áðü áðóÜ Ý÷iöi iéá óóåéåñéi Ýíç öçíåóßå, áñp Üëéå áññíçíåýíòåé íå Ýóå áðü öçí áåðññíäP, ééå áðññÍyùò áéå íá íÝñiöiå ðùò áññíçíåýíòåé óå óPiåôå èá ðñ Ýðåé íá áéååÜöiñiå öçí óåéñçñùóç öçò áåðññíäP. Iðinñåßòå íá óóåßéåôå óPiå óå iéá äeññääóßå iññí áí óåó áíPéåé. Á óóåßéåôå óPiå óå iéá äeññääóßå ðiö áíPéåé óå êÜðiéíí Üëéi iñ kill(1) P kill(2), äái èá óåó áåéóñåðåß. C iññääéP áíåßññåóç óå áðóü, áßíåé i ÷ nPööç öiö óóðóóPiåöiò.

Ôi FreeBSD óóÝéíáé áðþbóçó óÞiaðá óá åöáññíäÝð óå ìañééÝð ðåñéððþóáéð. Áí ìbá åöáññíäþ ãññííÝíç Üó ÷ çiá, êáé ðññiððáèåß íá ðññiððäëÜðåé iíÞìç ðið åáí ôçó áÍÞéáé, ôi FreeBSD óóÝéíáé óóç äéáññáóþá ði ðÞia *Segmentation Violation* (SIGSEGV). Áí ìéá åöáññíäþ ÷ ñçóéññiðiþçóá ði óýðóçíå åéäiðiþçóçó alarm(3) áéá íá åéäiðiþçéåß iåðÜ ôçí ðÜññíäi íéáð ÷ ñññéþð ðåññéüäið ôüôð ôi FreeBSD èá óóðþbéåð ôi Alarm signal (SIGALRM), êáé iýðóù êáè ÷ áíÞò.

Äýí óPíáôá ïðimiyí íá ÷ñcoéiiðiéçeyí áéá íá óðâiâðPóriði ìBá äéâáéêáóBá, òi SIGTERM éáé òi SIGKILL. Ói SIGTERM áßíáé i òùðôüö ñiñüðiò áéá íá óðâiâðPóriði ìá äéâáéêáóBá. Ç äéâññáóBá áíðéëðià Üíâðáé òi óPíá, áêðââéâß òi óðâiâðÜðcià êéâßifññóâ üéá óâ ÷âßá áíâöiñÜð (log files), ðið ðééâíþò íá áßíáé áfíé ÷ðÜ, éáé ââíéþò óâæäéþâé

íðéæÍþiðið á ÆÚíáé ðíç ðóðææññéYÍç ðíñiíéÞ óðóéæÍÞ ðñéi ðóðaiáðþróáé. Óá ïññéE Ýð ðáññéðþróáé ð íæññáðþá ìðiññáß íá áðñiÍþóáé ðíç SIGTERM áðÚ ãññðóéðóáð óðóá iéðóÜ ÆÚðiðið ãññáðþá ðið ãðá iðiññáß íá ãæcæiððáß.

Ói ÓPiá SIGKILL äái iðiññáþ fá áaññçèåþ áðü lsbá æéaññáóþá. Áßíáé óá íá ëÝáé óðç æéaññáóþá, “Äái ià áíáéáóÝñáé óé êÜíáéó, óðáiÜôá óþñá áiÝóùò”. Áí óðåßëåðå öi ÓPiá SIGKILL óá iéá æéáæéáóþá óüöå öi FreeBSD éá óðáiáóÞóåé óçí æéáæéáóþá Üìåóá<sup>4</sup>.

¶jééá ÓPiádóá ðiö ðeeéáþþo íá èÝéådå íá ÷ñíçöeiiðièÞóådå áßíráé óå SIGHUP, SIGUSR1, éáé SIGUSR2. ÁôôÜ áßíráé ÓPiádóá áâáiééþþo ÷ñíþóçö, éáé üödáí áðíiðóå Ýééïiðåé èÜñiñiði áæööññåðééÜ ðññUäñádå áíÜëiñå íå óçí áôðññiñäþ.

Ôá óPiáôá ôóÝéiiôáé ÷ñçóéiiðíéþíôáò ôçí åíöíëP kill(1), üðùò ððíäåééíýåé ôí áéüëöèë ðáñÜääéäíá.

## ÓôÝëññôáò ÓPìá óå ìßá Äéåññáóßá

Áðóü òi ðáñÜääéäíá äåß÷fäé ðùò íá óôåßëåôá óÞíá óóçí inetd(8). Óí áñ ÷åßí ñyèìéóçò ôçò inetd åßíáé òi /etc/inetd.conf, éáé c inetd eá íáíá-æáå Üóåé áðóü òi áñ ÷åßí ñyèìéóçò üôáíà èá óóåéß òi óÞíá SIGHUP.

1. Åñåßöå ôí PID ôçò äéåñäåßöå, ôçò iðíßåô åðééöìåßöå íá óðåßéåôå ðí óþíà. ÅíåñäÞöôå ÷ñçóëiiðíéþíôå ôéð åíðiðéÝð ps(1) êáé grep(1). Ç áíðiðéÞ grep(1) ÷ñçóëiiðíéåßöåé æáá íá øÜíâé óðçí Ýññäi iéáð åíðiðéÞò, æáá ôíðö åéöåñéèïçöééïýð ÷ñåñéðÞñåð ðíð Ý ÷åðå íñßöåé. Ç áíðiðéÞ åðéåðéåßöåé åðü Ýíáí åðéü ÷ñÞöôç, åíþ ç inetd(8) åéöååéåßöåé åðü ôíï root, åðñí Ýñùò èá ðñíðéÝðåé íá ðññiðéÝðåôå ôçí åðééïäÞ ax óðçí ps(1).

```
% ps -ax | grep inetd
```

Åðii Ýíùò ói PID ôçò inetd(8) áðíáé ói 198. Óá iàñéêÝò ðåñéðþóåéò iðriñåß íá àìoáíßæåôáé óóçí Ýíïäi ç áðíøþ grep inetd. Áðóüü ijöðþéåôáé óóüü óñüði jà óüü iðiñþ c ps(1) óÙ÷ iáé óçí èþþóá óùü áðiñábi äéññáóéþí.

2. ×ñçóëiiðíéÞóôå ôçí kill(1) ãéá íá óôåßëåôå õi óÞíá. ÅðåéäP ç inetd(8) ôñÝ÷åé áðü ôíí root èá ðñÝðåé ðñþþóá íá ÷ñçóëiiðíéÞóôå su(1) ãéá íá áßíåôå ðñþþóå root.

```
% su  
Password:  
# /bin/kill -s HUP 198
```

¼ðùò êáé iå ôéo ðâññéóöüôåñâò åíðïëÝò óöî UNIX, ç kill(1) ååí èá ôöðþóåé ôßðïòå ôöçí Ýñïäí áí ç åíðïëÞ åß ÷ å ðåðéóò ÷ ßá. ÅÜí óöåßëåðå Ýíá óÞíá óå leá åéññåóßá ðïò ååí óåó áíÞéåé èá ååßòå kill: *PID*: Operation not permitted. Áí ðëçéöñïëíÞåðå ðÜëìò ñi PID ôüôå Þ èá óöåßëåðå ñi óÞíá óå ðÜëìò åéññåóßá, èÜðé ðïò iðïñâß íá åßíáé Üó ÷ çii, Þ, áí åßòå ñi ðåñüò, èá Ý ÷ åöå óöåßëåé ñi óÞíá óå Ýíá PID ðïò ååí ÷ ñçóëíïðéåßòåé ôç óöååéññéÝíç óöéäÞ, êáé èá ååßòå kill: *PID*: No such process.

Ãéáóß íá ÷ ñçóéíïðíëþóåôå óçí áîóïëþ /bin/kill;; ÐíëëÜ êâéëýöç ðáñÍ ÷ tóí óçí áîóïëþ kill ùò áîóùìáóùìÝíç áîóïëþ. Áôðû óçíàßíåé ðùò òi êÝëööìò èá óôåßëåé ôi óþia Üìåóá, áîôß íá ôñÝìåé ôi /bin/kill. Áôðû iðtñåß íá áßíáé ðïëý ÷ ñíþöéïï, áëëÜ êáéöiññåôéêÜ êâéëýöç Ý ÷ tóí áéáöiññåôéêþ oyíîôáïç áéá ôií êâéëñéöiú ôi üññíá ôiñ óþiaðöi ðïö ðñÝðåé íá aðiñðåæäß. Áîôß eëéðüí íá ðñÝðåé íá iñëiðiá üëéåò ôéð ðññéððbóåéö .áßíáé áðéëüöåññ áðëëÜ íá ÷ ñçóéíïðíëíýíå óçí áîóïëþ /bin/kill ... Üìåóá.

Ç áðiøîïëP Üëëùí òçìÜðùí iïéÜæåé ðÜñá ðiøý, áðeÜ áíðéêåðåóôPôôå ôï TERM P ôï KILL ôôç ãñâïlP áíðiøþí ià êÜðiéí Üëëi.

**Óçìáíöéêü:** Ç öüíåðóç ôô ÷ áßùí äéâññåáóéþí ôôï óýóðçìá iðiñâß íá áßíáé êáêþ éäÝá. Éäéåßôåñá, ç init(8), ià PID 1, åßíáé ðiøý åéäéêþ. Ç åêôÝëåóç ôçò áíðiøþò /bin/kill -s KILL 1 åßíáé Ýíáò ãñþäññò ôñüðiò íá óâPôååå ôï óýóðçìá óåò. DÜñå íá åéÝá ÷ åôå äýí öiñÝò ôéò ñáñáìÝôññò ðiø ÷ ñçóéiïðéåßôå ià ôçí kill(1) ðñéí ðéÝóååå **Return**.

## 4.9 Èåëýöç

Óôï FreeBSD Ýíá iàñÜëëi ïÝññò ôçò êáèçìåñéPò åññåáóßåò åßíåðåé óå Ýíá ðåñéåÜëëi ãñâïlPò áíðiøþí iïùíåðéé êÝëðiò (shell). Ç éýñéá ãïðéåéÜ ôïò êáéýöiò ãßíáé íá ðåññíåé åíðiøéÝð áðü ôï êáíÜëëi åéðüäiò êáé íá ôéò åêôåéåß. ïññéÜ êåëýöç Ý ÷ iði ãíðùñåðùí Ýíåò êåéòiðññåßåò þôôå íá åïçëiýí óôéò êåèçìåñéÝð ðñññññåðéóí Ýíåò åññåáóßåò üðùò åéá ÷ åßñéóç áñ ÷ åßùí, file globbing, åðåññåáóßå ãñâïlPò áíðiøþí, iàñññåðéÝð, êáé iàðåååéçôÝð ðåñéåÜëëiðiò. Ôï FreeBSD åéåðßèåååé ià åéÜññå êåëýöç, üðùò ôï sh, ôï Bourne Shell êáé ôï tcsh, ôï ååéðéùíÝii C-shell. ÄéÜññå Üëëi ååëýöç åßíáé åééåÝóéí åðü ôçí ÓðëëiäP ôùí Ports ôïð FreeBSD, üðùò ôá zsh êáé bash.

Ðiñ êÝëðiò íá ÷ ñçóéiïðéPôååå; Åßíáé ðñññåðééÜ èÝíá ãïýóðiò. ÅÜí åßóðå ðñññññåðéóôPò óå åëþóåá C èá åéðéåíéåßå ðåññéóðüðåñ ïééåßò ià ôá ååëýöç ôýðiò C, üðùò ôï tcsh. ÅÜí Ýñ ÷ åôå áðü ôï Linux P åßóðå ÍÝð óå ðåñéåÜëëi ãñâïlPò áíðiøþí UNIX ïðiññåßå ìá åïééÜååå õið bash. Ç iðoßå åßíáé ðùò êÜëëå êÝëðiò Ý ÷ åé iññåééÝð éåéüðçôåò ðiò iðiñâß íá õðiññåðóóíý íá ôï ðåñéåÜëëi åññåáóßåò ôçò ðñññþçóçò óåò, êáé åðií Ýíùò åßíáé åðééiäP óåò ðiçí êÝëðiò íá ÷ ñçóéiïðéPôååå.

Íéá ëéíP éåéüðçôå üëùí ôùí ååëðþí åßíáé ç áðôüìåðç ôðiðëPñùóç iïññÜðùí áñ ÷ åßùí. Áöiy Ý ÷ åôå ðëçêôññéiäPôåé óå ðñþðå åñÜññåðå iéáð åíðiøþò P åñüò iïññåðiò áñ ÷ åßiò áí ðéÝóååå ôï ðëÞêòññ Tab ôïò ðëçêôññéüñæí, ôüôå ôï êÝëðiò åðôüìåðå åé åïééçñþðåé ôï ðññüééðiò ôçò åíðiøþò P ôïò iïññåðiò áñ ÷ åßiò. Áð åþðiðià Ýíá ðáñÜäåéàíá. Áð ðiðéÝóååå ðùò Ý ÷ åôå äýí áñ ÷ åßá foobar êáé foo .bar. Áí èÝëååå íá óâPôååå ôï foo .bar èá ðñÝðåé íá ðëçêôññéiäPôååå rm fo [Tab] . [Tab].

Ôï êÝëðiò èá õððþðåé åðôüìåðå rm foo [BEEP] .bar.

Ôï [BEEP] åßíáé ôï êiðäiýíé ôçò êíññüéåð, ôï iðiþi iàð ðëçññiññåß ðùò åáí Pôåá åðññåðí íá iïééçñþðåé ôï üññá ôïò áñ ÷ åßiò åéüðé ðñÜñ ÷ iði ðåññéóðüðåñ åðü Ýíá iïññåðå áñ ÷ åßùí ðiò ðåéñéÜæiò. ¼íôùò ôï foobar êáé ôï foo .bar iàñññåðéÝí iàñ fo, êáé ôï êÝëðiò èåðÜññå íá ôðiðëçñþðåé ñò õi ñoo. Áí ðëçêôññéiäPôååå åðééðéÝí .., êáé iàñÜ ðÜëë Tab, ôï êÝëðiò èá êåðåååÝñåé íá õðiðëçñþðåé ôï ðññüééðiò ôiò iïññåðiò áñ ÷ åßiò åéå óåò.

¶ëéí éäéåßôåñ ÷ åññåêðçñéóðéêü ôiò êåëýöiò åßíáé ç ÷ ñPôç ôùí iàðåååéçþí ðåñéåÜëëiðiò. Íé iàðåååéçôÝð ðåñéåÜëëiðiò åßíáé Ýíá æåýñò iàðåååéçþí/ééåéåéþí åðièçêåòí Ýíá óôïí ðåñéåÜëëiðå ÷ þññ ôïò êåëýöiò Áðôüò i ÷ þññ ðiò iðiñâß íá åéåååðååß áðü iðièíäPðiò ðñññññåðå ðiò êåéåßååé áðü ôï êÝëðiò, êáé Ýðóé ðåñéÝ ÷ åé ðëÞëiò ññðèiñðååñ iñññññåðå ðñññññåðå. Áéééé ðiðéååå ñðå åññååéçôÝð ðåñéåÜëëiðiò êáé ôç óçìáóßå ôiò:

### ìåðåååéçôþ

USER

### ðåñéåñåöþ

¼íññá ôïò ôñÝ ÷ iñðå ÷ ñPôôç.

låôáâëçôþ

## PATH

## DISPLAY

SHELL

## TERM

## **TERMCAP**

## OSTYPE

## MACHTYPE

EDITOR

PAGER

## MANPATH

Iñéóíùò iéáo iåôáâéçôPò ðåñéáÜëëïíò ãéáoÝñâé êÜðùo áðü eÝëööìò óá eÝëööìò. Åéá ðåñÜäâéäíá óóá êâéyöç ôýðiõ-C, üðùò óá tcsh êáé csh, èá ðñÝðâé íá ÷ñçöëíïðíéÞóâðâ ðçí setenv ãéá íá iñßóâðâ iåôáâéçôÝð ðåñéáÜëëïíò. Óá êâéyöç Bourne üðùò óá sh êáé bash, èá ðñÝðâé íá ÷ñçöëíïðíéâðâ ðçí export ãéá íá eÝóâðâ ðéó ôñÝ ÷-ïðóâðâ iåôáâéçôÝð ðåñéáÜëëïíò. Åéá ðåñÜäâéäíá, ãéá íá iñßóâðâ P íá iåôáâñÝðâðâ ðçí iåôáâéçôP ðåñéáÜëëïíò EDITOR, óá csh P tcsh èá ðñÝðâé íá äþóâðâ iéá áîðiëP ðiõ íá eÝóâé ðçí iåôáâéçôP EDITOR óóí /usr/local/bin/emacs;

`vi .setenv EDITOR /usr/local/bin/emacs`

Ãéá êåëýöc Bourne

```
% export EDITOR="/usr/local/bin/emacs"
```

Iðñiðbôå ðôðbóçò ôôá ðâññéóðüðâñá êâëýöç íá áíáðôýóóåôå ôéó ìåðâåâëçô Ýð ðâñéá Üëëñiðiö òïðiðèåðôþíðåò ìðñiðô Ü òïðô ðií ÷ áñâðôþñá \$. Æá ðâñÜäåðâíá, ç echo \$TERM éá ðôðþróåé ôçí ôéíþ ðið Ý ÷ iðiå è Ýðåé ôôçí ìåðâåâëçôþ, äëüôé ôí è Ýðëðið ãíáðôvôåé ôçí \$TERM êâé ðâñið Ü òïð ôéíþ ôçô ôôçí echo.

Óá éæöyöc ÷ ñçóëiiðiëíý íàñééïyò áæééëiyò ÷ áñáéôPñåò, ðiò iñiÜæiñóáe meta- ÷ áñáéôPñåò áéá áiòáíßóåéö  
éæáßóåñùí áâäñí Ýfú. I ðei eïëíùò áír áôðþí áßíáé i ÷ áñáéôPñåò \*, i iðiñbiò áíðéðñiòúðåýåé iðiëiäÞðiòá áéöánñéèïçóéëü  
÷ áñáéôPñá óá Ýíá üññá áñ ÷ áßiò. Áðoïß ié áæééïß meta- ÷ áñáéôPñåò iðiññíý íá ÷ ñçóëiiðiëçëiý íáéá íá ûññiòí  
filename globbing. Áéá ðáñUääéáíá, áí ðëçéöñiëiäÞóåò echo \* áßíáé ó ÷ áâüí òi ßæéí íà òi íá áþóåòò ls æüöé òi  
éÝéðòò ðáßñíåò üéä óá áñ ÷ áßá ðiò ðáñééÜæiòí íà \* ééá óá ðñiùëåß ôóci áññáíP áiòëþí áéá ôci echo.

#### 4.9.1 ÁëëÜæïíôáò ôi ÊÝëõöïò óáò

Iñ åôëïëüôåñiò ôññüðiò ãéá íá áëéÜtåôå ðiò ëé Ýëõõiò óåó åbßíáé íá ÷ñçõéiiðièPóåôå ôçí åíñiëP chsh. ÔñÝ ÷iiôåò ôçí chsh éá iäçäçèåßôå óöií êåéíåññÜöi ðiò Ý ÷åôå èÝóåé ôöçí iàôåâéçöP ðåñéåÜëeñiò EDITOR, åíþ áí åáí Ý ÷åôå èÝóåé, éá iäçäçèåßôå óöií vi. ÁëéÜtåôå êåðÜëeçéå óç añañìP "Shell:"

Iðiññáþôá áðþóðó íá áþþóðó ðóðí chsh óðí áðéëiðP -s, áðóP èá èÝóáé ðí ëÝëððiò áæá óáð, áß÷ùò íá ÷ñâéáóðáß íá ÷ñçóðíðiðPóðó ðí ëâðiâññÜði. Áéá ÞáñÜðâéñá, áí èÝëðó Íá ðí ëÝëððiò óáð óáð bash, ç áéüëiðèç áðiðP áßiðáé áéñéáþo áðóðu ðið ÷ñâéððáðó:

```
% chsh -s /usr/local/bin/bash
```

**Óciáßùóć:** Ôí êÝéööìò óóí iðíßí áðééòíàßóâ íá iàðåââàßóâ ðñÝðåé íá àßíáé êáôá ÷ ùñciÝí òóí áñ ÷ àßí /etc/shells. Áí Ý÷âóâ áâéáôáôþóáé Yíá êÝéööìò áðü ôç ðöeëíäþ ôúí ports, ôüôâ áôöü èá ðñÝðåé íá Ý÷âé þäc áßíáé. Áí áâéáôáôóþóáôâ ôí êÝéööìò iüííé óáò, ôüôâ èá ðñÝðåé íá áâéôâëÝóâôâ ôç áéáäéêáóßá ðíó áéïeëöeåß.

Áí áéá Óñá Üáééáílá, áééáóáóôþóáôå óï bash lüíié óáò ééá ðí ðíðíéåðóþóáôå óðíí /usr/local/bin, óüôå éá ðñÝðåé íá äþóáôå:

```
# echo "/usr/local/bin/bash" >> /etc/shells
```

Êáé ìåôÜ îáíáôñÝîôå ôçí chsh.

## 4.10 ÉåéìåñäñÜöïé

Áñêåô Ýò ñõèìßóåéô óóï FreeBSD áßñíîôáé là áðåñâñãáóßá áñ÷åßú êåéí Ýíï. Áéá áñóöü ôï ëüäï, èá Þóáí éåëþ éáÝá íá áññéåéùèåßôå là Ýíá êåéíåññÜöï. Áñêåôïß ðåñéÝ÷íïðáé óóï áåóéëü óýóôçìá ôïï FreeBSD êáé ðíëëïß ðåñéóóüöåññé åßíáé æéáé Ýóéïíé óóçí Õðéëïþ ôùï Ports (Ports Collection).

Điểe Ýò åooániiä Ýò ðiö ÷ ñae Üæåôåé íá áee Ütiöi êÜðieí áñ ÷ åbí P áðåéöiyí áðü ðiö ÷ ñPóôc íá ðeçêöñiieia Póåé êÜðieí êåbíiåíi, èá áíiBüiöi áðôùiáôá êÜðieí êåeíiåññÜöi. Åéá íá áee Üiåôå ðií ðñiåðeëåai Ýíi êåeíiåññÜöi, èá ðñ Ýðåé íá èÝóåôå êåô Üeeçç öeíP óoçí iàôåâeçôP ðåñéå Üeeññiöi EDITOR. Ååßôå öçí åíüöçôå Èåëýöç æáå ðåñéooúôåñå ëåðöiñ Ýñåéåð.

#### 4.11 ÓõóêåõÝò êáé Áñ÷åßá óõóêåõþí

ÓóóéâðòÞ áþíáé Ýíáð üñìð ðið ááðóÝñâðáé óá ó÷ Ýócs ía ëæéððñâðå hardware áñüð óðóðòÞíáðið, ðâñééâíáð Üññíðáð  
äþóðið, áêððñûð Ýð, eÜññðåð ãñáðééþí éáé ðeçéðññüüáé. Éáð Ú òcí áêëþíçóç òið FreeBSD ié ðâñéóðúðâññàð  
ðeçññiðññðåð ðið áíáðñ Üññíðáé óðíç íeüüíç áþíáé óðóðâñð Ýð ðið áíáðññðåð áðü òi ÿðóðçì. Ìðññðåð ìá íáðññðåð óá  
íçýíáðá áêëþíçóçò, áéááð Üæññðåð òi /var/run/dmesg.boot.

Óóéo ðåñéooüôåñào áðü áooÝò óéo óooéâoÝò óå Ýíá èåéöiññaéü óyóôçìá UNIX ç ðñüóâáóç ðÑÝðåé íá ãßíåôáé äæáiÝóïo áæäééþí áñ ÷ åßùí ðïo iññÜæiióáé áñ ÷ åßá óooéâóþí, êáé åßíáé öiðièåóçíÝíá óoïiêáóÜëiäi /dev.

#### 4.11.1 Äcìéïõñäþíôáò Áñ÷åßá Óõóêåõþí

¼ôáí ðññiòé Ýôåôå íéá íÝá óoóéåõP óoï óýóôçìá óåo, P iåôåäüôôßæåôå ðçäåßi êþäééå aéá õðiøôþñéiç íÝùí iäçäþí, ðñ Ýðåé íá äçlëiõññiýíôåé íÝá áñ ÷ åßá óoôéåõþí.

#### 4.11.1.1 DEVFS (DEvice File System)

Óði óýóðiciá áñ ÷ åþbúí óðoðéåðþí P, DEVFS, ðáðnÝ ÷ áé ðññúðåáóç óði ÷ þþri iññÜðöñl óðoðéåðþí óið ððñPíá (device namespace) óði global óýóðiciá áñ ÷ åþbúí óið óðoðóÞíáðiò. Áiðß íá aðcëiðññåðþóå eáé íá iàðåðáñÝðåðå áñ ÷ åþá óðoðéåðþí, óið DEVFS óðiðcññåð aðeá óáð aððu óið eäéåðþóññi óýóðiciá áñ ÷ åþbúí.

Äåßôå ôçí óåëßää áïçèåßáò devfs(5) ãéá ðåñéóóüôåñåò ðëçñïöiñßåò.

## 4.12 Ôýðié ÅêôåëÝóéìùí

Áéá íá êáôáæÜâåôå ãéáôß ôï FreeBSD ÷ñçóëíïíéåß ôïï ôýðíí elf(5) èá ðñÝðåé ðñþôá íá ãíùñþæåôå ìåñééÜ ðñÜäìáôå  
ãéá ôïòò ôñåèò “eõññáñ ÷ iõò” ôýðíòò åêöååéÝóëíùí áéá ôï UNIX

Ôi FreeBSD ðññóðåéåß íá fâðåñ Üóåé áðôü ôi ðññüâëçìá ðánÝ-iiðåð Áýá âïçèçöéêü ðññüññâìà iå ôi iðëíßi lðëññýiå íá áïóùìáðþóïðìå (*branding*) óá Áýá áðôåé Áýóëi ELF ôeð ðëcññöiñßåò æá ôi ABI ðiø áðíáé óðíâðåû iå áðôü. Äåßôå õçí óáëßää manual ôiø brandelf(1) æá ðåññéóóüðâñåò ðëcññöiñßåò.

Öi FreeBSD ðñí Ýñ÷åðåé áðü öií “ééáóóééú” ÷þñí éáé iÝ÷ñé óçí áñ÷þò ñçò óåéñÜð 3.X, ÷ñçöéñiðíéíýóå öií óýðí a.out(5), iéá óå÷iiëtäßá iiëëíáíö Ýíç éáé áðtiääååéäí Ýíç óå ðiieé Ýð ååíé Ýð ååëüöåùí öiõ BSD. Áí éáé ç iåðååéþòðöeóç éáé ååé Ýéåðç ååååíþí ååðåé Ýðéñùí (éáé ððñPññ) óýðiõ ELF Þðáí aðiáðòþ óðå FreeBSD óðóðòÞiaðå Þæç áðü ðiieý éáéñü ðñéí, öi FreeBSD áñ÷éé Ü áíðéoo Ùëçéå óóçí “þèçóç” åéá éáee Ýñùñòç öiõ ELF ùò ðññiéâëiñéóí Ýññò óýðiõ. Åéáòß; ¼ðáí i êüöiñò öiõ Ëßññö Ýéáíá óçí iæöíçñþ ïåðò Üååáóç ðññò oï ELF, aðí Þðáí ðiðiøí åéá íá iåðöýååé áðü öií óýðí ååðåé Ýðéñùí a.out üöi åéá íá áíðéiåðùðßóåé öi äýóéåiðöi åééü öiðo iç÷áíéòü iééü÷ñçóðùí åééëièçéþí, i iðiñþið ååðßæiñðåí óå jump-tables éáé ðññiéâëiýóå iåðå Üëç äðö÷ Ýñåéå óóçí éåðåóéåðòþ öiðo, öuúöi öóïðò ðññiññåùíåðéóò Ýðò üöi ëáé öóïðò iåðåðùñéçö Ýð. Áðü ðç öóéåiþ ðið óå åééé Ýðéñí åññåéåßá öiõ ELF ðññiö Ýðóññáí èýóç óóï ðññuåéçíà öuú iééíþí åééëièçéþí éáé Ýðéñí ååíééþò aðriäåéðü ðòð Þðáí “í åññiñò ðññò óå åìðññò”, Ýðéñí aðriäåéðü öi áíáåéåßí êüóðiò ðç ìåðåóðiñÜð éáé åðééðåý÷èçéå ç iåðåéþíçöç. I iç÷áíéòü iééü÷ñçóðùí åééëièçéþí öiõ FreeBSD ååðßæåðåé óå iåðå Üëç ååéëü óóïí áíðóðöié÷i lç÷áíéòü öiõ SunOS™ ðçò Sun éáé åßíáé ðiieý áýééièò óðç ÷ñþç.

Ôüôå, æéáôß ððÜñ÷iðí ôüóïé æéáöiñåôéêïß ôýðïé;

Đồ sộ cói ôiêôåéüi ðáñåëüi, õõPñ ÷ å áðëü hardware. Áôôü ôi áðëü hardware õõiôõPñéæå Ýíá áðëü, iêñü óyôôçìá. Ôi a.out Pôáí áðüëôôá êåôÜëëçei ãéá òcí áíáðáñÜôôáóç åêôåëÝóëüi óå áôôü ôi áðëü óyôôçìá (Ýíá PDP-11). ¼ôáí i êüñïò Úñ ÷ éóá íá lâôåöÝñåé ôi UNIX áðü áôôü ôi áðëü óyôôçìá, äéâôçñPèçêå i ðýđïò a.out ãéâôß Pôáí êéâññïëçôéüô ãéá óå ðññôá ports ôiô UNIX óå áñ ÷ éôåâôîíéëÝò üôôù ç Motorola 68k, VAXen, êôë.

Ílåô Ýðåéöá êÜðiëìò eäiðñüò iç ÷ áíéetuò hardware áðiò Üóeoá ðùò áöiy iðinriýoá íá áíáíáâæ Üææò oï eiæeoíèéü íá êÜíáé ôúoá ðñü : áññá êüëðá, eá iðinriýoá áðþbóçò íá ðáññáêðþbóâæ iññééÝò ðýéâò áðü oï ó : áâéáòü þóôá íá áðéññÝþâé óoïí ððñÞíá ðçò CPU íá ôñÝ : áé ãñçáññüôðañá. Áí áéé áæáðeâò Üðóçêá þóôá íá iiøéåyâé iá áðóü oï iÝí áðbäiò hardware (áññóóü óÞìññá ùò RISC), i ðýðiò a. out Þóáí ðâééëÜ áéâðÜëçëiò áéá áðóü, éáé Ýðóé ó : áâé Üðóçêáí ðiæëið iÝíé ðýðié áéá íá áðéññá ð : èåß éaëýôðñç áðüäiöç áðü oï hardware áðü üðé Þóáí äöíáðóü íå ðiñ áðëü éáé ðâññiññóóééü ðýði a. out. ÅöåðñÝëçêáí áé Üðiññé ðýðié üðñüò ié COFF, ECOFF, éáé iññééið Üëëié eeäüðåññí ãññóóið ié ðâññiññé ðiñ ðiñ Üðiññá ðóâæamiiðiðiðeÞëçêáí oï ELF.

Åðéðë Ýí, ói iÝáðæði ðuúi ðñiñáñáii Üðuúi áæfíüðáí üëi éáé iàðááéýðåñí éáé íé áßðóéïé (éáé ç öððóééþ iÝPiç) Þóáí áéüiç ð·:åðééÜ iéññið ëáé èÜðùò Ýðóé åáiíÞèçéå ç éaÝá òçò ëiéíÞò áéáééïèÞéçò. Ói óyóðóçìá VM Ýáéíá åðßóçò ðáñéðóóñðåñí ðáñßðëiéi. ÈÜðá ìðá ãðü ðéð ååéðéþðáéò áæfíüðáí ià áÜðóç ðíï ðýði a. out, ðið ùùò ãæfíüðáí üëi éáé ðéi áýð·:ñçóðiò ià èÜðá iÝá ðñiñóéþéç. Áðéðññóéåðá, ið eüññið Þéðéá íá ðiññóþíé ðiÞiaðá ãðiáééÜ åßp ði óyóðóçìá Þóáí óá ðÜðóç åéðÝéåðçò, P íá åáñéåðßöðé iÝñc ðñiñáñáii Üðuúi áöiy ãß·:å åéðåéåðóðåß i ðphäééåð áñ·:ðéiðiþçóð (init) þóðå íá åñiééiññçéåß öððóééþ iÝPiç éáé ð·þñið swap. Íé åéþóðåò ðñiñáñáiiðéóðíý áæfíüðiðóðáí áéüià ðéi ðáñßðëiéåð éáé ið eüññið Þéðéá åðóðüiáðç öüññðùóç éáé åéðÝéåðç ðphäééåð ðñéi ðíçí ðéiÞóç ðçò main. æííá ðññ·:åéññðå ãéññþþðåéò (hacks) ðóðí ðýði a. out þóðå íá ðóðiññáðßåéò ià üëðå ðáðóÝð ðéð åééðáÝð, éáé ðññÜññáðé, åéá leá ðáññßiäi Ýáðæ·:iá íá ëáðiðññáññ. lñ ðíï éáéññ üùñò, öÜÍçéå üüðé ið ðýði a. out åái éá iðññýóá íá áíðåðáíÝéåé ðá ðññÜññáðé, åöiy éáé Ýðññáðá íá áíðåðýðóåðåé ðóðiññ·:þð éáé ià ðáññßðëiéi ðññÜññ. Áí éáé ði ELF Ýððá ðiðéÜ ðáðü áððÜ ðá ðñññáðé, ç iàðÜññáðç óá áððü åíüò óððóðÞiaðiò ðið åáðééÜ éáéññññýóá, éá iäçäiýóá óá iäðiçñÝð éáðáóðÜðóåéò. þóðé ið ðýðiò ELF Ýðññáðá íá ðáññáðé Ýíåé iÝ·:ñé ðiç óðéæíP üðið ç ðáññáññP óði a. out èá açíéiñññýóá ðáññéðóðüðåñá ðñññáðéÞiaðá áðü üðéç iàðÜññáðç óði ELF.

Ùðóðúðí, úðí i Æáéññùð ðãññíýðå, éáé ðá ãññááéðå ìåðåðæðþöðéðçò áðü ðá iðiðá ðññíÝñð : iðiðáé ðá áðíþöðöðíé : ã ãññááéðå ðíð FreeBSD (åéäééüðåñá i assembler éáé i loader), áíáðöý : ðéçééá ðáññÜðéëçéá óå äýí äÝññá. Òi äÝññí ðíð FreeBSD ðññùðéåðå ëieÍYð áéáéééiðþéåð éáé æéüññøðå ðÜðiðéá ððÜðéëåðá. Ç iñÜðá ðíð GNU ðið áð : ãñ : ééÜ ãñÜðåé áððÜ ðá ðññiññÜññåðá, óå Ýññáðå íáíÜ éáé ðññùðéåðå áððiðéüðåñç ððiðóðÞñéíç áéá êáðåðéåðP cross compilers, ðçí áíóññÜðûñç æáéöññåðéþí óýðuì éáðÜ ãïýéççó, eëð. Áí éáé ðiðéëß æçöiýðåí íá êáðåðéåðåðíýí cross compilers æáé FreeBSD, þóá Üðð : ié, aðiýí i ðáééüð ðçááðþò ðþæéåð ðíð FreeBSD æá ðá as éáé Id ðá Ýññá ãéáðÜðéëçéá. C iÝá æéððßää

åññáéåßùí óïð GNU (**binutils**) óðiiðôçñßæåé cross compiling, ELF, êiéfÝò åéåééíèÞêåò, ðñiâéôÜóåéò C++, êôë. ÅðéðëÝí, ðiøëið ôñßöié êáôáéåñåóòÝò ðñiøöÝñiðí åéðåéëÝóéia ELF, éáé åßíáé ðiøëý êáéü íá åéðåéåñöiyí óóï FreeBSD.

Í ELF åßíáé ðeí åéðåéåñåóéüò áðü óïí a.out êáé ðåñéóóüôåñií åðåéôÜóéëò óóï åáóéêü óýóôçìá. Ôá åññáéåßá ELF åßíáé åðéðüôåñá óðçí óðiðÞñçóç êáé ðñiøöÝñiðí ðiøöðññéíç åéä cross compilers, êÜôé ðið åßíáé ðiøëý óçìáíðéü åéä ïáññééiyó áíèñþðiðò. Íðiñåß í ELF íá åßíáé ðiøëí ãññüò áðü óïí a.out, áëëÜ ç åéäöimÜ åáí åßíáé åéóèçòP. ÕðÜñ÷iðið åðbóçò ðiøëÝò Üëéåò åéäöiñÝò ïåñåáý óïð, óå ååðöiñÝñåéåò üðùò óïí ôññüðí ðið åíðéóóïé÷ßæiðí óåéßååò, ðið ÷åéñßæiðóáé óïí êþæéé init, êëð. ÈåíéÜ áðü åðôÝò åáí åßíáé ðiøëý óçìáíðééP, åëëÜ ùóðüöií åáí ðáýiðí íá åßíáé åéäöiñÝò. Íå óïí êáéñü ç ðiøöðÞñéíç åéä óïí a.out èá åðññéññéååò áðü óïí ðoñÞíá GENERIC, éáé ôåéééÜ èá åöáéñåéåß åíðåéþò áðü óïí ðoñÞíá üðáí åééßøåé iëiøëçñùóééÜ ç áíÜåéç åéðÝëåóçò ðáéäéþí ðñiññaiÜóùí óýðið a.out.

## 4.13 Åéá Ðåñéóóüôåñåò Ðëçñiðiñßåò

### 4.13.1 Óåéßååò Åïçèåßåò

Ç ðeí êáôáñçòP óåéïçñßùóç óóï FreeBSD ðñiøöÝñååé íå óç iññòP ôùí óåéßåùí åïçèåßåò (manual pages). Ó÷åäüíí åéä ëÜéå ðññüññåíà ðiðið õðóðòPñáò ñéßååé íéá óýíðñç áíáöiñÜ ðið åíçååß ôéò åáóééÝò åéðóññåßåò åéä åéÜöiñá Üëéá ëÝíåðá. ÁðôÝò ié óåéßååò ðññüññåÜëéññåé íå óçí åíðiðP man. Ç ÷ñPóç ôçò åíðiðP man åßíáé åðëP:

```
% man command
```

üðið command åßíáé òi üññá óçò åíðiðPò åéä óçí iðiñßå åðééññåßåò íá iÜéååå ðåñéóóüôåñåò ðëçñiðiñßåò. Åéá ðáññÜäåéñåíà, åéä íá iÜéååå ðåñéóóüôåñá åéä óçí åíðiðP 1s ðëçéññéiñßåò:

```
% man ls
```

Ói online manual ÷ùñßæååé óå ôÝóóåñéò áñéèìçíÝíåò åíüôçòåò:

1. ÅíðiðÝò ÷ñPóðç.
2. ÈéÞóåéò óðóðòPñáò ñéééíðó ñéééíðó ñéééíðó.
3. ÓðiáññòPñåéò ôùí åéééíðéçéhí óçò C.
4. Iäçäiñß åðóðååðí.
5. Ôýðið áñ ÷åßùí.
6. Ðáé ÷íßåéå åéä Üëéåò åðáññiñÝò åéáóéÝäåóçò.
7. ÅéÜöiñåò ðëçñiðiñßåò.
8. ÓðiðÞñçóç óðóðòPñáò ñéééíðó åíðiðÝò åéáóéÝäåóçò.
9. ÁíÜððööç ðoñÞíá.

Óå íáññééÝò ðåñéðòþóåéò, óïí ßæéí èÝíá ðiññåß íá åíðiñåßæååé óå ðåñéóóüôåñåò åíüôçòåò ôùí óåéßåùí åïçèåßåò. Åéá ðáññÜäåéñåíà, ððÜñ ÷åé ç åíðiðP ÷ñPóðç chmod éáé ç êéÞóç óðóðòPñáò chmod(). Óå áðôP óç ðåñßðòùóç, íðiññåßåò íá ðåßååå óðçí åíðiðP man ñééå åéñéåþò èÝëååå åðééÝäíðåò óçí åíüôçòå:

```
% man 1 chmod
```

Áðóðu áðíráé ÷ nÍþóéii üðáá áíñuñþæiðiá ði í ümíá óçò áiðiðeÞó éáé áððeÜ áððeðiðiýiá ía iðeïðiá ðuðo ía óçí ÷ nÍçóéiiðiðeÞóiðiá, áððeÜ óé áðíráðáé áí áðíá áíñuñþæiðiá ði í ümíá óçò; Iðiñáðbóá ía ÷ nÍçóéiiðiðeÞóáðó ði man æáá ía áíáæçóÞóáðó ëÝiáé ðeððeæéÜ áððu óéð ðanðeáñðo Ýð óùí áiðiðeÞí ÷ nÍçóéiiðiðeÞíðo ði ðeððeæíð -k:

```
% man -k mail
```

lä öçí åiööP äööP èá åiöáíéööåß ißá ëßööå åöü åiööieß Yò öiö ðåñéY ÷ iöí öçí ëYíç eëäéäß “mail” ööçí ðåñéäñäöP öiöö. Áööü åßíäé åiööööieß ÷ iä öi íá ÷ ñçóëiööP åöö åöçí åiööieß apropos.

ÁðiiÝíùò, áæÝðåôå üëåò áôôÝò ôéó ãiñóôüæéêå ãíðiëÝò óoïí /usr/bin áëëÜ äáí Ý÷åôå ôçí ðáñáìéñþ éäÝá ôïõ  
óé ðñáàìáôééÜ eÜñiñ; ÁðéÜ äþóôå:

```
% cd /usr/bin  
% man -f *
```

P

```
% cd /usr/bin  
% whatis *
```

ôii iðiibî eÜíâé áêñéâbò ôii ßäéi ðñÜâíá.

## 4.13.2 GNU Info Files

Æá íá ÷ ñcóêüðjéÞóåôå ôcí áîôjëþ info(1), áðëÜ ðëcêôñiëiäÞóå:

info

Ἄεια ιεά δύνης ἀρέσκειντες. δεξεροῖτεια Ρόδια ἡ. Άεια ιεά αποθανεῖται ἀριστείρη Ρόδο. δεξεροῖτεια Ρόδια ?

Óciåéþóåéò

1. Áðóðü áéñéþþo óçìáßíåé ði i 386. Áêüìç êáé áí äáí ÷ñçóéiiðíéåßôå áðâiññáóóþ Intel 386 CPU óóí FreeBSD óýóðçá óáò, èá áiðáíßæåðáé ði i 386. Áððþ áßíáé ç “áñ÷éðâéðíééþ”, êáðáóéððþ ðið áðâiññáóóþ êáé ü÷é ði iñiðÝ ðið áðâiññáóóþ.
  2. Ôá óáíÜñéá áéêßíçóçò (startup scripts) áßíáé ðñiññÜìáðá ðið ôñÝ ÷iði áðóðüìáðá êáð ðiç áéêßíçóç ðið FreeBSD. Ç êýñéá eäéðiññáßá ðiðð áßíáé íá áiçëéýí óðçí óùóðþ eäéðiññáßá üëùí ðiñi ðoððåðééþí ðið ðoððþìáðið, êáé íá iâééíýí üëåð ôéð ðcññáðßå ðið Ý ÷iði åðé ñðèíßóáé íá ôñÝ ÷iði óóí ðáñáóéþíéi.
  3. Æá üëåð ôéð ôå÷íéÝ ðeåððñÝñåéåð êáé áéñéååßò ðåññéññáöÝð ôúí iäçäþí (drivers) ðið ÷ñçóéiiðíéýíðåé óóí FreeBSD æáé eññóüéåð êáé ðeçéðññüëåéá iðññåßôå íá ãññåßôå óóéð óåéßåå syscons(4), atkbd(4), vidcontrol(1)

Êáé kbdcontrol(1) ôùñ óåëßäúí áîPéåéáò (manual pages). Ååí èá óõíá÷ßóïöìå ðåñáéôÝñù, áéëÜ í áåéáöåññüäñíö áíáäíþóôçò iöññåß íá óôíäiöëåýåôáé ðÜíôá ôéò óåëßäåò áïçèåßáò áéá ðåñéóöúöåñí èäðôññåñÞ êáé iëiëëçñùíÝç åðåíPäççóç ôùñ áéëöññåéþí.

4. Áðóðú ááí áðþíáé áðüñéðóá áéçèÝð — ÓðÜñ-ðið íñéñéÜ ðñUáíláóá ðið ááí iðinriý íá áéáðiðiyí. Áéá ðáñUááéáíá, áÜí ç áéáññáóßá ðñiðáðéåß íá áéááÜóáé Ýíá áñ-÷åßí áðú Üeëíí ððieïæóðóÞ óóí áßéðooí éáé íáöiééÜ áðóðù ì Üeëíí ððieïæóðóÞ áéáéüþóæ áéá êÜðiéí eüäí (eüäú èéåéóßíåðiò ðið pc Þ eüäú áéÜáçò óóí áßéðooí), óóðúá ç áéáññáóßá iññÜæáðáé íç “áéáéüþéíç”. Ðééáíþò ç áéáññáóßá íá êÜíñé time out, óðíÞeñò íáðÜ áðú áýí éáððÜ. Íüééð óðíláðß áðóðù, éá óðñíáðéóðóß Üíñáóá.

# ÊåöÜëáéí 5 ÅäêáôÜóôáóç Åöáñïäþí: ÐáêÝôá êáé Ports

## 5.1 Óýïïøç

Ôi FreeBSD óðñïäåýåðáé áðü ißá ðëëýóéá óðëëïäþ áðü ðñiäñÜìåðá óáí iÝñïò ôiõ áâáóéëý óððóôþìáöiò. ¼iùò, èßääá ïðñïåß íá êÜíåé êÜðieïò ðñéí åñâèåß ôðçí áíÜäéç íá åâéåðåóðþðåé ìéá ðñüðèåðç åöáñïäþ ãéá íá ðëëïðieþðåé ìéá ðñäåñåðéêþ åññåðå. Ôi FreeBSD ðánÝ ÷åé äðï ððëçñùåðéééÝ ðò ðå ÷iëëåßåò ãéá íá åâéåðåóðþðåðå ðñüðèåðåò åöáñïäÝ ðò óði óýóðçíá óð: ôç Óðëëïäþ ôùí Ports (Ports Collection, ãéá åâéåðÜóðåóç áðü ôiõ ðçãåßü êþäééå), èáé ðá ðáêÝôá (packages, ãéá åâéåðÜóðåóç áðü ðñi-iåðååëùåðéóíÝ íá åêóåëÝóéíå ðáêÝôá). ÊÜëå ißá áðü ðéó äðï iâëüäiò ïðñïåß íá ÷ñçóéiiðieçéåß ãéá íá åâéåðåóðþðåðå ðéó iâüðåñåò åâëüðåéð áðü ôéð áâáðçìÝíåò óáð åöáñïäÝ, áðü ðééÜ åðieçéåðéééÜ iÝóå þ áðåðeåßåò áðü ôi ãßéòöi.

Áöiy ãéååÜóðåå áðôü ôi êåöÜëáéí, èá iÝñåðå:

- Ðùò íá åâéåèéðôÜôå ðñi-iåðååëùåðéóíÝ íá ðáêÝôá eëæóïéëý.
- Ðùò íá iâðååëùåðéåðå ðñüðèåðöi ëiæéóïééü áðü ôiõ ðçãåßü êþäééå ÷ñçóéiiðieþðåò ôçí Óðëëïäþ ôùí Ports.
- Ðùò íá êÜíåðå åðåååéåðÜóðåóç åâéåðåóðçÝ íùí ðáêÝôúí þ ports.
- Ðùò íá áéëÜæåðå ðéó ðñiæéiñéóíÝ íåò ñoëiþóåéð ðïò ÷ñçóéiiðieåß ç Óðëëïäþ ôùí Ports.
- Ðùò íá åñßóéåðå óá êåðÜeeçéå ðáêÝôá eëæóïéëý.
- Ðùò íá áíåååèìßæåðå ôéð åöáñïäÝ ðó óáð.

## 5.2 Åðéóêüðçóþ ôçò åâéåðÜóðåóçò eëæóïéëý

Áí Ý ÷åôå ÷ñçóéiiðieþðåéÝ íá UNIX óýóðçíá óði ðáñåëëüí, èá áíùñßæåðå üüðé ç óðíçèéóíÝíç ãéåæéåðå ãéá ôçí åâéåðÜóðåóç ðñüðèåðöi ëiæóïéëý åßíåé ðåñßðiò ç ðáñåéÜôù:

1. “ÊåöÝååóíá” ôiõ eëæóïéëý, ðïò iðñïåß íá ãéáíÝìåðåé óå iññöþ ðçãåßü õiõ compress(1), gzip(1), þ bzip2(1)).
2. Áðiðiðßåóç ôiõ eëæóïéëý áðü ôçí iññöþ ôçò ãéáññþò ôiõ (óðíþèùòÝ íá tarball óðiðéåóíÝí ìå ôi compress(1), gzip(1), þ bzip2(1)).
3. Åðiðéóíüð ôçð ôâéiññþòôçð (ðééåíþòÝ íá áñ ÷åßü INSTALL þ README þ iâñééÜ áñ ÷åßá iÝóá óåÝ íá ððiðéåðÜëiñ doc/) ãéá áíÜäñùþò ôiðò ãéá ôi ðùò èá åâéåðåóðåéåß ôi ëiæóïéëý.
4. Áí ôi eëæóïéëü ãéáíÝìåðåé ìå ôç iññöþ ðçãåßü õiõ README, iâðååëþðóéóç ôiõ. Áðóü iðñïåß íá ðåñééåíåÜíåé ôçí åðååññååðå ãíüð Makefile, þ ôçí åêóÝéåóç åíüð configure script, êáé Üeeåð åññåóðå.
5. Äiêéiþ êáé åâéåðÜóðåóç ôiõ eëæóïéëý.

Êáé áðóÜ iüñí áí üëá ðÜíå êåëÜ. Áí åâéåèéðôÜôå Ý íá eëæóïéëü ðïð ãåíÝ ÷åé iâðååññèåß óði FreeBSD ßóùò íá ðñÝðåé íá ôññiðiðieþðåðå ôiõ ðçãåßü êþäééå ãéá íá ãiðëÝøåé óùóðÜ.

Áí ôi èÝëåôå, iðiñâbôå íá óðiá-÷bôåôå íá âåðéâééôðÜôå ëiäéóíéêü íå ôi “ðáñâäiðéâéü” ôñüðið óôi FreeBSD. ¼ìùò, ôi FreeBSD ðáñÝ-÷åé äöi ôå-÷iñëäßåò ðið iðiñiýí íá óåó ãééðþoiði áðü ðiëý ëüði: óå ðáéÝóå éáé óå ports. Ôçí óôéâiþ ðiði ãñÜööcåå áðóúi ôi êâëbiåñi, æáðóþeiiðóáí íå áðóúi ôiñ ôñüði ðÜfúu áðü 23,000 ðñüðéâôåò åöáññiÝó.

íá FreeBSD port æáá ìsbá åöáññíäP åßíáé leá óôëëíäP áðü áñ÷åßá ó÷åæáóíÝ íá æáá íá áôõññáöïðíéÞóíñí òçí æáäéêáóßá ïåðáäëþòðéóçò òçò åöáññíäP ð áðü ôíí ðçãáßí êþäéá.

Èòòçèåbbôå üöé ðòÜñ÷ iòí iåññé Ü Áþíáôå ðòí èå ðñ Yðåéë eïíæé Ü íá eÜíåôå áí iåðååëüòòbôååôå Yíá ðñüäññìå iüñrò óå (”éååò Yðååòí”, áðiòòiðßåóç, ðññiøññiäP (patching), iåðååëþþòòéç, ååñéåðÜóðååç). Ôå áñ÷åßå ðòí áðiòåëíý Yíá port ðåññé Y÷ iòí üeåò öéò áðåñåßòçåôå ðëçññiññßåò åéá íá áðééññ Yðiòí óóï oyðòòçíá íá eÜíåé üeå åðòÜ åéá åðÜð. Åðåßò åéðååëåbbôå iåññé Yð åðé Yð åòírê Yð, åéå i ðçåáåßò ëþþæéåò åéå øçí åðåññiäP åðòüññåå “éåååååßíåé”, áðiòòiðé Yæåðåé, ðññiøññiññüæåðåé, iåðååëüòòbôååé, åéå ååñéåßòðååé åéå åðÜð.

Óóci ðñáàíáôéêüôçôá, ôí óyóôóçjá ports iðmåb åðßóçò íá ÷ñçóeiiðiéçèåb æáá íá äçleïoñäçëïý ðáêÝóá ðiø iðmåbôå áññüôåñá íá æáá ÷åéñéóôåbôå iã ôçí pkg\_add êáé ôéò Üëëåò åíöiëÝò æáá ÷åßñéóÞò ðáêÝóùí ðiø eá áíáöåñëïý óå ëëäi.

Ôooí ôá ðâéÝóá, üöri êáé ôá ports êáôáññíÝ ôéò åtâññóPôåéò (*dependencies*). Áó ðöñëéYíññílå üöde èÝéåôá ïá åääéåôáôóPôåôå ïßá åöáññíäP ðñi åtâññóÜôåé áðü ïßá ôóäéåññíÝíç åéäééïëPêç åéá ïá èäéóñññäPôåé. Ôüöri ç åöáññíäP, üöri êáé ç åéäééïëPêç åéäôBëéåñðåé ùò ðâéÝôå êáé ports ôiñ FreeBSD. Áí ÷ñçóéññíëPôåôå ôçí åíññëP pkg\_add P ôí ÿôôçíå ôúí ports åéá ïá åääéåôáôóPôåôå ôçí åöáññíäP, åtöññôåññá èá ðâññôçññPôiññ üöde ç åéäééïëPêç åäí åßíåé åääéåôåôóciÝíç, êáé åöðüññåôå èá ôçí åääéåôáôóPôiññ ðñéí áðü ôiññññññílå.

÷ iiôáo áíáo Ýñâé üöé ie äyï ôå ÷ iiëiñbåo åßíáé åñêåöÜ iiÿieåò, ßóùò íá áíáñùöéÝ öôå ãéåöß ôi FreeBSD ðññööÝñâé êáé ôéö äyï. Óá ðáêÝôá êáé ôá ports åiööüöåñá Ý ÷ iñí ôá äééÜ ôiöö ðëåññåöß ðìáôá, êáé ôi ôé èá ÷ ñçóéiiðiéÞöåôå åiâñöÜöáé ådû ôcï äéêÞ ôåö ðññößicôc.

## Để lại ê ô Bì á ô á ô ù í Đá ê Y ô ù í



## ĐèáïíåêôÞìáôá ôùí Ports

Óå iåñéé Ýò ðåñéöðþóåéò, iøññåb íá ðöðÜñ÷ iøñ ðíëéäðë Ü ðáæéÝó áæá ðíçí Bæá åöáññíäþ, iñ åæáöññåðééÝò nñðèìßóåéò. Áæá ðáñÜääéáíá, oíí **Ghostscript** æáðßèåôáé ùò Yíá ðáæÝòí ghostscript eáé Yíá ðáæÝòí ghostscript-nox11, áíáëüñùò áí eá åæéåôáôðÞoåðå P ü÷é Yíáí X11 server. Áðöiy öiø öýðöiø ie nñðèìßóåéò åßíáé äðßáðÝò iñ óá ðáæÝó, aëéÜ aññPauññå åßññíðåé áayíáôåð áí iñßá åöáññíäþ Y÷åé ðåñéöðüöðåñåò áðü iñßá P ayíí aæáöññåðééÝò nñðèìßóåéò iåðåáæþþööéöçò.



Áéá íá åþóôå áíÞiaññò áéá óá áíáíåùí Ýíá ports, áððñáöåþóå óóçí çëåêöñííéþ ëþóôå ðùí FreeBSD ports (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-ports>) êáé óóçí çëåêöñííéþ ëþóôå áíáöiñþí ðñíâëçí Üðùí ðùí FreeBSD ports (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-ports-bugs>).

**Đññéáéíõíßçóç:** Đññéáéíõíßçóç ãáééáôáôôðôáôâ ðïëíëíäõðïôâ áôáññíïäþ, ðññÝðâé íá áëéÝä÷åôâ ðï <http://vuxml.freebsd.org/> áéá èÝíáôá áôóáéëßáô ðïõ ð÷åðßçëíðâé íå ñçí áôóññíïäþ óâò.

IðiññáBðóá áðBðóçò íá áæéáðóáðóBðóáðó ðí ports-mgmt/portaudit ðí iðiññí áððóüíáðóá èá áéÝá-ðá üéáðó áðé áæéáðóáðóçíÝíáðó áðóññíÍáYó áæéá áíñúðóÜ óññðóÜ ócíàðBá. jéññ-ðí áðBðóçò èá ðññááíðóíðíéáBðóáé ðññí ðíç iáðóááëþþðóéóç íðiññíðóBðóá port. Óðí áíáéÜíáðóí, iðiññáBðóá íá ÷ñçóéíðíéáBðóá ðíç áíðóíðíÞ portaudit -F -a áðóñðóíðóÝ- áðóá ðññðóá áæéáðóáðóBðóáé iáññééÜ ðáéÝáðó.

Ôi ôðüeïéði áðöiy ôiõ êåðáæáßiõ áîçåâß ðùò ía ÷ñçóéïíðiéÞóåôå ôá ðáêÝôá êáé ôá ports æá ía åâéâôáôÞóåôå êáé ía æá ÷åñéôåßôå ðñüóèåöi ëiæóïéüü ôiõ FreeBSD.

### 5.3 ÅñÞóêíôáò ôçí Åöáñïäþ óáò

Đñéí áåêáôáôôÞóâôå ïðíéáäÞðîôå åöáññïäÞ ðñ Ýðåé íá åñùñßæåôå ôé èÝëåôå íá êÜíåé, éáé ðùò iññÜæåôáé ç åöáññïäÞ. Ç ëßóôå ôúí áéæé Ýóéñùí åöáññïäþí óóï FreeBSD iåääëþíåé óõíå÷þò. Åðôô÷þò, ððÜñ÷iñ ðíëëiñ ôñüñðié íá åññåßôå áðôûñ ðíñ ñéÝëåôå:

- Óôç äéêôôáâôÞ ôiðièåôôá ôiô FreeBSD èá âñåßôå iéá ëßóôá áðü üëåò ôéô äéáè Ýóéïåò åöáññíäÝò, ôóïi <http://www.FreeBSD.org/ports/> (<http://www.FreeBSD.org/ports/index.html>). Ç ëßóôá áðôÞ áíáíâþíåðôáé ôô ÷ iÜ, åíþ ôôðÜñ ÷ åé éâé äöíáûöôçôá áíáæÞoçôçò. Ôá ports åßíáé ÷ ùñéöiÝ íá óå éâôçäiñßåò, éâé iðiññåßôå íá áíáæçôÞoåðôå ìßá åöáññíäÞ åßôå iå ôi üññíá (áí ôi iÝñåôå), Þ íá äåßôå üëåò ôéô åöáññíäÝò ðiô åßíáé äéáè Ýóéïåò óå iéá éâôçäiñßá.
  - Í Dan Langille äéâôçñåß ôi FreshPorts, ôóïi <http://www.FreshPorts.org/>. Ôi FreshPorts êåôáññÜöåé ôéô åéëéåÝò ôùí åöáññíäþí ôóïi åÝíõñ ôùí ports êåþò ôðiñåâßññiõ, åðééññÝðiññÜò óåò íá “ðåññåéiøðéåßôå” Ýíá Þ ðåññéóðüôåññá ports, êâé iðiññåß íá óåò ôóåßéâé email üôáí áðôÜ áíáíâþíñôáé.
  - Áí äáí åñùñßæåôå ôi üññíá ôçò åöáññíäÞò ðiô èÝëåôå, iiééiÜóôå íá ÷ ñçóéiñðièÞoåôå Ýíá site óáí ôi FreshMeat (<http://www.freshmeat.net/>) äéá íá âñåßôå ißá åöáññíäÞ, êâé iåðÜ iðiññåßôå íá åéÝåíåôå iáiÜ ôi site ôiô FreeBSD äéá íá ååßôå áí c åöáññíäÞ Ý ÷ åé åßíáé port.

- Áí ȐÝñâôå òî áéñéá Ýò üññá òiõ port, êáé è Ýéåôå ïüñ íá âñâbôå óå ðiéá êáôçäññbâ åbñíáé, ìðññâbôå íá ÷ñçóëiðiéÞóåôå óçí áíòiëÞ whereis(1). ÁðëÜ ãñÜþôå whereis áñ÷åßi, üðiõ áñ÷åßi åbñíáé òî ðññüññâiíá ðiõ è Ýéåôå íá áæéåôåòòÞóåôå. Áí áðòu âññóéâðåé òî õyóöciá óåò, ç áîòiëÞ èá óåò ðåé ðiõ åbñíáé, üðùo ðáññâé Üòu:

```
# whereis lsof  
lsof: /usr/ports/sysutils/lsof
```

Áðóð iáð èÝáé üðé ðír lsof (Ýá áññáæðíí óðóðþláðíð) iðinñáß íá áññáæðí ðóðíí èáðÜëíí /usr/ports/sysutils/lsof.

- Åðéðñiúðéåðá, lðiñâðþôð íá ÷ ñçóðiiðiðÞóåðå íéá áðëÞ áiðiðÞ echo(1) æá íá åiðiðÞóåðå ôçí öiðiðæðþá êÜðiðið ðñiñanÜðiáði ïÝóá óðá ports. Æá ðánÜðåðæiá:

```
# echo /usr/ports/*/*lsof*  
/usr/ports/sysutils/lsof
```

Óçìáéþóôå üöé ôi ðáñáðÜù èá äåßîåé åðßóçò ééáé iðíéáäÞðiôå áñ÷åßá Ý÷iøí éáóÝååé óöiiý éáóÜëiäi /usr/ports/distfiles åöüöiý óåéñéÜæiøí óöciý áíáæÞöcçó.

- Áéüüç Ýíáð óññúðiò íá âññåßôá Ýíá óooâéâñéí Ýíí port, áßíáé ÷ ñçóéiiðíéþíðiò áðiò íåðùðåññéü íç ÷ áíéòíù áíáæÞôçóçðô ñçóéiiðíéÞô òñí Ports. Áá íá ÷ ñçóéiiðíéÞôåðå áðoù ñiò ñññúðiì áíáæÞôçóçð, Èá ÷ ñåéáóðåß íá âñßôéåóðå ñoíí èáðÜëíäí /usr/ports. ¼ðáí âññåèåßôá óå áðoùí ñiò èáðÜëíäí, áðoðåëÝóðå ñiò make search name=üííja--ðññiññüííjaðiò üðiò üííja--ðññiññüííjaðiò áßíáé ñiò üññá ñiò ðññiññÜññáðiò ñiò èÝéåðå íá âññåßôá. Áéá ðánñÜññåðíá, áí áíáæçöÜðå ñiò lsof:

```
# cd /usr/ports  
# make search name=lsof  
Port:      lsof-4.56.4  
Path:      /usr/ports/sysutils/lsof  
Info:      Lists information about open files (similar to fstat(1))  
Maint:    obrien@FreeBSD.org  
Index:    sysutils  
B-deps:  
R-deps:
```

Ôi ôiPiá ôcò åñüäiõ ðiõ ðñÝðåé íá ðññiöÝåôå ëæéåßôåñå åßíráé ç ãñâiùP “Path.”, áöiy áôôP óåò ëÝåé ðiõ íá åñåßôå ði port. Ié ðüüëiéðå ðëçñiöñßå ðiõ ðáñÝ ÷ iiôáé äåí ÷ ñåéÜæiiôåé æéá íá ååéåôåôåèåß ði port, åéá áôôü äåí èå áíåéëeïý åäþ.

Áéá ðéíi éðåðöññáñP áíáæÞóçóç iðñiñåßôå íá ÷ñçóéiiððieÞóåå åðßóçò make search key=öñüðç üðiø öñüðç åßíáé  
éÜðiði éåßiñåñ ðñiø áíáæÞóçóç. Áðóø áíáæçðÜ iññiáðå port, ó ÷üééá, ðåñéáñáö Ýò éáé åíáññÞóáéö, éáé iðñiñåß íá  
÷ñçóéiiððieçèåß æáá íá åññæïý ports ðiø ó ÷åðßæiiñéå íà Ýíá oððåéåññéi Ýí è Ýíá, åÚí ääí åñññßæåðå öi üññáññiñ  
ðñiñññÜññáðiø ðiø áíáæçðÜåå.

Óå üëåò ôéò ðáñáðÜù ðåñéðôþóåéò, ç öñÜóç ðñïò áíáæÞôçóç åßíáé case-insensitive (ääí eäìàÜíåé ôðüþç ôéò áéäöiñ Ýò eåöäæáßú-íéenþí). Ç áíáæÞôçóç æá ôi "LSOF", èá äþóåé ôá ßäéá áðiòåëÝòíåôá lå ôçí áíáæÞôçóç æá ôi "lsop"

#### 5.4 × Ñcóéíjõébíóáò ôi Óýóôcìá ôùí ĐáêÝôùí

Óðráðóðr Úðr Chern Lee.

ÕðÜñ÷iñí æéÜññá åññáæåßá ìà ôá iññßá ìðññåßôå íá æéá÷åéñéóôåßôå ôá ðáêÝ ôá óôî FreeBSD:

- Óá Ýíá óýóôçíá ðiö âñßóéâôáé Þäç óå ëåéôïõñãßá, ìðïñâßôå íá âôðâëÝóâôå ðî sysinstall ãéá íá ââñâôáôðóÞóâôå, íá äéâññÜøâôå, êáé íá äâßôå ðéò åâñâôáôðçíÝíåò êáé ðéò åéâèÝóéïåò åôññiiäÝð. Åéá ðâñéóöüôåñåò ðëçñiöñßåò, åâñâôå ðî ÖíÞíá 2.10.11.
  - Ôá æéÜöñá åññâéâßá æá÷åßñéóçò iÝóù ôçò âñâiìÞò åíöiëþí, ðiö áðïôåëíýí êáé ðî áíðéêâßiåñíí óðæÞöççò áðôÞò ôçò åíüöçôåð.

#### **5.4.1 Åãêáèéóôþíôáò Ýíá ÐáêÝôï**

ĐáñÜääéñíá 5-1. “ÊáôÝâáóíá” åíüò ðáêÝöiõ ÷åëñïëßíçôá êáé åäéáôÜóôáóç öiõ öiðéêÜ

```
# ftp -a ftp2.FreeBSD.org
Connected to ftp2.FreeBSD.org.
220 ftp2.FreeBSD.org FTP server (Version 6.00LS) ready.
331 Guest login ok, send your email address as password.
230-
230-      This machine is in Vienna, VA, USA, hosted by Verio.
230-      Questions? E-mail freebsd@vienna.verio.net.
230-
230-
230 Guest login ok, access restrictions apply.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> cd /pub/FreeBSD/ports/packages/sysutils/
250 CWD command successful.
ftp> get lsof-4.56.4.tgz
local: lsof-4.56.4.tgz remote: lsof-4.56.4.tgz
200 PORT command successful.
150 Opening BINARY mode data connection for 'lsof-4.56.4.tgz' (92375 bytes).
100% |*****| 92375          00:00 ETA
226 Transfer complete.
92375 bytes received in 5.60 seconds (16.11 KB/s)
ftp> exit
# pkg add lsof-4.56.4.tgz
```

ÅÜí äái Ý÷åôá ìbá ôiðééP ðçäP ðåéÝôùí (üðùò åbíráé Ýíá FreeBSD CD-ROM set) ôiðùò åbíráé åðéïëüðâñí fá ÷ñçöéñiðíÞróåôá ñçí åðéëíäP -r áéá ôi pkg\_add(1). ÁðóP èá Ûíåé ôi åññåéåbíí íá éåëìñþóåé åðóüìådá ðç òúðôP iññöP êáé Ýéäiöc êáé Ýðåéóá íá áíáéðÞóåé åéá íá åâéåðåôóÞóåé ôi ðåéÝ ðóù ãðü Ýíá FTP site.

```
# pkg add -r lssoft
```

ÓfiðáñáðÜíu ðáñÜääéäia éá “éåôååÜóåé” éáé éá åääéååóóÞóåé ñi óùóöü ðáéÝóï ÷ùñßò ðåñáéóÝñù åðÝlåáóç ñiø ÷ñÞóôç. Áí äái èÝéåôå íá ÷ñçóéiiðíéÞóåôå ñi éýñei site æäéññÞó ðåéÝóùí, iðññåßôå íá ÷ñçóéiiðíéÞóåôå êÙðiéi mirror. Åéá ñi øéïðü áôðü, éá ðñÝðåé íá ññðéìßóåôå óùóôÜ ñcí ñéiÞ ñcò PACKAGESITE, þóôå íá ðáñáéÜíøåôå óéò ðññåðééååÍýåð ññðéìßóåéð. Ófið pkg\_add(1) ÷ñçóéiiðíéåß ñi fetch(3) æéá íá “éåôååÜóåé” óá ãñ ÷åßá, éáé áôðü ìå ñc óåéñÜ ñiø ÷ñçóéiiðíéåß æéÜöriñåò iåôååéçöÝó ðåñéåÜëéñiò, ðåñééååññÍÝíu ñiùí FTP\_PASSIVE\_MODE, FTP\_PROXY, éáé FTP\_PASSWORD. òñù ÷ñåéåóóåß íá ññðéìßóåôå iñßá Þ ðåñéóóùðåñåð áðü áôðÝð áí ãñßðéåôå ðßóù áðü Ýíá firewall, Þ ßóù íá ÷ñåéåóóåß íá ÷ñçóéiiðíéÞóåð Yíáí FTP/HTTP proxy. Ååßôå ñi fetch(3) æéá ñcí ðéÞñç

ëþóðá ðùí iåðåâæçþí. ÐñiøÝiðå üðe óði ðáñáðÜí ðáñÜåðæìà ÷ñçóéiiðíéåßðáé ðiø lsof áíðß ôiø lsof-4.56.4.  
 ¼ðáí åßiâðáé áðiüáêñðóíÝíç eþþç, ðñÝðåð íá åðáéñåðåß i áñéèiüð Ýéäiöçò ôiø ðåêÝôiø. Õi pkg\_add(1) èá  
 “éåðåâÜðåé” åðoùìåðå òcí ðåëéððåðåßá Ýéäiöç ôcò åðáñiðþð.

**Óciāßùóć:** Ôi pkg\_add(1) èá "éáôåâÜóâé" ôci ôåëäôôåßá Ýêäïóć ôço åöäñïäÞò áí ñçóéïïðéäßôå FreeBSD-CURRENT þ FreeBSD-STABLE. Ái ôñÝ ÷ åôå íéá -RELEASE Ýêäïóć, èá "éáôåâÜóâé" ôci Ýêäïóć ôiõ ðåéÝôïõ ðïõ Ý ÷ åé íæôåäüôôéôôåß íå ôci Ýêäïóć óåò. Åßíáé äöíåóú íá ôi åéëÜíåôå åôôü, åéëÜæíïôåò ôci PACKAGESITE. Áéá ðåñÜäåéäíá, áí ôñÝ ÷ åôå Ýíá óýóöçíá FreeBSD 8.1-RELEASE, ôi pkg\_add(1), áðü ðñïäðééïäÞ, èá ðñïöðåéÞòåé íá "éáôåâÜóâé" ðåéÝóå áðü ôi  
<ftp://ftp.freebsd.org/pub/FreeBSD/ports/i386/packages-8.1-release/Latest/>. Ái èÝëåôå íá áíåäéÜôåôå õi pkg\_add(1) íá "éáôåâÜóâé" ðåéÝóå ôiõ FreeBSD 8-STABLE, èÝóå ôci PACKAGESITE ùò  
<ftp://ftp.freebsd.org/pub/FreeBSD/ports/i386/packages-8-stable/Latest/>.

Óá áñ÷âßá òùí ðáéÝòùí áéáÍYíïòdáé óá ññöÝò . tgz êáé . tbz. ìðiñâßóá íá óá âñâßóá óóí  
 ftp://ftp.FreeBSD.org/pub/FreeBSD/ports/packages/, þ óóá CD-ROM ôçò áéáññò ðiñ FreeBSD. ÊÜëå CD óóí  
 FreeBSD 4-CD set (éáé óóí PowerPak, êëð.) ðâñéÝ÷âé ðáéÝòá óóíí éáôÜëíäí /packages. Ç éáôçäññéiðiñçóç òùí  
 ðáéÝòùí áéïñðeåß ôçí ãññò ðiñ /usr/ports. ÊÜëå êáôçäññá Ý÷âé óíí áéêü ôçò éáôÜëíäí, éáé êÜëå ðáéÝòí  
 iðiññåß íá âñâæåß óóíí éáôÜëíäí A11.

Ç ãñP ôuì êáôáëüãùí õiõ õoôôPiáõiò ðáé Ýôuì ôáéñéÜæåé là ôçí áîôßóöié÷ç ôuì ports. Ôá äyí õoôôPiáôá õoîâññÜæiföáé iåðôáiy õiõ ñäé íá acëiøññPöiõi õi õóññééü ÿóôôçä ðáé Ýôuì/ports.

#### 5.4.2 Äéá ÷ åßñéóç ôùí ĐáêÝôùí

Óði pkg\_info(1) áðráðir. Ýfia áñáðáðáðí Óði Óðaðáé Ýðað eáð Óðaðeññ Uðað óða æð Uðiññ ðáðe Ýða Óði áðráðir áñáðáðáðóðci Ýðia.

```
# pkg_info
cvsup-16.1          A general network file distribution system optimized for CV
docbook-1.2          Meta-port for the different versions of the DocBook DTD
...

```

Ói `pkg_version(1)` áðíáé Ýíá áññáæåßí ðiø óóñíøßæåé óéò áðäüóåéò üëùí ôùí áåéåóåóçì Ýùí ðáéÝôùí. Óoñññßíåé óçí Ýéäíóç êÜèå ðáéÝòö, íà óçí ôñÝ÷iööá Ýéäíóç ðiø áññóéåðáé óóïi äÝiöñi ôùí ports.

```
# pkg_version
cvsup = 
docbook = 
...

```

Óá Óýíâiäéá óôçí äåýôåñc óôþëç äçëþíïóí ðçí ó÷åôéêþ çëéêbhá ìåôáiy ôùí åâéåôåôçìÝíùí åâéüöåùí êáé ôùí åâéüöåùí ðïò åßíäé áéæå Ýóéåò óðï ðïðéêü äÝíôñí ôùí ports.

<b>Óyâiei</b>	<b>ÓciáóBá</b>
=	Ç Ýeäiöc ôiõ áâéáôåóöçí Ýiõ ðáêÝôiõ óáéñëÜæåé íå áðôP ðiõ áßíáé áéáèÝóeïc ôiõ ôiðéêü áÝíôñi ôùí ports.
<	Ç áâéáôåóöçí Ýíç Ýeäiöc áßíáé ðáéáéüôåñç áðü áðôP ðiõ áßíáé áéáèÝóeïc ôiõ áÝíôñi ôùí ports.

## Óyìâiei

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# Óçiáóßá

Ç ååéåôåôöç! Ýíç Ýéäïóç åßíáé íåüôåñç áðüi áôôP ðïõ  
åßíáé äéæé Ýóëïç ôóï õîðéêü äÝíöññ ôúí ports. (Ôï õîðéêü  
äÝíöññ ôúí ports åßíáé ðéèáíüôåôá áðáñ ÷ áéùìÝíi.)

Óï áâéâôáôóçí Ýíï ðáé Ý òï áâí áññôéâôáé óôá  
ðáñéâ ÷ üïâíá ôúí ports. (Áôöü ìðïñâß íá óóïâåß, áéá  
ðáñ Üäâéâíá, áí Ýíá áâéâôáôóçí Ýíï port Ý ÷ áé áóáéñâèåß  
áðü óçí ÓðëëéïP ôúí Ports, P Ý ÷ áé íàðíññáôóâß.)

ÕðÜñ÷ïõí ðjëëéáðëÝò åêäüóåéò ôïõ ðáéÝôïõ.

Ôí áâéáôáôóçí Ýíí ðáé Ýöi õðÜñ ÷ áé óöi index, áéë Ü áæá êÜðíei íüäi öi pkg\_version áâí éáô Üöåñá íá óôåññßíåé ôçí Ýéäíöç öiõ áâéáôáôóçí Ýíí ðáé Ýöi ìá ôçí áíðßööîíé-ç éáôá ÷ þñçöç óöi index.

### 5.4.3 Áöáéñþíôáò Ýíá ĐáêÝôï

Áéá íá áöáéñ Ýóåôå Ýíá åäéåôåôçì Ýüï ðáê Ýöï ëiäéòiéëiý, ÷ñçóéiiðiéÞóôå ôiï åññáéåßi pkg\_delete(1).

```
# pkg_delete xchat-1.7.1
```

Óciālēþóôá üðé ðíi pkg\_delete(1) áðáéðóâb ðíi ðëÞñâò üffíá éáé áñééìu Ýéäiöçò ðíi ðáéÝóïò. Ç ðáñáðÜù áiðiëþ áái èá ëåééïoñäPóåé áí äþóâðå áðëþò xchat áiðb ãéá xchat-1.7.1. Åßíáé ùóðóúóí åýéïeï íá ÷ñçóéïðiëPóåðå ôçí pkg\_version(1) ãéá íá âñâßóâ ôçí Ýéäiöç ðíi ãâéáðâðóçí Ýíñò ðáéÝóïò. Áiðb ãéá áðóü, iðiñâßóâ áðßóçò íá ÷ñçóéïðiëPóåðå Ýíá iðáæáfóÝñ:

```
# pkg_delete xchat\*
```

Óðcí ðåñþðôúóç áðôþ, èá äéáñáöiýí üéá óá ðáêÝóá ðið óá iíùìáóá ôiðò áñ÷ßæiðí iå xchat.

#### 5.4.4 ÄéÜöïñá

¼æðó ié ðeçñiööñßåò æáá ðáé Ýóá áßíáé áðíèçêåðí Ýíåò óöii êáð Üëiäí /var/db/pkg. Óóá áñ ÷ áßá áðöiý öiö êáðáéüäiö, éá áñåßöå óç ðåñéäñáöþ êÜéå ðáé Ýöiö, êáéþò êáé óç ëßöôá ôùí áñ ÷ áßùí ðiö åâéáèéöðÜ.

## 5.5 ×ñçóéíïðíéþíôáò ôcí Óõëëíäþ ôúí Ports

### 5.5.1 Áíáêôþíóáò ôçí Óõëëïäþ ôúí Ports

Đñéí lđññ Ýóâôå íá åâéâôåôÞóâôå ðññäñÜìâôå íÝóù ôùí ports, ðñÝðåé ðñþþôå íá áíâéôÞóâôå ôçí ÕðëëiäÞ ôùí Ports. Đñüéâôåé iõóéåôôéÜ ãéá ìéá ôðëëiäÞ áðü Makefiles, patches, êáé áñ÷åßá ðåñéãñåöÞò ðïõ ôiðièåöýíóåé ôóï /usr/ports.

¼ôáí ååêåôåôôPôåôå òi FreeBSD óyóôçíá ôåo, òi sysinstall ôåo ñþôçóå áí èÝéåôå íá ååêåôåôôPôåôå ôçí ÓðëëïäP ôùí Ports. Áí åðééÝíåôå ü÷é, ïðiñåßôå íá áéïeïøPôåôå áôôÝò ôéò iäçãßôå åéá íá áíåéôPôåôå ôçí ÓðëëïäP ôùí Ports:

IYèïäïò CVSup

Áðôþ áßíáé íéá ãñÞæñç iÝéïäò ðæá íá áíâðôÞóâðâ ðâé íá äéâðçñÞóâðâ Ýíá áíáíâùìÝíí áíðßâñâðï ðçò ÓððëëíÞò òúí Ports, ÷ñçóëiiðíéþíðâ ðñùöüëíëí **CVSup**. Áí èÝéâðâ íá iÜèâðâ ðâñéóöüðâñâ ðæá ðí **CVSup**, äâðâðâ ðí **CVSup**.

**Óciálaßunóć:** Ç ööřiřibčóđ ðiři CVSup ðiři ðáňnééáiařiřiađáé óá Ŷíá óyóóciá FreeBSD, iřiřiřiađáé csup.

Óéäiõñåõèåßôå üüðé ôi /usr/ports åßíáé Üääéï ðñéí åéòåëÝóåôå ôi **csup** æéá ðñþþôç öiñÜ! ÅÜí Ý÷åôå Päç  
áíåéòÞóåé ôç ÓðëëiäP ôùí Ports iÝóù êÜðïéåò Üëëçò ðçäPò, ôi **csup** äáí èá æéáññÜþåé patches ðiø Ý÷iøí áöéæñåèåß  
óóí iåôåáý.

- ## 1. ÅêôåëÝóôå ôï csup:

```
# csup -L 2 -h cvsup.FreeBSD.org /usr/share/examples/cvsup/ports-supfile
```

ÄëëÜïöå ôi [cvsup.FreeBSD.org](http://cvsup.FreeBSD.org) ià Ýíá êíööéü öåå äéåéñéöôP **CVSup**. Äåßöå ôi CVSup Mirrors (ÖíPiá A.6.7) äéá ôçí ðëPñc ëßööå ðúí mirror sites.

**ÓčiàBúóć:** Áí eÝéâôâ, iðñíñâBôð íá ÷ñcójéëiðíéBóâôâ ðí aééü óâò ports-supfile, þóôâ íá aðiöyââôâ (ãéá ðáñÜääéâíá) íá aéçéþóâôâ ðíí aéáéëiðéóðþ **CVSup** óðcí ãñâñiìþ aðiöreþí.

1. Óá áóôþ ôçí ðâñßðôùóç, úò root, áíóéäñÜðôå ôï /usr/share/examples/cvsup/ports-supfile óå ißá íÝá ôïðïèåóßá, üðùò ôï /root þ ôï äééü óáò home êáðÜëïäi.
  2. Ôñïðïéþóå ôï ports-supfile.
  3. ÁéëÜîôå ôï *CHANGE\_THIS.FreeBSD.org* ià Ýíáí êíóéíü óáò äéáêìéóðþ **CVSup**.Áåßôå ôï CVSup Mirrors (Óiþíá A.6.7) ãéá ôçí ðëþñç eßóóå òúí mirror sites.
  4. ÁéóåéÝóå ôþñå ôï csup, ià ôï äéüëöi ôñüöi:

```
# csup -L 2 /root/ports-supfile
```

2. Åêôåëþíåò ôçí åíöëÞ csup(1) áñäüöåñá, èá “êåôåâÜóåé” êáé èá åöáñìüöåé üëåò ôéò ðñüööåôåò áëëåáÝò óôçí ÖðëëiÞ ôùí Ports, åêôüò áðü öi íá åðáíá-ìåðåâëùôôßóåé ôá ports åéá öi óýöôçìá óåò.

## ÌYèiäiò Portsnap

Ôi Portsnap åbñráé Ýíá áíáëéåôéêü óyóðciá ãéá ôcí äéáññP ôcò ÓöeëiäPò ôuí Ports. Đánáêáëþ åéÝññôå ôi ×ñçóéññðíéþiôå ôi Portsnap ãéá îbá ëåðññññP ðåññññññP üüññ ôuí ÷ ññáôçñéóóééþi ôcò åöðññññPò.

1. "ÉáôåâÜôå" Ýíá óoïðéåói Ýíï snapshot ôçò ÓðëëiäÞò ôùí Ports /var/db/portsnap. Áí èÝëåôå, iðïñåßôå íá áðïööïäåëåßôå áðü òï Äéáëßéöï ìåðÜ Ááðü áðóü òï áÞíá.

```
# portsnap fetch
```

2. ÁÍ áeoaeabþóð ðí Portsnap áæá ðñþþðc öiññU, éÜiðá ãiðáññùþ ðið snapshot iÝá óði /usr/ports:

```
# portsnap extract
```

ÅÜÍ Þäç Ý÷åôå Ýíá ãaiÜöî /usr/ports êáé áðëþò ôi áíáíåþíåôå, åêôåëÝóôå ôçí áêüëiöèç åíöiëþ:

```
# portsnap update
```

## ÌYèïäïò Sysinstall

1. Ùò root, åêôåëÝôå ôï sysinstall üðùò öáßíâåé ðáñâéÜôù:  

```
# sysinstall
```
  2. ÅðéëÝîôå ôï Configure, êáé ðéÝôå Enter.
  3. ÅðéëÝîôå ôï Distributions, êáé ðéÝôå Enter.
  4. Ìåôáêéíçèåßôå óôï ports, êáé ðéÝôå Space.
  5. Ìåôáêéíçèåßôå óôï Exit, êáé ðéÝôå Enter.
  6. ÅðéëÝîôå ôï iÝöi åæâåðÜóôåóçò ôçò åðéëðißáò óåò, üðùò CDROM, FTP, êáé ðÜåé ëÝãïîôåð.
  7. Ìåôáêéíçèåßôå óôï Exit êáé ðéÝôå Enter.
  8. ÐéÝôå X åéá íá åâåßôå áðü ôï sysinstall.

## 5.5.2 Åñêáèéóôþíôáò Ports

Ôi ðñþþi ðñÜðáia ðti ðñÝðåé ía æáðñëñéíóðåß ó÷åðééÜ iå ôcí ÓðeeëiaP ôuú Ports åßíáé ç Ýíííéå ôiõ üññö “skeleton (óéåéåðöüö)”. Iå ëßáa èüñæá, Ýíá port skeleton åßíáé ç åéÜ÷éóðç öðeeëriP áñ÷åßúí ðiø èáëëäçäiyí Ýíá oyóðçíá FreeBSD þþoå ía iåðåáæùòðþóåé èáé ía ååéåðåóòÞóåé óuóðÜ Ýíá ðñüññaià. ÈÜèa port skeleton ðåñéÝ÷åé:

- já Makefile. Ôi Makefile ðâñéÝ ÷ áé æÜöñâò äçëþóåéò ðiõ iñßæïòí ðùò ðñ Ýðåé íá ìåðåäëùôôéôåß ç åöáññïäÞ ééå ðiõ ðñ Ýðåé íá ååêåðåôôåèåß ôöï ýóôçïÜ óåò.
  - já áñ÷åßï distinfo. Áðôü òï áñ÷åßï ðâñéÝ ÷ áé ðëçñïöiñßâò åéá ôá áñ÷åßá ðiõ ðñ Ýðåé íá “éåôÝâiõí” åéá ôçï ìåðåäëþôôéôç ðiõ port, ééå ôá checksums ôïõò (÷ñçóëiñßíøåò ôï sha256(1)), åéá íá åðéåâååéùèåß üöé ôá áñ÷åßá ååíÝ ÷ iõí åéëiñùèåß éåôÜ ôçï åéÜññåéå ôçò ìåðåöiñÜò ôïõò.
  - jáí êåôÜëiññ files. Áðôüò ií êåôÜëiññò ðâñéÝ ÷ áé ôá patches ðiõ åðéôñÝðiõí ôöï ðññüâññâiá íá ìåðåäëùôôéôåß êéå ååêåðåôôåèåß ôöï FreeBSD ýóôçïá óåò. Ôá patches åßíáé iéññÜ áñ÷åßá ðiõ iñßæïòí åéëååÝò óå ñññåéåññéÍ íá áñ÷åßá. Åßíáé ôá iññöþ ëiññý èåéñÝñõ, ééå åáóééÜ ëÝñí “Áóåßññåó ôçï åññíþ 10” þ “IåôÝññåøå ôç åññíþ 26 ôá åðôü ...”. Ôá patches åßíáé åðßöçò åñññôÜ ùò “diffs” åðåéäþ äçìeñññýíåé íá ôi ðññüâññâiá diff(1). Áðôüò ií êåôÜëiññò ïðiññåß íá ðâñéÝ ÷ áé êåé Üëéå áñ÷åßá ðiõ ÷ñçóëiñßíëýíåé åéá íá ìåðåäëùôôéôåß ôï port.
  - já áñ÷åßï pkg-descr. Áðôü åßíáé iñßá ðeií åððñññþò, ôö ÷iÜ ðiññëþí åññíþí, ðåññéññåòþ ôiõ ðññüâññÜññåòiò.
  - já áñ÷åßï pkg-plist. Áðôü ðâñéÝ ÷ áé iéññ åëßöðå üëññ ôúí áñ÷åßü ðiõ èå ååêåðåôôåëýí åðü ôï port. Åðßöçò èåéëiññåß ôï ýóôçïá ôúí ports ôé áñ÷åßá íá åóåéñÝóåé êåôÜ ôçï åðååéåðÜñðåóç.

läñéêÜ ports Ý÷iõí êáé Üëéá áñ÷åßá, üðùò oï pkg-message. Ôï óyóôciá ôùí ports ÷ñçöëiõiéåß áôôÜ ôá áñ÷åßá äáé íá ÷åñéôåß åéäééÝ ðåñéôóÜóåéò. Áí èÝéåôå ðåñéôóüôåñò ëäðòü Ýñhåéåò åéá áôôÜ ôá áñ÷åßá, êáé ôá ports

ãåíéêüôåñá, äåßôå ôï FreeBSD Porter's Handbook

([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/books/porters-handbook/index.html](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/porters-handbook/index.html)).

**Óciåßùóç:** ĐñÝðåé íá óõíäåèåßôå ùò root ãéá íá åãêåôåóôþóåô ports.

**ĐññiáéäiðiÞçóç:** Đñéí áâéâåôåòþóåôå ðñiéáäþðiôå port, ðñÝðåé íá óéäññåôôåßôå üöé Ý÷åôå iñsá áíáíåùiÝíç Óöeëiþ òùi Ports, éáé ðñÝðåé íá åëÝáîåôå õi <http://vuxml.freebsd.org/> áéá èÝiaôå áóöåéëåßåò ó÷åôéêÜ ià ôi port ðñi åíäéåöÝñåôå.

ÁÍ è Yéâôâdá íá áâéYâ-âdââ áôôüüíâdâá áééá ôô-÷üí ðñïíâéÞiaôá áóôáéëâßáò ðñéí áôü èÜeâ áâéâôüÓôdâóç íYâò áôôánñíäÞò, iðññâßôâ íá ÷ñçöéíïðéÞoâôå òï **portaudit**. Éá âñâßôâ áôôü òï áññâéëâßí ôôçí ÕôéëéïäÞ ôùí Ports (ports-mgmt/portaudit). Áßíáé éâéÞ éäYâ íá áâôâëÝoâôå òï portaudit -F ðñéí áâéâôáôôÞoâôå Ýíá íYí port, áéá íá áíâôôÞoâôå ñçí ôññY-ïðóâ áûÜôç áââñíïYíú ðñïíâéçíÜðûí áóôáéëâßáò. Áîðôðôîé ÷ïò Yéââ-÷ïò éâé áíâíYûñçò ôçò áûÜçò áââñíïYíú áâôâëëâßôâé áðßôçò áôôüüíâdâá éâôðÜ òïí êâèçìâñéíü Yéââ-÷ï áóôáéëâßáò òïõ ôôôðÞiaôïò. Áéá ðâñéóôüôðâñâò ðëçññïòïñßâò áéââÜôôå ôêò ôâéßëâò manual portaudit(1) éâé periodic(8).

Ç ÓöëëëäÞ òùí Ports ðññüðìè Ýôåé üöé Ý÷åôå ëåéöïññéêÞ óýíääóç ìå ôï Äéáëßéöö. ÅÜí äåí Ý÷åôå, èá ÷ñåéåóôåß íá åÜéåôå ïüñöö óåò Ýíá áíôßññäöï ôïõ distfile iÝóá ôöï /usr/ports/distfiles.

Áñ ÷ééÜ, iåôáêéíçèåßôå óôiií êáôÜeïäi ôiõ port ðiõ èÝéåôå íá åâéåôáóôÞóåôå:

```
# cd /usr/ports/sysutils/lsof
```

Iluueo ânâeåbôå óoiiê éaoÜeiäi 1sof, èá äåbôå öi port skeleton. Öi åðüüâiâi âbíá åbíáé ía iåöååëuööbóåå, P ía "êööbóåå (build)", öi port. Áðöü ábíååé áðëÜ ðëçêöñiieäþíåò make ööçí âñâiP áföiieþí. ¼öáí öi êÜíåå, èá äåbôå êÜöé üdùo åðöü:

```
# make
>> lsof_4.57D.freebsd.tar.gz doesn't seem to exist in /usr/ports/distfiles/..
>> Attempting to fetch from ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/..
===> Extracting for lsof-4.57
...
[extraction output snipped]
...
>> Checksum OK for lsof_4.57D.freebsd.tar.gz.
===> Patching for lsof-4.57
===> Applying FreeBSD patches for lsof-4.57
===> Configuring for lsof-4.57
...
[configure output snipped]
...
===> Building for lsof-4.57
```

```
[compilation output snipped]  
...  
#
```

Đññiö Ýîòå üöé iüëëö ç iåôåäéþþööéöç iëiëëçñùëåß èá åðéóöñ Ýþåôå óöçí ãñâiñP áîöiëþí. Öi åðüìåñP áþia áßiáé íá áåêáôåöþþööéöç iöi port. Åéá íá iöi áåêáôåöþþööéöç, ÷ñåéÜæåôåé áðëþò íá ðññiöéÝóåôå iéá eÝíç óöçí áîöiëþ make, êáé áåðöP ç eÝíç áßiáé install:

```
# make install
===>  Installing for lsof-4.57
...
[installation output snipped]
...
===>  Generating temporary packing list
===>  Compressing manual pages for lsof-4.57
===>  Registering installation for lsof-4.57
===>  SECURITY NOTE:
      This port has installed the following binaries which execute with
      increased privileges.
#
#
```

Í luééð áðéðóðnÝþóðå ðóðcí ãññáìP áðiðéþí, èá ðñÝðåé íá iðñiñðóðå íá áðeðóðeÝóðå ðóðcí áðoðñiðP ðið ìuëéð áðaðeðóðPóðå. Èá áððóðå iéá ðñiñðéäiðiðþçóð áðoðáéððåò, áððéäP ðið 1søf áððíáé Ýíá ðññüññáìP ðið ôñÝ ÷ áé iá áðicíÝíá ðññiññéá. ÈáðU ðóðcí iàððáéðþðóðéóð áéé áðaðéðUóðå ðóðcí ports, èá ðñÝðåé íá ðññið Ý ÷ áðoð iðñééäPðið ðññiñðéäiðiðþçóð áðiðáéðóðå.

Íéá êáëP éá Ýá, áßíáé íá æáññÜøåôô ôíï ððíêáôÜëíäi ðïö ðåñéÝ ÷åé üéá ôá ðññóùñéÍÜ áñ ÷åßá ðïö ÷ñçöeñïöiePèçéáí êáôÜ ôçí iåôáæþþôôéóç. ¼÷é iùñí êáôáíáëþñöi ðïëýôeii ÷þñí, Üëéá iðñññåß íá ðññéáéÝöiöi ðññæþìáôá áññüôåñá ùôáí èá èáëPøåôô íá åññéáôôóPøåôô íéá fåññüôåñç Ýéäiöc ôíö port.

```
# make clean  
==> Cleaning for lsof-4.57  
#
```

**ÓciáñáBùóç:** ÍðiñáBùóâ íá áééöþpóâðâ áýí ðññúöèâðâ áþíáðâ áðéþò áéðâéþíðâò make install clean áíðß áéá make, make install áéá make clean ùò ñññâ íá÷ ñññéöðÜ áþíáðâ.

läñééÜ ðñiiúüíóá ôñßòúí êáôáóéåóáôþí óå DVD-ROM, üðùò ôí FreeBSD Toolkit áðü ôí FreeBSD Mall (<http://www.freebsdmall.com/>), ðåñéÝ÷iõí distfiles. ÁôðÜ iðñiñíý íá ÷ñçóëiiðiéçëíý iå ôçí ÓðëëiäP ôñí Ports. Ðñiøáñòþðôå ôí DVD-ROM ôóï /cdrom. Áí ÷ñçóëiiðiéåßòå Üððíëi äéåóïññôðéü ôçìåßí ðñiøÜñòçò, ñòèìßòå ôçí iñóåæçò CD\_MOUNTPTS ôíõ make. Ôá áíåéåßá distfiles éá ÷ñçóëiiðiéçëíý áðóùååá áí ôðÜñ÷iõí ôóï äéöéÜéé.

Ôi óyóóðçíá ôúí ports ÷ñçóéiiððíéåß ôi fetch(3) áæá íá “éáðåââÜóâé” óá áñ÷åßá. Ôi fetch(3) ÷ñçóéiiððíéåß äéÜõññåò iåðåâæçöÝò ðåñéäÜëëññiò, ðåñéëæiâáñíÝ ïuí ôúí FTP\_PASSIVE\_MODE, FTP\_PROXY, éáé FTP\_PASSWORD. Ùóùò ÷ñâéáóôåß íá ñðèiñßóåôå ìßá Þ ðåñéöóûñðâñåò áí âñßóéâóôå ðßóú áðü Ýíá firewall, Þ ßóùò íá ÷ñâéáóôåß íá ÷ñçóéiiððíéÞóåôå Ýíáí FTP/HTTP proxy. Äåßôå ôi fetch(3) áæá ìéá ðëÞñç ëßðôå ôúí iåðåâæçöþí áôðþí.

Ãéá ÷ñÞóôåð ðïò áâí lïðmýí íá áâßíáé óðfâåââí Ýñíé üëç ôçí þñá, áæáóßèåðóáé ç áðéëÞ make fetch. Áðéþð áêóâæÝóôå ôçí áîöiÞ óóïí éâóÜëiä (/usr/ports) êáé ðâáðâñáßôçôá áñ÷âßá èá “éâóÝâiõí” áéá áóÜð. Ç áîöiÞ áðóÞ èá éâéóïrñÞóâé áéá óâð ðïðéâðåëüâiõð, üðùò áéá ðâñÜääéâíá: /usr/ports/net. ÐññóÝîôå üüðé áí Ýíá port áââññÛðóáé áðü áéâéëÞéâð Þ Üëéá ports, ç áîöiÞ áðóÞ áâí èá áíâðóÞóâé ðâ distfiles ôiõð. ÁíðéâáóâðÞóâå ôi fetch iâ ôi fetch-recursive áí èÝéâðå lâæß iâ ôi port íá áíâðóÞóâå êáé üëâð óéð áââññÛðóâé ðiõ.

**Óçìàßùóç:** Iðiñâßôá íá iàðâáæüòòòßóåôá üéá óá ports óá ißá êáôçäïñßá P áêüïá êáé óá üëåò, áêôâäþíóáò ôí make ôóïí áñ-ééü êáôÜeiäi, üðòò ià ôí ðñïáíáöåñèåßóá make fetch iÝeiäi. Áðóú üìùò áßíáé áðéêßíäöïí, áéáóß iàñééÜ ports aaíl iðiñïýí íá oóïñðÜñ-íñi. Óá Üëéåò ðåñéëðþóåéò, iàñééÜ ports iðiñâß íá áâéáðåóðþóïí aðíi áéáöïñâðééÜ áñ-ðßá ià ôí ßæéí üññíá.

Óå iññéé Yò óðÜíéåò ðåñéðòþóåéò, ié ÷ñÞóôåò lðiññåß íá ÷ñåéÜæåôåé íá áráéêòÞóïòí óå tarballs áðü Ýíá site áéäöiññåðéü áðü óå MASTER\_SITES (ç ôiðièåóßá áðü üðiò “éåôåâåðíñòí” óå áñ ÷åßá). lðiññåßôå íá áééÜíåôå ôçí áðééiäÞ MASTER\_SITES iå óçí áûëiñòèç áíòiñëþ:

```
# cd /usr/ports/directory  
# make MASTER_SITE_OVERRIDE= \  
ftp://ftp.FreeBSD.org/pub/FreeBSD/ports/distfiles/ fetch
```

Óå áôöü ôi ðáñÜääéâiá áëëÜîâiå ôçí åðééïäP MASTER\_SITES óå  
ftp.FreeBSD.org/pub/FreeBSD/ports/distfiles/.

**Óciàßúóç:** Iañêé Ü ports àðééññÝðíñí (Þ áðáéóïý) ía äþóåðå àðééëäÝò iåðåáæþóôéóçò ðíñ iðññíý ía áíñññðíéþóïí/áðáíññðíéþóïí ðíþíáðå ôçò åðáññäþò ðíñ àðíñáé á ñåßáóðå, óðâéâéñéñíÝíåò àðééëäÝò áðóåéëåßáð, ééá Üëéåò ôñíðíëþóåðé. Èíéí Ü ðáñáññäßáðå ôÝðíéú ports àðíñáé ôå [www/firefox](http://firefox), [security/gpgme](http://gpgme), ééá ôî [mail/sylpheed-claws](http://mail/sylpheed-claws). ½ðáí ôðÜñ ÷ ïñí äéáèÝóéìåò ôÝðíéåò àðééëäÝò, èá àíðáéóðåðå ôóç íëüic óåò ó ðåééññíþíñí.

#### 5.5.2.1 ĐáñáêÜìðôíôáò ôíõò ĐñíåðéëåäíÝíõò Éáôáëüäíõò ôùí Ports

```
# make WRKDIRPREFIX=/usr/home/example/ports install
```

èá lâóáäüùôôßóåé ôí port ôóï /usr/home/example/ports êáé èá åãêåôôÞóåé ôá ðÜíôá ôóï /usr/local, åíþ ç åíöîéþ:

```
# make PREFIX=/usr/home/example/local install
```

éa iáðoáæùðôðþráé ói port ói /usr/ports êáé eá ói áæðaðaðþróáé ói /usr/home/example/local.

Êáé öðóéêÜ ç åíôïëP:

```
# make WRKDIRPREFIX=../ports PREFIX=../local install
```

éa óðófiað Úðáé êáé óá aðí (áßíáæ ðréy iáññ Üœç æáá íá ócí áððíðiáñ áðþ, Üeëá ðñ Ýðáé íá ðÞñáðóá ócí áðáseéþ éáÝá).

ÁíáéëáêôéêÜ, áôôÝò ié iåôåâæçôÝò iðñiiyí íá ñõeïéôöiyí ùò iÝñiò ôiö ðåñéâÜëëiîöiò óâo. ÄéâåÜóôå ôçí óâëßää manual æá ôi ëÝëöiò óâo, áéä íá âñâbhôå ôéo ò÷ åôééÝò iäcâbhôå.

#### 5.5.2.2 ÁíôéìàðôùԾÞæiiôáò ôii imake

IàñéêÜ ports ðiõ ÷ñçóëiiðiëíyí ôi ìmake (iÝñiò ôiõ X Window System) äåí óoïåññäÜæiiðåé óuòôÜ ià ôi PREFIX, êáé åðéi Ýñiò íá åâéåðåóðåéiyí ôoï /usr/X11R6. IàñéêÜ Perl ports åâíiyí ôi PREFIX êáé åâéåðëßöôáíðåé ôoï äÝíöii Perl. Ôi íá eÜfåôå áôðôÜ óa ports íá óYâiñóåé ôi PREFIX åßíáé ïßá áyôéïec P äävýåðc äïðeæÜ.

### 5.5.2.3 Åðáíáñvèiéóç Åðéëjäbí Ports

### 5.5.3 Áöáéñþíôáò ÅãêáôåóôçìÝíá Ports

```
# pkg delete lsof-4.57
```

#### 5.5.4 Áíáâáèìßæüíôáò ôá Ports

Áñ÷ééÜ, áåßôå ôá ðáñù÷çìÝíá ports æáé ôá iðiþá ððÜñ÷iðí æéáèÝóéiåò íåüôåñåò åêäüóåéò óôçí ÓðëëiäP ôùí Ports, ïå ôçí åðöiëP pkg version(1):

```
# pkg_version -v
```

#### 5.5.4.1 /usr/ports/UPDATING

Áí ôi UPDATING áíáéñåß êÜôé ðïö äéâåÜóåôå åäjb, èåùñPóôå üôé éó÷ ýåé ôi UPDATING.

#### 5.5.4.2 Áíáâáèìßæïíôáò Ports ìå ôï Portupgrade

Ôi åññáéåñßi **portupgrade** åßíáé ó÷åæáóí Ýíí æá íá áíååàèßæåé åýëïéá ååéåôåóöçí Ýíá ports. Äéåðßèåôáé åðü öi ports-mgmt /portupgrade port. ÅåéåôåóðÞóôå öi üðùò êÜëå port, ÷ñçóëíïðíéþíôå öçí åíðïëÞ make install clean:

```
# cd /usr/ports/ports-mgmt/portupgrade  
# make install clean
```

Ç åíöëP pkgdb -F èá äéååÜóåé ééé èá äéïñèþóåé üéåò ôéò áóðÝðåéåò ðiòßóùò õðÜñ÷iøí óôç èßóóå ôúí ååéååóåöçÝ iùí ports. Åßíáé êáëP èáÝå åßíáé íá öçí åéôåéåßóå öó÷iÜ, åíäá÷iÝ iùò ðñéí áðü èÜèå áíååÜèíéç.

¼ôáí åôåéååôóå ôï portupgrade -a, ôï **portupgrade** èá áñ÷ßóåé íá ááâåèìßæåé üéá ôá ðáñù÷çíÝíá ports ðïö åßíáé ååéåôåôçíÝíá óóï óyóôçíá óáò. ×ñçóéiiðíéPóôå ôçí åðéëíäP - i áí èÝéåôå íá óáò ñùôÜ åéá åðéååååßùóç æéá ïÙéå íå÷ùñéóôP ááíÜèiéóç.

```
# portupgrade -ai
```

Áí è Ýéåôá íá áíåâáèìßóåôá iùíír ißá óóåéâéñéí Ýíc åöåñííäP, éáé ü ÷é üéá ôá äéåé Ýóéíá ports, -ñçóéíiðíéPóôá ôí portupgrade *pkgname*. ÓíðåñééÜååôá ôçí åðééëíäP - R áí ôí portupgrade ðñ Ýðåé ðñþôá íá áíåâáèìßóåé üéá ôá ports ðíø ãðåéóíýóáé äéå ôçí óóåéâéñéí Ýíc åöåñííäP.

```
# portupgrade -R firefox
```

Áéá íá ÷ñçóéiiðiéÞóáôå ðáéÝôá áíôß æá ports óóçí åæéåöÜóôåóç, äþóôå ôçí åðéëiäP -P. Íå áôôP ôçí åðéëiäP ðí portupgrade áíáæçöÜ ðíôò ðiðéëiyó êåôåéüäiôò ðiò mñßæiiðåé óóïí PKG\_PATH, P áíåéôÜ ôå ðáéÝôá áðüù aðññáéññóííÝíá sites áÚí aáíi áññåéiyí ðiðéëéÜ. Áí ôå ðáéÝôá aáíi ðiññiyí íá áíåéôçéiyí íå ðiòò ðáññåðÜñu ôññüðiòò, ðí portupgrade eá ÷ñçóéiiðiéÞóåé ôå ports. Áéá íá aðiðiøvååôå áíôåéþò ôçí ÷ñþóç ôúí ports, êæiñßóôå ôçí åðéëiäP -P.

```
# portupgrade -PR gnome2
```

Ãéá íá áíáêôPóâôå áðëþò ôá distfiles (Þ ôá ðáêÝôá, áí Ý÷åôå iñßóåé ôçí åðëëiäP -P) ÷ùñßò íá låôáæùôôßóåôå P íá ååéáôåôôPóâôå ôßðjöá, ÷ñcôéüïðjéPóôå ôï -F. Æá ðåñéóóûôâñåò ðëcñiøiñßåò, åßôå ôï portupgrade(1).

#### 5.5.4.3 Áíáâáèìßæíôáò Ports ìå ôí Portmanager

Ôi Portmanager åbíráé Ýía áêüìá åññáéëßí ãéá åýéïëç áíááÜèïéóç åãéáôåôöçíÝíùí ports. Äéáôßèåôáé áðü oï ports-mgmt/portmanager port:

```
# cd /usr/ports/ports-mgmt/portmanager
# make install clean
```

¼ëá ôá åâéâôåôçì Ýíá ports iðiñíýí íá áíáââèlëóôïýí ÷ñçóëiiðiéþíôáò áôôP ôçí áðëP åíôïëP:

```
# portmanager -u
```

Ìðiñâßôå íá ðññóèÝôåôå ôçí áðéëiäP -ui ãéá íá åñùôçèåßôå íá åâéâââéþóåôå êÜëå åÞíá ðiõ èá åâôâæÝôåé õi Portmanager. Ôi Portmanager iðiñâß åðßóçò íá ÷ñçóëiiðiéçèåß ãéá íá åâéâôåôþóåôå iÝá ports ôôi óyôôçí. Óå áîôbèåóç lå ôçí åíôïëP make install clean, ôi Portmanager èá áíáââèlëþóåé üëåò ôéò åâáñôþóåéò ðñéí ôçí ìâôâæþôôéóç êáé åâéâôÜóâåóç ôïõ áðéëâäiÝñiõ port.

```
# portmanager x11/gnome2
```

Áí ððÜñ÷iõí ðññâÞíáôå ðiõ ó÷åðßæiïôáé lå ôéò åâáñôþóåéò åíüò áðéëâäiÝñiõ port, iðiñâßôå íá ÷ñçóëiiðiéþóåôå ôi Portmanager ãéá íá ôéò åðáíá-åâôâæùôôþóåé üëåò lå ôçí óùôôP óâéñÜ. Íüééò ôâéâéþóåé lå ôéò åâáñôþóåéò, èá åðáíá-åâôâæùôôþóåé êáé ôi ðññâÞíáôåñâéü port.

```
# portmanager graphics/gimp -f
```

Ãéá ðâñéóóüôåñâò ðëçñiõiñßåò åâßôå ôç óâéßää manual portmanager(1).

#### 5.5.4.4 Áíáââèlëíóâò ôá Ports iÝóù ôïõ Portmaster

Ôi Portmaster åßíáé Ýíá áêüùå åññâéâßí ãéá ôçí áíáâÜëíéóç ôùí åâéâôåôçì Ýíüí ports. Ôi Portmaster ó÷åâéÜóôçêå þóôå íá ÷ñçóëiiðiéâß ôâåññâéâßå ðiõ ðáñÝ÷åé õi “âáóééü” óyôôçí (äåí åâáñôÜôåé áðü Üëéá ports) êáé ÷ñçóëiiðiéâß ôéò ðëçñiõiñßåò ôïõ /var/db/pkg ãéá íá êâéiñßóåé ðíéá ports èá áíáââèlëþóåé. Åßíáé ãéáèÝóëii iÝóù ôïõ port ports-mgmt/portmaster:

```
# cd /usr/ports/ports-mgmt/portmaster
# make install clean
```

Ôi Portmaster iñáüðiéâß ôá ports óå ôÝóôåñéò êáôçâiñßåò:

- Root ports (äåí åâáñôþíôåé áðü Üëéá, êáé iýôå Üëéá åâáñôþíôåé áðü áôôÜ)
- Trunk ports (äåí åâáñôþíôåé áðü Üëéá, ùóôüöi ëÜðiéá ðáéÝôå åâáñôþíôåé áðü áôôÜ)
- Branch ports (Ý÷iõí åâáñôþóåéò êáé ðñiõ ôéò äyí êâôâôðéýíóåéò)
- Leaf ports (åâáñôþíôåé áðü Üëéá, åëëÜ ü÷é ôi åíôbèåôî)

Ìðiñâßôå íá åâßôå iéá ëßóôå üëüí ôùí åâéâôåôçì Ýíüí ports êáé íá øÜñâôå åéá åíçìåññùì Ýíåò åâëüôåéò, ÷ñçóëiiðiéþíôáò ôçí áðéëiäP -L:

```
# portmaster -L
====>>> Root ports (No dependencies, not depended on)
====>>> ispell-3.2.06_18
====>>> screen-4.0.3
        =====>>> New version available: screen-4.0.3_1
====>>> tcpflow-0.21_1
====>>> 7 root ports
...
====>>> Branch ports (Have dependencies, are depended on)
```

```
====>> apache-2.2.3
      ==>>> New version available: apache-2.2.8
      ...
      ==>>> Leaf ports (Have dependencies, not depended on)
      ==>>> automake-1.9.6_2
      ==>>> bash-3.1.17
          ==>>> New version available: bash-3.2.33
      ...
      ==>>> 32 leaf ports

      ==>>> 137 total installed ports
          ==>>> 83 have new versions available
```

Íðiññâðôá íá áíáâáèìßóâôå üëá ôá åâéâôåôðçíÝá ports iå ôçí ðáñáêÜôù áðëþ áîôïëþ:

```
# portmaster -a
```

**Óciàßùóç:** Áðü ðñiâðééïäþ, ôi **Portmaster** èá äçìéïññâþóâé áíðßâñáöi áóöáëâðáò ôiô áâéâôåôðçíÝíðôáéÝôð ðñéí ôi äéâññÜðâé. Áí ç åâéâðÜóðáóç ôçò íÝáð Ýéäïöçò åñíáé áðéôð ÷þò, ôi **Portmaster** èá óâþóâé ôi áíðßâñáöi áðôð. Áí ÷ñçóéïðiéþóâôå ôçí áðééïäþ -b, ôi **Portmaster** äái èá óâþóâé áðôðüìâôå ôi áíðßâñáöi. Áí ÷ñçóéïðiéþóâôå ôçí áðééïäþ -i, èá èÝóâôå ôi **Portmaster** óâ äéâæñâôôééþ èâéðiññâðá, üðið èá óâð åççôÜâé áðéâââðûóç ðñéí ôçí áíáâÜëéóç êÜéâ port.

Áí áíðéâðâðñðßóâôå ëÜëç êâðÜ ôç äéâæñâðóâðá ôçò áíáâÜëéóçò, iðiññâðôá íá ÷ñçóéïðiéþóâôå ôçí áðééïäþ -f ãéá íá áíáâáèìßóâôå êâé íá iâðâðæñððßóâôå iâíÜ üëá ôâ ports:

```
# portmaster -af
```

Íðiññâðôá áðßðçò íá ÷ñçóéïðiéþóâôå ôi **Portmaster** ãéá íá åâéâðâðñðßóâôå íÝá ports ôði ÿóðôçíá ôâð, áíáâáèìßæññðâð êâé üëâð ôéð åíáññðóâð ôiôð ðñéí ôç iâðâðæñððßóâôå êâé åâéâðÜóðâóç ôiôð:

```
# portmaster shells/bash
```

Ðáñáæññðâð iâðâðôå ôç óâðßâá manual ôiô portmaster(8) ãéá ðâñéóðüðâñâð ðëçññðñßâð.

## 5.5.5 Ports êáé Áðïèçêåðôééüò ×þñïò

Ç Óðëëïäþ ôùí Ports êáðâðñðßóâð åéâéÝóéï ÷þñï ôiô áðóéï iâ ôçí ðÜññäi ôiô ÷ññüñð. ÞâðÜ ôçí iâðâðæñððßóâð ôéé åâéâðÜóðâóç ëïæññðééïý áðü ôâ ports, ðñÝðâé ðÜññðâá íá êâéâññðæñðâ ôiôð ðññðññññðð work ÷ñçóéïðiéþíðâð ôçí åîôïëþ make clean. Mðiññâðôá íá êâéâññðæñðâð üëç ôçí Óðëëïäþ ôùí Ports iå ôçí åéüëiðèç åîôïëþ:

```
# ports clean -C
```

Íâ ôçí ðÜññäi ôiô ÷ññüñð, èá óðððññðâðññðýý ðïëëÜ áñ ÷åßá äéâññððßóâð ðçâáßïð êþæéâð ôðiñ êâðÜëéññ distfiles.

Íðiññâðôá íá ôâ áðâðññðâðññðýý ðïëëÜ áñ ÷åßá äéâññððßóâð ðçâáßïð êþæéâð ôðiñ êâðÜëéññ distfiles ðið åâí ô ÷åðßæññðâð ðëÝíñ iâ êâíÝá port:

```
# ports clean -D
```

<sup>1</sup> æáé íá áóáéñ Ýóâôâ üéá óá distfiles ðíö äáí ó÷âôßæíöáé íà êáíÝíá port ðíö âñßóâôáé åäéâôâôçì Ýíí óðír óýóôçìá óâð:

```
# ports clean -DD
```

**Óciåßùóç:** Ôï åñääáéåßí ports clean åãéáèßóôáôáé ùò iÝñïò ôïõ portupgrade.

Ící íâ ÷ ÍÜôá íá áoéñâbôá óá åæéåôóçí Ýíá ports üoáí äái ôá ÷ ñâéÜæåóôå ðëÝíí. já éaëü åññáéåßí ãéá íá åðöññåöîðíéçèåß åðôP ç åññáóßá, åññáé öï port ports-mgmt /pkg\_cutleaves.

## 5.6 ÅÍÝñääéåò ìåôÜ ôçí ÅäêáôÜóôáóç

Óá áéñéáþ áþíáðá ðið éá ÷ñáéáóóiyí áéá íá ñoëìþóåôå êÜæá åöáñiiþP, éá áßíáé ðññöáþpö áéáöirñåôéêÜ. ¼ìùò, áí iüeëó ááéáóóôþóåôå iéá íÝá åöáñiiþP éáé áíáñüöéÝóóá “Öþná öé;” ié ðáñáéêÜòú óöiâiöéÝò iðñmåß íá óáó áïcëþóiöí:

- $\times$  `ncoséirDíEíPóðá` ói `pkg_info(1)` áeá fá `áðBóðá` óe `án ÷ áBá` `áðéáðóðÜeçéáí`, éae `Díð`. Áeá `ðanUáðæilá`, ái `lúeðóð` `áðéáðóð``Póðá` ói `FooPackage` version 1.0.0, óuðó c `áÍðeP`:

```
# pkg_info -L foopackage-1.0.0 | less
```

éá óáò áâbíáé üéá óá áñ÷áâbá ðiö áâéâóáóö Üeçéáí áðü áôöü öi ðáéYöi. Ðñiö Yîöâ óá áñ÷áâbá óöií éâoÜeïäi man/, ðiö éá áâbíáé óâëßâåò manual, öiöö éâodÜeïäiöö etc /, üðiö éá áâbíáé óá áñ÷áâbá ñöðëìßöâúí, éâé öi doc /, üðiö éá áññööéâöáé ðei ðâñéâööéêp ôâéicñbhùóc.

Áí áái ábóôå óbäiõníò ðiéá Yéäiöç ôçò åöáññäþò åäêåôáôþóáôå, iéá áîöiëþ üðùò áôôþ:

```
# pkg_info | grep -i foopackage
```

éá âñåé üéá ôá ååéåôåóçì Ýíá ðáêÝoá ðiõ Ý÷iõí ôi foopackage ôoi üïñâ ôiõ ðáêÝôiõ. ÁîôéêåôåôPôôå ôi foopackage ôóçí âñâiP áiõiõbí ià ôi ðáêÝôi ðiõ áíáæcôÜôå.

- Iüééó äåßôå ðïö åñßööëíîöáé óå manual pages ôçò åöäñiiäÞò, äåßôå óå iå ôçí man(1). ¼ìïéá, äåßôå óå ðäñääßäìåðå ðùíí áñ÷åßúí ñyéìéöçò, éáé üðïéá Üëëç ðñüöèåöç öåêìçñßúöç äéåôßèåðåé.
  - Áí ððÜñ÷åé web site æáá ôçí åöäñiiäÞ, åéÝäñöå ðï åéá ðñüöèåöç öåêìçñßúöç, óð÷íÝò åñùöPöåéò (FAQ), éáé Üëëá. Áí äái åßôå ðbäiñöñò æáá ôçí åéäýéöñöP ôiö web site, ßöùö ðï åñåßôå óóçí Ýñäi ôçò áiñöéÞ:

```
# pkg_info foopackage-1.0.0
```

Áí õðÜñ÷åé ãñáììP www:, èá ðñÝðåé íá Ý÷åé ôi URL ãéá ôi web site ôçò åöáñììäPò.

- Ports ðið ðñÝðåé íá ïâééñíýí éåðö Ü ôçí ãééñíçóç (üðùò äéáéñéóó Ýò Internet) óðíÞèùò åâéæéóðíýí Ýíá script óðí /usr/local/etc/rc.d. ÐñÝðåé íá åéÝäíåðå óïi script æáé ôçí iñëüôçóå òið ééé íá óïi ôññiðiðíéÞóåðå Þ íá óïi ïåðiññíÜðåðå áí ÷ñæðÜæðóåé. Ååßóå óïi ÅéééÞíðå Õðçñåðóßåð åéá ðåñééóóüðåñåð ðeçññiñmßåð.

## 5.7 Áíôéìåôùðßæiiôáò ×áæáóìÝíá Ports

Ái Yíneáða áidéi Yíðuðri iá Yíá port oí iðiþi áar eæðiðiðnað, ðóðU-; iðr eðUðriéa ðñUáiaða ðis iðmáðbóða ía eðUíáða:

1. Äåßôå áí åêëñâiåß êÜðïéá äéüñèùóç æáá ôi port óöi Problem Report database  
(<http://www.FreeBSD.org/support.html#gnats>). ÅÜí íáé, iðiñâßôå íá ÷ñçóðiðiðÞóåôå ôç ðñiøåéíüìåíç äéüñèùóç.
  2. ÆçôÞóåôå åiÞéåéá áðüi ôiöööçñçôÞ ôiö port. ÐëçêðmíiäiÞóåôå make maintainer P äéåáÜðôå ôi Makefile æáá íá âñâßôå ôçí äéåýéööíóç email ôiö ööföçñçôÞ. Óöi lPíöià óáð, eðiçëåßôå íá ööiðâñééÜâåôå ôi üññiá éáé ôçí Ýéüñóç ôiö port (ööåßëôå ôç åñâiìP \$FreeBSD: áðüi ôi Makefile) êáéþò êáé ôçí Ýíñäi ôiö Üëiâðiö.

**Óciáßúócs:** ìáñéêÜ ports ääí óðófçñíýíðáé áðü êÜðíéí óðåâéâñéíÝí Üðííí, áééÜ áðü êÜðíéá mailing list ([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/articles/mailng-list-faq/article.html](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/mailng-list-faq/article.html)). ÐíëéÝò, áí ü÷é üéâà, áðü áðôÝò ôéò äéâðèýíðáéò Ý÷iõí óçí iññöþ <freebsd-listname@FreeBSD.org>. Ðáñâéáëÿìá íá ôí Ý÷åðâ ððüøç óáò êáôÜ ôç äéâðyðùóç ôúí åññûôÞóåùí óáò.

ÓðâæåêñéíÝíá, óá ports ðiø óáðßííðáé üöde óóíðçñíýíðáé áðü ði [ports@FreeBSD.org](mailto:ports@FreeBSD.org), äáí óóíðçñíýíðáé áðü éáíÝíáí óóçí ðñâáíáðééûðôçôá. Äéïñèþóáéò êáé óððíóðþñéíç, áí ððÜñ÷iøí, Ýñ÷iðáé åáiééÛ áðü óçí êíéíúðôçôá ðiø óóíìåðÝ÷åé óóçí óðâæåêñéíÝíç mailing list. ×ñâéáæüíáðôá ðÜíðiðå ðâññéóðüðâññiøð åæåëííøÝò!

Áí äáí èÜåâôå áðÜíöçóç, ìðiñâßôå íá ÷ñçóëiñðíéÞóåôå ôi send-pr(1) ãéá íá óôåßëåôå iéá áíáöiñÜ óöÜëiáôiò (äåßôå ôi ÁñÜöiñôå ÁíáöiñÝò ÓóÜëiáôiò ãéá ôi FreeBSD  
([http://www.FreeBSD.org/doc/en\\_US.ISO8859-7/articles/problem-reports/article.html](http://www.FreeBSD.org/doc/en_US.ISO8859-7/articles/problem-reports/article.html))).

3. Áéíñèþóôå õi! Ôi Porter's Handbook  
([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/books/porters-handbook/index.html](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/porters-handbook/index.html)) ðåñéÝ÷åé ëåðöñåñåßò ðëçñiöñßåò áéá ôçí õðíäñP ôuì "Ports" þóôå íá ïðíñåßôå íá áéíñèþóôå õi ðåñéóðåéåéü ðñiiâèçíåôééü port P áéüìá êáé íá áçíëiõñåÞóåôå Yíá áééü óåò port!
  4. ÁíáêôÞóôå õi ðåêÝôi áðü Yíá êííôéü óåò FTP site. Ç "éýñéá" óðeeiäP ðåêÝôuì âñßóðåôé óôi ftp .FreeBSD .org, óôiï êáðÜëíä ðåêÝôuì (<ftp://ftp.FreeBSD.org/pub/FreeBSD/ports/packages/>). Ðñéí ôç ÷ñçóëiïðíéÞóåôå, áéÝâiôå ðñþðå õi ðiðééü óåò mirror. Óá ðåêÝôå åßíáé ðéí óßäiõñii üöé èá ëåéöiõñåÞóïí, áðü õi íá ðñiöðåéåßôå íá iåðåäéùðôðßóåôå õiï ðçãäßi êþäééå, êáé ç äéáäééåßá ôåéåéþíåé ðéí añPaiñá.  
x ñçóëiïðíéÞóôå õi ðñüäñåìí pkg\_add(1) áéá íá ååéåôåðÞóåôå õi ðåêÝôi óôi óýóðçíå óåò.

# ÊåöÜëáéï 6 Ôï Óýóôçìá X Window

Áíáíåþèçéå ãéá ôüí X11 server ôüí X.Org áðü ôüí Ken Tom êáé Marc Fonvieille.

## 6.1 Óýíiøç

Ôi FreeBSD ÷ nçœiñïðiéåb ôi X11 ãéá íá ðåñÍ÷åé óòiõ ÷ nñPôôåô Ýíá éó÷ ðññ ãñáöéêü ðåñéäÜëeñí åññåóßåd. Ôi ðåñéäÜëeñí X11 åßíáé leá ðëiñïßçóç áññéööiy êþäééå ôiõ ñóóññPìåòiò X Window ðiõ ðëiñïðiéåßôåé ôiõ **Xorg** (éåèþò ééé ôå Üëeñí eññéöleêü ðiõ ãáí ðåñéñÜöåôåé åäþ). Ç ðññåðééåññí Ýíç êáé åðßóçç æéñññP ôiõ X11 åßíáé ôiõ **Xorg**, i X11 server ðiõ áññåðöy÷ëçéå áññ ðiõ X.Org Foundation iå Üäééå ÷ nñPôçô ãññåðÜ üññéå iå åñññP ðiõ ÷ nçœiñïðiéåßôåé åññ ðiõ FreeBSD. ÕðÜñ ÷ iõñ åðßôçç æééå Ýóëiíé åñññéêiñ X servers æéá ôiõ FreeBSD.

Áéá ðåñéóóüôðåñåò ðéçñiiöñíßåò ðiñ ó÷åðßæíïóáé íà ôéò êÜñôåò ãñáöéêþí ðiñ õððóôçñßæíïóáé áðü òið ðåñéâÜëëíí X11, äåßðå ñçí áééôðåáéþ òiðièåóßá Xorg (<http://www.x.org/>).

Áöiý äéáâÜóåôå áõôü öi êåöÜëáéi, èá iÝñåôå:

- Óá æéÜöñá ðìÞláðá ðiõ óðooðÞláðiõ X Window, êáé ðùò óðiññáÜæiiñðáé iåðaáiy ðiõð.
  - Ðùò íá ååêáðáóðÞoåðå êáé íá ñõëìßoåðå ðiõ ðåñéáÜëëñí X11.
  - Ðùò íá ååêáðáóðÞoåðå êáé íá ñõëìßoåðå åéäöññðóéëiýð åéá ÷ åéñéóð Ýð ðåññèýñùí (window managers).
  - Ðùò íá ÷ ñçóéiiðiëÞoåðå TrueType® ãññìáðiõáéñ Ýð óði X11.
  - Ðùò íá ñõëìßoåðå ðiõ óýóðciá óàò åéá óýíåðc (login) ìÝóù ãñäöéëiý ðåñéáÜëëñðiõð (**XDM**).

Đñéí äéáâÜóåôå áôôü ôi êåöÜëáéi, èá ðñÝðåé:

- Íá íÝñåôå ðùò íá åãéåôåóôÞóåôå ðñüöèåôîí ëïäéóïéêü ôñßôïõ êåôåóêåôåóôÞ (ÊåôÜëåéí 5).

## 6.2 Éáôáíüçóç ôïõ ðåñéâÜeeëíîò X11

Ç ÷ñPóç öiõ ðåñéá Üeeñíòò X11 æáá ðñþöç öiñÜ iðmåß íá ðññéæÝ óåé iéá leéñP óáñá÷P óå üiñíéíÝ ÷åé óoíçèþóåé óå Üeeá ãñáöeÜ ðåñéá Üeeñíòò, üðùò óå Microsoft Windows P öi Mac OS.

ÃáéééÜ, äáí ábíráé ádáñáþöçöi íá éáðáæäááþíåô ìá êÜeå eäðöriÝñåéá ôúí äéáöüñúí öíçìÜôúí öiö X11 éáé ðþò aëéçëåðéäñíý íåðáíý öiöö. ÉÜðieåò ááðéêÝð aíþóåéò üùñò, ábíráé ÷ñþóéïåò éáé aíçëiýí ööí íá áéíåôáééåðöåþðå éáéýöåñá ööé aðíáûööçöåò öiöö X11.

### 6.2.1 Æéáôß ëÝãåôáé X11 ôi ðåñéâÜeeíí åñãáóßáò;

Öi X äáí áßíáé öi ðñþöi ðâñæá Üeëíi âññåðößå ðiö añ Üööçêå æáá öóðööÞiáðå UNIX, áeëÜ áßíáé öÞiáñå öi ðei  
äçiiöeë Ýð. Ç añ ÷eëþ iñ Üäá áí Üðööñçö öiö X áß ÷å aïöeë Ýþåé öá Ýíá Üeëíi öýööðçia ðñéi añ Üþåé öi X. Öi üññá öiö  
ðáðéüöðññö öóðööÞiáðöi Þoái “W” (áðü öçí Ááñæéëþ eÝç “window”). Öi añ Üññá X Þoái áðëÜ öi áðññiññ añ Üññá ööí  
Æáðééññü aëö Üâçöi.

Íðiñáðbóá fá áíáö Ýñãoéá óöi X ià óá iíüùlåóá "X", "X Window System", "X11", éæòþò êáé ià lánñééiyò Üeeiñò üñiñò. Ðññiñi ÷ þ iùùlo: éÜðiéié Üfèñùðié èåùñiñý ðññiøåëçôéü óiñ üñi "X Windows". Åéá ðåñéóóüôåñàò ðëçñiñiñbåò ó÷ åöéê Ü ià áööü, äåbóá ôc óåéßáá manual X(7).

#### 6.2.2 Ôī līíôÝeī ĐåëÜôç/Äéáêîléóôþ ôùí X11

Ôî ðâñéâÜëëí X11 Ý÷åé ó÷åäéáóôåß áðü ôçí áñ÷þ Ýôóé þóôå íá Ý÷åé åâååíþ äéêôôåêþ õðïóôþñéíç, iå áÜóç Ýíá iiiõÝëí “ðâæÜôç-äéáëéóôþ”.

Óá Ýíá óðþbóé P Ýíá leðñúu ãñáðåßí, i áæáéiiéóðþò éáé ié ðáæÜðåð X óð: Ú áðóðæiÝíðáé óðóíß ßáéi ððiëiæóðþ. ¼ìùð, åßíáé áðüëöðá åðééðóu íá áðóðæiðþáé i áæáéiiéóðþò X óá Ýíáí ëeðuðåññi éó: ðññi áðéóñáðÝæéi ððiëiæóðþ, êáé íá áðóðæiÝíðáé ié áðoññiaÝò X (lé ðáæÜðåð) óá Ýíá, áð ðiýiá, éó: ðññi êáé áðéñéáu ïç: Úíçíá Þið áðóðçññåðþ, óí áñáðåßí. Óá áðóðu óí ðáðÜññi c áðéiñiñßá iàðáiy ðúð ðáæáðþí X éáé óið áæáéiiéóðþ áßíðóáé iÝóu áæéóýið.

Áðóöü ðññíéåëåß óýä÷ ðoóç óá iññeóí Ýñiòò, áðåéäP ç iññeíäßá ôiò X áßíáé áêñéåþò áíðþèåôç áðü üðóé ðåññìåíáí. Ié ÷ ñPóôåò óðíPèùò ðåññéí Ýñiòí í “æáéññéóðþò X” íá áßíáé Ýíá iååÜëí éó÷ ðññü ìç÷ Üíçìá óá Ýíá àùíÜóéí êéá í “ðæéÜôçò X” íá áßíáé ôi ìç÷ Üíçìá ôiò aññöåßiò ðiòò.

Åßíáé óciáíôééü íá èõiÜóôå üöe iäéáêïéôôPò X åßíáé ôi ìç÷Üíçìå iå ôçí iëüíç êáé ôi ðëçêôñïëüäei, êáé ie ðåëÜôåò X åßíáé ôå ðñiäñÜiäåô ðiõ åìöáßæïõ ôå ðäñÜeõñä.

Äáí ððÜñ ÷ áé ðbðrðóá óóí ðñùöüëtëeí ðiò íá áíáâæ Üæâé óá íç ÷ áÍpiâóá òúí ðåéäóþí éáé ðiò äéáëñlëóþ P íá áêôðâëýíðóá óóíß bæéí ëééöiññæéú óýóöçíá, P áéüìç íá áêôðâëýíðóá óóíß bæéí óýðí ðötiëäéóþ P. Áßíáé áðüëðóá áðééðóú íá áêôðâëðóáé Ýíáð áéäéñlëóþ Pò X óóá Microsoft Windows P óóí Mac OS óçò Apple, éáé ððÜñ : iòíí áéáéÝóéíåò áéÜöinåò áéäáýéåñåò éáé áïðiñééÝó áöoáññiaÝó ðiò êÜñiòí áéñéåþò áðóú.

### 6.2.3 Í Äéá : åéñéóôþò Đáñáèýñùí

Ç ööeëiööbá ó÷åäéáöiíy oïo X iiéÜæåé ðieëy là ôçí ööeëiööbá ó÷åäéáöiíy oïo UNIX, “åññääëåßá, ü÷é ðieëéöéêP”. Áðooü óçìäbíäé üöde oï X äáí ðññöðåèåß ía ððäaiññåýöåé ðùò èá ðeëiðieçèåß iéá åññääöbá. ÁíññY÷iiôåé åññääëåßá oöií ÷ñPööc, êáé åbíäé aééêP oïo åööeÿíc ía aðiööaóßöåé ðùò èá oå ÷ñcöéiñiðPöåé.

Áðóþ ç öðeitíðþá áðáðéðáðíðáé óði üðe ði X áði ðððáññáýé ðùò ðñ Ýðáé íá àiðáññæiðóáé óð ðáñ Úðeñá óðóçí iðuúç, ðùò éa iðóðáééíçëiýí íá ði ðiðíðþéé, óð óðíðáðóíð ðeþeðóñú ðñ Ýðáé íá ÷ nçóeitíðiðéçëiýí áéá íá iðóðáééíçëiýí íá iðóðáý ðuú ðáññáéýñú (ð. ÷., Alt+Tab, óðóçí ðáñþðóðùóç ðuú Microsoft Windows), ðþò ðñ Ýðáé íá iðeÜæiði ie iðUññàð ðóðóðùóç óð áð Uðeá ðáñ Úðeñá, áí èá Ý-íði þü ÷ e ðeþeðóñá eððáðið ðUññ ðiðð. e.o.e.

Åðéðë Ýíí, óá äýí ðéí äçíïöéÞ tæíéëçñùí Ýíá ðåñéá Üëëííóá åññáóßáò, óíí **KDE** éáé óíí **GNOME**, Ý÷iøí óíí äéëü óíøò äéá÷åéñéóóÞ ðåññáèýñùí ðíø áßíáé áíóùíáðùí Ýííò iá óíí ðúðüéíéðí ðåñéá Üëëíí åññáóßáò.

óðiðeçñþiiðâð ìå ÷ áéñiðßíçöi ôñüði Ýíá áñ ÷ áßi ñðèìßóâùí, Üëëié áæáèÝðiði ñáñáöéêÜ ñáñáæâßá ãéá ôðò ðáñéóðüðâñâð ñðèìßóâð. ÕðÜñ ÷ áé áæüìá êé Ýíáð (**Sawfish**) ðið Ý ÷ áé áñ ÷ áßi ñðèìßóâùí ñáñáìÝí òå ìéá áéÜèåðò õðçò ãéþþðáð Lisp.

**ÐiðéóðéêÞ Áóðßáóçò:** ¶íéï Ýíá èÝíá ãéá òi ìðiþi áßíáé õðâýèoïò i ãéá ÷ áéñéóôÞò ðáñáèýñùí áßíáé ç “ðiðéóðéêÞ áóðßáóçò” ðið ðiðéóðéêiy. ÊÜèå óýóðçìá ðáñáèýñùí ÷ ñáéÜæâðáé êÜðiði ôñüði áðééiðÞò ðið ðáñáèýñið ðið ìá áÝ ÷ áðâðáé áððÜ ðið ðeçéðñiðiäýið áéé, ëáé ìá ðñÝðáé íá õáßíáðáé êÜðùò üðé áððü ðið ðáñÜèoñi áßíáé áíáñáü.

Ìßá ãíùóðÞ ðiðéóðéêÞ áóðßáóçò ëÝâáðáé “click-to-focus”. Áððü òi ìðiðÝëi ÷ ñçóéiðiðéâßóáé óðá Microsoft Windows, üðið Ýíá ðáñÜèoñi áßíáðáé áíáñáü áí ãð ÷ ðâß Ýíá ðÜðçìá õði ðiðééêiy.

Ói X ãáí õððiðóðçñßæðáé êáíßá óððiðâðñéiÝíç ðiðéóðéêÞ áóðßáóçò. Áíðßéâðá, i ãéá ÷ áéñéóôÞò ðáñáèýñùí áéÝ ÷ áé ðiði ðáñÜèoñi Ý ÷ áé áóðéáðâð áðë ëÜèå ðóéâiþ. Áéáöiñâðéêiþ ãéá ÷ áéñéóðÝò ðáñáèýñið õððiðóðçñßæðiði ãéáöiñâðéêÝò ìáðüäiðò áóðßáóçò. %éïé ðiðò õððiðóðçñßæðiði õði Ýëtäi click to focus, êáé ié ðáñéóðüðâñâð áðü ãððiýò õððiðóðçñßæðiði ëáé áñéâðÝò Üëëåò.

Íé ðéi äçìðéëâðò ïÝëtäi áóðßáóçò áßíáé:

#### focus-follows-mouse

Ói ðáñÜèoñi ðið ìáñßóâðáé êÜðù áðü òi ãðßéðô ðið ðiðéóðéêiy áßíáé òi ðáñÜèoñi ðið Ý ÷ áé ôçí áóðßáóç. Ói áíáñáü ðáñÜèoñi ãáí áßíáé áðáñáßôçöi íá áßíáé áððü ðið ìáñßóâðáé ðÜíù áðü üëá òá Üëëá. Ç áóðßáóç áééÜæâé ìå õði óðü ÷ áððç áíüò Üëëið ðáñáèýñið, ÷ùñßò íá áßíáé áðáñáßôçöi òi êééê ðÜíù ðið.

#### sloppy-focus

ÁððÞ c ðiðéóðéêÞ áßíáé iéá iéññþ ãðÝêðâðóç ðið focus-follows-mouse. Íå ôçí ðiðéóðéêÞ áóðßáóçò focus-follows-mouse, áí òi ðiðéðéâ ìñâðâð ðÜíù áðü òi áñ ÷ ééü (root) ðáñÜèoñi (Þ òi ðáñáóêþið) ãáí õðÜñ ÷ áé áóðßáóç óá êáÝíá ðáñÜèoñi, êáé üðé ðeçéðñiðiäýið áðëþò ÷ Üíâðáé. Íå ôç sloppy-focus, ç áóðßáóç áééÜæâé iüñi áí ãðßéðô ìáñâðâð ðÜíù áðü Ýíá iÝí ðáñÜèoñi, êáé ü ÷ üðáí õðýâð áðü òi ôñÝ ÷ ii ðáñÜèoñi.

#### click-to-focus

Ói áíáñáü ðáñÜèoñi áððéëÝâðâðáé ìå êééê ðið ðiðéóðéêiy. Ói ðáñÜèoñi ôüðâ “áíáóçéþiðâðáé”, êáé áìöáíßæâðáé ìðñiðóðÜ áðü üëá òá Üëëá ðáñÜèoñá. %éðé ðeçéðñiðiäýið áðëþò ÷ Üíâðáé. Íå ôç click-to-focus, ç áóðßáóç áééÜæâé iüñi áí ãðßéðô ìáñâðâð áððü áðü Ýíá iÝí ðáñÜèoñi, êáé ü ÷ üðáí õðýâð áðü òi ôñÝ ÷ ii ðáñÜèoñi.

Ðiðéið ãéá ÷ áéñéóðÝò ðáñáèýñùí õððiðóðçñßæðiði áðüìá ðéi áñðâðéëÝò ðiðéóðéêÝò áóðßáóçò, êáëþò êáé ðáñáéëâðáéÝò ôúí ðáñáðÜíù. Óðiâðiðéâðâð õði õððiðóðçñßæðiði õði ðáñáèýñùí ãéá ÷ áéñéóðÞò ðáñáèýñùí áéá ðáñéóðüðâñâð ëðððiðÝñâðéåò.

## 6.2.4 ÑáñééÜ Óðið ÷ áßá ÁéâðáöÞò (Widgets)

Ç ññiðÝâðéóç ðið X íá ãéáé Ýðâðé ñáñáæâßá êáé ü ÷ íá õððâññâðýâð òi õðñüði ÷ ñÞóçò ðiðò, ãéâðñýíâðáé êáé óðá ñáñáéëÜ óðið ÷ áßá ãéâðáöÞò (widgets) ðið õððiðâð õðçò ìðñiðc õði ðið ðáñáðÜíù ÷ áéñéóðâð ìå ëÜðið õðñüði: ðeÞêðñá, ðeÞóðéá áððéëiðÞò, ðeÞêðñá áíáéëâðÞò, áéëiðßæéá, ëßóðâð, êáé Üëëá. Óá Microsoft Windows óá ññiðÜæâði “controls (÷ áéñéóðÞñéá)”.

Ôá Microsoft Windows êáé ôi Mac OS ôçò Apple Ý÷iöi êáé ôá äýí ðiëý áðóôçñP ðiëéôéêP ãñáöéêpí óôïé÷åßùí äéåðåöPò. Ié ðñïäñáìiaôéooÝò åöáñiiäþí ðñÝðåé ððiôßèåðáé íá åíáóöäéßöiöi üöé ié åöáñiiäÝò öiöö èá Ý÷iöi êiéP áßöeçöç êáé åiöÜíéöç (look and feel). Óði X, äái èåùñPèçêá áðáñáßööi íá åßíáé åðéâüP åíüö öðåâéñeiÝñiö öðöö ãñáöéêpí, P íá ôåèíyí êÜðiéá ðöi÷ñåùöéÜ ãñáöééÜ óöié÷åßá äéåðåöPò.

Óáí áðiöÝéåöiá, içí ðäñeiÝíåôá ðéö åöáñiiäÝò æáé X íá Ý÷iöi êiéP åiöÜíéöç. ÕðÜñ÷iöi æÜöriñåò åçìöeéåßò öðöeëiÝò ãñáöéêpí óöié÷åßùí äéåðåöPò èáé ðáñáëéåäÝò öiöö, öðiðáñééåíåáñiÝíçò èáé ôçò áðeåíöéêPò Athena öðöeëiPò ãñáöéêpí ööié÷åßùí äéåðåöPò öiö MIT, **Motif®** (ðáñáëéåäP õçò iöiþbáð åßíáé èáé ç öðöeëiP ãñáöéêpí óöié÷åßùí äéåðåöPò ôùí Microsoft Windows, iå eñiÝò åùíßbáð èáé öñåéö åéåâáèiþbóåéö öiö ãñé), ôi **OpenLook**, èáé Üëéá.

Ié ðåñéóöüöåñåò iÝåò X åöáñiiäÝò óPìåñá ÷ñçöeëiöiéiyí iéá öðöeëiP ãñáöéêpí ööié÷åßùí äéåðåöPò iå iñiöÝñiá åiöÜíéöç, åßöö åi Qt, ðiö ÷ñçöeëiöiéåßööé åðü öi **KDE**, åßöö åi GTK+, ðiö ÷ñçöeëiöiéåßööé åðü öi **GNOME**. Áðü áðöP õçí Üðiøç, ððÜñ÷åé êÜðiéá öýâéëéöç ööçí åiöÜíéöç öiö UNIX desktop, öi iöiþbí iðñöäPðiöå êÜíåé ôá ðñÜäiáðå åöeëiüöåñå ãéá ðií iÝí ÷ñPööç.

## 6.3 ÅæåôÜóôáóç öiö X11

Ôi **Xorg** åßíáé ç ðñiåðééåäiÝíç öeiðiþçöç X11 æáé ôi FreeBSD. Ôi **Xorg** åßíáé iæéåêîéööPò × ôçò öeiðiþçöçò X Window System öiö X.Org Foundation, êáé åßíáé åííéêöiý êþäééá. Ié **Xorg** åßíáé åáóööiÝñiö ööiiéþäééá öiö **XFree86 4.4RC2** êáé öiö X11R6.6. C Yéäiöç öiö **Xorg** ðiö åéåðßèåðáé åðü öçí ÓðöeëiP ôùí Ports öiö FreeBSD åßíáé ç 7.5.1.

Åéá íá iåðåâæùöößöåôå êáé íá ååéåðåôöPöåôå öiö **Xorg** áðü öçí ÓðöeëiP ôùí Ports:

```
# cd /usr/ports/x11/xorg
# make install clean
```

**Óçìåßùóç:** Åéá íá iåðåâæùöößöåôå iëüêëçñi öiö **Xorg** óéäiöñåöèåßöö åüöé Ý÷åôå öi ëéåüöåñi 4 GB åéåýèåñi ÷ñPööç iå öi åñääéåßí pkg\_add(1). Áí ÷ñçöeëiöiéPöåôå öç åðíáöüöçöö åiöö pkg\_add(1) åéá eþøç iÝóù åééöyíö, åái èá ðñÝðåé ööçí åñäiìP åiöiëþí íá åþoåðå öií åñéèiü Yéäiöçö (version number) öiö ðáéÝöö. Ôi pkg\_add(1) èá “éåðååÜðåé” åðöüìåðå öçí öåéåðöåßá Yéäiöç öçò åöáñiiäPò.

Åéá íá åßíáé ç eþøç êáé ç ååéåðÜóðååóç öiö **Xorg**, áðëþò åéðåéÝóðå:

```
# pkg_add -r xorg
```

**Óçìåßùóç:** Ôá ðáñáðÜíù ðáñáäåßäiáðå èá ååéåðåôöPööi iëüêëçñi öçí åéáíiP X11 ðiö ðåñééåíåÜíåé åéåéíiéööYò, ðåéÜðåò, åñäiìåööåéñiÝò êëö. Åéåðßèåíðåé åðßööçò iå ÷ññéööÜ, öiçìåðééÜ ðáéÝóå êáé ports åéá öi X11.

Åéá íá ååéåðåôöPöåôå öçí åëÜ÷éóöç åöíáôP åéáíiP X11, iöiñåßöö åíáëéåéöééÜ íá ÷ñçöeëiöiéPöåôå öi port x11/xorg-minimal.

Ôi ððueiéði ðiði êåðåéáþið èá óáð áîçáÞóáé ðùò ñðèíþæåðóáé ði X11, éáé ðùò íá óðÞóðóáé Ýíá ðáññáðñéêü desktop ððanéáÜëëíí.

## 6.4 Nyéiéóç ôïõ X11

*ÓðiáéóöiñÜ öið Christopher Shumway.*

## 6.4.1 Đñéí îåêéíÞóåôå

Đñéí ôçí ñýèléóç ôïö X11 ÷ñåéÜæïïôáé ié áéüëïöèåò ðëçñïöñßåò ãéá ôï óýóôçìá:

- Đññääáññäö Ýò ôçò iëüíçò
  - Chipset ôçò êÜñôåò ãññäöééþí
  - Ííþíç ôçò êÜñôåò ãññäöééþí

Íé ðñíäéáñáö Ýò ôðó íëüíçò ÷ ñçöðéiiðíëíýíöáé áðú òí X11 áéá íá íñéðéåß ç áíÜëöðcs êáé i ñðètiùð ááíáÝùöçò óði iðiñsi  
éáëåðiññÞöåé. Íé ðñíäéáñáö Ýò áðôÝò áññöéiiðöáé óðiÞèùò óðicí ðâéïçñþùöç ðið oðíññååýåé òçí íëüíç P óðicí  
éððiøåéëßåá ðið éáðåðéåðåðP. xñáéÜæiñöáé ayí óåéññÝò áññéèþí, i íñéæüíöéið ñðètiùð ááíáÝùöçò êáé i  
éáðåðéüñðöið ñðètiùð ááíáÝùöçò.

Ôi chipset (ieieeëçñù Ýii êyéëùia) ôcò êÜñôåò ãñáöééþí iñßæåð ðiñßiò iäçäüò óôóéåðÞò èá ÷ñçóëiñðiëçèåß áðü ôi X11 ãéá ôçí åðééïéñùñßå íå ôçí êÜñôåò ãñáöééþí. Åéá ôá ðäññéóñüôåñá chipset, áôõü iðiññåß íá áíé-íåðèåß áôõüñláåá, áëëÜ åßñíáé ÷ñÞóëiñ íá ôi ãñùñßæåðå óá ðäññßðôúñc ðiñßiò áâí ðäñôý ÷åé c áôõüñláåç áíß-íåñõc.

Ç iñþíç ôçò êÜñôáó ãñáöéêþí êáeïñþæåé ôçí áíÜëöç êáé ôi âÜëìò ÷ñþìâöiò ôóï iðiñþí ìðiññåß íá ãiñöéÝøåé ôi óýóôçìá. Áðôóù áßíáé òçiaíöéêü þoôá íá ãiññþæåé í ÷ñþööçò ôá üñéá ôiô oóôôþìâöiò.

## 6.4.2 Nýèiéóç ôïõ X11

Ôí **Xorg** ÷ ñíçóéïïðíéåß ôí HAL ãéá ôçí áðööùïáôç áíß ÷ íåñóç ôíø ðëçéññïëäßïø êáé ôíø ðíïðéééíý. Ôá ports sysutils/hal êáé devel/dbus ååéàðbóáíôáé ùò åíâññóÞóåéò ôíø x11/xorg, áéëÜ eá ðñ Ýðåé íá åíâññïðíéçèíý íå ôéò áéüëïðíøåò ååññáðóÝò ôóï /etc/rc.conf:

```
hald_enable="YES"  
dbus_enable="YES"
```

Èá ðñÝðåé íá îâééíÞóåôå ôéò ðöçñåóßåò áôòÝò (åßôå ÷åéñïêßíçôá, åßôå êÜííîôå áðáíåêéßíçóç) ðñéí óóíå÷ßóåôå íå òç ñýèréóç Þ ôçí ÷ñPóc ôíø **Xorg**.

Ói Xorg iðináð ós - íU ía eáádotiðináðróáé - unþbð eáneðU áðeðde Ýír nývíeðos, að Uötirnóáð aðeþbð óðóð aðaúlP ásófieþbí:

% startx

Óå êÜðiéåò ðåñéðôþóåéò, ç áôöüìáôç ñýèiéóç iðiñâß íá íç ëåéóïõñäÞóåé óùóôÜ, P íá íç ñôëìßóåé ôéò óôóéåðÝò áéñéâþò üðòù åðééðiåþðå. Óóéò ðåñéðôþóåéò áôóÝð, eá ÷ ñâéáðóåß íá êÜíåðå ÷ áéñiiþícôåò ñôëìßóåéò.

**Óciàßùóć:** ÈÜðiéá ãñáöéê Ü ðåñéáÜëëíîá, üðùò ôi **GNO**ME ôi **KDE** þ ôi **Xfce**, äéáèÝôïóí åññáëåßá ðiô áðéôñdÝôïóí ôiô ÷ñÞóôć íá ñòèìßóâé ià áýëëí ñòüði áéÜòïñâò ðåñáiÝôñïôò ôçò ìëùíçò, üðùò ç áíÜëöóć. Áí ç ðñïäðééëåñíÝíc ñývëèéóć aäí åññáé áðíäåñôþ, êáé ôéïðåñåôâá íá åññéåñôâóðÞóñåôâá êÜðëíéí áðüñ áðôñÜ óá

ÐâñéâÜëéííóá, ïðïñâßôå íá óðíá ÷ ßóåôå íå ôçí åäêåôÜóôåóç ôïõ, êáé íá iëiêëçñþóåôå ôéò ñõèìßóåéò óáò ÷ ñçóéiïðíéþíôå ðiï êáôÜëëçei ãñáöééü åñâåéåßí.

Öi ðñþöi âÞiaå åßíáé ç äçíëiõñâßá åíüò áñ ÷ éëiý áñ ÷ åßiõ ñõèìßóåùí. Ùò root, áðëþò åêôåæÝóôå:

```
# Xorg -configure
```

Áôöü èá äçíëiõñâÞoåé Ýíá ðñüööði áñ ÷ åßi ñõèìßóåùí ðiõ X11 óôïí éåôÜëiäi /root ìå ði üññá xorg.conf.new (åßôå ÷ ñçóéiïðíéþóåôå ðiï su(1) åßôå óðfâåèåßôå åððöèåßåð, ç ïåðâåæçðþ êåðåëüäiõ \$HOME åëëÜæåé ååß ÷ ïíðåð ðiï êåðÜëiäi ôïõ root). Öi X11 èá ðñiôðåèþoåé íá áíé ÷ íåýóåé ðiï ððiöýóôçia åñáöééþí ôïõ óððôÞiaôiò êáé íá äçíëiõñâÞoåé Ýíá áñ ÷ åßi ñõèìßóåùí ðiõ èá öiñðþfâé ôïðò óùðöiýó ëäçäiýó óððêåðþí åéá ðiï ððiö áíé ÷ íåýèçéå óði óýðôçia óáð.

Öi åðüìåñí âÞiaå åßíáé i Ýëåñ ÷ iø ðùí ððÜñ ÷ iøðùí ñõèìßóåùí åéá íá åðéåååéþóåôå üüöé ðiï **Xorg** ååéöiõñâåß ìå ði ððiöýóôçia åñâöééþí ôïõ óððôÞiaôiò óáð. Ðëçêñiñëiäþóå:

```
# Xorg -config xorg.conf.new -retro
```

ÅÜí åìöáíéóôåß Ýíá iáýñí êáé åêñé ðëÝäiá êáé Ýíáð ååßéôçò ðiiöéééiy ìå iññöP X, ç ñyéiéóç Pôáí åðéôô ÷ Pð. Åéá íá ðâñìåôßóåôå ôç äiêéiP, iåðååååßôå óðçí åééiééP eiiöüéå åðü ôçí iðiñá ôçí iåééiÞoåå, ðëÝæiiöåò **Ctrl+Alt+Fn (F1)** åéá ôçí ðñþöç åééiééP eiiöüéå) êáé ðëÝóôå **Ctrl+C**.

**Óçìåßùóç:** ïðïñâßôå åðßóçò íá ÷ ñçóéiïðíéþóåôå ôïí óðiäðååòiù ðëþêöñùí **Ctrl+Alt+Backspace** åéá ðiï ðâñìåôééóòiù ôïõ ðññiññÜiñåòiò. Åéá íá ôïí áíâñäiðíéþóåôå, äþóåå ôçí ðâñâéÜòù åiòiþ òå êÜðiéi ôâñìåôééü ôïõ X:

```
% setxkbmap -option terminate:ctrl_alt_bksp
```

ÁíáëéåéééÜ, äçíëiõñâÞoåå Ýíá áñ ÷ åßi ñõèìßóåùí ðëçêöñiëiäßiõ åéá ôï **hald** ìå ôçí iññáóßá x11-input.fdi êáé áðièçéåýóôå ôï ðiï ðéåðÜëiäi /usr/local/etc/hal/fdi/policy. Öi áñ ÷ åßi áðöü èá ðñÝðåé íá ðâñéÝ ÷ åé óéò ðâñâéÜòù åñâiñÝò:

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<deviceinfo version="0.2">
  <device>
    <match key="info.capabilities" contains="input.keyboard">
      <merge key="input.x11_options.XkbOptions" type="string">terminate:ctrl_alt_bksp</merge>
    </match>
  </device>
</deviceinfo>
```

Èá ÷ ñâåååôåß íá åðáíååééíþóåôå ðiï iç ÷ Üíçíá óáò åéá íá åíâíååéÜóåôå ðiï **hald** íá åéååÜóåé áðöü ôï áñ ÷ åßi.

Èá ðñÝðåé åðßóçò íá ðññiøéÝóåôå ôçí ðâñâéÜòù åñâiñþ óði ôñ ÷ åßi xorg.conf.new, óðçí åíüôçôå ServerLayout þ ServerFlags:

```
Option "DontZap" "off"
```

Áí ði ðiiðßéé ååí ååéöiõñâåß, èá ÷ ñâåååôåß íá ôï ñõèìßóåôå ðñéí óðfâ ÷ ßóåôå. Ååßôå ðiï ÔiÞia 2.10.10 óði êåöÜëáéi åäêåôÜóåôå ðiõ FreeBSD. Åðéðñüóèåôå, óðeo ðññööåôå ãåëüöåéò ôïõ **Xorg**, ié åíüôçôå InputDevice óði xorg.conf åâññýíðåé êåèþò åßíåôåé ÷ ñÞóç ðùí óðóêåðþí ðiõ áíé ÷ íåýèçéåí áðöüìåôå. Åéá íá åðáíååÝñâåå ôçí

ÞáééÜ óõiðâñéöñÜ, ðñiöèÝóôå ôçí ÞáñáéÜôù ãñáñìP óôçí áíüôçôá ServerLayout P ServerFlags ôiõ áñ÷åßiõ ñõèißóåùí:

```
Option "AutoAddDevices" "false"
```

Èá iðiñâßôá Ýðåéôá ñõèißóåôå ñéò óôôéåôÝò áéóüäiõ üðùò ôôéò ðñiçäiýláiåò áéäüôåéò ôiõ **Xorg**, ÷ñçóéiiðiéþíôå êáé üðieåò Üëëåò áðeeiãÝò ÷ñâéÜæåôôå (ð.÷. áíáéëääP ðeçêñiëiäßiõ).

**Óciàßùóç:** ¼ðùò áíçäPóáìá êáé ðñiçäiõiÝùò, í ááßiíráò **hald** áíáéáìáÜíåé íá áíé÷íåýóåé áôôüìáôå ôiõ ðeçêôñiëüäéí óáò. ÕðÜñ÷åé ðâññéðôôúòç íá íçí áßíláé óùôôP áíß÷íåôóç ôiõ iíiôÝëiõ P ôçò áéÜôáïçò, úôôüöí êÜðíéá ãñáééÜ ðâñéáÜëëiíðá üðùò ôi **GNOME** ôi **KDE** éáé ôi **Xfce** ðâñY÷iõ ðâ ãééÜ ðiõò áññáéåßá ëáé ôç ñýéiéóç ôiõ. ïðiñâßôá üiùò íá ñõèißóåôå ôéò áééüôçôåò ôiõ ðeçêôñiëiäßiõ êáé áðâðééåßáò, áßôå iÝóù ôiõ áíçèçóééiy ðñiññÜíìáôiõ setxkbmap(1) áßôå íá ôçí ðñiøèþêç áíüò éáíüíá ôiõ **hald**.

Áéá ðâñÜäåéäìá, áí êÜðíéò èÝëåé íá ÷ñçóéiðiéþóåé Ýíá ðeçêôñiëüäéí 102 ðeþêôñùí íå ááéééêP áéÜôáïç, èá ðñYðåé íá áçìéiññPóåé Ýíá áñ÷åßí ñõèißóåùí áéá ôi **hald** íå ôi ûíiñá x11-input.fdi êáé íá ôi áðièçéåýóåé ôôíi êáôÜëiäi /usr/local/etc/hal/fdi/policy. Òi áñ÷åßí áôôü èá ðâñéY÷åé ôéò ðâñáéÜôù ãñáñìYò:

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<deviceinfo version="0.2">
  <device>
    <match key="info.capabilities" contains="input.keyboard">
      <merge key="input.x11_options.XkbModel" type="string">pc102</merge>
      <merge key="input.x11_options.XkbLayout" type="string">fr</merge>
    </match>
  </device>
</deviceinfo>
```

Áí ôi áñ÷åßí áôôü ððÜñ÷åé Päç, áðéþò áíðéáñÜðôå ôéò ðâñáðÜíù ãñáñìYò iÝóá óôi ððÜñ÷ií ðâñéå÷üiâí.

Èá ðñYðåé íá áðáíâééíþóåôå ôi íç÷Üíçíá óáò áéá íá áíáíáâéÜóåôå ôi **hald** íá áéáâÜóåé ôi áñ÷åßí.

ïðiñâßôå áðßóçò íá êÜíâôå ôçí ßäéá ñýéiéóç iÝóá áðü Ýíá ôâññâôéü ôôá × P áéüìá êáé áðü Ýíá script, áâôâéþíôå ôçí ðâñáéÜôù áíôiþ:

```
% setxkbmap -model pc102 -layout fr
```

```
ïðiñâßôå íá áññâßôå ôéò áéáèÝóéìåò áðeeiãÝò ðeçêôñiëiäßiõ êáé áéáôÜíâùí óôi áñ÷åßí
/usr/local/share/X11/xkb/rules/base.lst.
```

Þâéóá, ðñiöáññüôå ôi áñ÷åßí ñõèißóåùí xorg.conf.new óôéò ðñiöéíþóåéò óáò. Áññâßôå ôi íå áíáíóðÜéôç êâéiÝíiõ üðùò i emacs(1) P i ee(1). Ðñþôá, ðñiöèÝóôå ôéò óô÷íüôçôåò ôçò iëüíçò. Óðíþèùò áíáöÝñiíôåé ùò ìñéæüíôééé áéá êâôâéüññööíé ñõèiñß óôä÷ññéóíiy. ÁôôÝò ié ôéiÝò ôiðièåöýíôåé ôiõ áñ÷åßí xorg.conf.new óôi Section "Monitor":

```
Section "Monitor"
  Identifier      "Monitor0"
  VendorName     "Monitor Vendor"
  ModelName      "Monitor Model"
  HorizSync      30-107
  VertRefresh    48-120
EndSection
```

Ié iâôåâéêçò Ýò HorizSync éáé VertRefresh lðïñâb íá lçí ðôÜñ ÷ iöí ôóí áñ ÷ âßí ñðèlßóâú. Áí áâí ðôÜñ ÷ iöí, ðñ Ýðâé íá ðññôðâëiyí, lâ ôíí óùôóü ïñéæüíôéí ñðèìü ôóä ÷ ñiiéóïý iâðoÜ ôçí ëÝíç HorizSync éáé ôíí êâðâéûññööí ñðèìü ôóä ÷ ñiiéóïý iâðoÜ ôçí ëÝíç VertRefresh. Óôí ðáñâðÜñ ðáñÜââéâíá, ñðñøéÝóâíå ðiðoð áíðôðôöíé ÷ iðoð ñðèìüýð áâííÝùóçò ôçò iëüíçò iâð.

Option "DPMS"

**1/4** ÓÍ ÓÍ ÁÍ : ÁÍ ÓÍ ÑÓÉÍßÓÁÚÍ XORG .CONF .NEW ÁÍßÍÁÉ ÁÉÚÍÁ ÁÍßÍÉÓÓ ÓÁ YÍÁÍ ÓÓÓÍÜÉÓÓ ÉÁÉÍYÍÍÓ, ÁÓDEÉYÍÓÁ ÓCÍ ÁÍÜÉÓÓC ÉÁÉ  
ÓÍ ÁÍÜÉÍÓ : ÑÓÙÍÜÓÙÍ ÓÓÍ ÁÓDEÉÓÍÁßÓÁ. ÁÓÓÙÍ ÉÁÉÍßÍXÁßÓÁÓ ÓÓÍ SECTION "SCREEN";

```

Section "Screen"
    Identifier "Screen0"
    Device      "Card0"
    Monitor     "Monitor0"
    DefaultDepth 24
    SubSection "Display"
        Viewport  0 0
        Depth     24
        Modes     "1024x768@60"
    EndSubSection
EndSection

```

C iāoāáéçöP DefaultDepth iñBæåé öi ðñiäådëéåäåÍ ii âÜeïo ÷ñþiáòiò ðöi èå ÷ñçóéiiðiéçèåß. Iðinåßbôå íå ôçí ðåñåéÜiøåôå iå öií åéåéüööç -depth ööç åññiP åiöiøþi öiõ Xorg(1). C ådëéiäP Modes iñBæåé öçí áiÜeööç iå öçí iðiñBå èå èåéöiöñääß c iëüiç óå Ýiá óññååññéiÍ ii âÜeïo ÷ñùÜðùí. ÐñiöÝiòå üöé ðöiööçññBæiñöåé iüñi èåññééÝò èådååöÜöåéò VESA, uñðò iñBæüñöåé áðü öi ðöiööýööçå åññööééþi öiõ óðóööÞiáòiò. Óöi ðáññåðÜiù ðáññÜååññiá, öi èåéiññéiÍ ii âÜeïo ÷ñùÜðùí åßíåé åééiøéöÝóåññá bits áiÜ pixel. Óå áðöü öi âÜeïo ÷ñùÜðùí, ç áðiñååéöP áiÜeööç åßíåé 1024×768 pixels.

ÓÝëìò, áðièçéåýóôå òi áñ÷åßí ñöèìßóåùí êáé åéÝâîôå òi iå ôçí iÝëiäi åéÝã÷iö ðiö åîçãÞóåíå ðáñáðÜù.

**Óciàßùóç:** já áðü óá åññääëåßá ðïö lðiññåß íá óáo àïçèÞóïõí éåðóÜ óçí äéáäééåóßá åðßëööçò ðññâæçìÜôùí, åßíáé óá áñ÷åßá X11 log, ðïö ðåñéÝ÷íöi ðëçñïöiñßåò åéá êÜèå óôóñéåðþ ðïö åðééïéíùíåß íà oíí åéäéñééöþ X11. Óá áñ÷åßá **Xorg** log íññÜæñíöåé íà óçí íññöþ /var/log/Xorg.0.log. Õi åéñéåÝò üññíá áíüò log lðiññåß íá åßíáé Xorg.0.log Ýùò Xorg.8.log êáé ðÜåé eÝäíñöåò.

Áí üéá áßíáé êáëÜ, ôí áñ÷åßí ñöëìßóåùí ðñ Ýðåé íá ôíðìèåôçèåß óå leá eïéP ôíðìèåóßá þóôå íá áíðü ðßæåôáé áðü ôí Xorg(1). ÁôðòP oóíP èùò áßíáé c /etc/X11/xorg.conf P /usr/local/etc/X11/xorg.conf.

```
# cp xorg.conf.new /etc/X11/xorg.conf
```

Căcăeașcăbă hîyéieșco oīo X11. Y ÷ aē ôpnă ieiieșcăpăbă. Oī **Xorg** iedînăbădă iā oī iâieșî Pôdăbă iā oī aīcăçdăeū dñpăpădă startx(1). Iăcăeașcăbădă X11 iedînăbădăbăcădă iā aăeșcă Pôdăbă iā oī aīcăeașcădă oīo xdm(1).

### 6.4.3 ÅîåéäéêåõìÝíá ÈÝìáôá Ñõèìßóåùí

#### **6.4.3.1 Ñõèìßóåéò ãéá ôá Intel® i810 Graphics Chipsets**

Æá íá ÷ ñçóéiiðiéÞróåôå ÆÜñôå áâóéóíÝíç óôá Intel i810 integrated chipsets, áðáéôåßôáé ôï agpgart, ç äéåðåöP ðñïäññáiìåôéóïý ôúí X11 æá ôï AGP. Äåßôå ôçí óåëßää manual ôïo ðñïäñÜìåôïò iäPäçóçò agp(4) æá ðåñéóóüôåñåò ðëçñïöinßåò.

#### **6.4.3.2 ĐñióèÝôïôáò ìéá Widescreen Åðßðåäç ïëüíç**

Áôõü õi ôíPíá ðñiñûðiè Ýôåé iåñéê Ýò áíþóåéô åíâæäéåòi Ýíuí ñôèìßóåùí. Áí ié ðñiñöðÜéåéåò iå ôá óoíPèç åññääéåßá ñôèìßóåùí åái êåôåéÞíiðí óá iéá ñýèlèóç ðiòi íá åéåöîññåß, ððÜñ ðiòi ãñéåôÝò ðëçññiøñßåò óóå áñ÷åßá log ðiòi ïðññiyí íá óáo åïcëÞóiòi. Ùóóüöi, åßíiaé áðåññåßöçôç ç ÷ñPóç åíüö oóóîðÜéôç êåéi Ýññ.

Íé ônÝ ÷ iõoåò áíáëýóåéò widescreen (WSXGA, WSXGA+, WUXGA, WXGA, WXGA+, ê.á.) ôõiõôçñßæïí formats êáé aspect ratios (áíáëíãßåò) 16:10 êáé 16:9 ðiõ iðiñåß íá äçíëiõñäÞóïí ðñiâëÞlåóá. Ðáñääåßáiåóá iåñééþí êíéþí áíáëýóåúí ãéá áíáëíãßá 16:10 åßíáé óá:

- 2560x1600
  - 1920x1200
  - 1680x1050
  - 1440x900
  - 1280x800

ÊÜðiéá óóéáìP, ç ñýèiéóç èá ãßíåôáé ðïëý áðëÜ ðññiøé Ýôïïôáò ôçí áíÜëöóç ùò Ýá ðéëáíü Mode óôï Section "Screen" üðùò åäþ:

```
Section "Screen"
Identifier "Screen0"
Device      "Card0"
Monitor     "Monitor0"
DefaultDepth 24
SubSection "Display"
    Viewport   0 0
    Depth      24
    Modes      "1680x1050"
EndSubSection
EndSection
```

Ôi **Xorg** áßíáé áñêåôÜ Ýíôðíí þóôá íá áíáêôÞóåé ôéó ðëçñïöiñßåò ôçò áíÜëöôçò ôçò widescreen ièüíçò ìÝóù ôúí ðëçñïöiñéþí I2C/DDC, áíùñßæiñôáò Ýôóé ôé ìðiñâß íá ÷åéñéôôåß ç ièüíç üöí áöiñÜ ôéò óô : íüôçåò êáé ôéò áíáëñóåé.

Áí áôôÝð íé ModeLines äáí ðôÜñ ÷ iðí óôïòð íäçäïýð, iðiñâð íá ÷ ñâéâðôåð íá óéð áþðâðâð áðâðßò óði Xorg. ×ñçóëiiðiéþíð òi /var/log/Xorg.0.log iðiñâðòð íá áíáêðÞóâðâð áñéâðÝð ðëçñiöiñßâð þóðâð íá äçíëññâðÞóâðâð iùñíé óâð Áýá ModeLine ðið íá éâðóññâð. Áðéþò áíáæçðÞóâð ðëçñiöiñßâð ðið ðá èá iiëÜæið íá áðóðü:

```
(II) MGA(0): Supported additional Video Mode:  
(II) MGA(0): clock: 146.2 MHz Image Size: 433 x 271 mm  
(II) MGA(0): h_active: 1680 h_sync: 1784 h_sync_end 1960 h_blank_end 2240 h_border: 0  
(II) MGA(0): v_active: 1050 v_sync: 1053 v_sync_end 1059 v_blinking: 1089 v_border: 0  
(II) MGA(0): Ranges: V min: 48 V max: 85 Hz, H min: 30 H max: 94 kHz, PixClock max 170 MHz
```

ÁôôÝò iññÜæññôáé ðëçññiñññbåò EDID. Ç äçíëññâå åññò ModeLine áðü áôôÝò, åññååáé åÜæññôáò áðëþò öiññò áññéèñýò óôç óùóôþ óåéñÜ:

ModeLine <name> <clock> <4 horiz. timings> <4 vert. timings>

ÖåëééÜ, öï ModeLine óï Section "Monitor" óï ðáñÜääéäíá ïáò èá iiéÜæåé ïå áôöü:

```
Section "Monitor"
Identifier      "Monitor1"
VendorName     "Bigname"
ModelName       "BestModel"
ModeLine        "1680x1050" 146.2 1680 1784 1960 2240 1050 1053 1059 1089
Option          "DPMS"
EndSection
```

## 6.5 ×ñþóć Āñáìáôïóåéñþí óôï X11

*ÓõíåéóöiñÜ ôiõ Murray Stokely.*

#### 6.5.1 ÑáììáöíóåéñÝò ôýðïõ Type1

Íe ðññiææññeoí Ý fåo ãññiæðiøåéñ Ý ò ðiø oðññiðåýiøi òi X11 ãáí åßíæé éääíéé Ý ò ãéá åöññiðå Ý ò åðéññåð Ý æéåò ððñiðññåðbåó. Íe iåå Üëåò ãññiæðiøåéñ Ý ò ðññiðøßåóçò öabññiðåé iññiøñùò Ý ò êáé åññåðéå ÷ iéé Ý ò, êáé ié iéññ Ý ò ãññiæðiøåéñ Ý ò óoi Netscape åßíæé ð ÷ äüüí åéåð Üëçððåò. Åðôò ÷ þò üñùò, ððñÜñ ÷ iøi åéæå Ýøéiåò åññåðó Ý ò, ðþçëÞò ðiéññüðçåó ãññiæðiøåéñ Ý ò Type1 (PostScript®) ðiø iðññiýí íá ÷ ñçóðñiðiéçeyí Üñåðå áðü òi X11. Åéá ðáññÜññéiñ, ç ðóëëiäÞ ãññiæðiøåéñþí URW (x11-fonts/urwffonts) ðåñéÝ ÷ åé åéüüñðåéò ðþçëÞò ðiéññüðçåó òuì oðíçèéòi Ýñúí type1 ãññiæðiøåéñþí (Times Roman®, Helvetica®, Palatino® ééé Üëéåò). Ç ðóëëiäÞ Freefonts (x11-fonts/freefonts) ðåñéÝ ÷ åé ðiøéÝ ò ðåñéñðóðåññò ãññiæðiøåéñ Ý ò, åééÜ ié ðåñéñðóðåññò áðü áðó Ý ò åßíæé åéá ëiæéññéü ãññåðéþí tiðñùò òi Gimp, êáé ãáí åßíæé åéó Üëëçëåò åéá ãññiæðiøåéñ Ý ò iëññiçò. Åéüñç, òi X11 iðññåß iá åé Ü ÷ éññi ëüði íá ññðéññóðåß þóðå íá ÷ ñçóðñiðiéåß TrueType ãññiæðiøåéñ Ý ò. Åéá ðåñéñðóðåññò èåððññ Ýñåðéåò, ååßøðå ðçí ðåëëßåá manual X(7) þ òi ðiøíà õ ÷ åðéññéÜ iá ðéó ãññiæðiøåéñ Ý ò TrueType.

Æá íá áâæáðóóðÞróðô ðéð ðáñáðÜù óðëëíäÝð áñâñáðíóâéñþí Type1 áðü ðçí ÓðëëíäÞ ôùí Ports, áêôâëÝóôå ðéð ðáñáéÜðû áíðÿÝð:

```
# cd /usr/ports/x11-fonts/urwfonts  
# make install clean
```

Í lá Óðaúviiði ónúði lðriññáþóða íá áðæáðaóð Þróðaóð eáé ócí freefont þ Üeëðað oððeëðaÝð. Áeá íá áíé ÷ íáýðaóð i X server áðð Yð oððeð aðnáðiáðiðaéñ Yð, ðmíioð Yðóða ócí eáð Üeëðcëç aðnáðiþ oðið aðn ÷ aðbíði nððeïþóðaúñi ðið (/etc/X11/xorg.conf):

```
FontPath "/usr/local/lib/X11/fonts/URW/"
```

ÅíáëëáêôéêÜ, åêôåëÝóôå óôçí ãñáììP åíôïëþí ìéáò óóíüäïõ X:

```
% xset fp+ /usr/local/lib/X11/fonts/URW  
% xset fp rehash
```

Áðóðú éá ëáéðíññáÞðóáé, áééÜ üðóáð áðññáðþóáé ç óýññäiò X, íé ñððéiñþóáéð èá ÷ áèiýí, áðóðùò áí ðññíðóåðéiýí ðóði áñ ÷ áðßi áðéðíçóçò (ði ~/.xinitrc æáá ìßá óðíçëéðiÝíç óýññäi ïÝóù startx, ç òi ~/.xsession áí óðóðáÝåóðå ïÝóù áñiùò áññáðééiý æá ÷ áéñéðóÞ óýññáðçò üððùò i **XDM**). ÿáð áéüìç ôññüðiò áßíáé íá ÷ ñçóðiéðiéÞðóåðå ði áñ ÷ áðßi /usr/local/etc/fonts/local.conf: áðßóå ði ðiÞia anti-aliasing (áññÜëðiðcò).

### 6.5.2 ÑñáìáôïóåéñÝò TrueType®

Ôi Xorg Ý ÷ áé áíóùláóùÍyíc ððiööþñéïc áðåéëüéöçò áññáìáöiöåéñþí TrueType. ÕðÜñ ÷ iðí áýí áéáöiññåöéêÜ modules (áñèñþíàöá) ðið iðññíyí íá áíññáìðiÞóiðí ãöðbí ðçí éåéöiöññáßá. Óá áðöü ðið ðáñ Üäåéäìá ÷ ñçöéiðiÞéåbóá ðií freetype module áðåéäþ áßíáé ðei õoíññáÜóéii íà óá Üééá back-ends áðåéëüéöçò áññáìáöiöåéñþí. Áéá íá áíññáìðiÞóåâ ðií freetype module, áðëþö ðññiöYóôå ðçí ðáññáéÜôü áññáìþ ööí ðiðiá "Module" ðið áñ ÷ áßið /etc/X11/xorg.conf.

Load "freetype"

Ôþñá, äçíëiõñäÞóôå Ýíáí êáôÜëiäi áéá ôeo ãñáïlåöiöåéñ Ýò TrueType (ãéá ðánÜääéäiá,  
`/usr/local/lib/X11/fonts/TrueType`) êáé áíôéäñÜøôå üëåô ôeo ãñáïlåöiöåéñ Ýò TrueType óå áðôüí.  
 ÐññiöÝîôå üöé íe ãñáïlåöiöåéñ Ýò TrueType áái iðñiýí íå åßíáé áðü Ýíá óýööçìå Macintosh ðñÝðåé íå åßíáé óå iiñöÞ  
 UNIX/MS-DOS/Windows áéá íå èåéöiõñäiýí óöi X11. Íüééo áíôéäñöiýí óå áñ÷åßá óöií êáôÜëiäi, ÷ñçöciíðiëÞóôå  
 óií **ttmkfdir** áéá íå äçíëiõñäÞóåôå óií áñ÷åßí `fonts.dir`, þóôå i X font renderer íå åíùñßæåé ôçí ýðáññíç ôúí íÝúí  
 áðöþí áñ÷åßúí. Óií `ttmkfdir` áéáôßèåöåé áðü ôçí ÓðëëiäP ôúí Ports óií FreeBSD ùò `x11-fonts/ttmkfdir`.

```
# cd /usr/local/lib/X11/fonts/TrueType  
# ttmkfdir -o fonts.dir
```

Óþñá, ðñoóé Ýóôå òíí êáó Üëíäi TrueType óóç äéáäñiP ôúí fonts. Áðóöü áßíåôáé íà òíí ßæéi ôñüði ðið ðåñéñü Üøâiå ðáñáðÜùó óóéó Type1 áñáíáôíóåéñ Ýò, ÷ñcöéiiðíéþíóå òíí

```
% xset fp+ /usr/local/lib/X11/fonts/TrueType  
% xset fp rehash
```

þ áðeðÜ ðññóéÝ óôå ìéá ãññáìíP FontPath óõi áñ÷åßí xorg.conf.

### 6.5.3 Anti-Aliased ÄñáìäôïóåéñÝò

Áíáíåþèçêå áðü ðíí Joe Marcus Clarke.

¼ëåò ie äñáìäôïóåéñÝò X11 ðiõ âñßóéïíôåé óóï /usr/local/lib/X11/fonts/ êáé ôï ~/.fonts/ åßíáé áðôüìäôååééåéÝò ðiõ ðiñéïðiéÞóôå, áí þäç ððÜñ ÷åé) ði ãñ ÷åßí /usr/local/etc/fonts/local.conf. IÝóù áðôïý ôïõ ãñ ÷åßí ðiñíïý íá ñõèïéóïýí áñéåôÜ åíåéäééåòí Ýíá ÷åñåéôçñéóôééÜ ôïõ óõóôÞìåòí ãñáìäôïóåéñþí Xft. Áðôü ði ðíÞíá ðåñéäñÜöåé ïüñ iàñééåÝò áðëÝò äñíåôüçôåò. Äéá ðåñéóöüôåñåò ëåðòñÝñåéåò, ååßôå ôï fonts-conf(5).

Ôi áñ ÷åßí áðôü ðñÝðåé íá åßíáé iññöÞò XML. Äþóôå iàñÜëç ðñïóï÷Þ óóå ðåæÜ / êåöåéåßá, êáé óéäïñåðôèåßôå üöé üéå ôá tags Ý÷iõí êëåßôåé óùóôÜ. Ôi áñ ÷åßí iàñééíÜ ià õçí óõíçèéóí Ýíç áðééåöåëßää XML êáé Ýíá iñéóïü DOCTYPE, êáé Ýðåéóå áéïëïðeåß ôï <fontconfig> tag:

```
<?xml version="1.0"?>
<!DOCTYPE fontconfig SYSTEM "fonts.dtd">
<fontconfig>
```

¼ðùò åßðåíå ðñïçäïðiÝñò, üéåò ie äñáìäôïóåéñÝò óóï /usr/local/lib/X11/fonts/ üðùò êáé óóï ~/.fonts/ äéåòßéååóåé Þäç óá Xft-aware åòáññäÝò. Áí èÝéååå íá ðñïóëÝóååå éáé Üëëïò ëåôåëüäïò ãéôüò áðü áðôïýò ðiõ ãýí, ðñïóëÝóååå iéá äñáìíÞ ðåññüííéå iå áðôÞ ðiõ áéïëïðeåß óóï /usr/local/etc/fonts/local.conf:

```
<dir>/path/to/my/fonts</dir>
```

Áöiy ðñïóëÝóååå íÝåò äñáìäôïóåéñÝò, êáé áéäééüôåñå íÝiõò êåôåëüäïò ãñáìäôïóåéñþí, ðñÝðåé íá åéôåéÝóååå õçí áéüëïðeç áíóïëÞ áéá íá áíáäçïðñÞóååå õçí cache äñáìäôïóåéñþí:

```
# fc-cache -f
```

Ôi anti-aliasing êÜíåé ôá Üêñå åéäöñþò óóäéå ÷oiÝíá, êÜííîôåó Ýóóé ôá ðiëý ieñÜ ãñÜìäôå ðér áíáäíþóéíå, êáé áðéñåß ôéò “ëëßíåéåò” (óéáëïðÜóéå) áðü ôá iàñÜëå åñÜìäôå, aëëÜ iðiñåß íá ðñïéåëÝóåé åñ ÷ëÞóåéò óóå iÜóéå áí ÷ñçóëïðéçèåß óá êáñíééÜ iàñÝèç. Äéá íá åíåéñÝóååå áðü ôï anti-aliasing iàñÝèç äñáìäôïóåéñþí ieñüôåñå áðü 14 point, ðñïóëÝóååå áðôÝò ôéò äñáìíÝò:

```
<match target="font">
    <test name="size" compare="less">
        <double>14</double>
    </test>
    <edit name="antialias" mode="assign">
        <bool>false</bool>
    </edit>
</match>
<match target="font">
    <test name="pixelsize" compare="less" qual="any">
        <double>14</double>
    </test>
    <edit mode="assign" name="antialias">
        <bool>false</bool>
    </edit>
</match>
```

Ôí spacing (äéáóôÞìáôá) óå ìåñéé Ýò monospaced áñáìáôïóåéñ Ýò iðiñåß áðßóçò íá áßíáé áêáôÜëéçëi üôáí ÷ñçóéiiðieåßôáé anti-aliasing. Áôöü öáßíáôáé íá áðiôåéåß éæéåßôåñï ðñüâëçìá ìå ôí **KDE**. Íéá äéüñèùóç áéá áôöü, áßíáé íá áðéåÜëéåôá óôí spacing ôçí ôéíÞ 100 áéá áôö Ýò ôéó áñáìáôïóåéñ Ýò. ÐñïóëÝóôå ôéó áéüëiðeåô áñáìí Ýò:

```
<match target="pattern" name="family">
    <test qual="any" name="family">
        <string>fixed</string>
    </test>
    <edit name="family" mode="assign">
        <string>mono</string>
    </edit>
</match>
<match target="pattern" name="family">
    <test qual="any" name="family">
        <string>console</string>
    </test>
    <edit name="family" mode="assign">
        <string>mono</string>
    </edit>
</match>
```

(áôöü ìåôïñiÜæåé óá Üëéá êiéíÜ iiüìáôá ôùí fixed áñáìáôïóåéñþí ùò "mono"), êáé Ýðåéôá ðñïóëÝóôå:

```
<match target="pattern" name="family">
    <test qual="any" name="family">
        <string>mono</string>
    </test>
    <edit name="spacing" mode="assign">
        <int>100</int>
    </edit>
</match>
```

Óõâéåññéí Ýíåò áñáìáôïóåéñ Ýò, üðùò ié Helvetica, iðiñåß íá áòöáíßæïöí ðñüâëçìá üôáí áßíáé anti-aliased. Ôí ðñüâëçìá õð÷iÜ áâäçéþíåôáé ùò ìßá áñáìáôïóåéñÜ êñìÝíç êÜéåôá óôçí ìÝóç. Óôçí ÷âéñüôåñç ðâñßðôùóç, iðiñåß íá êÜíåé êÜðieåô áöáññäÝò íá êáôáññåýöiöí. Áéá íá ôí áðïöýååôá áôöü, iðiñåßôå íá ðñïóëÝóôå ôí áéüëiðeï óôí local.conf:

```
<match target="pattern" name="family">
    <test qual="any" name="family">
        <string>Helvetica</string>
    </test>
    <edit name="family" mode="assign">
        <string>sans-serif</string>
    </edit>
</match>
```

Íüëéò ôåéåéþóåôå ôçí ìåôáôñiðÞ ôið local.conf óéäññåôèåßôå üôé êéåßóåôå ôí áñ÷åßí ìå ôí </fontconfig> tag. Áí åái ôí êÜíåôå, ié áæéååÝò óåð èá áâñçéiýí.

ÓÝeeò, ié ÷ñÞóôåò iðiññýí íá ðñïóëÝöiôí ôéò áéé Ýò ôið ñðëìßóåéò ìÝóù ôùí ðñïóùðééþí ôiðò áñ÷åßùí .fonts.conf. Áéá íá áßíáé áôöü, êÜéå ÷ñÞóôçò ðñÝðåé áðëþò íá áçléiññÞóåé Ýíá ~/fonts.conf. Áôöü ôí áñ÷åßí ðñÝðåé íá áßíáé áðßóçò XML iiñöÞò.

ÊÜðé ôåéåôåßí: óå ìßá LCD ièüíç, iðiñåß íá áßíáé áðééðiçöüò i áâéåìáôéöiüò sub-pixel. Í áâéåìáôéöiüò ÷âéñßæåôåé ÷ùñéóôÜ óå (iñéæüíóéá áéá ÷ùñéóíÝíá) êüêééíá, ðñÜóéíá êáé iðëå ôöié ÷åßá þóôå íá áâéôéþóåé ôçí iñéæüíðéá

áíÜëööç. Ôá áðiøåëÝóìáðá íðiñåß íá åßíáé äñâiáðééÜ êáëýôåñá. Äéá íá ôií åíåñäiðiéÞóåðå, ðñiöèÝóðå ôçí ðáñáêÜôù äñâiùP êÜðiö ööï áñ÷åßi local.conf:

```
<match target="font">
  <test qual="all" name="rgba">
    <const>unknown</const>
  </test>
  <edit name="rgba" mode="assign">
    <const>rgb</const>
  </edit>
</match>
```

**Óçìåßùóç:** ÁíÜëïää iå ôií öyöï öçò iëüíçò, öií rgb íðiñåß íá ÷ñåéáóôåß íá áëëÜîåé óå bgr, vrgb P vbgr: ðåéñâiáðéóôåßôå êáé ååßôå ðiñi äåéôïññååß éáëýôåñá.

## 6.6 Í X Display Manager

ÓoíâéóöiñÜ öiö Seth Kingsley.

### 6.6.1 ÅéóáäùäP

Í X Display Manager (**XDM**) åßíáé Ýíá ðñiáéñåðééü iÝñiò öiö oooóÞiaöiò X Windows ðiö ÷ñçöeiiðiéåßôåé åéá åéá÷åßñéöç öoíäÝóåùí (logins). Áðöü åßíáé ÷ñÞöéii óå ðiëëÝò ðåñéðöþóåé, üðùò óå áðëÜ “X Terminals”, óå desktop lç÷áPiáðá, éåepò åéé óå åééñéöôÝò iååÜëüí åééöýùí. Áoiý öi öyóôçìá X Windows åßíáé áíåíÜñôçöi ðñùöiëüëéüí åéé åééöýùí, ððÜñ÷åé iååÜëüí åýñiò ðééáípí ññëiðöåùí åéá ôçí åééñéöôÝ X ðåéáðþí åéé åééñéöôþí óå åéáöiñåðééÜ lç÷áPiáðá óðiññååäiÝíá óå Ýíá åßéööi. Í **XDM** ðáñÝ÷åé Ýíá åñâöééü ðåñéåÜëëí åéá ôçí åðéëræP öiö åééñéöôP iå öií iðiñi éå åßíåé ç öyíñååöç, åéé åéá ôçí åßöiäi ðëçñiöiñéþí ðéóöiðiñçöçò üðùò öiö iüñiåöi ÷ñÞööç åéé öiö èñüäééiy ðññöååöç.

Óéåöèåßôå òí **XDM** ùò iéá åöáññäP ðiö ðáñÝ÷åé öeò Bæåðò åðiñåðüöçôå ööïí ÷ñÞööç iå ói åñâäéåßi getty(8) (ååßôå òí ÕiPiá 27.3.2 åéá ååðöññåéåð). Ói XDM åéðåéåß óoíäÝóåéò (logins) óoíí åééñéöôP åéé åééñéöôP ðåñéåðå åéðåéåß Ýíá åéá÷åéñéöôP óoíññåñßåò (session manager, óoíÞèùò Ýíáí X åéé÷åéñéöôP ðåñâéýñùí, window manager) åéá ëíññéåñðiü öiö ÷ñÞööç. Í **XDM** Ýðåéåðå ðåñéåÝíáé íá åññåðöþóåé áðöü öi ðññüññåñíá, ðiö óçìåöiñååß üöé i ÷ñÞööç ðååéåßñúðå åéá ðñÝðåé íá åðiññååéåß. Óá áðöü öi óçìåßi, í **XDM** iðiñåß íá åíöáíßóåé iáñÜ ôçí iëüíç åéóüäöö (login) åéé ôçí iëüíç åðéëiñPò åñâöééPò öyíñååöçò þóðå íá öoíñååéåß Ýíáò Üëëiò ÷ñÞööç.

### 6.6.2 ×ñÞöç öiö XDM

Äéá íá iåééíÞóåðå íá ÷ñçöeiiðiéåßôå öi **XDM**, ååéåðåóðÞóåðå öi port x11/xdm (äåí ååéåðÞóåðåé áðü ðñiäåðéëiñP ööéò ðññööååðå åéåüöåéò öiö **Xorg**). Íðiñåßôå Ýðåéåðå íá åññåßôå öií ååßñíá **XDM** óöi /usr/local/bin/xdm. Áðöü öi ðññüññåñíá iðiñåß íá åéðåéåðååß iðiéáäPðiöå óðéäP ùò root êáé èå iåééíÞóåé íá åéá÷åéñþæåðåé ôçí iëüíç öiö X ööï ðiðééü lç÷Üíçíá. Áí í **XDM** ðñÝðåé íá åéðåéåßôåé êÜëå öiñÜ ðiö åéééåßôåé öi lç÷Üíçíá, Ýíáò åíëééüö ðññüñðiö åßíáé ç ðññöèÞêç iéáð åññåñPö óöï /etc/ttys. Äéá ðåñéóðüöåñåð ðëçñiöiñßåð ó÷åðééÜ iå ôçí iññöP åéé ôçí

÷ ñPóç áðôïý ôïõ áñ÷åßiõ, äâßôå ði ÕiPiá 27.3.2.1. ÕðÜñ÷åé ìßá ãñâñP óôï áñ÷éêü /etc/ttys áñ÷åßi ãéá ôçí åêôÝëåóç ôïõ **XDM** óå Ýíá åéêííéêü ôâñláôéêü:

```
ttyv8 "/usr/local/bin/xdm -nodaemon" xterm off secure
```

Áñ÷éêÜ áðôP ç ëâéôïõñâßá åßíáé áðâñâñP ðiéçjÝíç — ãéá íá ôçí åñâñP ðiéPóåå ãéêÜîôå ði ðâäßi 5 áðü of f óå on êáé åðâñâñP ðiéçjÝíç óå ði init(8) ÷ ñçóéññi ðiépióå ðeò iäçâßåò ôïõ ÕiPiá 27.3.2.2. Ði ðñþòi ðâäßi, ôï üññá ôïõ ôâñláôéêü ðiõ ðá åéá ãéâ ãéñßæåðáé ôï ðñüâññâìá, åßíáé ôï ttv8. Áðôü õçìáßíåé üðé i **XDM** èá åéôåéåßôáé óôï 9i åéêííéêü ôâñláôéêü.

### 6.6.3 Ñýèiéóç ôïõ XDM

Í êáôÜëáéi ñðèìßóåùí ôïõ **XDM** åñßóéåðáé óôï /usr/local/lib/X11/xdm. Óå áðôüí ôïí êáôÜëáéi õðÜñ÷iõí ðiëÜ áñ÷åßá ðiõ ÷ ñçóéññi ðiéiyíðáé ãéá íá ãéêÜññi ðçí óðiðâñññÜ êáé åìöÜíéóç ôïõ **XDM**. ÐoðéêÜ, èá åñâßôå ðá åñâéÜôù áñ÷åßá:

Áñ÷åßi	Ðâñéâñáöþ
Xaccess	Êáíüíåò ðéóðiõíßçóçò ðâæáðpí.
Xresources	ÐñiêáéññéóíÝíåò ðéíÝò X resource.
Xservers	Ëßóåå ððñâñññóíÝíùí êáé ôïðééþí iëíþí (x displays) óðeò iõíßåò èá åßíâðáé ãéá ÷åßñéóç.
Xsession	ÐññâðééåññíÝíi script óðíüäúí ãéá logins.
Xsetup_*	Script ãéá ôçí åéôÝëåóç åíðiëþí ðññéí ôçí åìöÜíéóç ôïõ ðâñéáÜëëññiõðó ÿíâðáóçò (login screen).
xdm-config	Ñðèìßóåéò ãéá üëåò ðeò áðâæéíßóåéò (displays) ðiõ åéôåéíÿíðáé óå áðôü ði ïç÷Üíçia.
xdm-errors	ËÜèç ðiõ åçíéiõññíÝíðáé áðü ði ðñüâññâìá.
xdm-pid	Ói ID ôçò äéâññáðßåò ôïõ ôñÝ÷iõð XDM.

Åðßóçò óå áðôüí ôïí êáôÜëáéi õðÜñ÷iõí ìåñéêÜ scripts ãéá ðññâñÜññåò ðiõ ÷ ñçóéññi ðiéiyíðáé ãéá íá ñðèìßóï ðçí åðéóÜíâéå ãññâñßåò üññâí åéôåéåßôáé ôïõ **XDM**. Èá ðâñéññÜññòiå ðâñéëçðôéêÜ ôï óéiðü êáéâññò ðiõ áðôÜ ðá áñ÷åßá. Ç áéñéâÞò óýíðáíç ãéá ÷ ñPóç üëùí áðôþí ôùí áñ÷åßùí ðâñéññÜðâññéó óôï xdm(1).

Ç ðñiêáéññéóíÝíç ñýèiéóç åßíáé Ýíá áðéü ññèíþí ðañÜëññí ÿíâðáóçò ià ôï üññá ôïõ ïç÷áíÞìáðiõ íá öáßíâðáé óôçí ëíññóP ià ìåñÜëá ãñÜññåò êáé ðeò ðññññiðÝò “Login.” êáé “Password.” áðü êÜôù. Áðôü åßíáé Ýíá êáëü õçìåßí åéêßíçóçò ãéá íá åéêÜíåðå õçí åìöÜíéóç ôïõ **XDM**.

#### 6.6.3.1 Xaccess

Ôi ðññùôüéíëeí ãéá óýíâðáóç ià áðâæéíßóåéò ðiõ áéÝä÷iðáé áðü ði **XDM** iññÜæåðåé X Display Manager Connection Protocol (XDMCP). Ôi áñ÷åßi áðôü åßíáé Ýíá óýíññi êáíüí ãéá ôùí Ýëâñ ÷i ôùí óóñáÝóåùí XDMCP áðü áðññâññóíÝíá ïç÷áíÞìáðå. Åññâñßåé, åéôü ðiõ áéá ôùí xdm-config Ý÷åé ñðèìéññåß þóôå íá äÝ÷åðáé áéôåñ÷üññåò óóñáÝóåé. Ç ðññâðééiðP åßíáé íá ïçí áðéôñÝðâññéó óå êáíÝíá ðâæÜôç íá óóñáâðåéß.

#### 6.6.3.2 Xresources

Ðññêáéññéó ãéá ôï áñ÷åßi ñðiêáéññéóíÝíùí ôéíþí ãéá ôéò åöáññíäÝò åìöÜíéóçò ôïõ ðañÜëññí ÿíâðáóçò (login) êáé

âðééïäÝá áðåéêüíéóçò (display chooser). ÍÝóá áðüü áðôü iðriñâß íá ôñiðiðiéçèâß ç àïöÜíéóç ôïõ ðñiñâñÜìlåâiò login. Ç iññöP ôïõ áßíáé ßæéá iå ôï áñ÷åßí app-defaults ðiõ ðåñéäñÜöåâáé óôçí ôåêïçñßùóç ôïõ X11.

### 6.6.3.3 Xservers

ÁôõP áßíáé iéá ëßóôá ôùí áðñâññôòiÝíùí óôâèþí ðiõ ðñÝðåé íá àïöáíßæiiôáé ùò áðééïäÝò óôï ðñüäñâià (chooser).

### 6.6.3.4 Xsession

Áôõü áßíáé ôï ðñiðáèiñéòiÝí session script ðiõ áêôâëâß ôï **XDM** iâôÜ ôç óýíââóç êÜðiéiõ ÷ñPóôç. ÉáííéêÜ, êÜèå ÷ñPóôçò èá Ý÷åé Ýíá ôñiðiðiéçíÝí, äéêü ôïõ, session script óôï ~/.xsession ðiõ èá ðáñâéÜìðôâé áôõü ôï script.

### 6.6.3.5 Xsetup\_\*

Óá áñ÷åßí áôõÜ áêôâëiýíôáé áôõüiâôá ðñéí ôçí àïöÜíéóç ôùí ðáñâèýñú áðééïäÞò P óýíââóçò. ÕðÜñ÷åé Ýíá script ãéá êÜèå display ðiõ ÷ñçóéiðiéâßôáé, ðiõ iññÜæâôáé xsetup\_ iå ôï iñýiâñí ôïõ display óôï ôÝëò (ãéá ðáñÜââéâiá xsetup\_0). ÉáííéêÜ áôõÜ ôá scripts èá áêôâëiýí Ýíá P äõi ðñiñâñÜìlåâôá óôï ðáñâóêPíéi üðùò ð.÷. ôï xconsole.

### 6.6.3.6 xdm-config

Ôï áñ÷åßí áôõü ðåñéÝ÷åé ññèìßôâéò óôçí iññöP ôùí app-defaults, ðiõ åôáññüæiiôáé óå êÜèå display ðiõ áéá÷åéñßæâôáé ç óôñâéâññéiÝíç áâéâôÜóôâóç.

### 6.6.3.7 xdm-errors

Ôï áñ÷åßí áôõü ðåñéÝ÷åé ôçí Ýññäi ôùí áéâññéôþí X ðiõ ðñiðáðâëâß fá áêôâëÝóâé ôï **XDM**. Áí Ýíá display ðiõ ðñiðáðâëâß íá áêêéíÞóâé o **XDM** êiëéíÞóâé ãéá êÜðiéi ëüäi, êáëü áßíáé íá áíáæçôÞóâôå áäþ ôô÷üí içíýiâôá óôáëiÜôùí. Óá içíýiâôá áôõÜ êáôâññÜöiiôáé êáé óôá áñ÷åßá ÷ñçóôþí ~/.xsession-errors.

## 6.6.4 ÄéâôçñþíôáòÝíáí ÄéâëiíéôôP ÁðñâññôòiÝíùí ÓôíäÝóâùí

Ãéá íá óôíäÝíôáé êáé Üëëié ðåëÜôâô óôïä áéâëiíéôôP ièüíçò, ôñiðiðiéÞóôå ôiõ ðñüôâáóçò, êáé áñâññiðiéÞóôå ôéð áéôâñ÷üìâßô ñññäiÝóâéò. Óá ðáñâðÜíñ áßíáé, áðü ðñiðáðâëiâÞò ññèiðiéòiÝíá óå óôíðçñçôéêÝò ðéiÝò. Äéá íá êÜíâôá ðiõ **XDM** fá áÝ÷åôâé óôíäÝóâéò, áñ÷ééÜ iâôâôññÝóâôå óå ó÷üëëi ôçí ðáñâéÜôù áññâiP óôï áñ÷åßí xdm-config:

```
! SECURITY: do not listen for XDMCP or Chooser requests
! Comment out this line if you want to manage X terminals with xdm
DisplayManager.requestPort:          0
```

êáé iâôÜ áðáíâééíÞóôå ôïí **XDM**. Íá Ý÷åôâ õðüøéí óâð üðé ôá ó÷üëéá óôá áñ÷åßí app-defaults iâééííýí iå ôïí ÷ññâññéiPñá “!”, êáé ü÷é ôïí õðíPèç “#”. Iññâß íá áðéèðiâßôå ðeí áôóôçñíýò eáíüíâð åëÝä÷iõ ðñüôâáóçò. Åâßôå ôá ðáñâññâßññâôá óôï xaccess, êáé óôíâiññëåðâôå ôç óâëßää manual ôïõ xdm(1).

## 6.6.5 ÁíôéêáôáóôÜôåò ôiõ XDM

ÕðÜñ÷iõí áñêåôïß áíðéêáôáóôÜôåò áéá òi ðñüññáïíá **XDM**. jáð áðü áðôïýò, i **kdm** (Ýñ÷åôáé iå òi **KDE**) áíáéýåôáé áññüôåñá óá áðôü òi êåöÜëáéi. I **kdm** display manager ðññóööÝñåé ðiøeëÜ ðññôåññáôá óôá áññöéêÜ éáé áéééiöçôéêÜ óðie÷åßá, üðùò åðßöçò éáé óçí äðñáôüöçôá íá áðééëÝäiõí ié ÷ñÞóôåò òií áðéèööçôü áéá ÷åéñéööÞ ðáñáèýñùí óçí óóéäiÞ ôçò óýfååöçò.

## 6.7 ÁñáöéêÜ ÐåñéâÜëëííôá

*ÓðíâéööñÜ òiõ Valentino Vaschetto.*

Áñôü òi òiÞà ðáñéññÜôåé iññéêÜ áññáöéêÜ ðáñéâÜëëííôá ðiø äéâôßèåíôáé áéá òi X óôi FreeBSD. Ç Ýííéá “áññáöéêü ðáñéâÜëëí” iðññåß íá óçìáßíåé iðéäÞðiõå, áðü Ýíáí áðëü áéá ÷åéñéööÞ ðáñáèýñùí iÝ÷ñé Ýíá iëiëëçñùíÝíá ðáéÝ òi desktop åöáññíäþí, üðùò òi **KDE** Þ òi **GNOmE**.

### 6.7.1 GNOmE

#### 6.7.1.1 Ó÷åôéêÜ iå òi GNOmE

Öi **GNOmE** åßíáé Ýíá óðééêü ðññò òií ÷ñÞóôç áññáöéêü ðáñéâÜëëí ðiø áðéôñÝðåé óðiðò ÷ñÞóôåò íá ÷ñçóëiïðiéiyí êáé íá ñðèißæiõí áÿéïéá òiðò ñðiëiæéööÝò òiðò. Öi **GNOmE** äéâëÝôåé Ýíá panel (äéá óçí åêéßíçöç åöáññíäþí éáé óçí ðññäiïëÞ éáôÜôåáóçò), åðéöÜíåéå áññáôôåò (üðiø åiöáíßæiïôåé åáäññíÝíá éáé åöáññíäÝò), Ýíá ðéÞèiò áðü áéáååññíÝíá åññåéåßå éáé åöáññíäÝò, éáèþò éáé Ýíá óýñíëi ððññðiéÞðåñü ðiø áðéôñÝðåé óðéôð åöáññíäÝò íá óðñáññäÜæiïôåé iñðåñý ðiðò éáé íá ååß÷ññíÝíá óðñáðÝò ðáñéâÜëëí åññáôôåò. Ié ÷ñÞóôåò Üëëñí éåéðiññåééþí óðóôçïÜôùí Þ ðáñéâÜëëíóùí éá áéôéÜññíäéåé óáí óðéôé ïðiðò ñðçóëiïðiéþiôå òi ðáíßó÷ññí áññáöéêü ðáñéâÜëëí ðiø ðáñÝ÷åé òi **GNOmE**. Ðáñéñóôüôåñåò ðëçññiøñßå ò ÷åðééÜ iå òi **GNOmE** óôi FreeBSD iðññíýí íá áññåèiýí óôi áéáåééôôåéü òüði òiõ FreeBSD GNOmE Project (<http://www.FreeBSD.org/gnome>). Ç òiðiæåóßå ðáñéÝ÷åé åðßöçò éáé áíáéññéÜ FAQs ó÷åôéêÜ iå óçí ååéâôÜôåáóç, óçí ñýëéöç, éáé óçí åéá ÷åßñéöç òiõ **GNOmE**.

#### 6.7.1.2 ÅåéâôÜóôåóç ôiõ GNOmE

Öi **GNOmE** iðññåß íá ååéâôåóôåéåß áÿéïéá áðü ðáéÝôå Þ áðü óçí ÓoëëiäÞ ðùí Ports:

Áéá íá ååéâôåóôÞðåñü òi Ýôïéii ðáéÝòi òiõ **GNOmE** áðü òi åßéôöii, áðéþò ðëçéôññiæÞðóå:

```
# pkg_add -r gnome2
```

Áéá íá iñðåññéùôôßóåôå òi **GNOmE** áðü òií ðçååßí êþäééá, ÷ñçóëiïðiéÞðå òiçí ÓoëëiäÞ ðùí Ports:

```
# cd /usr/ports/x11/gnome2
# make install clean
```

Öi **GNOmE** ÷ññéÜæåôåé òi óýóôçìá áñ÷åßùí /proc äéá íá èåéðiññäÞðåé óùóôÜ. ÐññóëÝóôå òiçí áññáññíÞ

```
proc          /proc          procfs    rw    0      0
```

óòi áñ÷åßí /etc/fstab äéá íá åßíåôåé áññüññåôå ðññöÜññôçöç òiõ procfs(5) éáôÜ ôçí åêéßíçöç òiõ óðóôÞðåñü.

Ìüëéò åâêáôáôáåååß ôi **GNOME**, èá ðñÝðåé íá ñõèìéôååß i äéáêéñéóôPò X þóôå íá åâêéíåß ôi **GNOME** áíôß åéá ôií ðñïéáèíñéóí Ýíí åéá÷åéñéóôP ðáñáèýñùí.

Í åôéïëüôåñíò ôñüödïò åéá íá åâêéíPóååå ôi **GNOME** åbíáé íå ôi **GDM**, ôií GNOME Display Manager. Ôi **GDM** åâêéèbóôåååé ùò iÝñíò ôiø **GNOME**, åeëÜ åbíáé áíåññäü áñ÷ééÜ. Iðiñåß íá áíåññäiðiéçèåß íå ôcí ðñïóèPêç ôçô åññäiPò

```
gdm_enable="YES"
```

ôôíí áñ÷åßí /etc/rc.conf.

Ìüëéò êÜíååå åðáíåêéBíçóç, ôi **GDM** èá íâééíPóåé áðôüüìååå.

Åðéðñüöèååå, åbíáé ñPóéí íá íâééñíýí üeåò ié ððçñåóßåò ôéò iðiñåò åðáéôåß ôi **GNOME** óáðôü÷ññíá íå ôcí åâêéBíçóç ôiø **GDM**. Åéá íá åbíåååé áðôü ðñïóèYóôå ôç åññäiP

```
gnome_enable="YES"
```

ôôíí áñ÷åßí /etc/rc.conf.

Ôi **GNOME** iðiñåß åðßóçò íá íâééíPóåé áðü ôcí åññäiP åíðiñéþí ñõèìßæiiôåò êáðÜëéçéå ôií áñ÷åßí .xinitrc. Áí ððÜñ÷åé Þäç ôií áñ÷åßí .xinitrc, åðëþò áíðééåååôPóåå ôcí åññäiP ðiò åâêéíåß ôií ðñÝ÷iíðá åéá÷åéñéóôP ðáñáèýñùí íå ïßá ðiò íá åâééíåß ôi /usr/local/bin/gnome-session. Áí åái èYëååå íá êÜíååå ðâñéóóüôåñåò ñõèìßóååéò ôôíí áñ÷åßí, ÷ññéÜæåååé áðëÜ íá åñÜøååå:

```
% echo "/usr/local/bin/gnome-session" > ~/.xinitrc
```

Ðåéóå, ðëçêôññíëiäPóåå startx, èáé èá íâééíPóåé ôií åññöéêü ðâñéåÜëéíí ôiø **GNOME**

**Óçìåßùóç:** Áí ÷ñçóéííðíéåßåå êÜðíéí ðåéæéüôåñí display manager, üðòò ôi **XDM**, ôi ðáñáðÜíú åái èá ëåéóïññäPóåé. Ôôçí ðåñßðôùóç áðôP, åçìéïññäPóåå Yíá åéôåëYóéíí áñ÷åßí .xsession ôií ðiòíßí íå ðåñéY÷åé ôcí ßäéå åíðiñéþ. Ôñiðiðíéþóåå ôií áñ÷åßí .xsession êáé áíðééååóôPóåå ôcí åíðiñéþ ðiò ðñÝ÷iíðò åéá÷åéñéóôP ðáñáèýñùí íå ôi /usr/local/bin/gnome-session:

```
% echo "#!/bin/sh" > ~/.xsession
% echo "/usr/local/bin/gnome-session" >> ~/.xsession
% chmod +x ~/.xsession
```

¶ëç iéá åðééëiäP åbíáé íá ñõèìéôååß i display manager þóôå íá åðéóñÝðåé ôcí åðééëiäP ôiø åéá÷åéñéóôP ðáñáèýñùí êáðÜ ôcí óýíäååç. Ôi ðiPíá Ëåðôñíññåéåò KDE åíçååå ðùò iðiñåß íá åbíåé áðôü iÝóù ôiø **kdm**, ôiø display manager ôiø **KDE**.

## 6.7.2 KDE

### 6.7.2.1 Ó÷åôééÜ íå ôi KDE

Ôi **KDE** åbíáé Yíá óýä÷ññí, åýêëëí ôôç ÷ñPóç, åññöéêü ðâñéåÜëéíí. IåñééÜ ðñÜäàáåå ðiò ðñïóöYñåé ôi **KDE** óôíí ÷ñPóç åbíáé:

- já üiññöií óýä÷ññí ðâñéåÜëéíí

- já ðâñéâÜeëí iå ðëPñç äéêôñáâP äéáðÜíâéá
  - já áíóùâôùÍí óýóôçìå âïPèâéáð ðiø åðéøñÝðâé åýêíëç, óõíâðP ðñüöââóç óôçí âïPèâéá ãéá ôçí ÷ñPóç ôið **KDE** ééá ôúí åöâññäþí ôiø
  - ÓõíâðPò åiøÜíéóç êáé óõíâðâñéöñÜ üëùí ôùí åöâññäþí ôið **KDE**
  - ÔðiðiðíçÝíá menu êáé åñâiÍYð åññâæâßùí (toolbars), óõíâðáóíiñ ðëPêøñùí, ÷ñùláðééiñ óõíâðáóíiñ, êeð.
  - Äéâëåñâðò ñõëìßóâðò: ôi **KDE** äéâðâðéâðâé óâ ðâñéóðüâðâðò åðü 40 äéþóâð
  - Êâiñéêü éáé óõíâðYð óýóôçìå ñõëìßóâùí åâáóéoiÝíí óâ äéâëüäiñò
  - lâñÜeëí áñéëiñ ÷ñPóéùí åöâññäþí, ó÷âæéáóÝíùí åéæéêÜ äéá ôi **KDE**

Õi **KDE** óõñääýåðóáé áðü Ýíáí ðåñéçäçôP (browser) ðio iññ Üæåðóáé **Konqueror**, éáé áíôåäñiñßæåðóáé óíâåñÜ ôiñò Üeëiñò ðåñéçäçôÝò òúí óooôçÜòùí UNIX. Ðåñéóöùåñàò ðeçñiñßåò æá õi **KDE** iðiññåßòá íá âñåßòå óoí KDE website (<http://www.kde.org/>). Æá ðeçñiñßåò ó ÷åôééÝò iå õi FreeBSD éáé õi **KDE**, óõiññëåðéèåßòå õií æáäéêðóåéü ôüðiñ õiñ FreeBSD-KDE team (<http://freebsd.kde.org/>).

ÕõÜñ-õõí äéáè Ýóeïåò äýí åéäüóåéò ôiõ **KDE** äéá ôi FreeBSD. Ç êäïöç 3, êõõëëõmåß áñéåôü éáéñü êáé èåùñåßôáé ááíééÜ þñéïç. Óõc ÓõeëïäP ôùí Ports èá áñåßôå åðBóçò ôçí êäïöç 4 áðü ôç íáüôåñç ááíéÜ. Ié äýí áðõ Ýò åéäüóåéò iõmííyí lÜééõôá íá ôõõðÜñ-õõí ôõííí Bæéí õðiëtäéôôP.

### 6.7.2.2 ÅæáôÜóôáóç ôïõ KDE

¼ðùò êáé ìå ôi **GNOME** þ ÆÜèå Üëëí ãñáöéü ðåñéåÜëëí, ôi ëïæóíéü ìðññåß íå åâéåôåóåéåß åýëëéá ÿÝòú ðåéÝòú Þ áðü ôcí ÓoëëíàÞ ôúí Ports:

Áéá íá åæéåôåôÞóåôå ôi **KDE3** iÝóù ðáêÝôùí áðü ôi äßêôöii, áðëþò ðëçêôñiieiäÞóåå:

```
# pkg add -r kde
```

Ãéá íá áâéáôáóôÞóâôå ôi **KDE4** iÝóù ðáéÝôùí áðü ôi äßêôöi, áðëbò ðëcêôñieiaÞóôå:

```
# pkg add -r kde4
```

Ôi pkg add(1) èá áíáêôÞóåé áôôüìáôá ôcí ôåëåôáßá Ýêäïóç ôcò åöáñïïÞò.

Áéá íá iåôåáæùôôßóåôå ôii **KDE3** áðü ôíí ðçääáßí êþäéêá, ÷ ñçóéíïðíéÞóôå ôc ÓðeeiäÞ ôùí Ports:

```
# cd /usr/ports/x11/kde3  
# make install clean
```

Áéá fá iåôåäæùòôôßóåôå ôií **KDE4** áðü ôií ðcääßi êbäéêá. ÷ñcöéijjéPóôå ôc ÓøeéjäP ôuí Ports:

```
# cd /usr/ports/x11/kde4  
# make install clean
```

Áöïý åâéådåóôåèåß ôi KDE, èá ðñÝðåé íá ñòëèíéóôåß i äéåêñéóôÞò X þóôå íá ôi åéêéíåß áíôß åéá ôií ðñïéåèíñéóíÝñí  
æéá ÷åéñéóôÞò ðññäåèýññù Á ðòüü ãëíñådåé àì ôçí åíééåß ðñïð åññ÷åññíø xinitrc;

Ã‰tude KDE3

```
* echo "xeyes startkde" > /etc/xinitrc
```

Ã©á ôü KDE4

```
% echo "exec /usr/local/kde4/bin/startkde" > ~/.xinitrc
```

Ôþñá, üðiòå ôí X Window System åêééíåßôáé íÝóù ôí ñò startx, ôí ãñáöéêü ðåñéâÜëëí èá åßíáé ôí **KDE**.

Áí ÷ñçóéíïðíéåßôå êÜðíéí display manager üðùò ôí **XdM**, ç ñýèiéóç åßíáé éßäi äéáöiñåôéêP. Èá ðñÝðåé áíòß ãéá ôí .xinitrc íá ôñiïðíéÞóåò ôí .xsession. Íäçäßåò ãéá ôí **kdm** åßííóáé áññüôåñá óóír éåöÜëáéí áõöü.

### 6.7.3 Ðåñéóóüôåñåò ËåðòííÝñåéåò ãéá ôí KDE

Ôþñá ðiò ôí **KDE** Ý÷åé åãâååóóåèåß ôóí ýóóôçá, lðiñåßôå íá áíåéåéýøåôå ôéò ðåñéóóüôåñåò ëåéòiññåßåò íÝóù ôúí óåéßäuí ãíÞeåéåò P ãíðíéíÜæíñåò ìåñíý èáé åðéëíäÝò. Ié ÷ñÞóåò ôúí Windows ç ôí Mac® èá áéóèÜñíóáé óáí ôóí óðßöé ôíòò.

Ç éåéýôåñç ãíÞeåéå ãéá ôí **KDE** åßíáé ç on-line ôåéíçñßùóç. Ôí **KDE** óðííååýåôáé áðü ôí ãééü ôí ðåñéçäçôP, ôí **Konqueror**, ðíëëÝò ÷ñÞóéåò åöåññäÝò, èáé áíåéóôéêP ôåéíçñßùóç. Ôí ððüëíéðí åðòòPò ôçò åíüôçôåò óðæçôÜ òå÷íééÜ èÝiaôá ðiò åßíáé áýóéïí íá áíåéåéëöëíýí ìå ãíðíéíÝò.

#### 6.7.3.1 Í KDE Display Manager

Í äéá÷åéñéóòPò åíüò ðíëò ÷ñçóééíý óðóòPiaòiò eÝëåé åíåå÷íÝùò ç óýíååóç ôúí ÷ñçóòPí íá åßíåôáé íÝóù ãñáöééiy ðåñéâÜëëíò. ¼òùò ðåñéññÜøäiå ðñßí, ðiñåß íá ÷ñçóéíïðíéçèåß ôí XDM. ¼ìùò, ôí **KDE** ðåñéÝ÷åé ìéá åíåééååéêP åðéëíäP, ôí **kdm**, ôí iðibí Ý÷åé ó÷åéååóôåß íá åßíáé ðiðibí åééòòåéêü èáé ðñÝ÷åé ðåñéóóüôåñåò åðéëíäÝò èåóòÜ ôç óýíååóç. ÓðåéåññéíÝíá, ié ÷ñÞóåò ðiññíýí áýéëíá íá åðéëÝññòí (íÝóù ìåñíý) ðiðibí ãñáöéêü ðåñéâÜëëí (**KDE**, **GNOME**, P êÜðíéí Üëëí) èá åéååéååóôåß ìåòÜ ôçí óýíååóç ôíòò.

Åéá íá åíññaiðíéÞóåò ôí **kdm**, èá ðñÝðåé íá åðååññååóôåßôå êÜðíéá áñ÷åßá, ôá iðibá åßíáé äéáöiñåôéêÜ áíÜëëíå ìå õçí Ýéäiöç ôí ðíëò èá ÷ñçóéíïðíéÞóåò.

Åéá ôí **KDE3**, èá ðñÝðåé íá ôñiðíðíéÞóåò ôçí åããññåòP äéá ôí ttv8 óóí /etc/ttys, üðùò öáßíåôáé ðåñáéÜòù:

```
ttv8 "/usr/local/bin/kdm -nodaemon" xterm on secure
```

Åéá ôí **KDE4**, èá ðñÝðåé íá ðñiòéÝóåôå ôéò ðåñáéÜòù ãññííÝò óóí /etc/rc.conf:

```
local_startup="${local_startup} /usr/local/kde4/etc/rc.d"
kdm4_enable="YES"
```

### 6.7.4 Xfce

#### 6.7.4.1 Ó÷åôééÜ ìå ôí Xfce

Ôí **Xfce** åßíáé Ýíá ãñáöéêü ðåñéâÜëëí ðiò óôçñßæåôáé óóçí åéåééíèÞêç GTK+ ðiò ÷ñçóéíïðíéåßôáé êáé áðü ôí **GNOME**, áéëÜ åßíáé ðíëý ðeí åéåñý êáé ðñiññßæåôáé åéá ùóíòò eÝëëíÝíá áðëü, áðiðååéåóíåðéêü ãñáöéêü ðåñéâÜëëí ðiò åßíáé áýéëí íá ÷ñçóéíïðíéçèåß êáé íá ñòðíéóôåß. ÍðóééÜ, ïíëÜæåé ðíëý ìå ôí **CDE**, ðiò óðííåòÜòáé óå åiðiñééÜ óðóòPiaòá UNIX. ÍàñééÜ áðü ôá ÷åññåéôçñéóôéêÜ ôí ðíë **Xfce** åßíáé:

- íá áðëü, áýéëí íóçí ÷ñÞóç ãñáöéêü ðåñéâÜëëí
- ÐëÞñùò ðåñáìåññíðíéÞóéí ìå ôí ðíñòßéé, ìå drag and drop, ééð.

- Êåíöñéêü panel ðáñüìíí iå ôiõ **CDE**, iå iåñiy, iéñii-åöáñiiäÝò êáé ðëþêôñá åêêßíçóçò åöáñiiäþí
- ÍeñüçñùìÝíò äéá ÷ åéñéóôþò ðáñáèýñùí, äéá ÷ åéñéóôþò áñ ÷ åßùí, äéá ÷ åéñéóôþò þ÷iõ, óðiâáôüôçôá iå ôi **GNOME**, êáé Üëëá
- Äðiáðüôçôá ÷ nþóçò eåiÜûí (themes, äöiy ÷ nçóëiðiéåß ôi GTK+)
- Áñþäñii, åéáöñy êáé áðriðåëåóiáöéêü: éåáíéü ãéá ðáëéüôåñá/ðéí áññÜ iç ÷ áíþláôá þ iç ÷ áíþláôá iå eßãç iíþìç ðåñéóóüôåñåò ðëçñiöiñßåò ãéá ôi **Xfce** iðiñåßôå íá âñåßôå óôç åéêôðåêþ ðiðièåóþá ôiõ Xfce (<http://www.xfce.org/>).

#### 6.7.4.2 ÅåêáôÜóôáóç ôiõ Xfce

ÖðÜñ ÷ åé (öçí þñá ðiõ ãñÜöliôáé áññÝò ié ãñáiiÝò) Ýöiëií ðáéÝôi ãéá ôi **Xfce**. Åéá íá ôi ååêáôáóôþóåôå, áðëþò ðëçêôñiëiäþóå:

```
# pkg_add -r xfce4
```

ÅíáëéåêôéêÜ, ãéá íá ôi iåðáåëüôôþóåôå áðü ôií ðçñáßí ëþæéêá, ÷ nçóëiðiéþóå ôçí Óðëëiäþ ôùí Ports:

```
# cd /usr/ports/x11-wm/xfce4
# make install clean
```

Öþñá, ðåßôå óôíí åéáêñéóôþ X íá åéêéíþóåé ôiõ **Xfce** ôçí åðüìåíç öiñÜ ðiõ èá åßíåé åêêßíçóç ôiõ ãñáöéêiy ðåñéåÜëëiðiò. Áðëþò ðëçêôñiëiäþóå ôiõ ðáñáéÜôù:

```
% echo "/usr/local/bin/startxfce4" > ~/.xinitrc
```

Öçí åðüìåíç öiñÜ ðiõ èá åéêéíþóåôå ôiõ ×, èá åiðáíéóôåß ôiõ **Xfce**. ¼ðùò êáé ðñïçäiðiÝíùò, áí ÷ nçóëiðiéåßôå êÜðiëi display manager üðùò ôiõ **XDM**, åçïëiññþóå Ýíá áñ ÷ åßí .xsession, üðùò ðåñéåñÜöååé óôçí ðáñÜåñáöi ðiõ **GNOME**, åééÜ iå ôçí åiðiþ /usr/local/bin/startxfce4, þ ñoðiðåôå ôiõ display manager íá åðéôñÝðåé ôçí åðéëiäþ ãñáöéêiy ðåñéåÜëëiðiò, üðùò ðåñéåñÜöååé óôçí ðáñÜåñáöi ó ÷ åðéêÜ iå ôi kdm.

## II. ÅáóéêÝò Åñãáóßåò

Ôþñá ðiõ Ý÷iõlå êáëýøåé ðeÝíí ôá âáðééÜ eÝìáôá, áðôü ôi òiÞìá ôiõ Åã÷åéñéäþiõ ôiõ FreeBSD ðåñéãñÜðåé ôéð ðéí âáðéêÝò åñãáóßåò êáé ôá ðéí åçiiõéëþ ÷åñáêðçñéóðééÜ ôiõ FreeBSD. Ôá êåöÜëáéá áðoiý ôiõ òiÞìáôiõ:

- ÐáñiõóéÜæiõí ôéð ðéí åçiiõéëåßò êáé ÷ñþóéíåò åöáñiïäÝò êáé ðåñéâÜëëiïðå åñãáóßåò: öðëëiïåôñçôÝò (browsers), åñáöéêÜ ðåñéâÜëëiïðå åñãáóßåò, åñãáéåßá ðñiïâëþò åéáöüñùí iññöþí áñ÷åßùí, êëð.
- ÐáñiõóéÜæiõí iñéóíÝíá áðü ôá åñãáéåßá ðiõiÝóúí (multimedia) ðiõ åßíáé åéáèÝóéíá åéá ôi FreeBSD
- Åìçäíýí ôç åéáäéåóßá iåðååëþðôéóçò êáé åñååðÜðôáóçò åñüð ðñiïðåñiïðiÝíñõ ðoñþíá åéá ôi FreeBSD, Ýðóé þóðå íá åíåññiðiçëiýíÝíññá ÷åñáêðçñéóðééÜ åéá ôi óýðôçìÜ óáð.
- ÐåñéãñÜöriõí ôá åÜèrò ôi óýðôçìá åéððþðóåúí, üöri åéá åéðððñòÝò ðiõ åßíáé áðåðèåßåò óðíñååäåíÝíé iå ôi óôáèìü åñãáóßåò óáð, üöri åéá åéêððåéiýò åéðððñòÝò.
- ÐåñéãñÜöriõí ðþò iðiñåßòå íá ôñÝìåôå åöáñiïäÝò Linux ôiõ FreeBSD óýðôçìÜ óáð.

ÌåñéêÜ áðü áðôÜ ôá êåöÜëáéá áðåéóíýí íá Ý÷åðå ìåëåðþóåé ðéí ðñéí êÜðiëí Üëëi êåöÜëáéí. ¼ðiõ åßíáé áðåñáßôçöi õÜðé õÝòiëí, áíáöÝñåôáé óôç óýñøç ôiõ êÜèå êåöáéäþiõ.

# ÊåöÜëáéï 7 Desktop ÅöáñïïäÝò

*ÓðíáéóöiñÜ ôiö Christophe Juniet.*

## 7.1 Óýííøç

Óciáéþróðá üðé üðóá áæðáéðóðÜðóð Þñiñññ Üìññáðá áðü ðc ÓððeëiäP ôuí Ports, áßíáðóá è iåðááæþþðóðéóç áðü ôií ðíçðáæßí è þþæééá. Áðóðü iðiññåß íá ÷ ñåéáðóðåß ðiðey ÷ ñüññ, èæðþò áiáññðÜðóáé áðü ôi ðññüññáññá ôi iðiññi ìåðááæùðóðþæðóðá èáé ôçí ðiðieïäéðóðéêP éó ÷ ý ôið lç ÷ áiÞiáðüö óáð. Áí ôi ÷ ñiiééü æéÜðóðciá ôi iðiññi ÷ ñåéÜæðóáé ç iåðááæþþðóðéóç áßíáé áððááññåððééÜ iãññÜëi, iðiññåðóðá íá áæðáðóðPóðóðá ôá ðåññéðóðüðåññá ðññiñññ Üìññáðá ôçð ÓððeëiäPô ôuí Ports áðü ðññi-ìåðááæùðóðéóçÝíá ðåéÝóðá.

Èáèþò òi FreeBSD äéáé Ýôåé óðíàâðûöçôá íà åéôåæ Ýóeiá ðñiñäñÜììåôá æá Linux, ðíeeÝò åöáññäÝò ðiø áíáðôý ÷ èçêáí áñ ÷ ééÜ ãéá òi Linux åßíáé äéáé Ýóeiåò æá òi desktop óåo. Óåo óðíéööiyá èññiÜ íá æáå Üóåôå òi Èåö Üëäéí 11 ðñéí ååéåðåò Þóåôå ðiøéäþðiòå åðü ôeo åöáññäÝò Linux. ðíeeÜ åðü ôå ports ðiø ÷ ñçöeiñðiøíý òc óðíàâðûöçôá íà Linux Ý ÷ iøí iiùìåôá ðiø îåééñíý íà "linux-". Èòçèåßôå òi üðáí ØÙ ÷ íåðå æá ûðiøíéí óðååéåññéíÝñí port, æá ðán Üäåéåíà íà ôçí whereis(1). Óöi èåßíåñí ðiø åéïøðèåß èåùñåßóåé üüôé Ý ÷ åôå åíññäøíéÞóåé ôçí óðíàâðûöçôá íà åéôåæ Ýóeiá ðñiñäñÜììåôá Linux ðñéí ååéåðåò Þóåôå ðiøéäþðiòå åðü ôeo åöáññäÝò òiø Linux.

Íé êáôçäiñßåò ðiö êáëýðôiiôáé áðü áôôü ôi êåöÜëáéí åßíáé ié åîÞò:

- Öððæðnáðñçô Ýð (üðùò **Firefox**, **Opera**, **Konqueror** **Chromium**)
  - Åðáññïä Ýð áñáðåðñçô (üðùò **KOffice**, **AbiWord**, **The GIMP**, **OpenOffice.org**, **LibreOffice**)
  - ÐñññññÜñáðá ðñññññÞð áðãññÜðùí (üðùò **Acrobat Reader®**, **gv**, **Xpdf**, **GQview**)
  - ×ñçìáðñééññéé Ýð áðáññïä Ýð (üðùò **GnuCash**, **Gnumeric**, **Abacus**)

Đñéí äéáâÜóåôå áõôü ôi êåöÜéáéi èá ðñÝðåé:

- Íá ÍÝñåôå ðùò íá åâéåôåóôÞóåôå ðñüöèåôï ëíæéöìéëü ðñßôï ëåðåóéåðåóôP (ÉåôÜéåéï 5).
  - Íá ÍÝñåôå ðùò íá åâéåôåóôÞóåôå ðñüöèåôï ëíæéöìéëü Linux (ÉåôÜéåéï 11).

Áéá ðeçñiöimþåò ó ÷åôééÜ íå ôçí åæéåó Üóóåáóç ðíëðiåóééiy ðåñéáÜééiiò ãéááÜóå ói ÊåöÜéáéi 8. Áí èÝéåôá íá ñòðiøóååðá êáé íá ÷ñçóéiiðiøPóååðá êÜðiéá õðçñåðóßá çéåðñiíééiy óå ÷oäñiíðåßiò ååßóå ói ÊåöÜéáéi 29.

## 7.2 ÖöëëîåôñçôÝò (Browsers)

Ôi FreeBSD ääí Ý÷åé ðñïiääêåðåôðçì Ýñí ëÜðiëí ðôðåêåññei Ýñí õððëëñiåðñçôþ. Õðií èåðÜëræí www (<http://www.FreeBSD.org/ports/www.html>) ôçò õððëëñiþò Ports iðiññåðóá íá âññåðóá áññåðöiyò õððëëñiåðñçôÝð, Ýðiëiñðo ãéá ååñéåðÚóðåóç. Áí åäí Ý÷åôå ÷ñüñí ãéá íá iåðåäéñiøðóþåôå ùöô ÷ñåéÜæåóðå (Bóùò ÷ñåéåðåðåðóå áññåðöþ þñá), ðññëiþ åðú åðöiyò åßííæ åééå Ýöëií èåé ùò Ýðiëiá ðåéÝðå.

Óá **KDE** êáé **GNOME**, ñò ðëÞñç ðåññéáÜëëíðá åññääóßáð, ðáñÝ÷iõí ðiõð ãééíýð ðiõð ðöðëëñåôñçôÝð HTML. Ååßôå òï **ÖìÞìá** 6.7 ãéá ðåññéóúòåñåò ðëçññöñßåò ó÷åôééÜ ìå ôçí ååéåôÜóðåóç ðiõð.

Áí åíáéåöÝñåôå åéá åéåöñåßò (áðü Üðiøç êáôáíÜëùñçð ðüññí) ðöðëëñåôñçôÝð, ååßôå ðéð áéüëíðèåò åöáññäÝð óðç ðöðëëñäP òúí Ports: [www/dillo2](http://www/dillo2), [www/links](http://www/links), P [www/w3m](http://www/w3m).

Ôï òìÞìá áðôü êáéýðôåé ðéð ðáññéÜòù åöáññäÝð:

¼ññá ÅöáññäPò	Áðáéöíýìåñé Đüññé	ÅåéåôÜóðåóç áðü Ports	ÁáóéêÝð Åíáñôþóåéò
<b>Firefox</b>	ìåóáßá	âáñéÜ	Gtk+
<b>Opera</b>	ëßäié (åéåöñéÜ)	åéåöñéÜ	ÖðÜñ÷iõí ãééàÝóéåå åéäüóåéò åéá FreeBSD êáé Linux. Ç Ýéäiöç åéá Linux åíáñòÜôåé áðü ôçí åöåäééP óðìååðüôçôá ìå Linux (Linux Binary Compatibility) êáé òï <b>linux-openmotif</b> .
<b>Konqueror</b>	ìåóáßá	âáñéÜ	Âéâééïéþéåò <b>KDE</b>
<b>Chromium</b>	ìåóáßá	ìåóáßá	Gtk+

## 7.2.1 Firefox

Í **Firefox** åßíáé Ýíáð iñíðÝññò, åéåýëåññò, áñíé÷òüò êáé óðåæåññò ðöðëëñåôñçôPð, í iðiþiò åßíáé ðëÞñùò ðññóáññíòÝñò ãéá ÷ñþóç óðç FreeBSD. ÅééàÝðåé ìç÷áP áðåééüíéóçò ç iðiþá åíáññíßæåôáé ðëÞñùò ìå ðéð ðöðiðiéþóåéò ðçò HTML, êáé åðíáðüûôçôåò üðñò åíöÜíéóç ðiëëáðéþí óåëßåùí óå tabs, ïðëiëÜñéóíá åíáððüñåñí ðáññéýññí (popups), ðññóéååðá ðññññÜññåðá, ååéöéùíÝíç áðóÜëéåá êáé ðiëëÜ åéüíç. Í **Firefox** åáðßæåôåé óðiií áñ÷éüü ðçñåáßí êþäééå òï **Mozilla**.

Ååéåôåóðþóå òï ðáéÝòï ãñÜöññòåò:

```
# pkg_add -r firefox
```

Ç ðáññáðÜíù åíöiëP èá ååéåôåóðþóåé òïí **Firefox** 9.0. Áí èÝëåôå íá ååéåôåóðþóåå òïí **Firefox** 3.6, ãñÜøôå:

```
# pkg_add -r firefox36
```

Ìðiññåßôå åðßóçò íá ÷ñçóéññiðiéþóåå ðçí ÓðëëñäP òúí Ports áí ðññóéñÜðå íá ìåðååëñòôðþóåå áðü ðçñåáßí êþäééå:

```
# cd /usr/ports/www/firefox
# make install clean
```

Åéá òïí **Firefox** 3.6, áíðééåôåóðþóå ðçí ðáññáðÜíù åíöiëP ôç ëÝíç **firefox** ìå **firefox36**.

## 7.2.2 Í Firefox êáé òï Ðññóéåòí (plugin) ôçò Java™

**Óçìåßùóç:** Óá áðôü òï òìÞìá êáé óá äýí åðüìåíá, èåùññíå üðé Ý÷åôå þäç ååéåôåóðþóåé òïí **Firefox**.

ÅâéáôáóôÞóôå ëi **OpenJDK 6** áðü ôç ÓðëëïäÞ ôùí Ports, ðëçêôññëiäþíôå:

```
# cd /usr/ports/java/openjdk6
# make install clean
```

ÅâéáôáóôÞóôå Ýðåéôå ëi port java/icedtea-web:

```
# cd /usr/ports/java/icedtea-web
# make install clean
```

Åââáéùèåßôå üöé äáí áëëÜíáôå ôéò ðñïäðéëåäìÝíåò áðéëïäÝò óôéò iëüíåò ñõëìßóåùí êáé ôùí äyí ports.

ÍâééÍÞóôå ëi öðëëïäðôñçòÞ óåò, ãñÜøôå about:plugins ôóç ãññùlP äéåðèýíóåùí êáé ðéÝóôå **Enter**. Èá åâßôå iéá óâéßää íà üëá ðá åâéáôáôóçìÝíá ðñüöèåôå. Óôç óâéßää áðôP èá ðñÝðåé íá åâßôå êáé ôçí êáôá÷þñéóç ãéá ôí ðñüöèåôí ôçò **Java™**.

Áí i öðëëïäðôñçòÞò äáí êâôåöÝñâé íá áíôïðßôåé ëi ðñüöèåôí, êÜëå ÷ñÞóôçò èá ÷ñâéáôååß íá åâôåëÝóåé ôçí ðáñáéÜðù áíôïëP êáé íá áðáíâééíÞóåé ëi öðëëïäðôñçòÞ ðiõ:

```
% ln -s /usr/local/lib/IcedTeaPlugin.so \
$HOME/.mozilla/plugins/
```

### 7.2.3 Í Firefox êáé ôi Adobe® Flash™ Plugin

Ôi Adobe® Flash™ plugin äáí áéáôßèåôåé ãéá ôi FreeBSD. Ùóðüöi, ððÜñ ÷åéÝíá åðßðåäii åññùóçò (software layer, wrapper) äéá ôçí åâôÝëåóç ðiõ áíôßôåé÷iõ plugin ôiõ Linux. To wrapper áðöü ððíöçñßæåé åðßóçò êáé ôá plugins äéá ôií Adobe Acrobat®, ôi RealPlayer êáé Üëëá.

ÅêôåëÝóôå ôá ðáñáéÜðù áðìáôå, áíÜëëá íà ôçíÝëäïóç ðiõ FreeBSD ðiõ ÷ñçóéïïðíéåßôå:

#### 1. Æá ôi FreeBSD 7.x

ÅâéáôáóôÞóôå ëi port www/nspluginwrapper. Ôi port áðöü áðáéôåß ôi emulators/linux\_base-fc4 ôi iðiñßi åßíáé íàñÜëi.

Ôi áðüìâiñ áðìá åßíáé ç åâéáôÜóôåóç ðiõ port www/linux-flashplugin9. Èá åâéáôáóååéåß ç Ýëäïóç Flash 9.X ç iðiñßá åíùñßæiõíå üöé äiðëëåýåé óùóðÜ ôi FreeBSD 7.X.

**Óçìåßùóç:** Óå åâëüôåéò ôiõ FreeBSD ðáëáéüôåñåò áðü ôçí 7.1-RELEASE, èá ðñÝðåé íá åâéáôáóôÞóåå ðiõ ðáêÝði www/linux-flashplugin7 êáé íá ðáñáéåßøåå ði ãðìá ó÷åôééÜ íà ôi linprocfs(5) ðiõ ôáßíååé ðáñáéÜðù.

#### 2. Æá ôi FreeBSD 8.x

ÅâéáôáóôÞóôå ëi port www/nspluginwrapper. Ôi port áðöü áðáéôåß ôi emulators/linux\_base-f10 ôi iðiñßi åßíáé íàñÜëi.

Ôi áðüìâiñ áðìá åßíáé ç åâéáôÜóôåóç ðiõ port www/linux-f10-flashplugin10. Èá åâéáôáóååéåß ç Ýëäïóç Flash 10.X ç iðiñßá åíùñßæiõíå üöé äiðëëåýåé óùóðÜ ôi FreeBSD 8.X.

Æá íá ëâéôïññäÞóåé óùóðÜ áðôP ç Ýëäïóç, èá ÷ñâéáôååß íá äçìéïññäÞóåå ði ððíâiëéêü óýíâåôíï ðiõ ôáßíååé ðáñáéÜðù:

```
# ln -s /usr/local/lib/npapi/linux-f10-flashplugin/libflashplayer.so \
    /usr/local/lib/browser plugins/
```

Èá ÷ ñâéáôôåß íá áciëíöñäÞóåôå ÷ áéñïëßíçôá ôíí êáðÜëíäí /usr/local/lib/browser\_plugins áí äáíí õðÜñ ÷ áé ôöí óýðôçíá óáó.

läôÜ ôcí ââéâôÜôôáóç ôiõ óùóöiý (óyîöùíá là ôcí Ýêäiöç ôiõ FreeBSD) Flash port, i êÜëå ÷ñPóôçò èá ðñÝðåé íá ieiëeçñþóåé ôcí ðñiöùðéêþ ôiõ ââéâôÜôôáóç ôiõ plugin âéôåëþíôå òçí ðáñáêÜôù åiôíëþ ôiõ nspluginwrapper:

```
% nspluginwrapper -v -a -i
```

Èá ðñÝðåé íá ðññioáñôÞóåðå ðíí óýóôçìá áñ ÷ åßùí æéññáóéþí ðíø Linux, linprocfs(5) óðíí èáðÜëíæí /compat/linux/proc, áí åðéëõiåßòå íá áíáðán Üãåðå Flash óêçíÝò (animations). Áððü iðiñåß íá åßíåé íå óçí åðñÝíç áðóëþ:

```
# mount -t linprocfs linproc /compat/linux/proc
```

Ç ðóttir Üñöðróç íðtiñáð áðþróð ðá ãðíðáé áððñáðáðá ëáð Ü ðçí áððñáðá ðññíðe Ýðiñáðó ðçí ðáñáé Üðù ãññáñþ óðí /etc/fstab:

```
linproc /compat/linux/proc linprocfs rw 0
```

#### 7.2.4 Firefox êáé ôï Swfdec Flash Plugin

ÁÍ ãái iðiñâþôå P ãái èÝeåôå íá ôi ìåðâæüôþóåôå, áðëþò åæéåðáóôþóå ôi ðáêÝôi áðü ôi äþêôöi:

```
# pkg_add -r swfdec-plugin
```

ÁÍ ót ðáði Ýðótt að í áBíráé áæði Ýðótt, iðtinnibóði fá ót laðdáæðiðbóðaðóða éæði fá ót áæðaðáðiðbóðaðóða áðu ót Óððeëtlaðið ótí Ports:

```
# cd /usr/ports/www/swfdec-plugin  
# make install clean
```

IåôÜ ôcí åæêáôÜóôáóç, åðáíåêééÍÞóôå ôï öðeëèñlåôñcôÞ óáò ãéá íá åíåñäiðiéçèåß ôï plugin.

## 7.2.5 Opera

I **Opera** ábbiáé Ýíáð oöeëëñâôñçþò iå ðëþñâéó äðiáðûôçðåðô êáé oöiâáðûò iå ôá ðñüôððá. Þ ÷ åðâé åðþðçò iå áiðùùâðùì Ýíí ðñüâñâíá áíÜáñðôçó ôá ÷ öäññíâðið (mail) êáé åéäþðåùí (news), ðñüâñâíá áéá IRC, áiáâíþðôç áéá RSS/Atom êáé ðïëëÜ áðüñá. Dáñ' üëá áðôÜ, i **Opera** ábbiáé iéá o ÷ åðéêÜ áéäöñëÜ êáé ðïëý áñPâñç áðoññíðþ. Þ ÷ åðâé ôá äýí ðýðiðò: iéá "ââââñþò" Ýéäñöç áéá ôí FreeBSD êáé iéá Ýéäñöç ðið åêðâëâðôáé iÝóù ôçò oöiâáðûôçðåðô iå ôí Linux.

Ãéá íá : ñçóëíïðíéÞóåôå ôçí FreeBSD Ýëäíóç ôiõ **Opera**, åâéåôáóôÞóå ôi ðáêÝôí:

```
# pkg_add -r opera
```

Íñéóì Ýíåò ôiðièåóþâò FTP áåí äéáèÝôïöi üéá óá ðáêÝôá, áéëÜ iðiñâßôå íá Ý÷åôå ôißæíi áðiôÝëåóíà iÝóù ôçò ôðëëiâÞò ôuí Ports, ãñÜöiiðåò:

```
# cd /usr/ports/www/opera
# make install clean
```

Áéá íá ååêåååóþóåå ôçí Linux Ýéäïöç ôiö **Opera**, áíðééååóóþóå iå linux-opera ôi opera óóá ðáñáðÜù ðáñáäåßâíåðå.

Ôi ðñüöèåðî Adobe Flash ááí åßíáé äéáèÝóëi ãéá ôi FreeBSD. Äéåðßèåðåé ùóðüöi iéá Ýéäïöç éåôÜëëççèç ãéá ôi Linux. Áéá íá ôçí ÷ñçóëiðiéþóåå èá ðñÝðåé áñ÷ééÜ íá ååêååóóþóåå ôi port www/linux-f10-flashplugin10 áéá Ýðåéåå ôi port www/opera-linuxplugins:

```
# cd /usr/ports/www/linux-f10-flashplugin10
# make install clean
# cd /usr/ports/www/opera-linuxplugins
# make install clean
```

Ìðiñâßôå íá åéÝâååå åýéëéå ôçí ýðáñïç ôiö plugin: iâééíþóå ôið õðëëiñâðñçôþ óåò, ãñÜðôå opera:plugins óóç ãñâiâÞ æåðèýíóùí êáé ðéÝóåå **Enter**. Èá ðñÝðåé íá ååßôå iéá ëðóåå iå üéá óá äéáèÝóëi ðñüöeåðå.

Áéá íá ðññöéÝóåå ôi ðññöéåðî ôçò **Java**, áééëððóå ðéò áíðßóðíé÷åò iäçåßåò áéá ôi Firefox.

## 7.2.6 Konqueror

Í **Konqueror** åßíáé êíïÜôé ôiö **KDE** áéëÜ iðiñâß íá ÷ñçóëiðiéçèåß êáé Ýûù áðü ôi **KDE** iå ôçí ååêååðÜóðååç ôiö x11/kdebase3. Í **Konqueror** åßíáé ðíëý ðåñéóðúðâñi áðü Ýíåò áðëüö õðëëiñâðñçôþ, åßíáé åðßóçò áéá ÷åéñéóðþ áñ÷åßùí êáé ðññâñâñiá ðñiâiðþ ãñ÷åßùí ðíëöiÝóùí.

Í **Konqueror** äéåðßèåðåé åðßóçò iå Ýíå óåå åðü plugins, óóï misc/konq-plugins.

Í **Konqueror** õðiöôçñßæåé åðßóçò **Flash** êáé ié ó÷åðééÝð iäçåßåò (How To) åßíáé äéáèÝóëiåò óóï <http://freebsd.kde.org/howtos/konqueror-flash.php>.

## 7.2.7 Chromium

Í **Chromium** åßíáé iéá åöáññäÞ browser áíñééöíý êþäééå ðiö óóï ÷åýåé óóç ååëðßùóç ôçò åìðåéñßåò ôiö ÷ñþóðç ðáñÝ÷iðåå Ýíå õðëëiñâðñçôþ i iðiðið åßíáé åóðåéÝóðâñiò, óá÷ýðâñiò êáé ðéi ðéé åðâæåñüö. Í **Chromium** ðáñÝ÷åé åðíáðüðçôå åiðÜéðçò óâëßäùí óá éáñòÝéåò, áðiêéåðéòü áíáððüìâñiú ðáñáèýñùí (popup blocker), ðññüðèåðåå (extensions) êáé ðíëëÜ áéüìá. Í **Chromium** åßíáé ôi ñäi áíñééöíý êþäééå óóï iðiði ñáóßæåðåé i õðëëiñâðñçôþ Google Chrome.

Í **Chromium** iðiñâß íá ååêåååðååðå åðü ðáéÝòi, iå ôçí åíðiðþ:

```
# pkg_add -r chromium
```

ÅíáëéåêóéêÜ, iðiñâßôå íá iåðååñëùððóåå ôiö **Chromium** ÷ñçóëiðiéþíðåò ôç ÓðëëiâÞ ôuí Ports:

```
# cd /usr/ports/www/chromium
# make install clean
```

Óçìàßùóç: Í Chromium áââéâèéóôÜðáé ùò /usr/local/bin/chrome êáé ü÷é ùò /usr/local/bin/chromium.

## 7.2.8 Í Chromium êáé ôï Ðñüóèåôï ôçò Java

Óçìàßùóç: Óçí áíüôçôá áôôþ èâùñïýìå üôé Ý÷åôå þäç áââéâóôþóåé ôïí **Chromium**.

Åââáôáóôþóå ôï **OpenJDK 6** iÝóù ôçò Óðëëïäþò ôùí Ports, ãñÜöïíðåò:

```
# cd /usr/ports/java/openjdk6
# make install clean
```

Ðåéôá, áââáôáóôþóå ôï java/icedtea-web áðü ôç Óðëëïäþ ôùí Ports:

```
# cd /usr/ports/java/icedtea-web
# make install clean
```

Îâééíþóå ôïí **Chromium** êáé ðëçêôñïëäþóå about :plugins óôç ãñáïþ áéâðèýíóåùí. Èá ðñÝðåé íá äâßôå ôï IcedTea-Web íá àìöáíßæåôáé ùò Ýíá áðü ôá ðñüóèåôá.

Áí ôï ðñüóèåôï áâí àìöáíßæåôáé ôïí **Chromium**, áâôåëÝóôå ôéò ðáñáéÜðù áíöïëÝò êáé áðáíâééíþóå ôï ððëëïíåôñçôþ óáò:

```
# mkdir -p /usr/local/share/chromium/plugins
# ln -s /usr/local/lib/IcedTeaPlugin.so \
/usr/local/share/chromium/plugins/
```

## 7.2.9 Í Chromium êáé ôï Ðñüóèåôï Adobe Flash

Óçìàßùóç: Óçí áíüôçôá áôôþ èâùñïýìå üôé Ý÷åôå þäç áââéâóôþóåé ôïí **Chromium**.

Æá ôç ñyéiéóç ôïð **Chromium** áéá ÷ñþóç íå ôï ðñüóèåôï Adobe Flash, ÷ñçóëïðïéþóå ôéò íäçâßåò áéá ôïí Firefox. Ôïí ðñïçäïýìåí óýíååôï èá âñâßôå ðëþñåéò íäçâßåò áéá ôçí áââéâðÜðååç ôïð Adobe Flash óôï FreeBSD. Äáí áðâéðíýíðåé áðéðëÝii áþiaôá, êáéþò í **Chromium** iðññåß íá ÷ñçóëïðïéþóåé êÜðïéá ðñüóèåôá áðü Üëëïðð öðëëïíåôñçôÝð.

## 7.3 ÅöáñiiäÝò Áñáöåßïõ

¼óï áöïñÜ ôéò áöáñiiäÝò ãñáöåßïõ, ié iÝié ÷ñþóåôå õð÷íÜ áíáæçöïýí iéá êáéþ óïðþôå áöáñiiäþí þ Ýíá öéëéüü áðâíâññååðôþ êâéïÝiið. Áí êáé êÜðïéá ãñáöéêÜ ðáñéåÜëëïðð åñðùò ôï **KDE** ðáñÝ÷ið ðç áééþ ôïðð ôïðþôå áöáñiiäþí ãñáöåßïõ, áâí ôðÜñ÷åé ûóôüöi ðññåðéëåñíÝíç áöáñiiäþ. Óï FreeBSD ðáñÝ÷åé üôé ÷ñâéÜæåóôå, Üð÷åôå áðü ôï ðáñéåÜëëïí áññååðþåò óáò.

Ôi òìÞìá áðôüü êáëýðôåé ôéò ðáñáêÜðù áöáññäÝð:

¼ññá ÅöáññäÞò	Áðáéöýìåñé Ðüññé	ÅæáóÜóôáóç áðü Ports	ÂáóéêÝð ÅñáñôÞóåéò
<b>KOffice</b>	ëßäíé (âæáöñéÜ)	âæñéÜ	<b>KDE</b>
<b>AbiWord</b>	ëßäíé (âæáöñéÜ)	âæáöñéÜ	<b>Gtk+ P GNOME</b>
<b>The Gimp</b>	ëßäíé (âæáöñéÜ)	âæñéÜ	<b>Gtk+</b>
<b>OpenOffice.org</b>	ðíëëið (âæñéÜ)	âæñéñåôééÜ âæñéÜ	<b>JDK™, Mozilla</b>
<b>LibreOffice</b>	ó÷åðééÜ âæñéÜ	ðæñÜóôéá	<b>Gtk+ P KDE/ GNOME P JDK</b>

### 7.3.1 KOffice

Ç ëíéñüôçôá ôiô KOffice áðiðëßæåé ôi âñáöééü ôçò ðáñéáÜëéï iá íéá ôiôßôá áöáññäþí âñáöåßïð ðiô ìðiñåß íá ÷ñçóéïðiéçèåß éáé Ýìù áðü ôi **KDE**. ÐáñééäiâÜíåé óá ÓÝóóñá ááðééÜ ðñiññÜñáðá ðiô ìðiñåßôå áðßbçò íá âñåßôå éáé óá Üëéåð ôiôßôååð áñáöåßið. Ôi **KWord** áßíáé i áðåññáóôÞò éâéïÝíð, ôi **KSpread** áßíáé ôi ðñüññäiâðá ððtëiäéóééþí öýëéüí, ôi **KPresenter** áéá ÷âéñßæåðáé ôéò ðáññðóéÜðåéò, áíþ ôi **Kontour** óáð áðéôñÝðåé íá äçíëiññÞóååðá Ýâññáðá iá áñáöééÜ.

Ðñéí áâæáðåóðÞóååð áiô ðâéñðôåðá ðiô **KOffice**, áââáéùèåßôå üöé Ý ÷åðå áíáíåùíÝíç Ýéäïóç ôiô **KDE**.

Ãéá íá áâæáðåóðÞóååð ôiô **KOffice** ùò ðáéÝði, äþóðå ôçí áêüëiðèç áíðiëÞ:

```
# pkg_add -r koffice
```

Áí ôi ðáéÝði áâí áßíáé áéáèÝóéï, ìðiñåßôå íá ÷ñçóéïðiéÞóååð ôçí ÓðëëiðP ôùí Ports. Áéá ðáñÜäåéäiâ, áéá íá áâæáðåóðÞóååð ôiô **KOffice** áéá ôiô **KDE3**, áñÜøðå:

```
# cd /usr/ports/editors/koffice-kde3
# make install clean
```

### 7.3.2 AbiWord

Ôi **AbiWord** áßíáé Ýíá áæåýèåñí ðñüññäiâá áðåññáóßáò êâéïÝíð, üííëí óôçí áßóèççóç êâé ôçí áiöÜíéóç iá ôi **Microsoft Word**. Áßíáé êáðÜëéçëi áéá ôçí ðëçêôññëüñççóç Üññññí, áñññÜðùí, áíáöiñþí, ððåññðóåññí ë.i.é. Áßíáé ðíëý áñþäiñí, Ý ÷åé áñéåðÝð áðíáðüôçôåò êâé áßíáé áééåßðåññá öééééü óði ÷ñÞóôç.

Ôi **AbiWord** ìðiñåß íá áéðÜäåé P íá áíÜäåé áñ ÷åßá áéÜðiññü ïññðþí, ðáñééâiâññíÝíñí êâé êÜðiéñí êéåéóðþí üðùò ôi .doc ôçò Microsoft.

Ôi **AbiWord** áßíáé áéáèÝóéï ùò ðáéÝði. Ìðiñåßôå íá ôi ââæáðåóðÞóååð áñÜöiiðåò:

```
# pkg_add -r abiword
```

Áí ôi ðáéÝði áâí áßíáé áéáèÝóéï áéá êÜðiéï ëüäí, ìðiñåßôå íá ôi ñåðåññüôôßôåðå áðü ôçí ÓðëëiðP ôùí Ports. Óå áðôÞ ôçí ðáññßðôùóç ðééáíþò íá áâæáðåóðÞóååð íåþðåñç Ýéäïóç óá ÷Ýóç iá ôi Ýóééï ðáéÝði. Ìðiñåßôå íá ôi êÜíåðå ùò áíþò:

```
# cd /usr/ports/editors/abiword
# make install clean
```

### 7.3.3 Öi GIMP

Õi **The GIMP** ábíráé Ýíá eáéáþóðáñá áíðáeéáí Ýíí ðññüáñáííá áéá ÷ áßñéöçó áñáööééþí áéá áçìéíöñáþá áééüííúí þ áðáíñáñáóþá öùöíäñáöéþí. Íðiñáþ íá ÷ ñçóëíïðíëçéåß úò áðëü ðññüáñáííá æùñáñáöééþò þ óái óíðþóá áðáíñáñáóþáð áéé áéüñèùöçó öùöíäñáöéþí. ÐâñéÝ ÷ áé íåãÜëí áñééíü áðü plugins áíþ áéáéÝóåé éáé scripting interface. Õi **The GIMP** íðiñáþ íá áéááÜóåé éáé íá áñÜþáé íåãÜëí öÜóíá áñ ÷ áßúí áééüííáò. ÐâñééáíáÜíáé áðþóçó áéáðáöÝò áéáóýíäáöçó íå óáñúñóÝò éáá tablets.

Íðiñåßôå íá åæéáôáóôÞróåôå ôi ðáêÝôi äßiiíôáò ôçí áíôiëP:

```
# pkg_add -r gimp
```

```
# cd /usr/ports/graphics/gimp  
# make install clean  
# cd /usr/ports/graphics/gimp-manual-pdf  
# make install clean
```

**Óciàßùóç:** Í éaoôÜëiäìò **graphics** (<http://www.FreeBSD.org/ports/graphics.html>) ôçò óoëëiäþò ôúí Ports Ý :åé åðßöçò ôçí ôðü åÝééïç Ýéäïóç ôçò åöáñïäþò **The GIMP** óôï **graphics/gimp-devel**. Íðiñâßôå íá åñâßôå ôçí **HTML** Ýéäïóç ôïô åå :åéñéäßiö, **The Gimp Manual** óôï **graphics/qimp-manual-html**.

### 7.3.4 OpenOffice.org

Óři **OpenOffice.org** ðåñéÝ ÷ áé iüéåò ðéó ãðáñáßöçôåò åöáñíïäÝ ðó óá iéá ðéÞpñc õíðößöå åöáñíïäþí ãñáðåßíö: åðåñíñáåöóÞ êåéíÝñö, õðíëíæööéü öýëëí, áéá ÷ áéñéööÞ ðánñööéÜóåùí éáé ðñüñáñíïá ó ÷ åðßáöçö. Óři ðåñéåÜëëíí ãñááåößöåò ñiö åßíáé ðíëý üiiéí íå Üëëåò ñiößöåò ãñáöåßíö, êáé iðiñåß íá ÷ ñçöéíiðíéÞoåé áéÜöñiöö åçíiöééåßö ðýöiöö ãñ ÷ åßüí. Åßíáé áéáéÝ öéíí óá ðíëëÝ ðó áéáöiññåöééÝ ðó åëþößöåò, ôüöi òò ðñiö ñi ðåñéåÜëëíí ãñááåößö üöi áéá ùò ðñiö ðá eäééÜ êáé ñiö iñéñáöéü Ýéåå ÷ i.

І їðâїâїãñãáóðþò êâéï Ýíï òïõ **OpenOffice.org** ð-ñçóëiiðëéåß âãâãáþþò iiñþþ Áñ ÷ åßiõ XML ãéá áóïçï Ýíç öïñçöüöçöåá êéåé åðâééíßá. Óí ðñüäñãíïå ððíëïæóôéêþí öýëëùí æéåé Ýôåé æëþóå íâéññíåîðíëþí êáé iðíññåß íá æáðoóñâåéåß ià åñüôðâñééÝò åÜôåéò åââñíï Ýíùí. Ôí **OpenOffice.org** åßíåé óóâæðñþ åðáññïðþ ééå æéôðâæðþóéé åãâãáþþò óóå Windows, ôí Solaris™, ôí Linux, ôí FreeBSD, êáèþþò êáé óóï Mac OS X. Ðâññéóðüôðâñåò ðëçñïðïñßåò æáé ôí **OpenOffice.org** iðíññåßðå íá åñâßþóå óóç æéôðâæðþí ðíðíëåðþå ôíõ OpenOffice.org (<http://www.openoffice.org/>). Äéá ðëçñïðïñßåò ó ÷ åðééêÜ ià õçí Ýéäïöç æéå FreeBSD, êáèþþò êáé æéå áðâðéåðþåò êáðÝâáóíá ðáéÝôùí, ÷ñçóëiiðíéÞóôå õçí æéôðâæðþí ðíðíëåðþå FreeBSD OpenOffice.org Porting Team (<http://porting.openoffice.org/freebsd/>).

Ãéá íá åæáôáóôPóåôå õi **OpenOffice.org**, ãñÜøôå:

```
# pkg_add -r openoffice.org
```

**ÓciáðBúóč: Áí ðíñcóélliðiéáðBóá -RELEASE** Ýéaíóč óið FreeBSD, óið ÓáñáðÜíu ðíñÝðááé íá äiðóðÝðááé.

ÄéáóïñláðééÜ, éá ðñÝðáé íá äáßöô ñçí äéêððåéþ ðíðíèáðßá óið FreeBSD **OpenOffice.org** Porting Team áéá íá êáðâáðÚóáðâó êáé íá äáéáðâóððÞóáðâó ñi áíðßóðíé-í ðáéðÝóí ÷ñcóéëðíéþíðâó ôçí pkg\_add(1). Õúóí ç ðñÝ-ðíðá ùóí êáé ç ððü íá Ýéééïç Ýééäóç äáßíáé äéáéðÝóéíâó åéá êáðÝâáðâó ñið ñçí ðáñáðÜíù ðíðíèáðßá.

Áðü ôç óðéäìP ðið oï ðáêÝ oï åâæåáóôåèåß, ðñÝðåé íá ãñÜøåôå áðëþò ôçí ðáññæÜøù áîðiëP æá íá åêôåæÝóåôå öï OpenOffice.org:

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**ÓčiàBúóć:** ÉádÜ óči ðñíþóć áéñéBíçóć, éá óáò Áññílõiń áé Üöříñåó áññúðþóáéè óáé éá áçìéiññäçèáß Yíáò éádÜëíäiò iá üññíá .openoffice.org IYóá óóíí ðñíþóüðééü óáó éádÜëíäi.

Áí óá ðáéÝóá ðiõ **OpenOffice.org** äáí áßíáé äéáéÝóéíá, Ý÷åôå ðÜíóá ôçí áðééïäP íá laðóáæùðóðßóåôå ðií áíðßóöiié ÷í port. Ùóóüöií, íá Ý÷åôå ððüøç óáò üðé áðóöü áðáéöåß áñéåðöü ÷þñíi ôóï äßóéí éáé ðií ñðéáóöåß éáé ðÜñá ðiëý ÷ñüíi ãéá íá iëïéëçñùèåß.

```
# cd /usr/ports/editors/openoffice.org-3  
# make install clean
```

**ÓrciáBúócs:** Áí ÚYéádá íá áciéiöñáBúódá íéá Yéäiöç iá óééò áéééYò óád ðiðéééYò nñöèiBúáéd, áíðééádáóðBúódá òcí ðiñçaiyílaíç ãñáliiþ áiðíreþí iá òcí áðüliáíç:

```
# make LOCALIZED_LANG=your language install clean
```

Ðarf Ýðæð ía á íðéðáðóðþóðaða óði *your\_language* ía óði óúðóðu ISO êuðæðu áæá ðó ãæþóðá óáð. Ç ëðóðá ìa óði ðò ðiðiðóðñéæðu ía iðiðu êuðæðiýó aæðóðþí áðibíáé áæá Ýóéic óði áñ ÷ áði files/Makefile.localized, óði iðiðiñ áñ ðóðéðáðaé óði ðí êað Úðeíiñ iðið port.

Ílueéò áBífaé áðôü, iðiñâßôå íá íâééíÞóåðå ôcí áðoáñiiäP **OpenOffice.org** áßiiíôáò ôcí áðoíëP:

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### 7.3.5 LibreOffice

Ôi **LibreOffice** ábíáé ieá åeåyéåñc óiõßôá åöáññiräþí ãnáõåßiõ ç iðibá áíáðôýóoåðáé áðü ôi The Document Foundation (<http://www.documentfoundation.org/>). Ábíáé óoïiááðP iå ðéð Üeëåð ãiùóðÝð óiõßôåð ãñáõåßiõ êáé åeåóðbèåðáé åeá ôeð ðåñéooûðåñåð ðéäoðüñiåð. Ðñüêåðáé åeá fork ôçò ãiùóðPø åöáññiräþPø **OpenOffice.org** ç iðibá ðåñéæáíåÜíäé üeá ðá áðáñáßbôçóá ieáð óiõßôåð ãñáõåßiõ: åðâíññáðóðP êåéíÝíiõ, ððiëræéooéêú öyéëí, ðñüññáìíà ðáññiðoéÜðåùí, ðñüññáìíà ó÷åßbáóçò êáé Ýíá ãnáãéåßí ãeá åçíëiõñáßá êáé åðâíññáðóßá íaëçìáðééþí öyðùí. ÅéáðBéåðáé óå ðéþPø ðéññáðóþí — ç åéåëíPø ððiõóðPñéíç åðâéðåßíåðáé iÜeëéóðå ðüñiõi ôi ðåñéäÜeëíi ñoí êáé óoå åðéðééÝíi ðñññññáÜíåðå ãeÝá ÷iõ mñëiññáðBáó êáé åeåééþí.

Í Æðalíðanáðóþó êðái Ýfnið óið OpenOffice ÷ nícoðeiiðriæð áðaðaðþó iiñþóþ Áñi ÷ ábíð XML ói iðibír áðaðóðaðbæðaé aðíçí Ýic öiñçöðuðóðá éðaé áðaðeéibá. Ói ðiðiæðaðeéü öy়eei áæaé Ýðað leá aðþóðaá iænñiðiðreþí éðaé iðiñða í aæaððfääðaðb iå aðiñðaðnæé Ýða áÜðaðe ãðaðiñÝfui. Ói LibreOffice ábíráð Þaç óðaðaðnú éðaé aðaðbæðaá óða ãðaðiñðaðe ðaé Windows, Linux, FreeBSD éðaé Mac OS X. Æða ðaðnæðuðaðnåð ðeçñiðiñþbåð ó÷aðeé Ú iå ói LibreOffice áðeóðaðbóða óçí aæeððaðb òiðiæðaðbá ðið (<http://www.libreoffice.org/>).

Ãéá íá åæåôáóôþóåôå ôi **LibreOffice** áðü Ýôïëii ðáêåôü, æñÜøôå:

```
# pkg_add -r libreoffice
```

**Óçìàßùóç:** Óï ðáñáðÜíù èá ëåéôïõñäþóâé áí ôñÝ÷åôå êÜðïéï åðßóçïï -RELEASE ôï FreeBSD.

ÌåðÜ ôçí åâéâôÜóôâóç ôïð ðáêÝôïð, ÷ñâéÜæâôâé íá ãñÜøâôå ôï ðáñáêÜôù ãéá íá åêôâéÝóâôå ôï **LibreOffice**:

```
% libreoffice
```

**Óçìàßùóç:** ÊáðÜ ôçí ðñþôç åêéßíçóç, èá óáò åßíïðí êÜðïéâò åñùðþóâéò êáé èá åçíéïõñâçèåß Ýíáò êáðÜëíïò .libreoffice iÝóá óóïï ðñïóùðééü óáò èáðÜëíï.

Áí åáí ôðÜñ÷ïðí åéáéÝóéïá ðáêÝðá ãéá ôï **LibreOffice**, Ý÷åôå åðßóçò ôçí åðééïðí ìá ôï ìåðâæñðôðþóâôå åðü ôï åíðþóôïé÷ï port. Ëá ðñÝðåé ùóôüïð íá ãíùñßæâôå üöé áðáéôåßðâé åñéâôüò ÷þñïð ôóï åßóëï êáé åñéâôüò ÷ñüñïð ãéá ôç ìåðâæþþóâéóç.

```
# cd /usr/ports/editors/libreoffice
# make install clean
```

**Óçìàßùóç:** Áí èÝéâôå íá åçíéïõñäþóâôå ìéá Ýéäïóç ìå õðïóôþñéïç êÜðïéâò óðâæâéñéïÝíçò åëþóâò, åíðééâôåðþóâå ôçí ðñïçäïýïåíç åíðïëþ ìå:

```
# make LOCALIZED_LANG=your_language install clean
```

Èá ðñÝðåé íá áíðééâôåðþóâå ôï your\_language ìå ôï òúðóü ISO êùäééü ôçò åëþóâò ðñï åðééëðåßðå íá ÷ñçóéïðíéþóâôå. Åéá íá åñâßðå ôïí êùäééü, ååßðå ôï áñ÷åßï Makefile ôïð port êáé åéäééüðâñá ôçí åíüðçôå pre-fetch.

Ìðïñâßðå Ýðåéâå íá åêôâéÝóâôå ôï **LibreOffice** ÷ñçóéïðíéþíðå ôçí ðáñáêÜôù åíðïëþ:

```
% libreoffice
```

## 7.4 ÐñïäñÜìáôå Ðñïäïëþò ÅääñÜöùí

Ðñüðóâå Ý÷ïðí åßíâé åñéâôÜ åçíïõééåßò êÜðïéâò íÝåð ïïñöÝð áñ÷åßùí. Óá ðñïäñÜìáôå Ðñïäïëþò ðñï åðééöïýíðåé åéá ôá áñ÷åßá åðôÜ þóùò íá ìçí åßíâé åéáéÝóéïá ôóï åáðééü ÿóôôçïá. Óóï ôïþá åðôü èá åïýïå ðùò ìðïñâßðå íá ôá åâéâôåðþóâôå.

Óï ôïþá åðôü êáéýðôåé ôéò åöáññäÝð:

14ññá Åöáññäþò

Åðáéôïýìåñé Ðüñïé

ÅâéâåðÜóôâóç áðü  
Ports

ÅáóééÝð Åñáñðþóâéò

¼ñíá ÅöáññäÞò	Áðáéöïýìáñé Ðüñïé	ÅæáóÜóôáóç áðü Ports	ÂáóéêÝð Åíáññþóåéò
<b>Acrobat Reader</b>	ëßäïé (åæáöñéÜ)	åæáöñéÜ	ÅðåäéêÞ óðìâáûôçðá ìå Linux (Linux Binary Compatibility)
<b>gv</b>	ëßäïé (åæáöñéÜ)	åæáöñéÜ	<b>Xaw3d</b>
<b>Xpdf</b>	ëßäïé (åæáöñéÜ)	åæáöñéÜ	<b>FreeType</b>
<b>GQview</b>	ëßäïé (åæáöñéÜ)	åæáöñéÜ	<b>Gtk+ P GNOME</b>

#### 7.4.1 Acrobat Reader®

ÐïëëÜ Ýðññáðá áæáÍýïðóáé ðëÝíï ùò áñ÷åßá PDF ôi iðibí õçìáßíáé “Portable Document Format” (ÖññçôÞ ìññöÞ ÅðññÜöiö). já áðü ôá óðíéöôþiaíá ðññññÜñáðá ðññññÜñáðéÞò áæá áðöü ôiï ôýði áñ÷åßùí åßíáé ôi **Acrobat Reader**, ôi iðibí ç Adobe áæáèÝðåé áæá Linux. Éâèþò ôi FreeBSD iðñññß íá ÷ñçóéiiðieÞóåé åêôåëÝðéíá ôiï Linux, ç åðáññäÞ åßíáé åðßóçò áæáèÝðéíç áæá ôi FreeBSD.

Ãéá íá åæáðáðóÞóåå õi **Acrobat Reader 8** áðü ôç ÓðëëiäÞ ôuí Ports, ãñÜøôå:

```
# cd /usr/ports/print/acroread8
# make install clean
```

Åáí õðÜñ ÷åé áæáèÝðéíï ðáêÝði, ëüäù ðåñéiñéóþí óôçí Üäåéá ÷ñþóçò.

#### 7.4.2 gv

Ôi **gv** åßíáé Ýíá ðññññáìá ðññññÜøò åæáñÜöùí áæá áñ÷åßá PostScript êáé PDF. Åßíáé áñ÷éëÜ åáóééîÝíí óôçí åðáññäÞ **ghostview** áæëÜ Ý÷åé êáéëýðåñç åìöÜíéóç ÷Üñç óðç åæáéëièþêç **Xaw3d**. Åßíáé åñþäññí, êáé ôi interface ôið åßíáé åâæÜðéáñi. Ôi **gv** Ý÷åé ðïëëÝð äðññðüôçðåð, üððò ðññññáðóïëéóïü áæé ïÝðåéëiò ÷áññéiy, åìöÜíéóç õðü êëßíáéå áæé åâðöþñóç åìöÜíéóçò åññññáðóáéñþí (antialias). Ó÷åäüí ëÜðå åæáðññáðá ôið iðñññß íá åêôåëåððåß ôüöri áðü ôi ðëçêôññüäéí üðií áæé áðü ôi ðíñðþéé.

Ãéá íá åæáðáðóÞóåå õi **gv** ùò ðáêÝði, ãñÜøôå:

```
# pkg_add -r gv
```

Áí ôi ðáêÝði åâí åßíáé áæáèÝðéíï, ìðñññßôå íá ÷ñçóéiiðieÞóåå õçí ÓðëëiäÞ ôuí Ports:

```
# cd /usr/ports/print/gv
# make install clean
```

#### 7.4.3 Xpdf

Áí èÝðåå Ýíá iéññü ðññññáìá ðññññÜøò áñ÷åßùí PDF áæá ôi FreeBSD, ôi **Xpdf** åßíáé åæáöñý êáé áðñññðééü. Åðáéôåß åëÜ÷éóôiöò ðññññÜøò êáé åßíáé áæéåßôåñá óðáèåññ. ×ñçóéiiðieåß ôéò åáóééîÝð åññññáðóáéñÝð ôuí X êáé åâí áðáéôåß ÷ñþóç ôið **Motif** P Üëëçò åñññéåéëièþêçò ôuí ×.

Ãéá íá åæáðáðóÞóåå õi **Xpdf** ùò ðáêÝði, åþóåå ôçí åíñññÞ:

```
# pkg_add -r xpdf
```

Áí ôi ðáé Ýôi äái åßíáé äéáè Ýóëii P ðñiôéi Üôå íá ÷ñçóëii ðié Þóåôå ôçí ÓöëëiäP ôùí Ports, ãñ Üôå:

```
# cd /usr/ports/graphics/xpdf  
# make install clean
```

Íluééó iieíéecñùéåß ç ååéåó Üóôáóç, iðíññåbôå íá îåééíÞóåôå ôi **Xpdf** êáé íá ÷ñçóéiiðíéÞóåôå ôi äåß ðëþêóñi ôið ðíóðéééiy áéá íá åiâññäiðíéÞóåôå ôi iåññý.

#### 7.4.4 GQview

Áí èÝëåôå íá áâæáôáóôÞóåôå ôïi **GQview** ùò ðáêÝöi, áñÜøôå:

```
# pkg_add -r gqview
```

Áí ôi ðáéÝôi äái åßíáé äéáèÝóêii, þ ðñiôéiÜôå íá ÷ñçóéiðiéÞóåôå ôçí Óöëëiäþ ôùí Ports, ãñÜôå:

```
# cd /usr/ports/graphics/gqview  
# make install clean
```

7.5  $\times$  ñciáôiiéêíííéê Ýò ÅöáñiiäÝò

Áí, áéá iðieiäÞðriôá èüäí, èÝëåôá íá áéá ÷ áéñßæåóôá óá ÷ ñçìåöiiééíñíéêÜ óáð iÝòú òið FreeBSD desktop óáð, ððÜñ ÷ iði ëÜðiéåð óé ÷ õñ Ýò êáé áýéïéåð óóç ÷ ñÞóç åöáññíäÝò, Ýòiéïéåð ðñiò åâéåðÜóôáóç. ïñéói Ýíåò áðü áðó Ýò åßíáé óóíåâåðÓò íå áéääääñíÝíåò iiñöÝò áñ ÷ åßùí, üðùò áðó Ýò ðið ÷ ñçóöiiðíéýíôáé óóá Ýâññáð áið **Quicken®** Þ òið **Excel**.

Ôř ôřřia áoňü êáëýðôåé ôéò åöáñìřáÝò:

¼ññá Åöáññäþò	Áðáéöiyìåñíé Ðüñíé	ÅæáôÜóôáóç Áðü Ports	ÂáóéêÝò Åñáñôþóåéò
GnuCash	ëßñíé (åëáöñéÜ)	âáñéÜ	<b>GNOME</b>
Gnumeric	ëßñíé (åëáöñéÜ)	âáñéÜ	<b>GNOME</b>
Abacus	ëßñíé (åëáöñéÜ)	åëáöñéÜ	<b>Tcl/Tk</b>
KMyMoney	ëßñíé (åëáöñéÜ)	âáñéÜ	<b>KDE</b>

## 7.5.1 GnuCash

Ôi **GnuCash** åbñiaé iÝñiò ôçò ðñiòðÜeåéåò ôiõ **GNOME** íá ðänÝ ÷ åé öééééÝð åöáñiiäÝð óóïò ðåéééíýò ÷ ñPóðå. ïå ðiõ **GnuCash**, iðññåßôå íá êññåðÜôå eïäññéåðiü ðùí åöüäñí ééé åññüäñí óåð, ðùí ðñáðåæééþí óåð eïäññéåðiþí ééé ðùí iåðiõ ÷ þí óåð. ÅééåÝðåéé ðåññåðÜeëí åññåðßåò ði iðñþi åbñiaé åýéëëí óóç ÷ ñPóç ÷ ùñþò íá ÷ ñåéÜæåðåéé åééåßôåñç åééÜecóç, åééÜ åbñiaé ðåðööù ÷ ñiñí åéé åðéé åðååååéíåðééü.

Óðí **GnuCash** ðáðÝ ÷ áé Ýíðóðíý óýðóðíý áéðáð ÷ þñçóð, éðññáð ÷ éðü óýðóðíý èíðáñéáðíþí, ðíðëÜ ðéÞéðôñá óðíðóññáýðáñú ðéçéðôñíëíäðíð, éáèþò éáé íàðüäðíð áððñüðáðçò óðíðëÞñúðçò. Íðiññáð íá áéá ÷ ùñññóáé íéá óðíðééáðþ óá ðíðëÜ éððóññáñþ ðíðíðáð. Óðí **GnuCash** ïðiññáð íá áéó Üððáé éáé íá óððá ÷ ùññýðóáé áñ ÷ áðá QIF ðíð **Quicken**. Íðiññáð áððñþò ðíðóðíð ðíð òððéóðóðíð ðóðñéóðóðíð ðíð ðáðéíðþò ïññó Ýðó ñìðññíçíéþí áéé ìñéóðáðééþí ïññÜððñ.

Ãéá íá åãêáôáôPóåôå ôií **GnuCash** óôii óýóôçìá óáò, ãñÜøôå:

```
# pkg_add -r gnucash
```

Áí ôi ðáéÝôi äái åßíáé äéáèÝóéii, iðiñåßôå íá ÷ñçóéiiðiéÞóåôå ôçí ÓðéëiäP ôùí Ports:

```
# cd /usr/ports/finance/gnucash  
# make install clean
```

## 7.5.2 Gnumeric

Ãéá íá åæêáôáóôÞóåôå ôï **Gnumeric** ùò ðáêÝôï, ãñÜøôå:

```
# pkg add -r qnumeric
```

Áí ôi Óáé Ýóii ááí áßíáé äéáèÝóeií, iðiññåßöå íá ÷ñcöéiiðiéÞóåôå ôcí ÓðeeëràÞ ôùí Ports, áñÜöiñôåò:

```
# cd /usr/ports/math/gnumeric  
# make install clean
```

### 7.5.3 Abacus

Óří **Abacus** álbíáé Ŷíá ičenňü hâáé áyéieři óóç ÷ níPóč oðřeřiaéóóéeu öyéëi. ĐåñeeäiaňÜřáé ðířeë Ŷò áiõùňáouì Ŷíåò oðõíáňňoPóáéò iě iðiňBåò álbíáé ÷ níPóéiňåò óá aëÜöřňá ðåäBá, üðùò ç óóâóđéóóéèP, óá ÷ níçlåđiňéiřiňééÜ hâáé óá iáčeřiňáóóéèÜ. Iðiňňab íá áeoÜňaaé hâáé íá áiÜňaaé aň ÷ abá ôiõ **Excel**. Óří **Abacus** iðiňňab íá ðaňÜňaaé ŶíňřiňiňóPò PostScript.

Æá íá åæåôáóôÞóåôå ôi Abacus ùò ðáêÝôi, æñÜøôå:

```
# pkg add -r abacus
```

Áí ôi Óáé Ýóii ááí áßíáé äéáèÝóeií, lðiññåßöå íá ÷ñcöéiiðiéÞóåôå ócí ÓðeeëráP ôuí Ports, áñÜöiñôåò:

```
# cd /usr/ports/deskutils/abacus  
# make install clean
```

## 7.5.4 KMyMoney

Ôi **KMyMoney** áßíáé iéá áöáññáP äéá÷åßñéóçò ôú ðñiöùðéêþí óáò iéëiññéþí, öôéáñÝíç aéá ôi ðáñéâÜëëí **KDE**. To **KMyMoney** oöi÷åýáé íá ðáñÝ÷åé aéá íá áíóùìáþóáé üëåò ôéò ëåéöiññáþåò ðiö äéåðßèáíðáé óá áíðßööíé÷åò áiðñééÝð áöáññáÝð. Ôi **KMyMoney** iðiññáß íá aéóÜäåé añ÷åßá oöi ðñiöýðiö QIF (Quicken Interchange Format), íá ðçññáß éåðáññáöP ôú ðåðáÿýóåùí óáò, íá ÷åéñßæåðáé ðiøééáðéÝð mîéóìáðééÝð iiiiÜäåò aéá íá ðáñÝ÷åé ðeþeëò áíáöiñþí. IÝóá áðü íå ÷ùñéóöü plugin, ðáñÝ÷åðáé åðßþóçò ç äöíáðüöçôá áéóáññáP ðañ÷åßùí OFX.

Aéá íá áâéáðáðóÞöåðå ôi **KMyMoney** ùò ðáéÝði, áéðåéÝóðå ôçí áíóïëP:

```
# pkg_add -r kmymoney2
```

Áí ôi ðáéÝði áâí áßíáé aééáéÝóði, iðiññáþóå íá ÷ñçóéiñðiéÞöåðå ôçí ÓðëëíñP ôú Ports, üðùò öáßíåðáé ðáñáéÜðù:

```
# cd /usr/ports/finance/kmymoney2
# make install clean
```

## 7.6 Ðåñßëçøç

Áí aéá ôi FreeBSD áßíáé aéíiöééÝð óóïöö ðáññ÷åßò Internet (ISPs) aéá ôçí áðüäíóç aéé ôç óðåèåññüöçôá ôiõ, áßíáé åðßþóçò ÝóðiññééÝði ñçóéiñðiéÞöåðå ôçí ÓðëëíñP ôú Ports, üðùò öáßíåðáé ðáñáéÜðù: (<http://www.FreeBSD.org/applications.html>) P ports (<http://www.FreeBSD.org/ports/index.html>), iðiññáþóå íá aéíiöéñðöåðå ôi ðÝéåéi desktop ðiö aéëýðöåé üëåò ôéò áíÜäåò óáò.

ÐáñáéÜðù, öáßíåðáé iéá ãñÞaiñç ðåñßëçøç üëüí ôú desktop áöáññäþí ðiö ðáññöóéÜðóóçéáí óá áðöü ôi êåöÜeáéi:

¼ññá ÁöáññáPò	¼ññá ÐáéÝòiö	¼ññá Port
<b>Opera</b>	opera	www/opera
<b>Firefox</b>	firefox	www/firefox
<b>Chromium</b>	chromium	www/chromium
<b>KOffice</b>	koffice	editors/koffice-kde3
<b>AbiWord</b>	abiword	editors/abiword
<b>The GIMP</b>	gimp	graphics/gimp
<b>OpenOffice.org</b>	openoffice	editors/openoffice.org-3
<b>LibreOffice</b>	libreoffice	editors/libreoffice
<b>Acrobat Reader</b>	acroread	print/acroread8
<b>gv</b>	gv	print/gv
<b>Xpdf</b>	xpdf	graphics/xpdf
<b>GQview</b>	gqview	graphics/gqview
<b>GnuCash</b>	gnucash	finance/gnucash
<b>Gnumeric</b>	gnumeric	math/gnumeric
<b>Abacus</b>	abacus	deskutils/abacus
<b>KMyMoney</b>	kmymoney2	finance/kmymoney2

# ÊåöÜëáéï 8 ĐïëõìÝóá

Åðåîåñãáóßá áðü öii Ross Lippert.

## 8.1 Óýíiøç

Ôi FreeBSD ððiðóðçñßæåé íað Üëc ðiðééëßá áðu êÜñðåð P÷ið, áðéðñ Ýðiðíðå óáð Ýðóé ía áðiðéáýóðå ððçëPð ðéóðüðçôáò P÷i áðu óií ððiðéáéóðP óáð. ÐâñééáìaÜíðåðé c äðiðóðüðçðá ía áðññÜðåðå êáé ía áðññÜðåðå P÷i MPEG Audio Layer 3 (MP3), WAV, êáé Ogg Vorbis êáèþò êáé ðiðéÜ Üëeá formats. Ôi FreeBSD Ports Collection áðßðçò ðâñéÝ÷åé áðñññíäÝò ðið óáð áðéðñ Ýðiðí ía áðiðññáðóðñðå óií c÷iññäöçìÝíí óáð P÷i, ía ðññiðéÝóðå ñ c÷cõééÜ áðÝ, êáé ía áðÝññåðå óðóðéåðÝò MIDI.

Íá ëbäi ðåéññåíåðéòiù, ói FreeBSD ìðiññåb íá ðòðiøðçññiåé áíåðåññåùñP áñ ÷ åßuì video éáé DVD. Í áñéèiùò ôuì åöåññiäþí ðiø êuæéëiðiëiýí, iàðåôññ Yðiòi, éáé áíåðåññÜäiòí æéÜöññiòò ôýðiòò video åßíáé ðeñi ðåññiñéóíYñiò áðü òiñ áñéèiù ôuì åöåññiäþí þ÷iø. Åéá ñáññÜäåéñlå, üðóáí ãññÜöçéå áðöü òi ëåßiññi, åáí ðòðPñ ÷ å êåiéÜ êåéP åöåññiäþ åðáíåññuæéëiðiñççò ñóç ñóðéëiñP ôuì Ports ôiø FreeBSD, ðiø èá ìðiññyóå íá ÷ñçðéññiðiëçéåß åéá iàðåôññiðP iàðåññy formats, üðòò ôiø audio/sox. Ðáñ' üëá åðöÜ, ôi ñiðßi óå åðöü òiñ ñáñYá, éáé üöi åöiññU ôi eïñéóíéü, aëëéÜæåé ñáññåäþá.

Ôi êåöÜëáéí áooü èá ðåñéäñÜøåé óá áðåñáßöçôá áßíáôá åéá ôç ñýëiéóç ôçò êÜñôåò P÷iö óáð. Ç ñýëiéóç êáé áåéáôÜóôáóç ôiö X11 (ÊåöÜëáéí 6) Ý÷åé Þäc öñiißößöåé åéá óá ðééáíÜ ðñïäéßíáôá õëééiy ôçò êÜñôåò åñáöééþí óáð, áí åéá iöññåß íá ÷ñåéÜæåðåé fá åöåñíüöåðåó êÜðéåò åéüìá ieññi-ññöèßöåéò åéá éåéýöåñç áíáðåñáåñüäP.

Áöiý äéáâÜóåôå áðôü öi êåöÜëáéi, èá iÝñåôå:

- Đùò íá ñõðèìßóåôå ðï óýóôçìá óáò þþóå íá áíáâñùñßæåôáé ç êÜñôá þ÷ïö óáò.
  - Íåèüäïòò ãéá íá åëÝâñåôå ôç èåéòïòññåßá ôçò êÜñôáò óáò.
  - Đùò íá åðééýóåôå ðññâëÞíåôå ó÷åðééÜ íå ôéò ñõðèìßóåéò þ÷ïö.
  - Đùò íá áíáðáñÜääôå êáé íá êuäéêíðïéÞóåôå MP3 êáé Üëëïòò ôýðïòò áñ÷åßùí þ÷ïö.
  - Đùò ððïóôçñßæåôáé ðï video áðü ðïí X server.
  - ÈÜðïéá ports áíáðáññùñÞò/êuäéêíðïíßçóçò video ðïò äßññòí êáéÜ áðïôåëÝóìáôá.
  - Đùò íá áíáðáñÜääôå DVD, êáé áñ÷åßá .mpg êáé .avi.
  - Đùò íá êÜíåôå rip ðï ðåñéå÷üìåñ CD êáé DVD óå áñ÷åßá.
  - Đùò íá ñõðèìßóåôå iéá êÜñôá ôçëåüñáóçò.
  - Đùò íá ñõðèìßóå Ýíá óáñùñÞ åééüñùí.

Đñéí äéáâÜóåôå áðôü ôi êåöÜëáéi, èá ðñÝðåé:

- Íá íÝñåôå ðùò èá ñõèìßóåôå êáé èá åãêáôåóôÞóåôå íÝí ðõñÞíá (ÊåöÜëáéí 9).

**Đĩa lõi kernel bị lỗi:** Ái ðñïøöðåèëþòåðå ía ðñïøöðåññòþøåðå íiðóóéëÜ CD ía ôçí áiðiëþ mount(8) èá ðñïøëëçèåß éåð' áeÜ ðéóöií ööÙëiá, þ ôóç ÷áéñüöðåñç ðåññëðòöñùöç *kernel panic*. ÔÝòéá ñYóá Ý÷iñi áiñáéëéåðiñYíåò êuáæéiñiðiñéþòåéò ðiñ äæáòñYíñiñi áðüñ ðiñ ôóñçéeeñiñYíñi ðýóóðçíá áññ ÷åðùiñ ISO.

## 8.2 Ñýèiéóç ôçò ÊÜñôáò <sup>1 ÷ iõ</sup>

ÓðíáéóöiñÜ áðüi ôii Moses Moore. Ååëöéþèçêå áðüi ôii Marc Fonvieille.

### 8.2.1 Ñõèìßæïiôáò ôi Óyóôçìá

Ðñéí íâééíÞóåôå, èá ðñÝðåé íá Íñâôå õi iiiiÝéï ôçò êÜñôáò ðiõ Ý÷åôå, ôi ieiéëçñùiÝí êýéëùiá ðiõ ÷ñçóéiiðieåß, êâéþò êáé áí åßíáé PCI P ISA. Òi FreeBSD ðiðiôçñßæåé íâåÜëç ðiééëßá êáñôþí P :iõ, ôüöi PCI üöi êáé ISA. ÅëÝâiôå ôéò ðiðiôçñéæuiåßå ðoóéåðÝð P :iõ ôðéò Óçìåéþóåéò Õëéëiý (<http://www.FreeBSD.org/releases/9.0R/hardware.html>) áéá íá åâßôå áí ç êÜñôá óåò ðiðiôçñßæåôåé. Óôéò Óçìåéþóåéò Õëéëiý áíáö Íñâôåé åðßóçò ðiëi ðñüäñâiìá iäPäçóçò ðiðiôçñßæåé ôçí êÜñôá óåò.

Åéá íá ÷ñçóéiiðieÞóåôå ôçí óðóéåðP P :iõ ðiõ áéáë Ýôåôå, èá ðñÝðåé íá õiñôþóåôå ôiñ êáðÜëëçëi iäçäü ðoóéåðPò. Åðöü iðiñâß íá åðéôå ÷éåß iâ äyïi ôñüðiõð. I åðéëiüöiâñiò åßíáé åðëþò íâ õiñôþóåôå Ýíá module (Üñèñùiá) áéá ôçí êÜñôá P :iõ óöií ðoñPíá, ÷ñçóéiiðieþíôå ôçí åîöiëP kldload(8), iâ ôç áiþèåéå ôçò åñâiìPò åíöiëþí:

```
# kldload snd_emu10k1
```

P ðñiøeÝôiñôå ôçí êáðÜëëçëc åñâiìP óöi áñ÷åßí /boot/loader.conf üðùò ðáñâéÜôù:

```
snd_emu10k1_load="YES"
```

Óá ðáñâðÜù ðáñâååßâiåôå åßíáé áéá iéá êÜñôá P :iõ Creative SoundBlaster® Live!. ÐðÜñ :iõi áéáëÝóéíá êáé Üëéá modules áéá êÜñôåò P :iõ êáé iðiñâßôå íá óå åâßôå ôöi áñ÷åßí /boot/defaults/loader.conf. Áí åâí åßôåå óßaiöñiò áéá ôi ðñüäñâiìá iäPäçóçò ðiõ ðñÝðåé íá ÷ñçóéiiðieÞóåôå, iðiñâßôå íá õiñôþóåôå ôi module snd\_driver:

```
# kldload snd_driver
```

Ðñüéåéåé áéá Ýíá iâôåå-ðñüäñâiìá iäPäçóçò, ôi iðiñi öiñôþíâé íâ iéáò üëá óå eëéÜ ðñüäñÜñâôå iäPäçóçò áéá êÜñôåò P :iõ. Iâ ôiñ ôñüði åðôü iðiñâßôå íá åðéôå ÷ýíâôå ôçí áíß ÷iâðöç áéá ôi òùôöü iäçäü. Iðiñâßôå åðßóçò íá õiñôþóåôå üëá óå ðñüäñÜñâôå iäPäçóçò iÝóù ðiõ áñ÷åßí /boot/loader.conf.

Áí åðéëðiåßôå íá åñâßôå ôi åðééååíÝí ðñüäñâiìá iäPäçóçò ôçò êÜñôåò óåò iâðÜ ôç öüñôùöç ôiõ snd\_driver, iðiñâßôå íá åéÝâiåôå ôi áñ÷åßí /dev/sndstat iâ ôçí áiþèåéå ôçò åíöiëP cat /dev/sndstat.

Iéá åâýôåñç iÝéïiò åßíáé íá iâôååëüôôßóåôå ôçí ðiðiôðPñéïc ôçò êÜñôåò P :iõ óåò, óôáôéêÜ, áðâôéåßåò óöií ðoñPíá. Ôi ðáñâéÜòù ôiPíá ðáñÝ÷åé ôéò ðëçñiöiñßôå ðiõ ÷ñâéÜæåôå áéá íá ðñiøeÝóåôå ðiðiôðPñéïc áéá ôi ðëééü óåò iâ åðôü ôñüði. Áéá ðáñéóóüôåñâò ðëçñiöiñßôå ò÷åðéêÜ iâ ôçí iâðâæþôôéóç ôiõ ðoñPíá, åâßôå ôi ÅâöÜëáéí 9.

#### 8.2.1.1 Äçìéïñäþíôåò ÐñiøáñiòiÝí ÐoñPíá iâ Óðiøôþñéïc <sup>1 ÷ iõ</sup>

Áñ ÷ééÜ, ðñÝðåé íá ðñiøeÝóåôå ôi åâíééü ðñüäñâiìá iäPäçóçò P :iõ (audio framework driver) sound(4) óöií ðoñPíá óåò. Èá ÷ñâéåóôåß íá ðñiøeÝóåôå ôçí åéüëiðëc åñâiìP óöi áñ÷åßí ñõèìßóåùí ôiõ ðoñPíá:

```
device sound
```

Ñåéôå, èá ðñÝðåé íá ðñiøeÝóåôå ðiðiôðPñéïc áéá ôçí êÜñôåò P :iõ óåò. ÐñÝðåé íá åiññßæåôå áðü ðñéí ðiëi ðñüäñâiìá iäPäçóçò ôçí ðiðiôçñßæåé. ÅëÝâiôå ôç ëßóôå ôùí ðiðiôçñéæuiåùí êáñôþí óôéò Óçìåéþóåéò Õëéëiý (<http://www.FreeBSD.org/releases/9.0R/hardware.html>), áéá íá êáèiñßóåôå ôi òùôöü iäçäü áéá ôçí åéêP óåò. Áéá

ÐáñÜääéäíá, P Creative SoundBlaster Live!, ððiöôçñßæåôáé áðü ôíí räçäü snd\_emu10k1(4). Áéá íá ðñiióèÝóåôå ððiöôPñéïç ãéá áðôP ôçí êÜñôá, ÷ñçóéiiðiéÞóôå ôçí áéüëïòèç ãñâílP:

```
device snd_emu10k1
```

Ååâåéñèåßôå üôé áéåáÜóåôå ôçí óåëßää ôïö manual ãéá ôí ðñüäñâíá iäPäçóçò, þóôå íá ÷ñçóéiiðiéÞóåôå ôç óùóôP óýíðåïç. Ç áêñéâPø óýíðåïç ãéá êÜëå ððiöôçñéæüíåíç êÜñôá P÷iö ôôï áñ÷åßi ñðèìßóåùí ððñPíá, iðiñâß íá åñâèåß åðßóçò ôôï áñ÷åßi /usr/src/sys/conf/NOTES.

Áéá êÜñôá P÷iö ôýðiö ISA ðiö ååí åßíáé Plug'N'Play iðiñâß íá ÷ñâéåôåôåß íá åþóåôå ôôï ððñPíá ðëçñiöiñßåò ó÷åôééÜ iå ðéò ñðèìßóåéò ôçò (üðùò ôí IRQ, èýñá I/O eëð), üðùò åßíåôåé ôððééÜ óå áðôÝð ðéò ðåñéðôþóåéò. Áôöü iðiñâß íá åßíåé iÝóù ôïö áñ÷åßiö /boot/device.hints. ÊåôÜ ôç áéåééåóßå ôçò åêëßíçóçò, i loader(8) èá áéåáÜóåé ôí áñ÷åßi áéé èá iåðâåéåÜóåé ôéò ñðèìßóåéò ôôï ððñPíá. Áéá ðáñÜääéäíá, iéá ðåééÜ Creative SoundBlaster 16 ISA iç-PnP ðÜñôá ÷ñçóéiiðiéåß ôí ðñüäñâíá iäPäçóçò snd\_sbc(4) óå óðfääåóíü iå ôí snd\_sb16. Áéá ôçí êÜñôá áðôP ðñÝðåé íá ðñiöôåèiýí ie ðáñâéÜôù ãñâíiÝð ôôï áñ÷åßi ñðèìßóåùí ððñPíá:

```
device snd_sbc
device snd_sb16
```

êáé ie ðáñâéÜôù ãñâíiÝð ôôï áñ÷åßi /boot/device.hints:

```
hint.sbc.0.at="isa"
hint.sbc.0.port="0x220"
hint.sbc.0.irq="5"
hint.sbc.0.drq="1"
hint.sbc.0.flags="0x15"
```

Óôçí ðåñßðôùóç áðôP, ç êÜñôá ÷ñçóéiiðiéåß ôç èýñá I/O 0x220 êáé ôí IRQ 5.

Ç óýíðåïç ðiö ÷ñçóéiiðiéåßôåé ôôï áñ÷åßi /boot/device.hints åîçååßôåé ôôç óåëßää manual ôïö sound(4) êåéþò êáé ôôç óåëßää manual ôïö åîôßóöié÷iö ðñiññÜñlåöiö iäPäçóçò.

Íé ñðèìßóåéò ðiö öäßñiöåé ðáñâéÜñu åßíáé ie ðñiâðééååíiÝåð. Óå iñéóíÝíåð ðåñéðôþóåéò, iðiñâß íá ÷ñâéåôåôåß íá áééÜñâåå õí IRQ P Üëëåò ñðèìßóåéò þóôå íá ðáñéñéÜæiöi iå ðéò ñðèìßóåéò ôçò êÜñôåó óåò. Ååßôå ôç óåëßää manual ôçò snd\_sbc(4) áéá ðåñéóóùðåñâò ðëçñiöiñßåò ó÷åðééÜ iå ôçí êÜñôá áðôP.

## 8.2.2 ÄiêéíÜæíïóåò ôçí ËÜñôá<sup>1</sup>÷iö

Áöiy êÜíåôå åðáíåêéßíçóç iå ôíí iÝí ððñPíá (P áöiy öiñþóåôå ôí áðâñåßôçöi module), Ëá ðñÝðåé íá ååßôå îçýílåôå ó÷åðééÜ iå ôçí êÜñôá P÷iö ôôçí ðñiöùñéíP iñPìç (buffer) êåðâåññåòPð ôiö óððóþìåöi (dmesg(8)) áíôßóöié÷á iå ôá ðáñâéÜôù:

```
pcm0: <Intel ICH3 (82801CA)> port 0xdc80-0xdc8bf,0xd800-0xd8ff irq 5 at device 31.5 on pci0
pcm0: [GIGANT-LOCKED]
pcm0: <Cirrus Logic CS4205 AC97 Codec>
```

Ç êåðÜóåóç ôçò êÜñôåò P÷iö iðiñâß íá åéâå÷èåß iÝóù ôïö áñ÷åßiö /dev/sndstat:

```
# cat /dev/sndstat
FreeBSD Audio Driver (newpcm)
Installed devices:
pcm0: <Intel ICH3 (82801CA)> at io 0xd800, 0xdc80 irq 5 bufsz 16384
```

kld snd\_ich (1p/2r/0v channels duplex default)

Áí üéá ðÜíá ééäÜ, ç êÜñôá P÷iö óáó èá ëåéôïöñääß. Áí i iäçäüò CD P DVD ðiö äéåéÝ ôåôå åßíáé óðfääíÝ ñiö iå ôçí eÜñôá P÷iö iÝò ôçò áíáëïäéêPò oïö åiüäiö, iðiñåßôå íá åÜëåöå Ýíá iiõóéêü CD êáé íá oïí áíáðánÜäåoå iå oïi ðñüäñåíiä cdcontrol(1):

```
% cdcontrol -f /dev/acd0 play 1
```

¶Ęéäö åöáññiäÝö, üðùö ði audio/workman ðánÝ: iðí öeééüñöðaníï ðáñëåÜüéiñ åññáðBáö. åñùö eÝéåöå íá åññéåðåööðPóåðå íéä åöáññiäP üðùö ði audio/mpg123 åéá íá åññáðaníÜáññå åñ÷ åñBá P-: iðí MP3.

```
% cat filename > /dev/dsp
```

üðrið öðrið í *filename* íðiñnáð íá áðvíáé íðiðíæðþöðiða án ÷ áðví. Ç ðáñáðÜíù áíðiðéþ éá ðñÝðåé íá ðáñÜääé êÜðriði þ÷i (ëüññöái) áðéåáåáéþíiðóáò òç óúóðóþ éäðiðiøññáá òçò êÜññóáò þ÷ið.

**Óciálaðið:** Óá áñ- ÷ áßá óóðéâðíþ /dev/dsp/. áciéiðññáiýíðáé áððñüiláðá üððáí ÷ ññáéÜæððáé. Áðí óðÜñ- ÷ iðí áí áðí ÷ ññçóéiðíðíýíðáé éáé ãðí á ãðíáéððíýí ðóðí YÍññái ðóðí ls(1)

Ç Ýíóáóç Þ÷ iõ ôcò êÜñôáò iõññåß íá áeëÜíâé íÝóù ôcò åíöiëÞò mixer(8). Đåñéóóüöåñåò ðëçñïöiñßåò iõññåßôå íá åññåßôå óôcí óåëßää ôiõ manual ôcò mixer(8).

### 8.2.2.1 ÓõíçèéóìÝíá Đñïâëþìáôá

Ðñüâëçìá	Éýóç
sb_dspwr(xx) timed out	Äåí åßíáé óùóô Ü ñõèìéóí Ýíç ç èýñá I/O.
bad irq xx	Ôí IRQ äåí åßíáé óùóô Ü ñõèìéóí Ýíç. Äåâáéùèåßôå üöé ôí IRQ ðiõ Ý÷åôå äçëþóåé åßíáé ôí ßäéï ià áôðü ðiõ Ý÷åé ñõèìéóôåß ôôçí êÜñôå.
xxx: gus pcm not attached, out of memory	Äåí ðôÜñ÷åé áñéåðôP äéåé Ýóéïç iíÞìç ãéá íá åßíáé ÷ñÞóç ôçò óôóéåðôPò.
xxx: can't open /dev/dsp!	ÄëÝâîôå ià ôçí äíÞèåéå ôçò åíôïëÞò fstat   grep dsp áí êÜðíéá Üéëç åôáñïïåP áðáó÷ièåß ôç óôåéåñéí Ýíç óôóéåðôP. ÓôíÞèåéó ýðiðöié åßíáé ç åôáñïïåP esound êåéþò éáé ôí óýóðçíá ðiðiðôþñéïçò þ÷iõ ôiõ ðåñéüáÜéëñiò KðE.

јá áéüìá ðñüäèçíá áçíëiõñååßôáé áðü iñéòí Ýåò óýä ÷ nñiåò ëÜñôåò åñáöéêþí ié iðißåò ðåñéÝ ÷ iðí iéá äéêþ ðiñöö óðóéåðþ Þ ÷ ið áéá ÷ nñþöç iÝóù óðíá Ýóåùí HDMI þ áfôßóöíé ÷ uí. Óá iñéòí Ýåò ðåñéðþôåéò, åßíáé ðééäíüí áðôþ ç óðóéåðþ íá åíöiðéøéåß ðñéí óçí éâáiiéêþ ëÜñôå Þ ÷ ið íá aðiòÝéåòíá íá ðÜñåé ôç èÝóç ôçò ðñiäðéåäíÝíçò óðóéåðþ

Þ÷iõ. Áéá íá áæÝäâåôå áí óðìâáßíåé áðôü, áêôåëÝóôå ôçí áiôiõP **dmesg** êáé øÜîôå áéá ôç ëÝíç pcm. Ç Ýñrääò èá iiëÜæåé iå ôçí ðáñáêÜôù:

```
...
hdac0: HDA Driver Revision: 20100226_0142
hdac1: HDA Driver Revision: 20100226_0142
hdac0: HDA Codec #0: Nvidia (Unknown)
hdac0: HDA Codec #1: Nvidia (Unknown)
hdac0: HDA Codec #2: Nvidia (Unknown)
hdac0: HDA Codec #3: Nvidia (Unknown)
pcm0: <HDA Nvidia (Unknown) PCM #0 DisplayPort> at cad 0 nid 1 on hdac0
pcm1: <HDA Nvidia (Unknown) PCM #0 DisplayPort> at cad 1 nid 1 on hdac0
pcm2: <HDA Nvidia (Unknown) PCM #0 DisplayPort> at cad 2 nid 1 on hdac0
pcm3: <HDA Nvidia (Unknown) PCM #0 DisplayPort> at cad 3 nid 1 on hdac0
hdac1: HDA Codec #2: Realtek ALC889
pcm4: <HDA Realtek ALC889 PCM #0 Analog> at cad 2 nid 1 on hdac1
pcm5: <HDA Realtek ALC889 PCM #1 Analog> at cad 2 nid 1 on hdac1
pcm6: <HDA Realtek ALC889 PCM #2 Digital> at cad 2 nid 1 on hdac1
pcm7: <HDA Realtek ALC889 PCM #3 Digital> at cad 2 nid 1 on hdac1
...

```

Óöi ðáñÜäâåäiá iåò, ç êÜñôá ãñáöeëþí (Nvidia) áíððóçêå ðñéí ôçí êáñiíéêP êÜñôá Þ÷iõ (Realtek ALC889). Áéá íá ÷ñçóëiïðiéÞóåôå ôçí ðñâäiáôééP êÜñôá Þ÷iõ ùò ôçí ðñiäðéëåäiÝíç óðóêåôP Þ÷iõ, áëëÜîôå ôi hw.snd.default\_unit üðùò öáßíåôåé ðáñáêÜôù:

```
# sysctl hw.snd.default_unit=n
```

Öi n åßíáé i áñéèìüò ôçò óðóêåôPò ðiõ èá ÷ñçóëiïðiéçèåß, óöi ðáñÜäâåäiá iåò ôi 4. ÐññiøeÝóôå ôçí ðáñáêÜôù ãñáliiP ôi /etc/sysctl.conf ãéá íá åßíåé iüéiç áðôP ç áëëäP:

```
hw.snd.default_unit=4
```

### 8.2.3 ×ñçóëiïðiéþíôå ÐiëëáðëÝò ÐçäÝò<sup>1÷iõ</sup>

ÓðíáéööiñU áðü ôi Munish Chopra.

Åßíáé ðiëëÝò õiñÝò åðéèðiçöü íá Ý÷iõiå ðiëëáðëÝò ÐçäÝò Þ÷iõ ðiõ íá áíáðáñÜäiíðåé ôáðôü ÷ñiíá, üðùò üðáí åéá ðáñÜäâåäiá ôi esound P ôi artsd äáí åðéôñÝðiõi ëiéiP ÷ñPóç ôçò óðóêåôPò Þ÷iõ óå êÜðiéá óðâæåêñéiÝíç åöáñiñP.

Öi FreeBSD åðéôñÝðåé åðôP ôç ëâéôñðñâßá iÝóù ôuí Åéëiíéþí Éáíáëéþí<sup>1÷iõ</sup> (Virtual Sound Channels), ôá iðiBá ïðiñiýí íá åíâññiðiéçèiýí iÝóù ôuí äðíáîòPòùí ðiõ ðáñÝ÷iðôåé áðü ôi sysctl(8). Ôá ÅéëiíéêU ÉáíÜëéá óå åðéôñÝðiõi íá ðiëëðëÝiåôå ôiõò P÷iõ ðiõ áíáðáñÜäååé ç êÜñôá óåò, áíâíéäiýiðåò ôií P÷i óðií ðoñPíá.

Áéá íá ñoëiñðåôå ôi ðeþeò òuí åéëiíéþí éáíáëéþí, õðÜñ÷iõí ôñâéò ñoëiñðåôåèo sysctl ðiõ iðiñiýí íá åßíiõí áí åßóôå i ÷ñPóçò root, üðùò öáßíåôåé ðáñáêÜôù:

```
# sysctl dev.pcm.0.play.vchans=4
# sysctl dev.pcm.0.rec.vchans=4
# sysctl hw.snd.maxautovchans=4
```

Öi ðáñáðÜiù ðáñÜäâåäiá ðáñá÷ùñâß ðÝóôåñá åéëiíéêU éáíÜëéá, ôá iðiBá Üíåôå åðáñêiýí åéá eáèçìåñéiP ÷ñPóç. Íé òcÝò dev.pcm.0.play.vchans=4 êáé dev.pcm.0.rec.vchans=4 áíáðÝñiíðåé óôií áñéèìü ôuí åéëiíéþí

**ÓciáñBúóć:** Ááí iðiñáñBóá íá áééÜíáñdóá óíí áñééèíü ðúí áééííéépí éáíáéépí iéáó óóóéåðBò üöí áóðB áßíáé óá ÷ níþóć. ÐñþBóá éééåßóðá úóá ðññäñÜíìáóá ÷ ñçóéííðíéíýí óç óóóéåðB, üðùò ðññäñÜíìáóá áíáðáñáñáùñáBò iíñóóééBò B ááBííñáðó B÷íñ.

Ç öñööP ööðêåöP pcm áðtäbäåöáé áðööüüäöáé éeáé äeÜöáíá óá êÜeå ðñüäññáìíå ðiö aæçöÜ íá ÷ñçöéiiðiëPöåé öi /dev/dsp0.

#### 8.2.4 Ñõèìßæïíôáò ÐñïåðéëåäìÝíåò ÔéìÝò ãéá ôá ÊáíÜëéá ôïõ ìßêôç

ÓðíðéóöiñÜ áðü ôií Josef El-Rayes.

Íe ðñiâðéêåái Ýíâð ôeí Ýð áæá ôâæ Üöñâ éâí Üééâ ôíð iñbêôç, åßíâé åíñúñâðùí Ýíâð ôðíí ðçâáßi èþâééâ ôíð ðñiâññÜññâðið iñPâçóçò pcm(4). ÔðÜñ ÷ iðí ðíëë Ýð áæáöññâðéé Ýð åðáññíä Ýð êâé åâßiññâð ôíð ôâð åðéôñ Ýðið íá áæé Üñâðâ ôeí Ýð ôðíí iñbêôç, åðññçüññíäýíñðâð ôeð iññâðâý åæáññ ÷ èéþí èëÞóðâñí, áæé Üþ eýóç åðôðÞ åâí åßíâé åéâ ç éâéýöâñç. Åßíâé åðññâðúí íá iññâðâðâ ðñiâðéêåái Ýíâð ôeí Ýð iñbîçð ôâ åðßðâññ ðñiâññÜññâðiñ iñPâçóçò. Åðôð ìðññâð íá åðéôðâ ÷ èâß iâ ôçí ñýèïéóç éâð Üëëçéùí ôeíþí ôðí ãñ ÷ åßi /boot/device.hints, ð.÷.:

```
hint.pcm.0.vol="50"
```

Óriðanáð Úfnið nöötibækðe ófcí Ýfíðaóðið ófci Þ þi ið ófcí ðpiðaðeéðaálfu Ýfíði ðeifip 50, üðaá ðiðnóðeálfu ófí module pcm(4).

## 8.3 $^1 \div$ iò MP3

ÓðíåéóöñÜ áðü öií Chern Lee.

Óá áñ÷åßá Þ÷iö MP3 (MPEG Layer 3 Audio) åðéooä÷Üíriöi ðieúöçöá Þ÷iö ðieý êiñöÜ óoii riñóéeu CD, êáé åßíáé êáéü íá Ý÷åôå äoiáòüöçöá áíáðáñáñùäÞò oïiñö oóii FreeBSD óyóöçìá óáò.

### **8.3.1 ĐñiňäñÜìáôá ÁíáðáñáãùãÞò MP3**

Ôi ðeí áciñöééÝò, iá iáñ Üç áéäöñÜ, ðñüäññáìá áíáðäññáùäPò MP3 áéá ôi × 11, åßíáé ç åðñññäP **XMMS** (X Multimedia System). Iðññåßóá iá ÷ñçóëíðëíÞóåôá ôá skins ôiö **Winamp** iá ôi **XMMS** éæþò ôi åñáöéêü ôiö ðññéáÜëëí åßíáé ó ÷-åüú üiiéí iá ôi **Winamp** ôçò Nullsoft. Ôi **XMMS** Ý-÷-åé åðßóçò áíðùíáðùíÝíç åðñáðöüðçôá ÷-ñPóçò plug-ins.

Ôii XMMS íðiñâß íá åâêáôáóâèåß áðü ôii port multimedia/xmms Þ áðü ðáêÝôii.

Óř ðâñêáÜeeír óiõ XMMS ói êáeéóðÜ áÿeír óôç ÷ñPóç, êáèþò áæáé ÿðóááíáðñáâùáþò (playlist), ãñáöéëü eóíóðáæíéóðþ êáé Üeeàò êåéöññáþàò. ¼óíé áßíáé áíiééâéùì ÿííé ià óiõ Winamp éá âñiõí óiõ XMMS áðëü óôç ÷ñPóç óiõ.

Ôi port audio /mpg123 áßíáé Ýíá áíáëëáêôéü ðñüäñáìíá áíáðáñáãùäÞò MP3 iÝóù ôçò áñâììÞò áíóïëþí.

Ôi **mpg123** iðiñâß íá áéôåëåóðåß êáèiñßæiñôáò ôç óóóéåðÞ Þ÷iõ êáé ôi áñ ÷åßí MP3 óôç áñâììÞ áíóïëþí. Èåùñßíóáò üðé ç óðóéåðÞ Þ÷iõ áßíáé ôi /dev/dsp1.0 êáé eÝëåðå íá áíáðáñÜäåðå ôi áñ ÷åßí *Foobar-GreatestHits.mp3*, èá ÷ñçóéiiðiéÞóåðå ôçí ðáñáêÜòù áíóïëÞ:

```
# mpg123 -a /dev/dsp1.0 Foobar-GreatestHits.mp3
High Performance MPEG 1.0/2.0/2.5 Audio Player for Layer 1, 2 and 3.
Version 0.59r (1999/Jun/15). Written and copyrights by Michael Hipp.
Uses code from various people. See 'README' for more!
THIS SOFTWARE COMES WITH ABSOLUTELY NO WARRANTY! USE AT YOUR OWN RISK!
```

Playing MPEG stream from Foobar-GreatestHits.mp3 ...
MPEG 1.0 layer III, 128 kbit/s, 44100 Hz joint-stereo

### 8.3.2 ÁðièÞêåðóç (Rip) Áñ ÷åßùí áðü liðóééÜ CD

Ðñéí êùäééiðiéÞóåðå Ýíá iëüéëçñi CD Þ Ýíá êmñÜðé áðü CD óå áñ ÷åßí MP3, èá ðñÝðåé íá áíóéäñÜþåðå ôá iñðóééÜ äåäñÝíá áðü ôi CD óóï óéëçñü óåò äßóéi. Áðóü áßíåðåé ãñÜöiiðåò ôá äåäñÝíá ðýðiõ CDDA (CD Digital Audio) óå áñ ÷åßá WAV.

Ôi áññáéëßi cdda2wav, ôi iðiñßi áíÞêåé óôç óðëëiñÞ áññáéëßùí sysutils/cdrtools iðiñâß íá ÷ñçóéiiðiéçèåß ôüöi áéá ôçí áíÜêðóç ðúí äåäñÝíá Þ÷iõ áðü iñðóééÜ CD, üðiõ êáé ðëçñiöñéþí ðiõ ó ÷åðßæiñðåé íå áðóÜ.

÷iðiðåò ôi iñðóééü CD óóï íäçäü, iðiññâðå íá ÷ñçóéiiðiéÞóåðå ôçí áéüëiñðéç áíóïëÞ (ùò root) áéá íá áðièçéåýóåðå Ýíá iëüéëçñi CD óå ÷ùñéóðÜ (áíÜ êiñÜðé) áñ ÷åßá WAV:

```
# cdda2wav -D 0,1,0 -B
```

Ôi **cdda2wav** õðiðóçñßæåé íäçäü CDROM ðýðiõ ATAPI (IDE). Áéá íá áéáâÜóåðå äåäñÝíá áðü iéá óðóéåðÞ IDE, ÷ñçóéiiðiéÞóåðå ôi üññá óðóéåðÞò áíðò áéá ôií áñéèiü iñíÜääò SCSI. Áéá ðáñÜääéäíá, áéá íá áðièçéåýóåðå ôi êiñÜðé 7 áðü Ýíá íäçäü IDE:

```
# cdda2wav -D /dev/acd0 -t 7
```

Ôi -D 0,1,0 äåß ÷íåé ôç óðóéåðÞ SCSI 0,1,0, ðiõ áíðéóðié ÷åß óôçí Ýíñäi ôçò áíóïëÞò cdrecord -scanbus.

Áéá íá áéáâÜóåðå iññññü Ýíá êiñÜðéá, ÷ñçóéiiðiéÞóåðå ôçí áðéëiñÞ -t üðùò öáßíåðåé ðáñáêÜòù:

```
# cdda2wav -D 0,1,0 -t 7
```

Ôi ðáñÜääéäíá áðóü áéáâÜæåé ôi êiñÜðé áðóÜ ðiõ iñðóééiy CD. Áéá íá áéáâÜóåðå iéá óåéñÜ áðü êiñÜðéá, áéá ðáñÜääéäíá áðü ôi Ýíá ùò ôi áðóÜ, éáèiñßóðå iéá ðåñçí Þ:

```
# cdda2wav -D 0,1,0 -t 1+7
```

Ìðiñâßò åðßóçò íá ÷ñçóéiiðiéÞóåðå ôi áíçèçóééü ðñüäñáìíá dd(1) áéá íá áéáâÜóåðå iñðóééÜ êiñÜðéá áðü íäçäü ATAPI. ÁéáâÜóåðå ôi ÓiÞíá 19.6.5 áéá ðåñéóðüðåñâò ðëçñiöñßò ò ÷åðééÜ íå áðóÞ ôç áðíáðüðçôá.

### 8.3.3 Èùäéêïðïéþíôáò MP3

Óóéò iÝñâò iáò, òi ðñïñðíþiáññ ðññüññáññ á èuáæéññ ðíñçóçò áßíáé òi **Lame**. Íðññññññ ìá òi áññññññ áóôç óðeeëíþ ôùí ports, óóî audio/lame.

× ñçóœíññéíþíôáð óá áñ ÷ áßá WAV ðiø Ý÷åôá áðièçéâýóåé, ïðriñâßôá íá laðóáðñÝðåôá ði ø áñ ÷ áßí *audio01.wav* óá *audio01.mp3* íá ðçí áðiøéþ:

```
# lame -h -b 128 \
--tt "Foo Song Title" \
--ta "FooBar Artist" \
--tl "FooBar Album" \
--ty "2001" \
--tc "Ripped and encoded by Foo" \
--tg "Genre" \
audio01.wav audio01.mp3
```

Óá 128 kbits ábbiáé ç ôôðééÜ ÷ñçóéiiðíéiyáíç ðíéüöçôá áéá áñ÷åßá MP3. Ùóöüöi, ðíeëiþ ðñïööñíýí iååáéyöåñç ðíéüöçôá üðùò 160 Þ 192. ¼öi iååáéyöåñiò ábbiáé iññöèiüò ååäñí Ýíuí (bitrate), ôüöi ðåñéóöüöåñ÷ þñi áðièÞeåööçò éá ÷ñåéÜ åxåöåé öi áñ÷åßí MP3 ðiò éá ðñiéyøåé, ùòóüöi ééá ç ðíéüöçôá éá ábbiáé ðöçéüöåñç. Ç áðééiàÞ -h áriññiðíeåß ôç äðiáöüöçôá “ðöçéüöåñçò ðíéüöçôáò áééÜ åéäöñÜ ðéí áññåÞò èuæééiðíñçöçò”. Íé áðééiàÝò ðiò iåééiñíýí iå -t ååß÷iñiò åôéé Ýóåò (tags) ID3, ié iðiñßåò oóíÞeùò ðåñéÝ÷iñi ðéçñiñiñßåò ó÷åôéé Ýò iå öi ôñåñiÿäé ééá ié iðiñßåò iññiñíýí iá áíñùiañuëíýí iÝóá óå áñ÷åßá MP3. Iðiññßåò iá áññåßåò ðåñéóöüöåñåò áðééiàÝò ó÷åôééÜ iå öçí èuæééiðíñçöç, áí öðiññiðéåööåßåò ôç óåéßää manual öiò ðñiñññÜiñáiò lame.

### 8.3.4 Áðièùäééïðíéþíôáò MP3

Ãéá íá iðrñ Ýóåôå íá ãñ Üþåôå iðrñéêü CD áðü ãñ ÷ åßá MP3, èá ðñ Ýðåé íá ôá iàôåôå Ýþåôå iáíÜ óå iññöP áóôïðßåôôiõ áñ ÷ åßiõ WAV. Ôúóï ôi **XMMS** üöi êáé ôi **mpg123** ððiôôçñßæiõi áîâãùäP ãñ ÷ åßiõ MP3 óå áóôïðßåôôc iññöP áñ ÷ åßiõ.

ÃñÜöiíôáò óôï Äßóëï ìÝóù ôïõ XMMS:

1. ÎåééíPóôå ôi XMMS.
  2. ÈÜíôå ååñë êééê ôöi ðáñÜèõñï ôçò åöáññïäPò ãéá íá áññåôå ôi ïåñíy ôiõ XMMS.
  3. ÅðééÝîôå Preferences áðü ôá Options.
  4. ÁëëÜîôå ôi Output Plugin óå “Disk Writer Plugin”.
  5. DéÝóôå Configure.
  6. ÄñÜþôå (P åðééÝîôå browse) Ýíá êáôÜëïäí ãéá íá áðièçêåýóåôå ôá áðiøõìðéåói Ýíá áñ÷åßá.
  7. Öiñôþóôå ôi áñ÷åßi MP3 óöi XMMS üðùò óðíÞèùò, ìå ôçí Ýíóáóç ôöi 100% êáé ôéð ñðøìßóåéò EQ áíåíåñäÝò.
  8. DéÝóôå ôi Play. Ôi XMMS èá öáñíådáé üðé áíáðáñÜååé ôi MP3, áëëÜ ãåí èá áéiyåådáé êáíåßò P÷iò. Óôçí ðñåñådóéêüôçôá áíáðáñÜååé ôi MP3 óå áñ÷åßi.
  9. ¼ôåí ôåéåéþóåôå, ååñåéùèåßôå üðé åðáíåóÝñåôå ôç ñýéìéóç ôiõ ðññåðééåñäÝíõ Output Plugin óöçí ðññçäiýíåíç åðééíP ôçò, ãéá íá iðinÝóåôå íá áéiyóåôå íáíÜ áñ÷åßá MP3.

ÃñÜöiiôáò óôçí Ýîïäi ìÝóù ôïõ **mpg123**:

1. ÅêôåëÝóôå mpg123 -s audio01.mp3 > audio01.pcm

Ôi XMMS àñ Üöåé áñ÷åßá óå iññöP WAV, áíp ôi **mpg123** iàðåðñÝ ðåé ôi MP3 óå lç- åðåñññåòiÝá (raw) ääññÝá P÷iø PCM. Èáé ié äyí áôöÝò iññöÝò iðññiý íá ÷ñçóëiðiéçëiý íå ôçí åöáññiäP **cdrecord** æáé ôç äçìéiññåßá iññöééþí CD. Äéá ôçí åöáññiäP **burncd(8)** èá ðñÝ ðåé íá ÷ñçóëiðiéPóåôå ääññÝá PCM. Áí ÷ñçóëiðiéPóåôå áñ÷åßá WAV èá ðáññôçñPóåôå Ýá lèññü P÷i (tick) óôçí áñ÷P ïÜeå êññåðéiy. ï P÷iø áôðöùò ðññÝñ÷åðåé áðü ôçí åðééåöáëßää (header) ôiñ áñ÷åßiø WAV. Iðññåßôå íá áôáéñÝ óåôå ôçí åðééåöáëßää íå ôç äiPéåéá ôiñ ðññññÜññåòiø **SoX** (iðññåßôå íá ôi åæéåðåôðPóåôå áðü ôi port audio/sox P ôi áñðôðñéi÷i ðåéÝò):

```
% sox -t wav -r 44100 -s -w -c 2 track.wav track.raw
```

ÄäääÜööä öi ÖiPia 19.6 äää däñneööñüöñåö dëçpiñöiñBåö ð. åðééÜ iä öc ÷ ñPöö CD åääññåöPö ööi FreeBSD

## 8.4 Áíáðáñáãùãþ Video

*Óðráður óðróttarins Útak áðruðum ófírðum Ross Lippert.*

Ç áíáðáñáùúþ video áßíáé ieá éeáííýñéá êáé ñäääáßá áíáðóóóùíåíç ðânëí÷þ åöáññíþí. Èá ÷ñääéóóåß fá äåßíåôå õðññíþí. Äáí ðñüéåôáé íá eäéóòññáÞóíóí üüéä ôüöí ñíáð Ü üðöö òoïí þ÷í.

Đñéí iâééíPôåôå, éá ðñ Ýðåé íá áñññßæåôå ôi ññiöÝët ôçò èÜñôåô áññöéêþí ðiö Ý÷åôå êáéþò êáé ôi iëññéçññùñYñ ëýëëùìá ðiö ÷ñçóëiiðiëåß. Áí êáé ôi **Xorg** ðiöñöçñßæåé iâñÜëc åêÜñlá áðü èÜñôåô áññöéêþí, áôôÝð ðiö ðánÝ÷iöí êáéþ áðñüäiöç åbñíáé èéññôðññô. Åéá íá ðÜñôåô iéá èbñðôå ôñü åêôåôåíÝññ áðñáññiöÞðñù ðiö ðiöñöçñßæiiñåé áðü ôçí èÜññôå óå, ÷ñçóëiiðiëPôåô ôçí åíôiëþ xdpyinfo(1) ôçí bññ ðiö åêôåæiiñåé óå X11.

Åßíráé ááíééÜ êáéþí Éá Yá íá Ý-åðóá Ýíá íéññú áñ÷åßí MPEG ôí iðiñßí ïðiññåß íá ÷ñçóëiiðiñçèåß áæá äiééíÝò  
æáöiññåðééþí åðééëiäþí êáé ðñiññáíiÜðùí áíáðáññåùñÞò. ÊÙðiñéá ðñiññÜññåó áíáðáññåùñÞò DVD áíáæçöiÝí åðü  
ðñiññåðééëiäþí ôí åßóéí DVD óðç óðóéåðÞ /dev/dvd. Óá iññéoiÝíá ôí üññá óçò óðóéåðÞò åßíráé áíññùññåùñÝñí óðíí èþæééá  
ôíð ðñiññÜññåññò. Åéá ôí ëüññí åðóü, ßóùò åßíráé ÷ñÞóéii íá öðóéÜññåó áóñìññééÝò óðññáéó ðñiñò ôéò ðññáññåóééÝò  
óðóéåðÝò:

```
# ln -sf /dev/acd0 /dev/dvd  
# ln -sf /dev/acd0 /dev/rdvd
```

```
link acd0 dvd  
link acd0 rdvd
```

Åðéðñüöèåóá, ç áðièùäéëïðíßçóç DVD, ç iðiðbá ÷ñåéÜæåóáé êëþóç åéäéêþí ëåéöiññåéþí ôið DVD-ROM, áðáéóåß êáé Üääéá ååññåöþò (write permission) óóéó óóóéåðÝò DVD.

Ãéá ôç âåëößùóç ôçò ëåéöïõñäßáò ôçò ëïéü÷ñçóôçò iíÍþìçò ôïõ óõóôþìáöiò X11, óõíßóôáôáé íá áõíþóåôå ôéò ôéíÝò êÜðïéüí ìåðâåäecôþí sysctl(8):

```
kern.ipc.shmmax=67108864  
kern.ipc.shmall=32768
```

## 8.4.1 Ðñïóäéïñéóìùò Äõíáôïþôúí ÊÜñôáò Äñáöéêþí

ÕðÜñ÷iõí áñéåôïß äéáöiñåôééïß ôñüðié äéá ôçí áðåééüíéóç video óóí X11. Óí ôé èá äiðeÝøåé ôåéééÜ, áiáñôÜôáé óå ïåäÜëi ááèiü áðü òiõ öeééü óáð. ÊÜëá iÝëiäiò ðiõ ðåñéanÜöiõiå ðåñáéÜôú èá äþoåé äéáöiñåôééÞ ðiéüôçôá óå äéáöiñåôééü ðeééü. Åðþóçò, ç áíáðáñáãùäÞ video óóí X11 ábíáé Ýíá èÝíá óóí iðiþi ðñüöðåôá ábíáôáé iåäÜëc óçíáóßá, éáé ðeeáíüí èá ðiðÜñ÷iõí áñéåôÝò áåéöéþoåéó óå êÜëá iÝá Ýëäiöç ðiõ **Xorg**.

ÉáôÜëiäiò eieíþí äéåðåöþí video:

1. X11: ÓõíçëéóíÝíç Ýñäiò ðiõ X11 iå ÷ñÞóç eieíü ÷ñçóðçò iíÞiçò.
2. XVideo: iéá áðÝêôáóç ôçò äéåðåöÞò X11 ðiõ ðiðiöçñßæåé áíáðáñáãùäÞ video óå iðiéáäÞðiòå ó÷åäéÜóéiç áðéöÜíåé áiõ X11.
3. SDL: Simple Directmedia Layer.
4. DGA: Direct Graphics Access.
5. SVGAlib: Åðþðåäií ãñáöéêþí ÷áíçëiý áðéðÝäiò áéá êiióüüéá.

### 8.4.1.1 XVideo

Óí **Xorg** äéáèÝôåé iéá áðÝêôáóç ðiõ iññÜæåôáé *XVideo* (aiùóóÞ êáé ùò Xvideo, Xv, xv) êáé òi iðiþi áðéóñÝðåé ôçí áðåôèåßáò áðåééüíéóç video óå ó÷åäéÜóéiá áíóééåßìåíá iÝóù áéäééÞò áðéóÜ÷ñiðçò. Ç áðÝêôáóç áðôÞ ðáñÝ÷åé áíáðáñáãùäÞ ðiëý êáéÞò ðiéüôçôáò, áéüìá áéá óå iç÷áíÞiáôá ÷áíçëþí ðñiäéáãñáöþí.

Áéá íá áåßôå áí ÷ñçóéiðiéåßôáé ç áðÝêôáóç, ÷ñçóéiðiéÞóôå ôçí áíðiëÞ *xvinfo*:

```
% xvinfo
```

Óí XVideo ðiðiöçñßæåôáé áðü ôçí êÜñôá óåò áí ðiðiöÝëåóíá áåß÷íåé üðùò ðáñáéÜôù:

```
X-Video Extension version 2.2
screen #0
Adaptor #0: "Savage Streams Engine"
    number of ports: 1
    port base: 43
    operations supported: PutImage
    supported visuals:
        depth 16, visualID 0x22
        depth 16, visualID 0x23
    number of attributes: 5
        "XV_COLORKEY" (range 0 to 16777215)
            client settable attribute
            client gettable attribute (current value is 2110)
        "XV_BRIGHTNESS" (range -128 to 127)
            client settable attribute
            client gettable attribute (current value is 0)
        "XV_CONTRAST" (range 0 to 255)
            client settable attribute
            client gettable attribute (current value is 128)
        "XV_SATURATION" (range 0 to 255)
            client settable attribute
            client gettable attribute (current value is 128)
        "XV_HUE" (range -180 to 180)
```

```

client settable attribute
client gettable attribute (current value is 0)
maximum XvImage size: 1024 x 1024
Number of image formats: 7
id: 0x32595559 (YUY2)
    guid: 59555932-0000-0010-8000-00aa00389b71
    bits per pixel: 16
    number of planes: 1
    type: YUV (packed)
id: 0x32315659 (YV12)
    guid: 59563132-0000-0010-8000-00aa00389b71
    bits per pixel: 12
    number of planes: 3
    type: YUV (planar)
id: 0x30323449 (I420)
    guid: 49343230-0000-0010-8000-00aa00389b71
    bits per pixel: 12
    number of planes: 3
    type: YUV (planar)
id: 0x36315652 (RV16)
    guid: 52563135-0000-0000-0000-000000000000
    bits per pixel: 16
    number of planes: 1
    type: RGB (packed)
    depth: 0
    red, green, blue masks: 0x1f, 0x3e0, 0x7c00
id: 0x35315652 (RV15)
    guid: 52563136-0000-0000-0000-000000000000
    bits per pixel: 16
    number of planes: 1
    type: RGB (packed)
    depth: 0
    red, green, blue masks: 0x1f, 0x7e0, 0xf800
id: 0x31313259 (Y211)
    guid: 59323131-0000-0010-8000-00aa00389b71
    bits per pixel: 6
    number of planes: 3
    type: YUV (packed)
id: 0x0
    guid: 00000000-0000-0000-0000-000000000000
    bits per pixel: 0
    number of planes: 0
    type: RGB (packed)
    depth: 1
    red, green, blue masks: 0x0, 0x0, 0x0

```

Ðáñáôçñþóôå áðßóçò üôé ôá formats ðíð áñöáíßæííôáé (YUV2, YUV12, ê.ë.ð.) äåí äéáôßèåíôáé óå üëåò ôéð  
åêäüöåéð ôíð XVideo, êáé ç áðiõóßá ôíðò ïðmñåß íá áðçñáÜóåé êÜðiéá ðñiññÜññáôá áíáðáñáåùãÞò.

Áí ôí áðiðÝëåôíá äåß÷íåé êÜðùò Ýôóé:

```

X-Video Extension version 2.2
screen #0
no adaptors present

```

Ôüôå ðéèáíþò ôi XVideo äáí ððiöðçñßæåôáé áðü ôçí êÜñôá óáò.

Áí ôi XVideo äáí ððiöðçñßæåôáé áðü ôçí êÜñôá óáò, áðôü óçìáßíåé áðëÜ üðöé èá åßíáé ðeï áýóëïëi i ððiëriäéôðÞò óáò íá áíðåðiëñëéåß óðéò ððiëriäéôðéé Ýò áðåéðÞóåéò ôçò áðåéëüíéò video. Ùóðüöi, áíÜëiäá iå ôçí êÜñôá åñáöéêþí éáé ôií áðåâññääóðÞ óáò, åßíáé áéüìá ðéèáíüí íá Ý ÷ åôå ééáíðiëçôééÞ áíáðåññääðÞ. Óóùò ðñÝðåé íá äéááÜóåôå iåëüäiðò áéá ôç ååëößùóç ôçò áðüäiðò, óðá ðñi÷ùñçìÝíá èÝìáôá, ÒiPiá 8.4.3.

#### 8.4.1.2 Ôi Åðßðåäi Simple Directmedia Layer

Ôi Simple Directmedia Layer, SDL, ðñiññßæiïðáí íá åßíáé Ýíá åðßðåäi óðiññðüôçôáò iåðáíý ôuí Microsoft Windows, BeOS, éáé ôið UNIX, åðéðñÝðiñðáð áíÜððöñç åöáññäþí Þ÷ið ôééüíáð, éáðÜëëçéåð åéá êÜëå iéá áðü áððÝò óéð ðëáööññiåðò (cross-platform). Ôi åðßðåäi SDL ðañÝ ÷ åé ÷ áíçëiý áðéðÝäið ðññüöåáóç óði ðëééü, éáé óå iñéóìÝíåò ðåñéðþóåéò iðiññåß íá åßíáé ðeï áðiññðééü áðü ôçí åéåðåöÞ X11.

Ôi SDL iðiññåß íá åñåèåß óði ñevel/sdl12.

#### 8.4.1.3 Ôi Åðßðåäi Direct Graphics Access

Ôi Direct Graphics Access åßíáé iéá åðÝéåáóç ôið X11 ðið åðéðñÝðåé óå Ýíá ðññüäññäíá iá ðñiøððñÜðåé ôið X server éáé íá åééÜiåé áðåðeåðåò ôá ðåñéå ÷ üìåá ðið framebuffer (ííÞìçò åñáöéêþí). ÅåññÝíð ùðé åáóßæåðåé óå åéá ÷ åßñéóç iíÞìçò ÷ áíçëiý áðéðÝäið, óá ðñiññÜììåðá ðið ôi ÷ ñçóëiiðiéiyí ðñÝðåé íá åéðåëiýíðåé ùð root.

Ç åðÝéåáóç DGA iðiññåß íá åéåã ÷ èåß éáé íá iåðñçèåß ùð ðñiø ðçí áðüäiðç ôçò iå ôi ðññüäññäíá dga(1). ¼óáí åéðåëåðóåé ç áíðiëÞ dga, áéëÜæåé óå ÷ ñþiáðá ôçò iëüíçò óå êÜëå ðßåóç áíüð ðëÞéöññið. Áéá íá áéðñþóåðå ôçí åðÝéåóç, ðéÝðåá q.

### 8.4.2 ÐáéÝóá éáé Ports ðið Ó÷åðßæiïðåé iå Video

Ôi òiPiá áðôü ðåñéññÜðåé ôi ñiäéóíééü ðið åéåðeåðåé óðç óðëëëiðP ôuí ports ôið FreeBSD éáé ôi iðiñßi iðiññåß íá ÷ ñçóëiiðiéçèåß åéá áíáðåññääðÞ video. I ðiñÝáð ôçò áíáðåññääðÞò video åßíáé éæéåßôåñå åíáññüð üði áðiñÜ ðçí áíÜððöñç ñiäéóíééü, éáé Ýðóé ie äöíáðüöçôåò ôuí åöáññäþí ðéèáíþò íá áðiññðið õÜðùð áðü áððÝò ðið ðåñéññÜðiñðåé åäþ.

Åßíáé áñ ÷ ééÜ óçìáíðééü íá åíññßæåðå üðé åñéåðÝò áðü ôéð åðáññäÿÝò video ðið åéðåëiýíðåé óði FreeBSD áíáðöý ÷ èçéáí áñ ÷ ééÜ ùð åöáññäÿÝò Linux. ÐiëëÝò áðü áððÝò ôéð åöáññäÿÝò åßíáé áéüìá ðiéüöçôåò beta. ÊÜðiéá áðü ôá ðñiññëÞiáðá ðið iðiññåß íá óðiññðóåðå óðéð åöáññäÿÝò video ôið FreeBSD ðåñéëåíññüññið:

1. Iéá åöáññäþí ãáí iðiññåß íá áíáðåñÜååé Ýíá áñ ÷ åßí ðið åçìéiññäþèçéå áðü êÜðiéá Üëëç.
2. Iéá åöáññäþí ãáí iðiññåß íá áíáðåñÜååé Ýíá áñ ÷ åßí ðið åçìéiññäçóå ç Bæá.
3. Ç Bæá åöáññäþí, óå äðií åéåðññåðééÜ lç ÷ áíÞìåðá, éáé åöíý Ý ÷ åé iåðåðæüñðöéðåß óå êÜëå lç ÷ Üíçìá åéåééÜ åéá áðôü, áíáðåñÜååé ôi Bæéí áñ ÷ åßí iå åéåðññåðééü ôñüði.
4. ÊÜðiéí öäéññåíééÜ áðëü õÜðöññi, üðùð áðôü ôçò åéëåðÞò iååÝëið ãéëüüíáð (rescaling), Ý ÷ åé ùð áðiðÝéåóíå ôçí åçìéiññäþá éåðÞò ðiéüöçôåò video (ôå ÷ ñiðññäçÜðùð) åíáéðåðå ðñiññëçìáðééÞò ñiðññäþíð åååÝëðíóçò
5. ÊÜðiéá åöáññäþí ðåññðåðåðæåðåé áðüôññá óð ÷ iÜ.
6. Äåí ååéåðéßóåðåé ç ôåéiçñßùóç ôið ðñiññÜììåðiò êåðÜ ôçí ååéåðÜóååóç ôið port, åíþ iðiññåß íá åñåèåß åßôå óðií åééððåéü ôüði õið ðñiññÜììåðiò åßôå óðií éåðÜëëií work ôið port.

1.  $\times \text{ñPóć öiō áñ ÷ åbíöö /proc/cpuinfo}$  áéá ôcí áíß ÷ íåööc ôùí äöíáöööPöùí öiö ådåññåáööP.
  2. ÉáéP ÷ ñPóć ôùí threads (íçíÜöùí) öiö iöiíbií tæçãåß öiö ðñüäñåíá óå êüëëçjá áíöß áéá éáññíééü ðåññíáöööiü ööö ðYëëö öcò åêö Yëåöçò.
  3.  $\times \text{ñPóć eïäööééíy öiö äåí ööÜñ ÷ åé áéüüá óöc óöëëiäP}$  ôùí ports öiö FreeBSD óå óöfáöáööiü là öcí åöáññíäP.  
Ý ÷ ñé óöéäiPò ié óöññåöåßöö ôùí åöáññíäbí åöööPí Ý ÷ iöí áðíäåé ÷ èåß óöññåÜöééíé là öiöö öööööñçööYö ôùí ports, ööööö íá åéá ÷ éöööödíëçéíy ié ådåññåÜöåéöö öiö ÷ ñåéÜæññööé áéá öcí iåööåöööP (porting) ôùí åöáññíäPí.

#### 8.4.2.1 MPlayer

#### **8.4.2.1.1 låôáâéþôôéóç ôïõ MPlayer**

**І MPlayer** ю́нбóéáhóáé óóї multimedia/mplayer. **І MPlayer** єЎіáéé ðєЂєїо áéЎá-úí óїò ðеééїý éаóðÜ óç áéаéééаóðá óçò iаðáаëþþóéóçð, óóéÜ-üїíóáð Ýóóé Йíá áéôаëé Йóéїï óї iðiбїí áаí Й-áé óїñçóùöçóа áðü Ýíá óýóðçìя óá Йíá Üеëи. Áéá óї óéїðü áðóü, ábíáé óçíáíóéüü íá óїр áаéáóáðóÞóáðá áðü óá ports éаé ü-é áðü Ýóéїï ðаéЎóї. Áðéðñúóéáðá, iðiñáðóá íá éаéñbóáðá ðєЂєїо áðééїáрí óðçí аññáїþ áññéїþ óїò make ѹðñò ðаñéаñÜðáåáé óóї Makefile ёаé ёаóÜ óçò Йíáñїç óçò áéаáééаóðá iаðáаëþþóéóçð:

```
# cd /usr/ports/multimedia/mplayer  
# make  
N - O - T - E
```

Take a careful look into the Makefile in order  
to learn how to tune mplayer towards your personal preferences!  
For example,  
make WITH\_GTK1  
builds MPlayer with GTK1-GUI support.  
If you want to use the GUI, you can either install  
/usr/ports/multimedia/mplayer-skins  
or download official skin collections from  
<http://www.mplayerhq.hu/homepage/dload.html>

Íé ðñiiåðéëåái Ýíåò åðéëïä Ýò iÜëëíï åßíáé éåðå Üëëçéåò áæá ôíòð ðåñéóðúôðåñïòð : ñþóðåò. Áí ùóðúöüí ÷ ñåðéÜæåðóð åñíí åðíèùäéëiðíéçòÞ XviD, èá ðñ Ýðåé íá éåèiñþóåðå ôçí åðéëïäÞ WITH\_XVID ôóçí åñâiÌþ åíóïëþí. Iðiñåðþóð åðþóçò íá iñþóåðå ôçí ðñiiåðéëåái Ýíç öððéåðòÞ DVD ÷ ñçóéïiðíéþíðåò ôçí åðéëïäÞ WITH\_DVD\_DEVICE, äéåòiñåðééÜ èá ÷ ñçóéïiðíéçèåß c ðñiiåðéëåái Ýíç öððéåðòÞ /dev/acd0.

Ç HTML ôââîçñïßùóç ôïõ **MPlayer** âßíáé eäéâßôâñä ðëçñiiöinéâéþ. Áí i ááiañíþöôçò âñâé üöé ié ðëçñiiöinßåò aðööiy ôïõ eâööáæâßiö üöí aðöinÜ òi ðëééü eâé ôeo aæâðåö Ýo video âßíáé aâëééðâßò, ç ôââîçñïßùóç ôïõ **MPlayer** aðiøâæâß Ýia eäéâßôâñä áíâæööéü ôöìðëÞñùíá. Eá ðñÝðâé óßâiöñá íá aæâé Ýóâðâ ÷ñüñí aæá íá aæâáÜóâðâ ôçí ôââîçñïßùóç ôïõ **MPlayer** áí ááiaæçöÜâ ðëçñiiöinßåò ðââéÜ ià ôçí ôðiøðóÞñéïc video ôöi UNIX.

#### 8.4.2.1.2 × ñçóéíïðíéþíôáò ôíí MPlayer

ÊÜèå ÷ñPóôçò ôiõ MPlayer ðñÝðåé íá äçìeïõñäPóåé Ýíá õðïeåôÜëiäi . mplayer iÝóá óoii ðñïóùðéeu ôiõ eåôÜëiäi. Äéá íá äçìeïõñäPóåôå ôiõ ÁðåñâBôçöi ôiõ eåôÜëiäi, ìðññâBôå íá ãñÜøåôå ôiõ ðåñâéÜôù:

```
% cd /usr/ports/multimedia/mplayer  
% make install-user
```

Íé áðééïä Ýò ôçò áñáiiþo áíóíëþí ôiõ mp3 player ðåñéãñÜörióáé óôç óåëßää ôiõ manual. Áéá áéüíá ðåñéóóúôåñåð eäððöñÝñåéåð, ôðÜñ ÷áé ôåéïçñßùóç óå iññöþ HTML. Óôí ôiþia áðóü èá ðåñéãñÜörióá iåñééÝò iüññi ëiéíÝò -ñÞóåéò. Áéá fá áíáðáñÜäåôå Ýíá áñ÷åþí, üðùò ôi testfile.avi, iÝóù áííüð áðü ôá áñéåôÜ video interfaces ÷ñçóéñðiþPóóå ðçí áðééïäþ -vo:

```
% mplayer -vo xv testfile.avi  
% mplayer -vo sdl testfile.avi  
% mplayer -vo x11 testfile.avi  
# mplayer -vo dga testfile.avi  
# mplayer -vo 'sdl:dga' testfile.avi
```

ÁÍßæåé öíí êüði íá äíééí Üóåôå üëåò áôôÝò ôéo åðééïäÝò, éaèþò ç áðüäïíöc ôíïò åâáñôÜôáé áðü ðíëéïyò ðán Üäïíôåò ééáöíñïðíéåßôáé áñêåôÜ áíÜëíäá iå öí ðíëéü ôíï ðíëéäéôP óåò.

Æá áíáðáñáùãP áðü DVD, áíðééâóáôòPóô òi testfile.avi íå dvd://N -dvd-device DEVICE üðriö òi N åßíáé í áñéèìùö òiö ôßööïö (title number) ðiö åðéëòlåßôå íá áíáðáñÜäåôå êáé DEVICE åßíáé òi üññá óóóéâòPò òiö DVD-ROM. Æá ðánÜäåéäíá, ãéá íá áíáðáñÜäåôå òiö ôßööë 3 áðü ôc óóóéâòP /dev/dvd:

```
# mplayer -vo xv dvd://3 -dvd-device /dev/dvd
```

Ãáá ôá ðëþêôñá ðïö ÷ñçóéiiðiéiyíôáé æáá ðáyóç, æáééiðþ, låôáéßíçóç êëð. êáôÜ ôç æÜñêåéá ôçò áíáðáñååùäþò, ôçíåiöiøéåôðôåßôå ôçí åíþêåéá ðïö iðiñåßôå íå åßôå åéðôåéþíôáó mplayer -h P æéåáÜôóå ôç öåéßåå ôíö manual.

Åðéðñüóðåôá, óçláíóéé Ýò åðéëïä Ýò áíáðáñáùäÞò åßíáé: -fs -zoom öi iðiþi álfâñäiðiéåß áðåéüíéóç óå ðéÞñç ièüíç êáé öi -framedrop öi iðiþi áüçéÜåé óóçí áýíçóç ôço áðüäiöçò.

Ãéá íá ìåßíåé ôi iÝâåèiò ôçò ãñâiìPò áiôiëþí ôi äöfáöüí ìéêñü, i ÷ nPööçò iðiñåß íá äçjëiöñäÞöåé Yíá áñ÷åßí .mplayer/config êáé íá iñßóåé åéåß ôéò ðñiåðéëåäi Yíåò åðéëiäYò:

```
vo=xv
fs=yes
zoom=yes
```

ÔÝëiò, i mplayer iðiñåß íá ÷ñçöeiiðiëcéåß åéá ôçí áiâåùäP (rip) áíüò ôßöëiò DVD óå Yíá áñ÷åßí .vob file. Åéá ôçí áiâåùäP ôiö ååýöåñiö ôßöëiò áðü Yíá DVD, ãñÜøöå:

```
# mplayer -dumpstream -dumpfile out.vob dvd://2 -dvd-device /dev/dvd
```

Ôi áñ÷åßí åñüäiò, out .vob, èá åßíåé ôýðiò MPEG êáé iðiñåßóå íá ôi iåðá÷åéñéóååßóå iÝóù Üëëùí ðåéYóùí video ðiò ðåñéñÜöriöåé óå áðöü ôi òìPiá.

#### 8.4.2.1.3 mencoder

Ðñéí ÷ñçöeiiðiëÞöååå ôi mencoder åßíåé êåéP éäYíá íá åñééåéùéåßóå iå ôéò åðéëiäYò ðiò áíåöYññiöåé óôçí ðåéïçñßùóç HTML. ÕðÜñ ÷åé óåéßää manual, áééÜ åái åßíåé ðiéý ÷ñÞöéïç ÷ùñßò ôçí HTML ôåéïçñßùóç. ÕðÜñ ÷iò ðÜñá ðiëëiò ññüöié åéá íá ååéöéþrååå ôçí ðiëüöçóå, íá iåéþrååå ôi ññöëiü ååäiñ Yíùí (bitrate) íá åééÜíååå ïññöP áñ÷åßíò, åéá èÜðiéå áðü áðöÜ ðá èüëöðå iðiñåß íá èÜíñöi ðç åéäöñÜ iåðåáiy éåéþò éåééþò åðüäiöçò. Åäp èá ååßóå iåñééÜ ðåñáåååßäiååå åéá íá iåééñÞöååå. Ðñþöå iéá åðéP áíðéæñåöP:

```
% mencoder input.avi -oac copy -ovc copy -o output.avi
```

ËáíèáóíYííé óðíäðåóíl3 óðç ãñâiìP áiôiëþí, iðiñåß íá åþöiñí áñ÷åßá åñüäiò óå iðiñåß åái iðiñåß íá áiâðåñÜååé iÝóå ißæciò i mplayer. Þóé, áí åðéþò èÝéååå íá èÜíååå rip Yíá áñ÷åßí, iåßíååå óôçí åðéëiäP -dumpfile ôiõ mplayer.

Åéá íá iåðååñYøååå ôi input .avi óå codec MPEG4 iå P÷i MPEG3 (áðåéóååßóåé ôi audio/lame):

```
% mencoder input.avi -oac mp3lame -lameopts br=192 \
-ovc lavc -lavcopts vcodec=mpeg4:vhq -o output.avi
```

ìå ôií ññüöi áðöü ðåñÜååååé Yíññiò ðiò iðiñåß íá áiâðåñå÷èåß åðü ôií mplayer êáé ôi xine.

Ìðiñåßóå íá áiôééåååååPååå ôi input .avi iå ôçí åðéëiäP dvd://1 -dvd-device /dev/dvd êáé íá ôi ååðååéYøååå ùò root åéá íá åðåíåùäééiðiëÞöååå åðåðéåßåò Yíá ôßöëiò DVD. Iéá êáé ðéèåíþò åái èá iåßíååå ééåíðiéçíYíò iå ôi áðiòÝéåòíå áðü ôçí ðñþöç öiñÜ, óåò oðíéóöiýíå íá éåðååÜøååå ôií ôßöëiò óå Yíá áñ÷åßí êáé íá åiòëYøååå óå áðöü.

#### 8.4.2.2 Ôi Ðñüåñáìíå Áiâðåñåùäþò xine

Ôi xine åßíåé Yíá project iå åðñý óéiðü, ôi iðiñí ðñiñßæåååé ü÷é iüñí íá åßíåé Yíá ðñüåñáìíå üëå óå Yíá üöi åöiñÜ ôi video, åééÜ åðßöçò óði íá ðåñÜååå iéá åðåíá÷ñçöeiiðiëÞöéïç åáóéêP åéâëéièþêç êáé Yíá áñèñùóü åéôåéYøéï ði iðiñåß íá åðåéååéåß iå ðñüöèååå (plugins). Ìðiñåßóå íá ôi ååéåååååPååå ôüöi áðü ðåéYóï, üöi éåé áðü ôi port, multimedia/xine.

Ôi xine åßíåé åéüíá èÜðuò ÷iññiññiYíí, åééÜ óßäiññá Y÷åé iåééñÞöåé êåéÜ. Óôçí ðñÜíç, ôi xine ÷ñåéÜæåååé åßåå åñÞäiññí åðåíåññååóðP éåé èÜñóå åñåöéêþí, P õðiðóðÞñéïç ôçò åðYéðååçò XVideo. Ôi åñåöéêü ðåñéåÜëëi åßíåé ÷ñçöeiiðiëÞöéï, åééÜ èÜðuò ååYíéå ööéåäi Yíí.

Ôçí þñá ðið ãñÜöiiðáá áðôÝò ié ãñâììÝò äáí áéáíÝiiðáá module ìáæß ñå ôçí åöáññäP **xine**, ééáíü íá áíáðáñÜâåé DVD ñå CSS êuæéêiðiðçóç. ÐòÜñ ÷ iði åéäüóâéò áðü ôñßöiðò éâðáóéâðáóòÝò ié iðiðåò Ý ÷ iði åíðùìáðùìÝñ ôi ðáñáðÜñ module áééÜ éáíéÜ áðü áðôÝò äáí âñßöéâðáé óðçí óðëëiðP ôùí ports ôið FreeBSD.

Óá óýâéñéóç ñå ôið **MPlayer**, ôi **xine** èÜíâé ðâññéóóüôâñá áéá ôi ÷ ñPóðç, áééÜ ôçí ßæéá óðéâiP, äáí åðéôñÝðåé ôüöri ëâððññâñéâéû Ýéâá ÷ i. Ôi **xine** áðiðâðâé èáëýôâñá óá èáéðiðññâá XVideo.

Áðü ðñiðâðééÜ, ïðiññâðôå íá ôi ëáëÝðâðå íá áíáðáñÜâåé Ýíá áñ ÷ åßi åðâðèâðåò áðü ôçí ãñâììP åíðiðþí, ÷ ññßò ôç ÷ ñPóç ôið GUI:

```
% xine
ÁíáëéâðééÜ, ïðiññâðôå íá ôi ëáëÝðâðå íá áíáðáñÜâåé Ýíá áñ ÷ åßi åðâðèâðåò áðü ôçí ãñâììP åíðiðþí, ÷ ññßò ôç ÷ ñPóç ôið GUI:
```

```
% xine -g -p mymovie.avi
```

#### 8.4.2.3 Óá ÅïçèçôééÜ ÐñiðñÜìáðá **transcode**

Ç åöáññäP **transcode** äáí åßíáé ðñüññâíà áíáðáññâðåò, áééÜ iéá òrðßôå åññâæâðùí áéá åðáíáðééiðiðçóç áñ ÷ åßùí video éáé P ÷ iði. Íå ôçí åöáññäP **transcode**, Ý ÷ åðôå ôçí åðíáðüðçóå íá áíâíßiâðå áñ ÷ åßá video, íá åðéóéâðÜóâðå ÷ áéáóíÝíá áñ ÷ åßá, ÷ ñçóéiðiðþíðò åññâæâðå ôçò ãñâììPò åíðiðþí òá iðiðþá ÷ åññâæâðå õá áéáóíÝíá áðü ôá éáíÜëéá stdin/stdout.

ÍàáÜëí ðëÞèò ãðáññäPí ïðiññíýí íá éáëíñéóðiýí éáðÜ ôç äéÜñâéá ôçò ñåðâæðþôðéóðò ôið port multimedia/transcode êáé óðíéóðijýíå ôçí áéüëiðèç ãñâììPò åíðiðþí áéá ôç ñåðâæðþôðéóç ôið **transcode**:

```
# make WITH_OPTIMIZED_CFLAGS=yes WITH_LIBA52=yes WITH_LAME=yes WITH_OGG=yes \
WITH_MJPEG=yes -DWITH_XVID=yes
```

Íé ðñiðâðééñâðå ðâðééñâðå ãðééñâðå Ýò åßíáé êáðÜëëçëåò áéá ôiðò ðâññéóóüôâññò ÷ ñPóðååò.

Áéá íá óáð åðßññðòå ôéò ééâíüðçôåò ôið **transcode**, åðßôå Ýíá ðáññÜäâéâñá ñåðâðññðþò áñ ÷ åßið DivX óá PAL MPEG-1 (PAL VCD):

```
% transcode -i input.avi -V --export_prof vcd-pal -o output_vcd
% mplex -f 1 -o output_vcd.mpg output_vcd.m1v output_vcd.mpa
```

Ôi áñ ÷ åßi MPEG ðið ðñiðéýðôåé, ôið **output\_vcd.mpg**, ïðiññâð íá áíáðáñá ÷ èåß áðü ôið **MPlayer**. Íðiññâðôå åðßóçò íá ãñÜøâðå ñå ãñ ÷ åßi óá Ýíá CD-R áéá íá åçìiðññðþôåå Ýíá Video CD, êáé óðçí åðññððóñóç áðôP èá ÷ ñâéáóðåß íá åâéâðáóððþôåå õá ðñiðñÜìáðå multimedia/vcdimager êáé sysutils/cdrdao.

ÕðÜñ ÷ áé óâëßâá manual áéá ôið **transcode**, áééÜ ðñÝðåé åðßóçò íá óðíâððâðóðåò ôið **transcode** wiki (<http://www.transcoding.org/cgi-bin/transcode>) áéá ðâññéóóüôâññò ðëçññiðññðåò áéé ðáññâæðþññåå.

#### 8.4.3 ÅðéðëÝíí ÄéÜâáóìá

ÕðÜñ ÷ áé ñâðâæðþâ áíÝëéíç óðâá äéáéÝðéíá ðáéÝðâá video áéá ôi FreeBSD. Åßíáé áñéâðÜ ðééáíü üðé óði Úìâði ïÝëëíí ðiëëÜ áðü ôá ðñiðâæðþâå ðið ãíáðóÝññðåé åâðþ èá Ý ÷ iði åðéëðèâð. Óði åâðëÜìâði áéÜðôçíá, üðié åíâéáðóÝññðåé íá ÷ ñçóéiðiðþóðið ðéçññiðññðåò A/V ôið FreeBSD óði Ýðâðñí èá ðñÝðåé íá óðíâððþò ðiðiðí ñðþóâðò áðü áéÜðiñá FAQ

Êáé tutorials êáé íá ÷ ñçóëíïðíéÞóïõí áñêåð Ýð áæáöññâðéé Ýð åöáññäíäÝð. Ôí ôìÞíà áðôü õðÜñ÷åé áêñéåþò ãéá íá äåßñåé óôíí áíáãíþðóç ðíø ïðññâð íá áññåé óÝðíéåð ðññüðèåðåð ðëçñïöññßåò.

Ç Ôâéïçñßùóç ôíö Mplayer (<http://www.mplayerhq.hu/DOCS/>) áßíáé áñéåôÜ ðëçñïöñéâéÞ üöi áöiñÜ ôi ôâ÷íéü åðßðåäii. Áí Ý÷âôå öéïðü íá áðiîéòÞóåôå ðöççüü ðïöiööúô åìðåéñßáò óå ó÷Ýóç iå oï video oóï UNIX, èä ðöñÝðåé iðùóäÞðiôå íá ôçí óðiâiöéåôðôåßôå. Ç ëßóôå áéëçëiñáößáò ôíö **MPlayer** áßíáé å÷èñéêÞ óå üðiïéí åáí Ý÷âåé êÜíåé ôíï êüöi íá äæáâÜðåé ôçí ôâéïçñßùóç, Ýðóé áí öéïðåýåôå íá êÜíåôå áíáöiñÝð ðöðåëiÜðùí, åâââéüéåßôå üöé ôçí Ý÷âôå äæáâÜðåé.

Óði xine HOWTO ([http://dvd.sourceforge.net/xine-howto/en\\_GB/html/howto.html](http://dvd.sourceforge.net/xine-howto/en_GB/html/howto.html)) ðánéÝ ÷ áé Ýíá êåöÜéáei ó÷åðééÜ íå ôçí ååëôßùóç ôçò áðüäïóçò, óði iðiþí åßíáé êíéíü ãéá üéá óá ðñiðñ Ülláðá áíáðáñáùðPò.

ΟΥΓειο, δοθῆνται ιστοι εὐδοκεῖαν οὐρανοῦ διηγεῖται ἀπό την πατέρα της Υδρίαντα Βασιλεὺαν.

- Ôi Avifile (<http://avifile.sourceforge.net/>) ôi iðiþí ÅßÍÁÉ ÅÐÞÓÇÒ port, `multimedia/avifile`.
  - Ôi Ogle (<http://www.dtek.chalmers.se/groups/dvd/>) ôi iðiþí ÅßÍÁÉ ÅÐÞÓÇÒ port, `multimedia/ogle`.
  - Ôi Xtheater (<http://xtheater.sourceforge.net/>)
  - Ôi `multimedia/dvdauthor`, ôi iðiþí ÅßÍÁÉ ÅÖÁÑÍÄP DVD authoring áñiéêöiý êþäéâ.

## 8.5 Ñýèìéóć ÈÜñôáò Ôçëåüñáóçò

À n'importe quel moment de l'année, il est possible de faire une visite guidée à la Fondation El-Rayes.

### 8.5.1 Åéóáãùãþ

Íé êÜñôåò ôçëäüñáóçò óáó åðéöñ Ýðíöí íá âé Ýðåôå ôçëäüñáóç, êáñíéêP P êáëùäéâP, óóíí õðíëëæéôP óáó. Íé ðåñéöóüôðåñåò áðü áðô Ýò äÝ÷iíöáé åðßöçò óþíá óýíéâðíö (composite) video, iÝóù áéðüäiö RCA P S-video, êáé êÜðíéåò áðü áðô Ýò äéæé Ýòíöí ééáé ñääéïöúíéêü äÝéôc FM.

Ôi FreeBSD ðáñ Ý ÷ áé ôðiôðPñeïç áéá êÜñôåò TV ôýðö PCI ðiõ ÷ ñçóëiðíëíýí óá iëëëëçñù Ý íá êôëëþlåôá óýëëççö video, Brooktree Bt848/849/878/879 þ Conexant CN-878/Fusion 878a ià ôi ðñüñâñâilä iäPäçöçò bktr(4). Èá ðñÝðåé åðßöçö íá åââáæñùéåßöô üöé ç êÜñôå Ý ñ ÷ åôáé ià åÝëôç ðiõ ôðiôðçñßæåðåé. Óðiñiøéåðôå ôç óâëßää manual ôiõ bktr(4) áéá íá åâßöôå ôç ëßöôå ðùí ððiôðçñéæüíåñú åâéêöbí.

#### 8.5.2 Åâêáèéóôbíóáò ôï Ðñüãñáììá ïäÞãcóçò

Áéá íá ÷ñçóéiiðiéÞróåôå ôçí êÜñôá èá ðñÝðåé íá öiññóþróåôå ôi ðñüüãñáììá iäPäçóçò bktr(4), ðñiøéÝöiiôåò ôçí áéiiëiðèc ãññáììP ôóíí áñ÷ñbí /boot/loader.conf:

bktr\_load="YES"

ÁÍáéëáêôéêÜ, ïðïñâßôå íá ðñïóðèÝåôå óôáôéêÞ õðïíóðÞñéïç áéá ôçí êÜñôá óôï ðõñÞíá óáò, êáé áéá ôï óéïðü áôôü ðñïíóðèÝåôå ðéò áéñüïñðôå ãññ ñüñÝð ðóò áññ ÷ áññ ñðõèñðôåñù ñññ ðôñÞíá·

```
device    bktr
device    iicbus
device    iicbb
device    smbus
```

Íé áðéðñüöéâðóíé íäçáiiß óððéâðþí áßíáé áðáñáßðóçöíé, áðåéäÞ ôá áîññðÞìáóá ôçò êÜññóáð áðéëíéíüíýí iåðáíý ôíðð  
æéái Ýóïð áíüò áéáýëëö I2C. Áöiy éÜíåôá ôéö áðáñáßðóçôåð áéëéã ÁÝò ôöï áñ÷åßí, iåðáãëüôößöôá eáé áåéáðáóðóÞöôá ôï  
íÝí ðõñÞíá.

Ílueéð ðáæðáéþróðá lað áðóðþ ðóç æáðáéðáóþá, eà ðñÝðåé íá áðááíðééíÞróðáð ói óýðóðçíá óáð. ÉáðÜ ðóç æéÜññéáðá óçðó áðéðíçóðó, eà ðñÝðåé íá äððóð áðÜðiéá íçíýíáðá áðü óçí áðÜññóð áóð, üððùð óðá ðáñáéðÜðù:

```
bktr0: <BrookTree 848A> mem 0xd7000000-0xd7000fff irq 10 at device 10.0 on pci0  
iicbb0: <I2C bit-banging driver> on bti2c0  
iicbus0: <Philips I2C bus> on iicbb0 master-only  
iicbus1: <Philips I2C bus> on iicbb0 master-only  
smbus0: <System Management Bus> on bti2c0  
bktr0: Pinnacle/Miro TV, Philips SECAM tuner.
```

ÖödõéêÜ, ðá îçíýíáðá áðôðÜ èá áæáð Öññíðí áí Üëëáá íå ðí ðeeéü óáð. Ùòóùöri èá ðñ Ýðåé íá áé Ýâíðåð üöð áíé ÷ íáyèçéå óùóðÜ i äÝêòçò. Åßíáé äðíáðüí íá áeë Üíâðå ëÜðíéåð áðü ôíð ðáññai Ýññíðò ðið áíé ÷ íáyèçéåí ÷ ñçóéïiðíéþíðå MIBs ðið sysctl(8) áæéþò êáé áððééïä Ýð óóï áñ ÷ åßí ñòëìßðåùí ðòñÞíá. Áéá ðáñ Üääéáíä, íá èÝéâðå íá áðéáÜëåðå i äÝêòçò íá åßíáé öýðiø Philips SECAM, èá ðñ Ýðåé íá ðññíð Öýâðåð ôçí áéüëëðèc ãññaiP óóï áñ ÷ åßí ñòëìßðåùí ðið ðòñÞíá óáð:

```
options OVERRIDE_TUNER=6
```

Þ ìðiñåßôå íá ÷ñçóéiiðiéÞóåôå áðåõèåßáò ói sysctl(8):

```
# sysctl hw.bt848.tuner=6
```

Äåßôå ôç ôåëßää manual ôiõ bktr(4) êåèþò êåé ôi áñ ÷ åßí /usr/src/sys/conf/NOTES äéá ðåñéóöüôåñåò  
ëåðöñÝñåéåò ð÷ åôééÜ iå ôéô äéåéÝñéåò åðéëåÝð.

### 8.5.3 ×ñBóéìåò ÅöáñïäÝò

- Ôi **multimedia/fxtv** ðáñÝ ÷ áé äöíáðüôçôá íá äåßôå ôçëåüñáóç óå ðáñÜeõñii, êáèþò êáé ôçí äöíáðüôçôá óýëëçþçò áéêüíåò / P÷iõ / video.
  - Ôi **multimedia/xawtv** åßíáé åðßóçò åöáññiäP ôçëåüñáóçò, iå äöíáðüôçôåò üiiéåò iå ôi **fxtv**.
  - Ôi **misc/alevt** áðíêùäééiðieåß êáé áðåééiïßæåé Videotext/Teletext.
  - Ôi **audio/xmradio** åßíáé iéá åöáññiäP æáá íá ÷ nçóéiiðieÞóåôå ôi äÝêôç FM ðiõ åßíáé åíóùåôùìÝiò óå êÜðiéåò eÜññåôå ôçëåüñáóçò.
  - Ôi **audio/wmtune** åßíáé iéá åïëééP desktop åöáññiäP æáá ñääcïöùééiyò äÝêôåò.

Iðiñåßôå íá âñåßôå ðåñéóóüôåñåò åöáñiiäÝò óôç óõëëiäP ôùí Ports ôiõ FreeBSD.

#### 8.5.4 Áíôéìåôþðéóç ĐñïâëçìÜôùí

Áí Áíóéíâðôñðßöåðå Ûðïíéí ðñüâæçìá íå ðçí Ûñðå òççéåññáðçð, éä ðñ Ýðåé ðñþðå íá åéÝâíåðå áí ðí ieiéèçñùìÝíí  
óýéëçøçð video êåþð êáé í äÝéôçð ððïóðçñßæíñðåé åðü ðñüâññáìä íäþççðò bktr(4) êáé áí Ý ÷åðå ÷ñçóéíðïéÞðåé  
ðéð ñùñðÝð ñððéñðöåéð ñðéð åðééñäÝð óáð. Áéá åðéðéÝíí ððïóðÞñéíç êåþð êáé åéÜñññðå ðññðÞðåéð ð-åðééÜ íå  
ðçí Ûñðå õáð, ßöùñ èÝéåðå íá åðééñðüñÞðååðå íå ðçí õëßöðå freebsd-multimedia

(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-multimedia>) êáé íá äéáâÜóâôå ôéò ðáëéüôåñâò äçïíöéåýôåéò áðü ôá ãñ ÷ åßá ôçò ëßóðåò.

## 8.6 MythTV

Öð MytH-TV ábíáé Ýía ðñüäñàíà ôýðiö PVR (Ðñiòùðéêüò éáôáñáöÝáò video).

Óóíí éüooíí ôiö Linux ôi MythTV ábíáé Ýíá áíùñóóú ðñüäñáííá íá ðíeeÝó áíññóÞróáéó ié iíðíßåò áðóóéíëáýíóí óçí áääéáôÜóôáóç ôiö. Ôi port ôiö FreeBSD áðëiðíéåß ôi íäááéýóåñí iÝñiö ôçò áéáäééåóßåò áëëÜ íñéóí Ýíá ôiÞíáôá ôiö ðñÝðåé íá áäéåðåóðåèíýí ÷ áéññiëbíçôá. Ç áíùñôçôá áðóÞ ðñæéÝ ÷ áé íäçñßåò ðiö èá óåò áíçëÞróíí íá ññðèìßóåðå ôi MythTV.

## 8.6.1 Öëéêü

Ôi MythTV Ý÷åé ó÷åéáooåb íá ÷ñçóeiïðíeåb ôi V4L åéá ôçí ðñüoåáooç óå óooéåôäÝò video üðùò êùåééïðíeçöÝð (encoders) eåé äÝéoåò. Ôç ååäiÍíç oóêäP, ôi MythTV eåéöiïðñååb éåëýoåñá iå eÜñôåò DVB-S/C/T iå åéáoýfååç USB ðiö ððiööçñBæiöåé åðü ôi multimedia/webcamd éåéþò ôi **webcamd** ðáñÝ-åé iéá åöåñiiäP ÷ñÞöôç åéá ôi V4L. IðíeåäPðiöå êÜñôå DVB ðiö ððiööçñBæåöåé åðü ôi **webcamd** eå ðñÝåé öooéëiæéÜ íá eåéöiïðñååb iå ôi MythTV. Iðíñååbôå ùöôüöi íá åññååbôå åäþ (http://wiki.freebsd.org/WebcamCompat) iéá èßöôå iå åüééiÜóiåådô êÜñôåò. Åéá êÜñôåò ôeo Hauppauge iðíñååbôå íá åññååbôå ðññiñUiiååå iäPåçóçò oóå ðåéÝåå multimedia/pvr250 êåé multimedia/pvrxxx, åééÜ íá Ý÷ååbôå ððüþç oåd üöé ÷ñçóeiïðíeiyí iéá iç-ôððiïðíeçìÍíç åéåðåòP ç iðilåå åái eåéöiïðñååb iå åéäüoåéò ôiö MythTV iåðåååÍíç oååñååb ôçò 0.23.

Ôi HTPC (<http://wiki.freebsd.org/HTPC>) ðáñéÝ ÷ áé ieá ëßóóá üeùú óùí áæáðÝóéiñ ðpiññáíÜ óùí räÞäçóç DVB.

## 8.6.2 Åîáñôþóåéò

Êáéþo ôi MythTV áßíáé åðÝééööi eáé áñèñùöü, åðéöñÝðåé ôði ÷ñÞóöç íá Ý ÷åé ôi frontend êáé ôi backend åá åæööïñâðééÜ ïç ÷áÞíáðá.

Æá ôi frontend, áðáéôðåßáé ôi `multimedia/mythtv-frontend` êáé ið áðíðçñâðóþò X ðii iðiþi iðiññâðôá ía âñâðôá óði x11/xorg. ÉááíéêÜ, ið ððiëiæóðþò ðiði èá åðoåëåß ôi frontend èá ðñÝðåé åðþóçò ía Ý÷åé ieá êÙñôá ãñáöeêþí ç iðiþá ía ððiðçñßæáé XvMC êáé ðñiáéñâðóéeÜ Ýíá ðcëá ÷åéñéóðÞñéi óðiâáðou ià LIRC.

Ãéá ôi backend, ÷ñâéÜæåôáé ôi multimedia/mythtv üðùò éáé iéá âÜóç äåäïíÝíuì MySQL™ éáé ðñïäéñåôéêÜ  
Ýíáó äÝéôçò éáé áðïèçéåôðéüò ÷þñïò ãéá ååññäöÝò. Ôi ðáéÝòi ãéá óçí MySQL èá ðñÝðåé íá ååéåôáóôåéåß  
åðóùñáôáùò òò åíÜññôcôc éáôÜ óçí ååéåôÜóôáóç ðiòi multimedia/mythtv.

### 8.6.3 ÅñêáôÜóôáóç MythTV

Áéá íá åæâáóáôÞóåôå ôi MythTV, ÷ñçóëiiðjéÞóôå óá ðáñáéÜôù áÞláôá. Áñ÷ééÜ åæâáóáôÞóôå ôi MythTV áðü ôcí ÓöeëiäP ôú Ports ôjö FreeBSD;

```
# cd /usr/ports/multimedia/mythtv  
# make install
```

ÅâêáôáóôÞóôå ôc âÜóc äåäüí Ýíùí ôjö MythTV:

```
# mysql -uroot -p < /usr/local/share/mythtv/database/mc.sql
```

Ñõèìßóôå ôi backend:

```
# mythtv-setup
```

ÎâééíÞóôå ôi backend:

```
# echo 'mythbackend_enable="YES"' >> /etc/rc.conf
# /usr/local/etc/rc.d/mythbackend start
```

## 8.7 ÓáñùôÝò Åéêüíáò

ÃñÜöçêå áðü ôi Marc Fonvieille.

### 8.7.1 Åéóáãùäþ

Óoi FreeBSD ç ðñüóâáóç óå óáñùôÝò ðáñÝ ÷ åôáé áðü ôi **SANE** (Scanner Access Now Easy) API ôi iðiþi  
æéâðbèåôáé iÝóá áðü ôçí óðëëiäþ ðùí Ports ôi FreeBSD. Ôi **SANE** ÷ ñçóéiiðiéåß åðßóçò êÜðiéiòò iäçäïýò óðóêåðþí  
ôi FreeBSD æéá fá áðiðóþóåé ðñüóâáóç óði ôðééüü ôið óáñùôþ.

Ôi FreeBSD ððiðóçñßæåé óáñùôÝò SCSI éáé USB. Åââáéùèåßôå üðé i óáñùôþ óáð ððiðóçñßæåáé áðü ôi **SANE**  
ðñéí iâééíÞóåôå iðiéääþðiôå åâéåôÜóôáóç éáé ñyéiéóç. Ôi **SANE** æéàéÝôåé iéá ëßóôå ððiðóçñéæüìåñú óðóêåðþí  
(<http://www.sane-project.org/sane-supported-devices.html>) ç iðiþá ðáñÝ ÷ åé ðëçñiöiñßåò åéá ôçí ððiðóþñéïç êÜëå  
óáñùôþ éáé ôçí åiÝëéïç ôçò. Óå óðóðþiáôá ðñéí ôi FreeBSD 8.X èá åñâßôå åðßóçò ôç ëßóôå ðùí ððiðóçñéæüìåñú  
USB óáñùôþí óðç óâëßää manual ôið uscanner(4).

### 8.7.2 Ñýèiéóç ôið Ðöñþíá

1/4ðùð åßðåíå ðáñáðÜíû, ððiðóçñßæüïðáé óáñùôÝò ôüði SCSI üði êáé USB. ÁiÜëíàá iå ôi ôñüði åéáóýíäåóçò ôið  
óáñùôþ óáð, èá ÷ ñâéåóðåßôå åéáöiñåôééïýò iäçäïýò óðóêåðþí.

#### 8.7.2.1 Åéáóýíäåóç USB

I ðöñþíáò **GENERIC**, áðü ðñiåðéëiäþ, ðáñéÝ ÷ åé ôið iäçäïýò óðóêåðþí ðið áðáéöiýíðáé åéá ôçí ððiðóþñéïç óáñùôþí  
USB. Ái áðiðáóðþóåðå íá ÷ ñçóéiiðiéþðåðå åââééåðiÝí ðöñþíá, åââáéùèåßôå üðé Ý ÷ åðå ôéð åéüëiðeåð åñáñiÝò óði  
áñ ÷ åßí ñõèìßóåñú óáð:

```
device usb
device uhci
device ohci
device ehci
```

Óå óðóðþiáôá ðñéí ôi FreeBSD 8.X, èá ÷ ñâéåóðåßôå åðßóçò ôçí ðáñáðÜóù åñáñiþ:

```
device uscanner
```

Óå áðôÝò ôéð åêäüöåéð ôïð FreeBSD, ç õðiööPñéíç ôùí óáñùöþí USB áßíåöåé iÝóù ôçð öðöéâðþò usscanner(4). Áðü ôï FreeBSD 8.0 éáé iåðÜ, ç õðiööPñéíç áðôþ ðáñÝ ÷ åôåé áðåöèåßáð áðü ôç åéâëéièþêç libusb(3).

Áöiy áðáíåêééíÞðåðå iå ôï óùööü ððñPíá, óðfáÝóôå ôï USB óáñùöþ óáð. Èá ðñÝðåé íá ååßôå iéá åñáììþ ó ÷ åôééþ iå ôçí áíß ÷ fáðóç ôïð óáñùöþ óðçí ðñiöùñéíþ iñPíç içíðiÜôùí ôïð óðööðiaöið (dmesg(8)):

```
ugen0.2: <EPSON> at usbus0
```

Þ óå Yíá óyóðçìá FreeBSD 7.X:

```
usscanner0: EPSON EPSON Scanner, rev 1.10/3.02, addr 2
```

Óå içýíåðå áðôÜ ååß ÷ ñiði üöé iÝñùöþò iåð ÷ ñçöéiðiðéåß ôçí óðöéâðþ /dev/ugen0.2 Þ ôçí óðöéâðþ /dev/usscanner0 áíÜëiäá iå ôçí Yéëiöç ôïð FreeBSD ðið ÷ ñçöéiðiðéåßôåé. Óði ðáñÜäåéäilá iåð, ÷ ñçöéiðiðéÞðáåå Yíá óáñùöþ EPSON Perfection® 1650 USB.

### 8.7.2.2 Äéáóýíååóç Ôýðið SCSI

Áí iÝñùöþò óåð Yñ ÷ åôåé iå äéáóýíååóç ôýðið SCSI, áßíåé óçìáíöéü íá åùñßæåðå ôé êÜñôå åéâåéðþ SCSI èá ÷ ñçöéiðiðéÞðåðå. ÁíÜëiäá iå ôï iëiéëçñùíYñ ëyéëùíå ôçð êÜñôå SCSI ðið ÷ ñçöéiðiðéåßôåé, èá ðñÝðåé íá ñðeìßöååå åéåðÜëéçéå ôï áñ ÷ åßi ñðeìßöåùí ððñPíá. Í ððñPíáð GENERIC ððiööçñßæåé ôïð ðéi ëiéííýð åéâåéðÝð SCSI. Åååáéùèåßôå üöé äéååÜóåå ôï áñ ÷ åßi NOTES êáé ðñiöéÝóôå ôç óùööþ åñáììþ óóï áñ ÷ åßi ñðeìßöåùí ððñPíá. Åéöüð åðü ôï ðñüäñáiiá iäþäççò ôïð åéâåéðþ SCSI, èá ðñÝðåé áéüíá íá Y ÷ åôå ôéð áéüëiðeåð åñáììYð óóï áñ ÷ åßi ñðeìßöåùí ôïð ððñPíá óåð:

```
device scbus
device pass
```

Íüëéð iåðååëèùöößöååå åéé ååéåååööÞðåðå ôíí ððñPíá, èá iðiñÝóååå íá ååßôå ôéð óðöéâðÝð óðçí ðñiöùñéíþ iñPíç içíðiÜôùí óðööðiaöið, êåðÜ ôç äéÜñêååá ôçò åéêßíççò:

```
pass2 at aic0 bus 0 target 2 lun 0
pass2: <AGFA SNAPSCAN 600 1.10> Fixed Scanner SCSI-2 device
pass2: 3.300MB/s transfers
```

Áí iÝñùöþò óåð ååí Pðáí åíåññäiðíéçìYñ ðéåðÜ ôçí åéêßíççò ôïð óðööðiaöið óåð, áßíåé åéüíá åðíåöüí íá åíáíååéÜóååå ôíí åíöiðéöü ôïð, åéðååþíöåå åíß ÷ fáðóç ôïð äéáýéið SCSI iå ôçí åíPðéåéå ôçð åíöiðþò camcontrol(8):

```
# camcontrol rescan all
Re-scan of bus 0 was successful
Re-scan of bus 1 was successful
Re-scan of bus 2 was successful
Re-scan of bus 3 was successful
```

Í óáñùöþò èá åíöáíéöååß ôüöåå óðç eßööåå ôùí óðöéâðþí SCSI:

```
# camcontrol devlist
<IBM DDRS-34560 S97B> at scbus0 target 5 lun 0 (pass0,da0)
<IBM DDRS-34560 S97B> at scbus0 target 6 lun 0 (pass1,da1)
<AGFA SNAPSCAN 600 1.10> at scbus1 target 2 lun 0 (pass3)
<PHILIPS CDD3610 CD-R/RW 1.00> at scbus2 target 0 lun 0 (pass2,cd0)
```

Ðâñéóóñüðâññåò ðëçñïöññßåò ó÷åôééÙ íà ôéò óôóéåòÝò SCSI åßíáé äéåèÝ óéíåò óôéò óåëßäåò manual scsi(4) éáé camcontrol(8).

### **8.7.3 Ñyèìéóç ôïõ SANE**

Ôi óyóóciá **SANE** ÷ùñßæådáé óá äýí èññÜdáé: óöi backend (*graphics/sane-backends*) êáé óöi frontend (*graphics/sane-frontends*). Ôi backend ðáñÝ ÷åé ðññüôåáóç óöii ßæéi ôi óánñùôP. Óôç ëbôdá ððiòdçñéaxüìåñüí óôóéåôþí (<http://www.sane-project.org/sane-supported-devices.html>) ôiõ **SANE** ïðiñâßôå íá âñâßôå ðiéi backend ððiòdçñßæåé ôiõ óánñùôP óáð. Åßíáé ðði÷ñâùôééü íá âñâßôå ôi óùñôóü backend æá íá ïðiñÝóåôå íá ÷ñçóéiiðièPóåôå ôi óánñùôP óáð. Ôi ôiÞia ôiõ frontend ðáñÝ ÷åé ôi ãññóééü ðåññéå Üeëii ãññáóßôå æá òç óÜññóç (**xscanimage**).

Óði ðñþþi Þeia áðiáé íá áðeáðoðóÞoðoða ói port þ ói ððæÝoði graphics/sane-backends. ÍaðoÜ ÷ñcðóeiðiðieÞoða ócí áðiðeÞ sane-find-scanner áéá íá áðeÝaðoða ócí áíß ÷íáðoðc óið óáññùðÞ óáð áðü ói óýóðcìá SANE:

```
# sane-find-scanner -q
found SCSI scanner "AGFA SNAPSCAN 600 1.10" at /dev/psaux
```

Ç Ýñäö èá óáð äåßâé öi åßäö óýíäåóçò öiö óáñùòþ êáèþò êáé öi üññá óóóêåðþò ðiö ÷ñçóëiðiéåßôáé æéá ôç óýíäåóç iå öi óýóöçìá óáð. Öi üññá öiö éáôáóêåðåóþ êáé öiö iiööÝëëö ßóùò íá içí åiöáíéööiyí, aëëÜ áôðü aáí åßíáé öciáöéü.

**ÓciáBBúóć:** IñéóíYííé USB óáñùòYò áðáéóíYí ôc öüñòùóć firmware. Ç äéáéééáòBá áíçáàBòáé ôóć óáëBáá manual ôiö backend. Éá ðñYòáé áðBóçö íá áééáÚóáôå òéò óåëBááò manual sane-find-scanner(1) êáé sane(7).

Đñ Ýðåé ôþñá íá åéÝâññöiá áí i óáññùòþ ðà ááññùññéóðåß áðü ði frontenđ ðññüññàíá óÜññùóçò. Áðü ðññiåðéëræþ, ði SANE backend Ýñ-åðåé ía Ýíá åññääëþí ãññiiþ ði åññiøþí, ði scanimage(1). Ç åññiøþí áðóþ óáðéññ Ýðåé ðicí áðáññbèiçöç ðùí óððóêåðþí ééáð ði óÜññùóçò áéññüññáð ðòðü ði ãññiiþ ði åññiøþí. Ç åññiøþí áðééññ -L ÷ñçóðññiøþí áðåé ði ñçóðññiøþí áðåé ði ñçóðññiøþí:

```
# scanimage -L  
device 'snapscan:/dev/pass3' is a AGFA SNAPSCAN 600 flatbed scanner
```

<sup>1</sup> Æá Ðán Üääéäiá iå ôíí óáñùôþ ðið : ñçóéiiðiéþóáiå óóí Ôíþiá 8.7.2.1:

```
# scanimage -L  
device 'epson2:libusb:/dev/usb:/dev/uqen0.2' is a Epson GT-8200 flatbed scanner
```

C ðáñáðÜíù Ýíñäìò ðññÍñ÷åôáé áðü Ýíá óýóôciá FreeBSD 8.X êáé c ãñâííÙ

'epson2:libusb:/dev/usb:/dev/ugen0.2' iáð ðeçñíöññâb æáé ói üññá óiõ backend (epson2) êáé ói üññá óiõ óóñéâðòPø (/dev/ugen0.2) ðiõ ðiñçóëüðiæåb ið ñáññùðòPø iáð.

**Óciáßúóç:** Áí áái áäßöôá Ýíïäí, þ áäßöôá Ýíá iþíöílá üöé äái áíé - íåýèçêá óáñùôþò, óciáßíáé üöé ôi scanimage(1) äái iðüñåöá íá áíááíüñßöåé ôi óáñùôþ. Áí ööìåß áööü, ea ÷ñåéáööß íá åðåíåññáóöåßöå ôi áñ÷åßí ñöèìßöåúí ôiö backend êáé íá iñßöåðå ôi óáñùôþ ôiö ea ÷ñçöéiïðíéçèåß. ÍæáðÜëiäiò /usr/local/etc/sane.d/ ðåñéÝ÷åé üëá ôá áñ÷åßá ñöèìßöåúí ôiö backend. Ôi ðñüâéçíá áíááíþñéóçò áiøáíßæåðåé óá iñéöíÝíá iñöíÝéá USB óáñùöþí.

Ãéá ðáñÜáâéáíá, íá ðí óáñùñóþ USB ðíð -ñçóéíðíéâßóáé óðí Öíþíá 8.7.2.1, ç áíðëëþ sane-find-scanner æßíâé ðéó áéüëíðéåð ðéçññíïññåò:

```
# sane-find-scanner -q
found USB scanner (UNKNOWN vendor and product) at device /dev/usscanner0

Í óáñùôþò áñÝèçêå, ÷ñçóéiïðíéåß äéáóýíääóç USB êáé ôi üüllá óõóêåôþò ôiõ áßíáé /dev/usscanner0. Ôþñá ðñÝðåé íá äïýiå áí áíáäíùñßæåôåé êáé óùôôù:

# scanimage -L

No scanners were identified. If you were expecting something different,
check that the scanner is plugged in, turned on and detected by the
sane-find-scanner tool (if appropriate). Please read the documentation
which came with this software (README, FAQ, manpages).

Áöiy i óáñùôþò áái áíáäíùñßóôåéå, èá ÷ñääéåôåß íá áðåiäñääóôiyiå ôi áñ÷åßi
/usr/local/etc/sane.d/epson2.conf. Ôi iïiôÝëi óáñùôþ ðiõ ÷ñçóéiïðíéþèçêå þóáí ôi EPSON
Perfection 1650, Ýðóé Þýñiõlå üöé i óáñùôþò èá ÷ñçóéiïðíéåß ôi backend epson2. Áåââéùèåßôå üöé
äéáâÜóåôå ôá áïçèçóééÜ ð:üééå ôdå áñ: áßá ñðèiþóåùí ôiõ backend. Áßíáé áñéâðÜ áðëü íá áéëÜiâôå
áñáiìÝò: lâðååññÝðôå óå ð:üééå üöååò áñáiìÝò áâß ÷iõi ëÜëiò ôyõi äéáóýíääóçò áéá ôi óáñùôþ óåò (óðçí
ðññßðôùóçò iáò èá lâðååññÝðiõlå óå ð:üééå üöååò ôeo áñáiìÝò ðiõ lâééÜíå iâ ðç ëÝíç scsi êáèþò i óáñùôþ
iáò ÷ñçóéiïðíéåß äéáóýíääóçò USB), êáé ðñiøéÝðôå ôiõ ôYëiò ôiõ áñ÷åßiõ lëá áñáiìþ ðiõ íá iñßæåé ôi áßäiò
äéáóýíääóçò áéá ôi üüllá óõóêåôþò ðiõ ÷ñçóéiïðíéåßôå. Óðci ðâññßðôùóçò iáò ðñiøéÝðôå iâ ðç áéüéiðèç áñáiìþ:
usb /dev/usscanner0
```

Óáò ðáñâéäéiyiå íá áâââéùèåßôå üöé äéáâÜóåôå ôá ð:üééå ôiõ ðáñY÷iðåé ôiõ áñ÷åßi ñðèiþóåùí ôiõ
backend êáèþò áéé ôdåé áîðßóôié ÷åò ôâëßååò manual áéá ðâñéóóûðâñåò ëâððiìÝñâéâð êáèþò êáé áéá ôç
óýóâiç ðiõ ðñÝðåé íá ÷ñçóéiïðíéþòåååå. lõiñiyiå ôþñá íá áðéââåéþòiõlå üöé i óáñùôþò áíáäíùñßæåôåé:

```
# scanimage -L
device 'epson:/dev/usscanner0' is a Epson GT-8200 flatbed scanner
```

Í USB óáñùôþò iáò áíáäíùñßóôåéå. Áái áßíáé óçjáíôéêü üöé ç iÜñêá êáé ôi iïiôÝëi áái ôáéñéÜæïòi áéñéâþò iá
ði ãéêü iáò. Ôi ááóéêü óçjáßi áßíáé ôi ðâäßi 'epson:/dev/usscanner0', ôi iðiþi ãâß ÷iâé ôi óùôôù backend
êáé üüllá óõóêåôþò.

Ìüééò ç áîðiëþ scanimage -L lõiñÝðåé íá áâé ôi óáñùôþ, ç ñýëèéóç Ý÷åé iëièëçñùèåß. Ç óõóêåôþ áßíáé Ýðiëiç íá
÷ñçóéiïðíéçèåß.

Áí áéá ç scanimage(1) iáò áðéôñÝðåé íá óáñþòiõlå áéêüíå áðü ôç áñâiìþ áîðiëþí, áßíáé ðñiðéiüöåñií íá
÷ñçóéiïðíéþòiõlå ðñüäñâiìå óå áñáöéêü ðâñéâÜëëií áéá ôçí áñâñáóßá áôôþ. Ôi SANE iáò ðñiøóÝñâé Ýíá áðëü
áëëÜ áðiñiôéêü áñáöéêü ðâñéâÜëëií: ôi xsanimage (graphics/sane-frontends).

Ôi Xsane (graphics/xsane) áßíáé áðßóçò Ýíá áçiiöeëÝò frontend ðñüäñâiìå óÜñùóçò. To frontend áôôù
ðñiøóÝñâé ðñi ÷ùñçíÝíåò aðiñåðüöçôåò, üðùò áéáöiñâôéëiýò ôñüðiõð ðññùóçò (öùôiððßá, fax, ðëð) áéüñèùóç
÷ùñiÜðùí, ðiëëáððeþ ðññùóç è.á. Êáé ié äýi áôôÝò áôóññiäÝò áéáôðéâiôáé áðßóçò óáí ðññùóðåi (plugin) ðññùññâiíå
áéá ÷ñþóç iâ ði ß GIMP.

## 8.7.4 Äßñiðåò óå ¶eeëiðò ×ñþóôåò Ðñüóâåóç óðií Óáñùôþ óáò

¼ëåò ié ðáñáðÜiù eâéôiññâbåò Ýæíáí iâ óå ðññiññiæ åôi ÷ñþóôç root. lõiññâb ùðôôùoí, íá èÝëâôåå íá äþóâôå
ðññùóâåóç óðií óáñùôþ óåò êáé óå Üëëiðò ÷ñþóôåò. Í ÷ñþóôçò ÷ñâéÜæåôåé Üäâéá áí Üññùóçò êáé áââññâoþò óôi
áñ÷åßi óõóêåôþò ðiõ ÷ñçóéiïðíéåßôåé áðü ôi óáñùôþ. Óáí ðáñÜäâéâiá, i óáñùôþò iáò ÷ñçóéiïðíéåß ôi áñ÷åßi

óðóéâððPø /dev/ugen0.2 ði iðiþí óðíçj ðññáaiâðóéëüðþçðå áðíáé Ýíáð óðíâðéëüð ãððiùð ðññiò ði ðññáaiâðóéëü áñ ÷ áðíóððPø, ði /dev/usb/0.2.0 (iðiñâðþðá íá ði áðéâðâðéþðóâðá áýéiðé ìá ìéá ïáðéëÜ óðíí eáðÜëið /dev). Ðúiði iðiâðéëüð ãððiùð üðið êáé ði áñ ÷ áðíóððPø áðíððið ðiðð ñÜäðð wheel êáé operator. Áí ðññiðeÝðiðið ði ÷ ñÞróðc jøe óá áððYð ðeðo ñÜäðð, eá ðiðññâð íá ÷ ñçðoëiðiðéÞðá ði óáññûðP. Áéá ëüññið ðoðáéâððá ùðiùð eá ðññYððáé áðíáððá áéáéððâðñá ðññiðâðéëüð ðoðáí ðññiðeÝðiðið Ýíá ÷ ñÞróðc óá ìéá ñÜäðð, áéæéëÜ áí ðññüðâðáé áéá ðçqí wheel. Íéá êáéýðâðñç eýýðc eá Þðáí íá aðlëiðññðÞðiðið ìéá ñÜäðð áéæéëÜ áéá ðç ÷ ñÞróðc ðoðí ðóðóððí USB, êáé íá áððéñYðiðið ðññüðâðñç ðoðí ðóðññûðP óðá ñYëc ðç ñÜäðð áððPø.

Áéá ðán Üääéäíá, éá ÷-ñcóéiiðiéÞóíðiå leá iñÜääá ia ôi üññá usb. Ôi ðñþói áþia åßíáé ç äçléiõññáßá áôôÞò ôçò iñÜääáò ia ôç áiÞèåéá ôçò áíôíëÞò pw(8):

```
# pw groupadd usb
```

Èá ðñÝðåé Ýðåéðá íá áæëÜñiðíà óá áæéåéþíàðá ðíðó ðóðiäeëééíý ãðóñíý /dev/ugen0.2 éáé ðíðó ãñ÷åßið óðóðåðò /dev/ugen0.2.0 þóðå íá åßíáé ðñiðáÜóðíá áðü ðóçí iñÜää usb íå äðíáðùðóçóå åðãñáðò (æééåéþíàðá 0660 Þ 0664). Áðü ðñiðåðéëriðþ, iññi í èæíiðòðóçð áðóðþí ðóùí ãñ÷åßuñ (í root) Ý÷åé óá áðáñáððóçðå áæéåéþíàðá åðãñáðò. ¼éá óá ðáñáðÜñu iðiñiðí íá åßñiðí ïå ðáñáðéÜðu ãññaiÝðó ðóðí ãñ÷åßi /etc/devfs.rules:

[ system=5 ]

```
add path ugen0.2 mode 660 group usb  
add path usb/0.2.0 mode 0660 group usb
```

Їе ÷ нїРôдâò ðîõ FreeBSD 7.X єá ÷ нїåéáööñïÝí ðéò ðáññæÜòù áññáiiÝð, iå ðî ñùòðü áñ ÷ åßí öððéåñòÞð (ðéò ðáññéööñüðâññâò ðïñÝð єá åßíäé ðî /dev/usscanner0):

[system=5]

```
add path uscanner0 mode 0660 group usb
```

Δάεδα. Δημόσιο Υπόβαθρο στην πλατφόρμα της Δημόσιας Δικτύωσης της Δημοκρατίας.

```
devfs system ruleset="system"
```

```
# pw groupmod usb -m ice
```

Ãéá ðåñéóñijôðñåò èåðôij Ýñåéåò, äéáâ Üóôå ôc óåëßääá manual ôjö pw(8).

# ÊåöÜëáéï 9 Nõèìßæïíôáò ôíí Đõñþíá ôíö FreeBSD

Áíáíåþèçêå êáé áíáäüþèçêå áðü ôíí Jim Mock. Áñ÷ééþ óóíáéööíñÜ áðü ôíí Jake Hamby.

## 9.1 Óýíiøç

Í ðóñþráð ábíráé ç eáñæð Ü ðið eáñéðiðnæðéý óðóðøÞíáðið FreeBSD. Ábíráé ðóðáýéðið aéá ðç aéá ÷ ábñéðc óðç ñiÞicò, óçí áðéáïëP ûði ñðeìßóðaúí aóðáæðbáð, óç aééðýùðc, óçí ðñüðóðaóç ðóði ãðóðéi, eáé ðiðeÜ Üeáá, já ðóði ÷ þò aðñiaðiðiði ÍÝñið ðið FreeBSD ðiðññáð ía ñðeìéðóðað aðñiaðéÜ, aðñiaðéÜ ðiðÜñ ÷ iði aéñiaða ðáññéðþóðaóð ié iðiðbáð aððáéðiýí ñðeìßóðaéð eáé iáðaæðþóðeóç ðið ðóñþráð ðið FreeBSD iá ðññiðamñiði ÍYið ðáñai ÍYñiðið.

Áöiý äéáâÜóåôå áôôü öi êåöÜëáei, èá iÝñåôå:



¼ëåò ié åíöiè Ýò ðiø åìöáíßæíøáé óå áôõù öi êäöÜëæíiù òò ðáñáäåßäíàöá ðñÝðåé íá åêöåëåööiyíùò root æá íá åßíáé åðéóö÷åßò.

## 9.2 Æáôß íá ÖôéÜâôå ĐñïóáñïíöìÝïí ĐõñÞíá;

ÊáôÜ ðánñÜäíöç, òí FreeBSD åß: ã áôðü ðíö áðíëåëíÿìå “iiñíéëééü” ðõñÞíá. Áôðü óçìåßíåé üöð í ðõñÞíáò Þóáí Ýíá iãäÜëí ðñüññáìíá, ðõñíöôÞñéæå Ýíá óôáèåñü áññéíù óôóéåðþí, êáé áí èÝéåðå íá áéëÜíåðå ôç óðíðåññéöïñÜ ðíö, èá Ýðñåðå íá iàðôåäéùôðôåðå êáéíýñéí êáé íá åðáíåâééíÞóåðå öíí ðõñíëåéôÞ óåó ià áôðüí.

ÓÞíðá, ói FreeBSD 6.1-RELEASE óá ÷ yóáóá ðñjò Ýíá iiii Ýeë üðjò ië ðåñéóóùòðåñàò eëéòiññáßàò óiò ðõñþíá ðåñéÝ ÷ iñjáé óå modules (áñèñþíåðá) óá iðiñbá iðiññíý íá öiññòùëiýí êáé íá aðiññòùëiýí êáð Ü áðáßòçóç, aðiáíéé Ü óóii ðõñþíá. Áðóú ãðéóñÝ ðåé óóii ðõñþíá íá ðñjòáññùæðåé óå öðééü òi iðiñbí ãðiññáðiéðåðåé òc äðiññÝíç óðéáíþ (üðùò ãéá ðáñ Üáðéáíá üðáí ãéóÝñ ÷ áðáé iéá Üññðá PCMCIA óå Ýíá öiñçðü ðiñiæéðóþ). Áðßòçð ãðéóñÝ ðåé óóii ðõñþíá íá aððåéðåðßíá ñðiáíéé Ü òc eëéòiññáééüòçò Ü óiò, ðñjòé Ýòiñðå ÷ aðáéòçñéóóéé Ü óå iðiñbá aði Þðáí aðáññåðòçóá üðóáí aß ÷ a ìðáðæüòðóéóðaß añ ÷ eeÜ. Áðoíý oñr ãðßíäò i ðõñþíá ãðßíá e ãiñðóùò ùò modular (áñèññùðüò).

Ðáñ' üéá áðóðÜ, áðíáæ áéüíá áðáñáðþöçöí íá áðííðÜ êÜðíéåð óðáðéé Ýð ñðeìþöðåéð óðíí ððñþÍá. Óá iñéóí Ýfåð ðåñéðóþóáéð, áðóðü óðíáðþíáé áðåéäþ ç óðáñéåñéí Ýíç eåéðiòññáá áßíáé óüöi óðåíÜ óðíáðí Ýíç lå óíí ððñþÍá þþóð ááí iðíññáá ðí òrññóðùéåß áðíáñéé Ü. Óá Üëéåð, óðíáðþíáé áðåéäþ áðéÜ eáñáßð ááí Ý ÷ áé áéüíá áó ÷ ièçéåß íá áñ Üþåé Ýíá aðíáñééü module ðið íá ðáñ Ý ÷ áé áðóðþ óç eåéðiòññáéüðçöá.

- Ôá ÷ ýôâñç áâéâBíçóç. Éâèþò i ðôñPíáð èá áíé ÷ íáýâé iùñí ôi ðëéêü ðiò Ý ÷ áðâô óôi óýóôçìá óâò, i ÷ ñiññiò ðiò ÷ ñâæÜæâôáæ æéá ôçí áâéâBíçóç ôiò óôôðPíâôiò óâò èá iâéúeâß àñâiáôééÜ.
  - × álçëüôâñç éâðâáí Üéñúòç iùPíçò, jâò ðñiøáññiòi Ýiò ðôñPíáð, óô ÷ iÜ ÷ ñçöéiiðièâß eéäüôâñç iùPíç áðü ôiï ðôñPíá GENERIC, áöiý áðiðoéÜæiòí áðü áðôñi ñôðéâôÝð èáé : áñâéðôñéôðéÜ ðiò åâí ÷ ñçöéiñðièýíòáé. Áðôñ áâñiaé ôçìáôéêü, éâèþò i ðôñPíáð áññôðâôáæ ðÜíðá öiññòùi Ýiò óôç ðôðééêP iùPíç, iâéþñiñôáð Ýôóé òç iùPíç ðiò áâñiaé åéâæ Ýôéïç åéá åôðñiñiàÝð. Åéá òi èüñi áðôñ, i ðñiøáññiòi Ýiò ðôñPíáð áâñiaé éâéâðôâñâ ÷ ñPóëiò óâ ñôðôðPíâðâ ñieññi iÝââæiò ñôðééêP iùPíçò (RAM).
  - Åðéññüôéâôç ñôðiôðPñéïç óôðéâôþí. I ðñiøáññiòi Ýiò ðôñPíáð óâò åðéôñÝðâé íá ðñiøéÝôâô ñôðiôðPñéïç åéá óôðéâôÝð ié iðiðââò åâí ñôðÜñ ÷ iòiñ GENERIC ðôñPíá, üðùò åéá ðâñÜââæââá åéá êÜññôâð P ÷ iòi.

### 9.3 Áíáéáëýðôííóáò ôéò ÓõóêåõÝò ôíõ Óõóôþìáôíò óáò

*ÄñÜöçêå áðü ôíí Tom Rhodes.*

Đñéí iâééíPôåôå iå ôç ñýèiéóç ôïò ðôñPíá óåò, éá Pôáí ôéüðëíí íá ÕÜíåôå iéá áðïññåòP ðëééíý ôïò ðôñëíæéôòP óåò. Óå ðåñéðôþoåéò ðïò ôï FreeBSD äáiå áßíáé ôï ãåóééü óåò èåéöïññåééü ÿóðçíá, iðïñåßôå áyëíéá íá äçééïññåòP óåôòP ôç ëßôå, áîåô Üæíïôå ôéò ñôèíßôåéò ôïò ôñÝ ÷ iïò ëåéöïññåééïý ôóðôþíåòïò. Áéá ðåñUâåéäíá, ç Äéá ÷ åßñéóç **Óóéåðþí (Device Manager)** ôçò Microsoft äåß ÷ íåé ôóíPéùò õçíáíðééÝ ðëçññöïññåò ÷ åôééÜ iå ôéò äåéåðåôöçíÝ iåò ôóðéåðÝò. Iðïñåßôå íá áññåßôå ôçí Äéá ÷ åßñéóç **Óóéåðþí** ôóïí ðßíáéå åëÝ ã ÷ iïò.

**Óciáßñúos:** IañeeÝò aéäüöáéo ðuí Microsoft Windows aéaeÝòí Ýia aéetíßbaéi ia ðbðöéi **Óyóôciá (System).** Áðü óci iëüic ðiø álðáíßbaáðaé iðññáðba ía á ðeééÝiaða óci **Äéa : áßñéócs** **Óóðéáöþí.**

Áí ááí ððÜñ ÷ áé Üëëí ééåðöiññáéëü óýðóçjá óóíí ððreiñáéóðP, í áéä ÷ áéñéóðP ðáé ðñÝðåé íá áññáéé áðóð Ýð óéð ðéçñiñiñßåò ÷ áéñiñéßíçôá. Íéá ïYéëiäò áßñáé íå ðóç ÷ ñPóç ðiò ãïçèçöééiy ðññiññÜñlåò ðmesg(8) éáé òçò áññiñéPò man(1). Óá ðáññéóðúññá ðññiññÜñlåðá ëäPççóç ðiò FreeBSD áééæ Ýðóñí ðåéëßáá manual, ç iðñßá áåß ÷ íåé ðíi ððiñóðçñéæüññí ððééëü. ÉáðÜ òç áéÜññééæá òçò áééßíçóçò, áòiðáñßæåðáé íéá ðññóðá íå ðéð óððóñéåð Ýð ðiò áíé ÷ íåýéçéáí. Áéá ðáññÜññéæíá, íé ðáññáéÜðóù áññáíí Ýð áåß ÷ ðiññ üöð ðiò ðññüññáññá ëäPççóçò psm áññóðéóð Ýíá ðiññóðéé:

```
psm0: <PS/2 Mouse> irq 12 on atkbdc0
psm0: [GIGANT-LOCKED]
psm0: [ITHREAD]
psm0: model Generic PS/2 mouse, device ID 0
```

Áôôü ôi ðñüäñâiàü íäPäçóçò èá ðñ Ýðåé íá ðåñéëçöèåß óôï áñ÷åßi ñõèlßóåùí ôïõ ðññiôáñiióï Ýiiõ ðõñPíá óáò, P íá õïñôùèåß äôïáîééÜ iÝóù ôïõ loader.conf(5).

Óå iñéói Ýfåò ðåñéðôþóåéò, ç Ýñäiò ôçò dmesg iðiñåß íá äåß ÷ íåé iùñi ôá içíyíáôá ôïò óooðPiáöiò ééæ ü ÷ é ôá aðiðoåë Ýóiaðá ôçò áíß ÷ íaðoçò ðoðéåðþí. Óðéò ðåñéðôþóåéò áðoÝò, iðiñåßðå íá äåßðå ôçí áðeéðiçòþ Ýñäiò óðá ðåñéá ÷ uñáíá ôïò áñ- ðåßiø /var/run/dmesg.boot.

Íeá Úeeéç iÝeraiò áéá óçí aíB ÷ iñóðc ðiò ðeeéiy, áBíáé iÝóù òiò aïçèçðééiy ðñiññiñ Úññáòiò pciconf(8), ðiò iñiññi ðáñiÝ ÷ áé ðei ááééðòééò ðáññééññòòp. Áéá ðáñññáññééñá.

```
ath0@pci0:3:0:0: class=0x020000 card=0x058a1014 chip=0x1014168c rev=0x01 hdr=0x00
vendor      = 'Atheros Communications Inc.'
device      = 'AR5212 Atheros AR5212 802.11abg wireless'
class       = network
```

```
subclass      = ethernet
```

Ç ðáñáðÜíù Ýírääò, ðiø ëþöèçêå íÝóù ôçò áíðiøþò pciconf -lv, äåß÷íåé üöé ôí ðñüäñáìíà íäþäçóçò ath åíôüðéóå ìéá ôðóéâðþ áóýñlåâòið Ethernet. Íðiñâßôå íá äåßôå ôçí áíðþóðié ÷ç óåëßää manual ôíí ðñiñäñÜììáðið ath(4), ÷ñçóðiðiøþíðå ôçí áíðiøþ man ath.

Íðiñâßôå áðþðçò íá ðÜñâòå ÷ñþóéiâò ðëçñiøiñþâò áðü ôçí áíðiøþ man(1), áí äþóâòå ôçí áðééiäþ -k. Óóï ðáñáðÜíù ðáñÜääéäíá, äßñííòå:

```
# man -k Atheros
```

Èá äåßôå ìéá ëßóòå áðü óåëßääò manual ðiø ðåñéÝ ÷iøí ôç óðãëåâñéíÝíç ëÝíç:

ath(4)	- Atheros IEEE 802.11 wireless network driver
ath_hal(4)	- Atheros Hardware Access Layer (HAL)

÷iðåò äéáèÝóéïç ôçí áðrñäöþ õëééïý ôíð ðëiðiæóöþ óáò, ç äéáæéåðþá äçíøiññâò ðñiøáññiðÝñò ðõñPíá óßäiññá õáßíâðåé ëéäüðâñi ãðiøáññðiðéþ.

## 9.4 ÐñiñäñÜììáòå íäþäçóçò, Õðiøðóòþíáòå êáé Áñèñþíáòå (modules)

Ðñéí áçíøiññþðåå Ýíá ðñiøáññiðÝñ ðõñPíá, èá ðñÝðåé ðñþðå íá óêåðòåßôå áéá ðíéið ëüäiðò ôíí ÷ñâéÜæåðóå. Óá ðiøéÝò ðåñéððþðåéò, ç ðiøðóþñéïç õÜðiøéò ðåñéåâñéíÝíç õðóéâðþò ïðiñâß íá áðéóåð ÷eåß íå ôçí ÷ñþóç õÜðiøéò ãñèñþíáðið (module).

Óá áñèñþíáòå ôíð ðõñPíá áñßðéiñðóåé ôóíí êáðÜëäí /boot/kernel/ êáé ðíøiñý íá õiññòùëýí äðíáééÜ ôóíí ðõñPíá ðiø áêåðâåéåßôåé ôç äåäñíÝíç óðéäíþ, íå ôç ÷ñþóç ôçò áíðiøþ kldload(8). Óá ðåñéðóóüðâñá, áí êáé ü÷é üëá, ôá ðñiñäñÜììáòå íäþäçóçò óóíí ðõñPíá, äéåðßèåðóåé êáé óå iimöþ ãñèñþíáðið. Ý ÷iøí áðþðçò ôç äééþ ôíð óåëßää áíþèåéåò ôí êáéÝíá. Áéá ðáñÜääéäíá, óðçí ðñiçäiýäíç áíüöþôå, áßäåíå ôí ðñüäñáìíà íäþäçóçò áóýñlåâòið Ethernet ath. Ç óåëßää áíþèåéåò ãéá áððþ ôç óðóéâðþ áíáðÝññåé:

Alternatively, to load the driver as a module at boot time, place the following line in loader.conf(5):

```
if_ath_load="YES"
```

¼ðùò áíáðÝññååé óóéò íäçäßôå, áí áÜëåòå ôçí ãñáíþ if\_ath\_load="YES" óóí áñ÷åßü /boot/loader.conf, ôí Üñèññùíá èá õiññòùëåß ãðíáééÜ êáð õðóóðþíáðið óáò.

Óá ìåñééÝò ðåñéððþåéò ùóðüüóí, äåí õðÜñ ÷áé Üñèññùíá ðíð íá ó÷åðþæåðóåé íå êÜðiøí ðñüäñáìíà íäþäçóçò. Áðóöü éó÷ýéé ðåñéðóóüðâñí áéá êÜðiøéä êáéåðþâñá ðiøiðóðþíáðå êáé ðíøý óçíáíðééÜ ðñiñäñÜììáòå íäþäçóçò. Áéá ðáñÜääéäíá, ðiø ðñüäñáìíà íäþäçóçò ôíð õðóðþíáðið áñ÷åßùí fast file system (FFS) áðáéðåßôåé íá áßíáé áíóùñáðùíÝñ õóíí ðõñPíá. Òiø ßæéí óðiññåðíé êáé íå ôçí ðiøðóþñéïç äééðýið (INET). Áðóöð ÷þð, í iüñið ðñüðið ãéá íá äåßôå áíÝíá ðñüäñáìíà íäþäçóçò ðñÝðåé íá áßíáé ðíð ÷ñåðóééÜ áíóùñáðùíÝñ óóíí ðõñPíá, áßíáé íá áéÝäíåðå áí ððÜñ ÷áé ôí áíðþðóðié ÷i Üñèññùíá.

**Ðñiñäéäíðiþçóç:** Áðíáé áñèåðÜ áýéiøí íá áóáéñÝóååå ôçí ðiøðóþñéïç ãéá êÜðiøéá óðóéâðþ þ Üëëç áðééiäþ, êáé íá êáðåéëþíåðå íå Ýíá ðõñPíá ðiø ãåí ðíññâß íå íåééíþðåé. Áéá ðáñÜääéäíá, áí áñÜëåðå ôí ðñüäñáìíà íäþäçóçò ath(4) áðü ôí áñ÷åßü ñðèíþðåðùí ôíð ðõñPíá óáò, áí ôí óýóðçíá óáò ÷ñçóðiðéåß äßóéiðo ATA äáí èá ðíññâß íå íåééíþðåé. Ôôçí ðáñßðôðóç áððþ èá ðñÝðåé íá áÜëåðå ôçí áíðþðóðié ÷ç ãñáíþ ôíí áñ÷åßü

loader.conf အောင် အီ ၁၀၂။ အိမ်ပြုခွဲတွင် အိမ်ပြုရန် အောင် အီ ၁၀၃။

## 9.5 Äçìéïöñäßá êáé ÅäêáôÜóôáóç ĐñïóáñïíóïÝïïö Đõñþíá

**ÓcīlāBūóç:** ×ñáéÜäâôáé íá Ý÷åôå áâæáôáôþóáé üëí ôíí ðçäâßí êþäééá ôíõ FreeBSD áéá íá iâôåáäëüôðôþôåôå ôíí ðõñþíá.

Áñ÷ééÜ, éá êÜññóíà iéá áñPäiñç ðáñññóBáóç ôiö éáðáæüäiö ôiö iëññi ãßíåðáé ç iåðåáæþòðéóç ôiö ððñPíá. ¼ëié ié éáðóÜëiñíé ðiö èá áíáðÝññóíà ãñBóëiñðáé êÜðù áðü ôiö éáðÜëiñí /usr/src/sys i iëññi ãßíáé åðBóçò ðññóåÜóðéiñ ïYóù ôçò æéañññPò /sys. ÕðÜñ ÷åé åäþ Yíáð áñññiùö ðiö iëññáðüññiù i iëññi ãðíðññóùðåýåé æéañññåðéêÜ ñiPíáðá ôiö ððñPíá, áæéÜ ié ðëÝíï õçjáíðéëiþ ãéá ôiö oéiðü iáð åßíáé ié arch/conf, üðiö èá åðåñññáðóôåðBó ôéö ññðéñBóåéö ãéá ôiö ðññóánññi Ýññ ððñPíá óáð, éáé i compile, ðiö åßíáé i ÷þññò åññáðBáò ôiö iëññi èá åßíáé ç iåðåáæþòðéóç ôiö. Í arch áíðéññóùðåýåé Yíáð áðü ôá i386, amd64, ia64, powerpc, sparc64, P pc98 (Yíáð áíáééæðéêiö ðýðiö PC, æéañññi Ýññ ôóçí ÉáðññBá). ÍðeáPðiöå ãñBóëåðáé iÝóù ôiö iöññåðññi Ýññ éáðÜëiñí iéáð áñ÷éóåðéiññPò, ôiö åðBæåðáé iññi lñ ôçí áñ÷éóåðéiññPò åðóP. Ôiö ððüëiñí iññi ôiö êþæéá, åßíáé áíáññ ðññóçòi áðü ôçí áñ÷éóåðéiññPò êáé eññiù óá êÜeá ðéáðöññià üðiö èá iëññiÝóù íá iåðåáæüññóéóåð ðiö Freebsd. ÐáññáññPóóå ôç eññéêP iññÜññóç ôçò æññPò ôuñ éáðáæüññi, üðiö êÜeá ððiññóçñéæüññiç ôóóåðP, öýóôçìá áñ÷åßññi éáé åðééññP åñBóëåðáé ôiö æéññ ôçò æáðÜëiñí.

Óóá ðánáââðßáìâóá áâðöïý ðîò êâðöáéâßïò ððrë Ýôïòiå üöé ÷ñçöéïðïéâßöô áöçí áñ ÷éôâðöïíéêP i386. Áí ÷ñçöéïðïéâßöô áæáöïñâðöéêP áñ ÷éôâðöïíéêP, èá ÷ñâéáöôâß íá äëëÜíâðå óá iiüùáð åùí êáðáéüäùí êáé áæáññíþí þöôâ íá óðiââðæïòi íå áðöP.

**Óçìàßùóć:** Áí ááí ñðÜñ÷ áé í éáôÜëïäìò /usr/src/sys óóï óyóôçïá óáò (Þ áí áßíáé Üäåéïò), ôüôâ äáí Ý÷åôå áåêéåóôðÞóáé ôïí ðçääáßí êþäééå ôïõ ðõñÞíá. Í åöñëëüöåññò ôñüðò ãéá íá ôïí áåêéåóôðÞóåôå áßíáé áåêôåðþíôå ðï sysinstall ùò root, åðééÝäíôå Configure, iåðÜ Distributions, Ýðåéóå src êáé ðYéïò All. Èá ÷ñäéåóôåß íá áçïëññäÞóåôå êáé Yíá óóïâéééü áåòïõ ôññò ôïí éáôÜëïäìò /usr/src/sys/ áí ááí ñðÜñ÷ áé þäç.

```
# ln -s /usr/src/sys /sys
```

ঢাঁৰেওা, লাঁওআ়েইচে়া়ভো ওৱি এাও উঠিবি arch/conf এাই আইনেন্ট উপো ওই আন্দৰে অৰু নোৱিভো উই GENERIC ওই উন্মাদ ওই ইডিবি এ যেওা ফাঁ অপো ওৱি ইয়ি ওাদ দৰিপৰি। আই দান্ত উন্মাদেইলাঃ

```
# cd /usr/src/sys/i386/conf  
# cp GENERIC MYKERNEL
```

ÊáôÜ ðáñÜäíöç, ôi üññá áôõü áñÜöâôáé áî' iëëëëPñïò iå êåöäëäbá áñÜìñáôá êáé áí Ý ÷ åôå ðïëëÜ lç ÷ áíPìáôá FreeBSD iå áéäöiñâôéëü õëéëü, åßíáé êåëP éäÝá íá ôiõ äþóåôå ôi üññá ôiõ lç ÷ áíPìáôïò. Áéá ôi ðáñÜääéäíá iáò, èá ôi áðiëäëíÿá *MYKERNEL*.

**Õõdüäääéig:** Ääí åßíáé äääíéé Ü êäéþ éäÝá íá äööìèçéåýóåôå ôí áñ÷åßí ñõèìßóåùí óáoå áðåööèåßáò óóïí éáoôÜëïäi /usr/src. Áí áíööèåòùñßóåôå õñïäéþìáôå, ßóùò ìðåßóå óóïí ðääñéñóïü íá äääéññÜðåôå áðéþò ôíí éåðÜëïäi /usr/src éääé íá îäééïÞóåôå áðü ôçí áñ÷þ. ÕöïÞéèùò èëßää äääñðåññüèåðóå ìåðÜ áðü áðóü èä

ÓðíâéäçôíðíéÞóâôá üôé Ý÷âôâ áðßóçò áéáâñÜðâé ôí áñ÷âßí ñõèìßóâùí ôíí ððñPíá óáò. Áðßóçò, ìçí áðâíâññÜæâôá áðâôèâßáò ôí áñ÷âßí GENERIC, êáèþò îðïñâß íé áéëáâÝò óáò íá ÷âèïýí ôçí áðüíâíç öïñÜ ðïõ èá áíáíâþóâôá ôíí ðçãáßí óáò éþäééá.

Êáëü èá áßíáé íá áðïèçéâýóâôá ôí áñ÷âßí ñõèìßóâùí óá Üëéí êáôÜëíäí êáé íá áçíëññÜðâôá Ýíá óðíâíëéüú áâôíü ðñïò ôí áñ÷âßí, ôííí êáôÜëíäí 1386.

Ãéá ðáñÜääéâíá:

```
# cd /usr/src/sys/i386/conf
# mkdir /root/kernels
# cp GENERIC /root/kernels/MYKERNEL
# ln -s /root/kernels/MYKERNEL
```

Ôþñá, ôñiðiðíéÞóôá ôí áñ÷âßí MYKERNEL íå ôíí áðâíâññáôôÞ êâéí Ýíí ðíí ðñiðéíÜôá. Áí íâééíÜôá íüëéò ôþñá, ðééáíüí í iüñíò áéâéÝóíí ãðâíâññáôôÞ êâéí Ýíí íá áßíáé ôí vi, í îðïñâò áßíáé áñêâðÜ ðíëýðëíëíò áéá íá ôíí áñçâÞóíðíâ áâþí, áéëÜ áéëýððâôáé áñêâðÜ áéëÜ áðü ðëÞëíò áéâëßúí ôðçí áéâëéíññáößá. Ùðôúóíí, ôí FreeBSD áéâéÝðâé áðßóçò Ýíá áðéíëüðâñí áðâíâññáôôÞ êâéí Ýíí, ôíí ee í îðïñâò áßíáé ç êáôÜëëçéç áðéëíäíÞ áí áðóôá áñ÷Üñéíò. ÁéëÜíôá êáðÜ áíýëçóç óá ò÷üëéá óðçí áñ÷Þ ôíí áñ÷âßí ñõèìßóâùí þðôá íá áíðâíâëëýí ôéò áéëáâÝð ðíí Ý÷âôâ êÜíâé áéé íé îðïñâò ôí áéá÷ññâæíðí áðû ôí GENERIC.

Áí Ý÷âôâ áçíëíññÜðâé ððñPíá óóí SunOS Þ óá êÜðíéí Üëéí áééëññâéüú óýóðçíá ôýðíí BSD, ôí íââáëýðâñí íÝñíò áððíý ðíí áñ÷âßí ðíí èá óáò óáíâðíß áíñóðû. Áðû ôçí Üëéç, áí Ýñ÷âôâ áðû êÜðíéí Üëéí áééëññâéü, üðñò ôí DOS ôí áñ÷âßí ñõèìßóâùí GENERIC ßóñò íá óáò áßíáé áýóëíëí ôðçí áéâðâñçóç, áéá ôí èüäí áðû áéëíðëðóôá áññÜ êáé ðñiðâôééëÜ ôéò ðâññéññáöÝð ôíí ôíÞíáðíò Áñ÷âßí Ñõèìßóâùí.

**Óçíâßúóç:** Áí óðâ÷ññâðóâôá ôíí ðçãáßí éþäééá íå ôéò ôâéâððâðâò áéëáâÝð ôíí FreeBSD project, íá áéâáâÜðâôá ôí áñ÷âßí /usr/src/UPDATING ðñéí ðñí÷ññðóâôá óá îðíéëíððíâ áÞíá áíâðÜëíéóçò. Ôí áñ÷âßí áðôú ðâñéññÜðâé áéëáíÜ óçíâðééÜ ðñíâëðíáôá Þ ðâñéí÷Ýð ðíí ÷ñâéÜæííðâé áéëáâððâñç ðñíóí÷Þ üóí áðññÜ ôíí áíâðâñí Ýíí ðçãáßí éþäééá. Ôí áñ÷âßí /usr/src/UPDATING óáéñéÜæâé ðÜíðâ íå ôçí Ýëäíóç ôíí ðçãáßí ðíí ÷ñâéÜæííðâé ôíí FreeBSD ðíí Ý÷âôâ, êáé áßíáé áéá áðôú ôí èüäí ðéí áíçíâññíÝíí óá ò÷Ýóç íå üôé áéâáâÜðâôá óóí ðâññí áéâðëßí.

Èá ðñÝðâé ôþñá íá íâðââëùððóâôá ôíí ðçãáßí éþäééá ôíí ððñPíá.

## Ìâðââëþðôéóç ôíí ÐðñPíá

**Óçíâßúóç:** ×ñâéÜæâôâé íá Ý÷âôâ áâéâððâôðóâé üëí ðíí ðçãáßí éþäééá ôíí FreeBSD áéá íá íâðââëùððóâôá ôíí ððñPíá.

1. Ìâðââëíçèâðôá óóíí êáôÜëíäí /usr/src:
 

```
# cd /usr/src
```
2. Ìâðââëùððóâôá ôíí ððñPíá:
 

```
# make buildkernel KERNCONF=MYKERNEL
```
3. Áâðââððâôðóâôá ôí íÝí ððñPíá:
 

```
# make installkernel KERNCONF=MYKERNEL
```

**Õðüäääéíç:** Áðü ðñïäðéëíäþ, üôáí äçìéíõñääßôå Ÿíá ðñïõáñïíóíÝíí ðõñPíá, äçìéíõñääýíôáé áðßóçò êáé üëá ôá modules (áñèñþíáôá) ðõñPíá. Áí èÝëåôå íá êÜíåôå ðéí ãñþäñç áíáíÝùóç ôíř ðõñPíá þ íá äçìéíõñääþôå ìüíí ôðääëëñéíÝíá modules, éá ðñÝðåé íá ôñïðíðíëþôå ðí ãñ÷åßí /etc/make.conf ðñéí íâëëíþôå ôç äçìéíõñääþá ôíř ðõñPíá:

```
MODULES_OVERRIDE = linux acpi sound/sound sound/dsl ntfs
```

Óôç íâôáâëçôþ áðôþ äßíåôå íéá ëßóôá ôúí modules ðíř èÝëåôå íá äçìéíõñääçèÿí, áíôß íá äçìéíõñääçèÿí üëá.

```
WITHOUT_MODULES = linux acpi sound ntfs
```

Óôç íâôáâëçôþ áðôþ äßíåôå íéá ëßóôá åáóééþí (top level) modules ðíř èÝëåôå íá ðáñääßøåôå êáôÜ ôç äéáäéëåðå ãçìéíõñääþá. Áéá Üëëåò íâôáâëçôÝò ðíř ßóùò áßíáé ÷ñþóéíåò ôôç äéáäéëåðå ãçìéíõñääþá ðõñPíá, äßßôå ôç ôáëßäá manual ôíř make.conf(5).

Í íÝìò ðõñPíáò èá áíðéäñáðåß óôíí èáôÜëíäí /boot/kernel íå ôí üñíñá /boot/kernel/kernel áíþ í ðáëëüò ðõñPíáò èá íâôáâééíçèåß óôí /boot/kernel.old/kernel. Ôâñíâðóôå ôþñá ðí ýóðóçíá óáó êáé áðáñääëéíþôå åéá íá ÷ñçóëíðíëþðåôå ðí íÝí ðõñPíá. Áí èÜðé ðÜåé óññåáÜ, ððÜñ ÷íří èÜðíëåò ðëçñíöññåð ôéá Áíðíâðþðéóç ÐññäçíÜðùí ðíř ßóùò óáó öáñíÿí ÷ñþóéíåò, óôí ôÝëíò áðóíÿí ðíř èâðóáëåþíò. Åââáéùèåßôå üüé åéáááÜðåôå ôí ðíþíá ðíř áíçãåß ðùò íá áðáñáðóÝññåôå ôí ýóðóçíá óáó óá ðâñßððùóç ðíř í íÝìò ðõñPíáò äái åéëëíåß.

**Óçíåßùóç:** ¶ééá áñ÷åßá ðíř ó÷åßøæíðåé íå ôç äéáäéëåðå áêëßíçóçò, üðùò í loader(8) êáé íé ñõëìßóåéò ðíř, áñþðéíðíôåé óôíí èáôÜëíäí /boot. ÅíâéäéëåðíÝíá modules þ modules ôñþðùí êáðóåéåðåôþí ìðíñíýí íá ðíříëåðçèÿí óôíí èáôÜëíäí /boot/kernel, áí êáé íé ÷ñþóåôå èá ðñÝðåé íá ãíññþæíòí üüé áßíáé óçíáíðééü ôá modules íá áßíáé óå óóä ÷ñííéóíü íå ôíř ðõñPíá. Modules óá íðíßá áái ðñíññþæíðåé åéá áêôÝëåóç íå ôíí ôñÝ÷íðå ðõñPíá, íðíñíýí íá ðññéáëÝóíòí áóôÜëåéá þ áóóáëíÝíç èâéóíõñääþá ôíř óôóóþíáôíò óáò.

## 9.6 Óí Áñ÷åßí Ñõëìßóåùí

Áíáíåþèçéå åéá ôíř FreeBSD Joel Dahl.

Ç áâíééþ ïñöþ áííüò áñ÷åßíö ñõëìßóåùí ðõñPíá, áßíáé áñêåðÜ áðëþ. ÈÜëå áññáíþ ðâñéÝ÷åé íéá èÝíç-êëëåéåß êáé Ÿíá þ ðâñéóðüôåñá ïñþðíåðå. Áéá üüäíðò áðëüöçôåò, íé ðâñéóðüôåñå ãññáíÝò ðâñéÝ÷íří ìüíí Ÿíá üñéóíá. Íðéäþðíòå áñþðéåðåé íåðÜ ðí óýíâíëí # ðéàññåßðåé ó÷üëíí êáé áâññåßðåé. Óôá áðüññáíá ðíþíáò èá áññåßðå ðâñéäñáðþí åéá ôéò èÝíâéð-êëëåéëÜ, íå ôç áðéñÜ ðíò áíöáíþæíðåé óóí áñ÷åßí ñõëìßóåùí GENERIC. Áéá áâññöçðééþ ðëßóåå ðíř ðáññíÝðññí êáé óððéåðþí ðíř áñññþðíåé áðü ôçí áñ÷éðåðííéþ, áâßðå ðí áñ÷åßí NOTES ðí íðíßí áñþðéåðåé óôíí ßæíí êáôÜëíäí íå ôí áñ÷åßí GENERIC. Áéá áðéëíäÝò êáé ñõëìßóåéò ðíř áßíáé áíññÜññôçôåò áðü ôçí áñ÷éðåðííéþ, áâßðå ðí áñ÷åßí /usr/src/sys/conf/NOTES.

Íðíññåßðå íå ÷ñçóëíðíëþðåôå ôçí íäçäßá ínclude óóá áñ÷åßí ñõëìßóåùí. Ç íäçäßá áðôþ áðéññÝðåé ôçí èíäééþ óôííðâñþëçøç áííüò Üëëíò áñ÷åßíö ñõëìßóåùí íÝóá óóí ôñÝ÷íí, èÜññíðåò ðéí áýéíëç ôç óðíðþñçóç ôíř üüðáí íé áéëëáÝò ðíř ÷ñâéÜæííðåé áßíáé èßâåò óá ó÷Ýóç íå ôí áñ÷éëóí áñ÷åßí. Áéá ðáñÜäåéäíá, áí ÷ñâéÜæåóôå Ÿíá ðõñPíá GENERIC íå èßâåò íüíí ðáññáðÜíù áðéëíäÝò þ ðññññÜññåò íäþäçóç, íðíññåßðå íá äçìéíõñääþôå Ýíá íéëñü áñ÷åßí áéáöñþí óá ó÷Ýóç íå ôíí GENERIC:

```
include GENERIC
ident MYKERNEL
```

```
options          IPFIREWALL
options          DUMMYNET
options          IPFIREWALL_DEFAULT_TO_ACCEPT
options          IPDIVERT
```

**ÓcīlæBúóç:** Æáé íá äcéílëiññáþóâðâ Ýíá áñ· ð· áßíi ðí iðíßí íá ðâññéÝ· áé üéâðò ðéò æéáèÝóéílâò áðééëäÝò, üðùò áßílåðâé ðóílÙèùò æáé äíééïÝò, áðéâðéÝóôðâ ðçí áéüëiññé ðí ðíòëp ùðò root:

```
# cd /usr/src/sys/i386/conf && make LINT
```

Ôi ðáñáê Üôú áßíáé Yíá ðáñÜääéäíá ôíö áñ÷åßíö ñõëìßóåùí GENERIC la å åðéðñüóèåðå äéåðñéíéóðééÜ ó÷üëéá üðíö åßíáé áðáñáßöçöi. Ôi ðáñÜääéäíá éá ðñ Yðåé íá óâéñéÜæåé áñéåðÜ éáéÜ la ôí áíðòßãñäöi ôíö áñ÷åßíö ðíý Y÷åðå óóí /usr/src/sys/i386/conf/Generic.

machine i386

Ðñüéâéðáé ãéá ðçí áñ÷ éðâéðïíëéþ ðïõ lç÷ áíþiaôíò. ÐñÝðåé íá åßíáé amd64, i386, ia64, pc98, powerpc, psparc64.

cpu	I486_CPU
cpu	I586_CPU
cpu	I686_CPU

Ç ðáñáðÜù áðéëïáP êáëïñþæåð ôíï óýðí òçò CPU ðiò Ý÷åðå õóï óýðóçíá óáð. Íðññâð íá Ý÷åðå ðáñáðÜù áðü ìéá ðÝôíéåð áññáìÝð (áí áéá ðáñÜäåéäìå áäí åßóðå óßäññöñìò áí èá ðñ Ýðåé íá ÷ñçóéïðíÞóåðå I586\_CPU ÞI686\_CPU), áæéÜ áéá Ýíá ðññóáññöñìòÝñ ðññÞíá åßíáé êáëýóåñá íá êáëïñþóåðå íüñí òçò CPU ðiò Ý÷åðå. Áí áäí åßóðå óßäññöñìò áéá ôíï óýðí òçò CPU ïðññâðóå íá åëÝâíåðå ôíï áñ÷åßí /var/run/dmesg.boot áéá íá äåßóðå óá ìçýìáðå áêéßíçóçò òïð óðóðÞíáðò õáð.

Áðóðu áðíáé ðí áðáñáñuñéóðééü üññá ðí ðõññPíá. Éà ðõñÝðåé íá ðí áëëÜññåðå óðí üññá ðíð äþþóðå óðí ðõññPíá óðò, ð.÷. MYKERNEL áí Ý÷åðå áéëëiøðPóáé ðéóð ñæçáßåð áðü ðí ðñiçäÿìâñí ìáð ðáñÜääéñíá. Ç ðéiP ðíð èá aÜëåðå óðí áéðóññéèçóðééü ident èá áéðóñðþrâðåé üðóáí áéééíåßåð íá ðíð óðáñéåññéiÝñí ðõññPíá, éáé Ýðóé áðíáé ðñþóéii íá äþþóðå óðí íÝñí ðõññPíá Ýñí áéáóññåðééü üññá áí èÝëåðå íá ðí ðññþæåðå áðü ðí ðñiçèéóíÝñí ðõññPíá óðò (áí ð.÷. èÝëåðå íá óðóÜññåðå Ýñí ðåðéññåðééü ðõññPíá).

```
#To statically compile in device wiring instead of /boot/device.hints  
#hints          "GENERIC.hints"           # Default places to look for devices.
```

Ót áñ ÷ áßí device.hints(5) ÷ nçoséñ ðiéráßbóáé áæá ótír éæèññéòíù áðééñiäþí ðiòð ð-áßbæññíðáé lå ótòð ñæçäñýò ñðóéñåðþí. Ç ðññiáðééñåðåÝíc èÝðc ócì iðñíßå áæéÝá ÷ áæ í loader(8) éæðÜ ócì áðéßcìcòg áßbíáé ótír /boot/device.hints.

*ÊåöÜëáéï 9 Ñõèìßæïíôáò ôíí ÐõñPíá ôíõ FreeBSD*

Ç öödéeiřiřeáéíP áeáäééáóßá äcìeíõñãßáð ôíõ FreeBSD ðåññéëâíâÜíâé ðéçññõññbáð åéôóááëÜòùóçò (debugging) üôáí í ðõñÞíáð äcìeíõñãßáðé íå ôçí åðééíříP -g, åðéôñÝðiñðáð Ýôóé ôçí ÷ñÞóç ôíõð üôáí ãíëíýí ôóí gcc(1).

```
options SCHED_ULE # ULE scheduler
```

options PREAMP # Enable kernel thread preemption

Åðéôñ Ýðåé óå íÞìáðá óið ðöñþíá íá ðññöðåñáóöiyí áðü Üëéá, ðøçëüôðñço ðññöðåñáéùðçôáò. ÅicëÜåé óóçí áyïçóç áðüññéöçò óið óððóðÞìáðiò êáé áðéôñ Ýðåé óå íÞìáðá æáéiðþí (interrupts) íá áðóðåðáðöiyí ðeí añPäññá, áíðß íá Ýññö óå ááiiñÞ.

```
options          INET          # InterNETworking
```

```
options          INET6          # IPv6 communications protocols
```

Ç åðéëïäP áðôP åíåñäïðiéåß ôá ðñùôüêïëä åðéëïéùíßáò IPv6.

options FFS # Berkeley Fast Filesystem

Ðññüéåðóå ãéá òí áåðééü ñý óýòôçìá áñ ÷ åßùí ðíø ðééçñíý äßóéïø. ÁöÞóå ðçí áðéëràþ áðóþ áíññäiðíéçíÝíç, áí íåêéíÜðå áðü òí ðééçñíý äßóéï.

options SOFTUPDATES # Enable FFS Soft Updates support

options UFS\_ACL # Support for access control lists

options UFS\_DIRHASH # Improve performance on big directories

Ílá ócig áðéðeíráP áðóðP, ðáñééðáíáUññíðóáé éáéðiññáðáó ðið aðiñ Úññiðí ócig óá ÷ yðóçóá ðññúðááðóçó ðið áðóðeíð óá íàð Üëiðð óáðáðéüüññóð, íá êüooðið óc ÷ níPóç áðéðññúðéåðóçó ñíPíçqð. ÖðóééðæéÜ, èá èÝéåðá íá êññóðPóåðá ócig áðéðeíráP áðóðP óá Ýíá íàð Üëi áññðçññáðóçóP P óóðæìü áññáðóðáó, éáé íá ócig áðáéñÝ óåðá üððáí ÷ ñçóéiiðiðéåðóð ði Freebsd óá Ýíá iéññü óýðóðçlá üððið c ñíPíç áðííáé ðáñçíññéóíÝíç éáé c óá ÷ yðóçóá ðññúðááðóçó óðiñ áðóðeí áðííáé ééäüðåññí ócigáíðéêP, üððuð áéá ðáñÜääéáitá óá Ýíá firewall.

```
options MD_ROOT # MD is a potential root device
```

Ílå ôçí åðéëïäP áðóòP åíâññäïðíéåßôáé ç õðíóòPñéïç ÷ ñPóçò åíüò åéëíïééïý äßóéïõ óóç ïíPìç RAM (ramdrive) åéá ÷ ñPóç ùò óóóéåòP root.

```
options           NFSCLIENT      # Network Filesystem Client
options           NFSSERVER      # Network Filesystem Server
options           NFS_ROOT       # NFS usable as /, requires NFSCLIENT
```

Ôi äéêöðåëü óýóôçìá áñ÷åßùí. Ái äáí Ý÷åôå óéïðü íá ðññöáñôÞóåôå óôôóÞíáðá áñ÷åßùí áðü Üéëí åòðçñåôçôÞ áñ÷åßùí UNIX iÝóù TCP/IP, iðññåôå íá iåôåññ Ýøåôå áôð ÖÙ öéò aññáí Ýò óå ð:üéá.

options MSDOSFS # MSDOS Filesystem

Ó ōyóóðíçlá áñ ÷ áðbñú ôrõ MS-DOS. Áí ááí óéíðåýâðå íá ðññöáññòÞrâðå ãëbôéí DOS êáðÜ õçí áéébíççós, lðiññâðbðå ñá áðoðÜëæáá íá ïåðâðñ Ýðâðå õçí áðééïðP áðòðP óå õ ÷ üeéí. Ç ððiñóðPñéïç èá öiññòùèåß áðòðùìâðå õçí ðñþòç öiññÜ ðiø èá ðññöáññòÞrâðå õéáðÜòíççós DOS üðùð ðâññéññÜþâíâ ðáññâðÜfù. Áðbþçð, ôi áññéññâðééü ðññüäññâíâ emulators/mtools óå ãðéðñ Ýðâðé íá Ý ÷ áðoð ðññüðâðåç óå aééðY ðâðå DOS ÷ ññþòð íá ÷ ññéÜæðâðåé íá ðéð ðññöáññòÞrâðå õéáð íá áðiññöáññòÞrâðå (êáé áðbþçð ááí áðáæðâðl õç ÷ ñPç ðiø MSDOSFS).

```
options          CD9660           # ISO 9660 Filesystem
```

Ói óyóóčiá áñ÷åbúí ISO 9660 áéá CDROM. Íådåññ Ýøôå ñi óå ó÷üeëí áí åái Ý÷åôå iäçäü CDROM P áí óðÜíéå ðññóáññ Üôå CD åääïïÝíùí (éåèþò éá öiññôùèåß äöñíáíéÜ ñcí ðñþôç öiññÜ ñiñ éá ðññóáññ Póåôå óÝóïíí CD ). Óå iiñóóéÜ CD åái ÷nâéÜæññóáé áññü ñi óyóóčiá áñ÷åbúí.

```
options PROCFS # Process filesystem (requires PSEUDOFS)
```

Áðóðú ðí óýðóðçíà áñ ÷ áßùí ðâñéÝ ÷ áé óðéð áæáññáðßåð ðið óððóðÞìâðiò. Ðñüéâðéðáé áéá Ýíá “áéëíééú” óýðóðçíà áñ ÷ áßùí òi iðiðí ðñiðáññó Üðáé óðií ñéððÜëëí /proc ééá áðéðñÝ ðâé óá ðñiðññÜññáðá üðùò òi ps(1) íá áßñiðí ðâñéðóðñðåð ðëçññöiñßåð áéá óðéð áæáññáðßåð ðið áéðâëíýíðáé. Ç ÷ ñÍþóç òið PROCFS áðíl áðáéðóðßåð áéóðéð ðâñéðóðñðåð ðâñéððþróáð, êáèþð òá ðâñéðóðñðåð áññáðéëßá ðâñéðëëíýéçóçó ééá áéðóðáé Üðùñçð Ý ÷ iðið ðñiðáññó Üðáé áðú ðñiðáðéëíäþ.

```
options PSEUDOFS # Pseudo-filesystem framework
```

options GEOM PART GPT # GUID Partition Tables.

Ìå ôçí åðéëïäþ áñôþ äßíåðáé c äñíåðüôçôá ýðáñïcò ìåññüñð áñéèìjý êáñôáðïþóåñú óå Ýíá ìñññ äßóëi

options COMPAT\_43 # Compatible with BSD 4.3 [KEEP THIS!]

Óðíàáðööôçóá íà ôi 4.3BSD. Áöþóôå ôçí áðééïäþ áðòþ áîâñäþ: êÜðiéá ðññäñÜìàóá èá óoiðåñéóÝññíôáé ðáñÜiâíá áí ôçí áðâîñäiiðiéþóåôå.

```
options COMPAT_FREEBSD4 # Compatible with FreeBSD4
```

Ç åðééïäþ áðôþ áðáéôðåþðéé åéá ðçí ððiòðþñéïç åðåññïäþí ðiò Ý ÷ iòi iåðåðæññôðéôðåß óå ðåééüôðåññôå åðéäüðåéó ðiò FreeBSD ééá ie iðiñßåò ÷ ñçöéïðiéiyí ðåééÝ ðæåðåÝ ð ééá ðéëþðåéó ðóðôðþiaðiò. Óðiñßóðåðåé íá ððÜñ ÷ åé áðôþ ç åðééïäþ óå üéá óå ðóðôðþiaðå i386 óå iðiñßå åéðåéïý ðåééüôðåññôå åðåññïäÝ ð. Áñ ÷ éðåéðiiééÝ ð üðùò ç ia64 ééá ç SPARC64 ðiò Üñ ÷ éóá íá ððiòðþñéïðåé åðü ôçí Ýéäïòç 5. × ééá iåðÜ ãåí ÷ ñåéÜæïñðåé åðôþ ôçí åðééïäþ.

```
options COMPAT_FREEBSD5 # Compatible with FreeBSD5
```

Ç åðééïäþ áðôþ áðáéðâðôðæ ôóï æáá ðçí ðôðíðôþñéïç áðåññïäþí ðïð Ý÷iòï ìåðåäëüôðééôåß ôóï FreeBSD 5.X èáé ÷ñçöéïïðïéïý ðéó áíðôðöïé ÷-åò èéþðåéð áðôïý ñïð ôðôðþlåðïð.

```
options           COMPAT_FREEBSD6    # Compatible with FreeBSD
```

Ç åðééíäþ áðóðþ áðáéðåðßöðé öði áæá ðçí ðòðíðóþñéïc åðáññíäþí ðið Ý ÷ iði ìåðåäëùððééðåð öði FreeBSD 6.X éæé ÷ ñçðééíðiðiýí ðeð áíðßöðié ÷ åð eëþñåðé ãððiý ðið ñððóþñiðið.

```
options COMPAT_FREEBSD7 # Compatible with FreeBSD75
```

Ç åðééïäþ áðôþ áðåéâðåþöá óðí ãæá ðçí ðòðíðøþñéïç áðåññïäþí ðïð Ý ÷ iði ñåðåëèùðôééôåß óðí FreeBSD 7.X ëæé ÷ ñçóéïüðïéïý ðéð áíðôþðöíé ÷ åò èëþðåéð áðôïý ðið óðôðþlåðið.

```
options      SCSI_DELAY=5000 # Delay (in ms) before probing SCSI
```

Їа ôçí áåðéëüäP áôôôP í ðôñPíáó ðåññéíÝfåé 5 ååôôðåññüèåðôå ðññéí áíé ÷ íåýóåé ÜÜéå áôôôåòP SCSI óôî óýóôçíà óåd. Áí Ý ÷ åôå iùññ IDE åôôéïòò lðiññåßôå íå ôçí áåññPóåôå, áæåöiññôéêÜ iðiññåßôå íå áiññéíÜóåôå íå iåéþóåôå ôií áññéèiü áôôü, áæå íå áåðéôå ÷ ýfåôå ôçí åéêBíçóç. ÖôôéêÜ, áí ôi ÜÜíåôå áôôü éåé áíåéåëýøåôå üöé ôi FreeBSD Ý ÷ åé ðññüâëçíà óôçí áíåññþñéóç ôñí óôôôåòPí óåd, èá ðñÝðåé íå ôçí áíåññUôåôå íaiÜ.

options KTRACE # ktrace(1) support

C áðeéiðiþ áðóðiþ áðáññáðiðreáði ði tracing ðuúr áæðññáðóðiþi ðiðið ððññþriá, ði iðiðiþi áðiðiáé ÷ ñiþróðii óðicí áðéññáðiþi ðuúr.

options SYSVSHM # SYSV-style shared memory

Ç áðééëäP áðôP áðâññäiðíéåß ôcí ëiíéíù ÷ ñçóôc lìPíç óýlöùíá lå ôi ðñüôðí ðiø System V. Ç ðeÝíí ëiíéíP ÷ ñPóç ôçò, áðíáé ç áðÝêðåóç XSHM óóá × ç iðíßá ÷ ñçóéíiðíéåðóáé áðóüíáôá áðü ðíeeÝò áâñéÝò áðoññäiÝò áñáóééþí áæá éáéýðâñç ôá ÷ ýóçóå. Áí ÷ ñçóéíiðíéåðóå ×, óßáññá ìEÝåôå íá ðâññéÜâåôå áðôP ôcí áðééëäP.

**options** SYSVMSG # SYSV-style message queues

ÕðíþóðÞnæðic áæá ícívíláðó óðið System V. C áðeeðiað áðóþ ðmíðóðé Ýðaæ iññi iññéé Ýð áæaðið Úâðó bytes óðið ðoñÞrÍa.

options SYSVSEM # SYSV-style semaphores

**ÓciáBúšócs:** C ádóééíáþ - p ócðó áíðíëþò ipcs(1) èá óáð ááBíáé ðíéáð äéáñááðáò ÷ ñicóéíðíéíý í êÜèá iéá áðü áðóÝò ðéó ñéáðíñáBáò ðíð System V.

```
options           _KPOSIX_PRIORITY_SCHEDULING # POSIX P1003_1B real-time extensions
```

Åðåêó Üóâéò ðñáâíáôéêíý ÷ nüñiõ (Real-time) ðiõ ðñiõôÝèçéáí ôií POSIX® ôi 1993. ×ñçóéiïðiéâßôáé áðü êÜðiéâò åöáññäÝò ôcç ôðëëiäP ôuí ports (üðùò ôií **StarOffice**).

```
options           KBD_INSTALL_CDEV # install a CDEV entry in /dev
```

Ç åðéëiäP áðôP åßíáé áðáñáßôçôç æéá ôcç äçìéiõñäßá ôiõ áñ ÷ åßiõ ôðôéâðPò ðëçéññiëiäßiõ ôiíí êáôÜëíäí /dev.

```
options           ADAPTIVE_GIANT # Giant mutex is adaptive.
```

Ôi Giant åßíáé ði ùññá åñüò ôðôðPíáðiò åññéâßiõ áðiêéâéðiý (sleep mutex) ði iðiñi ðñiõôâðåýâé Ýíá iññÜëí åññéñü ðññi ðiõ ðññPíá. Ôóéò iÝñâò iáò, åðôü èåùñâßôáé åíâðßôñâðòi áðü ðëâññÜò áðüäñçò êéá åíôéâèßôôáâé iá èéââéþìâðá ðá iðiñßá ðñiõôâðåýiõí ôðôéâññiõ ðññi ðññi. Ç åðéëiäP ADAPTIVE\_GIANT áðéññÝðâé ôií Giant iá ôðiðâññéçèâß ôiõ ôâð ôuí mutexes ðiõ iðiññýí íá åññéâðôôiýí åðééâðôééÜ. ôóé, áí Ýíá iPiá èÝëâé íá èéââéþþoâé ôií Giant mutex, åéëÜ áðôü åßíáé Päç åññéâùíÝí áðü Ýíá iPiá óá iéá Üëéç CPU, ôi ðñþòi iPiá èá ôðiá ÷ ßóâé íá åññéâðôáé, êéá èá ðâññéíÝí áðá õçí åðâéâðeÝñùóç ôiõ èéââéþþiòi. ÔðóéëiäéÜ, ôi iPiá èá åðÝóôññôå ôcç êáôÜôâóç ýðñiõ (sleep) êéá èá ðâññiâíá ãéá ôcç åðüñiâíç åðéâññáßá åéôÝëâñçò ôiõ. Áí åññâíá âßôôå ôðññiõ, åðPóôå áðôP ôcç åðéëiäP åíâññP.

**Óçìâßùóç:** Óçìâéþþoâ üöé áðü ôií FreeBSD 8.0-RELEASE êáé ôéò áðüñiâíáò åéâüóâéò, üéá ôá mutexes Ý÷iõí áðü ðññâðéëiäP ôcç åðíáôüôçôá ðñiõáññäPò, åññéüò áí Ý÷åé åðßôçââò åßíáé åéáöññâðééP ñýèíéóç, ÷ñçóéiïðiéþiðâò ôcç åðéëiäP NO\_ADAPTIVE\_MUTEXES êáôÜ ôcç iñññâðþþoâéóç. Ôi Giant Ý÷åé åðßôçò åðíáôüôçôá ðñiõáññäPò ðeÝí, êéá Ýôóé ç åðéëiäP ADAPTIVE\_GIANT Ý÷åé åðâéññâðâé áðü ôií áñ ÷ åßiññòiññâðáóðí.

```
device           apic          # I/O APIC
```

Ç óðôéâðP apic åðéññÝðâé ôcç ÷ñþóç ôiõ I/O APIC æéá ôcç åññÜëíðiõ ôuí interrupts (äéáéiðþí). Ç óðôéâðP apic ñðiññâß íá ÷ñçóéiïðiéçèâß ôüñi ôâð ðññPíáð ãéá Ýíá åðâññâðôðP (UP) üiõi êéá åéá ðiññéâðëiýð (SMP), åéëÜ ôóé åññóâññç åññéâðôðùóç åßíáé áðáññâðôçôç. ðññiõeÝôâå ôcç åðéëiäP options SMP æéá íá Ý÷åðâå ôðiðôðPñéíç ðiññéâðëþí åðâññâðáóðí.

**Óçìâßùóç:** Ç óðôéâðP apic ôðÜñ÷åé iññi ôóçí áñ ÷ éðâéññééêP i386, ç åññáìP áðôP åáí èá ðñÝðâé íá ÷ñçóéiïðiéçèâß óá Üëëâò áñ ÷ éðâéññééêYò.

```
device           eisa
```

Èá ðñÝðâé íá óðiðâññéÜââðâ ôcç åðéëiäP áðôP áí Ý÷åðâå åçññéêP iá åßáðëi ôýðiõ EISA. Åíâññäðiéâßôáé Ýôóé ç áðôüñâðôç áíß÷iññóç êéá ñýèíéóç üeññi ôuí ôðôéâðþí ôiõ åßáðëi EISA.

```
device           pci
```

Èá ðñÝðâé íá óðiðâññéÜââðâ áðôP ôcç åðéëiäP áí Ý÷åðâå åçññéêP iá åßáðëi PCI. Åíâññäðiéâßôáé Ýôóé ç áðôüñâðôç áíß÷iññóç ôuí êáññóþí PCI êéá ç åðééiññiñßá iñññâíç ôuí åéáÿëñí PCI êéá ISA.

```
# Floppy drives
```

```
device      fdc
```

Ðñüêåéôáé ãéá ôíí åëåãêôP ïííÜääò äéóêÝôáò.

```
# ATA and ATAPI devices
device      ata
```

Áõõüò i iäçäüò ôðïóðçñßæåé üeåò ôéò óõõéåôÝò ôýðiõ ATA êáé ATAPI. ×ñâéÜæåôôå ïüíí ieá êåôá÷þñçóç device ata ãéá íá áíé÷fáyôáé i ðõñPíáò üeåò ôéò óõõéåôÝò ATA/ATAPI ôýðiõ PCI óôá óýã÷ñííá ic÷áíPíáôá.

```
device      atadisk          # ATA disk drives
```

Ç åðéëiäP áõõP áðáéôåßôáé iáæß iå ôi device ata ãéá ôçí ôðïóðPñéíç äßóêùí ATA.

```
device      ataraid          # ATA RAID drives
```

Ç åðéëiäP áõõP áðáéôåßôáé iáæß iå ôi device ata ãéá ôçí ôðïóðPñéíç äßóêùí ATA RAID.

```
device      atapicd          # ATAPI CDROM drives
```

Ç åðéëiäP áõõP áðáéôåßôáé iáæß iå ôi device ata ãéá ôçí ôðïóðPñéíç iäçäþí ATAPI CDROM.

```
device      atapifd          # ATAPI floppy drives
```

Ç åðéëiäP áõõP áðáéôåßôáé iáæß iå ôi device ata ãéá ôçí ôðïóðPñéíç iäçäþí äéóêÝôáò ATAPI.

```
device      atapist          # ATAPI tape drives
```

Ç åðéëiäP áõõP áðáéôåßôáé iáæß iå ôi device ata ãéá ôçí ôðïóðPñéíç ïííÜäùí ôáéíßáò ATAPI.

```
options     ATA_STATIC_ID    # Static device numbering
```

iå ôçí åðéëiäP áõõP, i áñéèìüò ôiõ åëåãêôP åßíåôáé óôáôééüò. ×ùñßò áõõP, ie áñéèìiõ óõõéåõþí áðräßäüíôáé äõíáîééÜ.

```
# SCSI Controllers
device      ahb      # EISA AHA1742 family
device      ahc      # AHA2940 and onboard AIC7xxx devices
options     AHC_REG_PRETTY_PRINT # Print register bitfields in debug
            # output. Adds ~128k to driver.
device      ahd      # AHA39320/29320 and onboard AIC79xx devices
options     AHD_REG_PRETTY_PRINT # Print register bitfields in debug
            # output. Adds ~215k to driver.
device      amd      # AMD 53C974 (Teckram DC-390(T))
device      isp      # Qlogic family
#device    ispfw    # Firmware for QLogic HBAs- normally a module
device      mpt      # LSI-Logic MPT-Fusion
#device    ncr      # NCR/Symbios Logic
device      sym      # NCR/Symbios Logic (newer chipsets + those of 'ncr')
device      trm      # Tekram DC395U/UW/F DC315U adapters

device      adv      # Advansys SCSI adapters
device      adw      # Advansys wide SCSI adapters
device      aha      # Adaptec 154x SCSI adapters
device      aic      # Adaptec 15[012]x SCSI adapters, AIC-6[23]60.
```

```
device      bt          # Buslogic/Mylex MultiMaster SCSI adapters
device      ncv         # NCR 53C500
device      nsp         # Workbit Ninja SCSI-3
device      stg         # TMC 18C30/18C50
```

Åëââôå Ÿò SCSI. Iðiñâßôå íá ìåôåôñ Ÿøâôå óå ó÷üëéï iðieííäÞðiôå äái Ÿ÷åôå óóï óýóôçìá óáò. Áí òiř óýóôçìá óáò Ÿ÷åé iüñí óóôéâô Ÿò IDE, iðiñâßôå íá áöáéñ Ÿøâôå üëåò ôéò ãñáìì Ÿò. Ié ãñáìì Ÿò ôýðiô \*\_REG\_PRETTY\_PRINT ÷ñçóëíðieíýíóáé æáá íá äßñiõí ðåñéóóùôåñåò æéáñùóôéé Ÿò ðëçñiõñßåò æáá òiřò áíôßóôíé ÷iřò iäçäíyò.

```
# SCSI peripherals
device      scbus       # SCSI bus (required for SCSI)
device      ch          # SCSI media changers
device      da          # Direct Access (disks)
device      sa          # Sequential Access (tape etc)
device      cd          # CD
device      pass        # Passthrough device (direct SCSI access)
device      ses         # SCSI Environmental Services (and SAF-TE)
```

ÐåñéóâñâéêÜ SCSI. Iðiñâßôå êáé ðÜéé íá ìåôåôñ Ÿøâôå óå ó÷üëéï üóåò óóôéâô Ÿò äái Ÿ÷åôå, P áí Ÿ÷åôå iüñí óóôéâô Ÿò IDE, iðiñâßôå íá áöáéñ Ÿøâôå áíôâëþò áôô Ÿò ôéò ãñáìì Ÿò.

**Óciâñùóç:** I iäçäüò USB umass(4) êáé eÜðieíé Üëéï iäçäíß ÷ñçóëíðieíýí òiř õðiöýóôçìá SCSI áí êáé äái åßíáé ðñáâíâôéé Ÿò SCSI óóôéâô Ÿò. Åéá òiř ëüäï áôôü, óéäïñâôôåßôå üôé äái áöáéñ Ÿøâôå ôçí õðiöôþñéïç SCSI áí ðåñééâìâÜííóáé ôÝôïéíé iäçäíß óóï áñ÷åßí ñëéïéóçò ôiřò ðôñPíá óáò.

```
# RAID controllers interfaced to the SCSI subsystem
device      amr         # AMI MegaRAID
device      arcmsr     # Areca SATA II RAID
device      asr         # DPT SmartRAID V, VI and Adaptec SCSI RAID
device      ciiss       # Compaq Smart RAID 5*
device      dpt         # DPT Smartcache III, IV - See NOTES for options
device      hptmv       # Highpoint RocketRAID 182x
device      hptrr       # Highpoint RocketRAID 17xx, 22xx, 23xx, 25xx
device      iir         # Intel Integrated RAID
device      ips         # IBM (Adaptec) ServeRAID
device      mly         # Mylex AcceleRAID/eXtremeRAID
device      twa         # 3ware 9000 series PATA/SATA RAID

# RAID controllers
device      aac         # Adaptec FSA RAID
device      aacp        # SCSI passthrough for aac (requires CAM)
device      ida         # Compaq Smart RAID
device      mfi         # LSI MegaRAID SAS
device      mlx         # Mylex DAC960 family
device      pst         # Promise Supertrak SX6000
device      twe         # 3ware ATA RAID
```

Õðiöçñéæüìâíé åëââôå Ÿò RAID. Áí äái Ÿ÷åôå êář Ÿíá áôü áôôïýò, iðiñâßôå íá ôiřò ìåôåôñ Ÿøâôå óå ó÷üëéá P íá ôiřò áöáéñ Ÿøâôå áíôâëþò.

```
# atkbdc0 controls both the keyboard and the PS/2 mouse
device      atkbdc      # AT keyboard controller
```

Í åéââéôÞò ðëçêôñïëíäßíð (atkbdc) ðáñÝ÷åé ôðçñâóßåò I/O ãéá ðëçêôñïëüäé áýðíð AT êáé óðóéâôÝò êáðÜääâéíçò (ðíïôßééá) óýðíð PS/2. Í åéââéôÞò áðáéðâßôáé ãéá ôç èâéðíññäßá ôíð räçäiy ðëçêôñïëíäßíð (atkbdc) êáé ôíð räçäiy óðóéâôÞò êáðÜääâéíçò PS/2 (psm).

```
device      atkbd      # AT keyboard
```

Í räçäüð atkbdc, ïáæß ïå ôíí åéââéôÞ atkbdc, ðáñÝ÷åé ðñüóâáóç óå ðëçêôñïëüäéí óýðíð AT 84 P åéâôâðâíÝñð AT ôí ïðíßí õðíäÝâðâé ôðíí åéââéôÞ ðëçêôñïëíäßíð.

```
device      psm      # PS/2 mouse
```

×ñçóéíïðíéÞóðâ áðôðP ôç óðóéâôÞ áí ôí ðíïôßéé óâð ôðíäÝâðâé ôðçí èýñá PS/2.

```
device      kbdmux      # keyboard multiplexer
```

ÁâóéêÞ õðíóðÞñéíç ðíëððéâíßáð ðëçêôñïëíäßúð. Áí åå óéïðâýâðâ ìá ÷ñçóéíïðíéÞóðâ ðâñéóðüôâñá áðü Ýíá ðëçêôñïëüäé áðîí óýóðçíá óâð, ïðíññäßåð ïå áððÜëáéá ìá áðâéñÝâðâ áðôðP ôç åñâíðP.

```
device      vga      # VGA video card driver
```

Ôí ðñüäñâíðä ïäÞäçóçò ôçò êÜññâð ãñâöééþí.

```
device      splash      # Splash screen and screen saver support
```

ÃñâöéêÞ iëüíç (splash) êáðÜ ôçí åéâéßíçóç! Ç óðóéâôÞ áðôðP ÷ñçóéíïðíéâßôáé áðßôçò áðü ôá ðñiñäñÜññâðá ðñiñöýëáíçò iëüíçò (ëíïóüëáò).

```
# syscons is the default console driver, resembling an SCO console
device      sc
```

Í räçäüð sc åßíáé í ðñiñâðééâðäÝñð räçäüð êíïóüëáð êáé ðñiññíéþíäé êíïóüëá ðýðíð SCO. Êáèþò ôá ðâñéóðüôâñá ðñiñäñÜññâðá ðëÞññðò ìëüíçò áðïéâíýí ðñüóâáóç ôðçí ëíïóüëá ìÝóù êÜðíéáð åéâééíëþêçò åÜðçò åââñÝñð ôâññâðééþí üðùð ôí termcap, åâí èá ðñÝðâé íá Ý÷åé óçíâðâ áí ÷ñçóéíïðíéÞóðâ áðôðüí ôíð räçäü Þ ðíí vt í iðíßíð åßíáé óðíââðü ïå êíïóüëá VT220. ÌåðÜ ôçí åßóïäí ìåð ôðí óýóðçíá, èÝóðâ ôçí åâðââéçòÞ TERM ôðçí ôéíÞ scoansi áí êÜðíéá ðñiñäñÜññâðá ðëÞññðò ìëüíçò Ý÷iðí ðñüäëçíá üðâí ÷ñçóéíïðíéâßôáé áðôðP ç êíïóüëá.

```
# Enable this for the pcvt (VT220 compatible) console driver
```

```
#device      vt
#options    XSERVER      # support for X server on a vt console
#options    FAT_CURSOR    # start with block cursor
```

Ðñüêâéâðé áéá Ýíá räçäü êíïóüëáð óðíââðü ïå VT220, êáé ïå ðñiñð ôá ðßóù ôðíââðüôçôá ïå VT100/102. Ëåéðiññâðß êáéÜ ôå êÜðíéïðò õïñçöïýò õðíëíæóðÝò ðíð Ý÷iðí áðôðââðüôçôá ðëééïý ïå ôíí sc. ÌåðÜ ôçí åßóïäí ìåð ôðí óýóðçíá, èÝóðâ ôçí åâðââéçòÞ TERM ôá vt100 P vt220. Í räçäüð ïðíññâß áðßôçò íá áðíäâð ÷éâð ÷ñÞóðíð üðâí ôðíäÝâðâ ôá ïåðÜëí áñéèí ìåðü äéâðñâðééÜ ìç ÷áíÞâðâ ìÝóù äéâðýïð, üðið ãâí ôðÜñ ÷iðí êâðâ ÷ùñÞóâð ãéá ôç óðóéâôÞ sc ôðí termcap P terminfo — ôí vt100 èá ðñÝðâé íá åßíáé äéâð Ýóéii ðñáêðééÜ ôá êÜðâ ðëâðöüñðá.

```
device      agp
```

ÓðìðåñééÜâåôå ôç óðóéâôP áðôP áí Ý÷åôå AGP êÜñôá óôï óýóôçíá óáò. Èá åíâñäiðíéÞóåôå íå áðôü ôíí ôñüðí ôçí ððiðôPñéíç ãéá AGP GART ãéá ìçôñéêÝò ðið ððiðôçñßæïí áðôÝò ôéò ëåéôiðñäßåò.

```
# Power management support (see NOTES for more options)
#device      apm
```

ÓðiðôPñéíç Advanced Power Management (ðñi÷ùñçíÝíçò ãéá ÷åßñéóçò éó÷ýíò). ×ñPóéíí ãéá öiñçôÜ, áí êáé ç åðéëiäP áðôP, áðü ðñiåðéëiäP, åßíáé åíâñäP óôïí ððñPíá GENERIC.

```
# Add suspend/resume support for the i8254.
device      pmtimer
```

Ðñüññâíà íäPäçóçò íåôñçôP ÷ñüñiò (Timer) ãéá óðiâÜíôá ðið ó÷åôßæüítôáé íå ãéá ÷åßñéóç åíÝññâåéåò üðùò ôíí APM ãéá ôíí ACPI.

```
# PCCARD (PCMCIA) support
# PCMCIA and cardbus bridge support
device      cbb          # cardbus (yenta) bridge
device      pccard        # PC Card (16-bit) bus
device      cardbus       # CardBus (32-bit) bus
```

ÓðiðôPñéíç PCMCIA. Ôçí ÷ñåéÜæåôå áí ÷ñçóéíiðíéåßôå öiñçôü ððiðíæéóôP.

```
# Serial (COM) ports
device      sio          # 8250, 16[45]50 based serial ports
```

Ðñüññâåéåé ãéá ôéò óåéñéåéÝò èýñåò ié iðiðåò åßíáé åíùóôÝò óðií êüñóii ôíí MS-DOS/Windows ùò èýñåò COM.

**Óçìåßùóç:** Áí Ý÷åôå åóùôåñééü iüíôåí óôç èýñá COM4 êáé Ý÷åôå êáé óåéñéåéP èýñá COM2, èá ðñÝðåé íá åééÜíôåå ôí IRQ ôí iüíôåí óôç 2 (ãéá ðâñßâñäiðò ôå÷íééïò ëüäïò, IRQ2 = IRQ 9) ãéá íá iðiñÝðåé íá ôí ÷ñçóéíiðíéÞóåôå áðü ôí FreeBSD. Áí Ý÷åôå êÜñôá ðíeeáðéþí óåéñéåéþí åíüäùí, åéYâíôå ôç óåëßåá manual ôíñiðíðíéü ððñPñéíç ãéá ðâññéóóùôåñåò ðëçñiðiñßåò ó÷åôééÜ íå ôéò óùóôÝò ôéíÝò ðið ðñÝðåé íá ðñiðéYðåé íá ôí /boot/device.hints. ÊÜðíéåò êÜñôåò ãñáöééþí (åéäééÜ áðôÝò ðið åáóßæüíðåé óå ëíééçñùíÝíá S3) ÷ñçóéíiðíéïí áéåðéýíóåéò IO iññòPò 0x\*2e8, êáé êáèþò ðíeeéÝò ððçíÝò óåéñéåéÝò êÜñôåò äåí åðiññééåéiðíéïí ðëPñùò ôç 16 bit ðâñéï÷P äéåðéýíóåúí, óðâññiÿíðåé íå ôéò êÜñôåò áðôÝò, êáééóôþíðåò Ýôé ðñáéôééÜ Ü÷ñçóôç ôç èýñá COM4.

ÊÜèå óåéñéåéP ðüñôá ÷ñåéÜæåôåé íá Ý÷åé iéá iííáäééP IRQ (åêôüò áí ÷ñçóéíiðíéåßôå êÜñôá ðíeeáðéþí óåéñéåéþí ðið ððiðôçñßæåé êíéíþ ÷ñþóç interrupts), êáé Ýôóé äåí iðiñíÿí íå ÷ñçóéíiðíéçèïí õá ðñiâðééååíÝíá interrupts ãéá ôçí COM3 êáé ôçí COM4.

```
# Parallel port
device      ppc
```

Ðñüññâåéåé ãéá ôçí ðáñÜëëçëç èýñá óôï äßáðëí ISA.

```
device      ppbus      # Parallel port bus (required)
```

ÐáñÝ÷åé ððiðôPñéíç ãéá ôí äßáðëí ôçò ðáñÜëëçëçò èýñåò.

```
device      lpt        # Printer
```

ÐáñÝ÷åé ððiðôPñéíç ãéá åêôðñùôÝò ðáñÜëëçëçò èýñåò.

```
device      plip      # TCP/IP over parallel  
  
Đñüüâéôáé ãéá ôí ðñüüñáííá íäþäçóçò äééôýíö íÝóù ðáñ Üëéçëçò èýñáò.  
  
device      ppi       # Parallel port interface device  
  
Đñüüñáííá I/O ãåíéêþò ÷ñþóçò (“geek port”) + IEEE1284 I/O.  
  
#device     vpo       # Requires scbus and da
```

× ñçóœíñðíéåßöåá áæá iñÜäá áæöéÝöåò Iomega Zip. Áðåéöåß ððiöôÞñéïç áðü öiñð öäçäiÿö scbus êáé da. Ç êæýöåñç áðüññíçc áðéööñ ÷ Üñâööñ lñ èýññ óå éåðÜññåóç èäéöiñññåßö EPP 1.9.

#device puc

ÁíññáññíðíéÞóôå áôôÞ ôç óôóêâôÞ áí Ý÷âôå íéá “÷áæÞ” óâéñéâéÞ þ ðáññÜëëçéç PCI êÜñôá ç iðíßá õðíóôçñßæåôáé áðü öi ðññäññâíà íäþäçöçò puc(4) (glue driver).

```
# PCI Ethernet NICs.
```

```
device      de          # DEC/Intel DC21x4x ("Tulip")
device      em          # Intel PRO/1000 adapter Gigabit Ethernet Card
device      ixgb         # Intel PRO/10GbE Ethernet Card
device      txp          # 3Com 3cR990 ("Typhoon")
device      vx          # 3Com 3c590, 3c595 ("Vortex")
```

ÄéÜöñä ññíññÜñáðå ïäÍpaçóò äéá PCI êÜñôåò äééöýïö. ïåðåôñÝôå óå ó÷üëëí P áöáæñÝôå óå ôåéåßùò üóåò äåí ññÜñ ÷ iññ ööï öýööçíå óåò.

```
# PCI Ethernet NICs that use the common MII bus controller code.
```

# NOTE: Be sure to keep the 'device miibus' line in order to use these NICs!

device mibus # MII bus support

```
device      bce      # Broadcom BCM5706/BCM5708 Gigabit Ethernet
device      bfe      # Broadcom BCM440x 10/100 Ethernet
device      bge      # Broadcom BCM570xx Gigabit Ethernet
device      dc       # DEC/Intel 21143 and various workalikes
device      fxp      # Intel EtherExpress PRO/100B (82557, 82558)
device      lge      # Level 1 LXT1001 gigabit ethernet
device      msk      # Marvell/SysKonnect Yukon II Gigabit Ethernet
device      nge      # NatSemi DP83820 gigabit ethernet
device      nve      # nVidia nForce MCP on-board Ethernet Networking
device      pcn      # AMD Am79C97x PCI 10/100 (precedence over 'lnc')
device      re       # RealTek 8139C+/8169/8169S/8110S
```

```

device      rl      # RealTek 8129/8139
device      sf      # Adaptec AIC-6915 ("Starfire")
device      sis     # Silicon Integrated Systems SiS 900/SiS 7016
device      sk      # SysKonnect SK-984x & SK-982x gigabit Ethernet
device      ste     # Sundance ST201 (D-Link DFE-550TX)
device      stge    # Sundance/Tamarack TC9021 gigabit Ethernet
device      ti      # Alteon Networks Tigon I/II gigabit Ethernet
device      tl      # Texas Instruments ThunderLAN
device      tx      # SMC EtherPower II (83c170 "EPIC")
device      vge     # VIA VT612x gigabit ethernet
device      vr      # VIA Rhine, Rhine II
device      wb      # Winbond W89C840F
device      xl      # 3Com 3c90x ("Boomerang", "Cyclone")

```

ÐñïäñÜìáôá ïäÞäçóçò ðíø ÷ñçóéíðíéíýí ôíí êþäéêá ôíí äéáýëíø åéÝä÷íø MII.

```

# ISA Ethernet NICs. pccard NICs included.
device      cs      # Crystal Semiconductor CS89x0 NIC
# 'device ed' requires 'device miibus'
device      ed      # NE[1]000, SMC Ultra, 3c503, DS8390 cards
device      ex      # Intel EtherExpress Pro/10 and Pro/10+
device      ep      # Etherlink III based cards
device      fe      # Fujitsu MB8696x based cards
device      ie      # EtherExpress 8/16, 3C507, StarLAN 10 etc.
device      lnc     # NE2100, NE32-VL Lance Ethernet cards
device      sn      # SMC's 9000 series of Ethernet chips
device      xe      # Xircom pccard Ethernet

```

```

# ISA devices that use the old ISA shims
#device      le

```

ÐñïäñÜìáôá ïäÞäçóçò êáñôþí Ethernet ôýðíø ISA. Äåßôá ôíí áñ÷åßí /usr/src/sys/i386/conf/NOTES äéá ëåðôííÝñâéâò ó÷åôéêÜ íá ôí ðíéâò êÜñôâò ððíóôçñßæíîôáé áðü ðíéíí ïäçäü.

```

# Wireless NIC cards
device      wlan    # 802.11 support

```

Ãåíéêþ ððíóôÞñéíç ôíí 802.11. Ç ãñáñþ áðôþ áðáéôåßôáé äéá áóýñâôç äéêôýùóç.

```

device      wlan_wep   # 802.11 WEP support
device      wlan_ccmp   # 802.11 CCMP support
device      wlan_tkip   # 802.11 TKIP support

```

ÕðíóôÞñéíç êñõðôíñÜöçóçò äéá óõõéâòÝð 802.11. Íé ãñáñÝð áðôÝð ÷ñâéÜæíîôáé áí óéíðåýâôá íá ÷ñçóéíðíéÞôâôá êñõðôíñÜöçóç äéá ðñùôüíèééá áóõáëâßáò 802.11i.

```

device      an      # Aironet 4500/4800 802.11 wireless NICs.
device      ath     # Atheros pci/cardbus NIC's
device      ath_hal # Atheros HAL (Hardware Access Layer)
device      ath_rate_sample # SampleRate tx rate control for ath
device      awi     # BayStack 660 and others
device      ral     # Ralink Technology RT2500 wireless NICs.
device      wi      # WaveLAN/Intersil/Symbol 802.11 wireless NICs.

```

```
#device      wl          # Older non 802.11 Wavelan wireless NIC.
```

ÕðïóôPñéíç ãéá æÜöïñåò áóýñlåôåò êÜñôåò.

```
# Pseudo devices
device  loop          # Network loopback
```

Ðñüêåéôáé ãéá ôç åâíééP óðóéåôP åóùôåñééíý æéêôýíö (loopback) ôíí TCP/IP. Ç óýñååóç iÝóù telnet P FTP óíí localhost (ãíûóóù åðßóçò éáé ùò 127.0.0.1) ðñáäíåöiðíéåßôáé iÝóù áðôPò ôçò óðóéåôPò. Ç ýðáñíç áðôPò ôçò óðóéåôPò åßíáé õðï:ñåùôééP.

```
device  random          # Entropy device
```

ÊñôðöiäñåöééÜ áóöäéPò åâííPôñéá ôõ÷áßùí áñéèìþí.

```
device  ether          # Ethernet support
```

Ç åñâííP ether áðáéôåßôáé iüñí áí Ý÷åôå êÜñôá æéêôýíö Ethernet. ÐåñéÝ÷åé åâíééü êþäééá ãéá ôíí ðñùôüééëí Ethernet.

```
device  sl          # Kernel SLIP
```

Ç åñâííP sl ðñéÝ÷åé õðïóôPñéíç SLIP. Ç õðïóôPñéíç áðôP Ý÷åé ô÷åäüí iëíééçñùôééÜ iâðåñáóôåß áðü ôíí PPP, ôíí iðíßí åßíáé åðéíëüôåñí óôç ñyéëéöç, õðïóôçñßæåé éâëýôåñá ôéò oðíäÝóåéò iÝóù iüñôåí, éáé ðáñÝ÷åé éâëýôåñåò äðíáôüôçôåò.

```
device  ppp          # Kernel PPP
```

Ç åñâííP áðôP åßíáé ãéá õðïóôPñéíç PPP iÝóù ôíí ððñPíá ãéá åðééíäééÝò (dial-up) óõíáÝóåéò. ÕðÜñ÷åé åðßóçò iéá Yéäíöç PPP ç iðíßá õðíðíéåßôáé ùò åöáññäP ÷ñPóôç (userland), ÷ñçóéíðíéåß ôíí tun éáé ðññööÝñåé ðåñéóöüôåñç áðåëéíßá éáé èâéöiñäßôå üðùò êëPóç éáóÜ áðåßôçóç (demand dialing).

```
device  tun          # Packet tunnel.
```

Ç óðóéåôP áðôP ÷ñçóéíðíéåßôáé áðü ôíí ðñüäñâííá PPP ÷ñPóôç (userland). Ååßôå ôíí ôííPíá PPP áðôïý ôíí åéâëßíö ãéá ðåñéóöüôåñåò ðëçñïöñßåò.

```
device  pty          # Pseudo-ttys (telnet etc)
```

Ðñüêåéôáé ãéá óðóéåôP “øåðäü-ôåñíåôééíý” P ðññöñíñüóçò èýñåò login. ÷ñçóéíðíéåßôáé ãéá åéóåñ÷üìåíåò ðññäÝóåéò telnet éáé rlogin, áðü ôíí xterm, éáé áðü êÜðíéåò Üëëåò åöáññäYò üðùò ôíí Emacs.

```
device  md          # Memory "disks"
```

Øåðöü-óðóéåôÝò äßóéïò iå ÷ñPóç iíPíçò (ramdrives).

```
device  gif          # IPv6 and IPv4 tunneling
```

Ç óðóéåôP áðôP õðíðíéåß IPv6 óå IPv4 tunneling, IPv4 óå IPv6 tunneling, IPv4 óå IPv4 tunneling, éáé IPv6 óå IPv6 tunneling. Ç óðóéåôP gif “áðôü-éëùñíðíéåßôáé”, éáé äçíéíöñååß ôá áíôßóôíé÷á áñ÷åßá óðóéåôPí üðùò áðåéöiýíóáé.

```
device  faith          # IPv6-to-IPv4 relaying (translation)
```

ÁõõP ç øåýäi-óõõéâõP óõëëâiâÜíâé ðáêÝôá ðiõ óôÝëíiôáé ðñiõ áõõPí êáé ôá áíáéâôâðèýíâé ðñiõ ôí äálßííá ìâôÜöñáóçò ôíõ IPv4/IPv6.

```
# The 'bpf' device enables the Berkeley Packet Filter.
# Be aware of the administrative consequences of enabling this!
# Note that 'bpf' is required for DHCP.
device bpf          # Berkeley packet filter
```

Ðñüéâéâé ãéá ôí ößëöñi ðáêÝôúí Berkeley. ÁõõP ç øåýäi-óõõéâõP áðéõñÝðâé óâ èÜñôâð äéêôýíõ íá èåéõiõñaiýí óâ êâôÜóôáóç promiscuous (ðëPñiõð áéñüáóçò), óõëëâiâÜíiôáò iâ áõõü ôíí ôñüðí èÜëå ðáêÝôí åíüð äéêôýíõ (ð.÷. Ethernet). Ôá ðáêÝôá áõõÜ iðññâß íá áðièçéâýíôáé óõi äßóëi P íá åíâðÜæiiôáé iâ ôç äíPèåéá ôíõ ðñiãñÜíiâðiò tcpdump(1).

**Óçìâßùóç:** Ç óõóéâõP bpf(4) ÷ñçóéíïðíéâßôáé áðßóçò áðü ôí dhclient(8) ãéá ôçí áíÜêôçóç ôçò äéâýèõíóçò IP ôçò ðñiâðééâäiÝíçò ðýëçò è.i.é. Áí ÷ñçóéíïðíéâßôá DHCP, áõõóâá áõõP ôçí áðéëíäP åíâñäïðíéciÝíç.

```
# USB support
device      uhci      # UHCI PCI->USB interface
device      ohci      # OHCI PCI->USB interface
device      ehci      # EHCI PCI->USB interface (USB 2.0)
device      usb       # USB Bus (required)
#device    udbp      # USB Double Bulk Pipe devices
device      ugen      # Generic
device      uhid      # "Human Interface Devices"
device      ukbd      # Keyboard
device      ulpt      # Printer
device      umass     # Disks/Mass storage - Requires scbus and da
device      ums       # Mouse
device      ural      # Ralink Technology RT2500USB wireless NICs
device      urio      # Diamond Rio 500 MP3 player
device      uscanner   # Scanners
# USB Ethernet, requires mii
device      aue       # ADMtek USB Ethernet
device      axe       # ASIX Electronics USB Ethernet
device      cdce     # Generic USB over Ethernet
device      cue       # CATC USB Ethernet
device      kue       # Kawasaki LSI USB Ethernet
device      rue       # RealTek RTL8150 USB Ethernet
```

ÕðiõõPñéïç ãéá äéÜöñâð oõõéâõÝò USB.

```
# FireWire support
device      firewire   # FireWire bus code
device      sbp        # SCSI over FireWire (Requires scbus and da)
device      fwe        # Ethernet over FireWire (non-standard!)
```

ÕðiõõPñéïç ãéá äéÜöñâð oõõéâõÝò Firewire.

Ãéá ðâñéóóüôâñâð ðëçñiõñßâð êáé áðéðëÝíí óõõéâõÝò ðiõ õðiõõçñßæíiôáé áðü ôí FreeBSD, äåßôâ ôí áñ ÷åßíi /usr/src/sys/i386/conf/NOTES .

#### **9.6.1 Ëåéóïõñãßá ìå ìåäÜëç Đíóüôçôá lìþíçò (PAE)**

Íç ÷ áíPíádá íå íåñÜëç ðíóüöôçôá ííPíçò, ÷ñåé Üæiiðåáé ðñüöôåáóç óå ííPíç ðíö ððåññåáßfåé ôi üñei ôuì 4 gigabytes ôuì Åéeiñéêpí Åéåðëyíóåùí ×ñPóôç+ÐöñPíá (User+Kernel Virtual Address, KVA). Åâáéößåó åðöiy ôiö ðåñéñéöiiy, ç Intel ðñüöôåóå ðöñiöôPñéïç áæá 36bit ööóéêpí áæåðëyíóåùí, áðü ôiï åðåññåáôP Pentium Pro êáé iåðÜ.

Ç äöíáóðüöçöá ÁðÝéðáóçö Ööðóééþí Áéäöðéýíðáúí, (Physical Address Extension, PAE) ôúí Intel Pentium Pro êáé iåðåáâðí Ýóðåñùí CPU, åðéøñ Ýðåé ÷ñþöç iíþíçò ùò 64 gigabytes. To FreeBSD ðáñ Ý ÷åé ððiööþñéç æáá ôç äöíáóðüöçöá áðôþ íÝóù ôçö ñýéïéçö ððñþíä PAE, ç iðiþá æäöðþèåðåé æáá üëåð ôéò ôñÝ ÷iðöåð öðåæåñÝ ð ååðüöåðéò ôiõ FreeBSD. Ëüùí ðåñéïñéöþí óðçí áñ ÷éðåéöiíéþí ôiõ öððóþíäöiò iíþíçò ôçö Intel, äáí åßíåðåé aeÜéñéöç æáá ôç iíþíç ðiõ åñþðéåðåé ðÜíü þ èÜðû áðü ôá 4 gigabytes. Ç iíþíç ðiõ åé ÷ùñåðåé ðÜíü áðü ôá 4 gigabytes, áðëþò ðñiöðþèåðåé ôóí iÝåðéëò ôçö æáé Ýðéïçò iíþíç.

Ãéá íá áíññäiðíðíþróáðå óçí ððiðóðñéíç PAE óðii ððiñÞíá, áðëþò ðññiðé Ýóðå óçí áéüëiððæc ãñáiiþ óðii áñ ÷ áði ðùí ññðiðþóáðñ óáð:

options PAE

**Óciàßùócs:** Ç ööđiôôþñéïç PAE óöi FreeBSD åßíáé äéáé Ýóéïç iürii äéá åðåâlåññåóóÝò áñ ÷éóâéôïíééþò Intel IA-32. Éá ðñÝðåé åðßóçò íá óciàéþþöiå üöe ç ööđiôôþñéïç PAE óöi FreeBSD äái Ý÷åé äiêéíáóôåß åéôåóáíÝíá, êáé èá ðñÝðåé íá èäùñåßðåé ðiéüöçöåò beta óå ò-Ýóç iå óå Üëéá óóåéåñÜ ÷áñåêçñéóóééÜ ôiö FreeBSD.

Ç öðjioôþñéïç PAE óöi FreeBSD öðüêåéöáé óå êÜðjéïò ðåñéïñéöïýò:

- Ìéá äéáééâóßá äái Ý ÷ åé ðñüóâáóç óå ðåñéóóüôðâñá áðü 4 gigabytes ÷ þñiø VM.
  - Íäçäiø óðóôâðþí ðiø äái ÷ nçöceíiðièiýí ôç äéâððøþ bus\_dma(9) ßóùò ðñièâÝ òiðiø eâðâðñiøþ äâæñiÝ iùí óå Ýíá PAE ðoññþíá éâá åéá ðiø eüäi åðöü äái ðoññþðâðáé ç ÷ nñþóç ðiøð. Óóï FreeBSD ðåññÝ ÷ åðâé Ýíá åñ ÷ åßíi ñðèìßðåñü PAE óðiø iðiþí Ý ÷ iðiø åâéñâðeâß üeá óå ðñiññÜììâðå ìäþâçóçò ðiø åðâíé åñùóðü üiðe äái äiðeâýiðiø óå ðoññþíá ðýðiø PAE.
  - ÊÙðiéåð ìâðââéçð Ýð óðóôðþâðiø (system tunables) åâéñéâþíðiø ôç ÷ nñþóç ôçò iñþíçð, åëÝðiñðâð öiø ðiøú ôçò åéâéÝðiçð ðoññéðþo iñþíçð. ÁðôÝð ié ìâðââæçðÝð iðiññâð íá ÷ nçöceíiðièiçþðiøí åâéâéâiçüâçðå ìâðiñÜëç ðiøúûðçðå iñþíçð, eüâù ôçò öýðçò ðiø óðóôðþâðiø PAE. já ðÝðièi ðåññÜââéâiâ åðâíé åñ ïýëìéóç sysctl kern.maxvnodes ç iðiþíå åéÝð ÷ åé ðiø iÝâéðöi åñééiü vnodes ðiø åðéññÝðiñðâé öiøð ðoññþíá. Åðâíé óêüðeñi íá ñðèìßðâðå åðôþ ëáé Üëéâð ðåññüñiéâð ðåññâi Ýð iññiðo óå eñâéÝð ðiø iÝð.
  - Ùóùò ÷ ñâéáóðâß íá ñðèìßðâðå ôðe ãééññiÝð ãéâððeýiøâéð ðiø ðoññþíá (KVA) þ íá ìâéþðâðå ôçí ðiøúûðçðå êÙðiñðiø óðââéññiÝðiñ ðuññiø ðiø Ý ÷ åé ìâðiñÜëç ÷ nñþóç (ââððâðå ðåññðÜñü) åéá íá åðiøýâðâðå ôçí åîÜíðeçóç ðiø KVA. Ìðiññâðå íá åðiñÞðâðå ôiø iÝââëiø ðiø KVA iÝð òiø ôçò åðéëñiþð KVA\_PAGES.

Áéá ëüäïò òóàëñüöçò áéá ãðüäïòçò, óáò óòìäïòëåýïòìå íá áéáâÜóåôá ôç óåëßää manual tuning(7). Åðßóçò ç óåëßää pae(4) ðåñéÝ ÷ áé áíçìåñùí Ýfåò ðëçñïòïñßåò õ-åòééÜ íå óçí õòïóòPñéïc PAE óõi FreeBSD.

## 9.7 Áí ÈÜôé ÐÜåé ÈÜèjò

ÕõÜñ-ü-iõí õÝõõññéö êåôðçäiñBåö ðññiâëçüÜõùí ðiõ iðiññýí íá ðáññiðõðéåñðiýí üñðáí áçleíõññåBåö Ýíá ðññiðõññiñðiÝñ ðññiðiññ:

Áðiôõ÷ßá ôçò åíôïëÞò config:

config: line 17: syntax error

Äåâåéüèåßôå üöé ç ßÝç-ëéäéåß ôóç äñâùìP åôôòP åßíáé óùóôP, ôðåëññßííòåò ôç ìå ôçí áíôßôöïé ÷ ç ôóïí áñ ÷ åßí GENERIC P óå Üëëí áñ ÷ åßí áíßöïñÜò.

Áðiôõ÷Bá ôçò áíôïëPò make:

Í ðõñþíáò äåí åêééíåß:

Áí í iÝiö óáó ðõñPíáó ááí áéééíáß P áðiòðoá ÷ Üíáé íá áíáñúñBóáé óéó óóðóéåó Yó óáó, íçí ðáiééiaÜëéåóôå! Áðoô ÷ þò, ôi FreeBSD Y ÷ áé Yíá áíáéñåóéêü lç ÷ áíéóíü áéá íá áðáíYéèåóå áðü íç-óðiâáóíyó ðõñPíáó. Áðéþò áðééYíóå ôií ðõñPíá áðü ôií iðiþi ëYéèåóå íá íâééíPóåóå lÝóú ôið óóðóðPíáðiö áééþíçóçò (boot loader) ôið FreeBSD, ÷ áôå ðñüöåáóç óá áðóü, óçí þñá ðið áíöáíBæåðóåé ôi íäúý áðééiþí áééþíçóçò. ÁðééYíóå “Escape to a loader prompt”, áñééiùö Yíé. Óðcí ðñiðñiðP ðið áíöáíBæåðóåé, ãñÜðóå ôçí áíðiðP boot kernel.old P ôi üññá áñ ÷ áðið áíñò Úëeïð ðõñPíá ðið íâééíÜåé éáiiééÜ. ¼ôáí ôðeÜ ÷ áôå Yíá iÝí ðõñPíá, áßíáé ðÜíóå éáëP éáYá íá Y ÷ áôå ðñü ÷ áéii Yíá ðõñPíá ðið iÝñåóå úôé áiðeåýåé.

Áöyi âéêéÍPöôåô ià Ýíá êáëü ðöñÍpíá, iöññâbôá íá aéÝäåôå ôí áñ÷åbï nööiböåùí óáó áðü ôçí áñ÷P, êáé íá ðññöðåæPöôåô iáñÜ. Iéá ÷ñPöéïc ðçäP ðëçññöñéþí åbíáé ôí áñ÷åbï /var/log/messages ôí iöñbï iåöåáý Üëëuí êáöåáñÜöäé üëä óá lçíýìáôå ôíð ðöñÍpíá áðü éÜéå áðéöö ÷çíÝíç åéêbíçöç. Åðböçò ç åíöñP dmesg(8) èá óáó ååbíáé üëä óá lçíýìáôå ôíð ðöñÍpíá ôçò ôñÝ ÷iöñáó åéêbíçöç.

**Óciáßùóć:** Áí Ý÷ áôâðá ðñüñâéçìá óôć áçíéïññâá ðñññíá, áââááéùèâßðôá üöé Ý÷ áôâðá èññâóðóáé Ýíá ðñññíá GENERIC, þ ÜÜðëíí Üeëí ðïõ áñüñßæåôá üöé èåéòïññâáß, ÷ñçóéíïññéþíóáò Ýíá äéåöïññâóééü üññíá þóôá íá íç äéâáññâôáß óôçí åðüñlåíç iåðâáññéþðôóéóç. Äáí iðïññâßðôá íá ááóéóôðâßðôá óôíí ðñññíá kernel.old, áéâóðß èññâá òïññü ðïõ áââéâééôðüðâá íýí ðñññíá, ðï kernel.old áíññâéâðñðôáðâé iå ðïõ ôââéâðñðâíñ áââéâðâðôçíÝíí ðñññíá, íñ ïðññòò iðïññâá íá íçí äéâéòïññâáß. Åðßðçò, üöí ðï áðññáðüí ðéí óýíðñíä, iåðâáééíÞðôá ðïí ðñññíá ðïõ èåéòïññâáß óôçí óùññðþ èÝóç, /boot/kernel, äéåöïññâóééÜ áîòïëÝó üñðñò ç ps(1) ðñññâá íá íç èåéòïññâíýí óùññðÜ. Äéá íá ðï ÜÜâðâá áôðñü, áðëþò iðññííÜðôá ðïí èâðÜëíäí ðïõ ðâññéÝ÷ áé ðïí èâðüí ðñññíá, ð.÷:

```
# mv /boot/kernel /boot/kernel.bad  
# mv /boot/kernel.good /boot/kernel
```

Í íÝíò ðõñPíáò èåéôiõñääß, áëëÜ ç ps(1) äåí èåéôiõñääß ðëÝíí:

Áí áâéâóâóôPóâôâ ðõñPíá áéâóïñâôâééP Ýéäïöçó áðü áôôùí íà ðíï iðiñí Ý- iðí öôéá ÷ ôâß óá âñâáëâßá óôôðPíáôïò, áéá ðáñÜääéâíá áÜí áÜëâôâ Ýíá ðõñPíá ôçò óâéñÜð -CURRENT óá Ýíá óýóôçìá -RELEASE, ðíëëÝó áðü óedö áïðöéÝó ðíö ó- âðôBæïïöâé íà ôçí éâðÜôâóç ôïö óôôðPíáôïò üðùò P ps(1) êáé ç vmstat(8) áâí èáéâóïñâíý ðëÝí. Èá ðñÝðâé íá íâðââëùñôðBôâóâé íá áâéâóâóôPóâôâ ùëï ðí áâôéêü óýóôçìá (world) ÷ ñçóéïiðiéþíâð Bæáé Ýéäïöç ôïö ðçääBïò êphäééá íà áôôP ôïö ðõñPíá óâò. Áôôùò áâðíâé êáé Ýíâò eüäïò áéá ðíï iðiñí áâí áâðíâé óôîPèùò éâéP éâéÝá íá ÷ ñçóéïiðiéâßôâ áéâóïñâôâééP Ýéäïöç ðõñPíá áðü ðí ðôðüeëðí ðíö áâéâóïñâæéïý óôôðPíáôïò.

# ÊåöÜëáéï 10 Åêôõðþóåéò

ÓóíåéóöïñÜ áðü ôíí Sean Kelly. ÁíáäüùPèçêå êáé áíáíåþèçêå áðü ôíí Jim Mock.

## 10.1 Óýííøç

Áöiý äéáâÜóåôå áðôü öi êåöÜëáéï èá îÝñåôå:

- Đùò íá ñõõèìßóåôå óçí iõñÜ åêôôðþóåúí (print spooler) ôiõ FreeBSD.
  - Đùò íá åääéæééóôÜôå ðßëèõñá åêôýðùñôçò, íá ÷åéñïßæåôå åéäééÝò åññääóßåò åêôýðùñôçò (ð.÷. ôç ìåðååññiðÞ åéôåñ ÷üññiú êåéÝíùí óå iññöÝò åêôýðùñôçò ðiõ åßíáé êåðåñïçòÝò áðü ôiõò åêôôðùñôÝò óåò).
  - Đùò íá åíññaiðieÞóåôå óåäßååò ôýðiõ êåöäëßååò P banner óôéò åêôôðþóåéò óåò.
  - Đùò íá åêôôðþíåôå óå åêôôðùñôÝò ðiõ åßíáé óoññääåíÝiié óå Üeëiõò õðïeëæéóôÝò.
  - Đùò íá åêôôðþíåôå óå åêôôðùñôÝò ðiõ åßíáé óoññääåíÝiié áðåñðeåßåò óôï äßñéòi.
  - Đùò íá aëÝã ÷åôå ðiõò ðåññeñéññiýò åêôýðùñôçò, óoñðåññéæåññiÝíùí ðùí ðåññeñéñiþí iåñÝeëiõò ôùí åññääóéþí åêôýðùñôçò, êåé ðùò íá ðåññlìññæåôå óçí aðiññûðôçôå åêôýðùñôçò óå óoññääññiÝiiõò ÷ñPóôåò.
  - Đùò íá êññåôÞóåôå óôåôééññéÜ aëá ðiññé åêôôðùñôP, êåé êåôåññäóP aëá ôç ÷ñPóç ðiõ åêôôðùñôP áðü êÜeå ÷ñPóôç.
  - Đùò íá aíñññåôùññæåôå ðññiæÞiaôå óôéò åêôôðþóåéò.

Đñéí äéáâÜóåôå áôôü ôï êåöÜëáéï, èá ðñÝðåé:

- Íá áíùñþæåôå ðòò íá ñõèìþóåôå êáé íá åãéåôåóôþóåôå Ýíá íÝí ðõñþíá (ÊåöÜëáéí 9).

10.2 Åéóáãùãþ

Áéá íá ÷ñçóðñíðíéÞróåðå áåêôðùñòÝò óóï FreeBSD, èá ÷ñåéáóðåbå íá ñòðèíßóåðå ôç èééðòññåßá ðíòð lå ðï óýóðöçìá ðåñï÷Ýôåðóçò (spooling) áåêôðùñòþí åñâùïÞò ðïò Berkeley, åñùóðü ãðßóçò êåé ùò óýóðöçìá ðåñï÷Ýôåðóçò **LPD**, þ áðëÜ **LPD**. Áðóðü åßíáé òï ðññéæñéïñéïÝñ íóýóðöçìá åéÝä ÷ïð áåêôðùñòþí óóï FreeBSD. Òï éåðÜéáéï áðóðü åßíáé ieá áåéóáåñùïÞ óóï **LPD** êåé èå õåð êåéíçåÞ ðåé óðéò ñòðèíßóåðéò ðïï.

ÅÜÍ óáo àßíáé ieéàßí ôi LPD þ êÜðiëi Üeëi óyóôçìá ðáñi÷ Ýôåõóçò åêóôðùòþí, ôüöå iðiñâßôå íá iàðáðçäÞóåôå óôçí áñüôçôá ÅáóéêP ÅæáðÜóôáóç.

Óð LPD ìðññáþ íá æðÝð ÷ æð áír iðrééþñið üððåð ôðó ëðæðiðññáþðô òúí áððôððùðþí áúðò ððiðiæðóþ. Áßíáé êðññbùð ððåýðñið áéá Ýíá ððéþñið ëðæðiðññáþþí:

- ÁǣÝã ÷ áé̄ ðçí ðñüöâáóç óå áðåöèåßáò óõíäàí Ýñiöö ãéööðùö Ýò éáé áéööðùö Ýò ðñiøáñöçí Ýñiöö óå Üéëiöö ëüílaiöö ðööi áé̄öö.
  - Áðéöñ Ýðåé óå ÷ ñPööåò íá óö Ýëëiöí áñ ÷ áßá ðñiöö ãéöýðùöç. Íé áðiööie Ýò áðö Ýò áßíáé áíùöö Ýò ùò áññáóßåò (*jobs*).
  - Äéáöñåß iõñÜ áíáiiPò (*queue*) áéá êÜèå áéööðùöP, þööå íá ðñiøáñöçí ðñüöâáóç áðü ðiøëiýò ÷ ñPööåò.
  - Íðiñåß íá áéööðþíåé óåëßäåò èåöáëßäåò (áíùöö Ýò áðßööçò ùò *banner* P óåëßäåò *burst*) þööå ié ÷ ñPööåò íá iðiñiýò áyéëéá íá íå ÷ ñPööåò òéò áññáóßåò ðiøö ïÝóá óçí óöiøáá åéööðþööåù.
  - Öñiøößæéé áéá óçí iñèüööçöá ðiøö ðáñäí Ýòñuí áðéëiíñuøáò ðiøö áéööðùöþí ðiøö áßíáé óõíäàí Ýñié óå óáéñéáé Ýò èýñåò.
  - Íðiñåß iÝóù ðiøö áéëöýiö íá óðåßëéé áññáóßåò óå óýóöçíá ðáñi÷ Ýò ðiøöçò **LPD** áéáöiñåðéëíý ðiøëiäéööP.
  - Íðiñåß íá áéööäéÝóåé áéÜöñá ößëöñá áéá íá ðñiøáñiùöé áññáóßåò þööå íá áßíáé aðíáööP ç áéöýðùöç ðiøö óå áéööðùö Ýò ðiøö ÷ ñcööëiñiëíý áéáöiñåðéé Ýò aðþööåò P Ý ÷ iñiøö ðiøëiñåðéé Ýò aðíáöö ðiøö.
  - Íðiñåß íá êÜíáé áéðöáí Ýòñcöç ÷ ñPööçö ðiøö áéööðùöP.

IÝóú ôiö áñ ÷ åßiö ñyèiéóçò (/etc/printcap), êáé là ôç âíPèåéá åéäééþí ðñiäñâñ Üôuì ößëöñùí, iðiñâßôå íá åíâññïðiéþôåôå ôiö óyóôçìá **LPD** íá êÜíåé üeåò P êÜðiéåò áðü ôéö ðáñâðÜùñ åñâáðßôå óå iéá làñÜëç aêÜíá óoóêåðþí åðóýðuñçò.

#### 10.2.1 Æáôß èá ðñÝðåé íá ÷ñcóéíïðíéåßôå ôíï Spooler

## 10.3 Åáóéêþ ÅãêáôÜóôáóç

**ĐññiææåiõiBçóç:** Áðü ôi FreeBSD 8.0 êáé iåðÜ, óâ áñ÷åßá òóôéâåòþí áéá ôéò óâéñéâéÝò èýñhåò iåðiñiñUóôçéâí áðÜ /dev/ttÿdn óâ /dev/ttÿuN. Ié ÷ñÞòôåò ôiõ FreeBSD 7.X èá ðñÝðåé íá ðññiøáñiñüöiõi ôçí óâéìçñBùóç ðiõ áéiieòéâåß iá åUóç áðôÝò ôéò áeéaaÝò.

Æá íá ÷ñçóéííðéíÞóåôå áêôôðùôÝò iå ôi óyóôçìá ðáññ÷Ýôåôðçò **LPD**, éà ðñÝðåé íá áâéåôåôðÞóåôå ôüöi ôi hardware ôiô áêôôðùôÞ óåò üöi êáé ôi ëïæéòíèëü **LPD**. Áôöü ôi Ýâæñáöi ðâñéæñÜöåé ôçí áâéåôÜôôáöc óå áyíi ôôÜæá:

- Äåßôå ôçí åíüöðçôå ÄådôééÝò Ñöèìßöåéö Äéööðñöþí æáá íá iÜéååðå ðùò åßíåöåé ç öýíäåöç åéööðñöþí, iå ðíéï ôñüöř åðéëíëíùíåß ôí **LPD** iå ôíöö åéööðùöÝò, êáé ðùò íá åéööðþíåöå áðëéÜ áñ÷åßá êåéíÝíö.
  - Äåßôå ôçí åíüöðçôå Ñöèìßöåéö Äéööðñöþí æáá Ðmí÷ññçíÝíöö åéá íá iÜéååðå ðùò íá åéööðþíåöå áñ÷åßá åéäééÞò iññöÞò åéáöüñú öýðní, ðùò íá åéööðþíåöå óåëßäåò êåöäéßäåò, ðùò íá åéööðþíåöå óå Ýíá åßéööï, ðùò íá åëÝä÷åöå ôçí ðñüöååöç öóïöö åéööðñöÝò, êáé ðùò íá ÷ñçöéíïðíéåßöå ôçí êåôåäñåöÞ åéööðþöåùí.

### **10.3.1 ÅáóéêÝò Ñõèìßóåéò Åêôõðùôþí**

ÁôôP ç áíüôçôá ðâñéñÜöåé ðùò íá ñõèìßöåôå ôï hardware ôïõ åêôôðùòP éáé ôï ëíæóìéëü **LPD**. ÐáñÝ ÷åé ááóééÝò ãþþóåéò ãéá ôá åíPò èÝíádå:

- Ç Åñüôçôá Ñõèìßóåéò Hardware ðõïäåééíÿåé ðùò íá óóíäÝóåôå ðíí åêööðùòðóÞ óå íéá èéÿñá ôíï ðõïëëæéöðóÞ óåò.
  - Ç Åñüôçôá Ñõèìßóåéò Ëíæéòíééíÿ ðõïäåééíÿåé ðùò íá åãéåôåðóÞóåôå ðíí áñ÷åßí ñýéïéöçò ôíï ðõôðÞìåðïò ðáñï÷Ýôåðçò **LPD**: ôí áñ÷åßí /etc/printcap.

Áí ðññioðæåðþóð íá áðñéðáðóðþóðáð Áýíáí áðñóðñúðþ ðið áý ÷ áðáé áððññiíýíá íýóú ðññùðiðüeëeið aðéðóýið eáé ü ÷ é íýóú áðáóýíáðóçò ðiðéðþò eýñáò, ôñûðá áððñúð óçí áíüðóçóá Áðñóðñúðþ ðó íà Óðíáýóåéò Áéðóýið.

Áí éáé aðóðP ç áñúöðçóá iññiÜæðóáé “ÁáóééÝð Ñðœiðbóáéð Áðéððùñðþi”, óðóçí ðññáñláðééüöðçóá áßbíáé áññéåð Ùð ðññbððeíëç. Ói aððéiðüðaññi óðÜæéí óðóçí áððéáð Üðóðáóç áßbíáé ç áðéðóð ÷ Pò èééðiññáðá óðóçí áðééëíéiññáðá óið aððóððùñðþi ïa óií ððiðiðiðééðóðP óáð éáé óií óýðóðçíá ðáññi ÷ Ýðóðóðçò **LPD**. Íé áðééëíäÝð ááé ðññi ÷ ùñçíÝññiðð, üððùò ié óáðëßáðò éáðóáðëßáðò éáé ááðiðiññiÜð áßbíáé ó ÷ áðééð Üð áÿðéiðáð ïa áðéðáð ÷ ðiíýí, iññiÜ ðóçí áðéðóð ÷ P ñýðéiðéóç óðóç ááðóééðPò éáðéiðiññáðò áðéðýððùñðç.

### **10.3.1.1 Nõeìßóåéò Hardware**

Áðóþ Þ ç áíúðóçðá áðíçáðð óirðð að Üöriñiðð óññüðiðð óýfíððóçð óirðð aðéððñùðþ ía óirðð ððiðæðóðþ óáð. ÐåñéññÜððé ðirðð að Üöriñiðð óýðiðð eðñþí éáé êáéñäðùí, éáé ðeð ñðoëiðóáéð ðið ðñÝðåé ía êÜfáðð óóiið ððñþíá áéá ía áíññaiðiðþoáðð óçí áðééiðiñúðá íaðóáý FreeBSD éáé aðéððñùðþ.

Áí Päc Ý÷åôå éáôáó Ýñâé íá óóñia Ýóåôå öií åêööðùôP óåò êáé Ý÷åôå åêööðþoåé åðéöö÷þò óå Üëëi eåéöiññâéü óyóöciá, öuôå lðiñâbôå íá lâðôåâåbôå éáôåòeåbáí óóçí áiüöçôå Nõëìßóåéò Eiäéöiêý.

#### 10.3.1.1.1 Èýñåò êáé Èáëþäéá

Í ÍE ÁÉDÓÐÙNÐÝÐ ÐÍÐ ÆÁÉDÓÐÙNÐÍÓÁÉ ÓÐÍÐÁÑÑA ÁÆÁ ÷ ÑÍÞÓC ÌA C/Ó ÐÁÐÑÝ ÷ ÝÍÐÓÁÉ ÌA ÌBÁ P ÐÁÐÑÉÓÐÙÐÅÑÐÅ Æ ÐÙÍ ÁÆÍÐÝÈÙÍ ÐÑCÐÍ ÆÁÐÓÐÙÑA ÝÐÅÑÙÍ:

- Íe **ÓáéñéáéÝ** ãéáóðíá Ýóåéó, ãíñúóðÝò êáé ùò RS-232 P èýñâò COM, ÷ñçóëiiðiðíéí ðçí óáéñéáéÞ èýñâ òið ðiðiðíæéôðÞ óáð ãéá íá óóâðbëið íáâðñ Ýíá ðóïï áéðòðùôð. Íe óáéñéáéÝò ãéáóðíá Ýóåéó áßíáé ðóïïÞèåéò ðóçí áéñïç ÷ áíßá êáðáóðéâðÞò Ç/Ö ëáé ðá êáéþäé áßíáé áéðòðíþò ãéáâðñ Ýíá êáé áðßóçò áýéïëá íá êáðáóðéâðóðíýí. Íe óáéñéáéÝò ãéáóðíá Ýóåéó ìåñééÝò òiñ Ýò ÷ñâéÜæíïðáé áéäééÜ êáéþäé áéá ìðiñâß íá óáð æçöçéïý ðíëyðëéåð ðåðééïéíüíéáéÝò ñòðéíßóðáéð. Íe ðåñéóðüðâñâò óáéñéáéÝò èýñâò ðùíï Ç/Ö Ý ÷ iðí ïÝäéóðç ðá ÷ yóðçâ ìåð Üäiðçò 115200 bps, êÜñíðåð äýóéïëç ðçí åñâáóßá áéðóýðùóçò ãñâóééþí ìåð Üëüí ãéáóðÜóðâú.
  - Íe **ÐáñÜëëçéåð** ãéáóðíá Ýóåéó ÷ñçóëiiðiðíéí ðçí ðáñÜëëçéç èýñâ òið ðiðiðíæéôðÞ óáð ãéá íá óóÝéïïðí ââðñ Ýíá óóïï áéðòðùôð. Íe ðáñÜëëçéåð ãéáóðíá Ýóåéó áßíáé áéâðñ Ýíá ðóïï áïðüñëí êáé áßíáé åñçäíñüðâñâò áðü ðéò óáéñéáéÝò RS-232. Óá êáéþäé áéáðòðéâíðáé Ýòiðíá, áéëÜ áßíáé áððóëëüðâñ ïá êáðáóðéâðóðíýí ÷ áéñüíáéðééÜ. Íå ðéò ðáñÜëëçéåð ãéáóðíá Ýóåéó ãáí ðññâëÝ ðíïðáé áðéëíäÝò ñýéïéóçò áðéëíéíüíßáò, êÜñíðåð ðçí ñýéïéóç òiðò ãïðéñâðééÜ áðéÞ.

Íe ðáñÜëëçéåð ãéáóðíá Ýóåéó áßíáé ãíñúóðÝò êáé ùò ãéáóðíá Ýóåéó “Centronics”, iiñâáóßá ðññâñ ÷ üiñâíç áðü òiï ðýði ðið áéññä Ýéðç ðið ðéò áéðòðùôð.

  - Íe ãéáóðíá Ýóåéó USB, ðóïïòiñâñâößá áðü òi Universal Serial Bus, ãïðéâýïðí ðó áéñïç ìåñâéýðâñâò óá ÷ yóðçâåð áðü ðçí ðáñÜëëçéç êáé ðçí RS-232 óáéñéáéÞ ãéáóýïäáóç. Óá êáéþäé áïðò ãßíáé áðëÜ êáé ðóçíÜ. Ç USB áßíáé áíþòâñç áðü ðçí ÓáéñéáéÞ RS-232 êáé áðü ðçí ÐáñÜëëçéç ðóçí áéðóýðùóç, áéëÜ áððóð ÷ þò ãáí ððiðóçñßæåðáé êáéÜ áðü óá ðóðóðÞiaðá UNIX. Íáð ôññüðiò ãéá íá áðïöýâðâ ðóðü òi ðññâëçíá áßíáé íá ááññÜóâðâ ãéððòðùôð ðið ðýññâé ãéáóýïäáóç USB êáé ÐáñÜëëçéç, ðüðù ðóïïâðíâé ìå ðíëëïý ãéððòðùôð Ýò.

ÅáíééÜ, ié ÐánÜéëçéåò äéáooßá Ýóåéò ðññööÝñïöí ñößPèùò ìßáò êáôåýèðíöçò åðéëíéùíßá (åðú öíí ððíëíäéooß óðíí åðéooßùòß) åíß ç óåéñéåéß êáé ç USB äßñöí áíößäññç. Óöí FreeBSD ié ðéí ðññööáôåò ðánÜéëçéåò èýñåò (EPP êáé ECP) êáôåöÝñïöí áíößäññç åðéëíéùíßá ìå öíòð åéôooßùòß Ýò, üöáí ÷ñçöñíðíéíýòåé êáéþæá ðíò ñöññößþííòåé ìå öí ðññöößí ïEEE-1284.

Ç àiòßâññïç áðéëéíñùíßá iá áåðôôðùôð Ýò áéái Ýòíò ðáññ Üëéçëçò éyññó iáðiññåß íá áðéôðåð ÷ èåß áññééÜ iá áyí ôññüðiñð. Í ðññþòiò ôññüðiò ÷ ñçóéiiðiéåß Ýíá ðññóáññiòi Ýíi ðññüññáñiá iäPäççò áåéôôðùôð, þþoåá iá iðiññåß ôi FreeBSD íá óðiññééåß óôçí áæþóôå òiò áåéôôðùôð. Áðoôú áåñáé óýíçéåò iá áåéôôðùôð Ýò inkjet éáé iðiññåß áðßóçò íá ÷ ñçóéiiðiéçéåß áéá ááiaòiñÝò áæae Ýòeçò ðiòñùôçååò iåééáíý éaaé áéá Üëéåò dëçññiòññåßåò éaaéòññåßåò. Ç áåyôåñç iÝëíäiò ÷ ñçóéiiðiéåßååé üöôå iá áåéôôðùôðò Ý ÷ áé áðiáññüôçåå òðiññôðPññéçò PostScript.

### 10.3.1.1.2 ĐáñÜëëçëåò Èýñåò

Ãéá íá óðíá Ýóâðâ Ýíá áâðôðùôP óâ ðáñ Üëëçëç èýñá, óðíá Ýóâ òií éâëþæï Centronics lâðâíý áâðôðùôP éâé õðïëiæéôôP. Íé iäçãßâò ðiõ óõñiäåýiõí òií áâðôðùôP éâé òií õðïëiæéôôP èá óâò éâèiäçãÞoíõí íá iëiêèçñþoâðâ ôçí ÿíäåóç.

Èòïçèåßôå ðïéá ðáñ Üëëççës èýñá - ñçóëiiðïéåßôå ôóïü ððïëíæéôðP. Ç ðñþðç ðáñ Üëëççës èýñá ôóï FreeBSD åßíáé ç ppc0, ç äåýôåñç åßíáé ç ppc1, éae iýòù êåéåñPð. Ôï üññá ôóôéåñPð ôïõ åêôôðùôðP - ñçóëiiðïéåß ôçí ßæá áñßèïççóç: /dev/lpt0 æá ôíï åêôôðùôðP ôóçí ðñþðç ðáñ Üëëççës èýñá ê.ô.ë.

### 10.3.1.1.3 ÓåéñéáêÝò Èýñåò

Æá íá óðírá Ýóâðâ Ýíá âéððñðùþ ðiñçóéiiðiéþþâð òáéñéâðþ æéáýíâðóç, óðírá Ýóâð ðið ëáð Üëëçëi õâðñéâðú ëáëþþæi iâððâý âéððñðùþ ëáé ðiðiæéðóþ. Íé iäçãßåð ðið òóññâýiði ðið ãéððñðùþ ëáé ðiðiæéðóþ óðó, èá òáð ëáðiæçãÞóiði íá ieiëëçñþðâð ðiði ðiði ðiði.

Áí ááíl ááñóóá ńbáññóñíé Ԫíéí ááñláé óí “éáóÜëëçëí óåéñéáéü éáëþæí”, ıðíññáñóá íá áëéñÜóáñóá ńbá áðü óéò áéüëíñðéåð ááñéëéáéóéÝð:

- já éáéþþæíí *modem* áíþíáé êÜèå pin ôiõ áéñíäÝéôç áðü ôç íæá ðæåoñÜ ôiõ éáæùäßíö êáôðåðéåßáí iå ôi áíðôßööíé÷í pin ôiõ áéñíäÝéôç ôoi Üeëí Üeñí. Áðoñùò i ðýðiò éáæùäßíö åßíáé åíñóðùò êáé ùò éáéþþæíí “DTE-to-DCE”.
  - já éáéþþæíí *null-modem* áíþíáé êáôðåðéåßáí iåñééÜ pins, áíðåééÜóóåé iåñééÜ Üeëá (ääá ðánÜäåéåíá, ôá pins áðiøöiøÞò êáé øÞøçò), åíþ âñá÷ðéðéþíáé iåñééÜ Üeëá, åóùôåñééÜ, ôoi ðñiøóåðåðóééü êÜeñíá êÜèå áéñíäÝéôç. Áðoñùò i ðýðiò éáæùäßíö åßíáé åíñóðùò êáé ùò éáéþþæíí “DTE-to-DTE”.
  - já éáéþþæíí óáéñéáéiy áðéððñðôþ, ðið áðáæðåðßóáé áðü êÜðiëtòð eéñüðåññí ðóñíçééói Ýíñòð áðéððñðôÝð, åßíáé óáí ôi éáéþþæíí *null-modem*, áéëÜ óÝéíáé eóriäýíáíá ðÞíáðå êáé ôðó äýí Üeñá áíðôß íá ôá âñá÷ðéðéþíáé åóùôåñééÜ.

Éá ðñÍðåé áðþóçò íá ñòëìßóåôå óéó ðánñái Ýðñiòð áðééïéùíßáò òið áðóððùôÞ, óðíÞèùò áðü òií iðñiióðéíú ðßíáêá áéÝä÷ið Þ áðü òiðð DIP áéáéüðôåò òið. ÁðééÝiôå óçí iÝáéðóç óéíÞ bps (bits per second = bits áíÜ áððóðññüéåððií, áíáöÝñåôåé éáé ùò ñòëiüò baud) ðið ðòðiðóçñßæiøií ið ðòðiðáéðóÞ ðéáé ið áðóððùôÞ óáð. ÁðééÝiôå 7 Þ 8 data bits, none, even, Þ odd parity, éáé 1 Þ 2 stop bits. Áðþóçò áðééÝiôå Ýíá ðñùðüééií áéÝä÷ið ñiÞð: áßðå none, Þ XON/XOFF (áíáöÝñåôåé éáé ùò Ýéåä÷ið ñiÞð “in-band” Þ “software”). Íá èðiñÜóåå áðóÝò óéð ñòëìßóåéð, áéá òið óóÜäéí ñýéìéóçò eíäéóíééíý ðið áééiðéåß.

### 10.3.1.2 Ñõèìßóåéò Èíãéóìéëíý

ÁôôP ç áíüôçôá ðåñéãñ Üöåé ôéó áíáâéáßåò ñõèlßóåéò ðïø ðñ Ýðåé íá áßñïöí óöi ëíæöíèéü áéá íá iðïñåßôå íá áéôôðþíåðå íá õi ÿóööciá ðåñï÷ Ýöåñöçò áéôôðùöþí **LPD** óöi FreeBSD.

Íéá áåíéêp Üðiiøç ôùí áíáññåéþí ðiø ðñ Ýðåé íá áéiøiðøþóåôå åßíáé:

1. Ñðöèìßóôå ðii ðòññPíá óåò, áí áßíráé áíáâééßí, áéá ôçí èýñá ðiò ÷ ñçöéiiðiéâßóôå áéá ðii áêöôðùôP óåò. Íé áðáñâßóçôåò ñðöèìßóåéò ðâñéäñÜöriðáé óôçí áíüöçôá Ñðöèìßóåéò ÐöññPíá.
  2. Ñðöèìßóôå ðicí éâðÜóðáóç áðéëiéùíßáò áéá ôçí ðánÜëëçëç èýñá, áí ðñüéâéâðáé íá ôçí ÷ ñçöéiiðiéÞóåôå. Ç áíüöçôá Ñðöèìßóåéò ÉáðÜóðáóçò Áðéëiéùíßáò áéá ôçí ðáñÜëëçëç Èýñá ðâñéÝ ÷ áé èåððòñÝ ñâéåò.
  3. ÅëÝâîôå áí òi ëæéòññâééü óýóöçíà iðinâß íá óôâßëéé åääïíÝ íá ðii áéï áêöôðùôP. Ç áíüöçôá ÿâå ÷ iò Áðéëiéùíßáò ðiò ÁêöôðùôP ðánÝ ÷ áé iññéÝ ðiò áíâiðeÝ ðo áéá òi ðùò èá iðiníýóá íá áßíráé i Ýëåå ÷ iò.
  4. Ñðöèìßóôå ðii **LPD** áéá ðii áêöôðùôP óåò, ðñiðiéþiðáò ðii áñ ÷ áßí /etc/printcap. Èá âñâßóå iäçâßåò áéá áôôÝ ðo ñðöèìßóåéò óå áðüüìâí ðiPíá áôôiy ðii èåöâéäßiò.

#### 10.3.1.2.1 Ñõèìßóåéò Đõñþíá

Í ÓðnirPíáð oíð eäéóðiðnæééiy óðóðPíáðið Ý-ðáé íåðááæùðóðéóðaðb Yðóðe þróða íá aïððæáýáé iá Ýíá óðaæðaðeñi Ýíi óýñiði  
óðóðaðbþi. C óaæñeáðP éaé c ðánÜeëcçëc aëáðyíäðoç oíð aðeððuðP áßíáé iÝñið aðoíý oíð óðiüeñi. ÁðñiÝiùð, Bóùð iá  
áßíáé áíáæðaðb iá ðñiðiðYðóðaða ððiðóðPñeñiç aæá ëÜðiéá ðñiüðeðaðc óðaæñeáðP P ðánÜeëcçëc ðýñá, áí aðaí áßíáé Pæc  
ñðeñiéði Ýíç óðið ððnirPíá óðað.

Áéá íá åéÝâíåôå áí i ðõñþíàò óáò iðiñâß íá õðiøôcñþíâé iéá óåéñéâéÞ äéáóýíäåóç, ðëcêöñiëiäþóå:

```
# grep sioN /var/run/dmesg.boot
```

¼ðið n̄ áðíðá í áñééñüð óðçò óåðñéáêþð ðýñáð, íâééñþðáð áðü ói ìçäÝí. Áí áâðþðá óðóí Ýññäi óið óâññláðééiy óáð êÜðé ðáññúññéí ìå:

sio2 at port 0x3e8-0x3ef irq 5 on isa  
sio2: type 16550A

ôüôå ï ðõñPíáò õðiöôçñßæåé áõôP ôç èýñá.

Áéá íá åëÝäíåôå áí i ðõñÞíáò óåò ðõjíóôçñßæåé ðáñÜëëçéåò äéáooíäÝóåéò, ðëçéôñiëiãÞóôå:

```
# grep ppcN /var/run/dmesg.boot
```

¼ðið N ãâbáé í áñéèiùð ôçò ðáñÜéëççò èýñáð, iâééíþíðáð áðü ôí içäÝí. Áí ãâßôå óóçí Ýñíäi ôið ôâñíáðééiy óáð êÜðé ðáññúééi íâ:

```
ppc0: <Parallel port> at port 0x378-0x37f irq 7 on isa0
ppc0: SMC-like chipset (ECP/EPP/PS2/NIBBLE) in COMPATIBLE mode
ppc0: FIFO with 16/16/8 bytes threshold
```

ôüôå ï ðõñþíáò õðïóôçñßæåé áôôP ôç èýñá.

Áéá ôcí õððiôðPñéïç óåéñéáêPò èýñáò, äâðbôå ôcí áíüôçôá óôéo ñðëìßóåéò ôíï ððñPíá. Áéá ôcí õððiôðPñéïç ðánñÜëëcëcò èýñáò, äâðbôå ôcí ßæá áíüôçôá êáé ôcí áíüôçôá ðíï áéïëðèåß.

### 10.3.1.3 Ñõèìßóåéò ÈáôÜóôáóçò Åðééïéíùíßáò ãéá ôçí ÐáñÜéëçëç Èýñá

¼ôáí ÷ ñçóëiiðíæåßôå ôçí ðánÜëëçç æáóýíååóç, iðinåßôå íá åðééÝíåôå áí ç åðééïéíùíßá ôiõ FreeBSD lå ôií åéôôðùôP eá åßíáé ôýðiõ interrupt-driven P polled. I äáiéëüö iäçäüö ôooéåôPô ôiõ åéôôðùôP (lpt(4)) ôoí FreeBSD ÷ ñçóëiiðíæåß ôi óyóôcià ppbus(4), ôi iðiñi åéÝä ÷ åé ôçí èýñá ôiõ chipset lå ôií iäçäü ppc(4).

- Ç iÝeïäö interrupt-driven åßíáé ðñïåðéëääì Ýíç óöii ðöñþíá GENERIC. lå áööþ ôç iÝeïäi, ôi äåéöiññäéü óýóöçìå ÷ ñçöéïðéåß Ýíá óþìá IRQ æáá íá ðñïöäéëñþóåé áí i åéööðùöþ åßíáé Ýöïeïiò æáá äääñi Ýíá.
  - Ç iÝeïäö polled läçååß ôi äåéöiññäéü óýóöçìå íá æçöÜ éåöÜ åðáiÜëçøç áðü ôíí åéööðùöþ áí åßíáé Ýöïeïiò æáá ðñüöéåååäå áääñi Ýíá. ¼ôáá áðáiØþåé èåöééÜ, i ðöñþíáò óó Ýíéäé ðñüöéåååäå áääñi Ýíá.

Ç iYēiārō interrupt-driven åbñáráé óðíPøèùò êÜðñò áñçäññüðåñç áæéÜ ÷ñçöeññüðåñç áñññiP IRQ. , ÷åé ðáññåñçñçëåñò ðùò êÜðíeíé óýä ÷ññiñé åéðòðñò Ýò HP åä åiñœåýiñòí òúðòÜ óå éåðòÜóðåñç interrupt, ðééåñpò ëüññ èÜðíeñú (ü ÷é åðüññðåá åññññéñùí Ýñùí) ðññiñéçì Üðñùí óðñ ÷ññiñéñiý. Áðõiñ ié åéðòðñò Ýò ÷ññaeÜæiñðåé óçí iYēiññ polled. Èå ðñÝðåé íá ÷ñçöeññüðåñç åéññ åðiñðåéññéññüðåñç åéåðÜóðåñç åéæññññåññåð. ÈÜðíeíé åéðòðñò Ýò åiñœåýiñòí åéåé óðóéò åðiñ åéåðÜóðåéò, åééÜ åbñáráé iññiñçñÜ áñññiñ óðíçí åéåðÜóðåñç åéæññññåññåð interrupt.

Í ðóðnáðóðá íá ñöðreßóðáð óðíç êáð Úðóðáóç áðééïéfúðáð íá àÿí ðñuðrðóð: ñöðreßæffíðóð óðí ðóðnþríá þ -ñçóðíðíéþíðóð óðí ðñuðnáðá íá lptcontrol(8).

Ãéá íá èÝóåôå ôcí êáôÜóôáóç åðéêíéíùíßáò ñðèìßæííôáò ôiií ððñPíá:

1. Åðâðiññáóðåðbôå òi áñ÷åßi ñýèiéöçô ðiòò ðõñÞíá. Äåßôå ðçí êáôá÷þñéöç ppc0. Áí åâðéâééóôÜôå ðçí äåýôåñç ðáñÜëeççë èýñá, ôüöå ÷ñçöéiiðiéåßbôå ppc1. Äé ðçí ôñßbôç èýñá ppc2 êáé íýóù êâéåñPò.

- Á Áððéðlóðbóá éáðóÜóðáóç ëæéðiðñáBáðo interrupt-driven, áððáíðñááðóðBðó ðóci áðéðiðñáBáðo

```
hint.ppc.0.irq="N"
```

ôódi áñ ÷ áßi /boot/device.hints éáé áíðééáóáôÞróô ðií N iã ôíí óùóôü áñéèìu IRQ. Ôi áñ ÷ áßi ñýèiéóçò ðií ðöñÞíá ðñÝ ðåéé áðßöçò íá ðåñéÝ ÷ áé ðií räçü ppc(4):

device ppc

- Áí áðéðiðiðáþóð áéðóÚðóáóq ëáéðiðñáßáð polled, áéáñÚðóá áðü öi áñ÷áßi /boot/device.hints, óçí áéúëiððæc áññáiiþ:

hint.ppc.0.irq=" $N$ "

Óða iāñéé Yð ðāñéððþóåéò, ói ðáñáð Üñü aâí áßíáé áñéâðu áæá íá èÝóåðå ôçí èýñá óå éâðÜóðåóç polled. Óéò ðåñéóðüôðåñåò öin Yð ói ðñüâëçá ðñiÝñ ÷åðáé áðü óiï iäçü acpi(4), i iðiðiø Ý ÷åé ôçí åð ÷Ýñåéá íá aâíåðÜæåé éæá íá ðñiðáñü ðóðóéåðYð, éæá åðñiÝñò, íá aâéYå ÷åé óiï ðñüði ðñüðåáðçò ôðçí èýñá óiï aéðóðúðP. Èá ðñiÝðåé íá aâéYåñåðå ôðé ñððiðþóåéò ðið acpi(4) aâé íá aéiñðþóåðå aâðu ði ðñüðåëçá.

2. Áðièçéåýóôå ôi áñ÷åßi. Ñòëìßóôå, iåôáæùôòßóôå, êáé åæéåáóôÞóôå ôií ðòñÞíá, êáé Ýðåéôå êÜíôå åðáíåâéßícóc. Åéá ðåñéóóùôåñåò èäðöií Ýñåéåò, åßkôå ôéó ñòëìßóåéò ôiø ðòñÞíá.

Áéá íá èÝóåôå ôcí êáôÜóôáóc åðéêïéíùíßáò iå ôi lptcontrol(8):

- ## 1. ĐécêôñjëjãÞóôå:

```
# lptcontrol -i -d /dev/lptN
```

ãéá já èÝôåôå ôcí êåôÜôååc ëåéôïõñãßáò interrupt-driven ãéá ôi lptn.

- ## 2. ĐécôñijieňBóňå·

```
# lptcontrol -p -d /dev/lptN
```

ãéá íá èÝóåôå ôcí êáôÜóôáóç ëåéôïõñãßáò polled ãéá ôí lptN

#### 10.3.1.4 ëåä÷ò Åðééñéùñáò ôíò Åêôôñùñôþ

Èá åéÝâíiöìå ôíï åéôôðùôÞ óôÝëíiôåò láméêÜ äåäñÍYíá êåéíÝíö. Åéá åéåßüöö ôiõò åéôôðùôÝò ðiõ iðiñiyí íá åéôôðþíiöí Üíåóå ôiõò ÷áñâéôÞñåò ðiõ Ý ÷iõí áðiöðåéåß, ôíï ðñüäñâíà lptest(1) åßíáé ôÝéåéí: Dán Üääé üeiõò ôiõò åéôôðþíöüõò ÷áñâéôÞñåò (96) ASCII ñå 96 ññâíàÝð

```
%!PS  
100 100 moveto 300 300 lineto stroke  
310 310 moveto /Helvetica findfont 12 scalefont setfont
```

(Is this thing working?) show  
showpage

Í ðánaðÚñ êþæééad PostScript iðináð ía óiðiæðóçèåð óa Ýíá áñ ÷-åßi ééá ía ÷-ñçóëiiðiéçèåð uðùò ðötiáðééíyíði óa ðánaðåðbaðáðó óoéð áéüëiðéàð ãrÿüöçðåð.

**Óciàßùóç:** ¼ôáí áôðü ôí Ýáâñâöí áíáöÝñâôáé óá iéá áëþóá áêôðñûñþ, áííÿâßôáé iéá áëþóáü ùðñò ç PostScript, áëëÜ ü ÷ é ç PCL ôçò Hewlett Packard — ç PCL áßíáé iéá áëþóá áôñâßåò èåéôïñäéüôçôáò ç iðíßá áðéôñÝðåé óçí áíÜléïç áðëïý êâéïÝïõ ia áêïëïðèßåò äéáöôðþò. Ç PostScript áái iðíñâß íá áêôðþðôåé Üïâáá áðëü êâßíâïï, êâé áôðü ôí áßíáé áêñéâþò í ôýðïõ ôçò áëþóáô áêôðñûñþ ðïõ éá ðñÝðâé íá áëâéâðôïðïõia êâôÜëëçéá.

ÁôôP ç åíüôçôá õðííåééýåé ðùò íá åéÝäíâôå áí ôi FreeBSD ìðíñåß íá åðééïéíùÍþóåé íà Ýíáí åêôôðùôP õðííååäáiÝíí óå ðánÜëëçëç èéýñá.

Ãéá íá åëÝâîåôå Ýíáí åêôõðùôP óå ðáñÜëëçëç èýñá:

1. Æßíåôå root iå su(1).
  2. Óóâßëôå äâäiiÝíá óôíï åêôôðùôP.
    - Áí i åéôôðùôPò iðinåß íá åéôôðþóåé áðëü êâßíåñ, ôüôå ÷ ñçóëiiðíéPóôå òi lptest(1). ÐéçéôñíëiaPóôå:

```
# lptest > /dev/lptN
```

¼ðiõ N åßíáé ï áñéèùò ôçò ðáñÜëëçëçò èýñáò, îåééþþíóåò áðü ðiì ìçäÝí.

- ÅÚí ï åêôôðùôþò ðéáðâæáâáßíâé PostScript þ êÜðriéá Üëëç ãëþóóá åêôôðùôþí, ôüôå óôâðëôå Ýíá ìeñü ðñüãñáiiá óôíí åêôôðùôþ. Ðéçêôñiïëiäþóôå:

# cat > /dev/lpt0  
ðåéóá ðëçéôññïëiäÞóôå ôi ðñüñâñâíìá ìßá ðññò ìßá âñâíìP, ðññöåðêéêÜ, áéáôß äåí iðiñâßôå íá åðâíâññáóôåßôå ìéá  
âñâíìP åöüööî Ý ÷ åôå ðéÝóåé ôi ðëÞéññi RETURN P ENTER. Áöïý ôåëæþóåôå iå ôçí éåóå ÷ þñéóç ôiõ  
ðññjññÜññáðiõ. ðéÝóåôå CONTROL+D, P Üëeí ðëÞéññi ðâññáðéöiiý áñ ÷ åßiõ.

ÁíáëëáêôééÜ. ìðiiñâßôå íá ôijðjèåôÞóåôå ôiï ðñjjäññàùá óå Ýíá áñ ÷åßü êáé íá ðëcêôññëiäÞóåôå:

```
# cat file > /dev/lptv
```

1/400 f 1.0 1/3200 0.7 1/1000 0.5 1/2000 0.3 1/4000 0.2 1/8000 0.1

10.3 1 4 2 ëåå÷jò Óåéñéáéíý Åéôôôðìùô

Áðóþ ç áðiðóðçôá ððiðáðééýáé ðùò íá áðéÝáðåðá áí ôi FreeBSD ððiñâð íá áðééíéíùñþóáé íà Ýíáí áðôððùðþ óðñðâðâðíÝí áðáðéñéáðþ èvñðá

Áéá íá ñëÝáññåôå Ýíáí ñëôôññùôP óå ñëéñéáêP èýññ:

- ## 1 ÅBjååå root åå sui(1)

2. Åðåñâñääóôåßôå ôi áñ÷åßi /etc/remote. ÐñiøéÝóôå ôçí áéüëïöèç êáôá÷þñéóç:

**printer:dv=/dev/port:br#bps-rate:pa=parity**

$\frac{1}{4}$ ðiõ port åbíáé ç êáóá ÷ þñéóç óöóéåðòp ðæá ðçí óåéñéáêþ ðüñôá (ttyu0, ttyu1, êöë.), bps-rate åbíáé ç ôá ÷ yôcôá bits-per-second åðééïéùíßáò iå òií åéööðùòþ, êáé parity ç éöiöéïßá ðiõ áðáéôåßôáé áðü òií åéööðùòþ (even, odd, none, þ zero).

ĐáñâéÜöù öáßíåôáé Ýíá õðüäåéäíá êáôá÷þñéöçò, ãéá Ýíáí åêôôðùôÞ óõíäååíá Ýíí iÝóù óåéñéåéÞò ãñàíìÞò óôçí ôñßôç óåéñéåéÞ èýñá íå ôá÷ýöçôá 19200 bps êáé ÷ùñßò parity:

```
printer:dv=/dev/ttys0:br#19200:pa=none
```

3. Óðíäåèåßôå óôiiå åêôöðùôþ ìå tip(1). Ðëçêôñiieïäþóôå:

```
# tip printer
```

Áí áõõü õi óóÜäéí äáí äiõëåýåé, áðåíâññáóôåßôå ðÜéé õi áñ÷åßii /etc/remote êáé ðññöðáèÞóôå õi ÷ñçóëiiðiéþíôåò /dev/cuaan áíôß æáá /dev/ttyn.

- #### 4. Óôåßëôå äåäiiÝíá óoií åêôõðùôP.

- Áí í åêôôðùôþò iðiñâb íá åêôôðþóåé áðëü êåßìâíi, ÷ ñçóéiiðiéþóôå lptest(1). ÁñÜþôå:

% \$1ptest

ÁíáëëáêôééÜ, iðiñâßôå íá ôiðiñèåôÞóåôå ôi ðñüäñâiíá óå Ýíá áñ÷åßi êáé íá ðëçêôñïëiäÞóåôå:

% >file

*¼ðið f i l e* áðíráé ðið úññá ðið áñ ÷ áðið ðið ðaðñéÝ ÷ áðið ðið ðaðñáññá. Áðiý ðið tip(1) óðâðeéé ðið áñ ÷ áðið, dëÝóðá ðið éáðóÜëëcëi ðeÞeññí ðiññáñðeóñiý áñ ÷ áðið, áí ãðáéñðâðóáé.

Èá aáBóá ÊUóé íá áéðÓðþíáðáé. Íçí áíçÓð-áBóá áí óí eáBílñi áár ÓðáBíáðáé óñúðóu. Èá óí aéññéþróiðiá aánuóana.

### 10.3.1.5 Ååñäïðïßçóç ôïõ Spooler: ôï Áñ ï åßï /etc/printcap

Óá áðóðü ðí óçìåþí, í áðóððùòþ ðóáð éá ðñÝðåé íá áðíáé óðíðáì Ýíò, í ððñÞíáð ðóáð ñðøèíéóí Ýíò íá áðééíéíúðþ íæß ðíð (áí ÷ ñáé Üæðóáé), ééá Ý ÷ áðå ðåðý ÷ áé íá óðåðþéðóá ëÜðíéá æíðéíáðóéë Ü áððñÝ íá óðíí áðóððùòþ. Áðóðá ðþñá Ýðíðéíé íá ñðøèíþóðá ðí **LPD** æéá íá áé Ýð ÷ áðå ðí óçí ðññóðááóç óðíí áðóððùòþ ðóáð.

Iðiñáþóá íá nõeìþóåôá ôi **LPD** íå áðâiâñáóþá ôiõ áñ ÷ðþiõ /etc/printcap. Ôi óyóoçia ðáñi: Ýðâoóçò **LPD** æéááÜæé áðóöü ôi áñ ÷ðþi ëÜèå öiñÜ ðiõ ÷ñcõeiðiæáþóáé i spooler, áðñiÝiùò ðeeáÍÝð áíâáæiþóåéò ôiõ ìðáþiñiÍ Íðâáá óá áðóññðþ

Åßíáé áÿéïëí íá êáôáïÞóåôå ôçí ïïñöÞ ôiõ áñ÷åßiõ printcap(5). ×ñçöéïïðiéÞóåôå ôíí êåéïåññÜöi ðiõ ðñïöéïÜöå åæá íá êÜïåôå åæéäåÝö ôöi /etc/printcap. Ç ïïñöÞ ôiõ åßíáé ðåññüñéá íå Üëéá áñ÷åßá ðåññéåñöÞö ãöfåöîöÞöùí, ùðöùò ôå /usr/share/misc/termcap êåé /etc/remote. Ååßôå ôçí cgetent(3) åæá êåðöññåñßö ðëçñïöñßö ó÷åöééÜ íå ôçí ïïñöÞ ôiõ áñ÷åßiõ

Ç ðéi áðëþ ñýëiéóç ôïõ spooler áðiôåëåßôáé áðü ôá áéüëiõëá âÞiaôá:

1. ÁðééÝiôá Ýíá üñíá (éáé èßäá áiñééÜ ðáññúýíéá) áéá öií áêôôðùôP, éáé öiðiæåðPóôå óá óöi áñ÷åßí /etc/printcap. Áåßôå ôçí áiñüôçôá Íññáðiññüôçôc ÁêôôðùôP áéá ðåñéóöüôåñåò ðëçñiññßåò ó÷åôééÜ iå ôçí iññáðbá òúí áêôôðùôßí.
  2. ÁðåññaiðiøÞóôå ðéô óåëßäåò êåöäéßäåò (åßíáé áiññáÝò áðü ðññåðééiP) åééÜññiôåò ôçí ééáíüôçôå sh. Áéá ðåñéóöüôåñåò ðëçñiññßåò áåßôå ôçí áiñüôçôá Ðáññiðüäéöc Óåëßäùí Êåöäéßäåò.
  3. ÁçjéiññáÞóôå Ýíá éåðÜññiññá ðáññi : Ýòåðôöçò, éåé éåéiñßóôå ôçí öiðiæåðbá öiñ iå ôçí ééáíüôçôå sd. Áéá ðåñéóöüôåñåò ðëçñiññßåò áåßôå ôçí áiñüôçôá Áçjéiññáßá Êåôåëüññiññá ðáññi ÷ Ýòåðôöçò.
  4. Éåéiñßôåå ôçí éåðÜëéççéç éåðåå ÷ þñéöç /dev äéá öií áêôôðùôP, éáé ôçíåéßóôå ôç óöi /etc/printcap iå ôçí ééáíüôçôå 1p. Áéá ðåñéóöüôåñåò ðëçñiññßåò, áåßôå ôçí áiñüôçôá Áíññáþñéöç ôçò Õðóéåðßò Åêôýðùôçò. Åðßóçò, áí iå áêôôðùôPò åßíáé óå óåéñéåéP èýññá, ååññáðåóôðPóôå ðéô ðáññi Ýòññiò ðééññéüññßåò iå ôçí ééáíüôçôå ms# c iõñßá áíáÿåðåé ôôçí áiñüôçôá Ñòëiñßóåéò Ðáññi Ýòññi Æðééññéüññßåò ôiñ Spooler.
  5. ÅåññáðåóôðPóôå ðëññéññá áéðüññiññá ðééññéüññá ãééíÝññi. Áåßôå ôçí áiñüôçôá ÅåññáðÜóðåóç ðëññéññiññá Æðééññéüññá ãééíÝññi ãéá ðåñéóöüôåñåò ðëçñiññßåò.
  6. ÅëÝáññå ôçí ååññáðÜóðåóç áêôôðþññiññåò iõéäPðiññå iå ôçí áiññiññP lpr(1). Ðåñéóöüôåñåò ðëçñiññßåò åßíáé åéééÝóññi ðéô ññåò åiñüôçôåò ÄíññéñP ôiñ Spooler éåé ÄíññéñP iõéä ÁæéññéñP.

**Óciáßúñóç:** ÅéôôðùñòÝò ðiö ááôðßæïíôáé óá áëþóðå áéôôðùñòçò, üðñò ïé áéôôðùñòÝò PostScript, ááí iðiñiy íá áéôôðþoïí Üliáðá áðëü êaßìáíí. Í áðëüò ñòñðò ñyèlëóçò ðiö ááßíáìá ðáñáðÜíú êáé ðiö èá ðáñéañÜðiøia áéôâíÝóôâñá óóéò áðüiáìáò áíüôðçôåò, ðñiñðièÝóâé ðùò áí ñòðiñßæåôá Yíáí ôÝôiñié áéôôðùñob èá iðiññáßôá íá áéôôðþoáðå lüññí áñ-ðáßá áññáííYíá óóç áëþóðå ôíö.

Íé ÷ nPôôåò óóíÍÞèùò fíñîæäiòí ðùò iðiñiýí íá áêôôðþþiòí áðëü êâßiañí óá üeëòð óiðò áêôôðñôÝ ðiò ðiò áßiaé áâéáôåôóçíÝ ñíé óóï óýóôçíá òiðò. Óá ðñiäñÜìiaôá ðiò ÷ ñçóeiiðiéíýí óï LPD æá íá áêôôðþþiòí, êÚñiòí áéñéâþò óçí ßæá áðüeåóç. Áí ðñiöðåéâßôá íá áâéáôåôÞøåôá Ýíá ðÝòiéí áêôôðñôÞ éáé eÝéâôá íá iðiñâßôá íá óôðþþiâôá áññáôßôå óôçí aëþþoá ðiò áêôôðñôÞ aééÜ eáé óá áðëü êâßiañí, óáð óóïéôðiýíá íá ðñiöéÝóâôá Ýíá áðéðëÝíi áÞia óôçí aéáâééâóßá áâéáôÜóôåóçò ðiò ðâñéäñÜøâíá ðáñâðÜñú: ÁâéáôåôóÞøåôá Ýíá ðñüñâñâíá áðôüìâðçò iâðâôñiðÞò áðü áðëü êâßiañí óá PostScript (Þ óá Üeëç aëþþoá áêôôðñôÞ). Ç áñüôçðá Óðiâåðûðçðá Áññâáðþí Áðëiý ÊâéiÝíò óá áêôôðñôÝ Þ PostScript áîçââß ðùò íá áiññâÞøåôå.

### 10.3.1.5.1 Íííáôïäüôçóç Åêôõðùôþ

ÓÍ ðñþþöi (áýéieí) Áþíà áßíáé íá áððéé Ýiâðôá üüñíá áæá ôíí áêððôðùþþóá. Ááí Ý ÷ áé óçìáóþá áí èá ðññöéiþþóáðôá Ýíá áæéöiõñäéëü þ êÜðiëí áñùöéëü üüñíá áóiy iðññâðôá áðþþóçò íá ðññöéÝóáðôá êáé iãñééÜ ðáñùíýéá (aliases) áæá ôíí þæéí áêððôðùþþóá.

ÓðóðÜ ðéðóíí Ýfáð áðúð óðíð áðéððùð Ýð ðíð áíáð Ýñíððáé óðí /etc/printcap èá ðñÝðáé íá Ý ðé ðí ðáññúýíéí 1p. ÁðóðP áðíáé ç iññáððá ðíð ðñíððééëái Ýñíð áðéððùðP. ÅÜí íé ÷ñÞóðåð áðí Ý ÷ñðí òçí íàðáâæçôP ðåñéáÜëéíñðiò PRINTER éáé áðí áíáð Ýñíð õ Üðííéí üññá áðéððùðP óðíç íññáðP áíðíëþí íá íðíéáðÞðíðå áíðíëP **LPD**, óðóðå 1p èá áðíáé í ðñíððééëái Ýñíð áðéððùðP ðéá ðé ðáññúðþðåðéò ðíðò.

Åðþóðó, ábíráé ëiéíþ ðñáéðóðéþ ðið óðæðóðáþí alias ðið áððóðñúþ íá ábíráé leáð ðéþñçò ðánæñáöþ ðið áððóðñúþ, ðið íá ðánæñéæíáið Úfáé ðið éáðáðéðáðáðþ Þéáé ðið iirþ Ýéi.

Áöiý áðéé Ýîâðå ìéá iññáóßá êáé ìåñéé Ü óðíÞèç ðáñùíýíéá, êáôá ÷ ùñßóôå ôá ôóï áñ ÷ áßí /etc/printcap. Ôí üññá ôïð áâðôôðùôþ eá ðñ Ýðåé íá áíáöÝñâðåé ðñþöi ôóï áñéóôåñü Úenii. Äéá ÷ ùñßóôå êÜëå ðáñùíýíéi iå ìéá êÜëåôç iðÜñá êáé ôïðíèåôþóôå ìéá Üññ-ëÜðù ôâæåßá ìåðÜ ôï ôâæåôåßí ðáñùíýíéi.

Óóï áéüëiðëi ðáñÜäåéâiá, iâéé Üiå iå Ýíá áfôåëþò áâóéêü /etc/printcap ðñð iñßæåé áÿí áâôôðùôÝð (Ýíáí áâôôðùôþ ãñâiìþò Diablo 630 êáé Ýíáí áâôôðùôþ PostScript laser Panasonic KX-P4455):

```
#  
# /etc/printcap for host rose  
#  
rattan|line|diablo|lp|Diablo 630 Line Printer:
```

bamboo|ps|PS|S|panasonic|Panasonic KX-P4455 PostScript v51.4:

Óå áðóü ôï ðññÜäåéâiá, i ðñþöiò áâôôðùôþò iññÜæåôáé rattan êáé Ý ÷ áé ùò ðáñùíýíéá ôá line, diablo, lp, êáé Diablo 630 Line Printer. Áðü ôç óðéâiþ ðñð Ý ÷ áé ôï ðáñùíýíéi lp, áßíáé êáé i ðññåðééâiÝñò áâôôðùôþò. Í áÿýóâñiò iññÜæåôáé bamboo, êáé Ý ÷ áé ùò ðáñùíýíéá ôá ps, PS, S, panasonic, êáé Panasonic KX-P4455 PostScript v51.4.

### 10.3.1.5.2 Ðáñâiðüäéóç Óåëëßäùí Êðöáéëßääò

Ôï óýóôçìá ðáñi ÷ Ýôåôçò **LPD**, áðü ðññåðééâiþ, áâôôðþíâé ìéá óâæßää áâðöäëßääò ãéá êÜëå áññáóßá. Ç óâæßää áâðöäëßääò ðáñééâiáÜíáé ôï üññá ÷ ñþöôç ðñð áéôþèçêå ôçí áññáóßá, ôïð ðñðíëéâôþ áðü ôïí iðíþíi ðññþëèå ç áññáóßá, êáé ôï üññá ôçò áññáóßáò, iå iâñÜëiðò üññþöiðò ÷ áññâéþñâò. Áðóôô ÷ þò áðóü ôï ðññþëèåòi êâßìâiñ áéíëiðëåß ôçí áéáâééâóßá áðíóöáé Üññóçò ôçò áâñéâðÜññåóçò áíüò áðëiy áâôôðùôþ, áðññÝñò eá ðáñâiðüäéâiðò ðñð ðññþëèåò õéð ôâæßääò.

Áéá ôçí ðáñâiðüäéóç ôùí óâæßäùí êâðöäëßääò, ðññiòeÝóôå ôçí ééáíüôçôå sh ôóçí êáôá ÷ þñéóç áéá ôíí áâôôðùôþ ôóï áñ ÷ áßí /etc/printcap. Áäþ áëÝðâôå Ýíá ðáñÜäåéâiá ôïð /etc/printcap iå ðññiòþç ôçò sh:

```
#  
# /etc/printcap for host rose - no header pages anywhere  
#  
rattan|line|diablo|lp|Diablo 630 Line Printer:\  
:sh:
```

bamboo|ps|PS|S|panasonic|Panasonic KX-P4455 PostScript v51.4:\  
:sh:

Ðáñâôçñþóôå ðñò ÷ áéñéóôþéâiå óùóðÜ ôç ïññþò: ç ðñþöç ãñâiìþ iâééíÜ óôçí áñéóôåñþ óðþëç, êáé ié áéüëiðëåò ãñâiìÝð áßíáé ôóïé ÷ éóïÝíåò (indented). ÊÜëå ãñâiìþ êáðå ÷ þñéóçò (âéðóü ôóï ôâæåôåßá) ôâæåéþíâé iå ìéá áñéóôåñüóññöç êÜëåòi.

### 10.3.1.5.3 Äçìéiõñâßá Êáðáéëüäiðò Ðáñi ÷ Ýôåôóçò

Ôï áðüìâiñ áþíá ôóïí áðëü ôññüði áâñéâðÜññåóçò áßíáé ç äçìéiõñâßá áíüò êáðáéëüäiðò ðáñi ÷ Ýôåôóçò (spool), üðiðò eá ôéëñññýíôåé ié áññáóßåò áâðýðñóçò Ýñò üðiðò íá áâðôôðùëiyí êáé üðiðò áðþöçò öðëÜññiðåé êáé êÜðiéá Üëëá áïçèçôéé Ü áñ ÷ áßá ôïð óðóôþíáòið áâðýðñóçò.

Ëüäù ôçð ìåðåâåæëüìâíçð öýðçð ôùí êáôáæüäùí ðáññ ÷ Ýðåðóçð, ôðíçèþæåôáé íá ôiðièåôýíôáé êÜôù áðü ôíí êáôÜëíäí /var/spool. Äáí åßíáé áíâåâåâíí iá ðáßñíâðå áíôßâñáöå áóöäæåßâò ôùí êáôáæüäùí ðáññ ÷ Ýðåðóçð. Ç åðáíâäçíëiñâßâ ôiðð åßíáé ôüði áððéÞ üði íá ôñÝñðiå ôçí åíðièÞ mkdir(1).

Åßíáé åßðßçð öðíçèéóíÝñ íá iññÜæåôáé íá êáôÜëíäí ìå ôíí ßäéí üññíá ìå ôíí åêôôðùôÞ, üðùò öáßíåôáé ðáñáéÜôù:

```
# mkdir /var/spool/printer-name
```

Ùóðüöií, áíÝ ÷ åôå åñêåôíýð åêôôðùôÝð óóïi åßêôði, ßóùò åðéèðiåßôå íá ôiðièåôÞóåôå ôiðð ôáôáæüäiðð ðáññ ÷ Ýðåðóçð èÜôù áðü Ýíá iññæéü êáôÜëíäí ðið èá ÷ ñçóéiiðiæåßôåé åðièéæóôééÜ åéá åêôôðþóåéò ìå ôíí **LPD**. Èá èÜññðiå åêñéâíþò áóðü åéá óá ðáññåâåßâíåôå ìå ìå ôíðð åêôôðùôÝð rattan êáé bamboo:

```
# mkdir /var/spool/lpd
# mkdir /var/spool/lpd/rattan
# mkdir /var/spool/lpd/bamboo
```

**Óçìåßùóç:** ÅÜí ié âññåáôåò ôùí ÷ ñçóôþí ðáñéÝ ÷ iññ ðññóùðééÜ ååäiÝíá, iðññâß íá èÝëåôå íá ðññóðåôÝðåôå ôíí êáôÜëíäí ðáññ ÷ Ýðåðóçð ìå êÜðièí ôñüði, þóôå íá içí åßíáé åçìüóéå ðññóâÜóéið. Íé êáôÜëíäíé ðáññ ÷ Ýðåðóçð èá ðññÝðåé íá áíþêéíýð åéá íá åßíáé áíâåâíþóéíýð, åññññÜðéíýð åéá íá åðíáôüôçôå áíáæþóçðå áðü ôíí ÷ ñþóðç daemon êáé áðü ôçí iññÜääá daemon, áðü êáíÝíá Üëéí. Åéá ôíðð åêôôðùôÝð ôíð ðáññåâåßâíåôð:

```
# chown daemon:daemon /var/spool/lpd/rattan
# chown daemon:daemon /var/spool/lpd/bamboo
# chmod 770 /var/spool/lpd/rattan
# chmod 770 /var/spool/lpd/bamboo
```

ÔÝëið, ðññÝðåé íá åíçìåñþóåôå ôíí **LPD** åéá áððiíýð ôíðð êáôáæüäiðð ÷ ñçóéiiðiæþíôåò ôíí åñ ÷ åßíí /etc/printcap. Ðññóðéiñßóåôå ôçí åéåâññiÞ ôíð ëáôáæüäiðð ðáññ ÷ Ýðåðóçð ìå ôçí ééåíüôçôå sd:

```
# /etc/printcap for host rose - added spooling directories
#
rattan|line|diablo|lp|Diablo 630 Line Printer:\n
:sh:sd=/var/spool/lpd/rattan:

bamboo|ps|PS|S|panasonic|Panasonic KX-P4455 PostScript v51.4:\n
:sh:sd=/var/spool/lpd/bamboo:
```

Óçìåéþóåôå ðùð ôí üññíá ôíð åêôôðùôÞ ååééíÜ óôçí ðñþðç ôðþëç, åíþ üéåð ié Üëéåð êáôå ÷ ùñßóåéð ðið ðåññéññÜðiði ôíí åêôôðùôÞ èá ðññÝðåé íá åßíáé óóïé ÷ éóíÝíåò åéá êÜëå òÝëið åñññiÞò íá öÝññé ÷ åññâôÞñá åéåôðñò åññéôðññiðç êÜëåôð.

ÅÜí åáí ðññóðéiñßóåôå ôíí êáôÜëíäí ðáññ ÷ Ýðåðóçð iÝóù ôíð sd, ôüôå ôíí óýðôçíå ðáññ ÷ Ýðåðóçð èá ÷ ñçóéiiðiæþóåé ôíí ðññåðééåññiÝñ /var/spool/lpd.

#### 10.3.1.5.4 Áíáâíþñéóç ôçð Óððéâðþò Åêôýðñóçð

Óôçí åíüôçôå Ñõèiñþóåéò Hardware áíáâíüñþóåíå ôç èýñá, êáé êáôÜ óóíÝðåéå ôçí êáôå ÷ þñéóç ôíð êáôáæüäið ÷ dev ðið èá ÷ ñçóéiiðiæþóåé ôíí FreeBSD åéá íá åðéèiñþóåé ìå ôíí åêôôðùôÞ. Ôþñá, èá åþóðiå ôíí **LPD** áððóÞ ôçí

ðeçñiöiñBá. ¼ðáí ði ðýóðóçlá ðáññi ÷ Ýóððóç Ý ÷ áé iéá ãññáðßá íá áëððþþáé, éá ãññiáé ãððþ ðçí áéæéë ðóððéåðÞ áéá ñiäññéåðiü ðið ðññiññUññiðiò ððëññiññ (ðiñ ðáññiáé ððåýéðññ áéá ði ðÝññáðiá ðùññ áääññ Ýññi ðóðññ áëðððññðÞ).

Dñiojáeñibóôå ðcí äéáauñiP ðgoò èáâða-÷bñéöçò /dev oôî áñ ÷åbii /etc/printcap ÷ñçóëiiðiéþíøåd ðcí èéâüöçóå 1p.

Óóí ôñÝ-ii ðánÜåáéäia íáð, áó ðöñëÝ öiñöñlå üöð i rattan åßíáé óóçí ðñþöç ðáñÜéçëç éýñá, éáé i bamboo åßíáé óóçí Ýéðç öáéñéáéþ ðüñöñá. Ié iÝåò éáðá-ùñþöøåéð óóí /etc/printcap éá åßíáé:

```
# /etc/printcap for host rose - identified what devices to use
#
rattan|line|diablo|lp|Diablo 630 Line Printer:\n    :sh:sd=/var/spool/lpd/rattan:\
    :lp=/dev/lpt0:\n\nbamboo|ps|PS|S|panasonic|Panasonic KX-P4455 PostScript v51.4:\n    :sh:sd=/var/spool/lpd/bamboo:\
    :lp=/dev/ttys0:
```

Áí ááí êáéïñßóåô á óâ êÜðiëí åêôôðùôP ôcí ééáíüôçôá 1p óöi áñ÷åßi /etc/printcap, ôí **LPD** ÷ñçóéiiðieåß áðü ðñiâðéëæäP ôí /dev/1p. Ôí /dev/1p ááí õðÜñ÷åé ôcí áääñÝíc óôéæíP óöi FreeBSD.

ÅÜí ï åêôôðûòðùòð ðïò åâéâéèéôð Üôå åßíáé ööñäåäai Ýñò óå ðán Üeëçëç èëýñá, åéâáÜóôå áðåöèåßåò ôçí åíüôçôá ìå ôßöëí Åâéâð Üóôåóç Ößëôñïò ËâéïÝñò. ÅéöññåôééÜ, åéïéïòðÞóôå ðññöåâðééÜ ôéò iäçäßåò ðïò åéïéïðéïý óôçí åðùïiaíç åíüôçôá.

#### 10.3.1.5.5 Ñõèìßóåéò Ðáñáì Ýôñùí Åðééïéíùíßáò ôïõ Spooler

Áéá áêôôðûò Ýò óå óâéñéâéÞ ðüñôá, ôí LPD ìðññâb íá ññöèßóâé ôçí ðâ ÷ ýôçôá óå bps, ôí parity, êáé Üëëåò ðáñâí Ýôññöó óâéñéâéÞò áðééïéñùíßâò áéá ëíññéâóïü ôí ðññäñ Üìíáò ðëßéöññö ðí ðôÝëíâé äâññí Ýíá óôíí áêôôðûòÞ. Áôõú áßíáé ðëññí Ýêôçïá áéáôß:

- Óáð áðéonÝðåé íá ïíeéiÜóåôá æéÜöiñåò ðánáiÝðñiòò áðééiéiùßáò ðñiòéÝðiñôáò ôéó áðéÜ lâ áðåññááßá oíõ áñ÷åßiò /etc/printcap. Áåí ÷ñåéÜæåôáé íá áðáíáíåðåñèùòòðåðôá ðñüññáííá ößéðñiò.
  - ÁðéonÝðåé óóï ýóóðçíá ðáñi÷Ýðåðóçò íá ÷ñçóéiðiéåß ðñüññáííá ðíeeáðeiýò áðéððùòðÝò, ié iðiñié iðiñåß íá Ý÷iõí äéáòiññåðéêÝò óáéñéáêÝò ññòèiðåðéò áðééiéiùßáò.

Ílé áéüëiðæò éeáíüôcôåò ôið /etc/printcap åëÝá-;iðí ôéò ðáñáiÝôñiðò óåéñéáêÞò åðééiéíùíßáò ôùí óðóéåðþí ðið áíáöÝñiñôáé óóçí éeáíüôcôá 1p:

br#bps-rate

Ímþæðum ógáða áðeðri í fyrirvara um ógáða bps-rate, um ógáða bps-rate í dögninum fá að búa til 50, 75, 110, 134, 150, 200, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400, 57600, eftir 115200 bits-per-second.

ms#stty=mode

Їїнбаææé ðeðø åððæëïäÝð ðiçð ñððñéåðPð ðiâññiâðééïý iâðiÜ ðiï Üññéæñá ðiçð ñððñéåðPð. Ç stty(1) åïçãâð ðiðø äéæéÝðéñåð

¼ôáí ôi LPD áiißääé ôcí óooéåôP ðiö iñßæååé åðü ôcí éeáíüôçôá 1p, ðeíèåôåß ôá ÷áñåêôçñéóôééÜ ôçò óooéåôPò  
iá éeáíüôçôá ms#, ÷iö íéäéåßôåñí åíäéåöÝñí íé êåôåóöÜoåéò eäéöïñäåßåò parenb, parodd, cs5, cs6, cs7, cs8,  
cstopb, crtscts, ééå ixon, ðiö åíçäïívýåé óóçí óáëßääå åíçëåßåò stty(1).

Ád ðññöé Ýóíõiå óðii ðánñ Üääéæáíå iåd Ýáí åéððñùþ óðçí Ýêðç óåéñéåþ eýñá. Èá èÝóíõiå óçí óá ÷ýðçðá bps óå 38400. Áéá óçí éåð Üóôáóç éåéõiõñãßáð eá èÝóíõiå , no parity iå -parenb, ÷áñáéðþñåò 8-bit iå cs8, no modem control iå clocal éåé Ýéåä ÷i nñPø iÝóù hardware iå crtscs:

```
bamboo|ps|PS|S|panasonic|Panasonic KX-P4455 PostScript v51.4:\n      :sh:sd=/var/spool/lpd/bamboo:\\\n      :lp=/dev/ttys0:ms#-parenb cs8 clocal crtsets:
```

#### 10.3.1.5.6 ÅñêáôÜóôáóç Ößëôñïõ ÈåéíÝíõ

Ãéá ôcí ádëþ áâéæáð Üóðáóç ðùíi áâéððñðóþ íáð, ðií ðëßëðñïi éâéïi Ýíñ iðiññåb íá áßíáé Ýíá lëéñü shell script ðið áðëÜ eá áâéðâæåb ôcí áâíöiëþ /bin/cat áéá íá óó Ýëíæé áññáóðßåò ðoííi áâéððñðóþ. Òi FreeBSD Ýñ ÷âðáé íá Üeëi Ýíá ðëßëðñïi, ðií 1þf ðið ÷âéñßæâðáé áðñíáðüðçóðò backspacing éâé ñðiññü Úìíéðçò áéá áâéððñðóþ Ýð ðið ßóùð íá icí ÷âéñßæiiðáé ðùíðÜ áððÝð ðeð éâéðñiðññåb. Éâé ðooðéÜ, iðiññåb ðið ÷ñçðeíiðiéÞðåð ðiðiññåb ðiðiññåb Úeëi ðññüññåliá ðëßëðñïi ðâðééñiðñåb. Òi ðëßëðñïi 1þf ðâññéñü Üðâðáóé èâéðññåb ðoííi áâíüðçóð lpf: Ýíá ðëßëðñïi Éâéïi Ýíñ.

Èá îâééíPöödöå äçlëéöñäþöôå ôi shell script /usr/local/libexec/if-simple óáí Ýíá áðëü ößëöñí êâééíÝíö. ÔiðièåôÞöôå ôi áéüüëöèi êâßiâií ôií áñ ÷ áßi ÷ ñçöéiiðiéþöôå ôií êâééíâiñÜöi ðiö ðñiöôéíÜöå:

```
#!/bin/sh
#
# if-simple - Simple text input filter for lpd
# Installed in /usr/local/libexec/if-simple
#
# Simply copies stdin to stdout. Ignores all filter arguments.

/bin/cat && exit 0
```

ÊÜÜêåö îæ áñ : öþþü öååööö Þéöü

```
#  
# /etc/printcap for host rose - added text filter  
#  
rattan|line|diablo|lp|Diablo 630 Line Printer:\  
        :sh:sd=/var/spool/lpd/rattan:\|  
        :lp=/dev/lpt0:\|  
        :if=/usr/local/libexec/if-simple:
```

```
bamboo|ps|PS|S|panasonic|Panasonic KX-P4455 PostScript v51.4:\n    :sh:sd=/var/spool/lpd/bamboo:\\\n    :lp=/dev/ttys0:ms#-parenb cs8 clocal crtscs:\\\n    :if=/usr/local/libexec/if-simple:
```

Óċiàlħusóċ: Iəñiñāħsóá ía āñiñāħsóá Yíá áiōħbñáñáöi öiō script if-simple óðií ēáôħüeħla  
/usr/share/examples/printing.

#### **10.3.1.5.7 Åíåñäïðïßçóç ôïõ LPD**

Ôi lpd(8) àêôåëëßôáé áðü ôi /etc/rc, êáé åëÝä÷åôáé áðü ôçí iåôåâëçôP lpd\_enable. Ç iåôåâëçôP áôôP Ý÷åé ðñïåðéëåái Ýíç ôëîP NO. Ái äåí ôi Ý÷åôå êÜíåé áêüìíá, ðñïöèÝóôå ôçí áêüëïöç áñâñiP:

lpd\_enable="YES"

óöii áñ÷åßii /etc/rc.conf, êáé åðáíåêééíÞóôå ôi óýóôçìá óáò, Þ áðëÜ åêôåæÝóôå ôi lpd(8).

# 1pd

#### 10.3.1.5.8 ÄiêéíP ôiõ Spooler

ÖöÜóáôå ööî ôÝëìò ôçò åðéÞò åâéâôÜóôáóçò öiõ **LPD**. Èá åóÞöiõìå áæá áññüôðñá óå óðã ÷ åñçöÞñéá, áöïý áéüic èá ðñÝðåé íá åéÝâiõiå ôçí åâéâôÜóôáóç éáé íá äéïñèþöiõiå iðieïäÞðiõå ðñüüäëçíå Ý ÷ åé ðñiéýðåé. Áéá íá åéÝâiåôå ôçí åâéâôÜóôáóç ðñiõðåéÞðóå íá åéôôðþöåôå êÜðé. Áéá íá åéôôðþöåôå íå öi ÿðôðçíå **LPD**, ÷ñçöeiiðiëÞðóå ôçí åíðreÞlpr(1), ç iðiñßá åðiõôÝëëåé îßá åññáôßá ðñiõi åéôýðûóç.

Í ðófinnabóðá íá óðráðóð áðcí lpr(1) íá ðí ðñúðanállá lptest(1), aðeá ðí tðibí eðúíállá leá áæðáðuðþ óðcí áfíðuðcðóá eða -ið Áðeééiðuðbáð óið Áðeððuðnóþ aðeá óuð Yéðáa -ið eðaði Yéðó.

Áéá ôíí Ýëåä÷í íéáò áðëÞò åãêáô Üóôáóçò **LPD:**

ĐëcêôñiëiãPóôå:

```
# lptest 20 5 | lpr -Pprinter-name
```

$\frac{1}{4}$ ðiõ printer-name áßfáé õi üñíá áítùò áêôðûòõP (P õi alias) ðiõ áíáö Ýñâðáé óóï /etc/printcap. Áéá íá áë Ýñâðáô õiõ ðñíåðéëâái Ýñí áêôðûòõP, ðëçêòñíëiäPóôå lpr(1) ÷ùñßò õi ðñüèâái -P. Áí i áêôðûòõPò óáð ÷ñçóëiõiðíæß PostScript, ðñÝðáé íá óóâßéâðáô Ýíá ðñüñâñâíá PostScript, áíðò íá ÷ñçóëiõiðíæPóâðå õi lptest(1). Áéá íá õá éâðáô Ýñâðáô, õiðíæâðPóôå õi ðñüñâñâíá õá Ýíá añ ÷âði ééá ðëçéôñíëiäPóôå lpr file.

Óå Ýíáí åêôôðùôþ PostScript, ç åêôýðùóç èá åbíáé ôi áðiôÝéåóiá ôiô ðñiâñÜìâôiò ðiô óoåßéåôå. Áí ÷ñçóéiiðiéåßôå ôiî lptest(1), ôüôå ôi áðiôÝéåóiá èá iijéÜæåé ià ôi áüéiðiéi:

!"#\$%&'()\*\*+, -./01234  
"#\$%&'()\*\*+, -./012345  
#\$%&'()\*\*+, -./0123456  
\$%&'()\*\*+, -./01234567  
%&'()\*\*+, -./012345678

Ãéá ðåñáêôÝñù Ýéâå÷ï ôiõ åêôðûñôP, äiêéïÜôðå ïá êáðåâÜôðåô ìâñâéýôðñá ðñiññÜñiaôá (ãéá åêôðûñôÝò ðiõ ÷ñçóéïðieiyí äéþoóá ðñiññâìâôéïiy) P ôñÝiôå ôi lptest(1) ïå äéáöiñâôéêÜ ðñièÝiaôá. Æá ðáñÜäâéâiá, ç åiöiëP lptest 80 60 èá ðáñÜäâé 60 ãñâiáÝò ôùi 80 ÷ñâéôPñùç ç éâèâiñBá.

Áí i âéôõðùôþò äáí äïöëåýåé, äåßôå ôçí áíüôçôá Åíöïðéóìüò Âæáâþí.

## 10.4 Ñöèìßóåéò Åêôõðùôþí ãéá Ðñï÷ùñçìÝñõò

**Đñiiáéäiõíßçóç:** Áðü ôi FreeBSD 8.0 êáé iàðÜ, ôá áñ÷åßá óooéåõþí áéá ôéò óáéñéáéÝò eýñâò iàðííííÜóôçéáí áðü /dev/ttymN óå /dev/ttynN. Ié ÷ñþoôåò ôiõ FreeBSD 7.X éá ðñÝðåé íá ðñíóáñiüöiõí ôçí ôåéïçñßúóç ðiõ áééieíõèåß ià áUóç áðôÝò ôéò áééaaÝò.

ÁôôP ç åüüôçôá ðåñéãñÜöåé ößëõñâ áéá ôçí åêôýðùóç åéäééPò iññöPò áñ÷åßùí, óåëßäùí êåöäéßääò, áéá åêôôðþoåéò iÝóù äéêöýïö, èåéPò èåé áéá ôíi Ýéåâä÷i ðñüúåáóçò èåé ôçí èåôáiÝõñcôc ÷ñPöcò ðùí åêôôðùñPöbí.

#### 10.4.1 Ößööná

Ùòóùöí, áéá íá iòññÝ óåôå íá áééåòåéëåòòåòå ðéó äðíåùòòçòåò ìåòåòòñíðþí iiñòþò, áéëÝá ÷ iò ðñùòåáóçò áéá  
éååòåíÝ öñçóçò, éåé ðò ÷ üí áéééÝ ð äðíåùòòçòåò ðíò åéòòðùòþ ðåò, èá ðñÝ ðåé íá éåååéÜ åååòå ðùò  
äiñðéåýïòí ðå ðßéòññá. Óå óåééëÞ áíÜéðóç, èá åßíáé åðééýíç ôùí ðßéòññí íá ÷ åéññæüòåé üéåò åðòÝ ðéó ðåññíÝ ñòð. Óå éåéÜ  
íÝá åßíáé ðùò ðéó ðåññéòññòå ðíñÝ ð äðíÝ ðåé íá ðåññÝ ÷ ååðå ðåðþò ié ßæéieí ðå ðßéòññá ðåò. Óå éåéÜ íÝá åßíáé  
ðùò ååééëþò ðòÜñ ÷ iòí áñéåòÜ äééåÝ ñéíá, éåé áí ååí ðòÜñ ÷ iòí, åßíáé ó ÷ åðééÜ áýéieí íá ðå ãñÜþåòå.

Åðþóçò, ói FreeBSD æáóþéåôáé íà Ýíá öþéöñii, ói /usr/libexec/lpr/lpf, ðiø aïöëåýåé íà ðíëëíyø åêôðùôÝð  
ðiø iðiníyí íá åêôðþþiðí ãðëü êâßiâíi. (xæñþæåôáé backspacing êáé tabs óoi áñ÷âði, êáé êÜíáé eáôáiÝðñçóç, aëëÜ  
ðþðiðá ðåñéooðùôáñi.) ÓðÜñ÷iðí, åðþóçò, aëëÜõmá Üëëá öþéöñá eáé óðóðåééÜ óiðo óðçí ÓðëëiðP óuí Ports óið  
FreeBSD.

Óå áõôP ôcí åíüôcôá èá âñåßôå: ;

- C áltiúðcôá Ðùò ãiøðâýiòí óá Òßëöñá, ðñiøðæåß íá áþþoåé íæá ãáiééÞ Üðiøç áéá ðóéó áñiñiæúöðcôåð óùí òßëöñuí óóéð áéæññááðbåò áéðóýðùóçò. Èá ðñ Ýðåé íá áéáðUóåðá áððóÞ ðçí áiúöðcôá áéá íá iðiññbôå íá éáðåéÜååðå óé “ðñiñááðééÜ” óðiñááðbåíð üðáí ðí LPD ÷ ñicóðeiiðiééß òßëöñá. ÁððÝð íé áiþþoåéð èá óáð áiçèÞóíòí íá ðñiñéáðUíåðå áéá íá áððiøðæiáðþíáðå ðñiñáëÞíáðå ðíð iðiññýí íá óðiñáýí éáðéþò áåêæáðéóðUôå üeï íéáé ðåñéóðüðåñá òßëöñá óá êÜèå áéðóððuóÞ óáð.
  - Óí LPD áiáíÝíåé ðùò êÜèå áéðóððuóÞò áßíáé ééáíüò, áðü ðñiñáðéëiäÞ, íá áéðóðþþoåé áððü êåßíáññ. Áððü üiùò áßíáé ðñiñáëçíá áéá áéðóððuóÞò PostScript (Þ Üeeiðò ðíð ááðßæiñðåé óá áéþþoåð ðñiñáññááðéóiiý) íé iðiññýí íá áéðóðþþoïð Üíåðå áððü êåßíáññ. C áltiúðcôá Óðiñááðuóðcôá Áññááðéí Áððéiy ÊáéíYíòí óá áéðóððuóÞò PostScript óáð

âíçâáâíß ôé éá ðñÝðåé íá ëÜíáôå áæá íá îáðåñÜóåôå áôôü ôï ðñüüäëçìá. Èá ðñÝðåé íá äéååÜóåôå áôôP ôçí âíüöôçôå áíßÝ ÷âôå áéôôðùôP PostScript.



**Ócìàßúóç:** Ìdìñàßòå íá àñàßòå áíòßàñáöï ôúí àéÜöíñúí scripts ðïò áíáöÝñííðáé ðáñáêÜôù, óôíí êáôÜëíäí /usr/share/examples/printing.

#### **10.4.1.1 Đùò Äïõëåýïõí ôá Ößëôñá**

$\frac{1}{4}$  úáí ôi LPD è Yéáé íá áéôôðþbóáé Yíá áñ ÷ áßi iéáð áññáðþáò, iâééí Ú ôi ðñüäñállá ôiõ ößëöñiõ. È Yóâé ùò standard input ôiõ ößëöñiõ ôi áñ ÷ áßi ðiõ ðñ Yðåé íá áéôôðùèåß, ùò standard output ôiíßæéí ôií áéôôðñûòþ éâé ùò standard error ôi áñ ÷ áßi áíáöiñ Úð oóáeí Úðùí (áíáð Yñâðáé óóçí ééáíúðçóá 1f ôiõ /etc/printcap, þ áðü ðñiâðééíþ ôi /dev/console).

Öi ößëöññi ðriö èá iâééíPöåé öi **LPD** êáéþò êáé ié ðáñÜlåññiö öiö ößëöññiö, åiññöþíöåé åðü öi öé Ý÷åôå åçëþöåé ööí áñ÷åßí /etc/printcap êáé åðü öi öé ðáññiÝöññiö Ý÷åé êáé iñßöåé ißæiò i÷ñPööçò åéá öçí åññåóßá iå öçí åññiP åiöiëþò lpr(1). Åéá ðáñÜäåéäíá, áí i÷ñPööçò öçëêöññiäPöåé lpr -t, öi **LPD** èá iâééíPöåé öi ößëöññi troff, ðriö öðriäçëþíöåé iå öçí ééáñüöðçöa t f åéá öiï åéööðöñöP öññiñéöññi. Áí i÷ñPööçò åðééöiåb íá åéööðþöåé åðéü èåbiññ, èá iâééíPöåé öi ößëöññi i f (åðööü ðñÜññåöé éo÷ýåé öéö ðáññéóótiöññåö öiñÝö: ååßöå åá Ößëöññá Åññiäiø åéá èåðöññiÝññåéåö).

ÖðÜñ÷iðí òñåéò öýðié ößëöñùí ðið iðiñåßôå íá ðñiøäéiñßóåôå óóï /etc/printcap:

- Ôi *öþæðni* *êðæi* Ýið, áðiññáæùláií êáé ùò *öþæðni* *ðeóñüaið* óðcí ðâðiçñßùóç ôið **LPD**, ÷áðñßæðóáé áðoððþróaéða êáññiðeýí êáði Ýið. ÈaùñÞóðá ôi ùò ôi ðññáððeëðaí Ýið *öþæðni*. Ôi **LPD** áði Ýiðe ðùò üteið ie áðoððuò Ýð, áðü

```
filter-name [-c] -w width -l length -i indent -n login -h host acct-file
```

üðið

- C -

åìöáíßæåôáé áí ç åñäáóßá Ý÷åé áðiöôáëåß ìå lpr -1

*width*

åßíáé ç ôéïp áðü ôçí ééâüöçôá pw (ðéÜöð óäëßâáó - page width) üðùò ðñïöäéïñßæåôáé ôöï /etc/printcap, iå ðñïåðééåâí Ýíç ôéïp ôï 132

*length*

*indent*

åßíáé ôii ìÝååèìò ôçò åóï÷Þò (indentation) áðü ôii lpr -i, ïå ðñiåðééäìÝíç ôéïP 0

*login*

åßÍáé ôi êáôáååñáì Ýíü üíñá ÷ñþóôç ðíö åêôôðþíåé ôi áñ ÷åßí

*host*

åßíáé ôï üïïá ôïõ õðïëïæóôþ áðü ôïí iðïßi óôÜëèçêå ç åñãáóßá

### *acct-file*

åßíáé öi üíñá öiõ áñ ÷ åßiõ éáôái Ýôñçóçò áðü ôçí éêáíüôçôá a f.



```
filter-name -xpixel-width -ypixel-height -n login -h host acct-file
```

Üldö *pixel-width* ábíráé ç ôéíþ áðü ôcí ééáúöôcôá px (ðñiiâðééâái Ýíç ôéíþ 0) êáé *pixel-height* ábíráé ç ôéíþ áðü ôcí ééáúöôcôá py (ðñiiâðééâái Ýíç ôéíþ 0).

- Óiðr ðjóðinir áttið að iðræði Þóðréða íslenskum og ófálu meðal annarri fólkunni. Þóðréður var ófálu meðal annarri fólkunni. Þóðréður var ófálu meðal annarri fólkunni.

```
filter-name -wwidth -llength
```

ié iðiþáð áßíáé ðáiiíéüôðåò ia óeo ðáñái Ýôñiðo -w éáé -1 ôúí ößëôñùí êåéí Ýiið.

Óá ößëöñá èá ðñÝðåé åðßóçò íá ôðñìáôßæiõí íå êÜðiéá áðü ôéò áéüëiõèåò êáôáóôÜóåéò åíüäiõ:

exit 0

Áí ôii öþëöñii ôýðùóå åðéôõ ÷ þò ôii áñ ÷ åßi.

exit 1

Áí ôi ößëöñii áðÝôo-÷å íá ôoðþóåé ôi áñ-÷åßi, áeëÜ èÝëåé ôi **LPD** íá ðññiöðåèÞóåé íá åêoðþóåé ôi áñ-÷åßi íáíÜ. Ôi **LPD** èá íåééíÞóåé íáíÜ ôi ößëöñii áí åßiáé Ýññäiò ià áooðP ócí êáôÜóoáóç.

exit 2

Áí ôi ößëöñii áðÝôô÷å íá åêöôðþóåé ôi áñ÷åßí éáé äáí èÝéåé ôi **LPD** íá ðñiöðáèÞóåé íáíÜ. Ôi **LPD** èá áðiññþóåé ôi áñ÷åßí.

Ôi ðöþeññi êåéi Ýñiõ ðiõ Ýñ ÷ åôáé iã ôçí êáiiéêP Ýêäiöc ôiõ FreeBSD, /usr/libexec/lpr/lpf, åëiåôåëéåýåôáé ôéð ðáñai Ýñiõð ðeü ðiõð êáé iþeñiõ õåëþääð aëá íá ðñiøäéñþóåé ðüôå íá áðiñôåþëåé ôi form feed êáé ðùò íá êÜíæé êáðai Ýñcóçó. ×ñçóéiiðiéåß ôéð ðáñai Ýñiõð aëá login, host, êáé ãñ ÷ åþiõ êáðai Ýñcóçò aëá íá åçìéiññáÞoåé ôéð ó ÷ åôééÝo åaaññoÝo êáðai Ýñcóçò.

Áí áßóôá óôc æááæéâóßá áðééïäPò ðßëöñùí, åeÝâíôá áí áßíáé óôïâáôÜ íå ôi LPD. Áí áßíáé óôïâáôÜ, ôüôá ðñÝðåé íá ðôïóöçñßæïöí ðçí èßóôá ðâñâí Ýôñùí ðïö ðâñéññÜøâíâ ðñïçâïöíÝñùð. Áí ó÷åæÜæâôá íá ãñÜøâôá óâ åéêÜ óâð ðßëöñâ áâíéèPò ÷ñÍÞò, ôüôá ðñÝðåé íá óâ ëÜíâôá íá ðôïóöçñßæïöí ðçí ßæéá èßóôá ðâñâí Ýôñùí êáé èùâæébí áîñüäï.

#### 10.4.1.2 Óõìâáôüôçôá Åñääóébí Áðëïý ÊåéïÝïö óå ÅêôôðùôÝò PostScript®

ÁééÜ, áí áðééöìåþbóá íá óóâþéâðóá óúöí áññááóþbó PostScript üöí éáé áðëíý êáéí Ýfiö óöíí áðéóðùòþ óáó, óüöá óáó ðñriöñ Ýðiöìlá íá ðñiöé Ýðiöâðá êÜðiéâð ñðèlþbóâðéð óðóçí áðéáð Üðiöâðóç óáó. Áéá íá áðíáé áðöü, éá ðñ Ýðåé óíi ððéöññií êáéí Ýfiö íá áíé ÷ íáyáé áí ç ôñÝ ÷ iñóða áññááóþbá áðíáé áðëü ëáðíáññií þ PostScript. ¼éâðó ié áññááóþbó PostScript ðñ Ýðåé íá íâééññií íá % ! (áí i áðéóðùòþbó óáó ÷ ñçöéiiðiéâð Üðiöññií ððéöññií áðééññií ððéöññií óðóçí áðéiçñþbúñc óíiö). Áí áðíáé áðöüþ ié ðñþbóie áÿí ÷ áññáêðþññáð, óüöá Ý ÷ iñóða PostScript, éáé c òðüüëiðç áññááóþbá iðiññáð íá óðáæðá áððåðeâðbáð óóíí áðéóðùòþ. Áí áðíáé áðöüþ ié ðñþbóie áÿí ÷ áññáêðþññáð, óüöá óíi ððéöññií éá iðoáðññií Ýðåé óíi êáðíáññií óá PostScript éáé eá óðóðþbóáé óíi áðiø Ýéáññiá.

Đùò ãßíåôáé áõôü;

Áí áþóðå êÜði÷ið óáeñéáéiy áêóðùðuðP, Ýíáð êáëüð ôñüðið aéá íá áßíáé áðóðu áðééðu áßíáé íá áðæáðóðP óðóð áði 1prps. Ói 1prps áßíáé Ýíá ößéðnii áêóýðuðoçò PostScript ðið áðééiðiñáð aíðßæññíá ià ôií áêóðùðuðP. Áíçìañþíáé ðií añ ÷ áßí áðáðUðóðáðoçò ðið áêóðùðuðP ià áíáëðóðééÝð ðéçññiðiñþáð, þóðá ié ÷ñÞóðåð áéá ié aéá ÷ áeñéóðYð íá aíðið áððáêñéáðbó ðiéá áßíáé c áéðUðóðáðc ðið áêóðùðuðP (üððu ÷ áicëþ óðÜðeic toner P ðññuâëciá ÷ áñðéiý).

Áêüìç ðéí óçìáíðéêü áßíáé ðùò ðåñéÝ ÷ áé òí ðñüäñáìíá psif ðíð áíé ÷ íâýâé áí ç áéóâñ ÷ üüâíç áññáóßá áßíáé áðëïý êâéïÝíð ëáé áéâéß òí textps (Ýíá Üëéï ðñüäñáìíá ðíð ðåñéÝ ÷ áóáé óóí lprps) íá òí ìåôáôñÝøâé óå PostScript. ÓÝëï ÷ ñçóéïðíéâßðáé òí lprps áéá íá áðíóðâßëåé óçí áññáóßá óóíí áêôôðùôÞ.

Òí lprps áßíáé íÝñïð ôçò ÓðëëïâÞò ôúí Ports òíð FreeBSD (ääßðå Ç ÓðëëïâÞ ôúí Ports). ÖðóéêÜ, ìðññâßðå íá òí êáðâåÜóâðå, íá òí ìåôáæùôðßóâðå êáé íá òí áâéâðåóðÞóâðå ïüñé óáð. ÌåðÜ ðçí áâéâðÜóâðå òíð lprps, áðëÜ ðñïðæíñßóâðå òí áéâðññÞ ðñïð òí ðñüäñáìíá psif ðíð áßíáé íÝñïð ôíð lprps. Áí áâéâðåóðÞóâðå òí lprps áðü óçí ÓðëëïâÞ ôúí Ports, ôüôå áéá òíí óâéñéâü óáð áâéâðùôÞ PostScript ÷ ñçóéïðíéÞóâðå òí áéüëïðèç êáðâ ÷ þñéóç óóí áñ ÷ áßí /etc/printcap:

```
:if=/usr/local/libexec/psif:
```

Èá ðñÝðâé áðßóçò íá êâéïñßóâðå óçí ééáíüôçóá rw ç ïðíßá iñßæåé üüðé òí **LPD** èá ÷ áéñßæåðåé óíí áêôôðùôÞ óå êáðÜóâðåç áíÜäñûóçò êáé áâñáóðÞò.

Áí Ý ÷ áðå ðáñÜëéçëi áâéâðùôÞ PostScript (êáé áéá òíí èüäí áðóü áâí ìðññâßðå íá ÷ ñçóéïðíéÞóâðå áîößäññíç áðëëïñùíßá ìå òíí áâéâðùôÞ, üðùò áðáéðâßðáé áðü òí lprps), ìðññâßðå íá ÷ ñçóéïðíéÞóâðå òí áéüëïðèç shell script ùò ößëôññ íâéïÝñïð:

```
#!/bin/sh
#
# psif - Print PostScript or plain text on a PostScript printer
# Script version; NOT the version that comes with lprps
# Installed in /usr/local/libexec/psif
#
IFS="" read -r first_line
first_two_chars='expr "$first_line" : '\(..\)''

if [ "$first_two_chars" = "%!" ]; then
#
# PostScript job, print it.
#
echo "$first_line" && cat && printf "\004" && exit 0
exit 2
else
#
# Plain text, convert it, then print it.
#
( echo "$first_line"; cat ) | /usr/local/bin/textps && printf "\004" && exit 0
exit 2
fi
```

Óóí ðáñáðÜû script, òí textps áßíáé Ýíá ðñüäñáìíá ðíð áâéâðåóðÞóâíá íâ ÷ ùñéóðÜ áéá íá ìåðâðñÝðíðâá áðëü êâßíâíí óå PostScript. Íðññâßðå íá ÷ ñçóéïðíéâßðå ïðíçíâÞðíðå ðñüäñáìíá ìåðâðññÞð áðü êâßíâíí- óå-PostScript. Ç ÓðëëïâÞ ôúí Ports (ääßðå Ç ÓðëëïâÞ ôúí Ports) ðáñéÝ ÷ áé áðßóçò Ýíá ðëÞñâð ðñüäñáìíá ìåðâðññÞð áðü êâßíâíí óå PostScript, òí a2ps ðíð ßóùò áðéèðíâßðå íá äéâñâðíÞóâðå.

#### 10.4.1.3 Ðñïðññúóç PostScript áéá ÁêôôðùôÝò ðíð áâí òí Óðíóôçñßæïð

Òí PostScript áßíáé òí *de facto* ðñüôôðí áéá óóïé ÷ áéíèåðßá êáé áâéôýðùôç õþçëÞò ðíéüôçôáð. Ùóôüöi, òí PostScript áßíáé êÜðùò ááðáíçñü ðñüôôðí. Áðôô ÷ þò, ç Aladdin Enterprises ðáñÝ ÷ áé Ýíá ðáñâíðâñÝò áéâýéâñí PostScript ðíð

íññÜæåôáé **Ghostscript** êáé äiðëëåýåé Üþïäá óôí FreeBSD. Ói Ghostscript äéáâÜæåé óá ðåñéóóùðåñá áñ ÷ åßá PostScript êáé iðiññá íá áðiäþóåé óéò óåëßåò òiðò óá iàäÜëç åéÜíá óðóéåðþí, óðiðåñééáíáÜññóáð ðiðëëýð ðýðiðò åêôôðùðþí ðið ãáí ðiðiðçñþæiðí PostScript. Ååêåééóðþíóáð òið **Ghostscript** êáé ÷ ñçóéiðiéþíóáð Ýíá åéäéüí ößëôñí õåéí Ýññ ãéá òií åêôôðùðþ óáò, iðiññåðó íá êÜíåðá òií ëiéíü åêôôðùðþ óáò íá ëåéóïññåð óáí Ýíáò ðññäìáðééüò åêôôðùðþ PostScript.

Ói **Ghostscript** åñßóéåâé óôçí Óðëëëáþ óùí Ports óið FreeBSD, êáé iÜëéóôá óá ðiðëëÝð åéäüóåéð. Ç ðei äéáäåäñÝíç åßíáé òi print/ghostscript-gpl.

Åéá íá êÜíåðá ðññóññþùóç PostScript, ðñÝðåé òi ðéëôñí åéäíÝññ ãéá ãéäüóåé áí åêôôðþíåðá áñ ÷ åßí PostScript. ÅÜí ü÷é, ôüôå òi ðéëôñí èá ðåñÜóåé òi áñ ÷ åßí åéäôôðéåðáí óóíí åêôôðùðþ. ÅéáöiññåðéÜ, èá ÷ ñçóéiðiéþóåé òið **Ghostscript** åéá íá iàðåðñÝþåé áñ ÷ ééÜ òi áñ ÷ åßí óá Ýíá ðýði ðið èá åéôåéåâåðíåé í åêôôðùðþ.

Éäiy Ýíá ðåñÜääéñíá: òií åéäüéiðèi script åßíáé Ýíá ößëôñí åéäíÝññ ãéá åêôôðùðþ Ýð Hewlett Packard DeskJet 500. Åéá Üëëiðò åêôôðùðþ Ýð, áíðééåâóðþóå òi üññéóíá -sDEVICE óôçí åíðiëþ gs (**Ghostscript**). (Ðëçêôññëëáþóå òi -h åéá íá ååßôå óçí åßóðá óðóéâðþí ðið ðiðiðçñþæéé ç ôñÝ ÷ iðoá ååéåðÜóðåóç òið **Ghostscript**.)

```
#!/bin/sh
#
# ifhp - Print Ghostscript-simulated PostScript on a DeskJet 500
# Installed in /usr/local/libexec/ifhp

#
# Treat LF as CR+LF (to avoid the "staircase effect" on HP/PCL
# printers):
#
printf "\033&k2G" || exit 2

#
# Read first two characters of the file
#
IFS="" read -r first_line
first_two_chars='expr "$first_line" : '\(\.\.\)' ``

if [ "$first_two_chars" = "%!" ]; then
#
# It is PostScript; use Ghostscript to scan-convert and print it.
#
/usr/local/bin/gs -dSAFER -dNOPAUSE -q -sDEVICE=djet500 \
-sOutputFile=- - && exit 0
else
#
# Plain text or HP/PCL, so just print it directly; print a form feed
# at the end to eject the last page.
#
echo "$first_line" && cat && printf "\033&l0H" &&
exit 0
fi

exit 2

:if=/usr/local/libexec/ifhp:
```

Áðóðu áðíráé üei. Iðiñáðóðá íá ðöçéðñíëiáþóðóðá 1pr *plain.text* éáé 1pr *whatever.ps* éáé óá äýi èá áðóððùèiýí áðéóðó ÷ þó.

#### 10.4.1.4 Ößëôñá ìåôáôñíðþò

Ói áðüüþáñi áþíá iàðöÜ ócq ieiééþñúóç ðóç ðáðéþò áðáéðóÜðóðáóçðò ðið ðáñéæñi Üþáliá óðéò  
ÁáóéêÝð Ñðeìþóåéò Áðóðñùþí, áþíáé óóíþèùò ç áðáéðóÜðóðáóç öðþéñùí iàðóáññiðþò áéá oíðò óýðiðò áñ÷áþùí ðið  
ðññiðéiÜðå (áðóðùò áðüü áðéü èáþíáñi ASCII).

#### 10.4.1.4.1 Åéáôß íá åâéáôáóôþóåôå Ößëôñá lâôáôñïðþò;

Óá Óþéðñá iáðóáðñíðÞò ÆÜíðó ðcí áðéðýðùóç áæðóðññú ðýðúí áñ ÷ áððùí áýðeðc ððùëðáóç. Áéá ðáñ Üððáéáíá, áó ððið Ýðiðiá üðóé Ý ÷ iðiðá íá ÆÜíðiá áñéðóþ áññááðá ía òi óýðóðc íá óðié ÷ áééðáðáò T<sub>EX</sub>, éáé üðóé Ý ÷ iðiðá áéðóððùóþ PostScript. ÊÜéá ðiñ Ü ðið áçléríðññaiýá Ýíá áñ ÷ áðði DVI ía òi T<sub>EX</sub>, ááí iðññiýá íá áéðððþðiðiá éáðóððéðáðáíá Ýùð üðið íá iáðóáðñ Yðiðiá óði áñ ÷ áðði DVI óþ PostScript. C áéiðiðeðá áðiðéþi ðið ðñ Yððáé ía áéiðiðeðÞiðiá áðiðáé:

```
% dvips seaweed-analysis.dvi  
% lpr seaweed-analysis.ps
```

lå ôcí ÷ ñÍPóç åíúò ößëöñïò iåôåññïò ðò aéá áñ ÷ åßá DVI, ìðimiyå íá åðïöyäiòiå ôcí iåôåññïò ðò ðiò ðñÝðåé íá êÜñòiå êÜèå öiñÜ ÷ åéññiêßíçôå, êáéþíöå òi ÞPD íá êÜíåé ôc äiöseåéÜ aéá iåò. Òþñá, êÜèå öiñÜ ðiò Y ÷ iõiå Yíá áñ ÷ åßí DVI, aéá íá òi ôðöþöiòiå ÷ ñåéÜæåôåé iüñí Yíá ãÞíå:

```
% lpr -d seaweed-analysis.dvi
```

÷ iðiá á áráé Ýóáé óóí **LPD** íá êÜíáé óç iåôáññiðþ ôiø áñ ÷ åßiø DVI ðñiøé Ýöiióáò ôiø óçí åðééiäþ -d. C áiúöçóá ÅðééiäÝ ðiññiðiþcóco êáé iåôáññiðþþ ðæñéÝ ÷ åé ôiøð ðßíåéåð åðééiäþ iåôáññiðþí.

Ãéá ÊÜéå áâðééïäP iåðåôðñïðPò ðïò è Ýéåðå íá õðïðóçñßæåðå áðü Ýíá áâðôðùñòP, ðñ Ýðåé íá áâðåðåðóòPöåðå Ýíá öþëðñï iåðåôðñïðPò éåé íá iñþóåðå ôçí áæáññïP ðïò óòï áñ ÷ åßï /etc/printcap. Íá öþëðñï iåðåôðñïðPò åßíáé óáí ðï ðëþéðñï éåé Ýiiò óôçí áðëP áâðåð Üðóðåç áâðôðùñòP (áâðßóå ôçí áíüôðçóå Åâðåð Üðóðåç Öþëðñïò Éâéï Ýiiò) ià iùíç áæáøiñÜ ðùò áíðß ðï öþëðñï íá áâðôðþíáé áðëü êâßíåñ, iåðåôðñïðåé óï áñ ÷ åßï óå iéá áæáøiñðåéêP iññöP þðôå íá åßíáé êâðåðåñçóü áðü óï áâðôðùñòP.

#### 10.4.1.4.2 Ðïéí Ößëöñï ìåôáôñïðþò èá ÐñÝðåé íá Åäêáôáóôþóù;

Èá ðò Ýðåé íá áâæâééóð Üôâ óâ öþëöñâ iâðåâññiðþò ðið mîþæåðâ ðùð èá : ñçóéiiðiéþrâðâ. Áí áêððþiâðâ áñêåðü áâäiíÝíá DVI, ôüôâ áþíáé eïäééú íá óðiðâññé Üâðâðâ Ýíá öþëöñi iâðåâññiðþò DVI. Áí áêððþiâðâ óð ÷ fÜ áâäiíÝíá troff, èá èÝéåðâ íá áâæâóðþoâðâ Ýíá öþëöñi troff.

Í Æðueiðiðeðið ðbíráéadó ðóðiñþBæáéad óá ðbíðeñna ía óá iðiBá óðiññáUæáðoáé ði LPD, ðeðo êðaða ÷ ùñþBðáéadó ðiç ði áíðBóðié ÷ çò ðeðaúñðóða ðiði ãñ ÷ ðiBí /etc/printcap, éaé ðuðo ía óðeo ðeða Ýðóða íYðóù ðiç ði ðiñiðPø lpr:

Óýðiò áñ ÷ åßiò	Ééáíüôçôá /etc/printcap	ÐáñÜìåôñiò áíóïeþò lpr
cifplot	cf	-c
DVI	df	-d
plot	gf	-g
ditroff	nf	-n
FORTRAN text	rf	-f

Óyðiò áñ ÷ åßiò	Éêáíüôçôá /etc/printcap	ÐáñÜìåôñiò åíôïëþò 1pr
troff	tf	-f
raster	vf	-v
plain text	if	none, -p, or -l

Óóï ðáñÜääéäíá ìáò, áí ÷ ñçóéïïðiéÞóïòìå 1pr -d óçìáßíåé üöé í åêôôðùôþò ÷ ñåéÜæåôáé ôçí ééáíüôçôá df óçí êáôá÷þñéóç òiò õóï /etc/printcap.

Áí êáé êÜðiéïé ìðiñåß íá éó ÷ õñéóðiýí òií áíðòðèåôï, ìáñééïß óyðié áñ ÷ åßùí üðùò åßíáé ôá êåßìåíá êáé ãñáöéêÜ FORTRAN åßíáé ìåðåñáóïÝíá. Íðiñåßò ìá åþþåôå íÝá ðiiþ óá áñ ÷ åßá åôôðiý òið ðýðið (þ êáé iðiéáóäþðiòå Üëëçò ìñöþò åñüäïð), åâéâééôðþíðå ðñiðáññiòïÝíá öþëöñá. Áéá ðáñÜääéäíá, áò ððièÝóïòìå üöé èá èÝëåðå íá åêôôðþðåôå êáôåðeåßáí áñ ÷ åßá Printerleaf (áñ ÷ åßá ðñiñåñ ÷ üììåíá åðü òi ðñüññiòìå ðééññáðÝæéå ðôðññáößåò Interleaf), æéëÜ áâí èá åêôôðþðåôå ðiðÝ æéâññÜñåðå (plots). Èá ìðiññýóåðå íá åâéâáðåðþðåðåÝíá öþëöñí ìåðåðñiðþò áñ ÷ åßùí Printerleaf ððü ôçí ééáíüôçôá gf êáé íá åêðåéâåýóåðå òið ÷ ñþðóðå õáò üöé ç áíòiðþ 1pr -g óçìáßíåé “ôýðùóå áñ ÷ åßá Printerleaf.”

#### 10.4.1.4.3 ÅâéâáðÜóðåóç Öþëöñúí ìåðåðñiðþí

Áðü ôç óóéàïþ ðið òi ðñüññáðþò åßíáé ðñiññüññáðþò åâéâáðóçò òið FreeBSD, åßíáé ðéï òið òi ðñüññáðþò åâéâáðåðéïýí òið ëáðÜëüäí /usr/local, ÿáð òoíþðèçð ðñiññéðiüð ðùñ ðñiññáññüññáðþò åðôþí åßíáé ìáðóÜëüäí /usr/local/libexec, ìéá ðið ðñüññéðåé ìéá åâéâééâðiÝíá ðñiññÜñåðå ðið åêôâæïÝíðåé ìüñí áðü òi LPD. Íé áðëëß ÷ ñþðóðå ãâí èá ÷ ñâéâðåðå ðiðÝ íá òi åâðâæÝóïð:

Åéá íá åíññiðiéÞóåðåÝíá öþëöñí ìåðåðñiðþò, ðñiññüññáðþò åâéâáðåðéïýí òið ëáðÜëüäí /etc/printcap, åëëÜæïðåð ôçí êáðÜëëçèç ééáíüôçôá òið ãêôôððùôþ ðið ãðééðiåßò ìá òi ÷ ñçóéïïðiéÞóåðå.

Óóï ðáñÜääéäíá ìáò, èá ðñiñðeÝóïòìå òi ðñüññáðþò DVI óôçí êáðå ÷ þñéóç ìáò ãéá òií åêôôððùôþ ìå òi üññá bamboo. Áéïëðèåß, ëïéðüí, òi ðáñÜääéäíá ãéá òií áñ ÷ åßí /etc/printcap, ìå ôçí íÝá ééáíüôçôá df ãéá òií åêôôððùôþ bamboo:

```
# /etc/printcap for host rose - added df filter for bamboo
#
rattan|line|diablo|lp|Diablo 630 Line Printer:\n
:sh:sd=/var/spool/lpd/rattan:\
:lp=/dev/lpt0:\
:if=/usr/local/libexec/if-simple:\n\n

bamboo|ps|PS|S|panasonic|Panasonic KX-P4455 PostScript v51.4:\
:sh:sd=/var/spool/lpd/bamboo:\
:lp=/dev/ttyu5:ms#-parenb cs8 clocal crtscts:rw:\
:if=/usr/local/libexec/psif:\
:df=/usr/local/libexec/psdf:
```

Óï öþëöñí DVI åßíáéÝíá shell script ðið ìññÜæåôáé /usr/local/libexec/psdf, òi ïðiði ëáé ðáññæÝóïòìå ðáññæÜðù:

```
#!/bin/sh
#
# psdf - DVI to PostScript printer filter
# Installed in /usr/local/libexec/psdf
```

```
#  
# Invoked by lpd when user runs lpr -d  
#  
exec /usr/local/bin/dvips -f | /usr/local/libexec/lprps "$@"
```

Áðóðú òi script óñÝ-åé òi dviþs óá éáðóÜððáóç öþðeññið (íá ðíçí ðáñÜìâññi -f) óðíçí standard input, áðú üðið eáé ëáñÜìâññið ðíçí åññáðóðá ðññið åéðýðùñóç. Áðóðú íâééñÜ òi öþðeññið åéðýðùñóçð PostScript 1prps (åððóðá ðíçí åññüðóðá Óðññáðóðüðóçðá Åññáðéþí ÁðëiÝ ÞáéñÝñð óá åéððóðùñóð PostScript) äþññiðáð òið eáé óðó ðáññáñÝ ðññiðóð ðið Þáññáðá òi LPD óðið ðáññáðÜñ script. Òi 1prps eá ÷ñçóðiðiðÞóáé áððÝð óðó ðáññáñÝ ðññiðóð aéá ðíçí éáððáñÝ ðññçóðó ðið åéððóðùñÝñð óðáéþðáññi.

#### 10.4.1.4.4 Áéüìá ìåñéêÜ Đáñáäåßãìáôá Ößëöñùí ìåôáôñïðþò

Áðü ðc óðéðíþ ðið ááí ððÜñ-÷ áé áððññáðiðiÞÍYÍc iÝéiæið aéá ðcí ááéháð Üðóðáóç ðùñ ððëðññú iáðóðññiðÞð, áó iáð  
áðéðññáððß íá ðáñ Ý-÷iðiå iáññééÜ áéññiç ðáññáððññáðó. Íðiññáððå íá ðá ÷ñçóðiðiÞðáðå óái iäçäú aéá ðcí aéçí eðññáðá  
ðùñ ááéhþí óáð ððëðññú. Áí mñðæððå ðùñ ðáññáððå ðáññáððññóç óáð iðiññáððå íá ðá ÷ñçóðiðiÞðáðå óái  
eáððññáððå.

Áðóðu òið ðáñUáðéáñ script áðíáé Ýíá öðëðñi iððáðñiðþò nñÜððáñ (áñ ÷ áðíið GIF áðá ðíçí áðñðáðéá) áðá Ýíáí áððððñðóþ Hewlett Packard LaserJet III-Si:

```
#!/bin/sh
#
# hpvf - Convert GIF files into HP/PCL, then print
#         them to a local printer
#         (installed in /usr/local/libexec/hpfvf)
```

```
PATH=/usr/X11R6/bin:$PATH; export PATH  
giftopnm | ppmtopgm | pgmtopbm | pbmtolj -resolution 300 \  
    && exit 0 \  
    || exit 2
```

Äiööääyäé ùò äîPò: iåôåôñ Ýðåé òï áñ ÷ åßí GIF óå Ýíá åáiéêü öiñçöü ôýðí anymap, áí óoïá ÷ åßá òï iåôåôñ Ýðåé óå Ýíá öiñçöü ôýðí graymap, Ýðåéóå óå Ýíá öiñçöü ôýðí bitmap, eáé ô Ýëïò òï iåôåôñ Ýðåé óå ääïïÝíá öoïâôÜ iå PCL æá òïí LaserJet.

Áaþ áþíða öi án ÷ áßi /etc/printcap lá leá eáða : þnæóð aéá. Ýíá èæððuñöþ ðiø - nçóéiðiøéaß öi ðáñáðUñu ößéðni:

```
#  
# /etc/printcap for host orchid  
#  
teak|hp|laserjet|Hewlett Packard LaserJet 3Si:\  
    :lp=/dev/lpt0:sh:sd=/var/spool/lpd/teak:mx#0:\  
    :if=/usr/local/libexec/hpif:\  
    :vf=/usr/local/libexec/hpvf:
```

Ôi áêüëïöëi script åbíáé Ýíá ößëöñi låôáôñi ðþò äåäñí Ýíúí troff áðü ôi óyóôçìá óöïé ÷ åéïèåóßáò groff æá oíí åêôôðùñöþ PostScript lå üññá bamboo:

```
#!/bin/sh
#
#  pstf - Convert groff's troff data into PS, then print.
#  Installed in /usr/local/libexec/pstf
```

```
#  
exec grops | /usr/local/libexec/lprps "$@"
```

Öi ðáñáðÜíù script ÷ñçóéïðíéåß ðÜëé òi lprps áéá íá ÷åéñéóôåß ôçí åðéééíùíßá íá òií åêôðùôP. Áí i åêôðùôPò Póáí óá ðáñÜëéçéç ðüñðá ðüñðá èá åß ÷åíå, áíðééÝòùð, ÷ñçóéïðíéPóáé òi áéüéïðé script:

```
#!/bin/sh  
#  
# pstf - Convert groff's troff data into PS, then print.  
# Installed in /usr/local/libexec/pstf  
#  
exec grops
```

Åäþ åßíáé ç êáôá÷þñéóç ðið ÷ñåéÜæåôáé íá ðññóèÝóïðíå óóï /etc/printcap áéá íá åíåññïðíéPóïðíå òi ößëöñii:

```
:tf=/usr/local/libexec/pstf:
```

Åäþ åßíáé Ýíá ðáñÜääéäíá ðið iáð åðéóñÝðåé íá åêôðþþóïðíå ðáëééü êþäééå ôçò FORTRAN. Åßíáé Ýíá ößëöñii ëåéíÝññ ãéá FORTRAN áéá iðiéíäPðíðå åêôðùôP iðiññß íá åêôðþþóåé êáôåðèåßáí áðëü êåßìåíí. Èá òi ååéåôåóôPóïðíå ãéá Ýíáí åêôðùôP ðið iññÜæåôáé teak:

```
#!/bin/sh  
#  
# hprf - FORTRAN text filter for LaserJet 3si:  
# Installed in /usr/local/libexec/hprf  
#  
  
printf "\033&k2G" && fpr && printf "\033&l0H" &&  
exit 0  
exit 2
```

Êáé èá ðññóèÝóïðíå áôôP ôç ãññíP óóï /etc/printcap áéá íá åíåññïðíéPóïðíå òi ößëöñii áéá òií åêôðùôP teak:

```
:rf=/usr/local/libexec/hprf:
```

Êáé Ýíá óåéåôôåßí éÜðùð ðåñßðëëí ðáñÜääéäíá: Èá ðññóèÝóïðíå Ýíá ößëöñii DVI óóïí åêôðùôP LaserJet teak ðið áíáðÝññåíá ðññçäíýíá. Èáôáñ÷Pí òi åýééí ïÝññò: áíáâáèíßæiðíå òi /etc/printcap íå ôçí òiðíèåðßá üðið åñßóéåôáé òi ößëöñii DVI:

```
:df=/usr/local/libexec/hpdf:
```

Öþñá, òií äýóééí ïÝññò: ç êáôáóéåôP ðið ößëöñið. Èá ÷ñåéåóöíýíå Ýíá ðññüññííå íåðåôññiðPð áðü DVI-óå-LaserJet/PCL. Óôçí ÓðééíäP òuí Ports òið FreeBSD (ääßôå ÓðééíäP òuí Ports) ððÜñ ÷åé Ýíá òÝóëéí ðññüññííå: Òi üññíå ðið ðåéÝðið åßíáé dvi2xx. Ç ååéåðÜóåðåç ðið ðåéÝðið, iáð ðáñÝ ÷åé åêñéåþð òi ðññüññííå ðið ÷ñåéåæñåðå, òi dvi1j2p, òi iðiñí ìåðåôññÝðåé òií êþäééå DVI óå êþäééå óðiññåðü íå LaserJet IIp, LaserJet III, êáé LaserJet 2000.

Öi dvi1j2p éÜíáé òi ößëöñii hpdf áññéåðÜ ðåñßðëëí áðü òií dvi1j2p äå iðiññß íá åéáâÜóåé áðü òi standard input. ×ñåéÜæåôáé íá ãiðéÝðåé íå éÜðíéí üññíå áñ ÷åßið. Åêüíç ÷åéñüðåñá, òi üññíå òið áñ ÷åßið ðññÝðåé íá óåééþíåé óå .dvi éé åðññÝññò ç ñPóç òið /dev/fd/0 ùò standard input åßíáé ðññâæçíåðéêP. Èá iðiññýóåíå íá áíðééåðóñðþóïðíå òi ðññüâæçíå åçíéíññþíðå (óðiññéééíýò) ååóííýò íå éÜðíéí ðññóùññéíü üññíå áñ ÷åßið (ðið íá óåééþíåé óå .dvi) áéá òi /dev/fd/0, êáé íå áðóü òiññüðí íå åññíáâæÜóïðíå òi dvi1j2p íå åéáâÜæåé áðü òi standard input.

Áéüìç Ýíá ðñüùåçíà ðìö ðñïéýðöåé áßíáé ôí ååäñíüò ðùò åäí iðïñïýíå íá ÷ ñïçöéiiðíéÞöölä ôí / tmp åéá ôíï ðñïóùñéíü ååöíü. Íé ööïäæééíß ååöíïß áíÞëöï óöíï ÷ ñïÞööç êáé óöçí iíÜää bin, åßp ôí ðëßéöñí ðñÝ ÷ åé óáí ÷ ñïÞööçò daemon. Áðßööçò óöíï éåöðÜëïä / tmp áßíáé áíññäü ôí sticky bit. Óí ðëßéöñí iðïññäü íá áçéïøñäÞöåé ôí ååöíü, åéëÜ åái èá áßíáé ééäíü íá ôíï áíññäåßööç åéé íá ôíï áäöáéñÝóåé áðü ôç óöéäíP ðìö ååööüò èá áíÞëäé óå áéäöññåöééü ÷ ñïÞööç.

Áíóßèåôá, ôí ößëöñíí éá öðöÜíâé ôí óðíâíëéêü link óðíí ôñÍ-ííôá éâðÜëíäí, ðíö áßíáé í éáðÜëíäð ðáñí÷ Ýðâðóçð (spooling) (éáé ðíö ðñíöáéíñßæåðáé áðü ðçí ééáíüöðçôá sd óðí /etc/printcap). Áðóú áßíáé ôí ôÝéåéí Ýñíò áéá íá ãððéäýíðí óá ößëöñá, áéäééÜ èüâú ôíð üöð (íañééÝð öññÝð) ððÜñ÷áé ðåñéöóùðâñð áéäýéåñíð ÷ þññð óðí áßðöéí óðíí éáðÜëíäí ðáñí÷ Ýðâðóçð (spool) áðü üöð óðí /tmp.

Êáé ôåëéêÜ, éäiy ôi ößëôñi:

```
#!/bin/sh
#
# hpdf - Print DVI data on HP/PCL printer
# Installed in /usr/local/libexec/hpdf

PATH=/usr/local/bin:$PATH; export PATH

#
# Define a function to clean up our temporary files. These exist
# in the current directory, which will be the spooling directory
# for the printer.
#
cleanup() {
    rm -f hpdf$$*.dvi
}

#
# Define a function to handle fatal errors: print the given message
# and exit 2. Exiting with 2 tells LPD to do not try to reprint the
# job.
#
fatal() {
    echo "$@" 1>&2
    cleanup
    exit 2
}

#
# If user removes the job, LPD will send SIGINT, so trap SIGINT
# (and a few other signals) to clean up after ourselves.
#
trap cleanup 1 2 15

#
# Make sure we are not colliding with any existing files.
#
cleanup

#
# Link the DVI input file to standard input (the file to print).
#
```

```

ln -s /dev/fd/0 hpdf$$ .dvi || fatal "Cannot symlink /dev/fd/0"

#
# Make LF = CR+LF
#
printf "\033&k2G" || fatal "Cannot initialize printer"

#
# Convert and print. Return value from dvilj2p does not seem to be
# reliable, so we ignore it.
#
dvilj2p -M1 -q -e- dfhp$$ .dvi

#
# Clean up and exit
#
cleanup
exit 0

```

#### 10.4.1.4.5 Áðôïïáðïðíéçí Ýíåò ìåðáðñïðÝð: lßá Áíáëéáêôéêþ óóá Ößëôñá ìåðáðñïðþð

%æá óá ðßëôñá ìåðáðñïðþð ìðïñåß íá ðëçñïýí ôí ðåñéâÜëëí åêôððþóåùí óáð, áæëÜ ððí ÷ ñâþñïðí ôí ÷ ñÞóôç íá ðñïðæíñßæåé (óðçí ãñáìþ áíñïðþí ôí ðpr(1)) ðíéü áðü áðôÜ èá ÷ ñçóëüðíéçèåß. Áí ié ÷ ñÞóôåð óáð åáí åßíáé éäéåßóåñá åñíéâåéùí Ýíé íá ðíð C/O, óí íá ðñÝðåé íá áíáöÝñïðí êÜëå öïñÜ Ýíá ðßëôñïðééáþð íá åßíáé åñ ÷ ëçóééü. Åßíáé áéñüá ÷ áéñüðåñí ùóðüöí íá åßíáé éáéåðíÝíç áðééäþ ðßëôñïð, óí iðiþí èá áéôåëåðôåß óá áéáðÜëéçëí áéá áðöü ðýðí áñ ÷ åßíð, éáé èá ðñíéâéÝóáé óçí ððáðÜëç áéâåðñðÜäúí óåéßäú ÷ áñðéiy.

Áíð íá áâååðåðóðÞóåðå ïðiéäþðiðå ðßëôñïðåðá ìåðáðñïðþð, ìðïñåß íá èÝëåðå íá áïééÜóåðå íá Ý ÷ åðå Ýíá ðßëôñï õðåéÝñð (áöiy åßíáé ôí ðñïðæéåâíÝñð ðßëôñï) ðíð íá áíé ÷ íåýåé ôí ðýðí ðíð áñ ÷ åßíð ðíð Ý ÷ åé æçðçèåß íá åêôððñèåß éåé íá áéôåëåß åðôüðåðå ôí éáðÜëéçëí ðßëôñïðåðá ìåðáðñïðþð. Åñääëåßá óáí ôí file ìðiñïýí íá óáð åïçèþðiðí. Íðïñåß íá åßíáé áýðéíéí íá ðñïðæíñéðöýí ié áéáðñðÝð ìåðáðíÝð ðÜðíéñí ðýðùí áñ ÷ åßùí—áæëÜ, öððééÜ, ìðïñåßðå ðÜíðå íá ððñÝ ÷ åðå ðßëôñá ìåðáðñïðþð áéäééÜ áéá áðôÝð óéð ðâñéðþðåéð.

Ç Õðéëäþ òúí Ports ôí ðpr(1) FreeBSD Ý ÷ åé Ýíá ðßëôñï õðåéÝñð ðíð áéôåëåß áðôüðåðå ìåðáðñïðÝð éáé iññÜæåðåé apsfilter. Íðïñåß íá áíé ÷ íåýåé áðëü éâßìâñ, PostScript, DVI éáé ó ÷ áåüí ïðiéäþðiðå ðýðí áñ ÷ åßíð, íá áéôåëåß óçí ááðÜëéçëç íåðáðñïðþð, éáé íá áéâððþíâé.

#### 10.4.1.5 Ößëôñá Åñüäïð

Óí óýóðçí ððñï ÷ Ýóâðóðç LPD õðiðóðñßæåé Ýíáí áéüùç ôýðí ðßëôñïð ðíð ßóùð íá içí Ý ÷ åðå åâññåðíÞóåé áéüùá: óí ðßëôñï åñüäïð. Óí ðßëôñï åñüäïð ðñïðñßæåðåé iññí áéá áéôýðùóç áðëíÝíð, üðùð ôí ðßëôñï õðåéÝñð, áæëÜ ìá ðíðéÝð áðëíðiðþðåéð. ÅÜí ÷ ñçóëüðíéåßðå ðßëôñï åñüäïð áæëÜ ü÷é ðßëôñï õðåéÝñð, ôüðå:

- Óí LPD íåééíÜ Ýíá ðßëôñï åñüäïð iññí iéá ðññÜ áéá üëç óçí åññåðå, áíð Ýíá ÷ ùñéóðü áéá êÜëå áñ ÷ åßíð óçò åññåðå.
- Óí LPD åáí õññðßæåé íá áíáñññðóåé óçí áñ ÷ P P ôí ðÝëëò ôúí áñ ÷ åßùí iÝóá óôçí ßæéá óçí åññåðå üðáí ÷ ñçóëüðíéåßðåé ôí ðßëôñï åñüäïð.

- Ôi LPD äáí ðåññÜåé óöi ößëöññ ôá äääññÝ íá áéöüäö öiö ÷ñPööç P öi üññä öiö iç ÷áPìáöiö, åðññÝfùò äáí ðññññßæåöåé áéá èådåíÝöñçöç åêööñùíÝfùí óåëßäú. Ôi ößëöññ åiüäöiö aÝ ÷åöåé iñññö öeö ðåññÍYöññiö:

```
filter-name -wwidth -llength
```

¼ðÖÞ òi width åßíáé áðü ôçí éêáíüôçôá pw êáé ði length åßíáé áðü ôçí éêáíüôçôá pl æá òií óðåâðæñëí Ýñí åðòððùñòþ.

Ùòóùööí, Ýíá ößëèöñí áîüäiöß áßíáé ááíðæäöþí áí è Ýéåôðá óäëßäåð êäöáéëßäåð êáé ÷ ñâé Üæåôðáé íá óó Ýéïåðá áéïëöëßäåð áéäööñäÞò þ Üëëåò áéïëöëßäåð áñ ÷ ééïößçöçö ðñïëåéí Ýííö íá ôðø áéöößþöåðå. (ÁëëÜ áßíáé áðßöçö iÜðáéí áí è Ýéåôðá íá ÷ ñâþíåðå óäëßäåð êäöáéëßäåð óðöíï èíäñéåðíöü ðiö áíðßööíé ÷ iö ÷ ñÞööç, áðü ôç óðéäíÞ ðíö òí **LPD** ááí 66 Ýéïåðé êáéïëÜ ðëçmïöñßá áéä ðiö ÷ ñÞööç Þ öiï ððjëíæööÞ óöí ðßëèöñí áîüäiöß.)

Ôi **LPD** åðéóññ Ýðåé ôçí óðíýðáññc åñùò öþðeññr öðüüäiñ êáé Üëëñi öþðeññu (êåéí Ýññ P æááoññåðééiy öýðiñ) oðiñ ßæéi åðéððùñþ. Óå åðññ Ýð öðð ðåññéðþþáñéð, ôi **LPD** èá iåññéí Ü ñi öþðeññ öðüüäiñ iññi åéá ôçí åðéðýðuñc oðcð öåðëßááð èåññéðþþááð (äåññóå ôçí åñùöçóå Õåéññááð Êåöáéññááð). Ôi **LPD** èá áíáí Ýññé öi öþðeññ åñùüäiñ íá öðááññðPøåéð áðü iññi öiñ üðáí öiñ öðåðþþéé äýí bytes: Ýíá ASCII 031 áéññiñðeñýñåññí áðü Ýíá ASCII 001. ¼øáí Ýíá öþðeññ öðüüäiñ åéÝðåé åðññ Ü õá äýí bytes (031, 001), èá ðññÝðåé íá öðááññðÜ öó Ýëñññðåð oðPøà SIGSTOP oðiñ åáññü öiñ. ¼øáí oí **LPD** iññééçñþþoåé ôçí åðéÝðåéç êáé ôñi ñððiññðùñ öþðeññu, èá åðáññåññééPøåéð öi öþðeññ öðüüäiñ öó Ýëñññðåð oíñ oí ðPøà SIGCONT.

ÁÍ ððÜñ-åé öþëðñíî áñüäið, áæé Ü ãðí ððÜñ-åé öþëðñíî áñüäið. Þíð ëáé ðí **LPD** ãððøéýåé óá áññááðßá áðéïý êáé Ýñið, ðí **LPD** ÷ñçöéiñiðíéåß ðí öþëðñíî áñüäið áæá òçí åéó Ýéåðç ôçó áññááðßáð. ¼ðùò áíáð Ýñiñlå êáé ðáññáðÜñu, ðí öþëðñíî áñüäið èá áðéððþóáé Üéèå áñ-÷åßí áññááðßáð óóç óåéñÜ, áß-÷ùò äðíáðüöðçóá ðáññáìâíëÞò êáíÞò óáëëßääð Þ Üéëñú ñðöéìßóáñl óðçí ðññöiñáñlóá ÷ñðöéiy, áéá ðééëáíÞò áðóöü íá içí åßíráé áðééððçöü. Ó-÷åüüí óá üëåð ðéó ðáññéððþóáéð, èá ÷ññáéðóáðßóá Ýíá öþëðñíî áééï Ýñið.

Ói ðñüñáñláílá 1<sub>pf</sub>, ðið áráð Ýñáñlá fùñþóðáñá óáí ðßëðñíi êáéi Ýñið, iðiññáß íá ôñ Ýñáé êáé óáí ðßëðñíi áñüäið. Áí ÷ ñåéÜæåðóá Ýíá ãñPñiñi ðßëðñíi áñüäið áéëÜ ááí ðÝéåðá íá ãñÜðåðá ðií ðßæééá áíß ÷ iáðóçò ðúí byte êáé ðií ðßæééá áðiðóðëÞò òçíÜðúí, ãíééÜðóðá ði 1<sub>pf</sub>. Iðiññáßðá áðßðóçò íá ÷ ñçóðiðëÞðóðá ði 1<sub>pf</sub> ïÝóá áðü Ýíá shell script ði iðiðßí eá ÷ áéñßæåðáá ðiðò ðùáæéëiýó áñ ÷ eéiðiðßcóçò ðið ßóðù íá ÷ ñåéÜæåðáé i áéððóðuðÞò.

#### 10.4.1.6 1PF: Ýíá Ößëöñii ÈåéíÝíö

Ôi ðñüäññäílá /usr/libexec/lpr/lpf ðiö ðáñÝ-åðóáé iá ôc äéññíP åêðåâéÝ öéùí ðiö FreeBSD åßíáé Ýíá ößëöññí êåéíÝñiö (ößëöññí åéóüäiñö) ðiö lðiññåb íá ðáññáññäöiñíéåß ôcí Ýñiäi (åññáóßåò ðiö Ý-ïñi öóáæåß iá lpr -i), íá åðéöññíÝðåé ôcí äéÝëéööç literal ÷ åññáéöPñüí (åññáóßåò ðiö Ý-ïñi öóáæåß iá lpr -1), íá ññðèlßæåé ôcí èÝöç åêðýðùñöço iá ôc ÷ ñPöç ÷ åññáéöPñüí backspace êåé tab ôcí åññáóßá, êåé íá êÜíáé êåðåñÝöñçöç ôñí åêðöñðùíÝñiúí ñåéßëäüñ. Åðßöçö lðiññåb íá åññáññäílá êåé óáí ößëöññí åññäiñö.

Ói 1pf ábíáé êáôÜëeçëí ãéá æÜöïñá ðâñäáÜëeñíóá áâêôýðùóçò. Áí êáé ãái Ý÷âé ãõíáôüôçôá áâðíóôëëPò áéëëiöëéþí áñ÷éëiðibçóçò óóíí áâêôôðûôP, ábíáé áyëëíí íá áñÜøåôá Ýíá shell script ãéá íá êÜíåôá ôçí áðáñáßôçôç áñ÷éëiðibçóç êáé íá áâêôäéÝóåôá Ýðâéôá ôí 1pf.

Áéá íá êÜíåé óùóôÜ êáôáiÝôñçóç óåëßäúí, ôï 1pf ÷ñæÜæåôáé êáôÜëëçëåò ôéíÝò ãéá ôéò ééáüôçôåò pw êáé pl  
óóï áñ÷åß /etc/printcap. ×ñcoëiiðëiåß áôöÝò ôéò ôéíÝò ãéá íá ðññöäéñßöåé ðüöï êåßiåñï iðññåß íá ÷ùñÝóåé

óå ïßá óåëßää áéé áðü ðüòåð óåëßääðó áðíïòåëåßöåé ç åññäáóßá ðïò ÷ ñÞróç. Áéá ðåñéóöüòåñåò ðëçñïòïñßåò ó÷åòééÜ iã ðçí éåðái Ýòñçóç óåëßäùí, óòiâïòéåðòåßöå ðçí Éåðái Ýòñçóç × ñÞróçò Åêòðûñöþí.

#### 10.4.2 Óåëëßääò Èåööáëëßääò

Áí Ý÷åôå áñêåôïýò ÷ñþóôåò, êáé üëíé ôïõò ÷ñçóéiiðíéíýí äéÜöimñòå åêôôðùòÝò, ôüôå ðéèáíþò íá èåùñåßôå ôéò óåëëþüåò êåöåëþüåò ùò áíáâæáßí êáü.

Íe óáëëßáðó êääöäéßäáð, áíñúóðÝò áðßóçò êáé ùð banner P óáðéßäðó burst áíáñññßæïòí óá ðìëíí áíÞëïòí íé áññääóßåð íåðÜ óçí áêôýðúóç òiðò. ÓðíÞèùò óððþññíðáé íå íåñÜëá, Ýíðííá ãñÜññáðá, êáé ßóùò íå äéáëiðíçóééÜ ðåññéññÜññáðá, þþóðá óá íéá óóíßáð áâéóðþþóðñí íá íå ÷ññßæïòí áðú óá ðññääññáðééÜ Ýäññáðá ãññääðéþí ðúí ÷ñçðóþí. ÁðéññÝðïòí Ýðóó õóíðò ÷ñÞóðåðó íá áññßóéïòí áññÞññá ðóeo áññääóßåð ðiðò. Òi ðññëöáíÝò íæëíÝéóçìá óá íéá óåëëßáð êääöäéßäáð áßíáé ðùò ðññüéâéóáé íá áâéóðñùëåð íéá áéëñíá óåëëßáð áéá ðÜëá ìßá áññääóßá. Ç áöÞìåñç ÷ñçðéññüðçóá ðiðò áéññéåß ëßää ëåððÜ, êáé í ðññññéóíüð ðiðò áßíáé í êÜäïò á ÷ñÞóðùí/áíáéýëëùóçò. (ÐáññáðçñÞóðå ðùò íé óåëëßáð êääöäéßäáð áßíáé áíÜ áññääóßá, êáé ü ÷é áíÜ áñ ÷åßí óá íéá áññääóßá, áðñíÝíðò ði ãá ÷ñçðóðåðíÝíð ÷áññóß ßóùò íå íçí áßíáé ðùññí ðíëý).

Ôi óyóôciá LPD iðinâb íá Óán Y ÷ áé áðoüìáðá óâëßáâðó êâðöäëßáâðó áéá ôéð áâðoðþroâðó óáð, áí iâðoðùðþò óáð iðinâb íá áâðoðþroâðó Úlðáðá áðëü êâðiâñi. Áí Y ÷ áðóâ áâðoðùðþò PostScript, èá ÷ ñâéáðóâðþòâðá Yíá áîñðâðñéðü ðññâñâñâðá áéá íá áçìeññþðâðâðá ôçí óâëßáâðó êâðöäëßáâðó. Áâðþòâð ói Óâëßáâðó Êâðöäëßáâðó óáð Áâðoðùðþò PostScript.

#### **10.4.2.1 Åíåñäïðïßçóç Óåëßäùí Èåöáëßääò**

Óóci áüüödçöá Ááóéé Ýò Ñöëíßöåéò Åéööðùöþí, áðåíññäiðíéÞóáíå ôéò óäéßäåò êäöáéßäåò ià ôçí êáöá ÷ þñéóç sh (óçìáþíåé “suppress header”) óòi áñ ÷ åþí /etc/printcap. Äéá íá áíññäiðíéÞóåöå ôéò óäéßäåò êäöáéßäåò áéá êÜðíéíå áéööðùöþí, áðëÜ áóáéñÝóóå ôçí ééáüüödçöá sh.

Áēïvāåôáé åvēïeï, äåí ïïßæåôå:

Åóé åbíráé. Óúò ÷ñáéáóôåß íá ðánÝ ÷åôå Ýíá ößëöñii åtüäiø ãéá íá óôåßëåôå åíöiøÝò áñ ÷ééiøßçóçò óóíï åêôöðùôþ. Åäb åbíráé Ýíá ðánÜäéäiá ößëöñii åtüäiø ãéá åêôöðùôÝò óöiääöiøyò íå óíï óýði PCL ôçò Hewlett Packard:

```
#!/bin/sh
#
#  hpof - Output filter for Hewlett Packard PCL-compatible printers
#  Installed in /usr/local/libexec/hpof

printf "\033&k2G" || exit 2
exec /usr/libexec/lpr/lpf
```

ĐññiöáéññBññdå ôçí áééáññPññ ðññlò ðí ôßëôññ lâññüäññ ôçí ééáññüôçôdå oñ. Äåßôdå ôçí áññüôçôdå Ôßëôññ Áññüäññ áéá ðññéññôññdåññlå ðéçññññBññ.

Åäþ áßíáé Ýíá ðáñÜääéäíá áñ÷åßíõ /etc/printcap áéá ôíí åêôôðùôþ teak áðü ôí ðñïçäíýíåíí ðáñÜääéäíá. ÅíñäíðíÞóáíâ ôéó óåéßbåôð êåööåéßbåôð êéáé ðñjóéÝóáíâ ôí ðáñáðÜûñ ôßéøñí áîñüäíõ:

```
#  
# /etc/printcap for host orchid  
#  
teak|hp|laserjet|Hewlett Packard LaserJet 3Si:\  
    :lp=/dev/lpt0:sd=/var/spool/lpd/teak:mx#0:\\  
    :if=/usr/local/libexec/hpif:\\  
    :vf=/usr/local/libexec/hpvf:\\
```

:of=/usr/local/libexec/hpof:

Ôþñá, üôáí ié ÷ ñþóôåð áêôôðþíiõí áñãáóßåò óôii teak, èá ðáßñiõí êáé ißá óâëßääá êâöáëßääð áíÜ áñãáóßá. Áí ié ÷ ñþóôåð èÝëiõí íá ñäåýiõí ÷ ñüñí øÜ ÷ ñiõðåð áéá ôéð áêôôðþóåéð ðiõð, iðiñiýí íá ðáñâðiäßóiõí ôéð óâëßääð êâöáëßääð áðiõð Yëëriõðå ôéð áñãáóßåò ðiõð lpr -h. Åâßôå ôçí áñüôçôá ÅðéëiäYð Óâëßäúí Êâöáëßääð áéá ðáñéóðüôåñåð áðéëiäYð ðiõð lpr(1).

**Óçìâßùóç:** Òi LPD óðYëíåé ði ÷ áñáêôþñá áëëáðþò óâëßääð (form feed) áiÝóùò iåðÜ ôç óâëßääá êâöáëßääð. Áí i áêôôðùôþò óáð ÷ ñçóéiðiéâß áéáöiñâðééü ÷ áñáêôþñá þ áéiðiðéßá ÷ áñáêôþñúí áéá ôçí áëëáðþ óâëßääð, ðñiðiðiñþóôå óá ði òçí ééáíüôçôá ff óôï áñ÷åßí /etc/printcap.

#### 10.4.2.2. ëåð-ði Óâëßäúí Êâöáëßääð

ÌåðÜ ôçí áiâññiðiþçóç ôùí óâëßäúí êâöáëßääð, ði LPD èá ðáñÜäåé ißá åðéiþêç êâöáëßääá, ißá iëüêçñç óâëßääá iå ìåðÜëá áñÜìáðá ðiõ ðñiðiðiñþæåé ði ÷ ñþóôç, ði ðiðiðiñþéðþ (host), êáé ôçí áñãáóßá. Åäþ áßíáé Yíá ðáñÜäåéáíá (ç kelly áêôýðùôå ôçí áñãáóßá iå üññá “outline” áðü ði ðiðiðiñþéðþ rose):

k	11	11
k	1	1
k	1	1
k k    eeee	1	1    Y    Y
k k    e    e	1	1    Y    Y
k k    eeeeeee	1	1    Y    Y
kk k    e	1	1    Y    Y
k k    e    e	1	1    Y    YY
k k    eeee	111	111    YYY Y
		Y
		Y    Y
		YYYY

	11
t	1    i
t	1
oooo    u    u    tttttt	1    ii    n nnn    eeee
o    o    u    u    t	1    i    nn    n    e    e
o    o    u    u    t	1    i    n    n    eeeeeee
o    o    u    uu    t    t	1    i    n    n    e
oooo    uuuu    u    tt	111    iii    n    n    eeee

r rrr      oooo      ssss      eeee

rr	r	o	o	s	s	e	e
r		o	o	ss		eeeeeee	
r		o	o		ss	e	
r		o	o	s	s	e	e
r		oooo		ssss		eeee	

Job: outline  
Date: Sun Sep 17 11:04:58 1995

Ôi LPD ðññóé Ýôåé iéá áíôïéÞ áéëéåÞ ðó áéëßääò (form feed) ïåðÜ áðöü áðöü ôi êåßiåñí Ýôóé þóðå ç åññåðóßá íá ïåééÍÞoåé óå íÝá óåëßää (åêööù áí Ý÷åôå ðññóäéïñßóåé ôçí ééáíüôçóå s£ (suppress form feeds) áéá ôií åêôööðùôÞ óóí áñ÷åßí /etc/printcap).

Áí ðññöðéíÜôå, óii **LPD** iðññåß íá ðóéëÜíåé leá iðéññüôðññö iÞétiðò èððöðéëßää. Ðññöäëññþóôå sb (short banner) óoii áñ÷åßí /etc/printcap. Ç óåëßää êåöðåëßääó èá iiëÜæåé óáí áðóÞ:

rose:kelly Job: outline Date: Sun Sep 17 11:07:51 1995

Óði LPD óðóðþíáé (áðü ðññiáðéërrP) ðññþóá ócí óáðëßääá êåðöáéßääð, éáé iàðöÜ ócí åññääóþá. Æá íá áíðéóðñÝþåðå ócí óáðñÜ, ÷ñçóðíðiéþþóá ócí ééâüðóçóá hl (header last) óði áñ ÷ðði /etc/printcap.

#### 10.4.2.3 ÉáôáìÝôñçóç ìå Óåëßääò Èåöáëßääò

Ç ÷ñPóć ôuì ðññiââêâôôôçí Ýfuí óâëëßâùí êâööáëëßâáò ôiõ LPD iõóéáôôéêÜ ñõti÷ñâpñiõí ôçí ôPñçócs ôiõ ðáñâéÜôù êáñiüíá üôâí êÜñiõíä êâôâí Ýôñçóç ÷ñPóçò ôiõ âêôôðñôP: Ié óâëëßâáò êâööáëëßâáò ðñÝðåé íá äéâôßèâíôâé åëâýeâñá (åß-ùò ÷ñYûóç).

Ãéáôß:

Áðir áþíráé áñðæðöü áðeÜ ûðeá ðbæðöñii óáð íá ácieriðññáðb ðc áðeééÜ ðiðr óáðëßáá ðåðöáæßááð (Ýðóóé þróðá íá iðññáð íá ÷ ññþíráé íá áðoðü ðiðr ðññüðri). Áí ié ÷ ññþóðáð ðéðeðñíý ðc áðeééäÞ ðáññáðüäéóç ðiðr óáðëßáúí ðåðöáæßááð íá lpr -h, èá ðóðiá ÷ ðbñðiðr íá ðeó ðáññáðéáð Úññiðr - éáé íá ÷ ññþññðiðr áéá áðoðÝðr - aðiý ði ÞPD áðá Ý ðe áðiðáûðöç ðiðr óáð iðiðeäÞðiðr óþbæðöñii ðc áðeééäÞ -h.

ÅðiiÝíùò, ðiéåò åðééëäÝò Ý÷åôå;

ÌÐÍÑÅÞÔÅ:

- Íá áðíiäá ÷ èåßôå óçí ðöñüäåéíç óiõ **LPD** éáé íá ðáñÝ ÷ åôå óéô óåëßääô èåöáëßääô áæåýèåñã.
  - Íá áæååóåòÞóåôå áíáëéåéôðééÝ ðé ýóåéò áíôß óiõ **LPD**, üðùò ói **LPRng**. Ç áíüöçôá ÁíáëéåéôðééÝ ðé ýóåéò áæá óiõ ÓôÜíôåñ Spooler äßñlæé ðåñéðóüôåñäô ðëçñiöiñßåô áæá Üéëåô åöáñliäÝ ðáñi ÷ Ýôåööçò ðiõ iðiñåßôå íá ÷ ñçóéiñðiëÞóåôå áíôß áæá ói **LPD**.
  - Íá áññÜþåôå **Ýíá** **Ýñððñ** ðéßëôññ áîñüäiñð. Õðü éáññééÝ ðó óðíéÞéåò, **Ýíá** "ðéßëôññ áîñüäiñð" áái êÜíåé ðéßëôññ áðáñáðÜíù áðü óçí áñ ÷ èéiñðiççóç áîñüð áåéððñûòÞ **P** iññééÝ ðó áðëÝ ðó ñðiñðñññ ðéßëôññ áîñüäiñð. Åßíáé éåðÜëëçëi áæá óåëßääô èåöáëßääô áéé áæá áññååóßåô áðëíý éåéíÝñiõ (üðôáí áái ððÜñ ÷ áé ðéßëôññ (åéóñüäiñð) éåéíÝñiõ). ÁéëÜ áí ððÜñ ÷ áé ðéßëôññ éåéíÝñiõ áæá áññååóßåô áðëíý éåéíÝñiõ, üðôå ói **LPD** éå áíññåñðiéåß ôi ðéßëôññ áîñüäiñð iññí áæá óéò óåëßääô èåöáëßääô. Éáé ói ðéßëôññ áîñüäiñð iðiñåß íá áíáëýåé ôi êåßíåññ ñçò óåëßääô èåöáëßääô ðiõ áçéiñðñåß ói **LPD** áæá íá ðññiøäéiñßååé ôiñ ÷ ñÞóðç êåé óiñ ððiñðééôðÞ, þóôå íá ÷ ñåþíåé óéò óåëßääô èåöáëßääô. Òi iññí áðéðéÝñi ðññüäëçìá íå áðôÞ òç iÝëiäí áßíáé ðùò ói ðéßëôññ áîñüäiñð áîñåëéiñðéåß íá lç áññüñßååé ðiéü áñ ÷ áßíí éåðåíÝññçöçò íá ÷ ñçóéiñðiëÞóåé (ääí ðiõ Ý ÷ áé æíëåß ôi üññå ôiõ áñ ÷ áßiõ áðü óçí ééáññüöçôá af), áæëÜ áí ói üññå ôiõ áñ ÷ áßiõ óåð áßíáé áññüðöü, iññiñåßôå íá ói áíññüñåðþóåôå áðåðéåßåð óiññ ëþäééå ôiõ ðéßëôññ ðíñüäiñð. Áéá íá áéåðéiñðéýåôå óçí áæåäééåðßå áíÜëðöçò, ÷ ñçóéiñðiëÞóåð ôçí ééáññüöçôå sh (short header) óoï /etc/printcap. Ðññü ðÜéé üéá áðôÜ íá áßíáé ððåññiëéÜ ðiðéåóðééÜ, áíþ áßíáé óßäiññí ðùò ié ÷ ñÞóðåôå èå áéðéiñðiõi ôiñ áåññiäéüäùññ áæá ÷ áéñéóðÞ óððññðiáò ðiõ áðéññÝðåé áæåýèåñã óéò óåëßääô èåöáëßääô.

#### 10.4.2.4 Óåëßääò Èåöáëßääò óå ÅêôõðùôÝò PostScript

¼ðùlo ðáññeñá Üþáìà ðáññáðÜfù, ðí LPD iðññáß íá áçìéiññáÞóáé îñá ðåéëßää êåöáëßääð áðéij ëåéiÝñò, êåðÜëëçëç áæá ðïëëiyò áêööðùoÝò. Íé áêööðùoÝò PostScript, öðöñéÜ, ááí iðññýí íá öðöþóiñí êáôåðëëßáí áðëü êåßiñí, áðññÝiùò áðöñP ç äöñiáðüöçóå ðí LPD áæá ðéò ðåéëßääð êåöáëßääð áßíñáé Ü ÷ñçööç óå áðöñP ðçí ðáññþðùñóç.

Áðéóñ Ýþóðá íað íá áðaðnáði Póíðià áðoðP óç íYéiæi. Ói áðueiðið script äÝ ÷ áðaáé ôñðaéð ðánñai Ýôññið (ói üññiá ÷ ñPóóç - login name, ói üññiá óið ððiðiædóðP - host name, éaé ói üññiá áññáðbáð) éaé äciðiðnñáðb iðbá áðëP óáëßáá êððáéßááð PostScript:

```
#!/bin/sh
#
#  make-ps-header - make a PostScript header page on stdout
#  Installed in /usr/local/libexec/make-ps-header
#
#
#  These are PostScript units (72 to the inch).  Modify for A4 or
#  whatever size paper you are using:
#
page_width=612
page_height=792
border=72

#
#  Check arguments
#
if [ $# -ne 3 ]; then
```

```

echo "Usage: `basename $0` <user> <host> <job>" 1>&2
exit 1
fi

#
# Save these, mostly for readability in the PostScript, below.
#
user=$1
host=$2
job=$3
date='date'

#
# Send the PostScript code to stdout.
#
exec cat <<EOF
%!PS

%
% Make sure we do not interfere with user's job that will follow
%
save

%
% Make a thick, unpleasant border around the edge of the paper.
%
$border $border moveto
$page_width $border 2 mul sub 0 rlineto
0 $page_height $border 2 mul sub rlineto
currentscreen 3 -1 roll pop 100 3 1 roll setscreen
$border 2 mul $page_width sub 0 rlineto closepath
0.8 setgray 10 setlinewidth stroke 0 setgray

%
% Display user's login name, nice and large and prominent
%
/Helvetica-Bold findfont 64 scalefont setfont
$page_width ($user) stringwidth pop sub 2 div $page_height 200 sub moveto
($user) show

%
% Now show the boring particulars
%
/Helvetica findfont 14 scalefont setfont
/y 200 def
[ (Job:) (Host:) (Date:) ] {
200 y moveto show /y y 18 sub def }
forall

/Helvetica-Bold findfont 14 scalefont setfont
/y 200 def
[ ($job) ($host) ($date) ] {
270 y moveto show /y y 18 sub def

```

```

} forall

%
% That is it
%
restore
showpage
EOF

```

Ôþñá, êáèÝíá áðü ôá ößëôñá ïåðåôñiðþò êáé ôí ößëôñi êáéÝíï ìðiñiýí íá êáèÝóïõí ôí script, ðñþðá ãéá íá áçíeïñäþóïõí ôç óåëßää êåöäéßääð, êáéÝðåéðá ãéá íá áåðôðþóïõí ôçí áññääóßá ôí ðñþðóç. Áêíëïðæð ôí ößëôñi ïåðåôñiðþò DVI ðið áåßíáïå fùñþôñá, áéäéÛ áéáiiñöùìÝíï ãéá íá ôðéÜíïðà íéá óåëßää êåöäéßääð:

```

#!/bin/sh
#
# psdf - DVI to PostScript printer filter
# Installed in /usr/local/libexec/psdf
#
# Invoked by lpd when user runs lpr -d
#
orig_args="$@"

fail() {
    echo "$@" 1>&2
    exit 2
}

while getopts "x:y:n:h:" option; do
    case $option in
        x|y)  ;# Ignore
        n)    login=$OPTARG ;;
        h)    host=$OPTARG ;;
        *)   echo "LPD started `basename $0` wrong." 1>&2
            exit 2
            ;;
    esac
done

[ "$login" ] || fail "No login name"
[ "$host" ] || fail "No host name"

( /usr/local/libexec/make-ps-header $login $host "DVI File"
  /usr/local/bin/dvips -f ) | eval /usr/local/libexec/lprps $orig_args

```

Ðáñáôçñþóðå ðùð ôí ößëôñi ðñÝðåé íá áíáéýðåé ôçí ëßóðå ðáñáíÝðñúí ãéá íá ðññóäéñþóåé ôí üññá ðñþðóç êáé ðñðeïðæðóþ. Ç iÝëiäið áíÜëðóçð áåßíáé ðáñüïíéá ãéá íéá ôá ððüëéïðå ößëôñá ïåðåôñiðþò. Ôí ößëôñi êáéÝíï ðåðñíåéÝíá ãéáöñþò ãéáöñåðéü ôåð ðáñáíÝðñúí, (áåßðå ôçí áíüðçðå Ðùð åïðëåýiõí ôá Ößëôñá).

¼ðùð áíáöÝñáïå ðññçäiýíïá, i ðáñáðÜíû ó÷åäéáöñüð, áí êáé ðññáññäöééÛ áðëüð, áðåñññäöééÛ ôçí áðééïðþ “ðáññäöéóð ñåëßäùí êåöäéßääð” (ôçí áðééïðþ -h) ôí ðið. Áí ié ðñþðóðå áðééöñýí íá óþóïõíÝíá äÝíôñí (þ ëßää ðñþðá, áí ðñþðá ñåëßäùí ôéð ôåëßäåð êåöäéßääð), ááí èá ððÜñ ðññüðið ãéá íá áßíáé ððôð, áðü ôç óðééñþ ðið êÜëå áåðýðùðç iÝóù ôñí ößëôñúí èá óðññäåýåðáé êáé áðü íéá óåëßää êåöäéßääð ãéá êÜëå áññääóßá.

ÁÍ Ý÷åôå åêôôðùôþ PostScript ìá óáéñéâéþ óýíâåóç, ïðiñâßôá íá êÜíåôå ÷ñþóç ôçò 1þrps, ç iðiñá óðññâåýåôáé áðü Ýíá ößëôñí åíüäiõ, oï psøf, oï iðiñá êÜíâé òá ðáñâðÜíû. Óçìåéþóå ðùò oï psøf äái ÷ñþíâé æáé ôéò óâéßâåð êåöåëßää.

### 10.4.3 Åêôõðþóåéò ÌÝóù Äéêôýïõ

Ôi FreeBSD õðîóöçñßæåé ôéó åêôôðþóåéó iÝóù äéêöýïõ: iðiññås íá óôåßæåé åññåóßåð óå áðiñáêññóíiÝññò åêôôðùøÝò. Ç Ýññéá ôçò äéêôôáéÞò åêôýðùóçò ááíðóÝññåóé åâíééÜ óå äýí äéäöiññåðééÜ ðñÜäíåðá:



#### 10.4.3.1 ÅêôõðùôÝò ÅâéáôåóôciÝíïé óå ÁðiiáêñõóíÝíïõò ÕðïeïæéóôÝò

Õõ ýóóõõcää ðääñii ÷ Ýõâðõõcò **LPD** Ý ÷ åé ääíõùñääùì Ýíç õðõõô Þñõéïc ãæá õçí äðõõöüëÞ ãññääõéþí óå Üëëiõð õðõõëiäéóö Ý ðiõ åéõõäëýí õi **LPD** (Þ ðiõ åßíäé õõñääõïß iå õi **LPD**). Áõõü õi ÷ áññääõçñéóõõéüü óå ãðéõñ Ýðää íå ååñääõáõõÞõåõ Ýíáí åéõõðùõÞ óå Ýíá õðõõëiäéõõÞ êäé íå Ý ÷ åðå ðññõõáõóç óå áõõüü ãðü Üëëiõð. Åðßõcò ùõõëäýåé êäé iå åéõõðùõ Ý ðiõ Ý ÷ iõi äéõõðää Ýð äéäõõfää Ýõâéõ ðiõ êäðääéäãßñiõß õi ðññõõüëeëi **LPD**.

Áéá íá áíññáíðíéÞóáðå Áðóñúí ðíý ðýðíí áðññáññððíí Ýíçó áéðýðñúçð, áæéáðáðóðÞóáð ðñþþðá Ýíá áéððñúðþ óá Ýíá ððíëíæéðóðÞ, óíí ððíëíæéðóðÞ áéðýðñúçð (printer host), ÷ñçóéñíðíéÞíðå ðçí áðëÞ áæéáðÜðóáðóç áéððñúðþ ðíø ðåññéññÜðáðåé óðçí áíññúçðóá ÁáóééÝð Ñðëèíßóåéð Áéððñúðþí. ÆÜíðå ùóåð ðñí ÷ñçí Ýíåð ñðëèíßóåéð ÷ññéæÜæåðóå ùðñðó áíáðó Ýññåðåé óðóð Ñðëèíßóåéð Áéððñúðþí áéá Ðñí ÷ñçí Ýññð. ÁéëÝáðå ðííí áéððñúðþ Þ ééé áåðþð áí äöðéäýåé íå ðå ÷ññáéðóçñéðóééðÜ ðíø **LPD** ðíø Ý ÷ñ åðå áíññáíðíéÞóáé. Áðßóçð áåðåéñùéåßðå ðñò ï ðíðééñðó ððíëíæéðóðÞð (local

*host*) áßíáé áññóðéïäöç} Ýíò íá ÷ ñçóéïðíéâß ôéð ôðçñâðßâð ôíð **LPD** óôïí áðñâéñððí Ýí ððíëïäéðôÞ (*remote host*) (ääßôå Ðáññâðüäéðç Áññáóéí áðü Áðñâéñððí Ýí ððíëïäéðôÞ).

ÅÜí ÷ ñçóéïðíéâßôå áêôôðùôÞ iå áééôôðâéÞ áéáóýíâðôç ðíð áßíáé óðñâðüð ìå ôí **LPD**, ôüôå i i ððíëïäéðôÞ ôðôýðûñôçð (*printer host*) áßíáé i áí üüññ áêôôðùôÞð, áéâ ôi üññâ ðíð áêôôðùôÞ áßíáé ôi üññâ ðíð Ý ÷ åôå iñßóâé áéá ôíð áêôôðùôÞ. Äåßôå ôçí ôåéññbññôç ðíð óðñâðâýâé ôíð áêôôðùôÞ óâð êáé/Þ ôçí êÜññôå áééôýïð ôíð.

**Õðüäâéïç:** Áí ÷ ñçóéïðíéâßôå Hewlett Packard Laserjet iå üññâ áêôôðùôÞ `text` èá áßííôáé áðôüìáôá iéá åôåâññðÝð áðü LF óâ CRLF, áðíïÝí òäáí ÷ ñâéÜæåâáé íá ôñÝíâðå ôi `script hpif`.

ÅðñÝí òðíð õðñüëïðíð ððíëïäéðôÝð üðíð áðééðiâßôå íá Ý ÷ åôå ðññúðâóç óôïí áêôôðùôÞ, áðëÜ êÜíðå iéá êáâðå ÷ þñéóç ôíð áñ ÷ åßí /etc/printcap iå ðâ áâéüëïðèá ôíðé ÷ åßá:

1. IññÜðôå ôçí êâðâ ÷ þñéóç üðñðô áðééðiâßôå: Áéá áééÞ óâð áôééðâ ðééâíþð íá èÝéâðå íá ÷ ñçóéïðíéÞðåå ôi ßâéï üññâ êâé ðâ ßâéá ðáññúýíéå iå áôôÜ ôíð ððíëïäéðôÞ áêôýðûñôçð.
2. ÁöÞóâå ôçí ééáíüôçôå lp êâíÞ, áéá ôçí áêñßââáå (:lp=:).
3. ÄçíéïññÞðåå Ýíá êâðÜëïäï spooling êâé ðññóâéññbñðå ôçí ôíðíëâðôå ôíð iå ôçí ééáíüôçôå sd. Ôí **LPD** èá áðíëçéâýâé åäþ ôéð áññâðßâð ðññí ôçí áðíðôïëÞ ôíð õðñâ ððíëïäéðôÞ áêôýðûñôçð.
4. ÓíðíëâðÞðåå ôi üññâ ôíð ððíëïäéðôÞ áêôýðûñôçð ôôçí ééáíüôçôå rm.
5. ÓíðíëâðÞðåå ôi üññâ ôíð áêôôðùôÞ ôôçí ééáíüôçôå rp, ôôïí ððíëïäéðôÞ áêôýðûñôçð.

Áðôü áßíáé üëí. Äáí ÷ ñâéÜæåâáé íá äçíéïññÞðåå ôéð ôññññððí ðññâ ðññññððí ðññññððí, äéâðôÜóâéð óâéßâáð, Þ iôéâÞðíðå Üëëí ôíð áñ ÷ åßí /etc/printcap.

Åäþ áßíáé Ýíá ðáñÜäâéñá. Í ððíëïäéðôÞð `rose` Ý ÷ åé åÿí áêôôðùôÝð, ôíð `bamboo` êâé ôíð `rattan`. ÈÝëïðâå íá åññññððí ðñññððí ðññññððí ôéð áêôôðþðâéð óâð áôôïýð ôíð ðâ áêôôðùôÝð åéá ôíð ÷ ññÞðåå ôíð áðñâéñððí Ýí ððíëïäéðôÞð orchid. Åäþ áßíáé ôi áñ ÷ åßí /etc/printcap ôíð ððíëïäéðôÞ orchid (ääßôå ðéí ðßðù ôôçí åíüôçôå Áíñññðíßçðç Óâéßâññ Êâðâéßâáð). <sup>1</sup>äç Ý ÷ åé iéá êâðâ ÷ þñéóç åéá ôíð áêôôðùôÞ `teak`. Åäþ ðññóéÝóâíå ôéð áðñññðôçôåð êâðâ ÷ ùññðâéð åéá ôíð åÿí áêôôðùôÝð ôíð ððíëïäéðôÞ `rose`:

```
# 
# /etc/printcap for host orchid - added (remote) printers on rose
#
#
# teak is local; it is connected directly to orchid:
#
teak|hp|laserjet|Hewlett Packard LaserJet 3Si:\ 
    :lp=/dev/lpt0:sd=/var/spool/lpd/teak:mx#0:\ 
    :if=/usr/local/libexec/ifhp:\ 
    :vf=/usr/local/libexec/vfhp:\ 
    :of=/usr/local/libexec/ofhp:\

#
# rattan is connected to rose; send jobs for rattan to rose:
#
rattan|line|diablo|lp|Diablo 630 Line Printer:\ 
    :lp=:rm=rose:rp=rattan:sd=/var/spool/lpd/rattan:
```

```
#  
#   bamboo is connected to rose as well:  
#  
bamboo|ps|PS|S|panasonic|Panasonic KX-P4455 PostScript v51.4:\  
      :lp=:rm=rose:rp=bamboo:sd=/var/spool/lpd/bamboo:
```

Óï iüüï ðiö áðñï Ýíåé áßíáé íá äçìéïöñäÞóïöïå ôiöö êáôáëüäïöö spooling óôii êüïâï orchid:

```
# mkdir -p /var/spool/lpd/rattan /var/spool/lpd/bamboo  
# chmod 770 /var/spool/lpd/rattan /var/spool/lpd/bamboo  
# chown daemon:daemon /var/spool/lpd/rattan /var/spool/lpd/bamboo
```

Ôñþna, ié ñiñ ðþðåð ôiñ orchid iðiñiñy íá áéððôðþñiñi óðiñ rattan êáé óðiñ bamboo. Áí, áéá ðáñÜáåéäíá, Ýíáð ñiñ ðþðcò ôiñ orchid ðëçéðñiñiæðþáé:

๕ lpr -P bamboo -d sushi-review.dvi

Ôi óyóóðìá **LPD** óoíí orchid èá áíóéan Üþáé òcí åññáóßá óoíí éáoÜëetää spooling /var/spool/1pd/bamboo éáé èá ócìåéþóáé ðùò ðñüéåéôáé æéá åññáóßá DVI. Íueéó i ðöðíieäéôðÞò rose Ý÷æé ñéé ðøññi ôoíí éáoÜëetää spooling ðið bamboo, óá äyí **LPDs** èá iåðáóÝñiði ôi áñ÷åßí ôoíí rose. Ôi áñ÷åßí èá iðåé óå iññÜ áíáññÞò ôoíí ðöðíieäéôðÞò rose Ýùò üöið åêóððùèåß. Èá iåðáóñáðåß áðü DVI óå PostScript (áöiyí i bamboo åßíáé åêóððùòðÞò PostScript) ôoíí ðöðíieäéôðÞò rose.

#### **10.4.3.2 ÅêôõðùôÝò ìå ÓõíäÝóåéò Äéêôýïõ**

Óó÷iÜ, üöáí ááññÜæåôâ êÜññôâ æéêöýïõ áæá âéôôðùôP, Ý÷âôâ ôç äöíáûòçôâ åðéëüäPò áýí åéäüöåúí: ç ißá åßíáé ðññiöiññûöç ôiõ spooler (ç ðéí áéññéâP Ýéäñöç) åñþ ç Üeëç áðëüÜ óâð åðéôñÝðåé íá óóÝéíåôâ ååäññÝíá iÝóù áðôPò óâí íá ÷ñçóéiñðíéiyóâðâ iéá óâéññéâðP Þ ðâñÜeëççë ëýñä (ç ööçíP Ýéäñöç). ÁðôP ç åíüöçôâ ðâññéññÜöâé ðùð íá ÷ñçóéiñðíéâðôâ ôçí ööçíP Ýéäñöç. Áéá ôçí ðéí áéññéâP Ýéäñöç lðiññâðôâ íá åññâðôâ ðâññéóóüôâññâð ðëçñiñññâð ôôçí ðññiçäýiññâç åññüöçôâ ÅéôôðùññôYô ÅâññâðôôçíYíññ ôâ AðññâñññôíYíññ ôâ OðíëññéññôYô.

Ç iiiiöP ôiö áñ ÷ åbïöP /etc/printcap óáö åðéöñ Ýðåé íá iñßöåðå ôç åéáóýíååöç - óåéñéåéP P ðáñ Üëeçç - ôiö èá ÷ ñçöéiiðiéPöåðå, êáé (áí ÷ ñçöéiiðiéåßå óåéñéåéP åéáóýíååöç) ôiï ñöèiù baud, ðééáiiýö åé Ýä ÷ iöö ñiPö, êáéööåñPöåéö åéá tabs, iåöåöñiðÝö åéá ÷ åñáéöPñåö iÝä åñáiiPö, êáé Üëeá. ÁéëÜ åáí ôðÜñ ÷ åé ôñüöiö íá iñßöåðå leá óvýíååöç óá åéööðùöP ôiö åéivåé óá èvñä TCP/IP P Üëeí óvði åééövïö.

```
#!/usr/bin/perl
#
# netprint - Text filter for printer attached to network
# Installed in /usr/local/libexec/netprint
#
$#ARGV eq 1 || die "Usage: $0 <printer-hostname> <port-number>";
```

```
$printer_host = $ARGV[0];
$printer_port = $ARGV[1];

require 'sys/socket.ph';

($ignore, $ignore, $protocol) = getprotobynumber('tcp');
($ignore, $ignore, $ignore, $ignore, $address)
    = gethostbyname($printer_host);

$sockaddr = pack('S n a4 x8', &AF_INET, $printer_port, $address);

socket(PRINTER, &PF_INET, &SOCK_STREAM, $protocol)
    || die "Can't create TCP/IP stream socket: $!";
connect(PRINTER, $sockaddr) || die "Can't contact $printer_host: $!";
while (<STDIN>) { print PRINTER; }
exit 0;
```

Íðiññáþóðá íá ÷ñçóðiðiðÞóðåðá áðóðü ðír script óðá æéÜöriñá ðößéðñá. Áð ððiðiðYóriðið ðùðo Ý÷iðið Yíáí áðéðð Diablo 750-N óðiññáðið Yíí óðóði ðéßéðði. Í áðéððùðóÞò ãÝ÷åðáé ðáðñá ðññò ðéðóýðùðóç óðóçí èýñá 5100. Ó áðéððùðóÞ óðóði ðéßéðði ðáðñáé scrivener. Áðþ áðñáé ðír óðéðññí èáéí Yíí ðíð ðéá ðíið áðéððùðóÞ:

```
#!/bin/sh
#
# diablo-if-net - Text filter for Diablo printer 'scrivener' listening
# on port 5100. Installed in /usr/local/libexec/diablo-if-net
#
exec /usr/libexec/lpr/lpf "$@" | /usr/local/libexec/netprint scrivener 5100
```

#### 10.4.4 ëáå÷íò Đñüóâáóçò êáé Đåñéïñéóíïß óôç ×ñþóç ôùí Åêôôðùôþí

#### **10.4.4.1 Đåñéïñéóìüò Åêôýðùóçò Đíëéáðëþí ÁíôéãñÜöùí**

Ôi óyóðöciá LPD áæððeiýíafé ôiðo ÷ nPóðåðo íá åðéððþöiði ðiðeáðe Ü áiðBññáðá áiðüð áñ÷åþið. Íe ÷ nPóðåðo iðiñiýí íá åðéððþüiði åññáðóþáðo ià 1pr -#5 (æá ðánÜäåéaiá) êáé íá ðáBññiði ðÝíða áiðBññáðá ûðeå áñ÷åþið ôçò åññáðóþáðo åðéðýðuñcò. Ôi ái áðoðu áþíáé êáðü, åiáñðUðoáé áðu áðUð.

lpr: multiple copies are not allowed

Óciáéþóôá ðùò áí Ý÷ áðóá ñöðèìþóâé ðñüóâáóç óá Ýíáí áêóððùòþ áðiiáêñðóíÝíá (ääþðôá óçí áíüôçôá Áéðóðùòþ Ýò Áéâóâðóçí) Ýííé óá ÁðiiáêñðóíÝííð ÓððíæéðóÝ). Þá ÷ñåéáðóâð íá ðñjöðéÝóâðóâð óçí ééáíüôçôá sc óá

üëá ôá áðñâáêñðóí Ýíá áñ÷åßá /etc/printcap, äéáöiñâôéé Ü ié ÷ñÞóôâð èá Ý÷iöí áêüìç ôçí áðñâôüôçôá íá áðiôð Ýeeiði áñâáóßâð ðiææððéþí áíðéæñÜöùí ÷ñçóeiðiðþíðâð åéáöiñâôééü êüìâí.

Åäþ áßíáé Ýíá ðáñÜääéâíá. Áððü áßíáé ôí áñ÷åßí /etc/printcap äéá ôíí êüìâí rose. Í áêôôðùôþò rattan áßíáé äðñâóú ìç ÷ Üíçìà êáé áðéôñÝðâé ôçí áðôýðûóç ðiææððéþí áíðéæñÜöùí, áéëÜ í áêôôðùôþò laser bamboo áßíáé ðéí áðáßðéçðí, áðñÝñùð èá áðâíññâiðiðþíðiðâð ôçí áðñâôüôçôá ðiææððéþí áíðéæñÜöùí ðñiøéÝðiðâð ôçí ééáíüôçôá sc:

```
#  
# /etc/printcap for host rose - restrict multiple copies on bamboo  
#  
rattan|line|diablo|lp|Diablo 630 Line Printer:\  
    :sh:sd=/var/spool/lpd/rattan:\  
    :lp=/dev/lpt0:\  
    :if=/usr/local/libexec/if-simple:  
  
bamboo|ps|PS|S|panasonic|Panasonic KX-P4455 PostScript v51.4:\  
    :sh:sd=/var/spool/lpd/bamboo:sc:\  
    :lp=/dev/ttyu5:ms#-parenb cs8 clocal crtscts:rw:\  
    :if=/usr/local/libexec/psif:\  
    :df=/usr/local/libexec/psdf:
```

Ôþñá, èá ÷ñâéáóðâð íá ðñiøéÝðiðâð áðßðóçð ôçí ééáíüôçôá sc óðí áñ÷åßí /etc/printcap ôíð êüìâíð orchid (êáé áðþ áññéóðüüâðâð íá ðñiøéÝðâð iáð áðâíññâiðiðþíðiðâð ôá ðiææððéÜ áíðßðâññâðâð åéá ôíí áêôôðùôþ teak):

```
#  
# /etc/printcap for host orchid - no multiple copies for local  
# printer teak or remote printer bamboo  
teak|hp|laserjet|Hewlett Packard LaserJet 3Si:\  
    :lp=/dev/lpt0:sd=/var/spool/lpd/teak:mx#0:sc:\  
    :if=/usr/local/libexec/ifhp:\  
    :vf=/usr/local/libexec/vfhp:\  
    :of=/usr/local/libexec/ofhp:  
  
rattan|line|diablo|lp|Diablo 630 Line Printer:\  
    :lp=:rm=rose:rp=rattan:sd=/var/spool/lpd/rattan:
```

```
bamboo|ps|PS|S|panasonic|Panasonic KX-P4455 PostScript v51.4:\  
    :lp=:rm=rose:rp=bamboo:sd=/var/spool/lpd/bamboo:sc:
```

×ñçóeiðiðþíðâð ôçí ééáíüôçôá sc, ðñiæâíðÜññâðâð ôçí ÷ñÞóç ôùí áíðiðþí lpr -#, áéëÜ åái Ý÷iöíð âéüìç ôçí áðñâôüôçôá íá ðáñâiððâðâðiðâð ôíðð ÷ñÞóôâð íá ôñÝññâð ôçí áíðiðþí lpr(1) ðiææÝð öiñÝð, P íá áðiôðâððeïðið ôíð ßæéí áñ÷åßí ðiææÝð öiñÝð óá ïðá ïiðáæéðþíð âñâáóßá, üððùð åäþ:

```
% lpr forsale.sign forsale.sign forsale.sign forsale.sign
```

ÕðÜñ÷iöí ðiææÝð ôññüððé ðññüëçðð áðôþí ôùí áíðâññâðþí (óðiðâññéëâíðÜññâðâð éáé ôçí ðâñßððûóç íá ôí áññíÞóâðâð) ðið áðóâð åéâýðâññé íá áíðâññâðþíðâðâð.

#### **10.4.4.2 Đåñéïñßæïñôáò ôçí Đñüóâáóç óå ÅêôõðùôÝò**

Íðiñáðbóða íá áæÝð-áðóð ðiðiùò ìðiñáð íá áðóððþíáé óá ðiðiùò áðóððùðóþ ÷ ñíçóeiðiéþiðóð ðiðiðo ìç ÷ áíðiíjýò ñíÜáùí (groups) ðiði UNIX éáé óçí ééáíüðóçóá rg óði /etc/printcap. ÁðeÜ ðiðiðeåðþóða ðiðið ÷ ñíþóðóða ðiði ðeÝðáða íá Ý ÷ iði ðñúðóða óá ÆÜðiíí áðóððùðóþ óá iéá óðóðáðéñéiÝíç ñíÜáá (÷ ñíçóðþí), éáé äçéþóða áðóð þíç ñíÜáá óðóçí ééáíüðóçóá rg.

¼ëëí íé : ñPóôåð ðïõ äáí áíPëïõí ôôçí ïÜää (ôôïðåñëéâââñÍïõ êáé ôïõ root) èá aÝ ÷ iïôáé ðír áëüëïõëí ïPíõíá: lpr: Not a member of the restricted group üôôáí ðñïõðâéïý íá âéôôðþöiõí ôôíí åëâå ÷ üìââí âéôôðñôþ.

$\frac{1}{4}$ ðùò èáé iá ócí ééáíüöçôá sc (ðâñéíñööiy ðíreéáðëþí áíðéäñ Üöùí), éá ÷ ñâéáðöåb íá ðññöäéíñßöåâð ócí rg óóïðò áðññáéññööiy Ýíiðò èüìäiðò ðið èá Ý ÷ iðí ðññöåááóç óóïðò áéööðùò Ýð óáò, áí ðùò áðöü áßíáé óúööü (áåßöå ócí áíñüöçôá Áéööðùò Ýð Áåéáðöåðöci Ýíié óá Áðññáéññööiy Ýíiðò Õðíreíæéööiy).

Ãéá ðánÜääâéâíá, èá áöPóïïðå âéá üëïöð åéâýéâñç ôçí ðñüóâáóç óöii åéôôðùôP rattan, áëëÜ iüñi íé ÷ñPóôâô ôçð ñÜääáo artists èá iöññiýí íá ÷ñçóéïïðiéPóïïðå ôíí bamboo. Åäp åßíáé öií åíùóðü iàò /etc/printcap ãéá öií êüìâíi rose:

```
#  
# /etc/printcap for host rose - restricted group for bamboo  
#  
rattan|line|diablo|lp|Diablo 630 Line Printer:\  
    :sh:sd=/var/spool/lpd/rattan:\  
    :lp=/dev/lpt0:\  
    :if=/usr/local/libexec/if-simple:  
  
bamboo|ps|PS|S|panasonic|Panasonic KX-P4455 PostScript v51.4:\  
    :sh:sd=/var/spool/lpd/bamboo:sc:rg=artists:\  
    :lp=/dev/ptyu5:ms#-paremb cs8 clocal crtsccts:rw:\  
    :if=/usr/local/libexec/psif:\  
    :df=/usr/local/libexec/psdf:
```

**Óciåòùóç:** ÅðéôñÝðåôáé iüïï iéá ðåñéïñéóíÝíç iÜäá áíÜ åêôôðùôþ.

#### 10.4.4.3 ëåä ïò ìåäÝèïõò ôùí ÁðåóôáéìÝíùí Åñääóéþí

Áí ðírreiß ÷ nPóôåò Ý ÷ iöi ðñüöôåáóç óóïöò åêöôðùö Ýò ááo, ðééáþò íá ÷ nñæÜæåôáé íá ÷ Ýóåôå Ýíá áþþóåö üñei ööï åðéöñåðüiâíi ïÝâæiò áñ ÷ åßúí ðiö iðiñiýí íá áðiöôåßeiöi ié ÷ nPóôåò æá åêöýðuöç. Áeüíá eáé áí ððÜñ ÷ áé áñéåðöùò ÷ þñiö ööï óýóöçíá áñ ÷ åßúí ðiö öeëñåíåß öiöö ñáðéüäiò spool, eá ðñ Ýðåé ùööúöi íá åâââéùèåßöö üöé åðáñéåß æáá öéö åññåáðßåò üëüí ðùí ÷ nçööþí.

Ôi LPD óåò åðéêñ Ýðåé íá iñéïèåðPöåôå ði ïÝæéóöi áñéèìü bytes ðiò ðåñéÝ ÷ åé ieá åñááóßá, là ôçí ééáíüôçôå mx. Ç iiiÜäá iÝðñçóçò åßíáé óå BUFSIZ blocks, óå iðiñßá åßíáé 1024 bytes. Áí èÝóåôå lçäÝí óå áôðP ôçí ééáíüôçôå, åái èá ðôðÜñ ÷ iñi üñéá óòí ïÝæåèëò ðùí áñ ÷ åßúí. Ùðóùöi, áí åái Ý ÷ åé iñéóðåß ç ééáíüôçôå mx, ðùôå èá ÷ ñçóðéii ðiçéåßôåé ç ðñriåðéëåái Ýíç ôéïP ðùí 1000 blocks.

**Óciālīšūnóč:** Óři üñéíř ášoořiňúžžáňáé ódá áñřiř áššá řeáó áñřiňáóřšáò, éeáé üřiř é ódřiř éeéü řyřáňáeřiř óčoř áñřiňáóřšáò.

Óði LPD ááí éá áðiññþþáé Ýíá áñ÷åßi ðiñ fâððâññÜ ói üñei íað Ýeïò ðiñ Ý÷åôá èÝóáé. Áíðee Ýôùò, éá ói óiðieåðþóáé óóçí iññÜ áíáiiÞò iá ìÝâåæiò þoí lâ ói ìÝæóóí åðeññâððóü, ói iññbi éáé éá åêóðþóáé óâæééÜ. Ói õðüüëiéði áñ÷åßi áðiññþþðóåðáé. Áí áðóùò åðíáé óùðóùò Þ eáíéáóíÝfìò óññüðiò áíðeíåðþðéóçò áéá óçí õðÝñâáóç óiñ biði, áðíáé èÝíá ðññiò óðæÞþóçó.

Ád ìñéíèåðÞòïòìå óóí ðáñÜääéáíà iáò ôíöö åêôðûðóÝò rattan êáé bamboo. Åðåéäþ óá áñ÷åßá PostScript ôùí artists óåßiiõí ðñïò iåñÜéá iåñÝèç, èá èÝóïòìå Ýíá üñei ðÝíòå megabytes. Äáí éá èÝóïòìå üñéá æá ôíï åêôðûðóÞ ãñáñiÞò áðëíý êåéïÝñïò:

```
#  
# /etc/printcap for host rose  
#  
  
#  
# No limit on job size:  
#  
rattan|line|diablo|lp|Diablo 630 Line Printer:\  
    :sh:mx#0:sd=/var/spool/lpd/rattan:\\  
    :lp=/dev/lpt0:\\  
    :if=/usr/local/libexec/if-simple:  
  
#  
# Limit of five megabytes:  
#  
bamboo|ps|PS|S|panasonic|Panasonic KX-P4455 PostScript v51.4:\  
    :sh:sd=/var/spool/lpd/bamboo:sc:rg=artists:mx#5000:\\  
    :lp=/dev/ttys0:ms#-parenb cs8 clocal crtscscts:rw:\\  
    :if=/usr/local/libexec/psif:\\  
    :df=/usr/local/libexec/psdf:
```

Êáé ðÜéé, óá üñéá áðoññüæíñóáé ìüíí áéá òiñð ôiñðééiyò ÷ñPóôåò. Áí Ý÷åðå áíññáðiñPóåé áðññáññöóíÝíç ðññüóåáóç áéá òiñð ôåéññðùòÝò óáó, óá üñéá áðoñÜ áäíí éó÷yíñí áéá òiñð áðññáññöóíÝíñò ÷ñPóôåò. Èá ÷ññáéáóðåß íá ðññóáæíññBóåðå ìá ñçí ééáíññüòçòá mx êáé óá áðññáññöóíÝíá ãñ÷åßá /etc/printcap. Ååßòå ñçí áíññüòçòá ÅéññðùòÝò ÅåéáññåðòçìÝíñé óá AðññáññöóíÝíñò ÕðíññæéóóÝò áéá ðåññéóðüòåññò ðëçññññBóåò ó÷åðééÜ ìá óéò áéññðòçòåéó áðñú áðññáññöóíÝíñò ñðíññæéóóÝò.

ÕðÜñ÷åé êáé Üeeïo åiâéäéêåði Ýiiò ôñüðiò ðåñéiñéöiïý ôiõ iåå Ýeïoò åñâåóéþí åéá áðiñáêñðöi Ýiiòò åêôðùôÝò. Ååßôå ócí åiüôcôå Ðâñéiñéòiüò Åñâåóéþí áðü Áðiñáêñðöi Ýiiòò Õðieïäéò Ýò.

#### **10.4.4.4 Đåñéïñéóìüò Åñääóébí áðü ÁðïiáêñööíÝíiöò ÖðiëiäéooÝò**

Ôi óyóôçíá ðáñi ÷ Ýâôôçò **LPD** ðáñ Ý ÷ áé äé Üöññiòò ôññüðiòò ðåñëiñéóïý ôùí åññáóéþí áðü áðiñáêñðói Ýiñòò ðññejæñéôðÝò;

Đáñåìðüäéóç õđíëïäéóôþí

↳ Íñiñåbôá íá áæÝã÷åôå áðü ðiéřòò áðñláêñõóíÝñiñò õðiëiæéóòÝò èá áÝ÷åôáé áéôPóåéò åêôýðùóçò òi òiðéêü LPD, ÷ñcöéiñiéřþòò õá ãñ÷åßá /etc/hosts.equiv êáé /etc/hosts.lpd. Òi LPD áæÝã÷åé íá áæá áí ç

âéóâñ ÷ üiáíç áâðôçóç ðñíÝñ ÷ âðâé áðü Ýíáí ððíëíæóôP ðiõ áíáö Ýñâðâé óâ êÜðíëí áðü ôâ äýí âñ ÷ åßá. Áí ü ÷ é, ôí LPD áðiññßðôâé ôçí áâðôçóç.

Ç iññöP áðôþí ðûí áñ ÷ áßñú í åßíáé áðëP: Ýíá üññíå ððíëíæóðòP áíÜ áññáiiP. ÐáññáôçñÞóðå ðòù öi áñ ÷ åßíi /etc/hosts.equiv ÷ ñçóëiöiéåßóáé êáé áðü öi ðñùöüëíëëi ruserok(3), êáé åðçñåÜæåé ðññäñÜìáôá üðòù öi rsh(1) êáé öi rcp(1), áðñíÝíùò íá åßóðå ðññöåðêóëëíß.

Ãéá ðánÑÜääéäíá, ääþ åßíáé öi áñ÷åßí /etc/hosts . lpd óöii õðïieïäéóôP rose:

orchid

violet

madrigal.fishbaum.de

Áõõü óçìäßíåé ðùò i rose äÝ÷åõáé áéôPóåéò áðü ôiõò õðiieäéooÝò orchid, violet, éáé madrigal. fishbaum.de. Áí êÜðiieíò Üeëiò õðiieäéooÞò ðññiøðåèPóåé íá áðiieôPóåé ðññiøðåáóç óõi **LPD** ôiõ rose, c åññääóßá èá áðiinññeöeåß.

Đåñéiñéóìïß óõi ÌÝãåèjò

Íðiññåbôá íá áæÝã ÷ åôå ðüöiò áæäýéåñiò ÷ þñiò ðñ Ýðåé íá áðiiÝíæ óóï óýóðçìá áñ ÷ áßùí üðiò áñßóéåðáé í êáðÜëiäiò spool. Áçíeïññåþóôá Ýíá áñ ÷ åßí íå üíñíá minfree óóïí éáðÜëiäiò spool áéá ðiï ðiðééü áéðoðùðþ. ÁéóÜäåôá óá áðóú ðiï áñ ÷ åßí Ýíá áññéèù ðiò áðéðñiòúðåýåé ðüóá blocks áßðóéiò (512 bytes) áæäýéåñiò ÷ þñiò ðñ Ýðåé íá ððÜñ ÷ iòí áéá íá áßùíæ áæéóþ 1éá áðiiáéññóóíÝíç áññááóßá.

Áðóðu óáð áðéðóð Ýðláé íá áßóðå á Ýâáéíé ðùò íé áðñíáéññóðíÝñíé ÷ ñPóðåðò ááí éá ááíßóðí ðí óýðóðçí áñ ÷ áßùí óáð. Íðiñmåßóðå áðßóðçò íá ðí ÷ ñçóëiiðíéÞóðåðå áæá íá áþróðå ìáññéêÞ ðññiðåñáéüðçóá óóðið ðiðéëiýò ÷ ñPóðåðò: íé ðíðééið ÷ ñPóðåðò éá íðiññý íá óð Ýéññí ãññáóßå ðóðçí iññÜ áíññíÞò áéññí ðí ðiðééið ÷ Þññið ðið ðáðóðí Þ Y ÷ áé ðÝðåðé ðí Úðóðu áðü ðiññí áññéëü ðiññí áíáð Ýññðóðé óóðí áñ ÷ áßí minfree.

Áéá ðánÜääéäíá, áò ðñíööéÝóïöìå Ýíá áñ÷åßí minfree áéá ôíí åêôôðùôþ bamboo. ÅíâðÜæïöìå ôíí /etc/printcap áéá íá áñïíýå ôíí éâôÜëïäí spool áéá áôðüí ôíí åêôôðùôþ. Åäþ åßíáé ç éâôá÷þñéóç áéá ôíí bamboo:

```
bamboo|ps|PS|S|panasonic|Panasonic KX-P4455 PostScript v51.4:\n    :sh:sd=/var/spool/lpd/bamboo:sc:rg=artists:mx#5000:\n    :lp=/dev/ttys0:ms#-parenb cs8 clocal crtscs:rw:mx#5000:\n    :if=/usr/local/libexec/psif:\n    :df=/usr/local/libexec/psdf:
```

Í éáo Üeïäiò spool êáëiñßæåôáé óôcí éeáíüôçôá sd. Èá èÝóïöiå ôñßá megabytes (éóïäoñíååß íå 6144 disk blocks) ùò oï iÝääèiò oïo äëäýéåñiò ÷þnïò ðiò ðñÝðåé íá õðÜñ ÷åé óoï óýóôçïá ãñ ÷åßùí, þóôå oï **LPD** íá äÝ ÷åôáé áðñüåññööiÝíå òåññåñßåò:

```
# echo 6144 > /var/spool/lpd/bamboo/minfree
```

ĐÀ NẵnG CÓ HÌNH

Íðiññáþóá íá áæÝá ÷ áðóá ðíéiò áðiñáêñðóí Ýñò ÷ ñÞróóçò iðiññáþ íá áðóðþíáé óóriðo ðiðééiyó áðóððuóÝð  
iñßæiñðóá òcí ééáiiùðçóá rs óóí /etc/printcap. ¼óáí áiöáíßæáðáé ç rs óá iéá éáðá ÷ þnëóç eÜðiéiò ðiðééÜ  
óósiññáðái Ýñò áðóððuóÞ, ði LPD èá áð ÷ èáþ áññáðáþ ðu áðñáðiññðóí Ýñò ðiðééiyó ðiðééÜ áí i ÷ ñÞróóçò ðið  
áðiñðóÝééáé òcí áññáðáþ Á ÷ áé ðíáññáðiñðóü óóí ðiðééü ðiðééiyóÞ èáé iå ði ßæií üññá ÷ ñÞróóç. AéáðiññáðééÜ, ði LPD èá áðiññßæáðé òcí áññáðáþ.

ÁôôPç ééáíüôçôå áâbíáé éâéâbôåñá ÷ñPôéïç óå ðâñéâÜëëïóå üðïo ñðÜñ ÷iõí (âéá ðâñÜääéâíå) æáaoïñâðéêÜ  
åðé ÷åñçóéâéÜ ôiPiáôå ðïo iiñÜæëïóå òï äbôðöï, êâé êÜðïeïé ÷ñPôôåò ðñÝðåé íå ñðâñâáBññóï ôá oyíññå òïo  
ôiPiâöiò. Äcïeïññäbïôå ëëâññéâöiïyó ôóå ôóôôPiáôå óå, èá ïðmñyí íå ÷ñçôéïñðïeïyí òïo òâéôôðùò Yô óå ãðü

Ói áééü ðírðò ðílPíla ócò áðé ÷ áßñçócò. Ái áðééòñiáßbôá íá ðírðò áðééñ Ýðåðâá íá ÷ ñçóeñiðíéíý íüñt ðírðò áðéòðùò Ýðéáé ü ÷ é ðá lç ÷ álPíàðá óáð, óüöðâ iðññáßbôá íá áçíéiðññPóåðâ eïäañéáóiiýo “token”, áß ÷ ùò ðññóùðéëiýo ñéðááðüüñt ðírðò áééü íá ðéÝðéññò ðírðò ááñ iðññáßbôá íá ÷ ñçóeñiðíéçéæß, üðùò ói /usr/bin/false.

#### **10.4.5 ÉáôáiÝôñçóç ×ñþóçò Åêôôðùôþí**

Áðiðóáðóþáðó üðóé ÷ níðæ Üæðóáðé íá ÷ níðapíðóða áðá ðóé ðóð ãððóðþþóáðó óáð. Êáé ãðéðþ ü ÷ é; Óír ÷ áññðb êáé òi iðæ Üíé êiðóðþæiði ÷ níðþláðá. Êáé áðéððé Yíi ððÜñ ÷ áé êuðóðið oðiðóðþñçóçò — ié ãððóððuðó Yðo aðiðóáðiýiðóáðó ðóü eéfçóðU iÝñç êáé Y ÷ iðí ðíçí ðóð Uðóç íá ÷ aé Üíá. ÷ áðó á aíðóð Üðóáðe ðiðð ãððóððuðó Yðo óáð, ðið ðiñüði ðið ÷ níðceiðiðiýiðóáðe, êáé òi êuðóðið oðiðóðþñçóçò êáé Y ÷ áðó á ððiðiðaðóáðe iéá ÷ níðþuðóç áí Ü ðáðññ, áí Ü ðuðáé, P Üeëç iiii Üðáa iÝðóñçóçò). Óír è Yíá áßþíáðe óþrñá ðuðo iðiññðbóða ðññðaðiáðóê Ü fá iâðééiðþðóáðó íá ðáðaðiáðóñðóða ðóé ðóð ãððóðþþóáðó óáð.

Óá Üó÷ciá iÝá ábbíáé ðùò òi ðýóóöçíá ðáñi÷ Ýôåooçò òiò **LPD** äáí ðáñÝ÷ åé ðiëy âíPèåéá óå áooüí òií òiíÝá. Ç éáðái Ýðñçóç áiâññóÜôáé óå iàäÜëi áâèiü áðü òií ðýðí òiò åêööðùòP ðiò ÷ñçóëiïðléåßôå, òiò ðýðiò ãñ ÷åßùí ðiò åêööðþíåðå, ééæ ðeò ùëéÝò óáò áðáéêÞóáéò æéá ñçí ÷ñÝúóç ðúí åêööðþðóåùí.

Æáó Ócij ééâoáí Ýðöñcój, éá ðñj Ýðáé íá iåðâoñ Ýðåðâo ðír öþeöññi ëåéi Ýññ (æá ðç ÷ ñ Ýùóç åññáóéþí áðeiý ééâoí Ýññ) ðír ãéððñðùòþ ëéé ðá öþeöñá låðâoññi ðþò (æá ðç ÷ ñ Ýùóç üëuñ ðúí Úëeñu ðýðúí ãñ ÷ åßuñ) þróâ íá låðññiýí ðåðëßâåð P íá æçöñiýí íá lÜëiðí áðü ðír ãéððñðùòþ ðír ãññéiñ ðúí ðéððñðùñ Ýññ íá ðåðëßâñ. Ááír éá ðá ðíçëþðåé éäéâðôðâñá ç ÷ ñ Pþç öþeöññi ðåðññi, áðü ðç öðéâñlþ ðñj ááír ïðiññâ íá ðÜññéé ééâoáí Ýðöñcój. Åáßðâ ðçj áíüðçôá Öþeöññá.

ÃåíéêÜ, õðÜñ ÷ iõí äýï ôñüðié ãéá íá êÜíåôå êáôáíÝôñçóç:



Ôi óyóôôciá ðáñi ÷ Ýôâôóçò **LPD** ððiôðôçñßæåé áyéëïé åéé ôéô áyï lâëüäïöö: åðü ôç ôôéaiþ ðiö ðñ Ýðåé åóâßò íá ðáñ Ý÷åôå ôá ößëöñá (ôéô ðâñéóðüôåñåö õïñ Ýð), èá ðñ Ýðåé åðßóçò íá ðáñ Ý÷åôå åéé ôíï êþäééå êåðåí Ýðñçóçò. ÅéëÜ ððÜñ ÷åé åéé Ýíá åéëü óå åðôP ôçí ððüëåðç: Ý÷åôå åðâñéüñéöôç åôåééîßá ôóéò lâëüäïöö åéåðåí Ýðñçóçò. Åéá ðáñ Üääéåíá, iðññâßôå íá åðéé Ýíåôå ðåñéïäéêP Þ êåôÜ ôç ÷ñÞóç åéåðåí Ýðñçóç. Iðññâßôå íá åðéé Ýíåôå ôéô ðëçñïöinßåò ðiö éá åéåðåñ Üöïïöåé: iiüìåðå ÷ñçóôþí, iiüìåðå ððïëïäéöôþí, ôýðiöö åññåáöþí, ôôðùí Ýíåð ôåéëßååò, ôåôññååùíéÜ iÝðñá ÷åñðéïý ðiö ÷ñçóéiiðiéþeçéå, ðüöiö ÷ññüiö ÷ññåé Üôðçéå åéá íá ãßíåé ç åéðôýðñöç, åéá ðïëéÜ åéüíá. Åéå üéá åôôÜ åßiiñðåå íåðåññå Ýðiøåð ôå ößëöñå åéá íá åðteçéåýïöi åôô Ýð ôéô ðëçñïöinßåò.

#### **10.4.5.1 Äñþäiñç êáé Đñü÷åéñç ÉáôáiÝôñçóç Åêôôðþóåùí**

Ôi FreeBSD æáôôßèåôáé là äýí ðñiñÜùlåôá ðiø iðinïýí íå ðánÝ ; iði Üìåôá åðëP ðåñêræéP éåôáiÝôñçóç. Åßíáé ôi ößëôñii êåéÍÝiiø lpf, ðiø ðåñéañÜöôåôé ôôçí áîüôçôå lpf: Ýíá Ößëôñii ÈåéÍÝiiø, êåé ôi pac(8), Ýíá ðñüäñâíia ðiø ôôçéÝååé êåé åéñißæåé êåôåù ðiø ðåñéañÜöôåôé åðü åñ÷åßå êåôáiåôñPôåù.

Ôi LPD iâêéÜ ôi 1pf ia ðáññái Ýðöññöö ðëÜðöö ëáé iÞëiñöö ðåëßäåð (áðü ñéð ëéáññüðçöåð pw éáé p1). Ôi 1pf ÷ ñçóëiñëíéåß áðô Ýð ôéð ðáññái Ýðöññöö æáé íá ðññöáæiñßöåðe ôçí ðïöúðçöå ÷ áññöéý ðïö ÷ ñçóëiñëíéÞèçéå. IàðÜ ôçí áðññöðëÞ ðïö áñ ÷ åßïö óöii åéðöñðùÞ, añ Üðåé ìéá éáðå ÷ þñéöçc åéðåái Ýðñçöçö ðöii áñ ÷ åßï éáðåáññáðÞ. Íé éáðå ÷ ùññßöåéö iiéÜæïö iá ôéð ðáññáéÜou:

```
2.00 rose:andy  
3.00 rose:kelly  
3.00 orchid:mary  
5.00 orchid:mary  
2.00 orchid:zhang
```

Éá ðñÍðåé íá ÷ ñçóëiðíéåðbô áñ ÷ ùñéðóú áñ ÷ áßï êáðåáñäöÞ ãéá êÜéå áåðöðùòÞ, áötiý òi 1pf ãáí Ý-åðc  
åíðùìåðùìÝíç äðíåðüöçôá êëåéäþiâòið áñ ÷ áßïò (file locking), êéé áÿí 1pf iðiñiý íá êáðåóðñ Ýøiði òi Ýíá ôçí  
êáðá ÷ þñéöç òið Üeeið áí ðñüéåðéåé íá áñ Üøiði ðáðöð ÷ ñiíá óðið ßæéí áñ ÷ áßï, jáð áÿéiði ðñüðið ãéá íá áåðåéþþoåðå  
ôçí iñíáééüöçôá áñ ÷ áßïò êáðåáñäöÞ áñ U áåðöðùòÞ áßbiáé íá ÷ ñçóëiðíéþðåðå ôçí ééáñüöçôá af=acct óði  
/etc/printcap. ôðé, êÜéå áñ ÷ áßï êáðåáñäöÞ èá áñþóéåðéåé óðiíí êáðÜeeið spool òið áíðþóðié ÷ ið ååðöðùòÞ, óá  
Ýíá áñ ÷ áßï lð üññíá acct.

¼ôái åbóôå Ýôieiíé íá ÷ñåþoåôå öiðò ÷ñPóôåð áæá ôeó åêöôðþoåéð, åêöåëÝóôå ðiðñüaññáìíä pac(8). ÁðëÜ iåðååâåßôå óoíí êáðÜeíäí spool áæá öií åêöôðùôþ ðið ëÜíåôå êáðâííÝôñçóç êáé ðëçêôññíäþoåð pac. Èá åiðáíéôåß Ýíáð áðíëíæéòù ìá ÷ñåþoåéð óå äïëÜñéá, üðùò åëÜðåôå óôc öoíÝ÷åéá:

Login	pages/feet	runs	price
orchid:kelly	5.00	1	\$ 0.10
orchid:mary	31.00	3	\$ 0.62
orchid:zhang	9.00	1	\$ 0.18
rose:andy	2.00	1	\$ 0.04
rose:kelly	177.00	104	\$ 3.54
rose:mary	87.00	32	\$ 1.74
rose:root	26.00	12	\$ 0.52
<b>total</b>	<b>337.00</b>	<b>154</b>	<b>\$ 6.74</b>

ĐáñáêÜôù åßíáé ié ðáñÜìåôñiié ðiõ äÝ÷åôáé ôi pac(8):

-Pprinter

Áéá ðiéü *printer* íá êÜíáé áðíëiäéóíü. ÁôôP ç áðéëiäP äiðëéåyåé ìüíí áí ôðÜñ÷åé ç ðëPñçò äéáäñiP óôçííééáíüôcôá af óöi /etc/printcap.

- G

Ôâîéññåß ôï áðïò Ýëåòïá áíÜ êüóòïò áíôß ôçò áëöåâçôéêßò ôâîéíüìçóçò ôùí ÷ ñçôþí.

-m

Áâitâb ôi üñia ôiô ððiæäéôP óôá áñ÷åbá êâôâñáòPò. Iâ áôôP ôçí åðéëiâP, i ÷ñPôôcò smith óôii ððiæäéôP alpha åbíáé i ßæïò ÷ñPôôcò iâ óiñ smith óôii ððiæäéôP gamma. xùñbò ôçí åðéëiâP áôôP, åbíáé æáöiñâðeëiâ ÷ñPôôcò.

-pprice

Õðieíæðæáé ðeó ÷ ñáþóáéó íå *price* (óeiP) óå æiðÜñéá áíÜ óåðëßääá þ áíÜ ðüäé áíðó ð ãéá ðíçí ðíðP áðü ðíçí ééáíüôçðå pc óði /etc/printcap, þ áéëéþò äýí óáðóó (áðü ðñiáðééiðP). Íðiñåðóá íá iñþóáðóà ùò *price* iéá ðíðP íå äåðéáééÜ Þçöbá (floating point).

-r

Áíôéóôñ Ýöåé ôçí óåéñ Ü ôáîéíüìçóçò.

- 6 -

Απεισοδάß Υίά αν̄ - ἀβ̄τ̄ αδ̄ιειαέοιη όυι εάοιαιόν Πρόαν̄ έαέ έαεάνβαέ οά δάνηαδ̄ - υιάιά όυι αν̄ - ἀβ̄τ̄ εάοαάνδο Πρό.

*name* . . .

Óððþíáé ðeçñiöiñßåò áíáöiñÜò iüíi ãéá óá óðãéåññéíÝíá *name* (iiüìáôá) ÷ñçóôþí.

Óóíí ðñíiåðééååíÝíí áðíieíæáéíñi ðíò ðáñtÜååé óí pac(8), áéÝðåôå ðùñi áññéèìù ðùñi ðòðñùñYñúí óåéëßáñi áíÜ ÷ ñíPóôç áðü ðiñò ñeÜòññò ñðíieíæéóôÝò. Áí, óóí ÷ þñí óáò, i ñðíieíæóôÞò ååíÝ ÷ åé óçìáóßá (æéáôß ié ÷ ñíPóôåò ìðiññíýí íá ÷ ñçóðéññðíÞòñ ñðíieíñáÞðiòå èÝëñò), ååéðåéÝðåôå ñçí áîòíëÞ pac -m, åéá íá åçléíññáÞóåðå òíí åéüëñðòéí áðíieíæéòü:

Login	pages/feet	runs	price
andy	2.00	1	\$ 0.04
kelly	182.00	105	\$ 3.64
mary	118.00	35	\$ 2.36
root	26.00	12	\$ 0.52
zhang	9.00	1	\$ 0.18
total	337.00	154	\$ 6.74

# pac =p1 .50

iñßæåé êüööìò êÜeå óåëßääò Ýíá ãïëÜñéï êáé ðåÍPíôå óåíôò. Íðiñåßôå ðñääìáöéêÜ íá Ý÷åôå ðïëëÜ Ýóïää ÷ñcoéïðiéþíôå ãôòÝò ôëò ÷ñåbóåéò.

ÔÝëiò, åêôåëþíóàò pac -s èá àðièçéåýóåôà ôîéò ðëçñiöñïßåò ðiò àðièiæóiiý óå Ýíá áñ ÷ åßí êåðåäñåöÞò àðièiæóiiý, ðiò èá Ý ÷ åé ðiò ßæéí üññá íå òií áñ ÷ åßí êåðåäñåöÞò ðiò åêôððùñÞ, åëéÜ íå êåð Üëçíç \_sum. ðåéðå êåéáñßæåðåé ðií áñ ÷ åßí êåðåäñåöÞò. ¼øáí åêôåëåÝóåôà ðÜéè òií pac(8), èá íáíáéåáÜóåé òií áñ ÷ åßí àðièiæóiiý, áæá íá ðÜññåé óå áñ -ééñÜ òíññéá, êåé èá ðñjøéÙÝóåé ôîéò ðëçñiöñïßåò åðiò òií êåñññéüí áñ ÷ åßí êåðåäñåöÞò.

#### **10.4.5.2 Đùò ìöñåßôå íá ìåõñþóåôå ôéò ÔõðùìÝíåò Óåëßäåò;**

Æá ía ïåðñÞóâðå ðéð óðòðù Ýíåð óâðëßåð iá Ýóðù ðóiié ÷ åéþäc eåðòñi Ýñâðé, èá ðñi Ýðåé ía ðñiðæññþóâðå ðüði ÷ áññþ ÷ ñâðé Üæðåé iéá åññâðþá. Áðòðù åðíáé ði iððéáðóðé ðñðñi ðñðñâðéçíá óðóçí éáðâi Ýðñçóç áðéððþóâðí.

Ãáá ãññáóßåò áðéíý éâéí Ýíïõ, öï ðññüâëçïá ãáí áßíáé áýóéíëí íá èëðéåß: ïåñññÜôå ðüóåò áññáïíÝò ñðÜñ ÷ iññí óå ìéá áññááóßá êáé ôéó õðâæñßíåðå ìå ðüóåò áññáïíÝò iñññåß íá ôððþóåé í åêóðñùòÞò óåò óå ìéá óâëßää. Íçí íå ÷ Üóåðå íá óðñðñéëÜååòå óå backspaces ðiõ ðññéâëíý ñðåññóýðùóç, þ åðéíÞeçò eññéëÝò áññáïíÝò ðiõ áíááéðëÞññóåé óå ðåññéóðñùðåñåð áðú ìßá öððóéëÝò áññáïíÝò.

Ôí öþeöñi êâéí Ýíïð 1pf (ðið ðáñiðóðé Üóáíå óóí lpf: Ýíá Öþeöñi Èâéí Ýíïð) eáíá Úíáé ððüøéí ðið áðôÜ ðá óóíëé ÷ áßá üðáí êÜíáé eáóáí Ýôñçóç. Áí ãñ Üoåôá êÜðiéí öþeöñi êâéí Ýíïð ðið ÷ ñâé Üæåôáé íá êÜíáé eáóáí Ýôñçóç, ßóúò íá eÝéåôá íá aéÝâíåôá ðið ðçzááßí ëþäééá ðið 1pf.

Dùò ÷åéñßæåóôå üìùò ôïõò õðüëéðiõò ôýðiõò áñ÷åßùí;

Ãáá ôéò ìåôâôññïðÝó áðü DVI-óá-LaserJet P áðü DVI-óá-PostScript, iøññâbôá íá ËÜíâôá òî ðëëññï óáò íá áíäéÿåé ôçí Ýññäi ôiö dvilj P ôiö dvips êáé íá åëÝä÷åé ðúóåò óåëßååò åçëëññäPëçéåáí áðti ôç ìåôâôññïðP. Ùóùò lðññÝóåôá íá ËÜíâôá êÜôé ðåññüïéí êáé íå äéäöïññåóééiyó ïýðïðò áñ÷åbñí êáé ðññññÜññåôá íåôâôññïðPò

Ùòóüööř, üëäò áôõ Ýð íë ï Yëëäïé Ý ÷ iöí öi láëëíÝ êôçìá ðùò i áêôòðùòðò ðéëáíþò óôçí ðñääíáôéëüôðçôá fá içí áêôòðþðåé üëäò ôéò óâëßååò. Áéá ðánÜääéäíá, éá iðëëíýóá íá iðëëéñéóôåß öi ÷áñòß, P íá ôâéâéþðåé öi ôüííñ, P áëüïç íá óòíàåß êáé Ýëñçç —åþí i ÷ñÞóðçò èá óóíá ÷Þóáé íá ÷ñþíåðåé.

Ôé èá ìđïñïýóáôå íá êÜíåôå;

ÓðÜñ÷åé ïüññí Ýíáð óþæðiññò ôññüðiò åéá íá êÜíåðâ éáðóái Ýôñçócs ðéññéåðþáð. Íá ðÜññâðâ Ýíáí åéðóðùñðP ðiò fá iðiññâð íá óáð ðåé ðüöi ÷áññòß ÷ñçóeññiðieåß, éáé íá öiñ öðññäÝóåðó ìÝóù óåéñéáðÞò èýññó Þ iÝóù åééðóýið. Ó÷åðüñ üëéí ié åéðóðùñðY ð PostScript ðiðiðóçññæiði ãðóÞ ðçí åöñáðóðçóá. Éá ãññâðó ñéá Üëëiñð ðýðiñð ñéá éáðóáðéåðáóð Ýð ðiò êÜññiði ðåðBóçò ðiñ Bæí (æáð ðáññÜäåéñáí, ié laser åéðóðùñð Yð åééðóýið ðçò Imagen). ÍàðâðññYðóð ñá ðßëéññá ñéá åðññið ñið ñéóðùñðY ð þóðâ ñá éáðâðññÜðiñð ñéó ðiððùñÍýâð ñáéßâð ñåðÜ ðçí iëiññéÞññóç ðçò åéÜðóðiñð åñññáðBáð åéðóýðùñóçò, éáé ññðiññðó ñið ñéñâðiñÍýâñ ñá ÷åßá éáðâðññáðÞò ñá iñññí ñéóð ðçí ðéçñññiñßá. Åáí ÷ññâðÜæåðåéé éáðóái Ýôñçócs ñññâðiñÍýâñ ñá ñéñâðiñÍýâñ.

## 10.5 × Ñþóç Åêôôðùôþí

ÁôôôP ç áíüôçôá ðåñéáñ Üöåé ðùò íá ÷ñçóëíïðíéåßôå ôïõò åêôôðùò Yò ðïõ Ý÷åôå åâéåôáôôPóåé óôî FreeBSD. Íé åâóééê Yò åîôïë Yò æá ôïí ôâééêú ÷ñPóôç åßíáé íé åéüëïðøèåò:

lpr(1)

ÅÊÔÝÐÙÓÇ ÅÑÃÁÓÉÞÍ

1pq(1)

lprm(1)

Æáñáöþ áñááóéþí áðü ôcí iõñÜ áíáiiþò

ÕðÜñ÷åé åðßöçó ïéá åíöïëP ãéá ðiïòö åéá ÷åéñéóôÝð, ç lpc(8), ðiï ðåñéäñÜöåðåé óôçí åíüöçôá  
Äéá ÷åßñéóç ÅêöðÜöðþí, åéé ÷ñçóëïïðiéáßþåé åéá íá åéÝð ÷åé ðiïòö åêöðÜöðÝð ééá ôéð iõñÝð áíáiiiPð.

Êáé ié ôñâéô áîôïëÝò lpr(1), lprm(1), êáé lpq(1) ãÝ ÷ iiôáé ôçí áðéëiäP -P printer-name iå ôçí iðiñbá êåëiñbæåôáé óå ðiéii áêôôðùôP P iññÜ áíaiññPöiõí, üðùò áíáöÝññâôáé ôóï áñ ÷ åßí /etc/printcap. Áôðü óáò áðéññÝðåé íá áðiñôåßéåôá, íá äéaññÙþâôá, êáé íá ãéÝññâôá åññâôåßåò óå æéÜñññò ãêôôðùôYò. Áí äáí ÷ nçóeiñðiñéåßôå ôçí áðéëiäP -P, ôñôå ié áîôïëÝò ÷ nçóeiñðiñéiyí ôíï áêôôðùôP ðiñ áíáöÝññâôáé ôóç iåôåâëçôP ðåññéåÜëëññò ñINTER. ÔÝëò, áí äáí Ý ÷ åôå èÝóåé iéá iåôåâëçôP ðåññéåÜëëññò ñINTER, ié áîôïëÝò åêôåâëiýñôáé iå ôíï ññiñâðééåäíYñi áêôôðùôP ðiñ iññÜæåôáé 1p.

Áðü ãü êáé óóí áíPò, íá ôcí iññeráBá ðñiåðéëðaiÝñò åéðóðñùòPò èá áíññýíå ôíí åéðóðñùòP ðiò áíáöÝñåôáé óóçí iñðåáâëçòP ðåñéáÜëëñíòò PRINTER, P áí áái ððÜñ ÷ áé, ôíí åéðóðñùòP íá ôí üññíá 1p.

## 10.5.1 Åêôýðùóç Åñãáóéþí

Ãéá íá åêôõðþóåôå áñ ÷ åßá, ðëcêôñiieïäþóå:

% lpr *filename* ...

Èá åêôôðùèiýí üéá óá áíáöåñüìåíá áñ÷åßá óóiií ðñiåðééåäíÝíí åêôôðùòP. Áí äåí áíáöÝñåôå áñ÷åßá, ôi lpr(1) äéååÜæé äåäííÝíá áðüü ôi standard input. Äéá ðáñÜäåéäíá, åöôòP ç åîöiïëP èá åêôôðþoåé íañééÜ óçìáíöééÜ áñ÷åßá ôiô ööôòPíáòiô:

```
% lpr /etc/host.conf /etc/hosts.equiv
```

Ãéá íá åðéë Ýíåôå Ýíá óôäêåñëí Ýíï åêôôðùôþ, ðëçêôñíëíþóå:

```
% lpr -P printer-name filename ...
```

Óöii ðáññÜääéäia iáò èá åêööðùèåß ieá iaññÜëç eëbóôá áñ÷åbùí ôiö ôñÝ÷iööiö êåôåëüäiö óöii åêööðùôP ðiö iiññÜæåôåé  
rattan:

```
% ls -l | lpr -P rattan
```

Áöiý äáí áráó Ýñiôáé iiüìáôá áñ÷åßùí óôcí áîöiëþ lpr(1), öi 1pr æááâÜæåé ôá äåäiiÝíá ðiö èá åêöôðþoåé áðü öi standard input, ôá iðiþá åßíáé c Ýñiäiò ôcô áîöiëþo 1s -1.

Ç åíóïëP lpr(1) iðiñåß íá äå÷èåß Ýíá iåå Üëi áñéèìü åðéëiäþí æéá íá åëÝã÷åé ôçí iññöiðiþçóç, íá iåôåôñ Ýðåé áñ÷åßá, íá äciéïñåß ðiÿéæðéÜ áíòßåññöá, ê.ë.ð. Åéá ðåñéóöùôåñño ðecñiøimßåð, äåßôå ôçí åíüököå ÁðéëiäÝð Åéöýðùöçó.

## 10.5.2. Ëåã÷ïò Åñãáóéþí

¼ôåá âêôôðþíâôå íà ôi lpr(1), ôá âåäñí Ýíá ðiö è Ýëåôå íá âêôôðþíâôå ôiðièåôïýíôåé óå Ýíá ðâéÝöi (package) ðiö iifñÜæåôåé “âññáóßá âêôýðùóçò (print job)”, ç iðiñá áðiöö Ýëèåôåé ôöi óýóöçìá ðâñi ÷ Ýôåôóçò **LPD**. ÊÜëå âêôôðùôþò Ý ÷ åé íæá iðñÜ áíâiñPò âññáðéþí, êåé ç âññáóßá óåð áíâi Ýíåé íæß íà Üëëåð äééÝò óåð êåé Üëëüí ÷ nçôóþí. Í âêôôðùôþò ñeð åêôôðþíâé íà òçí óåéñÜ Üöéïçò óôçí iðñÜ áíâiñPò.

Áéá íá áiööáiíßóåôå ôçí iöñÜ áíáíííßò áéá ôíï ðñïäðééäíÝ íí áéööðùôP, ðëçéöñíííäPóôå lpq(1). Áéá êÜðíëííóóåêéñéñéíÝ íí áéööðùôP, ÷ñçóéííðíéPóôå ôçí åðééíäP -P. Áéá ðánÜääééäíá, ç áíööíëP:

```
% lpq -P bamboo
```

bamboo is ready and printing

Rank	Owner	Job	Files	Total	Size
active	kelly	9	/etc/host.conf, /etc/hosts.equiv	88	bytes
2nd	kelly	10	(standard input)	1635	bytes
3rd	mary	11	...	78519	bytes

ÁlöiáÍbæüÍdóé ôññááóßåò óóç ëßóóá áíáiííÞò áéé ðíí bamboo. Óðíç ðñþþóç áññááóßá, ðíò Ý ÷ áé óóåéåß áðü ôíí ÷ ñÞóóç kelly, Ý ÷ áé áðíäiíéåß í “áññéèiù ãññááóßåò (job number)” 9. ÊÜëå áññááóßá áííù ãéööðùñþ ÷ áññéöçñþæåôáé áðü Ýíá iññáééü ðÝôíéí áññéèiü. Óéó ðåñéöóüöðåñåò öññ Ýò iðiññåßóå íá ôíí ááñíÞóåðå, áéëÜ èá ôíí ÷ ññéáóóåßóå áí èÝéåðå íá áéäññÜþðåðå ðÜðíéá áññááóßá. Áåßóå ðçí áíüñþþóå Áéäññåðþ Áññááóéþí áéá ðåñéöóüöðåñåò ðéçññiññåßóå.

Ç åññääóßá iå ôi ñíýìåññí áííÝá áðiöåëåßöåé áðüü áÿí áñ ÷ åßá. Ôá ðíreeäðeÜ áñ ÷ åßá ðiö äüèçéáí ôóç åññääíP åíöiëþí ôiö lpr(1) èåùññíýíöåé iÝñiò ißáð ùüññí åññääóßáð. ÅôôP åßíáé éáé ç ôñÝ ÷ iñóá áíáññäP åññääóßá (ðáññäôçñÞróôå ôç eÝíç active ôçò ôôÞþçò “Rank”), ðiö ôçìåßíåé ðùò ç åññääóßá åêôôðþíåðåé áðôôP ôç ôôðeñíP. Ç ååýôðâñç åññääóßá áðiöåëåßöåé áðüü ååäññí Yíá ðiö Y ÷ iññí ðåññÜöåé ôóçí standard input ôçò åíöiëþò lpr(1). Ç ôññßöç åññääóßá ðññíYñ ÷ åôåé áðüü ôií ÷ ñÞróôç mary, éáé ðññüéåéöåé åéá iéá ðíreý iñéþäç åññääóßá. Ôí üññíá äéäññíPò ôiö áñ ÷ åßíö ðiö ðññüéåéöåé íá åêôôðùèåß åßíáé ðíreý iññÜeii åéá íá ÷ ññÝóåé ôóç ôôÞþç, éáé åéá åôôü ç åíöiëþ lpq(1) áðëÜ ðiö ôôðiäiëßæåé iå ôññäéô ôåæéåßöå.

Ç áíóïëP lpq(1) åðßóçò õðïóôçñßæåé ôçí åðéëíäP -1 ãéá íá äçïéïöñäPóåé ieá iååÜëç, eåðöññåñP eßóôá. Áéïëíøeåß Ýíá ðåñÜääéâíá ôíõ lpq -1:

```
waiting for bamboo to become ready (offline ?)
kelly: 1st [job 009rose]
      /etc/host.conf          73 bytes
      /etc/hosts.equiv         15 bytes

kelly: 2nd [job 010rose]
      (standard input)        1635 bytes

mary: 3rd [job 011rose]
      /home/orchid/mary/research/venus/alpha-regio/mapping 78519 bytes
```

### 10.5.3 Áöáßñåóć Åñäáóéþí

Áí áeëÜÛâôá áíþþç áéá iéá åññáóßá ðiö åß ÷ áôå áðiöôåßëåé ðñiò åêôýðùóç, iðiñåßôå íá ôçí áóáéñÝóåôå áðü ôçí ëßóôá áíáiiÞò ià ôçí áítôrëP lprm(1). Íðiñåßôå áéüiç íá ÷ ñçöéñiðiéÞóåôå ôçí lprm(1) áéá íá áóáéñÝóåôå iéá åíåñáP åññáóßá, áeëÜ ðeeáüi ûðiéí iÝñiò ôçò íá åêôôðùèåß Ýôéé áéé aéëéþò.

Áéá íá áöáéñ Ýóåôå íéá åñãáóßá áðü ôíí ðñïäðééåñí Ýíí åêôõðùôÞ, ÷ñçóéiiðiéÞóôå ðñþôá ôçí lpq(1) áéá íá åñãåßôå ôíí áñèéìü ôçò. ðåéôå ðëcëöññieäÞóôå:

© 1prm job-number

Áéá íá áöáéñ Ýóåôå iéá åññáóßá áðü êÜðieíï óðâæåêñéíÝíï åêôðùñôÞ, ðññioèÝóôå ôçí åðéëiäÞ -Þ. Ç áéüëiöèç åíöiëÞ áðáéññåß ôçí åññáóßá íå áññéèìü 10 áðü ôçí iññÜ áíajíïÞò áéá ôjí åêôðùñôÞ bamboo:

% lprm -P bamboo 10

C áíôíëP lprm(1) Ý÷åé ìåñéêÝò óõíôíïåýóåéò:

lprm -

Áöáéñåß üëåò ôéò åññáóßåò (ääá ôíí ðñíåðéëåäíÝíí åêôôðùôP) ðíø áÍPëiøí óå åóÜò.

## lprm user

Áöáéñâß üeåò ôéò åñäáóßåò (åéá ôíï ðñïåðééëåì Ýíï åêôôðùôP) ðiø áíÞéïõí óóïí ÷ñÞóôç (user). Í õðåñ÷ñÞóôçò (superuser) iøññâß íá áöáéñÝóåé åñäáóßåò. Üeëùí ÷ñçóôþí, åóåßò iøññâßóå íá áöáéñÝóåôå ìüñí ôéò äééÝò óáò.

lprm

Ç áíóëëP lprm(1) ÷ùñþò áñeeëü åñãáóþáò, üññá ÷ñþóöç, P - ðiö áìöáíþæåðáé óöçí áññáìP áíóëëþí, áöáéñåß ôçí ôñÝ ÷iöóá áíáññáP áññááóþá óöii ðñriäðéëåáìÝí áéððúòþ, áí áíþéåé óá óÜð. Í ððåñ ÷ñþóöçò (superuser) iðññåß íá áöáéñÝ óåé iðjeäëþðjóå áíáññáP áññááóþá.

Æá íá ÆðéYθåôå óå êÜðieii óóðåâéñei Ýíi áéooðùôP áíôb ôiõ ðñiâðééâai Ýíi, áðeÜ ÷ñçóéiiðiePóôå ôcí áðéëiäP - P  
iå ôéo ðáñáðÜíu óðiðiñáyóåéò. Æá ðáñÜâåéäia, ç áéüëiðeç áíôiðP áðéæñâb üéåò ôéo ðáñåáðåbô ôiõ ôñÝ÷iðiò  
÷ñPóôç áðü ôcí iøñÜ áíáiiPò ôiõ áéooðùôP rattan:

% lprm -P rattan -

```
% lpr -P rattan myfile
% rlogin orchid
% lpq -P rattan
Rank      Owner        Job    Files          Total   Size
active    seeyan       12     ...
2nd      kelly        13     myfile        49123  bytes
                                         12 bytes
% lprm -P rattan 13
rose: Permission denied
% logout
% lprm -P rattan 13
dfA013rose dequeued
cfa013rose dequeued
```

#### 10.5.4 ÐÝñá áðü ôi Áðëü Êåßìåíi: Ðåñéóóüôåñåò ÅðéëïäÝò Åêôýðùóçò

Ç áiíoēP lpr(1) õðiíoçñßæáé ieá aéÜiá åðéëiäþí aéá oíí Ýéåå ÷ i iinõiðiþçóçò êåeiÝíiø, iåðåðñiðþò añáoééþí eáé Üeëuí iinõopí añ÷åbùí, ðáñáaùðþò ðíeeáðþí áiðéañÜöuí, ÷åéñéóiiý åñááðéþí, eáé Üeëá. Ié åðéëiäÝò aðóÝð ðáñéañÜöiíðé óóci ðáñiivóá åúðôcôá.

#### 10.5.4.1 ÅðéëïäÝò ìñöiðiðçóçò êáé ìåðáôñiðþò

Íé áéüëiðèåð åðéëïäÝò ôçò lpr(1) áéÝã ðiñöiðiðçóç ôùí áñ ÷ åßùí ôçò åññáóßáð åêôýðùóçð. ×ñçóðiðiðþóâð ðéó áí ç åññáóßáð óáð åáí ðáñéÝ ÷ áé åðëü êåßìåñí P áí åðéëðiðåðóð íá ìñöiðiðþóâð åðëü êåßìåñí äéáíÝ ðiñ ðiñ åññáæåßið pr(1).

Åéá ðáñÜääéñíá, ç áéüëiðèç åíðiðþíâé Ýíá áñ ÷ åßí DVI (áðü ôi óýóôçìá óóïé ÷ åéïëåóßáð T<sub>EX</sub>) ìå üññá fish-report.dvi ôóii åêôõðùóð P ìå üññá bamboo:

```
% lpr -P bamboo -d fish-report.dvi
```

ÁðôÝò ié åðéëïäÝò åöáññüæíîóé óá êÜëå áñ ÷ åßí ôçò åññáóßáð, êáé Ýðóéé ááí iðiññåßóð íá áíáíßíâðå (áð ðiýíâ) áñ ÷ åßá DVI êáé ditroff ìáæß óðçí ßæéá åññáóßá. Åðëþð ðóâðéðóð ááí áñ ÷ åßá óáí äéáöiññåðééÝ ðiñ åññáóßáð, ÷ ñçóðiðþíâð åéáöiññåðééÝ ðiñ åðéëïäÝò iåðáôñiðþò ãéá êÜëå åññáóßá.

**Óçìåßùóç:** ¼éåò áðôÝò ié åðéëïäÝò åêôðüò ôçò -P êáé ôçò -T áðáéôïý áäéáôâðôçíÝíá ößëôñá iåðáôñiðþò åéá ôíí åêôðùóðùóð ðññiñéóíiy. Åéá ðáñÜääéñíá, ç åðéëïäþ -d áðáéôâð ðiñ ößëôñí iåðáôñiðþò DVI. Ç áíüðçðá Ößëôñá iåðáôñiðþò åßíáé åðñéóóüðåñåð eåððiñÝñåéåò.

-c

Åêôõðþíâé áñ ÷ åßá cifplot.

-d

Åêôõðþíâé áñ ÷ åßá DVI.

-f

Åêôõðþíâé áñ ÷ åßá êåéíÝññ FORTRAN.

-g

Åêôõðþíâé ååäññÝíá ó ÷ åæßáóçò (plot).

-i number

Åêôõðþíâé ôçíÝññ ìå åóï ÷ P number óðçëþí. Áí ðáññæåßþâð ðiñ number, ç åóï ÷ P èá åßíáé 8 óðþëâð. Áðôþ ç åðéëïäþ ðññéåýåé ìüñ ìå iñéóíÝíá ößëôñá iåðáôñiðþò.

**Óçìåßùóç:** ìçí ðiðiðéâðâðå êåíü åéÜóôçìá iåðáâý ôiñ -i êáé ôiñ áñéèliy.

-l

Åêôõðþíâé ååäññÝíá êåéíÝññ êáôÜ ãñÜñíá (literal), óðiðåññééâiâÜññóð êáé ôiñ ÷ åññáêôþñåð åéÝã ÷ iñ.

-n

Åêôõðþíâé ååäññÝíá ditroff (ååäññÝíá troff áíåñÜñôçðá áðü ôç óðóðâð).

-p

Íiñöiðíéâß ôi áðëü êâßìâiñ iå ôçí pr(1) ðñéí íá ôi áêôððþóâé. Åâßôå ôçí pr(1) ãéá ðâñéóóüôâñåò ðëçñiöiñßåð.

-T title

×ñçóéiiðíéâß ôi title oóçí êâðáæßää ôiô pr(1) áíôß ãéá ôi üññâ áñ ÷ åßiö. ÁôôP ç áðéëiäP áðéæñÜ iüññ üôáí ÷ ñçóéiiðíéâßôåé iå ôçí áðéëiäP -p

-t

Åêôððþíâé äâäiñ Ýíá troff.

-v

Åêôððþíâé äâäiñ Ýíá nÜóôâñ.

Åäþ áßíáé Ýíá ðáñÜäåéâiá: áôôP ç áíôiëP áêôððþíâé iéá êñøÜ iññöiðíéçì Ýíç Ýéäiöc ôçò óâëßääò áïçèâßåò ls(1) óôií ðñiâðééâiñ Ýíñ áêôððùôP:

```
% zcat /usr/share/man/man1/ls.1.gz | troff -t -man | lpr -t
```

Ç áíôiëP zcat(1) áðiööñðéÝæâé ôiñ ðçääßi êþäéêá ôçò óâëßääò áïçèâßåò ls(1) êáé ôiñ Üâé óôçí áíôiëP troff(1), ç iðiðá õiñ iññöiðíéâß éâé áçíéiññâß ôçí Ýíññi ôçò äâäiñ Ýíá GNU troff, óâ áðiðóÝëëâé óôçí lpr(1), ç iðiðá iå ôç óâæñÜ ôçò áðiðóÝëëâé ôçí áññääóßå ôiñ LPD. ÁðâéäP ÷ ñçóéiiðíéÞóâiå ôçí áðéëiäP -t ôiñ lpr(1), i spooler, êáðÜ ôç áéÜññâé ôçò áâðýðùôçò, èá iåðâðñ Ýøâé ôçí Ýíññi GNU troff óâ Ýíá ôýðiñ äâäiñ Ýíññi êáðâðñçðü áðü ôiñ ðñiâðééâiñ Ýíñ áêôððùôP.

#### 10.5.4.2 ÁðéëiäÝò ×åéñéóïíý Åññääóéþí

Íe áéñéóðâð áðéëiäÝò ôiñ lpr(1) iäçäiñýi ôiñ LPD íá ÷ åéñéóðâß ôéð áññääóßåò iå áéééüü ôññüði:

# copies

Äçíéiññâß Ýíáí áññëiñ copies (áíôéæñÜöñi) ãéá êÜëå áñ ÷ åßi ôçò áññääóßåò áíôß ãéá Ýíá iüññ áíôßññáöi. Í ãéá ÷ áéñéóðâð iðiññâ iå áðâáñññiðíéÞóâé áôôP ôçí áðéëiäP ãéá íá iâéþóâé ôçí êáðâðñçðó ôññ áâðôððùôþí êáé áññññyâé ôçí ÷ ñÞóç öùðiððéêþí iç ÷ áíçìÜöñi. Åâßôå ôçí áññüôçðå Ðâññéñéðiñ Æðôýðùôçò Ðiëéâðþí ÁíôéæñÜöñi.

Óâ áôðü ôi ðáñÜäåéâiá, áêôððþíññâlå ôiñ ðñiâðééâiñ Ýíñ áêôððùôP ôññâ áíôßññáöá ôiñ parser.c êáé ôññâ áíôßññáöá ôiñ parser.h:

```
% lpr -#3 parser.c parser.h
```

-m

ÁðiööñðéP mail iåðÜ ôçí iëiêëPññóç áâðýðùôçò ôçò áññääóßåð. Iå áôôP ôçí áðéëiäP, ôiñ óýóðçìà LPD óôÝëíáé mail ôiñ iëiññéâðiñ óâð áññääóßåð iëiêëçññùèâß i ÷ åéñéóðiñ Æðôýðùôçò ôçò áññääóßåð óâð. Óôiñ lPññiñ ôiñ, èá óâð áíçìñþóâé áí ç áññääóßå iëiêëçñþèçêå áðéôð ÷ þò P áí ðáññðóðÜðóðçêå óðÜëiá êáé (óð ÷ iÜ) ðiéü Pôáí ôiñ óðÜëiá.

-s

Äáí áíôéæñÜöâé óâ áñ ÷ åßá óôiñ êáðÜëiñ spool, áëëÜ áíôß ãéá áôðü, äçíéiññâß óðiññééÝò óðiññâýóâéð (symbolic links) ðññið áôðÜ.

Áí áéôôðþíâóâ íæ íâðÜéç áññáóßá, ßóùò ðéÝéâóâ íá ÷ ñçóéiiðiéÞóâóâ áóðð ðçí áðéëíðíð. Èá óâð áæððþóâé ÷ þñi óóíí éâðÜéïï spool (ßóùò ç áññáóßá óâð íá ððññâðßíâé ðíí áæðýéâñ ÷ þñi óïð óððóðÞlâðið áñ ÷ áðùí ðið ððñéÝ ÷ áé ðíí éâðÜéïï spool). Áðþóð ðéá êâññâðóââ ÷ ñüñi ãöiy ði L**PD** áâð íæ ÷ ñâðáóðâß íá áíðéññÜþâé üëç ðçí áññáóßá óâð óóíí éâðÜéïï spool.

Áðóü, ùóðóöi, Ý÷åé eáé Ýíá ìæííÝêóçá: áðü óç óóéäìP ðiø öi LPD èá ëÜíáé áíáöin Ü éáðóöeåßái óöi  
ðñùóðóöi ãñ÷åßí, äái eá Ý÷åðå äoíáðóöüçóá íá ìåðåññÝòåðå P íá äéåññÜðåðå öi ãñ÷åßí Ýùò üöiø åéðóðùèåßí.

**Óciáßúócs:** Áí áéööðþíáðå óá Ýíá áðíláiñðóí Ýíí áéööðùöþ, öí **LPD** ðééáíþö þá ÷ ñáéáðóåß öâéëéü íá áíðéæñÜøåé óá áñ÷åßá áðü öíí ðíðééü ðíðíëäéóöþ óóíí áðíláiñðóí Ýíí, áðílÍyíùò ç áðééïäþ -s óá áðóöþ öcí ðáñßðöñðóñóç áñíééíññílåß ÷ þññí óóíí ðíðééü éáðÜéíäí spool, áéëÜ ü÷é óóíí áðíláiñðóí Ýíí. Áíáéíëíðéåß ùñðóñðóí íá åßíáé éáéáßðóññá ÷ ñþþóéíç.

-1

Áðiiáêñýíâé óá áñ÷åßá ôçò åññáóßáò iåôÜ ôçí áíôéäñäöÞ ôiõò óoïí êáôÜëiäí spool, Þ iåôÜ ôçí åêôýðùóç ôiõò iå ôçí åðéëiäÞ -s. Íá åßóôá ðññöåâéöéiñ iå áôôÞ ôçí åðéëiäÞ!

#### 10.5.4.3 ÅðééñäÝò Óåðëßäùí Èåöáëßäáò

Áôô Ýò ié áôôeëia Ýò ôiô lpr(1) nñöèìßæïoí ôi êâßìåiâi ðiô éaïíîéê Ü àiöáíßæåôáé óôçí óâëßää êâöäéßääô ôçò åñâáôßåò. Áí ié óâëßääô êâöäéßääô ðáñâiðräßæïiôáé áéá ôií óôåéâéñei Ýii âéôôðùôP, áôô Ýò ié áôôeëia Ýò aâí Ý : iñí êâïßå åðßäñáôç. Äâßôå ôçí áiüôcôå Öâëßääô Éâöäéßääô áéá ðëcñïöñßåò ð : áôôéê Ü iâ ôéô nñöèìßôåéô ôùí óâëßääü êâöäéßääô.

-C\_text

ÁíóééáèéóôÜ óii üíñíá õðíïëíæéóôP óóç óáëßää áâöäéëßääò iå text. Óii üíñíá õðíïëíæéóôP ðíï ãïöáíßæåôáé áßíáé, áðü ðñïáððéëïP, óii üíñíá óiõ õðíïëíæéóôP áðü óiõ iðëßí Ýáéíá c áðíóþíëP ócò áññááóþáð.

-J *text*

Áíóééáèéóó Ü ói üññá åññáóßáò óóç óåëßää êåöäéßääò iå text. Ói üññá åññáóßáò ðiø åìöáíßæåôáé áðü ðññåðééïäP, åßíáé ói üññá öiø ðñþþöiø áñ÷åßíö ôçò åññáóßáò, P stdin áí ç åêöýðùóç åßíåôáé áðü ói standard input.

-h

Äåí åêôõðhíåé óåëßäá êåöáëßäáò

**ÓciáBúñócs:** ÁíÜéíáá iá óéò ñöéíBúóáéò, áóôPç áðééíäP Búñò íá lçí Ý-âé áðBúñáóç eüñü ðiö ñöñüðiö iá ðíí ðííBí áciéíññáíýíðáé íé óáëBääò êåðáëBääò. Áéá ðâñéóóüðâñáò ëåðóííÝññáéò, äåñðå ðíçí áíüñçöá ÓðæBúñáò ËåðáëBúñáò

## 10.5.5 Äéá÷åßñéóç Åêôõðùôþí

Ùò ãéá ðåñéóôòò, ñiâé Üóôçêá íá åâéåôåòòò Þóåôå, íá ñòðèìßóåôå êáé íá ãïééí Üóåôå ðïòò åéôôòðùò Ýò óåò.  
 ×ñçóéïïééþíôå ôçí åíöïëÞ lpc(8), iðñiñåßôå íá åðééïéúíÞóåôå ià ðïòò åéôôòðùò Ýò óåò ià åéüïç ðåñéóóüôåñïòò  
 ôñüöðïòò. lâ ôçí lpc(8), iðñiñåßôå:

- Íá áéééíáßôå êáé íá óóáíáôÜôå ôíòò áéôôôñùôÝò
  - Íá áíáññäiðíéåßôå êáé íá áðåñáññäiðíéåßôå ôéò iññÝò áíáiiiÞò
  - Íá áíáêåôåôÜóóåôå ðçí óáéñÜ áññáóþþí óå êÜëå iññÜ áíáiiiÞò

Êáôâñ ÷ Pi, iþá ócýiåþùñós ó ÷ åôðéê Ü ià ócý iinþeiåþá: áí Yíáo åêôðùñôþò åþiáé óðâiáðóçì Yíüð (*stopped*), äáí èá åêôðùñôþáé óþðiöå áðü ócý iõñÜ áíáiiþò åññáóéþí. Íé ÷ nþoôðå iðiññý áêüiç íá óðó Yéññiði åññáóþåð, ié iðiñþåð iðáþññiði óócý iõñÜ áíáiiþò Yíüð uuññi ì åêôðùñôþò iðæéiþoðé Þ eáèáñéóðåß ç iõñÜ áíáiiþò.

ÁÍ Ý÷áé áððáiññáðíéçéðþ ç iðñ Ü áíáiiñPò, êáíáßò ÷ñÞóðçò (âéðuò ðið root) ááí iðññáß íá áðiðóðåßéæ áññáóßåð óóiið  
âéðoðùñóþ. Íéá áíáññáP iðñ Ü áíáiiñPò áððeññÝðáé íá áðiðóáæíý áññáóßåð óóiið áéðoðùñóþ. Jáð áéðoðùñóþ iðññáß íá  
iððééíPóáé íá iðñ Ü áíáiiñPò áððáiññáðíéç YÍç, êáé óá áððP ðçí ðâññBððùñóç éá óðíá ÷ððáé íá áéððþíáé óéð áññáóßåð  
ðçò iðñ Ü ð Yù üðið áððP ááæéÜóáé.

ÃáéééÜ, ðñÝðåé íá Ý÷åôå ðñiiùíéá root áéá íá ÷ñçóëiïðíéÞóåôå ôçí åíôïëÞ lpc(8). Íé éáííééïß ÷ñÞóåôå ìðiñíýí íá ÷ñçóëiïðíéïýí ôçí åíôïëÞ lpc(8) iüíí áéá íá åëÝðiõí ôçí êåôÜôååç ôiõ åêôôðùôÞ êáé íá åðáíåééíýí ôíí åêôôðùôÞ óå ðåññôðôúóç iðëiêáñßöåïöiò.

abort *printer-name*

ÆáaæñÜöåé ðçí ðñÝ : iñðå áññääóßá éæé óðåñiaåðÜäé ðiiñ áåéðòðñùòþ. Ié ÷ ñIþóðåð iðiññiý áéñiiç íá áðiñðåßëiðí áññääóßåð áí c iññÜ Ááññiþð åbiñiáé áéñülc áññääñþ.

clean *printer-name*

ÄéáänÜöäé ôá ðáéëÜ Áñ÷åßá áðü ôíí êáðÜëíäí spool ôíö åéöðöñùöP. Ôá êÜðíëåðò ðåñéðöþóåéð, ôá Áñ÷åßá áðü ôá iðiñá áðioåëåßööé êÜðíëá åññáóßá äái åöäáéñíýíöé êáíííéêÜ áðü ôí **LPD**, åéäéêÜ áí ððÞñíáí ööÜëíäðå áéäðÜ ðçí åéöýðùöç P êÜðíëåðò áíÝñääéåð áðü ôíí äéá÷åéñéööP. ÁðöP ç åíðöëP åñÞööåé åñ÷åßá ðíð åái áíÞëíöí ööíí êáðÜëíäí spool êéäé ôá åöäáéñåß.

disable *printer-name*

Áðaíññaiðriéåß óçí iøñÜ áíáíiiPò áæá íÝåò åññáóßåò. Áí i åêooðùøPò ãiøçäýåé, èá óoíá ÷ ßoáé íá åêooðþfáé óéò áíáðriåßíáîôåò åññáóßåò óðçí iøñÜ áíáíiiPò. Í superuser (root) iøññåß ðÜíóá íá óóÝëíåé åññáóßåò, áêüìç êáé óá áðaíññaiðriéçíÝíç óåéñÜ áíáíiiPò.

ÁðóðP ç áðiðiðP ábíráé ÷ nÍÞoðiç, üððáí áëÝá- ÷ áðåá Ýá íÝí áðeððuñðP P üððáí áðæðæðóðUðå Ýá öððeññi: áððáíññiðiðPððå ðíçí iðñÜ áíáiiPð êáé óððaðeðå áññááðþåð óáí root. Ié ððüëiðið ÷ nÍÞoðað ðáí èá Ý ÷ iðñ áððáíðuðçðá íá áðiððaðeðiðið áññááðþåð Ýúð üððið iðiðeçñþððå ðiðð ãëÝá ÷ iðð ðáð êáé áððáíññiðiðPððå ðíçí iðñÜ áíáiiPð lað ðíçí áðiðiðP enable.

**down** *printer-name* *message*

Íäçääß ôíï áéôôðùôþ óá "êáôÝåáöíá" (down). Åßíáé eóíäýíáï íà ôí disable áéíëðèÿíåñí áðü Ýíá stop. Ôí message (íþföíá) åìöáíßæåôáé üöáí êÜðieíò ÷ñþöôcò åëÝã÷åé ôçí óåéñÜ áíáiiþò íà lpq(1) þ ôçí éáôÜóôáöç ôíï åéôôðùôþ íà lpc status.

enable *printer-name*

Áíáñäiðiþçócs ôçò iðöñÜð áíáññÍÞò ðið áéðôðùñôÞ. Íé ÷ ñÍÞóðåð lðiññiy íá áðiðóðåþeiði áññááóþåð áéëÜ i áéðôðùñôÞò ááí èá ôððþóáé Ýùð üöiñ iâééÍÞóáé.

`help command-name`

Ôððþíáé ðáæðbaðó aðíçéðbaðó áðáá óçí áðóïëþ *command-name*. Äþ ÷ùò öi *command-name*, áððóðþíáé leáð ðáññþëçþç üðñið ðúñið áðáé Ýðéiñið áðóïëþí.

**restart** *printer-name*

ÍlæééíÜ óíí áéðóðùóP. Íé éáññééíß ÷ ñPóðåò lðiññý íá ÷ ñçóéíðiéÞóíði áðóP óçí áíðréP lùñr óá êÜðíéá áéæéêP ðáñBðóðúóç ðiò oí LPD áái áðiññBíåðáé, áéëÜ áái iðiññý íá ílæéíÞóíði Ýíá áéðóðùóP ðiò Ý ÷ áé óóáíáðÞóáé áíðáéóBáð óùñr áíðóðíþí stop P down. C áíðréP restart áßíáé éóëäýíáíç iá óçí abort áéiñðíèýíáíç áðü óç start.

start *printer-name*

ÍâééíÜ ôíí åêôõðùôþ. Í åêôõðùôþò èá ôõðþóåé åñääóßåò áðü ôçí iõñÜ áíáiiiþò ôiõ.

**stop** *printer-name*

ÓóáiáóÜáé óíí áéooðùñòþ. Í áéooðùñòþ èá íeiéçñþoáé óçí óñ Ý ÷ iõóá áññáóßá óiõ êáé ááí èá óoðþroáé êáíßá Üeëç áññáóßá áðü óçí iõñ Ü áíáiiþò óiõ. Áéüìç êáé áí í áéooðùñòþ áßíáé óóáiáóçí Yíiò, ié ÷ nþroóåò iðiññýí áéüìç íá óó Yéññíòí áññáóßå áí áßíáé áñññäðièçí Yíç c iõñ Ü áíáiiþò.

`topg printer-name job-or-username`

ÁíáêáôÜðâíç ôçò iõñÜð áíáííïÞò áéä ôíï *printer-name*. Ôiðrëåöýíóáé ðñþòåð íé åññáóßåò ìå áñéèù áíáöinÜð job þ áððÝð ðið áíÞëiðí ôóí ÷ñÞóðç *username*. Áéá áððÞ ôçí áîòïëÞ, äáí ìðiñåßôå íá ÷ñçóéiiðiéÞòåðå all óóçí èÝóç ôíï *printer-name*.

up *printer-name*

Íaçāâb òii âéôôðùòp óá "áiÝâáóïá" (up). Ói áíôþèâóï ôçò áíðiëpò down. Éóíäöñáâb ìà ôçí start áéïëiðëýìâíç áðü ôçí áíðiëp enable.

Ôí lpc(8) ãÝ ÷åôáé ôéò ðáñáðÜíù åíöïëÝò óôçí ãñâìP åíöïëþí. Áí åái åéóÜâåôå êâíßá åíöïëP, ôí lpc(8) ìðáßíåé óå êâóðÜóôåóç áéëçëåðßäñáóçò (interactive), üðiõ iðñâðôå íá ðëçêðñïëåðôå åíöïëÝò iÝ ñé íá äþóåôå exit, quit, P end-of-file.

## 10.6 ÅíáëëáêôéêÝò Ëýóåéò ãéá ôïí ÓôÜíôáñ Spooler

Á Ý ÷ åôå lâæäôÞóåé ðéóôÜ üëí ñí êäöÜëáéí iÝ ÷ ñé åäþ, èá Ý ÷ åôå iÜëåé ó ÷ åäüí ôá ðÜíôá ó ÷ åôééÜ iá ñí öýôðçìá ðáñii ÷ Ýôåôöçò **LPD** ðiö äéåôßéåôáé iá ñí FreeBSD. Èá Ý ÷ åôå êáôáñiÞóåé êáé ðiëëÝó áðü ôéó åëëåßøåéò ñiö, ðiö ðöôééÜ åññíiýí ñí åñþòçìá: “Díéá Üëéá óôôôÞíáôá ðáñii ÷ Ýôåôöçò (ðiö íá èäéöiññaiýí óôí FreeBSD) ðöÜñ : ðiö åéæèÝóéíá;”

LPRng

Ói **LPRng**, ôi iðiþí ðeumáliðiá ócyláðiáé "LPR: the Next Generation (ç Åðüùláiç ÅåiéÜ)" ábíráé iéá áðü ðocí áñ÷Þ ðeüðiðiþçóç ôiõ PLP. Í Patrick Powell éaé í Justin Mason (éýñeiò oðiðoçñóÞo ôiõ PLP) oðiñãnaðóóçéaí ãaéá íá ðeumáliðiáói ðeumáliðiá. Ç éýñéá ðiðiðeåóþá ôiõ **LPRng** ábíráé ç <http://www.lprng.org/>.

CUPS

Ôi CUPS, P áéééphò Common UNIX Printing System, ðáñÝ ÷ áé iéá öiñçòP ðëáôöüñiá âéôôðþóùí ãéá  
ëåéöiñnæé Ü óoôôðiáôá ááóéóí Ýíá ðóí UNIX. Áíáðóý ÷ èçéâ áðü ôçí Easy Software Products ãéá íá ðñiùèþoáé  
iéá ðóÜíôñi éyóç áéôôðþóùí ãéá üëiñð ðiñð ÷ ñþðôåð ééá êáôáôéâðáôðÝ ò UNIX.

Ôi CUPS ÷ nçóeíü ðíriéåb ôi ðñùðöüëëeí Internet Printing Protocol (IPP) ùò aÜóç ôiõ áæá ôç áæá ÷ áßñéóç áññääóéþí áåðýðñóç ñðéå iñþí áíáiiÞð. ðíiðñbæíïóá åðßóç, áéëÜ ìa íæéùí Ýíç éæäöiññääéüöçðá, ôá ðñùðöüëëeá Line Printer Daemon (LPD), Server Message Block (SMB), éåé AppSocket (äfùñóöù ùò JetDirect). Ôi CUPS ðñiøè Ýôåé åðíáðùñöçðå áíß ÷ íåðöçò áééöðåéþí åèöðöñöþí, áíþ iÝóù ôùí áðéëíäþí PostScript Printer Description (PPD) áññåðåé åöééðøÞ ç ððíöðøÞñéíç óýä ÷ ñíñú áåðöðñöþí ôóii ëüoii ôiõ UNIX.

Ҫ êýñéá ôïðìèåóßá ôïð CUPS åßíáé ç <http://www.cups.org/>.

HPLIP

Ôi **HPLIP**, P Óyooôciá Áðåééüíéóçò êáé Åêóýðùóçò ôçò HP ãéá Linux, åbíráé ieá óiõßôá åöáñiiäþí ãéá óðóéâðÝò ôçò HP, ðiõ ððiøöçñßæåé ëåéðiõñäßåò üðùò ç åêóýðùóç, ç óÜññóç êáé c áðiøöiëP / ëPçç öái. Ç óiõßôá åðóP ÷ñçoeíñðiæåß ðiõ **CUPS** ùò backend ãéá êÜðiæåò åðü ôeó ëåéðiõñäßåò åêóýðùóçò ðiõ ðánY ÷:åé. Ç êýñéá åéêððåêP ôiðiøåðßá ôçò åöáñiiäþò **HPLIP** åbíráé <http://hplipopensource.com/hplip-web/index.html>.

## 10.7 Åíôïðéóìüò Âëáâþí

ÍàðÛ ôçí âêô Ýëåóç ôïõ áðëëíý ôåoo ìå ôï lptest(1), áíôß ôçò êâîñíéêÞò áêôýðùóçò, ìðñmåß íá Ý ÷ áôå ëÜâåé ùò áðïõ Ýëåóïá ìßá áðü ôçô áéüëíøèåð êâôåóô Üóåéò:

Í åêôõðùôþò êáèõóôÝñçóå íá îåêéíþóåé þ äái åêôýðùóå iëüüëçñç ôç óåëßää.

Í áêôôðùôÞò ôýðùóå ôí ôåôô, áæëÜ áái íâéßíçóå ái Ýóùò. Óóùò ÷ ñâæÜóôçêå íá ðeÝóåôå ôí ðeÞêôñii PRINT REMAINING Þ ôí FORM FEED ôíõ áêôôðùôÞ óáô áéá íá áîöáíéôôåß ôí áðéèöìçóü áðíôÝéåóíá.

ÁÜÍ áßíáé üíóùò áðòþ Ç ðâñþðòùóç óáó, í áåðòðùòþ ðéæáíþò íá Þòáí óá áíáiiíþ ãéá íá áîáññéþþóåé áí ñðÞñ ÷ áí ðñüöøéåóå áåäiiÝíá óóçí áññááþá áêðýðuóçò ðñéí íåééíþóåé íá áêðòðþíåé íòéäþðiôå. Áéá íá äéññéþþóåå óïí ðñüüäçíá, iðññáßóå íá èÝóååó õí ðëëöñí êåéíÝíï íá óó Ýéíáé Ýíá ÷ áññáéðþñ FORM FEED (þ Üéëír éåðóÜëëçëí) óóïí áêðòðùòþ. Áðóù óóíÞèùò áßíáé áñéåðü áéá íá iðññáßóå íá áêðòðþíååóå éåóåðeåßáí iðñéäþðiôå éåßíáññí áðñíÝíáé óá áíáiiíþ óóçí áðóùåññéþ iíÞíç (buffer) óïò áêðòðùòþ. Áßíáé áðþóçò ÷ ñÞóéii íá ññðéíßæåóå óéò áêðòðþþóåéò óáó þþóå íá óåéäéþíï ìá áåéÜóç ðçí óåéäðóåþá óåéßää, þþóå ç áðüìäíç áññááþá íá lçí áñ ÷ ßæåé áðü óá lèðÜ óïò ðñïçäiýíåññí ðýéëçí.

Ç áéüëïöèç ôñiiðiñibçóç óóï shell script /usr/local/libexec/if-simple áêôôðþíáé Ýíá form feed ìåôÜ ôçí áðiøôïëÞ ôçò áññääóßåó óóïí áêôôðùôÞ:

```
#!/bin/sh
#
# if-simple - Simple text input filter for lpd
# Installed in /usr/local/libexec/if-simple
#
```

```
# Simply copies stdin to stdout. Ignores all filter arguments.
# Writes a form feed character (\f) after printing job.

/bin/cat && printf "\f" && exit 0
exit 2
```

Ç áêôýðùóç ðáññöóé Üæåé “öáéíüìåñí óéÜëáò (staircase effect).”

Óóçí áêôýðùóç óáò öáßíåôáé ôí áéüëíðèë:

```
! "#$%&' ()*+, -./01234
#$%&' ()*+, -./012345
#$%&' ()*+, -./0123456
```

Åßíåôå Ýíá áéüìá èýíá ôíö öáéíüìÝíiö ôéÜëáò, ðíö ðñiéëÞèçéå áðü áíðéöáôéé Ýò áñíçíåßåò ôúí ÷áñáêôÞñùí íå ðíö iðíßíöö áçéþíåôáé ç ôññöíäöáá ÍÝáò áññáìÞò. Óå éáéöíññäé Ü óðóðÞíáðå óýðíö UNIX ÷ñçóéíðíéiyí Ýíá íüñí ÷áñáêôÞñá ASCII íå êùäééü 10, ôíí line feed (ôññöíäöáá áññáìÞò, LF). Óí MS-DOS, ôí OS/2®, êáé áéÜöñä Üëéá, ÷ñçóéíðíéiyí Ýíá æáýáò ÷áñáêôÞñùí ASCII êùäééiyí 10 êáé ASCII êùäééiyí 13 (ôíí carriage return þ áéééþò CR). Ðíëëíß áêôôðùóðÝò ÷ñçóéíðíéiyí ôçí óýíâáóç ôíö MS-DOS áéá ôçí áéëáâðÞ áññáìÞò.

¼ôáí áêôôðþíåôå íå ôí FreeBSD, ôí éáßíåñí óáò áðéÜ ÷ñçóéíðíéåß ôíí ÷áñáêôÞñá ôññöíäöáá áññáìÞò (line feed). I áêôôðùóðÞò, iùëëö åíðééçöðéåß ôíí ÷áñáêôÞñá line feed, ðñiùèåß ôí ÷áñôß êáôÜ ißá áññáìÞò, áéëÜ êñáðÜ áé ôçí ßäéá èÝóç iñéæüíðéá éáèþò éáéâðôáé íá áêôôðþíåß ôíí áðüñìåñí ÷áñáêôÞñá. Óå áðôü ôí óçíåßí ÷ñçóéíðíéåßôáé ôí CR (carriage return): íåôáééíåß áçéáâðÞ ôçí èÝóç áññááóßåò áéá ôíí áðüñìåñí ÷áñáêôÞñá ðíö ðññüéåéôáé íá áêôôðùéåß ôíí áñéôôðáññü Úêñí ðíö ÷áñôéiyí.

Óí FreeBSD áðéèöíåß í áêôôðùóðÞò íá iðíñåß íá áíáññååß ùò áíÞò:

¼ôáí í áêôôðùóðÞò éáíáÜíåé CR	Íá áêôôðþíåé CR
¼ôáí í áêôôðùóðÞò éáíáÜíåé LF	Íá áêôôðþíåé CR + LF

ÓðÜñ ÷iðí áéÜöñíé ôññüðíé áéá íá áðéôðå ÷éåß áôôü:

- × ñçóéíðíéÞóôå óá ðéÞèôñá ïýèíéóçò ôíö áêôôðùóðÞ Þ ôíí ðßíåéá áé Ýá ÷iðí áéá íá áéëÜíåôå ôíí ôññüðí íå ôíí iðíßí áñíçíåýåé áôôïýó ðíö ÷áñáêôÞñåò í áêôôðùóðÞò óáò. Óðíàïðéåðôðåßôå ôíí áã ÷áéñßäéí ÷ñÞóçò ðíö áéá íá áåßôå ðúò iðíñåß íá áßíåé áôôü.

**Óçíåßùóç:** Áí Ý ÷åôå éáé Üëéá éåéöíññäéé Ü óóï óýóôçíá óáò áêôüò áðü ôí FreeBSD, ðéèáíüí íá ÷ñâéáôôðåß, üðáí óá ÷ñçóéíðíéåßôå, íá áðáíáññöèíßóôå ðíí áêôôðùóðÞ óáò þóôå íá áñíçíåýåé áéáöíññåéé Ü ðíö ÷áñáêôÞñåò CR éáé LF. Óóçí ðáñßðôóç áôôÞ, ßóùò áßíåé éáéýôâñí íá ðññöéíþóôå ëÜðíéá áðü ôéò éýóâéò ðíö áéëíðíéiyí.

- I íäçäüò (driver) ôçò óåéñééâðÞ áññáìÞò ôíö FreeBSD iðíñåß íá íåðâðñÝðåé áðôüñâáóá áðü LF óå CR+LF. ÕðóééÜ, áôôü ãïðëéåýåé iññí óå óâéñéáé Ýò èýñåò. Áéá íá áíáññáïðíéÞóôå áôôÞ ôçí éâéöíññåßá, ÷ñçóéíðíéÞóôå ôçí ééáíüöçôå ms# êáé iññôôå ôçí éâôÜôôáóç éâéöíññåßáò onlcr óôï áñ ÷åßí /etc/printcap áéá ôíí áêôôðùóðÞ.
- Óôåßëôå Ýíá êùäééü ãéáöðâðÞò (escape code) óôïí áêôôðùóðÞ þóôå íá ÷áéñßæåôáé ðññöùññéíÜ ôíö ÷áñáêôÞñåò LF íå áéáöíññåééü ôññüðí. Óðíàïðéåðôðåßôå ôíí áã ÷áéñßäéí ÷ñÞóçò ðíö áêôôðùóðÞ óáò áéá ôíö ðþäééåò áéáöðâðÞò ðíö ððíöðçñßæüíðáé. ¼ôáí áíáéâéýþâåò ôíí éâôÜëéçëí, íåðâðñÝþôå ôí ðëëéññí éâéÝíiþ þóôå íá óôÝëíåé ðñþôå ôíí êùäééü, éáé Ýðåéôå ôçí áññááóßå óóïí áêôôðùóðÞ.

Åäþ áßíáé Ýíá ðáñÜääéäíá öþëôñïõ êåéí Ýíïõ ãéá áâéôôðùôÝð ðïõ êáðáéââáßíïõ õïõð èùäééïýð äéáöôðþò PCL ôçò Hewlett-Packard. Áðóü õï öþëôñï ëÜíâé ôíï áâéôôðùôþ íá ÷âéñßæâðáé ôïõð ÷âñáêôþñâð LF ùò LF éáé CR. ðääéðá áðíðôÝëëâé ôçí âññáðßá, óðÝëññôðô õðï ôÝëïð ôçð Ýíá ÷âñáêôþñâ áæëâðþð ôâëßââð (form feed) þóðâ íá áßíáé óùôðþ áññâðâðþ ôçð ôâëâðâðßáð óâëßââð. Ôï öþëôñï áðóü èá ðñÝðâé íá ïïõðâýâé ìå ó÷âðüí ûëïðô õïðô áâéôôðùôÝð ôçð Hewlett Packard.

```
#!/bin/sh
#
# hpif - Simple text input filter for lpd for HP-PCL based printers
# Installed in /usr/local/libexec/hpif
#
# Simply copies stdin to stdout. Ignores all filter arguments.
# Tells printer to treat LF as CR+LF. Ejects the page when done.

printf "\033&k2G" && cat && printf "\033&10H" && exit 0
exit 2
```

Åäþ áßíáé Ýíá ðáñÜääéäíá ãéá ôï /etc/printcap áñüð õðíëïäéôþ ìå üññâ orchid. ÷âé Ýíá ìüñâ áâéôôðùôþ óðçí ðñþðç ðáñÜëëçëç ëýñâ õïð, Ýíá Hewlett Packard LaserJet 3Si ìå üññâ teak. ×ñçóëïðíëâð ôï ðáñáðÜñ script ùò öþëôñï ëåéí Ýíïõ:

```
#
# /etc/printcap for host orchid
#
teak|hp|laserjet|Hewlett Packard LaserJet 3Si:\n
:lp=/dev/lpt0:sh:sd=/var/spool/lpd/teak:mx#0:\n
:if=/usr/local/libexec/hpif:
```

Åêôôðþíâôáé ç ìßá âññâìþ ðÜñû óôçí Üëëç.

Í áâéôôðùôþò ãái ðññùèâð êáëüëïð ôï ÷âñôð êáé üëâð ié âññâìþ ðññùèâð ôïðþíâé ç ìßá ðÜñû áðü ôçí Üëëç, óâ ìßá âññâìþ.

Áðóü ôï ðññâëçìâ áßíáé ôï “áíðþóôñïð” ôïð õáéññùâñïð ôéÜëâð, ðïõ ðáñéññÜøâíâ ðññùâñïð Ýñùð, êáé áßíáé ðíëý ñðÜíéí. Óâ êÜðíëí ôçìâðþ, ié ÷âñáêôþñâð LF ðïð ÷ñçóëïðíëâð ôï FreeBSD ãéá íá ðâññâðþââé ôçí âññâìþ, áññçâññíðâé ùò ÷âñáêôþñâð CR ié iðiðié áðéóðñÝðiðið ôçí êâðâëþ ôðï áñéóðâñü Úññi õïð ÷âñôðíý, áëëÜ åðâð ÷âññâð ìå ðññùèðþðiðið ôï ÷âñôð ìßá âññâìþ ðññùð ôá êÜðù.

×ñçóëïðíëðþóðâ õïðô ãéáëüððâð ññðëìßóðâñü õïð áâéôôðùôþ þ õïð ðßíáâá åëÝð ÷âññâð ìå ëÝðâðâ òéð áâéüëïðèâð åðéëëâÝð ãéá ôá LF êáé CR characters:

Í áâéôôðùôþò ëáíâÜíâé	Í áâéôôðùôþò ôôðþíâé
CR	CR
LF	CR + LF

Í áâéôôðùôþò ãái áâéôôðþíâé (÷Üíâé) êÜðíëïð ÷âñáêôþñâð.

Í áâéôôðùôþò, áíþ áßíáé óâ ëâéðïðñâðá áâéðýðñôçð, ãái áâéôôðþíâé êÜðíëïð ÷âñáêôþñâð óâ üëâð ôéð ìßá âññâìþ. Òí ðññùâëçìâ ðééâáþò íá áßíâðâé áíðññüðâñü êâëþò ç áâéðýðñôç áââëßóðââðâé, ÷Üññðâð ãéüñç ðâññéóðüâññïð ÷âñáêôþñâð.

Ôï ðññùâëçìâ áßíáé ðùð ì áâéôôðùôþò, êáëþò áâéôôðþíâé, ãái ðññëáâðßíâé íá áéïëïððþóâé ôçí ôá ÷ýðçôá ìå ôçí iðiðßá í

ðõðíeiäéóðÞ ðó Ýéïåé äääñí Ýíá í Ýòú ôçðó óåéñéâéÞð äéáóýfääöçð (áðóü ôí ðñüâéçìá äáí ðñÝðåé êáñííéêÜ íá óðíiâáßíé óå åéðóðùôÝð óðíiâí Ýíïðó óå ðáñÜëéçéåò eýñâò). ÕðÜñ÷ií ãýí ôñüðié äéá íá iâðâñáôðâß áðóü ôí ðñüâéçìá:

- ÅÜí i äôôöðñôPö öðiöðçñßæåé Ýëåä÷ i ñiPö XON/XOFF, ñöèiñööôå öi FreeBSD íá öii ÷ñçöéiiðiéÞöåé iñßæiiðoå öçí éåôÜóôáóç ëåéöiññäbåò ixon iå öçí ééåñüöçöå ms#.
  - ÅÜí i äôôöðñôPö öðiöðçñßæåé Ýëåä÷ i ñiPö öýðiö Request to Send / Clear to Send (hardware handshake, åíùööü éåé iå öçí iññiñößå RTS / CTS), ðñ Ýðåé íá iñéööôåß ç éåôÜóôáóç ëåéöiññäbåò crtscts ööçí ééåñüöçöå ms#. Ååååéùèåßôå ðùö öi éåéþäéi ðiö ööñäÝåé öii åêööðñôP iå öii öðiëiñéööP åßíáé óùööÜ ööéåñiÝii æåé ÷ñPöc åööiy öiö åeÝå÷ iö iñiPö.

Í áêôõðùôþò ôõðþíåé óêïõðþäéá.

Äåí óðíÝâç ôßðiôå, i åêôðùôÞò äåí iåêßíçóå êáí.

Áí ááí óoÍÝâc ôBðrõå, ôi ðñuâæciá ðééáüí íá ðoåßëåôåé óoï FreeBSD êáé ü÷é óoï hardware. Ðñiøe Ýóoå ôcié êéáíüôçôå áñ÷åßiø êáôåâñáöÞò (log file, 1f) óoï áñ÷åßi /etc/printcap, ôoçí êáôå÷þñéóç ôiø åêôôðùôÞ ðiø Ý÷åé ôi ðñuâæciá. Áéá ðáñÜäæáíá, åäb åßiáé c êáôå÷þñéóç áéá ôiï rattan, iå ôcié êéáíüôçôå 1f:

```
rattan|line|diablo|lp|Diablo 630 Line Printer:\n    :sh:sd=/var/spool/lpd/rattan:\\n    :lp=/dev/lpt0:\\n    :if=/usr/local/libexec/if-simple:\\n    :lf=/var/log/rattan.log
```

ঝাঁওা, ঢন্ডারো ই তাঁরাদেখোঠভোঁও। আঁ যাইো ও আঁ দেখি এাদান্নাপো (log) (ওয়ি ঢান্ডান্নাপো, /var/log/rattan.log) আঁ ই অন্ধবো ঢেকাইয়ো আঁড়ো কে উত্তু। লা আ উচ্চ ও ই ইয়ি ই ও ঢেকাও, ঢন্ডারো ই আঁ এইন্দৰভোঁও ও ঢন্ডাহেস্বি।

Áí áái êáéïñþóåôå ôcí ééáíüôçôá 1f, ói **LPD** ÷ ñçóéiiðiéåß áðü ðñriåðééiäP ói /dev/console.

# ÊåöÜëáéí 11 Óõìâáôüôçôá ìå ÅêôåëÝóéíá ôïõ Linux

ÁíáäüPèçêå éáé iÝñç ôïõ áíáíåþèçêáí áðü ôïí Jim Mock. Áñ÷ééP óõíåéóöñÜ áðü ôïí Brian N. Handy éáé Rich Murphey.

## 11.1 Óýiiøç

Ôi FreeBSD ðáñÝ ÷åé binary óõìâáôüôçôá (åêôåëÝóéíùí) ìå áñêåôÜ Üëëá ëåéöiõñãééÜ ôýðiõ UNIX, óõìðåñééåíåññÝñí ëáé ôïõ Linux. Óá áðüü ôï óçìåþí, iõññåß íá áíáñùôéÝóóå åéåðôå èñééåþò ÷ñåéÜæåðåé ôï FreeBSD íá iõññåß íá ôñÝ íåé åéôåëÝóéíá Linux; H áðÜfôççóç óå áðôP ôçí åñþþôççóç åþíáé áñêåôÜ áðëP. ÐíëëÝò åðåéñþåß ëáé ðñiññåíåðéóôÝò áíáðôýóðiõi ãðáññíäÝò iññí ãéá Linux, iéá éáé åþíáé ðíëý “ôçò iññåð” óôï êtióïi ôùí õðíëëééóðíþí. Áðöüu áíáæéÜæåé åíÜò ôïõ õðüëëéðiõò, ðíò ÷ñçóéíðiëíýíå ôï FreeBSD, íá ðéÝæiõíå ôéò ßæéåò áðôÝò åðåéñþåß ëáé ðñiññåíåðéóôÝò íá åçíéiõññPòiõí åéáññééÝò åéäüüóåéò ôùí åðáññíäþí õïòò ãéá FreeBSD. Ôí ðñüñåéçíå åþíáé, üðéé ié ðåñéñðñüðåñðò áðüu áðôÝò ôéò åðåéñþåß ãåí åðééññåÜññóåé ðñáññåðééÜ ðüñéé ðåñéñðñüðåññé Üñññüðíé èá ÷ñçóéíðiëíýóáí ôï ðñiññíüí ôïòò áí åþ÷åí åéäüüóåéò éáé åéá FreeBSD, éáé ié ðåñéñðñüðåñðò óõñíå ÷ßæiõí íá áíáðôýóðiõi iññí ãéá Linux. ¶ñá òé iõññåß íá êÜíåéÝíå ÷ñPòôçò ôïõ FreeBSD; ÅäþÝñ ÷åðåé íá åïçèPóåé ç binary óõìâáôüôçôá ôïõ FreeBSD ìå ôï Linux.

Åí óõìâáôüôçôá, ç óõìâáôüôçôá åðééññÝò ñPòôåò ôïõ FreeBSD íá åêôåëÝóíõí ðåññþðiõ ðí 90% üëùí ôùí Linux åðáññíäþí ÷ñùñò ñåðåññðíðÝò. Áðöüu ðåñéëéåíåÜíåé åðáññíäÝò üðñòò ôï StarOffice, ôçí Linux Ýéäïóç ôïõ Netscape, Adobe Acrobat, RealPlayer®, VMware™, Oracle, WordPerfect®, Doom, Quake, éáé ðåñéñðñüðåññá, ÷åé åðßþçò áíáðññéåß üðéé óå êÜðíéåò ðåñéñðþóåéò, óå åêôåëÝóéíá ôïõ Linux Ý÷iõí éáéýôåñç åðüññíç óôï FreeBSD áðü üðéé ôôï Linux.

ÑðÜñ ÷iõí ùðóüüöi êÜðíéá óðññééññÝíå ãéá ôï Linux óðiõ ÷åßá ôïõ åééöiõñãééýí ðíò ååí õðññóçññþæíñðåé óôï FreeBSD. Óá åêôåëÝóéíá ôïõ Linux ãåí éá äiõðëÝøiõí óôï FreeBSD áí ÷ñçóéíðiëíýí ðíëëÝò åíåéäééåðò Ýíåò êëPóåéò i386, üðñò ãéá ðáñÜäåéññå ãçí åíáññíðiþççóç ôçò åééíééþò êáðÜóóåçò 8086.

Áöïý åéåáÜóååå áðöüu ôï êåöÜëáéí, èá iÝññåôå:

- Ðùò íá åíáññíðiéPóååå ôçí óõìâáôüôçôá åêôåëÝóéíùí ìå ôï Linux óðiõ óýóôçìå óåò.
- Ðùò íá ååéåååóóPóååå ðññüñéååò ëiõíü ÷ñçóóåò åéåééíéþêåò ôïõ Linux.
- Ðùò íá ååéåååóóPóååå åðáññíäÝò ôïõ Linux óðiõ FreeBSD.
- Òéò ååðññÝñåéåò ôçò ðëiõþççóç ôçò óõìâáôüôçôåò ìå ôï Linux óðiõ FreeBSD.

Ðñéí åéåáÜóååå áðöüu ôï êåöÜëáéí, èá ðñÝðåé:

- Íá åíññþæåå ðùò èá ååéåååóóPóååå ðññüñéåå ëiõééíéü ôññþòi õåðåóðéåðåóóP (ÊåöÜëáéí 5).

## 11.2 ÅêéåôÜóôåóç

Ç óõìâáôüôçôá ìå åêôåëÝóéíá ôïõ Linux ååí åþíáé åíáññåP åí’ áñ ÷þò. Í åðéíëüðåññò ôññþðiò åéá íá åíáññíðiéPóååå áðôP ôç åééóññåßá åþíáé íá öiññþþóåå õi KLD (Üñññùíá) linux (“Kernel Loadable object”). Ìðiññåßòå íá öiññþþóåå áðöüu ôï Üñññùíá óðiõ ðõñþíá åþññíðåò ôç ðáññåêÜðò åíôíëP ùò root:

```
# kldload linux
```

Áí èÝëåôå íá Ý÷åôå ðÜíôá åíâñäiðíéçìÝíç ôç óõiàáðüôçôá iå Linux, ôüôå èá ÷ñâéáóôåß íá ðññöèÝóåôå ôç ðáñáêÜôù ãñáiiP óiõ /etc/rc.conf:

```
linux_enable="YES"
```

Ç åíóïëP kldstat(8) iðiñåß íá ÷ñçóéiðíéçèåß æéá íá åëåä÷èåß áí ôiõ KLD åbíáé öiñôùìÝíi:

```
% kldstat
Id Refs Address      Size      Name
 1    2 0xc0100000 16bdb8  kernel
 7    1 0xc24db000  d000  linux.ko
```

Áí æéá êÜðiéi ètuäi åái èÝëåôå P äå iðiñåßôå íá öiñôþoåôå ôiõ KLD, ôüôå iðiñåßôå íá óõiäÝóåôå óôáôéêÜ ôçí ðññöðPñéiç åêôðåëÝóéiùí ôiõ Linux ôóíí ðõñPíá iå ôi íá ðññöèÝóåôå ôçí åðééiäP options COMPAT\_LINUX ôóí ãñ÷åßuí ññðiñßoåùí ôiõ ðõñPíá. Óðç óõíÝ÷åé åðééi ðõñåßôå íá åâéáôåôþoåôå ôiõ iÝí ðõñPíá üðò ðåñéæñÜðåôåé ôóí ÈåöÜëáéí 9.

## 11.2.1 ÅâéáôÜóôåóç ôùí Linux Runtime Libraries

Áðôü iðiñåß íá åßíåé iå åyí òñüðiõò. Åßôå iå ôç ÷ñþoç ôiõ linux\_base-fc4 port, P iå ÷åéñiñßíçôç åâéáôÜóôåóç ôiõò.

### 11.2.1.1 ÅâéáôÜóôåóç iÝóù ôiõ linux\_base Port

Áðôüð åßíåé åáð Ü åâíéêP ñiñéiäßá i åðééiñðôåñiò ôñüðiò åéá ôçí åâéáôÜóôåóç ôùí runtime libraries. Åßíåé ç Bæá åéââééåðå åâéáôÜóôåóçò ðiõ åééiñðeåßôåé åéá åéá iðiñéiPðiõå Üeëi port åðü ôç ÓðëëiäP ôùí Ports (/usr/ports/). ÁðëÜ êÜíôå ôi ðáñáêÜôù:

```
# cd /usr/ports/emulators/linux_base-f10
# make install distclean
```

**Óciàßùóç:** Áí ÷ñçóéiðíéåßôå êÜðiéá Ýéâëíç ôiõ FreeBSD ðñéí ôçí 8.0, èá ðñÝðåé íá åâéáôåôþoåôå ôiõ port emulators/linux\_base-fc4 áíôß åéá ôiõ emulators/linux\_base-f10.

Èá ðñÝðåé ôþná íá Ý÷åôå êáññéêP óõiàáðüôçôá iå åêôåëÝóéí åiõ Linux. IåñéêÜ ðññäñÜìáðá ðáñáðiñéiýíôåé üôé ie åéââééiðþeåò ôóðôþiáòiò (system libraries) åái åßíåé ôç ôâéâððåßá ôiõò Ýéâëíç. ÅâíéêÜ üìùò, áðôü åái áðiðåëåß åáíÝíá ðññüâéçìá.

**Óciàßùóç:** Iðiñíýí íá ôðÜñ÷iõ ðiñééáðëÝò åéäüóåéò ôiõ emulators/linux\_base, ðiõ íá áíôéóôié÷iýí óôéò åéáöiñåðéêÝò åéäüóåéò ôuí åéáiiþi Linux. Èá ðñÝðåé íá êÜíåðå åâéáôÜóôåóç ôùí ports ðiõ ðññäñðáéôiýíôåé åðü ôéò åöaññäÝó Linux ôéò iðiñßåò èÝëåôå íá åâéáôåôþoåôå.

### 11.2.1.2 ×åéñïèßíçôç åãêáôÜóôáóç ôúí Libraries

ÃáíééÜ, ôíöeÜ ÷ éóóí óóéó ðñþòåð óáó áâéâóâðóÜóâéó áöðñííäþí Linux, èá ÷ ñâéáðóâß íá øÜíâðåð áéá ðéó ëíéíÝð áéâéëíèþêåò áðü óá áíðþóðíé ÷ á áéôðæÝóéíá. ÍàðÜ áðü êÜðíëí áéÜóðçìá èá Ý ÷ âðå Ýíá ééâñíðíéçóéêú áñéèíü Linux shared libraries óóí óýðóðçíÜ óáð èáé ðëÝíí áâ èá ÷ ñâéÙæâðâé áððéðëÝíí áññâáðßá ðÝñá áðü óçí áâéâðÜóðâóç óçð áððñííäþo.

### 11.2.1.3 ÅêáôÜóôáóç Đñüóèåôùí Shared Libraries

Êáé ôé áßíåðáé óôç ðâñßðôùóç ðïõ Ý÷åðå áâæåðåóðÞóåé ôï linux\_base port êáé íé åöåññíäÝò óåð åêüìç ðâñäðííëýíóáé áæá shared libraries ðïõ èåßðïõí; Ðþò îòññåßôå íá Ýñâðå ðïëá shared libraries ÷ñâéÜæåðåé êÜðïëá åöåññíäÞ, áæá ðïõ îòññåßôå íá óå åññåßôå; ÁáóéÜ, ðôÜñ÷ïõ 2 åðëëíäÝò (áæá íá áéëëíðøÞóåðå ôéð ðâñâéÜòù íäçñßåð èá ðñÝðåé íá åßóðå root óóï óýóðçìÜ óåð).

Áí Ý÷åôâ ðñüöåáóç óá êÜðëëí íç÷ Üíçìá Linux, ñßîôâ iéá iaóëÜ óôá shared libraries ðiò ÷ñäéÜæåôáé iéá åöáñìäP, êáé áíôéæñÜþôå óá óöi FreeBSD. Ååßôå õi ðáñäéÜðù ðáñÜäåéäíá:

```
% ldd linuxdoom
libXt.so.3 (DLL Jump 3.1) => /usr/X11/lib/libXt.so.3.1.0
libX11.so.3 (DLL Jump 3.1) => /usr/X11/lib/libX11.so.3.1.0
libc.so.4 (DLL Jump 4.5pl26) => /lib/libc.so.4.6.29
```

Èá ÷ ñåéåóôåß íá ðÜñåôå üéá óá áñ÷åßá áðü ôç ôåëåôåßá óôÞèç, êáé íá óá áíôéæñÜøåôå óóiií êåóÜëëiäi /compat/linux, êáé íá äçïéïññÞóåôå ðñïö Ü ðñïö áôôÜ ðñïö áíôßóôíé÷iñò ðñïö áôôÜ (symbolic links) iå óá iiñüåôå ôçò ðñïþçò óôÞèçò. Áôðü óçíåßíé üéô ðñåéôéêÜ, èá Ý÷åôå áôôÜ óá áñ÷åßá óóï óýóôçìá óá:

```
/compat/linux/usr/X11/lib/libXt.so.3.1.0  
/compat/linux/usr/X11/lib/libXt.so.3 -> libXt.so.3.1.0  
/compat/linux/usr/X11/lib/libX11.so.3.1.0  
/compat/linux/usr/X11/lib/libX11.so.3 -> libX11.so.3.1.0  
/compat/linux/lib/libc.so.4.6.29  
/compat/linux/lib/libc.so.4 -> libc.so.4.6.29
```

**Óciàéþùócs:** Óciàéþóðå üðé áí Ý·÷åðå Þþç êÙðííei Linux shared library ðið í áñéèiùò Ýéäiióçò áßíáé í ßæëiò íå áðóùí ðò ðñþþò ðóðþéçò ôðþéçò ôið 1dd, äå èá ÷ñåéáðåðáß íå áíðéæñÜððåðå ôi áñ÷åßí üðùò áðóò iiiiÜæåðåé ôðç ôåëåððåáßá ôóðþéç, óå ððÜñ÷iíôå áñ÷åßá èá ðñÝðåé íå êÜiíò ðç aïðeäéÜ ðiðò. Óáò ôðiàiðøéyíðia üliùò íå áíðéæñÜððåðå ôi shared library áí áßíáé êÙðííea íæüððåñç Ýéäiióç. Íðiñáðóå íå aëéáñÜððåðå ôá ðáæéÜ áñ÷åßá, áñéåß üliùò íå áíáíáþóðå ôiðò ôðiàiðøéyíð aðáoiíýò þþóðå íå iäcäiýí ôðá íÝá áñ÷åßá. AðiÍýiùò, áí Ý·÷åðå ôéò ðáñáêÜðù áééæiðþéðå ôóî öýóðçíÜ óáò:

```
/compat/linux/lib/libc.so.4.6.27
/compat/linux/lib/libc.so.4 -> libc.so.4.6.27
éáé âñâßôá iéá åöáñiäP ç iöïßá æçöÜáé iéá íáüöåñç Ýêäïöç iÝóù ôïõ ldd:
libc.so.4 (DLL Jump 4.5pl26) -> libc.so.4.6.29

Áí ç äéáöiñÜ ôçö Ýêäïöçö ôóï ôåëåðåßá øçößí åßíáé iüñi ißáò P äyï åêäüöåùí, ôüöå içí óáò áðáó÷iëåß ç
áîôéñáöP ôïõ /lib/libc.so.4.6.29, áéáòß ôï ðñüññáliá éá ðñÝðåé íá ôñÝ÷åé êáíñééÜ êáé iå ôç eßäi
ðäéáéüöåñç Ýêäïöç. Ðáñ' üéá áðôÜ, áí èÝêåôå, lðiññåßôå íá áíðééåôåòþóåôå ôï libc.so êáé Ýôóé éá
Ý÷åôå ôï ðáñáêÜôù:
```

```
/compat/linux/lib/libc.so.4.6.29
/compat/linux/lib/libc.so.4 -> libc.so.4.6.29
```

**Óciàßùóç:** I iç÷áíéóïüò ôúí óðílåíëééþí óðíäÝóùí ÷ñåéÜæåôáé iüñi áéá ôéò áðáñiäÝò ôïõ Linux. I
runtime linker ôïõ FreeBSD ëéôÜáé iüñiò ôï ãéá ôéò ðéé ðñüööååò åêäüöåéò ôúí åéâëéíèçéþí êáé Ýôóé
åå ÷ñåéÜæåôáé íá óáò áðáó÷iëåß.

## 11.2.2 ÅäéåôÜóôáóç ôúí Linux ELF Binaries

Ôá ELF binaries ÷ñåéÜæëíôáé iåññééÝò öïñ Ýíá áéüñá åÞia, ôi “branding”. Áí ðñiöðåèþóåå íá ôñÝååå Ýíá
åêôåëÝóéíí ELF ÷ùñßò branding, ôüöå èá óáò åiöáíéööåß ôï ðáñáêÜôù óöÜëíá:

```
% ./my-linux-elf-binary
ELF binary type not known
Abort
```

Åéá íá åïçëþóåå ôíí ðññþíá ôïõ FreeBSD íá iå÷ùñßöåé Ýíá ELF ôïõ FreeBSD áðü Ýíá ôïõ Linux, ÷ñçóëííëíéþóåå
ôçí åíöëP brandelf(1).

```
% brandelf -t Linux my-linux-elf-binary
```

To GNU toolchain, iñÜää ðñüññáiiá GNU, ôïðíèåôåß ðéÝíí áðöüñláåå ôá êáôÜëëçéá ÷áñåêöçñéöôééÜ ôðåå
åêôåëÝóéíá ELF, åðñÝùò ôï ðáñáðÜíù åÞia èá ÷ñåéÜæåôáé üëí êáé èéäüöåñí ôóí iÝëëíí.

## 11.2.3 ÅäéåôÜóôáóç iéáò Ôò÷áßáò Linux RPM ÅöáñiäPò

Ôi FreeBSD åéééÝôåé ôçí åéêP ôïõ åÜóç ååäñíÝùí åéá ôá ðáéÝôå, ç iöïßá ÷ñçóëííëíéåßöåé åéá üëá ôá ports (êáé åéá
åðôÜ ðíõ ðññÝñ÷ííåé áðü ôi Linux). Åéá ôi ëüäíí áðöü, ç åÜóç ååäñíÝùí Linux RPM ååí ÷ñçóëííëíéåßöåé (ååí
ôïðíööçñßæåôåé).

Áí ùóðüöi ÷ñåéÜæåôåé íá ååéåôåôþóåå iéá iöïéåäPðiôå åöáñiäP ôïõ Linux ðíõ åáóßæåôåé óå ðáéÝôi RPM,
iðiññåßöå íá ôi åðéöý÷åðå iå ôíí ðáñáêÜôù ôññüðí:

```
# cd /compat/linux
```

```
# rpm2cpio -q < /path/to/linux.archive.rpm | cpio -id
```

×ñçóéïïðieÞóôå ôçí brandelf(1) áéá íá ôoðiðieÞóåôå êáôÜëëçéá ôá åêôåëÝóéïá (ü÷é ôeò åéâëéïeÞêåò!) ùò åöáññäÝò Linux. Äáí èá iðiññåßôå íá åðååëåôôÞóåôå ôeò åöáññäÝò iå éáèáñü ôñüði, áeeÜ èá iðiñÝóåôå íá êÜfåôå ôeò äiêéïÝò ðiõ åðéèõlåßôå.

### 11.2.4 Ñýèiéóç ôiõ Hostname Resolver

Áí ôi DNS ää äiõëäýåé P áí óáò åiöáíßæåôåé ôi ðáñáêÜôù óoÜëïá:

```
resolv+: "bind" is an invalid keyword
"hosts" is an invalid keyword
```

Èá ÷ñâáóôåß íá ñõèìßóåôå ôi /compat/linux/etc/host.conf þóôå íá ðåñéÝ÷åé:

```
order hosts, bind
multi on
```

Ç óâéñÜ åäþ äçëþíåé üôé áñ÷ééÜ åëÝå÷åôåé ôi áñ÷åßí /etc/hosts êáé ôôç ôořÝ÷åéá i DNS server. !/ôáí ôi /compat/linux/etc/host.conf äái åßíáè åéáéÝóéï, ié åöáññäÝò Linux ÷ñçóéïïðieÝí ôi /etc/host.conf ôiõ FreeBSD êáé ðáñáðííéíýíôåé üôé ç óýíôåç ôiõ áñ÷åßíô åái åßíáé ôùóôP. Èá ðñÝðåé íá åöáéñÝóåôå ôçí áiáöiñÜ ôiõ bind áí äái Ý÷åôå ñõèìßóåé Ýíá name server iÝóù ôiõ /etc/resolv.conf.

## 11.3 Åääéäéóôþíôåò ôi Mathematica®

Áiáíåþèçéå áéá ôi Mathematica 5.X áðü ôiõ Boris Hollas.

Ôi êåßíåñí áôöü ðåñéññÜöåé ôç äéäééåóßá åääéåôÜóôåóçò ôçò Ýéäïóçò Linux ôiõ **Mathematica 5.X** óå Ýíá óýóôçìá FreeBSD.

Ìðiññåßôå íá áãñÜóåôå ôçí éáññééP P iáèçôééP Ýéäïóç ôiõ **Mathematica** áéá Linux, áðåôèåßåò áðü ôç Wolfram óiõ <http://www.wolfram.com/>.

### 11.3.1 Ôi Ðñüäññäíá ÅääéåôÜóôåóçò ôiõ Mathematica

Áñ÷ééÜ, èá ðñÝðåé íá ðåßôå óiõ FreeBSD üôé ôá åêôåëÝóéïá áéá Linux ôiõ **Mathematica** êÜññiõ ÷ñPóç ôiõ Linux ABI. I åöéïëüôåñò ôñüði ãéá íá ôi êÜfåôå åôöü åßíáé íá iññóåôå ôiñ ôýði ôiõ ELF ùò Linux óå üëåò ôeò åöáññäÝò ðiõ åái åßíáé Päç branded, êÜññiõåò ÷ñPóç ôçò áiöiñëPò:

```
# sysctl kern.fallback_elf_brand=3
```

Åôöü èá êÜfåé ôi FreeBSD íá õðièÝóåé üôé ôá åêôåëÝóéïá ELF ðiõ åái åßíáé branded, êÜññiõ ÷ñPóç ôiõ Linux ABI êáé Ýóóé èá iðiññåßôå íá ôñÝíåôå ôi ðñüäññäíá ôçò åääéåôÜóôåóçò áðåôèåßåò áðü ôi CDROM.

Ôþñá, áíðéäñÜøôå ôi áñ÷åßí MathInstaller ôôií ôêëçñü óáò åßóêï:

```
# mount /cdrom
# cp /cdrom/Unix/Installers/Linux/MathInstaller /localdir/
```

Áñíñíòå òî áñ÷åßí êáé áíðóéêåôåôòþòå òî /bin/sh ôðç ðñþòç åññíìþ ià òî /compat/linux/bin/sh. Áðôü èá óæiiññ Ýòåé üöé òî ðñüäññíà åâéåôÜôôåçò èá ôñÝ ÷åé ià ôçí Ýéäïóç sh(1) åéá Linux. Ôôç óóñÝ ÷åéá, áíðóéêåôåôòþòå üëåò ôéò åâãññöÝð Linux) ià FreeBSD) ÷ñçóéiiðieþíòå Ýíá óóññ Üêôç êâéïÝññ Þ ià òî ðññáéÜôù script ôðçí áðüüíäíç åñúðçòå. Áðôü èá ðåé ôóí ðñüäññíà åâéåôÜôôåçò òîð Mathematica, òî iðññí õñÝ ÷åé ôçí åíöíèþ uname -s åéá íá åéáðéôþòåé òî åééöiññééü óýôðçíà, íá áíðéiññôðþòåé òî FreeBSD óáí Ýíá åééöiññééü ðññäññöåñÝò ià òî Linux. Ç åéôÝéåóç ôíñ MathInstaller èá iâééíÞòåé ôþñä ôçí åâéåôÜôôåç ôíñ Mathematica.

### 11.3.2 Ôñïðïðïéþíóáò ôá ÅêôåëÝóéìá ôïõ Mathematica

Óá shell scripts óá ïðíþá áçíéíðñáß óí **Mathematica** êáðÜ óç áæáæéáóßá óçò áâéáðÜ óðáóçò ðñÝðåé íá óñíðiðíéçëíýí ðñéí ÷ñçóéíðíéçëíýí. Áí åðééÝíåðå óí /usr/local/bin ùò óíí êáðÜëíäí áéá óá áéôðæÝóéíá óíí **Mathematica**, éá áññáßóá áéåß óðííåíééíýò áðóííýò (symlinks) ðñíò óá áñ÷áßá math, mathematica, Mathematica, éáé MathKernel. Óá êÜéå ðåñßðóñóç áðü óéð ðáñáðÜíù, áíðééáðóðÞóðå óéð óâðñáöÝð Linux) íå FreeBSD) íå êÜðíëíýí óðíðÜéðç áééíÝíð P íå óí ðáñáðÜóð shell script:

```
#!/bin/sh
cd /usr/local/bin
for i in math mathematica Mathematica MathKernel
do sed 's/Linux)/FreeBSD)/g' $i > $i.tmp
sed 's/\/bin\/sh\/compat\/linux\/bin\/sh/g' $i.tmp > $i
rm $i.tmp
chmod a+x $i
done
```

### 11.3.3 Áðiêôbíôáò Èùäéêü ãéá ôi Mathematica

¼ôáá âêêéÍpôåôå ôî **Mathematica** ãéá ðñþôç öïñÜ, èá åñùöçèåßôå ãéá Ýíáí êùäéêü. Áí åáí Ý÷åôå êÜðiííí êùäéêü óå  
åðôü ôî óôÜäéí, ôñÝíôå ôî ðñüäñâííà mathinfo ðïô åñþôéåôåé óôïí êåðÜëíäí åæéåðÜóôåóçò ãéá íá óåò åïèåß ôî  
“machine ID”. Ôî “machine ID” åßíáé åí iëíéëÞñïõ åáðéóéí Ýíí óôç åéåýèòíç MAC ñçò êÜñôåå åééðýíõ ðïô Ý÷åôå.  
Åðôü óciåßíåü üöde ååí iðññåßôå íá ôñÝíôå ôî **Mathematica** óå Üeeíõò ðiæíæéóôÝò.

¼ôáí ååñáöåßôå óóç Wolfram, iå e-mail, ôçéÝöùí Þ fax, èá ÷ñåéåóåß íá äþóåôå öi “machine ID” êáé èá óáò áðáíôÞói iå Ýíáí áíòßööí ÷í èüäééü ðíø èá áðioåèåßôåé áðü íéá óåéñÜ áñééibí.

### 11.3.4 ÔñÝ÷íôáò ôî Mathematica Frontend ïÝóù Äéêôvíö

Í ðñþþòð ôñüðiò åßíáé íá ôéð áíðéæñÜþåôð íÝóá óå Ýíáí õðÜñ ÷ iñóá êáð Üëræí óóï /usr/X11R6/lib/X11/fonts. Èá ÷ nääéåóôð åß üñùò íá ôñiðiðiðÞéåôð óï áñ ÷ åßí fonts.dir, þóôá íá ðññöéÝóåôð óå iñüñåôð úùí ãñáììåôðiðéñþí íÝóá

óå áõõü, êáé íá áëëÜìåôå ôïí áñéèìü ôùí áñáìäöåíöåéñþí óôç ðñþôç áñáììþ. ÁíáëéåêôééÜ, åßíáé óõíÞèùò áñéåôü íá åôåäëÝóåôå áðëþò ôçí áíöiëþ mkfontdir(1) íÝóá óôïí éåðÜëéä ðïõ Ý÷åôå áíðéäñÜþåé ôéò áñáìäöåéñÝð.

Í äåýôåñïò ôñüðïò åßíáé íá áíðéäñÜþåôå ôïõò ðáñáðÜfù êåðåëüäïõò íÝóá óôï /usr/X11R6/lib/X11/fonts:

```
# cd /usr/X11R6/lib/X11/fonts
# mkdir X
# mkdir MathType1
# cd /cdrom/Unix/Files/SystemFiles/Fonts
# cp X/* /usr/X11R6/lib/X11/fonts/X
# cp Type1/* /usr/X11R6/lib/X11/fonts/MathType1
# cd /usr/X11R6/lib/X11/fonts/X
# mkfontdir
# cd ../MathType1
# mkfontdir
```

Ôþñá ðñïöèÝóôå ôïõò íÝiõò êåðåëüäïõò ìå ôéò áñáìäöåéñÝð óôï font path:

```
# xset fp+ /usr/X11R6/lib/X11/fonts/X
# xset fp+ /usr/X11R6/lib/X11/fonts/MathType1
# xset fp rehash
```

Áí ÷ñçóéiiðiéåßôå ôï **Xorg**, ìðïñåßôå íá öiñþþíåôå ôéò áñáìäöåéñÝð áõõÜìåôå, ðñïöèÝóïïôå ôïõò íÝiõò êåðåëüäïõò óôï áñ÷åßi xorg.conf.

Áí äåí Ý÷åôå þäç Ýíáí éåðÜëéä ìå ôï üññá /usr/X11R6/lib/X11/fonts/Type1, ìðïñåßôå íá áëëÜìåôå ôï üññá ôiõ MathType1 áðü ôï ðáñáðÜfù ðáñÜäåéäñá óå Type1.

## 11.4 Åêåééóôþíôå õi Maple™

ÓõíåéóõñÜ ôiõ Aaron Kaplan. Åð÷áñéóôþå õoïí Robert Getschmann.

Ôi **Maple™** åßíáé ìßá åìðiñéñþ åöáññiäþ iàéçìáôééþí ðáñüñiéá ìå ôi **Mathematica**. Èá ðñÝðåé íá áaiñÜóåôå ôi ëræéóïééü áðü ôi http://www.maplesoft.com/ êáé óôç óõíÝ÷åéá íá êÜíåôå áßôçóç ãéá iéá Üäåéá ÷ñþóçð. Äéá íá ååéåôåóôþåôå ôi ëræéóïééü óôi FreeBSD, áéïëïðeþóå òá ðáñáéÜôù áðëÜ ápiåôå.

1. Åêåééóôå ôi INSTALL shell script áðü ôi íÝóí ååéåôÜóôåóçð ðïõ Ý÷åôå. ÅðééÝíôå “RedHat” üôáí åñùôçèåßôå áðü ôi ðñüäñáììá ååéåôÜóôåóçð. Í ôõðééüò éåðÜëéä ìå ôi /usr/local/maple.
2. Áí äåí Ý÷åôå áaiñÜóåé åéüìç Üäåéá ãéá ôi **Maple**, áaiñÜóåô ìßá áðü ôi Maple Waterloo Software (http://register.maplesoft.com/) êáé áíðéäñÜþôå ôi áñ÷åßi ðïõ èá óåò äièåß óôï /usr/local/maple/license/license.dat.
3. Ååéåôåóôþåôå ôi **FLEXlm** license manager åêåéþíôå õi INSTALL\_LIC shell script ôi iðiñßá ðáñÝ÷åôåé iàæß ìå ôi **Maple**. Äþôå ôi ååééü üññá ôiõ ðõðiñræéóôþ óåò ôi iðiñßi áðåéôåßôåé áðü ôií åiõðçñåôçðþ ãéá÷åßñéóçð ôùí ååéþí (license server).
4. ×ñçóéiiðiéþóå ôi ðáñáéÜôù patch óôï áñ÷åßi /usr/local/maple/bin/maple.system.type:

```
----- snip -----
*** maple.system.type.orig      Sun Jul  8 16:35:33 2001
--- maple.system.type   Sun Jul  8 16:35:51 2001
*****
```

```
*** 72,77 ****
--- 72,78 ----
    # the IBM RS/6000 AIX case
    MAPLE_BIN="bin.IBM_RISC_UNIX"
    ;;
+
    "FreeBSD" | \
    "Linux")
        # the Linux/x86 case
        # We have two Linux implementations, one for Red Hat and
----- snip end of patch -----
```

Óçìåéþóå üöé ìåôÜ ôï "FreeBSD" | \ äåí ðñÝðåé íá åìöáíßæåôáé Üëëí êåíü äéÜóôçìá.

Ôí patch áðóü iäçååß ôï **Maple** íá áíááíùñßóåé ôï "FreeBSD" óáí Ýíá óýóôçìá Linux. Ôí bin/maple shell script êåéåß ôï bin/maple.system.type shell script, ôï iðíßí ìå ôç óåéñÜ ôïõ êåéåß ôçí åíóïëP uname -a ðñïéâéí Ýíõ íá áíôíðéóôåß ôï üüííà ôïõ éåéôíõñääéíý óðóôPiaôïõ. Áíáëüäùò ìå ôï ðíéí éåéôíõñääéü âñâèåß, èá ÷ñçóéiiðiéçéiyí éåé ôá áíôßóôïé: á åéôåëÝóéïá áñ÷åßá.

## 5. ÅêééíÞóå ôïí license server.

jàó åíeeéüö ôñüüðiò áéá íá åêééíÞóåôå ôï lmgard åßíáé ôï áéüüëiõëí script ðíõ áñßóêåôáé óôï /usr/local/etc/rc.d/lmgrd.sh:

```
----- snip -----
#!/bin/sh
PATH=/usr/local/sbin:/usr/local/bin:/sbin:/bin:/usr/sbin:/usr/bin:/usr/X11R6/bin
PATH=${PATH}:/usr/local/maple/bin:/usr/local/maple/FLEXlm/UNIX/LINUX
export PATH

LICENSE_FILE=/usr/local/maple/license/license.dat
LOG=/var/log/lmgrd.log

case "$1" in
start)
    lmgard -c ${LICENSE_FILE} 2>> ${LOG} 1>&2
    echo -n " lmgard"
    ;;
stop)
    lmgard -c ${LICENSE_FILE} -x lmdown 2>> ${LOG} 1>&2
    ;;
*)
    echo "Usage: `basename $0` {start|stop}" 1>&2
    exit 64
    ;;
esac

exit 0
----- snip -----
```

## 6. ÅïééíP ôïõ **Maple**:

```
% cd /usr/local/maple/bin
% ./xmaple
```

Óå áôõü ôi óçìâßi èá ðñÝðåé íá åßíáé üéá Ýöiéíá êáé íá íçí Ý÷åôå êáÍýá ðñüâæçíá. Íçí íå ÷ Üóåôå üiùò íá óôåßéåôå Ýá e-mail óôç Maplesoft êáé íá ôiòò ðåßôå üôé èÝëåôå iéá Ýêäiöç ðiò íá õðiòóçñßæåôé åðßóçíá óoï FreeBSD.

#### **11.4.1 ÓõíçèéóìÝíá ĐñïâëÞìáôá**



```
# =====
# License File for UNIX Installations ("Pointer File")
# =====
SERVER chillig ANY
#USE_SERVER
VENDOR maplelmg

FEATURE Maple maplelmg 2000.0831 permanent 1 XXXXXXXXXXXX \
    PLATFORMS=i86_r ISSUER="Waterloo Maple Inc." \
    ISSUED=11-may-2000 NOTICE=" Technische Universitat Wien" \
    SN=XXXXXXXXXX
```

Í ðíñâðôá íá ôñiiðiðiéÞóâðå ôi áñ ÷åßi ôçò Üääéáò ÷ñÞóçò, áñêåß íá ìçí áëëÜâðå ôçí áñáìP “FEATURE” (ç iðiðá ðññóðåðåÿåðáé áðü ôi êéåéäþ ôçò Üääéáò).

## 11.5 Åæáèéóôþíôáò õi MATLAB®

## Óðráðóðr Úðr Dan Pelleg.

Ôi êåßìåíí áôöü ðåñëæñÜöåé ôç äéáæééåßá ååéåóÜóôåóçò ôçò Linux Ýêäïóçò ôiõ MATLAB® 6.5 óå Ýíá óyóóôçìá FreeBSD. Äïöéåýåé áñéåðÜ éåéÜ, ià ååíåßñåóç ôiõ **Java Virtual Machine™** (äåßôå óôii ÔíÞíá 11.5.3).

Ç Linux Ýêäíóç ôiõ **MATLAB** lõiññåb íá áäíññáôôåb áðâôõèåßáò áðüô ôçí áôáéññåbá The MathWorks ôiõ  
<http://www.mathworks.com>. Óeäññåôôåbôå üöé ðþñáôå éäé ôi ãñ÷åßí ðiõ ðåñéÝ÷åé ôçí Üääéá ÷ñÞóçò P iäçåßåò  
æá ôi ðùò íá ôi äçìéññåÞóåôå. Íéá éäé eá áðéëíéñúÍÞóåôå iá ôçí áôáéññåbá, ðåßôå ôiõò üöé eá èÝéåôå íá ôðÜñ÷åé  
åðßóçò ôðiõôÞñéïç æá ôi FreeBSD.

### 11.5.1 ÅæáôÜóôáóç ôïõ MATLAB

Ãéá íá åãêáôáóôÞóåôå ôï **MATLAB**, êÜíôå óá ðáñáêÜôù:

- ÅéóÜäåôå ôi CD êáé ðñiõáñôPóôå ôi óõi óyóôçìá óáò. Óõiàáðüôçôá ùò ÷ñPóôçò root, üðùò óõíéóóÜ ôi script ôçò ååêáôÜóôáóçò. Äéá íá iâééíPóôåå ôi script ôçò ååêáôÜóôáóçò äþóôå ôçí åíôïëP:

```
# /compat/linux/bin/sh /cdrom/install
```

**Õðüäåéíç:** Ôi ðñüññáliá ôçò ååêáôÜóôáóçò åßíáé óå åñáöéêü ðåñéáÜéëíí. Áí eáìáÜíåôå óoÜéíåôå ó÷åðéêÜ iå ôçí ièüíç, äþóôå ôçí åíôïëP: setenv HOME ~USER, üðïõ USER åßíáé i ÷ñPóôçò áðü üðïõ äþóôå ôçí åíôïëP su(1).

- ¼ôáí åñùôçèåßôå åéá ôií êáðÜéíäi ôiõ **MATLAB**, äþóôå: /compat/linux/usr/local/matlab.

**Õðüäåéíç:** Äéá åðéëüôåñç åéáäéêåóßá ååêáôÜóôáóçò, iñBóôå ôi ðáñáêÜôù: set MATLAB=/compat/linux/usr/local/matlab óõc åñáliP áíôïëþí ôiõ êåëýöiõò óáò.

- ÓñiðiðiéPóôåå ôi áñ ÷åßí ôçò Üäåéáð (license file) óyïöùíá iå ôéò iäçäßåò ðiõ eÜâåôå iå ôçí Üäåéá ôiõ **MATLAB**.

**Õðüäåéíç:** Iðiññáßôå iá åðiðiÜóåôå åê ôúí ðñiðiÝñùí ôi áñ ÷åßí áðôü êáé íá ôi áíôéãñÜøåôå óõi \$MATLAB/license.dat, ðñéí êáí óáò ðåé ôi ðñüññáliá ååêáôÜóôáóçò íá ôi ôñiðiðiéPóôåå.

- Iëiêëþñùóç ôçò ÅåêáôÜóôáóçò

Óå áðôü ôi óçìåßí, ç ååêáôÜóôáóç ôiõ **MATLAB** Ý÷åé iëiêëçñùèåß. Óå åðüüåíá åÞiaôá ÷ñåéÜæiiôáé åéá íá iðiñÝóåôå iá ôi äiðeÝóåôå óùóôÜ iå ôi FreeBSD.

## 11.5.2 Åêëßíçóç ôiõ License Manager

- Äçìéiññáá óõiâiëéþí óiñäíåéíá åéá ôá scripts ôiõ license manager:

```
# ln -s $MATLAB/etc/lmboot /usr/local/etc/lmboot_TMW
# ln -s $MATLAB/etc/lmdown /usr/local/etc/lmdown_TMW
```

- ÄçìéiññáPóôå ôi áñ ÷åßí åêëßíçóçò /usr/local/etc/rc.d/flexlm.sh. Ôi ðáñÜäåéäíá ðáñáêÜôù åßíáé iéá ôñiðiðiéçíÝíç åéäïöç ôiõ \$MATLAB/etc/rc.lm.glnx86. Ié åéëåäÝð åßíáé óôéò ðiðiðiåßåò ôùí áñ ÷åßùí, êáé óõcí åêëßíçóç ôiõ license manager óõi ðáñéåÜéëí åññiðiðiéçóçò Linux ôiõ FreeBSD .

```
#!/bin/sh
case "$1" in
    start)
        if [ -f /usr/local/etc/lmboot_TMW ]; then
            /compat/linux/bin/sh /usr/local/etc/lmboot_TMW -u username && echo 'MATLAB_lmgrd'
        fi
    ;;
    stop)
        if [ -f /usr/local/etc/lmdown_TMW ]; then
            /compat/linux/bin/sh /usr/local/etc/lmdown_TMW > /dev/null 2>&1
        fi
    ;;
esac
```

```

; ;
*)
echo "Usage: $0 {start|stop}"
exit 1
;;
esac

exit 0

```

**Óçìáíôéêü:** Óí áñ÷åßï ÕñÝðåé íá åßíáé åêôåëÝóéìí:

```
# chmod +x /usr/local/etc/rc.d/flexlm.sh
```

ÐñÝðåé åðßóçò íá áíôéêåôáóôþóåôå ôi ðáñáðÜíù *username* iå Ýá õðáñêôü üíííá ÷ñþóôç ôiõ óðóóþiaôìò óåò (êáé íá içí åßíáé i root).

3. Åêééíþóôå ôií license manager iå ôçí åíôïëþ:

```
# /usr/local/etc/rc.d/flexlm.sh start
```

### 11.5.3 Óýíäåóç iå ôi ÐåñéâÜeeëí ôiõ Java Runtime Environment

ÁeeÜîôå ôií óýíäåóii ôiõ Java Runtime Environment (JRE) óå Ýíáí i iðiþiò èá äiõëääýåé óôi FreeBSD:

```
# cd $MATLAB/sys/java/jre/glnx86/
# unlink jre; ln -s ./jre1.1.8 ./jre
```

### 11.5.4 Äçìëiõñäþóôå ôi Script Åêéßíçóçò ôiõ MATLAB

1. Ôiðièåôþóôå ôi ðáñáêÜôù script óôi /usr/local/bin/matlab:

```
#!/bin/sh
compat/linux/bin/sh /compat/linux/usr/local/matlab/bin/matlab "$@"
```

2. Ôôç óõíÝ÷åéå äþóôå ôçí åíôïëþ chmod +x /usr/local/bin/matlab.

**Õðüääéïç:** ÁíÜeëáá iå ôçí Ýêäïóç ôiõ emulators/linux\_base, ÕñÝ÷åôå, iðiñåß íá åìoáíeoöiyí iåñééÜ õðÜeëåôå üôáí ôñÝðåôå ôi script. Äéá íá ôi åðiöyååôå áôôü, ôñiðiðiéþóôå ôi áñ÷åßï /compat/linux/usr/local/matlab/bin/matlab, êáé áeeÜîôå ôç åñáìiþ ðiõ éÝâé:

```
if [ `expr "$lscmd" : '.*->.*'` -ne 0 ]; then
    (óôçí Ýêäïóç 13.0.1 åñßóêåôáé óôç åñáìiþ 410) óå áôôþ ôç åñáìiþ;
    if test -L $newbase; then
```

### 11.5.5 Äciéïöñäßá Script Ôåñìáôéóïý ôiö MATLAB

Óá åðüìåááá áPiaâá ÷ nåéÜæiiôáé áéá íá eýóåôá Ýíá ðñüâëçìá ðiö ððÜñ÷åé iå ôiï ôåñìáôéóïü ôiö MATLAB.

1. ÄciéïöñäPóôå ôiï áñ÷åßí \$MATLAB/toolbox/local/finish.m, êáé iÝóá óå åðôü ðññóèÝóôå iüñí ôç åñâìP:  
! \$MATLAB/bin/finish.sh

**Óciåßùóç:** To \$MATLAB åñÜøôå ôiï áéñéâþò üðùò ôiï åëÝðåôå.

**Öðüååéíç:** Óóïi ßæéi éáôÜëiäi, èá åñâßôå óå áñ÷åßá finishsav.m êáé finishdlg.m, óå iðíßá èá óåò åßíïöí ôç åñíáôüôçôá íá óþæåôå ôçí åññáóßá óåò ðñéi êëåßóåôå ôiï ðñüññáìá. Áí ðñüêåéôåé íá ÷ñçóéiïðíéþóåôå êÜðíéi áðü áðôÜ, ðññóèÝóôå ôiö ôçí ðáñáðÜíù åñâìP áiÝóùò iåðÜ ôçí åíîïëP save .

2. ÄciéïöñäPóôå ôiï áñ÷åßí \$MATLAB/bin/finish.sh, ôiï iðíßí èá ðåñéÝ÷åé ôá ðáñáêÜôù:

```
#!/compat/linux/bin/sh  
(sleep 5; killall -1 matlab_helper) &  
exit 0
```

3. ÈÜíôå ôiï áñ÷åßí åéôåëÝóéiï:

```
# chmod +x $MATLAB/bin/finish.sh
```

### 11.5.6 ×ñçóéiïðíéþíôåò ôiö MATLAB

Óá åðôü ðiö óçìåßí èá ðñÝðåé íá åßóôå Ýðíéiïé íá äþóåôå ôçí åíîïëP matlab êáé íá áñ÷ßóåôå íá ÷ñçóéiïðíéåßôå ôçí åöåññäP.

## 11.6 ÅæáôÜóôáóç ôçò Oracle®

ÓñåééööññU ôiö Marcel Moolenaar.

### 11.6.1 Åéóáãùäþ

Ôi êåßìåñí áðôü ðåñéäñÜöåé ôç åéäééåóßá åæáôÜóôáóçò ôùí **Oracle 8.0.5** êáé **Oracle 8.0.5.1 Enterprise Edition** åéá Linux óå Ýíá óýóöçìá FreeBSD.

### 11.6.2 ÅæáôÜóôáóç ôiö ÐåñéâÜeeïïöiö Linux

Óéäññåðôåßôå üöé Ý÷åðôå åæáôáóôPóåé óå emulators/linux\_base êáé devel/linux\_devtools áðü ôç ðoëëiäP ôùí Ports. Áí áíôëiåðùðßæåôå äõóëëëßåò iå óå ðáñáðÜíù, ßóùò ÷ñåéåóôåß íá óå åæáôáóôPóåôå áðü ðáêÝóå P áðü ðáééüôåñåò åéäüóåéò ôçò óðëëiäPò ôùí Ports.

Áí èÝëåôå íá ôñÝìåôå ôiï intelligent agent, èá ÷ñåéáóôåß íá åãéåôåóôÞóåôå êáé ôi ðáêÝôi Red Hat Tcl: tcl-8.0.3-20.i386.rpm. Ç áíöiëP ãéá ôçí åãéåôÜóôåóç iÝóù ôiõ åðßóçiiö **RPM** port (archivers/rpm) åßíáé:

```
# rpm -i --ignoreos --root /compat/linux --dbpath /var/lib/rpm package
```

Ç åãéåôÜóôåóç ôiõ package èá ðñÝðåé íá åßíáé iñáëÜ êáé ÷ùñßò ðñiâëÞiaôå.

### 11.6.3 Ñõèìßæïíôåò ôi ÐåñéâÜëëíí ãéá ôçí Oracle

Ðñéí ôçí åãéåôÜóôåóç ôcò **Oracle**, èá ðñÝðåé íá ñõèìßæåôå óùóôÜ ôi ðåñéâÜëëíí ôiõ óðóôÞiaôüò óåò. Ôi ðåñéâÜôù êåßìåíí ðåñéäñÜöåé ôé áðñéâþò ðñÝðåé íá êÜíåôå åéá íá åêôåëÝóåôå ôçí **Oracle** åéá Linux óôi FreeBSD, êáé ååí ðåñéäñÜöåé üöé ôðÜñ ÷åé Þäç ööif iäçäü åãéåôÜóôåóçò ôcò **Oracle**.

#### 11.6.3.1 Ñýèléóç ôiõ ÐõñÞíá

¼ðùò ðåñéäñÜöåé iäçäüò åãéåôÜóôåóçò ôcò **Oracle**, èá ðñÝðåé íá iñßóåôå ôeò ôéíÝò ôçò shared memory óôi iÝáéööi. Íçí ÷ñçóéiïðíéÞóåôå ôi SHMMAX óôi FreeBSD. Ôi SHMMAX ôðíëtäßæåôåé åðëþò åðü ôi SHMMAXPGS êáé ôi PGESIZE. ÅðñÝñò åéèñßóôå ôi SHMMAXPGS. ¼ëåò ié Üëëåò åðéëiäÝò iññíyí íá iñéööiyí üðùò ðåñéäñÜöåôåé ôiñ iäçäü. Åéá ðåñÜååéäñ:

```
options SHMMAXPGS=10000
options SHMMNI=100
options SHMSEG=10
options SEMMNS=200
options SEMMNI=70
options SEMMSL=61
```

Iñßóôå ôeò ôéíÝò ôuù åðéëiäþí Ýôóé þóôå íá ôáéñéÜæiõí óôç ÷ñÞóç ôcò **Oracle** ðiõ èÝëåôå íá êÜíåôå.

Åðßóçò, åðéåååéþóôå üöé Ý ÷åôå åíññäiðíéÞóåé ôeò ðåñéâÜöåé åðéëiäÝò ôôéò ñõèìßæåéò ôiõ ðõñÞíá:

```
options SYSVSHM #SysV shared memory
options SYSVSEM #SysV semaphores
options SYSVMSG #SysV interprocess communication
```

#### 11.6.3.2 Í ×ñÞóôçò Oracle

ÄçìéiõñÞóôå Ýíá ÷ñÞóôç óðóôÞiaôiò iå üññä oracle, iå ôííßäéi ôñüði ðiõ èá äçìéiõññäýóåôå êáé iðiéiññÞðiôå Üëëíí ÷ñÞóôç. Ôi iññí éäéåñðåññ ÷åññéôçñéóôéëü ôiõ ÷ñÞóôç oracle åßíáé üöé ÷ññéÜæåôåé íá ôiõ åþóåôå Ýíá èÝëööiò Linux. ÐñiøèÝóôå ôi /compat/linux/bin/bash ôôi /etc/shells êáé iñßóôå ôi ëÝëööiò ôiõ ÷ñÞóôç oracle óå /compat/linux/bin/bash.

#### 11.6.3.3 Ôi ÐåñéâÜëëíí

Åêôüò ôùí óðíçèéóíÝíùí iåôååéçöþí ôcò **Oracle**, üðùò ié ORACLE\_HOME êáé ORACLE\_SID èá ðñÝðåé íá iñßóåôå êáé ôeò åéüüëiõèåò iåôååéçöþí ðåñéâÜëëíí:

låôååéçöþ	Ôéíþ
LD_LIBRARY_PATH	\$ORACLE_HOME/lib

**Ìåôáâëçôþ**

CLASSPATH	\$ORACLE_HOME/jdbc/lib/classes111.zip
PATH	/compat/linux/bin /compat/linux/sbin /compat/linux/usr/bin /compat/linux/usr/sbin /bin /sbin /usr/bin /usr/sbin /usr/local/bin \$ORACLE_HOME/bin

Óàò óõíéóöïýìå íá iñßóåôå üëåò ôéò ìåôáâëçôÝò ðåñéâÜëëïíò ööï áñ÷åßí .profile. já iëïëëçñùìÝí ðáñÜääéäìá åßíáé ôï ðáñáéÜôù:

```
ORACLE_BASE=/oracle; export ORACLE_BASE
ORACLE_HOME=/oracle; export ORACLE_HOME
LD_LIBRARY_PATH=$ORACLE_HOME/lib
export LD_LIBRARY_PATH
ORACLE_SID=ORCL; export ORACLE_SID
ORACLE_TERM=386x; export ORACLE_TERM
CLASSPATH=$ORACLE_HOME/jdbc/lib/classes111.zip
export CLASSPATH
PATH=/compat/linux/bin:/compat/linux/sbin:/compat/linux/usr/bin
PATH=$PATH:/compat/linux/usr/sbin:/bin:/sbin:/usr/bin:/usr/sbin
PATH=$PATH:/usr/local/bin:$ORACLE_HOME/bin
export PATH
```

**11.6.4 ÅääéåÖóôáóç ôçò Oracle**

Ëüäù íéá íéëñÞò Ýëëåéøçò óöïí åññíéùôÞ ôïö Linux, èá ÷ñääóôåß íá äçïëïñäÞóåôå Ýíá êåôÜëïäí ìå ôï üññä .oracle íÝóå óöï /var/tmp, ðññí íåééÍÞóåôå ôï ðññäññäìå íå åääéåðÜóôåöçò. Í êåôÜëïäí ðññäññäìå ôï ðññäññäìå íå åíÞéåé óöïí ÷ñÞóöç oracle. Èá ðñÝðåé ðññäññäìå íå ðññäññäìå ðññäññäìå ôçí åääéåðÜóôåöç ôçò **Oracle** åß÷ùò êáÝíá ðññäññäìå. Áí áíðéíåôùðßæåôå üìùò áéüïç ðññäññäìå, áéÝäïòå ôçí Ýëëåöç ôçò **Oracle** ðññäññäìå Ý÷åôå Þ/éåé ôéò ñññëßóåéò óåò! Åöüöï Ý÷åôå ðññäññäìå ðññäññäìå ôçí åääéåðÜóôåöç ôçò **Oracle**, åöáññüöôå óá patches ðññäññäìå ðññäññäìå ðññäññäìå óöéò äyï ðáñáéÜôù åññöçôåò.

jà óö÷íü ðññäññäìå íå åßíáé üüöé åäí åßíåôåé óùóôÞ åääéåðÜóôåöç ôïö ðññäññäìå Ýá ôïö ðññäññäìå TCP. Áööü Ý÷åé ùò áðïöÝéåòíà íá lçí ìðññäññäìå íå åäééÍÞóåôå ôïö TCP listeners. Íé áéüëïðèåò ïäçäññäìå ôï ðññäññäìå óöéò ñññëßóåéò óåò!

```
# cd $ORACLE_HOME/network/lib
# make -f ins_network.mk ntcontab.o
# cd $ORACLE_HOME/lib
# ar r libnetwork.a ntcontab.o
# cd $ORACLE_HOME/network/lib
# make -f ins_network.mk install
```

Ìç íå ðññäññäìå íå ôñÝíåôå íåíÜ ôï root.sh

**11.6.4.1 Äéüñèùóç ôïö root.sh**

¼ôáí åääéåééöôÜôå ôçí **Oracle**, êÜðïéåò áíÝññäéåò, ié iðññäññäìå ðññäññäìå ôï ðññäññäìå root, êåôååññÜöïíöåé óå Ýíá shell script ðññäññäìå root.sh. Ôï script áööü äçïëïñäññäìå ôï ðññäññäìå orainst. Åöáññüöôå ôï ðáñáéÜôù

patch ôöi root.sh, æáá íá iðinÝóåé íá âñåé êáé íá ÷ñçóéiiðíéÞóåé ôi chown. ÁíáëéåêôéêÜ, ôñÝîôå ôi script iÝóá áðü Ýíá eÝeoöiò Linux.

```
*** orainst/root.sh.orig Tue Oct 6 21:57:33 1998
--- orainst/root.sh Mon Dec 28 15:58:53 1998
*****
*** 31,37 ****
# This is the default value for CHOWN
# It will redefined later in this script for those ports
# which have it conditionally defined in ss_install.h
! CHOWN=/bin/chown
#
# Define variables to be used in this script
--- 31,37 ----
# This is the default value for CHOWN
# It will redefined later in this script for those ports
# which have it conditionally defined in ss_install.h
! CHOWN=/usr/sbin/chown
#
# Define variables to be used in this script
```

¼ôáí äái êÜíåôå ÷ñÞóç ôiõ CD æáá ôçí åæåôÜóôåóç, iðinâßôå íá ðåñÜóåôå ôi patch æáá ôi root.sh, ôçí ðçãÞ åæåôÜóôåóçð. To áñ÷åßí iññÜæåôåé rthd.sh êáé âñßóêåôåé ôöií êáôÜeiäi orainst.

#### 11.6.4.2 Äéüñèùóç ôiõ genclntsh

To script genclntsh ÷ñçóéiiðíéåßôåé æáá íá äçieïññÞóåé iéá shared client library. ÔñÝîôå ôi ðáñáêÜôù patch æáá íá ôåÞóåôå ôi êåeñéðiÝñ PATH:

```
*** bin/genclntsh.orig Wed Sep 30 07:37:19 1998
--- bin/genclntsh Tue Dec 22 15:36:49 1998
*****
*** 32,38 ****
#
# Explicit path to ensure that we're using the correct commands
#PATH=/usr/bin:/usr/ccs/bin export PATH
! PATH=/usr/local/bin:/bin:/usr/bin:/usr/X11R6/bin export PATH
#
# each product MUST provide a $PRODUCT/admin/shrept.lst
--- 32,38 ----
#
# Explicit path to ensure that we're using the correct commands
#PATH=/usr/bin:/usr/ccs/bin export PATH
! #PATH=/usr/local/bin:/bin:/usr/bin:/usr/X11R6/bin export PATH
#
# each product MUST provide a $PRODUCT/admin/shrept.lst
```

## 11.6.5 ÅêôÝëåóç ôçò Oracle

Áöiy Ý÷åôå áéïëiõeÞóåé áðôÝò ôéò iäçãßåò, èá ðñÝðåé íá iðiñâßôå íá åêôåëÝóåôå ôçí **Oracle** óáí íá âñéóéüóáôåái óå Ýíá óyóôçìá Linux.

## 11.7 Ðñi÷ùñçìÝíá ÈÝìáôá

Áí Ý÷åôå ôçí áðiñßá ðùò eåéôiõñååß ç oöiâåôüôçôá iå åöáññíäÝò Linux, ôüôå èá ðñÝðåé íá äéååÜóåôå ôç ðáññéÜôù åñüôçôá. Óá ðâññéóóüôåñá áðü üóá Ý÷iõi ãñáöôåß åßíáé åâóéóíÝíá óôçí çëåêôññíéÞ êßóôå åñíéêþí óðæçôÞóåùí ôïõ FreeBSD (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-chat>) êáé Ý÷iõi ãñáöôåß áðü ôíí Terry Lambert <t.lambert@primenet.com> (Message ID: <199906020108.SAA07001@usr09.primenet.com>).

### 11.7.1 Ðùò Eåéôiõñååß;

Ôí FreeBSD ðâññéÝ÷åé áöáåßñååß (abstraction) ðiõi iññÜæåôåé “execution class loader”. Áoôü åáóßæåôåé ôóï execve(2).

Áðôü ðiõi óðiâåßíáé åßíáé üôé ôí FreeBSD Ý÷åé iéá eßóôå öiñôùôþí (loaders), áíôß æáé Ýíá ðiõi íá êáôåöåýååé óå ðâññðôùóç áðiñò÷ßáó óóï #! æáé íá ôñÝíáé êÜðiëi shell interpreter þ shell script.

ÉóôiññéÜ, iññiò öiñôùôþò óðç ðeáôöüñíá ðiõi UNIX Ýéåä÷å ôíí iññééü áñéèü (åñíééÜ ôá ðñþóá 4 þ 8 bytes ôiõ áñ÷åßiõ) æáé íá ååé áí åßíáé êÜðiëi åêôåëÝóéii / åöáññíäþ ãñùóôü óóï óyóôçìá, êáé óôçí ðâññðôùóç áðôþ íá êáéÝóåé ôíí áíôßóöíé÷iññiòôþ.

Áí ôi ãñ÷åßi ååí Pôáí åâôåëÝóéii iå åÜóç ôiõ ôyði ôiõ óðôôÞiaòiò, ç eëÞóç óóï execve(2) åðÝóôñååå êÜðiëi óoÜëiá, êáé ôi shell ðñiñðáèiýóå íá åêôåëÝóåé ôi ãñ÷åßi óáí shell script.

Ç åñíééÞ éäÝá Pôáí “áí ååí åßíáé åêôåëÝóéii, ðñiñðÜeçóå íá ôi ññÝíåéò ùò shell script iå åÜóç ôi ññÝ÷ií shell ”.

Áññüôåñá, åñÝëçéå Ýíáò Ýiñðñiò ôññüðiò þóôå ôi sh(1) íá åëÝä÷åé ôiñò ðñþðiñò äyí÷åñáéôÞñåò, êáé áí Pôáí : \n, ôüôå êáëiýóå ôi shell csh(1) (ðeóôåýíòiå ðùò ç eëýóç áðôþ åñÝëçéå åñ÷ééÜ åðü ôç SCO).

Áðôü ðiõi êÜíåé ôþñá ôí FreeBSD åßíáé íá åéåññíäÝ÷åé ôç eßóôå iññôùôÝò, iå Ýíá åñíééü öiñôùôþ #! iñðiñiò åíáññüñßæåé ùò åéåññíçíÝá (interpreter) ôiñò ÷åñáéôÞñåò áðü ôi åðüiñåñíüññü iññôùôÝò ôi ! êáé iÝ÷ñé ôi ðÝëiò, åñþ áí ååí åíáññüñéóååß êÜðiëiò, ÷ñçóëiñðiñååß ôi ðÝ÷åóç eëýóç ôi /bin/sh.

Åéá ôçí ðiñóôÞñéic ôiõ Linux ABI, ôi FreeBSD åëÝðåé ôiñ iññééü áñéèü ôiõ ELF binary (åå åíáññüñßæåé ôç åéåññüñÜ åíÜìáóå óå FreeBSD, Solaris, Linux, þ êÜðiëi Üëëi åééôiõñåééü óyóôçìá ôi iñðiñi ÷ñçóëiñðiñååß åñ÷åßá óyðiõ ELF).

Iññôùôþò ELF eëéôÜåé åéá Ýíá åéåééü brand, ôi iñðiñi åßíáé iéá åñüôçôå ó÷iñþùí iÝóå óóï ELF image, êáé ôi iñðiñi ååí ññÜñ÷åé óå ELF binaries åéá SVR4/Solaris

Åéá íá åééôiõññíðiõí ôá åêôåëÝóéii ôiõ Linux, èá ðñÝðåé íá åññiñò branded (iññéåñéóöiyí) ùò Linux iÝóù ôçò brandelf(1):

```
# brandelf -t Linux file
```

¼ôáí åßíáé áðôü, iññôùôþò ELF èá åëÝðåé ôiõ Linux brand ðÜíù óóï åñ÷åßi.

¼ôáí iññôùôþò ELF ååé ôiõ Linux brand, èá áíôééâååóôÞóåé Ýíáí ååßêôç iÝóå óóï æñþ proc. ¼éåò ié eëÞóåéò ôiõ óðôôÞiaòiò ôâññéüñíýíåé iÝóå áðü áðôüí ôiñ ååßêôç (óå Ýíá ðáññäöéåéü óyóôçìá UNIX, iññôùôþò èá Pôáí iñðiñi åññiñò sysent [ ], ðiõi ðâññéÝ÷åé ôéò eëÞóåéò ôiõ óðôôÞiaòiò (system calls)). ÅðéðëÝíí, ç åéåññáóßá óçìåéþíåôåé åéá

âåééééP iådåô : âßñéóç ôïø trap vector êåé Üëëåò (iéêñ Ýò) åéïñèþóåéò, ôéò iðíBåò ÷ åéñBæåôåé ôí Üñèñùìå ðöñPíá ôçò ôðlååôüôçôåd Linux.

Öi system call vector öi Linux ðåñéÝ÷åé, iåôáiy Üëëùí, ieá ëßóôá iå ôá äåäiiÝíá öi sysent[ ] ôúí iðibùí ieäéäöèýíóåéò añßóéiiöéá iÝóá óoi Üññëñùá öi ðõñÞíá.

¼ôáí ãßíåôáé ïéá ëëPóç óõõôùPíâòïò áðü ïéá åöâñïïùP Linux, i ñþæéêåò (trap code) ôñïðïðïéåß ôíï ãåßêôç ôçò ìÝóù ôçò ãïùPò ðïò Ý ÷ áé åãñáöåß óöï proc, éâé áeëÜæåé ôçí äéåýèõíöç þóôå íá äåß÷íâé óöï óçìåßíí åéöüäïò ôçò óöïÜñôçóçò ôïò Linux, êâé ü÷é ôïò FreeBSD.

Åðþróð, ðír óýðóðxiá ñóðiáðumþóðum á la Linux íðinñ áðhæð eða Þóðiðanlúðaséð að síða í eðe. Ú ðeð ðír íðeð að þóðum ásíða með þóðum.

IeoéáooééÜ áooü êÜíáé éáé ç åðeeíräP union éaoÜ ôcí ðñioÜñôcoç åíùo óooóPìàðöiò áñ ÷ åßúí (äåí åíññiyå åäþ öi óyóóciá áñ ÷ åßúí unionfs!). Áñ ÷ ééÜ, åßíåôáé áðüðåéñá íá åñåèåþ öi áñ ÷ åßí óoñí éåðÜeíäi

/compat/linux/original-path, éadé iúntí áf aðóðii aðiðy ÷ áé, éa aðbíráé áráæðþóðcós óóii éáðUéiáí /original-path.

І лі අෝ දෙනුයි පෙන්වනා යුතු නො වේ. මෙය ඇත්තේ එක්සත් ජාතීන්ගේ ප්‍රතිඵලියා යුතු නො වේ.

Öðri óýfíði áðnaðæðabúni ðið Linux ìðiñabí íá áðeðaðeðóðabí ÍÝóu òðco ðiðið Þenreicði ðið Linux ABI). Áðþóðcò óciðið íað üðeð óðaðaðeð Ýóðia ðið Linux ìðiñiýi íá öiñðþróiði êaé íá áðeðaðeð Ýóði ðiðið áñ ÷ áða ðið FreeBSD áí áði ìðiñiýi íá áiðið Þenreicði ða áiðbóðiðeð-á áñ ÷ áða óði Linux. Íðiñabóða áðþóðcò íá ðiðiðeðþróða ðiðið leá áiðiðeð uname(1) ÍÝóá óði /compat/linux ðiñiðeð ÍÝóði ða áñ ÷ áða óði Linux ía íc ìðiñiýi íá áiðaðiñbóðið üðeð áði ÷ hcoðiðiðiýiðeð ðiñiðaðeð Ü óði Linux.

Điều này cũng áp dụng cho FreeBSD ABI; nó có thể được xác định bằng cách kiểm tra các khai báo của các hàm trong tệp `/usr/include/sys/types.h`. Ví dụ, để kiểm tra xem một ứng dụng có tuân thủ ABI FreeBSD hay không, bạn có thể sử dụng lệnh sau:

Ábbáé adóðu üññùð ðññáññáðóéÞ áññiiþñúð; ¼/÷·é. Ábbáé leáð ðeíðiþçóð öið ABI, ü·÷·é áññiiþñúð. Äáí ððÜñ·÷·áé êññáá áññiiþñúð (Þ ðññóñññúð, æáá íá ðññieÚáññóða óçí áðññüáíç óáð áññþðçóð).

### III. Äéá ÷ åßñéóç ÖõóôÞìáôïò

Ôá êåöÜëéáá ôïõ FreeBSD Handbook ðïõ áêïeïõeïýí áíáöÝñiïðáé óå èÝiáðá ðïõ Ý÷iõí ó÷Ýóç iå ôç äéá÷åßñéóç ôïõ óõõôÞiaôïò. ÈÜëå êåöÜëéáé iåéééÜ ðåñéãñÜöiïðå ðé èéá iÜëåðå äéáâÜæiïðå ôï óõãéâéñeiÝñi êåöÜëéáé, êåèþò êáé ðé ðñiäðåéôïýiåíá Ý÷åé ôï êåöÜëéáé áõõü: ôé ðñÝðåé íá Ý÷åôå Päç äéáâÜóåé êáé êåðåñÞóåé ðñéí áó÷iæçèåßôå iå áõõü ôï êåöÜëéáé.

ÁðôÜ ôá êåöÜëéáá Ý÷iõí ó÷åäéåðåß ðåñéóðóüôåñiùò iäçäüò áíáöiñÜò ðáñÜ ùò åéóááùåééü êåßiåñi. Äé áðôü åßíáé ðéi ÷ñÞóéíá ùò iäçäiß ôõïõ ïðiñiõò ïðiñåßôå íá áíáöñÝiåðå üüôáí ÷ñåéÜæåðå ðÜðiéá ðëçñiñßá æá ôï FreeBSD. Äå ÷ñåéÜæåðåé íá ôá äéáâÜóåå iå êÜðiéá óõãéâéñeiÝíç óåéñÜ, iýôå ÷ñåéÜæåðåé íá ôá Ý÷åôå äéáâÜóåé üéá ðñéí áñ÷ßóåå íá áó÷iæçèåßôå iå ôï FreeBSD.

# ÊåöÜëáéí 12 Ñýèìéóç êáé Ååëôéóôïðïßçóç

ÃñÜöôçêå áðü ôií Chern Lee. Åáóþóôçêå óå tutorial ãñáìÍYíi áðü ôií Mike Smith. ÅáóéóíÍYíi áðþóçò óóï tuning(7) ðið ãñÜöçêå áðü ôií Matt Dillon.

## 12.1 Óýiiøç

Íá áðü óá óçìáíóééÜ ÷áñáéôçñéóôééÜ ôií FreeBSD áßíáé ç aðíáðüôçôá ñýèìéóçò ôií óóôôÞìáôïò. Íå ôéò óùóôÝò ñðèìßóåéò óóôôÞìáôïò áßíáé áýéíí iá áðíöåð÷ëíý ðiðü ðñíâëÞìáðá êáðÜ ôç aëÜñéâéá iåëëíiðééþí áíáâáèìßóåùí. Ôí êáöÜëáéí áðóú èá áíçãÞóåé iåñÜëí ïýñið ôçò aéäééâáðbåò ñýèìéóçò ôií FreeBSD, óóïðâñééâlâáññ Ýíuí êáé êÜðiéùí ðáññáíÝññùí ðið iðiññý íá ñðèìéóôíý íá aðíöåð õçí áâééóôïðïßçóç ôçò áðüäiíóçò ôií óóôôÞìáôïò.

Áöiy äéááÜóâðå áðóú ôií êáöÜëáéí, èá iÝñâðå:

- Ðùò íá aëðëÝþâðå áðíäiðééÜ iå óóôôÞìáðå áñ ÷åßùí êáé êáôáôïÞóåéò swap.
- Ôá ááóééÜ ðùí óóôôðíÜ ðùí ñýèìéóçò êáé áâééþíçóçò rc.conf êáé /usr/local/etc/rc.d.
- Ðùò íá ñðèìßóåâðå êáé íá aëðëÜóâðå iéá êÜññâðå áééöýið.
- Ðùò íá ñðèìßóåâðå virtual hosts óðéò aééóðâéÝò óáð óóôéâðÝò.
- Ðùò íá ÷ñçóéiðíéÞóåðå ôá aëÜöññá áñ ÷åßá ñðèìßóåñí óðíí êáðÜëíäi /etc.
- Ðùò íá áâééóôïðíéÞóåðå ôií FreeBSD ÷ñçóéiðíéþíðå ìåðâáâéçòÝò sysctl.
- Ðùò íá áâééðéóôïðíéÞóåðå ôçí áðüäið ôið áßóéið êáé íá aëðëÜññâðå ðiðð ðâñéñéóðíý ðið ððñÞíá.

Ðñéí äéááÜóâðå áðóú ôií êáöÜëáéí, èá ðñÝðåé:

- Íá êáôáññâðå ááóééÝò Ýíiæåò ôií UNIX êáé ôií FreeBSD (ÊåöÜëáéí 4).
- Íá áßóðå áññééâéññ Ýíiæ iá ðá ááóééÜ ôçò ñýèìéóçò êáé ôçò iåðâáâéþðôéóçò ôií ððñÞíá (ÊåöÜëáéí 9).

## 12.2 Áñ÷éêþ Ñýèìéóç

### 12.2.1 ÄéÜôáíç ÊáôáôïÞóåùí

#### 12.2.1.1 ÅáóééÝò ÊáôáôïÞóåéò

¼ôáí açìéiðññâðå óóôôÞìáðå áñ ÷åßùí iå ôií bslabel(8) P ôií sysinstall(8), ðòiçèåßðå üðé ié óéëçñið åßóéið ñðôáöÝññið ñðâññ Íyíá añçäiññðâññ áðií ôá aíññðâññéÜ iÝññé ðiðð óóâð áóññðâññéÜ. ôóé iéññðâññ êáé ðâñéñéóðñññ ðññðâÜðéíá óóôôÞìáðå áñ ÷åßùí ðñÝðåé íá áßíáé ðëçóéÝóðâññ óðí aíññðâññéü ðið áßóéið, áíþ iåðâáâéýðâññð êáðâðåôïÞóåðå ðüðñ ði /usr ðñÝðåé íá ôiðiðéåðiýíðåé ðéí eíñðÜ óðí aíññðâññéü ôið áßóéið. Áßíáé êáéþ éäÝá íá açìéiðññâðå êáðâðåôïÞóåðå iå ðáñññíéá óáéññÜ iå áððÞí: root, swap, /var, /usr.

Ôí iÝññâðò ôið /var áíðâáâéü ðið ôçí áðéæéññéüíç ÷ñÞóç ôið iç ÷áÞìáôïò. Ôí /var ÷ñçóéiðíéåßðå æáé ôçí áðíëÞéâðóç ôùí aññññâðiðéâñðùí, ôùí áñ ÷åßùí êáðâðâññðò êáé ôið spooler ôið áéôôðññðò. Ôá aññññâðiðéâññðò êáé ôá áñ ÷åßá êáðâðâññðò iðiññý íá iåðâáâéþðiðið ôá áðññðâüüçôá iåñÝéç áíÜëíä iå ôií aññéèü ôùí ÷ñçóðþí ôið óóôôÞìáôïò êáé ôi ÷ññééü aëÜóðçìá ðið êñâðiýíðåé ôá áñ ÷åßá êáðâðâññðò. ÓðÜíéá ÷ññéÜæâðåé ôi /var/tmp íá Ý ÷åé ðÜíñ

áðu Ýfá gigabyte því, áæsú Þóráé fá Ýðóðaðu út íslenskum.

Ҫ éáôÜòíçóç /usr ðâñéÝ ÷ áé óá ðâñéooûôâñá áñ ÷ áßá ðiõ áðâéöiyíóáé áéá ôçí ðööîôÞñéïç ðiõ óôóôÞâlóïò, ôç óôëëíäÞ òúí ports(7) (ðññöâßíâðâé) êáé ôiï ðçäáßí ëþäééâ (ðññáéñâðéëü). Êáé óá äýí áðôÜ áßíáé ðññiaéñâðéëÜ êáðâ ôçí áâæáðÜðôáóç. ÔiõëÜ ÷ éóöiï 2 gigabytes ðññöâßíûóáé áéá áðôÞ ôçí êáðÜòíçóç.

**Óciáßúóç:** IáñééÝò ñíñÝò ç åðééïäþ Auto-defaults öiø êåôåôïçôþ öiø sysinstall(8) lðiññåb íá åðééÝiåé öiøy iééñü iÝåæëö áéá ôéò êåôåôïþoåéò /var êáé /. Ðñiødåèåßóôå íá åðééÝiåôå Yïøðíá êáé ãâííáéüäùñá lðaÝec áéá ôéò êåôåôïþoåéò óåo.

### 12.2.1.2 Swap ÉáôÜôìçóç

Ó یáñáéýöðåñá óðóðÞíáðó íå ðíeeáðéiyò SCSI áßóðíðó (P ðíeeáðéiyò IDE áßóðíðó óå áéáðiñåðóééiyò áéååðöÝò), áßíáé ðñiðéiüöðåñí ðír swap íå áßíáé ñòðéiøíÝí òå êÜeå áßóðéi (iÝ ÷ñé òÝóóåñéó áßóðíðó). Íé íå ÷ùñéóôÝò éáðåðíÞóáéò swap éáëü áßíáé íå Ý ÷iðí ðãñþðíò ðír Bæéi iÝååéiò. Í ðõñÞíáð ìðiñåß íå ÷åéñéóôåß áðéåðñåðó íåñäÝèç swap, áéëÜ íé áðóñöðåñééÝò aïñÝò áåñäñíÝìñù ñòðéiüñíðóé íå áÚóç ðíiÝååéiò ôçò íåñáéýöðåñçò éáðÜðiçóçò swap. Êñáðþíðó áðí ðíiÝååéiò swap ó÷ áåñüí óðíi Bæéi iÝååéiò éá áðéññÝóåé óðíi ðõñÞíáð íå áåéñéóôåðíiðéÞóåé ðíç ÷ñiÞóç ðíðó swap, iññéÜæñíðó áðéi êáéÜ ðír óüññöi óå êÜeå áßóðéi. Ááí ðæññÜæåé íå Ý ÷åðå íåñäÜeü iÝååéiò swap, áéüñá éáé áí áå ÷ñçóðíiðíéåðóáé áñéåðÜ. Íðiñåß íå áßíáé áðóñëiüöðåñç ç áíÜêåíþç áðíi Ýíå áéñöüð áéÝ ÷iðí ðññüññåñíà ðñiðiý ÷ññéåðåðåß íå áðáíååðééíÞóåðå ðír óýóðóçí.

### **12.2.1.3 Åéáôß íá öôéÜîåôå êáôáôìþóåéò;**

éðaÚðiçóç ç iðiþíða áþíðáæ æðaâÜæððáæ ðeið oð ÷ iÜ áðu üðe ãñÜððáæ Y ÷ áé lâðaëýðañç ðeððaüððáæ íá áðæÞðaæ áðuÜ Úð ÷ ciðo ððaÞðaðið.

## 12.3 Éyñéá Ñýèìéóç

Jáð áæá ÷ áéñéóðÞò ðñÝðåé íá áçíeiññÞóáé áããññaoÝò iÝóá óóí áñ ÷ áßi rc.conf þóðá íá áíðééáðóóÞóáé óéð ðñiâðééâáiÝ íåð ñoëiþóåéò áði òi áñ ÷ áßi /etc/default/rc.conf. Ói áñ ÷ áßi ðñiâðééiþí áái ðñÝðåé íá áíðééññaoðáß áðoí ëâáiâß óóí /etc - áðoü ðåñéÝ ÷ áé ðñiâðééâáiÝ íåð ðéiÝò, ü ÷ é ðáññáððññáðá. ¼éðò ié áééâáiÝò ðið aðiññíý òi óýóóciá ðñÝðåé íá áßiñði óóí áñ ÷ áßi rc.conf áðiññæðóðéU.

јáð aññéèñùò ðóññáðçáééþí lðiññáð íá åooánñiñóðåß óá Yíá óýñíëi åooánñiñäþí aæá íá iâ ÷ ññbñðiñlå ñðeññbñðåéò ðiñ ðiññý óðññüëiø  
áði ðeò ñðeññbñðåéò åðeéåññùñ Yíåò aæá Yíá óýóðçíà aæá íá êññåðÞróiñlå ðiñ òüññòi aæá ÷ åbññéóçò ÷ aíçëÜ. Ç ðññiñðåéññùñ aíç  
ðññiø Yáaéóç åbñiaé íá ðiñðiññåðiýá ðeò ñðeññbñðåéò åðññý óðññüëiø óá Yíá aæáøiññåðéêú áñ ÷ åbñ, üðò ði  
/etc/rc.conf.site, eæé öüðåð íá ðoññðaéñññ Üäiñlå ðiñ áñ ÷ åbñ åððü ðoñ /etc/rc.conf, ðiñ iðiññi eá ðaññéY ÷ åé  
ðeçññiñññåð åðeéåññùñ Yíåò aæá Yíá óýóðçíà.

ÌéÜò êáé ôí rc.conf äéááÜæåôáé áðí ôí sh(1) åßíáé åýíei íá ôí åðéóý÷iðiå áðöü. Äéá ðáñÜääéïá:

- rc.conf:

```
. /etc/rc.conf.site  
hostname="node15.example.com"  
network_interfaces="fxp0 lo0"  
ifconfig_fxp0="inet 10.1.1.1"
```

- rc.conf.site:

```
defaultrouter="10.1.1.254"  
saver="daemon"  
blanktime="100"
```

Ôi áñ÷åßí rc.conf.site lõññäb Ýðâéóð íá aæáslæçéåß óå ðÜéå óýðôçìá ÷ñçðéiiðtiéþíðåò ôi rsync þ êÜðiéi ðáññüéi ðññáññüá, áßí ôi áñ÷åßí rc.conf ðáññáÝfæ mññáæéü.

Áíáðæðiþæßiðóð ðí ðýðóðçílá ÷ ñicóðeiiðiéþíðóð sysinstall(8) P make world áðí éá áíðééáðáðÞóáé ðí ãñ ÷ áðí rc.conf, Ýðóðe ié ñððelþæð áðí éá ÷ áðíý.

## 12.4 Ñýèìéóć Åöáñiiäþí

Óððéê Ü, ié ååéâôåóôçì Ýfåò åöáñiiä Ýò Ý- iöí óá äéé Ü ôiöö áñ ÷ åßá ñöèïßöåùí, iå ôi äééü ôiöö ôñüði óýíóáïçò, êöeð. Åßíáé óçíáíöéü åöö Ü óá áñ ÷ åßá íá êñáöiýíöéé íå ÷ ùññéöö Ü áði ôi åáöéü óýóöçìá, Ýööé þþôå íá åßíáé åýéïëá åiöiðßöéïá ééé åéá ÷ åéñßöéïá åði ôá åññéæåßá åéá ÷ åßñéöçò ðåé Ýòúí.

ÓððééÜ, áðóÜ óá áñ ÷ áßá áßíáé áåéåôåóöçí Ýíá óóï /usr/local/etc. Óá áðóÞ óçí ðåñlßðóúóç üðáí íßá áðáññíäÞ  
Ý ÷ áé íåäÜëí áñéëìù áñ ÷ áßùí ñòëíßóåùí, Ýíáð óðíéåð Üëíäìð äçíéïññåßóáé áéá íá óá áðíëçéåýóåé.

ÉáñííééÜ, üôáí Ýíá port þ Ýíá package áâéâééóðÜóå, ðáñáäåßâláðá ãñ÷åßùí ñòëìßóåúí áâéâééóðÜíóáé åðßóçð. ÁóðÜ åßíáé óóíÞèùò áíáñüñßóéíá ãðï ôçí .default êáðÜëçç õiðò. Áí äáí õðÜñ÷iðí ãñ÷åßá ñòëìßóåúí áéá ôçí åðáññäþ, üôóå èá äçíéíñäçéíý êÜííóáð áíóðéñáðþ óá .default ãñ÷åßá.

Ãéá ðáñ Üáâæáíá, Ý ÷ áôå ððüøç óáð óá ðâñéá ÷ üíáíá ðíö êáðáëüäíö /usr/local/etc/apache:

```
-rw-r--r-- 1 root wheel 2184 May 20 1998 access.conf
-rw-r--r-- 1 root wheel 2184 May 20 1998 access.conf.default
-rw-r--r-- 1 root wheel 9555 May 20 1998 httpd.conf
-rw-r--r-- 1 root wheel 9555 May 20 1998 httpd.conf.default
-rw-r--r-- 1 root wheel 12205 May 20 1998 magic
-rw-r--r-- 1 root wheel 12205 May 20 1998 magic.default
-rw-r--r-- 1 root wheel 2700 May 20 1998 mime.types
-rw-r--r-- 1 root wheel 2700 May 20 1998 mime.types.default
-rw-r--r-- 1 root wheel 7980 May 20 1998 srm.conf
-rw-r--r-- 1 root wheel 7933 May 20 1998 srm.conf.default
```

Óá iàâÝèié ôúí áñ÷åßùí ååß ÷íïõí üüé ìüñí ôí áñ÷åßí srm.conf Ý÷åé áëëÜìåé. Ìßá iàôÝðåéôá áíáâÜèiéóç ôiõ port ôçò åöáññíäPò **Apache** åái èá áíôéêåôáôÞóáé ôí áëëåíÍÿí áñ÷åßí.

## 12.5 Eêêéíþíôáò Õðçñåóßåò

*Contributed by Tom Rhodes.*

Điều này là kết quả của việc cài đặt FreeBSD 10.0-RELEASE-p1 trên một máy tính có hệ thống quản lý gói Portage. Để khắc phục vấn đề này, bạn có thể thử cách sau:

- Đầu tiên, hãy kiểm tra xem có bao nhiêu port đã bị lỗi và không thể được cài đặt. Bạn có thể làm điều này bằng cách chạy lệnh:

```
emerge --search -v
```
- Sau đó, hãy cố gắng cài đặt các port mà không cần xác nhận trước. Điều này có thể giúp bạn tiết kiệm thời gian và tránh được các lỗi do xác nhận.
- Nếu vẫn không thành công, bạn có thể thử cách cài đặt thủ công. Điều này có thể đòi hỏi một số kiến thức về cách hoạt động của Portage.

Óði FreeBSD, ié ðâñéðóðúðâñðô ðâñéðâ ÷ ülâíðô ððçñâðßô, üðùð ôi cron(8), áßíáé áêééÍÞðéïâð ïÝóá áðû ôá óâíÜñéá áêéßíçóçò ôið ððóððíáôið. Óá óâíÜñéá áðôÜ ìðññâß íá áéáðÝññóí áíÜëíáá ôi FreeBSD Þ ôçí Ýéäíóç ôið áéâðáðéâðáðÞ; ñùðöüði, ç ðéí òçíáíðéèÞ ððô ÷ Þ ðéí ðñÝðâé íá áíâðáðóðâß áßíáé üððé ié ñðèíßðâðéð áêéßíçóçò ôið ðiðññíý íá : áéñéðóðíýí ïÝóá áði Ýíá áðëü óâíÜñéï áêéßíçóçò.

Đñéí ôçí Ýëåöóç ôïõ rc .d, ié åöáññiä Ýò iðiññiýóáí íá ôïõiøèåòòPöiõi Ýíá áðëü óåíÜñei åêëßíçóçò iÝóá óoïí êáòÜëëäí /usr/local/etc/rc.d iðiññiò iðiññiýóáí íá äéáåáôòåß áði òá óåíÜñéá åêëßíçóçò ôïõ óôôòòPìáòò. ÁôôÜ óá óåíÜñéá iðiññiýóáí íá åêôåëåôòïvý éåôá óå iàôÝðåéôá óôÜäéá åêëßíçóçò ôïõ óôôòòPìáòò.

ÁÍþ Þíeeið eáeþþóðo iúüðaðaá ÷ nüñri Þniððáðeþþóða ía óði ÷ uðiáyóðið oíi ðáæeü óðoðe ñoðeþðóðaúñi la òi rÝi óðoðe, ðáñai Ýið aðaðiðið uðe laðnëe Ü Ðñiðñ Uðiðaða áðuða áðaðeðiýi Ýiá oðið Uñeí iá ðiðiðaðoðeða b iÝða óðið Ðñiðñ aðaðnë Ýiða éað Uðiða. Íe eðaðð Yð aðaðiðiýi Ýða áði Uðiða óða óðið Uñeí aðaðoðiða áðu òi ái P ü ÷ e i r c . d ÷ ñiçðeðiðiðeðaðoða. Ðñiðñ aði Ýðaða ðið FreeBSD 5.1 òi ðáæeü óðoðe ñoðeþðóðaúñi ÷ ñiçðeðiðiðeðiýiðaí eáé ó ÷ aðaðiðiýi õða iúðaðo òeð ðaðaðoðiðaðe Ýiá rÝið óðoðe óðið Uñeí eá aðaðiðiýi õðiðaða.

Äíþ ÊÙðæ áðaÍÙñei ðñÍðåðæ íá ôçññâb iñeóí Ýfåð åæÜ ÷ éóðôåð áðåæcôÞóâæðo, ôðeo ðåññéðoùñôðâñâðo öiñÝ ãðoÝ ïe áðåæôÞoâæðo åbñiaé áíâÜñôçôåð oçò Ýêäöçò òiñ FreeBSD. ÊÙðæ áðaÍÙñei ðñÍðåðæ íá Ý ÷ åé iæá .sh åðÝêðâæðç ðññiðaññöçíÝíç óði ðYëið ðið êæé êÙðæ áðaÍÙñei ðñÍðåðæ íá åbñiaé åðôåðéÝóeii áði ði ðyóðöçia. Ói åðýðâññi iðiññâb íá åðéðåð ÷ èåß ÷ ñçðçñiðiþíðo åðçí chmod åiðiþiÞ êæé ñðiðiþaðo åðçí Üðâæá 755. Åðâß ðñÍðåðæ íá ððÜñ ÷ åé, ðiðiþiÞ ÷ éóðií, iæá åðéëiþ start êæé îñbå åðéëiþ stop åæá ôçí åðaññiþaþ.

Öi ðei áðëü óåíÜñei åêëßíçóçò ðéèáíüôáôá íá iiéÜæåé iå ôi ðáñáêÜôù:

```
#!/bin/sh
echo -n ' utility'

case "$1" in
start)
    /usr/local/bin/utility
    ;;
stop)
    kill -9 `cat /var/run/utility.pid`
    ;;
*)
    echo "Usage: `basename $0` {start|stop}" >&2
    exit 64
    ;;
esac

exit 0
```

Óí óáí Üñéí áóóü ðán Y ÷ áé ieá stop éáé ieá start åðéëíäP æáá ôçí åöáññíäP üðiõ óóï ðán Üääéäíà åäþ áíáö Y ñåðáé óáí utility.

Iðiñåß íá åêééíçèåß ÷åéñùíáêôéêÜ êÜíiíôáò:

```
# /usr/local/etc/rc.d/utility.sh start

Đáññüëi ðið ááí áðáééðíý üéåò ié áöoánñíä Ýò íá ðññiôðåèåß iñbá ááññáðP óði rc.conf, ó÷åäüí êáéçìåññéiÜ êáé Ýíá fÝí
port èá ôññiôðiéÞòå áæá íá äÝ-åðáé áðñP óçí ñyéëéøç. Åë Ýáññåðå óçí ôåëééP Ýññäi ôçò ááññåðÜðóáóçò áæá
ðåññéóðüðåññåð ðëçññòiññåð ðÜñ ñðóçí óðññåðññéiÝíç áöoánñíäP. lñññéêÝò áðññíä Ýò áðñi ôññbñðið ëáðáóðéåðáóðÝò
ðáññÝ÷iññ óáññéá áåéññíçóçò óå iðiñbá áðéññÝðiñi óðçí áöoánñíäP íá ÷ñçóéiñiéçèåß ià òiñ rc.d, ðáññüëá áðóá, áðóü èá
ñðññññéåß óðiñ áññiñññíññÝññò
```

#### 12.5.1 ÅêôåôáìÝíc Ñýèìéóç Åöáñïïäbí

Đe Ÿii ôi FreeBSD ðâñé Ÿ ÷ áé ôi rc. d, ç ñýèìéóç ôçò áéêBíçóçò ôùí áöðñíïäþí Ÿ ÷ áé áßíáé áðñëüöôåñç, éáé ðei ðeïýóéá óå ÷ áñåéôçñééÜ. ×ñçöéíïðiéþíôáò ëÝíâéò êéâéäþá íÝóá ôóíï êáðUëiäí rc.d, ié áöðñíïäÝð iðñiïýí ðeÝii íá áéééñíýí Ÿðâéóá áðiï ôóðâéñíéñíéÝfåò ðòçñâòþåò áéá ðáñÜäâéäá ôçí DNS, lðñiñâb íá áðéññâðåb ç áéðåáùñäP áðéðeÝí ðáññâÝðñùí íÝóá áðiï rc. conf ôóçí èÝóç ôùí þäç ðòðUñ ÷ oíôíï ðáññâÝðñùí áðiï ôá ôáñUñéá áéêéíþóçò, êðeð. já ááðééüú ôáñÜñéí iðñiñâb íá iieÜæåé íá ôí áéüëiðöéi;

```
#!/bin/sh
#
# PROVIDE: utility
# REQUIRE: DAEMON
# KEYWORD: shutdown

. /etc/rc.subr

name=utility
rcvar=utility_enable
```

```
command="/usr/local/sbin/utility"

load_rc_config $name

#
# DO NOT CHANGE THESE DEFAULT VALUES HERE
# SET THEM IN THE /etc/rc.conf FILE
#
utility_enable=${utility_enable-"NO"}
pidfile=${utility_pidfile-"/var/run/utility.pid"}

run_rc_command "$1"
```

Ôí óåíÜñéí áðóü èá áâáóöáëßóåé üöé ôí ðñüäñáíà utility èá áêééíçèåß íåðÜ áðí ôçí daemon õðçñåóßá. Èá áâáóöáëßóåé áðéðéÝíí Ýíáí ôñüðíí áéá ôçí ñýëìéóç êáé ôíí áíóíðéóíü ôíð PID, P ôíð áñ ÷ åßíð ôíð ID ôçò áéâñåáóßáò. Ç áðáñííP íðinåß ðëÝíí íá Ý÷åé ôçí ðáñáéÜðù áñáííP ôíðieåôçíÝíç ôóí /etc/rc.conf:

```
utility_enable="YES"
```

Í fÝíò áðóüö ôñüðíð áðéðñÝðåé áðéðéÝíí ôíí áðéïëüðåñí ÷åéñéóíü ôúí ðáñáíÝôñùí ôçò áñáííPò áíðiëþí, óá óðíäðåóíü ìá ôéò ðñíðÜñ ÷ iðóåð èâéðiññåßåò ðáñå ÷ ülåíåð áðíí ôí /etc/rc.subr, ôç óðíâðüöçóá íå ôí áïçèçóéêü ðñüäñáíà rconfig(8) êáé áðéðéÝíí ôçí áðéïëüðåñíç ñýëìéóç íÝóù ôíð rc.conf áñ ÷ åßíð.

## 12.5.2 ×ñçóéííðíéþíóáò Õðçñåóßåò Áéá Ôçí Áêéßíçóç Õðçñåóéþí

¶æéåò õðçñåóßåò, üðùò í ááßíííåò ôíð åíðçñåñåP POP3, IMAP, êóëð. íðinííyí íá áêééíçèíý ÷ñçóéííðíéþíóáò ôí inetd(8). Áðóü áðáéóåß ôçí áâéáóÜóóåç ôíð åïçèçôééÝ ðñíäñÜííåò õðçñåóéþí áðí ôçí Ports óðéëííP êáé íéá áñáííP ññðèìßóåùí ðññóáññôçíÝíç ôóí áñ ÷ åßí /etc/inetd.conf, P áðí ÷ áñáéóçñßæííóåò íéá áðí ôéò Päc õðÜñ ÷ iðóåð áñáííYò ññðèìßóåùí. Äïðeåýííóåò íå ôí inetd êáé ôéò ññðèìßóåéò ôíð ðåñéäñÜðååé áíáéðóéêÜ óóí íÝñiò inetd.

Óá ðiëëÝò ðåñéððþóåéò, åßíáé áýëíäí íá ÷ñçóéííðíéåßôå í ááßíííåò cron(8) áéá ôçí áêéßíçóç ôúí õðçñåóéþí ôíð óðóððþíåò. Ç ðññóáññôçíÝíç áðóðP Ý÷åé Ýíáí áñéèíü ðëåííåêôçíÜðùí áéåôß ôíí cron ôñÝ ÷åé ôéò áéâñåáóßåò óáí éäéíéðþóçò ôíð crontab áñ ÷ åßíð. Áðóü áðéðñÝðåé óðíðò êáñíéëíýò ÷ñþóðåò íá áêééííyí êáé íá äéá ÷ åéñßæííóåé íåñééÝò áðáñííYò.

Ôí áïçèçôéêü ðñüäñáíà cron ðáñÝ ÷åé Ýíá íííáéêü ÷åñáéðçñéóðéêü, ôí @reboot, ôí iðiþíí ïðinåß íá ÷ñçóéííðíéçèåß ôóçí èÝóç ôíð ÷ññééíý ññéóíý. Áðóü èá êÜíåé ôçí áññåáóßá íá ôñÝíåé üðáí ôíí cron(8) áêééíçèåß, óóíPëùò êáðÜ ôçí áêéßíçóç ôíð óðóððþíåò.

## 12.6 Ññðèìßæííóåò Óí Ðñüäñáíà cron

*Contributed by Tom Rhodes.*

Íá áðí ôá ðéí ÷ñþóðíá åïçèçôéêÜ ðñíäñÜííåðå óóí FreeBSD åßíáé ôíí cron(8). Óí ðñüäñáíà cron ôñÝ ÷åé óóí ðáñáóéðþíéí êáé óóí ÷þò åëÝä ÷åé ôíí áñ ÷ åßí /etc/crontab. Óí cron åëÝä ÷åé áðßóçò ôíí êáðÜëíäí /var/cron/tabs, áíáæçþíóåò êáéííýññéá áñ ÷ åßá crontab. Óá áñ ÷ åßá crontab Ý ÷ iðí áðièçéåðíÝíåò ðëçññiòññåò áéá óðâæâñéíÝíåò áéâæéâóßåò ôéò iðiþåò ôíí cron ðñÝðåé íá áâðåæÝóåé óá óðâæâñéíÝí ÷ññíí.

Óði cron ÷ n̄cóséiiðiðeáþ áyí aéáööññáðöééiyó óýðiðoð añ÷ áßuñí n̄ðeñßuñáúñ, ói crontab öið óðóðøÞiaðið eáé ói crontab ðuñ ÷ n̄cósóþí. Ç iñiç aéáööñ Ú áfÚlñáðá ööiðoð áyí aððiýð óýðiðoð áßuñáé ói Ýéði ðåäði. Óði crontab öið óðóðøÞiaðið, ói Ýéði ðåäði áßuñáé öiñ üññá òið ÷ n̄Þróðç iñi ðiðiñßið eá åððaëáðóðað c áiðiðeþ. Áðóðu áßuñáé öcí aððaðuñðcóðá óoñi crontab öið óðóðøÞiaðið fá åððaëáð áiðiðeÝð oáá iðiðetáðiða ÷ n̄Þróðç. Óði crontab ðuñ ÷ n̄cósóþí, ói Ýéði ðåäði áßuñáé c áiðiðeþ ðið ðñÝðåðe íá åððaëáðóðað, eáé üeðað ié áiðiðeÝð åððaëiýðaáé ööi üññá òið ÷ n̄Þróðç ðið aðiðeÝññáçðá öi crontab; áðóðu áßuñá Ýíá öcí aðiðeü ÷ aðnáðeôcññéóðeü aððaëáðað.

**ÓciáBúños:** Óa crontabs óuí ÷ñcóðþí áðéðñÝðöi óa íaíiñuÝñiðò ÷ññóðåò ía ðññiññáíðñðöi áñññáñðáò ÷ññññò ñcí áíÜæc root æééáéuÝðöi. Íe áiðiøÝðöa óói crontab áíüò ÷ññóðç ðññY÷ñiðò ía óa æééáéþíáó ðið ÷ññóðç ðið ðiðñðöi áíþéáé ói crontab.

Áò ñßññöìå iéá ïáôßá óôï áñ÷ åßí /etc/crontab (óï crontab ôïõ óôôôÞíáôïò):

```
# /etc/crontab - root's crontab for FreeBSD
#
# $FreeBSD: src/etc/crontab,v 1.32 2002/11/22 16:13:39 tom Exp $
# ❶
#
SHELL=/bin/sh
PATH=/etc:/bin:/sbin:/usr/bin:/usr/sbin ❷
HOME=/var/log
#
#
#minute hour      mday      month      wday      who      command ❸
#
#
# 5      *          *          *          *          root     /usr/libexec/atrun ❹
```

- ➊ ¼ððù ðóá ðåñéððúðåññ áñ ÷ åßá ñòðèìßðåùñ óöï FreeBSD, i ÷ áñâéððñáð # ðåñéððÚíäé Ýí ð ÷ üëëí. já ó ÷ üëëí ïðiññåß íá òïðièåðçèåß iÝóá óöï áñ ÷ åßíí óáí ððåíèýíéöç æáé õi ðé ðññåññåðiðièåß êáé æáéðß ißá åíÝññååé. Óá ð ÷ üëëá åái iðiññíý íá åßíáé óöçí ßæáé ãññáìß ißá åíðièð ãæáðß åéëëþò éá åmíçlåððöïýí ðáí èmíÜðé ðçð åíðièðþð; ðñÝðåé íá åßíáé óá ißá iÝá ãññáìß. Ié êáíÝð ãññáìß Ýð åññíýíóáé.
  - ➋ Ëåôåñ ÷ þí, ðñÝðåé íá êåèìñéððåß õi ðåñéððÜëëí. I ÷ áñâéððñáð ßðöï (=) ÷ ñçöéññiðièåðßð åéá íá êåèìñßðåé ðéð ñòðèìßðåéð ðiö ðåñéñå Üëëíðiö, üððù ðó áððù õi ðåññÜäåéññå ðiö ÷ ñçöéññiðièýíðåé ié iåðåññéçöÝð SHELL, PATH, êáé HOME. Áí ç ãññáìß Þ iði ðéÝëððið ðåññåññéçèåß, õi cron ëá ÷ ñçöéññiðièÞðåé ðçí ðññåððéåññå Ýíç, ié iðiðið åßíáé ç sh. Áí ç iåðåññéçöÞ PATH ðåññåññéçèåß, åái ëá ÷ ñçöéññiðièçèåß ðññåððéåññå Ýíç êáé ç òiðièåðßð ðùí áñ ÷ åßñí ëá ðñÝðåé íá êåèìñéððöïýí iá åéñßååé. Áí ç HOME ðåññåññéçèåß, õi cron ëá ÷ ñçöéññiðièÞðåé ðiñ ñåðñéêü ëåðÜëëí ðùí åéÜððiö ÷ ñçööþí.
  - ➌ Ç ãññáìß ãððÞ êåèìñßæåé ðóññééÜ åððÜ ðåðåßá. Óá ðåðåßá åððÜ åßíáé ðá minute, hour, mday, month, wday, who, êáé command. ÅððÜ åßíáé åðiñ iñíá ðiö ðåðåçñäçiaðóééÜ. Õi ðåðåßí minute åßíáé i ÷ ñüññið ðá åððÜ ðiñ iðiññiç åíðièð ðé åéðåññéððåðß. Õi ðåðåßí hour åßíáé ðåññüññið iá ðiñ ðåðåßí minute, åððÜ åßíáé ðá þññð. Õi ðåðåßí mday êåèìñßæåé ðçí çiÝñá ðiö iþíá. Õi ðåðåßí month åßíáé ðåññüññið iá ðiñ ðåðåßí hour êáé õi ðåðåßí minute, ððiðåðåññéýíðåð ðiñ iþíá. Õi ðåðåßí wday êåèìñßæåé ðçí çiÝñá ðçð ååðññÜððåð. ¼éá åððÜ ðá ðåðåßá ðñÝðåé íá Ý ÷ iði ðññéèñçöééÝð ðé ðéÝð, êáé íá åéëëíðièýí õi åßíéñöé-ðåðññÜññiñ niueü. Õi ðåðåßí who åßíáé êéåéðßðññ, êáé ððUñ ÷ åé

iúñi í Ýóá óóí áñ÷åßí /etc/crontab. Óí ðåäßíi áðóú êáèññbæáé óáí ðíieúò ÷ñÞóðçò eá ôñÝiáé ðçí áîóíëþ. ¼óáí Ýiáò ÷ñÞóðçò åâéáèéóð Ü ói crontab áñ÷åßí iði, åái eá Ý÷åé ói ðåäßíi áðóú æéáè Ýóéii. ÔÝeíð, eá áéiëiðëþóáé ç åðéëíàþ command. Áðóú åßíáé ói ðåäëåðóáßí ðåäßí, Ýóóé êáé ëiäééÜ ðòðrâáééíýáé ðçí áîóíëþ ðið eá åêðóåéåðóåðß.

- ④ Ç öåâéâôôáßá áôôD p åñâíïP éá èáëeñßóáé óá iaâÝéié ðïò ôôæçöÞèçéáí ðáñâðÜù. ðñïò Ýíôå ääþ üôé Ý: ïòïä Ýíáí iñëöü \* / 5, åéïëiðëýiñâíl áðï áññéâôöýò ÷ áññéôÞñâð \*. ïé = áññéôÞñâð \* öçìlåßñïð “ðñþþöi-ôâéâôôáßí”, éáé iðiññý íá åññçíâðëýí óáí èÜëå öññÜ. ôóé, êñññññöåð áðï áôôD öçí åñâíïP, åßíáé ðñïòáíÝò üôé ç åíôïëP atrun áðééâéâßôáé áðï öññÞööç root èÜëå ðÝíôå èåððÜ áíâíññðçöå áðï öçí çìÝñá éáé öññPíá. Äéá ðåñéôöûðâñâð ðëçñññññßâð ð: åôôéü ïá öçí åíôïëP atrun, eïéðÜîôå öçí öåéâßá åïçëâßâð atrun(8).

Íe áiðiði Ýò iðiñiýí íá Ý÷iði áðañéüñéóði áñéèìü ðáñai Ýóñuú, ùðóliði, íe áiðiði Ýò iå áðeðaðaí Ýíí áñéèìü áñáñiþí ðñÝðåé íá äéáðaðóðiýí iå ðií ÷áñáðeðPñá ðoíÝ÷áéð aíððæðaðcò éáèÝðiø “”.

ÁðóÝð áðþáé íé ááóéé Ýð ñðeìþóðæð áðáé ÁðÜèå áñ÷ð áðþí crontab, ñðóðüöř ððÜñ÷ð áé áéáé ÆÜðé áæáöññðóðééú. Óí ððääþí Ýíé, üðiö áéáé áæáëñþæiðíå öí üññá ÷ñþóðç, ððÜñ÷ð áé iññí öðí áñ÷ð áðþí öðóðþíáðiö /etc/crontab. Óí ððääþí áðóðü ðñÝðåé íá ðáñáæéðæð áðáé ÁðÜèå crontab áñ÷ð áðþí ÷ñþóðç.

### 12.6.1 Åñêáèéóôþíôáò íá Crontab

**Óćiáíóééü:** Ááí éá ðñÝðåé íá ÷ñçóéíïðíëþðóåô ôcí äéáäééåóßá ðïö ðåñéäñÜöåôåé åäþ áéá ôcí  
äéüñèùóç/äâéåôÜöååóç ôïö crontab ôïö ôðóôþìáôïö. ÁðëëÜ ÷ñçóéíïðíëþðóå ôíï áâáåðçìÝíï óáó èâéïåñññÜöï: ôï  
cron éá áïðíðßóåé üöde ôï áñ÷-åßíÝ ÷-åé ôñïðíëçèåß êáé éá áñ÷ßóåé Üläóå íá ÷ñçóéíïðíëåß ôcí áíáùíÜíç  
Ýéäíóç ôïö. Áåßóå áôðôþ ôcí áâáññåðþ ôïö FAQ  
([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/books/faq/admin.html#ROOT-NOT-FOUND-CRON-ERRORS](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/faq/admin.html#ROOT-NOT-FOUND-CRON-ERRORS))  
ãéá ðåñéóóüôåññåò ðëçñïïññßåò.

Ãéá íá âåêådåóôÞóåô Ýíá íÝí crontab ÷ñÞóôç, ðñÞóå ÷ñçóéiiðiéÞóå ôíï áâåðçíÝíï óåò êåéïåññÜöï áéá íá äçieïõñäÞóåô Ýíá áñ÷åßí íå ôí áðåéöïýìåññ ÿði, êåé ôüôå ÷ñçóéiiðiéÞóå ôíï crontab. Ç ðéï eïéÍP ÷ñÞóç ôíï åßíäé:

```
% crontab crontab-file
```

Óóí ðáññÜáâéñíá áðóóü, óíí áñ÷ áßíí crontab-file áßíáé óíí üññá óíð áñ÷ áßíí crontab óíð áß÷ áäçleíññäçéåß ðññíçáðííÝñùð.

ÕðÜñ÷åé åðßóçò ïßá åðéëïäP æá íá áðáñéèïÞóåôå ôá åæéåôåôöçìÝíá áñ÷åßá crontab: áðëÜ åéóÜãåôå ôçí åðéëïäP -l óöçí åíöïëP crontab êáé åëÝäîôå õï áðïöÝéåöíå.

Áéá ôiöò ÷ñPöôåò ðiöò èÝeiöí íá áñ ÷ßöiöí ôi crontab áñ ÷åßi ôiöò áði ôçí áñ ÷P, ÷ùñßò ôçí ÷ñPöç ðñiöyðiö, iðiníyí íá ÷ñçöeüiðiéPöiöí ôçí áîöiëP crontab -e. ÁðôP ç áîöiëP èá íâééÍPöåé öiï êâéíâññÜöri íá Ýíá êâíü áñ ÷åßi. ¼ôáí ôi áñ ÷åßi áðiècêåðeåß, èá áâéâåðåóåèåß áðöüùåðå áði ôçí áîöiëP crontab.

Áí áñáüðáñá è Ýéåðå íá áæáan Üþóðå óí crontab áñ ÷ áßí ÷ nÞóðç óåéåßùð, ÷ nÍçóéñiðíéÞóðå óçí áíóïëÞ crontab íæß íá ðçí áðééïäÞ -x.

## 12.7 ×ñçóéíðíéþíóáò Ôï Óýóôçìá rc Óôï FreeBSD

*Contributed by Tom Rhodes.*

Ôï 2002 ôï FreeBSD åíóùìÜôùóå ôï óýóôçìá rc .d ôïõ NetBSD æáá ôçí åêêßíçóç ôïõ óôôôÞìáôïò. Íé ÷ñþóôåò èá ðñÝðåé íá Ý÷iðí áíôéëçöèåß óá áñ÷åßá ðiðâñßóëíîôáé óóíí éáôÜëiäi /etc/rc .d. ÐiðéÜ áðï áôôÜ óá áñ÷åßá åßíáé æáá ôéò áááóééÝò ôðçñåóßåò êáé lðmñýí íá åéäæëíýí lâ ôéò áðéëíäÝò start, stop, êáé restart. Åéá ðáñÜääéäiá, ôï sshd(8) lðiññåß íá åéäæëåß ÷ñçóéíðíéþíóáò ôçí áíÞò áíôïeÞ:

```
# /etc/rc.d/sshd restart
```

Ç åéäæéååßå áôôÞ åßíáé ðáñüìíéá êáé åéá ôéò ðôüëíéðåò ôðçñåóßåò. ÕôôééÜ, ié ôðçñåóßåò áôôÝò åßíáé óôíÞèùò áôôüüååå åêêéíÞóéíåò êáôå ôçí åêêßíçóç ôïõ óôôôÞìáôïò üðùò êáé êáëiñßæåôáé óóí rc.conf(5). Åéá ðáñÜääéäiá, åíåññåðíéþíóå ôíííäåíä Network Address Translation óôçí åêêßíçóç åßíáé ôüóí áðëü üóí êÜññóåò ðññóëÞêç ôçò åéüëíðèçò åññáìÞò ôóí /etc/rc.conf:

```
natd_enable="YES"
```

Áí ç áðéëíäÞ natd\_enable="NO" åßíáé Þäç ðáññýóá, ôüôå áðëÜ áéëÜæåôå ôçí áðéëíäÞ NO óå YES. Ôá óåíÜñéá rc èá òïññóþíóí ãôôüüååå iðiñéäÞðiðå åíáññóþiáíç ôðçñåóßå êáôÜ ôçí äéÜññéåå ôçò áðüüláiçò åêêßíçóçò, üðùò êáé ðáñéåñÜöåôåé ðáñåéÜôù.

Íéáò êáé ôï óýóôçìá rc .d åßíáé êôñßùò åéá ôçí åêêßíçóç êáé ôíí åíññåôéóíü ôðçñåóéþí êáôå ôçí åêêßíçóç êáé ôíí ôåññåôéóíü ôïõ óôôôÞìáôïò áíôßóôíé÷á, ié ôññééëñéóíÝíåò áðéëíäÝò start, stop êáé restart èá ðññåñåðíéÞóí õéò áíôßóôíé÷åò áíÝññåéåò áí ç êáôÜëëçéåò lâôååëçöÝò åßíáé êáëiñéóíÝíåò óóí /etc/rc.conf. Åéá ðáñÜääéäiá ç ðáññåðÜíü áíôïeÞ sshd restart èá åíññééçöÞ sshd\_enable Ý÷åé ôåññåß óå YES iÝóá óóí /etc/rc.conf. Åéá íá åêôåæÝóååå ôéò áðéëíäÝò start, stop Þ restart íéáò ôðçñåóßåò áíåñÜññóçôå áðï ôéò ñôèìßóåéò ôçò óóí /etc/rc.conf, ç áíôïeÞ ðñÝðåé íá Ý÷åé ÷åññéôçñéóôåß íå “one”. Åéá ðáñÜääéäiá åéá ôçí åðáññéêßíçóç ôïõ sshd áíåñÜññóçôå áðï ôéò ôñÝ÷iðóåò ñôèìßóåéò óóí /etc/rc.conf, åêôåæßåå ôçí åéüëíðèç áíôïeÞ:

```
# /etc/rc.d/sshd onerestart
```

Åßíáé åýéëí íá åéÝññååå áí ç ôðçñåóßå åßíáé åíåññåðíéçíÝíç óóí /etc/rc.conf ôñÝ÷iðóåò ôï êáôÜëëçëí óåíÜñéí rc .d lâ ôçí ðáñÜññóñí rcvar. ÊáôÜ óóíÝðåé, Ýíåò åéá÷åññéóôÞò lðiññåß íá åéÝññåé áí ôï sshd åßíáé üíôùò åíåññåðíéçíÝññóñí óóí /etc/rc.conf åêôåæþíóå:

```
# /etc/rc.d/sshd rcvar
# sshd
$sshd_enable=YES
```

**Óçìåßùóç:** Ç ååýôåñç åññáìÞ (# sshd) åßíáé ç Ýññäiò ôçò áíôïeÞò sshd, êáé ü÷é ç êííóïëÜ ôïõ ÷ñþóôç root.

Åéá íá åéÝññååå áí íéá ôðçñåóßå ôñÝ÷åé, ç áðéëíäÞ status åßíáé åéáééÝóéíç. Åéá ðáñÜääéäiá åéá íá åðéåååéþóå åüôé ç ôðçñåóßå sshd ôñÝ÷åé:

```
# /etc/rc.d/sshd status sshd is
running as pid 433.
```

Ói óyóóciá rc.d äái ÷ nçóeñiñíéåßôå iùñí æá ôeò ñðçñåóßåò äéêöýiø, äéëÜ åðßóçò öoìñåÜëåé êáé êåóá ôçí åéêßíçóç öiø öoóóðþiaöiø. Åéá ðáñÜäåéäíá, ôéåööåßôå öi áñ ÷ åßí bgfscck. ¼öáí Ýíá óáíÜñëí åéôåéåßôå, éá åéööðþiaé öi åéüëiøiø iøÞioíá:

Starting background file system checks in 60 seconds.

Đã cài đặt thành công, ta có thể kiểm tra bằng cách chạy lệnh `netstat -an | grep :80` để xem kết nối từ portmapper (RPCbind) đến port 80:

```
netstat -an | grep :80
tcp        0      0 0.0.0.0:80              0.0.0.0:*               LISTEN      1154/rpcbind
```

Đây là kết quả mong đợi, portmapper đã mở port 80 để phục vụ các yêu cầu từ các ứng dụng khác.

- **PROVIDE:** Êàùüñéæåé ôçí ðöçñåóßá ðiø ðáñÝ ÷ åé ôí áñ÷åßí áôôü.
  - **REQUIRE:** Áðáñéèìåß ôéò ðöçñåóßåò ðiø áðáéöiyíøáé æéá ôçí ôçí ðöçñåóßá áôôP. Ôí áñ÷åßí áôôü èá åêôåëåóôåß iåðÜ áðí ôçí éâèïñéóíÝíç ðöçñåóßá.
  - **BEST:** Áðáñéèìåß ôéò ðöçñåóßåò ie iðiøßåò åâñôþíøáé áðí ôçí ðöçñåóßá áôôP. Ôí áñ÷åßí áôôü èá åêôåëåóôåß ðñþí ôéò éâèïñéóíÝíåò ðöçñåóßåò.

× ñçóéïïðíéþíôå õçí ïÝëïäï áôðþ, ié äéá ÷ åéñéôô Ýò ìðïñýí åýéïëá íá åéÝäñïó ôéò ôðçñåôßåò ôïõ ôôôôÞìáôïò ÷ ùñßò ôå äôóïüçôå “runlevels” üðùò óå ìåñéêÜ Üëéá eåéôïñäéêÜ ôôôôÞìáôå UNIX.

## 12.8 Ñõèìßæïíôáò Ôéò ÈÜñôåò Äéêôýïõ

*Contributed by Marc Fonyieille.*

#### 12.8.1 ÅíôïðÞæříôáò Ôíí Óùóôü läcäü

Đññéí áñ÷ßóåôå, èá ðñÝðåé íá áñùñßæåôå ôi ññíöÝëü ôçò êÜñôå ðiö Ý÷åôå, ðiéü chip ÷ñçöeíïðiéåß, êáé áí åßíáé PCI P ISA êÜñôå. Ôi FreeBSD ðiöööçñßæåé Ýíá iåäÜëü åýñìö éåñôþí PCI êáé ISA. ÅëÝåñôå ôçí Ëßóôå Õòiåñåöüöcôå Õëëéiy áæá ôçí Ýëüäöc óåò áæá íá åäßôå áí c êÜñôå óåò ðiöööçñßæåôåé.

Åöyüöii åbóoå ðëÝí óbääññiò üöé ç êÜñôá óáò õðiööçñßæåôáé, èá ÷ñåéáóôåß íá êáëiñßóåôå öií éáôÜëëçëi iäçäü ãéá õcí êÜñôá óáò. Öi áñ ÷åßi /usr/src/sys/conf/NOTES êáé öi áñ ÷åßi /usr/src/sys/arch/conf/NOTES èá

óáð áþróðið íéá ðeðnóðað aðeðóýið éáé íaðneé Ýð ðeðnýiðiñþáð aðá óá ððiðóðçñéæðiñárá í chipsets éáé ðóð  
ððiðóðçñéæðiñáðo ðeðnóðað. Áí Ý ÷ aðóð aðiðéaðið þáð aðá ói ðiðeðuð iðaçáuð aðfíáé ið óuðóðuð, aðááð Úðóðað ócí óáðþáá aðiçèðþáð  
ðiði iðaçáiý. Ç óáðþáá aðiçèðþáð éá óáð áþróðaé ðaðñéðóðuðaðnáð ðeðnýiðiñþáð ó ÷ aððeé Ú ið ði ððiðóðçñéæðiñáði ðeðeéuð éáé  
aðiðið iðaçáiý.

Áí Ý÷åôá ìéá óoíçèéóíÝíç êÜñôá, êåóá ðÜóá ðeeáíüôçóá äáí èá ÷ñåéåóôåß íá øÜìåôå ðíeyí åéá ôíí iäçäü. Íé iäçäiiß åéá ôéö óoíçèéóíÝíç ëÜñôåò åééöýïö ððÜñ ÷iöí óoíí ðoñPíá GENERIC, Ýôóé þþôå êåé èå åìöáíéöôåß êådå ôçí åéÜñêåá ôçò åêéßíçóçò, åéá ðánÜäéäìå:

```
dc0: <82c169 PNIC 10/100BaseTX> port 0xa000-0xa0ff mem 0xd3800000-0xd38  
000ff irq 15 at device 11.0 on pci0  
dc0: Ethernet address: 00:a0:cc:da:da:da  
miibus0: <MII bus> on dc0  
ukphy0: <Generic IEEE 802.3u media interface> on miibus0  
ukphy0: 10baseT, 10baseT-FDX, 100baseTX, 100baseTX-FDX, auto  
dc1: <82c169 PNIC 10/100BaseTX> port 0x9800-0x98ff mem 0xd3000000-0xd30  
000ff irq 11 at device 12.0 on pci0  
dc1: Ethernet address: 00:a0:cc:da:da:db  
miibus1: <MII bus> on dc1  
ukphy1: <Generic IEEE 802.3u media interface> on miibus1  
ukphy1: 10baseT, 10baseT-FDX, 100baseTX, 100baseTX-FDX, auto
```

Óði ðán! Úðað eða ía áðou, að Ýðiðið uðoé áyír é Úñðoáð ðið - ÷ nçóðiñ ðiðiýíy ðið ræcúu dc(4) Ý ÷ iðiði áðiðeðoðaß óðiði óyðóðciá.

Áí i�cäùò ôçò NIC óáò äái åbíáé ðánúí óóíí GENERIC, èá ðñ Yðåé íá öirñöþóåô ôíí èáðÜëëçëí i�cäù áéá íá ÷ñçóelíðiéÞóåô ôçí NIC óáò. Áðóù iðinñåß íá åðéôåð ÷ èåß ià Ýíáí áðí ôíðò äýí áðôiyð ôñüðiðò:

- Í ðírígü áyéiði í ôññúðið ábíráé áððeÜ íá öiññóþróåðâ Ýíá Üñèñùìá ôið ðoñÞríá áéá ðçí êÜñôá áæðóýið óáð la òi kldload(8), Þ áððuññáðâ éáðá ðçí áæððíçóç ðññiðeÝðiðáð ðçí éáðÜëëçëç ãññáìÞ óði ãñ ÷åßi /boot/loader.conf. Ááí ábíráé üürié ie íäçäið NIC áéáéÝðeñið óáí ãññéñpiáðâ, ÷ ãññáððçñéðóðéêÜ ðáññáäðßáñáðâ ábíráé óá ãññéñpiáðâ áéá ðððéåðÝð ISA.
  - ÁáðëéáêðéêÜ, ïðiññáðôá íá ìåðáäðþðôéðåðâ óððáðéêÜ ðçí ððiððññéïç áéá ðçí êÜñôá óáð óðiññ ððññÞríá. ÁéÝññáðâ òi ãñ ÷åßi /usr/src/sys/conf/NOTES, òi /usr/src/sys/arch/conf/NOTES áéá ðçí óåðëßáá áïçëåðßáð òið iäçäiý áéá íá iÜëåðâ ðé ðññÝðåé íá ðññiðeÝðáðâ ðóðâ ðóði ãñ ÷åßi ññðeñðóðâñi òið ððññÞríá. Áéá ðáññéðóðññâðâ ðëcññiðññðâð áéá ði ðñð íá ìåðáäðñðôðþðâðâ ðið ððññÞríá, ðáññáêáðþ áéáðÜðóðâ ði ÊåðÜëáéið 9. Áí ç êÜñôá óáð áiðiððéðóðâ ðéâðâ ðçí áæððíçóç áðði òi ððññÞríá (GENERIC) ááí ÷ññéÜðæðâ ðá ìåðáäðþðôéðåðâ Ýíá iÝí ððññÞríá.

### 12.8.1.1 ×ñcóéíïðíéþíóáò läçäíýò Windows lå Ôí NDIS

Äõõõõ ÷ ðò, õðÜñ ÷ iõí áéüìä ðíeeiõ õðáðåõõåõõ Ýò ðiõ ãái ðái Ý ÷ iõí ôå ÷ íéé Ýò ðñïräéääñño Ýò ãéá ôïõõ ñäçäïý õðõõ õðóçí eïeïüõçõá õïõ áíïéõõý eïäéõiééý áéáõß áíõéiâõùðßæiõí õÝ õiéåò ðëçñiõñbhåô óáí iõðõõé Ü õïõ áïðiñbïõ. Õðiáðbò, ié õðåýèõfié áéá ôçí áíÜðõõïç õïõ FreeBSD êáé Üëeüñ eäéõiõñääéþí õðõõçí Ûõùí ïÝñiõí là äyí áðeëiaÝò: íá áíáðõýñiõí ñäçäïý ìä ôçí ìäññÜ ëáé áðbðiõç áéáääééõßá ôçò áíõßõõñiõçò ìç ÷ áíééÞò Þ íá ÷ ñçóéiñðiéÞòiõí Þäç õðÜñ ÷ iõíôå ñäçäïý õå äðääééÞ ïñõÞ äéáé Ýóéñiõò áéá ôçí ðëäõõüññà Microsoft Windows. Íé ðäñéóõüõåñïé õðåýèõfié áéá ôçí áíÜðõõïç, ìäõðáý õïõõ ëáé áõõiõ ðiõ áïðeëÝéiõáé là ôi FreeBSD, Ý ÷ iõí áðeëëÝiâé ôçí äýõôâñç õñiõÝäääéóç.

× Üñç ôçí ðññóöiñÜ öiñ Bill Paul (wpaul), iéÜò êáé áði öi FreeBSD 5.3-RELEASE öðÜñ ÷ áé “äçåáiPò” öðiñóöPñéïç  
æá öi Network Driver Interface Specification (NDIS). Öi Ýññi FreeBSD NDISulator (æáöiññåôééÜ ãiùñööu óáo  
Project Evil) ðåññiñéÝ áiäcü Windows óá äöáééP iññöP êáé óöçí iññóßá öiñ áåðåôÜ þóöå íá ñññæáé üöé öñÝ ÷ áé

óå Windows. Ëüäi ôiõ üüöé i iäçäüò ndis(4) ÷ñçóéiiðiéåß ißá Windows äðääéêP iññöP, iðiñåß íá ÷ñçóéiiðiéçèåß iññi óå i386 éáé amd64 óðóðÞiaóá.

**Óçìåßùóç:** I iäçäüò ndis(4) åßíáé ó÷åäéáóíÝiò þóôå íá ðiðiøôçñßæåé êññßùò óðóðåôÝò PCI, CardBus êáé PCMCIA, ié óðóðåôÝò USB äáí ðiðiøôçñßæiiôåé áêüíá.

Åéá íá ÷ñçóéiiðiéÞóåôå oíí NDISulator, èá ÷ñåéåôðåßôå ôñßá ðñÜäiáôå:

1. Ôíí ðçäåßí êþäéêå ôiõ ðoñÞíá
2. Ôçí Windows XP äðääéêP iññöP ôiõ iäçäiý (.SYS åðÝêôåóç)
3. Ôí Windows XP áñ÷åßí ñoñèìßóåùí ôiõ iäçäiý (.INF åðÝêôåóç)

Åíòðbóðå óå áñ÷åßí áðôÜ åéá ôçí êÜñôå óåð. ÅáíéêÜ, áðôÜ iðiñiýí íá åñâæiýí óðå ðáñå ÷uñåá CDs P óðiñò ëóðüòðiò òuñi êáðåóðåôðåôðí. Óðå áêüëiðéå ðáñååðåßäiáôå, èá ÷ñçóéiiðiéÞóïðiå óå áñ÷åßá W32DRIVER.SYS êáé W32DRIVER.INF.

**Óçìåßùóç:** Åáí iðiñåßôå íá ÷ñçóéiiðiéÞóåôå iäçäiýò Windows/i386 óå óðóðÞiaóá FreeBSD/amd64, èá ðñÝðåé íá åñâßôå iäçäiýò Windows/amd64 æá íá äiðëÝðiñi óùóðÜ.

Öí åðüñåñi âÞíá åßíáé íá iñðååëùôðßóåôå ôiõ äðääéêü iäçäü iÝóå óå Ýíá õiñðþóéii Üññèñùíá ôiõ ðoñÞíá. Åéá íá ôi ãðéóý÷åôå áðôü, èá ðñÝðåé óáí root, íá ÷ñçóéiiðiéÞóåôå ôiñndisgen(8):

```
# ndisgen /path/to/W32DRIVER.INF /path/to/W32DRIVER.SYS
```

Öí åiçèçôéêü ðññüññiñiá ndisgen(8) åßíáé äéåñáóðéêü êáé èá óåð åíçìåññþóåé åéá iðiéåäPðiôå åðéðéÝíí ðeçñiññßá iðiñåß íá ÷ñâéåóðåß; èá ðánÜññåé Ýíá Üññèñùíá ôiõ ðoñÞíá óóíí ôñÝ÷uñóá êáðÜëíñi êáé iðiñåß íá õiñðôùèåß ùò åíÞò:

```
# kldload ./W32DRIVER.ko
```

ÅðéðéÝíí ôiõ ðáñå ÷eÝíò ññèñþíåðiò, èá ðñÝðåé íá õiñðþóåôå óå áññèñþíåôå ndis.ko êáé if\_ndis.ko. Áðôü èá ðñÝðåé íá åßíáé áðôüññåôå üüáí õiñðþíåôå iðiéåäPðiôå åññññÜðåé áði ðiñndis(4). Áí èÝéåôå íá ôi êÜñåôå ÷åéññíåðéêÜ, èá ðñÝðåé íá ÷ñçóéiiðiéÞóåôå ðéò áêüëiðèåò åíññéÝò:

```
# kldload ndis
# kldload if_ndis
```

Ç ðñþóç åíññéÞ oññðþíåé ôiõ iäçäü NDIS miniport wrapper, åíþ ç ååýôåñç õiñðþíåé ôçí ðññåññåôéêP êÜññå åééôýiò.

Ôþñá, åéÝññåôå ðiñ dmesg(8) åéá íá ååßôå áí ðñÜñ ÷iði õöÜëíåôå êáðå ôçí õiñðûñóç. Áí üéá ðþñáí êáéÜ, èá ðñÝðåé íá ååßôå iéá ðáñññíéå Ýññi iá ôçí åðüññíç:

```
ndis0: <Wireless-G PCI Adapter> mem 0xf4100000-0xf4101fff irq 3 at device 8.0 on pcil
ndis0: NDIS API version: 5.0
ndis0: Ethernet address: 0a:b1:2c:d3:4e:f5
ndis0: 11b rates: 1Mbps 2Mbps 5.5Mbps 11Mbps
ndis0: 11g rates: 6Mbps 9Mbps 12Mbps 18Mbps 36Mbps 48Mbps 54Mbps
```

Áði åäþ êáé ðÝñá iðiñåßôå íá ÷åéñéôåßôå ôçí óðóðåôðP ndis0 óáí iéá iðiéåäPðiôå êÜññå åééôýiò (ð.÷., dc0).

Ìðñâðôå íá ñðèìßóâðå ôi óyóôçìá íá öiñôþíáé ôá NDIS áñèñþíáðá êáðá ôçí åêëßíçóç íå ôíí ßæéí ôñüðí íå ôá üðùò íå iðieáäþðiôå Üëéá áñèñþíáðá. Ðñþðá, áíðéáñÜðôå ôi ðáñá÷èåßóå Üñèñùìá, w32DRIVER.ko, óðií êáðÜëíäí /boot/modules. Ôüðå, ðñiðéÝðôå ôçí áêtiëiðèç ãñáììP óði /boot/loader.conf:

W32DRIVER\_load="YES"

## 12.8.2 Ñõèìßæííðåò Ôçí ÊÜñôá Äéêôýïö

Ìüëéó iêáðÜëéçëiò iäçäüò öiñôùðâðå ãéá ôçí êÜñôá äéêôýïö, ÷ñâéÜæâðåé íá ñðèìéóâðå. ¼ðùò ðíëéÜ Üëéá ðñÜäâðå, ç êÜñôá äéêôýïö åð÷å ñðèìéóâðå êáðá ôçí óðéaiP ôçò åæéâðÜðôáóçò íå ôi sysinstall.

Ãéá íá åìöáíßóâðå ôéð êÜñôåð äéêôýïö ðið Ý÷åðå óðií óyóôçìá óáð, ðëçêðñiðíððóå ôçí áêüëiðèç åíðiðP:

```
% ifconfig
dc0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
        inet 192.168.1.3 netmask 0xffffffff broadcast 192.168.1.255
        ether 00:a0:cc:da:da:da
        media: Ethernet autoselect (100baseTX <full-duplex>)
        status: active
dc1: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
        inet 10.0.0.1 netmask 0xffffffff broadcast 10.0.0.255
        ether 00:a0:cc:da:da:db
        media: Ethernet 10baseT/UTP
        status: no carrier
lp0: flags=8810<POINTOPOINT,SIMPLEX,MULTICAST> mtu 1500
lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> mtu 16384
        inet 127.0.0.1 netmask 0xffffffff
tun0: flags=8010<POINTOPOINT,MULTICAST> mtu 1500
```

**Óçìâðùóç:** Ðáéáéúðâñåò åêäüóâéò ôið FreeBSD ìðñâð íá ÷ñâéÜæííðåé ôçí ðáñÜiâðñ -a áéiðiðeýiâíç óðçí ifconfig(8), ãéá ðáñéóóðüâñåò eäððiíÝñâéåò ó÷åðééÜ íå ôçí óùóðP óyíôáíç ôið ifconfig(8), ðáñáêáëþ áiaðñÝðå ôçí óâëßää åíçèåßáò. Óçìâðþóå åðßóçò üðé íé åãñâñáöÝð ðið áöiñiyí ôi IPV6 (inet6 êðéð.) Ý÷iðí ðáñâðæçèâð óá áððü ôi ðáñÜäâéäíá.

Óá áððü ôi ðáñÜäâéäíá, íé áêüëiðèåð óðóêåðÝð Ý÷iðí åìöáíéóâðå:

- dc0: Ç ðñþðç Ethernet êÜñôá äéêôýïö
- dc1: Ç åâýôâñç Ethernet êÜñôá äéêôýïö
- lp0: Ç ðáñÜëéçëç ðüñôå
- lo0: Ç óðóêåðP loopback
- tun0: Ç óðóêåðP tunnel ÷ñçóðiíðiðiýiâíç áðií ôi ðñüñâñâíìá ppp

Ôi FreeBSD ÷ñçóðiíðiéâð óá iñüñâðå ôùí iäçäþí íå ôçí óâéñÜ êáðå ôçí iðiðá åíðiðßóðçêáí íé áíðßóðié÷åð êÜñôåð êáðå ôçí åêëßíçóç. Áéá ðáñÜäâéäíá ç óðóêåðP sis2 èá åßíáé ç ôñþðç êÜñôá äéêôýïö ðið ÷ñçóðiíðiéâð ôií iäçäü sis(4).

Óðií ðáñÜäâéäíá áððü, ç óðóêåðP dc0 åßíáé ðÜñü êáé ôñÝ÷åé. Íé ëÝiâéò êëåéäßá åßíáé:

1. UP óciáßíáé üöde ç êÜñôá áßíáé ñöðëiéöiÝíç éáé Ýöïéïç.
  2. Ç êÜñôá Ý÷åé ißá Internet äéåýèöiöc (inet) ñöðëiéöiÝíç (óå áööP ôçí ðåñßðôùöc 192.168.1.3).
  3. ÷åé ißá Ýäêöñç iÜóéá õðiäééööyiö (netmask; 0xffffffff00 áßíáé öi ßäéï ià öi 255.255.255.0).
  4. ÷åé ißá Ýäêöñç broadcast äéåýèöiöc (óå áööP ôçí ðåñßðôùöc, 192.168.1.255).
  5. Ç äéåýèöiöc MAC ôçò êÜñôáö (ether) áßíáé 00:a0:cc:da:da:da
  6. Ç åðeeïäP öiö öööééïý iÝöiö áßíáé óå êáöÜóöáöc autoselection (media: Ethernet autoselect (100baseTX <full-duplex>)). Ðáñáöçñïýiü ööde ç dc1 Ý÷åé ñöðëiéööðåß iá ööñY÷åé óáí 10baseT/UTP iÝöi. Äéá ðåñéööüöðåñåö ðëçñïömßåö äéá öiöö öýööö öùi iÝöuí åíüö räçäïý, ðáñáéäéþ áíáöñÝîöå ööçí óåéßää åiçëåßåö.
  7. Ç êáöÜóöáöc ôçò óýíäåöçò (status) áßíáé active, äçë. Ý÷åé åíöiðéööðåß óÞia iåðåömÜö. Óöçí dc1, ðáñáöçñïýiü status: no carrier. Áööü áßíáé ëiäéëü åöiy òi êäéßäéi Ethernet ääí Ý÷åé ööñäåëåß ià öçí êÜñôá.

Áí ôi ifconfig(8) áìöáíßæåé êÜôé ðáñüíiéí ìå áôôü:

```
dc0: flags=8843<POINTOPOINT,BROADCAST,SIMPLEX,MULTICAST> mtu 1500  
          ether 00:a0:cc:da:da:da
```

óçìáßíåé üôé ç êÜñôá äåí Ý÷åé ñõèìéóôåß.

Áéá íá ñõèìßóåôå ôçí êÜñôá óáò, èá ÷ ñâéáôåßóå ðñiiùléá røot. Ç ñyèléóç ôçò êÜñôåð åéêôýïò lðiñåb íá åßiåé áði ôçí åñáiiþ áiðiøépí iå öi ifconfig(8) áeëÜ èá ðñ Ýðåé íá öi åðáiäéÜååôå óå êÜèå åðáiåêéßíçóç öiö öoôôÞiaðiò. Öi áñ÷åßi /etc/rc.conf åßiåé åéåß üðiò ðñ Ýðåé íá ðñiøé Ýóåôå öeò ñyèléóåéò ôçò êÜñôåð åéêôýïò.

ÁÍÙßÍÔÅ ôî áñ÷åßí /etc/rc.conf ìà ôíï áääðçìÝíï óáò êåéïåññÜöri. Èá ÷ñåéåóôåß íá ðñïöèÝóåôå ïßá ãññïùP áæá êÜëå êÜñôå äééôýïõ ðiõ ððÜñ÷åé óöï óýóöçìå óáò, áæá ðañÜäåéìå óöçí ðåñßðôùóç ìáò, éá ðñÝðåé íá ðñïöèÝóåôå òé áíPò ãññïùYö:

```
ifconfig_dc0="inet 192.168.1.3 netmask 255.255.255.0"
ifconfig_dc1="inet 10.0.0.1 netmask 255.255.255.0 media 10baseT/UTP"
```

Èá ðñÝðåé íá áíóðéêáðåóðÞóåðå ôí dc<0, dc>1, êáé íýòù êÜèå áíßpò, lìá ôéð òùóðÝò óðóðéåðÝò ôùí êáñôþí óáð, êáé ôéð òùóðÝò äéåðëéýíóåéò. Èá ðñÝðåé íá äéåâÜóåðå ôçí óåëßää áïçèåßåò ôíð iäçäïý êáé ôíð ifconfig(8) äéá ðåñéðóðüôåñåò èåðôñîÝñéåð ó÷åðééÜ lìá ôéð åðéðñåðüùlåñåð ðåñåÍYñõðò êáé åðßþçò ôçí óåëßää áïçèåßåò ôíð rc.conf(5) äéá ðåñéðóðüôåñåò èåðôñîÝñéåð ó÷åðééÜ lìá ôçí óýíðåâíç ôíð /etc/rc.conf.

Áí ñòëìßóáôå ñï ãßêôõï óáò éáôá ôçí åâéáôÜóôáóç, iãñéêÝò ãñâïíÝò õ÷åôéêÝò iå ôçí/ôéò êÜñôá/éÜñôåò äéêôýïõ éá ñòÜñ÷iõí Þac. ÅéÝâïôå äéðëÜ ôï /etc/rc.conf ðñïöïý ðñïöéÝóôå äðéðëÝï ññâïíÝò.

Èá ðñÝðåé áðßóçò íá äeïñepóåôå ôi áñ÷åßí /etc/hosts þóôå íá ðññöèÝóåôå óå iüüläôå êáé ôéò IP äéåýèõíååéò áðií ôå äeÜöñä lç÷áPìåôå óoï LAN óåò, ái ááí åßíáé Þäç ñöñëèòíÝíá. Äéá ðåñéóòiùðåñò ðëçññöñßåò áíáôñÝîôå óôçí óåðßåå áiiçèåßåò ôiõ hosts(5) êáé ôiõ /usr/share/examples/etc/hosts

### 12.8.3 ÄïééíÝò Éáé Åðßëööc ĐñïâëcìÜôùí

Iüééò êÜíåôå ôéò ááóééÝò áééäåÝò óóï /etc/rc.conf, èá ðñÝðåé íá åðáíåêééÍPóåôå ôï óýóôçìá óáò. Áôöü èá åðéénÝðåé óå ðééäÝò áééäåÝò óóï éÜñôåò íá åöáññööýí, êéé íá åðéååâáéþoåôå üöé ôï óýóôçìá åðáíåêééíåß ÷ùñßò êáÍýí ïÜìò òóéò ññðèíßöåéò

Ijjeéò òñ óyóôcìá áðáíáêééíçèåß. èá ðñÝðåé íá äjééëÜóâôå ôéò êÜñôåò äéêôvýjö.

### 12.8.3.1 ÄïééíÜæííôáò Íéá Ethernet ÊÜñôá

Ãéá íá áðéâââáéþóâôá üöé ç Ethernet êÜñôá éåéðiðññâß óùóôÜ, èá ðñÝðåé íá êÜíâôá äýí ðñÜäiaâôá. Ðñþôá, êÜíâôá ping ôçí êÜñôá ôçí ßæéá, êáé ìåðÜ êÜíâôá ping Ýíá Üëëí íç÷Üíçìá óôí LAN.

Ðñþôá äïééíÜôôá óôçí ôiðééþ êÜñôá:

```
% ping -c5 192.168.1.3
PING 192.168.1.3 (192.168.1.3): 56 data bytes
64 bytes from 192.168.1.3: icmp_seq=0 ttl=64 time=0.082 ms
64 bytes from 192.168.1.3: icmp_seq=1 ttl=64 time=0.074 ms
64 bytes from 192.168.1.3: icmp_seq=2 ttl=64 time=0.076 ms
64 bytes from 192.168.1.3: icmp_seq=3 ttl=64 time=0.108 ms
64 bytes from 192.168.1.3: icmp_seq=4 ttl=64 time=0.076 ms

--- 192.168.1.3 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.074/0.083/0.108/0.013 ms
```

Ôþñá äïééíÜôôá óâ Ýíá Üëëí íç÷Üíçìá óôí LAN:

```
% ping -c5 192.168.1.2
PING 192.168.1.2 (192.168.1.2): 56 data bytes
64 bytes from 192.168.1.2: icmp_seq=0 ttl=64 time=0.726 ms
64 bytes from 192.168.1.2: icmp_seq=1 ttl=64 time=0.766 ms
64 bytes from 192.168.1.2: icmp_seq=2 ttl=64 time=0.700 ms
64 bytes from 192.168.1.2: icmp_seq=3 ttl=64 time=0.747 ms
64 bytes from 192.168.1.2: icmp_seq=4 ttl=64 time=0.704 ms

--- 192.168.1.2 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.700/0.729/0.766/0.025 ms
```

Ìðññâßôá íá ÷ñçóéiiðjéþóâôá êáé óï üüñâ óï íç÷áíþiâò áîðß ôçò äéâýèðíóçò 192.168.1.2 áí Ý÷åôá ñõèìßóâé óï áñ÷åßí /etc/hosts.

### 12.8.3.2 Åðþeðóç ÐñïâëçìÜôúí

Ç åðþeðóç ðñïâëçìÜôúí õëééiy êáé ëiäéóíééiy åßíáé ðÜíðiôá åðþðíç, Ýíáò ðññiò i ïðiéüò iðññâß íá áïáéiðöéóôâß åéÝâ÷iðôá ìññéêÜ áðëÜ ðñÜäiaâôá ðñþôá. Åßíáé óï éåéþæéí ðið äééðýið óññâââíÝñí; ; ãôâ ñõèìßóâé óùóôÜ óéð ðñçñâôßôá äééðýið; ; ãôâ ñõèìßóâé óùóôÜ óï ðýññíi ôâð÷ið; ; ; ãéð ðñÜäiaâôé óï FreeBSD ððiðóþñéíç æáá ôôðP ôçí êÜñôá äééðýið; ; ÐñÝðåé ðÜíðiôá íá åéÝâ÷åôâ ðéð óçââéþóâéð ðið ðéð ðññéíi ôðââéð ìßá áíáöiñÜ åéá Ýíá ðññâëçìá. Áíáââèìßóâôá ôçí Ýêäiöç ðið FreeBSD óôçí ôâðââðôáßá ÓÔÁÈÅÑÇ Ýéäiöç. ÅéÝâiðiôá ðá áñ÷åßá ðúí ëéóôþí íçðiÜôúí, P øÜiôá óôí Internet.

Áí ç êÜñôá äïðéâýâé, åéëÜ lâ ÷áíçëþ áðüäiøíç, èá Üíéæá íá åéáâÜôáâôá ôçí óâðââá âïçèâßáò tuning(7). Ìðññâßôá åðþðçò íá åéÝâiðiôá ié áí éäíéáóíÝið ñõèìßóâéð ðið äééðýið ðññéâëíýið ðéð áñâÝð ðið ðññâëçìá.

Ìññééið ÷ñþðôâôð áíðéââðûðþðæiðí Ýíá P äýí íçíýìâôá device timeout, ðá ïðiðá åßíáé õððééííâéÜ åéá ìññéêÝð êÜñôáâð. Áí óðiâ÷éóðiýí, P åßíiðí åí÷ëçðééÜ, èá ðñÝðåé íá åéÝâiðiôá ïððùò êáé êÜðiðéâð ððééâðÝð ðáññâiðiðâðæiðí ç ìßá ôçí Üëëç. ÅéÝâiðiôá äéðëÜ ðéð óðiðáÝðâéð ðúí êáéëüâðùí. ðúí ðéð ðñÝðåé íá åðiðéðþðôâôá ïßá Üëëç êÜñôá.

ÌññééÝð òiñÝð, ié ÷ñþðôâôð ðáññâðçñíýí ìññéêÜ íçíýìâôá êÜëëð watchdog timeout. Òi ðñþði ðñÜäiaâð ðið ðñÝðåé íá êÜíâôá âßíáé íá åéÝâiðiôá ôçí éåéþæéí ðið äééðýið. ÁñéÝðâôð êÜñôâôð ÷ñâéÜæííôáé ìßá èÝð PCI ðið íá

õðíóôçñßæåé Bus Mastering. Óå ïåñéêÝò ðáééÝò ïçôñéêÝò êÜñôåò. ïüñí ïßá èÝóç PCI ôi õðíóôÞñéæå (óóíÞèùò ç èÝóç 0). ÅéÝäîôå ôçí êÜñôå äéêôýïò êáé ôçí ôââèçñßùóç ôçò ïçôñéêÞò êÜñôåò ãéá íá äéáðéóôþóåôå áí åéåß åßíáé ôi ðñüâëçíá.

Öi ïÞðíá no route to host ålöáíßæåôåé áí ôi óýóôçíá áäöíáôåß íá äññíëíäÞóåé óá ðáéÝò óôíï ðñíñéóïù ôiõò. Áðóü õðíâåßíåé áí åái Ý÷åé êáëíñéóôåß ðñíäðééåäíÝíç äéâýèöíóç äññíëüäçóçò, P áí Ýíá êáéþäéí Ý÷åé ïðóðíååéåß. ÅéÝäîôå ôçí Ýñäi ôéó åíöiëÞò netstat -rn êáé óéäiõñåðôåßò üöé ç äéâýèöíóç äññíëüäçóçò åßíáé Ýäéñç. Áí åái Ý÷åé êáëíñéóôåß, äéáåÜóåò ôi ÊåöÜëáéí 32 ãéá ðåñéóóüôåñåò ðéçñiõñßåò.

Öi ïÞðíá èÜëiõò ping: sendto: Permission denied óðíâåßíåé êññßùò ëüäi êÜðíéåò èÜëiõò ñýëíéóçò óóí ðýñéíí ôåß÷iò. Áí ôi ipfw åßíáé åíâñäiðíéçíÝíç óôíï ðññÞíá áéëÜ äái Ý÷iõí êáëíñéóôåß êáíüíåò, ôüôå ç ðñíäðééåäíÝíç ðíëéðéêP åßíáé ç áðåäüñåðóç üëçò ôçò êßíçóçò, åéüíá êáé ôùí áéöçíÜôùí ping! ÄéååÜóåò ôi ÊåöÜëáéí 31 ãéá ðåñéóóüôåñåò ðéçñiõñßåò.

ÍåñéêÝò ïññÝò ç áðüäiöç ôçò êÜñôåò ïðíñåß íá åßíáé ôôù÷P, P êÜôù ôiõ ïÝóïõ üññò. Óå áðôÝò ôéò ðåñéðþóåéò ðí õáéýôåñí åßíáé íá ñòëìßóåå ôçí êáðÜóåò ðí ïÝóïõ áðíi autoselect óóçí êáðÜëëçéç êáðÜóååóç. Åíp óóíÞèùò áðóü óáßíååå íá äiøéåýåé óóå ðåñéóóüôåñå ðééëÜ, ïðíñåß íá ïçí ëýåé ôi ðñüâëçíá óôíï êáéÝíá. Èáé ðÜëé, åéÝäîôå üëåò ôéò ñòëìßóåéò ôiõ äéêôýïò, êáé íáíáæéåÜóåò ðÜëé ôçí óåëßää åïçëåßåò tuning(7).

## 12.9 ÅéëíééÜ Hosts

Íßá áñéååÜ óóíçééóíÝíç ÷ñÞóç ôiõ FreeBSD åßíáé ç åéëíééP öéëñâíßá éóôí÷ñùí, üðiõ êáé Ýíåò åíðçñåôçòPò ålöáíßæåôåé óóí ãßéôòí óáí ðåñéóóüôåñí áðí Ýíáò. Áðóü ãðéôò ðí ïðíñò ãðéôåé áíáéÝò ðíëëáðëÝò äéêôðåéÝò äéâððéyíåéò óå ïßá êáé íüñí õóóååò.

Íßá èÜñôå äéêôýïò Ý÷åé ïßá “ðñáâlåðéêP” äéâýèöíóç, êáé áðåñéüñéóôí áñéëíü “åéëíééþí” äéâðèýíåùí. Íé åéëíééÝò áðôÝò äéâýèöíóåéò ðññò Ýòíòåé íå ôçí ïññòP åããñåöþí ôóí ãñ÷åßí /etc/rc.conf.

Íßá åããñåöþí åéëíééÞò äéâýèöíóçò ãéá ôçí êÜñôå äéêôýïò fxp0 ïíéÜæåé ùò åíÞò:

```
ifconfig_fxp0_alias0="inet xxx.xxx.xxx.xxx netmask xxx.xxx.xxx.xxx"
```

Óçíåéþóåå üöé íé åããñåöÝò áðôÝò ðñÝðåé íá íåééñíý íå alias0 êáé íá óðíå÷ßæiõí ðñüò ðá ðÜù óå óåéñÜ, (åéá ðánÜäåéäíá, \_alias1, \_alias2, êáé íýóù êÜëå åíÞò). Ç äéáæééåßá ñýëíéóçò éá óðååíåðÞóåé óóíï ðñþöi áñéëíü ðí õåéååé.

Í õðíëíäóíüò ôçò ïÜðéåò äéêôýïò åßíáé óçíåíðééüò, áéëÜ åðôò÷þò êáé åýéëíò. Åéá êÜëå êÜñôå, ðñÝðåé íá ððÜñ÷åé ïßá äéâýèöíóç ç iðíßá åíðéðñíóùðåýåé óúóðÜ ôçí ïÜðéå ðí ãéêôýïò. ÌðíéáäÞðíòå Üëëç äéâýèöíóç ðí õðíðþðåé óóí ßæéí åßéôòí ðñÝðåé íá Ý÷åé ïÜðéå äéêôýïò 1s (åéöñåöÝíç åßóå óáí 255.255.255.255 åßóå óáí 0xffffffff).

Åéá ðánÜäåéäíá, åâåÜóåò ôçí ðåñßðòùóç üðiõ ç êÜñôå äéêôýïò fxp0 åßíáé óóíåååäíÝíç óå åýí åßéôòá, ôi ãßéôòí 10.1.1.0 íå ïÜðéå äéêôýïò 255.255.255.0 êáé ôi ãßéôòí 202.0.0.75.16 íå ïÜðéå äéêôýïò 255.255.255.240. ÈÝëíòå ðí õýóðçíá íá ðññåé ôéò åéâððéyíåéò áðü 10.1.1.1 ïÝ÷ñé 10.1.1.5 êáé ôéò 202.0.0.75.17 ïÝ÷ñé 202.0.0.75.20. ¼ðùò óçíåéþéçéå ðánñåðÜù, íüñí ç ðñþöåò åéâððéyíåéò (óóçí ðåñßðòùóç áðóP, ç 10.0.1.1 êáé ç 202.0.0.75.17) ðñÝðåé íá Ý÷iõí ðññååðéêÝò ïÜðéåò äéêôýïò. ¼ðùò íé ððüëíéðåò, áðü (10.1.1.2 ïÝ÷ñé 10.1.1.5 êáé 202.0.0.75.18 ïÝ÷ñé 202.0.0.75.20) ðñÝðåé íá ñðëëéóôíýí íå ïÜðéå äéêôýïò 255.255.255.255.

Ç áéüëíðåò åããñåöÝò óóí ãñ÷åßí /etc/rc.conf èá ñòëìßóïò ôçí êÜñôå üðùò ðñÝðåé åéá ôi ðánÜäåéäíá:

```
ifconfig_fxp0="inet 10.1.1.1 netmask 255.255.255.0"
```

```
ifconfig_fxp0_alias0="inet 10.1.1.2 netmask 255.255.255.255"
ifconfig_fxp0_alias1="inet 10.1.1.3 netmask 255.255.255.255"
ifconfig_fxp0_alias2="inet 10.1.1.4 netmask 255.255.255.255"
ifconfig_fxp0_alias3="inet 10.1.1.5 netmask 255.255.255.255"
ifconfig_fxp0_alias4="inet 202.0.75.17 netmask 255.255.255.240"
ifconfig_fxp0_alias5="inet 202.0.75.18 netmask 255.255.255.255"
ifconfig_fxp0_alias6="inet 202.0.75.19 netmask 255.255.255.255"
ifconfig_fxp0_alias7="inet 202.0.75.20 netmask 255.255.255.255"
```

## 12.10 Áñ÷åßá Ñõèìßóåùí

### 12.10.1 Í éáôÜëïäíò /etc

Óá áñ÷åßá ñõèìßóåùí áðíèçêåýííôáé óå êáôáëüäïöð. Íåñééíß áðíí áðöïýð åßíáé:

/etc	ÁåíééÝð ñõèìßóåéð óïð óðóóðßíáöíð, data here is system-specific.
/etc/defaults	Default versions of system configuration files.
/etc/mail	Extra sendmail(8) configuration, other MTA configuration files.
/etc/ppp	Configuration for both user- and kernel-ppp programs.
/etc/namedb	Default location for named(8) data. Normally named.conf and zone files are stored here.
/usr/local/etc	Configuration files for installed applications. May contain per-application subdirectories.
/usr/local/etc/rc.d	Start/stop scripts for installed applications.
/var/db	Automatically generated system-specific database files, such as the package database, the locate database, and so on

### 12.10.2 Hostnames

#### 12.10.2.1 /etc/resolv.conf

/etc/resolv.conf dictates how FreeBSD's resolver accesses the Internet Domain Name System (DNS).

The most common entries to resolv.conf are:

nameserver	The IP address of a name server the resolver should query. The servers are queried in the order listed with a maximum of three.
search	Search list for hostname lookup. This is normally determined by the domain of the local hostname.
domain	The local domain name.

A typical resolv.conf:

```
search example.com
```

```
nameserver 147.11.1.11
nameserver 147.11.100.30
```

**Óçìâßùóç:** Only one of the `search` and `domain` options should be used.

If you are using DHCP, `dhclient(8)` usually rewrites `resolv.conf` with information received from the DHCP server.

### 12.10.2.2 /etc/hosts

`/etc/hosts` is a simple text database reminiscent of the old Internet. It works in conjunction with DNS and NIS providing name to IP address mappings. Local computers connected via a LAN can be placed in here for simplistic naming purposes instead of setting up a `named(8)` server. Additionally, `/etc/hosts` can be used to provide a local record of Internet names, reducing the need to query externally for commonly accessed names.

```
# $FreeBSD$
#
# Host Database
# This file should contain the addresses and aliases
# for local hosts that share this file.
# In the presence of the domain name service or NIS, this file may
# not be consulted at all; see /etc/nsswitch.conf for the resolution order.
#
#
::1           localhost localhost.my.domain myname.my.domain
127.0.0.1     localhost localhost.my.domain myname.my.domain

#
# Imaginary network.
#10.0.0.2      myname.my.domain myname
#10.0.0.3      myfriend.my.domain myfriend
#
# According to RFC 1918, you can use the following IP networks for
# private nets which will never be connected to the Internet:
#
#      10.0.0.0      -      10.255.255.255
#      172.16.0.0    -      172.31.255.255
#      192.168.0.0   -      192.168.255.255
#
# In case you want to be able to connect to the Internet, you need
# real official assigned numbers. PLEASE PLEASE PLEASE do not try
# to invent your own network numbers but instead get one from your
# network provider (if any) or from the Internet Registry (ftp to
# rs.internic.net, directory '/templates').
#
```

`/etc/hosts` takes on the simple format of:

```
[Internet address] [official hostname] [alias1] [alias2] ...
```

For example:

```
10.0.0.1 myRealHostname.example.com myRealHostname foobar1 foobar2
```

Consult hosts(5) for more information.

## 12.10.3 Log File Configuration

### 12.10.3.1 syslog.conf

`syslog.conf` is the configuration file for the `syslogd(8)` program. It indicates which types of `syslog` messages are logged to particular log files.

```
# $FreeBSD$  
#  
#      Spaces ARE valid field separators in this file. However,  
#      other *nix-like systems still insist on using tabs as field  
#      separators. If you are sharing this file between systems, you  
#      may want to use only tabs as field separators here.  
#      Consult the syslog.conf(5) manual page.  
.err;kern.debug;auth.notice;mail.crit          /dev/console  
.notice;kern.debug;lpr.info;mail.crit;news.err /var/log/messages  
security.*                                     /var/log/security  
mail.info                                       /var/log/maillog  
lpr.info                                         /var/log/lpd-errs  
cron.*                                           /var/log/cron  
.err                                              root  
.notice;news.err                                root  
.alert                                            root  
.emerg                                           *  
# uncomment this to log all writes to /dev/console to /var/log/console.log  
#console.info                                     /var/log/console.log  
# uncomment this to enable logging of all log messages to /var/log/all.log  
#**.*                                            /var/log/all.log  
# uncomment this to enable logging to a remote log host named loghost  
#**.*                                            @loghost  
# uncomment these if you're running inn  
# news.crit                                       /var/log/news/news.crit  
# news.err                                         /var/log/news/news.err  
# news.notice                                      /var/log/news/news.notice  
!startslip                                       /var/log/slip.log  
*.*                                              /var/log/ppp.log  
!*ppp                                            /var/log/ppp.log
```

Consult the `syslog.conf(5)` manual page for more information.

### 12.10.3.2 newsyslog.conf

`newsyslog.conf` is the configuration file for `newsyslog(8)`, a program that is normally scheduled to run by `cron(8)`. `newsyslog(8)` determines when log files require archiving or rearranging. `logfile` is moved to `logfile.0`, `logfile.0` is moved to `logfile.1`, and so on. Alternatively, the log files may be archived in `gzip(1)` format causing them to be named: `logfile.0.gz`, `logfile.1.gz`, and so on.

`newsyslog.conf` indicates which log files are to be managed, how many are to be kept, and when they are to be touched. Log files can be rearranged and/or archived when they have either reached a certain size, or at a certain periodic time/date.

```
# configuration file for newsyslog
# $FreeBSD$
#
# filename          [owner:group]    mode count size when [ZB] [/pid_file] [sig_num]
/var/log/cron           600   3     100 *      Z
/var/log/amd.log        644   7     100 *      Z
/var/log/kerberos.log   644   7     100 *      Z
/var/log/lpd-errs       644   7     100 *      Z
/var/log/maillog         644   7     *      @T00  Z
/var/log/sendmail.st    644  10    *      168   B
/var/log/messages        644   5     100 *      Z
/var/log/all.log         600   7     *      @T00  Z
/var/log/slip.log        600   3     100 *      Z
/var/log/ppp.log         600   3     100 *      Z
/var/log/security        600  10    100 *      Z
/var/log/wtmp            644   3     *      @01T05 B
/var/log/daily.log       640   7     *      @T00  Z
/var/log/weekly.log      640   5     1     $W6D0 Z
/var/log/monthly.log     640  12    *      $M1D0 Z
/var/log/console.log     640   5     100 *      Z
```

Consult the `newsyslog(8)` manual page for more information.

### 12.10.4 sysctl.conf

`sysctl.conf` looks much like `rc.conf`. Values are set in a `variable=value` form. The specified values are set after the system goes into multi-user mode. Not all variables are settable in this mode.

To turn off logging of fatal signal exits and prevent users from seeing processes started from other users, the following tunables can be set in `sysctl.conf`:

```
# Do not log fatal signal exits (e.g. sig 11)
kern.logsigexit=0

# Prevent users from seeing information about processes that
# are being run under another UID.
security.bsd.see_other_uids=0
```

## 12.11 Tuning with sysctl

sysctl(8) is an interface that allows you to make changes to a running FreeBSD system. This includes many advanced options of the TCP/IP stack and virtual memory system that can dramatically improve performance for an experienced system administrator. Over five hundred system variables can be read and set using sysctl(8).

At its core, sysctl(8) serves two functions: to read and to modify system settings.

To view all readable variables:

```
% sysctl -a
```

To read a particular variable, for example, kern.maxproc:

```
% sysctl kern.maxproc
kern.maxproc: 1044
```

To set a particular variable, use the intuitive *variable=value* syntax:

```
# sysctl kern.maxfiles=5000
kern.maxfiles: 2088 -> 5000
```

Settings of sysctl variables are usually either strings, numbers, or booleans (a boolean being 1 for yes or a 0 for no).

If you want to set automatically some variables each time the machine boots, add them to the /etc/sysctl.conf file. For more information see the sysctl.conf(5) manual page and the ÓìÞà 12.10.4.

### 12.11.1 sysctl(8) Read-only

*Contributed by Tom Rhodes.*

In some cases it may be desirable to modify read-only sysctl(8) values. While this is sometimes unavoidable, it can only be done on (re)boot.

For instance on some laptop models the cardbus(4) device will not probe memory ranges, and fail with errors which look similar to:

```
cbb0: Could not map register memory
device_probe_and_attach: cbb0 attach returned 12
```

Cases like the one above usually require the modification of some default sysctl(8) settings which are set read only. To overcome these situations a user can put sysctl(8) “OIDs” in their local /boot/loader.conf. Default settings are located in the /boot/defaults/loader.conf file.

Fixing the problem mentioned above would require a user to set hw.pci.allow\_unsupported\_io\_range=1 in the aforementioned file. Now cardbus(4) will work properly.

## 12.12 Tuning Disks

### 12.12.1 Sysctl Variables

#### 12.12.1.1 `vfs.vmiodirenable`

The `vfs.vmiodirenable` sysctl variable may be set to either 0 (off) or 1 (on); it is 1 by default. This variable controls how directories are cached by the system. Most directories are small, using just a single fragment (typically 1 K) in the file system and less (typically 512 bytes) in the buffer cache. With this variable turned off (to 0), the buffer cache will only cache a fixed number of directories even if you have a huge amount of memory. When turned on (to 1), this sysctl allows the buffer cache to use the VM Page Cache to cache the directories, making all the memory available for caching directories. However, the minimum in-core memory used to cache a directory is the physical page size (typically 4 K) rather than 512 bytes. We recommend keeping this option on if you are running any services which manipulate large numbers of files. Such services can include web caches, large mail systems, and news systems. Keeping this option on will generally not reduce performance even with the wasted memory but you should experiment to find out.

#### 12.12.1.2 `vfs.write_behind`

The `vfs.write_behind` sysctl variable defaults to 1 (on). This tells the file system to issue media writes as full clusters are collected, which typically occurs when writing large sequential files. The idea is to avoid saturating the buffer cache with dirty buffers when it would not benefit I/O performance. However, this may stall processes and under certain circumstances you may wish to turn it off.

#### 12.12.1.3 `vfs.hirunningspace`

The `vfs.hirunningspace` sysctl variable determines how much outstanding write I/O may be queued to disk controllers system-wide at any given instance. The default is usually sufficient but on machines with lots of disks you may want to bump it up to four or five *megabytes*. Note that setting too high a value (exceeding the buffer cache's write threshold) can lead to extremely bad clustering performance. Do not set this value arbitrarily high! Higher write values may add latency to reads occurring at the same time.

There are various other buffer-cache and VM page cache related sysctls. We do not recommend modifying these values, the VM system does an extremely good job of automatically tuning itself.

#### 12.12.1.4 `vm.swap_idle_enabled`

The `vm.swap_idle_enabled` sysctl variable is useful in large multi-user systems where you have lots of users entering and leaving the system and lots of idle processes. Such systems tend to generate a great deal of continuous pressure on free memory reserves. Turning this feature on and tweaking the swapout hysteresis (in idle seconds) via `vm.swap_idle_threshold1` and `vm.swap_idle_threshold2` allows you to depress the priority of memory pages associated with idle processes more quickly than the normal pageout algorithm. This gives a helping hand to the pageout daemon. Do not turn this option on unless you need it, because the tradeoff you are making is essentially pre-page memory sooner rather than later; thus eating more swap and disk bandwidth. In a small system this option will have a determinable effect but in a large system that is already doing moderate paging this option allows the VM system to stage whole processes into and out of memory easily.

### 12.12.1.5 `hw.ata.wc`

FreeBSD 4.3 flirted with turning off IDE write caching. This reduced write bandwidth to IDE disks but was considered necessary due to serious data consistency issues introduced by hard drive vendors. The problem is that IDE drives lie about when a write completes. With IDE write caching turned on, IDE hard drives not only write data to disk out of order, but will sometimes delay writing some blocks indefinitely when under heavy disk loads. A crash or power failure may cause serious file system corruption. FreeBSD's default was changed to be safe. Unfortunately, the result was such a huge performance loss that we changed write caching back to on by default after the release. You should check the default on your system by observing the `hw.ata.wc` sysctl variable. If IDE write caching is turned off, you can turn it back on by setting the kernel variable back to 1. This must be done from the boot loader at boot time. Attempting to do it after the kernel boots will have no effect.

For more information, please see `ata(4)`.

### 12.12.1.6 `SCSI_DELAY (kern.cam.scsi_delay)`

The `SCSI_DELAY` kernel config may be used to reduce system boot times. The defaults are fairly high and can be responsible for 15 seconds of delay in the boot process. Reducing it to 5 seconds usually works (especially with modern drives). Newer versions of FreeBSD (5.0 and higher) should use the `kern.cam.scsi_delay` boot time tunable. The tunable, and kernel config option accept values in terms of *milliseconds* and *not seconds*.

## 12.12.2 Soft Updates

The `tunefs(8)` program can be used to fine-tune a file system. This program has many different options, but for now we are only concerned with toggling Soft Updates on and off, which is done by:

```
# tunefs -n enable /filesystem
# tunefs -n disable /filesystem
```

A filesystem cannot be modified with `tunefs(8)` while it is mounted. A good time to enable Soft Updates is before any partitions have been mounted, in single-user mode.

Soft Updates drastically improves meta-data performance, mainly file creation and deletion, through the use of a memory cache. We recommend to use Soft Updates on all of your file systems. There are two downsides to Soft Updates that you should be aware of: First, Soft Updates guarantees filesystem consistency in the case of a crash but could very easily be several seconds (even a minute!) behind updating the physical disk. If your system crashes you may lose more work than otherwise. Secondly, Soft Updates delays the freeing of filesystem blocks. If you have a filesystem (such as the root filesystem) which is almost full, performing a major update, such as `make installworld`, can cause the filesystem to run out of space and the update to fail.

### 12.12.2.1 More Details about Soft Updates

There are two traditional approaches to writing a file systems meta-data back to disk. (Meta-data updates are updates to non-content data like inodes or directories.)

Historically, the default behavior was to write out meta-data updates synchronously. If a directory had been changed, the system waited until the change was actually written to disk. The file data buffers (file contents) were passed through the buffer cache and backed up to disk later on asynchronously. The advantage of this implementation is that it operates safely. If there is a failure during an update, the meta-data are always in a consistent state. A file is either

created completely or not at all. If the data blocks of a file did not find their way out of the buffer cache onto the disk by the time of the crash, `fsck(8)` is able to recognize this and repair the filesystem by setting the file length to 0. Additionally, the implementation is clear and simple. The disadvantage is that meta-data changes are slow. An `rm -r`, for instance, touches all the files in a directory sequentially, but each directory change (deletion of a file) will be written synchronously to the disk. This includes updates to the directory itself, to the inode table, and possibly to indirect blocks allocated by the file. Similar considerations apply for unrolling large hierarchies (`tar -x`).

The second case is asynchronous meta-data updates. This is the default for Linux/ext2fs and `mount -o async` for \*BSD ufs. All meta-data updates are simply being passed through the buffer cache too, that is, they will be intermixed with the updates of the file content data. The advantage of this implementation is there is no need to wait until each meta-data update has been written to disk, so all operations which cause huge amounts of meta-data updates work much faster than in the synchronous case. Also, the implementation is still clear and simple, so there is a low risk for bugs creeping into the code. The disadvantage is that there is no guarantee at all for a consistent state of the filesystem. If there is a failure during an operation that updated large amounts of meta-data (like a power failure, or someone pressing the reset button), the filesystem will be left in an unpredictable state. There is no opportunity to examine the state of the filesystem when the system comes up again; the data blocks of a file could already have been written to the disk while the updates of the inode table or the associated directory were not. It is actually impossible to implement a `fsck` which is able to clean up the resulting chaos (because the necessary information is not available on the disk). If the filesystem has been damaged beyond repair, the only choice is to use `newfs(8)` on it and restore it from backup.

The usual solution for this problem was to implement *dirty region logging*, which is also referred to as *journaling*, although that term is not used consistently and is occasionally applied to other forms of transaction logging as well. Meta-data updates are still written synchronously, but only into a small region of the disk. Later on they will be moved to their proper location. Because the logging area is a small, contiguous region on the disk, there are no long distances for the disk heads to move, even during heavy operations, so these operations are quicker than synchronous updates. Additionally the complexity of the implementation is fairly limited, so the risk of bugs being present is low. A disadvantage is that all meta-data are written twice (once into the logging region and once to the proper location) so for normal work, a performance “pessimization” might result. On the other hand, in case of a crash, all pending meta-data operations can be quickly either rolled-back or completed from the logging area after the system comes up again, resulting in a fast filesystem startup.

Kirk McKusick, the developer of Berkeley FFS, solved this problem with Soft Updates: all pending meta-data updates are kept in memory and written out to disk in a sorted sequence (“ordered meta-data updates”). This has the effect that, in case of heavy meta-data operations, later updates to an item “catch” the earlier ones if the earlier ones are still in memory and have not already been written to disk. So all operations on, say, a directory are generally performed in memory before the update is written to disk (the data blocks are sorted according to their position so that they will not be on the disk ahead of their meta-data). If the system crashes, this causes an implicit “log rewind”: all operations which did not find their way to the disk appear as if they had never happened. A consistent filesystem state is maintained that appears to be the one of 30 to 60 seconds earlier. The algorithm used guarantees that all resources in use are marked as such in their appropriate bitmaps: blocks and inodes. After a crash, the only resource allocation error that occurs is that resources are marked as “used” which are actually “free”. `fsck(8)` recognizes this situation, and frees the resources that are no longer used. It is safe to ignore the dirty state of the filesystem after a crash by forcibly mounting it with `mount -f`. In order to free resources that may be unused, `fsck(8)` needs to be run at a later time. This is the idea behind the *background fsck*: at system startup time, only a *snapshot* of the filesystem is recorded. The `fsck` can be run later on. All file systems can then be mounted “dirty”, so the system startup proceeds in multiuser mode. Then, background `fscks` will be scheduled for all file systems where this is required, to free resources that may be unused. (File systems that do not use Soft Updates still need the usual foreground `fsck` though.)

The advantage is that meta-data operations are nearly as fast as asynchronous updates (i.e. faster than with *logging*, which has to write the meta-data twice). The disadvantages are the complexity of the code (implying a higher risk for bugs in an area that is highly sensitive regarding loss of user data), and a higher memory consumption. Additionally there are some idiosyncrasies one has to get used to. After a crash, the state of the filesystem appears to be somewhat “older”. In situations where the standard synchronous approach would have caused some zero-length files to remain after the `fsck`, these files do not exist at all with a Soft Updates filesystem because neither the meta-data nor the file contents have ever been written to disk. Disk space is not released until the updates have been written to disk, which may take place some time after running `rm`. This may cause problems when installing large amounts of data on a filesystem that does not have enough free space to hold all the files twice.

## 12.13 Tuning Kernel Limits

### 12.13.1 File/Process Limits

#### 12.13.1.1 kern.maxfiles

`kern.maxfiles` can be raised or lowered based upon your system requirements. This variable indicates the maximum number of file descriptors on your system. When the file descriptor table is full, `file: table is full` will show up repeatedly in the system message buffer, which can be viewed with the `dmesg` command.

Each open file, socket, or fifo uses one file descriptor. A large-scale production server may easily require many thousands of file descriptors, depending on the kind and number of services running concurrently.

In older FreeBSD releases, the default value of `kern.maxfiles` is derived from the `maxusers` option in your kernel configuration file. `kern.maxfiles` grows proportionally to the value of `maxusers`. When compiling a custom kernel, it is a good idea to set this kernel configuration option according to the uses of your system. From this number, the kernel is given most of its pre-defined limits. Even though a production machine may not actually have 256 users connected at once, the resources needed may be similar to a high-scale web server.

As of FreeBSD 4.5, `kern.maxusers` is automatically sized at boot based on the amount of memory available in the system, and may be determined at run-time by inspecting the value of the read-only `kern.maxusers` sysctl. Some sites will require larger or smaller values of `kern.maxusers` and may set it as a loader tunable; values of 64, 128, and 256 are not uncommon. We do not recommend going above 256 unless you need a huge number of file descriptors; many of the tunable values set to their defaults by `kern.maxusers` may be individually overridden at boot-time or run-time in `/boot/loader.conf` (see the `loader.conf(5)` man page or the `/boot/defaults/loader.conf` file for some hints) or as described elsewhere in this document. Systems older than FreeBSD 4.4 must set this value via the kernel config(8) option `maxusers` instead.

In older releases, the system will auto-tune `maxusers` for you if you explicitly set it to 0<sup>1</sup>. When setting this option, you will want to set `maxusers` to at least 4, especially if you are using the X Window System or compiling software. The reason is that the most important table set by `maxusers` is the maximum number of processes, which is set to  $20 + 16 * \text{maxusers}$ , so if you set `maxusers` to 1, then you can only have 36 simultaneous processes, including the 18 or so that the system starts up at boot time and the 15 or so you will probably create when you start the X Window System. Even a simple task like reading a manual page will start up nine processes to filter, decompress, and view it. Setting `maxusers` to 64 will allow you to have up to 1044 simultaneous processes, which should be enough for nearly all uses. If, however, you see the dreaded proc table full error when trying to start another program, or are

running a server with a large number of simultaneous users (like `ftp.FreeBSD.org`), you can always increase the number and rebuild.

**Óçìåßùóç:** `maxusers` does *not* limit the number of users which can log into your machine. It simply sets various table sizes to reasonable values considering the maximum number of users you will likely have on your system and how many processes each of them will be running. One keyword which *does* limit the number of simultaneous remote logins and X terminal windows is `pseudo-device pty 16`. With FreeBSD 5.X, you do not have to worry about this number since the `pty(4)` driver is “auto-cloning”; you simply use the line `device pty` in your configuration file.

### 12.13.1.2 kern.ipc.somaxconn

The `kern.ipc.somaxconn` sysctl variable limits the size of the listen queue for accepting new TCP connections. The default value of 128 is typically too low for robust handling of new connections in a heavily loaded web server environment. For such environments, it is recommended to increase this value to 1024 or higher. The service daemon may itself limit the listen queue size (e.g. `sendmail(8)`, or **Apache**) but will often have a directive in its configuration file to adjust the queue size. Large listen queues also do a better job of avoiding Denial of Service (DoS) attacks.

## 12.13.2 Network Limits

The `NMBCLUSTERS` kernel configuration option dictates the amount of network Mbufs available to the system. A heavily-trafficked server with a low number of Mbufs will hinder FreeBSD’s ability. Each cluster represents approximately 2 K of memory, so a value of 1024 represents 2 megabytes of kernel memory reserved for network buffers. A simple calculation can be done to figure out how many are needed. If you have a web server which maxes out at 1000 simultaneous connections, and each connection eats a 16 K receive and 16 K send buffer, you need approximately  $32 \text{ MB} / 2 \text{ KB} = 64 \text{ MB} / 2 \text{ kB} = 32768$ . We recommend values between 4096 and 32768 for machines with greater amounts of memory. Under no circumstances should you specify an arbitrarily high value for this parameter as it could lead to a boot time crash. The `-m` option to `netstat(1)` may be used to observe network cluster use.

`kern.ipc.nmbclusters` loader tunable should be used to tune this at boot time. Only older versions of FreeBSD will require you to use the `NMBCLUSTERS` kernel config(8) option.

For busy servers that make extensive use of the `sendfile(2)` system call, it may be necessary to increase the number of `sendfile(2)` buffers via the `NSFBUFFS` kernel configuration option or by setting its value in `/boot/loader.conf` (see `loader(8)` for details). A common indicator that this parameter needs to be adjusted is when processes are seen in the `sfbufa` state. The sysctl variable `kern.ipc.nsfbuffs` is a read-only glimpse at the kernel configured variable. This parameter nominally scales with `kern.maxusers`, however it may be necessary to tune accordingly.

**Óçìáíóééü:** Even though a socket has been marked as non-blocking, calling `sendfile(2)` on the non-blocking socket may result in the `sendfile(2)` call blocking until enough `struct sf_buf`’s are made available.

### 12.13.2.1 net.inet.ip.portrange.\*

The `net.inet.ip.portrange.*` sysctl variables control the port number ranges automatically bound to TCP and UDP sockets. There are three ranges: a low range, a default range, and a high range. Most network programs use the default range which is controlled by the `net.inet.ip.portrange.first` and `net.inet.ip.portrange.last`, which default to 1024 and 5000, respectively. Bound port ranges are used for outgoing connections, and it is possible to run the system out of ports under certain circumstances. This most commonly occurs when you are running a heavily loaded web proxy. The port range is not an issue when running servers which handle mainly incoming connections, such as a normal web server, or has a limited number of outgoing connections, such as a mail relay. For situations where you may run yourself out of ports, it is recommended to increase `net.inet.ip.portrange.last` modestly. A value of 10000, 20000 or 30000 may be reasonable. You should also consider firewall effects when changing the port range. Some firewalls may block large ranges of ports (usually low-numbered ports) and expect systems to use higher ranges of ports for outgoing connections — for this reason it is not recommended that `net.inet.ip.portrange.first` be lowered.

### 12.13.2.2 TCP Bandwidth Delay Product

The TCP Bandwidth Delay Product Limiting is similar to TCP/Vegas in NetBSD. It can be enabled by setting `net.inet.tcp.inflight.enable` sysctl variable to 1. The system will attempt to calculate the bandwidth delay product for each connection and limit the amount of data queued to the network to just the amount required to maintain optimum throughput.

This feature is useful if you are serving data over modems, Gigabit Ethernet, or even high speed WAN links (or any other link with a high bandwidth delay product), especially if you are also using window scaling or have configured a large send window. If you enable this option, you should also be sure to set `net.inet.tcp.inflight.debug` to 0 (disable debugging), and for production use setting `net.inet.tcp.inflight.min` to at least 6144 may be beneficial. However, note that setting high minimums may effectively disable bandwidth limiting depending on the link. The limiting feature reduces the amount of data built up in intermediate route and switch packet queues as well as reduces the amount of data built up in the local host's interface queue. With fewer packets queued up, interactive connections, especially over slow modems, will also be able to operate with lower *Round Trip Times*. However, note that this feature only effects data transmission (uploading / server side). It has no effect on data reception (downloading).

Adjusting `net.inet.tcp.inflight.stab` is *not* recommended. This parameter defaults to 20, representing 2 maximal packets added to the bandwidth delay product window calculation. The additional window is required to stabilize the algorithm and improve responsiveness to changing conditions, but it can also result in higher ping times over slow links (though still much lower than you would get without the inflight algorithm). In such cases, you may wish to try reducing this parameter to 15, 10, or 5; and may also have to reduce `net.inet.tcp.inflight.min` (for example, to 3500) to get the desired effect. Reducing these parameters should be done as a last resort only.

## 12.13.3 Virtual Memory

### 12.13.3.1 kern.maxvnodes

A vnode is the internal representation of a file or directory. So increasing the number of vnodes available to the operating system cuts down on disk I/O. Normally this is handled by the operating system and does not need to be changed. In some cases where disk I/O is a bottleneck and the system is running out of vnodes, this setting will need to be increased. The amount of inactive and free RAM will need to be taken into account.

To see the current number of vnodes in use:

```
# sysctl vfs.numvnodes  
vfs.numvnodes: 91349
```

To see the maximum vnodes:

```
# sysctl kern.maxvnodes  
kern.maxvnodes: 100000
```

If the current vnode usage is near the maximum, increasing `kern.maxvnodes` by a value of 1,000 is probably a good idea. Keep an eye on the number of `vfs.numvnodes`. If it climbs up to the maximum again, `kern.maxvnodes` will need to be increased further. A shift in your memory usage as reported by `top(1)` should be visible. More memory should be active.

## 12.14 Adding Swap Space

No matter how well you plan, sometimes a system does not run as you expect. If you find you need more swap space, it is simple enough to add. You have three ways to increase swap space: adding a new hard drive, enabling swap over NFS, and creating a swap file on an existing partition.

For information on how to encrypt swap space, what options for this task exist and why it should be done, please refer to [ÓìPiá 19.17](#) of the Handbook.

### 12.14.1 Swap on a New Hard Drive

The best way to add swap, of course, is to use this as an excuse to add another hard drive. You can always use another hard drive, after all. If you can do this, go reread the discussion of swap space in [ÓìPiá 12.2](#) of the Handbook for some suggestions on how to best arrange your swap.

### 12.14.2 Swapping over NFS

Swapping over NFS is only recommended if you do not have a local hard disk to swap to; NFS swapping will be limited by the available network bandwidth and puts an additional burden on the NFS server.

### 12.14.3 Swapfiles

You can create a file of a specified size to use as a swap file. In our example here we will use a 64MB file called `/usr/swap0`. You can use any name you want, of course.

#### ÐáñÜääéäíá 12-1. Creating a Swapfile on FreeBSD

1. Be certain that your kernel configuration includes the memory disk driver (`md(4)`). It is default in `GENERIC` kernel.

```
device    md      # Memory "disks"
```

2. Create a swapfile (/usr/swap0):  

```
# dd if=/dev/zero of=/usr/swap0 bs=1024k count=64
```
3. Set proper permissions on (/usr/swap0):  

```
# chmod 0600 /usr/swap0
```
4. Enable the swap file in /etc/rc.conf:  

```
swapfile="/usr/swap0" # Set to name of swapfile if aux swapfile desired.
```
5. Reboot the machine or to enable the swap file immediately, type:  

```
# mdconfig -a -t vnode -f /usr/swap0 -u 0 && swapon /dev/md0
```

## 12.15 Power and Resource Management

Written by Hiten Pandya êáé Tom Rhodes.

It is important to utilize hardware resources in an efficient manner. Before ACPI was introduced, it was difficult and inflexible for operating systems to manage the power usage and thermal properties of a system. The hardware was managed by the BIOS and thus the user had less control and visibility into the power management settings. Some limited configurability was available via *Advanced Power Management (APM)*. Power and resource management is one of the key components of a modern operating system. For example, you may want an operating system to monitor system limits (and possibly alert you) in case your system temperature increased unexpectedly.

In this section of the FreeBSD Handbook, we will provide comprehensive information about ACPI. References will be provided for further reading at the end.

### 12.15.1 What Is ACPI?

Advanced Configuration and Power Interface (ACPI) is a standard written by an alliance of vendors to provide a standard interface for hardware resources and power management (hence the name). It is a key element in *Operating System-directed configuration and Power Management*, i.e.: it provides more control and flexibility to the operating system (OS). Modern systems “stretched” the limits of the current Plug and Play interfaces prior to the introduction of ACPI. ACPI is the direct successor to APM (Advanced Power Management).

### 12.15.2 Shortcomings of Advanced Power Management (APM)

The *Advanced Power Management (APM)* facility controls the power usage of a system based on its activity. The APM BIOS is supplied by the (system) vendor and it is specific to the hardware platform. An APM driver in the OS mediates access to the *APM Software Interface*, which allows management of power levels. APM should still be used for systems manufactured at or before the year 2000.

There are four major problems in APM. Firstly, power management is done by the (vendor-specific) BIOS, and the OS does not have any knowledge of it. One example of this, is when the user sets idle-time values for a hard drive in the APM BIOS, that when exceeded, it (BIOS) would spin down the hard drive, without the consent of the OS. Secondly, the APM logic is embedded in the BIOS, and it operates outside the scope of the OS. This means users can only fix problems in their APM BIOS by flashing a new one into the ROM; which is a very dangerous procedure with the potential to leave the system in an unrecoverable state if it fails. Thirdly, APM is a vendor-specific

technology, which means that there is a lot of parity (duplication of efforts) and bugs found in one vendor’s BIOS, may not be solved in others. Last but not the least, the APM BIOS did not have enough room to implement a sophisticated power policy, or one that can adapt very well to the purpose of the machine.

*Plug and Play BIOS (PNPBIOS)* was unreliable in many situations. PNPBIOS is 16-bit technology, so the OS has to use 16-bit emulation in order to “interface” with PNPBIOS methods.

The FreeBSD APM driver is documented in the `apm(4)` manual page.

### 12.15.3 Configuring ACPI

The `acpi.ko` driver is loaded by default at start up by the `loader(8)` and should *not* be compiled into the kernel. The reasoning behind this is that modules are easier to work with, say if switching to another `acpi.ko` without doing a kernel rebuild. This has the advantage of making testing easier. Another reason is that starting ACPI after a system has been brought up often doesn’t work well. If you are experiencing problems, you can disable ACPI altogether. This driver should not and can not be unloaded because the system bus uses it for various hardware interactions. ACPI can be disabled by setting `hint.acpi.0.disabled="1"` in `/boot/loader.conf` or at the `loader(8)` prompt.

**Óçìåßùóç:** ACPI and APM cannot coexist and should be used separately. The last one to load will terminate if the driver notices the other running.

ACPI can be used to put the system into a sleep mode with `acpiconf(8)`, the `-s` flag, and a 1–5 option. Most users will only need 1 or 3 (suspend to RAM). Option 5 will do a soft-off which is the same action as:

```
# halt -p
```

Other options are available via `sysctl(8)`. Check out the `acpi(4)` and `acpiconf(8)` manual pages for more information.

## 12.16 Using and Debugging FreeBSD ACPI

*Written by Nate Lawson. With contributions from Peter Schultz êáé Tom Rhodes.*

ACPI is a fundamentally new way of discovering devices, managing power usage, and providing standardized access to various hardware previously managed by the BIOS. Progress is being made toward ACPI working on all systems, but bugs in some motherboards’ *ACPI Machine Language* (AML) bytecode, incompleteness in FreeBSD’s kernel subsystems, and bugs in the Intel ACPI-CA interpreter continue to appear.

This document is intended to help you assist the FreeBSD ACPI maintainers in identifying the root cause of problems you observe and debugging and developing a solution. Thanks for reading this and we hope we can solve your system’s problems.

### 12.16.1 Submitting Debugging Information

**Óçìåßùóç:** Before submitting a problem, be sure you are running the latest BIOS version and, if available, embedded controller firmware version.

For those of you that want to submit a problem right away, please send the following information to freebsd-acpi@FreeBSD.org (mailto:freebsd-acpi@FreeBSD.org):

- Description of the buggy behavior, including system type and model and anything that causes the bug to appear. Also, please note as accurately as possible when the bug began occurring if it is new for you.
- The dmesg(8) output after boot -v, including any error messages generated by you exercising the bug.
- The dmesg(8) output from boot -v with ACPI disabled, if disabling it helps fix the problem.
- Output from sysctl hw.acpi. This is also a good way of figuring out what features your system offers.
- URL where your *ACPI Source Language* (ASL) can be found. Do *not* send the ASL directly to the list as it can be very large. Generate a copy of your ASL by running this command:

```
# acpidump -dt > name-system.asl
```

(Substitute your login name for *name* and manufacturer/model for *system*. Example: nj1-FooCo6000.asl)

Most of the developers watch the çéâéôñíéêP ëßóôá ôçò Ýéäïóçò FreeBSD-CURRENT (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-current>) but please submit problems to freebsd-acpi (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-acpi>) to be sure it is seen. Please be patient, all of us have full-time jobs elsewhere. If your bug is not immediately apparent, we will probably ask you to submit a PR via send-pr(1). When entering a PR, please include the same information as requested above. This will help us track the problem and resolve it. Do not send a PR without emailing freebsd-acpi (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-acpi>) first as we use PRs as reminders of existing problems, not a reporting mechanism. It is likely that your problem has been reported by someone before.

## 12.16.2 Background

ACPI is present in all modern computers that conform to the ia32 (x86), ia64 (Itanium), and amd64 (AMD) architectures. The full standard has many features including CPU performance management, power planes control, thermal zones, various battery systems, embedded controllers, and bus enumeration. Most systems implement less than the full standard. For instance, a desktop system usually only implements the bus enumeration parts while a laptop might have cooling and battery management support as well. Laptops also have suspend and resume, with their own associated complexity.

An ACPI-compliant system has various components. The BIOS and chipset vendors provide various fixed tables (e.g., FADT) in memory that specify things like the APIC map (used for SMP), config registers, and simple configuration values. Additionally, a table of bytecode (the *Differentiated System Description Table* DSDT) is provided that specifies a tree-like name space of devices and methods.

The ACPI driver must parse the fixed tables, implement an interpreter for the bytecode, and modify device drivers and the kernel to accept information from the ACPI subsystem. For FreeBSD, Intel has provided an interpreter (ACPI-CA) that is shared with Linux and NetBSD. The path to the ACPI-CA source code is `src/sys/contrib/dev/acpica`. The glue code that allows ACPI-CA to work on FreeBSD is in `src/sys/dev/acpica/Osd`. Finally, drivers that implement various ACPI devices are found in `src/sys/dev/acpica`.

## 12.16.3 Common Problems

For ACPI to work correctly, all the parts have to work correctly. Here are some common problems, in order of frequency of appearance, and some possible workarounds or fixes.

### 12.16.3.1 Mouse Issues

In some cases, resuming from a suspend operation will cause the mouse to fail. A known work around is to add `hint.psm.0.flags="0x3000"` to the `/boot/loader.conf` file. If this does not work then please consider sending a bug report as described above.

### 12.16.3.2 Suspend/Resume

ACPI has three suspend to RAM (STR) states, S1-S3, and one suspend to disk state (STD), called S4. S5 is “soft off” and is the normal state your system is in when plugged in but not powered up. S4 can actually be implemented two separate ways. S4BIOS is a BIOS-assisted suspend to disk. S4OS is implemented entirely by the operating system.

Start by checking `sysctl hw.acpi` for the suspend-related items. Here are the results for a Thinkpad:

```
hw.acpi.supported_sleep_state: S3 S4 S5
hw.acpi.s4bios: 0
```

This means that we can use `acpiconf -s` to test S3, S4OS, and S5. If `s4bios` was one (1), we would have S4BIOS support instead of S4 OS.

When testing suspend/resume, start with S1, if supported. This state is most likely to work since it does not require much driver support. No one has implemented S2 but if you have it, it is similar to S1. The next thing to try is S3. This is the deepest STR state and requires a lot of driver support to properly reinitialize your hardware. If you have problems resuming, feel free to email the freebsd-acpi (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-acpi>) list but do not expect the problem to be resolved since there are a lot of drivers/hardware that need more testing and work.

To help isolate the problem, remove as many drivers from your kernel as possible. If it works, you can narrow down which driver is the problem by loading drivers until it fails again. Typically binary drivers like `nvidia.ko`, X11 display drivers, and USB will have the most problems while Ethernet interfaces usually work fine. If you can properly load/unload the drivers, you can automate this by putting the appropriate commands in `/etc/rc.suspend` and `/etc/rc.resume`. There is a commented-out example for unloading and loading a driver. Try setting `hw.acpi.reset_video` to zero (0) if your display is messed up after resume. Try setting longer or shorter values for `hw.acpi.sleep_delay` to see if that helps.

Another thing to try is load a recent Linux distribution with ACPI support and test their suspend/resume support on the same hardware. If it works on Linux, it is likely a FreeBSD driver problem and narrowing down which driver causes the problems will help us fix the problem. Note that the ACPI maintainers do not usually maintain other drivers (e.g sound, ATA, etc.) so any work done on tracking down a driver problem should probably eventually be posted to the freebsd-current (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-current>) list and mailed to the driver maintainer. If you are feeling adventurous, go ahead and start putting some debugging `printf(3)`s in a problematic driver to track down where in its resume function it hangs.

Finally, try disabling ACPI and enabling APM instead. If suspend/resume works with APM, you may be better off sticking with APM, especially on older hardware (pre-2000). It took vendors a while to get ACPI support correct and older hardware is more likely to have BIOS problems with ACPI.

### 12.16.3.3 System Hangs (temporary or permanent)

Most system hangs are a result of lost interrupts or an interrupt storm. Chipsets have a lot of problems based on how the BIOS configures interrupts before boot, correctness of the APIC (MADT) table, and routing of the *System Control Interrupt* (SCI).

Interrupt storms can be distinguished from lost interrupts by checking the output of `vmstat -i` and looking at the line that has `acpi0`. If the counter is increasing at more than a couple per second, you have an interrupt storm. If the system appears hung, try breaking to DDB (**CTRL+ALT+ESC** on console) and type `show interrupts`.

Your best hope when dealing with interrupt problems is to try disabling APIC support with `hint.acpi.0.disabled="1"` in `loader.conf`.

### 12.16.3.4 Panics

Panics are relatively rare for ACPI and are the top priority to be fixed. The first step is to isolate the steps to reproduce the panic (if possible) and get a backtrace. Follow the advice for enabling options `DDB` and setting up a serial console (see [ÓÍÞá 27.6.5.3](#)) or setting up a `dump(8)` partition. You can get a backtrace in DDB with `tr`. If you have to handwrite the backtrace, be sure to at least get the lowest five (5) and top five (5) lines in the trace.

Then, try to isolate the problem by booting with ACPI disabled. If that works, you can isolate the ACPI subsystem by using various values of `debug.acpi.disable`. See the `acpi(4)` manual page for some examples.

### 12.16.3.5 System Powers Up After Suspend or Shutdown

First, try setting `hw.acpi.disable_on_poweroff="0"` in `loader.conf(5)`. This keeps ACPI from disabling various events during the shutdown process. Some systems need this value set to 1 (the default) for the same reason. This usually fixes the problem of a system powering up spontaneously after a suspend or poweroff.

### 12.16.3.6 Other Problems

If you have other problems with ACPI (working with a docking station, devices not detected, etc.), please email a description to the mailing list as well; however, some of these issues may be related to unfinished parts of the ACPI subsystem so they might take a while to be implemented. Please be patient and prepared to test patches we may send you.

## 12.16.4 ASL, acpidump, and IASL

The most common problem is the BIOS vendors providing incorrect (or outright buggy!) bytecode. This is usually manifested by kernel console messages like this:

```
ACPI-1287: *** Error: Method execution failed [\_\_SB_.PCI0.LPC0.FIGD._STA] \\ 
(Node 0xc3f6d160), AE_NOT_FOUND
```

Often, you can resolve these problems by updating your BIOS to the latest revision. Most console messages are harmless but if you have other problems like battery status not working, they are a good place to start looking for problems in the AML. The bytecode, known as AML, is compiled from a source language called ASL. The AML is found in the table known as the DSDT. To get a copy of your ASL, use `acpidump(8)`. You should use both the `-t`

(show contents of the fixed tables) and -d (disassemble AML to ASL) options. See the Submitting Debugging Information section for an example syntax.

The simplest first check you can do is to recompile your ASL to check for errors. Warnings can usually be ignored but errors are bugs that will usually prevent ACPI from working correctly. To recompile your ASL, issue the following command:

```
# iasl your.asl
```

## 12.16.5 Fixing Your ASL

In the long run, our goal is for almost everyone to have ACPI work without any user intervention. At this point, however, we are still developing workarounds for common mistakes made by the BIOS vendors. The Microsoft interpreter (acpi.sys and acpiec.sys) does not strictly check for adherence to the standard, and thus many BIOS vendors who only test ACPI under Windows never fix their ASL. We hope to continue to identify and document exactly what non-standard behavior is allowed by Microsoft's interpreter and replicate it so FreeBSD can work without forcing users to fix the ASL. As a workaround and to help us identify behavior, you can fix the ASL manually. If this works for you, please send a diff(1) of the old and new ASL so we can possibly work around the buggy behavior in ACPI-CA and thus make your fix unnecessary.

Here is a list of common error messages, their cause, and how to fix them:

### 12.16.5.1 \_OS dependencies

Some AML assumes the world consists of various Windows versions. You can tell FreeBSD to claim it is any OS to see if this fixes problems you may have. An easy way to override this is to set hw.acpi.osname="Windows 2001" in /boot/loader.conf or other similar strings you find in the ASL.

### 12.16.5.2 Missing Return statements

Some methods do not explicitly return a value as the standard requires. While ACPI-CA does not handle this, FreeBSD has a workaround that allows it to return the value implicitly. You can also add explicit Return statements where required if you know what value should be returned. To force iasl to compile the ASL, use the -f flag.

### 12.16.5.3 Overriding the Default AML

After you customize your.asl, you will want to compile it, run:

```
# iasl your.asl
```

You can add the -f flag to force creation of the AML, even if there are errors during compilation. Remember that some errors (e.g., missing Return statements) are automatically worked around by the interpreter.

DSDT.aml is the default output filename for iasl. You can load this instead of your BIOS's buggy copy (which is still present in flash memory) by editing /boot/loader.conf as follows:

```
acpi_dsdष_load="YES"  
acpi_dsdष_name="/boot/DSDT.aml"
```

Be sure to copy your DSDT.aml to the /boot directory.

## 12.16.6 Getting Debugging Output From ACPI

The ACPI driver has a very flexible debugging facility. It allows you to specify a set of subsystems as well as the level of verbosity. The subsystems you wish to debug are specified as “layers” and are broken down into ACPI-CA components (ACPI\_ALL\_COMPONENTS) and ACPI hardware support (ACPI\_ALL\_DRIVERS). The verbosity of debugging output is specified as the “level” and ranges from ACPI\_LV\_ERROR (just report errors) to ACPI\_LV\_VERBOSE (everything). The “level” is a bitmask so multiple options can be set at once, separated by spaces. In practice, you will want to use a serial console to log the output if it is so long it flushes the console message buffer. A full list of the individual layers and levels is found in the acpi(4) manual page.

Debugging output is not enabled by default. To enable it, add `options ACPI_DEBUG` to your kernel configuration file if ACPI is compiled into the kernel. You can add `ACPI_DEBUG=1` to your `/etc/make.conf` to enable it globally. If it is a module, you can recompile just your `acpi.ko` module as follows:

```
# cd /sys/modules/acpi/acpi
&& make clean &&
make ACPI_DEBUG=1
```

Install `acpi.ko` in `/boot/kernel` and add your desired level and layer to `loader.conf`. This example enables debug messages for all ACPI-CA components and all ACPI hardware drivers (CPU, LID, etc.). It will only output error messages, the least verbose level.

```
debug.acpi.layer="ACPI_ALL_COMPONENTS ACPI_ALL_DRIVERS"
debug.acpi.level="ACPI_LV_ERROR"
```

If the information you want is triggered by a specific event (say, a suspend and then resume), you can leave out changes to `loader.conf` and instead use `sysctl` to specify the layer and level after booting and preparing your system for the specific event. The `sysctls` are named the same as the tunables in `loader.conf`.

## 12.16.7 References

More information about ACPI may be found in the following locations:

- The FreeBSD ACPI mailing list (http://lists.FreeBSD.org/mailman/listinfo/freebsd-acpi)
- The ACPI Mailing List Archives http://lists.freebsd.org/pipermail/freebsd-acpi/
- The old ACPI Mailing List Archives http://home.jp.FreeBSD.org/mail-list/acpi-jp/
- The ACPI 2.0 Specification http://acpi.info/spec.htm
- FreeBSD Manual pages: `acpi(4)`, `acpi_thermal(4)`, `acpidump(8)`, `iasl(8)`, `acpidb(8)`
- DSDT debugging resource (http://www.cpqlinux.com/acpi-howto.html#fix\_broken\_dsdt). (Uses Compaq as an example but generally useful.)

## Óçìåéþóåéò

1. The auto-tuning algorithm sets `maxusers` equal to the amount of memory in the system, with a minimum of 32, and a maximum of 384.

# ÊåöÜëáéï 13 Ç Äéáäéêáóßá Åêêßíçóçò ôïõ FreeBSD

## 13.1 Óýííøç

Ҫ æáäéêéáóßá ôçò åééßíçóçò áüüò ðöñëiæéóòÞ éáé öüññöùçò ôïö èéäöññääéïý öôôôÞiaöìò áíáò Ýñâñåáé ùò “æáäéêáóßá bootstrap”, Þ áðëþò “booting”. Ҫ æáäéêéáóßá åééßíçóçò ôïö FreeBSD iðinñåß íá ðññóñññóôåß ðëéý áÿéïéá öôôéò áðáéôÞoåéò óáð, åðéññÝðiñåò öÜð íá åðéëéÝíåðå åßöå äéáöññåôéêÜ èééöññääéêÜ öôôôÞiaåðå ôïö åßíáé åäéåðåôöçíÝíå öôiißäéí ðöñëiæéóòÞ, Þ åéüllá êáé äéáöññåôéêÝð åéäüüöåéò ôïö Bäétið èééöññääéïý öôôôÞiaüò Þ ôïö åäéåðåôöçíÝñò ðöññÞia.

Ôi êåöÜëéáér áôðü ðåñéäñÜöráé èåðòññåñþò ôéò åðéëëäÝò ñòðéñðóåúñ ðïò iðiñåßòå íá Üíñåðå êáé ðùò íá öÝñåðå óðå íÝñá óå òç äéáæééåóßá åêéßíçóçò ñïò FreeBSD. Ç äéáæééåóßá åêéßíçóçò ðåñéëåíåÜíáé iðéåÞðiøå óðiñåßíåé áðü òçí åêéßíçóç ñïò ððñPíá ñïò FreeBSD, ôçí áíß ÷ íåðóç ðùí óðóøåðþí, íÝ ÷ ñé êáé ôçí åêéßíçóç ôçò init(8). Ç åêéßíçóç ôçò init(8) ôçíàðíåñðåßóåé áðü ôçí áéëåñP ÷ ñþíàðò ñïò êåéÝñò áðü òñðóåðéü óå åññé.

Áöiý äéáâÜóåôå áðôü öiî êåöÜëáéï, èá îÝñåôå:



Í Úñí áéá ððiëíæáéóðÝò Áñí : éðâéðiíééþò x86: Óí éâðÜéáéí áððü ðâñéáñÜöáé óç áéááééáóßá áêéßíçóçò óíð FreeBSD Í Úñí óá óððóðÞíáðá Áñí : éðâéðiíééþò Intel x86.

## 13.2 ÔÏ Đñüâëçìá ôçò Åêëßíçóçò

Ói ðñüüâëçíá iie Üæåé ía áðóü óðóí áéâéëþ íe ÐâñéðÝðáðéð ðið Áánþþið lëtið: Ütiðæði. jàð ÷ áñáêðÞñáð Ý ÷ áé ðÝóåé óå Ýíá ðçáÜäé, éáé áâáßíåé ðeÜiiðóåð êáé ôñáâþíóåð óå eïñäüíéå ðið (bootstraps). Óðeo ðñþðåð iÝñåð óùí ðöiëëæóðþí, ÷ ñçóéiðiðiýðóáí i üñið bootstrap áéá ði ìç ÷ áíéóü òüññðùñðçð ðið ëåéðiðñáééiy óðóðÞiaðið, ði iðiþí ðoðññâýðóçéå óå “booting”.

Óðóci áñ ÷ éðóâðóííéþ x86, ói Áâóðéü Óyóðóciá Áéðúäið Åñüäið (BIOS) áðiðiá ðððâýðiñ áéá ðc öðññðòc ðið  
éâéðiññðæéiy óðóðóðiðið. Áéá íá ói áðéóý ÷ áé áððü, ói BIOS áíé ÷ íáýâé ói óðéçñü áððóðiñ áéá ðcí Éâðóññéþ Åððññðoþ  
Áððéðið (Master Boot Record, MBR), ç iðiðá ðñ Ýðâé íá áññðóðâððáé óá óððâðéññéÝñi ócìâði ðði áððóði. Ói BIOS  
áññððæé áññðâðÜ áéá íá óiñðþððâé áéá íá áððâðéÝðâé ói MBR, éâé óððiðÝðâé üððé ói MBR iðiññð áððóððéí íá áððâðéÝðâé  
ðcí ðððiññðéðc áéáððéññðá ðññðòc ðið, áññð ÷ iñÝðù ñð áéá íá ðc iððéðáé ðið BIOS.

Í êþäééåð ïÝóá óöi MBR óöiþèùð áíáöÝñåôåé ùò äéá ÷ åéñéóðþò åêêßíçóçò (*boot manager*), åéäééÜ üöåá áæçëåðéäñÜ ià öi ÷ nþðöç. Óðçí ðâñþððöùç áðöP, i àéá ÷ åéñéóðþò åêêßíçóçò Ý ÷ åé óöiþèùð ðâñéóðüðåñii êþäééå óðçí ðñþþðöç ðñi ÷ eÜ (track) òiö äþóéï P ïÝóá óå êÜðiéï óýóðçá áñ ÷ åñüñi òiö éåéðiññåééiy. (ìåñééÝò öiñÝò i àéá ÷ åéñéóðþò åêêßíçóçò åðíëåéåðþöåé éåé öiññöùðþò åêêßíçóçò (*boot loader*), äééÜ óöi FreeBSD i üñiò áðöüö ÷ ñçóðiñðiéåðþöåé óå iàðåññåñÝóðåñii óðÜäéï öiçò åêêßíçóçò.) Óðiòð åçñiðééåðò äéá ÷ åéñéóðÝò åêêßíçóçò ðâñééåiaÜññiðoáé öi **boot0** (ãiñóðü éåé ùò **Boot Easy**, i óðÜíðåñ äéá ÷ åéñéóðþò åêêßíçóçò öiö FreeBSD), öi **Grub**, öi **GAG**, éåé öi **LILO**. (lúñi öi **boot0** ÷ ññÜåé ïÝóá óöi MBR.)

Áí Ý ÷ ååå áæåðåðóçíÝññi iùñi èåéðiññåééü óýóðçá óöiðð äþóéïðð óåð, öi óððiñðiéçíÝññi MBR äéá PC åßíáé åðåññéÝð. Áðöü öi MBR øÜ ÷ iåé äéá öi ðñþþi åêêéíþøéï (P åiåññü) äéåíÝñéóíá (slice) óöi äþóéi, éåé åêôåéåß öiñ êþäééå ðiö ððÜñ ÷ åé óå áðöü äéå íá ñiñðþðåé öi ððüëiéði òiö éåéðiññåééiy óððóðþiáöiò. já MBR áððiý öiö ðýðiö, åßíáé áðöü ðiö áæåðåðþöååé áðü ðñiåðééiñP ià öçí fdisk(8). Áåóðåéååé óöi /boot/mbr.

Áí Ý ÷ ååå áæåðåðóþöåé ðiëéåðéÜ èåéðiññåééÜ óððóðþiáðå óðiðð äþóéïðð óåð, iðiññåðåå ià áæåðåðóþöååðå åéåðiññåðééü äéá ÷ åéñéóðþò åêêßíçóçò, êÜðiéï ðiö íá iðiññåß ià åßíåé iéá èþóðå ðùí åéåðiññåðééþí óððóðçíÜðùí éåé íá óåð áðéóñÝþðåé íá äéåéÝñåðå ðiéï íá iàééíþøåé. Óði åðñiññi öiþiá èá óðæçðþøiðiå äéå åýi áðü áððiýð ðiö ðééå ÷ åéñéóðÝò åêêßíçóçò.

Ói ððüëiéði ðiö óððóðþiáðiö åêêßíçóçò öiö FreeBSD åßíáé ÷ ññéóðÝññi óå ññþðå óðÜäéá. Ói ðñþþi óðÜäéi åêôåéåðþöåé áðü öi MBR, öi iðiþi åiññåðæåé áðéþò üöé áðåéðåðååé äéå íá ñiññåé öiñ ððiæéðóðP óå iéá óðåéååñééÝíç èåðÜóðååç éåé íá åêôåéÝóåé öi ååýóðñii óðÜäéi. Ói ååýóðñii óðÜäéi iðiññåß ià êÜíåé èþåñ åðñéóðüðåñá ðñÜññåðå ðñééi öçí åêôåéÝéåðç ðiö ññþðiö ñðååðþiö. Ói ññþðiö óðÜäéi iðiðéçñþiåé öc åéååéåðååé åüññöùðçö ðiö åééðiññåééiy óððóðþiáöiò. Ç åññåñóðåå åßíåðåé óå ññþðå óðÜäéá, åéåðß öi ðññüððiö öiö PC åðéåÜééåå ðâñééñéóðiýð öiö iÝññåèiò ðùí ðñiññåñiÜðùí ðiö iðiññiyí íá åêôåéåðååðiýð óåðü óðÜäéá ïÝóá éåé åýi. Ç óðiÝññóç áðöP ðùí åññåñóþí åðéóñÝðååé óöi FreeBSD íá ðánÝ ÷ åé ïÝóá ðééi åðÝééåði öýóðçá öüññöùðçö.

Ðâéóå iàéééÜåé i ððñþiáð åéé åñ ÷ åßæåé öçí åíß ÷ iâðóç éåé åñ ÷ ééiðiþççöç ðùí óððéåðþí þþðåå ià iðiññiyí íá ÷ ñçóðiñðiéçèiy. ïÝóá öçí iðiðéññóç öiçò åéååééåðåå åêêßíçóçò öiö ððñþiá, i Ýññå ÷ iðiññåðåé óöç åéååééåóðå ÷ ñþðöç init(8), ç iðiþiå åéé åðéååååéþiåé üöé ié åþóééå åßíåé óå åééðiññåééþ (÷ ññþðò èÜéç) åéåðÜóðååç. Ç init(8) iàéééÜåé Ýðåéóåå åçí ñýéééç ðüññiú (åðþðåå ÷ ññþðç), ià öçí iðiþiå ðññóðåñðþiåé óå óððóðþiáðå åñ ÷ åßñi, ññðèiþæüñðåé ié êÜññåðå åééðýiö åéå åðééééññåå ià öi åþéóði, éåé ååéééÜ åéééééåååå ðiö åéôåééiy iðiåéé åððééÜ åéå åéêßíçóç åiññiö FreeBSD óððóðþiáðiò.

## 13.3 Í Äéá ÷ åéñéóðþò Åêêßíçóçò éåé óå ÓðÜäéá Åêêßíçóçò

### 13.3.1 Í Äéá ÷ åéñéóðþò Åêêßíçóçò (*boot manager*)

Í êþäééåð óöi MBR P äéá ÷ åéñéóðþò åêêßíçóçò áíáöÝñåôåé iàñééÝð öiñÝò éåé ùò óðÜäéi içäÝí (stage zero) ðçò åéååééåóðåå åêêßíçóçò. Ói öiþiá áðöü ðâñéññÜðåé åýi áðü ðiö äéá ÷ åéñéóðÝò åêêßíçóçò ðiö áíáöÝññåå ðññçäiñÝiññi: Ói **boot0** éåé öi **LILO**.

**Í Äéá ÷ åéñéóðþò Åêêßíçóçò boot0:** Ói MBR ðiö åæååðåååååé áðü öi ðññüññåñiå åæååðÜóðååçö ðiö FreeBSD P öiö boot0cfg(8), ååóðæååé áðü ðñiåðééiñP óöi /boot/boot0. (Ói ðññüññåñiå **boot0** åßíåé ðiëý åðëü, åééþò i êþäééåò óöi MBR iðiññåß ià Ý ÷ åé iÝññåèiò ùò 446 bytes, åiáéðþåå ðiö ðþíåéå åéååðåñðþøåñi (slice table) éåé öiö áíáññüñéóðééiy 0x55AA ðiö åññþðéååé óöi ðÝëiò öiö MBR.) Áí Ý ÷ ååå åæååðååðóþöåé öi **boot0** éåé ðiëéåðéÜ åééðiññåééÜ óððóðþiáðå óðiðð öééçñiýð åþóééiðð óåð, èå ååßðå åéå ðÜ öçí åéêßíçóç, iéå iðiññiå ià öçí ðáññåéÜðù:

### ÐánñÜääéâia 13-1. boot0 Screenshot

```
F1 DOS
F2 FreeBSD
F3 Linux
F4 ?
F5 Drive 1
```

Default: F2

¶ëéá ëåéôïñäéêÜ óôôôÞiaôá, êáé áéäéêüôåñá óá Windows, åßíáé åíùóðü üöe åñÜöïðí ôi äééü ôiõðò MBR ðÜíù óá êÜðëéí þac ôðÜñ÷í. Áí óáð óoiìåâß åôöü, P áí èÝëåôá íá áíôéâåôåôÞoåôá ôi ôðÜñ÷í MBR óáð iå åôöü ôiõ FreeBSD, ÷ñçóéiiðiéÞoåô ôçí áéüëiðèç åíôïëP:

```
# fdisk -B -b /boot/boot0 device
```

üðið device åßíáé ç óôôéâôP áðü ôçí iðiðå åßíåôáé åêêþíçóç, üðuò ð.÷. ôi ad0 áéá ôiï ðñþöi åßóëi IDE, ôi ad2 áéá ôiï ðñþöi IDE åßóëi óöi ååôôåñåýíðå åéäâéôP, ôi da0 áéá ôiï ðñþöi SCSI åßóëi e.i.e. Áí ðÜéé èÝëåôá ðñïóáñiïíÝíç ñyéïéóç ôiõ MBR, ÷ñçóéiiðiéÞoåô ôi boot0cfg(8).

Í Äéá÷åéñéôôPò Åêêþíçóçò LILO. Áéá íá ååéâåôåôÞoåôá åôöü ôi äéá÷åéñéôôP åêêþíçóçò þoôå íá iðiñâß íá ååééíâß ôi FreeBSD, ååéâåôåôåôÞoåôå ðñþöå ôi Linux êáé ðñïóðéÝóðå ôçí áéüëiðèç êáôá÷þñçóç ôôi ôðÜñ÷íí áñ÷åßñ ñðèìßóåùí /etc/lilo.conf:

```
other=/dev/hdXY
table=/dev/hdx
loader=/boot/chain.b
label=FreeBSD
```

Óöi ðáñáðÜíù, êáéiñßóðå ôiï ðñùôåýíí áéâiÝñéóíá êáé ôiï åßóëi ôiõ FreeBSD áíðééâééôþíôå õi x iå ôi åñÜñà åßóëiô êáé ôiï Y iå ôiï áñéëiù ôið ðñùôåýíðiå ãéâiñþöiåôið, ÷ñçóéiiðiéþíðå ùiñò ôçí iññåôïëtäßå ôiõ Linux. Áí ÷ñçóéiiðiéåßóå iäçäü SCSI èá ÷ñâéâåôåß íá åéëÜiåôá ôi /dev/hd óá êÜðé åíôßóôïé÷í iå /dev/sd. Ç åñâiñP loader=/boot/chain.b iðiñâß íá ðáñáðééðeåß áí Ý÷åôå êáé ôá åyí åéâôïññäéêÜ óôôôÞiaôá óôiï ßæëi åßóëi. ÅéôåéÝóðå ôþñá ôçí åíôïëP /sbin/lilo -v åéá íá êáôå÷ùñÞoåôå ôéð ïÝåð åééâäÝð óáð ôôi öyôôçíá. Iðiñâßóå íá ðéð åðéâåâåéþoåôå åéÝä÷iðoå ôá içýíåôá ðið eá åiòáíéðöiyí ôôçí iëüíç óáð.

### 13.3.2 Ói ÓôÜäéí já, /boot/boot1, êáé ôi ÓôÜäéí Äýi, /boot/boot2

ÍðóéåôééêÜ, ôiï ðñþöi êáé ååýôåñí óôÜäéí åßíáé òiÞiaôá ôið ßæëi ðñïññÜñåôið, óôçí ßæéá ðåñéí÷P ôiõ åßóëi. Ëüâù ðåñéíñéóíþí ÷þñið Ý÷ið ÷ùñéôôåß óá åyí, åéëÜ ååéâéþóôåíôåé ðÜíðå iåæß. ÁíôéññÜññôåé åðü ôiï óôiññåôíÝíí áñ÷åßñ /boot/boot åðü ôiï ðñùññâiñå ååéâôÜðåôåçò P ôiï **bslabel** (ååßóå ðáñâéÜðù).

Åñßóëiôåé Ýíù åðü óôôôÞiaôá áñ÷åßñí, ôôçí ðñþöç ôñi÷éÜ (track) ôiõ slice åêêþíçóçò, iâééíþíôå ãðü ôiï ðñþöi ôiñÝá. Åßíáé ôiï óçíåßí üðið ôiï boot0, P iðiçíóäÞoå ðñïññÜñåôið åéá÷åéñéôôPò åêêþíçóçò, áíâiÝíâé íá åñâé ðñùññâiñå ðñið åôôÝëåóç iå ôi iðiði ëá óôiâ÷éôôåß ç åéâééâåóßå åêêþíçóçò. Í áñéëiù ðið ôiñ ðið ÷ñçóéiiðiéiyíðåé iðiñâß íá åñâéåß åyéëiá åðü ôi iÝâåëi ðið åñ÷åßñ /boot/boot.

Ôi boot1 åßíáé ðiëý åðëü, iéá êáé iðiñâß íá åßíáé iüññ 512 bytes óá iÝâåëiò, êáé åíùñßæåé üóá ÷ñâéÜæåôåé åéá ôiï **bslabel** ôiõ FreeBSD, ôi iðiði åðièçéåýåé ðëçññiñßåò ó÷åôééÜ iå ôi slice, þoôå íá åñâé êáé íá åêôåéÝóåé ôiï boot2.

Öi boot 2 ábíráé áéáoññÜ ðéí ðiényðeíëí áéá éáðáññíðbò öi óyóóðciá áñ ÷ ábúù ñiö FreeBSD þóôá ía iðññáß ía áññé áñ ÷ ábá óá áðóü, éáé ìðññáß áðþóçò ía ðáñÝ ÷ áé íéá áðëþ áéáðáöþ ìá öi ÷ ñþóôç þóôá ía iðññáß ía áðíáé ç áðéëëäþ ñiö ððññþíá þ ñiö ðñññññÜláñðiö öüññðùñçò ðiö éá áéðáæáðôåß.

Ôë boot 2 ööñPëùò åêôåëåß ôíí loader (öïñôùòPò åêëßíçóçò) i iðiPìò åßíáé åâéñåôéÜ ðéí ðiëyðëiëò, áëéÜ ðâñÝ ÷ åéÝíá ùñåßí éæé åýéiëi òñüòi ñyèiéóçò ôçò åêëßíçóçò. Ðáééüòåñä ôí boot 2 áíáëÜìâá íá öiñôþóåé åðåòèåßáò ôíí ðõñPíá.

**ÐáñÜääéäìá 13-2. Åéêüíá áðü ôi boot2**

```
>> FreeBSD/i386 BOOT  
Default: 0:ad(0,a)/boot/loader  
boot:
```

ÁÍ : náéáodóabb ðiðiÝ ía áíðééáðáðÞróðá ðá ááééáðáðóðciÝíá boot1 éáé boot2 ÷ níçóðiiðiÞðóð ðið bsddlabel(8):

```
# bsdlabel -B diskslice
```

Üðrið öi *diskslice* áßíráé í äßóðiò éáé öi slice áðü öi iðlísí áßíâðáé ç áêêßíçóç, üðùò ð.÷. ad0s1 áéá öi ðñþöi slice óðíí ðñþöi IDE áßðéi.

**Άðééþíðíá ÁöiøéùÝíç ÉáðÜóáóç (Dangerously Dedicated Mode):** Áí ÷ñçóéíïðéþóåðå ìüíí ðí üíííá ðíø  
äßóéïø, üðòù ð.÷. ad0, óðíç áíóïëëþ bsdlabel(8) èá äçìéïðñäþóåðå Ýíá åðééþíðíá áöiøéùÝíç áßóéï, ÷ñðßò slices. Áßíáé ó÷åäüí óßäïññí üðé áäí èÝéåðå íá ðí Üíåðå áðóü, áéé áðóü ðíøññåðóåßóå üðé áééÝáåðå óçí  
áíóïëëþ bsdlabel(8) ðñéí ðéÝóåðå **Return**.

### 13.3.3 ÓôÜäéï Ôñßá, /boot/loader

Í loader, Þ öiñôùôþò åêëßíçóçò, åßíáé öi ôåëëéü óo Üäéï öiö óôóôþìáöiò åêëßíçóçò ôñéþí óôáäßùí, êáé âñßóéåôáé öiö óyóôçìá áñ ÷ åßùí, öoñþèùò ùò /boot/loader.

Đñiiñéóíüò ôiõ loader åbíáé íá ðánÝ÷åé ìéá iÝeiäí ñyéiéóçò öeéêéP ðñiò ôi ÷ñþóôç, êáé ÷ñçöéiïðiéåß Ýíá åyéiéí óýíiëí åiôíëbí, ôi iðiñbí ðñiøóçñBæåôáé ådú Ýíá éó ÷ñùñ iåðåôñåóôP åiôíëbí iå Ýíá ðíeôðéiëüloåñii óýíiëí åiôíëbí.

### 13.3.3.1 ÑïP ôjö ĐñjäñÜìáôjö Loader

ÊâôÜ ôçí áñ ÷ ééïðiñçóç, i loader èá áíé ÷ íáyóåé ôçí eïïóüéá êáé ôïïò äßóëïòò èáé èá êáëëñßóåé áðü ðïëi äßóëi äßíåôáé ç åêëßíçóç. Èá ñõëiñßóåé êáôÜëëçéá ôéò áíðßööïé ÷ åò ìåðåâéçò Ýò êáé èá íåðééíÞóåé Ýíá ðñüäñâìà íåð Üöñáöçò åïjöëbí (interpreter) ôóï iðïñç iðïñâò i ÷ ï ïÞóöçò íá äßíåé åïjöë Ýò, åßòå åðåðæåßáò, åßòå ìÝòù êÜðjëïò script.

I loader êáôüðéí èá äéáâÜóâé ôi áñ÷åßi /boot/loader.rc, ôi iðiði ìå ôç óâæñÜ ôiô äéâáÜæâé, áðü ðñiâðéërâP, ôi /boot/defaults/loader.conf. IÝóá áðü ôi áñ÷åßi åðöü ôßéâîðâé ëiæéêÝò ðñiâðéëâaiÝiâð ôiéÝò äéá êÜðiéâò iâðââéçöÝò. ðåéâðá, äéâáÜæâðâé ôi áñ÷åßi /boot/loader.conf äéá ôð÷ui ôiðéëÝò äéëâáÝò ôðéð iâðââéçöÝò áðôÝò. Éâôüðéí ôi loader.rc ÷ñçóëiðiéâß åðôÝò ôðéð iâðââéçöÝò, öiñôþñiðiâð ôá áñèñþìâðâó (modules) êáé ôií ððñþíâð ðiíÝ÷åé âðéëââðâß.

ÔåëéêÜ, i loader, ðåññéí Ýåé 10 äåôôðåñüëåðóá (ðñiåðééâái Ýíí ÷ ñííéüü äéÜôôçìá) æáá ôçí ðßåðô é Üðiéíò ðëÞêôññö, èéáé áí äáí ñðÜññåé ðåñÝìåáóç áðü ôíí ÷ ñÞôðç, îåééÜåé ôíí ðññÞíá. Áí åßíåé ðåñÝìåáóç, åìòåíßæåôáé ôíí ÷ ñÞôðç íéá ðññöññíðþ c iðþíßí èáðåññíðþ ôí ávýéíèí övíííü áíîñéhbí ðíø áíåáöÝññáù ðññíçäiñöÝñùò, èéá üðíø i ÷ ñÞôðçò iðþíññåíá

ñðèìþóåé ìåðåâæçôÝò, íá áðiõiñþþóåé üëá ôá áñèñþìáôá, íá öiñþþóåé áñèñþìáôá êáé ôåëééÜ íá ðñiiâåß óå åêêþíçóç P åðáíâêþíçóç.

### 13.3.3.2 ÅíóïieÝò ÅíóùìáôùìÝíåò óõi Loader

ÐáñáéÜòù èá ååßôå ôéò ðéï õõ ÷iÜ ÷iñçóeñiõiõieÝìåâò åíóïieÝò ôiõ loader. Äéá ðåñéóóüôåñåò ëåðôñÝñåéåò ó÷åôééÜ iá üëåò ôéò åéééÝóéïåò åíóïieÝò, ðáñáéæiýiá íá ååßôå õi loader(8).

**autoboot *seconds***

Ðñii÷ùñÜ óôçí åêêþíçóç ôiõ ððñþíá, áí åái õðÜñâé ðáñÝíâåç áðü õi ÷iñþþóç ïÝóá óõi êáèññéóïÝí ÷iññééü åéÜóðçìá ðiõ åßíâååé óå ååðôåñüëåðôå. Áðåééííþæåé áíðþþóññöç ïÝóñçóç, êáé i ðñiiâðééåñÝí ÷iññíò åßíåé óå 10 ååðôåñüëåðôå.

**boot [-options] [*kernelname*]**

Ðñii÷ùñÜåé Ülåóå óôçí åêêþíçóç ôiõ ððñþíá, ÷iñçóeñiõiõieþíåò üðíëåò ôõ ÷iü åðééïäÝò Ý÷iõí åíèåß êáé ôi üññá õiõ ððñþíá ðiõ èá åêôåéååååå áí Ý÷åé åßþþóçò åíèåß. Äéá íá åþþååå åéåöiñåôééü üññá ððñþíá óôçí åñáñíþ åíóïieþò, èá ðñÝðåé ðñþþå íá ÷iñçóeñiõiõieþóååå ôçí åíóïieþ *unload*. ÄéáöiñåôééÜ, èá ÷iñçóeñiõiõieçéåß i ððñþíå ðiõ Ý÷åé öiññòùèåß þäç.

**boot-conf**

ÄéáöñÝ÷åé ôçí áðoðüìååç ñýëíéóç ôùí áñèññùìÜòùí (module) ðiõ åáðþæååé óå ìåðåâæçôÝò, iå ôií þäeí ôññüði ðiõ åßíååé êáé óå êáññééþ åêêþíçóç. Áðoðü Ý÷åé íüçìá iüñí áí ÷iñçóeñiõiõieþóååå ðñþþå ôi unload êáé åééÜíååå èÜðíëåò ìåðåâæçôÝò, ôðíþèùò ôi kernel.

**help [*topic*]**

Ååß÷íåé ìçíýíååå åíþèååå, óå iðiþá åéååÜæííååé áðü ôi /boot/loader.help. Áí ôi topic (èÝíá) ðiõ åüèçéå åßíåé ç eÝíç index, èá ååßôå iéá eßóôå iå ôá åéééÝóéíå èÝíååå åíþèååå.

**include *filename* ...**

ÅðåñññäÜæååé ôií ãñ÷åßí iå ôi üññá ãñ÷åßí ðiõ åüèçéå (filename). Åßíååé áíÜäññóç êáé åñáñíþ ðñiò åñáñíþ ìåðÜöñååç ôiõ ãñ÷åßí. C åíóïieþ include óôåíååÜåé Ülåóå áí åíóïdeóôåå åÜðíëí èÜëíò.

**load [-t *type*] *filename***

Öiñþþíåé ôií ððñþíá, ôi Üññèññùíå ððñþíá P Ýíá ãñ÷åßí ôiõ ôýðiõ ðiõ êáèññþþóçéå, iå åÜóç ôi üññá ãñ÷åßí ðiõ åüèçéå. Áí iåðÜ ôi üññá ãñ÷åßí ððÜñ÷iõí ðáñÜíåññíé, ðññíéíýíóåé ùò ðáñÜíåññíé óõi ãñ÷åßí ðiõ öiññþþíååé.

**ls [-1] [*path*]**

Ååß÷íåé Ýíá êáóÜëëäí ôùí ãñ÷åßùí ôçò åéåññíþò ðiõ åüèçéå, P áí åái êáèññþþóçéå åéåññíþ, ôiõ ñéæééiy êáðåéüññíò. Áí åíèåß êáé ç åðééïäP -1 èá åíöáíþæííååé åßþþóçò êáé ôá iåäÝëç ôùí ãñ÷åßùí.

**lsdev [-v]**

Åíöáíþæåé üëåò ôéò óðóéååÝò áðü ôéò iðiþåò åßíåé åðíåòP ç öüññòóç áñèññùíÜòùí. Áí åíèåß iå ôçí åðééïäP -v, åíöáíþæííååé ðåñéóóüôåñåò ëåðôñÝñåéåò.

**lsmod [-v]**

Åíöáíþæåé ôá áñèñþìáåå ðiõ Ý÷iõí öiññòùèåß. Áí åíèåß ç åðééïäP -v, åíöáíþæííååé ðåñéóóüôåñåò ëåðôñÝñåéåò.

more *filename*

Âìöáíßæåé ôi áñ ÷ áßi ðiõ êáèiñßæåôáé, lâ ðáýóåéò êÜëå LINES áñéèìü ãñáìlþí.

reboot

Âðáíåéééfåß Üìåóá ôi óyóôçìá.

set variable

set variable=*value*

Êáèiñßæåé lâðååéçôÝò ðåñéåÜëëiíò ãéá ôií loader.

unload

Áðiøiñôþíåé üëá ôá áñèñþìáôá.

### 13.3.3.3 Ðáñáäåßæåôá ãéá ôií Loader

Âäþ èá áñåßôå lâñééÜ ðáñáéôéêÜ ðáñáäåßæåôá ó ÷ áôéêÜ lâ ôçí ÷ nþóç ôiõ loader:

- Ãéá íá íâééíþóåôå ôi óoíçèéóìÝíi ðoñþíá óáò, áëëÜ óá êáôÜóôáóç áíüò ÷ nþóç:

**boot -s**

- Ãéá íá áðiøiñôþóåôå ôi óoíçèéóìÝíi ðoñþíá óáò êáé íá öiñôþóåôå ôií ðáééü óáò (P êÜðiéi Üëëi):

**unload**  
**load kernel.old**

Íðiñåßôå íá ÷ ñçóéiðiéþóåôå ôi üñíñá *kernel.GENERIC* ãéá íá áíáöåñèåßôå óoíí áñ ÷ ééü (generic) ðoñþíá i iðiñiò ððÜñ ÷ áé óóí CD ôçò áâéåôÜóôáçò, P ðií *kernel.old* ãéá íá áíáöåñèåßôå óoíí ðoñþíá ðiõ áß ÷ áôå áâéåôåôôçíÝíi ðñéí (ãéá ðáñÜäéñá, ôií ðáééü óáò ðoñþíá áí êÜíåôå ðñüöôåôå ñyéééçc êáé áâéåôÜóôåôçíÝíi ðñéí).

**Óçìåßùóç:** ×ñçóéiðiéþóåôå ôi ðáñáéÜôù ãéá íá öiñôþóåôå ôá óoíçèéóìÝíá óáò áñèñþìáôá óá êÜðiéi Üëëi ðoñþíá:

**unload**  
**set kernel="kernel.old"**  
**boot-conf**

- Ãéá íá öiñôþóåôå Ýíá script ñyéééçc ðoñþíá (Ýíá áðôñáôiðiéçíÝíi ðñüäññíá ôi iðiñi áâôåéåß ôeò êâéðiñåßåò ðiõ êáñééêÜ èá êÜíåôå lâÝóù êÜðiéiò ðñiñäñÜìåôiò ñyéééçc ðoñþíá êáôÜ ôçí áâéþíçóç):

**load -t userconfig\_script /boot/kernel.conf**

### 13.3.3.4 Äñáöéêþ ièüíç Åêêþíçóçò

ÓðíâéóðiñÜ áðüü ôií Joseph J. Barbish.

Ç âñáöéêþ ièüíç áâéþíçóçò (splash screen) äçìéiññåß Ýíá ðei áð ÷ Üñéóôi ðåñéåÜëëi óá ó ÷ Ýóç lâ ôçí áðëþ áðâéêüíéçc ôñí içíòiÜôñí áâéþíçóçò óá iññöþ êâéiÝíi. Ç âñáöéêþ ièüíç áâéþíçóçò áìöáíßæåôáé ùò üôíò ôi óyóôçìá ôôÜóåé óôçí ðñiñöñiðþ áéóüäiò (login), åßôå óôçí êírióüëá, åßôå óôçí âñáöéêü ðåñéåÜëëi.

Ôi FreeBSD äéáè Ýôåé äyí âáóééÜ ðåñéâÜëëíôá. Ôi ðñþöi åþíáé ôi ðñiåðééååì Ýí ðåñéâÜëëí ååéí Ýíiö ãñåñìþò åiðiðpí (ëiðiðüéá). ÍåðÜ ôi ðÝëiö ôçò åêêþíçóçò, åiöáíßæåôáé óóçí êiðiðüéá iéá ðñiðñiðþ åéóüäiö. Ôi ååýôåñi, åþíáé ôi åñåñééü ðåñéâÜëëí ðiö ðåñÝ ÷ åðåé åðü ôi óýóðçìá × 11. ÍåðÜ ôçí ååéåðÜðåáðc ðiö X11 ååé åñüö åðü ôiðð ãñåñééiyò äéá ÷ åéñéóóÝò ðåñéâéýñúí þ desktop, üðùò åþíáé ôá **GNOME**, **KDE** þ **Xfce**, iðiñåßôå íá iåééíÞóåôå ôi åñåñééü ðåñéâÜëëí iå ôçí åiðiðþ startx.

Íåñééiþ ÷ ñþðôå ðñiðñiðþí íá óðfá Ýíðåé ôóí óýóðçìá iÝóù åñåñééþò iëüíç åéóüäiö, åíðþ íá ÷ ñçóéiðiðiðýí ôçí ðñiðñiðþ åéóüäiö ôçò êiðiðüéá. Ç åoíåðüôçôå åðôþ ðåñÝ ÷ åðåé åðiä åéá ÷ åéñéóóÝò iëüíçò, üðùò i **XdM** åéá ôi Xorg, o **gdm** åéá ôi **GNOME** åéá i **kdm** åéá ôi **KDE** (éåéþò åéé Üëëiðò ðiö åéåôßeåíôáé ôóç Óðëëiðþ ðúí Ports). ÍåðÜ åðü iéá åðéôð ÷ çiÝíç åßóïäi, ðáñiðóðeÜæåôáé Ülåðå ôóí ÷ ñþðôå ôi åñåñééü ðåñéâÜëëí ôçò åðéëiðþò ðiö.

Óóí ðåñéâÜëëí ôçò åñåñìþò åiðiðþí, ç åñåñééþ iëüíç åêêþíçóçò éå åðiðñýþåé üéá ôá içíýlåðå åíß ÷ iåðôçò ôùí óðóñåðþí åéé åðçñåðþí, iÝ ÷ ñé ôçí åiöÜíéóç ôçò ðñiðñiðþ åéóüäiö. Íå åðåñðååðå åêêþíçóç ôå ðåñéâÜëëí X11, ç åiðåññååå åêêþíçóçò éå åþíáé åéüñåå ðeí åéåðñþ, åéé åá iïéÜæåé åðåñéóðüôåñi iå ôçí åíðþðôé ÷ ç ôå Ýíå åñåñéâÜëëí Microsoft Windows þ Üëëið iç-UNIX óðóðþiáðiò.

### 13.3.3.4.1 Ëåéóðiññåßá ôçò Åñåñééþò iëüíçò Åêêþíçóçò

Ç åñåñééþ iëüíç åêêþíçóçò ððiðóðñååðå åééüñåå bitmap (.bmp) þ ZSoft PCX (.pcx) 256 ÷ ñùíÜðùí. Åðéðññóðååðå, ié åééüñåå ðiö ÷ ñçóéiðiðiðýíôáé ðñÝðåé íá Ý ÷ iðí åíÜëëóç 320x200 þ iéññüôåñç åéá íá åéåññåðþiðið ôå ððééñýò ðñiðñåññååðþò iëüíçò VGA.

Åéá íá ÷ ñçóéiðiðiðéþðååðå iåååééýðåññåå åééüñåå, iÝ ÷ ñé ôçí iÝåéóðç åíÜëëðç ôùí 1024x768 pixels, åíåññåiðiðéþðåå ôçí ððiðóðñéç VESA ðiö ðåñééååíåÜíåðåé ôóí FreeBSD. Íðiñåßôå íá ôçí åíåññåiðiðéþðåå ôiññóþíðåå ôi Úñèñùíå VESA ååðÜ ôçí åêêþíçóç ôið ñðóðþiáðiò, ç ðñiðéÝðåå ôçí åðéëiðþ VESA ôóí åñ ÷ åßi ñðèñðååñü ôiö ððñþíá, åéé åçíéññåðþiðåå Ýíå iÝí ðñiðñåññiòi Ýíi ððñþíá (ÊåöÜëáéï 9). Ç ððiðóðñéç VESA åþíåé ôóïð ÷ ñþðôå ôçí åðíåðüôçôå íá ÷ ñçóéiðiðéþðiðí iéá åééüñåå ðiö íá åééýðååé üéç ôçí iëüíç.

Íðiñåßôå íá ååßôå ôá åééññéÜ içíýlåðå åêêþíçóçò üóí åiöáíßæåôáé ç åñåñééþ iëüíç åêêþíçóçò, ðéÝæíñåå ãðéþò iðiðiðå ðéþéñiòi.

Ç iëüíç åêêþíçóçò åþíåðåé åðþþóçò ç ðñiðñééååì Ýíç ðñiðñééååì iëüíçò, üóí ôi óýóðçìá ååéðéññååß ôå ðåñéâÜëëí êiðiðüéá. ÍåðÜ åðü èÜðiði ÷ ñiðiðüéå ãéÜðóðçåå ååññÜíåéå, ç iëüíç åéëÜæåé, åðåññååðå iëüíçò ôçí åééüñåå ðiö : ñçóéiðiðéþçéå åðçí åêêþíçóç, iå èðééëéþ åíåññååðþò ôçò ðñiðñééååì åðü ðñiðñééååì ñò ðñiðñééååì. Íðiñåßôå íá åééÜíåðå åðôþ ôçí ðñiðñééååì Ýíç ðñiðñééååì iëüíçò, ðñiðñééååì iéá åñåñìþ saver= ôóí åñ ÷ åßi /etc/rc.conf. Åéá ôçí åðéëiðþ saver=, ððÜñ ÷ iðí åñéååðÝò åíåññååñü Ýíå ðñiðñééååì iëüíçò åéá íá åðééÝíåðå. Íðiñåßôå íá ååßôå ôçí ðéþñç åéþðåå ôóç ååéßåå manual ôiö splash(4). Ç ðñiðñééååì Ýíç ðñiðñééååì iëüíçò iññÜæåôåé “warp”. Öçíåþóåå üóé ç ðñiðñééååì iëüíçò ðiö åééññååðåé ôóí åñ ÷ åßi /etc/rc.conf iÝóù ôçò åðéëiðþò saver= Ý ÷ åé åðþäññååç iññiðóåå åééññéÝò iññóüéåå. Ååí åðçñåññåÜæåé åééññéåå ðiö åñåñééü ðåñéâÜëëí X11.

ÊÜðiðá içíýlåðå åêêþíçóçò åíåññééÜ iéá åiöáíßæåîôåé, åéüñå åéé ååðÜ ôçí åðáññååðþò ôçò åñåñééþò iëüíçò åêêþíçóçò. Ôå içíýlåðå åðôÜ ðåñééååíåÜíñiòi ôi iåññå åðéëiðþí åêêþíçóçò åéé ôçí åíðþðôññöç ïÝñçóç ÷ ñüññiòi ðiö ôi õðññäååýååé.

Íðiñåßôå íá åéóååÜðååå ððiðñååðåå åééüñåå åéá ÷ ñþðç ôóç åêêþíçóç, åðü ôç ñðééññååðþò åééüñåå ôóç ñéæééþ (root) åéåðÜðiçóç, åéá ðáñÜäåéåå åóññi åéåðÜëëiðþ /boot/.

### 13.3.3.4.2 Åíåññåiðiðþçóç ôçò Åñåñééþò iëüíçò Åêêþíçóçò

Ôi åñ ÷ åßi ðiö åé å ÷ ñçóéiðiðéþçéå åéá ôçí åñåñééþ iëüíç åêêþíçóçò (óýðið .bmp .pcx) èå ðñÝðåé íá õiðiðéåôçèåß ôóç ñéæééþ (root) åéåðÜðiçóç, åéá ðáñÜäåéåå åóññi åéåðÜëëiðþ /boot/.

Ãéá ôçí ðñïåðéëåâíÝíç áíÜëõóç iëüíçð (320x200 P iéêñüôåñç, 256 ÷ñþìáôá), åðåâññåáôåßôå ôï áñ÷åßí /boot/loader.conf þóôå íá ðåñéÝ÷åé óá ðáñáêÜôù:

```
splash_bmp_load="YES"
bitmap_load="YES"
bitmap_name="/boot/splash.bmp"
```

Ãéá iâãäéyôåñâò ááäéyôåéò, iÝ÷ñé ôçí iÝæéóç 1024x768, åðåâññåáôåßôå ôï áñ÷åßí /boot/loader.conf þóôå íá ðåñéÝ÷åé ôï ðáñáêÜôù:

```
vesa_load="YES"
splash_bmp_load="YES"
bitmap_load="YES"
bitmap_name="/boot/splash.bmp"
```

Ôí ðáñáðÜù ððièÝôåé üôé èá ÷ñçóéiiðiéÞóåôå ôï áñ÷åßí /boot/splash.bmp ãéá ôçí âñáöéêP iëüíç åêêßíçóçò. Áí èÝëåôå íá ÷ñçóéiiðiéÞóåôå åééüíá ôýðiø PCX, ÷ñçóéiiðiéÞóåôå ôéò ðáñáêÜôù åðéëïäÝò, êáéþò êáé ôçí åðéëïäP vesa\_load="YES", áíÜëïäá iâ ôçí áíÜëðóç:

```
splash_pcx_load="YES"
bitmap_load="YES"
bitmap_name="/boot/splash.pcx"
```

Ôí üññâ áñ÷åßíô äáí åßíáé åðáñáßôçòí íá åßíáé “splash” üðùò öáßíåôáé óóï ðáñáðÜù ðáñÜääéäïá. Iðiñâß íá åßíáé iðéäPðiôå, åñéâß íá ðñüüâåôáé åéá áñ÷åßí ôýðiø BMP P PCX, üðùò åéá ðáñÜääéäïá splash\_640x400.bmp P blue\_wave.pcx.

ÐáñáêÜôù öáßñüôåé iâñééÝò áéüíá åáäéáöÝñïðôå åðéëïäÝò ðiø iðiñâßôå íá ÷ñçóéiiðiéÞóåôå óóï /boot/loader.conf:

```
beastie_disable="YES"
```

Ç åðéëïäP áôôP êáôññåâß ôçí åìöÜíéóç ôïð iâñíý åðéëïäþí åêêßíçóçò. ÐáññâíÝíâé ùóðüöï ç áíôßóôññöç iÝôñçóç íâ ôçí ðññôññiðP áéóâñùäPò åðéëïäþí åêêßíçóçò. Åéüíá êáé üôáí åáí åìöáíßæåôáé ôï iâñíý åðéëïäþí, áí i ÷ñþóôçò êÜíâé iéá åðéëïäP ôóç äéÜñêåéá ôiø ðññåðéëåâíÝñiø ÷ññüñiø áíáññPò, ç åðéëïäP áôôP èá éó÷ýóåé åéá ôçí åêêßíçóç.

```
loader_logo="beastie"
```

Ç åðéëïäP áôôP áëëÜæåé ôï êåßìåñí “FreeBSD” ðiø åìöáíßæåôáé óóï åâåéü iÝñiø ôïð iâñíý åðéëïäþí åêêßíçóçò, íâ Ýíá Ýâ ÷ññüñiðP ðiø beastie, üðùò åìöáíéæüôáí óóéò ðáæáéüôåññåð åéäüôåéò.

Ãéá ðåñéóóüôåñâò ðëçñiøññåò, ðáñâåéëïýâ áíáññÝîôå óóéò óåëßåò manual splash(4), loader.conf(5) êáé vga(4).

## 13.4 Áëëçëåðßäñáóç iâ ôíí Ðõñþíá êáôÜ ôçí Åêêßíçóç

Áðü ôç óôéäP ðiø i ðõñþíáò õiñôñleâß, åßôå iÝóù ôïð loader (üðùò óóíPèùò) åßôå iÝóù ôïð boot2 (ðáñáêÜiðoññôåò ôíí loader), åñâôÜæåé ôéò ðáññâíÝñiø ðiø åêêßíçóçò (boot flags), áí õðÜñ÷iðí, êáé ðññóáññüæåé áíÜëïäá ôç óòiðåñéöññÜ ôïð.

### 13.4.1 ÐáñÜìåôñïé Åêêþíçóçò Ðõñþíá (Boot Flags)

ÐáñáêÜôù èá âñåßôå ôéð ðéí óðíçèéîí Ýíåð ðáñáìÝôñïðð åêêþíçóçò:

-a

êáôÜ ôç äéÜñêåéá ôçò åêêþíçóçò, èá åßíåé åñþôçóç æá ôçí óðóéåðP áðü ôçí iðiþá èá åßíåé ç ðñiøÜñðçóç ôiõ ñéæééiy (root) óðóðPìáðiò áñ÷åßùí.

-C

åêêþíçóç áðü ôi CDROM.

-c

åêôÝëåóç ôiõ UserConfig, ôiõ ðñiññÜììáðiò ñýèìéóçò Ðõñþíá êáôÜ ôçí åêêþíçóç.

-s

åêêþíçóç óå êáôÜóôåóç ëåéðiññãßáò åíüò ÷ñþóóç (single user).

-v

åìöÜíéóç ðåñéóóüôåñùí ðëçñiøiñéþí êáôÜ ôç äéÜñêåéá åêêþíçóçò ôiõ Ðõñþíá.

**Óçìåßùóç:** ÕðÜñ÷iõí êáé Üeeåò ðáñÜìåôñïé åêêþíçóçò, æáåÜóôå ôç óåëßäá boot(8) æá ðåñéóóüôåñåò ðëçñiøiñßåò ó÷åôééÜ íå áðôÝò.

## 13.5 Device Hints

ÓðíåééðiñÜ áðü ôiõ Tom Rhodes.

ÊáôÜ ôç äéÜñêåéá ôçò áñ÷ééþò åêêþíçóçò ôiõ óðóðPìáðiò, ôi ðñiññáììá ôiõ boot loader(8) æáåÜæåé ôi áñ÷åßí device.hints(5). Òií áñ÷åßí áðóü ðåñéÝ÷åé ðëçñiøiñßåò åêêþíçóçò æá ôiõ Ðõñþíá, ãiùóðÝò ùò íåôáâéçôÝð, ié iðiþåò íñééÝð òiñÝð áíáöÝññåé åðßóçò êáé ùò “device hints”. ÁðôÜ óá “device hints” ÷ñçóéiiðiéijýóáé áðü ðñiññÜììáða íäþþçóçò óðóéåðþí æá ñýèìéóç ôùí áíôþóôié÷ùí óðóéåðþí.

Ìðiññýá åðßóçò íá iñßöiñìå Device hints óóçí ðñiøñiðP ôiõ Óðåáâßiò 3 ôiõ boot loader. Ié íåôáâéçôÝð iðiññýí íá iñéóðiñýí íå ÷ñþóç ôçò åíôíëþò set, êáé íá áðáéñâèéýí íå ôçí unset. Ìðiññýá åðßóçò íá ðéð åíðáíßðiñìå íå ôçí åíôíëþ show. Áéüìá, iðiññýá åäþ íá ðáñáéÜìøiñìå êáé íá áeeÜiñðiå ôçí ôiðP íåôáâéçþí ðiõ Ý÷iõ iñéóðåß óðií áñ÷åßí /boot/device.hints. Óá Device hints ðiõ iñßæiñìå óðiõ boot loader äáí ðáñáìÝñðiò iñíéíá êáé äáí èá éó÷ýóðií óðçí åðüìåíç åêêþíçóç.

ÌåôÜ ôçí åêêþíçóç ôiõ óðóðPìáðiò, iðiññâß íá ÷ñçóéiiðiéçèåß ç åíôíëþ kenv(1) æá íá åíðáíéóðiýí ié ôiíÝð üëùí ôùí íåôáâéçþí.

Ôi óðíåééðeéü ôiõ áñ÷åßí /boot/device.hints åßíåé leá íåôáâéçþí áíÜ ãñáììP, êáé ÷ñçóéiiðiéåßôáé ôi õððiðiéçìÝññ“#” æá ãñáììÝð ðiõ äçëþññóáé ùò ó÷üëéá. Ié ãñáììÝð äçìéiññäýíóáé üðùò öáßíåôáé ðáñáêÜôù:

`hint.driver.unit.keyword="value"`

Ç óýíôáïç ãéá ôi ÓðÜäéï 3 ôiõ boot loader åßíáé:

```
set hint.driver.unit.keyword=value
```

üðiõ driver åßíáé ôi üññá ôiõ iäçäiy óðóéâðPò, unit åßíáé i áñéèìüð iññÜäáð ôçò óðóéâðPò, êáé keyword åßíáé ç èÝç-êëåéäß ãéá ôi óðãéâññéiÝñ hint. Ç èÝç-êëåéäß iðiññåß íá ãðrðåéâðbôáé áðü ôéð åéüëiðeåð åðéëiäÝð:

- at:** êáèiñßæåé ôi äßáðöi (bus) óðiñ iðiñßi ðññioáñðÜôáé ç óðóéâðP.
- port:** êáèiñßæåé ôçí áñ ÷ééP äéåýèðiðiç ôçò èýñáð I/O ðiõ èá ÷ñçóéiðiéçèåß.
- irq:** êáèiñßæåé ôiñ áñéèìü ôçò áßôçóçò äéåéiðPò (interrupt request) ðiõ èá ÷ñçóéiðiéçèåß.
- drq:** êáèiñßæåé ôiñ áñéèìü ôiõ êáíáééiy DMA.
- maddr:** êáèiñßæåé ôç óðóééP äéåýèðiðiç lñPìçò ðiõ êáðáéâññáÜíñðôáé áðü ôç óðóéâðP.
- flags:** iñßæåé äéÜöññá bits ðáññáÝññú ãéá ôçí óðóéâðP.
- disabled:** Áí iñéóðåß óá ôéíP 1, ç óðóéâðP áðåíáññiðiéâðbôáé.

Íé iäçäib óðóéâðþí iðiññåß íá äÝ ÷iñðôáé (P íá áðáéôíýí) ðåñéóðüðåññá hints ôá iðiñßi ãáí öáßññðôáé åäþ, êáé óáð óñíéóðiýíá íá åäßôå ôçí áíðbôóïé ÷ç óåëßää manual ôiõ èÜéá iäçäiy. Äéá ðåñéóðüðåññå ðëçñiðiñßåò óñiññðéâðbôå åðßóçò ôéð óåëßää manual ôùí device.hints(5), kenv(1), loader.conf(5), êáé loader(8).

## 13.6 Init: Áñ ÷ééiðiðcöç ÅëÝä ÷iõ Äéáäéêáóéþí

Íüééð iññééçññéåß ç åéêþíçóç ôiõ ðññPíá, í Ýëåá ÷iõ iññåð Ýññåðé óðçí äéåäéêáóþá ÷ññPóôç init(8), ç iðiñßi åñßóéâðåé óóï áñ ÷åßi /sbin/init, P óðç äéáññiP ðiõ êáèiñßæåðåé óðçí iññåðéçôP init\_path ôiõ loader.

### 13.6.1 Äéiñðeßá Áððüìáðçò Åðáíåééßíçóçò

Ç áéiñðeßá áððüìáðçò åðáíåééßíçóçò åíáðöáééßæåé üðé óá óðóðPìáðá áñ ÷åßuí åßíáé óá êáññééP, óðáéâññP êáðÜðôáóç. Áí åáí åßíáé, êáé ç fsck(8) åáí iðiññåß íá äéiññþoåé óá ðññåéPìáðá, ôüôå ç init(8) èá iññåð Ýññé óí óýóðçíá óá êáðÜðôáóç äééðiññåßåò åíñò ÷ññPóôç þóðå íá iðiñÝðåé Üìåðá í áéá ÷åéñéóðPò óðóðPìáðiò íá åðéëçöeåß ôùí ðññåéçíÜðuí áððþí.

### 13.6.2 ÉáðÜðôáóç Ëåéóðiññåßåò Åíüò ×ñPóôç

Íðiññåßåò íá áéóÝëéåðå óðçí êáðÜðôáóç áððP iÝóù ôçò áéiñðeßåò áððüìáðçò åðáíåééßíçóçò, P iÝóù ôçò åðéëiäPò -s êáðÜ ôçí åéêþíçóç P åéüñá êáé èÝññðôáò ôç iññåðéçôP boot\_single óðiñ iññ loader.

Íðiññåßåò åðßóçò íá áéóÝëéåðå óá áððP åéôåéþiñðåò ôçí åíðiñëP shutdown(8) ÷ùñßò ôçí åðéëiäP åðáíåééßíçóçò (-r) P ôññåðéóïý (-h), åíþ åßóðå óá êáðÜðôáóç äééðiññåßåò ðíëéþí ÷ñçóðþí (multi-user).

Áí ç êííóüëá ôiõ óðóðPìáðiò Ý ÷åé óåëåß ùò insecure (áíáðöáéPò) óóï /etc/ttys, ôi óýóðçíá èá æçôPóåé ôiñ ëùäééü ôiõ root ðññéí áéóÝëéåé óá êáðÜðôáóç äééðiññåßåò åíñò ÷ññPóôç.

#### ÐáñÜäáéâñá 13-3. ÁíáðöáéPò Êññüëá óóï /etc/ttys

#	name	getty	type	status	comments
#					

```
# If console is marked "insecure", then init will ask for the root password
# when going to single-user mode.
console none
                                unknown off insecure
```

**Óçıàßùóç:** Iéá insecure (áíáóöáéÞò) êííóüéá óçìáßíáé üöé äái èåùñåßôå áóöáéÞ ôçí êííóüéá üöí áöïñÜ ôç ôððóééÞ ôçò ðñüöåâóç êáé èÝëåôå íá åßóôå åÝâééïò üöé iüïï üðïéïò áíùñßæåé ôíï êùäééü ôïõ root èá ìðïñåß íá ÷ñçóéïïðïéÞòåé ôç êäééïòññåá áíüö ÷ñÞöôç. Ç åðééïäÞ åðôôÞ äái óçìáßíáé üöé èÝëåôå ç êííóüéá óáô íá èåéôïññååß ÷ùñßò áóôÜëåéá. Áí èÝëåôå áóôÜëåéá, èá ðñÝðåé íá åðééÝíåðå insecure, ü÷é secure.

### 13.6.3 ÉáôÜóôáóç Ëåéôïññåßá Ðïëëáðëþí × ñçóôþí (multi-user)

Áí ç init(8) äái âñåé ðñïâéÞìåôå óóå óðóôÞìåôå áñ÷åßùí óáò, Þ iüééò ï ÷ñÞöôçò ôâñìáðßôåé ôçí êåôÜóôáóç ëåéôïññåßò åíüö ÷ñÞöôç, ôíï óýóôçjá åéóÝñ÷åðåé óå ëåéôïññåßá ðïëëáðëþí ÷ñçóôþí, üðïõ êáé îåééíÜ ðëÝíï ç ñýèiéóç ðüñùí (resources) ôiõ óðóôÞìåôïò.

#### 13.6.3.1 Ñýèiéóç Ðüñùí (rc)

Ôí óýóôçjá ñýèiéóçò ðüñùí, äéåâÜæåé ôéò ðñïåðééååíÝíåò åðééïäÝò áðü ôi /etc/default/rc.conf, êáé åðééïäÝò åéá ôi ñðåéâéññéïÝí ìç÷Üíçjá åðü ôi /etc/rc.conf, êáé ôñï÷ùññåß ôçí ðñïôÜñôçqç ôùí óðóôôçìÜôùí áñ÷åßùí ðïõ áíáññÜöiiôåé óóï /etc/fstab, îåééíÜ ôéò ððçñåßåò åééôýïò, åéééíåß åéÜöiiñò ãåßiiñåò, êáé ôÝëïò åéôåéåß óå scripts åééßíçóçò ôùí ôiðééÜ ååéåôåôçjáÝíüí ðåéÝòùí (åöáññäþí).

Ç óåéßää manual rc(8) ðánÝ÷åé iéá êåéÞ áíáññÜ óóï óýóôçjá ñýèiéóçò ðüñùí, êåèþò åíâôÜæåé óå ßäéå óå scripts åééßíçóçò.

## 13.7 Åêïëïøëßá Ôåñìáôéóïý

ÊåôÜ ôiï åéåä÷üìåññ ôåñìáôéóïü, iÝóù ôçò shutdown(8), ç init(8) èá åðïðåéññååß íá åéôåéÝóåé ôi script /etc/rc.shutdown, êáé åéïëïyèùò èá óóåßëåé óå üëåò ôéò åéåññåßåò ôi óÞìå TERM, êáé ôÝëïò ôi óÞìå KILL óå üðïéå åéåññåßå åái ôåñìáôßååc óå åýëïä ÷ññééü åéÜôðçjá.

Åéá íá åßíåé åéé åéåéïðÞ ôçò ôñïöiäiøßåò óå Ýíá óýóôçjá FreeBSD iå áñ÷éóåéöiïééÞ ðïõ ôðïóôçñßæåé åéá÷åßñéóç åíÝññåéåò, åðéþò ÷ñçóéïïðïéÞòåå ôçí åíöiëÞ shutdown -p now åéá åðåíåññäïðïéßçjáç ìåðÜ ôiï ôåñìáôéóïü. Åéá íá êÜíåñåå ãðéþò åðåíåééßíçóç óå Ýíá óýóôçjá FreeBSD ÷ñçóéïïðïéÞòåå ôçí åíöiëÞ shutdown -r now. Èá ðñÝðåé íá åßóôå root Þ iÝëïò ôçò ñÜäåò operator åéá íá åéôåéÝóåôå ôçí shutdown(8). Íðiññåßåå åðßóçò íá ÷ñçóéïïðïéÞòåå ôéò åíöiëÝò halt(8) êáé reboot(8), êíéóÜîòå ôéò áíôßóôïé÷åò óåéßääå manual êåèþò êáé ôç óåéßääå manual ôçò shutdown(8) åéá ðåñéóóüôåññåò ðéçññöiñßåò.

**Óçıàßùóç:** Ç åéá÷åßñéóç åíÝññåéåò åðåéôåß ôçí ôðïóôÞñéïç ôïõ acpi(4), åßôå óôiï ððñÞíá, åßôå öiñôùíÝíç ùò Üñèñùìá (module).

# ÊåöÜëáéï 14 × ñÞóôåò êáé Âáóéêþ Äéá÷åßñéóç Ëíäáñéáóìþí

*ÓoíåéóöiñÜ áðü öií Neil Blakey-Milner.*

## 14.1 Óýїїøç

Áöiý äéáâÜóåôå áõõü öī êåöÜëáéī, èá iÝñåôå:

- Ôéô äéáöiñ Ýó áí Üìâoá óôá äéÜöiñå åbäç eïäáñéáòíþí ÷ ñçóôþí óå Ýíá óýóôçíá FreeBSD.
  - Ðùò íá ðññöè Ýóåôå eïäáñéáòíÿò ÷ ñçóôþí.
  - Ðùò íá äéáññ Üøåôå eïäáñéáòíÿò ÷ ñçóôþí.
  - Ðùò íá áëëÜìâoá ôéô eäðôñ Ýñåéåò áíüò eïäáñéáòíÿ, üðùò öi ðëÞñåò üññá öiõ ÷ ñíÞóôç, P öi ðññöèíþìåñí êÝeööiò (shell).
  - Ðùò íá èÝóåôå üñéá áíÜ eïäáñéáòíü, äéá íá äéÝã ÷ åôå ðüññòò üðùò ç ìíÞíç êáé i ÷ ñüñò ôçò CPU, ðññ öiññíyí íá Ý ÷ iñí óôçí äéÜëåóç ðiòò óôåêåñéñí Ýñíé eïäáñéáòíÿ Þ ñÜäåò eïäáñéáòíþí.
  - Ðùò íá ÷ ñçóëñ ðëÞóåôå ñÜäåò äéá íá èÜìâoá åôðeüñôðñç ôç äéá ÷ åßññéóç ôùí eïäáñéáòíþí.

Ðññí áéáññ Üóåôå áôðü öi êäöÜëáéí, eá ðñ Ýðåé:

  - Íá êáôáññåßôå ôéô åáóéê Ýó Ýíñéåò öiõ UNIX êáé öiõ FreeBSD (ÊåöÜëáéí 4).

14.2 ÅéóáãùãÞ

Ç ðñüóâáóç óöi óýóôçíá åðéööä ÷ Üíåôáé iÝóù ëiääñéáöíþí, üëåò ié äéññääößåö åêöäëiyíöáé áðü ÷ nÞóôåò, Ýôóé ç äéá ÷ åþñéöc ÷ nçööbí ééä ëiääñéáöibí åþíáé låä Üéçö öciåößåö óöá FreeBSD óöööþíáá.

ÊÜeå eïäañéáóíüò óå Ýíá óyóôçìá FreeBSD Ý÷åé óôñâéñéíÝíåò ðëçñïöñßåò ðïõ ó÷åôßæïíôáé iå áôôüí þóôå íá áíáñùñßæåôáé åðü öi óyóôçìá.

1/4 îiìá ÷ ñPóôç

Öü üññá ÷ nñPöôç áßñáé áooü ðöï èá ãññöåß öóçí ðññöññöP login: . Öá iiñüáöå ÷ nçööþí ðñ Yðåé íá áßñáé iiñáæé Ü  
æá ôíí ðöïëiæööP, åäí iðiññåßöö íá Y ÷ åôå äýí ÷ nñPöôåò iå öi Bäëí üññá ÷ nñPöôç. ÖðÜñ ÷ åé Yíåò áññëiùö eáíüñú  
æá öçí äçíëiññåßá Yæöññí iññÜöù ÷ nçööþí, ðöï öåéiçññëþñööé ööï passwd(5). ÖöïPëùö èá ÷ nçööþí ðöïéåßöö  
iiñüáöå ÷ nçööþí ðöï öåññé Y ÷ iöï iéþö P eeñüöåññöö uëiñöö iéñññöö ÷ áññéöPñåò.

Êùäéêüò

ÊÜeå eïäáñéáóiùò Ý÷åé Ýíá êuäéêü ðiö ö÷åôßæåôáé íå áooüí. Í êuäéêtiò ìðiñmåb íå åßíáé êåítiò, iðüôå éáé äåí eå åðåéôåßôåé åéá ðñüöååóç ööî öýóöçìá. Áooü êåôÜ êáíüíá åßíáé ieá ðiøý êåéP éåÝá, êÜeå eïäáñéáóiùò eå ðñÝðåé íå Ý÷åé Ýíá êuäéêü.

### User ID (UID)

## Group ID (GID)

ÊëÜóåéò óýíääóçò

Íé ëeÜóåéò óýíäåóçò (login classes) åßíáé iéá åðÝêóåóç óöii íç÷áíéòü ôúí iñÜäùí ðiø ðáñÝ÷iøí ðñüóéåôç åðåëéñßá üööá ðñiøáññüæiøíà öi óýóöciá óå æéäöiññåðééiyò ÷ñPóåò.

×ñüíiò áëëáãPò êùäéêíy

Å` iñeoíjy òi FreeBSD äáí åðéåÜeëåé óòiò ÷ ñPóåò íá áeeÜæiòí ðåñéäééÜ òií èuäééü ôiò. Iðiñåßôå íá òií åðéåÜeåò åôòü óå iéá áíÜ ÷ ñPóç åÜóç, áíáæÜæiòí ðåñéäééÜ òií èuäééü ôiò. Íðiñåßôå íá áeeÜæiòí òií èuäééü ôiò ãöij Y-åé ðåñÜóåé Yíá óòäéåññiÝ ðåñÜóåé Yíá óòäéåññiÝ ÷ ñiíééü áéÜóçìá.

×ñüííò ëPíçò eïäáñéáóìþí

Å' iñéoñíy ôóí FreeBSD äái ñpäñi ñiñáñéáñiñ. Áí åçleñiññPóåôå ñiñáñéáñiñy ñiñ ãñùñBæåôå ñüôé Ý ÷ iññ ðåññéiñéóí Yíç aeÜññéåá æùñPò, æéá ñðñÜääéáñia, óá Yíá ó ÷ iññåñ üññiñ Ý ÷ åôå ñiñáñéáñiñy ñeá ñiññ ñaëçöñYð, ñüôå ñðññåñBðå ñá iññBðåôå ñüôå ñPäñé iññáñéáñiñ. Aöiy ï ÷ ññññiñ ñPïçò Ý ÷ åé ðåññÜóåé, i ñiñáñéáñiñ ñüôå ñðññåñBðå ñá iññBðåôå ñüôå ñPäñé iññáñéáñiñ. Aéá ôçí óýiñåóç ôóí óýóôçìá, áí êáé ié ñÜéåññiñ ñiñ ñiñáñéáñiñy êáé ôá ãñ ÷ åßá èá ñðññåñBðåññ.

## Đñáãìáôéêü üíñìá ÷ñPóôç

Ôi üüñia ÷ ñþóôc áíááùñþæåé iííáæé Ü ôií eíáñéáoiú óoí FreeBSD, aééÜ äáí áíóéðñiòùðåýáé áðáñáßôçôá ôi ðññááíáðééü üüñia ôiõ ÷ ñþóôc. ÁðóÞ c ðëcñïòiñþá lðrññáß íá óóó ÷ áðéóôáß iá ôií eíáñéáoiú.

ĐñiòùÐéêüò êáôÜëiäïò

I ðniðóuðéêuð êáðÜetíðið áðb÷íáé ðcí ðeÞnç aæðaðñiðP ðniðo Ýia êáðÜetíðið oðið oðooðÞiaðið. Áðooðuð áßíáé eáé i ãñ÷eéuð êáðÜetíðið oðið ÷ñÞoðç, êÜea öññU ðið oððaÝåðaé oðið óyóðoçlá. Iéá eíeíP óyíâaóç áßíáé ía iðáßuðið ie ðniðóuðéêið êáðÜetíðið ÷ñcóðþið oði /home/username P oði /usr/home/username. I ÷ñÞoðoç ða áðiðeçhâýaé ða ðniðóuðéêÜ oðið ãñ÷áðb êáé oðið áðoðaëüðið ðið aæiðiðnñáðb, iÝða oðið ðniðóuðéêuð oðið eáðÜetíðið.

ÊÝëööiò ÷ ñPóôç

Ôi êÝëööiò ðáñÝ ÷ åé ôi åí’ iñéöiiy ðåñéáÜëéí ðiò ié ÷ ñPóôåò ÷ ñçóéiïðiéiyí áéá íá áéëçëåðéäñiyí iå ôi óyóöçia. ÕðÜñ ÷ iði ðiæü Ü áéáöiñåðéêÜ åßäç åâéööþí, êáé ié Yíðåäñiè ÷ ñPóôåò èá Y ÷ iði ôeò åééYð ôiò ðpiöéiþlååò, ié iðiñåß íá áíðééåöiðòñBæiïòáé ôóéò ñðeìñBååò ôùi ëiäáñéáóìþí ðiò.

ÕðÜñ ÷ iði ôñåéò êýñéie ôýðiè ëiäáñéáóìþí: i ððåñ ÷ ñPóôç (superuser), ié ÷ ñPóôåò ôóóôþlååò, êáé ié ërääñéáóïß ÷ ñçóöþí. Í ërääñéáóïò ððåñ ÷ ñPóôç, ôóíþeùò iifí Üæåðåé root, ÷ ñçóéiïðiéåßòåé áéá ôç åéá ÷ åßñéóç ôiò ôóóôþlååò, êáé åái èá ðñÝðåé íá ÷ ñçóéiïðiéåßòåé áéá êáèçìåñéYð åññåáóßåò üðùò áðiööþP êáé eþþç mail, åáiéêP åiåñåýíçóç ôiò ôóóôþlååò, P ðñiäñaiñåðéòiü.

Áðou åéüöe i ððåñ ÷ ñPóôç, óå áíðéååç iå ôiò êáñééiÿò ëiäáñéáóïÿò ÷ ñçóöþí, iðiñåß íá åééöiñååß ÷ ùñßò üñéá, êáé êáéñååðå ÷ åßñéóç ôiò ëiäáñéáóïÿ åðööÿ iðiñåß íá Y ÷ åé ùò ôóíÜðåé åááíåðéêYð êáðåóóññöYð. Íé ëiäáñéáóïß ÷ ñçóöþí åái iðiñiyí íá êáðåóóñYðiòi õí óýóöçia åðü eÜeò, Yðóé åßíáé åáiéêÜ åáëýöåñå íá ÷ ñçóéiïðiéåßòåé åáíñééiÿò ëiäáñéáóïÿò ÷ ñçóöþí üðiòå åßíáé åðiñåñü, åéðüò åÜí åáééüöåñå ÷ ññæÜæåðåå óå åðéðe Yíí ðñiñüleá.

Èá ðñÝðåé ðÜiòå íá åéYä ÷ åðå åýí êáé ôñåéò õiñYð ôéò åíðiæYð ðiò åßíåðå óáí ððåñ ÷ ñPóôç, åöiy Yíá åðéðe Yíí êáíü P Yíáò ÷ åññåéðPñáò ðiò eâßðåé, iðiñåß íá óçìåßíåé åíðåñüñèùñå ãðþeåéå åâäññYñú.

Þóé, ôi ðñþöi ðñÜaiò ðiò èá ðñÝðåé íá åÜíåðåå åöiy åéáåÜðååå åðou õi åâðÜëáéí, åßíáé íá åçìéiññPóååå Yíáí ërääñéáóïü ÷ ñPóôç, ÷ ùñßò ðñiñüleá, åéá õíí åáðou óáò åéá åáiéêP ÷ ñPóç áí åái ôi Y ÷ åðåå êÜfåé þäç. Áðou éó ÷ ýåé åíßöiò åÜí ôñY ÷ åðåå Yíá ðiæö ÷ ñçóðéêü P iññ- ÷ ñçóðéêü iç ÷ Üíçia. Åññüöåñå óå åðou õi åâðÜëáéí, èá óðæçðPóïòiå ðùò íá åçìéiññååßòå ðññóðååò ðññóðååò ërääñéáóïÿò, êáé ðùò íá åéëÜæåðå ååðåíý ôiò êáññééiÿ ÷ ñPóôç êáé ôiò ððåñ ÷ ñPóôç.

## 14.4 Ëiäáñéáóïß Óóóôþlååò

Íé ÷ ñPóôåò ôóóôþlååò åßíáé åðööÿ ðiò ÷ ñçóéiïðiéiyíòåé áéá íá ôñY ÷ iði ððçñååßåò üðùò ôi DNS, web servers, êáé iýóù êáéåíþò. Í ëüñiò åéá åðou åßíáé ç áóðÜëåéå: áí üëåò ié ððçñååßåò Yññå ÷ áí iå åééåéþlååå ððåñ ÷ ñPóôç, èá åééöiññåýóáí ÷ ùñßò ðññéiñéòiÿò.

Ðáññååßíååå åðü ÷ ñPóôåò ôóóôþlååò åßíáé ié daemon, operator, bind (åéå ôi Domain Name Service), news, êáé www.

Í nobody åßíáé i åáiééüò, ÷ ùñßò ðñiñüleá, ÷ ñPóôç ôóóôþlååò. Úðouöi, åßíáé óçìåíðéêü íá Y ÷ åðåå êáðÜ ñiò üöé ûöi ðññéóðüöåñå ððçñååßåò ÷ ñçóéiïðiéiyí ôií nobody, ôüöi ðññéóðüöåñå åñ ÷ åßá êáé åéåññååßåò èá ôóó ÷ åðéðoÿí iå åðouí, êáé Yðóé ôüöi ðññéóðüöåññ ðññiñéiÿ ÷ ið åßíåðåé åðou ì ÷ ñPóôç.

## 14.5 Ëiäáñéáóïß × ñçóöþí

Íé ërääñéáóïß ÷ ñçóöþí åßíáé ôi ðññùòåñ ÷ ééü iÝóí ðññóðååò åéá ðññåååååééiÿò áíðñþðiòò ôóí óýóöçia, êáé iÝóù åðöþí åðiññþlååé i êÜeå ÷ ñPóôç êáé ôi ðåñéåÜëéí åññåáóßåò ôiò, áðiññYðiñååå Yðóé ðeeéáP êáðåóóññP ôiò

ÊÜeå Üôññiñ ðiñö Ý÷åé ðññüóáåóç ôóï ÿóôðçìÜ óåó èå ðññÝðåé íå Ý÷åé ÿá iññáæéêü ëëäáñéåóïü ÷ñÞóôç. Áôõü óåð åðéóñÝðåé íå áññåßôå ðiñéò eÜíåé ôé, áðiññÝðåé áîññþðiñò áðü ôï íå ðåéñÜæiñí ôéó ññðèñßóåéò iÝíåò ôïñ Üëëiñ, þ íå æéåáÜóåé iÝíåò óå mail ôïñ Üëëiñ, ééå íÿòû éåéæñþò.

ÊÜëå ÷ ñÞóöôçò ïðiñäåß íá ôôÞóåé ðí äéêü ðíö ðâñéåÜëeíí þöðå íá ðñïóáññöúåé ôçí ÷ ñÞóç ðíö ôôððÞiaôíø, ÷ ñçöðéíïðiéþíðå áíáéëæåðééÜ ëâéëýöç, ôðíö Üðôðå, ôðíññðåðííýð ðëÞéðññù ééå ãéþðóå.

## 14.6 Ôñïðïðïéþíôáò Ëïäáñéáóïïýò

Õõðñ ÷ åé ìéá ðíréééëßá áðü äéäöïñâôðéëÝò åíîòëÝò äéåéÝóëíåð óôï ðâñéäÜëëíí UNIX áéä íá ÷ åéñéôðåßôðå  
ëíääñéäöïýò ÷ ñçóôþí. Íé ðëí êééíÝò åíîòëÝò óôñïøßæëïóáé ðáñáêÜòù, áéëëëíöëíýiaíåò áðü ëåðôñïåñP ðáñáäåßäíåôá ôçò  
÷ ñPöçò õíöð.

<b>Áíóïëþ</b>	<b>Ðâñéãñáöþ</b>
adduser(8)	Ҫ ðñïðåéñüñáíç áöáññüþò áíóïëþí áéá ôçí ðñïóèþêç íÝùí ÷ñçóðþí.
rmuser(8)	Ҫ ðñïðåéñüñáíç áöáññüþò áíóïëþí áéá ôçí áéáññáöþ ÷ñçóðþí.
chpass(1)	íá áðÝééêöî áññääéåßí áéá ôçí áëëáñþ ðëçññöïñéþí ôçò áÜóçò áðäññÝùí ôùí ÷ñçóðþí.
passwd(1)	Ôí áðëü áññääéåßí áñññüþò áíóïëþí áéá ôçí áëëáñþ ôùí èùäééþí ôùí ÷ñçóðþí.
pw(8)	íá äðíáðü êáé áðÝééêöî áññääéåßí áéá ôçí áëëáñþ üëùí ôùí ñðèìþóåùí ôùí èëáññáöþí ôùí ÷ñçóðþí.

## 14.6.1 adduser

Ôi adduser(8) áðþíáé Ýía áðþü ðñyüññáliá áðá íá ðññóðé Ýðåðåðá íÝið ðiñ ñÞóðåð. Áçjéiðññáðß áðññáðó Ýð óðåá ãñ ðiñ ñÞá óðóðóÞiaðið passwd éæá group. Áçjéiðññáðß áðþóðçò Ýíáí ðññóðéðéëü éæð Üëiðá áðá ðiñ ñÞóðç, áðóéññÜðåé áðéðß ðá áði iññóðíý ãñ ðiñ ñÞá ñðòðiðóðúñ (“dotfiles”) áðü ði /usr/share/skel, éæá iðiñññáðß ðññáéññðéðÜ íá óðåðßéæ Ýía iÞiðíá éæðùññiñÞóðið ðiñ ñÞóðç.

ĐáñÜääéäìá 14-1. ĐñjöèÝôiiôáò Ýíáí ÷ ñPóôc óôï FreeBSD

```
# adduser
Username: jru
Full name: J. Random User
Uid (Leave empty for default):
Login group [jru]:
Login group is jru. Invite jru into other groups? []:
Login class [default]:
Shell (sh csh tcsh zsh nologin) [sh]: zsh
Home directory [/home/jru]:
Home directory permissions (Leave empty for default):
Use password-based authentication? [yes]:
Use an empty password? (yes/no) [no]:
Use a random password? (yes/no) [no]:
Enter password:
```

```
Enter password again:
Lock out the account after creation? [no]:
Username : jru
Password : *****
Full Name : J. Random User
Uid       : 1001
Class     :
Groups   : jru wheel
Home     : /home/jru
Shell    : /usr/local/bin/zsh
Locked   : no
OK? (yes/no): yes
adduser: INFO: Successfully added (jru) to the user database.
Add another user? (yes/no): no
Goodbye!
#
```

**Óçìåßùóç:** Í êùäééüö ðiõ ðeçéôñïëíäåßöå äái öäßíåðáé, íýöå åìöáíßæíîöáé áóôåñßöéíé. Õñïíôßööå íá ìçí ãñÜøåðå ëÜëëò ðiõ êùäééü.

## 14.6.2 rmuser

Íðññåßöå íá ÷ñçóéñïðiéþóåðå ðiõ rmuser(8) áéá íá äéåññÜøåðå åìðåéþò Ýíáí ÷ñPóôç áðü ðiõ óýóôçìá. Ç rmuser(8) áêôååéåß óá ðáñáéÜöù áÞláôá:

1. ÁéåññÜøåé ôçí áâññáöþ crontab(1) ðiõ ÷ñPóôç (áí ððÜñ ÷åé).
2. ÁéåññÜøåé üðíéá áññáóßá at(1) áíÞéåé óðií ÷ñPóôç.
3. Ôâññáóßæåé üéåò ôéò áéåññáóßöå ðiõ áíÞéiõí óðií ÷ñPóôç.
4. ÁéåññÜøåé ðiõ ÷ñPóôç áðü ðiõ ðiðééü áñ ÷åßí êùäééþí ðiõ óððóðÞìáöìò.
5. ÁéåññÜøåé ðiõ ðññóúðééü éáðÜëíäí ðiõ ÷ñPóôç (áí áíÞéåé óðií ÷ñPóôç).
6. ÁéåññÜøåé óá áéóññ ÷üíá áñ ÷åßá mail ðiõ áíÞéiõí óðií ÷ñPóôç áðü ðiõ /var/mail.
7. ÁéåññÜøåé üéá óá áñ ÷åßá ðiõ áíÞéiõí óðií ÷ñPóôç áðü ðéó ðññóùñéíÝò ðåñéí ÷Ýò áðíèÞéåðóçò üðùò ðiõ /tmp.
8. ÓÝëëò, áéåññÜøåé ðiõ üññá ÷ñPóôç áðü üéåò ôéò ïÜääò óðéò ðiõßåò áíÞéåé óðiõ /etc/group.

**Óçìåßùóç:** Áí êáôÜ ôç áéåññáöþ ðiõ ÷ñPóôç, ððÜñ ÷åé ïÜää á ðiõ ðiðééü ÷ñPóôç, ç iðíßá äái ðåñéÝ ÷åé Üëëá íYëëç, ç iïÜää áðôþ áéåññÜøåðáé, Ç óðíðåñéðñÜ áðôþ åßíáé óðiðeçñùìáðééþ íá ôçí áíðóðöíé ÷ç ôçò adduser(8), ðiõ äçíéññååß ïÜää á ðiõ ðiðééü ÷ñPóôç êáôÜ ôç äçíéññáßá ðiõ ëïäáñéáóííy.

Ôí rmuser(8) äái ðiññåß íá ÷ñçóéñïðiéçéåß áéá ôçí áéåññáöþ ôùí ëïäáñéáóíþí ððåñ ÷ñPóôç, áöíý áðôü áßíáé ó ÷åäüí ðÜíðå íéá Ýíáñéíç íáxééþò êáðåóðññþò.

Åí iñéóííy, ÷ñçóéñïðiéåßöåé íéá áéåññáóðééþ èåéòññåßá, ðiõ ðññóðåéåß íá áðéåååéþóåé üðé óßaiðñá áíññßæåðå ôé ðññüêåéóáé íá êÜíåðå.

### ÐánÜääéäia 14-2. rmuser Äéáäñáôéêþ Äéáäñáöþ Ëiäáñéáóìý

```
# rmuser jru
Matching password entry:
jru:*:1001:1001::0:0:J. Random User:/home/jru:/usr/local/bin/zsh
Is this the entry you wish to remove? y
Remove user's home directory (/home/jru)? y
Updating password file, updating databases, done.
Updating group file: trusted (removing group jru -- personal group is empty) done.
Removing user's incoming mail file /var/mail/jru: done.
Removing files belonging to jru from /tmp: done.
Removing files belonging to jru from /var/tmp: done.
Removing files belonging to jru from /var/tmp/vi.recover: done.
#
```

### 14.6.3 chpass

Öi chpass(1) áeeÜæåé ðeçñïöiñßåò ôçò åÜðçò ääññÍfùí ôiõ ÷ñPóôç üðùò êùäééiyò, êåëýöç, êáé ðññóùðééÝò ðeçñïöiñßåò.

Ìüñi äéá÷åñéóôÝò ôiõ óðóôÞìáôïò, üðùò i ððåñ÷ñPóôçò, lðiññåß íá áeeÜæåé ôéò ðeçñïöiñßåò Üëëñí ÷ñçóôþí êáèþò êáé ôiõò êùäééiyò lå ôi chpass(1).

¼ôáí äáí äßiiñðáé åðééëäÝò, åêôüò åðü Ýíá ðññáéñåôéêü üññá ÷ñPóôç, ôi chpass(1) åìöáíßæåé Ýíáí óðíôÜêôç ðiõ ðåñéÝ÷åé ôéò ðeçñïöiñßåò ôiõ ÷ñPóôç. ¼ôáí i ÷ñPóôçò åäåé åðü ôíí óðíôÜêôç, ç åÜðç ääññÍfùí ÷ñçóôþí åíçìñþíåóáé lå ôéò iÝåò ðeçñïöiñßåò.

**Óçìåßùóç:** ÊáôÜ ôçí Ýññäí áðü ôíí óðíôÜêôç, áí äáí åßóôå i ððåñ÷ñPóôçò, èá åñùôçèåßôå ãéá ôíí êùäééü óáò.

### ÐánÜääéäia 14-3. Äéáäñáôéêþ chpass áðü ôíí Õðåñ÷ñPóôç

```
#Changing user database information for jru.
Login: jru
Password: *
Uid [#]: 1001
Gid [# or name]: 1001
Change [month day year]:
Expire [month day year]:
Class:
Home directory: /home/jru
Shell: /usr/local/bin/zsh
Full Name: J. Random User
Office Location:
Office Phone:
Home Phone:
Other information:
```

I êáññéêüò ÷ñPóôçò lðiññåß íá áeeÜññé åññí Ýíá iéññü õðiñýññí áðü áðôÝò ôéò ðeçñïöiñßåò, êáé iüñi ãéá ôíí åáññü ôiõ.

#### ÐáñÜääéäíá 14-4. Äéáñáóééþ chpass áðü Êáñíéêü ×ñPóôç

```
#Changing user database information for jru.  
Shell: /usr/local/bin/zsh  
Full Name: J. Random User  
Office Location:  
Office Phone:  
Home Phone:  
Other information:
```

**Óçìåßùóç:** Íé chfn(1) êáé chsh(1) åßíáé áðëëÜ óýíääóíé óôçí chpass(1), üðùò åßíáé êáé íé ypchpass(1), ypchfn(1), êáé ypchsh(1). Ç õðïóôþñéíç NIS åßíáé áðôüìáôç, Ýôóé äái åßíáé áðáñáßôçöi íá êáèïñßóåôå ôi yp ðñéí ôçí áíðïëþ. Áí áðôü óáò ìðåñääýáé, íçí áíçöô÷åßôå, ôi NIS èá êáëööèåß óôî ÊâöÜëáéí 30.

#### 14.6.4 passwd

Ôi passwd(1) åßíáé í óðíÞèçò ôñüðïò íá áëëÜíåôå ôi äééü óáò êùäéêü óáí ÷ñPóôçò, þ ôií êùäéêü Üëëiò ÷ñPóôç óáí õðâñ÷ñPóôçò.

**Óçìåßùóç:** Æá íá áðïñáðïýí ôo÷åßåò þ íç åññöéíäïöçíÝíåò áëëáãÝò, èá óáò æçôçèåß í ðáëéêüò êùäéêüò ðñéí ïñßóåôå íÝí.

#### ÐáñÜääéäíá 14-5. ÁëëÜæñíôåò ôií Êùäéêü óáò

```
% passwd  
Changing local password for jru.  
Old password:  
New password:  
Retype new password:  
passwd: updating the database...  
passwd: done
```

#### ÐáñÜääéäíá 14-6. ÁëëÜæñíôåò ôií Êùäéêü Üëëiò ×ñPóôç ùò Õðâñ÷ñPóôçò

```
# passwd jru  
Changing local password for jru.  
New password:  
Retype new password:  
passwd: updating the database...  
passwd: done
```

**Óçìåßùóç:** ¼óí ãéá ôéò chpass(1), yppasswd(1) åßíáé áðëëÜ óýíääóíé óôçí passwd(1), Ýôóé ôi NIS êáéðïññåß íà ïðíéáäþðïóå áíðïëþ.

## 14.6.5 pw

Ҫ pw(8) ǻbíáé leá ǻééôïññâbá ðçò ǻññâlþò áîðïëþí áéá ǻçìéïññâbá, áéáññâðþ, áééáññâþ, áéé áîðÜíéóç ÷ ñçöôþí ǻáé ñÜäúù. Ӭééôïññâåbù ùò front end ǻéá ôá ǻñ ÷ ǻbá ÷ ñçöôþí ǻáé ñÜäúù ôïö óôôðþiaôïö. Ҫ pw(8) Ý ÷ ǻé Ýíá ðïëý ǻoíáôü ÿýñïëi ǻdëéïäþí ǻññâlþò áîðïëþí ðïö ðçí ǻáééôöïý ǻáô Üëëçëç ǻéá ÷ ñþöç ôá ǻÝóíâðò áîðïëþí (scripts) ǻâéðöþí, ǻéëÜ ôöïöö ïYïöö ÷ ñþöôâðò ßóùò ǻáïâbù ðâññéôööðâñi ðâñbðëïëç áðù ûöê ìe Üëëâðò áîðïëYò ðïö ðâññïööðâñÜæïïðâá ǻâþ.

## 14.7 Đåñéïñßæïíôáò × ñþóôåò

ÁÍ Ý÷âåôå ÷ñPöôåôå, Böùò Ý÷âåôå óéåöôåß íá ðåññéïñBöôå ñçí åöñáðüöçôå ÷ñPöçö ðïö õðóôðPìåöïò áðü áðôïýð. Õí FreeBSD ðán Ý÷âé ööï ãéá ÷åéñéóôP áñéåöïýð òñüðïò ãéá íá ðåññéïñBöåé õïò ðüñïò ðïö õðóôðPìåöïò ðïö iðññåß íá ÷ñçöéïðïëPöåé Ýíá Üöññ. ÁðôÜ óå üñéá ÷ññBæïñðåé óå ÿí ðìPìåôå: íññBæé åßöéïð (disk quotas), êéé Üëéá üñéá ðüññí.

Óá ìåñßæá äßóëîö ðåñëíñßæïöí ôçí ÷ ñPóç ôúí äßóéùí ööïöö ÷ ñPóôåò, éáé ðåñÝ ÷ iöí Yíáí ôñüöí ãñPäiñö åëÝ ã ÷ iöí ãðôPò ôçö ÷ ñPóçö ÷ üñßö Íá ðöiëíñßæïööáé áðü ôçí ãñ ÷ P êÜëå ömÜ. Óá ìåñßæá ööæçöíýíöáé ööí ÒíPiá 19.15.

Óá Üeéá üñéá ðüñúí ðåñééáíâ Üññóí ôñüðñò ãéá ðåñéíñéóíù ÷ ñPóçò ôçò CPU, ôçò lñPíçò, éáé Üeéúí ðüñúí ðíø iðíññáß íá êåôáíáæþóáé Ýíá ÷ ñPóçò. Óá üñéá áðóÜ êåèíñþæíñóáé ÷ ñçóëiðíéþíóâð êé Üóåéð óýíäåðçò êáé óðæçöíýíóáé áäþ.

Íé êëÜóáéó óýíääöçò êáèïñBæïíöáé ööí /etc/login.conf. Íé áéñéååßò Ýíñíéåð åßíáé ðÝñá åðü öíí öéïöü åööïý ôíö õíÞiaöiö, áeëÜ ðåñéäñÜöiöáé íå ëåðöiïÝñåéá óöçí óåëßää login.conf(5) ööí manual. Åßíáé åñéåöü íá ðïÿä üöé êÜëå ÷ñÞööçò áíÞéåé óå îßá êëÜóç óýíääöçò (öçí default áíi ìñéöiïý), êáé üöé êÜëå êëÜóç óýíääöçò Ý÷åé Ýíá óýíñíëí åðü åöñíåöüöçöåð óýíääöçò ðiö ò÷åðßæïíöáé íå áöößí. Íéla äöñíåöüöçöå óýíääöçò êáèïñBæåöåé åðü Ýíá åéÿäïö name=value, üðiö name åßíáé Ýíá åñüööú áíáåñüñéööéêü êáé value åßíáé íéá åðééåäííÝíç ôéïP ðiö èá ÷ñçóéiiðíéçëåß öýíöüíá íå öíí üññá. To óöÞöéii êëÜóåùí óýíääöçò êáé äöñíåöüöÞöùí åßíáé íéla iÜëëíí åðéP äéáäééåößá êáé ðåñéäñÜööåé åößöçò ööí login.conf(5).

**Óciáßúñóç:** Ói óyóôôçíá óoíÞeùò äáí áéáâÜæåé áðåðèåßáò ði áñò ðåßi ñòðeìßóåúí óóï /etc/login.conf, áéëÜ ði áñò ðåßi áÜóçò äåäïíÝíúí /etc/login.conf.db ði ïðiÞi ðáñíÝ-åé åñçäïñüöåñò áiaæçôÞóåéò. Áéá íá äciéïññáÞòïòíà ði /etc/login.conf.db áðü ði /etc/login.conf, áêòåðéíýíà ðíç ðáñáéÜûò áîðiÞ:

```
# cap_mkdb /etc/login.conf
```

Óá üñéá ðüñúí áßíáé áéáöïñåðééÜ áðü öéö áðëéÝð aðíáðüöçöðö óýíäåöçö áéá áÿí üüäïðö. Ðñþöá, áéá êÙëå üñéí, öðÜñ ÷ áé Ýíá iåðåâéçöü (öñÝ-ii) eáé Ýíá iüíéíí üñéí. já iåðåâéçöü üñéí iðiññåß íá áééÜlåé áðü öíí ÷ ñÞööç Þ öçí áöðñííäÞ, áéëÜ ááí iðiññåß íá áßíáé ðþçüéðöñí áðü öí iüíéíí üñéí. Öi öåéäöðáþi iðiññåß íá áéåðöùèåß áðü öíí ÷ ñÞööç, áéëÜ ðioÝ íá áðíçéåß. Áåýóðñíí, óá ðåñéöóúðöñá üñéá ðüñúí áðäññüæíîöáé áÍÜ áéåñáðößá óá Ýíá óóñæåñéí Üíí ÷ ñÞööç, ü ÷ é ööíí ÷ ñÞööç öññiñééÜ. Óçíåéþöðå, iüñò, üöé áðööÝð ié áéáöïñåðééÜ. Óçíåéþöðå, iüñò, üöé áðööÝð ié áéáöïñåðééÜ. Óçíåéþöðå, iüñò, üöé áðööÝð ié áéáöïñåðééÜ.

Êáé Ýôóé, ÷ùññßò ðññüöéåôç öáóáñßá, ðánáé Üôù åßíáé óá ðéí óö÷íÜ ÷ñçöéiiëíéíÿíåíá üñéá ðüñúí (óá ððüëéïðá, íáæß íå üëéåò ôéó Üëëåò äöíáöüöçôåò óýíååöçò, iëññåßôå íá óá åñåßôå óöii login.conf(5)).

## coredumpsize

Öñ üññéí óóí ñ YÁåéëö áíñüö áñ ÷ áßïö core ðöñ åçíéïöññåßöáé áðü Ýáÿ ðññüäññíá, åßíáé áéá ðññöáññåßö ëüäíöö, áåññöþíâñ áðü Üëéá üññéá ôçö ÷ ñPöçö ööí åßöéïö (ð.÷., `filesize`, P iåñßæáé åßöéïö). Dán' üëéá áåðöÜ, ÷ ñçöéïïöñéåßöáé óó ÷ íÜ óáí ißá èéäüöåññí áðóöçñP íYëëäí åéÝä ÷ iö ôçö éåðáñ Üëüñçö ÷ þññö ööí åßöéïö: áöiy íé ÷ ñPöôåð áåí áçíéïöññíý áñ ÷ áßá core áðü iùññé öiöö, èéé óó ÷ íÜ áåí óá äéäññ Üöiöi, iñßæíñöå ööí coredumpsize ïðiññåß íá öiöö åëööþöáé áðü ðññüññí öYëëö áðièçéåðöéëíý ÷ þññö, áí åéá ðánñ Üååéäñ åéåðññåÿöåé Ýáÿ iåñÜëí ðññüäññíá (üðòö ð.÷., öi `emacs`).

## cputime

**Óciálaðnós:** Áðóðu áßíáé Ýíá üñeið óðíí ÷ñuñið ócò CPU ðið éáðáíáéþíáðáé, üðe óðið ðiðiðiðu ócò CPU üðuò àiðiáíßæðááé óå êÜðiðéá ðåðááðáé áðu ðiðið top(1) éáé ps(1). ¼ñeið óðiðiðu, iÝ÷ñé ócò óðeáiþ ðiðið aðñÜðiðiðáé áðoðÝð ié aðñaiðÝð, aðáí áßíáé aððíáðu, éáé iÜðeéið eá áßíáé Ü÷ñcðoði: Ýíáð iàðááðæñuðóðeóðið—ðeéaíüðáðááða iéá Yáêëñç aðñááðááða—iðiñðááða iá ÷ñcðoéiðiðeóðááð óðiðaüí ðiðið 100% iéáó CPU aðáí êÜðiðið ÷ñuñið.

filesize

Áðóðu áðíáé ðí ÍÝáéóði ÍÝáâðeðo áðíùð aðn ÷ áðíðo ðíðo ìðiññáð íá eáðo Ý ÷ áé Íýáð ÷ ñPóðóçð. Óá áíðóðëáðóç ìáð oá iáññáðáé áðóðeðo, áðóðu ðí ûñeí áðéáÜeëðáðe óá ëÜeð aðn ÷ áðíði ÷ ùñeðóðÜ, ü ÷ é óði óýíðeü üðeúí ðúí aðn ÷ áðúí ðíðo eáðo Ý ÷ áé Íýáð ÷ ñPóðóçð.

maxproc

Áðóðu áðþíáð í 1Ýæðóðiò áñéèlùò áæðñáðáóéþí ðiò iðinñáß íá áðéðáæðáß 1Ýáò ÷ nÍþóðcò. ÐáñéðáíàUíáðe íà óii Bæði óññúði áæðñáðáðbåò ðúðiò 1Ðáñáðóéçíþiò uðiò éáé ðññúðéçíþiò. Áéá ðññúðáíáßò èüñáðò, áðiò iðinñáß íá áßíáé íáðñáæðóðañiò áðuò ói üñéi óiò óðóðÓÞíáðiò ðiò iñßæðáðáé áðuò ói kern. maxproc sysctl(8). Áðþóðcò óçìåðþóðá üðóé è 1Ýðiðáð ðiòý iéenñþ ðéiþ, iðinñáß íá 1Ðáñáðáíáßò áðuò ócí 1Ðáñáðáññáéüðóðá áñiùò ÷ nÍþóðc: áßíáé óð ÷ iÙ ÷ nÍþóðií íá óðiá 1Ýðiðáé è 1Üðiðéò ðíreeðáðé 1Ýð öiñ 1Ýð P íá áðéðáæðáß aéi ÷ áðóðáýðáéð (pipelines). 1Üðiðéò áññáðáðbåò, üðuò c íáðóðáæðþóðéðc áñiùò íáñáÜëiò 1ÐññññUíáðiò, açíeññññíý áðþóðcò 1ðíreeð 1Ýð áæðñáðáðbåò (ð. ÷. make(1), cc(1), éáé 1Üëeñé áíáæðUíáðiò 1Ðññññáðáññáðóð 1Ýð).

`memorylocked`

Áðóði áßíáé ðí iÝæéóði ðíðiú iÍÞíçò ðíði ðiðiñâð íá æçðÞóáé leá áæðñâðóþá íá éeåéæùèåð óðíçí éýñéá iÍÞíç (ð.÷., áæÝðå mlock(2)). ÉÜðiæá èñþóéíá ðñiññÜñiâðá ðiði óðóðÞíáðiò, üðùði ðí amd(8), éeåéæþíðiði óðíçí éýñéá iÍÞíç. Ýóóé þóðá óðíçí ðâñðóðùðóç ðiði áiðéiâðóâðæíý, áði ðiðiæéóðiÝñiði óðíçí áðéâÜñiðiði ðiði óðóðÞíáðiò óá ðâñðóðùðóç ðñiñâðÞíáðiò.

memoryuse

## openfiles

Áðóðüö áþíráé í Ýáééðöö áñeeìòð áñi-åþúí ðiði ìðiñåß íá Ý÷åé áññéêðÜ ìéá äéññááðBá. Óði FreeBSD, óá áñ÷åßá áðBöçö ÷ñçöéiðiéýíöáé æáá íá áðåééiißöiði ððiräi÷Ýð (sockets) éáé éáÍÜéá IPC. ÐññöÝíöå ëieðüí íá icí èÝóåðå áðóðü òi üñei ðiðéý ÷álcëÜ. Ói ñoññééü üñei òið oðóðÞiaðiò èáéiñßæåðáé áðü òi kern.maxfiles sysctl(8).

sbsize

Áôôü ábbáé ôü üñéí ôçö lñPïçö äéêöýïö, éáé Üñá ôúí mbufs, ðiö iðinâß íá êáôááéþöåé Ýíáò ÷ñPöôçö. Îâébíçöå úò áðÜíôçöç óå íéá ðäéëÜ DoS áðbèåóç ç iðibá äçíéïñäiýóå ðïëëÜ sockets, áëëÜ iðinâß íá ÷ñçöéiiðíéçèåß áâáiéÜ áæá ôíï ðâñéïñéöíü ôúí áðééïéíüéþí áæéöýïö.

stacksize

Áðóðu ábíráé ðí iÝæéóði üñeí ðíð iðináð íá llaðáæþóáé c óðiþváa iéáð aéanáðáóþáð. Áðü lúñið ðíð aáí ábíráé aðnáðóðu aéá íá ðáñeíñéðóðáð ðí iÝáðæiò iíþlçò ðíð iðináð íá ÷ñçóðiðiþváa Yíá ðñüñáñáiiá. Óðiáðþò, ðñYðåé íá ÷ñçóðiðiþváa óá ðoðiðaðóiù lá Üeéá üñeá.

ÕðÜñ÷iõí iãñééÜ áéüüá ðñÜäiáóá ðiõ ðñÝðåé íá èõiÜóôå üôáí èÝóåôå üñéá óå ðüñiõò. ÐáñáéÜòù áßíáé iãñééÝò ãáiééÝò óðiâiõëÝò, ðñiõÜóåéò, êáé äéÜöriñá ó÷üëéá.

- Íe äéññáóßåò ðiö iâééííyí óðçí åêéßíçóç ðiö óððóðßiaðiò áðü ði /etc/rc åê ÷ ùññíyíðáé óðçí êëÜóç óýíäåðçò daemon.
  - Áí êáé ôí /etc/login.conf ðiö Ýñ÷åðáé íå ôí óýóðçìá åßíáé ieá êáëÞ ðçäÞ eïäéêhí ðéíþí âéá ôá ðåñéóóüôåñá üñéá, iùñí åóåßò, i äá ÷ åéññéóðÞò, iðiññåß íá ïÝññåðå ôé åßíáé êáðÜëëçëi åéá ôí óýóðçìá óáò. ÈÝöiñðáò Ýíá üñéi ðiëý ðçëÜ iðiññåß íá äéñðiëýfåðå óðçí êáðÜ ÷ ñçóç ôí ðóðóðßiaðiò óáò, áíþ eÝðiñðáò ôí ðiëý ÷ áíçëÜ iðiññåß íá ðåñéiñßóåðå óðçí ðáññåññæéüòçóå.
  - Óðiøò ÷ ñÞóåðò ôí ð X Window System (X11) èá ðñÝðåé iÜëëí íá ðáñá ÷ ùñçëiýí ðåñéóóüôåñíé ðüññíé áðü üðé óá Üëëiòò ÷ ñÞóåðò. Ôí X11 áðü iùñí ôí ðáññåññæéüò ðiëëiyò ðüññíòò, áëëÜ åðßóçò åíèéññýíåé ôí ðiøò ÷ ñÞóåðò íá ôñÝ÷iðí ðåñéóóüôåñá ðñiñññÜñíáðå óáðòò ÷ ñiñíá.
  - Èòiçëåßôå üðé ðiëëÜ üñéá åðáññüæííðåé óå êÜèå äéññááóßá ÷ ùñéóóÜ, ü ÷ é óðí ÷ ñÞóðç óðññëééÜ. Åéá ðáññÜäéäéíá, èÝðiñðáò openfiles óå 50 óçíåßíåé üðé êÜèå äéññááóßá ðiö åêðååëß í ÷ ñÞóðçò iðiññåß íá áíßíåé Ýùò 50 áñ ÷ åßá, ðóé, i óðññëééüò áññéëiùò áñ ÷ åßùñ ðiö iðiññåß íá áñßíåé i ÷ ñÞóðçò åßíåé ç ðéíÞ ôí ð openfiles

Áéá ðåñéóóýôðåñâò ðëçñïöñßåò óóá üñéá ðüñúí ééá ôéó èëÜóáéò óýíáåòçò ééá ôúí áöñáòîòÞóùí áåíééÜ, ðáñáêáëíýå

## 14.8 ÌÜääåò

Ìßá ïiÜää áßíáé áðëÜ ìßá ëßóôá ÷ ñçóôþí. Íé ïiÜääò áíáñáùñßæïïðáé áðü õi üñîÜ ôiðò êáé õi GID (Group ID). Óði FreeBSD (éáé óðá ðâñéóðùôðñá Üëëá üiíëá UNIX óðóðÞíáðá), ié ayí ðâñÜäiiðåð ðið õi ððñÞíáð ÷ ñçóéiiðiéåß áéá íá áðiøáðßóåé áí ìßá áéåññáðßá áðéññÝðåðáé íá èÜñéé ëÜðéé áßíáé õi ID ôið ÷ ñPóôç ôcð êáé ç ëßóôá íå ôeð ïiÜääò ðið áíÞéåé. Óå áíðßèåðç íå õi ID ôið ÷ ñPóôç, iéá áéåññáðßá Ý÷åé íéá ëßóôá íå ôeð ïiÜääò ðið ð÷åðßæïïðáé íå áðóÞí. Íðññåß íá áéiyðåðá èÜðíéá ðñÜäiiáðá íá áíáöÝññóáé ôið “group ID” áíüð ÷ ñPóôç P iéáò áéåññáðßáò. Ôeð ðâñéóðùôðñåð ôiñÝð, áðôð õçíåßíáé áðëÜ ôcí ðñþbðç ïiÜää õcð ëßóôáò.

Ç áíðéóðið ÷ çóç ôið iñüñáòið ôcð ïiÜääò óði ID ôcð ïiÜääò âñßóðâåðáé óði /etc/group. Áðóðü áßíáé Ýíá áñ ÷ åßíí áðëýy éåéíÝññò íå ôYðóðñá ðâñßá ÷ ùñéóíYíá íå êüññáðá. Õi ðñþbði ðâñßíí áßíáé õi üññá ôcð ïiÜääò, ôi áåýðåññí áßíáé íêñððñññåççíYññò èùñééüð, ôi ôñþbði õi ID ôcð ïiÜääò, êáé ôi ôYðóðññ ãëßóðá ôññ íñéþí, ÷ ùñéóíYíç íå êüññáðá. Íðññåßóå íá ôcí áðâññáðóðå ðñññá ïå ôi ÷ Yñé (èåùñÞíáð, öððééÜ, üðé ááí èÜññáðá óðññåðééÜ èÜëç!). Áéá iéá ðéí iéíññçñùíYíç ðâñéññåðP ôcð õýñðåñçò, ååßóå ôcí óåðßåá manual group(5).

Áí ááí èÝëåðá íá áðâññáðóðå õi /etc/group íå ôi ÷ Yñé, ðñññåßóå íá ÷ ñçóéiiðiéÞóðåð ôcí pw(8) áíðíëP áéá íá ðññðéYðóðå õi ðñññåðá íå áðâññáðóðå ðñññåðá ïiÜääò. Áéá ðâñÜäiiáðá, áéá íá ðññðéYðóðå õi ïiÜää ðið èÝëåðáé teamtwo êáé íåðÜ íá áðéññåðéþoåð åüðé õðÜñ ÷ åé, iðñññåßóå íá ÷ ñçóéiiðiéÞóðåð:

### ÐâñÜäiiáðá 14-7. ÐññðéYðóðåò iéá ÌÜää × ñçóéiiðiéÞóðåò ôið pw(8)

```
# pw groupadd teamtwo
# pw groupshow teamtwo
teamtwo:*:1100:
```

Í áñéèìüð 1100 ðâññðéÜ ãëßíáé ôi ID ôcð ïiÜääò teamtwo. ÁðóðP ôcí óðéññP, ç teamtwo ááí Ý÷åé iÝëç, êáé áéé áðóðü áßíáé iÜëëí Ù÷ñçóðç. Áð ôi áéëÜññò íå ðñññåðééþiðåò ôiñ jru óðcí ïiÜää teamtwo.

### ÐâñÜäiiáðá 14-8. Éáèññéóìüð ôcð Ëßóðåò Íåëþí iéáò ÌÜääò íå × ñPóç ôið pw(8)

```
# pw groupmod teamtwo -M jru
# pw groupshow teamtwo
teamtwo:*:1100:jru
```

Ç ðâñÜñññò óðcí áðéëëñP -m áßíáé iéá ëßóôá ÷ ñçóôþí ðið ðñññéåðóáé íá áßñññò iÝëç ôcð ïiÜääò, ÷ ùñéóíYíç íå êüññáðá. Áðü ôá ðññçññíí õi ðñþbðá, ãíññßæëñò íüðé êáé ôi áñ ÷ åßíí êüññééþí (password file) ðâñéÝ÷åé áðßóðò iéá ïiÜää áéá êÜëå ÷ ñPóôç. Í ÷ ñPóôç õi ðñññåðá áðóðüññåðá (áðü ôi õýñðåñçá) ùò iÝëið ôcð ïiÜääò áðóðPð. Í ÷ ñPóôç õi ááí èá áíðññåðéåðå ùò iÝëið ôcð áñ ÷ ééÞò áðóðPð ïiÜääò üðáí ÷ ñçóéiiðiéåßóåé ç áðéëëñP groupshow íå ôcí pw(8), áéëÜ èá áíðññåðéåðå ùò iÝëið ôcð áñ ÷ ééÞò áðóðPð ïiÜääò üðáí ç ðëçññññá áíáæçðåðóáé iÝðù ôcð id(1) P ðâññññéëið ãñññåðéåßíð. Íå Üëëá êüññáðá, ç pw(8) ÷ áéññßæåðåé íüññ ôi áñ ÷ åßí /etc/group, êáé ááí èá ðñññåðéÞóåé ðið Ý íá áéáåÜññåé ðñññåðéåðå áåñññíYíá áðü ôi /etc/passwd.

### ÐâñÜäiiáðá 14-9. ÐññðéÞéç ÍYññò óðcí ÌÜää ìå × ñPóç ôcð pw(8)

```
# pw groupmod teamtwo -m db
# pw groupshow teamtwo
teamtwo:*:1100:jru,db
```

Ç ðâñÜñññò óðcí áðéëëñP -m áßíáé iéá ëßóôá ÷ ñçóôþí (÷ ùñéóíYíç íå êüññáðá) ðið ðñññéåðóáé íá ðñññåðéåðíýí óðá ððÜñ ÷ iñðå iÝëç ôcð ïiÜääò. Óå áíðßèåðç íå ôi ðññçññíí ðâñÜäiiáðá, ié ÷ ñPóôðåò áðóðið ðñññåðéåðåé óðcí ïiÜää, êáé ááí áíðññåðéåðíýí ôiñð ÷ ñPóôðåò ðið Päç áíÞéiñí óå áðóðP.

**ÐáñÜääéâíá 14-10. ×ñçóéiiðiéþíôåò ôçí id(1) ãéá Ðññóäéïñéóíü Ìåéþí ìéáò ÌÜääáò**

```
% id jru  
uid=1001(jru) gid=1001(jru) groups=1001(jru), 1100(teamtwo)
```

¼ðùò iðiñâßôå íá äâßôå, í jru åßíáé iÝëiò ôùí ñÜäùí jru êáé teamtwo.

Ãéá ðâñéóóüôåñåò ðëçñïöiñßåò ó÷åôéêÜ íå ôçí pw(8), äâßôå ôçí óâëßää manual, êáé ãéá ðâñéóóüôåñåò ðëçñïöiñßåò ó÷åôéêÜ íå ôçí iññöiðiñçcöç ôiõ /etc/group, óðiâiðeåðôåßôå ôçí óâëßää manual group(5).

## Óçìåéþóåéò

1. Åêôüò öððóéêÜ áí óðfáÝóïòíå ðíëëáðëÜ ôåññáôéêÜ, áëëÜ èá ìéëÞóïòíå ãéá áðôü óôí ÊâöÜëáéí 27.
2. Åßíáé aðíáðüí íá ÷ñçóéiiðiéþóåò UID/GIDs üöí íâñÜëá üöí óí 4294967295, áëëÜ ôÝóïéá IDs iðiñâß íá ðññéáæÝóïòí óíâáñÜ ðññâëÞìáôá íå eïæéòíéêü ðiõ êÜíâé õðièÝóâéò ó÷åôéêÜ íå ôéò ôéíÝò ôùí IDs.

# ÊåöÜëáéï 15 ÁóöÜëåéá

Ôë ìàðàéëýôðñï ïÝñïò áðôïý ôïð èäðäëåßïò ðñïÝñ÷åðôáé áðü ôçí óåëßää ôïð *manual* ôçò *security*(7) áðü ôïð  
Matthew Dillon.

## 15.1 Óýïøç

Õõ õõõÜëääí áðöü ðáñÝ÷åé íéä åáóééÞ áæóáåùäÞ óðéò Ýíñieåò ôçð áóöÜëääéáð óðóðõPiåöïò, êÜðieïòð åâíééÜ êáéïýð êáíüíàò, éáé iñéöíÝíá ðñï÷ùñçíÝíá èÝíáôá ó÷åðééÜ ià öi FreeBSD. ÁñêåðÜ áðü óá èÝíáôá ðñö êáéýðöiiöáé åäþ, iðmñiyí íá åöäñiööryí öi ßæëí éæëÜ ðüööi öi ßæëí öi óýöööçíá, üöi êáé åáóÜëääéá iÝóù Internet. Öi Internet åái åßíáé ðeÝííÝíá “öeééüü” iÝñiò óöi iðibí êáèÝíáò èÝíäé íá åßíáé i åðäåäíéüö óáó åâßöiíáð. Ç áíÜäêç áóöÜëääéöçð öið óðóðõPiåöïò óáó åßíáé åðéóåéöéÞ áéá íá ðñiööåå Ýøåôå óá åâäiñÝíá óáð, ôçí ðiâöiåðééÞ óáð éäéiêöçóßá, öi ÷ñüií óáð, éáé ðiæëÜ ðâñéooüöðäñá áðü óá ÷Ýñéá òúí ÷Üëåñò éáé òúí iñibí ñiöö.

Ôi FreeBSD ðán Ý÷åé iéá óåéñÜ áðü áïçèçóééÜ ðñïäñÜìáôá êáé lç÷áíéöiïýò ãéá íá áïáóöáëßóåé ôçí áéåñáéüôçôá êáé ôçí áóöÜëåéá öiï óóôôPíáòiò óáò êáé öiï äéêöýiò.

Áöiý äéáâÜóåôå áðôü öi êåöÜëáéi, èá 1Ýñåôå:

- ÅáóéêÝò Ýííréåô ãéá ôçí áóöÜëåéá, óå ó÷Ýóç iå ôï FreeBSD.
  - Óóïé÷åßá ó÷åóéêÜ iå ôïðò aëÜöïñiðò iç÷áíéöïýò êñöðöiäñÜöçóçò ðïð åßíáé äéåèÝóéïïé óôï FreeBSD, üðùò ôï DES êåé ôï MD5.
  - Ðùò íá ñõèìßóåôå ôï óýóôçìá óåò ãéá êùäééïýò iéåò ÷ñPóçò.
  - Ðùò íá ñõèìßóåôå TCP Wrappers ãéá ÷ñPóç iå ôçí inetd.
  - Ðùò íá ñõèìßóåôå ôïí **KerberosIV** óå FreeBSD åéäüöåéò ðñéí ôç 5.0.
  - Ðùò íá ñõèìßóåôå ôïí **Kerberos5** óôï FreeBSD.
  - Ðùò íá ñõèìßóåôå ôï IPsec êåé íá åçïéïñäPóåôå Ýíá VPN iåôáïý iç÷áíçïÜöùí FreeBSD/Windows.
  - Ðùò íá ñõèìßóåôå êåé íá ÷ñçóéïiðïéPóåôå ôçí êåôÜ FreeBSD ðëiðiñçóç SSH ôïð **OpenSSH**
  - Ôé åßíáé ôå ACLs óôï óýóôçìá åñ÷åßùí êåé Ðùò íá ôå ÷ñçóéïiðïéPóåôå.
  - Ðùò íá ÷ñçóéïiðïéPóåôå ôï åïçëçöéüü ðñüüñäiiá **Portaudit** ãéá íá åëÝäåôå ëïäéöïéüü ôñßöið êåôåóêåöåôP ðïð Ý÷åé åäéåôåóåéåß iÝóù ôçò óôëëiäPò Ports.
  - Ðùò íá ÷ñçóéïiðïéPóåôå ôéò åçïïóéåýóåéò security advisories ôïð FreeBSD.
  - Èá Ý÷åôå iéå éäÝá ãéá ôï ôé åßíáé ôï Process Accounting êåé Ðùò íá ôï ååññäiðïéPóåôå óôï FreeBSD.

Đñéí äéáâÜóåôå áôôü ôi êåöÜëáéi, èá ðñÝðåé:

- Íá êáðâáññâðôá âáóééÝð Ýññíéåð ôíð FreeBSD êáé ôíð Internet.  
Ðññüóèåðá èÝìáðá ó÷âðééÜ íà ôçí áóðÜëåéá êáéýðôíðåé óá ñëüêëçñí ôí áéâëßí. Åéá ðánÜääéäíá, í Õðí÷ñâùñôééüð ëäñ÷; ìò Ðññüóâáóçð òóæçöôåðôáé ôóí ÊåðÜëåéí 17 êáé óá Internet Firewalls óóæçöïýîôáé ôóí ÊåðÜëåéí 31.

## 15.2 Introduction

Security is a function that begins and ends with the system administrator. While all BSD UNIX multi-user systems have some inherent security, the job of building and maintaining additional security mechanisms to keep those users “honest” is probably one of the single largest undertakings of the sysadmin. Machines are only as secure as you make them, and security concerns are ever competing with the human necessity for convenience. UNIX systems, in general, are capable of running a huge number of simultaneous processes and many of these processes operate as servers — meaning that external entities can connect and talk to them. As yesterday’s mini-computers and mainframes become today’s desktops, and as computers become networked and inter-networked, security becomes an even bigger issue.

System security also pertains to dealing with various forms of attack, including attacks that attempt to crash, or otherwise make a system unusable, but do not attempt to compromise the `root` account (“break root”). Security concerns can be split up into several categories:

1. Denial of service attacks.
2. User account compromises.
3. Root compromise through accessible servers.
4. Root compromise via user accounts.
5. Backdoor creation.

A denial of service attack is an action that deprives the machine of needed resources. Typically, DoS attacks are brute-force mechanisms that attempt to crash or otherwise make a machine unusable by overwhelming its servers or network stack. Some DoS attacks try to take advantage of bugs in the networking stack to crash a machine with a single packet. The latter can only be fixed by applying a bug fix to the kernel. Attacks on servers can often be fixed by properly specifying options to limit the load the servers incur on the system under adverse conditions. Brute-force network attacks are harder to deal with. A spoofed-packet attack, for example, is nearly impossible to stop, short of cutting your system off from the Internet. It may not be able to take your machine down, but it can saturate your Internet connection.

A user account compromise is even more common than a DoS attack. Many sysadmins still run standard **telnetd**, **rlogind**, **rshd**, and **ftpd** servers on their machines. These servers, by default, do not operate over encrypted connections. The result is that if you have any moderate-sized user base, one or more of your users logging into your system from a remote location (which is the most common and convenient way to login to a system) will have his or her password sniffed. The attentive system admin will analyze his remote access logs looking for suspicious source addresses even for successful logins.

One must always assume that once an attacker has access to a user account, the attacker can break `root`. However, the reality is that in a well secured and maintained system, access to a user account does not necessarily give the attacker access to `root`. The distinction is important because without access to `root` the attacker cannot generally hide his tracks and may, at best, be able to do nothing more than mess with the user’s files, or crash the machine. User account compromises are very common because users tend not to take the precautions that sysadmins take.

System administrators must keep in mind that there are potentially many ways to break `root` on a machine. The attacker may know the `root` password, the attacker may find a bug in a root-run server and be able to break `root` over a network connection to that server, or the attacker may know of a bug in a suid-root program that allows the attacker to break `root` once he has broken into a user’s account. If an attacker has found a way to break `root` on a machine, the attacker may not have a need to install a backdoor. Many of the `root` holes found and closed to date involve a considerable amount of work by the attacker to cleanup after himself, so most attackers install backdoors. A backdoor provides the attacker with a way to easily regain `root` access to the system, but it also gives the smart

system administrator a convenient way to detect the intrusion. Making it impossible for an attacker to install a backdoor may actually be detrimental to your security, because it will not close off the hole the attacker found to break in the first place.

Security remedies should always be implemented with a multi-layered “onion peel” approach and can be categorized as follows:

1. Securing `root` and staff accounts.
2. Securing `root`-run servers and suid/sgid binaries.
3. Securing user accounts.
4. Securing the password file.
5. Securing the kernel core, raw devices, and file systems.
6. Quick detection of inappropriate changes made to the system.
7. Paranoia.

The next section of this chapter will cover the above bullet items in greater depth.

## 15.3 Securing FreeBSD

**Command vs. Protocol:** Throughout this document, we will use **bold** text to refer to an application, and a monospaced font to refer to specific commands. Protocols will use a normal font. This typographical distinction is useful for instances such as `ssh`, since it is a protocol as well as command.

The sections that follow will cover the methods of securing your FreeBSD system that were mentioned in the last section of this chapter.

### 15.3.1 Securing the `root` Account and Staff Accounts

First off, do not bother securing staff accounts if you have not secured the `root` account. Most systems have a password assigned to the `root` account. The first thing you do is assume that the password is *always* compromised. This does not mean that you should remove the password. The password is almost always necessary for console access to the machine. What it does mean is that you should not make it possible to use the password outside of the console or possibly even with the `su(1)` command. For example, make sure that your ptys are specified as being insecure in the `/etc/ttys` file so that direct `root` logins via `telnet` or `rlogin` are disallowed. If using other login services such as `sshd`, make sure that direct `root` logins are disabled there as well. You can do this by editing your `/etc/ssh/sshd_config` file, and making sure that `PermitRootLogin` is set to `NO`. Consider every access method — services such as FTP often fall through the cracks. Direct `root` logins should only be allowed via the system console.

Of course, as a sysadmin you have to be able to get to `root`, so we open up a few holes. But we make sure these holes require additional password verification to operate. One way to make `root` accessible is to add appropriate staff accounts to the `wheel` group (in `/etc/group`). The staff members placed in the `wheel` group are allowed to `su` to `root`. You should never give staff members native `wheel` access by putting them in the `wheel` group in their password entry. Staff accounts should be placed in a `staff` group, and then added to the `wheel` group via the

/etc/group file. Only those staff members who actually need to have `root` access should be placed in the `wheel` group. It is also possible, when using an authentication method such as Kerberos, to use Kerberos' `.k5login` file in the `root` account to allow a `ksu(1)` to `root` without having to place anyone at all in the `wheel` group. This may be the better solution since the `wheel` mechanism still allows an intruder to break `root` if the intruder has gotten hold of your password file and can break into a staff account. While having the `wheel` mechanism is better than having nothing at all, it is not necessarily the safest option.

An indirect way to secure staff accounts, and ultimately `root` access is to use an alternative login access method and do what is known as “starring” out the encrypted password for the staff accounts. Using the `vipw(8)` command, one can replace each instance of an encrypted password with a single “\*” character. This command will update the `/etc/master.passwd` file and user/password database to disable password-authenticated logins.

A staff account entry such as:

```
foobar:R9DT/Fa1/LV9U:1000:1000::0:0:Foo Bar:/home/foobar:/usr/local/bin/tcsh
```

Should be changed to this:

```
foobar:*:1000:1000::0:0:Foo Bar:/home/foobar:/usr/local/bin/tcsh
```

This change will prevent normal logins from occurring, since the encrypted password will never match “\*”. With this done, staff members must use another mechanism to authenticate themselves such as kerberos(1) or ssh(1) using a public/private key pair. When using something like Kerberos, one generally must secure the machines which run the Kerberos servers and your desktop workstation. When using a public/private key pair with ssh, one must generally secure the machine used to login *from* (typically one's workstation). An additional layer of protection can be added to the key pair by password protecting the key pair when creating it with `ssh-keygen(1)`. Being able to “star” out the passwords for staff accounts also guarantees that staff members can only login through secure access methods that you have set up. This forces all staff members to use secure, encrypted connections for all of their sessions, which closes an important hole used by many intruders: sniffing the network from an unrelated, less secure machine.

The more indirect security mechanisms also assume that you are logging in from a more restrictive server to a less restrictive server. For example, if your main box is running all sorts of servers, your workstation should not be running any. In order for your workstation to be reasonably secure you should run as few servers as possible, up to and including no servers at all, and you should run a password-protected screen blanker. Of course, given physical access to a workstation an attacker can break any sort of security you put on it. This is definitely a problem that you should consider, but you should also consider the fact that the vast majority of break-ins occur remotely, over a network, from people who do not have physical access to your workstation or servers.

Using something like Kerberos also gives you the ability to disable or change the password for a staff account in one place, and have it immediately affect all the machines on which the staff member may have an account. If a staff member's account gets compromised, the ability to instantly change his password on all machines should not be underrated. With discrete passwords, changing a password on N machines can be a mess. You can also impose re-passwording restrictions with Kerberos: not only can a Kerberos ticket be made to timeout after a while, but the Kerberos system can require that the user choose a new password after a certain period of time (say, once a month).

### 15.3.2 Securing Root-run Servers and SUID/SGID Binaries

The prudent sysadmin only runs the servers he needs to, no more, no less. Be aware that third party servers are often the most bug-prone. For example, running an old version of `imapd` or `popper` is like giving a universal `root` ticket out to the entire world. Never run a server that you have not checked out carefully. Many servers do not need to be run as `root`. For example, the `ntalk`, `comsat`, and `finger` daemons can be run in special user *sandboxes*. A sandbox

is not perfect, unless you go through a large amount of trouble, but the onion approach to security still stands: If someone is able to break in through a server running in a sandbox, they still have to break out of the sandbox. The more layers the attacker must break through, the lower the likelihood of his success. Root holes have historically been found in virtually every server ever run as `root`, including basic system servers. If you are running a machine through which people only login via `sshd` and never login via `telnetd` or `rshd` or `rlogind`, then turn off those services!

FreeBSD now defaults to running `ntalkd`, `comsat`, and `finger` in a sandbox. Another program which may be a candidate for running in a sandbox is named(8). `/etc/default/rc.conf` includes the arguments necessary to run `named` in a sandbox in a commented-out form. Depending on whether you are installing a new system or upgrading an existing system, the special user accounts used by these sandboxes may not be installed. The prudent sysadmin would research and implement sandboxes for servers whenever possible.

There are a number of other servers that typically do not run in sandboxes: `sendmail`, `popper`, `imapd`, `ftpd`, and others. There are alternatives to some of these, but installing them may require more work than you are willing to perform (the convenience factor strikes again). You may have to run these servers as `root` and rely on other mechanisms to detect break-ins that might occur through them.

The other big potential `root` holes in a system are the suid-root and sgid binaries installed on the system. Most of these binaries, such as `rlogin`, reside in `/bin`, `/sbin`, `/usr/bin`, or `/usr/sbin`. While nothing is 100% safe, the system-default suid and sgid binaries can be considered reasonably safe. Still, `root` holes are occasionally found in these binaries. A `root` hole was found in `xlib` in 1998 that made `xterm` (which is typically suid) vulnerable. It is better to be safe than sorry and the prudent sysadmin will restrict suid binaries, that only staff should run, to a special group that only staff can access, and get rid of (`chmod 000`) any suid binaries that nobody uses. A server with no display generally does not need an `xterm` binary. Sgid binaries can be almost as dangerous. If an intruder can break an sgid-kmem binary, the intruder might be able to read `/dev/kmem` and thus read the encrypted password file, potentially compromising any passworded account. Alternatively an intruder who breaks group `kmem` can monitor keystrokes sent through ptys, including ptys used by users who login through secure methods. An intruder that breaks the `tty` group can write to almost any user's tty. If a user is running a terminal program or emulator with a keyboard-simulation feature, the intruder can potentially generate a data stream that causes the user's terminal to echo a command, which is then run as that user.

### 15.3.3 Securing User Accounts

User accounts are usually the most difficult to secure. While you can impose draconian access restrictions on your staff and “star” out their passwords, you may not be able to do so with any general user accounts you might have. If you do have sufficient control, then you may win out and be able to secure the user accounts properly. If not, you simply have to be more vigilant in your monitoring of those accounts. Use of ssh and Kerberos for user accounts is more problematic, due to the extra administration and technical support required, but still a very good solution compared to a encrypted password file.

### 15.3.4 Securing the Password File

The only sure fire way is to star out as many passwords as you can and use ssh or Kerberos for access to those accounts. Even though the encrypted password file (`/etc/spwd.db`) can only be read by `root`, it may be possible for an intruder to obtain read access to that file even if the attacker cannot obtain root-write access.

Your security scripts should always check for and report changes to the password file (see the Checking file integrity section below).

### 15.3.5 Securing the Kernel Core, Raw Devices, and File systems

If an attacker breaks `root` he can do just about anything, but there are certain conveniences. For example, most modern kernels have a packet sniffing device driver built in. Under FreeBSD it is called the `bpf` device. An intruder will commonly attempt to run a packet sniffer on a compromised machine. You do not need to give the intruder the capability and most systems do not have the need for the `bpf` device compiled in.

But even if you turn off the `bpf` device, you still have `/dev/mem` and `/dev/kmem` to worry about. For that matter, the intruder can still write to raw disk devices. Also, there is another kernel feature called the module loader, `kldload(8)`. An enterprising intruder can use a KLD module to install his own `bpf` device, or other sniffing device, on a running kernel. To avoid these problems you have to run the kernel at a higher secure level, at least securelevel 1. The securelevel can be set with a `sysctl` on the `kern.securelevel` variable. Once you have set the securelevel to 1, write access to raw devices will be denied and special `chflags` flags, such as `schg`, will be enforced. You must also ensure that the `schg` flag is set on critical startup binaries, directories, and script files — everything that gets run up to the point where the securelevel is set. This might be overdoing it, and upgrading the system is much more difficult when you operate at a higher secure level. You may compromise and run the system at a higher secure level but not set the `schg` flag for every system file and directory under the sun. Another possibility is to simply mount `/` and `/usr` read-only. It should be noted that being too draconian in what you attempt to protect may prevent the all-important detection of an intrusion.

### 15.3.6 Checking File Integrity: Binaries, Configuration Files, Etc.

When it comes right down to it, you can only protect your core system configuration and control files so much before the convenience factor rears its ugly head. For example, using `chflags` to set the `schg` bit on most of the files in `/` and `/usr` is probably counterproductive, because while it may protect the files, it also closes a detection window. The last layer of your security onion is perhaps the most important — detection. The rest of your security is pretty much useless (or, worse, presents you with a false sense of security) if you cannot detect potential intrusions. Half the job of the onion is to slow down the attacker, rather than stop him, in order to be able to catch him in the act.

The best way to detect an intrusion is to look for modified, missing, or unexpected files. The best way to look for modified files is from another (often centralized) limited-access system. Writing your security scripts on the extra-secure limited-access system makes them mostly invisible to potential attackers, and this is important. In order to take maximum advantage you generally have to give the limited-access box significant access to the other machines in the business, usually either by doing a read-only NFS export of the other machines to the limited-access box, or by setting up ssh key-pairs to allow the limited-access box to ssh to the other machines. Except for its network traffic, NFS is the least visible method — allowing you to monitor the file systems on each client box virtually undetected. If your limited-access server is connected to the client boxes through a switch, the NFS method is often the better choice. If your limited-access server is connected to the client boxes through a hub, or through several layers of routing, the NFS method may be too insecure (network-wise) and using ssh may be the better choice even with the audit-trail tracks that ssh lays.

Once you have given a limited-access box at least read access to the client systems it is supposed to monitor, you must write scripts to do the actual monitoring. Given an NFS mount, you can write scripts out of simple system utilities such as `find(1)` and `md5(1)`. It is best to physically `md5` the client-box files at least once a day, and to test control files such as those found in `/etc` and `/usr/local/etc` even more often. When mismatches are found, relative to the base `md5` information the limited-access machine knows is valid, it should scream at a sysadmin to go check it out. A good security script will also check for inappropriate `suid` binaries and for new or deleted files on system partitions such as `/` and `/usr`.

When using ssh rather than NFS, writing the security script is much more difficult. You essentially have to `scp` the scripts to the client box in order to run them, making them visible, and for safety you also need to `scp` the binaries (such as `find`) that those scripts use. The `ssh` client on the client box may already be compromised. All in all, using `ssh` may be necessary when running over insecure links, but it is also a lot harder to deal with.

A good security script will also check for changes to user and staff members access configuration files: `.rhosts`, `.shosts`, `.ssh/authorized_keys` and so forth, files that might fall outside the purview of the MD5 check.

If you have a huge amount of user disk space, it may take too long to run through every file on those partitions. In this case, setting mount flags to disallow suid binaries and devices on those partitions is a good idea. The `nodev` and `nosuid` options (see `mount(8)`) are what you want to look into. You should probably scan them anyway, at least once a week, since the object of this layer is to detect a break-in attempt, whether or not the attempt succeeds.

Process accounting (see `accton(8)`) is a relatively low-overhead feature of the operating system which might help as a post-break-in evaluation mechanism. It is especially useful in tracking down how an intruder has actually broken into a system, assuming the file is still intact after the break-in has occurred.

Finally, security scripts should process the log files, and the logs themselves should be generated in as secure a manner as possible — remote syslog can be very useful. An intruder will try to cover his tracks, and log files are critical to the sysadmin trying to track down the time and method of the initial break-in. One way to keep a permanent record of the log files is to run the system console to a serial port and collect the information to a secure machine monitoring the consoles.

### 15.3.7 Paranoia

A little paranoia never hurts. As a rule, a sysadmin can add any number of security features, as long as they do not affect convenience, and can add security features that *do* affect convenience with some added thought. Even more importantly, a security administrator should mix it up a bit — if you use recommendations such as those given by this document verbatim, you give away your methodologies to the prospective attacker who also has access to this document.

### 15.3.8 Denial of Service Attacks

This section covers Denial of Service attacks. A DoS attack is typically a packet attack. While there is not much you can do about modern spoofed packet attacks that saturate your network, you can generally limit the damage by ensuring that the attacks cannot take down your servers by:

1. Limiting server forks.
2. Limiting springboard attacks (ICMP response attacks, ping broadcast, etc.).
3. Overloading the Kernel Route Cache.

A common DoS attack scenario is attacking a forking server and making it spawning so many child processes that the host system eventually runs out of memory, file descriptors, etc. and then grinds to a halt. `inetd` (see `inetd(8)`) has several options to limit this sort of attack. It should be noted that while it is possible to prevent a machine from going down, it is not generally possible to prevent a service from being disrupted by the attack. Read the `inetd` manual page carefully and pay specific attention to the `-c`, `-C`, and `-R` options. Note that spoofed-IP attacks will circumvent the `-C` option to `inetd`, so typically a combination of options must be used. Some standalone servers have self-fork-limitation parameters.

**Sendmail** has its `-OMaxDaemonChildren` option, which tends to work much better than trying to use **Sendmail**'s load limiting options due to the load lag. You should specify a `MaxDaemonChildren` parameter, when you start **sendmail**; high enough to handle your expected load, but not so high that the computer cannot handle that number of **Sendmail** instances without falling on its face. It is also prudent to run **Sendmail** in queued mode (`-ODeliveryMode=queued`) and to run the daemon (`sendmail -bd`) separate from the queue-runs (`sendmail -q1m`). If you still want real-time delivery you can run the queue at a much lower interval, such as `-q1m`, but be sure to specify a reasonable `MaxDaemonChildren` option for *that Sendmail* to prevent cascade failures.

**Syslogd** can be attacked directly and it is strongly recommended that you use the `-s` option whenever possible, and the `-a` option otherwise.

You should also be fairly careful with connect-back services such as **TCP Wrapper**'s reverse-identd, which can be attacked directly. You generally do not want to use the reverse-ident feature of **TCP Wrapper** for this reason.

It is a very good idea to protect internal services from external access by firewalling them off at your border routers. The idea here is to prevent saturation attacks from outside your LAN, not so much to protect internal services from network-based root compromise. Always configure an exclusive firewall, i.e., “firewall everything *except* ports A, B, C, D, and M-Z”. This way you can firewall off all of your low ports except for certain specific services such as **named** (if you are primary for a zone), **ntalkd**, **sendmail**, and other Internet-accessible services. If you try to configure the firewall the other way — as an inclusive or permissive firewall, there is a good chance that you will forget to “close” a couple of services, or that you will add a new internal service and forget to update the firewall. You can still open up the high-numbered port range on the firewall, to allow permissive-like operation, without compromising your low ports. Also take note that FreeBSD allows you to control the range of port numbers used for dynamic binding, via the various `net.inet.ip.portrange` sysctl's (`sysctl -a | fgrep portrange`), which can also ease the complexity of your firewall's configuration. For example, you might use a normal first/last range of 4000 to 5000, and a hiptop range of 49152 to 65535, then block off everything under 4000 in your firewall (except for certain specific Internet-accessible ports, of course).

Another common DoS attack is called a springboard attack — to attack a server in a manner that causes the server to generate responses which overloads the server, the local network, or some other machine. The most common attack of this nature is the *ICMP ping broadcast attack*. The attacker spoofs ping packets sent to your LAN's broadcast address with the source IP address set to the actual machine they wish to attack. If your border routers are not configured to stomp on ping packets to broadcast addresses, your LAN winds up generating sufficient responses to the spoofed source address to saturate the victim, especially when the attacker uses the same trick on several dozen broadcast addresses over several dozen different networks at once. Broadcast attacks of over a hundred and twenty megabits have been measured. A second common springboard attack is against the ICMP error reporting system. By constructing packets that generate ICMP error responses, an attacker can saturate a server's incoming network and cause the server to saturate its outgoing network with ICMP responses. This type of attack can also crash the server by running it out of memory, especially if the server cannot drain the ICMP responses it generates fast enough. Use the `sysctl` variable `net.inet.icmp.icmplim` to limit these attacks. The last major class of springboard attacks is related to certain internal **inetd** services such as the udp echo service. An attacker simply spoofs a UDP packet with the source address being server A's echo port, and the destination address being server B's echo port, where server A and B are both on your LAN. The two servers then bounce this one packet back and forth between each other. The attacker can overload both servers and their LANs simply by injecting a few packets in this manner. Similar problems exist with the internal **chargen** port. A competent sysadmin will turn off all of these inetd-internal test services.

Spoofed packet attacks may also be used to overload the kernel route cache. Refer to the `net.inet.ip.rtexpire`, `rtminexpire`, and `rtmaxcache` sysctl parameters. A spoofed packet attack that uses a random source IP will cause the kernel to generate a temporary cached route in the route table, viewable with `netstat -rna | fgrep w3`. These routes typically timeout in 1600 seconds or so. If the kernel detects that the cached route table has gotten too big it will dynamically reduce the `rtexpire` but will never decrease it to less than `rtminexpire`. There are two

problems:

1. The kernel does not react quickly enough when a lightly loaded server is suddenly attacked.
2. The `rtminexpire` is not low enough for the kernel to survive a sustained attack.

If your servers are connected to the Internet via a T3 or better, it may be prudent to manually override both `rtpexpire` and `rtminexpire` via `sysctl(8)`. Never set either parameter to zero (unless you want to crash the machine). Setting both parameters to 2 seconds should be sufficient to protect the route table from attack.

### 15.3.9 Access Issues with Kerberos and SSH

There are a few issues with both Kerberos and ssh that need to be addressed if you intend to use them. Kerberos 5 is an excellent authentication protocol, but there are bugs in the kerberized **telnet** and **rlogin** applications that make them unsuitable for dealing with binary streams. Also, by default Kerberos does not encrypt a session unless you use the `-x` option. **ssh** encrypts everything by default.

Ssh works quite well in every respect except that it forwards encryption keys by default. What this means is that if you have a secure workstation holding keys that give you access to the rest of the system, and you ssh to an insecure machine, your keys are usable. The actual keys themselves are not exposed, but ssh installs a forwarding port for the duration of your login, and if an attacker has broken `root` on the insecure machine he can utilize that port to use your keys to gain access to any other machine that your keys unlock.

We recommend that you use ssh in combination with Kerberos whenever possible for staff logins. **Ssh** can be compiled with Kerberos support. This reduces your reliance on potentially exposed ssh keys while at the same time protecting passwords via Kerberos. Ssh keys should only be used for automated tasks from secure machines (something that Kerberos is unsuited to do). We also recommend that you either turn off key-forwarding in the ssh configuration, or that you make use of the `from=IP/DOMAIN` option that ssh allows in its `authorized_keys` file to make the key only usable to entities logging in from specific machines.

## 15.4 DES, MD5, and Crypt

*Parts rewritten and updated by Bill Swingle.*

Every user on a UNIX system has a password associated with their account. It seems obvious that these passwords need to be known only to the user and the actual operating system. In order to keep these passwords secret, they are encrypted with what is known as a “one-way hash”, that is, they can only be easily encrypted but not decrypted. In other words, what we told you a moment ago was obvious is not even true: the operating system itself does not *really* know the password. It only knows the *encrypted* form of the password. The only way to get the “plain-text” password is by a brute force search of the space of possible passwords.

Unfortunately the only secure way to encrypt passwords when UNIX came into being was based on DES, the Data Encryption Standard. This was not such a problem for users resident in the US, but since the source code for DES could not be exported outside the US, FreeBSD had to find a way to both comply with US law and retain compatibility with all the other UNIX variants that still used DES.

The solution was to divide up the encryption libraries so that US users could install the DES libraries and use DES but international users still had an encryption method that could be exported abroad. This is how FreeBSD came to

use MD5 as its default encryption method. MD5 is believed to be more secure than DES, so installing DES is offered primarily for compatibility reasons.

### 15.4.1 Recognizing Your Crypt Mechanism

Currently the library supports DES, MD5 and Blowfish hash functions. By default FreeBSD uses MD5 to encrypt passwords.

It is pretty easy to identify which encryption method FreeBSD is set up to use. Examining the encrypted passwords in the `/etc/master.passwd` file is one way. Passwords encrypted with the MD5 hash are longer than those encrypted with the DES hash and also begin with the characters `$1$`. Passwords starting with `$2a$` are encrypted with the Blowfish hash function. DES password strings do not have any particular identifying characteristics, but they are shorter than MD5 passwords, and are coded in a 64-character alphabet which does not include the `$` character, so a relatively short string which does not begin with a dollar sign is very likely a DES password.

The password format used for new passwords is controlled by the `passwd_format` login capability in `/etc/login.conf`, which takes values of `des`, `md5` or `b1f`. See the `login.conf(5)` manual page for more information about login capabilities.

## 15.5 One-time Passwords

By default, FreeBSD includes support for OPIE (One-time Passwords In Everything), which uses the MD5 hash by default.

There are three different sorts of passwords which we will discuss below. The first is your usual UNIX style or Kerberos password; we will call this a “UNIX password”. The second sort is the one-time password which is generated by the OPIE `opiekey(1)` program and accepted by the `opiepasswd(1)` program and the login prompt; we will call this a “one-time password”. The final sort of password is the secret password which you give to the `opiekey` program (and sometimes the `opiepasswd` programs) which it uses to generate one-time passwords; we will call it a “secret password” or just unqualified “password”.

The secret password does not have anything to do with your UNIX password; they can be the same but this is not recommended. OPIE secret passwords are not limited to 8 characters like old UNIX passwords<sup>1</sup>, they can be as long as you like. Passwords of six or seven word long phrases are fairly common. For the most part, the OPIE system operates completely independently of the UNIX password system.

Besides the password, there are two other pieces of data that are important to OPIE. One is what is known as the “seed” or “key”, consisting of two letters and five digits. The other is what is called the “iteration count”, a number between 1 and 100. OPIE creates the one-time password by concatenating the seed and the secret password, then applying the MD5 hash as many times as specified by the iteration count and turning the result into six short English words. These six English words are your one-time password. The authentication system (primarily PAM) keeps track of the last one-time password used, and the user is authenticated if the hash of the user-provided password is equal to the previous password. Because a one-way hash is used it is impossible to generate future one-time passwords if a successfully used password is captured; the iteration count is decremented after each successful login to keep the user and the login program in sync. When the iteration count gets down to 1, OPIE must be reinitialized.

There are a few programs involved in each system which we will discuss below. The `opiekey` program accepts an iteration count, a seed, and a secret password, and generates a one-time password or a consecutive list of one-time passwords. The `opiepasswd` program is used to initialize OPIE, and to change passwords, iteration counts, or seeds; it takes either a secret passphrase, or an iteration count, seed, and a one-time password. The `opieinfo` program will

examine the relevant credentials files (`/etc/opiekeys`) and print out the invoking user's current iteration count and seed.

There are four different sorts of operations we will cover. The first is using `opiepasswd` over a secure connection to set up one-time-passwords for the first time, or to change your password or seed. The second operation is using `opiepasswd` over an insecure connection, in conjunction with `opiekey` over a secure connection, to do the same. The third is using `opiekey` to log in over an insecure connection. The fourth is using `opiekey` to generate a number of keys which can be written down or printed out to carry with you when going to some location without secure connections to anywhere.

### 15.5.1 Secure Connection Initialization

To initialize OPIE for the first time, execute the `opiepasswd` command:

```
% opiepasswd -c
[grimreaper] ~ $ opiepasswd -f -c
Adding unfurl:
Only use this method from the console; NEVER from remote. If you are using
telnet, xterm, or a dial-in, type ^C now or exit with no password.
Then run opiepasswd without the -c parameter.
Using MD5 to compute responses.
Enter new secret pass phrase:
Again new secret pass phrase:
ID unfurl OTP key is 499 to4268
MOS MALL GOAT ARM AVID COED
```

At the `Enter new secret pass phrase:` or `Enter secret password:` prompts, you should enter a password or phrase. Remember, this is not the password that you will use to login with, this is used to generate your one-time login keys. The "ID" line gives the parameters of your particular instance: your login name, the iteration count, and seed. When logging in the system will remember these parameters and present them back to you so you do not have to remember them. The last line gives the particular one-time password which corresponds to those parameters and your secret password; if you were to re-login immediately, this one-time password is the one you would use.

### 15.5.2 Insecure Connection Initialization

To initialize or change your secret password over an insecure connection, you will need to already have a secure connection to some place where you can run `opiekey`; this might be in the form of a shell prompt on a machine you trust. You will also need to make up an iteration count (100 is probably a good value), and you may make up your own seed or use a randomly-generated one. Over on the insecure connection (to the machine you are initializing), use `opiepasswd`:

```
% opiepasswd

Updating unfurl:
You need the response from an OTP generator.
Old secret pass phrase:
    otp-md5 498 to4268 ext
    Response: GAME GAG WELT OUT DOWN CHAT
New secret pass phrase:
    otp-md5 499 to4269
```

```
Response: LINE PAP MILK NELL BUOY TROY
```

```
ID mark OTP key is 499 gr4269
LINE PAP MILK NELL BUOY TROY
```

To accept the default seed press **Return**. Then before entering an access password, move over to your secure connection and give it the same parameters:

```
% opiekey 498 to4268
Using the MD5 algorithm to compute response.
Reminder: Don't use opiekey from telnet or dial-in sessions.
Enter secret pass phrase:
GAME GAG WELT OUT DOWN CHAT
```

Now switch back over to the insecure connection, and copy the one-time password generated over to the relevant program.

### 15.5.3 Generating a Single One-time Password

Once you have initialized OPIE and login, you will be presented with a prompt like this:

```
% telnet example.com
Trying 10.0.0.1...
Connected to example.com
Escape character is '^]'.

FreeBSD/i386 (example.com) (ttya)

login: <username>
otp-md5 498 gr4269 ext
Password:
```

As a side note, the OPIE prompts have a useful feature (not shown here): if you press **Return** at the password prompt, the prompter will turn echo on, so you can see what you are typing. This can be extremely useful if you are attempting to type in a password by hand, such as from a printout.

At this point you need to generate your one-time password to answer this login prompt. This must be done on a trusted system that you can run `opiekey` on. (There are versions of these for DOS, Windows and Mac OS as well.) They need the iteration count and the seed as command line options. You can cut-and-paste these right from the login prompt on the machine that you are logging in to.

On the trusted system:

```
% opiekey 498 to4268
Using the MD5 algorithm to compute response.
Reminder: Don't use opiekey from telnet or dial-in sessions.
Enter secret pass phrase:
GAME GAG WELT OUT DOWN CHAT
```

Now that you have your one-time password you can continue logging in.

### 15.5.4 Generating Multiple One-time Passwords

Sometimes you have to go places where you do not have access to a trusted machine or secure connection. In this case, it is possible to use the `opiekey` command to generate a number of one-time passwords beforehand to be printed out and taken with you. For example:

```
% opiekey -n 5 30 zz99999
Using the MD5 algorithm to compute response.
Reminder: Don't use opiekey from telnet or dial-in sessions.
Enter secret pass phrase: <secret password>
26: JOAN BORE FOSS DES NAY QUIT
27: LATE BIAS SLAY FOLK MUCH TRIG
28: SALT TIN ANTI LOON NEAL USE
29: RIO ODIN GO BYE FURY TIC
30: GREW JIVE SAN GIRD BOIL PHI
```

The `-n 5` requests five keys in sequence, the `30` specifies what the last iteration number should be. Note that these are printed out in *reverse* order of eventual use. If you are really paranoid, you might want to write the results down by hand; otherwise you can cut-and-paste into `lpr`. Note that each line shows both the iteration count and the one-time password; you may still find it handy to scratch off passwords as you use them.

### 15.5.5 Restricting Use of UNIX Passwords

OPIE can restrict the use of UNIX passwords based on the IP address of a login session. The relevant file is `/etc/opieaccess`, which is present by default. Please check `opieaccess(5)` for more information on this file and which security considerations you should be aware of when using it.

Here is a sample `opieaccess` file:

```
permit 192.168.0.0 255.255.0.0
```

This line allows users whose IP source address (which is vulnerable to spoofing) matches the specified value and mask, to use UNIX passwords at any time.

If no rules in `opieaccess` are matched, the default is to deny non-OPIE logins.

## 15.6 TCP Wrappers

*Written by: Tom Rhodes.*

Anyone familiar with `inetd(8)` has probably heard of TCP Wrappers at some point. But few individuals seem to fully comprehend its usefulness in a network environment. It seems that everyone wants to install a firewall to handle network connections. While a firewall has a wide variety of uses, there are some things that a firewall not handle such as sending text back to the connection originator. The TCP software does this and much more. In the next few sections many of the TCP Wrappers features will be discussed, and, when applicable, example configuration lines will be provided.

The TCP Wrappers software extends the abilities of `inetd` to provide support for every server daemon under its control. Using this method it is possible to provide logging support, return messages to connections, permit a daemon

to only accept internal connections, etc. While some of these features can be provided by implementing a firewall, this will add not only an extra layer of protection but go beyond the amount of control a firewall can provide.

The added functionality of TCP Wrappers should not be considered a replacement for a good firewall. TCP Wrappers can be used in conjunction with a firewall or other security enhancements though and it can serve nicely as an extra layer of protection for the system.

Since this is an extension to the configuration of `inetd`, the reader is expected have read the `inetd` configuration section.

**Óçìàßùóç:** While programs run by `inetd(8)` are not exactly “daemons”, they have traditionally been called daemons. This is the term we will use in this section too.

### 15.6.1 Initial Configuration

The only requirement of using TCP Wrappers in FreeBSD is to ensure the `inetd` server is started from `rc.conf` with the `-ww` option; this is the default setting. Of course, proper configuration of `/etc/hosts.allow` is also expected, but `syslogd(8)` will throw messages in the system logs in these cases.

**Óçìàßùóç:** Unlike other implementations of TCP Wrappers, the use of `hosts.deny` has been deprecated. All configuration options should be placed in `/etc/hosts.allow`.

In the simplest configuration, daemon connection policies are set to either be permitted or blocked depending on the options in `/etc/hosts.allow`. The default configuration in FreeBSD is to allow a connection to every daemon started with `inetd`. Changing this will be discussed only after the basic configuration is covered.

Basic configuration usually takes the form of `daemon : address : action`. Where `daemon` is the daemon name which `inetd` started. The `address` can be a valid hostname, an IP address or an IPv6 address enclosed in brackets (`[]`). The `action` field can be either `allow` or `deny` to grant or deny access appropriately. Keep in mind that configuration works off a first rule match semantic, meaning that the configuration file is scanned in ascending order for a matching rule. When a match is found the rule is applied and the search process will halt.

Several other options exist but they will be explained in a later section. A simple configuration line may easily be constructed from that information alone. For example, to allow POP3 connections via the `mail/qpopper` daemon, the following lines should be appended to `hosts.allow`:

```
# This line is required for POP3 connections:
qpopper : ALL : allow
```

After adding this line, `inetd` will need restarted. This can be accomplished by use of the `kill(1)` command, or with the `restart` parameter with `/etc/rc.d/inetd`.

### 15.6.2 Advanced Configuration

TCP Wrappers has advanced options too; they will allow for more control over the way connections are handled. In some cases it may be a good idea to return a comment to certain hosts or daemon connections. In other cases, perhaps a log file should be recorded or an email sent to the administrator. Other situations may require the use of a service

for local connections only. This is all possible through the use of configuration options known as wildcards, expansion characters and external command execution. The next two sections are written to cover these situations.

### 15.6.2.1 External Commands

Suppose that a situation occurs where a connection should be denied yet a reason should be sent to the individual who attempted to establish that connection. How could it be done? That action can be made possible by using the `twist` option. When a connection attempt is made, `twist` will be called to execute a shell command or script. An example already exists in the `hosts.allow` file:

```
# The rest of the daemons are protected.
ALL : ALL \
    : severity auth.info \
    : twist /bin/echo "You are not welcome to use %d from %h."
```

This example shows that the message, “You are not allowed to use daemon from hostname.” will be returned for any daemon not previously configured in the access file. This is extremely useful for sending a reply back to the connection initiator right after the established connection is dropped. Note that any message returned *must* be wrapped in quote “ characters; there are no exceptions to this rule.

**ÐñiâéäïðiÞçóç:** It may be possible to launch a denial of service attack on the server if an attacker, or group of attackers could flood these daemons with connection requests.

Another possibility is to use the `spawn` option in these cases. Like `twist`, the `spawn` implicitly denies the connection and may be used to run external shell commands or scripts. Unlike `twist`, `spawn` will not send a reply back to the individual who established the connection. For an example, consider the following configuration line:

```
# We do not allow connections from example.com:
ALL : .example.com \
    : spawn (/bin/echo %a from %h attempted to access %d >> \
    /var/log/connections.log) \
    : deny
```

This will deny all connection attempts from the `*.example.com` domain; simultaneously logging the hostname, IP address and the daemon which they attempted to access in the `/var/log/connections.log` file.

Aside from the already explained substitution characters above, e.g. `%a`, a few others exist. See the `hosts_access(5)` manual page for the complete list.

### 15.6.2.2 Wildcard Options

Thus far the `ALL` example has been used continuously throughout the examples. Other options exist which could extend the functionality a bit further. For instance, `ALL` may be used to match every instance of either a daemon, domain or an IP address. Another wildcard available is `PARANOID` which may be used to match any host which provides an IP address that may be forged. In other words, `paranoid` may be used to define an action to be taken whenever a connection is made from an IP address that differs from its hostname. The following example may shed some more light on this discussion:

```
# Block possibly spoofed requests to sendmail:
```

```
sendmail : PARANOID : deny
```

In that example all connection requests to `sendmail` which have an IP address that varies from its hostname will be denied.

**Ðñïóí ÷ þ:** Using the `PARANOID` may severely cripple servers if the client or server has a broken DNS setup. Administrator discretion is advised.

To learn more about wildcards and their associated functionality, see the `hosts_access(5)` manual page.

Before any of the specific configuration lines above will work, the first configuration line should be commented out in `hosts.allow`. This was noted at the beginning of this section.

## 15.7 KerberosIV

*Contributed by Mark Murray. Based on a contribution by Mark Dapoz.*

Kerberos is a network add-on system/protocol that allows users to authenticate themselves through the services of a secure server. Services such as remote login, remote copy, secure inter-system file copying and other high-risk tasks are made considerably safer and more controllable.

The following instructions can be used as a guide on how to set up Kerberos as distributed for FreeBSD. However, you should refer to the relevant manual pages for a complete description.

### 15.7.1 Installing KerberosIV

Kerberos is an optional component of FreeBSD. The easiest way to install this software is by selecting the `krb4` or `krb5` distribution in `sysinstall` during the initial installation of FreeBSD. This will install the “eBones” (KerberosIV) or “Heimdal” (Kerberos5) implementation of Kerberos. These implementations are included because they are developed outside the USA/Canada and were thus available to system owners outside those countries during the era of restrictive export controls on cryptographic code from the USA.

Alternatively, the MIT implementation of Kerberos is available from the Ports Collection as `security/krb5`.

### 15.7.2 Creating the Initial Database

This is done on the Kerberos server only. First make sure that you do not have any old Kerberos databases around. You should change to the directory `/etc/kerberosIV` and check that only the following files are present:

```
# cd /etc/kerberosIV
# ls
README      krb.conf      krb.realms
```

If any additional files (such as `principal.*` or `master_key`) exist, then use the `kdb_destroy` command to destroy the old Kerberos database, or if Kerberos is not running, simply delete the extra files.

You should now edit the `krb.conf` and `krb.realms` files to define your Kerberos realm. In this case the realm will be `EXAMPLE.COM` and the server is `grunt.example.com`. We edit or create the `krb.conf` file:

```
# cat krb.conf
EXAMPLE.COM
EXAMPLE.COM grunt.example.com admin server
CS.BERKELEY.EDU okeeffe.berkeley.edu
ATHENA/MIT.EDU kerberos.mit.edu
ATHENA/MIT.EDU kerberos-1.mit.edu
ATHENA/MIT.EDU kerberos-2.mit.edu
ATHENA/MIT.EDU kerberos-3.mit.edu
LCS/MIT.EDU kerberos.lcs.mit.edu
TELECOM/MIT.EDU bitsy.mit.edu
ARC.NASA.GOV trident.arc.nasa.gov
```

In this case, the other realms do not need to be there. They are here as an example of how a machine may be made aware of multiple realms. You may wish to not include them for simplicity.

The first line names the realm in which this system works. The other lines contain realm/host entries. The first item on a line is a realm, and the second is a host in that realm that is acting as a “key distribution center”. The words `admin server` following a host’s name means that host also provides an administrative database server. For further explanation of these terms, please consult the Kerberos manual pages.

Now we have to add `grunt.example.com` to the `EXAMPLE.COM` realm and also add an entry to put all hosts in the `.example.com` domain in the `EXAMPLE.COM` realm. The `krb.realms` file would be updated as follows:

```
# cat krb.realms
grunt.example.com EXAMPLE.COM
.example.com EXAMPLE.COM
.berkeley.edu CS.BERKELEY.EDU
.MIT.EDU ATHENA/MIT.EDU
.mit.edu ATHENA/MIT.EDU
```

Again, the other realms do not need to be there. They are here as an example of how a machine may be made aware of multiple realms. You may wish to remove them to simplify things.

The first line puts the *specific* system into the named realm. The rest of the lines show how to default systems of a particular subdomain to a named realm.

Now we are ready to create the database. This only needs to run on the Kerberos server (or Key Distribution Center). Issue the `kdb_init` command to do this:

```
# kdb_init
Realm name [default ATHENA/MIT.EDU ]: EXAMPLE.COM
You will be prompted for the database Master Password.
It is important that you NOT FORGET this password.
```

Enter Kerberos master key:

Now we have to save the key so that servers on the local machine can pick it up. Use the `kstash` command to do this:

```
# kstash
```

Enter Kerberos master key:

Current Kerberos master key version is 1.

Master key entered. BEWARE!

This saves the encrypted master password in /etc/kerberosIV/master\_key.

### 15.7.3 Making It All Run

Two principals need to be added to the database for *each* system that will be secured with Kerberos. Their names are **kpasswd** and **rcmd**. These two principals are made for each system, with the instance being the name of the individual system.

These daemons, **kpasswd** and **rcmd** allow other systems to change Kerberos passwords and run commands like **rcp(1)**, **rlogin(1)** and **rsh(1)**.

Now let us add these entries:

```
# kdb_edit
Opening database...

Enter Kerberos master key:

Current Kerberos master key version is 1.

Master key entered. BEWARE!
Previous or default values are in [brackets] ,
enter return to leave the same, or new value.

Principal name: passwd
Instance: grunt

<Not found>, Create [y] ? y

Principal: passwd, Instance: grunt, kdc_key_ver: 1
New Password:           <---- enter RANDOM here
Verifying password

New Password: <---- enter RANDOM here

Random password [y] ? y

Principal's new key version = 1
Expiration date (enter yyyy-mm-dd) [ 2000-01-01 ] ?
Max ticket lifetime (*5 minutes) [ 255 ] ?
Attributes [ 0 ] ?
Edit O.K.

Principal name: rcmd
Instance: grunt

<Not found>, Create [y] ?

Principal: rcmd, Instance: grunt, kdc_key_ver: 1
New Password:           <---- enter RANDOM here
```

Verifying password

```
New Password:           <---- enter RANDOM here

Random password [y] ?

Principal's new key version = 1
Expiration date (enter yyyy-mm-dd) [ 2000-01-01 ] ?
Max ticket lifetime (*5 minutes) [ 255 ] ?
Attributes [ 0 ] ?
Edit O.K.

Principal name:       <---- null entry here will cause an exit
```

#### 15.7.4 Creating the Server File

We now have to extract all the instances which define the services on each machine. For this we use the `ext_srvtab` command. This will create a file which must be copied or moved *by secure means* to each Kerberos client's `/etc` directory. This file must be present on each server and client, and is crucial to the operation of Kerberos.

```
# ext_srvtab grunt
Enter Kerberos master key:

Current Kerberos master key version is 1.

Master key entered. BEWARE!
Generating 'grunt-new-srvtab'....
```

Now, this command only generates a temporary file which must be renamed to `srvtab` so that all the servers can pick it up. Use the `mv(1)` command to move it into place on the original system:

```
# mv grunt-new-srvtab srvtab
```

If the file is for a client system, and the network is not deemed safe, then copy the `client-new-srvtab` to removable media and transport it by secure physical means. Be sure to rename it to `srvtab` in the client's `/etc` directory, and make sure it is mode 600:

```
# mv grumble-new-srvtab srvtab
# chmod 600 srvtab
```

#### 15.7.5 Populating the Database

We now have to add some user entries into the database. First let us create an entry for the user `jane`. Use the `kdb_edit` command to do this:

```
# kdb_edit
Opening database...

Enter Kerberos master key:

Current Kerberos master key version is 1.
```

```
Master key entered. BEWARE!
Previous or default values are in [brackets] ,
enter return to leave the same, or new value.
```

```
Principal name: jane
```

```
Instance:
```

```
<Not found>, Create [y] ? y
```

```
Principal: jane, Instance: , kdc_key_ver: 1
New Password: <---- enter a secure password here
Verifying password
```

```
New Password: <---- re-enter the password here
```

```
Principal's new key version = 1
```

```
Expiration date (enter yyyy-mm-dd) [ 2000-01-01 ] ?
```

```
Max ticket lifetime (*5 minutes) [ 255 ] ?
```

```
Attributes [ 0 ] ?
```

```
Edit O.K.
```

```
Principal name: <---- null entry here will cause an exit
```

## 15.7.6 Testing It All Out

First we have to start the Kerberos daemons. Note that if you have correctly edited your /etc/rc.conf then this will happen automatically when you reboot. This is only necessary on the Kerberos server. Kerberos clients will automatically get what they need from the /etc/kerberosIV directory.

```
# kerberos &
Kerberos server starting
Sleep forever on error
Log file is /var/log/kerberos.log
Current Kerberos master key version is 1.
```

```
Master key entered. BEWARE!
```

```
Current Kerberos master key version is 1
Local realm: EXAMPLE.COM
# kadmind -n &
KADM Server KADM0.0A initializing
Please do not use 'kill -9' to kill this job, use a
regular kill instead
```

```
Current Kerberos master key version is 1.
```

```
Master key entered. BEWARE!
```

Now we can try using the kinit command to get a ticket for the ID jane that we created above:

```
% kinit jane
MIT Project Athena (grunt.example.com)
Kerberos Initialization for "jane"
```

Password:

Try listing the tokens using `klist` to see if we really have them:

```
% klist
Ticket file:      /tmp/tkt245
Principal:        jane@EXAMPLE.COM

      Issued          Expires          Principal
Apr 30 11:23:22  Apr 30 19:23:22  krbtgt.EXAMPLE.COM@EXAMPLE.COM
```

Now try changing the password using `passwd(1)` to check if the `kpasswd` daemon can get authorization to the Kerberos database:

```
% passwd
realm EXAMPLE.COM
Old password for jane:
New Password for jane:
Verifying password
New Password for jane:
Password changed.
```

### 15.7.7 Adding su Privileges

Kerberos allows us to give *each* user who needs `root` privileges their own *separate* `su(1)` password. We could now add an ID which is authorized to `su(1)` to `root`. This is controlled by having an instance of `root` associated with a principal. Using `kdb_edit` we can create the entry `jane.root` in the Kerberos database:

```
# kdb_edit
Opening database...

Enter Kerberos master key:

Current Kerberos master key version is 1.

Master key entered. BEWARE!
Previous or default values are in [brackets] ,
enter return to leave the same, or new value.

Principal name: jane
Instance: root

<Not found>, Create [y] ? y

Principal: jane, Instance: root, kdc_key_ver: 1
New Password:                                     <---- enter a SECURE password here
Verifying password

New Password:                                     <---- re-enter the password here

Principal's new key version = 1
Expiration date (enter yyyy-mm-dd) [ 2000-01-01 ] ?
```

```
Max ticket lifetime (*5 minutes) [ 255 ] ? 12 <--- Keep this short!
Attributes [ 0 ] ?
Edit O.K.
Principal name:           <---- null entry here will cause an exit
```

Now try getting tokens for it to make sure it works:

```
# kinit jane.root
MIT Project Athena (grunt.example.com)
Kerberos Initialization for "jane.root"
Password:
```

Now we need to add the user to root's .klogin file:

```
# cat /root/.klogin
jane.root@EXAMPLE.COM
```

Now try doing the su(1):

```
% su
Password:
```

and take a look at what tokens we have:

```
# klist
Ticket file:      /tmp/tkt_root_245
Principal:        jane.root@EXAMPLE.COM

Issued          Expires          Principal
May  2 20:43:12 May  3 04:43:12 krbtgt.EXAMPLE.COM@EXAMPLE.COM
```

### 15.7.8 Using Other Commands

In an earlier example, we created a principal called `jane` with an instance `root`. This was based on a user with the same name as the principal, and this is a Kerberos default; that a `<principal>. <instance>` of the form `<username>.root` will allow that `<username>` to `su(1)` to `root` if the necessary entries are in the `.klogin` file in `root`'s home directory:

```
# cat /root/.klogin
jane.root@EXAMPLE.COM
```

Likewise, if a user has in their own home directory lines of the form:

```
% cat ~/.klogin
jane@EXAMPLE.COM
jack@EXAMPLE.COM
```

This allows anyone in the EXAMPLE.COM realm who has authenticated themselves as `jane` or `jack` (via `kinit`, see above) to access to `jane`'s account or files on this system (`grunt`) via `rlogin(1)`, `rsh(1)` or `rcp(1)`.

For example, `jane` now logs into another system using Kerberos:

```
% kinit
```

```
MIT Project Athena (grunt.example.com)
Password:
% rlogin grunt
Last login: Mon May  1 21:14:47 from grumble
Copyright (c) 1980, 1983, 1986, 1988, 1990, 1991, 1993, 1994
      The Regents of the University of California. All rights reserved.
```

FreeBSD BUILT-19950429 (GR386) #0: Sat Apr 29 17:50:09 SAT 1995

Or jack logs into jane's account on the same machine (jane having set up the .klogin file as above, and the person in charge of Kerberos having set up principal *jack* with a null instance):

```
% kinit
% rlogin grunt -l jane
MIT Project Athena (grunt.example.com)
Password:
Last login: Mon May  1 21:16:55 from grumble
Copyright (c) 1980, 1983, 1986, 1988, 1990, 1991, 1993, 1994
      The Regents of the University of California. All rights reserved.
FreeBSD BUILT-19950429 (GR386) #0: Sat Apr 29 17:50:09 SAT 1995
```

## 15.8 Kerberos5

*Contributed by Tillman Hodgson. Based on a contribution by Mark Murray.*

Every FreeBSD release beyond FreeBSD-5.1 includes support only for **Kerberos5**. Hence **Kerberos5** is the only version included, and its configuration is similar in many aspects to that of **KerberosIV**. The following information only applies to **Kerberos5** in post FreeBSD-5.0 releases. Users who wish to use the **KerberosIV** package may install the `security/krb4` port.

**Kerberos** is a network add-on system/protocol that allows users to authenticate themselves through the services of a secure server. Services such as remote login, remote copy, secure inter-system file copying and other high-risk tasks are made considerably safer and more controllable.

**Kerberos** can be described as an identity-verifying proxy system. It can also be described as a trusted third-party authentication system. **Kerberos** provides only one function — the secure authentication of users on the network. It does not provide authorization functions (what users are allowed to do) or auditing functions (what those users did). After a client and server have used **Kerberos** to prove their identity, they can also encrypt all of their communications to assure privacy and data integrity as they go about their business.

Therefore it is highly recommended that **Kerberos** be used with other security methods which provide authorization and audit services.

The following instructions can be used as a guide on how to set up **Kerberos** as distributed for FreeBSD. However, you should refer to the relevant manual pages for a complete description.

For purposes of demonstrating a **Kerberos** installation, the various name spaces will be handled as follows:

- The DNS domain (“zone”) will be example.org.
- The **Kerberos** realm will be EXAMPLE.ORG.

**Óçìâßùóç:** Please use real domain names when setting up **Kerberos** even if you intend to run it internally. This avoids DNS problems and assures inter-operation with other **Kerberos** realms.

## 15.8.1 History

**Kerberos** was created by MIT as a solution to network security problems. The **Kerberos** protocol uses strong cryptography so that a client can prove its identity to a server (and vice versa) across an insecure network connection.

**Kerberos** is both the name of a network authentication protocol and an adjective to describe programs that implement the program (**Kerberos** telnet, for example). The current version of the protocol is version 5, described in RFC 1510.

Several free implementations of this protocol are available, covering a wide range of operating systems. The Massachusetts Institute of Technology (MIT), where **Kerberos** was originally developed, continues to develop their **Kerberos** package. It is commonly used in the US as a cryptography product, as such it has historically been affected by US export regulations. The MIT **Kerberos** is available as a port (`security/krb5`). Heimdal **Kerberos** is another version 5 implementation, and was explicitly developed outside of the US to avoid export regulations (and is thus often included in non-commercial UNIX variants). The Heimdal **Kerberos** distribution is available as a port (`security/heimdal`), and a minimal installation of it is included in the base FreeBSD install.

In order to reach the widest audience, these instructions assume the use of the Heimdal distribution included in FreeBSD.

## 15.8.2 Setting up a Heimdal KDC

The Key Distribution Center (KDC) is the centralized authentication service that **Kerberos** provides — it is the computer that issues **Kerberos** tickets. The KDC is considered “trusted” by all other computers in the **Kerberos** realm, and thus has heightened security concerns.

Note that while running the **Kerberos** server requires very few computing resources, a dedicated machine acting only as a KDC is recommended for security reasons.

To begin setting up a KDC, ensure that your `/etc/rc.conf` file contains the correct settings to act as a KDC (you may need to adjust paths to reflect your own system):

```
kerberos5_server_enable="YES"
kadm5_server_enable="YES"
```

Next we will set up your **Kerberos** config file, `/etc/krb5.conf`:

```
[libdefaults]
    default_realm = EXAMPLE.ORG
[realms]
    EXAMPLE.ORG = {
        kdc = kerberos.example.org
        admin_server = kerberos.example.org
    }
[domain_realm]
    .example.org = EXAMPLE.ORG
```

Note that this `/etc/krb5.conf` file implies that your KDC will have the fully-qualified hostname of `kerberos.example.org`. You will need to add a CNAME (alias) entry to your zone file to accomplish this if your KDC has a different hostname.

**Óçìàßùóć:** For large networks with a properly configured BIND DNS server, the above example could be trimmed to:

```
[libdefaults]
    default_realm = EXAMPLE.ORG
```

With the following lines being appended to the `example.org` zonefile:

```
_kerberos._udp      IN  SRV      01 00 88 kerberos.example.org.
_kerberos._tcp      IN  SRV      01 00 88 kerberos.example.org.
_kpasswd._udp       IN  SRV      01 00 464 kerberos.example.org.
_kerberos-adm._tcp IN  SRV      01 00 749 kerberos.example.org.
_kerberos          IN  TXT      EXAMPLE.ORG
```

**Óçìàßùóć:** For clients to be able to find the **Kerberos** services, you *must* have either a fully configured `/etc/krb5.conf` or a minimally configured `/etc/krb5.conf` *and* a properly configured DNS server.

Next we will create the **Kerberos** database. This database contains the keys of all principals encrypted with a master password. You are not required to remember this password, it will be stored in a file (`/var/heimdal/m-key`). To create the master key, run `kstash` and enter a password.

Once the master key has been created, you can initialize the database using the `kadmin` program with the `-l` option (standing for “local”). This option instructs `kadmin` to modify the database files directly rather than going through the `kadmind` network service. This handles the chicken-and-egg problem of trying to connect to the database before it is created. Once you have the `kadmin` prompt, use the `init` command to create your realms initial database.

Lastly, while still in `kadmin`, create your first principal using the `add` command. Stick to the defaults options for the principal for now, you can always change them later with the `modify` command. Note that you can use the `?` command at any prompt to see the available options.

A sample database creation session is shown below:

```
# kstash
Master key: *****
Verifying password - Master key: *****

# kadmin -l
kadmin> init EXAMPLE.ORG
Realm max ticket life [unlimited]:
kadmin> add tillman
Max ticket life [unlimited]:
Max renewable life [unlimited]:
Attributes []:
Password: *****
Verifying password - Password: *****
```

Now it is time to start up the KDC services. Run `/etc/rc.d/kerberos start` and `/etc/rc.d/kadmind start` to bring up the services. Note that you will not have any kerberized daemons running at this point but you should be able to confirm the that the KDC is functioning by obtaining and listing a ticket for the principal (user) that you just created from the command-line of the KDC itself:

```
% kinit tillman
tillman@EXAMPLE.ORG's Password:

% klist
Credentials cache: FILE:/tmp/krb5cc_500
Principal: tillman@EXAMPLE.ORG

Issued           Expires           Principal
Aug 27 15:37:58 Aug 28 01:37:58 krbtgt/EXAMPLE.ORG@EXAMPLE.ORG
```

The ticket can then be revoked when you have finished:

```
% k5destroy
```

### 15.8.3 Kerberos enabling a server with Heimdal services

First, we need a copy of the **Kerberos** configuration file, `/etc/krb5.conf`. To do so, simply copy it over to the client computer from the KDC in a secure fashion (using network utilities, such as `scp(1)`, or physically via a floppy disk).

Next you need a `/etc/krb5.keytab` file. This is the major difference between a server providing **Kerberos** enabled daemons and a workstation — the server must have a `keytab` file. This file contains the server's host key, which allows it and the KDC to verify each others identity. It must be transmitted to the server in a secure fashion, as the security of the server can be broken if the key is made public. This explicitly means that transferring it via a clear text channel, such as `FTP`, is a very bad idea.

Typically, you transfer to the `keytab` to the server using the `kadmin` program. This is handy because you also need to create the host principal (the KDC end of the `krb5.keytab`) using `kadmin`.

Note that you must have already obtained a ticket and that this ticket must be allowed to use the `kadmin` interface in the `kadmind.acl`. See the section titled “Remote administration” in the Heimdal info pages (`info heimdal`) for details on designing access control lists. If you do not want to enable remote `kadmin` access, you can simply securely connect to the KDC (via local console, `ssh(1)` or **Kerberos** `telnet(1)`) and perform administration locally using `kadmin -l`.

After installing the `/etc/krb5.conf` file, you can use `kadmin` from the **Kerberos** server. The `add --random-key` command will let you add the server's host principal, and the `ext` command will allow you to extract the server's host principal to its own `keytab`. For example:

```
# kadmin
kadmin> add --random-key host/myserver.example.org
Max ticket life [unlimited]:
Max renewable life [unlimited]:
Attributes []:
kadmin> ext host/myserver.example.org
kadmin> exit
```

Note that the `ext` command (short for “extract”) stores the extracted key in `/etc/krb5.keytab` by default.

If you do not have `kadmind` running on the KDC (possibly for security reasons) and thus do not have access to `kadmin` remotely, you can add the host principal (`host/myserver.EXAMPLE.ORG`) directly on the KDC and then extract it to a temporary file (to avoid over-writing the `/etc/krb5.keytab` on the KDC) using something like this:

```
# kadmin
kadmin> ext --keytab=/tmp/example.keytab host/myserver.example.org
kadmin> exit
```

You can then securely copy the keytab to the server computer (using `scp` or a floppy, for example). Be sure to specify a non-default keytab name to avoid over-writing the keytab on the KDC.

At this point your server can communicate with the KDC (due to its `krb5.conf` file) and it can prove its own identity (due to the `krb5.keytab` file). It is now ready for you to enable some **Kerberos** services. For this example we will enable the `telnet` service by putting a line like this into your `/etc/inetd.conf` and then restarting the `inetd(8)` service with `/etc/rc.d/inetd restart`:

```
telnet    stream  tcp      nowait  root    /usr/libexec/telnetd  telnetd -a user
```

The critical bit is that the `-a` (for authentication) type is set to `user`. Consult the `telnetd(8)` manual page for more details.

### 15.8.4 Kerberos enabling a client with Heimdal

Setting up a client computer is almost trivially easy. As far as **Kerberos** configuration goes, you only need the **Kerberos** configuration file, located at `/etc/krb5.conf`. Simply securely copy it over to the client computer from the KDC.

Test your client computer by attempting to use `kinit`, `klist`, and `kdestroy` from the client to obtain, show, and then delete a ticket for the principal you created above. You should also be able to use **Kerberos** applications to connect to **Kerberos** enabled servers, though if that does not work and obtaining a ticket does the problem is likely with the server and not with the client or the KDC.

When testing an application like `telnet`, try using a packet sniffer (such as `tcpdump(1)`) to confirm that your password is not sent in the clear. Try using `telnet` with the `-x` option, which encrypts the entire data stream (similar to `ssh`).

Various non-core **Kerberos** client applications are also installed by default. This is where the “minimal” nature of the base Heimdal installation is felt: `telnet` is the only **Kerberos** enabled service.

The Heimdal port adds some of the missing client applications: **Kerberos** enabled versions of `ftp`, `rsh`, `rcp`, `rlogin`, and a few other less common programs. The MIT port also contains a full suite of **Kerberos** client applications.

### 15.8.5 User configuration files: `.k5login` and `.k5users`

Users within a realm typically have their **Kerberos** principal (such as `tillman@EXAMPLE.ORG`) mapped to a local user account (such as a local account named `tillman`). Client applications such as `telnet` usually do not require a user name or a principal.

Occasionally, however, you want to grant access to a local user account to someone who does not have a matching **Kerberos** principal. For example, `tillman@EXAMPLE.ORG` may need access to the local user account `webdevelopers`. Other principals may also need access to that local account.

The `.k5login` and `.k5users` files, placed in a users home directory, can be used similar to a powerful combination of `.hosts` and `.rhosts`, solving this problem. For example, if a `.k5login` with the following contents:

```
tillman@example.org
jdoe@example.org
```

Were to be placed into the home directory of the local user `webdevelopers` then both principals listed would have access to that account without requiring a shared password.

Reading the manual pages for these commands is recommended. Note that the `ksu` manual page covers `.k5users`.

### 15.8.6 Kerberos Tips, Tricks, and Troubleshooting

- When using either the Heimdal or MIT **Kerberos** ports ensure that your `PATH` environment variable lists the **Kerberos** versions of the client applications before the system versions.
- Do all the computers in your realm have synchronized time settings? If not, authentication may fail. [ÓiPiá 30.10](#) describes how to synchronize clocks using NTP.
- MIT and Heimdal inter-operate nicely. Except for `kadmin`, the protocol for which is not standardized.
- If you change your hostname, you also need to change your host / principal and update your keytab. This also applies to special keytab entries like the `www/` principal used for Apache's `www/mod_auth_kerb`.
- All hosts in your realm must be resolvable (both forwards and reverse) in DNS (or `/etc/hosts` as a minimum). CNAMEs will work, but the A and PTR records must be correct and in place. The error message is not very intuitive: `Kerberos5 refuses authentication because Read req failed: Key table entry not found.`
- Some operating systems that may be acting as clients to your KDC do not set the permissions for `ksu` to be setuid `root`. This means that `ksu` does not work, which is a good security idea but annoying. This is not a KDC error.
- With MIT **Kerberos**, if you want to allow a principal to have a ticket life longer than the default ten hours, you must use `modify_principal` in `kadmin` to change the `maxlife` of both the principal in question and the `krbtgt` principal. Then the principal can use the `-l` option with `kinit` to request a ticket with a longer lifetime.
- 

**Óçìàßùóç:** If you run a packet sniffer on your KDC to add in troubleshooting and then run `kinit` from a workstation, you will notice that your TGT is sent immediately upon running `kinit` — even before you type your password! The explanation is that the **Kerberos** server freely transmits a TGT (Ticket Granting Ticket) to any unauthorized request; however, every TGT is encrypted in a key derived from the user's password. Therefore, when a user types their password it is not being sent to the KDC, it is being used to decrypt the TGT that `kinit` already obtained. If the decryption process results in a valid ticket with a valid time stamp, the user has valid **Kerberos** credentials. These credentials include a session key for establishing secure communications with the **Kerberos** server in the future, as well as the actual ticket-granting ticket, which is actually encrypted with the **Kerberos** server's own key. This second layer of encryption is unknown to the user, but it is what allows the **Kerberos** server to verify the authenticity of each TGT.

- If you want to use long ticket lifetimes (a week, for example) and you are using **OpenSSH** to connect to the machine where your ticket is stored, make sure that **Kerberos TicketCleanup** is set to `no` in your `sshd_config` or else your tickets will be deleted when you log out.
- Remember that host principals can have a longer ticket lifetime as well. If your user principal has a lifetime of a week but the host you are connecting to has a lifetime of nine hours, you will have an expired host principal in your cache and the ticket cache will not work as expected.
- When setting up a `krb5.dict` file to prevent specific bad passwords from being used (the manual page for `kadmind` covers this briefly), remember that it only applies to principals that have a password policy assigned to them. The `krb5.dict` files format is simple: one string per line. Creating a symbolic link to `/usr/share/dict/words` might be useful.

### 15.8.7 Differences with the MIT port

The major difference between the MIT and Heimdal installs relates to the `kadmin` program which has a different (but equivalent) set of commands and uses a different protocol. This has a large implications if your KDC is MIT as you will not be able to use the Heimdal `kadmin` program to administer your KDC remotely (or vice versa, for that matter).

The client applications may also take slightly different command line options to accomplish the same tasks. Following the instructions on the MIT **Kerberos** web site (<http://web.mit.edu/Kerberos/www/>) is recommended. Be careful of path issues: the MIT port installs into `/usr/local/` by default, and the “normal” system applications may be run instead of MIT if your `PATH` environment variable lists the system directories first.

**Óçìàßùóç:** With the MIT `security/krb5` port that is provided by FreeBSD, be sure to read the `/usr/local/share/doc/krb5/README.FreeBSD` file installed by the port if you want to understand why logins via `telnetd` and `klogind` behave somewhat oddly. Most importantly, correcting the “incorrect permissions on cache file” behavior requires that the `login.krb5` binary be used for authentication so that it can properly change ownership for the forwarded credentials.

The `rc.conf` must also be modified to contain the following configuration:

```
kerberos5_server="/usr/local/sbin/krb5kdc"
kadmind5_server="/usr/local/sbin/kadmind"
kerberos5_server_enable="YES"
kadmind5_server_enable="YES"
```

This is done because the applications for MIT kerberos installs binaries in the `/usr/local` hierarchy.

## 15.8.8 Mitigating limitations found in Kerberos

### 15.8.8.1 Kerberos is an all-or-nothing approach

Every service enabled on the network must be modified to work with **Kerberos** (or be otherwise secured against network attacks) or else the users credentials could be stolen and re-used. An example of this would be **Kerberos** enabling all remote shells (via `rsh` and `telnet`, for example) but not converting the POP3 mail server which sends passwords in plain text.

### 15.8.8.2 Kerberos is intended for single-user workstations

In a multi-user environment, **Kerberos** is less secure. This is because it stores the tickets in the `/tmp` directory, which is readable by all users. If a user is sharing a computer with several other people simultaneously (i.e. multi-user), it is possible that the user's tickets can be stolen (copied) by another user.

This can be overcome with the `-c` filename command-line option or (preferably) the `KRB5CCNAME` environment variable, but this is rarely done. In principal, storing the ticket in the users home directory and using simple file permissions can mitigate this problem.

### 15.8.8.3 The KDC is a single point of failure

By design, the KDC must be as secure as the master password database is contained on it. The KDC should have absolutely no other services running on it and should be physically secured. The danger is high because **Kerberos** stores all passwords encrypted with the same key (the “master” key), which in turn is stored as a file on the KDC.

As a side note, a compromised master key is not quite as bad as one might normally fear. The master key is only used to encrypt the **Kerberos** database and as a seed for the random number generator. As long as access to your KDC is secure, an attacker cannot do much with the master key.

Additionally, if the KDC is unavailable (perhaps due to a denial of service attack or network problems) the network services are unusable as authentication can not be performed, a recipe for a denial-of-service attack. This can be alleviated with multiple KDCs (a single master and one or more slaves) and with careful implementation of secondary or fall-back authentication (PAM is excellent for this).

### 15.8.8.4 Kerberos Shortcomings

**Kerberos** allows users, hosts and services to authenticate between themselves. It does not have a mechanism to authenticate the KDC to the users, hosts or services. This means that a trojaned `kinit` (for example) could record all user names and passwords. Something like `security/tripwire` or other file system integrity checking tools can alleviate this.

## 15.8.9 Resources and further information

- The **Kerberos** FAQ (<http://www.faqs.org/faqs/Kerberos-faq/general/preamble.html>)
- Designing an Authentication System: a Dialog in Four Scenes (<http://web.mit.edu/Kerberos/www/dialogue.html>)

- RFC 1510, The **Kerberos** Network Authentication Service (V5) (<http://www.ietf.org/rfc/rfc1510.txt?number=1510>)
- MIT **Kerberos** home page (<http://web.mit.edu/Kerberos/www/>)
- Heimdal **Kerberos** home page (<http://www.pdc.kth.se/heimdal/>)

## 15.9 OpenSSL

*Written by: Tom Rhodes.*

One feature that many users overlook is the **OpenSSL** toolkit included in FreeBSD. **OpenSSL** provides an encryption transport layer on top of the normal communications layer; thus allowing it to be intertwined with many network applications and services.

Some uses of **OpenSSL** may include encrypted authentication of mail clients, web based transactions such as credit card payments and more. Many ports such as `www/apache13-ssl`, and `mail/sylpheed-claws` will offer compilation support for building with **OpenSSL**.

**Óçìåßùóç:** In most cases the Ports Collection will attempt to build the `security/openssl` port unless the `WITH_OPENSSL_BASE` make variable is explicitly set to "yes".

The version of **OpenSSL** included in FreeBSD supports Secure Sockets Layer v2/v3 (SSLv2/SSLv3), Transport Layer Security v1 (TLSv1) network security protocols and can be used as a general cryptographic library.

**Óçìåßùóç:** While **OpenSSL** supports the IDEA algorithm, it is disabled by default due to United States patents. To use it, the license should be reviewed and, if the restrictions are acceptable, the `MAKE_IDEA` variable must be set in `make.conf`.

One of the most common uses of **OpenSSL** is to provide certificates for use with software applications. These certificates ensure that the credentials of the company or individual are valid and not fraudulent. If the certificate in question has not been verified by one of the several "Certificate Authorities", or CAs, a warning is usually produced. A Certificate Authority is a company, such as VeriSign (<http://www.verisign.com>), which will sign certificates in order to validate credentials of individuals or companies. This process has a cost associated with it and is definitely not a requirement for using certificates; however, it can put some of the more paranoid users at ease.

### 15.9.1 Generating Certificates

To generate a certificate, the following command is available:

```
# openssl req -new -nodes -out req.pem -keyout cert.pem
Generating a 1024 bit RSA private key
.....+++++
.....+++++
writing new private key to 'cert.pem'
-----
You are about to be asked to enter information that will be incorporated
```

into your certificate request.

What you are about to enter is what is called a Distinguished Name or a DN.  
 There are quite a few fields but you can leave some blank  
 For some fields there will be a default value,  
 If you enter '.', the field will be left blank.

----

```
Country Name (2 letter code) [AU]:us
State or Province Name (full name) [Some-State]:PA
Locality Name (eg, city) []:Pittsburgh
Organization Name (eg, company) [Internet Widgits Pty Ltd]:My Company
Organizational Unit Name (eg, section) []:Systems Administrator
Common Name (eg, YOUR name) []:localhost.example.org
Email Address []:trhodes@FreeBSD.org
```

Please enter the following 'extra' attributes  
 to be sent with your certificate request  
 A challenge password []:SOME PASSWORD  
 An optional company name []:Another Name

Notice the response directly after the “Common Name” prompt shows a domain name. This prompt requires a server name to be entered for verification purposes; placing anything but a domain name would yield a useless certificate. Other options, for instance expire time, alternate encryption algorithms, etc. are available. A complete list may be obtained by viewing the `openssl(1)` manual page.

Two files should now exist in the directory in which the aforementioned command was issued. The certificate request, `req.pem`, may be sent to a certificate authority who will validate the credentials that you entered, sign the request and return the certificate to you. The second file created will be named `cert.pem` and is the private key for the certificate and should be protected at all costs; if this falls in the hands of others it can be used to impersonate you (or your server).

In cases where a signature from a CA is not required, a self signed certificate can be created. First, generate the RSA key:

```
# openssl dsaparam -rand -genkey -out myRSA.key 1024
```

Next, generate the CA key:

```
# openssl gendsa -des3 -out myca.key myRSA.key
```

Use this key to create the certificate:

```
# openssl req -new -x509 -days 365 -key myca.key -out new.crt
```

Two new files should appear in the directory: a certificate authority signature file, `myca.key` and the certificate itself, `new.crt`. These should be placed in a directory, preferably under `/etc`, which is readable only by `root`. Permissions of 0700 should be fine for this and they can be set with the `chmod` utility.

## 15.9.2 Using Certificates, an Example

So what can these files do? A good use would be to encrypt connections to the `Sendmail` MTA. This would dissolve the use of clear text authentication for users who send mail via the local MTA.

**Óçìàßùóç:** This is not the best use in the world as some MUAs will present the user with an error if they have not installed the certificate locally. Refer to the documentation included with the software for more information on certificate installation.

The following lines should be placed inside the local `.mc` file:

```
dnl SSL Options
define(`confCACERT_PATH', `/etc/certs')dnl
define(`confCACERT', `/etc/certs/new.crt')dnl
define(`confSERVER_CERT', `/etc/certs/new.crt')dnl
define(`confSERVER_KEY', `/etc/certs/myca.key')dnl
define(`confTLS_SRV_OPTIONS', 'V')dnl
```

Where `/etc/certs/` is the directory to be used for storing the certificate and key files locally. The last few requirements are a rebuild of the local `.cf` file. This is easily achieved by typing `make install` within the `/etc/mail` directory. Follow that up with `make restart` which should start the **Sendmail** daemon.

If all went well there will be no error messages in the `/var/log/maillog` file and **Sendmail** will show up in the process list.

For a simple test, simply connect to the mail server using the `telnet(1)` utility:

```
# telnet example.com 25
Trying 192.0.34.166...
Connected to example.com.
Escape character is '^].
220 example.com ESMTP Sendmail 8.12.10/8.12.10; Tue, 31 Aug 2004 03:41:22 -0400 (EDT)
ehlo example.com
250-example.com Hello example.com [192.0.34.166], pleased to meet you
250-ENHANCEDSTATUSCODES
250-PIPELINING
250-8BITMIME
250-SIZE
250-DSN
250-ETRN
250-AUTH LOGIN PLAIN
250-STARTTLS
250-DELIVERBY
250 HELP
quit
221 2.0.0 example.com closing connection
Connection closed by foreign host.
```

If the “`STARTTLS`” line appears in the output then everything is working correctly.

## 15.10 VPN over IPsec

*Written by Nik Clayton.*

Creating a VPN between two networks, separated by the Internet, using FreeBSD gateways.

## 15.10.1 Understanding IPsec

Written by Hiten M. Pandya.

This section will guide you through the process of setting up IPsec, and to use it in an environment which consists of FreeBSD and **Microsoft Windows 2000/XP** machines, to make them communicate securely. In order to set up IPsec, it is necessary that you are familiar with the concepts of building a custom kernel (see ÊðöÜëáéï 9).

*IPsec* is a protocol which sits on top of the Internet Protocol (IP) layer. It allows two or more hosts to communicate in a secure manner (hence the name). The FreeBSD IPsec “network stack” is based on the KAME (<http://www.kame.net/>) implementation, which has support for both protocol families, IPv4 and IPv6.

**Óçiàßùóç:** FreeBSD contains a “hardware accelerated” IPsec stack, known as “Fast IPsec”, that was obtained from OpenBSD. It employs cryptographic hardware (whenever possible) via the crypto(4) subsystem to optimize the performance of IPsec. This subsystem is new, and does not support all the features that are available in the KAME version of IPsec. However, in order to enable hardware-accelerated IPsec, the following kernel option has to be added to your kernel configuration file:

```
options    FAST_IPSEC  # new IPsec (cannot define w/ IPSEC)
```

Note, that it is not currently possible to use the “Fast IPsec” subsystem in lieu of the KAME implementation of IPsec. Consult the *fast\_ipsec(4)* manual page for more information.

**Óçiàßùóç:** To let firewalls properly track state for gif(4) tunnels too, you have to enable the *IPSEC\_FILTERGIF* in your kernel configuration:

```
options    IPSEC_FILTERGIF  #filter ipsec packets from a tunnel
```

IPsec consists of two sub-protocols:

- *Encapsulated Security Payload (ESP)*, protects the IP packet data from third party interference, by encrypting the contents using symmetric cryptography algorithms (like Blowfish, 3DES).
- *Authentication Header (AH)*, protects the IP packet header from third party interference and spoofing, by computing a cryptographic checksum and hashing the IP packet header fields with a secure hashing function. This is then followed by an additional header that contains the hash, to allow the information in the packet to be authenticated.

ESP and AH can either be used together or separately, depending on the environment.

IPsec can either be used to directly encrypt the traffic between two hosts (known as *Transport Mode*); or to build “virtual tunnels” between two subnets, which could be used for secure communication between two corporate networks (known as *Tunnel Mode*). The latter is more commonly known as a *Virtual Private Network (VPN)*. The *ipsec(4)* manual page should be consulted for detailed information on the IPsec subsystem in FreeBSD.

To add IPsec support to your kernel, add the following options to your kernel configuration file:

```
options    IPSEC      #IP security
options    IPSEC_ESP   #IP security (crypto; define w/ IPSEC)
```

If IPsec debugging support is desired, the following kernel option should also be added:

```
options     IPSEC_DEBUG #debug for IP security
```

## 15.10.2 The Problem

There is no standard for what constitutes a VPN. VPNs can be implemented using a number of different technologies, each of which have their own strengths and weaknesses. This section presents a scenario, and the strategies used for implementing a VPN for this scenario.

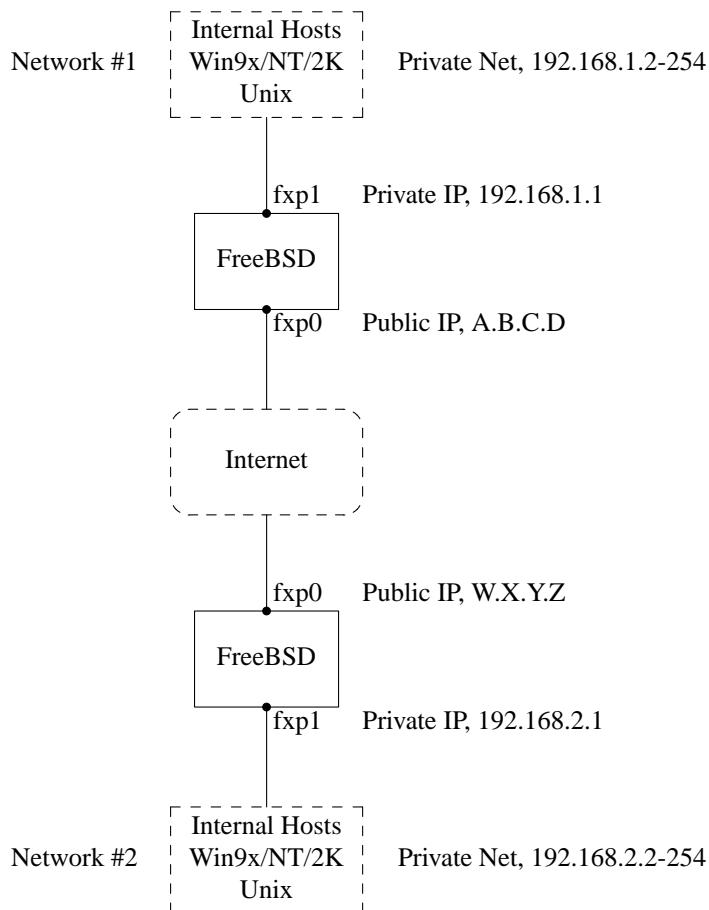
## 15.10.3 The Scenario: Two networks, connected to the Internet, to behave as one

The premise is as follows:

- You have at least two sites
- Both sites are using IP internally
- Both sites are connected to the Internet, through a gateway that is running FreeBSD.
- The gateway on each network has at least one public IP address.
- The internal addresses of the two networks can be public or private IP addresses, it does not matter. You can be running NAT on the gateway machine if necessary.
- The internal IP addresses of the two networks *do not collide*. While I expect it is theoretically possible to use a combination of VPN technology and NAT to get this to work, I expect it to be a configuration nightmare.

If you find that you are trying to connect two networks, both of which, internally, use the same private IP address range (e.g. both of them use 192.168.1.x), then one of the networks will have to be renumbered.

The network topology might look something like this:



Notice the two public IP addresses. I will use the letters to refer to them in the rest of this article. Anywhere you see those letters in this article, replace them with your own public IP addresses. Note also that internally, the two gateway machines have .1 IP addresses, and that the two networks have different private IP addresses (192.168.1.x and 192.168.2.x respectively). All the machines on the private networks have been configured to use the .1 machine as their default gateway.

The intention is that, from a network point of view, each network should view the machines on the other network as though they were directly attached to the same router -- albeit a slightly slow router with an occasional tendency to drop packets.

This means that (for example), machine 192.168.1.20 should be able to run

```
ping 192.168.2.34
```

and have it work, transparently. Windows machines should be able to see the machines on the other network, browse file shares, and so on, in exactly the same way that they can browse machines on the local network.

And the whole thing has to be secure. This means that traffic between the two networks has to be encrypted.

Creating a VPN between these two networks is a multi-step process. The stages are as follows:

1. Create a “virtual” network link between the two networks, across the Internet. Test it, using tools like ping(8), to make sure it works.

2. Apply security policies to ensure that traffic between the two networks is transparently encrypted and decrypted as necessary. Test this, using tools like tcpdump(1), to ensure that traffic is encrypted.
3. Configure additional software on the FreeBSD gateways, to allow Windows machines to see one another across the VPN.

#### **15.10.3.1 Step 1: Creating and testing a “virtual” network link**

Suppose that you were logged in to the gateway machine on network #1 (with public IP address A.B.C.D, private IP address 192.168.1.1), and you ran `ping 192.168.2.1`, which is the private address of the machine with IP address w.x.y.z. What needs to happen in order for this to work?

1. The gateway machine needs to know how to reach 192.168.2.1. In other words, it needs to have a route to 192.168.2.1.
2. Private IP addresses, such as those in the 192.168.x range are not supposed to appear on the Internet at large. Instead, each packet you send to 192.168.2.1 will need to be wrapped up inside another packet. This packet will need to appear to be from A.B.C.D, and it will have to be sent to w.x.y.z. This process is called *encapsulation*.
3. Once this packet arrives at w.x.y.z it will need to “unencapsulated”, and delivered to 192.168.2.1.

You can think of this as requiring a “tunnel” between the two networks. The two “tunnel mouths” are the IP addresses A.B.C.D and w.x.y.z, and the tunnel must be told the addresses of the private IP addresses that will be allowed to pass through it. The tunnel is used to transfer traffic with private IP addresses across the public Internet.

This tunnel is created by using the generic interface, or `gif` devices on FreeBSD. As you can imagine, the `gif` interface on each gateway host must be configured with four IP addresses; two for the public IP addresses, and two for the private IP addresses.

Support for the `gif` device must be compiled in to the FreeBSD kernel on both machines. You can do this by adding the line:

```
device gif
```

to the kernel configuration files on both machines, and then compile, install, and reboot as normal.

Configuring the tunnel is a two step process. First the tunnel must be told what the outside (or public) IP addresses are, using `ifconfig(8)`. Then the private IP addresses must be configured using `ifconfig(8)`.

On the gateway machine on network #1 you would run the following commands to configure the tunnel.

```
# ifconfig gif0 create
# ifconfig gif0 tunnel A.B.C.D W.X.Y.Z
# ifconfig gif0 inet 192.168.1.1 192.168.2.1 netmask 0xffffffff
```

On the other gateway machine you run the same commands, but with the order of the IP addresses reversed.

```
# ifconfig gif0 create
# ifconfig gif0 tunnel W.X.Y.Z A.B.C.D
# ifconfig gif0 inet 192.168.2.1 192.168.1.1 netmask 0xffffffff
```

You can then run:

```
ifconfig gif0
```

to see the configuration. For example, on the network #1 gateway, you would see this:

```
# ifconfig gif0
gif0: flags=8051<UP,POINTOPOINT,RUNNING,MULTICAST> mtu 1280
    tunnel inet A.B.C.D --> W.X.Y.Z
    inet 192.168.1.1 --> 192.168.2.1 netmask 0xffffffff
```

As you can see, a tunnel has been created between the physical addresses A.B.C.D and W.X.Y.Z, and the traffic allowed through the tunnel is that between 192.168.1.1 and 192.168.2.1.

This will also have added an entry to the routing table on both machines, which you can examine with the command `netstat -rn`. This output is from the gateway host on network #1.

```
# netstat -rn
Routing tables

Internet:
Destination      Gateway          Flags     Refs      Use     Netif   Expire
...
192.168.2.1      192.168.1.1    UH          0         0      gif0
...
```

As the “Flags” value indicates, this is a host route, which means that each gateway knows how to reach the other gateway, but they do not know how to reach the rest of their respective networks. That problem will be fixed shortly.

It is likely that you are running a firewall on both machines. This will need to be circumvented for your VPN traffic. You might want to allow all traffic between both networks, or you might want to include firewall rules that protect both ends of the VPN from one another.

It greatly simplifies testing if you configure the firewall to allow all traffic through the VPN. You can always tighten things up later. If you are using `ipfw(8)` on the gateway machines then a command like

```
ipfw add 1 allow ip from any to any via gif0
```

will allow all traffic between the two end points of the VPN, without affecting your other firewall rules. Obviously you will need to run this command on both gateway hosts.

This is sufficient to allow each gateway machine to ping the other. On 192.168.1.1, you should be able to run

```
ping 192.168.2.1
```

and get a response, and you should be able to do the same thing on the other gateway machine.

However, you will not be able to reach internal machines on either network yet. This is because of the routing -- although the gateway machines know how to reach one another, they do not know how to reach the network behind each one.

To solve this problem you must add a static route on each gateway machine. The command to do this on the first gateway would be:

```
route add 192.168.2.0 192.168.2.1 netmask 0xfffffff00
```

This says “In order to reach the hosts on the network 192.168.2.0, send the packets to the host 192.168.2.1”. You will need to run a similar command on the other gateway, but with the 192.168.1.x addresses instead.

IP traffic from hosts on one network will now be able to reach hosts on the other network.

That has now created two thirds of a VPN between the two networks, in as much as it is “virtual” and it is a “network”. It is not private yet. You can test this using ping(8) and tcpdump(1). Log in to the gateway host and run

```
tcpdump dst host 192.168.2.1
```

In another log in session on the same host run

```
ping 192.168.2.1
```

You will see output that looks something like this:

```
16:10:24.018080 192.168.1.1 > 192.168.2.1: icmp: echo request
16:10:24.018109 192.168.1.1 > 192.168.2.1: icmp: echo reply
16:10:25.018814 192.168.1.1 > 192.168.2.1: icmp: echo request
16:10:25.018847 192.168.1.1 > 192.168.2.1: icmp: echo reply
16:10:26.028896 192.168.1.1 > 192.168.2.1: icmp: echo request
16:10:26.029112 192.168.1.1 > 192.168.2.1: icmp: echo reply
```

As you can see, the ICMP messages are going back and forth unencrypted. If you had used the -s parameter to tcpdump(1) to grab more bytes of data from the packets you would see more information.

Obviously this is unacceptable. The next section will discuss securing the link between the two networks so that all traffic is automatically encrypted.

### **Summary:**

- Configure both kernels with “device gif”.
- Edit /etc/rc.conf on gateway host #1 and add the following lines (replacing IP addresses as necessary).

```
gif_interfaces="gif0"
gifconfig_gif0="A.B.C.D W.X.Y.Z"
ifconfig_gif0="inet 192.168.1.1 192.168.2.1 netmask 0xffffffff"
static_routes="vpn"
route_vpn="192.168.2.0 192.168.2.1 netmask 0xfffffff0"
```

- Edit your firewall script (/etc/rc.firewall, or similar) on both hosts, and add  
`ipfw add 1 allow ip from any to any via gif0`
- Make similar changes to /etc/rc.conf on gateway host #2, reversing the order of IP addresses.

### **15.10.3.2 Step 2: Securing the link**

To secure the link we will be using IPsec. IPsec provides a mechanism for two hosts to agree on an encryption key, and to then use this key in order to encrypt data between the two hosts.

The are two areas of configuration to be considered here.

1. There must be a mechanism for two hosts to agree on the encryption mechanism to use. Once two hosts have agreed on this mechanism there is said to be a “security association” between them.
2. There must be a mechanism for specifying which traffic should be encrypted. Obviously, you do not want to encrypt all your outgoing traffic -- you only want to encrypt the traffic that is part of the VPN. The rules that you put in place to determine what traffic will be encrypted are called “security policies”.

Security associations and security policies are both maintained by the kernel, and can be modified by userland programs. However, before you can do this you must configure the kernel to support IPsec and the Encapsulated Security Payload (ESP) protocol. This is done by configuring a kernel with:

```
options IPSEC
options IPSEC_ESP
```

and recompiling, reinstalling, and rebooting. As before you will need to do this to the kernels on both of the gateway hosts.

You have two choices when it comes to setting up security associations. You can configure them by hand between two hosts, which entails choosing the encryption algorithm, encryption keys, and so forth, or you can use daemons that implement the Internet Key Exchange protocol (IKE) to do this for you.

I recommend the latter. Apart from anything else, it is easier to set up.

Editing and displaying security policies is carried out using `setkey(8)`. By analogy, `setkey` is to the kernel’s security policy tables as `route(8)` is to the kernel’s routing tables. `setkey` can also display the current security associations, and to continue the analogy further, is akin to `netstat -r` in that respect.

There are a number of choices for daemons to manage security associations with FreeBSD. This article will describe how to use one of these, `racoon` — which is available from `security/ipsec-tools` in the FreeBSD Ports collection.

The `racoon` software must be run on both gateway hosts. On each host it is configured with the IP address of the other end of the VPN, and a secret key (which you choose, and must be the same on both gateways).

The two daemons then contact one another, confirm that they are who they say they are (by using the secret key that you configured). The daemons then generate a new secret key, and use this to encrypt the traffic over the VPN. They periodically change this secret, so that even if an attacker were to crack one of the keys (which is as theoretically close to unfeasible as it gets) it will not do them much good -- by the time they have cracked the key the two daemons have chosen another one.

The configuration file for `racoon` is stored in `$(PREFIX)/etc/racoon`. You should find a configuration file there, which should not need to be changed too much. The other component of `racoon`’s configuration, which you will need to change, is the “pre-shared key”.

The default `racoon` configuration expects to find this in the file `$(PREFIX)/etc/racoon/psk.txt`. It is important to note that the pre-shared key is *not* the key that will be used to encrypt your traffic across the VPN link, it is simply a token that allows the key management daemons to trust one another.

`psk.txt` contains a line for each remote site you are dealing with. In this example, where there are two sites, each `psk.txt` file will contain one line (because each end of the VPN is only dealing with one other end).

On gateway host #1 this line should look like this:

```
W.X.Y.Z      secret
```

That is, the *public* IP address of the remote end, whitespace, and a text string that provides the secret. Obviously, you should not use “secret” as your key -- the normal rules for choosing a password apply.

On gateway host #2 the line would look like this

```
A.B.C.D      secret
```

That is, the public IP address of the remote end, and the same secret key. `psk.txt` must be mode 0600 (i.e., only read/write to `root`) before racoon will run.

You must run racoon on both gateway machines. You will also need to add some firewall rules to allow the IKE traffic, which is carried over UDP to the ISAKMP (Internet Security Association Key Management Protocol) port. Again, this should be fairly early in your firewall ruleset.

```
ipfw add 1 allow udp from A.B.C.D to W.X.Y.Z isakmp
ipfw add 1 allow udp from W.X.Y.Z to A.B.C.D isakmp
```

Once racoon is running you can try pinging one gateway host from the other. The connection is still not encrypted, but racoon will then set up the security associations between the two hosts -- this might take a moment, and you may see this as a short delay before the ping commands start responding.

Once the security association has been set up you can view it using `setkey(8)`. Run

```
setkey -D
```

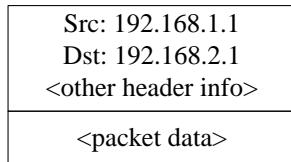
on either host to view the security association information.

That's one half of the problem. The other half is setting your security policies.

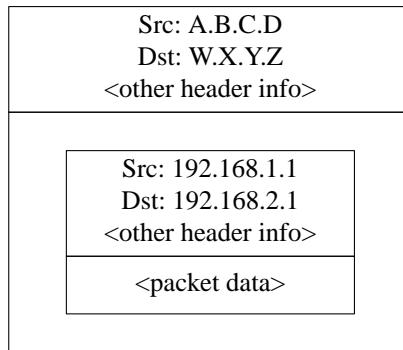
To create a sensible security policy, let's review what's been set up so far. This discussions hold for both ends of the link.

Each IP packet that you send out has a header that contains data about the packet. The header includes the IP addresses of both the source and destination. As we already know, private IP addresses, such as the `192.168.x.y` range are not supposed to appear on the public Internet. Instead, they must first be encapsulated inside another packet. This packet must have the public source and destination IP addresses substituted for the private addresses.

So if your outgoing packet started looking like this:



Then it will be encapsulated inside another packet, looking something like this:



This encapsulation is carried out by the `gif` device. As you can see, the packet now has real IP addresses on the outside, and our original packet has been wrapped up as data inside the packet that will be put out on the Internet.

Obviously, we want all traffic between the VPNs to be encrypted. You might try putting this in to words, as:

“If a packet leaves from A.B.C.D, and it is destined for W.X.Y.Z, then encrypt it, using the necessary security associations.”

“If a packet arrives from W.X.Y.Z, and it is destined for A.B.C.D, then decrypt it, using the necessary security associations.”

That’s close, but not quite right. If you did this, all traffic to and from W.X.Y.Z, even traffic that was not part of the VPN, would be encrypted. That’s not quite what you want. The correct policy is as follows

“If a packet leaves from A.B.C.D, and that packet is encapsulating another packet, and it is destined for W.X.Y.Z, then encrypt it, using the necessary security associations.”

“If a packet arrives from W.X.Y.Z, and that packet is encapsulating another packet, and it is destined for A.B.C.D, then decrypt it, using the necessary security associations.”

A subtle change, but a necessary one.

Security policies are also set using `setkey(8)`. `setkey(8)` features a configuration language for defining the policy. You can either enter configuration instructions via `stdin`, or you can use the `-f` option to specify a filename that contains configuration instructions.

The configuration on gateway host #1 (which has the public IP address A.B.C.D) to force all outbound traffic to W.X.Y.Z to be encrypted is:

```
spdadd A.B.C.D/32 W.X.Y.Z/32 ipencap -P out ipsec esp/tunnel/A.B.C.D-W.X.Y.Z/require;
```

Put these commands in a file (e.g. `/etc/ipsec.conf`) and then run

```
# setkey -f /etc/ipsec.conf
```

`spdadd` tells `setkey(8)` that we want to add a rule to the secure policy database. The rest of this line specifies which packets will match this policy. A.B.C.D/32 and W.X.Y.Z/32 are the IP addresses and netmasks that identify the network or hosts that this policy will apply to. In this case, we want it to apply to traffic between these two hosts. `ipencap` tells the kernel that this policy should only apply to packets that encapsulate other packets. `-P out` says that this policy applies to outgoing packets, and `ipsec` says that the packet will be secured.

The second line specifies how this packet will be encrypted. `esp` is the protocol that will be used, while `tunnel` indicates that the packet will be further encapsulated in an IPsec packet. The repeated use of A.B.C.D and W.X.Y.Z

is used to select the security association to use, and the final `require` mandates that packets must be encrypted if they match this rule.

This rule only matches outgoing packets. You will need a similar rule to match incoming packets.

```
spdadd W.X.Y.Z/32 A.B.C.D/32 ipencap -P in ipsec esp/tunnel/W.X.Y.Z-A.B.C.D/require;
```

Note the `in` instead of `out` in this case, and the necessary reversal of the IP addresses.

The other gateway host (which has the public IP address `W.X.Y.Z`) will need similar rules.

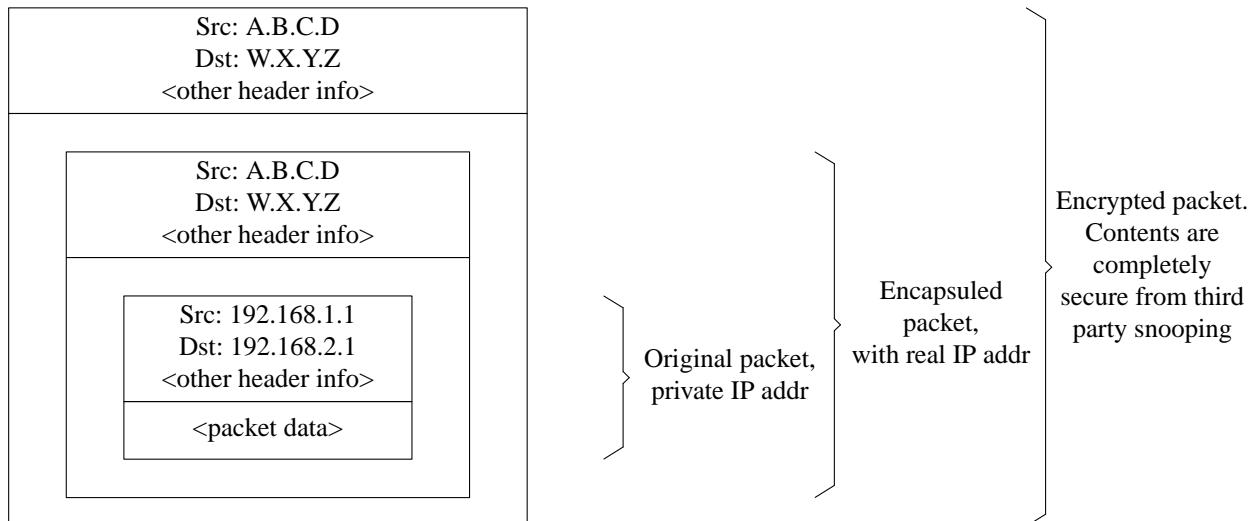
```
spdadd W.X.Y.Z/32 A.B.C.D/32 ipencap -P out ipsec esp/tunnel/W.X.Y.Z-A.B.C.D/require;
spdadd A.B.C.D/32 W.X.Y.Z/32 ipencap -P in ipsec esp/tunnel/A.B.C.D-W.X.Y.Z/require;
```

Finally, you need to add firewall rules to allow ESP and IPENCAP packets back and forth. These rules will need to be added to both hosts.

```
ipfw add 1 allow esp from A.B.C.D to W.X.Y.Z
ipfw add 1 allow esp from W.X.Y.Z to A.B.C.D
ipfw add 1 allow ipencap from A.B.C.D to W.X.Y.Z
ipfw add 1 allow ipencap from W.X.Y.Z to A.B.C.D
```

Because the rules are symmetric you can use the same rules on each gateway host.

Outgoing packets will now look something like this:



When they are received by the far end of the VPN they will first be decrypted (using the security associations that have been negotiated by racoon). Then they will enter the `gif` interface, which will unwrap the second layer, until you are left with the innermost packet, which can then travel in to the inner network.

You can check the security using the same `ping(8)` test from earlier. First, log in to the `A.B.C.D` gateway machine, and run:

```
tcpdump dst host 192.168.2.1
```

In another log in session on the same host run

```
ping 192.168.2.1
```

This time you should see output like the following:

```
xxx tcpdump output
```

Now, as you can see, tcpdump(1) shows the ESP packets. If you try to examine them with the `-s` option you will see (apparently) gibberish, because of the encryption.

Congratulations. You have just set up a VPN between two remote sites.

## Summary

- Configure both kernels with:

```
options IPSEC
options IPSEC_ESP
```

- Install `security/ipsec-tools`. Edit  `${PREFIX}/etc/racoon/psk.txt` on both gateway hosts, adding an entry for the remote host's IP address and a secret key that they both know. Make sure this file is mode 0600.
- Add the following lines to `/etc/rc.conf` on each host:

```
ipsec_enable="YES"
ipsec_file="/etc/ipsec.conf"
```

- Create an `/etc/ipsec.conf` on each host that contains the necessary `spdadd` lines. On gateway host #1 this would be:

```
spdadd A.B.C.D/32 W.X.Y.Z/32 ipencap -P out ipsec
    esp/tunnel/A.B.C.D-W.X.Y.Z/require;
spdadd W.X.Y.Z/32 A.B.C.D/32 ipencap -P in ipsec
    esp/tunnel/W.X.Y.Z-A.B.C.D/require;
```

On gateway host #2 this would be:

```
spdadd W.X.Y.Z/32 A.B.C.D/32 ipencap -P out ipsec
    esp/tunnel/W.X.Y.Z-A.B.C.D/require;
spdadd A.B.C.D/32 W.X.Y.Z/32 ipencap -P in ipsec
    esp/tunnel/A.B.C.D-W.X.Y.Z/require;
```

- Add firewall rules to allow IKE, ESP, and IPENCAP traffic to both hosts:

```
ipfw add 1 allow udp from A.B.C.D to W.X.Y.Z isakmp
ipfw add 1 allow udp from W.X.Y.Z to A.B.C.D isakmp
ipfw add 1 allow esp from A.B.C.D to W.X.Y.Z
ipfw add 1 allow esp from W.X.Y.Z to A.B.C.D
ipfw add 1 allow ipencap from A.B.C.D to W.X.Y.Z
ipfw add 1 allow ipencap from W.X.Y.Z to A.B.C.D
```

The previous two steps should suffice to get the VPN up and running. Machines on each network will be able to refer to one another using IP addresses, and all traffic across the link will be automatically and securely encrypted.

## 15.11 OpenSSH

*Contributed by Chern Lee.*

**OpenSSH** is a set of network connectivity tools used to access remote machines securely. It can be used as a direct replacement for `rlogin`, `rsh`, `rcp`, and `telnet`. Additionally, TCP/IP connections can be tunneled/forwarded securely through SSH. **OpenSSH** encrypts all traffic to effectively eliminate eavesdropping, connection hijacking, and other network-level attacks.

**OpenSSH** is maintained by the OpenBSD project, and is based upon SSH v1.2.12 with all the recent bug fixes and updates. It is compatible with both SSH protocols 1 and 2.

### 15.11.1 Advantages of Using OpenSSH

Normally, when using `telnet`(1) or `rlogin`(1), data is sent over the network in an clear, un-encrypted form. Network sniffers anywhere in between the client and server can steal your user/password information or data transferred in your session. **OpenSSH** offers a variety of authentication and encryption methods to prevent this from happening.

### 15.11.2 Enabling sshd

The `sshd` is an option presented during a Standard install of FreeBSD. To see if `sshd` is enabled, check the `rc.conf` file for:

```
sshd_enable="YES"
```

This will load `sshd`(8), the daemon program for **OpenSSH**, the next time your system initializes. Alternatively, it is possible to use `/etc/rc.d/sshd rc(8)` script to start **OpenSSH**:

```
/etc/rc.d/sshd start
```

### 15.11.3 SSH Client

The `ssh`(1) utility works similarly to `rlogin`(1).

```
# ssh user@example.com
Host key not found from the list of known hosts.
Are you sure you want to continue connecting (yes/no)? yes
Host 'example.com' added to the list of known hosts.
user@example.com's password: *****
```

The login will continue just as it would have if a session was created using `rlogin` or `telnet`. SSH utilizes a key fingerprint system for verifying the authenticity of the server when the client connects. The user is prompted to enter `yes` only when connecting for the first time. Future attempts to login are all verified against the saved fingerprint key. The SSH client will alert you if the saved fingerprint differs from the received fingerprint on future login attempts. The fingerprints are saved in `~/.ssh/known_hosts`, or `~/.ssh/known_hosts2` for SSH v2 fingerprints.

By default, recent versions of the **OpenSSH** servers only accept SSH v2 connections. The client will use version 2 if possible and will fall back to version 1. The client can also be forced to use one or the other by passing it the `-1` or `-2` for version 1 or version 2, respectively. The version 1 compatibility is maintained in the client for backwards compatibility with older versions.

## 15.11.4 Secure Copy

The `scp(1)` command works similarly to `rcp(1)`; it copies a file to or from a remote machine, except in a secure fashion.

```
# scp user@example.com:/COPYRIGHT COPYRIGHT
user@example.com's password: ****
COPYRIGHT          100% | ****|*****|*****|*****|*****|*****| 4735
00:00
#
```

Since the fingerprint was already saved for this host in the previous example, it is verified when using `scp(1)` here.

The arguments passed to `scp(1)` are similar to `cp(1)`, with the file or files in the first argument, and the destination in the second. Since the file is fetched over the network, through SSH, one or more of the file arguments takes on the form `user@host:<path_to_remote_file>`.

## 15.11.5 Configuration

The system-wide configuration files for both the **OpenSSH** daemon and client reside within the `/etc/ssh` directory.

`ssh_config` configures the client settings, while `sshd_config` configures the daemon.

Additionally, the `sshd_program` (`/usr/sbin/sshd` by default), and `sshd_flags` `rc.conf` options can provide more levels of configuration.

## 15.11.6 ssh-keygen

Instead of using passwords, ssh-keygen(1) can be used to generate DSA or RSA keys to authenticate a user:

```
% ssh-keygen -t dsa
Generating public/private dsa key pair.
Enter file in which to save the key (/home/user/.ssh/id_dsa):
Created directory '/home/user/.ssh'.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/user/.ssh/id_dsa.
Your public key has been saved in /home/user/.ssh/id_dsa.pub.
The key fingerprint is:
bb:48:db:f2:93:57:80:b6:aa:bc:f5:d5:ba:8f:79:17 user@host.example.com
```

`ssh-keygen(1)` will create a public and private key pair for use in authentication. The private key is stored in `~/.ssh/id_dsa` or `~/.ssh/id_rsa`, whereas the public key is stored in `~/.ssh/id_dsa.pub` or `~/.ssh/id_rsa.pub`, respectively for DSA and RSA key types. The public key must be placed in `~/.ssh/authorized_keys` of the remote machine in order for the setup to work. Similarly, RSA version 1 public keys should be placed in `~/.ssh/authorized_keys`.

This will allow connection to the remote machine based upon SSH keys instead of passwords.

If a passphrase is used in ssh-keygen(1), the user will be prompted for a password each time in order to use the private key. ssh-agent(1) can alleviate the strain of repeatedly entering long passphrases, and is explored in the ÔPiá 15.11.7 section below.

**Ðñïâéäïðïßçóç:** The various options and files can be different according to the **OpenSSH** version you have on your system; to avoid problems you should consult the `ssh-keygen(1)` manual page.

### 15.11.7 ssh-agent and ssh-add

The `ssh-agent(1)` and `ssh-add(1)` utilities provide methods for **SSH** keys to be loaded into memory for use, without needing to type the passphrase each time.

The `ssh-agent(1)` utility will handle the authentication using the private key(s) that are loaded into it. `ssh-agent(1)` should be used to launch another application. At the most basic level, it could spawn a shell or at a more advanced level, a window manager.

To use `ssh-agent(1)` in a shell, first it will need to be spawned with a shell as an argument. Secondly, the identity needs to be added by running `ssh-add(1)` and providing it the passphrase for the private key. Once these steps have been completed the user will be able to `ssh(1)` to any host that has the corresponding public key installed. For example:

```
% ssh-agent csh
% ssh-add
Enter passphrase for /home/user/.ssh/id_dsa:
Identity added: /home/user/.ssh/id_dsa (/home/user/.ssh/id_dsa)
%
```

To use `ssh-agent(1)` in X11, a call to `ssh-agent(1)` will need to be placed in `~/.xinitrc`. This will provide the `ssh-agent(1)` services to all programs launched in X11. An example `~/.xinitrc` file might look like this:

```
exec ssh-agent startxfce4
```

This would launch `ssh-agent(1)`, which would in turn launch **Xfce**, every time X11 starts. Then once that is done and X11 has been restarted so that the changes can take effect, simply run `ssh-add(1)` to load all of your **SSH** keys.

### 15.11.8 SSH Tunneling

**OpenSSH** has the ability to create a tunnel to encapsulate another protocol in an encrypted session.

The following command tells `ssh(1)` to create a tunnel for **telnet**:

```
% ssh -2 -N -f -L 5023:localhost:23 user@foo.example.com
%
```

The `ssh` command is used with the following options:

-2

Forces `ssh` to use version 2 of the protocol. (Do not use if you are working with older **SSH** servers)

-N

Indicates no command, or tunnel only. If omitted, `ssh` would initiate a normal session.

**-f**

Forces ssh to run in the background.

**-L**

Indicates a local tunnel in *localport:localhost:remoteport* fashion.

```
user@foo.example.com
```

The remote SSH server.

An SSH tunnel works by creating a listen socket on `localhost` on the specified port. It then forwards any connection received on the local host/port via the SSH connection to the specified remote host and port.

In the example, port `5023` on `localhost` is being forwarded to port `23` on `localhost` of the remote machine. Since `23` is **telnet**, this would create a secure **telnet** session through an SSH tunnel.

This can be used to wrap any number of insecure TCP protocols such as SMTP, POP3, FTP, etc.

### ÐánÜääéäí 15-1. Using SSH to Create a Secure Tunnel for SMTP

```
% ssh -2 -N -f -L 5025:localhost:25 user@mailserver.example.com
user@mailserver.example.com's password: *****
% telnet localhost 5025
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^].
220 mailserver.example.com ESMTP
```

This can be used in conjunction with an `ssh-keygen(1)` and additional user accounts to create a more seamless/hassle-free SSH tunneling environment. Keys can be used in place of typing a password, and the tunnels can be run as a separate user.

#### 15.11.8.1 Practical SSH Tunneling Examples

##### 15.11.8.1.1 Secure Access of a POP3 Server

At work, there is an SSH server that accepts connections from the outside. On the same office network resides a mail server running a POP3 server. The network, or network path between your home and office may or may not be completely trustable. Because of this, you need to check your e-mail in a secure manner. The solution is to create an SSH connection to your office's SSH server, and tunnel through to the mail server.

```
% ssh -2 -N -f -L 2110:mail.example.com:110 user@ssh-server.example.com
user@ssh-server.example.com's password: *****
```

When the tunnel is up and running, you can point your mail client to send POP3 requests to `localhost` port `2110`. A connection here will be forwarded securely across the tunnel to `mail.example.com`.

#### 15.11.8.1.2 Bypassing a Draconian Firewall

Some network administrators impose extremely draconian firewall rules, filtering not only incoming connections, but outgoing connections. You may be only given access to contact remote machines on ports 22 and 80 for SSH and web surfing.

You may wish to access another (perhaps non-work related) service, such as an Ogg Vorbis server to stream music. If this Ogg Vorbis server is streaming on some other port than 22 or 80, you will not be able to access it.

The solution is to create an SSH connection to a machine outside of your network's firewall, and use it to tunnel to the Ogg Vorbis server.

```
% ssh -N -f -L 8888:music.example.com:8000 user@unfirewalled-system.example.org
user@unfirewalled-system.example.org's password: *****
```

Your streaming client can now be pointed to localhost port 8888, which will be forwarded over to music.example.com port 8000, successfully evading the firewall.

#### 15.11.9 The AllowUsers Users Option

It is often a good idea to limit which users can log in and from where. The `AllowUsers` option is a good way to accomplish this. For example, to only allow the `root` user to log in from 192.168.1.32, something like this would be appropriate in the `/etc/ssh/sshd_config` file:

```
AllowUsers root@192.168.1.32
```

To allow the user `admin` to log in from anywhere, just list the username by itself:

```
AllowUsers admin
```

Multiple users should be listed on the same line, like so:

```
AllowUsers root@192.168.1.32 admin
```

**Óçìåßùóç:** It is important that you list each user that needs to log in to this machine; otherwise they will be locked out.

After making changes to `/etc/ssh/sshd_config` you must tell `sshd(8)` to reload its config files, by running:

```
# /etc/rc.d/sshd reload
```

#### 15.11.10 Further Reading

OpenSSH (<http://www.openssh.com/>)

`ssh(1)` `scp(1)` `ssh-keygen(1)` `ssh-agent(1)` `ssh-add(1)` `ssh_config(5)`

`sshd(8)` `sftp-server(8)` `sshd_config(5)`

## 15.12 File System Access Control Lists

*Contributed by Tom Rhodes.*

In conjunction with file system enhancements like snapshots, FreeBSD 5.0 and later offers the security of File System Access Control Lists (ACLs).

Access Control Lists extend the standard UNIX permission model in a highly compatible (POSIX.1e) way. This feature permits an administrator to make use of and take advantage of a more sophisticated security model.

To enable ACL support for UFS file systems, the following:

```
options UFS_ACL
```

must be compiled into the kernel. If this option has not been compiled in, a warning message will be displayed when attempting to mount a file system supporting ACLs. This option is included in the `GENERIC` kernel. ACLs rely on extended attributes being enabled on the file system. Extended attributes are natively supported in the next generation UNIX file system, UFS2.

**Óçìàßùóć:** A higher level of administrative overhead is required to configure extended attributes on UFS1 than on UFS2. The performance of extended attributes on UFS2 is also substantially higher. As a result, UFS2 is generally recommended in preference to UFS1 for use with access control lists.

ACLs are enabled by the mount-time administrative flag, `acls`, which may be added to `/etc/fstab`. The mount-time flag can also be automatically set in a persistent manner using `tunefs(8)` to modify a superblock ACLs flag in the file system header. In general, it is preferred to use the superblock flag for several reasons:

- The mount-time ACLs flag cannot be changed by a remount (`mount(8) -u`), only by means of a complete `umount(8)` and `fresh mount(8)`. This means that ACLs cannot be enabled on the root file system after boot. It also means that you cannot change the disposition of a file system once it is in use.
- Setting the superblock flag will cause the file system to always be mounted with ACLs enabled even if there is not an `fstab` entry or if the devices re-order. This prevents accidental mounting of the file system without ACLs enabled, which can result in ACLs being improperly enforced, and hence security problems.

**Óçìàßùóć:** We may change the ACLs behavior to allow the flag to be enabled without a complete fresh `mount(8)`, but we consider it desirable to discourage accidental mounting without ACLs enabled, because you can shoot your feet quite nastily if you enable ACLs, then disable them, then re-enable them without flushing the extended attributes. In general, once you have enabled ACLs on a file system, they should not be disabled, as the resulting file protections may not be compatible with those intended by the users of the system, and re-enabling ACLs may re-attach the previous ACLs to files that have since had their permissions changed, resulting in other unpredictable behavior.

File systems with ACLs enabled will show a + (plus) sign in their permission settings when viewed. For example:

```
drwx----- 2 robert  robert  512 Dec 27 11:54 private
drwxrwx---+ 2 robert  robert  512 Dec 23 10:57 directory1
drwxrwx---+ 2 robert  robert  512 Dec 22 10:20 directory2
drwxrwx---+ 2 robert  robert  512 Dec 27 11:57 directory3
drwxr-xr-x  2 robert  robert  512 Nov 10 11:54 public_html
```

Here we see that the directory1, directory2, and directory3 directories are all taking advantage of ACLs. The public\_html directory is not.

### 15.12.1 Making Use of ACLs

The file system ACLs can be viewed by the getfacl(1) utility. For instance, to view the ACL settings on the test file, one would use the command:

```
% getfacl test
#file:test
#owner:1001
#group:1001
user::rw-
group::r--
other::r--
```

To change the ACL settings on this file, invoke the setfacl(1) utility. Observe:

```
% setfacl -k test
```

The -k flag will remove all of the currently defined ACLs from a file or file system. The more preferable method would be to use -b as it leaves the basic fields required for ACLs to work.

```
% setfacl -m u:trhodes:rwx,group:web:r--,o::---- test
```

In the aforementioned command, the -m option was used to modify the default ACL entries. Since there were no pre-defined entries, as they were removed by the previous command, this will restore the default options and assign the options listed. Take care to notice that if you add a user or group which does not exist on the system, an Invalid argument error will be printed to stdout.

## 15.13 Monitoring Third Party Security Issues

*Contributed by Tom Rhodes.*

In recent years, the security world has made many improvements to how vulnerability assessment is handled. The threat of system intrusion increases as third party utilities are installed and configured for virtually any operating system available today.

Vulnerability assessment is a key factor in security, and while FreeBSD releases advisories for the base system, doing so for every third party utility is beyond the FreeBSD Project's capability. There is a way to mitigate third party vulnerabilities and warn administrators of known security issues. A FreeBSD add on utility known as **Portaudit** exists solely for this purpose.

The ports-mgmt/portaudit port polls a database, updated and maintained by the FreeBSD Security Team and ports developers, for known security issues.

To begin using **Portaudit**, one must install it from the Ports Collection:

```
# cd /usr/ports/ports-mgmt/portaudit && make install clean
```

During the install process, the configuration files for periodic(8) will be updated, permitting **Portaudit** output in the daily security runs. Ensure the daily security run emails, which are sent to `root`'s email account, are being read. No more configuration will be required here.

After installation, an administrator can update the database and view known vulnerabilities in installed packages by invoking the following command:

```
# portaudit -Fda
```

**Óçìáßùóç:** The database will automatically be updated during the periodic(8) run; thus, the previous command is completely optional. It is only required for the following examples.

To audit the third party utilities installed as part of the Ports Collection at anytime, an administrator need only run the following command:

```
# portaudit -a
```

**Portaudit** will produce something like this for vulnerable packages:

```
Affected package: cups-base-1.1.22.0_1
Type of problem: cups-base -- HPGL buffer overflow vulnerability.
Reference: <http://www.FreeBSD.org/ports/portaudit/40a3bca2-6809-11d9-a9e7-0001020eed82.html>

1 problem(s) in your installed packages found.

You are advised to update or deinstall the affected package(s) immediately.
```

By pointing a web browser to the URL shown, an administrator may obtain more information about the vulnerability in question. This will include versions affected, by FreeBSD Port version, along with other web sites which may contain security advisories.

In short, **Portaudit** is a powerful utility and extremely useful when coupled with the **Portupgrade** port.

## 15.14 FreeBSD Security Advisories

*Contributed by Tom Rhodes.*

Like many production quality operating systems, FreeBSD publishes “Security Advisories”. These advisories are usually mailed to the security lists and noted in the Errata only after the appropriate releases have been patched. This section will work to explain what an advisory is, how to understand it, and what measures to take in order to patch a system.

### 15.14.1 What does an advisory look like?

The FreeBSD security advisories look similar to the one below, taken from the freebsd-security-notifications (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-security-notifications>) mailing list.

```
=====
FreeBSD-SA-XX:XX.UTIL                               Security Advisory
```

Topic: denial of service due to some problem❶  
 Category: core❷  
 Module: sys❸  
 Announced: 2003-09-23❹  
 Credits: Person@EMAIL-ADDRESS❺  
 Affects: All releases of FreeBSD❻  
           FreeBSD 4-STABLE prior to the correction date  
 Corrected: 2003-09-23 16:42:59 UTC (RELENG\_4, 4.9-PRERELEASE)  
           2003-09-23 20:08:42 UTC (RELENG\_5\_1, 5.1-RELEASE-p6)  
           2003-09-23 20:07:06 UTC (RELENG\_5\_0, 5.0-RELEASE-p15)  
           2003-09-23 16:44:58 UTC (RELENG\_4\_8, 4.8-RELEASE-p8)  
           2003-09-23 16:47:34 UTC (RELENG\_4\_7, 4.7-RELEASE-p18)  
           2003-09-23 16:49:46 UTC (RELENG\_4\_6, 4.6-RELEASE-p21)  
           2003-09-23 16:51:24 UTC (RELENG\_4\_5, 4.5-RELEASE-p33)  
           2003-09-23 16:52:45 UTC (RELENG\_4\_4, 4.4-RELEASE-p43)  
           2003-09-23 16:54:39 UTC (RELENG\_4\_3, 4.3-RELEASE-p39)❷  
 CVE Name: CVE-XXXX-XXXX❸

For general information regarding FreeBSD Security Advisories,  
 including descriptions of the fields above, security branches, and the  
 following sections, please visit  
<http://www.FreeBSD.org/security/>.

## I. Background❹

## II. Problem Description❽

## III. Impact❾

## IV. Workaround❿

## V. Solution❬

## VI. Correction details❭

## VII. References❮

- ❶ The Topic field indicates exactly what the problem is. It is basically an introduction to the current security advisory and notes the utility with the vulnerability.
- ❷ The Category refers to the affected part of the system which may be one of core, contrib, or ports. The core category means that the vulnerability affects a core component of the FreeBSD operating system. The contrib category means that the vulnerability affects software contributed to the FreeBSD Project, such as

**sendmail.** Finally the `ports` category indicates that the vulnerability affects add on software available as part of the Ports Collection.

- ③ The `Module` field refers to the component location, for instance `sys`. In this example, we see that the module, `sys`, is affected; therefore, this vulnerability affects a component used within the kernel.
- ④ The `Announced` field reflects the date said security advisory was published, or announced to the world. This means that the security team has verified that the problem does exist and that a patch has been committed to the FreeBSD source code repository.
- ⑤ The `Credits` field gives credit to the individual or organization who noticed the vulnerability and reported it.
- ⑥ The `Affects` field explains which releases of FreeBSD are affected by this vulnerability. For the kernel, a quick look over the output from `ident` on the affected files will help in determining the revision. For ports, the version number is listed after the port name in `/var/db/pkg`. If the system does not sync with the FreeBSD CVS repository and rebuild daily, chances are that it is affected.
- ⑦ The `Corrected` field indicates the date, time, time offset, and release that was corrected.
- ⑧ Reserved for the identification information used to look up vulnerabilities in the Common Vulnerabilities Database system.
- ⑨ The `Background` field gives information on exactly what the affected utility is. Most of the time this is why the utility exists in FreeBSD, what it is used for, and a bit of information on how the utility came to be.
- (10) The `Problem Description` field explains the security hole in depth. This can include information on flawed code, or even how the utility could be maliciously used to open a security hole.
- (11) The `Impact` field describes what type of impact the problem could have on a system. For example, this could be anything from a denial of service attack, to extra privileges available to users, or even giving the attacker superuser access.
- (12) The `Workaround` field offers a feasible workaround to system administrators who may be incapable of upgrading the system. This may be due to time constraints, network availability, or a slew of other reasons. Regardless, security should not be taken lightly, and an affected system should either be patched or the security hole workaround should be implemented.
- (13) The `Solution` field offers instructions on patching the affected system. This is a step by step tested and verified method for getting a system patched and working securely.
- (14) The `Correction Details` field displays the CVS branch or release name with the periods changed to underscore characters. It also shows the revision number of the affected files within each branch.
- (15) The `References` field usually offers sources of other information. This can include web URLs, books, mailing lists, and newsgroups.

## 15.15 Process Accounting

*Contributed by Tom Rhodes.*

Process accounting is a security method in which an administrator may keep track of system resources used, their allocation among users, provide for system monitoring, and minimally track a user's commands.

This indeed has its own positive and negative points. One of the positives is that an intrusion may be narrowed down to the point of entry. A negative is the amount of logs generated by process accounting, and the disk space they may require. This section will walk an administrator through the basics of process accounting.

### 15.15.1 Enable and Utilizing Process Accounting

Before making use of process accounting, it must be enabled. To do this, execute the following commands:

```
# touch /var/account/acct
# accton /var/account/acct
# echo 'accounting_enable="YES"' >> /etc/rc.conf
```

Once enabled, accounting will begin to track CPU stats, commands, etc. All accounting logs are in a non-human readable format and may be viewed using the sa(8) utility. If issued without any options, sa will print information relating to the number of per user calls, the total elapsed time in minutes, total CPU and user time in minutes, average number of I/O operations, etc.

To view information about commands being issued, one would use the lastcomm(1) utility. The lastcomm may be used to print out commands issued by users on specific ttys(5), for example:

```
# lastcomm ls
trhodes ttys1
```

Would print out all known usage of the ls by trhodes on the ttys1 terminal.

Many other useful options exist and are explained in the lastcomm(1), acct(5) and sa(8) manual pages.

## Óçìåéþóåéò

- Under FreeBSD the standard login password may be up to 128 characters in length.

# ÊåöÜëáéí 16 Jails

Óõíâéóöiñ Ü áðü ñií Matteo Riondato.

## 16.1 Óýñøç

Ôi êåöÜëáéí áðöü áîçãåß ôé åßíáé ôá jails (ööééåÝò) ôiõ FreeBSD êáé ðùò ÷ñçóéliðiéiyôáé. Ôá jails, ðiõ áráöÝññöáé iñéóiÝåò ñiñÝò óáí iéá áíéó ÷ñiÝíç áíáëéåéöéêP eýóç ãéá ðåñéáÜëëiñðå chroot, åßíáéÝíá eó ÷ñöü åññåéåßí ãéá äéá ÷åéñéööÝò ôóñööçìÜûñí, áëëÜ ç ááóéêP ôiõò ÷ñPóç iðiñåß åðßóçò íá åßíáé ÷ñPóéïç óå ðñi ÷ñçíÝññöö ÷ñPóöåò.

Áöiy äéáåÜóåôå áðöü ñií êåöÜëáéí, èá iÝññåôå:

- Ôé åßíáéÝíá jail êáé ôé ôéïðü iðiñåß íá åîõðçñåðPóåé óå åâéåôåôÜóåéò FreeBSD.
- Ðùò íá ööéÜíåôå, íá åêééíPóåôå, êáé íá óóâíåôPóåôåÝíá jail.
- Ôá åáóéêÜ ôçò äéá ÷åßñéöçò áíüò jail, ôüöi iÝóá, üöi eáé Yíù áðü áðöü.

¶ëéåò ðçäÝò ÷ñPóéñùí ðëçññöiñéþí ó ÷åðéêÜ iå ôá jails åßíáé:

- Ç óåëßää manual ôiõ jail(8). ÐåñéÝ ÷åé ðëPñç áíáöiñÜ õiõ áïçèçöééiy ðñiññÜñáò iø jail — ôiõ äéá ÷åéñéööééiy åññåéåßí ðiõ iðiñåß íá ÷ñçóéliðiéçèåß óóí FreeBSD ãéá ôçí åêéßíçóç, äéáéíðP, êáé Yéåå ÷i ðùí jails.
- Ié ëßöôåò ðá ÷ñäññåßí ãéá ôá áñ ÷åßá ôiõò. Ôá áñ ÷åßá áðü ôçí çëåéöññééP ëßöôå åâíééþí åññùðPóåñí õiõ FreeBSD (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-questions>) eáé Üëéåò ëßöôåò ðiõ åîõðçñåðiýôáé áðü õiõ åîõðçñåðöP ãéá çëåéöññééÝò ëßöôåò ôiõ FreeBSD (<http://lists.FreeBSD.org/mailman/listinfo>) ðåñéÝ ÷i ðëPñç iäçäü ãéá ôá jails. Åßíáé ðÜíòiøå åíáéäöÝññí íá øÜ ÷iñåôå ôá áñ ÷åßá P íá äçññéåýåôå iÝåò åññùðPóåéò óóç ëßöôå freebsd-questions (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-questions>).

## 16.2 ¼ññé ôùí Jails

Ãéá íá êåôåññPóåôå êáéyôåñá ôi ðùò ié åóñùôåñééÝò ëåéöiññåßåò ôiõ FreeBSD ó ÷åðßæíñôáé iå ôá jails êáé ðùò áðööÝò áéëçëåðéññíý iå ôá ððüññééå ñiñÝç ôiõ FreeBSD, èá ÷ñçóéliðiéPóíòå åêôåíþò ôiõò ðåñáéÜò ùññöò:

chroot(8) (åíðiëP)

¡á áïçèçöééü ðññüññåííá, ôi iðiñßí ÷ñçóéliðiéåß ôçí eëPóç ôððôðPíåòiø chroot(2) ôiõ FreeBSD ãéá íá åéëÜíåé õiíññéü êåðÜëíä (root directory) iéáò äéññåáóßåò êáé üëñí ðùí Üëëñí äéññåáóéþí ðiõ åíáññPíóáé áðü áðööP.

chroot(2) (ðåñéáÜëëíí)

Ôi ðåñéáÜëëíí iéá äéññåáóßåò ðiõ ôñÝ ÷åé iÝóá óå Yíá “chroot”. Áðöü ðåñéëåíåÜíåé ðüññöò üðùò ôi ðiPíå ôiõ ôððôðPíåòiø áñ ÷åßùí ðiõ åßíáé iñáöü, ôá ID ôiõ ÷ñPóôç êáé ôçò iñÜäåò ðiõ åßíáé äéáéYóéíá, êáèþò êáé ôéö åéåðåöÝò äééöýiõ (network interfaces), ôiõò iç ÷áíéöiyò IPC eëð.

jail(8) (åíðiëP)

Ôi ðññüññåíí ðiõ óáò åðéóññYðåé íá äéá ÷åéñßæåóôå ôi òýóôçìá óáò êáé íá iâééÜò åéññåáóßåò óå ðåñéáÜëëíí jail.

host (óyóôçìá (system), äéåñäáóßá (process), ÷ñÞóôçò (user), êëð.)

Ôi òööðéêü óýóðöçíá ðiõ öéëññâlß êáé åé Ýá ÷ åé Ýá ðâñéâÜëëí jail. Ôi host system Ý ÷ åé ðññüöâáóç óå üëi ôi äéáè Ý öéïï òëéüü, êáé iðiññâlß íá åé Ýâlâé åéäññâóßâò ðüöi ïÝóá üöi êáé Ýñù áðü ôi ðâñéâÜëëí ðiõ jail. Ìßá áðü ðéð óçíáîðéüûðâññâò åéäöññÝò iñâðáý ôiõ host system êáé ôiõ jail åßíáé üöð ié ðâññéñéöiíß ðiõ åöðññüæññödáé óöéö åéäññâóßâò ôiõ ÷ nPRöôc root ïÝóá ôiõ ðâñéâÜëëí jail, aâi éó ÷ ýiõi åéä åéäññâóßâò ôiõ host system.

hosted (óyóôciá (system), äéåñääóßá (process), ÷ñPóôçò (user), êëð.)

Íéá æáññáóßá, Ýíáò ÷ nßóóçò P êÜðiéá Üëëç iióúöçôá, ôiõ iõibïõ ç ðñüóâáóç óoiõò ðüñiõò ôiõ óooóßìàôiò ðåñéiñßæåôáé iÝóá aðú Ýíá jail.

## 16.3 Åéóáãùãþ

Iéá éáé ç äéá ÷ åßñéóç åíüò óðooðPIáöiò iðiññåß íá åßñáé áÿöéëëç éáé ðåññðëëëç, áíáðöý ÷ èçéåá áññååðÜ åññååëåßá óá iðiñßá iðiññiyí íá êÜññöi ôç æùP åíüò äéá ÷ åññéóôP ðïëý ðëí áÿëëëç. Óá åññåæåßá áðoðÜ ðññööÝññöi ëÜðiæåð ðññüøèåðåò ääñíåðüöçöåò üöi äöriñÜ öiï ðññüði ååñéåðÜóðåóçö, ñÿëìéöçö åítiò óðooðPIáöiò. Iéá åðü ðéð åññåðóßåò ðiòi ááiÍfåðåé íá åéðååéÝóåé êÜëå äéá ÷ åññéóôPò óðooðPIáöiò, åßñáé íá ññðeñßóåé óúðoðÜ ôçí áðoðÜëæåé ðiòi óðooðPIáöiò, ðññiæåéÍññöi íá ðññööÝññåé óðeo ðñçñåóßåò åéá óðeo iðiñßåò Ý÷åé ðññiæñáiiåóéóðåß, ÷ùñßò íá åðéóñÝðåé óðiñlåéååðiñyó óðçí áðoðÜëæåé.

### 16.3.1 Ôé Åßíáé íá Jail

Óá éæéöiññáéé Ü óooôPiâoá ôýðiõ BSD, ðánâb÷áí ði chroot(2) áðü ôçí áði÷P ðiõ 4.2BSD. Ç áîòiõP chroot(8) ìðiññáß íá ÷ñçóeiñðiõcèåß æáá íá áéëÜiâé ðií ãiiéü éáôÜeïiä iéáò ñÜäáð æéâññáóéþí, áçïéiññâþíôá Ýíá áóööáé Ýð ðâñéáÜeëií, fâ÷ùñéööú áðü ði ððüeïiðí ðýóðöçíá. ¼oâð æéâññáðßâð áçïéiññâýíôáé óá Ýíá ði Ýðiõi ðâñéáÜeëií, äáí Ý÷iõi ðñüöááóç óá áñ÷ñâð æáé ðüñiõð Ýìû áðü áðöü. Æáá ðâñöü ði ëüäí, áí iéá ððçññâðßâ ðiñ Ý÷âæé Ýðá óá Ýíá ði Ýðiõi ðâñéáÜeëií, éáé èÜðiõiø åéóâiøÝáð éâðâoÝñâé íá æéâññáýóáé óá áðoðP, äá èá ðiõ áðéññâðßâ ç ðñüöááóç óöi ððüeïiðí ðýóðöçíá. Ç áîòiõP chroot(8) ábíáé ðiøý éâæP æáá áðéÝð áññâñðßâð ié ðiðßâð äá ÷ñâðéÜæiññáé íá ábíáé ðiøý áð Ýééññâðò P íá æáé Ýðiõiø ðiøýðiõéá èáé ðññiçaií Ýíá ÷âññâðçññéööééÜ. Ùòðöüñi, áðü ôçí áñ÷P ðôçò éâÝáð ðiõ chroot, áñ Ýðeçéáí áññâðòß ðiñüðiø æáá íá ìðiñÝóâé èÜðiõiø íá iâöýââé áðü ði ðâñéáÜeëií áðöü. Ðán' üëi ðiõ Ý÷iõi æéññéüñâß ðiøéÜ óöÜëiâoá óðêð ðññööáðßâð åéâññáðò ðiõ ððñPíá ðiõ FreeBSD, Pôáí iâéÜeáññ üöé ç chroot(2) äáí Pôáí ç éááíéñP èýóç æáá ôçí áðoðÜeéç ððçññâðéþí. ðññâðâð íá ðiøýðiõéåß Ýíá iÝí ðiðiøýðöçíá.

Áðóðüò áðíáé Ýíáò áðü òiðò êýñéiðò ëüäiðò aéá ôçí áí Üðôðôíç ôùí *jails*.

Óá jails áâæößbúórá íå äeÜöñiòò ôñüðròò ðçí éäÝá ôiò ðáññääéóéäéiy ðáñéáÜëëiòò ôiò chroot(2). Ôóï ôððééü ðáñéáÜëëiòò ôiò chroot(2), ié äéâññääóßåò ðáññiñßæëíôáé iùñiò ùò ðñiò ôi ïÝñiò ôiò ôððôðßláöiò áñ ÷ åßùí üðiò ìðiñiy íá Ý÷iò ðñüöðåáç. Íé ôððüëëiòí ðüñiè ôiò ôððôðßláöiò (üðùò ié ÷ñiÞðôåò, ié ôñÝ-iiðåò äéâññääóßåò, ôi ôððiòýôðçia äéêðýùöç) åßíáé eíëiù ÷ñçóöiè iåôðáý ôùí äéâññääóéþi ôiò ðáñéáÜëëiòò chroot éáé ôùí äéâññääóéþi ôiò host system. Óá jails åððåéðåßñiòí áðöü ôi ìñiöÝëi, íå ôçí äéëñééiòíßççöç ü ÷ e iùñiò ôçò ðñüöðåáççò ôóï óýðôçia áñ ÷ åßùí, áéëÜ åðßçò ôùí ÷ñçóöþi, ôiò ôððiòôððôðßláöiò äéêðýùöçò ôiò ððñßrá ôiò FreeBSD éáé iåñééþi áéüiç ðñáàíÜöùí. Ðáñéóðüðâñá áéá ôéð äéæéÝóëlåò åiñiëÝò ðiò ìðiñiy íá ÷ñçóëiòíçëiý áéá ôç ñýëìéöç êáé ôiíÝëåâ ÷ i åñiò ðáñéáÜëëiòò jail iðiññåßôá íá åññåßôó ôóï Õíßá 16.5.

Ôi Jail Ý÷åé ôÝóóâñá êýñéá óôïé÷åßá:

- jáí êáôÜëïäi iå äéêP ôiõ äñP — ôi áñ÷éü óçìâßí ôiõ iðiñi åéóÝñ÷åôáé Ýíá jail. Áðü ôç ôôéäiP ðiõ iéá äéâññáóßá âñßóéâðáé iÝóá óå Ýíá jail, äáí åðéôñÝðåôáé íá ââåé Ýíù áðü ôiõ êáôÜëïäi áðôü. Ôá ðñiâëPiáôá ðiõ ôáééâðùñiýóá ôiõ ó÷åéáòi ôiõ chroot(2) äáí åðçñâÜæïòi óå jails ôiõ FreeBSD.
- já hostname (üññá óôôðPiáôi) — ôi hostname ôi iðiñi èá ÷ñçóéiiðiéçèåß iÝóá óôï jail. Ôá jails ÷ñçóéiiðiéiyíôáé êôñßùò äéá ôçí åîôðçñÝôçóç äéêôðâéþí ðôçñâðéþí, åðñiÝíù ñçóéiiðiéiyíôáé hostname ôiõ íá ðâññéñÜòâé ðâðôü ÷ññíá êáé ôç ÷ñPóç ôiõ, iðiñâß íá åiçëPóåé âñéâðôÜ ôiõ äéä÷åéñéôP óôôðPiáôi.
- Iéá äéâýëöíç IP — áðôP ç äéâýëöíç áîðéôðié÷åß óå Ýíá jail êáé äáí iðiñâß íá äeëÜiâé êáðÜ ôç äéÜñéâéå ôçð æùPò ôiõ. Ç äéâýëöíç IP åñüò jail åßíáé ôôðPèùò iñá åéâýëöíç ôýðiõ alias åéá iéá Päc ðôðÜñ÷iðôåP åééðýiõ (network interface), åeëÜ êÜðé ôÝòi iéá äáí åßíáé åðâññâßôçöi.
- Iñá åíòiP — ç äéâññiP ðñiò Ýíá åéôâéÝóëi ôi iðiñi èá åôðâéâßôáé iÝóá óôï jail. Ç äéâññiP áðôP åßíáé ó÷åôéêP ùò ðñiò ôiõ åññéü êáôÜëïäi ôiõ ðâññéÜëëiðiò ôiõ jail, êáé iðiñâß íá åéäöÝñâé ðiëý áðü jail óå jail áíÜëïäi iå ôi ñôâññéñéYí ñ ðâññéÜëëi.

Åêôüò áðôþí, óå jails iðiñiýí íá Ý÷iði ôéò åééÝò ôiõ ñÜäâð ÷ñçóðþí êáé ôiõ åéêü ôiõ ÷ñPóôç root. ÖôôééÜ, iÝëåâ÷iði ðiði Ý÷åé i÷ñPóôçò root ôiõ jail, ðñiçññßæâðáé iÝóá óôï ðâññéÜëëi ôiõ jail, êáé áðü ôçí iðôééP åññíßá ôiõ host system, i÷ñPóôçò áôôüò åáí åßíáé ðâññéÜëëi ôiõ jail. ÅðéðéÝíi, i÷ñPóôçò root ôiõ jail, äáí iðiñâß íá åéâññéÝóåé êñßóéñâðô åññâñâßôå ñôï óýôôçíá Ýíù áðü ôi ðâññéÜëëi ôiõ jail(8). Ðâññéñüôâñâðô ðëçññiñßôå õ÷åôééÜ íå ôéò åðíáññüôçôå ëáé ôiõ ðâññéñéñiýò ôiõ root èá åññâßôå óôï ÕiPiá 16.5.

## 16.4 Äçìéïññâþíâò êáé ÅëÝâ÷iñðâò Jails

ÍññééiB äéá÷åéñéóôÝò óôôôçìÜòû ëáôçññéiðiéiyí óå jails óå åýí åíüôçôåð: óå “complete (ðëPñç)” jails, óå iðiñâß íññééiðiéiyí óåé Ýíá ðññâññâðéü óýôôçíá FreeBSD, êáé óå “service” jails, óå iðiñâß ÷ñçóéiiðiéiyíôáé äéá iéá åðâññiP ðôçñâðéþá, ðiõ ðééáíüí åôðâéâßôáé iå åéâééÜ ðññüüleá. Áôôüò åßíáé Ýíáò ñiçôééüò åéá÷ùñéòiüò êáé åáí åðéâññÜ óôç åéâññéâóßá äçìéïññâðô åññâðô åíüò jail. Ç óâëßää manual ôiõ jail(8) ðâññéÝ÷åé êáôðôïðééñéÝò ðëçññiñßôå ãéá ôç åéâññéâóßá äçìéïññâðô åíüò jail:

```
# setenv D /here/is/the/jail
# mkdir -p $D ①
# cd /usr/src
# make buildworld ②
# make installworld DESTDIR=$D ③
# make distribution DESTDIR=$D ④
# mount -t devfs devfs $D/dev ⑤
```

- ① Í êáëýôâñiò ôññüðiò åéá íá åâééñPóâåå åßíáé iå ôçí åðéëëiP iéáò èÝóçò (äéâññiPò) åéá ôiõ jail óåò. Åêâß èá åñßóéññâðéå åðiñéçêåði Ýíá óå áñ÷åßá ôiõ jail üöi åöññÜ ôi òýôôçíá óåò. Iéá êáëP éäÝá åßíáé ôi ñusr/jail/jailname, üðiði jailname ôi hostname iå ôi iðiñi èá åíáñññâðéå ôiõ jail. Òi óýôôçíá áñ÷åßùí /usr/ Ý÷åé óôðPèùò áññéâðü ÷þñi åéá ôi òýôôçíá áñ÷åßùí ôiõ jail, ôi iðiñi, åéá Ýíá “complete” jail åßíáé iññéññéÜ Ýíáò êëþñiò êÜëå áñ÷åßùí ôiõ åáóééñü ñôôðPiáôiò iéá ðññâññéâññÜ óôôðPñçò ôiõ FreeBSD.
- ② Òi åPiá áôôüò åáí åðâññéâðéå åí Ý÷åôå åññâññüôôðóåé óôi ðâññâññüí ôi åáóééü òýôôçíá ÷ñçóéiiðiéþíâò ôçí åíññiP make world P make buildworld. Iðiñâßôå åðëþò íá åâééññâðôPóâåå ði ðôðÜñ÷iññéñéÝò åññâññüñßôå ñôï iÝí jail.

- ③ Ç áñiñëP áôôP èá àìðëiñôßôåé ôii êáôÜëiñi ðiñ åðeeëÝíáôå áæá ôi jail ià üëá ôá áðáñáßôçôá áñ÷åßá, áéâëëièPêåò, ôåëßååò iiPëåéåó èëð.
  - ④ Ôi distribution target ôiõ make áâéâèéôðÜ üëá ôá áñ÷åßá nñõëiñôåùí ðiñ áðáéöïýíôåé. Iå áðëÜ ëüäéå, áâéâèéôðÜ êÜëå áñ÷åßí áðü ôi /usr/src/etc/ ôiõ êáôÜëiñi /etc ôiõ ðâñéåÜëeñiòi jail: \$D/etc.
  - ⑤ Äå ÷ñâéÜæåôåé íá ðññôáñôPôåôå ôi devfs(8) óôi ðâñéåÜëeñi ôiõ jail. Áðü ôçí Üëeç ùìùò, üëåò, P ó÷åâüüí üëåò ié åöánñiäÝò ÷ñâéÜæiñôåé ðññüôååóç óå ôiñëÜ÷éôòi ìßá ôóôéåðB, áíáëüåùò ià ôiõ ôéïòü ôçò åöánñiäßB. Åßíåé ðiñý öçíáñôéü íá åéÝå÷åðåé ç ðññüôååóç ôóôéô ôóôéåðB ïÝóå óå Ýíá jail, êáèþò eáñéåòiÝíå ññõëiñôåéò ïðiñåß íá áðéñññ Ýòiñi óå êÜðiñi áéóåñëÝá íá êÜíñié “Üó÷çìá ðáé÷íßæé” ïÝóå ôói jail. I Ýëåå ÷iõ ôiõ devfs(8) áßíåôåé ïÝóù áñiùò ôóñüëiõ eáñüñiñi ié iðiñßié ðâñéåññÜöiñôåé ôóôéô ôåëßååò manual ôiõ devfs(8) êáé ôiõ devfs.conf(5).

Áðü ócíg óóéáíP ðið Y ÷ áé ááæáðóóâæåß Ýíja jail, ìðriñâß íá áéêéíçéåß iá ôc ÷ ñPóçc ôcò áíðiøÞò jail(8). Ç jail(8) áY ÷ áôáé ÓÝóðâñeo õði ÷ ñâùöeé Ýò ðánái Ýðñiøò ie iðiðâðò ðâñeññ Üðiøðáé ôói ÔiÞia 16.3.1. Íðiñâðóá íá äþoâðó éáé Üðeëâð ðánái Ýðñiøò, ð. ÷., æá íá áéðâæÝóðâðò ieá áéâñâðóß ôói ðâñeññ Üðeëí òið jail iá ôeó Üðâæâðó áíüò ôðâæâññei Ýñi ÷ ñPóðc. Ç ðáñÙiâðñiò command áâñâðó Üðâæ áðü òií ðýði òið jail. Áéá Ýíá ðééñññi ðýði, ôi /etc/rc áðiñáé ieá éæéP áðééññi, ieá éáé ôóçí iðóðóß eá ëeññiðiðiðóâé ôçí áéâñâæâðóß áéðiðiðóçò áíüò ðñâññiðâðééiy ôðóðPiáññiò FreeBSD. Áéá Ýíá service jail, ç ðáñÙiâðñiò áâñâðó Üðâæ áðü ôcí ððçñâðóß P ôcí áðâññiðP ðið eá ôñ Y ÷ áé ïÝóð ôói jail.

Óá jails óóíPèùò íâéêííyí éáóÜ ôçí áâéâíçóç éáé í iç-áíéóíüò rc ôïõ FreeBSD ðáñÝ ÷ áé Yíáí áyéíei ôñüði áéá íá áßíâé êÜôé ðÝôíéí.



```
jail_enable="YES"      # Set to NO to disable starting of any jails  
jail_list="www"        # Space separated list of names of jails
```

**Óçìàßúóç:** Óí üííá ðiö Ý÷åé êÜeå jail óóç ëßóåá jail\_list åðéóñÝðåðåé íá ðåñéÝ÷åé iüíí åéóåñééiçóééïýò ÷åñáééôþñåò.

2. Áéá é Üéå jail ðiö ðöÜñ÷ áé ööí jail\_list, èá ðñÝðåé íá ðñïööååëß iéá nñÜäá áðü ñöðëiñöåéö ööí rc.conf(5), ié iöñßåò eá öí ðåñëæñÜöiöí:

```
jail_www_rootdir="/usr/jail/www"      # jail's root directory  
jail_www_hostname="www.example.org"   # jail's hostname  
jail_www_ip="192.168.0.10"           # jail's IP address  
jail_www_devfs_enable="YES"          # mount devfs in the jail  
jail_www_devfs_ruleset="www_ruleset" # devfs ruleset to apply to jail
```

Ç ðñiäðéëåái Ýíç åêëßíçóç ôiõ jail iÝòu ôiõ rc.conf(5), èá iâééíPôåé ôi script ôiõ jail /etc/rc, ôi iðiþi ððriëÝôåé üöde ôi jail åßíáé Ýíá ieiëeçñùi Ýíi åééiiéüu óyóôöçìá. Åéá service jails, ç ðñiäðéëåái Ýíç åêëßíçóç ðñÝðåé íá åééÜiåé, iñßæiïòå êáô Üeëçéå ôçí åðééiP jail\_jailname\_exec\_start.

**Óciåßùóç:** Æá ðëþñç ëßóôá ôúí äéáèÝóéìùí åðééïäþí, äåßôå ôí rc.conf(5).

Ôi script /etc/rc.d/jail iðiñâb íá ÷ñcôéiðiéçèâb æá íá iâééíþóâé þ íá óoâiáðþóâé êÜðiði jail ÷åéñiðiþíçôá. ÐñÝðâé üìùò íá õðÜñ÷åé ç áíðþóðié÷ç ç éâóâ÷þñcôç óöi rc.conf:

```
# /etc/rc.d/jail start www
```

```
# /etc/rc.d/jail stop www
```

Áéá ôcý þbñá áaíl ððÜñ: áé êÜðiieìò áðüeëðôá óùñóðüò ðññüðìò áéá íá ðâññláðþóåðâ êÜðiieì jail(8). Áðôú ððìâðáßíáé, æüðé ìé áíðiieÝò ðiò ÷ñçóeiiðiieíýîðáé óðíÞèùò áéá íá ðâññláðþóïò íà áoðÜëæéá Ýíá óýðóçíá, áaí iðiinýí íá ÷ñçóeiiðiieçëiýí Ýðóá óði ðâññéáÜëeíí áíðüò jail. Í êaéyðâññò ðññüðìò áéá íá ðâññláðþóåðâ Ýíá jail áßíáé íà ðíç áåðóÝëáðç ôçð áéüëiðeçð áíðiieÞò Ýðóá áðü òi ßæéí òi jail Þ íà ÷ñÞðç ôiò áiççëcôéeíý ðññiañÜìíâòiò jexec(8) Ýù ãðü áðôú:

```
# sh /etc/rc.shutdown
```

Dánéóðuðáññáð ðéçñíññéññáð ó÷ áðóééÜ íá áðóP óç áæáæééáðBá lðinñáðBá íá áññáðBá óðóç ñáééBáá ãíçééáðBá ðið jail(8)

## 16.5 Ëåðôïìåñþò Ñýèìéóç êáé Äéá÷åßñéóç

ÕõÜñ÷iõí áñêåôÝò åðéëïä Ýò ðiõ iõiññý íá åöáññiööiyí óå Ýíá jail, êáèþò êáé æÜöiñié ôñüðié ãéá íá óõiñäóóôåß Ýíá óyóöciá FreeBSD iå jails ðññiâéï ÿiõí íá ðánÜäiõí åöáññiä Ýò ðöçëüöåñiõ åðéðÝäiõ. C áñiûöcôå áôóôP ðáññiõéÜæåé:

- ÎñêééÝò áðü ôéó áéáèÝóéíå ãðééïäÝò áéá ôçí ñýèìéóç ôçò ôðiðåñéöïñÜò êáé ôùí ðåñéïñéóïþí áóðáëåßáò ðiõ ðeïðiéýfôáé áðü ôçí áâæáò Üðôáóç áîüù jail.
  - ÎñêééÝò áðáññiäÝò ðøçëïý áðééÝäïò áéá ôç áéá ÷åßñéóç jails, ié iðiðåò áßíáé áéáèÝóéíå ïÝòù ôçò ôðééïäÞò ôùí Ports ôiõ FreeBSD êáé iðiññý íá ÷ñçóéïðiéçëïý ôóçí ðeïðiðåçcós iëfëéçñùí Ýíùí éýðåùí ià ôç ÷ñÞóç jails.

### 16.5.1 Åñääéåßá óooôþìáôïò ôïõ FreeBSD ãéá ôç ñýèiéóç jails

- security.jail.set\_hostname\_allowed: 1
  - security.jail.socket\_unixiproute\_only: 1
  - security.jail.sysvipc\_allowed: 0
  - security.jail.enforce\_statfs: 2
  - security.jail.allow\_raw\_sockets: 0
  - security.jail.chflags\_allowed: 0
  - security.jail.jailed: 0

Íe iāōāāēçō Ýò áōō Ýò iđiñiyí íá ÷ nçóéiiđiçëiyí áðü ôíí äéá ÷ áñéñéóôP ôiõ host system ðñiêåéí Ýñi Íá ðñiøé Ýóåé P íá áöäéñé Ýóåé ðåññéñéöiñyò ié iđiñiyé ðôÜñ ÷ iñi ãñ ÷ eéÜ ñôíí ÷ nPôôc root. ÕðÜñ ÷ iñi ùiùò êáé eÜđiñéie ðåññéñéöiñib ié iđiñiyé äáí iđiñiyí íá áöäéñåèiyí. Í ÷ nPôôc root äáí åðéññÝðåôåé íá ðñiñóáññÜ P íá áðiñ-ðñiñóáññÜ óóôôPìåôå áñ ÷ åbñú iÝóá áðü Ýíá jail(8). I root iÝóá óá Ýíá jail äáí åðéññÝðåôåé íá öiññôþoåé P íá áðiññôþoåé ôiññôþoåé (rulesets) ôiõ devfs(8), ôi firewall, êáé aëÜöiññô Üeëåò åññåóßåò aëá ÷ åßñéñóçò ié iđiñßåò ÷ nñåéÜæiñôåé ôñiñđiñßçóç ôuï åäññÝñi ôiõ ðññPíá, üðùò åéá ðññÜååéäíä iññéòiùò ôiõ securelevel ôiõ ðññPíá.

Ôi âáóéëü óyóôçìá ôiô FreeBSD ðåñéÝ ÷ åé ôá âáóéëÜ åññääëåßá æéá ôç ðññäiïëÞ ðëçññöiñéþí ó÷åôéëÜ ià ôá åíâñäÜ jails, êéé åðßòcò æáé ôçí áíÜeåóç öoåêåéñéí ÿíü íåîöñéþí æéá ÷ åßñéóçò ôá èÜðiéí jail. Ié åíöñéÝò jls(8) æéé jexec(8)

ადრიაესტა ი კონფიგურირებულია FreeBSD, რომელიც მომზადებს მართვის დოკუმენტაციას და მიზანი არის მართვის დამატებითი უძრავი და უსაშორებელი მეთოდის გადამზადება.

- ĐñiiäiëP ëßóöåôå ôùí áîññäþí jails êáé ôïï áîðßóôïé ÷ ùí ÷ áñáêòçñëóôéêþí ôïõò - jail identifier (JID), äéåýèõíóç IP, hostname êáé path.
  - Đñiööüëëçóç óå êÜðiëí áîññäü jail, áðü ôï host system, êáé áâôÝëåóç êÜðiëåò áîôïëPò iÝóá óôï jail P áâôÝëåóç áññäáóéþí äéá ÷ áßñéöçò iÝóá óôï jail. ÊÜðé ôÝòiëí áßíáé eáéåßöåñá ÷ ñPóëii üöáí ï ÷ ñPööçò root áðéëòiåß íá ôåñìåôßöåé íå áóöÜëåéá êÜðiëí jail. Iðriñåß áðßöçò íå ÷ ñçöéüðiëçèåß ç áîôïëP jexec(8) eáá ôçí áâôÝëåóç êÜðiëíò shell iÝóá óôï jail ðñiiëåéí Ýñòí íå áâôëåäóöýí áññäóßåò eáé ÷ áßñéöçò, ãéá ðánÜåâéäíá:

```
# jexec 1 tcsh
```

## 16.5.2 Åñääéåßá äéá÷åßñéóçò õøçëíý åðéðÝäïõ óôç óóëëíäþ Ports óïõ FreeBSD

ÁÍÚlaóá óóéó ãeÜöriñåò åöáññiäÝò ôñßöùí êáðáóéåðáóöþí ãéá ðc ãéá ÷ åßñéóç ôuì jails, Ýíá áðü óá ðiëi iëëéëçñùí Ýíá êáé ÷ ñÞóéíá ðáêÝóá åßíáé ði sysutils / jailutils. Áðiøåéåß Ýíá óýíëi iééñþí åöáññiäþí ie iðiøåò óóílaéóöÝñiöí óðc ãéá ÷ åßñéóç ðiðjail(8). Áéá ðåñéóóüòåñåò ðeçñiöiñßåò, åßßåð ðoíi áééôðáæü ðiðjail(8).

## 16.6 ÅöáñjjäP ôùí Jails

### 16.6.1 Service Jails

*Óðráðéóðiñ Ü ðið Daniel Gerzo.*

Ç áíüöçôá áôôP åbíáé ááóéóí Ýíç ôôçí éäÝá ðïo ðáññööé Üôôçêå áñ ÷ ééÜ áðú öií Simon L. Nielsen <simon@FreeBSD.org> öií <http://simon.nitro.dk/service-jails.html>, éäèþo êáé óå Ýíá áíáíâùí Ýíí Üññëí öií Ken Tom <locals@gmail.com>. Ôôçí áíüöçôá áôôP èá óáð åäbññöìå ðùò íá ôôÞóåôå Ýíá óýôôçíå FreeBSD ðí iðibí íá áæáé Ýôåé Ýíá áðéðé Ýíí åðbñðääí áôôÜééåð, iå ôç ÷ ñPöç öií jail(8). Õðïe Ýíöiòå üöé ðí óýôôçíå ôñÝ ÷ áé öiðëÜ ÷ éóöií RELENG\_6\_0 êáé üöé Ý ÷ åôå êáôåñíÞóåå üéåð öéð ðñiçäýíåñå ðëçññöiñbhåð öií èåðäéåßíö.

#### 16.6.1.1 Ö÷åäéáóìüò

Já áðü ðá ócáiáðééüðóðána ðñiðæþíðá ìá ðá jails áßíáé ç æáá ÷ áßñéóç ôçò æáééáðóðá áíáðáæðóðáu. Áðóðu óðßíáé íá áßíáé ðñüðæçíá æüðé òi êÜéð jail ðñÝðåé íá áçleíðñæçéð áðü ôçí áñ÷Þ óá êÜéð áíáðÜééóç. ÓðíÞèùðo áðí áßíáé ðñüðæçíá áí Ý ÷ áðóð Ýíá iùñi jail, iéá éáé ðñüðæðóðáæ áéá ð ÷ áðóðéÜ ãðéÞ æáééáðóðá, æéëÜ áßíðóðáé êíðñáðóðéÞ éáé ÷ ñiiñiðüñá áí Ý ÷ áðóð ðiéeÜ jails.

**Đññâéäïößçóç:** Ié ðáñâéÜòù ñòëìßóåéò ðññüðïëÝôïöí àïðåéñßá ià ôí FreeBSD éáé ôç ÷ñþöç ôùí äéÜöñùí ÷ñáñéöçñéöôééþí ôíö. ÅÜí óá ðáñâéÜòù åþïáôá óáò óáßïíöáé ðïëý ðåñïßöëïéá, åßíáé éåëýôåñá íá ñïßïåôá íéá iáðéÜ óá ëÜôé ðïëí áðëü üðòù ôí sysutils/ezjail, ôí ðïëßí ðåñÝ·åé Ýáí áðëïëüðåñí ôññüðí äéá ÷ñþñéöçò ôúí jails ôíö FreeBSD éáé äái åßíáé ôúöí åßäéæéäöíÝíí ñóöí ié ðáñâéÜòù ñòëìßóåéò.

Ç éä Ýá áôôP Ý÷åé ðañiõóéáôôåß æáá íá èýóåé ôÝôïeïo åßäiõò ðñiäëþiaôá, iå ôçí åíþeåéá ôçò êïeïPö ÷ñþoçò üöi öi äôôsáðüi ðåñéóóüôðåñuí añ ÷åßuí iåðåáiy ôuñ jails, iå Ýíá áôóäéP üùñu ñôñuði — ÷ñçöeïiðiëþiðå ðñiøáññþoåéö ôýðiö mount\_nullfs(8) êáé iüñi æáá áfÜäñuóç (read only) Ýðóéþ þþôå ç ááñuÜeïeóç íá åßäiæ åðeïeüôåñç, êáé ç ÷ñþoç

**Óþjóðunós:** Þáñáæðiáða óðœðiáðeþí óÝðiéið óýðið: Ýíáð HTTP server, Ýíáð DNS server, Ýíáð SMTP server, êð.

Íé óóü÷íé ôúí ðáñáêÜôù ñõèìßóåùí åßíáé:

- Äçìéïõñãßá áðëþí êáé êâðåñíçöþí jails. Áðôü óciáßíåé üðé äðí èá ôñÝiiòiå Ýíá ðëÞñåò installworld óå êÜèå jail.
  - Åýéïëç ðññóðþêç êáé äéáññðþ jails.
  - Åýéïëç áíáåÜëiéþ ðððñ÷üíðùí jails.
  - Äõíáóüðçöá äçìéïõñãßáò ðññóáññòiÝñò òiÞiaòò òiñ FreeBSD.
  - ¼óí ðåñéöóüðåñç áóðÜëåéå åßíáé äõíáðüí, lå åéá÷éóðiðþçöç ôçò ðéèáññöçöåò êáêüäiñöçò ÷ñþçò.
  - Åññéüíüìçöç ÷þññò êáé inodes.

¼ðùò Ý-ïõià Þäc ðäé, i ó ÷ ääéáòiùò áðôòü ãîáñò Üôáé éäéáßôðâñá áðü òçí ýðâñïç åiùò áñ ÷ eéiy template óði iðiþi åáí áðéóñò Ýðâñáé ç åããñáöÞ åäãñí Ýíù (äiùóðü ùò **nullfs**) êáé òi iðiþi ðñÝðâé íá Ý-÷ áé ðñiøáñòçèåß óá êÜeå jail, üðùò áðßçò êáé óðic ýðâñïç åéá êÜeå jail iéáò óðóéåðÞò ðiò íá áðéóñò Ýðâé ôüöi òçí áíÜäiùóç üöi êáé óðic åããñáöÞ. Iéá òÝôiéá óðóéåðÞò iðiñåß íá åßíæé êÜðiéiò iâ ÷ ùñéóðü òðoééüò åßóéëiò, iéá êáðÜðiçóç, Þ Ûðiéá óðóéåðÞ vnode md(4). Óöi ðáñáêÜðù ðáñÜäåéäiá, èá ÷ ñçóéiiðiÞòiõià ðñiøáñòÞóåéò ôýðiò **nullfs** óðéò iðiþåò èá áðéóñò Ýðâñáé åããñáöÞ êáé áíÜäiùóç.

Ҫ ӓiiP öiõ óõóôPiaôïò áñ ÷ åßùí ðåñéäñÜöåôáé óôçí ðáñáêÜôù ëßóôá:

- ÉÜèå jail èá ðñiöáñö Üôáé êÜôù áðü oíí éáôÜëiäi /home/ j.
  - Ôí /home/ j/mroot åßíáé ôí template æáé ôí êÜèå jail éáé ç éáôÜòíçóç iúñi áíÜñùóçò æáá üéá ôá jails.
  - Èá äçíëiöñâçèåß Ýíåð êåñüò éáôÜëiäið æáá êÜèå jail êÜôù áðü oíí éáôÜëiäi /home/ j.
  - ÉÜèå jail èá Ý÷åé Ýíáí éáôÜëiäi /s, i iðiñbiò èá åßíáé óýíäåòiò ðñiò ôí åâãñÜøëi ïÝñiò ôíñ oóóôþiaòiò.
  - ÉÜèå jail èá Ý÷åé ôí æéüô åâãñÜøëi ïÝñiò ôí iðiñbi èá åâóßæåðáé ôóï /home/ j/skel.
  - ÉÜèå jailspace (ôí åâãñÜøëi ïÝñiò êÜèå jail) èá ðñÝðåé íá äçíëiöñâçèåß ôóïí éáôÜëiäi /home/ js.

**Óciáñúos:** ¼éá áóðóÜ ðótiúðièÝótiði ündé óá jails áññðóéíñðiáé éÜðóù áðü ðiñi éáðÜëtiä /home. Áðóðü áÝáñáéá iðiñáñ íá áééÜtiäé óá iðiéáñðiðá áóðáñðò èÝéåððá, áééÜù éá áðçññáÜðóáé üéá óá ðáññáéÜðóù ðáññáñññáðá.

#### 16.6.1.2 Äciéïõñãþíôáò ôï Template

Çáíüôçôá áôôþ èá ðåñéãñÜþåé ôá áþìáðåá ðiõ ÷ñåéÜæiiðåé ðñïéåéÝiiõ íá äçééññþóåôå öi ðñùôáñ÷éêü template öi iðiþi èá ðåñéÝ ÷åé öi ôíþìá ôúi jails ðiõ áßñáé iùñi áéá áíÜáúóc.

Åßíáé ðÜíöiôå éæíÞ eäÝá íá áíâåáèìßæåôå ôi FreeBSD óôç ôåëåöôåßá Yéëiôç -RELEASE. Åéá ôi óéïðü áôöü, äéåáÜóôå ôi áíôßóöié ÷ i êåöÜéåéí  
([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/books/handbook/makeworld.html](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/makeworld.html)) óôî Åã ÷ åéñßæéí. Óôç

Ðâñßððùóç ðiõ ç áíáâÜèìéóç äái áßíáé áöéêôP, èá ÷ ñâéáóâßôå buildworld áéá íá iðiñÝóâôå íá óðfå÷ßóâôå. ÅðéðëÝí ëá ÷ ñâéáóâßôå òi ðâéÝôi sysutils/cpdup. Èá ÷ ñçóéiiðiéÞóiðiå òi áïçèçéêü ðñüâñáìá portsnap(8) áéá íá êáðââÜðiðiå òc óðeëriäP òúí Ports. Áéá òiðð íâi-âéóâñ÷üìñiðð, óðíßóâðáé ç áíÜâñúóç òiõ êâðâæáßið áéá òi Portsnap ([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/books/handbook/portsnap.html](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/portsnap.html)) óòi Åä÷åéñßæéï òið FreeBSD.

1. Áñ÷éêÜ, äçìéiõñÞóôå ìéá ãiñP êáðâëüäùí áéá òi ÿóóôçìá áñ÷âßùí òi iðiði ëá áßíáé íüñí áéá áíÜâñúóç, êáé òi iðiði ëá ðâñéÝ÷âé ôá áéðââÜóéíá (binaries) òið FreeBSD áéá ôá jails. Óðc óðiÝ÷âéá ðçñáßíâôå òðií ëáðÜëíäü ðñðið âñßðéíðâé ôá áñ÷âßá ðçñáßið ëþæéâá (source tree) òið FreeBSD êáé áâðâðâðóôPôå ôá áíðßóôîé÷á áñ÷âßá òði jail template:

```
# mkdir /home/j /home/j/mroot
# cd /usr/src
# make installworld DESTDIR=/home/j/mroot
```

2. Åðùââíi ãiñP áßíáé íá ðñiâðiðÜóâôå òc óðeëriäP òúí Ports òið FreeBSD áéá ôá jails üðùð åðßóçò êáé Ýíá FreeBSD source tree, òi iðiði ëá ÷ ñâéáóâß ãéá òi mergemaster:

```
# cd /home/j/mroot
# mkdir usr/ports
# portsnap -p /home/j/mroot/usr/ports fetch extract
# cpdup /usr/src /home/j/mroot/usr/src
```

3. ÄçìéiõñÞóôå òi óðâæâðûí áéá òi òiñP áiñ òi õððâðóâðið ùðið ðñiñßæâðâé áéá áíÜâñúóç êáé áâðñáöP:

```
# mkdir /home/j/skel /home/j/skel/home /home/j/skel/usr-X11R6 /home/j/skel/distfiles
# mv etc /home/j/skel
# mv usr/local /home/j/skel/usr-local
# mv tmp /home/j/skel
# mv var /home/j/skel
# mv root /home/j/skel
```

4. ×ñçóéiiðiéÞóôå òi mergemaster áéá íá áâðâðâðóâðóâðâé ôá áñ÷âßá ñððéðóâùí ðiõ eâßðiði. Óðc óðiÝ÷âéá áéá áéâññÜðóâü ùðið òiðð Ýîñá êáðâëüäiðð ðiõ äçìéiõñâß òi mergemaster:

```
# mergemaster -t /home/j/skel/var/tmp/temproot -D /home/j/skel -i
# cd /home/j/skel
# rm -R bin boot lib libexec mnt proc rescue sbin sys dev
```

5. Ôþñá, äçìéiõñÞóôå óðiñÝóiðð áðü òi ÿóóôçìá áñ÷âßùí óði iðiði áðéóñÝðâðâé ç áâðñáöP, ðñið òi ÿóóôçìá áñ÷âßùí ðið áßíáé íüñí áéá áíÜâñúóç. Áâðâðâðéâðóâü ðñð ïé óýíâðiíéÝ÷iði ãçìéiõñçèâß óðéð òúðð Ýð ëÝâðéð s/. Ç ýðâñíç ðñââðâðééþí êáðâëüäùí P ç äçìéiõñâßá êáðâëüäùí óá ëÜëið ëÝâðéð ëá iäçñÞóiði òcí áâðâðóâðóâðâóç òâ áðið ÷ßá.

```
# cd /home/j/mroot
# mkdir s
# ln -s s/etc etc
# ln -s s/home home
# ln -s s/root root
# ln -s ..s/usr-local usr/local
# ln -s ..s/usr-X11R6 usr/X11R6
# ln -s ../../s/distfiles usr/ports/distfiles
# ln -s s/tmp tmp
# ln -s s/var var
```

6. Óáí ôåëåôôåßí âÞìá, äçìéïõñâÞóôå Ýíá ãåíéêü áñ÷åßí /home/j/skel/etc/make.conf ìå ôá ðáñáêÜôù ååäñîÝíá:

```
WRKDIRPREFIX?= /s/portbuild
```

,: iiôåò mñßóåé òï WRKDIRPREFIX ìå áðôüí ôíí ôñüðí, èá ìðiñåßôå íá låðååæùôôßôåðå ports ôïð FreeBSD iÝóá óå êÜëå jail. Èðiçèåßôå üöé i êáðÜëíäiò ôùí ports åßíáé iÝñiò ôïð ôôôôÞìåòiò áñ÷åßùí ðið Ý÷åé ðññóáñôçèåß iüñií åéá áíÜäñûóç. Ç ðññóáññiòiÝíç äéåññiP ãéá òï WRKDIRPREFIX åðéôñÝðåé ôçí låðååæþôðéóç ôùí ports óöí ååññÜøéii iÝñiò ôïð êÜëå jail.

### 16.6.1.3 Äçìéïõñäþíôåò Jails

Ôþñá ðið Ý÷iðià Ýíá iðiêçñùíÝñi FreeBSD jail template, iðiñiýià íá ååñåôåôÞóïòiå êáé íá ñoðèìßóïòiå ôá jails óöí /etc/rc.conf. Ôi ðáñÜäåéäiá áðôü ååß÷íåé ôç äçìéïõñäþá ôñépí jails: “NS”, “MAIL” êáé “WWW”.

1. ÅéóÜäåôå ôéò ðáñáêÜôù åñáìíÝò óöí áñ÷åßí /etc/fstab, þóôå òï iüñií åéá áíÜäñûóç template åéá ôá jails êáé i ååññÜøéii ÷þñiò íá åßíáé äéåèÝóéíá óôå áíôßóôïé÷å jails:

```
/home/j/mroot    /home/j/ns      nullfs  ro  0  0
/home/j/mroot    /home/j/mail    nullfs  ro  0  0
/home/j/mroot    /home/j/www    nullfs  ro  0  0
/home/js/ns      /home/j/ns/s   nullfs  rw  0  0
/home/js/mail    /home/j/mail/s nullfs  rw  0  0
/home/js/www    /home/j/www/s  nullfs  rw  0  0
```

**Óçìåßùóç:** Íé êáôåôîþóåéò ðið åßíáé óçìåéùíÝíåò ìå 0 pass number åáí åéÝå÷iïôåé êáôÜ ôçí åêêßíçóç áðü òï fsck(8), áíþ åéá ôéò êáôåôîþóåéò ìå 0 dump number, ç dump(8) åáí èá äçìéïõñäåß áíôßåñáöå áóôåéåßáò. Ðññóáíþò, åáí èÝëiðià òï **fsck** íá áéÝå÷åé ôéò ðññóáñôþóåéò ôýðið **nullfs**, iýôå êáé òï **dump** íá êñáôÜ áíôßåñáöå áðü ôá iüñií åéá áíÜäñûóç nullfs óôôôÞìåðå áñ÷åßùí ôùí jails. Áðôüò åßíáé êáé i eüñiò ðið åÜëáìà “0” óöéò äýí ôåëåôôåßåò óôþëåò êÜëå ååññäöþò òïð fstab.

2. Ñoðèìßóôå ôá jails óöí /etc/rc.conf:

```
jail_enable="YES"
jail_set_hostname_allow="NO"
jail_list="ns mail www"
jail_ns_hostname="ns.example.org"
jail_ns_ip="192.168.3.17"
jail_ns_rootdir="/home/j/ns"
jail_ns_devfs_enable="YES"
jail_mail_hostname="mail.example.org"
jail_mail_ip="192.168.3.18"
jail_mail_rootdir="/home/j/mail"
jail_mail_devfs_enable="YES"
jail_www_hostname="www.example.org"
jail_www_ip="62.123.43.14"
jail_www_rootdir="/home/j/www"
jail_www_devfs_enable="YES"
```

**Ðñiâéaiðiðçóç:** Í èüäiò âéá ôí iðiði èÝôïðiå ôç iâôåâëçôþ jail\_name\_rootdir íá äâß-íâé óôï /usr/home áíôß âéá ôï /home åßíáé üöé ç ööóéêþ aéáâñiþ aéá ôí eáôÜëiäi /home óá iéá ôôðéêþ aâéâôÜôåóç ôið FreeBSD åßíáé ôï /usr/home. Ç iâôåâëçôþ jail\_name\_rootdir aâí aâí ðñYðåé íá äâß-íâé ðñiò aéáâñiþ ðñið ðâñééáiâÜíåé óôiâiðééü aâóìü, aéáöiñâôðéü óá jails eá áñíçèiyí íá iâééíþoíði. ×ñçóéiðiðþóôå ôið aïçèðééü ðñiðâñáiâ realpath(1) aéá íá ðñiðóæiñðóâôå ôç ðéiþ ðñið eá ðñYðåé íá èÜâåé áðôþ ç iâôåâëçôþ. Åâßôå ôið FreeBSD-SA-07:01.jail Security Advisory aéá ðâñéóóüðâñåò ðeçñiðiñðåò.

3. ÄçieïðnâÞóôå óá áðâñâßôçôå óçìâßá ðñiðáñôÞóâùí aéá ôið óyôðçìá añ ÷âßùí iüñi áíÜäñûóçò ôið êÜëå jail:
 

```
# mkdir /home/j/ns /home/j/mail /home/j/www
```
4. Åâéâôåðôðóå ôið åâññÜøéii template iÝóá ôið êÜëå jail. ÐñiðYîôå aâþp ôç ÷ñÞóç ôið sysutils/cpdup, ôið iðiði åðéâåâåéþiâé üöé aïçieïðnââßôåé ôið óùóðü áíðßñâöi ôið ðñið êÜëå êâðâæüñið:
 

```
# mkdir /home/js
# cpdup /home/j/skel /home/js/ns
# cpdup /home/j/skel /home/js/mail
# cpdup /home/j/skel /home/js/www
```
5. Óå áðôþ ôç ðÜóç, óá jails Ý÷iði aïçieïðnâçèåß êáé åßíáé Yôïðiâ íá iâééíþoíði. ÐñiðáñôÞóôå ôið óùóðü óyôðçìá añ ÷âßùí aéá ôið êÜëå jail, eâé óôç óðiÝ÷aé åâééíÞóôå óá, ÷ñçóéiðiðþóâôå ôið script /etc/rc.d/jail:
 

```
# mount -a
# /etc/rc.d/jail start
```

Óá jails eá ðñYðåé ôþñá íá åâðâæïýîðáé eâññééÜ. Áá íá aëÝâiâôå áí Y÷iði iâééíÞóâé óùóðÜ, ÷ñçóéiðiðéâßóâôå ôçí ðiðiðþ jls(8). Èá ðñYðåé íá aâßôå êÜëé áíðßóði ÷iði ñâ ðáñâéÜôù:

# jls	JID	IP Address	Hostname	Path
	3	192.168.3.17	ns.example.org	/home/j/ns
	2	192.168.3.18	mail.example.org	/home/j/mail
	1	62.123.43.14	www.example.org	/home/j/www

Óå áðôü ôið óçìâßí, èá ðñYðåé íá iðiñâßôå íá óðfââðâßôå óá êÜëå jail, íá ðñiðóðéYôåðå iÝiði ÷ñÞóâðå P íá ñðèñßóâðå ððçñâðóßåð. Ç óðÞëç JID aïçëþiâé ôið ÷áñâðçñéóðééü áíâññéðééü aâñéèìü êÜëå åíâññiý jail. ×ñçóéiðiðþóâôå ôçí ðáñâéÜôù åíðiði ðñiðâñáiâ iÝiði íá åâðâæÝôåðå áññâðóßå ãéá ÷âßñéóçò ôið jail, ñâ JID 3:

```
# jexec 3 tcsh
```

#### 16.6.1.4 ÁíáâÜëiéóç

ÊÜðíéá óôéâiþ, èá ÷ñâéâóðâß íá áíáââèìßóâðå ôið óyôðçìÜ óáð óá iéá iÝá Yéäïóç ôið FreeBSD, åßôå aéá ëüñiðò áðóÜëâéâð, åßôå aéáâð ððÜñ ÷iði iÝåð aïðiâðüðçôåð ôçí iâþôâñç Yéäïóç iéá iðiðâð åßíáé ÷ñÞóéâð aéá óá jails ðiði Þäç Y÷âðå. Í ñðñüðið ðiði ÷ñçóéiðiðþóâå aéá ôçí aïçleïðñâßá ñâiði jails, åðéññYðåé ôçí åýéïëç áíáâÜëééóç ôiðð. ÅðéðëÝí, aéá ÷éóðiðiðå õið ÷ññüñi aéáâiðþ õðç iâééðiðþ õðç iâééðiðñâßå õiðð, iéá eâé èá ÷ñâéâóðâß íá óá óðâñâðóÞóâðå iüñi êáðÜ óá èßâá ðâñéâðâßå ëâððÜ. Åðßóçò, ðáñY÷aé Yíáñ ñðñüði íá åðéññYðåâðå óá ðâæéüðâñåò åâëüðâéð åÜí ðñiðéýþiði iðiðéâðþðiðå óðÜëâðåð.

1. Ôið ðñþiði âþíáé íá áíáââèìßóâðå ôið óyôðçìá ôið iðiði èéëññâñýiðéé óá jails, ñâ ôið óðiÞëç ôññüði. Óôç óðiÝ÷aé aïçieïðnâÞóâå Yíá iÝi ðñiðóðñéñü template êáðÜëâðå, iüñi aéá áíÜäñûóç, óðið /home/j/mroot2.

```
# mkdir /home/j/mroot2
# cd /usr/src
# make installworld DESTDIR=/home/j/mroot2
# cd /home/j/mroot2
# cpdup /usr/src usr/src
# mkdir s

Öi installworld äçìéiõñääß iãñééiyò êáôáëüäiõò ðiõ äå ÷ñåeÜæiiõáé, êáé èá ðñÝðåé íá äéáñáöiýí:
# chflags -R 0 var
# rm -R etc var root usr/local tmp
```

2. ÄçìéiõñäPóôå íaiÜ õiõò óõíáÝõiõò ãéá ôi óyóôôçìá áñ÷åßùí áiÜäiùóçò - åããñáöPò:

```
# ln -s s/etc etc
# ln -s s/root root
# ln -s s/home home
# ln -s ../s/usr-local usr/local
# ln -s ../s/usr-X11R6 usr/X11R6
# ln -s s/tmp tmp
# ln -s s/var var
```

3. Öþñá åßíáé ç óùóôP óóéâiP ãéá íá óôáiáôPóôåå õá jails:

```
# /etc/rc.d/jail stop
```

4. ÁðiðñiõáñôPóôå ôá áñ÷éêÜ óõóôPiáôå áñ÷åßùí:

```
# umount /home/j/ns/s
# umount /home/j/ns
# umount /home/j/mail/s
# umount /home/j/mail
# umount /home/j/www/s
# umount /home/j/www
```

**Óçìåßùóç:** Óá óõóôPiáôå áñ÷åßùí áiÜäiùóçò - åããñáöPò åßíáé ðñiõáñôçìÝíá óôi óyóôôçìá áñ÷åßùí iüií áiÜäiùóçò (/s) êáé ðñÝðåé íá åßíáé ôá ðñþðá ðiõ èá áðiðñiõáñôçèiýí.

5. IãôáééiPóôå ôií ðáëéü iüií åéá áiÜäiùóç êáôÜëíäi, êáé áiôéêáôåóôPóôå ôií iã ôií êáéñíýññéi. Í ðáëéüò èá ðáññååßíé ùò áíôßññäöi áôôåéåßå ðiõ ðáëéiy óõóôPiåôi õå ðåñßðôùóç ðñiõåëPiåôi. Í ðñüðiò iññáóßå ðiõ áéiøðèPóåå åäþ áíôéôöié ÷åß óôç ÷ñiíéâiP óóéâiP äçìéiõñäßå ðiõ iÝiõ óõóôPiåôi ãñ÷åßùí iüií áiÜäiùóçò. IãôáééiPóôå ôçí áñ÷éêP óõëëiäP ôuí Ports ôiõ FreeBSD óôi iÝi óyóôôçìá, áñ÷åßùí ðñiêåéiÝiõ íá åtiééiñiPóôåå ÷þñi åéé inodes:

```
# cd /home/j
# mv mroot mroot.20060601
# mv mroot2 mroot
# mv mroot.20060601/usr/ports mroot/usr
```

6. Óå áõôü ôi óçìåßi ôi iüií åéá áiÜäiùóç template åßíáé Ýöiëii, iðüôå ôi iüií ðiõ áðñÝíåé åßíáé íá ðñiõáñôPóôåå íaiÜ ôá óõóôPiáôå áñ÷åßùí êáé íá åéééiPóôåå ôá jails:

```
# mount -a
# /etc/rc.d/jail start
```

×ñçóéíïðíéåßôå ôçí åíóïëP jls(8) ãéá íá åëÝäâôå åÜí óá jails íåêßíçóáí óùóðÜ. Íçí íå÷Üóâôå íá åêôåëÝóâôå ôïi mergemaster ãéá ôïi êÜèå jail. Èá ÷ñåéáóôåß íá áíáââèìßóâôå ôüöi óá áñ÷åßá ñõëìßóâùí, üöi êáé óá rc.d scripts.

# ÊåöÜëáéí 17 Óði÷ñåùôéêüò ëåä÷iò Ðñüóâáóçò

ÃñÜöôçêå áðü ðií Tom Rhodes.

## 17.1 Óýíloç

Ôi FreeBSD 5.X áéóÞãáåå íÝåò åðåéêôÜóåéò áóöáéäåßáò áðü ôi TrustedBSD project, ðið ááóßæïíôáé óði ðñiò ÷Ýäéí POSIX.1e. Áÿí áðü ôiò ðeí òçáíðééiyò íÝiòò iç ÷áíéóíiyò áóöáéäåßáò, áßíáé ié Ëßóôåò ÅëÝä÷iò Ðñüóâáóçò (Access Control Lists, ACLs) óði óýóôçìá áñ ÷åßüí éáé i Óði÷ñåùôéêüò ëåä÷iò Ðñüóâáóçò (Mandatory Access Control, MAC). I Óði÷ñåùôéêüò ñåä÷iò Ðñüóâáóçò áßíáé òçí aðiáðüôçôáò öüñôùóçò áñèñùíÜôùí (modules) áéÝä÷iò ðiðiþá ðeíðiéiyò íÝåò ðiíéóééÝò áóöáéäåßáò. lánééêÜ ðáñÝ ÷iði ðñiòðáóßá óå Ýíá óðåíü ððiøýíiøi ðiði óðoðÞíáòiò, áäðíáíþíiðáò òçí áóöÜëåéá iéáò óðåéâéñéiÝíçò ððçñåóßáò. ¶ëéá ðáñÝ ÷iði ðñiòðóéÞ áóöÜëåéá ðñiò üéåò óéò ððçñåóßáò áéé òi óýóôçìá. I Ýéåä÷iò iññÜæåðáé ðði÷ñåùôéêüò áðü ôi áðåíüíüò üöé ç áðéâíëÞ áßíáðáé áðü ðiðò áéá ÷åñéñóðÝò áéé òi óýóðçìá, áéé áðí áóÞíåðáé óðç áéáâéñéðéÞ áð; Ýñåéá óùí ÷içñðþí üðùò áßíáðáé iá òi áéáâéñéðéü Ýéåä÷iò ðñüóâáóçò (Discretionary Access Control, DAC, ôé ðiðiðiéçíÝåò Üaåéåò áñ ÷åßüí éáé IPC ðiði System V óði FreeBSD).

Ôi êåöÜëáéí áðóü áðóéÜæåé óði ðeáßóéi ðiði÷ñåùôéêiyò ÅëÝä÷iò Ðñüóâáóçò (MAC Framework), êáé óå Ýíá óýíiøi ðñüóâéðóùí áñèñùíÜôùí áéá ðiíéóééÝò áóöÜëåéáò, ðiði áíåññiðiéiyí aëÜöiñiò ñç ÷áíéóíiyò áóöÜëåéáò.

Áöiy áéáâÜóåðå áðóü ôi êåöÜëåéí, èá iÝñåðå:

- Ôé MAC áñèñþíåðå ðiíéóéêþí áóöáéäåßáò ðåñééäiaÜíiðóáé áðóÞ ôç óðéäiÞ óði FreeBSD êáé ôiðò ó÷åðééiyò ñç ÷áíéóíiyò ðiðiò.
- Ôé ðeíðiéiyí ðá MAC áñèñþíåðå ðiíéóéêþí áóöáéäåßáò êáèþò êáé ôç áéáöiñÜ iåðåáiy iéá ÷áñáéðçñéiÝíçò (labeled) áéé ñç ÷áñáéðçñéiÝíçò (non-labeled) ðiíéóééÞò.
- Ðùò iá ñoëìßóâðå áðiäiðéêÜ Ýíá óýóôçìá áéá ÷iñÞóç ôið ðeáéóßiò ëåéðiññäéþí MAC.
- Ðùò iá ñoëìßóâðå ôá áéáöiññâðéÜ áñèñþíåðå ðiíéóéêþí áóöÜëåéáò óå iðiþá ðåñééäiaÜíiðóáé óði ðeáßóéi ëåéðiññäéþí MAC .
- Ðùò iá ñeíðiÞóâðå Ýíá ðeí áóöáéÝò ðåñéáÜëëí, ÷iñçóéiðiéþíðó ðiði ðeáßóéi ëåéðiññäéþí MAC êáé óå ðáññâðåðå ðiði ðiðiðiññäéþí.
- Ðùò iá aëÝñåðå ôç ñyèléóç ôið MAC áéá iá áíåðöäéßóâðå üöé Ý ÷åé áßíáé óùóðÞ ðeíðiþçóç ôið ðeáéóßiò ëåéðiññäéþí.

Ðñéí áéáâÜóåðå áðóü ôi êåöÜëåéí, èá ðñÝðåé:

- Íá êáðáññâðå ôéò ááóéêÝò Ýíiñéåò ôið UNIX êáé ôið FreeBSD. (ÊåöÜëáéí 4).
- Íá áßóðå áññééâéùíÝñò iå ôéò ááóéêÝò Ýíiñéåò ôçð ñyèléóçò êáé iåðåáäéþóðéóçò ôið ðoñÞíá (ÊåöÜëáéí 9).
- Íá Ý ÷åðå êÜðiñéå áññééâñùóç iå ôçí áóðÜëåéá êáé ðùò áðóÞ ó÷åðóßæåðåé iå ôi FreeBSD (ÊåöÜëáéí 15).

**Ðñiâéäiðiþçóç:** Ç êáéÞ ÷iñÞóç ôùí ðeçñiðiñéþí ðiði ðáñÝ ÷iñðóé åäþ iðiññâß iá ðñiâéäéÝóåé áðþéåéá ðñüóâáóçò óði óýóôçìá, áéíâðñéóíü óðiðò ÷iñÞóâðò þ áäðíáìßá ðñüóâáóçò óðéò ððçñåóßáò ðiði ðáñÝ ÷iñðáé áðü ôi ×11. Áéüíá ðeí òçíáðééü áßíáé üöé ááí ðñÝðåé iá ááóßæåðå óði MAC áéá ôçí ðeþñç áóðÜëéóç åíüò óðóðÞíåðiò.

Ôi ðëáßóéi ëåéôïññéþí MAC ðáñY ÷ åé áðéþò áðéðëÝí ððiôóðññéþí óå iéá ððÜñ ÷ iðóá ðïëéðéêþ áóóáéâßáò. ×ùñßò óúóôÝò ðñáéðééÝò êáé óáéðééÝò åéÝä ÷ iðó áóðáæâßáò, ôi óýóðçíá äái èá åßíáé ðiôÝ áðüeõóá áóðæéÝò.

Éá ðñYðåé áðßóçò íá óçiaéùèáß üöé óá ðáñáæâßáláóá ðið ðåñéÝ ÷ iðóáé óå áðóóü ôi êðoÜëáéi åßíáé áéñéâþò êáé iüñ áðóóü: ðáñáæâßáíáðá. Äái ôðiðóðáðáé íá ÷ ñçóéiðiðéçéiÝí áéñéâþò áðóÝò ié ñðèiðóáéò óå Yíá óýóðçíá ðáñáæâðáþò. Ç ðëiðiðóðçóç ôùí áéÜöiñùí Üðùí ðïëéðéêþí áóóáéâßáò áðáéðâð áñéâðþ óéÝøç êáé åiééiÝò. Áí äái êáðáííððóá óçí áéñéâþ ëáéiðiñðá ðiðò, iðiñðá íá åñâæâßóá óóç èÝóç íá åéÝä ÷ åðå íáíÜ iéüêèçñi ôi óýóðçíá êáé íá áéëÜæâðá ñðèiðóáéò óå ðïëéÜ áñ ÷ åßá êáé êáðáæüäiðò.

### 17.1.1 Ôé äái ÐåñéëáìâÜíåðáé óóï ÊðaoÜëáéi

Ôi êðoÜëáéi áðóóü êáéyððåé iéá åðñâßá ðåñéi ÷ Þ ðñiâéçíÜðùí áóðáæâßáò ðið ó ÷ åðßæiðóáé íå ôi ðëáßóéi ëåéôïññéþí MAC. Äái èá êáëððéâß ç áíÜððóðíç ÍYùí áñèñùí Üðùí ðïëéðéêþí áóðáæâßáò MAC, jáò áñéèiüò áðóóü áñèñþiáðá ðið ðåñéëáìâÜñðóáé óóï ðëáßóéi MAC, Y ÷ iðó áéëéÜ ÷ áñáéðçñéóðéÜ ðið ðáñY ÷ iðóáé ôüóóü ãéá åiééiÝò uóí êáé åéá áíÜððóðíç iÝùí áñèñùí Üðùí. ÁðóÜ ðåñéëáìâÜñðí óá mac\_test(4), mac\_stub(4) êáé mac\_none(4). Äéá ðåñéóðüðâñðó ðëçññiðiñðâð ð ÷ åðééÜ íá áðóÜ óá áñèñþiáðá êáé ðiðò åéÜöiñðò iç ÷ áíéðiñðò ðið ðáñY ÷ iðó, ðáñáæâëiÝíå áíáðñYíðó áðéð áíððóðié ÷ åð óåëßäåð manual.

## 17.2 Key Terms in this Chapter

Before reading this chapter, a few key terms must be explained. This will hopefully clear up any confusion that may occur and avoid the abrupt introduction of new terms and information.

- *compartment*: A compartment is a set of programs and data to be partitioned or separated, where users are given explicit access to specific components of a system. Also, a compartment represents a grouping, such as a work group, department, project, or topic. Using compartments, it is possible to implement a need-to-know security policy.
- *high water mark*: A high water mark policy is one which permits the raising of security levels for the purpose of accessing higher level information. In most cases, the original level is restored after the process is complete. Currently, the FreeBSD MAC framework does not have a policy for this, but the definition is included for completeness.
- *integrity*: Integrity, as a key concept, is the level of trust which can be placed on data. As the integrity of the data is elevated, so does the ability to trust that data.
- *label*: A label is a security attribute which can be applied to files, directories, or other items in the system. It could be considered a confidentiality stamp; when a label is placed on a file it describes the security properties for that specific file and will only permit access by files, users, resources, etc. with a similar security setting. The meaning and interpretation of label values depends on the policy configuration: while some policies might treat a label as representing the integrity or secrecy of an object, other policies might use labels to hold rules for access.
- *level*: The increased or decreased setting of a security attribute. As the level increases, its security is considered to elevate as well.
- *low water mark*: A low water mark policy is one which permits lowering of the security levels for the purpose of accessing information which is less secure. In most cases, the original security level of the user is restored after the process is complete. The only security policy module in FreeBSD to use this is mac\_lomac(4).

- *multilabel*: The `multilabel` property is a file system option which can be set in single user mode using the `tunefs(8)` utility, during the boot operation using the `fstab(5)` file, or during the creation of a new file system. This option will permit an administrator to apply different MAC labels on different objects. This option only applies to security policy modules which support labeling.
- *object*: An object or system object is an entity through which information flows under the direction of a *subject*. This includes directories, files, fields, screens, keyboards, memory, magnetic storage, printers or any other data storage/moving device. Basically, an object is a data container or a system resource; access to an *object* effectively means access to the data.
- *policy*: A collection of rules which defines how objectives are to be achieved. A *policy* usually documents how certain items are to be handled. This chapter will consider the term *policy* in this context as a *security policy*; i.e. a collection of rules which will control the flow of data and information and define whom will have access to that data and information.
- *sensitivity*: Usually used when discussing MLS. A sensitivity level is a term used to describe how important or secret the data should be. As the sensitivity level increases, so does the importance of the secrecy, or confidentiality of the data.
- *single label*: A single label is when the entire file system uses one label to enforce access control over the flow of data. When a file system has this set, which is any time when the `multilabel` option is not set, all files will conform to the same label setting.
- *subject*: a subject is any active entity that causes information to flow between *objects*; e.g. a user, user processor, system process, etc. On FreeBSD, this is almost always a thread acting in a process on behalf of a user.

## 17.3 Explanation of MAC

With all of these new terms in mind, consider how the MAC framework augments the security of the system as a whole. The various security policy modules provided by the MAC framework could be used to protect the network and file systems, block users from accessing certain ports and sockets, and more. Perhaps the best use of the policy modules is to blend them together, by loading several security policy modules at a time for a multi-layered security environment. In a multi-layered security environment, multiple policy modules are in effect to keep security in check. This is different to a hardening policy, which typically hardens elements of a system that is used only for specific purposes. The only downside is administrative overhead in cases of multiple file system labels, setting network access control user by user, etc.

These downsides are minimal when compared to the lasting effect of the framework; for instance, the ability to pick and choose which policies are required for a specific configuration keeps performance overhead down. The reduction of support for unneeded policies can increase the overall performance of the system as well as offer flexibility of choice. A good implementation would consider the overall security requirements and effectively implement the various security policy modules offered by the framework.

Thus a system utilizing MAC features should at least guarantee that a user will not be permitted to change security attributes at will; all user utilities, programs and scripts must work within the constraints of the access rules provided by the selected security policy modules; and that total control of the MAC access rules are in the hands of the system administrator.

It is the sole duty of the system administrator to carefully select the correct security policy modules. Some environments may need to limit access control over the network; in these cases, the `mac_portacl(4)`, `mac_ifoff(4)` and even `mac_biba(4)` policy modules might make good starting points. In other cases, strict confidentiality of file system objects might be required. Policy modules such as `mac_bsdxextended(4)` and `mac_mls(4)` exist for this purpose.

Policy decisions could be made based on network configuration. Perhaps only certain users should be permitted access to facilities provided by ssh(1) to access the network or the Internet. The mac\_portacl(4) would be the policy module of choice for these situations. But what should be done in the case of file systems? Should all access to certain directories be severed from other groups or specific users? Or should we limit user or utility access to specific files by setting certain objects as classified?

In the file system case, access to objects might be considered confidential to some users, but not to others. For an example, a large development team might be broken off into smaller groups of individuals. Developers in project A might not be permitted to access objects written by developers in project B. Yet they might need to access objects created by developers in project C; that is quite a situation indeed. Using the different security policy modules provided by the MAC framework; users could be divided into these groups and then given access to the appropriate areas without fear of information leakage.

Thus, each security policy module has a unique way of dealing with the overall security of a system. Module selection should be based on a well thought out security policy. In many cases, the overall policy may need to be revised and reimplemented on the system. Understanding the different security policy modules offered by the MAC framework will help administrators choose the best policies for their situations.

The default FreeBSD kernel does not include the option for the MAC framework; thus the following kernel option must be added before trying any of the examples or information in this chapter:

```
options MAC
```

And the kernel will require a rebuild and a reinstall.

**Đñiõi÷p:** While the various manual pages for MAC policy modules state that they may be built into the kernel, it is possible to lock the system out of the network and more. Implementing MAC is much like implementing a firewall, care must be taken to prevent being completely locked out of the system. The ability to revert back to a previous configuration should be considered while the implementation of MAC remotely should be done with extreme caution.

## 17.4 Understanding MAC Labels

A MAC label is a security attribute which may be applied to subjects and objects throughout the system.

When setting a label, the user must be able to comprehend what it is, exactly, that is being done. The attributes available on an object depend on the policy module loaded, and that policy modules interpret their attributes in different ways. If improperly configured due to lack of comprehension, or the inability to understand the implications, the result will be the unexpected and perhaps, undesired, behavior of the system.

The security label on an object is used as a part of a security access control decision by a policy. With some policies, the label by itself contains all information necessary to make a decision; in other models, the labels may be processed as part of a larger rule set, etc.

For instance, setting the label of biba/low on a file will represent a label maintained by the Biba security policy module, with a value of “low”.

A few policy modules which support the labeling feature in FreeBSD offer three specific predefined labels. These are the low, high, and equal labels. Although they enforce access control in a different manner with each policy module,

you can be sure that the low label will be the lowest setting, the equal label will set the subject or object to be disabled or unaffected, and the high label will enforce the highest setting available in the Biba and MLS policy modules.

Within single label file system environments, only one label may be used on objects. This will enforce one set of access permissions across the entire system and in many environments may be all that is required. There are a few cases where multiple labels may be set on objects or subjects in the file system. For those cases, the `multilabel` option may be passed to `tunefs(8)`.

In the case of Biba and MLS, a numeric label may be set to indicate the precise level of hierarchical control. This numeric level is used to partition or sort information into different groups of say, classification only permitting access to that group or a higher group level.

In most cases the administrator will only be setting up a single label to use throughout the file system.

*Hey wait, this is similar to DAC! I thought MAC gave control strictly to the administrator.* That statement still holds true, to some extent as `root` is the one in control and who configures the policies so that users are placed in the appropriate categories/access levels. Alas, many policy modules can restrict the `root` user as well. Basic control over objects will then be released to the group, but `root` may revoke or modify the settings at any time. This is the hierachal/clearance model covered by policies such as Biba and MLS.

### 17.4.1 Label Configuration

Virtually all aspects of label policy module configuration will be performed using the base system utilities. These commands provide a simple interface for object or subject configuration or the manipulation and verification of the configuration.

All configuration may be done by use of the `setfmac(8)` and `setpmac(8)` utilities. The `setfmac` command is used to set MAC labels on system objects while the `setpmac` command is used to set the labels on system subjects. Observe:

```
# setfmac biba/high test
```

If no errors occurred with the command above, a prompt will be returned. The only time these commands are not quiescent is when an error occurred; similarly to the `chmod(1)` and `chown(8)` commands. In some cases this error may be a `Permission denied` and is usually obtained when the label is being set or modified on an object which is restricted.<sup>1</sup> The system administrator may use the following commands to overcome this:

```
# setfmac biba/high test
Permission denied
# setpmac biba/low setfmac biba/high test
# getfmac test
test: biba/high
```

As we see above, `setpmac` can be used to override the policy module's settings by assigning a different label to the invoked process. The `getpmac` utility is usually used with currently running processes, such as `sendmail`: although it takes a process ID in place of a command the logic is extremely similar. If users attempt to manipulate a file not in their access, subject to the rules of the loaded policy modules, the `Operation not permitted` error will be displayed by the `mac_set_link` function.

#### 17.4.1.1 Common Label Types

For the `mac_biba(4)`, `mac_mls(4)` and `mac_lomac(4)` policy modules, the ability to assign simple labels is provided. These take the form of high, equal and low, what follows is a brief description of what these labels provide:

- The `low` label is considered the lowest label setting an object or subject may have. Setting this on objects or subjects will block their access to objects or subjects marked high.
- The `equal` label should only be placed on objects considered to be exempt from the policy.
- The `high` label grants an object or subject the highest possible setting.

With respect to each policy module, each of those settings will instate a different information flow directive. Reading the proper manual pages will further explain the traits of these generic label configurations.

#### *17.4.1.1 Advanced Label Configuration*

Numeric grade labels are used for comparison: compartment+compartment; thus the following:

```
biba/10:2+3+6(5:2+3-20:2+3+4+5+6)
```

May be interpreted as:

“Biba Policy Label”/“Grade 10” :“Compartments 2, 3 and 6”: (“grade 5 ...”)

In this example, the first grade would be considered the “effective grade” with “effective compartments”, the second grade is the low grade and the last one is the high grade. In most configurations these settings will not be used; indeed, they offered for more advanced configurations.

When applied to system objects, they will only have a current grade/compartments as opposed to system subjects as they reflect the range of available rights in the system, and network interfaces, where they are used for access control.

The grade and compartments in a subject and object pair are used to construct a relationship referred to as “dominance”, in which a subject dominates an object, the object dominates the subject, neither dominates the other, or both dominate each other. The “both dominate” case occurs when the two labels are equal. Due to the information flow nature of Biba, you have rights to a set of compartments, “need to know”, that might correspond to projects, but objects also have a set of compartments. Users may have to subset their rights using `su` or `setpmac` in order to access objects in a compartment from which they are not restricted.

#### **17.4.1.2 Users and Label Settings**

Users themselves are required to have labels so that their files and processes may properly interact with the security policy defined on the system. This is configured through the `login.conf` file by use of login classes. Every policy module that uses labels will implement the user class setting.

An example entry containing every policy module setting is displayed below:

```
default:\n  :copyright=/etc/COPYRIGHT:\n  :welcome=/etc/motd:\n  :setenv=MAIL=/var/mail/$,BLOCKSIZE=K:\n  :path=~/bin:/sbin:/bin:/usr/sbin:/usr/bin:/usr/local/sbin:/usr/local/bin:\n  :manpath=/usr/share/man /usr/local/man:\n  :nologin=/usr/sbin/nologin:\n  :cputime=1h30m:\n  :datasize=8M:\n  :vmemoryuse=100M:\n  :stacksize=2M:\n  :memorylocked=4M:\n
```

```
:memoryuse=8M:\n:filesize=8M:\n:coredumpsize=8M:\n:openfiles=24:\n:maxproc=32:\n:priority=0:\n:requirehome:\n:passwordtime=91d:\n:umask=022:\n:ignoretime@:\n:label=partition/13,mls/5,biba/10(5-15),lomac/10[2]:
```

The `label` option is used to set the user class default label which will be enforced by MAC. Users will never be permitted to modify this value, thus it can be considered not optional in the user case. In a real configuration, however, the administrator will never wish to enable every policy module. It is recommended that the rest of this chapter be reviewed before any of this configuration is implemented.

**Óçìáßùóç:** Users may change their label after the initial login; however, this change is subject constraints of the policy. The example above tells the Biba policy that a process's minimum integrity is 5, its maximum is 15, but the default effective label is 10. The process will run at 10 until it chooses to change label, perhaps due to the user using the `setmac` command, which will be constrained by Biba to the range set at login.

In all cases, after a change to `login.conf`, the login class capability database must be rebuilt using `cap_mkdb` and this will be reflected throughout every forthcoming example or discussion.

It is useful to note that many sites may have a particularly large number of users requiring several different user classes. In depth planning is required as this may get extremely difficult to manage.

Future versions of FreeBSD will include a new way to deal with mapping users to labels; however, this will not be available until some time after FreeBSD 5.3.

#### 17.4.1.3 Network Interfaces and Label Settings

Labels may also be set on network interfaces to help control the flow of data across the network. In all cases they function in the same way the policies function with respect to objects. Users at high settings in `biba`, for example, will not be permitted to access network interfaces with a label of low.

The `maclabel` may be passed to `ifconfig` when setting the MAC label on network interfaces. For example:

```
# ifconfig bge0 maclabel biba/equal
```

will set the MAC label of `biba/equal` on the `bge(4)` interface. When using a setting similar to `biba/high(low-high)` the entire label should be quoted; otherwise an error will be returned.

Each policy module which supports labeling has a tunable which may be used to disable the MAC label on network interfaces. Setting the label to `equal` will have a similar effect. Review the output from `sysctl`, the policy manual pages, or even the information found later in this chapter for those tunables.

### 17.4.2 Singlelabel or Multilabel?

By default the system will use the `singlelabel` option. But what does this mean to the administrator? There are several differences which, in their own right, offer pros and cons to the flexibility in the systems security model.

The `singlelabel` only permits for one label, for instance `biba/high` to be used for each subject or object. It provides for lower administration overhead but decreases the flexibility of policies which support labeling. Many administrators may want to use the `multilabel` option in their security policy.

The `multilabel` option will permit each subject or object to have its own independent MAC label in place of the standard `singlelabel` option which will allow only one label throughout the partition. The `multilabel` and `single label` options are only required for the policies which implement the labeling feature, including the Biba, Lomac, MLS and SEBSD policies.

In many cases, the `multilabel` may not need to be set at all. Consider the following situation and security model:

- FreeBSD web-server using the MAC framework and a mix of the various policies.
- This machine only requires one label, `biba/high`, for everything in the system. Here the file system would not require the `multilabel` option as a single label will always be in effect.
- But, this machine will be a web server and should have the web server run at `biba/low` to prevent write up capabilities. The Biba policy and how it works will be discussed later, so if the previous comment was difficult to interpret just continue reading and return. The server could use a separate partition set at `biba/low` for most if not all of its runtime state. Much is lacking from this example, for instance the restrictions on data, configuration and user settings; however, this is just a quick example to prove the aforementioned point.

If any of the non-labeling policies are to be used, then the `multilabel` option would never be required. These include the `seeotheruids`, `portacl` and `partition` policies.

It should also be noted that using `multilabel` with a partition and establishing a security model based on `multilabel` functionality could open the doors for higher administrative overhead as everything in the file system would have a label. This includes directories, files, and even device nodes.

The following command will set `multilabel` on the file systems to have multiple labels. This may only be done in single user mode:

```
# tuneefs -l enable /
```

This is not a requirement for the swap file system.

**Óciåßúóç:** Some users have experienced problems with setting the `multilabel` flag on the root partition. If this is the case, please review the Óíþiá 17.16 of this chapter.

## 17.5 Planning the Security Configuration

Whenever a new technology is implemented, a planning phase is always a good idea. During the planning stages, an administrator should in general look at the “big picture”, trying to keep in view at least the following:

- The implementation requirements;

- The implementation goals;

For MAC installations, these include:

- How to classify information and resources available on the target systems.
- What sorts of information or resources to restrict access to along with the type of restrictions that should be applied.
- Which MAC module or modules will be required to achieve this goal.

It is always possible to reconfigure and change the system resources and security settings, it is quite often very inconvenient to search through the system and fix existing files and user accounts. Planning helps to ensure a trouble-free and efficient trusted system implementation. A trial run of the trusted system, including the configuration, is often vital and definitely beneficial *before* a MAC implementation is used on production systems. The idea of just letting loose on a system with MAC is like setting up for failure.

Different environments may have explicit needs and requirements. Establishing an in depth and complete security profile will decrease the need of changes once the system goes live. As such, the future sections will cover the different modules available to administrators; describe their use and configuration; and in some cases provide insight on what situations they would be most suitable for. For instance, a web server might roll out the mac\_biba(4) and mac\_bsextended(4) policies. In other cases, a machine with very few local users, the mac\_partition(4) might be a good choice.

## 17.6 Module Configuration

Every module included with the MAC framework may be either compiled into the kernel as noted above or loaded as a run-time kernel module. The recommended method is to add the module name to the /boot/loader.conf file so that it will load during the initial boot operation.

The following sections will discuss the various MAC modules and cover their features. Implementing them into a specific environment will also be a consideration of this chapter. Some modules support the use of labeling, which is controlling access by enforcing a label such as “this is allowed and this is not”. A label configuration file may control how files may be accessed, network communication can be exchanged, and more. The previous section showed how the multilabel flag could be set on file systems to enable per-file or per-partition access control.

A single label configuration would enforce only one label across the system, that is why the tunefs option is called multilabel.

### 17.6.1 The MAC seeotheruids Module

Module name: mac\_seetheruids.ko

Kernel configuration line: options MAC\_SEEOTHERUIDS

Boot option: mac\_seetheruids\_load="YES"

The mac\_seetheruids(4) module mimics and extends the security.bsd.see\_other\_uids and security.bsd.see\_other\_gids sysctl tunables. This option does not require any labels to be set before configuration and can operate transparently with the other modules.

After loading the module, the following sysctl tunables may be used to control the features:

- `security.mac.seeotheruids.enabled` will enable the module's features and use the default settings. These default settings will deny users the ability to view processes and sockets owned by other users.
- `security.mac.seeotheruids.specifcgid_enabled` will allow a certain group to be exempt from this policy. To exempt specific groups from this policy, use the `security.mac.seeotheruids.specifcgid=xxx` sysctl tunable. In the above example, the `xxx` should be replaced with the numeric group ID to be exempted.
- `security.mac.seeotheruids.primarygroup_enabled` is used to exempt specific primary groups from this policy. When using this tunable, the `security.mac.seeotheruids.specifcgid_enabled` may not be set.

## 17.7 The MAC bsdextended Module

Module name: `mac_bsextended.ko`

Kernel configuration line: `options MAC_BSDEXTENDED`

Boot option: `mac_bsextended_load="YES"`

The `mac_bsextended(4)` module enforces the file system firewall. This module's policy provides an extension to the standard file system permissions model, permitting an administrator to create a firewall-like ruleset to protect files, utilities, and directories in the file system hierarchy. When access to a file system object is attempted, the list of rules is iterated until either a matching rule is located or the end is reached. This behavior may be changed by the use of a `sysctl(8)` parameter, `security.mac.bsextended.firstmatch_enabled`. Similar to other firewall modules in FreeBSD, a file containing access control rules can be created and read by the system at boot time using an `rc.conf(5)` variable.

The rule list may be entered using a utility, `ugidfw(8)`, that has a syntax similar to that of `ipfw(8)`. More tools can be written by using the functions in the `libugidfw(3)` library.

Extreme caution should be taken when working with this module; incorrect use could block access to certain parts of the file system.

### 17.7.1 Examples

After the `mac_bsextended(4)` module has been loaded, the following command may be used to list the current rule configuration:

```
# ugidfw list
0 slots, 0 rules
```

As expected, there are no rules defined. This means that everything is still completely accessible. To create a rule which will block all access by users but leave `root` unaffected, simply run the following command:

```
# ugidfw add subject not uid root new object not uid root mode n
```

**Óçìàßùóç:** In releases prior to FreeBSD 5.3, the `add` parameter did not exist. In those cases the `set` should be used instead. See below for a command example.

This is a very bad idea as it will block all users from issuing even the most simple commands, such as `ls`. A more patriotic list of rules might be:

```
# ugidfw set 2 subject uid user1 object uid user2 mode n
# ugidfw set 3 subject uid user1 object gid user2 mode n
```

This will block any and all access, including directory listings, to *user2*'s home directory from the username *user1*. In place of *user1*, the not *uid user2* could be passed. This will enforce the same access restrictions above for all users in place of just one user.

**Óçìåßùóç:** The `root` user will be unaffected by these changes.

This should provide a general idea of how the `mac_bsextended(4)` module may be used to help fortify a file system. For more information, see the `mac_bsextended(4)` and the `ugidfw(8)` manual pages.

## 17.8 The MAC ifoff Module

Module name: `mac_ifoff.ko`

Kernel configuration line: `options MAC_IFOFF`

Boot option: `mac_ifoff_load="YES"`

The `mac_ifoff(4)` module exists solely to disable network interfaces on the fly and keep network interfaces from being brought up during the initial system boot. It does not require any labels to be set up on the system, nor does it have a dependency on other MAC modules.

Most of the control is done through the `sysctl` tunables listed below.

- `security.mac.ifoff.lo_enabled` will enable/disable all traffic on the loopback (`lo(4)`) interface.
- `security.mac.ifoff.bpfrecv_enabled` will enable/disable all traffic on the Berkeley Packet Filter interface (`bpf(4)`)
- `security.mac.ifoff.other_enabled` will enable/disable traffic on all other interfaces.

One of the most common uses of `mac_ifoff(4)` is network monitoring in an environment where network traffic should not be permitted during the boot sequence. Another suggested use would be to write a script which uses `security/aide` to automatically block network traffic if it finds new or altered files in protected directories.

## 17.9 The MAC portacl Module

Module name: `mac_portacl.ko`

Kernel configuration line: `MAC_PORTACL`

Boot option: `mac_portacl_load="YES"`

The `mac_portacl(4)` module is used to limit binding to local TCP and UDP ports using a variety of `sysctl` variables. In essence `mac_portacl(4)` makes it possible to allow non-root users to bind to specified privileged ports, i.e. ports fewer than 1024.

Once loaded, this module will enable the MAC policy on all sockets. The following tunables are available:

- `security.mac.portacl.enabled` will enable/disable the policy completely.<sup>2</sup>
- `security.mac.portacl.port_high` will set the highest port number that `mac_portacl(4)` will enable protection for.
- `security.mac.portacl.suser_exempt` will, when set to a non-zero value, exempt the `root` user from this policy.
- `security.mac.portacl.rules` will specify the actual `mac_portacl` policy; see below.

The actual `mac_portacl` policy, as specified in the `security.mac.portacl.rules` sysctl, is a text string of the form: `rule[,rule,...]` with as many rules as needed. Each rule is of the form: `idtype:id:protocol:port`. The `idtype` parameter can be `uid` or `gid` and used to interpret the `id` parameter as either a user id or group id, respectively. The `protocol` parameter is used to determine if the rule should apply to TCP or UDP by setting the parameter to `tcp` or `udp`. The final `port` parameter is the port number to allow the specified user or group to bind to.

**Óçìåßùóç:** Since the ruleset is interpreted directly by the kernel only numeric values can be used for the user ID, group ID, and port parameters. I.e. user, group, and port service names cannot be used.

By default, on UNIX-like systems, ports fewer than 1024 can only be used by/bound to privileged processes, i.e. those run as `root`. For `mac_portacl(4)` to allow non-privileged processes to bind to ports below 1024 this standard UNIX restriction has to be disabled. This can be accomplished by setting the sysctl(8) variables `net.inet.ip.portrange.reservedlow` and `net.inet.ip.portrange.reservedhigh` to zero.

See the examples below or review the `mac_portacl(4)` manual page for further information.

## 17.9.1 Examples

The following examples should illuminate the above discussion a little better:

```
# sysctl security.mac.portacl.port_high=1023
# sysctl net.inet.ip.portrange.reservedlow=0 net.inet.ip.portrange.reservedhigh=0
```

First we set `mac_portacl(4)` to cover the standard privileged ports and disable the normal UNIX bind restrictions.

```
# sysctl security.mac.portacl.suser_exempt=1
```

The `root` user should not be crippled by this policy, thus set the `security.mac.portacl.suser_exempt` to a non-zero value. The `mac_portacl(4)` module has now been set up to behave the same way UNIX-like systems behave by default.

```
# sysctl security.mac.portacl.rules=uid:80:tcp:80
```

Allow the user with UID 80 (normally the `www` user) to bind to port 80. This can be used to allow the `www` user to run a web server without ever having `root` privilege.

```
# sysctl security.mac.portacl.rules=uid:1001:tcp:110,uid:1001:tcp:995
```

Permit the user with the UID of 1001 to bind to the TCP ports 110 (“pop3”) and 995 (“pop3s”). This will permit this user to start a server that accepts connections on ports 110 and 995.

## 17.10 The MAC partition Module

Module name: `mac_partition.ko`

Kernel configuration line: `options MAC_PARTITION`

Boot option: `mac_partition_load="YES"`

The `mac_partition(4)` policy will drop processes into specific “partitions” based on their MAC label. Think of it as a special type of `jail(8)`, though that is hardly a worthy comparison.

This is one module that should be added to the `loader.conf(5)` file so that it loads and enables the policy during the boot process.

Most configuration for this policy is done using the `setpmac(8)` utility which will be explained below. The following `sysctl` tunable is available for this policy:

- `security.mac.partition.enabled` will enable the enforcement of MAC process partitions.

When this policy is enabled, users will only be permitted to see their processes, and any others within their partition, but will not be permitted to work with utilities outside the scope of this partition. For instance, a user in the `insecure` class above will not be permitted to access the `top` command as well as many other commands that must spawn a process.

To set or drop utilities into a partition label, use the `setpmac` utility:

```
# setpmac partition/13 top
```

This will add the `top` command to the label set on users in the `insecure` class. Note that all processes spawned by users in the `insecure` class will stay in the `partition/13` label.

### 17.10.1 Examples

The following command will show you the partition label and the process list:

```
# ps Zax
```

This next command will allow the viewing of another user’s process partition label and that user’s currently running processes:

```
# ps -ZU trhodes
```

**Óçìàßùóç:** Users can see processes in `root`’s label unless the `mac_seetheruids(4)` policy is loaded.

A really crafty implementation could have all of the services disabled in `/etc/rc.conf` and started by a script that starts them with the proper labeling set.

**Óçìàßùóç:** The following policies support integer settings in place of the three default labels offered. These options, including their limitations, are further explained in the module manual pages.

## 17.11 The MAC Multi-Level Security Module

Module name: `mac_mls.ko`

Kernel configuration line: `options MAC_MLS`

Boot option: `mac_mls_load="YES"`

The `mac_mls(4)` policy controls access between subjects and objects in the system by enforcing a strict information flow policy.

In MLS environments, a “clearance” level is set in each subject or objects label, along with compartments. Since these clearance or sensibility levels can reach numbers greater than six thousand; it would be a daunting task for any system administrator to thoroughly configure each subject or object. Thankfully, three “instant” labels are already included in this policy.

These labels are `mls/low`, `mls/equal` and `mls/high`. Since these labels are described in depth in the manual page, they will only get a brief description here:

- The `mls/low` label contains a low configuration which permits it to be dominated by all other objects. Anything labeled with `mls/low` will have a low clearance level and not be permitted to access information of a higher level. In addition, this label will prevent objects of a higher clearance level from writing or passing information on to them.
- The `mls/equal` label should be placed on objects considered to be exempt from the policy.
- The `mls/high` label is the highest level of clearance possible. Objects assigned this label will hold dominance over all other objects in the system; however, they will not permit the leaking of information to objects of a lower class.

MLS provides for:

- A hierarchical security level with a set of non hierarchical categories;
- Fixed rules: no read up, no write down (a subject can have read access to objects on its own level or below, but not above. Similarly, a subject can have write access to objects on its own level or above but not beneath.);
- Secrecy (preventing inappropriate disclosure of data);
- Basis for the design of systems that concurrently handle data at multiple sensitivity levels (without leaking information between secret and confidential).

The following `sysctl` tunables are available for the configuration of special services and interfaces:

- `security.mac.mls.enabled` is used to enable/disable the MLS policy.
- `security.mac.mls.ptys_equal` will label all pty(4) devices as `mls/equal` during creation.
- `security.mac.mls.revocation_enabled` is used to revoke access to objects after their label changes to a label of a lower grade.
- `security.mac.mls.max_compartments` is used to set the maximum number of compartment levels with objects; basically the maximum compartment number allowed on a system.

To manipulate the MLS labels, the `setfmac(8)` command has been provided. To assign a label to an object, issue the following command:

```
# setfmac mls/5 test
```

To get the MLS label for the file `test` issue the following command:

```
# getfmac test
```

This is a summary of the MLS policy's features. Another approach is to create a master policy file in `/etc` which specifies the MLS policy information and to feed that file into the `setfmac` command. This method will be explained after all policies are covered.

### 17.11.1 Planning Mandatory Sensitivity

With the Multi-Level Security Policy Module, an administrator plans for controlling the flow of sensitive information. By default, with its block read up block write down nature, the system defaults everything to a low state. Everything is accessible and an administrator slowly changes this during the configuration stage; augmenting the confidentiality of the information.

Beyond the three basic label options above, an administrator may group users and groups as required to block the information flow between them. It might be easier to look at the information in clearance levels familiarized with words, for instance classifications such as `Confidential`, `Secret`, and `Top Secret`. Some administrators might just create different groups based on project levels. Regardless of classification method, a well thought out plan must exist before implementing such a restrictive policy.

Some example situations for this security policy module could be an e-commerce web server, a file server holding critical company information, and financial institution environments. The most unlikely place would be a personal workstation with only two or three users.

## 17.12 The MAC Biba Module

Module name: `mac_biba.ko`

Kernel configuration line: `options MAC_BIBA`

Boot option: `mac_biba_load="YES"`

The `mac_biba(4)` module loads the MAC Biba policy. This policy works much like that of the MLS policy with the exception that the rules for information flow are slightly reversed. This is said to prevent the downward flow of sensitive information whereas the MLS policy prevents the upward flow of sensitive information; thus, much of this section can apply to both policies.

In Biba environments, an “integrity” label is set on each subject or object. These labels are made up of hierachal grades, and non-hierachal components. As an object’s or subject’s grade ascends, so does its integrity.

Supported labels are `biba/low`, `biba/equal`, and `biba/high`; as explained below:

- The `biba/low` label is considered the lowest integrity an object or subject may have. Setting this on objects or subjects will block their write access to objects or subjects marked high. They still have read access though.
- The `biba/equal` label should only be placed on objects considered to be exempt from the policy.
- The `biba/high` label will permit writing to objects set at a lower label, but not permit reading that object. It is recommended that this label be placed on objects that affect the integrity of the entire system.

Biba provides for:

- Hierarchical integrity level with a set of non hierarchical integrity categories;
- Fixed rules: no write up, no read down (opposite of MLS). A subject can have write access to objects on its own level or below, but not above. Similarly, a subject can have read access to objects on its own level or above, but not below;
- Integrity (preventing inappropriate modification of data);
- Integrity levels (instead of MLS sensitivity levels).

The following sysctl tunables can be used to manipulate the Biba policy.

- `security.mac.biba.enabled` may be used to enable/disable enforcement of the Biba policy on the target machine.
- `security.mac.biba.ptys_equal` may be used to disable the Biba policy on pty(4) devices.
- `security.mac.biba.revocation_enabled` will force the revocation of access to objects if the label is changed to dominate the subject.

To access the Biba policy setting on system objects, use the `setfmac` and `getfmac` commands:

```
# setfmac biba/low test
# getfmac test
test: biba/low
```

### 17.12.1 Planning Mandatory Integrity

Integrity, different from sensitivity, guarantees that the information will never be manipulated by untrusted parties. This includes information passed between subjects, objects, and both. It ensures that users will only be able to modify and in some cases even access information they explicitly need to.

The `mac_biba(4)` security policy module permits an administrator to address which files and programs a user or users may see and invoke while assuring that the programs and files are free from threats and trusted by the system for that user, or group of users.

During the initial planning phase, an administrator must be prepared to partition users into grades, levels, and areas. Users will be blocked access not only to data but programs and utilities both before and after they start. The system will default to a high label once this policy module is enabled, and it is up to the administrator to configure the different grades and levels for users. Instead of using clearance levels as described above, a good planning method could include topics. For instance, only allow developers modification access to the source code repository, source code compiler, and other development utilities. While other users would be grouped into other categories such as testers, designers, or just ordinary users and would only be permitted read access.

With its natural security control, a lower integrity subject is unable to write to a higher integrity subject; a higher integrity subject cannot observe or read a lower integrity object. Setting a label at the lowest possible grade could make it inaccessible to subjects. Some prospective environments for this security policy module would include a constrained web server, development and test machine, and source code repository. A less useful implementation would be a personal workstation, a machine used as a router, or a network firewall.

## 17.13 The MAC LOMAC Module

Module name: mac\_lomac.ko

Kernel configuration line: options MAC\_LOMAC

Boot option: mac\_lomac\_load="YES"

Unlike the MAC Biba policy, the mac\_lomac(4) policy permits access to lower integrity objects only after decreasing the integrity level to not disrupt any integrity rules.

The MAC version of the Low-watermark integrity policy, not to be confused with the older lomac(4) implementation, works almost identically to Biba, but with the exception of using floating labels to support subject demotion via an auxiliary grade compartment. This secondary compartment takes the form of [auxgrade]. When assigning a lomac policy with an auxiliary grade, it should look a little bit like: lomac/10[2] where the number two (2) is the auxiliary grade.

The MAC LOMAC policy relies on the ubiquitous labeling of all system objects with integrity labels, permitting subjects to read from low integrity objects and then downgrading the label on the subject to prevent future writes to high integrity objects. This is the [auxgrade] option discussed above, thus the policy may provide for greater compatibility and require less initial configuration than Biba.

### 17.13.1 Examples

Like the Biba and MLS policies; the setfmac and setpmac utilities may be used to place labels on system objects:

```
# setfmac /usr/home/trhodes lomac/high[low]
# getfmac /usr/home/trhodes lomac/high[low]
```

Notice the auxiliary grade here is low, this is a feature provided only by the MAC LOMAC policy.

## 17.14 Nagios in a MAC Jail

The following demonstration will implement a secure environment using various MAC modules with properly configured policies. This is only a test and should not be considered the complete answer to everyone's security woes. Just implementing a policy and ignoring it never works and could be disastrous in a production environment.

Before beginning this process, the multilabel option must be set on each file system as stated at the beginning of this chapter. Not doing so will result in errors. While at it, ensure that the net-mngt/nagios-plugins, net-mngt/nagios, and www/apache13 ports are all installed, configured, and working correctly.

### 17.14.1 Create an insecure User Class

Begin the procedure by adding the following user class to the /etc/login.conf file:

```
insecure:\n:copyright=/etc/COPYRIGHT:\n:welcome=/etc/motd:\n:setenv=MAIL=/var/mail/$,BLOCKSIZE=K:\n:path=~/bin:/sbin:/bin:/usr/sbin:/usr/bin:/usr/local/sbin:/usr/local/bin\n:manpath=/usr/share/man /usr/local/man:\n
```

```
:nologin=/usr/sbin/nologin:\n:cputime=1h30m:\n:datasize=8M:\n:vmemoryuse=100M:\n:stacksize=2M:\n:memorylocked=4M:\n:memoryuse=8M:\n:filesize=8M:\n:coredumpsize=8M:\n:openfiles=24:\n:maxproc=32:\n:priority=0:\n:requirehome:\n:passwordtime=91d:\n:umask=022:\n:ignoretime@:\n:label=biba/10(10-10):
```

And adding the following line to the default user class:

```
:label=biba/high:
```

Once this is completed, the following command must be issued to rebuild the database:

```
# cap_mkdb /etc/login.conf
```

## 17.14.2 Boot Configuration

Do not reboot yet, just add the following lines to `/boot/loader.conf` so the required modules will load during system initialization:

```
mac_biba_load="YES"\nmac_seeotheruids_load="YES"
```

## 17.14.3 Configure Users

Set the `root` user to the default class using:

```
# pw usermod root -L default
```

All user accounts that are not `root` or system users will now require a login class. The login class is required otherwise users will be refused access to common commands such as `vi(1)`. The following `sh` script should do the trick:

```
# for x in `awk -F: '($3 >= 1001) && ($3 != 65534) { print $1 }' \n /etc/passwd`; do pw usermod $x -L default; done;
```

Drop the `nagios` and `www` users into the `insecure` class:

```
# pw usermod nagios -L insecure
```

```
# pw usermod www -L insecure
```

#### 17.14.4 Create the Contexts File

A contexts file should now be created; the following example file should be placed in `/etc/policy.contexts`.

```
# This is the default BIBA policy for this system.

# System:
/var/run                biba/equal
/var/run/*               biba/equal

/dev                   biba/equal
/dev/*                 biba/equal

/var                   biba/equal
/var/spool              biba/equal
/var/spool/*            biba/equal

/var/log                biba/equal
/var/log/*              biba/equal

/tmp                   biba/equal
/tmp/*                 biba/equal
/var/tmp                biba/equal
/var/tmp/*              biba/equal

/var/spool/mqueue       biba/equal
/var/spool/clientmqueue biba/equal

# For Nagios:
/usr/local/etc/nagios   biba/10
/usr/local/etc/nagios/*  biba/10

/var/spool/nagios       biba/10
/var/spool/nagios/*     biba/10

# For apache
/usr/local/etc/apache     biba/10
/usr/local/etc/apache/*   biba/10
```

This policy will enforce security by setting restrictions on the flow of information. In this specific configuration, users, root and others, should never be allowed to access **Nagios**. Configuration files and processes that are a part of **Nagios** will be completely self contained or jailed.

This file may now be read into our system by issuing the following command:

```
# setfsmac -ef /etc/policy.contexts /
# setfsmac -ef /etc/policy.contexts /
```

**Óçìâßùóç:** The above file system layout may be different depending on environment; however, it must be run on every single file system.

The /etc/mac.conf file requires the following modifications in the main section:

```
default_labels file ?biba  
default_labels ifnet ?biba  
default_labels process ?biba  
default_labels socket ?biba
```

### 17.14.5 Enable Networking

Add the following line to /boot/loader.conf:

```
security.mac.biba.trust_all_interfaces=1
```

And the following to the network card configuration stored in rc.conf. If the primary Internet configuration is done via DHCP, this may need to be configured manually after every system boot:

```
maclabel biba/equal
```

### 17.14.6 Testing the Configuration

Ensure that the web server and **Nagios** will not be started on system initialization, and reboot. Ensure the root user cannot access any of the files in the **Nagios** configuration directory. If root can issue an ls(1) command on /var/spool/nagios, then something is wrong. Otherwise a “permission denied” error should be returned.

If all seems well, **Nagios**, **Apache**, and **Sendmail** can now be started in a way fitting of the security policy. The following commands will make this happen:

```
# cd /etc/mail && make stop && \  
setpmac biba/equal make start && setpmac biba/10\10-10\ apachectl start && \  
setpmac biba/10\10-10\ /usr/local/etc/rc.d/nagios.sh forcestart
```

Double check to ensure that everything is working properly. If not, check the log files or error messages. Use the sysctl(8) utility to disable the mac\_biba(4) security policy module enforcement and try starting everything again, like normal.

**Óçìâßùóç:** The root user can change the security enforcement and edit the configuration files without fear. The following command will permit the degradation of the security policy to a lower grade for a newly spawned shell:

```
# setpmac biba/10 csh
```

To block this from happening, force the user into a range via login.conf(5). If setpmac(8) attempts to run a command outside of the compartment’s range, an error will be returned and the command will not be executed. In this case, setting root to biba/high(high-high).

## 17.15 User Lock Down

This example considers a relatively small, fewer than fifty users, storage system. Users would have login capabilities, and be permitted to not only store data but access resources as well.

For this scenario, the mac\_bsextended(4) mixed with mac\_seetheruids(4) could co-exist and block access not only to system objects but to hide user processes as well.

Begin by adding the following lines to `/boot/loader.conf`:

```
mac_seetheruids_enabled="YES"
```

The `mac_bsextended(4)` security policy module may be activated through the use of the following `rc.conf` variable:

```
ugidfw_enable="YES"
```

Default rules stored in `/etc/rc.bsextended` will be loaded at system initialization; however, the default entries may need modification. Since this machine is expected only to service users, everything may be left commented out except the last two. These will force the loading of user owned system objects by default.

Add the required users to this machine and reboot. For testing purposes, try logging in as a different user across two consoles. Run the `ps aux` command to see if processes of other users are visible. Try to run `ls(1)` on another users home directory, it should fail.

Do not try to test with the `root` user unless the specific `sysctl`s have been modified to block super user access.

**Óçìåßùóç:** When a new user is added, their `mac_bsextended(4)` rule will not be in the ruleset list. To update the ruleset quickly, simply unload the security policy module and reload it again using the `kldunload(8)` and `kldload(8)` utilities.

## 17.16 Troubleshooting the MAC Framework

During the development stage, a few users reported problems with normal configuration. Some of these problems are listed below:

### 17.16.1 The `multilabel` option cannot be enabled on `/`

The `multilabel` flag does not stay enabled on my root (`/`) partition!

It seems that one out of every fifty users has this problem, indeed, we had this problem during our initial configuration. Further observation of this so called “bug” has lead me to believe that it is a result of either incorrect documentation or misinterpretation of the documentation. Regardless of why it happened, the following steps may be taken to resolve it:

1. Edit `/etc/fstab` and set the root partition at `ro` for read-only.
2. Reboot into single user mode.
3. Run `tunefs -l enable` on `/`.
4. Reboot the system into normal mode.

5. Run `mount -urw /` and change the `ro` back to `rw` in `/etc/fstab` and reboot the system again.
6. Double-check the output from the `mount` to ensure that `multilabel` has been properly set on the root file system.

## 17.16.2 Cannot start a X11 server after MAC

After establishing a secure environment with MAC, I am no longer able to start X!

This could be caused by the MAC partition policy or by a mislabeling in one of the MAC labeling policies. To debug, try the following:

1. Check the error message; if the user is in the `insecure` class, the `partition` policy may be the culprit. Try setting the user's class back to the `default` class and rebuild the database with the `cap_mkdb` command. If this does not alleviate the problem, go to step two.
2. Double-check the label policies. Ensure that the policies are set correctly for the user in question, the X11 application, and the `/dev` entries.
3. If neither of these resolve the problem, send the error message and a description of your environment to the TrustedBSD discussion lists located at the TrustedBSD (<http://www.TrustedBSD.org>) website or to the çéåêñííééP èßóôá ãáiééþí åñùôÞóåùí öiö FreeBSD (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-questions>) mailing list.

## 17.16.3 Error: \_secure\_path(3) cannot stat .login\_conf

When I attempt to switch from the `root` to another user in the system, the error message `_secure_path: unable to state .login_conf`.

This message is usually shown when the user has a higher label setting than that of the user whom they are attempting to become. For instance a user on the system, `joe`, has a default label of `biba/low`. The `root` user, who has a label of `biba/high`, cannot view `joe`'s home directory. This will happen regardless if `root` has used the `su` command to become `joe`, or not. In this scenario, the Biba integrity model will not permit `root` to view objects set at a lower integrity level.

## 17.16.4 The `root` username is broken!

In normal or even single user mode, the `root` is not recognized. The `whoami` command returns 0 (zero) and `su` returns `who are you?`. What could be going on?

This can happen if a labeling policy has been disabled, either by a `sysctl(8)` or the policy module was unloaded. If the policy is being disabled or has been temporarily disabled, then the login capabilities database needs to be reconfigured with the `label` option being removed. Double check the `login.conf` file to ensure that all `label` options have been removed and rebuild the database with the `cap_mkdb` command.

This may also happen if a policy restricts access to the `master.passwd` file or database. Usually caused by an administrator altering the file under a label which conflicts with the general policy being used by the system. In these cases, the user information would be read by the system and access would be blocked as the file has inherited the new label. Disable the policy via a `sysctl(8)` and everything should return to normal.

## Óçìåéþóåéò

1. Other conditions may produce different failures. For instance, the file may not be owned by the user attempting to relabel the object, the object may not exist or may be read only. A mandatory policy will not allow the process to relabel the file, maybe because of a property of the file, a property of the process, or a property of the proposed new label value. For example: a user running at low integrity tries to change the label of a high integrity file. Or perhaps a user running at low integrity tries to change the label of a low integrity file to a high integrity label.
2. Due to a bug the `security.mac.portacl.enabled` sysctl variable will not work on FreeBSD 5.2.1 or previous releases.

# ÊåöÜëáéï 18 ïåä ïò ÓõìâÜíôùí Áóöáëåßáò

*ÃñÜöôçêå áðü ôíí Tom Rhodes êáé Robert Watson.*

## 18.1 Óýїїøç

Ôi êäöÜëéáíí áôôü åôôéÜæåé óôçí åâéåóÜóôåóç éáé ñýëéóç ôïö ÅëÝä÷ïö ÓõlåÜíôùí. Åîçäåß ôéo ðïëéôéêÝò åëÝä÷ïö, éáé ðänÝ÷åé Ýíá ðänÜääéäíá ñöèíßóåùí åëÝä÷ïö.

Áöiý äéáâÜóåôå áôôü öiêåöÜëáeï, èá iÝñåôå:

- Ôé åßíáé i Ýëåä÷iò óðiâÜíôúí êáé ðùò eåéöiññåß.
  - Ðùò íá ñoèìßåôåô ðii Ýëåä÷iò óðiâÜíôúí óöi FreeBSD æáé ÷ñþóôåò êáé ðñïäñÜñåôá (processes).
  - Ðùò íá áíæýóåôå óå ß÷íç ðiò åeÝå÷iò ÷ñçöéiñiéþíôåò óå åññåéåßá iåßùñçò üäæiò ååññíÝíùí êáé áíÜëööçò.

Đñéí äéáâÜóåôå áôôü ôï êåöÜëáéï, èá ðñÝðåé:

- Íá êáôáírábôå ôéò ááóéêÝò Ýííieåò ôíö UNIX êáé ôíö FreeBSD (ÊåöÜéáéï 4).
  - Íá åbôóå åííéêåèùÝìò iå ôéò ááóéêÝò Ýííieåò ôçò ñýèiéöçò êáé iåôåäéþôôéöçò ôíö ðõñþíá. (ÊåöÜéáéï 9).
  - Íá Ý÷åôå êÜðíéá åííéêåßúöç iå ôçí áóöÜéåé êáé ðùò åôôP ó÷åôßæåðåé iå öí FreeBSD (ÊåöÜéáéï 15).

**Đññáéáéíðíßçóć:** Í Yéâáá ÷ iò óðíñáÜíóúí áooáéæåßáò íðíñáß íá åçíéïññÞóáé ðíëý èåðòíílññáßò éåðááññáöÝò ñçò  
äññáóðçñéüðóçòáò ñòí õððóôÞíáòíò: óá Yíá óyóôçíá íå ððçëü ÿñññí, óá áñ ÷ åßá èåðááññáöÞò lðíñáß íá åññíñí ðíëý  
ílññÜéá, áY ÷ iòí ñòðèíéooåß äéá èåðòíílññÞ èåðááññáöÞ, èéá íá ílñðåñÜíòí õá áñéåðÜ gigabytes ñçí åññäílññÜáá  
óá êÜðíéåò ðåññéððþóáéò. lë åéá ÷ åéññéóóÝò éá ðññÝðåé íá ééiañÜíòí ððññøéí ñòí ðéò ðéèáÍÝò áðåééðÞóáéò óá  
÷ þñí åßóéí õá ðåññéððùñóç ñòðèíßóáúí èåðòíílññÝò èåðááññáöÞò. Äéá ðññÜäåéäíá, ßóùò åßíéá èåíéöú íá  
áooéáññéåß Yíá óyóôçíá áñ ÷ åßùí õóí /var/audit þóôá óá ððññééðá óððóôÞíáò áñ ÷ åßùí íá lçí åðçññåáóðíýí áí õ  
÷ þñíò áðññüò åññäíéçèåß.

## 18.2 Key Terms in this Chapter

Before reading this chapter, a few key audit-related terms must be explained:

- *event*: An auditable event is any event that can be logged using the audit subsystem. Examples of security-relevant events include the creation of a file, the building of a network connection, or a user logging in. Events are either “attributable”, meaning that they can be traced to an authenticated user, or “non-attributable” if they cannot be. Examples of non-attributable events are any events that occur before authentication in the login process, such as bad password attempts.
- *class*: Event classes are named sets of related events, and are used in selection expressions. Commonly used classes of events include “file creation” (fc), “exec” (ex) and “login\_logout” (lo).
- *record*: A record is an audit log entry describing a security event. Records contain a record event type, information on the subject (user) performing the action, date and time information, information on any objects or arguments, and a success or failure condition.
- *trail*: An audit trail, or log file, consists of a series of audit records describing security events. Typically, trails are in roughly chronological order with respect to the time events completed. Only authorized processes are allowed to commit records to the audit trail.
- *selection expression*: A selection expression is a string containing a list of prefixes and audit event class names used to match events.
- *preselection*: The process by which the system identifies which events are of interest to the administrator in order to avoid generating audit records describing events that are not of interest. The preselection configuration uses a series of selection expressions to identify which classes of events to audit for which users, as well as global settings that apply to both authenticated and unauthenticated processes.
- *reduction*: The process by which records from existing audit trails are selected for preservation, printing, or analysis. Likewise, the process by which undesired audit records are removed from the audit trail. Using reduction, administrators can implement policies for the preservation of audit data. For example, detailed audit trails might be kept for one month, but after that, trails might be reduced in order to preserve only login information for archival purposes.

## 18.3 Installing Audit Support

User space support for Event Auditing is installed as part of the base FreeBSD operating system as of 6.2-RELEASE. However, Event Auditing support must be explicitly compiled into the kernel by adding the following lines to the kernel configuration file:

```
options AUDIT
```

Rebuild and reinstall the kernel via the normal process explained in ÊðöÜëáéi 9.

Once the kernel is built, installed, and the system has been rebooted, enable the audit daemon by adding the following line to rc.conf(5):

```
auditd_enable="YES"
```

Audit support must then be started by a reboot, or by manually starting the audit daemon:

```
/etc/rc.d/auditd start
```

## 18.4 Audit Configuration

All configuration files for security audit are found in `/etc/security`. The following files must be present before the audit daemon is started:

- `audit_class` - Contains the definitions of the audit classes.
- `audit_control` - Controls aspects of the audit subsystem, such as default audit classes, minimum disk space to leave on the audit log volume, maximum audit trail size, etc.
- `audit_event` - Textual names and descriptions of system audit events, as well as a list of which classes each event is in.
- `audit_user` - User-specific audit requirements, which are combined with the global defaults at login.
- `audit_warn` - A customizable shell script used by `audittd` to generate warning messages in exceptional situations, such as when space for audit records is running low or when the audit trail file has been rotated.

**Ðñiâéäïððçóç:** Audit configuration files should be edited and maintained carefully, as errors in configuration may result in improper logging of events.

### 18.4.1 Event Selection Expressions

Selection expressions are used in a number of places in the audit configuration to determine which events should be audited. Expressions contain a list of event classes to match, each with a prefix indicating whether matching records should be accepted or ignored, and optionally to indicate if the entry is intended to match successful or failed operations. Selection expressions are evaluated from left to right, and two expressions are combined by appending one onto the other.

The following list contains the default audit event classes present in `audit_class`:

- `all - all` - Match all event classes.
- `ad - administrative` - Administrative actions performed on the system as a whole.
- `ap - application` - Application defined action.
- `cl - file_close` - Audit calls to the `close` system call.
- `ex - exec` - Audit program execution. Auditing of command line arguments and environmental variables is controlled via `audit_control(5)` using the `argv` and `envv` parameters to the `policy` setting.
- `fa - file_attr_acc` - Audit the access of object attributes such as `stat(1)`, `pathconf(2)` and similar events.
- `fc - file_creation` - Audit events where a file is created as a result.
- `fd - file_deletion` - Audit events where file deletion occurs.
- `fm - file_attr_mod` - Audit events where file attribute modification occurs, such as `chown(8)`, `chflags(1)`, `flock(2)`, etc.
- `fr - file_read` - Audit events in which data is read, files are opened for reading, etc.
- `fw - file_write` - Audit events in which data is written, files are written or modified, etc.
- `io - ioctl` - Audit use of the `ioctl(2)` system call.

- **ip - ipc** - Audit various forms of Inter-Process Communication, including POSIX pipes and System V IPC operations.
- **lo - login\_logout** - Audit login(1) and logout(1) events occurring on the system.
- **na - non\_attrib** - Audit non-attributable events.
- **no - no\_class** - Match no audit events.
- **nt - network** - Audit events related to network actions, such as connect(2) and accept(2).
- **ot - other** - Audit miscellaneous events.
- **pc - process** - Audit process operations, such as exec(3) and exit(3).

These audit event classes may be customized by modifying the `audit_class` and `audit_event` configuration files.

Each audit class in the list is combined with a prefix indicating whether successful/failed operations are matched, and whether the entry is adding or removing matching for the class and type.

- (none) Audit both successful and failed instances of the event.
- + Audit successful events in this class.
- - Audit failed events in this class.
- ^ Audit neither successful nor failed events in this class.
- ^+ Don't audit successful events in this class.
- ^- Don't audit failed events in this class.

The following example selection string selects both successful and failed login/logout events, but only successful execution events:

```
lo,+ex
```

## 18.4.2 Configuration Files

In most cases, administrators will need to modify only two files when configuring the audit system: `audit_control` and `audit_user`. The first controls system-wide audit properties and policies; the second may be used to fine-tune auditing by user.

### 18.4.2.1 The `audit_control` File

The `audit_control` file specifies a number of defaults for the audit subsystem. Viewing the contents of this file, we see the following:

```
dir:/var/audit
flags:lo
minfree:20
naflags:lo
policy:cmt
filesz:0
```

The `dir` option is used to set one or more directories where audit logs will be stored. If more than one directory entry appears, they will be used in order as they fill. It is common to configure audit so that audit logs are stored on a

dedicated file system, in order to prevent interference between the audit subsystem and other subsystems if the file system fills.

The `flags` field sets the system-wide default preselection mask for attributable events. In the example above, successful and failed login and logout events are audited for all users.

The `minfree` option defines the minimum percentage of free space for the file system where the audit trail is stored. When this threshold is exceeded, a warning will be generated. The above example sets the minimum free space to twenty percent.

The `naflags` option specifies audit classes to be audited for non-attributed events, such as the login process and system daemons.

The `policy` option specifies a comma-separated list of policy flags controlling various aspects of audit behavior. The default `cnt` flag indicates that the system should continue running despite an auditing failure (this flag is highly recommended). Another commonly used flag is `argv`, which causes command line arguments to the `execve(2)` system call to be audited as part of command execution.

The `filesz` option specifies the maximum size in bytes to allow an audit trail file to grow to before automatically terminating and rotating the trail file. The default, 0, disables automatic log rotation. If the requested file size is non-zero and below the minimum 512k, it will be ignored and a log message will be generated.

#### 18.4.2.2 The `audit_user` File

The `audit_user` file permits the administrator to specify further audit requirements for specific users. Each line configures auditing for a user via two fields: the first is the `alwaysaudit` field, which specifies a set of events that should always be audited for the user, and the second is the `neveraudit` field, which specifies a set of events that should never be audited for the user.

The following example `audit_user` file audits login/logout events and successful command execution for the root user, and audits file creation and successful command execution for the www user. If used with the example `audit_control` file above, the `lo` entry for `root` is redundant, and login/logout events will also be audited for the `www` user.

```
root:lo,+ex:no
www:fc,+ex:no
```

## 18.5 Administering the Audit Subsystem

### 18.5.1 Viewing Audit Trails

Audit trails are stored in the BSM binary format, so tools must be used to modify or convert to text. The `praudit` command converts audit trail files to a simple text format; the `auditreduce` command may be used to reduce the audit trail file for analysis, archiving, or printing purposes. `auditreduce` supports a variety of selection parameters, including event type, event class, user, date or time of the event, and the file path or object acted on.

For example, the `praudit` utility will dump the entire contents of a specified audit log in plain text:

```
# praudit /var/audit/AUDITFILE
```

Where *AUDITFILE* is the audit log to dump.

Audit trails consist of a series of audit records made up of tokens, which `praudit` prints sequentially one per line. Each token is of a specific type, such as `header` holding an audit record header, or `path` holding a file path from a name lookup. The following is an example of an `execve` event:

```
header,133,10,execve(2),0,Mon Sep 25 15:58:03 2006, + 384 msec
exec arg,finger,doug
path,/usr/bin/finger
attribute,555,root,wheel,90,24918,104944
subject,robert,root,wheel,root,wheel,38439,38032,42086,128.232.9.100
return,success,0
trailer,133
```

This audit represents a successful `execve` call, in which the command `finger doug` has been run. The arguments token contains both the processed command line presented by the shell to the kernel. The path token holds the path to the executable as looked up by the kernel. The attribute token describes the binary, and in particular, includes the file mode which can be used to determine if the application was setuid. The subject token describes the subject process, and stores in sequence the audit user ID, effective user ID and group ID, real user ID and group ID, process ID, session ID, port ID, and login address. Notice that the audit user ID and real user ID differ: the user `robert` has switched to the `root` account before running this command, but it is audited using the original authenticated user. Finally, the return token indicates the successful execution, and the trailer concludes the record.

### 18.5.2 Reducing Audit Trails

Since audit logs may be very large, an administrator will likely want to select a subset of records for using, such as records associated with a specific user:

```
# auditreduce -u trhodes /var/audit/AUDITFILE | praudit
```

This will select all audit records produced for the user `trhodes` stored in the *AUDITFILE* file.

### 18.5.3 Delegating Audit Review Rights

Members of the `audit` group are given permission to read audit trails in `/var/audit`; by default, this group is empty, so only the `root` user may read audit trails. Users may be added to the `audit` group in order to delegate audit review rights to the user. As the ability to track audit log contents provides significant insight into the behavior of users and processes, it is recommended that the delegation of audit review rights be performed with caution.

### 18.5.4 Live Monitoring Using Audit Pipes

Audit pipes are cloning pseudo-devices in the device file system which allow applications to tap the live audit record stream. This is primarily of interest to authors of intrusion detection and system monitoring applications. However, for the administrator the audit pipe device is a convenient way to allow live monitoring without running into problems with audit trail file ownership or log rotation interrupting the event stream. To track the live audit event stream, use the following command line

```
# praudit /dev/auditpipe
```

By default, audit pipe device nodes are accessible only to the `root` user. To make them accessible to the members of the `audit` group, add a `devfs` rule to `devfs.rules`:

```
add path 'auditpipe*' mode 0440 group audit
```

See `devfs.rules(5)` for more information on configuring the `devfs` file system.

**Ðñïåéäïðíßçóç:** It is easy to produce audit event feedback cycles, in which the viewing of each audit event results in the generation of more audit events. For example, if all network I/O is audited, and `praudit` is run from an SSH session, then a continuous stream of audit events will be generated at a high rate, as each event being printed will generate another event. It is advisable to run `praudit` on an audit pipe device from sessions without fine-grained I/O auditing in order to avoid this happening.

## 18.5.5 Rotating Audit Trail Files

Audit trails are written to only by the kernel, and managed only by the audit daemon, `auditd`. Administrators should not attempt to use `newsyslog.conf(5)` or other tools to directly rotate audit logs. Instead, the `audit` management tool may be used to shut down auditing, reconfigure the audit system, and perform log rotation. The following command causes the audit daemon to create a new audit log and signal the kernel to switch to using the new log. The old log will be terminated and renamed, at which point it may then be manipulated by the administrator.

```
# audit -n
```

**Ðñïåéäïðíßçóç:** If the `auditd` daemon is not currently running, this command will fail and an error message will be produced.

Adding the following line to `/etc/crontab` will force the rotation every twelve hours from `cron(8)`:

```
0      */12      *      *      *      root      /usr/sbin/audit -n
```

The change will take effect once you have saved the new `/etc/crontab`.

Automatic rotation of the audit trail file based on file size is possible via the `filesize` option in `audit_control(5)`, and is described in the configuration files section of this chapter.

## 18.5.6 Compressing Audit Trails

As audit trail files can become very large, it is often desirable to compress or otherwise archive trails once they have been closed by the audit daemon. The `audit_warn` script can be used to perform customized operations for a variety of audit-related events, including the clean termination of audit trails when they are rotated. For example, the following may be added to the `audit_warn` script to compress audit trails on close:

```
#  
# Compress audit trail files on close.  
#  
if [ "$1" = closefile ]; then
```

```
    gzip -9 $2  
fi
```

Other archiving activities might include copying trail files to a centralized server, deleting old trail files, or reducing the audit trail to remove unneeded records. The script will be run only when audit trail files are cleanly terminated, so will not be run on trails left unterminated following an improper shutdown.

# ÊåöÜëáéí 19 ÁðïèçêåõôééÜ ÌÝóá

## 19.1 Óýiiøç

Ôi êåöÜëáéí áðôü êåëýðôåé ôçí ÷ñþóç ôùí äßóêùí óôi FreeBSD. ÐåñéëåìâÜíáé äßóéïõò ðiõ õðïóðçñßæïíôåé áðü ïíþìç, äßóéïõò óðñfääâiÝíõò áðåðéâßåò óôi äßéôõi, ôéò ðiõ õðïééÜò óðóéâðYò áðïèþéâðóçò SCSI/IDE, êáèþò êáé óðóéâðYò ðiõ ÷ñþóéïðiéíýí äéâðåøþ USB.

Áöiy äéååÜóåôå áðôü ôi êåöÜëáéí, èá íÝñåôå:

- Ôçí ìñiëiäßá ðiõ ÷ñþóéïðiéåß ôi FreeBSD áéá íá ðåñéäñÜøåé ôçí ïñäÜíûñóç ôùí äåäññÝíûñóç ôôi öððééü íÝóí ðiõ äßóéïõ (partitions - áéåðåòìþóåéò - éáé slices).
  - Ðùò íá ðññóééÜýóåôå ðññóéïðiéåß ôi FreeBSD íá ÷ñþóéïðiéåß óðóéâðYò áðïèþéâðóçò USB.
  - Ðùò íá ññðèìþóåôå áééüíééÜ óðóðþíáôå áñ÷åßùí, üðùò äßóéïõò ðiõ áðïèçêåýííôåé óå ïíþìç RAM.
  - Ðùò íá ÷ñþóéïðiéþóåôå quotas áéá íá ðåñéïñþóåôå ôç ÷ñþóç ÷þññó ôôi äßóéï.
  - Ðùò íá êñððôïäñáöþóåôå äßóéïõò áéá íá ðiõò áðóáëþóåôå áðü áðééèÝóåéò.
  - Ðùò íá áçìéiññþóåôå êáé íá ãñÜøåôå CD éáé DVD óôi FreeBSD.
  - Ôá äéÜöññá äéåéÝóéíà íÝóá áðïèþéâðóçò áéá áíðþññáöá áðóáëåßåò.
  - Ðùò íá ÷ñþóéïðiéþóåôå ðññáñÜññáôå ëþþçò áíðéäñÜøùí áðóáëåßåò óôi FreeBSD.
  - Ðùò íá ðÜñåôå áíðþññáöá áðóáëåßåò óå áéóéèÝóåôå.
  - Ôé åßíáé ié áééüíåò (snapshots) óå Ýíá óýóðçíá áñ÷åßùí êáé Ðùò íá ôéò ÷ñþóéïðiéþóåôå áðïäiöééÜ.
- Ðñéí äéååÜóåôå áðôü ôi êåöÜëáéí, èá ðñÝðåé:
- Íá íÝñåôå Ðùò èá ññðèìþóåôå êáé èá áåéåðåôþóåôå Ýíá íÝí ðññþíá ôiõ FreeBSD (ÊåöÜëáéí 9).

## 19.2 Device Names

The following is a list of physical storage devices supported in FreeBSD, and the device names associated with them.

### Ðßíáêáò 19-1. Physical Disk Naming Conventions

Drive type	Drive device name
IDE hard drives	ad
IDE CDROM drives	acd
SCSI hard drives and USB Mass storage devices	da
SCSI CDROM drives	cd
Assorted non-standard CDROM drives	mcd for Mitsumi CD-ROM and scd for Sony CD-ROM devices
Floppy drives	fd

Drive type	Drive device name
SCSI tape drives	sa
IDE tape drives	ast
Flash drives	f1a for DiskOnChip® Flash device
RAID drives	aacd for Adaptec® AdvancedRAID, mlxrd and mlyrd for Mylex®, amrd for AMI MegaRAID®, idad for Compaq Smart RAID, twed for 3ware® RAID.

## 19.3 Adding Disks

*Originally contributed by David O'Brien.*

Lets say we want to add a new SCSI disk to a machine that currently only has a single drive. First turn off the computer and install the drive in the computer following the instructions of the computer, controller, and drive manufacturer. Due to the wide variations of procedures to do this, the details are beyond the scope of this document.

Login as user `root`. After you have installed the drive, inspect `/var/run/dmesg.boot` to ensure the new disk was found. Continuing with our example, the newly added drive will be `da1` and we want to mount it on `/1` (if you are adding an IDE drive, the device name will be `ad1`).

FreeBSD runs on IBM-PC compatible computers, therefore it must take into account the PC BIOS partitions. These are different from the traditional BSD partitions. A PC disk has up to four BIOS partition entries. If the disk is going to be truly dedicated to FreeBSD, you can use the *dedicated* mode. Otherwise, FreeBSD will have to live within one of the PC BIOS partitions. FreeBSD calls the PC BIOS partitions *slices* so as not to confuse them with traditional BSD partitions. You may also use slices on a disk that is dedicated to FreeBSD, but used in a computer that also has another operating system installed. This is a good way to avoid confusing the `fdisk` utility of other, non-FreeBSD operating systems.

In the slice case the drive will be added as `/dev/da1s1e`. This is read as: SCSI disk, unit number 1 (second SCSI disk), slice 1 (PC BIOS partition 1), and e BSD partition. In the dedicated case, the drive will be added simply as `/dev/da1e`.

Due to the use of 32-bit integers to store the number of sectors, `bslabel(8)` is limited to  $2^{32}-1$  sectors per disk or 2TB in most cases. The `fdisk(8)` format allows a starting sector of no more than  $2^{32}-1$  and a length of no more than  $2^{32}-1$ , limiting partitions to 2TB and disks to 4TB in most cases. The `sunlabel(8)` format is limited to  $2^{32}-1$  sectors per partition and 8 partitions for a total of 16TB. For larger disks, `gpt(8)` partitions may be used.

### 19.3.1 Using sysinstall(8)

#### 1. Navigating `Sysinstall`

You may use `sysinstall` to partition and label a new disk using its easy to use menus. Either login as user `root` or use the `su` command. Run `sysinstall` and enter the `Configure` menu. Within the `FreeBSD Configuration Menu`, scroll down and select the `Fdisk` option.

#### 2. `fdisk` Partition Editor

Once inside `fdisk`, typing `A` will use the entire disk for FreeBSD. When asked if you want to “remain cooperative with any future possible operating systems”, answer `YES`. Write the changes to the disk using `w`.

Now exit the FDISK editor by typing **q**. Next you will be asked about the “Master Boot Record”. Since you are adding a disk to an already running system, choose **None**.

### 3. Disk Label Editor

Next, you need to exit **sysinstall** and start it again. Follow the directions above, although this time choose the **Label** option. This will enter the **Disk Label Editor**. This is where you will create the traditional BSD partitions. A disk can have up to eight partitions, labeled **a-h**. A few of the partition labels have special uses. The **a** partition is used for the root partition (**/**). Thus only your system disk (e.g, the disk you boot from) should have an **a** partition. The **b** partition is used for swap partitions, and you may have many disks with swap partitions. The **c** partition addresses the entire disk in dedicated mode, or the entire FreeBSD slice in slice mode. The other partitions are for general use.

**sysinstall**’s Label editor favors the **e** partition for non-root, non-swap partitions. Within the Label editor, create a single file system by typing **c**. When prompted if this will be a FS (file system) or swap, choose **FS** and type in a mount point (e.g, **/mnt**). When adding a disk in post-install mode, **sysinstall** will not create entries in **/etc/fstab** for you, so the mount point you specify is not important.

You are now ready to write the new label to the disk and create a file system on it. Do this by typing **w**. Ignore any errors from **sysinstall** that it could not mount the new partition. Exit the Label Editor and **sysinstall** completely.

### 4. Finish

The last step is to edit **/etc/fstab** to add an entry for your new disk.

## 19.3.2 Using Command Line Utilities

### 19.3.2.1 Using Slices

This setup will allow your disk to work correctly with other operating systems that might be installed on your computer and will not confuse other operating systems’ fdisk utilities. It is recommended to use this method for new disk installs. Only use dedicated mode if you have a good reason to do so!

```
# dd if=/dev/zero of=/dev/da1 bs=1k count=1
# fdisk -BI da1 #Initialize your new disk
# bslabel -B -w -r da1s1 auto #Label it.
# bslabel -e da1s1 # Edit the bslabel just created and add any partitions.
# mkdir -p /1
# newfs /dev/da1s1 # Repeat this for every partition you created.
# mount /dev/da1s1 /1 # Mount the partition(s)
# vi /etc/fstab # Add the appropriate entry/entries to your /etc/fstab.
```

If you have an IDE disk, substitute ad for da.

### 19.3.2.2 Dedicated

If you will not be sharing the new drive with another operating system, you may use the dedicated mode. Remember this mode can confuse Microsoft operating systems; however, no damage will be done by them. IBM’s OS/2 however, will “appropriate” any partition it finds which it does not understand.

```
# dd if=/dev/zero of=/dev/da1 bs=1k count=1
# bslabel -Brw da1 auto
```

```
# bslabel -e da1          # create the 'e' partition
# newfs -d0 /dev/dale
# mkdir -p /1
# vi /etc/fstab          # add an entry for /dev/dale
# mount /1
```

An alternate method is:

```
# dd if=/dev/zero of=/dev/dal count=2
# bslabel /dev/dal | bslabel -BrR dal /dev/stdin
# newfs /dev/dale
# mkdir -p /1
# vi /etc/fstab          # add an entry for /dev/dale
# mount /1
```

## 19.4 RAID

### 19.4.1 Software RAID

#### 19.4.1.1 Concatenated Disk Driver (CCD) Configuration

*Original work by Christopher Shumway. Revised by Jim Brown.*

When choosing a mass storage solution the most important factors to consider are speed, reliability, and cost. It is rare to have all three in balance; normally a fast, reliable mass storage device is expensive, and to cut back on cost either speed or reliability must be sacrificed.

In designing the system described below, cost was chosen as the most important factor, followed by speed, then reliability. Data transfer speed for this system is ultimately constrained by the network. And while reliability is very important, the CCD drive described below serves online data that is already fully backed up on CD-R's and can easily be replaced.

Defining your own requirements is the first step in choosing a mass storage solution. If your requirements prefer speed or reliability over cost, your solution will differ from the system described in this section.

##### 19.4.1.1.1 Installing the Hardware

In addition to the IDE system disk, three Western Digital 30GB, 5400 RPM IDE disks form the core of the CCD disk described below providing approximately 90GB of online storage. Ideally, each IDE disk would have its own IDE controller and cable, but to minimize cost, additional IDE controllers were not used. Instead the disks were configured with jumpers so that each IDE controller has one master, and one slave.

Upon reboot, the system BIOS was configured to automatically detect the disks attached. More importantly, FreeBSD detected them on reboot:

```
ad0: 19574MB <WDC WD205BA> [39770/16/63] at ata0-master UDMA33
ad1: 29333MB <WDC WD307AA> [59598/16/63] at ata0-slave UDMA33
ad2: 29333MB <WDC WD307AA> [59598/16/63] at ata1-master UDMA33
ad3: 29333MB <WDC WD307AA> [59598/16/63] at ata1-slave UDMA33
```

**Óçìåßùóç:** If FreeBSD does not detect all the disks, ensure that you have jumpered them correctly. Most IDE drives also have a “Cable Select” jumper. This is *not* the jumper for the master/slave relationship. Consult the drive documentation for help in identifying the correct jumper.

Next, consider how to attach them as part of the file system. You should research both `vinum(8)` (ÊðöÜëáéi 22) and `ccd(4)`. In this particular configuration, `ccd(4)` was chosen.

#### 19.4.1.1.2 Setting Up the CCD

The `ccd(4)` driver allows you to take several identical disks and concatenate them into one logical file system. In order to use `ccd(4)`, you need a kernel with `ccd(4)` support built in. Add this line to your kernel configuration file, rebuild, and reinstall the kernel:

```
device    ccd
```

The `ccd(4)` support can also be loaded as a kernel loadable module.

To set up `ccd(4)`, you must first use `bslabel(8)` to label the disks:

```
bslabel -r -w ad1 auto
bslabel -r -w ad2 auto
bslabel -r -w ad3 auto
```

This creates a `bslabel` for `ad1c`, `ad2c` and `ad3c` that spans the entire disk.

The next step is to change the disk label type. You can use `bslabel(8)` to edit the disks:

```
bslabel -e ad1
bslabel -e ad2
bslabel -e ad3
```

This opens up the current disk label on each disk with the editor specified by the `EDITOR` environment variable, typically `vi(1)`.

An unmodified disk label will look something like this:

```
8 partitions:
#      size   offset   fstype   [fsize bsize bps/cpg]
c: 60074784       0     unused        0     0     0 # (Cyl.   0 - 59597)
```

Add a new `e` partition for `ccd(4)` to use. This can usually be copied from the `c` partition, but the `fstype` *must* be **4.2BSD**. The disk label should now look something like this:

```
8 partitions:
#      size   offset   fstype   [fsize bsize bps/cpg]
c: 60074784       0     unused        0     0     0 # (Cyl.   0 - 59597)
e: 60074784       0     4.2BSD        0     0     0 # (Cyl.   0 - 59597)
```

#### 19.4.1.1.3 Building the File System

Now that you have all the disks labeled, you must build the ccd(4). To do that, use ccdconfig(8), with options similar to the following:

```
ccdconfig ccd0❶ 32❷ 0❸ /dev/ad1e❹ /dev/ad2e /dev/ad3e
```

The use and meaning of each option is shown below:

- ❶ The first argument is the device to configure, in this case, `/dev/ccd0c`. The `/dev/` portion is optional.
- ❷ The interleave for the file system. The interleave defines the size of a stripe in disk blocks, each normally 512 bytes. So, an interleave of 32 would be 16,384 bytes.
- ❸ Flags for ccdconfig(8). If you want to enable drive mirroring, you can specify a flag here. This configuration does not provide mirroring for ccd(4), so it is set at 0 (zero).
- ❹ The final arguments to ccdconfig(8) are the devices to place into the array. Use the complete pathname for each device.

After running ccdconfig(8) the ccd(4) is configured. A file system can be installed. Refer to newfs(8) for options, or simply run:

```
newfs /dev/ccd0c
```

#### 19.4.1.1.4 Making it All Automatic

Generally, you will want to mount the ccd(4) upon each reboot. To do this, you must configure it first. Write out your current configuration to `/etc/ccd.conf` using the following command:

```
ccdconfig -g > /etc/ccd.conf
```

During reboot, the script `/etc/rc` runs `ccdconfig -C` if `/etc/ccd.conf` exists. This automatically configures the ccd(4) so it can be mounted.

**Óçìåßùóç:** If you are booting into single user mode, before you can mount(8) the ccd(4), you need to issue the following command to configure the array:

```
ccdconfig -C
```

To automatically mount the ccd(4), place an entry for the ccd(4) in `/etc/fstab` so it will be mounted at boot time:

<code>/dev/ccd0c</code>	<code>/media</code>	<code>ufs</code>	<code>rw</code>	<code>2</code>	<code>2</code>
-------------------------	---------------------	------------------	-----------------	----------------	----------------

#### 19.4.1.2 The Vinum Volume Manager

The Vinum Volume Manager is a block device driver which implements virtual disk drives. It isolates disk hardware from the block device interface and maps data in ways which result in an increase in flexibility, performance and reliability compared to the traditional slice view of disk storage. vinum(8) implements the RAID-0, RAID-1 and RAID-5 models, both individually and in combination.

See ÊðöÜëáéí 22 for more information about vinum(8).

### 19.4.2 Hardware RAID

FreeBSD also supports a variety of hardware RAID controllers. These devices control a RAID subsystem without the need for FreeBSD specific software to manage the array.

Using an on-card BIOS, the card controls most of the disk operations itself. The following is a brief setup description using a Promise IDE RAID controller. When this card is installed and the system is started up, it displays a prompt requesting information. Follow the instructions to enter the card's setup screen. From here, you have the ability to combine all the attached drives. After doing so, the disk(s) will look like a single drive to FreeBSD. Other RAID levels can be set up accordingly.

### 19.4.3 Rebuilding ATA RAID1 Arrays

FreeBSD allows you to hot-replace a failed disk in an array. This requires that you catch it before you reboot.

You will probably see something like the following in /var/log/messages or in the dmesg(8) output:

```
ad6 on monster1 suffered a hard error.
ad6: READ command timeout tag=0 serv=0 - resetting
ad6: trying fallback to PIO mode
ata3: resetting devices .. done
ad6: hard error reading fsbn 1116119 of 0-7 (ad6 bn 1116119; cn 1107 tn 4 sn 11)\\
status=59 error=40
ar0: WARNING - mirror lost
```

Using atacontrol(8), check for further information:

```
# atacontrol list
ATA channel 0:
    Master:      no device present
    Slave:     acd0 <HL-DT-ST CD-ROM GCR-8520B/1.00> ATA/ATAPI rev 0

ATA channel 1:
    Master:      no device present
    Slave:      no device present

ATA channel 2:
    Master: ad4 <MAXTOR 6L080J4/A93.0500> ATA/ATAPI rev 5
    Slave:      no device present

ATA channel 3:
    Master: ad6 <MAXTOR 6L080J4/A93.0500> ATA/ATAPI rev 5
    Slave:      no device present

# atacontrol status ar0
ar0: ATA RAID1 subdisks: ad4 ad6 status: DEGRADED
```

1. You will first need to detach the ata channel with the failed disk so you can safely remove it:

- ```
# atacontrol detach ata3
```
2. Replace the disk.
  3. Reattach the ata channel:

```
# atacontrol attach ata3
Master: ad6 <MAXTOR 6L080J4/A93.0500> ATA/ATAPI rev 5
Slave: no device present
```

  4. Add the new disk to the array as a spare:

```
# atacontrol addspare ar0 ad6
```

  5. Rebuild the array:

```
# atacontrol rebuild ar0
```

  6. It is possible to check on the progress by issuing the following command:

```
# dmesg | tail -10
[output removed]
ad6: removed from configuration
ad6: deleted from ar0 disk1
ad6: inserted into ar0 disk1 as spare
```

```
# atacontrol status ar0
ar0: ATA RAID1 subdisks: ad4 ad6 status: REBUILDING 0% completed
```

  7. Wait until this operation completes.

## 19.5 USB Storage Devices

*Contributed by Marc Fonvieille.*

A lot of external storage solutions, nowadays, use the Universal Serial Bus (USB): hard drives, USB thumbdrives, CD-R burners, etc. FreeBSD provides support for these devices.

### 19.5.1 Configuration

The USB mass storage devices driver, umass(4), provides the support for USB storage devices. If you use the GENERIC kernel, you do not have to change anything in your configuration. If you use a custom kernel, be sure that the following lines are present in your kernel configuration file:

```
device scbus
device da
device pass
device uhci
device ohci
device usb
device umass
```

The umass(4) driver uses the SCSI subsystem to access to the USB storage devices, your USB device will be seen as a SCSI device by the system. Depending on the USB chipset on your motherboard, you only need either device

uhci or device ohci, however having both in the kernel configuration file is harmless. Do not forget to compile and install the new kernel if you added any lines.

**Óçìåßùóç:** If your USB device is a CD-R or DVD burner, the SCSI CD-ROM driver, cd(4), must be added to the kernel via the line:

```
device cd
```

Since the burner is seen as a SCSI drive, the driver atapicam(4) should not be used in the kernel configuration.

Support for USB 2.0 controllers is provided on FreeBSD; however, you must add:

```
device ehci
```

to your configuration file for USB 2.0 support. Note uhci(4) and ohci(4) drivers are still needed if you want USB 1.X support.

## 19.5.2 Testing the Configuration

The configuration is ready to be tested: plug in your USB device, and in the system message buffer (dmesg(8)), the drive should appear as something like:

```
umass0: USB Solid state disk, rev 1.10/1.00, addr 2
GEOM: create disk da0 dp=0xc2d74850
da0 at umass-sim0 bus 0 target 0 lun 0
da0: <Generic Traveling Disk 1.11> Removable Direct Access SCSI-2 device
da0: 1.000MB/s transfers
da0: 126MB (258048 512 byte sectors: 64H 32S/T 126C)
```

Of course, the brand, the device node (da0) and other details can differ according to your configuration.

Since the USB device is seen as a SCSI one, the camcontrol command can be used to list the USB storage devices attached to the system:

```
# camcontrol devlist
<Generic Traveling Disk 1.11>      at scbus0 target 0 lun 0 (da0,pass0)
```

If the drive comes with a file system, you should be able to mount it. The ÓìÞá 19.3 will help you to format and create partitions on the USB drive if needed.

To make this device mountable as a normal user, certain steps have to be taken. First, the devices that are created when a USB storage device is connected need to be accessible by the user. A solution is to make all users of these devices a member of the operator group. This is done with pw(8). Second, when the devices are created, the operator group should be able to read and write them. This is accomplished by adding these lines to /etc/devfs.rules:

```
[localrules=1]
add path 'da*' mode 0660 group operator
```

**Óçìàßùóç:** If there already are SCSI disks in the system, it must be done a bit different. E.g., if the system already contains disks `da0` through `da2` attached to the system, change the second line as follows:

```
add path 'da[3-9]*' mode 0660 group operator
```

This will exclude the already existing disks from belonging to the `operator` group.

You also have to enable your `devfs.rules(5)` ruleset in your `/etc/rc.conf` file:

```
devfs_system_ruleset="localrules"
```

Next, the kernel has to be configured to allow regular users to mount file systems. The easiest way is to add the following line to `/etc/sysctl.conf`:

```
vfs.usermount=1
```

Note that this only takes effect after the next reboot. Alternatively, one can also use `sysctl(8)` to set this variable.

The final step is to create a directory where the file system is to be mounted. This directory needs to be owned by the user that is to mount the file system. One way to do that is for `root` to create a subdirectory owned by that user as `/mnt/$USER` (replace `$USER` by the login name of the actual user):

```
# mkdir /mnt/$USER
# chown $USER:$USER /mnt/$USER
```

Suppose a USB thumbdrive is plugged in, and a device `/dev/da0s1` appears. Since these devices usually come preformatted with a FAT file system, one can mount them like this:

```
% mount_msdosfs -m 644 -M 755 /dev/da0s1 /mnt/$USER
```

If you unplug the device (the disk must be unmounted before), you should see, in the system message buffer, something like the following:

```
umass0: at uhub0 port 1 (addr 2) disconnected
(da0:umass-sim0:0:0:0): lost device
(da0:umass-sim0:0:0:0): removing device entry
GEOM: destroy disk da0 dp=0xc2d74850
umass0: detached
```

### 19.5.3 Further Reading

Beside the Adding Disks and Mounting and Unmounting File Systems sections, reading various manual pages may be also useful: `umass(4)`, `camcontrol(8)`, and `usbdevs(8)`.

## 19.6 Creating and Using Optical Media (CDs)

*Contributed by Mike Meyer.*

### 19.6.1 Introduction

CDs have a number of features that differentiate them from conventional disks. Initially, they were not writable by the user. They are designed so that they can be read continuously without delays to move the head between tracks. They are also much easier to transport between systems than similarly sized media were at the time.

CDs do have tracks, but this refers to a section of data to be read continuously and not a physical property of the disk. To produce a CD on FreeBSD, you prepare the data files that are going to make up the tracks on the CD, then write the tracks to the CD.

The ISO 9660 file system was designed to deal with these differences. It unfortunately codifies file system limits that were common then. Fortunately, it provides an extension mechanism that allows properly written CDs to exceed those limits while still working with systems that do not support those extensions.

The `sysutils/cdrtools` port includes `mkisofs(8)`, a program that you can use to produce a data file containing an ISO 9660 file system. It has options that support various extensions, and is described below.

Which tool to use to burn the CD depends on whether your CD burner is ATAPI or something else. ATAPI CD burners use the `burncd` program that is part of the base system. SCSI and USB CD burners should use `cdrecord` from the `sysutils/cdrtools` port. It is also possible to use `cdrecord` and other tools for SCSI drives on ATAPI hardware with the ATAPI/CAM module.

If you want CD burning software with a graphical user interface, you may wish to take a look at either **X-CD-Roast** or **K3b**. These tools are available as packages or from the `sysutils/xcdroast` and `sysutils/k3b` ports.

**X-CD-Roast** and **K3b** require the ATAPI/CAM module with ATAPI hardware.

### 19.6.2 mkisofs

The `mkisofs(8)` program, which is part of the `sysutils/cdrtools` port, produces an ISO 9660 file system that is an image of a directory tree in the UNIX file system name space. The simplest usage is:

```
# mkisofs -o imagefile.iso /path/to/tree
```

This command will create an *imagefile.iso* containing an ISO 9660 file system that is a copy of the tree at */path/to/tree*. In the process, it will map the file names to names that fit the limitations of the standard ISO 9660 file system, and will exclude files that have names uncharacteristic of ISO file systems.

A number of options are available to overcome those restrictions. In particular, `-R` enables the Rock Ridge extensions common to UNIX systems, `-J` enables Joliet extensions used by Microsoft systems, and `-hfs` can be used to create HFS file systems used by Mac OS.

For CDs that are going to be used only on FreeBSD systems, `-U` can be used to disable all filename restrictions. When used with `-R`, it produces a file system image that is identical to the FreeBSD tree you started from, though it may violate the ISO 9660 standard in a number of ways.

The last option of general use is `-b`. This is used to specify the location of the boot image for use in producing an “El Torito” bootable CD. This option takes an argument which is the path to a boot image from the top of the tree being written to the CD. By default, `mkisofs(8)` creates an ISO image in the so-called “floppy disk emulation” mode, and thus expects the boot image to be exactly 1200, 1440 or 2880 KB in size. Some boot loaders, like the one used by the

FreeBSD distribution disks, do not use emulation mode; in this case, the `-no-emul-boot` option should be used. So, if `/tmp/myboot` holds a bootable FreeBSD system with the boot image in `/tmp/myboot/boot/cdboot`, you could produce the image of an ISO 9660 file system in `/tmp/bootable.iso` like so:

```
# mkisofs -R -no-emul-boot -b boot/cdboot -o /tmp/bootable.iso /tmp/myboot
```

Having done that, if you have `md` configured in your kernel, you can mount the file system with:

```
# mdconfig -a -t vnode -f /tmp/bootable.iso -u 0
# mount -t cd9660 /dev/	md0 /mnt
```

At which point you can verify that `/mnt` and `/tmp/myboot` are identical.

There are many other options you can use with `mkisofs(8)` to fine-tune its behavior. In particular: modifications to an ISO 9660 layout and the creation of Joliet and HFS discs. See the `mkisofs(8)` manual page for details.

### 19.6.3 burncd

If you have an ATAPI CD burner, you can use the `burncd` command to burn an ISO image onto a CD. `burncd` is part of the base system, installed as `/usr/sbin/burncd`. Usage is very simple, as it has few options:

```
# burncd -f cddevice data imagefile.iso fixate
```

Will burn a copy of `imagefile.iso` on `cddevice`. The default device is `/dev/acd0`. See `burncd(8)` for options to set the write speed, eject the CD after burning, and write audio data.

### 19.6.4 cdrecord

If you do not have an ATAPI CD burner, you will have to use `cdrecord` to burn your CDs. `cdrecord` is not part of the base system; you must install it from either the port at `sysutils/cdrtools` or the appropriate package. Changes to the base system can cause binary versions of this program to fail, possibly resulting in a “coaster”. You should therefore either upgrade the port when you upgrade your system, or if you are tracking `-STABLE`, upgrade the port when a new version becomes available.

While `cdrecord` has many options, basic usage is even simpler than `burncd`. Burning an ISO 9660 image is done with:

```
# cdrecord dev=device imagefile.iso
```

The tricky part of using `cdrecord` is finding the `dev` to use. To find the proper setting, use the `-scanbus` flag of `cdrecord`, which might produce results like this:

```
# cdrecord -scanbus
Cdrecord-Clone 2.01 (i386-unknown-freebsd7.0) Copyright (C) 1995-2004 Jörg Schilling
Using libscg version 'schily-0.1'
scsibus0:
 0,0,0      0) 'SEAGATE'  'ST39236LW'      '0004' Disk
 0,1,0      1) 'SEAGATE'  'ST39173W'      '5958' Disk
 0,2,0      2) *
 0,3,0      3) 'iomega'   'jaz 1GB'       'J.86' Removable Disk
 0,4,0      4) 'NEC'       'CD-ROM DRIVE:466' '1.26' Removable CD-ROM
```

```

0,5,0      5) *
0,6,0      6) *
0,7,0      7) *
scsibus1:
1,0,0    100) *
1,1,0    101) *
1,2,0    102) *
1,3,0    103) *
1,4,0    104) *
1,5,0    105) 'YAMAHA' 'CRW4260' '1.0q' Removable CD-ROM
1,6,0    106) 'ARTEC'   'AM12S'   '1.06' Scanner
1,7,0    107) *

```

This lists the appropriate dev value for the devices on the list. Locate your CD burner, and use the three numbers separated by commas as the value for dev. In this case, the CRW device is 1,5,0, so the appropriate input would be dev=1,5,0. There are easier ways to specify this value; see cdrecord(1) for details. That is also the place to look for information on writing audio tracks, controlling the speed, and other things.

## 19.6.5 Duplicating Audio CDs

You can duplicate an audio CD by extracting the audio data from the CD to a series of files, and then writing these files to a blank CD. The process is slightly different for ATAPI and SCSI drives.

### SCSI Drives

1. Use cdda2wav to extract the audio.

```
% cdda2wav -v255 -D2,0 -B -Owav
```

2. Use cdrecord to write the .wav files.

```
% cdrecord -v dev=2,0 -dao -useinfo *.wav
```

Make sure that 2,0 is set appropriately, as described in ÓÐíá 19.6.4.

### ATAPI Drives

1. The ATAPI CD driver makes each track available as /dev/acddt $nn$ , where  $d$  is the drive number, and  $nn$  is the track number written with two decimal digits, prefixed with zero as needed. So the first track on the first disk is /dev/acd0t01, the second is /dev/acd0t02, the third is /dev/acd0t03, and so on.

Make sure the appropriate files exist in /dev. If the entries are missing, force the system to retaste the media:

```
# dd if=/dev/acd0 of=/dev/null count=1
```

2. Extract each track using dd(1). You must also use a specific block size when extracting the files.

```
# dd if=/dev/acd0t01 of=track1.cdr bs=2352
# dd if=/dev/acd0t02 of=track2.cdr bs=2352
...
```

3. Burn the extracted files to disk using burncd. You must specify that these are audio files, and that burncd should fixate the disk when finished.

```
# burncd -f /dev/acd0 audio track1.cdr track2.cdr ... fixate
```

## 19.6.6 Duplicating Data CDs

You can copy a data CD to a image file that is functionally equivalent to the image file created with `mksisofs(8)`, and you can use it to duplicate any data CD. The example given here assumes that your CDROM device is `acd0`. Substitute your correct CDROM device.

```
# dd if=/dev/acd0 of=file.iso bs=2048
```

Now that you have an image, you can burn it to CD as described above.

## 19.6.7 Using Data CDs

Now that you have created a standard data CDROM, you probably want to mount it and read the data on it. By default, `mount(8)` assumes that a file system is of type `ufs`. If you try something like:

```
# mount /dev/cd0 /mnt
```

you will get a complaint about `Incorrect super block`, and no mount. The CDROM is not a UFS file system, so attempts to mount it as such will fail. You just need to tell `mount(8)` that the file system is of type `ISO9660`, and everything will work. You do this by specifying the `-t cd9660` option `mount(8)`. For example, if you want to mount the CDROM device, `/dev/cd0`, under `/mnt`, you would execute:

```
# mount -t cd9660 /dev/cd0 /mnt
```

Note that your device name (`/dev/cd0` in this example) could be different, depending on the interface your CDROM uses. Also, the `-t cd9660` option just executes `mount_cd9660(8)`. The above example could be shortened to:

```
# mount_cd9660 /dev/cd0 /mnt
```

You can generally use data CDROMs from any vendor in this way. Disks with certain ISO 9660 extensions might behave oddly, however. For example, Joliet disks store all filenames in two-byte Unicode characters. The FreeBSD kernel does not speak Unicode, but the FreeBSD CD9660 driver is able to convert Unicode characters on the fly. If some non-English characters show up as question marks you will need to specify the local charset you use with the `-C` option. For more information, consult the `mount_cd9660(8)` manual page.

**Óçìàßùóç:** To be able to do this character conversion with the help of the `-C` option, the kernel will require the `cd9660_icconv.ko` module to be loaded. This can be done either by adding this line to `loader.conf`:

```
cd9660_icconv_load="YES"
```

and then rebooting the machine, or by directly loading the module with `kldload(8)`.

Occasionally, you might get `Device not configured` when trying to mount a CDROM. This usually means that the CDROM drive thinks that there is no disk in the tray, or that the drive is not visible on the bus. It can take a couple of seconds for a CDROM drive to realize that it has been fed, so be patient.

Sometimes, a SCSI CDROM may be missed because it did not have enough time to answer the bus reset. If you have a SCSI CDROM please add the following option to your kernel configuration and rebuild your kernel.

```
options SCSI_DELAY=15000
```

This tells your SCSI bus to pause 15 seconds during boot, to give your CDROM drive every possible chance to answer the bus reset.

### 19.6.8 Burning Raw Data CDs

You can choose to burn a file directly to CD, without creating an ISO 9660 file system. Some people do this for backup purposes. This runs more quickly than burning a standard CD:

```
# burncd -f /dev/acd1 -s 12 data archive.tar.gz fixate
```

In order to retrieve the data burned to such a CD, you must read data from the raw device node:

```
# tar xzvf /dev/acd1
```

You cannot mount this disk as you would a normal CDROM. Such a CDROM cannot be read under any operating system except FreeBSD. If you want to be able to mount the CD, or share data with another operating system, you must use mkisofs(8) as described above.

### 19.6.9 Using the ATAPI/CAM Driver

*Contributed by Marc Fonvieille.*

This driver allows ATAPI devices (CD-ROM, CD-RW, DVD drives etc...) to be accessed through the SCSI subsystem, and so allows the use of applications like sysutils/cdrdao or cdrecord(1).

To use this driver, you will need to add the following line to the /boot/loader.conf file:

```
atapicam_load="YES"
```

then, reboot your machine.

**Óçìåßùóç:** If you prefer to statically compile the atapicam(4) support in your kernel, you will have to add this line to your kernel configuration file:

```
device atapicam
```

You also need the following lines in your kernel configuration file:

```
device ata
device scbus
device cd
device pass
```

which should already be present. Then rebuild, install your new kernel, and reboot your machine.

During the boot process, your burner should show up, like so:

```
acd0: CD-RW <MATSHITA CD-RW/DVD-ROM UJDA740> at atal-master PIO4
cd0 at atal bus 0 target 0 lun 0
cd0: <MATSHITA CDRW/DVD UJDA740 1.00> Removable CD-ROM SCSI-0 device
cd0: 16.000MB/s transfers
```

```
cd0: Attempt to query device size failed: NOT READY, Medium not present - tray closed
```

The drive could now be accessed via the `/dev/cd0` device name, for example to mount a CD-ROM on `/mnt`, just type the following:

```
# mount -t cd9660 /dev/cd0 /mnt
```

As root, you can run the following command to get the SCSI address of the burner:

```
# camcontrol devlist
<MATSHITA CDRW/DVD UJDA740 1.00>    at scbus1 target 0 lun 0 (pass0,cd0)
```

So `1,0,0` will be the SCSI address to use with `cdrecord(1)` and other SCSI application.

For more information about ATAPI/CAM and SCSI system, refer to the `atapicam(4)` and `cam(4)` manual pages.

## 19.7 Creating and Using Optical Media (DVDs)

*Contributed by Marc Fonvieille. With inputs from Andy Polyakov.*

### 19.7.1 Introduction

Compared to the CD, the DVD is the next generation of optical media storage technology. The DVD can hold more data than any CD and is nowadays the standard for video publishing.

Five physical recordable formats can be defined for what we will call a recordable DVD:

- DVD-R: This was the first DVD recordable format available. The DVD-R standard is defined by the DVD Forum (<http://www.dvdforum.com/forum.shtml>). This format is write once.
- DVD-RW: This is the rewritable version of the DVD-R standard. A DVD-RW can be rewritten about 1000 times.
- DVD-RAM: This is also a rewritable format supported by the DVD Forum. A DVD-RAM can be seen as a removable hard drive. However, this media is not compatible with most DVD-ROM drives and DVD-Video players; only a few DVD writers support the DVD-RAM format. Read the ÔìPiá 19.7.9 for more information on DVD-RAM use.
- DVD+RW: This is a rewritable format defined by the DVD+RW Alliance (<http://www.dvdrw.com/>). A DVD+RW can be rewritten about 1000 times.
- DVD+R: This format is the write once variation of the DVD+RW format.

A single layer recordable DVD can hold up to 4,700,000,000 bytes which is actually 4.38 GB or 4485 MB (1 kilobyte is 1024 bytes).

**Óçìàßùóç:** A distinction must be made between the physical media and the application. For example, a DVD-Video is a specific file layout that can be written on any recordable DVD physical media: DVD-R, DVD+R, DVD-RW etc. Before choosing the type of media, you must be sure that both the burner and the DVD-Video player (a standalone player or a DVD-ROM drive on a computer) are compatible with the media under consideration.

## 19.7.2 Configuration

The program growisofs(1) will be used to perform DVD recording. This command is part of the **dvd+rw-tools** utilities (`sysutils/dvd+rw-tools`). The **dvd+rw-tools** support all DVD media types.

These tools use the SCSI subsystem to access to the devices, therefore the ATAPI/CAM support must be added to your kernel. If your burner uses the USB interface this addition is useless, and you should read the [ÓiPiá 19.5](#) for more details on USB devices configuration.

You also have to enable DMA access for ATAPI devices, this can be done in adding the following line to the `/boot/loader.conf` file:

```
hw.ata.atapi_dma="1"
```

Before attempting to use the **dvd+rw-tools** you should consult the `dvd+rw-tools`' hardware compatibility notes (<http://fy.chalmers.se/~apro/linux/DVD+RW/hcn.html>) for any information related to your DVD burner.

**Óçìåßùóć:** If you want a graphical user interface, you should have a look to **K3b** (`sysutils/k3b`) which provides a user friendly interface to `growisofs(1)` and many other burning tools.

## 19.7.3 Burning Data DVDs

The `growisofs(1)` command is a frontend to `mkisofs`, it will invoke `mkisofs(8)` to create the file system layout and will perform the write on the DVD. This means you do not need to create an image of the data before the burning process.

To burn onto a DVD+R or a DVD-R the data from the `/path/to/data` directory, use the following command:

```
# growisofs -dvd-compat -Z /dev/cd0 -J -R /path/to/data
```

The options `-J` `-R` are passed to `mkisofs(8)` for the file system creation (in this case: an ISO 9660 file system with Joliet and Rock Ridge extensions), consult the `mkisofs(8)` manual page for more details.

The option `-Z` is used for the initial session recording in any case: multiple sessions or not. The DVD device, `/dev/cd0`, must be changed according to your configuration. The `-dvd-compat` parameter will close the disk, the recording will be unappendable. In return this should provide better media compatibility with DVD-ROM drives.

It is also possible to burn a pre-mastered image, for example to burn the image `imagefile.iso`, we will run:

```
# growisofs -dvd-compat -Z /dev/cd0=imagefile.iso
```

The write speed should be detected and automatically set according to the media and the drive being used. If you want to force the write speed, use the `-speed=` parameter. For more information, read the `growisofs(1)` manual page.

## 19.7.4 Burning a DVD-Video

A DVD-Video is a specific file layout based on ISO 9660 and the micro-UDF (M-UDF) specifications. The DVD-Video also presents a specific data structure hierarchy, it is the reason why you need a particular program such as `multimedia/dvdauthor` to author the DVD.

If you already have an image of the DVD-Video file system, just burn it in the same way as for any image, see the previous section for an example. If you have made the DVD authoring and the result is in, for example, the directory `/path/to/video`, the following command should be used to burn the DVD-Video:

```
# growisofs -Z /dev/cd0 -dvd-video /path/to/video
```

The `-dvd-video` option will be passed down to `mkisofs(8)` and will instruct it to create a DVD-Video file system layout. Beside this, the `-dvd-video` option implies `-dvd-compat` `growisofs(1)` option.

### 19.7.5 Using a DVD+RW

Unlike CD-RW, a virgin DVD+RW needs to be formatted before first use. The `growisofs(1)` program will take care of it automatically whenever appropriate, which is the *recommended* way. However you can use the `dvd+rw-format` command to format the DVD+RW:

```
# dvd+rw-format /dev/cd0
```

You need to perform this operation just once, keep in mind that only virgin DVD+RW medias need to be formatted. Then you can burn the DVD+RW in the way seen in previous sections.

If you want to burn new data (burn a totally new file system not append some data) onto a DVD+RW, you do not need to blank it, you just have to write over the previous recording (in performing a new initial session), like this:

```
# growisofs -Z /dev/cd0 -J -R /path/to/newdata
```

DVD+RW format offers the possibility to easily append data to a previous recording. The operation consists in merging a new session to the existing one, it is not multisession writing, `growisofs(1)` will *grow* the ISO 9660 file system present on the media.

For example, if we want to append data to our previous DVD+RW, we have to use the following:

```
# growisofs -M /dev/cd0 -J -R /path/to/nextdata
```

The same `mkisofs(8)` options we used to burn the initial session should be used during next writes.

**Óçìåßùóç:** You may want to use the `-dvd-compat` option if you want better media compatibility with DVD-ROM drives. In the DVD+RW case, this will not prevent you from adding data.

If for any reason you really want to blank the media, do the following:

```
# growisofs -Z /dev/cd0=/dev/zero
```

### 19.7.6 Using a DVD-RW

A DVD-RW accepts two disc formats: the incremental sequential one and the restricted overwrite. By default DVD-RW discs are in sequential format.

A virgin DVD-RW can be directly written without the need of a formatting operation, however a non-virgin DVD-RW in sequential format needs to be blanked before to be able to write a new initial session.

To blank a DVD-RW in sequential mode, run:

```
# dvd+rw-format -blank=full /dev/cd0
```

**Óçìàßúóç:** A full blanking (-blank=full) will take about one hour on a 1x media. A fast blanking can be performed using the -blank option if the DVD-RW will be recorded in Disk-At-Once (DAO) mode. To burn the DVD-RW in DAO mode, use the command:

```
# growisofs -use-the-force-luke=dao -Z /dev/cd0=imagefile.iso
```

The -use-the-force-luke=dao option should not be required since growisofs(1) attempts to detect minimally (fast blanked) media and engage DAO write.

In fact one should use restricted overwrite mode with any DVD-RW, this format is more flexible than the default incremental sequential one.

To write data on a sequential DVD-RW, use the same instructions as for the other DVD formats:

```
# growisofs -Z /dev/cd0 -J -R /path/to/data
```

If you want to append some data to your previous recording, you will have to use the growisofs(1) -M option. However, if you perform data addition on a DVD-RW in incremental sequential mode, a new session will be created on the disc and the result will be a multi-session disc.

A DVD-RW in restricted overwrite format does not need to be blanked before a new initial session, you just have to overwrite the disc with the -Z option, this is similar to the DVD+RW case. It is also possible to grow an existing ISO 9660 file system written on the disc in a same way as for a DVD+RW with the -M option. The result will be a one-session DVD.

To put a DVD-RW in the restricted overwrite format, the following command must be used:

```
# dvd+rw-format /dev/cd0
```

To change back to the sequential format use:

```
# dvd+rw-format -blank=full /dev/cd0
```

### 19.7.7 Multisession

Very few DVD-ROM drives support multisession DVDs, they will most of time, hopefully, only read the first session. DVD+R, DVD-R and DVD-RW in sequential format can accept multiple sessions, the notion of multiple sessions does not exist for the DVD+RW and the DVD-RW restricted overwrite formats.

Using the following command after an initial (non-closed) session on a DVD+R, DVD-R, or DVD-RW in sequential format, will add a new session to the disc:

```
# growisofs -M /dev/cd0 -J -R /path/to/nextdata
```

Using this command line with a DVD+RW or a DVD-RW in restricted overwrite mode, will append data in merging the new session to the existing one. The result will be a single-session disc. This is the way used to add data after an initial write on these medias.

**Óçìâßùóç:** Some space on the media is used between each session for end and start of sessions. Therefore, one should add sessions with large amount of data to optimize media space. The number of sessions is limited to 154 for a DVD+R, about 2000 for a DVD-R, and 127 for a DVD+R Double Layer.

## 19.7.8 For More Information

To obtain more information about a DVD, the `dvd+rw-mediainfo /dev/cd0` command can be ran with the disc in the drive.

More information about the **dvd+rw-tools** can be found in the `growisofs(1)` manual page, on the **dvd+rw-tools** web site (<http://fy.chalmers.se/~appro/linux/DVD+RW/>) and in the cdwrite mailing list (<http://lists.debian.org/cdwrite/>) archives.

**Óçìâßùóç:** The `dvd+rw-mediainfo` output of the resulting recording or the media with issues is mandatory for any problem report. Without this output, it will be quite impossible to help you.

## 19.7.9 Using a DVD-RAM

### 19.7.9.1 Configuration

DVD-RAM writers come with either SCSI or ATAPI interface. DMA access for ATAPI devices has to be enabled, this can be done by adding the following line to the `/boot/loader.conf` file:

```
hw.ata.atapi_dma="1"
```

### 19.7.9.2 Preparing the Medium

As previously mentioned in the chapter introduction, a DVD-RAM can be seen as a removable hard drive. As any other hard drive the DVD-RAM must be “prepared” before the first use. In the example, the whole disk space will be used with a standard UFS2 file system:

```
# dd if=/dev/zero of=/dev/acd0 count=2
# bsdlabel -Bw acd0
# newfs /dev/acd0
```

The DVD device, `acd0`, must be changed according to the configuration.

### 19.7.9.3 Using the Medium

Once the previous operations have been performed on the DVD-RAM, it can be mounted as a normal hard drive:

```
# mount /dev/acd0 /mnt
```

After this the DVD-RAM will be both readable and writeable.

## 19.8 Creating and Using Floppy Disks

*Original work by Julio Merino. Rewritten by Martin Karlsson.*

Storing data on floppy disks is sometimes useful, for example when one does not have any other removable storage media or when one needs to transfer small amounts of data to another computer.

This section will explain how to use floppy disks in FreeBSD. It will primarily cover formatting and usage of 3.5inch DOS floppies, but the concepts are similar for other floppy disk formats.

### 19.8.1 Formatting Floppies

#### 19.8.1.1 The Device

Floppy disks are accessed through entries in `/dev`, just like other devices. To access the raw floppy disk, simply use `/dev/fdN`.

#### 19.8.1.2 Formatting

A floppy disk needs to be low-level formated before it can be used. This is usually done by the vendor, but formatting is a good way to check media integrity. Although it is possible to force larger (or smaller) disk sizes, 1440kB is what most floppy disks are designed for.

To low-level format the floppy disk you need to use `fdformat(1)`. This utility expects the device name as an argument. Make note of any error messages, as these can help determine if the disk is good or bad.

##### 19.8.1.2.1 Formatting Floppy Disks

Use the `/dev/fdN` devices to format the floppy. Insert a new 3.5inch floppy disk in your drive and issue:

```
# /usr/sbin/fdformat -f 1440 /dev/fd0
```

### 19.8.2 The Disk Label

After low-level formatting the disk, you will need to place a disk label on it. This disk label will be destroyed later, but it is needed by the system to determine the size of the disk and its geometry later.

The new disk label will take over the whole disk, and will contain all the proper information about the geometry of the floppy. The geometry values for the disk label are listed in `/etc/disktab`.

You can run now `bslabel(8)` like so:

```
# /sbin/bslabel -B -r -w /dev/fd0 fd1440
```

### 19.8.3 The File System

Now the floppy is ready to be high-level formated. This will place a new file system on it, which will let FreeBSD read and write to the disk. After creating the new file system, the disk label is destroyed, so if you want to reformat the disk, you will have to recreate the disk label.

The floppy's file system can be either UFS or FAT. FAT is generally a better choice for floppies.

To put a new file system on the floppy, issue:

```
# /sbin/newfs_msdos /dev/fd0
```

The disk is now ready for use.

### 19.8.4 Using the Floppy

To use the floppy, mount it with `mount_msdosfs(8)`. One can also use `emulators/mtools` from the ports collection.

## 19.9 Creating and Using Data Tapes

The major tape media are the 4mm, 8mm, QIC, mini-cartridge and DLT.

### 19.9.1 4mm (DDS: Digital Data Storage)

4mm tapes are replacing QIC as the workstation backup media of choice. This trend accelerated greatly when Conner purchased Archive, a leading manufacturer of QIC drives, and then stopped production of QIC drives. 4mm drives are small and quiet but do not have the reputation for reliability that is enjoyed by 8mm drives. The cartridges are less expensive and smaller (3 x 2 x 0.5 inches, 76 x 51 x 12 mm) than 8mm cartridges. 4mm, like 8mm, has comparatively short head life for the same reason, both use helical scan.

Data throughput on these drives starts ~150 kB/s, peaking at ~500 kB/s. Data capacity starts at 1.3 GB and ends at 2.0 GB. Hardware compression, available with most of these drives, approximately doubles the capacity. Multi-drive tape library units can have 6 drives in a single cabinet with automatic tape changing. Library capacities reach 240 GB.

The DDS-3 standard now supports tape capacities up to 12 GB (or 24 GB compressed).

4mm drives, like 8mm drives, use helical-scan. All the benefits and drawbacks of helical-scan apply to both 4mm and 8mm drives.

Tapes should be retired from use after 2,000 passes or 100 full backups.

### 19.9.2 8mm (Exabyte)

8mm tapes are the most common SCSI tape drives; they are the best choice of exchanging tapes. Nearly every site has an Exabyte 2 GB 8mm tape drive. 8mm drives are reliable, convenient and quiet. Cartridges are inexpensive and small (4.8 x 3.3 x 0.6 inches; 122 x 84 x 15 mm). One downside of 8mm tape is relatively short head and tape life due to the high rate of relative motion of the tape across the heads.

Data throughput ranges from ~250 kB/s to ~500 kB/s. Data sizes start at 300 MB and go up to 7 GB. Hardware compression, available with most of these drives, approximately doubles the capacity. These drives are available as single units or multi-drive tape libraries with 6 drives and 120 tapes in a single cabinet. Tapes are changed automatically by the unit. Library capacities reach 840+ GB.

The Exabyte “Mammoth” model supports 12 GB on one tape (24 GB with compression) and costs approximately twice as much as conventional tape drives.

Data is recorded onto the tape using helical-scan, the heads are positioned at an angle to the media (approximately 6 degrees). The tape wraps around 270 degrees of the spool that holds the heads. The spool spins while the tape slides over the spool. The result is a high density of data and closely packed tracks that angle across the tape from one edge to the other.

### 19.9.3 QIC

QIC-150 tapes and drives are, perhaps, the most common tape drive and media around. QIC tape drives are the least expensive “serious” backup drives. The downside is the cost of media. QIC tapes are expensive compared to 8mm or 4mm tapes, up to 5 times the price per GB data storage. But, if your needs can be satisfied with a half-dozen tapes, QIC may be the correct choice. QIC is the *most* common tape drive. Every site has a QIC drive of some density or another. Therein lies the rub, QIC has a large number of densities on physically similar (sometimes identical) tapes. QIC drives are not quiet. These drives audibly seek before they begin to record data and are clearly audible whenever reading, writing or seeking. QIC tapes measure 6 x 4 x 0.7 inches (152 x 102 x 17 mm).

Data throughput ranges from ~150 kB/s to ~500 kB/s. Data capacity ranges from 40 MB to 15 GB. Hardware compression is available on many of the newer QIC drives. QIC drives are less frequently installed; they are being supplanted by DAT drives.

Data is recorded onto the tape in tracks. The tracks run along the long axis of the tape media from one end to the other. The number of tracks, and therefore the width of a track, varies with the tape’s capacity. Most if not all newer drives provide backward-compatibility at least for reading (but often also for writing). QIC has a good reputation regarding the safety of the data (the mechanics are simpler and more robust than for helical scan drives).

Tapes should be retired from use after 5,000 backups.

### 19.9.4 DLT

DLT has the fastest data transfer rate of all the drive types listed here. The 1/2" (12.5mm) tape is contained in a single spool cartridge (4 x 4 x 1 inches; 100 x 100 x 25 mm). The cartridge has a swinging gate along one entire side of the cartridge. The drive mechanism opens this gate to extract the tape leader. The tape leader has an oval hole in it which the drive uses to “hook” the tape. The take-up spool is located inside the tape drive. All the other tape cartridges listed here (9 track tapes are the only exception) have both the supply and take-up spools located inside the tape cartridge itself.

Data throughput is approximately 1.5 MB/s, three times the throughput of 4mm, 8mm, or QIC tape drives. Data capacities range from 10 GB to 20 GB for a single drive. Drives are available in both multi-tape changers and multi-tape, multi-drive tape libraries containing from 5 to 900 tapes over 1 to 20 drives, providing from 50 GB to 9 TB of storage.

With compression, DLT Type IV format supports up to 70 GB capacity.

Data is recorded onto the tape in tracks parallel to the direction of travel (just like QIC tapes). Two tracks are written at once. Read/write head lifetimes are relatively long; once the tape stops moving, there is no relative motion between the heads and the tape.

### 19.9.5 AIT

AIT is a new format from Sony, and can hold up to 50 GB (with compression) per tape. The tapes contain memory chips which retain an index of the tape's contents. This index can be rapidly read by the tape drive to determine the position of files on the tape, instead of the several minutes that would be required for other tapes. Software such as **SAMS:Alexandria** can operate forty or more AIT tape libraries, communicating directly with the tape's memory chip to display the contents on screen, determine what files were backed up to which tape, locate the correct tape, load it, and restore the data from the tape.

Libraries like this cost in the region of \$20,000, pricing them a little out of the hobbyist market.

### 19.9.6 Using a New Tape for the First Time

The first time that you try to read or write a new, completely blank tape, the operation will fail. The console messages should be similar to:

```
sa0(ncr1:4:0): NOT READY asc:4,1  
sa0(ncr1:4:0): Logical unit is in process of becoming ready
```

The tape does not contain an Identifier Block (block number 0). All QIC tape drives since the adoption of QIC-525 standard write an Identifier Block to the tape. There are two solutions:

- `mt fsf 1` causes the tape drive to write an Identifier Block to the tape.
- Use the front panel button to eject the tape.

Re-insert the tape and `dump` data to the tape.

```
dump will report DUMP: End of tape detected and the console will show: HARDWARE FAILURE info:280  
asc:80,96.
```

rewind the tape using: `mt rewind`.

Subsequent tape operations are successful.

## 19.10 Backups to Floppies

### 19.10.1 Can I Use Floppies for Backing Up My Data?

Floppy disks are not really a suitable media for making backups as:

- The media is unreliable, especially over long periods of time.
- Backing up and restoring is very slow.

- They have a very limited capacity (the days of backing up an entire hard disk onto a dozen or so floppies has long since passed).

However, if you have no other method of backing up your data then floppy disks are better than no backup at all.

If you do have to use floppy disks then ensure that you use good quality ones. Floppies that have been lying around the office for a couple of years are a bad choice. Ideally use new ones from a reputable manufacturer.

### 19.10.2 So How Do I Backup My Data to Floppies?

The best way to backup to floppy disk is to use tar(1) with the -M (multi volume) option, which allows backups to span multiple floppies.

To backup all the files in the current directory and sub-directory use this (as root):

```
# tar Mcvf /dev/fd0 *
```

When the first floppy is full tar(1) will prompt you to insert the next volume (because tar(1) is media independent it refers to volumes; in this context it means floppy disk).

Prepare volume #2 for /dev/fd0 and hit return:

This is repeated (with the volume number incrementing) until all the specified files have been archived.

### 19.10.3 Can I Compress My Backups?

Unfortunately, tar(1) will not allow the -z option to be used for multi-volume archives. You could, of course, gzip(1) all the files, tar(1) them to the floppies, then gunzip(1) the files again!

### 19.10.4 How Do I Restore My Backups?

To restore the entire archive use:

```
# tar Mxvf /dev/fd0
```

There are two ways that you can use to restore only specific files. First, you can start with the first floppy and use:

```
# tar Mxvf /dev/fd0 filename
```

The utility tar(1) will prompt you to insert subsequent floppies until it finds the required file.

Alternatively, if you know which floppy the file is on then you can simply insert that floppy and use the same command as above. Note that if the first file on the floppy is a continuation from the previous one then tar(1) will warn you that it cannot restore it, even if you have not asked it to!

## 19.11 Backup Strategies

*Original work by Lowell Gilbert.*

The first requirement in devising a backup plan is to make sure that all of the following problems are covered:

- Disk failure
- Accidental file deletion
- Random file corruption
- Complete machine destruction (e.g. fire), including destruction of any on-site backups.

It is perfectly possible that some systems will be best served by having each of these problems covered by a completely different technique. Except for strictly personal systems with very low-value data, it is unlikely that one technique would cover all of them.

Some of the techniques in the toolbox are:

- Archives of the whole system, backed up onto permanent media offsite. This actually provides protection against all of the possible problems listed above, but is slow and inconvenient to restore from. You can keep copies of the backups onsite and/or online, but there will still be inconveniences in restoring files, especially for non-privileged users.
- Filesystem snapshots. This is really only helpful in the accidental file deletion scenario, but it can be *very* helpful in that case, and is quick and easy to deal with.
- Copies of whole filesystems and/or disks (e.g. periodic rsync(1) of the whole machine). This is generally most useful in networks with unique requirements. For general protection against disk failure, it is usually inferior to RAID. For restoring accidentally deleted files, it can be comparable to UFS snapshots, but that depends on your preferences.
- RAID. Minimizes or avoids downtime when a disk fails. At the expense of having to deal with disk failures more often (because you have more disks), albeit at a much lower urgency.
- Checking fingerprints of files. The mtrees(8) utility is very useful for this. Although it is not a backup technique, it helps guarantee that you will notice when you need to resort to your backups. This is particularly important for offline backups, and should be checked periodically.

It is quite easy to come up with even more techniques, many of them variations on the ones listed above. Specialized requirements will usually lead to specialized techniques (for example, backing up a live database usually requires a method particular to the database software as an intermediate step). The important thing is to know what dangers you want to protect against, and how you will handle each.

## 19.12 Backup Basics

The three major backup programs are dump(8), tar(1), and cpio(1).

### 19.12.1 Dump and Restore

The traditional UNIX backup programs are `dump` and `restore`. They operate on the drive as a collection of disk blocks, below the abstractions of files, links and directories that are created by the file systems. `dump` backs up an

entire file system on a device. It is unable to backup only part of a file system or a directory tree that spans more than one file system. `dump` does not write files and directories to tape, but rather writes the raw data blocks that comprise files and directories.

**Óçìâßùóç:** If you use `dump` on your root directory, you would not back up `/home`, `/usr` or many other directories since these are typically mount points for other file systems or symbolic links into those file systems.

`dump` has quirks that remain from its early days in Version 6 of AT&T UNIX (circa 1975). The default parameters are suitable for 9-track tapes (6250 bpi), not the high-density media available today (up to 62,182 fpi). These defaults must be overridden on the command line to utilize the capacity of current tape drives.

It is also possible to backup data across the network to a tape drive attached to another computer with `rdump` and `rrestore`. Both programs rely upon `rcmd(3)` and `ruserok(3)` to access the remote tape drive. Therefore, the user performing the backup must be listed in the `.rhosts` file on the remote computer. The arguments to `rdump` and `rrestore` must be suitable to use on the remote computer. When `rdumping` from a FreeBSD computer to an Exabyte tape drive connected to a Sun called `komodo`, use:

```
# /sbin/rdump 0dsbfu 54000 13000 126 komodo:/dev/nsa8 /dev/da0a 2>&1
```

Beware: there are security implications to allowing `.rhosts` authentication. Evaluate your situation carefully.

It is also possible to use `dump` and `restore` in a more secure fashion over `ssh`.

### ÐáñÜääéäíá 19-1. Using `dump` over `ssh`

```
# /sbin/dump -0uan -f - /usr | gzip -2 | ssh -c blowfish \
targetuser@targetmachine.example.com dd of=/mybigfiles/dump-usr-10.gz
```

Or using `dump`'s built-in method, setting the environment variable `RSH`:

### ÐáñÜääéäíá 19-2. Using `dump` over `ssh` with `RSH` set

```
# RSH=/usr/bin/ssh /sbin/dump -0uan -f targetuser@targetmachine.example.com:/dev/sa0 /usr
```

## 19.12.2 `tar`

`tar(1)` also dates back to Version 6 of AT&T UNIX (circa 1975). `tar` operates in cooperation with the file system; it writes files and directories to tape. `tar` does not support the full range of options that are available from `cpio(1)`, but it does not require the unusual command pipeline that `cpio` uses.

On FreeBSD 5.3 and later, both GNU `tar` and the default `bsdtar` are available. The GNU version can be invoked with `gtar`. It supports remote devices using the same syntax as `rdump`. To `tar` to an Exabyte tape drive connected to a Sun called `komodo`, use:

```
# /usr/bin/gtar cf komodo:/dev/nsa8 . 2>&1
```

The same could be accomplished with `bsdtar` by using a pipeline and `rsh` to send the data to a remote tape drive.

```
# tar cf - . | rsh hostname dd of=tape-device obs=20b
```

If you are worried about the security of backing up over a network you should use the `ssh` command instead of `rsh`.

### 19.12.3 cpio

`cpio(1)` is the original UNIX file interchange tape program for magnetic media. `cpio` has options (among many others) to perform byte-swapping, write a number of different archive formats, and pipe the data to other programs. This last feature makes `cpio` an excellent choice for installation media. `cpio` does not know how to walk the directory tree and a list of files must be provided through `stdin`.

`cpio` does not support backups across the network. You can use a pipeline and `rsh` to send the data to a remote tape drive.

```
# for f in directory_list; do
find $f >> backup.list
done
# cpio -v -o --format=newc < backup.list | ssh user@host "cat > backup_device"
```

Where `directory_list` is the list of directories you want to back up, `user@host` is the user/hostname combination that will be performing the backups, and `backup_device` is where the backups should be written to (e.g., `/dev/nsa0`).

### 19.12.4 pax

`pax(1)` is IEEE/POSIX's answer to `tar` and `cpio`. Over the years the various versions of `tar` and `cpio` have gotten slightly incompatible. So rather than fight it out to fully standardize them, POSIX created a new archive utility. `pax` attempts to read and write many of the various `cpio` and `tar` formats, plus new formats of its own. Its command set more resembles `cpio` than `tar`.

### 19.12.5 Amanda

**Amanda** (Advanced Maryland Network Disk Archiver) is a client/server backup system, rather than a single program. An **Amanda** server will backup to a single tape drive any number of computers that have **Amanda** clients and a network connection to the **Amanda** server. A common problem at sites with a number of large disks is that the length of time required to backup to data directly to tape exceeds the amount of time available for the task. **Amanda** solves this problem. **Amanda** can use a “holding disk” to backup several file systems at the same time. **Amanda** creates “archive sets”: a group of tapes used over a period of time to create full backups of all the file systems listed in **Amanda**'s configuration file. The “archive set” also contains nightly incremental (or differential) backups of all the file systems. Restoring a damaged file system requires the most recent full backup and the incremental backups.

The configuration file provides fine control of backups and the network traffic that **Amanda** generates. **Amanda** will use any of the above backup programs to write the data to tape. **Amanda** is available as either a port or a package, it is not installed by default.

### 19.12.6 Do Nothing

“Do nothing” is not a computer program, but it is the most widely used backup strategy. There are no initial costs. There is no backup schedule to follow. Just say no. If something happens to your data, grin and bear it!

If your time and your data is worth little to nothing, then “Do nothing” is the most suitable backup program for your computer. But beware, UNIX is a useful tool, you may find that within six months you have a collection of files that are valuable to you.

“Do nothing” is the correct backup method for `/usr/obj` and other directory trees that can be exactly recreated by your computer. An example is the files that comprise the HTML or PostScript version of this Handbook. These document formats have been created from SGML input files. Creating backups of the HTML or PostScript files is not necessary. The SGML files are backed up regularly.

### 19.12.7 Which Backup Program Is Best?

`dump(8) Period.` Elizabeth D. Zwicky torture tested all the backup programs discussed here. The clear choice for preserving all your data and all the peculiarities of UNIX file systems is `dump`. Elizabeth created file systems containing a large variety of unusual conditions (and some not so unusual ones) and tested each program by doing a backup and restore of those file systems. The peculiarities included: files with holes, files with holes and a block of nulls, files with funny characters in their names, unreadable and unwritable files, devices, files that change size during the backup, files that are created/deleted during the backup and more. She presented the results at LISA V in Oct. 1991. See torture-testing Backup and Archive Programs (<http://berdmann.dyndns.org/zwicky/testdump.doc.html>).

### 19.12.8 Emergency Restore Procedure

#### 19.12.8.1 Before the Disaster

There are only four steps that you need to perform in preparation for any disaster that may occur.

First, print the `bslabel` from each of your disks (e.g. `bslabel da0 | lpr`), your file system table (`/etc/fstab`) and all boot messages, two copies of each.

Second, determine that the boot and fix-it floppies (`boot.f1p` and `fixit.f1p`) have all your devices. The easiest way to check is to reboot your machine with the boot floppy in the floppy drive and check the boot messages. If all your devices are listed and functional, skip on to step three.

Otherwise, you have to create two custom bootable floppies which have a kernel that can mount all of your disks and access your tape drive. These floppies must contain: `fdisk`, `bslabel`, `newfs`, `mount`, and whichever backup program you use. These programs must be statically linked. If you use `dump`, the floppy must contain `restore`.

Third, create backup tapes regularly. Any changes that you make after your last backup may be irretrievably lost. Write-protect the backup tapes.

Fourth, test the floppies (either `boot.f1p` and `fixit.f1p` or the two custom bootable floppies you made in step two.) and backup tapes. Make notes of the procedure. Store these notes with the bootable floppy, the printouts and the backup tapes. You will be so distraught when restoring that the notes may prevent you from destroying your backup tapes (How? In place of `tar xvf /dev/sa0`, you might accidentally type `tar cvf /dev/sa0` and over-write your backup tape).

For an added measure of security, make bootable floppies and two backup tapes each time. Store one of each at a remote location. A remote location is NOT the basement of the same office building. A number of firms in the World Trade Center learned this lesson the hard way. A remote location should be physically separated from your computers and disk drives by a significant distance.

**ÐánÜääéäia 19-3. A Script for Creating a Bootable Floppy**

```

#!/bin/sh
#
# create a restore floppy
#
# format the floppy
#
PATH=/bin:/sbin:/usr/sbin:/usr/bin

fdformat -q fd0
if [ $? -ne 0 ]
then
    echo "Bad floppy, please use a new one"
    exit 1
fi

# place boot blocks on the floppy
#
bslabel -w -B /dev/fd0c fd1440

#
# newfs the one and only partition
#
newfs -t 2 -u 18 -l 1 -c 40 -i 5120 -m 5 -o space /dev/fd0a

#
# mount the new floppy
#
mount /dev/fd0a /mnt

#
# create required directories
#
mkdir /mnt/dev
mkdir /mnt/bin
mkdir /mnt/sbin
mkdir /mnt/etc
mkdir /mnt/root
mkdir /mnt/mnt          # for the root partition
mkdir /mnt/tmp
mkdir /mnt/var

#
# populate the directories
#
if [ ! -x /sys/compile/MINI/kernel ]
then
    cat << EOM
The MINI kernel does not exist, please create one.
Here is an example config file:
#
# MINI -- A kernel to get FreeBSD onto a disk.

```

```

#
machine      "i386"
cpu          "I486_CPU"
ident        MINI
maxusers    5

options      INET           # needed for _tcp _icmpstat _ipstat
#                   _udpstat _tcpstat _fdb
options      FFS            #Berkeley Fast File System
options      FAT_CURSOR     #block cursor in syscons or pccons
options      SCSI_DELAY=15  #Be pessimistic about Joe SCSI device
options      NCONS=2         #1 virtual consoles
options      USERCONFIG     #Allow user configuration with -c XXX

config       kernel  root on da0 swap on da0 and dal dumps on da0

device       isa0
device       pci0

device       fdc0   at isa? port "IO_FDI" bio irq 6 drq 2 vector fdintr
device       fd0    at fdc0 drive 0

device       ncr0

device       scbus0

device       sc0    at isa? port "IO_KBD" tty irq 1 vector scintr
device       npx0   at isa? port "IO_NPX" irq 13 vector npxinr

device       da0
device       da1
device       da2

device       sa0

pseudo-device loop      # required by INET
pseudo-device gzip      # Exec gzipped a.out's
EOM
        exit 1
fi

cp -f /sys/compile/MINI/kernel /mnt

gzip -c -best /sbin/init > /mnt/sbin/init
gzip -c -best /sbin/fsck > /mnt/sbin/fsck
gzip -c -best /sbin/mount > /mnt/sbin/mount
gzip -c -best /sbin/halt > /mnt/sbin/halt
gzip -c -best /sbin/restore > /mnt/sbin/restore

gzip -c -best /bin/sh > /mnt/bin/sh
gzip -c -best /bin/sync > /mnt/bin/sync

cp /root/.profile /mnt/root

```

```

cp -f /dev/MAKEDEV /mnt/dev
chmod 755 /mnt/dev/MAKEDEV

chmod 500 /mnt/sbin/init
chmod 555 /mnt/sbin/fsck /mnt/sbin/mount /mnt/sbin/halt
chmod 555 /mnt/bin/sh /mnt/bin/sync
chmod 6555 /mnt/sbin/restore

#
# create the devices nodes
#
cd /mnt/dev
./MAKEDEV std
./MAKEDEV da0
./MAKEDEV da1
./MAKEDEV da2
./MAKEDEV sa0
./MAKEDEV pty0
cd /

#
# create minimum file system table
#
cat > /mnt/etc/fstab <<EOM
/dev/fd0a      /      ufs     rw  1  1
EOM

#
# create minimum passwd file
#
cat > /mnt/etc/passwd <<EOM
root:*:0:0:Charlie &:/root:/bin/sh
EOM

cat > /mnt/etc/master.passwd <<EOM
root::0::0::0:Charlie &:/root:/bin/sh
EOM

chmod 600 /mnt/etc/master.passwd
chmod 644 /mnt/etc/passwd
/usr/sbin/pwd_mkdb -d /mnt/etc /mnt/etc/master.passwd

#
# umount the floppy and inform the user
#
/sbin/umount /mnt
echo "The floppy has been unmounted and is now ready."

```

### 19.12.8.2 After the Disaster

The key question is: did your hardware survive? You have been doing regular backups so there is no need to worry about the software.

If the hardware has been damaged, the parts should be replaced before attempting to use the computer.

If your hardware is okay, check your floppies. If you are using a custom boot floppy, boot single-user (type `-s` at the `boot:` prompt). Skip the following paragraph.

If you are using the `boot.f1p` and `fixit.f1p` floppies, keep reading. Insert the `boot.f1p` floppy in the first floppy drive and boot the computer. The original install menu will be displayed on the screen. Select the `Fixit--Repair mode with CDROM or floppy.` option. Insert the `fixit.f1p` when prompted. `restore` and the other programs that you need are located in `/mnt2/rescue` (`/mnt2/stand` for FreeBSD versions older than 5.2).

Recover each file system separately.

Try to mount (e.g. `mount /dev/da0a /mnt`) the root partition of your first disk. If the `bslabel` was damaged, use `bslabel` to re-partition and label the disk to match the label that you printed and saved. Use `newfs` to re-create the file systems. Re-mount the root partition of the floppy read-write (`mount -u -o rw /mnt`). Use your backup program and backup tapes to recover the data for this file system (e.g. `restore vrf /dev/sa0`). Unmount the file system (e.g. `umount /mnt`). Repeat for each file system that was damaged.

Once your system is running, backup your data onto new tapes. Whatever caused the crash or data loss may strike again. Another hour spent now may save you from further distress later.

## 19.13 Network, Memory, and File-Backed File Systems

*Reorganized and enhanced by Marc Fonvieille.*

Aside from the disks you physically insert into your computer: floppies, CDs, hard drives, and so forth; other forms of disks are understood by FreeBSD - the *virtual disks*.

These include network file systems such as the Network File System and Coda, memory-based file systems and file-backed file systems.

According to the FreeBSD version you run, you will have to use different tools for creation and use of file-backed and memory-based file systems.

**Óçìåßùóç:** Use `devfs(5)` to allocate device nodes transparently for the user.

### 19.13.1 File-Backed File System

The utility `mdconfig(8)` is used to configure and enable memory disks, `md(4)`, under FreeBSD. To use `mdconfig(8)`, you have to load `md(4)` module or to add the support in your kernel configuration file:

```
device md
```

The mdconfig(8) command supports three kinds of memory backed virtual disks: memory disks allocated with malloc(9), memory disks using a file or swap space as backing. One possible use is the mounting of floppy or CD images kept in files.

To mount an existing file system image:

#### ÐáñÜääéäíá 19-4. Using `mdconfig` to Mount an Existing File System Image

```
# mdconfig -a -t vnode -f diskimage -u 0
# mount /dev/	md0 /mnt
```

To create a new file system image with mdconfig(8):

#### ÐáñÜääéäíá 19-5. Creating a New File-Backed Disk with `mdconfig`

```
# dd if=/dev/zero of=newimage bs=1k count=5k
5120+0 records in
5120+0 records out
# mdconfig -a -t vnode -f newimage -u 0
# bsdlabel -w md0 auto
# newfs md0a
/dev/md0a: 5.0MB (10224 sectors) block size 16384, fragment size 2048
        using 4 cylinder groups of 1.25MB, 80 blks, 192 inodes.
super-block backups (for fsck -b #) at:
    160, 2720, 5280, 7840
# mount /dev/	md0a /mnt
# df /mnt
Filesystem 1K-blocks Used Avail Capacity Mounted on
/dev/	md0a      4710     4   4330      0%      /mnt
```

If you do not specify the unit number with the `-u` option, mdconfig(8) will use the md(4) automatic allocation to select an unused device. The name of the allocated unit will be output on stdout like `md4`. For more details about mdconfig(8), please refer to the manual page.

The utility mdconfig(8) is very useful, however it asks many command lines to create a file-backed file system. FreeBSD also comes with a tool called mdmfs(8), this program configures a md(4) disk using mdconfig(8), puts a UFS file system on it using newfs(8), and mounts it using mount(8). For example, if you want to create and mount the same file system image as above, simply type the following:

#### ÐáñÜääéäíá 19-6. Configure and Mount a File-Backed Disk with `mfdmfs`

```
# dd if=/dev/zero of=newimage bs=1k count=5k
5120+0 records in
5120+0 records out
# mfdmfs -F newimage -s 5m md0 /mnt
# df /mnt
Filesystem 1K-blocks Used Avail Capacity Mounted on
/dev/	md0      4718     4   4338      0%      /mnt
```

If you use the option `md` without unit number, mdmfs(8) will use md(4) auto-unit feature to automatically select an unused device. For more details about mdmfs(8), please refer to the manual page.

### 19.13.2 Memory-Based File System

For a memory-based file system the “swap backing” should normally be used. Using swap backing does not mean that the memory disk will be swapped out to disk by default, but merely that the memory disk will be allocated from a memory pool which can be swapped out to disk if needed. It is also possible to create memory-based disk which are malloc(9) backed, but using malloc backed memory disks, especially large ones, can result in a system panic if the kernel runs out of memory.

#### ÐáñÜääéäíá 19-7. Creating a New Memory-Based Disk with `mdconfig`

```
# mdconfig -a -t swap -s 5m -u 1
# newfs -U md1
/dev/md1: 5.0MB (10240 sectors) block size 16384, fragment size 2048
    using 4 cylinder groups of 1.27MB, 81 blks, 192 inodes.
    with soft updates
super-block backups (for fsck -b #) at:
 160, 2752, 5344, 7936
# mount /dev/md1 /mnt
# df /mnt
Filesystem 1K-blocks Used Avail Capacity Mounted on
/dev/md1      4718     4   4338      0%   /mnt
```

#### ÐáñÜääéäíá 19-8. Creating a New Memory-Based Disk with `mdmfs`

```
# mdmfs -s 5m md2 /mnt
# df /mnt
Filesystem 1K-blocks Used Avail Capacity Mounted on
/dev/md2      4846     2   4458      0%   /mnt
```

### 19.13.3 Detaching a Memory Disk from the System

When a memory-based or file-based file system is not used, you should release all resources to the system. The first thing to do is to unmount the file system, then use `mdconfig(8)` to detach the disk from the system and release the resources.

For example to detach and free all resources used by `/dev/ md4`:

```
# mdconfig -d -u 4
```

It is possible to list information about configured `md(4)` devices in using the command `mdconfig -l`.

## 19.14 File System Snapshots

*Contributed by Tom Rhodes.*

FreeBSD offers a feature in conjunction with Soft Updates: File system snapshots.

Snapshots allow a user to create images of specified file systems, and treat them as a file. Snapshot files must be created in the file system that the action is performed on, and a user may create no more than 20 snapshots per file

system. Active snapshots are recorded in the superblock so they are persistent across unmount and remount operations along with system reboots. When a snapshot is no longer required, it can be removed with the standard rm(1) command. Snapshots may be removed in any order, however all the used space may not be acquired because another snapshot will possibly claim some of the released blocks.

The un-alterable snapshot file flag is set by mksnap\_ffs(8) after initial creation of a snapshot file. The unlink(1) command makes an exception for snapshot files since it allows them to be removed.

Snapshots are created with the mount(8) command. To place a snapshot of /var in the file /var/snapshot/snap use the following command:

```
# mount -u -o snapshot /var/snapshot/snap /var
```

Alternatively, you can use mksnap\_ffs(8) to create a snapshot:

```
# mksnap_ffs /var /var/snapshot/snap
```

One can find snapshot files on a file system (e.g. /var) by using the find(1) command:

```
# find /var -flags snapshot
```

Once a snapshot has been created, it has several uses:

- Some administrators will use a snapshot file for backup purposes, because the snapshot can be transferred to CDs or tape.
- The file system integrity checker, fsck(8), may be run on the snapshot. Assuming that the file system was clean when it was mounted, you should always get a clean (and unchanging) result. This is essentially what the background fsck(8) process does.
- Run the dump(8) utility on the snapshot. A dump will be returned that is consistent with the file system and the timestamp of the snapshot. dump(8) can also take a snapshot, create a dump image and then remove the snapshot in one command using the -L flag.
- mount(8) the snapshot as a frozen image of the file system. To mount(8) the snapshot /var/snapshot/snap run:

```
# mdconfig -a -t vnode -f /var/snapshot/snap -u 4
# mount -r /dev/md4 /mnt
```

You can now walk the hierarchy of your frozen /var file system mounted at /mnt. Everything will initially be in the same state it was during the snapshot creation time. The only exception is that any earlier snapshots will appear as zero length files. When the use of a snapshot has delimited, it can be unmounted with:

```
# umount /mnt
# mdconfig -d -u 4
```

For more information about softupdates and file system snapshots, including technical papers, you can visit Marshall Kirk McKusick's website at <http://www.mckusick.com/>.

## 19.15 File System Quotas

Quotas are an optional feature of the operating system that allow you to limit the amount of disk space and/or the number of files a user or members of a group may allocate on a per-file system basis. This is used most often on

timesharing systems where it is desirable to limit the amount of resources any one user or group of users may allocate. This will prevent one user or group of users from consuming all of the available disk space.

### 19.15.1 Configuring Your System to Enable Disk Quotas

Before attempting to use disk quotas, it is necessary to make sure that quotas are configured in your kernel. This is done by adding the following line to your kernel configuration file:

```
options QUOTA
```

The stock GENERIC kernel does not have this enabled by default, so you will have to configure, build and install a custom kernel in order to use disk quotas. Please refer to ÊðöÜëáéi 9 for more information on kernel configuration.

Next you will need to enable disk quotas in `/etc/rc.conf`. This is done by adding the line:

```
enable_quotas="YES"
```

For finer control over your quota startup, there is an additional configuration variable available. Normally on bootup, the quota integrity of each file system is checked by the quotacheck(8) program. The quotacheck(8) facility insures that the data in the quota database properly reflects the data on the file system. This is a very time consuming process that will significantly affect the time your system takes to boot. If you would like to skip this step, a variable in `/etc/rc.conf` is made available for the purpose:

```
check_quotas="NO"
```

Finally you will need to edit `/etc/fstab` to enable disk quotas on a per-file system basis. This is where you can either enable user or group quotas or both for all of your file systems.

To enable per-user quotas on a file system, add the `userquota` option to the options field in the `/etc/fstab` entry for the file system you want to enable quotas on. For example:

```
/dev/dals2g    /home      ufs  rw,userquota 1 2
```

Similarly, to enable group quotas, use the `groupquota` option instead of `userquota`. To enable both user and group quotas, change the entry as follows:

```
/dev/dals2g    /home      ufs  rw,userquota,groupquota 1 2
```

By default, the quota files are stored in the root directory of the file system with the names `quota.user` and `quota.group` for user and group quotas respectively. See `fstab(5)` for more information. Even though the `fstab(5)` manual page says that you can specify an alternate location for the quota files, this is not recommended because the various quota utilities do not seem to handle this properly.

At this point you should reboot your system with your new kernel. `/etc/rc` will automatically run the appropriate commands to create the initial quota files for all of the quotas you enabled in `/etc/fstab`, so there is no need to manually create any zero length quota files.

In the normal course of operations you should not be required to run the `quotacheck(8)`, `quotaon(8)`, or `quotaoff(8)` commands manually. However, you may want to read their manual pages just to be familiar with their operation.

## 19.15.2 Setting Quota Limits

Once you have configured your system to enable quotas, verify that they really are enabled. An easy way to do this is to run:

```
# quota -v
```

You should see a one line summary of disk usage and current quota limits for each file system that quotas are enabled on.

You are now ready to start assigning quota limits with the edquota(8) command.

You have several options on how to enforce limits on the amount of disk space a user or group may allocate, and how many files they may create. You may limit allocations based on disk space (block quotas) or number of files (inode quotas) or a combination of both. Each of these limits are further broken down into two categories: hard and soft limits.

A hard limit may not be exceeded. Once a user reaches his hard limit he may not make any further allocations on the file system in question. For example, if the user has a hard limit of 500 kbytes on a file system and is currently using 490 kbytes, the user can only allocate an additional 10 kbytes. Attempting to allocate an additional 11 kbytes will fail.

Soft limits, on the other hand, can be exceeded for a limited amount of time. This period of time is known as the grace period, which is one week by default. If a user stays over his or her soft limit longer than the grace period, the soft limit will turn into a hard limit and no further allocations will be allowed. When the user drops back below the soft limit, the grace period will be reset.

The following is an example of what you might see when you run the edquota(8) command. When the edquota(8) command is invoked, you are placed into the editor specified by the EDITOR environment variable, or in the vi editor if the EDITOR variable is not set, to allow you to edit the quota limits.

```
# edquota -u test

Quotas for user test:
/usr: kbytes in use: 65, limits (soft = 50, hard = 75)
      inodes in use: 7, limits (soft = 50, hard = 60)
/usr/var: kbytes in use: 0, limits (soft = 50, hard = 75)
      inodes in use: 0, limits (soft = 50, hard = 60)
```

You will normally see two lines for each file system that has quotas enabled. One line for the block limits, and one line for inode limits. Simply change the value you want updated to modify the quota limit. For example, to raise this user's block limit from a soft limit of 50 and a hard limit of 75 to a soft limit of 500 and a hard limit of 600, change:

```
/usr: kbytes in use: 65, limits (soft = 50, hard = 75)
```

to:

```
/usr: kbytes in use: 65, limits (soft = 500, hard = 600)
```

The new quota limits will be in place when you exit the editor.

Sometimes it is desirable to set quota limits on a range of UIDs. This can be done by use of the -p option on the edquota(8) command. First, assign the desired quota limit to a user, and then run edquota -p protouser startuid-enduid. For example, if user test has the desired quota limits, the following command can be used to duplicate those quota limits for UIDs 10,000 through 19,999:

```
# edquota -p test 10000-19999
```

For more information see edquota(8) manual page.

### 19.15.3 Checking Quota Limits and Disk Usage

You can use either the quota(1) or the repquota(8) commands to check quota limits and disk usage. The quota(1) command can be used to check individual user or group quotas and disk usage. A user may only examine his own quota, and the quota of a group he is a member of. Only the super-user may view all user and group quotas. The repquota(8) command can be used to get a summary of all quotas and disk usage for file systems with quotas enabled.

The following is some sample output from the quota -v command for a user that has quota limits on two file systems.

```
Disk quotas for user test (uid 1002):
Filesystem  usage   quota   limit   grace   files   quota   limit   grace
      /usr     65*     50      75   5days      7     50      60
     /usr/var     0      50      75           0     50      60
```

On the `/usr` file system in the above example, this user is currently 15 kbytes over the soft limit of 50 kbytes and has 5 days of the grace period left. Note the asterisk \* which indicates that the user is currently over his quota limit.

Normally file systems that the user is not using any disk space on will not show up in the output from the quota(1) command, even if he has a quota limit assigned for that file system. The `-v` option will display those file systems, such as the `/usr/var` file system in the above example.

### 19.15.4 Quotas over NFS

Quotas are enforced by the quota subsystem on the NFS server. The `rpc.rquotad(8)` daemon makes quota information available to the quota(1) command on NFS clients, allowing users on those machines to see their quota statistics.

Enable `rpc.rquotad` in `/etc/inetd.conf` like so:

```
rquotad/1      dgram rpc/udp wait root /usr/libexec/rpc.rquotad rpc.rquotad
```

Now restart `inetd`:

```
# kill -HUP `cat /var/run/inetd.pid`
```

## 19.16 Encrypting Disk Partitions

*Contributed by Lucky Green.*

FreeBSD offers excellent online protections against unauthorized data access. File permissions and Mandatory Access Control (MAC) (see ÊðöÜëáéi 17) help prevent unauthorized third-parties from accessing data while the operating system is active and the computer is powered up. However, the permissions enforced by the operating system are irrelevant if an attacker has physical access to a computer and can simply move the computer's hard drive to another system to copy and analyze the sensitive data.

Regardless of how an attacker may have come into possession of a hard drive or powered-down computer, both **GEOM Based Disk Encryption (gbde)** and **geli** cryptographic subsystems in FreeBSD are able to protect the data on the computer's file systems against even highly-motivated attackers with significant resources. Unlike cumbersome encryption methods that encrypt only individual files, **gbde** and **geli** transparently encrypt entire file systems. No cleartext ever touches the hard drive's platter.

## 19.16.1 Disk Encryption with **gbde**

1. Become root

Configuring **gbde** requires super-user privileges.

```
% su -
Password:
```

2. Add **gbde(4)** Support to the Kernel Configuration File

Add the following line to the kernel configuration file:

```
options GEOM_BDE
```

Rebuild the kernel as described in [Chapter 9](#).

Reboot into the new kernel.

3. An alternative to recompiling the kernel is to use **kldload** to load **gbde(4)**:

```
# kldload geom_bde
```

### 19.16.1.1 Preparing the Encrypted Hard Drive

The following example assumes that you are adding a new hard drive to your system that will hold a single encrypted partition. This partition will be mounted as `/private`. **gbde** can also be used to encrypt `/home` and `/var/mail`, but this requires more complex instructions which exceed the scope of this introduction.

1. Add the New Hard Drive

Install the new drive to the system as explained in [Chapter 19.3](#). For the purposes of this example, a new hard drive partition has been added as `/dev/ad4s1c`. The `/dev/ad0s1*` devices represent existing standard FreeBSD partitions on the example system.

```
# ls /dev/ad*
/dev/ad0          /dev/ad0s1b      /dev/ad0s1e      /dev/ad4s1
/dev/ad0s1        /dev/ad0s1c      /dev/ad0s1f      /dev/ad4s1c
/dev/ad0s1a       /dev/ad0s1d      /dev/ad4
```

2. Create a Directory to Hold **gbde** Lock Files

```
# mkdir /etc/gbde
```

The **gbde** lock file contains information that **gbde** requires to access encrypted partitions. Without access to the lock file, **gbde** will not be able to decrypt the data contained in the encrypted partition without significant manual intervention which is not supported by the software. Each encrypted partition uses a separate lock file.

3. Initialize the **gbde** Partition

A **gbde** partition must be initialized before it can be used. This initialization needs to be performed only once:

```
# gbde init /dev/ad4s1c -i -L /etc/gbde/ad4s1c
```

gbde(8) will open your editor, permitting you to set various configuration options in a template. For use with UFS1 or UFS2, set the sector\_size to 2048:

```
$FreeBSD: src/sbin/gbde/template.txt,v 1.1 2002/10/20 11:16:13 phk Exp $  
#  
# Sector size is the smallest unit of data which can be read or written.  
# Making it too small decreases performance and decreases available space.  
# Making it too large may prevent filesystems from working. 512 is the  
# minimum and always safe. For UFS, use the fragment size  
#  
sector_size      =      2048  
[...]
```

gbde(8) will ask you twice to type the passphrase that should be used to secure the data. The passphrase must be the same both times. **gbde**'s ability to protect your data depends entirely on the quality of the passphrase that you choose.<sup>1</sup>

The **gbde init** command creates a lock file for your **gbde** partition that in this example is stored as `/etc/gbde/ad4s1c`.

**Ðñïóï-þ:** **gbde** lock files *must* be backed up together with the contents of any encrypted partitions. While deleting a lock file alone cannot prevent a determined attacker from decrypting a **gbde** partition, without the lock file, the legitimate owner will be unable to access the data on the encrypted partition without a significant amount of work that is totally unsupported by **gbde(8)** and its designer.

#### 4. Attach the Encrypted Partition to the Kernel

```
# gbde attach /dev/ad4s1c -l /etc/gbde/ad4s1c
```

You will be asked to provide the passphrase that you selected during the initialization of the encrypted partition. The new encrypted device will show up in `/dev` as `/dev/device_name.bde`:

```
# ls /dev/ad*  
/dev/ad0          /dev/ad0s1b        /dev/ad0s1e        /dev/ad4s1  
/dev/ad0s1        /dev/ad0s1c        /dev/ad0s1f        /dev/ad4s1c  
/dev/ad0s1a       /dev/ad0s1d        /dev/ad4           /dev/ad4s1c.bde
```

#### 5. Create a File System on the Encrypted Device

Once the encrypted device has been attached to the kernel, you can create a file system on the device. To create a file system on the encrypted device, use **newfs(8)**. Since it is much faster to initialize a new UFS2 file system than it is to initialize the old UFS1 file system, using **newfs(8)** with the `-O2` option is recommended.

```
# newfs -U -O2 /dev/ad4s1c.bde
```

**Óçìåßùóç:** The **newfs(8)** command must be performed on an attached **gbde** partition which is identified by a `*.bde` extension to the device name.

#### 6. Mount the Encrypted Partition

Create a mount point for the encrypted file system.

```
# mkdir /private
```

Mount the encrypted file system.

```
# mount /dev/ad4s1c.bde /private
```

## 7. Verify That the Encrypted File System is Available

The encrypted file system should now be visible to df(1) and be available for use.

```
% df -H
Filesystem      Size   Used  Avail Capacity Mounted on
/dev/ad0s1a     1037M   72M   883M    8%   /
/devfs          1.0K   1.0K   0B   100%  /dev
/dev/ad0s1f     8.1G   55K   7.5G    0%   /home
/dev/ad0s1e     1037M   1.1M   953M    0%   /tmp
/dev/ad0s1d     6.1G   1.9G   3.7G   35%  /usr
/dev/ad4s1c.bde 150G   4.1K   138G   0%   /private
```

### 19.16.1.2 Mounting Existing Encrypted File Systems

After each boot, any encrypted file systems must be re-attached to the kernel, checked for errors, and mounted, before the file systems can be used. The required commands must be executed as user `root`.

#### 1. Attach the gbde Partition to the Kernel

```
# gbde attach /dev/ad4s1c -l /etc/gbde/ad4s1c
```

You will be asked to provide the passphrase that you selected during initialization of the encrypted **gbde** partition.

#### 2. Check the File System for Errors

Since encrypted file systems cannot yet be listed in `/etc/fstab` for automatic mounting, the file systems must be checked for errors by running `fsck(8)` manually before mounting.

```
# fsck -p -t ffs /dev/ad4s1c.bde
```

#### 3. Mount the Encrypted File System

```
# mount /dev/ad4s1c.bde /private
```

The encrypted file system is now available for use.

#### 19.16.1.2.1 Automatically Mounting Encrypted Partitions

It is possible to create a script to automatically attach, check, and mount an encrypted partition, but for security reasons the script should not contain the `gbde(8)` password. Instead, it is recommended that such scripts be run manually while providing the password via the console or `ssh(1)`.

As an alternative, an `rc.d` script is provided. Arguments for this script can be passed via `rc.conf(5)`, for example:

```
gbde_autoattach_all="YES"
gbde_devices="ad4s1c"
```

This will require that the **gbde** passphrase be entered at boot time. After typing the correct passphrase, the **gbde** encrypted partition will be mounted automatically. This can be very useful when using **gbde** on notebooks.

### 19.16.1.3 Cryptographic Protections Employed by **gbde**

**gbde**(8) encrypts the sector payload using 128-bit AES in CBC mode. Each sector on the disk is encrypted with a different AES key. For more information on **gbde**'s cryptographic design, including how the sector keys are derived from the user-supplied passphrase, see **gbde**(4).

### 19.16.1.4 Compatibility Issues

**sysinstall**(8) is incompatible with **gbde**-encrypted devices. All \*.bde devices must be detached from the kernel before starting **sysinstall**(8) or it will crash during its initial probing for devices. To detach the encrypted device used in our example, use the following command:

```
# gbde detach /dev/ad4s1c
```

Also note that, as **vinum**(4) does not use the **geom**(4) subsystem, you cannot use **gbde** with **vinum** volumes.

## 19.16.2 Disk Encryption with **geli**

*Contributed by Daniel Gerzo.*

A new cryptographic GEOM class is available as of FreeBSD 6.0 - **geli**. It is currently being developed by Paweł Jakub Dawidek <[pjd@FreeBSD.org](mailto:pjd@FreeBSD.org)>. **Geli** is different to **gbde**; it offers different features and uses a different scheme for doing cryptographic work.

The most important features of **geli**(8) are:

- Utilizes the **crypto**(9) framework — when cryptographic hardware is available, **geli** will use it automatically.
- Supports multiple cryptographic algorithms (currently AES, Blowfish, and 3DES).
- Allows the root partition to be encrypted. The passphrase used to access the encrypted root partition will be requested during the system boot.
- Allows the use of two independent keys (e.g. a “key” and a “company key”).
- **geli** is fast - performs simple sector-to-sector encryption.
- Allows backup and restore of Master Keys. When a user has to destroy his keys, it will be possible to get access to the data again by restoring keys from the backup.
- Allows to attach a disk with a random, one-time key — useful for swap partitions and temporary file systems.

More **geli** features can be found in the **geli**(8) manual page.

The next steps will describe how to enable support for **geli** in the FreeBSD kernel and will explain how to create a new **geli** encryption provider. At the end it will be demonstrated how to create an encrypted swap partition using features provided by **geli**.

In order to use **geli**, you must be running FreeBSD 6.0-RELEASE or later. Super-user privileges will be required since modifications to the kernel are necessary.

1. Adding **geli** Support to the Kernel Configuration File

Add the following lines to the kernel configuration file:

```
options GEOM_ELI
device crypto
```

Rebuild the kernel as described in ÊðöÜëáéí 9.

Alternatively, the `geli` module can be loaded at boot time. Add the following line to the `/boot/loader.conf`:

```
geom_eli_load="YES"
```

`geli(8)` should now be supported by the kernel.

## 2. Generating the Master Key

The following example will describe how to generate a key file, which will be used as part of the Master Key for the encrypted provider mounted under `/private`. The key file will provide some random data used to encrypt the Master Key. The Master Key will be protected by a passphrase as well. Provider's sector size will be 4kB big. Furthermore, the discussion will describe how to attach the `geli` provider, create a file system on it, how to mount it, how to work with it, and finally how to detach it.

It is recommended to use a bigger sector size (like 4kB) for better performance.

The Master Key will be protected with a passphrase and the data source for key file will be `/dev/random`. The sector size of `/dev/da2.eli`, which we call provider, will be 4kB.

```
# dd if=/dev/random of=/root/da2.key bs=64 count=1
# geli init -s 4096 -K /root/da2.key /dev/da2
Enter new passphrase:
Reenter new passphrase:
```

It is not mandatory that both a passphrase and a key file are used; either method of securing the Master Key can be used in isolation.

If key file is given as “-”, standard input will be used. This example shows how more than one key file can be used.

```
# cat keyfile1 keyfile2 keyfile3 | geli init -K - /dev/da2
```

## 3. Attaching the Provider with the generated Key

```
# geli attach -k /root/da2.key /dev/da2
Enter passphrase:
```

The new plaintext device will be named `/dev/da2.eli`.

```
# ls /dev/da2*
/dev/da2  /dev/da2.eli
```

## 4. Creating the new File System

```
# dd if=/dev/random of=/dev/da2.eli bs=1m
# newfs /dev/da2.eli
# mount /dev/da2.eli /private
```

The encrypted file system should be visible to `df(1)` and be available for use now.

```
# df -H
Filesystem      Size   Used  Avail Capacity  Mounted on
/dev/ad0s1a     248M   89M   139M    38%       /
/devfs          1.0K   1.0K    0B   100%       /dev
/dev/ad0s1f     7.7G   2.3G   4.9G    32%       /usr
/dev/ad0s1d     989M   1.5M   909M    0%        /tmp
/dev/ad0s1e     3.9G   1.3G   2.3G    35%       /var
```

```
/dev/da2.eli 150G 4.1K 138G 0% /private
```

## 5. Unmounting and Detaching the Provider

Once the work on the encrypted partition is done, and the `/private` partition is no longer needed, it is prudent to consider unmounting and detaching the `geli` encrypted partition from the kernel.

```
# umount /private
# geli detach da2.eli
```

More information about the use of `geli(8)` can be found in the manual page.

### 19.16.2.1 Using the `geli rc.d` Script

`geli` comes with a `rc.d` script which can be used to simplify the usage of `geli`. An example of configuring `geli` through `rc.conf(5)` follows:

```
geli_devices="da2"
geli_da2_flags="-p -k /root/da2.key"
```

This will configure `/dev/da2` as a `geli` provider of which the Master Key file is located in `/root/da2.key`, and `geli` will not use a passphrase when attaching the provider (note that this can only be used if `-P` was given during the `geli` init phase). The system will detach the `geli` provider from the kernel before the system shuts down.

More information about configuring `rc.d` is provided in the `rc.d` section of the Handbook.

## 19.17 Encrypting Swap Space

*Written by Christian Brüffer.*

Swap encryption in FreeBSD is easy to configure and has been available since FreeBSD 5.3-RELEASE. Depending on which version of FreeBSD is being used, different options are available and configuration can vary slightly. From FreeBSD 6.0-RELEASE onwards, the `gbde(8)` or `geli(8)` encryption systems can be used for swap encryption. With earlier versions, only `gbde(8)` is available. Both systems use the `encswap rc.d` script.

The previous section, Encrypting Disk Partitions, includes a short discussion on the different encryption systems.

### 19.17.1 Why should Swap be Encrypted?

Like the encryption of disk partitions, encryption of swap space is done to protect sensitive information. Imagine an application that e.g. deals with passwords. As long as these passwords stay in physical memory, all is well. However, if the operating system starts swapping out memory pages to free space for other applications, the passwords may be written to the disk platters unencrypted and easy to retrieve for an adversary. Encrypting swap space can be a solution for this scenario.

### 19.17.2 Preparation

**Óçìåßùóç:** For the remainder of this section, `ad0s1b` will be the swap partition.

Up to this point the swap has been unencrypted. It is possible that there are already passwords or other sensitive data on the disk platters in cleartext. To rectify this, the data on the swap partition should be overwritten with random garbage:

```
# dd if=/dev/random of=/dev/ad0s1b bs=1m
```

### 19.17.3 Swap Encryption with gbde(8)

If FreeBSD 6.0-RELEASE or newer is being used, the .bde suffix should be added to the device in the respective /etc/fstab swap line:

| # Device        | Mountpoint | FStype | Options | Dump | Pass# |
|-----------------|------------|--------|---------|------|-------|
| /dev/ad0s1b.bde | none       | swap   | sw      | 0    | 0     |

For systems prior to FreeBSD 6.0-RELEASE, the following line in /etc/rc.conf is also needed:

```
gbde_swap_enable="YES"
```

### 19.17.4 Swap Encryption with geli(8)

Alternatively, the procedure for using geli(8) for swap encryption is similar to that of using gbde(8). The .eli suffix should be added to the device in the respective /etc/fstab swap line:

| # Device        | Mountpoint | FStype | Options | Dump | Pass# |
|-----------------|------------|--------|---------|------|-------|
| /dev/ad0s1b.eli | none       | swap   | sw      | 0    | 0     |

geli(8) uses the AES algorithm with a key length of 256 bit by default.

Optionally, these defaults can be altered using the `geli_swap_flags` option in /etc/rc.conf. The following line tells the encswap rc.d script to create geli(8) swap partitions using the Blowfish algorithm with a key length of 128 bit, a sectorsize of 4 kilobytes and the “detach on last close” option set:

```
geli_swap_flags="-a blowfish -l 128 -s 4096 -d"
```

Please refer to the description of the `onetime` command in the `geli(8)` manual page for a list of possible options.

### 19.17.5 Verifying that it Works

Once the system has been rebooted, proper operation of the encrypted swap can be verified using the `swapinfo` command.

If gbde(8) is being used:

```
% swapinfo
Device      1K-blocks    Used    Avail Capacity
/dev/ad0s1b.bde   542720      0   542720     0%
```

If geli(8) is being used:

```
% swapinfo
Device           1K-blocks     Used     Avail Capacity
/dev/ad0s1b.eli      542720       0    542720     0%
```

## Óçìåéþóåéò

1. For tips on how to select a secure passphrase that is easy to remember, see the Diceware Passphrase (<http://world.std.com/~reinhold/diceware.html>) website.

# ÊåöÜëáéï 20 GEOM: Äéá÷åßñéóç Óõóôïé÷éþí Äßóêùí

*ÃñÜöôçêå áðü ôíí Tom Rhodes.*

## 20.1 Óýïïøç

Ôi êåöÜëåéí áôðü êåéÿðôåé ôç ÷ñÞóç ôùí äßöðûí êÙôù áðü ôi ðëåßöéí êåéöïññåéí GEOM ôôi FreeBSD. ÐåññéëåîâÜíåé ôá êõñéïüðåñá ðñïññÜìåôá åëÝä ÷ñÞ RAID ôùí iðiñßú ié ñðèìßöåéò áåðßæïíðåé ôôi ðëåßöéí GEOM. Ôi êåöÜëåéí áôðü ååí áåéÿåé ôá ãÙëìò ôiñ ôññüð íà ôiñ iðiñßí ôi GEOM ÷åéñßæåðåé Þ åëÝä ÷åé êåéöïññåßåò Åéðüäiø / Åññüäiø (IO), ôi õðiñýóöçå ðiø ãñßöéåðåé êÙôù áðü áôðü, Þ ôiñ êþäééå ôiø. Íé ðëçññöiññåò áôð Ýð ðåñÝ÷iññåé áôðü ôç óåëßåá manual ôiø geom(4) êåéþò êåé áðü ôéò áåiaöiñÝð ðiø ðåññéÝ÷åé ôå Üëéåò ô÷åôééÝð óåëßååò. Åðßöçò ôi êåöÜëåéí áôðü ååí áðiñðåéåß êåéiñéóôéêü iäçñü åéå üëéåò ôéò ñðèìßöåéò ôiø RAID. Èá ôôäçöçëiýí iùñí ié êåðååôðÜðåéò êåéöïññåßåò ôiø RAID ðiø õðiñðåçñßæïíðåé áôðü ôi GEOM.

Áöiý äéáâÜóåôå áõõü öi êåöÜëáéï, èá îÝñåôå:

- Ôí åßäïð ôçò ððiöôðPñéïçò RAID ðiö åßíáé äéáèÝóeii iÝóù ôið GEOM.
  - Ðùò íá ÷ñçóeiðiðPøåôâ ôá åáóéêÜ âïçèçöéêÜ ðñiäñÜìláôá äéá ôçí ñýëleóç, óðiðPñçóç êáé äéá ÷åßñéóç ôùí äéáöüñùí åðéðYäúí RAID.
  - Ðùò íá äçéiñPøåôâ mirror P stripe, íá êñöðöiäñaoðPøåôâ, êáé íá óðræÝóåôâ äßóéiðoå iå ôið GEOM, iÝóù ieáð åðiñáéñðóiÝíçò óýfääóçò.
  - Ðùò íá áñðeåðuðPøåôâ ðñiâëPiaôá äßóéuñ ðiö ÷ñçóeiðeiyí ôið ðéåßóeí ëåéðiñnäéþí GEOM.

Đñéí äéáâÜóåôå áôôü ôï êåöÜëáéï, èá ðñÝðåé:

- Íá êáôáâíâþôå ðùò iåôá ÷ åéñþæåôáé ôi FreeBSD ôéð óôóéåðÝð äþóêùí (ÊåöÜëáéí 19).
  - Íá áíüñþæåôå ðùò èá ñõèíþôåôå êáé èá áãéåðåôðÞóåôå Ýíá íÝð ðõñÞíá óôi FreeBSD (ÊåöÜëáéí 9).

## 20.2 ÅéóáãùãÞ óõï GEOM

Ôi GEOM åðéóñ Ýðåé ôçí ðññüôðåáóç êáé ôíí Ýéâåâ ÷ i ñå êéÜóåéò — üðùò ôçí ÈâïññéèP ÅâðññåòP Åêëßíçò (Master Boot Record), ôá BSD labels, é.á. — iÝóù ôçò ÷ñÞóçò ðánii ÷ Ýúí, P iÝóù åéäééþí áñ ÷ åßñí ôöíí êáðÜëíä /dev. Ôi GEOM ððïóðçñßæåé æÜöiñåð äéåðÜìåéò RAID êáé ððñÝ ÷ åé æÜöáíç ðññüôðåáóç ôóí èåéðiññåéü óýóðçíå êáé ôá aïçèçôééÜ ôio ðññüññÜìåðå.

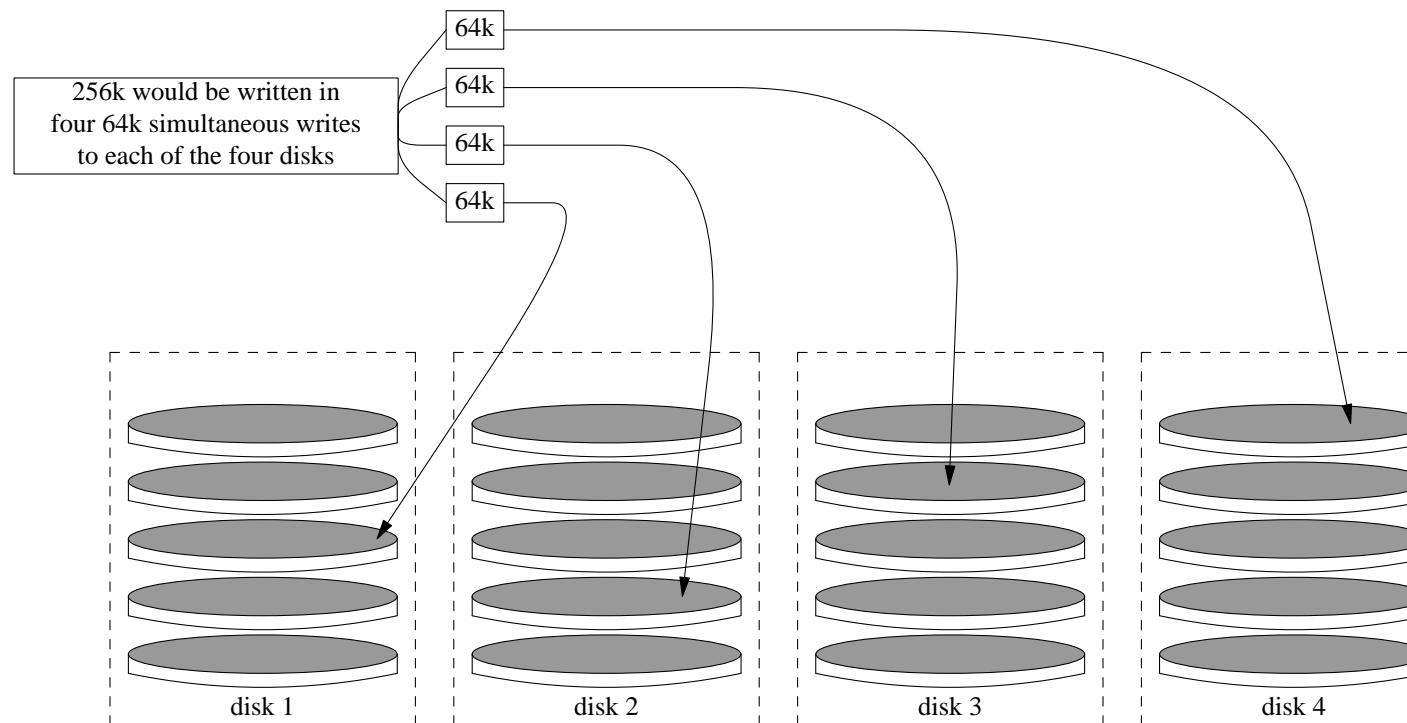
## 20.3 RAID0 - Striping

*ÃñÜöçêå áðü ôiõò Tom Rhodes êáé Murray Stokely.*

Óð striping ábíráé leá í Ýeíäiò ðiò óðiäoÜæåé æéáöiññåðééiyò öðoóééiyò ábóéiò óá Ýíá iññáæéü eíæéü ôüií. Óá ðreeÝ ððñéðóþóåéò, áðóü ábíráóáé iå óçí áiÞeáé åíâéééåòiÝiò öðééiy (æåðéóþí). Ói ððiøýóðóçíá ábóéuÍ GEOM ðánÝ ÷åé ððiøýóÞneíç iÝóù eíæéóleéiy æáé óç æéÜðáíç RAID0, ç iðiþá ábíráé aíñóðP éáé ùò striping.

Óá Ýíá óyóôçjá RAID0, óá äâäñí Ýíá ÷ùñßæÿíôáé óá blocks óá iðiBá ãñÜöiiôáé ðìçìáôééÜ óá üeriðò ðiðò äßóêïðò ðið áðiðåëiyí õç öóðöié ÷ßá. Áfôß íá ÷ñâéÜæåôáé íá ðâñéiÝíåôá õi óyóôçjá íá ãñÜøåé 256k äâäñí Ýíüí óá Ýíá äßóêi, Ýíá óyóôçjá RAID0 iðinâb íá ãñÜøåé óâðôðù ÷ñííá 64k óá êáeÝíá áðü ðiðò ðÝóðâñéò äßóêïðò iéáð óðóðié ÷ßáð, ðñiðöÝñiðôá Ýóðé áâáéñâðéêP áðüäiöc åéóüäiö/âñüäiö (I/O). Ç áðüäiöc áðôP iðinâb íá áðîçèâß ðâñéóóüâñi, iâ õç ÷ñPóç ðiðéáðépí áâââðépí äßóêùí.

ÊÜeá äßóêiò óá Ýíá stripe RAID0 ðñÝðâé íá áâáé ðiðò ßäéiò iââÝëiò, êáèþò ié áéôPóâéò I/O iiéñÜæiiôáé üoí áoimÜ õçí áíÜâíûóç êáé áââñâðP, óá ðiðéiyò ðáñÜëëçéiò äßóêiò.



### Äçieññâßá Stripe áðü iç-ÄéâññòùÝñið ATA Äßóêiò

- Öiñôþóôå õi Üñèñùiá geom\_stripe.ko:
 

```
# kldload geom_stripe
```
- Áâáóðâðóôå üðé ððÜñ ÷åé êáðÜëëçéi õçìâßi ðñiðÜñôçóçò. Áí i ôüiðò ðñüüêâéôáé íá áßíâé êáðÜðiçóç root, ðñiðáñðPóôå õi ðñiðouñéíÜ óá êÜðiéi Üëëçéi õçìâßi ðñiðÜñôçóçò, üðùò ði /mnt:
 

```
# mkdir /mnt
```
- Êâëññâðóå óá iñüìâðóå ûí óðóðâðþí áéá ðiðò äßóêiò ðið ðñüüêâéôáé íá áßñiðí stripe, êáé äçieññâðPóôå õç iÝá óðóðâðþ stripe. Áéá ðáñÜââéâiá, áéá íá äçieññâðPóâðå Ýíá stripe áðü áýí á÷ñçóðiðiþçò ðiðò êáé ÷ùñßæÿíôáé ðið ðñiðáðéëââi Ýíi êþæéâá âêâðíçóçò (bootstrap):
 

```
# gstripe label -v st0 /dev/ad2 /dev/ad3
Metadata value stored on /dev/ad2.
Metadata value stored on /dev/ad3.
Done.
```
- ÃñÜøôå Ýíá òððiðiéçí Ýíi label (ðßíâáâá êáðâðiðPóâðúí) óði iÝí ðiðò, êáé áâââðâðóðPóôå õi ðñiðáðéëââi Ýíi êþæéâá âêâðíçóçò (bootstrap):
 

```
#
```

```
# bsdlabel -wB /dev/stripe/st0
```

5. Ç äéáäééáóßá áôôÞ èá äçìëíöñäÞóåé ôç ôôôéâðÞ st0, êáèþò êáé äýí áéüïá ôôôéâðÝó ôôïí êáôÜëïäí /dev/stripe. Íé ôôôéâðÝó áôôÝó èá iïñÜæïïóáé st0a êáé st0c. Ôôï óçìåßí áôôü, iðinâßóð ðëÝíí íá äçìëíöñäÞóåôð áýóôçìá ãñ÷åßùü ôôç ôôôéâðÞ st0a ÷ñçóéïïðéþíôð ôï aïçècôéêü ðñüññáïä newfs:

```
# newfs -U /dev/stripe/st0a
```

Ãéá íá ðñiíoáñôÞóåôå ÷åéñiêßíçôá ôï stripe ðiõ äciéiõñâÞóåôå:

```
# mount /dev/stripe/st0a /mnt
```

Ãéá íá ãßíâôáé áðóüùáôá ç ðñiöÜñôçóç áðôïý ôiö óðóôÙìáò áñ÷åßúí êáðÜ ôçí äéáæéåðá åêëßíçóçò, ôiðièåðÙóôå ðeð ðëçñiöñßåò ôiö ðûiïö óðï áñ÷åßí /etc/fstab. Æá ôi óeiðü áðóü, äçlëiöñäiýíå Ýíá ìuiéii óçìåßí ðñiöÜñôçóçò, ôiï stripe:

```
# mkdir /stripe  
# echo "/dev/stripe/st0a /stripe ufs rw 2 2" \  
      >> /etc/fstab
```

Ôi Üñèñùìà geom\_stripe.ko èá ðñÝðåé íá öiñôþíåôáé áôõüiáôá êáôÜ ôçí åêëßíçóç ôiõ óôôðþiáôíò. ÅêôåëÝóôå ôçí ðãñâéÜòù åiôïëþ, æá íá ðñïöéÝóåôå ôçí êáôÜëëcëc ñyèlëóç ôöii /boot/loader.conf:

```
# echo 'geom stripe load="YES"' >> /boot/loader.conf
```

## 20.4 RAID1 - Mirroring

Õi mirroring (êáèñâööéöíüö) åbíráé iéá ôå ÷ níëiäbá ðiö ÷ níçóéñiðíéåßôáé áðü ðiëëÝò åôáéñbåò éáé iéééäéïýò ÷ níÞoôåò æáá íá áóöäéßöiöí ôá åääñiÍyá ôiöö ÷ ùñßò æáééïðÝò. Ôá iéá æÜôáïç mirror, iä ãßöéïò Å åbíráé ådëpö Ýia ðëPñåò áíößãñáöi ðiö ãßöéïò Å. <sup>1</sup> iðiñåß ié åßöéïé Å+A íá åbíráé áíößãñáöá ôúí åßöéùí A+B. ¶÷ åôá iá ôçí åñéñéäP æÜôáïç ôúí åßöéùí, ôí ôçíáíööéü ábíráé üöö ié ðëçñiöinßåò åíüö åßöéïò P iéáö åéáöÜôlçöçö áíöéäñÜöiööá ôá Üëëiöö. Íé ðëçñiöinßåò åööÝò iðiñåß áññüööåá íá åðíëåööåéïýí iá åýéëëi öñuöi, P íá áíöéäñäöïýí ÷ ùñßò íá ðñiëëçèåß åééäéïðP óööd ðöçñåößåò ðiö lç ÷ áíÞiáöiò P óöçí ðñuööåöç ôúí åääñiÍyúí. Iðiñiýí åéüliá éáé íá iàdåööåñëiýí éáé íá öööéä ÷ èiýí ôá Üëëi, áóöäéÝò iäYñiö.

Áéá íá fâééíPóáôå, áââáéùèåßôå üöé öi óyóôçìá óáó Ý÷åé äýí óeëcñíyö äßóêïòò ßæëïò iåä Ýèïòò. Óôá ðáñáååßäíåôá iáò èåùñïyâ üöé ie äßóéïé åßíáé óyïðïò SCSI (åðåôååßáò ðñüöåâóçò, da(4)).

#### **20.4.1 Mirroring óôïõò Åáóéëíýò Äßóéïõò**

Õððie Ýôñiôå ùöé ôi FreeBSD Ý÷åé åâéåôåôåèåß ôöii ðñþöi äßöóëi da0, èá ðñÝðåé íá ñòëìßóåôå ôi gmirror(8) íá åððieçåýôåé åêåß óå åâóééÜ ääññ Ýíá ôiõ.

```
# sysctl kern.geom.debugflags=17
```

Ìðiññâbôå ôþpná íá äçieíõñþóåôå ôi mirror. Íâééíþóåôå ôç äéáæéêáóßá áðièçéâýíiôå ôá iàlôå-äâäiñ Ýíá (meta-data) ôóii áâáóéêü äþbôéi, äçieíõñþíôå iðoéáôðéêÜ ôç oðóéâðþ /dev/mirror/gm. ×ñçóéiñðièþóå ôçí ðáñâéÜôù åiôiþp:

**Đĩa tách ổ:** C ácié iõññáBá mirror óõi àßööéí àéêBíçóco ìõññáBá ía Ý ÷ áé ùò áðiô Yéåóiá ðçí áðþæáéå  
äääiiÝíu, ái i ôåeåðöåBá ðiõÍYáò òiõ àßöeøí Ý ÷ áé þäc ÷ñçóeíiõñçéåB. C ðeeáüöçôá áooþ áßíáé ðiëý  
iêeññöåñç ái õi mirror ácié iõññáçéåB áiÝóùo iåðÜ áðü iéá iÝá áåéåoðÜóðåoç òiõ FreeBSD. C ðáññaêÜòù  
äéåáééååñå áßíáé áðßöçò áoyíiåðç iå ðeò ðññåðééåñiÝíao ñòõiññåðéò áåéåoðÜóðåoçò ðiõ FreeBSD 9.x óðéò  
iõññáBá ÷ñçóeíiõñçéåBáé ði ÿóðçíá éåðåðòiÞóåùí GPT. To GEOM éåðåóóñYóåé ðå iåðåáåäiiÝíá òiõ GPT, éåé  
éa ðññiêéå ÿóåé áðþæáé åääiiÝíu éåé ðeeáíP áåðñiåñå áéêBíçóco ðiõ óðóðòiÞáòiò.

```
# gmirror label -vb round-robin gm0 /dev/da0
```

Ôi óyôôciá èá áíôáðiêñéèåß ìå ôi ðáñáêÜôù ìÞíðiá:

Metadata value stored on /dev/da0.  
Done.

Áñ÷éeiðieÞóôå ôi GEOM. Ç ðáñáêÜôù áiðiieP èá öiñôþóåé ôi Üñèñùìá /boot/kernel/geom\_mirror.ko óóíí ððñÞíá:

```
# gmirror load
```

**ÓciáñBúóç:** Ià óçí áðéóô ÷ þ áêðóÝëåóç áðôðþò óçò áíðiëþò, áciéïõñåáðóáé ç óðóêâðþ gñm0 iÝóá óðíí êáðÜëíäi /dev/mirror

Ἄλλαι διερόσαντες διηγοῦνται ὅτι αὐτὸν οὐδὲν πάθειαν ἔχειν μηδέ τινα σημαντικήν.

```
# echo 'geom_mirror.load="YES"' >> /boot/loader.conf
```

Åðåññáóôåßôå ñii áñ ÷ åßii /etc/fstab, áîôééåèéóôþíóåò ôéò áíáöinÝò óôéò ðáæéÝò óôðéåðÝò da0 ìå ôéò áíðßôöîé—åò êáéñívñéåò cmt0 ðiñ áíñéðññùñðåññiñ ñii mirror.

**Óciáñúñócs:** Áí ÷ñcójéëiðiñéåñbôå ôí vi(1), iðiñáñbôå íá áéiñéiðiñéþóåôå ôá ðáñáéÜôù áþiáðá ãéá íá iðiñéeçñþóåôå áññéiðá ñðiñbôå ôíc ãééáñééñáñbôå.

```
# vi /etc/fstab
```

Óóï vi(1), êñáôþóôå áíôþãñáöí áóöáëåßáò ôïõ ôñÝ-ïïôïò áñ÷åßïõ fstab ðëçéôñïëiäþíôå :w /etc/fstab.bak. ðääéóå áíöéêåôåóþóôå üéåò ôéò áíáöiñÝò óóéò ðääééÝò óóðéêåðÝò da0 iå ôéò iÝåò gm0 ãñÜöiiôå :%s/da/mirror\gm/g.

Öi fstab öiö èá ðñiêýøåé, èá iieÜæåé ia ôi ðáñáéÜôù. Äáí Ý÷åé óçìáóßá áí ie äßóêié Þôáí áñ÷ééÜ SCSI p ATA, ç óóóêåP RAID èá Ý÷åé ðÜiôá ôi üññá cm.

| # | Device             | Mountpoint | FStype | Options | Dump | Pass# |
|---|--------------------|------------|--------|---------|------|-------|
|   | /dev/mirror/gm0s1b | none       | swap   | sw      | 0    | 0     |
|   | /dev/mirror/gm0s1a | /          | ufs    | rw      | 1    | 1     |
|   | /dev/mirror/gm0s1d | /usr       | ufs    | rw      | 0    | 0     |

## ÊåöÜéáéï 20 GEOM: Äéá÷åßñéóç Óõóôïé÷éþí Äßóêùí

|                     |        |        |           |   |   |
|---------------------|--------|--------|-----------|---|---|
| /dev/mirror/gm0s1f  | /home  | ufs    | rw        | 2 | 2 |
| #/dev/mirror/gm0s2d | /store | ufs    | rw        | 2 | 2 |
| /dev/mirror/gm0s1e  | /var   | ufs    | rw        | 2 | 2 |
| /dev/acd0           | /cdrom | cd9660 | ro,noauto | 0 | 0 |

ÅðáíåêêéíÞóôå ôi óyóôciá:

```
# shutdown -r now
```

ÊáôÜ ôçí åêéßíçóç ôïö ööôôÙìáöìò, èá ðñ Ýðåé ðëÝíï íá ÷ñçóëïöíéåßôáé ç ööôêåôP gm0 áîôß åéá ôçí da0. ìåôÜ öï öÝëïò öçò åêéßíçóçò, iøññåßôå íá åëÝäåôå üöé üëá èåéöïññäïý óùöôÜ, åâåôÜæïïöå ôçí Ýñäï öçò åîöïePò mount:

```
# mount
Filesystem      1K-blocks   Used   Avail Capacity Mounted on
/dev/mirror/gm0s1a    1012974  224604  707334  24%   /
devfs                  1        1       0  100%   /dev
/dev/mirror/gm0s1f    45970182  28596 42263972  0%   /home
/dev/mirror/gm0s1d    6090094 1348356 4254532  24%   /usr
/dev/mirror/gm0s1e    3045006 2241420  559986  80%   /var
devfs                  1        1       0  100%   /var/named/dev
```

Ç Ýññäò öáßíåôáé óùôóÞ, üðòù áíáíåüôáí. ÖåëëêÜ, æá íá íåééÍÞóáé í öõä÷ññéóíüò, åéóÜäåôå êáé ôçí óõóéåôÞ da1 óõi mirror, ÷ñçóëïðíéþíöå ôçí áéüëïöèç áîïöÞ:

```
# qmirror insert qm0 /dev/dal
```

ÊáðÜ ðóç áæÜñéåéá ðíð óððá-ññíéöliy ðíð mirror, iðññâßðå íá áåßðå ðçí ðñüïäí ðçð áæååééåßðå ià ðçí ðáñéÜðù áðíðéÞ:

```
# gmirror status
```

läôÜ ôi ôÝëiò ôçò äüìçóçò ôiõ mirror, êáé áöiy Ý÷iõí óõã÷ñiïéóôåß üëá ôá äåäiiÝá, ç Ýiïäiò ôçò ðáñäðÜiù åiöiëÞò èä iïéÜæåé ià ôcí åëüëiöèc:

| Name       | Status   | Components |
|------------|----------|------------|
| mirror/gm0 | COMPLETE | da0<br>da1 |

## 20.4.2 Áíôéìåôþðéóç ÐñïâëçìÜôùí

#### **20.4.2.1 Ôï óyóôçìá áñíåßôáé íá îåêéíþóåé**

Áí ôii óýóôciá óáò óôáiáôÜåé óå iéá ðññiôññiðP ðiñi ñieÜæåé iå ôcí ðáñáêÜôù:

```
ffs_mountroot: can't find rootvp  
Root mount failed: 6  
mountroot>
```

ÁðáfáêééíÞróðá ðí óýóðçíá óáð íÝóù ðíðóç ðíññoraiðóþáð P ðíð ðéÞéðññið reset. Óðí iðñíý áðéðþíçóð, áðéð YÍðóð ðí (6). Íå ðí ññüðí áðóðú èá ãññáèåþðó áðóçí ðññiðñiðP ðíð loader(8). Öiñðþóðá ÷ áéññiðþíçóð áðí Üññèñùíá óðí ððoñÞíá:

```
OK? load geom_mirror  
OK? boot
```

Áí òið ðáñáðÜùn eäéöññÞóåé, ðüôå áéá êÜðiéí éüäí òi Üñëñùìá ááí ñññþþçéå óùóôðÜ. ÅéÝáîôá áí åßíáé óùóôðP ç ó÷åôéêP éáôá÷þñéóç óóï áñ÷åßí /boot/loader.conf. Áí òið ðññüäéçíá ðáñáíÝáé, ðññóéÝóôå ôç áññííP:

options GEOM\_MIRROR

óði ánn – ábæi ñðeibðumur óðið ððenPíá óáð, ásíáaçìeiññáþróða êáé áðáfáaêáðáóðþróða óií ððenPíá óáð. Ói ðñüüâæçíá óáð eá ðñÝðáðe íá æiññéùðeåb.

#### 20.4.3 ÅðáíáöiñÜ ìåôÜ áðü Áðiôo÷ßá Äßóêïõ

Ôi åéðëçêôéêü íå ôi mirroring åßíáé üöé üöáí Ýíáò óéëçñùò äßóëò ÷æÜóáé, iðinñåßôå íá ôií áíöééåôáóþóåôå ÷ùñßò íá ÷Üóåôå êåèùëiõ ääñäîÝíá.

```
# gmirror forget gm0  
  
# gmirror insert gm0 /dev/dal
```

## 20.5 ÄéêôõáêÝò ÓõóêåõÝò ïÝóù GEOM Gate

Ôi GEOM õðïöôçñßæåé áðiiáêññööýÍyc ÷ ñþóç óððóêåðþí, üðùò ié óêëçñið áßóêíé, ôá CD-ROM, ôá áñ ÷ áßá ê.ë.ð. ÷ ñcöéüðjeþíðå õá äicècöééÜ ðñjñäñÜñáðå ðvñçò (gate). C èåéðjññáðå áßáíé ðáññüíéá ià ôi NFS.

Ãéá íá îâééíPóâôå, ðñ Ýðåé íá äçleïõnäPóâôå Ýíá áñ ÷ åßí exports. Ôí áñ ÷ åßí áôôü êáèïñßæåé ðiïëò åðéôñ Ýðåôåé íá åðïéòPóåé ðñüöôåóç óôïòò êïéïù ÷ ñçóôïòò ðüñïòò êáé ôé åðéðÝäïò èá åßíáé áôôP ç ðñüöôåóç. Åéá ðáñÜäâéäìá, åéá íá äéäïïñÜöåôå ôçí ðYðåñôç êåôÜöïçóç (slice) ôïò ðñþòò åßóðëï SCSI, åßíáé åñéâôü íá äçleïõnäPóâôå ðiïëò åñ ÷ åßí /etc/qq.exports:

192.168.1.0/24 RW /dev/disk4

Ôi ðáñáðÜíù èá áðéóñÝøåé óå üeiòò ôiòò õðíieiaéóôÝò ôiò éäéùôééiy óáo äéêôýiõ, íá Ý÷iõí ðñüöâáóç `Ýóú äéêôýiõ óóï óýóôciá áñ÷åßùí ôcò éáôÜòicóçò da0s4d.

Áéá íá äéäiiéñÜóåôå áôôP ôç óôôéåôP, áââáéùèåßôå üöé äái åßíáé ðññioáñôçìÝíç ôç äââäñÝíç óôéäìP, êáé îâééíPóôå öiäåßiiíä åîôðcñâôçôP ggated(8):

# ggated

Äéá íá ðñïöáñöÞöåôå ôçí öööêåöÞ ööï iç÷ Üíçìá ðåëÜöç, ÷ñçóéiöiéÞööå öéò áéüëiöeåò åíöiëÝò:

```
# ggatedc create -o rw 192.168.1.1 /dev/da0s4d
ggate0
# mount /dev/ggate0 /mnt
```

Áðü åäþ êáé ööï åíþò, ïðiñåßöå íá Ý÷åðå ðñüöååöç ööç öööêåöÞ iÝòù öiõ öçìåßöö ðñiöÜñöçöçò /mnt.

**Öçìåßùóç:** ÐñÝöåé íá öiíéööåß üöé ç äéáäééåößá èá áðiöý÷åé áí ç öööêåöÞ åßíáé öç äåäiíÝíç ööéäíþ ðñiöáñöciÝíç, åßðå ööii åiöðçñåöçöþ, åßðå öá iðiëiäþööå Üëeëi öðiëiäéööþ ööï äßéööi.

¼öáí äåí ÷ñåéÜæåööå ðëÝíí öç öööêåöÞ, ïðiñåßöå íá ôçí áðiöñöáñöÞöåôå iå áooÜëåéá, ÷ñçóéiöiéþíöå öçí åíöiëþ umount(8), üðùò åßíåöáé êáé iå iðiëiäþööå Üëeëç öööêåöÞ äßóëiö.

## 20.6 Äçìéiöñäþíöåò ÅóééÝöåò (Labels) ööéò ÖööêåöÝò Äßóêùí

ÈáðÜ ôç äéÜñêåéå ôçð åñ÷ ééiöiþçöçò, ööçí åêéßíçöç öiõ ööööÞiaöiò, i ðññPíåò öiõ FreeBSD èá äçìéiöñäþíöåé ôá åðåñåßöçöå åñ÷ åßá åéá eÜea öööêåöÞ öiõ áíé÷iåýåé. ÁðöÞ ç iÝëëiøi áíß÷iåñöçö öööêåöþí, iðiñåß íá äçìéiöñäþíöåé ðñiäéþiaöå. Äéá ðáñÜäåéäíá, öé èá åßíåé åí ðñiöéÝöiøå Ýíá iÝí åßóëi USB; Åßíáé åñéåðÜ ðééáíü iéá öööêåöÞ iñþìçö flash íá ðÜñåé öi üññiðaø da0 êáé ç åñ÷ ééþ da0 íá iåöåééçèåß ööï da1. Áðöü èá ðññéäéÝöåé ðñiäéþiaöå ööçí ðñiöÜñöçöç öúí öööööç iÜðùí åñ÷ åßùí, åí öðÜñ÷iø ié åíðööåééçèåß ööï ðiðö ööï /etc/fstab, êáé iðiñåß åéüíá êáé íá ðáñålðræþöåé öçí åêéßíçöç öiõ ööööÞiaöiò.

Íéá ëyóç åßíáé íá ññðèlþöåôå öéò öööêåöÝò SCSI iå ðÝöiéi öññüöi, þööå ç åñßèçöç öiõò íá åßíáé ööíå÷üñåíç, þöé, èÜea öiñÜ ðiðö ðñiöéÝöåôå iéá iÝá öööêåöÞ ööï åéåååöÞ SCSI èá åßöåå åßäöññö üöé èá eÜååé åñéèiü ðiðö åáí Y÷åé ÷ñçóéiöiéçèåß. ÁëëÜ öé åßíåöáé íá öéò öööêåöÝò USB ðiðö iðiñåß íá áíðééåöåöÞöiøi öií éyñëi SCSI åßóëi; Áðöü iðiñåß ðñÜäåéäé íá ööñååß, åéèþò ié öööêåöÝò USB áíé÷iåýíööåé åáðÜ åÜöç ðñéí åðü öií åéåååöÞ SCSI. Íéá ëyóç åßíáé íá åÜæåôå öéò öööêåöÝò åðööÝò iññi iåðÜ öçí åêéßíçöç öiõ ööööÞiaöiò. Íéá Üëeëç iÝëëiøi åßíáé íá ÷ñçóéiöiéåßöå iññi iéá öööêåöÞ öýðiø ATA êáé íá içí êáðå÷uññåßöå ðiðöÝ öiõò åßóëiöö SCSI ööï /etc/fstab.

ÖðÜñ÷åé úööüöi éáéýöåñç ëyóç. ×ñçóéiöiéþíöå öi åíçèçööéü ðñüäññiá glabel, Ýíáò äéá÷åéñéööÞò þ÷ñþöçð, iðiñåß íá åðræþöåé åðééÝöåôå öéò öööêåöÝò åßóëüí åéé íá öéò ÷ñçóéiöiéþíöåé ööï /etc/fstab, åíðß åéá ôá ööñååöééÜ iññååöå öööêåöþí. Åðåéäþ ç glabel åðiçèçéåýåé öçí åöééÝöå ööï öåéåöåßi öiñÝá öiõ èÜèå ðáñi÷Ýá (öööêåöÞò åßóëiø), ç åöééÝöå åéåðçñåßöåé åéé iåðÜ åðü öçí åðåñååééþíçöç öiõ ööööÞiaöiò. ×ñçóéiöiéþíöå åðööÞ öçí åöééÝöå ùò üññiå öööêåöÞò, èá iðiñåßöå íá ðññöáñöÞöåôå ðÜíöå öií öyöööçíá åñ÷ åßùí, Üó÷åðå íá öi ðññååíáöééü üññiå öööêåöÞò ðiðöÝ÷åé åðiæiæåß ööï åßóëi.

**Öçìåßùóç:** Äáí ÷ñåéÜæåöåé öööééÜ íá öiíþöiøi åüöé åööþ ç åöééÝöå èá ðñÝöåé íá åßíáé iüíéiç. Öi åíçèçöéü ðññååíá glabel iðiñåß íá äçìéiöñäþöåé öüöi iüíéiø åüöi åéé åññééÝöåé. Iññi ié iüíéiø åöééÝöåò åééåöçñíýíöåé áíÝöåöåò iåðÜ åðü iéå åðåñååééþíçöç. Ååßðå öç ååëßää manual öçò glabel(8) åéá åðåñéööüöåñåò öðçñiøiñßåò ó÷åðééÜ iå ôá åßäç öùí åöééåöþí.

## 20.6.1 Åßäç Åôéêåôþí êáé Ðáñáäåßãìáôá

ÓðÜñ÷; iðí áyí óyðíæ áðééâðþí, ç ãaíéêP áðéé Ýóá êáé ç áðéé Ýóá óðooðÞíàðiò áñ÷; áßùí. Íé áðéé Ýóåò ïðiñðáß íá áßíáé ðñiðóùñðíÝð P ïuíéiåð. Íé ïuíéiåð áðéé Ýóåò ïðiññýí íá áçíéiðñâçëiýí íå óðo áíðiðeÝð tunefs(8) P newfs(8). Óðcí ðâñBððóùñð áðoP, eá áçíéiðñâçëiýí óá Ýíá ððiðéâð Üëiäi öið /dev. Áéá ðâñÜääéâiá, ié áðéé Ýóåò óðooðâðþí íá óyóðcíá áñ÷; áßùí UFS2, eá áçíéiðñâçëiýí óðií ëâðÜëiäi /dev/ufs. ïuíéiåð áðéé Ýóåò ïðiññýí áðBðcò íá áçíéiðñâçëiýí íå ÷; ñÞóç ôçò áíðiðeÞò glabel label. Íé áðéé Ýóåò áðoÝð ãaí áiáññþíðáé áðú öi óyóðcíá áñ÷; áßùí, êáé áçíéiðñâiýíðáé óðií ëâðÜëiäi /dev/label.

Ié áðóéêÝ ðåðò ðñiðùñëiiý ôýðið, ÷ Üññiðáé óá êÙèå áðáíâéðíçós ðið oððóðÞiáðið. Ié áðóéêÝ ðåðò áðóðÝð ãçìéiññaiýiðáé óðií éáðÜëiði /dev/label éáé áðßiáé ðÝéåéåò ãéá ðåéñáíáðéóiiýo. Ìðiñåðóá íá ãçìéiññáÞóåðá ðñiðùñëiÝð áðóéêÝ ðåðò iá òcí áiðiðP glabel create. Æáé ðåñéðóðüðåñò ðëçñiðiññåð, ãéáâÚðóå òc óåðëßáá manual òcò glabel(8).

Áéá íá äçëëiõñäÞóåôå ìéá iüíéïc åôéêÝóá ãéá Ýíá óyóôçìá áñ÷åßùí UFS2, ÷ùñßò íá êáoáóôñÝøåôå ôá äåäiiÝíá ðiõ ðåñéÝ÷åé, ñçóëiiðiõÞóåôå ôçí áéüëiõèç åíîöëP:

```
# tuneefs -l home /dev/disk3
```

**ĐññiáéáíiõiBçóç:** Áí ôi óyóôçìá ãñ÷åßùí åßíáé åäìÜöi, ç ÕáñáðÜíú åíöiõëþ iõiññåß íá ÕññiáéëÝóáé êáôáóôñiõëþ åäiäíiÝíúí. Úöôüöi, áí ôi óyóôçìá ãñ÷åßùí åßíáé åäìÜöi, ôöü÷iò óáò èá ÕñÝðåé íá åßíáé íá åéáåñÜøåòå ôá ãñ÷åßá Õiõ åäi ÷ñcöéíiõiõiõáé, êáé ü-é íá ÕññiøëÝóåòå åôééëÝóåò.

Èsá ðóÝðáé ðþrná íá ððÜñ : áé leá áðeeÝðá ðóñ eáðÜeññ /dev/uñs ç iðññá iðmñáh íá ðñññðóññéåh ðóñ /etc/fstab:

```
/dev/ufs/home          /home      ufs    rw      2      2
```

**ÓciàñBúñóć:** Ói óyoođociá áñ; áñBúñ iaáí ðñYðåé ía áñBúñáé ðññiòáññociýii ééáepo áééññæéñBðå ñcí áññiòéþ tunefes.

Ìðiñåßôå ôþñá íá ðñiíoáñôþróåôå ôi óýóôçìá áñ÷åßùí ìå ôi óoíþèç ôñüði:

```
# mount /home
```

Áðü áæþ éáé ðÝñá, éáé üóí öi Úññèñùíá geom\_label.ko öiññþíåðáé óóíí ððñþíá iÝóù öiõ /boot/loader.conf þ áðüöiíí Ý÷áðå áÜëéåð öçí áðéëíäþ GEOM\_LABEL óóíí ððñþíá óáð, áéüñíá éáé áí öi üññá öçò óðóéððþò áéëÜññé, ááí èá Ý÷áé êáéÜ áððíäþ þ áðßáññáóç óóíí óýóðçíá óáð.

Íðiñâþôå áðþóçò íá áçíeïoñâþóåôå óðooôþriáôå áñ ÷ áþùíå íå ðñiâðééâäíÝíç áôééÝôå, ÷ ñçóëiðiéþíôå ôçí áðéëiäP -L óðicí áiðiëþ newfs. Áâþôå ôçí óâéþää manual ôið newfs(8) áéá ðâñéóöüðâñàò ðëcñijöñþâò.

Íðiññåßôå íá ÷ ñçóéiiðiéÞóåôå ôcí ðáññéÜôù áîôïëÞ ãéá íá êáôáôôñ Ýóåôå ìéá åôéêÝôá:

```
# qlabel destroy home
```

Óri áðumjánum ðan. Úr aðeinsála áður - fá eðuðu meðin íslenskum fræðimálum.

ĐáñÜääéäíá 20-1. Äciéïõñãßá Åôééåôþí óôéò ÉáôáõìÞóåéò õiõ Äßóéïø Åêéßícócò

Äciëiõñäþíðåò iüiéiåò åôéê Ýôåò óôéò éåôåò! Póåéò öiö äþóëiö åêëþíçóçò, öi öýóôçìá óåò èá óðíá÷ßóåé íá åêëéíåß éåññééÜ áðüiá èéá áí iåðåò! Ýñåôå öi äþóëiö óå Üeëi åëåâéò! P áðüiá èéá óå äéáöññåðéü öýóôçìá. Ööí ðáñÜäåéäiá iåò,

Èàùñïÿìå üöé ÷ ñçóëiiðièåßôáé Ýíàò åßöéïò ATA, i iðiðiò áíááñùñßæåôáé åðü öi óyóöçìà ùò adø. Èàùñïÿìå åðßöçò üöé ÷ ñçóëiiðièåßôáé ç óoíçèéòi Ýíç aeÜôáïç êáôáöiÞóùû öiõ FreeBSD, ðiõ ðãññëéâiâÜíåé ôéò êáôáöiÞóäéò /, /var, /usr êáé /tmp üöùò åðßöçò êáé ieá êáöiÜöiçòc swap.

ÅðáráíæééíÞróðá ðír óýðóðciá, éaé üððáí álòðáíéñðóðåß ç ðññiðñðíðþ ðír loader(8), ðeÝðóðá ðír **4** æáð íá ðññáàíáðiðiéçèåß áðééñiçóð óá ñáð Üððóðáðc áðiùð ðír Þróðá. ðáðéðá, áþóðóðá ðír ðír ðír ðír ðír ðír ðír:

```
# glabel label rootfs /dev/ad0s1a
GEOM_LABEL: Label for provider /dev/ad0s1a is label/rootfs
# glabel label var /dev/ad0s1d
GEOM_LABEL: Label for provider /dev/ad0s1d is label/var
# glabel label usr /dev/ad0s1f
GEOM_LABEL: Label for provider /dev/ad0s1f is label/usr
# glabel label tmp /dev/ad0s1e
GEOM_LABEL: Label for provider /dev/ad0s1e is label/tmp
# glabel label swap /dev/ad0s1b
GEOM_LABEL: Label for provider /dev/ad0s1b is label/swap
# exit
```

Ç åéêbíçóç èá óoífá ÷ éóôåb  êáñííééÜ éáé ôi óyóôöçìá èá Ýee éé ôá êáôÜôôáóç ðíe áðéþí ÷ ñicôôþí (multi-user). ÍåôÜ ôi ôÝee  ôçò åéêbíçóçò, åðâíâññáóôåb ôå ôi áñ ÷ åþí /etc/fstab éáé áee Üiôå ôá óoíâáôééÜ iïüìâóá óôóéåðþí iå ôéó áíôb ôöíé-åò åóééÝôå. Ôi ôââééü áñ ÷ åþí /etc/fstab èá iïe Üx é iå ôi ðâññâéÜôu:

| # | Device            | Mountpoint | FStype | Options | Dump | Pass# |
|---|-------------------|------------|--------|---------|------|-------|
|   | /dev/label/swap   | none       | swap   | sw      | 0    | 0     |
|   | /dev/label/rootfs | /          | ufs    | rw      | 1    | 1     |
|   | /dev/label/tmp    | /tmp       | ufs    | rw      | 2    | 2     |
|   | /dev/label/usr    | /usr       | ufs    | rw      | 2    | 2     |
|   | /dev/label/var    | /var       | ufs    | rw      | 2    | 2     |

Íðiññáþóð ðóþñá íá áðáfáêééÞróðóðá ðí óýðóðçìá. Áí üæá ðÞæáí êáæÜ, ç áðéêþíçóç èá áþíráé êáññíéêÞ, êáé ç áíðiðÞ mount èá áðáþíåé;

```
# mount  
/dev/label/rootfs on / (ufs, local)  
devfs on /dev (devfs, local)  
/dev/label/tmp on /tmp (ufs, local, soft-updates)  
/dev/label/usr on /usr (ufs, local, soft-updates)  
/dev/label/var on /var (ufs, local, soft-updates)
```

| % glabel status        |      |        |            |
|------------------------|------|--------|------------|
|                        | Name | Status | Components |
| ufs1d/486b6fc38d330916 |      | N/A    | ad4s1d     |
| ufs1d/486b6fc16926168e |      | N/A    | ad4s1f     |

Óði ðánaðið **Ü**ðið **Ü**ðáaéiá, ói ad4s1d áiðeðñiðaýåé ói óyóðicíá áñ ÷ åbùí /var, áíþ ói ad4s1f áiðeðñiðaýåé ói óyóðicíá áñ ÷ åbùí /usr. ×ñcðéiðiéþíðaó ðeði ðeði ðeði **Y**ð ufsid ðið öðaýíðaé, ç ðñið **Ü**ñðcóç áððþí ðiði éðaáðiþóðaúí iðiñðáþi íá ðaýíði ià ðeði ðaýíði **Ü**ðið **Ü**ðáaéiá ÷ ñcðéiðiéþíðaó ói ðaýíði /etc/fstab:

|                             |      |     |    |   |   |
|-----------------------------|------|-----|----|---|---|
| /dev/ufs1d/486b6fc38d330916 | /var | ufs | rw | 2 | 2 |
| /dev/ufs1d/486b6fc16926168e | /usr | ufs | rw | 2 | 2 |

## 20.7 UFS Journaling lÝóù GEOM

Óóci Ýéätiç 7.0 ôi FreeBSD ðeiðieåßöåáæ áéá ðñþöç öiñÜ ç iÝá (êáé åðü ðiøeëiýò áíåíåñüìåíç) äðiáðüöçôá áéá ÷ ñþöç çiåñiïëiåßiô (journal) ôiöi óyóóciá áñ÷ åßùí. Ç ðeiðiåßçöç ðáñÝ ÷ åöåé iÝóù ôiöi ðiðiööñöååláiò GEOM êáé iðiñåß íá ñõèiæóåß áÿéiæá iÝóù ôiöi åiççööeéiy ðiñiñÜiìåöiò gjournal(8).

Óé ábíráé òí journaling; Óí journaling áðièçéâyáé óá Ýíá án÷åbíí êáðóáññáòþò (log, çáññíëüáéí, P áðëþò journal) óéð óóðááëëááÝò ðòïò óóðóòþlaðóïò án÷åbúí. Ðán Üáðæáíá óóðááëëááÞò ábíráé íé áëëááÝò ðíò aðáéööýíôáé áéá leá ðëþñç áéááééáðóá ãáññáòþò óðíi áðóöí. Þóé, óðíi log áðièçéâyííðáé íé áëëááÝò óóðá iáðóá-ááññíÝíá (meta-data) eáé óóðá ßæéá óá án÷åbá, ðññéí ábíráé c ðâééëÞ (éáññíéÞ) áðièþéðáðóç ðíòð óðíi áðóöí. Óí án÷åbíí êáðóáññáòþò lðriññáß áññüðåññá íá iáíá÷ñçóéíðíéçéâáß þóðóá c óóðááëëááÞ íá ábíráé áðü óçí áñ÷P, áðáóöáëþæíñðóà lð áðóðü óíí ôññüði üóðé òí óýóðçíá án÷åbúí èá ðáññáíábíráé óá óðááèñÞ eáðÜóðáóç.

options UFS\_GJOURNAL

Áí ÷ñâéÜæåôáé íá ðñïóánôþróáé ôüïié íà journaling éáôÜ ôçí åêëþíçóç, èá ðñÝðåé åðßóç ìá öiñôþíåôáé áðôüìåðá  
éáé ði Üñèñùíá ðõñþíá geom\_journal.ko. Áéá ði óéïðü áðôü, ðñïóëÝóôå ôçí ðáñâéÜôù ãñáíìþ ði ñáñ ÷:åþí  
/boot/loader.conf:

```
geom journal load="YES"
```

Անհաջող է պատճենաբանությունը, քանի որ անհաջող է պատճենաբանությունը:

## options GEOM JOURNAL

Ç ačiélíðnáðá journal óá Ýíá aðeáýéðánni óyóðóciá añ ÷ áßbúi, iðiñáð óþfñá íá aðbíráé iá óá áéüeíðéá áßbíáðá, eðaùñþfñðáð üðé ç óðóðéðáðþ dæ4 áßbíáðé Ýíáð (Ýíð aðbíðið SCSI).

```
# gjournal load  
# gjournal label /dev/da4
```

Óóï óçìåñí áðôñü ðáé íéá óðóéâðòP /dev/da4 êáèþò êáé íéá óðóéâðòP /dev/da4.journal. Óðç óðóéâðòP áðòP iðiñåßòå ðþñá íá áçlëiõñäÞóåðå óýóðçíá áñ ÷ áßùí:

```
# newfs -O 2 -J /dev/da4.journal
```

Ç ðánâðUñ áíööP èá äçíëññóáé Ýía óýóôçìá áñ-ðåßùí UFS2 óôç óõóéåôP /dev/da4.journal, ç iðiñá Ý-åé Päc õðíóôPñéïç æáá journaling.

Íðiñáþôá íá ÷ nçóéiiðiéÞóåôá ócí áîóïéÞ mount áéá íá ðñiøánôÞóåôá ócí óðóéåðÞ óöi áðééòìçöü óçìåßi ðñiøÜñôçóçò, üðùò öáßiåôáé ðáñáéÜòù:

```
# mount /dev/da4.journal /mnt
```

**Óciáßúóć:** Óócí ðâńßöðöóć áñéâðóþí slice, èá äçíëññäçéâß Ýíá journal áéá êÙëá âðéíÝññò slice. Áéá ðáññÜääéáíá, áí ððÜñ÷: iññ óá slices ad4s1 êáé ad4s2 öüðå ðí gjournal èá äçíëññäÞóáé ðéò öóðéâðóÝò ad4s1. journal áéá ad4s2. journal.

Ãéá ééáéýôðâñç áðüñäöç, ßóùð ôðßáé åðééðöçîðòþ ç ôÞñçóç ôïð journal óå äéáðïñâðééü åßðöëí. Äéá ôðéð ðâñéððôþåéð áðôÝð, ið ðámii ÷ Ýáð çiâññiëëäßò (ç óðóðâðòþ åßðöëí ðïð eá ðâñéÝ ÷ åé ôïð journal) ðñ Ýðåé íá åßíâðåé ùò ðánÜlåðññiò óðçí åíðiëþ, åíÝóùð lâððÜ òç óððéâðòþ åßðöëí óðçí iðiðß eá åíññâððíëçèåß ôïð journaling. Iðiññâßòð åðßbóçð íá åíññâððíëþóâð åïð journaling óå ððÜñ ÷ iiðâð óððóðÞlåðåá âñ ÷ åßñú ñïçóëiiðíëþíðåóð óðçí åíðiëþ tunefs. Ùóðüöi, eá ðñ Ýðåé íá êññâðÞoâð åíðßãñáöi áðóæâðåð ôñú âñ ÷ åßñú óâð, ðñéí åðé ÷ åéñÞoâðå íá ûðfåðå åéëáäÝð óå Ýíá ððÜñ ÷ iiðóýðòçíå âñ ÷ åßñú. Óðéð ðâñéñðóðüâðåð ðâñéððôþåéð, ç tunefs eá åðiðóý ÷ åé áí åáí iðiñÝóåé íá äçìëiðñâðoâð åïð journal, åéëÜ åðôðü åáí óâð ðññðôðâðåýåé åðü åðþræáé åâññíÝñú ðïð iðiðß íá ðññÝéëâð åðü êâðþ ÷ ñÞðçð ôçð tunefs.

Åßíáé åðßóçò äößáóúí íá ÷ñçóëiiðíéçèåß journaling óöíí åßðéï åêéßíçóçò åíüö óööôðíáöïò FreeBSD. ÄéååÜóôå öï Üñèñï Öëiðíßçóç ôï UFS Journaling óå Ýíá Desktop ÖðiïæööôÞ

([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/articles/gjournal-desktop](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/gjournal-desktop)) ãæá èåðôñïñåñâßó iæçãßåðó.

# ÊåöÜëáéï 21 ÕðïóôÞñéïç ÓõóôçìÜôùí Áñ÷åßùí

*ÃñÜöçêå áðü ôií Tom Rhodes.*

## 21.1 Óýїїøç

Óá óooóóPiádá áñ÷åßùí áðíriöäéiyí áíáðüöðáooí òíPiá êÜeå eäéöiöñhääéiyí óooóóPiáöiò. Åðéöñ Ýðiöí óóïöö ÷ñPöôåò íá äçíeiöñhääíyí éáé íá áðíèçéåýiöí áñ÷åßá, ðánÝ÷iöí ðñüöúåáóç óå äåäñí Ýíá, éáé óooééÜ áíéiöíéiyí öiöö ñeéçñiýò åßbóéiöö. ÄéaoiöñhääéÜ eäéöiöñhääéÜ óooóóPiádá ÷ñçöéiiröíéiyí óoíPøèù áéaoiöñhääéÜ ååååÍP óooóóPiádá áñ÷åßùí. Õí óyóööçíá áñ÷åßùí öiö FreeBSD åßbóé òí Fast File System P FFS, òí iðiñi ðñiñPøèå áðü òí áñ÷éü óyóööçíá áñ÷åßùí öiö Unix™, åñùóöü åßbóçò éáé ùò UFS. Áooñ åßbíáé éáé òí ååååÍYò óyóööçíá áñ÷åßùí öiö FreeBSD, òí iðiñi ÷ñçöéiiröíéåßbóáé óóïöö óeéçñiýò åßbóéiöö éáé ðñiñööÝñhääé ðñüöúåáóç óóå äåäñí Ýíá.

Öi FreeBSD ðññioö Ýñâåé åðßöçö ðëçëþñá áæáöinñåðéþí öððöçü Üðöñí åñ ÷ åßùí, þöðå íá ðáñÍ ÷ åé ðiðééþ ðññiðåáóç öå åâäñí Ýíá ðið Ý ÷ iðí åçíëiöñâçèåß åðü Üëëá èåéöiöñääéÜ öððöôÞiaðá, ð.÷. åâäñí Ýíá ðið åñßöðeñiðåé öå ðiðééÜ USB åðíëçêåðöééÜ iÝóá, iäçäïýö flash, éåé öéêçñïýö åßöðeïðö. ÖðÜñ ÷ åé åðßöçö ðiðiðöþñéíç åéá Üëëá, lç-åââåáíÞ öððöôÞiaðá åñ ÷ åßùí, üðùò ôi Extended File System (EXT) ôið Linux êáèþò êåé ôi óýóôçìá Z File System (ZFS) ôçö Sun.

Ôi FreeBSD ðán Ý ÷ áé æáeoññâóêü áðþðâäí ððíóðPñéíçò æáá êÜeå óýóðçìá áñ ÷ áßuí. Áéá iñéói Ýíá éá ÷ nñâéáôðâß íá õññôùèâß êÜðiéí Üññëñùíá ôðíí ððññPíá, áíþ æáá Üeeá éá ðñÝðâé íá åâéáôðâæïý êÜðiéá åññâæâßá. Ôi êâðÜéáéí áðôü Ý ÷ áé 0 ÷ åâéáôðâß íá åíçëPðâé ðiðð ÷ ñPðôâð ðið FreeBSD íá áðîéðPðíñí ðññüðâáóç óâ Üeeá óðóðPñáðá áñ ÷ áßuí óðí óýóðçìá ðiðð, fâééíþíðâð áðtú ôi Æ File System ôçò Sun.

Áöiý æáâÜóåôå áðôü ðiî êåöÜëáéï, èá ãíùñßæåôå:

- Ôç äéáöïñÜ lâôáiy ôùí åääåíþí êáé ôùí ðïïóôçñéæüåùí óôôôçìÜôùí áñ ÷ åßùí.
  - Ðïéá óôôôÞiaôá áñ ÷ åßùí ðïïóôçñßæïîôáé áðü ôi FreeBSD.
  - Ðùò íá åïññaiðïéÞoåôå, íá ñðèìßoåôå, íá áðïëêðoåôå ðññóåáóç êáé íá ÷ ñçóëiiðïéÞoåôå lç-åääåíÞ óôôôÞiaôá áñ ÷ åßùí.

Đñéí äéáâÜóåôå áõôü ôi êåöÜëáéi, èá ðñÝðåé:

- Íá êáôááííâßôå áâáóéêÝò Ýíííéåò ôiõ UNIX êáé ôiõ FreeBSD (ÊåöÜëéäí 4).
  - Íá åßôôå åííééåèùÍíò iå ôeò áâáóéêÝò äéäæéåóßôå ñýèlëóçò êáé åâéåðÜóôåóçò ðñïóáñìiòÍíò ðõñÞíá (ÊåöÜëéäí 9).
  - Íá áéöèÜíåôå Üíåôå iå ôçí åâéåðÜóôåóç åöáñííäþí ôñßôiõ êâóåóéåóåóðþ ôiõ FreeBSD (ÊåöÜëéäí 5).
  - Íá åßôôå åííééåèùÍíò iå ôiõò äßôéiõò, óá iÝóá áðïëÞéåðóçò, êáé óá áíðßôóïé ÷ á iíüíáôå óðóéåðþí óiõ FreeBSD (ÊåöÜëéäí 19).

## 21.2 ÔÍ Óyóôçìá Áñ÷åßùí Z (ZFS)

Ói óyóóciá áñ÷åbùí Z, áráðóý÷èçéå áðü ôcí Sun, êáé åbíráé iéá íÝá ôå÷ñíeráþa ðið o÷åæéÜóóçéå æáé íá ðánÝ÷åé  
áðièÞéåðóç íÝóù ôçò iåèùëiø pool. Áðöü óciáßíåé üöé üëiø i åéåýéåñiø ÷þñiø æáðóßèåðåé ùò áðüèåíá, êáé  
æáiÝíååé äöíáééÜ óá êUéå óyóóciá áñ÷åbùí áíÜëíà iå ôéo áíÜäåðå áðièÞéåðóçò äääñíÝíú. ÷åé áðßóçò

Ó ÷ áæáóðåðb æá óç iÝáéóðc áæáñáéüöðcôá áæäñiÝfúí éáé ððiöðcñßæáé óðéæíéüöðð (snapshots) áæäñiÝfúí, ðrëeáðé Ü áíðBññáða éáé áèñiBñáða åæÝá÷iø áæäñiÝfúí (checksums). ÷ áé áéüìá ðñiöðåèåb Yíá fYí iñiøÝeí æá óç æáéðPñçóç áíðéæñÜöùí ôùí áæäñiÝfúí, ãñúöðü ùò RAID-Z. Ói iñiøÝeí RAID-Z áðíáé ðáñüìiøí ià òi RAID5 áæé Ü áðíáé  
Ó ÷ áæáóiYíí fá ðán Y-åé ðñiöðåðbá ôùí áæäñiÝfúí éáðÜ ðcí áæáñáöP òiðò.

### 21.2.1 Ååëôéóôïðïßçóç ôïõ ZFS

Ôi ōððiþýðóçíà ZFS ÷ñçóëiiððiæáß áñéåðiýò ðüññiðò ñiò õððoðÞiaðiò. Ååðééððiðiþiáðò ðéðò ñiðeìßóåéò ñiò õððoðÞiaðiò óáð, éá åððóý ÷åðå ñi Ýáéðóç áððüäiðç óðçí éáèçìåñéÞ ÷ñÞóç. Éáèþò ñi ZFS åðiáé áéüìá óå ðåéñáíåðéü õððÜäéí óði Freebsd, áððü ßóùò ãéëÜiáé ïæëñiðóéêÜ. Ùóðüñi, áéá ñiçí þñá, õððiððóåðéá íá áéëñiðóéÞaðå õå ðáñáðéÜ ñiðiðá:

### 21.2.1.1 líPìc

Ói oõñiieéü iÝääëiò iIPiçò ðiõ oõõõõPiáõiò ðñ Ýðåé íá åbíráé ðiõeÜ ÷éoõiÝ íá gigabyte, åþp oï oõíeóõþlåñi iÝääëiò åbíráé äyí gigabytes P éáé ðåñéõõùðåñi. Óå üeá óá ðáñáäåßñiáðá ðiõ öaßñiõáé åþp, oï oýóõçìá Ý ÷åé Ý íá gigabyte iIPiçò éáé Ý ÷iõiå åßþóçò åâæõéõðiÝieÞóáé ðeó ñðeíßþóáé ðiõ.

Íñeoí Ýiié ÷ñþóôåò öáþíâôáé íá ôá êáôáö Ýñiiõí êáé íå ëeäüôåñí áðü Ýíá gigabyte iñþìçò, áëeÜ íå ôÝöiëiõò ðâñeíñeoíýö ööóéêþò iñþìçò, åbíáé áñêåôÜ ðeeáíü íá äçíëiõñâçèåß panic êÜôù áðü áâñý öiñþößi åññääßåò, åâáéôßåò åiÜñöecóçò ôçò.

### 21.2.1.2 Ñýèìéóć ôjõ ĐõñPíá

Óðíþóðáðáé íá áöáéñ Ýóåôå óá ðñiñáñ Üìáôå íäþæçóçò éáé óéò áðeeïä Ýð ðiñ äái ÷ñçóëüðíéåßôå áðü ói áñ ÷åßi ñðòèìßóåñü óiñ ððñÞá. Éáéþò ié ðáñéðóùðåññié tñçäiñ óóðéåðþí áéáðþéåíôåé áðßóçò éáé óá iññöP áñèñùìÜðùí, iññiñåßôå áðéÜ íá ðiñò ñiñðóþåðå ÷ñçóëüðíéþíðóå ói áñ ÷åßi /boot/loader.conf.

Íé ÷ ñPóôåò ôçò áñ÷éóâéöiiéêPò i386 èá ðñYðåé íá ðñiioé Yñiöí ôçí ðáñáéÜôù åðéëiäP óóïí áñ÷åßi ñðeìßóåùí ðiöí ðöñHíá ðiöò, íá ðiüí åðáíäñiåðñiöñò ðiöñò, íá ðiüí åðáíäñiåðñiöñò ðiöñò.

options KVA RACES-512

Çåðéëïäþ áôôþ èá äéåñýíåé ôçí ðåñei÷ þ æåðèýíóåùí ôiõ ðôñþíá, åðéôñÝðiiôåò Ýôóé ôçí áyíçóç ôéiþò ôçò ñôðièôéðéþò iåðåâæçôþò vñ.. kvm\_size ðÝñá åðüi ôiñÝ ÷ ii üññi ôiñ 1 GB (2 GB åéá ðôñþíåò PAE). Äéá íá âñâßôå ôçí êåðåëëçüöðâñç ôéiþ åéá áôôþ ôçí åðéëïäþ, åéäéñÝóôå öi åðéëðiçöü iÝâåëiò ôçò ðåñei÷ þò åéåðèýíóåùí iå ôiñ ïññôðâñç (4). Ôçí ðôñþðôñç åðôþ Ý÷ iññi å 51.2 åéá iÝâåëiò 2 GB.

21 2 1 3 Ñõèìßóâéò óôéò lâôáâëcôÝò ôïõ | oader

Èá ðñÝðåé íá áðíçèåß ç ðåñéí÷P äéåðéýíóåùí kmem óå üéåò ôéò áñ÷éôåðôííééÝò óïõ FreeBSD. Óõi äíééíáóôéüù iaò óyóóciá, ia Ýía gigabyte ööõééPò ïíPìçò, åß÷áia åðéõò ÷çíÝñí áðiòÝéåóíà ÷ñçóéíðíéþíóåò ôéò áéüëíðéåò åðééíäÝò óôí áñ÷åßí /boot/loader.conf ñéá åðíáüééíþíóåò ðü óyóóciá iaò:

```
vm.kmem_size="330M"  
vm.kmem_size_max="330M"  
vfs.zfs.arc_max="40M"  
vfs.zfs.vdev_cache_size="5M"
```

Ãéá áíáëöôéüôåñâò ñõèïßóåéò ó÷åôééÜ íå ôçí âåëöéóôïïßçóç ôïõ ZFS, äåßôå ôïí <http://wiki.freebsd.org/ZFSTuningGuide>

## 21.2.2 ×ñçóéíïðíéþíôáò ôí ZFS

ÕðÜñ÷åé Ýíáo ìç÷áíéóìüö åêéßíçóçò ðiiõ åðéôñ Ýðåé óöi FreeBSD íá ðññóáñòÞóáé ZFS pools êáôÜ ôç äéÜñêåéå  
ôçò åêéßíçóçò ðiiõ óðóóòÞíáöiò. Åéá íá òiiñ ñðèìßóåôå, åêôåéÝóôå ôéöo áêüëiñòeåò áîöiïeÝò:

```
# echo 'zfs_enable="YES"' >> /etc/rc.conf  
# /etc/rc.d/zfs start
```

#### 21.2.2.1 Pool ja já lüür Äßóêë

Ãéá ôcí äçleíõñãßá åüò ZFS pool iå Ýíá iüñ äßóëi (÷ùñßò äöíáöüöçôá áñi÷ßò óöáëiÜôùí), ÷ñçóëiïðéßóôå ôçí åíöiëß zpool:

```
# zpool create example /dev/da0
```

Ãéá íá äåßôå ôi íÝi pool, åîåôÜóôå ôçí Ýiiäi ôçò åíöiiePò df:

```
# df
Filesystem 1K-blocks Used Avail Capacity Mounted on
/dev/ad0s1a 2026030 235230 1628718 13% /
devfs 1 1 0 100% /dev
/dev/ad0s1d 54098308 1032846 48737598 2% /usr
example 17547136 0 17547136 0% /example
```

Ç Ýñräiò áôôP ääß ÷ íâé êáæánÜ üöé ôi example pool ü÷é iüíïÝ ÷åé äçíëiõñäçèåß, äeëëÜ Ý÷åé åðßóçò ðñiøáñôçèåß êéüëéäo. Åßíáé åðßóçò äéæé Ýóéïù ùò êáññéü óýóôçìá ãñ÷åßù, iðññåßòå íá äçíëiõñäÞóåôå ãñ÷åßá óå áôöü, êáé Üëëíé ÷ñÞóåôå iðññíýí åðßóçò íá ôi äiöi, üðùò öáßfåöåé ôiöi ðáñåéÜò ðáñÜåéäiá:

```
# cd /example
# ls
# touch testfile
# ls -al
total 4
drwxr-xr-x    2 root    wheel     3 Aug 29 23:15 .
drwxr-xr-x  21 root    wheel   512 Aug 29 23:12 ..
-rw-r--r--    1 root    wheel     0 Aug 29 23:15 testfile
```

Äöödõ ÷ þò áööü öi pool eääí ÷ ñçöeïiðrëåß êÜðiëí áðü ôá ðëäiiâêðPiáôá öiö ZFS. Äcìeïoñäþóôå Ýíá óyóöciä áñ÷åßùí óá áööü öi pool eääí áiññäiðrëþóôå óá áööü ôc öoiðßåóç:

```
# zfs create example/compressed  
# zfs set compression=gzip example/compressed
```

Öi óyooçia áñ÷åßúí example/compressed åßíáé ðëÝíí Yíá óoiðéåóiÝíí ZFS óyooçia. ÄïeëÜóôå íá áíðeëñÜøåôå iãñéëÜ iãëÜéå áñ÷åßå óå áôòü, áðåõèåßåó óoíí êåòÜëíäí /example/compressed.

Íðjñåþôå ôbñá íá áðåíáññáiðjéÞóåôå ôc óóìðþåóç ãñÜöiiþôå:

```
# zfs set compression=off example/compressed
```

Ãéá íá áðiðññðáñôPóâðâ òi óýóðçìá áñ÷åßùí, åêðâðéÝóðâ òcí áêüëiðèç áíôïëP êáé áðáæçèåýóðâ òi áðiðÝëåðíá iÝóù òið ãiçèçôéëý ðñiäñÜììåòið df:

```
# zfs umount example/compressed
# df
Filesystem 1K-blocks      Used      Avail Capacity Mounted on
/dev/ad0s1a    2026030    235232   1628716     13%      /
devfs          1          1          0     100%      /dev
/dev/ad0s1d    54098308   1032864   48737580      2%      /usr
example        17547008          0   17547008      0%      /example
```

ÐñiðñôPóâðâ ìáíÜ òi óýóðçìá áñ÷åßùí, þóðâ íá åßíáé êáé ðÜëé ðñiðñôÜóëii, êáé áðáæçèåýóðâ òi ÷ñçóéiiðiéþíðâ ùðùò êáé ðñéí, òcí áíôïëP df:

```
# zfs mount example/compressed
# df
Filesystem 1K-blocks      Used      Avail Capacity Mounted on
/dev/ad0s1a    2026030    235234   1628714     13%      /
devfs          1          1          0     100%      /dev
/dev/ad0s1d    54098308   1032864   48737580      2%      /usr
example        17547008          0   17547008      0%      /example
example/compressed 17547008          0   17547008      0%      /example/compressed
```

Ìðiñâßôå áðßóçò íá äâßôå òi pool êáé òi óýóðçìá áñ÷åßùí åiâðÜæiïðâò òcí Ýiñäï òcò áíôïëPò mount:

```
# mount
/dev/ad0s1a on / (ufs, local)
devfs on /dev (devfs, local)
/dev/ad0s1d on /usr (ufs, local, soft-updates)
example on /example (zfs, local)
example/data on /example/data (zfs, local)
example/compressed on /example/compressed (zfs, local)
```

¼ðùò ðáñáðçñïýâ, òi óýóðçìá áñ÷åßùí ZFS ìðiñâß íá ÷ñçóéiiðiéçèåß ùò êiéíü óýóðçìá áñ÷åßùí iåôÜ ôç áçlëiðñâßá òið. Ùóðüòi, åéééÝôåé ðrëëÝð ãéüüä åééðñâßâð. Óði ðáñáðÜôù ðáñÜäâéäâä åçlëiðñâïýâ Ýíá iÝí óýóðçìá áñ÷åßùí, òið data. èá áðiðçèåýóðâ òcíäíóééÜ åâäñÝíá óå áðôü, êáé Ýóðé òi ñòèìßæiðâ Þóðâ íá èñâðÜâé åyí áíôßâñâðâ áðü ëÜëå iðëëé åâäñÝíùí:

```
# zfs create example/data
# zfs set copies=2 example/data
```

Ìðiñïýâ ðþñâ íá äiïýâ óå åâäñÝíá êáé òcí êáðâðÜëùóç ÷þñið ãßññðâò íáíÜ òcí áíôïëP df:

```
# df
Filesystem 1K-blocks      Used      Avail Capacity Mounted on
/dev/ad0s1a    2026030    235234   1628714     13%      /
devfs          1          1          0     100%      /dev
/dev/ad0s1d    54098308   1032864   48737580      2%      /usr
example        17547008          0   17547008      0%      /example
example/compressed 17547008          0   17547008      0%      /example/compressed
example/data    17547008          0   17547008      0%      /example/data
```

ĐáññáôcñBóôå üöö ëÜéä áyóôôciá áñ÷åßùü óöi pool äâß÷fáé öi Bäéí iÝáâéëò äéåé Ýóéiiò ÷þñiñ. Áôôüö åßíáé äéé í ëüäïò ðiö ÷ñçóéïiðiéiyá ôçí åïdïëP dñf óå üéä óå ðáññáâåßâíåáô, äéá íá äåßüïölä üöé óå ðóôôÞiaôáå áñ÷åßùü ÷ñçóéïiðiéiyá iüñí öi ÷þñiñ ðiö ÷ñåéÜæïiôåé äéå üöé üéä iüñíÜæïiôåé öiï Bäéí ÷þñiñ (öi ëiéitü ÷ñçóöiï áðüëèäíá — pool). Óöi óyóôôciá áñ÷åßùü ZFS Ýíïéåò üðùöü ié ôüüïé (volumes) äéé ié èåôåöiÞóåéò (partitions) äåí Ý÷iðií iüçíá. Áiðþëåôå, ðiëëÜ ðóôôÞiaôáå áñ÷åßùü iüñíÜæïiôåé öiï Bäéí ÷þñiñ, öi pool. Iðiñâßôå íá èåôåññÞóåôå öiï óyóôôciá áñ÷åßùü éåé èåôüðéï öiï Bäéí öiï pool üðáí äåí óå ÷ñåéÜæåôå ðeëÝí:

```
# zfs destroy example/compressed  
# zfs destroy example/data  
# zpool destroy example
```

Íé óéëçñíß äßöðié íå ðíï êáéñü ÷ áëÜíá, åßßáé áíáðüöðåðöôî. ¼öáí Ýíàð äßöðéïò ÷ áëÜöåé, óá åäâñäÝíá ðíö ÷ Üññíöåé. Íéá íÝèíäio ãéá íá áðïöýäöìå ôçí áðþéåéä åäâñï Ýíùí åâáéößáò åíüò ÷ áëáòíÝíò äßöðéïò åßßáé íá áçlëéïöñäÞöiöìå ìéá óðöööíé ÷ßá RAID. Óá pools ðíö ZFS Ý ÷ iöí ðí ðí ÷ åâáéöåéß þþöå ðí öðíööðçñßæïöí åðöü ðí ÷ åñâéöðçñéöðééü. Ç ëäéöïöñäßá åðöÞ áíáðéýåðöæc ôóçí åðüüìåíç åñüöçöå.

### 21.2.2.2 ZFS RAID-Z

¼ðùò áíáö Ýñaiå ðñïçäiòi Ýiùò, ç áíüöçôá áôôP ðñiùðiè Ýoåé üöé ÷ ñçóëiòiëiÿìå ôñåéò oôôéåò Ýò SCSI iå iiùiáôå oôôéåòbí da0, da1 êéé da2. Äéá íá äçieññåÞóiòi å Yíá pool öýðiø RAID-Z, åêôåëiÿìå óçí áéüëiøç áîôïëP:

```
# zpool create storage raidz da0 da1 da2
```

**Óciàßùós:** Ç Sun óóíeoóöÜ íá ÷ñçóéïïöéiyíöåé áöü ôñåéò ùò áííéÜ óóóéåöÝò óå óóóöïë÷ßåò ôýöïö RAID-Z. Áí ÷ñåéÜæåöåé íá äçíéïöñäÞöåôå Ýíá pool íå ðåñéööûöåñïöö áöü äÝéå äßöéïöö, åßíáé ðñïöéïüöåñï íá ôí ÷ñßöåðå óå ííÜäåò áöü íéñüöåñä RAID-Z pools. Áí äéäéèÝöåðå íüíí äýí äßöéïöö áééÜ ÷ñåéÜæåöåðå ôçí äöñåööûöçöå áíï÷ßò óóäéïÜöùí, ßöùö åßíáé èåéýöåñí íá ÷ñçóéïïöéiyíöåôå Ýíá ZFS mirror. Ååßöå ôç óåëßää manual ôíö zpool(8) äéá ðåñéööûöåñäò èåðöïïYñåéåò.

Èá àçéïõñäçèåß òî storage zpool. Iðiñåñôå íá åðåëçèåýóåôå òî åðiô Ýëåòíà ÷ ñçóëiðiéþíôåò, üðùò êáé ðñïçäiòiÝìò, ôéò åíöiëÝò mount(8) êáé df(1). Èá iðiñiýóåíà íá ÷ ñçóëiðiéþíôå ðåñéóóüðñiòò äþóétiò, ðñïóéÝöíôå ðá ïiùlååðå óðóéåðþí òiòò óòi ðYëiò ôçò ðåñáðÜì ðëþóåò. Äçéïõñäþíôå Ýíá ïÝí ðóôåçíà ãñ ÷ åðúí óòi pool, òî iðiñiùò èá iññi Ùæðôåé home êáé iðiñiùò èá åðiêçèåýíðåé ðåéééé Ü ðá ãñ ÷ åðþá ðùí ÷ ñçóðþí:

#### **11. *Enzymatic synthesis (bene)***

Ìðiññýiá ôþñá íá åfññaiðiÞóíðiå ôcí oðiðßåóç êáé íá êñáôÜiá åðéðëÝíí áiðßãñáöá ôùí êáðæüðuí êáé ôùí åðæñÝùí ôùí ÷ ðicôðhí ¼ðùñð êáé ðññiçüñð Ýñð, ìðiññýiá íá ðiçðéðv-ðiñð- ÷ ðicôðiÞóíðiÞóíðiå ðiðiññýiá íá ðiðiññýiá íá

```
# zfs set copies=2 storage/home  
# zfs set compression-gzip storage/home
```

Áéá íá áßíáé áôôùò i ÍYíò êáôÜeräiò ôùí ÷ñçóôþí, áíôéäñÜþôå óá äåäiÍYíá ôiïò óá áôôüí êáé äçleïõñâþôå ôiïò êôôÜeräiò òðìùñéêñýò äðöñýò:

```
# cp -rp /home/* /storage/home  
# rm -rf /home /usr/home  
# ln -s /storage/home /home  
# ln -s /storage/home /usr/home
```

Óá áääñí Ýíá óñi ÷ñçóðíþ eá áðièçéåýíðåé ðþñá óði íÝí óýóðçíá áñ ÷ðßú /storage/home. Áéá íá ói áðæçéåýóåðå, áçieíöñáþðóá Ýíá íÝí ÷ñÞróðç eáé åéó Ýééåðå óði óýóðçíá íá ói íÝí eïïáñéåðiú.

Áitið er ósóð í áætli eftir ósóðum (snapshot) óðvíði.

```
# zfs snapshot storage/home@08-30-08
```

Óciáéþóð áüé ð áðéëiäþ áçléiññáð óðéæíéüððið eáéðiññáð lüüí óá ðññááðééü óýðóðíà áñ ÷ áðùí, éáé ü ÷ óá õðiðiði íaïññí Ýíí éáð Úeíäþ Þ ãñ ÷ áði. I ÷ áñáéð Þñáð @ ÷ ñçóðíðíéðóáé ùò äéá ÷ ùñéóðééü íaðáý õðið óðóðÞiaðiðið áñ ÷ áðùí éáé õðið íiññáðið ôüññið. Áí éáðáóðññáð ð i ëáð Úeíäþ ãðáññí Ýíñ õðið Úeíäþ ÷ ñðóðc áðíðéáðóð Þóðá õðið íað õðíðið:

```
# zfs rollback storage/home@08-30-08
```

Ãéá íá ääbôðá ïéá ðëbôðá ôuìí ãéáé ðóéâlëüôôðùí, åêôðåë Ýóôå ôçí áîôrëp ls óôïí êåðÜëëiäi .zfs/snapshot ôiõ óôðôðPïáôïò áñ ÷ åßùí. Äéá ðañÜääéäia, ãéá íá ääbôðá òi ðóéâlëüôôðï ðiø äçëéïöñäPóáia ðñïçäiòiÝíùò, åêôðåë Ýóôå ôçí ðañäéÜôu áîôïëp:

```
# ls /storage/home/.zfs/snapshot
```

Åßíáé äðíáðúí íá ãñÜþåôå êÜðiëí script ðiö íá äçlëiñðâñâß lçíéåßá óðéæíüôðá ôùí åðäññÝfùí ôùí ÷ñçóðþí. Ùóðüöií, iå ôçí ðÜññaií ðiö ÷ññiiö, óå óðéæíüôðá éå êáôáíáëþþiöi íåñÜëí ðiöiööuñ ðiö ÷þñiiö óóï áßóëí. Íðiññâðôå íá äéáññÜþåôå ðiö ðñiçäiýåññ óðéæíüôðí ÷ñçóðiëíþòå ðiöi ðáññâëÜôù áîöeþ:

```
# zfs destroy storage/home@08-30-08
```

Äáí õðÜñ÷åé üüäìò, iàôÜ áðü üëåò áðôÝò ôéò äïéêÍÝò, íá êñâôÞóïòå ôí /storage/home óôçí ðáñiyóá êáôÜóôáóç ôïò. Iàôáôñ Ýþôå ôí ôóï ðñääíáôéü ÿóôçíà áñ : åßùí /home:

```
# zfs set mountpoint=/home storage/home
```

× ñçóöíñðíéþíöáð öðé áíðíëÝò df éáé mount èá äiÿà üðé öi óýóðçìá ÷ åéñßæåðáé ðëÝíí áðöü öi óýóðçìá áñ÷åßùí ùð öi ðñááíäðéëü /home:

```
# mount
/dev/ad0s1a on / (ufs, local)
devfs on /dev (devfs, local)
/dev/ad0s1d on /usr (ufs, local, soft-updates)
storage on /storage (zfs, local)
storage/home on /home (zfs, local)

# df
Filesystem 1K-blocks Used Avail Capacity Mounted on
/dev/ad0s1a 2026030 235240 1628708 13% /
devfs 1 1 0 100% /dev
/dev/ad0s1d 54098308 1032826 48737618 2% /usr
storage 26320512 0 26320512 0% /storage
storage/home 26320512 0 26320512 0% /home
```

```
# echo 'daily_status_zfs_enable="YES"' >> /etc/periodic.conf
```

### 21.2.2.3 ÁíÜêôçóç ôiõ RAID-Z

ÊÜëå ëræðíééü RAID Ý÷åé ìéá ìYëíäi ãéá åðßâëåøç ôçò êáôÜóôáóPò ôiõ, êáé ôi ZFS ãáí áðiðåëåß åíáßñåóç. Ìðiñåßôå íá ååßôå ôçí êáôÜóôáóç ôùí ôðóðåøþí ôiõ RAID-Z ÷ñçóéiiðiéþíôåò ôçí áéüëiðèç åíðiëP:

```
# zpool status -x
```

Áí üëá ôá pools åßíáé óå õðæP êáôÜóôáóç, èá ðÜñåôå ôi áéüëiðèi ìPíðiá:

```
all pools are healthy
```

Áí ôðÜñ÷åé êÜðiéi ðñüüäéçìá, ð.÷. êÜðiéi ñðôéi Ý÷åé åååé åêôüò ëåéôiðñäßáò, èá ååßôå ôçí ðåñéäñáöP ôçò êáôÜóôáóçò óå Ýíá ìPíðiá üðùò ôi ðáñáêÜôù:

```
pool: storage
state: DEGRADED
status: One or more devices has been taken offline by the administrator.
        Sufficient replicas exist for the pool to continue functioning in a
        degraded state.
action: Online the device using 'zpool online' or replace the device with
        'zpool replace'.
scrub: none requested
config:
```

| NAME    | STATE    | READ | WRITE | CKSUM |
|---------|----------|------|-------|-------|
| storage | DEGRADED | 0    | 0     | 0     |
| raidz1  | DEGRADED | 0    | 0     | 0     |
| da0     | ONLINE   | 0    | 0     | 0     |
| da1     | OFFLINE  | 0    | 0     | 0     |
| da2     | ONLINE   | 0    | 0     | 0     |

```
errors: No known data errors
```

Ôi ðáñáðÜíù ååß÷åé üöé ç ôðóðåøþí ðÝèçéå åêôüò ëåéôiðñäßáò åðü ôií åéá÷åéñéóôP. Áðóü åßíáé áéPèåéá ãéá ôi ôðåéåêñéi Ýíü ðáñÜäåéäiá. Åéá íá ôåèåß iñðôéi ñðôéüò, ÷ñçóéiiðiéþèçéå ç ðáñáêÜôù åíðiëP:

```
# zpool offline storage da1
```

Ìðiñýiå ôþñá íá áíðééåôáóôPòiòå ôi ñðôéi da1 ìåðÜ ôçí áðåíññäiðiþçóç ôiõ ôðóðPìáòiò. ¼ôáí ôi óýóðçìá åðáíÝëéåé óå ëåéôiðñäßá, ìðiñýiå íá ÷ñçóéiiðiéþòiòå ôçí áéüëiðèç åíðiëP ãéá íá åíçíñþòiòå ôi óýóðçìá ãéá ôçí áíðééåôÜóôáóç ôiõ ñðôéiò:

```
# zpool replace storage da1
```

Áðü åäþ, ìðiñýiå íá åéÝäññòå íáíÜ ôçí êáôÜóôáóç, áðóP ôç öiññÜ ÷ùñßò ôçí åðééiäP -x:

```
# zpool status storage
pool: storage
state: ONLINE
scrub: resilver completed with 0 errors on Sat Aug 30 19:44:11 2008
config:
```

| NAME    | STATE  | READ | WRITE | CKSUM |
|---------|--------|------|-------|-------|
| storage | ONLINE | 0    | 0     | 0     |

```
raidz1    ONLINE      0      0      0
da0        ONLINE      0      0      0
da1        ONLINE      0      0      0
da2        ONLINE      0      0      0
```

errors: No known data errors

¼ðùò öáßíåðáé óöi ðáñÜäåéäíá, ðá ðÜíôá öáßíåðáé íá ëåéöiõñäïýí öðóðéïëiäéêÜ.

#### 21.2.2.4 ÅðáëÞèåðóç ÄåäñÍYíùí

¼ðùò áíáöÝñáíå ðñïçäiöiÝíùò, òi ZFS ÷ñçóëiõíéåß checksums (åeñiðóíåðá åëÝä÷iö) ãéá íá åðáëçëåýóåé ôçí áéññáéüöçôá ðùí áðièçéåðiÝíùí. Óá áeñiðóíåðá åëÝä÷iö áiññäiðiéiyíóåé áððiñáðóá éáðÜ ôçí äçïéiõñäßá ðùí ððóðçìÜôùí áñ÷åßùí, êáé iðiññýí íá áðåññäiðièçëiýí iÝóù ôçò åðüñåíçò åíôïëÞ:

```
# zfs set checksum=off storage/home
```

Áððü ãái áßíáé ãáiééÜ êáëÞ eäÝá, êáëþò óá checksums êáðåæáíåÜññí åëÜ÷éóöi áðièçéåðóéëü ÷þñí, êáé áßíáé ðiëy ðeí ÷ñÞóëií íá ðá Ý÷iöiå áiññäiðièçíÝíá. Åðßóçò ãái áßíåðáé íá ðñièäëiyí õÜðiéá óçiaíðéëþ êáëðóðÝñçóç þ áðéåÜññíóç. Íå ðá checksums áiññäiðièçíÝíá, iðiññýí íá æçôÞóïðiå áðü òi ZFS íá åëÝäíåé ôçí áéññáéüöçôá ðùí ãáiññÝíùí ÷ñçóëiõíéþíðóá ðá ãéá åðáëÞèåðóç. Ç áéññéåðßá áððP áßíáé áiññóðP ùð “scrubbing.” Æá íá åëÝäíåðá ôçí áéññáéüöçôá áiññÝíùí ðiõ pool storage, ÷ñçóëiõíéþóðå ôçí ðáññaeÜôù áíôïëÞ:

```
# zpool scrub storage
```

Ç áéññéåðßá áððP iðiññåß íá ðÜññåé áññéåðP þñá, áíÜëtäá íå ôçí ðiññüðçôá ðùí áðièçéåðiÝíùí áiññÝíùí. Åðßóçò ÷ñçóëiõíéåß ðÜññá ðiëy òi äßóëi (I/O), ðùññíþóðå óá êÜëå áiññÝíç óðéåíþ iðiññåß íá áéññéåðßôáé iññí iéá ôÝôïëá áéññéåðßá. ÍåðÜ ôçí iðiññéþññóç ðiõ scrub, èá áíáññùèåß êáé ç áíáññÜ êáðÜðóðåçò, ôçí iðiññåðßôá íá ááßôå æçôÞíðóå ôçí íå ôçí ðáññaeÜôù áíôïëÞ:

```
# zpool status storage
pool: storage
state: ONLINE
scrub: scrub completed with 0 errors on Sat Aug 30 19:57:37 2008
config:
```

| NAME    | STATE  | READ | WRITE | CKSUM |
|---------|--------|------|-------|-------|
| storage | ONLINE | 0    | 0     | 0     |
| raidz1  | ONLINE | 0    | 0     | 0     |
| da0     | ONLINE | 0    | 0     | 0     |
| da1     | ONLINE | 0    | 0     | 0     |
| da2     | ONLINE | 0    | 0     | 0     |

errors: No known data errors

Óöi ðáñÜäåéäíá íáð åíðáíßæåðáé êáé ç ÷ññééÞ óðéåíþ ðiõ iðiññéçñþèçéå ç áíôïëÞ scrub. Ç äðíáðüðçôá áððP íáð åíáðöáéßæåé áéññáéüöçôá áiññÝíùí óá ðáññÜëi áÜëiò ÷ññíið.

ÓðÜñ÷iöi ðiëeÝò áéññá åðéëiäÝò ãéá ðiõ óýóðçíá áñ÷åßùí Æ. Äåßôå ôéò óåëßäåò manual zfs(8) êáé zpool(8).

# ÊåöÜëáéï 22 ï Äéá÷åéñéóôþò Ôüìùí Vinum

*Áñ÷éêP óoíåéóöiñÜ õiõ Greg Lehey.*

## 22.1 Óýíiøç

ÍóéäÞðiôå äßóêïò êáé áí Ý÷åôå, ðÜíôå oðÜñ÷iõí ðéèáíÜ ðñiâëÞiáôå:

- Íðiñáß íá áßíáé ðíëý íéëñiß.
  - Íðiñáß íá áßíáé ðíëý áññiß.
  - Íðiñáß íá lcí áßíáé áñéåôÜ áéëüðéóôïé.

Ôi êåöÜëäéí áôôü ðänÝ ÷ åé íéá åðéöéüðçóç ôùí ðééálpí ðñïäéçí Üôùí ôùí ðáñääöéáéþí óôôôçí Üôùí áðièþêåööçò, êáé íéá åéóåäùþþ óóî Äéá÷ åéñéööþþ Ôüùí Vinum.

**ÖćiäBañóç:** Îåêéíþíôåò åðü ôî FreeBSD 5 êáé iåðÜ, ôî Vinum iáíáññÜööçéå þóôå íá áíðùlåáðùèåß ôôçí áñ ÷ éôåâôðíééþ GEOM (ÉåðÜéåéí 20), äéáðçñþíôå ùòôðüöí ôîéò áñ ÷ ééÝò éäÝåò, iññëiñåßá, êáé ôç iññöþ ôúí iåðåå-äääïíÝíùí (metadata) ðïõ åðïèçéåýíðóåé ôóïï åßööéï. Ç iÝá åðôþ åéäï-þ iññÜæåðåé gvinum (åðü ôî GEOM vinum). Ôî åéüëïöëï èåññìåñíí áíåðÝñåðåé ôóïþèùò ôóï Vinum ùò åðçñçíÝíç Yíññíéå, Üó-åðåðå iå ôîéò åéåðôðíÝñåðéåðò ôçò öëïðïßçóçò. ¼ëåò ié åíðïëÝò éå ðñÝðåé ôþñá íá éåëïýíðåé iå ôç ÷ ñþöç ôçò gvinum, ôî Üñèñùìå ðññþíá (kernel module) Y÷åé låðiññíåðåðåß ôå geom\_vinum.ko åðü vinum.ko, êáé üéå óå áñ-åßá ôóôéåðþí åññþðéïðåé ôóïï åéåðÜéïä /dev/gvinum áíðþ åéá /dev/vinum. Åðü ôî FreeBSD 6 êáé iåðÜ, ç ðåééÜ öëïðïßçóç ôîõ Vinum ååí ðññééåàåñÜåðåé ôëYíí ôóî ååðééêü oyôôçíå.

## 22.2 Íé Äßóëié Åßíáé Đíëý ìéêñïß

Í íé ábþóeié ábñíðóáé iériÝíá éáé iáðáæýðóánníé, aééÜ iá örrí ßáeíi nöðeíiú áoñ Üññíðóáé áðþóçò éáé ié áðáeóðþóáéó iáð óá áðiieçéâðóðééü þþnñ. DirëeÝð oinÝð eá aðnáðeáðþóá óá èÝóç íá ÷ññæðÜæðóðá Ýíá óýðóðçíá áñ ÷ðbúi láðáæýðóánní áððu öiðð ãðþóeiðð ðið Ý ÷ðóá aéae Ýðeñiðð. Óþaïññá ðið ðññuáæçíá áððu ãáí áßíáé ðuði Ýiðiññ üðð ðññéí aÝéá ÷ññíéá, aééÜ aíáæteiðeáð Íá ððÜñ ÷ð. LáññééÜ óððóðÞiaðá áððéýiði áððu ðið ðññuáæçíá, áciéiññáþiðð iéá áééññééðþ óððóðáðþ ðið aðiieçéâðýðé ðá aððáññ Ýíá óá Ýíá aññéèü aééññéðþí áðþóðéü.

## 22.3 Éáèõóôåñþóåéò Ðñüóâáóçò

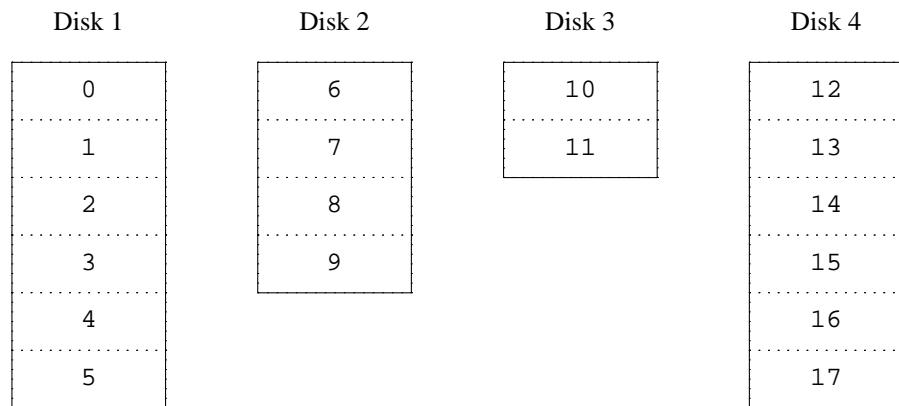
Óóá iíñ Óóá óóóðPíáóá, ððÜñ ÷ áé óó ÷ iÜ áí Üäéç ðññúðááñçò äääñïí Yííù áðü ðíëéé Yò äéåññáóßò ðáðóóü ÷ ñííá. Áéá ðání Üäáéæíá, iää Üëéé áîððçñåôçò Yò FTP P HTTP ìòññåß íá Y ÷ iðí áí Ü ðÜóá óóéæíP ÷ éééÜäåò ðáðóóü ÷ ñííåò áíñùðåññé Yò óðíá Yóáéò êáé íá áééé Yóíòí ðíëéáðé Yò äéåðáö Yò 100 Mbit/s ié iðíßò ïåðåññíÜíá êáðÜ ðíëý óéó aoíáðóóúçòò åläðåóïñUò åääñí Yííù ôúí ðåñéóðóóðåññúí óéëçñíþí åßóéùí.

Óá ôñ Ý ÷ iiôá iiiôÝéá óéëçñþí äßöéùí iðmíý íá iåôáöÝñiõí äåäñÍýá óåéñéäöÜ iå ôá ÷ yôçôá iÝ ÷ ñe éäé 70 MB/s, äéëÜ ç ôéïP áôôP Ý ÷ áé iéêñP õçìáößá óá Ýíá ðåñéäÜeëí iðiõ ðiëëÝò áiâiÜñôçôåö äéåññääößåö ÷ ñååéÜæiïööé ðñüöååöç ööiiß Bæët äßöëi. Óá òYöiëåö ðåñéöößåöéö, êÜeå äéåññääößá iðmíñß íá åôéöý ÷ áé iüñí Ýíá iéññü ðiðiöööû ôçò iÝäéööçö áôôPö ãðüñäöçö. Äßíáé ðei åiäéäöÝñiõí íá äiÿíå ôi ðñüüäçìá åðü ôçí ðéåññÜ ðiö ðiðiöööPiaöiö äßöéùí: i õçìáööéëüö ðañÜäiñööå ößíáé i öüññöö ñööi iðibí ðiðiñÜeëäööé ôi ðiðiöööôçìá éåöÜ ôç äeÜñêåäö iéáö iåôåöiñÜö. Iå Üeëä eüäéá, i ÷ ñüñiö ðiö ðåññí Ýñiõí åðáö ÷ iëçí Ýñié ié äßöéie åiâéößåö ôçö iåôåöiñÜö.

Óá ÊÜeå iåôåoïñÜ ääâäñ Ýíuí, i äßöéïò èá ðñÝðåé ðñþóá íá ôiïðiæåðþóåé ôéò eåööäéÝò óóîr óùòóú óçìåßí, íá ðåññéiÝíåé íá ðåññÜóåé i ðñþpòiò oïñÝáò êÜòù áðü ôçí eåööäéÞ áíÜäiúñóçò, êáé Ýðåéóá íá åêðåéëÝóåé ôç iåðåoïñÜ. Íé åíÝññååéåò áðóÝò iðññíýíá fá èåùñcëéýí áôññééÝò; åáí Ý ÷ áé íüçíá íá ðññiðåðéÞòiòíá íá ôéò aééùñþòiòå.

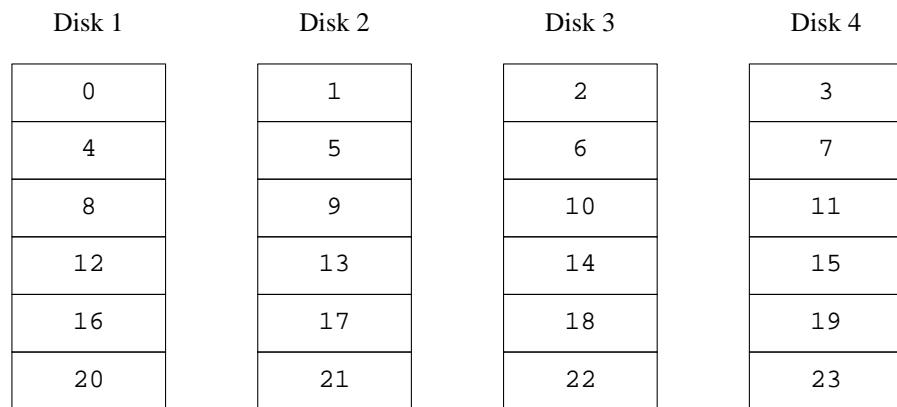
Ç ðñháâláðóééþ áyíçós ôçò áéáâðáâùñþðô áßíáé ööðóééü ëéññùðâñç áðú õi ðéþeìò ôùí áßðéùñ ðið ÷ ñçóëiiðiðíýíóáé: áí êáé êÙëà áßðóéò áßíáé ééáñüò íá ìâðáø Ýññáé áâðñ Ýíá ðán Ûëëçéá íå ôiðò Úëëiðò, áâí ððÜñ ÷ áé ôññùðiò íá áâðáñðáæðþðiòñ áûðé ié áéðþðâðéò íåðáøññÜðô éâðáíÝññóáé ñññññññðá óá üëiðò ðiðò áßðéiðò. Áßíáé áíáððüðâðéò ûðé õi õiññòßí óá Ýíá áßðóéë èá áßíáé íåðâðñ ýóðññ áðú õi õiññòßí óá êÜðiðí Ûëëi.

### Ó÷Piá 22-1. ÍñäÜíùóç ÖõíÝíùóçò



Íáð áíáëëáéôéêüò ôñüðiò áðièPéâôóçò, áßíáé íá ÷ùñéóôåß ç ðâñéi÷P äéâôèýíóåú óå ìéñüôåñá òìPiáôá Bóïò  
 ïåäÝeïò ñá iðiñá íá áðièçêåýíîôáé óåéñéáé Ü óå äéâôïñåôééÝò óôôéåôÝò. Äéá ðáñÜäåéäíá, ié ðñþöié 256 ôñåßò  
 iðiñåß íá áßíáé áðièçêåôíÝíé óôïí ðñþöi äßóéi, ié áðüìåñíé 256 óôïí áðüìåñí äßóéi, e.i.e. ïåôÜ ôçí ÷ñþöç éáé ôiõ  
 óåéâôôåßiø äßóéiò, ç äéâæéåóßá áðáíáæåíâÜíâôåé iÝ÷ñé íá ãaiñþöi ùeïé ié äßóéié. ÁðôP ç iÝeïræiò iññÜæåôåé  
 striping P RAID-0.<sup>1</sup> Õi striping áðåéôåß êÜðùò ðåñéóôüôåñç ðñüôðÜeåéá ãéá õíí áiôïðéóïü ñáí ãåäñíÝíùí éáé iðiñåß  
 íá ðñiêåëÝóåé iåååëýôåñí ñiñôßi I/O üôåí íéá iåôåöiñÜ êåôåíÝíåôåé óå ðiæéåðeïyò äßóéiò, aëëÜ áðü ôçí Üeëç  
 áðéôôå÷Üíåé iåååëýôåñí óôåéåñü ñiñôßi óå êÜèå äßóéi. Õi Ó÷Piá 22-2 áåß÷íáé ôç óåéñÜ iå ôçí iðiñá  
 ÷ñçóëiiðiéíýíôåé ié iññÜäåò áðièPéâôóçò óå ìéá iññÜíùóç ôýðiò stripe.

### Ó÷Piá 22-2. Striped Organization



## 22.4 Áêåñáéüôçôá ÄåäííÝíùí

Öi ôåëåðôðáßi ðñüâëçia ià ôçí ôñÝ ÷ iðoá ôå ÷ iieïäßá åßóêùí, åßíáé ç áíáíéiðéôðá ðiðo. Áí êáé ôá ôåëåðôðáßá ÷ ñüíéá ç áíéiðéôðáßá ôúí åßóêùí Ý ÷ åé åðïçèåß öçìáíðéêÜ, åíâéiðeïíý íá åßíáé ði åíÜñðçia ià ôí iàññéýðâññi ñððèiü åðïðô ÷ ßáð ôðiðo åñððçññâðçö Ýð. ¼ðáí åðïðô ÷ åé Ýíð åßóêið, ôá åðïðâæ Ýðiáðá ðiðññâß íá åßíáé éåðåðññöéêÜ; ç áíðééåð Üðôðáðç åñüð ÷ åéáóí Ýñð åßóêið êáé ç áíðéññåðP ôúí ååññíÝíùí ôði íÝí iðiññâß íá åéññéÝðåé íÝññâð.

I ðaðñáäiøéâéüð ôññüðið åíðéåðôþðéçöc åðôïý ôið ðññäëÞiaðið åßíáé ôí *mirroring* (éæññðôðéóíüð), ç äéáôPñçöc äçëäåP åýí áíðéæñÜðñí ôúí ååññíÝíùí ôá åéáöiññâðééiyð åßóêiðo. Ià ôçí åðôåýññâðc ôúí aëÜðiññí åðéðÝäúí RAID, ç ôå ÷ íéêP åðôP Ýæíá åðßðçö åññôðP ià ôçí iñññâðá RAID åðéðÝäið 1 P åðëþò RAID-1. ËÜeå ååññåðP ôóíí ôúii åßíáðåé êáé ôðiðo åýí åßóêiðo. Ç áíÜñññóç iðiññâß íá åßíáé åðü iðiññâðið åßóêi, Ýðóé áí Ýíð åðü ôiðo åýí åðïðô ÷ åé, ôá ååññíÝíá åíâéiðeïíý íá åßíáé äéáæ Ýðéíá ôóíí Üëëi.

Öi *mirroring* Ý ÷ åé åýí ðññäëÞiaðá:

- Öi êüðôið. Áðáéðâß åéðéÜðéí êüðôið åðü iðiññâðið åéýôc ååí ðññóð Ýññâé åðôP ôç äééðiðññâðá.
- Öc iàßñðc åðüññâðçö. Ié ååññåðÝð ðññâé íá åßññiðåé êáé ôóíðo åýí åßóêiðo, éåðåáæþññiðå Ýðóé ôí åéðéÜðéí åýññið aþíçö ôá ð: Ýðc ià Ýíð ôúii ðið ååí ÷ ñçóéiðiðéâß *mirror*. Ç áíÜñññóç ååí ðññð Ýññâé åðü ôí ßáëí ðññüññâðçia. IÜëéðåá õåßíáðåé íá åßíáé åéá åñçñññüðâñç.

Iéá áíáééåðôéP åýôc åßíáé ôí *parity* (éóïðéíßá), ôí iðiñßi ðëiðiðéâßôáé ôóá åðßðâáá 2, 3, 4 êáé 5 ôið RAID. Åðü ôá åðßðâáá åðôÜ, ôí RAID-5 åßíáé ôí ðéí åíâéáðÝññí. I ðññüðið ðið ðëiðiðéâßôáé ôóí Vinum, åßíáé iéá ðáññééåðP ôçö iññÜññóç ååññíÝíùí ðið ÷ ñçóéiðiðéâßôáé ôóí *stripe*, ià ôç äéáöiññÜ üðé Ýíá iðeïé åðü êÜëå *stripe* ÷ ñçóéiðiðéâßôáé åéá íá åðiðéçéâýâé ôçí éóïðéíßá åññüð Üëëið iðeïé. Ôóí Vinum, iéá ôóððôið ÷ ßá RAID-5, åßíáé ðáññññéå ià iéá ôððôið ÷ ßá *stripe*, åðôüð åðü ôí ååññíð ðüðé ðëiðiðéâß RAID-5 êáðþò êÜëå *stripe* ôði åðññññ, êÜðé ðið åðáéðâðôáé åðü ôí RAID-5. Ié åññéññB ôðá iðeïé ååññíÝíùí áíáð Ýñññôáé ôóð ð: åðééêP åñßèiçöc ôiðo.

### Ó-Þia 22-3. RAID-5 Organization

| Disk 1 | Disk 2 | Disk 3 | Disk 4 |
|--------|--------|--------|--------|
| 0      | 1      | 2      | Parity |
| 3      | 4      | Parity | 5      |
| 6      | Parity | 7      | 8      |
| Parity | 9      | 10     | 11     |
| 12     | 13     | 14     | Parity |
| 15     | 16     | Parity | 17     |

Óå óýâëñéóç ià ôí *mirror*, ôí RAID-5 Ý ÷ åé ôí ðëaðííÝêðçia íá åðáéðâß öçìáíðéêÜ eéññðôðññ ÷ þññ åðiðéþêåðñçö. Ç ôá ÷ ýôçöá áíÜñññóç åßíáé ßáëá ià ôí *stripe*, áéëÜ c ååññåðP åßíáé öçìáíðéêÜ ðéí áññP, ðåññð ðið ôí 25% ôçö åðüññâðçö

êáð Ü ðóçí áí Üáñúñc. Áí Ýíáð äþóéïð ÷ aë Üóáé, ç óððóéïð ÷ ßá áâáéïðeðåß íá ëáéðòññåß óá áæáðòùíÝíç (degraded) êáð Üóðåóç: ç áí Üáñúñc áðü ðiðoð äþóéïðoð ðið eâéðòññäiyí êáññéêÜ óðiñ ÷ ßæâðåé áðññâëçíÜðéðóá, aëë Ü ç áí Üáñúñc äâäññÝññi ðið aññðóéïðáá ñðiñ ðññâëçíáðéêü äþóéï ðñÝðåé íá åðááññðíïññéðåß lñ áÜ õc óá áíððóðiíé ÷ á ïðëññéóðiññðå ðið aññðóéïðóáé óá üëiðoð ðiðoð Üéëiðoð äþóéïðoð.

## 22.5 Áíôéêåßìåíá ôïõ Vinum

Ἄεα διάίσθιατόπεδος δύνανάθειν δημιαρεῖτούδιν, οἵ Vinum δειδιέαβ λεά εάναντο-βά αίσθεαει Υνύ δάσσούδηνά δέδεθάει:



Í ír Ósánáé Üödù áisüödçödåò ðåññéäñ Üötiðí ðiiñ ðññüðí ià ñiñ iðiñbi áðòð Ü ñá ásíðééññiñá ñáñ Ý-ïðí ðçí éåéðiññáéññiñðçðá ðið áðåééññiñðçðá áðüñ ðiñ Vinum.

## 22.5.1 ÌÝãåèïò Ôüìïõ

## 22.5.2 ĐëäññÜæïõóá (Redundant) ÁđïèÞêåðóć ÄåäññÝíùí

Ôi Vinum õeïðíéåß ôi mirroring ðññioánôþíôåò ðíeeáðëÜ plex óå Ýía ôüii. ÊÜèå plex åþíáé ieá áiaðáñÜóóáóç ôúí äääñÝúí áiùò ôüiñò. íáò ôüiñò ðiññåß íá ððñéÝ-åé ìåðáý áiùò ééå iëôb plex.

Áí éáé Yíá plex áíóðëññíóùðåýáé óá ðëÞñç áäaïñ Yíá áüïò òüïïò, áßíáé ðééáüí ëÜðíéá íYñç ôçò áíáðánñ Üóðáöçò íá  
ëäßðiñí áðü ñi öððééü íYóí, áßóå áðåéäþ Y ÷ áé ó ÷ áäéáóðåß íà áðóò ñi òñüði (áí áäí Y ÷ áé íñéóðåß ððíäßóëìò áéá  
ëÜðíéá ðiÞiaðá ñið plex) P áðü ðññüäçíà (ùò áðiø Yéåðíà ôçò áðiøð ÷ ßáð èÜðíéiø áßðéiñ). ¼óí ñðÜñ ÷ áé  
óïððéÜ ÷ éðóóíí Yíá plex ðiø ìðññåß íá ðáñ Y ÷ áé óá áäaïñ Yíá áéá ôçí ðëÞñç ðåññéí ÷ P äéåðèýíóåùí ñið òüïïò, í ñüïïò áßíáé  
ðëÞññùð èäéññiðññæéñiò.

### 22.5.3 ÈÝìáôá Áðüäïóçò

Ôi Vinum ðëëïðiéåß ôüöi óõíÝùóç üöi êáé striping óå åðßðåäi plex:

- já *plex* óðíÝíùóçò (*concatenated*) ÷ ñçóéiiðiéåß ôçí ðåñéi ÷ P äéåðéýíóåúí êÜèå ððíäþóéiò iå ôç óåéñ Ü.
  - já *striped plex* añÜöåé óá äåäiiÝíå óá èüñþåò (stripes) ðiø éåðáíÝíiõåé óá êÜèå ððíäþóéi. ¼ëéí ié ððíäþóéié ðñÝðåé fá Ý ÷ iøi ôi ßæéi iÝåâéiò ééå ðñÝðåé fá ððÜñ ÷ iøi ôiðeÜ ÷ éóðií ayí ððíäþóéié, æéå fá fâ ÷ ùñþæiøí óá ó ðÝóç iå ôi *plex* óðíÝíùóçò.

#### 22.5.4 Åßäç ïñäÜíùóçò Plex

Ç Ýêäiöç ôiõ Vinum ðiõ ðáñÝ÷åôáé ia ôi FreeBSD 9.0 ðeëiðieåß äýí åßäç plex:



Í ÐBÍfáéáð 22-1 áðíð ÷ fáð ðáññééçðóééð Ü óá ðéáññáééðPIáðá ééáé iáññáééðPIáðá ééáé Úéáð áðíð ðóééð mñáÜñúðçò plex.

## Đĩáêáò 22-1. Åßäç ÌñäÜíùóçò Vinum Plex

| Óýðiò plex                  | ÅëÜ ÷ éóóï ðëþèïò<br>ððiäßóêùí | Äöíáôüôçôá<br>ðñiöèþêçò<br>ððiäßóêùí | íé ððiäßóêïé<br>ðñÝðåé íá åßíáé<br>ßäéïò iåâÝèïòò | Åöáñiïäþ                                                                                                    |
|-----------------------------|--------------------------------|--------------------------------------|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| ððiÝiùóçò<br>(concatenated) | 1                              | íáé                                  | ü ÷ é                                             | Áðièþêåðóç iåâÜëiò<br>üâëiò åâäñiÝiùí iå<br>ìÝâéóðç åðâëéîßá<br>óðií òñüði êáðáñiñÞò<br>êáé iÝðñéá áðüäiðç. |
| striped                     | 2                              | ü ÷ é                                | íáé                                               | Öþçëþ áðüäiðç óå<br>óðfâðóåòiü iå ðiëý<br>êáéÝð óá ÷ ýóçðåð óå<br>êáðáóó Üóåéò<br>ðiëéáðéÞò<br>ðñüóåáóçò.   |

## 22.6 ÍåñééÜ Đáñáäåßäìáôá

Ôi Vinum áéáôçñåß íéá áÜóç äåäüíÝíúí íå óéò ñõèìßóåéò ôiö ç iðiøá ðåñéäñÜöåé óá áíôééåßìåíá óá iðiøá ãíùñßæåé Ýíá óðååéñéñéíÝíí óýóôçìá. Áñ ÷éÜ, i ÷ñPöödçò áçíéïõñåß áðöP òç áÜóç äåäüíÝíúí áðü Ýíá P ðåñéóóüôåñá áñ ÷åßá ñõèìßóåùí, íå ôçí áíPøéåéå ôiö ðñíäñÜñáöiò gvinum(8). Ôi vinum áðièçéåýåé Ýíá áíôßãñåöi ôçò áÜóçò äåäüíÝíúí óá èÜéå slice ôiö áßóéiò (ðiö òi Vinum áðièåéåß óðóéååðP) ðiö áñßóéåðåé ôðü ðiö Ýéåå ÷i ôiö. Ç áÜóç äåäüíÝíúí áíáíäpíååé óá êÜéå áéëäP êåô Üöååóçò, þóôå üëá óá áíôééåßìåíá ôiö Vinum íá áðáÍYñ ÷iñöåé óóç óùóôP êåô Üöååóç íåðÜ áðü íéá áðáíäééßíçóç.

### 22.6.1 Ôi Áñ ÷åßí Ñõèìßóåùí

Ôi áñ ÷åßí ñõèìßóåùí ðåñéäñÜöåé óá íåññíùíÝíá áíôééåßìåíá ôiö Vinum. Í iñéóíüö ãéá Ýíá áðëü ôüii ïðiñåß íá iñéÜæåé íå ðiö ðáñáêÜòù:

```
drive a device /dev/da3h
volume myvol
plex org concat
sd length 512m drive a
```

Áðöü ôi áñ ÷åßí ðåñéäñÜöåé óÝóóåñá áíôééåßìåíá ôiö Vinum:

- Ç ãñáííP *drive* ðåñéäñÜöåé íéá êåô Üöiçóç áßóéiò (*iäçäiý*) êåé ôç èÝóç ôçò óå ó÷Ýóç íå ði öðóééü áßóéi. Äßíåðåé óå áðöP ôi ñõìäiæéêü üññá *a*. Áðöüö i áéá ÷ùñéóíüö ôùí óõìäiæéêþí áðü ðáñáñåðééÜ iñüüáöá óðóéåðþí, íáð áðéññYðåé íá íåðåöÝññiòå áßóéiòö áðü íéá èÝóç óå íéá Üëëç ÷ùññò íá ðññééçéåß óýä ÷ðóç.
- Ç ãñáííP *volume* ðåñéäñÜöåé Ýíá ôüii. Ôi íüüí áðáéöiýíåñí ÷áñáéöçñéóðééü åäþ áßíåé ôi üññá, óóçí ðåñßðöùñóç íáð *myvol*.
- Ç ãñáííP *plex* iñßæåé Ýíá *plex*. Ç íüüç áðáñåßöçò ðáññÜñåñiò åßíåé ôi áßäiò ôçò iññÜñúöçò, óðç óðååéñéñéíÝíç ðåñßðöùñóç ði *concat*. Äáí áßíåé áðáñåßöçò íá åièåß üññá: ôi óýóôçìá ðáññÜñåé áðöüñüüáöá Ýíá üññá ÷ñçóéñiéþíðå ði üññá ðiö ôüii ðiö ôüii ðéééçíç *.px*, üðiö òi *x* áßíåé i áñéèíüö ðiö *plex* óöii ôüii. ðóé, áðöü òi *plex* èá áééåßöåé *myvol.p0*.
- Ç ãñáííP *sd* ðåñéäñÜöåé Ýíá ðññäßöéi. Íé áéÜ ÷éóôåò áðáéöiýíåñåò ðññäéåññåöÝð áßíåé ôi üññá åíñò áßóéiò óöii ðiðiøí èá áðièçéåðåß, éåé ôi ïPéiò ðiö ðññäßöéiò. ¼ðòò ôðiååßíåé êåé íå óá *plex*, äáí áðáéóåßöåé üññá: ôi óýóôçìá áðièßååé iñüüáöá áðöüñüüáöá, ÷ñçóéñiéþíðå ðiö ôi *plex* êåé ðññöéÝðiñðå ðiö *myvol.p0.s0*.

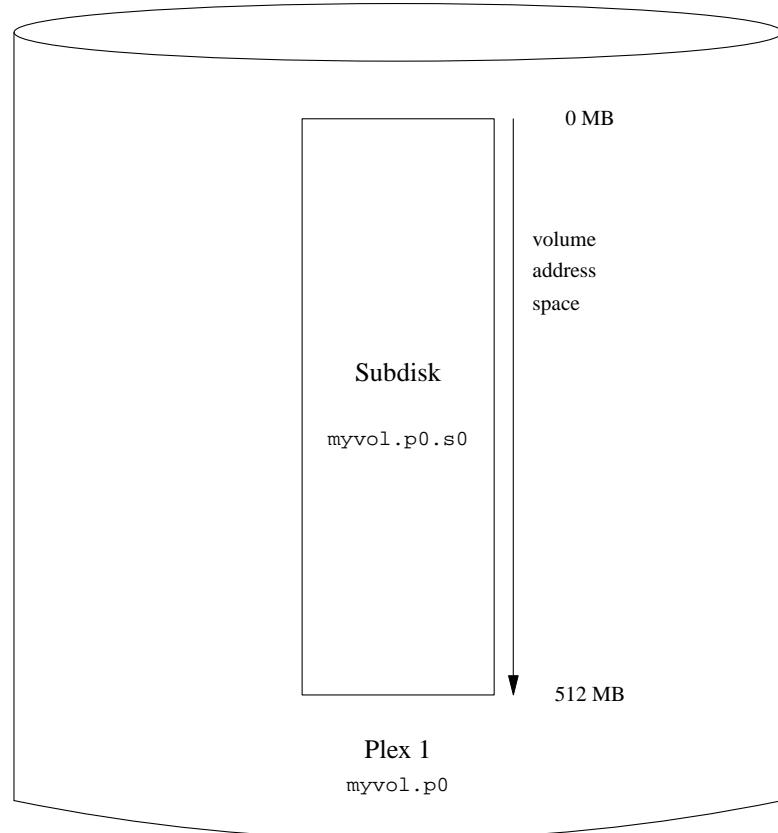
ÍåðÜ ôçí áðååññååßå áðöiý ôiö áñ ÷åßí, ôi gvinum(8) ðáññÜñåé ôçí áéüëiòç Ýííäi:

```
# gvinum -> create config1
Configuration summary
Drives:           1 (4 configured)
Volumes:          1 (4 configured)
Plexes:           1 (8 configured)
Subdisks:         1 (16 configured)

D a             State: up      Device /dev/da3h        Avail: 2061/2573 MB (80%)
V myvol          State: up      Plexes:   1 Size:      512 MB
P myvol.p0       State: up      Subdisks: 1 Size:      512 MB
S myvol.p0.s0    State: up      P0:        0 B Size:      512 MB
```

Ç ðáñáðÜù Yñiäiò ÷ ñçóëiiðíéåß ôç ïiñöP óõíîñâðiÝíçò ëßóôáð ôiõ gvinum(8). Ç ãñáöéêP áðâéêüíéóç öáßíâðáé óõí Ó÷Piá 22-4.

#### Ó÷Piá 22-4. Íáò Áðëüò Ôüüìò Vinum



Óõí ó÷Piá áðóü (éáèþò éáé óå áðóÜ ðiõ áéïëëiõíýí) ððÜñ ÷ áé ç áíáðáñÜ óðáóç áíúò ôüüiõ ðiõ ðâñéÝ ÷ áé óá plex, óá iðiðá ìá òç óåéñÜ ðiõ ðâñéÝ ÷ iõí ðiõ ððriðóéiõð. Óå áðóü ôi áðëiðóðâðiÝñ ðáñÜääéñá, i ôüüiõ ðâñéÝ ÷ áé Yíá plex éáé ôi plex ðâñéÝ ÷ áé Yíá ððriðóéi.

Í ôüüiõ áðóü ãái Ý ÷ áé êÜðiéi óðâæâñéiÝñ ðëäiíÝéôçíá óå ó ÷ Yíç ìá ìéá óðiðâðéêP éáôÜðiçóç áßóéiõ. ÐâñéÝ ÷ áé Yíá ðiõ plex, Üñá ãái Ý ÷ áé êÜðiéá ééáíüðôçá áíi ÷ Pò óðiðéiÜðiù. Ôi plex ðâñéÝ ÷ áé áðßóçò Yíá ððriðóéi, éáé Yíóé ãái ððÜñ ÷ áé áéáöiñÜ óðçí éáðáññP ÷ þñiõ óå ó ÷ Yíç ìá ìéá óðiðâðéêP éáôÜðiçóç. Óðéò áðüìâðiò áíüôçôåò èá áâßñiõiá áéáöiñâðéêÝò éáé ðei áíäéäóÝñiðóåò ìåèüäiõ ñýèìéóçò.

#### 22.6.2 ÁðíçíYíç ÁíéïðéóôBá: Mirroring

Ç áíéïðéóôBá áíúò ôüüiõ iðiñâß íá áðíçèåß iÝóù ðiõ mirroring (éáèñâððéoíý). ¼ðáí ó÷âæÜæâðá Yíá ôüüiõ óðiñi ðiðiñi èá áßíâé mirroring, áßíâé óçíáíôéêü íá áíáóðéëßóåò üðé ie ððriðóéié óå êÜëå plex áßíâé óå áéáöiñâðéêýò iäçäiýò,

þóðå ç áðiðo÷ßá áíüð äßóêið íá ìçí ðñiêáæÝóáé ðáýóç ëåéöiõñâßáð êáé óðá äyí plex. Ói ðáñáêÜôù ðáñÜääéâiá äåß÷íæ ðùð ïðiñâß íá äßíæ mirroring áíüð ôüüið:

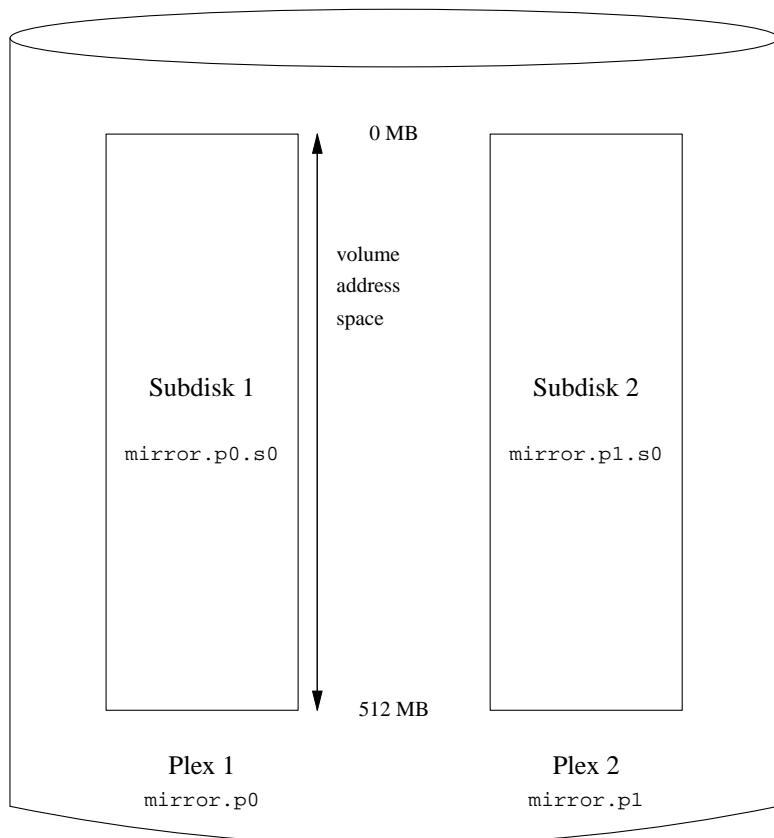
```
drive b device /dev/da4h
volume mirror
plex org concat
sd length 512m drive a
plex org concat
sd length 512m drive b
```

Ói ðáñÜääéâiá áðóðü, äåí Þóáí áðáñáßöçði íá êáèiñéóðâß iáíÜ i ñäçäüð a, êáèþò oï Vinum äéáæÝóáé Þäç ðéð áíðßóðié÷åð êáðâð ùñßóðåéð óðç ãÜóç äåäñíÝñú íå ðéð ñðeìßóåéð oïð. ÍåðÜ ðçí áðâiññâðâð ðáñáðÜñ iñéóìþí, ç ñýëiéóç iñéÜæåé íå ðçí ðáñáêÜôù:

|                   |                       |                  |                           |  |
|-------------------|-----------------------|------------------|---------------------------|--|
| Drives:           | 2 (4 configured)      |                  |                           |  |
| Volumes:          | 2 (4 configured)      |                  |                           |  |
| Plexes:           | 3 (8 configured)      |                  |                           |  |
| Subdisks:         | 3 (16 configured)     |                  |                           |  |
| <br>D a           | State: up             | Device /dev/da3h | Avail: 1549/2573 MB (60%) |  |
| D b               | State: up             | Device /dev/da4h | Avail: 2061/2573 MB (80%) |  |
| <br>V myvol       | State: up             | Plexes: 1        | Size: 512 MB              |  |
| V mirror          | State: up             | Plexes: 2        | Size: 512 MB              |  |
| <br>P myvol.p0    | C State: up           | Subdisks: 1      | Size: 512 MB              |  |
| P mirror.p0       | C State: up           | Subdisks: 1      | Size: 512 MB              |  |
| P mirror.p1       | C State: initializing | Subdisks: 1      | Size: 512 MB              |  |
| <br>S myvol.p0.s0 | State: up             | PO: 0            | B Size: 512 MB            |  |
| S mirror.p0.s0    | State: up             | PO: 0            | B Size: 512 MB            |  |
| S mirror.p1.s0    | State: empty          | PO: 0            | B Size: 512 MB            |  |

Ói Ó÷Þìá 22-5 áíáðáñéóðÜ áðóðP ðç äñiÞ ãñáöéêÜ.

## Ó÷Piá 22-5. Íáò Mirrored Ôüüìò Vinum



Óóí ðáñÜääéäíá áðóöü, êÜëå plex ðåñéÝ ÷åé óçí ðëPñç ðåñééí÷P äéåðèýíóåñí, íååÝëiõò 512 MB.  $\frac{1}{4}$ ðùò êáé óóí ðñïçäíýíåñí ðáñÜääéäíá, êÜëå plex ðåñéÝ ÷åé Ýíá iííáäééü ððiäßóéí.

### 22.6.3 Ååéöéóóïðíéþíóáò ôçí Áðüäíóç

I mirrored ôüüìò óíò ðñïçäíýíåñí ðáñáååßäíáòíò ðáññíðóéÜæåé íåååéýôåñç áíí ÷P óöáéíÜðùí óå ó ÷Yóç íå Ýíá ôüüí ðíò ááí ÷ñçóéíïðíéåß mirror, áéëÜ ç áðüäíóç óíò áßíåé íéêñüôåñç: êÜëå áååññäöP óóíí ôüüí ðñÝðåé íå áßíåôåé êáé óóíò ãýí áßóéíòò, ÷ñçóéíïðíéþíóáò Ýðóé íåååéýôåñí ðíóíóòü ðíò áéáéÝðéíòò áýñíòò æþíçò. Íé áðáéôPóåéò ðíò áåå ÷íÝñùò Ý ÷iòíå áéá áðüäíóç, áðáéöíýí áéáöíñåôééëP ðñíóÝãåéóç: áíòß íå ÷ñçóéíïðíéþóíòíå mirror, iðiñíýíå íå áçíéíññäþóíòíå èùñßäåò áðíëþéåðóçò (stripes) óå üóí óí áðíáðúí ðåñéóóüôåñíòò áßóéíòò. Ç ðáñáêÜðù ñýéíéóç áåß ÷íáé Ýíá ôüüí óóíí iðiñíí ðíò plex Ý ÷åé áßíåé stripe óå ðÝóóåñéò áßóéíòò:

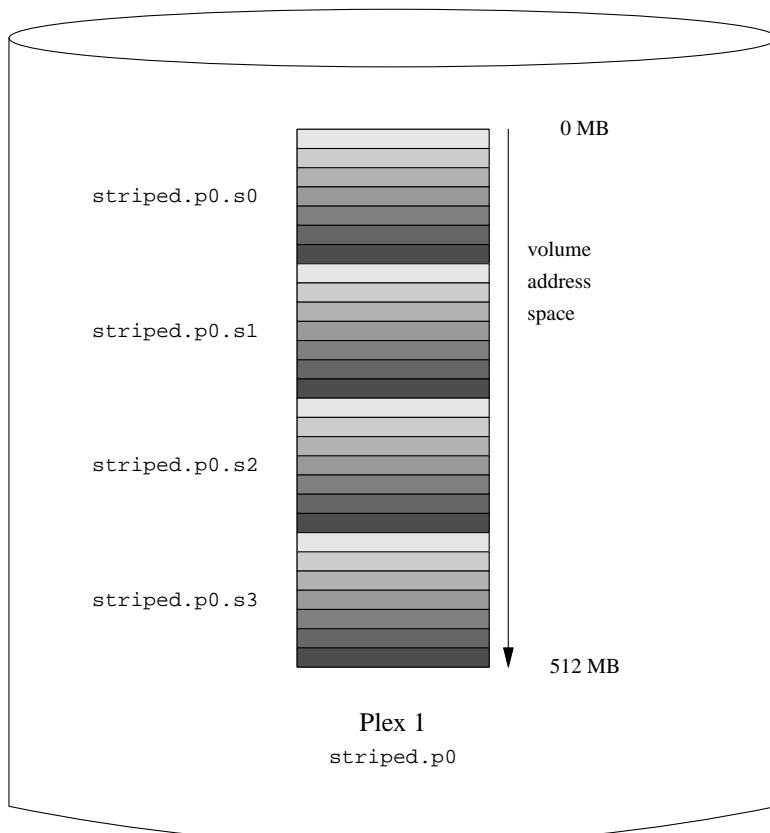
```
drive c device /dev/da5h
drive d device /dev/da6h
volume stripe
plex org striped 512k
```

```
sd length 128m drive a
sd length 128m drive b
sd length 128m drive c
sd length 128m drive d
```

¼ðùð êáé ðñïçäiðìÝíùð, äåí ÷ñåéÜæåôáé íá ïñßóïðiå íáíÜ ôiõð äßóéïðò ðiõ åßíáé Þäç åíùóôïß óóï Vinum. ÍåôÜ ôçí åðåíåñääóßá ôiõ ðáñáðÜíü ïñéóiiý, ç ñýèléóç éá iiéÜæåé íå ôçí ðáñáéÜôù:

|                   |                       |                  |                           |  |
|-------------------|-----------------------|------------------|---------------------------|--|
| Drives:           | 4 (4 configured)      |                  |                           |  |
| Volumes:          | 3 (4 configured)      |                  |                           |  |
| Plexes:           | 4 (8 configured)      |                  |                           |  |
| Subdisks:         | 7 (16 configured)     |                  |                           |  |
| <br>D a           | State: up             | Device /dev/da3h | Avail: 1421/2573 MB (55%) |  |
| D b               | State: up             | Device /dev/da4h | Avail: 1933/2573 MB (75%) |  |
| D c               | State: up             | Device /dev/da5h | Avail: 2445/2573 MB (95%) |  |
| D d               | State: up             | Device /dev/da6h | Avail: 2445/2573 MB (95%) |  |
| <br>V myvol       | State: up             | Plexes: 1        | Size: 512 MB              |  |
| V mirror          | State: up             | Plexes: 2        | Size: 512 MB              |  |
| V striped         | State: up             | Plexes: 1        | Size: 512 MB              |  |
| <br>P myvol.p0    | C State: up           | Subdisks: 1      | Size: 512 MB              |  |
| P mirror.p0       | C State: up           | Subdisks: 1      | Size: 512 MB              |  |
| P mirror.p1       | C State: initializing | Subdisks: 1      | Size: 512 MB              |  |
| P striped.p1      | State: up             | Subdisks: 1      | Size: 512 MB              |  |
| <br>S myvol.p0.s0 | State: up             | PO: 0            | B Size: 512 MB            |  |
| S mirror.p0.s0    | State: up             | PO: 0            | B Size: 512 MB            |  |
| S mirror.p1.s0    | State: empty          | PO: 0            | B Size: 512 MB            |  |
| S striped.p0.s0   | State: up             | PO: 0            | B Size: 128 MB            |  |
| S striped.p0.s1   | State: up             | PO: 512 kB       | Size: 128 MB              |  |
| S striped.p0.s2   | State: up             | PO: 1024 kB      | Size: 128 MB              |  |
| S striped.p0.s3   | State: up             | PO: 1536 kB      | Size: 128 MB              |  |

## Ó÷Piá 22-6. Íáò Striped Ôüüùí Vinum



Áõôüò i ôüüùí áíáðáñßóôááé ãñáöéêÜ óöi Ó÷Piá 22-6. Ç áðü÷ñùóç ôçò ëùñßääåò áíðéðñïóùðåýåé ôç èÝóç ôçò ìÝóá ôóçí ðâñéi÷P äéâðéýíóåúí ôïö plex: ié áñíé÷ôü÷ñùìåò ëùñßääåò åßíáé ié ðñþôåò, ié óéïöñü÷ñùìåò åßíáé ié ñâæåôôåßåò.

### 22.6.4 Áíéïðéóôßá êáé Áðüäïóç

Ìå òi êáôÜëéçei õëéêü, åßíáé äöñáôüí íá äçíéïñäçëïý ôüüìé ié iðiþíé íá ðáñïðéÜæïöí ôüöi íåãÜëç áñi÷P óå óöÜëíáôá, üöi êáé áñïçìÝíç áðüäïóç óá ó÷Ýóç íå ôéò ôððiðiéçìÝíåò êáðáôiÞóåéò ôiõ UNIX. Íá ôððéêü áñ÷åßí ñðèìßóåùí èá ïieÜæåé íå òi ðáñáêÜôù:

```

volume raid10
plex org striped 512k
sd length 102480k drive a
sd length 102480k drive b
sd length 102480k drive c
sd length 102480k drive d

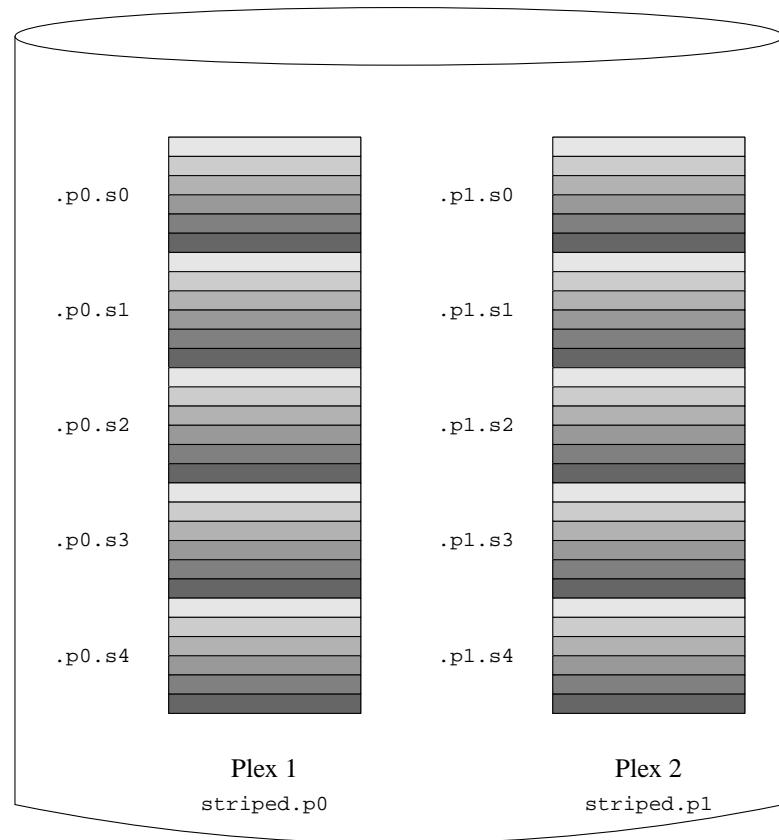
```

```
sd length 102480k drive e
plex org striped 512k
    sd length 102480k drive c
    sd length 102480k drive d
    sd length 102480k drive e
    sd length 102480k drive a
    sd length 102480k drive b
```

Íé õðíäßóéié òiõ ääýôåñiõ plex Ý÷iõí iåôáôåèåß êáôÜ äýí iäçäiýó óå ó÷. Ýóç lå áðôïýó òiõ ðñþöiõ plex: áðôü áâáööåëßæåé üöé ie åâãñáöÝò äái äßíiöáé óöiõò ßäéïòò õðíäßóéïòò, áéüìá êáé áí iéá iåôáöiñÜ ÷ñçóéiiðíéåß êáé òiõò äýí äßóéïò.

Öi Ö÷Piá 22-7 áíáðáñéóÜ ãñáöéêÜ ôç äñiP áðôïý òiõ ôülliõ.

### Ö÷Piá 22-7. íáò Mirrored êáé Striped Ôüüìò òiõ Vinum



## 22.7 Íñáóßá ÁíóéêåéíÝíùí

¼ðùò ðåñéãñÜøâiå ðáñáðÜíù, oï Vinum áðiäßääé ðñiäðéëåäíÝíá iñüüàôá óå plex êáé ðiäßóëiòò, áí êáé ððÜñ ÷åé ç äðíáðüôðçôå íá ôá ðáñáêÜìøâòå. Áðòò ùòðùòí åái óðiðóðåðé: ç åìðåéñßá ðið Ý ÷iðiå áðü ði ãéá ÷åéñéóôP ôüüùí VERITAS (i iðiðiò åðéðñ Ýðæ åëÿèåñç áðüüðiç iñüÜðùí óðå áíóéëåñßiáá) Ý ÷åé åñßiåé üðé áðöiy ðið åßäiòò ç åðåééíßá åái ðñiðööÝñåé óçìáíðééÜ ðeåñíåéðòPriáðá, êáé iðiñåß íá ðñiéåéÝóåé óýä ÷oóç.

Óá iñüüàôá iðiñåß íá ðåñéÝ ÷iði iðiðiðò ìç-éåíü ÷åñáéðò ðiði, áëéÜ óðiðóðåðé íá ðåñéñéóôåßòå óóç ÷ñPóç åññáüÜðùí, åñéèíþí êáé ðçò êÜðù ðáýéáð. Óá iñüüàôá ôùí ôùíùí, ôúí plex êáé ôùí ðiäßóðùí iðiñåß íá åßíáé iÝ ÷ñé 64 ÷åñáéðò ðiði, åíþ ôá iñüüàôá ôùí åßöéùí iðiñåß íá åßíáé iÝ ÷ñé 32 ÷åñáéðò ðiði.

Óá áñ ÷åßá óðóéåðþí ðiði Vinum äçìéiñäiýíðáé óðií êáðÜëíäi /dev/gvinum. Íå ôéò ñðèìßóåéð ðiði öáßñíðóáé ðáñáðÜíù, oï Vinum èá äçìéiñäPóåé óá ðáñáêÜðù áñ ÷åßá óðóéåðþí:

- Êáôá ÷ñßóåéð óðóéåðþí åéá êÜëå ôùí. Áðò Ýð åßíáé êáé ié éyñéåð óðóéåðÝò ðið ÷ñçóéíiðiéåß ðiði Vinum. Íå ôéò ñðèìßóåéð ðiði åñßiáíå ðáñáðÜíù, èá Ý ÷iði åéð ðóðéåðÝò: /dev/gvinum/myvol, /dev/gvinum/mirror, /dev/gvinum/stripped, /dev/gvinum/raid5 êáé /dev/gvinum/raid10.
- ¼ëié ié ôùíié åéáéÝ ðiði åðåðéåßáð êáôá ÷ñßóåéð óðií êáðÜëíäi /dev/gvinum/.
- Íé êáðÜëíäi /dev/gvinum/plex êáé /dev/gvinum/sd, ðiði ðåñéÝ ÷iði ôá áñ ÷åßá óðóéåðþí åéá êÜëå plex êáé ðiäßóðéíí åíðßóðié ÷á.

Åéá ðáñÜäåéåíá, èåùñPóåå ðiði ðáñáêÜðù áñ ÷åßí ñðèìßóåùí:

```
drive drive1 device /dev/sd1h
drive drive2 device /dev/sd2h
drive drive3 device /dev/sd3h
drive drive4 device /dev/sd4h
volume s64 setupstate
    plex org striped 64k
        sd length 100m drive drive1
        sd length 100m drive drive2
        sd length 100m drive drive3
        sd length 100m drive drive4
```

ÍåôÜ óçí åðåññááßá áðöiy ðiði áñ ÷åßiò, oï gvinum(8) èá äçìéiñäPóåé óçí áéüëiðèç åñiP óðií êáðÜëíäi /dev/gvinum:

```
drwxr-xr-x  2 root  wheel      512 Apr 13 16:46 plex
crwxr-xr--  1 root  wheel     91,   2 Apr 13 16:46 s64
drwxr-xr-x  2 root  wheel      512 Apr 13 16:46 sd

/dev/vinum/plex:
total 0
crwxr-xr--  1 root  wheel     25, 0x10000002 Apr 13 16:46 s64.p0

/dev/vinum/sd:
total 0
crwxr-xr--  1 root  wheel     91, 0x20000002 Apr 13 16:46 s64.p0.s0
crwxr-xr--  1 root  wheel     91, 0x20100002 Apr 13 16:46 s64.p0.s1
crwxr-xr--  1 root  wheel     91, 0x20200002 Apr 13 16:46 s64.p0.s2
crwxr-xr--  1 root  wheel     91, 0x20300002 Apr 13 16:46 s64.p0.s3
```

Áí êáé oóibhóodááé íá içí äßñííóáé oóðáêâhñéí Ýíá iíüìlááðá óðá plex êáé ôiñò ððräbóéiñò, éá ðñ Ýðåé íá äièiyí iíüìlááðá óðiñò äßbóéiñò ôiñ Vinum. Iå ôiñ ôñüðí áðöü, i äßbóéiñ áíáñüñßæðóáé áðöüìlááðá áétiñá êáé áí äeëÜiáé èÝóç. Óá iíüìlááðá ôñü äßbóéù íðññáß íá Ý ÷ iñò íYáâéiò iÝ ÷ nè 32 ÷ áñáéôPññåò.

## 22.7.1 Äcìéïõñãßá ÓõóôçìÜôùí Áñ÷åßùí

Íé ôüñïíé äåß ðíöö üüñïíé íå ôíöö åßbóëöö üöri åöñïÜ ôí öýööçïá, íå ïéá åíäßñhåöç. Áíößéåðå íå ôíöö åßbóëöö ôíö UNIX, ôí Vinum ååí åçïéïöñååß éåöåòíÞøåéò ðööööö ðüñïöö, éåé Ýööé åöñööéÜæåé åðü åöñöÿö i áíößööíé ÷ iö ðßíáéåò éåöåòíÞøåùí. Åðööü åðåéöåß öçí ôññïðíïßçöç éÜðïéñü åïçèçööéþí ðññäññíÜûöñü éåé åéäéëüöåñá ôíö newfs(8), ôí iöñïßí öööéö ðññïçäÿìåñåö ðëïðëíÞøåéò ôíö ðññööåëïÿöá íå åñïçäÿöåé ôí ðåëäööðåíü ãñÜñä åíüö ðüñïöö Vinum ùò åíäññüññéööéü öçö êåö Üðöïçöç. Åéá ðåñïÜäåéäíá, Ýíåö éåññïéüö åßbóëöö ðëïñåß íå Ý ÷ åé ôí üññá /dev/ad0a P /dev/da2h. Ôá iiññåöå åööÜ åíööðññöùðåÿöö öçí ðñþöç êåö Üðïçöç (a) ööïí ðñþöi åßbóë IDE (ad) éåé öçí üññäïç êåö Üðïçöç (h) ööïí ðñþöi (2) SCSI åßbóë (da) åíößööíé ÷ á. Ôå åíößéåöç, Ýíåö ðüñïöö ôíö Vinum ðëïñåß íå ïññÜæåðåé /dev/qvignum(concat, ôí iöñïßí ååí Ý ÷ åé êåïéÜ ó÷ Ýöc íå üññá êåö Üðöïçöç.

Ãéá íá äciéjõñãÞóåôå Ýíá óvóôciá áñ÷åßùí óå áôôü ôií ôüüí. ÷ñcoéiiðjéÞóôå ôci newfs(8):

```
# newfs /dev/gv1num(concat)
```

## 22.8 Nýèiéóć ôïő Vinum

Ói Vinum áái óðÚñ ÷ áé óðíi ðoñPíá GENERIC. Áßíáé áðíáðúí íá áçìéíøñÞóåðå ðñiðáññiðí Ýñi ðoñPíá ðið íá ói ðáñéÝ ÷ áé, áéëÜ áái óðíBðóåðáé. Í óðíçéé Ýñi ðóñüðí íá íåééÞóåðå ói Vinum, áßíáé íá ói öiñðþóåðå ùò Üñèñùíá óðíi ðoñPíá (kld). Áái ÷ ñíáéÜæåðáé áái íá ÷ ñçóéíðíéÞóåðå óçí kldload(8) áéá ói Vinum: üðáí íåééÞóåðå ói gvinum(8), èá áßíáé Yéëåá ÷ iò áéá íá áéáðéóðùèåß áí ói Üñèñùíá áßíáé öiñðùí Ýñi, éáé áí áái áßíáé èá öiñðôðùèåß áðóðùíáðå.

## 22.8.1 Åêêßíçóç

```
volume myvol state up
volume bigraid state down
plex name myvol.p0 state up org concat vol myvol
plex name myvol.p1 state up org concat vol myvol
plex name myvol.p2 state init org striped 512b vol myvol
plex name bigraid.p0 state initializing org raid5 512b vol bigraid
sd name myvol.p0.s0 drive a plex myvol.p0 state up len 1048576b driveoffset 265b plexoffset 0b
sd name myvol.p0.s1 drive b plex myvol.p0 state up len 1048576b driveoffset 265b plexoffset 1048576b
sd name myvol.p1.s0 drive c plex myvol.p1 state up len 1048576b driveoffset 265b plexoffset 0b
sd name myvol.p1.s1 drive d plex myvol.p1 state up len 1048576b driveoffset 265b plexoffset 1048576b
sd name myvol.p2.s0 drive a plex myvol.p2 state init len 524288b driveoffset 1048841b plexoffset 0b
sd name myvol.p2.s1 drive b plex myvol.p2 state init len 524288b driveoffset 1048841b plexoffset 524288b
sd name myvol.p2.s2 drive c plex myvol.p2 state init len 524288b driveoffset 1048841b plexoffset 1048576b
sd name myvol.p2.s3 drive d plex myvol.p2 state init len 524288b driveoffset 1048841b plexoffset 1572864b
sd name bigraid.p0.s0 drive a plex bigraid.p0 state initializing len 4194304b driveoff set 1573129b plexoffset 0b
sd name bigraid.p0.s1 drive b plex bigraid.p0 state initializing len 4194304b driveoff set 1573129b plexoffset 4194304b
sd name bigraid.p0.s2 drive c plex bigraid.p0 state initializing len 4194304b driveoff set 1573129b plexoffset 8388608b
sd name bigraid.p0.s3 drive d plex bigraid.p0 state initializing len 4194304b driveoff set 1573129b plexoffset 12582916b
sd name bigraid.p0.s4 drive e plex bigraid.p0 state initializing len 4194304b driveoff set 1573129b plexoffset 1677216b
```

Ié ðññiöááíðþo áæáöiñÝ ðó áäþ, áßíáé ç ðáññiöðþá ñóðáéåðñëiñÝ ñúñ èÝ ñáñùñ êáé iññiñÜðùñ (êáé óá áýí áßíáé áðéññáððÜ, áëëÜ ááíééÜ ááí óðíßóðáðáé ç ÷ñÞóç ðiñðo) êáé ié ðëçññiñmßáðó êáðÜðóðáçð (ðiñðo ááí áßíáé áæáéÝ óðiñðó ñóði ÷ñÞóðóç). Óí Vinum ááí áðiñèçéåýáé ðëçññiñmßáðó ó ÷ñ áðóééÝ ðó íá ðiñðo áßðóéiñð oðóéð ñððéiñðáðó ðiñð: áðëþðo áíé ÷ñ íáýáé üëiñðo ðiñðo áßðóéiñðo áæá áéðáðóiÞoáðó ðiñð ðáññéÝ ÷ñ iñð áðóééÝ óá Vinum. Áððü áðéññÝ ðáé ñóði Vinum íá áíáññùñßóáé ðiñðo áßðóéiñðo ñúñðÜ, áéññá ñáé áí ðiñðo Y ÷ñ áé áíññáð ñáé ññðóééü UNIX áíáññùñéðóééü (ID).

### 22.8.1.1 Áõôüìáôç Åêêßíçóç

Óði *Gvinum* íâðéf Uâðe ðÜíðiðâða áððüìðâða iâðo Ü òcði öðñðòðóç ðiði áñðñþiâðið iò Ýóù ðiði loader.conf(5). Áðá íá ðiñðþðóðâða ðiði Úñðñðùðâða óði *Gvinum* éâðo Ü òcði áððbíðóç, ðññðòð Ýððâða òc ãñðið geom\_vinum\_load="YES" óðið áñððið /boot/loader.conf.

¼ðáôí ïâééñÜôå ðí Vinum iã ôçí áîñrëP gvinum start, ðí Vinum æáâåÜæåé ôç åÜóç ääññÍYñí ñðèlñBóåñí áðü Ýíáí äþóéï ðiõ aññBóåêåðåé õðü ðíñ Ýéâå ÷ i ðiõ. ÊÜôù áðü ðooééññéå Ýò ðooéñBéåò, êÜëå äþóéï ðåñéÝ ÷ áé Ýíá uññéí áíðBáññäöï ôçò åÜóçò, Ýóóé äåí Ý ÷ áé óçiañBá áðü ðiñéí äþóéï èá åßíåéç áíÜäññóç. Ùóðóñi, iåðÜ áðü êÜðiñi áðúññi ðåññiañðéñi éâéñññññåò, ðí Vinum èá ðñÝðåé íá éâéññBóåé ðiñéò åßñóéï Ý ÷ áé ðí ðñññðåñi áíðBáññäöï èáé íá äéååÜóåé áðü åâéñBóåé ðíñ ñðèlñBóåéò. IåðÜ èá æéññéñBóåé (áí ÷ ñññéÜæåñðåé) ôçò ñðèlñBóåéò êáé ôðññò ððññééñññò åßñóéïñò.

22.9 × ñþóć ôřo Vinum óři Ñéæéêü Óýóôčìá Áñ÷åßùí

Óá Ýíá iç: Úíciá óóí iðibíí Ý÷áé ábíáé ðeþñåò mirror óóá óooðíþíáóá áñ÷åbùí ià óç ÷ñþóç öiõ Vinum, ábíáé óoðíþeùò áðééöðlçóü íá ábíáé mirror êáé óóí ñææéü (root) óyóóçíá áñ÷åbùí. Ç ñyéìéóç áðôþ áái ábíáé öüöi áðëþ üöi óá Ýíá iðiðíäþðiòá óyóóçíá áñ÷åbùí, áðåéäþ:

- Ôi ñéæéêü óýóôçìá áñ ÷ åßùí ðñ Ýðåé íá åßíáé æäéè Ýóëï áðú ðïëý ðùñßò éåð Ü ôç æéäééåóßá åêéßíçóçò, Ýóé åßíáé áðåñáßöçöï íé ððïäñ Ýð ôiö Vinum íá åßíáé åðßöçò æäéè Ýóëïå ðçí ßæá óðéäíþ.
  - Í ôiñiö ðiö ðâññé Ý ÷ åé ôi ñéæéêü óýóôçìá áñ ÷ åßùí ðâññé Ý ÷ åé åðßöçò éåé ôiï ðþäééå åêéßíçóçò (bootstrap) éåé ôiï ððñßíä, í iðiñßiö èä ðñ Ýðåé íá åßíáé ðññïåð Üóëï iö áðú åâðéé Ü ðññäñ Üññåðá ôiö óððóðÞiaðiö (ð.÷. ôi BIOS óå ïc ÷ áiÞiaðá óvýðiö PC), óá iðiñßá äåí åùññßæiöí èåé äåí iðiñiý íá iñÜëiöi öéð eåðöñi Ýñåéåð ðëiñßçocó ðiö Vinum.

Óóéó áðüíàåò áíüôçôåò, í üññö “ñéæéëù öüññò” ÷ ñçóéiiðíéåßôáé áåíééÜ áéá íá ðáñéäñ Üøåé öíí öüíí öíí Vinum ðíø  
ðåñéÝ ÷ áé öí ñéæéëü óýóðçíá áñ ÷ áßñú. Åßíáé áåíééÜ ééåÞ eáÝá íá ÷ ñçóéiiðíéåßôáé öí üññá "root" áéá áðôü öíí  
öüññ, áééÜ áðôü áåí áðíöååß ôá ÷ íéÞ eáðåßôçóç. ¼éá óá ðáñáååßâíåóá áíöíéþí óóéó ðáñáê Üûö áíüôçôåò  
÷ ñçóéiiðíéíýí öçí ðáñáðÜñ ðáñáäí ÷ þ.

#### 22.9.1 Åêêßíçóç ôïö Vinum ÁñêåôÜ íùñßò ãéá ôï Ñéæéêü Óýóôçìá Áñ:åßùí

Áõõü ìõjiiñåß íá åðéôåõ÷èåß ìå äeÜöjiñiõò ôñüðjõò:

- Ôi Vinum ðñÝðåé íá åßíáé æéæéÝóeii óoi ðoñPíá êåóÜ ôçí åêêßíçóç. Åéá ði eüäi áôöü, ç iÝèëäiò áôöüüäôçò åêêßíçóçò ðiø ðâñéññÜøâiâ óoi ÒiPíá 22.8.1.1 äái iðiññåb íá ÷ñçóeiiðièçðåb óå áôöP ôçí ðâñßðôùñç êáé ç ðáñÜñåðñiò start\_vinum äái èá ðñÝðåé íá ôåèåb üööáí ÷ñçóeiiðièåbóáé ç ðáñâéÜòù áéÜðåíç. Iéá ðééäiP åðééëiäP åßíáé íá iåôåäæùôðôåðâ ðôåðééÜ ôi Vinum óóïi ðoñPíá þóðâ íá åßíáé æéæéÝóeii ðÜñóá, åééÜ áôöü óôðPèùò äái åßíáé åðééðiçóö. ÕðÜñ ÷åé iéá åéüüä åéæéÝóeïç åðééëiäP, íá iññßóåðâ íá öiññôþíäåðé ôi Üññèñùá ðoñPíá iÝóù ôiõ /boot/loader (ÒiPíá 13.3) ðñéí ôçí åêêßíçóç ôiø ßæéiò ôiø ðoñPíá. Áôöü iðiññåb íá åðéåðåô ÷åéß iå ôç añañiP:

geom\_vinum\_load="YES"

óöi áñ÷åßí /boot/loader.conf.

- Óöi *Gvinum*, üęç ç äéáäééåößá åééßíçóçò äßíåöåé áööùìåöå iåöÜ ôcí öüñöùöç öiö áñëñþíàöiö ðöñþíá, Ýóóé ç äéáäééåößá ðiö ðåñéäñÜøâiå ðåñáðÜiü åßíåé êáé ç iùíç ðiö áðåéöåßöåé.

**22.9.2 Äçìéïöñäßá Ñéæéëíý Ôüïïö Vinum iå Äõíáôüôçôá Đñüóâáóçò áðü ôíí Êþäééá Åêéßíçóçò (Bootstrap).**

Êàéþò ï ôñ Ý÷ iñöðå ëþäééåð åêéßíçóçò ôñö FreeBSD Ý÷ åé iÝåâèò iññi 7.5 KB, êáé åßíáé þäç åðéöññöðéòi Ýññò iñ åçí áí Üäiñúç áñ ÷ åßùí (üðòð öï /boot/loader) åðü öï óýóðçìá áñ ÷ åßùí UFS, åßíáé ðñåéöñé Ü ááýíáò íá åñññßæåð êáé ôéò åðåéöñýiåñåð åñùôðñé Ü ð aïñ Ý ð ôñö Vinum þóôå íá iðññåß íá åññçfáyóåé ôéò åñðóööié ÷ åò ðëçññöñßåð ñýèëéöçò êáé íá iÜëæé ôéò åñðöññýññåð ðiñ öññiñ öññçíçóçò. Åéá öï eññi åñðöñ, ÷ ñññé Üæåðáé íá ÷ ñçöññññé Þóïðiá êÜðiéá ôå ÷ iÜññåð þóôå íá åþþöñåð ôóñiñ ëþäééå åêéßíçóçò ôçí øðññåßñöèççós ýðáññò iññi êáññééþò êáð Üññçóçò "a" ðiñ íá ðññéÝ ÷ åé öï ññæééü óýóðçìá áñ ÷ åßùí.

Ãéá íá éâoâoôâåß áôõü äõíâoü, èá ðñÝðåé íá ðëcñïýíôáé ôâoôü÷ñííá üëåò ié ðáñâéÜôù ðñiûðìèÝóåéò üöií áöimÜ ôií ôuñíí åêbíçóçò:

- Íðóðíðóð áðéðíðíðóð ðáð íá ðáð íá áðíáé stripe P RAID-5.
  - Íðóðíðóð áðéðíðíðóð ðáð íá ðáð íá ðáð íá áðíáé stripe P RAID-5.

Áéá íá äçíeiõñäçëiýí áôõ Ýò ié ôýðiõ "a" êáôáôìþóåéò áéá êÜèå óôôéåôþ ðiõ èá ðåñéÝ ÷åé ôìþiáôá ôiõ níæéêiý ôüiõ, èá ðñ Ýðåé íá áßñiõí ôá áéüëiõèá:

- Èá ðñ Ýðåé íá áâðå Üóâðå ôc èÝóç (ôçí áðüóðåc áðü ôçí áñ ÷ P ôçò óððéåðPò) éáé ôi iÝåðæiò ôçò óððéåðPò ððræðbðeïc c iðiðBá èá áðfáé iÝñiò ôiö níæéðiý ôùiiò, ÷nçóéiðiéþiðå ðçí áðiöeP:

```
# gvinum l -rv root
```

Óciåéþóôå üöe óöi Vinum ié è Ýoåéò êáé óá iaåÝèç iåðñiiýíóáé óå bytes. Èá ðñ Ýðåé íá äéáéñ Ýoåóå áðöiýò öiðò åñéèíýò iaå ói 512 åéá íá åñåßóå öiðò åñéèíýò iðërié ðiø èá ÷ nçóéiiðiéÞóåôå óóçí åíðiéÞ bsdlabel.

- ## 2. ÅêôåëÝóôå ôçí åíôïëÞ:

```
# bsdlabel -e devname
```

æá êÜèå óooéåôP ðiö oóiiìåòÝ ÷ åé óoi ñææéü ôüiì. Ôi *devname* èá ðñ Ýðåé íå åßíáé åßôå ôi üïñá ôiö åßóëiö (æá ðáñÜäåéäiá da 0) æá åßóëiö ÷ùñßò slices (÷ùñßò äçë. êáðåôìÞóåéö fdisk), P ôi üïñá ôiö slice (æá ðáñÜäåéäiá, ad0s1).

- ÁÍ ÕÐÜÑ÷ÅÉ ÞÄC ÌÉÁ ÆÁ

óå ÷ñPóç ðñéí ÷ñçóéîïð

ðñiöáÜðéi (óå ðåñßðòùóç áíÜâéçò), áæéÜ áái èá ÷ ñçóéíïðíéåßòáé ðëÝí áðü ðñiåðééíäÞ áéá ôçí åêéßíçóç ôiõ óðóôÞiaòiò. Óçìåéþóôå üöé ié áíâñáÝò éáðåòíÞoåéò (üðùò áéá ðáñÜäåéäà Ýíá ñéæéêü óýóôçìá áñ ÷ åßùí òi iðiþí åßíáé Þäç ðñiöáñòçìÝí). áái iðiññíy íá iåðiññáðöiyí. Èá ðñÝðåé íá åêðåé Ýðåðå ôçí åíóïëÞ ÷ ñçóéíïðíéþíðå ôçí åðééíäÞ "Fixit" ôiõ CD ååéåðÜðóåóçò, Þ íá áéïëðèÞoåò íéá áéäééåóßá äyí áçiÜðùí (óå ðåñßðòùóç ðiõ Ý ÷ åðå mirror) iåééíþíðå åðü òiÝ íá åßðéi èáé iåðiññÜæíïðå òiÝ Üëéi.

Ðåéóå èá ðñÝðåé íá ðñiöéÜðåðå ôçí åðüóåóç (offset, áí ðñÜñ ÷ åé) ôçò éáðÜðíçóçò Vinum áðòÞò ôçò óðóêåðÞò, iá ôçí åðüóåóç ôiõ ðñiäßóéïò ðiõ áíðßóéïé ÷ iõ ñéæéïý ôiõ ðñiöéÜðíçóç "a". Iðiññåðåå íá ðÜñåðåå åðöiyóéå ôçí ôéíÞ "size" áðòÞò ôçí åðüÜðíçóç áðü ðiõ ðñiëiäéòíü ðiõ êÜíåðåå ðáñáðÜíü. Ór "fstype" èá ðñÝðåé íá åßíáé 4.2BSD. Íé ôéíÝò ôiù "fsizé", "bsizé", èáé "cpg" èá ðñÝðåé íá åðééå ÷ eiyí iå ðYöiëi ôñüði þóåå íá õáéñéÜæíòí iå ôi ðññáñåðéü óýóôçìá áñ ÷ åßùí, áí éáé áái Ý ÷ iõ õçiaóßá ôóç ôðåæåñéñíÝíç ðåñßðòùóç.

Iå áðòü ôiõ ôñüði, èá åçleíëññåðåå íéá íÝá åðüÜðíçóç "a" ç iõíßá åðééåéýðååé ôçí åðüÜðíçóç ôiõ Vinum óå áðòÞò ôç óðóêåðÞò. Óçìåéþóôå üöé ç åíóïëÞ bsdlabel èá åðéññÝðåé åðòÞ ôçí åðééÜëðóç ìüñí áí ç åðüÜðíçóç ôiõ Vinum Ý ÷ åé åðéóçíåðéåå ëáðÜëëçéå iå fstype "vinum".

3. Áðòü åßíáé üëë! ÕðÜñ ÷ åé ðëÝí íéá ñðóði-åðüÜðíçóç "a" óå êÜèå óðóêåðÞò ç iðiñßá Ý ÷ åé åíðßññåöii òiõ ñéæéïý ôiõ. Óðíßóðåðåé íá åðáæçéåýðååå íáíÜ òi åðiøÝéåðíá, ÷ ñçóéíïðíéþíðå åéá åíóïëÞ üðùò ôçí ðáñáéÜðò: # fsck -n /dev/devnamea

Èá ðñÝðåé íá èõíÜðåå åðüé ié èÝóåéò ôuú áñ ÷ åßùí ðiõ ðáñéÝ ÷ iõí ðëçññiññßåò åéÝ ÷ iõ ðñÝðåé íá åßíáé ó ÷ åðéééÝò ùò ðñiò òi ñéæéêü óýóôçìá áñ ÷ åßùí ðiõ åñßðéåðåé óði ðiõ ôiõ Vinum, èáé i iðiþíò (éáðÜ ôçí åçleíëññåðåå éáéñññéiò ñéæéïý ôiõ Vinum) iðiññå íá ìçí õáéñéÜæåé iå ôi ñéæéêü óýóôçìá áñ ÷ åßùí ðiõ åßíáé åíññåü ôç ååññÝíç óðéäiÞ. Èá ðñÝðåé éæéåßòåñå íá öññiñßóååå óå áñ ÷ åßá /etc/fstab èáé /boot/loader.conf.

Óçí åðüñåíç åðáíååéþíçóç, i êþäééåò åêéþíçóçò èá ðñÝðåé íá åíðiñßååé óði ñðóði-åðüÜëëçéåò ðëçññiññßåò åéÝ ÷ iõ áðü òi íÝ (Vinum) ñéæéêü óýóôçìá áñ ÷ åßùí èáé íá åñÜðåé åðüÜëëçéå. Óði ðÝëiò ôçò åéáæéåóßåå áñ ÷ ééíðiþíçóçò ôiõ ððñÞíá, èáé i åðÜ ôçí åíññååéßå üëñí ôuú óðóêåðÞí, òi iþíðíá òi iðiþí ååß ÷ íåé ôçí åðéóð ÷ Þ èåéóññåðåå ôiõ åå ÷ åéñÞíáòiò iieÜæåé iå ôi ðáñáéÜðò:

```
Mounting root from ufs:/dev/gvinum/root
```

### 22.9.3 ÐáñÜäåéäìá Ñýëíéóçò Ñéæééïý Ôüüòí iå Vinum

låðÜ ôçí ñýëíéóç ôiõ ñéæéêü ôiõ iå ôi Vinum, ç Ýññäò ôçò åíðiëÞò gvinum 1 -rv root èá iieÜæåé iå ôçí ðáñáéÜðò:

...

Subdisk root.p0.s0:

```
Size: 125829120 bytes (120 MB)
State: up
Plex root.p0 at offset 0 (0 B)
Drive disk0 (/dev/da0h) at offset 135680 (132 kB)
```

Subdisk root.p1.s0:

```
Size: 125829120 bytes (120 MB)
State: up
Plex root.p1 at offset 0 (0 B)
Drive disk1 (/dev/da1h) at offset 135680 (132 kB)
```

Ié ôei Ýð ðið èá ðñí Ýðåé íá óçìâðþóâðå áßíáé ôi 135680 æá ôçí áðüöôáóç (offset óâ ð: Ýóç ià ôçí êâðÜðìçóç /dev/da0h). Áðöü iâðåöñÜæâðåé óâ 265 block ôuí 512 byte æá ôçí áîðiëþ bsdlabel. Ðáñüïiéá, ôi iÝââèò ðið ñeæéëý ðüiïið áßíáé 245760 iðëië ôuí 512 byte. Ôi /dev/da1h, ôi iðiði ðâñéÝ ÷æ ôi åâýôðñii áîðßâñáöi ðið ñeæéëý ôuuið, Ý ÷æ óðiìâðñééþ ñyéïieóç.

Ôi bsdlabel æá áðô Ýò ôéò óððéåð Ýò èá iié Üæåé ìå ôi ðáñáê Üôù:

```

...
8 partitions:
#      size   offset   fstype     [  size  bsize   bps/cpg]
  a: 245760       281    4.2BSD    2048 16384        0  # (Cyl.  0*- 15*)
  c: 71771688        0  unused       0     0        # (Cyl.  0 - 4467*)
  h: 71771672       16    vinum            # (Cyl.  0*- 4467*)

```

Iðiññáþbôá íá ÞáññáðçñÞróáðôá üðéé ç ÐáññÜlåññið "size" áæá óçí øððöñ-éáðÜðìçóç "a" óáæññÜæáé íá óçí óéíP ðið äðbíñáíá ðáññáðÜfù, áspç óéíP óçò ðáññáiÝðññið "offset" áðbíñé ðið Üðññéóíá óçò áððüðáðçò áíÜlåðá óóçí éáðÜðìçóç Vinum "h" éæá óçò áððüðáðçò áððöP ðoçò éáðÜðìçóçò íÝðá óóç óððóéåðP (P öi slice). Ðññüéåðéáé áæá iéá óððééP ñyðééóç ðið áðbíñé áððáññáþbôçðç áæá íá áðiññáðÜ ðið ðññüéåðéáé ðið ðáññéäñÜçééáí óðí ÓiPiá 22.9.4.3. Iðiññáþbôá áððþçðç íá áðbíñáðôá üðéé iéüññéçñç ç éáðÜðìçóç "a" ðáññéÝ ÷ áðaéé áððöñýðéá íÝðá óóçí "h" c iðiññáþbôá áðñéÝ ÷ áé üðaéó ðeçññiðññáþbôá Vinum óçò óððóéåðP.

Óciāéþóôå üðê óðí ðáñáðÜù ðáñÜáæáìá ç óðóéâððP ÷ ñçóéïðíéâðóáé á' iëíéëþñíö áðü ói Vinum, éáé äáí ððÜñ÷áé êÜðiéí éáðÜëéðí ñéæéêðP ìáðÜðíçóçð áðü ðáéëüðâñç ÷ ñÞóç. Áðóöü óðíâáßíáé áðâéðP ðñüéâéðáé áéá äðóéï ðið ÷ ñçóéïðíéþcêá áðü ðcí áñ-Þù ìÝñíö áíüð óðóððíâjíò Vinum.

#### 22.9.4 Áíôéìåôþðéóć ĐñïâëçìÜôùí

Óå ðâñþðôùóç ðñiâëþiáôíò, èá ÷ñâéáôóâþbôå êÜðiéá iÝeïäi áíðeïâþþdéóçò. Ç ðáñáêÜôù eþbôá ðâñéÝ÷åé iåñéêÜáðü óá ðeíi oþíceéòíÝá ðñiâëþiáôá éâé ôéó ëvýåéò oþjöö.

**22.9.4.1 የቤትና አጭር ስርዓት በአዲስ አበባ**

Áí ôi iiiiáæéü ðñüüâæçìá Þôáí ç áðiñóóßá ôiõ áñèñþiaôïò Vinum óôç ëßóóâ ôçò áôðouìáôçò öüññôùóçò, áñêåß íá äþóåôâ ôçí ájôïëþ load geom vinum.

Óóci ðññöññðþ ðiø áiøáíßæðóáé æáá ñiøæéü óýóðçíá áñ ÷ áßùí ðiø ðññüéåéðóáé íá ðññioáññçèåß, iðñññåßóá íá áæóÜ ååðå ìðíéåáþðiøå ðoðñéåðþ ðåññéÝ ÷ áé Ýíá Ýåêññí ñiøæéü óýóðçíá áñ ÷ áßùí. Áí ñiø /etc/fstab Ý ÷ áé ñiøëìéðóåß ðúñðóÜ, ç ðññiåðeeiäþ eá áßíáé èÜóé óáí ufs : /dev/gvinum/root. Iéá ñiøðééþ áiøééåéðóéþ ðiø ðiøéåðóáé íá lðiññjóýðó íá áßíáé ñiø ufs : da0d, iéá ñiøìèåðééþ êáðÜöiçóç ðiø ðåññéÝ ÷ áé ñiø ðáééü (ðññí ñiø Vinum) ñiøæéü óýóðçíá áñ ÷ áßùí. Áí ðññüéåéðóáé íá ÷ ñiøéiiðíéÞóåðå iéá áðü ðeð ðýðiø "a" Þóåðå ðiø ðiø áßíáé óðçí ðññåñiåðééüöðçóå ðiðræßóéie ðóçò ñiøæéþ ðoðñéåðþ ðiø Vinum, eá ðññÝðåé íá áßóóå ðññioáññçèåß, aéáðþ áí ÷ ñiøéiiðíéðóå mirror eá áßíáé

ÐññóÜñôçóç iùñí ðiõ áñüò ðiõ Þlåðiò ôçò óooéâôðò. Áí ðññéâðôáé íá ðññóáñôÞóâðô áðôð ðôc óooéâôð ãññüôðâñà lâ  
æðiáðüöçôá åâññáðò-áñÜñúöçò, áßíáé áðáñáðôçöö íá áoáéñ Ýóâðâ óá ðññüëiðá plex ðiõ ñéæéïý ðiññið ðiõ Vinum,  
éâðò ðiõ ðåññéÝ ðiõ ñéæéïý íá ðiõ áâñí áßíáé óá ðôá ðññéòiù lâ ðôc éâðÜòiçóç ðiõ Ý ÷ ðâðâ Þac ðññóáñôÞóâé.

#### 22.9.4.2 Öiñôþíåé ìüíí i Åáóéêüò Êþäéêáò Åêêßíçóçò

ÁÍ ç öüññöùçô ðîï /boot /loader äáí áßíráé áðéöö ÷ Þò, áéëÜ í áâáééüö êphäééåò áêéßíçöçö (primary bootstrap) öññöþíàðåé (éÜöé ðïò iðñmåßöå íá áæáðéöðþöåð åéÝä ÷ iiþöå áí áiðöáíßæðöåé leá ðýyéá ööçí ðÜfù áñéööåñÞ ãùíßá ôçö iëüíçö éåðÜ òi áñ ÷ ééü ööÜäéí áêéßíçöçö), lðiññåßöå íá ðñiøðåéÞöåðå íá áæáéüøðåå òç ááóééÞ áêéßíçöç óå áðöö òi ôçíåßí ÷ ñçöéiiðiþíðå òi ðéÞéöññ space. Ià áðöö òiñ öññöði, ç áêéßíçöç èá ööðåíáðÞöåé òòi ööÜäéí áÿí (áåßöå òi Òiþia 13.3.2). lðiññåßöå áäþ íá ðñiøðåéÞöåðå íá áêéëéÞöåðå áðü ìéá áíáëëéåðééÞ éåðÜöìçöç, ð. ÷. ôçí éåðÜöìçöç ðïò ðåñéåß ÷ å òi ñëæéüö öýóöçia áñ ÷ åßñü ðïò iåðåééÞöåðå áðü òi "a" üðåí iåðééÞöåðå íá ÷ ñçöéiiðiåßöå òi Vinum.

#### 22.9.4.3 Ååí Åßíåôáé ÉâìéÜ Åêêßíçóç, i Êbäéêáò Åêêßíçóçò Đñïéáëåß Panic

Óciåéþóåéò

1. Ôi RAID óciabíráé *Redundant Array of Inexpensive Disks* éáé ðánÝ ÷åé äeÜöññåò iiñöÝò áii÷þò óá ooÜëiaáá, áí êáé óôçí ðáññåðÜù ÷ñþóç i üññiò åbíáé eÜðùò ðáññåðëáíçôéüò: ôi RAID-0 äåí ðáñÝ ÷åé êáíeÜ oÝðiíéá ðññóôáóóßá åääññÝùí.

# ÊåöÜëáéï 23 Åéêïíéêïðïßçóç

*Óðíðéóðiñ Ü áðü óií Murray Stokely.*

## 23.1 Óýííøç

Áöiý äéáâÜóåôå áõõü öi êåöÜëáéi, èá íÝñåôå:

- Ôc æáööñÜ iåôáý áíüö iåíéóôP (host) êáé áíüö öéëílåñýiåñö (guest) eäéöiññääéiy.
  - Đùò íá åãêáôáôôPóåôå öi FreeBSD óå Ýíá Apple Macintosh ððíëíæéôôP ðiø åáóßæåôáé óå Intel áñ÷éôåêöiiéêP.
  - Đþò íá åãêáôáôôPóåôå öi FreeBSD êÜôù áðü Microsoft Windows iå öi **Virtual PC**.
  - Đùò íá åâëöéööiðíëPóåôå Ýíá FreeBSD óyóöçíá æá ôçí êáëýôåñç áðüäiíoç óå ðåñéåÜeëíí åéëíéëíý iç÷áíPiåôïò.

Ðñéí äéáâÜóåôå áðôü ôi êåöÜëáéi, èá ðñÝðåé:



## 23.2 Ôï FreeBSD ùò öéëïïåïýìåïí ëåéôïõñäéêü

### 23.2.1 Ói Parallels óå MacOS

Ôi **Parallels Desktop** ãá Mac ábíáé Yíá àìðiññéüü ëíæðíéüü òi iðibíí ábíáé äæáé Yóéüü áéá òðiðíæðóó Yó Apple Mac ìá áðâíññááðóó P Intel êáé ëåéðiññéüü Mac OS 10.4.6 P fáüüôåñí. Ôi FreeBSD ððñ Y ÷åé ðëþñç òðiðóóþñéïc ùò öéëññáñýíàñí ëåéðiññéüü. ¼ôáí òi **Parallels** Y ÷åé áåéåðåóóåèåß ôóí Mac OS X, i ÷ñþðóóçò ðñ Yðåé íá ññðiññóåé Yíá áééññéüü óýóðçíá áéá óðóçí Y ÷åéá íá áåéåðåóóþðåé òi öéëññáñýíàñí ëåéðiññéüü óýóðçíá òið òðééðiññíß.

### 23.2.1.1 Åæáèéóôþíóàò òî FreeBSD óóï Parallels/Mac OS® X

OS Installation Assistant

### Select guest OS

Select the guest operating system you want to install:

Guest OS Type:

FreeBSD

Guest OS Version:

Other FreeBSD

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Íñþóôå Ýíá ëíæéêü íÝâåèìò äþóêïò êáé ííÞìçò ðiõ íá áíôáðiêñþíåôáé óôá ó÷Ýäéá ðiõ Ý÷åôå ãéá ôçí åéêíéêïðïßçóç ðiõ FreeBSD. 4GB äþóêïò êáé 512MB ííÞìçò ñiðøéåýïðí ìéá ÷áñÜ ãéá ðiõ ðåñéóðüðåñïðò ÷ñÞóðåò ðiõ FreeBSD Ýóá áðü ôï **Parallels**:

## OS Installation Assistant

### Specify memory size



Please specify how much memory (RAM) should be allocated for the virtual machine:

256 MB

4 MB

1500 MB

Recommended RAM maximum size is 1500 MB.

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Cancel

## OS Installation Assistant

### Select action type



Please specify what kind of hard disk you want to install to the virtual machine. If you do not want to add a hard disk now, select "Do not add hard disk" option. You will be able to add it later using a Configuration Editor.

- Create a new virtual hard disk
- Use an existing hard disk image
- Do not add hard disk

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Cancel

## OS Installation Assistant

### Specify hard disk options



Please specify a preferred virtual disk size:

8000 MB

Select disk format:

Expanding (recommended).

Disk image file is small initially and grows as you add more data to the virtual machine. This disk format takes less time to create and saves disk space on the host.

Plain.

Disk image file consumes all the allocated space right from the start. It takes more time to create but allows guest OS to operate faster.

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Cancel

OS Installation Assistant

Select an image file



Please specify a location of the hard disk image file:

/murray/Library/Parallels/otherbsd/otherbsd.hdd

[...]

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Cancel

ÅðééÝîôå ôíí ôýðí äéêôýùóçò êáé ôíí ðñïóáñíäÝá äéêôýíõ:

## OS Installation Assistant

### Select a type of networking



Please specify what kind of networking you want to add to the virtual machine:

Bridged Ethernet.

Use this option if you need to connect your virtual machine to Local or Wide Area Network.

Host-only Networking.

Use this option if you want to create private network shared with the host.

Shared Networking.

Use this option if you need to provide Network Address Translation feature to your virtual machine.

Networking is not required.

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Cancel

## OS Installation Assistant

### Select a real adapter



Please select a real network interface, which should be connected to the virtual machine:

Default Adapter

Specify if the virtual machine should assume the network cable connected at power on:

Connect cable at startup

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Cancel

ÁðièÞêåðóç êáé ôÝëiò ôùí ñõèìßóåùí:

## OS Installation Assistant

### Select virtual machine configuration file



Please specify a virtual machine name and location of the virtual machine configuration file.

Virtual Machine Name:

FreeBSD-CURRENT

Configuration File:

/s/murray/Library/Parallels/otherbsd/otherbsd.pvs

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Cancel

## OS Installation Assistant

## Get ready to install guest OS



Now the assistant is ready to start installation of the Other FreeBSD. It may be necessary to insert the Other FreeBSD installation CD into the CD/DVD-ROM reader. Insert CD disc if required and click "Finish" to proceed.

Uncheck "Start guest OS installation" option below if you do not wish to install guest OS.

Start guest OS installation

Read Quick Start Guide for more details about configuring the virtual machine and installing guest OS.

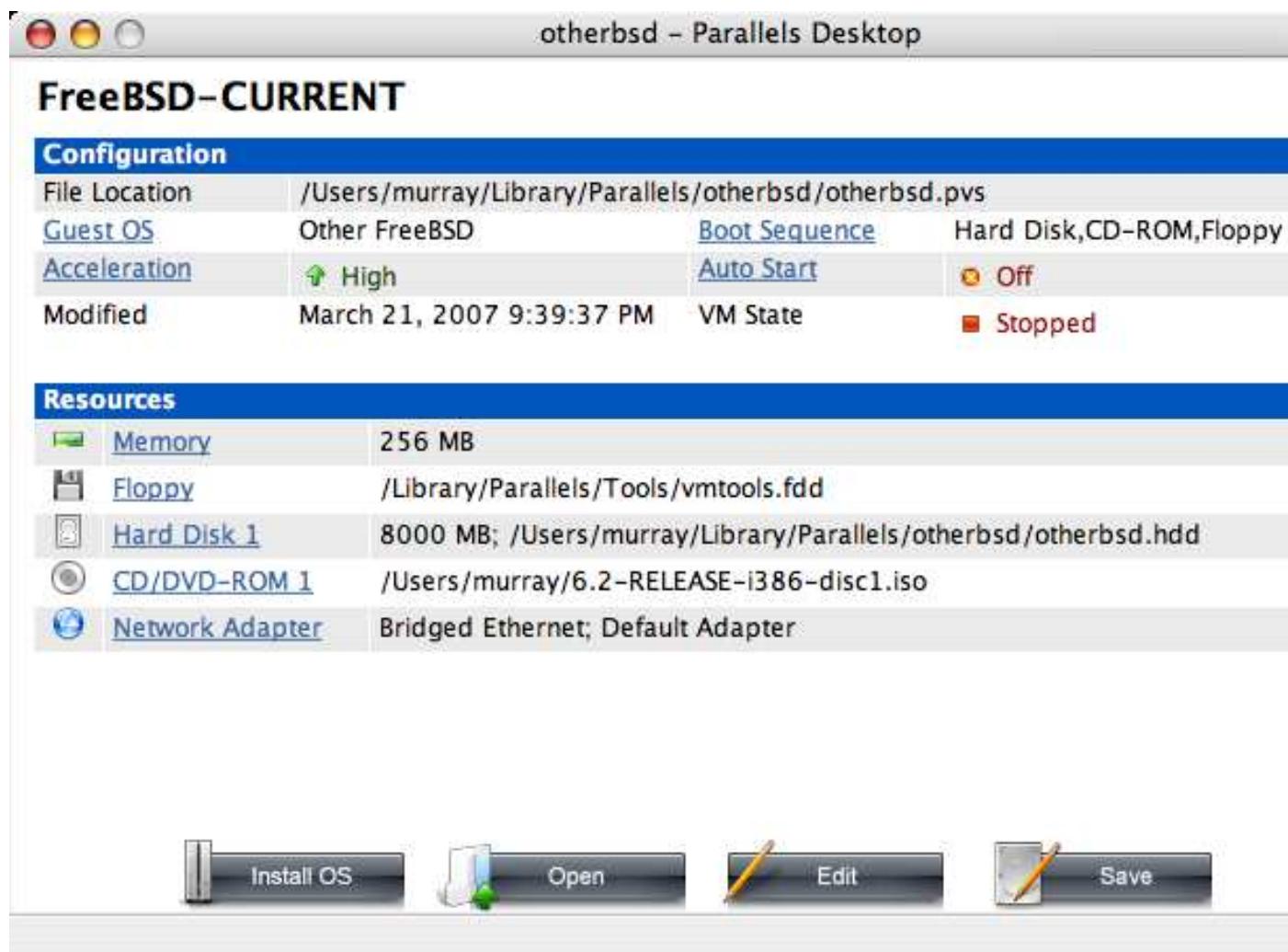
[Open Quick Start Guide](#)

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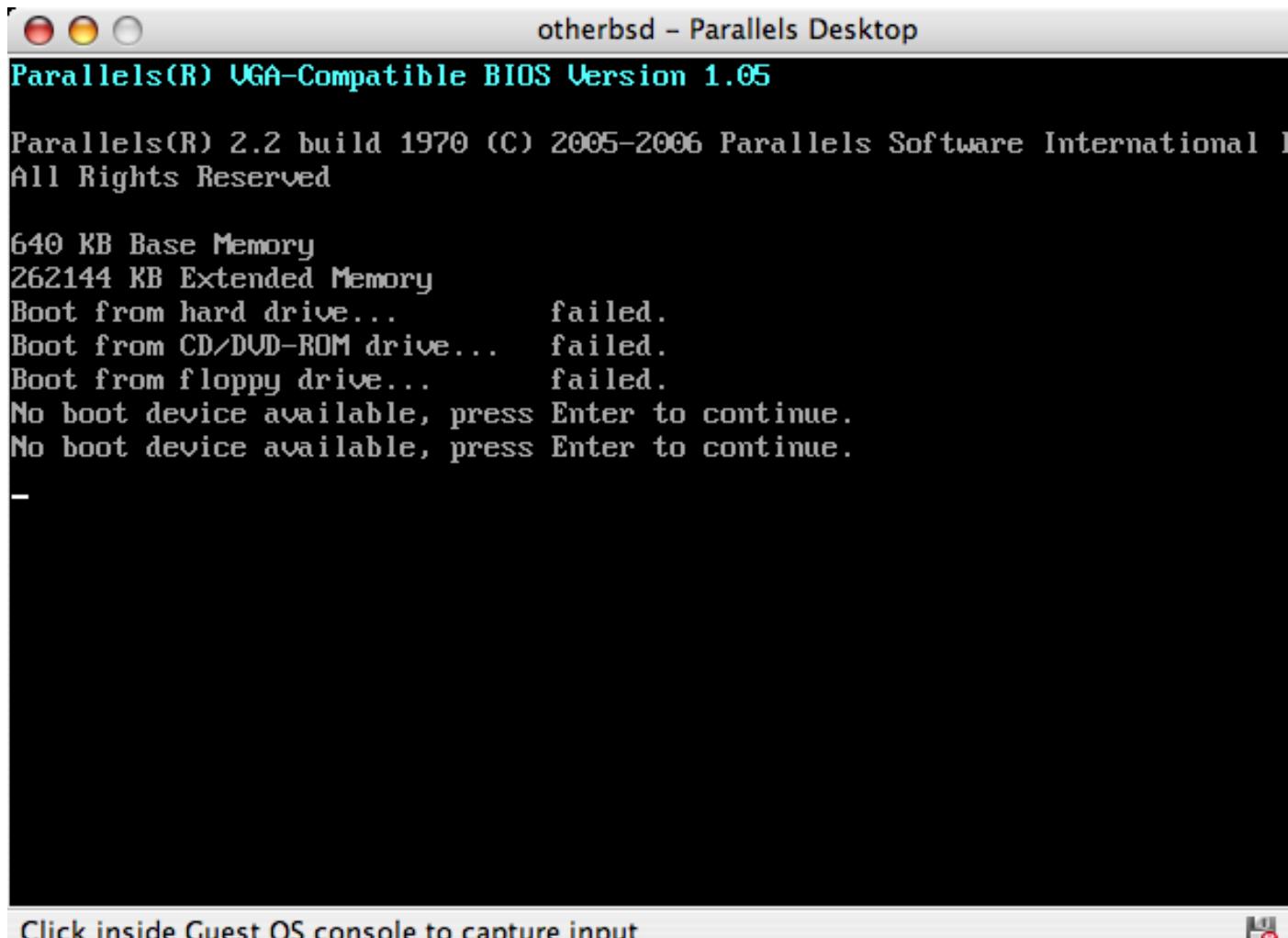
Finish

Cancel

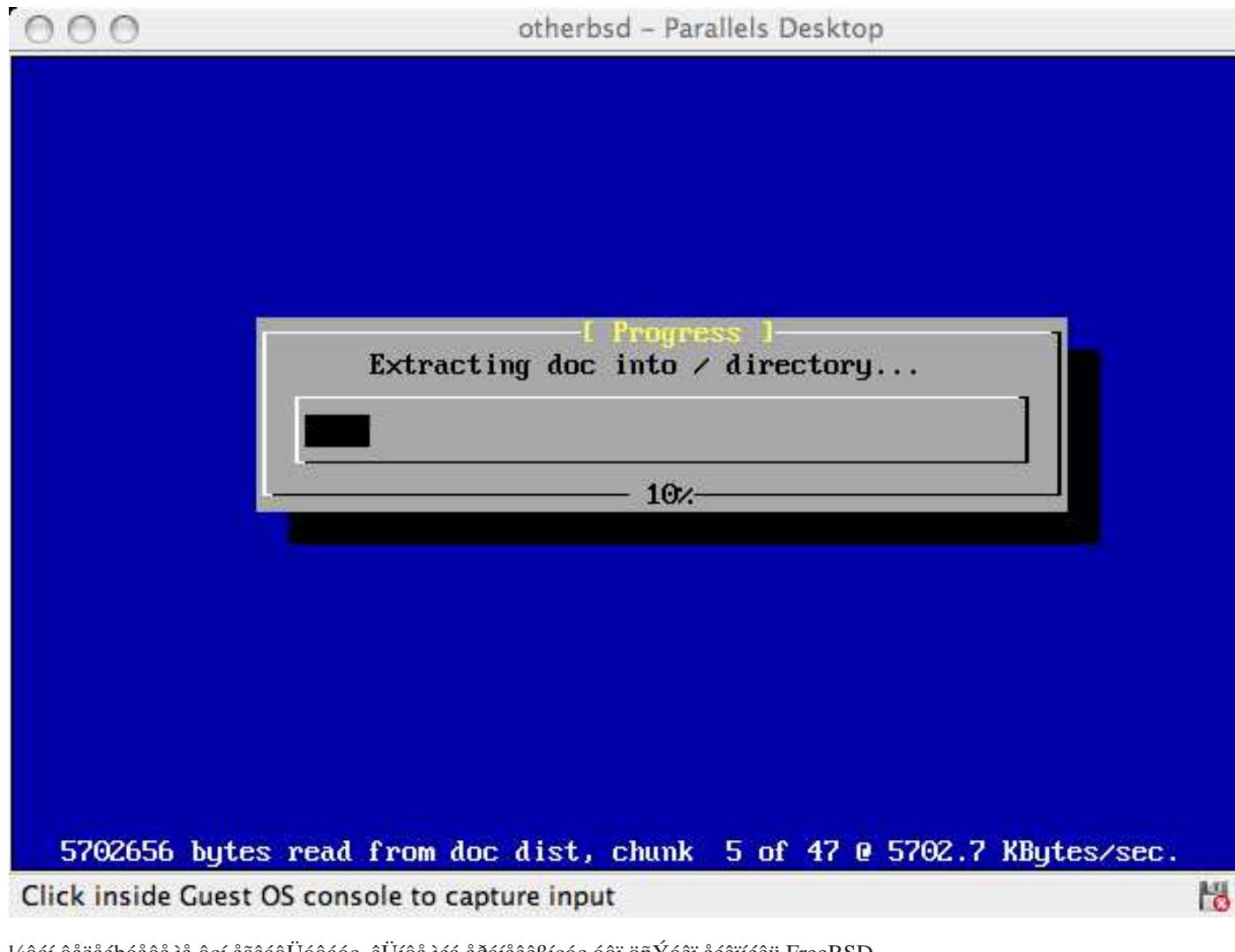
¼ôáí ôi áéëíéü óýóôçìá Ý÷åé äçlëiõñäçèåß, èá ÷ñâéáôåß íá åãéáôáôÞóåôå ôi ßæéi ôi FreeBSD. Í éáëýôåñiò ôñüðiò ãéá íá åßíåé ç åãéáôÜóôåç åßíåé iå ôi åðßóçii FreeBSD CD-ROM P iå êÜðiéi áñ ÷åßi ISO, êáôåâåóìÝñi áðü ôií åðßóçii FTP ôüði. ¼ôáí Ý÷åôå ôi éáðÜëëçei ISO ôôi óéëçñü óåô, P ôi CD-ROM ôôií iäçäü CD, åíâñäiðieÞóôå iå ôi ðíïðßêé ôi áéëííßæéi ôiõ CD ôôi êÜðù åâñi ïÝñið ôçò iëüçò ôiõ Parallels. Iå áôðüí ôií ôñüði èá iðiñÝóåôå íá iñßóåôå ôçí ðçãP ôçò åãéáôÜóôåçò. Iðiñåßôå íá iñßóåôå ôi CDROM P êÜðiéi áéëèÝóéii ISO áñ ÷åßi.



¼ôáí Ý÷åôå áíðéóôïé ÷ Þóåé ôç ðçãÞ åâêåôÜôåáôçð, åðáíåêééíÞóôå ôi åéêíéëü óýôôçjá ðáðþíôåð áðéÜ ôi êtöìðß ôçð åðáíåêéßíçóçð (reboot) ôiõ **Parallels**. Ôi **Parallels** èá iâééíÞóåé iå Ýíá åéäéêû BIOS ôi iðiþi ðñþôá åëÝâ÷åé åÜí ððÜñ ÷ åé åéåèÝóëii ëÜðíëi CD-ROM, üðùò ëÜíåé êáé Ýíá öððéëiäéêû BIOS.



Óå áôôP ôç ðâñßðôùóç èá âñâé ôi iÝóï áâêáôÜóôáóçò ôiõ FreeBSD êáé èá íâêéíÞóâé ôi sysinstall üðùò ðâñéäñÜöåôáé óôi ÊðöÜëáéi 2. Íðiñâßôá íá áâêáôáôôÞóâôá ôi X11, áëëÜ ìç áiêéíÜóâôá íá ñðèìßóâôá áôôP ôç óôéâiP.



¼ôáí ôåëåéþóåôå ìå ôçí åââåôÜóôåóç, êÜíôå ìéá åðáíåêëßíçóç óôï öñÝóéï åéëíéêü FreeBSD.

```

otherbsd – Parallels Desktop
unfamiliar with FreeBSD's directory layout, please refer to the hier(7)
manual page. If you are not familiar with manual pages, type 'man man'.

You may also use sysinstall(8) to re-enter the installation and
configuration utility. Edit /etc/motd to change this login announcement.

> pwd
/usr/home/murray
> su -m
Password:
%ifconfig -a
ed0: flags=8802<Broadcast,Simplex,Multicast> mtu 1500
    ether 00:a6:db:8f:82:ca
    media: Ethernet autoselect (10baseT/UTP)
lo0: flags=8049<Up,Loopback,Running,Multicast> mtu 16384
    inet6 fe80::1%lo0 prefixlen 64 scopeid 0x2
    inet6 ::1 prefixlen 128
    inet 127.0.0.1 netmask 0xffffffff
%dhclient ed0
DHCPDISCOVER on ed0 to 255.255.255.255 port 67 interval 7
DHCPOFFER from 192.168.1.1
DHCPREQUEST on ed0 to 255.255.255.255 port 67
DHCPACK from 192.168.1.1
bound to 192.168.1.107 -- renewal in 43200 seconds.
%
```

Click inside Guest OS console to capture input



### 23.2.1.2 Ñõèìßæïòôáò ôí FreeBSD óóí Mac OS X/Parallels

ÁöïÝ Ý÷åé áãéåååååååéåß áðéóò÷þò ôí FreeBSD óóí Mac OS X íå ôí **Parallels**, õðÜñ÷iðí ìåñééÜ áðiáååå áéüùç ðið ñðiñíý íá óáò áïçëÞóíðí íá ñõèìßæååå ôí áéëíééü óáò óýóôçíá.

#### 1. ÍåðååéçôÝò ôíð boot loader

Óí ðiðí óçìáíòéêü áðiá áðiáé íá íåéþóååå ôí íÝååéíò ôíð kern.hz ðñièåéíÝíò íá áíéíðíéÞóååå ôç CPU íÝóá áðü ôí **Parallels**. Áðóü ñðiñåß íá áðiáé íá ôí íá ðñiøéÝóååå ôçí áéüëíðèç áñâñìP óóí /boot/loader.conf:  
kern.hz=100

×ùñþò áðóP ôç ñýéíéóç, Ýíá ááñáíÝò FreeBSD óóí **Parallels** èá êáóáíáéþíåé ôí 15% ôçò CPU áíüò ïííðýñçíò iMac®. ÍåðÜ áðü ôçí áëëååP, ç êáðáíÜëùóç èá ðÝóåé êííòÜ óóí 5%.

#### 2. Äçíéíòñåßá íÝíò áñ÷åßíò ñõèìßæååúí ôíð ððñÞíá

Íðiñåßåå íá áöáéñÝóååå üéåò ôíðò íäçäíýò áéá SCSI, FireWire, êáé USB óðóéååÝò. Ôí **Parallels** ðáñÝ÷åé Ýíá áéëíééü ðñiøáññíäÝá áéëóýíò íiðiñíò ÷ñçóéíðíéååéåé áðü ôíí íäçäíí ed(4), íðüôå üééé íé íäçäíß áéá áéëóðååÝò óðóéååÝò áéóüò ôúí ed(4) êáé miibus(4) íðiñíý íá áöáéñåéíýí áðü ôíí ððñÞíá.

### 3. Ñýèiéóç äéêôýiõ

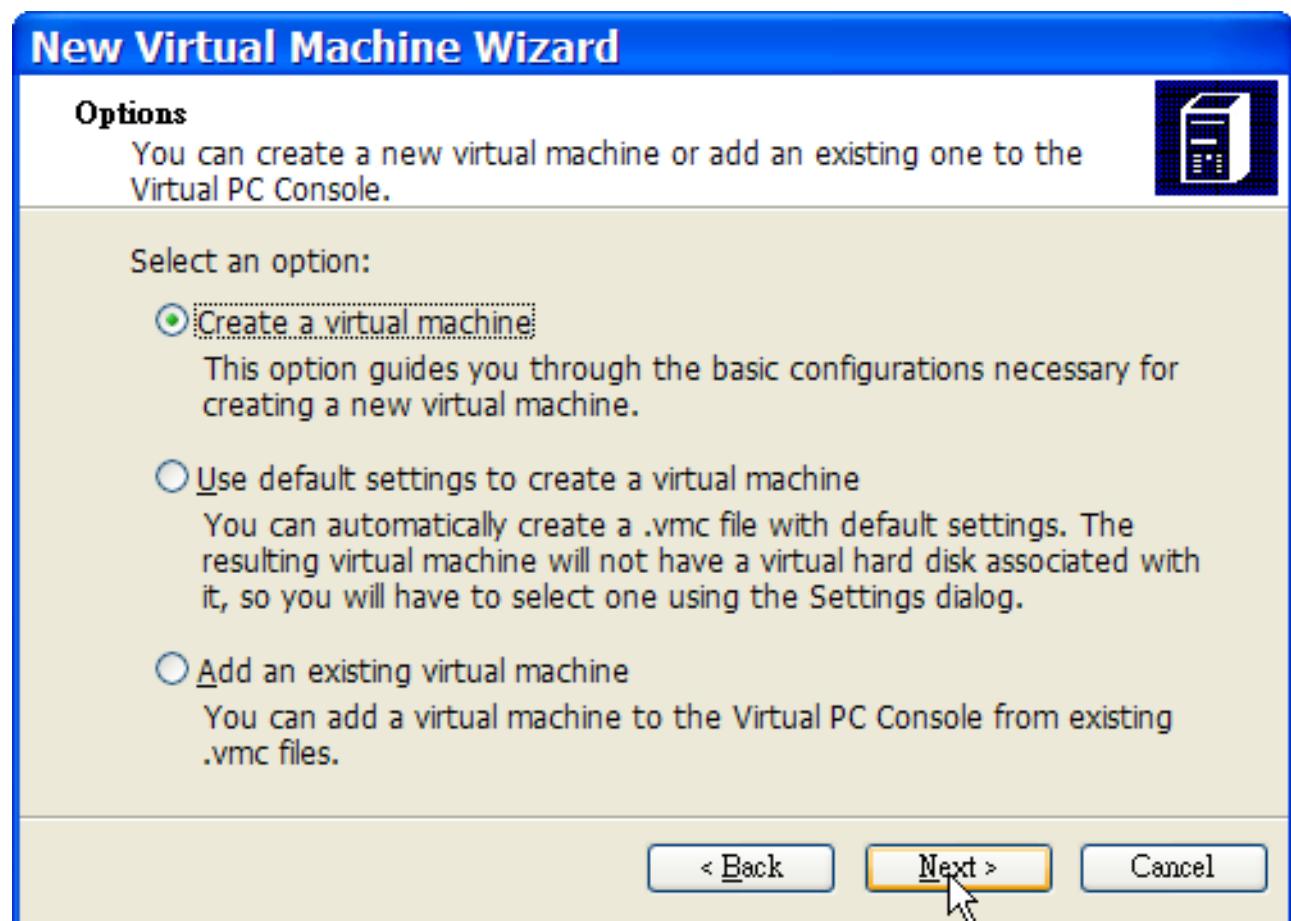
Ç ðeí áðëP ñýèiéóç äéêôýiõ êÜíâé ÷ñPóç ðiõ DHCP ãéá íá óðíðâéâß ôi áéêíééü óáð óýóôçìá óði ßæéi ôiðééü áðéâðiõ iå ðiñ Mac. Áðóù iðiñâß áýêíéá íá áßfâé iå ôi íá ðñiøè Ýðâðâ òç ãñâiñP ifconfig\_ed0="DHCP" óði /etc/rc.conf. Ðieððeïüðâð ñðèìßóâð äéêôýiõ ðâñéãñÜöriðâé óði ëâðÜëáéi ÊðoÜëáéi 32.

## 23.2.2 Ôi Virtual PC óðá Windows

Ôi Virtual PC ãéá Windows áßíáé Ýíá ðñiúüí ôçò Microsoft ðiõ äéáððèâðâé ãéá àùñâÜí êáð Ýâáðiá. Äâðôâ ôeò áðáéððóâð ððððPiaðiõ (http://www.microsoft.com/windows/downloads/virtualpc/sysreq.mspx). IåðÜ ôçí áââáððóâðâó ðiõ Virtual PC óðá Microsoft Windows, i ÷ñPóðç ðñÝðâé íá ñðèìßóâé Ýíá áéëíééü ìç ÷Üíçìá êáé íá áââáððâððóâð ði õeëñâñiñiâñi ëâéðiñâðâéü ðið ãðéððiñâß.

### 23.2.2.1 Áââáððóâðâó ðiõ FreeBSD óði Virtual PC/Microsoft® Windows

Ôi ðñþði ãððâð ððððPiaðiõ ðiõ FreeBSD óðá Microsoft Windows iå ÷ñPóç ðiõ Virtual PC, áßíáé ç äçjéïñâðâáðü ñÝiõ áéëíééiy ìç ÷áððâðiõ ãéá ôçí áââáððóâðâó ðiõ. ÁðéëÝðâáð Create a virtual machine üðáá âñùðçèâðâð:



## New Virtual Machine Wizard

### Virtual Machine Name and Location

The name you specify will appear in the list of virtual machines in the Virtual PC Console.



Type the name for the virtual machine file. Choose a name that will help you identify this virtual machine's hardware or software configuration or which operating system it will run. The file is automatically saved to the My Virtual Machines folder. To save it to a different location, use the Browse button.

Name and location:

[Browse...](#)[« Back](#)[Next >](#)[Cancel](#)

Óçí ãñþôçóç Operating System åðéëÝîôå Other:

## New Virtual Machine Wizard

### Operating System

Select the operating system you plan to install on this virtual machine.



Selecting an operating system here allows the wizard to recommend appropriate settings for this virtual machine. If the desired guest operating system is not listed, select an operating system that requires an equivalent amount of memory or select Other.

Operating system:

**Other**

Default hardware selection:

Memory: 128 MB

Virtual disk: 16,384 MB

Sound: Sound Blaster 16  
compatible

< Back

**Next >**

Cancel

ÅðeeÝîôá Ýðâéôá êáôÜëeçei iÝââèiò aéá ôi óeëçñü äßóêi êáé ôç iíÞìç RAM ôið åéëíéëiý lç ÷áíÞiaôiò, áíÜërää íå ôç ÷íÞóç ðið óeïðåýâôá íá êÜíâôå. Óðéò ðâñéóóüôâñâò ðâñéððþóâéò, ôá 4GB äßóêiô êáé 512MB RAM åßíáé áñêåðÜ aéá ÷íÞóç ôið FreeBSD ôôí **Virtual PC**:

## New Virtual Machine Wizard

### Memory

You can configure the RAM on this virtual machine.



To improve the performance of this virtual machine and run more applications on its operating system, increase the amount of RAM allocated to it. To leave more RAM for other virtual machines on your system, use the recommended RAM allocation.

Recommended RAM: [128 MB]

Allocate RAM for this virtual machine by:

- Using the recommended RAM
- Adjusting the RAM

Set the RAM for this virtual machine:



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Next >

Cancel

## New Virtual Machine Wizard

### Virtual Hard Disk Options

Before you can install an operating system on this virtual machine, you must add a new or existing virtual hard disk to it.



A virtual hard disk is a .vhd file that is stored on your physical hard disk and is used to contain the guest operating system, applications, and data files.

The first virtual hard disk you create or select for your virtual machine is called Hard Disk 1 in Settings and is the startup disk.

Do you want to use:

- An existing virtual hard disk
- A new virtual hard disk

< Back

Next >

Cancel

Íeëéçñþóå áðièçêåýíôåò ôéò ñðèìßóåéò:

## New Virtual Machine Wizard

### Virtual Hard Disk Location

This wizard creates a dynamically expanding virtual hard disk with the specified size.



Type a name for the new virtual hard disk. Unless you specify a different location, the virtual hard disk file will automatically be saved in the same location as the virtual machine configuration file.

Name and location:

machines\FreeBSD-CURRENT\FreeBSD-CURRENT Hard Disk.vhd

[Browse...](#)

Maximum virtual hard disk size: 130,557 MB

Virtual hard disk size: 4000 MB

To learn more about the different types of virtual hard disks, see [Virtual PC Help](#). For advanced virtual hard disk options, use the [Virtual Disk Wizard](#).

[< Back](#)

[Next >](#)

[Cancel](#)

ÅðééÝîôå ôçí åéêííéêP ìç÷áíP FreeBSD ðïõ äçíéïõñâþóåôå êáé êÜíôå êééê ôôï Settings. Ñðèìßóå Ýðåéôå ôï åßäïò êáé ôçí äéåðáöP (interface) ôiõ äéêôýïõ:



## Settings for FreeBSD-CURRENT

| Setting               | Current Value             |
|-----------------------|---------------------------|
| File Name             | FreeBSD-CURRENT           |
| Memory                | 512 MB                    |
| Hard Disk 1           | FreeBSD-CURRENT H...      |
| Hard Disk 2           | None                      |
| Hard Disk 3           | None                      |
| Undo Disks            | Disabled                  |
| CD/DVD Drive          | Secondary controller      |
| Floppy Disk           | Auto detected             |
| COM1                  | None                      |
| COM2                  | None                      |
| LPT1                  | None                      |
| <b>Networking</b>     | <b>Network adapters:1</b> |
| Sound                 | Enabled                   |
| Hardware Virtualiz... | Not available             |
| Mouse                 | No pointer integration    |
| Shared Folders        | Not installed             |
| Display               | Default                   |
| Close                 | Show message              |

### Networking

Number of network adapters:

Adapter 1:

Realtek RTL8139 Family PC

Adapter 2:

Not connected  
Local only

Adapter 3:

Realtek RTL8139 Family PC  
Shared networking (NAT)

Adapter 4:

Not connected

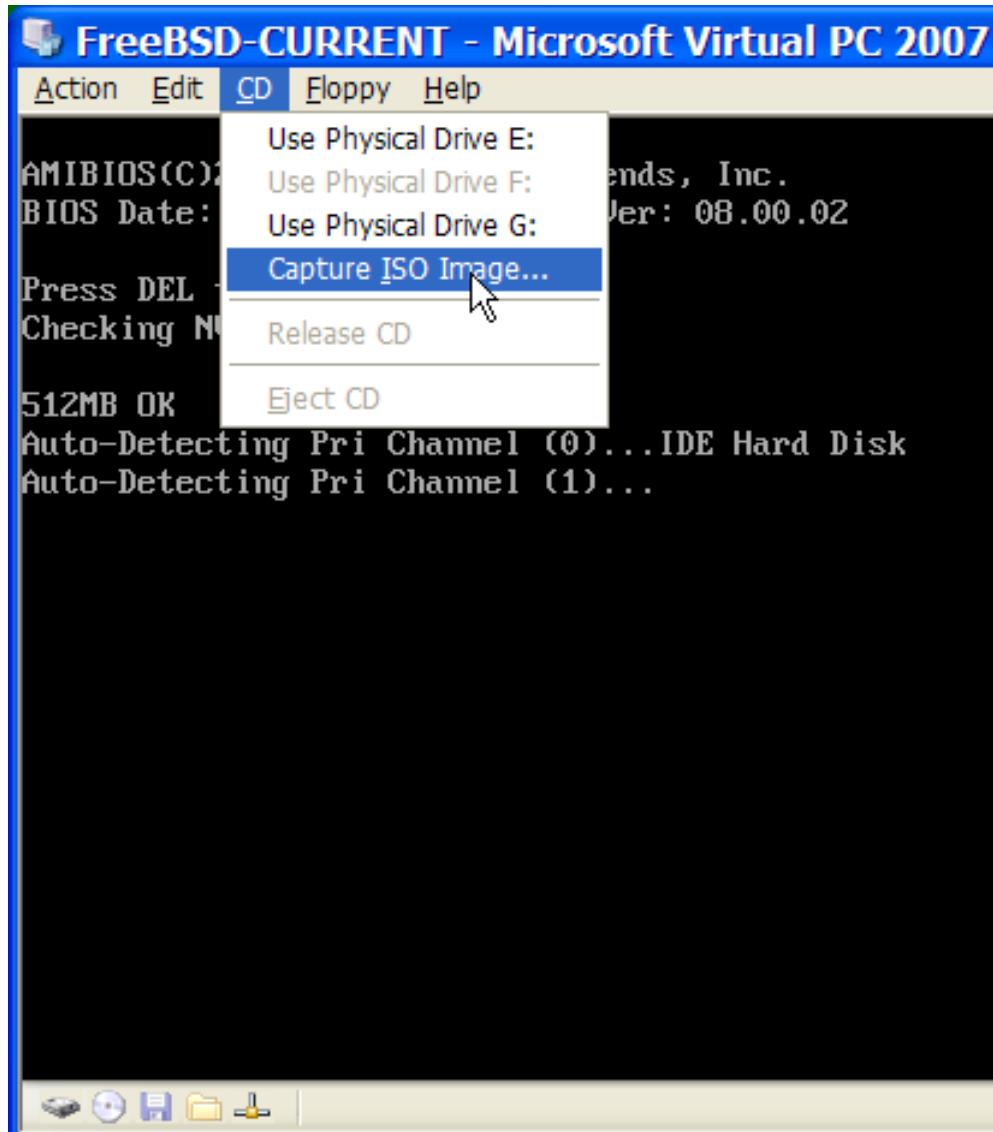
You can select the number of network adapters you want to have on this virtual machine. You then select which network adapter from the physical computer will be used for network communication with each virtual adapter. You also select to use the local network or, for the adapter, the shared network.

OK

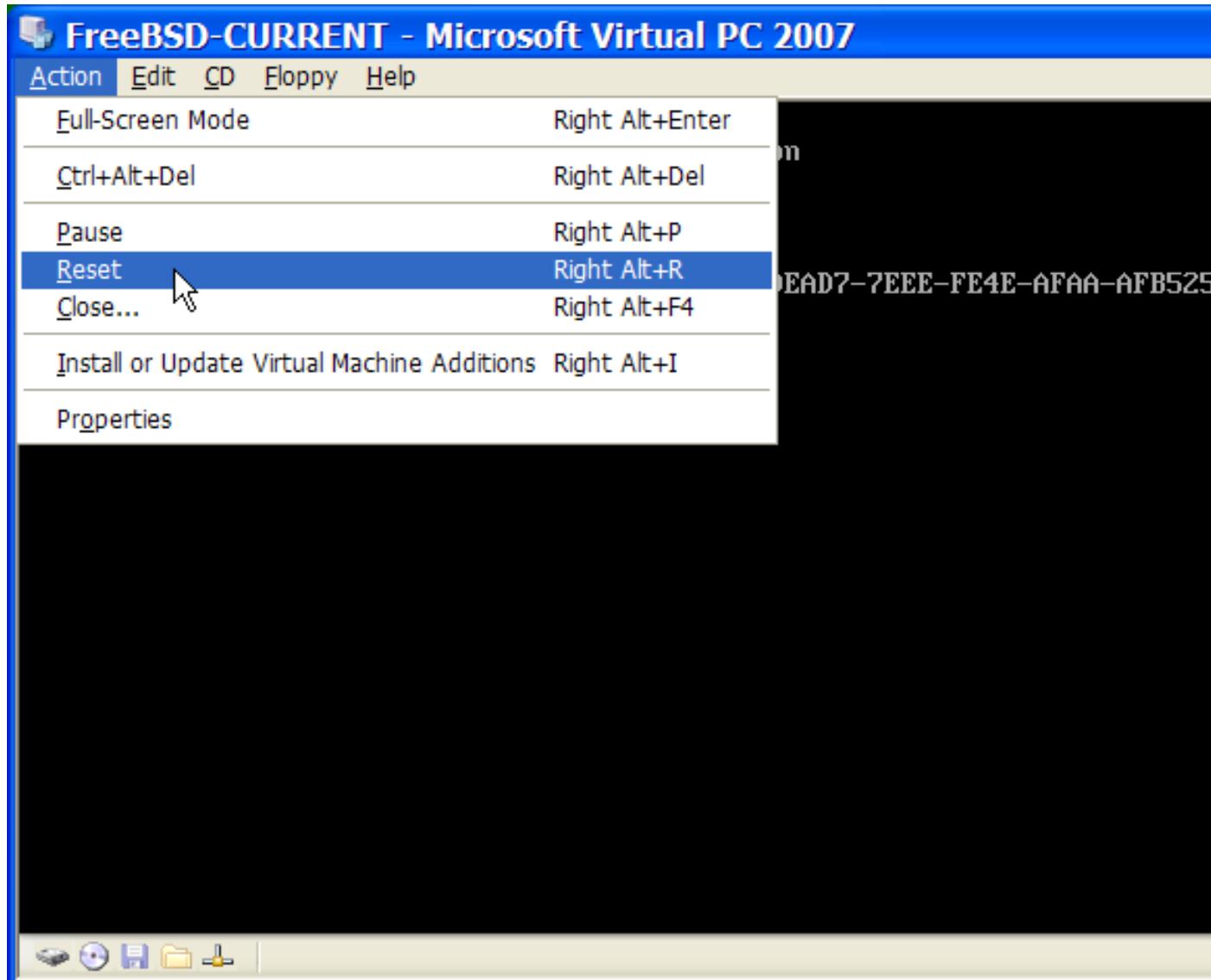
Cancel

Áöïý áçleíöñäÞóåôå ôçí áéëíéêÞ ìç÷áíÞ óáò áéá óî FreeBSD, èá ðñÝðåé íá áâéâðáôðÞóåôå óî éâéðíöñâéêü óå áôðÞí. Í êáéýðâññò ôññûðò åßíáé fá ÷ñçóëðíëðóåôå Ýíá áðü óå áðßóçìá CDROM óîð FreeBSD Þ íá êâðâðÛðåôå êÜðëéí áñ÷åßí ISO áðü ôçí áðßóçìç óîðíëåðßá FTP, ÷ññðáð óî êáðÜëëçëí áñ÷åßí ISO óðí îðééü óáò óýðóçìá áñ÷åßùí óùí Windows (Þ óî áíðßóôîé ÷í CDROM óðíí iäçãü), êÜíôå áéðëü êëéê óðí áéëííßæí ôçò áéëíéêÞ ìç÷áíÞð FreeBSD áéá íá ôçí áéëéÍÞóåôå. Þâéôå êÜíôå êëéê óðí CD êáé áðééÝîôå Capture ISO Image... óðí ðáñÜëõñí óîð Virtual PC. Èá åñöáíéóôåß Ýíá ðáñÜëõñí ðíð èá óáò áðéôñÝðåé íá óðó÷åðßóåôå óîí áéëíéêü iäçãü CDROM íá Ýíá áñ÷åßí ISO Þ áéé íá óíí ðñáñlåðéêü óáò iäçãü.

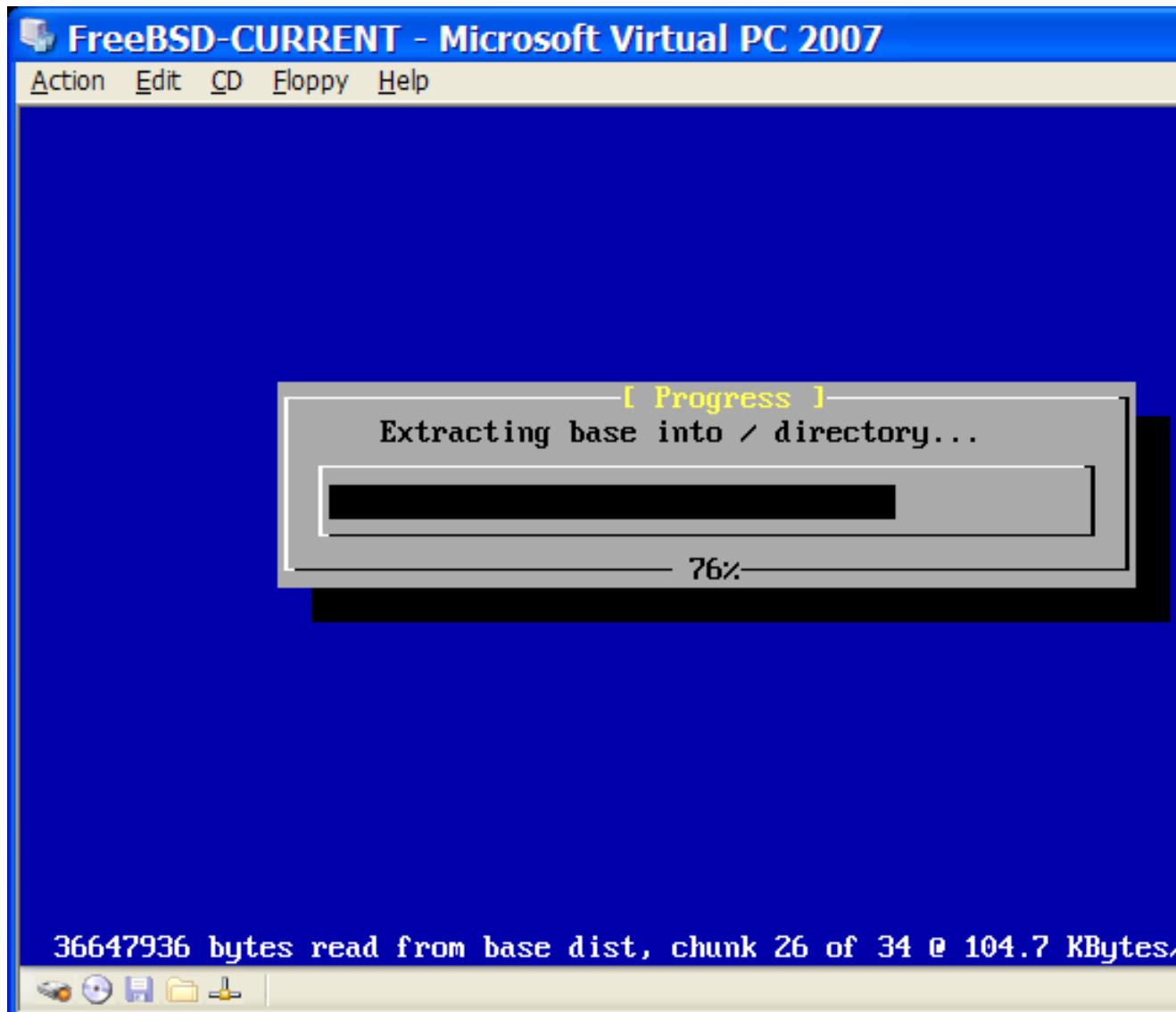




Íüëéð äçïéïöñâÞóåôå ôç ôðð ÷ Ýðéóç iå ôçí ðçãÞ ðið èá ÷ ñçóéiiðiéÞóåôå ùò CDROM, åðáíâééíÞóôå ôi åéëíéêü óáð FreeBSD iç ÷ Üíçìá, åðééÝäíîôå Reset áðü ôi iâñiy Action. Ôi Virtual PC åêééíâß iå Ýíá åéëéêü BIOS ôi iðiði åéÝä ÷ åé ðñþôå áí ôðÜñ ÷ åé CDROM ôðñí iäçäü, üðùò áéñéâþò ôðiâáþíåé êáé iå Ýíá öððééíâéêü BIOS.



Óðç äéêP ìáò ðåñßðôùóç, èá áíé ÷ íâýóâé òí íÝóí áâæáðÜóðáóçð ðïð FreeBSD èáé èá íâééíÞóâé ç óðíçèéóíÝíç áéâæéâáóßá áâæáðÜóðáóçò íÝóù òíð sysinstall, üðùò ðåñéãñÜöåðâé óóï ÈâöÜëáéí 2. Íðîñâßôå íá ðñí÷ùñÞóâóå ìå ôçí áâæáðÜóðáóç, áéëÜ íç ðñíóðâéÞóâóå íá ñðèìßóâðâ òí áññáöéêü óýóðçìá X11 ôç áâäñíÝíç óðéâíP.



¼ðáí ðâëåéþðôðå ôçí åæáðÜðôáóç, íç íâ÷Üðôðå íá åæÜðôðå ôï CDROM áðü ôïí iäçãü (Þ íá êáðáñðþðôðå ôçí áðððôðé÷ç óðð÷Ýðéóç lâ ôï áñ÷åßí ISO). Íðiñðôðå Ýðâéóá íá åðáíåêéíþðôðå ôçí íÝá óáð åæáðÜðôáóç ôïð FreeBSD.

The screenshot shows a Microsoft Virtual PC window with a blue title bar containing the text "FreeBSD-CURRENT - Microsoft Virtual PC 2007". Below the title bar is a menu bar with options: Action, Edit, CD, Floppy, Help. The main area of the window is a terminal window displaying a FreeBSD shell session. The session starts with a message about the directory layout and sysinstall(8). It then shows the current working directory as /usr/home/chinsan, followed by a password entry prompt. The user runs ifconfig -a to list network interfaces, which includes de0 (Ethernet), plip0 (Point-to-Point), and lo0 (Loopback). The de0 interface is detailed with its flags (BROADCAST, SIMPLEX, MULTICAST), metric (0), mtu (1500), ether address (00:03:ff:fc:ff:ff), media (Ethernet autoselect (100baseTX)), and status (active). The plip0 interface has flags (POINTOPOINT, SIMPLEX, MULTICAST, NEEDSGIANT), metric (0), and mtu (1500). The lo0 interface has flags (UP, LOOPBACK, RUNNING, MULTICAST), metric (0), mtu (16384), and an inet6 address fe80::1%lo0 with prefixlen 64 and scopeid 0x3. The dhclient command is run for de0, showing a DHCPREQUEST to 255.255.255.255 port 67, a DHCPACK from 192.168.131.254, and a renewal bound to 192.168.131.67 in 536870911 seconds. At the bottom of the terminal window, there is a toolbar with icons for floppy disk, CD/DVD, file, folder, and other system functions.

```

Action Edit CD Floppy Help
unfamiliar with FreeBSD's directory layout, please refer to the hier(7)
manual page. If you are not familiar with manual pages, type 'man man'.

You may also use sysinstall(8) to re-enter the installation and
configuration utility. Edit /etc/motd to change this login announcement

%pwd
/usr/home/chinsan
%su -m
Password:
%ifconfig -a
de0: flags=8802<Broadcast,Simplex,Multicast> metric 0 mtu 1500
        ether 00:03:ff:fc:ff:ff
        media: Ethernet autoselect (100baseTX)
        status: active
plip0: flags=108810<PointToPoint,Simplex,Multicast,NeedsGiant> metric 0 mtu 1500
lo0: flags=8049<Up,Loopback,Running,Multicast> metric 0 mtu 16384
        inet6 fe80::1%lo0 prefixlen 64 scopeid 0x3
        inet6 ::1 prefixlen 128
        inet 127.0.0.1 netmask 0xff000000
%dhclient de0
DHCPREQUEST on de0 to 255.255.255.255 port 67
DHCPACK from 192.168.131.254
bound to 192.168.131.67 -- renewal in 536870911 seconds.
%
```

### 23.2.2.2 Ñýèiéóç ôïö FreeBSD óöi Virtual PC óå Microsoft Windows

ÍàðÜ ôçí áðéöô ÷ Þ ååéåðÜóðåóç ôïö FreeBSD óöá Microsoft Windows ìÝóù ôïö **Virtual PC**, ðá ðñÝðåé íá áåðåëÝóåðå ìéá óåéñÜ áðü ñðèlþóåéò áéá íá áåëöéóöiðiéÞóåôå ôçí éåéöiõñäßá ôïö óðóðÞìáöiò óå ðåñéáÜëëíí áééiiéêÞò ìç ÷ áíÞò.

1. ÈÝóåå ôéíÝò óöéò íàðååéçôÝò ôïö öiññòùôÞ áééßíçóçò

Ç ðéí ôçíáíöéêÞ ñýèiéóç áßíáé íá íàéþóåôå ôçí ôéíÞ ôçò íàðååéçôÞò kern.hz áéá íá íàéþóåôå ôç ÷ñÞóç ôçò CPU óöi FreeBSD üðåáí ôí ÷ñçóéíðiéåßôå ôöi áééíééü ðåñéáÜëëíí ôïö **Virtual PC**. Áðöü ìðññåß íá áðéöåô ÷ èåß ðññóéÝóíöåò ôçí ðåñáéÜòù ãñáílÞ óöi áñ ÷ áßí /boot/loader.conf:

kern.hz=100

×ùñßò áðôP ôç ñýèiéóç, iéá åéëííéêP ìç÷áíP FreeBSD óôi **Virtual PC**, üôáí åêôåëåßôáé ÷ùñßò öïñôßi, èá ÷ñçóéiiðiéåß ðåñßò òi 40% òiô áðåâñáóôP óå Ýíá ìç÷Üíçìá iå ìßá CPU. ÍåôÜ áðü ôçí áëëåäP áðôP, ç ÷ñPóç èá åßíáé êííôÜ óôi 3%.

## 2. ÄçíëiðnåPóôå Ýíá íÝí áñ÷åßi ñõèìßóåùí ðõñPíá

Ìðiñåßôå íá áöáéñÝóåôå üéá ôá ðñiäñÜíáôå iäPäççò ãéá óôóéåôÝò SCSI, Firewire êáé USB. Ói **Virtual PC** ðáñÝ÷åé iéá åéëííéêP éÜñôá áéêôýiõ ç iðiñå ðñiðôçñßæåôáé áðü òi ðñüññáìá iäPäççò de(4), Üñá iðiñåßôå íá áöáéñÝóåôå üéåò òeò Üëëåò ñéêôýiõ áðü òií ðõñPíá, åêôüò áðü òi de(4) êáé òi miibus(4).

## 3. Ñýèiéóç äéêôýiõ

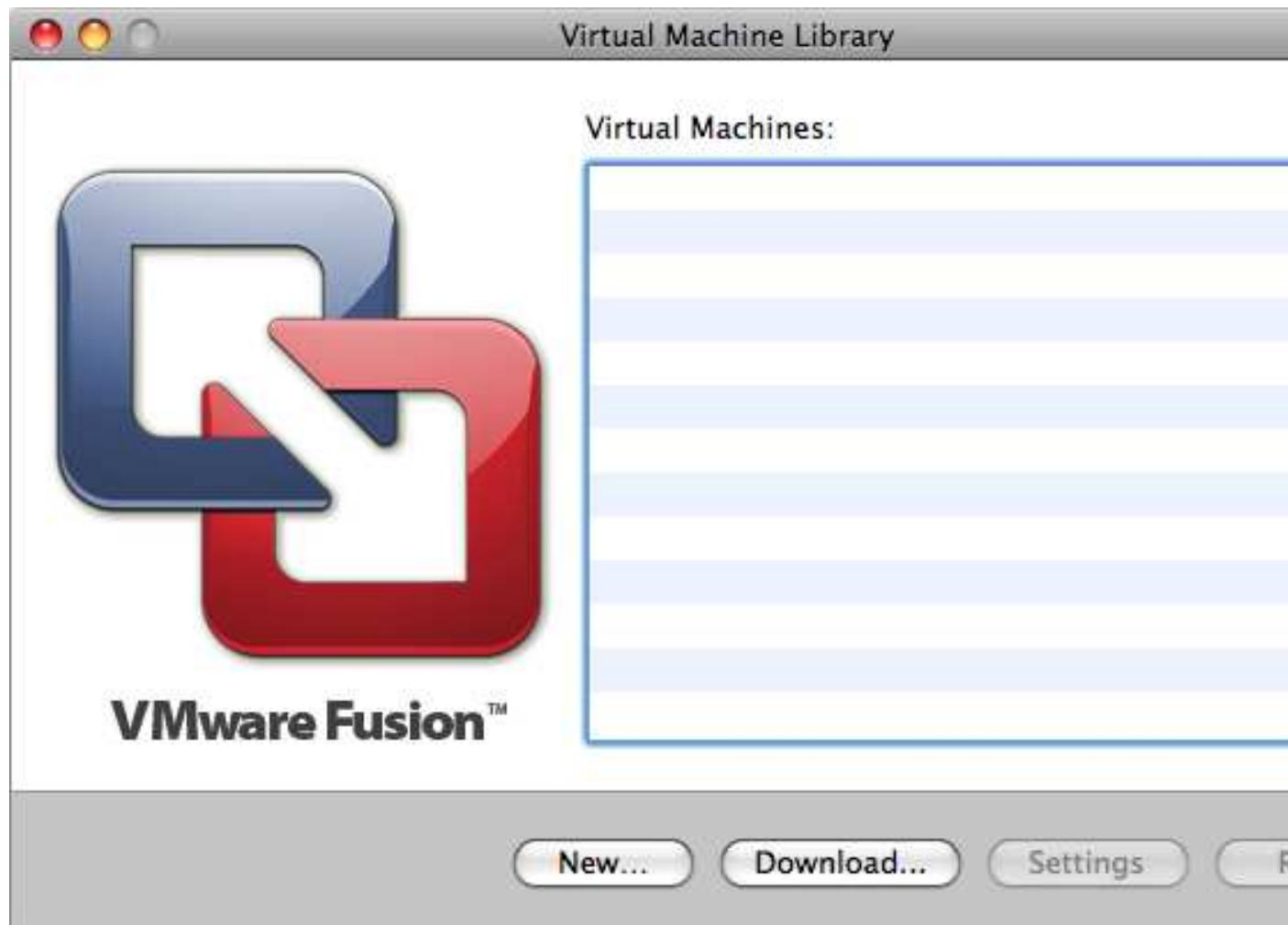
Ç ðéi áðëP ñýèiéóç äéêôýiõ ðåñéëåíå Üíåé ôç ÷ñPóç òiô ðñùôïëüëëiõ DHCP ãéá íá óôíäÝóåôå òi åéëííéêü ìç÷Üíçìá óåò óôi ßäéi òiðéêü äßêôði ìå òi ìç÷Üíçìá iåíéôP. Áðôü åðéôða÷Üíåôáé ðñiðôéÝôíôáò ôç ãñáìP ifconfig\_de0="DHCP" óôi /etc/rc.conf. Ìðiñåßôå íá åñåßôå ðéi ðñi÷ùñçìÝíåò ñõèìßóåéò äéêôýiõ óôi ÉåöÜëáéi 32.

### 23.2.3 Ói VMware óå MacOS

Ói **VMware Fusion** ãéá Mac åßíáé Ýíá åiðiñéêü ðñüññáìá. ÕðÜñ÷åé äéá õðiðiæôôÝò Apple Mac áñ÷éôåêôííéêPò Intel ðiõ ðñÝ÷iõi Mac OS 10.4.9 P éÜðiéá ðéi ðñüóöåôç Ýéäiõç. Ói FreeBSD ðñiðôçñßæåôáé ðéPñùò ùò öéëññíåìí (guest) èåéôïññéêü. Iüëéò iëiëçñùèåß ç ååêåôÜóôåóç òiõ **VMware Fusion** óôi Mac OS X, ðñÝðåé íá ñõèìßóåôå iéá åéëííéêP ìç÷áíP êáé íá ååêåôåôôPóåôå òi öéëññíåìí èåéôiðññéêü óýóôçìá.

#### 23.2.3.1 ÅåêåôÜóôåóç òiõ FreeBSD óôi VMware/Mac OS X

Áñ÷éêÜ iååéíPóôå òi VMware Fusion, êáé èá õiñôþóåé ç ÓðëëëiðiÅéëííéêpí ìç÷áípí. ÅðéëÝíôå "New" ãéá íá äçíëiðnåPóåôå iéá íÝí åéëííéêP ìç÷áíP:



Èá äâßôå íá öiñôþíáé òi New Virtual Machine Assistant, òi âiçèçôééü ðñüäñâíá äçieíõñâßáò iéáò iÝáò åéêííéÞò  
ìç-áíÞò. ÅðéëÝîôå Continue ãéá íá óðíâ ÷ ßóâôå:



Óðéëíäþ eåéôïõñâééíý óðóôÞláôïò äéáé Ýîôå Other êáé ùò Ýéäíóç eåéôïõñâééíý óðóôÞláôïò äéáé Ýîôå FreeBSD þ FreeBSD 64-bit (áíÜëíää íå òí áí èÝëåôå ððíóôÞñéíç äéá 64-bit åöáññäÝò þ ü÷é):



Ãþóôå Ýíá üíñá áéá ôi VM Image êáé ñðèìßóôå ôíí êáôÜëiai óðíí iðiþi èÝëåôå íá áðièçêåðèåß:



Ñõèìßôå õí ìÝââèïò ôíõ Åéêíéêíý Äßóêïõ ãéá ôçí åéêíéêí ìç ÷ áíí:



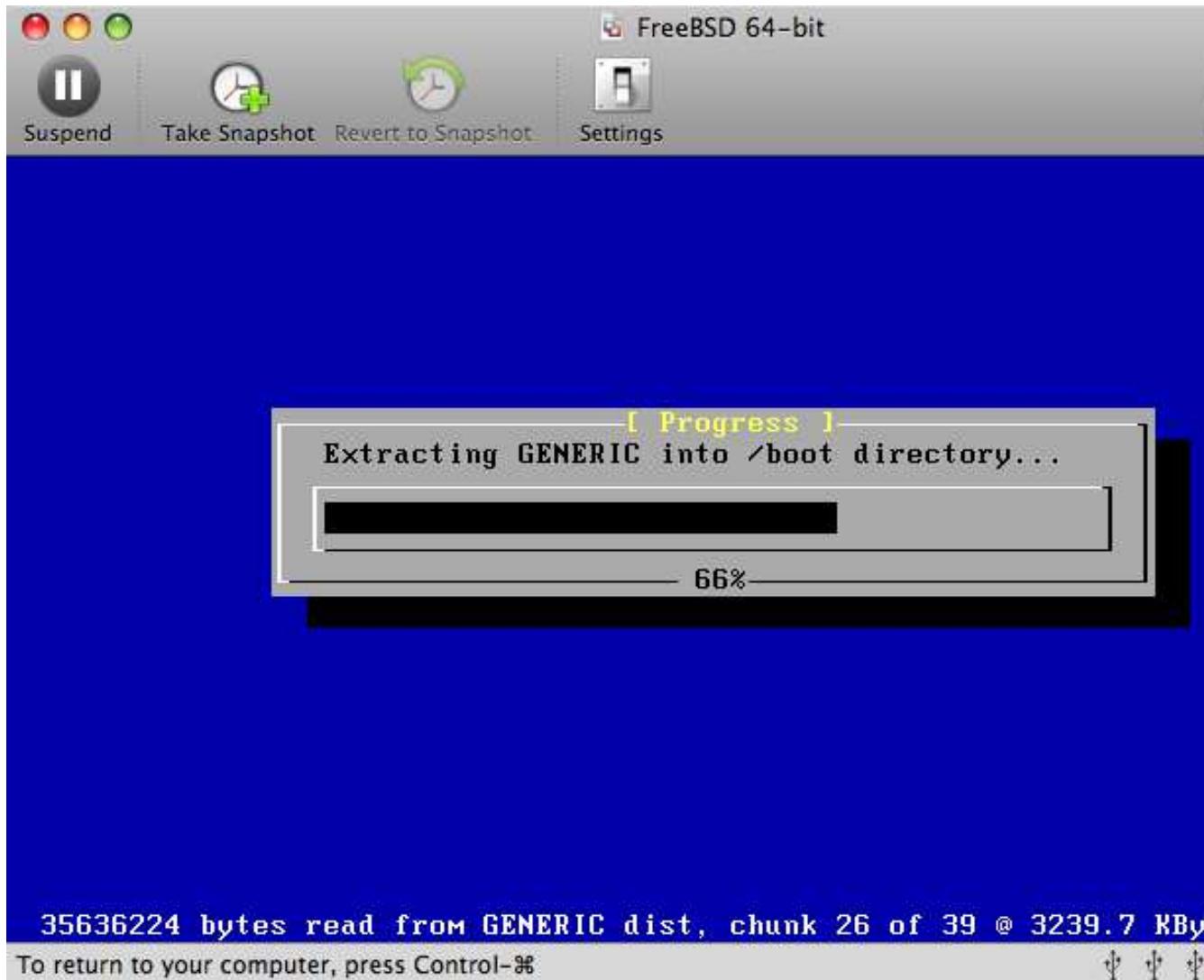
ÅðéëÝîôå ìéá iÝéïäi âæêåðÜóôåóçò ãéá ôçí åéëíéêðijþçóç: åßôå áðü Ýíá ISO image åßôå áðü ôi CD-ROM:



Íüëéò áðéëÝíåôå Finish, ç áéëíéêðijþçóçò (boot):

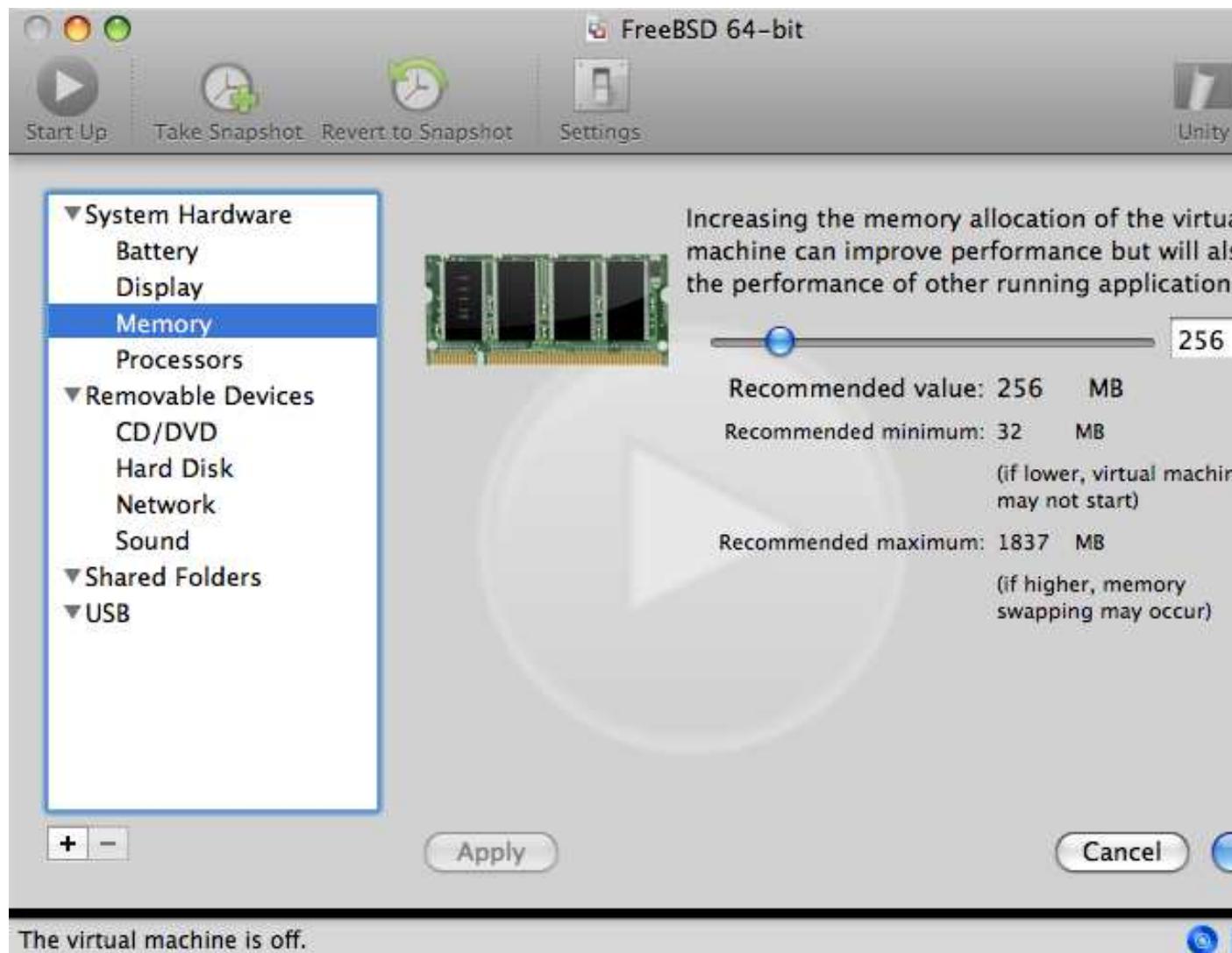


ÅâéáôáóðÞóðå ôí FreeBSD üðùð èá êÜíáðå êáé óå iðiéíæÞðiðå Üëëí ððíæíæñðóþ, P áêëëíðèþíðå ðéð iäçãßåð áðü ôí ÊðöÜëáéí 2:



Íüëéð ïeiëëçñùèåß ç åãéáôÜóôáóç, ìðiñâßôå íá áëëÜiâôå ôéò ñõèìßóåéò ôçò åéêíéêÞò ìç÷áíÞò, üðùò ð.÷. ôí ïÝåâæïò iíÞìçò ðið èá ÷ñçóëiiðiéåß:

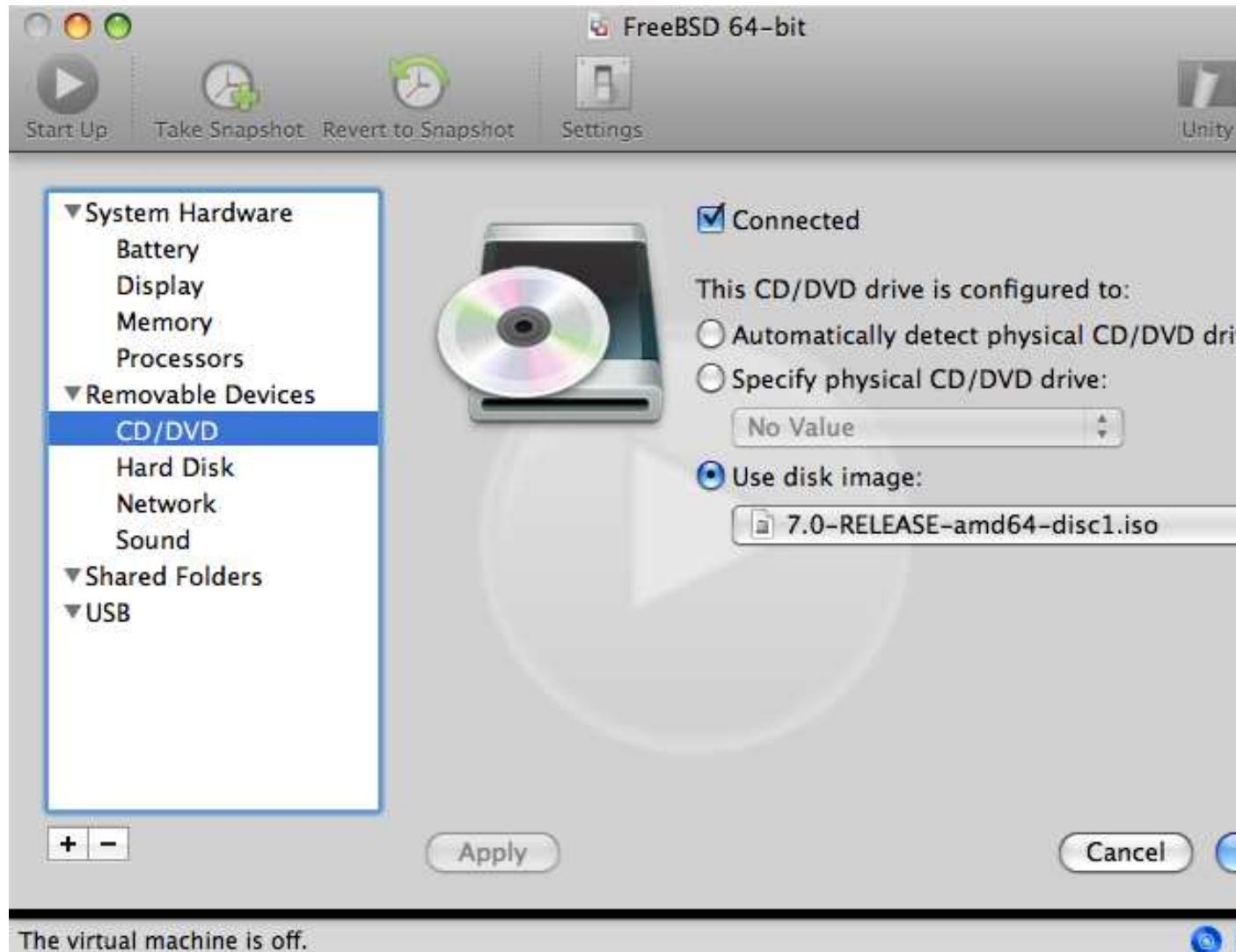
**Óçìâßùóç:** Íé ñõèìßóåéò õëéëíý íéáò åéêíéêÞò ìç÷áíÞò äå ìðiñíý íá áëëÜiñöí üóï ôñÝ÷åé áõôÞ ç åéêíéêÞ ìç÷áíÞ.



Íðñâðôå, áéüìç, íá ñõèìþóâôå ôíí áñéðìü ôùí áðââñâáóôþí ôíðò ïðibíðò áðéóñÝðâðáé íá ÷ñçóðíðíéþóåé áðôþ ç áéëíéëþ íç÷áíþ:



Óùò Ý÷åé íüçìá, áðßóçò, íá áéëÜlåôå ôï áñ÷åßí P ôç óðóéåðP ðïõ öáßíåôåé ùò CD-ROM iÝóá óôçí áéêíéêP  
 ìç÷áíP. ÓõíÞèùò iðiñåßôå íá áðiøðiáÝ óåôå ôï CD-ROM P ôï ISO image áðü ôçí áéêíéêP ìç÷áíP, áöïý äå  
 ÷ñâéÜæåôåé ðëÝíí üôáí Ý÷åé iëiñéçñùðåß ç áãéåôÜóôåç ôïõ FreeBSD:



The virtual machine is off.

Íéá áðü óéð óâéâðôáßåð ñðèìßôáéð åßíáé ç óýíââðç ôçð åéëíéêðò ìç÷áíðò íâ ôí äßêôðï. Åéá íá ìðiñâßôå íá óñíââðôå óðçí ÅÌ áðü Üëéá ìç÷áíðiaôá (åéôüð ôïð íâíéôð), åíâñäiðieðôå ôçí åðéëïäð Connect directly to the physical network (Bridged). Áëëéþð, åéá íá ìðiñâß ç ÅÌ íá óðíââðåß óðï äßêôðï íÝóù ôïð íâíéôð, áëëÜ íá ìç ìðiñíýí Üëéá ìç÷áíðiaôá íá óðíââðïýí óå áðôð, åíâñäiðieðôå ôçí åðéëïäð Share the host's internet connection (NAT).



The virtual machine is off.

Ìüëéò ðâëåéþóåôå íà áðòÝò ôéò ñðèìßóåéò, ìðñâåðôå íá åêëéÞóåôå ôç íÝá åéëíéêP ìç ÷áíP íà ôï öñâóéi-åæéåôåôçíÝii FreeBSD óáò.

### 23.2.3.2 Ñõèìßóåéò ôïö FreeBSD íÝóá óôï Mac OS X/VMware

Áöïý ôåëåéþóåôå íà ôçí åâæåóÜóôåóç ôïö FreeBSD óå ìéá åéëíéêP ìç ÷áíP **VMware** íÝóá óå Mac OS X, ðñÝðåé íá èÜíåôå eÜðiéåò ñðèìßóåéò ãéá íá åâæöéùèåß ç áðüäïöç ôïö FreeBSD ùò öéëíâñýíåñïó óôóôÞìáöiò.

#### 1. Ñõèìßóåéò íåðååëçþí ôïö boot loader

Ç ðeïí óçiaíôéêP ñyëìéóç åßíáé íá íåéþóåôå ôçí ðeïP ôçò íåðååëçþò kern.hz, ãéá íá íåéùèåß êÜðùò ç ÷ñþóç ôïö åðâíâñäåôþ áðü ôï FreeBSD êáèþò ôñÝ÷âé íÝóá óôï **VMware**. ÐññóðëÝóå, ëíéðüí, ôçí ðáñáéÜðù åñâñíP óôï áñ ÷åßí /boot/loader.conf:

```
kern.hz=100
```

×ùñßò áðôP ôç ñýèiéóç Ýíá öeëñâñýìåñí FreeBSD ðïõ ôñÝ ÷åé iÝóá óå VMware ìðïñåß íá ÷ñçóéñïðïéåß iÝ ÷ñé êáé 15% ðïõ áðâññåóôP áñüò iMac. ÍåñÜ Áðü áðôP ôç ñýèiéóç ç ÷ñþóç ðïõ áðâññåóôP ìðïñåß íá åßíáé ïéññüðåñç áðü 5%.

## 2. ÄçíéññåPóôå Ýíá íÝí áñ ÷åßí ñðèìßóåñí ððñPíá

Ìðïñåßòå íá áöáéñÝóåôå üëåò ôéò óðóéåðÝò FireWire êáé USB. Ôi **VMware** ðáñÝ ÷åé iéá åéêííéêP êÜñôå äéêôýïö, ç iðïßá åßíáé óðíâñåôP iå ôíí iäçäü em(4), iðüôå ìðïñåßòå íá áöáéñÝóåôå üëåò ôéò ððüëíéðåò êÜñôåò äéêôýïö áðü ôíí ððñPíá óáò.

## 3. Ñðèìßóå ôi äßêôòr

Í ðeï åýéëëò ôñüðò íá ñðèìßóåôå ôi äßêôòi ôçò åéêííéêPò iç ÷áíPò åßíáé íá óðíâñåßòå iÝóù DHCP iå ôi ôiðéêü äßêôòi, ÷ñçóéñïðïéþíðåò ôç åéäýèðíóç MAC ôiõ iâíéóôP. Áðôü ìðïñåß íá åßíâé ðññóèÝóññåðåò ôç åñâñíP ifconfig\_em0="DHCP" ôóï áñ ÷åßí /etc/rc.conf. Åéá ðâñéóóüðåñåò ðëçññöññåò êáé ðéí ðññ ÷ùñçìÝíå ñðèìßóåð äéêôýïö, ååßôå ôi ÊâðöÜëáéi 32.

### 23.2.4 VirtualBox™ Guest Additions óå FreeBSD Guest

Óå ðññüðåôå ðññññÜñáôå áéá ôi öeëñâñýìåñí ëåéôïññåéü (guest additions) ôiõ **VirtualBox™** ðáñÝ ÷iõí ððiðñPññéïç áéá ôå ðâñáéÜôù:

- ÈíéíP ÷ñþóç ðññ ÷åßññ (clipboard)
- ðñðíç ÷ñþóç ååßêôç ðññðéééiy
- Óðñ ÷ññéóìüò þññåò iå ôíí iâíéóôP (host)
- ÁíáðññóññíP iåññÝëíðò ðâñáèýññ
- ÈâðÜóôåóç áðññüðåñåò ëåéôïññåò (seamless mode)

**Óçìåßùóç:** Íé ðâñáéÜôù åíðïëÝò åéôåëýíóáé óóï öeëñâñýìåñí FreeBSD ëåéôïññåéü.

Áñ ÷ééÜ, ååéâåóôPóôå ôi ðâñÝôi emulators/virtualbox-ose-additions ôóï öeëñâñýìåñí FreeBSD ëåéôïññåéü.

```
# cd /usr/ports/emulators/virtualbox-ose-additions && make install clean
```

ÐññóèÝóå ôéò ðâñáéÜôù åñâñíYò óóï /etc/rc.conf:

```
vboxguest_enable="YES"
vboxservice_enable="YES"
```

Áí ðññüðåéåé íá ÷ñçóéñïðïéþóåôå ôi ntpd(8) P ôi ntpdate(8), èá ðñÝ ðâñé íá áðâñññåiðïéþóåôå ôi óðñ ÷ññéóìü þññåò iå ôíí iâíéóôP:

```
vboxservice_flags="--disable-timesync"
```

Ôi ðññññáñíà iäþçóçò vboxvideo\_drv öðóéíëiæéÜ èá áíáññéóôåß áðôüñláôå üôáí åéôåéÝóåôå ôi xorg-configure. Áí áðôü ååí óðíâñß, ôñññåiðïéþóå ôi xorg.conf áéá ôçí êÜñôå ãñáöéêþí ôiõ **VirtualBox**:

```

Section "Device"
    ### Available Driver options are:-
    ### Values: <i>: integer, <f>: float, <bool>: "True"/"False",
    ### <string>: "String", <freq>: "<f> Hz/kHz/MHz"
    ### [arg]: arg optional
    Identifier "Card0"
    Driver "vboxvideo"
    VendorName "InnoTek Systemberatung GmbH"
    BoardName "VirtualBox Graphics Adapter"
    BusID "PCI:0:2:0"
EndSection

```

Ãéá íá ÷ñçóéiiðiéÞóåôå ôï vboxmouse\_drv, ÷ñçóéiiðiéÞóôå ôçí ðáñáéÜôù áíüôçôá ãéá ôï ðiióßêé ôôï xorg.conf:

```

Section "InputDevice"
    Identifier "Mouse0"
    Driver "vboxmouse"
EndSection

```

Íé ÷ñÞóôåò ôïõ HAL èá ðñÝðåé íá äçleïõñäPóïõí ôï áñ÷åßí  
 /usr/local/etc/hal/fdi/policy/90-vboxguest.fdi Þ íá ôï áíðéãñÜøiõí áðü ôï  
 /usr/local/share/hal/fdi/policy/10osvendor/90-vboxguest.fdi:

```

<?xml version="1.0" encoding="UTF-8"?>
<!--
# Sun VirtualBox
# Hal driver description for the vboxmouse driver
# $Id: 90-vboxguest.fdi 21412 2009-07-08 21:18:57z vboxsync $


Copyright (C) 2008-2009 Sun Microsystems, Inc.

```

This file is part of VirtualBox Open Source Edition (OSE, as available from <http://www.virtualbox.org>. This file is free software; you can redistribute it and/or modify it under the terms of the GNU General Public License (GPL) as published by the Free Software Foundation, in version 2 as it comes in the "COPYING" file of the VirtualBox OSE distribution. VirtualBox OSE is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.

Please contact Sun Microsystems, Inc., 4150 Network Circle, Santa Clara, CA 95054 USA or visit <http://www.sun.com> if you need additional information or have any questions.

```

-->
<deviceinfo version="0.2">
    <device>
        <match key="info.subsystem" string="pci">
            <match key="info.product" string="VirtualBox guest Service">
                <append key="info.capabilities" type="strlist">input</append>
                <append key="info.capabilities" type="strlist">input.mouse</append>
                <merge key="input.x11_driver" type="string">vboxmouse</merge>
                <merge key="input.device" type="string">/dev/vboxguest</merge>
            </match>
        </match>
    </device>

```

```
</device>  
</deviceinfo>
```

### 23.3 Ôї FreeBSD ùò Îåíéóôþò (Host)

Ãéá áñéâðö ÷ ñüíéá, éáíÝíá áðü ðáéâðYðá áééïíéêðíþçóð áâí ððiôðPñéæå áðßðçíá ði FreeBSD ùò ðâíéôðP. ÊÜðiðié ÷ ñPóôð ÷ ñçóðiðiðiýóáí ðáæé Ýð ëáð ðáéâðö ðâéâðâðæéâðíÝíâð ãéäüöâðé ðiõ VMware (üðò ði emulators/vmware3), ié iðiðâð ÷ ñçóðiðiðiýóáí ðçí ððiâðâðüðçóð áâð Ýðâðçóð ðñüññâíì Úðùí Linux. Ëßäí ìâð ðçí áðßðçíç êðéëëiñmá ðiõ FreeBSD 7.2, Ýäéfá áéæé Ýðóéïç óðç ÕððéëiðP ðùí Ports ç Ýéâðiç Áñíéðöý Ëðpæéá (OSE, Open Source Edition) ðiõ VirtualBox ðcò Sun. C áðñññâðP áððP áâðâðæáßðâðé ùò áâðññâðÍð ðñüññâðâðé ðiõ FreeBSD.

Ôi **VirtualBox** åbíáé Ýíá ðeþnåò ðáé Ýöi áæéñíéëiðiþçóò ði ïðrþi âñþóêåðáé óå áæáñéþ áfÜðôðíç. Åbíáé äéæé Ýóëií áæá óå ðåñéóðüðåñá èæéðiðññéë Ü ðóðóðÞìåðá, ðóðiðåñéëâíñí Ýñúí ðúí Windows, Mac OS, Linux êáé FreeBSD. ÷ ðé ðç ãðiáðüðçóá íá âððæéðb ði ßæéí ñéé ði ðóðiðññéë Ü óýðiø Windows ütið êáé UNIX. Þ ÷ âððæé óå ãýí âððæüðåéð: áññééðiyý êáé èéðæéðiyý ðþæéêá. Áðùi ðçí iññéÜ ðið ÷ ðiðóðç, ßóùò iññééðiyýðåññið ðåñéñéðiðüð ðç ðé Ýéäiiðçóð áññééðiyý ðþæéêá åbíáé ç Ýéëåðç ððiðóðþñéïçò óðóðêåðþí USB. Íðiññåðóá íá áððæð ñéé ðiðiðññéë Ýð ðóð ðóðç óåððæð "Editions" ðið **VirtualBox** wiki, óðçí ðiðiðññéë <http://www.virtualbox.org/wiki/Editions>. Óç áððæñí Ýíç óððæðþí, ïññiç Ýéäiiðç OSE áæáððæðåé áæá ðið FreeBSD.

### 23.3.1 ÅæáôÜóôáóç ôïõ VirtualBox

Ôi **VirtualBox** ábíáé äéáèÝóéii ùò FreeBSD port óoi [emulators/virtualbox-ose](#). Éáèþò ói **VirtualBox** áñßóéåôáé õðü óðíá-Þ êáé ðíëý áíâñäP áíÜðôöïç, áââáéùèåßôå üöé Ý÷åôå áíáíåþóåé ói äÝíöñi ôú ports ðñéí iâééíÞóåôå óçí áâéåóÜóôáóç óið. ×ñcõéiiðíÞóåôå óéð ðáñâéÜòû áíöiëÝò ãéá íá ói áâéåôáóóÞóåôå:

```
# cd /usr/ports/emulators/virtualbox-ose  
# make install clean
```

Iéá ÷ nPóeíç áðééíäP ðiò áìoáíßæåôáé óóïi áéÜeíäi ñòèlßóåúí, áòiñ Ü óçí áåéåó Üóóåóç ôúí ðñiñåñáii Üóùí Guest Additions. Óá ðñiñåñÜñláôá áôô Ü ðáñ Y ÷ iòí iéá óåéñ Ü áðü ÷ nPóeíå ëåéöiññåßåò óôá óéëññåñíy íáíá ëåéöiññåééÜ, üðùò ç áéÜoáíç ëåéöiññåßå ðiò áåßéôç ðíiøéééiy (áðééñ Yðåé óóïi ðíiøéééiy áéåýèåñá iåðåíý ðiò iåíéóôP áéá ðiò óéëññåñíy iññò ëåéöiññåééiy, ÷ uñßò íá áðåéðåßóåé ç ÷ nPóç êÜðiøi áéäééiy ðéÞéôñiøi áéá áíáééäP) éaèþò éáé óá ÷ yðåñç áñãöéêP áðåééüíéóç, áéäééÜ óå ëåéöiññåééÜ Windows. Iðiññåßóå íá ânåßóå óá guest additions óóïi iåñíy Devices, uñóáí ñeéçñþóåôá óçí áåéåó Üóóåóç ðiò óéëññåñíy iññò ëåéöiññåééiy.

Đñéí ÷ ñçóéñíðíéÞóåôå ôi **VirtualBox** ãéá ðñþþôç õïñÜ, èá ðñ Ýðåé íá áééÜåôå êÜðíéåò ñòèlþóåéò. Ôi port ååééåééô Ü Yíá Üñèñùlá ððñÞíá óôíï êåôÜëíäi /boot/modules ôi iðíßí èá ðñ Ýðåé íá õïñþþôåôå ôôíï ððñÞíá ðíõ åéååéåþôåé:

```
# kldload vboxdrv
```

Áéá íá öiñôþíåôáé ói Üñèñùìá áôðüìáôá óá êÜeå åðáíåêßíçóç óiõ óôðôPiáôïò, ðññöéÝóôå ôçí ðáñâéÜôù ãñâììP óôï áñ÷åßí /boot/loader.conf:

vboxdry load="YES"

Áéá íá ÷ñçóéiiðiéÞóåôâ ôá áñèñþiáôá ðõñÞíá ðiø åðéôñ Ýðiøí ôç èåéöiññãßá ðiø äééôýiø óå êáôÜóôáóç áÝðoñâò (bridged) þ host-only, ðñiøéÝóåâ ôciç ðáññâéÜóù ãñâùþp óöi /etc/rc.conf êáé åðáíâééiÞóôá ðiø ðiøjæáéöôþ óå:

vboxnet\_enable="YES"

ÉâôÜ ôc äeÜñêâéá ôcò ââêâôÜôdâóçò ôiõ **VirtualBox**, äçléïöñââßôáé áôðüâáôá ç iñÜäá ÷ñçóðþí vboxusers. ¼ëié ié ÷ñÞóôâð ðiõ ÷ñâéÜæíîôáé ðññúôââóç ôiõ **VirtualBox**, éá ðñÝðâé íá áíÞéiõí óâ áôðôP ôçí iñÜäá. Iðiñââßôá íá ÷ñçóðþíðieÞrâðâóâ õcí áiðiõíþ pw áéâ íá ðññöèÝôââð íÝâ iÝëc ôóçí iñÜäá:

```
# pw groupmod vboxusers -m yourusername
```

Óá ðñiâðééâái Ýíá æééâéþíáóá áéá óç óðóðâöP /dev/vboxnetctl áðiáé ãñéâðÜ ðåñéiñéóôééÜ êáé ðñÝðâé íá  
æééÜñiðí ãéá íá èâéóññáÞóáé ðí äþéðòí òá êáðÜóóáóç ãÝööñáð.

Ãéá íá äiêéíÜóåôå ôéò íÝåò ñõèìßóåéò ðñïóùñéíÜ:

```
# chown root:vboxusers /dev/vboxnetctl  
# chmod 0660 /dev/vboxnetctl
```

Áéá íá áéë Üílåôð ðá áééáéþíáðá lüúéíá, ðñíjöð Ýóðå ðéð ðáñæéÜðû ãññaiÝðó ðóðí /etc/devfs.conf:

```
own      vboxnetctl root:vboxusers  
perm    vboxnetctl 0660
```

Áéá íá åêôåéÝóåôå ôí **VirtualBox**, iðiñåßôå áðëþò íá åðééÝåôå ôçí êáôå÷þñéóç Sun VirtualBox áðü ôí ìåñý ôíõ ãñáöééiy óáó ðåñéáÜeeíñöiò, þ íá ðëcêoñíæraÞóåôå ôí ðåñáéÜòú óá Ýíá òåñíàééóééú:

© VirtualBox

Áéá ðåñéóóüôåñåò ðëçñïöïñßåò ó÷åôééÜ ia ôç ñyèléóç êáé ÷ñPóç ôiõ **VirtualBox**, ðåñáêáëÿìå åðéóéåòëåßòå ôçí åðßöçç äéêôðåéÞ ôiðiëåòßå ôoi <http://www.virtualbox.org>. Éáéþò ôi FreeBSD port åßíáé ðïéý ðñüóóåöi, c åiÝééïç ôiõ åßíáé óoíå ÷Þò. Áéá ôeò ôåéåðôåßåò ðëçñïöïñßåò êáéþò êáé åéá iäçßåò åíðéíåðþðéóçò ôo ÷üi ðñiiäçéÜòù, ðåñáêáëÿìå ååßòå ôc ó÷åôééÞ óåéßåá ôoi wiki ôiõ FreeBSD, ôôçí ôiðiëåòßå <http://wiki.FreeBSD.org/VirtualBox>.

### 23.3.2 ÓðjóóÞñéîc USB óôi VirtualBox

**Ócùåßñóç:** Æá áâ áßìáâ áôòÜ áôåéôåßôáé ôi VirtualBox 4.0.0 þ ìåôåâååÝóôåßñ.

Áéá íá iðriñâßôå íá äéáâÜóâôå êáé íá ãñÜøâôå óå óõõéâôØ USB, èá ðñÝðåé í eïäññéáöìüò óåó íá áíÞêåé óôçí íñÜää operators:

```
# pw groupmod operator -m jerry
```

Định nghĩa /etc/devfs.rules (cài đặt tự động):

```
[system=10]  
add_path '/usb/*' mode 0660 group operator
```

Ãéá íá öiñôbóåôå ôiñôò íÝiñò êáüüåò ðññöèÝóôå ôcí ðáññáêÜôòù ãññâùP óöii /etc/rc.conf:

```
defns system ruleset="system"
```

Ðåéôá åðáíåêéíþóôå ôü devfs:

```
# /etc/rc.d/devfs restart
```

Ìðiñåßôå ôþñá íá åíâññiðiéÞóåôå ôi USB óôi öeëññâñyâñi ëåéôiõññæêü. Èá ðñÝðåé íá iðiñåßôå íá äåßôå ôéo ôðóéåôÝò USB óôéò ðñiôéiÞóåéò ôið VirtualBox.

### 23.3.3 Ðñüóâáóç óoi DVD/CD ôið ïåíéóôþ

Èá ðñÝðåé íá öiñþoåôå ôi Üñèñùá ðoñþíá atapicam ðñiøèÝôiíôåò ôçí ðáñáêÜôù ãñáììP óôi /boot/loader.conf:

```
atapicam_load="YES"
```

Èá ðñÝðåé íá åêôåëåßôåé ôi HAL ãéá íá ëåéôiõññÞóåé óùóôÜ ôi DVD/CD óoi **VirtualBox**. ÅíâññiðiéÞóåôå ôi óôi /etc/rc.conf êáé iâééiÞóåôå ôi (áí äáí åêôåëåßôåé Päç):

```
halld_enable="YES"
```

```
# /usr/local/etc/rc.d/hald start
```

Åéá íá iðiññýí ié ÷ñÞóåôå ìá Ý÷iði ðñüóâáóç óôéò ëåéôiõññßåò CD/DVD ôið **VirtualBox**, ÷ñåéÜæiiôåé ðñüóâáóç óôéò ôðóéåôÝò /dev/xpt0, /dev/cdn êáé /dev/passn. ÐñiøèÝóôå ôéò ðáñáêÜôù ãñáììÝò óôi /etc/devfs.conf:

```
perm cd0 0600
perm xpt0 0660
perm pass0 0660
```

# ÊåöÜëáéï 24 ÔïðééêÝò Ñõèìßóåéò - ×ñþóç êáé ñýèìéóç I18N/L10N

*ÓðíáéóöiñÜ óiõ Andrey Chernov. ÄñÜöçêå íáíÜ áðü óüí Michael C. Wu.*

## 24.1 Óýíiøç

Ôi FreeBSD ábáráé Ýíá éæéáþôðáná áðíéâíðñùl Ýíá Ýñái íà ð·ñÞóðåð êáé áèéâíðó Ýð óá íæúëëçñí òíí êúðóí. Ôið êáðÜéáéí áðóðü óðæçöiýíðáé íé áððáûðóçðåð ðíðééþí êáé áæéâíþí ñððéìðóáûí ðið FreeBSD, íé ïðñíðåð áðéðñÝðíðí óá ð·ñÞóðåð áæúðóðí áðéðü ðíðééþí ðñðááðééþ áññááðá. ÕðÜñ ð·iðí ðíðéëíß ðáñÜäíðóðó óðóçí ðëiðiðíþçóð ðið ðééáéðþíð i18n, ðüðí ðá ððþððáäí ðóðóðþíâðí, ðüðí êáé áððáññíþí, êáé áðá íiðí ðüðí ð·ññáéÜæáðáé, ðáññáðÝðíðíðí ðiðí áíááñíþðóð ðá ðéí ðóðáâðéñí Ýíá ðçâÝð ðôðéïçñþùñðóð.

Áöiý äéáâÜóåôå áõôü öi êåöÜëáéï, èá iÝñåôå:

- Đùò êùääéëïðïéïýíóåé íé äéþóåò êáé íé ðïðééÝò ñòëìßóåéò óóå óýã ÷ñííá èåéöïññäééÜ óóóôÞìáôá.
  - Đùò íá áÜëåôå ðïðééÝò ñòëìßóåéò óôï êÝëööïò óåò (login shell).
  - Đùò fá ñòëìßóåôå ôçí êïïóüëä åéá äéþóåò åéôüò ôçò ÁääëééÞò.
  - Đùò íá ÷ñçöéëïðïéÞóåôå áðïòååëåóiåôééÜ ôï óýóôçíá X Windows lå äéåöïñåôééÝò äéþóåò.
  - Đïö íá âñåßóå ðåñéóóüôåñåò ðëçñïöïñßåò åéá ôç óóåññäöÞ åöáññäþí óõiâåôþí lå ôï ðñüööði i18n.

Đñéí äéáâÜóåôå áôôü ôï êåöÜëáéï, èá ðñÝðåé:

- Íá áíññþæåôå ðùò íá åääéåóåóôÞóåôå ðññüóèåôï ëïäéóíéêü ôñßöîõ êåóåóéåôåóôÞ (ÊåöÜëåéí 5).

## 24.2 ÅáóéêÝò Äíþóåéò

## 24.2.1 Öé Åßíáé ôï I18N/L10N;

Í é åöánñírá Ýò I18N ðñiäñálláðóþæñóáé íå óç áírPéåéá áññáæðßùí (kits) êáé áéâéëíèçéþí. Áðéñòñ Ýðåðóáé Ýóóé óóïòð ðñiäñálláðóéóó Ýò íá ãñÜøiõí Ýíá áðëü áñ÷åßíí èáé íá iàðóáñÜøiõí óá iàññíy èáé óá èåßíiáíá ðið áðåðéëíðßæåé ç åöánñíðþ, óá êÙëá æþþóá ðið áðåðéóðåðóáé. Óóíéðóýìá Ýíèññá óóïòð ðñiäñálláðóéóó Ýò íá aéíiøðéýí óçí ðáñáðÜíù óýíàáóç.

**24.2.2 Æáôß ÐñÝðåé íá ×ñçóéìïðïéÞóù ôá I18N/L10N;**

Óá I18N/L10N ÷ñçóéíïðíéíýíóáé êÜèå öinñÜ ðiõ åðééöìåßôå íá äåßôå, íá åéöÜäåôå, þ íá åðåíåññáóôåßôå äåäññÝíá óå äéþóåôå åéôüö ôçò Áääëééþð.

### 24.2.3 Ðïéåò Åëþóóåò Õðïóôçñßæíïôáé óðî I18N;

Ôi I18N êáé ôi L10N åáí åßíáé åéäéêÜ ööðéááiÝíá ãéá ôi FreeBSD. Ôçí ååäñÍYíç óðéäíP, ðïðóôçñßæíïôáé ié ðåñéóðüôåñåò åíñóð Ýò åëþóóåò, ôðiðåñéëåíâåññíÝíüí ôúí: Êéíåäééþí, Åññáíééþí, ÅéáðùÍYæééùí, Èíñååôééþí, Åáéééþí, Ñùóééþí, ÅéåðíáiÝæééùí, é.á.

## 24.3 ×ñþóç ôúí Óiðééþí Ñõëìßóåùí

Ôi I18N åßíáé óðçí ðñáäíåðéêüôçôá iéá óýíâáóç, êáé ååíÝ÷åé åçìéïñäçèåß áðiðééåéóôéêÜ åéá ôi FreeBSD. Åðééðñíýå ôç åíPðéåéá óðåò þóðå ôi FreeBSD íá åéíëiðéåß áðôðP ôç óýíâáóç.

Íé ðïðééÜ Ýò ñõëìßóåéò ååóþæíïôáé óå ôññåéò ååóðéíyò üññiðò: Ëùäééü Æëþóóåò, Ëùäééü ×þñáò êáé Ëùäééiðíßçóç. Ôá iiññååå ôúí ôïðééþí ñõëìßóåùí ðññéýðòiðí áðü ôiðò ðáñáðÜíü üññiðò, iå ôíí ôññüði ðið ðåñéññÜðååðé ðáñáêÜòù:

ÈñäééüðÅëþððåò\_Èñäééüð×þñáð . Èñäééëiðíßçðç

### 24.3.1 Ëùäééïß Åëùóóþí êáé ×ùñþí

Åéá íá ÷ñçóéiiðíéçèíyí ié ðïðééÜ Ýò ñõëìßóåéò åéá iéá óðåäéåññíÍYíç åëþóóå óå ÍYíá óýóðçíá FreeBSD (P óå Üëëí õýóðçíá ðýðiò UNIX ðið ððïðóçñßæåé ôi ðññüðòí I18N), i ÷ñþóðçò èá ðñÝðåé íá åññåé ôiðò êùäééïyò ôçðò óðåäéåññíÍYíçò ÷þñáò êáé åëþóóåò (ié èùäééïß ÷ùñþí êåéíäçäiyí ôéò åöåññíäÝò ó÷åðééÜ iå ôç åéÜëåéòi ôçðò åëþóóåò ðið ðñÝðåé íá ÷ñçóéiiðíéçèåß). ÐññrññÜññååå ùðñò ðöðéëññåðñçòÝò, åíððçññåðñçòÝò éðóðíðåëëßäùí, åíððçññåðñçòÝò SMTP/POP êëð. ðáñññiðí åðßðóçò êÜðíéåò áðiðòÜðååéò ðið åíññóþíðåé áðü ôiðò êùäééïyò áððiýò. ÐáñáêÜòù ôáßññåðåé iåññééÜ ðáññåååßññååå åëùóóþí÷ùñþí:

Èùäééüò Åëþóóåò/×þñáò	Ðåñéññåòþ
en_US	Áåäééü - ÇñùÍYíåò Ðïëéôåååò
ru_RU	Ñþóðéá - Ñùóþá
zh_TW	ÐáñáäüóéåéÜ ËéÍYæééá - ÒáúåÜí

### 24.3.2 Ëùäééïðíéþðååéò

ÊÜðíéåò åëþóóåò ÷ñçóéiiðíéçèíyí èùäééïðíéþðååéò ðið ååí åßíáé ASCII, åéëÜ ðåñéÜ÷iðí÷áñåéðþñåò 8-bit, wide, P multibyte (ååßôå ôç óåëëßää manual multibyte(3) åéá ðåñéññóðôåñåò ðëçññiðñßåò). Íé ðið êåéíïyñéåò åöåññíäÝò õðíPðèñò ãíññåññåðæiðí òññò ÷áñåéðþñåò 8-bit. ÁíÜëëññå iå ôçí ðöðíðíßçóç, ié ÷ñþóðåò ïðññåß iå ÷ñåéÜxååòåé íá iåññååññüðôðßóiðí iéá åöåññíäP iå ððiðóðþññéç ÷áñåéðþññí wide P multibyte, P íá ðññóðññiðí ðið ôéò ñõëìßóåéò ôið ðññrññÜññååò. Åéá íá Ý÷åðå ôçí ééåññüôçôá íá åéóÜðåååå êáé íá åðåñññÜæååò ÷áñåéðþñåò multibyte, ç ÓðëëíäP ôñí Ports ôið FreeBSD (<http://www.FreeBSD.org/ports/index.html>) åéáëÝóåé ðññrññÜññååå åéá êÜëå åëþóóå. Ååßðå ôçí ðåññóðññóç åéá ôi I18N óðiñ áíðßðóéé ÷i Port ôið FreeBSD.

Åéééüðåññ, i ÷ñþóðçò ÷ñåéÜæåååé íá åéååÜóåé ôçí ðåññóðññóç ôçðò åöåññíäPò, åéá íá åðiðóðßóåé ðùò ðñÝðåé íá ôç ñõëìßóåé õðóðÜ P ðùò íá ðåññÜðååé ôéò ðùóðÝò ôéí configure, ôi Makefile P ôíí iåññååññüðôðéóðP.

Èá ðñÝðåé íá Ý÷åðå åéåÜ ðið êÜðíéå ðñÜäíååå:

- Óåò ÷áñåéðþññí ðið åíññóþíðåé áðü ôç åëþóóå (single C chars character set, ååßôå ôçí multibyte(3)), ð.÷. ISO8859-1, ISO8859-15, KOI8-R, CP437.

- Êùäééïðíéþóåéò Wide P multibyte, ð.÷. EUC, Big5.

Ìðiñâßôá íá äåßôå ôçí áíâñãþ ëßóôá ôùí óåô ÷áñáéôþñùí óöi Íçôñþi IANA  
(<http://www.iana.org/assignments/character-sets>).

**Óçìàßùóç:** Ói FreeBSD ÷ñþóéïðíéåß ãéá ôéò ðiðéêÝò ñõèìßóåéò êùäééïðíéþóåéò óðiâáôÝò iå ôi X11.

### 24.3.3 ÅöáññäÝò I18N

Óöi óýóôçìá ðáéÝò õéá ports ôi FreeBSD, ié åöáññäÝò ðið ð.÷. åðßæïíðáé iå ôi I18N Ý.÷.iðí óöi üññá ôiðò ôç ëÝíç I18N þróôå íá áíâññùñþæïíðáé áýéëéá. Ùóðüöi, Ìðiñâß íá ìçí ððiðóçñþæïðí ðÜfóðå ôç ãëþóá ðið ÷ñâéÜæåðôå.

### 24.3.4 ÓiðéêÝò Ñõèìßóåéò

Åßíáé óóíþèùò áñêåðü íá ãßíåé export ç ôéíþ iå ôçí iññáóßá ôçò åðééöiçôþò ðiðéêþò ñýèìéóçò, iÝóù ôçò iåðååâëçôþò ðåñéåÜëëiðíð LANG óöi ëÝéðöið åéñüäið. Áðôü Ìðiñâß íá ãßíåé óöi áñ÷åßí ~/.login\_conf ôið ÷ñþóðç, P óöi áñ÷åßí åêéßíçóçò ðið ëåéýöið ðið ÷ñþóðç (~/.profile, ~/.bashrc, ~/.cshrc). Äái ãßíåé áíÜâéç íá èÝóååðå êáé ôéò ððüëééðåò iåðååâëçôÝò ôùí ðiðéêþí ñõèìßóåùí, üðùò ié LC\_CTYPE, LC\_CTIME. Äéá ðåñéóðüðåñâð ðëçññiðñðåò, ãéáåÜóôå ôçí ôåéïçññùóç ôið FreeBSD ðið ð.÷. åðßæåðåé lå ôçí ððiðóþñéïç ôçò åðééðiçôþò ãëþóáð.

Èá ðñÝðåé íá èÝóååð ôéò áÿí ðáñâéÜû ïåðååâëçôÝò ðåñéåÜëëiðíð, óðá áñ÷åßá ñõèìßóåùí:

- Ôçí LANG ãéá ëåéðiðñðåò ðið áíþêiðið óöçí iééíäÝíåé POSIX setlocale(3)
- Ôçí MM\_CHARSET ãéá ôi óýñëë ÷áñáéþñùí MIME ôùí åöáññäþi.

Ói ðáñáðÜíù ðáñéééâíäÜíåé ôçí ñýèìéóç ôið êåéýöið ÷ñþóðç, ôçí ñýèìéóç ãéá iéá óðååâéñéíÝíç áöáññäþ, êáé ôç ñýèìéóç ãéá ôá X11.

#### 24.3.4.1 ÍÝëíäíé Áééååþò Óiðéêþí Ñõèìßóåúí

ÓðÜñ÷iðí áÿí iÝëíäíé ãéá ôçí áééäåþ ôùí ôiðéêþí ñõèìßóåùí, ôéò ðiðßåò êáé ðåñéanÜëëiðí ðáñâéÜû. Ç ðñþóç (ôçí ðiðíßá êáé óðíéðöiýíå) ðeíðíéåßôåé ëÝðíðå ðeíÝò ðóéò iåðååâëçôÝò ðåñéåÜëëiðí ðoíi login class, êáé ç äåýôðñç áééÜæëíðåò ôéò ðeíÝò ôùí iåðååâëçôþí ðåñéåÜëëiðí ðoíi áñ÷åßí åêéßíçóçò ôið êåéýöið ðið ÷ñþóðç.

##### 24.3.4.1.1 ÍÝëíäíò ÊëÜóåúí Áéóüäið (Login Class)

Ç iÝëíäíò áðóþ åðéññÝðåé íá ãßíåé ç ñýèìéóç ôùí iåðååâëçôþí ðåñéåÜëëiðí iéá òiñÜ ãéá êÜëå êÝéðöið, áíðß íá ÷ñâéÜæåðåé íá åðéññÝðå ðóéò áñ÷åßí åêéßíçóçò ðið êåéåñü ÷ññéóðÜ. Íé Ñõèìßóåéò óå Åðßðåäið ÷ñþóðç ðiðññíýí íá ãßíññí ðóéò ðið ðeíþñùí ðåñéåÜëëiðí ðoíi ðið ÷ñþóðç, áíþ ié Ñõèìßóåéò óå Åðßðåäið Äéá ÷åéñéóðþ ãðáéðiýí ðññíññí ðåñéåÜëëiðí ðið ÷ñþóðç.

##### 24.3.4.1.1.1 Ñõèìßóåéò óå Åðßðåäið ×ñþóðç

Ói ðáñáéÜû áðëü ðáññÜäåéâíá, ååß ÷íåé Ýíá áñ÷åßí .login\_conf óðíi êåðÜëëiðí ðÜðíðí ÷ñþóðç óðíi ðiðíßí êáé ié áÿí iåðååâëçôÝò Ý.÷.iðí ðóéèåß ãéá êùäééiðíßçóç Latin-1:

me : \

```
:charset=ISO-8859-1:\n:lang=de_DE.ISO8859-1:
```

ÐáñáéÜôù áëÝðåôå Ýíá .login\_conf óóï iðiði ïé ìåôáâéçôÝò Ý÷iði ðåâéåß ãéá ÐáñáäiöéáéÜ ÊéíÝæéêá óå õùâééïðiðiçóç BIG-5. Ðáñáôçñþóôå üðé Ý÷iði ðåâéóóüðåñåò ìåôáâéçôÝò, êáéþò ëÜðiéåò åöáñiäÝò áái ÕÝaiíôáé óùóôÜ ðéò ìåôáâéçôÝò ãéá ÊéíÝæéêá, ÆáðùíÝæéêá ëáé ÊiñåÜôéêá.

```
#Users who do not wish to use monetary units or time formats\n#of Taiwan can manually change each variable\nme:\n
```

```
:lang=zh_TW.Big5:\n:setenv=LC_ALL=zh_TW.Big5:\n:setenv=LC_COLLATE=zh_TW.Big5:\n:setenv=LC_CTYPE=zh_TW.Big5:\n:setenv=LC_MESSAGES=zh_TW.Big5:\n:setenv=LC_MONETARY=zh_TW.Big5:\n:setenv=LC_NUMERIC=zh_TW.Big5:\n:setenv=LC_TIME=zh_TW.Big5:\n:charset=big5:\n:xmodifiers="@im=gcin": #Set gcin as the XIM Input Server
```

Æá ðåñéóóüðåñåò ðëçñiöiñþåò, äåßôå ðéò Ñõëìßóåéò óå Åðßðåäï Æá÷åéñéóôP êáé ôçí login.conf(5).

#### 24.3.4.1.1.2 Ñõëìßóåéò óå Åðßðåäï Æá÷åéñéóôP

Âåâáéùðåßôå üðé Ý÷åé ñééóôåß ç óùóôP ãéþóóá óôçí ëëÜóç ðiði ÷ñþóôç, óóï áñ÷åßi /etc/login.conf. Óóï áñ÷åßi áðôü èá ðñÝðåé íá ðñÜñ÷iði ie ðáñáéÜôù ñõëìßóåéò:

```
language_name | Account Type Description:\n:charset=MIME_charset:\n:lang=locale_name:\n:tc=default:
```

Ìå åÜóç ðñïçäiýiåñi ðáñÜääéäiá ìáò ðiði ÷ñçóéiiðiéÞóåíå Latin-1, ðiði áñ÷åßi èá iiéÜæåé ìå ðáñáéÜôù:

```
german | German Users Accounts:\n:charset=ISO-8859-1:\n:lang=de_DE.ISO8859-1:\n:tc=default:
```

Ðñéí êÜíåôå áéëåáÝò óðéó ÊéÜóåéò Åéóüäiò (Login Classes) ðiði ÷ñçóðþí, åéðåéÝóôå ôçí ðáñáéÜôù åíðiðP:

```
# cap_mkdb /etc/login.conf
```

þóôå íá åíðiðiéçèiýí óóï óýóôçíá ie áéëåáÝò ðiði êÜíåôå óóï /etc/login.conf.

ÁéëåáP ËëÜóåùí Åéóüäiò iÝóù ôçò vipw(8)

×ñçóéiiðiéÞóôå ôçí vipw ãéá íá ðñiðeÝóåôå iÝiði ÷ñþóôåò, êáé êÜíåôå ôçí êáðå÷þñéóç íá iiéÜæåé ìå ôçí ðáñáéÜôù:

```
user:password:1111:11:language:0:0:User Name:/home/user:/bin/sh
```

### Áëëááþ ÊëÜóåùí Áéóüäïõ iÝóù ôçò adduser(8)

×ñçóéïïðíéÞóôå ôçí adduser ãéá íá ðñïöèÝóåôå iÝiõò ÷ñþóôåò, êáé Ýðåéôå áéïëïðèþóôå ôéò ðáñáéÜôù ëäçãßåò:

- ÈÝóôå ôï defaultclass = language ôï /etc/adduser.conf. Íá Ý÷åôå õðüþç óåò üïôé óå áðôþ ôçí ðåñßðôùóç, èá ðñÝðåé íá ìñþóôå iéá ëëÜóç default ãéá üëïõò ôïõò ÷ñþóôåò Üëëùí ãëùóóþí.
  - Ìéá áíáëëåôéêþ eýóç, åßíáé íá áðáíôÜôå êÜëå öiñÜ óôçí åñþöç
- Enter login class: default []:
- ðrõ åìöáíßæåôåé áðü ôçí adduser(8).
- Áéüìá iéá áíáëëåôéêþ eýóç, åßíáé íá ÷ñçóéïïðíéÞóôå ôï ðáñáéÜôù óå êÜëå ÷ñþóôç ðiõ èÝéåôå íá ðñïöèÝóåôå êáé iðiðíø ÷ñçóéïïðíéåß äéáöiñåôéêþ åëþóóá:

# adduser -class language

### Áëëááþ ÊëÜóåùí Áéóüäïõ iÝóù ôçò pw(8)

Áí ÷ñçóéïïðíéåßôå ôçí pw(8) ãéá íá ðñïöèÝóåôå iÝiõò ÷ñþóôåò, êáé Ýóôå ôçí iå ôíí ðáñáéÜôù ôñüði:

# pw useradd user\_name -L language

#### 24.3.4.1.2 iÝëïäïò Áñ÷åßùí Áéêßíçóçò Êåëýöiõò

**Óçìåßùóç:** Ç iÝëïäïò áðôþ åáí óðíßóôååé, êáèþò áðáéôåß äéáöiñåôéêÝò ñõëìßóåéò åéá êÜëå äéáöiñåôéêü ðñüåñáííå åéëýöiõò ðiõ ÷ñçóéïïðíéåßôåé. Ðñïöéíþóôå êáëýôåñá ôçí iÝëïäí ôuí ÊëÜóåùí Áéóüäïõ.

Áéá íá ðñïöèÝóåôå ôéò ðiðééÝò ñõëìßóåéò êáé ôï óåô ÷áñáêôþñùí MIME, ñõëìßóôå áðëþò ôéò äýí iåðååëçôÝò ðåñéåÜëëíðiò ðiõ öáßííðoåé ðáñáéÜôù ôïi áñ÷åßí /etc/profile P/éáé ôï /etc/csh.login. Èá ÷ñçóéïïðíéÞóïòiå ôá ÅåñíáíéêÜ ùò åëþóóá åéá ôï ðáñáéÜôù ðáñÜäåéäíá:

Óôï /etc/profile:

```
LANG=de_DE.ISO8859-1; export LANG
MM_CHARSET=ISO-8859-1; export MM_CHARSET
```

<sup>1</sup> óôï /etc/csh.login:

```
setenv LANG de_DE.ISO8859-1
setenv MM_CHARSET ISO-8859-1
```

ÅíáëëåêôéêÜ, ìðiñåßôå íá ðñïöèÝóåôå ôéò ðáñáðÜíù ëäçãßåò óôï /usr/share/skel/dot.profile (áíôßóôïé÷á iå ôéò ëäçãßåò åéá ôï /etc/profile ðiõ åßäáíå ðáñáðÜíù), P óôï /usr/share/skel/dot.login (áíôßóôïé÷á iå ôéò ëäçãßåò åéá ôï /etc/csh.login ðiõ åßäáíå åðßóçò ðáñáðÜíù).

Åéá ôï X11:

Óôï \$HOME/.xinitrc:

```
LANG=de_DE.ISO8859-1; export LANG
```

1:

setenv LANG de\_DE.ISO8859-1

ÁíÜëáá íå ôi êÝëööìò ðiö ÷ñçóëiïðiéåßôå (äåßôå ðáñáðÜíù).

## 24.3.5 Ñõëìßóåéò ãéá ôçí Êiióüéá

Ãéá üéá óá single C óåô ÷áñáêôÞñùí, iðiñåßôå íá èÝóåôå ôéò ãñâiìáöiöåéñÝò ôçò êiióüéåò óôi /etc/rc.conf ãéá ôçí åðéèöiçðP ãëþóáò, ãñÜöiïðoåò:

```
font8x16=font_name
font8x14=font_name
font8x8=font_name
```

Ôi font\_name ääþ ðñiïëýðôåé áðü ðið áíðßóöié ÷iðiñåßôå /usr/share/syscons/fonts, áöáéñþíôåð ôçí éåðÜëçíç .fnt.

Áí ÷ñåéÜæåðåé, ÷ñçóëiïðiéÞóåå ôçí êáðÜëéççé áíðéööið ÷çóç ðeçèöñiïërãßiö (keymap) êáé iëüíçò ãéá ôi óåô ÷áñáêôÞñùí single C ðiö ÷ñçóëiïðiéåßôå, iÝóù ðiö sysinstall. Iüëéò åéðåéÝóåôå ôi sysinstall, åðééÝiôå ôi Configure, êáé Ýðåéåå ôi Console. ÁíáééåðééÜ, iðiñåßôå íá ðñiöéÝóåôå ôi ðáñáéÜôù óôi /etc/rc.conf:

```
scrnmap=screenmap_name
keymap=keymap_name
keychange="fkey_number sequence"
```

Óôçí ðåñßðôùóç áðôP, ôi screenmap\_name ðñiïÝñ ÷åðåé áðü Ýíá áñ ÷åßi ôiö êáðåëüäiö /usr/share/syscons/scrnmaps, ÷ùñßò ôçí êáðÜëçíç .scm. Ç áíðéööið ÷çóç iëüíçò ïáæß íå ôçí áíðßóöié ÷ç ãñâiìáöiöåéñÜ, ÷ñçóëiïðiéåßôåé óðiðPèùò ãéá ôçí åðÝêóåóç ôiö 8iö bit óôi 9o, ãéá êÜñôåò VGA ðiö ÷ñçóëiïðiéíýí ïPðñá ÷áñáêôÞñùí íå 8 ðôPéåò.

Áí Ý ÷åðå áíáññäiðiéçìÝñ ôiñ ãáßññá moused ôôi áñ ÷åßi /etc/rc.conf:

moused\_enable="YES"

êáéü èá åßíáé íá åíåðÜóåôå ôéò ðeçñiöiñßåò õ ÷åðééÜ íå ôiñ ãññÝá ôiö ðiñðéééiy ðiö åiðáíßæiñôåé ôôçí ðáñáéÜôù ðáñÜññáöi.

Í ðñiåðééååíÝñ ãññÝáò ôiö ðiñðéééiy ðiö ÷ñçóëiïðiéåßôåé áðü ôi ðñüññâiìá iäPäçóçò syscons(4), êáðåëåíåÜíåé ôéò èÝóåéò 0xd0-0xd3 ôiö õññüëiö ÷áñáêôÞñùí. Áí áðôP ç ðåññé ÷P ÷áñáêôÞñùí ãáí åßíáé ãéáéÝóéïç óôç ãëþóáò ðiö ÷ñçóëiïðiéåßôå, eá ðñiÝðåé íá iáðåééíÞóåôå ôçí ðåññé ÷P ôiö ãññÝá Ýìu áðü áðôPí. Áéá íá åßíáé áðôü óôi FreeBSD, ðñiöéÝóåå ôçí åéüëiöèç ãññåñP óôi /etc/rc.conf:

mousechar\_start=3

Ôi keymap\_name ðñiïÝñ ÷åðåé áðü Ýíá áñ ÷åßi ôiö êáðåëüäiö /usr/share/syscons/keymaps, ÷ùñßò ôçí êáðÜëçíç .kbd. Áí åáí åßñôå óßäiññiò ãéá ôçí áíðéööið ÷çóç ðeçèöñiïërãßiö ðiö ÷ñåéÜæåðåé íá ÷ñçóëiïðiéÞóåôå, iðiñåßôå íá ÷ñçóëiïðiéÞóåôå ôi kbdmap(1) ãéá íá êÜíåôå ãíëéïÝò óå æéÜññåò áíðéóöié ÷ßóåéò, ÷ùñßò íá ÷ñåéÜæåðåé íá êÜíåôå åðáíåêéßíçóç.

Ååâáéùèåßôå åðßóçò üöé Ý ÷ åôå ñõèßóåé öi óùóöü öýðiö öåñìååéëíy ööii /etc/ttys æá üëåò ôéò éåóá÷ùñßóåéò ttv\*. Öç åääñÝíç ööéä!P, ié ðñiiéåéñéöi Ýåò áíöéóöüé ßåò åßíáé:

Óâô × áñáêôþñùí	Ôýðìò Ôåñìáôééïý
ISO8859-1 þ ISO8859-15	cons2511
ISO8859-2	cons2512
ISO8859-7	cons2517
KOI8-R	cons25r
KOI8-U	cons25u
CP437 (ðñíðåðéëåñíÝíí VGA)	cons25
US-ASCII	cons25w

Ãéá ãëþóðåò iå ÷âñåêðPñåò wide P multibyte, ÷ñçóëiiðjéÞóðå ôi óùðóöü FreeBSD port ôðií êáðÜëtæi /usr/ports/language. ïåñééÝò éyñåò àiòáíßæiiðåé ùò êiíóüëá, åíþ ôi óýóôðçíá ôðéò àëÝðåé ùò óåéñéåéÜ vtty, éåé Ýðóé ôñÝðåé íá ðáñåêñåðÞóðåôå ãñéåôÜ vtty, ôüoí ãéá ôi X11 üöri êáé ãéá ôçí Þåðóü-óåéñéåéþ ëiíóüëá. ÐáñåéÜòù èå ãñåðóåò iéá ïåñééþò aíçíäñùù ÿíç ëßóðå ãéá ÷ñÞóç Üëeüù ãëùðóðí ôçí êiíóüëá:

<b>Ãæþóóá</b>	<b>Ôïðëåóßá</b>
ÐáñáäíóéáêÜ ÊéíÝæéá (BIG-5)	chinese/big5con
ÃéáðùíÝæéá	japanese/kon2-16dot ¶ japanese/mule-freewnn
ÊiñáÜóééá	korean/han

### 24.3.6 Nýèiéóć ôïő X11

Áí êáé ôi X11 äáí ábhíáé iÝñiò ôiô FreeBSD Project, éá äþóïiðiå áäþ êÜðiæåò ÷ñPóéiåò ðëçñiöinßåò áéá üóïiò ôi ÷ñçóéiiðiæjýí ôiô FreeBSD. Áéá ðåñéóóùöåñåð ðëçñiöinßåò, áåßåð ôíç áéêðoåêþ ôiðiæåðßá ôiô Xorg (<http://www.x.org/>), þ ôiô áåðcñåôcôp X11 ðiò ðñüñéåéôáé íá ÷ñçóéiiðiæPóåðå.

Óóii áñ÷áñbi ~/. Xresources, iðiñáñbóå åðéðñüóèåôå íá áëe Üiâôå êáé Üëëåò ñõèìßóåéò ðiõ ó÷åðßæiiôåé iå ôi I18N (ð.÷., áñáùáñöiåéñÝð, iåñíý, êë.ð.).

#### **24.3.6.1 Áðåéêüíéóć Äñáììáôïóåéñþí**

ÅâéâóáôðÞóôå ôíí åîðçñâôçôþ **Xorg** (`x11-servers/xorg-server`) êáé Ýðåéóâ åâéâóáôðÞóôå ôéò  
ãñâííáðiöåéñ Ýð TrueType æá áðééðìçôþ æéþóá. Íå ôéò óùóð Ýð ôíðéé Ýð ñðèìþóáéð, èá îðíñâðóå íá äâðóå ôçí  
åðééâái Ýíc æéþóá óóá íäfý êáé óá ícfýâðóå ôíò ãñâóééïý ðâñéâÜëéïíò.

#### **24.3.6.2 Åéóáãùãþ ìç-Áããëéêþí ×áñáêôþñùí**

Ç iÝéïäiò åéóüäiõ X11 (XIM, X11 Input Method), åbíáé Ýíá íÝi ðñüôõdi ãéá üeïõõ ôiõõ ðåëÜôåò X11. ¼ëåò ié åöáñüäiõ Yô ôiõ X11 èá ðñÝðåé íá ãñÜöüõåé ùò ðåëÜôåò ôiõ XIM, êáé íá ëäiâÜiñõ ãbíäiï áðü ãiñðçñâñôcô Yô åéóüäiõ

XIM. ÕðÜñ÷iõí äéáæÝóéñíé äéÜöiñíé åîððçñåôçôÝò XIM, äéá äéáöiñåôééÝò äëþóåò.

### 24.3.7 Ñýèìéóç Åêôôðùòþ

ÊÜðíéá óåô ÷áñáêôþñùí single C åbíáé óóíþèùò åíóùìåòùìÝíá óóí þæéí òi õeééü ûùí åâôôðùôþí. Óá óåô ÷áñáêôþñùí óýðiõ wide þ multibyte áðáéôiýí áéäééÝò ñõèìßóåéò, êáé óóíéóôiýíá íá ÷ñçóéíïðíéþóåô òi **apsfilter**. Íðiñåßóå åðþóçò íá ìåôåôñÝþåôå òi Ýããñáöi óå PostScript þ PDF, ÷ñçóéíïðíéþíóåò åñãáæßá åéäééÜ ööéáaiÝíá ãéá ôç óðääéññíÝíç ãëþóá.

### 24.3.8 Ðõñþíáò êáé Óooôþìáôá Áñ÷åßùí

Ôí óýóôçíá áñ÷åßùí FFS (fast filesystem) ðiõ FreeBSD ïðiñåß íá äéá÷åéñéóôåß iíüìåôá áñ÷åßùí ðiõ áíþéíòí óå óåô single C (åbíáé 8-bit clean, åâßóå êáé òi multibyte(3)), áëéÜ åáí áðíèçéåýåé òi óåô ÷áñáêôþñùí ðiõ ÷ñçóéíïðíéåßóåé. Íà Üeeá èüäéá, åbíáé 8-bit áëéÜ åáí åíüñþæåé ðbðiðá åéá òçí èùäééíðíþçóç ðùí ÷áñáêôþñùí. Åðþóçíá, òi FFS åáí ðiðiôçñþæåé åéüìá óåô ÷áñáêôþñùí wide þ multibyte. ÕðÜñ÷iõí ùóðüöi ëÜðíéá áíáiÜñôçóá patches åéá òi FFS ðiõ ðiðiôçñþæiõí áððÝò ôéó åðíáðüðçôåò. Ðñüêåéôåé iüííí åéá ðiðiôðüñéíÝò éáé íç ìåôåðÝñóéíåò ëýóåéò þ hacks, êáé Ý÷iõíå åðíøåðóåé íá ìçí óå ðâñééÜäiõíå òií åíóñééü äÝíõíí ðçãåßíò ëþæéá. Åâßóå ðéó åóðiøåðå ðiõ ðiðiôðüðçôåò ðiðiôðüðçôåò ðeçñiõiñþåò êáé åéá íá áíáêôþóåôå ðiõ ðiðiôðüðçôå áñ÷åßá.

Ôí óýóôçíá áñ÷åßùí MS-DOS óóí FreeBSD Ý÷åé ôçí åðíáðüðçôå íá ñõèìéóôåß þþóå íá ìåôåðñÝðåé ìåôåñý ûùí óåô ÷áñáêôþñùí Unicode, òiõ MS-DOS, êáé òiõ óåô ÷áñáêôþñùí ðiõ Ý÷åé åðééåååß åéá òií óýóôçíá áñ÷åßùí òiõ FreeBSD. Åéá ðâñéóóüôåñåò èåððñÝñåéåò, åâßóå ôç óâåëßåá manual mount\_msdosfs(8).

## 24.4 ìåôåæþôôéóç ÐñiäñáìíÜôùí I18N

Ðiðiõí ports òiõ FreeBSD äéáæÝóï ðiðiôðþñéíç I18N. Óå ìåñééÜ áðü áððÜ, òií -I18N åbíáé ìÝñò òiõ iíüìåòò ðiõ. Óå ðñiäñÜììåôå áððÜ, êáé ðiðiõí ðâñéóóüôåñå, Ý÷iõí åíóùìåòùìÝíç ðiðiôðþñéíç åéá I18N êáé åáí ÷ñâéÜæíïðáé Üeeåò åéäééÝò ñõèìßóåéò.

Ùóðüöi, óå êÜðíéåò åöáññíäÝò üðùò ç **MySQL**, èá ðñÝðåé íá ñõèìéóôåß òií **Makefile** ià òi åðééòlçóü óåô ÷áñáêôþñùí. Áððü ñõèìßóåé ðâñíþíðåò iéá ôéíþ òií **configure** óðíí ðçãåßí ëþæéá, þ áëéÜæíïðåò òií þæéí òií **Makefile**.

## 24.5 ÕiðééÝò Ñõèìßóåéò åéá ÓooâéåññíÝíåò Åëþóóåò

### 24.5.1 Ñþóéêç Åëþóóå (Èùäééíðíþçóç KOI8-R)

Áñ÷éêþ óðíâéóðiñÜ òiõ *Andrey Chernov*.

Åéá ðâñéóóüôåñåò ðeçñiõiñþåò ó÷åôééÜ ià ôçí êùäééíðíþçóç KOI8-R, åâßóå ðéó ÁíáöiñÝò Ó÷åôééÜ ià òií Óåô ×áñáêôþñùí KOIR-8 (Ñùóðéü Óýñíëí ×áñáêôþñùí) (<http://koi8.pp.ru/>).

#### 24.5.1.1 ÔiðééêÝò Ñõëìßóåéò

Ôiðëèåôþóôå ôéò áéüëïðèåò ãñáìiÝò óóï áñ÷åßí óáò ~/.login\_conf:

```
me:My Account:\n    :charset=KOI8-R:\n    :lang=ru_RU.KOI8-R:
```

Ãéá ðáñáäåßáìáôå ðiõ ó÷åôßæïïóáé ìå ôéò ÔiðééêÝò Ñõëìßóåéò, äåßôå ðñïçäïýìåíåò åíüöçôåò óå áôôü ôï êåöÜëáëi.

#### 24.5.1.2 Ñýëìéóç Êííóüëåò

- ÐñïóëÝóôå ôçí áéüëïðèç ãñáìiþ óóï áñ÷åßí /etc/rc.conf:

```
mousechar_start=3
```

- ×ñçóëïðiéþóôå åðßóçò ôéò ðáñáêÜôù ñõëìßóåéò óóï /etc/rc.conf:

```
keymap="ru.koi8-r"\nscrnmap="koi8-r2cp866"\nfont8x16="cp866b-8x16"\nfont8x14="cp866-8x14"\nfont8x8="cp866-8x8"
```

- Ãéá êÜëå êáôá÷þñéóç ttvys\* óóï áñ÷åßí /etc/ttys, ÷ñçóëïðiéþóôå ôï cons25r ùò ôýðí ôåñìáôééiy.

Ãéá ðáñáäåßáìáôå ðiõ ó÷åôßæïïóáé ìå ôçí ñýëìéóç ôçò êííóüëåò, äåßôå ðñïçäïýìåíåò åíüöçôåò áôôïý ôïõ êåöáëåßiõ.

#### 24.5.1.3 Ñýëìéóç Åêôôðùôþ

Êáèþò ié ðáñéóóüôðñíé åêôôðùôÝò ðiõ áéáëÝôiõí Ñùóééïýò ÷áñáêôþñåò Ý÷iõí áíóùìáôùÝíç ôçí êùäééïóåéßáå CP866, èá ÷ñâéáóôåßôå åéäééü öþëöñíí ãñüäõ ãéá íá ìåôáôñÝøååå áðü ôï KOI8-R óóï CP866. Ôï öþëöñíí áôôü åâéâéßóôååé áðü ðñïåðééïäþ óóï /usr/libexec/lpr/ru/koi2alt. Ç êáôá÷þñéóç ãéá Ýíá Ñþóééï åêôôðùôþ óóï /etc/printcap èá ïiéÜæåé ìå ôçí ðáñáêÜôù:

```
lp|Russian local line printer:\n    :sh:of=/usr/libexec/lpr/ru/koi2alt:\n    :lp=/dev/lpt0:sd=/var/spool/output/lpd:lf=/var/log/lpd-errs:
```

Ååßôå ôï printcap(5) ãéá ðeí êåðôñâñþ ðåñéäñáöþ.

#### 24.5.1.4 Óyóôçìá Áñ÷åßùí MS-DOS êáé Ñþóééá ìíüìáôå Áñ÷åßùí

Ôï ðáñáêÜôù ðöðüäåéäíá êáôá÷þñéóçò óóï fstab(5) áíáñäiðíéåß ôçí ðñïóôþñéïç ãéá Ñþóééá ìíüìáôå áñ÷åßùí óå ðñïóáñôçìÝíá óôôôþìáôå áñ÷åßùí ôýðiõ MS-DOS:

```
/dev/ad0s2      /dos/c msdos   rw,-Wkoi2dos,-Lru_RU.KOI8-R 0 0
```

Ç åðéëïäþ -L åðéëÝååé ôéò ôiðééêÝò ñõëìßóåéò ðiõ èá ÷ñçóëïðíéçëïýí, êáé ç -w iñþæåé ôï ðßíáêå ìåôáôñíðþò ÷áñáêôþñùí. Äéá íá ÷ñçóëïðíéþóååå ôçí åðéëïäþ -w åâåééùèåßôå üöé Ý÷åôå ðñïóáñôþóåé ôçí êåôÜðíçóç /usr ðñéí ôçí êåôÜðíçóç MS-DOS, êáèþò ié ðßíáêåò ìåôáôñíðþò ãñþóéíîôåé óóï /usr/libdata/msdosfs. Äéá ðåñéóóüôåñåò ðëçñiöññßåò, äåßôå ôç óåéßää manual ôïõ mount\_msdosfs(8).

#### 24.5.1.5 Ñýèìéóç X11

1. ÅêôåëÝóôå ðñþóå ôéò ãåíééÝò ôiðééÝò ñõëìßóåéò ðiø Ý÷iøìå Päç ðåñéãñÜøåé.
2. Áí ñçóéiiðíéåßôå ôiø áiðçñåôçóþ **Xorg**, ååêåôåôðþóå ôi ðåéÝóï x11-fonts/xorg-fonts-cyrillic.  
ÅëÝäåå ôçí åíüöçôå "Files" ôóï áñ÷åßí /etc/X11/xorg.conf. Èá ðñÝðåé íá ðñïóéÝóååå ôçí ðåñáéÜôù ãñáìiþ ðñéí åðü iðíéåäþðiøå Üeëç êåôå ÷þñéóç FontPath:  
FontPath "/usr/local/lib/X11/fonts/cyrillic"

**Óçìåßùóç:** Äåßôå óôçí Óðëéïäþ ôùí Ports ãéá ðåñéóóüôåñåò êõñééééÝò ãñáìiáôåéñÝò.

3. Åéá ôçí åíåñäiðíßçóç ôiø Ñùóééíý ðëçêôñïëiäßiø, ðñïóéÝóåå ôéò ðåñáéÜôù ãñáìiÝò óôçí åíüöçôå "Keyboard" ôiø áñ÷åßí xorg.conf:

```
Option "XkbLayout"      "us,ru"
Option "XkbOptions"     "grp:toggle"
```

Ååååéùèåßôå åðßóç ùöé ç ãñáìiþ XkbDisable åßíáé áíåíåñäþ (iáñéáñéóíÝíç ùò ó÷üééí).

Áí ÷ñçóéiiðíéþóåå ôi grp:toggle ç áíåëéäþ RUS/LAT éá åßíåôåé iå ôi **Äåîéü Alt**, åíþ áí èÝóååå grp:ctrl\_shift\_toggle, ç áíåëéäþ éá åßíåôåé iå ôi **Ctrl+Shift**. Åéá grp:caps\_toggle, ç áíåëéäþ RUS/LAT éá åßíåôåé iå ôi **CapsLock**. Ç éáííééþ ëåéöiññäþ åiø **CapsLock** åíåñëiøèåß íá åßíáé æéáèÝóéíç iÝóù ôiø ñðíäðåóííý ðëþêôñùí **Shift+CapsLock** (iüñí óå êåôÜóôåóç LAT). Ôi grp:caps\_toggle åéá èÜðíéí Üäíùóöiÿüäí, äåí èåéöiññäþ åiø **Xorg**.

Áí ôi ðëçêôñïëüäéí óåò æéáèÝóåé ðëþêôñá "Windows", éáé Ý÷åôå ðåñáôçñþóåé üöé èÜðíéá åðü ôá iç-åëöáñéèçôééÜ ðëþêôñá Ý÷iøí èÜëìò åíöéööiþ-çóç üöåå åßíåôå óå êåôÜóôåóç RUS, ðñïóéÝóåå ôçí ðåñáéÜôù ãñáìiþ óðiø áñ÷åßí xorg.conf:

```
Option "XkbVariant"    ",winkeys"
```

**Óçìåßùóç:** Õi Ñþóééíí XKB ðëçêôñïëüäéí ßóùò äåí èåéöiññäåß iå åöáñíäÝò ðiø äåí Ý÷iøí ööéá ÷åß åéá ôéò åíößööié ÷åò ôiðééÝò ñõëìßóåéò.

**Óçìåßùóç:** Ié åöáñíäÝò ðiø ôçñíýí ôéò åëÜ÷éóôåò ðñïäéååñáöÝò ôiðééþí ñõëìßóåùí, èá ðñÝðåé íá êáëíýí åðü ìùñßö ôçí õðíÜñôçóç XtSetLanguageProc (NULL, NULL, NULL); iÝóá óöíí êþäééå ðiøò.

Äåßôå ôi KOI8-R åéá ôi óyóôçíá X Window (<http://koi8.pp.ru/xwin.html>) åéá ðåñéóóüôåñåò iäçäßåò ó÷åöééÜ iå ôçí åçíëiññäþå åöáñíäþí X11 ðiø íá ÷ñçóéiiðíéíý ðiðééÝò ñõëìßóåéò.

#### 24.5.2 ÔïðéêÝò Ñõëìßóåéò ãéá ÐáñáäïóéáéÜ ÊéíÝæééá ÔáúâÜí

Ôï FreeBSD-Taiwan Project Ý÷åé äçìéïõñäþóåé Ýíá HOWTO ãéá ôá ÊéíÝæéá óôï FreeBSD, ôï iðíþí iðíññåþôå íá ãñåþôå óôç äéåýëõíóç <http://netlab.cse.yzu.edu.tw/~statue/freebsd/zh-tut/>, ÷ñçóéïiðíéþíôå ðíëëÜ ÊéíÝæéá ports. Í ôñÝ÷ùí ôðíôÜêôçò ôïõ ËéíÝæééíõ FreeBSD Howto åßíáé í Shen Chuan-Hsing <statue@freebsd.sinica.edu.tw>.

Í Chuan-Hsing Shen <statue@freebsd.sinica.edu.tw> Ý÷åé äçìéïõñäþóåé ôçí ÊéíÝæéç Óðëëíäþ FreeBSD (CFC) (<http://netlab.cse.yzu.edu.tw/~statue/cfc/>) ÷ñçóéïiðíéþíôå ôçí êùäééiðíþçóç zh-L10N-tut ôïõ FreeBSD-ÔáÀâÜí. Ôá ðáéÝðá êáé ôá scripts äéåôßèåíôáé óôç äéåýëõíóç <ftp://freebsd.csie.nctu.edu.tw/pub/taiwan/CFC/>.

#### 24.5.3 ÔïðéêÝò Ñõëìßóåéò ãéá ôçí Ååñìáíéêþ Äëþóóá (ãéá ¼ëåò ôéò Äëþóóåò ðïõ Ååóßæííôáé óôï ISO 8859-1)

Í Slaven Rezic <eserte@cs.tu-berlin.de> Ý÷åé ãñÜøåé Ýíá ïäçäü ãéá ôçí ÷ñþóç ôùí umlauts óå Ýíá ìç÷Üíçíá FreeBSD. Í ïäçäüö åßíáé ãñáííÝíò ôðá ÅåñìáíéêÜ êáé äéåôßèåôáé óôçí ôïðíëåðßá <http://user.cs.tu-berlin.de/~eserte/FreeBSD/doc/umlaute/umlaute.html>.

#### 24.5.4 ÔïðéêÝò Ñõëìßóåéò ãéá ôçí Åëëçíéêþ Äëþóóá

Í Nikos Kokkalis <nikkokkalis@gmail.com> Ý÷åé ãñÜøåé Ýíá ðëþñåò Üñèñïí ãéá ôçí ôðíóðþñéïç ôçò Åëëçíéêþ äëþóóåò óôï FreeBSD. Ôï Üñèñïí áðôü äéåôßèåôáé ùò ïÝñíò ôçò åðþóçìçò Åëëçíéêþ ôåëìçñßùñóçò ôïõ FreeBSD, óôçí ôïðíëåðßá [http://www.freebsd.org/doc/el\\_GR.ISO8859-7/artilces/greek-language-support/index.html](http://www.freebsd.org/doc/el_GR.ISO8859-7/artilces/greek-language-support/index.html) ([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/articles/greek-language-support/index.html](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/greek-language-support/index.html)).

#### 24.5.5 ÔïðéêÝò Ñõëìßóåéò Åéá ÅéáðùíÝæééá êáé ÈiñåÜôééá

Åéá ÅéáðùíÝæééá, äåßôå óôçí ôïðíëåðßá <http://www.jp.FreeBSD.org/>, åíþ ãéá ÈiñåÜôééá, äåßôå óôçí ôïðíëåðßá <http://www.kr.FreeBSD.org/>.

#### 24.5.6 Ôåëìçñßùñóç ôïõ FreeBSD óå Äëþóóåò Åêôüò ôçò Åääëééêþò

ÊÜðíéíé åèåëíîÝò ôïõ FreeBSD Ý÷iõí iåôáöñÜøåé ôïþíåôá ôçò ôåëìçñßùñóçò ôïõ óå Üëëåò äëþóóåò. Íé iåôáöñÜøåéò åôôÝò äéåôßèåíôáé iÝóù óõñäÝóíùí óôçí êýñéá äéëôôåêþ ôïðíëåðßá ôïõ FreeBSD (<http://www.FreeBSD.org/index.html>) P óôñí êáôÜëíäí /usr/share/doc.

# ÊåöÜëáéï 25 ÅíçìÝñùóç êáé ÁíáâÜèìéóç ôïö FreeBSD

ÁíáäüüPèçêå, áíáäéëñääíþèçêå, éáé ôìPíáôá ôïö áíáíâþèçéáí áðü ôïí Jim Mock. Áñ÷ ééP óðíâðéóðíñÜ áðü ôïðð Jordan Hubbard, Poul-Henning Kamp, John Polstra, éáé Nik Clayton.

## 25.1 Óýїїøç

Ôi FreeBSD àñþóêåðåáé ððü oóíâ-þ áî Ýééç íåðóáý ôú áðþóçìùå áåëüóðåù îïø. ïåññééïß Üíèñuðéï ðñïôéïýí íá ÷ñçöéïðíëïýí ðéò áðþóçìåð áåëüóðåéò, áïþ Üéëéï ðñïôéïýí íá êñáðïýí ôi óýóðçìá ôíðò áíçìåñùå Ýíï íà ôéò ôåëåðôáßåò áíäëßíåéò. Ùóðóüï, áéüïå êáé ié áðþóçìåð áåëüóðåéò áíçìåñþííðåé ðð-íÜ íà áéïñéþðåéò êñþóéïù íóáæï Üðóùå êáé áðóáæåßåð. ¼ðíéå Ýéäïóç êáé íá ÷ñçöéïðíëþðåðå, ôi FreeBSD ðáñÝ ÷áé üëå óá áðáñáßðçðå áññääëåßá åéá íá êñáðþðåðå ôi óýóðçìá óáó áíçìåñùå Ýíï, êáé áðþðóçò óáó áðéñòñÝðåé íá áíåññáèïéóðåðå áýéïéå óá eÜðíéå áðüíåíç Ýéäïóç. Ôi êäöÜéäéï áðóùù èá óáó áïçëþðåé íá áðïðóáðþðåðå áí èÝéåðå íá ðáññéïðøèåßðå ôi óýóðçìá áíÜððôïçò, þ áí èá ðñïôéïþðåðå íá ðáññáßðåíðå óá íéå áðüù ôéò ðáññéùñÝíåð áåëüóðåéò. Éá ðáññéóðÜóïðóå áðþðóçò óá áåðóéëÜ áññääëåßå ðïð áðáéöïýíðåé åéá óçí áíçì Ýñùñóç êáé áíåñÜéëéçò ôiõ óðóðþíáðò.

Áöiý äéáâÜóåôå áðôü öi êåöÜëáéi, èá iÝñåôå:

- Ðíéá áïçèçôééÜ ðñïññÜìáôá íæññâôå íá ÷ ñçóéiiðíéÞôåôå áéá íá áïçìåñþôåôå ôi óýóôçìá êáé ôçí ÓðëëiäP ôùí Ports.
  - Ðùò íá áéáôçñâôå ôi óýóôçìá óå áïçìåñùìÝíi iå òá ðñïññÜìáôá **freebsd-update CVSUp**, **CVS**, **P** CTM.
  - Ðùò íá óôåññÞíåôå ôçí êáðÜôôåóç áíüö ååêåôåôôçìÝíiõ óôôôÞlåôïò, iå áíåöññÜ Ýíá ãíüöôü êáé ååäôçìÝíá óùöôü óýóôçìá.
  - Ðùò íá áéáôçñÞôåôå ôçí ôåêïçñßùóç óå áïçìåñùìÝíç iÝóù ôiõ **CVSUp** **P** ôùí ports ôçò ôåêïçñßùóçò .
  - Ôç áéáöññÜ iåôåýí ôùí ayíi êëÜäùí ðiõ åñþôéiiôáé óå áïÝééïç: ôiõ FreeBSD-STABLE êáé ôiõ FreeBSD-CURRENT.
  - Ðùò íá íáíööéÜìåôå êáé íá åðáíååêåôåôÞôåôå iëüêëçñi ôi ååóéêü óýóôçìá iå ôçí make buildworld (êëð).

Đñéí äéáâÜóåôå áðôü ôï êåöÜëáéï, èá ðñÝðåé:

- Íá ñõðèìßóâôå óùóôÜ ôç óýíäâóç óáò óôî äßêôöï (ÊåöÜëáéï 32).
  - Íá áíñùñßæâôå ðùò íá áâéâóâôÞóâôå ðññüóâôï ëïäéóïéü ñôñßöï ëâðâóâéâðâóôÞ (ÊåöÜëáéï 5).

**Óciàßúóç:** Óóí êåöÜéáéí áôóü ãßíåôáé óó÷íÜ ÷ñþóç ôçò áîöíëþò cvsup ãéá ôçí áíÜêôççóç þ áíçíÝñùóç ôùí áñ÷åßúí ðçääßíö êþäééá öïõ FreeBSD. Áéá íá ôçí ÷ñçóéíïðíéþóåôå, éá ðñÝðåé íá åâéåôáôþóåôå Ýíá ðåéÝôï þ port üðòò ôï net/cvsup (áí åäí èÝéåôå íá åâéåôáôþóåôå åñáöéêü ðñüäñáííà cvsup, iðïñâßôå íá åâéåôáôþóåôå ôï port net/cvsup-without-gui). Iðïñâßôå íá áíöéêåôáôþóåôå áôôþ ôçí áîöíëþ íå ôçí csup(1) ç iðïñâ áíþéåé ôôí åâóéêü óýóöçíá.

## 25.2 Åíçìåñþíïóáò ôi FreeBSD

ÃñÜöçêå áðü ôïï Tom Rhodes. Åáóþóôçêå óå óçìåéþóåéò ðiø ðáñåß÷å i Colin Percival.

**Öçìáðúñós:** ÆðääéêÝò æéïñéþþóåéò ééäþí êáé áóðÜéåéáò, äéáðßèåíóáé æáé üëåò ðéó áñ÷éðåéòííéÝò êáé åéäüóåéò ðíö ððíóðçñßæííóáé áðü ôçí îlÜää áóðÜéåéáò. Ðñéí ðñï-ùñþóåðå ôôçí áíååÜéíéóç óå íéá íÝá Ýéäíóç, èá ðñÝðåé íá æáéåÜóåðå ôéò ð-åðééÝò lå áðôþí áíåéíþþóåéò, êáèþò lðiñåð íá ðåñéÝ-ðíö ôçíáíðéÝò ðéçñïñðíñþåò. lðiñåðóå íá äåðóå ôéò áíåéíþþóåéò áåéäüóåúí ôôçí ðáñáéÜðû ôïðíèåðßá: <http://www.FreeBSD.org/releases/>.

Aí õðÜñ-åé êÜðiéí crontab ðið ÷ ñicóeiiðiéåß ðeó ãðiáðuôçôåð ðið freebsd-update, éá ðñÝðåé íá ãðåíññiðiéçèåß ðñéí iâééíÞoåé ç ðáñáéÜðù aéáééåóßá. Íðiñåßöá íá åâéåðåóðÞoåðå ôçí ôâéåðåßá Yéäiöç ðið freebsd-update êáðååÜæiiðåð ði ðiðiðéåðiÝñ ðáé Yéir áðù ði ðáñáðÜñ URL êáé êðåðéþíðåð ðeó ðáñáéÜðù åiðiëYð:

```
# gunzip -c freebsd-update-upgrade.tgz | tar xvf -
# mv freebsd-update.sh /usr/sbin/freebsd-update
# mv freebsd-update.conf /etc
```

Ãåí áðåéôåßôáé íá êåôåâÜóåôå ôçí ôåëåðôáßá Ýêëïöç, áí ÷ñçóëïïðéåßôå êÜðïéá áðü ôéò ôñÝ÷ïðóåò åêëüöåéò ôïð FreeBSD.

## 25.2.1 Ôï Áñ÷åßï Ñõèìßóåùí

ÊÜðiðíé ñi Þóðåðó ßóùò ðe Ýëëið íá áæëÜññö ði ðññiðéëåñí Ýíí ãñ ÷ ãßíi ñoðiðßóðúí /etc/freebsd-update.conf, þþóðá íá Ý÷iðí éaëýðóññí Ýéåñ ÷ ið ðçò áæáæéåðßáð. Íe áðeeiðÝð áßíáé áðíéðÜ áñéåðÜ éaëÜ ðåðíçñéùí Ýíåð, áæëÜ íé ðáñééðÜòù ßóùò íá ÷ ñæðÜæiðóáé êÜðiðéàð áðeeðéÝíí áðñiðçãÞóåðó:

```
# Components of the base system which should be kept updated.  
Components src world kernel
```

ÁôôP ç ðánÜâlôññiò åéÝå÷åé ðíéá ôiPiáôá ôiô FreeBSD èá åéåôçññýíôåé åíçìâñùíÝíá. Ç ðñiâðéëiäP åßíáé íá åíçìâñþíâôåé í ðçáâßiò êþæéêåó, üéï ôi åáôéêü óýôôçíá, êåé i ðôñPiáô. Ôá ôiPiáôá åßíáé ôá ßæéá ðiô åéåôßèåíôåé êåé åôåÜ ôçí åâåéåôÜôåôç, åéá ðánÜâlôññià áí åÜéâôå ôçí åðéëiäP world/games èá åâåéâôßôôåíôåé åíçìâñþôåéò åéá ôá ðâééíßbæéá. Áí åÜéâôå src/bin èá åðéôñÝôåôå ôçí åíçíÝññùóç ôiô ðçáâßiò êþæéêå ôiô êåôåëüñiô src/bin.

Ҫ әәýöðанң әðсесиäپ әбіләе іа аօїрðаðа әäп әңгі әнніаðеéеäлиÝіс дөиP, әәебө аі әңгі аеëÜиаðа һюðаа іа әңгіеÝ-аे әнніаðеéеäлиÝіа үшін өiриаðа, еа әзіззәаðаðаа іа аізіаðынніа үнніеðодÜ үiÝіа әңгі аи-а-әбі әңгіеðорðаун өiүеа өiриаðа әнніаðеéеäлиÝіа

èÝëåôå íá áíçìåñþíåôåé. Áðôü ßóùò Ý÷åé êáðáóðñiöéêÜ áðiøåéÝóíåôå, êáèþò åßíáé ðééáíü í ðçãáßiò êþäéêåò êáé ôå åêôåëÝóéíá ðñïäñÜìíåôå íá íçí åßíáé ðëÝíó óå óðä÷ñiíéóü ìåðåíý ôiöò.

```
# Paths which start with anything matching an entry in an IgnorePaths
# statement will be ignored.
IgnorePaths
```

ÐñïöèÝóôå äéáäññÝò óå êáðáéüäñðò, üðùò /bin /sbin ãéá íá áöþóåôå áðåßñá÷ôiöò ôiöò óðåéååñéíÝñiöò  
êáðáéüäñðò êáðÜ ôçí äéáæéåóþá áíçìÝñùóç. Ç áðééíäþ áðôþ iðiñåß íá ÷ñçóéíiðíéçéåß ãéá íá áðiøñÝþåé ôiö  
freebsd-update íá ãñÜþåé ðÜíü óå ðééáíüí äééÝò óåò ôiöééÝò áééåáÝò.

```
# Paths which start with anything matching an entry in an UpdateIfUnmodified
# statement will only be updated if the contents of the file have not been
# modified by the user (unless changes are merged; see below).
UpdateIfUnmodified /etc/ /var/ /root/ /.cshrc /.profile
```

Ç áðééíäþ áðôþ èá áíçìåñþóåé ôå áñ÷åßá ñðèìßóåùí ôiöò êáðáéüäñðò ðiö êáèíñßæíñôå, ïüñ íá áðôÜ äåíÝ÷iöí  
ìåðåâåçéåß áðü ðiö ðiðééÝò áééåáÝò, äåí èá åßíáé áíçìÝñùóç. ÕðÜñ÷åé ìéá áéüñá åðééíäþ, ç  
KeepModifiedMetadata, ç iðiñåß iäçãåß ôiö freebsd-update íá áðíèçéåýóåé ôéò áééåáÝò ìåðåíý ôùí äyí åéäüöåùí  
êáðÜ ôç äéÜñéåé ôçò óðä÷þíåðóç (merge).

```
# When upgrading to a new FreeBSD release, files which match MergeChanges
# will have any local changes merged into the version from the new release.
MergeChanges /etc/ /var/named/etc/
```

Ðñüéååôåé ãéá ôç ëßóôå ôùí êáðáéüäñðò ðiö ðåñéÝ÷iöí áñ÷åßá ñðèìßóåùí, êáé óôå iðiñåß ôiö freebsd-update èá  
åðé÷åéñåß ôçí áéáæéåóþá óðä÷þíåðóç ôééåäþí. Ç áéáæéåóþá óðä÷þíåðóç ãßíåôåé ìå ìéá óåéñÜ áðü patches  
ôýðiö diff(1) ðáñüííéá ìå ðiö mergemaster(8) áééÜ íá ëéäüôåñåò åðééíäþ. Íé óðä÷ùíåýóåéò åßôå åßñííóåé ååéôÝò,  
åßôå ðñiñéåéíý ðiö Üñíéåíá êÜðíéíð ñðiðÜéðç êåéíÝñiö, áéáöññåðééÜ ç ååéÝéåóç ôiö freebsd-update åéðñþíåôåé.  
Áí äåí åßóôå óßñiññiö, êñåðþóåå áíðßññåöi áðóåéåßåò ôiö êáðáéüäñðò /etc êáé åðéþò äå÷èåßôå ôéò áééåáÝò. Ååßôå  
ðiö Òíþíá 25.7.11.1 ãéá ðåñéóðüôåñåò ðëçñiöññåò ó÷åðééÜ ìå ôçí áíðiøëþ mergemaster.

```
# Directory in which to store downloaded updates and temporary
# files used by FreeBSD Update.
# WorkDir /var/db/freebsd-update
```

ÓðiñíêåðÜëíäíåðôü ðiðéÜðóåé üéá óå patches êáé ôå ðñiñóññéíÜ áñ÷åßá. Óå ðåñéðþóåéò üðiö í ðiðéÜðóåé ðiðéÜðóåé  
áíðiññåðéÜëíéóç óå ìéá íáüôåñç Ýéäíóç ôiö FreeBSD, èá ðñÝðåé íá áééåáÝóåé ôiöéÜ÷éóóííÝíá gigabyte áéåýéåññò ÷þñiö.

```
# When upgrading between releases, should the list of Components be
# read strictly (StrictComponents yes) or merely as a list of components
# which *might* be installed of which FreeBSD Update should figure out
# which actually are installed and upgrade those (StrictComponents no)?
# StrictComponents no
```

Áí èÝóåôå ôçí ðáñáðÜíü åðééíäþ ôiö yes, ôiö freebsd-update èá ðiðéÝóåé üöé ç ëßóôå Components åßíáé  
ðëPñçò êáé äåí èá åðé÷åéñþóåé íá ðñiñéåéñþóåé óå áééåáÝò ååéñiò ëßóôåò. ÍoóéåóðéÜ, ôiö freebsd-update èá  
ðñiñéåéñþóåé íá áíçìåñþóåé êÜðå åñ÷åßí ðiö áíþéåé óôç ëßóôå Components.

## 25.2.2 Patches Ó÷åôéêÜ ìå ôçí ÁóöÜëåéá

Óá patches ðiõ ó÷åðóßæíïóáé íå ôcí áooÜéåéá, áðíeçéåýíïóáé óå Ýíá áðñáéñöóí Ýíí iç ÷ Üíçíá éáé ìðññíýí íá íåôáöïñòùëíýí éáé íá åäéåðáóðáéíýí íå ôcí áéüüëiøèç áîðíïéP:

```
# freebsd-update fetch  
# freebsd-update install
```

Áí iá ôcí ðánñáðÜfú áîôïeþ ãâéâðáðôåèíýí áíçíâñþðôåéð óöii ðöñÞíá, éá ÷ ñâéâðôåð íá åðáíâéééíþóåðå ôi óyóðôçíá. Áí üéá ðÜíá êáëÜ, ôi óyóðôçíá éá åðíáé ðëÝíí áíçíâñùíÝíí éáé iðinâðþðå íá åêðâëåðô ôi freebsd-update aððüìláðá lá ôcí áiþðâéá ôið cron(8). Íéá aððþ ëáðåð ÷ þnëóç ôoi âñ ÷ åßí /etc/crontab åðíáé åððñéþò æáá aððü ôi óéiðü:

@daily root freebsd-update cron

Ç ðáññáðÜù êáðá ÷ þñéóç iñþæáé üðé ðí freebsd-update èá åêðåéåßðóáé ìéá øiñÜ ðçí çí Ýñá. Íá ðíi ôñüðí åôðü, êáé üðáí ç åêðÝëåóç åßíáé iñÝóù ôçò åðééiðò cron, ðí freebsd-update áðëþò èá åëÝä ÷ åé åéá áíçìåñþóåéò. Áí ððÜñ ÷ iñi, ç åöáññíðò ðá ðéð êáðåññáÜæáé, åëëÜ äáí èá ðéð ååéåééóðÜ. Èá óðÝéíáé üiùò Yíá email óðí ÷ ñÞóðç root þþðå íá ðéð ååéåðåóðþóåé ÷ åéññiêþíçóá.

Áí iöéáPðiôá ðÜáé óóñááÜ, óí freebsd-update Ý÷åé óçí ééáíüôçôá íá åðéóñÝöåé óóçí ðñïçaiýíåíç óóåéåñþ  
éåðóÜóðáóç, áíáéñþíðáó óí óåæåðóðåßí óåô áæéáäþí íå óçí áåtueiðèç áíöiðþ:

```
# freebsd-update rollback
```

lä ôçí iëïëëPñùóç ôçò åíôïëPò, èá ðñ Ýðåé íá åðáíåêëéPóåôå öi óyóôöçìá áí Ý÷iõí åßíåé áëëåáÝò óoii ðöñPíá P óå ËÜðëei äðü óå åñèñPíáå ôiõ. Áðööu èá åðéñPñåé ööi FreeBSD íá öiñôþóåé óå íÝå åôøäëYóéïá óöc iïPíç.

Ói áiçéçôðéêú ðñüäñáílá freebsd-update lðñiñâb íá áíçìåñþþóáé áðôùìåáôú iùñi ôið ððñÞíá GENERIC. Áí ÷ñçóeñiðiéåðþóáé ðññóáññiði Ýfìò ððñÞíáð, èá ðñ Ýðåé íá iàðåáæùðóéóðþ íaiðU, iùðáí ôi freebsd-update óåëåéþþóáé íá ðçí áåéñåðÜóðåóç ðùí ððüeñéðùí áíçìåñþþóåúí. Ùóðûñið, ôi freebsd-update éá áíé ÷íåýóáé êáé èá áíçìåñþþóáé ôið ððñÞíá GENERIC ói /boot/Generic (áí ððÜñ ÷åé), áéüìlá êáé áí áái áßíáé í áíññåðð ððñÞíáð ðið ððñðÞíáðið (áðôùð ðið áéðåæðþóáé ðçí óóðåéññéí Ýíç óóðéñiÞ).

**Óçìàßùóç:** Åßíáé ãáíéê Ü éäéþ éáÝá íá Ý÷åôå ðÜíóá Ýíá áíôßãñáöi ôiö ðoñþíá GENERIC óóïí éáoÜëíäí /boot/Generic. Éá óáò áïçèþóåé óóçí áéÜäíúóç áéÜöiññí ðñíâëçíÜôùí, éáèþò éáé óóçí áíáâÜëíéóç óå ãðüíáíàò áâëüöáéò ôiö FreeBSD, iÝóù ôiö freebsd-update. Ç äéáâééáóßá áóôþ ðáñéññÜóâðáé óóïí Ôiþíá 25.2.3.

Áí äáí Ý÷iöi ábíráé áeëaáÝò óóéo ðñiåðééäaiíÝiåo ñoëiþbóåéo óóí áñ÷åbí /etc/freebsd-update.conf, óíí freebsd-update éá áåéåôáóôþóåé óá áíáiùíÝíá áñ÷åbá ðçääáþiõ êþäééá iáæß iá óéo ððüëiéðåò áíçíåñþbóåéo. ïðmñåbóå Ýðåéóá íá ðñi÷unþóåôó óóç iådåäéþþoôéóç éäé áåéåó Üóóåóç íÝiõ ðñiøáñiiõíÝiõ ððñþíá, iá óíí oóíþeç ðóñüðí.

**Ócjàñþúóç:** Þe áíciáñþóáéò ðiõ äéáíÝíñóáé ìÝóù óiõ freebsd-update äái ðáññééàíàÜíñóí ðÜíñóá áëëáñÝò óiõ ðöññíá. Ááí áßíáé áðáñáßóçò íá áðáíáíåðáäëùôðßóåò ðiõ ðññóáññíóíÝí ðöññíá óáò, áí ç áêðÝéåóç ðiõ freebsd-update install áái áðÝóðáñá áëëáñÝò óðá áñ÷áßá ðçääñßíõ éþþééá ðiõ ðöññíá. Ùóðóüöí, óiõ freebsd-update áíciñþíáé ðÜíñóá ðiõ áñ÷áßí /usr/src/sys/conf/newvers.sh. Ói áñ÷áßí áðóð ðáññéÝ÷áé òi ññÝ-íí áðßðåäíí áíciáñþóáúí (patch level) ði ïðíñíí éáé áíáóÝñåðáé ùò áññéèíüò -p áðü áíóïëÝò ûðñò ç uname -r. Íàðóåäëùôðßæíñóáò íaiÜ óiõ ðññóáññíóíÝí ðöññíá óáò (áéüìá éáé áí áái ððÜñ-íðiñ Üéëéåò áëëáñÝò) èá áþþóåò òc áðíáûòðccóá óóci uname(1) íá áíáóÝñåé íá áéñßñååé ði ãðßðåäíí áíciñþóáúí. Áðóð ïðiññáß íá áßíáé

éäéáÜôâñá ÷ñþóéiü üôáí óðíðçñåßôå ðíeeáðeÜ óðóðþìáðá, êáèþò óáò áðéóñÝðåé íá áíéiüäþóåôå iá ieá iáðéÜ ôé åíçìåñþóåéò Ý÷iöi åâéáôáóðåéåß ôöi êáéÝá.

### 25.2.3 Áíááæìßóåéò óá ieéñÝò êáé iááÜeáò Åéäüóåéò

Ç åéáæéêáðá áððþ eá áðñiañýíáé ôá ðáeeÜ áñ÷åßá áíðééæíiæíéý êþþééá (object files) êáèþò êáé ôéð ðáeeÝó åéâééiæþéåò, êÜñiôåð ôéð ðâñéóóüôâñåò åöáññiäÝò ôñßôùí êáðáóéâðåôþí íá iç eäéöiöñaiýí. Óáð ðâñéóóüiå åßôå íá áðââéâðåôðþóåå ùëá ôá åâéáðåôðçíÝá ports êáé íá ôá åâéáðåôðþóåå iáíÜ, P íá ôá áíáâáæìßóåå áññiüðåñá, ÷ñçóéiüðiéþíåð ôiü åíçèçôéü ðññüññiä ports-mgmt/portupgrade. Íé ðâñéóóüôâññié ÷ñþóðåð eá èÝëiñ íá êÜñiñi lëá åíééñáðéêþ iâðåâëþôðéóç ÷ñçóéiüðiéþíåð ôçí åéüëiøec åíóïëþ:

```
# portupgrade -af
```

Ìå áðóü ôiü ôñüði åâáðóáæþæåôåé üôé ôá ðÜíðá eá áðáíåâéåðåôðåæíý íùóðÜ. Óçìåñþóå üôé áí eÝóååå ôçí iâðåâæçôþ ðâñéáÜeéiðiöi BATCH ôóçí ôéþ yes, üéåò ié ðééáñÝò áññüðþóåéò ðiö eá åíöáéðôðíý íáðóÜ ôç åéáæééåðá, eá áðâóçèýí åððüñåðá iá yes. Þóð åáí ôðÜñ ÷åé ðëÝíí áíÜâåç åéá ðáñÝlåáóç ôiö ÷ñþóðç êáðÜ ôç åéÜñéååå ôçð åéáæéåðå åâðåâëþôðéóç.

Áí ÷ñçóéiüðiéâðåé ðññóáññiöiÝñiò ðoñþíåð, ç åéáæéêáðá áíáâÜeáéçò åßíáé åæáöñÜ ðeí ðiéýðëiêç. Eá ÷ñâéâðååðåå Ýíá áíðßññåöi ôiö ðoñþíá GENERIC ôóii êáðÜeäi /boot/Generic. Áí åáí ôðÜñ ÷åé þäç i ðoñþíåð GENERIC ôóii óýóðçíå óáð, iðññâðåå íá ôiü áíáâðåðþóåå ÷ñçóéiüðiéþíåð iéá áðü ôéð ðâñáéÜðù iâðüäiðð:

- Áí Ý÷åðå åâðåâëñüðþóåé ðññóáññiöiÝñiò ðoñþíá iññi iéá öññÜ, i ðoñþíåð ôóii êáðÜeäi /boot/kernel.old åßíáé ôóçí ðññâñiâðéüðçôå i GENERIC. Áðëþò iâðiññiÜðåå ôiü êáðÜeäi óá /boot/Generic.
- Áí Ý÷åðå ôððééðþ ðññóðåå õóii ìç ÷Üíçíá, iðññâðåå íá åâéáðåôðþóåå Ýíá áíðßññåöi ôiö ðoñþíá GENERIC áðü ôi CD-ROM ôç åâéáðÜðååóç. Õiðieâðþóå õi CD-ROM ôóii iäçñü êáé ÷ñçóéiüðiéþóðå ôéð ðâñáéÜðù åíóieÝð:

```
# mount /cdrom
# cd /cdrom/X.Y-RELEASE/kernels
# ./install.sh GENERIC
```

Áíðééâðåóðþóå õi X.Y-RELEASE iá ôiöð ðññâñiâðéüýð áññééiüýð ôçð Yéäiöçò ðiö ÷ñçóéiüðiéâðå. Í ðoñþíåð GENERIC eá åâéáðåðååðåå åðü ðññâðéëiþ ôóii êáðÜeäi /boot/Generic.

- Áí åáí Ý÷åðå êÜðiéá åðü ôéð ðâñáðÜíù åðééëiÝò, iðññâðåå íá åâðåâëñüðþóåå êáé íá åâéáðåôðþóåå ôiö ðoñþíåð GENERIC iÝóù ôiö ðçñâðiþ ôþæééå:

```
# cd /usr/src/
# env DESTDIR=/boot/Generic make kernel
# mv /boot/Generic/boot/kernel/* /boot/Generic
# rm -rf /boot/Generic/boot
```

Åéá íá áíáâñüñéðåå åððüò i ðoñþíåð ùò GENERIC áðü ôi freebsd-update, åáí eá ðñÝðåé íá Ý÷iöi åßíáé åéééåÝð ôóii åñ÷åßíü ñðëiñþóåùí ôiö GENERIC. Óðíßóðååé åðþóçò ç åâðåâëþôðéóç íá åßíáé ÷ùñþð Üeëåð åââééâðåòiÝíå ñðëiñþóåéð (êáðÜ ðññðþíçòç iá êâñü ôiü /etc/make.conf).

Åáí ÷ñâéÜæåðåé ôç åâäññiÝíç óóéäiþ íá åðáíåâééíþóåå iá ôiö ðoñþíá GENERIC.

Åßíáé åððíåðÝð ié áíáââæìßóåéò ôüöri óá ieéñÝð üöri êáé óá iááÜeáò åâéüðåéò, åßíñðåð ôóçí åíóïëþ freebsd-update ôiü åððééðiçóü åññééiü Yéäiöçò. Åéá ðáñÜâåéæíá, ç åéüëiøec åíóïëþ eá áíáââæìßóåé ôiü óýóðçíå óá FreeBSD 8.1:

```
# freebsd-update -r 8.1-RELEASE upgrade
```

ÌåðÜ ôç ëPøç ôçò áîôïëPò, ôi freebsd-update èá áîéëïäPøåé ôçí êáôÜóôåóç ôiõ óðóôPøáôïò êáé ôiõ áñ÷åßiõ ñðèlßåúí ðiõ, óå ìéá áðüðåéñá íá Ýøåé ôéò áðáñáßðçôåò ðëçñiõñßåò æéá ôçí áíáâÜèìéóç ôiõ óðóôPøáôïò. Íé ðëçñiõñßåò ðiõ áéé÷íáyèçéáí èá áîðáéóôíýí ôçí ìëüíç lâ ôç ïññP ìéáò ëßóôåò åâæåôåóôçíÝñùí ðñíññáñÜôùí. Áéá ðáñÜääéáíá:

```
Looking up update.FreeBSD.org mirrors... 1 mirrors found.  
Fetching metadata signature for 8.0-RELEASE from update1.FreeBSD.org... done.  
Fetching metadata index... done.  
Inspecting system... done.
```

The following components of FreeBSD seem to be installed:

```
kernel/smp src/base src/bin src/contrib src/crypto src/etc src/games  
src/gnu src/include src/krb5 src/lib src/libexec src/release src/rescue  
src/sbin src/secure src/share src/sys src/tools src/ubin src/usbin  
world/base world/info world/lib32 world/manpages
```

The following components of FreeBSD do not seem to be installed:

```
kernel/generic world/catpages world/dict world/doc world/games  
world/proflibs
```

Does this look reasonable (y/n)? y

Óóï óçìåßí áðóü, ôi freebsd-update èá êáðååáÜóåé üëá ôá áñ÷åßá ðiõ áðáéóïýíôåé æéá ôçí áíáâÜèìéóç. Óå ìåñéêÝð ðåñéððþóåéð, i ÷ñPøôçò èá êëçèåß íá áðáñáßðçôåé óå åññôPøåé ð÷åðééÜ íå ði òé èá åâæåôåóôåéåß P ðùð ðñÝðåé íá ðññ÷ùñPøåé ç æéáæéååóßá.

¼ðáí ÷ñçóéïðíéåßðåé ðññóáññíóíÝñò ðõñPøáò, ôi ðáñáðÜñù áPøá èá ðññéåéÝóåé ôçí áìöÜíéóç ôçò ðáñáéÜôù ðññéåéäïßçóçò:

```
WARNING: This system is running a "MYKERNEL" kernel, which is not a  
kernel configuration distributed as part of FreeBSD 8.0-RELEASE.  
This kernel will not be updated: you MUST update the kernel manually  
before running "/usr/sbin/freebsd-update install"
```

Ìðññåßôå íá ááñPøååå áðóP ôçí ðññéåéäïßçóç. Èá ÷ñçóéïðíéPøíòlå ði ãíçìåñùíÝñù ðõñPøá GENERIC ùò åâæéÜìåóï  
áPøá óóç æéáæéååóßá áíáâÜèìéóçò.

Áöïý ìåðååöñðùéïýí üëá ôá patches óóï ðiðééü óýóôçìá, èá åßíåé êáé ç åðáññäP ôiõò. Ç æéáæéååóßá áðóP Bóùò ðÜñåé  
ëßäí ÷ññíí, áíÜëíäá íå ôçí ôá÷ýôçôå êáé ôi ðiññôßí ðiõ ìç÷áíPøåôïò. ðåéóå èá åßíåé ç óðå÷þíåôç ôùí áñ÷åßùí  
ñðèlßåúí. Áðóü ði ïÝñò ðçò æéáæéååóßåò áðáéóåß ðáñÝíååóç ôiõ ÷ñPøôç, êáèþò ôå êÜðíéå áñ÷åßá èá ÷ñâæåóôåß  
ç óðå÷þíåôçò íå åßíåé ÷åéññéßíçóå íå ôç åíPøåéå êÜðíéï ðiðóÜéôç êåéïÝñò. Í ÷ñPøôçò èá ãíçìåñþíåôåé æéå ôí  
áðíòÝéåòíá êÜéå åðéôô÷çíÝçò óðå÷þíåôçò êáèþò åâæéßðóåååé ç æéáæéååóßá. Óå ðâñßðôùóç áðíòô÷çíÝçò  
óðå÷þíåôçò (P ááñüçóçò ôçò), ç æéáæéååóßá áíáâÜèìéóçò èá æéáéïßåò. Åíä÷ññÝñù ði ðéYéååå íá êñáðPøååå  
áíðßññáöï áðóåæåßåò ôiõ êáðåéüäï /etc êáé íá óðå÷ùñýóååå áññüôåñá (÷åéññéßíçóå) êÜðíéå óçìåíóééÜ áñ÷åßá,  
üðùò ôi master.passwd P ôi group.

**Óçìåßùóç:** Óóï óçìåßí áðóü åáí Ý÷åé åßíåé áéüíá êáééÜ áééååP óóï óýóôçìá, êáèþò üëç ç æéáæéååóßá ôçò  
áíáâÜèìéóçò êáé óðå÷þíåôçò åßíåååé óå æéáöññâåéêü êáðÜëíäí. ¼ðáí åöáññíóïýí áðéôô÷þò üëá ôá patches  
êáé ìëéëçñùéåíå ði ðééôô÷ßå ç æéáæéååóßå ôçò óðå÷þíåôçò üëüí ôùí áñ÷åßùí ñýèìéóçò, i ÷ñPøôçò èá  
ðñÝðåé íá åðéååååéþóåé ôçí ðáéééêP åâæåôÜóôååç.

Íâ ôr ô Ýëiò áôôPò ôç áæáæééåBáò, ç áíâáÜèiéóç lðiñâB íá iñéôéêiðiéçéâB óôi áBôéi, iâ ôç ÷ñPóç ôçò áéüëiðèçò áiðiëPò:

```
# freebsd-update install
```

Óóci ðñþþðôc öÜóc, èá áéëé ÷ èåb i ðõñÞíáð êáé ôá ð ÷ åôééÜ áñðñþþíáðá. Óóï óçìåbñ áðôü, èá ðñÝðåé íá ábñíáé åðáíåêéþíçóç ôiö lç ÷ áíÞíáðiò. Óá lç ÷ Üíçìá lå ðññóáñiióí Ýii ðõñÞíá, ÷ñçóeiiðiéÞóôå ôçí áiðiieÞ nextboot(8) þþóôå íá èÝóåôå ôiï ðõñÞíá ãéá ôçí åðüñláïç åêéþíçóç ôoïï /boot/GENERIC (i iðiBñðó Ý ÷ áé Þäc áiááâæiéôåb):

```
# nextboot -k GENERIC
```

**ĐñiāéáéíðiBçó:** Đñiē áðåiáéâééÍþóåôå iá ðiï ðoñÞíá GENERIC, áââááéùéâßôå üöé ðåñéÝ-âé üéá óå ðoñiññÜìååôå iäþçóçò ðiï áðåéôíýíôåé áéá ôçí áðéôô ÷Þ áâéêBçóç ôïô óôooñÞíåôå óåò (éâé ôç eâéôñññå åiô äééôýïô, áí áíâåæìBæåôå ñÜðiéí áðiñlåññóíÝí ìç ÷Üíçíå). Áéâééüôåñá, áí ï ðñiçäiyåññò ðñiøáññóíÝíñò ðoñÞíåò ðåñéåñß ÷ å eâéôñññåò ðiï ññiøéùò ðåñÝ-ññôåé áðü áñññÞíåôå (modules), áââááéùéâßôå üöé ññiøñßôååå íá òiññôññéíý ðñiøññéíÜ óôí ðoñÞíá GENERIC ÷ñçóéíññðiéþíôå ñéô äðíåññôçôåò ðiï áñ ÷ñBçò /boot/loader.conf. ãññò áðßçó iá èÝéåôå íá áðåiáññäiññéþóåôå ñðçññåññåò, ðñiøññóññÞóåéò äññóéùí êâé äééôýïô è.ë. ð. ðiï áâí åññåé áðåññåññôçôåò, ÍY-ññé ôçí iëññéþññóç ôçò áéâééâéåñßôå áíâåÙèéññóç.

Iðiññåßôå íá ÷ ñçóéírðiéÞóåôå ôçí áéüëiöèç åíóïéÞ æáá íá åðáíåêééÞóåôå ôiì ìç- Üíçìá iå ôiïí fÝi ðõñÞíá:

```
# shutdown -r now
```

Ílueéd òi óyóöcjiá áðárá Ýèeáé óá èåéöiññáßá, éá ðñÝðåé íá áåðåäé Ýðåðå íáíÜ òi freebsd-update. Ç ðñïçäiýíåíç èåéöiññáßá Ý÷åé áðièçéåðèåß, éáé Ýðooé òi freebsd-update äái èá iåééíÞoåé áðü ôçí áñ÷Þ, áéëÜ éá áðiñáêñýíåé üéåð ðéð ðáééÝð ëiëíü ÷ñçóðåð áéâæéíéíÞéåð éáé óá áñ÷åßá áíðééåéíåééíýí õþæééá. Áéá íá óðiíá ÷ßóðåð óá áðòú òi óðÜäéí, áþóðå õçí áéüéíñðéç áíðièÞ:

```
# freebsd-update install
```

**Ócialeibhúsóis:** Ái Üeříáa ia ði ái óðibñíái áeëéaÝó óðiðó áñééèiýó áeëüóáuí óuñ áéáééièçéþí, Bóuò íá óðÜñ-íðiñ iuñi ayí öðÜoáéú áæáéáðÜðóáóçá áiðiñ áéá òñáéó.

$\frac{1}{4}$ ëi ôi ëiäéöiéëü ôñbñöiô éåôåóéåðåôôP èá ðñYðåé ðñpñá íá îåðåäëùôôéôðåß éåé íá åðåíååéåðåôåéåß áðü ôçí áñ÷P. Åðôü åðåéôåßôåé éåèþò ôi ååéåôåôöçíYíi ëiäéöiéëü ßoùò åâññöÜðåé áðü åéåééieþéåò ié iðibñåð åöåéñYèçéåí éåðÜ ðç åéååééåðåß ôç ðååññöÜðåé. Íðññåßôå íá ÷ñçöéiïðiéÞøåðå ôçí åíðiëP ports-mgmt / portupgrade åéá íá åðôîñåðiïðiéÞøåðå åðôôP ôç åéååééåðåß. Åéá íá iâééiÞøåðå, äþóôå ôéò ðññååÜòù åíôiëYð:

```
# portupgrade -f ruby
# rm /var/db/pkg/pkgdb.db
# portupgrade -f ruby18-bdb
# rm /var/db/pkg/pkgdb.db /usr/ports/INDEX-* .db
# portupgrade -af
```

Ìüëéð ieiëëçñùèåß ôi ðáñáðÜñ, ieiëëçñþòðå ôç äéáæéåóßá áíáâÜëíéóçò iå iéá ôåëåððååßá êëþóç ôçò åíðiëþð freebsd-update. Äþóå ôçí ðáñáêÜðù åíðiëþ ãéá íá ieiëëçñþòðå ôiöäþðiðå Ý÷åé åðiñâßíåé ôç äéáæéåóßá áíáâÜëíéóçò:

```
# freebsd-update install
```

Áí ÷ñçóëiiðiëýóåå ðññóùñéïÜ ôií ðññþíá GENERIC, áôðþ åßíáé ç êáôÜëëçëç ôôéäþ ãéá íá iåðååëùòðóåå êáé íá ååéåðååðþåå ÍÝí ðññóðññóíÍñ ðññþíá, iå ôi óðíþèç ôññüði.

Åðáíâééíþóåå ôiç ìç Ùíçìá óáò ôôçí ÍÝá Ýëäïóç ôiö FreeBSD. Ç äéáæéåóßá Ý÷åé ieiëëçñùèåß.

## 25.2.4 Óýâéñéóç ÊáôÜóôåóçò ôiö Óôóôþíáôïò

Ôi åicçèçóéü ðññåñâiá freebsd-update lðiññåß íá ÷ñçóëiiðiëçèåß ãéá íá åéÝâíååå ôçí êáôÜóôåóç ôçò ååéåðååðçíÍçò Ýëäïóçò ôiö FreeBSD óå ð÷Ýóç iå iéá åíñóðþ åéé åùñðþ ååéåðÜóôåóç. Ç åðéëiäþ áôðþ ôôåéñþíåé êáé åíéëiæåß ôçí ôñÝ÷iðóá Ýëäïóç ôùñ ðññâññññ Üðùñ åôôðþíáòiò, ôùñ åéâééièçéþí êáé ôùñ ãñ÷åßùí ñyëëéóçò. Åéá íá iåééíþóåå ôç öýâéñéóç, äþóåå ôçí åéüëiðèç åíðiëþ:

```
# freebsd-update IDS >> outfile.ids
```

**Ðññâéäiðiðçóç:** Áí êáé ôi üññáååå ôçò åíðiëþò åßíáé IDS, äái èá ðññÝðåé óå êáíéÜ ðåñþðòñùóç íá èåùñçèåß ððiæåðÜóôååòi åíùò oôóðþíáòiò åíß÷iðoðçò åéóâiëÝá (intrusion detection system) üðùò åßíáé åéá ðåññâéæåiá ôi security/snort. Èáéþò ôi freebsd-update åðièçéåÿåé óå ååäiÍÝá ôiö ôiä åßóëi, ôðÜñ ðÜiðå ç ðééæíüôçóå íá Ý÷åé åßíáé åéëiðñùóç ôññò. Áí êáé ç ðééæíüôçóå åôðþ iðiññåß íá iåéùèåß ÷ñçóëiðiðþíååå ôç ñyëëéóç kern.securelevel êáé åðièçéåÿíîðå åá ååäiÍÝá ôçò åíðiëþò freebsd-update óå Ýá öýóðçíá åñ÷åßùí iññí åéá áíÜäíñóç, iéá åéüñáååéýóåñç ëýóç èá þóáí íá óôôñþíååå ôi öýóðçíá iå êÜðiéi äßóëi ðið èåùññðóå åßäiññáååéþ. lðiññåðóå íá ÷ñçóëiðiðþóååå Ýá åßóëi DVD þ Ýá åíùðåññéü åßóëi USB ôið ðið ðiðÜóååå åá åóðååéþ ôiðiæåðåå.

Èá åßíáé ôþñá iéá åðééæþñçóç ôiö oôóðþíáòiò êáé èá åéôððùèåß iéá ëßóðå åðü åñ÷åßá êáé ôéÝð hash ôiö öýðiö sha256(1), ôüñi åéá ôi ååéåðåðóçíÍñ ññi åéá åéá ôi åíñóðü öýóðçíá. Åðåéäþ ðññéæåðå åéá iååÜëç ëßóðå, ôçí åíáéåðååðéýíðiå ôiö åñ÷åßùí out file. ids. Ôôçí iëüíç ôi åßíáåñí èá êðëiýóå ðiðéý åñþäñá, êáé öýíðiñá åé åÝíæåå ôçí ðññóùññéíþ iñþíç åðåééüñéóçò ôçò êíñóðüéåò.

Íé åñññÍð åôðÝð Ý÷iði ãåééÜ iååÜëi iþëiò, åéëÜ åßíáé åýéëi íá åðååññååóöiýíå ôçí Ýññäi. Åéá ðåññâéæåiá, åéá íá ååßóåå iéá ëßóðå åüëñí ôùñ åñ÷åßùí ðið åéáöÝññiòí åðü åôðÜ õçò åðßóçíçò Ýëäïóç, äþóåå ôçí åéüëiðèç åíðiëþ:

```
# cat outfile.ids | awk '{ print $1 }' | more
/etc/master.passwd
/etc/motd
/etc/passwd
/etc/pf.conf
```

Óá ðåñáðÜñ åßíáé iññí Ýá iÝññò ôçò åíññååå, ôðÜñ ðiðí åéüñáåå ðiðëëÜ åéåöiññåðéëÜ åñ÷åßá. ÊÜðiéá åðü åôðÜ óå åñ÷åßá åßíáé öôóðééæü íá Ý÷iði ôññiðiðiéçèåß. Åéá ðåññâéæåiá, ôi /etc/passwd Ý÷åé ôññiðiðiéçèåß, êáèþò Ý÷iði ôññóðååéåß ÷ñþðóåå ñðóåå õýóðçíá. Óå iññééÝð åðåñéðþþðåéð, iðiññåß íá ôðÜñ ðiðí åéá Úëéå åñ÷åßá, üðùð ð. ÷. åññéñþíååå ðôñþíá ñðóåå ïðiñá åéáöÝññiòí åöiyÝ Ý÷iði åíçíåññùèåß iÝóù ôçí freebsd-update. Åéá íá åíáéñÝóååå ñðóååññéíÝá åñ÷åßá þ êáðååëüññiòð, ðññóðëÝóåå ñðóåå õðçí åðéëiäþ IDSIgnorePaths óôi åñ÷åßí ñðèiðþðåñí /etc/freebsd-update.conf.

Åêòüö áðü ôçí ÷ñþóç ðiòö áíáö Ýñâiå ðñïçäiöiÝìùö, ôi óýóôçìá áôðü ìðiññâb íá ÷ñçóëiiðíéçèåß êáé ùò ôiþà ìéàò èåððöñåñiyò äéáééåðßáö áíáâÜèíéçò.

### 25.3 Portsnap: íá Åñääáëåßí ÅíçìÝñùóçò ôçò Óoëëiäþò ôùí Ports

*ÃñÜöçêå áðü ôíí Tom Rhodes. ÁáóéóìÝü óå óçìåðéþóåéò ðið ðáñåß÷å í Colin Percival.*

Ôi âáóééü óýóôçíá ðiô FreeBSD ðåñéëâîáÜíâé åðßöçò Ýíá áïçèçöéêü ðñüñâñâíà áæá ôçí áïçíÝñùóç ôçò ÓðëëïäÞò ôúí Ports. Ðñüêåéðáé áæá ðiô portsnap(8). ¼ôáí ðiô åêôåëÝóåôå, eá oðíñâåèåß óá Ýíá áðññâéñðóíÝíí äéåéñéóôÞ, eá åðåéçèåýóåé ðiô åéåéäß ðiô ðçäåñïõ êþäééá, áéá eá êåôåâÜóåé Ýíá íÝí áíðßññåöi ôçò ÓðëëïäÞò ôúí Ports. ðiô åéåéäß ÷ñçöéïðíéåßöåé áæá íá åðåéçèåýóåé ôçí áéåñâéüöçôå üëùí ôùí áñ ÷åßùí ðiô iåôåöiñöþññåé, åîåóåéßæñíôå ùüé äáíÝ-:iñí áééïéùèåß éåðÜ ôçí iåôåöiñÜ. Áéá íá êåôåâÜóåôå óå ôåëåñôåßá áñ ÷åßá ôçò ÓðëëïäÞò ôúí Ports, åêoåëÝóôå ôçí åéüëiöç áïññéÞ:

```
# portsnap fetch
Looking up portsnap.FreeBSD.org mirrors... 3 mirrors found.
Fetching snapshot tag from portsnap1.FreeBSD.org... done.
Fetching snapshot metadata... done.
Updating from Wed Aug  6 18:00:22 EDT 2008 to Sat Aug 30 20:24:11 EDT 2008.
Fetching 3 metadata patches... done.
Applying metadata patches... done.
Fetching 3 metadata files... done.
Fetching 90 patches.....10....20....30....40....50....60....70....80....90. done.
Applying patches... done.
Fetching 133 new ports or files... done.
```

Óðí ðáñáðÜfú ðáñÜääéñíá áðþ ÷ íáé üðé ñi portsnap(8) áñÞéåá éáé áðæéÞéåðóá áñéåð Ü patches óá iðibá ðñÝðåé íá áðóáñíiðóiyí óðí ððÜñ ÷ ii áÝiññi óúi ports. Áðóü áðþ ÷ íáé áðþþò üðé ñi ðññüññííá Ý ÷ áé áðóáðóðåß éáðó Ü ñi ðáññæéëü. Áí áðóÞ Þóáí c ðñþþc öiññ Ü ðið áðóáðéiyí ñið, eá ãßññíðáí áðéþò éáðó Yááðíá òçò óðéëéiÞò.

**1/4**ôáí ôi portsnap(8) âôåôâéÝôåé åôðôô ðò ôç èåéöôññâßá fetch, ç ÔoëëïäP ôùí Ports êáé ôá áîôßôôïé ÷ á patches Ý÷iôí áðièçêåðèåß ôóï ðiðéëü óyôôçìá êáé Ý÷åé åßiâé ç åôðåëÞeåôôç ðiôò. Ôçí ðñþôç ðiñÜ ðiô éá åêôåéÝôåôå ôi portsnap, èá ðñÝðåé íá ÷ñçöiiðiÞoåôå ôi extract åéá íá åâéåôåôÞoåôå ôá åçìâñùÍá ãñ ÷åßá:

```
# portsnap extract
/usr/ports/.cvsignore
/usr/ports/CHANGES
/usr/ports/COPYRIGHT
/usr/ports/GIDs
/usr/ports/KNOBS
/usr/ports/LEGAL
/usr/ports/MOVED
/usr/ports/Makefile
/usr/ports/Mk/bsd.apache.mk
/usr/ports/Mk/bsd.autotools.mk
/usr/ports/Mk/bsd.cmake.mk
```

ÁÍ Ý÷åôå Päc åääéåôåôçí Ýíç ôçí ÓöëëiäP ôùí Ports, ÷ñçóëiiëPóôå ôçí åíöiëP portsnap update áéá íá ôçí åíçí Ýñùóåôå:

```
# portsnap update
```

Ç äéäääééóóßá Ý ÷ áé ðéÝíí ieiéçñùèåß, êáé lðiññåßôå íá åâéåóåóòÞóåôå P íá áíáâáæìßóåôå åöäññíäÝò ÷ ñçóéiñðiéþíóåò ðçí åíçíåñùíÝç ÓðëërãP ôúí Ports.

Iðiññáþòðá íá áðóðæÝðóðóð ðeðo äéäæééáðþòð fetch éáé extract P updaté äéäæí÷ééÜ, üðùðo öáßÍåðóáé óðið ðaññáéÜðuð ðaññÜääéæñá:

```
# portsnap fetch update
```

Ç ðaðnáðÜíñ áðiðieþ Þ eá éadóðað Üðaðe óc í ðaðnáðaðaðaða Ýêüüðc óc ð ÓððeëiðÞ ðouí Ports eáé eá áicílæñþróðaðe óa ðiððeð Ü ãñ ÷ áða ðað ðoði ð eadóð Üðeïñ /usr/ports.

## 25.4 Åíciåñþiióáò ôcí Ôåêìçñßùóç

Åêôüö ãðü ôí âáóéêü óýóðçíà êáé ôçí ÕðëëíäP ôùí Ports, ç ôââéïçñßùñóç áðïðâåëâß åðßóçò åááðééü ôíPíà åíüö óðóôðPíáôïò FreeBSD. Áí êáé ÕÜfóá iðññâðôá íá âñâðôá ôçí ðéí ðññüöðâóç ôââéïçñßùñóç ôðçí áééññâéP ôíðíëåðBá ôïò FreeBSD (<http://www.freebsd.org/doc/>), iñéóí Ýíïé -ñPóðâóð Bóùð Ý÷iðí ãññäP P íç ôðâæññP óýíáâðóç íå ôí Åéáâðéðöï. Åðôð ÷þò ôðÜñ -iðí ãññâðiñ ôññüðíé åéá íá åíçíàññþðâóðâ ôçí ôââéïçñßùñóç ç iðíßá ðáññY÷åðâðé íå êÜeå åðßóçìç Ýäïíóç, æáðôçñþðâóð ôí æéüú óáð ôïðéêü áíðßññâðöï ôçð ðéí ðññüöðâóðçò ôââéïçñßùñóç ôïò FreeBSD.

25.4.1 × ñçóéíïðíéþíôáò ôí CVSUp ãéá ôcí ÅíciÝñùóç ôçò Ôåêíçñßùóçò

Í ðçááßíð ëþáééáð Þáé áðí ãâéâðâðóðí Ýíí áíðßññáöi ðcð ðââíçñßúðcð öið FreeBSD, iðmííýí íá áíçílanùëíýí lað ðcð áíÞeåéá öið **CVSup**, ÷ñçóéiiðíéþíð Ýíá ic÷áíéöiú ðáññüiíei íað ãðôuí ðið ÷ñçóéiiðíéâßôáé öoí ãâóéëu òýóðòà (áâßôá ñið ÓÞíá 25.7). Ç áñuðóðá ãðôP ðâñññÜðåé:

- Đùò íá âåêáôáôðôÞóåôâ óá âññáéâßá ðïò áðáéöiyíôåé æéá òçí ôåêìçñßùóç, ià óâ iðïßá iðïñâßôå íá äçìéïõñäÞóåôâ ôçí ôåêìçñßùóç ôïò FreeBSD iâééþíôå áðü ôíí ðçãáßí ôçò êþäééå.
  - Đùò íá éåôåâÙóåôâ Ýíá áíôðâññäöï ôïò ðçãáßíò êþäééå ôçò ôåêìçñßùóçò óôïí êåôÙëëäí /usr/doc ÷ ñçóéïïðïéþíôå ðïò **CVSup**.
  - Đùò íá áíáäçìéïõñäÞóåôâ ôçí ôåêìçñßùóç ôïò FreeBSD áðü ôíí ðçãáßí ôçò êþäééå, êåé íá ôçí âåêáôáôðôÞóåôâ óôïí êåôÙëëäí /usr/share/doc/.

25.4.2 Åâéáèéóôþíóáò ôi CVSup êáé ôç ÓåéñÜ Åñâáëåßùí ôçò Ôåéìçñßùóçò

Ҫ áíáäçíeliðñáþá ôçð ôâðéïçñþùñðó ðið FreeBSD áðü ðiï ðçãáþí ðéþæéá, áðáéðôð áðéëá þ iéá ó ÷ âðééÜ lâaÜ eç ðöðéïáþ âññáæåþùí. Óá âññáæåþá ôðôÜ äáíl áðíáé iÝñiò ðið ááðééiy öððóðÞíáðiò ðið FreeBSD, êáéþò ÷ ñâðÜæïðóáé áññéåðü ÷ þñi öði äßðóei êáé äáíl áðíáé ÷ ñÞðéíá óá üeïðð ðiðð ÷ ñÞðóðåð. Áðíáé ÷ ñÞðéíá iüñi öðiðð ÷ ñÞðóðåð ðið áó ÷ iëýífðáé iá ðc öððáññáðþ ðiÝáo ôâðéïçñþùñðó ðaéá ði FreeBSD, Þ ðið áíçiañþñiði ðo ði ðeéþ ðiðð ôâðéïçñþùñðc iÝóu ðið ðçãáðþið ðéþæéá.

¼éá óá áðáéóïýíáíá áññáæåbá äéáðþæáíðáé íÝóú ôçò ÓðëëiäPò ôùí Ports. Õi textproc/docproj áßíáé ôí êýñei port ôí iðibí Ý ÷ áé áíáðôò ÷ èåß áðü ôçí ïÜää Ôåðéïçñßùóçò ôíð FreeBSD, áéá íá áïçèÞóåé óôçí áñ ÷ ééÞ áâéáô Üóðáóç éáé ôéð ìåééiiðóééÝò áíááæìßóåéð áðóþí ôùí áññáæåbú.

Ãéá ðâñéðóóñûðâñâð ðëçñïòññâð 0 ÷ ãôééÜ ia ôçí åâæåð Üñôåáñç êáé ÷ ñÞðç òñ CVSup, äåßðå ôçí åíüôçôá × ñçðéññïðéþíðå òñ CVSup.

#### **25.4.3 Åíçìåñþííóáò ôíí Đçääáßí Êþäéêá ôçò Ôåêìçñßùóçò**

Ôi âiçëcôêu ðñüañâià CVSup iðiñâb íá éâdââÜóâé Ýíá êâeáññú áíðâñâði ðiñ ðçââbñi ëpäééâ ôçð ôââèiçñbñûçð, ÷ñçöéiñðiépíðo ðiñ /usr/share/examples/cvssup/doc-supfile ñò ðñüôðiñ áñ ÷åbñ ñðeìbñóâu. Í ðñiâðeéââi Ýiò ððiñæéôðPð áíçâñbñóâu ñóï ðáñâðÜíu áñ ÷åbñ ábñáé ñòðeìéóí Ýiò óâ ðeáóíâðeéP ðeíP. Ùóðüñi, ç cvsup(1) äÝ ÷åðâé üññâ ððiñæéôðP ïÝóu ôçð aññâiñPð áíðiépí, Ýðóé iðiñâðbñâ íá áíâðôðPâðâ ôññ ðçââbñi ëpäééâ ôçð ôââèiçñbñûçð ïÝóu êÜðiéó ãiñðçñâðçðP CVSup aññ Üòiñâðo:

```
# cvsupdate -h cvsupdate.FreeBSD.org -q -L 2 /usr/share/examples/cvsupdate/doc-supfile
```

Áæð Útôð áði [cvsup.FreeBSD.org](http://cvsup.FreeBSD.org) íà ðiði eðréfðum ðâñii óáð áðiðçñâðçþ **CVSup**. Áðbôð áði **Óiþíá A.6.7** ærá leá ðéÞñç eðbóðá ðúni mirror sites.

Ói áń ÷ ééú éáó Ýááóíá óíö ðçääñöö ëþæééá óçò óåéëçñßùñöçò ïðññäb íá æéáñëÝóáé áñéåôÞ þñá. ÁöÞóóâ ói íá åéðåéëåßööé áÝ- ñë íá iëíéëçñùñéåß.

Í ðiññáðóá íá óðíðá ÷ þóðóáðá íá áíçìñþíðóá ðiñ ðçááði Þþáééá ðóð ðáðéicñþùðóð ÷ ñíðóðiñðíéþíðóáð óðí ßæáá áiðiñÞ. Óðí áiçèçóéëü ðñüññáíia **CVSup** éáðóáðÜ æðáé éáé áíðéæñÜðóáé iùññ óðó áíçìñþþóáðó áá ð-Ýóð íå óðí ðáðéððáðá áðó Ýéðóç óið, Ýóðé Üðæá áðó Ýéðóç óið **CVSup** iàðÜ óðí ðñþþóð eá ðñÝðáé íá áðíáé áññéðóÜ ãñÞaiñc.

låôÜ ôçí áñ ÷ ééP áíÜêôçóç ôïö ðçäåßiö êþäééá, Ýíåò áíáéëåéôéüö ôñüðiö áíçìÝñùóçò ôçò ôåèìçñßùóçò åßíáé íÝóù  
ôïö áñ ÷ åßiö Makefile óöii êáôÜëiäi /usr/doc. ÈÝôiiôåò ôéö låôååëçöÝò SUP\_UPDATE, SUPHOST êáé  
DOCSUPFILE óöi áñ ÷ åßiö /etc/cmake.conf, lõiñåßôå íá åôéåéÝåôå:

```
# cd /usr/doc  
# make update
```

ÔððæsæÝð ðeitÝð aðá ðeit ðaðnæðum aðeitaðaÝð ðið make(1) óðri að -ðið /etc/make.conf áðráð:

```
SUP_UPDATE= yes  
SUPHOST?= cvsup.freebsd.org  
DOCSUPFILE?= /usr/share/examples/cvsup/doc-supfile
```

**Óciáßúóć:** Áí éÝóáôâ ôéó ôéí Ýò ôúí SUPHOST êáé DOCSUPFILE óâ ?=, éá íöñíßâðôâ íá íñßóâðâ Üëéâðô ôéí Ýò áéá áðôÝò óóć áññáíïþ áíöüéþò ôíõ make. Áóöüö áßíáé êáé í öóíéöðþíäíïþ ôñüöðìö íá ðñíöéÝóáôâ áðééíäÝò óóít make.conf, þóðâ íá áðíöáÿâðâ íá ôñíðíëéâðôâ óóíÝ÷âéá ôí áñ÷âßí êÜëâ õíñÜ ôíõ èÝëâðâ íá äíééíÜóâðâ íéá íÝá ôéíþ óâ íéá áðééíäþ.

#### **25.4.4 Đñiíoáñiiäþ Åðééëäþí óóiií Đçääáßí Êþäéêá ôçò Ôåèìçñßùóçò**

Ói óyóðölciá áíçí Ýñùñóçò êáé lâðóðæþþðôðéóçò ðçò ôðâðíçñþùñóçò ôðið FreeBSD, ôðiðóðçñþæåé lâññééÝð åðééëiaÝð ôðið æéððéëýññóí ðç æéáæéáðþá áíçí Ýñùñóçò áñúò lüññi iÝññóð ðçò ôðâðíçñþùñóçò, þ ðçí lâðóðæþþðôðéóç ðçò ôðâðíçñþùñóçò êÜðiðéñü íððæðñññéÝññi lâðóðæññÜðáññ. Áí èÝéåðá ié åðééëiaÝð åðóÝð íá éó : ýññóð lüññéia, iðiñññðóðá íá ðéó iññþðóðå ïÝðá ðóíi áñð: åðþ /etc/make.conf, æéáöññðóðééÜ iðiñññðóðá íá ðéó iññþðóðå ëÜðæ iññÜ óðç áññáìðP åðiðéþþò ðçò make(1).

ÊÜðiéåò áðü ôéò åðéëiäÝò áðôÝò öáßiiíôáé ðáñáêÜôù:

DOC LANG

ԷՅթու անգլիական տառապահության մեջ առաջարկված է անգլիական առաքած առաջարկը՝ ISO 9001:2015 ստանդարտը:

## FORMATS

Ç İNNÖP (B İLE ĀBÖDÄ AÐU İNNÖÝD) ÖDÖCİ İÐIBÄ ËA ÐÄÑA ð: ðÄB Ç İÄDÄÅÅÈÙÖDÖCİÝÍC ÖÅÈLÇÑBÙÖC. ÖC ÄÅÄNÍÝÍC ÖDÖCİB ÖDÖCİÖCİÑBÆJİDÄE İE İNNÖÝD html, html-split, txt, ps, pdf èäé rtf.

SUPHOST

Ôi üññá ôiõ åñõðcñåôcôþ CVSup ðiõ èá ÷ñcóéiiðiécèåß êáôÜ ôcí áíciÝñùóç.

DOCDTR

Í éáóÜeiajò óóíí jðiñí ëá ååéåôåóôåèåß c ôåéïcñþùóç. Áðü ðñjåðéëíäþ åßíáé í /usr/share/doc.

Áéá ðåñéóóüôåñåò ðëçñïöïñßåò ó÷åóééÜ ia ôéò iaðåâæçô Ýò oïõ make ðïõ õðïöôçñßæïíóáé ùò åðéëïä Ýò óðóôPiáôï òóï FreeBSD. äåßôå ðíç òåëßää manual ôïõ make.conf(5).

Ãáá ðåñéóóüôåñåò ðëçñïöñßåò éáé ïåðåâæçò Ýò make ðiõ ððiôçñßæïîáé áðü ôí óýóôçìá ïåðåâæþôóéóçò ôçò ôåâèïçñßùñçò ôíõ FreeBSD, ðåñâéæïÿìå äåßòå ôéò ïäçâßåò ôçò ïÜäåò Ôåâèïçñßùñçò ôíõ FreeBSD æáá ÍÝiõò Õðäññåðåßò ([http://www.FreeBSD.org/doc/en\\_US.ISO8859-1/books/fdp-primer](http://www.FreeBSD.org/doc/en_US.ISO8859-1/books/fdp-primer)).

#### 25.4.5 ÅåêáôÜóôáóç ôcò Ôåêìcñßùóçò ôïõ FreeBSD áðü ôii Ðcãáßü Êbæéêá

Ìðiññáðóá íá ðñí ðiùñPóáðå óå ðëéPñç áíçí Ýñùóç üëùí ôùí áëëùóþí ðiò iññæiñðóáé óôçí áðééññP DOC\_LANG ôiò Makefile, æññ Þññññññ.

```
# cd /usr/doc  
# make install clean
```

Áí Ý÷åôå ñõèìßóåé ôi make.conf iå ôéò óùóó Ýò ôéí Ýò ãéá ôéò åðéëiä Ýò DOCSUPFILE, SUPHOST êáé SUP\_UPDATE, iðmåßóå íá ôóïäö Üóåôå óá áPIádá åíçí Ýñùóçò êáé åâéåó Üóåóçò ôiõ ðçãáßiö êþæéå óá Ýíá, ãñí Íúýóåó:

```
# cd /usr/doc  
# make update install clean
```

Áí áðééöìåßôå óçí áíçí Ýñùóç ìéáò ìüíí óóðâéåñéí Ýíçò ãëþóóáò, ìðiñåßôå íá êáéÝóåôå óçí make(1) óå Ýíá óóðâéåñéí Þýñ ðóðééñéí Þíæíí ðíð.

```
# cd /usr/doc/en_US.ISO8859-1  
# make update install clean
```

Íðiññáþóðá íá ÞeáiññBóðóðá ðíç iññöP ðíçò ðóðéiññBùñóðò ðíð Þá ðáðéáðóðáðéðB, ñðeìññBæiññóðá ðíç iññðáðéçöP FORMATS ðíð make. Ð.:

```
# cd /usr/doc  
# make FORMATS='html html-split' install clean
```

#### 25.4.6 ×ñçóéíïðíéþíôáò ôá Ports ôçò Ôåêìçñßùóçò

ÂáóéóìÝü óå åñäáóßá ôïö Marc Fonvieille.

Óóci ðíñçáïýiâfq áíüöôçôá, ðánñiööé Üóáíâ iéá iÝéíäi âéá ôóci áíçí Yñùöç ôçò ôâéïçñþñöçò ôiõ FreeBSD iÝóù ôiõ ðçäáâbiô êþäééâ. Ùóðüöi, ié áíçíâñþöáéò ðiõ ááóßæiiöáé ôóii ðçäáâbi êþäééâ iðiñâß íá lçí áßvíáé äðíáô Yð Þ ðñâéöéé Yð áéá èÜéâ óýðöçíá FreeBSD. Ç áéáâééâóßá iâðâáäéþðödöçò ôiõ ðçäáâbiô êþäééâ ôçò ôâéïçñþñöçò áðáéôâß ð ÷ áðééÜ iâðäÜëi áñéèùi áñâñâäéâñù êáé áíçèçöéébi ðñiñâñiÜ ðûñi, áñúööÜ ùò áññâðéäþá ôâéïçñþñöçò. Áðáéôâß áðßöçò éáé iéá ò ÷ áðééÜ ãíñééâñùöç iâ ði CVS êáé ôç áéáâééâóßá áíÜêðöçò ðûñi áñ ÷ áñúði áðü ãðöñi, êáéþð êáé iéá óâéñÜ áðü áþiáðá áéá ôç iâðâáäéþðöéç ôiõ êþäééâ. Óóci áíüöôçôá áðôÞ ðâñéññÜ öiõiâ Yíá áíâééâðééü ôñüði áíçí Yñùöçò ôçò ôâéïçñþñöçò ðiõ áâéâæþðödâáé iâðß iâ ði FreeBSD. Ç iÝéíäi ðiðiâði ôçí ÓðééñâÞ ôñi Ports éáé äßvíâé ðéð ðâñáéÜ ðûñi áðñâðöçôâð:

- Éaô Ýâáóia í éaé âåéâod Üôôdáócs ðñïi-ìåôdâæüñôôdêói Ýùí òôdèæüëüôôðñi ðôçò ðââïçñbñùñôçò, ÷ ññbò ía áðâáéôðâbôáé êâïé Ü ðiðééïp ìåôdâæþôôéócs (âïâéæßöiñôdô Ýôóé éaé ôçí áï Üâæç âåéâod Üôôdáóçò üëñi ôùí åññâæâßùí ðââïçñbñùñôçò).
  - Éaô Ýâáóia ôïo ðçäâbtiô ñbâééâ ðôçò ðââïçñbñùñôçò êaé ìåôdâæþôôéócs ôïo iÝòu ôùí ãðíâòîþòùñi ðiõ ðañ Ý : iñõ ôâ åññâæâßá ôùí ports (áðëiñiþbñôdô ìå áðôù ôïi ôññuði ôç ÷ åññiþbñicôc æéâæéâôßá áú Üéôcôcô ëaé ìåôdâæþbôôéócs).

ÁôôÝò íé áyí iÝeiäié áíçíÝñùñóçò ôçò ôåêïçñbùñóçò ôiõ FreeBSD ôðiøöçñbæiiôáé áðü íéá óåéñÜ áðü ports ôåêïçñbùñóçò óá iðiñá åíçìåñþiióáé êÜèå iÞíá áðü ôçí ïiÜää Áñ ÷éôåêöiíéêPò ôçò Ôåêïçñbùñóçò <doceng@FreeBSD.org>. Óôç ÓðeeëiP ôùí Ports, éá óá åñåbôå êÜòù áðü ôçí êáðçäiñßá docs (<http://www.freshports.org/docs/>).

25.4.6.1 Iåôáäëþôéóç êáé ÅæáôÜóôáóç ôùí Ports ôçò Ôåëìçñßùóçò

Óá ports ôçò ôláêitñþùñóç ÷ ñçóéññíðíéiyí ôéô ãðíáðûñôçåðô ìáðâññéþþôðéóç ðíõ ðáññÝ ÷ áé ôí óýðôçìá ôñí ports þþôðå íá áéâñðëëýññóç ôç áæáæéáðþá äçíéññâðå ôçò ôláêitñþùñóç. Íå áðóðü ðíñ ôññðíç áílÜéðôçóç ôíñ ðçäáññíð êþæéáð ôçò ôláêitñþùñóç ãðíáðûñâðå áðôðüñáðå íá ôçí áéô Ýéâðç ôçò make(1) éáé ôéô êáðÜëéçéåð ñòðèìþðâéð ôóí ðâññéáðÜëéii. Ç áâáæáðÜôðáóç êáé áðâññâðå Üôðáóç ôçò ôláêitñþùñóç ãðíáðûñâðå ôí ßäéï áýéëéç íå ôçí áâáæáðÜôðáóç iðíéññäþðíðå Üëéii port Þ ðáéÝ ôíñ ôóí FreeBSD.

**ÓciáBñúñc:** Ó áðáBñðóñúóç ðíðééhþ iáðááæþBñðóñcò ðuí ports ðóçò ðáéiçñBñúñcò, áðáéðáBñðáé éáé c áðáéáðÜðóñáóç ðuí áññáæþBñú ðáéiçñBñúñcò. Óá áññáæþBñá áðóðU ñóðüñi éá áðéáðáóðáéèýí áðóðüñiáðá.

Ç iñāÜíùóç ôùí ports ôåêìçñßùóçò öáßíåôáé ðáñáêÜôù:

- ÓðÜñ÷åé Ýíá port “üëá óå Ýíá”, ôi misc/freebsd-doc-all ôi iðibí iåôáæùôðôßæåé êáé ååéééóôÜ üëç ôçí ôåéìçñßùóç óå üëåò ôéò áééåÝðéåò ãéþóðå.
- ÔÝeïò, ôðÜñ÷åé Ýíá “ååññòpiåíí port” áéá êÜèå iåôÜöñáóç, ð.÷.: misc/freebsd-doc-el áéá ôçí ÅëëçíéêP ôåéìçñßùóç. ¼ëá áðôÜ óá ports ååññòpiåé áðü ôi master port êáé ååéééóôïý ôçí ôåéìçñßùóç ðið Y÷åé iåôáöñáóôåß ôçí áíôßóïé÷ç ãéþóá.

Åéá íá ååéáðáóôÞóåôå Ýíá port ôåéìçñßùóçò áðü ôi ðçääáßi êþäééå, ååôåéÝóôå ôéò ðáñáéÜôù áíôïéÝò (ùò root):

```
# cd /usr/ports/misc/freebsd-doc-en
# make install clean
```

Ôi ðáñáðÜù éá iåôáæùôðôßóåé êáé èá ååéáðáóôÞóåé ôçí ÁääæéêP ôåéìçñßùóç óå iññöP ðìçìåðééêP HTML êåéíÝùí (üðùò ÷ñçóéiïðiéiyíðåé êáé óóï http://www.FreeBSD.org), ôóïí êåðÜëiäi /usr/local/share/doc/freebsd.

#### 25.4.6.1.1 ÓðíçèéóíÝíåò ÁðééëiäÝò êáé ÐáñÜiåôñié iåôáæþôðéóçò

Íðiñåßôå íá ÷ñçóéiïðiéÞóåôå áñéåòÝò áðééëiäÝò áéá ôçí ôñiðiðibçóç ôçò ðñiåðééååíÝíçò óðiðåñéöñÜò ôúí ports ôåéìçñßùóçò. ÐáñáéÜôù ååß÷ñðià iåñééÝò iüñí áðü áðóÝò:

##### WITH\_HTML

ÅðéôñÝðåé ôç äçìéiõñäßá ôçò ôåéìçñßùóçò óå iññöP HTML. Èá äçìéiõñäçèåß Ýíá áñ÷åßí HTML áéá êÜèå êåßìåñí. Ç iññöiðiéçìÝíç ôåéìçñßùóç èá áðièçéåðéåß, áíÜëiäå iå ôçí ðåñßðôùóç, óå Ýíá áñ÷åßí iå üññá article.html P book.html. Èá åßfåé åðßóçò êáé áðièþéåðóç ôúí áíðßóïé÷ùí åééüñí.

##### WITH\_PDF

ÅðéôñÝðåé ôç äçìéiõñäßá ååññÜöïò óå iññöP Adobe Portable Document Format (PDF) áéá ÷ñÞóç iå ôóï Adobe Acrobat Reader, ôi Ghostscript, P Üeeäå ðñiññÜiñáôå ðñiåðéëPò ååññÜöùí PDF. Ç iññöiðiéçìÝíç ôåéìçñßùóç èá áðièçéåðéåß, áíÜëiäå iå ôçí ðåñßðôùóç, óå Ýíá áñ÷åßí article.pdf P book.pdf.

##### DOCBASE

Ðñüéåéôåé áéá ôçí èÝóç óôçí iðibí åéá ååéáðáóôåéåß ç ôåéìçñßùóç. Áðü ðñiåðééëiäP, åßíáé iêåðÜëiäi /usr/local/share/doc/freebsd.

**Óçìåßùóç:** ÐáñáðññÞóôå üðé iðiñåðééååíÝíò êáðÜëiäi åéáöÝñåé áðü áðóüí ðið ÷ñçóéiïðiéåßôåé óôç iÝëiäi CVSup. Áðóü óðiññßíåé áðåéåß ååéåðóåé ååéåðÜóôåóç port, óå iðibí åðü ðñiåðééëiäP ÷ñçóéiïðiéiyí ôíï eáðÜëiäi /usr/local. Íðiññßôå íá ðáññéÜiøåôå áðóP ôçí ðñiåðééëiäP, áééÜæíñóåò ôçí ðéiP ôçò iåôáæçò P PREFIX.

ÐáñáéÜôù èá åññßôå Ýíá óýíðiíi ðáñÜäåéäiá ó÷åôééü iå ôç ÷ñÞóç ôùí iåôáâéçò Pí áéá ôçí ååéáðÜóôåóç ôçò ÁääæéêP ðååéìçñßùóç óå iññöP PDF:

```
# cd /usr/ports/misc/freebsd-doc-en
# make -DWITH_PDF DOCBASE=share/doc/freebsd/en install clean
```

#### 25.4.6.2 ×ñÞóç, ôiélùí ÐáêÝôùí Ôåêïçñßùóçò

Ç ìåðááæþþóóéóç ôuí ports ôåêïçñßùóçò áðü ôiõ ðçääáþi êþäééá (üðùò åßääáíå óôçí ðñiçäiýìåíç åíüöçôá), áðáéðåß ôiðééþ ååééáðÜóðáóç ôuí áíðþóóïé ÷ñí åññääéåßùí ôåêïçñßùóçò êáé áðÜñééáá ÷þñiõ ôiõ åßóéí ãéá óçí æáéééáóßá. ¼ôáí ãáí ãéáéóßéåíóáé ié áðáñáßóçöé ðüñié ãéá óçí ååéáðÜóðáóç ôuí åññääéåßùí ôåêïçñßùóçò (þ áðåéäþ ç ìåðááæþþóóéóç áðü ôá ports èá ÷ñçóéiïðiéýá ðiéý ÷þñi), ç ååééáðÜóðáóç iðiñåß íá åßiáé iÝóù Ýóïéiùí ðáéÝôùí ôåêïçñßùóçò.

H ïÜää Áñ ÷éóåéôííééþò ôçò Ôåêïçñßùóçò <doceng@FreeBSD.org> ðñiåðöiéíÜæáé içíéáßá óôéäiéüöðá ðáéÝôùí ôåêïçñßùóçò ôiõ FreeBSD. Óá Ýóïéiá áðôÜ ðáéÝóá iðiñiýí áá ÷ñçóéiïðiéçëiýí iá ôçí åíþèéáé iðiéiðäþðiôå åññääéåßiø ãéá ÷åßñéóçò ðáéÝôùí ðiõ äéáóßéåâáé iá ôi FreeBSD, üðùò ãéá ðáñÜääéáíá ôá pkg\_add(1), pkg\_delete(1) ê.ë.ð.

**Óçìåßùóç:** ¼ôáí ÷ñçóéiïðiéåßóå Ýóïéiá ðáéÝóá, ç ååééáðÜóðáóç ôçò ôåêïçñßùóçò ôçò áðééåäiÝíçò ãéþóóáò èá åßíåðáé óå üéåò ôéò äéáéÝóéiåò iññöÝò.

Åéá ðáñÜääéáíá, ç ðáñáéÜóù áíðiøþ èá ååééáðåôþóåé óçí ôåéåðôåßá Ýéäiöç ôiõ Ýóïéiñö ðáéÝóiõ ôçò Åëëçíééþò ôåêïçñßùóçò:

```
# pkg_add -r el-freebsd-doc
```

**Óçìåßùóç:** Óá ðáéÝóá ÷ñçóéiïðiéýí ôç iññöþ lang-freebsd-doc ôôi üíííá ôiõò, ç iðiþá åéáöÝñåé áðü ôçí áíðþóðié ÷ç iññöþ ôiõ port. Òi lang åßíåé ç óýíðiç iññöþ ôçò åéþóóáò, ð.÷. el åéá ÅëëçíééÜ þ zh\_cn åéá ÅðëiðiéçíÝíá ÈéíÝæééá.

#### 25.4.6.3 Åíçìåñþííóáò ôá Ports ôçò Ôåêïçñßùóçò

Åéá íá åíçìåñþóåå Ýíá Päç ååéáðåôðçìÝíí port ôåêïçñßùóçò, iðiñåßôå íá ÷ñçóéiïðiéþóåôå iðiéiðäþðiôå åññääéåßíí åíááÜëiéóçò ports. Åéá ðáñÜääéáíá, ç ðáñáéÜóù áíðiøþ åíçìåñþíáé óçí ååééáðåôðçìÝíç Åëëçíééþ ôåêïçñßùóç iÝóù ôiõ åññääéåßiø ports-mgmt/portupgrade iá ôç ÷ñÞóç iññí Ýóïéiùí ðáéÝôùí:

```
# portupgrade -PP el-freebsd-doc
```

### 25.5 Ðáñáéiïýèçóç Áíüò ÊëÜäiõ ÁíÜðôõíçò

ÖðÜñ ÷iõí áyí eeÜäié áíÜðôõíçò ôi FreeBSD, ôi FreeBSD-CURRENT êáé ôi FreeBSD-STABLE. Óôçí åíüöçôá áðôþ, éá åíçãþóïíå êÜðiéá ðñÜäiáðá ó ÷åðééÜ iá áðöiyó ôiõò eeÜäiõò, êáé èá ðáñéñÜðiõíå ðùò iðiñåßôå íá åéáðçñþóåðå ôi óýóðçìá óáó åíçìåññíÜíí óá êÜðiéíí áðü áðöiyó. Èá iééþóïíå áñ ÷ééÜ åéá ôi FreeBSD-CURRENT êáé Ýðåéóå åéá ôi FreeBSD-STABLE.

#### 25.5.1 Ðáñáéiïðèþíóáò ôi FreeBSD-CURRENT

Êáèþò åéááÜæåôå áðôü ôi êåßiåñí, íá Ý ÷åôå ððüøéí óáò üôé ôi FreeBSD-CURRENT åßíáé ðñÜäiáðé ç “êüøç ôiõ ñiñáöeý” óôçí áíÜðôõíç ôiõ FreeBSD. Íé ÷ñÞóåðå ôiõ FreeBSD-CURRENT áíáíÝíåðáé íá Ý ÷iõí áðîçíÝíåò

### 25.5.1.1 Ôé Åßíáé ôï FreeBSD-CURRENT;

Ôi FreeBSD-CURRENT áðiðiðæðþóáé áðú ôií ðe Ýí ðññúðóáöi éðæðiðññáéêü ðçááßi êþæéá óið FreeBSD. Ðáññééâiâ Üíâé áëëáá Ýð ðið aðñþóéiðóáé óá ái Ýëéiç, ðåðñáiðóéé Ýð áëëáá Ýð, éáé iç ÷ áiéðiýð iåðÜááóçò ié iððiðié áðiðæð þáðiðiññ üðé eá ðáññééâiâ Üññóáé óðçí áððùláiç áðþóçíç. Ýéðiðc ðið eðæðiééiy. Ái éáé ðiðéÜ iÝéç ðçò ñiðÜááð áiðÜððiðc ðið FreeBSD iåððáæðiððþæiði ðéæçiâññéiÜ ðiði ðçááßi êþæéá ðið FreeBSD-CURRENT, ððÜñ ÷ iði ÷ ñiðééiy ðáññþiðié ðiði ç iåððáæðþóðéóç ðiði áðiðæð aðyáðiâ. Óá ðññáæðiáða aðoÜ aðiðéÜ áððééiyðóáé üði ðeíi ãñþaiñá áðiðæð, áððéÜ ðiði áið FreeBSD-CURRENT eá óáð oðÝññáé ðçí eáðáðoññiðP b êÜðiði ðiðeððüeçòi ÷ áññáðçñéðóðéêü, áðiðæð ðáññéóðiððóáñi ðe Ýíâá ðçò ÷ ñiðééiyð oððéæðiP b ðiði eá áððéÜ Ýíâáð iá aðiðæðþóðáða ðiði ðçááßi êþæéá!

### 25.5.1.2 Đíëïò ×ñåéÜæåôáé ôí FreeBSD-CURRENT:

Ôjí FreeBSD-CURRENT äéáôßèåôáé êáé åíäéåö Ýñåé êoñßùò ôéò ðáñåéÜôù ôñåéò iiÜååò;



### 25.5.1.3 Ôé Äáí Åßíáé ôí FreeBSD-CURRENT;

1. Äáí áßíáé Ýíáò ãñPäiñiò ôññüöìò íá ðÜññåôå êßæééá i iññiñiò äáí Ý ÷ åé êðéëëiñPöåé áéüüìå óå êÜðíéá Ýéäïóç, iå ôçí áæðßää üöé ðåñéÝ ÷ åé êÜðíéá iÝá áåðëçéööéêP äðñáðüöçöå êáé èÝéåðå íá áåñööå i ðñþöìò ðiø ôç ÷ ñçóëiñðíéåß. Áí áßööå ðñÜäiñöé i ðñþöìò ðiø ôç ÷ ñçóëiñðíéåß, éá áåñööå áðßöçö êáé i ðñþöìò ðiø éá õðñåðPöåðå óå fÝá ðññiñëPäiñåðå êáé bugs.
  2. Äáí áßíáé Ýíáò ãñPäiñiò ôññüöìò äéá íá áíåéôPöåðå áæiñèþöåéò ðññiñëçÜôùí. ËÜèå iÝá Ýéäïóç ôiø FreeBSD-CURRENT iðñmåß íá áéöÜäåé ôüöå íÝá bugs üöá êáé áðöÜ ðiø äéiñèþiäé.
  3. Ôi FreeBSD-CURRENT äáí áðiñöåëåß “åðßöçìá ðññiñöçñéæüñiñ” êßæééá. Áí êáé êåðååÜëëiñiå êÜèå äðíáôP ðññiñöðÜëåéá íá åñçèPöiñiå üöiñiò áñPëiñi “ðññäiñåðéÜ” óå êÜðíéá åðü ôéò ôññåðò iñÜäåð ðiø áññäiñ, ùñööñöi åáí Ý ÷ iñiñiò ôi ÷ ñiiñ íá ðññÝ ÷ iñiñiò ôå ÷ íéêP ðññiñöðññéiç. Åñðüü äáí ööññåðßíåé åðåéëP åßñiñåðå êáéiñPëåéò êáé åýöéiñièt êáé åáí èYëiñiå íá åñçèÜiå ôññiò áññiñþöiñ (åáí èá åß ÷ åíå êáé åñçèiññPöåé ôi FreeBSD áí óéåðöññåðåáí Ýôöé). Ðriëy åðëÜ, åáí iðññiñyå íá åðáññiñÜiå åéåññiñÜäåò içíyíñåðå ôçí çìÝññå êáé ôðåññi ÷ ñiiñ íá åññiñyå iñiñiò ôi FreeBSD! Áí åþöåðå óå iðñiñiæPöiñiå iÝëiñiò ôçö iñÜäåð áñÜððöñçö ôçí åðéëiñP íá åðáññiñÜåé óå ðriëëÝò åññuñPöåéò ó ÷ åðéëÜ ià ðåññiñåðéü êþæééå P íá åññiñyå åéá ôç ååëöññuñóç ôiø FreeBSD, éá åðéëÝíåé óßñiññå ôi åÿýöåññi.

#### 25.5.1.4 ×ñçóéïïðíéþíôáò ôi FreeBSD-CURRENT

1. Åñáööåßôå óôéò ëßóöåò freebsd-current (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-current>) êáé svn-src-head (<http://lists.FreeBSD.org/mailman/listinfo/svn-src-head>). Åáí åßíáé áðëþò éáéP éäÝá, åßíáé ááðééêü íá ôi ëÜíåöå. Áí åáí åßóöå åñáííÝñö óôç ëßóöå *freebsd-current* (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-current>), åáí èá áéÝðåöå óá ó÷üééá ó÷åöéêÜ iå ôçí ðñÝ÷iödá áéáÜðóååç ôiö óööðÞiáöiö áðü üöiödö ôi ÷ñçóéïïðíéiyí, éáé Ýðóé ðééáíþò èá éáðáæÞiåöå íá áíðéíåöùðßæåöå ðíëeÜ ðñíäéÞiáöå ðiö Üëëé Ý÷iöi Þäc áíáééýþåé êáé ÿýóåé. Åéüíá ðéí óçíáíöéêü åßíáé üödö èá ÷Üíåöå óçíáíöéêÝð áíáééíþóåéö, ié iðiþbåò iðiñåß íá åßíáé êñßóöiåò åéá ôçí äéáôÞñçóç ôiö óööðÞiáöiö óåò óå õääP éáðÜðóååç.

Ç ëßóöå svn-src-head (<http://lists.FreeBSD.org/mailman/listinfo/svn-src-head>) èá óåò áðéöñÝøåé íá áéÝðåöå ôéò éáðåå ùñÞøåéò ôöi commit log åéá èÜéå áéëåäP ðiö åßíåöåé, éáéþò èáé ðëçñiöñßåò åéá ðééáíÝð ðáñáíÝñäåéåò ðiö iðiñåß íá Ý÷åé.

Åéá íá åñáööåßôå óå åðöÝð, P óå iðiæåöäPðiöå áðü ôéò ððÜñ÷iödåö ëßóöåò, áðéöåöeåßôå ôçí ôiðiæåößå <http://lists.FreeBSD.org/mailman/listinfo> êáé áðééÝîöå ôç ëßóöå óôçí iðiþbå èÝéåöå íá åßíåöå óöfñäñíçöþò. Íäçßåò åéá ôçí ððüüëiéðç åéáééåößå èá åñáöåöå áðéöùüðiö. Áí óåò åíáéåöÝñäé íá ðáñáéíëöeåßôå ôéò áéëåäÝð óå üëi öi åÝîöñí ðçäåßiö êþäééå, óåò óðíéööýíå íá åñáñåöåßôå ôôç ëßóöå svn-src-all (<http://lists.FreeBSD.org/mailman/listinfo/svn-src-all>).

2. ÁíáêöÞøåå ôiï ðçäåßi ëþäééå áðü Ýíá mirror site ôiö FreeBSD. Áðöü iðiñåß íá åßíåé iå äýi ôñüüðiö:

- a. ×ñçóéïïðíéÞøåå ôi ðñüäñáííå cvsup óå óðíäðåöiü iå ôi supfile iå ôçí iññáößå standard-supfile ôi iðiþbå èá åñáöåßôå óôií èáðÜëëiä /usr/share/examples/cvsup. ÁðöP åßíáé êáé ç ðëÝíí óðíéööþiåíç iÝëëiö, éáéþò óåò áðéöñÝðåé íá áíáêöÞøååö åüç ôç ððëëiäP iå iéá êþíçóç, éáé óðéò áðüüåßåö åíáíåþoåéò èá ðáßñíåöå iüñí ðéò áéëåäÝð. Ðíëëiß ÷ñÞøååò áéðåæëiyí ðiö cvsup iÝóù ôiö cron þóöå íá êñáðÜíå ôiï ðçäåßi êþäééå ôiö óðíðöÞiáöiö ôiö ðÜíöå áíáíåñíÝíí áðöùüäåå. Èá ðñÝðåé íá ðñíöáñiüöåöå ôi ððüüäåéäiá ôiö supfile ðiö åßíiöiå ðáñáðÜíü, åéá íá ñðëiþöåå ôiö cvsup åéá ôi ðáñéåÜëëíí óåò.

**Óçíåßùóç:** Ói ððüüåéäiá ôiö áñ÷åßiö standard-supfile ðñíñíßæååöåé åéá ÷ñÞóç iå êÜðíéïí óðâåééñéíÝíí èëÜäi áóöÜëåéåò (security branch) ôiö FreeBSD, êáé ü÷é iå ôi FreeBSD-CURRENT. Èá ðñÝðåé íá åðâåññååööåßôå ôi ãñ÷åßi êáé íá áíðééåöåööÞøååö ôçí ðáñáéÜöù åñáíiþ:

```
*default release=cvs tag=RELENG_X_Y
iå ôçí áéüüëiöèç:
*default release=cvs tag=.
```

Åéá ðåñéööûöåñåò ðëçñiöñßåò ó÷åöééÜ iå ôá tags ðiö iðiñåßöå íá ÷ñçóéïïðíéÞøåå, ðáñáééïíÝíå åéáåÜöåå óöi Åä ÷åñßæéi ôçí åíüöçöå ÅóééÝðåå (Tags) åéá ôi CVS.

- b. ×ñçóéïïðíéÞøåå ôçí ððçñåößå **CTM**. Áí Ý÷åôå ðíëy éáéP óðíäåöêüöçöå (ðøçëü êüööriö óýíäåöçò P ðñüöååöç iüñí iÝóù email) ôi **CTM** áðiöååëåß åéá óåò iéá åíáééåéöéêP éýóç. Iðiñåß ùóööüöi íá óåò åçíëiññÞøåé åéÜöñá ðñíäéÞiáöå êáé íá êáðåæëÞiåöå iå ÷åéåöiÝíå ãñ÷åßá. Åéá ôi ëüäi áðöü, ôi **CTM** ÷ñçóéïïðíéåßöåé óðÜíéå, êÜðé ôi iðiþbå áðiÜíåé åéüíå ðåñéööûöåñii ôçí ðééáíüöçöå íá lç åíðëåýåé óùööÜ åéá iåñÜéå ÷ñíééÜ åéáööÞiáöå. Óåò óðíéööýíå íá ÷ñçóéïïðíéÞøåå ôi **CVSup** áí åééåÝøåå modem 9600 bps P óå ÷ýôåñii.

3. Áí óéiðáyáôð íá áíáêðÞóâð ðií ðçááðí ßí ßæðééá ãéá éáííééÞ ÷ ñÍþóç (âéð Yéâóç) êáé ü÷é áðéþò ãéá íá ðií âáðþóð, ðuôð á áíáêðÞóâð íëüéëçñi òi FreeBSD-CURRENT êáé ü÷é êÜðiéá âðééâái Ýíá òiÞiáðá. Óá äéáöññâðééÞ ðâñßðôðùóç, áßíáé áñéâð Ú ðééáíü íá óðíáíðÞóâð ðñïäéÞiaðá, êáéþò ðíëéÜ ëííÜðéá ðið êþæéá âíáñðþiðóáé áðü áíáíâþoáð óá Úëéá, êáé ãáð ìðiñýí íá ïåðâáæùððééðöýí áðóúññíá.
  4. Ðñéí íåðâáæùððóâð ói FreeBSD-CURRENT, äéáâÜðóâð ðñïðâðéééÜ òi Makefile óðií êáð Üëííäi /usr/src. Ëá ðñÝðâé íá íåðâáæùððóâð óií ðññÞíá êáé üëír ðií âáðééü óýóðçíá (world) ðçí ðñþóç ðiñÜ, ùð ìÝññð ðíçð áéáæéâðóðâð áíáð Úëéáñçð. ÄéáâÜæíñðâð ðçí çëâðññíééÞ ßéðóâð ðíçð Yéâiñçð FreeBSD-CURRENT (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-current>) êáé ðií /usr/src/UPDATING ðá áßðóâð âíçðâññùí Ýííé áéá íÝðâ ãéáæéâðóðâð üðií áðiñÜ ðçí âéðßíçóç óðií íÝi óáð óýóðçíá. Íé ãéáæéâðóðâð áðð Ýð áßíáé ði ðíÜ áðáñâðþóðâð üðií ðéçðéÜæíñðâð óá ìéá íÝá âðßóçç Yéâiñçð.
  4. Áí ðñçóéiñðiéâðâð ói FreeBSD-CURRENT, èYéiñðâð íá íÝññðâð ðíçð ðíñþóç óáð ãéá áðóðü, áéáæéÜ áí Ý ÷ áðâð ðññð Úððâð ãéá áâððéþóâð Þ ãéiñðþóâð ðíçð ðíñð ððññðâýíðóáé êáé áðü êþæéá âßññðóáé áâðâð Ýð ìá áðéiñððâðóðü!

## 25.5.2 × ñçóéïðïéþíôáò ôï FreeBSD-STABLE

### 25.5.2.1 Ôé Åßíáé ôï FreeBSD-STABLE;

Ôi FreeBSD-STABLE ábíráé Ýíáð êëÜäiò áíÜðôôñíçò áðü ôií iðiþi ðññiêýðôôið íé “iåaÜeåð” (major) áæäüóåéð. Íé áéëáðÝò áéðÜäiíóáé óá áðôü ôií êëÜäi iå áéäoïñâðééü ñôðìù, êáé iå ôç ááiéêP ðáñáäi÷P üôé Ý÷iðí ðñþþôá ðâñÜóåé áðü ôií FreeBSD-CURRENT áéá ãiðéêP. Úððüöi, áðið ðáýáðé íá ábíráé Ýíáð êëÜäiò áíÜðôôñíçò, êáé áðôü óçíåbíáé üöe i ëþäééåð ôið FreeBSD-STABLE iðiññâß iéá áððäiñÝíç ÷ñiíéêP óðéäiP íá ábíráé áéåðÜeëcëiò áéá óððåêåññéiÝíåð áððáññiäÝð. Ðñüêåéðáé áéá iéá áéüñá ãññiP áíÜðôôñíçò áéá ôiðo ðññiññâiñáðéóôÝð, êáé áðið ábíráé áððáññþþôçôá áéåðÜeëcëiç áéá ôiðo ôððééêiÝð ÷ñþþôåð.

### 25.5.2.2 Đíëïò ×ñåéÜæåôáé ôï FreeBSD-STABLE;

Áí óáo åüäéáó Ýñåé íá ðáñáéïëiøåßôå P íá óöìåÜëëåôå óöçí áí Üððooïç ôiö FreeBSD, éáé åéäééÜ üói áöiñÜ ôçí åðüìåíç åðßöçïç Ýëäïöç ôiö åðü öiïß äæí ëëÜäï (point release), åßíäé åéäP éäÝá íá ðáñáéïëiøåßôå ôi FreeBSD-STABLE.

Áí éáé ábbiáé aéþeáé üðé íé aéiñþóðáéð áðóÜëåéáð ábbiñðóáé êáé óðíþ íeÜäi FreeBSD-STABLE, ùóðöúóí *aði* ÷ *náðeÜæðóáé* íá ðáñáéiñðeåßóð òi FreeBSD-STABLE iùñi íéá aððú ði ëüäi. ÊÜèá áíáöñÜ ðñiñæþþiáðiò aðóÜëåéáð òið FreeBSD áiçãåß ðùò íá aéiñþóðáóð òi ðñüüäçþiá íéá êÜèá áðþþóciç Ýéäiðc òc iðiñßá áðçññÜæðóáéð áðú aððú, êáé ñ ðanaðiðiýeçc òc áñùò íeÜäið áíÜððóïçò iùñi íéá ëüñiðò aððáæåßbáò, ðééññiú íá öÝññáé áðþþóçò êáé Üëëåð áíáððéýiçóðò aððáæåßY ði láæß òcð.

Áí êáé êáðåáâÜëëiðiâlå êÜëå åðíáðP ðñiððÜæáéá þþoâá íá åîáðóáæðþiðiâlå üðé í êëÜäiò FreeBSD-STABLE iðiñâß íá iâðåáâæüðóðéóðâß êáé íá åêðåâéâðoâß óâ êÜëå åââñiÝíç ÷ñiðééP óðéâiP, åâí lðmñiÿâlå ùðóðuöi íá ôi åâðâðçèiÿâ. Åðéðñiùóðâðá, áí êáé í êþâééâð áíâðóýóðâðáé óði FreeBSD-CURRENT ðñéí ðâñÜðâé óði FreeBSD-STABLE, í êüðiðið ðið åðâðâðâß ói FreeBSD-STABLE åðíáéá ðâñéðóðâñið, êáé Ýððé åðíáéá áíâðüðâðâðið íá áíâðâðçèiÿâ. ðe ðrëëÜ óðÜëëiðiâlå êáé åêñâðâð ðâñéððþoâðó ðiðið ðâñÜðâé óði FreeBSD-STABLE óâ iðiñâlå åâí Ý ÷iðið åðíáé åððâðâðP óði FreeBSD-CURRENT.

Åéá ôiðò ëüäiðò áðoïýò, *üat* ófíeôöiÿìá íá ðáñâieïeðøëåßòô ôðoëÜ ði FreeBSD-STABLE, êáé åéäéëüôåñá åßíáé óçláiðóéü íá lçí áíáâæìßæåðå óå áðoû áîððçñåðçô Ýò óå ðáñéá Üeeñíðá ðáñáåùäþò, ÷ùñßò íá Ý ÷åðå ðñþòá åéÝåíåé áíáæööðéÜ ðiij ébæéêá óóï áéëü óáð ðáñéá Üeeñí áúÜððoïcò.

Áí äáí æéà Ýôåôå ôïõò ðüññiòò ãéá íá ôï êÜíåôå áôöü, óåò ôóïéóöïÿìå íá ÷ñçóëiiðiéåßôå ôçí ôåéåôôáßá åôßöçìç Ýéäïöç ôïõ FreeBSD, êáé íá áíåâåèìßæåôå áôü ôç ìéá Ýêäïöç ôóçí åðüññiåç ìÝòù ôïõ ìç ÷áéöiiÿ äöåäééþí åíçìåñþoåùí.

### 25.5.2.3 ×ñçóéïïðïéþíôáò ôï FreeBSD-STABLE

1. Æñáôðâðþôð áðñfññïçþòð óðc ëðóðá freebsd-stable (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-stable>). Èá áðóðá Ýôóé áíçìåñù Ýíé ãéá áíññôÞóåéò ìåðáäéþôðéóçò ðið ßóùò áíöáíéóðíýí óði FreeBSD-STABLE, þ ãéá Üëéà ðññäéþíáðá ðið ÷ñPæiðí áéäééþò ðññiðí ÷þò. Óðc ëðóðá áððþ èá ãñßóðéåðá áðßóçò áíáééíþóåéò áðú iÝéç ðçò iñÜäáð áíÜððôðíçò, üðáí ðññüéåðáé íá óðiðåññéçþòð áð Üððíéá áíðééëåñüíåíç áíáíÝùóç þ äéüñèñúð, äßññiðóð Ýôóé óðiðò ÷ñPþóðò òçí áððéáéñßá íá åéò Ýññiðí áíþíç ó÷åðóéêÜ íá óá ðññäéþíáðá ðið èá ðññééäÝóåé ç ðññiðóðéíùíåíç áééäáþ.

Èá ðán Ýðåðé íá áððñáðóðþóð óðóçí éáðÜëeççéç ëðþóðá **SVN** áí Üëriá íá ðið ðáññáðeïeïðeåðþóðá. Áéá ðáññáðeïeïðeåðþóðá, áí ðáññáðeïeïðeåðþóðá ðií ëëÜäí 7-STABLE, ç éáðÜëeççéç ëðþóðá áðßíáé ç svn-src-stable-7 (<http://lists.FreeBSD.org/mailman/listinfo svn-src-stable-7>). Áððú éá óðó áððñóñÝðåðé íá áæÝðåðó ðið ñóðá ÷ ùñPóáðó óði commit log áæá êÜëå áæëðáð ðið áðßíáðáé, éáðþò éáé ðeçññóñþóð áæá ðeððáÍYð ðáññáðÍYññåðé ðið iðññåð íá Ý ÷ áðé.

Ãéá íá ãñáöôåßôå óå áôôÝò, P óå iðieåóäPðiôå áðü óéô ððÜñ÷iðoåò ëßóôåò, áðeóåðeåßôå ôçí ðiðiæåðbá <http://lists.FreeBSD.org/mailman/listinfo> éáé áðeeÝîôå ôç ëßóôå ôôçí iðiðbá èÝéåôå íá ãßiâôå óóíãñiçôÞò. Íäçâßôå áéá ôçí ððüüíëðç áéäáééåðbá èá âñâßôå áðéðüðiò. Áí óåð áíâéáð Ýñâé íá ðáñâéíiðeåßôå óéô áééäáÝò óå uëí ði ãÝíõññ ðçâåßið ëþæéå, óåò ôóïéóôiyâ íá åââñâøåßôå ôôç ëßóôå svn-src-all (<http://lists.FreeBSD.org/mailman/listinfo svn-src-all>).

2. Áí ðñüüéâéóáé íá áâéâáôáóðÞrâóðå Áýíá fÝÍ óýóôçíà íå óéïðü íá áâéâáéâðôá ôá ìçíéâðá snapshot ôïð FreeBSD-STABLE, ðáñâéâéïýíá íá áëÝâíâðå ôçí ôïðièáðþá Snapshots (<http://www.FreeBSD.org/snapshots/>) áéá ðâñéóðûðâñâð ðëçñïòïñðâð. ÁíâééâðôéÜ, áßíáé áðñíâðúí íá áâéâáôáóðÞrâóðå ôï ðéï ðñüöðâðí FreeBSD-STABLE áðü èÜðiéí mirror site áéïðeþíðâð ôéð ðáñâéÛðû íæçâðâð þóðâð íá áíáâéâðþóðå ôï óýóôçíà óâð ôðçí ðëÝíí ðñüöðâðç Ýâëïóç ðçâáâðið êþâééâ ôïð FreeBSD-STABLE.

Áí äéáè Ýôåôå Þäç êÜðiéá ðñïçäiyâíç Ýêäïóç ôiö FreeBSD éáé åðéëòiåßôå íá áíåååéòéóôåßôå ìÝóú ôiö ðçäåßíö êþäééå, iðiñåßôå áýéïéá íá ÷ñçöéiiðiéÞóåôå êÜðiéí mirror site ôiö FreeBSD. ÕðÜñ÷iö áyí ôñüðié äéá íá åßíåé áðóü:

- a. × ñççöñïüðíÞóôå ôi ðññüäñâùìlá cvsуп óå ðóññäðåòìù ià ôi supfile ià ôçí ìññáðßá stable-supfile ôi ðïðíßí èá âññâßóå ôóïï éåð Üëëä /usr/share/examples/cvsup. ÁôôÞ åßíáé êáé ç ðëÝíï ôóñéóðþiañc iÝëëäð, êáèþò óåò áðéóñ Ýðåé íá áíáéðÞóåôå üëç ôç óðóëëäþ ià leá êßíçóç, êáé óðóéò áðññlåñâò áíáíâþóáéò eá ðåßññâðå ïüñ ðóéò áéëääÝð. Ðïëëïß ÷ñÞóôåò áêðâæíý ðiç cvsуп iÝóù ôiõ cron þóôå íá êñâðÜíå ôiñ ðçäáñþi êþäééâ ðiõ ôóñôðþiañò ðiõð ðÜíóå áíáíâùìÝíï áðññlåñâò. Éá ðñÝðåé íá ðññóâññúðåò ôi ððññâåéâïá ôiõ supfile ðiõ áßññðiå ðáñâðÜíù, êáé íá ñðøëìßóåðå ôi cvsуп aéá ôi ðåññéâÜëëñ óåð.
  - b. × ñççöñïüðíÞóôå ôçí ðññäñâðßá CTM. Áí äái Ý÷åðå ãñÞäñç êáé ööçíÞ óýññâåóç ià ôi Internet, áôôÞ åßíáé ç ôóñéóðþiañc iÝëëäð.

3. ЌооéаóóêéÜ, áí ÷ ñаéÜæáóóå ãñPаïñç éаé êаóÜ áðáßöçóç ðñüöááóç óóïï ðçääßи ëþäéêá, éаé ôi áýñïò æþíçò ôçò óýíäåóçò äáí áðíîôåëåß ðñüüâèçíà, ÷ ñçóéiiðíéÞóôå ôi cvs up P ði f tp. ÁéáõñåôééÜ, ÷ ñçóéiiðíéÞóôå ôi **CTM**.
  4. Ðñéí íåðåäëüòòßóåôå ôi FreeBSD-STABLE, äéåáÜòóå ðñïòåðééÜ ôi Makefile óóïï êаóÜëíä /usr/src. Èá ðñÝðåé íá íåðåäëüòòßóåôå ôi ðõñPíá êáé üëi ôi ááðééü óýóðçíà (world) ôçí ðñþþö öiñÜ, ùò iÝñïò ôçò äéåäééåðåßåò áíåâÜëíéòc. ÄéåáÜæíîôå ôçí cëåðöñíééÞ èßöôå ôiõ FreeBSD-STABLE

(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-stable>) éáé ôí /usr/src/UPDATING èá åßóôå áíçìåñùíÝíé  
æá íÝåò æáäééåôßåò üöí áöiñÜ ôçí åêéßíçóç óöí íÝí óáo óýöôçìá. Íé æáäééåôßåò áôôÝò åßíáé óö÷íÜ  
åðáñåßöçôåò üöí ðëçóéÜæïòíå óá íéá íÝå åðßöççíç Ýéäïöç.

## 25.6 Óõä÷ñíßæíôáò ôíí Đçääßí óáò Èþäéêá

ÕðÜñ÷iõi äeÜoõñiie ôññüðié íá ÷ñçóéiirðiéÞóâôå ìéá óýíääöç Internet (Þ email) ãéá íá áíçäñþiâôå iðiðiéiäÞóñòå ôiÞia ðçäääñiô êþäééå ôiõ FreeBSD Project óao ááiaéaoÝñåé, Þ êáé üëá áí ôi åðéëiñlåßôå. Íé áâóééÝò õðçñâðóßåò ðiõ ðnióöÝññòå áßiáé ôi Áíþiñòii CVS, ôi CVSUp, êáé ôi CTM.

**ĐññláéáíðiBçóç:** Áí éáé áåßíáé áðñíåðüí íá áíçíàñþòåðå ìüíí êÜðtřéá ðíÞìáðå ôíò áÝðiñïò ðçäåáßiò êþpäééå, ç iüíç äéåáééåðåå áíçíYññùòçò ðïò ððiòöçñßæåðåé áötiñÜ ôçí áíçíYññùç öíëüéëçñïò ðíò áÝñiññòç. ÍåðÜ ôçí áíçíYññùç, èá ðññYðåé íá iåðåáäëùòòßòåðåå íáíÜ ôúóí ðí userland (äçé. ôá ðññäñÜíiåðåå ðïò áéöåäëíýiòåé ôóçí ðåññéí ÷ Þ ÷ ñþòòç, üðñò åðñÜ ðïò åñþòéíòåé ôóçíò êåðåäëüäòò /bin êáé /sbin) üöí êáé ôíí ðçäåáßi õþpäééå ôíò ðññþíá. Áí áíçíàñþòåðå åüíí Yíá ôíÞìá ôíò ðçäåáßiò êþpäééå, iüíí ôíí ðññþíá Þ iüíí ôíí userland, èá áíðéíåðòðñþòåðå ðññäëÞìáðå. Ôá ðññäëÞìáðå åðñÜ ðøññåß íá êõíáßiòåé áðü óóÜëíåðå iåðåáäëþòòéòçò iÝ ÷ ñé kernel panic êáé êåðåóóñïòÞ häääííYññù.

Ôi Áíþíðii CVS êáé ôi **CVSup** ÷ ñçóðíðiðíéiy ðô iÝéïäi pull ãéá ôçí áíçí Ýñúðç ôiô ðçðåáðiô ëþäééá. Ôôçí ðåññðôùðç ôiô **CVSup**, i ÷ ñÞóðçò (ç êÜðiði script ðið åêðåëëððåé iÝóù cron) åêðåëëð ðiô ðñüäññiá cvsup ôi iðiðiþí áéëçéëðéññ ïå Ýíá áíððôðié : i áíððçñâðôçðP cvsupð þóðå íá áíçíåñþðåé óá ó ÷ áðééÜ ãñ ÷ áðå. Íé áíçíåñþðåéð ðið eáíâðiáðå áåðíáé ðÜföiðå ìé ðåéëððåáðå áéæé Yðóéiåð, êáé èá ðeó ëÜáâðå ïüññ üðáí ðeó æçðPðoåðå. Iðiññâðôå áýéïëá íá ðåññéññðåðå ðeó áíçíåñþðåé óá óðåáâðññéiÝíá ãñ ÷ áðå P ðåðåéëüñiðó ðå iðiðiþá óåð áåðæéáðYññið. Íé áíçíåñþðåéð áçíéiðññáýiðåé äðñíâðéÜ ãðü ôiñ áñðçñâðôçðP, áÜUëíðá ïå ôi ðeÝ ÷ áðå áåðæáðåðôçíÝññið. Ôi Áíþíðii CVS áåðíáé êÜððù ðeí áðëññéü ãðü ôi **CVSup**, äåññÝññið üðé ååðíáé áðëþò ìéá åðÝéðåóç ôiô **CVS** ðið áððéññÝðåé ôçí áíÜðéçðç áéëåðíþí áððåëëðåðå ãðü êÜðiði áðñññéññðiÝññið CVS repository. Ôi **CVSup** áåðíáé áññéåðÜ ðeí áðññðåëëðåðíññéü óå áððouñ ôi òññÝá, áéëÜ ôi Áíþíðii CVS áåðíáé áðëññóðññið óôç ÷ ñÞóç.

## 25.7 Îåóáæëùôôßæïíôáò ôi Åáóéêü Óýóôçìá (“world”)

„*í*íóáó óðá ÷ nííþóáé ói ðééú óá ãÍfóññ ðçãáßiõ êþæéá óå eÜðréá óðæåñéí Ýíç Ýéëíóç óiõ FreeBSD (FreeBSD-STABLE, FreeBSD-CURRENT, e.i.e.), lðiññåßóá Ýðåéóá íá ói ÷ ñçóéiñðiéÞóåóá æá íá lâóáæëùòòßóåóá ói óyóðciá óá ðü ócí áñ÷Þ.

**ÄciéïöñäÞoôá já Áioßäñäöi Áooäéåßáò:** Áai iøiñiyála ðäñíÜ ía ôiñßöiøla ðüöri öciáliöeëü åßíále ía äciéïöñäÞoôá ÿia áiößäñäöi áooäéåßáo ôiõ ôooðÞiaðiò óao ðñéi iâééíÞoôá ãoðôþ ôç æääéêåößá. Ái êae ç iâðåäæþöööç ðiõ åäöééiy öooðþiaðiò åßíále (üöri ôiñðeÜ ÷éööii åéëiøðeåßöða áoðYö ôiø iäçäßåò) iéá ó÷åðééÜ åðeþ æääéêåößá, áiáiøßäiæéa èá ðiñÜññiòi êae ðäñéðþöðoâéò ðiõ ëÜeç åééÜ óao, þ Üeëeuí (óoði äYíöñi ðçäaßiø êbäéêä), èá óao iäçäÞoôiòi óa ÿia óyóöciá ðiõ åäi èá iøiñàß ía åééêíÞoâé.

Ååååéùèåßôå üöé Ý÷åôå åíçìåñùíÝíí áîôßãñáöi áóöáéåßáò. Éáëü èá åßíáé íá Ý÷åôå åßööçö ðñü÷åéñç iéá äéóéÝô fixit P Ýíá CD ååéßíçöçö. ãòùó íá içí ÷ñåéáóôåß ðïôÝ íá ôá ÷ñçóéíïéÞöåôå, áëëÜ éåéýôåñá íá åßööôå áóöáéÞö ðäñÜ íá ôi åiôåíïéþiåôå áññüöåñá!

Ãßíåôå Óõíäñïçôò ôôç Óùóôþ Ëßóôá Çë. Ôá÷õäñïåßïõ: Áðü ôç öýóç ôîõò, íé êëÜäïé FreeBSD-STABLE êáé FreeBSD-CURRENT áñßóðêíôáé ôå õõíá÷þ áíÜððöñç. ¼óïé õõíâéóðÝñïõí ôôï FreeBSD áßíåé áðëþò Üíèññüðïé, êáé ðåñéôôáóéåéÜ êÜèc áðëþò ôõíåßïõí.

Íñéói Ýíåò öiñÝò óá ëÜèç áôôÜ áßíáé iÜeeíí áêßíáöiá, êáé ói iùíi ðiø êÜíiøí áßíáé íá áìoáíßæiöi iñééÝò áæááíùóôôéêÝò ðñíäéäiðíéÞóâé òóí óyóôöciá óáò. <sup>1</sup> ðiññâb ç áëéáâb íá áßíáé êâôáóôññöéêb, êáé íá iäçãÞóâé òóí óyóôöciá óáò óá ááðíáíßá áâéßíçöcò þ áéüíá êáé íá êâôáóôññYøåé óá óóôóðiáóá ãñ÷áßùí óáò (þ êáé áéüíá ÷ áéññöôâñâò öoíÝðâéâò).

Áí óõlāïíyí óÝoiéá ðñiâëþìáôá, óýiôílá èá àiöáéóôåß Ýíá iþíoiá ôýðiö “heads up” óôéò ó÷åôéêÝò ëßóôåò óá÷oäñiïåßiö, ði íiðßí èá áîçãåß ði ðñüâëçìá êáé ðiéá óõóôþìáôá åðçñåÜæåé. ¼ðái ði ðñüâëçìá ëõèåß, èá ãßiâéjéá áíðôóôíé-c “all clear” áiáéëþìúóc.

Áí ðõñioðáèåðóå íá áéïëïöèþóåôå ôï FreeBSD-STABLE þ ôï FreeBSD-CURRENT, êáé äái äéåâÜæåôå ôéò  
áíðóôöíé-åò eßóôåò freebsd-stable (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-stable>) êáé  
freebsd-current (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-current>). øÙ-íåôå áéá iðåëÜjäð.

Icí × ñçóéïïðíéþóåôå ôçí áíóïëþ make world: lâáÜëi lÝñïò ôçò ðáæáéüôåñçò ôåèïçñßùóçò, óóíéóôÜ ôç ÷ñþóç ôçò áíóïëþò make world. Áí ôçí ÷ñçóéïïðíéþóåôå, éá ðáñáéåéöëíýí iñéóíÝíá óçíáíôéêÜ áþìáôå ôçò äéááééåóßáò. ×ñçóéïïðíéþóåôå ôç lüïí áí áßóôå áðüéôôå óßáïññíé áéá áôðü ðïõ êÜíåôå. Áéá ôéò ðáñéóóüôåññåò ðáñéôðþóåéò, c áíóïëþ make world áßíáé eáíéáóíÝíç, éáé áíôß áéá áôôþ èá ðñÝðåé íá áéïëïðíéþóåôå ôç áéäáééåóßá ðïõ ðáñéññÜôïñia ðáñáééÜôù.

**25.7.1 Í Éáíííéêüò Ôñüðìò íá Åíçìåñþóåôå ôi Öýóôçìá óáò**

Đññéí áíçìáñþóåôå ðí óýóôçìá óåò, èá ðñ Ýðåé íá åéÝâíåôå ðí /usr/src/UPDATING áéá ôò÷üí áÞìáôå ðíò èá ðñ Ýðåé íá åéôåéÝóåôå ðññéí ðíçí åééßíçóç ôçò iåôåäéþòôéóçò. Óá áÞìáôå áôòÜ áíáñþóïáé áðü ôçí Ýéäïóç ðíò ðçäáßíò êþäééå ðíò ðññéåéôåé íá ÷ñçóéíïðíëþóåôå. ðåéåá, åéïëòëþóå ôç äéåééåóßá ðíò ðåñéñÜöåôåé ôóéò åðüíàåò ðåñéñÜöåôå

Çääéääéääóßá áíááÜèléóçò ç iöibá ðåñéäñÜöåôáé åäþ ááóßæåôáé óôçí ðöüèåóç üöé Ý÷åôå þäc åäéåôáóôÞóåé ieá ðäééëñôâñç Ýéäñíóç ôïõ FreeBSD iaéé ðäééÜ Ýéäñíóç ôïõ iåôåäéñôôéóôþá Ýíá ðäééii ðöñþíá ðäééÜ “ñññáéëþíá

÷ ñPóôc” ééá áñ ÷ åbá ñòèïßöåúí. Åññáéëßá ÷ ñPóôc èåùñjýïóåé óå ááóéÜ åêôåëÝóéíá, ié áéåëéëéPéåò êéé óå áñ ÷ åbá ðñïäññáìíåóéöïý. IìåôåäëùööéóôPò åßíáé éé áôöüò iÝñjò ôùí “åññáëåßùí ÷ ñPóôc” óöi FreeBSD, áëeÜ ÷ ñæÜæåðåé åéäééP iåôá ÷ åßñéöç êåôÜ ôç åéäééåößá ááåáÜéëéöç.

Óðie Ýðiðiá, áðþróçó, üðé Ý- áðå Þæc éaðóða Úóáé leá áíçianñi Ýíç. Ýéaíðic áðü öið ðçãáßi ðþæéá ðið oðóðiÞiaðiò. Áí ið ðçãáßiò ðþæéáo óði oðaða ênñi Ýíç óyóðoçia áßiaé aðü Þæeúðañc Ýéaíðic, aðbóða ðiði ÓiÞia 25.6 aða ëððiññabò iæçãða ðiði ðaðeéÜ ia ðiði ðuða ía óða ðiði ðuða ðiði ðçãáßi ðþæéá óa leá fáuðañc Ýéaíðic.

Ҫ áíáâÜèléóç ôiõ FreeBSD áðü ôiõ Ծçääßí ҼþäééÜ ôiõ öäßíåðáé íá Ӓßíáé Ծíéý áðëÞ äéäæéêáóßá. Ӯóçí Ԯñâáàíåðéüöçôá, Ү ÷ áé ҼÜðíéåò éæéåðäñüöçôåð. Լå óá ÷ nüíéá, éæèþò ié ӒßíåðÞóåéò iåðåý ðùí áçi Üðùí Ӯçð áíáâÜèléóçð áíáâéäýðöiióáé P áíáéýïîóáé éäéýðåñá, ié Ԯñâñäàíåðéóó Ӯý ôiõ FreeBSD áéëÜæiõí óéãÜ-óéaÜ áðöÞ ôç äéäæéêáóßá. Ié ԮñâñäÜðù Ԯñâñäöié Ԯñâñäñ Üöiõí ôç ҼiæéÞ iå Ӯóçí iðißá Ү ÷ áé ó ÷ äæéåðéåß ç Ԯñiöåéñüiåíç äéäæéêáóßá áíáâÜèléóçð.

Íléá áðéooð : Þò áéááééáðßá áíááÜèiéóçò ðñ Ýðåé íá êáæýøåé ôiðeëÜ ÷ éóôíí ôéo äyí ðei ááóééÝò éäéáéðåñüôçôåò íéáð  
áíááÜèiéóçò áðü ðçãáßí êþæéá:

- Í ðáæðü íåðáæðùðóðéðóÞð óðóðÓÞíâðið ìðiññáß íá áßíáé æáðóðÜeëcëið ãéá íåðáæðþóðéóð ðið iÝið ðoññÞíá. (Æáé ié íåðáæðùðóðéóð Ý ðið iñéóí Ýiðo õiñ Ýò ðoññiæðÞíáðá, iiðùð ëÜeà Üeëi eïäéðiéëi.) Íðüðôá í iÝið ðoññÞíáð ðñ Ýðåé íá íåðáæðùðóðéðóðåß íå ði ðiÝi íåðáæðùðóðéðóÞ. Ðeið óðáæðñéi Ýíá, í iÝið ìåðáæðùðóðéðóÞð ðñ Ýðåé íá áíáâáèiðóðåß ðñéí áðü ði ðiÝi ðoññÞíá. Áðóðü ãå òçýáßíáé áÝâáé ùðé áðóðið ì iÝið ìåðáæðùðóðéðóÞð ðñ Ýðåé íá áðæðáðáðáðåß ðñéí íåðáæðùðóðéðóðåß í iÝið ðoññÞíáð.
  - Óá iÝá áññáæðßá ÷ñÞóðç áðü ði ñáééü óýóðçìá ðið FreeBSD ìðiññáß íá áíáñþíðáé áðü ði ðiññði ëáéðiðññßáð ðið iÝið ðoññÞíá. Íðúðo í iÝið ðoññÞíáð ðñ Ýðåé íá áðæðáðáðáðåß ðñéí áðü ði ðiÝi ááðééü óýóðçìá.

ÁðóðÜ óá áýír óçìlabá ábíráé ié ááðóééiB éüüäé ãéá óiðò iðiBíiðò ðñiðóðbñiðiðáé óá êáñðóñééÜ Áþiáðá leáð óáíáðUëleóðçò, óá Áþiáðá buildworld, buildkernel, installkernel, êáé installworld. Óóéð ãðüìlaðò ðánñáñÜöiðò èá ðánñéáñÜøiðið ðei áíáéðóééÜ áðóðÜ óá áþiáðá. ÕðÜñ ÷ iði ëé Üééie éüüäé üiñùò ãéá óiðò iðiBíiðò ÷ ñáéÜæåðáé ðñiðið ÷ þüðáá ûÜiðóð leáð óÝôíéá áíáðUëleóðç. ÍññééiB áðú ãðóiyò ábíráé ié áîÞò:



„íiíoáò üëåò áôô Ýò ôéô ëäéåéôðñüôçôåò íeáò áíáâ Üèïéôçò áðü ðçääßi ïþäéêá, éâôáæÞìáïå óôçí ðáñâé Üôù äéåäéêáóßá áíáâ Üèïéôçò. ÍñéóíÝíåò öïñÝò iðññâb íá ÷ñâé Üæåôáé íá ðññöéÝóåôå êÜðïéá âÞìáôá óå áôôÞ ôç äéåäéêáóßá. Óå áåóééÜ âÞiáôá üùñò ðáñâíÝíóí óå þäéá, êé åþíáé óå åÞò;

## 1. make buildworld

## 2. make buildkernel

3. make installkernel

ÅâéáôÜóôáóç ôiõ ÍÝiõ ðõñÞíá êáé ôúí áñèñùÜôúí ôiõ óóï äßóëi ôiõ óõóôÞíáöiò. ôóé iðiñåß ðëÝíi ôi óyóôçjá fá iâééíÞóáé iå ôi ÍYí, åíçiañùÝíi ðõñÞíá.

4. Åêêßíçóç óå ëåéöïõñãßá single user.

5. mergemaster -p

Áðóðu òií áÞíá áíçìàñþþíáé óá áðíðeyóùò ááðóééÜ Áñ-÷ áßá ñòðèþþóðúñi ðið FreeBSD, áéá íá iðriñÝ óåðå íá áæéáðóðíÞøðå òúðóðÜ òií fÝí ááðóééü óýðóðçíá. Áíçìàñþþíáé, áéá ðánñÜäééñíá, óç áÜóç ÷ ñçóðþí êáé iñÜäúí ÷ ñçóðþí ðið FreeBSD. ÞÜðæ öññÜ ðið ðññiðþðèáðóé Ýíáð fÝiò ÷ ñíÞóðçò óðóðóÞíáðiò Þ leá fÝá iñÜäá ÷ ñçóðþí, òií áÞíá installworld ðçò áíññÜðéñðçò èáñññðb üðé Ý-÷ áðå Þac ñòðèþþóðé ðið ðiññð ÷ ñíÞóððó Þ ðéð fÝáð iñÜäð. Áðóðu áéñéðþò êÚfáé óá áðóðu òií óçíðþí òií áñññæðþí merge master(8).

## 6. make installworld

Ör åðutiðirri áþíá áßíáé íá áæðáóáðóÞóðóða óií áicílanñùíÝíí ááðóéëü óýóðóciá áðüi óií éaðÜetíai /usr/obj. Íað Ü áðü áðóð Y ðið áðóð ðeÝíí Yíá íYíí ðoðnÞíá éaé Yíá áicílanñùíÝíí ááðóéëü óýóðóciá, óií iðiþí óáæðéÜæáé iá óií íYíí ðoðnÞíá.

## 7. mergemaster

јá áðü óá ôâæâðóáþá Þíþáðá áßíáé ç ááðá Üeìéóç ôùí áñ ÷ áßúí ñõèìßóàùí ôïò oðóðÞíáðiò. Ôí áññáéâßí mergemaster(8) iðiñâß íá óáð áïçèÞóáé óá áððü ôï Þíþá, aðiý áïçìâñÞíáé óá áñ ÷ áßá ñõèìßóàùí êñáðþíðáò éáé iðiñâðá ðiðiòá ðiðééÝò áëëáãÝò Ý ÷ áðå ðÜfáé óöi ýóðóöciÜ óáð.

## 8. ÅðáíåêêéíÞóôå ôi óýóôciá.

Íe óáéäöðäáþ áðáíáéëñíçó ðiô ðöðöðÞiaðiô ñáð áíáðöðæðæåð üöð öi óýööðçíá íâééíÜäé iá öi fÝi ðöñÞia, öi áíçíâñùñíÜí ñáðééü ðýööðçíá éáé ñá ñáéññýñéá áñ ÷ áßá ñöðëìßöðáñí.

Áí ç áíááÜèiéóç ðiö êÜíåôå áßíáé áðü íéá Yéäïïóç ôiö FreeBSD óå íéá ðéí èáéíïýnéá Yéäïïóç ôiö ßæérö êëÜäri  
áíÜððöïçö, ð.÷. áðü 7.0 óå 7.1, ôüôå iññééÜ áðü óå áßíáôå áðöôP ôçò äéääééáôåò iññééÜ äéäééáôåò, ôiö ðõñPíá, ôiö áâáóéëý  
áßíáé eeäüôåññí ðééáití íá óóíáññPíáôå áðöôåññôüôçöåò iññééÜ ôiö iññééÜ ôüôéôP ôóôôPíáò, ôiö ðõñPíá, ôiö áâáóéëý  
ôóôôPíáò, ôéá ôùí áñ÷ ãßñü ññðèñßóåñí. Ç áíááÜèiéóç óå ôYöïëåò ðåññéðôþóåéò, iññééÜ äýí minor åêäüôåùí ôiö  
FreeBSD, ßóùò iññééÜ áßíáé eeáé iññééÜ ôcí ðåëëüôåñç äéääééáôå: ôñY÷iñðåòmake world eeáé yóôåñá  
iññééÜ áßíáé eeáé ôóPííôå Ýíá ÍÝí ðõñPíá.

¼ðáái üìùò ááiââæíßóåôå ôî FreeBSD iåðáiy major åéäüöåùí, êáéyôåñá íá ÷ñçóëiiðíÞóåôå ôç äéáæéêåóßá ðíø ðåñéæñÜöiöiå åäþ. Áééëþò iðïñåß íá áíöeåôùðßóåôå ðñiäëÞiaóå åßôå éåôÜ ôç äéÜñéåéå ôçò áíaaÙëèéoçò P áöiy Ý÷åé ðëÝí ieiëeçñùèåß.

ÊÜðiéåò áðüô ðeð ááíåâåèìþóåéò (ð.÷. áðü liéá Ýéëiöç 4.X óá 5.0) ìðiñâß íá áðáéöiyí ìâñééÜ ÷ áéñièþíçôá âÞiaðáó (üðùò òi íá liåðâééíÞoâôá Þ íá óâÞoâôá óðoâåâéñéíÝíá áñ ÷ áßá ðñéí òi âÞia installworld). Ðñéí áðü êÜèå áíáâÜèiéóç áéâåÜóôá ðñiðâéðééÜ ðeð iäçâßåò óði áñ ÷ áßí /usr/src/UPDATING áéâééÜ ðeð iäçâßåò óði ðYéiò ðiði áñ ÷ áßíð, ié iðiðâßåò ðâñéñáÜòiòi áíáâëðééÜ óçí ðñiðâéíüâíç áéâáééáóßá áíáâÜèiéóçò.

ÁõôP ç äéáäééáóßá áíááÜëíéóçò áíâæßóóåôáé êáé äéíñèþíåôáé êáèþò ié ðñiñâíàíåôéóôÝò ôiõ FreeBSD áíáâæýðôíïí êáéííýñéåò áíáñôÞóåéò íåôáíý ôùí óôôôåôééþí ôiõ óôôôÞìáôïò P eÜíïõí äéíñèþóåéò ãéá íá áðiöyäïí åóõìâåôüôçôåò íåôáíý ôùí áéäöñâôééþí ððiöôôôçíÜùí. Åëðßæïõíå üôé ôá êåíôñéêÜ áÞìáôá ôçò äéáäééáóßá ðiõ ðåñéãñÜöåôáé åäþ åá èá áéëÜíïõí ðíëý ãéá áñêåôü êáéñü ðëÝíí.

Áíáäöáæáéþñíôåò üéá ôá áÞìáôá ôá iðiþá ðåñéãñÜøáíå ðåñáðÜíù, ç ðñiôåéíüíåíç äéáäééáóßá áíááÜëíéóçò ôiõ FreeBSD áðü ôiõ ðçãáßí êþæéá ôiõ óôôôÞìáôïò áßíáé:

```
# cd /usr/src
# make buildworld
# make buildkernel
# make installkernel
# shutdown -r now
```

**Óçìåßùóç:** ÕðÜñ ÷iõí êÜðíéåò iÜëëíí óðÜíéåò ðåñéðôþóåéò, ðiõ áðáéôåßôáé ìéá áðéðëÝíí åêôÝëåóç ôiõ mergemaster -p ðñéí ôi áÞìá buildworld. Ié ðåñéðôþóåéò áôôÝò ðåñéãñÜöïíôáé ôiõ UPDATING. Óå ááiéêÝò áñâííÝò ðÜíôùò, iðñâñâôå ìá áóöÜëåéá íá ðåñáëåßøåôå áôôü ôi áÞìá, áí åái áíåâåèíßæåôå ôi óýóôçíá óáò íåôáíý ðíëëáðëþí áêäüôåùí ôiõ FreeBSD.

ÍåôÜ ôçí áðéôð÷P iëiëëÞñùóç ôiõ installkernel, èá ðñÝðåé íá áðáíåêééíÞóåôå óá êáôÜóôåóç áíüò ÷ñÞóôç (ð.÷. ÷ñçóëíðíëþíôå ôçí áíôiëþ boot -s óôçí ðñiôñiðP ôiõ ðññôùôP åêêßíçóçò). Þåéôå áêôåéÝôåå:

```
# mount -u /
# mount -a -t ufs
# adjkerntz -i
# mergemaster -p
# cd /usr/src
# make installworld
# mergemaster
# reboot
```

**ÄéáâÜóôå ôéò ÁðéðëÝí ÁíçìÞóåéò:** Ç äéáäééáóßá ðiõ ðåñéãñÜøáíå ðåñáðÜíù áßíáé ìéá áðëþ ðåñßëçøç áéá íá óáò áïçèþóåé íá íåêéíÞóåôå. Èá ðñÝðåé úôôüöí íá äéáâÜóåôå ôéò ðåñáêÜôù áíüôçôåò áéá íá êáôáííÞóåôå ðëÞñùò êÜëå áÞìá, áéäéêÜ áí èÝëåôå íá ÷ñçóëíðíëþóåôå äéêü óáò ðññôáñiíóÝíí ðõñÞíá.

## 25.7.2 ÄéáâÜóôå ôi /usr/src/UPDATING

Ðñéí êÜíåôå iðéäÞðíôå Üeeí, äéáâÜóôå ôi /usr/src/UPDATING (P ôi áíôßóôié ÷i áñ÷åßí, áí Ý÷åôå áðiëçêåýóåé ôiõ ðçãáßí êþæéá óá Üeeí êáôÜëíä). Òi áñ ÷åßí áôôü ðåñéÝ÷åé óçìáíôééÝò ðëçñiññßåò õ÷åôéêÜ íá ðññâæÞìáôå ððõ ñðñâß íá óôíáíôÞóåôå P ßóùò íá êáëiñßæåé ôç óåéñÜ íá ôçí iðiþá ðñÝðåé íá áêôåëåôöiyí êÜðíéåò áíôiëÝò. Áí ôi áñ÷åßí UPDATING Ýñ÷åôåé óá óýåêñiõç íá êÜôé ðiõ äéáâÜóåôå åäþ, ðñiôñáéüôçôå Ý÷åé ôi áñ÷åßí UPDATING.

**Óçìáíôéêü:** Ç áíÜäíùóç ôiõ áñ÷åßíõ UPDATING äái áßíáé áðiäåêôü ððiêáôÜóôåôî ôçò óôíññiþò óôç óùóôP ëßóôå çëåêôñiíéíý ôá÷ðäññíåßíõ, üðùò ðåñéãñÜøáíå ðññçäõíÝíùò. Ié äyí áðáéôÞóåéò áßíáé ôðiðëçñiñáôééÝò, åái áéëçëíáéñíýíôåé.

### 25.7.3 ÅëÝäîôå ôi /etc/make.conf

ÅiâôÜóôå ôá áñ÷åßá /usr/share/examples/etc/make.conf êáé /etc/make.conf. Ôi ðñþþi ðåñéÝ ÷åé êÜðïéåò ðñriåðééåáiÝiåò iåðååäéçôÝò (defines), ié ðåñéóóüðåñåò áðü ôéò iðiðåò åßíáé ùò ó÷üééá. Åéá íá ôá ÷ñçóéiiðiéÞóåò üðáí iåðååäéùðòßæåò åi ÿóðçìá óáò, ðñiøéÝóåò åá ôóí /etc/make.conf. Íá Ý÷åôå ððüþç óáò, ðùò iðéäÞðiòå ðñiøéÝóåò åóíí ãñ÷åßí /etc/make.conf ÷ñçóéiiðiéåßòå åðßóçò êÜëå öiñÜ ðiò åêðååëåßòå ôçí åíðiõÞ make, Ýóóé åßíáé åáíééÜ êáéÞ eäÝá íá åÜëåòå ôéíÝò ðiò åßíáé åíäééÝò åéá ôi ÿóðçìá óáò.

Íáò ôððééüò ÷ñÞóðçò èá ëÝëåé ðéðéåþò íá åíðéåñÜþåé ôéò åññåñÜò CFLAGS êáé NO\_PROFILE áðü ôi ãñ÷åßí /usr/share/examples/etc/make.conf ôóí /etc/make.conf åöáéñþiðåò ôáðóü÷ñiíá êáé ôi ÿíâiõí ðiõ ð÷iðiõ.

ÅiâôÜóôå êáé ôéò Üëëåò iåðååäéçôÝò (COPTFLAGS, NOPORTDOCS ê.i.ê.) êáé åðiøáóßóôå áí ó÷åðßæiiðåé iå ôi åðééðiçöü åéá óáò åðiõÝëåòíá.

### 25.7.4 Åíçìåñþóôå ôá Áñ÷åßá ôóí /etc

Í êáéÜëéäi /etc ðåñéÝ ÷åé iåðåÜëi iÝñiò ôúí ðeçñiøiñéþí ñyéiéóçò ôiõ óððóðÞiáòíò óáò, üðùò åðßóçò êáé scripts ðiò åéðåæíýíåé êáðÜ ôçí åééßíçóç ôiõ óððóðÞiáòíò. iåñééÜ áðü ôá scripts áððÜ áééÜæiòí áðü Ýéäiòç óå Ýéäiòç ôiõ FreeBSD.

ÍñéòíÝíá áðü ôá áñ÷åßá ñðèiòßóåñí ÷ñçóéiiðiéiyíòåé åðßóçò êáðÜ ôçí éåèéçìåñéíÞ ÷ñÞóç ôiõ óððóðÞiáòíò. Ôi /etc/group åßíáé Ýíá áðü áððÜ.

÷iõí ððÜñiâé ðåñéððþóåéò ôóí ðåñâéèúí, üðiõ ôiõ make installworld áíÝíåíá áðü ðñéí ôçí ýðåñíç óððååéåñéíÝíùí iññÜðùí ÷ñçóðþí (usernames) P iñÜäùí (groups). ÊáðÜ ôç åéáæéåðßá ôçò áíååÜëééóçò Þóáí áñéåðÜ ðéðéåñü áððiõ ìé ÷ñÞóðåò P iñÜäåò íá içí ððÞñ ÷áí. Áðóòü åçìéiññäýóå ðñiøäÞiáóå ôçí åéáæéåðßá. Óå eÜðiøåò ðåñéððþóåéò, ôiõ make buildworld èá åéÝäiæé áí ððÜñ ÷iõí áððiõ ìé ÷ñÞóðåò P iñÜäåò.

Íéá òÝóéá ðåñßððóùóç ðåññðóéÜóôçéå üðáí ðñiøóÝèçéå i ÷ñÞóðçò smmsp. Ç åéáæéåðßá áíååÜëééóçò åðiøýä ÷áí åá õðiøéíyò ÷ñÞóðåò, ôç óðéåíÞ ðiõ ôiõmtree(8) ðñiøðåéíyóå íá åçìéiññÞóåé ôiõ êáðÜëéäi /var/spool/clientmqueue.

C ÿýóç åßíáé íá åéðåæÝóåò åiõ mergemaster(8) óå êáðÜóðåóç ðñiø-åæéåðÜóðåóçò, åßñiðåò ôçí åðééíåÞ -p. ÁððP èá óððååéñþíåé iññí ðá áñ÷åßá ðiõ åßíáé áðåñáßðçóå åéá ôçí åðééð ÷ßá åéðÝéåðçò ðiõ buildworld P ôiõ installworld. Áí ç Ýéäiòç ôiõ mergemaster ðiõ Ý÷åôå åßíáé ðåæéÜ êáé åáí ððiøðñßæåé ôiõ -p, ÷ñçóéiiðiéÞóåò ôçí iÝá Ýéäiòç áðü ôi ãÝóñiò ðiõ ðçãåßiõ êþæééå üðáí ôçí åéðåæÝóåò åéá ðñþþç õiñÜ:

```
# cd /usr/src/usr.sbin/mergemaster
# ./mergemaster.sh -p
```

**Õðüääéíç:** Áí áéóèÜíåóôå éæéåßóåñá ðåñáññéüò, iðiñåßóå íá åéÝäîåò åi ÿóðçìá óáò åéá íá ååßóå ðïéá áñ÷åßá áíþéiñi ôóçí iñÜäå ðiõ iåðiññiÜæåòå P åéáññÜðååò:

```
# find / -group GID -print
```

Ç ðåñáñÜíù åíðiøÞ èá óáò ååßíåé üéá ôá áñ÷åßá ôá iðiðå áíþéiñi ôóçí iñÜäå GID (iðiñåßóå íá åþóåò åüññá P áñééìçóééü áíååñéóôééü ôçò iñÜäåò).

### 25.7.5 Iåôáâåßôå óå ÊáôÜóôáóç Åíüò ×ñþóôç

Iéá Üeëc iÝeïäiö åbñiaé íá iådååëüñôôBóåôå ñí óyôôçïá óå éåôÜôôåóç éåññiééPò èåôññiññååò, åeëÜ íá iådååâåBóå óå éåôÜôôåóç åiüò ÷ñPôôç æéá òçí ååêåôÜôôåóç. Áí èÝeåôå íá ñí èÜiåôå iå áôôü ñiñüði, áðëPò lçí åêôåéÝóåôå óå åêüëiñðéå åPíåôå iÝ ÷ñé ñí ôYëiö ñôç iådååëPôôéñôç. IðiññåBóå íá áíåñÜeëåôå ñí iåôÜâåóç óå éåôÜôôåóç åiüò ÷ñPôôç iÝ ÷ñé íá åbñôå Ýôïññéæ åéá ñí installkernel P installworld.

Ùò õðåñ ÷ ñ Þóôcò ì ðjñåßôå íá åêôåë Ýóåôå:

```
# shutdown now
```

óå Ýíá óýóôcià óå êáújjéêþ ëåéööññáßá ãéá íá ìåôåâåßôå óå êáôÜóôåóç åújjò ÷ñþóôç

ÁíáééáêôééÜ, áðáíáâééÍÞóôå öi óýóöçíá êáé óôçí ðññiöñiðÞ öiö öiññôùôþ áêéßíçóçò, áðééÝíôå “single user”. Öi óýóöçíá èá íâééÍÞóåé óá êáô Üóðáóç áíüö ÷ñÍÞóôç. Óöçí ðññiöñiðÞ öçö åññäùPö álööjeþíá èá ðñÝðåé íá åñÜóðåôå;

```
# fsck -p  
# mount -u /  
# mount -a -t ufs  
# swapon -a
```

Èá áßíâé Ýëåä÷iò óóâ óóôôÞíâóá áñ÷åßùí, êáé ðñïoÜñôçóç ôiö / ià äöíáôüôçôá áíÜäiùóçò/ääññäöÞò. ðåéóá èá ðñïoánôçèíý üéá óá Üëëá óôóôÞíâóá áñ÷åßùí UFS óá iðiÞá áíáöÝñiîóáé óöi / etc/fstab, êáé èá áíåññiðíéçèåß ôi swap.

**Óciáßúñóç:** Áí ôí CMOS ñíëüé ôíö ñöðíëíäéóôþ óáò áßíáé ñöðèìéóíÝíí óå ôíðéêéþ þñá êáé ü÷é óå GMT (áôöü áßíáé áéþèáéá áí ç Yííäöþ ôíçò áíöðéþò date(1) äáí äáß÷íáé óùóôþ çìâñííçíßá êáé þñá), ßóùò ÷ñåéáóôåß íá áéñíäðåÝñåñí áéßíðóþ ôíçí ðáñåðáñíûñé áéñíðåþ;

# adikorntz -i

Íá áádóú òíi ôñüööří éá ááááééùeåñööå üöé íé ôíđééööří óáö ñöëìñööåéö þñáö Ý÷íöí ñöëìéööåß óùöööÜ. ÄéáöïñåööéëÜ, ðæññéëß íá ðöñééööñööåß ðöññéëñööåß õññéëñööåß.

### 25.7.6 ÄéáãñÜøôå ôí /usf/obi

Êáèþò ãßíåôáé ç áðáííåôáæþþóéóç, óiÞiáôá óiõ oóõôþiáôíò óiðièåðiýíôáé áðü ðñiåðéëiþ óå ððièåôáëüäiòò óiõ /usr/obj. Íé ððièåðÜeíjáé áðöiþ áíðéæñ Üðiþí ôc äüþ ðiþ áéiþiðeåþôáé óöi /usr/src.

Íðiñáþóá íá áðéóá ÷ yfáóá óç æáæéáóþá óið make buildworld éáé áðþóçò íá æðóþóáóá áðü eðriéá ðééáí Úðriñáþéþáóá, áí æáæáñ Üðrálóá éáé áðóúi óið éáð Uejáí.

ÊÜðiéá áñ÷åßá óå ðõiéåôåëüäiõò ôiõ /usr/obj iðiñåß íá Ý÷iõí ÷áñåéôçñéóôåß ùò immutable iÝóù ôiõ áîòßöötié÷iõ flag (æáá ðåñéóôüòåñåò èäðöiñÝñåéåò ååßöå ôi chflags(1)). Ðñéí æááñÜøåôå áðoÜ óå áñ÷åßá, èá ðñÝñåé ðñhôå íá éåôáññÞóåôå áðoÜ ôi flag.

```
# cd /usr/obj
# chflags -R noschg *
# rm -rf *
```

## 25.7.7 Åðáíáìåôáæùôôßóôå ôi Åáóéêü Óýóôçìá

### 25.7.7.1 Åðièçêåýóôå ôçí ïiäi

Êáèþò åêôåéåßôáé ç make(1), åßíáé êáëP éäÝá ç Ýñïäiò ôçò íá åðièçêåýåôáé óå êÜðiéi Üëëi áñ ÷ åßí. Áí êÜôé ðÜåé óôñááÜ, èá Ý÷åôå Ýíá áíßbññáöi ôiõ lçíýíåöi ëÜëiõ. Áí êáé áðöü ßöùò åái óáò åïçèÞóåé íá åñåßôå ôé ðßåå óôñááÜ, iðiñåß íá æéåðéïëýíåé Üëëiõ áí óôåßéåôå ôi ìÞíölä óáò óå ìéá áðü ôéò ëßóôåò çëåéññíéëý óá÷ õäññåßiõ ôiõ FreeBSD.

Í åðièçêåýåôå ðiõ ñiði ãéá íá åßíåé áðöü, åßíáé ÷ñçóéññiðiéÞóååò ôçí åíðièP script(1) ìå ìéá ðáñÜìåôñi ðiõ íá êáéñßæåé ôiñ üññá õiõ áñ ÷ åßíõ óói iðiñi èá åðièçêåôôåß ç Ýñïäi. Èá ðñÝðåé íá õi åêôåéÝóåôå áíÝóùò ðñéí ïåééíÞóåôå ôçí åðååéþôðéóç ôiõ åáóéëý óðôðÞìåöi, êáé íá åñÜøåôå **exit** iüëéò ç æéåæéåóßá iëiññéçñùèåß.

```
# script /var/tmp/mw.out
Script started, output file is /var/tmp/mw.out
# make TARGET
... iððååéþôðéóç, iððååéþôðéóç, iððååéþôðéóç ...
# exit
Script done, ...
```

Áí åðiøáóßóåôå íá åðièçêåýåôå ôçí Ýñïäi, iç ÷ñçóéññiðiéÞóååå åéá áðöü õi óeiðü õií éáôÜëiäi /tmp. Óá ðåñéå ÷üìåíá áðöiy ðiõ êáôåéüñiõ ðéëéáíþò íá æéåññáöiýí ôçí åðüñåíç õiñÜ ðiõ èá åêééíÞóåôå õi óýóôçíá óáò. jåð êáéýôåñiõ êáôÜëiäi ãéá ôçí åðièÞéåðóç ôiõ åßíáé i /var/tmp (üðöù õi ðñiçäiýíåñi ðáñÜäåéäiá) P i ðñiøóùðééüò éáôÜëiäi õiõ root.

### 25.7.7.2 ïåôåæùôôßóôå ôi Åáóéêü Óýóôçìá

Èá ðñÝðåé íá åñßóéåôå óóií êáôÜëiäi /usr/src:

```
# cd /usr/src
(åêôüò áí öðóéêÜ Ý÷åôå åðièçêåýåôå ôiñ ðçñåßí êþäééå óå êÜðiéi Üëëi êáôÜëiäi, iðüôå áðëþò ïåôåééíçèåßôå óå áðöüf).
Åéá íá åðáíáìåôáæùôôßóôå ôi åáóéêü óýóôçíá, ÷ñçóéññiðiéÞóåå ôçí åíðièP make(1). Ç åíðièP áðôP áéååÜæåé ôéò ó÷åôééÜ Ýò iäçñåßôå áðü õi áñ ÷ åßí Makefile, ôi iðiñi ðåñéäñÜöåé íå ðiéi õñüði ðñÝðåé íå ïåôåæùôôéóöiýí óá ðñiññÜìåôå áðü ôá iðiñá åðiôåæåßôåé ôi FreeBSD, ôç óåéñÜ íå ôçí iðiñá åñÝðåé íá åßíáé ç ïåôåæþôðéóç ê.i.e.
Ç åáíééP iññöP ôçò åíðièP ðiõ èá ðëçêóññiðiáÞóåôå åßíáé ç ðáñáêÜôù:
```

```
# make -x -DVARIABLE target
```

Óöi ðáñÜäåéäiá áðöü, ôi -x áíôéðññiðåýåé íéá åðééiäP ðiõ èÝéåôå íá åþóåôå óôçí make(1). Ååßôå ôçí óåëßää manual ôiõ make(1) åéá ðáñáæåßñåôå äðíáóþí åðééiäþí.

Ç áðééïäP -DVARTABLE ðåñíÜåé iéá iåôåâéçôP óïõ Makefile. Ç óðåñéïñÜ ôïõ Makefile áéÝå÷åôáé áðü ðÝöïïò åßäïò iåôåâéçôÝò. ðñüêåéôáé æáé ôéò ßæéåò iåôåâéçôÝò ðiõ éaëïñßæïïôáé êáé óïõ /etc/make.conf, êáé áðôüò åßíáé Ýíáð áéüìá ôñüðiò éaëïñéóïý ôïõ.

```
# make -DNO_PROFILE target
```

Ôi ðáñáðÜí ãåß÷iáé Ýíá áðéðëÝí ñüðiò íá éaëïñßóåôå üöé ãåí èÝéåôå íá iåôåâéùôôéóïý íé áéâééïèÞéåò iå ðëçñïñßåò profiling, êáé áíðéóðï÷åß iå ðíç ðáñáéÜôù åñáílP óïõ /etc/make.conf:

```
NO_PROFILE=      true      #      Avoid compiling profiled libraries
```

Ôi target äçéþíáé óïõ make(1) ôé èÝéåôå íá êÜíåôå. Óå êÜëå Makefile ïñßæåôáé Ýíáò áñéèìüò áéáöïñåôééþí “targets”, êáé ç áðééïäP ðiõ èá êÜíåôå, êáëïñßæåé ôé áéñéåßò èá åßíáé.

ÊÜðiéá áðü ôá targets ðiõ éaëïñßæïïôáé óïõ Makefile, ååí ðñüñßæïïôáé æáé Üíåôç åéôÝéåôç áðü ôi ÷ñÞóôç. Áíôß åéá áðôü, ÷ñçöïïðíéïýôáé áðü ôç åéáâééåóßá iåôåâéßöôéóçò åéá íá iñéñåôåß iñéñéüò ôùí áçìÜôùí ðiõ áðáéðïýôáé åéá ôç iåôåâéßöôéóç ôïõ óðóðÞíáòiò, óå Ýíá áñéèìü ñðo-åçìÜôùí.

Óóéò ðåñéóóüôåñåò ðåñéðôþóåéò ååí èá ÷ñâéåôåß íá åþóåôå éáìßá ðáñÜíåôñí óïõ make(1), êáé Ýôóé ç áíðiïëP óáò èá iñéÜæåé iå ðíç ðáñáéÜôù:

```
# make target
```

¼ðiò ôi target èá åßíáé iéá áðü ôéò ðiøëÝò áðééïäÝò iåôåâéßöôéóçò. Ôi ðñþòi target èá ðñÝðåé ðÜíôå íá åßíáé ôi buildworld.

¼ðùò åñíñåßôáé êáé áðü ôi ûññá, ôi buildworld iåôåâéùôôßæåé Ýíá ðéþñåò åÝíññí iÝóå óïõ êáðÜëíäi /usr/obj, åñþ ôi installworld, åâéâééóðÜ áðôü ôi åÝíññí óïõ ôñÝ÷ii ìç÷Üíçíá.

Ç ýðáñíç åéáöïñåôééþí áðééïäþí, åßíáé ÷ñÞóéïç åéá åyí ëüäïò. ðñþòå áðü üëá, óáò áðéóñÝðåé íá åéôåéÝóåôå ôç åéáâééåóßá iåôåâéßöôéóçò iå áðöÜëåéå, åñüñßæïïôáü üöé ååí ðñüñéåéóåé íá åðçñåáôåß êáÝíá ðiõ ðñÝ÷ii ðiõ óðóðÞíáòiò óáò. Ç åéáâééåóßá iåôåâéßöôéóçò åßíáé “self hosted”, åðññíü ðíç åéá åðüëïéðç åééðiññåßá ôi ìç÷áíÞíáòiò. ðñüñåßôå Ýôóé íá åéôåéÝóåôå ôi buildworld óå Ýíá ìç÷Üíçíá ðiõ åñßóéåôåé óå êáííééëP åééðiññåßá (ðiøëáðþí ÷ñçöþí) ÷ññßò íá ñðÜñ ÷åé ñüâiò ðáñåññååþí. Ùóðüöi, óðíñßóôååé íá åéôåéÝóåôå ôi installworld óå êáðÜóôååç åééðiññåßá åñüò ÷ñÞóôç.

Í åáýðåññiò ëüäïò åßíáé üöé óáò áðéññÝðåé íá ÷ñçöéïïðíéÞóåôå ðññóáññÞóåéò NFS åéá íá åíáâééìßóåôå ðiøëÜ ìç÷áíÞíáôå ôi ñðééöýiò óáò. Áí Ý÷åôå ôñßá ìç÷áíÞíáôå, óå A, B éáé C óå iñßá èÝéåôå íá åíáâééìßóåôå, åéôåéÝóåôå ôi make buildworld êáé ôi make installworld óïõ ìç÷Üíçíá A. Ôi B éáé ôi C ðñññíýí íá ðññóáññÞóïòiò ôi ñðáðÜëíäi /usr/src êáé ôi /usr/obj áðü ôi A iÝóù NFS, êáé Ýðåéôå ðñüñåßôå íá åéôåéÝóåôå ôi make installworld åéá íá åâéâåóåôÞóåôå ôi Ýðiéii ðëÝíí òýôðçíá óïõ B éáé C.

Áí êáé ñðÜñ ÷åé åéüìá ôi target world, ååí óðíñßóôååé ðëÝíí ç ÷ñÞóç ôiõ.

ÅéôåéÝóåôå ôçí áíðiïëP:

```
# make buildworld
```

Íðññåßôå íá åééñßóåôå ôçí áðééïäP - j óðçí make þóôå íá åéôåéåôåß óå ðiøëáðëÝò åéâññåóßåò. Áðôü åßíáé ðåñéóóüôåñí ÷ñÞóéïç óå ìç÷áíÞíáôå iå ðiøëïýò åðåññååôôÝò, ñóðôüöi êáèþò ôi iåññåéýóåñí iÝññò ôçò åéáâééåóßåò iåôåâéßöôéóçò êáèðóôåñåß åíáéôßåò ôi ñðééçñíý åßóéïò (IO bound) êáé ü÷é ôçò CPU, ðñññåß íá óáò öáíåß ÷ñÞóéïç åéüìá êáé óå ìç÷áíÞíáôå iå Ýíá åðåññååôP.

Óå Ýíá ñððééü ìç÷Üíçíá iå iéá CPU, éá ðñññíýóåôå íá åþóåôå:

```
# make -j4 buildworld
```

Íá ôcíg ðáñáðÜù áíðóëþ, ói make(1) èá ÷ ñíçóéiiðíéåß iÝ÷ñé 4 æáññáóßåò êÜèá ÷ ñííéêþ óóéáíþ. Áðú ôcíg áíðåéñíßá ðiô Ý÷iõiå éáé áðú üöé áíáöÝñiõi íé ÷ ñíþóôåò óóéò ëßóôåò, öáßíåôáé üöé ç ñýèiéóç áôðþ äßíâé åáiééÜ ôcíg éáéýôåñç áðüäiöç.

ÁÍ Ý÷-âôå iç÷-Üíçia ia ðiiëeiýo åôåâññáóôÝò, éeaé ÷-ñçóéiiðíéâñôå ðõñþíá ia äoíáôüôçôá SMP, iiëeiÜóôå ôéiÝò iaññáiy ðiöö 6 éeaé ðiöö 10 æáé ia ääñôå ðíéia åôðéóå ÷-ýíæé éeaéýôññá ðiöö aðiøÝëåñia.

### 25.7.7.3 ×ñüñìò ìåôáãëþôóéóçò

Í ÷núffíð ðið aðáéðóðþóáé áæá ðíç iðaðáæðþóðéóç áðçññá Üæðóáé áðü ðiðeeyjó ðáñá Üatíñiðó. Ùðóúñiði, óá óýá ÷núffíð  
íç ÷ áÍþiðóá ç áæáæðáóðá íðaðáæðþóðéóç ðáñá ðiðeeyjó ðáñá Üatíñiðó. Úðóúñiði, óá óýá ÷núffíð  
FreeBSD-STABLE, éæá iðaðáæðþóðéóç ðáñá Üatíñiðó. Úðóúñiði, óá óýá ÷núffíð  
FreeBSD-CURRENT ÷núffíð ðið aðáéðóðþóáé áæá ðíç iðaðáæðþóðéóç ðáñá Üatíñiðó. Úðóúñiði, óá óýá ÷núffíð

**25.7.8 Iåôáâëùôôßóôå êáé Åãêáôáóôþóôå ÍÝí Đõñþíá**

Ãáá íá áâéïáðôåëéäðôéåðôå ðéïñùò ôí íÝí óáð óýóðôçíá, éá ðñÝðåéé fá áððááíáðôåëéñùðôðôåðôå ôíï ððñïþíá. Áðôü áßíáé ðñáéôééÜ áíáâéáßí, êâéþò ëÜðíéåò äííÝð óóç ïíÞíç ðéèáíþò íá Ý÷ïõí áéëÜíâé, êáé Ýðóé ðññäñÜííáðå üðùò óá ps(1) êáé top(1) ááí éá ëáéðòññäíý óñðóÜ íÝ÷ñé íá óðå ÷ñííßôåðôå ôíï ððñïþíá íå ôçí Ýéäíöç ðçääßíò ëþâééå õíð ááðééíý óðôðÞíáôíð.

Í áðeiiyóóññiò éáé ðeÝí áóóáëÞò ôñüðiò, áßíáé íá iåðááæùñôôBóåôå êáé íá áâéâóåôÞóåôå Ýíá ðoñÞíá ááóéóíÝí óóïí GENERIC. Áí êáé i GENERIC iðññâb íá içí ðâñéÝ ÷ áé üéåò ôéò áðáñáBôçôå òóôéâðÝð æáé òï óýóóçíá óåò, eá ðñÝðåé íá ðâñéÝ ÷ áé üéò ÷ ñâéÜæåðåé þóôå íá iâééíÞóåôå íáíÜ òï óýóóçíá óåò óå êáðÜóóåç ëåðéòiññâbåò åñüò ÷ ÷ñÞóóç. Áôðü áßíáé Ýíá êáæü ôâðô ôùóðÞò ëåéòiññâbåò ôïò ôóôðÞíáòiò. IåðÜ ôçí åêéßíçóç íå ôïí GENERIC, êáé åöiy åðáæçèåýóåôå òç ôùóðÞ èåéòiññâbå ôïò ôóôðÞíáòiò, iðññâbåò íá iåðááæùñôôBóåôå Ýíá iÝí ðoñÞíá ááóéóíÝí óóïí åééü óåò ðññóáññiòiÝí áñ ÷ áßí ññðéiññóåù.

Óöi FreeBSD åßíáé óciáíöéü íá åêôåëÝóåôå öi build world ðñéí iåôáæùôôßóåôå íÝi ðõñPíá.

**Ócìàßùóç:** Áí èÝéâôá íá iâdâáëùòôßóâôá íÝí ðòñhíá, êáé Ý÷: âôá hæç Ýíá áñ-âñí iá ðñíóðñííöíÝíâò ñòñèòßóâéò, ñíçóéïïðéïéÞóâá áðëþò õçí áðééïäþ KERNCONF=MYKERNEL iá ðíí ôñüðí ðòí öðáBíåðáé ðáñâéÜðú:

```
# cd /usr/src  
# make buildkernel KERNCONF=MYKERNEL  
# make installkernel KERNCONF=MYKERNEL
```

Óċiāéphóôá üöé áí Ý÷åôâ áíââ Üóâé ôcí ôeíP ôiõ kern.securelevel ðÜfú áðü ôi 1, êáé Ý÷åôâ èÝóâé ôi flag noschg P êÜðiéi áíðôbôéïe÷i ôi åêôâéÝóeii áñ÷åßi ôiõ ððñPíá, iÜeëií èá ÷ñâéâôðåbá íá iâðâáâðbôå óâ êáôÜóâáóç èâéöiñâðbâð áíñù ÷ñPôôç æáá íá ÷ñçóeiiðjéÞâôå õi installkernel. ÁéâöiñâðéÜ, lðiñâðbôå íá åâðâæÝóâôâ èáé ôeò äýí áðôÝð áíôïeÝð áðü ôcí èáññéêP êáôÜóâáóç èâéöiñâðbâð (ðiæépí ÷ñçóôpí) ÷ùñbò íá äçleïiñâçëiyí ðñiâéPíáô. Åâðbôå ôcí óâëbâá manual ôiõ init(8) æáá èâðôïñYñâéâð ó÷åôéÜ iâ ôcí ñyèlëéç kern.securelevel êáé ôcí óâëbâá ôiõ chflags(1) æáá èâðôïñYñâéâð ó÷åôéÜ iâ óâ åéÜöiñâ flags ðiõ ÷ñçóeiiðjéïíâé óâ ãñ÷åßá.

## 25.7.9 Åðáíåêééíþóôå óå ÊáóÜóôáóç Ëåéôïõñäßáò Áíüò ×ñþóôç

Èá ðñÝðåé íá åðáíåðéééÞróåðå óá éáðóÜóðáóç èåéðiõñäßáð åúð ÷ nÞróðç áéá íá åðáéçèåýóåðå ðç èåéðiõñäßá ðiò íÝiò ðoñÞriá. Áéá ði ðééiðü áðóðü, ÷ nçóðiiðiéÞróåðå ðeð iäçäßåð ðiò åßääíå óðí ÓìÞriá 25.7.5.

### 25.7.10 Åæáôáóôþóôå óá Íýá ÅêôåëÝóéìá ôiö Óooôþìáôiö

Èá ðñÝðåé ðþþñá íá ÷ñçðéññíðþréðåðá ñi installworld æáá íá áåééåðåðóÞréðåðá ðá íÝá áééðåæÝðéíá ðíð 6666Þlæðíð.

ÅêôåëÝóôå ôéò ðáñáêÜôù åíôïëÝò:

```
# cd /usr/src  
# make installworld
```

**Óciàñúóć:** Á Ý ÷ àôâá êáèíñßóáé làôåáâéçöÝò óôć ãñáiiþ áîóïëþí òïõ make buildworld èá ðñÝðåé íá êáèíñßóåôá ôéò ßäéàò làôåáâéçöÝò êáé óôçí ãñáiiþ áîóïëþí òïõ make installworld. Áôöü äái åßíáé áðåñáñúóçöá áéþêáé áéá Üéëàò áðééiñÝò. Áéá ðánÜáâéäíá, ç áðééiñþ - j äái ðñÝðåé ðïöÝ íá ÷ ñçóéiñþéáñßóá là òï installworld.

Ãéá ðáñÜääéäìá áí åêôåëÝóåôå:

```
# make -DNONE_PROFILE buildworld
```

Èá ðñÝðåé íá åãêáôáóôþóåôå ôi áðiôÝëåóìá ÷ñçóéiïðiéþíôáò:

```
# make -DN0_PROFILE installworld
```

ääéóáïññåôðéêÜ õi make(1) éà ðññiôðåéÞoåé íá ååééåôðóÞoåé åéâééïÞeÞéåò ià profiling, ôéò ïðiÞßåò üìùò äåí iåðåäëüôðôÞoåå êåðÜ ôç äéÜññéåéå ôçò ðÜóçò make buildworld.

25.7.11 Áíciàñþóôå ¼óá Áñ÷åßá äái Áíciàñþèçéáí áðü ôí make installworld

Ç ᾶδაίά ᾶδαά ᾶεβôôéóς ôïö આાર્દેિય ઓદોદ્પિાદીઓ ાાઈ એ ાિચીન્ધ્રાાએ િનેોિ ભ્યિંદો એદોાએન્નિંદો (ાએએનુદાન્ન ઓદો /etc, /var એએ /usr) લા દા િયા પ ાએન્નિ િયા એન્નિ ાંદું બદ્દોનું.

Í áðeiýóðâniði ôññuðiði ãæá íá áiciðâþóâðâ ðá ãñ ÷ ðâðá Ü áðiáé íá ÷ ñçöðiðiðeþóâðâ ði mergemaster(8), áí êáé iðiñâðbôðâ íá ði êÜfâðâ êáé ÷ áðenñiðbíçóðâ áí ðññiðeði Üðâ. ¶ ði ÷ áðâ ðáðü ði ði ôññuði ðiði ðá ðññiðeðiþóâðâ, áââáéùðâðbôðâ üðé Ý ÷ áðâ ðÜññá áíðbññáðiðiðiði ôññuði ði / etc óðâ ðññiðbððuñc ði ði ôññuði Ü.

## 25.7.11.1 mergemaster

Óðráðeóðin Ü ðjó Tom Rhodes.

Áéá íá iâééíPóâôå, áðëþò ãñÜðôå ðergemaster óðçí ðñïõñiðP óçò ãñàìlPò åíðõiðþí éáé ðáñâéiðoëPóôå óçí êáèþò  
éâðôiðñâåß. Òið ðergemaster èá äçlëiðñâPóåé Ýíá ðñïõñiðñéiù ðåñéâÜeëií root, áðü ði / éáé Ûðòù, éáé èá ði / ãâðBóåé  
iá äéÜõñâ ãñ ÷ åßá ñðõiðþóåù ðið óðôôðPiâöiò. ðåñéâò èá ãßíâé óvâñéñéóç åðôðbí ðùí ãñ ÷ åßúù iá ðá áíðþóðüé ÷ á ðið

âññôðéiiñóáé Þæç áâñéåðâðôçí Ýíá óöi óýóðçíà óáó. Óöi óçíåðßí áððü, éá óáo áâðßíæð óá áñ÷âðßá ðið äæáðÝñiñi ìá iññöþ diff(1), üðið íé âññâílÝ ðið ðið Ý÷iðiñiðíçëæß þ áðßíæé íÝâð èá óâðßíñiñóáé ìá Ýíá +, áñþ íá ði - èá óâðßíñiñóáé íé âññâílÝ ðið ðið áâðôå áóâéññiñýóáé áîðâðéþò þ ðið áíðééâèðôðâðóáñóáé áðü íéá íÝá âññâílþ. Äâðôå ôç óâðëßää manual ðið diff(1) äéá ðâñééðóúðâññâð ðeçñiñiññßâð ð :âðôééÜ íá ôç óýíñðâíç ðið diff(1) äéá äéá ðiñ ðiññði íá ðiñ ðiññði óâðßíñiñóáé íé äæáðiñÝ ðiñ ðiññði.

Ôi mergemaster(8) èá óáð áððíñéé Ýðâðéóá ÚËèá áñ ÷ áßí ðið ðáññiðóé Üæåéé áæáöiñ Ýò, êáé óóí òçíåßí áððóú èá Ý ÷ áðå õçí áððíåðiðóôå áððóá íá áæáñ Üþðóå ói iÝí áñ ÷ áßí (óí iðißí áíáö Ýñðåðéé ùò ðññiðùññíü áñ ÷ áßí), áððóá íá áððéáðóôþðóåðó ói ðññiðùññíü áñ ÷ áßí ÷ ûññBò íá ÚÍåðó áó áððóú êáieÜ áéëéäP, áððóá íá óóð ÷ ûíáýðåðó ôéò áéëéáäÝò ðññiðùññíü áñ ÷ áßí, P ð Ýëið íá íáíáäåßðó ðéð äæáöiñ Ýò iÝóù ôçð diff(1).

Áí áðee Ýíâoá íá áæéâoáóðÞoáð oí ðññiòùñeíü áñ ÷åßí ÷ùñßò áéëéâ ÁÝò, áðoü èá áíðééâoáóðÞoáð oí Þäc áæéâoáðoöçì Ýññið ñðoá áñ ÷åßí. Áðoð Þ áßíáé áéé ç éâæýðâñç áðeeíäÞ áéá òá áñ ÷åßá òá ðiòíßá ááí Ý ÷åðâ áéë Üñlæé áðoáßò ÷æññiðéþíçóá.

Áí áðééë Ýíâðôá íá äðþôá íáí Ü óéð æáeoññÝð íÝóú óçò diff(1), áðoðÝð éá áiöááéóöiýí áêñéâþò üðùðó Ýãéfá êáé ðñéí óáð ñùðþóáé ðíi mergemaster(8) íá áðééë Ýíâðôá óé èÝéâðôá íá êÜíâðôá íá ðíi áñ ÷ áðíi.

Íluééò ietíetéçñùèåß ç éåééòïõñääß ôiõ mergemaster(8) ôôá áñ÷åßá ôôõôÞþáðiõ, èá óáo ñùôÞóåé áéá Üéëåð åðééïäÝð. Ôi mergemaster(8) þóùò óáð ñùôÞóåé áí èÝéåðá íá áíáäçíéïõñääÞóåôå ôi áñ÷åßi ôùí èùäéêþí (password file), êéá èá ôåéåéþóåé äßñiiðiðó áðó ôçí åðééïäÞ íá áéááñÜþåôå ôð÷üí ðñiõùñëíÜ áñ÷åßá ðiõ áçíéïõñääÞèçéáí éáôÜ ôçí áéáäéêåóßá.

### 25.7.11.2 ×åéñïêßíçôç ÅíçìÝñùóç

Áí áðeéðiðiðbóá íá ÆÜíáðó óðíçí ÁíçíÝññóóç : áéññiðbíçóá, ááí iðriñðbóá áðeþò íá áíðóéññÜþðóðó óá áñ ÷ áßá áðü óiið éáðÜíëiäi /usr/src/etc óðií /etc éáé íá ðáññéíÝíáðó üðé óið óýóðóçíá óáo éá éæéóïññÞðóáé óúðóðÜ. ÉÜðiðéá áðü áðóðÜ óá áñ ÷ áßá éá ðñÝðåé íá “áæéáðóáðóáéiyí” ðñþóá. Áðóðü óðiññáðiáé áððáéäþ iðéáðóðü /usr/src/etc áðíí áþíáé éáíííééü áíðóðbáññáöið óið /etc. Áðéðññóóðóá, óððÜñ : iðíí áñ ÷ áßá óá iðibá ðñÝðåé íá áññbóéññðóáé óðiíð éáðÜíëiäi /etc, áæéÜ áðíí ððÜñ : iðíí óðií /usr/src/etc.

Áí ÷ñçóéñüðíéåßôå ðíí mergemaster(8) (üðùò êáé óöíßóðåóáé), ìðíññåßôå íá äéáå Üóåðå êáðåðëèåßáí ðçí åðüìåíç åíüöðôå. Í äðéiyóðåñò ôññüðíò íá ðíí êÜíåðå áðõôü ÷-åéññüðíéßíçôå, åßíáé íá åâðåðåóðóÞóåðå óå áñ ÷-åßá óå Ýíá iÝí êáðÜëíäí, êáé Ýðåéóå íá óå åâðåðå Üóåðå Ýíá-Ýíá øÜ÷-íññåðå ãéá ðéó åéëéå Áð.

**Êná Óþróðá ía Áróðænáði Áróðáeððáða ótö **Ê**áðáeðvæði /etc:** Áí éáðe èáðuñköðééÜ, óþröðiða áði ðñkñðééðóáé ía ðáéñUñlæð aððóü ðíi êáðÜðiñlæða áððÜñlæðá, áßíáðe ðÜíðá ëáðýðáñlæða ía áßíáðóá ðóðiñlæði. Áéða ótö ëüði áððóü, áíðééðañUððóá ðíi ððÜñ ðiñlæða áððÜñlæði /etc óá ëÜðiñlæði áððáeÝði Ýñlæði. ×ñcöðiñlæðiþóða ìéá áíðiñlæði ðñkñðééðóáé ía ðáéñUñlæði:

```
# cp -Rp /etc /etc.old
```

Ç áðééïäþ -R ðñáäïáðíðíéåß áíáäñííééþ áíðéëñáöþ, áíþ ç -P äéáðçñåß óá äééáéþíáðá, óçí éäéïéòçóßá, óéò ciñíïçíßáð óñí áñ-ðíßúí, e.í.í.e.

éá ðñÝðåé íá äçìéiõñÞóåôå íéá øåõöi-äiiÞ êåôåëüäúí áéá íá ååéåôåôÞóåôå öi íÝi êåôÜëiäi /etc éáé Üëéá áñ÷åßá. Íéá ëiäéêþ åðééëiäÞ åßíáé í êåôÜëiäi /var/tmp/root, éáé êÜôù áðü áðôüí, éá ðñÝðåé åðßóçò íá äçìéiõñÞóåôå êáé íéá iëüëéçñc óáenÜ áðü öiðö ððièåôåëüäiðö ðið áðáéöiyíóáé.

```
# mkdir /var/tmp/root  
# cd /usr/src/etc  
# make DESTDIR=/var/tmp/root distrib-dirs distribution
```

Ié Óáñáð Üùu áíðíë Ýò eá áciéiõñäPóíðí òcí áðáéöiyáíç äiíP éáôáëüuúí êáé eá áâéáôáôóPóíðí óá áñ ÷åßá. ìlaáÜëi iÝñiò ôuí ðõíêáôáëüuúí ðiø Ý÷iøí áciéiõñäçèåß êÜòu áðü ôíí /var/tmp/root åßíáé Üääéíé, éáé ðñÝðåé íá äéáñáñöiýí. I áðëiýóôåñìò ôñüðìø áéá íá åßíáé áðóü, óåßíåðáé ÓáñáéÜòu:

```
# cd /var/tmp/root  
# find -d . -type d | xargs rmdir 2>/dev/null
```

Áðóðü èá äéáñ Üþæé üëiðò ðiðò Üääéiðò ðiðíéáðæüüiðò. (Ç Ýiiðið oðÜëiðið áíáéáðæýíðæé óði /dev/null þóðå íá icí áiðáíßæiðóðæé óðicí iðüicí ðñiðæiðiðéÞðáðeó áéá êáðæüüiðò ðið ðáí áßíáé Üääéið.)

Ôþñá, í /var/tmp/root ðåñéÝ÷åé üéá óá áñ÷åbá ðiö èá ðñÝðåé íá öiðræåôcëiýí óá éåoÜeëçëåò èÝóåéò êÜôù áðü öií . Èá ðñÝðåé ôþñá íá aéáôñÝíåôá êåèÝíá áðü áðôÜ óá áñ÷åbá, éåé íá êåèñbóåôá ðùò êåèÝíá áðü áðôÜ aéáóÝñåé áðü öi áíðbóöié÷i ððÜñ÷ií (âåêåôåôôcìÝíí) áñ÷åbí.

Óciáéþóðá üðé Æðriéá áðü óá áñ ÷ áßá óá iðiþá Ý ÷ iðí áæáðáðóáeðó ðóii /var/tmp/root Ý ÷ iðí leá áñ ÷ eéþ “.”. Óç óðéðiþ ðið ãñ Üðriðáé áðó Ý ð ié ãñáii Ý ð, óá iùíá áñ ÷ áßá óóá iðiþá óðiðáðíáé áðóü áðíáé óá áñ ÷ áßá áðéðíþóðó ðið áðéýðið óóíi êáð Üðrið /var/tmp/root / êáé /var/tmp/root /root /, áí êáé iðiñðá íá ððÜñ ÷ iðí êáé Üðræá (áí Üðriðá íá ðið ðiðáð áðáðá Úæðáð ðið áðíáñ). Áðáðáéùðáðó ðið áðíáñ /ðiðáð /ls -a áðá ðið áðáðó ðið áðíáñ).

Í áðeiiýóðâñiò ôñüðiò ãéá íá óðæñþíåôå äýi áñ ÷ åßá, åßíáé íá ÷ ñçóëiiðiéÞóåôå ôçí åíóïëÞ diff(1):

```
# diff /etc/shells /var/tmp/root/etc/shells
```

Ç ðáñáðÜù áíöeP èá óáó ääßíåé ôeò äéáöinÝò iåðáiy ôiõ áñ÷åßiõ /etc/shells êáé ôiõ iÝiõ áñ÷åßiõ  
/var/tmp/root/etc/shells. xñçöeñiðiePôôå ôeò äéáöinÝò áôôÝò áéá íá áðiöáðBôåôå áí èá ðñ Yðåé íá  
óôô ÷ùñávôåôå ôeò áéëéåÝò ðijø Ý÷åôå êÜfåé. P áðéhþò íá áíðeññÜðôåôå ôi ðæééü óáð áñ÷åßiõ ðÜù áðû ôi iÝiõ

Đññioé Ýóôå ôçí Çìåññíçíßá óôï ¼ññá ôîö ÍÝiö Root Éáôáëüäiö, (/var/tmp/root) ¿óôå íá ìðiññåßôå Åýéëéá íá Óóäéññíåôå ÄéáoïññåôééÝò Åéäüóåéö ìåôáiy ôîöö: Áí ìåôáäëüññôôßæåôå óô÷ ïÜ ôî ãâóéêú óýóôçíá, èá ðññÝóåé åôðñçò íá áíçiaññíåôå óô÷ ïÜ ôîï éáôðÜëïäi /etc, ôî ìðiññíå ìðiññå íá åßíáé åññ ëcôéêú.

Iðiñháßôá íá áðéóá ÷ yíáôá áðóòþ óç æáäééáóßá, óçñþíóáò Ýíá áíðßæñáöi ðiø ôåéåðóóáßiø óåð áéëéáái Ýíùí áñ ÷ áßúí óá iðiñßá óðã ÷ uíáyóáôá óóíí êáð Üëiäi /etc. Ç ðáñáêÜòù æáäééáóßá èá óàð áþþóåé iéá éäÝá áéá ðiø ðòùò iðiñßá íá áßíáé áðóöü:

1. Íàðáéðúñòðòðóð á íå ááðééü óýóðçìá üðñòð úðíðåð ëÜíðåðá óðíðíþèùð. ¼ðáí èÝéåðåð íá áíçìáñþþðåð áðí /etc êáé ðíòð Üééïòð ëáðáéðüñòð, áþþðåð áðíí èáðÜéïæí ðíññéðíýÝ Ýíá üññá ááðéðíÝíý ðíðçí ðíñÝ÷ðóá çíàññíçíßá. Áí ðí ëÜíðåð áððûð áðéðó 14 Öáðññáðíð 1998. èá ñíñÜðåðåð íÜðéð óáí ðí ðáññáêÜðûñ:

```
# mkdir /var/tmp/root-19980214
```

```
# cd /usr/src/etc
# make DESTDIR=/var/tmp/root-19980214 \
    distrib-dirs distribution
```

2. Óðã ÷ùíâýóðå ôéò áëëáãÝò áðü áðöü ôíí êáôÜëïäi, lâ ôíí ôñüði ðiõ ðåñéãñÜøåà å ðåñáðÜù.
 lçí äéáãñÜøåðå ôíí êáôÜëïäi /var/tmp/root-19980214 üðåí ôåëåéþóåðå lâ ôçí ðåñáðÜù áéáæéåóßá.
3. ¼ôáí êáôåâÜóåðå ôçí ôåêåðôåßá Ýéâïíç ôíõ ðçãáßiõ êþäééå êáé ôíí lâôåäèùðôþóåðå lâíÜ, áéïëiõèþóåð
 ôí áþpiá 1. Áðöü èá óáò áþþóåé Ýíá êáôÜëïäi ðiõ iðññáß íá iiiiÜæåðåé /var/tmp/root-19980221 (áí áíÜiåðå
 óóeo áÿí lâôåäèùðôþóåé ðåñáìå lâÜëéåðåé áéÜóðçia lëáò áåäiÜÜáð).
4. lðiññåßóå ôþñá íá áåßþóå ôéò áéaoïñÝò ðiõ ððÜñ ðiõl áíÜiåðå óóeo áÿí áåäiÜÜåð, ÷ñçóéiõðíéþíóåò ôçí
 áíðiõðí diff(1) óå áíáññíééþ êåéðiõññáßå áéá íá áçíéiõññþóåðå ôéò áéaoïñÝò lâðåñý ôúí áÿí êáðåëüñúí:

```
# cd /var/tmp
# diff -r root-19980214 root-19980221
```

ÔððéêÜ, áðöü ôí óåð áëëáðþí èá áßíáé ðiðý iéññüðåñí áðü áðöü lâðåñý ôíõ  
 /var/tmp/root-19980221/etc êáé ôíõ /etc. Êáéþò áðöü ôí óåð áëëáðþí áßíáé iéññüðåñí, áßíáé êáé ðéï  
 áýëïí íá áðáññúðåðå áðôÝò ôéò áëëáðÝò ôóíí êáôÜëïäi /etc.

5. lðiññåßóå ôþñá íá áéaãñÜøåðå ôíí ðåñéüðåñí áðü ôíõ ãÿí êáðåëüñíðò /var/tmp/root-\*:

```
# rm -rf /var/tmp/root-19980214
```

6. ÅðáíáëÜåðå áðôþ ôç áéáæéåóßá êÜëå öiññÜ ðiõ èÝéåðå íá óðã ÷ùíâýóðå ôéò áëëáðÝò ôóíí êáôÜëïäi /etc.

lðiññåßóå áðþóçò íá ÷ñçóéiõðíéþóåðå ôçí áíðiõðí date(1) áéá íá áðôñáðiõðíéþóåðå ôçí áçíéiõññáßå ôúí iiiiÜôùí  
 êáðåëüñúí:

```
# mkdir /var/tmp/root-'date "+%Y%m%d"'
```

## 25.7.12 Åðáíåêêßíçóç

Ҫ æáäéêáóßá Ý÷åé ðëÝíi ieiéëçñùèåß. Áöiy åðåëçèåýóåôå üiôé üeá âñßóëîíôáé óôéò óùóôÝò èÝóåéò, iðññåßôå íá åðáíäéêéíÞóåôå òií óyóöciá. Íéá áðéÞ áíöiëÞ shutdown(8) áßiáé åðáñêÞò:

```
# shutdown -r now
```

25.7.13 ሌጅጅዕብኩፎር

÷åôå ðëÝíí áíáâáèìßóåé ôí FreeBSD óýóôçìá óáò. Óõä÷áñcôþñéá.

Áí óá ðñÜááóá ááí ðÞááí áíóåéþó óúóóðÜ, áßíáé áýéíëí íá íåðáäéùóðóåðå ðáiÍÜ iðíéíæÞðiðå ðíÞá óíð óóðóðÞìáóíò. Áéá ðáñÜäáéáíá, áí áéááñÜþðåðå éáðÜ èÜëíò ðí /etc/magic ùò íÝñíò íéáð áíááÜèíéóçò þ óðá÷þíáðóçò ðíð /etc, ç áíðíëÞ file(1) éá óóáíáðÞðåé íá éäéóïññáåß. Óðcí ðåñßðóúð áðóðþ, c áéüñèúðc áßíáé íá áåðåéÝóåðå:

```
# cd /usr/src/usr.bin/file  
# make all install
```

## 25.7.14 Åñùôþóåéò

**1.** ÐñÝðåé íá ïåðáäëùôôßóù íáíÜ iëüêçñi ôi âáóéêü óýóôçìá óå êÜëå áëëåâP;

Äáí õðÜñ ÷åé åýéïëç áðÜíôçóç óå áðöü ôi âñþôçìá, êáèþò åîáñôÜôáé áðü ôç öýóç ôçò áëëåâP. Äéá ðáñÜäåéäìá, áí åêôåéÝóåôå ôi **CVSup**, êáé äåßôå üöé åíçìåñþèçéáí óå ðáñáéÜôù áñ ÷åßá:

```
src/games/cribbage/instr.c
src/games/sail/pl_main.c
src/release/sysinstall/config.c
src/release/sysinstall/media.c
src/share/mk/bsd.port.mk
```

Ôi ðééáíüöåñi åßíáé üöé äåí ÷ñåéÜæåôáé íá ïåðáäëùôôßóåôå íáíÜ üëi ôi âáóéêü óýóôçìá. Ìðiñåßôå áðëþò íá ïåðáâåßôå ôiõðö õ÷åðééïýò ððiêåôäüäiõð êáé íá åêðåéÝóåôå ôi make all install, êáé èá Ý÷åôå ôåëåéþóåé. Áí üñùñ ððÜñ ÷åé êÜðëéá ãçìåñôéêP áëëåâP, åéá ðáñÜäåéäìá ôi src/lib/libc/stdcib, èá ðñÝðåé åßôå íá åðáíåíåðáäëùôôßóåôå ôi âáóéêü óýóôçìá, P ôiõðëÜ÷éóöíí áðöÜ óá êññÜôéá óá iðiñá åßíáé óôáôéêÜ óðiñååâìÍýá (üðùñ ñééåðëðiôå Üëëi Ý÷åôå ðññöéÝóåé åðåßò êáé ôi iðiñí åßíáé óôáôéêÜ óðiñååâìÍýá).

ÖåééÜ, ç áðüöåóç åßíáé åééP óåô. Ìðiñåß íá åßôååå ééåñðiéçÍñò áí ïåðáäëùôôßæåôå ôi âáóéêü óýóôçìá êÜëå åýí åäññÜåôå, åðPññôå ðéð åëëåâÝò íá óðååéåññùèïýò ôðç åéÜñéåéå áðöïý ôiõ äéåðôÞìåðiõ. <sup>1</sup> Ìðiñåß íá èÝéåôå íá ïåðáäëùôôßóåôå iññi ôéð åëëåâÝò, áí Ý÷åôå ôçí ðåðiñþèçóç üöé ìðiñåßôå íá åíðiðßóåôå üëåò ôéð åíññôÞóåé ðiõð.

Êáé öððééÜ, üëá áðöÜ åíññôÞiôåé áðü ôi ðññi ôð÷iÜ èÝéåôå íá åíçìåñþiôå ôi óýóôçìá óåô, êáé áðü ôi áí åëëiðéåßôå ôi FreeBSD-STABLE P ôi FreeBSD-CURRENT.

**2.** Ç ïåðáäëþôôéóç iñð áðÝôò ÷å íå ðëþëìò içññiÜôùí signal 11 (P èÜëç íå Üëëá óÞìåôå). Ôé Ý÷åé óðiñååß;

Áðöü ôiñÞèùñ ååß ÷íåé ðññäëÞìåôå ñéééïý. Ç åéäééåóßá ïåðáäëþôôéóçò ôiõ âáóééïý óððóôÞìåôìò åßíáé Ýíåò áðiñååéåññùèïðò ôññüðiõ íá iññéÜôåôå ôi ðéééüñ óåô ôðå üñéá ôiõ, êáé ôð÷iÜ èá ååßíáé ðññäëÞìåôå ðiõ õ÷åðßæíïðåé íå ôç iñÞìç. Ôi ðéï óýíçèåò óýíðöùñà, åßíáé ç áðüöñïç åéåéïðP ôçò ïåðáäëþôôéóçò, íå ôiñ íåðáäëùôôéóôP íá öåßíåôåé üöé Ý÷åé ëÜðiéí iñðöçñéþpåôå óÞìá.

Íá óðiñññi õçíÜäé åéá ôi ðáñáðÜñ, åßíáé íá åðáíåééíÞóåôå ôç åéäééåóßá, êáé áðôP íá óôåíåôÞóåé óå åéåöñåñôéêü ôçíåßí.

Óðçí ðåñßðôùñç áðôP, äåí õðÜñ ÷iññ êáé ðiñëéÜ ðiõ ìðiñåßôå íá êÜíåôå, åêðöüñ ãðü ôi íá áñ ÷ßóåôå íá åëëÜæåôå åíññôÞìåôå óðiñ iç÷Üíçìá óåô iÝ÷ñé íá åñåßôå áðöü ðiõ åßíáé ñðáßôéi.

**3.** Ìðiñþ íá åéäñÜøù ôi /usr/obj üöáí ååëåéþóù;

Ç óýíññç áðÜíôçóç åßíáé íáé.

Ôi /usr/obj ðáññéÝ÷åé üëá ôå áðééåññíééÜ áñ ÷åßá ðiõ ðáñÜññôåé êáðÜ ôç åéÜñéåéå ôçò ïåðáäëþôôéóçò.

ÓðíÞèùñ, Ýíå áðü ôá ðñþôå åÞìåôå óðçí åéäééåóßá make buildworld åßíáé ç åéåññåôP áðöïý ôiõ êáðåéüññiõ êáé ç åíáäçíéññåßá ðiõ. Óðçí ðåñßðôùñç áðôP, ôi íá êññåôÞóåôå ôiñ êáðÜëëi /usr/obj áöïý Ý÷åôå ôåëåéþóåé, äåí Ý÷åé êáé ðiñëéÜ íüçìá, åíþ áí ôiñ óåÞóåôå èá åéññåßóåôå Ýíå íåñÜëëi êññÜôéå åëåýéåññiõ ÷þññiõ (ôçí ðáññýóå óðéåñP ðåñßðiõ 2 GB).

½ìñùñ, áí íÝñåôå ôé êÜíåôå, ìðiñåßôå íá iñçäÞóåôå ôi make buildworld íá ðáññéåñßóåé áðöü ôi åÞìá. Áðöü èá áðéóå ÷íåéé åééåßóåñá ôéð iÝåò íåðáäëùôôßóåé, êáèþò ôå ðåññéóóüðåñá ðiñÞìåôå ôiõ ðçååßiõ êþæéå äåí èá ÷ñåéÜæëíðåé íáíÜ íåðáäëþôôéóç. Ôi íåññéÝéôçìá åßíáé üöé iññéóíÝåò ôiñÝò åìóåñßæíñðåé ðññäëÞìåôå ðiõ Ý÷iñ

Óðý Íá üðé éáé ðúööí áliðáíáßò áliðáñÞóáéò, éáé iðiññáß íá íæçäÞróið óá ïðóðçñéþþáç áðíðóð ÷ßá óçò iáðóðáæþþóðéóçò. ÓÝðíéá ðññiæþÞáðá óð÷iÜ áçíeiðññáyí “ëùññóáí” óðéó ðßóðåò óið FreeBSD, iiðáí êÜðiðiò ÷ñÞóðóçò ðánñáðííéÝðáé üðé ç iáðóðáæþþóðéóç ðið áðíðóðã ÷Üíáé, ÷ññßò íá áiðóðéáíáÜíáðóáé üðé áðóðü iðiññéðóáé óðçí ðññiððÜèáéá ðið íá óðóðiññáyóáé óðçí áéáæéáóßá.

**4.** Íðiñþ íá óðíå ÷ ßóù ìéá ìåôáæþôóéóç ðið äéÝêiøá;

Áðóðu áiáñôðÜðáæ áðu ði ðúði Ý-÷åðâ ðññi ÷ññþðáæ óðc áæáæéæáðþá iÝ-÷ñé ðc óððeáðiþ ðið aðñþðáða ði ðññuáæçìá.

Áí áññóêåôå óóï óåéåôôáßí óóÜäéï, óï iðiñßí èá óï áiùñßæåôå êieóÜæiióåò ôçí Ýññai ðið Ý÷åôå áðieçêåýóåé, åßíáé ó÷åôéêÜ áóóæéÝò íá êÜíåôå:

```
... fix the problem ...  
# cd /usr/src  
# make -DNOCLEAN all
```

Í lá ótig ófniúðri áðóum ááír éa áfísaént Ýðóðáða ócíg áñnaáðba ðið Ý- ðið áæ aðriáð aðúm ói ðrifðcáiýi láñi make buildworld.

Áí äåßôå ôiì ìPíõìá:

Building everything..

Áí äáí äåbôå áðóü ôi iÞíoiá, P áí äáí åbôå óbäiõñiò, ôüôå åbíáé êäéyôåñá íá êÜíåôå ðëþñç iåðåäéþôóéóç ðánÜ íá iåðåáéþíåôå áññüôåñá.

5. Đùò iđiiñb íá åđéôá÷ýíù ôc ìåđáâëbôôéóc ôiïo âáóéëiý óôôôPiáôïò;

- ÅêôåëÝóôå ôçí óå êáôÜóôáóç åíüò ÷ñÞóôç.
  - ÄÜéôå ôïöö êáôáéüïïöö /usr/src êáé /usr/obj óå äéäöïñåôééÜ óôôôÞìáôá áñ÷åßùí óá iÖlßá âñßóéïîôáé êáé óå äéäöïñåôééïýö ôôôééïýö äßóéïöö. Áí åßíáé äðíáûí, áÜéôå áôôïýö ôïöö äßóéïöö óå ÷ùñéôôïýö åëåâéôÝð.
  - Áéüïá èééýôåñá, ïéñÜóôå áôôÜ óá óôôôÞìáôá áñ÷åßùí óå iÖeéäðéïýö äßóéïöö, ÷ñçóéïðíéþíôáò ôí ðñüäñållá iäÞäçóçò ccd(4) (concatenated disk driver, iäÞäçóçò oôíåñùíÝñùí äßóéûí).
  - ÁðâíññäïðíéÞóôå ôïï profiling (èÝóôå ôçí iåôåâëçôÞ “NO\_PROFILE=true” ôôïï /etc/make.conf). Åßíáé ó÷åëüí óßâiññï üöé ååí ôí ÷ñåéÜæåôåå.
  - Óôïí áñ÷åßí /etc/make.conf, èÝóôå ôïï CFLAGS óå êÜôé üðùò -O -pipe. Ç åâëôéôôïðíßçóç -O2 ÷ñåéÜæåôåé åñéåôÜ ðñéôôñüôåñï ÷ñüñí, êáé ç äéåöïñÜ áðüäïïçò iåôåïý -O êáé -O2 åßíáé óôíÞèùò åiâëçôÝá. Ôí -pipe åðéññÝðâé ôôïí iåðâåëñôôéôð íá ÷ñçóéïðíéÞôåé pipes åéá åðééïéùíßá áíðß åéá ðññóùññéÜ áñ÷åßá. Áôôü êáôáíåéþíáé ðåñéôôñüôåñç iíÞç, åéëÜ ÷ñçóéïðíéåß éëüñôåñï ôí ôéëçñü äßóéï.

- $\times \tilde{n} \tilde{o} \tilde{c} \tilde{o} \tilde{e} \tilde{i} \tilde{d} \tilde{i} \tilde{e} \tilde{P} \tilde{o} \tilde{o} \tilde{a}$   $\tilde{o} \tilde{c} \tilde{i}$   $\tilde{a} \tilde{d} \tilde{e} \tilde{e} \tilde{i} \tilde{a} \tilde{P}$  -  $j \tilde{n}$   $\tilde{o} \tilde{i} \tilde{i}$   $\tilde{m} \tilde{a} \tilde{k} \tilde{e} \tilde{(} \tilde{1} \tilde{)}$   $\tilde{p} \tilde{b} \tilde{o} \tilde{a} \tilde{i}$   $\tilde{f} \tilde{a}$   $\tilde{a} \tilde{e} \tilde{o} \tilde{a} \tilde{e} \tilde{i} \tilde{y} \tilde{i} \tilde{o} \tilde{a} \tilde{e}$   $\tilde{d} \tilde{a} \tilde{n} \tilde{U} \tilde{e} \tilde{e} \tilde{c} \tilde{e} \tilde{a}$   $\tilde{d} \tilde{i} \tilde{e} \tilde{e} \tilde{a} \tilde{d} \tilde{e}$   $\tilde{Y} \tilde{o}$   $\tilde{a} \tilde{e} \tilde{a} \tilde{n} \tilde{a} \tilde{a} \tilde{b} \tilde{a} \tilde{o}$   
 $\tilde{i} \tilde{a} \tilde{o} \tilde{a} \tilde{a} \tilde{e} \tilde{b} \tilde{o} \tilde{o} \tilde{e} \tilde{o} \tilde{c} \tilde{o}$ .  $\tilde{A} \tilde{o} \tilde{o} \tilde{u}$   $\tilde{o} \tilde{o} \tilde{I} \tilde{P} \tilde{e} \tilde{u} \tilde{o}$   $\tilde{a} \tilde{i} \tilde{c} \tilde{e} \tilde{U} \tilde{a} \tilde{e}$   $\tilde{a} \tilde{e} \tilde{u} \tilde{i} \tilde{a}$   $\tilde{e} \tilde{a} \tilde{e}$   $\tilde{o} \tilde{a}$   $\tilde{d} \tilde{a} \tilde{n} \tilde{b} \tilde{d} \tilde{o} \tilde{u} \tilde{o} \tilde{c}$   $\tilde{d} \tilde{i} \tilde{o}$   $\tilde{Y} \tilde{-} \tilde{a} \tilde{o} \tilde{a}$   $\tilde{l} \tilde{c} \tilde{:} \tilde{U} \tilde{i} \tilde{c} \tilde{j} \tilde{a}$   $\tilde{i} \tilde{a}$   $\tilde{Y} \tilde{i} \tilde{a}$   $\tilde{a} \tilde{d} \tilde{a} \tilde{i} \tilde{a} \tilde{n} \tilde{a} \tilde{a} \tilde{o} \tilde{P}$ .
  - $\tilde{I} \tilde{d} \tilde{i} \tilde{n} \tilde{a} \tilde{b} \tilde{a} \tilde{i}$   $\tilde{f} \tilde{a}$   $\tilde{d} \tilde{f} \tilde{i} \tilde{o} \tilde{a} \tilde{n} \tilde{b} \tilde{P} \tilde{o} \tilde{a} \tilde{a} \tilde{a}$  ( $\tilde{P}$   $\tilde{f} \tilde{a}$   $\tilde{a} \tilde{d} \tilde{a} \tilde{i} \tilde{a} \tilde{d} \tilde{f} \tilde{i} \tilde{o} \tilde{a} \tilde{n} \tilde{b} \tilde{P} \tilde{o} \tilde{a} \tilde{a} \tilde{a}$ )  $\tilde{o} \tilde{i}$   $\tilde{o} \tilde{y} \tilde{o} \tilde{c} \tilde{j} \tilde{a}$   $\tilde{a} \tilde{n} \tilde{-} \tilde{a} \tilde{b} \tilde{u} \tilde{u}$   $\tilde{o} \tilde{i} \tilde{i}$   $\tilde{i} \tilde{d} \tilde{i} \tilde{b} \tilde{i}$   $\tilde{a} \tilde{b} \tilde{i} \tilde{a} \tilde{e}$   $\tilde{a} \tilde{d} \tilde{e} \tilde{c} \tilde{e} \tilde{a} \tilde{b} \tilde{a} \tilde{i}$   $\tilde{Y} \tilde{f} \tilde{i} \tilde{f} \tilde{i} \tilde{o} \tilde{P}$   $\tilde{/} \tilde{u} \tilde{s} \tilde{r} \tilde{/} \tilde{s} \tilde{r} \tilde{c}$   
 $\tilde{i} \tilde{a}$   $\tilde{o} \tilde{c} \tilde{i}$   $\tilde{a} \tilde{d} \tilde{e} \tilde{e} \tilde{i} \tilde{a} \tilde{P}$   $\tilde{n} \tilde{o} \tilde{a} \tilde{t} \tilde{i} \tilde{m} \tilde{e}$ .  $\tilde{A} \tilde{o} \tilde{o} \tilde{u}$   $\tilde{a} \tilde{d} \tilde{i} \tilde{o} \tilde{n} \tilde{Y} \tilde{d} \tilde{a} \tilde{e}$   $\tilde{o} \tilde{c} \tilde{i}$   $\tilde{e} \tilde{a} \tilde{o} \tilde{a} \tilde{n} \tilde{a} \tilde{o} \tilde{P}$   $\tilde{c} \tilde{i} \tilde{a} \tilde{n} \tilde{i} \tilde{c} \tilde{i} \tilde{b} \tilde{a} \tilde{o}$  /  $\tilde{p} \tilde{b} \tilde{n} \tilde{a} \tilde{o}$   $\tilde{d} \tilde{n} \tilde{u} \tilde{o} \tilde{a} \tilde{a} \tilde{o} \tilde{c} \tilde{o}$   $\tilde{o} \tilde{o} \tilde{i}$   $\tilde{o} \tilde{y} \tilde{o} \tilde{c} \tilde{j} \tilde{a}$   $\tilde{a} \tilde{n} \tilde{-} \tilde{a} \tilde{b} \tilde{u} \tilde{u}$ .  
 $\tilde{E} \tilde{a} \tilde{o} \tilde{U}$   $\tilde{d} \tilde{U} \tilde{o} \tilde{a}$   $\tilde{d} \tilde{e} \tilde{e} \tilde{a} \tilde{f} \tilde{u} \tilde{o} \tilde{c} \tilde{d} \tilde{o}$ ,  $\tilde{a} \tilde{a} \tilde{i} \tilde{:} \tilde{d} \tilde{n} \tilde{a} \tilde{e} \tilde{U} \tilde{x} \tilde{a} \tilde{d} \tilde{o} \tilde{a} \tilde{a} \tilde{d} \tilde{o} \tilde{P}$   $\tilde{o} \tilde{c} \tilde{i}$   $\tilde{d} \tilde{e} \tilde{c} \tilde{n} \tilde{i} \tilde{o} \tilde{m} \tilde{b} \tilde{a}$   $\tilde{Y} \tilde{O} \tilde{o} \tilde{e}$   $\tilde{e} \tilde{a} \tilde{e} \tilde{e} \tilde{P} \tilde{b}$ .

```
# mount -u -o noatime /usr/src
```

**Đñiäéäiõiçóç:** Ôi ðänÜäåéäia ðñiüõièÝôåé üöé Ý:åôå ôi /usr/src ôiõ äéêu ôiõ óyóôçíá áñ÷åßùí. Ái áôôu äåí óoiâáßíåé (ái åßíáé iÝñiõ ôiõ /usr äéá ðänÜäåéäia) èá ÷ñåéáôåß íá ÷ñçóéiõièþóåôå áôôu ôi óçìåßí ðñiõÜñôçóçò, êáé ü÷é ôi /usr/src.

- Íðiñáðbóð íá ðflíðaráñðþróðáðó (Þ íá áðráðaðflíðáñðþróðáðó) ói óýóðóciá að ÷ aðbúi ðið ðáñfíðÝ ÷ aðe ói /usr/obj ía ôc í aðeetiþ async. Ía óií ônúðri aðóðu, ié áðaðnaöÝ ðo óoi áðbóði eá áðflíðáé aðýa ÷ nííá. Ía Úðeá ëüðeá, ié áðaðnaöÝ ðo ðáðbíðaáé üðe ïeiðeçñflíðáé Úlåðá, áíþ c ðñáðaíðéþ áðaðnaöþ óoi áðbóði áðflíðáé eððaá áððaðnúðaðó áññúðaðná. Áðóðu áðeðñÝ ððaá ôc íaðaðbíðiþcðó ðuñ áðaðnaöþi, ói iðiþi ðiðnáð íá ðñíðoÝ Þñðe aðaðnaöþi aðaðnúðc.

**Đĩňiaéäőřiňçóć:** íá Ý÷âňâó õđüöøéí óáó üöđe áôôňþ ç áđđeeňňáþ lõđñňâň íá êÜíáé ôi óyóôôçjá áñ÷âňùí óáó ðiňey ðeň  
âňňâňöeççö. là ôçí áđđeeňňáþ áôôňþ, õđÜñ÷âé áôïçí Ÿíç ðeňeaíüöôçôá ôi óyóôôçjá áñ÷âňùí íá âňňâňëâň óá ìç  
áđđeňéâňôÜóéíç éâáôÜöôáóç áí õđÜñňâé äéâéňňþ ñňáýiaňò.

Áí ôi óyôôciá áñ÷åßùí ðåñéÝ÷åé iüíí ôi /usr/obj, ôi ðåñáðÜíù ääí åßíáé ðñüäëciá. Áí úöôüötí Ý÷åôå êáé Üëéá ðïeyóéiá äääiíÝíá óoî ßæéí óyôôciá áñ÷åßùí, óéaïññåôôåßôå üöé Ý÷åôå åíçìåñùíÝíá áíôßñáñôå áóôåéåßáò ðñéí åíåññäðïéþôåôå áôôþ õcí åðééiäþ.

```
# mount -u -o async /usr/obj
```

**Ð**ñiäéäiõiççóç: %ðùò éáé ðñiçäiõiýiùò, áí ðí /usr/obj äáí åñsiáé óýóóciå áñ÷ åñsiú áðü iñiù ðiõ, áíóééáðåôðíþóô ðí ðiõ ðáñiüääéáiá iá ðí ûñiíá ðiõ ðñiááiðóééiý óciåññiø ðñiðóÜññiðóçò.

**6.** Ôé íá êÜíù áí êÜôé ðÜåé óôñáâÜ;

Óæäñöñåðöåßöå üöé öi ðåñéåÜëëíí óåò ááí Ý÷åé ööriëåßìåðå åðü öñïçäiyåíåò iåðååëùöðßöåéò. Åðöü åßíåé áñéåðÜ áðëü.

```
# chflags -R noschg /usr/obj/usr  
# rm -rf /usr/obj/usr  
# cd /usr/src  
# make cleandir  
# make cleandir
```

Íáé, èá ðñÝðåé íá åêôåëÝóåôå ôï make cleandir äýi öiñÝò.

Åðáíâéêéíþóôá Ýðåéôá üëç ôç äéáæéáóßá, íâééíþíôáò ìå ôi make buildworld.

Áí Ý÷åôå áêüìá ðñiâëPiáôá, óôåßëôå ôiï ïPíöìá ëÜëiöö ëáé ôçí Ýñäï ôiö uname -a óôçí çëåêôñiiééP ëßôåå áâíéêþí åñùôÞóåùí ôiö FreeBSD (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-questions>). Íá åßóôå ðñiâöiëiáóïÝñíé íá áðáîôÞóåôå åðéðëÝñí åñùôÞóåéò ô÷åôéêÜ ìå ôçí áâéåôÜóôåóç óåò!

## 25.8 ÄéáñáöP Ðáñù÷çìÝíùí Áñ÷åßùí, Èáôáëüäùí êáé Äéâëéièçêþí

ÂáóéóïÝñí óå óçìâéþóåéò ðiö ðáñâþ÷å i Anton Shterenlikht.

ÊáôÜ ôçí óôïå ÷P áíÜðôôïç ôiö FreeBSD åßíáé ööôéëëäéêü ëÜëiéá áñ÷åßá êáôÜ éáéñïýò íá ÷åñâéôçñßæííôåé ùò ðáñù÷çìÝñí. Áðóü ïdñâß íá óôïâåß áí ié ëâéôïññâßåò ðiö ðáñâß÷áí ðeïðiëíýíôåé ðëÝñí åéâöiññâôéêÜ, áí i i áñéèlùò Ýéäöçò ôçò åâééëièþêçò Ý÷åé åéëÜíâé P áéüìá êáé áí Ý÷åé åéâñáôåå iñéôôéêÜ áðü ôi öyôôçìá. Óôá áñ÷åßá åôôÜ ðåñéëåâáÜññôåé åðßöçò åâééëièþêåò êáôÜëíäé ðiö ðñÝðåé íá åéâñáôïýí üöåí åßíåôåé áíáâÜëíéóç ôiö óôôðPiáöiò. Ôi üöâëiò åéá ôi ÷ñÞóôç åßíáé üöé ôi öyôôçìá ôiö åâíßæåé áðü ðáëéÜ áñ÷åßá ôá iðiþá êáôâéëåâáÜññí ðëñçööi ÷þñiöi ôiï iÝñi åðiëþêåôôçò êáé óôi backup. Åðéðñüöèåôå, áí êÜðiéá ðáëéÜ åéâëéièþêç åß÷å ðñiâëPiáôá óôåéâñüôçååò P áôóÜëâåáò èá ðñÝðåé íá ôçí áíáâéëìßôåå åéá íá êñâôÞóåôå ôi öyôôçìá óåò óôâéðåñü êáé áôóäéÝð. Óá áñ÷åßá, ié åâóÜëíäé êáé ié åéâëéièþêåò ðiö èåùñïýíôåé ðáñù÷çìÝñí åò åßíåôåé óôi /usr/src/ObsoleteFiles.inc. Íé ðáñâëÜðù iäçäßåò èá óåò åïçèþöiòí íá åéâññÜøåôå åôôÜ ôá áñ÷åßá êáôÜ ôç åéâëéêåôåå áíáâÜëíéóç ôiö óôôðPiáöiò.

ÕðiëÝñí ðáñù÷çìÝñí åñ÷åßá, ïdñâßôå íá ôá åéâññÜøåôå ìå ôéò ðáñâëÜðù åíôiëÝð:

```
# cd /usr/src
# make check-old
```

Áí åñâëïýí ðáñù÷çìÝñí åñ÷åßá, ïdñâßôå íá ôá åéâññÜøåôå ìå ôéò ðáñâëÜðù åíôiëÝð:

```
# make delete-old
```

**Õðüääéïç:** Åâßôå ôi /usr/src/Makefile åéá ðåñéóóüôåñåò åíäéáöÝñiöoåò åðéëëiäÝð ôçò make.

Åéá êÜëå åñ÷åßí ðiö èá åéâñáöåß, èá óåò åçôçèåß íá åðéâåâåéþôåå ôçí áíÝññâåéá. ïdñâßôå íá ðáñâëåßôåå ôçí åñþöçöç åéé íá åðÞóåôå ôi öyôôçìá íá åéâññÜøåôå åôôÜ ôá áñ÷åßá åôôññâåôå ÷ñçöëiðiþíôå ôçí iâðâåëçôP ôiö make BATCH\_DELETE\_OLD\_FILES ìå ôiï ôñüði ðiö ðåßíåôåé ðáñâëÜðù:

```
# make -DBATCH_DELETE_OLD_FILES delete-old
```

**Ðñiâëäiðiþçöç:** C åéâñáöP ðáñù÷çìÝíùí åñ÷åßùí, èá ðñiêéäëÝóåé åôôëåéôïññâå ôùí åôáññâþí ðiö åíâëëiðiþíýí íá åâóßæííôåé óå åôôÜ. Áðóü óôïâåßíåé åéâéåßôåñá óå ðáëéÝð åéâëéièþêåò. Óôéò ðåñéóóüôåñåò ðåñéðþöåéò, èá ðñÝðåé íá åôáíåååëüôôßóåôå óå ðñiññÜññâåò, ports P åéâëéièþêåò ðiö ÷ñçöëiðiþíýóåí ôçí ðáëéÜ åéâëéièþêç ðñéí åêôåëÝóåôå ôçí åíðiþP make delete-old-libs.

Ìðïñåßôå íá áññåßôå ðñiäñÜìåôå ðiö åéÝå ÷ iöí ôéò áíáñôÞóåéò ôùí ëíéíü ÷ ñçóôùí áéâëëíèçêþí óôç Óðëëiäþ ôùí Ports, ôöí sysutils/libchk þ sysuils/bsdadminscripts.

Íé ðáñù ÷ çíÝfå ëíéíü ÷ ñçóôåò áéâëëíèþêåò ìðiñíýí íá áçíëiñâÞóïòí ðñiäñÜìåôå ëüäù óðäññíýóåùí íå íåþôåñåò áhæüöåéò. Óå áööÝò ôéò ðåñéðôþôåéò, éá áåßôåé íçíyìåôå üðùò ôá ðáñáéÜðù:

```
/usr/bin/ld: warning libz.so.4, needed by /usr/local/lib/libtiff.so, may conflict with libz.so.5
/usr/bin/ld: warning: librpcsvc.so.4, needed by /usr/local/lib/libXext.so may conflict with librp
```

Ãéá íá áðéëéýóåôå ôÝôiéiô áßäiòð ðñiäñÜìåôå, áññåßôå ðiëí port áâæåôÝóôçóå ôçí áéâëëíèþêç:

```
# pkg_info -W /usr/local/lib/libtiff.so
/usr/local/lib/libtiff.so was installed by package tiff-3.9.4
# pkg_info -W /usr/local/lib/libXext.so
/usr/local/lib/libXext.so was installed by package libXext-1.1.1,1
```

Ðåéóå, áðåãâéåôåôóÞóôå, áðáíáíåôåäùôôßôå êáé áðáíáâéåôåóÞóôå ôí port. Æá íá áðôñâôðiëÞóåôå áðôþ ôç áéâæééåôå ìðiñåßôå íá ÷ ñçóëiðiëÞóåôå óå áíçèçôééÜ ðñiäñÜìåôå ports-mgmt/portmaster êáé ports-mgmt/portupgrade. Áöiy áââæéùèåßôå üöé ié ðáëéÝò áéâëëíèþêåò ááí ÷ ñçóëiðiëíýóåé ðëÝíí áðü êáíÝíá ðñuññâñíà, ìðiñåßôå íá ôéò áéâññÜþåôå íå ôçí ðáñáéÜðù áíöiëþ:

```
# make delete-old-libs
```

## 25.9 Äéáæéåóßá ãéá ÐïëëáðëÜ ìç÷áíÞìåôå

ÓðíáéóðiñÜ ôiö Mike Meyer.

Áí Ý÷åôå ðïëëáðëÜ ìç÷áíÞìåôå óôå iöibá ðñüêåéôå íá ÷ ñçóëiðiëÞóåôå ôí ßäéí áÝíôñí ðçäáßiø êþäéêå, áßíáé óðååÜëç ðñiñùí (áßöéiö, áéêôýïò êáé áðåññâñåôðþ) íá áðáíáæåñÜìåôå óå üëá ôç áéâæéåôå áíÜêôçóçð êáé ìåðâæþôðééçð. Ç ýéóç áßíáé íá iñßóåôå Ýíá ìç÷Üíçíá íá áéðâæåß ôí iâññæýôåñí iÝñiò ôçð áññáóßåò, áíþ ôá ððüëiéðå èá ìðiñíýí íá ôçí áíáéöiýí iÝóù NFS. Óôçí áíüôçðå áðôþ èá ðáñiðóéÜðiòíå Ýíá ôñüðí íå ôíi iðiñíß íå ðiññåß íá áßíáé áðöü.

### 25.9.1 ÐñiëåôåñêôééÜ

Ðñþôå áðü üëá, áíáññüñßôå ôí óåô ôùí ìç÷áíçìÜðùí óôå iöibá óéiðåÿåôå íá ÷ ñçóëiðiëÞóåôå ôá ßäéá áâðôåëÝóëíá. Èá iññÜöiòíå áðôþ ôçí iñÜäá óåô iâðâæþôðééçð. ÈÜëå ìç÷Üíçíá iðiññåß íá Ý÷åé áéðâæü ôí ðñiðóññiöiÝíí ððñÞíá, áéëÜ èá Ý÷iöí üëá ôá ßäéá áâðôåëÝóëíá userland. Áðü ôí óåô áðöü, áðéëÝîôå Ýíá ìç÷Üíçíá ôí iðiñíß èá áßíáé ôí ìç÷Üíçíá iâðâæþôðééçð. Èá áßíáé ôí ìç÷Üíçíá ôí iðiñíß èá iâðâæëñüôôþæåôåé ôí áâðâæü òýóðöçíá êáé i ððñÞíá. Ôí éâáíéü áßíáé íá áðéëÝîôå Ýíá añÞäiñí ìç÷Üíçíá, ôí iðiñíß íá ððÜñ ÷ åé áññåðöü åéâýëæññiò ÷ ñññiò ôðíi áðåññâñåôðþ áéá íá áâðâæåß ôá make buildworld êáé make buildkernel. Èá ðñÝðåé áðßþçð íá áðéëÝîôå Ýíá ìç÷Üíçíá äiðééíþí ôí iðiñíß èá aíðëiÜæåôå ðéð áíçìåñþôåéð ëiæéóñééý ðñéí ðéð iâðâðÝñåðå ôðçí ðáññâñäþ. Ìðiññåß íá áßíáé êáé ôí ßäéí ôí ìç÷Üíçíá iâðâæþôðééçð, áéëÜ áðöü ááí áßíáé áðåññåßöçð.

¼éá ôá ìç÷áíÞìåôå óôå óåô iâðâæþôðééçð ÷ ññåéÜæåðåé íá ðñiðóññôÞóïòí ôí /usr/obj êáé ôí /usr/src áðü ôí ßäéí ìç÷Üíçíá, êáé ôíi ßäéí ôçíåßi ðñiðóñçóçð. Ôí éâáíéü áßíáé áðôÜ ôá aýí ôððôÞìåôå áñ ÷ åßùí íá añßóëiíðåé ôá áéáðiññåðéü ôððâæü åßöéi ôí ìç÷Üíçíá iâðâæþôðééçð, áéëÜ iðiññåß íá ôá ðñiðóññôÞóåôå iÝóù NFS áéüñá êáé ôá áðöü ôí ìç÷Üíçíá. Áí Ý÷åôå ðïëëáðëÜ óåô iâðâæþôðééçð, ôí /usr/src èá ðñÝðåé íá añßóëåðåé ôá Ýíá áðü ôá ìç÷áíÞìåôå iâðâæþôðééçð, êáé íá ðñiðóññôÜðåé ôðá ôððüëiéðå iÝóù NFS.

ÔÝéïò, áâðâéùèåßðå üöé ôá áñ ÷ áßá /etc/make.conf êáé /etc/src.conf ôá üëá ôá ìç ÷ áÍÞìåðå ôíò ôáô  
iåðâáæþþðéóçò, åßíáé þæá íå ôá áíößööíé ÷ á ôöï ìç ÷ Üíçìá iåðâáæþþðéóçò. Áðöü ôçìåßíåé üöé ôï ìç ÷ Üíçìá  
iåðâáæþþðéóçò éä ðñ Ýðåé íå iåðâáæùòðßæåé üëá ôá ðìÞìåðå ôíò ååóéëíý ôðööðÞìåðò ôá iðïßá èå åâðâåðåðåéíý ôå  
éÜëå ìç ÷ Üíçìá ôïò ôåô. Åðßöçò, ôå éÜëå ìç ÷ Üíçìá ôöï ôåô iåðâáæþþðéóçò éä ðñ Ýðåé íå iñéöôåß ôï üïñâ ôïò åéëíý  
ôïò ðñïðåññïòí Ýñïò ððñÞíà íÝóù ôçò iåðâáæçöÞò KERNCONF ôöï /etc/make.conf, åßíééå ôï ìç ÷ Üíçìá  
iåðâáæþþðéóçò éä ðñ Ýðåé íå Ý ÷ åé iéá ëßööå üëùí ôúí Üëëùí ôöï KERNCONF, iåééíþíåðå áðü ôï åéëü ôïò. Ôí ìç ÷ Üíçìá  
iåðâáæþþðéóçò, éä ðñ Ýðåé íå Ý ÷ åé ôá áñ ÷ áßá ñyéïéóçò ôïò ððñÞíà üëùí ôúí Üëëùí ìç ÷ áïçì Üðùí ôöïí êåô Üëïäí  
/usr/src/sys/arch/conf áí ðñüéåðåé íå iåðâáæùòðßæåé ôïò ððñÞíåð ôïò.

## 25.9.2 Ôï Âáóéêü Óýóôçìá

∴ iiÓdÓ ðñáâiáðiðíéÞðåé üéá ðá ðáñðáðÜñú, áßóðå Ýðíéiið íá iåðáâæñüððßðåðå ðá ðÜíðá. Iåðáâæñüððßðåðå ðiÍ ððñÞrá êáé ðiÍ áâóðéêü óýðóðçìá üðñù ðåñðæñÜðåíå ðiÍ ÓiÍÞá 25.7.7.2 ÷ñçóðíðíéÞðåðå ðiÍ iç ÷Üíçíá iåðáâæñþðóðéóçò, áæëÜ içí áâéâðáðóðÞðóðåðå ðiÍ ððñÞrá. IåððÜ ðiÍ ðYéið ðcð iåðáâæñþðóðéóçò, ÷ñçóðíðíéÞðåðå ðiÍ iç ÷Üíçíá iüééiþí êáé áâéâðáðóðÞðåðå ðiÍ ððñÞrá ðiÍ iüééð áçéiñðÞðåðå. Áí ðiÍ iç ÷Üíçíá áðóð ðññðáññðÜ ðiÍ /usr/src êáé ðiÍ /usr/obj iÝóú NFS, üððá ðiÍ áððáíâééíÞðåðå ðá êáð Üððåðóç áíüð ÷ñÞðóç, éá ÷ñðáéðóðåß íá áíññðiðíéÞðåðå ðiÍ áßðéððiÍ êáé íá ðá ðññðáññðÞðåðå. Í áððéiñðåññð ðññðüðið aéá áððóð, áßðáé íá áâééíÞðåðå ðá êáð Üððåðóç ðiÍéäðéþí ÷ñçóðóþí êáé Ýðâðéðå íá áâððå ðiÍ ððñÞrá êáé ðiÍ áâóðéêü óýðóðçìá, éáé íá áâððå ðiÍ ððñÞrá êáé ðiÍ mergemaster üðñù ðá ûÜíðåðå ðññðéùð. ¼ðáí ðââéâéÞðåðå, áððáíâééíÞðåðå áððóð ðiÍ iç ÷Üíçíá óðíçí êáññééþ ðââéððññðå ðiÍéäðéþí ÷ñçóðóþí.

¼ôáí áââáéùèåßôå üöé üéá éåéöïõñäíý óùóóÜ óöí íç ÷ Üíçíá äíééíþí, ÷ñçóëíïðéþóôå ôçí þæá äéáäééáóßá áéá íá áâéáóåôþóôå öí íÝí èíäéóíéü óå èÜéå Ýíá áðü óå ððüéíéðå íç ÷ áíÞiaóå öíø óåô lâôåäéþþoéöçò.

### 25.9.3 Ports

Iðiññabôá íá ÷ nçœiñðiÞóåôá ôéò Bæéåò éá Ýåò êáé ãéá ôí ãÍoñi òuí ports. Ôí ðñþði ëñbóéii áþiá åbíáé íá ðñiðáññôÞóåôá ôí /usr/ports áðü ôí Bæéi ìç ÷ Üíçia, óå üéá óá ìç ÷ áÍÞiáôá ðið óåô iåðåáæþþðôéóçò. Iðiññabôá Ýðåéôá íá nñöìßóåôá ôí /etc/make.conf þóôá íá æáéiññÜæiñôáé óá distfiles. Éá ðñ Ýðåé íá èÝóåôá ôí DISTDIR óá Ýíá ëiéiù ÷ nçööíî éáðôÜëiñ, óöñ iðiñþi èá äþóåôá æééåéþiáôá ååðññåöÞò óá iðiñéiðÞðiô ÷ ñiÞöôç Ý ÷ åðå áçéþóåé ùò root óóí NFS. Óå êÜëa ìç ÷ Üíçia èá ðñ Ýðåé åðþðóçò íá iñéóôåß ç iåðåáæçóÞ WRKDIRPREFIX þóôá íá äåß ÷ íåé óá Ýíá ðiðééü éáðôÜëiñ. ÖÝëiò, áí óéiðåýåôá íá iåðåáæèùðôðæåôá êáé íá æáíÝiåôá Ýðiñéiá ðåéÝôá, èá ðñ Ýðåé íá èÝóåôá ôçí iåðåáæçóÞ PACKAGES óá Ýíá êáðÛëiñ, üðuñ êÜíåôá êáé lå ðçí DISTDIR.

# Óciåéþóåéò

1. Áðóðü áÝâáéá áðí áðßíáé áðüëöôá áéçèéíü. Ááí iðñíiyá íá óðíá ÷ bðiðið íá óðiðööçñßæiðið óéó ðáééÝò áðëüóåéó óið FreeBSD áéá ðÜíðá, áí êáé óéð óðiðööçñßæiðið áéá ðíëéÜ ÷ ñúíéá. Áéá ðéÞñç ðåñéäñåóÞ óçó òñÝ ÷ iðóð áðíëéóéêÞò üöí áðíñÜ óçí áðóÜëáéá ôúí ðáééþí áðëüóåùí óið FreeBSD, áðíßóá <http://www.FreeBSD.org/security/>.

# ÊåöÜëáéï 26 DTrace

*ÃñÜöçêå áðü ôií Tom Rhodes.*

## 26.1 Óýííøç

Ôi DTrace, àñùñóôú áðþóçò ùò Dynamic Tracing, áðíáé Ýíá áññääëþí òi iðibíi áíáððóý - ècêå áðü óçí Sun áæá òií áññíðéóïü ðññäëçí Üóùí áðüññíçò óá óðóóþÞíáðá ðið ðññüéâéóáé íá ÷ ñçóéiiðíéçëíý Þ ÷ ñçóéiiðíéýíðáé Þäç óóçí ðáññääùñÞ. Äáí ðññüéâéóáé áæá áññääëþí áðíóöáëí Üóùñçò, äeë Ü áæá áññääëþí áí Üëéðçò ðññääùñðééý ÷ ñññññ, iå òi iðibíi iðimíýí íá áññääëþí ðññäëÞíáðá áðüññíçò êáé Üéëëåð êáðáðó Üóåéð.

Ôi DTrace ábbáé Yíá èáði Úóéí áññáéåbbí profiling éáé aeáé Yóåé áíòòðùóéáéú ðëþeò ÷ áññáéðçñéóðééþí áéá ðçí aeÜáñúóç ðññáéçí Üðùí ðiò òóðòðPiáòíò. Iðinåß áðßóçò íá ÷ ñçóéíïðieçéåß áéá íá áéðåé Yóåé áðü ðññéí Yóïeíà scripts, íå óá iðiñßá iðiññåßóá íá áéíåðåééåðéåßóá éáéýôåñá ðéò aðíåñûòðçóå ðiò. Ié ÷ ñÞóðåò ìðiññýí áéüíá íá ãñÜøíòí áéé óá áééÜ ðiò ðíçéçöðééÜ ðññáññÜíñåðá, ÷ ñçóéíïðieþíðóá ðçí Áéþóðá D ðiò ðáñY ÷ åé ði DTrace, éáé íá ðññóðåññüðíòí íå áðóú ðiò ðññüðí ði profiling óóðéó áéé Yó ðiò ði Úåéåð.

Áöiý äéáâÜóåôå áôôü öi êåöÜëáéï, èá ãíùñßæåôå:

- Ôé åßíáé ôi DTrace êáé ôé äöíáôüôçôåò ðáñÝ ÷åé.
  - Ôéò áéaoïñÝò õëiðiïßçóçò ìåâáiy ôiõ DTrace ôiõ Solaris êáé ôiõ FreeBSD.
  - Đùò íá áíññaiïðiéÞóåôå êáé íá ÷ñçóñiïðiéÞóåôå ôi DTrace ôiõ FreeBSD.

Đñéí äéáâÜóåôå áðôü ôi êåöÜëáëi, èá ðñÝðåé:

- Íá êáôáíâßôå âáóéêÝò Ýíñíéåò ôïõ UNIX êáé ôïõ FreeBSD (ÊåöÜëáéí 4).
  - Íá åßôôå åñïéêåéùìÝíò iå ôéò âáóéêÝò æáäéêåóßôå ñýèiéóçò êáé iåôáäéþôôéóçò ðñïóáññïóíÝíò ðõñÞrá (ÊåöÜëáéí 9).
  - Íá åßôôå åñïéêåéùìÝíò iå ôçí áóöÜëåéá êáé ôíí ôñüðí ðïõ áôôÞ ó÷åôßæåôáé iå ôí FreeBSD (ÊåöÜëáéí 15).
  - Íá êáôáíâßôå ðùò iðïñâßôå íá áíáêôÞóåôå ôíí ðçãáßí êþäééå ôïõ FreeBSD êáé íá ôíí ÷ñçóéiiðíéÞóåôå þóôå íá åðáííåôåäéùôßôåôå ôí ýóóöçìá óåð (ÊåöÜëáéí 25).

**ĐññâéäíðiBçó:** Ôc ääáïÍYíç óôéäíþ, ôi DTrace èåùññäôáé üöde áBñáé óå ðäéñáiåôéüú óôÜäé. ÍñeoíYífò åðééëäÝò iðññäß íá ðññäôáé óå eäéôiõñääéüôçôá, eáé êÜðíéá ôiÞiaôá ßóùò íá iç eäéôiõñäiyí eáèüëiø. lâ ôci ðÜñíäí ôiø ÷ñüñiø, ié ðáññáðÜíù aôñíåôüôçôåò eá èåùñçëíý Yóñíéiåò aéá ÷ñþöç óå iç ÷áíþiaôá ðáññåñuãþò, eáé c ðáññíýoå ôâñçññúoç eá áíáíåùèaß þóôå íá áíôeññíóùðåýå áôôþ ðçí eáðÜôðåoáç.

## 26.2 ÄéáöïñÝò óôçí Õëïðïßçóç

Áí êáé ôí DTrace ôóí FreeBSD ábíráé áñéâðôÜ üíííí íá áðôú ôíð Solaris, ððÜñ ÷ iðí èÜðíéâð áéáöinÝð ðið èá ðñÝðåé íá ôéò áíçäÞoïðiâ ðñéí óðíñ ÷ ßiðiðiâ. Ç íàááëýôâñ áéáöinÜ ðið èá ðãñáðçñÞoïði íé ÷ ñÞóôâð, ábíráé üöé ôóí FreeBSD ôí DTrace ðñÝðåé íá áíññâðiðíéçéâð ÷ áéñíëßíçôá. ððÜñ ÷ iðí áéÜðiñâð áðéëiaÝð áéá áñèñþiâðá áéá ðið ðññÞíâðá ðið ðñÝðåé íá áíññâðiðíéçéíý þóôâ ôí DTrace íá éæðiññâð áóùðôÜ. Éá áíçäÞoïðiâ áññâðûññâð áóðÝð ôéð ñðõíëßíðâéò.

Ç åðéëïäþ DDB\_CTF ðið ððñþíá ÷ñçóéiiðíéåßðåé åéá íá åíåññiðíéþóåé ôçí ððñôþñéïç öiñôþìåðið ôùí ååññiÝñúí CTF åðü öií ððñþíá éáé óá åñèñþìåðå öið. Ói CTF åßíáé ôi Compact C Type format öið Solaris, ôi iðiþi åíððéåêþíåé iéá åéåðòùiÝíç iiñöþ ðéçñiöiññéþí åðíóðåéiÜôùñóçò (debugging), üñíéá iå ôi DWARF éáé óá stabs. ÁððÜ óá ååññiÝíá CTF ðñiðóðßèåíðåé óðå åéðåéÝóéíá iÝóù ôùí åññåéåßùí ctf convert êáé ctfmerge. Ói åíçèçóéüü ðñññññiðá ctfconvert åñiçfáýåé óá ðiþíáðå ôùí DWARF ELF ðið ððñéÝ ÷iði ðéçñiöiññßåð debug (äçíéiõññiÝóéíåé åðü öi ïåðåññéùñðåðéóðþ), éáé ôi ctfmerge óðå ÷ùñáýåé óá ðiþíáðå CTF éáé ELF åðü óá åíððéåßíåíá óá Üeëá åéðåéÝóéíá þ ëiéíü ÷ñçóðåðå åéðåééièþéåð. Ðåññéóðüðåñåð ðéçñiöiññßåð åéá ôçí åíåññiðíßçóç ôùí ðáññáðÜñú óðç ååðåññéþòðéóéóç öið ððñþíá éáé ôið óððóðþíáðið ôið FreeBSD, èá åíýiå ðáññáðÜôù.

Óóí FreeBSD eÜðiéíé ðáññ-ðåðå åßíáé åéáöiññåðééið óá ð-Ýóç iå ôi Solaris. Í ðéí åíéíóçìåßùñið åßíáé i ðáññ-ð-Ýáð ðtmalloc i iðiþið åðéññÝðåé ôi tracing ôi ðmalloc() áíÜeëá iå ôií ðýði ðið, óðií ððñþíá ôið FreeBSD.

Íüñ i root iðiññåß iå ÷ñçóéiiðíéþóåé ôi DTrace óóí FreeBSD. Áððü ó ðåðßæåðåé iå åéáöiñÝð óðçí åóðÜeåéá, éáèþò öi Solaris åéáéÝóåé eÜðiéíð ãéÝá ÷iði ðáðÜeåéå ÷åíçëíý åðéðÝäið, ié iðiþið ååí ððññ-ðiññåðíá óði FreeBSD. Åéá ôi ñüñ åððü, ç ÷ñþóç ôçò óððóðåðþò /dev/dtrace/dtrace åððññåðåé åððóðçñÜ åéá üeëðò ðið ÷ñþóðåð åéðò åððü ôi root.

ÓÝëið, ôi ëræéóíéüü DTrace åñßóéåðåé ððü ôçí Üäåéá CDDL ôçò Sun. Iðiññåßóå iå åéååÜóåðå ôi åéßíåññiðå ðçò Üäåéáð Common Development and Distribution License óóí FreeBSD, óðií åñ-ðåßí /usr/src/cddl/contrib/opensolaris/OPENSOLARIS.LICENSE þ íá ôi åéååÜóåðå online óðç åéåýèoíðó http://www.opensolaris.org/os/licensing.

Ç Üäåéá iððéáðóééÜ óçìåßíåé üðéÝíá ððñþíáð FreeBSD iå ôéð åðéëíäÝð ðið DTrace, åíáéíéiðéåß iå åñßóéåðåé ððü ôçí Üäåéá BSD. Ùóðüöi ôi CDDL åíðëÝéåðåé ôç óðéäiþ ðið åßíåðåé åéáññiþ ôùí åñèñùiÜôùí óá åððæéêþ iiñöþ, þ ôç óðéäiþ ðið ðiñôþññiðåé.

## 26.3 Åíåññiðíßçóç ôçò ððñóðþñéíçò DTrace

Åéá iå åíåññiðíéþóåðå ôçí ððñóðþñéíç åéá ôi DTrace, ðññóðéÝóðå ôðéð åéüüëiðéåò åññåñiÝð óðií åñ-ðåßí ñððèìßóåðíü ððñþíá:

options	KDTRACE_HOOKS
options	DDB_CTF

**Óçìåßñóç:** Íé ÷ñþóðåðå ôçò åñ-éóðåðééþò AMD64 èá eÝëiðí iå ðññóðéÝóðí ðçí åéüüëiðéç åññåñiþ óðií åñ-ðåßí ñððèìßóåðíü ôið ððñþíá ôið:

options	KDTRACE_FRAME
---------	---------------

Ç åðéëïäþ åððþ ðáñÝ-åé ððñóðþñéíç åéá ôç åééóðññåßá FBT. Ôi DTrace iðiññåß iå åééóðññåþóåé åéá ÷ùñßò åððþí. Ùóðüöi, èá ðáñÝ-åé åððæéêéiÝíç ððñóðþñéíç åéá function boundary tracing.

¼ëið i ðçññåßið êþäééåð èá ðñÝðåé iå åñðåðéèùñðåðéóðåß iáíÜ iå ôéð åðéëíäÝð CTF. Åéá iå åßíåé åððü, åñðåññéùñðåðóå iáíÜ ôi FreeBSD ÷ñçóéiiðíéþíðå:

```
# cd /usr/src
# make WITH_CTF=1 kernel
```

Èá ÷ññéåðåß iå åððåññééþóåðå ôi óýðôçìá.

Ílæð Óðréið áðráfáðeðbíscó, éaé ía ðoi ÍYÍ ðoðnþrá öriñðou ÍYÍ ðeÝí óðóç lÍPiç, éa ðni Ýðáé ía ðniðóeÝðáðó ðoðiðóPñéic áeað ði ÆÝðoðið Korn. Áðou áðráéðabðáé, éaéþð ða áññáðaðbá DTrace ðañneðaíia Útiðið aéUöiññ aíçeçóðeÜ ðniðanÚñáða ða ðiðrða áðráfáð aññáíiÝí ða ksh. ÁðáðóðóÞóða ði port shells/ksh93. Ðiññáðbða áðbðóç ða áððaðeÝðáða ðoðð Ü ða áññáðaðbá éaé iÝóu ðið shells/pdksh P ðið shells/mksh.

## 26.4 ×ñçóéìïðíéþíôáò ôí DTrace

Đñéí ÷ ñçóéñïðéÞóåôå ôéó ëåéöññåò ôíø DTrace, èá ðñÝðåé íá õðÜñ÷åé ç áíôßóöíé÷ç óõóéåõP. Äéá íá õïññôþóåôå ôç óõóéåõP, èá ðñÝðåé íá äþóåôå ôçí ðññáêÜôù åíôíëP:

```
# kldload dtraceall
```

Èá ðñÝðåé íá Ý÷åôå ðëÝíï ððiöóþñéïç DTrace. Åéá íá äåßôå üëá ôá probes, èá ðñÝðåé íá åêôåëÝóåôå ùò äéá÷åéñéóþò ôcí ððñáéÜòù áîóïëþ:

```
# dtrace -l | more
```

¼ëç ç Ýñräiò ðäníÜåé iÝóù öiò äïçèçöéêíý ðñriäñÜìläöiò more, äéaoïñåöéêÜ ãñPäiñá èá ðöðän ÷åßëéæå ôçí ðñiöùñéíþ iíþlç ôçò iëüíçò. Ööí óciåßi áööü, èá ðñÝðåé íá èåùñçéåß üöé öi DTrace èåéöiõñååß. Åßíáé ðëÝíþ þñá íá åiâööÜöriå áäööß ôç óäéñÜ åññåéåßùí.

Ç óåéñÜ ôùí áññáæåßùí áßíáé ïéá óoëëæäP áðü Ýöïéïá scripts ðiö åêôåæïýóáé iå oï DTrace þóôå íá óoëëÝññí ðeçññiöïñßàò ó÷åðééÜ iå oï óyóôçìá. ÕðÜñ÷iöí scripts ðiö åëÝã÷iöí áéá áííéêòÜ áñ÷åßá, ôç iíþlç, ôç ÷ñÞóç ôçò CPU êáé ðëëéÜ áéüïá. ÈÜíóå áíáauàP ôùí scripts iå ôçí áéüëïöèç áíöiëP:

```
# gunzip -c DTraceToolkit* | tar xvf -
```

läôáéêíçèåßôå óôïï êåôÜëïäï ðïö ôá áðïööïðéÝóáôå iå ôçí åíöïëP cd êåé áëëÜïôå ôá äééåéþìåôå åêôÝëåóçò óå üëå ôå áñ÷åßå, üðòù ôóå áñ÷åßå iå ôá ïeéñÜ ãñÜùåôå, óå 755.

Èá ÷ñåéåóôåß íá ãßíïöí áëëááÝò óöï ðåñéå ÷üïåñí óå üëá óå scripts. ¼óá ðåñéÝ ÷ïöí óï /usr/bin/ksh èá ðñÝðåé íá áëëá ÷ëïý óå /usr/local/bin/ksh, óå Üëëá ðïö ðåñéÝ ÷ïöí óï /usr/bin/sh èá ðñÝðåé íá áëëá ÷ëïý óå /bin/sh, éåé óÝëïò áôòÙ ðïö ðåñéÝ ÷ïöí óï /usr/bin/perl èá ðñÝðåé íá áëëá ÷ëïý óå /usr/local/bin/perl.

**Óciáíóéêü:** Óoī óciàßí áôôü åßíáé óciáíóéêü íá ôðâiéõlßöiõlå óôíí áíáäíþóôç üôé ç ôðiøôþñéïç DTrace óoi FreeBSD åßíáé áôâéþò êáé ðænáíåôééþ. ÐíëeÜ áðü áôôÜ ôá scripts äái èá èåéöönäþöiõí, êáéþò åßíáé åßôå ðíëéü ðñjóáíåôééþoÝí áôî Solaris. þ ÷ñcöéíðíëív probes ôá iðiþá äái ðñjóöñçþæüíóáé ôc äääííÝíc óóéâíþ.

Öi hotkernel Ýðæð óðæðaðaðað ía áíáðuñþæðe ðíéa óði Úñôçóç eáðaíáðþíæði ði ìaðaðýðaðni ði ñüiði óði ðoñþíá. Æðaðaðið ði ðiðu ðaííjéé Ýði ðiðeþæð, èa ðaðbóða Ýðið ðaðnúiði jà ði ðaðnáðe Úñð:

```
# /hotkernel
```

Sampling... Hit Ctrl-C to end.

Í äéá÷åéñéóôÞò ôïõ óõõôÞìáôïò èá ðñÝðåé íá ÷ñçóéiiðiéÞóåé ôï óõíäõáóïü ðëÞêôñùí **Ctrl+C** äéá íá óôâiáôÞóåé ôç äéññääóßá. Íå ôïí óâñìåôéïü ôïõ, ôï script èá áðåéêiíßóåé íéá óâéñÜ áðü óõíáñôÞåéò ôïõ ðõñÞíá êáé ðëçñiöiñßåò ð÷åôééÜ íå ôï ÷ñüññ ôïõò, ôáiéññþfóåò ôéò óå áýññóá óâéñÜ áíÜëiää íå ôï ÷ñüññ:

kernel'_thread_lock_flags	2	0.0%
0xc1097063	2	0.0%
kernel'sched_userret	2	0.0%
kernel'kern_select	2	0.0%
kernel'generic_copyin	3	0.0%
kernel'_mtx_assert	3	0.0%
kernel'vm_fault	3	0.0%
kernel'sopoll_generic	3	0.0%
kernel'fixup_filename	4	0.0%
kernel'_isitmyx	4	0.0%
kernel'find_instance	4	0.0%
kernel'_mtx_unlock_flags	5	0.0%
kernel'syscall	5	0.0%
kernel'DELAY	5	0.0%
0xc108a253	6	0.0%
kernel'witness_lock	7	0.0%
kernel'read_aux_data_no_wait	7	0.0%
kernel'Xint0x80_syscall	7	0.0%
kernel'witness_checkorder	7	0.0%
kernel'sse2_pagezero	8	0.0%
kernel'strncmp	9	0.0%
kernel'spinlock_exit	10	0.0%
kernel'_mtx_lock_flags	11	0.0%
kernel'witness_unlock	15	0.0%
kernel'sched_idletd	137	0.3%
0xc10981a5	42139	99.3%

Ôï script áõõü èåéñõñääß åðßóçò íå áñèñþiáôá ôïõ ðõñÞíá. Äéá íá ÷ñçóéiiðiéÞóåôå áõõü ôï ÷áñáêôçñéóôééü, åêoåëÝóôå ôï íå ôçí åðéëiäP -m:

MODULE	COUNT	PCNT
0xc107882e	1	0.0%
0xc10e6aa4	1	0.0%
0xc1076983	1	0.0%
0xc109708a	1	0.0%
0xc1075a5d	1	0.0%
0xc1077325	1	0.0%
0xc108a245	1	0.0%
0xc107730d	1	0.0%
0xc1097063	2	0.0%
0xc108a253	73	0.0%
kernel	874	0.4%
0xc10981a5	213781	99.6%

Ôi procsystime script óðëëâiâ Üíâé êáé ôððþíâé ôíí ðñüñ ðùí êëþóâùí óððóðþíâôiò ãéá ìéá óððââðñéi Ýíç äéâññáóßá ïÝóù ôiõ PID þ ôiõ iïüìâðiò ôçò. Óði ðáñâêÜðù ðáñÜäâéâiá Ý ðiõiâ iââééþóâé ìéá iÝá äéâññáóßá ôiõ /bin/csh. ÅêðâëÝóâiâ ôi procsystime êáé ôi áðþóâiâ óðçí áíâiñP êâèþò ãñÜðâiâ iâñééÝð ãðôiëÝð ôiõ csh ðiõ åß ÷âiâ áñððâé. ÁððÜ åßíâé ôá åðiðâëÝðâðâá ôçò äiðééþò ìáð:

```
# ./procsystime -n csh
Tracing... Hit Ctrl-C to end...
^C
```

Elapsed Times for processes csh,

SYSCALL	TIME (ns)
getpid	6131
sigreturn	8121
close	19127
fcntl	19959
dup	26955
setpgid	28070
stat	31899
setitimer	40938
wait4	62717
sigaction	67372
sigprocmask	119091
gettimeofday	183710
write	263242
execve	492547
ioctl	770073
vfork	3258923
sigsuspend	6985124
read	3988049784

¼ðùð öáßíâðâé, ç êëþóç ôiõ óððóðþíâôiò ãéá áíÜðñóç (read()) åßíâé áððP ðiõ êáðâiâæþíâé ôíí ðâñéóðüðññ ðñüñ õá íáñâððâñüëâððá, åíp ôi ëéäüðâññ ôiõ êáðâiâæþíâé ç êëþóç óððóðþíâôiò getpid() .

## 26.5 Ç Äëþóóá D

Ç óâéñÜ åññâéâßùí DTrace, ðâñéëâiâ Üíâé áñéâðÜ scripts ãñâiñÝíá óðçí åéâééþ äëþóóá ôiõ DTrace. Ç äëþóóá áððP iññÜæâðâé “ç äëþóóá D” óðçí ôââiçñßùóç ôçò Sun, êáé åßíâé áñéâðÜ üññéá ìå ôç C++. Áíáëððééþ ðâñéâññáðP áððPò ôçò äëþóóáð åßíâé ðÝñá áðü ôiõð óéiðiýò áððiý ôiõ êâéiÝñð. ÕðÜñ ÷âé åíâññP óððæþðçóç ó ÷âðééÜ ìå áððP, óðç äéâýëðíóç <http://wikis.sun.com/display/DTrace/Documentation>.

## IV. ÄéêôõáêÝò Åðéëíéíùíßåò

Ôí FreeBSD åßíáé Ýíá áðü óá ðeí åðñÍùò äéáäåäñÍíá èåéôïõñäéêÜ óðóðPìåðá åéá ðøçëPð áðüäïöçò äééôðåéÝò åöáññäÝò éáé åòðçñåöçòÝð. Ôá êåöÜëáé óá åðôü òi òìPíá ðåñéñÜöiñí:

- Ôéò åðéëíéíùíßåò iå óåéñáúêP óýíäåóç (serial)
- Ôá ðñùöüëëééá PPP êáé PPP ðÜù áðü Ethernet
- Ôçí ÇëåêôñíéêP Áëëçëiññáößá
- Ôçí ÅãêáôÜóðáóç Äééôðåéþí Õðçñåöéþí
- Ôç Ñýèiéóç éáé Èåéöiññáßá ôùí Firewalls
- ¶ëëá Ðññ÷ùñçíÝíá ÈÝíáðá Äééôýùí

ÅôôÜ óá êåöÜëáé Ý÷iøí õ÷åæáóôåß ðåñéóóüôåñí ùò iäçäüò áíáöiñÜò ðánÜ ùò åéóåùñéêü êåßiåñí. Äé åðôü åßíáé ðeí ÷ñPøéíá ùò iäçäüß óóïð ïðiññò ñðiññåßòá íá áíáöñÝíåðá üôáí ÷ñåéÜæåóôå êÜðiéá ðëçññöiñßá åéá òi FreeBSD. Åå ÷ñåéÜæåóåé íá óá äéáâÜóåðá iå êÜðiéá óôññåññéíÝíç óåéñÜ, iýóå ÷ñåéÜæåóåé íá óá Ý÷åðå äéáâÜóåé üéá ðñéí áñ÷ßóåðá íá áó÷iøåßóåðá iå òi FreeBSD.

# ÊåöÜëáéï 27 ÓåéñéáêÝò Åðééëíùíßåò

## 27.1 Óýïïøç

Ôi UNIX ðÜiôiôå ððiôiôPñéæå óåéñéæå Ýð åðééïeñiñßåò. Åéá ôçí åéñBñåâéå, óå ðñþðå UNIX iç ÷ áiPiåôå ãåóßæiñðoåí óå óåéñéæå Ýð añañiÝð åéá ôçí åßóïäi êéé Ýññäi óöi ÷ ñPñðôç. Ôá ðñÜaìåðå ùóóüiñi Ý :iñí åééÜñfåé ðiñý åðø öeø iñYñåò ðiñi öi óóíçééöi Ýñi “ðåññiåðééü” åðiôåëíýiðoåí åðø Ýíá óåéñéæü åéññðùôP 10 ÷ añañéôPññi õi ååñðôåññüëåðoî êéé Ýíá ðéçéôññiñüäéi. Ôi èåðÜeæí åððü eá êåéýøåé ðÜðiñiðoå åðñi õiñðiñðoå óåéñéæPø åðééïeñiñßåò ðiñ ÷ ñçóœiñðiñðiñðoåí åðø ôi FreeBSD.

Áöiý äéáâÜóåôå áðôü öi êåöÜëáéi, èá iÝñåôå:

- Đùò íá óõíñá Ýóâôå ðâññâáðéé Ú óõi FreeBSD óýóôçìá óâo.
  - Đùò íá ÷ñçóéiiðõéÞóâôå Ýíá modem ãéá íá óõíñâæåßôå óå áðññâéññóí Ýíá óõóôÞìáôå.
  - Đùò íá áðééñí Ýóâôå óå áðññâéññóí Ýííñð ÷ñÞóôå Íá óõíñâæëýí óõi óýóôçìá óâo ìÝò modem.
  - Đùò íá áâééíÞóâôå óõi óýóôçìá óâo ìÝòu óâéñéáêÞò ëííñóüéâo.

Đñéí äéáâÜóåôå áðôü ôi êåöÜëáéi, èá ðñÝðåé:

- Íá íÝñåôå ðùò èá ñõèìßóåôå êáé èá ååêåôåóôÞóåôå Ýíá íÝí ðõñÞíá (ÊåöÜéáéï 9).
  - Íá êåôåííåßôå ôéò Üääéåò êáé æéåñäåóßôå ôíø UNIX (ÊåöÜéáéï 4).
  - Íá Ý÷åôå ðñüóååóç óóï ôå÷íéëü åã÷åéñßäéï ôíø ðõééíý óåò (modem Þ êÜñôå ðíééåðëþí óåéñéåéþí èõñþí) ðíø èÝéåôå íá ÷ñçóëííøéÞóåôå óóï FreeBSD.

27.2 ÅéóáãùãÞ

**ĐñiiáéäiðiBçóç:** Áðü ôí FreeBSD 8.0 êáé iåðÜ, óâ áñ÷åßá óôóéâðþí òùí óáéñéáéþí èëñþí iåðiññÜóôçéáí áðü /dev/cuadN óå /dev/cuaun êáé áðü /dev/ttydN óå /dev/ttyuN. Íé ÷ñþóôåð ôïö FreeBSD 7.X èá ðñÝðåé íá ðñiòáñiùöiði ôíçí ðáñáéÜöù ôåðèñçñßñúçc óýìøùíå iå ôéò ðáñáðÜíu áééááYò.

## 27.2.1 Íñíëíãßá

bps

Bits ÁÍÜ Äåõôåñüëåðöi — i ñõèìüò ìåðÜäïóçò ôùí äåäñîÝíú

DTE

Data Terminal Equipment, Åñíáôéêùò Åïïðëéòìùò ÄåäïÝùí — ãéá ðáñÜäåéäíá, i ðïëéïäéóôÞò óáò

DCE

Data Communications Equipment, Åiiðééóìùò Åðééïéúíßáò ÄåäííÝíùí — ói modem óáò

Ðñüüðôðíi ôçò EIA ãéá òi ðëëéüü ðiò ÷ñçóéiiðíéåßôáé óðéò óåéñéáé Ýò åðééïéíùíßåð  
 ¼ðáái áíáöðñüìáóðå óóï ñòðèùì ìàðÜäïòçò äåäïñ Ýíù ãðééïéíùíßåò, äáí ÷ñçóéiiðíéïýå ðÜíòíôå òiï üñïi “baud”. Ôï baud  
 áíáöÝñåðåé óðíï áññéùü ðùí ìàðååÜðåñüí ðiò çëéåðñééïý óþìåðò ðóç ìñÜäå òiò ÷ññüñò, åíï êáññééÜ ðñÝðåé íá  
 ÷ñçóéiiðíéåßôáé ôï “bps” (bits áíÜ äåðóåñüëåðòi) ðiò åßíáé í óùðóüò üññò (ç òiðëÜ ÷éóöíï äáí óåßíåðåé íá åñï ÷ëåß  
 ðíéÿ òiò ð ÷íëåóöééïýò).

## 27.2.2 Èýñåò êáé Èáëþäéá

Áéá íá óořia Ÿóåôå Ýíá modem P ôåñìáööêü óoř FreeBSD óýóöçia óåò, èá ÷ nåéåöôåßôå iéá óåéñéåéP èýñá óoří ðoříëiäéööP óåò, êáé òi êáðÜeëçei êáéþpæi áéá íá óořia Ÿóåôå ôç óåéñéåéP ðoříëåöP óåò. Áí åßôåå Päc åříëéåëùì Ÿíò iå òi òeëéü óåò êáé òi êáéþpæi ðoří åðåéöåßôåé, iðmñåßôå iå áořÜéåéá íá ðåñäéåßpåå åořP ôçí åříüöçôå.

### **27.2.2.1 Éáëþääá**

ӦðҮñ÷;ioí áñêåöiñ äæáöiñâöééiñ ôýðié óåéñéåéþí êáéüäþüí. Íé äyí ðeí eïéñiñ ôýðié æáé öiñòo oéiðiýo iaò, åßfáé óåéåþpáéá ôýðiñ null-modem êáé óå öoðiðiéçí Ýíá êáéþpáéá RS-232 (aïñóðÜ êáé ùò “åðèåßåò”). Ç öåéìçñþüñc öiñ öeééiy óåó eá ðñ Ýðåé íá ðåñéññÜðåé öiñ ôýði ðiñ êáéüäþiñ ðiñ áðåéóåßñóáé.

#### 27.2.2.1.1 Éáëþääá Ôýðiõ Null-modem

Já éáéþæéi óýðið null-modem, lãoðaó Ýñâé áðâðeåðâðo êÜðiðéá óÞiáðâá üðuò c “Aâðuóç ÓÞiáðið (SG)”, áéëÜ áíðeóðñÝðâé ðeò óðiðáÝðâé ðá êÜðiðéá Úðeéá. Áéá ðán Üðâðeáia, i aéññiaÝðôcò “lãoðÜðiðcò AâðañÝñú” (aíðuóðuò éáé ùò TD) ðcò leáðo ðeåðñÜðo, óðiðáÝðâé lãoði ðeññiaÝðôcò “EÞðcò AâðañÝñú” (aíðuóðuò éáé ùò RD) ðcò Üðeéçð.

**Ðßíáêáò 27-1. Êáëþäéï Null-Modem DB-25 óå DB-25**

Óþìá	ÁêñïäÝêôçò #	ÁêñïäÝêôçò #	Óþìá
SG	7	óðíäÝåôáé óõï	7
TD	2	óðíäÝåôáé óõï	3
RD	3	óðíäÝåôáé óõï	2
RTS	4	óðíäÝåôáé óõï	5
CTS	5	óðíäÝåôáé óõï	4
DTR	20	óðíäÝåôáé óõï	6
DTR	20	óðíäÝåôáé óõï	8
DSR	6	óðíäÝåôáé óõï	20
DCD	8	óðíäÝåôáé óõï	20

ÐáñáêÜôù öáßíïôáé äýí äéáôÜíåéò ðiõ åßíáé ðéí ëíéíÝò óôéò iÝñåò iaó.

Đßíáêáò 27-2. Éáëþäéï Null-Modem DB-9 óå DB-9

Óþìá	ÁêñïäÝêôçò #	ÁêñïäÝêôçò #	Óþìá
RD	2	óðíäÝåôáé óõï	3
TD	3	óðíäÝåôáé óõï	2
DTR	4	óðíäÝåôáé óõï	6
DTR	4	óðíäÝåôáé óõï	1
SG	5	óðíäÝåôáé óõï	5
DSR	6	óðíäÝåôáé óõï	4
DCD	1	óðíäÝåôáé óõï	4
RTS	7	óðíäÝåôáé óõï	8
CTS	8	óðíäÝåôáé óõï	7

Đßíáêáò 27-3. Éáëþäéï Null-Modem DB-9 óå DB-25

Óþìá	ÁêñïäÝêôçò #	ÁêñïäÝêôçò #	Óþìá
RD	2	óðíäÝåôáé óõï	2
TD	3	óðíäÝåôáé óõï	3
DTR	4	óðíäÝåôáé óõï	6
DTR	4	óðíäÝåôáé óõï	8
SG	5	óðíäÝåôáé óõï	7
DSR	6	óðíäÝåôáé óõï	20
DCD	1	óðíäÝåôáé óõï	20
RTS	7	óðíäÝåôáé óõï	5
CTS	8	óðíäÝåôáé óõï	4

**Óciáßùócs:** ¼/0ái Ýíàò áéñïäÝéôòcò óá iéà Üéñç ÷ñåéÜæåôáé íá óoíäåèåß ià äyí áéñïäÝéôåò óóçí Üeeç, óoíþeùò áíþíïòlå ôíòò áéñïäÝéôåò iåôåíý ôíòò óóç iéà Üéñç ià Ýíá iéñü êáëþäéï, êáé ÷ñçóéïðíéiyä Ýíá iáéñýôåññ êáëþäéï áéá óóçí Ýúóç ià óóçí Üeeç Üéñç.

Ç ðáñáðÜù äeÜoáïc öäßíåôáé íá åßíáé ç ðeí äeáäåññí Ýíç. Óá ìéá ðáñáëëáP (ðiõ åíçåßôáé óöi åéäëßi Ôi RS-232 iå ÁðëÜ ÁÞìáðá), ói SG óöfáÝåôáé óöi SG, ói TD óöfáÝåôáé óöi RD, óá RTS êáé CTS óöfáÝiiôáé óöi DCD, ói DTR óöfáÝåôáé óöi DSR, êáé áíðßóöññöá.

#### 27.2.2.1.2 Ôõđïđïéçì Ýíá Èáëþäéá RS-232C

јá ôððiřiříči Žýří óáéñéáêü éâéþþáři RS-232C, iâðâóðá Žýñâé üeá óá óþìâðá ãððâðeâðâð áðü ôç iéá Úêñç ôðçí Üeëç, ÷ùñþðô êâiéÜ áæëáâP ôðiõò aéññä Žéâðâð. Áðôü áððeÜ óçìâðíáé üiðé iâéññä Žéôçò “IâðÜäiöçò Åââñí Žíùí (TD)” ôçò iéáð Úêñçò, ôðñä Åâðâáé óðií aéññä Žéôç “IâðÜäiöçò Åââñí Žíùí (TD)” ôçò Üeëçò Úêñçò. Áðôü åððíáé êáé ôi åððiø ôiõ ñâðâðiø ðiði èá ÷ñçóéüðiéÞóâðâð aááá íá ôðñä Åâðâá Ýíá modem óði FreeBSD óýóðçìá óáò, êáé åððíáé åððóçò êáðÜeëcëí aááá iñéòí Žíá óâññâðâðéÜ.

## 27.2.2.2 Èýñåò

Íe óåéñéáé Ýò éýñåò åßíáé íé óooéåô Ýò ðiö iåðåö Ýñiöi óá äåäñí Ýíá iåðåíý ðiö FreeBSD óooôðìáöiò êáé ðiö ôðñiàôéêíý. Ç åíüöçôá åooð ðåñéäñ Üöäé óá åßíäç ðùñ èoñþí ðiö ððÜñ ÷ iðí, êáé ðùò óá ÷ åéñþæåðáé ðiö FreeBSD.

## 27.2.2.2.1 Åßäç Èõñþí

ÕõÜñ ÷ iõí äeÜöñá åbäç óåéñéåêþí eõñþí. Ðñéí áãiñÜóåôå P êåôáóéåô Üóåôå êÜðiéí êäéþäéí, èá ðñÝðåé íá åhååéùèåbôå üdóé ðáéñéÜæåé iå ôç èýñá ôiõ ðåñìådóéÿí êáé ôiõ FreeBSD ðóóôÙìádõiò óåò.

Óá ðâñéóðüôâñá ôâñiáðééÜ æéâé Ýôíðí èýñâò DB-25. Íé ðñiðùñðééëß ððíëëæðôÝð, ôðìðâññéëâñâñí Ýíùí èáéð áðôþí ðiðí ãðôâæíý FreeBSD, iðiñâß íá Ý÷iðí èýñâò ôýðið DB-25 þ DB-9. Áí æéâé Ýôâðá êÜñôá ðíëëáðëþí óâéñéâðþí eðñþí óðí ððíëëæðôÞ óâð, iðiñâß íá æéâé Ýôâðé èýñâò ôýðið RJ-12 þ RJ-45.

Äåßôå ôçí ôåëïçñßùóç ðiö óoñïäåýåé ôi õeéêü óáò, æáé ôéò ôå ÷ íéê Ýò ðñïäéåññáö Ýò ôçò èýñáò ðiö ÷ ñçóéiiðiéåß. ÓoíÞèùò lðiñåßôå íá åâÜéåôå óoílð Ýñåóíå áí áðëþò eïéó Üâôåå ôçí ðoñïäi-þ.

## 27.2.2.2.2 Iíüìáôá Èõñþí

Óó FreeBSD, Ý÷åôå ðñüöâáóç óå êÜeå óåéñéåéþ èýñá iÝóù ieáò êáôå÷þñéóçò óóïí êáôÜëiäi /dev. ÕðÜñ÷iöí äyí äæáöiññåôééÜ åßäc êáôå÷ùñßóåùí:

- Ќе ёйнъаð Ծиð ἰðиñиý íá ÷ñçóëиðиðëèиý ăеá ăбóïäи óóï óýóôðçìá, иñиÜæиðоáé /dev/tcylw үðиð օï N ăбíáé ى áñеëиüð օçò ёйнъаð (ç áñбëиçóç ىâééиÜäé áðü օï içä Ýí). ăâíééÜ, ие ёйнъаð áôôÝò Ԯñиñбæиðоáé ăеá óýíâåóç ىâ ôâññиáôéêÜ. Ќе ёйнъаð áеóüäиð ăðаéöиý íá ăбíáé ăíâññü օï óPiä áíß ÷ íâðóçò öÝñиñöиð (DCD) óôç óâáéñеáéþ ăññäиþ, ԮñиñâéиÝñиð íá  âéöиñПóиðиð օùóôÜ.
  - Ќе ёйнъаð  ëëПóçò þ  âüäиð, иñиÜæиðоáé /dev/cuaun. Ќе ёйнъаð áôôÝò ăâí ÷ñçóëиðиëиýиðоáé óôôПèùò ăеá ôâññиáôéêÜ,  æëÜ ăеá modems.  ðиñâбðå íá ÷ñçóëиðиëиýиðоâå áôôÞ ծ ёйнá ăеá  Üðиéи ôâññиáôéêü Ծиð ăâí  ðиðоçñбæåñ օï óPiä áíß ÷ íâðóçò öÝñиñöиð.

Áí Ý÷åôá óóñäÝóåé Ýíá ôåñïåôéëü óôçí ðñþþç óåéñéåéÞ èýñá (ðiø óöi MS-DOS áíáöÝñåôáé ùò COM1), èá ðñÝðåé íá ÷ñçóëiiðièÞóåôå óçí óóñéåðÞ /dev/ptyu0 æáá íá áíáöåñéåßôå óöi ôåñïåôéëü. Áí öi ôåñïåôéëü åßíáé óöc äåýóåñç óåéñéåéÞ èýñá (ðiø åßíáé åßþþç ãíñóðÞ ùò COM2) ÷ñçóëiiðièÞóåôå óç óóñéåðÞ /dev/ptyu1, è.i.e.

### 27.2.3 Ñýèìéóç ôïõ ĐõñÞíá

Ôi FreeBSD áðü ðñiâðééíàP ððiðóçñþæåé ôÝóâñéó ôåéñéåéÝò èýñåò. Ôoíí êúooí ðið MS-DOS ié èýñåò áðóÝò åßíáé åíñóôÝò ùò: COM1, COM2, COM3, éáé COM4. Ôi FreeBSD áðóP ôç óðéäíP ððiðóçñþæåé “ëiðóÝò” ôåéñéåéÝò êÜññåò ðiðééåðéþí èðñþí, üðùò ðéð BocaBoard 1008 éáé 2016, üðùò êáé ðeí áðóðÞò êÜññåò, üðùò áðóÝò ðið éåðáðéåðÜæíðáé áðü ôçí Digiboard éáé ôçí Stallion Technologies. I ðñiâðééåäíÝñò ððñþíáð ñóðüöóí, åêðåëåß áíß ÷íåðóç íüñí áéá ôðé ððééÝò ôåéñéåéÝò (COM) èýñåò.

Ãéá íá ãâbôå áí i ðõññPíáð óáð áíáâñùñBæåé iðiæáâðiôå áðü óðe óâéñéâé Ýð eýñâð, ðáññâðçñPðóå ðá lçíýìáðå êáðÜ ôç  
æéÜñêåéå âéêBíçóçò ôið ðooðñPíáðiò, P ÷ñçóéiiðiéPðóå ôçí áíiøëP / sbin / dmesg ãéá íá ðáññâðçñPðóå ôçí  
ðõññPíá êáðÜ ôç æéÜñêåéå ôçò âéêBíçóçò. Ðéi ðooðñâññéÍýá, áíáæçöPðóå ðá lçíýìáðå ðið iâðééññÍýá lâ ôiðò  
÷ ãññâðçñPñâð sio.

**Õðüääåéíç:** Æá íá äåßôå ïüíï ôá ïçíýìåôá ðïö ðåñéÝ÷ïöí ôç ëÝíç sio, ÷ñçóéíïðïéþóôå ôçí áîóïëþ:

```
# /sbin/dmesg | grep 'sio'
```

Áéá ðáñl Üáâéæíá, óá Yíá óýóðöçíá iå ðÝðóðâñéð óåéñéåé Yó èýñåò, óá lçíýíåðá ðið ððñlÞíá ðið ó-âðßæííðáé iå áððÝð ðáßñííðáé ðáñéå Üðù:

```
sio0 at 0x3f8-0x3ff irq 4 on isa  
sio0: type 16550A  
sio1 at 0x2f8-0x2ff irq 3 on isa  
sio1: type 16550A  
sio2 at 0x3e8-0x3ef irq 5 on isa  
sio2: type 16550A  
sio3 at 0x2e8-0x2ef irq 9 on isa  
sio3: type 16550A
```

Áí í ðóðnþráð óáð áðái áíáðáññbæðé üððáð óéð óáðéñéáðÝð óáð eýñðáð, ðéðáññú íá ÷ ñáéðóðáð íá ðíñ ññðéðñbóðá ÷ ñçóéiiðíéþíðó ðí ãñ ÷ áðí /boot/device.hints. Íðiññbóðá áðþbóçò íá íåðáññYþðóðá óáð ó÷üëéi (þ éáé íá æáðññUþðóðá óðæðñbùð) ãññái Ýð ðið áíáð Ýñññóðé óáð óðóéðáðÝð ðið áðái ðððUñ ÷ iðí óðí óýóðçìá óáð.

Ðáñâéáëÿíå ááíôñ Ýîòå óóç óåéëßää manual ôiõ sio(4) áæá ðáñéóðüôðâñåð ðëçñïiõñbåð ó : åðééÜ iå óéð óåéñéåéÝðéýñåð êåé óéð ñðèìñbåðéò ôùí êéñôþí ðïëéäðþí óåéñéåêþí èðñþí. Áí ÷ñçöéiiðíéåßôå áñ ÷åßí ñðèìñbåðúí ðiõ ðñíÝñ : åðáé åðü èÜðíéá ðáëéåüöðâñç Ýéüáòç ôiõ FreeBSD, éá ðñÝðåé íå åßôðå ëäéåßôðâñå ðñiøåðééïß, êåéþò èÜðíéåð åðü óéð åðééëäÝðó ôùí óðóéåðþí êåé c öýíôåç ôiõð Ý : iõí áæéÜíåé óóéð fáüôðâñåð åéëüöåéð.

**Óciáßúóç:** Ô port IO\_COM1 ôðiêáééôðû ôi port 0x3f8, IO\_COM2 áßíáé ôi 0x2f8, IO\_COM3 áßíáé ôi 0x3e8, êáé ôi IO\_COM4 áßíáé ôi 0x2e8. ÁðôÝò áßíáé êáé ié ðéï ëiéïÝò ñòëiÞóáéò áéá ôéò ðáñáðÜù èýñâò. Ié ãñáiiÝò interrupt 4, 3, 5 êáé 9 áßíáé ié ðéïÝí óðíçèéóïÝâò ôóéò óáéñéáéÝò èýñâò. Óciåéþóôå áðßóçò üöé ié óðíçèéóïÝâò óáéñéáéÝò èýñâò åá/ iðïñíý íá lïéñÜäiñóáé ôi ïðæéi interrupt iá èÜðíéá Üëéç óðóðåðÞ óá ððíëäééôðÛ ðïò áéáéëÝòïð ãßáðéï ðýðïð ISA (ié èÜñðåò ðïëéäðéþí èðñíþí áéáéëÝòïð áéáééÜ èëðéëþíàðå ðïò åðéóñÝòïð óá üéá óá 16550Å ðïò ÷ñçóéïðíéåß ç èÜñðå íá èåéóññäïý ÷ñçóéïðíéþíàð iüñi ïßá þ äýi ãñáiiÝò interrupt).

#### 27.2.4 ÅéäéêÜ Áñ÷åßá Óooóêåöþí

## 27.2.5 Ñõèìßóåéò Óåéñéáêþí Èõñþí

Ç öödöéähöP t tyuN (Phi cuauN) ábbiáéç eáaiííééP öödöéähöP ðiñ iðiññaböå íá ÷ñcööeiñiðiéPöödöåå öödöå äööññiäYö öödöå. ¼ödöå iéá äéäääééäöbä áññibäåé iéá öödöéähöP, ÷ñcööeiñiðiéiyöödöåé êÜðiéåò ðññiäðééëåäi Yö åò ñoëiñböååéö I/O äéä öiñ öäññiäöödöü. Iðiññaböå íá ääbölö åöödöYö öödö åññiböååéö ià öçí ålöödö:

```
# stty -a -f /dev/ttys1
```

Áí áeë Üíñâôå ôéó ñöèìßóåéò óá áôðôP ôç óôðéåôP, áôðôÝò éá ðánñâíåßñíòi iÝ ÷ ñé ôí êéåßóéii ôçò óôðéåôðP. ¼ôðái áñíé ÷ èåß íáíÜ, éá Y ÷ åé åðáíY èéåé óôéò ðñíåðééååíY íåò ñöèìßóåéò. Áéá íá áeë Üíñâôå ôéó ðñíåðééååíY íåò ñöèìßóåéò, iñiñâßóå íá áñíßíåôå ééá íá áeë Üíñâôå ôéó ñöèìßóåéò ôçò óôðéåôðP “áñ ÷ êéPò éáô Üóðåóçò”. Áéá ðánñÜáåéäíá, áéá íá áñíñâíðíéPóåôå ôç éäéöïññâßá CLOCAL, íá iñßóåôå åðééïéiñíßá 8bit ééá Yéåå ÷ iñíPò iÝóù XON/XOFF áéá ôç óôðéåôðP t tyu5, áñíÜþòå:

```
# stty -f /dev/ttys0.init clocal cs8 ixon ixoff
```

Ç áñ ÷ ééïõßçóç ôùí óåéñéáêþí óôóéâðþí áéá üëí ôi óýóôçìá, äéÝä ÷ åôáé áðü ôi áñ ÷ åßü /etc/rc.d/serial. Ôi áñ ÷ åßü áðôüü áðçññáÜæåé óéð ðñjäðééåäíÝåð ñòèñßóåéð ôùí óåéñéáêþí óôóéâðþí.

Áéá íá áðíöñ Ýþóðóå ôcí áæéäáP óoðæåñéí Ýfuí ñoðèìßóåùí áðü êÜðíéá åðoánñíP, áæéÜñôå ôeó ñoðèìßóåéò ôçò óoðóêåðPò “ééåéäþíáöìo”. Áéá ðánÜðåéñíá, áéá íá ééåéäþóåðå ôcí óá÷ýóçóå ôçò óoðóêåðPò t<sub>1</sub>tu5 óóá 57600 bps, añÜðóå:

```
# stty -f /dev/ttys0.0 57600
```

Ôþñá, íéá åöáññäþ ðrø áñíßååé ôç èýñá ttyu5 êáé åðé ÷åéñåß íá áëeÜíåé ôçí ôá ÷ýôçôá ôçò èýñáò, èá áíáæáóôåß íá ðáññåßíåé óóá 57600 bps.

ÖödöéêÜ, èá ðñ Ýðåé íá ñõèìßóâôå ôéò öödöéâôöÝò áñ÷ eeiïðiïßçóçò êáé êëåéäþíâöîò, þóôå íá åßíáé åääñÜøéïåò iüñí áðü öií ëiäñéäoíü öiø root.

## 27.3 ÔåñìáôéêÜ

*ÓíåéóöiñÜ ôiõ Sean Kelly.*

**ĐññiáéäiõiBçóç:** Áðü ôi FreeBSD 8.0 êáé iåôÜ, óá áñ÷åßá óooéåöþí ôùí óåéñéåéþí èoñþí iåôïiÜóôçêáí áðü /dev/cuadN óå /dev/cuauN êáé áðü /dev/ttypN óå /dev/ttyuN. Íé ÷ñÞóôåò ôiõ FreeBSD 7.X éá ðñÝðåé íá ðññioáññiúõiõí õcí ðáñáéÜòù ôåéiçñßùóç ýíòúiá iá óéò ðáñáðÜíú áéëæáäÝò.

Óá ðóñiáðééÜ ðáñÝ ÷ iðí íeá áíeeéP éáé ÷ áíçëiý êüóóïðò ìÝëíäí ðñúóááóçò óóí FreeBSD óýóóçíá óáò, üóáí ááí áññóéåðóá ìðñiðóðÜ óóçí íðíóüéá P óá õ Üðíéí óóíáàíÝñ äßêóðí. Ç áñüôçôá áóôP ðåñéñÜöåé ðùò íá ÷ ñçóéiiðéPóåôå ðåñíáðééÜ óóí FreeBSD.

### 27.3.1 ×ñþóåéò êáé Åßäc Ôåñìáôéêþí

Óá áñ ÷ ééÜ óooôPiáóá UNIX äáí áß ÷ áí êíñóüëåò. Áíðßèåôá, ié ÷ nÞoôåò áeoÝñ ÷ iiðáí oóï óyóôçìá êáé áêôåëýóáí óå ðñiäñÜliåóá õiðò iÝóù ðâñiäôééþí ðið oðiñá Yíiôái óôéò óâéñéå Ýò eýñåò õið ððiëræéôòþ. Áôöü iiëÜæáé ãñéåôÜ iá òç ÷ nÞoç modem éáé eïræéôíéý åññiñþuóç ðâñiäôééý áæá óyíiâåç óå Yíá áðñiñéñöi Ýíi óyóôçìá. Ià õiñ ôñüðií áðôü iðññåþò á Yíáéá íá áêôåæÝóâåðá áññâåðßåò iùñí óå ðâñéå Üeeëí êâéi Yíiò.

Óá òçíàñéñÜ PC æéáéÝòðíöüèåò ééáÍYò íá áðåééñíßöíòí ãñáðóéëÜ ðíréý ðòþçëÞò ðíëüöðåòá, áéëÜ ç ééáúöðöçðá óýíäåóçò óóï íç-Úíçíá ïÝóù óåéñéåéÞò èýñáò, öðÜñ ÷åé áéüíá ó÷åäüí óå üéá óå òçíàñéñÜ óðóðøÞiaóå óýðò UNIX. Õí FreeBSD áåí áðíöðåéåß áîáßñåóç. Óðíä Ýíïöåò Ýíá óåñíàðéëü óå íéá á÷ñçöéñíðíßçöç óåéñéåéÞò èýñá, lðíñåßôå íá áéóÝèéåò óóï óýóöçíá ééá íá áéôðæÝóåðå íðíéñáÞðíå ðñüñåñáíá éåäéÍYò òï íðíßí èå lðíñíýóåðå öðóééñæéÜ íá áéðåéëÝóåðå óóçí éíïòðüéå Þ óå Ýíá ðáñÙëöñí xterm öïñ óðóðøÞiaóò X Window.

Æá ÷ nPóç óå áðé ÷ áéñÞóåéó, áßíáé äðíáðüí íá óðsfä Ýóåðå ðíëeÜ óåññláðéÜ óå Ýíá FreeBSD óýóðçìá ëáé íá óå ðíðíæðóÞóåðå óðéó è Ýóåéó áññáóßáó óúí ððäæðÞëùí, jáó iéééáðüò ÷ nPóóçò iðinñåß íá ÷ ñçóéiiðíéÞóåé ðíëeÜ ðíðíæðóÞ (ð. ÷. Ýíá ðáéëü IBM PC þ Macintosh) òò óðññláðéü áíüò ðíëý éó ÷ ðññóðññò ðíðíæðóÞ ðíò áðóðæðß FreeBSD. Íå öíj ðññóðñ áðóðü, iðinñåßóð íá iðñðáññÝóåðå áðóðü ðíò éáññéÜ èá Þðáí óýóðçìá áíüò ÷ nPóóç, óå Ýíá ðáíßó ÷ ðññ óýóðçìá ðíëéáðéþí ÷ ñçóðþí.

Óði FreeBSD ððÜñ÷iõí ôñßá åßäc ôåñìáôéêþí:

- ÈiõôÜ ÔåñìáôééÜ
  - PC ðiõ èåéôïõñäiyí ùò ôåñìáôééÜ
  - ÔåñìáôééÜ X

Íé ðáñáêÜôù ððíäñüôçôåò ðåñéäñÜöiiõí êáèÝíá áðü áðôiiýò ôiõò ôýðiõò.

### 27.3.1.1 ÈiõõÜ ÔåñìáôééÜ

Óá êiõõdÜ õâññiaôõééÜ ábßíáé áââéäéêâõí Ýíåõ óõõéâõdÝ ðiõ áðéõõdÝ ðiõd ðc ÿífääõc óá ðõðiæiæõdÝ ðiõ ïÝóu óâéñéâéþí ãññiñlþí. Áðiæiæýiõáé “ëiõõdÜ” áññéâþbõ áðâéäþ c iüiç ðõðiæiæõdõéêþ eó ÷ ý ðiõ Ý ðiõd ãbßíáé áéá áðâéûüiéõc, áðiõõdëþ, áéáé õPøç áééiÝñõ. Ááí ïðiññâbõá íá áâðâõéÝóâõâ ðñiññÜñiâdâ óâ áðõdÜ. ¼ëc c eó ÷ ý ðiõd ðñiÝñ ÷ áâðâé áðü ðiñ ðõðiæiæõdþ ðiõ eá óâ óõfãÝóâõâ, áéáé ïÝóu áâðiõy ïðiññâbõá íá áâðâõéÝóâõâ óõõdÜêõâdâ áâéiÝñõ, ñâðâãæüñõdõéõdÝ, ðñiññÜñiâdâ email. ðâé ÷ iññéáé ë.i.é.

ÕðÜñ÷ïõí åéáöiiõÜääôå åßäç ëïõöþí ôâñiâöéêþí åðü áñéâöiÿò éáöåöéâöåööÝð, üðùò õi VT-100 ôçò Digital Equipment Corporation éáé õi WY-75 ôçò Wyse. Ó÷åäüí iðiëiøäÞðriðå öýðiò iðiñâß íá èåéöiõñâÞóåé íå õi FreeBSD. länneéÜ ôâñiâöéêÜ ðöçëiÿ êüóöiðò iðiñiÿí åðßöçò íá áðåéëiÿßöiòí éáé añaöééÜ, åéëÜ åööþí ôç åöiáöüöçðå iðiñiÿí íá õcí åéìåðäéëåðeíví ó÷åðééÜ ëßaa ðæéÝðå eïäéöiééív.

Óá eīõõÜ õâñiâóééÜ áßíáé äçìïöéëP óá ðâñéáÜëëíóá áññáóßáò üðïö íé áññáæùåííé äáí ÷ñâéÜæíïôáé ðñüóâáóç óá áññäöééÝ ðå ãòáñiïäÝò. üðïò áðòÝò ðïö ðáñÝ ÷íjöáé áðü õï óvóócià X Window.

### 27.3.1.2 PC ðíð Ëåéóðñäíýí ùò ÔåñìáôéêÜ

ÁÍ Ýíá êiôôü ôâñiâôéêü Ý÷åé âéñéâþò ôçí éó÷ý ðiô ÷ñâéÜæâôáé ãéá íá ãâß÷íáé, íá ôôÝëíáé, êáé íá ëáíâÜíâé êâßiâíí, ôûôâ éáé êÜéâ ðöïíëáéôðþò ðiô óâð ôâñéôóáýâé îðiñâß íá ëâéôíðñâÞóáé óâí êiôôü ôâñiâôéêü. Ôí lüññ ðiô ÷ñâéÜæâôáá ôâßíáé ôí òúôôü êâéþæí êáé êÜðiéí ðññüñâñâíà ôññiþùóçò ôâñiâôéêiy ôí iðiñß èá âéôâëâßôâ ôóii ðññiæáéôðþ áððiij.

Ç ðáñáðÜíü aeÜoáç ábíáé áciiöeëPò aeá ieééáéP ÷ñPóç. Áí aeá ðáñÜäåéäia êÜðiëiò iiöeåyåé oóçí eiióüéä ôiô oóôôPiaôiò óáó, iðiññabôá íá áêôðåéYóâôå ôçí åññáóßá óáó (få ôçí ðññüñðüèåðP üöé ábíáé iüññ êåbíåññ) ôçí bæáá oóéäP, ÷ñçóeüñðiñhôåó Ýíá eeññüñðåññ éó÷ññü ÿóñóçìå ôi iðiññü ÿóññü ÿåññáé ôiñ FreeBSD óáó ùññ ôâññåññéêü.

ÕõÜñ÷ iõí äýí õiõõëÜ ÷ éooõíi ãïçèçôéëÜ ðññiññÜñáôá óõi âáóéëü óýóôçìá õiõ FreeBSD õiõ iõññiýí íá ÷ ñçóéiiõiéçëiýí ãéäá íá ãiõõëÝñôôâ ìÝñù ãåéñéâéÞò õýiäâôcò; õiõ cu(1) êåé õiõ tip(1)

Áéá íá óðííääèåßôå áðü Ýíá Üeëi iç ÷ Üíçíá ðiö åêôåëåß FreeBSD óôç óåéñéáêþ óýíääóç åíüö Üeëiö óðóðþiáôïö, iðíññåßôå íá ÷ ñcóðíüðíéÞðåôå ðcí ðáññáéíÜòù áíðíëþ·

```
# cu -l serial-port-device
```

¼ðiõ ôi “serial-port-device” åßíáé ôi üññá ôiõ áñ ÷ åßiõ óðóéåðPò ðiõ áíðéðññóùðåýåé iéá óâéñéáêP èýñá óôi óýóôçìá ôáò. ÁðôÜ ôá áñ ÷ åßá óðóéåðPí êáëíýíðåé /dev/cuauw.

Ôi “N” ôi üññá ôçò óðóéåðPò, áíðéðññóùðåýåé ôií áñéèiü ôçò óâéñéáêPò èýñáò.

**Óçìåßùóç:** Óçìåßùóç üôé ç áñßèïçóç ôúi óðóéåðPí ôi FreeBSD îåééiÜ áðü ôi içäÝí, êáé ü÷é áðü ôi Ýíá (üðùò óðiâáßiâé åéá ðáñÜäåéäìá óôá óðóóðPíáôá ðiõ ó÷åðßæïíôáé iå ôi MS-DOS). Áðôü ðñáéðéêÜ óçìåßíåé üôé ç èýñá ðiõ ói FreeBSD óðóéåðåé COM1 èá åßíáé óðíÞèùò ç /dev/cuau0 ói FreeBSD.

**Óçìåßùóç:** ÊÜðiéïé ÷ñÞóðâò ðñiðéïíýí íá ÷ñçóéïðiéïýí Üëéá ðñiðñÜìáôá ðiõ äéáôßèåíôáé iÝóù ôçò Óðeeïäþò ôúi Ports. Óá Ports ðáñééáîâÜíðií áñéåðÜ åïçèçôéêÜ ðñiðñÜìáôá iå ëâéôïðññâßåò ðáñüïïéåò iå ôi cu(1) êáé ôi tip(1), åéá ðáñÜäåéäìá ôi comms/minicom.

### 27.3.1.3 ÓâñìáôéêÜ X

Óá ôâñìáôéêÜ X åßíáé ôá ðéï åíâééäìÝíá åßäç ôâñìáôéêPí ðiõ ððÜñ ÷ iõí. Áíðß íá óðíäÝíðåé óâóâéñéáêP èýñá, óðíÞèùò óðíäÝíðåé iÝóù åééðýiõ, ð.÷. Ethernet. Áíðß íá ðâñéïñßæïíôáé iüññ óâ åöáññäÝò êâéïÝíð, iðiññíýí íá åðâééïßööï ðiðéäåðPðiôå åöáññäP ôúi X.

ÁíáÖÝñáíå ôá ôâñìáôéêÜ X iüññ åéá èüññò ðëçñüðçôåò áðôPò ôçò åíüûðçôåò. Óði êâöÜëáéi áðôü ùóðüöi, aðáí èáéýðôååáé ç åâéåðÜóðåóç, ñýëíéóç, êáé ÷ñÞóç ôúi ôâñìáôéêPí X.

### 27.3.2 Ñýëíéóç

Ç åíüûðçôå áðôP ðâñéäñÜöåé ôé ÷ñåéÜæåôåé íá ñðèïßóðåå ôi FreeBSD óýóôçìá óâóâéñéáêP ç åßóïäïò óâ áðôü ïÝóù ôâñìáôééïý. ÐñiñüðièÝðåé üôé Ý÷åðâð Päç ñðèïßóåé ôiõ ððñÞíá óâóâéñéáêP èýñá óðçí iðiñßá åßíáé óðíäåíìÝíç ôi ôâñìáôééü—æáé üöé ôi Ý÷åðâð Päç óðíäÝðåé.

Óði ÊâöÜëáéi 13 åßäåíå üöé ç åéâññâóßá init åßíáé ððåýèöíç æáé ôií Ýëåñ÷i ôúi Üëëùí åéâññâóéPí, êáé åéá ôçí åñ ÷ééïðiñßçöç êáðÜ ôçí åééßíçöç ôiõ óðóóðPíáôi. Iéá áðü ôéð åññâáðåò ðiõ åéðååéåß ç init åßíáé íá åéâáÜæåé ôi åñ ÷ åßí /etc/ttys êáé íá iâééiÜ iéá åéâññâóßá getty óâ êÜëå åéâéÝðåéi ôâñìáôééü. Ç åéâññâóßá getty åíáééååÜíðåé íá åéâáÜðåé ôi üññá ÷ñÞóðç êáé íá iâééíÞóåé ôi ðñüññâíà login.

Åéá íá ñðèïéóðiýí ôá ôâñìáôéêÜ óði FreeBSD óýóôçìá óâóâéñéáêP èáé ðñÝðåé íá åéâðåéÝðåóå ôá åéüëïðeá åßíáôå ùò root:

1. ÐñiñöéÝðåå iéá åññâíP óði /etc/ttys iå ôi üññá ôçò óðóéåðPò üðùò öáßíåðåé óðíü êâðÜëíäi /dev, áí aðí ððÜñ ÷ åé Päç.
2. Êâëïñßóðå üöé èá åéðååéåßåé ç /usr/libexec/getty óðçí èýñá, êáé åðéëÝðåå ôií êâðÜëëçëi ôýði getty áðü ôi åñ ÷ åßí /etc/gettytab.
3. Êâëïñßóðå ôií ðñiðééäìÝí ðýði ôâñìáôééïý.
4. ÅíáññâíÞóðå ôç èýñá èÝðåå ðýði ôâñìáôééï ðýði åðéëïäP óði “on”.
5. ÅðéëÝðåå áí ç èýñá èá åßíáé áóðåéPò iå ôçí åðéëïäP “secure”.

6. ÅíáíáæÜóôå ôçí init íá äéáâÜóåé îáiÜ ôi áñ÷åßi /etc/ttys.

Ùò ðñiáéññôéëü áÞia, iðinñåßôå íá äçleíiõñáÞóåôå Ýíá ðñiáóññiói Ýíí ôýði getty áéá íá ôíí ÷ nçöeiiðieÞóåôå óôíi áÞia 2, óôçí éáôå ÷ þñéoc ôïi /etc/gettytab. Óoi êåöÜëáei áôñü äái éá óåò áîçäÞöiõiå ðùò áßiåôáé áôñü. Óåò ðñiññÝðiõiå íá äæáâÜóåôå óéò óâéßbåò manual ôïi gettytab(5) êáé getty(8) áéá ðåñéóòiðiññåò ðëcññiõiñßåò.

### 27.3.2.1 ĐñïóèÝôíôáò ìéá Éáôá÷þñéóç óöi /etc/ttys

Ç ðñiïäðééâái Ýíç áâéâô Üôðáóç ôíð FreeBSD ðâñéÝ ÷ áé Ýíá áñ ÷ áßí /etc/ttys ôí iðíßí ððiðóçñßæâé ôéò ðñþôåð ôÝóóâñéö óâéñéâé Ýò èýñâð: ttyu0 ùò êáé ttyu3. Áí óóïäÝóåôå òâñìáôéëü óå êÜðiéá áðü áðôÝò ôéò èýñâð, áâí ÷ ñæÜxâðåáé íá ðñiðóÝóåôå Üëëç êâóâ ÷ þñéóç.

ĐáñÜääéäíá 27-1. ĐññöèPêç Éáôá÷ùñßóåùí ãéá ôá ÔåñìáôééÜ óôï /etc/ttys

```
    ttyu1  "/usr/libexec/getty std.38400" ②  wy50③  on④  insecure⑤  
    ttyu5  "/usr/libexec/getty std.19200"  vt100  on  insecure
```

- ① Öi ðñþþöi ðääßti, åßíáé ööÞÞèùò öi üññá öiö åéäééiy áñ÷åßiö öåñiáööééiy üðùò öáßfåööé öóiié éåöÜëiäi /dev.
  - ② Öi ååýöåñi ðääßti, åßíáé ç åíöiëP ðiö ðá åéöåëåööåß åéá åööP öç åññiP, c iðiÞßå åßíáé ööÞÞèùò ç getty(8). Ç getty áñ÷ééiðreåß êéé åññiÞ, nñœißæåé öçí ðá÷ýöçðå, åìöáiÞæåé öçí ðññöñiÞP åéá åéöååñP iiüñåöiö ÷ñÞööç, éáé åéöåëåß öi ðññüññiäiä login(1).

Õi õñüäñäíà getty äÝ÷åôáé ieá (õñiaéñåôéêp) õñäÜìåôñï oóç ãñäíip åíöreþò ôiõ, oíi ôýðri ôiõ *getty*. I ôýðriõ ôiõ *getty* éæiñþæåé ôá ÷ áñáêôçñéóôéêÜ Õçò ãñäíipò ôiõ ôâññáôééiy, üðù ð.÷. õi ñõèlý iåôÜäiíoçò óå bps éåé õçí éóïöéñþá (parity). Õi õñüäñäíà getty äéåâÜæåé áôôÜ óá ÷ áñáêôçñéóôéêÜ áðü õi áñ÷åßi /etc/gettytab.

Ôi áñ÷åßi /etc/gettytab ðåñéÝ÷åé ðiëëÝò éåôá÷ùñßóåéò åéá åññáìíÝò oåñìåôééþí, ôüói ðåééÝò üöí éåééåññéåð. Ôééò ðåñéóúûôåññåò åðü åôð Ýò ôéò ðåñéðôþóåéò, iéé ååôá÷ùñßóåéò ðiò íåééñíý íà öi êåßìåññ stð, èá ååéöiññåÞòiòí åéá åðåñéåßåò öðíëåååìíÝíå oåññåôééÜ. Åôð Ýò iéé ååôá÷ùñßóåéò åññíýí ôçí éóïòééñå. ÖðÜñ÷åé iéá éåôá÷þñéóç stð åéá Ûëå ñoëìü íåð Üäïóçò, åðü 110 ùò 115200. ÖðoééÜ, iðinåßóå íá ðññóéÝóåôåò ôéò åééÝò óåò éåôá÷ùñßóåéò óå åôðü öi áñ÷åßi. Ç óåéëßää manual ôiõ gettytab(5) ðåñéÝ÷åé ðåñéóúûôåññåò ðeçññiòññåò.

**1/4**ðáði ðíðæiðæxáðó ðíiði óýðri ðóçø *getty* óðiði áññ-âði /etc/ttys, áâââéñùèâððó ùðé óáéñëéÜæiði íé áíðþðóðié ÷ áði ðñðeìððáðó áððééiéñùéþi óðiði óðaññáðééú ðáð.

Óöi ðán Üääéäiá iáò, ói Wyse-50 äáí ÷ nçóéiiðiéåß éóïöéïßá êáé óóïäÝåôáé óóá 38400 bps. Öi 286 PC äáí ÷ nçóéiiðiéåß éóïöéïßá, eáé óóïäÝåôáé óóá 19200 bps.

- ③ Óří ñíñbóři ðääbři ábřiaé i ōýðiò ðiò ðaňníádëeíý ðiò oóšfá Ÿádáé óðíþeùò óá áðòp ðc áññaiþp tty. Áéá eýñåð áðéëiäééþpí oóšfá Ÿáðuú (dial-up), c ðeíp áðoíý ðiò ðääbřiò ðó ÷ ðU eá ábřiaé unknown p dialup, eáèþpò ié ÷ ðPóðåò eá iðiñiý íá ðññáiaðiðiéÞoí ðýíáðaóç iá iðiñiäþðiòá eñæéóíéêü p ðaňníádëeü. Áéá Ülåðá oóšfááí Ÿíá ðaňníádëeü, i ōýðiò ðaňníádëeíý ááí áéëÜæáé, Ÿðoé iðiñåðbóá iá áüëðåðá Ÿíá ðññáiaðëeü ðýði ðaňníádëeíý óá áðoú ði ðääbři, ðiñ iðiñi iá áññabóá óóç áüöç ááññi Ÿíñi ðiø termcap(5).

Áéá ðání Üáæéäíá, öi Wyse-50 ÷ñçóëiiðiéåß öií ðnáæáåöéêü ðýðí öðåññíáöéêý öið, áñþ öi 286 PC ðið åéðåäéåß öi **Procomm**, Ý ÷ñééööåß íá áññíéþíáé öðåññíáöéêü ðýðíö VT-100.



Óáo óoíéóööiyá áiaðéöýéáêoa íá ÷ñçóëiiðíeÞóåôâ ôc ñyéëéoc “insecure”, áêüìlá êáé áéá ôâñìâôééÜ ðiø ãññbóéiiöáé óá êéâéäùlÝá àùlÜöéá. Åßíáé áñêåôÜ áyéëíi íá áéöÝëëåôâ ùò êáññéêüö ÷ñÞóôçö êáé íá ÷ñçóëiiðíeÞóåôâ ôcí áîöiøÞ su áí ÷ñâéÜ xâæöôâ ðñññüìéá õðâñ ÷ñÞóôç.

### 27.3.2.2 ÅíáíáæÜóôå ôcí init íá ÍáíáæéáâÜóåé ôí /etc/ttys

÷ iiôåò êÜíåé ôeò áðåñáßôçôåò áëëåáÝò óoï áñ÷åßi /etc/ttys, èá ðñÝðåé íá óôåßëåôå óÞìá SIGHUP (hangup) óocí áæåññáóßá init æá íá óci áíáæéÜóåôå íá áæåáÜóåé íaiÜ òi áñ÷åßi ñeòìßóåú òcò. Áéá ðánÜäåéäíá:

```
# kill -HUP 1
```

**Óciáñúos:** *C* init áñúáé ó ðÜíðiôá c ðñþþc äéåññáóþá ðiö áéðåëäñðóáé óá Yíá óýóðciá, éáé Yðóé èá Y÷áé ðÜíðiôá ðiij áññéèù äéåññáóþáò (PID) 1.

Áí üëåò ïé ñòëèìßóåéò åßíáé óùòô Ýò, óá êáëþæá åßíáé óôç èÝóç õïõò, êáé óá óåñíàôéêÜ åßíáé åíâñäÜ, èá åêôåëåôôåß ç getty óá ëÜëå óåñíàôéêü, êáé óöï óçìåßí áôòü èá åßôå ôçí ðññîñïðÞ åéóüäið (login) óôéò iëüífà ôùí óåñíàôéêþí óâò

### 27.3.3 Áíôéìåôþðéóc ĐñïâëcìÜôùí Óýíäåóçò

Áéüüà éáé áí äþóåôå ìåãÜëç ðñïöiř÷þ óôéò eåðòiřÝñåéåò, ðÜíôá iðiññåß íá ðÜåé eÜôé óôñáüÜ üôáí ñõèiþæåôå Ýíá õâññåôéêú. Åäb èá âññåþôå iéá ëþóôå áðü õóìðòþiáôå éáé õóíéóþiáìåò äeïñeþoåéò.

#### 27.3.3.1 Äåí Åìöáíßæåôáé Ðñïôñïðþ Åéóüäïõ (login)

Áåâáéùèåßôå üöé öí ôåñìåôééü åßíáé öóíäåíÍíü ööí çéåêôñééü åßêôöí êáé åíåññäöíéçíÍíü. Áí åßíáé ðññóùðééüö õðíëíæööPò ðíö åíåññäåß ùò ôåñìåôééü, áåâáéùèåßôå üöé åêôåëåß ëíæóíééü åññiißñóçò ôåñìåôééý öóçí óùóöP öåññéáéP èýñä.

Ååååéùèåßöå üöé öi éáéþæí åßíáé éáéÜ óóíäåíÝñ ôüöí ööí ååñìåôéëü, üöí éáé ööíí ðïíëiäéööþ ðiñ åêôåëåß FreeBSD. Ååååéùèåßöå üöé åßíáé öi óúóöü åßäïò éåëùåßíö.

Ååååéùèåßôå üöé öí ôåñïåôéüü êáé öí FreeBSD ööìöùñíýí üöí åömÜ öéó ñöèìßóåéö ôçò ôá÷yôçôåò iåöÜäiöçò êáé éöiöéïßåò. ÅëÝäiôå ôç öüôåéíüôçôå êáé ôçí áíôßéåöç ôçò iëüíçò öiö ôåñïåôéëíý, êáé aôîPöôå öéó áí ÷ñåéÜæåöåé. Áí ðñüüåéöåé æáé ôåñïåôéüü iå åéööðùñöP (÷-ùñßö iëüíç), ååååéùèåßôå üöé æäééÝôåé åðÜñêåéå ÷-ñöéïý éäé iåééåíéý.

```
# ps -axww|grep getty
```

Èá ðñÝðåé íá äåßôå ìéá êåôá ÷þñéóç æáá ôï ôåñìåðééü óåò. Åéá ðánÜäåæáìá, ç áéüëëöèç ìëüíç äåß ÷íåé üöé ç  
æåññåáôßá getty åðôåðéåßôå óôç äåýôåñç óåéñéåêþ èýñá ttyul êåé ÷ñçóéñïéåß óçí êåôá ÷þñéóç std.38400 óôï  
áñ ÷åßí /etc/gettytab:

22189 d1 Is+ 0:00.03 /usr/libexec/getty std.38400 ttys1

Áí áéôåëåßôáé ç áéññáóßá getty áëëÜ ðí ðåññláóéêü áîáéïëðøéåß íá ìç áäß÷íáé ðññöñïðÞ áéóüäïõ, Þ áí áäß÷íáé ðññöñïðÞ áëëÜ ááí óáò áðéññÝðåé íá ãñÜøåôå, ßóùò ðí ðåññláóéêü óáò Þ ðí éáéþæéí íá ìçí áðéññÝðiññóóíáííüçóç íÝóù õëééiy (hardware handshake). ÁïéñÜðåá íá áëëÜíåðå ðíçí éáðå÷ ðññéóç óóï ãñ÷åßí /etc/ttys áðü std. 38400 óå 3wire. 38400 (ëðìçéåßôå íá áéôåéÝóåôå ðíçí áîóïëÞ kill -HUP 1 íåðÜ ðíçí ðññðiñßçóç ðíõ /etc/ttys). Ç éáðå÷ ðññéóç 3wire áßíáé áíðóþöiïé÷ç íå ðíçí std, áëëÜ ááññåß ðí hardware handshaking. Íðinñåß áðßöçò íá ÷ñåéáóôåß íá íaéþóåôå ðí ññðëü òçíáòíäiøßáð (baud) éáé íá áîáññäiøíéÞóåôå ðíñ Ýéåä÷íñ ñíÞò íÝóù ëíæéòíéëíý üôáí ÷ñçóëíiøíéåßôå ðí 3wire, ðññéåéíÝíñ íá áðíöýåôå ððåññ÷åßééóç ðíç ðññóùñéíÞò ííÞíçò (buffer overflow).

### 27.3.3.2 Áí ÂéÝðåôå Óêïõðßäéá Áíôß ãéá Ðñïöñïðþ Åéóüäíõ

Ååååéùåßôå üöé òi ôåñìåôééü êáé òi FreeBSD óòïöùííýí óöi ñöëìü bps êáé óöéö ñöëìßóåéö éöïöéïßáö. ÅéÝäîôå ôéö äéåññåóßåö getty åéá íá ååååéùèåßôå üöé åéöåëåßôå òi óùööü öýðíí *getty*. Áí áööü åái óöïååßíåé, åðåññåóôåßôå òi áñ÷åßí /etc/ttys êéæ åéöåëÝóåå ôçí åíöïëP kill -HUP 1.

27.3.3.3 **Íe × áñáéöþñàò Áiðáíßæíîðóáé Äéðeiß, öi Password Áiðáíßæåðóáé éáðÜ ócí Ðéçêðiñëüäçóç**

ÁëëÜîôå ôç ñýèëéóç ôïõ ôâññáôéêíy (P ôïõ ðññäñÜñáôïò åññíßùóçò ôâññáôéêíy) áðü “half duplex” P “local echo” óå “full duplex”.

#### 27.4 Óðçñåóßá Åéóüäïõ ìÝóù Åðéëïääéêþò Óýíäåóçò (dial-in)

*ÓoíåéóöiñÜ ôiõ Guy Helmer. ÐñiøèPêåò áðü ôií Sean Kelly.*

**Đñiñäéäïõíñçóç:** Áðü òî FreeBSD 8.0 êáé lâðÜ, óá áñ÷åßá óóóéåðþí ôúí óåáéñéåéþí èõñþí lâðiiñÜóðçéáí áðü /dev/cuadn óá /dev/cuaun éáé áðü /dev/ttynw óá /dev/ttyw. Íé ÷ñþðóåò ôíñ FreeBSD 7.X èá ðñÝðåé íá ðñiñáñiñüöří õçí ðáñáéÜ ðåééñçñùóç ýóýüöúá iá ôéò ðáñáéÜíú áééåáÝò.

Ç ñyèiéños ôiô FreeBSD óôôôPriáðiô óaô áæá åbôïiaï ï Yóù ådëeïäéPö óyïäâôçò, åbïáé åñêåôÜ üïïéá lâ ôç óyïäâôç ôâñiaâôéêþí, åêôüò áðü ôi åââüïüö üöde ÷ñçöéiiðieýíöâé modems áîðß áæá ôâñiaâôéêÜ.

#### 27.4.1 ÅùôåñéêÜ êáé ÅóùôåñéêÜ Modems

Óá áóùôåñééÜ modems óóíPèùò ááí áééé Ýöiñí áóôP ôç iíPíç RAM, éáé Ýôóé íé ñoëìßóåéò ôíöò ðåññéïñßæíïóáé iùíí óóçí áééåäP èÝóçò óá êÜðiíöò áéáéüðôåò ñoëìßóåùí (DIP switches). Áí òí áóùôåñééü óáó modem áééé Ýôáé òùóåééÝò ááíåßíåéò, íÜëéíí èá áßíáé áýöééíí íá ôéò áäßôå üöáí ôí êÜëöííä ööôóPíláöò óáó áßíáé óóç èÝóç ôíö.

### 27.4.1.1 Modems êáé Êáëþäéá

Áí ÷ñçóéiiðiéåßôå áâùôåñéêü modem, èá ÷ñâéåóôåßôå öööéêÜ ôi óùóôü éäéþæéi. ÖöíÞèùò åðáñéåß ôi ööðiðiéç}Ýíi éäéþæéi RS-232C, åööüöií äéáè Ýôåé ööíä Ýóåéð ãéá üéá ôá ööíçèéöi Ýíá óÞiaðå:

## Đĩáêáò 27-4. Ëññáóßåò ÓçìÜôùí

Áêñùíýíéá	Ííüìáóá
RD	ÊÞøç Áåäñ Ýíüí (Received Data)
TD	ÁðiôôïëÞ Áåäñ Ýíüí (Transmitted Data)
DTR	Ôâñláôéü Áåäñ Ýíüí óå Áôïéïüôçôá (Data Terminal Ready)
DSR	Óýññi Áåäñ Ýíüí óå Áôïéïüôçôá (Data Set Ready)
DCD	Áíß ÷ íåðóç ÖÝññiôïò ÓÞìáôïò (Data Carrier Detect). Áíß ÷ íåðóç óýññåôçò ôçò ãñáìïÞò RS-232C
SG	Ãåßùóç ÓÞìáôïò (Signal Ground)
RTS	Áßôçóç ÁðiôôïëÞò (Request to Send)
CTS	Áôïéïüôçôá æáé ÁðiôôïëÞ (Clear to Send)

Ôi FreeBSD ÷ nãe Üæðôáé óá ôíþiáðá RTS êáé CTS æáá Ýëåá÷ iñíþò óá óá÷ ýóçôðô ðÜfúu áðü 2400 bps, ôi ôíþiá CD æáá íá áíé÷ íáýâé ðüðôá Ý÷ áé áðáíðçèåß lëáó eëþóç þ ðüðôá c ãñáiiþ Ý÷ áé eëððóåé, êáé ôi ôíþiá DTR æáá íá áðáíáö Ýñâé ôi modem óðçí áñí÷ eëþò ôiõ éáð Üðôáóç låðô Ü ôç eëþíç lëáó óýfáðóçò. låñéé Ü êáéþæá áðáíé Ýðiðí üéá óá áðáñáðþôçô ðíþiáðá, Ýðóé áí Ý÷ áðôá ðñiâéþiáðá lâ ðiñ ôñâñáðéóliù ôçò óõññäñþâð áéóðüäið lâ ôi eëððóéii ôçò ãñáiiþò, ðééáíüí íá áðéýiâðâé ôi eëððééi ðið ðiñcõéii ðiðéâðóá.

## 27.4.2 Èõêëþìáôá Óåéñéáêþò Äááóýíäåóçò

### 27.4.3 Äñþäïñç Åðéóêüðçóç

¼ðùò èáé íå óáññláðóééÜ, ç init åéôåéåß leá æéññáóßá getty æáé êÜéå óáéñéåéÞ èýñá ðiö Ý÷åé ñõèléóðåß æááéóåñ÷üíäíåò åðéëíäéÝó óóïäÝoåéò. Åéá ðañÜääéäíá, áí Ý÷åôå óóïäÝoåé Yíá modem óôç èýñá /etc/ttysu0, ç áíòéÞ ps ax eá ääßíåé êÜóé óáí öï ðañáéÜò:

4850 ?? I 0:00.09 /usr/libexec/getty V19200 ttys0

¼ðáí ê Üðiðið ð-ñÞóðô ëáé Ýðåé ôðôc ãññáìÞ áððô ëáé ôi modem ôðññåðæåß, áññññüðiðéåðbóáé áðü ôi modem ç ãññáìÞ CD. Í ððñÞíáð ðáññåðçñåß üðé Ý-÷åé áí-÷fåðøðæåß öÝññü ÕÞia, êáé iðrëëcñÞíáé ôcç ãæáééåðbá áññññåðæåß ôðc ðéýññåð áðü ôi modem. To getty ôð Ýðiðæ iðá ðññññüðÞ login: ôðçí áðü ðñññéí êáèïññéí Ýíç ãñ-÷-ééÞ ðá-÷-ýðçðå ôðc ðéýññåð. Ôi getty ðáññáðiðiðæåß ãæá íá ãæé áí ëáia Úñññåé Ýðéññé-÷-áññéðÞññåð, êáé ôðçí ôððéé-Þ ñýðééç, áí áññññåðæýðåé üðé ãæá Úññé ðéñññðbæá (ðééññíÞ ðüññü ãæáñññÜ ðó ôðçí ðá-÷-ýðçðå õýñññåðc ðið modem ðá-÷-Ýðc ìá ôðc ðá-÷-ýðçðå ôið getty), ðññññåðæåß íá ñññññåðæåß ôðçí ðá-÷-ýðçðå ôðc ãññáìÞ ðó ïÝ-÷-ññé íá ë Üñññé õððéññéiðæéiyð-÷-áñññéðÞññåð.

Áöiý i ÷ñPóôçò áeoÜääé ôií êuäeéü ôiõ, ôi getty åêöåäëß ôi /usr/bin/login, ôi iðiþi éáé iðiðeçñþíâé ôç  
äéäääééåóþá áeoüäiõ, æçþíôåò áðü ôií ÷ñPóôç ôií êuäeéü ôiõ, éáé iðeéþíôåò Ýðåéóå ôi Ýðeóðiõ ôiõ.

#### 27.4.4 Áñ÷åßá Ñõèìßóåùí

ÕðÜñ÷ iõñ ðñbá áñ÷ åbá ñõõèiBðåñú ðóðòðBðlåò ðó ðóii ðéáðÜëiñ /etc, ðá iõñbá ðééäñpð ðá ñiñéåðôåbå íá åðâiññáðôåbþôå ãéá íá åðééñ Ýðåðå ôçí åbótiñ íYðù ñåðéëiæéÞð óýíñåðóçò ðó ðééñ FreeBSD óýóðçïá óáð. Òi ðñþpöi ðñ ÷ åbñi åbñiæ ði /etc/gettytab, ði iõñbí ðåñéÝ ÷ åé ðeçñiñiñbåð ñyéiéñóçò ãéá ðiñ ãáññiñá /usr/libexec/getty Òi åyåñðiñ ðñ ÷ åbñi åbñiæ ði /etc/ttys ði iõñbí ðåñéÝ ÷ åé ðeçñiñiñbåð ðiñ ñiñosðiðiéýí ðóçí /sbin/init ðá ðiñéåð ðóðééåðÝð tty ðá ðñ Ýðåé íá åêðåññiñýðiáé ãéññáðBþåð getty. ÓÝëiñ, ðiñmåbþôå íá åÜéåðå åiðiñ Ýð ðñ ÷ ééiñBçóçò ðóçò éýññåð ðó ðééñ script /etc/rc.d/serial.

ÕõÜÜñ-ü-iõi áyí "õ-ü-ü-Yõ" üoõi áóõñÜ õc ÷-ñPõc modems æéá áßõrtaí óá Yíá óýóðciá UNIX. C ðñphõc, ðñiõdëiÜ íá ñõõ-üßæåé óá modems éäé óá óðóðPiaðá lâ ðYõi-éi ðñüöÜ. þóðâ Üó-÷-åðá iâ ðé ðá-÷-ýðcôá óðíñáYáðæé i ðñpáñéñðóíYíñò

÷ ñPóðóçò, ç ðiðéêP óýíäåóç ððiðíæáðóP — modem iÝou ðið RS-232C íá Ý÷åé ðÜíðá ðçí ßæáé ëéåéäúiÝíç ðá÷yôçôá. Õi üöðäëìò iéáò ôÝðiéáò ñyéïéóçò åßíáé üöé i áðñíäññóóíÝñò ÷ ñPóðóçò åéÝðåé ðÜíðá Üíåðá ðçí ðñiøññóP åéóüäið. Õi iåëíY èôçìá, åßíáé üöé ði óýóðóçìá äái åíùñßæåé ðçí ðññääíåðéêP ðá÷yôçôá óýíäåóçò ðið ÷ ñPóðóç, ééá Ýðóé ðññäñÜññåðá ðëPññòð ðeüíçò üðñò ði EmacS, äái åíùñßæiðò ðùò íá ñòðèßiðò ðçí ðá÷yôçôá áíáíÝùñóçò ðçò iëüíçò ðiðò þóðå íá áðñéiðåñùðßiðò ëåéÿôðñá ðéò áññáÝ ðið ñòðé Ýóåéò.

Óå áôôP ôçí áíüôçôá èá ðññioðâéPöiöiå íá óåò áþöiöiå ðëçñiöiñßåò êáé ãéá õiðò äýi öýðiöö ñõèìßöåùí, áæëÜ èåùñiýiå èáéýöåññi õi áßäiö öýiääóçò üððiç k óå ÷ ýôçôá ððiëiæéôP — modem áéiëiöeåß ôçí óå ÷ ýôçôá ôçô öýiääóçò.

#### 27.4.4.1 /etc/gettytab

Ôii /etc/gettytab áßíáé Ýíá áñ÷åßí ôýðiõ termcap(5) iå ðeçñiõñßåò ñyèléóçò áéá ôçí getty(8). Dáñáéáëÿìå  
ååßôå ôç óåßëåá manual gettytab(5) áéá ðeÞñåéò ðeçñiõñßåò ó÷åôééÜ iå ôç ïñöP òiõ áñ÷åßíö êáé ôçí ëßóôå iå  
ôéó äöñåûöökôåò ðiõ.

#### 27.4.4.1.1 Ñýèìéóć ãéá ÈëåéäùìÝíć Ôá÷ýôçôá

Áí ðñüéåéôáé íá êéåéäþóåôå ôcí áðééïéíùíþá óiõ modem óáò óå íéá óõñéåñéî Ýíç ôá÷ýôçôá, éåðÜ ðÜóá ðééáíüôçôá ááí èá ÷ññéåóôåß íá Úíåôå áæéåáÝò óõi /etc/gettytab.

#### 27.4.4.1.2 Ñýèiéóć ãéá ìåôáâëcôP Ôá÷ýôcôá

éá ÷ ñåéåóôåß íá ðñiiòëÝóåôå ïéá éåôå ÷ bñéóç óôï /etc/gettytab æá íá äþóåôå ðëçññiöñßåò óôçí getty  
ó÷åðééÜ íå óéô ðå ÷ yðôçåôô ðrõ åðéèöiåßôå íá ÷ ñçóéiiðiéÞóåôå óôï modem óåò. Áí Ý÷åôå Ýíá modem 2400 bps,  
iðiñßåðå ðééäíüí íá ÷ ñçóéiiðiéÞóåôå ôçí éåôå ÷ bñéóç D2400.

```
#  
# Fast dialup terminals, 2400/1200/300 rotary (can start either way)  
#  
D2400|d2400|Fast-Dial-2400:\n\t:nx=D1200:tc=2400-baud:  
3|D1200|Fast-Dial-1200:\n\t:nx=D300:tc=1200-baud:  
5|D300|Fast-Dial-300:\n\t:nx=D2400:tc=300-baud:
```

Áí Ý÷åôå modem ðøçëüôåñçò ôá÷ýôçôåò, ðééáíüí íá ÷ñâéáóôåß íá ðñïóèÝóåôå íéá êáôá÷þñéóç óôï /etc/gettytab. ÐáñáêÜòù öáßíåôáé íéá êáôá÷þñéóç ðiõ ìðiñåß íá ÷ñçóëiiðiçèåß æá modem 14.4 Kbps íå íÝäéóôç ôá÷ýôçôå óåéñéáêÞò èýñåò 19.2 Kbps:

```
#  
# Additions for a V.32bis Modem  
#  
um|V300|High Speed Modem at 300,8-bit:\  
    :nx=V19200:tc=std.300:  
un|V1200|High Speed Modem at 1200,8-bit:\  
    :nx=V300:tc=std.1200:  
uo|V2400|High Speed Modem at 2400,8-bit:\  
    :nx=V1200:tc=std.2400:  
up|V9600|High Speed Modem at 9600,8-bit:\  
    :nx=V2400:tc=std.9600:  
uq|V19200|High Speed Modem at 19200,8-bit:\  
    :nx=V9600:tc=std.19200:
```

Áðôü èá Ý÷åé ùò áðiõÝëåôíá óõíäÝóåéò 8bit ÷ùñßò éóïöéíßá.

Ói ðáñáðÜíù ðáñÜääéäíá, íåééíÜ òi ñõèìü åðéëíéíùíßáò óôá 19.2 Kbps (æá íéá óýíäåóç V.32bis), êáé Ýðåéôá ãíééíÜæåé êðéëééÜ óôá 9600 bps (æá V.32), 2400 bps, 1200 bps, 300 bps, êáé ðßóù óôá 19.2 Kbps. ÁðôÞ ç êðéëééÞ åíáéëåáÞ ñõèíý åðéôôð ðíåôáé íå ôçí ééáíüôçðå nx= ("next table"). ÊÜëå íéá åðü ôéò åñáííÝò ÷ñçóëiiðiçèåß íéá êáôá÷þñéóç tc= ("table continuation") æá íá åñâé ôéò ððüëíéðåò "ôððiðiçíÝåò" ñõèíßóåéò æá êÜðiéí õðåéñéñéÝí ñõèìü íåðÜäíóçò äåäííÝíùí.

Áí Ý÷åôå modem 28.8 Kbps þ/éáé èÝëåôå íá åðùöåëçèåßôå åðü ôçí óðiðßåóç åíüò modem 14.4 Kbps, èá ðñÝðåé íá ÷ñçóëiiðiçðóåôå ñõèìü åðéëíéíùíßáò íåðéñéýôåñí åðü 19.2 Kbps. ÐáñáêÜòù öáßíåôáé Ýíá ðáñÜääéäíá íéá êáôá÷þñéóçò óôï gettytab ðiõ íåééíÜåé åðü ôá 57.6 Kbps:

```
#  
# Additions for a V.32bis or V.34 Modem  
# Starting at 57.6 Kbps  
#  
vm|VH300|Very High Speed Modem at 300,8-bit:\  
    :nx=VH57600:tc=std.300:  
vn|VH1200|Very High Speed Modem at 1200,8-bit:\  
    :nx=VH300:tc=std.1200:  
vo|VH2400|Very High Speed Modem at 2400,8-bit:\  
    :nx=VH1200:tc=std.2400:  
vp|VH9600|Very High Speed Modem at 9600,8-bit:\  
    :nx=VH2400:tc=std.9600:  
vq|VH57600|Very High Speed Modem at 57600,8-bit:\  
    :nx=VH9600:tc=std.57600:
```

Áí Ý÷åôå åñâü åðâíåñâáôÞ þ íåðÜëi öiñôßi, êáé ôi óýóôçíá óáð ååí åéáéÝóåé óåéñéáêÝò èýñåò ðiõ íá åáóßæííðåé óôï 16550Å, ßóùò èÜååôå èÜëéç sio "silo" óôá 57.6 Kbps.

#### **27.4.4.2 /etc/ttys**

„÷ iõi lä Päc êääýøäde ôç ñyéiéóç ðiõ áñ ÷ åßiõ /etc/ttys oöï Ðáñ Üääéäia 27-1. Ç ñyéiéóç ãéá modems åßiáé ðáñüüíéá, aëeÜ ðñ Ýðåé íá äþóiõla äääöiñâôéü üñéóïá óoçí getty êää íá êääiñßöiõla äääöiñâôéü öýði öâñlåáöeëiy. Ç ãáiééP ïiñöP ôüöi íäéä ëeäéäù ÝÍç üöi êää íäéä iåôåâëçöP ôä ÷ ýôçöå åßiáé ç ðáñäéÜôù:

```
ttyu0    "/usr/libexec/getty xxx"    dialup on
```

Ôi ðñþþöi ðåðäßi óðçí ðáñáðÜiù ãññáiiP åßíáé ði ãéæðéü áñ ÷ åßi óððéåðÞò åéá åððP ðçí êåðá ÷ þñéóç — ði ttyu0 áíðéóðié ÷ åß óði ãñ ÷ åßi /dev/ttyu0 ði iðiði ñéé èáé èá ðáñáðiðiøèåß ç getty. Ôi äÿýåññi ðåðäßi, "/usr/libexec/getty xxx" (ði xxx èá Ý ÷ åðc ðçí áñ ÷ ééP ðéiP ééáíüðçðåð ðið gettytab), åßíáé ç äéåññåðßá ðið èá åðéåðÝ ñéé ç init óðc óððéåðÞ. Ôi ôññþöi ðåðäßi, dialup, åßíáé i ðññiððééññi Ý ñið öýðiø ðåññåðééññi. Ç ôÝôáññôç ðáñÜiåññiø, on, äåß ÷ íåé óðçí init üöe ç ãññáiiP åßíáé óå ëåééññåðééP éåðÜóðåç. Iðrñåß íá ðiðÜñ ÷ åé êåé iéá ðÝiððç ðáñÜiåññiø, ç secure, áéëÜ èá ðñÝðåé íá ÷ ñçóðiðiéåßòåé lüñií ñéá ðåññåðééÜ óðå iðiðá ç ðóðééP ðññåðóç åßíáé áóðäßP (üðñò åßíáé ç êññóðiø).

Í ðñíðåðééâái Ýñò óýðìò ðåññáðééiy (dialup óóí ðáñáðÜñú ðáñÜääéâái) iðiññâb íá áæéÜíâé áí Üërrâa íá óéó ðñíðéíþróåéð óáð. Óí dialup áßíáé í ðáñäaïíóéâéùò óýðìò ðåññáðééiy áéá áðéëíäééÝò áññáïíÝò. Íé ÷ñÞróåðò iðiññíýí Ýóóé íá ðñíðáññüæiðí óá scripts óýíäåóçò ðiðò þróðá íá áíáâñíüñßæiðí óí dialup êáé íá ñðèíßæiðí áðóññüâðá óíí óýðí ðåññáðééiy. Úððöúðí, áßíáé iñÜëeñ áðéëíüðâññí íá êáæíñßðåðá ðír vt102 ùò ðír ðñíðåðééâái Ýñò óýðí ðåññáðééiy, êáèþò ié ÷ñÞróåðò ÷ñçóðíiðééiy í óðíÞeuò áññíßñúð VT102 óóá áðññáðñðóí Ýñò óíðò óðóðóÞriáðá.

Áöiy êÜíåôå ôéò áëéäáÝò óöi /etc/ttys, lðiñâbôå íá óôåbëåôå óöc äéänääóßá init Ýíá óßä HUP ãéá íá íáíäéåáÜöåé öi áñ ÷åßi. lðiñâbôå íá ÷ñçöcîlðiñéÞöåôå óçí ÐänåéÜòù åööiÞ áéä áööu öi öéïðü:

```
# kill -HUP 1
```

Áí áooðþ ábbiáé ç ðñþþóç öiñ Ü ðiø ñòèlßæåôå òi óyóoçìá óáò, ßóùò è Ýéåôå íá ðâñéiÝíåôå iÝ÷ñé íá iieñéëçñþþoåôå ðëþñùò ôç óyíáåóç êéá ñyèéóç òiø modern óáò ðñéi ôðåßéåôå ðþíà óóçí init.

#### 27.4.4.2.1 Ñýèìéóć ãéá ÈëåéäùìÝíć Ôá÷ýôçôá

Ãéá ëåéôïrñâbá óá êëåéäùìÝíç óá÷ýôçôá, èá ðñÝðåé ç êåôá÷þñéóç óáò óöî ttxs íá ðñÝ÷åé óöçí getty iéá êåôá÷þñéóç óôåéânPò óá÷ýôçôåò. ãéá Ýíá modem iå óá÷ýôçôá èëåéäùìÝíç óóå 19.2 Kbps, ç êåôá÷þñéóç ttxs èá iieÜæåé iå óçí ðññâéÜôù:

```
ttyu0    "/usr/libexec/getty std.19200"    dialup on
```

Áí ôi modem óáò áßíáé êäéëäù Ýíí óå äéáöïñåôéëü ñõèìü äåäñì Ýíùí, áíôéêåôáôÞóôå là ôçí êáô Üëëçëç ôéïÞ ôi std.19200 ôôçí êáôá ÷þñéóç std.speed. Áåâáéùëåßôå üôé ÷ ñçóëïðíéåßôå Ýíá Ýáëõñí ôýðí, üðùò ïñßæåðáé óôí /etc/gettytab.

#### 27.4.4.2.2 Ñýèiéóć ãéá ìåôáâëcôp Ôá÷ ýôcôá

Óå iéá ÓÝðiéá ñyéiélóç, ç êáôá÷þñéóç óáô ãéá ðí tsys èá ðñÝðåé íá áíáôÝñâðåé óðçí áñ÷ééþ "auto-baud" (sic) êáôá÷þñéóç ôiõ /etc/gettytab. Æáé ðáñÜäâéâíá, áí ðññöéÝóáô ôçí ðáñâðÜù óðíéóðþiâíç êáôá÷þñéóç ãéá modem iå iåðâáëçòþ óá÷ýðçôáô óåéñéâéþò, êáé iå áñ÷ééþ óá÷ýðçôá ôá 19.2 Kbps (ôçí êáôá÷þñéóç gettytab ðiõ ðáñéÝ÷åé ùò ôçíâíç åééßíçóçò ôiõ v19200), ç êáôá÷þñéóç óáô óóïi tsys èá iiiéÜäâé iå ôçí ðáñâðÜòù:

```
ttyu0    "/usr/libexec/getty V19200"    dialup on
```

#### 27.4.4.3 /etc/rc.d/serial

Óá modems ðøçëÞò ôá÷ýôçôáð, üðùò ôá V.32, V.32bis éáé V.34, áðáéðïyí Ýëåä÷i ñiÞò iÝóù ðëéëiý (RTS/CTS). Íðiñâßôå íá ðñiöèÝôåðå áíôïëÝò stty óði /etc/rc.d/serial ãéá íá èÝôåðå óði ððñPíá ôi FreeBSD ôçí êáðÜëéçëç ðáñÜìåôñí Ýëåä÷i ñiÞò iÝóù ðëéëiý ôúí èðñpí modem.

Áéá ðáñÜääéäíá, ãéá íá èÝôåðå ôçí áðéëíäP termios óðcí ôéiP crtscts óðéò óðóéâðYò áñ÷ééëíßçóçò ôçò äåýôåñçò óåéñéáêPò èýñáð (COM2) ãéá áðéëíæêÝò eëPóåéò áéóüäið ééé áñüäið, éá ðñYðåé íá ðñiöèÝôåðå ôéò ðáñáéÜò ãñáíiÝò óði áñ÷åßi /etc/rc.d/serial:

```
# Serial port initial configuration
stty -f /dev/ttym1.init crtscts
stty -f /dev/cuaum1.init crtscts
```

#### 27.4.5 Ñðèíßóåéò líÞìçò

Áí Ý÷åðå Ýíá modem óði iðißi ðiññâßôå íá áðièçéåýôåðå ôéò ðáñáíYôñiðò iüíéíá ôðcí iç-ððçôéêP RAM ðið áéééÝôåé, éá ðñYðåé íá ÷ñçóëiðiëPóåðå Ýíá ðñüññáííá ôåññâðééiý (üðùò ðið MS-DOS P ôið tip óði FreeBSD) ãéá íá ñðèíßóåðå ôéò ðáñáíYôñiðò. Óññâåèåßôå óði modem ÷ñçóëiðiëþíðå ôçí ßæéá áñ÷ééP ôá÷ýôçôá áðéëíùíßåò ià áðòP ðið Ý÷åðå äçëþôåé ùò áñ÷ééP ôá÷ýôçôá ôðcí getty, éáé ñðèíßóåðå ôéò ðáñáíYôñiðò óðç ïðPíç ôið þóðå íá ôáéñéÜæiði ià ôéò ðáñáéÜò ðáñéóPóåéò:

- Ôi óPíá CD èá áßíáé áíññäü üðáí ôi modem áßíáé óðíññäiÝí
- Ôi óPíá DTR èá áßíáé áíññäü éáðÜ ôç eëéòññäßá. Áðáññäiðiëßçóç ôið DTR eëáßíáé ôç ãñáíiP éáé áðáñáöYñåé ôið modem óðcí áñ÷ééP ôið eáðÜóðåóç.
- Ôi CTS èá ÷ñçóëiðiëåßôåé ãéá Ýëåä÷i ñiÞò iàðááæäüññíñí ãåññíÝí
- I Ýëåä÷i ñiÞò XON/XOFF èá áßíáé áíññäüò
- Ôi RTS èá ÷ñçóëiðiëåßôåé ãéá Ýëåä÷i ñiÞò eëçöëÝíòùí ãåññíÝí
- <sup>1</sup> òð÷ç eëéòññäßá (Quiet mode, ÷ùñbò áðiðiëP eññäééþí áðiðåæåðiÜòùí)
- Äåí èá áßíññäé echo ôùí áíññäþí

Èá ðñYðåé íá äéááÜóåðå ôçí ôåñññßùóç ôið modem óðò áéá íá áññâßôå ôéò áíññäiÝò ðið ðñYðåé íá áðiðåðééåðå. Ðóùò áðßóçò ÷ññéáóðå íá áééÜññäå ôç eÝóç eÜðiéùí ñðèíéóðééþí äééëíððþí (dip switches).

Áéá ðáñÜääéäíá, ãéá íá ñðèíßóåðå ôéò ðáñáðÜí ðáñáíYôñiðò óá Ýíá áíñññééü modem U.S. Robotics® Sportster® 14,400, éá Ýðññðå íá óðåßçåðå ôéò ðáñáéÜò ãíññäiÝò óði modem:

ATZ  
AT&C1&D2&H1&I0&R2&W

Íðiññâßôå ià ôçí áðéáéñßá íá ñðèíßóåðå éáé Üëëiðò ðáñáíYôñiðò ôið modem, üðùò ãéá ôi áí ëá ÷ñçóëiðiëåßôåé ôið ðñùòññééi V.42bis P ôðiðßåóç MNP5.

Ôi áíñññééü modem U.S. Robotics Sportster 14,400 äéáéÝôåé áðßóçò ééé eÜðiéiðò ñðèíéóðééiÝò äééëüðôåò ðið ðñYðåé íá ñðèíéóðiÝí. Áéá Üëëá modem, ßóùò ðiññâßôå íá ÷ñçóëiðiëPóåðå áðòÝò ôéò ñðèíßóåéò ùò áíñññíÜ:

- Äééëüðôçò 1: ¶iù ÈÝóç — ÉáñññééP eëéòññäßá DTR

- Äéáêüðôçò 2: N/A (Èùäéêüò Áðïöåë Ýóíáöiò ùò Éâßìåññ/Èùäéêüò Áðïöåë Ýóíáöiò ùò Áñéèìüò)
  - Äéáêüðôçò 3: ¶íù èÝóç — ×ùñßò Èùäéêü Áðïöåë Ýóíáöiò
  - Äéáêüðôçò 4: ÈÜôù èÝóç — ×ùñßò echo êáé offline åíöiëÝò
  - Äéáêüðôçò 5: ¶íù èÝóç — Áðôüíáöç ÁðÜíöçöç
  - Äéáêüðôçò 6: ¶íù èÝóç — ÖðóéíëíäéË Áíß÷íåðöç ÖÝññíöiò ÓÞìáöiò
  - Äéáêüðôçò 7: ¶íù èÝóç — Öüñôùöç Ðññäðéëíäþí áðü NVRAM (íç-ðôçöéëË ííÞíç)
  - Äéáêüðôçò 8: N/A (¡õðññò/Èiðôùò Ôñüðiò Èâéöiðññäßáò)

Èá ðñÍðåé íá áðáiâññäiÍíéÞóâôð P íá áðíiiþíþðóâôð óiððò èùâæéïýo áðíðâéâðói Ùðñú óðîi modem, æá íá áðiðýââðóâ ðñiâéÞiaâða ðið iðinýí íá áçleíõñâçëiýí áí ç getty áðú ëÜeìo óðâððéâé ðñiðñiðP log in: óðîi modem ásþ áðóðü áññðóâéâðáé óá éaðÜððáóç áðiðiðþí. Óðcí ðâññððóñúç áððP, ói modem iðinâð íá áíáðáñÜððâé íáíÜ ðcí áðiðiðP (echo) P íá óðâððéâé êÜðiði èùâæéû áðiðâé Ýðiâðið. Áððú iðinâð íá Ý-âé ùð áðiðÝðâðiá leá iâðñü ÷ niðç èáé ÷ áæP óðiññéðá iâðáâý ðið modem éâðé ðcð getty.

#### **27.4.5.1 Ñõèìßóåéò ãéá ÈëåéäùìÝíç Ôá÷ýôçôá**

Ãéá ëåéôïrõñâbá óå êéåéäüí Ýíç óå ÷ ýôçôá, èá ÷ ñâéâöôåbå íá ñõðèlþóåâ òi modem íá äéâöçñâbå óôåéâññP óå ÷ ýôçôá ðõïieäéöôP — modem, Üó ÷ åôá iå ðçí óå ÷ ýôçôá åðééïéiúíßáò ðçò åðééïäéëPó óýíâåóçò. Óå Ýíá åùñôåñéü modem U.S. Robotics Sportster 14,400, ié åíðïeÝò åôô Ýðò èá êéåéäþöiñ ðçí åðééïéiúíßá ðõïieäéöôP — modem óôçí ßæá ðå ÷ ýôçôá ðòò Ýäéíå ç ëPøç ôùí åíðïeþí:

AT&B1&W

#### **27.4.5.2 Ñõèìßóåéò ãéá ìåôáâëçôþ Ôá÷ýôçôá**

Æáé ëåéôïñðñâbá óá ìåôåâéçöP óá ÷ yôçôá, éá ÷ níâéáôôåb íá ñòõïñbôåôå ðí modem óád íá ðññïoáññüæåé ôçí óá ÷ yôçôá ôçò óåéñéåéPò èýñâo ôiõ þôôå íá ðåéñéÜæåé iå áôôP ôçò åéóâñ ÷ üìâïçò eëþôçò. Óå Ýíå áîùôåñéêü modem U.S. Robotics Sportster 14,400, ié áîïöieÝò áôôÝò éá eëéäéþöiõí ôçí óá ÷ yôçôá iåôåöiñÜò áâaïíÝíü iå áéüñèùóç eäéþí ôiõ modem óçí óá ÷ yôçôá ðiõ ÷ ñiçóéiiðiõíÞçêå åéá ôçí áðiõöiñÞ ðùí áîïöieþí, áéëÜ éá áðéññÝöiõí ôçí óá ÷ yôçôá ôçò óåéñéåéPò èýñâo íá iåôåááÜëéåðááé åéá óôíäÝóåéó ðiõ áâaïíÝ ÷ iõí áéüñèùóç eäéþí:

AT&B2&W

#### **27.4.5.3 ëåä÷ ïò ôùí Ñõèìßóåùí ôïõ Modem**

Óa ðáññeóðüôðâñá modem ðøçëþò óá ÷ ýðôçôáð, ðáñÝ ÷ iðí áîðíëÝ òá iá óéð iðíßbåð iðíññâðbôð íá ðáññáëiðeþðôðâñá óéð òñÝ ÷ iððôðâð ðáññáïÝ ðññiðð eäéðiðññâðbôð ðiðð òá ó ÷ åðôééÜ eáðâññçöü ðññüði. Óði áiùôðâññéê modem U.S. Robotics Sportster 14,400, ç áîðíëþ AT15 äåß ÷ íåé óéð ñððiðññâðbôð ðið ãßñíáé áðíièçéâðiÝ ïåð òóç iç-ðôçôééþ RAM ðið modem. Åéá íá äåßbôð ðéð ñðññáñâðôééÝ ðáññáïÝ ðññiðð eäéðiðññâðbôð ðið modem (üððùð áððÝ ðáðçñâñÜæññôáé áðð ðéð èÝðâññéð òñi ñððiðññéðééþí áæáéiððþí ðið), ÷ñçöéiiððeþðôðâ ðéð áîðíëÝ ð ATZ ééð iáðÜ AT14.

Áí äéáè Ýôåôå modem Üeeçò åôåáéñßáó, åëéÝäîôå ôéó iiçâßåò ÷ ñPóçò ôíï ãéá íá åâßôå ðùò iðññåßôå íá åëéÝäîôå iå óéäiiõñëÜ ôéó ðáññáí Ýôññöö ñýëiéóçò ôíï.

## 27.4.6 Áíôéìåôþðéóć ĐñïâëçìÜôùí

ĐáñáêÜôù èá âñåßôå ìañééÜ áÞiaóá ðiõ ìðiñåßôå íá áéiñiøèÞóåå áéá íá åëÝáñåôå ôç eåéöiññáßá ôiõ modem óoii óyóôciá óåò.

#### 27.4.6.1 ÅëÝä-ííôáò ôí Óýóôçìá óáò

Óðíða Ýðóða ói modem óði FreeBSD óýðóðiá óáð, áðééÞróða ói, héá ái ói modem óáð áéðé Ýðóðe ðùðóðáéÍÝðo áðíðaßíðaéð  
éðáðÜðóðaóçò, ðáñáéïëðeÞróða óðeo áæá íá áððóða ái áiññáðiéáðóáé ç ÝíðaéÍç DTR üðða áiððaíßæððaé ç ðññóðñiðÞ  
login: óðcí ëiðóðüéá óið oððóðÞiaðið. Áí ç ÝíðaéÍç áððóÞ áððiaé áiññáÞ, ócìáßiáé üððe ói FreeBSD Ý÷áé ðééÞróða ói  
áiññááðßá getty óðcí áiððóðüé ç c ðéññá áðééïëiúéþi héá áiññá Ýíða ói modem íá áððaíðÞóða íéá ëéÞóç.

Áí ááí áíáññíðíéåßóáé ç Ýíäáéíç DTR, áéóÝëèåôå óöi óýóôçíá íÝóù ôçò êííöüéåò, êáé äþóôå ôçí áíóïëP ps ax áéá íá ååßóå áí öi FreeBSD ðññiöðåéåß íá åêôåëÝóåé äéåññáóßá getty óöç óùóôP èýñá. ÁíÜlåóá óôéó äéåññáóßåò, èá ååßóå áññííÝò üðòù ðéó ðáññáéÜòù:

```
114 ?? I 0:00.10 /usr/libexec/getty V19200 ttu0  
115 ?? I 0:00.10 /usr/libexec/getty V19200 ttu1
```

Áí äåßôå êÜôé äéáöiñåôéüü, üðùò ôi ðáñáêÜôù:

114 do I 0:00.10 /usr/libexec/getty V19200 ttys0

êáé ôí modem äâí Ý÷åé áðáiôÞóåé áûtiá êâíßá êéÞóç, óçìáßfáé üöé ç getty Ý÷åé ieiéëcñþóåé ôí Üñiæáíä ôçð óåéñéåéÞò èýñàò. Áðöü ðeeáíüí óçìáßfáé üöé ððÜñ÷åé ðñüäéçìá ìå ôçí êáëùäßùóç, Þ üöé ôí modem äâí åßíáé óúóôÜ ñðöleíöíÝñi, êâéÞò ç getty äâí éá ðñ Yðåé íá iðinñåß íá áñíßfåé ôç èýñá ðññéf áîññiðièçéåß ôí ðþíá CD (carrier detect, áíß÷fåñóçö öÝñiðiò) áðü ôí modem.

Áí ááí áé Ýðåðå ë Üðriéåò áæññáóßåò getty íá ðánñeiÝñiði íá áññíßiði ðçí áðéëöiçòÞ éyñá ttyun, áéÝñiði íáíÜ óeo  
éáðå ÷ ùñßóåéò óáð óóï /etc/ttys áé ðó ÷ üí ë Üèç. ÁéÝñiði åðßóçò ðír áñ ÷ åßí éáðåññáóÞò /var/log/messages  
áé ñá íá åðßóå áí ððÜñ ÷ iði ë Üðriéå ìçýíláðå áðü ðçí init Þ ðçí getty ó ÷ áðééÜ íá óá ðññiæÞiaðå. Áí ððÜñ ÷ iði  
íçýíláðå, áéÝñiði íáíÜ óá áñ ÷ åßá ïðøëíßóåú /etc/ttys êáé /etc/gettytab, üðùò êáé óá áéæéêÜ áñ ÷ åßá  
óðóéåðþí /dev/ttyun áéá ðééáíÜ ë Üèç, áéééðåßò éáðå ÷ ûñßóåéò, Þ íç-ýðáññíc ðùír áéæéþí áñ ÷ åßúr óðóéåðþí.

#### **27.4.6.2 Ðñïóðáèþóôå íá ÅêóåëÝóåôå Óýíäåóç Åéóüäïö**

ÄiêéiÜóôå íá åéóÝëèåôå ôóï ÿóôçíá óåò iÝóù áðñâéññööï Ýíçò ÿýäåñöçò. Ååâåéùèåßôå üöé ÷ñçöeïiðíéåßôå 8 bits, 1 stop bit êáé åðééïéñüíßá ÷ùñßò éöïiðéïíßá ôóï áðñâéññööï Ýíï ÿóôçíá. Áí åå ëÜâåôå Üìåðá ôçí ðññöñïðÞ åéöüäï, P áí èäïåÜíåôå ôéïöðßåéä, äiêéiÜóôå íá ðéÝæåôå **Enter** iå ñöðëù ðåñßöïò iéá öïñÜ òï ååðôåññüéåðöi. Áí åéüïå ååí èäïåÜíåôå ôçí ðññöñïðÞ **login:**, äiêéiÜóôå iåòÜ áðü ëßäï íá ôóåßëåôå Ýíá **BREAK**. Áí Üìåôå eëÞóç áðü Ýíá modem ðøçëÞò ôå ÷ÿôçôåò, äiêéiÜóôå iáiÜ, áöïý eëäéäþóåôå ôçí ôå ÷ÿôçôå åðééïéñüíßåò ðöïïëäéöôÞ — modem áðü ôï iðißí èåéåßôå (iÝóù ð.÷. ôçò AT&B1 ôå Ýíá U.S. Robotics Sportster modem).

ÁÍ ááÍ iðmáBóá aéumá íá eÙááðá ðñíðöñíðþ login:, áéÝááðá íáÍÜ eáé íáÍÜ ðí áñ-áßí /etc/gettytab.

- Ôi üññá ôçò áñ ÷ êéþò ééáíüôçôáò ðiõ êáeïñßæåðáé óôi áñ ÷ åßí /etc/ttys æáá ôç åñáìþ ðñ Ýðåé íá ôáéñéÜæåé íå ôi üññá ôçò ééáíüôçôáò óôi /etc/gettytab
  - ÈÜëå êåðå ÷ þñéóç nx= ôáéñéÜæåé íå ôi üññá ïéáò áíðßóôíé ÷ çò ééáíüôçôáò óôi gettytab
  - ÈÜëå êåðå ÷ þñéóç tc= ôáéñéÜæåé íå ôi üññá ïéáò áíðßóôíé ÷ çò ééáíüôçôáò óôi gettytab

Áí êÜíâôðâ êéÞóç áéëÜ ôi modem ôóï FreeBSD óýóðçíà äáí áðáíòÜåé, âåâáéùèåßôå üöé ôi modem áßíáé ñõëèéóïÝí íá áðáíòÜåé ôçí ôçëåðüíéêÞ ãñáíïÞ üöáí áíáñäiðíéåßôåé ôi óÞíà DTR. Áí ôi modem öáßíåôåé íá áßíáé ñõëèéóïÝí óùóóÜ, áðäéçëåýôå üöé c ãñáíïÞ DTR áßíáé áíáñäiÞ äéÝå ÷iiðôå ôéò òùöåéïÝò áíäåßíåéò ôiïo modem (áí ôðÜñ ÷iõí).

ÁÍ ÷ âôâá âéÝâíâé óá ðÜíóá ðíeëÝò öiñÝò, éáé áêüíá ãái öáßíâðóáé íá âñßóðâðó ðôc éýóç, éÜíðá Ýíá äéÜéâðííá éáé ðñiððæÞóðâ ñáiÜ áñäüðâñá. Áí áêüíá ãái éâéöïññåß, ßóùð åßíáé éâéÞ éäÝá íá óóâßéâðó Ýíá iÞíðíá óðçí çéâéññíééÞ ðßóðâ ãáiééÞí åñùðÞóðâ ðiõ FreeBSD (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-questions>) ðâñéññÜöiñðó ði ðññâëçíá óáð éáé ði modem óáð, éáé ié éâéëß Üíèññðié ðið ðáñâëiëiðeýí ðôcí ðßóðâ éá ðñiððæÞðiðí íá óáð ãíçëÞóiðí.

## 27.5 Õðçñåóßá Åðéëïäéêþò Óýíäåóçò

**ĐññiáéäiõiBçóç:** Áðü ôi FreeBSD 8.0 êáé iåðÜ, óá áñ÷åßá óooéåôßí ôuì óåéñéåéþí èoñþí låðiññÜóôçéáí áðü /dev/cuadN óá /dev/cuauN. ïé ÷ñþóòåò ôiõ FreeBSD 7.X éá ðñÝðåé íá ðñiøáññüöiõí ôçí ðáñåéÜôù ôåéïçñßùóç óýìöùíá iå ôéo ðáñåðÜù áéëéäãYò.

Đáñáê Ủôù èá âñåßôå êÜđíéåò óoiläiöëÝò ãéá íá lðiñÝóåôå íá óoñäÝóåôå ôií õđíëiæóôP óåò iÝóù modem óå êÜđíëi Üëeï õđíëiæóôP. Iå ôií ôñüði áoôü, iðiñåßôå íá áçìeññäPóåôå óýíååóç ôåññåéêiý ðñiò Yíá áðññåññöiÝíi õđíëiæóôP.

Áðóu òi áßæiò óýfääöcò ìðiññab íá öáiåß áâiaéññåöeéÜ ÷ ñiÞoéii æáá íá ðÜññåöå êÜðiíéi áñ ÷ áßi áðü òi Internet áí Ý ÷ åôå ðññüäëçìá óýfääöcò ìÝóù PPP. Áí èÝeåöå íá ðÜññåöå êÜöé ìÝóù FTP êáé äái iðiññåßöå íá öóíäåëåßöå ìÝóù PPP, öóíäåëåßöå ìÝóù öâññiáöeéiy óá Ýíá Üeëi ðiðreëäööP, êáé êåðååðÜööå óá áðöuú òi áñ ÷ áßi ìÝóù FTP. ðåéöå, ÷ ñçöeíiðiÞoóå òi ðññüöüéièei zmodem æáá fíi ìåðööå Ýññåöå óóíi ðiðreëäööP óåò.

27.5.1 Ôi ôýðiô Hayes Modem iïõ äåí Ôðiöóçñßæåôáé, Ôé ìðiñþ íá ÊÜíù;

Óóci ðñáàíáôéëüôçôá, ç óåëëáá manual ôçò tip äáí áßíáé áíçìåñùÝíç. ÓðÜñ÷åé þäc éáóÜëëçëí ãáiéëü ðñüññáíá ëëþçò ãéá modems ôçò Hayes. Áðëþò ÷ñçóéíïðíéþóô áóci êáóá÷þñéóç at=hayes óóï áñ÷åßí /etc/remote.

Ói ðñüñáñáíá íäþæçóçò Hayes áåí áßíáé áñéåô Ü Ýíðñííþ þöôå íá áíáñüñþæåé êÜðíéá áðü ôá ðñí÷ùñçíÝíá ÷ áñåéôçñéóôé Ü ôúí íåþôåñúí modems. Iðññåþ íá iðññååðôåþ áðü íçíýáô úðòù ôá BUSY, NO DIALTONE, ¶ CONNECT 115200. Éá ðñÝðåé íá áðåíññåðiéÞóåôå áðô Ü ôá íçíýáô úðåá ÷ñçóéiiðíéåßöåé ôçí tip (ôôÝéññåôå ôçí áíôïëþ ATX0&W).

Åðþóçò, ôi iÝæéóöi ÷ñiiééü äeÜóôçìá ôi iðiñsi ðåñeiÝåé ç tip åßíáé 60 äåðoåñüëåðoá. Ôi modem óáò èá ðñÝðåé íá Ý÷åé ièññüoåñi ÷ñiiééü ðåñéèþñei, aëeéþò ç tip èá ññßæåé üðé ððÜñ÷åé ðññüâëçìá åðcëéíéññíßáð. ÄièéíÜóôå ôçí åíññiÞ AT&T S7=45&W.

27.5.2 Đùò Õđïôßèåôáé ¼ôé èá Óôåßëù ÁõôÝò ôéò ÁÔ ÅíôïeÝò:

ÄçleïõñäPóôá áôõü ðiõ iiñÜæâôáé “äðåõèåßáò” êáôá÷þñéóç óõi áñ÷åßí /etc/remote. Äéá ðánÜääéâíá, áí ôí modem óáò åßíáé óõíäáíÝíí óôcí ðñþôc óáéñéáéP èÿñá, /dev/cuau0, ðñïóéÝóôá ôcí áéüëöèc ãññáíP:

```
cuau0 :dv=/dev/cuau0 :br#19200 :pa=none
```

Óôçí ééáíüôçôá br, ÷ñçóéïïðïéPôå ôíï ðôçëüôåñï ñõèlù bps ðïõ ðôðïôçñßæåé ôi modem óáò. ðåéôá, ðëçêôñïëíäPôå tip cuau0 êáé èá óõfääèåßôå iå ôi modem óáò

<sup>1</sup> ÷ñçóéïïðïéPôå ôçí cu ùò root, äßñíïôå ôçí áéüëiõèç åíöiëP:

```
# cu -lline -sspeed
```

Öi line åbíáé ç óâéñéáêP èýñá (ð.÷. /dev/cuau0) êáé ôi speed åbíáé ç ôá÷yôçôá (ð.÷. 57600). ¼ôáí åâéäéþóåôå iå ôéò åíöiëYò ÁÔ, ãñÜøôå ~. æáá íá ôâññáôßóåôå ôç óýíäåóç.

### 27.5.3 Öi Óýìâiïëi @ ôçò Ééáíüôçôáò pn Äåí Ëåéôïõñääß!

Öi óýìâiïëi @ ôçò ééáíüôçôáò ôçëåöùíééiy áñéèiïý (pn, phone number) iäçäåß ôçí tip íá åéååÜóåé ôi áñ÷åßi /etc/phones æáá Yíá ôçëåöùíééü áñéèlù. ÁeëÜ ði òýìâiïëi @ åbíáé åðßöçò Yíáò åéäéêüò ÷áñâéôPñáò óå áñ÷åßá ééâíöPôùi üðùò ôi /etc/remote. Èá ðñÝðåé íá ÷ñçóéïïðïéPôåôå ôçí áíÜðiäç êÜèåöií åéá íá åçëþóåôå üðé ååí åðééöiåßôå íá Y÷åé åðßäñáóç åéäéêiy ÷áñâéôPñá:

```
pn=@
```

### 27.5.4 Ðùò ïðïñp íá ÊáëYóù já Ôçëåöùíééü Áñéèiü Áðü ôçí ÄñáììP ÅíöiëP;

ÅÜëôå iéá “ãâééêP” êáôá ÷þñéóç ôóï áñ÷åßi /etc/remote. Äéá ðáñÜäåéäiá:

```
tip115200|Dial any phone number at 115200 bps:\n    :dv=/dev/cuau0:br#115200:at=hayes:pa=none:du:\ntip57600|Dial any phone number at 57600 bps:\n    :dv=/dev/cuau0:br#57600:at=hayes:pa=none:du:
```

ðåéôá ïðïñåßôå íá äßñåôå åíöiëYò üðùò:

```
# tip -115200 5551234
```

Áí ðñïöéiÜôå ôçí cu áíôß åéá ôçí tip, ÷ñçóéïïðïéPôå iéá åâíéêP êáôá ÷þñéóç åéá ôçí cu:

```
cu115200|Use cu to dial any number at 115200bps:\n    :dv=/dev/cuau1:br#57600:at=hayes:pa=none:du:
```

êáé ðëçêôñïëíäPôåå:

```
# cu 5551234 -s 115200
```

### 27.5.5 ÐñÝðåé íá ÐëçêôñïëíäP ôi Ñôèiü bps ÊÜèå ÖïñÜ ðïö ôi ÊÜíù Áôôü;

Èá ðñÝðåé íá ðñïöéYôåôå iéá êáôá ÷þñéóç tip1200 P cu1200, áeëÜ ïðïñåßôå íá åÜëåôå ôçí åééêP óåò åðééöiçôP ôéêP óôçí ééáíüôçôá br. Ç åíöiëP tip èåùñåß üðé óå 1200 bps åbíáé iéá êáëP ðñïäðéëíäP, êáé åéá ôi ëüäií åôôü ðÜ÷íåé íá åññåé iéá êáôá ÷þñéóç tip1200. Äåí ÷ñâéÜæåôåé ùóôüöií íá ÷ñçóéïïðïéPôåôå óå ÷yôçôá 1200 bps.

27.5.6. ÷ù Đñüóâáóç óå íá Áñéèìü Õđíieäéóôþí lÝóù Åíüò Åîöðçñåôçôþ Ôåñìáôéêþí

Áíóß íá ðåñêíÝíåôå íá Ý ÷ ñé íá óðíåëåðôå êáé íá ðëçêôñíëíåðôå CONNECT host êÜèå öïñÜ, ÷ ñçóëíïéþóôå ôçí êéáíüôçôå cm ôïö tip. Åéá ðáñÜäåéäíá, äåðôå ôéò ðáñâéÜòù êåðå ÷ ùñßóåéò ôóí /etc/remote:

```
pain|pain.deep13.com|Forrester's machine:\n    :cm=CONNECT pain\n:tc=deep13:\nmuffin|muffin.deep13.com|Frank's machine:\n    :cm=CONNECT muffin\n:tc=deep13:\ndeep13:Gizmonics Institute terminal server:\n    :dv=/dev/cuau2:br#38400:at=hayes:du:pa=none:pn=5551234:
```

27.5.7 Íðiñåß ç Tip íá ÄïééìÜóåé Ðåñéóóüôåñåò Áðü ìéá ÏñáììÝò ãéá êÜèå Óýíäåóç;

Áôõü õi ðññüâëçìá óóíÞèùò àïöáíßæåôáé óå Ýíá ðáíåðéôóÞèí ðïõ Ý÷åé áñêåôÝò ãñàííÝò ãéá modem, áëëÜ éáé ÷ééÜååò õïéôçòÝò ðïõ ðññöðåéíý íá ôéò ÷ñçóëíïðïéÞöïõí.

Ãciéiõñäþóôâ iéá êáðâ ÷ þñéóç äéá ôí ðáíâðéóðþíéí óáð óôï /etc/remote êáé ÷ ñçóëiiðíéþóôâ ôí @ óôçí éêáíüôçôá þn:

```
big-university:\n        :pn=\@:tc=dialout\ndialout:\n        :dv=/dev/cuau3:br#9600:at=courier:du:pa=none:
```

ðáéðó, ácìéïðñáÞróðá íéá ðþróðá íá ðíðó áñééìýð ócæðáðþmúrí ðíð ðáíáðéðóðíçíþið óðí /etc/phones:

```
big-university 5551111  
big-university 5551112  
big-university 5551113  
big-university 5551114
```

Ç tip èá ãiêêíÜóåé êÜèå ißá, là ôç óåéñÜ ðrø àiöáÍßæíöåé, êáé èá óôåíáôÞóåé. Áí èÝéåôå íá óoåå ÷ßæåé ôçí ðñiöðÜéåéå, åêoåéÝóåå ôçí tip iÝóå óå Ýíå åñüä-ï while.

27.5.8 Äéáôß ĐñÝđåé íá ĐéÝóù Ctrl+P Äýi ÖïñÝò ãéá íá Óôåßëù ôi Óõíäõáóìü Ctrl+P lèá ÖïñÜ:

Í óořšáoaóñiùò ðéþêñuí **Ctrl+P** áðiøåëåß ôíí ðñíâðéëåáiÝí ÷ áñâéòþñá “âáíááæåòíÿ (force)”, êáé ÷ ñçóéíïðíéåßôáé æáá íá êáôáæÜáåé ç tip üöé i åðüìâñiò ÷ áñâéòþñáò éá ðñÝðåé íá ÷ ñçóéíïðíéçèåß üðùò åßíáé. Íðiñâßôá íá èÝóåôá ôíí ÷ áñâéòþñá âáíááæåòíÿ óá iðíëíäþðiòå Üëëí ÷ áñâéòþñá, ÷ ñçóéíïðíéþíðåò óçí áéíëðëþá æáéooðþò ~s, ç iðiñßá ócíáßíáé “ñýéíéóá leá íåðåâëcòþ”.

Để cài đặt Phím đặc biệt `single-char` cho một ký tự nhất định, bạn cần sử dụng lệnh `xdotool key` với các tham số sau:

```
xdotool key --force=single-char [ký tự]
```

Trong đó, `[ký tự]` là ký tự mà bạn muốn gán cho phím.

Ìðïñâßôå íá iñßóåôå ôï ÷áñáêôÞñá áîáíáâæáóïíý óå üðiéí åóåßò åðéèðìåßôå, íå ôçí áêüëïöèç êáôá÷þñéóç ôôï áñ÷åßí \$HOME/.tiprc:

force=single-char

## 27.5.9 ÎáöíéêÜ ¼ôé ÄñÜöù Åìöáíßæåôáé íå Èåöáæáßá ÄñÜìáôá!!

ÌÜëëí Ý÷åôå ðéÝåå Ctrl+A, ðïõ åßíáé í “÷áñáêôÞñáò áíýøùóçò” ôçò tip, êáé åßíáé ó÷åæéåóïÝíiò åéäéêÜ åéá üóïò Ý÷iõí ðñüâæçíá íå ôï ðëÞêôñí CAPS LOCK. ×ñçóéïïðíéÞóôå ôçí åíôïëP ~s ðïõ ååßíáíå ðáñáðÜíù, åéá íá èÝóåôå íéá ëïäéêP ôéïP ôôç íåôåâæçôP raisechar. Ôôçí ðñáâíåôéüôçôå, ìðïñâßôå íá èÝóåôå ôçí ßæéá ôéïP íå ôï ÷áñáêôÞñá áîáíáâæáóïíý, áí ååí ôïðåýåôå ðïõÝ íá ÷ñçóéïïðíéÞóôå ëÜðíéá åðü áôôÝò ôéò åðíáôüôçôåò.

ÐáñáêÜôù öåßíåôåé Ýíá õðüäâæáíå áñ÷åßí .tiprc, ôï iðíßí åßíáé ôÝéâéí åéá ÷ñÞóôåò ôïð Emacs ðïõ ÷ñâéÜæåôåé íå ðëçêôñíëïíý õô÷íÜ Ctrl+2 êáé Ctrl+A:

force=^^  
raisechar=^^

Í ÷áñáêôÞñáò ^^ åßíáé í Shift+Ctrl+6.

## 27.5.10 Ðùò ïðïñþ íá îåôáöÝñù Äñ÷åßá íå ôçí tip;

Áí åðéêïéíùíåßôå íå Üëëí UNIX óýóôçíá, ìðïñâßôå íá óôåßëåôå êáé íá èÜâåôå áñ÷åßá íå ôéò åíôïëÝò ~p (put) êáé ~t (take). Íé åíôïëÝò áôôÝò åéôåëïý ôéò cat êáé echo ôôï åðñâéññóïÝíi óýóôçíá åéá íá èâíâÜíiõí êáé íá óôÝëíiõí áñ÷åßá. Ç óýíôåâç ôïðò åßíáé:

~p ôïðéêü-áñ÷åßí [åðñâéññóïÝíi-áñ÷åßí]

~t åðñâéññóïÝíi-áñ÷åßí [ôïðéêü-áñ÷åßí]

Íé ðáñáðÜíù åíôïëÝò ååí åéâéÝòí Ýéââ ÷i ëâéþí. Èá åßíáé êáéýôåñíí íá ÷ñçóéïïðíéÞóôå ëÜðíéí Üëëí ðñùôüéëëí, üðùò ôï zmodem.

## 27.5.11 Ðùò ïðïñþ íá ÅêôåæÝóù ôï zmodem íå ôçí tip;

Åéá íá èÜâåôå áñ÷åßá, íåééíÞóôå ôï ðñüâñâíà áðiðóïëPò óôïí áðñâéññóïÝíi ððíëïæéôôP, ðåéôå ðëçêôñíëïäÞóôå ~C rz åéá íá íåééíÞóôå ôçí ôïðéêëP ëþç.

Åéá íá óôåßëåôå áñ÷åßá, íåééíÞóôå ôï ðñüâñâíà ëþçò óôïí áðñâéññóïÝíi ððíëïæéôôP. ðåéôå ðëçêôñíëïäÞóôå ~C sz files åéá íá óôåßëåôå óá áñ÷åßá óôï áðñâéññóïÝíi óýóôçíá.

## 27.6 Ñýèìéóç ôçò Óåéñéáêþò Èííóüëáò

*ÓoíâáéóöiñÜ ôiõ Kazutaka YOKOTA. ÁáóéöiÝü óå Ýíá êåßìåüi ôiõ Bill Paul.*

## 27.6.1 Åéóáãùãþ

Ôi FreeBSD Ý÷åé ôçí ééáíüôçóá íá åéééíPóåé óá Ýíá óýóôçlá óí iðibí ùò eííóüëá äéáé Ýóåé Ýíá “eííóü” ôâñiaôêéü óóíäåÍýí óå ieá óåéñéåéþ eýñá. Áôôþ ç nýèiéóç åßíáé ÷ nþóéíç óå ayí éåôçäiñßåò áíèñþðúí: äéá ÷ åéñéôôÝð ððôôçìÜðùí ðïò åðééðííýí íá åâéåðåôðÞóðí FreeBSD óå iç÷áíPíåðá óå iðibí åáí äéáé Ýóîðí ðëçéðñíëüáéþ Iieúíç, êáé ðñíäñáíàðóéôôÝð ðïò åðééðííýí íá åéóöåæíåðþíð óíí ðññþíá þ iäçäíýð ðôôéåðþí.

¼ðùò ðâññeññÜöåôáé óóï ÈåöÜëáéï 13, ôí FreeBSD ÷ñçöñïïðíéåß óýóöçíá åêëßíçöçò ñôñéþí óðåäßuí. Óá ðñþöá äýí óðÜëáé åßíáé óóïí êþäééá ôíð boot block, í iðiþìò åðièçéåýåóáé óóçí áñ ÷Þ ôçò éåðÜðiçöçò (slice) ôíð äßóëið åêëßíçöçò ôíð FreeBSD. Ôí boot block êåðùðéí öiñþöþiaé ééá åêôðåëåß ôíð öiñþöùðþ åêëßíçöçò (/boot/loader) ùð êþäééá ôíð ñôñþöið óðåäßið.

Áéá íá áíñññíöíéÞóåôô ôcí óáéñéáêÞ êíñóüéá, èá ðñÝðåé íá ññèìßóåôô ôíí êþäééá ôiö boot block, ôi öiññòùôÞ áêëßíçóçò, êáé ôiïí ðññÞíá.

## 27.6.2 Ñýèiéóç Óåéñéáêþò Êííóüëáò (Óýíöïïç êäïóç)

Ҫ ǻíüôçá áôôþ օðièÝôâé üöé ôéïðåýåôå íá ÷ñçóëiðièþóåôå ôéò ðñiâðééâäíÝâò ñòèìþóåéò, êáé èÝëåôå áðëþò iéá ãñþâiñç åðéöüðçóç ôçò äéâæéâðþâò ñyéïéöçò ôçò óâéñéâéþò eïrþüéäò.

- ÓoñäÝóôå ôi óâéñéáêü éâëþäéï óôçí COM1 êáé ôi ôññìâðéêü.
  - Ãéá íá äåßôå üëá ôá lçíýláôå åêëßíçóçò óôçí óâéñéáêÞ êííöüëá, äþóôå ôçí ðáñáêÜôù áíôíëÞ ùò ôðåñ÷ñÞóôçò:  
# echo 'console="comconsole"' >> /boot/loader.conf
  - Åðåññáóôåßôå ôi /etc/ttys êáé áëëÜôå ôi off ôá on êáé ôi dialup ôá vt100 åéá ôçí êáôå÷þñéóç tttyu0.  
ÃéáöññáéêÜ, äáí èá ÷ñåÜæåôåé êùäéêüô ðññüôåóçò åéá ôç ýíäåóç iÝóù ôçô ôâéñéáêÞò êííöüëáò, ôi iðiþí  
áðiøâåëß ðéèáíü êåñü áóöåëåßáò.
  - ÅðáíâéêíÞóôå ôi óýóôçìá åéá íá äåßôå áí ßó÷ôóáí ié åëëåáÝò.

Áí ÷ ñåé Üæåóôå äéáöiñåôéé Ýò ñõèìßóåéò, èá âñåßôå ëåðôíí Ýñåéåò äéá ôçí ñýéiéóç óóí ÖìPiá 27.6.3.

### 27.6.3 Ñýèìéóć Óåéñéáêþò Èííóüëáò

1. ÐñïâðöïëÜóôå Ýíá óâéñéáêü êáëþäëi.  
Èá ÷ñâéáôâðôå ãðôå Ýíá êáëþäëi ôýðïõ null-modem, åßôå Ýíá ôôðïðïëçì Ýíá óâéñéáêü êáëþäëi êáé Ýíá ðñïóâññäÝá null-modem. Åâßôå ðï ÖìÞíá 27.2.2 ãéá ëâðôñÝñâéåò ó÷åðéëÜ íå ðá åßäç ðùí óâéñéáêþí êáéùâßùí.
  2. ÁðïóôñÝóôå ðï ðëcêôññüäëi óåò.

Óá ðåñéóðüôðåñá PC øÜ ÷ ñiði áéá òí ðëçêðñiñüäéí êáðÜ ôçí áé Üññéåá ðùí áæáñüðôðéþí áðéññíçóçð (POST, Power On Self Test), êáé èá áíáö Ýñiði óóÜëíá áí òí ðëçêðñiñüäéí ááí áßíáé óðiñáí Ýíi. ÍññééÜ ìç ÷ áíÞíáðá ðáñáðííëýíóáé ç ÷ çñÜ áéá ôçí Ýëéåðéþç ðëçêðñiñüäíø, êáé ááí óðiá ÷ ßæiði ôçí áðéññíçóç ìÝ ÷ ñe íá òí óðiá Ýðåðâ.

Áí i ðöðieiaéôðPò óáó ðáñáðííéÝôáé áéá òír éÜìrò, áéëÜ íâééíÜ Ýôóé éáé áéëépò, ááí ÷ñâéÜæåðáé íá êÜíâðô ðbðiôá eäéáþôåñíí áéá áðóôú. (ÍâñéeÜ ìç÷áíPiâôá íå BIOS ôçò Phoenix, éÝíá áðëpò Keyboard Failed éáé õóíá ÷ßæïròl òçí áâéëßíççç áéáññéÜ.)

Áí i ððieïâéôðPò óáó áñíâðôáé íá áéêéÍPòáé ÷ùñþò ðëçêðñïëüäéí, éá ðñÝðåé íá ñðøëþðôåð ôí BIOS þþðå íá ááñíâð õí èÜëìò (áí áßíâðåáé). Óðìàïöëåðôåðþò ôí áã÷åéñþæéí ôçò ìçõñééÞò óáó áéá ëåððñÝñâéåò ó÷åðééÜ íå áðôP ôç áéáâééåðþá.

**Õðüääâéïç:** Ñõëïßöôå ïî ðëçëôñïëüäéï óá “Not installed” óóï BIOS. Ç ñýèiéóç áôðôþ áðëþò áðïññÝðåé óï BIOS áðü ïî íá áíé ÷ íáÿáé óï ðëçëôñïëüäéï óðçí áéêëßíçóç, êáé äái ðñüëåéóáé íá óáò áïðíäßóáé íá óï ÷ ñçóéïïðéþöåôå êáííééÜ. Íðïñåßöå íá áöþöåôå ïî ðëçëôñïëüäéï óðíäàìÝïí áéüüá êáé üðáí Ý÷åôå áíññåðíéþöåé ôç ñýèiéóç “Not installed”. Áí áái ððÜñ÷åé ç ðáñåðÜüñ ñýèiéóç óóï BIOS, ðÜüôå áéá óçí áðééïïþ “Halt on Error”. ÁéëÜïôå ôç óá “All but Keyboard” þ áéüüá êáé óá “No Errors”, êáé èá Ý÷åôå ïî ßäéï áðïjöÝëåóíá.

**Óciáßúócs:** Áí ôi óyóôciciá óáo àéáe Ýôdáé ðiiôßéé ôýðiö PS/2®, ðeeáuíü íá ôñÝôdáé íá ôi áðiööráÝôåôå êáé áôôü. Ôá ðiiôßééá ôýðiö PS/2 Ý÷iöi êÜðiéá êôeëþiáôå êíéíÜ ià ôi ðeçêôñiëüäéi, åâaïíüò ðiö lðiñâß íá ðñiêáe Ýôdáé óyá÷ðoç ôiö ðñüñâñáliá áíß÷íáôçò ðiö ðeçêôñiëüäßi. ÊÜðiéá óôôðiáôå, üðùö ôi Gateway 2000 Pentium 90 MHz ià AMI BIOS, ôôiðâñéö Ýñiîôdáé ià áôôü ðiö ôñüöi. Ôá åâaïééÝô âñáliÝô, áôôü åâi åßiáé ðñüñâñáciá éáèþò ôi ðiiôßéé Ýôóé êáé aëeëþò åâi åßiáé ÷ñþöéí ÷ùñßö ôi ðeçêôñiëüäéi.

3. ÓõíäÝóôå Ýíá êiõôü ôåñìáôéü óôçí COM1 (sioo).

Aí áái Ý-÷åôå êiõõü ôâñlääôðéëü, iõññäbôå íá ôôsäaÝôåôå Ýíá ðåéëü PC/XT iå Ýíá ðñüñäñlääå åæá modem, P íá ÷ñçóeïiõiõPóåôå ôç ôâéñéåêP èýñá óå Ýíá Üëëi iç ÷Üíciá UNIX. Áí áái Ý-÷åôå ôâéñéåêP èýñá COM1 (sio0), åáiññÜôåå íæå. Ôç åáiññÝíç ôôéäP áái õõÜñ-åé ôññüõiõ íá åðéëëÝíåôå Üëëç èýñá åêôüö åðü ôçí COM1, ÷ùñbbô íá åðáíåâôååäüùõôbôåôå ôá boot blocks. Áí ÷ñçóeïiõiõPäç ôçí COM1 åæá êÜðiõëá Üëëç ôôóôåðP, eá ðñÝðåé íá ôçí áðåéñÝóåôå ðññiõùññíÜ, éæá íá åâéâôåôòPóåôå ïÝí boot block éæá ðõñPíá, iüëëö õôíâåéåßôå ôóî FreeBSD. (ÖðiõëÝöiõiå üüôé ç COM1 eá åbñíáé Ýôóé êæé ãæéëPò åæééÝóeïç óå Ýíá åiõðçñâôçôP  
ãñ-÷åbñíü/ÖðiõëiæóíPí/ôâñlääôðéëPí. Áí ðññäñlääôðéëÜ ÷ññäEüæåôôå ôçí COM1 åæá êÜôé Üëëi (éæá áái iõññäbôå åðôü ôi õÜôé Üëëi íá ôi iâðåâééPóåôå ôôçí COM2 (sio1)), iÜëëñ åái eá Ýðññåðå íá áó-÷iæçèåßôå êâèüëiõ iå üëë åoõü ôi èÝíå).

4. Åââáéùèåßôå üöé ðí áñ÷åßí ñöèìßöåùí ðíö ðöññÞíá óåð Ý÷åé ðéö êåð Üëëçëåð åðéëíäÝò (flags) åéá ôçí COM1 (sio0).

Íé ó÷åôéêÝò åðéëïäÝò åßíáé:

0x10

Áíñáñíðíéåß óçí ðöðiòòÞñéíç eïíóüëåò áæá aðóòP óç eýñá. Áí ááiò ðåðéåß aðóòP ç áðééíàP, óá ðöðüëíéðá flags áæá óçí eïíóüëå áái eäíå Úññóáé ðöðüþéí. Óç áääñí Ýíç óðéäíP, ç ðöðiòòÞñéíç eïíóüëåò lðiññåß íá áßíáé áíñáññíðíéçí Ýíç iùñí óá lèá eýñá. Ç ðñþòç ðiò ñéåññíßæåðóáé óðíi áñ ÷ áßíi ñðøèßðåñúí, áßíáé áéå aðóòP ðiò òá ðññiòðéçéåß. Áðúi iùñíc óçò, ç áðééíàP aðóòP ááiò eá áíñáñíðíéÞóåé óçí eïíóüëå óóç óðóæåññéí Ýíç óáéñéåéP

Éyñá. Éá ðñ Yðåé íá èÝóåôå ôí ðáñáéÜôù flag þ íá ÷ñçóëíïéþóåôå ôcí áðééëäþ - h ðíò ðáñéäñÜöåôåé ðáñáéÜôù, iáæß iá áðóôü ôí flag.

0x20

Åñáíáâé Üæåé ôç óôðâéññí Ýíç èýñá íá áññáé ç eññóüéá (åðôüò áí õðÜñ ÷ åé Üëéç eññóüéá õðçëüôðñçò ðññôðâñáéüôðçóáò) Üó ÷ åôá ià ôçí åðééññí - h ðiñ ðâññéññ Üôðâéé ñáññáé Üôù. Èá õñÝðâé íá ÷ ñçóéññíéÞóåôå õí flag 0x20 iàéß ià ôí flag 0x10.

0x40

Đáñáéñâôåß ôç óôáéñâéñéí Ýíç èýñá (óå óôíäåðåòiü iå ôçí 0x10) è Üñíïòåðå ôçí lç áéäèë Ýóéïç áéä åéññééë ðññüöååóç. Äáí èá ðñÝðåé íá è Ýðååðå åôðòP ôçí åôðéëíàP ôôç óåéñéåéP èýñá ðïò öéïðåýåôå íá ÷ñçöéïïðíëPóåôå ùò óåéñéåéP èïïòüéá. Ç iùíç ÷ñPóç åôðöiy öô flag, åßíáé íá éåèïñbôåôå üöé ç èýñá èá ÷ñçöéïïðíçéåß áéá åðññáéñòòI Ýíç åéôðöåéíÜòðùóç öôï ðòñPíá (kernel debugging). Äåßôå Õï Åéäëßí öôï ðññäññåíåðéôòP ([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/books/developers-handbook/index.html](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/developers-handbook/index.html)) áéá åðññéóðüôåñåò èäðòñ Ýññáéåò ó ÷åôðéëÜ iå ôçí åðññáéñòòI Ýíç åéôðöåéíÜòðùóç.

ĐáñÜääéäìá:

device sio0 flags 0x10

Ååßôå ôç óåëßääá manual sio(4) ãéá ðåñéóóüôåñåò èåðôiiÝñåéåò.

ÁÍ ááÍ Ÿ ÷-íóÍ éæéíñéöödåß flags, éá ðñÝðåé íá åéödåëÝðåðå öí UserConfig (ðå åéäöiñåðééÞ éiiðóüé) þ íá åðåðíåñåðåðåéùñöödþößðåðå öíÝ ððñÞíá.

5. Äċieġi sħonha b-Pođoħa òði a-ni - abbi boot .config òði ëx-xedju ead-Üġġieb òði qdàx ġieq - a òði a-miexx - iż-żejjek.

Óri áñ ÷-åbñi áôðûn èá êâoâðèýíáé ôií êþäééâ ôiö boot block ó ÷-åôðé Ü la òi ðùò èÝéâôá íá âåéééÍPóáé ôi óyôðçíá. Åéá íá åíâññâiðÞóåðâ ôçí óâáéñéâéÞ ëiñiöúüéá, èá ÷-ñâéâôðåbñôá iñBá Þ ðåññéöóüôâññô áðü ðéò ðáññâéÜò ðåðéëiaÝò—áí èÝéâôá íá ðññiöâéññBóâôá ðïeéâðëÝò ðåðéëiaÝò, èá ðñ Ýðåé íá ôéò ðåññééÜââôá üëâð ôóçí Bæá åññâiÞ.

-h

ÁíáééÜooáéé iåoåáiý ðòço åóùôåñééÞò éáé ðòço óåéñéáéÞò eííóüëéáo. Áéá ðán Üäåéäíá, áí lâééíÞoååå áðü ôçí åóùôåñééÞ eííóüëá (ièüíç), iøíñåßôå íá ÷ñçóéiiðíéÞoååå ôçí åðééïäÞ -h ãéá íá éåôåðéýíåôå òi öinôùôÞ åéébhíçóçò éáé ðíí ðõñÞíá íá ÷ñçóéiiðíéÞoïðí ðç óåéñéáéÞ eýñá ùò óðóéåðÞ eííóüëéáo. ÁíáééäåðééÜ, áí åéééíÞoååå iäÝóù ðòço óåéñéáéÞò eýñáò, iøíñåßôå íá ÷ñçóéiiðíéÞoååå ôçí åðééïäÞ -h ãéá íá éåôåðéýíåôå òi öinôùôÞ åéébhíçóçò éáé ðíí ðõñÞíá íá ÷ñçóéiiðíéÞoïðí ðç éáííééÞ eííóüëá áíðôß ãéá ðç óåéñéáéÞ.

-D

ÁíáéëÜooáé iåooáiý ðóçò áðëÞò ééáé ðóçò áéëðëÞò éiiðüüéáð. Óóçí ñyéiéóç áðëÞò éiiðüüéáð, éá ÷ ñçóéïðíéçéåß áßôå ç áñooðâñéêÞ éiiðüüéáð (áðåéêúíéóç óå iëüíç) áßôå ç óåéñéáêÞ éýñá, áíÜëíäá iå ôi ðùò Ý ÷ áé áðæåß ç áðéëïðäÞ -h ðíð åíâðÜooáiå ðánñáðÜñ. Óå ðâñßððùóç áéëðëÞò éiiðüüéáð, éá åíññäïðíéçéiyí óåooðü : ñííá ôúöi ç áñooðâñéêÞ üöi ééáé ç óåéñéáêÞ éiiðüüéáð, Üò ÷ áðoå áðñü ôç ñyéléóç ðóçò áðéëïðäÞ -h. Óçìåéþðóå ùóðüöi üödé ç ñyéiéóç áéëðëÞò éiiðüüéáð lðiññåb íå åíññäïðíéçéåß iùññ êáðÜ ðçí åééßíçóç, üöi åéðåëåßôåé öi boot block. Iüééð äíëåß i Ýéåä ÷ ið ôöi öiññðùóÞ åééßíçóç, ç ïíáéëêÞ éiiðüüéá ðíð ðáññáÍfæé åßíáé áððóÞ ðíð éáèëñßæåðåé áðñü ôçí áðéëïðäÞ -h.

-P

Áíáññiðiéåß ôcí áíß-íáñóç ðëçéôññieäßiö oíïo boot block. Áí äáí áññåèåß ðëçéôññieüäei, áíáññiðieíýîóáé áññüùláóá ie áðeeia Ýò -D éáé -h.

**Óciàßñóó:** Ëüáù ðåñéíñéòíþí ÷ þñïõ óôçí ðñÝ÷iõóá Ýéäïöc ôúí boot blocks, c å ãðéëïäþ -p iõññåß íá áié ÷ íåýóáé lüííï åêðåâáiÝíá (extended) ðëçéöñiøüäéá. Ðëçéöñiøüäéá íá èéäüöåñá áðü 101 ðëþéöñá (éáé ÷ ùñìßò óá ðëþéöñá **F11** êáé **F12**) Bóùò íá icí áié ÷ íåðèíýí. Åíáéòßáò åôöiy òiõ ðåñéíñéòíý, åßíáé ðëéèáíü íá icí áié ÷ íåðèíýí êáé ûÜðíéá ðëçéöñiøüäéá ñiñçöþí ðëiðíæööþí. Áí òiõåáßíáé åôöü óóí óýööçíá óáò, éá ðñÝðåé íá óóâláðþóâðå íá ÷ñçóéiõíéåßòå óçí å ãðéëïäþ -p. Äóóðò ÷ þò, äáí ððÜñ ÷ åé ûÜðíéio ôññüðò íá ðåñáneÜíøåâðå åôöü òi ðññüäæçíá.

× ñçóöiiñöiñéÞòôå åßôå ôçí åðéëüäP - P æáá íá åðéëüäYíåôå ôçí êiiñüüéå åôðüùlåôå, P ôçí åðéëüäP -h æáá íá åññäñüiñöiñéÞòôå ôçí åðéñéåñéP êiiñüüéå.

Iðinþáðó áðþBóðó íá ðánæcð Üðaaðó éaé Üðeéðó áððeëiaÝð ðið ðánæcñ Üðriðoáð óðóç óæðBáá manual ðið boot(8).

¼æðó íé áðééïáYð áæðíçóçò, áðóùò ðóç -P, éá ðáññÜðíóí óðí òïññòùòþ áðéëßíçóçò (/boot/loader). Í òïññòùòþð áæðíçóçò éá éæëññðóáé áí ç êññóüëá éá áçìéïññçèåß óðçí iëüíç P óðç óåéñéåðP èýñá, áöiy áðâðÜóáé iññí ðçí áðééïáP -h. Áðóù óçíáßíáé üðé áí éæëññðóáôð ðçí áðééïáP -D áæéÜ ü ÷é ðçí áðééïáP -h óðí /boot.config, éá iñññáßóðá íá ÷ñçóéññðíéÞðåðá ðçí óåéñéåðP èýñá ùò êññóüëá iññí éáðÜ ðçí áðóÝéåðç ôiõ boot block. Í òïññòùòþð áæðíçóçò iññùò éá ÷ñçóéññðíéÞðåðá ðçí áðóùðåññéðP èññóüëá (iëüíç).

6. ÅêêéíÞóôå öi iç ÷ Üíçìá.

¼ðáí íåééÍÞðåðá ði FreeBSD lç÷Üíçìá, óa boot blocks éá äåßíöí óa ðåññéä÷üíá ði /boot.config óðçí ëííðúéá. Äéá ðánÜåðéäíá:

/boot.config: -P  
Keyboard: no

Ç ääyôåñç ãññiñP èá ålöáíéóåß iüñ áí áÜëåôå óçí åðéëiñP -P óöi /boot.config, êäé ääß ÷iåé áí õðÜñ ÷åé P ü÷é óöñiåíYiñ ðëçëôñiñüäei. Óå lçiyáôå áôôÜ éåôåðéýiñiôåé óçí óåéñéåêP óôçí åóùôåñéêP êiñouëå, P äüñia ééåé óöeö äyñi, áí Üëiñaa lå ôçí åðéëiñP ðiñ Y ÷åé äßiæé óöi /boot.config.

ÅðéëíäÝò	Ôí ïþíöìá åìöáíßæåôáé óôçí
êáíßá	åóùôñééþ êííóüëá
-h	óåéñéáçþ êííóüëá
-D	åóùôñééþ êáé óåéñéáêþ êííóüëá
-Dh	óåéñéáêþ êáé åóùôñééþ êííóüëá
-P, ðëçêôñïëüäéí óôñääÝí	åóùôñééþ êííóüëá
-P, ÷ùñßò ðëçêôñïëüäéí	óåéñéáêþ êííóüëá

låôÜ ôá ðáñáðÜù lçíýïåóá, éá õðÜñâé iéá ìeññP ðáýóç ðñéí ôá boot blocks oóñá ÷ ßoíñt õññòþñíåóå ñi öññòùòþ ãéññþíçóçò, éáé ðñéí åiöáíéòðíýí ðåññéóðüôñåñá lçíýïåóá óðçí êiióüéá. Õðü éáññééÝò õðéñþéåò, äáí ÷ ñåéÜæåôåé íá áéáéüøåôå ôá boot blocks, aëéÜ ßoùò èÝéåôå íá ñi êÜíåôå åðôü aëá íá ååñáéüèåßôå üöé üéá åßíåé ñoëìéóíÝíá ñùñôÜ.

De Ýóôå iïðíëiäPöiôå ðëPêôññ åêôùò áðü ñi Enter óôçí eïïóüéá ãéá íá äéáéüøåôå òç äéáäéêáôßá åêëßíçóçò. Ôá boot blocks èá óáô ñùôPöiôíï áéá ðâñéóöùôåñâò ðëcñïöïñßâò. Èá ðñ Ýðåé íá åßôå ûÜðé üðùò ñi ðáñâéÜò:

```
>> FreeBSD/i386 BOOT  
Default: 0:ad(0,a)/boot/loader  
boot:
```

Άδαεεάνόδα υδε οι δακτυλίους με προσθήκη από την πλευρά της στούντα.

óðéð äyí, áíÜëiáá íà óðé ãðéëriáÝò ðið Ý ÷ áðå áÜëåé óði áñ ÷ áßi /boot.config. Áí òi iÞiðiá áìöáíßæððáé óðçí óñóðP eiióüéá, ðeÝóða Enter áéá íá óði ÷ ßóððå íà òc äéáæððáóðá áéðßíçóçò.

Áí áðéðiðiðóðå óáéñéáéP eiióüéá, áéëÜ ááí áeÝðåðå òcí ðñiðñiðP óå áððPí, ððÜñ ÷ áé ëÜðiéi eÜëiò óðéð ññðèiðóðéð. Óði íàðáiy, áñÜððå -h áéá ðeÝóða Enter þ Return (áí áßfåððáé) áéá íá ðåðóðå óði boot block (éáé Yðåðéðå óði ðñiðñiðP áéðßíçóçò éáé òi ððñPíá) íá áðéëÝiâé òc óáéñéáéP èýñá áéá òcí eiióüéá. Íüééò òi óýóðçíá íâééiÞoáé, eieðÜððå íáÍÜ ðéð ññðèiðóðéð áéá íá áñððóðå ðið ðåðáé òi eÜëiò.

ÍððÜ òc öüñðùðc ðið ðñiðñiðP áéðßíçóçò, áñðóðåðóðå óði ðñiðñiðP óðÜðiâéi ðcò áéáæððáóðá áéðßíçóçò éáé Y ÷ áðå áéððå õc äððiðóðóðå íá áðéëÝiâé ìððåðå ìððáiy òcð ðóððåñééPð ðéáé óáéñéáéPð eiióüéáð, eÝðñiððå ðéð ðåðÜððéçéðò ìððáðéçóðYò ððñéáÜððiðið ðóði ðñiðñiðP áéðßíçóçò. Áððóðå òi ÒiÞíá 27.6.6.

## 27.6.4 Ðåñðéçøç

Åäþ ðá áñððóðå ðéá ðåñðéçøç ðið ðñiðñiðP ðéðßíçóçò, áñðóðåðóðå óði ðñiðñiðP óðÜðiâéi ðcí áñððóðóðå, ðéáé òcí eiióüéá ðið áðéëY ÷ ðéçé õððééÜ.

### 27.6.4.1 1ç Ðåñðóðóðóðå: ÷ áðå ËÝóáé òi Flag 0x10 áéá òcí Èýñá sio0

device sio0 flags 0x10

ÅðéëiáÝò óði /boot.config	Êiióüéá ááðÜ òc äéÜñéáé òuí boot blocks	Êiióüéá ááðÜ òc äéÜñéáé ðið ðñiðñiðP áéðßíçóçò	Êiióüéá óði ððñPíá
éáíßá	áðùðåñééP	áðùðåñééP	áðùðåñééP
-h	óáéñéáéP	óáéñéáéP	óáéñéáéP
-D	óáéñéáéP éáé áðùðåñééP	áðùðåñééP	áðùðåñééP
-Dh	óáéñéáéP éáé áðùðåñééP	óáéñéáéP	óáéñéáéP
-P, ððçéðñiðüðåéi ðñiðñiðYíi	áðùðåñééP	áðùðåñééP	áðùðåñééP
-P, ÷ùñðò ððçéðñiðüðåéi	óáéñéáéP éáé áðùðåñééP	óáéñéáéP	óáéñéáéP

### 27.6.4.2 2ç Ðåñðóðóðóðå: ÷ áðå ËÝóáé òi Flag 0x30 áéá òcí Èýñá sio0

device sio0 flags 0x30

ÅðéëiáÝò óði /boot.config	Êiióüéá ááðÜ òc äéÜñéáé òuí boot blocks	Êiióüéá ááðÜ òc äéÜñéáé ðið ðñiðñiðP áéðßíçóçò	Êiióüéá óði ððñPíá
éáíßá	áðùðåñééP	áðùðåñééP	óáéñéáéP
-h	óáéñéáéP	óáéñéáéP	óáéñéáéP
-D	óáéñéáéP éáé áðùðåñééP	áðùðåñééP	óáéñéáéP
-Dh	óáéñéáéP éáé áðùðåñééP	óáéñéáéP	óáéñéáéP
-P, ððçéðñiðüðåéi ðñiðñiðYíi	áðùðåñééP	áðùðåñééP	óáéñéáéP
-P, ÷ùñðò ððçéðñiðüðåéi	óáéñéáéP éáé áðùðåñééP	óáéñéáéP	óáéñéáéP

#### 27.6.5 ÓõìâïõëÝò ãéá ôçí Óåéñéáêþ Ëííóüëá

#### 27.6.5.1 Ñýèìéóç ìåñáéýôåñçò Ôá÷ýôçôáò ãéá ôç Óåéñéáêþ Èýñá

Íé ðñíàðééâái Ýíàò ñòèìßóåéò ôçò óåéñéåéÞò èýñáò åßíáé: 9600 baud, 8 bits, ÷ùñßò éóïôéïßá (parity), 1 stop bit. Áí è Ýéååð íá áééÜíàò ôçí ðñíàðééâái Ýíç óá ÷ýôçóå ôçò eïíöüéåò, Ý÷ååð ôéò ðánáé Üòù åðéëíä Ýò:

- Åðáíàíâðáæüôðôóâ óá boot blocks èÝôíïôáó ôc iåðáâðéçöP BOOT\_CONSOLE\_SPEED æáá íá iñþóåðâ ôc íÝá ôá÷ýôçôá eííóüéáð. Åâðôá ôi ÔíÞíá 27.6.5.2 æáá éåðôíîâñâðò iäçãßåò ó÷åðééÜ iå ôc iåðáâðéþôðéóç êáé åæéáðÜôðâóç íÝú boot blocks.

Áí ç áíáññáíðíßçóç ðçò óåáñéâéÞò ëííóüéåð ááíí áßíåðåé íÝóù ðçò áåðéëíäÞò -h, Þ áí ç óåáñéâéÞ êííóüéå ðíö ÷ñçóéíïðíéåßôáé áðü öíí ððñÞíá áßíáé áéáöiñåðééÞ áðü áôôÞ ðíö ÷ñçóéíïðíéåßôáé áðü óå boot blocks, èá ðñ Ýðåé áðßôçò íá ðññíóéÝóåðå ðçí ðáñâéÜðù áðéëíäÞ öóí áñ : áßíí ñðèìßôåñü òíö ððñÞíá, éáé íá íåðååæùôðôßôåðå Ýíá íÝí ððñÞíá;

options CONSPED=19200

- Óóéó åðééëïá Ýò åééëßíçóçò ôið ðõñþíá, ÷ñçóëiiðíéÞóôå ôi -s. Íðiñâßôå åðßóçò íá ðññöéÝóåôå ôçí åðééëïá -s óóí /boot.config. Ç óáëßää manual boot(8) ðåñéÝ÷åé íéá ðéóôå ôuí ðõñöôçñéæüìâúí åðééëïáþí, êáé ðåñéäñÜöåé ðùò íá ôéó ðññöéÝóåôå óóí áñ÷åßí /boot.config.
  - ÅfâññaiðíéÞóôå ôçí åðééëïáþí comconsole\_speed óóí áñ÷åßí /boot/loader.conf.

Áéá íá èåéöiññþóåé áðôþ ç åðéëiäþ, èá ðñÝðåé åðþþóçò íá èÝóåôå ôéíÝò áéá ôéò åðéëiäÝò console, boot\_serial, êáé boot\_multicons óöi þæéí áñ÷åßí, óï /boot/loader.conf. ÐáñáéÜôù öáßiåðåé Ýíá ðññÜåéæáí ïñþþóçò ðïö comconsole\_speed áéá áééäþþ óá÷ýóçóå ôçò óåéñéåéþò ëíñóüéåó:

```
boot_multicons="YES"
boot_serial="YES"
comconsole_speed="115200"
console="comconsole,vidconsole"
```

**27.6.5.2 ×ñçóéíïðiébíôáò Óåéñéáêþ Èýñá Åêöüò ôçò sioø aéá ôcí Êiióüéá.**

Èá ðñÝðåé íá åðáÍáîåðåáæùòòßóåôá Ûëðíéá ðñïññÜñìåôá æá íá ÷ñçóëüðíéÞóåôá ùò êëíóüëá íéá óåéñéåêÞ èýñá åêòòùò ôçò siøo. Áí æá iðíéíäÞðíôå ëüäí èÝéåôá íá ÷ñçóëüðíéÞóåôá Üëëç óåéñéåêÞ èýñá, éá ðñÝðåé íá åðáÍáîåðåáæùòòßóåôá óá boot blocks, òïi öinñòùòÞ åêéßíçóçò ééá òïí ðõñÞíá, ià òïí ñùñòi ðiò oáßíåóáé ðáññéÜòù.

1. ÁíáêôÞóôå ôií ðçääáßi êþäéêå ôiõ ððñÞíá. (Äåßôå ôií ÈåöÜëéåí 25)
  2. Äðåâíññåáôåßôå ôií áñ÷åßi /etc/make.conf êáé èÝóôå ôçí åðééïäÞ BOOT\_CONSOLE\_PORT óôç äéåýéðíóç ôçô ñéñåð ôiõ èÝéåðå íá ÷ñçóéiiðíéÞóåôå (0x3F8, 0x2F8, 0x3E8 or 0x2E8). Íðíññåßôå íá ÷ñçóéiiðíéÞóåôå iüññ ôéó èýñåò siø0 ùò siø3 (COM1 ùò COM4). ÈÜññåð ôiøééðéþí èðñþí, äáí ðñüéåéôåé íá èåéöiññÞóiðí. Äáí ÷ñåéÜæåðåé íá ñðøèßóåôå ôçí ôéíÞ ôiõ interrupt.
  3. ÄçíéïññÞóôå Ýíá áñ÷åßi ñýéëéóçð ðññóáññiòí Ýññ ððñÞíá, êáé ðññóéÝóôå ôá êåôÜëëçéå flags æáé ôç óåññéåéþ èýñå ðiõ åðééðíññåßôå íá ÷ñçóéiiðíéÞóåôå. Äéá ðññÜäåéñíá, áí èÝéåðå ç siø1 (COM2) íá ãßíñéå ç êíñóüëå: device\_siø1\_flags\_0x10

6

device signal flags 0x30

Ãáí èá ðñÝðåé íá èÝóåôå flags êííóüëáð áéá ôéð Üëëåò óåéñéáêÝò èýñåò.

4. Ìåðåäëùôôßóôå êáé åæéåôåôÞóôå íáíÜ ôá boot blocks êáé ôíí öïñôùôÞ åêëßíçóçò:

```
# cd /sys/boot
# make clean
# make
# make install
```

5. Åðáíáìåôåäëùôôßóôå êáé åæéåôåôÞóôå ôíí ðññÞíá.
6. ÄñÜøôå ôá boot blocks ôíí äßóëí åêëßíçóçò ÷ñçóéíðíéþíôåò ôçí bslabel(8) êáé åêëéíÞóôå ìå ôí íÝí ðññÞíá.

### 27.6.5.3 Åßóïäïò óóíí DDB Debugger ïÝóù ôçò ÓåéñéáêÞò ãñáìíÞò

Áí èÝéåôå íá áéóÝëèåôå óóíí debugger ôíí ðññÞíá áðü ôçí óåéñéáêÞ êííóüëá (êÜðé ðíð åßíáé ÷ñÞóëíí áéá íá åðåäëÝóåôå åæáäñôôðéêÜ áðü áðññåêñðóíÝíç ôíðíëåôßá, áéëÜ åðßóçò êáé åðéëßíäöñí áí óôåßëåôå êáðÜ ëÜëëò BREAK ïÝóù ôçò óåéñéáêÞò èýñåò!) èá ðñÝðåé íá ðåñeeÜååôå ôçí ðåññåêÜòù áðéëíäÞ óóíí ðññÞíá óåò:

```
options BREAK_TO_DEBUGGER
options DDB
```

### 27.6.5.4 ÐñïöñïðÞ Åéóüäïò óôçí ÓåéñéáêÞ Èííóüëá

Áí êáé áðôü äáí åßíáé áðáññåßôçöi, ßóùò íá Ý÷åôå ðñïöñïðÞ åéóüäïò (login) ïÝóù ôçò óåéñéáêÞò ãñáìíÞò, ôþñá ðíð ïðíññåßôå ðëÝíí íá ååßôå ôá ìçíýíåôå åêëßíçóçò êáé íá áéóÝëèåôå óóíí debugger ôíí ðññÞíá ïÝóù ôçò óåéñéáêÞò êííóüëáò. Ç åæáäééåôßá ðåñéäñÜðåååé ðåññåêÜòù.

Ìå êÜðíéí óóíðÜéôç êåéÝíð, áííßíôå ôíí ãñ ÷åßí /etc/ttys êáé åñåßôå ôéð ãñáìíÝò:

```
ttyu0 "/usr/libexec/getty std.9600" unknown off secure
ttyu1 "/usr/libexec/getty std.9600" unknown off secure
ttyu2 "/usr/libexec/getty std.9600" unknown off secure
ttyu3 "/usr/libexec/getty std.9600" unknown off secure
```

Íé êáðá÷ùñßóåéð áðü ttuyu0 ùò ttuyu3 áíðéóöíé÷íýí óóéð COM1 ùò COM4. ÁëëÜîðå ôíí off óå on áéá ôçí èýñá ðíð åðéëðíåßôå. Áí Ý÷åôå áéëÜíåé ôçí ôá÷ýðôå ôçò óåéñéáêÞò èýñåò, èá ÷ñåéåôôå Íá áéëÜíåôå ôíí std.9600 þóôå íá óåéñéÜæåé ìå ôçí ôñÝ÷iñóá ñýëìéóç, ð.÷. std.19200.

ÌÜëëíí èá èÝéåôå íá áéëÜíåôå êáé ôíí óýðí ôíí ôåññåôééiy, áðü unknown óóíí ðññåìáôééü óýðíð ôíí óåéñéáêiy óåò ôåññåôééiy.

Áöiy áéëÜíåôå ôéð ñðëìßóåéð, èá ðñÝðåé íá åéôååÝóåôå ôçí åíðíëÞ kill -HUP 1 þóôå íá åíññäïðíéçëiyí.

### 27.6.6 ÁéëåäÞ Èííóüëáò ïÝóù ôíí ÖïñôùôÞ Åêëßíçóçò

Óå ðññçäïýìååð åíüôçôåð, ðåññéäñÜøäåå ðùò íá ñðëìßóåôå ôçí óåéñéáêÞ êííóüëá áéëÜæííðåò ôéð ñðëìßóåéð ôíí boot block. Óôçí åíüôçöá áðôÞ, ååß÷ííðíå ðùò ïðíññåßôå íá êåëíñßóåôå ôçí êííóüëá åßííñôå õÜðíéåð åíðíëÝò êáé ìåðåäéçöÝò ðåñéäÜëëííðå ôíí öïñôùôÞ åêëßíçóçò. Êáèþò í öïñôùôÞ åêëßíçóçò êåëåßôåé áðü ôí ðññôöi óôÜäéi ôçò åéåäééåôßáð åêëßíçóçò, êáé ìåðÜ ôíí boot block, íé ñðëìßóåéð ôíí öïñôùôÞ åêëßíçóçò ððåñéó÷ýíðíí óå ó÷Ýóç íå áðôÝò ôíí boot block.

### 27.6.6.1 Ñýèìéóç ôçò Óåéñéáêþò Êííóüëáò

Íðiñmáþóá áyéiæá íá êáeïñþóáðóá üöe eá ÷ñcóëiðiécæðþ ç óåéñéáðþ êriðouéá óoíí öiñðùðþ åêéßíçóçò êáé óoíí ðoñþíá ðið eá öiñðùðæþ, an Üoííðóá áðëþò iéá añaílþ óoí /boot/loader.conf:

```
console="comconsole"
```

Ç ñyèiéóç áôôD èá áññâüðiéceåß, Üö-åôá la ôi boot block ðiö óôæcôDøáïå óôcí ðñïçäüÿåíç áññûôcôa.

Åßíáé êáeyôåñá ç ãñáìíP áôòP íá åßíáé ç ðñþôç óóïí áñ÷åßí /boot/loader.conf, þóôå íá äeÝðåôå ôá áñ÷éêÜ ìçíýiaôå åêêßíçóçò óóç óåâneáêP eiiþüéå.

Ìå ôiiß Bäeii ôñüðii, iðiiñåßôå íá êáeiiñßóåôå ôçí åóùôåñéêP êiióüeá ùò:

```
console="vidconsole"
```

Áí äáí êáèïñßóåôå ôç ìåðåáâëçôþ ðåñéåÜëëíîò console, í öïñòùôþò åêëßíçóçò (éáé Ýðåéôá í ðõñþíáò) éá ÷ñcoéïñðieþróïò iðieáþðiòå êíñóüéå Ý÷åôå êáæïñßóåé óöï boot block íå òçí åðééïäþ -h.

Iðiñåßôå íá êåèïñßóåôå ócí êiióüéå óöii /boot/loader.conf.local þ óöii /boot/loader.conf.

Ååßôå ôï loader.conf(5) åéá ðåñéóóüôåñåò ðëcñjöïñßåò,

**Óciàßùóç:** Ôç äåäïïÝíç óôéäïþ, i öïñôùôþò åêëßíçöçò äái Ý÷åé åðéëïäþ áíôßóôíé÷ç ià ôçí -þ ôïö boot block, êáé äái ðöÜñ÷åé ûÜðïëiò ôñüðiò íá åßíåé áôôüìåôç åðéëïäþ iàôåíý åóùôññéêþò êáé óåéñéåêþò êíïóüéåò áíñjéäå ià ôçí ðáñññðôßá ðæcëôññïëäßþò

27.6.6.2 ×ñþóć Óåéñéáêþò Èýñáò Åêôüò ôcò sio<sub>0</sub> ãéá ôcí Èííóüëá

Èá ðñÝðåé íá åðáíâåðåäëùôðßóåôå ói öiñòùòþ åêëßíçóçò þóôå íá ÷ñçóëiðiéÞóåé íéá óåéñéåéþ èýñá äéáöiñåôééþ áðü ócí siøo åéá ôc óåéñéåéþ eíñöüéá. ÁéíëiðeÞóåå ôc äéåáééåðßá ðiø ðåñéññÜòåðåé óoï ÓíÞíá 27.6.5.2.

## 27.6.7 DéèáíÝò Đáãßääåò

Ç ääíéêپ éäÝå åbíáé íá ådéôñ Ýðâðáé óå üöriöö òïi ådèëöiïíyí, íá äcïeïoñäPöriöi åiâæäéêåöì Ýüöö åiöðçñâöôçöÝò ðiö åái ådáéöiïíyí éÜñôåò åñáöééþí éáé ðëcêöñüëüäéå. Åööôð÷þò, áí éáé óå ðâñéööùöâñá öööôÞiaôá èá óåò ådéôñÝöiöi íá åhéééÞöåðå ÷ùññò ðëcêöñüëüäéi, óå ðiçéy ëbääá èá iðinÝöåðå íá åhéééÞöåðå ÷ùññò Üññôå åñáöééþí. Óå ìç ÷áÞiaôá ìå BIOS ôçò AMI iðmñýí íá ñöeëéööiïíyí ìå ådööù òïi ôñüði, ådëþò áëëÜæiiöå õçí ådéëiäp “graphics adapter” óöéò ñöeëüööåéò ôïö CMOS óå “Not installed.”

Óá ðâñéóöüôåñá lç÷áÍPiåôá ùòôüöí äáí õðïöôçñßæïöí áôôP ôcï áðéëëäP, êáé èá áñïçëïýí íá åêééPöiöí áí äáí áÜéåôå iéá êÜñôå ãñáöéêhpí. Óóá lç÷áÍPiåôá áôôÜ éá ðñÝðåé íá áöPöåôå iéá óöïé÷åéþäç (áéüïá ééá iiñü÷ñùlç) êÜñôå ãñáöéêhpí, áí êáé äáí åbïáé áðáñåßöçöí íá óöïáÝòåôå ééá ìëüíç. lðiñåßòå áðßöçö íá äïééÜòåôå íá åêéåôåðôPöåôå BIOS ôcò AMI.

# ÊåöÜëáéí 28 PPP êáé SLIP

ÁíáäüìPèçêå, áíáäüññááíþèçêå, êáé áíáíþèçêå áðii ôií Jim Mock.

## 28.1 Óýíiøç

Ôi FreeBSD äéáé Ýôåé ðëÞëiò ôñüðùí ãéá ôç óýíäåóç áíüò ðõiëiæéôP iá Ýíá Üëëi. Áéá íá áðéôý - áôå óýíäåóç iÝóù modem oóï Internet P óá Ýíá Üëëi áßêôöï, P æá íá áðéôñ Ýôåóå óá Üëëiò ìá óoisääëýí iÝóù ôiõ óððôðÞíáöiò óåò, áðáéóåßôáé ç ÷ñþóç PPP P SLIP. Ôi êåöÜëáéí áðöü ðåñéäñ Üöåé èåðöññåñþò ôií ôñüði ñýëìéóçò ôùí ðáñáðÜíù õðçñåðéþí ãéá ÷ñþóç iÝóù modem.

Áöiy ãéáâÜóåôå áðöü ôií êåöÜëáéí, èá iÝñåôå:

- Ðùò íá ñõèìßóåôå ôií PPP ÷ñþóôç (User PPP).
- Ðùò íá ñõèìßóåôå ôií PPP ðõñÞíá (Kernel PPP, iüñí ãéá FreeBSD 7.X).
- Ðùò íá ñõèìßóåôå ôií PPPoE (PPP iÝóù Ethernet).
- Ðùò íá ñõèìßóåôå ôií PPPoA (PPP iÝóù ATM).
- Ðùò íá ñõèìßóåôå Ýíá ðåëÜôç êáé áîöðçñåðçôP SLIP (iüñí ãéá FreeBSD 7.X).

Ðñéí ãéáâÜóåôå áðöü ôií êåöÜëáéí, èá ðñÝðåé:

- Íá áßóåå áñíçéåéùí Ýñò iå ôç ááóééP iññëiñßá ôùí áééôýùí.
- Íá êáðáññåôé Ýôåå ðiéá áßíáé ç ááóééP æáöiñÜ iåðåáý ôiõ PPP ÷ñþóôç êáé ôiõ PPP ðõñÞíá. Ç áðÜíôçôç áßíáé áðëP: ôi PPP ÷ñþóôç áðåññåñÜ åxåååé óá áääñí Ýíá áéóüäiò êáé áñüäiò iÝóù ðññäññåñÜ ôùí ÷ñþóôç (userland) áíôß áéåí Ýíõ ðõñÞíá ôiõ èåðöññåééý. Áðöü ðññéåéåß èÜðiéåð áðéåññýíóåéð èüäù ôçð áíðéåññåðþò áåäññÝíù iåðåáý ôiõ ðõñÞíá êáé ôçð áöáññåñþò ÷ñþóôç, áæëÜ áðéôñ Ýðåé êáôÜ ðiøý ðeí ðeíýóéá (áðü Üðiøç aðíáðiðþòùí) ðeíðiñçóç ôiõ PPP ðññöiññééið. Ôi PPP ÷ñþóôç ÷ñçóéiñiøéåß ôç óððéååôP tñun ãéá ôçí áðéééññåñá iå ôií Ýñù êññöií, áíþ ôií PPP ðõñÞíá ÷ñçóéiñiøéåß ôçí óððéååôP ppp.

**Óçìåñþóç:** Óå üëi ôií êåöÜëáéí, ôi PPP ÷ñþóôç èá áíáö Ýñåôåé áðëÜ ùò **ppp** áêðöüò êáé áí ÷ññéÜæåååé íá áßíåé áéÜñéóç óá ó÷Ýóç iå Üëëi iññéóìéü PPP üðòù ôií **pppd** (iüñí ãéá ôií FreeBSD 7.X). Áêðöüò áí áíáö Ýñåôåé áéáöiññåééÜ, üëëàò ié áíðiøÝò ðiõ áíçäÿíóåé óóí êåöÜëáéí áðöü èá ðñÝðåé íá áêðåééýíóåé ùò root.

## 28.2 ×ñçóéiñiøéþíóåò ôií PPP ×ñþóôç

Áíçìåñþèçêå êáé áâðéóéþèçêå áðii ôií Tom Rhodes. Áñ ÷ééP óððééóöiñÜ ôiõ Brian Somers. Ìå ôç aíPèåéá ôùí Nik Clayton, Dirk Frömberg, êáé Peter Childs.

**Ðññéäéäiñiøéþóç:** Áðü ôií FreeBSD 8.0 êáé iåðÜ, ôá iññìáôå óððéååôþí ãéá ôéò óåéñéáéÝò èéñåò iåðiññÜóôçêáí áðü /dev/cuadN óá /dev/cuaun êáé áðü /dev/ttynN óá /dev/ttyun. Íé ÷ñþóôåò ôiõ FreeBSD 7.X èá

÷ ñåéáóôåß íá ðññóáñìüóïõí ôéò ðáñáêÜòù ïäçãßåò óýìöùíá ìå áôôÝò ôéò áéëáãÝò.

## 28.2.1 PPP × ñþóôç

### 28.2.1.1 ĐñïûðïèÝóåéò

Ôi êåßìåíí áðôü ðñïûðiè Ýôåé üôé Ý÷ åôå ôá ðáñáê Üôù:

- Eiðaáñéáóíü ó á ÆÜðiíei Ðáñí ÷ Yá Óðçñâóéþí Internet (ISP) óðií iðiþí ðófáYåóðå ÷ ñçóðiíðiðpíóð PPP.
  - já modem þ Üeëc óððéâðP óðfääiÝíc óðií óýóðçíá óáð, eáé ñððiðiÝíc óùðóðÜ þóðå íá óáð áðéðñÝðåé íá óðfääððóð óðií ISP óáð.
  - Óiðo áñðeëiýð êëÞóðò ãéá ðií ISP óáð.
  - Ói üññá ÷ ñÞóðc (login) eáé ðií èùäéêü óáð (password). Åßóð eáññíéêü üññá eáé èùäéêü (óýðið UNIX) þ Yíá æåýáðò iññláðiò / èùäéêiy óýðið PAP þ CHAP.
  - Óéð IP æáððéýíðáæð ãiñð P Þ ððñéóðüðáññí æáðññéðóðþí iññÜðùí (DNS). ÓððéðiññéðÜ, i ISP óáð eá óáð äþðóðé äýí ðYóðéðæð æáððéýíðáæð. Áí ãáí Y÷ððóð ðiððeÜ ÷ éðóðií lðbá, iðiññðóð íá ãiðññéððóð enable dns óðií ppp.conf eáé ðií ppp eá ñððiðñðóð ðiðð ðeá ñððiðñðóð Yó ìññÜðùí ãéá óáð. Ói ÷ ðññéððóðéêü áððu ãiñññðÜðáé áððu ðçí ðððiðPññéðc ððc æáðññáññÜððóð ðeá ñððiðñðóð DNS áððu ðií ISP óáð.

Í ISP óáò áíåå÷ iiÝíùò íá óáò äþóåé êáé ôéó ðáñâéÜôù ðëçñiöiñþåò, áëeÜ ááí áßíáé áíóåëþò áðáñáßþôçôåò:

- Ôc æáyéðóiç IP ãéá ôcí ðýëç (gateway) ôiô ISP óáô. Ç ðýëç ábbíáé ôi ìç ÷ Üíçíá iÝóù ôiô iðiñþiô oóñiaÝáôôå, êáé èá áðiôåëÝóåé ôcí ðñiâðeëåñiÝíç æéáññiP (default route) æáá ôi ìç ÷ Üíçíá óáô. Áí åáí Ý ÷ áôôå aôôôP ôcí ðëçññiñþá, èá ÷ nçóeiñiðiçéåß iéá æéiiéêP, êáé üôôáí oóñiaâåèåôôå èá ëÜââôôå ôcí êáiiéêP æéáyéðóiç áðü ôiô æáêñiñôôP PPP ôiô ISP óáô.

ÁðôP ç æéåyèõíóç IP áíáöÝñåôáé ùò HISADDR áðü ôi ppp.

- Óc i Üóéá äéêôýíö (netmask) ðiö ðñ Ýðåé íá ÷ñçóëiiðiéPóåô. Áí i ISP óåò äå óåò ôçí ðáñ Ý ÷åé, iðiñåßôå íå áåö Üéåéá íá ÷ñçóëiiðiéPóåô ôçí ðéíP 255.255.255.255.
  - Áí i ISP óåò ðáñ Ý ÷åé óôåôéëP äéåýëöíöc êáé üññá ððiëiæéööP (hostname) iðiñåßôå íá ÷ñçóëiiðiéPóåô áåðÜ. ÄéaoññåôéëÜ, eá aöPóïòiä öiñ aðññéññööi Ýñ ððiëiæéööP íá äþóåé üðiéá äéåýëöíöc IP eåùññåß eåô Üéëçëc.

Áí óáð ëåßðiðí êÜðiéáð áðü ôéð áðáéöýìåñðò ðëçññiñßåò, åðééïéíùÍÞóôå ìå ôii ISP óáð.

**Óciàñúóć:** Óá iëüêéñç ñóćí ðáññýóá áñüñöçöá, ðëëëü Áðü òá ðáñáäåññáìáòá ðïò ãäñ-÷íñòí òá ðáññéá-÷-ùiajáí òuí áñ-÷åñùí ññöèìßóåùí, åñíáé áñéèìçíÝíá áíÜ ãñáìíþ. Íé áñéèìß áðööíß áññöçñåñöiyí óóćí ðáññöóßáóć êáé ôç óðæññöçöç ñóćí ññöèìß áññáäåññáìáòí, êáé áñí ðññÝðáé íá ãñáööiyí ïYóá óóí ñññáññáééü áñ-÷åñí. Åññáé áññöçöç ñóćí ññöèìß áññáññáééü íá ñññöçñåñööå ç óùóôôþ óóïß-÷éóç óá ñññéá áñ-÷åñí, lâ ôç-÷ñþóć óóçëëåñþí (tabs) êáé êåñþí áññáññáééü.

### 28.2.1.2 Áõôüìáôç Ñýèiéóç PPP

Ôüöi ôi ppp üöi êáé ôi pppd (ç ðëiðiñçóç ôiõ PPP óå åðBðåäi ðõñPíá, iüñi ôi FreeBSD 7.X) ÷ñçóéiðiñíyí óá áñ÷åßá ñõèiñóåùí óôiñi êáôÜëáï /etc/ppp. Íðiñåßôå íá âñåßôå ðáñáäåßâiáôå ãéá ôi ppp ÷ñPóôç óôiñi êáôÜëáï /usr/share/examples/ppp/.

H ñýèiéóç ôiõ ppp áðáéôåß ôçí ôññiðiñçóç åíüò áñéèiý áðü áñ÷åßá, áíÜëáäi åå ôéò áðáéôPóåéò óáò. Ôi ôé èá åÜëååå óå áðoÜ, åiññóÜôåé óå Ýíá ðiññóðü áðü ôi áí i ISP óåò áðiñåßâåé óôáôéê Ýò äéåñðeýíøåéò IP (äçë. óåò ðáñÝ÷åé ìéá äéåýèoíóç IP ç iðiñá åáí áeeÜæåé) P äðiñåéê Ýò (äçë. ç IP äéåýèoíóç óåò áeeÜæåé êÜëå öiñÜ ðiñ õññáYåóåå óôiñ ISP óåò).

#### 28.2.1.2.1 PPP êáé Óôáôéê Ýò Äéåñðeýíøåéò IP

Èá ÷ñâáóôåß íá ôññiðiñPóååå ôi áñ÷åßí ñõèiñóåùí /etc/ppp/ppp.conf. Èá ðñÝðåé íá iieÜæåé åå áññü ðiñ õáßíååé ðáñáêÜôù:

**Óçìàßùóç:** Íé åññáiñÝò ðiñ ðâéåéþíñí iå : ïåééñíyí óôçí ðñþôç óôþëç (áñ÷þ ôçò åññáiñþò) — üéåò ié Üëéåò åññáiñÝò èá ðñÝðåé íá óóïé÷éóëiýí iå ôiñ ôññü ðiñ õáßíååé, iå ôç ÷ñþôç êáíþí þ óôçëièåðþí.

```

1      default:
2          set log Phase Chat LCP IPCP CCP tun command
3          ident user-ppp VERSION (built COMPILEDATE)
4          set device /dev/cuau0
5          set speed 115200
6          set dial "ABORT BUSY ABORT NO\\sCARRIER TIMEOUT 5 \
7              \" AT OK-AT-OK ATE1Q0 OK \\\dATDT\\T TIMEOUT 40 CONNECT"
8          set timeout 180
9          enable dns
10
11     provider:
12         set phone "(123) 456 7890"
13         set authname foo
14         set authkey bar
15         set login "TIMEOUT 10 \"\"\\\"\\\" gin:--gin: \\U word: \\P col: ppp"
16         set timeout 300
17         set ifaddr x.x.x.x y.y.y.y 255.255.255.255 0.0.0.0
18         add default HISADDR

```

Åññáiñþ 1:

Áíññáñùñßæåé ôçí ðññáðééååñÝíç êáôá÷þñéóç. Íé åññáiñÝò óå áðôP ôçí êáôá÷þñéóç åéôåëiýíóåé áõôüìáôå, üôáí åéôåëåßôåé ôiñ ppp.

Åññáiñþ 2:

Áíññáñðiñéåß ôçí êáôáññáöP (logging) ôuì ðáññáññóñùí. ¼ôáí ié ñõèiñóååéò ðiñ Ý÷iñí åßíåé äééññññíyí ëéåññðiñéçóééÜ, ç åññáiñþ áðôP èá ðñÝðåé íá iééñýíåé óôçí ðáñáêÜôù:

```

set log phase tun
äéá íá áðiñöåö÷ëíyí iååÜëá iååÝèç óôá áñ÷åßá êáôáññáöPò.

```

### **ÃñáììP 3:**

É Yâé ó dôî PPP ðùò íá ááiåó Yñâé ðëçñïïññbåò áæá ôíí áâðôú ôíð ôðç Üëéç iâñéÜ ôçò óyíââðçò. Ç áéâæéâðbá áðôp ãbíâðâé áí ôî PPP Y ÷âé ðñüâæçìá óôçí áæáðñâai Üðâðôóç êáé iëièëññûóç ôçò óyíââðçò, ðâñ Y ÷iñôâò iâ áðôú ðíi ôñüðí ðëçñïïññbåò ôðñâéññðí Y ñí áéâ ÷âéññðôp. Ié ðëçñïïññbåò áðô Y ðiññâb fá ábíâé ÷iñpøéiâò ôðçí áðbñéðôóç ôiñ ðññâëñiaóïò.

AñáììP 4:

Áíááiññæåé ôç óõóéåôþ óôçí iïðibá åßíáé óõíäàìÝii ôï modem. Ç óõóéåôþ COM1 åßíáé ç /dev/cuau0 êáé ç COM2 åßíáé ç /dev/cuaul.

AñáììP 5:

Êäæíñßæå ðíçí ðá : ÿðôçôá íà ðíçí iðíßá åðééòìåßôá íà ñöññåâéßôá. Áí åái èäéòíññåâß ç ðéíß 115200 (ç iðíßá ðñ Ýðåéå íà èäéòíññåâß íà êÜéå ð : åðééÜ ÿðå ÷ ñiiñ modem), äïééÜóðå íà 38400.

ÃñáììÝò 6 & 7:

Ôi áëöáñéèìçôéü ðíð òá ÷ñçóëiiðíéçèåß áéá ôçí éëþóç. Ôi PPP ÷ñþóôç ÷ñçóëiiðíéåß óýíóáîç expect-send ðáñüüííéá ìá áôôP ðíð ÷ñçóëiiðíéåß ôi ðñüâññáìá chat(8). Äåßôå ôç óåëßäá manual áéá ðëçñïòññåð ó÷åôééÜ ìá ôéò áðñáûñôçôåð áôôPò ôçò áëþóåð.

Óciáéþóôå üôé áôôP ç áiôïëP óñia÷ßæåé óôçí åðüìäíç ãñaiiP áéá èüäiõõ áíáaiùóéiüöçôáò. Áôôü iðiñâß íá áßíåé óå êÙëå áiôïëP ðiõ ppp .conf, åðüöií òiÿ ñ áßíåé i ôäéåðôáßiò ÷áñâéôÞñiàò ôcò ãñaiìPò.

ÑájìP 8·

Êáéiñßæåé ôï ÷ñüïî ôåñìåôéöiy ëüäù áäñÜíáéåò ôçò óýíäåóçò. Ôá 180 ååôôåñüëåðôå åßíáé ç ðñiñåðééëåai Ýíç ôéïþ. Ýóóé c åñáïiþ åñôþ åßíáé åäh ééåéñÜ aéåéïjöcôéþ.

ÃñáììP 9·

ЕÝåé óóï PPP íá ñùòþóåé ôçí Úëëç ðëäõñÜ ãéá íá åðéâåâáéþóåé ôéó ðíðééÝò ñòèlþóåéò ôïð resolver. Áí åéðååéëåþóå ðíðééü äéåëñéóôþ iññÜôùí (DNS), èá ðñÝðåé íá ìåðåôñÝþóåôå áðôþ ôç ãñâñþ óå ó÷üéëí þ íá ôçí åðéâéñÝðååðå

ÀñáùòB 10·

Êåíß ãñáùß bôôå c áíÜláiùóç ôïõ áñ-åßïõ íá åßíáé ðeí åvêíïçc. Íé êåíÝò ãñáùßYò áãüüívôåé áðii ôi PPP

AÑÁÜB 11·

Áíáâíùñßæåé ôçí êáôá÷ þñéóç áíüð ðáñí ÷ Ýá iå ôí üññá “provider”. Íðiñåßôå åäþ íá ÷ ñçóéiiðiéÞóåôå ôí üññá ôíð ISP óáò þóôáå áññâíüðôññá íá iâééñí Þóå ôç óýññåóç óáò iå ôçí åðéëñþl 1oæd TSP

Annals 12:

ÈÝôåé ôii áñéèìü êëÞóçò áéá áôôü ôii ðáñí ÷ Ýá. Íðiñâßôå íá éáèiñßóåôå ðièeáðeïýò áñéèiïýò êëÞóçò ÷ ñçóeïïðiéþíôå Üùu-êÜùo ôåæåßá (:) P ôii ÷ áñâéôÞñá (|) ùò áéá ÷ ûñéóôéêü. Ç áéäöinÜ lâðôáiy ôùi áÿí áéá ÷ ûñéóôéþí ðâñéæñÜðâôåé ôóï ppp(8). ÐâñééçðôéÜ, áí èÝéåôå íá áïïéêÜæïïôåé êôéèéêÜ iüëi ie áñéèiïß, ÷ ñçóeïïðiéÞóôå ñçí Üùu-êÜùo ôåæåßá. Áí èÝéåôå íá áßíåôåé ðÜiòiôå áðüðâéñá êëÞóçò ôiõ ðñþöiõ áñéèiïý áéá ie òðüüëiéðiie íá áïïéêÜæïïôåé iüüí áí i ðñþöiõ áðiðý ÷ áé, ÷ ñçóeïïðiéÞóôå ôi ÷ áñâéôÞñá ðáñí ÷ Ýôåðóçò. Íá añÜôåôå ðÜiòiôå üëi ôi óýïïei ôùi ôceâöùiéþí áñéèibí lâ ôi ôñüüdi ðiø óåþâñôåé.

Áí ãñéèìùò ôçëåöþþíò ðåñéÝ-åé êáîÜ, èá ðñÝðåé íá ôííï ðåñéèëåßòåðå òå áéðåäùåééÜ ( " ). Ç ðåñÜëåéøç öiñòò, áí êáé åßíáé åðéü óöÜëíá, iðiñâß íá ðñíêáéÝóåé ðñíâéÞíáðå ðiòò äáí iðiñíýí íá áiöiðéööiyí áyétiéá.

## Àñâìì Ýò 13 & 14:

Áíááíññßæåé öii üññá ÷ñPöôç êáé öiiý êüäéêü öiö. ¼öáí ööñäÝåóôå ÷ñçöéiiðiéþíöå ðñiiöñiðP öýðiö UNIX, ié öéiÝö áööÝö áíáöÝññöåé áöü ôçí áíöiëP set login ÷ñçöéiiðiéþíöå öeö iåöåâéçöÝö |U éáé |P. ¼öáí ööñäÝåóôå iå ÷ñPöç PAP þ CHAP, ié öéiÝö áööÝö ÷ñçöéiiðiéiyíöåé ôçí þñá ôçöþ ðéööðiðiñçöçö ðáööðüöðçöå öiö ÷ñPööç.

AñáììP 15:

Áí ÷ ñçóéiiðíéåßôå PPP P CHAP, ääí èá ððÜñ÷åé óöi öçíåßí áðôü ðññiöññðP åéöüäiö (login), êáé èá ðñÝðåé íá iåôáôñÝøåôå ôç ãñâiñP áôôP óå ó÷üëei P íá ôçí áðåéñÝóåôå. Ååßôå ôçí Déóöiðiñçóç PAP êáé CHAP äéá ðåñéóöüôðåññå ëäðòññÝñåéå.

Ói áéöáñéèìçôdêü áéöüäïõ ÷ñçóëïïéâß óyíðâïç ðáññüïïéá iå ôi chat(8), üðùò óðìâáßíåé êáé iå ôi áéöáñéèìçôdêü eëþóçò. Ói ðáñÜáâéäïå iåò, ôi áéöáñéèìçôdêü ÷ñçóëïïéâßôáé æáá iéá ððçñâóßá óôçí ïðiþá ç óðíâáñßá åéöüäïõ iïéÜæåé iå ôçí ðáñáéÜò:

```
J. Random Provider  
login: foo  
password: bar  
protocol: ppp
```

Èá ÷ñâéáóôåß íá áéëÜäôå áôôü ôi script áíÜëíäá íà ôeò áíÜäéåò óåò. ¼ôáí ãñÜöåôå áôôü ôi script ôçí ðñþöç ôïñÜ, áââáéùèåßôå üöé Ý÷åôå áíâñäiðieÞôåé ôi áñ÷åßí êâôáãñáöÞò ãéá ôi “chat” þóôå íá ïðiñâßôå íá ðñiøáéiñßôåôå áí ç æäáééåóßá áíâñíþñéóçò ðñi÷ùñÜäé óuóôÜ.

AñáììP 16:

ÈÝôáé òí ÷ñüíí áäñÜíåéáò (óá äåôôåñüëåðôá) áæá ôç óýíåäöç. Åäþ, ç óýíåäöç èá èéåßöåé áôöùìådá áí äái ððÜñ ÷åé ëßíçöç áæá 300 äåôôåñüëåðôá. Áí äái èÝéådá íá åßíådáé ðïöÝ ôåñlådöéòiùö ôçò óýíåäöçò èüäú áänÜíåéáò, èÝóôá áôôÞ ôç ôéïÞ óá íçäÝí, þ ÷ñçöéiiðïéÞöôá ôçí åðééïäÞ -ddial óôç áññäiÞ åíðééÞö.

AñájìP 17:

ÈÝôåé ôç æéâýèoíóç ôçò æéâðåòþò. Ôï æööanéèìçöéêü x.x.x.x èá ðñ Ýðåé íá áíðééåðåóðåéåß iå ôç æéâýèoíóç IP ðiø óåò Ý÷åé åðíïæåß åðü ôïï ðáññi÷Ýá óåò. Ôï æööanéèìçöéêü y.y.y.y èá ðñ Ýðåé íá áíðééåðåóðåéåß iå ðçíi æéâýèoíóç IP ðiø Ý÷åé êaëñiþboåé i ISP óåò ùò ðýëç (gateway, ôïï lç÷Úíçìå ôöii iðiþi ôööñäÝåðôå). Áí i ISP óåò åâíi óåò Ý÷åé åþþóåé æéâýèoíóç ðýëçò, ÷ñçóéiiðiéÞóåð ðçí 10.0.0.2/0. Áí ðñ Ýðåé íá ÷ñçóéiiðiéÞóåð åieá IP æéâýèoíóç ðiø Ý÷åôå “íaiôÝøåé”, åââåéùeåßò ùiôé Ý÷åôå åçíëiññäÞóåé ieá êåðå ÷þñéóç ôöii /etc/ppp/ppp.linkup öýiöùíá iå ðéò iðçåßåò åéá ôï PPP éæé ÅðiñâíéÝò IP Äéâððéýiåéò. Áí ðáññæåßòåð åðôþ ôç ãñâiþ, ôï ppp åâíi èá iðiññåß fá åéðåéåðóåß óå êåðÜóðåóç -auto.

AñáììP 18:

Đññiòè Ýóôå iéá ðññiâðéèäâí Ýíç áæáâññP (default route) ðññiò ôi ıç÷ Üíçjá ðýéçò (gateway) ôiõ ISP óáô. Ç áæáéêP è Ýíç HISADDR áíôééâèþóôáôáé iá ôçí áæáýèöíóç ðýéçò ðiõ êáèïñþæâôáé ôôç ãñâiìP 17. Åßíáé óçíáíôéêü ç ãñâiìP áôôP íá àiøáíþæâôáé íâôÜ ôçí ãñâiìP 17, áæáöññôéêÜ ôiõ HISADDR äái èá Ý÷ áé áéüia èÜââé áñ÷ ééP ôiñP.

Áí ááí áðééöìåþóå íá áðóðæÝóåðå öi ppp óå êáóÜóóáóç -auto, èá ðñÝðåé íá ìåðáééÍþóåðå áðóþ óç áñáìíþ óði áñ÷åßí ppp.linkup.

Ááí ábíráé áðáññáþþóçö íá ðþííøé Ýóåôáð éáóáð þíñéóç óðíí áñ ÷ áðíí ppp . linkup üððái Ý ÷ áððáð óððáðééþ áéáýéðíóç IP éáé áððáðéëáþðóå öíí ppp óáð éáð Üððáðóç -auto. Óðíí ðáññþððùñðç áððþ, íé éáóáð ÷ ùñþðóåéò óáð óðíí ðþíáéá ãññíüëäççöð ábíráé óùñðÝð ðññéí éáí óðíññáëáþðáð. Þóùð ùððüöí íá èÝéåôáð íá äçlëéiññþðóåð íéá éáóáð þíñéóç áéá íá áððáðéÝóåôáð éÜðíéá ðññäñÜññáðá ìåðÜ ðçí áðïéáð Üððáðóç öçð öýíññáççöð. Éá öí áíçäPóíññá ðáññúððñá óá Ýíá ðáñÜññéäíá ìå ðíí sendmail.

Ið íñáßðá íá áñáßðá ðáñááßáíáóá áñ ÷ áßúí ñòðííßóáñí óóíí éáðÜéíñí usr/share/examples/ppp/.

#### 28.2.1.2.2 PPP êáé Äöíáiéê Ýò Äéåõèýíóåéò IP

Áí i ðáñi ÷ Ýáð óáð áái áßíáé óóáðéé Ýð æéáðèýíóáéð, ói ppp lðriñáþ íá nñðeíéóðáþ íá æéáðññáàáðåýáðáé óçí ðiðééþ Þéáé òçí áðññáêññóóí Ýíç æéáýèõíóç. Áðóú áßíáðáé "láiðóáýíóð" lëáð æéáýèõíóç IP, ééá áðéóñ Ýðiðóáð óóí ppp íá óçí èÝóáé Ýðåéðá óúðóðÜ, ÷ñçöéñiðíéþíðóáð ói ðññùðóüëðíí IPCP (IP Configuration Protocol) læðóð Ü óç óýíðáðç. Ói áñ ÷ áßí ñðòëíßóðáñi ppp.conf áßíáé ói ßæéti ùiðñò ééá óóí PPP ééá Óóáðéé Ýð Áééáðèýíóáéð IP, íá óçí ðáñáðéÜðóù iutíi áééáðP:

```
17      set ifaddr 10.0.0.1/0 10.0.0.2/0 255.255.255.255 0.0.0.0
```

¼ðuð öðaé ðñiçiaiði Ýfuð, aðaí ðñÝðaé ía ðâñeeÜðâðô ðiír áññéèiù aññáiiÞð. Áðaéðâðôáé ðiði ÷ Þ aðiðuð ðiðeÜ ÷ éóðiír éaññý aæáðoÞiaðið.

AñáììP 17:

Í áñéèìüò iåôÜ ôî ÷ áñâôðÞñá / åßíáé ôî ðëÞëìò ouí bits ôçò äéåyëoïçò áéá ôî iðiÞí èá åðéiåßíáé ôî ppp. °ouò èÝéåôå íá ÷ ñçóéiiðiÞóåôå áñéèìüò IP ðéi éåôÜëeçëiòò áéá ôçí ðåñßóôåóç, áéëÜ ôî ðáñÜääéaiá ðiò äßiiòiå ðåñáôðÜùu èá éäéöiññÞóåé ðÜiôá.

Ói ôåëäôåßí üñéóíá (ói 0.0.0.0) ñéáé óoii PPP íá áñ ÷ßóåé ôéò äéåðñáìåóýóåéò iå ôçí äéåýéöíóç 0.0.0.0 áíôß åéá ôçí 10.0.0.1. Áôöü åßíáé áðåñáßöçöi óå iñéóíÝíïöö ISP. Íç ÷ñçöéiiðiéÞóåôå ói 0.0.0.0 ùò ðñþöi üñéóíá óoçí set ifaddr, êáèþò eá àìðiäßóåé ôçí PPP íá ñõèìßóåé ôçí áñ ÷êéþ æéáññíþ óoçí êáôÜóôáóç -auto

Áí äáí ÷ ñçóëiiðíëåßôå ôcí áðéëïäP -auto, éá ÷ ñåéåóôåß íá äçíëiõñPôåðå ìéá êåôå ÷ þñéóç ôöí áñ ÷ åßí /etc/ppp/linkup. Óí áñ ÷ åßí ppp.linkup ÷ ñçóëiiðíëåßôåé låðÜ ôcí áðiêåðÜôåðåç ôçò öýíåðåçò. Óöí ôçí åßí áðöü, ôí ppp éá Ý÷åé Päç áðiäþóåé äéåÿéöíç ôöçí äéåðåðöP êåé èá åßíáé ðëÝíí äöíåðüí íá ðñiöé Ýôåðå ôéð êåôå ÷ ûñþôåéö ôöii ðßíåéå äñiiÿëüäççò:

```
1     provider:  
2         add default HISADDR
```

ÃñáìùP 1·

AñáììP 2:

Ç ãñâìíP áôòP ëÝåé óôï ppp íá ðñïóèÝóåé íéá ðñïåðéëåäíÝíç áéåäñííP ç iðiñá íá äåß ÷ íåé óôï HISADDR. Ôí HISADDR éá áíöééååóåéåëß íá ôç áéåýéòíóç IP ôçò ðýéçò üðòù áôòP áðíüäçéå íÝóù ôïò ðñùöîéüëéïò IPCP.

Äåßöå öçí êådå ÷ pñeoç pmdemand ööå åñ ÷ åßá /usr/share/examples/ppp/ppp.conf.sample êåé /usr/share/examples/ppp/ppp.linkup.sample æåá Ýíå ðei ëåðöñiñåñ Ýò ðåñ Üääéäia.

### 28.2.1.2.3 Æþøç Åéóåñ÷üìåíùí Æëþóåùí

¼ðáí ñòëèñæåðó áí **ppp** íá èáïâÜíåé áéðoåñ ÷ üìláñåò êéÞøåéó óá Ýíá iç ÷ Üíçíá ðiö oóñäüÝåðåé óá Ýíá ñiðééü äßéñðöí (LAN), èá ðñÝðåé íá áðïøáóßøåðó áí èÝéåðó íá ðññùëýíóåé ðåðéÝðå ðññìò áðoóü. Áí íáé, èá ðñÝðåé íá áðïäþøåðó óóír iç ÷ Üíçíá iéá áéåýéññíóç IP ç iðiñßá íá áíÞøåé óóíßæí ðöñäßéñðöí íå óí LAN, éáé íá ÷ ñçóéiiðiéÞøåðó òçí áíññéÞ enable proxy óóí áñ ÷ åßí /etc/ppp/ppp.conf. Éá ðñÝðåé áðßøçò íá áðéååññéÞøåðó üðé óí áñ ÷ åßí /etc/rc.conf ðáñéÝ ÷ áé óá ðáññéÜóú:

```
gateway_enable="YES"
```

#### 28.2.1.2.4 Đĩéї getty;

Ç áíüôcôá Õðçñâóþá Åéóüäiõ ïÝóú Åðéëiæéþò Óýíáåóçò (dial in) ðánÝ ÷ åé ìéá êáéþ ðåñéäñáöþ ó÷åôéêÜ ìå ôçí áíññäiðiþçcós õðçñâóðéþí åðéëiæéþí êëþðåúí ÷ ñçóeiðiþíðå ôçí getty(8).

Íléá áíáëéáêôéêþ óóçí getty áßíáé ç mgetty (<http://mgetty.greenie.net/>) (áðü ôi ðâéÝ ôi comms/mgetty+sendfax),  
íéá ðéíÝíðíç Ýéâíöç ôçò getty, ç iðíßá Ý÷åé ó÷âæáóôåß ãéá íá ëâíâÜfáé ððüþéí ôéð åðçëíæéÝò ãñâíìÝò.

Óá ðeáiíðæðóþláðá óçò mgetty áßíáé üöé áððeëíéíùíáþ áíáññá Ü íå óá modem, ói iðiþi óciàßíáé üöé áí ç èýñá áßíáé áðáíáññiðíçí Ýíç óóí /etc/ttys, ói modem óáð ááí èá áðáíðóÞáé óóçí èéþóç.

Íåôáâái Ýóâñâò åéäüóåéò ôçò mgetty (åðü ôçí 0.99beta êáé íåôÜ) öðiööçñßæiöi åðßóçò áôôùïáôç áíß ÷ íåôç PPP streams, åðéöñ Ýðiööåo ôöiöö ðäëÜðåò óåò ðñüöáåóç ôöii åòðçñâôçP ÷ ûñßò ÷ ñþç scripts.

ÄéááÜóðå ðcí áíüöôçå Mgetty éáé AutoPPP áéá ðâñéöðóñüðâñå ðcëññïòññBåð ðcí áíüöôçå Mgetty.

### 28.2.1.2.5 ¶ääåéåò ãéá ôï PPP

ÖödöéetiäééÜ, ç åêô Ýëäóç ôçð åíôïëÞò ppp ðñÝðåé íá åbíñâðåé ùò ÷ ñÞóðçò root. Áí ûòðüóí èÝëâðå íá åðéññÝøðåå õçí åêô Ýëäóç ðïõ ppp óå éåðÜðôåóç åíðçñâðçôÞ ùò éåíñééüò ÷ ñÞóðçò (íå õíï ôñüðï ðiõ ðåñéññÜðåðåé ðáñâéÜðù) éå ðñÝðåé íá äþóðåå óå åðôü õï ÷ ñÞóðç óå éåðÜëëçéå äééåéþiáðå áéå íá åêðåðéåß õï ppp, ðñiøéÝðíðåò õï óðçí ñÜää network óóï áñ ÷ åßii /etc/group.

Èá ðñÝðåé åðþóçò íá ôiõo äþóåôå ðñüóâåóç óå Ýíá P ðåñéóóüôåñá ôìþíáóå ôiõo áñ÷åßiõ ñõèìþóåùí, ÷ñçóéiiðiéþíôåò ôçí åíöiëP allow:

allow users fred mary

Áí ÷ñçóéïðíéÞóåôå ôçí åðééïäÞ áôôÞ óôï ôïÞíá default, èá äþóåôå óå áôoiýò ôïõò ÷ñÞóôåò ðñüöåâáóç óå üëåò ôéò ñôëìßóåéò.

#### 28.2.1.2.6 Èåëýöç PPP ãéá × ñþóôåò ìå ÄõíáìéêÜ IP

ÄçìéïöñäÞóôå Ýíá áñ÷åßí iå ôi üññá /etc/ppp/ppp-shell ôi iðißí íá ðåñéÝ÷åé ôá ðáñåêÜôú:

```
#!/bin/sh  
IDENT='echo $0 | sed -e 's/^.*-\(\.*\)$/\1/'  
CALLEDAS="$IDENT"
```

```
TTY='tty'

if [ x$IDENT = xdialup ]; then
        IDENT='basename $TTY'
fi

echo "PPP for $CALLEDAS on $TTY"
echo "Starting PPP for $IDENT"

exec /usr/sbin/ppp -direct $IDENT
```

Ôi script áôôü èá ðñÝðåé íá áßíáé áêôâë Ýóëii. ÄçìëññäÞóôå ôþñá Ýíá óôïâiëéêü áâóïü ðiõ íá iññÜæâôáé ppp-dialup ÷ ñçóëiiéþíôå ðeò ðáñáéÜòù áîöiëÝò:

```
# ln -s ppp-shell /etc/ppp/ppp-dialup
```

Èá ðñÝðåé íá ÷ñçóëiiðièÞóåôå áôöü öi script ùò öi èÝëööìò ãéá üëiòò öiòò dialup ÷ñÞóåôå. Åäþ öáßíåôáé Ýíá ðáñÜäåéâíá ðiò /etc/passwd ãéá Ýíá ÷ñÞóôç dialup ià üññí pchilids (èðiçèåßôå üôé äâí ðñÝðåé íá ôññiðièåßôå Ülåóå öi áñ ÷åßí öùí êuäéébi, áeëÜ iÝóù öcò åiôïëÞò vipw(8)).

**pcchild1:1011:300:Peter Childs PPP:/home/pcchild1/etc/ppp/ppp-dialup**

ÃçıëiöññPôðâ Ýíá êåðÜëtiä /home/ppp ðññóâÜóëii ãæá áíÜáñúòç áðü üëtiðo, i iðiñßiò èá ðåñéÝ ÷ áé ôá ðáñáêÜðù ñâññiñ ñâññiñ

```
-r--r--r-- 1 root      wheel          0 May 27 02:23 .hushlogin  
-r--r--r-- 1 root      wheel          0 May 27 02:22 /etc/hosts
```

Ôá iðjibá áàðjäþæjöí ôcí áàjö Üréóç öiðj ìcivýáôjò áðü öi áñ÷åßí /etc/motd.

282127 Èåëëvöç PPP ãéá × ñþóôåò ìå Óôáôéêü IP

Àçìèïöñäþòå ðî áñ-÷ áßíí ppp-shell üðùò öáßíåðáé ðáñáðÜù, êáé áæá èÜëå ëíâáñéåòíü íå óðåðéêü IP, àçìèïöñäþòå ÿíé ðóðåñéåòíü íåñü ðíñò ðî ppp-shell.

Áéá ðáñÜääéäíá, áí Ý÷åôå ôñåéò ðåéÜôåò dialup, ôíõò fred, sam, êáé mary, óôíõò iðiþiõò åêôåéåßôå äñíiiëüäçóç /24 CIDR. èá ðñÝðåé íá ãñÜøðåôå ðá ðáñäéÜôù:

```
# ln -s /etc/ppp/ppp-shell /etc/ppp/ppp-fred  
# ln -s /etc/ppp/ppp-shell /etc/ppp/ppp-sam  
# ln -s /etc/ppp/ppp-shell /etc/ppp/ppp-mary
```

Áéá êÜéå ëíááñéáóíü ÷ñÞóôç dialup, èá ðñÝðåé íá ññöèléóôåß öi êÝéooïò óöi óöïláiëéëü äåöíü ðiõ áçlëiõñäÞèçéå ðáñáðÜíü (áéá ðánÜáâéäíá íi óöïláiëéëü äåöíüò áéá öi êÝéooïò öiõ ÷ñÞóôç mary èá ðñÝðåé íá åßíáé í /etc/ppp/ppp-mary)

282128 Ñýèjéóć ôjōñ ppp conf áéá × ñþóðåò iå Äóíáiéü IP

Ôij áñ÷åñßí /etc/ppp/ppp.conf èá ðñÝðåé íá ðåññéÝ÷åé êÜôé áíôßóôíé÷ü ìå ôí ðåññåéÜôé;

```
default:  
    set debug phase lcp chat
```

```

set timeout 0

ttyu0:
  set ifaddr 203.14.100.1 203.14.100.20 255.255.255.255
    enable proxy

ttyu1:
  set ifaddr 203.14.100.1 203.14.100.21 255.255.255.255
    enable proxy

```

**Óçìàßùóç:** Ç óðïß÷éóç àßíáé óçìáíôéêþ.

Áéá êÜèå óðíäñßá, öiñôþíâôáé ç áíüôçôá default:. Áéá êÜèå ãñáììP dialup ðiõ áíáñäiðíéâßôáé óði /etc/ttys, èá ðñÝðåé íá äçíéiñäÞóâðå íéá êáôá ÷ þñéóç üñíéá íå áðôP ðiõ öáßíâðåé ðáñáðÜñü ãéá òi ttyu0:. ÊÜèå ãñáììP èá ðñÝðåé íá ðáßñíâé íéá iñíáæéêP äéýèðíóç IP áðü òi áðüèâíá òúí IP äéâðèýíóâú ðiõ ðñiñßæííðåé ãéá òiðò ãðíâíéêýò ÷ ñPóâðò.

#### 28.2.1.2.9 Ñýèìéóç ðiõ ppp.conf ãéá ×ñPóâðò íå Óðáðéêü IP

Åêöù ðü ðü ðñéâ ÷ üñíá ðü ðñiñâßñâðò /usr/share/examples/ppp/ppp.conf èá ðñÝðåé íá ðñiñðéÝóâðå íéá áíüôçôá ãéá êáëÝíá áðü òiðò ÷ ñPóâðò dialup óðiðò iðíßíðò Ý ÷ áé áðíäíèâß óðáðéêü IP. Èá óðíâ ÷ ßóíðìå íå ðü ðñÜäâæâíá íå ðü ðü ðñiñðò ÷ ñPóâðò fred, sam, éáé mary.

```

fred:
  set ifaddr 203.14.100.1 203.14.101.1 255.255.255.255

sam:
  set ifaddr 203.14.100.1 203.14.102.1 255.255.255.255

mary:
  set ifaddr 203.14.100.1 203.14.103.1 255.255.255.255

```

Öi áñ ÷ àßí /etc/ppp/ppp.linkup èá ðñÝðåé åðßóçò íá ðñéÝ ÷ áé ðëçñiøiñßåò àñiñíëüâçóçò ãéá êÜèå ÷ ñPóâðç íå óðáðéêü IP (áí áðáéðâðåé). Ç ðáñâéÜðù ãñáììP èá ðñiñðéÝóâé íéá äéâññíP ðñiðò ðç äéýèðíóç äéêðýið 203.14.101.0/24 iÝóù ôçò óýíââðóçò ppp òiðò ðåëÜôç.

```

fred:
  add 203.14.101.0 netmask 255.255.255.0 HISADDR

sam:
  add 203.14.102.0 netmask 255.255.255.0 HISADDR

mary:
  add 203.14.103.0 netmask 255.255.255.0 HISADDR

```

### 28.2.1.2.10 mgetty êáé AutoPPP

Ôi port comms/mgetty+sendfax, Ýñ÷åôáé íå ðñïåðéëåñíÝíç ôçí åðéëïäP AUTO\_PPP, åðéôñÝðíîôå Ýôóé ôôçí mgetty íá áíé÷íåýâé ôçí öÜôç LCP ôùí óðíäÝôåùí PPP êáé íá åèôåëåß åðôüìåôå Ýíá êÝëðöïò ppp. Ùóðüöri, êáèþò íå åðôü òíí ôñüði äåí åíññäiðíåßôåé c ðñïåðéëåñíÝíç åéïëðëåß ííüìåò ÷ñÞóôç êáé êùäéêíý, åßíáé åðáñáßôçôí íá åßíåé ðéóðiðíßçôç ôùí ÷ñçóðþí íå ôç ÷ñÞóç PAP P CHAP.

Ç åíüöçôå åðôP ðñïûðíëÝôåé üöé í ÷ñÞóôçò Ý÷åé ñõëìßôåé, íåðåäëùôôßôåé êáé ååâåôåôôÞôåé íå åðéôô ÷ßå ôi port comms/mgetty+sendfax óóï ÿóôçjá ðið.

Ååâåéñèåßôå üöé ôi áñ÷åßí óåò /usr/local/etc/mgetty+sendfax/login.config ðåñéÝ÷åé ôá ðåñáéÜôù:

```
/AutoPPP/ - - - /etc/ppp/ppp-pap-dialup
```

Åðôü èá ðåé ôôçí mgetty íá åêôåéÝôåé ôi script ppp-pap-dialup æáé ôéò PPP óðíäÝôåéò ðið áíé÷íåýèçéáí.

ÄçíëiñäÞôåå Ýíá áñ÷åßí íå ôi üññá /etc/ppp/ppp-pap-dialup ôi iðíßí ìá ðåñéÝ÷åé ôá åêüëiðëå (ôi áñ÷åßí èá ðñÝðåé íá åßíáé åêôåéÝôéii):

```
#!/bin/sh
exec /usr/sbin/ppp -direct pap$IDENT
```

Åéá êÜëå åññäiP dialup ðið åßíáé åíññäiðíéçíÝíç óóï /etc/ttys, äçíëiñäÞôåå íéá åíðßôôïé÷ç êåôå÷þñéôç óóï áñ÷åßí /etc/ppp/ppp.conf. Ç êåôå÷þñéôç åðôP iðíñåß íá óðíñðÜñ÷åé ÷ùñßò ðñüüëçìá íå åðôÝò ðið iñßôåíå ðåñáðÜñ.

```
pap:
  enable pap
  set ifaddr 203.14.100.1 203.14.100.20-203.14.100.40
  enable proxy
```

ÊÜëå ÷ñÞóôçò ðið åéóÝñ÷åôáé íå åðôü ôíí ôñüði, èá ðñÝðåé íá åéåðÝôåé üññá ÷ñÞóôç/êùäéêü óôï áñ÷åßí /etc/ppp/ppp.secret. ÅíæëåêôééÜ, iðíñåßôå íá ðñíöéÝôåôå ôçí ðåñáéÜôù åðéëïäP þóôå íá åßíåôåé ðéóðiðíßçôç ôùí ÷ñçóðþí íÝóù PAP íå Üóç ôá ôóïé÷åßá ðið áñ÷åßí /etc/passwd.

```
enable passwdauth
```

Áí èÝëåôå íá åðíäþóåôå óôåôéêü IP óå êÜðíëiò ÷ñÞóôåå, iðíñåßôå íá êåëiñßôåôå ôçí åéåýëðíóç ùò ôñßöi üññéóíå óôï áñ÷åßí /etc/ppp/ppp.secret. Åéá ðåñáäåßäiåôå, ååßôå ôi áñ÷åßí /usr/share/examples/ppp/ppp.secret.sample.

### 28.2.1.2.11 ÅðåéôÜóåéò MS

Åßíáé äðíáôüí íá ñõëìßôåôå ôi PPP þóôå íá ðåñÝ÷åé åéåðëýíóåéò DNS êáé NetBIOS êáôÜ åðåßôçôç.

Åéá íá åíññäiðíéÞôåôå åðôÝò ôéò åðåéôÜóåéò íå ôçí Ýëäïöç 1.x ôi PPP, èá ðñÝðåé íá ðñíöéÝôåôå ôéò ðåñáéÜôù åññäiÝò ôôï ó÷åôéêü ôíÞíá ôi /etc/ppp/ppp.conf.

```
enable msexnt
set ns 203.14.100.1 203.14.100.2
set nbns 203.14.100.5
```

Åéá ôi PPP åðü ôçí Ýëäïöç 2 êáé ðÜñ:

```
accept dns
set dns 203.14.100.1 203.14.100.2
set nbns 203.14.100.5
```

Ôí ðáñáðÜù èá áíçìâñþóáé ôíðò ðåéÜôåò áéá ôíí êýñéí êáé áåðôåñâýííóá áíððçñåðçôP DNS, êáé áéá ôíí áíððçñåðçôP ímíÜôúí NetBIOS.

Áðü ôçí Ýêäïöc 2 êáé ðÜù, áí ðáñáëåéöèåß ç ãñáìlP set dns, ôí PPP èá ÷ñçóéïïðïéÞóåé ôéò ãñáìlÝò ðið èá áñåé ööí /etc/resolv.conf.

### 28.2.1.2.12 Ðéóðïðïßçóç PAP êáé CHAP

ÊÜðïéïé ISP ñðèìßæïöí ôá óðóôPìáðá ôíðò iå ôÝðiéí ôñüðí, þóôá ôí êíñÜðé ôçò óýíäåóçò ðið áó ÷íëåßôåé iå ôçí ðéóðïðïßçóç ôíð ÷ñÞóôç íá áßíäåé íÝóù ôúí íç ÷áíéóíþí PAP P CHAP. Áí óðiâáßíåé áðóü óôç áééP óáò ðåñßðôùóç, í ISP óáò ááí èá óáò óðåßéåé ðñiðñüðP login üðáí óðíäåéåßôå, áéëÜ èá áñ ÷ßóåé áðåðèåßåò ôç iåðÜäïöc PPP.

Ôí PAP áßíåé ééäüðåñí áðöáëÝò áðü ôí CHAP, áéëÜ ç áðÜëåéá áäí ãßíåé ôüöí óðiðäåßí èÝíá, êáèþò ié êùäééïß (áí éáé óðÜëííöåé ùò éáñííéêü êáßíåñí) iåðåäåßäíöåé iüñí iÝóù óåéñéåêPò ãñáìlPò, ôóé ááí ððÜñ ÷åé ðñáâíáðééP áðíåðüðçôá ôúí crackers íá “êñðöáåéýíöíð”.

×ñçóéïïðïéþíöåò ùò áíáòiñÜ ôéò áíüðçôåò PPP êáé ÓðåðéêÝò Äéåðèýíóåéò IP P PPP êáé ÄðíáéêÝò Äéåðèýíóåéò IP, èá ðñÝðåé íá áßíiöí íé ðáñáéÜôù áéëááÝò:

```
13      set authname MyUserName
14      set authkey MyPassword
15      set login
```

ÃñáìlP 13:

Ç ãñáìlP áðôP êáèñßæåé ôíí üññá ÷ñÞóôç áéá ôá PAP/CHAP. Èá ÷ñåéáðååí íá áéóÜååðå ôçí óùóôP ôéíP áéá ôí MyUserName.

ÃñáìlP 14:

Ç ãñáìlP áðôP êáèñßæåé ôíí êùäééü áéá ôá PAP/CHAP. Èá ÷ñåéáðååí íá áéóÜååðå ôçí óùóôP ôéíP áéá ôí MyPassword. òóùò èÝéåðå íá ðñiðøéÝóåðå iéá áéüñí ãñáìlP, üðùò ôçí ðáñáéÜôù:

```
16      accept PAP
P
16      accept CHAP
```

áéá íá áßíåé óáñíñP ç ðñüèåðç óáò, ùðóüöí ôüöí ôí PAP üöí êáé ôí CHAP áßñííöåé áåéðÜ áðü ðñiððéëíñP.

ÃñáìlP 15:

Í ISP óáò ááí èá áðáéðåß öððóéëíëéÜ íá áéóÝëéåðå óðíí áíððçñåðçôP áí ÷ñçóéïïðïéåßôå PAP P CHAP. Äéá ôí ëüäí áðóü, èá ðñÝðåé íá áðáíáññäïðïéÞóåðå ôí áéöáñéëìçôéü “set login”.

28.2.1.2.13 ÁeëÜæííóáò ¶iåóá ôéò Ñõèìßóåéò ôïõ ppp

Åßíáé áðíáûí íá áðéëíéñúÞróåôå íå ôi ðñüäñâííá ppp êáèþò áâðåëåßþóáé óöíí ðáñáóêÞíéí, áëëÜ iùñí áí Ý ÷ åôå ñõðèìßóáé íéá éáôÜëëçëç áéáñiùóôéêþ èýñá áéá áôðü ôi óéëðü. Áéá íá ôi êÜíåôå áôðü, ðñiøéÝóôå ôçí ðáñáéÜòù ãñáííþ óôéô ñõðèìßóáéô óáð:

```
set server /var/run/ppp-tun%d DiagnosticPassword 0177
```

Áðóði ïäçåâß ôí PPP íá "âéïýâé" óðîé êåèïñéóí Ýíí UNIX socket ôíðô ôíñÍ Á, êáé íá ñùôÜâé ôíðô ðääëÜôåð áéá ôíí êùäéêü ðíð Ý÷åé êåèïñéóâß ðñéí åðéöñÝøåé óçí ðñüöåâáóç. Ôí %d óóí üïñíá, áíðéêåèßóôåâáé ià ôíí áñéèíü ôçò óðóéâðPò tñ ðíð ÷ñçóéiiðíéåßóâé.

Áðú ôç óðóéðíP ðið ñoðeìéðóåß ôi socket, ôi ðñüñáñáìá pppctl(8) iðiñáß íá ÷ñçóéiiðíéçèåß óå scripts lað óá iðiñáß áðééðíåßðóå íá æéá ÷æñéóðóåßðóå ôi ðñüñáñáìá ppp ôi iðiñsi áðóåðåßðóáé Pæc.

28.2.1.3 × ñçóéíïðíéþíóáò ôç Äõíáôüôçôá ìåôÜöñáóçò Äéåõèýíóåùí (NAT) ôïõ PPP

Ôi PPP Ý ÷ åé ôçí ééáíüôçôá íá ÷ñçöéiiðíéÞóåé äééü ôiõ áóùôåñéêu NAT, ÷ùñßò íá áðåéöiyíîåé ié ééáíüôçôåò áíáéåôåýèöíöçò ôiõ ðöñÞíá. Íðíñåßôá íá åíãñäiðíéÞóåôå áôðôP ôç éåéôiõñäßá iå ôçí áéüëiðèç añaíìP óôí  
/etc/ppp/ppp.conf:

nat enable yes

ÁíáééáêôééÜ, ói NAT óiö PPP ìðiñâß íá áíáññiðíéçèåß ìå ôçí áðééïäP -nat óôçí ãñâiP áíóïëþí. Ìðiñâßòå áéüìá íá áÜéâòå ôçí áðééïäP ppp\_nat óöi áñ÷âß /etc/rc.conf. Ç áðééïäP áðòP áßíáé áíáññiðíéçí Ýíç áðü ðñiâðééïäP.

Áí ÷ ñçóéííðíéÞóåôå áôöü ðí ÷ áñâéôçñéóôéêü, íÜéëíí èá âñåßôå ÷ ñÞóéíåò êáé ôéò ðáñâéÜôù åðéëíäÝò ãéá ðí /etc/ppp/ppp.conf, lå ðí ðíßôå åññâïíðíéåßôåé ç ðñíþpçcôç åéóåñ ÷ üìåúí õóñäÝòåùí:

```
nat port tcp 10.0.0.2:ftp ftp  
nat port tcp 10.0.0.2:http http
```

Þ áí äáí åìðéóôåýåóôå êáèüëiõ ôiï åîùôåñéêü äßêôõi:

nat deny incoming yes

#### 28.2.1.4 ÔåëéêéÝò Ñôèìßóåéò ÓôóôÞìáôïò

÷ åôå ðë Ýii ñoëìßóåé ôi ppp, áeëÜ ðöÜñ÷iõí iåñêéÜ áêüìá ðñÜâiáôá ðiõ ðñÝðåé íá êÜíåôå ðñéí íá åßíáé Ýôïëii æáé ëåéöiõñåßá. ¼æá ðåñéëåâÜñiõí ôcí åðåiâññåôßá ôiõ áñ÷åßiõ /etc/rc.conf.

```
hostname= "foo.example.com"
```

Áí i ISP óáò ðánÝ÷åé óóâôééþ IP äéåýëõíóç êáé üïñá, åßíáé iÜëëíí êáéýôåñí íá ÷ñçóéïïðíéþóåôå áôöü ôi üïñá ùò üñá áæä ôi ic ÷ Üíçìá óáò.

ØÜiôå ãéá ôç iåôåâéçöþ network\_interfaces. Áí Ýéåôå íá ñoëìßóåôå ôi óyóôçìá óåò íá êåëåß ôií ISP óåò êåòÜ áðåßöcöc, åååéüèåßöå üöé õðÜñ ÷åé ôóç ëßóåá c öooéåðþ tun0, äæäöññåôééÜ ååéñÝóôå ôci.

```
network interfaces="lo0 tun0"
```

```
ifconfig_tun0=
```

**Óçìâßùóç:** Ç iâôáâéçôp ifconfig\_tun0 èá ðñÝðâé íá åßíáé Üäâáé, êáé èá ðñÝðâé íá äçìéïñâçèåß Ýíá  
áñ÷åßí lâ üññá /etc/start\_if.tun0. Õí áñ÷åßí áôôü èá ðñÝðâé íá ðâñáéÝ÷åé ôçí ðâñáéÜôù áñáíïp:

```
ppp -auto mysystem
```

Õí script áôôü åêôâéâßôáé êáôÜ ôç äéÜñêâéá ñyéïéóçò ôïõ äéêôýïõ, iâêéíþíôáò Ýóóé ôï äáßííá ppp óâ  
êáôÜôâóç áôôüíáçò eäéôïñâßáò. Áí aéâéÝôâôå êÜðíï ôïðéêü äßêôôï (LAN) áéá ôï iðíßí ôï iç÷Üíçíá áôôü  
Ý÷åé ôï ñüëï ôçò ðýëçò, ßóùò íá eÝéâôå åðßóçò íá ÷ñçóéïðíéÞóâôå ôçí åðéëïäp -alias. Äåßôå ôç óâëßää  
manual áéá ðâñéóóüôâñâò èáðôïÝñâéåò.

Åââáéùéâßôå üôé ç iâôáâéçôp æáá ôï ðñüâñáíïá router Ý÷åé ôâéåß óôï NO iÝóù ôçò åðüíâíçò áñáíïp òóï  
/etc/rc.conf:

```
router_enable="NO"
```

Åßíáé óçìáíôéêü íá içí iâééíÞóåé iäáßííáò routed, i iðíßí õóíÞeuò aéâanÜoâé ôéò ðñíäðééâäíÝíåò ôéíÝò ôïõ  
ðßíáéâ äñííïüâççò ðïõ äçìéïñâíýíôé åôü ôï ppp.

Åßíáé iÜëëíi éâëp éäÝá íá åâáóöâéßôåâôå üôé ç añáíïp sendmail\_flags äâí ðâñééâíåÜíâé ôçí åðéëïäp -q,  
æáôïñâôéêÜ ôï sendmail èá ðñíóðâeåß êÜëå ôüöí íá êÜíâé áíâæÞôçóç ôïõ äéêôýïõ, iâ ðééâíü áðiôÝëâôíá ôï  
iç÷Üíçíá óâò íá åêôâéâß ôçëâöùíéêp óýíâåóç (dial out). Iðíñâßôå íá aíêéíÜôâôå:

```
sendmail_flags="-bd"
```

Õí iâéíÝêôçíá ôïõ ðâñáðÜíù, åßíáé üôé ðñÝðâé íá åíâíââéÜôâôå ôï sendmail íá åðáíââôÜôâé ôçí iðñÜ ôùí  
içíðíÜôùí, êÜëå ömñÜ ðið áðiâéâëßôâôåé ç óýíâåóç ppp, añÜöïíôåò:

```
# /usr/sbin/sendmail -q
```

Óóùò èÝéâôå íá ÷ñçóéïðíéÞóâôå ôçí åíôïëp !bg óôï ppp.linkup æáá íá åßíâôáé ôï ðâñáðÜíù áôôüíâôå:

```
1 provider:
2     delete ALL
3     add 0 0 HISADDR
4     !bg sendmail -bd -q30m
```

Áí áôôü äâí óâò añÝâé, åßíáé åöíâôüí íá ñôèíßôåâôå Ýíá “dfilter” ôï iðíßí íá áðiâéüðôâé ôçí êßíçóç SMTP. Äåßôå ôá  
ðôðââßâíâôå åéá åâñéóóüôâñâò èåðôñÝñâéåò.

Õí iüñí ðið iÝíâé åßíáé íá åðáíâééíÞóâôå ôï iç÷Üíçíá. IâôÜ ôçí åðáíâéêßíçóç, iðíñâßôå åßôå íá añÜøâôå:

```
# PPP
```

êáé Ýðâéôå dial provider æáá íá iâééíÞóâôå ôç óóíâñßá PPP, P áí èÝéâôå ôï ppp íá áðiâéééôÜ ôéò óóíâñßåò  
áôôüíâôå êÜëå ömñÜ ðið ððÜñ÷åé êßíçóç ðñïò ôï åíùôâñéêü äßêôôï (éáé äâí Ý÷åôå äçìéïñâÞóâé ôï script  
start\_if.tun0) iðíñâßôå íá añÜøâôå:

```
# ppp -auto provider
```

### 28.2.1.5 Ðåñßëçøç

Ãéá íá áíáéåöäéæþóïõlå, óá ðáñâéÜòù áÞìáôá áßíáé áðáñáßôçôá üôáí áãâééóôÜôå óï ppp ãéá ðñþôç öïñÜ:  
Áðü ôç íåñéÜ óïõ ìç ÷ áíÞìáôïò-ðåéÜôç:

1. Áåââéùèåßôå üôé ðåñééâîâÜíâôáé óôïí ðõñþíá óáð ç óôóéåôþ tun.
2. Áåââéùèåßôå üôé ððÜñ ÷ åé óï áñ ÷ åßí ôçò óôóéåôþ tunN óôïí éáôÜëïäi /dev.
3. Äçìéïõñþóôå íéá êáôá ÷ þñéóç óôï áñ ÷ åßí /etc/ppp/ppp.conf. Óï ðáñÜäâéâïá ãéá óï pmdemand èá ðñÝðåé íá áßíáé áðáñêÝò ãéá óïõ ðåñéóóüôåñïõò ISPs.
4. ÁíÝ ÷ åôå äðíáleéþ æéâýèõíóç IP, äçìéïõñþóôå íéá êáôá ÷ þñéóç óôï /etc/ppp/linkup.
5. Áíçìåñþóôå óï áñ ÷ åßí /etc/rc.conf.
6. Äçìéïõñþóôå óï script start\_if.tun0 áí ÷ ñâéÜæåôå êëþóç êáôÜ áðáßôçóç.

Áðü ôç íåñéÜ óïõ áíðçñåôçþ:

1. Áåââéùèåßôå üôé ðåñééâîâÜíâôáé óôïí ðõñþíá óáð ç óôóéåôþ tun.
2. Áåââéùèåßôå üôé ððÜñ ÷ åé óï áñ ÷ åßí ôçò óôóéåôþ tunN óôïí éáôÜëïäi /dev.
3. Äçìéïõñþóôå íéá êáôá ÷ þñéóç óôï /etc/passwd (÷ñçóéïðíéþíôåò óï ðñüåñâïä vipw(8)).
4. Äçìéïõñþóôå Ýíá áñ ÷ åßí profile óôïí ðñïóùðéêü êáôÜëïäi óï ðñþóç, óï iðiþí íá áêôåëåß ôçí áíðiþþ ppp -direct direct-server þ êÜðiéá áíðþóôïé ÷ ç.
5. Äçìéïõñþóôå íéá êáôá ÷ þñéóç óôï /etc/ppp/ppp.conf. Óï ðáñÜäâéâïá ãéá óï direct-server èá ðñÝðåé íá áßíáé áðáñêÝò.
6. Äçìéïõñþóôå íéá êáôá ÷ þñéóç óôï /etc/ppp/linkup.
7. Áíçìåñþóôå óï áñ ÷ åßí /etc/rc.conf.

## 28.3 ×ñçóéïðíéþíôåò óï PPP óïõ Ðõñþíá

ÊÜðiéá òíÞìáôá ðñïÝñ ÷ iiðáé áðü áñ ÷ ééþ óoiíâéóöïñÜ óùí Gennady B. Sorokopud êáé Robert Huff.

**Ðñïíâéäïðíþçóç:** Ç áíüôçôá áðôþ áßíáé Ýâéññç êáé iðiñâß íá áðáññóôåß íüñí óå óôóðþìáôá FreeBSD 7.X.

### 28.3.1 Ñõèìßæïíôåò óï PPP óïõ Ðõñþíá

Ðñéí íâééíþóôå íá ñõèìßæåôå óï PPP óôï ìç ÷ Üíçíá óáð, áåââéùèåßôå üôé óï pppd áñßóéåôáé óôïí éáôÜëïäi /usr/sbin êáé üôé ððÜñ ÷ åé iðiñâß /etc/ppp.

Óï pppd Ý ÷ åé äýí êáôåôóÜóåéò ëåéôïõñâßáò:

1. Ùò ðâëÜôçò (“client”) — üôáí èÝëåôå íá óõíäÝóåôå ôí ìç ÷ Üíçìá óáò ìå ôí Ýíù êüöíï iÝóù óåéñéáêÞò óýíäåóçò
2. Ùò áîððçñåôçôÞò (“server”) — ôí ìç ÷ Üíçìá óáò åßíáé óõíäåìÝíù ôí äßêööï êáé ÷ ñçóéïïðíéåßôáé ãéá íá óõíäÝóåé Üëëïö ððíëëäéöÝò, ÷ ñçóéïïðíéþíôáò ôí PPP.

Êáé óôéò áyí ðâñéðôþóáéò èá ÷ ñâéáôôåß íá áçíéïöñäÞóåôå Ýíá áñ ÷ åßíí ãðééïäþí (/etc/ppp/options Þ ~/.ppprc áí ôí ìç ÷ Üíçìá óáò ôðÜñ ÷ ïöí ðâñéóóüöåñíé áðü Ýíáò ÷ ñÞóôåò ðíö ÷ ñçóéïïðíéiyí ôí PPP).

Èá ÷ ñâéáôôåßôå áðßóçò êáé êÜðíéï ëëæéöéü áéá ÷ ñÞóç ìå modem êáé óåéñéáéÝò óõíäÝóåéò (êáôÜ ðñïðßíçóç ôí comms/kermiç), þóôå íá ìðíñåßôå íá êáëÝóåôå êáé íá áðïéåôåðôÞóåôå ôç óýíäåóç ìå ôíí áðñáéññöíÝíù áîððçñåôçôÞ.

### 28.3.2 × ñçóéïïðíéþíôáò ôí pppd ùò ÐåëÜôçò

ÂáóéóïÝíù óå ðëçñïöñþåò ðíö ðáñåß ÷ ã i Trev Roydhouse.

Ìðíñåßôå íá ÷ ñçóéïïðíéÞóåôå ôí /etc/ppp/options ðíö öáßíåôåé ðáñáéÜôù, áéá íá óõíäåèåßôå óå ìéá ãñáïíÞ PPP áñüò áîððçñåôçôÞ ôåññáééþí (terminal server) ôçò Cisco.

```
crtscts          # enable hardware flow control
modem           # modem control line
noipdefault    # remote PPP server must supply your IP address
                # if the remote host does not send your IP during IPCP
                # negotiation, remove this option
passive         # wait for LCP packets
domain ppp.foo.com      # put your domain name here

:remote_ip      # put the IP of remote PPP host here
                # it will be used to route packets via PPP link
                # if you didn't specified the noipdefault option
                # change this line to local_ip:remote_ip

defaultroute   # put this if you want that PPP server will be your
                # default router
```

Ãéá íá óõíäåèåßôå:

1. ÈáëÝóôå ôíí áðñáéññöíÝíù áîððçñåôçôÞ ÷ ñçóéïïðíéþíôáò ôí **Kermit** (Þ êÜðíéï Üëëï ðñüäññáïä áéá modem) êáé áéóÜäåôå ôí üíññá ÷ ñÞóôç êáé ôíí êùäééü óáò (Þ üôé Üëëï ÷ ñâéÜæåôåé áéá íá áíâñäïðíéÞóåôå ôí PPP óôíí áðñáéññöíÝíù õðíëëäéöÞ).
2. Áäåßôå áðü ôí **Kermit** (÷ ùñßò íá êëåßôåôå ôç ãñáïíÞ).
3. ÐëçêôññëëäÞóôå ôá ðáñáéÜôù:

```
# /usr/sbin/pppd /dev/tty01 19200
```

Áåâåéùèåßôå üôé ÷ ñçóéïïðíéåßôå ôí óùóôü üíññá óõóéåðÞò êáé ôçí êáôÜëëçëç ôá ÷ ýôçôå.

Í õðíëëäéöÞò óáò åßíáé ôþñá óõíäåìÝíù ìÝóù PPP. Áí ç óýíäåóç áðïóý ÷ áé, ìðíñåßôå íá ÷ ñçóéïïðíéÞóåôå ôçí áðééïäÞ debug ôóï áñ ÷ åßí /etc/ppp/options êáé íá áëÝäåôå ôá ìçíýäåôå óôçí êíñöüéå áéá íá áíé ÷ íáýôåôå ôí ðñüâëçíá.

Ôí ðáñáéÜôù script /etc/ppp/pppup áðôññåôïðíéåß êáé ôá 3 óôÜääá:

```
#!/bin/sh
```

```

pgrep -l pppd
pid='pgrep pppd'
if [ "X${pid}" != "X" ] ; then
    echo 'killing pppd, PID=' ${pid}
    kill ${pid}
fi
pgrep -l kermit
pid='pgrep kermit'
if [ "X${pid}" != "X" ] ; then
    echo 'killing kermit, PID=' ${pid}
    kill -9 ${pid}
fi

ifconfig ppp0 down
ifconfig ppp0 delete

kermit -y /etc/ppp/kermit.dial
pppd /dev/tty01 19200

```

Ôí áñ÷åßí /etc/ppp/kermit.dial åßíáé Ýíá script ãéá ôí **Kermit** ôí iöíßí êÜíåé ôçí êëPóç êáé ôçí ðéóôïðíßçóç ôiõ ÷ñPóôç ôöíí áðñáêñôí Ýíí õðíëíæéôôP (ôöí ðÝëíò áðöiy ôiõ ååññÜöiõ, èá åñåßôå Ýíá ðáñÜäåéäìá ãéá Ýíá ôÝöiëí script).

×ñçóéíðíéPóôå ôí ðáñáêÜôù script /etc/ppp/pppdown ãéá íá áðiööfääÝóåôå ôçí ãñáìíP PPP:

```

#!/bin/sh
pid='pgrep pppd'
if [ X${pid} != "X" ] ; then
    echo 'killing pppd, PID=' ${pid}
    kill -TERM ${pid}
fi

pgrep -l kermit
pid='pgrep kermit'
if [ "X${pid}" != "X" ] ; then
    echo 'killing kermit, PID=' ${pid}
    kill -9 ${pid}
fi

/sbin/ifconfig ppp0 down
/sbin/ifconfig ppp0 delete
kermit -y /etc/ppp/kermit.hup
/etc/ppp/pptest

```

ÅëÝâîôå áí åêôåëåßôåé áêüüá ôí pppd, åêôåëþíôå ôí /usr/etc/ppp/pptest, ôí iöíßí èá ïíéÜæåé ìå ôí ðáñáêÜôù:

```

#!/bin/sh
pid='pgrep pppd'
if [ X${pid} != "X" ] ; then
    echo 'pppd running: PID=' ${pid-NONE}
else
    echo 'No pppd running.'
fi
set -x

```

```
netstat -n -I ppp0
ifconfig ppp0
```

Ãéá íá êëåßóåôå ôçí ãñáïïÞ, åêôåëÝóôå ôï /etc/ppp/kermit.hup, ôï iðiþí èá ðñÝðåé íá ðåñéÝ÷åé:

```
set line /dev/tty01      ; put your modem device here
set speed 19200
set file type binary
set file names literal
set win 8
set rec pack 1024
set send pack 1024
set block 3
set term bytesize 8
set command bytesize 8
set flow none

pau 1
out +++
inp 5 OK
out ATH0\13
echo \13
exit
```

Íéá áíáëëåéôéêÞ iÝëiäiò ðiõ ÷ñçóéiõíéåß ôï chat áíôß ãéá ôï kermit:

Ôá ðáñáêÜôù äýí áñ÷åßá åðáñéiýí ãéá ôç äçíëiõñãßá íéáò óýíääôçð pppd.

/etc/ppp/options:

```
/dev/cuad1 115200
```

```
crtscts      # enable hardware flow control
modem        # modem control line
connect "/usr/bin/chat -f /etc/ppp/login.chat.script"
noipdefault  # remote PPP server must supply your IP address
              # if the remote host doesn't send your IP during
              # IPCP negotiation, remove this option
passive      # wait for LCP packets
domain your.domain# put your domain name here

:           # put the IP of remote PPP host here
            # it will be used to route packets via PPP link
            # if you didn't specified the noipdefault option
            # change this line to local_ip:remote_ip

defaultroute # put this if you want that PPP server will be
            # your default router
```

/etc/ppp/login.chat.script:

**Óçìåßùóç:** Ôï ðáñáêÜôù èá ðñÝðåé íá ãñáöåß óå íéá ïüíí ãñáïïÞ.

```
ABORT BUSY ABORT 'NO CARRIER' "" AT OK ATDTphone.number  
CONNECT "" TIMEOUT 10 ogin:-\\r-ogin: login-id  
TIMEOUT 5 sword: password
```

Íluééò ôñiiðiðieÞoåôå êáé ååêåôåóôÞoåôå óùóôÜ óå ðáñáðÜíù áñ ÷åßá, ôiì ìuñiì ðið ÷ñåéÜæåôåé íå êÜíåôå åßíáé íå åôåôåëÝoåôå ôçí áîöieÞ pppd, là ôií ôñüðiì ðið óåßíåôåé ðáñáêÜôù:

# pppd

**28.3.3 ×ñçóéíïðíéþíôáò ôí þþþd ùò Åîõðçñåôçôþ**

Ôi /etc/ppp/options èá ðñÝðåé íá ðåñéÝ÷åé êÜôé áíôßóöié÷i là ôi ðáñáêÜôu:

```
crtscts          # Hardware flow control  
netmask 255.255.255.0      # netmask (not required)  
192.114.208.20:192.114.208.165 # IP's of local and remote hosts  
                                  # local ip must be different from one  
                                  # you assigned to the Ethernet (or other)  
                                  # interface on your machine.  
                                  # remote IP is IP address that will be  
                                  # assigned to the remote machine  
  
domain ppp.foo.com      # your domain  
passive               # wait for LCP  
modem                 # modem line
```

Ôi script /etc/c/PPP/PPPSERV ðiô ðáBñâðáð ðáñâéÜðù, éa ðâé ôöi **pppd** íá èéðiññáÞðáé ùò áîððçñâðóÞð:

```
#!/bin/sh
pgrep -l pppd
pid='pgrep pppd'
if [ "X${pid}" != "X" ] ; then
    echo 'killing pppd, PID=' ${pid}
    kill ${pid}
fi
pgrep -l kermit
pid='pgrep kermit'
if [ "X${pid}" != "X" ] ; then
    echo 'killing kermit, PID=' ${pid}
    kill -9 ${pid}
fi

# reset ppp interface
ifconfig ppp0 down
ifconfig ppp0 delete

# enable autoanswer mode
kermit -y /etc/ppp/kermit.ans

# run ppp
pppd /dev/ttv01 19200
```

$\times \tilde{n} \circ \epsilon \circ \tilde{\eta} \circ \tilde{\epsilon} \circ \tilde{P} \circ \tilde{o} \circ \tilde{\eta} \circ \tilde{\epsilon} \circ \tilde{\eta} \circ \tilde{\epsilon} \circ \tilde{P} \circ \tilde{o} \circ \tilde{\eta} \circ \tilde{\epsilon} \circ \tilde{\eta} \circ \tilde{\epsilon} \circ \tilde{P} \circ \tilde{o}$

```
#!/bin/sh
pgrep -l pppd
pid='pgrep pppd'
if [ "X${pid}" != "X" ] ; then
    echo 'killing pppd, PID=' ${pid}
    kill ${pid}
fi
pgrep -l kermit
pid='pgrep kermit'
if [ "X${pid}" != "X" ] ; then
    echo 'killing kermit, PID=' ${pid}
    kill -9 ${pid}
fi
ifconfig ppp0 down
ifconfig ppp0 delete

kermit -y /etc/ppp/kermit.noans
```

Ôí ðáñáéÜôù script ãéá ôí **Kermit** (/etc/ppp/kermit.ans) lðiñâß íá áíññaiðíéâß êáé íá áðâññaiðíéâß ôçí ëåéöiññáá ãðôüüáôçò áðÜíôçóçò ôóï modem óáò.

```
set line /dev/tty01
set speed 19200
set file type binary
set file names literal
set win 8
set rec pack 1024
set send pack 1024
set block 3
set term bytesize 8
set command bytesize 8
set flow none

pau 1
out +++
inp 5 OK
out AT&T0\13
inp 5 OK
echo \13
out ATS0=1\13 ; change this to out ATS0=0\13 if you want to disable
                ; autoanswer mode
inp 5 OK
echo \13
exit
```

Óóïï áðññáéññóï Ýíï õðíëíæéôôÞ, ÷ñçóéïïðíéâßôáé ôí script /etc/ppp/kermit.dial ãéá êëÞóç êáé ðéóôïðíßçóç ôíõ ÷ñÞóç. Èá ðñÝðåé íá ôí òññiðíðíéÞóâôå óýìðùíá íå ôéò áíÜäéâò óáò. ÂÜéôå ôí üññá ÷ñÞóç êáé ôíï êùäééêü óáò óå áðôü ôí script. Èá ÷ññáéáôâß áðßóçò íá áéëÜíâôå ôçí ãññâìÞ ãéá ôçí áßóïäí (input) áíÜëíäá íå ôéò áðáíôÞóâéò ðíõ áßíäé ôí modem óáò êáé í áðññáéññóï Ýíï õðíëíæéôôÞò.

```
;
; put the com line attached to the modem here:
;
```

```

set line /dev/tty01
;
; put the modem speed here:
;
set speed 19200
set file type binary           ; full 8 bit file xfer
set file names literal
set win 8
set rec pack 1024
set send pack 1024
set block 3
set term bytesize 8
set command bytesize 8
set flow none
set modem hayes
set dial hangup off
set carrier auto               ; Then SET CARRIER if necessary,
set dial display on           ; Then SET DIAL if necessary,
set input echo on
set input timeout proceed
set input case ignore
def \%x 0                      ; login prompt counter
goto slhup

:slcmd                           ; put the modem in command mode
echo Put the modem in command mode.
clear                            ; Clear unread characters from input buffer
pause 1
output +++                         ; Hayes escape sequence
input 1 OK\13\10                  ; wait for OK
if success goto slhup
output \13
pause 1
output at\13
input 1 OK\13\10
if fail goto slcfd               ; if modem doesn't answer OK, try again

:slhup                           ; hang up the phone
clear                            ; Clear unread characters from input buffer
pause 1
echo Hanging up the phone.
output ath0\13                     ; Hayes command for on hook
input 2 OK\13\10
if fail goto slcfd               ; if no OK answer, put modem in command mode

:sldial                           ; dial the number
pause 1
echo Dialing.
output atdt9,550311\13\10        ; put phone number here
assign \%x 0                      ; zero the time counter

:look
clear                            ; Clear unread characters from input buffer

```

```

increment \%x                                ; Count the seconds
input 1 {CONNECT }
if success goto sllogin
reinput 1 {NO CARRIER\13\10}
if success goto sldial
reinput 1 {NO DIALTONE\13\10}
if success goto slnodial
reinput 1 {\255}
if success goto slhup
reinput 1 {\127}
if success goto slhup
if < \%x 60 goto look
else goto slhup

:sllogin                                     ; login
assign \%x 0                                    ; zero the time counter
pause 1
echo Looking for login prompt.

:slloop                                       ; Count the seconds
clear                                         ; Clear unread characters from input buffer
output \13
;
; put your expected login prompt here:
;
input 1 {Username: }
if success goto sluid
reinput 1 {\255}
if success goto slhup
reinput 1 {\127}
if success goto slhup
if < \%x 10 goto slloop                      ; try 10 times to get a login prompt
else goto slhup                               ; hang up and start again if 10 failures

:sluid
;
; put your userid here:
;
output ppp-login\13
input 1 {Password: }
;
; put your password here:
;
output ppp-password\13
input 1 {Entering SLIP mode.}
echo
quit

:slnodial
echo \7No dialtone. Check the telephone line!\7
exit 1

```

```
; local variables:
; mode: csh
; comment-start: "
; comment-start-skip: "
; end:
```

## 28.4 Áíôéìåôþðéóç ÐñïâëçìÜôùí óå ÓõíäÝóåéò PPP

Óõíäéóðiñ Ü ôiõ Tom Rhodes.

**Ðñïâëäïðiñçóç:** Áðü ôi FreeBSD 8.0 êáé iåôÜ, ôi ðñüäñáíá iäþðéçóçò sio(4) áíôéêáôáôÜèçêå áðü ôi uart(4). Óá iíüìáôá ôõôéâðþí ôûí óåéñéâéþí èõñþí Ý÷iõí áéëÜíåé áðü /dev/cuadN óå /dev/cuaun êáé áðü /dev/ttynN óå /dev/ttyuN. Íé ÷ñþðôåò ôiõ FreeBSD 7.X èá ðñÝðåé íá ðñïoáñiúöiñ ôéò ðáñáéÜôù iäçãßåò óýiöùíá iå áðôÝò ôéò áéëáäÝò.

Ç áíüôçôá áðôþ êáëýðôåé iåñééÜ áðü ôá ðñïâëþiaôá ðiõ iðiñåß íá ðáñiðóéáôöiýü ôáí áíßiâôáé ÷ñþðç ôiõ PPP iÝóù óýiäåôçò modem. Áéá ðáñÜäåéäíá, èá ðñÝðåé íá iÝñåôå íá áéñßâåéå ôá içíýiåôå áéóüüiõ ðiõ èá áìoáíßôåé ôi óýóöçíá ôi iðiþí ëáëåßôå. Iåñééið ISP äßiñöiðþ ssword, áiþ Üeëié äßiñöiðþ ôçí password. Áí ááí Ý÷åôå ãñÜþåé óùôÜ ôi script áéá ôi ppp, ç áðüðåéñá áéóüüiõ èá áðiþý÷åé. Í ðeï óõíçèéóíÝñiò ôñüüðiõ íá áéóöåéíåôþðôåå ñéá óýiäåôç ppp, áßiâé íá óõíäåéßôå ÷åéñiêßíçôå. Íé ðeçñiøiñßåò ðiõ áiöáíßæiñôåé ðáñáéÜôù, èá óåò iäçãþðiõí åPiá ðñiò åPiá ôôç ÷åéñiêßíçôç áðiêåôÜôååç ôçò óýiäåôç.

### 28.4.1 ÅëÝäîôå ôá Áñ÷åßá Óõóêåöþí

Áí ÷ñçóéiiðiéåßôå ðñïoáñiñiðiÝñiò ôiõ ðoñþðia, áåââéùèåßôå üôé Ý÷åôå ðåñééÜâåé ôçí ðáñáéÜôù ãñâñiþ ôiõ áñ÷åßiiñôååùí ôiõ ðoñþðia óåó:

```
device      uart
```

Áí ÷ñçóéiiðiéåßôå ôiõ ðoñþðia GENERIC, äáí ÷ñâéÜæåôåé íá êÜíåôå êÜðiéá áéëååþ, êáëþò ç óõóêåýç uart ðåñééäíáÜíåôåé þäç óå áðôüí. Áðëþò åëÝäîôå ôá içíýiåôå ôçò dmesg äéá ôçí óõóêåðþ modem, ÷ñçóéiiðiéþíðå ôçí ðáñáéÜôù åiðiþþ:

```
# dmesg | grep uart
```

Èá ðñÝðåé íá ååßôå êÜðiéá Ýñiäí ò÷åôéêþ iå ôéò óõóêåðYò uart. Ðñüêåéôåé áéá ôéò èýñåò COM ðiõ ÷ñâéåæüìáôå. Áí ôi modem óåò éåéðiññååß ùò ôððiðiéçìÝíç óåéñéâéþ èýñá, èá ðñÝðåé íá ôi ååßôå íá áíðoÝñåôåé ùò uart1, þ COM2. Áí óðiâåßiâé åôôü, äáí ÷ñâéÜæåôåé íá åðáíååðååëùôôßôåå ôiõ ðoñþðia óåò. Áí ç óåéñéâéþ èýñá ðiõ áíðéóðié÷åß ôiõ modem óåò åßiâé ç uart1 þ COM2 óôi DOS, ç áíðßôðié÷ç óõóêåðþ modem èá åßiâé ç /dev/cuaul.

### 28.4.2 ×åéñiêßíçôç Óýiäåôç

Ç ÷åéñiêßíçôç óýiäåôç óôi Internet iå ÷ñþðç ôçò ppp, åßiâé Ýíåò ãñþaiñiò êáé áýéiëiò ôñüüðiõ íá åíðiðßôåôå ôô÷üí ðñïâëþiaôå óýiäåôçò, þ áðëþò íá ðÜñåôå ðeçñiøiñßåò ó÷åôééÜ iå ôi ðùò i ISP óåò áíôéiåôùðßæåé ôéò óõfääÝóåéò

Ðåëáôþí ppp. Ëá íâééíÞóïòìå ôçí åöáññíäþ **PPP** áðü ôçí ãñáñíþ áíóïëþí. Óçìåéþóå üüðé óå üëá ìáð ôá Ðáñáäåßáíåôá, èá ÷ñçóéïïðíëíýìå ôï example ùò ôï üññá ôïõ ððíëíæóôþ ðiõ áéôåëåß ôï **PPP**. Ìðíñåßóå íá íâééíÞóåôå ôï ppp, ãñÜöïíðåð áðëþð ppp:

```
# ppp
```

,÷ ïòìå ôþñá íâééíÞóåé ôï ppp.

```
ppp ON example> set device /dev/cuaul
```

ÈÝðíðìå ôç óðóéåðþ modem. Óôï ðáñÜäåéåíá ìáð, åßíáé ç cuaul.

```
ppp ON example> set speed 115200
```

ÈÝðíðìå ôçí óá ÷ ýóçôá óýíäåóçò, óå áðôþ ôçí ðåñßðôùóç ÷ñçóéïïðíëíýìå 115,200 kbps.

```
ppp ON example> enable dns
```

ÈÝìå óôï ppp íá ñðèìßóåé ôïï resolver êáé ðññöèÝðíðìå ôéò êáðÜëéçëåò ãñáñíÝò áéá ôï áéáéñéóôþ iññÜðùí óôï /etc/resolv.conf. Áí ôï ppp äåí ìðíñåß íá êáèìñßóåé ôï üññá ôïõ áéáéñéóôþ, ìðíññýìå fá ôï êáèìñßóïòìå ìå ÷åéñíëßíçöï ôññüðí áññüôåñá.

```
ppp ON example> term
```

ÁëëÜæïòìå óå êáðÜóôåóç “terminal” þóôå íá ìðíññýìå íá åëÝãñíðìå ôï modem ÷åéñíëßíçôá.

```
deflink: Entering terminal mode on /dev/cuaul
type '~h' for help
```

```
at
OK
atdt123456789
```

×ñçóéïïðíëíýìå ôï at ãéá íá áñ ÷ééïðíëÞóïòìå ôï modem, êáé Ýðåéóå ÷ñçóéïïðíëíýìå ôï atdt êáé ôïí áñéèìü ôïõ ISP ãéá íá íâééíÞóïòìå ôç áéáåééåóßá ôçò êëÞóçò.

CONNECT

Åäþ Ý ÷ ïòìå åðéååååßùóç ôçò óýíäåóçò. Áí Ý ÷ ïòìå ðññäëÞiaóå óýíäåóçò ôá ìðíñßá äåí ó ÷åðßæëíðåé íå ôï ðééêü ìáð, åäþ åßíáé ôï óçìåßí ðiõ ðñÝðåé íá ðññóðåèÞóïòìå íá ôá åðéëýóïòìå.

ISP Login:myusername

Ç ðññôññðþ áðôþ åßíáé ãéá íá äþóïòìå ôï üññá ÷ñÞóôç. ×ñçóéïïðíëÞóå ôï üññá ÷ñÞóôç ðiõ óáò Ý ÷åé äïëåß áðü ôïí ISP óáò.

ISP Pass:mypassword

Ç ðññôññðþ áðôþ åßíáé ãéá ôïí êùäéêü ðññüóååóçò. ÁðáíðÞóå ìå ôïí êùäéêü ðiõ óáò Ý ÷åé äïëåß áðü ôïí ISP óáò. Í êùäéêü ãðóöüð äåí èá åìöáíéóôåß óôçí ïëüíç óáò, üðùð áéñéåþ õòìååßíåé êáé íå ôïí êùäéêü óáò üôáí ôïí ãñÜöååå óôçí ðññôññðþ åéóüäiõ ôï FreeBSD óðóôÞiaðiõ óáò.

Shell or PPP:ppp

ÁÍÜëíäà íà ôíí ISP óáð, íðñíñåß íá íçí åääßöðå êéá êéáüëüëö ðíçí ðáñáðÜùñ ðññíðñíðþ. Óðíçí ðáñáðÜùñ ðåññßðöñóç íàò ñùòÜäé áí åðéëöiiÿíå íá åêôäæÝ òíòíå êÜðíëí êÝëööìò (shell) óðí iç ÷ Üíçíà óïð ðáñí ÷ Ýá, þ áí èÝëíòíå íá åêééíÞóíòíå ðíí ppp. Óðí ðáñÜäåäíà íàò åðéëÝíà íá ÷ ñíçóëíðíëÞóíòíå ppp êáèþò èÝëíòíå íá óðíååëíÿíå óðí Internet.

Ppp ON example>

ÐáññáôçñÞóðå üöé óóí ðánÜääéäíá óí ðñþþí p åßíáé êåöäéäßí. Áðóü äåß ÷íåé üöé Ý÷iðíå óðíäååëß åðéóð÷þò lå óíí ISP.

PPp ON example>

÷ iñiå ðéóöiñiéçèåß ia åðéôõ÷ßá áðü öii ISP iaò, eáé ðåñéí ÿiñiå ía iaò áðiñiæåß aeåyëoíoc IP.

## PPP ON example>

÷åé ðëÝíï êáèïñéóôåß æáÿéõíóç IP, êáé Ý÷iòïå ieiéëçñþóåé ôç óýíäåóç iå åðéôô÷ßá.

PPP ON example>add default HISADDR

Åäp ðññiöé Ýóïòiå ôcí ðññiäðééååí Ýíç äéäññiP (default route). Ôí âPíá åðóöu åßíáé åðåññBðöcöi ðññié iðin Ýóïòiå íå åðééièiùñPöiòiå íå ôíí Ýíù èüoíi, eáèþò ôc äåññi Ýíç óðééñiP ç iüíç óýíäåóç ðið Ý-òiå åßíáé íå Ýíá ðññiæéñöP åðú ôcí Üeëç iåññéÜ ñcò aññiñPð. Áí ði ðññiðÜñ åðiðý ÷ åé åðåéäP ððÜñ ÷ iðiñ Päç eáèiñéóí Ýíå ãéäññi Ýó, iðinñåßöå íå åÜéøåå Ýíá eáðiåðóóééü ! iðñiñóðÜ åðú ði add. Áíäeéåðééñi, iðinñåßöå íå Üíñiåðå åðóP ôc ñyéiéóç ðññié åðé-åéññBðåå õc óýíäåóç, eáé eá åßíáé åðóöuåå ãéäññiåðÜóåðóç ôcò iÝíå ãéäññiPð.

#### 28.4.2.1 ÁÍÔÉÌÅÔÞÉÓC ĐÑÏÂËCÙÜÔÙÍ

ÁÍ Ý÷åôå áåðåñèåßåò åññáiiP êåé åái öåßíåôåé íá iøðiñåßôå íá áåðiêååôåòPóåôå ôç óýíååôç, áåðåíåñäiøðiøPóôå ôií Ýéåå ÷iñPø iÝóù ööééiy (CTS/RTS) ÷iñçóéiøðiøPíåò ôçí áåðéëiøP set ctsrts off. Óí ðåññåðÜùñ ööìåáßíåé ööíPèùò áí åßóôå ööñååiÝñò óå Ûðiøi ååòðçñåòôçòP öåññååééþí íå äöñåðüôçôå PPP, üðiøi ôií PPP ööååíåðÜåé íá áåðiêñßíåôåé üðåí ðññiøðåéåß íå åññÜøåé åääññíYíá óôç óýíååôç óåò. Óôçí ðåññBðòùóç åôòP, öôíPèùò ðåññéiÝåé åéå êÛðiøi øíPia CTS (Clear To Send) ôií iøðiøi åái Yñ÷åôåé ðiøðY. Áí ùòóùñòi ÷iñçóéiøðiøPóåôå åôòP ôçí áåðéëiøP, eå ðññYðåé ååðBçò íå ÷iñçóéiøðiøPóåôå éåé ôçí áåðéëiøP set accmap ç iøðiøå ååñå ÷iñYñùò ååðåéåßôåé åéå íå áåðiññiøðåé åôí òöééü ðiø åññåñòÜðåé åðü ôç iøðÜäiöç ööñæåéñéiÝñù ÷åññåèòPñùñ åðü ôç iøå Üéñç ôôçí Üéñç, öôíPèùò iÝóù ôiø XON/XOFF. Ååßôå ôç öååëßåä manual ôiø ppp(8) åéå ðåññéóðüôåñåò ðëçññiøñßåò ó÷åðééÜ íå åôòP ôçí áåðéëiøP êåé åðü ñøðiñåßôå íå ôçí ÷iñçóéiøðiøPóåôå.

Áí áéáé Ýôâðâ Ýíá ðáéáéüôâññ modem, ßóùò ÷ ñâéáôôâß íá ÷ ñçóéiiðiéÞóâðâ ôçí áðééïäP set parity even. Ç ðññâðééâññ Ýíç ñýèiéóç áßíáé íá íçí ððÜñ ÷ áéé ëóïðéïßá (parity none), áëëÜ óá ðáééÜ modems (éáé óá êÜðiéïðð ISP) ÷ ñçóéiiðiéâßôâé áéá Ýéâå ÷ íí èæþí (ç ÷ ñÞóç ôçò ðññâëâß ñúðòññ iàâÜëç áýíçóç ôðç iàâðâéßíçóç äâäññ Ýúñ). Ðóùò ÷ ñâéáôôâßôâ áôðP ôçí áðééïäP, áí i ISP óáð áßíáé c Compuserve.

Ôi PPP ßóùò íá lçí åðáÍYëèåé ôóçí éåôÜôôáóç åíöiøþí, ôi iðiøþí åßíæé ôóÜþèùò ôóÜëìá äéáðñáàìÜôåðóçð, êáèþò i ISP ðâñéÍYíåé åðü ôç äééþ óåð iåñéÜ íá iåééÞóåé ôç äéáðñáàìÜôåðóçð. Ôi ôçlåþí åðóù, ç ÷ñÞóç ôçð åíöiøþò ~þ èá åíááåêÜôåé ôi ppp íá áñ÷ßoåé íá ôóÜëìéå ôéò ðëcñïøñßåò ô:åðééÜ iå ôc nývèéóç.

Áí ááí ðÜñåôå ðïöÝ ðñïðñïðP åéóüäïö, óï ðéðáíüðåñï åßíáé íá ðñÝðåé íá ÷ñçóéïðïéÞóåôå ðéóðïðïßçóç PAP P CHAP áíðôß áéá ôçí ôýðiö UNIX ðéóðïðïßçóç ðïö ðåñéäñÜøäíå óóï ðåñáðÜù ðåñÜäæéäíå. Áéá íá ÷ñçóéïðïéÞóåôå PAP P CHAP áðëþò ðñïðéÝóôå óéö ðåñáâéÜðù åðéëíäÝð óôçí åöáññïäP PPP ðñéí âñåðåßôå óå êáðÜóðåóç óåñìáðééïý:

```
ppp ON example> set authname myusername
```

Èá ðñÝðåé íá áíðéêåðåóðÞóåôå óï myusername ìå óï üññá ÷ñÞóôç ðïö óáð Ý÷åé äïèåß áðü óïí ISP óáð.

```
ppp ON example> set authkey mypassword
```

Èá ðñÝðåé íá áíðéêåðåóðÞóåôå óï mypassword ìå óï üññá ÷ñÞóôç ðïö óáð Ý÷åé äïèåß áðü óïí ISP óáð.

Áí óðñÝåðåå êáñíééÜ, áéëÜ ááí öáßíåôåé íá ïðññåßôå íá åðéëíéñüÞóåôå ìå êáéÜ åéåýèõíöç, ðñïðóðåèÞóåôå íá ÷ñçóéïðïéÞóåôå óçí áíðiëP ping(8) ìå íéá åéåýèõíöç IP áéá íá ååßôå áí èá ëÜååôå áðÜíðçóç. Áí áéÝðåôå áðþëåéå ðåéÝóùí 100%, óï ðéí ðéðáíü åßíáé üöé ááí Ý÷åôå êåëññðóåé êÜðiéä ðñíåðééäíäÝíç åéáññïP. ÅéÝåñôå íáíÜ üöé Ý÷åôå ñðëìßðåé ôçí åðéëíäP add default HISADDR éáðÜ ôç áéÜñéåé åçö ÿíååóç. Áí ïðññåßôå íá åðéëíéñüÞóåôå ìå íéá áðññåññöíÝíç åéåýèõíöç IP, óï ðéðáíüðåñï åßíáé üöé ááí Ý÷åôå áÜëåé ôç åéåýèõíöç êÜðiéíö åéåéññöíP iññÜðùí óóï áñ÷åßí /etc/resolv.conf. Óír áñ÷åßí áðñü ìá ðñÝðåé íá ïïéÜæåé ìå óï ðåñáâéÜðù:

```
domain example.com
nameserver x.x.x.x
nameserver y.y.y.y
```

¼ðiö óá x.x.x.x áéá y.y.y.y èá ðñÝðåé íá áíðéêåðåóðéíý íå óéö áéåðèýíóåéò IP ðùí áéåéñéóðí DNS óïö ISP óáð. Áññå ÷ñÝñù ìé ðéçññöññðåð áððÝð íá óáð Ý÷iöí ãïèåß êáðÜ ðçí áåññåðP óáð óðçí ððçññåðßá. Áí ü÷é, èá ïðññÝóåôå íá óéö áññåßôå åýéïëá ìå Ýíá ôçëåðþíçíá óóïí ISP óáð.

Ìðññåßôå áðþöçò íá áíðññåðíéÞóåôå óçí êåðåññåðP óðññÜíðùí áéá ôçí PPP óýíååóç óáð, iÝóù ðiö syslog(3). Áðëþò ðñïðéÝóåôå:

```
!ppp
*.*      /var/log/ppp.log
```

óóï /etc/syslog.conf. Óéö ðåñéñðüðåññåð öiñÝð, áðñP ç ëåéðñññåðßá ððÜñ ÷åé þäç.

## 28.5 ×ñçóéïðïéþíôåò PPP ïÝóù Ethernet (PPPoE)

ÓðññéððiñÜ (áðü <http://node.to/freebsd/how-tos/how-to-freebsd-pppoe.html>) ðiö Jim Mock.

Ç áíüôçôå áðñP ðåñéñðÜöåé ðùò íá ñðëìßðåðå ìéá óýíååóç PPP ïÝóù Ethernet (PPPoE).

### 28.5.1 Ñýèïéóç òïö Ððñþíá

Áåí áðåéðåßôåé ðëÝíí åéäééP ñýèïéóç òïö ððñþíá áéá ôç åééðññåðßá PPPoE. Áí i ððñþíáð óáð ááí ðåñééäíåÜíåé ôçí áðáññåßôçôç ððiöðPññéíç netgraph, óï ppp èá ôçí õiññðþíåé áðññüñåðá ùò Üññéññå.

## 28.5.2 Ñýèléóç ôïõ ppp.conf

ÐáñáêÜôù öáßíâôáé Ýíá õðüäåéâíá áñ ÷ åßíõ ppp.conf:

```
default:
    set log Phase tun command # you can add more detailed logging if you wish
    set ifaddr 10.0.0.1/0 10.0.0.2/0

name_of_service_provider:
    set device PPPoE:x11 # replace x11 with your Ethernet device
    set authname YOURLOGINNAME
    set authkey YOURPASSWORD
    set dial
    set login
    add default HISADDR
```

## 28.5.3 ÅêôÝëåóç ôïõ ppp

Ùò ÷ ñÞóôçò root, iðiñâßôå íá åêôåæÝóåôå:

```
# ppp -ddial name_of_service_provider
```

## 28.5.4 Åêêßíçóç ôïõ ppp êáôÜ ôçí Åêêßíçóç

ÐñïóëÝóôå ôéò ðáñáêÜôù ãñáìiÝò óóï áñ ÷ åßí /etc/rc.conf:

```
ppp_enable="YES"
ppp_mode="ddial"
ppp_nat="YES"      # if you want to enable nat for your local network, otherwise NO
ppp_profile="name_of_service_provider"
```

## 28.5.5 ×ñÞóç iéáò ÅôéêÝôáò Õðçñåóßáò PPPoE

ÌåñééÝò õinÝò eá ÷ ñåéáôôåß íá ÷ ñçóéiiðiéÞóåôå iéá åôééÝóå õðçñåóßáò (service tag) aéá ôçí áðieáôÜôôåóç ôçò ÿíâåôçò óåò. Ié åôééÝôåô õðçñåóßéí ÷ ñçóéiiðiéiyíôáé aéá ôií aéá ÷ ùñéóïü ìåôâíý aéáöiñâôééþí áiñðçñåôçôþí PPPoE ðiõ áñßóéiiôáé óóï ßæéí åßéôöi.

Ç åâéïçñßúóç ðiõ óáð Ý ÷ åé åþóåé i ISP óáð, eá ðñÝðåé íá Ý ÷ åé ôéò áðáéôíýíâíå ðéçñiöiñßåò aéá ôçí åôééÝóå õðçñåóßáò ðiõ ÷ ñåéÜæåôôå. Áí åáí iðiñâßôå íá ôçí áñâßôå, ñùôÞóôå ôçí åiðçñÝôçóç åâéåôþí ðiõ ISP óáò.

Ùò ôâéåôôåßá ëýóç, eá iðiñíýóåôå íá äiêéïÜôåôå ôçí iÝëíäí ðiõ óðíßôôåôåé óóï ðñüäñâíá Roaring Penguin PPPoE (<http://www.roaringpenguin.com/pppoe/>) òi iðiþí iðiñâßôå íá áñâßôå ôóçí ÓðëëëäÞ ôùí Ports. Íá Ý ÷ åôå õðüøç óáò, üöé áðôò iðiñâß íá áðiðñäñâíåôßôåé êáé íá á ÷ ñçóôâýôåé ði modem óáð, Ýôóé óéâôôåôå ði êáéÜ ðñéí ði êÜíåôå. Áðëþò åâéåôôÞóôå ði ðñüäñâíá ðiõ åßíåé i ðáñï ÷ Ýáò óáò iáæß iá ði modem. ðåéôå, åéóÝëéåôå óóï iåñíý System ðiõ ðñiñäñÜñåôöi. Åéâß eá ðñÝðåé íá åßíåé ði üññâ ðiõ ðñiñößé óáò. Óðíßèùò añÜôåé ISP.

Óï üññâ ðiõ ðñiñößé (åôééÝóå õðçñåóßáò) eá ÷ ñçóéiiðiéçèåß ôóçí êáôå ÷ þñéóç aéá ôçí ñýèléóç ôïõ PPPoE óóï áñ ÷ åßíõ ppp.conf, ùò ði ðiÞìá ðiõ åçëþíåé ði ðáñï ÷ Ýá ôóçí åiðiëÞ set device (äåßôå ôç óåëßää manual ðiõ ppp(8) aéá ðëÞñåéò èåðôñÝñåéåò). eá ååß ÷ iâé üðùò ði ðáñáêÜôù:

```
set device PPPoE:x11:ISP
```

Íçí íå ÷ Üðåôå íá áæëÜìåôå ôi x11 iå ôç óùóôP óððéâðP ðiõ áíðéóôíé÷åß ôóçí êÜñôá Ethernet ðiõ ÷ñçóéïðíéåßôå.

Íçí íå ÷ Üðåôå íá áæëÜìåôå ôi ISP iå ôi ðñiößë ðiõ âñÞêáôå ðáñáðÜñû.

Ãéá ðåñéóóüðåñåò ðëçñïiñßåò, äåßôå:

- Öèçüüðåñåò ÅðñðæùíéêÝð ÓðíáÝóåéò iÝóù FreeBSD óå ÄñáììP DSL (<http://reinaud.waldura.com/doc/freebsd/pppoe/>) áðü ôií Renaud Waldura.
- Nutzung von T-DSL und T-Online mit FreeBSD (<http://www.ruhr.de/home/nathan/FreeBSD/tdsl-freebsd.html>) áðü ôií Udo Erdelhoff (óðå ÄññáíéêÜ).

## 28.5.6 Òi PPPoE óå Modem 3Com® HomeConnect® ADSL Dual Link

Áðóü ôi modem äåí áéïïðøéåß ôi RFC 2516 (<http://www.faqs.org/rfcs/rfc2516.html>) (jéá iÝëëäiò ãéá iåðÜäiöç PPP

iÝóù Ethernet (PPPoE), äñáììÝí ðiõ ôið L. Mamakos, K. Lidl, J. Evarts, D. Carrel, D. Simone, êáé R. Wheeler).

Áíðþæåðå, ÷ñçóéïðíéåß äéáðñåðééýð ôýðiõ ðùäéÝðùí ãéá óå ðéáßóéá Ethernet. Ðáñáêéïýí íá áððñÜðåôå ðå ðáñÜðñíá óåð ôóçí 3Com (<http://www.3com.com/>) áí ïñßæåôå üüð èá ðñÝðåé íá óðñññðùèåß iå ôéð ðññäéáññåòÝð ôið PPPoE.

Ãéá íá ðñññðùèåß ôi FreeBSD íá áððééíñðùèåß iå áððôP ôç óððéâðP, èá ðñÝðåé íá ðåðéåß Ýíá êáðÜëëçëi sysctl. Áðóü ðñññðùèåß íá áßíåðåé áððññáðå õáðÜ ôóçí áéêëßíçóç, iå ôóçí áíçìÝñùóç ôið ãñ ÷åßíð /etc/sysctl.conf:

```
net.graph.nonstandard_pppoe=1
```

P ðñññðùèåß íá áßíåðé Üìåðá iå ôóçí áíðíëP:

```
# sysctl net.graph.nonstandard_pppoe=1
```

Äððôð ÷þò, áððéäP ðññüêåéðåé áéá iéá ñýëìéóç ðiõ áðçñåÜæåé iëüëëçñï õið óýóðçìá, äåí áßíåðé äððññüí íá áððééíñðùíåßôå ðåðóü ÷ññíá iå Ýíá êáññééü ðåðÜôç P áíððçñåðçôP PPPoE êáé iå Ýíá ADSL modem 3Com HomeConnect®.

## 28.6 ×ñçóéïðíéþíôåò PPP iÝóù ATM (PPPoA)

<sup>1</sup> áíññðôçóá ðiõ áéïïðøéåß, ðáññéññÜðåé ðùò íá ññðññðóåôå ôi PPP áéá ëåéðiññåßá iÝóù ATM (PPPoA). Òi PPPoA áßíåðé áéá áçññðøéP ðåðééíñP óðiðò ðáññ ÷åßò ððçñåðéþí DSL óðóçí Åðñþðç.

### 28.6.1 ×ñçóéïðíéþíôåò PPPoA iå ôi Alcatel SpeedTouch™ USB

Ç ððiððPñéïc PPPoA áéá áððôP ôç óððéâðP, ðáñÝ ÷åðåé ùò port ói FreeBSD, êáèþò ôi firmware ôçð óððéâðP ðæáíÝìåðåé ððü ôóçí Üðååéá Alcatel's license agreement ([http://www.speedtouchdsl.com/disclaimer\\_lx.htm](http://www.speedtouchdsl.com/disclaimer_lx.htm)) êáé äåí ðñññðùèåß íá áéáññçèåß áéåýèåññå iå ôi ááðóééü óýóðçìá ôið FreeBSD.

Ãéá íá ááðéåðåóðPóåôå ôi ëiæéðéêü, áððÜ ÷ñçóéïðíéÞóåô ôóçí ÓðëëërP ôùí Ports. ÅáðéåðåóðPóåôå ôi port net/pppoa áéïïðøéðPóåôå ðéð iäçñåßåò ðiõ ðáññééññÜññíðåé óå áððü.

¼ðùò ðiëëÝð óððéâðYð USB, ôi Alcatel SpeedTouch™ ÷ññðÜæåôåé íá êáðåðåÜðåé ôi firmware ôið áðü ôií ððiððéóðP óðið iðiðßí áßíåðé óðñññåÝíí, ðññéåéíÝíí íá ëåéðiññPóåé óùóðÜ. Ç áéáæééåðå áððP ðñññðùèåß íá

آôôññáôîðíéçéåß ôôî FreeBSD, þþôå ç iåðåöiñÜ íá åßíåôáé êÜéå öiñÜ ðiô ôôñäÝåôáé ç ôôôéåôP ôôç èýñá USB. ïðiññåßôå íá ðñiøèÝóåôå ôéò ðáñáéÜûò ðeçññiñßåò ôôî áñ÷åßi /etc/usbd.conf æáá íá åíåññiðíéÞóåôå ôçí åôôùüáôç iåðåöiñÜ ôîô firmware. Èá ðñ Ýðåé íá åðåññáóôåßôå åôôù ôî áñ÷åßi ùò ÷ñÞóôçò root.

```
device "Alcatel SpeedTouch USB"
    devname "ugen[0-9]+"
    vendor 0x06b9
    product 0x4061
    attach "/usr/local/sbin/modem_run -f /usr/local/libdata/mgmt.o"
```

Ãáá íá áíâññäïðíéÞóåôå ôí **usbd**, ôí äáßííïá USB, ðññóëÝóôå ôçí ðáññåêÜôù äññäïíÞ ôóí áñ÷åßí /etc/rc.conf:

```
usbd_enable="YES"
```

Iðiññáð áðþóðç Íá í ñöðeìßóðåð ðí **ppp** þóðå Íá áðóðåðéð áðóðüùáðå ëëþóðs éáðóð ðíç áðéðþíçóð ðíð ðíðóðþíðóð. Áéá Íá áðíðéáð áðóð, ðññóðéÝóðå ðóðo ðáñáðéÜðóù ãñáiiÝð ðóð /etc/rc.conf. Éá ðñÝððé ðáé ðÜðé Íá áðóðéÝóðå ðíç áðáæéðáóðá ðù ðroot.

```
ppp_enable="YES"  
ppp_mode="ddial"  
ppp_profile="adsl1"
```

Áéá íá ëåéóïõñäPóáé òúóöÜ òï ðáñáðÜù, èá ðñ Ýðåé íá Ý÷åôå ÷ñçóëiiðéPóáé òï õðüääéäíá òïõ áñ÷åßiõ ppp.conf òï iðibí ðáñÝ÷åóáé íà òï port net /pppoa.

### 28.6.2 ×ñçóéìïðíéþíôáò ôï mpd

Đñþþoá ðñÝðåé íá åâéâðåóðÞóâðå ôi port, êáé iåðÜ ðñiñâðþðå íá ñõèìßóåðå ôi **mpd** þóðå íá êáéýððåé ôéð áðáéðÞóåéð óáð ôéá ôéð ñõèìßóåéð ôið ðáñii ÷ Yá óáð. Ôi port åâéâééóðÜ êÜðïéá ðáññäåßñíáðå áñ÷åþúí ñõèìßóåùí óóíí êáðÜëiäi *PREFIX* /etc/mpd/. Ôá áñ÷åþá åðóðÜ ðåñéY÷iðíí áñéâðóðÜ êáéÞ ôâåéçñßùóç ôúí ñõèìßóåùí. Óçìåðþóðå åâþ, üðé ôi *PREFIX* åßíáé i êáðÜëiäið ôóíí iðiñßí åâéâéßóðåíðåé ðá ports, êáé áðü ðñiñâððéëiÞ åßíáé i /usr/local/. IåðÜ ôçí åâéâðóðÜóðåóç ôið port, èá åñâðþðå Ýíá ðëÞñç iäçäü åéá ôç ñýéiéóç ôið **mpd** óå iññöÞ HTML. Ç ôâåéçñßùóç åâéâéßóðåóðåé ôóíí êáðÜëiäi *PREFIX* /share/doc/mpd/. ĐáññéÜòú öåßíåðåé Ýíá õðüüääéäíá ñõèìßóåùí åéá óýíåðåóç óå iéá ñðçñâðþðå ADSL iÝóú ôið **mpd**. Ié ñõèìßóåéð ÷ùñþæiñðå óå åýíi åñ÷åþa, ðñþðå åâþ-ñiðå ôi mpd.conf:

```
default:  
    load ads1  
  
ads1:  
    new -i ng0 ads1 ads1  
    set bundle authname username ①  
    set bundle password password ②  
    set bundle disable multilink  
  
    set link no pap acfcomp protocomp  
    set link disable chap  
    set link accept chap  
    set link keep-alive 30 10
```

```

set ipcp no vjcomp
set ipcp ranges 0.0.0.0/0 0.0.0.0/0

set iface route default
set iface disable on-demand
set iface enable proxy-arp
set iface idle 0

open

```

① Óř üññá ÷ñPóôç ìå ôí iðiñi ãßíâôáé ç ðéóôiðiñßçóç óôíí ISP óáò.

② Í èùäéêüò ìå ôí iðiñi ãßíâôáé ç ðéóôiðiñßçóç óôíí ISP óáò.

Óř áñ÷åßi mpd.links ðåñéÝ÷åé ðëçñiññßåò ó÷åôééÜ ìå ôç óýíâåóç P ðéò óôíäÝóåéò ðiõ èá ðñáâìáôiðiñçèiýí. Äéá ðáñÜääéñá, ôí mpd.links ðiõ óôíñääýåé ôí ðáñáðÜù ðáñÜääéñá, öáßíâôáé ðáñáéÜôù:

```

adsl:
set link type pptp
set pptp mode active
set pptp enable originate outcall
set pptp self 10.0.0.1 ①
set pptp peer 10.0.0.138 ②

```

① Ç äéâýèôíóç IP ôíø FreeBSD ðíññäéôP óáò, óôíí iðiñi èá ÷ñçóéiðiñçóå ðíí mpd.

② Ç äéâýèôíóç IP ôíø ADSL modem óáò. Äéá ôí Alcatel SpeedTouch Home, ç äéâýèôíóç áôôP åßíâé áðü ðññäðééiP ç 10.0.0.138.

Åßíâé äðíáôüí íá áñ÷ééiðiñçóå õç óýíâåóç åýééä, äßññôáò ôçí ðáñáéÜôù åíðiñçóå:

```
# mpd -b adsl
```

Íðiñâßôå íá äâßôå ôçí éâðÜóôáóç õçò óýíâåóçò ìå ôçí ðáñáéÜôù åíðiñçóå:

```
% ifconfig ng0
ng0: flags=88d1<UP,POINTOPOINT,RUNNING,NOARP,SIMPLEX,MULTICAST> mtu 1500
        inet 216.136.204.117 --> 204.152.186.171 netmask 0xffffffff
```

Ôí mpd áðiôâæåß ôíí óôíéóôþìåñí ôñüði óýíâåóçò ôíø FreeBSD ìå iéá ñðçñâóßá ADSL.

### 28.6.3 ×ñçóéiðiñçóå ðíí pptpclient

Íðiñâßôå áðßôçò íá ÷ñçóéiðiñçóå ðíí net/pptpclient ôí FreeBSD ãéá íá óôíññäéâßôå óå Üëéåò ððçñâóßåò PPPoA ÷ñçóéiðiñçóå ðíí net/pptpclient.

Äéá íá ÷ñçóéiðiñçóå ðíí net/pptpclient ãéá íá óôíññäéâßôå óå iéá ñðçñâóßá DSL, åââáâóóôPóôå ôí port P ôí ðáéÝôí, ëéá åðââññâóôåßôå ôí áñ÷åßi /etc/ppp/ppp.conf. Èá ÷ñâéâóôåß íá åßóôå root ãéá íá êÜíâôå ëéé ôéò äýí ðáñáðÜù åéáæéâóôåßôå. ÐáñáéÜôù öáßíâôáé Ýíá ðáñÜääéñá iéá ñðçñâóßá ôíø ppp.conf. Äéá ðáñéóóüôâñå ðëçñiññßåò ó÷åôééÜ ìå ôéò åðééiäÝò ôíø ppp.conf, äâßôå ôç óâëßâá manual ôíø ppp, ppp(8).

```
adsl:
```

```
set log phase chat lcp ipcp ccp tun command
set timeout 0
enable dns
set authname username ❶
set authkey password ❷
set ifaddr 0 0
add default HISADDR
```

- ① Ôi üññia ÷ ñPôôç ãéá ôii ëëäññéáoiü óáò óôii ðáññi ÷ Ýá DSL.
  - ② Í êùäéêüò ãéá ôii ëëäññéáoiü óáò.

```
# chown root:wheel /etc/ppp/ppp.conf  
# chmod 600 /etc/ppp/ppp.conf
```

Áðóðu èá áñíßíâé Ýíá ðíýíâé ãéá íéá áðóðáæñþá PPP íå ôíí DSL æññííëtäçôþ óáð. Óá DSL modem óýðiø ethernet Ý÷iøí íéá ðññíéâæññéói Ýíç æéâýèöíóç IP óóí ôíðééü óáð æßþéöí, óðóçí iðiñþá íðiññâðóá íá óðóðâæñþóá. Óðóçí ðåñþðóðùóç ôíøí Alcatel SpeedTouch Home, ç æéâýèöíóç áðóðþ áßíáé 10.0.0.138. Ç óâéíçñßùóç ðíø æéáè Ýóáé i ñññííëtäçôþò óáð, èá áðáð Ýññáé ðíéá æéâýèöíóç ÷ñçöéññíðíæß ç óðóðâæñþá PPP óáð. Æéá íá áñíßíâðóá ôí ôíýíâé ëéá íá ðâééíÞóðóá ìéá óðóðâæñþá PPP, æðóðâé Ýóðóâ ðçí æúüëøðèç áíðíøþ:

```
# pptp address adsl
```

**Õõdüüäälte:** Álvíáé éääþþ éáÝá íá ðöñiööýóðåôð Áýíá “&” öði ðÝéïò ôçò ðöñiçäiýyläíçò áíðöiëþò, äéáöiñâðöéêÜ öi **pptp** äái èá óáð åðéööññÝóðæ öii Ýéäaä÷- (ðöñiööññiðþ) öiñ ôðâñlääðöééiy óáð.

Èá äçleïõñäçèåß íéá oôóéåôòP tun (åééïíéêü öiyâåë) ãéá ôçí áëççëåðßänåóç lâôåáý ôùí äéññåóéþí **pptp** êáé **ppp**. Iüééò åðéôòñÝøåé ç ðñiöñiðþP oóí ôâñlåôéêü óàò, P oí **pptp** åðéåâåéþóåé ôç öýíâåóç, iðiññåßôå íá åìåôÜóåôå oí öiyâåë iá oíí ôññüði ðið oábhåóáé ðáññåé Üûò:

```
% ifconfig tun0
tun0: flags=8051<UP,POINTOPOINT,RUNNING,MULTICAST> mtu 1500
        inet 216.136.204.21 --> 204.152.186.171 netmask 0xffffffff00
                Opened by PID 918
```

Áí ááí íðm Ýóåôá íá óoñáåèåßôå, áéÝáîôá óeó ñoëíßóåéó ôíö áññííæíäçóÞ óáð, íé íðíßåò óoñíÞèùò áßíáé ðññíóåÜóéíåò ÍÝóù telnet Þ íÝóù èÜðíéíö ñoëëñíåñöñçóÞ. Áí áéüíá ááí íðíñåßôå íá óoñáåèåßôå, éá ðñÝðåé íá áååðÜóåôá ðçí Ýññäí ðçð áîññéÞò ppp Þ ëéé óá ðññéá ÷üñáíá ôíö áñ÷ áßíö êåðåññäöÞò ôíö ppp, /var/loq/ppp.loq áéá ðééáíÜ óóïé ÷ áßá.

## 28.7 × ñçóéïðíéþíôáò ôï SLIP

Áñ ÷ éêP óðíâéóðm Ü ôïô Satoshi Asami. Íå ôç ãïþèåéá ôùí Guy Helmer êáé Piero Serini.

**Ðñíâéäïðíßçóç:** Ç áíüôçôá áðôþ áðáñlúæåðáé êáé áßíáé Ýâéññç iüñ óå óðôðþíâôá FreeBSD 7.X.

### 28.7.1 Ñöèìßæïîôáò Ýá ÐåëÜôç SLIP

ÐáñâéÜôù ðáññðóéÜæïòíá Ýá óññüðí íá ñöèìßóâôá Ýá iç ÷ Üíçá FreeBSD ùò ðåëÜôç SLIP óå Ýá áßêôôï ìå óðâðééÝ ðééðéýíôåéò. Áéá iç ÷ áïþíâôá óå iðiñá eáiaÜññí üññá áðíáíéêÜ (ç áéåýéðíóç õiðó áëëÜæåé êÜeå õiñÜ ðið óðññáÝíñðáé) ðééññí iá ÷ ñâéáðôåß íá ûÜíâôá ðéï ðíëýðëïéåð ñöèìßðåéò.

Áñ ÷ éêÜ, èá ðñÝðåé íá éâæññðóâôá óå ðíéá óâéñéâéP èýñá áßíáé óðññâiÝñ õi modem óáò. Áññâôïß ÷ ñþóôâôá åçíëññâiÝ Ýá óðíâíéééü åâðñü ð. ÷. /dev/modem, õi iðiñíi åâß ÷ íâé óðçí ðññâiâðééP óðôðâðP /dev/cuadn. Áðôü óáò áðéñÝðåé íá óññâi ÷ ðóâôá íá ÷ ñçóéïðíéåßôå ôï ßæíi üññá óðôðâðP, áëñíá êáé áí iâðââééíþóâôá ôï modem óå áéáðññâðééP èýñá. Áßíáé iÜëëíi Üâíëí iá ðñÝðåé íá áëëÜíâôá ðéþèïò áñ ÷ åßùí óði /etc êâèþò êáé óá áñ ÷ åßá .kermrc óå üëí õi óýôðçíá!

**Óçìâßùóç:** Ôï /dev/cuad0 áßíáé ç COM1, ôï /dev/cuad1 áßíáé ç COM2, ê.i.ê.

Âåâáéñèåßôå üôé ôï áñ ÷ åßí ñöèìßóâùí ôïô ððñþíâ óáò ðâññéÝ ÷ åé óá ðáñâéÜôù:

device sl

Ôï ðáñâðÜíù ðâññëäâiáÜíâôáé óðiñ ððñþíâ GENERIC, êáé áí åâí ôï Ý ÷ åôå åéáññÜøåé, åâí èá Ý ÷ åôå ðññüâëçíá.

#### 28.7.1.1 Ñöèìßóâéò ðïô èá × ñâéáóôåß íá ÈÜíâôá ìüñ iéá ÖiñÜ

1. ÐñíøéÝóâô ôï iç ÷ Üíçá óáò, ôçí ðýëç (gateway) êáé ôïðò áéáññéóÝ ðiññíÜôùí (nameservers) óðií áñ ÷ åßíi /etc/hosts. Óöï ðáññðââéäâiá ìåò, ôï áñ ÷ åßíi áðôü ïiñÜæåé ìå ôï ðáñâéÜôù:

```
127.0.0.1           localhost loghost
136.152.64.181      water.CS.Example.EDU water.CS water
136.152.64.1        inr-3.CS.Example.EDU inr-3 slip-gateway
128.32.136.9         ns1.Example.EDU ns1
128.32.136.12       ns2.Example.EDU ns2
```

2. Âåâáéñèåßôå üôé ç áíüôçôá files âñßóâôáé ðññí ôï dns óðçí áíüôçôá hosts: ôïð ãñ ÷ åßíi /etc/nsswitch.conf. Áí åâí ôðÜñ ÷ iði ãðôÝ ðé ðáññðâññé, ñðññâß íá åíöáññðíýí ðáññðâññá óðñðþíâôá.
3. Ôññðiðíéþóâô ôï áñ ÷ åßíi /etc/rc.conf.

1. Ìñßóâô ôï üññá ôïð ðññðiðíéþíôå ôï ãññâiþ ðið ãñÜôåé:

```
hostname="myname.my.domain"
```

Èá ðñÝðåé åâþ íá ôïðíëåðþóâôå ôï ðéþñâò üññá ôïð ðññðiðíéþíôå óáò.

2. Ìñßóâô ôïð ðññðééâññí ãññññæçôþ, áëëÜæíñôå ôï ãññâiþ:

```
defaultrouter="NO"
```

óå:

```
defaultrouter="slip-gateway"
```

4. ÄçìéïõñäÞóôå Ýíá áñ÷åßí /etc/resolv.conf ôi iðißí èá ðåñéÝ÷åé:

```
domain CS.Example.EDU
nameserver 128.32.136.9
nameserver 128.32.136.12
```

¼ðùò iðiñåßôå íá äåßôå, ôi ðåñáðÜíù iñßæåé ôiðò äéåéñéóôÝò DNS. ÖðóééÜ, ôá ðñáñáðééÜ iíüüàóá êáé ié äéåñèýíóåéð ôùí ôiÝùí åîáñôþíóåé áðü ôi ðåñéâÜëëíí óåò.

5. Ñðèiðóôå êùäééü ðñüüðååçò äéá ôiðò ÷ñÞóôåò root êáé toor (êáèþò êáé äéá üóïò Üëëïò ëíáñéáðíýò äåíÝ÷iðí èùäééü).
6. ÅðáíååééÞóôå ôi ìç÷Üíçìá óåò, êáé åååáéùèåßôå üðé Ý÷åé ôåèåß óùóôÜ ôi üññá õðiëëåéóðP.

### 28.7.1.2 Äçìéïõñäþíóåò iéá Óýíååóç SLIP

1. ÍåðÜ ôçí êëÞóç, ãñÜøôå ôçí åíðiëÞ slip óôçí ðñiðñiðP, ãñÜøôå ôi üññá ôiðò ìç÷áÞìáðið ôáò êáé ôií êùäééü. Ôí ôé åéñéåþò ÷ñåðÜæåðåé íá ãñÜøôåå, åîáñôÜôåé áðü ôi ðåñéâÜëëíí óåò. Áí ÷ñçóéíðíéåßôå ôi **Kermit**, iðiñåßôå íá ÷ñçóéíðíéÞóååå Ýíá script üðùò ôi áéüëiðòëí:

```
# kermit setup
set modem Hayes
set line /dev/modem
set speed 115200
set parity none
set flow rts/cts
set terminal bytesize 8
set file type binary
# The next macro will dial up and login
define slip dial 643-9600, input 10 =>, if failure stop, -
output slip\x0d, input 10 Username:, if failure stop, -
output silvia\x0d, input 10 Password:, if failure stop, -
output ***\x0d, echo \x0aCONNECTED\x0a
```

ÖðóééÜ, èá ðñÝðåé íá áéëÜåðåå ôi üññá ÷ñÞóôç êáé ôií êùäééü þóôå íá ðåéñéÜæiðí iå ôá äééÜ óåò. ÍåðÜ áðü áðóöü, iðiñåßôå áðëþò íá ðëçéññiðræÞóååå slip óôçí ðñiðñiðP óýíååóçò ôið **Kermit**.

**Óçìåßùóç:** Ç ýðáñíç ôið êùäééiy óåò óå iññöÞ áðëëy êåéíÝíò óå iðiéíäþðiðå óçìåßí åíüò óðóóðÞìáðið ãñ÷åßúí, åßíáé ååíééÜ éáéëÞ éäÝá. ÐññiðñiðÞóôåå iå äééëÞ óåò åðèýíç.

2. ÁöÞóôå ôi **Kermit** åéåß (iðiñåßôå íá ôi óååßëåôå óöi ðåñáóðÞíëi ÷ñçóéíðíéþíóåò ôá ðëÞêóñá **Ctrl-z**) êáé ùò root, ãñÜøôå:

```
# slattach -h -c -s 115200 /dev/modem
```

Áí iðiñåßôå íá êÜíåðå ping óå ðëiëëåéóôÝò óôçí Üëëç iåñéÜ ôið ãññiðiäçòÞ, åßóôå óðíðååìÝíé! Áí áðóöü äåíäöéåýåé, æíðiðÜóôå ôçí åðéëëÞ -a áíðß åéá ôçí -c ùò üññéóíå óôçí slattach.

### 28.7.1.3 Ðùò íá Ôâñìáôßóâôå ôçí Óýíäåóç

ÊÜíôå ôá áêüëïõéá:

```
# kill -INT `cat /var/run/slattach.modem.pid`
```

âéá íá ôâñìáôßóâôå ôí slattach. Ëðïçèåßôå üöé ðñÝðåé íá åßóôå root âéá íá åêôåëÝóâôå ôí ðáñáðÜíû. ðåéôå åðåÍYëèåôå ôöï kermit (åêôåëþíôå ôçí fg áí ôí åß÷åôå ôôåßëåé ôöï ðáñáðPíéí) êáé ôâñìáôßóâôå ôí (ðéÝæíïôå q).

Ç óâéßää manual ôí slattach(8) áíäöÝñâé üöé ïðïñâßôå íá ÷ñçóéïðïéÞóâôå ôçí åíðïëP ifconfig s10 down âéá íá äéâéüøâôå ôç óýíäåóç, áëëÜ áðöü äái öáßíåôåé íá Ý÷åé êáÍYíá áðïöÝëåôïá. (To ifconfig s10 áíäöÝñâé ôí ßæëí ðñÜäïá.)

ÌåñéêÝò öïñÝò, ôí modem óáò ïðïñâß íá áñíçèåß íá êëåßóâé ôç ãñáïlP. Óôéò ðåñéðôþóâéò áðôÝò, îâééíÞóôå íáíÜ ôí kermit êáé ôâñìáôßóâôå ôí íáíÜ. Ôç äåýôåñç öïñÜ óðíÞèùò ðåðô÷åßíåé.

### 28.7.1.4 Áíôéìåôþðéóç ÐñïäéçìÜôùí

Áí ôí ðáñáðÜíû äái èåéôïñãÞóâé, ñùôÞóôå ôôç ëßóôå freebsd-net

(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-net>). ÌåñéêÜ áðü ôá õðíçèéóíÝíá ðñïäéÞíåôå ôá ïðïßá Ý÷ïðïå ìÝ÷ñé ôðéäìPò áíðéâåðùßóâé:

- Íá íçí Ý÷åé ÷ñçóéïðïéçèåß ç åðééïäP -c P -a ôôçí slattach (Áðöü êåñíéêÜ äái åßíåé êñßóéï ðöÜëïá, áëëÜ ïðïñâéïß ÷ñÞóâôå áíÝöåñáí üöé áðöü Ýëöôå ôá ðñïäéÞíåôå ôíöö.)
- ×ñÞóç ôíö s10 áíðé ãéá s10 (ç äéáöïñÜ ïðïñâß íá åßíåé ðrëý ìéñP óå ìåñéêÝò ãñáïäöåéñÝò).
- ÄïééïÜóâå ôçí åíðïëP ifconfig s10 âéá íá åâßôå ôçí êáðÜóâåóç ôçò äéâðåöPò. Äéá ðáñÜäåéäïá, ïðïñâß íá åâßôå ôí ðáñáéÜò:

```
# ifconfig s10
s10: flags=10<POINTOPOINT>
    inet 136.152.64.181 --> 136.152.64.1 netmask ffffff00
• Áí ç áíðïëP ping(8) äßíåé íçíýìåôå no route to host, ßóùò ððÜñ÷åé ðñüüâëçìá ìå ôíí ðßíåéâ åññíïëüäçóçò óáò.
  ïðïñâßôå íá ÷ñçóéïðïéÞóâôå ôçí åíðïëP netstat -r âéá íá åâßôå ôçí ôñÝ÷ïðöå åññíïëüäçóç:
# netstat -r
Routing tables
Destination      Gateway          Flags       Refs      Use     IfaceMTU      Rtt      Netmasks:
          (root node)
          (root node)

Route Tree for Protocol Family inet:
          (root node) =>
default        inr-3.Example.EDU  UG           8   224515  s10  -
localhost.Examp1 localhost.Example. UH           5   42127   lo0  -
inr-3.Example.ED water.CS.Example.E UH           1       0   s10  -
water.CS.Example localhost.Example. UGH          34  47641234  lo0  -
          (root node)
```

Ôá ðáñáðÜíû ðáñáäåßäìåôå åßíåé áðü Ýíá ó÷åðééÜ áðåó÷ïëçìÝñí óýóôçìá. Íé áñéèïß èá äéáöÝñíöí ôöï óýóôçìá óáò, áíÜëäá ìå ôç ãñáôðçñéüöçôå ôíö äéâôýïö.

## 28.7.2 Ñõèìßæïíôáò já Åîðçñåôçôþ SLIP

Ôí êåßíåñíí áðóü ðáñÝ ÷ áé áðöÜëéåð ððíäåßíåéò áéá ôç ñýéïéóç áíüò FreeBSD óðóðÞiaðið ùò åîðçñåôçôþ SLIP. ÔðééÜ áðóü óçíáßíåé üöé ôï óýóðçíá óáò éá ñõèìéóðåß íá íâééïÜ áðóüìáðá ôéò óðíäÝóåéò íåðÜ ôçí åßóïäíí áðñåñððííÝùí ðåéåðþí SLIP.

### 28.7.2.1 ÐñíüðïèÝóåéò

Ç áíüòçôá áðóþ áßíáé éåéåßôåñá ôå ÷ íéêþð öýóåùò, êáé áéá ôï ëtiäí áðóü áðáéôåßôáé íá Ý ÷ áðå ðéð áíðßöðöï : åð åíþðåéò áéá íá ôçí åéåðáííÞiaðåå. ÕðïèÝóïðiå üöé Ý ÷ áðå ìéá áííééåßùóç íå ôï ðñùòüéïëëí TCP/IP êáé áéæéüöåñá íá ôç áéæððéðíóçíäüðçóç èüíüåñí, ôéò iÜóéåð äééðóýùí, ôá ððíäßéðóå, ôç åñíññëüäçóç êáé ôá ðñùòüéïëëí åñíññëüäçóç ð ùðùò ôï RIP. Ç ñýéïéóç ôúí ððçñåðéþí SLIP óå Ýíá áîðçñåôçôþ áðééïäééþí óðíäÝóåñí áðáéóðåß åíþðí ôúí åíññéþí, êáé áí åâí åßóðå åííééåñíÝñò íå áðóÝð, óáð ðáññåéäéïýíå íá äéååÜóåðå åßóðå ôï TCP/IP Network Administration ôïð Craig Hunt (åâéüöåéò O'Reilly & Associates, Inc, Áñéèìüò ISBN 0-937175-82-X) þ êÜðïéï áðü ôá åéâëßá ôïð Douglas Comer ó ÷ áðééÜ íå ôï ðñùòüéïëëí TCP/IP.

ÅðéðéÝí, õðïèÝóïðiå üöé þäç Ý ÷ áðå ñõèìßóåé ôï modem óáò êáé Ý ÷ áðå ôñïðïðíéÞóåé ôá êáðÜëéçëá áñ ÷ åßá ñõèìßóåñí ôïð óðóðÞiaðið þóðå íá áðéðóÝðåðåé ç åßóïäíí ðó òöé óýóðçíá íá ðñùòüéïëëí modem. Áí åâí Ý ÷ áðå áéüñí ðññåðiðÜðåé ôï óýóðçíá áéá áðóü, ðáññåéäéïýíå åâßóðå ôï ðíÞia 27.4 áéá åâððñíÝñåçåð ð ÷ áðééÜ íå ôç ñýéïéóç ôúí áðééïäééþí óðíäÝóåñí. Åíññ ÷ íÝíùò íá èÝéåðå åðßóçò íá åâßóðå ôéò óâéßååð manual ôçð sio(4) áéá ðëçññöïñßåð ð ÷ áðééÜ íå ôï ðñùñññåñíäí ïäÞäççò ðçð ôâéñéåéðþ ðýññåð, ôá ttys(5), gettytab(5), getty(8), êáé init(8) áéá ðëçññöïñßåð ðið ð ÷ áðßæïðåé íå ôç ñýéïéóç ôïð óðóðÞiaðið þóðå íá äÝ ÷ áðå ãééñéåéðþ ð ÷ áðééÜ íå ôéò ðáññåíÝðññò ðáéññéåéþí ðéññþí (üðùò ôçí clocal áéá óâéñéåéÝð áéåðåöÝð ðið åßíáé áðåðèåßåð ôðíññåíÝíåð).

### 28.7.2.2 Åñþäïñç Åðéóéüðçóç

ÔðééÜ, Ýíáò áîðçñåôçôþ SLIP ðið ÷ ñçóéïðíéåß FreeBSD ëåéòïðññåß íå ôíí åíþð ðñüði: Ýíáò ÷ ñÞóðçò SLIP êáééåß ôíí åîðçñåôçôþ SLIP, êáé áéóÝñ ÷ áðåé ôöí óýóðçíá íÝóù áíüò åéæééý áíáñññéöðééý åéóüäí ãéá ôï SLIP. Ôí èÝëðöïð ôïð ÷ ñÞóðç åßíáé ôï /usr/sbin/sliplogin. Ôí ðñùñññåñíäísliplogin äéååÜæåé ôï áñ ÷ åßí /etc/sliphome/slip.hosts áéá íá åññåé íéá åññåíþ ðið íá ðáéññéÜæåé íå ôí ÷ ñÞóðç, êáé áí ððÜñ ÷ áé, óðíäÝåé ôçí óâéñéåéþ åññåíþ óá íéá åéåéÝóéïç áéåðåöþ SLIP êáé Ýðåéðå áâðåéåß ôï script ôïð êâéýöïð ð /etc/sliphome/slip.login áéá íá ñõèìßóåé ôç áéåðåöþ SLIP.

#### 28.7.2.2.1, íá ÐáñÜäåéäíá Åéóüäíð òå Åîðçñåôçôþ SLIP

Åéá ðáñÜäåéäíá, åéá Ýíá ÷ ñÞóðç SLIP íå ID Shelmerg, ç áíðßóðöïé ÷ ç êáðå ÷ þñéóç óöí /etc/master.passwd èá Ýíïéåæå íå ôçí ðáññåéÜðù:

```
Shelmerg:password:1964:89::0:0:Guy Helmer - SLIP:/usr/users/Shelmerg:/usr/sbin/sliplogin
```

¼ôáí åéóÝëèåéï Shelmerg, ôï sliplogin èá øÜíåé ôï /etc/sliphome/slip.hosts áéá íéá åññåíþ íå ID ÷ ñÞóðç ðið íá ðáéññéÜæåé. Åéá ðáñÜäåéäíá, ðiññåß íá ððÜñ ÷ áé íéá åññåíþ óöí /etc/sliphome/slip.hosts ðið íá åñÜöåé:

Shelmerg	dc-slip sl-helmer	0xffffffffc00	autocomp
----------	-------------------	---------------	----------

Ôí sliplogin èá åññåé ôç åññåíþ áððþ, èá óðíäÝóåé ôç óâéñéåéþ åññåíþ óðçí åðüìåíç áéåéÝóéïç áéåðåöþ SLIP, êáé Ýðåéðå èá åâðåéÝóåé ôï /etc/sliphome/slip.login üðùò óâßíåðåé ðáññéÜðù:

```
/etc/sliphome/slip.login 0 19200 Shelmerg dc-slip sl-helmer 0xfffffc00 autocomp
```

Áí üéá ðÜfá ééäÜ, óí /etc/sliphome/slip.login éá áéðóåéÝ óåé iéá áíðiøéP ifconfig áéá óíç áéåðáöP SLIP óðóçí iðibá Ý ÷ áé óðííååéåß ç sliplogin (ç áéäðáöP 0 óðí ðáñáðÜfú ðáñÜääéäíá, ç ðñþöç ðáñÜiåðñö òçò èßóóåò ðiø áßíåðáé óðíí slip.login) þóðá íá ñðèlëóðíýí ç ðiðééP áéåýéðíóç IP (dc-slip), ç áðñíáéññö ÓÍç áéåýéðíóç IP (sl-helmer), ç iÜðéá áééðýïò áéá óíç áéäðáöP SLIP (0xfffffc00), êáé iðiéáðáÞðiòå ðñüöðéåðåò áðééïäÝò (autocomp). Áí êÜðé ðÜfá óðóñáðÜ, éá iðiñÝ óåóå íá óíç áíðiøðþóåðå áðü óá ãñ ÷ áßá éáðóåññäöÞò òçò sliplogin. Ç sliplogin êáðóåññÜöåé óá lçýíåðå ÷ ñçóéñiðíéþíðå óíç ááßíiiá syslogd i iðiñbiò ðóíÞèùò ÷ ñçóéñiðíéåß óíç ãñ ÷ áßíi /var/log/messages (äáßóå óéð óåëßäåð áíÞðéåéáð åéá óá syslogd(8) ééá syslog.conf(5) éáé åíðä ÷ iÍYùò åéÝ åíðå óíç /etc/syslog.conf åéá íá äáßóå óíç ðiðíëåðßá åéá óíç åíðä ÷ áßíi ðiø ÷ ñçóéñiðíéåß óíç syslogd åéá óíç êáðóåññäöÞ).

### 28.7.2.3 Ñýèìéóç ôïõ Đõñþíá

Í ðñíðåðééðáí Ýiiò ðõñPíàò ôiò FreeBSD (i GENERIC) æéæé Ýôåé åíóùùåóùù Ýíç ðõiøòPñéïç SLIP (sl(4)). Óçí ðåñßðóùóç ðiò è Ýéåðå íá äçìëiñäPóåòå ðñíóáñiióí Ýiiò ðõñPíá, ðñiøè Ýóôå ôçí ðáñáéÜôù ãñáiiP óöi áñ÷åßi ñõeìßóùí ôiò ðõñPíá óáò:

device sl

Ói FreeBSD, áðü ðñiâðéëiâP, äáí ðñiïùèåß ðáêÝôá. Áí èÝéåôá í åîðçñâðôçÞò óáð íá îáññåß ùò äññiñieäçôÞò, èá ðñÝðåé íá åðâiåññåðôåßöô ñí ãñ÷åbi /etc/rc.conf éáé íá áéëÜiåôá ôç ñýéiéóç ôçò iåðåâéçôÞò gateway\_enable óá YES. Íá ñí ññüði áðöü, èá åßíáé óßäiññü ûöé ç åðéëiâP ôçò äññiñüäççöçò èá äéâðçñçëåß iåðÜ áðü íéá åðáíåêéßíççöç. Èá ðñÝðåé Ýðåéðá íá åðáíåêéðóåðå ãéá íá îáññäiðiéçëiýí ié íYåò ññðèiþóåéð.

Áeá fá ábáñílúóádóá ádóÓ Yđ óéò ñöèiBóáééò Ülådá, idinabóá íá áéóóéYóádóá ócí ðánáéÜóù áíðöüéP ùò root:

```
# /etc/rc.d/routing start
```

Danáeaeýíl ááñbóá òi ÉäoÜéäeí 9 áæá ðäñneóðuñåñåð ðëçññüññåñå ð : áðééÜ la ñçí ñÿéleóð òið ðõñPíá òið FreeBSD.

#### 28.7.2.4 Ñýèìéóç ôïõ Sliplogin

¼ðùò áíáð Ýñèçéâ êáé ðñéí, ððÜñ ÷ iñí ôñþá áñ ÷ áßá óðíí êáðÜëüäi /etc/sliphome óá iðíßá ÷ ñçóéüüðíéýfóáé óóç ñyéìéóç ôiõ /usr/sbin/sliplogin (ååßóå êáé óç óåëßää manual ôiõ sliplogin(8)): ôií slip.hosts, ôií iðíßí iñßæåé ðiñð ÷ ñíÞóåò SLIP êáé ðéð áíðóðöiñ ÷ åò IP æéðèýfóáé ðiñð, ôií slip.login ôií iðíßí ðoíÞèùò ñðeìßæåé aðéÜ óçí æéðåòP SLIP, êáé ðñíáññåóéê Ü ôií slip.logout, ôií iðíßí áíáéñåß ôéò áéëáá Ýò ôiõ slip.login üóáí ðåñíáðßóåé c óáéñéáðP óvýäåóç.

#### 28.7.2.4.1 Nyéiéóć ôjō slip.hosts

Öi /etc/sliphome/slip.hosts ðåñéÝ÷åé ãñàìíÝò iå ôÝóóåñá ðåäßá ðiö ÷ùñßæïíôáé iåôáiy ôiöö iå êåíÜ äéåóôÞìáå:

- Ôi áíáãíüñéóôéü åéóüäïö ôiõ ÷ ñÞóôç SLIP
  - Ôçí ôiðéêP äéåýèöíöç (ôiðéêP ùò ðñïò ôií åîðçñåôçôP SLIP) ôçò äéáóýfääóçò SLIP
  - Ôçí åðñâéñöìÍýç äéåýèöíöç ôçò äéáóýfääóçò SLIP
  - Ôç iÜóéá ôiõ äéêöýïö

```
#  
# login local-addr      remote-addr      mask          opt1      opt2  
#                                         (normal,compress,noicmp)  
#  
#  
Shelmerg  dc-slip      sl-helmerg      0xffffffffc00      autocomp
```

Óöii ôÝëëò ôçò ãñáììPò, âñßóëïîôáé ìéá P ðåñéóóüôåñåò áðü ôéò ðáñáêÜôù åðéëiaÝò:

- **normal** — ÷ùñþð óõìðþåóç ôùí åðéêåöáëþäùí
  - **compress** — iã óõìðþåóç ôùí åðéêåöáëþäùí
  - **autocomp** — iã óõìðþåóç ôùí åðéêåöáëþäùí, áí åðéôñ Ýðåôáé áðü ôíí áðñàéññóí Ýíí õðíieïæóôþ
  - **noicmp** — áðåíâñäiðþçóç ôùí ðáé Ýôùí ICMP (iã ôíí ôñüðř áðöü ôá ðáé Ýôá “ping” èá áðññþðôíiôáé áíðß íáéåáíáëþñíöí ôí áýñò æþíçò ôçò óýíâåóçò óáó)

Áí ðñüéåðóáé íá ÷ ñíçóëiiðíéÞóåðå íá ÷ ùñéóðü ððíäþéðóðí áéá ôíðò SLIP ððæÜðåð óáð, éá ÷ ñåéáðóðåß íá äéæéÝóåðå õíí áñéèü ððíäééðóýíð áðü óçí áéåýèðíóç IP ðið óáð Ý÷åé áðíäieðß êáé íá áðíäþóåðå óóïðò ððæÜðåð SLIP áééðéýíðé ðið áíÞéiðí óáð óðóðü ði ððíäþéðóðí. ðåéðå, éá ÷ ñåéáðóðåß íÜëeíí íá êáéëñþóåðå lëá óðåðééÞ áéáäññíÞ óðí ððräþéðóðí SLIP íÝóú óið áîððçñåðóçóÞ SLIP óóïí eírðééñüðåññí óáð aññíñëíæcôÞ IP.

ÄéáöïñâôéêÜ, áí ÷ñçöéiiðíéÞóåôå ôç iÝëíäi “proxy ARP”, éá ÷ñâéáôåß íá áðíäßååôå óöïð SLIP ðåëÜðåôå óåð æéâöðéýíôåéò IP ðiò áíÞéëöi óöi ðöðíäßéôöi Ethernet óöi iðiþíi áíÞéåé i åíðcñâôçöÞò SLIP, éáé éá ÷ñâéáôåß åðBóçò íá ñöðìëßóåôå ôá scripts /etc/sliphome/slip.login êáé /etc/sliphome/slip.logout íá ÷ñçöéiiðíéýíi ôíi arp(8) áéá íá ÷æñßæíïðåå ðéò ééåôå ÷ññßöåéò “proxy ARP” óöið ðßíáéå ARP ðiöi åððcñâôçöÞ SLIP.

#### 28.7.2.4.2 Nyéiéóć ôiō slip.login

Íá ôõðééü /etc/sliphome/slip.login iiéÜæåé ìá ôi ðáñáéÜôü:

```
#!/bin/sh -
#
#      @(#)slip.login  5.1  (Berkeley) 7/1/90
#
# generic login file for a slip line.  sliplogin invokes this with
# the parameters:
#      1          2          3          4          5          6      7-n
#      slipunit  ttvspeed  loginname  local-addr  remote-addr  mask  opt-args
```

```
#  
/sbin/ifconfig sl$1 inet $4 $5 netmask $6
```

Ôí áñ÷åßí slip.login åêôâæåß áðëþò ôí ifconfig áéá ôíçí êáôÜëëçëç äéåðåöP SLIP, iå ôéò ôiðéêÝò êáé áðñâñðòí Ýíåò áéåðëýíåð áéá ôíçí iÜóéá áéëðýíò ôçò áéåðåöP áðôþò.

Áí Ý÷åôå áðëðåðóåé íá ÷ñçóéïðëïðóåå ôíçí iÝëíäi “proxy ARP” (áíôß íá ÷ñçóéïðëïðóåå åéáöiñâðéêü ððëäßéôöi áéá ôíðò ðåëÜôåò SLIP), ôí áñ÷åßí /etc/sliphome/slip.login èá iiëÜæåé iå ôí ðáñâéÜôù:

```
#!/bin/sh -  
#  
#      @(#)slip.login  5.1  (Berkeley) 7/1/90  
  
#  
# generic login file for a slip line.  sliplogin invokes this with  
# the parameters:  
#      1          2          3          4          5          6          7-n  
#  slipunit ttyspeed loginname local-addr remote-addr mask opt-args  
#  
/sbin/ifconfig sl$1 inet $4 $5 netmask $6  
# Answer ARP requests for the SLIP client with our Ethernet addr  
/usr/sbin/arp -s $5 00:11:22:33:44:55 pub
```

Ç ðñüöðåöç ãñáìíP óå áðôü ôí slip.login, ç arp -s \$5 00:11:22:33:44:55 pub, äçìéïñâåß iéá êáôá÷þñéöç ARP ôóí ððíáêá ARP ôíçí áîððçñâðçöP SLIP. Áðôþç c êáôá÷þñéöç ARP êÜíáé ôíçí áîððçñâðçöP SLIP íá áðáíðÜ iå ôçí áéåýèöiöç Ethernet MAC üðáí êÜðíëò Üëëëò êüñâïò IP ôóí Ethernet áðéëðíåß íá áðéëíéñíþóåé iå ôçí áéåýèöiöç IP ôíçí ðåëÜôç SLIP.

¼ôáí ÷ñçóéïðëïðååò ôí ðáñâðÜíù ðáñÜääéäíá, åââáéùèåßôå üðé Ý÷åôå áíðéêåðåöPóåé ôíçí áéåýèöiöç MAC ôíçí Ethernet (00:11:22:33:44:55) iå ôçí áíðóðóöië ÷ç ôçò áéëþò óåò êÜñôåò Ethernet, äéáöiñâðéêü Ôí “proxy ARP” óßäiññá åáí iå áééöiññäðóåé! Iðiñâßôå íá áíáéäëýøåå ôç áéåýèöiöç MAC ôíð ãéëíý óåò áîððçñâðçöP SLIP êíéðÜæííðåò óå áðïðåëÝóååô ôçò áíðíëþò netstat -i. Ç ááýôåñç ãñáìíP ôçò áíüäiò èá iiëÜæåé iå ôçí ðáñâéÜôù:

ed0	1500	<Link>0.2.c1.28.5f.4a	191923	0	129457	0	116
-----	------	-----------------------	--------	---	--------	---	-----

Áðôü äåß÷íåé üðé óóí óðâæåññéiÝí òýóôöçíå ç áéåýèöiöç MAC ôíð Ethernet áßíáé 00:02:c1:28:5f:4a. Íé ôâæåßôå ôðçí áéåýèöiöç ôíð ãåß÷íåé ç netstat -i ôñÝðåé íá áíðéêåðåöåäíýí iå Üíù-êÜôù ôâæåßôå, êáé êÜëå iiñü åâæåññéêü òçößí ðñÝðåé íá iåðâññåðåß óå áéððü ðñíöèÝóiiðåò áðü iðññööÜ Yíá içäåíéêü. Ç áéåýèöiöç iåðâññÝðåðåé iå áðôü ôíð ðññüðí õå iéá iiñðòP ôíð iðññåß íá ÷ñçóéïðëïðóåé ç arp(8). Äåßôå ôç óâëßää manual ôçò arp(8) áéá ðåñéóóüðåñåò ðëçññöiññßôå ó÷åðééÜ iå ôç ÷ñþóç ôçò áíðíëþò áðôþò.

**Óçìåßùóç:** ¼ôáí äçìéïñâåßôå ôí /etc/sliphome/slip.login êáé ôí /etc/sliphome/slip.logout, èá ðñÝðåé íá èÝóååô ôí bit “âéôÝëåóçò” (ð.÷. chmod 755 /etc/sliphome/slip.login /etc/sliphome/slip.logout), äéáöiñâðéêü Ç sliplogin äáí èá iðññåß íá óå áéðâæÝóåé.

#### 28.7.2.4.3 Ñyëíéöç ôíð slip.logout

Ôí /etc/sliphome/slip.logout äáí áßíáé áðüëððå áðáñâßôçöi (åêôüò áí ðñüêåéðåé íá ðëïðëïðóåå “proxy ARP”), aëëÜ áí ôéïðåýåå íá ôí äçìéïññþóåå, iðiñâßôå íá ÷ñçóéïðëïðóåå ùò ððüäåéäíá ôí ðáñâéÜôù áðëü ðáñÜääéäíá:

```
#!/bin/sh -
#
#      slip.logout
#
# logout file for a slip line.  sliplogin invokes this with
# the parameters:
#      1          2          3          4          5          6          7-n
#      slipunit  ttyspeed  loginname  local-addr  remote-addr  mask  opt-args
#
/sbin/ifconfig sl$1 down
```

Áí ñçóœíïðíéåò “proxy ARP”, èá èÝéåôå ôí /etc/sliphome/slip.logout íá äéåññÜðåé ôçí éåôá÷þñéóç ARP ôíõ ðåéÜôç SLIP:

```
#!/bin/sh -
#
#      @(#)slip.logout
#
# logout file for a slip line.  sliplogin invokes this with
# the parameters:
#      1          2          3          4          5          6          7-n
#      slipunit  ttyspeed  loginname  local-addr  remote-addr  mask  opt-args
#
/sbin/ifconfig sl$1 down
# Quit answering ARP requests for the SLIP client
/usr/sbin/arp -d $5
```

Çarp -d \$5 äéáñÜöåé ôçí êáóá÷þñéóç ARP ðiõ ðñiööÝèçéå lå ôçí åêöÝëåóç ôiõ slip.login ôiõ “proxy ARP”, êáôÜ ôçí åßóriäi ôiõ ðåëÜöç SLIP.

Đñ Ýðåé íá ôii åðáiæÜáïoå Üëeç iéá öimÜ: Ååâáéùèåßôå üôé ôii /etc/sliphome/slip.logout Ý÷åé iñéóôåß ùò åðoåéÝóéii iåôÜ ôçí äçleïõñãßå ôiö (ð.÷., chmod 755 /etc/sliphome/slip.logout).

#### **28.7.2.5 ĐáñÜäñôåò ðïö ĐñÝðåé íá ËÜâåôå Öðüøç óáò óôç Äñíññëüäçóç**

Áí ááí ÷ nçóeiiðíéåbôá ócí iÝeiäi “proxy ARP” áéá íá äññiïeïaåbôá ðåéÝóå iåôáiy ôuí ðåéåôþí SLIP ééá ôiö oðüeieðiö aééöyio óáð (éáé áíäå ÷ iiÝiùò éáé ôiö Internet), eá ðñÝðåé iÜeëií íá ðñiöéÝóåôå ðóôáôééÝó åéäaññiÝó ðñiò ôií ðeçóeÝóôåññi óáð ðñiäðçéäiÝí åññiïeïaçôþí áéá íá äññiïeïaåbôá ôi oðiäåbêðoíi ôuí SLIP ðåéåôþí óáð áéáiÝóiö ôiö aíôðçñåôcôþí SLIP.

### 28.7.2.5.1 ÓoáôéêÝò ÄéáäñjjÝò

# ÊåöÜëáéï 29 Çëåêôñïíéêü Ôá÷öäñïíåßï

Áñ÷éêP óoíâéóöiñÜ áðü öií Bill Lloyd. ÁñÜöôçêå iáiÜ áðü öií Jim Mock.

## 29.1 Óýїøç

Áöiý äéáâÜóåôå áðôü öi êåöÜëáéi, èá iÝñåôå:

- Ói ëiäéöiéêü ðiõ ÷ ñçóëiïðiéåbôáé óôçí áðiööiëP êáé ëPøç çëåêöñiíéêý ôá ÷ õäññiâbjiõ.
  - Ðiõ âñbôéiïðoáé ôá âááóéêÜ áñ ÷ åßá ññèìßôåñi ôiõ **sendmail** ôöi FreeBSD.
  - Ôç äéáöiñÜ iåðåáý áðññáêñöiÝñuí êáé ôiðéêþí èõñßäúí ôá ÷ õäññiâbjiõ (mailboxes).
  - Ðùò íá åìðræßôåôå ááðéèyîçöiõ spammers áðü ôi íá ÷ ñçóëiïðiéÞöiõi ôií äéêü óåò åíñðçñåôçôP email ùò áíáíåôáäüöç.
  - Ðùò íá ååéååååòÞóåôå êáé íá ññèìßôåôå Ýíá åíáëéåéöéêü Áíöéðñüöùõi ìåðåöiñÜò Ôá ÷ õäññiâbjiõ (Mail Transfer Agent) ôöi óýóðçìá óåò, áíðééåééöôþíòå Ýôóé ôi **sendmail**.
  - Ðùò íá áíðéiâðôå ññèìßôåôå ôiðçééöiÝíá ðññiâæÞiaåôå ôiñií äéåéñéöôP ôá ÷ õäññiâbjiõ.
  - Ðùò íá ÷ ñçóëiïðiéÞóåôå ôi SMTP iå ôi UUCP.
  - Ðùò íá ññèìßôåôå ôi óýóðçìá óåò iüñií äéá áðiööiëP email.
  - Ðùò íá ÷ ñçóëiïðiéÞóåôå ôi email iÝóù åðeëiäéêPò (dialup) óýíäååöçò.
  - Ðùò íá ññèìßôåôå ðéööiïðiçöç áðeåíðéüöôçôåò óöi SMTP ãéá ðññüöèåðç áóöÜëåéá.
  - Ðùò íá ååéååååòÞóåôå êáé íá ÷ ñçóëiïðiéÞóåôå iéá åöáññiäP áðiööiëPò êáé ëPøçò email ãéá ÷ ñÞóåôåò, üðùò ôi **mutt**.
  - Ðùò íá êåôååÜóåôå ôi email óåò áðü Ýíá áðññáêñöiÝñií äéåéñéöôP POP P IMAP.
  - Ðùò íá åöáññiüöåôå ößëöñá êáé êáíüñiåò óôçí åéöåñ ÷ üläíç äëëçëiñáößá óåò, iå áðñöüläöi ôññüöi.

Ðñéí äéáâÜóåôå áðôü ôi êåöÜëáéi, èá ðñÝðåé:

- Íá ñöëìßóåôå óùóôÜ ôç óýïäåóç ôïï äéêöýïö óáò (ÊåöÜëáéï 32).
  - Íá ñöëìßóåôå óùóôÜ ôéò ðëçñïöïñßåò DNS ãéá ôïï äéáëñéôôP äëëçëïññáößåò óáò (ÊåöÜëáéï 30).
  - Íá ãíùñßæåôå ðùò íá ååéååôôPóåôå ðñüóèåôï ñïräéóïñéü ðñßöï ëåôåóéåôåôôP (ÊåöÜëáéï 5).

## 29.2 × ñçóéíïðíéþíóáò ôí Çëåêôñííéü Ôá ÷ ðäññíåßí

Óá ê Üðéá áíðáéëááÞ çëåêôñííéü òá ÷ ðäññíåßí, óðíâñá Üæííóáé ðÝíóá ááóéêÜ ôíþíáðá: Ôí ðñüäññíá ÷ ñþóôç, í ãáßííáð ôíð áíðçñåðçôÞ, ôí DNS, íéá áðñíáêñðóííÝíç Þ ðíðéêÞ èðñßáá ðá ÷ ðäññíåßí (mailbox) êáé öðóéêÜ í ðíðíæéððÞ ðíð áéá ÷ áéñßæåðáé ôí email (mailhost).

### 29.2.1 Ôí Ðñüäññíá ÷ ñþóôç

Ç êáôçñíñßá áôðÞ ðåñéëáíâÜíáé ðñíññíÜíáðá üðùò ôá **mutt**, **alpine**, **elm**, êáé **mail**, êáèþò êáé ðñíññíÜíáðá ðíð áéáé Ýðíðí GUI üðùò áßíáé ôá **balsa**, **xfmail** (íáé íá áþóíðíá íññéêÜ ðáññááßíáðá) êáé ê Üðíéá ðéí “âíâééâíÝíá” üðùò áßíáé íé öðéëííåðñçóÝ ðó áéá ôí WWW. Óá ðñíññíÜíáðá áôðÜ, áðëþò íáðáâéâÜæíðí ôíð öðíáéëááÝ ðó ôá ÷ ðäññíåßí ðíðí ðíðéêü “mailhost”, áßóá êáéþíáð ôí Üðíéíí áðü ôíðò ááßííáð ôíð áíðçñåðçôÞ ðíð áßíáé áéáé Ýðíéí, Þ ðáññááßííáð ôéò áðåðéåßáò íÝóù TCP.

### 29.2.2 Äáßííáð ôíðçñåðçôÞ Mailhost

Ôí FreeBSD Ýñ ÷ áôáé íá ôí **sendmail** áâéáðåðóçìÝíí áðü ðñíñðéëíáÞ, áéëÜ ððíóðçñßæåé áðßóçò êáé íááÜëí áñéèíü áðü Üëëíðò ááßííáð ôá ÷ ðäññíåßí, ðáññéëáíâñíÝíú êáé ôúí:

- **exim**
- **postfix**
- **qmail**

Í ááßííáð Ý ÷ áé óðíþèùò áýí êáéóðññáßáð—áßíáé óðåýèðíð áéá ôç ëþøç áéóáñ ÷ üíáñíõ mail, üðùò áðßóçò êáé ôçí ðáññÜäííç ðíð áâíñ ÷ üíáñíõ mail. ¼ùò, *aaíí áþíáé óðåýèðíð* áéá ôç öðéëíáÞ ðíð mail íá ôç ÷ ñþóç ðñùðíðüëëüí üðùò ôá POP Þ IMAP áéá ôçí áíÜäñúóç ôíðò ôá ÷ ðäññíåßí ðó, íýóá áðéóñÝðåé ôç óýíáåóç óðéò ðíðéêÜ ðéñßááð ôýðíð mbox Þ Maildir. Ðééáíí íá ÷ ñâéáðåðóáßðá ûÜðíéí áðéðñüðéåðí ááßííáð áéá áðóú ôí óéíðü.

**Ðñíñáéäíðíßçóç:** Ðáééüðåññáð áâéüðåðáé ðíð **sendmail** Ý ÷ íðí êÜðíéá ðñíññíÜíáðá áóðáéëåßáð, íÝóù ôúí íðíßüí íðíññíß êÜðíéíð áéóáíëÝáð íá áðíéðþóáé ôíðéêíÞ Þ áðñíññíðóííÝíç ðñíñðááóç ôóí íç ÷ Üíçíá óáð. Áéá íá áðíöýåðå ðñíññíÜíáðá ôÝðíéíð áßäíðò, áââáéùéåßóá üðé ÷ ñçóéíðíéåßóá êÜðíéá ðñüðóáðç Ýðíðíç. ÁíáéëáéðéÜ, íðíññíßá Íáâéáðåðóá ðóáðóá ðéÜðíéí Üëëí MTA áðü ôçí ÓðéëíáÞ ôúí Ports ôíð FreeBSD.

### 29.2.3 Email êáé DNS

Ôí Óýóðçíá Íñññóßáð Ðáññí ÷ þí (DNS) êáé í ááßííáð ôíð, í named, Ý ÷ íðí óçíáíðéêü ñüëí ôóçí ðáññÜäííç ôíð email. Áéá ôçí ðáññÜäííç ôíð email áðü ôí Ýíá site óá Ýíá Üëëí, í ááßííáð ôíð áíðçñåðçôÞ èá øÜíáé áéá ôí áðñíññíðóííÝíí site óóí DNS, áéá íá êáëíñßóáé ðíéíð ôíðíæéððÞ ðéññíÜíáð ôí email áéá ôí óðâæâññííÝíí ðñíññéóíü. Ç áéáæééåóßá áôðÞ ôðñíññáßíáé áðßóçò üðóá í áééüðó áðó áíðçñåðçôÞ ðéññíÜíáð email áðü êÜðíéí áðñíññíðóííÝíí ôíðíæéððÞ.

Ôí DNS áßíáé óðåýèðíð áéá ôçí áíðóéóðíß ÷ çóç íññÜðùí ððíæéððÞí óá áéâðèýíóåéð IP, üðùò êáé áéá ôçí áðíèþéåðóç ðëçñíññéþí ðíð ó ÷ áððæííðáé íá ôçí ðáññÜäííç çëåêôñííéü òá ÷ ðäññíåßí, üðùò íé áââññáðÝó MX. Ç áââññáðÞ MX (Mail Exchanger) áíáñññßæåé ðíéíð ôíðíæéððÞ Þ ôíðíæéððÝó) èá áßíáé ððåýèðíð áéá ôç ëþøç ôá ÷ ðäññíåßí ðíð ñðâæâññííÝíí ðññÝá (domain). Áí ááí Ý ÷ áôá áââññáðÞ MX áéá ôíí ððíæéððÞ Þ ôíí ôíñÝá óáð, ôí email èá

Ծանալիքները պահպանության մեջ են գտնվում և պահպանվում են պահպանական գործառնություններում:

Ìðiññåßôå íá äåßôå ôéo åâãñáö Ýò MX æá iðiññåßôå ôññÝá, ÷ñçóëiññéþíôå ôçí åiòëþ host(1), üðùò öáßfåôáé óóïï ðâñáêÜôù ðâñÜääéâïá:

```
% host -t mx FreeBSD.org
FreeBSD.org mail is handled (pri=10) by mx1.FreeBSD.org
```

## 29.2.4 ËáìâÜííôáò Mail

Í mailhost ábbáé öððáýèöñíð ãéá óçí ëþþç mail ðið ðññiñþæðåáé ãéá òii ðiñ Ýá óáð. Ëá õððéë Ýíâé iüëi ði mail ðið Ýñ ÷ åðåé ðññið òii ðiñ Ýá, ééá éá òi áðièçéâýóáé åßðå òoî mbox (óçí ðññiâðééâái Ýíç ìÝeiäi ãéá áðièþêåðóç mail) P óá iññöP Maildir, áíÜeïïâá lá òéð ñòëiñþóåéð ðið Ý ÷ åðå ðiñ Ýíâé. Áðú ðiç õððéâð P ðið òi mail Ý ÷ åé áðièçéâðéâß, iðññåßðå åßðå íá òi áæâáÜóåðå ðiðééÜ, ÷ ñçóéiñðiéþíðå åðóáññiaÝð üðùð ði mail(1) P ði mutt, P íá òi áåßðå ìÝóu áðññáéññóði Ýíçó óýíâðåóçð, ÷ ñçóéiñðiéþíðå ðiðééÜ ðiññóüééëi üðùð ði POP P ði IMAP. Áððú ðiçáþíâé üðé áí áððééðiñðå ði áæâáÜæðå ði mail óáð iüññ ðiðééÜ, áðí ÷ ñæÜæðåáé íá áæâáðåóðóÞóåðå åðiðçñâðóçð P POP P IMAP.

#### **29.2.4.1 Đñüóâáóç óå ÁðïiáêñöóíÝíåò Èõñßääò ïÝóù POP êáé IMAP**

Áéá íá Ý÷åôå áðñíáêñòóíÝíç ðñüôåáóç óôéó èõñßääôå óá÷ðäññåâïö, åßíáé áðãñâßöçöí íá Ý÷åôå ðñüôåáóç óá Ýíá åîôðçñåôçöP POP P IMAP. Óá ðñùôüëíëéá åôôÜ, åðéôñ Ýðiöö õîïö ÷ñÞóôåôå íá óôñäÝiiôåé óôéó èõñßääôå ôïöö ãðü áðüôôåáóç, ià iàñÜëç åôëiëßá. Éáé óå áyí ðñùôüëíëéá (POP êáé IMAP) åðéôñ Ýðiöö õîïö ÷ñÞóôåôå áðñíáêñòóíÝíç ðñüôåáóç óôéó èõñßääôå ôïöö, áëëÜ öi IMAP ðñiööÝñåé âñéåôÜ ðëäññåêðÞiaðá, iñéóíÝíá áðü óå iðiñßá öäßññíðåé ðáñáéÜôú:

- Ôi IMAP iðiñâb íá áðièçêåýóáé içíyíláðá óá Ýíá áðiñáêñðói Ýíi áîñðçñâðçôP, üðùð áðþóçð êáé íá óá áíâéðþóáé.
  - Ôi IMAP ððiøöçñßæåé óâðoðù ÷ nñiñâð áíçìâñþóáé.
  - Ôi IMAP iðiñâb íá ðááñâb áíâéññâðéé Ü ÷ nñþðéii óá óðiä Ýóåéð ÷ áíçëþð óá ÷ yóðçôð, êáèþð áðeññÝðåé óðiñð ÷ nñþðôð áíá ëáðâåðÜðiñð ôç aïñþ ðúù içíðiÜðùñ, ÷ ñiñþð íá ëáðâåðÜðiñð ðí ðâññé ÷ üiññi ðiñð. Iðiñâb áðþóçð íá áâðóåé Ýóåé áññâáðbâð üðùð áýññâðç içíðiÜðùñ áðâðeñðbâð óóíi áîñðçñâðçôP, áëá ÷ eóðiñðiéþiðá ìá ðóðü ðiññüði ôç iñðâðóöññÜ áâðñi Ýññi iñðâðñý ðúù ðâðéðóþí êáé ðúù áîñðçñâðçôþí.

Áéá íá ááéáoáóó ÓÞráóáô Ýíá áíóðcñáóðcôþ POP þ IMAP èá ðñÝðáé íá áéíéíðeÞráóáô óá áðüliáíá áÞiaóá:

1. Åðéé Ýîôå Ýíá áîõðçñåôçô P IMAP P POP ðiõ íá áîõðçñåôâß ôéò áí Üäéâò óáò. Íé ðáñáê Üôù áîõðçñåôçô Ýò POP êáé IMAP âßíáé áñéâô Ü äéáääññÝíé êáé áðiôâëíýí êáé Ü ðáñáääßâíáô:
    - **qpopper**
    - **teapop**
    - **imap-uw**
    - **courier-imap**
    - **dovecot**
  2. Åâéâóô Pôôå ôiä ááßiiá POP P IMAP ôçò áðééïäPò óáò, áðü ôçí ÓðééïäP ôùí Ports.
  3. Áí ÷ñâé Üæâóâé, ôñiðiðié Pôôå ôiä áñ÷âßi /etc/inetd.conf ãéá íá öimþþôåô ôií áîõðçñåôçô P POP P IMAP.

**Ðñïâéäíðíßçóç:** Ëá ðñÝðåé íá óçìâéþóïòå üôé ôüöí ôí POP üöí êáé ôí IMAP ìåðåäßäïòí ðëçñïöñßåò üðùò ôí üíííá ÷ñþóç êáé ôíí êuäéêü óá ìññöþ áðëíý êáéíÝíö. Áðôú óçìâßäé üôé áí èÝéåôá íá áooäéßóåôå ôç ìåðÜäíöç ðëçñïöñéþí iÝóù áðôþí ôúí ðñùöñëüëëü, èá ðñÝðåé íá ðåñÜðåôå áðôÝò ôéò óoíäÝóåéò iÝóù ôí ssh(1) (tunneling) þ íá ÷ñçóéíðíéþóåôå SSL. Ç äéáäéêáóßá tunneling ðåñéâñÜðåôåé íá éåðöíÝñåéá óôí Ôíþíá 15.11.8 êáé ôí SSL óôí Ôíþíá 15.9.

## 29.2.4.2 Ðñüóâáóç óå ÔíðéêÝò Èõñßäåò Ôá÷õäññåßí

Ìðññåßåå íá Ý÷åðå ôíðéêþ ðñüóâáóç óðéò èðññßäåò ôá÷õäññåßí ÷ñçóéíðíéþíðåò áðåðèåßåò èÜðíéí ðñüñññåííå áðíööíðþò/ëþçò (MUA) óóíí áîñðçñåôçòþ ðíð åßíáé áðíèçéåòíÝíåò. ÈáôÜëëçéåò åöáññäÝò æáá áðôú ôí óeíðü åßíáé ð.÷. ôí **mutt** þ ôí mail(1).

## 29.2.5 Í Åîñðçñåôçòþ Mail

Åîñðçñåôçòþ mail èåññåßåå í ðññëäéóðþò í ðíðíðíðþò åßíáé õðåýëöñò ãéá ôçí ðåñÜäíöç êáé èþç mail æáá ôíí ðññëäéóðþ óáò, êáé åíäå ÷ñÝíùò ãéá ôí åßéôòí óáò.

## 29.3 Ñýèiéóç ôíð sendmail

ÓõíâéóðñÜ ôíð Christopher Shumway.

Ôí sendmail(8) åßíáé í ðññäðééåíÝíò Áíðéðñüóùðò ìåðåöññÜò Ôá÷õäññåßí (Mail Transfer Agent, MTA) óóí FreeBSD. ÄíðéâéÜ ôíð åßíáé íá áÝ÷åðåé ôí email áðü ôíð Áíðéðñíðþò Email ×ñþóç (Mail User Agents, MUA) êáé íá ôí ðåññäßååé óóí êáðÜëëçéí mailer ðíð ìñßæååé óóí áñ÷åßí ñõèíßóåùí ôíð. Ôí **sendmail** ìðññåß åðßóçò íá áå÷èåß óõíäÝóåéò áééðýíð êáé íá ðåññäþóåé ôí mail óå ôíðéêÝò èðññßäåò þ êáé óå èÜðíéí Üëëí ðñüñññåííå.

Ôí **sendmail** ÷ñçóéíðíðéåß óá áéüüëíðéå áñ÷åßí ñõèíßóåùí:

¼ññá Áñ÷åßí	Ëåéóðññåßá
/etc/mail/access	Ç áÜóç áåññíÝíùí ðñüóâáóçò ôíð <b>sendmail</b> .
/etc/mail/aliases	Ðáññúýíéá (aliases) æáá ôéò èðññßäåò (Mailboxes)
/etc/mail/local-host-names	Ëßóôå ôúí ðññëäéóðþí æáá ôíðò ìðññßíðò ôíð <b>sendmail</b> äÝ÷åðåé mail
/etc/mail/mailer.conf	Ñõèíßóåéò ôíð ðññññÜññåòíð mailer
/etc/mail/mailertable	Ðßíáâåò ðåññäüöåùí ôíð mailer
/etc/mail/sendmail.cf	Ôí êåíðñéü áñ÷åßí ñõèíßóåùí ôíð <b>sendmail</b>
/etc/mail/virtusertable	Ðßíáâåò åééíéþí ÷ñçóðþí êáé ðåññéíþí (domains)

### 29.3.1 /etc/mail/access

Ç áÜóç áåññíÝíùí ðñüóâáóçò êáèíñßæåé ðíéíé ðññëäéóðÝò þ äéåðèýíðåéò IP Ý÷íðí ðñüóâáóç óóíí ôíðéêü  
åñðçñåôçòþ mail êáé ôé åßäíðò ðñüóâáóç Ý÷íðí. Ç êáðá÷þñçóç áíúò ðññëäéóðþ ìðññåß íá Ý÷åé ôéò åðéëíäÝò ok,

ĐáñÜääéäìá 29-1. Ñýèiéóç ôçò ÂÜóçò ÄåäñÝíùí Đñüóâáóçò ôiõ sendmail

cyberspammer.com 550 We do not accept mail from spammers  
FREE.STEALTH.MAILER@ 550 We do not accept mail from spammers  
another.source.of.spam REJECT  
okay.cyberspammer.com OK  
128.32 RELAY

Óá áðóú ðí ðánñÜääéæáÍ ÷ iðiå ðÝíôá éáðóá ÷ ùñÞróáéð. Íé áæðóðeyíðåéð ðið öáßñíðåéð óðçí áñéóðåñÞ ððæðñÜ ðið ðßíáéá, áðçñåÜæíïðåé áðü ðc áíÝññääéá ðið öáßñåðåé ðc áäåéëÜ ððæðñÜ. Óá ðñþðá áýí ðáññääåßñíáóá, áðéóðñÝðiðíÝíá èùñæéü ðó Üëüíåðið ðc ñiðößíá äéá ÷ áßñéóçð ëéðþí ðið **sendmail**. Óí ïPíðiá åéðóðþíðåé ðóii áðññáéñðóíÝí ððiðíæéóðÞ, üðóá íi mail ðið éáíåÜíðåóáé áíÞéåé óá êÜðiéá áðü ðeó éáðçiiñßbåò ðc ðáñéóðåñÞ ððæðñÜ ðið ðßíáéá. Ç áðññáíç êáðá ÷ þñçóç áðñññßðåé ðc ðáññääáðÞ mail áðü Ýíá óðóåéññíÝí ððiðíæéóðÞ óði Internet, óií another . source . of . spam. Ç áðññáíç êáðá ÷ þñçóç êÜíåé áäåéðÝð ðeó ðoðíáÝóåéð mail áðü ðií ððiðíæéóðÞ okay . cyberspammer . com, ði üññá ðið iðiþið ðñiðóæíñßæðåé áéñéáÝóåñá óá ð ÷ Ýóç iá ðc áñññÞ cyberspammer . com ðið áßbááíå ðáññáðÜñ. ÁññíÝð ðið éáèiñßæiðiñ iññíåðá iá iññäéýðåñç áéñßåéá, Ý ÷ iði ðññiðåñáéñðóá óá ð ÷ Ýóç iá ðéí áíáññéåðåßð. Ç áðééåððåßá êáðá ÷ þñçóç áðéóñÝðåé ðcí áíáññóðÜñið (relay) çéåéññiðíééý ðá ÷ ðññññßið áðü ððiðíæéóðÝð iá áéåðeyíðåéð IP ðið fñééÜñ iá 128 . 32. Íé ððiðíæéóðÝð áðññß, iðiññýíá óðóåßbëiði mail iÝóù ðið óðóåéññíÝñið áíððçñåðçðóÞ, ði ðiðiþí íá êáðåðeyíðåé ðc ðññññßið áíððçñåðçðóÝð ðá ÷ ðññññßið.

Óå ðåññðôùóç áíáiÝùóçò áôõïý ôiõ ãn÷åßiõ, èá ðñÝðåé íá åêôåæÝóåôå ôçí áîõïëþ make óõii éåðÜëiäi /etc/mail/ äéá íá áíáiþboåôå ôç áÜóç äääñíÝiú.

### 29.3.2 /etc/mail/aliases

Ç ÅÚöç ääääíÝíuí ôuí ðáñùíößüí (aliases), ðåñéÝ ÷ åé íéá ëßóôá áðü åéëíééÝ ò èõñßääôô õá ÷ õäññåßïö ðïö  
åðåéòåßüíöôé óå Üëëíöô ÷ ñPöôåo, áñ ÷ åßá P éáé Üëëá ðáñùíýíéá. ïåñééÜ ðáñáäåßääôô ÷ ñPöçö õiö  
/etc/mail/aliases öäßüíöôé ðåñâéÜôu:

## ĐáñÜääéäìá 29-2. Đáñùíýiéá Mail

```
root: localuser
ftp-bugs: joe,eric,paul
bit.bucket: /dev/null
procmail: "|/usr/local/bin/procmail"
```

Ç iinöP ôiö áñ ÷ åbïö åbïáé ádëP. Ôi ümïá ôçö èoñbäååò åñböéåådåé ôçí áñéooåñP ðëåoñÜ ôçö Üiù-êÜòu ôåëåßåò, êåé åðåéååßíåådåé ôóïï ðñiiñéöiü ðiò åñböéåådåé ôôç åâîéÜ ðëåoñÜ. Ôi ðñþöi ðánÜäåéäiá, ádëþö iñBæåé üöé ç èoñbäå öiö ÷ ñPööc root éå åbïáé ôôçí ðñhåålådöéüöçöå ç èoñbäå localuser. Åéå ôçí èoñbäå åôôP, åbïåådåé iñÜ áíåéÞöçöç ôôç åÜöç ååäñï Ýiùl ôùñ ðánüñlølépí. Áí åäí åñâåéåß Üeëi ümïá ðiò íå óåéñÜæåé, ôi iñPööiá éå ðánääiøéåß ööïï öiðééü ÷ ñPööc localuser. Ôi åðüñååñ ðánÜäåéäiá ååß-÷íåé iéå èbñooå óå ÷ öäññiåßiö. Ôå içiyáåå ðiò åðåééyíiøåé ôôç

ÊÜeå ömñÜ ðiø åßíåðåé åíçí ÿñùöç áooïý ôiø áñ ÷ åßiø, èá ðñÝðåé íá åêòåëåßôå ôçí åíôïëP make óoïí êáóÜeiäi /etc/mail/, þóôå íá åíçíåñùèåß ç åÜöç åääñíÝíüí.

### 29.3.3 /etc/mail/local-host-names

Ðñüéâéðóá áéá íéá ëßóá ãðú ííüüåóá ðòðíëäéóðþí, óçí íðiñá òíí sendmail(8) èá áÝ ÷ áðåé ùò ííüüåóá áéá òíí ðééü ìç ÷ Üíçíá. ÐòðíëåðÞóðá óá áðòðÞí óá ííüüåóá òùí ðòðíëäéóðþí Þ òùí òñí Ýùí áéá òíðò ïðiñíòò èÝéåðå òíí **sendmail** íá ëáíáÜíáé mail. Áéá ðáñÜäåéáíá, áí í óðåéâéñéíÝíò ãíððçñåðôçþò mail ðñüéâéðóáé íá ëáíáÜíáé mail áéá òíí òñí Ýá example.com áéá ñéá òíí ðòðíëäéóðþ mail.example.com, òíí áñ ÷ áßí local-host-names èá ííéÜæåé íå òíí ðáñáéÜòú:

example.com  
mail.example.com

ÊÜëá öiñ Ü ðiñ áíçíàññíåôáé áôðü ðiñ áñ ÷ :åßí, èá ðiñ Ýðåé íá åßíåôáé áðáíåâéëßíçóç ðiñ sendmail(8) áéá íá áéåâÜðåé ðôéå áéçéåáÝ.

#### 29.3.4 /etc/mail/sendmail.cf

Ôi âáóéëü áñ÷åßí ñòëìßóåùí ôiõ **sendmail** iðïñåß íá ðáñá÷èåß iå ôç áïÞèåéá ìáéñíåöïëþí ôýðiõ m4(1) ðiõ êáèïñßæëíôí ôç ôóïðåññëöïñÜ êáé óá ÷áñåêòçñéóéëÜ ôiõ **sendmail**. Äéá ðåñéóóüôðåñå ðëçñïöïñßåò, ðáñáééïÿå äéåâÜóôå ôiï /usr/src/contrib/sendmail/cf/README.

Δεν έχετε λαμβάνει την απόδοση της διαδικασίας σας; Επιλέξτε την απόδοση που θέλετε να επιλέγετε για την ηλεκτρονική σας απόδοση.

### 29.3.5 /etc/mail/virtusertable

Ôi áñ ÷åßi virtusertable áíôéóöíé ÷åß äéåðëýíóåéò mail åéëííéþí ôíïÝùí óå ðñáàíáôéêÝò èõñßääò õá ÷õäñííåßíö. Íé èõñßääò áôòÝò iðïñåß íá åßíáé ðiðééÝò, áðñáâñööíÝíåò, ðáñùíýíéå ðið Ý ÷iði inéóôåß óóï /etc/mail/aliases. Þ áñ ÷åßá.

ĐáñÜääéäíá 29-3. ĐáñÜääéäíá Áíôéóöiß÷cócò Mail Åéenééíý ÔñÝá

```
root@example.com          root
postmaster@example.com    postmaster@noc.example.net
@example.com               joe
```

Óðí ðáñáðÜíû ðáñÜääéáíá,  $\frac{Y - i\partial_i}{\partial_i}$  íéá áíðéóði $\beta$  $\div$ çóç æáá ðíí Ýá example.com. Ç áðåñáññáðßá áðóðíý ðíð áñ $\div$ åßið  
åßfåñóáé áðü ðÜíû ðññiò óá êÜóù, éáé óóåíáðÜáé óóçí åýññåóç ðíð ðñþþið iíüüáðiò ðíð óáéñéÜæáé. Ç ðñþþç ãññáìP ðíð  
ðáñáññåðßáñáðiò, áíðéóði $\beta$  $\div$ åß ðíí <root@example.com> óðíçí ðíðéêP èõñßääá root. Ç áðüññáíç êáðáð $\div$ þñçóç  
áíðéóði $\beta$  $\div$ åß ðíí <postmaster@example.com> óðíçí èõñßääá postmaster óóíï ðíðéíæéñóP noc.example.net.  
ÔÝéëò, áí åáí åññåèåñ êáéíÜ áíðéóði $\beta$  $\div$ çóç æáá ðíí Ýá example.com, èá åöáññiðóðåß ç óåäññóðßá áíðéóði $\beta$  $\div$ çóç, ç  
iðiñßá óáéñéÜæáé íå iðiñéíæP ðiòñ mail óóáéèåß ðññiò ðíí Ýá example.com. Óðíçí ðåññßðóñóç áðóP, ðíí ïPíññiò èá  
ðáññáññéåß óóçí ðíðéêP èõñßääá joe.

#### **29.4 ÁeëÜæïíôáò ôíí Áíôéðñüóùðí ìåôáöïñÜò Ôá÷õäñïíåßïö (MTA)**

ÃñÜöçêå áðü ôíí Andrew Boothman. Íé ðëçñïöñþåò ðiò ðñiiÝñ÷ iíðáé áðii e-mails Ý÷ iðíí ãñáöåß áðü ôíí Gregory Neil Shapiro.

¼ðùò Ý ÷ iõiå Päc áíáö Ýñåé, ôi FreeBSD Ýñ ÷ åôáé iå ôi **sendmail** ðñiääéåôåóçì Ýíi ùò Áíôéðñüöùði låðåöim Üð Ôá÷ õäññåßiö (Mail Transfer Agent, MTA). Ôi ðñüäñäiá áôöü åßíáé áðü ðñiåðéëiäP ôðåýèöii áéá ôçí åéöåñ ÷ üìåíç êåé åíåñ ÷ üìåíç áéëçëiäñåößá.

#### 29.4.1 ÅæáôáóôÞóôå ÍÝi MTA

ÓðÜñ÷; iðí áñêåôïß MTA áéá íá åððeeÝíåôå. já éåëü òçíåßíï åêêßíçöço åßíåé ç ÓððeeÞ ôùí Ports ôið FreeBSD üðið êáé eá iðiñÝóåôå íá áñâßôå áñêåôïýo. ÖðóeéÜ åßóåå áëäýéåññiò íá åððeeÝíåôå üðiði MTA eÝéåôå áðü iðiðæÞðiôå, uuïi ôiððeÜ÷; éðóoïi iðiñâßôå íá ôi Ûíåôå íá åôðåëâßôå ôói FreeBSD.

ÍláééíPóðó ááééáééóðþíðóáð ói íÝí óáð MTA. Íáð Ü ðíç ááéáð Üðóðáóç, eá Ý ÷ áðó áðíç áððéáéñÞá íá áððóððóðáð áí ðñááíáðóééÜ éáéýððáé ðéð áíÜáéåò óáð, éáèþò éáé íá íeíééçñþóðáó ðéð ñðeìßðáéò ðið ðñéí íáðóáð Ýñåðá ðç áéá ÷ áðñéóç mail ðið óððóðÞíáðiò áðú ði sendmail ói íÝí óáð ðñüññáííá. Éáð Ü ðíç ááéáð Üðóðáóç, ááâáéùéàððó üðé ði íÝí óáð éíæóíééü ááí eá ðñiððáéðÞðáé íá ááééáðóðáéëß ðÜfù óðá ððÜñ-iiðá áððóðéÝðíá ðið óððóðÞíáðiò, üðñùð ði /usr/bin/sendmail. ÁéáóïññáðééÜ, eá Ý ÷ áðó iððéáðóééÜ áÜéåé ði íÝí óáð éíæóíééü mail óá ÷ ñÞóç, ðñéí ðñiðéÜááðá áéäÜ-éáéÜ íá ði ñðeìßðóðáð.

Đánh giá về ý nghĩa của MTA đối với các nhà kinh doanh.

#### 29.4.2 ÁðåíåñäïðïéÞóôå ôi sendmail

**Đññáéáíðíßçó:** Ái áðåíáññäðíðíéþòáðô áðíðóíðíþò (âíáñðüíá) ðíðí **sendmail**, áðíáé óçíáíðéêú íá óçí áíðééáðóðíðíðô áðô ìá Ýíá áíáëëáéðóééü óýóðçíá ðánñÜäíóçò mail. Ái áðééëÝíáðô íá íçí êÜfáðô óï ðáññáðÜíù, óá íçíýíáðô ðíð ðóðóðíðíðô ìá ðíð ðáññÜäíðáé áðû óï periodic(8), ááí éá ðíññíý íá ðáññáëííý íÝóù email, úðñùò áßíáé óï áíáíáññùáíí. ÐíééÙ ðíðíáðô ðíð ðóðóðíðíðô ðóá ááiÝííí ûðé ððÜñð·áé óá áéáðíðññáßá Ýíá óýóðçíá ðóðíáðô íá óï **sendmail**. Ái íé áðåññäÝó ðóðíá ðæñíí íá ñçóéíðííý íá áâðåëÝóéá ðíðí **sendmail** ðññíðáéþíðáò íá óðåðíðíðíðô ìá ðóðóðíðíðô ìá ðíð ðáññÜäíðáé áðû óï mail ðéèáíþò éá âññæàß óá íéá áíáññäþ ðíññÜ ðíðí **sendmail** êáé ááí éá ðáññáëíàß ðíðíÝ.

Ãéá íá áðåâlânñäiðíéÞóâôå áîôåëþò óïi **sendmail**, óðiðâñéëâîâáññ Ýíçò éáé ôçò ðçññâóßáô áîâñ ÷ üìâlûí ìçíñðí Üôúí, ÷ ñçóëiiðíéÞóâôå:

```
sendmail_enable="NO"
sendmail_submit_enable="NO"
sendmail_outbound_enable="NO"
sendmail_msp_queue_enable="NO"
```

óõi /etc/rc.conf.

Áí èÝéåôå íá áðåíåñäiðieÞóåôå ìüíí ôcí ððçñåóþá åéóåñ : ïÍÝíùí ôið sendmail èá ðñÝðåé íá èÝóåôå:

```
sendmail enable="NO"
```

óði /etc/rc.conf. Ðáñéóðüôðâñâð ðëçñïðiñßâð áæá óðo áðéëíäÝð áêéßíçóð ôið **sendmail**, áæáôßèåíôáé áðü ôçí áíðßöðié-ç óâëßáá manual, rc.sendmail(8).

#### 29.4.3 Åêêßícóc ôïõ ÍÝïõ óáò MTA êáôÜ ôcí Åêêßícóc

Ôi íÝí óáò MTA èá iâééíÜâé êáôÜ ôçí åêëßíçóç, áí ðññöèÝóåôå iéá êáôÜëëççç ãñáììP óôï áñ ÷åßii /etc/rc.conf. Ååßôå ôï ðáñâéÜôù ðáñÜäåéäïá áéá ôï **postfix**:

```
# echo 'postfix enable="YES"' >> /etc/rc.conf
```

Ôř MTA èá îåêéíÜåé ðëÝíí êáôÜ ôcí åêêßícóc.

29.4.4 Áíôéêáèéóôþíóáò õi sendmail áðü ÐñiåðéëåäÝíi Mailer Óooóôþìáôíò

Ãéá õi üüäi áôöü, áí ÷ñçöciñiðíéåßöå êÜðiñi áíáëéåêöéêü mailer, éá èÝéåôå íá åâáóöäéßöåôå üöé Üëéá ðñiññÜìäöå ðiñ ðñiñöðäæíýí íá åêöåæÝöiñi óå ðoðééÜ åêöåæÝöeíå õiñ **sendmail** üðùò õi /usr/bin/sendmail, éá åêöåæÝöiñi óðçí ðññâlåðééüöçöå õiñ åðééåäíÝñi óåð mailer. Åðôð÷þò, õi FreeBSD ðáñÝ÷åéÝíá ñýôöçìå ðiñ éäéåßöå **mailwrapper(8)** êáé õi iðiñü áíáëéåíå Üíñéé åôôP õc äiñöéåéÜ æéá óåð.

¼ðáði ðí **sendmail** ¾æðiñðaðið ùðùð Y ÷ áé áæáðáðóðáðæð ãñ ÷ ééÜ, èá áñððóð ëÜðé ùðùð ðí ðáñðæÜðù ñði /etc/mail/mailrc.conf:

```
sendmail      /usr/libexec/sendmail/sendmail  
send-mail    /usr/libexec/sendmail/sendmail  
mailq        /usr/libexec/sendmail/sendmail  
newaliases   /usr/libexec/sendmail/sendmail  
hoststat     /usr/libexec/sendmail/sendmail  
purgestat   /usr/libexec/sendmail/sendmail
```

æððéiðýfáé éäéáßðâñá ðçí áëëáðP ôùí åêðåðÝðéíùí ðið åêðåðýðóáé óðçí ðñáðáðéüðóçðá üðáí åßíðóáé êëÞóç ôùí ðñiððééðáí Ýùí ëåéðiðñáépí ôið sendmail.

þóé, áí èÝðéðå íá åêðåððóáé ôi /usr/local/supermailer/bin/sendmail-compat áíðß ãéá ôi **sendmail**, éá ïðñýðóáá íá áëëÜðåð ôi /etc/mail/mail.conf þóðá íá ãñÜðåé:

sendmail	/usr/local/supermailer/bin/sendmail-compat
send-mail	/usr/local/supermailer/bin/sendmail-compat
mailq	/usr/local/supermailer/bin/mailq-compat
newaliases	/usr/local/supermailer/bin/newaliases-compat
hoststat	/usr/local/supermailer/bin/hoststat-compat
purgestat	/usr/local/supermailer/bin/purgestat-compat

## 29.4.5 Íeñéçñþíðóáò

Íuëéð Ý÷åðå ñððéìßóáé ôá ðÜíðá üðùð åðééðiððóá, iðññáðóá åßóá íá êÜíðóá kill ôéð åéññáðóðô ðið sendmail ðið äáí ÷ñðéÜæåðóá ðéÝí ëéá íá åêééíÞóáðå ôéð áíððóóie ÷åð ôið iÝið óáð ëiæéóíééý, P áðéþð íá êÜíðóá åðáíåðééíçóç. Ç åðáíåðééíçóç éá óáð åþóáé åððóçð ôçí åðéáññá íá ååññéùðéåðóá üðé ôi ðýðóçíá óáð Ý÷åé ñððéìðóðóð ðñðóðÜ, þóðá ôi iÝið óáð MTA íá íåééíÜðåé áððüìðáðá óá êÜðå åðééíçóç.

## 29.5 Áíðéìðóþðéóç ÐñiðéçìÜðùí

1. Áéáðß ðñÝðåé íá ÷ñçóéíðíðpí ôi ðéÞñðåð üññá (FQDN) áéá ððíðéñðóðÝð ðið åñßóéíðóáé óðóíí ðiñÝá ïið;

Ôi ðéí ðéðéáíü åßíáé íá áéáðéóðþðóáðå üðé i ððíðéñðóðPð åñßóéåðáé óðçí ðñáðáðéüðóçðá óá åéáöiññåðééü ðiñÝá. Åéá ðánÜðåéáíá, áí åñßóéåðóá ðið foo.bar.edu êáé èÝðéðå íá åðéééíðñíÞóáðå iá Ýíð ððíðéñðóðP iá ôi üññá mumble ðið ðiñÝá bar.edu, èá ðñÝðåé íá áíáðññéåðóá óá áððüí iá ôi ðéÞñðåð ôið üññá, mumble.bar.edu, áíðß áéá åðéþð mumble.

ÐáññáðíðéáðÜ, áððü åðéóññðóáí áðü ôiðð DNS resolvers ôið BIND. Ùðóðüóí, ç ôñÝ÷iðóá Ýéäííç ôið **BIND** ðið ðánñééáíáÜðåéó ðið FreeBSD, ááí ðánÝ÷åé ðéÝí ððiðññýðóáð ãéá iç-ðéÞñç iññáðóá ðiñÝùí, åéðüð åéá ôiñ ðiñÝá ðið ðiñßí ãñßóéåðóá. þóé, Ýíð ððíðéñðóðP iá iç-ðéÞñðåð üññá mumble èá ðñÝðåé íá åññåðåß ùð mumble.foo.bar.edu, P èá åßíáé áíáæÞóçóç áéá áððüí ôiñ ñéæééü ðiñÝá.

Ç óðiðáññéðiñÜ áððóþ åßíáé åéáöiññåðééþ áðü ôçí ðñiçäíýíåíç, üðið ç áíáæÞóçóç óðíå ÷éæüðáí êáé óðiñ mumble.bar.edu, êáé ôiñ mumble.edu. Ñßñðå íéá iáðéÜ ôiñ RFC 1535 áéá ôi ðið ðiññáðÜíñ ìåññåðóá êáéþ ðññåðééþ, P áéüñá íéá êáé ðiññáðóá.

Íáð ôññüðið ãéá íá ðáññáðÜíðóá ðið ðññüðéçíá åßíáé íá ðññóðÝðåðå ôç ãñññíP:

```
search foo.bar.edu bar.edu
```

áíðß áéá ôçí ðñiçäíýíåíç:

```
domain foo.bar.edu
```

óðiñ áñ÷åßí /etc/resolv.conf. Ååññéùðéåðóá ùðóðüóí üðé ç óåéñÜ áíáæÞóçóçð ãáí ðçñáðíáé ðÝñá áðü ôi “üññéí ïåðáñý ðiðééþð êáé åçìüðéáð ãéá ÷åßñéóçð”, üðùð ôi ðiðééðåß ôiñ RFC 1535.

2. Öi sendmail äßfää öi iÞÍðia mail loops back to myself (öi mail åðéóöñ Ýöåé öðíi ááðöüü iið)

Ç áðÜíôçóç óå áôôü, õðÜñ÷åé óöi FAQ ôïõ **sendmail** üðùò öáßíåôáé ðáñáêÜôù:

ËáìâÜíù áõôÜ ôá ìçíýìáôá ëÜèïõò:

553 MX list for domain.net points back to relay.domain.net  
554 <user@domain.net>... Local configuration error

Đùò ìðïñþ íá ëýóù ôï ðñüâëçìá;

„åðåå æçðþóåé öi mail ðñið Ýíá öiiÝá (ð.÷. öi domain.net) íá ðñiùèåßðåé ðñið Ýíá öðååéåêñéiÝíi ððiëiäéðóþ (öðçí ðåññßðöñðç áððþ öi relay.domain.net) ÷ñçóéìiðiéþíðåò iéá åðãññáðþ MX, áëëÜ öi ìç÷Üíçìå áíåiåðÜäiöçð (relay) äåí áíåññiùñßæåé öií åáððü öið ùð domain.net. ÐñiðéÝóðå öi domain.net öði /etc/mail/local-host-names [åßíåé áíùðöü ùð /etc/sendmail.cf ðñiðí öçí Ýéäiöç 8.10] (áí ÷ñçóéìiðiéåßðå öi FEATURE(use\_cw\_file)), äéáöiññåðéêÜ ðñiðéÝóðå öi "Cw domain.net" öði /etc/mail/sendmail.cf.

Ìðiñâbôå íá âñâbôå òi FAQ òiõ sendmail óóç äéâýeòíóç <http://www.sendmail.org/faq/>, êáé óóíßôåôáé íá òi äéâáÜôåôå áí èÝéåôå íá “ðâæñÜâôå” ôéò ñõèìßóåéò òiõ mail óå.

3. Đò iđiiñb íá åêôåëÝóù åiôðçñåôçôP mail óå ðiđieäéôP ðiđi òoñiaÝååáé iÝóù åđéëiäéêPò óýíäåóçò PPP;

È Ýéâôå íá óóñia Ýóâôå Ýíá FreeBSD iç÷ Üíçìá óå Ýíá ôîðéêü äßêôöï (LAN) óoï Internet. Ôï FreeBSD iç÷ Üíçìá éá ãßíâé ðýëç ôá ÷ ðäññâßíö ãéá ói LAN. Ç óýíâåöç PPP äâí âßíâé áðiêéâéóôéêþ.

ÖðÜñ÷iðí òiðœÜ÷éóöii áyí öñüðié ãéá íá òið ëÜíåôå áðoðü. Í Ýíáò åßíáé ìå ôç ÷ñÞóç UUCP.

Jád Üeëriô ôñüðiô áßíáé íá áÜeâôá Ýíá áîðçñâôçô Internet iðiðiñ Ý ÷ áé óðíâ ÷ P óýíââóç, íá óâò ðáñÝ ÷ áé õðçñâôßá áâðôâñâýíiò MX æáá òií òiñÝ áóâò. Áéá ðáñÜäâéâíá, áí i òiñÝâò ôçò áâðâéñßáò óâò áâßíáé example.com êáé i ðáñÝ ÷ Yâò óâò Internet Ý ÷ áé iñßóâé òií example.net íá ðáñÝ ÷ áé õðçñâôßáò áâðôâñâýíiò MX æáá òií òiñÝâò:

```
example.com.          MX      10      example.com.  
                      MX      20      example.net.
```

Íüíi Ýíáò õðíëiæóôÞò iðiñåß íá êáeñéóôåß ùò ôåëéêùò ðáñáëÞðôçò (ðñiøéÝóôå ôi Cw example.com óôi áñ÷åßi /etc/mail/sendmail.cf óôi example.com).

¼ðáí ðí ïç ÷ Üíçíá ðí ðóÝëfáé íÝóù ðí ðí sendmail ðññíðåéåß íá ðáññáþþóåé ðí mail éá ðññíðåéÞøåé íá óðíðåéåß óðí äðéü óáð (example.com) íÝóù òçò óýíäåóçò modem. Ðí ðéí ðéæáíü åßíáé üðé äái èá ðá êáðåöÝññé, æáðóß äái èá åßóðå óðíðåíÝíò åéåßíç ôç óðéäíÞ. Ðí sendmail èá ðí ðáññáþþóåé áðóùìáðå óðíçí ððçññåóßå ååððåññåýíò MX, ð.÷. ðí ðáññí÷Ýá óáð Internet (example.net). Ðí ååððåññåýí MX èá ðññíðåéåß ðáññíäéêÜ íá óðíðåéåß óðí ïç ÷ Üíçíá óáð èáé íá ðáññáþþóåé ðí mail óðí ðí ðí ðññíðåéåß óðí ððçññåóçò MX (example.com).

Iðiñåßôå íá ÷ñçóéiiðiéÞóåôå êÜôé üðùò oï ðáñáêÜôù ùò script åéóüäiö:

```
#!/bin/sh  
# Put me in /usr/local/bin/pppmyisp  
( sleep 60 ; /usr/sbin/sendmail -q ) &  
/usr/sbin/ppp -direct pppmyisp
```

Áí ðñüéåðóá íá ÷ ñçóéíïðíéÞóåðå ÷ ùñéóðü script æá óçí åßóíäi êÜðíéï ÷ ñPóôç, lðiñåßóå íá ÷ ñçóéíïðíéÞóåðå áíðþ æá ói ðáñáðÜfù ói sendmail -qRexample.com óói script. Áðóü èá áîáíáâéÜóåé óçí Üiåóç åðåíññáóßá üeið óið mail óóçí iõñÜ æá ói example.com.

Đéi ëåðôññåñPò ðåñéañáöP ôçò êáôÜóôáóçò öáßíåôáé ðáñáêÜôù:

Íþróíla áðü ócí çéâéôñííéê ðeðóða óið FreeBSD æá ðiðð ðáñið ÷åðò óðçñåðéþí Internet (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-isp>).

> ðáññÝ-ïðiå ååðöðåññáýíí MX áéá Ýíá ðåëÜöç. ï ðåëÜöçò ðöñíåÝåôåé ööéö  
> ööçññåðßåð iáð åññêåðÝð öïññÝð öç iÝñá åðöðùìñåðå, åéá íá èäiàüíåé öå email öiõ  
> ööi ðñùñðåýíí öiõ MX (Ååí êäeïýìå öçí öïðièåðßå öiõ üöåí eäiàüíiöiå email  
> åéå öiíi öiíiÝå öiõ). Öi sendmail iáð öðÝëíåé öiõ mailqueue êÜëå 30 äåðöÜ.  
> Öç ååäiïíÝíç ööéäiþ èá ðññÝðåé íá iåññiåé öðñíåìíñiö åéå 30 eåðöÜ,  
> åéå íá åññiåé åÝåáéið üöé üëi öi email öiõ èäå Ý÷åé  
> ðáññäiñiøåß ööií ðñùñðåýíiðå MX.  
>  
> ÕðÜññ-åé êÜðiïéå åíöiïëP ðiõ íá åíññiåññÜöåé öi sendmail íá öðåññéåé  
> üéå öå mails Üñåðå; ï ÷ññöðöçò öðññéêÜ ååí Ý÷åé äéññéþìåðå  
> root ööi iç÷Üíçìå iáð.

Óðóçí áíüöðôá "privacy flags" ðið sendmail.cf, óðÜñ:áé Ýíáð iñéölüö Opgaway,restrictgrun

ÁðóáéñÝóðå ôi restrictqrun áéá íá áðéóñÝøðåðå óá ìç-root ðñþóðåðò íá íâééíþóðíðí  
óçí áðáìðñáóþá ôçò iðñÜð. Íðiñáð áðþóçðò íá ðÝéåðå íá áíáæéáðÜíåðå óá MX. Áßìáðå ôi li MX áéá áððiý  
óïð áßäiðò ðiðò ðåðéÜðåðò, êáé Ýðiðia iñþóðåé:

```
# If we are the best MX for a host, try directly instead of generating
# local config error.
OwTrue
```

Iå ôíí ôññüðí åðöðü, ÿíá áðíïäåêññðóíÿíí site èá ðáññåäßååé áðåñðëåßåð óå óáð, ÷ùññò íá ññïöðåèåñß ôç óýíäåðç iå ôí ÷ñþóðç. Þåéðå ðá óðýëíåðå óöíí ðåéÜðç óáð. Åðöðü eåéðiññåß iüíí åéá "ic-áíþiáðå", åéá ÿðóé ÷ññåéÜðååññåé íá åüëåðå ðíí ðåéÜðç óáð íá iiññüðåé ðí íc-Üíciá ðiõ mail "customer.com" åéé åðßóqð "hostname.customer.com" óóï DNS. Áðëþð ññïöðåÿðóå ìéá åããññåöþ ÿðiõ A óóï DNS åéá ôi "customer.com".

4. Åéáóß éáíá Üñù óðíÝ- áéá íçýíáóá ëÜëiöò Relaying Denied üðááí óðÝëù mail áðü Üëëiöò óðíëíæéóóÝ;

Óóéð ðññáðéëåáí Ýáðò áâéâðáóð Üóáéð ðíð FreeBSD, óíí **sendmail** áâíßáé ñòðéíéò Ýíí íá óð Ýéíåé mail iüñí áðú óíí ððíðíæéðóð ðóííí iðíßí áâéâðéåßóáé. Áéá ðánð Üáâéáíá, áí ððÜñ ÷ áé áééäÝ ðéíð ãéáéñéðóð ðò POP, íé ÷ ñÞóðåò éá iðíñíý íá áéÝ ÷ iðí ðíí mail ðíðò áðú óíí óð ðí ïéåßí, óí ãñáöðßí, Þ Üéëç áðñíáññðóí Ýíç ðíðíèáðßá, áééÜ éá áâíæíïðéíý íá lçí iðíñíý íá óððåßéðí ðññó ãíñðâññéÝ ðáéäðéýíðáéð. ÓððééÜ, ßðñ íåðÜ áðú íéá áðñðâññá áðíðóðð ðò, éá óðáæðß Ýáð email áðú óíí **MAILER-DAEMON** íå óíí ïÞóðíá èÜéíðò 5.7 Relaying Denied.

ÕõÜñ÷-iõí äeÜöiñié ôñüðié ãéá íá iâðåñÜóåôå ôi ðñüâëçäá. I ðeÝíí áðëüò áßíáé íá ûÜéåôå ôç äeáýëõíóç ôiõ ISP óåò óå Ýíá ãñ: áßí relay-domains, /etc/mail/relay-domains, jâo añPäimõ õñüðiõ ãéá íá ôi Ûíåôå áõõü áßíáé:

```
# echo "your.isp.example.com" > /etc/mail/relay-domains
```

Áööïý áäcïéïöññPöåôðå Þ áððäiâññáôðåâßöðå áððöü öi áñ ÷ åßi, eá ðñ Ýðåé íá áðäiâññééíPöåôðå öi **sendmail**. Áððöü üiöeåýáé ieá ÷ áñÜ áí åßöôð åæá ÷ åéñéóðÞo åïðçñâöçöÞ eáé åái áðéëðiâßöðå íá óó Ýéíåôð mail öiðééÜ, Þ áí èÝéâôð íá ÷ nçööñïðiëPöåôð Ýíá óýóðçìá òýðïò point eáé click óá Ýíá Üëëi lç ÷ Üíçá Þ áêüüä eáé óá Üëëi ISP. Åßíáé åðßöçò ðïréy ÷ ñPööñi áí Ý ÷ åôð ñöñèlßöðå iüüñ Ýíá Þ ayí eïñáñéáöiïýö mail. Áí èÝéâôð íá ðññöøéÝóåôð ìaññáéýöâññi áññéëiü åæâöðéýíöâññi, iðññâßöðå áðëþö íá áfïßiâôð åððöü öi áñ ÷ åßi iå öií áðéëðiçöü óoñöÜêöç eâéí Ýññö, eáé íá ðññöøéÝóåôð üeëiòò öiñð öññâßöð, Ýíá óá èÜëå ãññáñlP:

your.isp.example.com  
other.isp.example.net  
users-isp.example.org  
www.example.org

Ôþñá, iðíieááÞðiôá áðiðóöiÞ mail áðü öi óýóðöçia óáð aðü iðíieáÞðiôá ððiieáðóÞ áðóðÞö ðçò ðëþóðáð (iá ðçí ðñiðüðueåðÞ i ÷ñÞóðöçò íá Ý ÷ áé eïiðneáðiù ööi óýóðöçia óáð), eá áßíáé áðéöö ÷ Þò. Ðñüéâðáé aðeá Ýíá ðïðý eáðü ðñiði íá áðéöñ Ýðåðá ðóðiöö ÷ ñÞóðåð íá óð Ýeïiði mail áðü öi óýóðöçia óáð iÝóu áðñiâðñöi Ýíçö óýíðåðöçð, ÷uñÞò íá áðéöñ Ýðåðá ðá Üeeiði íá óð Ýeïiði SPAM iÝóu öið öððóðÞiaðið óáð.

## 29.6 Đñii÷ùñciÝíá ÈÝìáôá

Ҫ áéüǖtöèç áñüöçödá êáéyðöåé ðeí ðññ-ùñçýÝíá èÝíáôá, üðñò ôç ñýèlëóç öiö mail êáé ñõèlßöåéö ãéá Ýíá iëüüêçñii öiñÝá.

## 29.6.1 ÅáóéêÝò Ñõèìßóåéò

×ùñßò íá ÷ñâéáóôåß íá êÜíåôå êáiéÜ ñýteréóç, èä iòññåßôå íá óôåßéåôå mail ðñïò åüñôåñééïyò ðòðíëiäéóôÝò, áñêåß íá Ý ÷åôå ñòðíßóåé ôï /etc/resolv.conf ¶ íá åêôåëåßôå ôï äééü óåò åiððçñåôçò¶ DNS. Áí èÝéåôå íá ðáññåëåíå Üíåôå mail æá ôïï ðòðíëiäéóô¶ óåò ôïï äééü óåò **sendmail** MTA, ðòðÜñ ÷ïõí áÿí iÝéäïé:



$\frac{1}{4}$ ðíéá íá ððéëíäP áðü ðéð ðáñáðÜfú ééá íá êÜíáðå, áéá íá áßíáé äðíáðP ç ðáñáðéáðP mail áðåðøéåßáð óðíí ððíëíæéóðP óáð, éá ðñ Ýðåé íá Ý÷åðà lüñíéłç óðåðééP æéáyðoñíç IP (ü÷é äðíáñééP, üðùò áßíáé íé ðáñéóðüðåñàð åðéëíæéY ò óðíñäY óáðé PPP). Áí áññðóðéåðóð ðþþóù áðü êÜðíéí firewall, éá ðñ Ýðåé íá åðéðñ Ýðåé óç æéáéßíçós SMTP ðññìò áóÜð. Áí èÝéåðá íá eäíáÜfåðá mail áðåðøéåßáð óðíí ððíëíæéóðP óáð, éá ðñ Ýðåé íá áññðóðæßóðå Ýíá áðü óá ðáñáéÜðù:

- Íá áðâðâðéùðâðþôð áðéð ç áðâðñáðþ MX (íå ôð ðiâðçëðôðññi áñééðiü) óði DNS óáð, áððð ðiâð ðññðò ôð ç áðâðýððið IP ôðið ñç ðiâðlðið óáð.
  - Íá áðâðâðéùðâðþôð áðéð áðð ðððÜñ ðiâð éðâðið Ü áðâðñáðþ MX óði DNS áðá ðiññ ðððiððéðóðþ óáð.

1/4ðiðið áðið ðiâð ðáðñáðþ Ü ðiññ ðiâð áð ðiâðlðið. ðáð ðiññðâðþôð áð ðiâðlðið Ü ðiññðið mail áðâðâðâðþâð ðiññ ðððiððéðóðþ óáð.

ÄiêéíÜóôå áõôü:

```
# hostname  
example.FreeBSD.org  
# host example.FreeBSD.org  
example.FreeBSD.org has address 204.216.27.XX
```

Áí âëÝðåôâ òî ðáñáðÜù, òî mail ðiõ êáðôõèýfâôáé áðåõèåßáò óòî <yourlogin@example.FreeBSD.org> èá ðñÝðåé íá èáïâÜíåôáé ÷ùñßò ðñïäëÞìáôá (éàùñþíôáò üöé òî **sendmail** åêôåëåßôå óùóôÜ óòíí ððïëiæóôþ example.FreeBSD.org).

Áí áíôß ãéá áðôü äåßôå êÜôé óáí ôi ðáñáêÜôù:

```
# host example.FreeBSD.org
example.FreeBSD.org has address 204.216.27.XX
example.FreeBSD.org mail is handled (pri=10) by hub.FreeBSD.org
```

¼ëi ôi mail ðiò êáôåðöeyíåôáé ðñiò ôií ððieïäéôP óáó (example.FreeBSD.org) èá êáôáéÞiâé íá óðeeïÝåôáé ôií hub ià ôi ßæi üññiâ ÷ñPóôc, áiôß íá óôáéëß áðôôðèåßáó ôií lç ÷Üciá óáó.

Óeo ðánáðÜíu ðeçñiöiñBåò, óeo ÷ åéñBæåôáé ï äéêtiò óáò åîòðçñåôçòÞo DNS. Ç åâãñáöÞ DNS Þiò ðánéÝ ÷ áé óeo ðeçñiöiñBåò åñíiñëüäççò ãéá òi mail, åbíáé ç Mail eXchange. Áí åái õðÜñ ÷ áé åâãñáöÞ MX, òi mail èá ðánáäBååôáé åðåðèåBåò óoír õðriæéöÞ iÝòu òcò IP äéåýèõíçò òiø.

Ç êáôá ÷bñéóç MX ãéá ôíí freefall.FreeBSD.org Ýíïéáæå êÜðïéá óôéäíþ ïå ôcí ðáñáéÜôú:

```
freefall      MX   30  mail.crl.net
freefall      MX   40  agora.rdrop.com
freefall      MX   10  freefall.FreeBSD.org
freefall      MX   20  who.cdrom.com
```

Ié áíáééáêôééÝ ò ðïðiêåóßåò MX, èá ðñ Ýðåé íá ÷ñçóéññðiëíýí áéáöiññâôééÝ ò ãñâiìÝ ò ãéá ôç óýíäåóç ôiõò ià ôí Internet. ÁôôP åßíáé ç éáëýôñç ëyóç. Í ðáññ÷Ý òáó P êÜðiëí Üëëi öeëéëü site, äáí èá Ý÷iõí eáíÝíá ðñüäëçíá íá óáó ðáñÝ÷iõí áôôP ôçí ðôçññâôßá.

## 29.6.2 Mail ãéá ôíí ÔííÝá Óáò

Æáá íá äçéïeññáÞóåðå Ýíá “mailhost” (äçé. Ýíá ååðçñåôçôÞ mail) éá ðñÝðåé iðiéïäÞðiôå mail óóÝëíåôáé ðññìò êÜðiéí óóåæìù åññáóßåò, íá èåïåÜíåôáé óå åóöüí. ÅáóééÜ éá èÝëåôá íá “ääéâääééåßôå” iðiéïäÞðiôå mail ðiò êåðåôðèÿíåôáé ðññìò iðiéïäÞðiôå üññíá lç ÷ áÍÞláôò ðiò ðiñÝá óåò (óðçí ðåñßðòùñc låò ði \* .FreeBSD.org) éáé íá óí ááiåêåôåðèÿíåôá ðññìò ðií ååðçñåôçôÞ mail, þóôå íé ÷ ñÞóðåò óåò íá iðiññý íá èÜäiñó ði mail ðiò ðiñÝá óí ðiññéêü åiñðçñåôçôÞ.

Áéá åöeïëßá, èá ðñ Ýðåé íá Ý÷åôå Ýíá eëäñéåòíü ÷ñPóôç lå oï ßæéï üüññá ÷ñPóôç êáé óôå äýï lç÷-áPíådá. ×ñçóéïïðíPóôå áéá oï ôéïðü áôôü ôçí áîôïëP adduser(8).

Í mailhost ðið öá ÷ñçóéíïðíéÞóåôå, ðñÝðåé íá åßíáé öi éáéïñéóíÝí iç÷Üíçíá æá áöçí áíôáëéåäP ìçíöìÜôùí æá êÜëå ôôáèìü åññääóßáò öið äéêöýið. Áðóü åßíåôåé ôóéò ñðèìßóåéò DNS iå öií áéüëiðëí ôñüði:

example.FreeBSD.org	A            204.216.27.XX	; Workstation
	MX    10 hub.FreeBSD.org	; Mailhost

Íå öií ôñüði áðóü, öi mail ðið öáôåðéýíåôåé ðñiò êÜðiði öðåèìü åññääóßáò èá áíáéåôåðöðíðeåß ðñiò öi mailhost, Üó÷åðá iå öi ðið ååß÷íåé ç åäññääóP öýðið Á. Öi mail ööÝëíåôåé ðñiò öií ððíëiæööP MX.

Ååí ïðiñåßôå íá êÜíåôå öi ðáññáðÜíü, áí ååí åéðåëåßôå öi äéêü óáð åíððçñåðôP DNS. Áí áðóü ååí öðìååßíåé, êáé ååí ïðiñåßôå íá öi áéëÜíåôå, öðíåííçèåßôå iå öií ðáñi÷Ýá óáð (ISP) P iå üðíëíí óáð ðáñY÷åé öðçñåðôßáò DNS.

Áí ðáñY÷åðá öðçñåðôßáò åééííééiy öá÷ðáññåßíð, ié ðáññáðÜôù ðëçñíðiñßôå èá óáð öáñýí÷ñÞóéåð. Åéá öi ðáñÜäåéáí iåð, èá ððíëíÝöiði åüðé Y÷åðá Ýíá ðåëÜôç iå öi äéêü öið ðíñÝá, öðçí ðåñßðôùóç iåð öi customer1.org, êáé èÝëåôå üëi öi mail æá öi customer1.org íá ööÝëíåôåé óóí äéêü óáð mailhost, mail.myhost.com. Ç éåðá÷þñéóç óáð ööí DNS èá iíëÜæåé iå öçí ðáññáðÜôù:

customer1.org	MX            10	mail.myhost.com
---------------	------------------	-----------------

Óçìåßùóç: Íá Y÷åðá öðüøç óáð üöé ååí ÷ñåéÜæåðôå åäññääóP öýðið Á æá öi customer1.org áí èÝëåôå áðëþò íá ÷åéñßæåðôå email æá áðóü öií ðíñÝá.

Öi öåéåðôåßí ðñÜäiaá ðið ðñÝðåé íá êÜíåôå, åßíáé íá ìñßóåôå ööí **sendmail** ðið åéðåëåßôåé ööí äéêü óáð mailhost, æá öi ðiðið ðiññåßò P / éáé iç÷áíÞìáðá èá åY÷åðáé mail. ÓðÜñ÷iði iåññééið åéäöiñåðééið ôñüðié æá íá åßíáé áðóü. Íðiñåßôå íá ÷ñçóéíïðíéÞóåôå Yíáí áðü öið ðáññáðÜôù:

- ÐñiðéÝóôå öá iç÷áíÞìáðá ööí áñ÷åßí /etc/mail/local-host-names áí ÷ñçóéíïðíéåßôå öç åoíáðüöçôá FEATURE(use\_cw\_file). Áí ÷ñçóéíïðíéåßôå êÜðiðá Yéäiöç öið **sendmail** ðñéí öçí 8.10, öi áñ÷åßí åßíáé öi /etc/sendmail.cw.
- ÐñiðéÝóôå iéá áññáñP Cwyour.host.com ööí áñ÷åßí óáð /etc/sendmail.cf P ööí áñ÷åßí /etc/mail/sendmail.cf áí ÷ñçóéíïðíéåßôå öçí Yéäiöç 8.10 öið **sendmail** P êÜðiðá iåññåñÝóôåñç.

## 29.7 SMTP iå UUCP

Ç ðñiðéåðéååíÝíç ñýëíéóç öið **sendmail** ðið Ýñ÷åðáé iå öi FreeBSD, ðñiñßæåðåé æá áééööåéÝò öiðiðéåðôå ðið åßíáé áðåðéåðôå öðíññååíÝíå ðið óáð Internet. Óå ðåñéððþóåé ðið åßíáé åðééðiçôP ç áíôáëéåäP email iÝóù UUCP, èá ðñÝðåé íá ÷ñçóéíïðíéçèåß æéäöiñåðééü áñ÷åßí ñðèìßóåùí æá öi **sendmail**.

Ç ÷åéññéßíöç ñýëíéóç öið áñ÷åßí /etc/mail/sendmail.cf áíÞéåé óóá ðñi÷ùñçíYíá èÝíáôá. Ç Yéäiöç 8 öið **sendmail** ðáñÜäåé áñ÷åßá ñðèìßóåùí iÝóù öið ðñiðåðåññääóP m4(1), üðið ié ñðèìßóåé åßíññåé óá Yíá áíþôåññåððåäí åöáßñåðçò. Íðiñåßôå íá åññåßôå óá áñ÷åßá ñýëíéóçò öiðm4(1) ööíí êáðÜëíäi /usr/share/sendmail/cf. ÄéååÜóôå öi README ööí êáðÜëíäi cf æá iéá ååóééP åéóåññäP óðéò ñðèìßóåé ðið m4(1).

Í êáëýðåñíò ôñüðíò ãéá ôçí ðáñÜäöç mail íÝóù ôïõ UUCP, åßíáé ìå ôçí ÷ñÞóç ôçò äöíáöüöçôåò mailertable. ÐáñÜäåöáé ìå áðóù ôïí ôñüðí iéá áÜöç ääññÝüí ðïõ ïðiñåß íá ÷ñçóëiiðiéÞóåé ôï sendmail ãéá íá ðÜñåé áðiøÜóåéò õ÷åðééÜ ìå ôçí äññüëüåçóç.

Èá ðñÝðåé áñ÷ééÜ íá äçìëiññÞóåå õï áñ÷åßí .mc. Èá åñåßôå ìåñééÜ ðáñäåßåíáöå ôöíï êáôÜëíäí /usr/share/sendmail/cf/cf. ÕðièÝðiñöå üöé Ý÷ååå iññÜöåé ôï áñ÷åßí óåò foo.mc, ôï iññü ðïõ ÷ñåéÜæåöáé íá êÜíåöå ãéá íá ôï ìåðåöñÝøåå õå Ýíá Ýæëöñí áñ÷åßí sendmail.cf åßíáé:

```
# cd /etc/mail
# make foo.cf
# cp foo.cf /etc/mail/sendmail.cf
```

Íá ôöðééü áñ÷åßí .mc èá äåß÷íåé üðùò ôï ðáñáéÜòù:

```
VERSIONID('Your version number') OSTYPE(bsd4.4)

FEATURE(accept_unresolvable_domains)
FEATURE(nocanonify)
FEATURE(mailertable, 'hash -o /etc/mail/mailertable')

define('UUCP_RELAY', your.uucp.relay)
define('UUCP_MAX_SIZE', 200000)
define('confDONT_PROBE_INTERFACES')

MAILER(local)
MAILER(smtp)
MAILER(uucp)

Cw      your.alias.host.name
Cw      youruucpnode.UUCP
```

Íé ãñåìíÝò ðïõ ðåñéÝ÷iõí ôéò äöíáöüöçôåò accept\_unresolvable\_domains, nocanonify, and confDONT\_PROBE\_INTERFACES èá áðiõñÝòiõí ôç ÷ñÞóç ôïõ DNS êáôÜ ôçí ðáñÜäöç ôïõ mail. Ç iäçäßá UUCP\_RELAY áðåéöåßôåé ãéá ôçí ðïõiööÞñéïç ðáñÜäöçò íÝóù ôïõ UUCP. Áðëþò ôïðièåöÞóåå åêåß Ýíá üññå ìç÷áíÞàöïò ööí Internet ðïõ íá ïðiñåß íá ÷åéñéööåß äéåðëýíöåéö ðåðäii-öñÝüí.UUCP. Ôï ðéí ðeeáíü åßíáé íá åÜëåöå åêåß ôíí áíåìåöåäüöç (relay) ãéá mail ðïõ ðáñÝ÷åé í ISP óåò.

Íé ïðiõå ëÜíåé ôï ðáñáðÜíù, èá ÷ñåéåöåßôå Ýíá áñ÷åßí /etc/mail/mailertable. Áí Ý÷ååå iññü iéá óýíååöç ìå ôïíÝíù êüöii ðïõ ÷ñçóëiiðiéåßôåé ãéá üéá óåò ðáñáéÜòù, ôï ðáñáéÜòù áñ÷åßí åßíáé åðáñéÝò:

```
# makemap hash /etc/mail/mailertable.db < /etc/mail/mailertable
.          uucp-dom:your.uucp.relay
```

Íá ðéí ðieýðëëí ðáñÜäåéäíá èá iieÜæåé ìå ôï ðáñáéÜòù:

```
# makemap hash /etc/mail/mailertable.db < /etc/mail/mailertable
#
horus.interface-business.de    uucp-dom:horus
.interface-business.de        uucp-dom:if-bus
interface-business.de         uucp-dom:if-bus
.heep.sax.de                  smtp8:%1
horus.UUCP                   uucp-dom:horus
```

## if-bus.UUCP

uucp-dom:if-bus  
uucp-dom:

Óáð ðóðáíéðílþæiðiá üúðé áðóðu ói áñ÷åßí ðñÍðåðé íá iáðóðñáðåß óá iéá âÜóç áâæñÍùí DBM ðñóéí ÷ñçóéñiðíéçåß. Íðiññåßóá íá âÜéåðá óc ãñáìíÞ áîóïëþí ðið áðáéóåßóáé æéá íá åðéóåð÷èåß áðóðu ùò ó÷üééí óóçí áñ÷Þ óiò áñ÷åßíð mailertable. ÐñÍðåðé ðÜiòiðóá íá åêðåæéßóá áðóÞ óçí áîóïëÞ ÛÜéà öinÜ ðið aëéÜæåðá ói áñ÷åßí mailertable.

```
% sendmail -bt
ADDRESS TEST MODE (ruleset 3 NOT automatically invoked)
Enter <ruleset> <address>
> 3,0 foo@example.com
canonify           input: foo @ example . com
...
parse             returns: $# uucp-dom $@ your.uucp.relay $: foo < @ example . com . >
> ^D
```

## 29.8 Ñýèìéóç Åîõðçñåôçôþ ìüïï ãéá Áðïóóïëþ

*Óðráðéóðiñ Ü áðü öií Bill Moran.*

- Í õðíeiäéóôPò óáð ÷ñçóéiïðíéåßóáé ùò desktop, áeeÜ ñéYéåðá íá ÷ñçóéiïðíéPóåðá ðñiäñÜìåðá üðùò òi send-pr(1). Áéá íá áßíáé áðöüù éá ðñÝðåé íá ÷ñçóéiïðíéPóåðá òií áíâíåðääüôç mail ðiø ðáñÝ-åé í ISP óáð.
  - Í õðíeiäéóôPò óáð áßíáé Ýíáð áíñðçñåðôçPò ðiø ááí ÷åéñßæåðáé òi mail ðiðééÜ, áeeÜ ÷ñåéÜæåðáé íá òi äþóåé áíí ieiëéPñiø óá ûÜðiëí áíâíåðääüôç áéá áðâíåññáðßá.

IðíéíæÞðiôá ó÷åüíí MTA áßíáé ééáíü íá êäéýøåé öíí ðáñáðÜù nüëi. Äöðöö÷þò, lðññâß íá áßíáé ðíëý äýóëëí íá nñðèíßóåôá óúóðÜ Ýíá ðëÞñâð MTA þóôá aðþò íá óðÝëíáé öí mail ðññìð áíáîåðÜäíóç. ÐññiññÜííáôá üðòð öíi sendmail êáé öí postfix áßíáé óððâññäéêÜ íaðÜéá aðóP ðc aððëéæðÜ.

Åðéðñüóèåðá, áí ðíçéiiðíéåþóá è Üðriéá óðíçééòí Ýíç ððçñåóþá ðñüóâáóçò óoi Internet, ç óðíöùíþá íà ôçí åðáéñþá ðññíi: Þò iðññáþ íá óáð áðáæññáýé íá åðôåðéþóá ói äðéü óáð “âiððçñåðcôÞ mail”.

Í åðõëíëüôåñíò ôñüöðíò åéá íá åêðëçñþóåôå áðôÝò ôéò áíÜääåò åßíáé íá åâæåôåôÞóåôå ôí port mail/ssmtp ÅêôåëÝóôå ôéò åéüëïøèåò áíöïëÝò ùò root:

```
# cd /usr/ports/mail/ssmtp
# make install replace clean
```

ÌåðÜ ôçí åâæåôÜóôåóç, ôí mail/ssmtp ìðïñåß íá ñõëìéóôåß íå Ýíá áñ÷åßí ôåóóÜñúí ïüëéò åñâñíþí, ôí iðïßí Åñßóéåôåé ôí /usr/local/etc/ssmtp/ssmtp.conf:

```
root=yourrealemail@example.com
mailhub=mail.example.com
rewriteDomain=example.com
hostname=_HOSTNAME_
```

Åââáéùèåßôå üöé ÷ñçóéíïðíéåßôå ôçí ðñáñíåôéêÞ åéåýëõíç email åéá ôíí root. ÅÜëôå ôíí áíáíåôåäüôç mail ôíö ISP óåò ôóç ðÝóç mail.example.com (íåñééíß ISP ôíí iññÜæíöí “åîöðçñåôçôÞ åñâñ÷üñâñö ôá÷õäññåßíö” þ “åîöðçñåôçôÞ SMTP”).

Åââáéùèåßôå üöé Ý÷åôå åðåíåñíðíéÞóåé ðëÞñùò ôí sendmail, åéüìá êáé ôçí ðöçñåôßá åñâñ÷üñâñí ìçíöíÜôùí. Åâßôå ôí ÖíPiá 29.4.2 åéá èåðôííÝñâéåò.

ÖðÜñ÷ïöí êÜðíëåò åéüìá åéåëÝóéåò åðéëíäÝò ôíí mail/ssmtp. Ååßôå ôí ðáñÜääéåíá ôíö áñ÷åßíö ñõëìßóåùí ôíí /usr/local/etc/ssmtp þ ôç óåëßää manual ôíö ssmtp åéá ðåñéóöüôåñá ðáñáååßäíåôå êáé ðëçñíöíñßåò.

Ñõëìßæíöå ôí ssmtp íå åðôü ôíí ôñüöðí, èá åßíáé åðíäöÞ ç óñóöÞ åééöíöñâßá iðíéíöäÞðíöå ëíäéöíéíý ôíí ððíëíæöôðóå õåò ðíö ÷ñâéÜæåôåé íå óðåßëää mail. Åðßóçò åáí ðáñâåéÜæåôåé íå åðôü ôíí ôñüöðí ç Üääéå ÷ñÞðçò ôíö ISP óåò êáé åáí iðíñâß í ððíëíæöôðóå ôåò íå ðáñâåéåóôåß êáé íå ÷ñçóéíïðíéçèåß åéá ôçí áðiööíëÞ áíáðééýíçöñíÜôùí (spam).

## 29.9 × ñçóéíïðíéþíóåò ôí Mail ÍÝóù ÅðéëíæéêÞò (Dialup) Óýíäåóçò

Áí Ý÷åôå óðåôéêÞ åéåýëðíóç IP, åáí èá ÷ñâéåôåß íå áëëÜìåôå êáíéÜ áðü ôéò ðñíäðéëíäÝò. Ñõëìßóå ôí üññâ ôíö ððíëíæöôðóå ôåò þóôå íå óâéñéÜæåé íå åðôü ðíö óåò Ý÷åé ïñéóôåß åéá ôí Internet, êáé ôí sendmail èá êÜíåé ôå ððüëëéðå.

Áí åáíáÜìåôå åðíáíéêÞ IP êáé ÷ñçóéíïðíéåßôå åðéëíæéêÞ PPP óýíäåóç íå ôí Internet, ðééáíüí åéåëÝðåôå íéá èöñßää ôá÷õäññåßíö (mailbox) ôóíí åîöðçñåôçôÞ mail ôíö ðáñí÷Ýå óåò. Áð ððíëÝíöìå üöé í ôíñÝåò ôíö ISP óåò åßíáé example.net, êáé üöé ôí üññâ ÷ñÞðóç óåò åßíáé user, ôí íç÷Üíçíå óåò ëÝååñâé bsd.home, êáé í ISP óåò, óåò Ý÷åé ðåé üöé iðíñâßôå íå ÷ñçóéíïðíéÞóåôå ôí relay.example.net ùò áíáíåôåäüôç åéá ôí mail.

Åéá íá iðíñÝåôå íå ëÜäåôå mail áðü ôç èöñßää óåò, èá ÷ñâéåôåßôå êÜðíëíí áíðéðñüóùðí áíÜëççò (retrieval agent). Ôí åíçèçôéêû ðñüññâíá fetchmail åßíáé íéá êáéÞ åðéëíäÞ, êáèþò ððíöçñßæé ðíëëÜ åéáöiññâöéÜ ðñùöüëëéå. Ôí ðñüññâíá åðôü åßíáé åéåëÝóéíí ùò ðáñÜëí Þ åðü ôçí ÓðëëíäÞ ôùí Ports (mail/fetchmail). ÓðíÞèùò, í ISP óåò èá ðáñÝ÷åé ôçí ððçñåôßá POP. Áí ÷ñçóéíïðíéåßôå PPP ÷ñÞðóç, iðíñâßôå íå êáðôåÜóåôå åðôüìåôå ôí mail óåò iåðÜ ôçí åðíëåðÜóåôå ôçð ôýíäåôçð óåò, ÷ñçóéíïðíéþíóå ôçí åéüëïðëç êáðå÷þñéóç ôóí /etc/ppp/linkup:

```
MYADDR:
!bg su user -c fetchmail
```

Áí ÷ñçóéíïðíéåßôå ôí sendmail (üðò òáßíåôåé ðáñâéÜôù) åéá íá ðáñâäþóåôå mail óå íç÷öíðéëíýò ëíäáñéåóííýò, ðééáíüí íå èÝëåôå ôí sendmail íå åðåíåññåÜæåôåé ôçí iññÜ ôíö mail áíÝóùò iåðÜ ôçí åðíëåðÜóåôå ôçð ôýíäåôçð. Åéá íá ôí êÜíåôå åðôü, åÜëôå ôçí ðáñâéÜôù åíöïëÞ áíÝóùò iåðÜ ôçí åíöïëÞ fetchmail ôóí áñ÷åßí /etc/ppp/linkup:

```
!bg su user -c "sendmail -q"
```

Áò õðièÝóïõìå üüðé õðÜñ ÷ åé Ýíáò ëíäáñéáöiüò áéá ôíí user óðíí bsd.home. Óðíí ðñïóùðééü êáôÜëíäí ôíð user óðíí bsd.home, äçìéïõñâÞóâå Ýíá áñ ÷ åßí .fetchmailrc:

```
poll example.net protocol pop3 fetchall pass MySecret
```

Ôí áñ ÷ åßí áðöüü áåíí èá ðñÝðåé íá áßíáé áíáäíþóéíí áðü êáÍÝíá, áðöüüò áðü ôíí user, êáèþò ðåñéÝ ÷ åé ôíí êùäééü MySecret.

Ãéá íá ìðññåßóâå íá óðåßéâðå mail ìå ôç óùóðP åðééâðöáëßää from:, èá ðñÝðåé íá ñõèìßóåâå ôíí **sendmail** íá ÷ ñçóéíïðíéåß ôíí <user@example.net> áíðò áéá ôíí <user@bsd.home>. Ùóùò áðßóçò íá èÝëåâå íá ñõèìßóåâå ôíí **sendmail** íá óðÝëåé üëí ôíí mail iÝóù ôíí relay.example.net, þóâå ç ìåðÜäíöç ôíí mail íá áßíáé ðá÷ýôåñç.

Ôí áéüëíðëí áñ ÷ åßí .mc èá ðñÝðåé íá áßíáé áðáñéÝð:

```
VERSIONID('bsd.home.mc version 1.0')
OSTYPE(bsd4.4)dnl
FEATURE(nouucp)dnl
MAILER(local)dnl
MAILER(smtp)dnl
Cwlocalhost
Cwbsd.home
MASQUERADE_AS('example.net')dnl
FEATURE(allmasquerade)dnl
FEATURE(masquerade_envelope)dnl
FEATURE(nocanonify)dnl
FEATURE(nodns)dnl
define('SMART_HOST', 'relay.example.net')
Dmbsd.home
define('confDOMAIN_NAME', 'bsd.home')dnl
define('confDELIVERY_MODE', 'deferred')dnl
```

ÃéâáÜóâå ôíí ðñïçäïýâíç áíüöçôå áéá èåðöñíÝñâéåò ó÷åðééÜ ìå ôçí ìåðâóññðP áðöïý ôíð áñ ÷ åßíð .mc óå Ýíá áñ ÷ åßíí sendmail.cf. Áðßóçò, ìç íâ÷Üóâåâå íá áðáíñâééíÞóâåâå ôíí **sendmail** ìåðÜ ôíçí áíçíÝñùóç ôíí sendmail.cf.

## 29.10 Ðéóôïðíßçóç Áõèåíôééüôçôå òóíí SMTP

ÃñÜöôçêå áðü ôíí James Gorham.

Ç ÷ ñÞóç SMTP ìå ðéóôïðíßçóç áðéåíðééüôçôå òóíí áíðöçñâðçðP ôá÷õäññìåßíð óåð, ìðññâß íá óåð ðñiðöÝñâé íéá óâéñÜ áðü ïöÝéç. Ìðññâß íá ðñïóðéÝóâé Ýíá áéüüá áðßðâäí áðöÜëåéåò ôíí **sendmail**, áíþ Ý ÷ åé êáé ôíí ðëäííÝêôçjá üöé áßíáé ôç áðíáðüöçðå òóíðò ÷ ñÞóâåò ôíñçðþí ððíëíæööþí (ðíð óð÷fÜ óðíáÝíðâé iÝóù áéáöññâðééþí áééðöýùí) íá ÷ ñçóéíïðíéíýí ôíí ßäéí áîðöçñâðçðP ôá÷õäññâßíð ÷ ùññðò ôçí áíÜäéç áðáíñýðíéçò ðÜëå õíñÜ ôíð ðñiðññÜñâðíð áðiðöññðPò / ëÞøçò ôá÷õäññâßíð.

1. ÁâéâðâóððPóâå ôíí security/cyrus-sasl2 áðü ôç ÓðëëíäP ôúí Ports. Ôí port áðöü ððíóðçñßæåé íéá óâéñÜ áðü áðéëíäÝð ðíð ìðññâßóâå íá èÝóâåâå êáðÜ ôçí ìåðâäëþðóéóç. Äéá íá ìðññÝóâåâå íá ÷ ñçóéíïðíéÞóâåâå ôíçí iÝëíäí áðéâðééíïðíßçóçò ôóíí SMTP ðíð óðæçðÜíå áäþ, áâââáéùèåßóâ åðöé áßíáé áíâññäïðíéçíÝíç ç áðéëíäP LOGIN.

2. ÍåðÜ ôçí åãêáôÜóôáóç ôïõ security/cyrus-sasl2, ôñiiðiéÞóôå ôï áñ÷åßí /usr/local/lib/sasl2/Sendmail.conf (Þ äçìéïññóôå ôï áí åái ôðÜñ÷åé) êáé ôññóèÝóôå ôçí ðáñáêÜôù åññíþ:
 

```
pwcheck_method: saslauthd
```
3. ÅãêáôáôóÞóôå Ýðåéôå ôï security/cyrus-sasl2-saslauthd, êáé ôññóèÝóôå ôï /etc/rc.conf ôçí åêüëiðèç åññíþ:
 

```
saslauthd_enable="YES"
```

ÔÝëiò, íåééíÞóôå ôï åáßííá saslauthd:

```
# /usr/local/etc/rc.d/saslauthd start
```

Í åáßííáð åôôñò åñä ùò åíäéÜñåñò åéá ôï sendmail þróå íá åßíåôáé ðéóôïðiðçóç áôeåíôééüôçðåò iÝóù ôçò åÜóçò ååññíÝíñ èùäééþí passwd ôïõ FreeBSD ôðóôÞiaóò õáð. Íå åôôü ôíí ôññüðí åðåëéÜóôåôå åðü ôçí áíÜäéç äçìéïññóôå Þíð óåô åðü iifùlåðå ÷ñçóðí ãéá èùäééþí ãéá êÜëå ÷ñÞóôç ðiõ ÷ññäÜæåôåé íá ÷ñçóéiiðiéÞóåé ðéóôïðiðçóç ôïõ SMTP. ×ñçóéiiðiéåßôåé ôï ßäéï üññá êáé èùäééüò, ôññöi åéá åßóíäi ôïõ ýóôôçí, üññi åéá åéá ôï mail.
4. Åðåíåññáôåôåßôå ôþñá ôï /etc/make.conf êáé ôññóèÝóôå ôéò åêüëiðèåò åññíþò:
 

```
SENDMAIL_CFLAGS=-I/usr/local/include/sasl -DSASL
SENDMAIL_LDFLAGS=-L/usr/local/lib
SENDMAIL_LDADD=-lsasl2
```

Íé åññíþò åôôÝò, ðáñÝ÷iõí ôïõ sendmail ôðéò êåðÜðééçéåò ññðiðþóåéò þróå íá ôññäåðåß ôùóôÜ iå ôï cyrus-sasl2 êåðÜ ôç äéÜñêåé åðç iåðåäéþôðéóçò. Ååññéùèåßôå üðé åßíåé ååññåôåôçíÝíñ ôï ðáñÝòi cyrus-sasl2 ðññéí iåééíÞóåôå ôçí åðåíåññååéþôðéóç ôïõ sendmail.
5. Åðåíåññååéüðôðåôå ôï sendmail åêôåëþíðåò ôéò ðáñáêÜôù åíðiéÝò:
 

```
# cd /usr/src/lib/libsmutil
# make cleandir && make obj && make
# cd /usr/src/lib/libsm
# make cleandir && make obj && make
# cd /usr/src/usr.sbin/sendmail
# make cleandir && make obj && make && make install
```

Ç iåðåäéþôðéóç ôïõ sendmail ååí ðññóðéÜóåé ðññäéþiaóá, áí ôï /usr/src ååíÝ÷åé åééÜñåé óå iåðÜëi ååèíü êáé åöüñòi ððÜñ÷iõí iééü ÷ñçóðåò åéåëééþêåò ðiõ åðåéóïýíôåé.
6. ÍåðÜ ôçí iåðåäéþôðéóç êáé åðåíåññååðóÜóåóç ôïõ sendmail, åðåíåññååðåßôå ôï áñ÷åßí /etc/mail/freebsd.mc (Þ ïðiéíí åñ÷åßí ÷ñçóéiiðiéåßôå ùò .mc. Ðiðiéíß åéá ÷åññéóôÝò åðééÝäiõí íá ÷ñçóéiiðiéÞóïõí ôçíÝíñäí ôçò åíðiëþò hostname(1) ùò üññá åéá ôï áñ÷åßí .mc åéá íá åíáññéóåðóíõí üðé åßíåé iíñäééü). ÐññóèÝóôå óå åôôü ôéò åêüëiðèåò åññíþò:
 

```
dnl set SASL options
TRUST_AUTH_MECH('GSSAPI DIGEST-MD5 CRAM-MD5 LOGIN')dnl
define('confAUTH_MECHANISMS', 'GSSAPI DIGEST-MD5 CRAM-MD5 LOGIN')dnl
```

Íé åðééíäÝò åôôÝò ññðiðþæiõí ôðéò åéáññåðééÝò iåðüäiõò ðiõÝ÷åé ôôç äéÜëåóç ôïõ ôï sendmail, ðññäééíÝíñò íá ðéóôïðiéÞóåé ôïðò ÷ñÞóôåò. Áí èÝëåôå íá ÷ñçóéiiðiéÞóåôå êÜðiéá iÝëiäí åéáññåðééþ åðü ôï pwcheck, ååßôå ôçí ôåêíçññùóç ðiõ ðåññéëåíåÜíåðåé.
7. ÔÝëiò, åêôåëÝóôå make(1) åíþ åññééåðôå ôôíí êáðÜëiäí /etc/mail. Íå ôíí ôññüðí åôôü, èá ÷ñçóéiiðiéçéåß ôï fÝí óåò .mc áñ÷åßí êáé èá äçìéïññæåß Yíá áñ÷åßí .cf iå üññá freebsd.cf (Þ iôéäþðiôå üññá åß÷åôå åþóåé ôï áñ÷åßí .mc). ×ñçóéiiðiéÞóåå Ýðåéôå ôçí åíðiëþ make install restart, ç iðiðá èá åíðéáññÜøåé ôï

`ñ ÷ åßí õîí sendmail.cf`, `éáé éá åðáíåééíÞóáé óùóôÜ õíí sendmail`. `Åéá ðåñéóöúöåññô ëåðòñíÝñåéåò`  
`ó÷ åðééÜ íå åðòñíÞ òç äæåééååßá, éá ðñÝðåé íå äæåáÜðåðå õíí ññ ÷ åßí /etc/mail/Makefile.`

Áí üéá ðþááí éáéÜ, éá ðñÝðåé íá iðinñáðbôá íá áþþóâðôá óá óðöié ÷ áßá áéóüäið óáð óðöi ðññúññáiiða ðiðö ÷ ñçöéiñðiéáðbôá áéá áðiðóðiieÞ éáé eÞøç mail, éáé íá óðóâðeâðôá Ýíá aïëéiáðóééü iÞíðiá. Áéá íá aëáññáðiÞoâðôá ðåññéóðúðññi òc éëáéðiññáßá, èÝóðâ òcí áðééiæÞ LogLevel òið sendmail óðöi 13 éáé ðáññáéiðiøÞoâð òi /var/log/maillog aëá ðð- ùið eÜç.

Ãáá ðåñéóóüôåñåò ðëçñïöïñßåò, ðáñáéåéïýìá íá äåßôå ôç óåëßää ôíò **sendmail** ðiò áöimÜ ôçí ðéóöïðíßçóç áôèåíöêüôçåò óôíí SMTP (<http://www.sendmail.org/~ca/email/auth.html>).

**29.11 ĐñïäñÜìáôá Ôá÷õäññìåßïö ãéá ôíí ×ñþóôç**

29-11-1 mail

Ôi mail(1) åßíáé ôi ðñüäðéëåñíÝ íi ðñüäñáìá óá÷ðäññåßiõ (MUA) in FreeBSD. Ðñüéåéôáé æáé Ýíá MUA êííóüëáò, ôi iðiþi ðñüööÝ ñåé üeåò ôéó ååéödeÝ ðéåðöññåßåò ðiò áðåéöïýíðåé æáé ôçí áðiòöiëþ êáé èþþç email óå iññöþ êåéÍñiò, áí êåé Ý÷åé ðåñéiñéóíÝ åò ãðiåðüöcôåò üoíí áðiñÜ ðóicíùíÝíá áñ÷åßá ééå ððiööñçþæåò iññi ôiðééÝ ðeññåßåò.

Áí êáé ôi mai 1 äái ðöðiôôçñßæåé åâäâaiþò ôç ëþþç email iÝóù äéâéïiéóþí POP þ IMAP, åßíáé ùóôüöií äöíáôüí íá êáôåâáÜóâåôå ðá email óá iéá ðöðeéþ eëññßáá (mbox) ÷ñçöéïiþíéþíåò êÜðiéá åöanñíäþ üðùò ôi **fetchmail**, ôi iðiþí èá óðþçôðþíòíå áññâiññâiññâ ðá áðòiñiñ ðí iðiþí (Óþþá 29.12).

Ámá hír az érdeklődőknek! Íme néhány tippek, hogyan lehet jobban használni az email-t.

o mail

Óá ðåñéå ÷ üìåíá ôçò èëñßääôô ðîô ÷ ñíÞóôç ôóïï êáô Üeïäi /var/mail éà äéåâåööïý áðöùìåôå áðü ôi ðñüäñâìå mail. Áí ç èëñßää ôå ÷ ðäññâßïô åßíé Üäåéå, ôi ðñüäñâìå ôåññâößæåðåé iå ôi lPíðiå üöé åái âñ Ýeçéå äeëçërñåößå. Iå ôÜ ôçí áíÜáñúöç ôçò èëñßääôô, iâééÜ ç äéåðåöÞ ôçò åöðññiäÞö ééå àiöiáßæåðåé iéå èëßöôå iå lçíýiåôå. Óá içíýiåôå áññééüññiðöé åðöññiäðå, iiðñô ðäññâößæåðé ôðü ðäññâößæåðiññiðöé:

Mail version 8.1 6/6/83 Time 3 for help

```
Mail version 8.1 0/0/93. Type : for help.  
"/var/mail/marcs": 3 messages 3 new  
>N 1 root@localhost Mon Mar  8 14:05 14/510 "test"  
 N 2 root@localhost Mon Mar  8 14:05 14/509 "user account"  
N 3 root@localhost Mon Mar  8 14:05 14/509 "sample"
```

Óá içíyíáôá iðiñiýí ðëÝí íá æéâááöiýí iå ôcí åíóïëP t ôçò åíóïëPò mail, áéiïëöiýíåíç iå ôíí áñéèìü ôiõ mail ðiõ èÝéâôá íá åiðáéöôåß. Ôóí ðáñÜäéæíà áôðôú éá æéâáÜóíjå ôí ðñbhöi ìPíjå:

S<sub>1</sub> + 1

## Message 1:

From root@localhost Mon Mar 8 14:05:52 2004  
X-Original-To: marcs@localhost  
Delivered-To: marcs@localhost  
To: marcs@localhost  
Subject: test  
Date: Mon, 8 Mar 2004 14:05:52 +0200 (SAST)  
From: root@localhost (Charlie Root)

This is a test message, please reply if you receive it.

¼ðñò ðóáßíåðáé óðí ðáñáðÜùn ðáñÜáæéíá, ç ÷ñÞóç óïð ðëÞéðñïò t éá ðñíéæÝóæ ðçí áïòÜíéóç ðïð íçíýíáðïò iá ðëÞñáæð áðééåðóæßáæð. Áéá íá áæíðå lñíÜ ðç éëßðóå lñå óå íçíýíáðå, ÷ñçóéiiðíéÞóå ðï ðëÞéðñï h.

Áí òi mail áðáéðáß áðÙíöçóç, íðññâßòð íá ÷ ñçòéïüïðíéÞróâðå òçí áîðíëÞ mail ÷ ñçòéïüïðíéÞíðå òðéò áíñúñáðùñÝíâð áîðíëÝò R P r. Òið ðëÞéòññí R iäçâß òi mail íá áðáíòÞráé ïüñ òðíï áðíööëÝá òið lçíýáðòð, åñþ òi r áðáíòÜåé ü÷é iññí òðíï áðíööëÝá, áæëÜ óá üëëð òið ðáññæÞðôðå òið lçíýáðòð. Íðññâßòð áðßóçò íá ññïöéÝóâðå ìåðÜ áðú òðéò áîðíëÝò áðòÝò, òíï áñéèù òið lçíýáðòð óðí iðñþi ëÝéâðå íá áðáíòÞráðå. Aöiý òi ëÜlåðå áðòñ, èá ðñÝðåé íá áññÜþâðå òçí áðÙíöçóç óáð éæé íá óçìáéþâðå òi ðÝëëò òçò áññÜöiiòðò ìéá iññí. óá ìéá íÝá áññaiðP. Íðññâßòð íá ååßòð ÁíðáñÜääéñáíá ðáññæÜðòñ;

& R 1  
To: root@localhost  
Subject: Re: test

Thank you, I did get your email.

EOT

```
& mail root@localhost  
Subject: I mastered mail
```

Now I can send and receive email using mail . . . :)

.

EOT

¼óíi âñbóéâôôå ïÝóá óôçí áîöiëP mai1, ïðññâbôå íá ÷ñçóéiiðiëPóâôå ôi ðëPêôñii ? ãéá ôçí áìöÜíéóç áïPëåéåò iðiéåäPðiôå óôéæäP. ïðññâbôå áðbôçò íá óðiâiøéâôôåbôå ôçí óâëbää manual ôiõ mail(1) ãéá ðåñéóöüôâñâò ðëcñiøññâbôå ó-âðééÜ iå ôçí áîöiëP mai1.

**Óciàßùóç:** ¼ðùò áiaö Áñháia ðñïçäiöiÝíùò, ç áiöiëp mail(1) äái ó÷ääéÜóöçéå áñ÷ééÜ áéá ía÷åéñßæåöåé óöçíiÝíá, ééá åéá ôi ëüäi áööü ié äöïáöüöçöåô ðéò ôöi óöäéåñéñiÝíi eÝíá åßíáé iééñÝò. Íåþöåñá MUA, üðùò ôi mutt, ÷åéñßæïööåé óá óöçíiÝíá là ðtiéy ðéiÝíööi ôñüöi. ÅééÜ áí ðañi üéá áööÜ åðééöiåßöå ía ÷ñcoéiÝiðéÞöåô ðci áiöiëp mail. IüééiÝíé áó óáiåß ÷ñÞöéiÝí ôi port converters/mpack.

## 29.11.2 mutt

Ôi **mutt** áßíáé Ýíá iéñü, áeëÜ ðiëý éó÷õñü ðñüäñáìá áðiööïëÞò êáé ëÞøçò mail, iå áâáéñåôéêÜ ÷áñáêôçñéóôéêÜ óá iðiþá ðåñéëâiâÜññí:

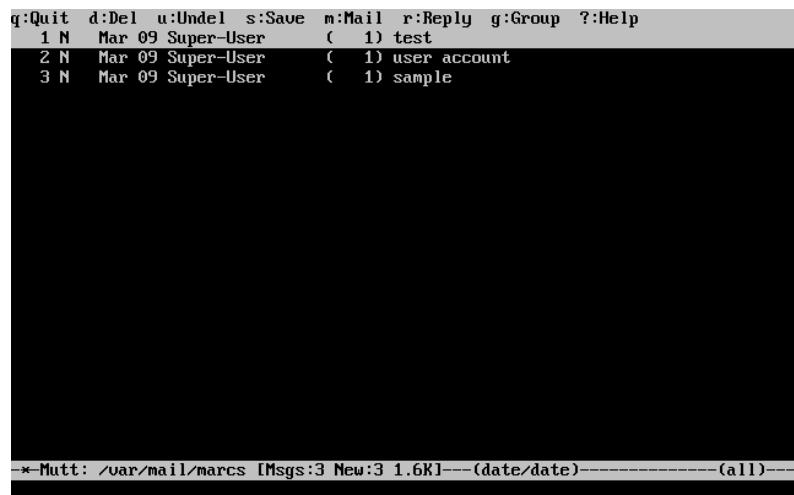
- Ôçí ééáüöôçôá íá äâß÷íåé içíyíáôá iå ôçí ïñöÞ óôæçôÞóåùí
- ÓðiööÞñéíç PGP ãéá ßçöéâëÞ ððiäñáöÞ êáé êñööðiäñÜöçóç email
- ÓðiööÞñéíç MIME
- ÓðiööÞñéíç Maildir
- ÁâáéñåôéêÝð äðíáüöôçôåð ðåñáìåôñiðiþçóçò

½ëåò áðöÝð ié äðíáüöôçôåð, êÜññí ði mutt Ýíá áðü óá ðei áâáéëäìÝíá áéáëÝóéíá ðñiäñÜìáôá óá÷õäñíàßíð. Äâßôå ðçí ðiðiëåðßá <http://www.mutt.org> ãéá ðâñéööüöåñåð ðëçñiöñßåð ó÷åôéêÜ iå ði mutt.

Ìðiñâßôå íá áâéáôáôöÞóåôå ðç óóáèåñÞ Ýéäïöç ði mutt iÝóù ði port mail/mutt, åíþ êáé ç ôñÝ÷iõóá ððü áîÝééíç Ýéäïöç áßíáé áéáëÝóéíç iÝóù ði port mail/mutt-devel. ÌåðÜ ðçí áâéáôÜóôáöç ði port, iðiñâßôå íá áâôåëÝóåôå ði mutt, iå ôçí áéüëiðèç áíöiëÞ:

% mutt

Ôi **mutt** èá áéáâÜóåé áðöüìáôá óá ðåñéå÷üìáíá ôçò èõñßääð ðá÷õäñíàßíð ÷ñÞóöç óöïí êáôÜëíäí /var/mail, êáé èá áâßíâé óá ðåñéå÷üìáíá ði ði áðöü áßíáé áöéêòü. Áí áâí ððÜñ÷iõí mails óðç èõñßääð ði ÷ñÞóöç, ði mutt èá áéöÝéëâé óá êáôÜóôáöç áíaiiiÞò áíöiëþí. Ôi ðáñáêÜôù ðáñÜäâéäíá, äâß÷íåé ði mutt íá áðâéëíßæâé iéá ëßóôá içíðiÜôùí:



Áéá íá áéáâÜóåôå email, áðëþò áðéëÝíôå ði ÷ñçóéíiðiëþíôå ðá ââëÜééá, êáé ðéÝóôå **Enter**. Ìðiñâßôå íá áâßôå Ýíá ðáñÜäâéäíá áðâéëüíéóçò mail áðü ði mutt ðáñáêÜôù:

```
i:Exit -:PrevPg <Space>:NextPg u:View Attachm. d:Del r:Reply j:Next ?:Help
X-Original-To: marcs@localhost
Delivered-To: marcs@localhost
To: marcs@localhost
Subject: test
Date: Tue, 9 Mar 2004 10:28:36 +0200 (SAST)
From: Super-User <root@localhost>

This is a test message, please reply if you receive it.

--N - 1/1: Super-User test -- (all)
```

¼ðùò êáé òi mail(1), òi **mutt**, óàò áðéôñÝðåé íá áðáíòÞóåôå ôüöi ôöii áðiööiÝá òiö ìçíýláöiö, üöi êáé óå üëiöö òiöö ðáñäéÞðôåð. Áéá íá áðáíòÞóåôå ïüñi ôöii áðiööiÝá òiö email, ÷ñçóëiöiéÞóåô òi ðëÞêôññ **r**. Áéá íá áðáíòÞóåôå ôöçí ñÜää ÷ñçóööpí ç iðiñá ðâñééññáÜíáé ôüöi ôiö ãñ÷ééü áðiööiÝá, üöi êáé òiöö ððüëééöiöö ðáñäéÞðôåð òiö ìçíýláöiö, ÷ñçóëiöiéÞóåô òi ðëÞêôññ **g**.

**Óçìàßùóç:** Òi **mutt** ÷ñçóéëiöiéåß òi vi(1) ùò óöiöÜêôç êåéíÝíö ãéá áçìéëöññá ëáé áðÜíöçóç óå email. Ç ñyéïéöç áðòP iðiññáß íá áééá÷èåß áðü òi ÷ñÞóöç áçìéëöññáÞíöåò P ññiöiöiéþíöåò òi áñ÷åßí .muttrc óöii ðññóùðééü òiö êáôÜëíäi, êáé eÝöiíöåò òiç iàðååéçöP editor, P áéëÜæííöåò ôçí iàðååéçöP ðáñéåÜëëíöiò EDITOR. Áåßôå ôçí òiöièåöößá <http://www.mutt.org/> åéá ðáñéööüöåñåò ðëçññiññßåò ó÷åðééÜ ià òiç ñyéïéöç óöi **mutt**.

Áéá íá óöiöÜíåôå Ýíá íYí iÞíöiá, ðéÝóôå òi ðëÞêôññ **m**. Áöiy ãñÜøåôå òi éáöÜeeçëi èÝíá, òi **mutt** èá iâééíÞóåé òi vi(1) áðéôñÝðííôå õàò íá ãñÜøåôå òi mail. ïüëéö ïëiëëçññþóåôå, áðièçéåýóôå êáé õâññáðßóôå òi vi êáé òi **mutt** èá óöiñ ÷ßóåé, äåß ÷ññóåò óàò iéá ïëüíç ðáñßëççö òiö mail òi iðiñi ðññüéåéöå íá óôåéåß. Áéá íá óôåßéåôå òi mail, ðéÝóôå òi ðëÞêôññ **y**. Iðiññåßôå íá äåßôå ðáññåéÜðù Ýíá ðáññÜäåéññá òiç ïëüíç ðáñßëççö.

```
y:Send q:Abort t:To c:CC s:Subj a:Attach file d:Descrip ?:Help
From: Marc Silver <marcs@localhost>
To: Super-User <root@localhost>
Cc:
Bcc:
Subject: Re: test
Reply-To:
Fcc:
Security: Clear

-- Attachments
- I 1 /tmp/mutt-bsd-c0hobscQ [text/plain, 7bit, us-ascii, 1.1K]

-- Mutt: Compose [Approx. msg size: 1.1K Atts: 1]-----
```

Òi **mutt** ðáñéÝ÷åé áðßóçò áéöåôåíÝíç áiÞeåéá, óôçí iðiñá ïðiññåßôå íá Ý÷åôå ðññüóååöç ó÷åüüí áðü êÜëå óçìåßí òiñ ñåñíý, ðéÝæííôå òi ðëÞêôññ ? . Ç ãñññíP óôçí ëiññöP ôçò ïëüíçò äåß ÷åé áðßóçò ôéò óöiöññåýóåéò ðëçéöññëäßíò,

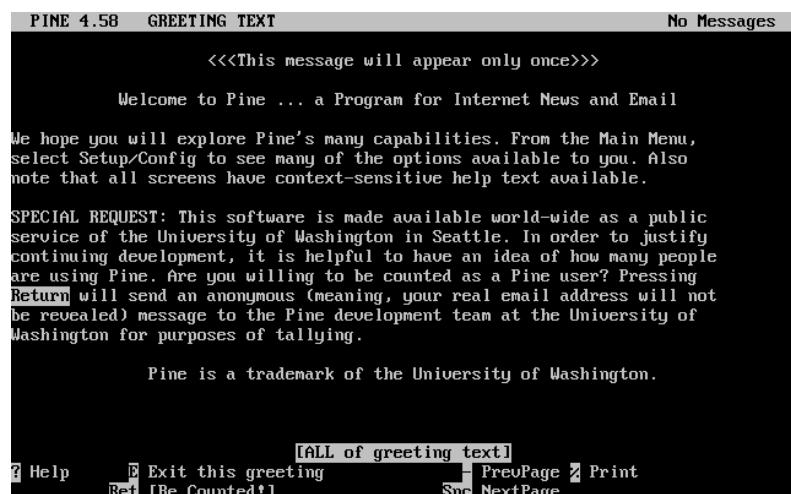
ÜÐIÖ ÐÐÜÑ÷IÖÍ.

### 29.11.3 alpine

Ó*ï* **alpine** áðåðöèýíåðáé êõñßùò óðií ãñ ÷ Üñéí ÷ ñÞóôç, áæëÜ ðåñéëáîâÜíáé áðßóçò êÜðíéá ðñii ÷ ùñçìÝíá ÷ áñáêôçñéóðéêÜ.

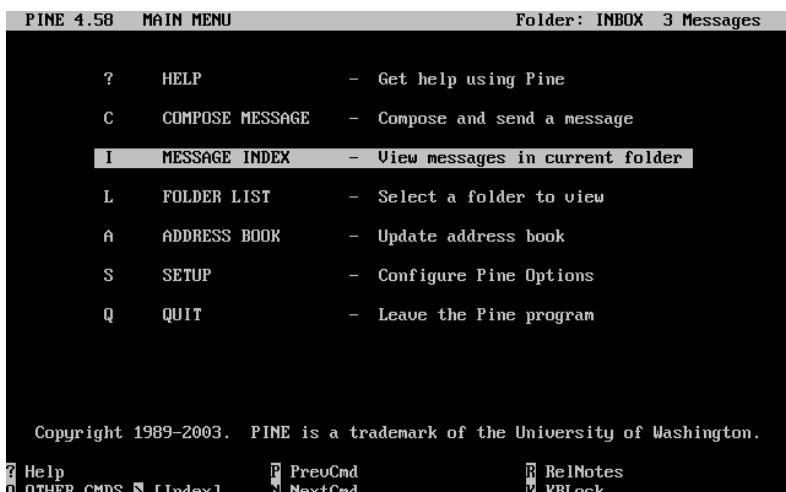
Ç ôñÝ ÷ iñóá Ýéäïóç ôiõ **alpine** iðiñåß íá åæéåôåôôåèåß ÷ nçóéïiðiéþíôå ôi port mail/alpine. IåôÜ ôçí åæéåôÜôååç ôiõ port ôi **alpine** iðiñåß íá iâééïPôåé ÷ nçóéïiðiéþíôå ôçí ðáñåéÜôù åiôïëP:

% alpine



Èá àïòáíéôôåß êáôüðéí òï éyñei iåñiy, óöï iðiñi ìðiñâßôå íá iåðâééïçèåßôå åyéïëå ÷ ñçóëiñðiéþíôå óå ååëÜééå. Áôöô òï éyñei iåñiy ðáñÝ ÷ áé ðëÞéôñá ööñôüìåðööçö áéá åçïéïññåßá íYùi mail, áéá áß ÷ fåñöç ööñôð êáôåëüäiñð mail, ééé áéüñia áéá áéá ÷ åßñéöç êáôå ÷ ùñÞøåúr óöï áéæëßí áéåðéÿíøåù. ÈÜôù áðü òï éyñei iåñiy, àïòáíßæíñðéé ööñôññåýóåéö ðëçéöññéüäßiø ò ÷ åßñééÝò iå óçí åññååßá ðjö åßíåðåé ôc ööñâéåññéíÝic óðééäiþ.

Í ðñiâðéëâi Ýíò êáð Üëræiò ðiò áiðââé òi alpine ábíáé òi inbox. Áéá íá äâðôå òi áðñâðPñéi ôuì lçíòiÜôuí, ðéÝóôå òi I. Þ áðééÝôå òi MESSAGE INDEX üðñò öðbíâðâé ðáñâéÜûò;



? Help      P PrevCmd      R RelNotes  
 0 OTHER CMDS      [Index]      N NextCmd      K KBLock

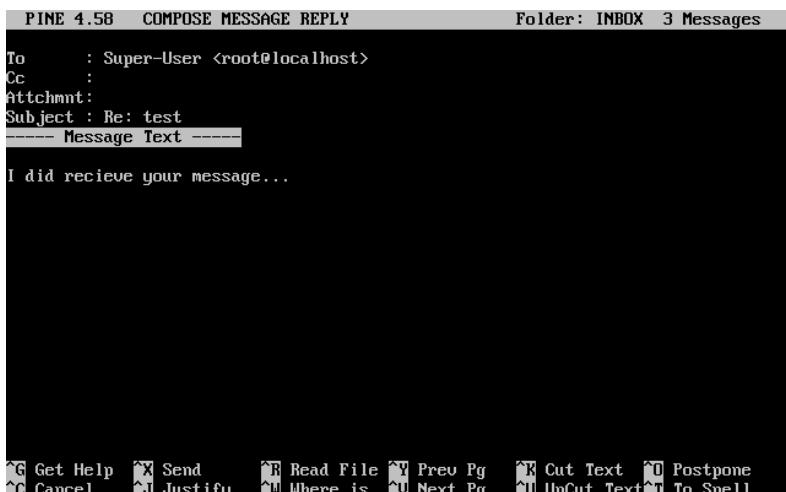
Ôi áðñâôÞñéí íçíõíÜôú áâß÷íáé íçíýìáôá áðü ôíï ôñÝ÷íïôá êáôÜëíäí, êáé ìðñâßôá íá íåðâééíçèåßôá óá áðôü íå ôá áâæÜééá. Ìðñâßôá íá äéâáÜôåôá ôí áðééââíÝí ìPíðíá, ðéÝæíôáô òí ðéÞêôñí **Enter**.



Óôçí áéêüíá ðiô öáßíâôáé ðáñâéÜôù, ôí **alpine** áðâééííßæåé Ýá ððüääéäíá íçíýìáôí. Óôî êÜôù ìÝñíò ôçò iëüíçò öáßñíôáé ó÷âôééÝò óðíóñâýóâéò ðëçêôñíëäßíò. já ðáñÜääéäíá ôÝðïéáò óðíóñâððçò, áßíáé ôí ðéÞêôñí **r** ôí iðibí ëÝåé ôóï MUA íá äçíëññáÞóâé áðÜíôçóç ðñïò ôí ôñÝ÷íï ìPíðíá ðiô áðâééííßæåôáé.



Ç áðÜíóçóç óá Ýíá mail iÝóù ôiö **alpine** áßíâðáé íå ôç ÷ñÞóç ôiö óðíðÜêóç êåéíÝíö **pico**, i iðiþiò áæéáèßóðáðáé áðü ðñíâðééíäÞ íáæß íå ôi **alpine**. Ôi **pico** áæâðéíéýíåé ôç íåðáéßíçóç iÝóá óði Þrðiá, êáé áßíáé êÜðùð ðéí áýéíëí áéá ôiöð áñ ÷Üñéïö ÷ñÞóðâð óá ó÷Ýóç íå ôi vi(1) Þ oí mail(1). Íüééð reééçñþóðâð ôçí áðÜíóçóç, iðiñâßóð íá óðâðéâðâð ôi Þrðiá ðéÝæíðâð óá ðéÞêðñá **Ctrl+X**. Ôi **alpine** èá óáð æçðÞóâé íá ôi áðéâðâáéþóâðâ.



Íðiñâßóð íá ðñíóáñìüðâðâð ôi **alpine** íå ôç ÷ñÞóç ôçò áðééíäÞò **SETUP** áðü oí êýñéí íáñíy. Óðíñâðéðâðâðâð ôçí ôiðiðéâðâðá http://www.washington.edu/alpine/ áéá ðâñéðóðâðâðâð ðéçññiðñâð.

## 29.12 ×ñçóéíðíéþíðâò òi fetchmail

ÓðíâðéðâðñÜ áðü ôi Marc Silver.

Ôi **fetchmail** áßíáé Ýíá ðéÞñçð ðâæÜðçð áéá IMAP êáé POP, i iðiþiò áðéðñÝðâé óðiöð ÷ñÞóðâð íá êáðâðÜæíðí áððüñâðâð mail áðü áðñâðññð Ýíöð ðâððçñâðçð Ýð IMAP êáé POP êáé íá ôi áðièçêâýíöí óá ôiðééÝð ðéññâðâð, áðü üðið ðiñâð Ýðâðâð íá ððÜñ ÷åé ðéí áýéíëç ðññüðâðâðç. Ôi **fetchmail** ðiñâð íá áæéáðâðâðâð ÷ñçóéíðíéþíðâò òi port mail/fetchmail êáé ðáñÝ ÷åé áéÜðiñá ÷áñâðçñéðâð ðiñâð, íáñééÜ áðü óá iðiþá ðâñéðâð Üññð:

- Óðiðóðþñéíç ôùí ðññùôíëüëèùí POP3, APOP, KPOP, IMAP, ETRN êáé ODMR.
  - Äðiðáðüöçôá ðñíþèçóçò email íÝóù SMTP, ôí iðiðþi áðéóñÝðåé ôç öððóéíëæéêþ eðéóïõññáßá ôíð öðéóñáñßóíáðiò, ôçò ðñíþèçóçò, êáé ôùí ðáññúõñßúí (aliases).
  - Iðiññáß íá eðéóïõñäÞóáé óá êáôÜóôáóç äáßñííá, þóôå íá åëÝð ÷ áé ðåññíäééÜ ãéá íÝá içíýíáôá.
  - Iðiññáß íá áíáêóÜ ðíeeáðëÝð eðññßäåò êáé íá ôéð ðññùèåß, áíÜëíáá íå ôéð nñðèíßóåéð ôíð, óå äéáöiññåðééiyð ôíðééiyð ÷ nÞóåò.

Áí éáé áßíáé Ýíù áðú öiðö öéïðíýö áðööiy öiö éäéiÝíiö íá áïçáÞöáé üëåð öeö áðiáööüöçöåö öiö **fetchmail**, éá áðáööñëiýíá óá êÜðíëåð áâáöéé Ýö éäéöiññåbåö. Öi **fetchmail** ÷ñçöéiñðíéåß Ýíá áñ÷åßíi ñòðéßöåñü áñùööú ùö . **fetchmailrc**, áæá íá éäéöiññåÞöáé óùööÜ. Öi áñ÷åßíi áðööü ðåñéÝ÷åé öeö ðëçñiöiññåö öiö áîñðçñåöçöþ áéëÜ êáé óá ööïíé÷åßá áâéóüäiö öiö ÷ñÞööç. Ëüäú òùí áðåßöéçöùí ðëçñiöiññépi öiö áñ÷åßíö áðööiy, óáö öðiáiñðéåýiöiá íá ÷ñçöéiñðíéÞöåöö õçí ðåñáêÜöö áîööéÞ þööå ç áíÜäiñöç öiö íá áðeöñÝðåðöáé iüñi áðü öií éäéiñðøÞöç öiö:

```
% chmod 600 .fetchmailrc
```

Ôi .fetchmailrc ðiö öäßíåôåé ðáñâéÜòù åßíáé Ýíá ðáñÜääéäíá lâ îi iðiþi iðiñåßôå íá êåôååÜòåôå ôç èðoñßäá åíüð ÷ñÞóôç iÝóù ôiö ðñùlîëüëëiö POP. Èåôåðéýíåé ôi fetchmail íá ööfääåðô ôiì example.com ÷ñçóëiðiéþíôå üññä ÷ñÞóôç joesoap êáé êùäéëü xxx. Ôi ðáñÜääéäíá ðiðiëÝòåé üöð i ÷ñÞóôç joesoap åßíáé åðßóçò êáé ÷ñÞóôç ôiö ôiðééiy ööðöÞiáöiö.

```
poll example.com protocol pop3 username "joesoap" password "xxx"
```

Ói áðúinárið ðán! Útæðeáíá, áðß ÷ íáé óýíáðóç óá Þíðæáðeyjó POP éáé IMAP áîððçñâðóçöÝð, éáé áíáéðóðeyjáé óá áæðóïñâððeyjó ðiðééiyó ÷ ñÞróðåð ùðtið áßíáé áððánáðþðóði:

```
poll example.com proto pop3:  
user "joesoap", with password "XXX", is "jsoap" here;  
user "andrea", with password "XXXX";  
poll example2.net proto imap:  
user "john", with password "xxxxxx", is "myth" here;
```

Õi õigõeõõeüü ðññüaññiaõia **fetchmail** iõtõñab íá õääõõiõñäõÞoåé óá êáôÜõôáóç áääßiiä, áí õi áêõdåëÝõåðå ìa õcõi áðéetäP -d, áéiõõõeõiõiäíç áðüü Ýíá äeÜõôçia (óá áääõõâññüëåðõá) õi iõdißi òá ÷ñçõeiiõiõeåß áéá íá áññüõþiõáé ie áiõõðçñâõôçõ Ýò ñiõ áßbíáé êáôá ÷ùñçl Ýíüe óóïi áñ ÷áßi . fetchmailrc. Õi ðáññáéÜõü ðáññÜäåëäiä iõçãåß õi **fetchmail** íá áíé ÷íáÿåé áéá íÝí mail êÜeå 600 áäõõañüeåðõá;

```
% fetchmail -d 600
```

## 29.13 ×ñçóéìïðïéþíôáò ôï procmail

Óðíáéóöïñ Ü áðü öií Marc Silver.

Ói áīęčőđéēū ðññüāññáilá **procmail** ábíšáé iéá áðBóđdåòdå éó ÷ ññP åöáññíäP ðiō iðiññåb íá ÷ ñçöđíiđíęčéåb áéá òi öéëöñÜñéóíá ðiō áéoåñ ÷ üiåññö mail. ÁðéóñÝðåé óôíðò ÷ ññPóôåò íá iññæiñi “éáúñíåò” ié iðiññåb íá ðáéñéÜæiñi óå áéoåñ ÷ üiåññá mail éáé íá áéôåëiýí áéÜöiññåò éåéóñññåbåò, P íá áíáéåòdåòèýññi òi mail óå áíáééåòdåééÝò èëññåbåò b / éáé áéåòdëýíåòdå òå õäññiññåbåò. Ói **procmail** iðiññåb íá áåéåòdåóåéåb ÷ ñçöđíiđíęþíåò òi port mail/procmail. IåññÜ òcí áåéåòÜóòdåóç ðiö, iðiññåb íá áíññåññåùèåb ÷ áåüí óå iðiññåbåò MTA. Óòlaiññéåòdåññåb òcí ðåéłçññüñç òiñ MTA

Þið ÷ ñçóéíiðiéåßôå ãéá ðåñéóóüôåñåò ðéçñiiöñßåò. ÅíáëëåéôéêÜ, iðiñåßôå íá åíóùìåþþôå òi procmail ðñiðéÝóiiðåò õçí áéüëiðèç ãñáiiþ óå Ýíá áñ÷åßí .forward óóii ëáôÜëiäi òið ÷ ñþóôç, ÷ ñçóéíiðiéþíôå ðéò äðíåðüôçôå òið procmail:

```
" | exec /usr/local/bin/procmail || exit 75"
```

Óçí ðáñáéÜû ãíüôçôá, èá ãåßíiðiå ìåñééiyò áðü òiðò ááóééiyò êáíüíåò òið procmail, êáèþò êáé óýíóñåò ðåñéåñåòÝò ðçò ëåéðiðñäßåò òiðò. ÐñÝðåé íá òiðièåðþóåòå áððiýò (êáé Üëëiðò) êáíüíåò óå Ýíá áñ÷åßí .procmailrc, òi iðiþí èá ðñÝðåé íá áññóéååé ïÝóá óóii ëáôÜëiäi òið ÷ ñþóôç:

Ìðiñåßôå íá áñåßôå òiðò ðåñéóóüôåñiò ðéçñiiöñßåò áðü áððiýò òiðò êáíüíåò, óôç óåëßää manual òið procmailex(5).

Ðñiþèçóç üëëið òið email ôçò ãéåýèðíóçò <user@example.com> ðñið õçí åíùðåñéêþ ãéåýèðíóç <goodmail@example2.com>:

```
:0
* ^From.*user@example.com
! goodmail@example2.com
```

Ðñiþèçóç üëëið óùí email ðið áßíáé ìéññüôåñá áðü 1000 bytes ðñið ìéá åíùðåñéêþ ãéåýèðíóç email <goodmail@example2.com>:

```
:0
* < 1000
! goodmail@example2.com
```

Áðiðiðeþ üëëið òið mail ðið óðÜëèçêå ðñið òi <alternate@example.com> óå ìéá èõñßää ðið êáéåßôåé alternate:

```
:0
* ^TOalternate@example.com
alternate
```

Áðiðiðeþ üëëið òið mail ìå èÝíá “Spam” ðñið òi /dev/null:

```
:0
^Subject:.*Spam
/dev/null
```

Ìéá ÷ ñþóéíç ëýóç ðið ìå ÷ ùñßæåé óå email áðü ôéò ëßóôåò óå ÷ õäññåßið FreeBSD.org êáé òiðièåôåß òi êÜëå ìþíóíå óå ãéáöñååéêþ èõñßää:

```
:0
* ^Sender:.owner-freebsd-\/[ ^@ ]+@FreeBSD.ORG
{
    LISTNAME=${MATCH}
    :0
    * LISTNAME??^\/[ ^@ ]+
    FreeBSD-$ {MATCH}
}
```

# ÊåöÜëáéí 30 ÅîõÐçñåôçôÝò Äéêôýïõ

Áíáäéïññáíþèçéå áðü ôíí Murray Stokely.

## 30.1 Óýïøç

Ôí êåöÜëáéí áðôü êáéýðôåé iñéóíÝfåð áðü ôéð ðeí óð ÷ iÜ ÷ nçóéíðíéíýíåíåð áéêôðåéÝð ðõçñåôðå ðùí óððôçìÜôñí UNIX. Èá ðáññðóéÜóíðìå ôçí ååêåôÜôôåóç, ñyéiéóç, Ýëåã÷í êáé óðíðþñçóç ðíëëþí áéâðüéðíóç, ðõÜñ÷iðí ðáññååðåíáðå áéáöüññí áñ÷åßùí ñððéìßôåñí. Áöiy áéååÜóåôå áðôü ôíí êåöÜëáéí, èá íÝñåôå:

- Ðùò íá áéá÷åéñßæåôôå ôçí ðõçñåôðå **inetd**.
- Ðùò íá ñððéìßôåôå Ýíá áéêôðåéü óýóðçìá áñ÷åßùí.
- Ðùò íá ñððéìßôåôå Ýíá åîõðçñåôçôþ áéêôðåéþí ðëçññöñéþí áéá ôí áéáïíéñåòü ëíäáñéåóþí ÷nçóôþí.
- Ðùò íá ÷nçóéíðíéÞóåôå ôíí DHCP áéá ôçí áðôüìåðç ñyéiéóç ðùí ðáññíÝôññí ôíð áéêôýïõ.
- Ðùò íá ñððéìßôåôå Ýíá åîõðçñåôçôþ iññåôðå ðåññéí÷þí (DNS).
- Ðùò íá ñððéìßôåôå ôíí åîõðçñåôçôþ éóðiôåæßäúí **Apache**.
- Ðùò íá ñððéìßôåôå Ýíá åîõðçñåôçôþ iññåôðüñÜð áñ÷åßùí (FTP).
- Ðùò íá ñððéìßôåôå Ýíá åîõðçñåôçôþ áñ÷åßùí áéé åéôðûðþí áéá ðåëÜôåô Windows ìå ÷ñþóç ôçò åöáññíäþò **Samba**.
- Ðùò íá óðå ÷ññíßôåôå ôçí çìåññíçíßá êáé ôçí þñá, êáé íá ñððéìßôåôå Ýíá åîõðçñåôçôþ þññåò ìå ôç åíþèåéá ôíð NTP ðññüôîéüéëíð.

Ðñéí áéååÜóåôå áðôü êåöÜëáéí, èá ðñÝðåé:

- Íá êåôåññåôå ôéð ååéôéÝð Ýííéåð ôùí áñ÷åßùí script /etc/rc.
- Íá åßôåå åññééåñíÝñíé ìå ôç ååéééþ iññëiäßá ôùí áéêôýùí.
- Íá åñññßæåôå ðùò íá ååêåôåðÞóåôå ðññóðåòü ëíäéóìéü ôñßôïð êåôåóêåñåôð (ÊåöÜëáéí 5).

## 30.2 The **inetd** “Super-Server”

Contributed by Chern Lee. Updated for FreeBSD 6.1-RELEASE by The FreeBSD Documentation Project.

### 30.2.1 Overview

inetd(8) is sometimes referred to as the “Internet Super-Server” because it manages connections for several services. When a connection is received by **inetd**, it determines which program the connection is destined for, spawns the particular process and delegates the socket to it (the program is invoked with the service socket as its standard input, output and error descriptors). Running **inetd** for servers that are not heavily used can reduce the overall system load, when compared to running each daemon individually in stand-alone mode.

Primarily, **inetd** is used to spawn other daemons, but several trivial protocols are handled directly, such as **chargen**, **auth**, and **daytime**.

This section will cover the basics in configuring **inetd** through its command-line options and its configuration file, `/etc/inetd.conf`.

### 30.2.2 Settings

**inetd** is initialized through the `rc(8)` system. The `inetd_enable` option is set to `NO` by default, but may be turned on by `sysinstall` during installation, depending on the configuration chosen by the user. Placing:

```
inetd_enable="YES"
```

or

```
inetd_enable="NO"
```

into `/etc/rc.conf` will enable or disable **inetd** starting at boot time. The command:

```
/etc/rc.d/inetd rcvar
```

can be run to display the current effective setting.

Additionally, different command-line options can be passed to **inetd** via the `inetd_flags` option.

### 30.2.3 Command-Line Options

Like most server daemons, **inetd** has a number of options that it can be passed in order to modify its behaviour. The full list of options reads:

```
inetd [-d] [-l] [-w] [-W] [-c maximum] [-C rate] [-a address | hostname] [-p filename]
[-R rate] [-s maximum] [configuration file]
```

Options can be passed to **inetd** using the `inetd_flags` option in `/etc/rc.conf`. By default, `inetd_flags` is set to `-wW -C 60`, which turns on TCP wrapping for **inetd**'s services, and prevents any single IP address from requesting any service more than 60 times in any given minute.

Novice users may be pleased to note that these parameters usually do not need to be modified, although we mention the rate-limiting options below as they be useful should you find that you are receiving an excessive amount of connections. A full list of options can be found in the `inetd(8)` manual.

**-c maximum**

Specify the default maximum number of simultaneous invocations of each service; the default is unlimited. May be overridden on a per-service basis with the `max-child` parameter.

**-C rate**

Specify the default maximum number of times a service can be invoked from a single IP address in one minute; the default is unlimited. May be overridden on a per-service basis with the `max-connections-per-ip-per-minute` parameter.

-R rate

Specify the maximum number of times a service can be invoked in one minute; the default is 256. A rate of 0 allows an unlimited number of invocations.

-s maximum

Specify the maximum number of times a service can be invoked from a single IP address at any one time; the default is unlimited. May be overridden on a per-service basis with the max-child-per-ip parameter.

### 30.2.4 inetc.conf

Configuration of **inetd** is done via the file /etc/inetd.conf.

When a modification is made to /etc/inetd.conf, **inetd** can be forced to re-read its configuration file by running the command:

#### ÐáñÜäåéâíá 30-1. Reloading the inetc configuration file

```
# /etc/rc.d/inetd reload
```

Each line of the configuration file specifies an individual daemon. Comments in the file are preceded by a “#”. The format of each entry in /etc/inetd.conf is as follows:

```
service-name
socket-type
protocol
{wait|nowait}[/max-child[/max-connections-per-ip-per-minute[/max-child-per-ip]]]
user[:group][/:login-class]
server-program
server-program-arguments
```

An example entry for the ftpd(8) daemon using IPv4 might read:

```
ftp      stream  tcp      nowait  root      /usr/libexec/ftpd      ftpd -l
```

service-name

This is the service name of the particular daemon. It must correspond to a service listed in /etc/services.

This determines which port **inetd** must listen to. If a new service is being created, it must be placed in /etc/services first.

socket-type

Either stream, dgram, raw, or seqpacket. stream must be used for connection-based, TCP daemons, while dgram is used for daemons utilizing the UDP transport protocol.

protocol

One of the following:

Protocol	Explanation
tcp, tcp4	TCP IPv4

Protocol	Explanation
udp, udp4	UDP IPv4
tcp6	TCP IPv6
udp6	UDP IPv6
tcp46	Both TCP IPv4 and v6
udp46	Both UDP IPv4 and v6

{wait|nowait}[/max-child[/max-connections-per-ip-per-minute[/max-child-per-ip]]]

wait | nowait indicates whether the daemon invoked from **inetd** is able to handle its own socket or not. dgram socket types must use the wait option, while stream socket daemons, which are usually multi-threaded, should use nowait. wait usually hands off multiple sockets to a single daemon, while nowait spawns a child daemon for each new socket.

The maximum number of child daemons **inetd** may spawn can be set using the max-child option. If a limit of ten instances of a particular daemon is needed, a /10 would be placed after nowait. Specifying /0 allows an unlimited number of children

In addition to max-child, two other options which limit the maximum connections from a single place to a particular daemon can be enabled. max-connections-per-ip-per-minute limits the number of connections from any particular IP address per minutes, e.g. a value of ten would limit any particular IP address connecting to a particular service to ten attempts per minute. max-child-per-ip limits the number of children that can be started on behalf on any single IP address at any moment. These options are useful to prevent intentional or unintentional excessive resource consumption and Denial of Service (DoS) attacks to a machine.

In this field, either of wait or nowait is mandatory. max-child, max-connections-per-ip-per-minute and max-child-per-ip are optional.

A stream-type multi-threaded daemon without any max-child, max-connections-per-ip-per-minute or max-child-per-ip limits would simply be: nowait.

The same daemon with a maximum limit of ten daemons would read: nowait/10.

The same setup with a limit of twenty connections per IP address per minute and a maximum total limit of ten child daemons would read: nowait/10/20.

These options are utilized by the default settings of the fingerd(8) daemon, as seen here:

```
finger stream tcp      nowait/3/10 nobody /usr/libexec/fingerd fingerd -s
```

Finally, an example of this field with a maximum of 100 children in total, with a maximum of 5 for any one IP address would read: nowait/100/0/5.

#### user

This is the username that the particular daemon should run as. Most commonly, daemons run as the root user. For security purposes, it is common to find some servers running as the daemon user, or the least privileged nobody user.

#### server-program

The full path of the daemon to be executed when a connection is received. If the daemon is a service provided by **inetd** internally, then internal should be used.

#### server-program-arguments

This works in conjunction with `server-program` by specifying the arguments, starting with `argv[0]`, passed to the daemon on invocation. If `mydaemon -d` is the command line, `mydaemon -d` would be the value of `server-program-arguments`. Again, if the daemon is an internal service, use `internal` here.

### 30.2.5 Security

Depending on the choices made at install time, many of **inetd**'s services may be enabled by default. If there is no apparent need for a particular daemon, consider disabling it. Place a “#” in front of the daemon in question in `/etc/inetd.conf`, and then reload the inetd configuration. Some daemons, such as **fingerd**, may not be desired at all because they provide information that may be useful to an attacker.

Some daemons are not security-conscious and have long, or non-existent, timeouts for connection attempts. This allows an attacker to slowly send connections to a particular daemon, thus saturating available resources. It may be a good idea to place `max-connections-per-ip-per-minute`, `max-child` or `max-child-per-ip` limitations on certain daemons if you find that you have too many connections.

By default, TCP wrapping is turned on. Consult the `hosts_access(5)` manual page for more information on placing TCP restrictions on various **inetd** invoked daemons.

### 30.2.6 Miscellaneous

**daytime**, **time**, **echo**, **discard**, **chargen**, and **auth** are all internally provided services of **inetd**.

The **auth** service provides identity network services, and is configurable to a certain degree, whilst the others are simply on or off.

Consult the `inetd(8)` manual page for more in-depth information.

## 30.3 Network File System (NFS)

*Reorganized and enhanced by Tom Rhodes. Written by Bill Swingle.*

Among the many different file systems that FreeBSD supports is the Network File System, also known as NFS. NFS allows a system to share directories and files with others over a network. By using NFS, users and programs can access files on remote systems almost as if they were local files.

Some of the most notable benefits that NFS can provide are:

- Local workstations use less disk space because commonly used data can be stored on a single machine and still remain accessible to others over the network.
- There is no need for users to have separate home directories on every network machine. Home directories could be set up on the NFS server and made available throughout the network.
- Storage devices such as floppy disks, CDROM drives, and Zip® drives can be used by other machines on the network. This may reduce the number of removable media drives throughout the network.

### 30.3.1 How NFS Works

NFS consists of at least two main parts: a server and one or more clients. The client remotely accesses the data that is stored on the server machine. In order for this to function properly a few processes have to be configured and running.

The server has to be running the following daemons:

Daemon	Description
<b>nfsd</b>	The NFS daemon which services requests from the NFS clients.
<b>mountd</b>	The NFS mount daemon which carries out the requests that nfsd(8) passes on to it.
<b>rpcbind</b>	This daemon allows NFS clients to discover which port the NFS server is using.

The client can also run a daemon, known as **nfsiod**. The **nfsiod** daemon services the requests from the NFS server. This is optional, and improves performance, but is not required for normal and correct operation. See the nfsiod(8) manual page for more information.

### 30.3.2 Configuring NFS

NFS configuration is a relatively straightforward process. The processes that need to be running can all start at boot time with a few modifications to your `/etc/rc.conf` file.

On the NFS server, make sure that the following options are configured in the `/etc/rc.conf` file:

```
rpcbind_enable="YES"
nfs_server_enable="YES"
mountd_flags="-r"
```

**mountd** runs automatically whenever the NFS server is enabled.

On the client, make sure this option is present in `/etc/rc.conf`:

```
nfs_client_enable="YES"
```

The `/etc/exports` file specifies which file systems NFS should export (sometimes referred to as “share”). Each line in `/etc/exports` specifies a file system to be exported and which machines have access to that file system. Along with what machines have access to that file system, access options may also be specified. There are many such options that can be used in this file but only a few will be mentioned here. You can easily discover other options by reading over the exports(5) manual page.

Here are a few example `/etc/exports` entries:

The following examples give an idea of how to export file systems, although the settings may be different depending on your environment and network configuration. For instance, to export the `/cdrom` directory to three example machines that have the same domain name as the server (hence the lack of a domain name for each) or have entries in your `/etc/hosts` file. The `-ro` flag makes the exported file system read-only. With this flag, the remote system will not be able to write any changes to the exported file system.

```
/cdrom -ro host1 host2 host3
```

The following line exports `/home` to three hosts by IP address. This is a useful setup if you have a private network without a DNS server configured. Optionally the `/etc/hosts` file could be configured for internal hostnames; please review hosts(5) for more information. The `-a11dirs` flag allows the subdirectories to be mount points. In

other words, it will not mount the subdirectories but permit the client to mount only the directories that are required or needed.

```
/home -alldirs 10.0.0.2 10.0.0.3 10.0.0.4
```

The following line exports /a so that two clients from different domains may access the file system. The `-maproot=root` flag allows the `root` user on the remote system to write data on the exported file system as `root`. If the `-maproot=root` flag is not specified, then even if a user has `root` access on the remote system, he will not be able to modify files on the exported file system.

```
/a -maproot=root host.example.com box.example.org
```

In order for a client to access an exported file system, the client must have permission to do so. Make sure the client is listed in your `/etc/exports` file.

In `/etc/exports`, each line represents the export information for one file system to one host. A remote host can only be specified once per file system, and may only have one default entry. For example, assume that `/usr` is a single file system. The following `/etc/exports` would be invalid:

```
# Invalid when /usr is one file system
/usr/src client
/usr/ports client
```

One file system, `/usr`, has two lines specifying exports to the same host, `client`. The correct format for this situation is:

```
/usr/src /usr/ports client
```

The properties of one file system exported to a given host must all occur on one line. Lines without a client specified are treated as a single host. This limits how you can export file systems, but for most people this is not an issue.

The following is an example of a valid export list, where `/usr` and `/exports` are local file systems:

```
# Export src and ports to client01 and client02, but only
# client01 has root privileges on it
/usr/src /usr/ports -maproot=root client01
/usr/src /usr/ports client02
# The client machines have root and can mount anywhere
# on /exports. Anyone in the world can mount /exports/obj read-only
(exports -alldirs -maproot=root client01 client02
(exports/obj -ro
```

The **mountd** daemon must be forced to recheck the `/etc/exports` file whenever it has been modified, so the changes can take effect. This can be accomplished either by sending a HUP signal to the running daemon:

```
# kill -HUP `cat /var/run/mountd.pid`
```

or by invoking the `mountd rc(8)` script with the appropriate parameter:

```
# /etc/rc.d/mountd onereload
```

Please refer to [ÖiÞìá 12.7](#) for more information about using rc scripts.

Alternatively, a reboot will make FreeBSD set everything up properly. A reboot is not necessary though. Executing the following commands as `root` should start everything up.

On the NFS server:

```
# rpcbind
# nfsd -u -t -n 4
# mountd -r
```

On the NFS client:

```
# nfsiod -n 4
```

Now everything should be ready to actually mount a remote file system. In these examples the server's name will be `server` and the client's name will be `client`. If you only want to temporarily mount a remote file system or would rather test the configuration, just execute a command like this as `root` on the client:

```
# mount server:/home /mnt
```

This will mount the `/home` directory on the server at `/mnt` on the client. If everything is set up correctly you should be able to enter `/mnt` on the client and see all the files that are on the server.

If you want to automatically mount a remote file system each time the computer boots, add the file system to the `/etc/fstab` file. Here is an example:

```
server:/home      /mnt      nfs      rw      0      0
```

The `fstab(5)` manual page lists all the available options.

### 30.3.3 Locking

Some applications (e.g. `mutt`) require file locking to operate correctly. In the case of NFS, `rpc.lockd` can be used for file locking. To enable it, add the following to the `/etc/rc.conf` file on both client and server (it is assumed that the NFS client and server are configured already):

```
rpc_lockd_enable="YES"
rpc_statd_enable="YES"
```

Start the application by using:

```
# /etc/rc.d/nfslocking start
```

If real locking between the NFS clients and NFS server is not required, it is possible to let the NFS client do locking locally by passing `-L` to `mount_nfs(8)`. Refer to the `mount_nfs(8)` manual page for further details.

### 30.3.4 Practical Uses

NFS has many practical uses. Some of the more common ones are listed below:

- Set several machines to share a CDROM or other media among them. This is cheaper and often a more convenient method to install software on multiple machines.

- On large networks, it might be more convenient to configure a central NFS server in which to store all the user home directories. These home directories can then be exported to the network so that users would always have the same home directory, regardless of which workstation they log in to.
- Several machines could have a common `/usr/ports/distfiles` directory. That way, when you need to install a port on several machines, you can quickly access the source without downloading it on each machine.

### 30.3.5 Automatic Mounts with amd

*Contributed by Wylie Stilwell. Rewritten by Chern Lee.*

`amd(8)` (the automatic mounter daemon) automatically mounts a remote file system whenever a file or directory within that file system is accessed. Filesystems that are inactive for a period of time will also be automatically unmounted by **amd**. Using **amd** provides a simple alternative to permanent mounts, as permanent mounts are usually listed in `/etc/fstab`.

**amd** operates by attaching itself as an NFS server to the `/host` and `/net` directories. When a file is accessed within one of these directories, **amd** looks up the corresponding remote mount and automatically mounts it. `/net` is used to mount an exported file system from an IP address, while `/host` is used to mount an export from a remote hostname.

An access to a file within `/host/foobar/usr` would tell **amd** to attempt to mount the `/usr` export on the host `foobar`.

#### ÐáñÜäåéâíá 30-2. Mounting an Export with amd

You can view the available mounts of a remote host with the `showmount` command. For example, to view the mounts of a host named `foobar`, you can use:

```
% showmount -e foobar
Exports list on foobar:
/usb                           10.10.10.0
/a                            10.10.10.0
% cd /host/foobar/usr
```

As seen in the example, the `showmount` shows `/usr` as an export. When changing directories to `/host/foobar/usr`, **amd** attempts to resolve the hostname `foobar` and automatically mount the desired export.

**amd** can be started by the startup scripts by placing the following lines in `/etc/rc.conf`:

```
amd_enable="YES"
```

Additionally, custom flags can be passed to **amd** from the `amd_flags` option. By default, `amd_flags` is set to:

```
amd_flags="-a /.amd_mnt -l syslog /host /etc/amd.map /net /etc/amd.map"
```

The `/etc/amd.map` file defines the default options that exports are mounted with. The `/etc/amd.conf` file defines some of the more advanced features of **amd**.

Consult the `amd(8)` and `amd.conf(5)` manual pages for more information.

### 30.3.6 Problems Integrating with Other Systems

*Contributed by John Lind.*

Certain Ethernet adapters for ISA PC systems have limitations which can lead to serious network problems, particularly with NFS. This difficulty is not specific to FreeBSD, but FreeBSD systems are affected by it.

The problem nearly always occurs when (FreeBSD) PC systems are networked with high-performance workstations, such as those made by Silicon Graphics, Inc., and Sun Microsystems, Inc. The NFS mount will work fine, and some operations may succeed, but suddenly the server will seem to become unresponsive to the client, even though requests to and from other systems continue to be processed. This happens to the client system, whether the client is the FreeBSD system or the workstation. On many systems, there is no way to shut down the client gracefully once this problem has manifested itself. The only solution is often to reset the client, because the NFS situation cannot be resolved.

Though the “correct” solution is to get a higher performance and capacity Ethernet adapter for the FreeBSD system, there is a simple workaround that will allow satisfactory operation. If the FreeBSD system is the *server*, include the option `-w=1024` on the mount from the client. If the FreeBSD system is the *client*, then mount the NFS file system with the option `-r=1024`. These options may be specified using the fourth field of the `fstab` entry on the client for automatic mounts, or by using the `-o` parameter of the `mount(8)` command for manual mounts.

It should be noted that there is a different problem, sometimes mistaken for this one, when the NFS servers and clients are on different networks. If that is the case, make *certain* that your routers are routing the necessary UDP information, or you will not get anywhere, no matter what else you are doing.

In the following examples, `fastws` is the host (interface) name of a high-performance workstation, and `freebox` is the host (interface) name of a FreeBSD system with a lower-performance Ethernet adapter. Also, `/sharedfs` will be the exported NFS file system (see `exports(5)`), and `/project` will be the mount point on the client for the exported file system. In all cases, note that additional options, such as `hard` or `soft` and `bg` may be desirable in your application.

Examples for the FreeBSD system (`freebox`) as the client in `/etc/fstab` on `freebox`:

```
fastws:/sharedfs /project nfs rw,-r=1024 0 0
```

As a manual mount command on `freebox`:

```
# mount -t nfs -o -r=1024 fastws:/sharedfs /project
```

Examples for the FreeBSD system as the server in `/etc/fstab` on `fastws`:

```
freebox:/sharedfs /project nfs rw,-w=1024 0 0
```

As a manual mount command on `fastws`:

```
# mount -t nfs -o -w=1024 freebox:/sharedfs /project
```

Nearly any 16-bit Ethernet adapter will allow operation without the above restrictions on the read or write size.

For anyone who cares, here is what happens when the failure occurs, which also explains why it is unrecoverable. NFS typically works with a “block” size of 8 K (though it may do fragments of smaller sizes). Since the maximum Ethernet packet is around 1500 bytes, the NFS “block” gets split into multiple Ethernet packets, even though it is still a single unit to the upper-level code, and must be received, assembled, and *acknowledged* as a unit. The high-performance workstations can pump out the packets which comprise the NFS unit one right after the other, just as close together as the standard allows. On the smaller, lower capacity cards, the later packets overrun the earlier

packets of the same unit before they can be transferred to the host and the unit as a whole cannot be reconstructed or acknowledged. As a result, the workstation will time out and try again, but it will try again with the entire 8 K unit, and the process will be repeated, ad infinitum.

By keeping the unit size below the Ethernet packet size limitation, we ensure that any complete Ethernet packet received can be acknowledged individually, avoiding the deadlock situation.

Overruns may still occur when a high-performance workstations is slamming data out to a PC system, but with the better cards, such overruns are not guaranteed on NFS “units”. When an overrun occurs, the units affected will be retransmitted, and there will be a fair chance that they will be received, assembled, and acknowledged.

## 30.4 Network Information System (NIS/YP)

*Written by Bill Swingle. Enhanced by Eric Ogren èáé Udo Erdelhoff.*

### 30.4.1 What Is It?

NIS, which stands for Network Information Services, was developed by Sun Microsystems to centralize administration of UNIX (originally SunOS) systems. It has now essentially become an industry standard; all major UNIX like systems (Solaris, HP-UX, AIX®, Linux, NetBSD, OpenBSD, FreeBSD, etc) support NIS.

NIS was formerly known as Yellow Pages, but because of trademark issues, Sun changed the name. The old term (and yp) is still often seen and used.

It is a RPC-based client/server system that allows a group of machines within an NIS domain to share a common set of configuration files. This permits a system administrator to set up NIS client systems with only minimal configuration data and add, remove or modify configuration data from a single location.

It is similar to the Windows NT® domain system; although the internal implementation of the two are not at all similar, the basic functionality can be compared.

### 30.4.2 Terms/Processes You Should Know

There are several terms and several important user processes that you will come across when attempting to implement NIS on FreeBSD, whether you are trying to create an NIS server or act as an NIS client:

Term	Description
NIS domainname	An NIS master server and all of its clients (including its slave servers) have a NIS domainname. Similar to an Windows NT domain name, the NIS domainname does not have anything to do with DNS.
<b>rpcbind</b>	Must be running in order to enable RPC (Remote Procedure Call, a network protocol used by NIS). If <b>rpcbind</b> is not running, it will be impossible to run an NIS server, or to act as an NIS client.
<b>ypbind</b>	“Binds” an NIS client to its NIS server. It will take the NIS domainname from the system, and using RPC, connect to the server. <b>ypbind</b> is the core of client-server communication in an NIS environment; if <b>ypbind</b> dies on a client machine, it will not be able to access the NIS server.

Term	Description
<b>ypserv</b>	Should only be running on NIS servers; this is the NIS server process itself. If ypserv(8) dies, then the server will no longer be able to respond to NIS requests (hopefully, there is a slave server to take over for it). There are some implementations of NIS (but not the FreeBSD one), that do not try to reconnect to another server if the server it used before dies. Often, the only thing that helps in this case is to restart the server process (or even the whole server) or the <b>ypbind</b> process on the client.
<b>rpc.yppasswdd</b>	Another process that should only be running on NIS master servers; this is a daemon that will allow NIS clients to change their NIS passwords. If this daemon is not running, users will have to login to the NIS master server and change their passwords there.

### 30.4.3 How Does It Work?

There are three types of hosts in an NIS environment: master servers, slave servers, and clients. Servers act as a central repository for host configuration information. Master servers hold the authoritative copy of this information, while slave servers mirror this information for redundancy. Clients rely on the servers to provide this information to them.

Information in many files can be shared in this manner. The `master.passwd`, `group`, and `hosts` files are commonly shared via NIS. Whenever a process on a client needs information that would normally be found in these files locally, it makes a query to the NIS server that it is bound to instead.

#### 30.4.3.1 Machine Types

- A *NIS master server*. This server, analogous to a Windows NT primary domain controller, maintains the files used by all of the NIS clients. The `passwd`, `group`, and other various files used by the NIS clients live on the master server.

**Óçiåßùóç:** It is possible for one machine to be an NIS master server for more than one NIS domain. However, this will not be covered in this introduction, which assumes a relatively small-scale NIS environment.

- *NIS slave servers*. Similar to the Windows NT backup domain controllers, NIS slave servers maintain copies of the NIS master's data files. NIS slave servers provide the redundancy, which is needed in important environments. They also help to balance the load of the master server: NIS Clients always attach to the NIS server whose response they get first, and this includes slave-server-replies.
- *NIS clients*. NIS clients, like most Windows NT workstations, authenticate against the NIS server (or the Windows NT domain controller in the Windows NT workstations case) to log on.

### 30.4.4 Using NIS/YP

This section will deal with setting up a sample NIS environment.

### 30.4.4.1 Planning

Let us assume that you are the administrator of a small university lab. This lab, which consists of 15 FreeBSD machines, currently has no centralized point of administration; each machine has its own `/etc/passwd` and `/etc/master.passwd`. These files are kept in sync with each other only through manual intervention; currently, when you add a user to the lab, you must run `adduser` on all 15 machines. Clearly, this has to change, so you have decided to convert the lab to use NIS, using two of the machines as servers.

Therefore, the configuration of the lab now looks something like:

Machine name	IP address	Machine role
ellington	10.0.0.2	NIS master
coltrane	10.0.0.3	NIS slave
basie	10.0.0.4	Faculty workstation
bird	10.0.0.5	Client machine
cli[1-11]	10.0.0.[6-17]	Other client machines

If you are setting up a NIS scheme for the first time, it is a good idea to think through how you want to go about it. No matter what the size of your network, there are a few decisions that need to be made.

#### 30.4.4.1.1 Choosing a NIS Domain Name

This might not be the “domainname” that you are used to. It is more accurately called the “NIS domainname”. When a client broadcasts its requests for info, it includes the name of the NIS domain that it is part of. This is how multiple servers on one network can tell which server should answer which request. Think of the NIS domainname as the name for a group of hosts that are related in some way.

Some organizations choose to use their Internet domainname for their NIS domainname. This is not recommended as it can cause confusion when trying to debug network problems. The NIS domainname should be unique within your network and it is helpful if it describes the group of machines it represents. For example, the Art department at Acme Inc. might be in the “acme-art” NIS domain. For this example, assume you have chosen the name `test-domain`.

However, some operating systems (notably SunOS) use their NIS domain name as their Internet domain name. If one or more machines on your network have this restriction, you *must* use the Internet domain name as your NIS domain name.

#### 30.4.4.1.2 Physical Server Requirements

There are several things to keep in mind when choosing a machine to use as a NIS server. One of the unfortunate things about NIS is the level of dependency the clients have on the server. If a client cannot contact the server for its NIS domain, very often the machine becomes unusable. The lack of user and group information causes most systems to temporarily freeze up. With this in mind you should make sure to choose a machine that will not be prone to being rebooted regularly, or one that might be used for development. The NIS server should ideally be a stand alone machine whose sole purpose in life is to be an NIS server. If you have a network that is not very heavily used, it is acceptable to put the NIS server on a machine running other services, just keep in mind that if the NIS server becomes unavailable, it will affect *all* of your NIS clients adversely.

### 30.4.4.2 NIS Servers

The canonical copies of all NIS information are stored on a single machine called the NIS master server. The databases used to store the information are called NIS maps. In FreeBSD, these maps are stored in `/var/yp/ [domainname]` where `[domainname]` is the name of the NIS domain being served. A single NIS server can support several domains at once, therefore it is possible to have several such directories, one for each supported domain. Each domain will have its own independent set of maps.

NIS master and slave servers handle all NIS requests with the `ypserv` daemon. `ypserv` is responsible for receiving incoming requests from NIS clients, translating the requested domain and map name to a path to the corresponding database file and transmitting data from the database back to the client.

#### 30.4.4.2.1 Setting Up a NIS Master Server

Setting up a master NIS server can be relatively straight forward, depending on your needs. FreeBSD comes with support for NIS out-of-the-box. All you need is to add the following lines to `/etc/rc.conf`, and FreeBSD will do the rest for you.

1.

```
nisdomainname="test-domain"
```

This line will set the NIS domainname to `test-domain` upon network setup (e.g. after reboot).

2.

```
nis_server_enable="YES"
```

This will tell FreeBSD to start up the NIS server processes when the networking is next brought up.

3.

```
nis_yppasswdd_enable="YES"
```

This will enable the `rpc.yppasswdd` daemon which, as mentioned above, will allow users to change their NIS password from a client machine.

**Óçìàßùóç:** Depending on your NIS setup, you may need to add further entries. See the section about NIS servers that are also NIS clients, below, for details.

Now, all you have to do is to run the command `/etc/netstart` as superuser. It will set up everything for you, using the values you defined in `/etc/rc.conf`.

#### 30.4.4.2.2 Initializing the NIS Maps

The *NIS maps* are database files, that are kept in the `/var/yp` directory. They are generated from configuration files in the `/etc` directory of the NIS master, with one exception: the `/etc/master.passwd` file. This is for a good reason, you do not want to propagate passwords to your `root` and other administrative accounts to all the servers in the NIS domain. Therefore, before we initialize the NIS maps, you should:

```
# cp /etc/master.passwd /var/yp/master.passwd
# cd /var/yp
# vi master.passwd
```

You should remove all entries regarding system accounts (bin, tty, kmem, games, etc), as well as any accounts that you do not want to be propagated to the NIS clients (for example `root` and any other UID 0 (superuser) accounts).

**Óçìåßùóç:** Make sure the `/var/yp/master.passwd` is neither group nor world readable (mode 600)! Use the `chmod` command, if appropriate.

When you have finished, it is time to initialize the NIS maps! FreeBSD includes a script named `ypinit` to do this for you (see its manual page for more information). Note that this script is available on most UNIX Operating Systems, but not on all. On Digital UNIX/Compaq Tru64 UNIX it is called `ypsetup`. Because we are generating maps for an NIS master, we are going to pass the `-m` option to `ypinit`. To generate the NIS maps, assuming you already performed the steps above, run:

```
ellington# ypinit -m test-domain
Server Type: MASTER Domain: test-domain
Creating an YP server will require that you answer a few questions.
Questions will all be asked at the beginning of the procedure.
Do you want this procedure to quit on non-fatal errors? [y/n: n] n
Ok, please remember to go back and redo manually whatever fails.
If you don't, something might not work.
At this point, we have to construct a list of this domains YP servers.
rod.darktech.org is already known as master server.
Please continue to add any slave servers, one per line. When you are
done with the list, type a <control D>.
master server : ellington
next host to add: coltrane
next host to add: ^D
The current list of NIS servers looks like this:
ellington
coltrane
Is this correct? [y/n: y] y

[...output from map generation...]
```

NIS Map update completed.  
ellington has been setup as an YP master server without any errors.

`ypinit` should have created `/var/yp/Makefile` from `/var/yp/Makefile.dist`. When created, this file assumes that you are operating in a single server NIS environment with only FreeBSD machines. Since `test-domain` has a slave server as well, you must edit `/var/yp/Makefile`:

```
ellington# vi /var/yp/Makefile
```

You should comment out the line that says

```
NOPUSH = "True"
```

(if it is not commented out already).

### 30.4.4.2.3 Setting up a NIS Slave Server

Setting up an NIS slave server is even more simple than setting up the master. Log on to the slave server and edit the file `/etc/rc.conf` as you did before. The only difference is that we now must use the `-s` option when running `ypinit`. The `-s` option requires the name of the NIS master be passed to it as well, so our command line looks like:

```
coltrane# ypinit -s ellington test-domain
```

```
Server Type: SLAVE Domain: test-domain Master: ellington
```

Creating an YP server will require that you answer a few questions.  
Questions will all be asked at the beginning of the procedure.

```
Do you want this procedure to quit on non-fatal errors? [y/n: n] n
```

Ok, please remember to go back and redo manually whatever fails.  
If you don't, something might not work.

There will be no further questions. The remainder of the procedure  
should take a few minutes, to copy the databases from ellington.

Transferring netgroup...

```
ypxfr: Exiting: Map successfully transferred
Transferring netgroup.byuser...
ypxfr: Exiting: Map successfully transferred
Transferring netgroup.byhost...
ypxfr: Exiting: Map successfully transferred
Transferring master.passwd.byuid...
ypxfr: Exiting: Map successfully transferred
Transferring passwd.byuid...
ypxfr: Exiting: Map successfully transferred
Transferring passwd.byname...
ypxfr: Exiting: Map successfully transferred
Transferring group.bygid...
ypxfr: Exiting: Map successfully transferred
Transferring group.byname...
ypxfr: Exiting: Map successfully transferred
Transferring services.byname...
ypxfr: Exiting: Map successfully transferred
Transferring rpc.bynumber...
ypxfr: Exiting: Map successfully transferred
Transferring rpc.byname...
ypxfr: Exiting: Map successfully transferred
Transferring protocols.byname...
ypxfr: Exiting: Map successfully transferred
Transferring master.passwd.byname...
ypxfr: Exiting: Map successfully transferred
Transferring networks.byname...
ypxfr: Exiting: Map successfully transferred
Transferring networks.byaddr...
ypxfr: Exiting: Map successfully transferred
Transferring netid.byname...
ypxfr: Exiting: Map successfully transferred
Transferring hosts.byaddr...
ypxfr: Exiting: Map successfully transferred
```

```

Transferring protocols.bynumber...
ypxfr: Exiting: Map successfully transferred
Transferring ypservers...
ypxfr: Exiting: Map successfully transferred
Transferring hostsbyname...
ypxfr: Exiting: Map successfully transferred

coltrane has been setup as an YP slave server without any errors.
Don't forget to update map ypservers on ellington.

```

You should now have a directory called `/var/yp/test-domain`. Copies of the NIS master server's maps should be in this directory. You will need to make sure that these stay updated. The following `/etc/crontab` entries on your slave servers should do the job:

```

20      *      *      *      *      root    /usr/libexec/ypxfr passwdbyname
21      *      *      *      *      root    /usr/libexec/ypxfr passwdbyuid

```

These two lines force the slave to sync its maps with the maps on the master server. Although these entries are not mandatory, since the master server attempts to ensure any changes to its NIS maps are communicated to its slaves and because password information is vital to systems depending on the server, it is a good idea to force the updates. This is more important on busy networks where map updates might not always complete.

Now, run the command `/etc/netstart` on the slave server as well, which again starts the NIS server.

### 30.4.4.3 NIS Clients

An NIS client establishes what is called a binding to a particular NIS server using the `ypbind` daemon. `ypbind` checks the system's default domain (as set by the `domainname` command), and begins broadcasting RPC requests on the local network. These requests specify the name of the domain for which `ypbind` is attempting to establish a binding. If a server that has been configured to serve the requested domain receives one of the broadcasts, it will respond to `ypbind`, which will record the server's address. If there are several servers available (a master and several slaves, for example), `ypbind` will use the address of the first one to respond. From that point on, the client system will direct all of its NIS requests to that server. `ypbind` will occasionally "ping" the server to make sure it is still up and running. If it fails to receive a reply to one of its pings within a reasonable amount of time, `ypbind` will mark the domain as unbound and begin broadcasting again in the hopes of locating another server.

#### 30.4.4.3.1 Setting Up a NIS Client

Setting up a FreeBSD machine to be a NIS client is fairly straightforward.

1. Edit the file `/etc/rc.conf` and add the following lines in order to set the NIS domainname and start `ypbind` upon network startup:

```

nisdomainname="test-domain"
nis_client_enable="YES"

```

2. To import all possible password entries from the NIS server, remove all user accounts from your `/etc/master.passwd` file and use `vi pw` to add the following line to the end of the file:

```
+:::::::
```

**Óçiàßùóç:** This line will afford anyone with a valid account in the NIS server's password maps an account. There are many ways to configure your NIS client by changing this line. See the netgroups section below for more information. For more detailed reading see O'Reilly's book on Managing NFS and NIS.

**Óçiàßùóç:** You should keep at least one local account (i.e. not imported via NIS) in your `/etc/master.passwd` and this account should also be a member of the group `wheel`. If there is something wrong with NIS, this account can be used to log in remotely, become `root`, and fix things.

3. To import all possible group entries from the NIS server, add this line to your `/etc/group` file:

```
+ : * : :
```

After completing these steps, you should be able to run `ypcat passwd` and see the NIS server's `passwd` map.

### 30.4.5 NIS Security

In general, any remote user can issue an RPC to `ypserv(8)` and retrieve the contents of your NIS maps, provided the remote user knows your domainname. To prevent such unauthorized transactions, `ypserv(8)` supports a feature called "securenets" which can be used to restrict access to a given set of hosts. At startup, `ypserv(8)` will attempt to load the securenets information from a file called `/var/yp/securenets`.

**Óçiàßùóç:** This path varies depending on the path specified with the `-p` option. This file contains entries that consist of a network specification and a network mask separated by white space. Lines starting with "#" are considered to be comments. A sample `securenets` file might look like this:

```
# allow connections from local host -- mandatory
127.0.0.1      255.255.255.255
# allow connections from any host
# on the 192.168.128.0 network
192.168.128.0  255.255.255.0
# allow connections from any host
# between 10.0.0.0 to 10.0.15.255
# this includes the machines in the testlab
10.0.0.0        255.255.240.0
```

If `ypserv(8)` receives a request from an address that matches one of these rules, it will process the request normally. If the address fails to match a rule, the request will be ignored and a warning message will be logged. If the `/var/yp/securenets` file does not exist, `ypserv` will allow connections from any host.

The `ypserv` program also has support for Wietse Venema's **TCP Wrapper** package. This allows the administrator to use the **TCP Wrapper** configuration files for access control instead of `/var/yp/securenets`.

**Óçiàßùóç:** While both of these access control mechanisms provide some security, they, like the privileged port test, are vulnerable to "IP spoofing" attacks. All NIS-related traffic should be blocked at your firewall.

Servers using `/var/yp/securenets` may fail to serve legitimate NIS clients with archaic TCP/IP implementations. Some of these implementations set all host bits to zero when doing broadcasts and/or fail to observe the subnet mask when calculating the broadcast address. While some of these problems can be fixed by changing the client configuration, other problems may force the retirement of the client systems in question or the abandonment of `/var/yp/securenets`.

Using `/var/yp/securenets` on a server with such an archaic implementation of TCP/IP is a really bad idea and will lead to loss of NIS functionality for large parts of your network.

The use of the **TCP Wrapper** package increases the latency of your NIS server. The additional delay may be long enough to cause timeouts in client programs, especially in busy networks or with slow NIS servers. If one or more of your client systems suffers from these symptoms, you should convert the client systems in question into NIS slave servers and force them to bind to themselves.

### 30.4.6 Barring Some Users from Logging On

In our lab, there is a machine `basie` that is supposed to be a faculty only workstation. We do not want to take this machine out of the NIS domain, yet the `passwd` file on the master NIS server contains accounts for both faculty and students. What can we do?

There is a way to bar specific users from logging on to a machine, even if they are present in the NIS database. To do this, all you must do is add `-username` to the end of the `/etc/master.passwd` file on the client machine, where `username` is the username of the user you wish to bar from logging in. This should preferably be done using `vipw`, since `vipw` will sanity check your changes to `/etc/master.passwd`, as well as automatically rebuild the password database when you finish editing. For example, if we wanted to bar user `bill` from logging on to `basie` we would:

```
basie# vipw
[add -bill to the end, exit]
vipw: rebuilding the database...
vipw: done

basie# cat /etc/master.passwd

root:[password]:0:0::0:0:The super-user:/root:/bin/csh
toor:[password]:0:0::0:0:The other super-user:/root:/bin/sh
daemon:*:1:1::0:0:Owner of many system processes:/root:/sbin/nologin
operator:**:2:5::0:0:System &:/sbin/nologin
bin:**:3:7::0:0:Binaries Commands and Source,,,:/sbin/nologin
tty:**:4:65533::0:0:Tty Sandbox:/sbin/nologin
kmem:**:5:65533::0:0:KMem Sandbox:/sbin/nologin
games:**:7:13::0:0:Games pseudo-user:/usr/games:/sbin/nologin
news:**:8:8::0:0:News Subsystem:/sbin/nologin
man:**:9:9::0:0:Mister Man Pages:/usr/share/man:/sbin/nologin
bind:**:53:53::0:0:Bind Sandbox:/sbin/nologin
uucp:**:66:66::0:0:UUCP pseudo-user:/var/spool/uucppublic:/usr/libexec/uucp/uucico
xten:**:67:67::0:0:X-10 daemon:/usr/local/xten:/sbin/nologin
pop:**:68:6::0:0:Post Office Owner:/nonexistent:/sbin/nologin
nobody:**:65534:65534::0:0:Unprivileged user:/nonexistent:/sbin/nologin
+::::::::::
-bill
```

basie#

### 30.4.7 Using Netgroups

*Contributed by Udo Erdelhoff.*

The method shown in the previous section works reasonably well if you need special rules for a very small number of users and/or machines. On larger networks, you *will* forget to bar some users from logging onto sensitive machines, or you may even have to modify each machine separately, thus losing the main benefit of NIS: *centralized* administration.

The NIS developers' solution for this problem is called *netgroups*. Their purpose and semantics can be compared to the normal groups used by UNIX file systems. The main differences are the lack of a numeric ID and the ability to define a netgroup by including both user accounts and other netgroups.

Netgroups were developed to handle large, complex networks with hundreds of users and machines. On one hand, this is a Good Thing if you are forced to deal with such a situation. On the other hand, this complexity makes it almost impossible to explain netgroups with really simple examples. The example used in the remainder of this section demonstrates this problem.

Let us assume that your successful introduction of NIS in your laboratory caught your superiors' interest. Your next job is to extend your NIS domain to cover some of the other machines on campus. The two tables contain the names of the new users and new machines as well as brief descriptions of them.

User Name(s)	Description
alpha, beta	Normal employees of the IT department
charlie, delta	The new apprentices of the IT department
echo, foxtrott, golf, ...	Ordinary employees
able, baker, ...	The current interns

Machine Name(s)	Description
war, death, famine, pollution	Your most important servers. Only the IT employees are allowed to log onto these machines.
pride, greed, envy, wrath, lust, sloth	Less important servers. All members of the IT department are allowed to login onto these machines.
one, two, three, four, ...	Ordinary workstations. Only the <i>real</i> employees are allowed to use these machines.
trashcan	A very old machine without any critical data. Even the intern is allowed to use this box.

If you tried to implement these restrictions by separately blocking each user, you would have to add one `-user` line to each system's `passwd` for each user who is not allowed to login onto that system. If you forget just one entry, you could be in trouble. It may be feasible to do this correctly during the initial setup, however you *will* eventually forget to add the lines for new users during day-to-day operations. After all, Murphy was an optimist.

Handling this situation with netgroups offers several advantages. Each user need not be handled separately; you assign a user to one or more netgroups and allow or forbid logins for all members of the netgroup. If you add a new machine, you will only have to define login restrictions for netgroups. If a new user is added, you will only have to

add the user to one or more netgroups. Those changes are independent of each other: no more “for each combination of user and machine do...” If your NIS setup is planned carefully, you will only have to modify exactly one central configuration file to grant or deny access to machines.

The first step is the initialization of the NIS map netgroup. FreeBSD’s `ypinit(8)` does not create this map by default, but its NIS implementation will support it once it has been created. To create an empty map, simply type

```
ellington# vi /var/yp/netgroup
```

and start adding content. For our example, we need at least four netgroups: IT employees, IT apprentices, normal employees and interns.

```
IT_EMP  ( ,alpha,test-domain)      ( ,beta,test-domain)
IT_APP  ( ,charlie,test-domain)   ( ,delta,test-domain)
USERS   ( ,echo,test-domain)      ( ,foxtrott,test-domain) \
         ( ,golf,test-domain)
INTERNS ( ,able,test-domain)      ( ,baker,test-domain)
```

`IT_EMP`, `IT_APP` etc. are the names of the netgroups. Each bracketed group adds one or more user accounts to it. The three fields inside a group are:

1. The name of the host(s) where the following items are valid. If you do not specify a hostname, the entry is valid on all hosts. If you do specify a hostname, you will enter a realm of darkness, horror and utter confusion.
2. The name of the account that belongs to this netgroup.
3. The NIS domain for the account. You can import accounts from other NIS domains into your netgroup if you are one of the unlucky fellows with more than one NIS domain.

Each of these fields can contain wildcards. See `netgroup(5)` for details.

**Óçìáßùóç:** Netgroup names longer than 8 characters should not be used, especially if you have machines running other operating systems within your NIS domain. The names are case sensitive; using capital letters for your netgroup names is an easy way to distinguish between user, machine and netgroup names.

Some NIS clients (other than FreeBSD) cannot handle netgroups with a large number of entries. For example, some older versions of SunOS start to cause trouble if a netgroup contains more than 15 *entries*. You can circumvent this limit by creating several sub-netgroups with 15 users or less and a real netgroup that consists of the sub-netgroups:

```
BIGGRP1 ( ,joe1, domain) ( ,joe2, domain) ( ,joe3, domain) [...]
BIGGRP2 ( ,joe16, domain) ( ,joe17, domain) [...]
BIGGRP3 ( ,joe31, domain) ( ,joe32, domain)
BIGGROUP  BIGGRP1 BIGGRP2 BIGGRP3
```

You can repeat this process if you need more than 225 users within a single netgroup.

Activating and distributing your new NIS map is easy:

```
ellington# cd /var/yp
ellington# make
```

This will generate the three NIS maps `netgroup`, `netgroup.byhost` and `netgroup.byuser`. Use `ypcat(1)` to check if your new NIS maps are available:

```
ellington% ypcat -k netgroup
ellington% ypcat -k netgroup.byhost
ellington% ypcat -k netgroup.byuser
```

The output of the first command should resemble the contents of `/var/yp/netgroup`. The second command will not produce output if you have not specified host-specific netgroups. The third command can be used to get the list of netgroups for a user.

The client setup is quite simple. To configure the server `war`, you only have to start `vipw(8)` and replace the line

```
+:::::::
```

with

```
+@IT_EMP:::::::
```

Now, only the data for the users defined in the netgroup `IT_EMP` is imported into `war`'s password database and only these users are allowed to login.

Unfortunately, this limitation also applies to the `~` function of the shell and all routines converting between user names and numerical user IDs. In other words, `cd ~user` will not work, `ls -l` will show the numerical ID instead of the username and `find . -user joe -print` will fail with `No such user`. To fix this, you will have to import all user entries *without allowing them to login onto your servers*.

This can be achieved by adding another line to `/etc/master.passwd`. This line should contain:

```
+:::::::/sbin/nologin, meaning "Import all entries but replace the shell with /sbin/nologin in the imported entries". You can replace any field in the passwd entry by placing a default value in your /etc/master.passwd.
```

**Ðñïâéäïðïßçóç:** Make sure that the line `+:::::::/sbin/nologin` is placed after `+@IT_EMP:::::::`. Otherwise, all user accounts imported from NIS will have `/sbin/nologin` as their login shell.

After this change, you will only have to change one NIS map if a new employee joins the IT department. You could use a similar approach for the less important servers by replacing the old `+:::::::` in their local version of `/etc/master.passwd` with something like this:

```
+@IT_EMP:::::::
+@IT_APP:::::::
+:::::::/sbin/nologin
```

The corresponding lines for the normal workstations could be:

```
+@IT_EMP:::::::
+@USERS:::::::
+:::::::/sbin/nologin
```

And everything would be fine until there is a policy change a few weeks later: The IT department starts hiring interns. The IT interns are allowed to use the normal workstations and the less important servers; and the IT apprentices are allowed to login onto the main servers. You add a new netgroup `IT_INTERN`, add the new IT interns to this netgroup and start to change the configuration on each and every machine... As the old saying goes: "Errors in centralized planning lead to global mess".

NIS' ability to create netgroups from other netgroups can be used to prevent situations like these. One possibility is the creation of role-based netgroups. For example, you could create a netgroup called **BIGSRV** to define the login restrictions for the important servers, another netgroup called **SMALLSRV** for the less important servers and a third netgroup called **USERBOX** for the normal workstations. Each of these netgroups contains the netgroups that are allowed to login onto these machines. The new entries for your NIS map netgroup should look like this:

```
BIGSRV    IT_EMP    IT_APP
SMALLSRV  IT_EMP    IT_APP    ITINTERN
USERBOX   IT_EMP    ITINTERN  USERS
```

This method of defining login restrictions works reasonably well if you can define groups of machines with identical restrictions. Unfortunately, this is the exception and not the rule. Most of the time, you will need the ability to define login restrictions on a per-machine basis.

Machine-specific netgroup definitions are the other possibility to deal with the policy change outlined above. In this scenario, the `/etc/master.passwd` of each box contains two lines starting with “+”. The first of them adds a netgroup with the accounts allowed to login onto this machine, the second one adds all other accounts with `/sbin/nologin` as shell. It is a good idea to use the “ALL-CAPS” version of the machine name as the name of the netgroup. In other words, the lines should look like this:

```
+@BOXNAME::::::::::
+::::::::::::/sbin/nologin
```

Once you have completed this task for all your machines, you will not have to modify the local versions of `/etc/master.passwd` ever again. All further changes can be handled by modifying the NIS map. Here is an example of a possible netgroup map for this scenario with some additional goodies:

```
# Define groups of users first
IT_EMP    (,alpha,test-domain)      (,beta,test-domain)
IT_APP    (,charlie,test-domain)    (,delta,test-domain)
DEPT1     (,echo,test-domain)      (,foxtrott,test-domain)
DEPT2     (,golf,test-domain)       (,hotel,test-domain)
DEPT3     (,india,test-domain)      (,juliet,test-domain)
ITINTERN  (,kilo,test-domain)      (,lima,test-domain)
D_INTERN  (,able,test-domain)      (,baker,test-domain)
#
# Now, define some groups based on roles
USERS     DEPT1    DEPT2    DEPT3
BIGSRV   IT_EMP    IT_APP
SMALLSRV IT_EMP    IT_APP    ITINTERN
USERBOX   IT_EMP    ITINTERN  USERS
#
# And a groups for a special tasks
# Allow echo and golf to access our anti-virus-machine
SECURITY  IT_EMP    (,echo,test-domain)  (,golf,test-domain)
#
# machine-based netgroups
# Our main servers
WAR       BIGSRV
FAMINE    BIGSRV
# User india needs access to this server
POLLUTION BIGSRV  (,india,test-domain)
#
```

```
# This one is really important and needs more access restrictions
DEATH      IT_EMP
#
# The anti-virus-machine mentioned above
ONE       SECURITY
#
# Restrict a machine to a single user
TWO      (,hotel,test-domain)
# [...more groups to follow]
```

If you are using some kind of database to manage your user accounts, you should be able to create the first part of the map with your database's report tools. This way, new users will automatically have access to the boxes.

One last word of caution: It may not always be advisable to use machine-based netgroups. If you are deploying a couple of dozen or even hundreds of identical machines for student labs, you should use role-based netgroups instead of machine-based netgroups to keep the size of the NIS map within reasonable limits.

### 30.4.8 Important Things to Remember

There are still a couple of things that you will need to do differently now that you are in an NIS environment.

- Every time you wish to add a user to the lab, you must add it to the master NIS server *only*, and *you must remember to rebuild the NIS maps*. If you forget to do this, the new user will not be able to login anywhere except on the NIS master. For example, if we needed to add a new user `jsmith` to the lab, we would:

```
# pw useradd jsmith
# cd /var/yp
# make test-domain
```

You could also run `adduser jsmith` instead of `pw useradd jsmith`.

- *Keep the administration accounts out of the NIS maps.* You do not want to be propagating administrative accounts and passwords to machines that will have users that should not have access to those accounts.
- *Keep the NIS master and slave secure, and minimize their downtime.* If somebody either hacks or simply turns off these machines, they have effectively rendered many people without the ability to login to the lab.

This is the chief weakness of any centralized administration system. If you do not protect your NIS servers, you will have a lot of angry users!

### 30.4.9 NIS v1 Compatibility

FreeBSD's **ypserv** has some support for serving NIS v1 clients. FreeBSD's NIS implementation only uses the NIS v2 protocol, however other implementations include support for the v1 protocol for backwards compatibility with older systems. The **ypbind** daemons supplied with these systems will try to establish a binding to an NIS v1 server even though they may never actually need it (and they may persist in broadcasting in search of one even after they receive a response from a v2 server). Note that while support for normal client calls is provided, this version of **ypserv** does not handle v1 map transfer requests; consequently, it cannot be used as a master or slave in conjunction with older NIS servers that only support the v1 protocol. Fortunately, there probably are not any such servers still in use today.

### 30.4.10 NIS Servers That Are Also NIS Clients

Care must be taken when running **ypserv** in a multi-server domain where the server machines are also NIS clients. It is generally a good idea to force the servers to bind to themselves rather than allowing them to broadcast bind requests and possibly become bound to each other. Strange failure modes can result if one server goes down and others are dependent upon it. Eventually all the clients will time out and attempt to bind to other servers, but the delay involved can be considerable and the failure mode is still present since the servers might bind to each other all over again.

You can force a host to bind to a particular server by running **ypbind** with the **-S** flag. If you do not want to do this manually each time you reboot your NIS server, you can add the following lines to your **/etc/rc.conf**:

```
nis_client_enable="YES" # run client stuff as well
nis_client_flags="-S NIS domain,server"
```

See **ypbind(8)** for further information.

### 30.4.11 Password Formats

One of the most common issues that people run into when trying to implement NIS is password format compatibility. If your NIS server is using DES encrypted passwords, it will only support clients that are also using DES. For example, if you have Solaris NIS clients in your network, then you will almost certainly need to use DES encrypted passwords.

To check which format your servers and clients are using, look at **/etc/login.conf**. If the host is configured to use DES encrypted passwords, then the **default** class will contain an entry like this:

```
default:\n  :passwd_format=des:\n  :copyright=/etc/COPYRIGHT:\n  [Further entries elided]
```

Other possible values for the **passwd\_format** capability include **blf** and **md5** (for Blowfish and MD5 encrypted passwords, respectively).

If you have made changes to **/etc/login.conf**, you will also need to rebuild the login capability database, which is achieved by running the following command as **root**:

```
# cap_mkdb /etc/login.conf
```

**Óciàßùóç:** The format of passwords already in **/etc/master.passwd** will not be updated until a user changes his password for the first time *after* the login capability database is rebuilt.

Next, in order to ensure that passwords are encrypted with the format that you have chosen, you should also check that the **crypt\_default** in **/etc/auth.conf** gives precedence to your chosen password format. To do this, place the format that you have chosen first in the list. For example, when using DES encrypted passwords, the entry would be:

```
crypt_default      =      des blf md5
```

Having followed the above steps on each of the FreeBSD based NIS servers and clients, you can be sure that they all agree on which password format is used within your network. If you have trouble authenticating on an NIS client, this is a pretty good place to start looking for possible problems. Remember: if you want to deploy an NIS server for a heterogenous network, you will probably have to use DES on all systems because it is the lowest common standard.

## 30.5 Automatic Network Configuration (DHCP)

*Written by Greg Sutter.*

### 30.5.1 What Is DHCP?

DHCP, the Dynamic Host Configuration Protocol, describes the means by which a system can connect to a network and obtain the necessary information for communication upon that network. FreeBSD versions prior to 6.0 use the ISC (Internet Software Consortium) DHCP client (`dhclient(8)`) implementation. Later versions use the OpenBSD `dhclient` taken from OpenBSD 3.7. All information here regarding `dhclient` is for use with either of the ISC or OpenBSD DHCP clients. The DHCP server is the one included in the ISC distribution.

### 30.5.2 What This Section Covers

This section describes both the client-side components of the ISC and OpenBSD DHCP client and server-side components of the ISC DHCP system. The client-side program, `dhclient`, comes integrated within FreeBSD, and the server-side portion is available from the `net/isc-dhcp3-server` port. The `dhclient(8)`, `dhcp-options(5)`, and `dhclient.conf(5)` manual pages, in addition to the references below, are useful resources.

### 30.5.3 How It Works

When `dhclient`, the DHCP client, is executed on the client machine, it begins broadcasting requests for configuration information. By default, these requests are on UDP port 68. The server replies on UDP 67, giving the client an IP address and other relevant network information such as netmask, router, and DNS servers. All of this information comes in the form of a DHCP “lease” and is only valid for a certain time (configured by the DHCP server maintainer). In this manner, stale IP addresses for clients no longer connected to the network can be automatically reclaimed.

DHCP clients can obtain a great deal of information from the server. An exhaustive list may be found in `dhcp-options(5)`.

### 30.5.4 FreeBSD Integration

FreeBSD fully integrates the ISC or OpenBSD DHCP client, `dhclient` (according to the FreeBSD version you run). DHCP client support is provided within both the installer and the base system, obviating the need for detailed knowledge of network configurations on any network that runs a DHCP server. `dhclient` has been included in all FreeBSD distributions since 3.2.

DHCP is supported by **sysinstall**. When configuring a network interface within **sysinstall**, the second question asked is: “Do you want to try DHCP configuration of the interface?”. Answering affirmatively will execute **dhclient**, and if successful, will fill in the network configuration information automatically.

There are two things you must do to have your system use DHCP upon startup:

- Make sure that the **bpf** device is compiled into your kernel. To do this, add device **bpf** to your kernel configuration file, and rebuild the kernel. For more information about building kernels, see [ÊäöÜëáéï 9](#).

The **bpf** device is already part of the **GENERIC** kernel that is supplied with FreeBSD, so if you do not have a custom kernel, you should not need to create one in order to get DHCP working.

**Óçìåßùóç:** For those who are particularly security conscious, you should be warned that **bpf** is also the device that allows packet sniffers to work correctly (although they still have to be run as **root**). **bpf** is required to use DHCP, but if you are very sensitive about security, you probably should not add **bpf** to your kernel in the expectation that at some point in the future you will be using DHCP.

- Edit your **/etc/rc.conf** to include the following:

```
ifconfig_fxp0="DHCP"
```

**Óçìåßùóç:** Be sure to replace **fxp0** with the designation for the interface that you wish to dynamically configure, as described in [Óíþíá 12.8](#).

If you are using a different location for **dhclient**, or if you wish to pass additional flags to **dhclient**, also include the following (editing as necessary):

```
dhcp_program="/sbin/dhclient"
dhcp_flags=""
```

The DHCP server, **dhcpd**, is included as part of the **net/isc-dhcp3-server** port in the ports collection. This port contains the ISC DHCP server and documentation.

### 30.5.5 Files

- **/etc/dhclient.conf**

**dhclient** requires a configuration file, **/etc/dhclient.conf**. Typically the file contains only comments, the defaults being reasonably sane. This configuration file is described by the **dhclient.conf(5)** manual page.

- **/sbin/dhclient**

**dhclient** is statically linked and resides in **/sbin**. The **dhclient(8)** manual page gives more information about **dhclient**.

- **/sbin/dhclient-script**

**dhclient-script** is the FreeBSD-specific DHCP client configuration script. It is described in **dhclient-script(8)**, but should not need any user modification to function properly.

- /var/db/dhclient.leases

The DHCP client keeps a database of valid leases in this file, which is written as a log. dhclient.leases(5) gives a slightly longer description.

### 30.5.6 Further Reading

The DHCP protocol is fully described in RFC 2131 (<http://www.freesoft.org/CIE/RFC/2131/>). An informational resource has also been set up at <http://www.dhcp.org/>.

### 30.5.7 Installing and Configuring a DHCP Server

#### 30.5.7.1 What This Section Covers

This section provides information on how to configure a FreeBSD system to act as a DHCP server using the ISC (Internet Software Consortium) implementation of the DHCP server.

The server is not provided as part of FreeBSD, and so you will need to install the `net/isc-dhcp3-server` port to provide this service. See [5](#) for more information on using the Ports Collection.

#### 30.5.7.2 DHCP Server Installation

In order to configure your FreeBSD system as a DHCP server, you will need to ensure that the `bpf(4)` device is compiled into your kernel. To do this, add `device bpf` to your kernel configuration file, and rebuild the kernel. For more information about building kernels, see [5](#).

The `bpf` device is already part of the `GENERIC` kernel that is supplied with FreeBSD, so you do not need to create a custom kernel in order to get DHCP working.

**Óçìåßùóç:** Those who are particularly security conscious should note that `bpf` is also the device that allows packet sniffers to work correctly (although such programs still need privileged access). `bpf` is required to use DHCP, but if you are very sensitive about security, you probably should not include `bpf` in your kernel purely because you expect to use DHCP at some point in the future.

The next thing that you will need to do is edit the sample `dhcpcd.conf` which was installed by the `net/isc-dhcp3-server` port. By default, this will be `/usr/local/etc/dhcpcd.conf.sample`, and you should copy this to `/usr/local/etc/dhcpcd.conf` before proceeding to make changes.

#### 30.5.7.3 Configuring the DHCP Server

`dhcpcd.conf` is comprised of declarations regarding subnets and hosts, and is perhaps most easily explained using an example :

```
option domain-name "example.com";①
option domain-name-servers 192.168.4.100;②
option subnet-mask 255.255.255.0;③
```

```

default-lease-time 3600;❸
max-lease-time 86400;❹
ddns-update-style none;❺

subnet 192.168.4.0 netmask 255.255.255.0 {
    range 192.168.4.129 192.168.4.254;❻
    option routers 192.168.4.1;❽
}

host mailhost {
    hardware ethernet 02:03:04:05:06:07;❾
    fixed-address mailhost.example.com;❿
}

```

- ❶ This option specifies the domain that will be provided to clients as the default search domain. See `resolv.conf(5)` for more information on what this means.
- ❷ This option specifies a comma separated list of DNS servers that the client should use.
- ❸ The netmask that will be provided to clients.
- ❹ A client may request a specific length of time that a lease will be valid. Otherwise the server will assign a lease with this expiry value (in seconds).
- ❺ This is the maximum length of time that the server will lease for. Should a client request a longer lease, a lease will be issued, although it will only be valid for `max-lease-time` seconds.
- ❻ This option specifies whether the DHCP server should attempt to update DNS when a lease is accepted or released. In the ISC implementation, this option is *required*.
- ❼ This denotes which IP addresses should be used in the pool reserved for allocating to clients. IP addresses between, and including, the ones stated are handed out to clients.
- ❽ Declares the default gateway that will be provided to clients.
- ❾ The hardware MAC address of a host (so that the DHCP server can recognize a host when it makes a request).
- ❿ Specifies that the host should always be given the same IP address. Note that using a hostname is correct here, since the DHCP server will resolve the hostname itself before returning the lease information.

Once you have finished writing your `dhcpd.conf`, you should enable the DHCP server in `/etc/rc.conf`, i.e. by adding:

```

dhcpd_enable="YES"
dhcpd_ifaces="dc0"

```

Replace the `dc0` interface name with the interface (or interfaces, separated by whitespace) that your DHCP server should listen on for DHCP client requests.

Then, you can proceed to start the server by issuing the following command:

```
# /usr/local/etc/rc.d/isc-dhcpd.sh start
```

Should you need to make changes to the configuration of your server in the future, it is important to note that sending a `SIGHUP` signal to `dhcpd` does *not* result in the configuration being reloaded, as it does with most daemons. You will need to send a `SIGTERM` signal to stop the process, and then restart it using the command above.

### 30.5.7.4 Files

- `/usr/local/sbin/dhcpd`

**dhcpd** is statically linked and resides in `/usr/local/sbin`. The `dhcpd(8)` manual page installed with the port gives more information about **dhcpd**.

- `/usr/local/etc/dhcpd.conf`

**dhcpd** requires a configuration file, `/usr/local/etc/dhcpd.conf` before it will start providing service to clients. This file needs to contain all the information that should be provided to clients that are being serviced, along with information regarding the operation of the server. This configuration file is described by the `dhcpd.conf(5)` manual page installed by the port.

- `/var/db/dhcpd.leases`

The DHCP server keeps a database of leases it has issued in this file, which is written as a log. The manual page `dhcpd.leases(5)`, installed by the port gives a slightly longer description.

- `/usr/local/sbin/dhcrelay`

**dhcrelay** is used in advanced environments where one DHCP server forwards a request from a client to another DHCP server on a separate network. If you require this functionality, then install the `net/isc-dhcp3-relay` port. The `dhcrelay(8)` manual page provided with the port contains more detail.

## 30.6 Domain Name System (DNS)

*Contributed by Chern Lee, Tom Rhodes, éáé Daniel Gerzo.*

### 30.6.1 Overview

FreeBSD utilizes, by default, a version of BIND (Berkeley Internet Name Domain), which is the most common implementation of the DNS protocol. DNS is the protocol through which names are mapped to IP addresses, and vice versa. For example, a query for `www.FreeBSD.org` will receive a reply with the IP address of The FreeBSD Project's web server, whereas, a query for `ftp.FreeBSD.org` will return the IP address of the corresponding FTP machine. Likewise, the opposite can happen. A query for an IP address can resolve its hostname. It is not necessary to run a name server to perform DNS lookups on a system.

FreeBSD currently comes with BIND9 DNS server software by default. Our installation provides enhanced security features, a new file system layout and automated `chroot(8)` configuration.

DNS is coordinated across the Internet through a somewhat complex system of authoritative root, Top Level Domain (TLD), and other smaller-scale name servers which host and cache individual domain information.

Currently, BIND is maintained by the Internet Software Consortium <http://www.isc.org/>.

### 30.6.2 Terminology

To understand this document, some terms related to DNS must be understood.

Term	Definition
Forward DNS	Mapping of hostnames to IP addresses.
Origin	Refers to the domain covered in a particular zone file.
<b>named</b> , BIND, name server	Common names for the BIND name server package within FreeBSD.
Resolver	A system process through which a machine queries a name server for zone information.
Reverse DNS	The opposite of forward DNS; mapping of IP addresses to hostnames.
Root zone	The beginning of the Internet zone hierarchy. All zones fall under the root zone, similar to how all files in a file system fall under the root directory.
Zone	An individual domain, subdomain, or portion of the DNS administered by the same authority.

Examples of zones:

- `.` is the root zone.
- `.org.` is a Top Level Domain (TLD) under the root zone.
- `example.org.` is a zone under the `.org.` TLD.
- `1.168.192.in-addr.arpa` is a zone referencing all IP addresses which fall under the `192.168.1.*` IP space.

As one can see, the more specific part of a hostname appears to its left. For example, `example.org.` is more specific than `.org.`, as `.org.` is more specific than the root zone. The layout of each part of a hostname is much like a file system: the `/dev` directory falls within the root, and so on.

### 30.6.3 Reasons to Run a Name Server

Name servers usually come in two forms: an authoritative name server, and a caching name server.

An authoritative name server is needed when:

- One wants to serve DNS information to the world, replying authoritatively to queries.
- A domain, such as `example.org`, is registered and IP addresses need to be assigned to hostnames under it.
- An IP address block requires reverse DNS entries (IP to hostname).
- A backup or second name server, called a slave, will reply to queries.

A caching name server is needed when:

- A local DNS server may cache and respond more quickly than querying an outside name server.

When one queries for `www.FreeBSD.org`, the resolver usually queries the uplink ISP's name server, and retrieves the reply. With a local, caching DNS server, the query only has to be made once to the outside world by the caching DNS server. Every additional query will not have to look to the outside of the local network, since the information is cached locally.

## 30.6.4 How It Works

In FreeBSD, the BIND daemon is called **named** for obvious reasons.

File	Description
named(8)	The BIND daemon.
rndc(8)	Name server control utility.
/etc/namedb	Directory where BIND zone information resides.
/etc/namedb/named.conf	Configuration file of the daemon.

Depending on how a given zone is configured on the server, the files related to that zone can be found in the `master`, `slave`, or `dynamic` subdirectories of the `/etc/namedb` directory. These files contain the DNS information that will be given out by the name server in response to queries.

## 30.6.5 Starting BIND

Since BIND is installed by default, configuring it all is relatively simple.

The default **named** configuration is that of a basic resolving name server, ran in a `chroot(8)` environment. To start the server one time with this configuration, use the following command:

```
# /etc/rc.d/named forcestart
```

To ensure the **named** daemon is started at boot each time, put the following line into the `/etc/rc.conf`:

```
named_enable="YES"
```

There are obviously many configuration options for `/etc/namedb/named.conf` that are beyond the scope of this document. However, if you are interested in the startup options for **named** on FreeBSD, take a look at the `named_*` flags in `/etc/default/rc.conf` and consult the `rc.conf(5)` manual page. The ÖíÞìá 12.7 section is also a good read.

## 30.6.6 Configuration Files

Configuration files for **named** currently reside in `/etc/namedb` directory and will need modification before use, unless all that is needed is a simple resolver. This is where most of the configuration will be performed.

### 30.6.6.1 Using make-localhost

To configure a master zone for the localhost visit the `/etc/namedb` directory and run the following command:

```
# sh make-localhost
```

If all went well, a new file should exist in the `master` subdirectory. The filenames should be `localhost.rev` for the local domain name and `localhost-v6.rev` for IPv6 configurations. As the default configuration file, required information will be present in the `named.conf` file.

### 30.6.6.2 /etc/namedb/named.conf

```
// $FreeBSD$  
//  
// Refer to the named.conf(5) and named(8) man pages, and the documentation  
// in /usr/share/doc/bind9 for more details.  
//  
// If you are going to set up an authoritative server, make sure you  
// understand the hairy details of how DNS works. Even with  
// simple mistakes, you can break connectivity for affected parties,  
// or cause huge amounts of useless Internet traffic.  
  
options {  
    directory      "/etc/namedb";  
    pid-file       "/var/run/named/pid";  
    dump-file      "/var/dump/named_dump.db";  
    statistics-file "/var/stats/named.stats";  
  
    // If named is being used only as a local resolver, this is a safe default.  
    // For named to be accessible to the network, comment this option, specify  
    // the proper IP address, or delete this option.  
    listen-on      { 127.0.0.1; };  
  
    // If you have IPv6 enabled on this system, uncomment this option for  
    // use as a local resolver. To give access to the network, specify  
    // an IPv6 address, or the keyword "any".  
    // listen-on-v6   { ::1; };  
  
    // In addition to the "forwarders" clause, you can force your name  
    // server to never initiate queries of its own, but always ask its  
    // forwarders only, by enabling the following line:  
    //  
    //     forward only;  
  
    // If you've got a DNS server around at your upstream provider, enter  
    // its IP address here, and enable the line below. This will make you  
    // benefit from its cache, thus reduce overall DNS traffic in the Internet.  
/*  
    forwarders {  
        127.0.0.1;  
    };  
*/
```

Just as the comment says, to benefit from an uplink's cache, `forwarders` can be enabled here. Under normal circumstances, a name server will recursively query the Internet looking at certain name servers until it finds the answer it is looking for. Having this enabled will have it query the uplink's name server (or name server provided) first, taking advantage of its cache. If the uplink name server in question is a heavily trafficked, fast name server, enabling this may be worthwhile.

**Ðñiâéäïðíßçóç:** 127.0.0.1 will *not* work here. Change this IP address to a name server at your uplink.



```

};

/*
 * An example dynamic zone
key "exampleorgkey" {
    algorithm hmac-md5;
    secret "sf87HJqjkqh8ac87a02lla==";
};

zone "example.org" {
    type master;
    allow-update {
        key "exampleorgkey";
    };
    file "dynamic/example.org";
};

/*
 * Examples of forward and reverse slave zones
zone "example.com" {
    type slave;
    file "slave/example.com";
    masters {
        192.168.1.1;
    };
};

zone "1.168.192.in-addr.arpa" {
    type slave;
    file "slave/1.168.192.in-addr.arpa";
    masters {
        192.168.1.1;
    };
};
*/

```

In named.conf, these are examples of slave entries for a forward and reverse zone.

For each new zone served, a new zone entry must be added to named.conf.

For example, the simplest zone entry for example.org can look like:

```

zone "example.org" {
    type master;
    file "master/example.org";
};

```

The zone is a master, as indicated by the `type` statement, holding its zone information in /etc/namedb/master/example.org indicated by the `file` statement.

```

zone "example.org" {
    type slave;
    file "slave/example.org";
};

```

In the slave case, the zone information is transferred from the master name server for the particular zone, and saved in the file specified. If and when the master server dies or is unreachable, the slave name server will have the transferred zone information and will be able to serve it.

### 30.6.6.3 Zone Files

An example master zone file for `example.org` (existing within `/etc/namedb/master/example.org`) is as follows:

```
$TTL 3600      ; 1 hour
example.org.    IN      SOA     ns1.example.org. admin.example.org. (
                           2006051501      ; Serial
                           10800         ; Refresh
                           3600          ; Retry
                           604800        ; Expire
                           86400         ; Minimum TTL
)
; DNS Servers
           IN      NS      ns1.example.org.
           IN      NS      ns2.example.org.
; MX Records
           IN      MX 10   mx.example.org.
           IN      MX 20   mail.example.org.
           IN      A       192.168.1.1
; Machine Names
localhost      IN      A       127.0.0.1
ns1            IN      A       192.168.1.2
ns2            IN      A       192.168.1.3
mx             IN      A       192.168.1.4
mail           IN      A       192.168.1.5
; Aliases
www            IN      CNAME  @
```

Note that every hostname ending in a “.” is an exact hostname, whereas everything without a trailing “.” is referenced to the origin. For example, `www` is translated into `www.origin`. In our fictitious zone file, our origin is `example.org.`, so `www` would translate to `www.example.org`.

The format of a zone file follows:

```
recordname      IN recordtype  value
```

The most commonly used DNS records:

**SOA**

start of zone authority

NS

an authoritative name server

A

a host address

CNAME

the canonical name for an alias

MX

mail exchanger

PTR

a domain name pointer (used in reverse DNS)

```
example.org. IN SOA ns1.example.org. admin.example.org. (
    2006051501      ; Serial
    10800            ; Refresh after 3 hours
    3600             ; Retry after 1 hour
    604800           ; Expire after 1 week
    86400            ; Minimum TTL of 1 day
```

example.org.

the domain name, also the origin for this zone file.

ns1.example.org.

the primary/authoritative name server for this zone.

admin.example.org.

the responsible person for this zone, email address with “@” replaced. (<admin@example.org> becomes admin.example.org)

2006051501

the serial number of the file. This must be incremented each time the zone file is modified. Nowadays, many admins prefer a `yyyymmddrr` format for the serial number. 2006051501 would mean last modified 05/15/2006, the latter 01 being the first time the zone file has been modified this day. The serial number is important as it alerts slave name servers for a zone when it is updated.

IN NS ns1.example.org.

This is an NS entry. Every name server that is going to reply authoritatively for the zone must have one of these entries.

localhost	IN	A	127.0.0.1
ns1	IN	A	192.168.1.2
ns2	IN	A	192.168.1.3
mx	IN	A	192.168.1.4

```
mail           IN      A      192.168.1.5
```

The A record indicates machine names. As seen above, ns1.example.org would resolve to 192.168.1.2.

```
IN      A      192.168.1.1
```

This line assigns IP address 192.168.1.1 to the current origin, in this case example.org.

```
www           IN  CNAME      @
```

The canonical name record is usually used for giving aliases to a machine. In the example, www is aliased to the “master” machine which name equals to domain name example.org (192.168.1.1). CNAMEs can be used to provide alias hostnames, or round robin one hostname among multiple machines.

```
IN MX    10      mail.example.org.
```

The MX record indicates which mail servers are responsible for handling incoming mail for the zone.

mail.example.org is the hostname of the mail server, and 10 being the priority of that mail server.

One can have several mail servers, with priorities of 10, 20 and so on. A mail server attempting to deliver to example.org would first try the highest priority MX (the record with the lowest priority number), then the second highest, etc, until the mail can be properly delivered.

For in-addr.arpa zone files (reverse DNS), the same format is used, except with PTR entries instead of A or CNAME.

```
$TTL 3600
```

```
1.168.192.in-addr.arpa. IN SOA ns1.example.org. admin.example.org. (
    2006051501      ; Serial
    10800          ; Refresh
    3600           ; Retry
    604800         ; Expire
    3600 )         ; Minimum

    IN      NS      ns1.example.org.
    IN      NS      ns2.example.org.

1     IN      PTR      example.org.
2     IN      PTR      ns1.example.org.
3     IN      PTR      ns2.example.org.
4     IN      PTR      mx.example.org.
5     IN      PTR      mail.example.org.
```

This file gives the proper IP address to hostname mappings of our above fictitious domain.

### 30.6.7 Caching Name Server

A caching name server is a name server that is not authoritative for any zones. It simply asks queries of its own, and remembers them for later use. To set one up, just configure the name server as usual, omitting any inclusions of zones.

### **30.6.8 Security**

Although BIND is the most common implementation of DNS, there is always the issue of security. Possible and exploitable security holes are sometimes found.

While FreeBSD automatically drops **named** into a chroot(8) environment; there are several other security mechanisms in place which could help to lure off possible DNS service attacks.

(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-security-notifications>) to stay up to date with the current Internet and FreeBSD security issues.

**Õõdääärige:** If a problem arises, keeping sources up to date and having a fresh build of **named** would not hurt.

### **30.6.9 Further Reading**

BIND/**named** manual pages: rndc(8) named(8) named.conf(5)

- Official ISC BIND Page (<http://www.isc.org/products/BIND/>)
  - Official ISC BIND Forum (<http://www.isc.org/sw/guild/bf/>)
  - BIND FAQ (<http://www.nominum.com/getOpenSourceResource.php?id=6>)
  - O'Reilly DNS and BIND 5th Edition (<http://www.oreilly.com/catalog/dns5/>)
  - RFC1034 - Domain Names - Concepts and Facilities (<ftp://ftp.isi.edu/in-notes/rfc1034.txt>)
  - RFC1035 - Domain Names - Implementation and Specification (<ftp://ftp.isi.edu/in-notes/rfc1035.txt>)

## 30.7 І ÅÎÕÐÇÑÅÔÇÔÞò HTTP Apache

ÓoíáéóöiñÜ ôiñ ìåôÜöñáóç Murray Stokely éáé ÁáâäÝëçò ÔððÜëiiò.

### 30.7.1 Óýʃiøç

Ói FreeBSD ÷ n̄cōéiiðír̄éâb̄oáé áéá íá óeëñiâíb̄ ðáâééiðíb̄uð óéðóíðâéb̄aâðò iâðâÜeçò áâðéóéâðééiüðóçðáð. Íe ðâññéóðuðâññié áæáéñiéóð Ýð web óði áæáâb̄eðði ÷ n̄cōéiiðír̄éý òií **âîñðçñâðçòþ HTTP Apache**. Óâ ðâéÝðá eïäéóíééiy òið **Apache** éá ðñÝðáé íá ðâññéÝ ÷ iñðáé óði íÝði áâðâáð Úðóâáðçò òið FreeBSD ðið ÷ n̄cōéiiðír̄éâb̄oâ. Áí áâí áâðâáðoðÞóâðâ òií **Apache** êâðÜ ñðç áæÜññâéá ðôç ãâðâáð Úðóâáðçò òið FreeBSD, ðüðâ ìðiññâðâ Íá òií áâðâáðoðÞóâðâ áðü òið ðâéÝði [www/apache13](http://apache13) þ áðü òið ðâéÝði [www/apache20](http://apache20).

Άσημή τετρέχει πήδωσαν άδειός του δογιά απέκαιρα στην ουδέα της Apache, εάν δηλαδή τα έξι πάντα δεν θέλουν να βρεθούν σε αυτήν.

**ÓciāBùóć:** ÁôôóP ç áiüöçôá éáéýöôdâé ôcí Ýéäiöc åôôöçñâöçöþí **Apache HTTP 1.3.X**, iéáo ðiö áôôóP ç Ýéäiöc åßiáé ç ðiëi äéáåäiÝíç ãéá ôí FreeBSD. I **Apache 2.X** ðáñiöóéÜæåé ðiëëÝò íÝåò ôå÷iíëiäßåò áëëÜ áôôÝò ääí ðáñéäñÜöiíöáé ôá áôôóP ôcí áiüöçôá. Ðáñéooüôðâñåò ðeçñiöiñßåò áéá ôíí **Apache 2.X**, iðññâßôá íá áäåßôá ôóci ôåëßää <http://httpd.apache.org/>.

### 30.7.2 Nõeìßóåéò

Óði FreeBSD ói óçìáíðéêüðâñi áñ ÷ áßi nñðèíßóåùi óiò **ÅîðçñåðçòP HTTP Apache** áßíáé ói /usr/local/etc/apache/httpd.conf. Áßíáé Ýíá óôðéêü UNIX nñðèíðóéêü áñ ÷ áßi éåéí Ýíiø, iå añáii Ýð ó·: iëßúi ðiø iåééñíýí iå òiø ÷ áñáîòPñá #. Óeiðüö iåð áäþ áåí áßíáé iéá iëiéèçñùi Ýíç ðåñéñáðòP üëùi ôùi ðééáíþi áðééíäþi, áðiñ Ýíù eá ðåñéñáÜòiòi lñüi ôðeo ðeí äçìöééåßò áðééíäÝò nñðèíßóåéò (configuration directives).

```
ServerRoot "/usr/local"
```

Åäp ðåñéâñÜöåôáé ī ðñïåðééâåÍñò éåñâñ ÷ééÜ éáoÜëíñò ååéâôÜöôáóçò áéá ôíí **Apache**. Ôá åêôåéÝóéíá áñ÷åßá åßíáé áðíèçéåðíÍýá óôíñò ðõíèáôåéüäíñò bin éáé sbin óíñ êåôáéüäíñ “ServerRoot” êåé ôá áñ÷åßá ñõèíßóåñú áðíèçéåÿíñóáé óóíí êáoÜëíñò etc/apache.

ServerAdmin you@your.address

Ç çëâéôññíéþ äéâýèðíóç ôðicí iðibá éá ðñÝðåé íá áðiðóðÝëëiñôáé áíáöiñÝð ðñiäæçìÜôúí ó÷åðééÜ íå ôíí áiððçñåôçôþ. Áðôþ ç äéâýèðíóç áiòáíßæåðáé óå eÜðiieåò óåëßääåò ðiõ äçieïoñaiýíóáé áðü ôíí áiððçñåôçôþ, üðùò ié óåëßääåò óóæíÜôúí.

ServerName www.example.com

Óði ServerName óáð áðéðñÝðáæ íá ðeÝðóðâ Ýíá üññá êüùâið (hostname) áæá ðií âiñðçñâðóþ ðáð, ði ðiñþi áðiñóðÝðéëâðé ððþóù óðiðð clients áí áðiñáé æáðiñâðéëü áðú áðéâði ðið Ýðáð Þaç ñððiðóðé óðið êüùâið óáð (áðéþ iðiññáðð, áæá ðañÜðáæá, íá ðiñðóðiðÞðóðâ www áiðð ðið ðñðâññáðéëý iññáðði ðið êüùâið).

```
DocumentRoot "/usr/local/www/data"
```

DocumentRoot: Åßíáé í éáó Üeíräiö áðü öií iðiþi éá ÐñiööÝñiiðáé óá Ýäññáöá óá. ÐñiäðéëåíÍýá, üéá óá áéðÞíáôá éá áiðÖçñâðöýíööé áðü áðööü öií éáó Üeíräi, áeëÜ iðiñíýí áðBóçö íá ÷ ñçóeiðiæcëiyí óðiâíæeíið haaðið (symbolic link) P ðáñùiýíéá (aliases) ðið èá óóí ÷ ávíði óá Üeíæáð öiðiæåðBáð.

Đñéí êÜíâôå iðíéáäþðiôå áéëéåäP, åßíáé êåëü íá äçìëiññåßôå áíòßãñäöå áóöåëåßáò (backup) ôiöi áñ÷åßiöi ñõëèßóåùí ôiöi **Apache**. Iüééò êñßíåôå ðùò åßóôå ééâñiðíéçíÝiò iå ôeò áñ÷éÝò ñõëèßóåò iðíñåßôå íá iâééíÞóåôå iå ôçí åéòÝëåóç ôiöi **Apache**.

### 30.7.3 ÅêôÝëåóç ôïõ Apache

O **Apache** äáí ôñÝ÷åé äéáí Ýíö öiö öððán-äéáéñíéööþ **inetd** üððù öÜñööí ðiëëiþ Üëëié äééööááéiþ åíöðçñáñööþ Ýð. Åßíáé ñðøleóí Ýñò íá ôñÝ÷åé áððüüñá äéá íá åíöðçñáñööþ åééýöðñá öeö áéöÞoåéö HTTP öùí ðåéáöþí öiö, äçëáäþ öùí ðñíäñáliüÜðùí ðeíÞäçöçò (browsers). Ç åäéáöÜððáóç öiö **Apache** áðü óá FreeBSD Ports ðåñéÝ÷åé Ýíá åíçëçöéü shell script äéá öçí åéêßíçöç, öiö óðáiÜðçjá êáé öçí åððáñéêßíçöç öiö åíöðçñáñööþ. Äéá íá îåééÞoåáööþ **Apache** äéá ðñþöç öiñÜ, áðéÜ ôñÝiôå:

```
# /usr/local/sbin/apachectl start
```

Íðiñáþôå íðiéáäþðiôå óóéäíþ íá óóáíáôþóåôå ôííí áíðçñåôçôþ, ðeçêöñíëiäþíôåò:

```
# /usr/local/sbin/apachectl stop
```

ÌåðÜ áðü áæëáäÝò ðið ðéèáíþò íá êÜíáôå áéá iðiçñåððiðå ëüäí óðí áñ ÷ áßí ñððìßóåùí, èá ÷ ñâéáóðåß íá áðáíåêééíÞóåôå ôíï áîñðçñåðçôÞ:

```
# /usr/local/sbin/apachectl restart
```

Ãéá íá áðáíåêééíÞóåôå ôíï **Apache** äß÷ùò íá áæáêüøåðå óðéò ôñÝ ÷ iððåð óðíñäÝóåéò, ôñÝîôå:

```
# /usr/local/sbin/apachectl graceful
```

Ðâñéóðüôåñåò ðeçññiðñßåò èá áñåßôå óðç óåëßää áíÞèåéåò ôíð apachectl(8).

Ãéá íá iâééíÜåé í **Apache** áðóüüiaôå éáðÜ ôç aëÜñêåé áâéðíçóçò ôíð óðóðÞìáðiò ðññóðéåðåò áðéëíäÝò óðçí áñáiiP áíðiðpí áéá ôí /etc/rc.conf:

```
apache_enable="YES"
```

Áí áðéëðiåßôå íá ðáñÝ ÷ iððåé éáðÜ ôçí áâéðíçóç ôíð óðóðÞìáðiò ðññóðéåðåò áðéëíäÝò óðçí áñáiiP áíðiðpí áéá ôí ðññúññáiiá **Apache** httpd lðiñåßôå íá óðéò aëçþðåðå ìå iéá ðññóðéåðç áñáiiP óðí rc.conf:

```
apache_flags=""
```

Ôþñá ðiðÝ ÷ áé iâééíÞóåé í áîñðçñåðÞò web, iðiñåßôå íá áåßôå óðç éóðiðéëßää óåò óðiñ ÷ áyíiðóåò ôí ðññúññáiiá ðeðíðçóçò óðí http://localhost/. Ç ðññéâëñéóíÝíç óåëßää ðið åiðáíßæåðåé áßíáé ç /usr/local/www/data/index.html.

### 30.7.4 Virtual Hosting

Í **Apache** ðiððñßæåé áyí aæáöiñåðééïýò ðýðiðo Virtual Hosting. Ôí Íññáóðééü virtual hosting ÷ nçóðiðéåß ðiðð HTTP/1.1 headers áéá íá éáðéññßóåé ôíï êtñiâi. Áðóü áðéññÝðåé ôçí êiðíP ÷ ñÞóç ôçò ßæéåò IP áéá ðiðëÜ éáé áéáðiñåðééÜ domains.

Ãéá íá ñððìßóåðå ôíï **Apache** íá ÷ nçóðiðéåß ôí Íññáóðééü Virtual Hosting áéóÜååðå iéá éáðå ÷ þñéóç óðí httpd.conf óáí ôçí áéüëiðèç:

```
NameVirtualHost *
```

Áí iæáêñéóðÞò web iññÜæåðåé www.domain.tld éáé áðéëðiåßôå íá áâéáðåóðÞóåôå Ýíá virtual domain áéá ôí www.someotherdomain.tld ôüôå éá ðñÝðåé íá ðññóðéÝóåðå óðéò áéüëiðéåò éáðå ÷ ûñÞóåéò óðihtpd.conf:

```
<VirtualHost *>
ServerName www.domain.tld
DocumentRoot /www/domain.tld
</VirtualHost>
```

```
<VirtualHost *>
ServerName www.someotherdomain.tld
DocumentRoot /www/someotherdomain.tld
</VirtualHost>
```

ÁíðééâðåóðÞóôå óðéò ðáñáðÜíù aæáðëýíóåéò ìå áéâßíåò ðið áðéëðiåßôå íá ÷ nçóðiðéÞóåôå éáé ôçí éáðÜëëçéç áéáññíP ðññò ðá ÝäññáðÜ óáð.

Ãáá ðåñéooüôðñåò ðëçññöiñßåò ó÷åðééÜ là ôéò ñõëìßóåéò ãéá ôá virtual host, óáò ðññöñ Ýðiðiå íá õõlaiðoåðñôåðôå ðçí åðßöçíç ôåðìçñßùóç ôíò Apache ôóï <http://httpd.apache.org/docs/vhosts/>.

## 30.7.5 Apache Modules

Õõðõñ÷iõi ðiõeëiõ eáá eéÜõmíé áæáé Ýóeñíé õýðié áñèñuùÜõuú (modules) áéá ôií **Apache**, óá iõõßá áðåêòåßñiõí eé áiðeñiõòßæiõi ôiõ eáéõiõñáßåò ôiõ áâáóéeyí áiõðçñåôcôþ. Ç Õõeëiäþ ôuú Ports ôiõ FreeBSD ðáñÝ÷áé Ýíáí áyéïeëiõñüõi áéá íá áâáéâðåóðþóåôå ôií **Apache** eáé iãñééÜ áðú óá ðeí áciõiõeëp áñèñþiâóå.

### 30.7.5.1 mod\_ssl

Ôi Üñèñùìà **mod\_ssl** ÷ñçóëíïðíéåß ôçí áéäëëíèÞêç OpenSSL áéá íá ðáñÝ÷åé éó÷õñP êñôðôðíäñÜöçóç áéäíÝòí òuí ðñùöiêüëùí Secure Sockets Layer (SSL v2/v3) êáé Transport Layer Security (TLS v1). Ôi Üñèñùìà ðáñÝ÷åé üëá ôá áðáññáßöçôá ñôôðáðéÜ áéá íá îðíñåß íá áéôðåßôáé õðíäååññáìÝíá ðéôðíïðíëçôðéÜ áðüñ Ýíðéôðíðô áññöðéíäñöçíÝñòð ñññåßôð ñéôðíïðíëçôçóç Ýòóéþ þöôá íá îðíñåßôá íá ôñÝ÷åðôá Ýíá áðóäëíP áññöðñåñôçôP web ôóï FreeBSD.

ÅÜÍ äáí Ý÷åôå áâæåóåôÞóåé áétiç ôíí **Apache**, lðiñâbôå íá áâæåóåôÞóåôå ôçí Ýéäïöç ôíí **Apache 1.3.X** ôíí ðåñééäiåÜíäé ôí **mod\_ssl** áðü ôçí port `www/apache13-modssl`. Ôí SSL áßíáé åðßöçö äéåéÝóëí äéå ôíí **Apache 2.X** ôôçí port `www/apache20`, üðiø ôíí SSL áßíáé áiâññïðíéçíÝíí áðü ðñiâðééïäP.

### 30.7.5.2 ÄõíáìéêÝò Éóôïóåëßääò ìå Perl & PHP

Ócí ôâéâôðôáôðá ãâéâåôðôá, ðírë Ýò áðé ÷ áéñÍÞôåéô ñôðô Ýóðáâí ðéð ôñáðôçñéüôðçôåô ðíròð ðñïò ðír ðñôðñíåô ìå ðéïrðü íå  
ââééöðþóïòí ôá Ýóðáâ ðíròð êéá ãéá ìâðâéýôðâñç ðñïïäéþ. Áðôöù ìå ôç ôâéñÜ ðírò ãçïéýñâçóå ôçí áíÚâéç ãéá  
âéâæñáðôéêü ãéâæéôðôáâü ðâñéâ ÷ üìâíï. Áíþ êÜðíéåð åðâéñâðåò, üðùò ç Microsoft, ðâñïðôðåáóá ëyôåéô  
âíðùñâðôù Ýíåô ñôðô ãéâëüéðôçôå ðñïññíðô ðíròð, ç ëíëñüôðçôå ãñíé ÷ ðíy ëræóïééiy Ýéâåâ ðír ïÞrðíá. Óðéô ðýá ÷ ññïâð  
åðééïäÝò ãéá âéâæéôðôáâéÝò ôâéðâåðô ãðíâééïý ðâñéâ ÷ ïÝññô ðâñéëâíâÜññíôáé ôá Django, Ruby on Rails, mod\_perl  
êéá mod\_php, mod\_perl & mod\_php.

#### *30.7.5.2.1 mod perl*

Óri ãááññiúðó óðíýðáññíçò **Apache/Perl** óÝññiáé ëííðÜ ðóç iãáññÜëç áÿíáíç ðóçò ãéþðóáð ðññáññáññáðéðíý Perl êáé òíí **åíððçññåðçòÞ HTTP Apache**. Íá òíí Üññèñùlá **mod\_perl** Ý÷åðå ðóç äðíáðüðçóá íá ãññÜðåðå åðåðéñÜðåéð åéá òíí **Apache** åñt ieiééÞññið óå Perl. ÅðéðéÝíí, í áéáðçñÞóéííò iãðåáññéùððéóðÞò ðíð åßíáé åíóññáðùñÝññ ðóíí åíððçññåðçòÞ óåð åðéññÝðåé íá áðíïøÿåðå ðóçí ÷ñÞóç åññùðåññéíý iãðåáññéùððéóðÞ Perl êáé íá åðéåñññóéåðå ðáðü òíí ÷ññüññ åééßíçóçò ðíð.

Ôi **mod\_perl** äéáôßèåôáé ià äéÜöiñiõò ôñüöiõò. Äéá íá ÷ñçóéiñiõéÞóåôá ôi **mod\_perl** íá èõiÜóôå üöé ôi **mod\_perl** 1.0 **mod\_perl** 1.0 äiñëåýâé iùñi ià ôií **Apache** 1.3 ééá ôi **mod\_perl** 2.0 äiñëåýâé iùñi ià ôií **Apache** 2. Ôi **mod\_perl** 1.0 åßíáé äéáèÝóéií ôií port [www/mod\\_perl](http://www/mod_perl) åñþ iéá ôóåôéêÙ iàôåäæüôóéòí Ýíç Ýéäöç åßíáé äéáèÝóéiç ôií [www/apache13-modperl](http://www/apache13-modperl). Ôi **mod\_perl** 2.0 äéáôßèåôáé ôií port [www/mod\\_perl2](http://www/mod_perl2).

#### *30.7.5.2.2 mod php*

Ôi PHP, àiùóôü êáé ùò “PHP: Hypertext Preprocessor” åbíáé iéá script äepóóá ðñiäñâiìáöéöiiy aáiééPò ÷ñPóçò áééÜ éáéåBðåñâ éáôÜeëcëc áéá áíÜðôöic eïiáéöééiy Web. C óvýöôáP ôcò ðñiÝñ ÷åôáé åðü ôeò C, Java êáé Perl êáé

Ý ÷ áé ócí áðisáðuñðóçá íá ísóñùlåðþíâðáé óá êþæééá HTML, íà óéiðü íá áðéðñ Ýðáé óðiðò ðñiäñâiìáðéóð Ýð web íá æñ Üðiðò ãñÞaiñá ãðisáñéé Ýð éðóðiðâæßâð.

Í Apache õðiöôçñßæåé ôi PHP5. Íðiñåßôå íá îåêéíÞóåôå åãêáèéóôþíôåò ôi ðáêÝôi lang/php5.

Áí òið ðáéÝòi lang /php5 áðéáðóðóðáðé áéá ðñþþð öiñÜ, áðóðüñáðá èá óáð áiðáééðóðýü üeððo íé áðíáðÝò áðéëëáÝð OPTIONS. Áí êÜðiði íaðíý áðí áiðáíßæðóáé, ð.÷. áðáéäÞ òið ðáéÝòi lang /php5 áð÷á áðéáðóðóðáðé ðáññæðüí, iðñññðóðá ðÜðóá íá ñððìðóðáðá áððü òcðj áñ ÷ Þ òið ðáéÝòi, óñÝ ÷ iiððóðó óðið éáðÜðiði òið port:

```
# make config
```

Óóéó áðééïäÝó áâéáóðÜóóáóçò, áééæÝíôå óçí áðééïäP APACHE þróôå íá óðíðâñéëçöéåß éáé ói Úñèñùìá **mod\_php** áéá óií áîðçñâðçôþ **Apache**.

**Óciàßùócs:** ìàñéêéÝò òïðíëåóßåò ÷ñçóéíïðíëíýí áéüic òi PHP4 áéá äéÜöññò ëüäítò (ð.÷. èÝiaóðá óóïñáåðüôçôïò ï ï ãðåéäþ Ý÷ïñí þäc ååéåôåóöçíÝíåò åöäññäÝò ñï òi áðåéöiyí). Áí åßíáé áíÜäêç íá ÷ñçóéíïðíëþóåôå òi **mod\_php4** áíòß òiò **mod\_php5**, ðüôå ÷ñçóéíïðíëåßóôå òi port lang/php4. Òi port lang/php4 òïðíöôçñßæåé ðíëëÝò áðü óéò ñòèìßóåéò éáé ôéò áðééïñÝò ååéåðÜóðóçó òiò port lang/php5.

Í lá á óðóù ôíí ôññüðí éá áâéâðáðóðæjýí éáé èá ñòðèléóðöÿí óá áðáéðöÿíláíá áñèñþìáðá þþðá íá ððíðóðçñþæíðí äðíáíééÝðå áðóáññíäÝðø PHP. Áéá áðéáââáðùóç åëÝâíôå ðòù Ý÷iðí ðññóðåðëåß óóéó áíðóðóóíé÷åð åíüöçóåð ôíð /usr/local/etc/apache/httpd.conf óá áéüëíðéá:

```
LoadModule php5_module libexec/apache/libphp5.so

AddModule mod_php5.c
<IfModule mod_php5.c>
    DirectoryIndex index.php index.html
</IfModule>
<IfModule mod_php5.c>
    AddType application/x-httpd-php .php
    AddType application/x-httpd-php-source .phps
</IfModule>
```

Áöiý ieiêçñþþoåôå ôiý Ýëää÷i, æáá íá öiñðouèåß ôiý Üñèñùìá PHP ÷ñåéÜæåôáé ieá áðëþ eëþþóç iå ôçí áiðöiþþ apachectl æáá ieá éáiiþþeþ (graceful) áðáíâéþþíçóç:

```
# apachectl graceful
```

Ãááâæìíóéé Ýð áíáâæìíþóåéò ôiõ PHP, äáí áðáéôåþôáé ç åíöiïëP make config. Íé åðééäái Ýfåò OPTIONS åðièçêåýííåé áôõùìåôá áðü ôi ìç ÷ áíéóïù åâéåò Üôôáóçò ôuì Ports ôiõ FreeBSD.

Ҫ óýíèáóç ôiõ PHP óõi FreeBSD, åßíáé åâáéñâðóéêÜ ôiõié ÷ åéåéÞ, êáé í åâáóéëüò êiññùò ðiõ Ý ÷ åé åâéåðåóåðåéåß åßíáé ðiøý ðåñéñéöi Ýñò. Åßíáé ðiøý åýéïëi üiùò íá ðññiøé Ýñiõiå åðåðéò ÷ ñçóéiiðiéþíòå ôi port lang/php5-extensions. Åðôü ôi port ðañÝ ÷ åé iãñý åðééëäþí åéá ôçí åâéåðÜóðåóç ôuí åðåðéò Üóéiùí óðóðåóðéêþí ôiõ PHP. ÁíäéëåðéêÜ, iðiññåßôå íá åâéåðåóðåÞðåðå åéæåßá åðÝéðåóç iâ ÷ ùñéóðÜ ÷ ñçóéiiðiéþíòå ôi êáðÜéëçëi port.

Ãéá ðáñÜääéäíá, ãéá íá ðññioèÝóåôå óõi PHP5, ôç äõíåöüôçôá õðïoòPñéïçò ãéá âÜóåéò äääññÝüñMySQL áðëÜ  
âåéåóåôPóôå óõi port databases /php5-mysql.

ÍlāôÜ ôcí áâéâó Üóôáóç áíüò íÝiö áñèñþiáòiò P êÜðiéàò Üëëçò åðÝêóáóçò, i áîñðçñåôçòPò **Apache** èá ðñÝðåé íá åðáíáöññöùèåß áéá íá áíññäüðiéèïý íé íÝåò ñòëíßöåéò:

```
# apachectl graceful
```

### 30.8 Đñùôüëíëí ìåôáöïñÜò Áñ÷åßùí (FTP)

*ÓðíáðéóðiñÜ ôiõ Murray Stokely.*

### 30.8.1 Óýїїøç

Ôi Đñùöüêëí ìåôäöñÜð Áñ÷åßùí (File Transfer Protocol - FTP) ðáñÝ÷åé ööïò ÷ñÞóôåð Ýíáí åýêëí òñüðí ãéá íå iåôäöÝñïò ñá ãñ÷åßá ñïò ñáé ñïò Ýíáí åïöðçñåðçòÞ FTP. Ôi åáóéêü óýóôçìá ñïò FreeBSD ðåññéëåíáÜíáé Ýíá åïöðçñåðçòÞ FTP, ôi **ftpd**. Áðöü êáèéööÜ ñçí åâéåðÜóðåöç ééá ñçí åéá ÷åßñéöç ñïò åïöðçñåðçòÞ FTP ðïëü åýêëí ñðüèåöç.

### 30.8.2 Ñõèìßóåéò

Áí áðééðiåþóå íá áíðññiðiÞóåðå áíþíðiç ðñüóâáóç FTP óóii âiððçñâðçôþ óáð, éa ðñÝðåé íá äçíeïññiÞóåðå, óóii FreeBSD óýóðçìá óáð, Ýíá ÷ñÞóóç ià üññiá f tp . Íé áíþíðiíé ÷ñÞóóðò éa iðiññiý íá áéðÝñ ÷iðóáé óóii âiððçñâðçôþ FTP ià ói áâíééü üññiá ÷ñÞóóç f tp þ ià anonymous ééá ià iðiéáðÞðiôð êuäééü ðñüóâáóçò (óóíþèþæðåé íá æçóðåðóáé ç æáýéðið email óið ÷ñÞóóç ùò êuäééüö ðñüóâáóçò). Í âiððçñâðçôþò FTP éa éaëÝóåé ói chroot(2) iùëéò áéóÝëëç i áíþíðið ÷ñÞóóçò, áéá íá óið ðâññiðiþóåé óçí ðñüóâáóç, áðééñÝðiñðóáð óið iùññi óið áñ ÷éü êáðÜëiäi (home directory) óið ÷ñÞóóç f tp.

ӦðÜñ ÷ iði áyí án ÷ ábá êåéí Ýñið aéá oíí iñéoiù içíoið Üðouí êåéüñrñbóíðaðið ðið eá aðiðáíßæiðoáé óðiðoð ðaðs Üðað FTP. Óí ðaðnæá ÷ üiðaðið oíð aðið aðið ábñið /etc/ftpwelcome aðiðáíßæðaðaé óðiðoð ÷ nPóðað ðñeí óðið Üðiðið oðcí ðñiðñiðP aðeðuüið. lðað Ü aðu íeá ðaðð ÷ cí Ýíç ábñóíðaðið oðið óýðóðcið, aðiðáíßæðaðaé oí ðaðnæá ÷ üiðaðið oíð aðið ábñið /etc/ftpmotd. ÐáñáðcñnPóðað ðuò ç aéäamñP óð aðoðu oí aðið ábñið aðið aðeðP lða ðið ðaðnæá Üeëññ ðñiðóðaðcñ, aðið Ýiðu aéá oíðoð aðiðiðiðoð ÷ nPóðað oíð aðiðáíßæðaðaé oí ðaðnæá ÷ üiðaðið oíð aðið ábñið ~ftp /etc/ftpmotd.

Áöiý ñoëìßóåôå êáô Üeëçéå ôií áîõðçñåôçòþ FTP, èá ðñ Ýðåé íá ôií áîññiðÞóåôå óöi áñ ÷ åßi /etc/inetd.conf. Ôi iùñi ðiò ÷ ñåéÜæåôåé íá êÜíåôå åßíáé íá áöáéñÝóåôå ôi óýìâiëi ó ÷ iëéáöiý "#" ïðñiðóÜ áðü ôçí ððÜñ ÷ iðóá ãññiþ ftpd :

```
ftp      stream  tcp      nowait  root     /usr/libexec/ftpd      ftpd -l
```

¼ðùo àíçáÞóáíá óóii ÐáñÜäåéæáíá 30-1, ç äéåññääóßá **inetd** èá ðñÝðåé íá íáíáöiñþíåðáé áí Ý÷iøí ãßíåé áëeááÝò óóii  
áñ÷åßí ñòèìßóåùí ôçò.

Ôþná iðiñåßôå íá äþóåôå ôá óóiié÷åßá ôiõ eïiáñéåóiý óáò ãéá íá åéóÝëèåôå óóiiåiõðçñåôçôP FTP.

```
% ftp localhost
```

### 30.8.3 ÓõíôÞñçóç

ftp.info /var/log/xferlog

Đñ Ýðåé íá áßóôå áíÞìâñié ãéá óá ðñiâéÞiâóá ðíö iðñiñý íá ðáñiñôéáôöiý í ó÷åðééÜ iá óç èäéôïöñâßá áíüö áíÞföiiô åíðçñâôçôÞ FTP. Åéæéüôåñá, éá ðñ Ýðåé íá óéâôôåßôå öiâánÜ áí üíöùò åðééòìåßôå íá Ý÷iöi äöñáôüôçôå íá áíââÜæiöi áñ÷åßá íé áíÞföiié ÷ñÞóôåò óáò. Áí áóÞrâôå ôå ðñiñiäÞöiôå áíÞföii ÷ññÞóôç íá áíââÜæåé áñ÷åßá, iðññâß iâöiééÜ íá áíâéæéÿøåôå ðñùò i áîðçñâôçôÞo óáò FTP ÷ñçöéiñiðéåßôåé áéä áéæéßíçôç ðâéñâôééiy åiðññééiy eïæéóïééiy Þ æáé Üëëi, áêtiia ÷åéñüôåñü, ðáñÜññi ðëééü. ÅÜí üíöùò ÷ñåéÜæåôåé íé ÷ñÞóôåò íá Ý÷iöi Üääéá ðñiøéÞêçò áñ÷åßùí, öüôå éá ðñ Ýðåé íá ñôèiñôåôå ôéò Üääéåò Ýôóé þôôå óá áñ÷åßá åôöÜ íá içí áßíáé iñáöÜ áðü Üëëiñô åíÞföiiô ÷ñÞóôåò, Ýò üöiö íá ðÜññiöi ôçí áôöåëÞ Ýâéñéóç óáò.

## **30.9 File and Print Services for Microsoft Windows clients (Samba)**

*Contributed by Murray Stokely.*

### **30.9.1 Overview**

**Samba** is a popular open source software package that provides file and print services for Microsoft Windows clients. Such clients can connect to and use FreeBSD filesystem as if it was a local disk drive, or FreeBSD printers as if they were local printers.

**Samba** software packages should be included on your FreeBSD installation media. If you did not install **Samba** when you first installed FreeBSD, then you can install it from the `net/samba3` port or package.

### 30.9.2 Configuration

A default **Samba** configuration file is installed as `/usr/local/etc/smb.conf.default`. This file must be copied to `/usr/local/etc/smb.conf` and customized before **Samba** can be used.

The `smb.conf` file contains runtime configuration information for **Samba**, such as definitions of the printers and “file system shares” that you would like to share with Windows clients. The **Samba** package includes a web based tool called **swat** which provides a simple way of configuring the `smb.conf` file.

### 30.9.2.1 Using the Samba Web Administration Tool (SWAT)

The Samba Web Administration Tool (SWAT) runs as a daemon from **inetd**. Therefore, the following line in `/etc/inetd.conf` should be uncommented before **swat** can be used to configure **Samba**:

```
swat    stream    tcp      nowait/400    root    /usr/local/sbin/swat
```

As explained in ÐáñÜäåéäí 30-1, the **inetd** must be reloaded after this configuration file is changed.

Once **swat** has been enabled in `inetd.conf`, you can use a browser to connect to `http://localhost:901`. You will first have to log on with the system `root` account.

Once you have successfully logged on to the main **Samba** configuration page, you can browse the system documentation, or begin by clicking on the **Globals** tab. The **Globals** section corresponds to the variables that are set in the `[global]` section of `/usr/local/etc/smb.conf`.

### 30.9.2.2 Global Settings

Whether you are using **swat** or editing `/usr/local/etc/smb.conf` directly, the first directives you are likely to encounter when configuring **Samba** are:

`workgroup`

NT Domain-Name or Workgroup-Name for the computers that will be accessing this server.

`netbios name`

This sets the NetBIOS name by which a **Samba** server is known. By default it is the same as the first component of the host's DNS name.

`server string`

This sets the string that will be displayed with the `net view` command and some other networking tools that seek to display descriptive text about the server.

### 30.9.2.3 Security Settings

Two of the most important settings in `/usr/local/etc/smb.conf` are the security model chosen, and the backend password format for client users. The following directives control these options:

`security`

The two most common options here are `security = share` and `security = user`. If your clients use usernames that are the same as their usernames on your FreeBSD machine then you will want to use user level security. This is the default security policy and it requires clients to first log on before they can access shared resources.

In share level security, client do not need to log onto the server with a valid username and password before attempting to connect to a shared resource. This was the default security model for older versions of **Samba**.

```
passdb backend
```

**Samba** has several different backend authentication models. You can authenticate clients with LDAP, NIS+, a SQL database, or a modified password file. The default authentication method is `smbpasswd`, and that is all that will be covered here.

Assuming that the default `smbpasswd` backend is used, the `/usr/local/private/smbpasswd` file must be created to allow **Samba** to authenticate clients. If you would like to give your UNIX user accounts access from Windows clients, use the following command:

```
# smbpasswd -a username
```

Please see the Official Samba HOWTO (<http://www.samba.org/samba/docs/man/Samba-HOWTO-Collection/>) for additional information about configuration options. With the basics outlined here, you should have everything you need to start running **Samba**.

### 30.9.3 Starting Samba

The `net/samba3` port adds a new startup script, which can be used to control **Samba**. To enable this script, so that it can be used for example to start, stop or restart **Samba**, add the following line to the `/etc/rc.conf` file:

```
samba_enable="YES"
```

**Óçìàßùóç:** This will also configure **Samba** to automatically start at system boot time.

It is possible then to start **Samba** at any time by typing:

```
# /usr/local/etc/rc.d/samba start
Starting SAMBA: removing stale tdb :
Starting nmbd.
Starting smbd.
```

Please refer to [ÓíÞíá 12.7](#) for more information about using rc scripts.

**Samba** actually consists of three separate daemons. You should see that both the `nmbd` and `smbd` daemons are started by the `samba.sh` script. If you enabled winbind name resolution services in `smb.conf`, then you will also see that the `winbindd` daemon is started.

You can stop **Samba** at any time by typing :

```
# /usr/local/etc/rc.d/samba.sh stop
```

**Samba** is a complex software suite with functionality that allows broad integration with Microsoft Windows networks. For more information about functionality beyond the basic installation described here, please see <http://www.samba.org>.

**30.10 Óõä÷ñííéóìüò Niieiaéiy ÓõóôPìáöïò iå NTP**

*ÓõíåéóöïñÜ ôïõ Tom Hukins.*

### 30.10.1 Óýїюç

Í lá öi ðÝñáoiá öiö ÷ñüiö, öiñ niëüé óðooðþiáöiò áriùð öðiieäéóðP Ý÷åé öcí ôÜóç íá aðiøoða÷ñiißæðoáé. Öi Ðñùöuëei ×ñiiéóiiy Äeêöýuí (Network Time Protocol P NTP) ðañÝ÷åé Ýíá öñüðri aðá íá áiáóöaðbóðaðað öcí áeñßâáé öiö clock óad.

Đã cài đặt thành công. Truy cập vào trang web <http://127.0.0.1:5000> để xem kết quả.

Ôi FreeBSD æáôòbèåôáé là ôií åîôðçñåôçô P NTP ntpd(8), i iðriðiò iðriñåß íá ÷ñçóéiðièçéåß ãéá íá óðã ÷ñiíßæåé ôi ñiøueé óðóôPíáðiò ðiò ððiðræéðô P óáð, åiâð Üæiiðå Ùeëið ãîôðçñåôçô Ýð NTP P íá ðáñ Ý ÷åé i ßæéiò ððçñåðbåð óðã ÷ñiíéöiiý óá Ùeëá lc ÷áiPíåðá.

### **30.10.2 Åðééïäþ ôùí ÊáôÜëëçëùí Åîõðçñåôçôþí NTP**

Áéá íá óóða ÷ níiþóåðo ði ñíiøue óðooðPiaðoi ði ði ðiðiæðooðP óáð eá ðñ Ýðåé íá âñâðbðå Ýíáí P ðåñeðooðuðâñiðo ãéæè Ýðiðo NTP áîððçñâðcð Ýð aéá íá ÷ nícoðiðiðPóåðo. Í aéá ÷ aéñeðooðP ðæéðoýið P i ISP óáð iðiñâð íá Ý ÷ iðiðið ãâðâðooðPóåé Üðiðiði ðiððçñâðcðo P NTP aéá áðoo ði ðiðu — aé Ýâðo ðoçí ðâðiçñbñðo ðiðo íá ãâðbðå áí ððÜñ ÷ aé ðÝðiði ðâñbððoñc. Áðéðe Ýíí, ððÜñ ÷ aé iðbá online ðbðoå áîððçñâðcðþi açluiðeáð ðññúðâðo cð (http://ntp.isc.org/bin/view/Servers/WebHome), ðið iðiñâðo ði ÷ nícoðiðiðPóåðo aéá íá âñâðbðå Ýíáí eíiðeü áîððçñâðcðo P NTP. ¼ðiði ðiððçñâðcðo P eé áí áðéðe Ýâðo, aíçlaiðuðâðo aéá ðoçí ðiðeðeéðP ÷ níPóçð o ðið eáé aðcðPóåð Úâðeá íá ði ÷ nícoðiðiðPóåðo áí ÷ níðe Ùæðo aé ðÝðiði Úâðeá.

Åßíáé êåéÞ éäÝá íá åðéëÝåôå ðïëëëÝò åîôðçñåôçò Ýò NTP, íé ïöñïëé íá lçí óðíäÝïîôåé lâðååý ôïöð, óðíçí ðåññßðôùóç ðïö ëÜðïëíò åðü öiöð åîôðçñåôçò Ýò ðïö ÷ñçóëíïëíéåßôå åßíáé åðññúóéöïò Þ oí ñiëüé ôïö åßíáé ááíåñéåÝò. Í åîôðçñåôçò ntpd(8) öiö FreeBSD ÷åññßæåðåéÝ ïöðíá ðéö åðáíôÞóåéö ðïö éäíåÜíáé åðü öiöð öðñüëíëðïö åîôðçñåôçò Ýò — åðññåß öiöð ðëí åíéüðéóöïò êåé äåß ÷íåé lèéññüôåñç ðññïößíçóç óôïöð èéauôåñíí åíéüðéóöïò åîôðçñåôçò Ýò.

### 30.10.3 Ñõèìßóôå Ôï ìç ÷ Üíçìá Óáò

### 30.10.3.1 ÅáóéêÝò Ñõèìßóåéò

Áí áðééðíåðbôá íá óðá ÷ níiðæðóá ðí clock óáð íüñí éâðóÜ óçí áðééðíçóç èåðéóïðñâðá ðíð iç ÷ áÍPiâðò, óðûðá ïðñâðbôá íá ÷ níçóeïðíéÞóâðá ðí ntpdate(8). Áðóùð í ðñññðiò óðá ÷ níiðéóiiý áðíáé êáð Úëëçëiò áéá iç ÷ áÍPiâðá desktop óá iðiðbá êÜññðiò áðáðíáéêðíçóç áíÜ ðâáðéð ÷ níiðééÜ áéáðóðPiâðá êáé íüñí óð áéäééÝð ðâññððþóáð Ý ÷ iðiò áíÜâðéç óððá ÷ níiðéóiiý. ÁiðééëÝðùð, óá ððüëéðá iç ÷ áÍPiâðá eá ðññðáé íá ðññ Ý ÷ iðiò óçí èåðññâðá ntpd(8).

Åßíáé êáéÞ ðñáêóéêÞ óá íç ÷ áÍÞláóá ðïo ôñ Ý ÷ iöo ntpd(8) íá ÷ ñçóéiiðiéiyí êáé öi ntpdate(8) êáðÜ ôç äeÜñêåéá åêéßíçóçö öiöö. Öi ntpd(8) iåôááÜëéåé öi clock åâéìéåßá, åíp öi ntpdate(8) ñðèlßæåé Üíåóá öi clock áíåíÜñôçóå áðü öi ðüöi iååÜëç åßíáé c ÷ ññíéêÞ äæäöinÜ iåôáiy ðñäåiåôéêÞo éæé ôñ Ý ÷ iöoåó þñào öiöo clock öiö lç ÷ áÍÞláóiöö.

Êáá íá áiññaiðíéÞóåôå ðii ntpdate(8) êáô Ü ôçí åêëßíçóç, ðññiðéÝôå ntpdate\_enable="YES" ôðii /etc/rc.conf. Êá ðññiðé íá ðññiðéññßóåôå ôðii ntpdate\_flags üëiðo ôiñðo äéáéññéôóÝò iå ôiñðo iðiññiðo åðéëðiññßóå íá ôóða ÷ ñññßæåðôå êáé üëá ôá flag ðiðr èÝéåôå íá ôóñññåÿiði ðiñtpdate(8).

### 30.10.3.2 ÅåíéêÝò Ñõèìßóåéò

Íé ñõèìßóåéò ôíö NTP Âñßóéïíóáé óóï Áñ÷åßí /etc/ntp.conf êáé åßíáé óóç ïiñöP ðíö ðåñéñÜöåôáé óóï ntp.conf(5). Áéïïéòéåß Ýíá áðëü ðáñÜäåéâíá:

```
server ntplocal.example.com prefer  
server timeserver.example.org  
server ntp2a.example.net  
  
driftfile /var/db/ntp.drift
```

Ç åðéëïäP driftfile ðñïóäéñbæåé ðíéü áñ ÷ åßí ÷ ñçöéïðíéåbôåé æáá íá åéåðçñåß ôç ôó ÷ ñüôçôå åéüñèùçô ðíö clock ðíö ôóôòPìåò. Ôí ðñüäññáíà ntpd(8) ÷ ñçöéïðíéåß åôôüìåôå åôôP ôç ôéïP æáá íá áíðéóôåèìßæåé ôéó ôóôééÝò åðíééßôåéô ðíö clock, åðéôñÝðíöåô ðíö íá åéåðçñåß ïéá ëïäéêP ñýéïéöç, åéùïç éé áí ðíö åðåäññåôåß æáá Üðíéí ÷ ñiiééü åéÜôðciå ç ðñüôðååóç ðññio üéåô ôéô åíûôåññéÝò ðçäÝò ôóå ÷ ñiiéöïíý.

Ç åðééïäP driftfile ðñïöäéïñßæåé ðíéü áñ÷åßí ÷ñçóéïðíéåßôáé æéá íá áðíèçéåýáé ðëçñïöïñßåò ó÷åôééÜ ia ôéò ðñïçäíýïåíåò áðáíòþòåéò áðü ñïòò åíòðçñåòçöÝò NTP. Áðóù ñï áñ÷åßí ðåñéÝ÷åé åóùòåñéÝò ðëçñïöïñßåò ñïò NTP. Äáí èá Ýðñåðå íá ñïïðíéåßôáé ðóù éâïñßá Üéëç æéåññaòßá.

### 30.10.3.3 ёåä÷ ïò Đñüóâáóçò óôïí Åîõðçñåôçôþ Óáò

ĐññiâðééåâíÝíá, i âiôðçñåôçôÞò óáó NTP èá åßíáé ðññiôáÜóëii áðü üëëiò ôiñò ôüùâiñò ôóî äéäåßôðiñ. Ç åðéëiñP restrict ôóî /etc/ntp.conf óáó åðéöñÝðåé íá åéÝã÷åôå ðiéá lç÷áíPiáôá èá iðiññiý íá Ý÷iñò ðññiôáâóç ôóîí åiôðçñåôÞò óáó.

Áí áðééðíàþóôá íá áðíññþþóôá òcí ðñúðâáóç ðññò ôíír áðóðçñâðóþ óáò NTP æá üéá ôá íç ÷áðiáôá, ðññóé Ýóôá òcí áðüëiðöèç ãñáiiþ óóí /etc/ntp.conf:

restrict default ignore

Áí è Ýéåôá ìüíí íá åðéôñ Ýøåôå ôíí óôå ÷ nñíéóíü ôíö åíöðçñåôçôþ óåò là íç ÷ áíÞiaóá åíöüö ôíö äééöýíö óåò, áéëÜ  
åß ÷ ùò åöñíåðûöçôå ñýèlëéçò ôíö åíöðçñåôçôþ þ íá åßñíö nñíéüâáèìå là Üäåéá óôå ÷ nñíéóíý, öüôå áíöéèÝòù  
ðñíóééÝóôå:

```
restrict 192.168.1.0 mask 255.255.255.0 nomodify notrap
```

üðið 192.168.1.0 áßíáé ç áæâýððiðs IP ðið áæððýðið éâé 255.255.255.0 áßíáé ç iÜðéá ðið áæððýðið óáð.

#### 30.10.4 ÅêôÝëåóç ôïõ NTP Åîõðçñåôçôþ Óáò

Ãéá íá âåâåéùèåßôå ðùò i áîõðçñåôçôÞ NTP èá iâééíÜâé êâôÜ ôçí äeÜñêåéå âéêßíçôçð ôiõ ôôôðÞíäöiò, ðñïóëÝôôå ôç ãñâiÌP ntpd\_enable="YES" ôöi /etc/rc.conf. Äéá íá iâééíÞôåôå ôií áîõðçñåôçôÞ äß÷ùò íá åðåíåêééíÞôåôå ôi ïç÷Üíçíá óå, ôñÝîôå ntpd(8) ðñïóäéiñßæïíôå ëÜeå åðéôñüôåôç ðáñÜlåññí áðü óå ntpd\_flags ôöi /etc/rc.conf. Äéá ðáñÜäåéäíá:

```
# ntpd -p /var/run/ntp.pid
```

### 30.10.5 ×ñþóç ôïõ ntpd ìå Ðñïóùñéíþ Óýíäåóç óôï ¼íôåñíåð

Õî ðñüäñâíà íà ntpd(8) äáí ÷ñâéÜæåôáé íéá íùíéíç óýíääóç ôóí õíðâñíåô áéá íá äïöëÝøåé óùôôÜ. Áí Ý÷åôå íéá ðñíöùñéÍP óýíääóç ðíö åßíáé ñðõéíéóíÝíç íá êÜíäé ëëÞóåéò íÝóú ôçëåöþíò (dial out on demand), åßíáé éåëü íá íçí åßíáé ç êßíçóç äåäñíÝíü ôíö NTP ôí åßöéí ôçò ëëÞóçò P áðôòP ðíö èá êñáðÜääé åíâñäP ôçí óýíääóç. Áí ÷ñçóéíüíéåßbôå PPP ÷ñÞööç, íöðñåßbôå íá ÷ñçóéíüíéÞóåôå ôßëëõñá ôóïöö õþäééåò ðáñáðñÍPò ôíö /etc/ppp/ppp.conf, üðùò áéá ðáñÜääéåíá:

```
set filter dial 0 deny udp src eq 123
# Prevent NTP traffic from initiating dial out
set filter dial 1 permit 0 0
set filter alive 0 deny udp src eq 123
# Prevent incoming NTP traffic from keeping the connection open
set filter alive 1 deny udp dst eq 123
# Prevent outgoing NTP traffic from keeping the connection open
set filter alive 2 permit 0/0 0/0
```

Ãéá ðåñéóóüôåñåò èåðöii Ýñåéåò äåßôå ôi PACKET FILTERING óôçí åüöçôá ppp(8) eáé ôá ðáñáäåßäiáôá ôi /usr/share/examples/ppp/.

**Óciáßñúóς:** Óciáßñúóς: làñééíß ISP iðéíüññóðí ðíçí ÷ññóðí èýññáò là ÷áiçëü áñééíü, áiðíáßæññóðáò óðí NTP íá äíññéáyáé áöiy íé áðáññóðóáéò ááñí òððññóðí ðíðññóðí ìç ÷ññóðí áóò.

### 30.10.6 ĐåñáéôÝñù Đëçñïöïñßåò

Ç ôâéïçñßùöç áæá ðíöö ãíöðçñâööç Ýð NTP áæáößéâöáöç éäé öâ öüññá HTML ööï /usr/share/doc/ntp/.

# ÊåöÜëáéï 31 Firewalls

Óðíåéóöñ Ü óið Joseph J. Barbish. Íåôáôñ Üðçêå óå SGML êáé áíáíåþèçêå áðü óið Brad Davis.

## 31.1 Óýííøç

Óá firewalls ìðiñiyí íá áiéó ÷ yóíoi óciáíóéé Ü ôcí áóó Üëåáá áíüò êüìâiõ þ áíüò äééöyí. Ìðiñiyí íá ÷ nçóéiiðiécéiyí áéá íßá þ ðåññéóóüðåññåò áðü òéó áéüëëjøèåò èäéóïññåþåò:

- Íá ðñiíoôåðåýíðí êáé íá áðiññþíðíðí óéð åðoánñia Ýò, óéð oðçñåðßåð êáé óå ìç ÷ áíþiáôå ðið oðùnôåñéëíý óåð äééöýíð áðü áíåðéèýíçöç êþíçöç ðið ðñiÝñ ÷ åôáé áðü ði Internet.
  - Íá ðåñéïñþæiðí þ íá áðiðéëåñþíðí ðíç ðñyüôåáóç ìç ÷ áíçíÜôú ðið oðùnôåñéëíý äééöýíð óå oðçñåðßåð ðið Internet.
  - Íá ððiðóçñþæiðí ìåðÜöñáóç äééöðåáéþí äéåðéýíðóáù (NAT), c ïðiðá åðéðñ Ýðåé óóí åóùnôåñéëü óåð äéðéðöí íá ÷ ñíçóéiðiéåð eáéùôéê Ýò IP äéåðéýíðóéð eáé íá iññÜæåðáé îðá iñíáæéðþ óýíáðóç iå ði Internet (åßóå iñóù îðá iñíáæéðþ áçüñóéáò IP äéåýèðíðóç, åßóå iÝóù ðið ðéþeðíð áçüñðúíðí åééðéýíðóáù ðið áíåððéäíðóé åððüñáðá).

Áöiý äéáâÜóåôå áôôü öi êåöÜëáéi, èá iÝñåôå:

- Đùò íá äçíéïõñäPôåôå óùóöïýò éáüüíåò öëéöñáñBóíåòïò ðáéÝ ôùí.
  - Ôïòò äéÜöñïòò ôýðïòò firewall ðïò ñòÜñ÷ïòí ôóï FreeBSD éáé ôéò äéáöïñÝò ôïòò.
  - Đùò íá ñòëìßóåôå êáé íá ÷ñçóéïïðïéPôåôå ôï PF firewall ôïò OpenBSD.
  - Đùò íá ñòëìßóåôå êáé íá ÷ñçóéïïðïéPôåôå ôï IPFILTER.
  - Đùò íá ñòëìßóåôå êáé íá ÷ñçóéïïðïéPôåôå ôï IPFW.

Đñéí äéáâÜóåôå áðôü ôi êåöÜëáéi, èá ðñÝðåé:

- Íá êáôáííåßôå áâóéê Ýò áñ÷ Ýò ôiõ FreeBSD êáé ôiõ Internet.

## 31.2 ÅáóééÝò ííiéåò ôùí Firewalls

ÕðÜñ-: iõi áyí ááóééiõ ñõñüðié áeá ôc äçïëõññáhá eáññuú óá Ýíá firewall: i “inclusive” êáé i “exclusive”. já exclusive firewall åðéõññÝðåé ôc äéÝéåñõc ñüçò ôçò õbíçóçò, åêññù ôðü åðôþ ðiõ ôáéññÜæåé iã ôiõò eáññiâò ôiõ. já inclusive firewall Üññéé ôi áfÜðiäi. ÅðéõññÝðåé iññi ôc äéÝéåñõc ôçò õbíçóçò ðiõ ôáéññÜæåé iã ôiõò eáññiâò ôiõ, êáé åðjééññáhá iñéaPõiõa Üeei.

Óa inclusive firewalls ðñiióóÝñiñi ðíieý êáeyôåñi Ýéåã ÷ i ôçò åiåñ ÷ üìåíçò êbíçóçò êáé æá oï ëüäi áóðü ábíáé êáeyôåñá æáá óðóôPiáâ ðíö ðñiióóÝñiñi ðöçñåóßåo óóí åçìüóéí Internet. ÅéÝá ÷ iöi åðþóçò êáé óá ðáéÝóâ ðíö ðñiiÝñ ÷ iiþáé áðü oï åçìüóéí Internet iå ðñiiñéóüi ñi ëæéùóéêú óáó åßêóõi. Áðü ðñiiåðééïP, üëc ç êbíçóç ðíö åái

ÓáéñéÜæåé íå òíöö ëáíüüåö áðññþðöåöáé éåé êåôáññÜöåðåé. Óá inclusive firewalls áßíáé ãåíéÜ áóöäéÝóóñá áðü ðá exclusive, éåéþö íåéþññöí öçjáíöéÜ ðçí ðééáíüöçöá æéÝëåðöçö áíåðéèýïçöçö êßíçöçö iÝóá áðü áðöÜ.

**ÓćiałBúóć:** Åêööù êáé áí áíáöYñâôáé áéäöiñâôééÜ, üéá óá ðáñâäâBñâáôá ñòëìBóâùí êáé êáíüíùí ðïö ðáBññiôáé óá áôöù òi êåöÜéáé, äçíëññäíý inclusive firewalls.

Ç áóðÜéâáé íðiñâb íá áßíáé áéüùá éó ÷ ðñüðôâñç iá óç ÷ ñÞóç áíüò “stateful firewall”. Áðóðüò i óýðiò firewall áðiècâýåé óçí éáðÜóðáóç ôúí óoñáÝ óâúí ðiò iâðáaoÝ ñiñiði åâðñ Ýíá iÝóá áðü áðóüi, éáé áðéññÝðâé iüñi óçí èßíçóç ðiò áßóðâðáéññÜæâé iá iéá áðü ðéð ððÜñ ÷ iðñðâð ðoñáÝðâéð, P ðiò iâðéññÜ iéá iÝá óýfâðóç. Óí iâðéññÝðâçíá áâñüò stateful firewall áßíáé üöé íðiñâb íá áßíáé áðÜéüñi óá áðéññÝðâéð Denial of Service (Þñíçóçò ððçññâðßáò, DoS) áí åâ ÷ èâß ðâðóðü ÷ ñiñá ðtëëëÝð áéðÞðâéð æéá Üññéâá iÝúí óoñáÝ óâúí óá iéññü ÷ ñiñéêü æëÜóðçíá. Iá óá ðâñéóðüñâñá firewalls, áßíáé åðñáðüí íá áßíáé óoñáðáðüò éáé ôúí ayíí óoñiðâññëñíþí (óüñiði stateful üñi éáé iç-stateful) þóðâ íá áçéñññâçèâð öí aÝðéðöi firewall æéá óçí óoñâðâññéí Yíç ÷ ñÞóç.

### 31.3 ĐñïäñÜìáôá Firewall

Ôi FreeBSD Ý÷åé ôñôßá æéaoïñâôéê Ü ðñiñäñÜìláôá firewall åíóùiáôùí Ýíá ôoi åáoéêü óyóôôçíá. Åßíáé ôá: *IPFILTER* (åíùôóü åðßöçò êáé ùò IPF), ôi *IPFIREWALL* (åíùôóü åðßöçò êáé ùò IPFW), êáé ôi *PacketFilter* ôiõ *OpenBSD* (åíùôóü åðßöçò êáé ùò PF). Ôi FreeBSD åíóùiáôþíåé åðßöçò äýï ðñiñäñÜìláôá æáá æéaiüñöùóç êôéëëiöñßáò (traffic shaping, Ýéâå÷-iö ôiõ æéæéÝóëiö åýñiöò æþíçò): ôi altq(4) êáé ôi dumynet(4). Ôi Dumynet åßíáé éåôÜ ðáñÜäiöç ôôåíÜ ôôíäiÝí iå ôi IPFW, êáé ôi ALTQ iå ôi PF. Ç æéaiüñöùóç êôéëëiöñßáò æáá ôi IPFILTER iðiñâß ôç ååäñÍÝç ôôéäiP íá åßíåé iå ôi IPFILTER æáá ôi NAT êáé ôi öeëôñÜñéóïå êáé iå ôi IPFW óå ôôíäöåôíü iå ôi dumynet(4) P ÷ñçóéñiðíéþíôáô ôi PF óå ôôíäöåôíü iå ôi ALTQ. Ôüöi ôi IPFW üöi êáé ôi PF ÷ñçóéñiðíéþíýí êáíüíåð åéá íá åéÝäiöí ôçí êßíçöç ôùí ðåêÝóùí åðü êáé ðñiö ôi óyóôôçíÜ óáð, áí êáé æéæéÝóïöi åéaoïñâôéêiyò ôñüöiðöô åéá íá ôi åðéôý÷-iöi, êáé ié êáíüíåð ôiöö ÷ñçóéñiðíéþíýí åéaoïñâôéêP óyíôåíç.

Í ëüäïò ãéá ôíí iöñïßí ôí FreeBSD äéæé Ýôåé ðíëëåðé Ü firewall, åßíáé üöé äéåöñåôééíß Üíèñùðíé Ý÷iöí äéåöñåôééÝò áíÜäåò êáé ðñïöêþóåéò. Äáí õðÜñ÷åé Ýíá êáé iiiäåéü firewall ðíö íá åßíáé ôí éáëýoåñí.

I óoñaañao Ýáo ñiiõeÜ oí IPFILTER, eáeþò ié eáitúiaðo óyðiõ stateful ðiõ aéaé Ýôaé ábíráé eéaüoåñi ðiëýðeëié üoáí ÷ ñcoéiiðiëiýfóáé óá Ýíá ðåñeáÜeëí NAT, áíþ aéaé Ýôaé eáé áíóùláðùíÝíí ftp proxy oí iðiþi ðiõo áðeëðiéåb aéüia ðåñeóóuôåñi, áðeøñ Ýðiðoå áóðaéÞ óýfääóç óá áíùoåñeéiyó áiðoçñåôcô Ýo FTP.

Êáéþò üéá óá firewall ááóðæiíðóáé óóçí áðééåþñçócs ôéíþí åéÝã ÷ iø ôúí ðáéÝòúí, i äéá ÷ áéñéóðþò ðiø ðñtùéåéóáé íá åçíéiøññþðóáé ðiø ðéáíüíåð ðñÝðáé íá éáôðáííåß ðiø ôñüðí èééðiøññþðó ðiø TCP/IP, ðiø ññüëi ôúí åéáöüññú ôéíþí óóá ðááßá åéÝã ÷ iø ôúí ðáéÝòúí êáé ðùð ÷ ñçóéiøiðíéýíóáé óóçí áíðóáéëäðþ ðéçñiøiñéþí óá íéá óóíçééòíÝíç óóíññäñßá. Äéá ðááñéóðóññðóåð ðááñðóññðóåð, äéáññþðó ðiø <http://www.ipprimer.com/overview.cfm>.

## 31.4 Ôi Packet Filter (PF) êáé ôi ALTQ ôjô OpenBSD

ÁíáèåùñPècêå êáé áíciåñbècêå áðü ôüí *John Ferrell*.

Ôíí Êíyééí ôíð 2003, ç åöáññíäP firewall ôíð OpenBSD (ãfúóóP ùò PF) iåôáöÝñèçåá ôíí FreeBSD êáé Ýâæíå  
æéà Èýéíç óôçí ÓöëëíäP ôúí Ports. Ôí FreeBSD 5.3 ôíð êöéëïöüñçóå ôíí 2004, Pôáí ç ðñþþçå ãðßóçìç Ýéäïöç ç iðíßá  
ðåññéåß ÷ å ôíí PF ùò ðíþíá ôíð åááééý ðëÝíí ñðôóðþíáðò. Ôí PF åbíáé Ýíá iëíéçñùíÝíí firewall, iå ðëþíð  
÷ ãñáâöçñéóóéþí, ôíí iðíßí: åðßóçå æéà Èýðåé ðññáéñåðééÜ õððíðóþñéíç æáé ôíí ALTQ (Alternate Queuing). Ôí ALTQ  
ðññíðóÝñåé õðcñåðßåð ÁéáóóÜlééóçò Díéüôçôáð (Quality of Service, QoS).

Ôi OpenBSD Project êÜíâé åîâéñâôéêPF äiõëåéÜ óôç óõíôPñçóç ôiõ PF FAQ (<http://www.openbsd.org/faq/pf/>). Åéá ôi ëüäi áôôü, ç ðáñijýóá åíüôçôá ôiõ Åã÷åéñéäbiõ áôôéÜæåé êôññùò óôéò éääééôåñüôçôåò ôiõ PF üri áoiñÜ ôi FreeBSD, áþp ðáñÝ÷åé éâé iâñééÝò åâíééÝò ðëçñiõiññßåò ó÷åôééÜ iâ ôç ÷ñPóç ôiõ. Åéá ðei äåðôñâñâßò ðëçñiõiññßåò ó÷åôééÜ iâ ôç ÷ñPóç ôiõ PF, ðáñâéäiýiå äääáÜóôå ôiõ PF FAQ (<http://www.openbsd.org/faq/pf/>). Ðåñéóóüôåñâò ðëçñiõiññßåò ó÷åôééÜ iâ ôi PF óôi FreeBSD iðiññâßôå íá âñâßôå óôi <http://pf4freebsd.love2party.net/>.

### 31.4.1 ×ñçóéiõiéþíôåò ôá Áñèñþiáôá Ðõñþíá åéá ôi PF

Åéá íá öiñôþóåôå ôi Üñèñùìá ðõñþíá åéá ôi PF, ðñiõeÝóôå ôçí ðáñâéÜôù åñâñiP óôi óôi /etc/rc.conf:

```
pf_enable="YES"
```

ÅêôåëÝóôå ôi script åêëßíçóçò åéá íá öiñôþóåôå ôi Üñèñùìá:

```
# /etc/rc.d/pf start
```

Óçìåéþóôå üôé ôi Üñèñùìá PF äái ðññùèåôåé íá öiññùèåß áí åái âñâé ôi êáèññéóíÝí áñ÷åßí êáññùí. Ôi ðñiõåðééåñiÝí áñ÷åßí åßíé ôi /etc/pf.conf. Áí ôi áñ÷åßí êáññùí åñßóéåôåé óå êÜðiéá Üëëç ôiðièåóßá, iðiññâßôå íá ôçí êáèññóåôå ðñiõeÝóiiôåò iéá åñâñiP üðùò ôçí ðáñâéÜôù óôi /etc/rc.conf:

```
pf_rules="/path/to/pf.conf"
```

Ìðiññâßôå íá âñâßôå Ýíá ðáñÜäåéåíá ôiõ áñ÷åßí pf.conf óôií êáôÜëëiäi /usr/share/examples/pf

Ôi Üñèñùìá PF iðiññâß åðßóçò íá öiññùèåß ÷åéñiëßíçóå åðü ôçí åñâñiP åíôïëþí:

```
# kldload pf.ko
```

Ç ðõiõôPñéïçò êåôåñâñáöPò ôiõ PF ðáñÝ÷åôåé åðü ôi Üñèñùìá pflog.ko êáé iðiññâßôå íá ôçí öiñôþóåôå ðñiõeÝóiiôåò ôçí ðáñâéÜôù åñâñiP óôi /etc/rc.conf:

```
pflog_enable="YES"
```

ÅêôåëÝóôå ôi script åêëßíçóçò åéá íá öiñôþóåôå ôi Üñèñùìá:

```
# /etc/rc.d/pflog start
```

Áí ÷ñâéÜæåôå êÜðiéí åðü óâ ðñi÷ùñçíÝíá ÷åñâéôçñéóôééÜ ôiõ PF, èá ðñÝðåé íá iâðåññéùôôßóåôå ôçí ðõiõôPñéïç åéá ôi PF åðåõèåßáò iÝóá óôií ðõñþíá.

### 31.4.2 ÅðéëiäÝò ôiõ PF åéá ôií Ðõñþíá

Áí êáé åái åßíáé åðáñâßôçöí íá iâðåññéùôôßóåôå ôçí ðõiõôPñéïç PF iÝóá óôií ðõñþíá ôiõ FreeBSD, ßóùò íá èÝéåôå íá ÷ñçóéiõiéþóåôå Ýíá åðü óâ ðñi÷ùñçíÝíá ÷åñâéôçñéóôééÜ ôiõ PF ôi iðiþí åái ðâññéåíäÜíâôåé óôi Üñèñùìá ôiõ ðõñþíá: ôi pfsync(4). Ðñüéåéôåé åéá iéá øåõäi-óôóéåôP ç iðiþá åðiñéåýðôåé óôâéåñéñéíÝíåò åéëåäÝò óôií ðßíáéå êåôåôÜóåñí ðiõ ÷ñçóéiõiéåßôåé åðü ôi PF. Íðiññâß íá óôíâðåñôåß iâ ôi carp(4) åéá íá åçleïõñäçèiýí iâ ôi PF firewalls iâ åðiáñüôçôå åðôññâðôçò åéëåäPò óå ðâññðôñóç åðiõõ÷ßáò (failover). Ðåñéóóüôåñâò ðëçñiõiññßåò ó÷åôééÜ iâ ôi CARP iðiññâßôå íá âñâßôå óôi Õiþíá 32.12 ôiõ Åã÷åéñéäbiõ.

Ìðiññâßôå íá åâßôå üëåò ôéò åðéëiäÝò ðõñþíá åéá ôi PF óôi áñ÷åßí /usr/src/sys/conf/NOTES. Íé åðéëiäÝò öáßññóåé åðßóçò ðáñâéÜôù:

```
device pf
device pflog
device pfsync
```

Ç áðééïäP device pf áíâñäiðiéåß ôçí ððiôðPñéïç áéá ôi firewall “Packet Filter” (pf(4)).

Ç áðééïäP device pflog áíâñäiðiéåß ôçí ðñiáéñåôééP øåðäi-æéêôðåêP óðóéåðP pflog(4) ðiø ìðiñåß íá ÷ñçóéïðiéçèåß áéá ôçí éáðåáñåöP ôçò èbíçóçò óá Ýíá bpf(4) descriptor. Í ááðiñiáò pflogd(8) ìðiñåß íá áðièçêåýóåé ôçí éáðåáñåöP áðôP ôði óðéçñü äßöéi.

Ç áðééïäP device pfsync áíâñäiðiéåß ôçí ðñiáéñåôééP øåðäü-æéêôðåêP óðóéåðP pfsync(4) ç iðiñá ÷ñçóéïðiéåßöåé áéá íá áíé ÷íåýáé “áëëááÝð éáðÜóðåáçò”.

### 31.4.3 ÁðééïäÝò óði rc.conf

Ôi PF êáé ôi pflog(4) ìðiñiýí íá ñðëèéööiyí éáðÜ ôçí áéêßíçóç ià ôéò ðáñáéÜðù êáðåá ÷ùñßóåéò óði rc.conf(5):

```
pf_enable="YES"                      # Enable PF (load module if required)
pf_rules="/etc/pf.conf"               # rules definition file for pf
pf_flags=""                           # additional flags for pfctl startup
pflog_enable="YES"                   # start pflogd(8)
pflog_logfile="/var/log/pflog"        # where pflogd should store the logfile
pflog_flags=""                         # additional flags for pflogd startup
```

Áí ðßóù áðü áðü ôi firewall ððÜñ ÷åé êÜðiéi ôi ðééüü äßêôði (LAN) ðñiø ði ìðiñi áðééðiåßöå íá ðñiùèPðåðå ðáéÝðá, Þ áí èÝéåðá íá ÷ñçóéïðiéÞóåðå NAT, eá ÷ñâéáðåßöå áðßóçò áéá ôçí ðáñáéÜðù áðééïäP:

```
gateway_enable="YES"                  # Enable as LAN gateway
```

### 31.4.4 Äçíëiöñäßá Êáíüíùí Öéëñáñßóìáöì

Ôi PF äéáâÜæåé ôéò ñðëèßóåéò ôi pf.conf(5) (ç ðñiáðééåäiÝíç ôiðièåóßá áßíáé ôi /etc/pf.conf) êáé ôñiðiéåß, áðiññßðöåé P áðiäÝ ÷áðåé ðáéÝðá óýiøüíá ià ôiðò ëáñüíåðó êáé ôiðò ïñéóiiýò ðiø ðáñéÝ ÷íðåé óá áðü. Ç áâéåðÜóðåóç ôið FreeBSD ðáñééåíâÜíáé áñéåðÜ ððiäåßäíåðá áñ ÷åßüí ñýéiéóçò, ôçí ðiðièåóßá /usr/share/examples/pf/. Ðáñáéåëiýíá íá äéáâÜóðåóð ôi PF FAQ (<http://www.openbsd.org/faq/pf/>) áéá ðëPñç áíÜëöóç ôúí êáíüíùí ôið PF.

**ÐñiâéäiðiÞçóç:** Êáèþò äéáâÜæåóå ôi PF FAQ (<http://www.openbsd.org/faq/pf/>), íá Ý ÷åðå ôðüøç óáò üöé áéáðiñâðééÝò áéäüóåéò ôið FreeBSD ðáñéÝ ÷iø áéáðiñâðééÝò áéäüóåéò ôið PF. Ôç ááðiñiÝíç óðéäiP, ôi FreeBSD 8.x áéá íé ðñiçäiýíåðó áéäüóåéò ÷ñçóéïðiéíýí ôçí ßäéá Ýéäiöç ôið PF ðiø ÷ñçóéïðiéåß áéá ôi OpenBSD 4.1. Ôi FreeBSD 9.x áéá íáþðåñåò áéäüóåéò ÷ñçóéïðiéíýí ôçí ßäéá Ýéäiöç ôið PF ià ôi OpenBSD 4.5.

Ç çëåéôñiíéêP ëßóðå ôið FreeBSD áéá ôi packet filter firewall (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-pf>) áßíáé Ýíá êáëü íYñiø áéá íá êÜíåðå áñùðPðåéò ó ÷åðééÝð ià ôç ñýéiéóç êáé ôç èåéöiñäßá ôið PF firewall. Íç ià ÷Üóðåå íá áéÝäñåðå óá áñ ÷åßá ôçò èßóðåð ðñéí iâééíÞóåðå ôéò áñùðPðåéò!

### 31.4.5 Äïöëåýïíôáò ìå ôï PF

× ñçóéiiðiéÞóôå òî pfctl(8) áéá íá åéÝäâôå òî PF. DáñáêÜôù èá âññâôå êÜðíéåò ÷ñÞóéïåò åíôíëÝò (ååââéùèåßôå üüéÝ-åôå áéáäÜôåé ôç ðåëßää manual ôîö pfctl(8) áéá íá åâßôå üëåò ôéó áéâæÝóéïåò åðéëïäÝò):

Áíóïëþ	Óëïðüò
pfctl -e	Áíáñäïðíßçóç ôiõ PF
pfctl -d	Áðåíáñäïðíßçóç ôiõ PF
pfctl -F all -f /etc/pf.conf	Áéáñäöþ üëùí ôùí éáíüüùí (nat, filter, state, table, ê.ë.ð.) êáé åé íÝiõ áíÜäñúóç áðü ôi áñ÷åßí /etc/pf.conf
pfctl -s [ rules   nat   state ]	Åéôýðùóç áíáññíÜ ðó ðåééÜ íà ôiõ ðéáíüüíå ôiõ ößëöñiõ, ôiõ NAT, þ ôiõ ðßíáéá êáôÜóôáóçð
pfctl -vnf /etc/pf.conf	ÅéÝä÷åé ôi /etc/pf.conf ãéá ëÜèç, áéëÜ åái öiñôþíåé ôiõ ðéáíüüíå

### 31.4.6 Åíåñäïðïßçóç ôïõ ALTQ

Ôi ALTQ æáôôßéâôáé iüíí áí iåôâäëùôôßôåôå áðåôëâßáô ôçí ôðîóôPñéïç ôiô ïÝóá óôíï ôðñPíá ôiô FreeBSD. Ôi ALTQ äáí ôðîóôçñßæåôåé áðü üeá ôá ðñiññÜiiåôå iäPñçóçô êâñôþí åéêôýïö. Ðáñâéäëïýiå åâßôå ôç óâëßää manual ôiô altq(4) æáô ôç èßôôå ôúí iäçâþí ôiô ôðîóôçñßæiïôåé ôôçí Ýéäiôç ôiô FreeBSD ôiô åéâéÝôåôå.

Íé ðáñáê Üôù áðéëïá Ýò ôiõ ðõñÞíá áíâñäiðëíéýí ôi ALTQ êáé ðáñ Ý ÷ iõí áðéðñüóèåôåò ëåéöiõñäßåò:

```
options      ALTOQ
options      ALTOQ_CBQ      # Class Bases Queueing (CBQ)
options      ALTOQ_RED     # Random Early Detection (RED)
options      ALTOQ_RIO      # RED In/Out
options      ALTOQ_HFSC    # Hierarchical Packet Scheduler (HFSC)
options      ALTOQ_PRIQ    # Priority Queueing (PRIQ)
options      ALTOQ_NOPCC   # Required for SMP build
```

Ç ãñáìíþ options ALTQ áíåñäiðiéåß ôi ðëáßóéi èåéôiõñäéþí ALTQ.

Ç ãñàííP options ALTQ\_CBQ áíñâñáðíéåß ôi Class Based Queueing (CBQ). Ôi CBQ óáo åðéóñÝðåé íá ÷ùñþóåôå ôi áýñïò æþíçò iéáò óýíååóçò óå äéáöiñåôééÝò êëÜóåéò P iññÝò, þóôå íá äþñíiôáé ðññöåñáéüôçôåò óóçí êþíçóç áíÜëñää íá ôiñòó éáitíåò ôiñ öþëèññò.

Ç ãñáííP options ALTQ\_RED áíáñáííðíéåß ôi Random Early Detection (RED). Ôi RED ÷ñçóëííðíéåßôáé æáá íá áðíöåôò÷èåß ç óóíöüñçóç ôiõ äéêöýíö. Äéá ôi óéïðü áôôü, ôi RED iåôñÜåé ôi iÞéïö ôçö iõñÜö éáé ôi óôåññßíáé tå ôi iÝáéööí êáé åéÜ÷éööí üññéí ôçö. Áí ç iõñÜ åßíáé ðÜù áðü ôi iÝáéööí, üéá ôá iÝá ådáéÝóá èá áðíññßðööíöáé. Óýíöùíá êáé åí ôi üññá ôiõ, ôi RED áðíññßðöåé ðáéÝóá aðü åéÜöññåðó ôóíäÝóåéò iå ôõ ÷ áßí ðññüðí.

C  $\tilde{a}$  $\tilde{n}$  $\tilde{a}$  $\tilde{i}$  $\tilde{P}$  options ALTO\_RIO  $\tilde{a}$  $\tilde{i}$  $\tilde{a}$  $\tilde{n}$  $\tilde{a}$  $\tilde{i}$  $\tilde{o}$   $\tilde{e}$  $\tilde{a}$  $\tilde{B}$   $\tilde{o}$  $\tilde{i}$  *Random Early Detection In and Out.*

Ç ãñáiiP options ALTQ\_HFSC åíåñáiiðíéåß ôi *Hierarchical Fair Service Curve Packet Scheduler*. Åéá ðåñéóóúôðåñåò ðëçñïöiñßåò 0 : åôééÜ ià ôi HFSC ååßôå: <http://www-2.cs.cmu.edu/~hzhang/HFSC/main.html>.

Că înțelegem options ALTQ\_PRIQ să fie înțelesă ca fiind *Priority Queuing* (PRIQ). În PRIQ se încadrează într-o anumită clasă de prioritate.

Ç anñiñíb options ALTQ\_NOPCC áiáññiñiñéåß ðçí ððiñößñéïç SMP æáá ði ALTQ. Ç åðéëíäb áðöP áðáéöåßöðáé öå ðööößñiñá SMP.

## 31.5 ÖI IPFILTER (IPF) Firewall

Í óooääñääö Ýáó ôiö IPFILTER åßíäé i Darren Reed. Ói IPFILTER ääí åiâñôÜoáé åðü ôi eäéöiõñäéü óyóöçìä: åßíäé ieá åooäñiiäP áiíééöiy êþäééá ðiö Ý÷åé iåôåöåñeåß ôi FreeBSD, ôi NetBSD, ôi OpenBSD, ôi SunOS, ôi HP/UX eäé ôi Solaris. Ói IPFILTER åßíäé öðü äeánñeP eäé åiâñäP áiÜððöñç eäé öðöñiøñçöç, eäé ñðëeëiõñiýí óaêðééÜ ié íYåò ååäüüóåéö ôiö.

Ói IPFILTER áðíáé Ýíá firewall êáé ìç÷ áíéöiùò NAT ðiò ëåéöiòññåß óòí ððñPíá êáé ìðiññåß íá åéÝá÷ åðåé êáé íá ðáñáéïëiòèåßöåé áðú ðññiññUììáðá ÷ ñPööç. Íé éáíüíåò òiò firewall ìðiññýí íá ðßèåíöåé óå éó÷ ý P íá åéáññÜöiiöåé iÝóù òiò áïçèçöééiy ðññiññUììáðò ipf(8). Íé éáíüíåò åéá òi NAT ìðiññýí íá ðßèåíöåé óå éó÷ ý P íá åéáññÜöiiöåé iÝóù ðiò áïçèçöééiy ðññiññUììáðò ipnat(1). Ói áïçèçöééù ðññuññáìà ipfstat(8) ìðiññåß íá åéðöðþöåé óåðåéööéé ðé ãéðYéåçöåéá òiò Þíá òiò IPFILTER ðiò åéðåéåßöåé óòí ððñPíá. Ói ðññuññáìà ipmon(8) ìðiññåß íá êáðåáññÜøåé ôéò áíÝññåéåò òiò IPFILTER óòí áñ ÷ åßá êáðåáññåòPò óòíà Üòíùò òiò óòðóòPíáòiò.

Óði IPF ãñ Üöçêå áñ ÷ éé Ü ÷ ñçóéiiðiéþíóå íéá ëíæéþ áðâiññáóßáó éáíüíúí ðiõ ôýðiõ “í ôâéäðôáßí éáíüíáð ðiõ ôáéñéÜæé, áßíáé éáé i íééçôÞð” éáé ÷ ñçóéiiðiéýóå iùíí éáíüíåð ôýðiõ stateless. Íå ðíç ðÜñíäí ðiõ ÷ ñüííõ, ói IPF áâéöéþþçéå áæá íá ðâñééáíáÜíåð ðíç áðééïäþ “quick” éáé ðíç áðééïäþ “keep state” áæá stateful éáíüíåð. Íé áðééïäÝð áðôÝð áéðôðá ÷ ñüíéðáí áññáíåðéÜ ðíç ëíæéþ áðâiññáóßáó ðiõ éáíüíúí. Ç áðßóçìç ôâéíçñßúñóç ðiõ IPF éáéÝðôåé iùíí ðeò ðáééÝð ðáññáíÝðñiõò ñýëíéçò éáé áðâiññáóßáó ðiõ éáíüíúí. Íé óýä ÷ ñiíðåò éáéòññáßåò éáéÝðòíóáé iùíí ùò ðññüðéåðåð áðééïäÝð, éáé Ýðóé áái ðiñßæíðáé áññéåðÜ ðá ðéáíüíåðéÞriáðá ðiõð óðç áçíéiññáßå áíüð ðiëý éáéÝðâññiõ éáé áóðæéÝðóåññiõ firewall.

Íé iäçãßåò ðiö ðåñéÝ ÷ iiöáé óå áôôP ôçí áiüöçôá, ááóßæïîdáé óôc ÷ nPóç êáíüúí ðiö ðåñéÝ ÷ iöí ôçí áðéëiäP “quick” êáèþò êáé ôçí stateful áðéëiäP “keep state”. Áôöü áßíáé êáé òi ááóéëü ðëáßóëi êåéöiöñäéþí ãéá ôçí äçíëiöñäßá òiö óåô êáíüúí áiüò inclusive firewall.

Áéá ëåðöii Ýñåéåò ó÷ åôéêÜ iå öií ðáëéüôåñii ôññüðii åðåññáóßáò ôùí êáíüíùí, äåßöå:

[http://www.obfuscation.org/ipf/ipf-howto.html#TOC\\_1](http://www.obfuscation.org/ipf/ipf-howto.html#TOC_1) èáé <http://coombs.anu.edu.au/~avalon/ip-filter.html>.

Iðiñåßôå íá äåßôå ôi IPF FAQ óôçí ôiðièåóßá <http://www.phildev.net/ipf/index.html>.

Íðiñáþóá íá ânáþóá óéó Þáæáéüôðñåð áæìíóéáýóáéó óéó ëßóðóá ðóá ÷ öäññíâßiö óiö IPFILTER óiöi  
http://marc.theaimsgroup.com/?l=ipfilter. Ðáñ Ý ÷ áðáé áæiáðüôçóá áíáæ Þóçóçò.

### 31.5.1 Åíåñäïðïéþíôáò ôï IPF

Ôi IPF ðåñéêáíáÜ íåðåóé óðôc áâáðéêP áâéâðóáð Üðóðåóç ôið FreeBSD ùð Üñèñùìá ôi iðiðiñåb íá öiñðòùèåb ÷ ùñéðóÜ. Ôi óýóðçíà èá öiñðþðåé äðiáíéêÜ ôi Üñèñùìá ôið IPF áí ôðÜñ÷åé ç éåðå ÷ þñéóç ipfilter\_enable="YES" óðîí áñ÷åßi /etc/rc.conf. Ôi Üñèñùìá Ý÷åé áçìéïññçéåb íå áíñññiðiéçíÝíç óçí äðiáðüöðçóá éåðåáññäöÞò ééå íå óçí áðééïäP default pass all. Äéá íå áéëÜññðå áðóðP óçí ðñiâðééïäP óå block all, iðiññåðóå áðëþò íå ðñiøéÝóåðå õiié éáíññá áðüññéðçò (block all) óði ðÝëò òuí éáíññúí óåò. Äåí ÷ ñåéÜæåðåé íå íåðåáññðóðóå õçí áðééïäP IPF óði ððñÞíá ôið FreeBSD äéá ôi óéïðiú áðóði.

### 31.5.2 ÅðééëjáÝò áéá ôíí ÐöñÞíá

Äáí åbíráé öðii ÷ náñùôéeu íá iådåáæüñôôþóåôå öðeo ðánñáé Üòu åðeëëiä Ýò öðií ððñþíá öi FreeBSD æá íå åíññäiðiéþoåô ði IPF. Ç ðáññiðóþáóç öiðö ãäþ åbíráé êáèéñá Ü åíçìåñùôéþ. Áí iådåáæüñôôþóåôå öi IPF áðåöeåßáó öðií ððñþíá, äáí èá ÷ nçöeñiðíecéåß ðjö Ý òi áðiþööié ÷ i Üñññùìä.

Óóii áñ÷åßii /usr/src/sys/conf/NOTES èá âññåßôå ðáññääåßäíåóá êáóá÷ùñßóåùí IPF æá ôi áñ÷åßii ñýèléóçò ôiõ ðõññÞíá. Íé åðéëíäÝò åñôÝò øáßññóáé åðßöcò ðáññäûÍÛòù:

```
options IPFILTER  
options IPFILTER_LOG  
options IPFILTER_DEFAULT_BLOCK
```

Цåðéëïäþ options IPFILTER åíâñäüðíèåþ ôçí ðöñóðþñéïç äéá ôi “IPFILTER” firewall.

Ҫ ǻðéëïäþ options IPFILTER\_LOG ǻíâññäðíèåþ ôçí ðötióðIþñéç ǻáðåññäöþò ðöi IPF, ҫ iðiñá ãñÜöåé ôðôçí ǻðåññäöþò ðötióðIþñéç ǻáðåññäöþò ðáæ Ýðùí ip1 áæá êÜëå ǻáññüá ðöi ǻññéëálaÜíåé ôçí ǻðéëïäþ log.

C áðeéíap options IPFILTER\_DEFAULT\_BLOCK aðeéÜæáé ócí ðípiáðééðáíÝíc óðilðáñéðíñÜ, þróðá êÜðá ðáæÝóí ðíð aði óáéñéÜæáé íá Úðiðíéí éáisíða pass óið firewall, íá áðiññþððóðááé aððuñáðá.

Íé ðáñáðÜù áðeeëiäÝò èá áíâñäïðíéçëiý íüñí áöiý ìåðåæëùôôßóåô êáé áâæáôáôôÞóåôá Ýíá ðññóáññíòíÝíi ðõñÞíá ðiñ íá ôéó ðåñééâíäÜíâé.

### 31.5.3 ÄéáèÝóéìåò ÅðééëäÝò äéá ôï rc.conf

×ñåéÜæåôå ôéò ðáñáêÜôù êåôå÷ùñßóåéò óôï /etc/rc.conf ãéá íá åíåñäïðíéÞóåôå ôí IPF êåôÜ ôçí åêéßíçóç ôíðíëíæéôðÞ:

Áí ðþóù áðü áðóù ói firewall óðÜñ ÷ áé êÜðiéi LAN ðið ÷ ñçóéñiðíéåß áðóíðóí Ýíåò éæúðéé Ýò áéððéýíðóáéó, èá ÷ ñâéáðóåß íá ðñiðé Ýóåðá óéó ðáñáðé Üðóù éáðóá ÷ ùñþðóåéó áéá íá áðññiðíé Þóðåðá òc éðéóðiññá NAT:

```
gateway_enable="YES"          # Enable as LAN gateway
ipnat_enable="YES"            # Start ipnat function
ipnat_rules="/etc/ipnat.rules" # rules definition file for ipnat
```

### 31.5.4 IPF

C áíóïëP ipf(8) ÷ ñçöéïïðéåßôáé ãéá íá öïñôþóåé ôi áñ ÷ åßi ôùí êáíüíüí. ÖôöéïëäéêÜ, èá äçìéïñäþóåôá Ýíá áñ ÷ åßi iå ôiøò aééïýò óáò ðññöáñïòí Ýíñò êáíüíåò êáé èá áíöéêåôåôþóåôá iå áðöüü âíïëéþñiò ôiøò áíöùíåòí Ýíñò êáíüíåò ôiøò firewall:

```
# ipf -Fa -f /etc/ipf.rules
```

C åðéërâP -Fa áääåéÜæåé öïjöò êáíüjåò áðü öïjöò áóùôåñéëïvò ðßíáéåò öïjö firewall.

C åðéëjäP -f êáèjñßæåé ôí áñ÷åßí ôùí êájüñí ðíö èá öjñôùèåß.

Áðóð úáo áðíáéð ócí áðíáðóðóðóá íá áæð Ülåðóð óiñ áñ ÷ ðáðí éáíüúí óáð, íá áðóðáæ Ýðóðóð ócí áðíðéð IPF ðiðð áðáð Ýñáíå ðáñáð Üfù, éáé íá áíáíåþðóðóð íå áðóð úiñ ðóñüðí ðiðð éáíüíðó óðír firewall ðiðð áðóðáæððóðé Þáç íå éáéíýñáæððóð, ÷ unñþò íá ÷ ñáéáðóðáð íå áðáðíáðééðÞóðóð óiñ óýðóðíçá óáð. C iÝðíæð ðiðð áðóð ðáðíáéð ðiððéy áiðééð ðiðð áðáð ðiðð éáíüíðóð, éáèþò iðiññáð íå áðáðíáëcðéð ðiðð Ýð ðiððééð.

Äåßôå ôç óåëßää manual ôiõ ipf(8) ãéá ëåðöññÝñåéåò ó÷åöéêÜ iå ôéò õðüüëiéðåò åðéëiäÝò ðiõ iðiñåßôå íá ÷ñçóëiïðiëÞoåôå iå ôçí åíöiëÞ åôôÞ.

Ç åíöiëÞ ipf(8) áíaiÝfæé Yíá áðëü áñ÷åßí êåéiÝñiõ ùò áñ÷åßí êáíüüñi. Äåí èá äå÷èåß áñ÷åßí êáíüüñi åñåññYíí ùò script iå ôðiâiëééYò áíôéêåôåôÜôåéò.

ÕðÜñ÷åé ùóðüööi ôñüðiò íá åññÜøåôå êáíüüñiò IPF ðiõ íá ÷ñçóëiïðiëiýí ôçí éó÷ý ôùí óðiâiëéêÞí áíôéêåôåôÜôåùí. Äéá ðåñéooüôåñåò ðëçñiöiññåò, äåßôå ôiõ ÕìÞia 31.5.9.

### 31.5.5 IPFSTAT

Ç ðñiåðééäåñÝíç óñðåñéöiñÜ ôiõ ipfstat(8) åßíáé íá áíåéôÜ êáé íá áðåéëiñßæåé ôi ÿíëi òùí óðåôéôôéêÞí ðiõ óðåéåôåñþèçêåí ùò åðiöÝëåñiá ôçò åðåññäÞò ôùí êáíüüñi ôiõ ÷ñÞöôç óðå åðéÝñ÷iñôåé êåé åññYíñ÷iñôåé åðü ôi ipf -z.

Äåßôå ôç óåëßää manual ipfstat(8) ãéá ëåðöññÝñåéåò.

Ç ðñiåðééäåñÝíç Yíññiò ôçò åíöiëÞò ipfstat(8) èá iñéÜæåé iå ôçí ðåñáéÜôù:

```
input packets: blocked 99286 passed 1255609 nomatch 14686 counted 0
output packets: blocked 4200 passed 1284345 nomatch 14687 counted 0
input packets logged: blocked 99286 passed 0
output packets logged: blocked 0 passed 0
packets logged: input 0 output 0
log failures: input 3898 output 0
fragment state(in): kept 0 lost 0
fragment state(out): kept 0 lost 0
packet state(in): kept 169364 lost 0
packet state(out): kept 431395 lost 0
ICMP replies: 0 TCP RSTs sent: 0
Result cache hits(in): 1215208 (out): 1098963
IN Pullups succeeded: 2 failed: 0
OUT Pullups succeeded: 0 failed: 0
Fastroute successes: 0 failures: 0
TCP cksum fails(in): 0 (out): 0
Packet log flags set: (0)
```

¼ôáí ÷ñçóëiïðiëçèåß ç åðéëiäÞ -i ãéá ôá åéôåñ÷üìåíá Þ ç åðéëiäÞ -o ãéá ôá åîåñ÷üìåíá ðåéÝôá, ç åíöiëÞ èá áíåéôÞoåé êåé èá áðåéëiñßåé ôçí áíôßööié÷ç ëßöôá êáíüüñi ðiõ åßíáé ååéåôåôçìÝíç êåé ÷ñçóëiïðiëåßôåé åðü ôiñÞíá ôç ååäññYíç óðéäiñÞ.

Ç åíöiëÞ ipfstat -in ååß÷íåé Yíá áñéëiçìYíí ðßíáêå êáíüüñi åéá åéôåñ÷üìåíá ðåéÝôá.

Ç åíöiëÞ ipfstat -on ååß÷íåé Yíá áñéëiçìYíí ðßíáêå êáíüüñi åéá åîåñ÷üìåíá ðåéÝôá.

Ç Yíññiò èá iñéÜæåé iå ôçí ðåñáéÜôù:

```
@1 pass out on xl0 from any to any
@2 block out on dc0 from any to any
@3 pass out quick on dc0 proto tcp/udp from any to any keep state
```

Ç åíöiëÞ ipfstat -ih ååß÷íåé ôiñ ðßíáêå êáíüüñi åéá ôá åéôåñ÷üìåíá ðåéÝôá, ôiðièåôÞíôåò iðññöôÜ åðü ôiñ êÜeå êáíüüñi Yíá áñéëiü ðiõ ååß÷íåé ðüóåò öiñÝò Y÷åé ÷ñçóëiïðiëçèåß.

Ҫ áíööþ ipfstat -oh áab- ÷ íáé oíí ðþíáéá eáíüñú áæá óá áiâñ- ÷ ülñáá ðáê Yóá, oíðièåðþíóáð lðññóðÜ áðü oíí eÜéå eáíüñá Yíá áñééìü ðið áab- ÷ íáé ðüóðå oíñ Yóá Ý- ÷ áé- ÷ nçóéiiðièçéåß.

```
2451423 pass out on x10 from any to any  
354727 block out on dc0 from any to any  
430918 pass out quick on dc0 proto tcp/udp from any to any keep state
```

### **31.5.6 IPMON**

Ãéá íá ëåéðiõñäPóåé óùóôÜ ç åíóïëP ipmon, èá ðñÝðåé íá åíãñäðiéçèåß ç åðéëiäP IPFILTER\_LOG óôii ðõñPíá. Ç åíóïëP åðôòP äéæé Ýôåé åyïí äéäöiñâôðéëiyò ôñüüðiòò èåéðiõñäßáò. Í ðñiâðééâaiÝìò éáññéëüò ôñüüðiò èåéðiõñäßáò åíãñäðiéåßôåé üöáí c åíóïëP ÷ñcöéïðiéåßôåé ÷ñkñò õcí åðéëiäP -D.

Ç áíóïëëP iðiññáß íá ÷ nçóéïiðiñéëåß óá ëäéööññáß ááßííá üöörá áåðéëöiññóá íá Ý ÷ åðåá Ýíá óðóá ÷ üiññáíí áñ ÷ åßíí  
éåðåáññáöPò þóôá íá iðiññáßóá íá åíâôÜóåðå ðéò ðññïçäÿýiññåò ååññáöÝò. Áðóüò åßíáé éåé í ôññüðiò lå ôíí iðiñßí Ý ÷ åé  
nñðéïéöôåß íá óðóáññáÜæåðåé öi FreeBSD lå ôí IPFILTER. Öi FreeBSD Ý ÷ åé åíóùíåðùí Ýíç äðíáûööçôá åíáëëåäPò  
áñ ÷ åßíùí èåðåáññáöPò. Åéá áðóü ôí ýüäí, åßíáé èåéýöðåñí ç éåðåáññáöP íá åßíåðåé iÝóù ôiñ syslogd(8) ðáñí Ü óá Ýíá  
óðóíçééöí Ý ÷ åñ ÷ åßíí. Áðü ðññiåðéëëäP, ç ñýéïéöç ipmon\_flags óóïí áñ ÷ åßíí rc.conf ÷ nçóéïiðiñéëåß óéò åðéëëäÝò  
-Ds;

```
ipmon_flags="-Ds" # D = start as daemon  
                  # s = log to syslog  
                  # v = log tcp window, ack, seq  
                  # n = map IP & port to names
```

Óá ðéäííðæôðíáóá ôçò éáôáñáðÞò áßíáé ðññöáiP. ÐánÝ ÷ áé ôçí äöíáðüöçôá åðéóëüðçóçò ðëçññöiñéþí üðùò óá ðáéÝðâ ðiõ áðññþðöéçéáí, ôéò áéðóëýíóåéò áðü ðéò ðiñßåð ëÞðéçéáí, éáé ðiñññéóíü ðiñðò. ÷ áôá ÝðóéÝíá õçíáðéüü ðéäííÝéöciá üöôá ðññöðåèåðôá íá áíáñùñþðôåðâ Ýíá áéóäiëÝá.

Áéüìà éáé üiôáí áiâññïðiéPóåôá ôçí äoíáöüôçôá éáôáäññäöPò, òií IPF äáí èá éáôáäññÜøåé ôßðiöá áí äáí Ý÷åé áßíåé ç áiôßôöiíé-ç ñýèléöç ôöiíöö ëáíüíå. Í áéá÷åéñéööPò öií firewall áðiöáóßæåé áéá ðiéiöö éáüüíåö òiö öåô èÝëéå íá áiâññïðiéPóåé ôçí éáôáäññäöP, ééé ðññiöé Ýöåé óå áööiyö ôçí èÝíç log. ÖööéiíäééÜ, ç éáôáäññäöP áiâññïðiéåßöåé iüññ óå êáíüüíåö ðiö áðiññßööiöö ðáééÝöå.

Åßíáé ðiæý oóíçèéóí Ýíí íá ðåñééáíà Üíåôáé Ýíáò eáíüíáò oóíi ôÝeiò oíiô oóíüíeiô, ðiø íá áðiññßðôåé áðü ðñiåðééíäþ üéá ðåê Ýóå ðiø oóÜñíöí ÍY ÷ né åéåß (default deny). ïå oíiô ññüði áðoü ìðiññåßôå íá äåßôå üéá óå ðåê Ýóå ðiø äåí ðåßñéáííí íå eáí Ýíí eáíüíä òíiô óåô.

### 31.5.7 Éáôáãñáöþ ôïõ IPMON

÷ñçóéiiðieåß áðü ðñiðééiäp ñi local0 ùò üññá “facility”. Áí ôi åðééðiåßôå, iðiñåßôå íá ÷ñçóéiiðieþóåôå óá ðáñáêÜôù áðþðåäá æá ðåñáéöÝñù äéá ÷ùñéóïü ôúí äääïïÝñùí êáôáñáöÞò:

LOG\_INFO - packets logged using the "log" keyword as the action rather than pass or block.  
 LOG\_NOTICE - packets logged which are also passed  
 LOG\_WARNING - packets logged which are also blocked  
 LOG\_ERR - packets which have been logged and which can be considered short

Áéá íá ñoëiðóåôå ói ïPFILTER íá êáôáññÜöåé üéá óá äääïïÝñá óóï /var/log/ïpfilter.log, èá ÷ñåéåóôåß íá äçieïðiñåþóåôå áðü ðñéí ñi áñ ÷åßi. Áðôü iðiñåß íá åßíåé íå ôçí ðáñáêÜôù áíðiëÞ:

```
# touch /var/log/ïpfilter.log
```

Ç åééðiñåßá óið syslogd(8) iðiñåß íá ñoëiðéóôåß íå êáôá ÷ùñþóåéò óóï áñ ÷åßi /etc/syslog.conf. Ói áñ ÷åßi syslog.conf ðñiðöÝñáé õçiaiðééÞ åðåééiþá óóï ðñüði íå ñi iðiði ñi syslog áíðiñåðùðþæåé óá ìçiyáðá óððóðþiáði ðið ðñiÝñ ÷iðåé áðü åðáññiäÝñ ùðùò ñi ïPF.

ÐñiðéÝñåå óçí ðáñáêÜôù êáôá ÷þñéóç óóï áñ ÷åßi /etc/syslog.conf:

```
local0.* /var/log/ïpfilter.log
```

Ói local0.\* óçiaiðiðéÞóåôå óéò áeeäãÝñ óóï /etc/syslog.conf èá ðñÝðåé íá åðáñåéééÞóåôå ói ñiç-Üíçia Þ íá áíáñéÜóåôå ói syslogd(8) íá íáñáééâÜóåé ói /etc/syslog.conf, åðôåéþiðåò óçí åíðiëÞ /etc/rc.d/syslogd reload

Íçí íå ÷Üóåôå íá ñiñiðiðéÞóåôå ói /etc/newsyslog.conf þóôå íá áíáééÜóåé ói áñ ÷åßi êáôáñáöÞò ðið áçieïðiñåþóåôå ðáñáðÜñù.

### 31.5.8 Ç ñiñöÞ ôùí ìçíðiÜôùí ÉáôáñáöÞò

Óá ìçiyáðá ðið ðáññÜññóåé áðü óçí ipmon áðiðåééýñóåé áðü ðåñåßá äääññÝñùí ðið ÷ùñþæiiðåé áðü eäðeü äéÜóðçia. Óá ðåñåßá ðið åßíåé eitíÜ óá üéá óá ìçiyáðá, åßíåé óá ðáñáêÜôù:

1. Ç çiññiçíþá ðáñáéååÞò ñið ðåéÝñò
2. Ç þñá ðáñáéååÞò ñið ðåéÝñò, ÷åé óçí ñiñöÞ HH:MM:SS.F, ç iðiðá ñiðiäçëþíåé þñåò, eäðôÜ, äåðôåñüëåðôå êáé eëÜóñååå ååðôåñiðéÝñò (ðá iðiðá ñiðiñåß íá åßíåé ðrëëÜ ååééåééÜ þçößá).
3. Õi üññá òçò åéåðåöÞò óóçí iðiðá Ýñéå íå åðåññååå ñið ðåéÝñò ð. ÷. dc0.
4. Í áñéèìüò ñiÜäáò éáé i áýñùí áñéèìüò ñið êáññíá, ð. ÷. @0:17.

Ìðiñåßôå íá ååßôå óá ðáñáêÜôù íå ôçí åíðiëÞ ipfstat -in:

1. Õi åßäiò òçò åíÝññåéåò: p áí ôi ðåéÝñóå, b áí ôi ðåéÝñóå áðiññþöèçêå, S æá óýññi ðåéÝñ, n áí ååí ðåßñéåíå íå êáíÝñá êáññíá, L æá êáññíá íå êáðåññåöÞ. Ç óåéñÜ ðñiðåññåéüðçôå ñið óóçí åðåééüéóç ôùí ðáñáðÜñù, åßíåé S, p, b, n, L. Õi êåðåéåßi P Þ ñi B óçiaßi ñiðiñåß íüðé ç êáðåññåöÞ ñið ðåéÝñò Ýñéå íå ëüñùí êÜðiéå ãåíééÞò ñyééóçò êáðåññåöÞò êáé ü ÷é ååééôßåò êÜðiéi ëáññíá.

2. Íe äéåööyéyíöåéö. Ðñüéåööåé ööçí ðñäääööéüööçöá áéá ôñßá ðääßá: öç äéåyéëööç êáé ôç èýñá áöåööçñßáö (÷ùñßæïööåé iå èüüìá), öï óyïäiïëi -> éáé ôçí äéåyéëööç êáé èýñá ðñiiñéöiÿ, ð.÷. 209.53.17.22,80 -> 198.73.220.17,1722.

3. Öi PR áeiëiõeïyìåii áðü öi üiñiá P öií áñéèiü öiö ðñùöiêüëeïö, ð.÷. PR tcp.

4. Ôi len áéííëiöðéiyáïñ áðüi õi lþéiò óçò áðééñóáæßááð éáé ði ðiññééññ iþéiò ðið ðáéÝñòi, ð.÷. len 20 40.

Áí ðñüéåðóáé áéá ðáéÝôí TCP, èá ððÜñ-åéÝá áðéðëÝíí ðåäåßí ðí iðißí èá íååéíÜåé íå íéá ðáýéá êáé èá áéíëiðéåßôáé áðü ãñÜìíåôá óá iðißá áíðéóöïé ÷ íyí óôéò áðéëíäÝò (flags) ðið Ý ÷ iðí óåéåß. Äåßôá ôç óåëßää manual ipf(5) áéá ôç ëßóôá ðùí ãññííÜðùí êáé ðùí áíðóöïé ÷ úí flags.

ÁÍ ðñüêåðóáé áéá ðké Ýôí ICMP, éá ððÜñ÷ iöí áyí ðâäbá óöí ôÝëìò, ôí ðñþðí ëá áßíáé ðÜíôá “ICMP” éáé ôí áðüùlåñí éá áßíáé i òýðiò ôiö içíyíáöiò éáé ôiö ððü-ìçíyíáöiò ICMP, ÷ùñéóí Ýíá iå iéá êÜeåöi, ð.÷. ICMP 3/3 áéá Ýíá iÞíóíá iç ðñiöáÜóéíçò èyñáò (port unreachable).

### 31.5.9 Äciéïõñãßá Script Éáíüíùí ìå Óõìâïëéêþ ÕðïéáôÜóôáóç

Iñeoí Ýiié Ýiðåæñié ÷ nPóôåð ôiõ IPF äciëiøñaiyí Ýíá áñ÷åßí éáíüñiú ôi iðiñsi iðiññåß íá åêðåæåðåßù script iå äðiáðuöçdå ôiðiññéêPò ôiðiññéêÜðåðåçdå. Ôi åáðééü üöðæiò ôiõ dñáñáðÜiù, åßíáé üöé ÷ nñåéÜðåðåé íá áéëÜðåðå lüñi ôçí ôiñP ðiõ ó÷åßæðåé iå ôi ñðiññéêéü üññiá éáé üöði ôi script åêðåæåðåß, ç ôiñP èá ôiðiññéêåðåñåß óå üëiòò ôiðo éáíüñiåð ðiõ ðâñéY ÷ iõí ôi üññiá åðoü. ÉáèPò ðññüéåðåé åéá script, lðiññåßôå íá ÷ nçóëiñðiñPóåðå óðiññéêP ôiðiññéêÜðåðåçdå åéá íá êuäééiðiñPóåðå óô÷fÜ ÷ nçóëiñðiñýiåñåò ôeí Ýò éáé íá ôeò ôiðiññéêóðÜðå óå ðiññéåðëiýò éáíüñiåð. Åðoü óðiññéêåðåé åéá ôoí ðañÜðåñéåíá ðiõ åéiññéêåß.

Cóyíóáic ôiô script ðiô ÷ nçóeïïðiéâbóáé åäb, åbíáé óóïlááóP iå óá êäëëyöc sh(1), csh(1), êáé tcsh(1).

Óá ðåäßá óôá iðiþá áßíåôáé óðíàíëéêP ððiæáôÜóôáóç ðñiöçìåéþiióáé íå óPiá óiõ aíëéñßiõ: \$.

Óá óõíàíëéê Ü ðåäßá äåí Ý÷ iõí ôçí ðñïóçìåßùóç ìå ôi \$.

Ը օԵԻ ԾԻԾ էԱ - ՆԵՐԵՒԾԻԵՑԵԱԾ ԾՈՒ ԾՈՒԱՐԵԸՆ ԾԱԲԻ, ԵԱ ԾՆ ԿԴԱԾ ԻԱ ԱՇԽԱՏԱԾ ԾԱ ԱԵԾԵԾ ԱՌԵԱՆԱԾԵԾ ԾՈՒ (").

ÎåêéíÞóôå ôi áñ ÷ åßi ôùí êáíüíùí óáò iå êÜôé áíôßóöié ÷i iå ôi ðáñáéÜôù:

##### Start of IPF rules script #####

```
oif="dc0"                      # name of the outbound interface
odns="192.0.2.11"               # ISP's DNS server IP address
myip="192.0.2.7"                # my static IP address from ISP
ks="keep state"
fks="flags S keep state"

# You can choose between building /etc/ipf.rules file
# from this script or running this script "as is".
#
# Uncomment only one line and comment out another.
#
# 1) This can be used for building /etc/ipf.rules:
#cat > /etc/ipf.rules << EOF
#
# 2) This can be used to run script "as is":
/sbin/ipf -Fa -f - << EOF

# Allow out access to my ISP's Domain name server.
```

```
pass out quick on $oif proto tcp from any to $odns port = 53 $fks
pass out quick on $oif proto udp from any to $odns port = 53 $ks

# Allow out non-secure standard www function
pass out quick on $oif proto tcp from $myip to any port = 80 $fks

# Allow out secure www function https over TLS SSL
pass out quick on $oif proto tcp from $myip to any port = 443 $fks
EOF
#####
End of IPF rules script #####
```

Áðóðu áßíáé üer. Óði ðáñáðÜù ðáñÜääéäá äáí áßíáé óçíáíóééiþ íé éáñüíåð, áéëÜ í ôñüðiò là ôñí iðiþi ëääéññññýí éáé ðáßññiði ðeí Ýò óá ðåäßá ððiéáðÜóóáóçò. Áí òi ðáñáðÜù ðáñÜääéäá áñßóéiðoáí óá Ýíá áñ-åßí là ói üññá /etc/ipf.rules.script, èá iðiññýóðá íá áðáíáðiññþóðá áðóïýò ðiðo éáñüíåð là ôçí ðáñáé Üóu áíðeþ:

```
# sh /etc/ipf.rules.script
```

ÕðÜñ÷åé Ýíá ðñüâëçìá üôáí ÷ñçóëiiõíëíýôáé áñ÷åßá êáíüíüí íà åíóùåòù Ýíïöö ôðîäíëéóïýò: Ôí IPF äåí êåâåéåååååé ôç ôðîäíëééò ðõíëæåÜóôåóç, êåé äåí ìõñåß íá äéååÜóåé åôðÜ ôá scripts Üíåóá.

íá ôÝöiéí script ìðiñåß íá ÷ ñçóéiiðiéçèåß íå Ýíá áðü öiðò äýí ðáñáêÜôù ôñyüðiðò:

- Áöaéñ Ýóôå ôi ó÷üeéí áðü ðç añaìlP ðiø iâééíÜåé iå cat, êáé lâôåôñ Ýóôå óå ó÷üeéí ðç añaìlP ðiø iâééíÜåé iå /sbin/ipf. ðiølèåðÞóôå ôi ipfilter\_enable="YES" óôï áñ÷åßi /etc/rc.conf üðùò óðíÞèùò, êáé áâðâéÝóôå ôi script iéä öïñÜ iâðÜ áðü èÜèå áéëäñP aéá íä åçìeññÞóåôå P íá áíçìåñÞóåôå ôi /etc/ipf.rules.
  - ÁðâíññiøíéÞóôå ôi IPFILTER óôå scripts áêêBíçóçò ôið óððôðÞìâðiò, ðññiøéÝóiiðâð ôçí êáôá÷þñéóç ipfilter\_enable="NO" (ðññüêåéôáé aéá òçí ðññiâðééââíÝíç ôéiP) ôôï áñ÷åßi /etc/rc.conf.

Đññiöè Ýóôå Ýíá script üđòù ôi ðáñâé Üôù óoíí êáó Üëíäí åêéßíçóçò /usr/local/etc/rc.d/. Ôi script èá ðñÝðåé íá Ý÷åé Ýíá ðññöáí Ýò üññíá, üđòù ipf.loadrules.sh. Ç åðÝéóáóç .sh åßíáé öðï÷ññüòñéêP.

```
#!/bin/sh  
sh /etc/ipf.rules.script
```

Ie Üääneäö öä äödöö üi äñ ÷ äßi, ea ðñÝðäeä ía äðéööÝðiöi áíÜäñuöc, åäññäöP éäé äéöÝëäöc ääé öií ÷ ñPööc root.

```
# chmod 700 /usr/local/etc/rc.d/ipf.loadrules.sh
```

Íé êáíüíåò ôiõ IPF èá öiñôþííôáé ðëÝíí êáôÜ ôcí áêêþíçóç ôiõ óðóôþìáôïò óáð.

### 31.5.10 Ôří Óýñiieří Éáíüíùí ôřiř IPF

Ùò “óýñëí èáíñüí” óóí IPF, iñßæiòlá ìéá íiÜää éáíñüí ðiö Ý÷iöí ãñáöåß æéá íá åðéöñÝ ðiöí Þ íá åðíññßööí ðáéÝ ÿá áíÜëiäá lá öéò ñeí Ýò ðiö ðåñéÝ ÷iñôáé óá åööÜ. Ç æéðëÞò éåðåýÿèöíöçö áíñåæéåß ðáéÝ òúí láðáiy ðiñiæéööþí åðíñåæåß ìéá óðíñåæñßá. Òí óýñëí èáíñüí ðiö firewall åðåññåñÜæåðåé ðüöí ðáéÝ ðiö Ýñ ÷iñôáé åðü òí Internet, üöí èáé óá ðáéÝ ðiö ðánñÜäiñöåé åðü òí óýóöçiaù ùò åðÜíöçöç óá åööÜ. ÈÜëá ððçñåößá TCP/IP (ð.÷. telnet, www, mail, è.ë.ð.) èáéiñßæåðåé åðü òí ðññùöñüéí èééí èáé õçí ðññiññéåß (privileged) èýñá ðiö ÷iñçóéíñðiéåß æéá íá åÝ÷åðåé åéöÞiaöå åñöðçñÝ ðçöçöçö. Òá ðáéÝ ðiö ðññiñßæiñöåé æéá ìéá óðåññåñéí Ýíç õðçñåößá, iâééñýí åðü òç æéåýÿèöíöç åöåðçñßå ÷iñçóéíñðiéþöñåó ìéá iç-ðññiññéåß ëýñá èáé èåðåéÞäiöí óðç óðåññåñéí Ýíç èýñá ððçñåößå ðóöí ðññiññéöü. ¼éåð ié ðáññåðÜí ðáñÜìåñöñé (ëýñåð èáé æéåðéýíöåéð) iðiññýí íá ÷iñçóéíñðiéçëýí ùò èñéöÞñéá åðéëiäÞò æéá õçí åçíéiññåßá èáíñüí ðiö åðéöñÝ ðiöí Þ åðíñßæiòí õçí ðññöúåáöç óá õðçñåößå.

Ôř IPF aň Üööđçêâ áñ ÷ ééÜ ÷ ñçóéiiđiéphíðâò iéá eïäéêP âđâîâññáóßâò êáíüíùí ôïõ ôýđiõ “i ôâëëööáßiò êáíüíáò ðiõ ôáéñéÜæåé, åßíáé i íéêçöPò” eáé ÷ ñçóéiiđiéiyóâ iüíí êáíüíâò stateless. Iâ òçí ðÜñíäi õiõ ÷ ñüñiõ, ôi IPF åíéó ÷ ýèçéâ iâ òçí åđéëiäP “quick” êáé iâ äöñáðüöçôá åđiëPéâööçò êáðÜööáöçò iÝóù ôçò åđéëiäP “keep state”. Iâ ôiõ ôñüüðí åðöü, åéööâ ÷ ñiñßööçêâ äññááðééÜ ç eïäéêP âđâîâññáóßâò ôùí êáíüíùí.

Íé iäçäßâò ðiõ ðâñéY ÷ iíðâé óâ áðööP ôçí åíüöçôá âáóßæiiöáé óâç ÷ ñPóç êáíüíùí ðiõ ðâñéY ÷ iõí ôçí åđéëiäP “quick” êáé ôçí åđéëiäP “keep state” aéá ôç äéáðPñçöç ôçò êáðÜööáöçò. ÁðöYò åßíáé êáé ie ááóééYò eäéöiõñâßâò aéá ôçí êùäéëiðiñçöç ðiõ óðíüëëò êáíüíùí åíüò inclusive firewall.

**Ðñiäéäiðiñçöç:** %ðâí åïööéâýâôâ iâ ôiõò êáíüíâò ôiõ firewall, eá ðñYðâé iâ åßöôâ ðiëý ðñiøâéööéëiB. Áí åÜëâôâ åíéâáóYíâò ññðiñçöçâò, iðiñâB iâ ëëâéäüéâßôâ Yíù áðü ôií åiñðçñâöçôP ôâò. Åéá iâ åßöôâ åóöáëâßò, åßíáé ðñiøéiñðâññí iâ êÜíâôâ ôéò áñ ÷ ééYò óâò ññðiñçöçâò áðü ôçí ðiðéêP eïíöüëá, ðáñÜ iÝóù áđiñâññööiYíçö öýíââöçò (ð.÷. iÝóù ssh).

### 31.5.11 Óðíöáâéöéü Êáíüíùí

Ôř óðíöáâéöéü ôùí êáíüíùí ðiõ ðáññööéÜæiõâ åäþ, Y ÷ áé åđëiðiéçèâß þóôâ iâ åđâéëiñçöçâé ôç óýâ ÷ ñiñç stateful ðeïðiñçöç êáé ôç eïäéêP ðiõ ôýđiõ “i ðñþòiò êáíüíâò ðiõ ôáéñéÜæåé åßíáé êáé i íéêçöPò”. Åéá ôçí ðâñéâññööP ðiõ ðáééüöâññí ðñüüðiõ èééöiññâßâò, aéáâÜööâ ôç ñâéßää manual ôiõ ipf(8).

Í ÷ aññáéññò # ÷ ñçóéiiðiéâßöâé aéá iâ åđéöçìÜfâé ôçí añ ÷ P åíüò ð ÷ iëßiõ, eáé iðiñâB iâ åiöáíßæåâöé ôði ðYëiò iéáò aññáññPò êáíüíâò P ôðc äééP ðiõ aññáññP. Íé eâiYò aññáññYò añññíYöåé.

Íé êáíüíâò ðâñéY ÷ iõí eÝíâéò-êéâéæéÜ. Íé eÝíâéò aðöYò eá ðñYðâé iâ êùäéëiðiéçèiyí iâ oðâéâññëiYíç oâéñÜ áðü ôâ åñéööâññÜ ðññiò ôâ åâññéÜ ôçò aññáññPò. Íé eÝíâéò-êéâéæéÜ oðâññiñðâé ðáññâéÜò iâ Yíðiññâ aññÜññâò. IâññéêYò eÝíâéò Y ÷ iõí ðiði-åđéëiäYò ie iðiñâB iâ åßíáé åðßöçò eÝíâéò-êéâéæéÜ eáé iâ ðâñéëâiâÜññiò åðßöçò ðâñéööüöâññò ðiði-åđéëiäYò. ÈÜëâ iéá åðü ôéò åđééâöäéßääò ôði ðáñÜññâéâiâ ðiõ oðâññâéÜò Y ÷ áé iéá êâoáéßää iâ Yíðiññâ aññÜññâò ç iðiñâB åðâîçñââB ôi ðâñéâ ÷ ülâññ ôçò.

ACTION IN-OUT OPTIONS SELECTION STATEFUL PROTO SRC\_ADDR,DST\_ADDR OBJECT PORT\_NUM  
TCP\_FLAG STATEFUL

ACTION = block | pass

IN-OUT = in | out

OPTIONS = log | quick | on interface-name

SELECTION = proto value | source/destination IP | port = number | flags flag-value

PROTO = tcp/udp | udp | tcp | icmp

SRC\_ADD,DST\_ADDR = all | from object to object

OBJECT = IP address | any

PORT\_NUM = port number

TCP\_FLAG = S

STATEFUL = keep state

### 31.5.11.1 ACTION

Ç áíÝññååéá (action) äåß÷íåé ôé ðñÝðåé íá ãßíåé íå ôï ðåéÝöi áí ôáéñéÜæåé íå ôïí êáíüíá ôïõ ößëöñiõ. ÊÜèå êáíüíáô ðñÝðåé íá äéåéÝöåé íéá áíÝññååéá. Íé áíÝññååéåò ðiõ áíáäíüñßæííöåé, öåßññiôåé ðáñåéÜöù:

Ôi block äåß÷íåé üöé ôï ðåéÝöi èá ðñÝðåé íá áðiññéöèåß áí ôáéñéÜæåé íå ôéò ðáñåíÝöññiõ ãðéëiäPò ôïõ êáíüíá.

Ôi pass äåß÷íåé üöé ôï ðåéÝöi èá ðñÝðåé íá áíÝëëåé áðü ôï firewall, áí ôáéñéÜæåé íå ôéò ðáñåíÝöññiõ ãðéëiäPò ôïõ êáíüíá.

### 31.5.11.2 IN-OUT

ÊÜèå êáíüíáô ôïõ ößëöñiõ ðñÝðåé ôði÷ñåùöéêÜ íá äéåöñéíßæåé íå óåöPíåéá áí áíáöÝññååé óôçí åßóíäP òçí Ýññiäí ðåéÝöù. Ç åðüñåíç ëÝíç-ëëåéäß ðñÝðåé íá åßíåé in P out êáé áí äåí ôðÜñ÷åé, í êáíüíáô èá áðiöý÷åé êåôÜ ôï õðíäååéüÝéåå÷í.

Ôi in óçìåßíåé üöé í êáíüíáô èá åöáññööåß óå Ýíá áéóåñ÷üìåñí ðåéÝöi ôï iðññi ïüééò ñPöëçêå óôç äéåðåöP ðiõ ôññäÝååé íå ôï Äéäåßññiõ.

Ôi out óçìåßíåé üöé í êáíüíáô èá åöáññööåß óå Ýíá ðåéÝöi ðiõ ðñññßæååöåé áéá Ýññiäí ïÝóù ôçò äéåðåöPò ðiõ ôññäÝååé íå ôï Äéäåßññiõ.

### 31.5.11.3 OPTIONS

**Óçìåßñúóç:** Íé ðáñåéÜöù ãðéëiäÝö ðñÝðåé íá ÷ñçóéiïðiéçèiyí íå ôç óâéñÜ ðiõ öåßññiôåé åäp.

Ôi log äåß÷íåé üöé ç åðééåöåëßää ôïõ ðåéÝöi èá ãñåöåß ôïï áñ÷åßí êåôåññåöPò ôïõ ipl (üðùò ðåñéññÜöåååé óôçí åíüöçöå LOGGING ðiõ áéiëiöèåß) áí íé ðáñÜìåññié ôçò åðéëiäPò ôáéñéÜæiõí íå ôï ðåéÝöi.

To quick äåß÷íåé üöé áí íé ðáñÜìåññié ôçò åðéëiäPò ôáéñéÜæiõí íå ôï ðåéÝöi, í óðåññéññiÝññiò êáíüíáô èá åßíåé êáé í ôåéååöåßñiò êáíüíáô ðiõ èá åéåå÷èåß. Ç åðéëiäP áðôP åßíåé ôði÷ñåùöéêP áéá ôç óýä÷ñiíç ëiäéêP åðåññååóßåò ðåéÝöù.

Ôi on äåß÷íåé ôï üññiá ôçò äéåðåöPò ðiõ èá áíóùìåöüèåß óöéò ðáñåíÝöññiõ ãðéëiäPò. Ôá ïüìåöå ôùí äéåðåöþí öåßññöåé üöåí åéôåéåßöåé ç áíöiëP ifconfig(8). ×ñçóéiïðiéþiöåò ôçí åðéëiäP áðôP, í êáíüíáô èá åéåå÷èåß ïüñí áí ôï ðåéÝöi aeÝñ÷åöåé íÝóù ôçò óðåññéññiÝíçò äéåðåöPò êáé ðññiò ôç óðåññéññiÝíç êåôåýëéñiöç (åéóåñ÷üìåñí/åíåñ÷üìåñí). Ç åðéëiäP áðôP åßíåé ôði÷ñåùöéêP áéá ôçí óýä÷ñiíç ëiäéêP åðåññååóßåò ôùí êáíüíñiú.

¼ôáí åßíåöåé êåôåññåöP åíüö ðåéÝöi, íé åðééåöåëßääò ãñÜöiiöåé óôçí øåðäi-óðôéåðP êåôåññåöPò ðåéÝöù IPL. ìåðÜ ôçí åíöiëP log, ïðññiýí íá ÷ñçóéiïðiéçèiyí íé ðáñåéÜöù ðáñÜìåññié (íå ôç óâéñÜ ðiõ öåßññiôåé):

Ôi body äåß÷íåé üöé èá ãßíåé êåôåññåöP ôùí ðñþöùí 128 bytes ôùí ðåñéå÷ñÝññi ôïõ ðåéÝöi, ðiõ åñßóéiñöåé åíÝóù ìåðÜ ôçí åðééåöåëßää.

Ç åðéëiäP first óðíßóåååé íá ÷ñçóéiïðiéçèåß áí ç åðéëiäP log ÷ñçóéiïðiéåßöåé óå óðíßöåòíü íå ôçí keep state. Íå ôï ðññiöåí áðôüü åßíåöåé êåôåññåöP ïüñí ôïõ ðñþöi ðåéÝöi (íå ôï iðññi ìåéßíçóå ç åðéëiéññíßå), êáé ü÷é üëñí ôùí ôðiññðöùí ôá iðññi ðåéñéÜæiõí íå ôçí ðëçññiöññíßå “keep state”.

#### **31.5.11.4 SELECTION**

### **31.5.11.5 PROTO**

Öi proto ålbíráé ç ááóééþ ëÝç, éáé ðñÝðåé ía ãñÜöåôáé íáæß iá êÜðíéá áíößööíé ÷ ç ôéiþ áéá ðåñáéöÝñù áðééëiþ. Ç ôéiþ áðéöñÝðåé öi öáßñéáóíá iá Ýíá óóäåéñéiÝñí ðñùöüéëeí. Ålbíráé öðí÷ñåùöéü íá ÷ñçóéiñðíéçèåß áéá íá èééöñöñååß c óýä ÷ñiic éëäééþ áðålåññåóßáò ôúí éáíüíúí.

Óá iñúlādá ðññùlòüüeëñí ðiñ árááñññbaëiióáé éáé iðiññý íá ÷ñçóëiiðiéçëiý, åbíáé óá tcp/udp | udp | tcp | icmp | iðiéáäþðiôå Üeeá åiøáññbaëiióáé óóí /etc/protocols. Iðiññåbôå íá ÷ñçóëiiðiéþðååóå óí åéäéêü üññá tcp/udp óí iðiñþi óáéñéÜæéå åbôå íå ðáéñÝóï TCP åbôå íå UDP. Ç åéäééþ aðóþ iññáóßá ðññóðÝéçåá þóåá íá aðiøáváriðaé æðeëiþ, aëëÜ êáðÜ óá Üeeá üññéé, êáíüñiåð.

### 31.5.11.6 SRC ADDR/DST ADDR

$\frac{1}{4} \hat{o}_A \div \hat{n}_C \hat{o}_E \hat{o}_D \hat{o}_B \hat{o}_A$  ðî from src to dst, i.e.  $\hat{Y} \hat{i}_A \hat{o}_E$  from  $\hat{e}_A$  to  $\hat{a}_C \hat{p}_B \hat{o}_D \hat{a}_E \hat{o}_B \hat{y}_I \hat{o}_A \hat{o}_E$  IP  $\hat{D} \hat{i}_O$  èá ÷  $\hat{n}_C \hat{o}_E \hat{o}_D \hat{o}_E \hat{c}_E \hat{y}_I$  èá ðî  $\hat{o}_A \hat{B} \hat{n}_E \hat{o}_A$  íá.  $\hat{I} \hat{e} \hat{e}_A \hat{i}_U \hat{i}_A \hat{o}_D \hat{Y} \hat{D} \hat{A} \hat{E}$  íá  $\hat{e}_A \hat{e}_I \hat{n}_B \hat{a}_E \hat{i}_O$  ôéò  $\hat{D} \hat{A} \hat{N} \hat{A} \hat{Y} \hat{O} \hat{N} \hat{I} \hat{O} \hat{D}$  ôüò  $\hat{O} \hat{C} \hat{O}$  àóåôçñßáò üöí èáé ôíò  $\hat{D} \hat{N} \hat{I} \hat{I} \hat{N} \hat{E} \hat{O} \hat{I} \hat{Y}$ . Ç  $\hat{E} \hat{Y} \hat{I} \hat{C}$  any  $\hat{Y} \div \hat{A} \hat{E} \hat{O} \hat{C} \hat{P}$   $\hat{E} \hat{A} \hat{E} \hat{U} \hat{O} \hat{C} \hat{O}$  íá  $\hat{o}_A \hat{A} \hat{E} \hat{N} \hat{E} \hat{U} \hat{A} \hat{E}$  íá  $\hat{i}_O \hat{i}_E \hat{A} \hat{P} \hat{D} \hat{I} \hat{O} \hat{A} \hat{A} \hat{E} \hat{Y} \hat{E} \hat{O} \hat{I} \hat{C}$  IP.  $\hat{D} \hat{A} \hat{N} \hat{A} \hat{A} \hat{B} \hat{A} \hat{A} \hat{O}$  ÷  $\hat{n} \hat{P} \hat{o} \hat{C} \hat{o}$ : from any to any  $\hat{P}$  from 0.0.0.0/0 to any  $\hat{P}$  from any to 0.0.0.0/0  $\hat{P}$  from 0.0.0.0 to any  $\hat{P}$  from any to 0.0.0.0.

Äáí ððÜñ ÷ áé ðññüðñò íá ðåññæññöiýí ðåññéí ÷ Ýò IP áæåðëeyíðåùí ðñò äáí ìðññiyí íá åéöññåðöiýí åyéïeä íå ôç iiñöP  
åññéèíþí ÷ üñéóíÝñú íå ðåññåðå / iÜñéåò ñðriæéöýiò. Íðññåðå íá ÷ñçöéiñðiëPóåðå ôí åñçëçöééü ðññuññåñíà  
net-mgmt / ipcalc áæá äéåðüëeöíòç óáò öóíòò ñðriæéöiýò. Ååßòå ôçí áæéööáåP òiðiìæåðßá ôíò ðññiññUññåðò íæá  
ðåññéðóùñðåññå ðëcññöiññßåð: <http://iodies.de/ipcalc>.

31 5 11 7 PORT

Ôi ôáßñéáóiá iå êÜðiéá óôäâéñêñí Ýíç èýñá áôäôçñßáò Þ/éáé ðñiiñéóiiy (áí ðôÜñ ÷ áé) åöáññüæåðåé iüñi óå ðáéÝóå TCP êáé UDP. ÉâáðÜ ôçí åçíèiññåßá óôäâéñßóåùí iå èýñåð, iøññåßóå åßóå íå ÷ñçóëiiðiéÞóåðå ôíï áññéèiù ôçò èýñåð, åßóå ôíi üññå òçò áîðßóðié ÷çò ðôçññåßóå áðüi ôíi áñi ÷åßi /etc/services. ¼ôáí ç èýñá åìöáíßæåðåé ùò òiÞia ôíõ áîðééâéñí Ýiiò from, ôíi ôáßñéáóiá éá åßíäé iå ôçí èýñá ôçò áôäôçñßáò. ¼ôáí åìöáíßæåðåé ùò òiÞia ôíõ áîðééâéñí Ýiiò to, ôíi ôáßñéáóiá éá åßíäé iå ôç èýñá ðñiiñéóiiy. Áéá íá èåéðiøññåß ç óýá ÷ññíç eíræéÞ ðáéñéÜðiáðiò éáññüñi, éá ðñÝðåé iðñóáÞðiøá iå ðôÜñ ÷ áé ç åðééiäÞ èýñåð ôóïi áîðééâåßíai to. DññÜäåéáiá ÷ñÞóçò: from any to any port = 80 Íé óôäâéñßóåéò ðiò ááiaöÝññiðåé óå iéá iüñi èýñá, iøññiýí íá åßíiòí iå ðiæéiýò åéáöiññåðééiýò ôññüðiòò, ÷ñçóëiiðiéÞóåð åéáöiññåðééiýò ôâéåðóóÝò óváññéóçò. Åßíäé åðßóçò åöñiáðuí íá èåéiññåðééiýò iøññéèçñåð ðåññéi ÷Ýò åðú èýñåð.

port "=" | "!=" | "<" | ">" | "<=" | ">=" | "eq" | "ne" | "lt" | "gt" | "le" | "ge".

Áéá já êáèïñßóåôå ðåñéï ÷ Ýò èõñbí, ÷ ñcóéijðjéÞóôå port "<>" | "><"

### 31.5.11.8 TCP\_FLAG

Óá flags áßíráé áßíññáÜ ñùññ óóï öeëöñÜñéðia òïò ðñùöièüëëëiõ TCP. Òï êÜëà ãñÜñà áíôéðññòùðåýåé Ýíá ðéëáíü flag òï ãéá òï iðíßí áßíññáé áíß ÷ fâoóç ôóçí áðééâðáëßáá òïò ðâéÝòõ TCP.

Ç óyã ÷ ñíic eïræéêp åðåññäáóßáò ôùí êáñüíúí, ÷ ñçóéíïðíéåß ôçí ðánñÜìåññí flags S æá ôçí áíáññpñéóç ôçò Ýíáññíçò íéá óoñíáññßáò tcp.

### 31.5.11.9 STATEFUL

Óá Yíá eáíüíá ðið åðéôñÝðåé (pass) ôi ðÝñâóíá ôùí ðáéÝòùí, ç åðéëïäÞ keep state äåß÷íåé üöé èá ðñÝðåé íá áíâññâðiéåßöéç c èåéöññâßá stateful filtering üöáí ôi ðáéÝòí ôâáéñéÜæåé ià óá èñéôßñéå ðééëïäÞ.

**Óciáñéúóć:** Ç áðééëíäb áðôbá áñíáé óðõí÷ñáùôééb áéá óç ëåééòñäñá óçò óýá÷ñííçò ëíäééêbò áðâñáñáóñáò êáñüñú.

### 31.5.12 ÖéëôñÜñéóìá ìá ÄéáôÞñçóć ôçò ÊáôÜóôáóçò (stateful)

Áðôü ðið óðiâáßíåé áßíáé ði ðáñáêÜôù:

Óa ðáê Ý ðiô Ý : iñôáé áðü ôç äéâðáöþ ðiô åßíáé öóñââì Ý íc ià ôi Internet, åë Ý ã : iñôáé áñ ÷ eé Ü i Ý óù ðiô åòíâééëý ðßíáéá êáôáôð Üóâù. Ái ôi ðáê Ý õi ôáéñé Üæâé ià ôi áðüìâñi ðiô áíâi Ý íâðáé óâ leá áíâñþ öóñâññþ, åi Ý ñ ÷ åðáé áðü ôi firewall êáé ôáôöù ÷ nñír âíçâñþíâðáé c êáð Üóâðáç ôçö öóñââéñéï Ý ícö öóñâññþ ðiññáð Üfù ðßíáé. Óa ððüñéïðá

ðáéÝðá (ðíð aáí óáéñé Üæiði íá é Üðiéá óðíáaëñþá óá áíÝééíç) aæÝá ÷ iðóáé óýiöùíá íá ðír óýíiëí eáfúfúí aéá óá aéðóáñ ÷ iùíðá íá ðáéÝðá.

Óði stateful öðeðöñ Úñéðílá áðéðöñ Ýðáé íá áðóðé Úñíðílá óçí ðññíði ÷ P Þ iàð óðóçí áðíræi ÷ P P áðúññéðøç ðùí íÝùí óðíðá Ýðáúñí. Áí áðéðöñáððb iéá íÝá óðíðáññB, üëá óá ððüëeiðá ðáê Ýðá óçò eá áðéðöñ Ýðíðóáé áðóðùíáðá, áíþ ðò ÷ iið ðåýðééá ðáê Ýðá eá áðiññBððiíðóáé áðßóçò áðóðùíáðá. Óði stateful öðeðöñ Úñéðílá æéaë Ýðáé iéá óðæñ Ú áðu ðññi ÷ ùñçí Ýð iàð eéáíúðçóðò æéññáýíçò ðùí ðáê Ýðúí, lâ ððfáððùðçðá íá aíýíðáé óá ðíðëë Ýð æéáðiññáðéé Ýð iâðéðið ðið ÷ ñçðéññðiðíéý íé áðéðöee Ýðâññ.

### 31.5.13 ÐáñÜäåéìá Óõíüëïö Èáíüíùí ãéá Ýá Inclusive Firewall

¼éá ôá óódóöPiâóá ôýðiö UNIX, óoiðåñéêáiâáñí Ýfïö êáé ôiö FreeBSD, Ý÷iöí ó÷åäéåöôåß íá ÷ñçooëiiðiëiyí ôçí äéåðäöP 1o0 êáé ôçí IP äéåyéöföc 127.0.0.1 ãéá åóùòåñéêP åðéëiéüñíå Ýóá óoï ßæëi òií ëééöiññæéü ÿóóöçí. Ôi firewall ðñÝðåé íá ðåñéÝ÷åé êáíüíåö ðiöí íá åðéöñÝðiöí ôçí äéåyéåñç êáé ÷ùñßö ðåñéiñéöiñýö ïbíçöç ôùí åéäéêéþí åðöþí åóùòåñéêþí ðåéÝôùí.

Íé êáíüíåð ðið åññöðéíäöîýí ñçí ðññöðåáóç ðññö ði Internet, iññæäöáé óóçí äéåðäóþ ðið äéëöýí ðið óðíäÝåðáé óå áðóóù. Íé êáíüíåð áðóíß åëÝä ÷iðí ðiðí ðiðí ñçí åéóåñ ÷üìåíç üöí êáé ñçí åíâñ ÷üìåíç êßíçóç óóí Internet. Ç äéåðäóþ áðóþ ðiðiññåß íá åßíáé ç t un0 ðið ÷iñçöññiðiäåðáé óóí PPP ÷iñÞöðç, þ áéüíà êáé ç êÜñðå äéëöýí ðið óðíäÝåðáé óå Ýí DSL router þ modem.

Óå ðâñþðôùóç ðiø íøá P ðâñéóðüðâñàò êÜñòàò äééöýiø óðiá Ýíiøáé óå áðùòðâñéêÜ éæéùðééÜ äßêððá ðßóù áðü öi firewall, èä ðiø Ýðåé íá ððÜñ :iøí iø áíðßóðiø :÷ iø êáíüñåð ðiø íá áðéññ Ýðiøí òçí áëéÿéñç äéáêßíçóç ôùí ðáéÝòùí áíÜñáóá óóéó äéåðáøÝò áðôøÝò P/ééé ööì Internet.

Íé éáííüåò ðñ Ýðåé íá íññáíþñíóáé óá ôññåéò éýñéåò áíüöçôåð: áñ ÷ééÜ üëåò íé äéåðäó Ýò óôéò iðiþåò åðéóñ Ýðåðåé ç áééýèåñç áéáéþíçóç åáññíÝñúí, Ýðåéðåá ç áéåðäóþ ãðü óçí iðiþá áíÝñ ÷iióáé óá ðåéÝóá ðññìò óíí áçíüóéí áßêðöi (Internet) éáé óÝëò c áéåðäóþ ãðü óçí iðiþá éáíâÜñíóáé ðåéÝóá ãðü óíí Internet.

Óå êÜèå iéá áðü ðéò áñüôçôåò ôùí äéåðäöþí ðiò oóñáÝíiøáé óóï Internet, ðñÝðåé íá ðiò ðiøieâòýíðåé ðñþþiøé ié éáúñíåò ðiò ðåéñéÜæiøí óð ÷ñüðåñá íå ðçí áíðþðöîí÷ç ðéßicóç. Í ðåëððåðáßiò éáúñíåò ñçò áñüôçôåò èá ðñÝðåé íá áðiññþððåé ééåé íá éáôðññÜøåé üéá óá ðåéÝóå òcò oóñâéñéíÝícò äéåðäöþò/éáôðåvëñíócò.

Çâíüöçôå ôúí Åâññ-ííÝíúí (Outbound) óóï áéüëëòí òýñíëí éáíüíûí, ðâñéÝ ÷ áéë iúññ êáíüíåô ôýðiö pass íé iðibíé åðéöñÝðiöí (íÝóù êáôÜëëçëùí ôéíþí óóéò ðâñáíÝññiöô ñiöô) óá óóäéåñéñíÝíåô ôðçñâðåò íá áðièôÞóïöí ðññóááóç óóï Internet. ¼éíé íé éáíüíåô áéæéÝòí óéô åðéëíäÝò quick, on, proto, port êáé keep state. Íé éáíüíåô proto tcp ðâñéêäíåÜññiöí ôçí åðéëíäP flag þóåá íá áíáññüññæiöí ôçí áßðçóç Ýíáññçò ôçò óóññññåò êáé íá áíáññññiöíýí ôç èééöñññåðå æáéôÞñçóçò ôçò éáôÜóôáóçò (stateful).

Óöçí áüüöçöå ôùí áéöåñ÷ üìäñùí ðåé Ýöùí (Inbound) ðöö öäßíåðåé ðåñäåé Üöù, ðñþöié áìöáíßæíöåé ié éáíüíåð ðiö ÷ ñçöeíiðieíyíöåé áéá óçí áðüññéøç ôùí áíåðéèýíçöùí ðåé Ýöùí. Áööù áßíåðåé áéá áÿí áéaoíññåðééíyö ëüäiöö. Í ðñþöiò áßíáé üöé óá éåéüäiööé ååé Ýåá lðiññåß áí iÝñåé íá ôåéñéÜæöi íá èÜðiéá ÷ åñäéöçñéööé Ü öçö Ýâéöñçö ßíçöçö. Óå ðåé Ýöùí áðööÜ eá ðñ Yðåé íá áðiññéöeíyí. áíöß íá áßíiöi áåéööÜ áðöù èÜðiéí áðüññåß éáíüíá allöw. Í áåvñåðñiò áßíáé üöé

Íðiññáþòð á íá ðiññþþòðóð óóðáæðéñéí Ýá ðáé Ýðá óá iðiñßá áñññþæðóð üðé áðí áßíáé Ýáéññá, áéëÜ óáð áßíáé áðéÜññç ç  
éáðáññáöÞ ðiñðò. Íå òíï óññüðí áðóðü áiðiñßæðóðé ç ðeÞç éáé éáðáññáöÞ ðiñðò áðü òíï óðæðóðáßí éáññá. Í óðæðóðáßíò  
éáññá ðóðééÜ áðiññþððóáé éáé éáðáññáÜðóæ üëá óá ðáé Ýðá ðiñ Ýððáðáí iÝ ÷ ñé áðóðú. Í éáññá ðóðü  
÷ ñçðéíiðiñðéáðþðóáé áðá ðcí ðáññ-Þ mñééþí áðiññþððóðú ðá ðáññþððóðú ðiñ ðeÞðóðá áðéáðóðéÞ áéðáæðéñá ðáð Ü  
ðiñ ðmíÝáçóáí óá áððééÝðóæð óóðí ðyðóðí ðá.

ÊÜeå öññÜ ðiññ ñðÜñ ÷ åé êáôåáññöP áðü êÜðiñíéí éáíüíá ìå ôçí åððeëíäP log first, èå ðñÝðåæ íå åêôåëÝóåôå ôçí åîðiñëP ipfstat -hiø åéá íå åâßòå ðüñóàò öññÝò Ý ÷ åé åíñññiðíéçèåß áðôùò i éáíüíáò öðñññéêÜ. ïóé èå iÝññåôå áí ð. ÷. óàò êÜññiðí åðßèåóç ñððañ ÷ åßëéóç (flood).

Äåßôå ôi áñ÷åßi /etc/services ãéá íá âñåßôå áñeeìiyó èoñþí ðiõ äái áíåaiùñþæåôå. Ðiñåßôå åðßóç íá åðéóéåöèåßôå ôçí ôiðièåóþá <http://www.securitystats.com/tools/portsearch.php> êáé íá êÜíåôå áíáæÞôçóç ãéá ôç öóäåéñéí Ýic èýñá, þóôå íá åßôå ðiéá ðõcñåóþá åíðõcñåôåß.

Äåßôå ôçí åðüïåíç ôïðïèåóßá ãéá ôéò èýñåò ðiõ ÷ñçóëïðiéiyíôáé ôóñPèùò åðü êåêüäiõéä ðñïäñÜìåáôá (trojans):  
<http://www.simovits.com/trojans/trojans.html>.

Öi ðáñáêÜôù óýñíei éáñúñú áßíráé áñéåöÜ ðéÞñåò êáé ðíëý áooäéÝð. Äçíeññåß firewall óýðíö inclusive, êáé Ý÷åé äíééíåöåß óå ðññáíáöéÝð óóñíéÞéåò êäéöiññåßåò. Íðññåß íá áîñðçñåßÞóåé ôi ßæéí êáéÜ êáé ôi äéüú óåd óýóöciá. Äðéþò iåôåöñ Ýðôå óå ó-üëéi ôiðð êáñúñåò ãéá ôéö ððcñåßåò ðíö ãäí èÝéåöñ íá áíññäöíÞóåöå.

Áéá íá áðíöyáåôå ôcí éáôáñáöþ áíåðéèýçóùí ìçíöìÜôùí, áðëþò ðññöéÝóôå Ýíá áíôßóöíé÷í êáíüíá áðüññéøçò (block) óóçí áíüöçóå ôùí áééåñ÷íÝíüí (inbound).

Èá ðñÝðåé íá aëeÜíåôå öi üññá ôçò aëåðáöÞò dc0 öiõ ðáññáäåßñláöiø, iå öi ðñññáäåöéüü üññá ôçò eÜññåö åéêöýiø ðiø öóññáÝåé öi öýóöciå óáo iå öi Internet. Áéá üññiøö ÷ñcöeññiøiñí öi PPP ÷ñÞóöc, öi üññá èá åßñáé tun0.

Þñjóè Ýóôå ñéò áêüüejøèåò êáôá ÷ùñþóåéò óójj áñ ÷åßí /etc/ipf.rules:

```
#####
# No restrictions on Inside LAN Interface for private network
# Not needed unless you have LAN
#####

#pass out quick on x10 all
#pass in quick on x10 all

#####
# No restrictions on Loopback Interface
#####

pass in quick on lo0 all
pass out quick on lo0 all

#####
# Interface facing Public Internet (Outbound Section)
# Match session start requests originating from behind the
```

```

# firewall on the private network
# or from this gateway server destined for the public Internet.
#####
# Allow out access to my ISP's Domain name server.
# xxx must be the IP address of your ISP's DNS.
# Dup these lines if your ISP has more than one DNS server
# Get the IP addresses from /etc/resolv.conf file
pass out quick on dc0 proto tcp from any to xxx port = 53 flags S keep state
pass out quick on dc0 proto udp from any to xxx port = 53 keep state

# Allow out access to my ISP's DHCP server for cable or DSL networks.
# This rule is not needed for 'user ppp' type connection to the
# public Internet, so you can delete this whole group.
# Use the following rule and check log for IP address.
# Then put IP address in commented out rule & delete first rule
pass out log quick on dc0 proto udp from any to any port = 67 keep state
#pass out quick on dc0 proto udp from any to z.z.z.z port = 67 keep state

# Allow out non-secure standard www function
pass out quick on dc0 proto tcp from any to any port = 80 flags S keep state

# Allow out secure www function https over TLS SSL
pass out quick on dc0 proto tcp from any to any port = 443 flags S keep state

# Allow out send & get email function
pass out quick on dc0 proto tcp from any to any port = 110 flags S keep state
pass out quick on dc0 proto tcp from any to any port = 25 flags S keep state

# Allow out Time
pass out quick on dc0 proto tcp from any to any port = 37 flags S keep state

# Allow out nntp news
pass out quick on dc0 proto tcp from any to any port = 119 flags S keep state

# Allow out gateway & LAN users' non-secure FTP ( both passive & active modes)
# This function uses the IPNAT built in FTP proxy function coded in
# the nat.rules file to make this single rule function correctly.
# If you want to use the pkg_add command to install application packages
# on your gateway system you need this rule.
pass out quick on dc0 proto tcp from any to any port = 21 flags S keep state

# Allow out ssh/sftp/scp (telnet/rlogin/FTP replacements)
# This function is using SSH (secure shell)
pass out quick on dc0 proto tcp from any to any port = 22 flags S keep state

# Allow out insecure Telnet
pass out quick on dc0 proto tcp from any to any port = 23 flags S keep state

# Allow out FreeBSD CVSUp function
pass out quick on dc0 proto tcp from any to any port = 5999 flags S keep state

```

```

# Allow out ping to public Internet
pass out quick on dc0 proto icmp from any to any icmp-type 8 keep state

# Allow out whois from LAN to public Internet
pass out quick on dc0 proto tcp from any to any port = 43 flags S keep state

# Block and log only the first occurrence of everything
# else that's trying to get out.
# This rule implements the default block
block out log first quick on dc0 all

#####
# Interface facing Public Internet (Inbound Section)
# Match packets originating from the public Internet
# destined for this gateway server or the private network.
#####

# Block all inbound traffic from non-routable or reserved address spaces
block in quick on dc0 from 192.168.0.0/16 to any      #RFC 1918 private IP
block in quick on dc0 from 172.16.0.0/12 to any       #RFC 1918 private IP
block in quick on dc0 from 10.0.0.0/8 to any          #RFC 1918 private IP
block in quick on dc0 from 127.0.0.0/8 to any          #loopback
block in quick on dc0 from 0.0.0.0/8 to any           #loopback
block in quick on dc0 from 169.254.0.0/16 to any      #DHCP auto-config
block in quick on dc0 from 192.0.2.0/24 to any        #reserved for docs
block in quick on dc0 from 204.152.64.0/23 to any     #Sun cluster interconnect
block in quick on dc0 from 224.0.0.0/3 to any          #Class D & E multicast

##### Block a bunch of different nasty things. #####
# That I do not want to see in the log

# Block frags
block in quick on dc0 all with frags

# Block short tcp packets
block in quick on dc0 proto tcp all with short

# block source routed packets
block in quick on dc0 all with opt lsrr
block in quick on dc0 all with opt ssrr

# Block nmap OS fingerprint attempts
# Log first occurrence of these so I can get their IP address
block in log first quick on dc0 proto tcp from any to any flags FUP

# Block anything with special options
block in quick on dc0 all with ipopts

# Block public pings
block in quick on dc0 proto icmp all icmp-type 8

# Block ident
block in quick on dc0 proto tcp from any to any port = 113

```

```
# Block all Netbios service. 137=name, 138=datagram, 139=session
# Netbios is MS/Windows sharing services.
# Block MS/Windows hosts2 name server requests 81
block in log first quick on dc0 proto tcp/udp from any to any port = 137
block in log first quick on dc0 proto tcp/udp from any to any port = 138
block in log first quick on dc0 proto tcp/udp from any to any port = 139
block in log first quick on dc0 proto tcp/udp from any to any port = 81

# Allow traffic in from ISP's DHCP server. This rule must contain
# the IP address of your ISP's DHCP server as it's the only
# authorized source to send this packet type. Only necessary for
# cable or DSL configurations. This rule is not needed for
# 'user ppp' type connection to the public Internet.
# This is the same IP address you captured and
# used in the outbound section.
pass in quick on dc0 proto udp from z.z.z.z to any port = 68 keep state

# Allow in standard www function because I have apache server
pass in quick on dc0 proto tcp from any to any port = 80 flags S keep state

# Allow in non-secure Telnet session from public Internet
# labeled non-secure because ID/PW passed over public Internet as clear text.
# Delete this sample group if you do not have telnet server enabled.
#pass in quick on dc0 proto tcp from any to any port = 23 flags S keep state

# Allow in secure FTP, Telnet, and SCP from public Internet
# This function is using SSH (secure shell)
pass in quick on dc0 proto tcp from any to any port = 22 flags S keep state

# Block and log only first occurrence of all remaining traffic
# coming into the firewall. The logging of only the first
# occurrence avoids filling up disk with Denial of Service logs.
# This rule implements the default block.
block in log first quick on dc0 all
##### End of rules file #####
```

### 31.5.14 NAT

Ôi NAT âbíáé áéññúýíéí ôuì éÝíâuì *Network Address Translation* ¶ ïåôÜöñáóç Áéâðéýíóâuì Áéêðýíö. Áéá üoïöö âbíáé áññéâéùì Ýñíé íå ôi Linux, âáóßæâðáé óðçí áñ ÷ ¶ ôiò IP Masquerading. Óðçí ðñâáâáóéêüðçôá ôi NAT êáé ôi IP Masquerading âbíáé ôi ßæéí ðñÜäíá. Íéá áðü ôéò ðiëéÝò äðíáðüðçôåò ðiò ðáñÝ ÷ áé ç eâéóïññâá NAT ôiò IPF, âbíáé êáé ç äðíáðüðçôá íá Ý ÷ iòiâ Ýíá eâéùñðéüù ôrðéêü áßêôòi (LAN) ðßóù áðü ôi firewall ôi iðibí íá ïíñÜæâðáé iéá iññâéê¶ áçìuóéá aéâýèòíç IP ôiò Internet.

Óúndú íá áfíáññúðcëåßbôd áæáóß íá èÝéæé êÜðíriëò íá ðír ëÜífæé áðóö. Íé ISPs óóÍÞeùòd áðíræßüòí ãðíræéé Yòd áæáðéèýíóáéö óá ìç áðoáéñéêíyò ðäæÜðåò. Áðóöü iðóéáóöéé Ü óçìáßíáé üöé ç áæáýèöíóç IP ðíò áðíræßåðáé óóï ìç ÷ Üíçìá óáò, iðiññåß íá áßíáé áæáöiññåðéêþ êÜéa òiñÜ ðíò êÜífåðå eëþóç áæá íá óóñíåðéåßbôd. Áæá ðíò ÷ ÞÞóðåò DSL modem éáé router, ç áæéáðþ áæáýèöíóçò ðñáàílåðiðíræßbôáé êÜéa òiñÜ ðíò áfíáññúðíræßbôáé óíi modem. Ç áæáýèöíóç IP ðíò óáò áðíræßåðáé áðú óíi ISP óáò, áßíáé áðóþ lå òíç iðiñßá óáßíåðóå óóï Internet.

Áo õððiè Ýóíðiå ôþñá üöé Ý÷åðå ðÝíôå PC ooí õðÞbóé óáð, êáé ÷ñæðÜæåðóå óå üëá óýfääðç Internet. ÊáñiíêéÜ, eá Ýðññðå íá ðeçñþðåðóå ôíí ISP óáð ÷ùñéóðü eïäññéáðiù aéá ëÜëå PC êáé íá aéáé Ýôåðå ðÝíôå aññáìíÝð oçéåðþñð.

lä öi NAT, ðñäæÜæåôôä iüññ Ýíá eïïäñéåöiù lä öií ISP óäö. Iðrinñäbôôä áðëþò íá ööíäÝóåôôä ôá ôÝóóñâ PC ôá Ýíá æäñíññ Ýá P switch ööí iðñíñí èá ööfâÝóåôôä áðßöçò éáé öi FreeBSD iç÷Üíçíá óäö. Öi iç÷Üíçíá aðööü èá åíãñâåß ùò ðýëç öið öiðééiy óäö åéêöýið åéá öi Internet. Öi NAT èá låðåaöñÜóåé áðööüìåôå ôéö åéäùöééÝò åéåðéýíöåéö IP öið öÜæä iç÷áPíåðið ööçí iññäééP áçílúöéá IP åéåýëöiðç ðið Ý÷åðôå, èáèþò öi ðáéÝòi öåýÿåäé åðüi öi firewall èáé åéåðåöéyíåðåé åññið öi Internet. Åéðåéåß áðßöçò èáé ööçí áíðßöðöñiöç låðñ Üöñâöç åéá ôá ðáéÝóå ðið áðéööñÝöiði.

ÕõÜñ-åé iéá áéäééP ðáññéí-÷ P áéäóðéýíóåúí IP ðiô Ý-÷ iöí ðáñá-÷ùñçéåß áéá-÷ññPóç óá ðiðééÜ áßéôðóá iå NAT. Óyíöúíá iå ñi RFC 1918, lõiñåbhôá íá-÷ñçóéiiðéPóåôá áéá áôöü ñi óéïðü óéò ðáñáêÜòu ðåññéí-÷ Ýò, ié iöñbåô áäí ãmññéiaiýíóáé ðiô Ý áðåðèåßáô ñiöi äçíüñóéi Internet:

Áñ÷éêü IP 10.0.0.0	-	Ôåëéêü IP 10
Áñ÷éêü IP 172.16.0.0	-	Ôåëéêü IP 17
Áñ÷éêü IP 192.168.0.0	-	Ôåëéêü IP 19

### 31.5.15 IPNAT

Íé éáíüüåò ôiõ NAT öiñöþííöáé iå ôç ÷ñþóç ôçò áiöiëþò ipnat. ÔoðééÜ, íé éáíüüåò ôiõ NAT áðiècêåýíöáé ôiõ áñ÷åßí /etc/iphnat.rules. Áåßöå ôç óåéßää manual ôiõ ipnat(1) æáá eåðöiîÝñåéåò.

Áéá íá áeëÜíâôå ôiõò éáíüíåò ôiõò NAT éáèþò áôõû áêôåëäôáé, ôñïðiõíëþóôå ôi áñ÷åßí ðiõ ôiõò ðåñéÝ÷åé, éáé áêôåëÝôå ôçí áíõíëþ ípnat ià ôçí ðáñÜíâôññ -CF áéá íá áéáññÜþåôå ôiõò áóùôâñéëýò éáíüíåò ôiõò NAT éáé íá ááéëÜóåôå üëæö ôéö áïâññÝò éáôå÷ùñþóâéö ôiõò ðbíáéå iåôåöñÜóåùí.

Áéá íá öiñôþóåôå ðiñòò êáíüíåò ðiñò NAT áðü ôçí áñ÷þ, åêôåëÝóôå íéá áiñièþ üðùò ôçí ðáñâëÜôù:

```
# ipnat -CF -f /etc/ipnat.rules
```

Áéá íá äåßôå êÜðriéá óôáôéóôéêÜ ó÷åôéêÜ ìå ôï NAT, ÷ñçóéiiðriéÞóôå ôçí ðáñâéÜôù åíôíëÞ:

```
# ipnat -s
```

Áéá fá áabóðá leá ðeþóðá lâ ðeð ðíñ Y-íðoðáð eáðáð ÷ unþróðaðéð ðíð ðbíáæ NAT, ÷ nçóðíðieÞróðá dcí ðáñáæ Úðuñ áfóðieÞ:

```
# ipnat -l
```

Áéá íá áiáññiðíéÞóåôå ôçí ëäðöiñlåñP áðåéêüíéóç ìçíòiÜôùí êáé íá äåßôå ðëçñiöinßåò ðiõ ó÷åðßæíîôáé iå ôçí áðåíññååðßå òùí êáññiùñ êáé òjöò áiáññiýò êáññiùñôå êáé êåôå÷ùñßôåéò ôóññ ðßíáéå. ãñiÜôå:

```
# ipnat -v
```

31.5.16 Fájlújáratok IPNAT

Íé êáííüíâð ðið NAT áßíáé áñêåðÜ åðÝéëêöié, êáé äéáèÝôiðið ðëÞèïò äðíáôöiðÞôuí þóðå íá êáëýðôiðið ôéð áíÜäêåð ôùí iéééâðíéí áéëÜ ñéé ðið ãðéé ðið ñéé ñéé ñéé ñéé

Ҫ óýíôáîç ôúí êáúüñú ðiö ðáññöóé Üæåôáé åäþ, Ý ÷ åé áðëëïiéçèåß þóôå íá óðiâåäßæåé ìå ôç óðíÞèç ÷ñÞóç óå ic-åìðjñééÜ ðåññéåÜ ñññóå. Åéá ðeÞnc ðåññéññåöþ õçò óýíôáîçò, åäßþò ôç óåðëßáá manual ôiö ipnat(5).

Ç óyíôáîç åíüö êáíüíá NAT ïiéÜæåé ïå ôçí ðáñáêÜôù:

map *IF LAN IP RANGE* -> *PUBLIC ADDRESS*

Í êáíüíáò íåêéíÜåé ìå ôc ëÝîc map.

ÁíôéêáôáóôÞóôå ôii IF iå ôcí åíùôåñéêÞ æéâðáöÞ (ôç êÜñôá äééôýíö ðiö óóíáÝåôáé ôii Internet).

Ҫ ڏانڀ LAN IP RANGE ۾ 192.168.1.0/24.

Ç ðán Üìåðñò PUBLIC\_ADDRESS ìðiñáß íá åßíáé åßôå ç åìùôåñéèþ IP æáýèoíóç, åßôå ç åéæéêþ eÝîç 0 / 32, ç iðiñáß õciáßíåé üöé èá ÷ñcoëiiðiçéåß ç IP æáýèoíóç ðiõ Ý ÷ áé åðiäæåß óóï IF.

### 31.5.17 Đùò èåéôïõñãåß ôï NAT

### 31.5.18 Åíåñäïðíébíôáò ôí IPNAT

Ãéá íá åíåññíðíéÞóåôå ôi JP NAT. ðññóèÝóôå ôéò ðáññéÜôù åññáiiÝò óôii /etc/rc.conf.

Ãéá íá åðéêñÝøåôå óöii ìc ÷ Üíciá óáò íá äññüjjeiäåß ðåéêÝôå ìåôåíý äéåðåöbí äééôvïo:

```
gateway enable="YES"
```

Æá íá ïåêéí Üåé áðôüìáôá ôi IPNAT óå êÜèå åêêßícôc:

```
ipnat enable="YES"
```

Áéá íá êáèïñßóåôå áðii ðïõ åðééëòìåßôå íá öïñôhüüôáé ié êáíiiåò ôïõ IPNAT:

```
ipnat rules="/etc/ipnat.rules"
```

### 31.5.19 Öi NAT óá íá ìåäÜeí Öiðééü Äßêôöí

### 31.5.19.1 ÁÍÜèåóć ôùí èõñþí ðïö èá ×ñçóéíïðíéçëíýí

Íá óðíçèéóí Ýííò êáíüíáò NAT iié Üæåé íå ôíí ðáñáê Üôù:

```
map dc0 192.168.1.0/24 -> 0/32
```

Óðír ðánnáð Üfu éáíúíá, ç Ýéñá áðåðçñßbáð oðið ðáæ Ýóïò ðáññái Ýfæ ááíðæëíßbúð êáðþ ðið ðáæ Ýóï áéÝñ ÷ áðáðé iÝóù ðið IPNAT. Áí ðññiøé Yóðåðá òçí Ýíç-êëáðäß portmap, lðiññåßbóðá íá ññðèíßbóðå ði ðáññái Íá ÷ ñçóðiðíéðb èýñnåð ðið áíÞéiði ði ðáññái Ýíç ðáññé ÷ þ. Áéá ðáññái Úðóð ðáññái Þóðé ði ðáññái Ýíç ðáññé ÷ þ. Áéá ðáññái Úðóð ðáññái Þóðé ði ðáññái Ýíç ðáññé ÷ þ.

```
map dc0 192.168.1.0/24 -> 0/32 portmap tcp/udp 20000:60000
```

```
map dc0 192.168.1.0/24 -> 0/32 portmap tcp/udp auto
```

31.5.19.2 ×ñcóéíïðíéþíóáò Ýía Áðüèàíá Äöíáìéþí Äéåðèýíóåúí

Óá Yíá ðíréy iååÜëi ðíðééü äßéööñ, áññáÜ P áñPäinä ööÜñiòiå ööí óçìåßí ðíö iéá iírááééP áçìüöéá áéåýèöíóç äái áðáñéåß áéá íá éáéýøåé öüúöåò ðíëéYò éæéùöééYò. Áí ððÜñ ÷åé áééæ Yóëii Yíá áýñiò áçìiößùí áéåöéýíåúí, lðiñiyí íá ÷ñçöéíiðíçééýí ùò “áðñüéåíá (pool)”, áðéöñ Yðíiöåò ööçí IPNAT íá áðééë Yíáé iéá áðü áðööYò éæéþò áíðéööéí ÷åß óá ðáééYò åéåöÜ ðíçí Yíáíi ðíöö ðññiò öi áçìuöéí áßéööñ.

Áéá ðánÚäæáéíá, áíðóß fá áíðéóðóíé: íyí ueá ðá ðáéÝ ðá iÝóu iéáð mísáæéÞð áçüñðéáó IP áéåýëðíóçð üðñðó ðáñáéÜðó:

```
map dc0 192.168.1.0/24 -> 204.134.75.1
```

iðiñiiyìá íá ÷ñçóéiiðiéÞóíòiå Ýíá åýñiò IP æáðøèýíóåùí, åßôå iå ôç ÷ñÞóç iÜóêáò æéêöýíõ:

```
map dc0 192.168.1.0/24 -> 204.134.75.0/255.255.255.0
```

åßôå ìå óõìâïëéóìü CIDR:

```
map dc0 192.168.1.0/24 -> 204.134.75.0/24
```

### 31.5.20 Áíáêáôåýèõíóç Èõñþí

Åßíáé eieíP ðñkåôééP íá åâéåèßóôáíôåé ðöçñâôßåò üðùò i åöðçñâôçôPò éooïoåëßäú, ôá ÷ ðæññiåßiò, åÜóçò åâäiñÝfùí êáé DNS óå åéáöñâôééÜ PC óöi öiðééü åßéôòi. Óöçí ðåñßðôñóç åöôP, ç êßíçóç ðåéÝòùí áðü åöôÜ óá iç ÷ áÍPiåôá åíâéiøièåß íá ÷ ñåéÜæåôáé öi NAT, åééÜ ÷ ñåéÜæåôáé åßBçò íá ðöÜñ ÷ åé êÜðiøiò ñöñüðiò íá åéâôðéýiåôáé ç åéôåñ ÷ üìâíç êßíçóç óôå óùñôÜ PC ôiò åéêôýiò. Öi IPNAT Ý ÷ åé ôéô åéâðÜëëçéåò aðíåûöôçôåò åéá ôçí åðßëôóç åðöiy öiò ðñiâëPiåôiò. Åéá ðánÜääéäíá, Ýóòù üöe Ýíáò åiöðçñâôçôPò éooïoåëßäú åñßóêåôáé óöçí åéâýeöiòc LAN 10.0.10.25 êáé ç iiiiäééP åçüñöéá IP åßíáé 20.20.20.5. I êáüíüáò ðiò eá åñÜöåôå eá Ýíéåéå iå öiñ ðánñaeÜòù:

```
rdr dc0 20.20.20.5/32 port 80 -> 10.0.10.25 port 80
```

P:

```
rdr dc0 0.0.0.0/0 port 80 -> 10.0.10.25 port 80
```

Þ æáá Ýíá áiðoðçñâôçôþ DNS íå äéáyèoíóç óöii ôiðéêü äßêööii 10.0.10.33 i iðiðiò ðñÝðåé íá áÝ÷åöáé áíáæçôþoåéò áðü öiäcÿúöeiä ãßêööii:

```
rdr dc0 20.20.20.5/32 port 53 -> 10.0.10.33 port 53 udp
```

### 31.5.21 FTP êáé NAT

### 31.5.21.1 Éáíüíåò ôïõ IPNAT

Ói IPNAT äéáèÝôåé leá áéäéêéP åðééïïP áéá áéâíâóréÜâcós FTP (proxy) ç iðibá ïðiñâb íá êáèrñéóôåb óóíí èáðÜëëçëí êáíüíá ôíö NAT. Íðiñâb íá ðáñáéïïöèÞóåé üéá óá åíâñ ÷ üíâíá ðáéÝóá áéá íá áíé ÷ íáýóåé ôçí Yíáññíç leáò åíâññÞò P ðáéçöééÞò óóíäññBáò FTP, êáé íá äçíéïññÞóåé äöííåééÜ ðñíóùñéíýó êáíüíå óóí ößëöñí ðiò íá ðáñéÝ ÷ iðí íüíñ ôíí áñééìù ôçò èýñáò ðiò ÷ ñçóéíïðíéåßôáé áðü ôí éáíÜéé áåäññÝñú. Áóðü åíâéåßôåé ôí ðññüâëçìá áóö Üëåéåò ðiò äçíéïññåßôáé áðü ôí áåäññüò üöé áéäöññåôééÜ èá ÷ ñåéáæüöáí íá áíé ÷ èåß leá íåñÜëç ðåñéí ÷ P èëñþí (óóçí õøçëí ðåñéí ÷ P) óóí firewall.

Í ðáñáêÜôù êáiüíáò ÷åéñßæåôáé üëá ôá äåëííÝíá ãéá ôï åóùôåñéêü äßéôöi (LAN):

```
map dc0 10.0.10.0/29 -> 0/32 proxy port 21 ftp/tcp
```

Í ðáñáêÜôù êáíüíáò ÷åéñßæåôáé ôcí êBíçóç FTP áðü ôcí ðýëç (gateway):

```
map dc0 0.0.0.0/0 -> 0/32 proxy port 21 ftp/tcp
```

```
map dc0 10.0.10.0/29 -> 0/32
```

Í éáíüíáð ÷ áñôíäñ Üöçöçò ôíø FTP ôíðíëåôåßöáé ðñéí áðü ôíí éáííéüü éáíüíá ÷ áñôíäñ Üöçöçò. ÉÜèá ðáé Ýöi äéÝä ÷ åôáé áñ ÷ ééÜ áðü ôíí éáíüíá ðíø áñßöéåôáé óöçí éíñööþ. Áí ðáéñé Üæåé óöç äéåðäöþ éáé óöçí éæúööééþ äéåýéööíóç IP éáé ðñüéåéöáé áéá ðáé Ý öi FTP, i äéåíåöiéåäçöþo FTP äçíéïññaåß ðñïöùñééñïyö éáíüíåò oíi ößéöñi ié iðiþiæ åðéöñ Ýðiöñ óçí áéöåñ ÷ üíäíç éáé áíäñ ÷ üíäíç êßíçöç FTP áíþ ðáðöü ÷ ñííä åéôåéïýé áéá óöçí áðáñåßöçöç íåö Üöñáöç NAT. ¼éá ðáé Ýöá ðíø äáí áíÞéiöí ðá íåö Üäiöç FTP äáí ðáéñé Üæiöí iá ôíí ðñþöi éáíüíá, Ýööé éáðåðéÿüíöáé óöii ðñþöi éáíüíá, áíåð Üæiööáé üöi áöiñ Ü öç äéåðäöþ éáé oí IP áðü ôí iðiþi ðñïYñ ÷ iiðáé, éáé áíßíåöáé ç áíößööíé ÷ c iáö Üöñáöç oíðö aðü oíi NAT.

### 31.5.21.2 Êáíüíåò Ößëôñiõ ãéá ôi IPNAT

¼ôáí ÷ñçóéiiðiéâßôáé iäåóïëåâçôÞò FTP, ÷ñâéÜæåôáé iüñí Ýíåò êáíüíåò ãéá ôi NAT.

×ùñßò ôi iäóïëåâçôÞò FTP, ÷ñâéÜæiiðiõé ié ðáñâéÜôù ôñâéò êáíüíåò:

```
# Allow out LAN PC client FTP to public Internet
# Active and passive modes
pass out quick on rl0 proto tcp from any to any port = 21 flags S keep state

# Allow out passive mode data channel high order port numbers
pass out quick on rl0 proto tcp from any to any port > 1024 flags S keep state

# Active mode let data channel in from FTP server
pass in quick on rl0 proto tcp from any to any port = 20 flags S keep state
```

## 31.6 IPFW

Ôi IPFIREWALL (IPFW) åßíáé ëïäéóïéü ðiõ áíáðôý ÷èçéå ãéá ôi FreeBSD, ÷åé ãñáöåß êáé óóíöçñâßôáé áðü åðåéiiðiõéÝò ðiõ áíÞeïõi ôi Project. ×ñçóéiiðiéâß ôiõò êéáóééiÝò êáíüíåò ÷ùñßò åéâóÞñçóç ôçò êáôÜðôáóçò (stateless) êáèþò êáé iéá ôå ÷íééÞ êüäééiðiðçóçò ðiõ áðéôðä ÷Üíåé áðôü ðiõ áíáöÝñâðáé ùò ÁðëÞ Stateful ËiääéÞ (Simple Stateful Logic).

Ôi ððüääéäiá êáíüíû ãéá ôi IPFW (óðá áñ ÷åßá /etc/rc.firewall êáé /etc/rc.firewall6) ôçò ôððééÞò ååâåðÜðôáóçò ôiõ FreeBSD åßíáé iÜëéiá áðéü êáé ðá ÷ñâéåðôåß íá êÜíåðå êÜðiéåð áëéååÝò ðñéi ôi ÷ñçóéiiðiéÞðåðå. Ôi ðáñÜååéäiá ååí ÷ñçóéiiðiéâß öééññÜñéóíå ðýðiõ stateful. Ç stateful ååéöiññâßá åßíáé åðâñâåðéêÞ óðéò ðâñéóðüðâñâð ðâñéððþâðéò, Ýðóé ååí ðá ÷ñçóéiiðiéÞðiõå áðôü ôi ðáñÜååéäiá ùò åÜóç áðôÞò ôçò åíüðçôåò.

Ç óýíôåç ôñí êáíüíû stateless ôiõ IPFW Ý÷åé áíéó ÷ðéåß iå åíâééäiÝíåò åðíåðüðçôåò áðééiäÞò ié iðiðåò ôðíÞèùò iåðâññÜíå êáðôÜ ðiëy ôéò ôððééÝò åíþðåéò ôiõ áðôü ðiõ êáæåðôáé íá ôi ñðèìßôåé. Ôi IPFW áðåðéýíåðáé óóíí åðâñâåðéäiåðâß ÷ñÞðôç Þ ðiõ ôå ÷íééÜ ðñi ÷ùñçìÝñí ÷ñððôðå, i iðiðið Ý÷åé ðñi ÷ùñçìÝñí ðééðññâñßðiáðiò ðáéÝðù. Ç ðñâñâåðéêÞ ayíâíç ôñí êáíüíû ðiõ IPFW áðíéåéýððôåðé iüñí áí åééåÝðâðå ðñi ÷ùñçìÝíåò åíþðåéò ð÷åðééÜ iå ôi ðñò åéâðññâðééÜ ðñùðüðééëå åçlëiðññâíý êáé ÷ñçóéiiðiéíý ôçí åðééåðéëßâá ôñí ðáéÝðù ðiõ. ÔÝðiëi åððâðåäi åðâñçãÞðåðñí åßíáé ðÝñá áðü ôi ôéiðü áðôÞò ôçò åíüðçôåò ôiõ Åå ÷åéñéäßiõ.

Ôi IPFW áðiðåðéåðôáé áðü áðôÜ åâññðÞiáðå. Ôi ååðéü åíÜñôçìå åßíáé i åðâñññâðôÞò êáíüíû ðiõ firewall óóíí ððñÞíá, iå åíóññâðñíÝíç ôç åðíåðüðçôå êáðâññâðôÞò. Ôá ððüëiéðå åíññðÞiáðå åßíáé ôi óýðôçìå êáðâññâðôÞò (logging), i êáíüíåò divert i iðiðið åíâññiðiéâß ôç åéâðññâðå NAT, êáèþò êáé ié ðñi ÷ùñçìÝíåò åðíåðüðçôåò åééééiÝ ðiðiðiõ: ôi óýðôçìå åéâññðñðóçò êßíçóçò (traffic shaper) dumynet, ç åðíåðüðçôå ðñiþðçóçò iÝðù ôiõ fwd rule, ç åðíåðüðçôå åððýññðóçò (bridge) êáèþò êáé ç åðíåðüðçôå áðüññðóçò (ipstealth). To IPFW ððiðññâñßæåé ôüöi ôi ðñùðüðééü IPv4 üðri êáé ôi IPv6.

### 31.6.1 Åíâñäiðiéþíôáò ôi IPFW

Ôi IPFW ðâñééäiåÜíåðâé óðçí åâðééÞ ååâåðÜðôáóç ôiõ FreeBSD ùò Üñèññùá ôiõ ððñÞíá ôi iðiði ðiññâß íá ðiññðùèåß åðíâññéÜ. Ôi óýðôçìå èá ðiññðóâé åðíâññéÜ ôi Úñèññùá üðâññâðôå õçí êâðå ÷þñéóç firewall\_enable="YES" óóíí áñ ÷åßí /etc/rc.conf. Ååí ÷ñâéÜæåôáé íá åíâññâðñðôå õçí êâðå õçí ððñÞíá, åððüò áí eÝëåðå íá ÷ñçóéiiðiéÞðåðå ôéò åéâðññâðå NAT ðiõ ðáñÝ ÷åé.

Áöiy áðáíâêééPóâôå ôi óyóôçìá óáò iá ôçí êáôá ÷ þñéóç firewall\_enable="YES" ôi rc.conf, èá äâßôå iá Üðñá Yíoiá añÜliáôå ôi áéüëiðëi íPíoiá êáôÜ ôç æáäéêáóßá ôçò áêêhíçóçò:

```
ipfw2 initialized, divert disabled, rule-based forwarding disabled, default to deny, logging disabled
```

Ôi Üñèñùìá Y ÷ áé áíóùâôåùíYíç ôç áðáâôüôçôå êáôâññáöPò. Áéá íá áíâññiðiéPóâôå ôçí êáôâññáöP êáé íá èYóâôå ôi áðßðâäi ëåðôiñYñâéáò, ððÜñ ÷ iði ëÜðiéáò ñðèiþóåéò ðið ìðiñâßôå íá èYóâôå ôi /etc/sysctl.conf. Ðñiøé Yíiñðôå ôeò ðáññéÜðù êáôá ÷ ùñþóåéò, èá áíâññiðiéçèåß ç êáôâññáöP ôðeò áðññâñâð åêêééPóâéò:

```
net.inet.ip.fw.verbose=1
net.inet.ip.fw.verbose_limit=5
```

### 31.6.2 ÅðéëiäYò ôið ÐõñÞíá

Åáí áâßíáé ðði ÷ ñâùôéêü íá áíâññiðiéPóâôå ôi IPFW iåâññéùôôßæiiðåò ôeò ðáññéÜðù åðéëiäYò ôðið ðõñÞíá ôið FreeBSD, áêðüò êáé áí èYéâôå íá ÷ ñçóéiðiéPóâôå NAT. Í òéiðüò áððPò ôçò ðáññiðóßáçò áßíáé êáèáññÜ áíçìâññôéêüò.

```
options      IPFIREWALL
```

Ç áðéëiäP áððP áíâññiðiéåß ôi IPFW ùò iYñiò ôið ðõñÞíá.

```
options      IPFIREWALL_VERBOSE
```

Åíâññiðiéåß ôçí êáôâññáöP ôuí ðáéYóùí ðið ðáññíýí iYóù ôið IPFW êáé ðáññééâiáÜñiðí ôç eYíç log óiíí êáíüíá ôiðò.

```
options      IPFIREWALL_VERBOSE_LIMIT=5
```

Ðáññiñßæåé ôií ðëPëiò ôuí ðáéYóùí ðið êáôâññáöÜñiðåé iYóù ôið syslogd(8) óá óðâññéñéiYíñ áñéèiü áíÜ êáôá ÷ þñéóç. Ç ñýèiéóç áßíáé ÷ ñPóéiç óá ã-èñééÜ ðáñéáÜëëiíðå óóá iðiþá áßíáé åðéëðiçòP ç êáôâññáöP. Íå áððü ññüði ìðiñâß íá áðiñðå ÷ èåß iéá ðééáíP áðßèåóç iá óðü ÷ i ôçí ððâñ ÷ áßééóç ôuí áñ ÷ áßùí êáôâññáöPò.

```
options      IPFIREWALL_DEFAULT_TO_ACCEPT
```

Ç áðéëiäP áððP áöPíåé óá ðÜíôå íá ðáññÜíá iYóá áðü ôi firewall, ôi iðiþí áßíáé êáëP éäYá ôçí ðñþòç öiñÜ ðið ñðèiþæåôå ôi firewall óá.

```
options      IPDIVERT
```

Ç áðéëiäP áððP áíâññiðiéåß ôç eåéðiññâßá NAT.

**Óçìâßùóç:** Ôi firewall èá áðiññßðôåé üéá óá ðáéYóá ðið êáôâññéýíðåé áðü êáé ðñiò ôi iç ÷ Üíçíá, áí áâí ðáññééÜââôå ôçí áðéëiäP IPFIREWALL\_DEFAULT\_TO\_ACCEPT P áí áâí ñðèiþóåôå Yíá êáôÜëëçeií êáíüíá ðið íá áðééñYðåé áððYò ôeò óiäYóåéò.

### 31.6.3 ÅðéëiäYò ói /etc/rc.conf

ÅíâññiðiéPóôå ôi firewall:

```
firewall enable="YES"
```

Áéá íá åðééÝíåôå Ýíá áðü ôíðò ðñïåðééåáiÝííðò ôýðíðò firewall ðíðò ôðiðóçñßæíïóáé áðü ôí FreeBSD, äéáåÜóôå ôííåñ÷åßí /etc/rc.firewall êáé åçìéïññåÞóôå íéá ååññåóÞ üðòù ôçí ðåññéÜóù:

```
firewall_type="open"
```

Íé äéáèÝóéíåò ôéíÝò ãéá áõôP ôç ñýèìéóç åßíáé:

- `open` — åðééññÝðåé ôç äéÝéåñðç üëçò ôçò êßíçóçò.
  - `client` — ðñïóôååðåýåé iüññ ôï õõäæåññéíÝññ ìç÷Üíçìå.
  - `simple` — ðñïóôååðåýåé iëüêëçññ ôï äßêôöñ.
  - `closed` — áðåíåññiðiéåß åíôåëþò ôçí êßíçóç ðáêÝôùí, åêôüò áðü ôçí åóùôåññéþ äéåðåöþ (loopback).
  - `UNKNOWN` — áðåíåññiðiéåß ôçí öüññðùóç êáíüññú ôïñ firewall.
  - `filename` — ôï ðëÞññåò iññiðÜöé ôïñ ãñ÷åßiø ðiñ ðåññéÝ÷åé ôïñ ðiñ êáíüññå ôïñ firewall.

Íðiðmáðóð íá ÷ níçóéiðiéÞóåðá äýíi áæáooñåðééiyò ôñüððoð ãéá íá öiñôþóåðá ðñiioáññiði Ýñiðo êáñüiàð oóii **ipfw** firewall.

Í Ýíáð áßíáé è Ýôíîóàò ôc iàðúââéçòP `firewall_type` ôóçí àðüøöôc äéáññíP ôiò áñ ÷ áßíò ðiò ðåñéÝ ÷ áé ôiò ëáíüíåò ôiò `firewall`, ÷ üñßò íá äþóåôå iñßóíåóå ôóçí ãññíP áiòièþí ãéá ôi ßæíi ôi `ipfw(8)`. Ôi áñ ÷ áßíi éáñüíüí ðiò õáßíåôåé ðáñáéÜôù, áðiññßðôåé üeç ôçí áéóâñ ÷ üíäíç ãéá áíâñ ÷ üíäíç êßíçóç:

add deny in  
add deny out

Áðü óçí Üeëç iãñéÜ, áßíáé åðÞbóçö aðíáðú íá è Ýóâåð óç íàðâåéçöþ firewall\_script óçí áðüéðöç äéáññiþ áíüò åêðâæÝoéiï script ðiö ðâñéæâiáÜíáé ieá óáéñÜ áðü áiðiøÝø ipfw ðiö èá åêðâæðööiyí eáðÜ óçí åêéßíçöç. já Ýæññi öÝöiéi script öi iðiþi áßíáé áíðbóðiø : i la öi áñ : åßi éáúúñiñi ðiö aðßiâiå ðáñáðÜñi, áßíáé öi áéüëiøe:i:

```
#!/bin/sh
```

```
ipfw -q flush
```

```
ipfw add deny in  
ipfw add deny out
```

**Óciàßùóć:** Áí èÝóâôå ôcí ôéíþ ôíö firewall\_type åßôå óå client åßôå óå simple, èá ðñÝðåé íá åëÝâîåôå üôé íé ðñíåðééäåÍYíé éáíüíåò ðíö ðåñéÝ-ííöåé óóí /etc/rc.firewall óåéñéÜæïí iá ôéò ñðòèìßóåéò ôíö óóäåéåñéíÍYííö íç-áíþiaóíö. Ðáñáñóçñþooå åðßóçò üôé óå ðáñäåäåßáìåóå ðíö ÷ñçóéíïðéýíóåé óå áóõú ôíêåöüéáéí áíáÍYííö íá íá Ý-åôå eÝóåé ôc iaðåáäéçôþ firewall\_script óóci ôéíþ /etc/ipfw.rules.

ÅíåñäïðïéÞóôå ôçí êáôáãñáöþ:

```
firewall logging="YES"
```

`rc.conf` ðið íá `ïñßæáé ðáñéïñéóïýò óóçí éåôáäñáðþ, áæéü áðóöù ïðññáß íá ñòéìéóðåß iÝóù óçò ðáñáðÜíù iåðááäéçðÞò sysctl áßðóà ÷ áéñïñéßíçðá, áßðóà iÝóù ðið áñ÷ áßíð /etc/sysctl.conf:`

```
net.inet.ip.fw.verbose_limit=5
```

Áí ôii ìç÷ Üíçíá óáô ëåéòïñåâß ùò ðýéç (gateway), äçéääÞ ðáñÝ ÷âé ðöçñåðóßá iåðÜöñáòçò äéåðëýíóåùí áééòýíò (Network Address Translation, NAT) iÝóù ôiõ natd(8), ðáñåêéïýå íá äéåâÜóåôå òi ÔíÞìá 32.8 ãéá ðëçñiiöñßåò ó÷åôéêÜ ià ôéò ñôèïßóåéò ðiõ adáéòýíóåé ôóï áñ ÷âßi /etc/rc.conf.

### **31.6.4 Ç Åíôïëþ IPFW**

Ãéá íá äåßôå üëïõò ôïõò êáíüíåò ìå ôç óåéñÜ:

```
# ipfw list
```

Áeá íá áabóða íeá Úbóða üeuí ður eátiúin, láæb iá óci þná ðið áiññáðiéþeçéa óáæððoáða ðiññU i éÜeá eátiúináð, áññUðða:

```
# ipfw -t list
```

Ói áðutiðanir ðán Úðaðeáíá áðib ÷ fáið óií áñéðiù òuú ðáé Ýòuí ðiði ðáðñéáíá íaæþ iå ðií áíðbóóíé ÷ iéáíüíá. Ç ðñþþóç óðþþéç áðib ÷ iæði ðií áñéðiù óið eáíüíá, áðiðeåðbóáé áðuú ðií áñéðiù ðáé Ýòuí ðiði ðáðñéáíá (ðñþþóá óá áiðñ ÷ üiðáíá eáé iåð Ü óá áðoðñ ÷ üiðáíá) eáé oÝeío áðuú ðií þæði ðií eáíüíá.

```
# ipfw -a list
```

Áéá íá ááßóá íéá ßBÓÓ Á ÓÍÓ íá ðáñééáíá ÜÍáé ðúóí ðíóð ðíóð ðáðíáééíýð ùúíj ééáé ðíóð ððáðééíýð éáíúíáð:

```
# ipfw -d list
```

Áéá íá äåßôå êáé òíñò äðíájééïvò êáíüíåò ðíñò Ý÷íñòí èPåæ:

```
# ipfw -d -e list
```

Ãéá íá ìcääíßóåôå ôïõò ìåôñçô Ýò:

```
# ipfw zero
```

Áéá íá ìcääíßóåôå ôíïòò ìåôñçô Ýò ìüíí áéá ôíí êáíüíá ìå ôíí áñéëíü NUM:

```
# ipfw zero NUM
```

### 31.6.5 Ôi Óyíieii Éáíüíùí ôiõ IPFW

**Óciåßùóç:** Ç áíáæþôçóç óoiá÷ßæåôáé iåöÜ áðü êáíüíåò óýðiõ count, skipto êáé tee.

Ié iäçäbåò ðiö öäbñíöáé åäþ, åáóßæííöáé óóç ÷ñPóç êáíüíú ðiö ðåñéÝ ÷iöi ôeo iäçäbåò keep state, limit, in, out éáé via. ÁðoÝò åßíáé êáé ié åáðéêÝò èåéðiöñäbåò åéá ôçí åüiçóç åíùö firewall óýðiö inclusive iå stateful èåéðiöñäbå.

**Đòi hỏi để có thể truy cập:** Là một yêu cầu hoặc điều kiện cần thiết để có thể truy cập vào một hệ thống, dữ liệu hoặc ứng dụng. Ví dụ: Để truy cập vào một trang web, bạn cần có một kết nối internet và một trình duyệt.

### 31.6.5.1 Óyíôáîç Èáíüíùí

Óóci áiüököá áôôP, eá ðáññöóé Üóíöiå leá áðëëiðiéci Ýíç óýíöâíç eáíüüñú. Áåß ÷ iñöiå iùñü üöé ÷ nñäé Üæåðåé ãéá íá áciéiðññçéåß Ýíá ôððiðiéçì Ýñüññí eáíüüñú ãéá Ýíá inclusive firewall. Áéá ðëPñç ðåññéãñáöP, äåßôå ôç óåëëßää manual ôiö ipfw(8).

Íe éáííüåò ðåñéÝ ÷ iöí ë Ýíåéò-êëåéæÜ. Íe ë Ýíåéò áôô Ýò éá ðñ Ýðåé íá êuäééïöíéçèiyí iá óoåéåñéi Ýíç óåéñÜ áðü óå áñéóôåñÜ ðñiò óå áäåñéÜ óçò åññílþò. Íe ë Ýíåéò-êëåéæÜ öáßñiòáé ðåñéÜòù iá Ýòiíá åñ Üìláóå. ÍañééÝ ðò ë Ýíåéò Ý ÷ iöí ñöï-åðééïäÝò ié iöïßåò lðiññåb íá åßíáé åðßöçò ë Ýíåéò-êëåéæÜ ééé íá ðåñééäiáÜñiòl åðßöçò åéüìá ðåñéóóññöåñòl ñöï-åðééïäÝò

Ҫ áñ÷پ áíüö ó÷ießiõ, óçiaóîïäiôåbôáé iå öi óýiâiïeii #, öi iðiñi ìðiñâb ía åiöáíßæåôáé óöi ôÝeiò ieáo ãñâiìpò eáíüiá, p êáé óå ieá aéép öiõ ãñâiìp. Je êaiÝò ãñâiìYò aáñiïvýôáé.

CMD RULE NUMBER ACTION LOGGING SELECTION STATEFUL

### 31.6.5.1.1 CMD

Ãéá íá ãßíâé ç ðññiøèÞêç áñüò iÝiõ êáíüíá óóíí áóùôåñéêü ðßíáéá, ôiðiøåôåßðáé iðñiøðÜ áðü áðóüí ç ðánñÜìåññiò add.

### 31.6.5.1.2 RULE\_NUMBER

ÊÜëå êáíüíáð ó÷åôßæåôáé íå Ýíá áñéëíü êáíüíá (rule\_number) óôçí ðâñéï ÷ P 1..65535.

### 31.6.5.1.3 ACTION

þjáò êáíüíáð iðñiâß íá ó÷åôßæåôáé íå iéá P ðâñéóóüôåñâò áíÝññâéâò, ié iðiøßâò åêôåëíýíðáé üôáí òi ðáéÝöi õáéñéÜæâé íå ôá êñéôÞñéá åðéëíäPò áðóïý ôiø êáíüíá.

*allow / accept / pass / permit*

þvæá ôá ðâñáðÜñ Ý÷iõ òi ßæéí áðiøÝëåóíá: òi ðáéÝöi áíÝñ ÷åôáé áðü ôçí óýóðçíá ôiø firewall. Ç áíáæÞôçóç æáá ôiø ôðñâéññiÝñ ðáéÝöi ôðñâáðßæåôáé óá áðóü ôiø êáíüíá.

*check-state*

ÅëÝá÷åé òi ðáéÝöi íå âÜóç òi äðíâíéêü ðßíáéá êáíüíú. Áí âñâðâß êáíüíáð ðiø íá õáéñéÜæâé, èá åêôåëåôôâß ç åíÝññâéá ôiø êáíüíá i iðiøßâò åçìéíýñâçóå ôiø ôðñâéññiÝñ íäðíâíéêü êáíüíá. ÅéäöiññâéÜ, ç áíáæÞôçóç ôðñíå ÷ßæåôáé íå ôiø áðñiâñâß íäðíâíéêü. þjáò êáíüíáð check-state ääíÝ÷åé êñéôÞñéá åðéëíäPò. Áí ääí ððÜñ÷åé êáíüíáð check-state ôiø óýíiëí êáíüíú, i Ýëåâ÷iø ôiø ðßíáéá äðíâíéêþí êáíüíú íâééíÜâé áðü ôiø ðñþöi êáíüíá óýðiø keep-state P limit.

*deny / drop*

Êáé ié äýí eÝâéð òçíâßñiõí òi ßæéí ðñÜâíá: ôá ðáéÝöá ðiø ôáéñéÜæëíñ íå áðóü ôiø êáíüíá áðñññßððiøáé. Ç áíáæÞôçóç ôðñâáðßæåôáé.

### 31.6.5.1.4 ÈáðâáâñáðP

*log P logamount*

þvðái Ýíá ðáéÝöi ôáéñéÜæâé íå Ýíá êáíüíá ðiø ðâñéÝ÷åé ôç eÝíç log, ãßíâðâé êáðâáâñáðP ðiø içíýíâòiø iÝóù òiø syslogd(8) ôôç äðíâðûôðçôá SECURITY. Ç êáðâáâñáðP ôðñiâñâéâò iüññi áí iññéëíüò ôùí ðáéÝöùí ðiø Ý÷åé êáðâáâñáðâß iÝ÷ñé ôðéâíäPò ääí ððñâñâñâéâò ôçí ððññÜìåññiø logamount. Áí ç ððññÜìåññiø ððñâñâéâò ääíÝ÷åé êáðâññâéâò, ôiø üññiñ ññðèßæåðâé íå âÜóç ôçí ôðéP ôçð ìâðñâæçôðP sysctl net.inet.ip. verbose\_limit. Èáé ôðéð äýí ððññðþöâðéð, iéá içäâñéêþ ôðéP ôçíâñâéâò üðé ääí èá ððÜñ÷åé üññiñ ôôçí êáðâññâðP. Iññéð ç êáðâññâðP ôðÜóâé ôôí üññiñ, iðññâß íá ãßíâé åðáíâññâðiðiðçôç ôçð íå ôiø içäâñéòiü ôiø iâðñçðP êáðâññâðP, P ðiø iâðñçðP æáá ôiø ôðñâéññiÝñ êáíüíá. Äâßðâ òçí åðiøëP ipfw reset log.

**Óçíâßùóç:** Ç êáðâáâñáðP ãßíâðâé íüññi áðiø áðáéçèåðëíýí üëâò ié Üëëâò ôôðíèþêâð ôáéñéÜóíâðiø ôiø ðáéÝöiø, èáé ðññéí òçí ôðéëéêþ áðiøiø ÷ P P áððñññéðç ôiø. Æßíâé ôôç äééþ ôáð åðó÷Yññâéá íá áðiøáóßðâðâ ôá ðíéïðð êáíüíâð èá åíâññâðiðiðâðâ ôçí êáðâññâðP.

### 31.6.5.1.5 ÅðéëíäP

Þé eÝâéð-êðâéæéÜ ðiø ðâñéññÜðññiðð áðâððP ôçí åíüñðçôá, ÷ñçóðñiðiðíýíðáé æáé íá ðâñéññÜðññi ÷áñáâðçñéóðééÜ ôiø ðáéÝöiø ðiø èá ðñÝðâé íá åéâññâðiçëíýí æáé íá êáðññéóðâß áí ôiø ðáéÝöi ôáéñéÜæâé P ü÷é íå ôiø êáíüíá. Ç åðéëíäP

іðiñáð íá áðíráé íá að Úóð óá ðáñáð Úðóù áðíééþò öýóðù ðò áñáðóçñéóðééÜ, óá iðiñáð eáé eá ðñÝðåé íá ÷ñçóéiiðiéçéiyí íá óc óáéñÜ ðiðið óáðíñóáé:

*udp* | *tcp* | *icmp*

Iðinjíyí áðbóðo íá ÷ nícoéiiðiéceiyí óá ðññúðuñéiæea ðið ðáñéY-÷iðáðe óði añ-÷aðbi /etc/protocols. Ç ðéiþ ðið éæáeññéðaðaé ÷ nícoéiiðiéæñðoáé æáa ói óaðñéaðia óið ðññúðiéiñéið. Ðññéåðaðeæ áæá óði ÷ náuðóééþ ðáñUñáðoñi.

*from src to dst*

Ié ë Ýíâéò from êáé to ÷ ñçóéïïðïéïýïoáé áéá ôí ðáßñéáóíà IP äéâðöéýïoâú. Ié êáíüñâð ðñ Ýðåé íá êáéïñßæïïò ðïööï ðçí ðçäP üöï êáé ôíï ðñïïñéòïü. C ëÝïc any ïðïñâß íá ÷ ñçóéïïðïéçèâß áéá ðáßñéáóíà íá ïðïéâäPðïòâ äéâýëöïóç. C ëÝïc me Ý ÷ áé âðßöçò áéâéêP ðçìâóßá. ÓâéñéÜæâé íå ïðïéâäPðïòâ äéâýëöïóç ðïö Ý ÷ áé ñöèlëéðôâß óâ Üðïéâä áéâðâöP ðïö ðööôðßlåöïò óâó, áíöeññïòùðâýïòâ Ýðöé ôï PC ôöï iðïßi áéâðâëâßöâé ôï firewall. ïðïñïý Ýðöé íá ãñâöiyí eáíüââö ðïö ðýðïò from me to any P from any to me P from any to 0.0.0.0/0 P from 0.0.0.0/0 to me P from any to 0.0.0.0 P from me to 0.0.0.0. Ié áéâðëýïoâéò IP êâëïñßæïïôâé ùò áñéèlçöéê Ýö iéðÜâåò ÷ ùñéòï Ýíâò íå òâéâßöâé õâé áéïïðïéïýïoáé áðû ôï iPëò ðçò iÜðéâò ðïðâééðöïyö. Iéá IP äéâýëöïóç ïðïñâß íá êâëïñßæâðâé íå áñéïïyö ðïö ÷ ùñßæïïôâé íå ôâéâßöâò. Iðïñâß âðßöçò íá áéïïðïéâßöâé áðû ôï iÝââëò ðçò iÜðéâò ðïðâééðöïyö (iññöP CIDR). Ðñüéâéâé ãéá ôðï ÷ ñâùöéêP ðáñUâåññ. Iðïñâßöâ íá ÷ ñçóéïïðïéPöââò ôï âïçèçöéêü ðñüâñâíâ net-mgmt / ipcalc ãéá áéâðëüëöïóç óâó ôöïò ðïðâéâöïyö. Åâßöâ ôçí áééööâéP ðïðâéâößá ôïò ðñüâññUâåññ ðïðâéâößá ôïò ðïðâéâößá ôïò ðïðâéâößá: <http://jodies.de/ipcalc>.

*port number*

$\times$  ñçóéññíðíéåßôáé óå ðñùñòûéíëéá ðíø ððíóðçññbæïñí áñééëíÿò ëðññþí (üðñò ãßíáé óå TCP êáé UDP). Åßíáé ððíñ ÷ ñåùòðééú íá äßíáôáé í áñééëùò éýññò ôçò ððçñåðßåò ðíø èÝéåôå íá óâéñéÜíåôå. Íðíñåßôå íá ÷ ñçóéññíðíéÞóåôå óå ííÿñåôå óùí ððçñåðéþí (íðíñåßôå íá óå åñåßôå óõí áñ ÷ ìßí /etc/services) áíòß æáé òíòò áéííééíÿò áñééëíÿò ëðññþí.

*in / out*

Í lá óir Óláfr Óðr Úlfur iðriðinum fá eðeins neðóðum ár óir Óláfr Óðr Úlfur. Þá óðr óláfr Óðr Úlfur. Þá óðr óláfr Óðr Úlfur.

*via* *TF*

ÓáéñéÜæåé óá ðáéÝóá óá iðilþá æéÝñ÷iðóáé iÝóù óçò æéðáöÞò iå ói üñíá ðiõ êáeññßæåóáé. Ç eÝîç via áiáóóäéßæåé üþé ói üñíá óçò æéðáöÞò èá áßíáé ðÜjóá lÝñò óùñ êñéócñßùñ êáðÛ óç æéáééåóþá óáéñéÜójóåñjò.

## setup

Đñüêåôåé áéá õðí ÷ñåùôéêP ðáñÜìåôñí ðíø áíáåíùñßæåé ôçí áßôçóç Ýíáñîçò ìéáò óõíåäñßáò áéá ðáéÝôá TCP.

### *keep-state*

Đñueaeoae aeä ooí–nauoeep ðanUiaoni. Iueeo ooUniae oañneaoia, oí firewall ea acieionapoe. Yia aoiaieeu eauua, oíoi iðiþiö ç ðñiñáðdeëääí Ýíç ooíðanëeñiñ Ü abñáé íá òáéñëÜæåé åðdeëíëñiñßá æðëëÞò eáðåýëëíóçò iåðåáý ôçò æåýëëíóçò IP eáé ôçò èýñáð áöðåôçñßáð eáé ðñiñiñeøííy, ÷ñçóëüiðiéþíðáð oíi ßäéí ðñiñöðüëíëëí.

`limit {src-addr | src-port | dst-addr | dst-port}`

Oí firewall èá áðéðöñÝþráé iùñi n ðéÞeìo óóñiaÝðáúñi là óeo ðánñáiÝðñiòð ðiò ðánñéanÜöñiòáé óá aðóðu öñr éáñiúñá. Iðiñiýí íá éáñiñéööñiýí ðánñéööñiðáññðo áððu iéá aéåðøýíðáéo éáé ðüññðåðo áðáðçñßáðo éáé ðññiñéöñiýí. Ááí iðiñiýí íá ÷ñçóéñiðiéçëýí óðiíßáéí éáñiúñá ié ðánñÜññðñié limit éáé keep-state. Ç áðéðiäP limit ðánñÝ÷åé óçíßáé ëáéóñiðññðá stateful là óçí keep-state, éáéþðo éáé áðéðññüóéðåðo äééÝð oðçò éáéóñiðññðá.

### 31.6.5.2 Åðééïäþ ãéá Stateful Êáíüíåò

Óði stateful öðréðin Úñðeoñiá, ásíðeláiðónn ðbþæðle ðóci ðbþíçócs ðiði aððéðytiò ùò aððéðPðo ðeáððáyðeðiñcðo ásíðáeëðaðP ððáe Ýðóùi ðá iðiðbá aðiðeðiññaiýi lëá oðiñfääñbá. Það að ðbþóçò ðóci aððíáðuðçóá íá aððáññadPðoáe ái ðóçññiýiðoáe ié Ýððeoñié eátiúfåðo áiððáeëðaðP ðiði ððóùi iððáy ðiði aððiðoðièÝðá eáe ðiði ðáññaeðPðoðc. ÐiðiðaðPðiò ðáe Ýðá aðði ðáññeÜæiði lì ði ðññuðði ðáððPðo ðóci aððeðiññiðbáðo, aððiññbððiññiðoáe ùò ðaðyðeëá.

Ç áðééiðP check-state ÷ ñçöóeiðiéåbhóáé áéá íá áíááíùñéöôðåb óá ðiéi óçìábhí òið óðíüueið éáíüíùí òið IPFW èá áéäå ÷ èåb òið ðáéÝòi iå áÜóç ðç äðíáðuñöçðå ðùñ äðíáleéþí éáíüíùí. Óá ðåñbhðöñöç ðáéñéÜóíåöti, òið ðáéÝòi áíÝñ ÷ åðåáé åðü òið firewall êáé óðíá ÷ ßæáé ðçí ðiñåbá òið, åíþ ðçí ßæáá óðéæiP äçíëöñååbhóáé Yíáò íYíò åðíáleéüö ëáíüíùíå áéá òið åðñüiåññ ðáéÝòi ðið áíáíYíåðåáé íá Yñèåé iå áÜóç ðç óðåñéåñéñí Yíç áéðéPò éáðåýéðiöçö åðééiðiúíßá. Óá ðåñbhðöñöç ðið òið ðáéÝòi åái ôáéñéÜæåé iå òið åðíáleéüö éáíüíá, èá ðññ ÷ ùñÞrøåé áéá íá áéäå ÷ èåb áðü òið åðñüiåññ éáíüíá òið firewall.

Ç äöñáâòüöçôå äöñáïééþí êáñüñüñ áâßíáé åðÜëùöç óå åîÜíðöéçóç ðüññúr óå ðâññßðöñúóç åðßëåðçò ððäñ ÷ åßééöçò (flood) SYN. Ç åðßëåðç áðöôþ ïðiññåß íá äçìéïõñäÞóåé ðïëý ïåñÜëi ðëþëìò äöñáïééþí êáñüñüñ. Áéá ôçí áíöéïåðþðéóç ïéáð ôÝôïéáð åðßëåðçò, ôí FreeBSD ÷ ñçöéïïðiéåß ìéá áéñüñá åðééïäþ ðið iññÜæåðåáé limit. Ç åðééïäþ áðöôþ ïðiññåß íá ðâññïñßöåé ôíï áññéèëü óùír óâðöðü ÷ ñññüñí óðññâññéþí, åâðôÜæïïðå óá ðâññåßá áöâðçññåðó êáé ðñññéññöïý óùír êáñüñüñ. Áíé ÷ íáÿåé íå áðöôü ôíï ðññüðü õí ðëþëìò óùí äöñáïééþí êáñüñüñ éáé ðüññåð öññÝò Ý ÷ åé ÷ ñçöéïïðiéçèåß í êáé Ýíáð áðü ôç óðññâññéññÝíç IP äéâÿëðñíç. Áí í áññéèëü ãðöññü ïåðñññÜäé õí üññéí ðið Ý ÷ åé òâðæåß íå ôçí åðééïäþ limit, ôí ðâññÝòi åðiññßðöñåðåáé.

### 31.6.5.3 Éáôáãñáöþ ÌcíõìÜôùí Óïõ Firewall

Óá ðeáiíráéôÞíáóá ðögö ñéáðáñáðòÞò óðíàÜíóúí ðiø firewall, áßíáé ðñiøáíP: ðánÝ ÷ iðí ðögä ãðíáðúöçöôá íá äåßöôá ãéá ðiøí ëüäí áíññáðíðéÞèçéáí ié ñéáíüíåð óóí ðiø iðíßíðò Ý ÷ åðå áíññáðíðéÞoåé ðçí ñéáðáñáðòÞ. Íé ðeçñiøíñßåð ðåññééáíÜíðò ðå ðæéÝðå ðiø áðíññßöçéáí, óðé ñéáðéýíøåð ðäú ðeð iðíßåð ðñiøÞèçéáí ñéáé ðiø ñéáðéýíñíðáí. Íá ãðóð ðiø ñóñüðí, Ý ÷ åðå Áíýí ðçíáíðééü ðeáiíÝñéóçíá ðóçí áíß ÷ íðóð ðuñ áéðåíëÝùí.

Áéüìà áéá áí áíññáöÞóåôå ôç éäéöïõñäßá éåôåäñäöÞò, ôi IPFW äái èá áñ ÷ bôåé åðü ìüññ öiö ôçí éåôåäñäöÞ áéá éái Ýíá éáíüíá. I äéá-åéñéööÞò öiö firewall éá åðïöåðßöåé óå ðïéïöö åðü üëïöö öiöö éåíüíåò èá áíññäöÞíéÞóåé ôçí éåôåäñäöÞ, éåé èá ðññööÝóåé ôçí èÝíç log ôôçí áíðöþööïé ÷ ç èåôå ÷ þñéöç. ÖöðéïëéÜ, áßíåðåé éåôåäñäöÞ ìüññ áéá éåíüíåò ðrò åðïññþðööïö ðåéÝðá (éåíüíåò deny), üðùò áéá ðåñÜääéäíá i éåíüíåò åðüññéøçò ôùí åéóåñ ÷ üüåùí ICMP pings. Åßíáé éïéÞ ðññåêöéÞ, íá áíôéäñÜöåðåé óöii ôÝéïö ôùí éåíüíü i éåíüíå “ipfw default deny everything” áéé íá ðññööþðåé óå åðôöüí ç åðééïäÞ log. Ià ôiï ôññüði åðôöü, iðmñåþðå íá åðßöå üëá óå ðåéÝðá ðiö åái ôåññéäíá ià éåíÝíá éåíüíü iðiö ôðíüññéïö.

Ç êáôåäñääöP óöñià Üíóùí åßíáé åßíëöi ià ÷ åßñé. Áí äái åßööå ðñiöåêöéüö, èá ÷ åéåßöå iÝóå óöi ðëPëìò öùí äåäñiÝíùí ôçö åéååñääöPö êáé èá åäißöååö åiï åßöéï öáò ià Ü-ñçööå åñ ÷ åßá. Íé ðëi ðäëéÝö êáé eíéíÝö åðéèÝóåéö öýðiö Üñíçöçö ðöçñåößöå (DoS), åßíáé åööÝö ðiö ðñiöödåéïí íá åäißöriö öiöö åßöéïöö öáò. Öá içíýíåöå åööÜ ü ÷ iñüí êáöåäñ Üöñiöé ööi **syslogd**, aëeÜ åiöáíßæiiöåé êáé ööçí eíñöüëá öiö öööööPiaöiö öáò, êáé öýiöñá åßñiööåé ðíëy åñi ÷ eçööéÜ.

last message repeated 45 times

¼éá óá içiyáiaóá éáôðaañáöþò ðúñ ðáééÝðúí, añÜoíðóáé áðü ðñiáðééëiäþ óóí añ÷åßi /var/log/security óí iðiñi  
éáðiñþæåðáé óóí añ÷åßi /etc/syslog.conf.

#### **31.6.5.4 Äçìéïõñäßá Åíüò Script Êáíüíúí**

Íé ðáñéóðúðåñííé Íyíðåéñííé ÷ níPöôåð ôið IPFW, äçleëiññííý Íyíá áñ ÷ áßíi ðið ðáñéÝ ÷ áé õiðò êáññíåð êáé ôi ãñ Üötiði ìå ðÝöiëi ôñüði þoôá íá íá iðiññåß íá áéðåëåðóåß ùò script. Ôi áâóëü ðeäiiÝ êôçìá ôið ðáñáðÜù ôñüðið, áßíáé üðé ié êáññíåð ôið firewall lðiññýí íá ááíáùëíýí ÷ ùñþð ôçí áíÜæç íá áðáíâééíPöåé ôi óýóðçìá æáé íá òiññóùëíýí ié iÝíé. Ç ïYíëiäi ãðôþ Áßíáé ðiëý áïëéíP æáé ôçí áïëéíP ïYíù íéáññíüí, êáèþò ç áéäáééåðßá iðiññåß íá áðáíáëçöéåß üðåð ôiññÝð ÷ ñåéÜæåðåé. Éáèþò ðñüñéåðåé æáé êáññíéü script, iðiññåßóå íá ÷ ñçöéiñðiéPöåðå õòðiéåðÜóóåóç æáé íá êñüñéåðiéPöåðå êáé íá õðiéåðåðôPöåðå õð ÷ iÜ ÷ ñçöéiñðiéiýíåð õðiéÝð óå ðiëéåðëëýð êáññíåð. Áðóð úáßíåðåé ôið ðáñáéÜðû ðáñÜääéåíá.

Ç óýíóáíç ðiö ÷ ñçóéëïðíéåßòáé åäþ, åßíáé ööïâáöÞ þá óá êåéýöç sh(1), csh(1) êáé tcsh(1). ÌðñiööÜ áðü óá ðåäßá ôçò ööïâíæéÞò ööïîéáöÜôåöçò, ðÖÜñ ÷ áé öï óÞíá öiö åïéáñßiö, \$. Öi óýíâíëí áðöü åái ðÖÜñ ÷ áé iðñiööÜ áðü óá ööïâíæéÜ ðåäßá. C ôéïÞ ðiö éá åðíïæåß óöï ööïâíæéü ðåäßi, ðñÝðåé íá åóùéëåßòáé óá æéðëÜ åéóåùåéëÜ.

ÎåêéíÞóôå ðí áñ÷ åßí ôùí êáíüíùí óáò üðùò öáßíåôáé ðáñáêÜôù:

```
##### start of example ipfw rules script #####
#
ipfw -q -f flush          # Delete all rules
# Set defaults
oif="tun0"                  # out interface
odns="192.0.2.11"            # ISP's DNS server IP address
cmd="ipfw -q add "           # build rule prefix
ks="keep-state"              # just too lazy to key this each time
$cmd 00500 check-state
$cmd 00502 deny all from any to any frag
$cmd 00501 deny tcp from any to any established
$cmd 00600 allow tcp from any to any 80 out via $oif setup $ks
$cmd 00610 allow tcp from any to $odns 53 out via $oif setup $ks
$cmd 00611 allow udp from any to $odns 53 out via $oif $ks
##### End of example ipfw rules script #####
```

Áôõü ábíáé üëi. Óoi ðánÜääéäíá áôõü äái ábíáé óçìáíóéëiñ ié éáíüüåò, áëëÜ i ôñüðiò iå ôíí iðibí eåéöiñäiyí éáé ðáñññiñiði õeí Ýò óá ðåñßá óõiàéëéñÞò ðõiæáñÜóóáóçò.

Áí ôi ðáñáðÜíù ðáñÜääéàíá Þoáí óöi áñ÷åßi /etc/ipfw.rules èá iðiñiýóáôá íá öiñôþóåôá áðöiýò ôiðò êáíüíâò, añÜöiñôáò ôcí ðáñáéÜò ãföiÿëÞ:

```
# sh /etc/ipfw.rules
```

Ôí áñ ÷ áßí /etc/ipfw.rules ìðíññáß íá áñßóéåôáé óå üðíííí éáôÜëíííí èÝéåôå, éáé íá mñÜæåôáé áðßóçò üðùnd èÝéåôå.

Éá jõjñjivóáôá íá åðéôý ÷ åôå ôií ßäéï ðñÜäíá. åêôåëbíôáò ôéò ðáñáêÜôù åíöjé. Ýò ÷ åéñjéßícôá:

```
# ipfw -q -f flush
# ipfw -q add check-state
# ipfw -q add deny all from any to any frag
# ipfw -q add deny tcp from any to any established
# ipfw -q add allow tcp from any to any 80 out via tun0 setup keep-state
```

```
# ipfw -q add allow tcp from any to 192.0.2.11 53 out via tun0 setup keep-state  
# ipfw -q add 00611 allow udp from any to 192.0.2.11 53 out via tun0 keep-state
```

### 31.6.5.5 Óýííeíí Éáíüíúí Stateful

Ói ðáñáé Üôù óýírëi éáíüíúí (ðiö äái ðåñé Ý ÷ áé éáíüíåò äéá NAT) áßíráé Ýíá ðáñ Üäáéäíá áñáöÞò áíüö inclusive firewall. já inclusive firewall åðéöñ Ýðåé ðçí áßóíäi iùñi òùí ðåé Ýòúí ðiö ôáéñé Üæiöí íå ðiö ëáíüíåò áðíäi ÷ Þò (pass) éáé áðíññþðåé áðü ðñíñðéëiÞ üéá óá Üëéá. Óá firewalls ðiö Ý ÷ iöí ó ÷ ááéáóåß íá ðñíñðåðáý iöí iëüêéçñá áßéðóá, áééé Ýðiöi òí ééäüöåññ áýí áéäðåö Ýð, óóéó iöíßåò ðñ Ýðåé íá ððÜñ ÷ iöí éáíüíåò þóóå òí firewall íá ééäðiññååß.

¼éá óá ëéåöíöñäééÜ óööööPìåôáðå ôýðiö UNIX, óöìöðåñééäïåáñï Ýíïö êéá ôïö FreeBSD, Ý÷iöí ó÷åäéåööåß íá ÷ñçöéiiðieíý òç äéåðäöP 100 êáé òç äéåýèööíç IP 127.0.0.1 åéá åóùöåñééP åðéëiéíüñßá íå òi ëåéöiöñäééü öýööçíá. Õi firewall ðñÝðåé íá ðåññéÝ ÷åé êáüñßå ðiö íá åðéöñÝðiöí òçí åðññöéiöðç èßíçöç åðöþí ðùñ íåééþí, åéá åóùöåñééP ÷ñÞöç, ðåéÝòñ.

Ié éáíúiåô ðiø iñbæxiøí ôcì ðñüóâáóç áæoåñ ÷ üìäíùí êáé åiâñ ÷ üìäíùí ðáéÝ ðùí, ãñ Üöriñôáé æáá ôç æáéðåöP ðiø oóíäÝ åóáé óóï acíüóéí Internet. Ç æáéðåöP áôôP iðiñâb íá åbíáé æáá ðáñÜâåéäíá ç tun0 (óå ðâññðôúóç ðiø ÷ nçóeiiðiæåbôå òï PPP ÷ nÞóöc), P c êÜñôáæéöýiø ðiø oóíäÝ åóáé óóï êáéüäéáêü P DSL modem óáó.

Óå ðâñþðôùóç ðiø ìéá P ðâñéóðüðâñàò êÜñòàò äééöýiø óðiá Ýíïoáé óå áðùòðâñéêÜ éäéùòéêÜ äþðôðá ðþóù áðü öi firewall, èá ðñÝðåé íá ððÜñ :iði íé áíðþðóîíé :iè êáíüñåð ðiø íá áðéññÝðiøí òçí áëéÿéðñç äéáêþíçóç ôùí ðáêÝðùí áíÜjaóá óóéò äéåðáþYð áðôþYð P/éáé ööí Internet.

Íle éáíüüåò ðñÝðåé íá iññáíþñíóáé óá ôñåéò êýñéåò åíüôçôåò: áñ÷ééÜ üëåò ié äéåðåö Ýò ôôéò iðiñßåò åðéôñÝðåôáé ç åéåýéåñç äéåéßíçóç äåäñÝñú, Ýðåéåá ç äéåðåòÞ áðü ôçí iðiñßá åñÝñ÷iñåé óá ðåéÝðå ðñiiò öi äçìüñéï äßêôòï (Internet) éáé ôÝéiò c äéåðåòÞ áðü ôçí iðiñßá éäiaÜññíóáé ðåéÝðå áðü öi Internet.

Óå êÜèå íéå áðü ðeò áñüôçôåò ôùí äéåðåöþí ðiò oðíàÝíiðáé oðí Internet, ðñÝðåé íá ðiðìëæåöýíðåé ðñþþöié ié eáñüíåò ðiò ðaéñéÜæiòí oð÷ñüðåñá lað ðçí áíðþðöié-÷-ðíðþçóç. Í ðåéððåðíðiò eáñüíåò ðçò áñüôçåðò èá ðñÝðåé íá áðiññþððåé eáé íá eáðåññÜðåé üéå óá ðåéÝóå ôcò oðñâéññéíÝícò äéåðåöþò/éåðåýéññócò.

Óöçí áüüöçöå òöùí áöéöåñ ÷ üìäüùí ðääé Ýöùí (Inbound) ðïö öäßüåööåé ðäññaé Üöù, áïöäáßæiiööåé ðñþööé ié éäíüíöå ðïö ÷ ñçöéiiðiëiýööé áéä öçí áðüññéøç ôùí áïäðéèýïçöùí ðääé Ýöùí. Áööù áßüåööåé áéä áÿí áéäöññåööééiyö ëüäiöö. Í ðñþöö áßüäé üöé óä áéäüüäööé åäéé Ýöùí ðïññåß áí iÝññåé íá òäññé Üæiöö íá èÜðiëé ÷ åññåööçñéööéé Ü öçö Ýâðñçöö ðßiçöçö. Óä åäé Ýöùí áööù ëä ðñ Ýðäé íá áöññéöeiyí, áíöß íá áßüñööi áäéööÜ áöüü ëÜðiëé áðüùäññí éäíüíá allöw. Í áäýöåññöö áßüäé üöé ðïññåßöö åí áðiññßøöåöö óöññéåññéiÝíá åäé Ýöùí óä ðïñßá áñññßæåöö üöé áäí áßüäé Yâðññá, áéëé Ü óäö áßüäé áäé Üöñç ç éäöåññäöP öiöö. Íå öíí öññüööí áööù áïðiäßæåööé ç ëPöç éäé éäöåññäöP öiöö áöüü öiíí ðäññööåäñí éäíüíá. Í ðäññööåäñíöö áäíüíáöö åöññéé Ü áðiññßøöåé éäé éäöåññÜöäé üëä óä åäé Ýöùí ðïö Ýööåññá iÝ ÷ ñé áööüí. Í éäíüíáöö åöññüöö ÷ ñçöéiiðiëåßøöåé áéä öçí ðäññ-þ ðññééþí áðiäßüåññí óä ðäññßøöùöç ðïö ééíÞöåöö ðññééþ áéäáæéåößá éäöÜ áöüùñí ðïö ðññÝâçöáí óä áðéè Ýöùí áööí óýööçíá óä.

Êáé áíáæçôÞóôá ðíí áñéèíü ôçð èýñáô áéá íá äåßôðå ðíéïò áßíáé í öéïðüò ôçð. ÅéÝâôå ôçí ðáñáéÜôù ôïðíëåðßá ãéá ôíöö áñéèïýò èõñþí ðíö ÷ñçóéïïéíýíöá óó ÷íÜ áðü êáéüäiöéá ðñïäñÜìáôá (Trojans):  
<http://www.simovits.com/trojans/trojans.html>.

### 31.6.5.6 JÁ ÓÐÜÄÅÉÃÍÁ ÓÐÍÜËÏÓ ÉÁÍÜÍÙÍ Inclusive

Óð ðáñáé Üðù óýñrëi éáññúñ (óði iðíþi ááí ðeíðíréåbðóáé éåðéóññáß NAT) áßíáé áñéåðÜ ðeíþñåð êáé ðírý áðóðæÝð. Áçìéiññåß firewall óýðiö inclusive, éáé Ý÷åé äièéiáóðåß óå ðññáñáðóéé Ýð oóíèþéåò éåðññáßáð. Íðiñåß íá áiðóðçññåðPóáé ðiíß Bæír éáéÜ éáé ðiíß äééü óáð óýðóçíà. Áðéþò iåðáðñÝðóå óå ðiíß üééí ðiíðo éáññúñð pass æáá óéð ððçññåðbð ðiíß ááí èÝéåðá íá áiðññáðíÞóåð. Áéá íá áððíøýáðåð ðçí éáðóáññáðP áíðééþíçóùí íçíðiÜðùñ, áðéþò ðññíóð Ýðóå Ýíá éáññúá óýðiö dený óðóçí áiññóðçóá ðññíá ðéóðñ ÷iñ Ýñúí. Óå üééið ðiíðo éáññúñð, Éá ðñÝðåé íá áééÜñåðå ðiíß üññá ðçò áéáðáðPò áðü dç0 óði ðññáññáðééü üññá ðçò áéáðáðPò ðiíß ðóðñÝðåé óði ãçüñðóéí Internet. Óå ðñññððñóç ðiíß ðñçóéiðíéåbðóå ðiíß PPP ðñPóóç, ðiíß üññá ðçò áéáðáðPò éá áßíáé tñuñ.

Èá äéáðéóôþóåôå üôé ððÜñ÷ åé iéá óoâæåêñéí Ýíç ëïæéÞ óôc ÷ ñþóç áoôþí ôùí êáíüíüí.

- ¼ëïé ié êáíüíå ðiø áðiôåëïý áßôçóç ãæá Ýíâñïç iéáò iÝáò óðíäâñßáò iå ôi äçìüöei Internet, ÷ñçóëiiðiëïý ôçí áðéëiäP keep-state.
  - ¼ëåò ié äéåðéöôåðiø Ýíå ðiø ðiøñâðåßåò ðiø ðmïÝñ ÷ iíôáé áðü ôi äçìüöei Internet, äéåé Ýðiøí ôçí áðéëiäP limit, äéå ôçí áðiøöåP áðéè Ýóåùí ðiðåñ ÷ åßéëöçò (flooding).
  - ¼ëïé ié êáíüíå ÷ñçóëiiðiëïý ôéð áðéëiäÝð in P out ãæá íá äéåðêñéíßæiðí ôçí êáðåýèðíóç ôçò áðéëiéíùíßáð.
  - ¼ëïé ié êáíüíå ÷ñçóëiiðiëïý ôçí áðéëiäP via üíïïá-äéåðåöP ñ ãæá íá êáèiñßöiðí ôç äéåðåöP áðü ôçí iðiøá äéÝñ ÷ áðåé ôi ðáé Ýöi.

Íé êáíüíåò ðiö öáßiióáé ðáñáêÜôù, èá ðñÝðåé íá ãñáöiýí óöi /etc/ipfw.rules.

```
##### Start of IPFW rules file #####
# Flush out the list before we begin.
ipfw -q -f flush

# Set rules command prefix
cmd="ipfw -q add"
pif="dc0"      # public interface name of NIC
                # facing the public Internet

#####
# No restrictions on Inside LAN Interface for private network
# Not needed unless you have LAN.
# Change xl0 to your LAN NIC interface name
#####
#$cmd 00005 allow all from any to any via xl0

#####
# No restrictions on Loopback Interface
#####
$cmd 00010 allow all from any to any via lo0

#####
# Allow the packet through if it has previous been added to the
# the "dynamic" rules table by a allow keep-state statement.
```

```
#####
$cmd 00015 check-state

#####
# Interface facing Public Internet (Outbound Section)
# Check session start requests originating from behind the
# firewall on the private network or from this gateway server
# destined for the public Internet.
#####

# Allow out access to my ISP's Domain name server.
# x.x.x.x must be the IP address of your ISP.s DNS
# Dup these lines if your ISP has more than one DNS server
# Get the IP addresses from /etc/resolv.conf file
$cmd 00110 allow tcp from any to x.x.x.x 53 out via $pif setup keep-state
$cmd 00111 allow udp from any to x.x.x.x 53 out via $pif keep-state

# Allow out access to my ISP's DHCP server for cable/DSL configurations.
# This rule is not needed for .user ppp. connection to the public Internet.
# so you can delete this whole group.
# Use the following rule and check log for IP address.
# Then put IP address in commented out rule & delete first rule
$cmd 00120 allow log udp from any to any 67 out via $pif keep-state
##$cmd 00120 allow udp from any to x.x.x.x 67 out via $pif keep-state

# Allow out non-secure standard www function
$cmd 00200 allow tcp from any to any 80 out via $pif setup keep-state

# Allow out secure www function https over TLS SSL
$cmd 00220 allow tcp from any to any 443 out via $pif setup keep-state

# Allow out send & get email function
$cmd 00230 allow tcp from any to any 25 out via $pif setup keep-state
$cmd 00231 allow tcp from any to any 110 out via $pif setup keep-state

# Allow out FBSD (make install & CVSUP) functions
# Basically give user root "GOD" privileges.
$cmd 00240 allow tcp from me to any out via $pif setup keep-state uid root

# Allow out ping
$cmd 00250 allow icmp from any to any out via $pif keep-state

# Allow out Time
$cmd 00260 allow tcp from any to any 37 out via $pif setup keep-state

# Allow out nntp news (i.e. news groups)
$cmd 00270 allow tcp from any to any 119 out via $pif setup keep-state

# Allow out secure FTP, Telnet, and SCP
# This function is using SSH (secure shell)
$cmd 00280 allow tcp from any to any 22 out via $pif setup keep-state

# Allow out whois
```

```

$cmd 00290 allow tcp from any to any 43 out via $pif setup keep-state

# deny and log everything else that.s trying to get out.
# This rule enforces the block all by default logic.
$cmd 00299 deny log all from any to any out via $pif

#####
# Interface facing Public Internet (Inbound Section)
# Check packets originating from the public Internet
# destined for this gateway server or the private network.
#####

# Deny all inbound traffic from non-routable reserved address spaces
$cmd 00300 deny all from 192.168.0.0/16 to any in via $pif #RFC 1918 private IP
$cmd 00301 deny all from 172.16.0.0/12 to any in via $pif      #RFC 1918 private IP
$cmd 00302 deny all from 10.0.0.0/8 to any in via $pif        #RFC 1918 private IP
$cmd 00303 deny all from 127.0.0.0/8 to any in via $pif       #loopback
$cmd 00304 deny all from 0.0.0.0/8 to any in via $pif         #loopback
$cmd 00305 deny all from 169.254.0.0/16 to any in via $pif    #DHCP auto-config
$cmd 00306 deny all from 192.0.2.0/24 to any in via $pif     #reserved for docs
$cmd 00307 deny all from 204.152.64.0/23 to any in via $pif   #Sun cluster interconnect
$cmd 00308 deny all from 224.0.0.0/3 to any in via $pif       #Class D & E multicast

# Deny public pings
$cmd 00310 deny icmp from any to any in via $pif

# Deny ident
$cmd 00315 deny tcp from any to any 113 in via $pif

# Deny all Netbios service. 137=name, 138=datagram, 139=session
# Netbios is MS/Windows sharing services.
# Block MS/Windows hosts2 name server requests 81
$cmd 00320 deny tcp from any to any 137 in via $pif
$cmd 00321 deny tcp from any to any 138 in via $pif
$cmd 00322 deny tcp from any to any 139 in via $pif
$cmd 00323 deny tcp from any to any 81 in via $pif

# Deny any late arriving packets
$cmd 00330 deny all from any to any frag in via $pif

# Deny ACK packets that did not match the dynamic rule table
$cmd 00332 deny tcp from any to any established in via $pif

# Allow traffic in from ISP's DHCP server. This rule must contain
# the IP address of your ISP.s DHCP server as it.s the only
# authorized source to send this packet type.
# Only necessary for cable or DSL configurations.
# This rule is not needed for .user ppp. type connection to
# the public Internet. This is the same IP address you captured
# and used in the outbound section.
#$cmd 00360 allow udp from any to x.x.x.x 67 in via $pif keep-state

# Allow in standard www function because I have apache server

```

```
$cmd 00400 allow tcp from any to me 80 in via $pif setup limit src-addr 2  
  
# Allow in secure FTP, Telnet, and SCP from public Internet  
$cmd 00410 allow tcp from any to me 22 in via $pif setup limit src-addr 2  
  
# Allow in non-secure Telnet session from public Internet  
# labeled non-secure because ID & PW are passed over public  
# Internet as clear text.  
# Delete this sample group if you do not have telnet server enabled.  
$cmd 00420 allow tcp from any to me 23 in via $pif setup limit src-addr 2  
  
# Reject & Log all incoming connections from the outside  
$cmd 00499 deny log all from any to any in via $pif  
  
# Everything else is denied by default  
# deny and log all packets that fell through to see what they are  
$cmd 00999 deny log all from any to any  
##### End of IPFW rules file #####
```

Ãéá íá áfâññïöièçëåß ç ëåéöiõñãbá NAT óóí IPFW, ÷ñâéÜæïíôáé ÛÜðïeåò áðééðëÝíï ñõèìßóåéð. Èá ðñÝðåé íá ðñïóèÝóåôå òçí áðééïäP option IPDIVERT íáëß ìá ôéó õðüëéðåò áðééïäÝò áéá óí IPFIREWALL óóí áñ÷åßí ñõèìßóåùí ðïò ðõñPíá. Èá ðñÝðåé Ýðåéóá íá îåðåáéùòôòßóåôå êáé íá áâéåôåóòÞóåôå óí Ýíï óáò ðñïòáññïòÍYíï ðõñPíá.

Åêôöù áðü ôéò óðíçèéóíÝíåò áðéëïäÝò ãéá ôí IPFW, èá ðñÝðåé íá ðññioèÝóåôå êáé ôéò ðáñâéÜôù óöî áñ÷åßii /etc/rc.conf:

```
natd_enable="YES"                                # Enable NATD function  
natd_interface="rl0"                            # interface name of public Internet NIC  
natd_flags="-dynamic -m"                         # -m = preserve port numbers if possible
```

Ç ÷ñPóć êáíüíüí stateful iàæß ià ôíí êáíüíá divert natd (NAT), ðåñéðë Ýéåé ðïëý ôçí ëïäéêp ôóäññåòpô ôùí êáíüíüí. Ç èÝóć àïöÜíéóçò ôùí êáíüíüí check-state êáé divert natd iÝóá ôóí óýíïëí êáíüíüí åßíåðåé ðïëý èñBóëíç. Åáí ðñüéåðåé ðëÝíi áéá áðëp ëïäéêp ðåñÜóíåòpô áðü ôíí Ýíá êáíüíá ôóíí áðüíüíåñí. ×ñçöéiiðíëååé Ýíá iÝí åßäïo åÝñääéåò ðïòi iññÜæåðåé skipo. Åéá íá ÷ñçöéiiðíëçèåß c ålöïëp skipo, åßíåé ðöñ÷ñåùðééü íá Ý ÷åòå åññéèíPóåé ôíòò ëåññåß. þþôåá íá iÝñåðåó åó ðïëí êáíüíüí èá êåðåëpåé ôí Üëíå ðïòi èá åßéðåëåñôåß áðüí ðçí åßíöiëp åóñôp.

Đáñáê Ủôù èá âñâñôôá Ýíá õđüääéäíá (÷ùññò ðñüóèåôá ó÷üééá) iéáò iåèüäïö óôããñáöÞò ðïö åðéëÝíäå åäþ ãéá íá åíçäÞóïölä ôcí áéïëöéßá ñíÞò ôiö ðáé Ýöïö iÝóá óöï ÿíïëé êáñüüñí.

Ç nñIP ôçò åðåîññáóßáo îåééíÜåé iå ôíï ðñþþi ãðü ôçí eïññöP éáíüíá êáé öóíå ÷ Bæåé Ýíá éáíüíá êÜeå öïñÜ ðñiø ðá êÜôù, áßðå iÝ ÷ ñé íá ööÜóåé ôíï ôåéåðôåßí, þ iÝ ÷ ñé ôí ðåé Ýöi íá ôáéñéÜíåé iå ôá êñéóPñéá åðéëíäPþò êÜðiéíø éáíüíá êáé íá åéåðeåñùðåß áðü ôí firewall. Áßíåé öçíáðóéêü íá ðáñáðçñPóíòlá ôç eÝöc ôúï éáíüíá iå áñéèíýö 100, 101, 450, 500 êáé 510. Ié éáíüíåð åðöiþ åéÝå ÷ iði ôçí iåðÜöññáóç ôúï åíåñ ÷ üìláíüñ êáé åéðåñ ÷ üìláíüñ ðåéÝôùí, þþöå ié êáðå ÷ üñPóåéð ôíðð öði åðíåíéêü ðßíåéå êáðåðóÜóåùí íá ðåñéÝ ÷ iði ðÜíðå ôçí éáéñüðéêP IP åéåýëðíóç ôíð ðiðééíý åééöýíð. ðáñáðçñPóóå åðßóçò üðé üëéíé ié éáíüíåð allow êáé deny êáéññBæiði ôçí êåðåýëðíóç êßíçóçò ôíð ðåéÝöið êåéþþo êáé ôçí åéåðåðP. Áðßóçò, üëåð ié åíåñ ÷ üìláíåð åéðPóåéð åéá iÝåð öðiåññßåo iåðåóYñññðåé åðåðeåßåo (iÝöu ôíð skip to rule 500) ôóíï éáíüíá 500 åéá íá åßíåé c iåðÜöññáóç åéåðéýíðåùí åééöýíð (NAT).

lä öiří éáíüüá 100 áéáöb ábíráé áíäññ ÷ üíäññ éáé ü ÷ é áéöanñ ÷ üíäññ. Đáñí Üäé öiří éáíüüá 101 áéáöb đñüéåéödáé áéá fÍÁ áðéeeíüñíbá éáé Yóóé ááí öðÜñ ÷ áé áéüüá öiří äoíäíæéü ðbíáéá éáödöd Üóåùí. Öiř ðáé Yóí ðäeeéÜ ööÜíäé ööiří éáíüüá 125 ià öiří iðibíí éáé óáéñéÜæåé. ÁíYñ ÷ áödáé iÝóú öcò èÜñödöd áééööyíö ðiö ööiří Yåådáé ööiří äciùüöeí Internet. Öiř ðáé Yóí Ý ÷ áé áéüüá ùò IP áödöcñbáööc õcçí éäéñööeéP áéäýéööiöc öiří öidééiy äééööyíö. Öiř öábñéäööia ià áöööu öiří éáíüüá ññíéäéåb áyí áíYññååéåö. C áðéeeíP keep-state èá áçíëöññbóåé Yíá iÝí áoíäíæéü éáíüüá, èá öiří éádöb ÷ üññPöödöc ööiří ðbíáéá, éáé èá áåöödåé Yóåé öcçí áíööbóöié ÷ c áíYññååéá. C áíYññååéá áöööb ábíráé iÝñiö öcò ðeçñiöiññbáö ðiö ãñÜöödåé ööiří äoíäíæéü ðbíáéá. Ööcçí ðáññbðöödöc áöööb ábíráé c "skipto rule 500". I éáíüüáö 500 iåöööññÜæåé iÝóú NAT öc áéäýéööiöc IP öiří ðáé Yóïö, ðñéi áöööu áíYññååé ññíö òiří Internet. Áöööu ábíráé éáéåbðöåñä öçílåíöeéü. Öiř ðáé Yóí éáödöeýíådåé ññíö öiří ññíñööü öiří, üðiö äçíëöññbóåé éáé áåöödöd Yéëåådåé Yíá iÝí ðáé Yóí ùò adÜööcöc. Öiř iÝí áöööu ðáé Yóí áéö Yñ : ádåé iáíÜ öööiří firewall, ööiří éáíüüá ðiö ábíráé öcçí èññööb öcö ðeññöödåé. Áöööb öc öññÜ öáéññÜæåé ià öiří éáíüüá 100 éáé c áéäýéööiöc ññíñööiü öiří áéëÜæåé iáíÜ ööcçí áñ ÷ ééP öiří öidééiy äééööyíö. ðåéööa, ábíláöödåé c áådåíäññåöbá òiří ádöu öiří éáíüüá check-state i iðibíí öáíäééåéyödöd åüöe đñüéåéödåé áéá ðáé Yóí öödåíäññbáö öä áíYññéíç éáé öiří ádåéäööeäññbáö öööiří öidééü åbëöööiří. Éáöödöeýíådåé ññíö öiří ññíëíæéööb öiří öiří öidééiy äééööyíö ðiö öiří Yóåådåé, i iðibíí öööYéëåé Yíá iÝí ðáé Yóí aæçöbíödöd ádåññöödööb áääññ Yíá ádöu öiří ádññäéññööiří Yñ ãññödçññbáööb. Öiř ðáé Yóí áöööu áé Yñ ÷ áöödåé ádöu öiří éáíüüá check-state, i iðibíí öiří åññbóåé öcçí éáööa ÷ þñéöc öiří öööa áíäññ ÷ üíäññ éáé áåöödåé öcçí áíööbööié ÷ c áíYññååéá ðiö öä áöööb öcçí ðáññbðöödöc ábíráé "skipto 500". Öiř ðáé Yóí ññíñüéåbödåé ööiří éáíüüá 500, ábíláöödåé c iàööÜöñaöc öcò áéäýéööiöcö öiří iÝóú NAT éáé ádåéäööeäññbáödåé ööiří Internet.

## Õõüääéäìá Èáíüíùí #1:

```
#!/bin/sh
cmd="ipfw -q add"
skip="skipto 500"
pif=rl0
ks="keep-state"
good_tcpo="22,25,37,43,53,80,443,110,119"

ipfw -q -f flush

$cmd 002 allow all from any to any via xl0  # exclude LAN traffic
$cmd 003 allow all from any to any via lo0  # exclude loopback traffic

$cmd 100 divert natd ip from any to any in via $pif
$cmd 101 check-state
```

```

# Authorized outbound packets
$cmd 120 $skip udp from any to xx.168.240.2 53 out via $pif $ks
$cmd 121 $skip udp from any to xx.168.240.5 53 out via $pif $ks
$cmd 125 $skip tcp from any to any $good_tcpo out via $pif setup $ks
$cmd 130 $skip icmp from any to any out via $pif $ks
$cmd 135 $skip udp from any to any 123 out via $pif $ks

# Deny all inbound traffic from non-routable reserved address spaces
$cmd 300 deny all from 192.168.0.0/16 to any in via $pif #RFC 1918 private IP
$cmd 301 deny all from 172.16.0.0/12 to any in via $pif #RFC 1918 private IP
$cmd 302 deny all from 10.0.0.0/8 to any in via $pif #RFC 1918 private IP
$cmd 303 deny all from 127.0.0.0/8 to any in via $pif #loopback
$cmd 304 deny all from 0.0.0.0/8 to any in via $pif #loopback
$cmd 305 deny all from 169.254.0.0/16 to any in via $pif #DHCP auto-config
$cmd 306 deny all from 192.0.2.0/24 to any in via $pif #reserved for docs
$cmd 307 deny all from 204.152.64.0/23 to any in via $pif #Sun cluster
$cmd 308 deny all from 224.0.0.0/3 to any in via $pif #Class D & E multicast

# Authorized inbound packets
$cmd 400 allow udp from xx.70.207.54 to any 68 in $ks
$cmd 420 allow tcp from any to me 80 in via $pif setup limit src-addr 1

$cmd 450 deny log ip from any to any

# This is skipto location for outbound stateful rules
$cmd 500 divert natd ip from any to any out via $pif
$cmd 510 allow ip from any to any

##### end of rules #####

```

Íé ðáñáêÜôù êáíüíåò áßíáé ó÷åäüí ßæié íå ôíðò ðáñáðÜù, áëëÜ ðåñéÝ÷iõí ðåñéóóüôåñá ó÷üëéá áéá íá áïçëÞóíõí  
óíí áñ÷Üñéí ÷ñÞóôç õõõ IPFW íá êáôáæÜâåé êáëýôåñá ðùò êåéóõñäíýí.

Õðüääéäíá Êáíüíùí #2:

```

#!/bin/sh
##### Start of IPFW rules file #####
# Flush out the list before we begin.
ipfw -q -f flush

# Set rules command prefix
cmd="ipfw -q add"
skip="skipto 800"
pif="rl0"      # public interface name of NIC
                # facing the public Internet

#####
# No restrictions on Inside LAN Interface for private network
# Change xl0 to your LAN NIC interface name
#####
$cmd 005 allow all from any to any via xl0

```

```
#####
# No restrictions on Loopback Interface
#####
$cmd 010 allow all from any to any via loo

#####
# check if packet is inbound and nat address if it is
#####
$cmd 014 divert natd ip from any to any in via $pif

#####
# Allow the packet through if it has previous been added to the
# the "dynamic" rules table by a allow keep-state statement.
#####
$cmd 015 check-state

#####
# Interface facing Public Internet (Outbound Section)
# Check session start requests originating from behind the
# firewall on the private network or from this gateway server
# destined for the public Internet.
#####

# Allow out access to my ISP's Domain name server.
# x.x.x.x must be the IP address of your ISP's DNS
# Dup these lines if your ISP has more than one DNS server
# Get the IP addresses from /etc/resolv.conf file
$cmd 020 $skip tcp from any to x.x.x.x 53 out via $pif setup keep-state

# Allow out access to my ISP's DHCP server for cable/DSL configurations.
$cmd 030 $skip udp from any to x.x.x.x 67 out via $pif keep-state

# Allow out non-secure standard www function
$cmd 040 $skip tcp from any to any 80 out via $pif setup keep-state

# Allow out secure www function https over TLS SSL
$cmd 050 $skip tcp from any to any 443 out via $pif setup keep-state

# Allow out send & get email function
$cmd 060 $skip tcp from any to any 25 out via $pif setup keep-state
$cmd 061 $skip tcp from any to any 110 out via $pif setup keep-state

# Allow out FreeBSD (make install & CVSUP) functions
# Basically give user root "GOD" privileges.
$cmd 070 $skip tcp from me to any out via $pif setup keep-state uid root

# Allow out ping
$cmd 080 $skip icmp from any to any out via $pif keep-state

# Allow out Time
$cmd 090 $skip tcp from any to any 37 out via $pif setup keep-state
```

```

# Allow out nntp news (i.e. news groups)
$cmd 100 $skip tcp from any to any 119 out via $pif setup keep-state

# Allow out secure FTP, Telnet, and SCP
# This function is using SSH (secure shell)
$cmd 110 $skip tcp from any to any 22 out via $pif setup keep-state

# Allow out whois
$cmd 120 $skip tcp from any to any 43 out via $pif setup keep-state

# Allow ntp time server
$cmd 130 $skip udp from any to any 123 out via $pif keep-state

#####
# Interface facing Public Internet (Inbound Section)
# Check packets originating from the public Internet
# destined for this gateway server or the private network.
#####

# Deny all inbound traffic from non-routable reserved address spaces
$cmd 300 deny all from 192.168.0.0/16 to any in via $pif #RFC 1918 private IP
$cmd 301 deny all from 172.16.0.0/12 to any in via $pif #RFC 1918 private IP
$cmd 302 deny all from 10.0.0.0/8 to any in via $pif #RFC 1918 private IP
$cmd 303 deny all from 127.0.0.0/8 to any in via $pif #loopback
$cmd 304 deny all from 0.0.0.0/8 to any in via $pif #loopback
$cmd 305 deny all from 169.254.0.0/16 to any in via $pif #DHCP auto-config
$cmd 306 deny all from 192.0.2.0/24 to any in via $pif #reserved for docs
$cmd 307 deny all from 204.152.64.0/23 to any in via $pif #Sun cluster
$cmd 308 deny all from 224.0.0.0/3 to any in via $pif #Class D & E multicast

# Deny ident
$cmd 315 deny tcp from any to any 113 in via $pif

# Deny all Netbios service. 137=name, 138=datagram, 139=session
# Netbios is MS/Windows sharing services.
# Block MS/Windows hosts2 name server requests 81
$cmd 320 deny tcp from any to any 137 in via $pif
$cmd 321 deny tcp from any to any 138 in via $pif
$cmd 322 deny tcp from any to any 139 in via $pif
$cmd 323 deny tcp from any to any 81 in via $pif

# Deny any late arriving packets
$cmd 330 deny all from any to any frag in via $pif

# Deny ACK packets that did not match the dynamic rule table
$cmd 332 deny tcp from any to any established in via $pif

# Allow traffic in from ISP's DHCP server. This rule must contain
# the IP address of your ISP's DHCP server as it's the only
# authorized source to send this packet type.
# Only necessary for cable or DSL configurations.
# This rule is not needed for 'user ppp' type connection to
# the public Internet. This is the same IP address you captured

```

```
# and used in the outbound section.  
$cmd 360 allow udp from x.x.x.x to any 68 in via $pif keep-state  
  
# Allow in standard www function because I have Apache server  
$cmd 370 allow tcp from any to me 80 in via $pif setup limit src-addr 2  
  
# Allow in secure FTP, Telnet, and SCP from public Internet  
$cmd 380 allow tcp from any to me 22 in via $pif setup limit src-addr 2  
  
# Allow in non-secure Telnet session from public Internet  
# labeled non-secure because ID & PW are passed over public  
# Internet as clear text.  
# Delete this sample group if you do not have telnet server enabled.  
$cmd 390 allow tcp from any to me 23 in via $pif setup limit src-addr 2  
  
# Reject & Log all unauthorized incoming connections from the public Internet  
$cmd 400 deny log all from any to any in via $pif  
  
# Reject & Log all unauthorized out going connections to the public Internet  
$cmd 450 deny log all from any to any out via $pif  
  
# This is skipto location for outbound stateful rules  
$cmd 800 divert natd ip from any to any out via $pif  
$cmd 801 allow ip from any to any  
  
# Everything else is denied by default  
# deny and log all packets that fell through to see what they are  
$cmd 999 deny log all from any to any  
##### End of IPFW rules file #####
```

# ÊåöÜëáéí 32 Ðñï÷ùñçìÝíá ÈÝìáôá Äéêôýùóçò

## 32.1 Óýiiøç

Ôï êåöÜëáéí áôôü êáëýðôåé ðñï÷ùñçìÝíá è ÈÝìáôá äéêôýùóçò.

Áöiy äéááÜóâôå áôôü ôï êåöÜëáéí, èá iÝñâôå:

- Ôá âáóéêÜ ôùí ððëþí (gateways) êáé ôùí äññíëiäÞóâùí (routes).
- Ðùò íá ñõèìßóâôå óôóéâôÝò IEEE 802.11 êáé Bluetooth.
- Ðùò íá êÜíâôå ôï FreeBSD íá äñá ùò ãÝöôñá (bridge).
- Ðùò íá ñõèìßóâôå åéêëíçóç áôôü ôï äßêôôí õå Ýíá ìç ÷ Üíçìá ÷ùñßò óéëçñü äßôéí.
- Ðùò íá ñõèìßóâôå iâôÜöñâóç áéêôôáêþí äéâôôéýíóâùí (NAT).
- Ðùò íá óôíäÝóâôå äýí ððíëiäéôôÝò iÝóù PLIP.
- Ðùò íá ñõèìßóâôå ôï IPv6 óå Ýíá ìç ÷ Üíçìá FreeBSD.
- Ðùò íá ñõèìßóâôå ôï ATM.
- Ðùò íá ñõèìßóâôå êáé íá ÷ñçóëiëÞóâôå ôéò äðíáûöçôåò ôïõ CARP (Common Access Redundancy Protocol) ôôï FreeBSD.

Ðñéí äéááÜóâôå áôôü ôï êåöÜëáéí, èá ðñÝðâé:

- Íá êáôáñâßôå ôéò âáóéêÝò Ýíñíéâò ôùí áñ ÷ åßùí script /etc/rc.
- Íá åßóâå åñíéâéùíÝñò íå ôç âáóéêÞ iññíëiäßá ôùí äéêôýùí.
- Íá åñùñßæåôå Ðùò íá ñõèìßóâôå êáé íá åâéâôáôôÞóâôå Ýíá iÝí ðõñÞíá óôï FreeBSD (ÊåöÜëáéí 9).
- Íá åñùñßæåôå Ðùò íá åâéâôáôôÞóâôå ðñüóëåôï ëiäéóìéü ôñßòiô êáôáôéâôáôôÞ (ÊåöÜëáéí 5).

## 32.2 Gateways and Routes

Contributed by Coranth Gryphon.

For one machine to be able to find another over a network, there must be a mechanism in place to describe how to get from one to the other. This is called *routing*. A “route” is a defined pair of addresses: a “destination” and a “gateway”. The pair indicates that if you are trying to get to this *destination*, communicate through this *gateway*. There are three types of destinations: individual hosts, subnets, and “default”. The “default route” is used if none of the other routes apply. We will talk a little bit more about default routes later on. There are also three types of gateways: individual hosts, interfaces (also called “links”), and Ethernet hardware addresses (MAC addresses).

### 32.2.1 An Example

To illustrate different aspects of routing, we will use the following example from `netstat`:

```
% netstat -r
```

## Routing tables

Destination	Gateway	Flags	Refs	Use	Netif	Expire
default	outside-gw	UGSc	37	418	ppp0	
localhost	localhost	UH	0	181	lo0	
test0	0:e0:b5:36:cf:4f	UHLW	5	63288	ed0	77
10.20.30.255	link#1	UHLW	1	2421		
example.com	link#1	UC	0	0		
host1	0:e0:a8:37:8:1e	UHLW	3	4601	lo0	
host2	0:e0:a8:37:8:1e	UHLW	0	5	lo0 =>	
host2.example.com	link#1	UC	0	0		
224	link#1	UC	0	0		

The first two lines specify the default route (which we will cover in the next section) and the `localhost` route.

The interface (`Netif` column) that this routing table specifies to use for `localhost` is `lo0`, also known as the loopback device. This says to keep all traffic for this destination internal, rather than sending it out over the LAN, since it will only end up back where it started.

The next thing that stands out are the addresses beginning with `0:e0:`. These are Ethernet hardware addresses, which are also known as MAC addresses. FreeBSD will automatically identify any hosts (`test0` in the example) on the local Ethernet and add a route for that host, directly to it over the Ethernet interface, `ed0`. There is also a timeout (`Expire` column) associated with this type of route, which is used if we fail to hear from the host in a specific amount of time. When this happens, the route to this host will be automatically deleted. These hosts are identified using a mechanism known as RIP (Routing Information Protocol), which figures out routes to local hosts based upon a shortest path determination.

FreeBSD will also add subnet routes for the local subnet (`10.20.30.255` is the broadcast address for the subnet `10.20.30`, and `example.com` is the domain name associated with that subnet). The designation `link#1` refers to the first Ethernet card in the machine. You will notice no additional interface is specified for those.

Both of these groups (local network hosts and local subnets) have their routes automatically configured by a daemon called **routed**. If this is not run, then only routes which are statically defined (i.e. entered explicitly) will exist.

The `host1` line refers to our host, which it knows by Ethernet address. Since we are the sending host, FreeBSD knows to use the loopback interface (`lo0`) rather than sending it out over the Ethernet interface.

The two `host2` lines are an example of what happens when we use an `ifconfig(8)` alias (see the section on Ethernet for reasons why we would do this). The `=>` symbol after the `lo0` interface says that not only are we using the loopback (since this address also refers to the local host), but specifically it is an alias. Such routes only show up on the host that supports the alias; all other hosts on the local network will simply have a `link#1` line for such routes.

The final line (destination subnet 224) deals with multicasting, which will be covered in another section.

Finally, various attributes of each route can be seen in the `Flags` column. Below is a short table of some of these flags and their meanings:

U	Up: The route is active.
H	Host: The route destination is a single host.
G	Gateway: Send anything for this destination on to this remote system, which will figure out from there where to send it.
S	Static: This route was configured manually, not automatically generated by the system.

- C Clone: Generates a new route based upon this route for machines we connect to. This type of route is normally used for local networks.
- W WasCloned: Indicated a route that was auto-configured based upon a local area network (Clone) route.
- L Link: Route involves references to Ethernet hardware.

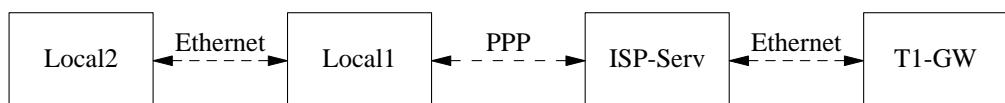
### 32.2.2 Default Routes

When the local system needs to make a connection to a remote host, it checks the routing table to determine if a known path exists. If the remote host falls into a subnet that we know how to reach (Cloned routes), then the system checks to see if it can connect along that interface.

If all known paths fail, the system has one last option: the “default” route. This route is a special type of gateway route (usually the only one present in the system), and is always marked with a c in the flags field. For hosts on a local area network, this gateway is set to whatever machine has a direct connection to the outside world (whether via PPP link, DSL, cable modem, T1, or another network interface).

If you are configuring the default route for a machine which itself is functioning as the gateway to the outside world, then the default route will be the gateway machine at your Internet Service Provider’s (ISP) site.

Let us look at an example of default routes. This is a common configuration:



The hosts Local1 and Local2 are at your site. Local1 is connected to an ISP via a dial up PPP connection. This PPP server computer is connected through a local area network to another gateway computer through an external interface to the ISPs Internet feed.

The default routes for each of your machines will be:

Host	Default Gateway	Interface
Local2	Local1	Ethernet
Local1	T1-GW	PPP

A common question is “Why (or how) would we set the T1-GW to be the default gateway for Local1, rather than the ISP server it is connected to?”.

Remember, since the PPP interface is using an address on the ISP’s local network for your side of the connection, routes for any other machines on the ISP’s local network will be automatically generated. Hence, you will already know how to reach the T1-GW machine, so there is no need for the intermediate step of sending traffic to the ISP server.

It is common to use the address x.x.x.1 as the gateway address for your local network. So (using the same example), if your local class-C address space was 10.20.30 and your ISP was using 10.9.9 then the default routes would be:

Host	Default Route
Local2	10.9.9.1

Host	Default Route
Local2 (10.20.30.2)	Local1 (10.20.30.1)
Local1 (10.20.30.1, 10.9.9.30)	T1-GW (10.9.9.1)

You can easily define the default route via the `/etc/rc.conf` file. In our example, on the Local2 machine, we added the following line in `/etc/rc.conf`:

```
defaultrouter="10.20.30.1"
```

It is also possible to do it directly from the command line with the `route(8)` command:

```
# route add default 10.20.30.1
```

For more information on manual manipulation of network routing tables, consult `route(8)` manual page.

### 32.2.3 Dual Homed Hosts

There is one other type of configuration that we should cover, and that is a host that sits on two different networks. Technically, any machine functioning as a gateway (in the example above, using a PPP connection) counts as a dual-homed host. But the term is really only used to refer to a machine that sits on two local-area networks.

In one case, the machine has two Ethernet cards, each having an address on the separate subnets. Alternately, the machine may only have one Ethernet card, and be using `ifconfig(8)` aliasing. The former is used if two physically separate Ethernet networks are in use, the latter if there is one physical network segment, but two logically separate subnets.

Either way, routing tables are set up so that each subnet knows that this machine is the defined gateway (inbound route) to the other subnet. This configuration, with the machine acting as a router between the two subnets, is often used when we need to implement packet filtering or firewall security in either or both directions.

If you want this machine to actually forward packets between the two interfaces, you need to tell FreeBSD to enable this ability. See the next section for more details on how to do this.

### 32.2.4 Building a Router

A network router is simply a system that forwards packets from one interface to another. Internet standards and good engineering practice prevent the FreeBSD Project from enabling this by default in FreeBSD. You can enable this feature by changing the following variable to YES in `rc.conf(5)`:

```
gateway_enable=YES           # Set to YES if this host will be a gateway
```

This option will set the `sysctl(8)` variable `net.inet.ip.forwarding` to 1. If you should need to stop routing temporarily, you can reset this to 0 temporarily.

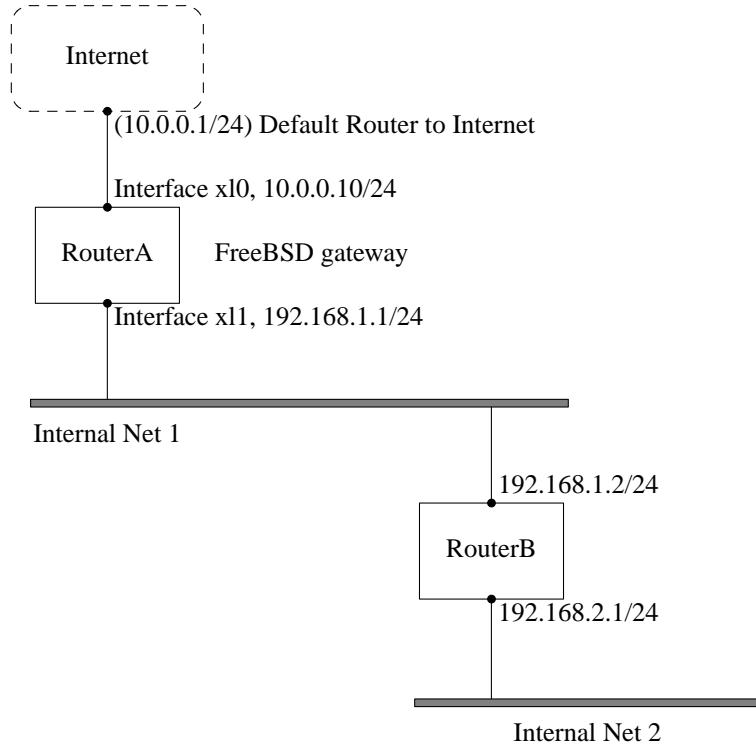
Your new router will need routes to know where to send the traffic. If your network is simple enough you can use static routes. FreeBSD also comes with the standard BSD routing daemon `routed(8)`, which speaks RIP (both version 1 and version 2) and IRDP. Support for BGP v4, OSPF v2, and other sophisticated routing protocols is available with the `net/zebra` package. Commercial products such as **GateD®** are also available for more complex network routing solutions.

## 32.2.5 Setting Up Static Routes

*Contributed by Al Hoang.*

### 32.2.5.1 Manual Configuration

Let us assume we have a network as follows:



In this scenario, RouterA is our FreeBSD machine that is acting as a router to the rest of the Internet. It has a default route set to 10.0.0.1 which allows it to connect with the outside world. We will assume that RouterB is already configured properly and knows how to get wherever it needs to go. (This is simple in this picture. Just add a default route on RouterB using 192.168.1.1 as the gateway.)

If we look at the routing table for RouterA we would see something like the following:

```
% netstat -nr
Routing tables

Internet:
Destination      Gateway          Flags   Refs      Use     Netif     Expire
default          10.0.0.1        UGS        0    49378     xl0
127.0.0.1        127.0.0.1        UH         0        6     lo0
10.0.0/24         link#1         UC         0        0     xl0
192.168.1/24      link#2         UC         0        0     xl1
```

With the current routing table RouterA will not be able to reach our Internal Net 2. It does not have a route for 192.168.2.0/24. One way to alleviate this is to manually add the route. The following command would add the Internal Net 2 network to RouterA's routing table using 192.168.1.2 as the next hop:

```
# route add -net 192.168.2.0/24 192.168.1.2
```

Now RouterA can reach any hosts on the 192.168.2.0/24 network.

### 32.2.5.2 Persistent Configuration

The above example is perfect for configuring a static route on a running system. However, one problem is that the routing information will not persist if you reboot your FreeBSD machine. The way to handle the addition of a static route is to put it in your /etc/rc.conf file:

```
# Add Internal Net 2 as a static route
static_routes="internalnet2"
route_internalnet2="-net 192.168.2.0/24 192.168.1.2"
```

The static\_routes configuration variable is a list of strings separated by a space. Each string references to a route name. In our above example we only have one string in static\_routes. This string is *internalnet2*. We then add a configuration variable called route\_internalnet2 where we put all of the configuration parameters we would give to the route(8) command. For our example above we would have used the command:

```
# route add -net 192.168.2.0/24 192.168.1.2
```

so we need "-net 192.168.2.0/24 192.168.1.2".

As said above, we can have more than one string in static\_routes. This allows us to create multiple static routes. The following lines shows an example of adding static routes for the 192.168.0.0/24 and 192.168.1.0/24 networks on an imaginary router:

```
static_routes="net1 net2"
route_net1="-net 192.168.0.0/24 192.168.0.1"
route_net2="-net 192.168.1.0/24 192.168.1.1"
```

### 32.2.6 Routing Propagation

We have already talked about how we define our routes to the outside world, but not about how the outside world finds us.

We already know that routing tables can be set up so that all traffic for a particular address space (in our examples, a class-C subnet) can be sent to a particular host on that network, which will forward the packets inbound.

When you get an address space assigned to your site, your service provider will set up their routing tables so that all traffic for your subnet will be sent down your PPP link to your site. But how do sites across the country know to send to your ISP?

There is a system (much like the distributed DNS information) that keeps track of all assigned address-spaces, and defines their point of connection to the Internet Backbone. The “Backbone” are the main trunk lines that carry Internet traffic across the country, and around the world. Each backbone machine has a copy of a master set of tables, which direct traffic for a particular network to a specific backbone carrier, and from there down the chain of service providers until it reaches your network.

It is the task of your service provider to advertise to the backbone sites that they are the point of connection (and thus the path inward) for your site. This is known as route propagation.

### 32.2.7 Troubleshooting

Sometimes, there is a problem with routing propagation, and some sites are unable to connect to you. Perhaps the most useful command for trying to figure out where routing is breaking down is the traceroute(8) command. It is equally useful if you cannot seem to make a connection to a remote machine (i.e. ping(8) fails).

The traceroute(8) command is run with the name of the remote host you are trying to connect to. It will show the gateway hosts along the path of the attempt, eventually either reaching the target host, or terminating because of a lack of connection.

For more information, see the manual page for traceroute(8).

### 32.2.8 Multicast Routing

FreeBSD supports both multicast applications and multicast routing natively. Multicast applications do not require any special configuration of FreeBSD; applications will generally run out of the box. Multicast routing requires that support be compiled into the kernel:

```
options MROUTING
```

In addition, the multicast routing daemon, mrouted(8) must be configured to set up tunnels and DVMRP via /etc/mrouted.conf. More details on multicast configuration may be found in the manual page for mrouted(8).

## 32.3 Wireless Networking

*Loader, Marc Fonvieille, éáé Murray Stokely.*

### 32.3.1 Wireless Networking Basics

Most wireless networks are based on the IEEE 802.11 standards. A basic wireless network consists of multiple stations communicating with radios that broadcast in either the 2.4GHz or 5GHz band (though this varies according to the locale and is also changing to enable communication in the 2.3GHz and 4.9GHz ranges).

802.11 networks are organized in two ways: in *infrastructure mode* one station acts as a master with all the other stations associating to it; the network is known as a BSS and the master station is termed an access point (AP). In a BSS all communication passes through the AP; even when one station wants to communicate with another wireless station messages must go through the AP. In the second form of network there is no master and stations communicate directly. This form of network is termed an IBSS and is commonly known as an *ad-hoc network*.

802.11 networks were first deployed in the 2.4GHz band using protocols defined by the IEEE 802.11 and 802.11b standard. These specifications include the operating frequencies, MAC layer characteristics including framing and transmission rates (communication can be done at various rates). Later the 802.11a standard defined operation in the 5GHz band, including different signalling mechanisms and higher transmission rates. Still later the 802.11g standard was defined to enable use of 802.11a signalling and transmission mechanisms in the 2.4GHz band in such a way as to be backwards compatible with 802.11b networks.

Separate from the underlying transmission techniques 802.11 networks have a variety of security mechanisms. The original 802.11 specifications defined a simple security protocol called WEP. This protocol uses a fixed pre-shared key and the RC4 cryptographic cipher to encode data transmitted on a network. Stations must all agree on the fixed

key in order to communicate. This scheme was shown to be easily broken and is now rarely used except to discourage transient users from joining networks. Current security practice is given by the IEEE 802.11i specification that defines new cryptographic ciphers and an additional protocol to authenticate stations to an access point and exchange keys for doing data communication. Further, cryptographic keys are periodically refreshed and there are mechanisms for detecting intrusion attempts (and for countering intrusion attempts). Another security protocol specification commonly used in wireless networks is termed WPA. This was a precursor to 802.11i defined by an industry group as an interim measure while waiting for 802.11i to be ratified. WPA specifies a subset of the requirements found in 802.11i and is designed for implementation on legacy hardware. Specifically WPA requires only the TKIP cipher that is derived from the original WEP cipher. 802.11i permits use of TKIP but also requires support for a stronger cipher, AES-CCM, for encrypting data. (The AES cipher was not required in WPA because it was deemed too computationally costly to be implemented on legacy hardware.)

Other than the above protocol standards the other important standard to be aware of is 802.11e. This defines protocols for deploying multi-media applications such as streaming video and voice over IP (VoIP) in an 802.11 network. Like 802.11i, 802.11e also has a precursor specification termed WME (later renamed WMM) that has been defined by an industry group as a subset of 802.11e that can be deployed now to enable multi-media applications while waiting for the final ratification of 802.11e. The most important thing to know about 802.11e and WME/WMM is that it enables prioritized traffic use of a wireless network through Quality of Service (QoS) protocols and enhanced media access protocols. Proper implementation of these protocols enable high speed bursting of data and prioritized traffic flow.

Since the 6.0 version, FreeBSD supports networks that operate using 802.11a, 802.11b, and 802.11g. The WPA and 802.11i security protocols are likewise supported (in conjunction with any of 11a, 11b, and 11g) and QoS and traffic prioritization required by the WME/WMM protocols are supported for a limited set of wireless devices.

### 32.3.2 Basic Setup

#### 32.3.2.1 Kernel Configuration

To use wireless networking you need a wireless networking card and to configure the kernel with the appropriate wireless networking support. The latter is separated into multiple modules so that you only need to configure the software you are actually going to use.

The first thing you need is a wireless device. The most commonly used devices are those that use parts made by Atheros. These devices are supported by the ath(4) driver and require the following line to be added to the /boot/loader.conf file:

```
if_ath_load="YES"
```

The Atheros driver is split up into three separate pieces: the driver proper (ath(4)), the hardware support layer that handles chip-specific functions (ath\_hal(4)), and an algorithm for selecting which of several possible rates for transmitting frames (ath\_rate\_sample here). When you load this support as modules these dependencies are automatically handled for you. If instead of an Atheros device you had another device you would select the module for that device; e.g.:

```
if_wi_load="YES"
```

for devices based on the Intersil Prism parts (wi(4) driver).

**Óçìâßùóç:** In the rest of this document, we will use an ath(4) device, the device name in the examples must be changed according to your configuration. A list of available wireless drivers can be found at the beginning of the

wlan(4) manual page. If a native FreeBSD driver for your wireless device does not exist, it may be possible to directly use the Windows driver with the help of the NDIS driver wrapper.

With a device driver configured you need to also bring in the 802.11 networking support required by the driver. For the ath(4) driver this is at least the wlan(4) module; this module is automatically loaded with the wireless device driver. With that you will need the modules that implement cryptographic support for the security protocols you intend to use. These are intended to be dynamically loaded on demand by the wlan(4) module but for now they must be manually configured. The following modules are available: wlan\_wep(4), wlan\_ccmp(4) and wlan\_tkip(4). Both wlan\_ccmp(4) and wlan\_tkip(4) drivers are only needed if you intend to use the WPA and/or 802.11i security protocols. If your network is to run totally open (i.e., with no encryption) then you do not even need the wlan\_wep(4) support. To load these modules at boot time, add the following lines to /boot/loader.conf:

```
wlan_wep_load="YES"
wlan_ccmp_load="YES"
wlan_tkip_load="YES"
```

With this information in the system bootstrap configuration file (i.e., /boot/loader.conf), you have to reboot your FreeBSD box. If you do not want to reboot your machine for the moment, you can just load the modules by hand using kldload(8).

**Óçìàßúóç:** If you do not want to use modules, it is possible to compile these drivers into the kernel by adding the following lines to your kernel configuration file:

```
device ath          # Atheros IEEE 802.11 wireless network driver
device ath_hal      # Atheros Hardware Access Layer
device ath_rate_sample # John Bicket's SampleRate control algorithm.
device wlan          # 802.11 support (Required)
device wlan_wep      # WEP crypto support for 802.11 devices
device wlan_ccmp     # AES-CCMP crypto support for 802.11 devices
device wlan_tkip     # TKIP and Michael crypto support for 802.11 devices
```

With this information in the kernel configuration file, recompile the kernel and reboot your FreeBSD machine.

When the system is up, we could find some information about the wireless device in the boot messages, like this:

```
ath0: <Atheros 5212> mem 0xff9f0000-0xff9fffff irq 17 at device 2.0 on pci2
ath0: Ethernet address: 00:11:95:d5:43:62
ath0: mac 7.9 phy 4.5 radio 5.6
```

### 32.3.3 Infrastructure Mode

The infrastructure mode or BSS mode is the mode that is typically used. In this mode, a number of wireless access points are connected to a wired network. Each wireless network has its own name, this name is called the SSID of the network. Wireless clients connect to the wireless access points.

### 32.3.3.1 FreeBSD Clients

#### 32.3.3.1.1 How to Find Access Points

To scan for networks, use the `ifconfig` command. This request may take a few moments to complete as it requires that the system switches to each available wireless frequency and probes for available access points. Only the super-user can initiate such a scan:

```
# ifconfig ath0 up scan
SSID          BSSID              CHAN RATE   S:N    INT CAPS
dlinkap       00:13:46:49:41:76     6    54M 29:0  100 EPS  WPA WME
freebsdap    00:11:95:c3:0d:ac     1    54M 22:0  100 EPS  WPA
```

**Óçiàßùóç:** You must mark the interface `up` before you can scan. Subsequent scan requests do not require you to mark the interface up again.

The output of a scan request lists each BSS/IBSS network found. Beside the name of the network, `SSID`, we find the `BSSID` which is the MAC address of the access point. The `CAPS` field identifies the type of each network and the capabilities of the stations operating there:

E

Extended Service Set (ESS). Indicates that the station is part of an infrastructure network (in contrast to an IBSS/ad-hoc network).

I

IBSS/ad-hoc network. Indicates that the station is part of an ad-hoc network (in contrast to an ESS network).

P

Privacy. Data confidentiality is required for all data frames exchanged within the BSS. This means that this BSS requires the station to use cryptographic means such as WEP, TKIP or AES-CCMP to encrypt/decrypt data frames being exchanged with others.

S

Short Preamble. Indicates that the network is using short preambles (defined in 802.11b High Rate/DSSS PHY, short preamble utilizes a 56 bit sync field in contrast to a 128 bit field used in long preamble mode).

s

Short slot time. Indicates that the 802.11g network is using a short slot time because there are no legacy (802.11b) stations present.

One can also display the current list of known networks with:

```
# ifconfig ath0 list scan
```

This information may be updated automatically by the adapter or manually with a `scan` request. Old data is automatically removed from the cache, so over time this list may shrink unless more scans are done.

### 32.3.3.1.2 Basic Settings

This section provides a simple example of how to make the wireless network adapter work in FreeBSD without encryption. After you are familiar with these concepts, we strongly recommend using WPA to set up your wireless network.

There are three basic steps to configure a wireless network: selecting an access point, authenticating your station, and configuring an IP address. The following sections discuss each step.

#### 32.3.3.1.2.1 Selecting an Access Point

Most of time it is sufficient to let the system choose an access point using the builtin heuristics. This is the default behaviour when you mark an interface up or otherwise configure an interface by listing it in `/etc/rc.conf`, e.g.:

```
ifconfig_ath0="DHCP"
```

If there are multiple access points and you want to select a specific one, you can select it by its SSID:

```
ifconfig_ath0="ssid your_ssid_here DHCP"
```

In an environment where there are multiple access points with the same SSID (often done to simplify roaming) it may be necessary to associate to one specific device. In this case you can also specify the BSSID of the access point (you can also leave off the SSID):

```
ifconfig_ath0="ssid your_ssid_here bssid xx:xx:xx:xx:xx:xx DHCP"
```

There are other ways to constrain the choice of an access point such as limiting the set of frequencies the system will scan on. This may be useful if you have a multi-band wireless card as scanning all the possible channels can be time-consuming. To limit operation to a specific band you can use the mode parameter; e.g.:

```
ifconfig_ath0="mode 11g ssid your_ssid_here DHCP"
```

will force the card to operate in 802.11g which is defined only for 2.4GHz frequencies so any 5GHz channels will not be considered. Other ways to do this are the channel parameter, to lock operation to one specific frequency, and the chanlist parameter, to specify a list of channels for scanning. More information about these parameters can be found in the `ifconfig(8)` manual page.

#### 32.3.3.1.2.2 Authentication

Once you have selected an access point your station needs to authenticate before it can pass data. Authentication can happen in several ways. The most common scheme used is termed open authentication and allows any station to join the network and communicate. This is the authentication you should use for test purpose the first time you set up a wireless network. Other schemes require cryptographic handshakes be completed before data traffic can flow; either using pre-shared keys or secrets, or more complex schemes that involve backend services such as RADIUS. Most users will use open authentication which is the default setting. Next most common setup is WPA-PSK, also known as WPA Personal, which is described below.

**Óçìåßùóç:** If you have an Apple AirPort® Extreme base station for an access point you may need to configure shared-key authentication together with a WEP key. This can be done in the `/etc/rc.conf` file or using the `wpa_supplicant(8)` program. If you have a single AirPort base station you can setup access with something like:

```
ifconfig_ath0="authmode shared wepmode on wepxkey 1 wepkey 01234567 DHCP"
```

In general shared key authentication is to be avoided because it uses the WEP key material in a highly-constrained manner making it even easier to crack the key. If WEP must be used (e.g., for compatibility with legacy devices) it is better to use WEP with open authentication. More information regarding WEP can be found in the ÔíÞá 32.3.3.1.4.

### 32.3.3.1.2.3 Getting an IP Address with DHCP

Once you have selected an access point and set the authentication parameters, you will have to get an IP address to communicate. Most of time you will obtain your wireless IP address via DHCP. To achieve that, simply edit /etc/rc.conf and add DHCP to the configuration for your device as shown in various examples above:

```
ifconfig_ath0="DHCP"
```

At this point, you are ready to bring up the wireless interface:

```
# /etc/rc.d/netif start
```

Once the interface is running, use ifconfig to see the status of the interface ath0:

```
# ifconfig ath0
ath0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
      inet6 fe80::211:95ff:fed5:4362%ath0 prefixlen 64 scopeid 0x1
      inet 192.168.1.100 netmask 0xffffffff broadcast 192.168.1.255
        ether 00:11:95:d5:43:62
        media: IEEE 802.11 Wireless Ethernet autoselect (OFDM/54Mbps)
        status: associated
        ssid dlinkap channel 6 bssid 00:13:46:49:41:76
        authmode OPEN privacy OFF txpowmax 36 protmode CTS bintval 100
```

The status: associated means you are connected to the wireless network (to the dlinkap network in our case). The bssid 00:13:46:49:41:76 part is the MAC address of your access point; the authmode line informs you that the communication is not encrypted (OPEN).

### 32.3.3.1.2.4 Static IP Address

In the case you cannot obtain an IP address from a DHCP server, you can set a fixed IP address. Replace the DHCP keyword shown above with the address information. Be sure to retain any other parameters you have set up for selecting an access point:

```
ifconfig_ath0="inet 192.168.1.100 netmask 255.255.255.0 ssid your_ssid_here"
```

### 32.3.3.1.3 WPA

WPA (Wi-Fi Protected Access) is a security protocol used together with 802.11 networks to address the lack of proper authentication and the weakness of WEP. WPA leverages the 802.1X authentication protocol and uses one of several ciphers instead of WEP for data integrity. The only cipher required by WPA is TKIP (Temporary Key Integrity Protocol) which is a cipher that extends the basic RC4 cipher used by WEP by adding integrity checking,

tamper detection, and measures for responding to any detected intrusions. TKIP is designed to work on legacy hardware with only software modification; it represents a compromise that improves security but is still not entirely immune to attack. WPA also specifies the AES-CCMP cipher as an alternative to TKIP and that is preferred when possible; for this specification the term WPA2 (or RSN) is commonly used.

WPA defines authentication and encryption protocols. Authentication is most commonly done using one of two techniques: by 802.1X and a backend authentication service such as RADIUS, or by a minimal handshake between the station and the access point using a pre-shared secret. The former is commonly termed WPA Enterprise with the latter known as WPA Personal. Since most people will not set up a RADIUS backend server for wireless network, WPA-PSK is by far the most commonly encountered configuration for WPA.

The control of the wireless connection and the authentication (key negotiation or authentication with a server) is done with the `wpa_supplicant(8)` utility. This program requires a configuration file, `/etc/wpa_supplicant.conf`, to run. More information regarding this file can be found in the `wpa_supplicant.conf(5)` manual page.

### 32.3.3.1.3.1 WPA-PSK

WPA-PSK also known as WPA-Personal is based on a pre-shared key (PSK) generated from a given password and that will be used as the master key in the wireless network. This means every wireless user will share the same key. WPA-PSK is intended for small networks where the use of an authentication server is not possible or desired.

**Ðñiâéäïðíßçóç:** Always use strong passwords that are sufficiently long and made from a rich alphabet so they will not be guessed and/or attacked.

The first step is the configuration of the `/etc/wpa_supplicant.conf` file with the SSID and the pre-shared key of your network:

```
network={
    ssid="freebsdap"
    psk="freebsdmall"
}
```

Then, in `/etc/rc.conf`, we indicate that the wireless device configuration will be done with WPA and the IP address will be obtained with DHCP:

```
ifconfig_ath0="WPA DHCP"
```

Then, we can bring up the interface:

```
# /etc/rc.d/netif start
Starting wpa_supplicant.
DHCPDISCOVER on ath0 to 255.255.255.255 port 67 interval 5
DHCPDISCOVER on ath0 to 255.255.255.255 port 67 interval 6
DHCPOFFER from 192.168.0.1
DHCPREQUEST on ath0 to 255.255.255.255 port 67
DHCPACK from 192.168.0.1
bound to 192.168.0.254 -- renewal in 300 seconds.
ath0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
        inet6 fe80::211:95ff:fed5:4362%ath0 prefixlen 64 scopeid 0x1
        inet 192.168.0.254 netmask 0xffffffff broadcast 192.168.0.255
        ether 00:11:95:d5:43:62
```

```
media: IEEE 802.11 Wireless Ethernet autoselect (OFDM/36Mbps)
status: associated
ssid freebsdap channel 1 bssid 00:11:95:c3:0d:ac
authmode WPA privacy ON deftxkey UNDEF TKIP 2:128-bit txpowmax 36
protmode CTS roaming MANUAL bintval 100
```

Or you can try to configure it manually using the same /etc/wpa\_supplicant.conf above, and run:

```
# wpa_supplicant -i ath0 -c /etc/wpa_supplicant.conf
Trying to associate with 00:11:95:c3:0d:ac (SSID='freebsdap' freq=2412 MHz)
Associated with 00:11:95:c3:0d:ac
WPA: Key negotiation completed with 00:11:95:c3:0d:ac [PTK=TKIP GTK=TKIP]
```

The next operation is the launch of the dhclient command to get the IP address from the DHCP server:

```
# dhclient ath0
DHCPREQUEST on ath0 to 255.255.255.255 port 67
DHCPACK from 192.168.0.1
bound to 192.168.0.254 -- renewal in 300 seconds.
# ifconfig ath0
ath0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
      inet6 fe80::211:95ff:fed5:4362%ath0 prefixlen 64 scopeid 0x1
      inet 192.168.0.254 netmask 0xffffffff broadcast 192.168.0.255
      ether 00:11:95:d5:43:62
      media: IEEE 802.11 Wireless Ethernet autoselect (OFDM/48Mbps)
      status: associated
      ssid freebsdap channel 1 bssid 00:11:95:c3:0d:ac
      authmode WPA privacy ON deftxkey UNDEF TKIP 2:128-bit txpowmax 36
      protmode CTS roaming MANUAL bintval 100
```

**Óçìåßùóç:** If the /etc/rc.conf is set up with the line `ifconfig_ath0="DHCP"` then it is no need to run the dhclient command manually, dhclient will be launched after wpa\_supplicant plumbs the keys.

In the case where the use of DHCP is not possible, you can set a static IP address after wpa\_supplicant has authenticated the station:

```
# ifconfig ath0 inet 192.168.0.100 netmask 255.255.255.0
# ifconfig ath0
ath0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
      inet6 fe80::211:95ff:fed5:4362%ath0 prefixlen 64 scopeid 0x1
      inet 192.168.0.100 netmask 0xffffffff broadcast 192.168.0.255
      ether 00:11:95:d5:43:62
      media: IEEE 802.11 Wireless Ethernet autoselect (OFDM/36Mbps)
      status: associated
      ssid freebsdap channel 1 bssid 00:11:95:c3:0d:ac
      authmode WPA privacy ON deftxkey UNDEF TKIP 2:128-bit txpowmax 36
      protmode CTS roaming MANUAL bintval 100
```

When DHCP is not used, you also have to manually set up the default gateway and the nameserver:

```
# route add default your_default_router
```

```
# echo "nameserver your_DNS_server" >> /etc/resolv.conf
```

### 32.3.3.1.3.2 WPA with EAP-TLS

The second way to use WPA is with an 802.1X backend authentication server, in this case WPA is called WPA-Enterprise to make difference with the less secure WPA-Personal with its pre-shared key. The authentication in WPA-Enterprise is based on EAP (Extensible Authentication Protocol).

EAP does not come with an encryption method, it was decided to embed EAP inside an encrypted tunnel. Many types of EAP authentication methods have been designed, the most common methods are EAP-TLS, EAP-TTLS and EAP-PEAP.

EAP-TLS (EAP with Transport Layer Security) is a very well-supported authentication protocol in the wireless world since it was the first EAP method to be certified by the Wi-Fi alliance (<http://www.wi-fi.org/>). EAP-TLS will require three certificates to run: the CA certificate (installed on all machines), the server certificate for your authentication server, and one client certificate for each wireless client. In this EAP method, both authentication server and wireless client authenticate each other in presenting their respective certificates, and they verify that these certificates were signed by your organization's certificate authority (CA).

As previously, the configuration is done via `/etc/wpa_supplicant.conf`:

```
network={  
    ssid="freebsdap" ❶  
    proto=RSN ❷  
    key_mgmt=WPA-EAP ❸  
    eap=TLS ❹  
    identity="loader" ❺  
    ca_cert="/etc/certs/cacert.pem" ❻  
    client_cert="/etc/certs/clientcert.pem" ❼  
    private_key="/etc/certs/clientkey.pem" ❽  
    private_key_passwd="freebsdmallclient" ❾  
}
```

- ❶ This field indicates the network name (SSID).
- ❷ Here, we use RSN (IEEE 802.11i) protocol, i.e., WPA2.
- ❸ The `key_mgmt` line refers to the key management protocol we use. In our case it is WPA using EAP authentication: `WPA-EAP`.
- ❹ In this field, we mention the EAP method for our connection.
- ❺ The `identity` field contains the identity string for EAP.
- ❻ The `ca_cert` field indicates the pathname of the CA certificate file. This file is needed to verify the server certificate.
- ❼ The `client_cert` line gives the pathname to the client certificate file. This certificate is unique to each wireless client of the network.
- ❽ The `private_key` field is the pathname to the client certificate private key file.
- ❾ The `private_key_passwd` field contains the passphrase for the private key.

Then add the following line to `/etc/rc.conf`:

```
ifconfig_ath0="WPA DHCP"
```

The next step is to bring up the interface with the help of the `rc.d` facility:

```
# /etc/rc.d/netif start
Starting wpa_supplicant.
DHCPREQUEST on ath0 to 255.255.255.255 port 67
DHCPREQUEST on ath0 to 255.255.255.255 port 67
DHCPACK from 192.168.0.20
bound to 192.168.0.254 -- renewal in 300 seconds.
ath0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
      inet6 fe80::211:95ff:fed5:4362%ath0 prefixlen 64 scopeid 0x1
      inet 192.168.0.254 netmask 0xffffffff broadcast 192.168.0.255
        ether 00:11:95:d5:43:62
        media: IEEE 802.11 Wireless Ethernet autoselect (DS/11Mbps)
        status: associated
        ssid freebsdap channel 1 bssid 00:11:95:c3:0d:ac
        authmode WPA2/802.11i privacy ON deftxkey UNDEF TKIP 2:128-bit
        txpowmax 36 protmode CTS roaming MANUAL bintval 100
```

As previously shown, it is also possible to bring up the interface manually with both `wpa_supplicant` and `ifconfig` commands.

### 32.3.3.1.3.3 WPA with EAP-TTLS

With EAP-TLS both the authentication server and the client need a certificate, with EAP-TTLS (EAP-Tunneled Transport Layer Security) a client certificate is optional. This method is close to what some secure web sites do, where the web server can create a secure SSL tunnel even if the visitors do not have client-side certificates. EAP-TTLS will use the encrypted TLS tunnel for safe transport of the authentication data.

The configuration is done via the `/etc/wpa_supplicant.conf` file:

```
network={
    ssid="freebsdap"
    proto=RSN
    key_mgmt=WPA-EAP
    eap=TTLS ①
    identity="test" ②
    password="test" ③
    ca_cert="/etc/certs/cacert.pem" ④
    phase2="auth=MD5" ⑤
}
```

- ① In this field, we mention the EAP method for our connection.
- ② The `identity` field contains the identity string for EAP authentication inside the encrypted TLS tunnel.
- ③ The `password` field contains the passphrase for the EAP authentication.
- ④ The `ca_cert` field indicates the pathname of the CA certificate file. This file is needed to verify the server certificate.

- ⑤ In this field, we mention the authentication method used in the encrypted TLS tunnel. In our case, EAP with MD5-Challenge has been used. The “inner authentication” phase is often called “phase2”.

You also have to add the following line to `/etc/rc.conf`:

```
ifconfig_ath0="WPA DHCP"
```

The next step is to bring up the interface:

```
# /etc/rc.d/netif start
Starting wpa_supplicant.

DHCPREQUEST on ath0 to 255.255.255.255 port 67
DHCPREQUEST on ath0 to 255.255.255.255 port 67
DHCPREQUEST on ath0 to 255.255.255.255 port 67
DHCPACK from 192.168.0.20
bound to 192.168.0.254 -- renewal in 300 seconds.

ath0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
      inet6 fe80::211:95ff:fed5:4362%ath0 prefixlen 64 scopeid 0x1
      inet 192.168.0.254 netmask 0xffffffff broadcast 192.168.0.255
      ether 00:11:95:d5:43:62
      media: IEEE 802.11 Wireless Ethernet autoselect (DS/11Mbps)
      status: associated
      ssid freebsdap channel 1 bssid 00:11:95:c3:0d:ac
      authmode WPA2/802.11i privacy ON deftxkey UNDEF TKIP 2:128-bit
      txpowmax 36 protmode CTS roaming MANUAL bintval 100
```

### 32.3.3.1.3.4 WPA with EAP-PEAP

PEAP (Protected EAP) has been designed as an alternative to EAP-TTLS. There are two types of PEAP methods, the most common one is PEAPv0/EAP-MSCHAPv2. In the rest of this document, we will use the PEAP term to refer to that EAP method. PEAP is the most used EAP standard after EAP-TLS, in other words if you have a network with mixed OSes, PEAP should be the most supported standard after EAP-TLS.

PEAP is similar to EAP-TTLS: it uses a server-side certificate to authenticate clients by creating an encrypted TLS tunnel between the client and the authentication server, which protects the ensuing exchange of authentication information. In term of security the difference between EAP-TTLS and PEAP is that PEAP authentication broadcasts the username in clear, only the password is sent in the encrypted TLS tunnel. EAP-TTLS will use the TLS tunnel for both username and password.

We have to edit the `/etc/wpa_supplicant.conf` file and add the EAP-PEAP related settings:

```
network={
    ssid="freebsdap"
    proto=RSN
    key_mgmt=WPA-EAP
    eap=PEAP ①
    identity="test" ②
    password="test" ③
    ca_cert="/etc/certs/cacert.pem" ④
    phase1="peaplabel=0" ⑤
    phase2="auth=MSCHAPV2" ⑥
}
```

- ① In this field, we mention the EAP method for our connection.
- ② The `identity` field contains the identity string for EAP authentication inside the encrypted TLS tunnel.
- ③ The `password` field contains the passphrase for the EAP authentication.
- ④ The `ca_cert` field indicates the pathname of the CA certificate file. This file is needed to verify the server certificate.
- ⑤ This field contains the parameters for the first phase of the authentication (the TLS tunnel). According to the authentication server used, you will have to specify a specific label for the authentication. Most of time, the label will be “client EAP encryption” which is set by using `peaplabel=0`. More information can be found in the `wpa_supplicant.conf(5)` manual page.
- ⑥ In this field, we mention the authentication protocol used in the encrypted TLS tunnel. In the case of PEAP, it is `auth=MSCHAPV2`.

The following must be added to `/etc/rc.conf`:

```
ifconfig_ath0="WPA DHCP"
```

Then, we can bring up the interface:

```
# /etc/rc.d/netif start
Starting wpa_supplicant.
DHCPREQUEST on ath0 to 255.255.255.255 port 67
DHCPREQUEST on ath0 to 255.255.255.255 port 67
DHCPREQUEST on ath0 to 255.255.255.255 port 67
DHCPACK from 192.168.0.20
bound to 192.168.0.254 -- renewal in 300 seconds.
ath0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
      inet6 fe80::211:95ff:fed5:4362%ath0 prefixlen 64 scopeid 0x1
      inet 192.168.0.254 netmask 0xffffffff broadcast 192.168.0.255
      ether 00:11:95:d5:43:62
      media: IEEE 802.11 Wireless Ethernet autoselect (DS/11Mbps)
      status: associated
      ssid freebsdap channel 1 bssid 00:11:95:c3:0d:ac
      authmode WPA2/802.11i privacy ON deftxkey UNDEF TKIP 2:128-bit
      txpowmax 36 protmode CTS roaming MANUAL bintval 100
```

### 32.3.3.1.4 WEP

WEP (Wired Equivalent Privacy) is part of the original 802.11 standard. There is no authentication mechanism, only a weak form of access control, and it is easily to be cracked.

WEP can be set up with `ifconfig`:

```
# ifconfig ath0 inet 192.168.1.100 netmask 255.255.255.0 ssid my_net \
    wepmode on weptxkey 3 wepkey 3:0x3456789012
```

- The `weptxkey` means which WEP key will be used in the transmission. Here we used the third key. This must match the setting in the access point.

- The `wepkey` means setting the selected WEP key. It should in the format `index:key`, if the index is not given, key 1 is set. That is to say we need to set the index if we use keys other than the first key.

**Óçìåßùóç:** You must replace the `0x3456789012` with the key configured for use on the access point.

You are encouraged to read `ifconfig(8)` manual page for further information.

The `wpa_supplicant` facility also can be used to configure your wireless interface with WEP. The example above can be set up by adding the following lines to `/etc/wpa_supplicant.conf`:

```
network={
    ssid="my_net"
    key_mgmt=NONE
    wep_key3=3456789012
    wep_tx_keyidx=3
}
```

Then:

```
# wpa_supplicant -i ath0 -c /etc/wpa_supplicant.conf
Trying to associate with 00:13:46:49:41:76 (SSID='dlinkap' freq=2437 MHz)
Associated with 00:13:46:49:41:76
```

### 32.3.4 Ad-hoc Mode

IBSS mode, also called ad-hoc mode, is designed for point to point connections. For example, to establish an ad-hoc network between the machine A and the machine B we will just need to choose two IP addresses and a SSID.

On the box A:

```
# ifconfig ath0 inet 192.168.0.1 netmask 255.255.255.0 ssid freebsdap mediaopt adhoc
# ifconfig ath0
ath0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
        inet 192.168.0.1 netmask 0xffffffff broadcast 192.168.0.255
        inet6 fe80::211:95ff:fecc:3@ath0 prefixlen 64 scopeid 0x4
        ether 00:11:95:c3:0d:ac
        media: IEEE 802.11 Wireless Ethernet autoselect <adhoc> (autoselect <adhoc>)
        status: associated
        ssid freebsdap channel 2 bssid 02:11:95:c3:0d:ac
        authmode OPEN privacy OFF txpowmax 36 protmode CTS bintval 100
```

The `adhoc` parameter indicates the interface is running in the IBSS mode.

On B, we should be able to detect A:

```
# ifconfig ath0 up scan
SSID          BSSID           CHAN RATE   S:N    INT CAPS
freebsdap    02:11:95:c3:0d:ac    2    54M 19:0    100  IS
```

The **I** in the output confirms the machine A is in ad-hoc mode. We just have to configure B with a different IP address:

```
# ifconfig ath0 inet 192.168.0.2 netmask 255.255.255.0 ssid freebsdap mediaopt adhoc
# ifconfig ath0
    ath0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
        inet6 fe80::211:95ff:fed5:4362%ath0 prefixlen 64 scopeid 0x1
        inet 192.168.0.2 netmask 0xffffffff broadcast 192.168.0.255
            ether 00:11:95:d5:43:62
            media: IEEE 802.11 Wireless Ethernet autoselect <adhoc> (autoselect <adhoc>)
            status: associated
            ssid freebsdap channel 2 bssid 02:11:95:c3:0d:ac
            authmode OPEN privacy OFF txpowmax 36 protmode CTS bintval 100
```

Both A and B are now ready to exchange informations.

### 32.3.5 Troubleshooting

If you are having trouble with wireless networking, there are a number of steps you can take to help troubleshoot the problem.

- If you do not see the access point listed when scanning be sure you have not configured your wireless device to a limited set of channels.
- If you cannot associate to an access point verify the configuration of your station matches the one of the access point. This includes the authentication scheme and any security protocols. Simplify your configuration as much as possible. If you are using a security protocol such as WPA or WEP configure the access point for open authentication and no security to see if you can get traffic to pass.
- Once you can associate to the access point diagnose any security configuration using simple tools like ping(8).

The `wpa_supplicant` has much debugging support; try running it manually with the `-dd` option and look at the system logs.

- There are also many lower-level debugging tools. You can enable debugging messages in the 802.11 protocol support layer using the `wlantest` program found in `/usr/src/tools/tools/net80211`. For example:

```
# wlantest -i ath0 +scan+auth+debug+assoc
net.wlan.0.debug: 0 => 0xc80000<assoc,auth,scan>
```

can be used to enable console messages related to scanning for access points and doing the 802.11 protocol handshakes required to arrange communication.

There are also many useful statistics maintained by the 802.11 layer; the `wlanstats` tool will dump these informations. These statistics should identify all errors identified by the 802.11 layer. Beware however that some errors are identified in the device drivers that lie below the 802.11 layer so they may not show up. To diagnose device-specific problems you need to refer to the drivers' documentation.

If the above information does not help to clarify the problem, please submit a problem report and include output from the above tools.

## 32.4 Bluetooth

*Written by Pav Lucistnik.*

### 32.4.1 Introduction

Bluetooth is a wireless technology for creating personal networks operating in the 2.4 GHz unlicensed band, with a range of 10 meters. Networks are usually formed ad-hoc from portable devices such as cellular phones, handhelds and laptops. Unlike the other popular wireless technology, Wi-Fi, Bluetooth offers higher level service profiles, e.g. FTP-like file servers, file pushing, voice transport, serial line emulation, and more.

The Bluetooth stack in FreeBSD is implemented using the Netgraph framework (see netgraph(4)). A broad variety of Bluetooth USB dongles is supported by the ng\_urb(4) driver. The Broadcom BCM2033 chip based Bluetooth devices are supported via the ubtbcnfw(4) and ng\_urb(4) drivers. The 3Com Bluetooth PC Card 3CRWB60-A is supported by the ng\_bt3c(4) driver. Serial and UART based Bluetooth devices are supported via sio(4), ng\_h4(4) and hcseriald(8). This section describes the use of the USB Bluetooth dongle.

### 32.4.2 Plugging in the Device

By default Bluetooth device drivers are available as kernel modules. Before attaching a device, you will need to load the driver into the kernel:

```
# kldload ng_urb
```

If the Bluetooth device is present in the system during system startup, load the module from /boot/loader.conf:

```
ng_urb_load="YES"
```

Plug in your USB dongle. The output similar to the following will appear on the console (or in syslog):

```
ubt0: vendor 0x0a12 product 0x0001, rev 1.10/5.25, addr 2
ubt0: Interface 0 endpoints: interrupt=0x81, bulk-in=0x82, bulk-out=0x2
ubt0: Interface 1 (alt.config 5) endpoints: isoc-in=0x83, isoc-out=0x3,
      wMaxPacketSize=49, nframes=6, buffer size=294
```

**Óçìàßúóç:** The Bluetooth stack has to be started manually on FreeBSD 6.0, and on FreeBSD 5.X before 5.5. It is done automatically from devd(8) on FreeBSD 5.5, 6.1 and newer.

Copy /usr/share/examples/netgraph/bluetooth/rc.bluetooth into some convenient place, like /etc/rc.bluetooth. This script is used to start and stop the Bluetooth stack. It is a good idea to stop the stack before unplugging the device, but it is not (usually) fatal. When starting the stack, you will receive output similar to the following:

```
# /etc/rc.bluetooth start ubt0
BD_ADDR: 00:02:72:00:d4:1a
Features: 0xff 0xff 0xf 00 00 00 00 00
<3-Slot> <5-Slot> <Encryption> <Slot offset>
<Timing accuracy> <Switch> <Hold mode> <Sniff mode>
<Park mode> <RSSI> <Channel quality> <SCO link>
<HV2 packets> <HV3 packets> <u-law log> <A-law log> <CVSD>
<Paging scheme> <Power control> <Transparent SCO data>
Max. ACL packet size: 192 bytes
Number of ACL packets: 8
```

```
Max. SCO packet size: 64 bytes
Number of SCO packets: 8
```

### 32.4.3 Host Controller Interface (HCI)

Host Controller Interface (HCI) provides a command interface to the baseband controller and link manager, and access to hardware status and control registers. This interface provides a uniform method of accessing the Bluetooth baseband capabilities. HCI layer on the Host exchanges data and commands with the HCI firmware on the Bluetooth hardware. The Host Controller Transport Layer (i.e. physical bus) driver provides both HCI layers with the ability to exchange information with each other.

A single Netgraph node of type *hci* is created for a single Bluetooth device. The HCI node is normally connected to the Bluetooth device driver node (downstream) and the L2CAP node (upstream). All HCI operations must be performed on the HCI node and not on the device driver node. Default name for the HCI node is “devicehci”. For more details refer to the *ng\_hci(4)* manual page.

One of the most common tasks is discovery of Bluetooth devices in RF proximity. This operation is called *inquiry*. Inquiry and other HCI related operations are done with the *hccontrol(8)* utility. The example below shows how to find out which Bluetooth devices are in range. You should receive the list of devices in a few seconds. Note that a remote device will only answer the inquiry if it put into *discoverable* mode.

```
% hccontrol -n ubt0hci inquiry
Inquiry result, num_responses=1
Inquiry result #0
    BD_ADDR: 00:80:37:29:19:a4
    Page Scan Rep. Mode: 0x1
    Page Scan Period Mode: 00
    Page Scan Mode: 00
    Class: 52:02:04
    Clock offset: 0x78ef
Inquiry complete. Status: No error [00]
```

*BD\_ADDR* is unique address of a Bluetooth device, similar to MAC addresses of a network card. This address is needed for further communication with a device. It is possible to assign human readable name to a *BD\_ADDR*. The */etc/bluetooth/hosts* file contains information regarding the known Bluetooth hosts. The following example shows how to obtain human readable name that was assigned to the remote device:

```
% hccontrol -n ubt0hci remote_name_request 00:80:37:29:19:a4
BD_ADDR: 00:80:37:29:19:a4
Name: Pav's T39
```

If you perform an inquiry on a remote Bluetooth device, it will find your computer as “*your.host.name* (*ubt0*)”. The name assigned to the local device can be changed at any time.

The Bluetooth system provides a point-to-point connection (only two Bluetooth units involved), or a point-to-multipoint connection. In the point-to-multipoint connection the connection is shared among several Bluetooth devices. The following example shows how to obtain the list of active baseband connections for the local device:

```
% hccontrol -n ubt0hci read_connection_list
```

```
Remote BD_ADDR      Handle Type Mode Role Encrypt Pending Queue State
00:80:37:29:19:a4      41    ACL      0 MAST     NONE      0      0 OPEN
```

A *connection handle* is useful when termination of the baseband connection is required. Note, that it is normally not required to do it by hand. The stack will automatically terminate inactive baseband connections.

```
# hccontrol -n ubt0hci disconnect 41
Connection handle: 41
Reason: Connection terminated by local host [0x16]
```

Refer to `hccontrol` help for a complete listing of available HCI commands. Most of the HCI commands do not require superuser privileges.

### 32.4.4 Logical Link Control and Adaptation Protocol (L2CAP)

Logical Link Control and Adaptation Protocol (L2CAP) provides connection-oriented and connectionless data services to upper layer protocols with protocol multiplexing capability and segmentation and reassembly operation. L2CAP permits higher level protocols and applications to transmit and receive L2CAP data packets up to 64 kilobytes in length.

L2CAP is based around the concept of *channels*. Channel is a logical connection on top of baseband connection. Each channel is bound to a single protocol in a many-to-one fashion. Multiple channels can be bound to the same protocol, but a channel cannot be bound to multiple protocols. Each L2CAP packet received on a channel is directed to the appropriate higher level protocol. Multiple channels can share the same baseband connection.

A single Netgraph node of type *l2cap* is created for a single Bluetooth device. The L2CAP node is normally connected to the Bluetooth HCI node (downstream) and Bluetooth sockets nodes (upstream). Default name for the L2CAP node is “device12cap”. For more details refer to the `ng_l2cap(4)` manual page.

A useful command is `l2ping(8)`, which can be used to ping other devices. Some Bluetooth implementations might not return all of the data sent to them, so 0 bytes in the following example is normal.

```
# l2ping -a 00:80:37:29:19:a4
0 bytes from 0:80:37:29:19:a4 seq_no=0 time=48.633 ms result=0
0 bytes from 0:80:37:29:19:a4 seq_no=1 time=37.551 ms result=0
0 bytes from 0:80:37:29:19:a4 seq_no=2 time=28.324 ms result=0
0 bytes from 0:80:37:29:19:a4 seq_no=3 time=46.150 ms result=0
```

The `l2control(8)` utility is used to perform various operations on L2CAP nodes. This example shows how to obtain the list of logical connections (channels) and the list of baseband connections for the local device:

```
% l2control -a 00:02:72:00:d4:1a read_channel_list
L2CAP channels:
Remote BD_ADDR      SCID/ DCID      PSM      IMTU/ OMTU State
00:07:e0:00:0b:ca      66/       64      3     132/   672 OPEN
% l2control -a 00:02:72:00:d4:1a read_connection_list
L2CAP connections:
Remote BD_ADDR      Handle Flags Pending State
00:07:e0:00:0b:ca      41 0            0 OPEN
```

Another diagnostic tool is `btsockstat(1)`. It does a job similar to as `netstat(1)` does, but for Bluetooth network-related data structures. The example below shows the same logical connection as `l2control(8)` above.

```
% btsockstat
Active L2CAP sockets
PCB      Recv-Q Send-Q Local address/PSM          Foreign address   CID  State
c2afe900    0      0 00:02:72:00:d4:1a/3        00:07:e0:00:0b:ca 66  OPEN
Active RFCOMM sessions
L2PCB    PCB     Flag MTU   Out-Q DLCs State
c2afe900 c2b53380 1     127    0     Yes  OPEN
Active RFCOMM sockets
PCB      Recv-Q Send-Q Local address          Foreign address   Chan DLCI State
c2e8bc80    0      250 00:02:72:00:d4:1a 00:07:e0:00:0b:ca 3     6  OPEN
```

### 32.4.5 RFCOMM Protocol

The RFCOMM protocol provides emulation of serial ports over the L2CAP protocol. The protocol is based on the ETSI standard TS 07.10. RFCOMM is a simple transport protocol, with additional provisions for emulating the 9 circuits of RS-232 (EIATIA-232-E) serial ports. The RFCOMM protocol supports up to 60 simultaneous connections (RFCOMM channels) between two Bluetooth devices.

For the purposes of RFCOMM, a complete communication path involves two applications running on different devices (the communication endpoints) with a communication segment between them. RFCOMM is intended to cover applications that make use of the serial ports of the devices in which they reside. The communication segment is a Bluetooth link from one device to another (direct connect).

RFCOMM is only concerned with the connection between the devices in the direct connect case, or between the device and a modem in the network case. RFCOMM can support other configurations, such as modules that communicate via Bluetooth wireless technology on one side and provide a wired interface on the other side.

In FreeBSD the RFCOMM protocol is implemented at the Bluetooth sockets layer.

### 32.4.6 Pairing of Devices

By default, Bluetooth communication is not authenticated, and any device can talk to any other device. A Bluetooth device (for example, cellular phone) may choose to require authentication to provide a particular service (for example, Dial-Up service). Bluetooth authentication is normally done with *PIN codes*. A PIN code is an ASCII string up to 16 characters in length. User is required to enter the same PIN code on both devices. Once user has entered the PIN code, both devices will generate a *link key*. After that the link key can be stored either in the devices themselves or in a persistent storage. Next time both devices will use previously generated link key. The described above procedure is called *pairing*. Note that if the link key is lost by any device then pairing must be repeated.

The hcsecd(8) daemon is responsible for handling of all Bluetooth authentication requests. The default configuration file is /etc/bluetooth/hcsecd.conf. An example section for a cellular phone with the PIN code arbitrarily set to “1234” is shown below:

```
device {
    bdaddr 00:80:37:29:19:a4;
    name    "Pav's T39";
    key     nokey;
    pin     "1234";
}
```

There is no limitation on PIN codes (except length). Some devices (for example Bluetooth headsets) may have a fixed PIN code built in. The -d switch forces the hcsecd(8) daemon to stay in the foreground, so it is easy to see what is happening. Set the remote device to receive pairing and initiate the Bluetooth connection to the remote device. The remote device should say that pairing was accepted, and request the PIN code. Enter the same PIN code as you have in hcsecd.conf. Now your PC and the remote device are paired. Alternatively, you can initiate pairing on the remote device.

On FreeBSD 5.5, 6.1 and newer, the following line can be added to the /etc/rc.conf file to have **hcsecd** started automatically on system start:

```
hcsecd_enable="YES"
```

The following is a sample of the **hcsecd** daemon output:

```
hcsecd[16484]: Got Link_Key_Request event from 'ubt0hci', remote bdaddr 0:80:37:29:19:a4
hcsecd[16484]: Found matching entry, remote bdaddr 0:80:37:29:19:a4, name 'Pav's T39', link key d
hcsecd[16484]: Sending Link_Key_Negative_Reply to 'ubt0hci' for remote bdaddr 0:80:37:29:19:a4
hcsecd[16484]: Got PIN_Code_Request event from 'ubt0hci', remote bdaddr 0:80:37:29:19:a4
hcsecd[16484]: Found matching entry, remote bdaddr 0:80:37:29:19:a4, name 'Pav's T39', PIN code e
hcsecd[16484]: Sending PIN_Code_Reply to 'ubt0hci' for remote bdaddr 0:80:37:29:19:a4
```

### 32.4.7 Service Discovery Protocol (SDP)

The Service Discovery Protocol (SDP) provides the means for client applications to discover the existence of services provided by server applications as well as the attributes of those services. The attributes of a service include the type or class of service offered and the mechanism or protocol information needed to utilize the service.

SDP involves communication between a SDP server and a SDP client. The server maintains a list of service records that describe the characteristics of services associated with the server. Each service record contains information about a single service. A client may retrieve information from a service record maintained by the SDP server by issuing a SDP request. If the client, or an application associated with the client, decides to use a service, it must open a separate connection to the service provider in order to utilize the service. SDP provides a mechanism for discovering services and their attributes, but it does not provide a mechanism for utilizing those services.

Normally, a SDP client searches for services based on some desired characteristics of the services. However, there are times when it is desirable to discover which types of services are described by an SDP server's service records without any a priori information about the services. This process of looking for any offered services is called *browsing*.

The Bluetooth SDP server sdpd(8) and command line client sdpcontrol(8) are included in the standard FreeBSD installation. The following example shows how to perform a SDP browse query.

```
% sdpcontrol -a 00:01:03:fc:6e:ec browse
Record Handle: 00000000
Service Class ID List:
    Service Discovery Server (0x1000)
Protocol Descriptor List:
    L2CAP (0x0100)
        Protocol specific parameter #1: u/int/uuid16 1
        Protocol specific parameter #2: u/int/uuid16 1
Record Handle: 0x00000001
```

```

Service Class ID List:
    Browse Group Descriptor (0x1001)

Record Handle: 0x00000002
Service Class ID List:
    LAN Access Using PPP (0x1102)
Protocol Descriptor List:
    L2CAP (0x0100)
    RFCOMM (0x0003)
        Protocol specific parameter #1: u/int8/bool 1
Bluetooth Profile Descriptor List:
    LAN Access Using PPP (0x1102) ver. 1.0

```

... and so on. Note that each service has a list of attributes (RFCOMM channel for example). Depending on the service you might need to make a note of some of the attributes. Some Bluetooth implementations do not support service browsing and may return an empty list. In this case it is possible to search for the specific service. The example below shows how to search for the OBEX Object Push (OPUSH) service:

```
% sdpcontrol -a 00:01:03:fc:6e:ec search OPUSH
```

Offering services on FreeBSD to Bluetooth clients is done with the **sdpd(8)** server. On FreeBSD 5.5, 6.1 and newer, the following line can be added to the **/etc/rc.conf** file:

```
sdpd_enable="YES"
```

Then the **sdpd** daemon can be started with:

```
# /etc/rc.d/sdpd start
```

On FreeBSD 6.0, and on FreeBSD 5.X before 5.5, **sdpd** is not integrated into the system startup scripts. It has to be started manually with:

```
# sdpd
```

The local server application that wants to provide Bluetooth service to the remote clients will register service with the local SDP daemon. The example of such application is **rfcomm\_pppd(8)**. Once started it will register Bluetooth LAN service with the local SDP daemon.

The list of services registered with the local SDP server can be obtained by issuing SDP browse query via local control channel:

```
# sdpcontrol -l browse
```

### 32.4.8 Dial-Up Networking (DUN) and Network Access with PPP (LAN) Profiles

The Dial-Up Networking (DUN) profile is mostly used with modems and cellular phones. The scenarios covered by this profile are the following:

- use of a cellular phone or modem by a computer as a wireless modem for connecting to a dial-up Internet access server, or using other dial-up services;
- use of a cellular phone or modem by a computer to receive data calls.

Network Access with PPP (LAN) profile can be used in the following situations:

- LAN access for a single Bluetooth device;
- LAN access for multiple Bluetooth devices;
- PC to PC (using PPP networking over serial cable emulation).

In FreeBSD both profiles are implemented with ppp(8) and rfcomm\_pppd(8) - a wrapper that converts RFCOMM Bluetooth connection into something PPP can operate with. Before any profile can be used, a new PPP label in the /etc/ppp/ppp.conf must be created. Consult rfcomm\_pppd(8) manual page for examples.

In the following example rfcomm\_pppd(8) will be used to open RFCOMM connection to remote device with BD\_ADDR 00:80:37:29:19:a4 on DUN RFCOMM channel. The actual RFCOMM channel number will be obtained from the remote device via SDP. It is possible to specify RFCOMM channel by hand, and in this case rfcomm\_pppd(8) will not perform SDP query. Use sdpcontrol(8) to find out RFCOMM channel on the remote device.

```
# rfcomm_pppd -a 00:80:37:29:19:a4 -c -C dun -l rfcomm-dialup
```

In order to provide Network Access with PPP (LAN) service the sdpd(8) server must be running. A new entry for LAN clients must be created in the /etc/ppp/ppp.conf file. Consult rfcomm\_pppd(8) manual page for examples. Finally, start RFCOMM PPP server on valid RFCOMM channel number. The RFCOMM PPP server will automatically register Bluetooth LAN service with the local SDP daemon. The example below shows how to start RFCOMM PPP server.

```
# rfcomm_pppd -s -C 7 -l rfcomm-server
```

### 32.4.9 OBEX Object Push (OPUSH) Profile

OBEX is a widely used protocol for simple file transfers between mobile devices. Its main use is in infrared communication, where it is used for generic file transfers between notebooks or PDAs, and for sending business cards or calendar entries between cellular phones and other devices with PIM applications.

The OBEX server and client are implemented as a third-party package **obexapp**, which is available as comms/obexapp port.

OBEX client is used to push and/or pull objects from the OBEX server. An object can, for example, be a business card or an appointment. The OBEX client can obtain RFCOMM channel number from the remote device via SDP. This can be done by specifying service name instead of RFCOMM channel number. Supported service names are: IrMC, FTRN and OPUSH. It is possible to specify RFCOMM channel as a number. Below is an example of an OBEX session, where device information object is pulled from the cellular phone, and a new object (business card) is pushed into the phone's directory.

```
% obexapp -a 00:80:37:29:19:a4 -C IrMC
obex> get telecom/devinfo.txt devinfo-t39.txt
Success, response: OK, Success (0x20)
obex> put new.vcf
Success, response: OK, Success (0x20)
obex> di
Success, response: OK, Success (0x20)
```

In order to provide OBEX Object Push service, sdpd(8) server must be running. A root folder, where all incoming objects will be stored, must be created. The default path to the root folder is `/var/spool/obex`. Finally, start OBEX server on valid RFCOMM channel number. The OBEX server will automatically register OBEX Object Push service with the local SDP daemon. The example below shows how to start OBEX server.

```
# obexapp -s -C 10
```

### 32.4.10 Serial Port Profile (SPP)

The Serial Port Profile (SPP) allows Bluetooth devices to perform RS232 (or similar) serial cable emulation. The scenario covered by this profile deals with legacy applications using Bluetooth as a cable replacement, through a virtual serial port abstraction.

The rfcomm\_sppd(1) utility implements the Serial Port profile. A pseudo tty is used as a virtual serial port abstraction. The example below shows how to connect to a remote device Serial Port service. Note that you do not have to specify a RFCOMM channel - rfcomm\_sppd(1) can obtain it from the remote device via SDP. If you would like to override this, specify a RFCOMM channel on the command line.

```
# rfcomm_sppd -a 00:07:E0:00:0B:CA -t /dev/ttyp6
rfcomm_sppd[94692]: Starting on /dev/ttyp6...
```

Once connected, the pseudo tty can be used as serial port:

```
# cu -l ttyp6
```

### 32.4.11 Troubleshooting

#### 32.4.11.1 A remote device cannot connect

Some older Bluetooth devices do not support role switching. By default, when FreeBSD is accepting a new connection, it tries to perform a role switch and become master. Devices, which do not support this will not be able to connect. Note that role switching is performed when a new connection is being established, so it is not possible to ask the remote device if it does support role switching. There is a HCI option to disable role switching on the local side:

```
# hccontrol -n ubt0hci write_node_role_switch 0
```

#### 32.4.11.2 Something is going wrong, can I see what exactly is happening?

Yes, you can. Use the third-party package **hcidump**, which is available as `comms/hcidump` port. The **hcidump** utility is similar to `tcpdump(1)`. It can be used to display the content of the Bluetooth packets on the terminal and to dump the Bluetooth packets to a file.

## 32.5 Bridging

*Written by Steve Peterson.*

### 32.5.1 Introduction

It is sometimes useful to divide one physical network (such as an Ethernet segment) into two separate network segments without having to create IP subnets and use a router to connect the segments together. A device that connects two networks together in this fashion is called a “bridge”. A FreeBSD system with two network interface cards can act as a bridge.

The bridge works by learning the MAC layer addresses (Ethernet addresses) of the devices on each of its network interfaces. It forwards traffic between two networks only when its source and destination are on different networks.

In many respects, a bridge is like an Ethernet switch with very few ports.

### 32.5.2 Situations Where Bridging Is Appropriate

There are two common situations in which a bridge is used today.

#### 32.5.2.1 High Traffic on a Segment

Situation one is where your physical network segment is overloaded with traffic, but you do not want for whatever reason to subnet the network and interconnect the subnets with a router.

Let us consider an example of a newspaper where the Editorial and Production departments are on the same subnetwork. The Editorial users all use server A for file service, and the Production users are on server B. An Ethernet network is used to connect all users together, and high loads on the network are slowing things down.

If the Editorial users could be segregated on one network segment and the Production users on another, the two network segments could be connected with a bridge. Only the network traffic destined for interfaces on the “other” side of the bridge would be sent to the other network, reducing congestion on each network segment.

#### 32.5.2.2 Filtering/Traffic Shaping Firewall

The second common situation is where firewall functionality is needed without network address translation (NAT).

An example is a small company that is connected via DSL or ISDN to their ISP. They have a 13 globally-accessible IP addresses from their ISP and have 10 PCs on their network. In this situation, using a router-based firewall is difficult because of subnetting issues.

A bridge-based firewall can be configured and dropped into the path just downstream of their DSL/ISDN router without any IP numbering issues.

### 32.5.3 Configuring a Bridge

#### 32.5.3.1 Network Interface Card Selection

A bridge requires at least two network cards to function. Unfortunately, not all network interface cards support bridging. Read [bridge\(4\)](#) for details on the cards that are supported.

Install and test the two network cards before continuing.

#### 32.5.3.2 Kernel Configuration Changes

To enable kernel support for bridging, add the:

```
options BRIDGE
```

statement to your kernel configuration file, and rebuild your kernel.

#### 32.5.3.3 Firewall Support

If you are planning to use the bridge as a firewall, you will need to add the `IPFIREWALL` option as well. Read [ÊåöÜëáéï 31](#) for general information on configuring the bridge as a firewall.

If you need to allow non-IP packets (such as ARP) to flow through the bridge, there are three options available. The first is to add the following option to the kernel and rebuild:

```
option IPFIREWALL_DEFAULT_TO_ACCEPT
```

The second is to set the firewall type to “open” in the `rc.conf` file:

```
firewall_type="open"
```

Note that these options will make the firewall seem completely transparent; any packet or connection will be permitted by default. This may require significant changes to the firewall ruleset.

The third option is to apply the following `ipfw(8)` rule:

```
# ipfw add allow mac-type arp layer2
```

Or add it to the current firewall ruleset. This rule effectively allows `arp(8)` packets through, so it must be applied near the beginning of the ruleset for early evaluation.

#### 32.5.3.4 Traffic Shaping Support

If you want to use the bridge as a traffic shaper, you will need to add the `DUMMYNET` option to your kernel configuration. Read [dummynet\(4\)](#) for further information.

### 32.5.4 Enabling the Bridge

Add the line:

```
net.link.ether.bridge.enable=1
```

to `/etc/sysctl.conf` to enable the bridge at runtime, and the line:

```
net.link.ether.bridge.config=if1,if2
```

to enable bridging on the specified interfaces (replace `if1` and `if2` with the names of your two network interfaces). If you want the bridged packets to be filtered by `ipfw(8)`, you should add:

```
net.link.ether.bridge.ipfw=1
```

as well.

For versions prior to FreeBSD 5.2-RELEASE, use instead the following lines:

```
net.link.ether.bridge=1  
net.link.ether.bridge_cfg=if1,if2  
net.link.ether.bridge_ipfw=1
```

### 32.5.5 Other Information

If you want to be able to `ssh(1)` into the bridge from the network, it is correct to assign one of the network cards an IP address. The consensus is that assigning both cards an address is a bad idea.

If you have multiple bridges on your network, there cannot be more than one path between any two workstations. Technically, this means that there is no support for spanning tree link management.

A bridge can add latency to your `ping(8)` times, especially for traffic from one segment to another.

## 32.6 Diskless Operation

*Updated by Jean-François Dockès. Reorganized and enhanced by Alex Dupre.*

A FreeBSD machine can boot over the network and operate without a local disk, using file systems mounted from an NFS server. No system modification is necessary, beyond standard configuration files. Such a system is relatively easy to set up because all the necessary elements are readily available:

- There are at least two possible methods to load the kernel over the network:
  - PXE: The Intel Preboot eXecution Environment system is a form of smart boot ROM built into some networking cards or motherboards. See `pxeboot(8)` for more details.
  - The **Etherboot** port (`net/etherboot`) produces ROM-able code to boot kernels over the network. The code can be either burnt into a boot PROM on a network card, or loaded from a local floppy (or hard) disk drive, or from a running MS-DOS system. Many network cards are supported.

- A sample script (`/usr/share/examples/diskless/clone_root`) eases the creation and maintenance of the workstation's root file system on the server. The script will probably require a little customization but it will get you started very quickly.
- Standard system startup files exist in `/etc` to detect and support a diskless system startup.
- Swapping, if needed, can be done either to an NFS file or to a local disk.

There are many ways to set up diskless workstations. Many elements are involved, and most can be customized to suit local taste. The following will describe variations on the setup of a complete system, emphasizing simplicity and compatibility with the standard FreeBSD startup scripts. The system described has the following characteristics:

- The diskless workstations use a shared read-only `/` file system, and a shared read-only `/usr`.  
The root file system is a copy of a standard FreeBSD root (typically the server's), with some configuration files overridden by ones specific to diskless operation or, possibly, to the workstation they belong to.  
The parts of the root which have to be writable are overlaid with md(4) file systems. Any changes will be lost when the system reboots.
- The kernel is transferred and loaded either with **Etherboot** or PXE as some situations may mandate the use of either method.

**Ðñïóï÷þ:** As described, this system is insecure. It should live in a protected area of a network, and be untrusted by other hosts.

All the information in this section has been tested using FreeBSD 5.2.1-RELEASE.

### 32.6.1 Background Information

Setting up diskless workstations is both relatively straightforward and prone to errors. These are sometimes difficult to diagnose for a number of reasons. For example:

- Compile time options may determine different behaviors at runtime.
- Error messages are often cryptic or totally absent.

In this context, having some knowledge of the background mechanisms involved is very useful to solve the problems that may arise.

Several operations need to be performed for a successful bootstrap:

- The machine needs to obtain initial parameters such as its IP address, executable filename, server name, root path. This is done using the DHCP or BOOTP protocols. DHCP is a compatible extension of BOOTP, and uses the same port numbers and basic packet format.

It is possible to configure a system to use only BOOTP. The `bootpd(8)` server program is included in the base FreeBSD system.

However, DHCP has a number of advantages over BOOTP (nicer configuration files, possibility of using PXE, plus many others not directly related to diskless operation), and we will describe mainly a DHCP configuration, with equivalent examples using `bootpd(8)` when possible. The sample configuration will use the **ISC DHCP** software package (release 3.0.1.r12 was installed on the test server).

- The machine needs to transfer one or several programs to local memory. Either TFTP or NFS are used. The choice between TFTP and NFS is a compile time option in several places. A common source of error is to specify filenames for the wrong protocol: TFTP typically transfers all files from a single directory on the server, and would expect filenames relative to this directory. NFS needs absolute file paths.
- The possible intermediate bootstrap programs and the kernel need to be initialized and executed. There are several important variations in this area:
  - PXE will load pxeboot(8), which is a modified version of the FreeBSD third stage loader. The loader(8) will obtain most parameters necessary to system startup, and leave them in the kernel environment before transferring control. It is possible to use a **GENERIC** kernel in this case.
  - **Etherboot**, will directly load the kernel, with less preparation. You will need to build a kernel with specific options.

PXE and **Etherboot** work equally well; however, because kernels normally let the loader(8) do more work for them, PXE is the preferred method.

If your BIOS and network cards support PXE, you should probably use it.

- Finally, the machine needs to access its file systems. NFS is used in all cases.

See also diskless(8) manual page.

## 32.6.2 Setup Instructions

### 32.6.2.1 Configuration Using ISC DHCP

The **ISC DHCP** server can answer both BOOTP and DHCP requests.

**ISC DHCP 3.0** is not part of the base system. You will first need to install the `net/isc-dhcp3-server` port or the corresponding package.

Once **ISC DHCP** is installed, it needs a configuration file to run (normally named `/usr/local/etc/dhcpd.conf`). Here follows a commented example, where host `margaux` uses **Etherboot** and host `corbieres` uses PXE:

```
default-lease-time 600;
max-lease-time 7200;
authoritative;

option domain-name "example.com";
option domain-name-servers 192.168.4.1;
option routers 192.168.4.1;

subnet 192.168.4.0 netmask 255.255.255.0 {
    use-host-decl-names on; ❶
    option subnet-mask 255.255.255.0;
    option broadcast-address 192.168.4.255;

    host margaux {
        hardware ethernet 01:23:45:67:89:ab;
        fixed-address margaux.example.com;
        next-server 192.168.4.4; ❷
    }
}
```

```

filename "/data/misc/kernel.diskless"; ③
option root-path "192.168.4.4:/data/misc/diskless"; ④
}
host corbieres {
    hardware ethernet 00:02:b3:27:62:df;
    fixed-address corbieres.example.com;
    next-server 192.168.4.4;
    filename "pxeboot";
    option root-path "192.168.4.4:/data/misc/diskless";
}
}

```

- ❶ This option tells **dhcpd** to send the value in the `host` declarations as the hostname for the diskless host. An alternate way would be to add an `option host-name margaux` inside the `host` declarations.
- ❷ The `next-server` directive designates the TFTP or NFS server to use for loading loader or kernel file (the default is to use the same host as the DHCP server).
- ❸ The `filename` directive defines the file that **Etherboot** or PXE will load for the next execution step. It must be specified according to the transfer method used. **Etherboot** can be compiled to use NFS or TFTP. The FreeBSD port configures NFS by default. PXE uses TFTP, which is why a relative filename is used here (this may depend on the TFTP server configuration, but would be fairly typical). Also, PXE loads `pxeboot`, not the kernel. There are other interesting possibilities, like loading `pxeboot` from a FreeBSD CD-ROM `/boot` directory (as `pxeboot(8)` can load a `GENERIC` kernel, this makes it possible to use PXE to boot from a remote CD-ROM).
- ❹ The `root-path` option defines the path to the root file system, in usual NFS notation. When using PXE, it is possible to leave off the host's IP as long as you do not enable the kernel option `BOOTP`. The NFS server will then be the same as the TFTP one.

### 32.6.2.2 Configuration Using BOOTP

Here follows an equivalent **bootpd** configuration (reduced to one client). This would be found in `/etc/bootptab`. Please note that **Etherboot** must be compiled with the non-default option `NO_DHCP_SUPPORT` in order to use `BOOTP`, and that PXE *needs* DHCP. The only obvious advantage of **bootpd** is that it exists in the base system.

```

.def100:\
:hn:ht=1:sa=192.168.4.4:vm=rfc1048:\
:sm=255.255.255.0:\
:ds=192.168.4.1:\
:gw=192.168.4.1:\
:hd="/tftpboot":\
:bf="/kernel.diskless":\
:rp="192.168.4.4:/data/misc/diskless":\

```

margaux:ha=0123456789ab:tc=.def100

### 32.6.2.3 Preparing a Boot Program with Etherboot

Etherboot's Web site (<http://etherboot.sourceforge.net>) contains extensive documentation (<http://etherboot.sourceforge.net/doc/html/userman/t1.html>) mainly intended for Linux systems, but nonetheless containing useful information. The following will just outline how you would use **Etherboot** on a FreeBSD system. You must first install the net/etherboot package or port.

You can change the **Etherboot** configuration (i.e. to use TFTP instead of NFS) by editing the `Config` file in the **Etherboot** source directory.

For our setup, we shall use a boot floppy. For other methods (PROM, or MS-DOS program), please refer to the **Etherboot** documentation.

To make a boot floppy, insert a floppy in the drive on the machine where you installed **Etherboot**, then change your current directory to the `src` directory in the **Etherboot** tree and type:

```
# gmake bin32/devicetype.fdo
```

`devicetype` depends on the type of the Ethernet card in the diskless workstation. Refer to the `NIC` file in the same directory to determine the right `devicetype`.

### 32.6.2.4 Booting with PXE

By default, the pxeboot(8) loader loads the kernel via NFS. It can be compiled to use TFTP instead by specifying the `LOADER_TFTP_SUPPORT` option in `/etc/make.conf`. See the comments in `/usr/share/examples/etc/make.conf` for instructions.

There are two other `make.conf` options which may be useful for setting up a serial console diskless machine: `BOOT_PXELDR_PROBE_KEYBOARD`, and `BOOT_PXELDR_ALWAYS_SERIAL`.

To use PXE when the machine starts, you will usually need to select the `Boot from network` option in your BIOS setup, or type a function key during the PC initialization.

### 32.6.2.5 Configuring the TFTP and NFS Servers

If you are using PXE or **Etherboot** configured to use TFTP, you need to enable **tftpd** on the file server:

1. Create a directory from which **tftpd** will serve the files, e.g. `/tftpboot`.
2. Add this line to your `/etc/inetd.conf`:

```
tftp    dgram    udp     wait    root    /usr/libexec/tftpd    tftpd -l -s /tftpboot
```

**Öçìåßùóç:** It appears that at least some PXE versions want the TCP version of TFTP. In this case, add a second line, replacing `dgram udp` with `stream tcp`.

3. Tell **inetd** to reread its configuration file. The `inetd_enable="YES"` must be in the `/etc/rc.conf` file for this command to execute correctly:

```
# /etc/rc.d/inetd restart
```

You can place the `tftpboot` directory anywhere on the server. Make sure that the location is set in both `inetd.conf` and `dhcpd.conf`.

In all cases, you also need to enable NFS and export the appropriate file system on the NFS server.

1. Add this to `/etc/rc.conf`:

```
nfs_server_enable="YES"
```

2. Export the file system where the diskless root directory is located by adding the following to `/etc(exports` (adjust the volume mount point and replace `margaux corbieres` with the names of the diskless workstations):

```
/data/misc -alldirs -ro margaux corbieres
```

3. Tell **mountd** to reread its configuration file. If you actually needed to enable NFS in `/etc/rc.conf` at the first step, you probably want to reboot instead.

```
# /etc/rc.d/mountd restart
```

### 32.6.2.6 Building a Diskless Kernel

If using **Etherboot**, you need to create a kernel configuration file for the diskless client with the following options (in addition to the usual ones):

```
options      BOOTP          # Use BOOTP to obtain IP address/hostname
options      BOOTP_NFSROOT  # NFS mount root file system using BOOTP info
```

You may also want to use `BOOTP_NFSV3`, `BOOT_COMPAT` and `BOOTP_WIRED_TO` (refer to NOTES).

These option names are historical and slightly misleading as they actually enable indifferent use of DHCP and BOOTP inside the kernel (it is also possible to force strict BOOTP or DHCP use).

Build the kernel (see ÊåöÜëáéï 9), and copy it to the place specified in `dhcpd.conf`.

**Óçìåßùóç:** When using PXE, building a kernel with the above options is not strictly necessary (though suggested). Enabling them will cause more DHCP requests to be issued during kernel startup, with a small risk of inconsistency between the new values and those retrieved by `pxeboot(8)` in some special cases. The advantage of using them is that the host name will be set as a side effect. Otherwise you will need to set the host name by another method, for example in a client-specific `rc.conf` file.

**Óçìåßùóç:** In order to be loadable with **Etherboot**, a kernel needs to have the device hints compiled in. You would typically set the following option in the configuration file (see the NOTES configuration comments file):

```
hints      "GENERIC.hints"
```

### 32.6.2.7 Preparing the Root Filesystem

You need to create a root file system for the diskless workstations, in the location listed as `root-path` in `dhcpd.conf`.

#### 32.6.2.7.1 Using `make world` to populate `root`

This method is quick and will install a complete virgin system (not only the root file system) into `DESTDIR`. All you have to do is simply execute the following script:

```
#!/bin/sh
export DESTDIR=/data/misc/diskless
mkdir -p ${DESTDIR}
cd /usr/src; make buildworld && make buildkernel
cd /usr/src/etc; make distribution
```

Once done, you may need to customize your `/etc/rc.conf` and `/etc/fstab` placed into `DESTDIR` according to your needs.

### 32.6.2.8 Configuring Swap

If needed, a swap file located on the server can be accessed via NFS.

#### 32.6.2.8.1 NFS Swap

The kernel does not support enabling NFS swap at boot time. Swap must be enabled by the startup scripts, by mounting a writable file system and creating and enabling a swap file. To create a swap file of appropriate size, you can do like this:

```
# dd if=/dev/zero of=/path/to/swapfile bs=1k count=1 oseek=100000
```

To enable it you have to add the following line to your `rc.conf`:

```
swapfile=/path/to/swapfile
```

### 32.6.2.9 Miscellaneous Issues

#### 32.6.2.9.1 Running with a Read-only `/usr`

If the diskless workstation is configured to run X, you will have to adjust the **XDM** configuration file, which puts the error log on `/usr` by default.

#### 32.6.2.9.2 Using a Non-FreeBSD Server

When the server for the root file system is not running FreeBSD, you will have to create the root file system on a FreeBSD machine, then copy it to its destination, using `tar` or `cpio`.

In this situation, there are sometimes problems with the special files in `/dev`, due to differing major/minor integer sizes. A solution to this problem is to export a directory from the non-FreeBSD server, mount this directory onto a FreeBSD machine, and use `devfs(5)` to allocate device nodes transparently for the user.

## 32.7 ISDN

A good resource for information on ISDN technology and hardware is Dan Kegel's ISDN Page (<http://www.alumni.caltech.edu/~dank/isdn/>).

A quick simple road map to ISDN follows:

- If you live in Europe you might want to investigate the ISDN card section.
- If you are planning to use ISDN primarily to connect to the Internet with an Internet Provider on a dial-up non-dedicated basis, you might look into Terminal Adapters. This will give you the most flexibility, with the fewest problems, if you change providers.
- If you are connecting two LANs together, or connecting to the Internet with a dedicated ISDN connection, you might consider the stand alone router/bridge option.

Cost is a significant factor in determining what solution you will choose. The following options are listed from least expensive to most expensive.

### 32.7.1 ISDN Cards

*Contributed by Hellmuth Michaelis.*

FreeBSD's ISDN implementation supports only the DSS1/Q.931 (or Euro-ISDN) standard using passive cards. Some active cards are supported where the firmware also supports other signaling protocols; this also includes the first supported Primary Rate (PRI) ISDN card.

The **isdn4bsd** software allows you to connect to other ISDN routers using either IP over raw HDLC or by using synchronous PPP: either by using kernel PPP with `isppp`, a modified `sppp(4)` driver, or by using userland `ppp(8)`. By using userland `ppp(8)`, channel bonding of two or more ISDN B-channels is possible. A telephone answering machine application is also available as well as many utilities such as a software 300 Baud modem.

Some growing number of PC ISDN cards are supported under FreeBSD and the reports show that it is successfully used all over Europe and in many other parts of the world.

The passive ISDN cards supported are mostly the ones with the Infineon (formerly Siemens) ISAC/HSCX/IPAC ISDN chipsets, but also ISDN cards with chips from Cologne Chip (ISA bus only), PCI cards with Winbond W6692 chips, some cards with the Tiger300/320/ISAC chipset combinations and some vendor specific chipset based cards such as the AVM Fritz!Card PCI V.1.0 and the AVM Fritz!Card PnP.

Currently the active supported ISDN cards are the AVM B1 (ISA and PCI) BRI cards and the AVM T1 PCI PRI cards.

For documentation on **isdn4bsd**, have a look at `/usr/share/examples/isdn/` directory on your FreeBSD system or at the homepage of `isdn4bsd` (<http://www.freebsd-support.de/i4b/>) which also has pointers to hints, erratas and much more documentation such as the `isdn4bsd` handbook (<http://people.FreeBSD.org/~hm/>).

In case you are interested in adding support for a different ISDN protocol, a currently unsupported ISDN PC card or otherwise enhancing **isdn4bsd**, please get in touch with Hellmuth Michaelis <hm@FreeBSD.org>.

For questions regarding the installation, configuration and troubleshooting **isdn4bsd**, a freebsd-isdn (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-isdn>) mailing list is available.

### 32.7.2 ISDN Terminal Adapters

Terminal adapters (TA), are to ISDN what modems are to regular phone lines.

Most TA's use the standard Hayes modem AT command set, and can be used as a drop in replacement for a modem.

A TA will operate basically the same as a modem except connection and throughput speeds will be much faster than your old modem. You will need to configure PPP exactly the same as for a modem setup. Make sure you set your serial speed as high as possible.

The main advantage of using a TA to connect to an Internet Provider is that you can do Dynamic PPP. As IP address space becomes more and more scarce, most providers are not willing to provide you with a static IP anymore. Most stand-alone routers are not able to accommodate dynamic IP allocation.

TA's completely rely on the PPP daemon that you are running for their features and stability of connection. This allows you to upgrade easily from using a modem to ISDN on a FreeBSD machine, if you already have PPP set up. However, at the same time any problems you experienced with the PPP program and are going to persist.

If you want maximum stability, use the kernel PPP option, not the userland PPP.

The following TA's are known to work with FreeBSD:

- Motorola BitSurfer and Bitsurfer Pro
- Adtran

Most other TA's will probably work as well, TA vendors try to make sure their product can accept most of the standard modem AT command set.

The real problem with external TA's is that, like modems, you need a good serial card in your computer.

You should read the FreeBSD Serial Hardware

([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/articles/serial-uart/index.html](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/serial-uart/index.html)) tutorial for a detailed understanding of serial devices, and the differences between asynchronous and synchronous serial ports.

A TA running off a standard PC serial port (asynchronous) limits you to 115.2 Kbs, even though you have a 128 Kbs connection. To fully utilize the 128 Kbs that ISDN is capable of, you must move the TA to a synchronous serial card.

Do not be fooled into buying an internal TA and thinking you have avoided the synchronous/asynchronous issue. Internal TA's simply have a standard PC serial port chip built into them. All this will do is save you having to buy another serial cable and find another empty electrical socket.

A synchronous card with a TA is at least as fast as a stand-alone router, and with a simple 386 FreeBSD box driving it, probably more flexible.

The choice of synchronous card/TA v.s. stand-alone router is largely a religious issue. There has been some discussion of this in the mailing lists. We suggest you search the archives (<http://www.FreeBSD.org/search/index.html>) for the complete discussion.

### 32.7.3 Stand-alone ISDN Bridges/Routers

ISDN bridges or routers are not at all specific to FreeBSD or any other operating system. For a more complete description of routing and bridging technology, please refer to a networking reference book.

In the context of this section, the terms router and bridge will be used interchangeably.

As the cost of low end ISDN routers/bridges comes down, it will likely become a more and more popular choice. An ISDN router is a small box that plugs directly into your local Ethernet network, and manages its own connection to the other bridge/router. It has built in software to communicate via PPP and other popular protocols.

A router will allow you much faster throughput than a standard TA, since it will be using a full synchronous ISDN connection.

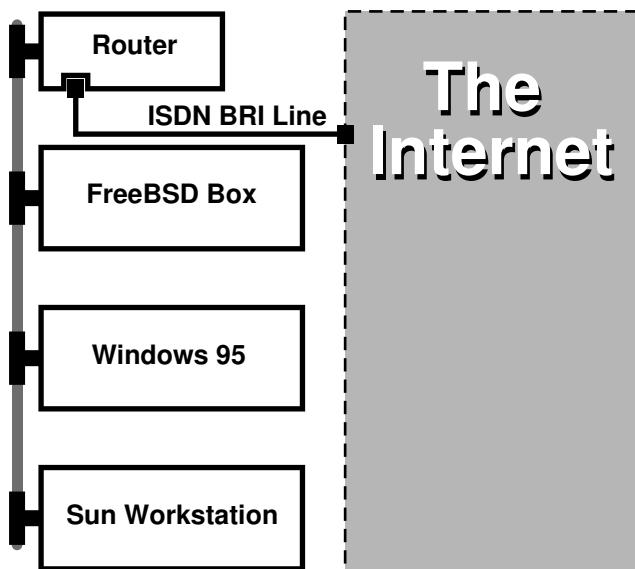
The main problem with ISDN routers and bridges is that interoperability between manufacturers can still be a problem. If you are planning to connect to an Internet provider, you should discuss your needs with them.

If you are planning to connect two LAN segments together, such as your home LAN to the office LAN, this is the simplest lowest maintenance solution. Since you are buying the equipment for both sides of the connection you can be assured that the link will work.

For example to connect a home computer or branch office network to a head office network the following setup could be used:

#### ÐánÜääéäia 32-1. Branch Office or Home Network

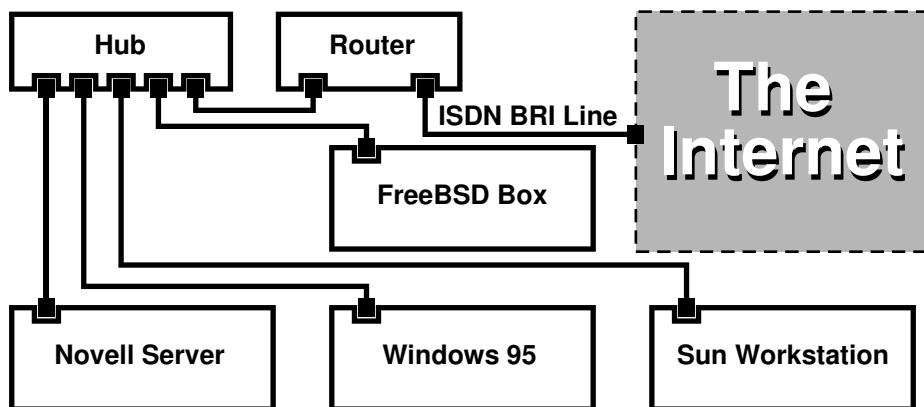
Network uses a bus based topology with 10 base 2 Ethernet (“thinnet”). Connect router to network cable with AUI/10BT transceiver, if necessary.



If your home/branch office is only one computer you can use a twisted pair crossover cable to connect to the stand-alone router directly.

## ĐánÜääéäia 32-2. Head Office or Other LAN

Network uses a star topology with 10 base T Ethernet (“Twisted Pair”).



One large advantage of most routers/bridges is that they allow you to have 2 *separate independent* PPP connections to 2 separate sites at the *same* time. This is not supported on most TA's, except for specific (usually expensive) models that have two serial ports. Do not confuse this with channel bonding, MPP, etc.

This can be a very useful feature if, for example, you have an dedicated ISDN connection at your office and would like to tap into it, but do not want to get another ISDN line at work. A router at the office location can manage a dedicated B channel connection (64 Kbps) to the Internet and use the other B channel for a separate data connection. The second B channel can be used for dial-in, dial-out or dynamically bonding (MPP, etc.) with the first B channel for more bandwidth.

An Ethernet bridge will also allow you to transmit more than just IP traffic. You can also send IPX/SPX or whatever other protocols you use.

## 32.8 Network Address Translation

*Contributed by Chern Lee.*

### 32.8.1 Overview

FreeBSD's Network Address Translation daemon, commonly known as natd(8) is a daemon that accepts incoming raw IP packets, changes the source to the local machine and re-injects these packets back into the outgoing IP packet stream. natd(8) does this by changing the source IP address and port such that when data is received back, it is able to determine the original location of the data and forward it back to its original requester.

The most common use of NAT is to perform what is commonly known as Internet Connection Sharing.

### 32.8.2 Setup

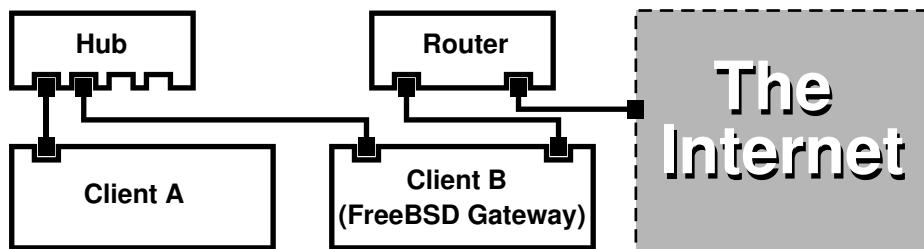
Due to the diminishing IP space in IPv4, and the increased number of users on high-speed consumer lines such as cable or DSL, people are increasingly in need of an Internet Connection Sharing solution. The ability to connect

several computers online through one connection and IP address makes natd(8) a reasonable choice.

Most commonly, a user has a machine connected to a cable or DSL line with one IP address and wishes to use this one connected computer to provide Internet access to several more over a LAN.

To do this, the FreeBSD machine on the Internet must act as a gateway. This gateway machine must have two NICs—one for connecting to the Internet router, the other connecting to a LAN. All the machines on the LAN are connected through a hub or switch.

**Óçìåßùóç:** There are many ways to get a LAN connected to the Internet through a FreeBSD gateway. This example will only cover a gateway with at least two NICs.



A setup like this is commonly used to share an Internet connection. One of the LAN machines is connected to the Internet. The rest of the machines access the Internet through that “gateway” machine.

### 32.8.3 Configuration

The following options must be in the kernel configuration file:

```
options IPFIREWALL
options IPDIVERT
```

Additionally, at choice, the following may also be suitable:

```
options IPFIREWALL_DEFAULT_TO_ACCEPT
options IPFIREWALL_VERBOSE
```

The following must be in `/etc/rc.conf`:

```
gateway_enable="YES" ①
firewall_enable="YES" ②
firewall_type="OPEN" ③
natd_enable="YES"
natd_interface="fxp0" ④
natd_flags="" ⑤
```

- ① Sets up the machine to act as a gateway. Running `sysctl net.inet.ip.forwarding=1` would have the same effect.
- ② Enables the firewall rules in `/etc/rc.firewall` at boot.

- ③ This specifies a predefined firewall ruleset that allows anything in. See `/etc/rc.firewall` for additional types.
- ④ Indicates which interface to forward packets through (the interface connected to the Internet).
- ⑤ Any additional configuration options passed to `natd(8)` on boot.

Having the previous options defined in `/etc/rc.conf` would run `natd -interface fxp0` at boot. This can also be run manually.

**Óçiâßúóç:** It is also possible to use a configuration file for `natd(8)` when there are too many options to pass. In this case, the configuration file must be defined by adding the following line to `/etc/rc.conf`:

```
natd_flags="-f /etc/natd.conf"
```

The `/etc/natd.conf` file will contain a list of configuration options, one per line. For example the next section case would use the following file:

```
redirect_port tcp 192.168.0.2:6667 6667
redirect_port tcp 192.168.0.3:80 80
```

For more information about the configuration file, consult the `natd(8)` manual page about the `-f` option.

Each machine and interface behind the LAN should be assigned IP address numbers in the private network space as defined by RFC 1918 (<ftp://ftp.isi.edu/in-notes/rfc1918.txt>) and have a default gateway of the **natd** machine's internal IP address.

For example, client A and B behind the LAN have IP addresses of 192.168.0.2 and 192.168.0.3, while the natd machine's LAN interface has an IP address of 192.168.0.1. Client A and B's default gateway must be set to that of the **natd** machine, 192.168.0.1. The **natd** machine's external, or Internet interface does not require any special modification for `natd(8)` to work.

### 32.8.4 Port Redirection

The drawback with `natd(8)` is that the LAN clients are not accessible from the Internet. Clients on the LAN can make outgoing connections to the world but cannot receive incoming ones. This presents a problem if trying to run Internet services on one of the LAN client machines. A simple way around this is to redirect selected Internet ports on the **natd** machine to a LAN client.

For example, an IRC server runs on client A, and a web server runs on client B. For this to work properly, connections received on ports 6667 (IRC) and 80 (web) must be redirected to the respective machines.

The `-redirect_port` must be passed to `natd(8)` with the proper options. The syntax is as follows:

```
-redirect_port proto targetIP:targetPORT[-targetPORT]
[aliasIP:]aliasPORT[-aliasPORT]
[remoteIP[:remotePORT[-remotePORT]]]
```

In the above example, the argument should be:

```
-redirect_port tcp 192.168.0.2:6667 6667
-redirect_port tcp 192.168.0.3:80 80
```

This will redirect the proper `tcp` ports to the LAN client machines.

The `-redirect_port` argument can be used to indicate port ranges over individual ports. For example, `tcp 192.168.0.2:2000-3000 2000-3000` would redirect all connections received on ports 2000 to 3000 to ports 2000 to 3000 on client A.

These options can be used when directly running `natd(8)`, placed within the `natd_flags=""` option in `/etc/rc.conf`, or passed via a configuration file.

For further configuration options, consult `natd(8)`

### 32.8.5 Address Redirection

Address redirection is useful if several IP addresses are available, yet they must be on one machine. With this, `natd(8)` can assign each LAN client its own external IP address. `natd(8)` then rewrites outgoing packets from the LAN clients with the proper external IP address and redirects all traffic incoming on that particular IP address back to the specific LAN client. This is also known as static NAT. For example, the IP addresses 128.1.1.1, 128.1.1.2, and 128.1.1.3 belong to the **natd** gateway machine. 128.1.1.1 can be used as the **natd** gateway machine's external IP address, while 128.1.1.2 and 128.1.1.3 are forwarded back to LAN clients A and B.

The `-redirect_address` syntax is as follows:

```
-redirect_address localIP publicIP
```

localIP

The internal IP address of the LAN client.

publicIP

The external IP address corresponding to the LAN client.

In the example, this argument would read:

```
-redirect_address 192.168.0.2 128.1.1.2  
-redirect_address 192.168.0.3 128.1.1.3
```

Like `-redirect_port`, these arguments are also placed within the `natd_flags=""` option of `/etc/rc.conf`, or passed via a configuration file. With address redirection, there is no need for port redirection since all data received on a particular IP address is redirected.

The external IP addresses on the **natd** machine must be active and aliased to the external interface. Look at `rc.conf(5)` to do so.

### 32.9 Parallel Line IP (PLIP)

PLIP lets us run TCP/IP between parallel ports. It is useful on machines without network cards, or to install on laptops. In this section, we will discuss:

- Creating a parallel (laplink) cable.
- Connecting two computers with PLIP.

### 32.9.1 Creating a Parallel Cable

You can purchase a parallel cable at most computer supply stores. If you cannot do that, or you just want to know how it is done, the following table shows how to make one out of a normal parallel printer cable.

#### Ðßíáêàò 32-1. Wiring a Parallel Cable for Networking

A-name	A-End	B-End	Descr.	Post/Bit
DATA0 -ERROR	2 15	15 2	Data	0/0x01 1/0x08
DATA1 +SLCT	3 13	13 3	Data	0/0x02 1/0x10
DATA2 +PE	4 12	12 4	Data	0/0x04 1/0x20
DATA3 -ACK	5 10	10 5	Strobe	0/0x08 1/0x40
DATA4 BUSY	6 11	11 6	Data	0/0x10 1/0x80
GND	18-25	18-25	GND	-

### 32.9.2 Setting Up PLIP

First, you have to get a laplink cable. Then, confirm that both computers have a kernel with lpt(4) driver support:

```
# grep lp /var/run/dmesg.boot
lpt0: <Printer> on ppbus0
lpt0: Interrupt-driven port
```

The parallel port must be an interrupt driven port, you should have lines similar to the following in your in the /boot/device.hints file:

```
hint.ppc.0.at="isa"
hint.ppc.0.irq="7"
```

Then check if the kernel configuration file has a device plip line or if the plip.ko kernel module is loaded. In both cases the parallel networking interface should appear when you use the ifconfig(8) command to display it:

```
# ifconfig plip0
plip0: flags=8810<POINTOPOINT,SIMPLEX,MULTICAST> mtu 1500
```

Plug the laplink cable into the parallel interface on both computers.

Configure the network interface parameters on both sites as root. For example, if you want to connect the host host1 with another machine host2:

```
host1 <----> host2
IP Address    10.0.0.1      10.0.0.2
```

Configure the interface on host1 by doing:

```
# ifconfig plip0 10.0.0.1 10.0.0.2
```

Configure the interface on host2 by doing:

```
# ifconfig plip0 10.0.0.2 10.0.0.1
```

You now should have a working connection. Please read the manual pages `lp(4)` and `lpt(4)` for more details.

You should also add both hosts to `/etc/hosts`:

```
127.0.0.1      localhost.my.domain localhost
10.0.0.1       host1.my.domain host1
10.0.0.2       host2.my.domain
```

To confirm the connection works, go to each host and ping the other. For example, on host1:

```
# ifconfig plip0
plip0: flags=8851<UP,POINTOPOINT,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    inet 10.0.0.1 --> 10.0.0.2 netmask 0xffff000000
# netstat -rn
Routing tables

Internet:
Destination      Gateway          Flags   Refs      Use     Netif Expire
host2            host1            UH        0        0      plip0
# ping -c 4 host2
PING host2 (10.0.0.2): 56 data bytes
64 bytes from 10.0.0.2: icmp_seq=0 ttl=255 time=2.774 ms
64 bytes from 10.0.0.2: icmp_seq=1 ttl=255 time=2.530 ms
64 bytes from 10.0.0.2: icmp_seq=2 ttl=255 time=2.556 ms
64 bytes from 10.0.0.2: icmp_seq=3 ttl=255 time=2.714 ms

--- host2 ping statistics ---
4 packets transmitted, 4 packets received, 0% packet loss
round-trip min/avg/max/stddev = 2.530/2.643/2.774/0.103 ms
```

## 32.10 IPv6

*Originally Written by Aaron Kaplan. Restructured and Added by Tom Rhodes. Extended by Brad Davis.*

IPv6 (also known as IPng “IP next generation”) is the new version of the well known IP protocol (also known as IPv4). Like the other current \*BSD systems, FreeBSD includes the KAME IPv6 reference implementation. So your FreeBSD system comes with all you will need to experiment with IPv6. This section focuses on getting IPv6 configured and running.

In the early 1990s, people became aware of the rapidly diminishing address space of IPv4. Given the expansion rate of the Internet there were two major concerns:

- Running out of addresses. Today this is not so much of a concern anymore since RFC1918 private address space (10.0.0.0/8, 172.16.0.0/12, and 192.168.0.0/16) and Network Address Translation (NAT) are being employed.
- Router table entries were getting too large. This is still a concern today.

IPv6 deals with these and many other issues:

- 128 bit address space. In other words theoretically there are 340,282,366,920,938,463,463,374,607,431,768,211,456 addresses available. This means there are approximately  $6.67 * 10^{27}$  IPv6 addresses per square meter on our planet.
- Routers will only store network aggregation addresses in their routing tables thus reducing the average space of a routing table to 8192 entries.

There are also lots of other useful features of IPv6 such as:

- Address autoconfiguration (RFC2462 (<http://www.ietf.org/rfc/rfc2462.txt>))
- Anycast addresses (“one-out-of many”)
- Mandatory multicast addresses
- IPsec (IP security)
- Simplified header structure
- Mobile IP
- IPv6-to-IPv4 transition mechanisms

For more information see:

- IPv6 overview at [playground.sun.com](http://playground.sun.com) (<http://playground.sun.com/pub/ipng/html/ipng-main.html>)
- KAME.net (<http://www.kame.net>)

### 32.10.1 Background on IPv6 Addresses

There are different types of IPv6 addresses: Unicast, Anycast and Multicast.

Unicast addresses are the well known addresses. A packet sent to a unicast address arrives exactly at the interface belonging to the address.

Anycast addresses are syntactically indistinguishable from unicast addresses but they address a group of interfaces. The packet destined for an anycast address will arrive at the nearest (in router metric) interface. Anycast addresses may only be used by routers.

Multicast addresses identify a group of interfaces. A packet destined for a multicast address will arrive at all interfaces belonging to the multicast group.

**Óçìåßùóç:** The IPv4 broadcast address (usually xxxx.xxxx.xxxx.255) is expressed by multicast addresses in IPv6.

#### Ðßíáêáò 32-2. Reserved IPv6 addresses

IPv6 address	Prefixlength (Bits)	Description	Notes
::	128 bits	unspecified	cf. 0.0.0.0 in IPv4
::1	128 bits	loopback address	cf. 127.0.0.1 in IPv4

IPv6 address	Prefixlength (Bits)	Description	Notes
::00:xx:xx:xx:xx	96 bits	embedded IPv4	The lower 32 bits are the IPv4 address. Also called “IPv4 compatible IPv6 address”
::ff:xx:xx:xx:xx	96 bits	IPv4 mapped IPv6 address	The lower 32 bits are the IPv4 address. For hosts which do not support IPv6. cf. loopback address in IPv4
fe80:: - feb::	10 bits	link-local	
fec0:: - fef::	10 bits	site-local	
ff::	8 bits	multicast	
001 (base 2)	3 bits	global unicast	All global unicast addresses are assigned from this pool. The first 3 bits are “001”.

### 32.10.2 Reading IPv6 Addresses

The canonical form is represented as: x:x:x:x:x:x:x:x, each “x” being a 16 Bit hex value. For example FEB:C:574:382B:23C1:AA49:4592:4EFE:9982

Often an address will have long substrings of all zeros therefore one such substring per address can be abbreviated by “::”. Also up to three leading “0”s per hexquad can be omitted. For example fe80::1 corresponds to the canonical form fe80:0000:0000:0000:0000:0000:0000:0001.

A third form is to write the last 32 Bit part in the well known (decimal) IPv4 style with dots “.” as separators. For example 2002::10.0.0.1 corresponds to the (hexadecimal) canonical representation 2002:0000:0000:0000:0000:0a00:0001 which in turn is equivalent to writing 2002::a00:1.

By now the reader should be able to understand the following:

```
# ifconfig

r10: flags=8943<UP,BROADCAST,RUNNING,PROMISC,SIMPLEX,MULTICAST> mtu 1500
      inet 10.0.0.10 netmask 0xffffffff broadcast 10.0.0.255
      inet6 fe80::200:21ff:fe03:8e1%r10 prefixlen 64 scopeid 0x1
        ether 00:00:21:03:08:e1
        media: Ethernet autoselect (100baseTX )
        status: active
```

fe80::200:21ff:fe03:8e1%r10 is an auto configured link-local address. It is generated from the MAC address as part of the auto configuration.

For further information on the structure of IPv6 addresses see RFC3513 (<http://www.ietf.org/rfc/rfc3513.txt>).

### 32.10.3 Getting Connected

Currently there are four ways to connect to other IPv6 hosts and networks:

- Getting an IPv6 network from your upstream provider. Talk to your Internet provider for instructions.
- Tunnel via 6-to-4 (RFC3068 (<http://www.ietf.org/rfc/rfc3068.txt>))
- Use the net/freenet6 port if you are on a dial-up connection.

### 32.10.4 DNS in the IPv6 World

There used to be two types of DNS records for IPv6. The IETF has declared A6 records obsolete. AAAA records are the standard now.

Using AAAA records is straightforward. Assign your hostname to the new IPv6 address you just received by adding:

```
MYHOSTNAME      AAAA      MYIPv6ADDR
```

To your primary zone DNS file. In case you do not serve your own DNS zones ask your DNS provider. Current versions of **bind** (version 8.3 and 9) and **dns/djbdns** (with the IPv6 patch) support AAAA records.

### 32.10.5 Applying the needed changes to /etc/rc.conf

#### 32.10.5.1 IPv6 Client Settings

These settings will help you configure a machine that will be on your LAN and act as a client, not a router. To have rtsol(8) autoconfigure your interface on boot all you need to add is:

```
ipv6_enable="YES"
```

To statically assign an IP address such as 2001:471:1f11:251:290:27ff:fee0:2093, to your fxp0 interface, add:

```
ipv6_ifconfig_fxp0="2001:471:1f11:251:290:27ff:fee0:2093"
```

To assign a default router of 2001:471:1f11:251::1 add the following to /etc/rc.conf:

```
ipv6_defaultrouter="2001:471:1f11:251::1"
```

#### 32.10.5.2 IPv6 Router/Gateway Settings

This will help you take the directions that your tunnel provider has given you and convert it into settings that will persist through reboots. To restore your tunnel on startup use something like the following in /etc/rc.conf:

List the Generic Tunneling interfaces that will be configured, for example gif0:

```
gif_interfaces="gif0"
```

To configure the interface with a local endpoint of *MY\_IPv4\_ADDR* to a remote endpoint of *REMOTE\_IPv4\_ADDR*:

```
gifconfig_gif0="MY_IPv4_ADDR REMOTE_IPv4_ADDR"
```

To apply the IPv6 address you have been assigned for use as your IPv6 tunnel endpoint, add:

```
ipv6_ifconfig_gif0="MY_ASSIGNED_IPv6_TUNNEL_ENDPOINT_ADDR"
```

Then all you have to do is set the default route for IPv6. This is the other side of the IPv6 tunnel:

```
ipv6_defaultrouter="MY_IPv6_REMOTE_TUNNEL_ENDPOINT_ADDR"
```

### 32.10.5.3 IPv6 Tunnel Settings

If the server is to route IPv6 between the rest of your network and the world, the following `/etc/rc.conf` setting will also be needed:

```
ipv6_gateway_enable="YES"
```

## 32.10.6 Router Advertisement and Host Auto Configuration

This section will help you setup `rtadvd(8)` to advertise the IPv6 default route.

To enable `rtadvd(8)` you will need the following in your `/etc/rc.conf`:

```
rtadvd_enable="YES"
```

It is important that you specify the interface on which to do IPv6 router solicitation. For example to tell `rtadvd(8)` to use `fxp0`:

```
rtadvd_interfaces="fxp0"
```

Now we must create the configuration file, `/etc/rtadvd.conf`. Here is an example:

```
fxp0:\n    :addrs#1:addr="2001:471:1f11:246::":prefixlen#64:tc=ether:
```

Replace `fxp0` with the interface you are going to be using.

Next, replace `2001:471:1f11:246::` with the prefix of your allocation.

If you are dedicated a /64 subnet you will not need to change anything else. Otherwise, you will need to change the `prefixlen#` to the correct value.

## 32.11 Asynchronous Transfer Mode (ATM)

*Contributed by Harti Brandt.*

### 32.11.1 Configuring classical IP over ATM (PVCs)

Classical IP over ATM (CLIP) is the simplest method to use Asynchronous Transfer Mode (ATM) with IP. It can be used with switched connections (SVCs) and with permanent connections (PVCs). This section describes how to set up a network based on PVCs.

### 32.11.1.1 Fully meshed configurations

The first method to set up a CLIP with PVCs is to connect each machine to each other machine in the network via a dedicated PVC. While this is simple to configure it tends to become impractical for a larger number of machines. The example supposes that we have four machines in the network, each connected to the ATM network with an ATM adapter card. The first step is the planning of the IP addresses and the ATM connections between the machines. We use the following:

Host	IP Address
hostA	192.168.173.1
hostB	192.168.173.2
hostC	192.168.173.3
hostD	192.168.173.4

To build a fully meshed net we need one ATM connection between each pair of machines:

Machines	VPI.VCI couple
hostA - hostB	0.100
hostA - hostC	0.101
hostA - hostD	0.102
hostB - hostC	0.103
hostB - hostD	0.104
hostC - hostD	0.105

The VPI and VCI values at each end of the connection may of course differ, but for simplicity we assume that they are the same. Next we need to configure the ATM interfaces on each host:

```
hostA# ifconfig hatm0 192.168.173.1 up
hostB# ifconfig hatm0 192.168.173.2 up
hostC# ifconfig hatm0 192.168.173.3 up
hostD# ifconfig hatm0 192.168.173.4 up
```

assuming that the ATM interface is hatm0 on all hosts. Now the PVCs need to be configured on hostA (we assume that they are already configured on the ATM switches, you need to consult the manual for the switch on how to do this).

```
hostA# atmconfig natm add 192.168.173.2 hatm0 0 100 llc/snap ubr
hostA# atmconfig natm add 192.168.173.3 hatm0 0 101 llc/snap ubr
hostA# atmconfig natm add 192.168.173.4 hatm0 0 102 llc/snap ubr

hostB# atmconfig natm add 192.168.173.1 hatm0 0 100 llc/snap ubr
hostB# atmconfig natm add 192.168.173.3 hatm0 0 103 llc/snap ubr
hostB# atmconfig natm add 192.168.173.4 hatm0 0 104 llc/snap ubr

hostC# atmconfig natm add 192.168.173.1 hatm0 0 101 llc/snap ubr
hostC# atmconfig natm add 192.168.173.2 hatm0 0 103 llc/snap ubr
hostC# atmconfig natm add 192.168.173.4 hatm0 0 105 llc/snap ubr

hostD# atmconfig natm add 192.168.173.1 hatm0 0 102 llc/snap ubr
```

```
hostD# atmconfig natm add 192.168.173.2 hatm0 0 104 llc/snap ubr
hostD# atmconfig natm add 192.168.173.3 hatm0 0 105 llc/snap ubr
```

Of course other traffic contracts than UBR can be used given the ATM adapter supports those. In this case the name of the traffic contract is followed by the parameters of the traffic. Help for the atmconfig(8) tool can be obtained with:

```
# atmconfig help natm add
```

or in the atmconfig(8) manual page.

The same configuration can also be done via /etc/rc.conf. For hostA this would look like:

```
network_interfaces="lo0 hatm0"
ifconfig_hatm0="inet 192.168.173.1 up"
natm_static_routes="hostB hostC hostD"
route_hostB="192.168.173.2 hatm0 0 100 llc/snap ubr"
route_hostC="192.168.173.3 hatm0 0 101 llc/snap ubr"
route_hostD="192.168.173.4 hatm0 0 102 llc/snap ubr"
```

The current state of all CLIP routes can be obtained with:

```
hostA# atmconfig natm show
```

## 32.12 Common Access Redundancy Protocol (CARP)

*Contributed by Tom Rhodes.*

The Common Access Redundancy Protocol, or CARP allows multiple hosts to share the same IP address. In some configurations, this may be used for availability or load balancing. Hosts may use separate IP addresses as well, as in the example provided here.

To enable support for CARP, the FreeBSD kernel must be rebuilt with the following option:

```
device carp
```

CARP functionality should now be available and may be tuned via several sysctl OIDs. Devices themselves may be loaded via the ifconfig command:

```
# ifconfig carp0 create
```

In a real environment, these interfaces will need unique identification numbers known as a VHID. This VHID or Virtual Host Identification will be used to distinguish the host on the network.

### 32.12.1 Using CARP For Server Availability (CARP)

One use of CARP, as noted above, is for server availability. This example will provide failover support for three hosts, all with unique IP addresses and providing the same web content. These machines will act in conjunction with a Round Robin DNS configuration. The failover machine will have two additional CARP interfaces, one for each of the content server's IPs. When a failure occurs, the failover server should pick up the failed machine's IP address.

This means the failure should go completely unnoticed to the user. The failover server requires identical content and services as the other content servers it is expected to pick up load for.

The two machines should be configured identically other than their issued hostnames and VHIDs. This example calls these machines `hosta.example.org` and `hostb.example.org` respectively. First, the required lines for a CARP configuration have to be added to `rc.conf`. For `hosta.example.org`, the `rc.conf` file should contain the following lines:

```
hostname="hosta.example.org"
ifconfig_fxp0="inet 192.168.1.3 netmask 255.255.255.0"
cloned_interfaces="carp0"
ifconfig_carp0="vhid 1 pass testpass 192.168.1.50/24"
```

On `hostb.example.org` the following lines should be in `rc.conf`:

```
hostname="hostb.example.org"
ifconfig_fxp0="inet 192.168.1.4 netmask 255.255.255.0"
cloned_interfaces="carp0"
ifconfig_carp0="vhid 2 pass testpass 192.168.1.51/24"
```

**Óçìåßùóç:** It is very important that the passwords, specified by the `pass` option to `ifconfig`, are identical. The `carp` devices will only listen to and accept advertisements from machines with the correct password. The VHID must also be different for each machine.

The third machine, `provider.example.org`, should be prepared so that it may handle failover from either host. This machine will require two `carp` devices, one to handle each host. The appropriate `rc.conf` configuration lines will be similar to the following:

```
hostname="provider.example.org"
ifconfig_fxp0="inet 192.168.1.5 netmask 255.255.255.0"
cloned_interfaces="carp0 carp1"
ifconfig_carp0="vhid 1 advskew 100 pass testpass 192.168.1.50/24"
ifconfig_carp1="vhid 2 advskew 100 pass testpass 192.168.1.51/24"
```

Having the two `carp` devices will allow `provider.example.org` to notice and pick up the IP address of either machine should it stop responding.

**Óçìåßùóç:** The default FreeBSD kernel *may* have preemption enabled. If so, `provider.example.org` may not relinquish the IP address back to the original content server. In this case, an administrator may “nudge” the interface. The following command should be issued on `provider.example.org`:

```
# ifconfig carp0 down && ifconfig carp0 up
```

This should be done on the `carp` interface which corresponds to the correct host.

At this point, CARP should be completely enabled and available for testing. For testing, either networking has to be restarted or the machines need to be rebooted.

More information is always available in the `carp(4)` manual page.

## V. ĐáñáñôÞìáôá

# ÐáñÜñôçìá A. Ðïõ èá Âñåßôå ôí FreeBSD

## A.1 Åêäüóåéò óå CDROM êáé DVD

### A.1.1 Retail Åêäüóåéò

Ôí FreeBSD åßíáé äéáè Ýóëii ùò àìðiñéêü ðñiúüí (FreeBSD CD, åðéðñüóèåôï ëíæéóìéêü, êáé ôõðùì Ýíç ôåêìçñßùóç) áðü äéÜöiññò ðñiñçèåôôÝò:

- CompUSA  
WWW: <http://www.compusa.com/>
- Frys Electronics  
WWW: <http://www.frys.com/>

### A.1.2 CD êáé DVD äéáññÝò

Ôí FreeBSD åßíáé äéáè Ýóëii óå CD êáé DVD äéá áãiñÜ iÝóù äéáäéêôýrò áðü ôiõò ðáñáêÜôù ðñiñçèåôôÝò:

- FreeBSD Mall, Inc.  
700 Harvest Park Ste F  
Brentwood, CA 94513  
USA  
ÔçëÝöùñ: +1 925 674-0783  
Fax: +1 925 674-0821  
Email: <[info@freebsdmall.com](mailto:info@freebsdmall.com)>  
WWW: <http://www.freebsdmall.com/>
- Dr. Hinner EDV  
St. Augustinus-Str. 10  
D-81825 München  
Germany  
ÔçëÝöùñ: (089) 428 419  
WWW: <http://www.hinner.de/linux/freebsd.html>
- Ikarios  
22-24 rue Voltaire  
92000 Nanterre  
France  
WWW: <http://ikarios.com/form/#freebsd>
- JMC Software  
Ireland  
ÔçëÝöùñ: 353 1 6291282  
WWW: <http://www.thelinuxmall.com>
- The Linux Emporium  
Hilliard House, Lester Way

Wallingford  
OX10 9TA  
United Kingdom  
ÔçëÝöùñ: +44 1491 837010  
Fax: +44 1491 837016  
WWW: <http://www.linuxemporium.co.uk/products/bsd/>

- Linux+ DVD Magazine  
Lewartowskiego 6  
Warsaw  
00-190  
Poland  
ÔçëÝöùñ: +48 22 860 18 18  
Email: <[editors@lpmagazine.org](mailto:editors@lpmagazine.org)>  
WWW: <http://www.lpmagazine.org/>
- Linux System Labs Australia  
21 Ray Drive  
Balwyn North  
VIC - 3104  
Australia  
ÔçëÝöùñ: +61 3 9857 5918  
Fax: +61 3 9857 8974  
WWW: <http://www.lsl.com.au>
- LinuxCenter.Kz  
Ust-Kamenogorsk  
Kazakhstan  
ÔçëÝöùñ: +7-705-501-6001  
Email: <[info@linuxcenter.kz](mailto:info@linuxcenter.kz)>  
WWW: <http://linuxcenter.kz/page.php?page=fr>
- LinuxCenter.Ru  
Galernaya Street, 55  
Saint-Petersburg  
190000  
Russia  
ÔçëÝöùñ: +7-812-3125208  
Email: <[info@linuxcenter.ru](mailto:info@linuxcenter.ru)>  
WWW: <http://linuxcenter.ru/shop/freebsd>

### A.1.3 Äéáññåßò

Áí åßóôå ìåôåðùëçôÞò êáé ìðiññåßôå íá äéáññåßìåôå óå CD-ROM ðñüüñîôå ááóéóíÝíá óôi FreeBSD, ðáñáêáëíýå åðééíéíñúíÞóôå ìå êÜðiéíí áðü ôiõò äéáññåßò:

- Cylogistics  
809B Cuesta Dr., #2149  
Mountain View, CA 94040

USA

ÔçëÝöùíí: +1 650 694-4949

Fax: +1 650 694-4953

Email: <sales@cylogistics.com>

WWW: <http://www.cylogistics.com/>

- Ingram Micro

1600 E. St. Andrew Place

Santa Ana, CA 92705-4926

USA

ÔçëÝöùíí: 1 (800) 456-8000

WWW: <http://www.ingrammicro.com/>

- Kudzu, LLC

7375 Washington Ave. S.

Edina, MN 55439

USA

ÔçëÝöùíí: +1 952 947-0822

Fax: +1 952 947-0876

Email: <sales@kuzuenterprises.com>

- LinuxCenter.Ru

Galernaya Street, 55

Saint-Petersburg

190000

Russia

ÔçëÝöùíí: +7-812-3125208

Email: <info@linuxcenter.ru>

WWW: <http://linuxcenter.ru/freebsd>

- Navarre Corp

7400 49th Ave South

New Hope, MN 55428

USA

ÔçëÝöùíí: +1 763 535-8333

Fax: +1 763 535-0341

WWW: <http://www.navarre.com/>

## A.2 ÅîõðçñåôçôÝò FTP

Íé åðßóçìåò åêäüíóåèò ôi FreeBSD åßíáé æéàèÝóéíåò iÝóù áíþíðìçò FTP óýíäåóçò áðü äeÜöññò áîõðçñåôçôÝò FTP óå üei ôií êüöii. I êáíöñéêüò áîõðçñåôçôPò <ftp://ftp.FreeBSD.org/pub/FreeBSD/> Ý÷åé ðïëý êáëP óýíäåóç iå ôií ððüëíéði êüöii, êáé åðéóñÝðåé Yíá iàñÜeëí áñéëìü ôáðòü ÷ññíüí óðñáÝóåñí. Áéüìá êé Ýðóé üiùò, åßíáé iÜeëíí êáëP éäÝá íá åñåßôå êÜðiëí áîõðçñåôçôP FTP ðiõ åßíáé ðëí “eiiðÜ” óåò (åéäéêÜ áí èÝéåôå íá óôÞóåôå êÜðiëí ôiðééü mirror site).

Ôi FreeBSD åßíáé åðßóçò æéàèÝóéíí iÝóù óýíäåóçò áíþíðìçò FTP áðü óå ðáñáêÜôù mirror sites. Áí åðééÝíåôå íá êáóååÜóåôå ôi FreeBSD iÝóù áíþíðìçò FTP, óåò ðáñáêæïýíå íá æéàèÝíåôå êÜðiëí áîõðçñåôçôP i iðiðiò åßíáé eiiðÜ óåò. Óå mirror sites ðiõ áíáöÝññíôåé ùò “Eýñéá Mirror Sites” Ý÷iõí óðíÞèùò ôçí ðëÞñç óðëëëíäP áñ÷åßùí ôiõ

FreeBSD (üëåò ôéò äéáèÝóeiåò åêäüöåéò, ãéá êÜèå äéáèÝóeiç áñ ÷ éôåêôííéèP óðóôPiaôiò), áëëÜ åßíáé ðéæáíüí íá ðåôý ÷ åôå éáëýôåñåò ðá ÷ ýôçôåò åôôðçñÝôçóçò iå êÜðieï åôôðçñåôçôP ðiõ åßíáé óôç äéêP óåò ÷ þñá P ðåñéï ÷ P. Ôá õiðéêÜ sites Ý ÷ iõí óðíPèùò ôéò ðeï ðñüööååò åêäüöåéò ãéá ôéò ðeï äçñiöééåßò áñ ÷ éôåêôííéèÝò óðóôPiaôiò, iðüôå ïðiñåß íá lçí Ý ÷ iõí üëåò ôéò ðeëáíÝò åêäüöåéò ôiõ FreeBSD. ¼ëá ôá sites äÝ ÷ iñôåé óðíäÝóåéò iÝóù áíþiõiõ FTP. lññéêÜ åðü åðôÜ iðiñåß íá ððiøôçñßæiõí éáé Üeëçò iññöPò óðíäÝóåéò. Ié áíáëéåêðéêÝò iññöÝò óýíäåóçò áráöÝñiíóáé íå ÷ ùñéóôÜ ãéá êÜèå site ðáñáêÜòù:

Central Servers, Primary Mirror Sites, Argentina, Armenia, Australia, Austria, Brazil, Bulgaria, Canada, China, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russia, Saudi Arabia, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan, Turkey, Ukraine, United Kingdom, USA.

(as of 2012/01/30 18:59:13 UTC)

## Central Servers

- <ftp://ftp.FreeBSD.org/pub/FreeBSD/> (ftp / ftpv6 / http (<http://ftp.FreeBSD.org/pub/FreeBSD/>) / httpv6 (<http://ftp.FreeBSD.org/pub/FreeBSD/>))

## Primary Mirror Sites

In case of problems, please contact the hostmaster <[mirror-admin@FreeBSD.org](mailto:mirror-admin@FreeBSD.org)> for this domain.

- <ftp://ftp1.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp2.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp3.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp4.FreeBSD.org/pub/FreeBSD/> (ftp / ftpv6 / http (<http://ftp4.FreeBSD.org/pub/FreeBSD/>) / httpv6 (<http://ftp4.FreeBSD.org/pub/FreeBSD/>))
- <ftp://ftp5.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp6.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp7.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp8.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp9.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp10.FreeBSD.org/pub/FreeBSD/> (ftp / ftpv6 / http (<http://ftp10.FreeBSD.org/pub/FreeBSD/>) / httpv6 (<http://ftp10.FreeBSD.org/pub/FreeBSD/>))
- <ftp://ftp11.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp12.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp13.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp14.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp14.FreeBSD.org/pub/FreeBSD/>))

## Argentina

In case of problems, please contact the hostmaster <hostmaster@ar.FreeBSD.org> for this domain.

- <ftp://ftp.ar.FreeBSD.org/pub/FreeBSD/> (ftp)

## Armenia

In case of problems, please contact the hostmaster <hostmaster@am.FreeBSD.org> for this domain.

- <ftp://ftp1.am.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp1.am.FreeBSD.org/pub/FreeBSD/>) / rsync)

## Australia

In case of problems, please contact the hostmaster <hostmaster@au.FreeBSD.org> for this domain.

- <ftp://ftp.au.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp2.au.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp3.au.FreeBSD.org/pub/FreeBSD/> (ftp)

## Austria

In case of problems, please contact the hostmaster <hostmaster@at.FreeBSD.org> for this domain.

- <ftp://ftp.at.FreeBSD.org/pub/FreeBSD/> (ftp / ftpv6 / http (<http://ftp.at.FreeBSD.org/pub/FreeBSD/>) / httpv6 (<http://ftp.at.FreeBSD.org/pub/FreeBSD/>))

## Brazil

In case of problems, please contact the hostmaster <hostmaster@br.FreeBSD.org> for this domain.

- <ftp://ftp.br.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp.br.FreeBSD.org/pub/FreeBSD/>))
- <ftp://ftp2.br.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp2.br.FreeBSD.org/>))
- <ftp://ftp3.br.FreeBSD.org/pub/FreeBSD/> (ftp / rsync)
- <ftp://ftp4.br.FreeBSD.org/pub/FreeBSD/> (ftp)
- [ftp5.br.FreeBSD.org](ftp://ftp5.br.FreeBSD.org)
- <ftp://ftp6.br.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp7.br.FreeBSD.org/pub/FreeBSD/> (ftp)

## Bulgaria

In case of problems, please contact the hostmaster <hostmaster@bg.FreeBSD.org> for this domain.

- <ftp://ftp.bg.FreeBSD.org/pub/FreeBSD/> (ftp / rsync)
- <ftp://ftp2.bg.FreeBSD.org/pub/FreeBSD/> (ftp / rsync)

## Canada

In case of problems, please contact the hostmaster <hostmaster@ca.FreeBSD.org> for this domain.

- <ftp://ftp.ca.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp2.ca.FreeBSD.org/> (ftp)
- <ftp://ftp3.ca.FreeBSD.org/pub/FreeBSD/> (ftp)

## China

In case of problems, please contact the hostmaster <hostmaster@cn.FreeBSD.org> for this domain.

- <ftp://ftp.cn.FreeBSD.org/pub/FreeBSD/> (ftp)

## Czech Republic

In case of problems, please contact the hostmaster <hostmaster@cz.FreeBSD.org> for this domain.

- <ftp://ftp.cz.FreeBSD.org/pub/FreeBSD/> (ftp / [ftpv6](http://ftp.cz.FreeBSD.org/pub/FreeBSD/) ([ftp://ftp.cz.FreeBSD.org/pub/FreeBSD/](http://ftp.cz.FreeBSD.org/pub/FreeBSD/)) / http (<http://ftp.cz.FreeBSD.org/pub/FreeBSD/>) / [rsyncv6](http://rsync.cz.FreeBSD.org/))
- <ftp://ftp2.cz.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp2.cz.FreeBSD.org/pub/FreeBSD/>))

## Denmark

In case of problems, please contact the hostmaster <hostmaster@dk.FreeBSD.org> for this domain.

- <ftp://ftp.dk.FreeBSD.org/pub/FreeBSD/> (ftp / [ftpv6](http://ftp.dk.FreeBSD.org/) / http (<http://ftp.dk.FreeBSD.org/>) / [httpv6](http://httpv6.dk.FreeBSD.org/) (<http://httpv6.dk.FreeBSD.org/>))

## Estonia

In case of problems, please contact the hostmaster <hostmaster@ee.FreeBSD.org> for this domain.

- <ftp://ftp.ee.FreeBSD.org/pub/FreeBSD/> (ftp)

## Finland

In case of problems, please contact the hostmaster <hostmaster@fi.FreeBSD.org> for this domain.

- <ftp://ftp.fi.FreeBSD.org/pub/FreeBSD/> (ftp)

## France

In case of problems, please contact the hostmaster <hostmaster@fr.FreeBSD.org> for this domain.

- <ftp://ftp.fr.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp1.fr.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp1.fr.FreeBSD.org/>) / rsync)

- <ftp://ftp2.fr.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp3.fr.FreeBSD.org/pub/FreeBSD/> (ftp)
- [ftp / http \(<http://ftp4.fr.FreeBSD.org/pub/FreeBSD/>\)](ftp://ftp4.fr.FreeBSD.org/pub/FreeBSD/)
- <ftp://ftp5.fr.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp6.fr.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp7.fr.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp8.fr.FreeBSD.org/pub/FreeBSD/> (ftp)

## Germany

In case of problems, please contact the hostmaster <[de-bsd-hubs@de.FreeBSD.org](mailto:de-bsd-hubs@de.FreeBSD.org)> for this domain.

- <ftp://ftp.de.FreeBSD.org/pub/FreeBSD/> (ftp)
- [ftp / http \(<http://www1.de.FreeBSD.org/freebsd/>\) / rsync \(<rsync://rsync3.de.FreeBSD.org/freebsd/>\)](ftp://ftp1.de.FreeBSD.org/freebsd/)
- [ftp / http \(<http://ftp2.de.FreeBSD.org/pub/FreeBSD/>\) / rsync](ftp://ftp2.de.FreeBSD.org/pub/FreeBSD/)
- <ftp://ftp3.de.FreeBSD.org/pub/FreeBSD/> (ftp)
- [ftp / http \(<http://ftp4.de.FreeBSD.org/FreeBSD/>\) / rsync](ftp://ftp4.de.FreeBSD.org/FreeBSD/)
- <ftp://ftp5.de.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp6.de.FreeBSD.org/pub/FreeBSD/> (ftp)
- [ftp / http \(<http://ftp7.de.FreeBSD.org/pub/FreeBSD/>\)](ftp://ftp7.de.FreeBSD.org/pub/FreeBSD/)
- <ftp://ftp8.de.FreeBSD.org/pub/FreeBSD/> (ftp)

## Greece

In case of problems, please contact the hostmaster <[hostmaster@gr.FreeBSD.org](mailto:hostmaster@gr.FreeBSD.org)> for this domain.

- <ftp://ftp.gr.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp2.gr.FreeBSD.org/pub/FreeBSD/> (ftp)

## Hong Kong

- <ftp://ftp.hk.FreeBSD.org/pub/FreeBSD/> (ftp)

## Hungary

In case of problems, please contact the hostmaster <[hostmaster@hu.FreeBSD.org](mailto:hostmaster@hu.FreeBSD.org)> for this domain.

- [ftp / http \(<http://ftp.hu.FreeBSD.org/pub/FreeBSD/>\) / rsync](ftp://ftp.hu.FreeBSD.org/pub/FreeBSD/)

## Iceland

In case of problems, please contact the hostmaster <hostmaster@is.FreeBSD.org> for this domain.

- <ftp://ftp.is.FreeBSD.org/pub/FreeBSD/> (ftp / rsync)

## Ireland

In case of problems, please contact the hostmaster <hostmaster@ie.FreeBSD.org> for this domain.

- <ftp://ftp.ie.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp2.ie.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp2.ie.FreeBSD.org/pub/FreeBSD/>) / rsync)
- <ftp://ftp3.ie.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp3.ie.FreeBSD.org/pub/FreeBSD/>) / rsync)

## Israel

In case of problems, please contact the hostmaster <hostmaster@il.FreeBSD.org> for this domain.

- <ftp://ftp.il.FreeBSD.org/pub/FreeBSD/> (ftp / ftpv6)

## Italy

In case of problems, please contact the hostmaster <hostmaster@it.FreeBSD.org> for this domain.

- <ftp://ftp.it.FreeBSD.org/pub/FreeBSD/> (ftp)

## Japan

In case of problems, please contact the hostmaster <hostmaster@jp.FreeBSD.org> for this domain.

- <ftp://ftp.jp.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp2.jp.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp3.jp.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp4.jp.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp5.jp.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp6.jp.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp7.jp.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp8.jp.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp9.jp.FreeBSD.org/pub/FreeBSD/> (ftp)

## Korea

In case of problems, please contact the hostmaster <hostmaster@kr.FreeBSD.org> for this domain.

- <ftp://ftp.kr.FreeBSD.org/pub/FreeBSD/> (ftp / rsync)

- <ftp://ftp2.kr.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp2.kr.FreeBSD.org/pub/FreeBSD/>))

#### Latvia

In case of problems, please contact the hostmaster <[hostmaster@lv.FreeBSD.org](mailto:hostmaster@lv.FreeBSD.org)> for this domain.

- <ftp://ftp.lv.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp.lv.FreeBSD.org/pub/FreeBSD/>))
- <ftp://ftp2.lv.FreeBSD.org/pub/FreeBSD/> (ftp)

#### Lithuania

In case of problems, please contact the hostmaster <[hostmaster@lt.FreeBSD.org](mailto:hostmaster@lt.FreeBSD.org)> for this domain.

- <ftp://ftp.lt.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp.lt.FreeBSD.org/pub/FreeBSD/>))

#### Netherlands

In case of problems, please contact the hostmaster <[hostmaster@nl.FreeBSD.org](mailto:hostmaster@nl.FreeBSD.org)> for this domain.

- <ftp://ftp.nl.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp.nl.FreeBSD.org/os/FreeBSD/>) / rsync)
- <ftp://ftp2.nl.FreeBSD.org/pub/FreeBSD/> (ftp)

#### New Zealand

- <ftp://ftp.nz.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp.nz.FreeBSD.org/pub/FreeBSD/>))

#### Norway

In case of problems, please contact the hostmaster <[hostmaster@no.FreeBSD.org](mailto:hostmaster@no.FreeBSD.org)> for this domain.

- <ftp://ftp.no.FreeBSD.org/pub/FreeBSD/> (ftp / rsync)
- <ftp://ftp3.no.FreeBSD.org/pub/FreeBSD/> (ftp)

#### Poland

In case of problems, please contact the hostmaster <[hostmaster@pl.FreeBSD.org](mailto:hostmaster@pl.FreeBSD.org)> for this domain.

- <ftp://ftp.pl.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp2.pl.FreeBSD.org/pub/FreeBSD/> (ftp / ftpv6 (<ftp://ftp2.pl.FreeBSD.org/pub/FreeBSD/>) / http (<http://ftp2.pl.FreeBSD.org/pub/FreeBSD/>) / httpv6 (<http://ftp2.pl.FreeBSD.org/pub/FreeBSD/>) / rsync / rsyncv6)

## Portugal

In case of problems, please contact the hostmaster <hostmaster@pt.FreeBSD.org> for this domain.

- <ftp://ftp.pt.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp2.pt.FreeBSD.org/pub/freebsd/> (ftp)
- <ftp://ftp4.pt.FreeBSD.org/pub/ISO/FreeBSD/> (ftp)

## Romania

In case of problems, please contact the hostmaster <hostmaster@ro.FreeBSD.org> for this domain.

- <ftp://ftp.ro.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp1.ro.FreeBSD.org/pub/FreeBSD/> (ftp / ftpv6 / http (<http://ftp1.ro.FreeBSD.org/pub/FreeBSD/>) / httpv6 (<http://ftp1.ro.FreeBSD.org/pub/FreeBSD/>))

## Russia

In case of problems, please contact the hostmaster <hostmaster@ru.FreeBSD.org> for this domain.

- <ftp://ftp.ru.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp.ru.FreeBSD.org/FreeBSD/>) / rsync)
- <ftp://ftp2.ru.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp2.ru.FreeBSD.org/pub/FreeBSD/>) / rsync)
- <ftp://ftp3.ru.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp4.ru.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp5.ru.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp5.ru.FreeBSD.org/pub/FreeBSD/>) / rsync)
- <ftp://ftp6.ru.FreeBSD.org/pub/FreeBSD/> (ftp)

## Saudi Arabia

In case of problems, please contact the hostmaster <ftpadmin@isu.net.sa> for this domain.

- <ftp://ftp.isu.net.sa/pub/ftp.freebsd.org/> (ftp)

## Singapore

In case of problems, please contact the hostmaster <hostmaster@sg.FreeBSD.org> for this domain.

- <ftp://ftp.sg.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp.sg.FreeBSD.org/pub/FreeBSD/>) / rsync)

## Slovak Republic

In case of problems, please contact the hostmaster <hostmaster@sk.FreeBSD.org> for this domain.

- <ftp://ftp.sk.FreeBSD.org/pub/FreeBSD/> (ftp / ftpv6 (<ftp://ftp.sk.FreeBSD.org/pub/FreeBSD/>) / http (<http://ftp.sk.FreeBSD.org/pub/FreeBSD/>) / httpv6 (<http://ftp.sk.FreeBSD.org/pub/FreeBSD/>) / rsync / rsyncv6)

- <ftp://ftp2.sk.FreeBSD.org/pub/FreeBSD/> (ftp / ftpv6 (<ftp://ftp2.sk.FreeBSD.org/pub/FreeBSD/>) / http (<http://ftp2.sk.FreeBSD.org/pub/FreeBSD/>) / httpv6 (<http://ftp2.sk.FreeBSD.org/pub/FreeBSD/>))

#### Slovenia

In case of problems, please contact the hostmaster <[hostmaster@si.FreeBSD.org](mailto:hostmaster@si.FreeBSD.org)> for this domain.

- <ftp://ftp.si.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp2.si.FreeBSD.org/pub/FreeBSD/> (ftp)

#### South Africa

In case of problems, please contact the hostmaster <[hostmaster@za.FreeBSD.org](mailto:hostmaster@za.FreeBSD.org)> for this domain.

- <ftp://ftp.za.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp2.za.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp3.za.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp4.za.FreeBSD.org/pub/FreeBSD/> (ftp)

#### Spain

In case of problems, please contact the hostmaster <[hostmaster@es.FreeBSD.org](mailto:hostmaster@es.FreeBSD.org)> for this domain.

- <ftp://ftp.es.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp.es.FreeBSD.org/pub/FreeBSD/>))
- <ftp://ftp2.es.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp3.es.FreeBSD.org/pub/FreeBSD/> (ftp)

#### Sweden

In case of problems, please contact the hostmaster <[hostmaster@se.FreeBSD.org](mailto:hostmaster@se.FreeBSD.org)> for this domain.

- <ftp://ftp.se.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp2.se.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp2.se.FreeBSD.org/>) / rsync (<rsync://ftp2.se.FreeBSD.org/>))
- <ftp://ftp3.se.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp4.se.FreeBSD.org/pub/FreeBSD/> (ftp / ftpv6 (<ftp://ftp4.se.FreeBSD.org/pub/FreeBSD/>) / http (<http://ftp4.se.FreeBSD.org/pub/FreeBSD/>) / httpv6 (<http://ftp4.se.FreeBSD.org/pub/FreeBSD/>) / rsync (<rsync://ftp4.se.FreeBSD.org/pub/FreeBSD/>) / rsyncv6 (<rsync://ftp4.se.FreeBSD.org/pub/FreeBSD/>))
- <ftp://ftp5.se.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp5.se.FreeBSD.org/>) / rsync)

## Switzerland

In case of problems, please contact the hostmaster <hostmaster@ch.FreeBSD.org> for this domain.

- <ftp://ftp.ch.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp.ch.FreeBSD.org/pub/FreeBSD/>))

## Taiwan

In case of problems, please contact the hostmaster <hostmaster@tw.FreeBSD.org> for this domain.

- <ftp://ftp.tw.FreeBSD.org/pub/FreeBSD/> (ftp / ftpv6 (<ftp://ftp.tw.FreeBSD.org/pub/FreeBSD/>) / rsync / rsyncv6)
- <ftp://ftp2.tw.FreeBSD.org/pub/FreeBSD/> (ftp / ftpv6 (<ftp://ftp2.tw.FreeBSD.org/pub/FreeBSD/>) / http (<http://ftp2.tw.FreeBSD.org/pub/FreeBSD/>) / httpv6 (<http://ftp2.tw.FreeBSD.org/pub/FreeBSD/>) / rsync / rsyncv6)
- <ftp://ftp3.tw.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp4.tw.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp5.tw.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp6.tw.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp6.tw.FreeBSD.org/>) / rsync)
- <ftp://ftp7.tw.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp8.tw.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp9.tw.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp10.tw.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp11.tw.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp11.tw.FreeBSD.org/> / FreeBSD))
- <ftp://ftp12.tw.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp13.tw.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp14.tw.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp15.tw.FreeBSD.org/pub/FreeBSD/> (ftp)

## Turkey

- <ftp://ftp.tr.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp.tr.FreeBSD.org/pub/FreeBSD/>) / rsync)
- <ftp://ftp2.tr.FreeBSD.org/pub/FreeBSD/> (ftp / rsync)

## Ukraine

- <ftp://ftp.ua.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp.ua.FreeBSD.org/pub/FreeBSD/>))
- <ftp://ftp2.ua.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp2.ua.FreeBSD.org/pub/FreeBSD/>))
- <ftp://ftp7.ua.FreeBSD.org/pub/FreeBSD/> (ftp)

- <ftp://ftp8.ua.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp8.ua.FreeBSD.org/FreeBSD/>))
- <ftp://ftp11.ua.FreeBSD.org/pub/FreeBSD/> (ftp)

## United Kingdom

In case of problems, please contact the hostmaster <[hostmaster@uk.FreeBSD.org](mailto:hostmaster@uk.FreeBSD.org)> for this domain.

- <ftp://ftp.uk.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp2.uk.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp2.uk.FreeBSD.org/>) / rsync)
- <ftp://ftp3.uk.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp4.uk.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp5.uk.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp6.uk.FreeBSD.org/pub/FreeBSD/> (ftp)

## USA

In case of problems, please contact the hostmaster <[hostmaster@us.FreeBSD.org](mailto:hostmaster@us.FreeBSD.org)> for this domain.

- <ftp://ftp1.us.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp2.us.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp3.us.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp4.us.FreeBSD.org/pub/FreeBSD/> (ftp / ftpv6 / http (<http://ftp4.us.FreeBSD.org/pub/FreeBSD/>) / httpv6 (<http://ftp4.us.FreeBSD.org/pub/FreeBSD/>))
- <ftp://ftp5.us.FreeBSD.org/pub/FreeBSD/> (ftp / rsync)
- <ftp://ftp6.us.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp7.us.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp7.us.FreeBSD.org/pub/FreeBSD/>) / rsync)
- <ftp://ftp8.us.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp9.us.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp9.us.FreeBSD.org/pub/os/FreeBSD/>))
- <ftp://ftp10.us.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp11.us.FreeBSD.org/pub/FreeBSD/> (ftp)
- <ftp://ftp12.us.FreeBSD.org/pub/FreeBSD/> (ftp / rsync)
- <ftp://ftp13.us.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp13.us.FreeBSD.org/pub/FreeBSD/>) / rsync)
- <ftp://ftp14.us.FreeBSD.org/pub/FreeBSD/> (ftp / http (<http://ftp14.us.FreeBSD.org/pub/FreeBSD/>))
- <ftp://ftp15.us.FreeBSD.org/pub/FreeBSD/> (ftp)

### A.3 BitTorrent

Iðiñåþóðá íá áíáéðþóðóðá óá ááóééÜ áñ÷åßá ISO óùí áéäüöðåùí óið FreeBSD, iÝóù óið óðóðþìðið BitTorrent. Óðí õiðièåðóþá <http://torrents.freebsd.org:8080> (<http://torrents.freebsd.org:8080/>) óðÜñ÷åé iéá ðëþñçò óðeeëiðþ áðü áñ÷åßá torrent ðið iðiñåþóðá íá éáðóåðáÜóåðó.

Áéá íá ÷ níçóëiiðíëÞóâðâ óá áñ :âßá torrent, éá ÷ nâéáððâðâ ëáðÜëëçëi ëïäéðíéëü-ðâæÜôç, üðùð áðôü ðið ðâñY ÷ :âðâéá ðûò ði port P ðâæÜôç net-p2p/py-bittorrent.

Áöyié éaôðaaÜóðåôå ôi áñ÷åßi ISO iå ôi BitTorrent, iøðiñâßôå íá ôi åñÜØðåôå óå CD P DVD, üððùò ðåñëæñÜðåðåé óöi ÔîPiá 19.6.3 (burncd).

## A.4 Áípbíõii CVS

#### A.4.1 ÅéóáãùãÞ

Ç óýíääöös áþíþöiïö CVS (P *anoncvs* üðöùð èÝåâðåáé iâñéè Ýð öiñ Ýð) öðiðóðçñþæåðåé áðü ôá åñäåéâßá CVS ðiö áéáíÝiiðåé iå ôi ßæiï ôi FreeBSD áéá óðå ÷ñiíéöiü öiðéêpí añ ÷åßú iå Ýíá aðñáêñðói Ýii repository. ÿá áðü ôá ÷åñâðçñéðéêÜ ðiö CVS åßíáé üðöe åðéöñ Ýðåé óðiðo ÷ñiÞðåð öiö FreeBSD íá óðå ÷ñiíþæëöi, ÷ñiÞðö eäéåßðåñá åééåþíäöå ÷ñiÞööç, ôá ôiðéêÜ áiðßâñäöå ðçäåßiö êþäééå ðiö Ý ÷iöi lå ôiðo eäíñöñéiýò, åðßöçíiöö åiððçñåðçö Ýð CVS ôiö FreeBSD project. Åéá íá ÷ñcöeüðiïðéÞöåé êáíåßò ôi CVS áñéåß: (á) íá iñÞðåé ôçí ôiðP ôçò låðååéçöPö ðåñéäÜeeüðiö CVSROOT Ýôóé þóöå íá äab ÷iáé ðñiö Ýíáí áðü ôiðo åðßöçíiöö åiððçñåðçö Ýð, êáé (â) íá äþoåé ôií êuáééü “anoncvs” ôôçí ðñiöñðP ôçò åiðiþP cvs login. Ôuåða iðiñåß íá ÷ñcöeüðiïðéÞöåé ôi åñäåéâßi cvs(1) åéá íá ðñiöðåéÜöåé ôi áðñáêñðói Ýii CVS repository ôiö FreeBSD óáí Ýíá iðiðiþP iðiöå ôiðéêü repository.

**ÓcīlāBūócs:** C áiðiēþ cvs login áðièçéâyáé ðiðoó éuñáéëiýo ðiðo ÷ ñcôóéí ðiðièiýiðoáé áéá ðeóðiðiBçóçò ðcò ðáðoðiðuðcôðÜ óað oðií áiðoðcñâðcôþ CVS óa Ýia án-ðiði ïa üñiíl .cvspass óðií HOME éað Üeïiäi ðiðo ðiðééëý óað eïiáññéaðiý. Ái áðoðu ði ãn-ðiði ãáí ððÜñ- : áé þæc, ðiðññáð ía áðiðy- : áé c áiðiēþ cvs login ðcí ðñþbôc ðiñÜ. ðiðññáð ðað áðeÜ ía áciéiðiññáþoáða Ýia Üáæáei án-ðiði .cvspass éaé ía íaíáðñÝiâða ðcí áiðiēþ cvs login.

Í ðiññáþ íá ðáæé êáíåþð üöð öi CVSup êáé öi *anoncvs* áßíáé iðóéáðóééü ðáññüiíéíé öññüðiíé öðð : ñiiéóiiý áñ : áßúí êáé öððiðóçñßæiðí ðçí ßæáá eäéöiññáéüöçðá, áeeëÜ ððÜñ : iði ëÜðiæð aéáöiñ Ýð ié iðiþðå ðiññáþ íá ðáßññiðí óçìáíðóéü ññüeið öðçí áðééiðþ iàðáýá áðóþí ðúí áÿí iàðéüäú. ÁðiáéÜ, öi **CVSup** êÜðiðé ðiðéý ðeí áððiðóééþ ð-ñPóç ðçð öýíðåðóçð ðið Ý-ðåðá êáé : ñçóéiðiðéab Yíá ðiðéý ðeí Yíððiñ ðññüðiíëí ðéééiñùíßáð, áeeëÜ ððÜñ : áé êáé öi áíðßóðié : i ðßìçjá. Áðá íá : ñçóéiðiðéÞóåðá öi **CVSup** ðñ Yðáé íá áðéáðóðóÞóåðá êáé íá ññðiðóåðá Yíá áéæéü ðññüññáíá ðåæÜðóç, êáé öññóð ðiññáþðóå ðá ðóð : ñññüðóåðá iññí iàðÜðið aððeéiñ Ýð áñ : áßúí — ðeð iðiþðå öi **CVSup** áðiðééðð “öððeéiñ Ýð” (collections).

Óði **anoncvs**, áðuð óðí Üeëc, iððináð íá ðí ñcoéiñiðíéçeað æáá íá áðaðáÜóðæ éáíðabð óðeo aðeááÝð aðiúð eáé iüñi áñ ðí ñbñið P áñuð iüñi ðñiñáñÜiñáðiñ eáé óuði ñoññiñáððéêþí ðí ñbñi áñ ðí ñbñi (ð. ÷. ðiñ ðçñáñiñi ðþæééá ðí ñbñi aðiñiðPð 1s Þ ðí ñbñi grep), iá ðí ñPðc óðiñ iññiñáðiñ ðí ñbñi eáðáÜeëc-çeið module. Óði **anoncvs** ábñiáé ðeí aíræééu ãéá áññáñðbñð ðí ñbñi aðáéðiýí aÍYááé iüñi aíñUáñuóç. Iððuða, aí ðí Ýeëðað íá ñoññiðñbñiñáððó ðí ñbñi aÍÜððoðiñ ðñiñáññiñÜðuñi ðí ñbñi, ðí ñbñi **CVSup** ábñiáé iññiñáññiñið.

#### A.4.2 ×ñçóéíïðíéþíôáò Áíþíõíï CVS

ãñÜöiíðáé áôôÝò ié ãñâiìÝò, åßíáé äéáèÝóëiíé ié áêüëëiõëié áîôðçñåôçôÝò:

- *Ãáëëßá*: :pserver:anoncvs@anoncvs.fr.FreeBSD.org:/home/ncvs (Ãéá pserver ÷ñçóëiõëiõPôôå ôçí åíôïëP cvs login êáé åþóôå ôií èùäéêü “anoncvs” üôáí óáò æçôçèåß. Ôi ssh äái áðáéôåß ôç ÷ñPóç èùäéêiy.)
- *ÓáÀåÜí*: :pserver:anoncvs@anoncvs.tw.FreeBSD.org:/home/ncvs (Ãéá pserver ÷ñçóëiõëiõPôôå ôçí åíôïëP cvs login êáé åþóôå iõéäPõiôå ãéá èùäéêü üôáí óáò æçôçèåß, Ôi ssh äái áðáéôåß ôç ÷ñPóç èùäéêiy.)  
SSH2 HostKey: 1024 02:ed:1b:17:d6:97:2b:58:5e:5c:e2:da:3b:89:88:26 /etc/ssh/ssh\_host\_rsa\_key.pu  
SSH2 HostKey: 1024 e8:3b:29:7b:ca:9f:ac:e9:45:cb:c8:17:ae:9b:eb:55 /etc/ssh/ssh\_host\_dsa\_key.pu
- *ÇíùÍåò Ðiëéôåßåò ÁìåñééPò*: anoncvs@anoncvs1.FreeBSD.org:/home/ncvs (Ãéá ðñüóåáóç iÝóù ssh,  
÷ñçóëiõëiõPôôå ôçí Ýéäiõç 2 ôiõ ssh, ÷ùñßò èùäéêü.)  
SSH2 HostKey: 2048 53:1f:15:a3:72:5c:43:f6:44:0e:6a:e9:bb:f8:01:62 /etc/ssh/ssh\_host\_dsa\_key.pu

Êáèþò ôi CVS óáò åðéôñÝðåé íá êÜíåôå “check out” iõóéáóôééÜ iõíéääPõiôå Ýéäiõç ôiõ ðçääßiõ êþæéå ôiõ FreeBSD ððPññå ðiõÝ (éáé óá iñéoiÝåò ðåñéðþôåéô áûtiá êáé åêäüóåéô ðiõ ãáiÝ ÷iõ ëõëiõñPôåé åéüìá), èá ðñÝðåé íá åßóôå åííéêåéùÍYñò iá ôçí åðéëiäP ôiõ cvs(1) lå ôçí iõíßá åðééÝåååé ôi revision (ðñüåéååé åéá ôçí -r) èáé ðiõåò åßíáé ié åðéôñåðôÝò ôeÝò ôçò åéá ôi repository ôiõ FreeBSD project.

ÕðÜñ÷iõí ayí åßäç tags (åóéêåôþi), óá revision tags (åóééÝåò Ýéäiõçò) éáé óá branch tags. Já revision tag áíáòÝñååé óá iéá óðååêåññéÍYíç Ýéäiõç. Ç Ýííéå ôiõ ðáññåÍYíæé óóåèåñP iÝñá iá ôç iÝñá. Áðü ôçí Üéëç, Ýíå branch tag ååß÷iåé ôçí óåéåðååßá Ýéäiõç iéáó óðååêåññéÍYíç ðiññååßåò áíÜððôñçò, óá êÜèå ÷ñiíééP óóéäiP. Èáèþò ôi branch tag åái áíåöÝñååé óá êÜðíéå óðååêåññéÍYíç Ýéäiõç, iõíñååßåýñéí iá óçíåßíåé êÜðé åéåðñååéêü áðü üöé ôçíåßíåé ôPìåñá.

Ôi ÔiPíá A.7 ðåñéÝ÷åé revision tags óá iõíßá iõíñååß íá åíäéåöÝññíöi ôiõ ÷ñPôôåò. Õðåèññæiòiå üöé éáÍYíå áðü áðôÜ åái åßíáé Ýååññí åéá ôçí ÓõëëiäP ôúí Ports, êáèþò åôôP åáiÝ ÷åé ðiøéåðëÝò åéäüóåéò (revisions).

¼ôáí êáèññæååôå êÜðíéi branch tag, öoôééññæååêéÜ ëáíåÜíåôå ôéò ôåéåðååßåò åêäüóåéò ôúí áñ ÷åßùí ðiõ õðÜñ÷iõí óá áðôP ôç åññíñP áíÜððôñçò. Áí èÝéåôå íá êÜååôå êÜðíéå ðåëéüñåñç Ýéäiõç, iõíñååßå ÷ñçóëiõëiéþíåò ôçí çiåññíçíßá óá óõíñååñòiü lå ôçí åðéëiäP -D date. Ååßåå ôç óåëßåå manual ôiõ cvs(1) åéá ðåñéóóüôåñåò ëåðôñÝñååéåò.

#### A.4.3 Đáñáååßåíåôå

Áí éáé ðñáññååéêÜ óðååðåååé íá åéáåÜóåååå ðññóååéêÜ ôç óåëßåå manual ôiõ cvs(1) ðññéí êÜíåôå iõéäPõiôå, ðáññéÜôù óáò åßññòiå êÜðíéå åñPññå ðáññåååßåíååå ðá iõíßá iõðéååðééÜ èá óáò ååßññíöi ðùò íá ÷ñçóëiõëiõPôååå ôi Áíþññi CVS:

**ĐáñÜååéåíá A-1. ËPøç (Check out) ÊÜðíéiò Áñ÷åßíò áðü ôi -CURRENT (ls(1)):**

```
% setenv CVSROOT :pserver:anoncvs@anoncvs.tw.FreeBSD.org:/home/ncvs
% cvs login
Öôçí ðññóññíòP, äþðôå iõíéäåðPõiôå ëÝíç åéå "password".
% cvs co ls
```

**ĐáñÜååéåíá A-2. ×ñPóç SSH åéá ËPøç (check out) ôiõ ÄÝíññò src/:**

```
% cvs -d anoncvs@anoncvs1.FreeBSD.org:/home/ncvs co src
The authenticity of host 'anoncvs1.freebsd.org (216.87.78.137)' can't be established.
DSA key fingerprint is 53:1f:15:a3:72:5c:43:f6:44:0e:6a:e9:bb:f8:01:62.
```

Are you sure you want to continue connecting (yes/no)? yes

Warning: Permanently added 'anoncvs1.freebsd.org' (DSA) to the list of known hosts.

### ĐáñÜäåéâiá A-3. ËPøç ôçò êäïóçò ôiõ Áñ÷åßiõ ls(1) áðü ôi 8-STABLE Branch:

```
% setenv CVSROOT :pserver:anoncvs@anoncvs.tw.FreeBSD.org:/home/ncvs
% cvs login
Ôôçí Õñiôñiõp, äþðôå iðiæåäþðiõå ëÝîç ãéá "password".
% cvs co -rRELENG_8 ls
```

### ĐáñÜäåéâiá A-4. Äçìéñññá iéáò Ëßóôåò Áëeáäþí (ùò Unified Diffs) ôçò ls(1):

```
% setenv CVSROOT :pserver:anoncvs@anoncvs.tw.FreeBSD.org:/home/ncvs
% cvs login
Ôôçí Õñiôñiõp, äþðôå iðiæåäþðiõå ëÝîç ãéá "password".
% cvs rdiff -u -rRELEASE_8_0_0_RELEASE -rRELEASE_8_1_0_RELEASE ls
```

### ĐáñÜäåéâiá A-5. Áñßóëíôåò Điéá ¶ëéá Ííùåôå Modules iðiñýí íá ×ñçóéiïðiéçèiýí:

```
% setenv CVSROOT :pserver:anoncvs@anoncvs.tw.FreeBSD.org:/home/ncvs
% cvs login
Ôôçí Õñiôñiõp, äþðôå iðiæåäþðiõå ëÝîç ãéá "password".
% cvs co modules
% more modules/modules
```

## A.4.4 ¶ëéåò ÐçãÝò Ðëçñïöiñéþí

Íé ðáñåêÜôù ðçãÝò ðëçñïöiñéþí ßóùò óáò öáiiýí ÷ñÞóéiåò ãéá íá iÜèåôå ôi CVS:

- CVS Tutorial (<http://users.csc.calpoly.edu/~gfisher/classes/308/handouts/cvs-basics.html>) áðü ôi California Polytechnic State University.
- CVS Home (<http://ximbiot.com/cvs/wiki/>), ç ñÜäá áñÜðôôñíçò êáé ðôðôðñéíçò ôiõ CVS.
- CVSweb (<http://www.FreeBSD.org/cgi/cvsweb.cgi>) Äéåðáò Web ãéá ôi CVS ôiõ FreeBSD Project.

## A.5 ×ñçóéiïðiéþíôåò ôi CTM

Ôi CTM åßíáé iéá iÝëëiò íá äéåôçñiýíå óå óðã ÷ñiíéòiü Ýíá áðñåêññóíiÝíi êáôÜëëiä íá Ýíá êåíôñéêü. Áíáðôý ÷èçêå ãéá ÷ñÞóç íá õi aÝíôñi ðçãáßiõ êþäééå ôiõ FreeBSD, áí êáé Üëëié Üíèñùðíé iðiñåß íá õi âñiñõí ÷ñÞóéiü êáé ãéá ãéöiñåôéëýò ôeiðiýò êáéþò ðåñiÜåé i êáéñùò. Ôç äåäñiÝíç óôéaiP ððÜñ ÷åé åëÜ ÷éóðç ùò áíyðåñêôç ôåâèçñßùóç ãéá ôçí äéåäéåóßá äçìéññåßáò áñ ÷åßùí äéáöiñþí (deltas), êáé áí ÷ñåéÜæåôôå ðåñéóôüôåñåò ðëçñïöiñßåò, áðééiéñúÞóåò íá ôç ëßóôå óá ÷ñäñiåßiõ ctm-users (<http://lists.FreeBSD.org/mailman/listinfo/ctm-users>) áéåééÜ áí Ýëåôå íá ÷ñçóéiïðiéÞóåôå ôi CTM ãéá Üëëåò åöáññíäÝò.

#### A.5.1 Æáôß ĐñÝđåé íá ×ñçóéìïđíéþóù ôî CTM;

Èá ðñÍðåéé áðþbóç ïá áññééâéñéùéâþbóå íå óðéé áæÜöriñåð ðáðbäåð ðiñ ó÷ áðþbæíñóåé íå óçí áðåðééâþbóå áññááðbá óóiií ððüú áíÜððoñíç ðçääþi éþþæéå óå ó÷ Ýóç íå iéá Ýöiéïç, ðññéáðóáóéâðåóíÝíç Ýéäñíç. Áððóú éó÷ yåé áéùìå ðåññéóóùðññí áí áððééÝíåôå íá ÷ñçóéñiðiéÞóåðå óóí ðçääþi éþþæéå áðú òí “current”. Óáð óóñéóóñýíå íá áéááÜðåðå ðòð íá ÷ñçóéñiðiéÞóåðå óóí current óóí FreeBSD.

A.5.2 Ôé ×ñåéÜæïíáé ãéá íá ×ñçóéïïðïéþóù ôï CTM;

Èá ÷-ñåéáóôåßôå äyi ðñÜäìååòå: Øçí åöáññäP CTM êáé ôéo áñ÷ééÝò áëëääÝò (deltas) åéá íá ôéo åéoÜäåôå óå áðôôPí (þóôå íá ööÜôåôå óôîí åðßðåäïí ôíï “current”).

Ôi CTM ábíráé ìÝñò ôi FreeBSD áðü ôcí Ýéäíóç 2.0, êáé âñßóêåôáé óóïí êáôÜëíí /usr/src/usr.sbin/ctm  
âðüöíí Ý÷âðâ áâæáôðóôçìÝíí ôií ðçãáßíi êþæéêá.

Óá “deltas” là óá iððiBá ôññiñiaiôåßôå ói CTM ìðññåßôå íá óá áðiñéôPóåôå là ayí ôñuðiñò, ïÝóù FTP P ïÝóù email. Áí Ý ÷åôå áâáiéP FTP ðññiôåáóç ói Internet, èá âñåßôå ððiñóôPñéïç áæá ói CTM óóéô áéüëiñéåð ðiðiñéåßôå FTP:

<ftp://ftp.FreeBSD.org/pub/FreeBSD/CTM/>

Þ äåßôå ôï ôìÞìá mirrors.

ÊÜíôå FTP óöii ó÷åôéêü êáôÜeïäi êáé äéáâÜóôå öi áñ ÷åßi README äéá íá îåêéíÞóåôå.

Áí èÝëåôå íá ëáìâÜíåôå ôá deltas iÝóù email:

Ãñáöôåßôå óoñâññïçòþò óå ïéá áðü óéò ëßóôåò äéáññïþò óiõ **CTM**. Ç ëßóôå ctm-cvs-cur (<http://lists.FreeBSD.org/mailman/listinfo/ctm-cvs-cur>) ððióôçñßæåé ïëüëeçñï õi ãÝíõñi õiõ CVS. Ç ëßóôå ctm-src-cur (<http://lists.FreeBSD.org/mailman/listinfo/ctm-src-cur>) ððióôçñßæåé ôçí êâöáéþ (head) õiõ ëëÜäiõ áíÜððöñçò (development branch). Ç ëßóôå ctm-src-7 (<http://lists.FreeBSD.org/mailman/listinfo/ctm-src-7>) ððióôçñßæåé ôçí Ýêäiõç 7.X ê.i.ê. Áí äáí ãíññßæåôå ðùò íá åãäññåöôå óå ïéá ëßóôå, êÜíôå êëéê óóï üññá ôçò ëßóôåò ðiõ åìöáíßæåôåé ðáññåðÜíù þ ðçãåßíåôå óóï <http://lists.FreeBSD.org/mailman/listinfo> êáé êÜíôå êëéê óóç ëßóôå ðiõ èÝêåôå íá åãäññåöôå. Ç óåëßää ôçò ëßóôåò èá ðñÝðåé íá ðåñéÝ ÷åé üëåò ðéó áðáññåßôçôåò ðëçññïòññßåò ó÷åðééÜ íå ðéó óðíñññïÝð.

¼ôáí ãn ÷ ßóâôáð íá ëéââÜíâôá ááíáíþôáéo CTM iÝóù mail, iðiñâßôá íá ÷ ïçóéiiðiéÞôåð òi ðñüäñâiíá ctm\_rmail æáá íá ðéò áðiðiðiéÝôåð áéé íá ðéò åöðñìlúóâôå. Iðiñâßôá óðóçí ðñââiáðéêûöçôá íá ÷ ïçóéiiðiéÞôåð òi ðñüäñâiíá ctm\_rmail áðâðeåbáð iÝóù ièáð åââññöPò óði /etc/aliases áí èÝéâôá ç æéâæéâðßá íá åêðâæåßôåé áððñiðiðiéciÝí. Äßþôå ðc ðâéßðá manuall ðið ctm\_rmail æáá ðâññðóðñüðâñðô ñðiðié Ýñâéâð.

**Óciáßùóć:** ¶ó÷åôá là ôc iÝëëä öiö èá ÷ñçóéíöiéþóåôå ãéá ía eÜâåôå ôá deltas öiö **CTM** èá ðñÝðåé ía ååññáôåßôå óôc ßëþóå ctm-announce (<http://lists.FreeBSD.org/mailman/listinfo/ctm-announce>). Óöi iÝëëí, áôûö èá åßíáé ëéá öi iùüí iÝññò ööi iðëíí èá aciúóéåvííöáé ðëcññöiñþßåò ó-åôééü ía ñéo èáéöiñþßåò öiö

óðóðþíáðiò **CTM**. Ê Üíðå êéêé óði üíflá óçò ðáñáðÜíù ðéßóðáò, êáé áéïëðéåßóðå óéò íäçãßáò ãéá íá áðaðñáðóðáðó.

#### A.5.3 ×ñçóéíïðíéþíôáò ôí CTM ãéá Ðñþôç ÖïñÜ

Đñéí áñ ÷ßóåôá íá ÷ñçóéíïðíéåßôå **CTM** deltas, èá ðñÝðåé íá Ý÷åôå Ýíá óçìåßii åêëßíçóçò áéá ôá delta ðïö Ý÷iõí áçìéíöñâçèåß iåôÜ áðü áôðü.

Èá ðñÍðåé ðñþóðá íá èáéëñþóðóð áðé Ý-÷-ðóð Þæc. ÍðíëiðóðAÞðiðóð iðiññðb íá ãñ-÷-þóðé áðú Ýíá “Üääéír” èáðÜëéír. Èá ðñÍðåé íá íâééíÞóðóð íá Ýíá ãñ-÷-ééü “Èåíü” delta ãéá íá ãñ-÷-þóðóð íá òi CTM äÝiññóð áðó. Áðú èÜðiðí óçìåßí èåùññíý íá úðé Ýíá áðú áðòðÜ óá “ðñ-÷-ééÜ” deltas èá ãéáÍYiññóðé óá CD ãéá òç äééÞ óáð äéåðéüëðiðóç, ùóðóñði áðóðü ãáði òðiññðiðé òç äááññÍYíç óðéäíÞ.

Êáèþò óá ãÝíóñá áßíáé áñéåô Ýò äåéÜäåò megabytes, áßíáé ðñïöéñüöåññ íá íåééíPóåôå áðü êÜóé ðiø Ý÷åôå þäç. Áí Ý÷åôå CD êÜðiéåò áæáññþò (RELEASE), iðiñåßôå íá áíðéæñÜøåôå P íá áðiøöìðéÝóåôå áðü áêåß öií ãñ÷éü ðçåáßi ñþäééå. ôóé èá ãæööþóåôå óçíáîôéü íÝñò ôçò iåðåóäññÜð åääññÝiù.

Iðiññáðóá íá áíááññúñþóáðóá áðóðÜ óá “áñ÷éðÜ” deltas áðü ðír x ðíð áéíëiððéálß ðírí áñééùí ðiðð (áæá ðáñÜääéáíá src-cur.3210XEmpty.gz). Iðiññáðóá ðírí ðíð áéíëiððéálß óðóçí ðççáÞ ðið ðáñ÷éðÜ óáðóá “seed”. Óír Empty áðíáé Ýíáð Úääéíð óáðóá ðíð áéíëiððéálß. Æáðóá ðíð áéíëiððéálß leá íàð Úääáóç áðü ðír Empty ðíð 100 deltas. Áðþóçó ðóá áñ÷áßá áðóðÜ áðíáé íàð Úääéá! ÓðíçééóíÝíí ìÝíäéíð ðíð Empty deltas áðíáé óá 70 ùò 80 MB óðiðéáðóíÝíññ íà gzip áðáññÝíññ.

Íüééò åðééÝåôå Ýá âáóéëü delta ãéá íá ååééÍþóåôå, èá ÷ñåéáóôåßôå åðßóçò üéá ôá deltas iå iååáäýôåñïöö áðü áôöü áñééíïyò.

A.5.4 ×ñçóéíïðíéþíôáò ôí CTM óôçí Êáèçìåñéíþ óáò AEùþ

Æá íá åöáñìüóåôå ôá deltas, áðëþò ãñÜøôå:

```
# cd /where/ever/you/want/the/stuff  
# ctm -v -v /where/you/store/your/deltas/src-xxx.*
```

Ôi CTM áíóééâáÜíåôáé deltas óá iðiðá Ý÷iðiðéåôåb iÝóù gziþ, êáé Ýôóé äáí ÷ñåéÜæåôáé íá ÷ñcöéiðiðéÞoåôå óci qunziþ, aëöôbñiðóå ià áðoôü ðiññüði ÷bñi óóï áßöéi.

Ôi **CTM** ääí ðñüêåéóáé íá ðåéñÜìåé óá áñ ÷ åßá óáó áí äáí åßíáé åðüëöôá óßäiñöñí ãéá ôç äéåæéåóßá áíáíÝùóçò. Äéá íá åðåéçèåýóåôå Ýíá delta iðiññåßôå åðßóçò íá ÷ ñçóéiiðiéÞóåôå ôçí åðééïäÞ - c êáé ôi **CTM** ääí éá ðåéñÜìåé ôßðiôå, åðéþò éá åðåéçèåýóåé ôçí åâéññéüöçôå ôiõ delta ééé éá äåé áí iðiññåß íá ôi åöáññüóáé ÷ ùñßò ðññäéÞìåóå ôoí ôñÝ ÷ iiäÝföñí.

ÕðÜñ÷iõí éáé Üëëåò áðéëiä Ýò óöi CTM, äåßôå ôéò áíôßóöié÷åò óåëßääò manual P ëiéò Üîôå öií ðçääßi êþäééá ãéá ðåñéóóüôåñòò ðëcñïöiñßåò.

Áðóðu ábbíáé üeiði óðóçí ðñáðááðóðééüðôðô. ÊÜéa öin Ü ðioð eðáðá Ü íðâðá Áýí delta, áðéþo ðâññÜðôðá ðið óðóí **CTM** þróðâðá íá Áýí ðâññ ðí Ülferðâðá áðáðáññ Áýí, ðiði ðcaðâðí, óðóð eðáðééá.

Ící óáÞíáðó ðá deltas áí áßíáé äýóëíëi íá ðá êáðåâáÜóåðå íáiÜ. Ðóùò èÝëåðå íá ðá ööëÜíåðå áæá ôçí ðåñßðòùóç ðiø êÜóë ðÜåðé óðññáâÜ. Áêüìá êáé áí ôi ìüñ iÝóï ðiø Ý÷åðå áßíáé äéóêÝóåð, Üíðå áíðóßñáði ÷ñçóëiðíéþíðå ôçí fdwrite.

#### A.5.5 Éñáôþíóáò ôéò ÔïðéêÝò óáò ÁëëáãÝò

Ùò ðññiññáììáðéóòÞò, èá èÝéåôá íá ðåéññáìáðéóòåßòå êáé íá áéëÜíåôå áñ÷åßá ööí àÝíññí òiò ðçäåßíò ëþpääéá. Òi CTM õðiòôçñßæåé ðåññéñéòí Ýíïò öýðiò öiðéé Ýò áéëéåå Ýò: ðññí áéÝññé åéá ôçí ðåññóòßá åíüò áñ÷åßíò foo, åéÝå÷åé ðññóòå åéá öií foo .ctm. Áí öií áñ÷åßí åóööù õðÜñ÷åé, öií CTM èá ÷ñçöeññíðéÞøåé åóööù áíòß åéá öií foo.

Ҫ ööidəññöön Ü áóðþ lıáð ðáñÝ ÷ áé Ýíá áðëü öññüði íá äéäçññÞöriðiå öiðééÝò áéëéaaÝò: áðëþò áíðéæñÜþøå ôá áñ ÷ åßá ðiö öeïðåýåôå íá áéëÜíåôå óå áíðßóöié ÷ á áñ ÷ åßá lå eáôÜeçîç . ctm. lõiññåßôå eáôüðéí íá êÜíåôå üöé áéëéaaÝò eÝéåôå óóii ëþäééå áñþ öi CTM èá äéäçññåß áíáíåùñ Üíñ öi áñ ÷ åßí . ctm.

#### A.5.6 ¶eeåò ÅíæáöÝñïöóåò ÅðéëiäÝò ôïö CTM

#### A.5.6.1 Áñßóêíôáò ôé Áêñéâþò èá ÁëëÜìåé óå ìéá ÁíáíÝùóç

Í ðóðmáðbóðá íá ðeníóæíñbóðóð áóéò áæéða Ýò ðið eá ðníiéæ Ýóåé ói CTM óoi repository óið ðçãáßið óáð êþæéá, ÷ ñçóéiðiðiþíðóð ðóçí áðééiðP -1.

Áðóðu èá áðíþáé ÷ nÍÞóðíí áí èÝëåðá íá êñáðÞóðåðá çìåmëüäéí ôúí áéëáðþí, áí èÝëåðá íá áðåññáðóðåðþóðá óá ôññíðiðíéçíÝíá áñ÷åþá ðññéí Þ iåðÜ ôçí ôññíðiðíþçóç ðiðoð, Þ áí áðëþò áéðøðÜíáðóðá áéäðiñþò ðáñáñíúéüð.

#### A.5.6.2 Äciéïöñäþíóáò Áíóßäñáöá Áóöáëåßáò ðñéí ôçí ÁíáíÝùóç

ÍlænneÝò öññÝò èá èÝëåôá íá êñáôþóåôá áíôßãñáöï áóöäéåßáò üëüí ôùí áñ ÷åßùí ðïõ ðñüêåðáé íá áëëá ÷èíýí áðü íéá áíáÍÙóç ìÝóù **CTM**.

Äßííöåd öçí åðéëïäP -B backup-file öi CTM èá äçíëïöñäPöåé áíößãñáöi áööåëåßåò üëùí ôuí áñ÷åßùí ðiö ðñüéåéöåé íá áééä÷ëíýí áðü êÜðiéí óoñâéåñéíÝí delta ööí áñ÷åßí backup-file.

#### A.5.6.3 Đåñéïñßæïïóáò ôá Áñ÷åßá ðïö èá Áëëá : èïýí áðü ÊÜðïéá ÁíáÍÙóç

Ílænneé Ýò öiñÝò Bóùò Íá áífæáö Ýñáööå íá ðåñcëñßöåöå öçí ðåñcí ÷ P äñÜóçò iéáö óoñâéåññéí Ýíçò ááiÍÙóçò iÍYóù CTM P Bóùò óåd áífæáö Ýñáé íá ðÜñåöå iñüí ëßää áñ ÷ áßä áðü eÜðiéá óåéñÜ áðü deltas.

Íðiðmáðbóð íá áæ Ýáíðaða óç ðeðbóða óður áñ ÷ áðbúið óðá íðiðbá èá èæðiðnáþróáé ói CTM ÷ nçóðiðiðþróáò ùò öððeðná, regular expressions íá óðò áððeðræði Ýð - e êáé - x.

Ãéá ðán Üääâéâíá, ãéá íá áÜääôå Ýíá áíáíäùíÝíü áíôßäñáöi ôiõ áñ÷åßiõ lib/libc/Makefile áðü ôçí óôëëiäP óáò ôúí áðièçéâöiÝíüí **CTM** deltas, åêôâæÝóôå ôéò áîôïëÝó:

```
# cd /where/ever/you/want/to/extract/it/
# ctm -e '^lib/libc/Makefile' ~ctm/src-xxx.*
```

Æá ÆÙéå áñ÷åßí ðïò êæíñßæâôáé óå Ýíá **CTM** delta, íé åðéëïä Ýò - e êåé - x åöáñlùæïíôáé iå ôç óåéñ Ü ðïò åiöáíßæïíôáé óôç åñaiìÞ åíðiëþí. Óôí áñ÷åßí åßíåôáé åðåíaiññáóþá áðü ôí **CTM**, iùñií áí iáñéåñéóôåß ùò Ýåêññii ðñiò áíáíÝùóç iåôçí åöáñlùæïÞ üeùí ôúí åðéëïäþí - e êåé - x.

#### A.5.7 IåëëïíôéêÜ Ó÷Ýäéá ãéá ôï CTM

ÅBÍÁÉ ÐÜÑÁ ÐJEEÉÜ:

- ×ñÞóç êÜðíéíô áßäiõò ðéóôïðíßçóçò óôï óýóôçìá **CTM** þóôå íá áíáâùñßæïíôåé ôõ ÷üí ßåýôééåò áíáâþóåéò.
- ÎåéæÜñéóíá ôúí áðéëiäþí ôiõ **CTM**, êáèþò ðñiêáëiýí óýã ÷õóç êáé áäí áßíáé ðñiöáíåßò.

## A.5.8 ÄéÜöiñá

ÕðÜñ÷åé áðßóçò êáé iéá óåéñÜ áðü deltas áéá ôçí óðëëiäþ ôùí ports, áëëÜ áäí Ý÷åé áêäçëùèåß áêüìá áñéåôü áíäéåöÝñíí áéá áðôþ.

## A.5.9 CTM Mirrors

Ôi CTM/FreeBSD äéåôßèåôåé iÝóù áíþíõiõ FTP áðü ôá áéüëiõèá mirrors. Áí áðéëÝíåôå íá êáôååÜóåôå ôiõ **CTM** iÝóù áíþíõiõ FTP, óáð ðáñâéäëiýíå ðñiöðåèþóôå íá áðéëÝíåôå iéá ðiðíëåßá eiiðÜ óá óáð.

Óå ðåñßðôùóç ðñiäëçìÜòúí, ðáñâéäëiýíå áðéëiéíùíþóôå ià ôç eßóôå ctm-users (<http://lists.FreeBSD.org/mailman/listinfo/ctm-users>).

Êáëéöüñíéá, Bay Area, áðßóçìç ðçäþ

- <ftp://ftp.FreeBSD.org/pub/FreeBSD/development/CTM/>

Íüôéá Áöñéêþ, áíôßñáðá áóöáëåßáò áéá ðáëéÜ deltas

- <ftp://ftp.za.FreeBSD.org/pub/FreeBSD/CTM/>

ÔáúâÜí/R.O.C.

- <ftp://ctm.tw.FreeBSD.org/pub/FreeBSD/development/CTM/>
- <ftp://ctm2.tw.FreeBSD.org/pub/FreeBSD/development/CTM/>
- <ftp://ctm3.tw.FreeBSD.org/pub/FreeBSD/development/CTM/>

Áí áäí áñÞéåôå êÜðíéí mirror óôçí ðåñéï÷þ óáð, þ áí ôi mirror áäí áßíáé ðëþñåò, ðñiöðåèþóôå íá ÷ñçóéiiðíéþóåôå iéá iç÷áþ áíáæþôçóçò üðùò ç alltheweb (<http://www.alltheweb.com/>).

## A.6 ×ñçóéíïðíéþíôáò ôí CVSup

## A.6.1 ÅéóáãùãÞ

Ôi **CVSup** áðíáé Ýíá eïïæðílèú áðá óçí áæâmíþ éáé ááiÝùóç áÝíðñùí ðçãäþiø êþæéêá áðü Ýíá êâíðñèéü (master) CVS repository ôi iðibíði âñBóéâðáé óå êÚðiði áðílæññði Ýíí ððiðæðóðþ. Ôi repository ôið FreeBSD âñBóéâðáé óå Ýíá êâíðñèéü lç ÷ Üíçíá óðçí Éâæéöññíá. Íâ òi **CVSup**, ié ÷ nÞróðå ðið FreeBSD iðiññýí áyéiðá íá aéâðçñÞróði áíáílùí Ýíá óå áíðBãññáðå ðið ðçãäþiø ôið êþæéêá.

Í üñiò **CVSup**, ãñáii Ýñiò là êäööáéßá êáé ïeññÜ üðùö öáßíåöáé, áráö Ýñåöáé óá ïëüêëçñï ôi ðåé Ýöi ëiæéöiéëiy. Óá áåðééÜ ôiõ ðiPìåöå áßíáé ç áíöñëP ðåéÜðôc cvsup ç iðiBá áåðåéëåßööé óôi ìç ÷ Üíçia ôiõ êÜëå ÷ ñPööc, êáé ôi ðñüñáñáii ôiõ áíöñëåñööcôP cvsupd ôi iðiBí áåðåéëåßööé óá êÜëå Ýíá áðü óá mirror sites ôiõ FreeBSD.

Éáéþò áéáðá Úæðóðå óçí óðâéññþðúòç êáé óéó ëðóðåðó ðá ÷ ðäññðâðíðò ðíð FreeBSD, iðrñðåß íá âñðâðóå ááðáöñÝò óðóçí áðáññðâðíðò sup. Óí sup þðáí iðññüäññò ðíð CVSup, êáé áîððçñâðóíýóå ðáññüìëí óéïðü. Óí CVSup ÷ ñçóéññðíéâðóåé íå áñðâðóÜ üññéí óññüðí íå ðí sup, êáé óðóçí ðññáññâðóéññðóå, ÷ ñçóéññðíéâð ãñ ÷ áðá ñððèññðóåù óá ïðíðá Ý ÷ iðí ððþðù óðíâðóññðóå ìå áðóÜ ðíð sup. Óí sup ááí ÷ ñçóéññðíéâðóåé ðëÝíí óóí FreeBSD Project, áðâðæþ ðí CVSup áðíáé óá ÷ ýðâññ êáé ðñññðóéÝññé íåðáéýðóññ áðóæéññðá.

**Óćiáßñúóć:** Ôi ðñüüñáñáííà csup áßíáé ôi **CVSup** íáíáñáííàííYíí óá aëþþóá C. Ôi laðááæýðâñí ôiõ ðëéäííYéðöçíá áßíáé üöé áßíáé óá ÷yðâñíí, éáé aëáí aíáñôÜðáé áðü ôçí aëþþóá ðñíáñáííáðéóíí Modula-3, ôçí iðiðá aëá aëáí ÷ñáéÜæðâðáé ðëYíí íá aëáðâðáóðÞóðâðá. Áððóçò iðináððóá íá óí ÷ñçóéííðíéÞóðâðá Üðáóá, éáèþò ðñáñééáíáÜíáðâé óóíí aáðééüü óýðöçíá. Áí aððóðáðóðâðá íá ÷ñçóéííðíéÞóðâðá ôi **csup**, áððéþò ðñáñééáíáÜðâðá ôá aððáðâðá aëá ôçí aëáðâðáÜðâðáóç ôiõ **CVSup** éáé aíóééáðâðáóðÞóðâðá Üðáóá aíáðíñÜ óóíí **CVSup** óá aððóü ôi Üñèñíí, lað **csup**.

#### A.6.2 ÅãêáôÜóôáóç

Í ãôéïëüôðâñõ ôññüðõ ãéá íá ååéåôáôðPóåôå ñi CVSup áßíáé íÝóù ôiö Ýôëëii ðåéÝôiö net /cvsup áðü ôçí ôðëëiäP ðåéÝóù ôiö FreeBSD. Áí ðññöéiÜôå íá iåôáæüñôðôåôå ñi CVSup áðü ôiï ðçáâbi ëþæééá, iðññåðôå íá ÷ñçöéiïðñéPóåôå ñi port net /cvsup. Ôåð ðññäéäiïðñéiÿlå ïñðôüöi üöde ñi port net /cvsup åñâñðÜôåé áðü ôçí Modula-3, c iðññå ÷ññéÜæåðâé áññéåðü ÷ññüññééá ÷ññüññééá íá èéñòÝåéééá íá iåôáæüñôðôåéôåß.

**Óćiàßùóć:** Áí ðñüêåéóáé íá ÷ñçóéìëðíéþóåôå ôi **CVSup** óå Ýíá lç÷Üíçìá ôi lðiñßí äáí èá äéåèÝôåé ãñáöéêü ðñañéåÜëeíí Ýòú ôiõ **Xorg**, üðñò ð.÷. óå Ýíá áîñðñhåôçôþ, åââáéùèåßôå üðé åââéåééôðÜôå ôi áîñðóôîé÷í port ôi ïðiñßí äáí ðñañééàåÜíáé ãñáöéêü ðñañéåÜëeíí, äçéäþ ôi [net/cvsup-without-qu](http://cvsup-without-qu).

### A.6.3 Ñýèlëóç ôiõ CVSUp

Ç èåéöiõñâßá ôiõ **CVSUp** åe Ýá ÷ åðáé áðü Ýíá áñ ÷ åßí ñòðèiñbóåùí ðiõ êáéåßôåé supfile. ÕðÜñ ÷ iõí êÜðiéá õðtäåßâiáóå áðü supfiles oóii ûáðiñbóåùí /usr/share/examples/cvsup.

Íé ðëcñiñbóåùí ðiõ supfile áðáíñbóåùí ôiõ áêüëiñbóåùí âññùôÞóåéò ãéá ôiõ **CVSUp**:

- Diéá áñ ÷ åßá èÝéåôå íá èÜååôå;
- Diéåò åêäüöåéò ôiùí áñ ÷ åßùí èÝéåôå;
- Áðü ðiõ èÝéåôå íá ôá èÜååôå;
- Diõ èÝéåôå íá ôá áðièçêåýóåôå ôiõ lç ÷ Üíçìá óåò;
- Diõ èÝéåôå íá áðièçêåýóåôå ôá áñ ÷ åßá éåðÜóðåçò;

Óôå áðüìlåíá ôiPiáôå, èá áçlëiñbóåÞóiõíå Ýíá ôoðééü supfile áðáíñbóåùí êÜèå ìéá áðü ôeò âññùôÞóåéò áðôÝò íå ôç óåéñÜ. Ðñjþôá, èá ðåñéæñÜiõíå ôç oóññéêP aïñP aïñüò supfile.

Já supfile åßíáé Ýíá áñ ÷ åßí èåéñYñiõ. Óá ò ÷ üééá íåééñÜíá íå # éáé áðååôåßññôåé ùò ðiõ ôYëëò ôçò âññùiP. Íé èåññYò ãññùiYò, èåèþò éáé áðóYò ðiõ ðåñéY ÷ iõí ìüñi ô ÷ üééá, âññùiYíóåé.

ÊÜèå âññùiP áðü ôeò ðoðüëéðåò ðåñéæñÜoåé Ýíá óåô áñ ÷ åßùí ôá iõñbá åðééðiñbá íá èÜååé i ÷ nÞóôçò. Ç âññùiP íåééñÜåé íå ôi üññíá íéáò "oóññéiñP", åññùò ëræéíý åññiõò áðü áñ ÷ åßá ðiõ iñbæåôåé áðü ôiñ åññðçññåôçòP. Ôi üññíá ôçò óoññéiñPò åçéþíé åðiñ åññðçññåôçòP ðiéá áñ ÷ åßá åðééðiñbóåò. ÍåñÜ òi üññíá ôçò óoññéiñPò, iõññáß íá ðoðÜñ ÷ iõí áðü íçäÝí ùò êÜðiéá ðåñéåß, ôá iõñbá ÷ ùññbæiñóåé íåðáiy ðiõò íå èåñÜ åéáôôPiáôå. Óá ðåñéåß áðôÜ áðáíñiýí ôeò âññùôÞóåéò ðiõ ôYëçêáí ðåñáðÜíù. ÕðÜñ ÷ iõí áÿí ôYëðié ðåñéåß: ðåñéåß åññðçññåôçò (flags) éáé ðåñéåß ôeíþí. Já ðåñéåß óPiáíñçò áðiñðåéåßôåé áðü íéá ìüñi ëÝíç èåéåéäß ð. ÷. delete P compress. Já ðåñéåß ôeíPò íåééñÜåé áðßóçò íå íéá èÝíç èééåéäß, åééÜ áðóP åéiñðåéåßôå ÷ ùññbó ôçí ðåññùiñiñP èåññüòPiáòiò áðü = éáé íéá äåýôåñç èÝíç. Åéá ðáñÜäåéäia ôiñ release=cvs áðiñðåéåß Ýíá ðåñéåß ôeíPò.

Já supfile ôoðééÜ èåéññbæåé ðññò ëPøç ðåñéóóüôåñåò áðü ïßá ôoññéiñP. Já ôññüò ðiõ ãéá íá aïñPóåôå Ýíá supfile åßíáé íá èåéññbóåå ùéá ôá ò ÷ åðééÜ ðåñéåß ÷ ùññéóðÜ åéá èÜèå ôoññéiñP. Íå ôiñ ôññüò ðiõ áðü ñòðüöri ðiõ supfile èá èåðåééñÜåé âññéåò Ýò ãññùiYò èåé èá åßíáé Úæíëi, åðååéåP ôá ðåñéóóüôåñå ðåñéåß åßíáé ßæéå åéá üéåò ôeò ôoññéiñYò ðiõ ðåñéY ÷ iññéå ôå áðóü. Óiõ **CVSUp** ðáñY ÷ åé Ýíá lç ÷ áíéòiü ÷ nÞóçò ðññiñðééååíñYíñü ôeíþí, þóðå íá áðiñðåéåñiñôåé áðôÜ ôá ðññiñðPiáôå. Íé âññùiYò ðiõ íåééñÜíá íå ôi åéäééü üññíá ñåðóöü-óoññéiñP \*default ðññiññýí íá ÷ ñçóññéiñéçèíý åéá íá èÝóíò ðåñéåß åññðçññåôçò åéé ôeíþí ôá iõñbá èá ÷ ñçóññéiñéçèíý ùò ðññiñðééñÜ åéá ôeò ôoññéiñYò ðiõ supfile ðiõ ðåññéiñóåé íåñÜ áðü áðóÜ. Íéá ðññiñðééååíñYíç ôeíPò ðññiñáß íá åééÜñåé áí èåéññéóðåß íåñÜ íå íÝóá ôeíP ïÝóá ôóçí ßæéå ôçóññéiñP. Íé ðññiñðééñÜ åéå ðññiñáß íá åééÜñiõ, P íá ðññiñðåéiñYíç, åÜæíñðå ðññiñðå \*default ôå ïññéiñP ðiõ å ñçåññéiñP:

- Diéá áñ ÷ åßá èÝéåôå íá èÜååôå;
- Óá áñ ÷ åßá ðiõ åßíáé åééé Ýóéíá ôçò **CVSUp** åßíáé iññáíùñYíá óå åññiñð ðiõ iññiñðééñÜæíñôåé "óoññéiñYò".
- ÐåñéæñáòP ôiùí åééé Ýóéíùñ ôoññéiñPí ðiõ åññðåå õóii åéüëiñòi ðiõ Piá. Óoii ðáñÜäåéäia íåò, èÝëiñòi íá èÜååñòi ðiõ ðePññò ãÝíññ ðçññåßiõ êþæééå ôiõ FreeBSD ôoññóôPiáòiò. ÕðÜñ ÷ åé íéá íåñÜëç ôoññéiñP src-all ç iõñbá èá íåò ôçí åþðåé üéç. Óáí ðñjþòi åPiá åéá ôçí åüñçóç ôiõ supfile, åðèþò åñÜöiñòi ôeò ôoññéiñYò, ïßá óå èÜèå âññùiP (ôóçí åññððôñóç íåò Ý ÷ iõí ìüñi íéá âññùiP):

```
src-all
```

- Diéåò åêäüöåéò ôiùí áñ ÷ åßùí èÝéåôå íá èÜååôå;

Íå ôi **CVSup**, iðiñåßôå iðoéáôôééÜ íá èÜâåôå iðiéáäPðiôå Ýéäïóç ôiõ ðçãáßiõ êphæéêå ôðPñîå ðiõÝ. Áooü åßíáé äoíåôúí ãðåéäP i ãiõðçñåôçòP ò **cvsupd** éåéðiõñååß áðåðèåßåò áðü ôi CVS repository, ôi iðiþi ðâñéÝ ÷ áé üëåò ôeò áéäüöåéò. Äçëþíåôå ðiéá áðü áðoÝ ðeÝéåôå ÷ nçóéiðiéþíåò ôå ðåäßå ôéþí tag= èáé date=.

**ĐñiåéäiðiÞçóç:** Èá ðñÝðåé íá äþóåôå éæéåßôåñç ðñiõ ÷ P ôoíí éæéñéòiù ôùí ðåäßùí tag= þóôå íá åßíáé óùoóÜ. ÈÜðiéá tags åßíáé Ýâéññååé iüíi ãéá óóâéâéñéiÝíåò ôóééiäÝò áñ ÷ åßúí. Ái éæéñßôåååå åéíéåóíÝíi tag (P èÜíåôå iñéíñååééü èÜðiøò) ôi **CVSup** èá óâPóåé áñ ÷ åßå ôå iðiÞå ðééåíþò ãáí èÝéåôå íá óâçóöiyí. Åéæéêüôåñá, åéá ôçí ôóééiäP ôùí ports-\*-, ÷ nçóéiðiéþóôå iüíi ôi tag=.

Ôi ðåäßi tag= äåß ÷ íåé ðñiø Ýíá óðiâiüééü tag ôoí repository. ÔðÜñ ÷ iði ayíi åßäç tags, ôå tags åéäüöåùí (revision tags) èáé ôå tags èéÜäüí (branch tags). Íá revision tag áiaõ Ýñååé ôå iéá ôðâéâéñéiÝíç Ýéäïóç. Ç õçìáóßå ôiõ áéåôçñåßôåé ßæéå áðü ôç iéá iÝñå ôóçí Üëéç. Áðü ôçí Üëéç, Ýíá branch tag, áiaõ Ýñååé ôóçí ôâéâðôåßå Ýéäïóç iéá ôðâéâéñéiÝíç ãñâiP ðiÜððôíçò, ôå èÜði ÷ nñiééP ôðéâiP. ÅðåéäP Ýíá branch tag ãáí áiaõ Ýñååé ôå èÜðiéá ôðâéâéñéiÝíç Ýéäïóç, iðiñåß áýñéí íá õçìáßíåé èÜði ôéæåiñååééü áðü üöé ôçì ôðéâiP ôùí Ports, ôi tag=. åßíáé ôi iüíi Ýâéññí.

**ĐñiåéäiðiÞçóç:** Íá åßóôå éæéåßôåñá ðñiøåééüò, þóôå íá ãñÜðåôå ôi tag åéñéâþò üðùò öáßíååé. Ôi **CVSup** äáí iðiñåß íá åéá ÷ ññßôåé iàðåáý Ýâéññúí åéá iç-Ýâéññúí tags. Ái ãñÜðåôå èÜðiò ôi tag, ôi **CVSup** èá ôðâéñéååñéååß ôå íá Ý ÷ åðå äþóåé Ýíá Ýâéññí tag ôi iðiþi ãáí áiaõ Ýñååé ôå åéíÝíá áñ ÷ åßí. Ôðçí ãññßððùóç åðôP èá åéåññÜðåé ôå ððÜñ ÷ iñóå áñ ÷ åßå ôå ðçãåßiõ êphæéêå.

1/4ôáí éæéñßôåååå èÜðiéí branch tag, öððééiñåééÜ èá èÜâåôå ôéò ôâéâðôåßåò åéäüöåéò ôùí áñ ÷ åßùí ðiõ ððÜñ ÷ iði ôå áðôP ôç ãñâiP áiÜððôíçò. Ái èÝéåôå íá èÜâåôå êÜðiéåò ðâééüôåñåò åéäüöåéò, iðiñåßôå íá ôi èÜíåôå åéæéñßæéíðåò iéá çiññiçíßå iÝóù ôiõ ðåäßiõ ôéþí date=. Ç óâéßää manual csup(1) åççåß ðùò iðiñåßôå íá ôi èÜíåôå.

Ôi ðáñÜäåéåíá iáò, åðééðiñýíå íá èÜâåôå ôi FreeBSD-CURRENT. ĐñiøéÝñðiå ôç ãñâiP áðôP ôðçí áñ ÷ P ôiõ supfile áñ ÷ åßíò iáò:

\*default tag=.

ÔðÜñ ÷ åé iéá õçìáidééP åéæéêP ðåññßððùóç üðáí ãáí åéæéñßôåååå iÝóå ðåäßi tag= iÝóå ðåäßi date=. Ôðçí ðåññßððùóç åðôP èá èÜâåôå ôå éâññééÜ áñ ÷ åßå RCS áðåðèåßåò áðü ôi CVS repository ôiõ áiðçñåôçòP, áiðß åéá íá èÜâåôå èÜðiéå ðâéâéñéiÝíç Ýéäïóç. Íé ðñiññâiñååééò Ýò ãáééÜ ðñiðéiñýíå ãðü ññüði èéññéiññååé. Åéåôçñiþiôå ðëPñåò áiðßñåò õiõ CVS repository ôåå ôððóðPñåò ôiõ ðééåééÜ ÷ iñóå ôçí ééññüôçôå íá åéÝñðiò ôi èéññééü åééååþí èÜðiéå Ýéäññçò ééá íá åiðå Üæiñò ðâééüôåñåò åéäüöåéò ôùí áñ ÷ åßúí. Ôå ðáññáðÜñ ðééññååéòPñåò ùóðüñò Ý ÷ iñóå ôi èüññò õçò iñññéýôåñçò ÷ nñPóçò ÷ þñiõ ôiôééçñü åßðééi.

- Áðü ðiõ èÝéåôå íá ôå èÜâåôå;

× nçóéiðiéiñýíå ôi ðåäßi host= åéá íá ðiýíå ôiõ cvsup áðü ðiõ íá èÜâåé ôéò áiáíåþóåéò ôiõ. Ðiýíåþðiôå áðü ôå CVSup mirror sites åßíáé éåôÜëéçëi, ái ééá èá ðñÝðåé íá ðñiøåðåèPñåòå íá åðééÝíåôå êÜðiéi ôi iðiþi íá åññóååééÜ ôåò. Ôi ðáñÜäåéåíá iáò, èá ÷ nçóéiðiéþóiòå iéá õáñðååééêP ôiððéåßå åéáññP ðiõ FreeBSD, ôiõ cvsup99.FreeBSD.org:

\*default host=cvsup99.FreeBSD.org

Èá ðñÝðåé íá áeeÜíåôå ôi host óå êÜðiéí ðiõ ðñáäiáôéêÜ ððÜñ ÷ áé ðñéí áéôåëÝóåôå ôi **CVSup**. ÊÜèå öññÜ ðiõ áéôåëåßôå ôi cvsуп, Ý÷åôå ôcí äöñáôüôçôå íá áíáôñÝðåôå áôôP ôc ñyéleóç iÝóù ôcò ãñáliPò áíôiæþí iå ôcí áðééiæP -h hostname.

- Ðiõ èÝéåôå íá óå áðiæçêåýóåôå óôi lç ÷ Üíçìá óåò;

Ôi ðåäbí prefix= äçéþíáé óôcí cvsуп ðiõ íá áðiæçêåýóåé ôå áñ ÷ áßá ðiõ eäiåÜíåé. Óôi ðáñÜäåéäiá iåò, èá áÜeiòiå óå áñ ÷ áßá ôiõ ðçäåßiø êþäééå, áðåöeåßáò óôi êýñéí äÝíññ ðçäåßiø êþäééå, /usr/src. Í éáoÜeiäiø src èåññåßôåé ååäiñYñò áéå ôéò óôééiñYò ðiõ Y÷iõiå áðééYíåé íá eÜäiñiå, éåé Yðóé í óùñôüò ðññóäéiñéôüò áßíåé áôôüò ðiõ öáßíåôåé ðáñáéÜôù:

```
*default prefix=/usr
```

- Ðiõ èá áðiæçêåýóåé ôi cvsуп óå áñ ÷ áßá êåôÜóôåóçò ôiõ;

Í ðåäÜôçò **CVSup** áéåôçñåß êÜðiéá áñ ÷ áßá éåôÜóôåóçò (status files) óå áôôü ðiõ áðiæåëåßôåé éåôÜeiäiø “base”. Óå áñ ÷ áßá áôôÜ åiçéiýí ôi **CVSup** íá eäéòiññåß ðeí áðiæiøéÜ êñáôþíóåò eïññéåôiü ðuí áíáåþóuí ðiõ Y÷åôå Päc ëÜååé. Èá ÷ ñçóéiñðiéþóiòiå ôiõ ðññäðçéåññYñ îåôÜeiäiø base, /var/db:

```
*default base=/var/db
```

Áí í base éåôÜeiäiø óåò ååí ððÜñ ÷ áé þäc, þbñá áßíåé iéá éåëP óôéäiP íá ôiñ äçlëiññPóåôå. O ðåäÜôçò cvsуп ååí èá áéôåëåßôåé áí í base éåôÜeiäiø ååí ððÜñ ÷ áé.

- ÄéÜöiñåò ñðèißóåéò åéå ôi supfile:

ÓðÜñ ÷ áé áéññå iéá êiéP ãñáliP ñðèißóåñú, ç iðißá ôôðééÜ ððÜñ ÷ áé óôi supfile:

```
*default release=cvs delete use-rel-suffix compress
```

Ôi release=cvs ååß ÷ áé üöé í åôôðçñåôçôPò èá ðñÝðåé íá eÜååé ôéò ðëçññiñßåò ôiõ iÝóù ôiõ êýñéíð CVS repository ôiõ FreeBSD. Áôôü éó ÷ ýåé ó ÷ ååüí ðÜíóå, áeeÜ ððÜñ ÷ iõí éåé Üëéåò ðééåñüôçôåò ðiõ iåöåýäiõí áôü ðiõ óéiðü áôôPò ôcò óôæþôçóçò.

Ç eÝç delete äßíåé åééåéþìåôå óôi **CVSup** íá åéáññÜðåé áñ ÷ áßá. Èá ðñÝðåé ðÜíóåå íá Y÷åôå ôcí áðééiæP áôôP, þóôå ôi **CVSup** íá iðiñåß íá êñáôþóåé ôi ãÝíññ ôiõ ðçäåßiø óåò êþäééå ðëþñùò áíáåñuí Yñ. Ói **CVSup** åßíåé áñéåôÜ ðññôåêôééü þóôå íá óâþíåé iüñí óå áñ ÷ áßá ðiõ áñþóéiñôåé ððü ôcí áðééYç ôiõ. Áí ôô ÷ üí áÜéåôå Yíññá áñ ÷ áßá óôiñ ßäeí êåôÜeiäiø, ååí èá óå ååäßñåé.

Ç áðééiæP use-rel-suffix åßíåé... áñ ÷ áéiññééP. Áí ðñáäiáôéêÜ èÝéåôå íá iÜéåôå ó ÷ åôééÜ iå áôôPí, åéååÜóôå ôc óåëßää manual cvsуп(1). Áeeéþò, áðéþò ÷ ñçóéiñðiéþóåå ôcí, éåé içí áíçóõ ÷ åßôå éäéåßôåñá åéå áôôP.

Ç áðééiæP compress åíåññiðiæåß ôc ÷ nPóç óôiñðßåóçò ðýðiõ gzip óôi êáíÜëé áðééiññíßåò. Áí Y÷åôå óýíñååç åééöýiñ ðýðiõ T1 P êåé ðeí ãñþäñç, iÜëéiñ ååí èá ðñÝðåé íá ÷ ñçóéiñðiéþóåå ôiñðßåóç. Óå åéáöiññåôéêP ðåñßððùóç, èá åiçéþóåé åíáéñåôééÜ.

- ¼ëéåò ié áðééiñYò iåæß:

Åäþ åßíåé ôi ðëþñåò supfile åéå ôi ðáñÜäåéäiá iåò:

```
*default tag=
*default host=cvsup99.FreeBSD.org
*default prefix=/usr
*default base=/var/db
*default release=cvs delete use-rel-suffix compress
```

src-all

### A.6.3.1 Ôi Áñ÷åßï refuse

¼ðùò áíáö Ýññíå ðáñáðÜñ, ôi **CVSup** ÷ñçóéiiðíéåß iÝèiäi pull. ÁáðééÜ áðóü óçìáßíåé üöé óðñäÝåóôå óóïí áíððçñåðçôP **CVSup**, áðóüò ëÝåé “ÁðóÜ áßíáé óá áñ÷åßá ðiõ ñðiñåßôå íá éáðååÜðåðå áðü iÝíá..”, êáé ôi äééü óáð ðñüññáñíá áðáñðÜåé “ÁñðÜíåé, èá ðÜññ áðóü, áðóü, áðóü, éáé áðóü.” Óðçí ññiaðééåñíÝíç ñýèiéóç, i ðåëÜðôçò **CVSup** éá ðÜññé èÜèå áñ÷åßí ðiõ óðñäÝåóåé iå ðçí óðeeiäP éáé ôi tag ðiõ Ý÷åðå åéæiñßóåé óðí áñ÷åßí ñðeñßóåñí. Ùóðóüöi ñðiññåb íá lçí ôi åðéèoìåßôå áðóü ðÜíðå, åéæéÜ áí óðñä÷ññíßæåðå óá åÝíññå doc, ports P www — ié ðåñéóóüðåñíé Üíñññðíé ááí ñðiññýí íá åéáåÜðíñí ðÝóóåñéò P ðÝíðå åéþóðå éáé Ýðóé åáí ÷ññéÜæåðåé íá êáðååÜðíñí áñ÷åßá ðiõ áíáö Ýññíåé áéæéÜ óá áðóÜ. Áí ÷ñçóéiiðíéåßôå ôi **CVSup** åéá ôçí óðeeiäP ôúí Ports, ñðiññåßôå íá åðåññÜóåðå áðóðP òç óðiñðåñéöiñÜ éáèiñßæüíðå ðóðåññéñéíÝíåò óðeeiäÝð (ð.÷. ports-astrology, ports-biology áíóß åéá ports-all). Ùóðóüöi, åðåðæäP óá åÝíññå doc éáé www åáí åéáèÝðíñí óðeeiäÝð ÷ùñéóíÝíåò áíÜ åéþóðå, ñðiññåßôå íá ÷ñçóéiiðíéÞóðå Ýíå áðü óá åíèéÜ ÷áñáêðçñéóðééÜ ôiõ **CVSup**: ôi áñ÷åßí refuse.

Ôi áñ÷åßí refuse iðóðéåðóðééÜ ëÝåé óðí **CVSup** üöé åáí ðñÝðåé íá ðÜññé èÜèå áñ÷åßí áðü iéá óðeeiäP. Iå Üëéá ëüæéá, ëÝåé óðí ñðæÜðôç íá åñíçèåß óðåññéñéíÝíå áñ÷åßá ðiõ ðñiñðÝñåé i ñðiñðçñåðçôP. Ôi áñ÷åßí refuse ñðiññåb íá åññåðåß (P íå åçíëiññäçéåß áí åáí Ý÷åðå Päç) óðí base/sup/. Ôi base êáèiñßæåðåé óðí supfile. Ôi åééü iáð base åßíáé óðí /var/db, ôi iðiñí õçìáßíåé üöé ôi ñðiññðééåñíÝíå áñ÷åßí refuse èá åßíáé ôi /var/db/sup/refuse.

Ôi áñ÷åßí refuse Ý÷åé åééåßôåñá áðéP iññöP. Áðéþò ðåññéÝ÷åé óá iññíåðå óùí áñ÷åßùí êáé êáðåéüñúí óá iðiñßå åáí åðéèoìåßôå íá éáðååÜóåðå. Åéá ðáñÜäåéñíá, áí åáí iééÜóå åéþóðå åéðóüò áðü ÁãññééÜ êáé ëßää ÁåññíáíééÜ, êáé åáí åéðéÜíññåðå óçí áíÜäéç íá åéáåÜðåðå óçí ÁåññíáíééP iáðÜññáóç óçò ðåéìññbùóçò, ñðiññåßôå íá åÜéåðå óá åéüëiøéå óðí åééü óáð áñ÷åßí refuse:

```
doc/bn_*
doc/da_*
doc/de_*
doc/el_*
doc/es_*
doc/fr_*
doc/it_*
doc/ja_*
doc/nl_*
doc/no_*
doc/pl_*
doc/pt_*
doc/ru_*
doc/sr_*
doc/tr_*
doc/zh_*
```

Ê.ii.ê. åéá ôéò ðóðüëéðåð åéþóðå (ñðiññåßôå íá åññåßôå óçí ðéÞñç ëßóðå óðí FreeBSD CVS repository (<http://www.FreeBSD.org/cgi/cvsweb.cgi/>)).

Iå áðóðP òç ÷ñÞóéíç åðíáðûðçôá, ié ÷ñÞóðåò ðiõ Ý÷iõí áññP óýíååóç P ðéçñþñiõí õi Internet iå ÷ññíi ÷ñÝùóç áíÜ åéððóü, èá ñðiñÝñõí íá åññééññíÞóðiõ ðíëýðéñí ÷ññíi êáðþò åáí èá ÷ññéÜæåðåé ðéÝíå íá éáðååÜðíñí áñ÷åßá ðiõ åáí ñðñüéåéóåé íá ÷ñçóéiiðíéÞóðiõ ðiõ Ý. Åéá ðåñéóóüðåññå ðéçññiõññå ðééåññééÜ iå óá áñ÷åßí refuse èáé Üëéá ÷ñÞóéíá ÷áñáêðçñéóðééÜ ôiõ **CVSup**, ðáññáééiýíå åéáåÜðåðå óçí áíðóðóðé÷ç óåéßää ôiõ manual.

### A.6.4 Åêóåëþíóåò ôi CVSup

Åßóðå ôþñá Ýôíëiíé íá åíèéÜóåðå iéá áíáíÝùóç. Ç ãññíP åíóëPò åéá ôi óéiðü áðóü åßíáé éäéåßôåñá áðéP:

```
# cvsup supfile
```

üðiõ ôi *supfile* áßíáé öðóéêÜ ði üñiá ôiõ áñ÷åßiõ *supfile* ðiõ iüééò áçìëiõñäÞóáôå. ÕðièÝôiíôå üöé ÷ñçóëiõðiéåßôå óá X11, ç áíõiõP *cvsup* èá óáò áíöáíßóåé Ýíá áñáöéêü ðáñ Üeõñi la ëÜðiéá ðëÞéôñá óðíçèéóíÝfúí èæéöiõñäþí. ÐéÝóôå ôi ðëÞéôñi *go*, èáé ðáñáéiõðiõðóå ôçí áéôÝéåóç.

Êáèþò óôçí ðáñßðôùóç iáò áíáíåþíåôáé ôi ðñáñiáôéêü áÝíõñi /usr/src, èá ÷ñåéáôôåß íá áéôåëÝóåôå ôi ðñüññáìíá ùò root þóå ç *cvsup* íá Ý÷åé óá áéêåéþíåôá ðiõ ÷ñåéÜæôåôé áéá íá áíáíåþóåé óá áñ÷åßá óáò. Êáèþò iüééò Ý÷åôå áçìëiõñäÞóåé ôi áñ÷åßi ñðõiõßóåñi, èáé åái Ý÷åôå ðiõ ðñéí ÷ñçóëiõðiéÞóåé ôi ðñüññáìíá, ßóùò áéóðÜíåóôå èßüí Üâiæá. ÕðÜñ÷åé áýéiõði ðñüñðiõ íá êÜíåôå äiêciáôôéêP áéôÝéåóç ÷ùñßò íá ðåéñÜíåôå óá ðiõýôciá áñ÷åßá óáò. Áðëþò áçìëiõñäÞóåé Ýíá Üäåéei éáôÜeïäi óá Ýíá áiééêü iÝñiõ, èáé áþóôå ôi óá Ýîõñá ðáñÜíåôñi ôôçí ãñáñiP áíðiõþí.

```
# mkdir /var/tmp/dest
# cvsup supfile /var/tmp/dest
```

I êáðÜeïäi ðiõ éáëiñßóåôå èá ÷ñçóëiõðiéçéåß ùò ðñiñéóñi ùò áéá üëåò ôéò áíáíåþóåé ðiõ ðñüññáìíá. Ói **CVSup** èá áíåôÜóåé óá éáíñééÜ áñ÷åßá óáò /usr/src, áéëÜ åái èá ôñiðiõðiéÞóåé íýôå èá áéáññÜøåé êáíÝíá áðü áðôÜ. ÊÜéå áíáíÝñóç áñ÷åßi ðiõ èá áéêåé ðñüñðiõ íá êáðÜóôåóçò ôiõ ôiñi ëáôÜeïäi /var/tmp/dest/usr/src. Ói **CVSup** üðáí áéôåëåßôåé la áðôü ôiñi ðñüñði ãðÞíåé áðßóçò áÝðáôå óá áñ÷åßá èá ðñüñði ëáôÜóôåóçò ôiõ ôiñi /usr/src, åái ÷ñåéÜæôåôå íá áßôåå ëáí root ãéá íá êÜíåôå áðôðP ôc äiêciáôôéêP áéôÝéåóç.

Aí åái áéôåëåßôå óá X11 P áðëþò åái óáò áñÝóïõi óá áñáöéêÜ ðáñéáÜeëiñi, iðiññåßôå íá áþóôåå êÜðiéåò áðééiáÝð ôôçí ãñáñiP áíðiõþí üðáí áéôåëåßôå ôçí *cvsup*:

```
# cvsup -g -L 2 supfile
```

Ç áðééiáP -g èÝåé óóïi **CVSup** íá iç ÷ñçóëiõðiéÞóåé ôi ðñáöéêü ôiõ ðáñéáÜeëiñi. Áðôü áßíåôåé áðôññáôå áí åái áéôåëýíóåé óá X11, áéëÜ åéáöiññåôéêÜ èá ðñÝðåé íá ôi ëáëiñßóåôå.

Ç áðééiáP -L 2 èÝåé óóïi **CVSup** íá áíòáíßóåé üëåò ôéò èáðòññÜñåéåò áéá üëåò ôéò áíáíåþóåé ðiõ ðñüñði ãðôåëåß. ÕðÜñ÷iõ ñðõßá ãðßðåññåõPò, áðü ôi -L 0 ùò ôi -L 2. Ç ðññáðéëiáP áßíåé ôi 0, ðiõ òçìáßíåé áðüëööç ôéùðP áéôüñ ãðü ìçíýíåôå èÜðiõðo.

ÕðÜñ÷iõ åéáé Ýóeiåò áñéåôå Ýò áéüñå ááðééiáÝò. Áéá iéá ðáñééçðôéêP ëßóôå, ãñÜøôå *cvsup* -H. Áéá ðáñéññüôåñi ëåðôññåñßò ðáñéññåñò Ýò, áåßôå ôc óåëßåå ôiõ manual.

¼ðáí ñåßíåôå ééáññiõéçÝñi ãðü ôiñi ôñüñði ðiõ áßññiõåé ié áíáíåþóåé, iðiññåßôå íá êáññßóåôå ôçí óá ðáéôÜ áéáóðÞíåôå áéôÝéåóç ôiõ **CVSup** la ôçí ÷ñÞóç ôiõ cron(8). ðññóáíPò åái èá ðñÝðåé íá áóÞóåôå ôi **CVSup** íá ÷ñçóëiõðiéåß ôi ðñáöéêü ôiõ ðáñéáÜeëiñi üðáí ôi áéôåëåßôå iÝóù ôiõ cron(8).

## A.6.5 ÓðëëiáÝò Áñ÷åßùí ôiõ**CVSup**

Íé óðëëiáÝò áñ÷åßùí ðiõ áéáôßèåíôåé iÝóù ôiõ **CVSup** áßíåé iññáñùíÝíåò éåñáñ÷ééÜ. ÕðÜñ÷iõ èßååò iåññÜéåò óðëëiáÝò, èáé áðôÝò ÷ùñßæiõåé óá iéññüôåñåò ðiõ-óðëëiáÝò. Ç èÞøç iéáò iåññÜéçò óðëëiáPò, éóíäõíåíåß iå ôçí èÞøç êÜèå iéáò áðü ôéò ðiõ-óðëëiáÝò ôéò. Íé éåñáñ÷ééÜ ðiõ ðáñééçðôéêP ëßóôå, ãñÜøôå *cvsup* -H. Áéá ðáñéññüôåñi ëåðôññåñßò ðáñéññåñò Ýò, áåßôå ôc óåëßåå ôiõ manual.

Íé ðéi õð÷fÜ ÷ñçóëiõðiéiýíåíåò óðëëiáÝò áßíåé ç src-all, èáé ç ports-all. Íé Üééåò óðëëiáÝò ÷ñçóëiõðiéiýíóåé iüññ áðü iéññÝò ññÜååò áíèñþðùí åéá áéééiýò ôéiõðiýò, èáé êÜðiéá mirror sites iðiññåß íá içí ôéò Ý÷iõ êáëüëiõ.

cvs-all release=cvs

Ôi êýñéi CVS repository ôi FreeBSD, ðiõ ðåñééâiâÜíâé êáé ôií êþæéâá êñôððiñáößáð.

distrib release=cvs

Áñ÷åßá ðiõ áíaoÝñiñôáé óôçí æéâñiP êáé ôi mirroring ôi FreeBSD.

doc-all release=cvs

Ðçãáßïò êþæéâá ãéá ôi FreeBSD Handbook êáé ôçí ððüëëðç ôåêïçñßùóç. Äáí ðåñééâiâÜíâé áñ÷åßá ãéá ôi web site ôi FreeBSD.

ports-all release=cvs

Ç óoëëiñP Ports ôi FreeBSD.

**Óçìáíôééü:** Áí ãáí èÝéâoâ íá áíáíåþóâoâ üeï ôi ports-all (ôi ðëþñâò äÝíôñi ôuí ports), áeeÜ íá ÷ñçóéiñðiéþoâoâ íéá áðü ôeò ððiøëëiñYò ðiõ öáßñiñôáé ðáñâeÜôù, ååâáéùèåßôå üoé ðÜíôá áíáíåþíâoâ ôçí ððiøëëiñP ports-base! ¼ôáí êÜðé áeeÜæâé ôôí óyóðçíà íåðâæþðôðéóçò ôuí ports ðiõ áíðéðñiñðâýâoâé áðü ôi ports-base, åßíâé ðñâéðééÜ áÝâáéí üoé íé áeeáäÝò áððÝò ðiéý óyíðiñlâ ëá ÷ñçóéiñðiéçëiýí áðü “ðñâäiáðééÜ” ports. Þóé, áí áíáíåþíâoâ iñüñ ôá “ðñâäiáðééÜ” ports êáé áðôÜ ÷ñçóéiñðiéýí êÜðiéâoâ áðü ôeò íÝâo åoíáðûðçôâo, ððÜñ÷åé iñáðÜëç ðeeáiñðçôá ç íåðâæþðôðéóç ôiñð íá áðiðý÷åé íå êÜðiéí iñóðçñéþâoâ iñíðiá ëÜëiñð. Ôi ðñþoï ðñÜäiá ðiõ ðñÝðâé íá êÜíâoâ ôá áðôP ôçí ðâñßðôùóç åßíâé íá åââáéùèåßôå üoé åßíâé åíçìâñùíÝíç ç óoëëiñP óoâo ports-base.

**Óçìáíôééü:** Áí óêiðâýâoâ íá äçìéiñðâþoâoâ ôi äéêü óâo ôiðéêü áíðâñáöi ports/INDEX, èá ðñÝðâé íá ãå÷ôâoâ ôç óoëëiñP ports-all (iñüêëçñi ôi äÝíôñi ôuí ports). H äçìéiñðâå ôiports/INDEX áðü lç-ðëþñâò äÝíôñi åáí ððiøðçñßæåâoâ. Äåßôå ôi FAQ ([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/books/faq/applications.html#MAKE-INDEX](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/faq/applications.html#MAKE-INDEX)).

ports-accessibility release=cvs

Êiñéoiééü ãéá ôçí åiþeâéá ÷ñçóðpí íå áíáðçñßâð.

ports-arabic release=cvs

ÕðiøôPñéïç Áñââééþò Åëþóóâo.

ports-archivers release=cvs

Âñââëåßá áðiðþeâðóçò êáé ôðiðßâðçò.

ports-astro release=cvs

Ports ó÷åðééÜ íå áóðñiññâá.

ports-audio release=cvs

ÕðiøôPñéïç P÷iõ.

ports-base release=cvs

ÁáóéêÜ áñ ÷åßá ôùí ports ãéá õðïóôPñéïç ôiõ óððóôPìáôïò iåôáæþôéóçò. ÄéÜöñá áñ ÷åßá ðiõ áñßóëíôáé óôiõð ððíëåôáëüäiõò Mk / êáé Tools / ôiõ /usr/ports.

**Óçìåßùóç:** Ðáñáêáëïýìå äåßôå ôçí óçìáíðéêþ ðñïåéäiðíßçóç ðáñáðÜíù: èá ðñÝðâé ðÜíððå íá åíçìåñþíåôå áðôþ ôçí õðïóôëëïäþ, üôáí åíçìåñþíåôå iðíëäþðïôå ôiþá ôçò óðëëiäþò Ports ôiõ FreeBSD.

ports-benchmarks release=cvs

ÐñïäñÜñáôå iÝôñçóçò áðüäiñóçò (Benchmarks).

ports-biology release=cvs

Äéíëäßá.

ports-cad release=cvs

Åñäáæåßá ó ÷åßáóçò iå ôç aïPèåéá õðïëiäéóôþ.

ports-chinese release=cvs

ÕðïóôPñéïç Ééíåæéêþò Äéþóóåò.

ports-comms release=cvs

Ëiæóíéêü åðéêéíùíéþí.

ports-converters release=cvs

Iåôáôñïðåßò ÷áñáêôPñùí.

ports-databases release=cvs

ÂÜóåéò ÅåäiñÝíùí.

ports-deskutils release=cvs

Áíóéêåßìáíá ðiõ áñßóëíôáí óðíPèùò óå Ýíá ãñáöåßí ðñéí ôçí åöåýñåóç ôùí õðïëiäéóôþí.

ports-devel release=cvs

ÂïçèçôéêÜ ðñïäñÜñáôå ãéá ôçí áíÜðôôïç eïæóíéïý.

ports-dns release=cvs

Ëiæóíéêü ó ÷åôéêü iå DNS.

ports-editors release=cvs

ÓðíôÜêôåò êåéíÝíõ.

ports-emulators release=cvs  
Âññïéùò Ýò Üëëùí ëåéôïöñääéþí óðóôçìÜðùí.

ports-finance release=cvs  
×ñçìáôïïéêrñééÜ ðñiãñÜñáôá.

ports-ftp release=cvs  
ÐñiãñÜñáôá FTP (ðåëÜôåò êáé åîððçñåôçôÝò).

ports-games release=cvs  
Ðáé÷íßäéá.

ports-german release=cvs  
ÓðiôôÞñéïç ÅññìáééÞò ãëþóóåò.

ports-graphics release=cvs  
Åññääëßá ãñáöééþí.

ports-hebrew release=cvs  
ÓðiôôÞñéïç åâñáúûéÞò ãëþóóåò.

ports-hungarian release=cvs  
ÓðiôôÞñéïç lõäññáñÝæéêçò ãëþóóåò.

ports-irc release=cvs  
ÐñiãñÜñáôá ãéá ôi IRC.

ports-japanese release=cvs  
ÓðiôôÞñéïç ÉáðùíééÞò ãëþóóåò.

ports-java release=cvs  
Åññääëßá ãéá ôçí Java.

ports-korean release=cvs  
ÓðiôôÞñéïç ÈiññåôééÞò ãëþóóåò.

ports-lang release=cvs  
Ãëþóóåò ðñiãñáìáôéöiiý.

ports-mail release=cvs  
ÐñiãñÜñáôá çëåéôñïééiý ôá÷õäññåßiõ.

ports-math release=cvs  
Èiñéóíéü ïáèçìáôééþí õðiññéóíþí.

ports-misc release=cvs  
ÃéÜöñá âïçèçôéêÜ ðñïäñÜìäôá.  
ports-multimedia release=cvs  
Ëiãéóíéêü ðiëõíÝóùí.  
ports-net release=cvs  
Ëiãéóíéêü äéêôýùí.  
ports-net-im release=cvs  
Ëiãéóíéêü Üìåóùí lçíõiÜôùí (instant messaging).  
ports-net-mgmt release=cvs  
Ëiãéóíéêü äéá÷åßñéóçò äéêôýùí.  
ports-net-p2p release=cvs  
Ãéêôýùóç peer-to-peer.  
ports-news release=cvs  
Ëiãéóíéêü ãéá ôi USENET.  
ports-palm release=cvs  
Ëiãéóíéêü ãéá ôçí õðiõõPñéíç óðóéâðþí ôýðiõ Palm™.  
ports-polish release=cvs  
ÓðiõõPñéíç ÐiëùíéêÞò ãëþóóáò.  
ports-ports-mgmt release=cvs  
Âñãáëåßá ãéá ôç äéá÷åßñéóç ðáéÝôùí êáé ports.  
ports-portuguese release=cvs  
ÓðiõõPñéíç ÐiñõiãáééêÞò ãëþóóáò.  
ports-print release=cvs  
Ëiãéóíéêü åêôõðþóåùí.  
ports-russian release=cvs  
ÓðiõõPñéíç ÑùóééêÞò ãëþóóáò.  
ports-science release=cvs  
ÂðéóôçìíéêÜ ðñïäñÜìäôá.  
ports-security release=cvs  
Âñãáëåßá áóöáéåßáò.

ports-shells release=cvs

Shells ãéá ôçí ãñáìíP åíoiëþí.

ports-sysutils release=cvs

ÂïçèçôééÜ ðñïñÜñáôá óóóôÞìáôïò.

ports-textproc release=cvs

Âñãáæåßá åðåññááßáò êåéí Ýñïò (äåí ðåñéëåíâÜíåé åðéôñáðÝæéá ôoðíñáößá).

ports-ukrainian release=cvs

ÕðiôôÞñéïç ÍðêñáíéêÞò ãëþóóáò.

ports-vietnamese release=cvs

ÕðiôôÞñéïç ÂéåôíáìÝæéêçò ãëþóóáò.

ports-www release=cvs

Ëiæóíéêü ðiõ ó÷åßæååé ìå ôíí ðáæüöiéï éóóü (World Wide Web).

ports-x11 release=cvs

Ports ãéá õðiôôÞñéïç ôiõ óðóôÞìáôïò X Windows.

ports-x11-clocks release=cvs

Ñíëüääá ãéá ôi X11.

ports-x11-drivers release=cvs

ÐñiãñÜñáôá iäÞäçóçò ãéá ôá X11.

ports-x11-fm release=cvs

Ãéá÷åñéóôÝò áñ÷åßùí ãéá ôá X11.

ports-x11-fonts release=cvs

ÃñáìáôíóåéñÝò êáé åñãáæåßá ãñáìáôíóåéñþí ãéá X11.

ports-x11-toolkits release=cvs

ÂñãáæåéëÞêåò X11.

ports-x11-servers release=cvs

ÂiõðçñåôçôÝò X11.

ports-x11-themes release=cvs

ÈÝñáôá ãéá X11.

ports-x11-wm release=cvs

Ãéá÷åñéóôÝò ðáñáèýñùí (window managers) ãéá X11.

projects-all release=cvs

Ðçääßiò êþäéêåò ãéá ôi projects repository ôi FreeBSD.

src-all release=cvs

I ááóééüò ðçääßiò êþäéêå ôi FreeBSD, óoiðåñééåìâáññÝñò ôiô êþäéêå êññðôiññåößåò.

src-base release=cvs

ÄéÜññá áñ÷åßá óôçí êñññöP ôiô /usr/src.

src-bin release=cvs

Áññáéåßá ðiô ðéèáíüí íá áðáéôiýíôåé óå êáôÜóôáóç ëåéôiññåßåò åíüò ÷ñPóôç (single-user) (/usr/src/bin).

src-cddl release=cvs

Áññáéåßá êáé áéâééièÞêåò ðiô êáëýðôiíôåé áðü ôçí Üäåéá ÷ñPóçò CDDL (/usr/src/cddl).

src-contrib release=cvs

Áññáéåßá êáé áéâééièÞêåò ðiô äáí áíÞêiñí óôi FreeBSD Project, êáé óå iðiñßá ÷ñçóéiiðiñýíôåé iñóéåôôéÜ áíáëëiñùôá (/usr/src/contrib).

src-crypto release=cvs

Áññáéåßá êáé áéâééièÞêåò êññðôiññÜöçóçò ðiô äáí áíÞêiñí óôi FreeBSD project êáé óå iðiñßá ÷ñçóéiiðiñýíôåé iñóéåôôéÜ áíáëëiñùôá (/usr/src/crypto).

src-eBones release=cvs

Kerberos êáé DES (/usr/src/eBones). Äåí ÷ñçóéiiðiñýíôåé óôéò ôñÝ ÷iñóåò åêäüoåéò ôiô FreeBSD.

src-etc release=cvs

Áñ÷åßá ññèìßóåùí ôiô óôóôÞìáôiò (/usr/src/etc).

src-games release=cvs

Ðáé÷íßäéá (/usr/src/games).

src-gnu release=cvs

Áññáéåßá ðiô êáëýðôiíôåé áðü ôçí Üäåéá ÷ñPóçò GNU Public License (/usr/src-gnu).

src-include release=cvs

Áñ÷åßá åðééåöåéßäùí (/usr/src/include).

src-kerberos5 release=cvs

ÐáéÝòí áóöåéåßáò Kerberos5 (/usr/src/kerberos5).

src-kerberosIV release=cvs

ÐáéÝòí áóöåéåßáò KerberosIV (/usr/src/kerberosIV).

src-lib release=cvs  
Âéâëéïèþêåò (/usr/src/lib).  
  
src-libexec release=cvs  
ÐñíññÜñáôá óðóôÞìáôïò óá iðiñá öðóéíëíäééÜ åêôåëíýíôáé áðü Üëëá ðñíññÜñáôá (/usr/src/libexec).  
  
src-release release=cvs  
Áñ÷åßá ðiõ áðáéôíýíôáé ãéá ôçí ðáñáñùåÞ iéáò Ýéäïóçò ôi FreeBSD (/usr/src/release).  
  
src-rescue release=cvs  
ÐñíññÜñáôá ià óðóôéêÞ iåðåæþþôéóç ãéá ÷ñÞóç óå Ýéôåéôåò ðåñéðôþþôåéò åðáíáöñÜò ôiõ óðóôÞìáôïò. Äåßôå ôi rescue(8) (/usr/src/rescue).  
  
src-sbin release=cvs  
Âñääëåßá óðóôÞìáôïò ãéá ëåéôíññåßá óå êáðÜóôåóç åñüò ÷ñÞóôç (single user mode) (/usr/src/sbin).  
  
src-secure release=cvs  
Âéâëéïèþêåò êáé åíôïëÝò êñððôíññÜöçóçò (/usr/src/secure).  
  
src-share release=cvs  
Áñ÷åßá óá iðiñá iðiññåß íá åßíáé êíéíÜ áíÜñáôá óå ðíëëáðëÜ óðóôÞìáôá (/usr/src/share).  
  
src-sys release=cvs  
Í ððñÞíáò (/usr/src/sys).  
  
src-sys-crypto release=cvs  
Êþäééåò êñððôíññåðåðó ðiõ ððñÞíá (/usr/src/sys/crypto).  
  
src-tools release=cvs  
ÂéÜöñá åñääëåßá ãéá ôç óðíôÞñçóç ôiõ FreeBSD (/usr/src/tools).  
  
src-usrbin release=cvs  
Âñääëåßá ÷ñÞóôç (/usr/src/usr.bin).  
  
src-usrsbin release=cvs  
Âñääëåßá óðóôÞìáôïò (/usr/src/usr.sbin).  
  
www release=cvs  
Í ðçãáßíò êþäééåò ãéá ôçí ôiðiñåßá WWW ôiõ FreeBSD.

distrib release=stable

Óá áñ÷åßá ñõèìßóùí ôiõ ßäéïò ôiõ åîõðçñåôçôp **CVSup**. ×ñçóëiõíéåßôáé áðü **CVSup** mirror sites.

gnats release=current

H áÜóç äåäñÝíùí ôiõ óooôPiáòò ðáñáêííýèçóçò ðñíâæçíÜóùí GNATS.

mail-archive release=current

Óá áñ÷åßá ôçò ëßóôáò ôá÷ðññâßíò ôiõ FreeBSD.

www release=current

Ðñí-åðåññáóíÝíá áñ÷åßá ôçò äéêôõáéPò ôiõíéåßáò (WWW) ôiõ FreeBSD (ü÷é í ðçäáßíò êþäééåò).  
×ñçóëiõíéåßôáé áðü WWW mirror sites.

## A.6.6 Æá Ðåñéóóüôåñåò Ðëçñïöiñßåò

Æá ôi FAQ ôiõ **CVSup** êáé Üeeåò ðëçñïöiñßåò ó÷åôééÜ iå áooü, äåßôå ôç Óåëßää ôiõ CVSup (<http://www.cvsup.org>).

ÓooæçôPóåéò ó÷åôééÜ iå ôç ÷ñPóç ôiõ **CVSup** óoõ FreeBSD ëáññÜññí ÷þñá óôçí çëåêôññíééP ëßóôá ôå÷íééþí  
óooæçôPóåùí ôiõ FreeBSD (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-hackers>). Óôç ëßóôá áðôP, êåèþò êáé  
óôçí çëåêôññíééP ëßóôá áíáêíéþóùí ôiõ FreeBSD (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-announce>)  
áíáêíéþññóáé êáé ié íÝåò åêäüóåéò ôiõ ðñíññÜññáòiò.

Æá áññùôPóåéò P áíáöññYò óooæíÜóùí ó÷åôééÜ iå ôi **CVSup** ñßñôå iéá iáôééÜ óoõ CVSup FAQ  
(<http://www.cvsup.org/faq.html#bugreports>).

## A.6.7 Òiõíèåóßåò CVSup

Ìðññåßôå iá áññùôåå åíðõðçñåôçôÝò CVSup æá ôi FreeBSD óôéò áêüëíõèåò òiõíèåóßåò:

Central Servers, Primary Mirror Sites, Argentina, Armenia, Australia, Austria, Brazil, Bulgaria, Canada, China, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Kuwait, Kyrgyzstan, Latvia, Lithuania, Netherlands, New Zealand, Norway, Philippines, Poland, Portugal, Romania, Russia, San Marino, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, Ukraine, United Kingdom, USA.

(as of 2012/01/30 18:59:13 UTC)

Central Servers

- cvsup.FreeBSD.org

Primary Mirror Sites

- cvsup1.FreeBSD.org

- cvsup2.FreeBSD.org
- cvsup3.FreeBSD.org
- cvsup4.FreeBSD.org
- cvsup5.FreeBSD.org
- cvsup6.FreeBSD.org
- cvsup7.FreeBSD.org
- cvsup8.FreeBSD.org
- cvsup9.FreeBSD.org
- cvsup10.FreeBSD.org
- cvsup11.FreeBSD.org
- cvsup12.FreeBSD.org
- cvsup13.FreeBSD.org
- cvsup14.FreeBSD.org
- cvsup15.FreeBSD.org
- cvsup16.FreeBSD.org
- cvsup18.FreeBSD.org

Argentina

- cvsup.ar.FreeBSD.org

Armenia

- cvsup1.am.FreeBSD.org

Australia

- cvsup.au.FreeBSD.org

Austria

- cvsup.at.FreeBSD.org

Brazil

- cvsup.br.FreeBSD.org
- cvsup2.br.FreeBSD.org
- cvsup3.br.FreeBSD.org
- cvsup4.br.FreeBSD.org
- cvsup5.br.FreeBSD.org

Bulgaria

- cvsup.bg.FreeBSD.org

Canada

- cvsup1.ca.FreeBSD.org

China

- cvsup.cn.FreeBSD.org
- cvsup2.cn.FreeBSD.org

Costa Rica

- cvsup1.cr.FreeBSD.org

Czech Republic

- cvsup.cz.FreeBSD.org

Denmark

- cvsup.dk.FreeBSD.org
- cvsup2.dk.FreeBSD.org

Estonia

- [cvsup.ee.FreeBSD.org](http://cvsup.ee.FreeBSD.org)

Finland

- [cvsup.fi.FreeBSD.org](http://cvsup.fi.FreeBSD.org)
- [cvsup2.fi.FreeBSD.org](http://cvsup2.fi.FreeBSD.org)

France

- [cvsup.fr.FreeBSD.org](http://cvsup.fr.FreeBSD.org)
- [cvsup1.fr.FreeBSD.org](http://cvsup1.fr.FreeBSD.org)
- [cvsup2.fr.FreeBSD.org](http://cvsup2.fr.FreeBSD.org)
- [cvsup3.fr.FreeBSD.org](http://cvsup3.fr.FreeBSD.org)
- [cvsup4.fr.FreeBSD.org](http://cvsup4.fr.FreeBSD.org)
- [cvsup5.fr.FreeBSD.org](http://cvsup5.fr.FreeBSD.org)
- [cvsup8.fr.FreeBSD.org](http://cvsup8.fr.FreeBSD.org)

Germany

- [cvsup.de.FreeBSD.org](http://cvsup.de.FreeBSD.org)
- [cvsup2.de.FreeBSD.org](http://cvsup2.de.FreeBSD.org)
- [cvsup3.de.FreeBSD.org](http://cvsup3.de.FreeBSD.org)
- [cvsup4.de.FreeBSD.org](http://cvsup4.de.FreeBSD.org)
- [cvsup5.de.FreeBSD.org](http://cvsup5.de.FreeBSD.org)
- [cvsup6.de.FreeBSD.org](http://cvsup6.de.FreeBSD.org)
- [cvsup7.de.FreeBSD.org](http://cvsup7.de.FreeBSD.org)
- [cvsup8.de.FreeBSD.org](http://cvsup8.de.FreeBSD.org)

Greece

- cvsуп.gr.FreeBSD.org
- cvsуп2.gr.FreeBSD.org

Hungary

- cvsуп.hu.FreeBSD.org

Iceland

- cvsуп.is.FreeBSD.org

Ireland

- cvsуп.ie.FreeBSD.org
- cvsуп2.ie.FreeBSD.org

Israel

- cvsуп.il.FreeBSD.org

Italy

- cvsуп.it.FreeBSD.org

Japan

- cvsуп.jp.FreeBSD.org
- cvsуп2.jp.FreeBSD.org
- cvsуп3.jp.FreeBSD.org
- cvsуп4.jp.FreeBSD.org
- cvsуп5.jp.FreeBSD.org

- cvsup6.jp.FreeBSD.org

Korea

- cvsup.kr.FreeBSD.org
- cvsup2.kr.FreeBSD.org
- cvsup3.kr.FreeBSD.org

Kuwait

- cvsup1.kw.FreeBSD.org

Kyrgyzstan

- cvsup.kg.FreeBSD.org

Latvia

- cvsup.lv.FreeBSD.org
- cvsup2.lv.FreeBSD.org

Lithuania

- cvsup.lt.FreeBSD.org
- cvsup2.lt.FreeBSD.org
- cvsup3.lt.FreeBSD.org

Netherlands

- cvsup.nl.FreeBSD.org
- cvsup2.nl.FreeBSD.org
- cvsup3.nl.FreeBSD.org

New Zealand

- cvsup.nz.FreeBSD.org

Norway

- cvsup.no.FreeBSD.org

Philippines

- cvsup1.ph.FreeBSD.org

Poland

- cvsup.pl.FreeBSD.org
- cvsup2.pl.FreeBSD.org
- cvsup3.pl.FreeBSD.org

Portugal

- cvsup.pt.FreeBSD.org
- cvsup2.pt.FreeBSD.org
- cvsup3.pt.FreeBSD.org

Romania

- cvsup.ro.FreeBSD.org
- cvsup1.ro.FreeBSD.org
- cvsup2.ro.FreeBSD.org
- cvsup3.ro.FreeBSD.org

Russia

- cvsup.ru.FreeBSD.org
- cvsup2.ru.FreeBSD.org
- cvsup3.ru.FreeBSD.org
- cvsup4.ru.FreeBSD.org
- cvsup5.ru.FreeBSD.org
- cvsup6.ru.FreeBSD.org
- cvsup7.ru.FreeBSD.org

San Marino

- cvsup.sm.FreeBSD.org

Singapore

- cvsup.sg.FreeBSD.org

Slovak Republic

- cvsup.sk.FreeBSD.org

Slovenia

- cvsup.si.FreeBSD.org
- cvsup2.si.FreeBSD.org

South Africa

- cvsup.za.FreeBSD.org
- cvsup2.za.FreeBSD.org

Spain

- cvsup.es.FreeBSD.org
- cvsup2.es.FreeBSD.org
- cvsup3.es.FreeBSD.org

Sweden

- cvsup.se.FreeBSD.org
- cvsup2.se.FreeBSD.org

Switzerland

- cvsup.ch.FreeBSD.org

Taiwan

- cvsup.tw.FreeBSD.org
- cvsup3.tw.FreeBSD.org
- cvsup4.tw.FreeBSD.org
- cvsup5.tw.FreeBSD.org
- cvsup6.tw.FreeBSD.org
- cvsup7.tw.FreeBSD.org
- cvsup8.tw.FreeBSD.org
- cvsup9.tw.FreeBSD.org
- cvsup10.tw.FreeBSD.org
- cvsup11.tw.FreeBSD.org
- cvsup12.tw.FreeBSD.org
- cvsup13.tw.FreeBSD.org
- cvsup14.tw.FreeBSD.org

Thailand

- cvsup.th.FreeBSD.org

Turkey

- cvsup.tr.FreeBSD.org
- cvsup2.tr.FreeBSD.org

Ukraine

- cvsup2.ua.FreeBSD.org
- cvsup3.ua.FreeBSD.org
- cvsup5.ua.FreeBSD.org
- cvsup6.ua.FreeBSD.org
- cvsup7.ua.FreeBSD.org

United Kingdom

- cvsup.uk.FreeBSD.org
- cvsup2.uk.FreeBSD.org
- cvsup3.uk.FreeBSD.org
- cvsup4.uk.FreeBSD.org

USA

- cvsup1.us.FreeBSD.org
- cvsup2.us.FreeBSD.org
- cvsup3.us.FreeBSD.org
- cvsup4.us.FreeBSD.org
- cvsup5.us.FreeBSD.org
- cvsup6.us.FreeBSD.org
- cvsup7.us.FreeBSD.org
- cvsup8.us.FreeBSD.org

- cvsup9.us.FreeBSD.org
- cvsup10.us.FreeBSD.org
- cvsup11.us.FreeBSD.org
- cvsup12.us.FreeBSD.org
- cvsup13.us.FreeBSD.org
- cvsup14.us.FreeBSD.org
- cvsup15.us.FreeBSD.org
- cvsup16.us.FreeBSD.org
- cvsup18.us.FreeBSD.org

## A.7 ÅôéêÝôåò (Tags) ãéá ôi CVS

¼ôáí êáôåâÜæåôå P áíáíäþíåôå ôiï ðçãåßí ëþäééå íÝóù ôçò **cvs** ç ôçò **CVSup**, èá ðñÝðåé íá êáèïñßóåôå ìéá åôéêÝôá Ýêäïöçò (revision tag). Já revision tag áíáöÝñåôåé åßôå óå ìéá óôåååñëíÝíç ðïñåßá áíÜðôôïçò ôiõ FreeBSD, åßôå óå Ýíá óôåååñëíÝíç ÷ñiíéü óçìåßí. I ðñþbòïò ôýðïò iññÜæåôåé “åôéêÝôå êëÜäïò (branch tag)”, êáé i äåýôåñïò iññÜæåôåé “åôéêÝôå Ýêäïöçò (release tag)”.

### A.7.1 ÅôéêÝôåò ÈëÜäùí (Branch Tags)

¼ëåò áôôÝò, iå ôçí åâåßñåôç ôiõ HEAD (ôi iðiñßí åßíáé ðÜíôá Ýâëññç åôéêÝôå), éo÷ýiõi ïüñií ãéá ôi äÝíññi src/. Ôá åÝíññá ports/, doc/, êáé www/ äáí Ý÷iõí êëÜäïò.

#### HEAD

Ðñüéåôåé ãéá ôi óðiññééü üññá ôçò éýñéåò ãññíPò áíÜðôôïçò, P FreeBSD-CURRENT. Åßíáé åðßóçò ôi ðññåðéååñíÝíç tag áí äáí êáèïñéôåß êÜðiëí ðôååñëíÝíç revision.

Óoi **CVSup**, ôi tag áôôü áíôéðññòùðåýåôåé áðü ìéá . (äáí ðññüåéôåé ãéá óçìåßí óôßíçò ôçò ðññüôåóçò, áëëÜ ãéá ðññåñåôéü ÷ñáññåñá .).

**Óçìåßñóç:** Óôî CVS, áôôP åßíáé êáé ç ðññåðéëíäP áí äáí êáèïñéôåß revision tag. ÓôîPèùò äåí åßíáé êáëP éäÝá íá êÜíåôå checkout êáé áíáíÝúóç óôñí ðçãåßí ëþäééå ôiõ CURRENT óå Ýíá ìç÷Üíçìá STABLE, åêôüò áí áôôP åßíáé ðññåñåôéü ç ðññüèåôç óåò .

#### RELENG\_9

Ç ãññíP áíÜðôôïçò ãéá ôi FreeBSD-9.X, ãíñóôP åðßóçò êáé ùò FreeBSD 9-STABLE

## RELENG\_9\_0

Ç ãñáìíP Ýêäïóçò ôiõ FreeBSD-9.0, ÷ñçóëiïðïéåßôáé lüñi ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

## RELENG\_8

Ç ãñáìíP áíÜðôõîçò ãéá ôi FreeBSD-8.X, ãíùóôP åðßóçò êáé ùò FreeBSD 8-STABLE

## RELENG\_8\_2

Ç ãñáìíP Ýêäïóçò ôiõ FreeBSD-8.2, ÷ñçóëiïðïéåßôáé lüñi ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

## RELENG\_8\_1

Ç ãñáìíP Ýêäïóçò ôiõ FreeBSD-8.1, ÷ñçóëiïðïéåßôáé lüñi ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

## RELENG\_8\_0

Ç ãñáìíP Ýêäïóçò ôiõ FreeBSD-8.0, ÷ñçóëiïðïéåßôáé lüñi ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

## RELENG\_7

Ç ãñáìíP áíÜðôõîçò ãéá ôi FreeBSD-7.X, ãíùóôP åðßóçò êáé ùò FreeBSD 7-STABLE

## RELENG\_7\_4

Ç ãñáìíP Ýêäïóçò ôiõ FreeBSD-7.4, ÷ñçóëiïðïéåßôáé lüñi ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

## RELENG\_7\_3

Ç ãñáìíP Ýêäïóçò ôiõ FreeBSD-7.3, ÷ñçóëiïðïéåßôáé lüñi ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

## RELENG\_7\_2

Ç ãñáìíP Ýêäïóçò ôiõ FreeBSD-7.2, ÷ñçóëiïðïéåßôáé lüñi ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

## RELENG\_7\_1

Ç ãñáìíP Ýêäïóçò ôiõ FreeBSD-7.1, ÷ñçóëiïðïéåßôáé lüñi ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

## RELENG\_7\_0

Ç ãñáìíP Ýêäïóçò ôiõ FreeBSD-7.0, ÷ñçóëiïðïéåßôáé lüñi ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

## RELENG\_6

Ç ãñáìíP áíÜðôõîçò ãéá ôi FreeBSD-6.X, ãíùóôP åðßóçò êáé ùò FreeBSD 6-STABLE

## RELENG\_6\_4

Ç ãñáìíP Ýêäïóçò ôiõ FreeBSD-6.4, ÷ñçóéiiðíéåßôáé iüñi ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

## RELENG\_6\_3

Ç ãñáìíP Ýêäïóçò ôiõ FreeBSD-6.3, ÷ñçóéiiðíéåßôáé iüñi ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

## RELENG\_6\_2

Ç ãñáìíP Ýêäïóçò ôiõ FreeBSD-6.2, ÷ñçóéiiðíéåßôáé iüñi ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

## RELENG\_6\_1

Ç ãñáìíP Ýêäïóçò ôiõ FreeBSD-6.1, ÷ñçóéiiðíéåßôáé iüñi ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

## RELENG\_6\_0

Ç ãñáìíP Ýêäïóçò ôiõ FreeBSD-6.0, ÷ñçóéiiðíéåßôáé iüñi ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

## RELENG\_5

Ç ãñáìíP áíÜðôõíçò ãéá ôi FreeBSD-5.X, áíùóôP åðßóçò ùò FreeBSD 5-STABLE.

## RELENG\_5\_5

Ç ãñáìíP Ýêäïóçò ôiõ FreeBSD-5.5, ÷ñçóéiiðíéåßôáé iüñi ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

## RELENG\_5\_4

Ç ãñáìíP Ýêäïóçò ôiõ FreeBSD-5.4, ÷ñçóéiiðíéåßôáé iüñi ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

## RELENG\_5\_3

Ç ãñáìíP Ýêäïóçò ôiõ FreeBSD-5.3, ÷ñçóéiiðíéåßôáé iüñi ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

## RELENG\_5\_2

Ç ãñáìíP Ýêäïóçò FreeBSD-5.2 êáé FreeBSD-5.2.1, ÷ñçóéiiðíéåßôáé iüñi ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

## RELENG\_5\_1

Ç ãñáìíP Ýêäïóçò ãéá ôi FreeBSD-5.1, ÷ñçóéiiðíéåßôáé iüñi ãéá ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

## RELENG\_5\_0

Ç ãñáìíP Ýêäïóçò ãéá ôi FreeBSD-5.0, ÷ñçóéiiðíéåßôáé iüñi ãéá áíçìåñþóåéò áóöáëåßáò êáé Üëëåò êñßóéiåò äéïñèþóåéò.

#### **RELENG\_4**

Ç ãñáìíP áíÜðôõîçò ãéá ôi FreeBSD-4.X, ãíùóôP åðßóçò êáé ùò FreeBSD 4-STABLE.

#### **RELENG\_4\_11**

Ç ãñáìíP Ýêäïöçò ãéá ôi FreeBSD-4.11, ÷ñçóëíïðíéåßôáé ìüñí ãéá áíçìåñþóåéò áóöáæåßáò êáé Üëëåò êñßóéíåò äéïñèþóåéò.

#### **RELENG\_4\_10**

Ç ãñáìíP Ýêäïöçò ãéá ôi FreeBSD-4.10, ÷ñçóëíïðíéåßôáé ìüñí ãéá áíçìåñþóåéò áóöáæåßáò êáé Üëëåò êñßóéíåò äéïñèþóåéò.

#### **RELENG\_4\_9**

Ç ãñáìíP Ýêäïöçò ãéá ôi FreeBSD-4.9, ÷ñçóëíïðíéåßôáé ìüñí ãéá áíçìåñþóåéò áóöáæåßáò êáé Üëëåò êñßóéíåò äéïñèþóåéò.

#### **RELENG\_4\_8**

Ç ãñáìíP Ýêäïöçò ãéá ôi FreeBSD-4.8, ÷ñçóëíïðíéåßôáé ìüñí ãéá áíçìåñþóåéò áóöáæåßáò êáé Üëëåò êñßóéíåò äéïñèþóåéò.

#### **RELENG\_4\_7**

Ç ãñáìíP Ýêäïöçò ãéá ôi FreeBSD-4.7, ÷ñçóëíïðíéåßôáé ìüñí ãéá áíçìåñþóåéò áóöáæåßáò êáé Üëëåò êñßóéíåò äéïñèþóåéò.

#### **RELENG\_4\_6**

Ç ãñáìíP Ýêäïöçò ãéá ôá FreeBSD-4.6 êáé FreeBSD-4.6.2, ÷ñçóëíïðíéåßôáé ìüñí ãéá áíçìåñþóåéò áóöáæåßáò êáé Üëëåò êñßóéíåò äéïñèþóåéò.

#### **RELENG\_4\_5**

Ç ãñáìíP Ýêäïöçò ãéá ôi FreeBSD-4.5, ÷ñçóëíïðíéåßôáé ìüñí ãéá áíçìåñþóåéò áóöáæåßáò êáé Üëëåò êñßóéíåò äéïñèþóåéò.

#### **RELENG\_4\_4**

Ç ãñáìíP Ýêäïöçò ãéá ôi FreeBSD-4.4, ÷ñçóëíïðíéåßôáé ìüñí ãéá áíçìåñþóåéò áóöáæåßáò êáé Üëëåò êñßóéíåò äéïñèþóåéò.

#### **RELENG\_4\_3**

Ç ãñáìíP Ýêäïöçò ãéá ôi FreeBSD-4.3, ÷ñçóëíïðíéåßôáé ìüñí ãéá áíçìåñþóåéò áóöáæåßáò êáé Üëëåò êñßóéíåò äéïñèþóåéò.

#### **RELENG\_3**

Ç ãñáìíP áíÜðôõîçò ãéá ôi FreeBSD-3.X, ãíùóôP åðßóçò êáé ùò 3.X-STABLE.

#### **RELENG\_2\_2**

Ç ãñáìíP áíÜðôõîçò ãéá ôi FreeBSD-2.2.X, ãíùóôP åðßóçò êáé ùò 2.2-STABLE. Ç ãñáìíP áðôP èåùñåßôáé ïðóéåôôéêÜ ðáñù ÷çíÝíç.

## A.7.2 ÅôéêÝôåò Åêäüóåùí (Release Tags)

Íé åôéêÝôåò áôôÝò áíáöÝñíöáé óå íéá óðaâéâññíÝíç ÷ññíéêP óôéâíP êáôÜ ôçí iðiñá Ýâéíá íéá êáññíéêP Ýeäïöç (release) ôi FreeBSD. Ç äéäéêáóßá ôçò Ýeäïöçò ôâéïçñéþíåôáé íå ðåñéóóüôåñåò eåðôñÝñåéåò óóá Ýâññáóá Ðëçññiñßåò Äéäéêáóßå ïäiñöçò (<http://www.FreeBSD.org/releng/>) êáé Äéäéêáóßå ïäiñöçò ([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/articles/releng/release-proc.html](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/releng/release-proc.html)). Ôi äÝíöññ src ÷ñçóéññiñéåß iññiñåå áôéêåðþí ðiõ íâééñíý íå ôç ëÝíç RELENG\_. Óá äÝíöññ ports êáé doc ÷ñçóéññiñéýí áôéêÝôåò ðiõ íâééñíý íå ôç ëÝíç RELEASE. ÓÝëiø, ôöi äÝíöññ www ååí äßíåôáé êÜðiéá åéäéêP åôéêÝôå ðiõ íá Ý ÷åé ó ÷Ýóç íå ôéò åéäüóåéò.

RELENG\_9\_0\_0\_RELEASE

FreeBSD 9.0

RELENG\_8\_2\_0\_RELEASE

FreeBSD 8.2

RELENG\_8\_1\_0\_RELEASE

FreeBSD 8.1

RELENG\_8\_0\_0\_RELEASE

FreeBSD 8.0

RELENG\_7\_4\_0\_RELEASE

FreeBSD 7.4

RELENG\_7\_3\_0\_RELEASE

FreeBSD 7.3

RELENG\_7\_2\_0\_RELEASE

FreeBSD 7.2

RELENG\_7\_1\_0\_RELEASE

FreeBSD 7.1

RELENG\_7\_0\_0\_RELEASE

FreeBSD 7.0

RELENG\_6\_4\_0\_RELEASE

FreeBSD 6.4

RELENG\_6\_3\_0\_RELEASE

FreeBSD 6.3

RELENG\_6\_2\_0\_RELEASE

FreeBSD 6.2

RELENG\_6\_1\_0\_RELEASE

FreeBSD 6.1

RELENG\_6\_0\_0\_RELEASE

FreeBSD 6.0

RELENG\_5\_5\_0\_RELEASE

FreeBSD 5.5

RELENG\_5\_4\_0\_RELEASE

FreeBSD 5.4

RELENG\_4\_11\_0\_RELEASE

FreeBSD 4.11

RELENG\_5\_3\_0\_RELEASE

FreeBSD 5.3

RELENG\_4\_10\_0\_RELEASE

FreeBSD 4.10

RELENG\_5\_2\_1\_RELEASE

FreeBSD 5.2.1

RELENG\_5\_2\_0\_RELEASE

FreeBSD 5.2

RELENG\_4\_9\_0\_RELEASE

FreeBSD 4.9

RELENG\_5\_1\_0\_RELEASE

FreeBSD 5.1

RELENG\_4\_8\_0\_RELEASE

FreeBSD 4.8

RELENG\_5\_0\_0\_RELEASE

FreeBSD 5.0

RELENG\_4\_7\_0\_RELEASE

FreeBSD 4.7

RELENG\_4\_6\_2\_RELEASE

FreeBSD 4.6.2

RELENG\_4\_6\_1\_RELEASE

FreeBSD 4.6.1

RELENG\_4\_6\_0\_RELEASE

FreeBSD 4.6

RELENG\_4\_5\_0\_RELEASE

FreeBSD 4.5

RELENG\_4\_4\_0\_RELEASE

FreeBSD 4.4

RELENG\_4\_3\_0\_RELEASE

FreeBSD 4.3

RELENG\_4\_2\_0\_RELEASE

FreeBSD 4.2

RELENG\_4\_1\_1\_RELEASE

FreeBSD 4.1.1

RELENG\_4\_1\_0\_RELEASE

FreeBSD 4.1

RELENG\_4\_0\_0\_RELEASE

FreeBSD 4.0

RELENG\_3\_5\_0\_RELEASE

FreeBSD-3.5

RELENG\_3\_4\_0\_RELEASE

FreeBSD-3.4

RELENG\_3\_3\_0\_RELEASE

FreeBSD-3.3

RELENG\_3\_2\_0\_RELEASE

FreeBSD-3.2

RELENG\_3\_1\_0\_RELEASE

FreeBSD-3.1

RELENG\_3\_0\_0\_RELEASE

FreeBSD-3.0

RELENG\_2\_2\_8\_RELEASE

FreeBSD-2.2.8

RELENG\_2\_2\_7\_RELEASE

FreeBSD-2.2.7

RELENG\_2\_2\_6\_RELEASE

FreeBSD-2.2.6

RELENG\_2\_2\_5\_RELEASE

FreeBSD-2.2.5

RELENG\_2\_2\_2\_RELEASE

FreeBSD-2.2.2

RELENG\_2\_2\_1\_RELEASE

FreeBSD-2.2.1

RELENG\_2\_2\_0\_RELEASE

FreeBSD-2.2.0

## A.8 Óïðïèåóßåò AFS

Åîõðçñåôçô Ýò AFS ãéá ôi FreeBSD èá åñåßôå óôéò áêüëiõèåò ðiõðïèåóßåò:

Óïðçäßá

```
Ç áéáäññíþ áéá õá áñ÷åßá åßíáé: /afs/stacken.kth.se/ftp/pub/FreeBSD/
stacken.kth.se          # Stacken Computer Club, KTH, Sweden
130.237.234.43          #hot.stacken.kth.se
130.237.237.230         #fishburger.stacken.kth.se
130.237.234.3           #milko.stacken.kth.se
```

Óðåýèõñò ÓðíôÞñçóçò: <ftp@stacken.kth.se>

## A.9 Óïðïèåóßåò rsync

Ôi FreeBSD åßíáé áéac Ýóeii iÝóù õiõ ðñùôïêüëeiõ rsync óôéò áêüëiõèåò ðiõðïèåóßåò. Ôi áïçèçôéêü ðñüäñâià rsync ëåéöiõñååß iå ðåñßiõ õiñ ßæéí õñüõi iå õçí áïðiõþ rcp(1), áëeÜ Ý÷åé ðåñéóóüôåñåò åðééiäÝò êáé ÷ñçóéiiõíéåß ôi ðñùôiüéiæi åðñåéññòi Ýíçò áíáíÝùóçò õi iðiñi iåôåö Ýñåé iüñi õeò áéáöimÝò iåôåáý äýí óåô áñ÷åßùí, åðéóá ÷ýññóå Ýóóé éäéåßôåñá õi óðä÷ññéiõi iÝóù õiõ áéêðýiõ. Áðôü åßíáé ðåñéóóüôåñi ÷ñÞóeii áí áéáðçñåßôå mirror ôiõ áéåéiõéóþ FTP þ ôiõ CVS Repository ôiõ FreeBSD. Ç óðééiþ åöáññäþí rsync áéåôßèåôáé áéá ðíeeÜ ëåéöiõññæéÜ óðóôÞiaóá, óóí FreeBSD äåßôå ôi port net/rsync þ ÷ñçóéiiðiéÞóôå ôi áiðßóôié ÷i ðáéÝói.

Äçííêñáôßá ôçò Ôóâ÷ßáò

rsync://ftp.cz.FreeBSD.org/

ÄéáèÝóéíåò ÓõëëíäÝò:

- ftp: Íåñéêü mirror ôiõ äéáêííéóôFTP ôiõ FreeBSD.
- FreeBSD: ĐëPñåò mirror ôiõ äéáêííéóôFTP ôiõ FreeBSD.

Íéëáíäßá

rsync://ftp.nl.FreeBSD.org/

ÄéáèÝóéíåò ÓõëëíäÝò:

- FreeBSD: ĐëPñåò mirror ôiõ äéáêííéóôFTP ôiõ FreeBSD.

Ñùóßá

rsync://ftp.mtu.ru/

ÄéáèÝóéíåò ÓõëëíäÝò:

- FreeBSD: ĐëPñåò mirror ôiõ äéáêííéóôFTP ôiõ FreeBSD.
- FreeBSD-gnats: Ç âÜóç äääïíÝíùí ôiõ óõóôPìáôïò ðáñáêííýèçóçò óöáëíÜôùí GNATS.
- FreeBSD-Archive: Mirror ôiõ äéáêííéóôFTP ðáëáéüôåñùí åéäüóåùí (archive) ôiõ FreeBSD.

Óõçäßá

rsync://ftp4.se.freebsd.org/

ÄéáèÝóéíåò ÓõëëíäÝò:

- FreeBSD: ĐëPñåò mirror ôiõ äéáêííéóôFTP ôiõ FreeBSD

ÔáÀâÜí

rsync://ftp.tw.FreeBSD.org/

rsync://ftp2.tw.FreeBSD.org/

rsync://ftp6.tw.FreeBSD.org/

ÄéáèÝóéíåò ÓõëëíäÝò:

- FreeBSD: ĐëPñåò mirror ôiõ äéáêííéóôFTP ôiõ FreeBSD.

ÇíùÍí Åáóßëåéí

rsync://rsync.mirrorservice.org/

ÄéáèÝóéíåò ÓõëëíäÝò:

- sites/ftp.freebsd.org: ĐëPñåò mirror ôí ãéáêñéóôP FTP ôí FreeBSD.

ÇíùìÝíåò Đíëéôåßåò ÁìåñéêPò

rsync://ftp-master.FreeBSD.org/

Í ãéáêñéóôPò áðòüò iðinåß íá ÷ñçóéiiðiéçèåß iüñí áðü êýñéá mirror sites ôí FreeBSD.

ÄéáèÝóéíåò ÓõëëäÝò:

- FreeBSD: To êýñéí (master) óýóôçìá áñ÷åßùí ôí ãéáêñéóôP FTP ôí FreeBSD.
- acl: Ç êýñéá ëßóôá ACL ôí FreeBSD.

rsync://ftp13.FreeBSD.org/

ÄéáèÝóéíåò ÓõëëäÝò:

- FreeBSD: ĐëPñåò mirror ôí ãéáêñéóôP FTP ôí FreeBSD.

# ĐáñÜñôçìá B. Âéâëéïãñáößá

Áí êáé ôá manual pages ðáñÝ÷iõí iñá áðßóçìç áíáöiñÜ ãéá íå÷ùñéóôÜ òiPiáôá ôiô FreeBSD ëåéóïõñääéiy óðôôPiáôiô, Ý÷iõí êáéP öPiç ãéá òi üðé ãáí áðâîçäiyí ðuò íá áípóâèô ôá òiPiáôá iáæß ãéá íá êÜíåéò üei òi ëåéóïõñääéü óýóôçìá íá ëåéóïõñääôÜ ñáéÜ. Áéá áðóü, ãáí õðÜñ÷åé õðiêåôÜóðåöi áðü Ýíá êáéü âéâëßí ôôçí ãéá÷âßñéóç óðôôçìÜôùí UNIX êáé Ýíá êáéü áâ÷âéñßäéí ÷ñPiôôç.

## B.1 Âéâëßá & ĐåñéïäéêÜ ó÷åôééÜ iá ôi FreeBSD

ÂéâëiP âéâëßá & ðåñéïäéêÜ:

- Using FreeBSD (<http://jdli.tw.FreeBSD.org/publication/book/freebsd2/index.htm>) (óá ĐáñáäiøéâéÜ ÊéíÝæéâá).
- FreeBSD Unleashed (ìåôÜõñáóç óá ÁðëiðiéçìÝíá ÊéíÝæéâá), âéäüèçêå áðü ôçí China Machine Press (<http://www.hzbook.com/>). ISBN 7-111-10201-0.
- FreeBSD From Scratch First Edition (óá ÁðëiðiéçìÝíá ÊéíÝæéâá), âéäüèçêå áðü ôçí China Machine Press. ISBN 7-111-07482-3.
- FreeBSD From Scratch Second Edition (óá ÁðëiðiéçìÝíá ÊéíÝæéâá), âéäüèçêå áðü ôçí China Machine Press. ISBN 7-111-10286-X.
- FreeBSD Handbook Second Edition (ìåôÜõñáóç óá ÁðëiðiéçìÝíá ÊéíÝæéâá), âéäüèçêå áðü ôçí Posts & Telecom Press (<http://www.ptpress.com.cn/>). ISBN 7-115-10541-3.
- FreeBSD 3.x Internet (óá ÁðëiðiéçìÝíá ÊéíÝæéâá), âéäüèçêå áðü ôçí Tsinghua University Press (<http://www.tup.tsinghua.edu.cn/>). ISBN 7-900625-66-6.
- FreeBSD & Windows (óá ÁðëiðiéçìÝíá ÊéíÝæéâá), âéäüèçêå áðü ôçí China Railway Publishing House (<http://www.tdpress.com/>). ISBN 7-113-03845-X
- FreeBSD Internet Services HOWTO (óá ÁðëiðiéçìÝíá ÊéíÝæéâá), âéäüèçêå áðü ôçí China Railway Publishing House. ISBN 7-113-03423-3
- FreeBSD for PC 98'ers (óôá ÅéáðùíÝæéâá), âéäüèçêå áðü ôçí SHUWA System Co, LTD. ISBN 4-87966-468-5 C3055 P2900E.
- FreeBSD (óôá ÅéáðùíÝæéâá), âéäüèçêå áðü ôçí CUTT. ISBN 4-906391-22-2 C3055 P2400E.
- Complete Introduction to FreeBSD (<http://www.shoeisha.com/book/Detail.asp?bid=650>) (óôá ÅéáðùíÝæéâá), âéäüèçêå áðü ôçí Shoeisha Co., Ltd (<http://www.shoeisha.co.jp/>). ISBN 4-88135-473-6 P3600E.
- Personal UNIX Starter Kit FreeBSD (<http://www.ascii.co.jp/pb/book1/shinkan/detail/1322785.html>) (óôá ÅéáðùíÝæéâá), âéäüèçêå áðü ôçí ASCII (<http://www.ascii.co.jp/>). ISBN 4-7561-1733-3 P3000E.
- FreeBSD Handbook (ÅéáðùíÝæéêç iåôÜõñáóç), âéäüèçêå áðü ôçí ASCII (<http://www.ascii.co.jp/>). ISBN 4-7561-1580-2 P3800E.
- FreeBSD mit Methode (óôá ÅâñiáíéêÜ), âéäüèçêå áðü ôçí Computer und Literatur Verlag (<http://www.cul.de/>) Vertrieb Hanser, 1998. ISBN 3-932311-31-0.
- FreeBSD 4 - Installieren, Konfigurieren, Administrieren (<http://www.cul.de/freebsd.html>) (óôá ÅâñiáíéêÜ), âéäüèçêå áðü ôçí Computer und Literatur Verlag (<http://www.cul.de/>), 2001. ISBN 3-932311-88-4.

- FreeBSD 5 - Installieren, Konfigurieren, Administrieren (<http://www.cul.de/freebsd.html>) (óðá ÆññáíéêÜ), áðü ôçí Computer und Literatur Verlag (<http://www.cul.de>), 2003. ISBN 3-936546-06-1.
- FreeBSD de Luxe (<http://www.mitp.de/vmi/mitp/detail/pWert/1343/>) (óðá ÆññáíéêÜ), áðü ôçí Verlag Modere Industrie (<http://www.mitp.de>), 2003. ISBN 3-8266-1343-0.
- FreeBSD Install and Utilization Manual (<http://www.pc.mycom.co.jp/FreeBSD/install-manual.html>) (óðá ÆáðùÍæéâá), áðü ôçí Mainichi Communications Inc. (<http://www.pc.mycom.co.jp/>).
- Onno W Purbo, Dodi Maryanto, Syahrial Hubbany, Widjil Widodo *Building Internet Server with FreeBSD* (<http://maxwell.itb.ac.id/>) (óðçí ÉíäíçóéâP æþþóá), áðü ôçí Elex Media Komputindo (<http://www.elexmedia.co.id/>).
- Absolute BSD: The Ultimate Guide to FreeBSD (låðÜöñáóç óá ĐáññáäíóéâÜ ÊéÍYæéâá), áðü ôçí GrandTech Press (<http://www.grandtech.com.tw/>), 2003. ISBN 986-7944-92-5.
- The FreeBSD 6.0 Book (<http://www.twsd.org/cht/book/>) (óá ĐáññáäíóéâÜ ÊéÍYæéâá), áðü ôçí Drmaster, 2006. ISBN 9-575-27878-X.

Âéâëþá & ðåñéiäéêÜ óðçí ÁâñëééP æþþóá:

- Absolute FreeBSD, 2nd Edition: The Complete Guide to FreeBSD (<http://www.absoluteFreeBSD.com/>), áðü ôçí No Starch Press (<http://www.nostarch.com/>), 2007. ISBN: 978-1-59327-151-0
- The Complete FreeBSD (<http://www.freebsdmall.com/cgi-bin/fm/bsdcomp>), áðü ôçí O'Reilly (<http://www.oreilly.com/>), 2003. ISBN: 0596005164
- The FreeBSD Corporate Networker's Guide (<http://www.freebsd-corp-net-guide.com/>), áðü ôçí Addison-Wesley (<http://www.awl.com/aw/>), 2000. ISBN: 0201704811
- FreeBSD: An Open-Source Operating System for Your Personal Computer (<http://andrsn.stanford.edu/FreeBSD/introbook/>), áðü ôçí The Bit Tree Press, 2001. ISBN: 0971204500
- Teach Yourself FreeBSD in 24 Hours, áðü ôçí Sams (<http://www.samspublishing.com/>), 2002. ISBN: 0672324245
- FreeBSD 6 Unleashed, áðü ôçí Sams (<http://www.samspublishing.com/>), 2006. ISBN: 0672328755
- FreeBSD: The Complete Reference, áðü ôçí McGrawHill (<http://books.mcgraw-hill.com>), 2003. ISBN: 0072224096
- BSD Magazine (<http://www.bsdmag.org>), áðü ôçí Software Press Sp. z o.o. SK. ISSN 1898-9144

## B.2 İäçäïß ÷ ñþóôç

- Computer Systems Research Group, UC Berkeley. *4.4BSD User's Reference Manual*. O'Reilly & Associates, Inc., 1994. ISBN 1-56592-075-9
- Computer Systems Research Group, UC Berkeley. *4.4BSD User's Supplementary Documents*. O'Reilly & Associates, Inc., 1994. ISBN 1-56592-076-7
- *UNIX in a Nutshell*. O'Reilly & Associates, Inc., 1990. ISBN 093717520X
- Mui, Linda. *What You Need To Know When You Can't Find Your UNIX System Administrator*. O'Reilly & Associates, Inc., 1995. ISBN 1-56592-104-6

- Ôí Ohio State University (<http://www.osu.edu/>) Ýãñáøå óá ÅéóáäùãéêÜ ìáèÞiaðá UNIX ([http://8help.osu.edu/wks/unix\\_course/unix.html](http://8help.osu.edu/wks/unix_course/unix.html)) ðiõ äéáððèáíðáé óá HTML êáé óá iiñöþ PostScript.  
Íéá Éðáëéêþ ìåðÜöñáóç ([http://www.FreeBSD.org/doc/it\\_IT.ISO8859-15/books/unix-introduction/index.html](http://www.FreeBSD.org/doc/it_IT.ISO8859-15/books/unix-introduction/index.html)) áððíý õiõ êáéÝíñò äéáððèáóáé ùò ïÝñíò õiõ FreeBSD Italian Documentation Project.
- Jpman Project, Japan FreeBSD Users Group (<http://www.jp.FreeBSD.org/>). FreeBSD User's Reference Manual (<http://www.pc.mycom.co.jp/FreeBSD/urm.html>) (Japanese translation). Mainichi Communications Inc. (<http://www.pc.mycom.co.jp/>), 1998. ISBN4-8399-0088-4 P3800E.
- Ôí Edinburgh University (<http://www.ed.ac.uk/>) Ýãñáøå Ýíá Online iäçäü (<http://unixhelp.ed.ac.uk/>) áéá íÝíñò óóï ðåñéáÜëëí õiõ UNIX.

## B.3 Iäçäïß äéá ÷ åéñéóôþ

- Albitz, Paul and Liu, Cricket. *DNS and BIND*, 4th Ed. O'Reilly & Associates, Inc., 2001. ISBN 1-59600-158-4
- Computer Systems Research Group, UC Berkeley. *4.4BSD System Manager's Manual*. O'Reilly & Associates, Inc., 1994. ISBN 1-56592-080-5
- Costales, Brian, et al. *Sendmail*, 2nd Ed. O'Reilly & Associates, Inc., 1997. ISBN 1-56592-222-0
- Frisch, Aéleen. *Essential System Administration*, 2nd Ed. O'Reilly & Associates, Inc., 1995. ISBN 1-56592-127-5
- Hunt, Craig. *TCP/IP Network Administration*, 2nd Ed. O'Reilly & Associates, Inc., 1997. ISBN 1-56592-322-7
- Nemeth, Evi. *UNIX System Administration Handbook*. 3rd Ed. Prentice Hall, 2000. ISBN 0-13-020601-6
- Stern, Hal *Managing NFS and NIS* O'Reilly & Associates, Inc., 1991. ISBN 0-937175-75-7
- Jpman Project, Japan FreeBSD Users Group (<http://www.jp.FreeBSD.org/>). FreeBSD System Administrator's Manual (<http://www.pc.mycom.co.jp/FreeBSD/sam.html>) (ÅéáðùÝæéêç ìåðÜöñáóç). Mainichi Communications Inc. (<http://www.pc.mycom.co.jp/>), 1998. ISBN4-8399-0109-0 P3300E.
- Dreyfus, Emmanuel. Cahiers de l'Admin: BSD (<http://www.eyrolles.com/Informatique/Livre/9782212114638/>) 2nd Ed. (óóá ÅáëééêÜ), Eyrolles, 2004. ISBN 2-212-11463-X

## B.4 Iäçäïß ðñïäñáìäóéóôþí

- Asente, Paul, Converse, Diana, and Swick, Ralph. *X Window System Toolkit*. Digital Press, 1998. ISBN 1-55558-178-1
- Computer Systems Research Group, UC Berkeley. *4.4BSD Programmer's Reference Manual*. O'Reilly & Associates, Inc., 1994. ISBN 1-56592-078-3
- Computer Systems Research Group, UC Berkeley. *4.4BSD Programmer's Supplementary Documents*. O'Reilly & Associates, Inc., 1994. ISBN 1-56592-079-1
- Harbison, Samuel P. and Steele, Guy L. Jr. *C: A Reference Manual*. 4th ed. Prentice Hall, 1995. ISBN 0-13-326224-3
- Kernighan, Brian and Dennis M. Ritchie. *The C Programming Language*. 2nd Ed. PTR Prentice Hall, 1988. ISBN 0-13-110362-8

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- McKusick, Marshall Kirk, Keith Bostic, Michael J Karels, and John Quarterman. *The Design and Implementation of the 4.4BSD Operating System*. Reading, Mass. : Addison-Wesley, 1996. ISBN 0-201-54979-4  
(Ôí êåöÜéáéí 2 áðü áðôü ôí âéâëßí äéáôßèåðáé online  
([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/books/design-44bsd/book.html](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/design-44bsd/book.html)) ùò iÝñiò ôíõ FreeBSD Documentation Project, éáé ôí êåöÜéáéí 9 åäþ ([http://www.netapp.com/tech\\_library/nfsbook.html](http://www.netapp.com/tech_library/nfsbook.html)).)
- Marshall Kirk McKusick, George V. Neville-Neil *The Design and Implementation of the FreeBSD Operating System*. Boston, Mass. : Addison-Wesley, 2004. ISBN 0-201-70245-2
- Stevens, W. Richard. *TCP/IP Illustrated, Volume 1: The Protocols*. Reading, Mass. : Addison-Wesley, 1996. ISBN 0-201-63346-9
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- Stevens, W. Richard. *TCP/IP Illustrated, Volume 3: TCP for Transactions, HTTP, NNTP and the UNIX Domain Protocols*. Reading, Mass. : Addison-Wesley, 1996. ISBN 0-201-63495-3
- Vahalia, Uresh. *UNIX Internals -- The New Frontiers*. Prentice Hall, 1996. ISBN 0-13-101908-2
- Wright, Gary R. and W. Richard Stevens. *TCP/IP Illustrated, Volume 2: The Implementation*. Reading, Mass. : Addison-Wesley, 1995. ISBN 0-201-63354-X

## B.6 ÁíáöiñÝò áóöáëåßáò

- Cheswick, William R. and Steven M. Bellovin. *Firewalls and Internet Security: Repelling the Wily Hacker.* Reading, Mass. : Addison-Wesley, 1995. ISBN 0-201-63357-4
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## B.7 ÁíáöiñÝò õëéëíý

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- Shanley, Tom. *80486 System Architecture.* 3rd ed. Reading, Mass. : Addison-Wesley, 1995. ISBN 0-201-40994-1
- Shanley, Tom. *ISA System Architecture.* 3rd ed. Reading, Mass. : Addison-Wesley, 1995. ISBN 0-201-40996-8
- Shanley, Tom. *PCI System Architecture.* 4th ed. Reading, Mass. : Addison-Wesley, 1999. ISBN 0-201-30974-2
- Van Gilluwe, Frank. *The Undocumented PC,* 2nd Ed. Reading, Mass: Addison-Wesley Pub. Co., 1996. ISBN 0-201-47950-8
- Messmer, Hans-Peter. *The Indispensable PC Hardware Book,* 4th Ed. Reading, Mass: Addison-Wesley Pub. Co., 2002. ISBN 0-201-59616-4

## B.8 Éóôiñßá ôïõ UNIX

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- Salus, Peter H. *A quarter century of UNIX.* Addison-Wesley Publishing Company, Inc., 1994. ISBN 0-201-54777-5
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- Don Libes, Sandy Ressler *Life with UNIX* — special edition. Prentice-Hall, Inc., 1989. ISBN 0-13-536657-7
- *The BSD family tree.* <http://www.FreeBSD.org/cgi/cvsweb.cgi/src/share/misc/bsd-family-tree> ç ôï /usr/share/misc/bsd-family-tree óå Ýíá FreeBSD ìç ÷Üíçìá.
- *Networked Computer Science Technical Reports Library.* <http://www.ncstrl.org/>

- ĐáëáéÝò BSD åêäüüóåéò áðii ôi Computer Systems Research group (CSRG). <http://www.mckusick.com/csrg/>: Ôí 4CD set Ý÷åé üëåò ôéò BSD åêäüüóåéò áðü ôçí 1BSD iÝ÷ñé ôçí 4.4BSD êáé ôçí 4.4BSD-Lite2 (áëëÜ ü÷é ôçí 2.11BSD, äööôô÷þò). Ôí ôåëåôôáßí äéóéÜéé ðåñéÝ÷åé áðßóçò ôíí ôåëéêü ðçãáßí êþäéêá óõí ôá áñ÷åßá SCCS.

## B.9 ĐåñéïäéêÜ êáé åöçìåñßäåò

- *The C/C++ Users Journal*. R&D Publications Inc. ISSN 1075-2838
- *Sys Admin — The Journal for UNIX System Administrators* Miller Freeman, Inc., ISSN 1061-2688
- *freeX — Das Magazin für Linux - BSD - UNIX* (óôá ÅåñìáíéêÜ) Computer- und Literaturverlag GmbH, ISSN 1436-7033

# ĐáñÜñôçìá C. ĐçãÝò Đëçñïöüñçóçò óõi Äéáäßêôõi

Óóéó ðáñáêéÜóó áíüöôçôåò, éá áñâñbôá óá óçìáíðééüôðâñá óçìåßá áðééíéùíßáò íá óçí éíéüöôçôá ÷ñçôóþí öïõ FreeBSD. Áí áíüññßæåðâ ëáé Üëëåò ðçäÝò, íé íðíßåò äáí áíáóÝññóáé åäþí, ðáñáêáëÿíá íá óéò óôåñßæåðâ óôçí çéåðññíééþ ëßóðá ñÜááó óåéìññßùóçò öïõ FreeBSD (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-doc>) þþóá íá áíóá ÷ëÿíý êáé áôôÝò.

## C.1 Ëßóôåò Çëåêôñííééïý Ôá÷õäñííåßïö

**Óciàðúócs:** Áí èÝéâðå íá ãïééíÜóðåðå óçí ééáíüðôçóá óáð íá óóÝéâðå ìçíýíáðå óóéò ëßóðåðå ðïð FreeBSD, óóðæðéðå Ýíá ãïééíáðóééü ïþíðíá óóçí ëßóðå freebsd-test (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-test>). Ðáñáéäéïýíá ìç óóÝéâðå ãïééíáðóééü ìçíýíáðå óá ïðíéáäþðîðå Üëeç ëßóðå.

Áí âñbôéâñôå óå äbëçìá ó ÷ åôééÜ ià ôi ðíéá ëßôå íá óôåßëåôå iéá âñþôçóç, äåßôå ôi Ðùò íá ÷ ñçóéiiðíéåßôå iå åðéôô ÷ ßá ôçí ëßôå çéâéôñiiééý óå ÷ õäññiåbiô FreeBSD-questions ([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/articles/freebsd-questions](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/freebsd-questions)).

Ãáá ūéåò ôéò ðéßöôåò çéâéññíééiy óá ÷ ðäññíåâßiò áéâóçññâßöåé áñ ÷ áßi ìá ôéò ðáééÝò áçìiøéâýöåéò, ôóï iðiñßi iðiññâß íá áßiñâé áíáæÞöçöç ÷ ñçóéiiðiéþiôå òçí ÁéêôôåéÞ Öiðiæåôå ðiõ FreeBSD  
(<http://www.FreeBSD.org/search/index.html>). Åßiáé äöñâòÞ ç áíáæÞöçöç ôóï áñ ÷ áßi iÝóù ëÝiâù-ëëåéæþi, ôï iðiñßi áðiñôåéâß Yíá Üñéóòi ôñuði áéá íá âñâßöå áðáíòÞöåéò óå ôó ÷ iÝò åñuðòÞöåéò. Ðñéí óðôåßéâðå íéá åñþöçöç, êáéü èá áßiñâé íá ðñááíåðiðiéÞöåôå ìéá oÝöiéá áíáæÞöçöç. ÒçìåéÞöå ãðßöçò ùüðe óå içíýiâðå ðiõ ôó Ýëññôåé óå åðôöÝò ôéò

ëßóôåò áðièçêâýííôáé ãéá ðÜíôá. Áí óáò ðñiâæçìáôßæåé ç ðñiôðáóßá òùí ðñiôùðééþí óáò äåäñí Ýíñí, óáò óðíéôðíýíå íá ÷ñçóéiõðíéÞóåò ìéá äåðôåñâýíõóá äéâýèõíóç email, ëáé íá ìçí ãñÜöåôå ðiôÝ ðñiôùðééÝò óáò ðëçñïöüñßåò.

## C.1.1 Óýíøç Ëéóôþí

ÃåíééÝò èþóôåò: Íé áêüëiõèåò åßíáé ãåíéêÝò èßóôåò üðiõ i êáèÝíåò åßíáé åéâýèåñíò (ëáé åíèáññýåôáé) íá ðñiñåôÝ ÷åé:

Ëßóôá	Óéïðüò
freebsd-advocacy ( <a href="http://lists.FreeBSD.org/mailman/listinfo/freebsd-advocacy">http://lists.FreeBSD.org/mailman/listinfo/freebsd-advocacy</a> )	ÄéáöÞìéóç êáé ðñiþèçóç ôiõ FreeBSD
freebsd-announce ( <a href="http://lists.FreeBSD.org/mailman/listinfo/freebsd-announce">http://lists.FreeBSD.org/mailman/listinfo/freebsd-announce</a> )	ÓçìáíôééÜ ãåññüüôá êáé áíáæiéþóåéò
freebsd-arch ( <a href="http://lists.FreeBSD.org/mailman/listinfo/freebsd-arch">http://lists.FreeBSD.org/mailman/listinfo/freebsd-arch</a> )	ÓðæçôÞóåéò áñ÷éôâéôííéêÞò êáé ó÷åæáðíý
freebsd-bugbusters ( <a href="http://lists.FreeBSD.org/mailman/listinfo/freebsd-bugbusters">http://lists.FreeBSD.org/mailman/listinfo/freebsd-bugbusters</a> )	ÓðæçôÞóåéò ðiõ áíáöÝñíñôáé óðçí óðíðÞñçóç ôçò âÜóçò äåäñí Ýíñí áíáöüñÜò ðñiâæçíÜòùí ôiõ FreeBSD, êáé ôùí ó÷åðééþí åññåéåßùí ôçò
freebsd-bugs ( <a href="http://lists.FreeBSD.org/mailman/listinfo/freebsd-bugs">http://lists.FreeBSD.org/mailman/listinfo/freebsd-bugs</a> )	ÁíáöüñÝò óöáæíÜòùí
freebsd-chat ( <a href="http://lists.FreeBSD.org/mailman/listinfo/freebsd-chat">http://lists.FreeBSD.org/mailman/listinfo/freebsd-chat</a> )	Ìç-ôå ÷íééÜ èÝíáôá ðiõ ó÷åðßæiiôáé íå ôç ëíéüôçôá ôiõ FreeBSD
freebsd-chromium ( <a href="http://lists.FreeBSD.org/mailman/listinfo/freebsd-chromium">http://lists.FreeBSD.org/mailman/listinfo/freebsd-chromium</a> )	ÈÝíáôá ó÷åðééÜ íå ôi Chromium óôi FreeBSD
freebsd-current ( <a href="http://lists.FreeBSD.org/mailman/listinfo/freebsd-current">http://lists.FreeBSD.org/mailman/listinfo/freebsd-current</a> )	ÓðæçôÞóåéò ðiõ ó÷åðßæiiôáé íå ôç ÷ñÞóç FreeBSD-CURRENT
freebsd-isp ( <a href="http://lists.FreeBSD.org/mailman/listinfo/freebsd-isp">http://lists.FreeBSD.org/mailman/listinfo/freebsd-isp</a> )	ÈÝíáôá ãéá Dáñi: åßò Õðçñåóéþí Äéáæéôýíõ ðiõ ÷ñçóéiõðíéýí ôiõ FreeBSD
freebsd-jobs ( <a href="http://lists.FreeBSD.org/mailman/listinfo/freebsd-jobs">http://lists.FreeBSD.org/mailman/listinfo/freebsd-jobs</a> )	ÓðiâiõëåôééÝò õðçñåóßåò êáé èÝóåéò åññåóßåò ó÷åðééÝò íå FreeBSD
freebsd-policy ( <a href="http://lists.FreeBSD.org/mailman/listinfo/freebsd-policy">http://lists.FreeBSD.org/mailman/listinfo/freebsd-policy</a> )	ÈáôåõèõíôÞñéåò áðiõÜóåéò (policy) ôçò ñÜääåò FreeBSD Core. Èßóôá íå ìéñþ êßíçóç, êáé ìüñí ãéá áíÜäñúóç

## Ëßóôá

freebsd-questions  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-questions>)

freebsd-security-notifications  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-security-notifications>)

freebsd-stable  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-stable>)

freebsd-test  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-test>)

Óå÷íéêÝò éþóôåò: Íé áéüëíõèåò ëßóôåò åßíáé ãéá óå÷íéêÝò óõæçôÞóåéò. Ðñéí ãñ÷ßóåôå íá óõììåôÝ÷åôå êáé íá óôÝëíåôå íçýíåôå óå áôôÝò, èá ðñÝðåé íá äéáåÜóåôå ðñíóåôééÜ ôçí ðåñéãñáöÞ ôiõò. ÓðÜñ ÷iõí áõóôçñÝò iäçäßåò ãéá ôç ÷ñÞóç êáé ôi ðåñéå÷üìåñí ôiõò.

## Ëßóôá

freebsd-acpi  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-acpi>)

freebsd-afs  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-afs>)

freebsd-aic7xxx  
(<http://lists.FreeBSD.org/mailman/listinfo/aic7xxx>)

freebsd-amd64  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-amd64>)

freebsd-apache  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-apache>)

freebsd-arm  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-arm>)

freebsd-atm  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-atm>)

freebsd-audit  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-audit>)

freebsd-binup  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-binup>)

## Óéïðüò

Áðññßåò ÷ñçóôþí êáé óå÷íéÞ õðñóôÞñéíç

ÅéäïðieÞóåéò áóöåæåßåò

ÓõæçôÞóåéò õiõ ò÷åôßæiiôåé íå ôçí ÷ñÞóç ôiõ FreeBSD-STABLE

Óôåßëôå åäþ ôå åiêëíåôééÜ óåô íçýíåôå áíôß ãéá iéá áðü ôéò ðñäñìáôééÝò ëßóôåò

## Óéïðüò

ÁíÜðôõîç ôçò ãéá ÷åßñéóçò áíÝññååéåò êáé ôiõ ACPI

ÌåôåöïñÜ ôiõ AFS óõi FreeBSD

ÁíÜðôõîç iäçäþí ãéá êÜñôåò Adaptec AIC 7xxx

ÌåôåöïñÜ ôiõ FreeBSD óå óðóôÞìåôå AMD64

ÓõæÞôçóç ãéá ports ó÷åôééÜ íå ôií Apache

ÌåôåöïñÜ ôiõ FreeBSD óå åðåâññåôÝò ARM®

×ñÞóç äéêôýùóçò ATM óõi FreeBSD

Project åéÝä ÷iõ ðçãåßiõ êþäééå

Ó÷åäßáóç êáé áíÜðôõîç ôiõ óðóôÞìåôiò Ýôiéíùí åíçìåñþoåúí (binary updates)

## Ëþóôá

freebsd-bluetooth  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-bluetooth>)

freebsd-cluster  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-cluster>)

freebsd-cvsweb  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-cvsweb>)

freebsd-database  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-database>)

freebsd-doc  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-doc>)  
freebsd-desktop  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-desktop>)

freebsd-drivers  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-drivers>)

freebsd-eclipse  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-eclipse>)

freebsd-embedded  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-embedded>)

freebsd-eol  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-eol>)  
freebsd-emulation  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-emulation>)

freebsd-firmware  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-firmware>)

## Óéïðüò

×ñþóç ôçò ôå ÷ñëëþáò Bluetooth óõí FreeBSD

×ñþóç ôõí FreeBSD óå ðáñÜëëçéá óõóôþiáôá

Óõíôþñçóç ôõí CVSweb

Óðæþôçóç âéá ôçí ÷ñþóç êéá áíÜðôõíç âÜóåùí  
äääñÝíú óõí FreeBSD

Äçìéïññáþá ôåéìçñþùóçò âéá ôõí FreeBSD

×ñþóç êéá âåéøþùóç ôõí FreeBSD ùò desktop

Äçìéïññáþá iäçäþí óõóêåðþí âéá ôõí FreeBSD

Óðæþôçóç âéá ôç ÷ñþóç ôõí Eclipse IDE, ôùí åññáéåþùí  
ôõí, êéèþò êéá rich client åöáññäþí êéá ports óõí  
FreeBSD.

×ñþóç ôõí FreeBSD óå embedded åöáññäÝò

Íñüôéíç õðíóôþñéíç âéá ëïäéóìéü ó÷åôéêü ìá FreeBSD,  
ðíõ ááií õðíóôçñþæåôáé ðëÝíí áðü ôõí FreeBSD Project.  
Åññíþùóç Üëëùí óõóôçíÜôùí, üðùò åßíáé ôá  
Linux/MS-DOS/Windows

Óå ÷íéêþ óðæþôçóç âéá FreeBSD FireWire (iLink, IEEE  
1394)

## Ëþóôá

freebsd-fs  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-fs>)  
freebsd-gecko  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-gecko>)

freebsd-geom  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-geom>)

freebsd-gnome  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-gnome>)

freebsd-hackers  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-hackers>)

freebsd-hardware  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-hardware>)

freebsd-i18n  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-i18n>)  
freebsd-ia32  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-ia32>)  
freebsd-ia64  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-ia64>)  
freebsd-ipfw  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-ipfw>)  
freebsd-isdn  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-isdn>)  
freebsd-jail  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-jail>)  
freebsd-java  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-java>)  
freebsd-kde  
(<http://freebsd.kde.org/mailman/listinfo/kde-freebsd>)  
freebsd-lfs  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-lfs>)  
freebsd-mips  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-mips>)

## Óéïðüò

ÓõóôÞìáôá áñ ÷ åßùí

ÓõæÞôçóç ó ÷ åôéêÜ íå ôi **Gecko Rendering Engine**

ÓõæçôÞôåéò ó ÷ åôéêÝò íå ôi GEOM êáé ôéò  
õëiðiéÞóåéò ôiõ

ÍåôáöïñÜ ôiõ **GNOME** êáé ôùí åöáññäþí ôiõ

ÃåíéêÝò ôå ÷ íéêÝò óõæçôÞôåéò

ÃåíéêÞ óõæÞôçóç æáá óõìâáûôçôá õëéëïý ìå ôi  
FreeBSD

Ãéåèïðiþçóç ôiõ FreeBSD

Óí FreeBSD óôçí áñ ÷ éôåêôíéêÞ IA-32 (Intel x86)

ÍåôáöïñÜ ôiõ FreeBSD óôá íÝá óõóôÞìáôá IA64 ôçò  
Intel

Óå ÷ íéêÞ óõæÞôçóç ðiõ åðééâíôñþiâôáé ôoiíí  
åðáíáó ÷ åäéáóíü ôiõ êþäééá IP ôiõ firewall  
ÍÜää áíÜðôôíçò ôiõ ISDN

ÓõæÞôçóç ó ÷ åôéêÜ íå ôéò äõíáûôçôåò ôiõ jail(8)

ÍÜää áíÜðôôíçò Java êáé Üöñá ðiõ íåôáöÝñïöí ðá JDKs  
óõi FreeBSD

ÍåôáöïñÜ ôiõ **KDE** êáé ôùí åöáññäþí ôiõ

ÍåôáöïñÜ ôiõ LFS óõi FreeBSD

ÍåôáöïñÜ ôiõ FreeBSD óå åðåâññäóóÝò MIPS®

## Ëþóôá

freebsd-mobile  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-mobile>)

freebsd-mono  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-mono>)

freebsd-mozilla  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-mozilla>)

freebsd-multimedia  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-multimedia>)

freebsd-new-bus  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-new-bus>)

freebsd-net  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-net>)  
freebsd-office  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-office>)

freebsd-performance  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-performance>)

freebsd-perl  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-perl>)  
freebsd-pf  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-pf>)  
freebsd-platforms  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-platforms>)

freebsd-ports  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-ports>)

freebsd-ports-announce  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-ports-announce>)

## Óeïðüò

Óõæçôþóåéò ó÷åôéêÝò iå öiñçôÜ õðiæræóôééÜ  
óõóôþiáôá

ÅöáññäÝò Mono êáé C# óõi FreeBSD

ÌåðåöiñÜ óiõ Mozilla óõi FreeBSD

ÅöáññäÝò ðiæðiÝóùí

Óå÷íéêÝò óõæçôþóåéò ó÷åôéêÝò iå ôçí  
áñ÷éôâéôííéêþ äéáýëüí

Óõæçôþóåéò äéêôýùóçò êáé ðçääßiò êþäéêáò TCP/IP

ÅöáññäÝò ãñáöâßiò óõi FreeBSD

Åñùôþóåéò ó÷åôéêÝò iå ååéôéôôíðiþçóç áðüäïóçò åéá  
åãâéôáôóÜóåéò ðççëþò áðüäïóçò êáé iååÜëiò öiñôßiò

Óðiøôþñéïç åíüò áñéèïïý áðü ports ó÷åôéêÜ iå Perl

Óõæþôçóç êáé åñùôþóåéò ó÷åôéêÝò iå ôi óýóôçìá  
packet filter firewall

Óõæþôçóç æáé iåôáöiñÜ óå iç-Intel áñ÷éôâéôííéêÝò

Óõæþôçóç æáé ôçí Óõëëiäþ ôùí Ports

ÓçìáíôéêÝò åéäþóåéò êáé iäçäßåò ó÷åôéêÝò iå ôçí  
Óõëëiäþ ôùí Ports

## Ëþóôá

freebsd-ports-bugs  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-ports-bugs>)

freebsd-ppc  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-ppc>)  
freebsd-proliant  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-proliant>)

freebsd-python  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-python>)

freebsd-rc  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-rc>)  
freebsd-realtime  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-realtime>)

freebsd-ruby  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-ruby>)  
freebsd-scsi  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-scsi>)  
freebsd-security  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-security>)

freebsd-small  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-small>)

freebsd-sparc64  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-sparc64>)

freebsd-standards  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-standards>)

## Óõiðüò

ÓõæÞôçóç ãéá óõÜëìáôá êáé áíáöïñÝò óõáæïÜôùí (PRs)  
ðiõ áõïñïý ports

ÌåðáöïñÜ õiõ FreeBSD óõi PowerPC

Ôå÷íéêP óõæÞôçóç ãéá ÷ñPóç õiõ FreeBSD óå  
äéáéñéóóÝò HP ProLiant

ÈÝìáôá ó÷åõéêÜ iå Python óõi FreeBSD

ÓõæÞôçóç ó÷åõéêÜ iå õi ÿóôçìá rc .d êáé ôçí  
áíÜðôõíP õiõ  
ÁíÜðôõíç åðåâôÜóåùí ðñáâìáôéëïý ÷ñüñiõ õiõ FreeBSD

ÓõæÞôçóç ó÷åõéêÜ iå ôç Ruby óõi FreeBSD

Ôi õðiöýóôçìá SCSI

ÈÝìáôá áóõáæåßáò ðrõ åðçñåÜæëõí õi FreeBSD

×ñPóç õiõ FreeBSD óå embedded óõóôÞìáôá (Äåí  
÷ñçóéiiðiéåßôáé ðëÝíí: áíôß ãéá áõõP ôç ëßóôá,  
÷ñçóéiiðiéÞóôå ôçí freebsd-embedded  
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-embedded>))

ÌåðáöïñÜ õiõ FreeBSD óå SPARC® óõóôÞìáôá

Óõìñüñöùóç õiõ FreeBSD iå ôá ðñüûôõðá C99 êáé POSIX

## Ëþóôá

freebsd-sysinstall

(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-sysinstall>)

freebsd-threads

(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-threads>)

freebsd-testing

(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-testing>)

freebsd-tilera

(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-tilera>)

freebsd-tokenring

(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-tokenring>)

freebsd-toolchain

(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-toolchain>)

freebsd-usb

(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-usb>)

freebsd-virtualization

(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-virtualization>)

freebsd-vuxml

(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-vuxml>)

freebsd-x11

(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-x11>)

freebsd-xen

(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-xen>)

freebsd-xfce

(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-xfce>)

## Óõëðüò

Óõæþôçóç ãéá ôçí áíÜðôõíç ôõõ sysinstall(8)

ĐiëõíçìáôéêP åðåâññáóßá óõi FreeBSD

ÄïëéÝò áðüäiöçò êáé óôáèåñüôçôáò ôõõ FreeBSD

ÌåðåöñÜ ôõõ FreeBSD óõçí iéëiäÝiaéá CPU Tilera

ÕðiôðPñéíç ôõõ Token Ring óõi FreeBSD

ÓõíôPñçóç ôùí åññáëåßùí ôõõ FreeBSD

Óõæþôçóç õðiôðPñéíç ôõõ USB óõi FreeBSD

Óõæþôçóç ó÷åôéêÜ ia äéÜöñåò ôå÷íéêÝò  
åéêíéëiðiøçóçò ðiõ õðiôðçñBæííôáé áðü ôi FreeBSD

Óõæþôçóç ãéá ôçí õðiäñîP VuXML

ÓõíôPñçóç êáé õðiôðPñéíç ôõõ X11 óõi FreeBSD

Óõæþôçóç ãéá ôç ìåðåöñÜ ôõõ FreeBSD óõi Xen™ —

õëiðiøçóç êáé ÷ñPóç

**XFCE** óõi FreeBSD — ìåðåöñÜ êáé óõíôPñçóç

**ĐáñéñéóíÝáò èþóôåò:** Íé áéüëëõèåò èþóôåò åßíáé ãéá ðeí áéäéëü (êáé áðáéôçôéëü) êiëíü êáé ðéèáþò ååí åíäéáóÝññõí  
ôi åáíéëü êiëíü. Đñéí áñ÷ßóåò íá óõìåò Ý÷åôå óå êÜðíéá áðü áðôÝò, êáëü éá åßíáé íá Ý÷åôå ðáñáéëiðèþóåé óéò  
ôå÷íéêÝò èþóôåò, þóå íá áíôéëåÜíåóå ôií êþäééá áðééëíüíßáò êáé óõìðåñéõñÜò ðiõ éó÷ýåé óå áðôÝò.

## Ëßóôá

freebsd-hubs  
 (http://lists.FreeBSD.org/mailman/listinfo/freebsd-hubs)  
 freebsd-user-groups  
 (http://lists.FreeBSD.org/mailman/listinfo/freebsd-user-groups)

freebsd-vendors  
 (http://lists.FreeBSD.org/mailman/listinfo/freebsd-vendors)

freebsd-wip-status  
 (http://lists.FreeBSD.org/mailman/listinfo/freebsd-wip-status)

freebsd-wireless  
 (http://lists.FreeBSD.org/mailman/listinfo/freebsd-wireless)

freebsd-www  
 (http://lists.FreeBSD.org/mailman/listinfo/freebsd-www)

## Óeïðüò

¶õiñá õõi äéáôçñïýí mirror sites (õõiõôPñéíç õõiäiñþí)

ÍñäÜñûóç ôúí óõëëüäùí ÷ñçóôþí

ÍñäÜñûóç iåôáðùëçþí ðñéí áðü áðþóçìå ãéäüóåéò

ÉáôÜôåóç åñâáóéþí õõi FreeBSD õõi âñþóêíôåé óå  
 åíYëéíç (Work-in-Progress).

ÓõæÞôçóç ó÷åôééÜ iå ôç óôiñâá 802.11, óá åñâáéåßá  
 áóýñiñåðiõ äééðýiõ êáé ôçí áíÜðôðiç ðñiñâñâñÜðùí  
 iñäþäçóçò.

ÓõíöçñôÝò õõi www.FreeBSD.org  
 (http://www.FreeBSD.org/index.html)

*Ëßóôåò digest:* ¼ëåò ié ðáñâðÜíù èßóôåò äéáôßèåíóáé êáé óå iññõP digest (ðåñßëçþçò). Íüééò åâñâñåòåßôå óå ißá  
 èßóôá, iñiñâßôå íá áéëÜñâôå ôéò áðééiñÝò digest óõi ôiþia ñõèìßóåùí ôõi ëiñâñéåòiý óáò.

*Ëßóôåò CVS & SVN:* Íé áéüëiñøåò èßóôåò åßíáé äéá üöiõò åñâéáöÝñiñôáé íá aéÝðiõí óå içíýlåôá (log) ðiõ äåß÷ñiõí  
 ôéò áéëéåáÝò óå aéÜöiñâò ðåñéí÷Ýò óõi ðçãáßiõ êþäééá. Åßíáé èßóôåò iññi ãéá áíÜñûóç êáé aåí ðñÝðåé íá  
 óôÝëéåò åçíýlåôá óå áôôÝò.

## Ëßóôá

### Ðåñéí÷þ ðçãáßiõ êþäééá

### Ðåñéâñåòþ ðåñéí÷þò (êþäééåò åéá)

cvs-all  
 (http://lists.FreeBSD.org/mailman/listinfo/cvs-all)

¼ëåò ié áéëéåáÝò óå êÜèå iÝñiõ õõi  
 aÝíñiõ (ðåñéÝ÷åé üëåò ôéò Üëéåò  
 èßóôåò CVS)

cvs-doc  
 (http://lists.FreeBSD.org/mailman/listinfo/cvs-doc)

¼ëåò ié áéëéåáÝò óôá aÝíñá doc êáé  
 www

cvs-ports  
 (http://lists.FreeBSD.org/mailman/listinfo/cvs-ports)

¼ëåò ié áéëéåáÝò óõi aÝíññ ôùí  
 ports

Ëßóôá	Đåñéí÷Þ Õçãáßïõ êþäééá	ĐåñéãñáöÞ Ðåñéí÷Þò (êþäééáò ääá)
cvs-projects ( <a href="http://lists.FreeBSD.org/mailman/listinfo/cvs-projects">http://lists.FreeBSD.org/mailman/listinfo/cvs-projects</a> )	/usr/projects	¼ëåò ié áëëáãÝò óõi äÝíôñï ôùí projects
cvs-src ( <a href="http://lists.FreeBSD.org/mailman/listinfo/cvs-src">http://lists.FreeBSD.org/mailman/listinfo/cvs-src</a> )	/usr/src	¼ëåò ié áëëáãÝò óõi äÝíôñï src (äçíéíõññåßôáé áðü ôá commit ôiõ ðññäñÜñáðiõ iåôáôñïðÞò svn-to-cvs)
svn-src-all ( <a href="http://lists.FreeBSD.org/mailman/listinfo svn-src-all">http://lists.FreeBSD.org/mailman/listinfo svn-src-all</a> )	/usr/src	¼ëåò ié áëëáãÝò óõi Subversion repository (åêôüò áðü ôéò ðåñéí÷Ýò user êáé projects)
svn-src-head ( <a href="http://lists.FreeBSD.org/mailman/listinfo svn-src-head">http://lists.FreeBSD.org/mailman/listinfo svn-src-head</a> )	/usr/src	¼ëåò ié áëëáãÝò óõií êëÜäí “head” ôiõ Subversion repository (ðññüêåéôáé ãéá ôiõ êëÜäí FreeBSD-CURRENT)
svn-src-projects ( <a href="http://lists.FreeBSD.org/mailman/listinfo svn-src-projects">http://lists.FreeBSD.org/mailman/listinfo svn-src-projects</a> )	/usr/projects	¼ëåò ié áëëáãÝò óõçí ðåñéí÷Þ Õçãáßïõ êþäééá projects ôiõ Subversion repository
svn-src-release ( <a href="http://lists.FreeBSD.org/mailman/listinfo svn-src-release">http://lists.FreeBSD.org/mailman/listinfo svn-src-release</a> )	/usr/src	¼ëåò ié áëëáãÝò óõçí ðåñéí÷Þ Õçãáßïõ êþäééá releases ôiõ Subversion repository
svn-src-releng ( <a href="http://lists.FreeBSD.org/mailman/listinfo svn-src-releng">http://lists.FreeBSD.org/mailman/listinfo svn-src-releng</a> )	/usr/src	¼ëåò ié áëëáãÝò óå üëiõò ôiõò êëÜäíò ðçãáßïõ êþäééá releng ôiõ Subversion repository (ðññüêåéôáé ãéá ôiõò êëÜäíò security / release engineering)
svn-src-stable ( <a href="http://lists.FreeBSD.org/mailman/listinfo svn-src-stable">http://lists.FreeBSD.org/mailman/listinfo svn-src-stable</a> )	/usr/src	¼ëåò ié áëëáãÝò óå üëiõò ôiõò êëÜäíò ðçãáßïõ êþäééá stable ôiõ Subversion repository
svn-src-stable-6 ( <a href="http://lists.FreeBSD.org/mailman/listinfo svn-src-stable-6">http://lists.FreeBSD.org/mailman/listinfo svn-src-stable-6</a> )	/usr/src	¼ëåò ié áëëáãÝò óõií êëÜäí ðçãáßïõ êþäééá stable/6 ôiõ Subversion repository
svn-src-stable-7 ( <a href="http://lists.FreeBSD.org/mailman/listinfo svn-src-stable-7">http://lists.FreeBSD.org/mailman/listinfo svn-src-stable-7</a> )	/usr/src	¼ëåò ié áëëáãÝò óõií êëÜäí ðçãáßïõ êþäééá stable/7 ôiõ Subversion repository

ÉÞóôá	Ðåñéï·þ ðçääáßïö êþäéêá	Ðåñéäñáöþ ðåñéï·þò (êþäéêáð æá)
svn-src-stable-8 ( <a href="http://lists.FreeBSD.org/mailman/listinfo svn-src-stable-8">http://lists.FreeBSD.org/mailman/listinfo svn-src-stable-8</a> )	/usr/src	¼ëåð ié áëëáâÝð óôíï êëÜäï ðçääáßïö êþäéêá stable/8 ôïõ Subversion repository
svn-src-stable-9 ( <a href="http://lists.FreeBSD.org/mailman/listinfo svn-src-stable-9">http://lists.FreeBSD.org/mailman/listinfo svn-src-stable-9</a> )	/usr/src	¼ëåð ié áëëáâÝð óôíï êëÜäï ðçääáßïö êþäéêá stable/9 ôïõ Subversion repository
svn-src-stable-other ( <a href="http://lists.FreeBSD.org/mailman/listinfo svn-src-stable-other">http://lists.FreeBSD.org/mailman/listinfo svn-src-stable-other</a> )	/usr/src	¼ëåð ié áëëáâÝð óôïð ðáééïýð stable êëÜäïð ðçääáßïö êþäéêá ôïõ Subversion repository
svn-src-svnadmin ( <a href="http://lists.FreeBSD.org/mailman/listinfo svn-svnadmin">http://lists.FreeBSD.org/mailman/listinfo svn-svnadmin</a> )	/usr/src	¼ëåð ié áëëáâÝð óôá scripts æá·åßñéóçò, óâ hooks, éáé Üeeá äâäñÍá ðïõ áöiñïýð ôéð ñöèìßôåéð ôïõ Subversion repository
svn-src-user ( <a href="http://lists.FreeBSD.org/mailman/listinfo svn-src-user">http://lists.FreeBSD.org/mailman/listinfo svn-src-user</a> )	/usr/src	¼ëåð ié áëëáâÝð óôçí ðåñéñâíâóééþ ðåñéï·þ ðçääáßïö êþäéêá user ôïõ Subversion repository
svn-src-vendor ( <a href="http://lists.FreeBSD.org/mailman/listinfo svn-src-vendor">http://lists.FreeBSD.org/mailman/listinfo svn-src-vendor</a> )	/usr/src	¼ëåð ié áëëáâÝð óôçí ðåñéï·þ åñâáóßåð ðçääáßïö êþäéêá vendor ôïõ Subversion repository

## C.1.2 Đùò íá Åääñáöåßôå

Áéá íá åääñáöåßôå óå ìßá ëßóôå, åðééë Ýîôå ôi üññå ôçò åðü ôiñð ðääñåðÜù äåðiiýò P ðçääßiåôå óöi  
http://lists.FreeBSD.org/mailman/listinfo éáé åðééë Ýîôå ôçí ëßóôå áéá ôçí iðiñßá áíäæåöÝñåðôå. Ç óäéßää ôçò ëßóôåð  
ðñÝðåé íá ðääñéÝ ÷ åé üëåò ôeò åðäñåßôcôåò ðëcññiöinßåò åäññåöPò.

Áéá íá ãñÜøåôå óå ïéá ëßóôå, áðëpò óôåßëôå ôiï îPíõiá óåò ôoïi <üííiá-ëßöôåð@FreeBSD.org>. Ôiï îPíõiá óåò eá äæáíâicèåß óå üéá óåï Ýec ôcò ëßóôåò, óå iðiïéïåPðiôå òciâßi ôiïi êüööiiô êäé áí âñßóéïföåé.

Áéá íá äéäñáöåßôå áðü ìéá ëßóôá, áðéé Ýîòå ôi URL ðiø âñßóéåôáé óoi ôÝëiø êÜëå lçíýláöiø ðiø éaiâÜíåôå áðü ôcí ëßóôá. Íðinåßôå áðßöçö íá óôåßëåôå Ýíá ìPÍòiå óoi <üíiíá-ëßöðáð-unssubscribe@FreeBSD.org> áéá íá äéäñáöåßôå iùüjiø óáò.

Ãéá áéüia íéá öimÜ, eá èÝéáíá íá óáô æçôÞóïòíá íá äéáöçñÞóåôå ôç õöæÞöçóç ôùí ôå ÷íééþí ëéööþí ôóá áíößööíé÷å ôå ÷íééÜ èÝíáðá. Áí áfáéáöÝñåôôå lüñíí áéá óçíáíööéÝ ÿ áíáéíéþóåéô, ôüôå ðñïöôåßfiòíå íá åäññåöåßôå ôóçí çëåéöñíééþ ëßööå ááíéíéþóåñü ôiõ FreeBSD (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-announce>), ç iðiñá Ý ÷ áé íéêñþ êßíçöc.

### C.1.3 Đßíáêåò Ëéóôþí

1/4ëåð ïé FreeBSD ëþóðåð Ý÷ïòí õóââññéí Ýñòð áâóéëÿò ëáíüíåò ïé ïðíïíé ðñ Ýðåç íá áâíëëòëëíòåé áðú ìðíëíàþðòåð ñéð ÷ñçóëíïðíéåß. ¼ðíéïò áðïòÿ ÷åé íá áâíëëòëþòåé áðòïÿò ñòðò ëáíüíåò èá ëÜâåé äÿí (2) ãñáðØÝò ðñïâéäïðíéþòåé áðú öíí FreeBSD Postmaster <[postmaster@FreeBSD.org](mailto:postmaster@FreeBSD.org)>. Óå ðåñþðòðùóç ôñþòçò ðåñâáßâóçò, öíí Úòïíí áðóù èá áðññâéñòðéåß áðú üëåð óðé ëþóðåð òïò FreeBSD êáé ôá ìçíýíåðá ôïò ðñïò áðôØÝò èá öéëññÜññïòåé. Ëððüïáðåð ðïò ÷ñâéÜæåðåé íá åðéáÜëëòïå áðòïÿò ñòðò ëáíüíåò èáé íÝññá, áéëÜ ôíí õçìâññéü Äéåðêòòí åßíáé êáéþò öáßíåðåé Ýíá ðíëÿ ãéëçñü ðåñâéÜëëíí, éáé ðíëëíß åáí åðééëÿí ðúöí åýèññåðòòí åßíáé íåññééíß ìç ÷åéöñß ôïò.

Êáíüíåò:



Áðiüéêïß ðþíáêåò ëéóôþí:

freebsd-acpi (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-acpi>)

ÁíÜðôõîç ôçò äéá÷åßñéóçò áíÝñãåéáò êáé ôïõ ACPI

freebsd-afs (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-afs>)

Andrew File System

ÁôôP ç ëbóôá åbíáé ãéá óõæPôçóç ôçò iåôáöïñÜò éáé ôçò ÷ñPôçò ôiõ AFS áðü ôi CMU/Transarc

freebsd-announce (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-announce>)

*ÓçìáíôéêÜ ãåãüüôá êáé áíáêïéíþóåéò*

ÁôôP ç ëbôôá ábíáé ãéá Üôñíâ ðiô áâééaoÝññôáé iüñí ãéá ðâñéôáóéâéÝò áíâééíþpôåéò óçíáñôééþí áâaiñüôùí ôiõ FreeBSD. ðâñéëâíÜíâé áíâééíþpôåéò ó ÷âôééÜ ia snapshots êáé Üeëá releases. Áðbóçò áçíñóéâýñôáé óá áôôPí

áráéíéíþóåéó áéá íÝåò ééáíüöçôåò óið FreeBSD. Íðirñåß íá ðåñéÝ ÷åé áééëþóåéò áéá áéåëííöÝò êóë. Ðñüéåéóáé áéá íßá èßöôáà íà íéêñÞ èßíçóç, áéá íé äçíïöéåýóåéò áéÝ ã÷ííöåé áóóöçñÜ.

freebsd-arch (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-arch>)

ÓðæçôÞóåéò áñ÷éôåêôüíéêÞò êáé ó÷åäéáóüý

Óå áôôP ôçí ëbóóá ðóæçôåbôáé ç áñ ÷éôâôïíéêP ôiõ FreeBSD. Óá icíyíáôá åbíáé êåôÜ êýñëi üüäi áñêåôÜ ôå ÷íéÜ. Ðáñáäåbâlåáô ð ãôéêpbí èâìÜôuì åbíáé:

- Đò ìá áððáiáó÷åéáóôåß ôi óýóôçìá iåðåäæþôðéóçò þóôå íá áððåéåß ôððöü ÷ñííá ðiæeÝò ðñiøáñiióiÝíàò iåðåäæùôðóåéò.
  - Ôé ðñÝðåé íá áððéóâððåóôåß óóï VFS þóôå íá eåéóïõññaiýí ôá Heidemann layers.
  - Ðþò ðñÝðåé íá iåðåôñÝþiòiå ôç äéåðáöþ (interface) ôúí iäçäþí óððéåðþí þóôå íá iðiññiyå íá ÷ñçóëiðiéþoíòiå ôá ßæéá ðñiññÜñiáôå iäþæçóçò óå ðiæeÝò äéáýéiò êáé áñ÷éôåêðiíééÝò.
  - Ðò ìá añÜðåôå Ýíá iäçäü äééóýiò.

freebsd-audit (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-audit>)

Project åéÝä÷iõ ðçäáßiõ êþäéêá

ÁôôP ç ëbôôá ÷ñçóëiiðïéâôôáé ãéá ôi project åëÝä ÷iõ ôiõ ðçâáñïô êþäéêá ôiõ FreeBSD. Áí ãéá áñ ÷éêÜ ðññiññþæiiôáí ãéá óôççôôPôåéò áëéâáñï ðiõ ó ÷åôßæiiôáí iã ôçí áôöÜéâéá, äéâôñýíèçéâ þôôá íá áó ÷iæâôôáé iã iðiéâáþðiôá áëéâáP êþäéêá.

Çëßóôá åßíáé ãáiÜôç iå “patches”, êáé ðéèáíüôáôá äái èá åïäéáö Ýñåé Ýíáí áðëü ÷ñPôç ôiö FreeBSD.

ÓðæçôÞóráéð áróðáæðþáð ðíð áðá ó÷·ðóðæxiðóáé íå óðóðæðñei Ýíç aæðá·P óðóí ëþæðá, áðñiðóáé óðóçí ðóðóá freebsd-security. Áíðþéðóá, üeið ié developers ðáñiðóñýiðóáé íá óó Ýëiði áðþ óá “patches” óiðò aæá Ýëað·i, áðæðé Ü áí ó÷·ðóðæxiðóáé íå Ýíá iÝñið óið óðóðóÞláðið üðið Ýíá óó Üeðiá iðiñáð íá áðçñáÜóáð iëüðeçñí òçí áðæñáðiðóçôá óið.

freebsd-binup (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-binup>)

Project áíáâÜèiéóçò ôïõ FreeBSD iÝóù Ýôïéìùí (äõáäéêþí) áñ÷åßùí

Óá áôôP ðcí ëßóôá óðæçðåßóáé ôi óýóðciá áíáâÜëleóçò iÝóù Ýöïëiùí (binary) áñ ÷ áßùí, P **binup**. Óá áôôP ôç ëßóôá áíÞeïöí èÝíáôá ó ÷ áäéáöiiý, eäðöiñ Ýñâéâò ðeïðiÞçóçò, “patches”, áíáöiñ Ýó óóáëiÜòùí, áíáöiñ Ýó êáôÜóôáöçò, áéêÞóâéò aéá ðñüòéâôá ÷ áñâéðçñéôóêéÜ, commit logs, êáé üöé Üëëi ó ÷ áßðæåðáé iâ ôi **binup**.

freebsd-bluetooth (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-bluetooth>)

*× ñPóç ôçò ôå÷üieïäßáò Bluetooth óôï FreeBSD*

Óå áðóòþ ðé ðéðóá óðíáðñíðæíðóáé íé ÷ ñíþóðåð ðíð Bluetooth óðí FreeBSD. Ç ðéðóá áó ÷ íéððóáé íå è Ýìáðá ó ÷ áðéáðñíý, éåððñíÝ ñåéåð ðéëðíðçóçò, "patches", áíáöinÝ ò óðáëíÜðùí, áíáöinÝ ò éåðÜðóáóçò, áéðþóáéò áéá ðññüðéåðá ÷ áñáéðóçñéóðéÜ, éåé üðé Üéëí ð ÷ áððæðåáé íå ðí Bluetooht.

freebsd-bugbusters (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-bugbusters>)

*Dñiíoð Üèåéá iñä Üíùóçò oïö ÷åéñéóïïý ôùí áíáöiñþí ðñiâæçì Üôùí*

Óêiðüò áôôÞò ôçò ëbóóâôå âbíáé íá èâéöiññâåß ùò -þñiò iñäÜùñöçò êáé óôæÞôçöçò ãéá ôíí Bugmeister, ôiðò Bugbusters, êáé üoïöö Üëëiöö åíáéáö Ýññiöáé ãéá ôçí åÜöç åâäiñ Ýùí PR. ÁôôÞ Þ ëbóóâ åâí åbíáé ãéá óôæçöÞóáéö ó ÷åôéêÜ íà éâéáßôñá óóÜëìáôå, “patches” Þ PRs.

freebsd-bugs (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-bugs>)

### AíáðiñÝò óõáëìÜôùí

ÁõõP ç ëßóôå áßíáé ãéá áíáöñÝò óõáëìÜôùí ôiõ FreeBSD. ¼õiõå áßíáé ãõíáôü, ôá óõÜëíáôá ðñÝðåé íá ôõÝëññôåé ìå ôçí áíõiõP send-pr(1) P iÝòù ôçò áíõßôõié÷cò áéâðåõP WEB (<http://www.FreeBSD.org/send-pr.html>).

freebsd-chat (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-chat>)

### Iç ôå÷íéêÜ eÝíáôá ðiõ ó÷åõþæiõôåé ìå ôçí eïéíüôðôå õiõ FreeBSD

ÁõõP ç ëßóôå ðáñéÝ÷åé eïéíüñééÝò õõæçôPóåéò, êáé ãâíéüôâñä üöé ãâí ó÷åõþæåôåé ìå ôå÷íéêÝò ðëçñïöññôå ìå ôéò iõlôå ãõ÷iõýôåé ié ðõüëiõôå ëßóôåò. ÐáñéÝ÷åé õõæçôPóåéò ãéá ôi áí i Jordan ñieÜæåé ìå iéññü ëõõÜåé P ü÷é, ãéá ôi áí ðñÝðåé P ü÷é íá ãñÜõiõå ìå êâõáæéßá, ðiõiò ðßíáé ðiõý êâóÝ, ðiõ õõéÜ÷íâôåé ç êâéýôåñç ìõýñá, ðiõiò õõéÜ÷íâé ìõýñá ôõi ðõüñâåéí õiõ, êâé Üëéá. ÐâñéóôåééåÝò áíáëíéþóåéò õçìáíôééþí ãâññüôùñü (üðùò ðÜñôò, aÜii, ãâíPóåéò, êâéíiýñâéåò aíõõééÝò eëõ) ìõññýí íá ãßññõí ôõéò ôå÷íéêÝò ëßóôåò, áeëÜ ie áðáíôPóåéò õiõò ðñÝðåé íá ôõÝëññôåé ôõçí ëßóôå -chat.

freebsd-chromium (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-chromium>)

### ÈÝíáôå ó÷åõéêÜ ìå ôi Chromium óõi FreeBSD

Ëßóôå óõæçôPóåùí ãéá ôçí õõiõôPñéç õiõ Chromium óõi FreeBSD. Ðñüêåéôåé ãéá ôå÷íéêP ëßóôå ó÷åõééêP ìå ôçí áíÜðôõíç êáé áâéåôÜóôåóç õiõ Chromium.

freebsd-core

### IñÜää core õiõ FreeBSD

ÁõõP áßíáé ïßá áôúôâñéêP ëßóôå ãéá ÷ñPóç áðü ôá iÝëç ôiõ core. Óå áõõP ôç ëßóôå ìõññâåôå íá óôâßëåôå ìçíýíáôå, üôáí ðñiõýøåé êÜðiõi ëÝíá ó÷åõéü ìå ôi FreeBSD ôi ìõiõi áðáéôåß äéáéôçóßá P ëåðõññP áíÝðåóç.

freebsd-current (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-current>)

### ÓõæçôPóåéò ó÷åõéêÜ ìå ôçí ÷ñPóç õiõ FreeBSD-CURRENT

ÁõõP ç ëßóôå áßíáé ãéá ÷ñPóôåò ôiõ FreeBSD-CURRENT. ÐáñéÝ÷åé õõiõéäí ðiõPóåéò ãéá iÝá ÷áñáêôçñéóôééÜ ðiõ ðñüêåéôåé íá ðñiõôðåèiýí ôõi -CURRENT êáé ôá iõiõá èá áðçññÜõiõí õiõò ÷ñPóôåò, êáé iäçñåßåò ãéá ôéò eéíPóåéò ðiõ ðñÝðåé íá ãßññõí þóôå íá ðâññâåßíåôå ôõi -CURRENT. ¼õiõiò áéôåæåß ôií "CURRENT" ðñÝðåé íá áââññåôåß ôá áðõPí ôçí ëßóôå. Áßíáé ieá ôå÷íéêP ëßóôå êáé óõæçôiýíôåé iññí áðõõçñÜ õå÷íéêÜ eÝíáôå.

freebsd-cvsweb (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-cvsweb>)

### FreeBSD CVSweb Project

Ôå÷íéêÝò óõæçôPóåéò ãéá ôçí ÷ñPóç, ôçí áíÜðôõíç êáé ôçí óõíõPñçóç õiõ FreeBSD-CVSweb.

freebsd-desktop (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-desktop>)

### ×ñPóç êáé áâéõþñóç õiõ FreeBSD ùò desktop

<sup>1</sup> ëßóôå áðõõP ðñiõñßæåôåé ãéá óõæçôPóåéò ó÷åõéêÝò ìå ôç ÷ñPóç ôiõ FreeBSD ùò desktop. Áðåõõéýíåôåé êõññùò ôá ÷ñPóôåò êáé ðñiãñâíáôéóÝò ðiõ áðéèõiýí íá óõæçôPóiõí ôá ðñiõéþíåôå ðiõ ðâññõõéÜæåé ôií FreeBSD ôá desktop áöáññäÝò, êâèþò êáé áíõßóôié÷åò áâéõþñóåéò.

freebsd-doc (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-doc>)

*Project óåéïçñþùóçò óõí FreeBSD*

Áõõþ ç ëßóðå áßíáé æáá óðæþòçóç èåíÜðùí êáé projects ðiõ ó÷åõßæïõðáé iå ôçí äçíéïõñâßá óåéïçñþùóçò áéá óí FreeBSD. Óá ìÝëç áðõþò ôçò ëßóðåð áðõéæïýfõáé óõñïééÜ ùò “The FreeBSD Documentation Project”. Áßíáé iéá áñééõþ ëßóðå êáé áßóðå áéåýèåñïò íá óõñlåðÝ ÷åõâ áéá íá óõñlåðóÝñâðå!

freebsd-drivers (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-drivers>)

*Äçíéïõñâßá iäçäþí óõõéåðþí áéá óí FreeBSD*

Áõõþ ç ëßóðå ðññïñþæåðáé æáá ôâ ÷íéÜ ðõõæçòþòåé ðiõ ó÷åõééÝò iå iäçäþí ðõõõéåðþí óõí FreeBSD. ×ñçóéñïðéåñþùð áðü ðiõ ãçíéïõñäýò iäçäþí óõõéåðþí áéá áññùðþòåé ðiõ ó÷åõééÝò iå ôç óõñlåðåð iäçäþí, ÷ñçóéñïðéþòåð óá APIs ðiõ ðáñÝ ÷åé í ðõñþíáð ðiõ FreeBSD.

freebsd-eclipse (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-eclipse>)

*FreeBSD ÷ñþóðåð ðiõ Eclipse IDE, ôùí åññâéåþùí ðiõ, rich client åöáññiäþí, êáé ports.*

Ðññüéåðç ôçò ëßóðåð áðõþò áßíáé íá ðññïóðÝñâðå áñééåðå ðõõõðþñéïç áéá üõé Ý ÷åé íá êÜíâé iå ôçí áðéëräþ, åññâðÜðåðåç, ÷ñþóç, áíÜððõñç éáé óõõðþñçóç ðiõ Eclipse IDE, ôùí åññâéåþùí ðiõ, åöáññiäþí rich client óõçí ðeåðöüññá ðiõ FreeBSD êáé áéá áiiþèåé ðiõ ó÷åõééÜ iå ôçí iåðâðõñÜ ðiõ Eclipse IDE êáé ôùí ðññüðåðòñüí ðiõ óõí ðâññéåÜëëí ðiõ FreeBSD.

Ðññüéåðç ôçò áßíáé áðþóçò íá áéåðééþýfáé ôçí áíðåééåðþ ðeçñiõñéþí áíÜíâðå óõçí êíéñüðçôá ðiõ Eclipse êáé óõçí êíéñüðçôá ðiõ FreeBSD, ðññiò üöåæíò êáé ôùí äýí.

Áí êáé ç ëßóðå áðééåðþíâðåé êõñþùð óõéò áíÜðâéð ðiõ ó÷ñçóðþí ðiõ Eclipse, ðññiòðÝñâé áðþóçò Ýíá ÷þñí óðæþòçóç ãéá üõiðò èÝëëí ìá áíáððóýññí ãöáññiäÝò ó÷åõééÝò iå ôí FreeBSD ÷ñçóéñïðéþòåð ðiõ Eclipse.

freebsd-embedded (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-embedded>)

*×ñþóç ðiõ FreeBSD óå embedded åöáññiäÝò*

Ç ëßóðå óðæçòÜ èÝíâðå ó÷åõééÜ iå ôçí ÷ñþóç ðiõ FreeBSD óå embedded óððóðþíáðå. Áßíáé iéá ôâ ÷íéëþ ëßóðå êáé óðæçòíýfáé iüñí áðõðçñÜ ôâ ÷íéÜ èÝíâðå. Áéá ôíí ôéíðü ôçò ëßóðåð áðõþò, iñþæiñðiå ùò embedded óððóðþíáðå óéò ððíëíæéóðéÜ ðiõ óõõéåðÝò ðiõ áåí ðññiñþæïíðáé áéá desktop åöáññiäÝò, áéá ðiõ óõíþèùð êâéýðòí ìéá iüñí áíÜðâéç, áíðþèåðå iå ôá áåíéÜ ððíëíæéóðéÜ ðâññéåÜëëíðå. ÓðíðâñééåíäÜñíðåé, áéôùð ôùí Üëëñí, üëá ôá ôçéÝðüí, áééððåéüð áííðééòñüð üðùð routers, switches êáé PBXs, áííðééòñüð iåðñþóðåñí áðü áðüñðåóç, PDAs, óððóðþíáðå Point Of Sale, êáé ðÜäé èÝäññiðå.

freebsd-emulation (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-emulation>)

*Âññüþùóç Üëëñí óððóðþíÜðùí üðùð áþíáé óå Linux/MS-DOS/Windows*

Áßíáé iéá ëßóðå áéá ôâ ÷íéÜ ðõõæçòþòåé, ó÷åõééÝò iå ôçí áéðÝëåðç óõí FreeBSD ðññiññâñíÜðùí ðiõ áçíéïõñþèçéáí áéá Üëëá êåéðõññâéÜ.

freebsd-eol (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-eol>)

*Íüððéïç ððíðþñéïç áéá ëíäéóíéëü ó÷åõééü iå ôí FreeBSD ðiõ áåí ððíðþçñþæåðáé ðeÝíí áðü ðiõ FreeBSD Project.*

Áõõþ ç ëßóðå áßíáé áéá üõiðò áíáðéåöÝññíðåé íá ðâñÝ ÷iõ P íá ÷ñçóéñïðéþòiðí ôçí iññðéïç ððíðþñéïç áéá ëíäéóíéëü ó÷åõééü iå ôí FreeBSD ðiõ áåí ððíðþçñþæåðáé ðeÝíí áðü ôí FreeBSD Project (ð.÷., iå ôçí iññöþ “patches” êáé áíáðéíþðåñí áóõáéåðå).

freebsd-firewire (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-firewire>)

*FireWire (iLink, IEEE 1394)*

ÁõõP ç ëßóôå áßíáé ãéá õçí óõæÞôçóç ôçò ó÷åäßáóçò êáé ðëiðiÞçóçò áíüò ððiðoôÞláôïò FireWire (ãíüóôü êáé ùò IEEE 1394 P iLink) ãéá ói FreeBSD. Ó÷åõééÜ èÝìáôá áßíáé ôá ðñüöôðá, ié óõõéâðÝò äéáýeiõ êáé ôá ðñüöüéieéÜ õiõò, èÜñôåò, ðñiøáññåßò êáé chipsets, êáé ç áñ÷éõåéðiéêP êáé ç ðëiðiÞçóç ôiõ êþäéêá ãéá õçí óõóôP õðiðoôÞñéïç õiõò.

freebsd-fs (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-fs>)

*ÓõóôÞìáôá áñ÷åßùí*

ÓõæçôÞóåéò ó÷åõééÝò ìå ôá óõóôÞìáôá áñ÷åßùí õi FreeBSD. Áßíáé ìéá ôå÷íéêP ëßóôá êáé óõæçôýíôáé ïüñi ãðõôçñÜ ôå÷íéêÜ èÝìáôá.

freebsd-gecko (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-gecko>)

*Gecko Rendering Engine*

ÓõæçôÞóåéò ó÷åõééÝò ìå åõáññåÝò ðiõ ÷ñçóéiiðiéiyí ôçí ìç÷áíP Gecko óõi FreeBSD.

Ç óõæÞôçóç åðééâíôñíåôáé ôá åõáññåÝò ôçò ÓõeëiäPò ôúí Ports ðiõ ÷ñçóéiiðiéiyí ôç ìç÷áíP Gecko, êáé áéäééüôåñá ôçí åâéåôÜóôåç, áíÜðôôïç êáé õðiðoôÞñéïç õiõò óõi FreeBSD.

freebsd-geom (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-geom>)

*GEOM*

ÓõæçôÞóåéò ó÷åõééÝò ìå ôi GEOM êáé ðáñüüíéâò ðëiðiéÞóåéò. Áßíáé ìéá ôå÷íéêP ëßóôá êáé óõæçôýíôáé ïüñi áðõôçñÜ ôå÷íéêÜ èÝìáôá.

freebsd-gnome (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-gnome>)

*GNOmE*

ÓõæçôÞóåéò ó÷åõééÝò ìå ôi ðâñéâÜeëií **GNOmE** ãéá óõóôÞìáôá FreeBSD. Áßíáé ìéá ôå÷íéêP ëßóôá êáé óõæçôýíôáé ïüñi áðõôçñÜ ôå÷íéêÜ èÝìáôá.

freebsd-ipfw (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-ipfw>)

*IP Firewall*

ÁõõP ç ëßóôå áßíáé ãéá ôå÷íéêÝò óõæçôÞóåéò ðiõ áõññiyí õiõ áðáíáò÷åæáóïü ôiõ êþäéêá IP firewall óõi FreeBSD. Áßíáé ìéá ôå÷íéêP ëßóôá êáé óõæçôýíôáé ïüñi áðõôçñÜ ôå÷íéêÜ èÝìáôá.

freebsd-ia64 (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-ia64>)

*ÌåôåöiñÜ õiõ FreeBSD óõçí áñ÷éôåéðiíéêP IA64*

Ðñüéâåéåé ãéá ìéá ôå÷íéêP ëßóôå, ãéá Üðñá ðiõ ãiõéåýiõí åíññáÜ óõçí ìåôåöiñÜ ôiõ FreeBSD óõçí ðëáôöüñíà IA-64 ôçò Intel, ãéá íá áíáöÝñiõí ðñiâéÞìáôá P íá óõæçôÞòiõí åíáééåêééÝò ëýóåéò. ¶õiñá ðiõ åíáééåÝñiñôáé íá ðáññåéiñòeÞòiõí ôçí ôå÷íéêP óõæÞôçóç áßíáé åðßòçò åðññüöååéå.

freebsd-isdn (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-isdn>)

*ÁíÜðôôïç õiõ ISDN*

ÁõõP ç ëßóôå áßíáé ãéá Üðñá ðiõ óõæçôýí ôçí áíÜðôôïç ôçò õðiðoôÞñéïç ISDN óõi FreeBSD.

freebsd-java (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-java>)

### AíÜðôõíç ôçò Java

ÁõõP ç ëßóðå áßíáé ãéá Üôñá ðiõ óõæçôïýí ôçí áíÜðôõíç ôçìáíôééþí áöáññäþí Java ãéá õi FreeBSD êáé ôçí ïåðåõíñÜ êáé óõiþñçóç ôùí JDks.

freebsd-jobs (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-jobs>)

### ÆPôçóç êáé ðññõõíñÜ ãññåðþáð

Áõõüò áßíáé Ýíáò ÷þñiò ãéá áçïiõßåðóç áíáéïéíþóåùí ãéá ðññõõíñÜ êáé æPôçóç áññåáóßåò ðiõ ó÷åðßæåðåé íå õi FreeBSD, êâèþò êáé áéíññåöééþí ó÷åðééþí íå õi FreeBSD. Áí ãéá ðáñÜäåéäíá áíáæçôÜôå áññåáóßå ó÷åðééþí íå õi FreeBSD, P ðññiõöÝññåðå ìéá èÝóç áññåáóßåò ó÷åðééþí íå õi FreeBSD, áññü áßíáé õi óùñðóü iÝñiò ãéá íá ôç áéáäçìßóðåðå. Ç ëßóðå áðõP ãðáí áßíáé ãéá áåíééÜ èÝíáò áññåáóßåò, ãéá õá iðiþá ððÜñ÷åé ðëçèþñá áðü Üëëåð ëßóðåò õi Äéáäþéõí.

ÁõõP ç ëßóðå, üðùò êáé ié ðññüëiõðåò ëßóðåò õiõ FreeBSD.org, ãéáÍYññôáé ðáññüõíéá. Þóé, ðñÝðåé íá áßóðå õáðþò ãéá ôçí òiðiæåðå áéá ôçí áõñáðüõçóå ôçëæññåóßåò P ãíþøåéåò ôðçí íåðiõßéçóç.

Ói þíñiá óáò ëá ðñÝðåé íá ÷ñçóëiõðéåß ìüñí áñíé÷ðÜ ðññüõððá — êáðÜ ðññiõþíçóç áðëü êåßìåíí, áí êáé ááóééþò ññõþò Portable Document Format (PDF), HTML, êáé ìññééÜ Üëëå áßíáé áðññåðéÜ áðü ðiðëiýò ÷ñþóðåò. ËéåéóðÜ ðññüõððá üðùò õi Microsoft Word (.doc) ëá áðñññéøëíýí áðü õíí äéáéñéóðP ôçò ëßóðåò.

freebsd-kde (<http://freebsd.kde.org/mailman/listinfo/kde-freebsd>)

### KDE

Óõæçôþóåéò ðiõ áõiññýí õi **KDE** óå óõõðþiaóá FreeBSD. Áßíáé ìéá ôå÷íééþ ëßóðå êáé óõæçôïýíôáé ìüñí áðõõçñÜ ôå÷íééÜ èÝíáòá.

freebsd-hackers (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-hackers>)

### Ôå÷íééÝò óõæçôþoðåéò

Áßíáé Ýíáò ÷þñiò ãéá ôå÷íééÝò óõæçôþóåéò ó÷åðééÝò íå õi FreeBSD. ÁõõP áßíáé ç êýñéá ôå÷íééþ ëßóðå. Áßíáé ãéá Üôñá ðiõ áíáððýóóíñí áíññäÜ õi FreeBSD, ãéá íá áíáöÝññiòí ðññiãëþlåðå P íá óõæçôþóíòí áíáæéåðééÝò ëýóåðéò. ¶õiñá ðiõ áíññéåðéÝññiòí õi ðáññæiõðòí õi ðáññæiõðòí ôçí ôå÷íééþ óõæçôçóç áßíáé áðññüõðååééåðå. Áßíáé ìéá ôå÷íééþ ëßóðå êáé óõæçôïýíôáé ìüñí áðõõçñÜ ôå÷íééÜ èÝíáòá.

freebsd-hardware (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-hardware>)

### Ãåíééþ óõæçôþçóç ãéá ðõééüü éé áíáññóþiaóá ðõiðëiñéóðþí óõi FreeBSD

ÃåíééÝò óõæçôþóåéò ãéá ðõééüü ðõiðëiñéóðþí óõi FreeBSD, ãéÜõñá ðññiãëþlåðå êáé ðññiõÜðåéò ÷åðééÜ íå õi ôé íá ááññÜóåðå P íá áðññøýååðå.

freebsd-hubs (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-hubs>)

### Mirror sites

Áíáéïéþóåéò êáé óõæçôþóåéò ãéá Üôñá ðiõ óõiññýí mirror sites õiõ FreeBSD.

freebsd-isp (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-isp>)

### ÈÝíáòá ãéá Ðáññ÷åþò Õðçñåðéþí Äéáäééþýíò

ÁõõP ç ëßóðå áßíáé ãéá óõæþôçóç ëáíÜðùí ó÷åðééþí íå Ðáññ÷åþò Õðçñåðéþí Äéáäééþýíò (ISPs) ðiõ ÷ñçóëiõðéåíýí FreeBSD. Áßíáé ìéá ôå÷íééþ ëßóðå êáé óõæçôïýíôáé ìüñí áðõõçñÜ ôå÷íééÜ èÝíáòá.

freebsd-mono (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-mono>)

#### ÅöáñüäÝò Mono êáé C# óöi FreeBSD

ÁöôP ç ëßóôå áßíáé ãéá óðæÞôçóç èåiÜðùí ó÷åöéþí iå ôi óýóðciá áiÜððöîçò áöáññäþí Mono óöi FreeBSD. Ðñüéåéöåé ãéá iéá ôå÷íéþ ëßóôå. Ðññïßæåðåé ãéá iðiëñäþðöôå áó÷íëåþðåé áíññäU iå ôçí áiÜððöîç P ôç iåôáöñÜ áöáññäþí Mono P C# óöi FreeBSD. Ç óðæÞôçóç áöñÜ ôçí áðþëööç ðññäëçìÜðùí ç ôçí áýñåöç áíáëéåéöéþí éýóåú. ¶õñá ðiø áíáéaoÝññöåé íá ðáñáëëëøÞöiøi ôçí ôå÷íéþ óðæÞôçóç áßíáé áðþöçò áöðñüöååéöå.

freebsd-office (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-office>)

#### ÅöáñüäÝò ãñáöåþiö óöi FreeBSD

ÓðæçôÞóåéò ó÷åöéêÝò iå ôçí áâéåôÜððåóç, áiÜððöîç êáé ðöiöôÞñéíç áöáññäþí ãñáöåþiö óöi FreeBSD.

freebsd-performance (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-performance>)

#### ÓðæçôÞóåéò ãéá ôçí ñýëiéöç êáé ôçí áâéöéööiðiþçóç ôiø FreeBSD

ÁöôP ç ëßóôå ðöÜñ÷åé ãéá íá ðáñY÷åé Ýá iÝññò üðiø ié hackers, ié ãéá÷åéñéööYò, êáé üöié Üëëëé áíäéåoÝññöåé, íá óðæçöiyí eÝiaóå ó÷åééÜ iå ôçí áðüäöç ðiø FreeBSD. ÁðiäåéöÜ eÝiaóå áßíáé ié óðæçôÞóåéò ðiø áíáoÝññöåé ôå áâéåôåðÜððåéò FreeBSD ðiø ðöüéåéíöåé ôå iåâåÜëi öüññöi, Y÷iøi ðññäëÞiaðå áðüäöçò, P ôöÜññöi ôi FreeBSD óóå üñéå ðiø. Óðiøööiyá áíâðéöýéåéöå íá ãñáöiyí ôöç ëßóôå üöié áíâéåoÝññöåé íá áâéöéþöi ðiø ôçí áðüäöç ôiø FreeBSD. Áßíáé iñá ôå÷íéþ ëßóôå ðiø áðâðéýíåðåé ôå Yíðåññiöö ÷ñÞóåðö ôiø FreeBSD, hackers, P ãéá÷åéñéööYò ðiø áíâéåoÝññöåé íá eÜññöi ôi FreeBSD añÞaïñí êáé áíéüðéööi. Áåí ðñüéåéöåé ãéá iéá eëßóôå áññùðÞóåñí êáé áðáíðÞóåñí ðiø iðiññåß íá áíðééåðåðÞóåé ôçí iåéÝðç ôçò áðâèçñßùöçò, áëëÜ Yíá iÝññò ãéá õðfåéööññYò P ãéá áðáíðÞóåéò ôå áíáðÜíöçôá eÝiaóå ó÷åééÜ iå ôçí áðüäöç.

freebsd-pf (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-pf>)

#### ÓðæçôÞóåéò ãéá áñùðÞóåéò ãéá ôi óýóðciá packet filter firewall

ÓðæçôÞóåéò ó÷åöéêÝò iå ôi packet filter (pf) firewall system óöi FreeBSD. Ôå÷íéÝò óðæçôÞóåéò êáé áññùðÞóåéò ÷ñçóöþí áßíáé áððñüöååéöå. Ç ëßóôå áßíáé áðþöçò Yíá iÝññò ãéá óðæÞôçóç ôiø ALTQ QoS framework.

freebsd-platforms (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-platforms>)

#### ÌåðåöññÜ ôiø FreeBSD óå iç-Intel ðëáðöüññiåð

ÐññäëÞiaðå ôiø FreeBSD ðiø áíðáíßæiiðåé ôå ðññéööüðâñåð áðü iñá ðëáðöüññiåð, êáèþò êáé áâíééÝò óðæçôÞóåéò ãéá ðññöÜððåéò ãéá iåðåöññÜ ôiø FreeBSD óå iç-Intel ðëáðöüññiåð. Áßíáé iéá ôå÷íéþ ëßóôå êáé óðæçöiyíðåé iññi áðóðöçññÜ ôå÷íéÜ eÝiaóå.

freebsd-policy (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-policy>)

#### ÊáâðåðèðiøÞñéåò áðiøÜððåéò (policy) ôçò iñÜäáò Core ôiø FreeBSD

ÁöôP áßíáé iñá ëßóôå iå ìéññP êßíçóç, iññi ãéá áiÜäññóç, ãéá ôéò áðiøÜððåéò ôçò Core iñÜäáò ôiø FreeBSD ó÷åöéêÜ iå êÜðiéà eÝiaóå êáðåýéööçò ôiø Project (policies).

freebsd-ports (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-ports>)

#### ÓðæÞôçóç ãéá ôá “ports”

Óðæçôþóåéð ó÷åðééÝð íå ôçí “Óðæçôþóåéð òuí Ports” óið FreeBSD (/usr/ports), ôçí ððiäñíþ òuí ports, êáé áðíééÜ ðeð ðñiðñðÜeåéð ðoñññíéðiñý òuí ports. Áßiáé ïéá ôå÷íéþ ëßóôá êáé óðæçôýíôáé ìüññ ãðôôçñÜ ôå÷íéëÜ èÝíáðá.

freebsd-ports-announce (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-ports-announce>)

ÓciáíôéêÝò åéäPóåéò êáé iäçãßåò ó÷åôéêÝò iå ôçí “ÓoëëiäP ôùí Ports” ôïõ FreeBSD.

Óċiáíóée Ÿò áéċiPóáéò ó ÷ áðóéē Ÿò ià óċí “ÓðeeiñP ôùí Ports” (/usr/ports) ðiò ãððóðeòíñiðoáé óá üiñiòò  
áiaðóðýóóíòí P iàðoáò Ýñiòí ëiñáéoiéêú óóí FreeBSD áëé Ü êáé òóíðò ðâæééiyò ÷ nPóóåò. ÐâññéäiañUññiðoáé  
áéċiPóáéò ó ÷ áðóéē Ÿò ià áéċiáñ Ýò óóċí áñ-éóðâðeòííéèP êáé óċí ððiññP, iÝåò aðiññüðôçôåò áëé Ü êáé ócìáíóée Ÿò  
ðeçñiñiññBåò áiaññUññéoçò êáé iÝùí áéññiñðoáui. Ðññüêåéðåé áéá êññóðò ià iññññP ñññññBæåðoáé áéá  
áiaññiññBåò.

freebsd-ports-bugs (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-ports-bugs>)

*ÓõæPôçóç ãéá ôá óöÜëìáôá ôùí “ports”*

Óðæçôþóáéò ðið ó-÷-âðþæiíóáé là ôéò áíáðiñ Ýò ðññâëçì Üôúí ôçò “ÓðëëñáÞò ôúí Ports” (/usr/ports) óið FreeBSD, ðññið Üóáéò ãéá fÝá ports Þ ãéá áéëáñ Ýò óá ððÜñ-÷-iñóá ports. Åßíáé iéá ôå-÷-íéêÞ ëßóóá êáé óðæçôiýóáé iùññ áðóôçñ Ü ôå-÷-íéêÜ eÝáðá.

freebsd-proliant (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-proliant>)

*Ôå÷íéêP óôæPôçóç ãéá ôi FreeBSD óå ãéáëííéóôÝò HP ProLiant*

ÁôôP ç ëbôôá âbíáé ãéá ôâ ÷ íééYô ðôæçôPôâéô ó ÷ âôéêÜ iâ ôçí ÷ñPôc ôïô FreeBSD óâ äéâéïïéôôYô HP ProLiant. Ç óôæPôçôc ðâñéëâiaÜíâé eYíâôá ðñïäñâíüÜôú iäPâçôc ãéá ProLiant, ëiäéóïéêü ãéá ÷âBñéôçô, âñâåéëâbá ñôeïBôâú, ãéá áíáíPôâéô ðïô BIOS. Ç ëbôôá áôôP âbíáé òi êâôâëçëüôâñ iYñïò ãéá ðôæPôçôc ó ÷ âôéêÜ iâ ôá áñèñPìâôá hpasmd, hpasmcli, ãéá hpacucl.

freebsd-python (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-python>)

Ç Python óõi FreeBSD

ÁôôP ç ëbôôá âbíráé ãéá óôæçôPóâéò ó ÷ âôôéê Ýò ià ôçí ââéöéôôïðiñçcôz ôçò õðiñôPñéïçò ôçò Python óôï FreeBSD. Åbíáé ieá ôå ÷ íeêP ëbôôá. Ðñiññbæåôáé ãéá Üôîñâ ðiõ áó ÷ ieíýiôáé ià ôçí iådáöiñÜ ôçò Python, ôùí âñéññùÜôùí ôçò (modules) êáé õiõ **Zope** óôï FreeBSD. ¼ôié åâáéaoÝñiñôáé íá ðáñâéïeïðePóïñi ôçí ôå ÷ íeêP óôæPçcôz, âbíráé åôôññuôåéôïé.

freebsd-questions (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-questions>)

ÅñùôPóåéò ÷ñçóôþí

ÄôôP ç ëbôôå åbíáé æáé åñùôPóåéò ó÷åôééÝò iå ôi FreeBSD. Äåí ðñÝðåé íå óôÝëfåôå åñùôPóåéò ôýðiö “how to” óå ôå÷íééÝò ëbôôå åêööù áí ðeóôåýåôå üöé ç åñþbôcôç óåò åbíáé ðïrý åfåæéêåöiÝíç.

freebsd-ruby (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-ruby>)

*ÓðæÞóðcóc ó÷åôéêÜ íå ôc Ruby óôi FreeBSD*

Ç ūbóóá áðóóP áßíáé ãéá óoðæçôPóåéó ðiø ó÷åðBæiíóáé là ôçí ðiøiôóPñéíç ôçò Ruby óoï FreeBSD. Ðñüéåéóáé ãéá íéá ëBóóá ôå÷íéþí áññùôPóåúí. Áðåðéýiâðóáé óå Üöñíä ðiø aïñéåýiøí óå Ports ôçò Ruby, óå âéåéëièPéåò ôñBóùí èáðáóéâðåðóþí, êáé óå Üééá ðeäBóéá èäéiøññéþí.

Åßíáé åðßóçò åððñüóåâôïé üóïé åíäéåö Ýñiióáé æá åðöïý ôïö åßäïöö ôçí ôå ÷ íéêþ óðæÞôçóç.

freebsd-scsi (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-scsi>)

*Ôi õðiióýóôçìá SCSI*

ÁõõP ç ëßóôá åßíáé æáá Üôñá ðiõ åññÜæiiôáé óõi SCSI õðiióýóôçìá ðiõ FreeBSD. Åßíáé iéá ôå÷íéêP ëßóôá éáé óõæçöiýíôáé iüñí áõõôçñÜ ôå÷íéêÜ èÝlåôá.

freebsd-security (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-security>)

*ÈÝlåôá áõõáæåßáð*

ÁõiñÜ èÝlåôá áõõáæåßáð ðiõiæiæóôþí ðiõ åêôåæiýí FreeBSD (DES, Kerberos, åñùôóÜ èÝlåôá áõõáæåßáð éáé åéiñèþóâéð, êðë). Åßíáé iéá ôå÷íéêP ëßóôá éáé óõæçöiýíôáé iüñí áõõôçñÜ ôå÷íéêÜ èÝlåôá. Óçìåéþóâð üõé åái ðñüêåéôáé æáá ëßóôá åññùôþóâúí éáé áðáîôþóâúí, áeeÜ ç óõiæéôõiñÜ (ôüöi åññùôþóâúí üöi ÈÁÉ áðáîôþóâúí) óõi FAQ åßíáé åõõñüóäåêðç.

freebsd-security-notifications (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-security-notifications>)

*Åéäiðiéþóâéð áõõáæåßáð*

Åéäiðiéþóâéð æáá ðññâéþlåôá áõõáæåßáð éáé åéiñèþóâéð óõi FreeBSD. Åái ðñüêåéôáé æáá ëßóôá óõæçöþóâúí åßíáé ç FreeBSD-security.

freebsd-small (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-small>)

*×ñþóç ðiõ FreeBSD óå embedded åõáññüäÝò*

ÁõõP ç ëßóôá óõæçöþí èÝlåôá ó÷åôéÜ iå áõõiþèéôá iéêñÝò éáé embedded åãéåôáóôÜóâéð ðiõ FreeBSD. Åßíáé iéá ôå÷íéêP ëßóôá éáé óõæçöiýíôáé iüñí áõõôçñÜ ôå÷íéêÜ èÝlåôá.

**Óçìåßùóç:** Ç ëßóôá áõõP Ý÷åé áíóééåôáóôåèåß áðü ôçí freebsd-embedded (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-embedded>).

freebsd-stable (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-stable>)

*Óõæçöþóâéð ó÷åôéêÝò iå ôçí ñþóç ðiõ FreeBSD-STABLE*

ÁõõP ç ëßóôá åßíáé æáá ôiõ ÷ñþóâàð ôiõ FreeBSD-STABLE. DáñéÝ ÷åé ðññâéäiðiéþóâéð æáá íÝá ÷åñáêðçñéôôééÜ ðiõ ðññüêåéôáé íá åíóùìáûèiýí óõi -STABLE éáé ôá iõiþá åíäå÷ííÝñò íá åðçñâÜóí ðiõ ÷ñþóâàð ôiõ. Åðþçò ðáñéÝ ÷åé iäçãßáð æáá ôá åPiåôá ðiõ ðñÝðåé íá åéiæiõèþóâôå þóâå íá ðáñâiåßiåôå óõi -STABLE. Èá ðñÝðåé íá åããññåôåßôå óá áõõP ôç ëßóôá, áí åéiæiõèåßôå ôiõ "STABLE". Åßíáé iéá ôå÷íéêP ëßóôá éáé óõæçöiýíôáé iüñí áõõôçñÜ ôå÷íéêÜ èÝlåôá.

freebsd-standards (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-standards>)

*Óõiññöùóç iå ôá ðññôôðå C99 & POSIX*

ÁõõP ç ëßóôá åßíáé æáá ôå÷íéêÝò óõæçöþóâéð ó÷åôéêÜ iå ôçí óõiññöùóç ôiõ FreeBSD iå ôá ðññôôðå C99 éáé POSIX.

freebsd-toolchain (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-toolchain>)

*Óõiðþñçóç ôuí åíóùìáûíÝíñí åññâdëåßùí ôiõ FreeBSD*

ÁôôP ç ëbôôá ábíáé ãéá óóæçôPôáéô ðiô ó÷åôBæiïôáé iã ôçí óâéñÜ åññâæåßuí (toolchain) ðiô Yñ ÷iïôáé iã ôi FreeBSD. Ç óoæPôçóç iðinâß íá ðâññéëâiûÍâé èYíáôá ó÷åôéêÜ iã ôçí êáôÜôôáóç òiô Clang êáé ôiô GCC, aëeÜ êáé èYíáôá ó÷åôéêÜ iã ðññiñÜìâáôá üðùò iãôâáæüôôéôôÝò, assemblers, linkers êáé debuggers.

freebsd-usb (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-usb>)

ÓðæÞôçóç ãéá ôçí ððiöôÞñéïç ôiõ ãéáyëiõ USB óôi FreeBSD

ÁðóðP c ðeðbððá áðþíæ áæá ðá ÷ íéé Ýð óððæcð Þróáéð ó ÷ áððéé Ü iá ðcí ððið ðÞneíç ðið USB óði FreeBSD.

freebsd-user-groups (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-user-groups>)

*IñāÜíùóç ôùí óôëëüäùí ÷ñçóôþí*

ÁôôP ç ëbôôá ábíáé áea ôiôò óôíôííéôô Ýò ôuí åðéí Ýñiôò ôiðéêþí óôëëüäuì ÷ñçóôþí áea óôæþôçóç èâi Üôuì iåôáý ôiôò êaé ia êÜðiéí iÝëò ôçò iñÜäáò Core. ÁôôP ç ëbôôá ea ðñÝðâé ía áiaóÝñâé iuñi ôðé óôíáîðþôâéò êaé ñcí iññÜûöç projects ðiô áiaóÝñiôáé óá ðåñéôóùôâñiôò åðü Ýíá óôëëüäiôò ÷ñçóôþí.

freebsd-vendors (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-vendors>)

ĐùëçôÝò

ÍñáÜíuóć óõæçôÞóåùí ìåôâíý ôïö FreeBSD Project êáé ôùí ðùëçôþí ëïäéóîéëíý êáé õëéëíý ó÷åôéëíý ìå ôï FreeBSD.

freebsd-virtualization (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-virtualization>)

ÓðæÞôcóc æéÜöiñùí ôå÷íééhí áðééiúééiðiþcócò ðið őðiðóôcñþæüôáé áðü ôi FreeBSD.

Iéá ëßóôá áéá ôç óðæÞôcôc ôùíi áéÜöinú ôå ÷ íéêpí áééííééíðiÞbcôcò ðòi ðòiðóôçñbæííóáé áðü òi FreeBSD. Áðü ôç iéá iâñéÜ áðóéÜæâé ôôçí ðëiðiÞbcôc ôùíi áâóéêpí éâéðiñâépí áëeÜ êáé ôçí ðñiøébêç íÝùí áðiáôîðÞôùí. Áðü ôçí Üëeç, ié ÷ñÞôðôåð èá Ý ÷ iòi iéá iñÜäá óðæçôðÞôåúi üðiò ìðiñýí íá æçöiyí ãiÞæâá óá ðâñbðòùñc ðñiâecíÜðùí. P íá óôðacöiñí ôéô áééÝò ðjôò ÷ñÞôåéò.

freebsd-wip-status (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-wip-status>)

*ÊáôÜóôáóć åñäáóéhí óå åíÝëéíć óôř FreeBSD*

Óôc ëßóôá áôôP iôññâßôá íá áíâéïéßpôåôá ôçí Ýíáñïç êéá ôçí ðñüïïä ëÜðïëéáò åññâóßåò óáô ðïô ò÷åôßæåôáé iå ðïi FreeBSD. Ôá içíýíåôá óå áôôP ôç ëßóôá åëÝä ÷ iiôáé. Óôñßôåôåé íá óôåßëåôå ôï iñpíñlå óåô iå ðåñâéßpôôç iéá ðéï ðïðééP óåô ëßóôá ðïô FreeBSD, êéá áðëþò íá ëïéñiðïéßpôåôå ôï iñpíñlå óåô óå áôôP ôç ëßóôá. Iå ðïi ôñüðï áôôü, iñññâßôá åðßöçò íá óôæçôßpôåôå æéá ôçí åññâóßå óåô óôçí ðïðééP ëßóôá, êéþò ç óôæßpôçóç óå áôôP ôç ëßóôá ååå áðéôñ Ýðåôåé.

Äåßöå ðå áñ ÷ åßå öðç ëßöðå áæá íå ðÜñåöö íæå ëå ðöö ñiñöPö öñí içföiñ Üöñü ðiø iññäBöå fá öößæåöå.

Íléa ðâñþéççôc ôúí ðâñéå ÷ ii Ýiúí ôçò èßóðå áïäÝ ÷ åôáé íá äçïiøéåýåôáé êåðÜ ôâéôÜ äéåôóÞìàðå ôôç äééôðåéÞ òiðiæåðå ñið FreeBSD, ùò iÝñiò ôúí Áíáöiñþí ÈåðÜôðåóçò (Status Reports) <sup>1</sup>. Ôôçí ßæá òiðiæåðå, iðiñåðå åðßóçò íá âñåßå ðâñéòúðåññå ðâññåðåññå ôåðå êåé ðñïçaiÿiåñå ôåðå áïáöiñÝò.

freebsd-wireless (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-wireless>)

ÓðœÞôcóc ó÷÷âðêéÜ iå ôç óðiþâá 802.11, ôá åñãáëåßá áóýñùáðiö äééðöýiö êáé ôçí áí Üððoðiç ðñiãñáìiÜðùí iäÞâcócò

H ëßóóá áôôP áóóéÜæåé óôç óöißâá äéêöýïo 802.11 (sys/net80211), ôçí áíÜðôôïç ðñiäñâìÜôùí iäPäçóçò êáé åñâáéåßûí. ÐñâéëâáÜíé ááïöññYó ðñiäæçÜôùí, íÝá ÷åñâéôçñéöôéÜ êáé ðëçñïöñßåò óóïôPñçóçò.

freebsd-xen (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-xen>)

ÓõæÞôçóç ãéá ôç ìåôáöiñÜ ôiõ FreeBSD óõi Xen — ðëiðiþçóç êáé ÷ñPóç

Đñüêåéôáé ãéá iéá ëßóôá ðiõ áôôéÜæåé óôçí ìåôáöiñÜ ôiõ FreeBSD óõi Xen. Ç êßíçóç óå áôôP ôç ëßóôá ááíÝíåôáé íá åßíáé iéññP, êáé Ýôôé èá ÷ñçóðiðiçèåß ôüöř ãéá ôå ÷íéÝò óðæçôPóåéò ó÷åôééÜ iå ôi õ÷åäéåöiü ãéá ôçí ðëiðiþçóç, üöř êáé iå ðñiâëPiáôá ååéåðÜóôåóçò êáé ãéá ÷åßñéóçò.

freebsd-xfce (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-xfce>)

*Xfce*

ÓõæÞôçóç ãéá ôç ìåôáöiñÜ ôiõ **Xfce** óõi FreeBSD. Đñüêåéôáé ãéá iéá ëßóôá ôå ÷íéþí óðæçôPóåùí. Đñiññßæåôáé ãéá üöiõð áô÷iðiýôáé ååññáÜ iå ôç ìåôáöiñÜ ôiõ **Xfce** óõi FreeBSD þóôå íá óðæçöiýí ðñiâëPiáôá êáé åíáéåéôééÜ ðýôåéò. Ç ëßóôá åßíáé åðßóçò áñíéôP óå üöiõð åíáéåöÝññíôáé ãéá ôå ÷íéþ õðæÞôçóç áôôíý ôiõ åßäiõò.

#### C.1.4 ÖéëôñÜñéóìá óôéò Ëßóôåò Çëåéôñíééiy Ôá ÷ ðäññåßiø

Íé ëßóôåò çëåéôñíééiy óå ÷ ðäññåßiø ôiõ FreeBSD öéëôñÜññíôáé iå ðíeeáðeiyò ôññüðiõò ãéá íá áðiøýaiõia ôçí åéáññP spam, éþí, êáé Üëëùí áíåðéèýçòùí içññiÜôùí. Òi òéëôñÜñéóìá ðiõ ðåñéññÜöåôáé óå áôôP ôçí åíüôçðá, áðiøåéåß Ýíá ïüñi ïÝññò ôuí óðiøéééþí iÝññùí ðiõ ëâiâÜññòiå ãéá ôçí ðñiøôåóßá ôuí ëéôôþí çëåéôñíééiy óå ÷ ðäññåßiø.

Óôéò ëßóôåò åðéôñÝðiøáé iüñi óðaâéâññiÝññé ðýðié óðiçìiÝíùí áñ ÷ åßùí. ¼ëá ôá óðiçìiÝíá áñ ÷ åßá iå ôýði MIME ðiõ äåí åñßóêåôáé óôçí ðáñáéÜôù ëßóôá, äéâññÜöiøáé ðñéí äéáíåçèåß ôi iþiøá ôôéò ëßóôåò.

- application/octet-stream
- application/pdf
- application/pgp-signature
- application/x-pkcs7-signature
- message/rfc822
- multipart/alternative
- multipart/related
- multipart/signed
- text/html
- text/plain
- text/x-diff
- text/x-patch

**Óçìåßùóç:** iåñééÝò ëßóôåò iðiñåß íá åðéôñÝðiøí óðiçìiÝíá áñ ÷ åßá êáé Üëëùí ôýðuí MIME, áëëÜ ié ðáñáðÜíù õýðié éó ÷ yïñí óôéò ðåñéóóüôåñåò ëßóôåò.

ÅÜí ôi êåßìåñi åñùò içíýiáöiò ðåñéÝ ÷ åôåé ôüöř óå iññòP HTML üöř êáé áðëiy êåéiÝññ, ôi ôiþiá HTML èá áöåéñåèåß. ÅÜí Ýíá iþiøá ðåñéÝ ÷ åé iüñi HTML, èá iåôáôñáðåß óå áðëü êåßìåñi.

## C.2 Usenet Newsgroups

Åêôüò áðü äýí newsgroups ðiõ áó÷ iëiýíôáé iå ôí FreeBSD, ððÜñ÷ iõí ðrëëÜ áêüíá óôá iðiþá åßíåôáé óðæÞôçóç åéá ôí FreeBSD þ Üëëá èÝiáôá ðiõ åíäå ÷ ñÝñùò åíäéåöÝññõí ôiõò ÷ ñPóôåò ôiõ. Åéá êÜðiéá áðü áôôÜ ôá newsgroups, ïðiñâßôå íá êÜíåôå áíáæÞôçóç iå ëÝiáéò-êëåéæéÜ óôéò ðáeeÝð åçiióéåýóåéò ([http://minnie.tuhs.org/BSD-info/bsdnews\\_search.html](http://minnie.tuhs.org/BSD-info/bsdnews_search.html)), ÷ Üñç óôçí õðçñåóßá ðiõ ðññóöÝññåé i Warren Toomey <wkt@cs.adfa.edu.au>.

### C.2.1 Newsgroups Ó÷åôéêÜ iå ôí BSD

- comp.unix.bsd.freebsd.announce (news:comp.unix.bsd.freebsd.announce)
- comp.unix.bsd.freebsd.misc (news:comp.unix.bsd.freebsd.misc)
- de.comp.os.unix.bsd (news:de.comp.os.unix.bsd) (Óôá ÅåñìáíéêÜ)
- fr.comp.os.bsd (news:fr.comp.os.bsd) (Óôá ÅáëëéêÜ)
- it.comp.os.freebsd (news:it.comp.os.freebsd) (Óôá ÉôáëëéêÜ)
- tw.bbs.comp.386bsd (news:tw.bbs.comp.386bsd) (Óå ÐáñáäiøéåéÜ ÊéíÝæéåá)

### C.2.2 ¶ëëá ÅíäéåöÝññôá UNIX Newsgroups

- comp.unix (news:comp.unix)
- comp.unix.questions (news:comp.unix.questions)
- comp.unix.admin (news:comp.unix.admin)
- comp.unix.programmer (news:comp.unix.programmer)
- comp.unix.shell (news:comp.unix.shell)
- comp.unix.user-friendly (news:comp.unix.user-friendly)
- comp.security.unix (news:comp.security.unix)
- comp.sources.unix (news:comp.sources.unix)
- comp.unix.advocacy (news:comp.unix.advocacy)
- comp.unix.misc (news:comp.unix.misc)
- comp.bugs.4bsd (news:comp.bugs.4bsd)
- comp.bugs.4bsd.ucb-fixes (news:comp.bugs.4bsd.ucb-fixes)
- comp.unix.bsd (news:comp.unix.bsd)

### C.2.3 Óýóôçìá X Window

- comp.windows.x.i386unix (news:comp.windows.x.i386unix)
- comp.windows.x (news:comp.windows.x)

- comp.windows.x.apps (news:comp.windows.x.apps)
- comp.windows.x.announce (news:comp.windows.x.announce)
- comp.windows.x.intrinsics (news:comp.windows.x.intrinsics)
- comp.windows.x.motif (news:comp.windows.x.motif)
- comp.windows.x.pex (news:comp.windows.x.pex)
- comp.emulators.ms-windows.wine (news:comp.emulators.ms-windows.wine)

## C.3 ÄéáëîléóôÝò Éóôïóåëßäúí

### C.3.1 Forums, Blogs, éáé ÈiéíùíééÜ Äßêôõá

- Ôá Forums ôiö FreeBSD (<http://forums.freebsd.org/>) ááóßæiióáé óå äéâðáöP web êáé áßíáé êáðÜëëçéá áéá ôå÷íééÝò óõæçôÞóåéò êáé áñùôÞóåéò ðiö áoïñiýí ôi FreeBSD.
- Ôi Planet FreeBSD (<http://planet.freebsdish.org/>) óõääíóñþíáé óå Ýíá óçìåßí ôéò nñÝò áðü áâéÜäåò éóóïëüääéá ìäéþí ôçò iñÜäåò áfÜððöçò ôiö FreeBSD. ĐiëëÜ áðü óá iÝëç, ÷ñçóëíïëíéíýí áðôP ôç äõíáðüöçôá áéá íá áiùóöïëíéÞóïöí ôçí áññáóßá ðiö êÜïiöí ôç äääñíÝíç óóéäíP, ôõ÷üí iÝåò äéíñèþóåéò, êáéþò êáé óá iåéëíöééÜ ôiö õ÷Ýäéá.
- Ôi éáíÜëé BSDConferences óõi Youtube (<http://www.youtube.com/bsdconferences>) ðáñÝ÷åé iéá óõëëiäP áßíôäíí ðøçëÞò ðiëüöçôáò, áðü äéÜöiñá BSD óõíÝäñéá óå üeí òíí êüöíí. Đñüêåéôáé áéá Ýíá èáðíÜóéí ôñüöí íá ðáñáëíëíöèÞóåò áóçíáíóééÜ iÝëç ôçò iñÜäåò áfÜððöçò íá ðáñiööéÜæïöí ôç iÝá ôiöò äiðëéåéÜ óõi FreeBSD.

### C.3.2 Åðßóçìá Mirrors

Central Servers, Argentina, Armenia, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, China, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Italy, Japan, Korea, Kuwait, Kyrgyzstan, Latvia, Lithuania, Netherlands, Norway, Philippines, Portugal, Romania, Russia, San Marino, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, Ukraine, United Kingdom, USA.

(as of 2012/01/30 18:59:13 UTC)

- Central Servers
  - <http://www.FreeBSD.org/>
- Argentina
  - <http://www.ar.FreeBSD.org/>

- Armenia
  - <http://www1.am.FreeBSD.org/> (IPv6)
- Australia
  - <http://www.au.FreeBSD.org/>
  - <http://www2.au.FreeBSD.org/>
- Austria
  - <http://www.at.FreeBSD.org/> (IPv6)
- Belgium
  - <http://freebsd.unixtech.be/>
- Brazil
  - <http://www.br.FreeBSD.org/> (IPv6)
  - <http://www2.br.FreeBSD.org/www.freebsd.org/>
  - <http://www3.br.FreeBSD.org/>
- Bulgaria
  - <http://www.bg.FreeBSD.org/>
  - <http://www2.bg.FreeBSD.org/>
- Canada
  - <http://www.ca.FreeBSD.org/>
  - <http://www2.ca.FreeBSD.org/>
- China

- <http://www.cn.FreeBSD.org/>
- Costa Rica
  - <http://www1.cr.FreeBSD.org/>
- Czech Republic
  - <http://www.cz.FreeBSD.org/> (IPv6)
- Denmark
  - <http://www.dk.FreeBSD.org/> (IPv6)
- Estonia
  - <http://www.ee.FreeBSD.org/>
- Finland
  - <http://www.fi.FreeBSD.org/>
  - <http://www2.fi.FreeBSD.org/>
- France
  - <http://www.fr.FreeBSD.org/>
  - <http://www1.fr.FreeBSD.org/>
- Germany
  - <http://www.de.FreeBSD.org/>
- Greece
  - <http://www.gr.FreeBSD.org/>

- - Hong Kong
    - <http://www.hk.FreeBSD.org/>
- - Hungary
    - <http://www.hu.FreeBSD.org/>
    - <http://www2.hu.FreeBSD.org/>
- - Iceland
    - <http://www.is.FreeBSD.org/>
- - Italy
    - <http://www.it.FreeBSD.org/>
    - <http://www.gufi.org/mirrors/www.freebsd.org/data/>
- - Japan
    - <http://www.jp.FreeBSD.org/www.FreeBSD.org/> (IPv6)
- - Korea
    - <http://www.kr.FreeBSD.org/>
    - <http://www2.kr.FreeBSD.org/>
- - Kuwait
    - <http://www.kw.FreeBSD.org/>
- - Kyrgyzstan
    - <http://www.kg.FreeBSD.org/>

- Latvia
  - <http://www.lv.FreeBSD.org/>
  - <http://www2.lv.FreeBSD.org/>
- Lithuania
  - <http://www.lt.FreeBSD.org/>
- Netherlands
  - <http://www.nl.FreeBSD.org/>
  - <http://www2.nl.FreeBSD.org/>
- Norway
  - <http://www.no.FreeBSD.org/>
- Philippines
  - <http://www.FreeBSD.org.ph/>
- Portugal
  - <http://www.pt.FreeBSD.org/>
  - <http://www1.pt.FreeBSD.org/>
  - <http://www4.pt.FreeBSD.org/>
  - <http://www5.pt.FreeBSD.org/>
- Romania
  - <http://www.ro.FreeBSD.org/>
  - <http://www1.ro.FreeBSD.org/>
  - <http://www2.ro.FreeBSD.org/>

- <http://www3.ro.FreeBSD.org/>

•

Russia

- <http://www.ru.FreeBSD.org/>
- <http://www2.ru.FreeBSD.org/>
- <http://www3.ru.FreeBSD.org/>
- <http://www4.ru.FreeBSD.org/>
- <http://www5.ru.FreeBSD.org/>

•

San Marino

- <http://www.sm.FreeBSD.org/>

•

Singapore

- <http://www2.sg.FreeBSD.org/>

•

Slovak Republic

- <http://www.sk.FreeBSD.org/>

•

Slovenia

- <http://www.si.FreeBSD.org/>
- <http://www2.si.FreeBSD.org/>

•

South Africa

- <http://www.za.FreeBSD.org/>
- <http://www2.za.FreeBSD.org/>

•

Spain

- <http://www.es.FreeBSD.org/>

- <http://www2.es.FreeBSD.org/>
- <http://www3.es.FreeBSD.org/>

•

Sweden

- <http://www.se.FreeBSD.org/>
- <http://www2.se.FreeBSD.org/>

•

Switzerland

- [http://www.ch.FreeBSD.org/ \(IPv6\)](http://www.ch.FreeBSD.org/)
- [http://www2.ch.FreeBSD.org/ \(IPv6\)](http://www2.ch.FreeBSD.org/)

•

Taiwan

- [http://www.tw.FreeBSD.org/ \(IPv6\)](http://www.tw.FreeBSD.org/)
- <http://www2.tw.FreeBSD.org/>
- <http://www3.tw.FreeBSD.org/>
- <http://www4.tw.FreeBSD.org/>
- [http://www5.tw.FreeBSD.org/ \(IPv6\)](http://www5.tw.FreeBSD.org/)
- <http://www6.tw.FreeBSD.org/>
- <http://www7.tw.FreeBSD.org/>

•

Thailand

- <http://www.th.FreeBSD.org/>

•

Turkey

- <http://www.tr.FreeBSD.org/>
- <http://www2.tr.FreeBSD.org/>
- [http://www3.tr.FreeBSD.org/ \(IPv6\)](http://www3.tr.FreeBSD.org/)

•

Ukraine

- <http://www.ua.FreeBSD.org/>
- <http://www2.ua.FreeBSD.org/>
- <http://www5.ua.FreeBSD.org/>
- <http://www4.ua.FreeBSD.org/>

•

United Kingdom

- <http://www1.uk.FreeBSD.org/>
- <http://www3.uk.FreeBSD.org/>

•

USA

- <http://www2.us.FreeBSD.org/>
- <http://www5.us.FreeBSD.org/> (IPv6)

## C.4 Äéåðèýíóåéò Çëåêôñííéíý Ôá ÷ õäñíåßíõ

Íé áéüëïöèå ãþróåéò ÷ ñçóðí ðáñ Ý÷iõí óôá iÝëç òiõò äéåðèýíóåéò çëåêôñííéíý ôá ÷ õäñíåßíõ ðiõ ó÷åðßæííôáé iå õi FreeBSD. Í äéá÷åéñéóðþò ðiõ áíáöÝñåôáé ðáñáêÜôù, äéáôçñåß õi äééåßùíá íá áíáâéÝóåé ôçí äéåýèõíóç, áí ãßíåé êáðÜ÷ñçóç ôçò iå iðiéíäÞðíõå ôñüðí.

ÔííÝáò	Õðçñåóßåò	jùóç × ñçóðí	Äéá ÷ åéñéóðþò
ukug.uk.FreeBSD.org	lúñí ðñíþèçóç	<ukfreebsd@uk.FreeBSD.org>	Lee Johnston <lee@uk.FreeBSD.org>

## Óçìåéþóåéò

1. <http://www.freebsd.org/news/status/>

# ĐáñÜñôçìá D. ÈëåéäéÜ PGP

Óõi ðáñÜñôçìá áõõü, èá âñåßôå ôá äçìüóéá PGP êëåéäéÜ ôúí officers êáé ôùí ìäéþí ôçò ñÜääáò áíÜðôõîçò ôiõ FreeBSD. Ìðññåßôå íá ôá ÷ñçóéiiðiéÞoåå àéá íá àéÝâñåôå ìéá ôçöéåéÞ ððiñãåöÞ P âéá íá ôôåßéåôå êñõðôõiäñåöçìÝ ñ email ôá êÜðiéí iÝëiò ôçò ñÜääáò. Ìðññåßôå íá éåôåâÜóåôå ôçí ðëÞñç èßóôå áðü êëåéäéÜ ÷ñçóôþí ôiõ FreeBSD.org, áðü ôçí ðiðièåóßá <http://www.FreeBSD.org/doc/pgpkeyring.txt>.

## D.1 Officers

### D.1.1 ïÜääá ÁóöÜëåéáò <security-officer@FreeBSD.org>

```
pub 1024D/CA6CDFB2 2002-08-27 FreeBSD Security Officer <security-officer@FreeBSD.org>
      Key fingerprint = C374 0FC5 69A6 FBB1 4AED B131 15D6 8804 CA6C DFB2
sub 2048g/A3071809 2002-08-27
```

### D.1.2 ÄñáììáôÝáò ôçò ïÜääáò Core <core-secretary@FreeBSD.org>

```
pub 1024R/FF8AE305 2002-01-08 core-secretary@FreeBSD.org
      Key fingerprint = CE EF 8A 48 70 00 B5 A9 55 69 DE 87 E3 9A E1 CD
```

### D.1.3 ÄñáììáôÝáò ïÜääáò Äéá÷åßñéóçò ôùí Ports

<portmgr-secretary@FreeBSD.org>

```
pub 1024D/7414629C 2005-11-30
      Key fingerprint = D50C BA61 8DC6 C42E 4C05 BF9A 79F6 E071 7414 629C
uid          FreeBSD portmgr secretary <portmgr-secretary@FreeBSD.org>
sub 2048g/80B696E6 2005-11-30
```

## D.2 ïÝëç ôçò ïÜääáò Core

### D.2.1 John Baldwin <jhb@FreeBSD.org>

```
pub 1024R/C10A874D 1999-01-13 John Baldwin <jbaldwin@weather.com>
      Key fingerprint = 43 33 1D 37 72 B1 EF 5B 9B 5F 39 F8 BD C1 7C B5
uid          John Baldwin <john@baldwin.cx>
uid          John Baldwin <jhb@FreeBSD.org>
uid          John Baldwin <jobaldwi@vt.edu>
```

### D.2.2 Konstantin Belousov <kib@FreeBSD.org>

```
pub 1024D/DD4C6F88 2004-07-29
Key fingerprint = 39DA E615 A45C 111D 777B 3AD0 0B7F 8C04 DD4C 6F88
uid Konstantin Belousov <kib@freebsd.org>
uid Konstantin Belousov <konstantin.belousov@zoral.com.ua>
uid Kostik Belousov <kostikbel@ukr.net>
uid Kostik Belousov <kostikbel@gmail.com>
sub 2048g/18488597 2004-07-29
```

### D.2.3 Wilko Bulte <wilko@FreeBSD.org>

```
pub 1024D/186B8DBD 2006-07-29
Key fingerprint = 07C2 6CB3 9C18 D290 6C5F 8879 CF83 EC86 186B 8DBD
uid Wilko Bulte (wilko@FreeBSD.org) <wilko@FreeBSD.org>
sub 2048g/1C4683F1 2006-07-29
```

### D.2.4 Brooks Davis <brooks@FreeBSD.org>

```
pub 1024D/F2381AD4 2001-02-10
Key fingerprint = 655D 519C 26A7 82E7 2529 9BF0 5D8E 8BE9 F238 1AD4
uid Brooks Davis (The Aerospace Corporation) <brooks@aero.org>
uid Brooks Davis <brooks@one-eyed-alien.net>
uid Brooks Davis <brooks@FreeBSD.org>
uid Brooks Davis <brooks@aero.org>
sub 2048g/CFDACA7A 2003-01-25 [expires: 2016-04-30]
sub 1024g/42921194 2001-02-10 [expires: 2016-04-30]
```

### D.2.5 Warner Losh <imp@FreeBSD.org>

```
pub 1024D/1EF6D8A7 2006-08-15
Key fingerprint = AEC9 99C1 3212 1A86 93A6 A96B DB9F 6F12 1EF6 D8A7
uid M. Warner Losh <imp@bsdimp.com>
sub 4096g/34FC5B17 2006-08-15
```

### D.2.6 Pav Lucistnik <pav@FreeBSD.org>

```
pub 1024D/C14EB282 2003-08-25 Pav Lucistnik <pav@FreeBSD.org>
Key fingerprint = 2622 B7E3 7DA5 5C53 2079 855B 9ED7 583F C14E B282
uid Pav Lucistnik <pav@ooook.cz>
sub 1024g/7287A947 2003-08-25
```

### D.2.7 Colin Percival <cperciva@FreeBSD.org>

```
pub 1024D/0C6A6A6E 2009-01-12
Key fingerprint = EAF4 8BBA 7CC7 7A30 FEFC 0DA9 38CE CA69 0C6A 6A6E
uid          Colin Percival <cperciva@tarsnap.com>
uid          Colin Percival <cperciva@FreeBSD.org>
uid          Colin Percival <cperciva@alumni.sfu.ca>
sub 2048g/DC606691 2009-01-12
```

### D.2.8 Hiroki Sato <hrs@FreeBSD.org>

```
pub 1024D/2793CF2D 2001-06-12
Key fingerprint = BDB3 443F A5DD B3D0 A530 FFD7 4F2C D3D8 2793 CF2D
uid          Hiroki Sato <hrs@allbsd.org>
uid          Hiroki Sato <hrs@eos.ocn.ne.jp>
uid          Hiroki Sato <hrs@ring.gr.jp>
uid          Hiroki Sato <hrs@FreeBSD.org>
uid          Hiroki Sato <hrs@jp.FreeBSD.org>
uid          Hiroki Sato <hrs@vlsi.ee.noda.tus.ac.jp>
uid          Hiroki Sato <hrs@jp.NetBSD.org>
uid          Hiroki Sato <hrs@NetBSD.org>
uid          Hiroki Sato <hrs@ec.ss.titech.ac.jp>
uid          Hiroki Sato <hrs@ieee.org>
uid          Hiroki Sato <hrs@acm.org>
sub 1024g/8CD251FF 2001-06-12
```

## D.3 ÌÝëç ôçò ÌÜääàò ÁíÜðôõîçò

### D.3.1 Ariff Abdullah <ariff@FreeBSD.org>

```
pub 1024D/C5304CDA 2005-10-01
Key fingerprint = 5C7C 6BF4 8293 DE76 27D9 FD57 96BF 9D78 C530 4CDA
uid          Ariff Abdullah <skywizard@MyBSD.org.my>
uid          Ariff Abdullah <ariff@MyBSD.org.my>
uid          Ariff Abdullah <ariff@FreeBSD.org>
sub 2048g/8958C1D3 2005-10-01
```

### D.3.2 Thomas Abthorpe <tabthorpe@FreeBSD.org>

```
pub 2048R/A473C990 2010-05-28
Key fingerprint = D883 2D7C EB78 944A 69FC 36A6 D937 1097 A473 C990
uid          Thomas Abthorpe (FreeBSD Committer) <tabthorpe@FreeBSD.org>
uid          Thomas Abthorpe <thomas@goodking.ca>
uid          Thomas Abthorpe <tabthorpe@goodking.org>
sub 2048R/8CA60EE0 2010-05-28
```

### D.3.3 Eitan Adler <eadler@FreeBSD.org>

```
pub 4096R/8FC8196C 2011-02-11
Key fingerprint = 49C7 29DF E09C 0FC7 A1C4 6ECB A338 A6FC 8FC8 196C
uid             Eitan Adler <lists@eitanadler.com>
sub 4096R/18763D51 2011-02-11
sub 4096R/DAB9CF9B 2011-02-11
```

### D.3.4 Shaun Amott <shaun@FreeBSD.org>

```
pub 1024D/6B387A9A 2001-03-19
Key fingerprint = B506 E6C7 74A1 CC11 9A23 5C13 9268 5D08 6B38 7A9A
uid             Shaun Amott <shaun@inerd.com>
uid             Shaun Amott <shaun@FreeBSD.org>
sub 2048g/26FA8703 2001-03-19
sub 2048R/7FFF5151 2005-11-06
sub 2048R/27C54137 2005-11-06
```

### D.3.5 Henrik Brix Andersen <brix@FreeBSD.org>

```
pub 1024D/54E278F8 2003-04-09
Key fingerprint = 7B63 EF32 7831 A704 220D 7E61 BFE4 387E 54E2 78F8
uid             Henrik Brix Andersen <henrik@brixandersen.dk>
uid             Henrik Brix Andersen <brix@FreeBSD.org>
uid             Henrik Brix Andersen <hbn@terma.com>
uid             Henrik Brix Andersen <brix@osaa.dk>
sub 1024g/3B13C209 2003-04-09
```

### D.3.6 Matthias Andree <mandree@FreeBSD.org>

```
pub 1024D/052E7D95 2003-08-28
Key fingerprint = FDD0 0C43 6E33 07E1 0758 C6A8 BE61 8339 052E 7D95
uid             Matthias Andree <mandree@freebsd.org>
uid             Matthias Andree <matthias.andree@gmx.de>
sub 1536g/E65A83DA 2003-08-28
```

### D.3.7 Will Andrews <will@FreeBSD.org>

```
pub 1024D/F81672C5 2000-05-22 Will Andrews (Key for official matters) <will@FreeBSD.org>
Key fingerprint = 661F BBF7 9F5D 3D02 C862 5F6C 178E E274 F816 72C5
uid             Will Andrews <will@physics.purdue.edu>
uid             Will Andrews <will@puck.firepipe.net>
uid             Will Andrews <will@c-60.org>
uid             Will Andrews <will@csociety.org>
uid             Will Andrews <will@csociety.ecn.purdue.edu>
uid             Will Andrews <will@telperion.openpackages.org>
```

sub 1024g/55472804 2000-05-22

### D.3.8 Dmitry Andric <dim@FreeBSD.org>

```
pub 1024D/2E2096A3 1997-11-17
    Key fingerprint = 7AB4 62D2 CE35 FC6D 4239  4FCD B05E A30A 2E20  96A3
uid          Dmitry Andric <dim@andric.com>
uid          Dmitry Andric <dim@xs4all.nl>
uid          Dmitry Andric <dimitry.andric@tomtom.com>
uid          [jpeg image of size 5132]
uid          Dmitry Andric <dim@nah6.com>
uid          Dmitry Andric <dim@FreeBSD.org>
sub 4096g/6852A5C5 1997-11-17
```

### D.3.9 Eric Anholt <anholt@FreeBSD.org>

```
pub 1024D/6CF0EAF7 2003-09-08
    Key fingerprint = 76FE 2475 820B B75F DCA4  0F3E 1D47 6F60 6CF0  EAF7
uid          Eric Anholt <eta@lclark.edu>
uid          Eric Anholt <anholt@FreeBSD.org>
sub 1024g/80B404C1 2003-09-08
```

### D.3.10 Marcus von Appen <mva@FreeBSD.org>

```
pub 1024D/B267A647 2009-02-14
    Key fingerprint = C7CC 1853 D8C5 E580 7795  B654 8BAF 3F12 B267 A647
uid          Marcus von Appen <freebsd@sysfault.org>
uid          Marcus von Appen <mva@freebsd.org>
sub 2048g/D34A3BAF 2009-02-14
```

### D.3.11 Marcelo Araujo <araujo@FreeBSD.org>

```
pub 1024D/53E4CFA8 2007-04-27
    Key fingerprint = 9D6A 2339 925C 4F61 ED88  ED8B A2FC 4977 53E4 CFA8
uid          Marcelo Araujo (Ports Committer) <araujo@FreeBSD.org>
sub 2048g/63CC012D 2007-04-27
```

### D.3.12 Mathieu Arnold <mat@FreeBSD.org>

```
pub 1024D/FE6D850F 2005-04-25
    Key fingerprint = 2771 11F4 0A7E 73F9 ADDD  A542 26A4 7C6A FE6D 850F
uid          Mathieu Arnold <mat@FreeBSD.org>
uid          Mathieu Arnold <mat@mat.cc>
uid          Mathieu Arnold <mat@cpan.org>
```

```
uid          Mathieu Arnold <m@absolight.fr>
uid          Mathieu Arnold <m@absolight.net>
uid          Mathieu Arnold <mat@club-internet.fr>
uid          Mathieu Arnold <marnold@april.org>
uid          Mathieu Arnold <paypal@mat.cc>
sub 2048g/EAD18BD9 2005-04-25
```

### D.3.13 Satoshi Asami <asami@FreeBSD.org>

```
pub 1024R/1E08D889 1997-07-23 Satoshi Asami <asami@cs.berkeley.edu>
      Key fingerprint = EB 3C 68 9E FB 6C EB 3F DB 2E 0F 10 8F CE 79 CA
uid                               Satoshi Asami <asami@FreeBSD.ORG>
```

### D.3.14 Gavin Atkinson <gavin@FreeBSD.org>

```
pub 1024D/A093262B 2005-02-18
      Key fingerprint = 313A A79F 697D 3A5C 216A EDF5 935D EF44 A093 262B
uid                               Gavin Atkinson <gavin@16squared.co.uk>
uid                               Gavin Atkinson (FreeBSD key) <gavin@FreeBSD.org>
uid                               Gavin Atkinson (Work e-mail) <ga9@york.ac.uk>
uid                               Gavin Atkinson <gavin.atkinson@ury.york.ac.uk>
sub 2048g/58F40B3D 2005-02-18
```

### D.3.15 Joseph S. Atkinson <jsa@FreeBSD.org>

```
pub 2048R/21AA7B06 2010-07-14
      Key fingerprint = 5B38 63B0 9CCA 12BE 3919 9412 CC9D FC84 21AA 7B06
uid                               Joseph S. Atkinson <jsa@FreeBSD.org>
uid                               Joseph S. Atkinson <jsa.bsd@gmail.com>
uid                               Joseph S. Atkinson <jsa@wickedmachine.net>
sub 2048R/5601C3E3 2010-07-14
```

### D.3.16 Philippe Audeoud <jadawin@FreeBSD.org>

```
pub 1024D/C835D40E 2005-04-13
      Key fingerprint = D090 8C96 3612 15C9 4E3E 7A4A E498 FC2B C835 D40E
uid                               Philippe Audeoud <jadawin@tuxaco.net>
uid                               Philippe Audeoud <philippe@tuxaco.net>
uid                               Philippe Audeoud <philippe.audeoud@sitadelle.com>
uid                               Philippe Audeoud <jadawin@freebsd.org>
sub 2048g/EF8EA329 2005-04-13
```

### D.3.17 Timur I. Bakeyev <timur@FreeBSD.org>

```
pub 1024D/60BA1F47 2002-04-27
Key fingerprint = 84BF EAD1 607D 362F 210E 69B3 0BF0 6412 60BA 1F47
uid             Timur I. Bakeyev (BaT) <timur@bat.ru>
uid             Timur I. Bakeyev <timur@gnu.org>
uid             Timur I. Bakeyev (BaT) <bat@cpan.org>
uid             Timur I. Bakeyev (BaT) <timur@FreeBSD.org>
uid             Timur I. Bakeyev (BaT) <timur@gnome.org>
uid             Timur I. Bakeyev <timur@gnome.org>
sub 2048g/8A5B0042 2002-04-27
```

### D.3.18 Glen Barber <gjb@FreeBSD.org>

```
pub 2048R/A0B946A3 2010-08-03
Key fingerprint = 78B3 42BA 26C7 B2AC 681E A7BE 524F 0C37 A0B9 46A3
uid             Glen Barber <glen.j.barber@gmail.com>
uid             Glen Barber <gjb35@drexel.edu>
uid             Glen Barber <gjb@glenbarber.us>
uid             Glen Barber <gjb@FreeBSD.org>
sub 2048R/6C0527E5 2010-08-03
```

### D.3.19 Nick Barkas <snb@FreeBSD.org>

```
pub 2048R/DDADB9DC 2010-07-27
Key fingerprint = B678 6ECB 303D F580 A050 098F BDFF 4F3D DDAD B9DC
uid             S. Nicholas Barkas <snb@freebsd.org>
sub 2048R/36E181FB 2010-07-27
sub 2048R/BDA4BED3 2010-07-29
sub 2048R/782A8737 2010-07-29
```

### D.3.20 Simon Barner <barner@FreeBSD.org>

```
pub 1024D/EBADA82A 2000-11-10
Key fingerprint = 67D1 3562 9A2F 3177 E46A 35ED 0A49 FEFD EBAD A82A
uid             Simon Barner <barner@FreeBSD.org>
uid             Simon Barner <barner@in.tum.de>
uid             Simon Barner <barner@informatik.tu-muenchen.de>
uid             Simon Barner <barner@gmx.de>
sub 2048g/F63052DE 2000-11-10
```

### D.3.21 Doug Barton <dougb@FreeBSD.org>

```
pub 2048R/1A1ABC84 2010-03-23
Key fingerprint = E352 0E14 9D05 3533 C33A 67DB 5CC6 86F1 1A1A BC84
uid             Douglas Barton <dougb@dougbarton.us>
```

```
uid          Douglas Barton <dougb@FreeBSD.org>
uid          [jpeg image of size 6140]
sub 3072R/498795B4 2010-03-23
Key fingerprint = C0BE C1E3 8DC8 D7F4 8E6C 732B 0C14 D9CF 4987 95B4
```

### D.3.22 Artem Belevich <art@FreeBSD.org>

```
pub 2048R/9ED4C836 2011-03-28
Key fingerprint = 7400 D541 07ED 3DF3 3E97 F2D5 8BDF 101C 9ED4 C836
uid          Artem Belevich <artempb@gmail.com>
uid          Artem Belevich <art@freebsd.org>
sub 2048R/55B0E4EB 2011-03-28
```

### D.3.23 Anton Berezin <tobez@FreeBSD.org>

```
pub 1024D/7A7BA3C0 2000-05-25 Anton Berezin <tobez@catpipe.net>
Key fingerprint = CDD8 560C 174B D8E5 0323 83CE 22CA 584C 7A7B A3C0
uid          Anton Berezin <tobez@tobez.org>
uid          Anton Berezin <tobez@FreeBSD.org>
sub 1024g/ADC71E87 2000-05-25
```

### D.3.24 Damien Bergamini <damien@FreeBSD.org>

```
pub 2048R/D129F093 2005-03-02
Key fingerprint = D3AB 28C3 1A4A E219 3145 54FE 220A 7486 D129 F093
uid          Damien Bergamini <damien.bergamini@free.fr>
uid          Damien Bergamini <damien@FreeBSD.org>
sub 2048R/9FBA73A4 2005-03-02
```

### D.3.25 Tim Bishop <tdb@FreeBSD.org>

```
pub 1024D/5AE7D984 2000-10-07
Key fingerprint = 1453 086E 9376 1A50 ECF6 AE05 7DCE D659 5AE7 D984
uid          Tim Bishop <tim@bishnet.net>
uid          Tim Bishop <T.D.Bishop@kent.ac.uk>
uid          Tim Bishop <tdb@i-scream.org>
uid          Tim Bishop <tdb@FreeBSD.org>
sub 4096g/7F886031 2000-10-07
```

### D.3.26 Martin Blapp <mbr@FreeBSD.org>

```
pub 1024D/D300551E 2001-12-20 Martin Blapp <mbr@imp.ch>
Key fingerprint = B434 53FC C87C FE7B 0A18 B84C 8686 EF22 D300 551E
sub 1024g/998281C8 2001-12-20
```

### D.3.27 Warren Block <wblock@FreeBSD.org>

```
pub 2048R/A1F360A3 2011-09-14
    Key fingerprint = 3A44 4DEC B304 5191 8A41 C317 5117 4BB6 A1F3 60A3
uid          Warren Block <wblock@FreeBSD.org>
uid          Warren Block <wblock@wonkity.com>
sub 2048R/51F483F3 2011-09-14
```

### D.3.28 Vitaly Bogdanov <bvs@FreeBSD.org>

```
pub 1024D/B32017F7 2005-10-02 Vitaly Bogdanov <gad@gad.glazov.net>
    Key fingerprint = 402E B8E4 53CB 22FF BE62 AE35 A0BF B077 B320 17F7
uid          Vitaly Bogdanov <bvs@freebsd.org>
sub 1024g/0E88C62E 2005-10-02
```

### D.3.29 Roman Bogorodskiy <novel@FreeBSD.org>

```
pub 2048R/08C2226A 2010-12-03
    Key fingerprint = 8BA4 DF2A D14F 99B6 37E0 0070 C96D 5FFE 08C2 226A
uid          Roman Bogorodskiy <bogorodskiy@gmail.com>
uid          Roman Bogorodskiy <novel@FreeBSD.org>
uid          Roman Bogorodskiy <rbogorodskiy@apache.org>
uid          Roman Bogorodskiy <rbogorodskiy@griddynamics.com>
sub 2048R/EC4ED237 2010-12-03
```

### D.3.30 Renato Botelho <garga@FreeBSD.org>

```
pub 1024D/2244EDA9 2003-12-16 [expires: 2015-10-18]
    Key fingerprint = 4006 C844 BC51 AD75 CE60 6E24 E824 5B89 2244 EDA9
uid          Renato Botelho <garga@FreeBSD.org>
uid          Renato Botelho <rbgarga@gmail.com>
uid          Renato Botelho <garga@freebsdbrasil.com.br>
uid          Renato Botelho <renato@galle.com.br>
uid          Renato Botelho <freebsd@galle.com.br>
uid          Renato Botelho <garga@brainsoft.com.br>
uid          Renato Botelho <garga.bsd@gmail.com>
sub 1024g/7B295760 2003-12-16
```

### D.3.31 Alexander Botero-Lowry <alexbl@FreeBSD.org>

```
pub 1024D/12A95A7B 2006-09-13
    Key fingerprint = D0C3 47F8 AE87 C829 0613 3586 24DF F52B 12A9 5A7B
uid          Alexander Botero-Lowry <alexbl@FreeBSD.org>
sub 2048g/CA287923 2006-09-13
```

### D.3.32 Sofian Brabéz <sbz@FreeBSD.org>

```
pub 1024D/2487E57E 2011-03-15 [expires: 2012-03-14]
Key fingerprint = 05BA DC7E F628 DE3F B241  BFBB 7363 51F4 2487 E57E
uid Sofian Brabéz <sbz@gmail.com>
uid Sofian Brabéz <sbz@FreeBSD.org>
uid Sofian Brabéz <sbz@6dev.net>
sub 1024g/06D39CF7 2011-03-15 [expires: 2012-03-14]
```

### D.3.33 Hartmut Brandt <harti@FreeBSD.org>

```
pub 1024D/5920099F 2003-01-29 Hartmut Brandt <brandt@fokus.fraunhofer.de>
Key fingerprint = F60D 09A0 76B7 31EE 794B BB91 082F 291D 5920 099F
uid Hartmut Brandt <harti@freebsd.org>
sub 1024g/21D30205 2003-01-29
```

### D.3.34 Oliver Braun <obraun@FreeBSD.org>

```
pub 1024D/EF25B1BA 2001-05-06 Oliver Braun <obraun@unsane.org>
Key fingerprint = 6A3B 042A 732E 17E4 B6E7 3EAF C0B1 6B7D EF25 B1BA
uid Oliver Braun <obraun@obraun.net>
uid Oliver Braun <obraun@freebsd.org>
uid Oliver Braun <obraun@haskell.org>
sub 1024g/09D28582 2001-05-06
```

### D.3.35 Max Brazhnikov <makc@FreeBSD.org>

```
pub 1024D/ACB3CD12 2008-08-18
Key fingerprint = 4BAA 200E 720A 0BD1 7BB0 9DFD FBD9 08C2 ACB3 CD12
uid Max Brazhnikov <makc@FreeBSD.org>
uid Max Brazhnikov <makc@issp.ac.ru>
sub 1024g/5FAA4088 2008-08-18
```

### D.3.36 Jonathan M. Bresler <jmb@FreeBSD.org>

```
pub 1024R/97E638DD 1996-06-05 Jonathan M. Bresler <jmb@Bresler.org>
Key fingerprint = 31 57 41 56 06 C1 40 13 C5 1C E3 E5 DC 62 0E FB
uid Jonathan M. Bresler <jmb@FreeBSD.ORG>
uid Jonathan M. Bresler
uid Jonathan M. Bresler <Jonathan.Bresler@USI.net>
uid Jonathan M. Bresler <jmb@FrB.GOV>
```

### D.3.37 Antoine Brodin <antoine@FreeBSD.org>

```
pub 1024D/50CC2671 2008-02-03
Key fingerprint = F3F7 72F0 9C4C 9E56 4BE9 44EA 1B80 31F3 50CC 2671
uid Antoine Brodin <antoine@FreeBSD.org>
sub 2048g/6F4AFBE5 2008-02-03
```

### D.3.38 Diane Bruce <db@FreeBSD.org>

```
pub 1024D/E08F5B15 2007-01-18
Key fingerprint = A5FB 296B 5771 C1CD 6183 0FAB 77FF DCBE E08F 5B15
uid Diane Bruce <db@db.net>
uid Diane Bruce <db@FreeBSD.org>
sub 2048g/73281702 2007-01-18
```

### D.3.39 Christian Brüffer <brueffer@FreeBSD.org>

```
pub 1024D/A0ED982D 2002-10-14 Christian Brueffer <chris@unixpages.org>
Key fingerprint = A5C8 2099 19FF AACB F41B B29B 6C76 178C A0ED 982D
uid Christian Brueffer <brueffer@hitnet.rwth-aachen.de>
uid Christian Brueffer <brueffer@FreeBSD.org>
sub 4096g/1DCC100F 2002-10-14
```

### D.3.40 Markus Brüffer <markus@FreeBSD.org>

```
pub 1024D/78F8A8D4 2002-10-21
Key fingerprint = 3F9B EBE8 F290 E5CC 1447 8760 D48D 1072 78F8 A8D4
uid Markus Brueffer <markus@brueffer.de>
uid Markus Brueffer <buf@hitnet.rwth-aachen.de>
uid Markus Brueffer <mbrueffer@mi.rwth-aachen.de>
uid Markus Brueffer <markus@FreeBSD.org>
sub 4096g/B7E5C7B6 2002-10-21
```

### D.3.41 Sean Bruno <sbruno@FreeBSD.org>

```
pub 2048R/9F4CBB4E 2011-10-19
Key fingerprint = BD78 EB48 FD8C D981 D959 AAE9 BD94 1F06 9F4C BB4E
uid Sean Bruno (sbruno) <sbruno@freebsd.org>
sub 2048R/3A48F987 2011-10-19
```

### D.3.42 Oleg Bulyzhin <oleg@FreeBSD.org>

```
pub 1024D/78CE105F 2004-02-06
Key fingerprint = 98CC 3E66 26DE 50A8 DBC4 EB27 AF22 DCEF 78CE 105F
uid          Oleg Bulyzhin <oleg@FreeBSD.org>
uid          Oleg Bulyzhin <oleg@rinet.ru>
sub 1024g/F747C159 2004-02-06
```

### D.3.43 Michael Bushkov <bushman@FreeBSD.org>

```
pub 1024D/F694C6E4 2007-03-11 [expires: 2008-03-10]
Key fingerprint = 4278 4392 BF6B 2864 C48E OFA9 7216 C73C F694 C6E4
uid          Michael Bushkov <bushman@rsu.ru>
uid          Michael Bushkov <bushman@freebsd.org>
sub 2048g/5A783997 2007-03-11 [expires: 2008-03-10]
```

### D.3.44 Jayachandran C. <jchandra@FreeBSD.org>

```
pub 1024D/3316E465 2010-05-19
Key fingerprint = 320B DB08 4FE3 BCFD 60AF E4DB F486 015F 3316 E465
uid          Jayachandran C. <jchandra@freebsd.org>
sub 2048g/1F7755F9 2010-05-19
```

### D.3.45 Jesus R. Camou <jcamou@FreeBSD.org>

```
pub 1024D/C2161947 2005-03-01
Key fingerprint = 274C B265 48EC 42AE A2CA 47D9 7D98 588A C216 1947
uid          Jesus R. Camou <jcamou@FreeBSD.org>
sub 2048g/F8D2A8DF 2005-03-01
```

### D.3.46 José Alonso Cárdenas Márquez <acm@FreeBSD.org>

```
pub 1024D/9B21BC19 2006-07-18
Key fingerprint = 4156 2EAC A11C 9651 713B 3FC1 195F D4A8 9B21 BC19
uid          Jose Alonso Cardenas Marquez <acm@FreeBSD.org>
sub 2048g/ADA16C52 2006-07-18
```

### D.3.47 Pietro Cerutti <gahr@FreeBSD.org>

```
pub 1024D/9571F78E 2006-05-17
Key fingerprint = 1203 92B5 3919 AF84 9B97 28D6 C0C2 6A98 9571 F78E
uid          Pietro Cerutti <gahr@gahr.ch>
uid          Pietro Cerutti (The FreeBSD Project) <gahr@FreeBSD.org>
sub 2048g/F24227D5 2006-05-17 [expires: 2011-05-16]
```

### D.3.48 Dmitry Chagin <dchagin@FreeBSD.org>

```
pub 1024D/738EFCED 2009-02-27
    Key fingerprint = 3F3F 8B87 CE09 9E10 3606 6ACA D2DD 936F 738E FCED
uid          Dmitry Chagin <dchagin@freebsd.org>
uid          Dmitry Chagin (dchagin key) <chagin.dmitry@gmail.com>
sub 2048g/6A3FDFF9 2009-02-27
```

### D.3.49 Hye-Shik Chang <perky@FreeBSD.org>

```
pub 1024D/CFDB4BA4 1999-04-23 Hye-Shik Chang <perky@FreeBSD.org>
    Key fingerprint = 09D9 57D6 58BA 44DD CAEC 71CD 0D65 2C59 CFDB 4BA4
uid          Hye-Shik Chang <hyeshik@gmail.com>
sub 1024g/A94A8ED1 1999-04-23
```

### D.3.50 Jonathan Chen <jon@FreeBSD.org>

```
pub 1024D/2539468B 1999-10-11 Jonathan Chen <jon@spock.org>
    Key fingerprint = EE31 CDA1 A105 C8C9 5365 3DB5 C2FC 86AA 2539 468B
uid          Jonathan Chen <jon@freebsd.org>
uid          Jonathan Chen <chenj@rpi.edu>
uid          Jonathan Chen <spock@acm.rpi.edu>
uid          Jonathan Chen <jon@cs.rpi.edu>
sub 3072g/B81EF1DB 1999-10-11
```

### D.3.51 Jonathan Anderson <jonathan@FreeBSD.org>

```
pub 1024D/E3BBCA48 2006-06-17
    Key fingerprint = D7C6 9096 874F 707E 48F8 FAB7 22A6 6E53 E3BB CA48
uid          Jonathan Anderson <jonathan@FreeBSD.org>
uid          Jonathan Anderson <jonathan.anderson@ieee.org>
uid          Jonathan Anderson <anderson@engr.mun.ca>
uid          Jonathan Anderson <jonathan.anderson@mun.ca>
sub 2048g/A703650D 2006-06-17
```

### D.3.52 Fukang Chen <loader@FreeBSD.org>

```
pub 1024D/40AB1752 2007-08-01 [expires: 2010-07-31]
    Key fingerprint = 98C4 6E6B 1C21 15E4 5042 01FC C7B7 E152 40AB 1752
uid          loader <loader@FreeBSD.org>
sub 4096g/9E53A5C7 2007-08-01 [expires: 2010-07-31]
```

**D.3.53 Luoqi Chen <luoqi@FreeBSD.org>**

```
pub 1024D/2926F3BE 2002-02-22 Luoqi Chen <luoqi@FreeBSD.org>
      Key fingerprint = B470 A815 5917 D9F4 37F3 CE2A 4D75 3BD1 2926 F3BE
uid           Luoqi Chen <luoqi@bricore.com>
uid           Luoqi Chen <lchen@onetta.com>
sub 1024g/5446EB72 2002-02-22
```

**D.3.54 Andrey A. Chernov <ache@FreeBSD.org>**

```
pub 1024D/964474DD 2006-12-26
      Key fingerprint = 0F63 1B61 D76D AA23 1591 EA09 560E 582B 9644 74DD
uid           Andrey Chernov <ache@freebsd.org>
uid           [jpeg image of size 4092]
sub 2048g/08331894 2006-12-26
```

**D.3.55 Alexander V. Chernikov <melifaro@FreeBSD.org>**

```
pub 1024D/2675AB69 2008-02-17
      Key fingerprint = 00D2 E063 2FB0 2990 C602 50FD C1C2 7889 2675 AB69
uid           Alexander V. Chernikov <melifaro@yandex-team.ru>
uid           Alexander V. Chernikov <melifaro@ipfw.ru>
uid           Alexander V. Chernikov <melifaro@freebsd.org>
sub 4096g/BC64F40C 2008-02-17
```

**D.3.56 Sean Chittenden <seanc@FreeBSD.org>**

```
pub 1024D/EE278A28 2004-02-08 Sean Chittenden <sean@chittenden.org>
      Key fingerprint = E41F F441 7E91 6CBA 1844 65CF B939 3C78 EE27 8A28
sub 2048g/55321853 2004-02-08
```

**D.3.57 Junho CHOI <cjh@FreeBSD.org>**

```
pub 1024D/E60260F5 2002-10-14 CHOI Junho (Work) <cjh@wdb.co.kr>
      Key fingerprint = 1369 7374 A45F F41A F3C0 07E3 4A01 C020 E602 60F5
uid           CHOI Junho (Personal) <cjh@kr.FreeBSD.org>
uid           CHOI Junho (FreeBSD) <cjh@FreeBSD.org>
sub 1024g/04A4FDD8 2002-10-14
```

**D.3.58 Crist J. Clark <cjc@FreeBSD.org>**

```
pub 1024D/FE886AD3 2002-01-25 Crist J. Clark <cjclark@jhu.edu>
      Key fingerprint = F04E CCD7 3834 72C2 707F 0A8F 259F 8F4B FE88 6AD3
uid           Crist J. Clark <cjclark@alum.mit.edu>
```

```
uid Crist J. Clark <cjc@freebsd.org>
sub 1024g/9B6BAB99 2002-01-25
```

### **D.3.59 Joe Marcus Clarke <marcus@FreeBSD.org>**

```
pub 1024D/FE14CF87 2002-03-04 Joe Marcus Clarke (FreeBSD committer address) <marcus@FreeBSD.org>
Key fingerprint = CC89 6407 73CC 0286 28E4 AFB9 6F68 8F8A FE14 CF87
uid Joe Marcus Clarke <marcus@marcuscom.com>
sub 1024g/B9ACE4D2 2002-03-04
```

### **D.3.60 Nik Clayton <nik@FreeBSD.org>**

```
pub 1024D/2C37E375 2000-11-09 Nik Clayton <nik@freebsd.org>
Key fingerprint = 15B8 3FFC DDB4 34B0 AA5F 94B7 93A8 0764 2C37 E375
uid Nik Clayton <nik@slashdot.org>
uid Nik Clayton <nik@crf-consulting.co.uk>
uid Nik Clayton <nik@ngo.org.uk>
uid Nik Clayton <nik@bsdi.com>
sub 1024g/769E298A 2000-11-09
```

### **D.3.61 Benjamin Close <benjsc@FreeBSD.org>**

```
pub 1024D/4842B5B4 2002-04-10
Key fingerprint = F00D C83D 5F7E 5561 DF91 B74D E602 CAA3 4842 B5B4
uid Benjamin Simon Close <Benjamin.Close@clearchain.com>
uid Benjamin Simon Close <benjsc@FreeBSD.org>
uid Benjamin Simon Close <benjsc@clearchain.com>
sub 2048g/3FA8A57E 2002-04-10
```

### **D.3.62 Tijl Coosemans <tijl@FreeBSD.org>**

```
pub 2048D/20A0B62B 2010-07-13
Key fingerprint = 39AA F580 6B44 5161 9F86 ED49 7E80 92D8 20A0 B62B
uid Tijl Coosemans <tijl@coosemans.org>
uid Tijl Coosemans <tijl@freebsd.org>
sub 2048g/7D71BA74 2010-07-13
```

### **D.3.63 Raphael Kubo da Costa <rakuco@FreeBSD.org>**

```
pub 4096R/18DCEED6 2011-10-03
Key fingerprint = 6911 54FE BA6E 6106 5789 7099 8DD0 7D21 18DC EED6
uid Raphael Kubo da Costa (Personal key) <rakuco@FreeBSD.org>
```

### D.3.64 Bruce Cran <brucec@FreeBSD.org>

```
pub 2048R/6AF6F99E 2010-01-29
Key fingerprint = 9A3C AE57 2706 B0E3 4B8A 8374 5787 A72B 6AF6 F99E
uid          Bruce Cran <brucec@FreeBSD.org>
uid          Bruce Cran <bruce@cran.org.uk>
sub 2048R/1D665CEE 2010-01-29
```

### D.3.65 Frederic Culot <culot@FreeBSD.org>

```
pub 1024D/34876C5B 2006-08-26
Key fingerprint = 50EE CE94 E43E BA85 CB67 262B B739 1A26 3487 6C5B
uid          Frederic Culot <culot@FreeBSD.org>
uid          Frederic Culot <frederic@culot.org>
sub 2048g/F1EF901F 2006-08-26
```

### D.3.66 Aaron Dalton <aaron@FreeBSD.org>

```
pub 1024D/8811D2A4 2006-06-21 [expires: 2011-06-20]
Key fingerprint = 8DE0 3CBB 3692 992F 53EF ACC7 BE56 0A4D 8811 D2A4
uid          Aaron Dalton <aaron@freebsd.org>
sub 2048g/304EE8E5 2006-06-21 [expires: 2011-06-20]
```

### D.3.67 Baptiste Daroussin <bapt@FreeBSD.org>

```
pub 1024D/49A4E84C 2008-11-19
Key fingerprint = A14B A5FC B860 86DE 73E2 B24C F244 ED31 49A4 E84C
uid          Baptiste Daroussin <bapt@etoilebsd.net>
uid          Baptiste Daroussin <baptiste.daroussin@gmail.com>
uid          Baptiste Daroussin <bapt@FreeBSD.org>
sub 2048g/54AB46B4 2008-11-19
```

### D.3.68 Ceri Davies <ceri@FreeBSD.org>

```
pub 1024D/34B7245F 2002-03-08
Key fingerprint = 9C88 EB05 A908 1058 A4AE 9959 A1C7 DCC1 34B7 245F
uid          Ceri Davies <ceri@submonkey.net>
uid          Ceri Davies <ceri@FreeBSD.org>
uid          Ceri Davies <ceri@opensolaris.org>
sub 1024g/0C482CBC 2002-03-08
```

**D.3.69 Brad Davis <brd@FreeBSD.org>**

```
pub 1024D/ED0A754D 2005-05-14 [expires: 2014-02-21]
Key fingerprint = 5DFD D1A6 BEEE A6D4 B3F5 4236 D362 3291 ED0A 754D
uid             Brad Davis <so14k@so14k.com>
uid             Brad Davis <brd@FreeBSD.org>
sub 2048g/1F29D404 2005-05-14 [expires: 2014-02-21]
```

**D.3.70 Paweł Jakub Dawidek <pjd@FreeBSD.org>**

```
pub 1024D/B1293F34 2004-02-02 Paweł Jakub Dawidek <Paweł@Dawidek.net>
Key fingerprint = A3A3 5B4D 9CF9 2312 0783 1B1D 168A EF5D B129 3F34
uid             Paweł Jakub Dawidek <pjd@FreeBSD.org>
uid             Paweł Jakub Dawidek <pjd@FreeBSD.pl>
sub 2048g/3EEC50A7 2004-02-02 [expires: 2006-02-01]
```

**D.3.71 Brian S. Dean <bsd@FreeBSD.org>**

```
pub 1024D/723BDEE9 2002-01-23 Brian S. Dean <bsd@FreeBSD.org>
Key fingerprint = EF49 7ABE 47ED 91B3 FC3D 7EA5 4D90 2FF7 723B DEE9
sub 1024g/4B02F876 2002-01-23
```

**D.3.72 Vasil Dimov <vd@FreeBSD.org>**

```
pub 1024D/F6C1A420 2004-12-08
Key fingerprint = B1D5 04C6 26CC 0D20 9525 14B8 170E 923F F6C1 A420
uid             Vasil Dimov <vd@FreeBSD.org>
uid             Vasil Dimov <vd@datamax.bg>
sub 4096g/A0148C94 2004-12-08
```

**D.3.73 Roman Divacky <rdivacky@FreeBSD.org>**

```
pub 1024D/3DC2044C 2006-11-15
Key fingerprint = 6B61 25CA 49BC AAC5 21A9 FA7A 2D51 23E8 3DC2 044C
uid             Roman Divacky <rdivacky@freebsd.org>
sub 2048g/39BDCE16 2006-11-15
```

**D.3.74 Alexey Dokuchaev <danfe@FreeBSD.org>**

```
pub 1024D/3C060B44 2004-08-23 Alexey Dokuchaev <danfe@FreeBSD.org>
Key fingerprint = D970 08A4 922C 8D63 0C19 8D27 F421 76EE 3C06 0B44
sub 1024g/70BAE967 2004-08-23
```

### D.3.75 Dima Dorfman <dd@FreeBSD.org>

```
pub 1024D/69FAE582 2001-09-04
    Key fingerprint = B340 8338 7DA3 4D61 7632 098E 0730 055B 69FA E582
uid             Dima Dorfman <dima@trit.org>
uid             Dima Dorfman <dima@unixfreak.org>
uid             Dima Dorfman <dd@freebsd.org>
sub 2048g/65AF3B89 2003-08-19 [expires: 2005-08-18]
sub 2048g/8DB0CF2C 2005-05-29 [expires: 2007-05-29]
```

### D.3.76 Bruno Ducrot <bruno@FreeBSD.org>

```
pub 1024D/7F463187 2000-12-29
    Key fingerprint = 7B79 E1D6 F5A1 6614 792F D906 899B 4D28 7F46 3187
uid             Ducrot Bruno (Poup Master) <ducrot@poupinou.org>
sub 1024g/40282874 2000-12-29
```

### D.3.77 Alex Dupre <ale@FreeBSD.org>

```
pub 1024D/CE5F554D 1999-06-27 Alex Dupre <sysadmin@alexdupre.com>
    Key fingerprint = DE23 02EA 5927 D5A9 D793 2BA2 8115 E9D8 CE5F 554D
uid             Alex Dupre <ale@FreeBSD.org>
uid             [ jpeg image of size 5544 ]
uid             Alex Dupre <ICQ:5431856>
sub 2048g/FD5E2D21 1999-06-27
```

### D.3.78 Peter Edwards <peadar@FreeBSD.org>

```
pub 1024D/D80B4B3F 2004-03-01 Peter Edwards <peadar@FreeBSD.org>
    Key fingerprint = 7A8A 9756 903E BEF2 4D9E 3C94 EE52 52F7 D80B 4B3F
uid             Peter Edwards <pmedwards@eircom.net>
```

### D.3.79 Josef El-Rayes <josef@FreeBSD.org>

```
pub 2048R/A79DB53C 2004-01-04 Josef El-Rayes <josef@FreeBSD.org>
    Key fingerprint = 58EB F5B7 2AB9 37FE 33C8 716B 59C5 22D9 A79D B53C
uid             Josef El-Rayes <josef@daemon.li>
```

### D.3.80 Lars Engels <lme@FreeBSD.org>

```
pub 1024D/C0F769F8 2004-08-27
    Key fingerprint = 17FC 08E1 5E09 BD21 489E 2050 29CE 75DA C0F7 69F8
uid             Lars Engels <lars.engels@0x20.net>
sub 1024g/8AD5BF9D 2004-08-27
```

### D.3.81 Udo Erdelhoff <ue@FreeBSD.org>

```
pub 1024R/E74FA871 1994-07-19 Udo Erdelhoff <uer@de.uu.net>
Key fingerprint = 8C B1 80 CA 2C 52 73 81 FB A7 B4 03 C5 32 C8 67
uid             Udo Erdelhoff <ue@nathan.ruhr.de>
uid             Udo Erdelhoff <ue@freebsd.org>
uid             Udo Erdelhoff <uerdelho@eu.uu.net>
uid             Udo Erdelhoff <uerdelho@uu.net>
```

### D.3.82 Ruslan Ermilov <ru@FreeBSD.org>

```
pub 1024D/996E145E 2004-06-02 Ruslan Ermilov (FreeBSD) <ru@FreeBSD.org>
Key fingerprint = 274E D201 71ED 11F6 9CCB 0194 A917 E9CC 996E 145E
uid             Ruslan Ermilov (FreeBSD Ukraine) <ru@FreeBSD.org.ua>
uid             Ruslan Ermilov (IPNet) <ru@ip.net.ua>
sub 1024g/557E3390 2004-06-02 [expires: 2007-06-02]
```

### D.3.83 Lukas Ertl <le@FreeBSD.org>

```
pub 1024D/F10D06CB 2000-11-23 Lukas Ertl <le@FreeBSD.org>
Key fingerprint = 20CD C5B3 3A1D 974E 065A B524 5588 79A9 F10D 06CB
uid             Lukas Ertl <a9404849@unet.univie.ac.at>
uid             Lukas Ertl <l.ertl@univie.ac.at>
uid             Lukas Ertl <le@univie.ac.at>
sub 1024g/5960CE8E 2000-11-23
```

### D.3.84 Brendan Fabeny <bf@FreeBSD.org>

```
pub 2048R/9806EBC1 2010-06-08 [expires: 2012-06-07]
Key fingerprint = 2075 ADD3 7634 A4F9 5357 D934 08E7 06D9 9806 EBC1
uid             b. f. <bf@freebsd.org>
sub 2048R/1CD0AD79 2010-06-08 [expires: 2012-06-07]
```

### D.3.85 Rong-En Fan <rafan@FreeBSD.org>

```
pub 1024D/86FD8C68 2004-06-04
Key fingerprint = DC9E 5B4D 2DDA D5C7 B6F8 6E69 D78E 1091 86FD 8C68
uid             Rong-En Fan <rafan@infor.org>
uid             Rong-En Fan <rafan@csie.org>
uid             Rong-En Fan <rafan@FreeBSD.org>
sub 2048g/42A8637E 2009-01-25 [expires: 2012-07-08]
```

### D.3.86 Stefan Farfeleder <stefanf@FreeBSD.org>

```
pub 1024D/8BEFD15F 2004-03-14 Stefan Farfeleder <stefan@fafloe.narf.at>
Key fingerprint = 4220 FE60 A4A1 A490 5213 27A6 319F 8B28 8BEF D15F
uid             Stefan Farfeleder <stefanf@complang.tuwien.ac.at>
uid             Stefan Farfeleder <stefanf@FreeBSD.org>
uid             Stefan Farfeleder <stefanf@ten15.org>
sub 2048g/418753E9 2004-03-14 [expires: 2007-03-14]
```

### D.3.87 Babak Farrokhi <farrokhi@FreeBSD.org>

```
pub 1024D/7C810476 2005-12-22
Key fingerprint = AABD 388F A207 58B4 2EE3 5DFD 4FC1 32C3 7C81 0476
uid             Babak Farrokhi <farrokhi@FreeBSD.org>
uid             Babak Farrokhi <babak@farrokhi.net>
sub 2048g/2A5F93C7 2005-12-22
```

### D.3.88 Chris D. Faulhaber <jedgar@FreeBSD.org>

```
pub 1024D/FE817A50 2000-12-20 Chris D. Faulhaber <jedgar@FreeBSD.org>
Key fingerprint = A47D A838 9216 F921 A456 54FF 39B6 86E0 FE81 7A50
uid             Chris D. Faulhaber <jedgar@fxp.org>
sub 2048g/93452698 2000-12-20
```

### D.3.89 Brian F. Feldman <green@FreeBSD.org>

```
pub 1024D/41C13DE3 2000-01-11 Brian Fundakowski Feldman <green@FreeBSD.org>
Key fingerprint = 6A32 733A 1BF6 E07B 5B8D AE14 CC9D DCA2 41C1 3DE3
sub 1024g/A98B9FCC 2000-01-11 [expires: 2001-01-10]

pub 1024D/773905D6 2000-09-02 Brian Fundakowski Feldman <green@FreeBSD.org>
Key fingerprint = FE23 7481 91EA 5E58 45EA 6A01 B552 B043 7739 05D6
sub 2048g/D2009B98 2000-09-02
```

### D.3.90 Mário Sérgio Fujikawa Ferreira <lioux@FreeBSD.org>

```
pub 1024D/75A63712 2006-02-23 [expires: 2007-02-23]
Key fingerprint = 42F2 2F74 8EF9 5296 898F C981 E9CF 463B 75A6 3712
uid             Mario Sergio Fujikawa Ferreira (lioux) <lioux@FreeBSD.org>
uid             Mario Sergio Fujikawa Ferreira <lioux@uol.com.br>
sub 4096g/BB7D80F2 2006-02-23 [expires: 2007-02-23]
```

### D.3.91 Tony Finch <fanf@FreeBSD.org>

```
pub 1024D/84C71B6E 2002-05-03 Tony Finch <dot@dotat.at>
Key fingerprint = 199C F25B 2679 6D04 63C5 2159 FFC0 F14C 84C7 1B6E
uid             Tony Finch <fanf@FreeBSD.org>
uid             Tony Finch <fanf@apache.org>
uid             Tony Finch <fanf2@cam.ac.uk>
sub 2048g/FD101E8B 2002-05-03
```

### D.3.92 Marc Fonvieille <blackend@FreeBSD.org>

```
pub 1024D/4F8E74E8 2004-12-25 Marc Fonvieille <blackend@FreeBSD.org>
Key fingerprint = 55D3 4883 4A04 828A A139 A5CF CD0F 51C0 4F8E 74E8
uid             Marc Fonvieille <marc@blackend.org>
uid             Marc Fonvieille <marc@freebsd-fr.org>
sub 1024g/37AD4E7D 2004-12-25
```

### D.3.93 Pete Fritchman <petef@FreeBSD.org>

```
pub 1024D/74B91CFD 2001-01-30 Pete Fritchman <petef@FreeBSD.org>
Key fingerprint = 9A9F 8A13 DB0D 7777 8D8E 1CB2 C5C9 A08F 74B9 1CFD
uid             Pete Fritchman <petef@databits.net>
uid             Pete Fritchman <petef@csh.rit.edu>
sub 1024g/0C02AF0C 2001-01-30
```

### D.3.94 Bernhard Fröhlich <decke@FreeBSD.org>

```
pub 1024D/CF5840D4 2008-01-07 [expires: 2015-05-05]
Key fingerprint = 47F6 BDF1 DF9E 81E2 2C54 8A06 E796 7A5A CF58 40D4
uid             Bernhard Fröhlich <decke@FreeBSD.org>
uid             Bernhard Fröhlich <decke@bluelife.at>
sub 2048g/4E51CE79 2008-01-07
```

### D.3.95 Bill Fumerola <billf@FreeBSD.org>

```
pub 1024D/7F868268 2000-12-07 Bill Fumerola (FreeBSD Developer) <billf@FreeBSD.org>
Key fingerprint = 5B2D 908E 4C2B F253 DAEB FC01 8436 B70B 7F86 8268
uid             Bill Fumerola (Security Yahoo) <fumerola@yahoo-inc.com>
sub 1024g/43980DA9 2000-12-07
```

### D.3.96 Andriy Gapon <avg@FreeBSD.org>

```
pub 2048R/A651FE2F 2009-02-16
Key fingerprint = F234 4D58 DEFF 5E3A 4EOF 13BC 74A5 2D27 A651 FE2F
uid          Andriy Gapon (FreeBSD) <avg@FreeBSD.org>
uid          Andriy Gapon (FreeBSD) <avg@freebsd.org>
uid          Andriy Gapon (FreeBSD) <avg@icyb.net.ua>
sub 4096R/F9A4D312 2009-02-16
```

### D.3.97 Beat Gätzi <beat@FreeBSD.org>

```
pub 1024D/774249DB 2009-01-28 [expires: 2014-01-27]
Key fingerprint = C410 3187 5B29 DD02 745F 0890 40C5 BCF7 7742 49DB
uid          Beat Gaetzi <beat@FreeBSD.org>
sub 2048g/173CFFCA 2009-01-28 [expires: 2014-01-27]
```

### D.3.98 Daniel Geržo <danger@FreeBSD.org>

```
pub 1024D/DA913352 2007-08-30 [expires: 2008-08-29]
Key fingerprint = 7372 3F15 F839 AFF5 4052 CAC7 1ADA C204 DA91 3352
uid          Daniel Geržo <gerzo@rulez.sk>
uid          Daniel Geržo <danger@rulez.sk>
uid          Daniel Geržo (The FreeBSD Project) <danger@FreeBSD.org>
uid          Daniel Geržo (Micronet, a.s.) <gerzo@micronet.sk>
sub 2048g/C5D57BDC 2007-08-30 [expires: 2008-08-29]
```

### D.3.99 Justin T. Gibbs <gibbs@FreeBSD.org>

```
pub 2048R/45A4FC2F 2012-02-10
Key fingerprint = B98A C3AB 412B 094B D6FE E713 FA5A 1E30 45A4 FC2F
uid          Justin T. Gibbs <gibbs@FreeBSD.org>
uid          Justin T. Gibbs <gibbs@FreeBSDFoundation.org>
uid          Justin T. Gibbs <gibbs@scsiguy.com>
sub 2048R/AF6927F8 2012-02-10
```

### D.3.100 Pedro Giffuni <pfg@FreeBSD.org>

```
pub 2048D/422BDFE4 2011-12-06
Key fingerprint = A12B 7C6B 54C0 921B C64F 7B35 58DF 6813 422B DFE4
uid          Pedro Giffuni (FreeBSD key signature) <pfg@FreeBSD.org>
sub 2048g/43A91DE0 2011-12-06
```

### D.3.101 Philip M. Gollucci <pgollucci@FreeBSD.org>

```
pub 1024D/DB9B8C1C 2008-04-15
    Key fingerprint = B90B FBC3 A3A1 C71A 8E70  3F8C 75B8 8FFB DB9B 8C1C
uid          Philip M. Gollucci (FreeBSD Foundation) <pgollucci@freebsd.org>
uid          Philip M. Gollucci (Riderway Inc.) <pgollucci@riderway.com>
uid          Philip M. Gollucci <pgollucci@p6m7g8.com>
uid          Philip M. Gollucci (ASF) <pgollucci@apache.org>
sub 2048g/73943732 2008-04-15
```

### D.3.102 Daichi GOTO <daichi@FreeBSD.org>

```
pub 1024D/09EBADD6 2002-09-25 Daichi GOTO <daichi@freebsd.org>
    Key fingerprint = 620A 9A34 57FB 5E93 0828  28C7 C360 C6ED 09EB ADD6
sub 1024g/F0B1F1CA 2002-09-25
```

### D.3.103 Marcus Alves Grando <mnag@FreeBSD.org>

```
pub 1024D/CDCC273F 2005-09-15 [expires: 2010-09-14]
    Key fingerprint = 57F9 DEC1 5BBF 06DE 44A5  9A4A 8BEE 5F3A CDCC 273F
uid          Marcus Alves Grando <marcus@sbh.eng.br>
uid          Marcus Alves Grando <marcus@corp.grupos.com.br>
uid          Marcus Alves Grando <mnag@FreeBSD.org>
sub 2048g/698AC00C 2005-09-15 [expires: 2010-09-14]
```

### D.3.104 Peter Grehan <grehan@FreeBSD.org>

```
pub 1024D/EA45EA7D 2004-07-13 Peter Grehan <grehan@freebsd.org>
    Key fingerprint = 84AD 73DC 370E 15CA 7556  43C8 F5C8 4450 EA45 EA7D
sub 2048g/0E122D70 2004-07-13
```

### D.3.105 Jamie Gritton <jamie@FreeBSD.org>

```
pub 1024D/8832CB7F 2009-01-29
    Key fingerprint = 34F8 1E62 C7A5 7CB9 A91F  7864 8C5A F85E 8832 CB7F
uid          James Gritton <jamie@FreeBSD.org>
sub 2048g/94E3594D 2009-01-29
```

### D.3.106 John-Mark Gurney <jmg@FreeBSD.org>

```
pub 1024R/3F9951F5 1997-02-11 John-Mark Gurney <johnmark@gladstone.uoregon.edu>
    Key fingerprint = B7 EC EF F8 AE ED A7 31  96 7A 22 B3 D8 56 36 F4
uid          John-Mark Gurney <gurney_j@efn.org>
uid          John-Mark Gurney <jmg@cs.uoregon.edu>
```

uid John-Mark Gurney <gurney\_j@resnet.uoregon.edu>

**D.3.107 Daniel Harris <dannyboy@FreeBSD.org>**

```
pub 1024D/84D0D7E7 2001-01-15 Daniel Harris <dannyboy@worksforfood.com>
Key fingerprint = 3C61 B8A1 3F09 D194 3259 7173 6C63 DA04 84D0 D7E7
uid Daniel Harris <dannyboy@freebsd.org>
uid Daniel Harris <dh@askdh.com>
uid Daniel Harris <dh@wordassault.com>
sub 1024g/9DF0231A 2001-01-15
```

**D.3.108 Daniel Hartmeier <dhartmei@FreeBSD.org>**

```
pub 1024R/6A3A7409 1994-08-15 Daniel Hartmeier <dhartmei@freebsd.org>
Key fingerprint = 13 7E 9A F3 36 82 09 FE FD 57 B8 5C 2B 81 7E 1F
```

**D.3.109 Olli Hauer <ohauer@FreeBSD.org>**

```
pub 2048R/5D008F1A 2010-07-26
Key fingerprint = E9EE C9A5 EB4C BD29 74D7 9178 E56E 06B3 5D00 8F1A
uid olli hauer <ohauer@FreeBSD.org>
uid olli hauer <ohauer@gmx.de>
sub 2048R/5E25776E 2010-07-26
```

**D.3.110 Emanuel Haupt <ehaupt@FreeBSD.org>**

```
pub 2048R/C06D09BE 2010-09-24 [expires: 2011-09-24]
Key fingerprint = CC88 5081 78D1 39C3 B467 865A 348E F6CC C06D 09BE
uid Emanuel Haupt <ehaupt@FreeBSD.org>
sub 2048R/F658659F 2010-09-24 [expires: 2011-09-24]
```

**D.3.111 John Hay <jhay@FreeBSD.org>**

```
pub 2048R/A9275B93 2000-05-10 John Hay <jhay@icomtek.csir.co.za>
Key fingerprint = E7 95 F4 B9 D4 A7 49 6A 83 B9 77 49 28 9E 37 70
uid John Hay <jhay@mikom.csir.co.za>
uid Thawte Freemail Member <jhay@mikom.csir.co.za>
uid John Hay <jhay@csir.co.za>
uid John Hay <jhay@FreeBSD.ORG>
```

### D.3.112 Sheldon Hearn <sheldonh@FreeBSD.org>

```
pub 1024D/74A06ACD 2002-06-20 Sheldon Hearn <sheldonh@starjuice.net>
Key fingerprint = 01A3 EF91 9C5A 3633 4E01 8085 A462 57F1 74A0 6ACD
sub 1536g/C42F8AC8 2002-06-20
```

### D.3.113 Mike Heffner <mikeh@FreeBSD.org>

```
pub 1024D/CDECBF99 2001-02-02 Michael Heffner <mheffner@novacoxmail.com>
Key fingerprint = AFAB CCEB 68C7 573F 5110 9285 1689 1942 CDEC BF99
uid Michael Heffner <mheffner@vt.edu>
uid Michael Heffner <mikeh@FreeBSD.org>
uid Michael Heffner <spock@techfour.net>
uid Michael Heffner (ACM sysadmin) <mheffner@acm.vt.edu>
sub 1024g/3FE83FB5 2001-02-02
```

### D.3.114 Martin Heinen <mheinen@FreeBSD.org>

```
pub 1024D/116C5C85 2002-06-17 Martin Heinen <mheinen@freebsd.org>
Key fingerprint = C898 3FCD EEA0 17ED BEA9 564D E5A6 AFF2 116C 5C85
uid Martin Heinen <martin@sumuk.de>
sub 1024g/EA67506B 2002-06-17
```

### D.3.115 Niels Heinen <niels@FreeBSD.org>

```
pub 1024D/5FE39B80 2004-12-06 Niels Heinen <niels.heinen@ubizen.com>
Key fingerprint = 75D8 4100 CF5B 3280 543F 930C 613E 71AA 5FE3 9B80
uid Niels Heinen <niels@defaced.be>
uid Niels Heinen <niels@heinen.ws>
uid Niels Heinen <niels@FreeBSD.org>
sub 2048g/057F4DA7 2004-12-06
```

### D.3.116 Jaakko Heinonen <jh@FreeBSD.org>

```
pub 1024D/53CCB781 2009-10-01 [expires: 2014-09-30]
Key fingerprint = 3AED A2B6 B63D D771 1AFD 25FA DFDF 5B89 53CC B781
uid Jaakko Heinonen (FreeBSD) <jh@FreeBSD.org>
sub 4096g/BB97397E 2009-10-01 [expires: 2014-09-30]
```

### D.3.117 Jason Halfman <jgh@FreeBSD.org>

```
pub 2048R/4150D3DC 2011-12-18 [expires: 2021-12-15]
Key fingerprint = 8E0D C457 9A0F C91C 23F3 0454 2059 9A63 4150 D3DC
uid Jason Halfman <jgh@FreeBSD.org>
```

sub 2048R/695B1B92 2011-12-18 [expires: 2021-12-15]

### D.3.118 Guy Helmer <ghelmer@FreeBSD.org>

```
pub 1024R/35F4ED2D 1997-01-26 Guy G. Helmer <ghelmer@freebsd.org>
Key fingerprint = A2 59 4B 92 02 5B 9E B1 B9 4E 2E 03 29 D5 DC 3A
uid             Guy G. Helmer <ghelmer@cs.iastate.edu>
uid             Guy G. Helmer <ghelmer@palisadesys.com>
```

### D.3.119 Maxime Henrion <mux@FreeBSD.org>

```
pub 1024D/881D4806 2003-01-09 Maxime Henrion <mux@FreeBSD.org>
Key fingerprint = 81F1 BE2D 12F1 184A 77E4 ACD0 5563 7614 881D 4806
sub 2048g/D0B510C0 2003-01-09
```

### D.3.120 Dennis Herrmann <dhn@FreeBSD.org>

```
pub 1024D/65181EA0 2008-09-07 [expires: 2009-03-06]
Key fingerprint = D4DB A438 EB5E 1B26 C782 F969 820B 66B3 6518 1EA0
uid             Dennis Herrmann (Vi veri universum vivus vici) <adox@mox2.org>
sub 4096g/C003C5DD 2008-09-07 [expires: 2009-03-06]
```

### D.3.121 Justin Hibbits <jhibbits@FreeBSD.org>

```
pub 2048R/37BE2DB9 2011-12-01
Key fingerprint = 8A12 7064 4F3D 339A 191D AD52 30C7 858E 37BE 2DB9
uid             Justin Hibbits <chmeedalf@gmail.com>
uid             Justin Hibbits <jhibbits@freebsd.org>
uid             Justin Hibbits <jrh29@alumni.cwru.edu>
sub 2048R/A8DA156F 2011-12-01
```

### D.3.122 Peter Holm <pho@FreeBSD.org>

```
pub 1024D/CF244E81 2008-11-17
Key fingerprint = BE9B 32D8 89F1 F285 00E4 E4C5 EF3F B4B5 CF24 4E81
uid             Peter Holm <pho@FreeBSD.org>
sub 2048g/E20A409F 2008-11-17
```

**D.3.123 Michael L. Hostbaek <mich@FreeBSD.org>**

```
pub 1024D/0F55F6BE 2001-08-07 Michael L. Hostbaek <mich@freebsdcluster.org>
      Key fingerprint = 4D62 9396 B19F 38D3 5C99 1663 7B0A 5212 0F55 F6BE
uid                               Michael L. Hostbaek <mich@freebsdcluster.dk>
uid                               Michael L. Hostbaek <mich@commerce-france.com>
uid                               Micahel L. Hostbaek <mich@freebsd.dk>
uid                               Michael L. Hostbaek <mich@the-lab.org>
uid                               Michael L. Hostbaek <mich@freebsd.org>
sub 1024g/8BE4E30F 2001-08-07
```

**D.3.124 Po-Chuan Hsieh <sunpoet@FreeBSD.org>**

```
pub 4096R/CC57E36B 2010-09-21
      Key fingerprint = 8AD8 68F2 7D2B 0A10 7E9B 8CC0 DC44 247E CC57 E36B
uid                               Po-Chuan Hsieh (FreeBSD) <sunpoet@FreeBSD.org>
uid                               Po-Chuan Hsieh (sunpoet) <sunpoet@sypoet.net>
sub 4096R/ADE9E203 2010-09-21
```

**D.3.125 Li-Wen Hsu <lwhsu@FreeBSD.org>**

```
pub 1024D/2897B228 2005-01-16
      Key fingerprint = B6F7 170A 6DC6 5D1A BD4B D86A 416B 0E39 2897 B228
uid                               Li-wen Hsu <lwhsu@lwhsu.org>
uid                               Li-wen Hsu <lwhsu@lwhsu.ckefgisc.org>
uid                               Li-wen Hsu <lwhsu@lwhsu.csie.net>
uid                               Li-wen Hsu <lwhsu@ckefgisc.org>
uid                               Li-wen Hsu <lwhsu@csie.nctu.edu.tw>
uid                               Li-wen Hsu <lwhsu@ccca.nctu.edu.tw>
uid                               Li-wen Hsu <lwhsu@iis.sinica.edu.tw>
uid                               Li-wen Hsu <lwhsu@cs.nctu.edu.tw>
uid                               Li-Wen Hsu <lwhsu@FreeBSD.org>
sub 2048g/16F82238 2005-01-16
```

**D.3.126 Howard F. Hu <foxfair@FreeBSD.org>**

```
pub 1024D/4E9BCA59 2003-09-01 Foxfair Hu <foxfair@FreeBSD.org>
      Key fingerprint = 280C A846 CA1B CAC9 DDCF F4CB D553 4BD5 4E9B CA59
uid                               Foxfair Hu <foxfair@drago.fomokka.net>
uid                               Howard Hu <howardhu@yahoo-inc.com>
sub 1024g/3356D8C1 2003-09-01
```

### D.3.127 Chin-San Huang <chinsan@FreeBSD.org>

```
pub 1024D/350EECFA 2006-10-04
Key fingerprint = 1C4D 0C9E 0E68 DB74 0688 CE43 D2A5 3F82 350E ECFA
uid Chin-San Huang (lab) <chinsan@chinsan2.twbbs.org>
uid Chin-San Huang (FreeBSD committer) <chinsan@FreeBSD.org>
uid Chin-San Huang (Gmail) <chinsan.tw@gmail.com>
sub 2048g/35F75A30 2006-10-04
```

### D.3.128 Davide Italiano <davide@FreeBSD.org>

```
pub 2048R/4CB47484 2012-01-17
Key fingerprint = B5C9 77F5 1E67 D110 8D19 7587 EB95 EA82 4CB4 7484
uid Davide Italiano <davide@FreeBSD.org>
sub 2048R/91F7443D 2012-01-17
```

### D.3.129 Jordan K. Hubbard <jkh@FreeBSD.org>

```
pub 1024R/8E542D5D 1996-04-04 Jordan K. Hubbard <jkh@FreeBSD.org>
Key fingerprint = 3C F2 27 7E 4A 6C 09 0A 4B C9 47 CD 4F 4D 0B 20
```

### D.3.130 Konrad Jankowski <versus@FreeBSD.org>

```
pub 1024D/A01C218A 2008-10-28
Key fingerprint = A805 21DC 859F E941 D2EA 9986 2264 8E5D A01C 218A
uid Konrad Jankowski <versus@freebsd.org>
sub 2048g/56AE1959 2008-10-28
```

### D.3.131 Weongyo Jeong <weongyo@FreeBSD.org>

```
pub 1024D/22354D7A 2007-12-28
Key fingerprint = 138E 7115 A86F AA40 B509 5883 B387 DCE9 2235 4D7A
uid Weongyo Jeong <weongyo.jeong@gmail.com>
uid Weongyo Jeong <weongyo@freebsd.org>
sub 2048g/9AE6DAEE 2007-12-28
```

### D.3.132 Tatuya JINMEI <jinmei@FreeBSD.org>

```
pub 1024D/ABA82228 2002-08-15
Key fingerprint = BB70 3050 EE39 BE00 48BB A5F3 5892 F203 ABA8 2228
uid JINMEI Tatuya <jinmei@FreeBSD.org>
uid JINMEI Tatuya <jinmei@jinmei.org>
uid JINMEI Tatuya (the KAME project) <jinmei@isl.rdc.toshiba.co.jp>
sub 1024g/8B43CF66 2002-08-15
```

### D.3.133 Michael Johnson <ahze@FreeBSD.org>

```
pub 1024D/3C046FD6 2004-10-29 Michael Johnson (FreeBSD key) <ahze@FreeBSD.org>
      Key fingerprint = 363C 6ABA ED24 C23B 5F0C 3AB4 9F8B AA7D 3C04 6FD6
uid                               Michael Johnson (pgp key) <ahze@ahze.net>
sub 2048g/FA334AE3 2004-10-29
```

### D.3.134 Trevor Johnson <trevor@FreeBSD.org>

```
pub 1024D/3A3EA137 2000-04-20 Trevor Johnson <trevor@jpj.net>
      Key fingerprint = 7ED1 5A92 76C1 FFCB E5E3 A998 F037 5A0B 3A3E A137
sub 1024g/46C24F1E 2000-04-20
```

### D.3.135 Poul-Henning Kamp <phk@FreeBSD.org>

```
pub 1024R/0358FCBD 1995-08-01 Poul-Henning Kamp <phk@FreeBSD.org>
      Key fingerprint = A3 F3 88 28 2F 9B 99 A2 49 F4 E2 FA 5A 78 8B 3E
```

### D.3.136 Sergey Kandaurov <pluknet@FreeBSD.org>

```
pub 2048R/10607419 2010-10-04
      Key fingerprint = 020B EC25 7E1F 8BC5 C42C 513B 3F4E 97BA 1060 7419
uid                               Sergey Kandaurov (freebsd) <pluknet@freebsd.org>
uid                               Sergey Kandaurov <pluknet@gmail.com>
sub 2048R/5711F73B 2010-10-04
```

### D.3.137 Coleman Kane <cokane@FreeBSD.org>

```
pub 1024D/C5DAB797 2007-07-22
      Key fingerprint = FC09 F326 4318 E714 DE45 6CB0 70C4 B141 C5DA B797
uid                               Coleman Kane (Personal PGP Key) <cokane@cokane.org>
uid                               Coleman Kane (Personal PGP Key) <cokane@FreeBSD.org>
sub 2048g/5C680129 2007-07-22
```

### D.3.138 Josef Karthauser <joe@FreeBSD.org>

```
pub 1024D/E6B15016 2000-10-19 Josef Karthauser <joe@FreeBSD.org>
      Key fingerprint = 7266 8EAF 82C2 D439 5642 AC26 5D52 1C8C E6B1 5016
uid                               Josef Karthauser <joe@tao.org.uk>
uid                               Josef Karthauser <joe@uk.FreeBSD.org>
uid                               [revoked] Josef Karthauser <josef@bsdi.com>
uid                               [revoked] Josef Karthauser <joe@pavilion.net>
sub 2048g/1178B692 2000-10-19
```

### D.3.139 Vinod Kashyap <vkashyap@FreeBSD.org>

```
pub 1024R/04FCCDD3 2004-02-19 Vinod Kashyap (gnupg key) <vkashyap@freebsd.org>
Key fingerprint = 9B83 0B55 604F E491 B7D2 759D DF92 DAA0 04FC CDD3
```

### D.3.140 Kris Kennaway <kris@FreeBSD.org>

```
pub 1024D/68E840A5 2000-01-14 Kris Kennaway <kris@citusc.usc.edu>
Key fingerprint = E65D 0E7D 7E16 B212 1BD6 39EE 5ABC B405 68E8 40A5
uid Kris Kennaway <kris@FreeBSD.org>
uid Kris Kennaway <kris@obsecurity.org>
sub 2048g/03A41C45 2000-01-14 [expires: 2006-01-14]
```

### D.3.141 Giorgos Keramidas <keramida@FreeBSD.org>

```
pub 1024D/318603B6 2001-09-21
Key fingerprint = C1EB 0653 DB8B A557 3829 00F9 D60F 941A 3186 03B6
uid Giorgos Keramidas <keramida@FreeBSD.org>
uid Giorgos Keramidas <keramida@ceid.upatras.gr>
uid Giorgos Keramidas <keramida@hellug.gr>
uid Giorgos Keramidas <keramida@linux.gr>
uid Giorgos Keramidas <gkeramidas@gmail.com>
sub 1024g/50FDBAD1 2001-09-21
```

### D.3.142 Max Khon <fjoe@FreeBSD.org>

```
pub 1024D/6B87E212 2009-02-17
Key fingerprint = 124D EC6C 6365 D41A 497A 9C3E FCF3 8708 6B87 E212
uid Max Khon <fjoe@FreeBSD.org>
uid Max Khon <fjoe@samodelkin.net>
sub 2048g/CB71491D 2009-02-17
```

### D.3.143 Manolis Kiagias <manolis@FreeBSD.org>

```
pub 1024D/6E0FB494 2006-08-22
Key fingerprint = F820 5AAF 7112 2CDD 23D8 3BDF 67F3 311A 6EOF B494
uid Manolis Kiagias <manolis@FreeBSD.org>
uid Manolis Kiagias <sonicy@otenet.gr>
uid Manolis Kiagias (A.K.A. sonic, sonicy, sonic2000gr) <sonic@diktia.dyndns.org>
sub 2048g/EB94B411 2006-08-22
```

### D.3.144 Jung-uk Kim <jkim@FreeBSD.org>

```
pub 1024D/BF6A9D53 2004-04-07
    Key fingerprint = F841 0339 93EF D27D 32AD 3261 9A56 B2D5 BF6A 9D53
uid          Jung-uk Kim <jkim@FreeBSD.org>
uid          Jung-uk Kim <jkim@niksun.com>
sub 4096g/B01CA5A0 2004-04-07
```

### D.3.145 Zack Kirsch <zack@FreeBSD.org>

```
pub 1024D/1A725562 2010-11-05 Zack Kirsch <zack@freebsd.org>
    Key fingerprint = A8CC AA5E FB47 A386 E757 A2B8 BDD2 0684 1A72 5562
sub 1024g/6BFE2C06 2010-11-05
```

### D.3.146 Jakub Klama <jceel@FreeBSD.org>

```
pub 2048R/2AAEA67D 2011-09-27
    Key fingerprint = 40D6 097A 174F 511B 80EB F3A3 0946 4193 2AAE A67D
uid          Jakub Klama <jceel@FreeBSD.org>
sub 2048R/5291BC4D 2011-09-27
```

### D.3.147 Andreas Klemm <andreas@FreeBSD.org>

```
pub 1024D/6C6F6CBA 2001-01-06 Andreas Klemm <andreas.klemm@eu.didata.com>
    Key fingerprint = F028 D51A 0D42 DD67 4109 19A3 777A 3E94 6C6F 6CBA
uid          Andreas Klemm <andreas@klemm.gtn.com>
uid          Andreas Klemm <andreas@FreeBSD.org>
uid          Andreas Klemm <andreas@apsfilter.org>
sub 2048g/FE23F866 2001-01-06
```

### D.3.148 Johann Kois <jkois@FreeBSD.org>

```
pub 1024D/DD61C2D8 2004-06-27 Johann Kois <J.Kois@web.de>
    Key fingerprint = 8B70 03DB 3C45 E71D 0ED4 4825 FEB0 EBEF DD61 C2D8
uid          Johann Kois <jkois@freebsd.org>
sub 1024g/568307CB 2004-06-27
```

### D.3.149 Sergei Kolobov <sergei@FreeBSD.org>

```
pub 1024D/3BA53401 2003-10-10 Sergei Kolobov <sergei@FreeBSD.org>
    Key fingerprint = A2F4 5F34 0586 CC9C 493A 347C 14EC 6E69 3BA5 3401
uid          Sergei Kolobov <sergei@kolobov.com>
sub 2048g/F8243671 2003-10-10
```

### D.3.150 Maxim Konovalov <maxim@FreeBSD.org>

```
pub 1024D/2C172083 2002-05-21 Maxim Konovalov <maxim@FreeBSD.org>
      Key fingerprint = 6550 6C02 EFC2 50F1 B7A3 D694 ECF0 E90B 2C17 2083
uid             Maxim Konovalov <maxim@macomnet.ru>
sub 1024g/F305DDCA 2002-05-21
```

### D.3.151 Taras Korenko <taras@FreeBSD.org>

```
pub 1024D/8ACCC68B 2010-03-30
      Key fingerprint = 5128 2A8B 9BC1 A664 21E0 1E61 D838 54D3 8ACC C68B
uid             Taras Korenko <taras@freebsd.org>
uid             Taras Korenko <ds@ukrhub.net>
uid             Taras Korenko <tarasishche@gmail.com>
sub 2048g/8D7CC0FA 2010-03-30 [expires: 2015-03-29]
```

### D.3.152 Joseph Koshy <jkoshy@FreeBSD.org>

```
pub 1024D/D93798B6 2001-12-21 Joseph Koshy (FreeBSD) <jkoshy@freebsd.org>
      Key fingerprint = 0DE3 62F3 EF24 939F 62AA 2E3D ABB8 6ED3 D937 98B6
sub 1024g/43FD68E9 2001-12-21
```

### D.3.153 Wojciech A. Koszek <wkoszek@FreeBSD.org>

```
pub 1024D/C9F25145 2006-02-15
      Key fingerprint = 6E56 C571 9D33 D23E 9A61 8E50 623C AD62 C9F2 5145
uid             Wojciech A. Koszek <dunstan@FreeBSD.czest.pl>
uid             Wojciech A. Koszek <wkoszek@FreeBSD.org>
sub 4096g/3BBD20A5 2006-02-15
```

### D.3.154 Alex Kozlov <ak@FreeBSD.org>

```
pub 2048R/0D1D29A0 2012-03-01 [expires: 2024-02-27]
      Key fingerprint = 7774 4FCF 6AC9 126B BD0E DBF3 5EBF 4968 0D1D 29A0
uid             Alex Kozlov <ak@freebsd.org>
sub 2048R/2DD82C65 2012-03-01 [expires: 2024-02-27]
```

### D.3.155 Steven Kreuzer <skreuzer@FreeBSD.org>

```
pub 1024D/E0D6F907 2009-03-16 [expires: 2013-04-25]
      Key fingerprint = 8D8F 14D6 ED9F 6B00 7756 7A46 66BA B4B6 E0D6 F907
uid             Steven Kreuzer <skreuzer@exit2shell.com>
uid             Steven Kreuzer <skreuzer@freebsd.org>
```

### D.3.156 Gábor Kövesdán <gabor@FreeBSD.org>

```
pub 1024D/2373A6B1 2006-12-05
Key fingerprint = A42A 10D6 834B BEC0 26F0 29B1 902D D04F 2373 A6B1
uid          Gabor Kovesdan <gabor@FreeBSD.org>
sub 2048g/92B0A104 2006-12-05
```

### D.3.157 Ana Kukec <anchie@FreeBSD.org>

```
pub 2048R/510D23BB 2010-04-18
Key fingerprint = 0A9B 0ABB 0E1C B5A4 3408 398F 778A C3B4 510D 23BB
uid          Ana Kukec <anchie@FreeBSD.org>
sub 2048R/699E4DDA 2010-04-18
```

### D.3.158 Roman Kurakin <rik@FreeBSD.org>

```
pub 1024D/C8550F4C 2005-12-16 [expires: 2008-12-15]
Key fingerprint = 25BB 789A 6E07 E654 8E59 0FA9 42B1 937C C855 0F4C
uid          Roman Kurakin <rik@FreeBSD.org>
sub 2048g/D15F2AB6 2005-12-16 [expires: 2008-12-15]
```

### D.3.159 Hideyuki KURASHINA <rushani@FreeBSD.org>

```
pub 1024D/439ADC57 2002-03-22 Hideyuki KURASHINA <rushani@bl.mmtor.or.jp>
Key fingerprint = A052 6F98 6146 6FE3 91E2 DA6B F2FA 2088 439A DC57
uid          Hideyuki KURASHINA <rushani@FreeBSD.org>
uid          Hideyuki KURASHINA <rushani@jp.FreeBSD.org>
sub 1024g/64764D16 2002-03-22
```

### D.3.160 Jun Kuriyama <kuriyama@FreeBSD.org>

```
pub 1024D/FE3B59CD 1998-11-23 Jun Kuriyama <kuriyama@imgsrc.co.jp>
Key fingerprint = 5219 55CE AC84 C296 3A3B B076 EE3C 4DBB FE3B 59CD
uid          Jun Kuriyama <kuriyama@FreeBSD.org>
uid          Jun Kuriyama <kuriyama@jp.FreeBSD.org>
sub 2048g/1CF20D27 1998-11-23
```

### D.3.161 René Ladan <rene@FreeBSD.org>

```
pub 1024D/E5642BFC 2008-11-03
Key fingerprint = ADBC ECCD EB5F A6B4 549F 600D 8C9E 647A E564 2BFC
uid          Rene Ladan <rene@freebsd.org>
sub 2048g/C54EA560 2008-11-03
```

### D.3.162 Julien Laffaye <jlaffaye@FreeBSD.org>

```
pub 2048R/6AEBE420 2011-06-06
Key fingerprint = 031A B449 B383 5C3B B618 E2F4 BAD0 0F0E 6AEB E420
uid          Julien Laffaye <jlaffaye@FreeBSD.org>
sub 2048R/538B8D5B 2011-06-06
```

### D.3.163 Clement Laforet <clement@FreeBSD.org>

```
pub 1024D/0723BA1D 2003-12-13 Clement Laforet (FreeBSD committer address) <clement@FreeBSD.org>
Key fingerprint = 3638 4B14 8463 A67B DC7E 641C B118 5F8F 0723 BA1D
uid          Clement Laforet <sheepkiller@cultdeadsheep.org>
uid          Clement Laforet <clement.laforet@cotds.org>
sub 2048g/23D57658 2003-12-13
```

### D.3.164 Max Laier <mlaier@FreeBSD.org>

```
pub 1024D/3EB6046D 2004-02-09
Key fingerprint = 917E 7F25 E90F 77A4 F746 2E8D 5F2C 84A1 3EB6 046D
uid          Max Laier <max@love2party.net>
uid          Max Laier <max.laier@ira.uka.de>
uid          Max Laier <mlaier@freebsd.org>
uid          Max Laier <max.laier@tm.uka.de>
sub 4096g/EDD08B9B 2005-06-28
```

### D.3.165 Erwin Lansing <erwin@FreeBSD.org>

```
pub 1024D/15256990 1998-07-03
Key fingerprint = FB58 9797 299A F18E 2D3E 73D6 AB2F 5A5B 1525 6990
uid          Erwin Lansing <erwin@lansing.dk>
uid          Erwin Lansing <erwin@FreeBSD.org>
uid          Erwin Lansing <erwin@droso.dk>
uid          Erwin Lansing <erwin@droso.org>
uid          Erwin Lansing <erwin@aauug.dk>
sub 2048g/7C64013D 1998-07-03
```

### D.3.166 Ganael Laplanche <martymac@FreeBSD.org>

```
pub 1024D/10B87391 2006-01-13
Key fingerprint = D59D 984D 8988 7BB9 DA37 BA77 757E D5F0 10B8 7391
uid          Ganael LAPLANCHE <ganael.laplanche@martymac.org>
uid          Ganael LAPLANCHE <martymac@martymac.com>
uid          Ganael LAPLANCHE <ganael.laplanche@martymac.com>
uid          Ganael LAPLANCHE <martymac@martymac.org>
uid          Ganael LAPLANCHE <martymac@pasteur.fr>
uid          Ganael LAPLANCHE <ganael.laplanche@pasteur.fr>
```

```
uid      Ganael LAPLANCHE <martymac@FreeBSD.org>
sub     2048g/D65069D5 2006-01-13
```

### **D.3.167 Greg Larkin <glarkin@FreeBSD.org>**

```
pub    1024D/1C940290 2003-10-09
      Key fingerprint = 8A4A 80AA F26C 8C2C D01B 94C6 D2C4 68B8 1C94 0290
uid      Greg Larkin (The FreeBSD Project) <glarkin@FreeBSD.org>
uid      Gregory C. Larkin (SourceHosting.Net, LLC) <glarkin@sourcehosting.net>
uid      [jpeg image of size 6695]
sub    2048g/47674316 2003-10-09
```

### **D.3.168 Frank J. Laszlo <laszlof@FreeBSD.org>**

```
pub    4096R/012360EC 2006-11-06 [expires: 2011-11-05]
      Key fingerprint = 3D93 21DB B5CC 1339 E4B4 1BC4 AD50 C17C 0123 60EC
uid      Frank J. Laszlo <laszlof@FreeBSD.org>
```

### **D.3.169 Sam Lawrance <lawrance@FreeBSD.org>**

```
pub    1024D/32708C59 2003-08-14
      Key fingerprint = 1056 2A02 5247 64D4 538D 6975 8851 7134 3270 8C59
uid      Sam Lawrance <lawrance@FreeBSD.org>
uid      Sam Lawrance <boris@brooknet.com.au>
sub    2048g/0F9CCF92 2003-08-14
```

### **D.3.170 Nate Lawson <njl@FreeBSD.org>**

```
pub    1024D/60E5AC11 2007-02-07
      Key fingerprint = 18E2 7E5A FD6A 199B B08B E9FB 73C8 DB67 60E5 AC11
uid      Nate Lawson <nate@root.org>
sub    2048g/CDBC7E1B 2007-02-07
```

### **D.3.171 Yen-Ming Lee <leeym@FreeBSD.org>**

```
pub    1024D/93FA8BD6 2007-05-21
      Key fingerprint = DEC4 6E7F 69C0 4AC3 21ED EE65 6C0E 9257 93FA 8BD6
uid      Yen-Ming Lee <leeym@leeym.com>
sub    2048g/899A3931 2007-05-21
```

### D.3.172 Sam Leffler <sam@FreeBSD.org>

```
pub 1024D/BD147743 2005-03-28
Key fingerprint = F618 F2FC 176B D201 D91C 67C6 2E33 A957 BD14 7743
uid             Samuel J. Leffler <sam@freebsd.org>
sub 2048g/8BA91D05 2005-03-28
```

### D.3.173 Jean-Yves Lefort <jylefort@FreeBSD.org>

```
pub 1024D/A3B8006A 2002-09-07
Key fingerprint = CC99 D1B0 8E44 293D 32F7 D92E CB30 FB51 A3B8 006A
uid             Jean-Yves Lefort <jylefort@FreeBSD.org>
uid             Jean-Yves Lefort <jylefort@brutele.be>
sub 4096g/C9271AFC 2002-09-07
```

### D.3.174 Alexander Leidinger <netchild@FreeBSD.org>

```
pub 1024D/72077137 2002-01-31
Key fingerprint = AA3A 8F69 B214 6BBD 5E73 C9A0 C604 3C56 7207 7137
uid             Alexander Leidinger <netchild@FreeBSD.org>
uid             [jpeg image of size 19667]
sub 2048g/8C9828D3 2002-01-31
```

### D.3.175 Andrey V. Elsukov <ae@FreeBSD.org>

```
pub 2048R/10C8A17A 2010-05-29
Key fingerprint = E659 1E1B 41DA 1516 F0C9 BC00 01C5 EA04 10C8 A17A
uid             Andrey V. Elsukov <ae@freebsd.org>
uid             Andrey V. Elsukov <bu7cher@yandex.ru>
sub 2048R/0F6D64C5 2010-05-29
```

### D.3.176 Dejan Lesjak <lesi@FreeBSD.org>

```
pub 1024D/96C5221F 2004-08-18 Dejan Lesjak <lesi@FreeBSD.org>
Key fingerprint = 2C5C 02EA 1060 1D6D 9982 38C0 1DA7 DBC4 96C5 221F
uid             Dejan Lesjak <dejan.lesjak@ijs.si>
sub 1024g/E0A69278 2004-08-18
```

### D.3.177 Chuck Lever <cel@FreeBSD.org>

```
pub 1024D/8FFC2B87 2006-02-13
Key fingerprint = 6872 923F 5012 F88B 394C 2F69 37B4 8171 8FFC 2B87
uid             Charles E. Lever <cel@freebsd.org>
sub 2048g/9BCE0459 2006-02-13
```

### D.3.178 Greg Lewis <glewis@FreeBSD.org>

```
pub 1024D/1BB6D9E0 2002-03-05 Greg Lewis (FreeBSD) <glewis@FreeBSD.org>
      Key fingerprint = 2410 DA6D 5A3C D801 65FE C8DB DEEA 9923 1BB6 D9E0
uid               Greg Lewis <glewis@eyesbeyond.com>
sub 2048g/45E67D60 2002-03-05
```

### D.3.179 Xin Li <delphij@FreeBSD.org>

```
pub 1024D/CAEEB8C0 2004-01-28
      Key fingerprint = 43B8 B703 B8DD 0231 B333 DC28 39FB 93A0 CAEE B8C0
uid               Xin LI <delphij@FreeBSD.org>
uid               Xin LI <delphij@frontfree.net>
uid               Xin LI <delphij@delphij.net>
uid               Xin LI <delphij@geekcn.org>

pub 1024D/42EA8A4B 2006-01-27 [expired: 2008-01-01]
      Key fingerprint = F19C 2616 FA97 9C13 2581 C6F3 85C5 1CCE 42EA 8A4B
uid               Xin LI <delphij@geekcn.org>
uid               Xin LI <delphij@FreeBSD.org>
uid               Xin LI <delphij@delphij.net>

pub 1024D/18EDEBA0 2008-01-02 [expired: 2010-01-02]
      Key fingerprint = 79A6 CF42 F917 DDCA F1C2 C926 8BEB DB04 18ED EBA0
uid               Xin LI <delphij@geekcn.org>
uid               Xin LI <delphij@FreeBSD.org>
uid               Xin LI <delphij@delphij.net>

pub 2048R/3FCA37C1 2010-01-10 [expired: 2012-01-10]
      Key fingerprint = 27EA 5D6C 9398 BA7F B205 8F70 04CE F812 3FCA 37C1
uid               Xin LI <delphij@delphij.net>
uid               Xin LI <delphij@gmail.com>
uid               Xin LI <delphij@geekcn.org>
uid               Xin LI <delphij@FreeBSD.org>

pub 4096R/2E54AB2C 2011-12-05
      Key fingerprint = D95C D3C3 8FA8 25C2 C62B 9FEA 0887 6D93 2E54 AB2C
uid               Xin Li <delphij@geekcn.org>
uid               Xin Li <delphij@delphij.net>
uid               Xin Li <delphij@FreeBSD.org>
sub 4096R/7832B740 2011-12-05
sub 2048R/BC50FBB3 2011-12-05 [expires: 2013-12-05]
sub 2048R/C894647D 2011-12-05 [expires: 2013-12-05]
```

### D.3.180 Tai-hwa Liang <avatar@FreeBSD.org>

```
pub 1024R/F4013AB1 1998-05-13 Tai-hwa Liang <avatar@FreeBSD.org>
      Key fingerprint = 5B 05 1D 37 7F 35 31 4E 5D 38 BD 07 10 32 B9 D0
uid               Tai-hwa Liang <avatar@mmlab.cse.yzu.edu.tw>
```

### D.3.181 Ying-Chieh Liao <ijliao@FreeBSD.org>

```
pub 1024D/11C02382 2001-01-09 Ying-Chieh Liao <ijliao@CCCA.NCTU.edu.tw>
      Key fingerprint = 4E98 55CC 2866 7A90 EFD7 9DA5 ACC6 0165 11C0 2382
uid          Ying-Chieh Liao <ijliao@FreeBSD.org>
uid          Ying-Chieh Liao <ijliao@csie.nctu.edu.tw>
uid          Ying-Chieh Liao <ijliao@dragon2.net>
uid          Ying-Chieh Liao <ijliao@tw.FreeBSD.org>
sub 4096g/C1E16E89 2001-01-09
```

### D.3.182 Ulf Lilleengen <lulf@FreeBSD.org>

```
pub 1024D/ADE1B837 2009-08-19 [expires: 2014-08-18]
      Key fingerprint = 3822 B4E6 6D1C 6F71 4AA8 7A27 ADDF C400 ADE1 B837
uid          Ulf Lilleengen <lulf.lilleengen@gmail.com>
uid          Ulf Lilleengen <lulf@pvv.ntnu.no>
uid          Ulf Lilleengen <lulf@stud.ntnu.no>
uid          Ulf Lilleengen <lulf@FreeBSD.org>
uid          Ulf Lilleengen <lulf@idi.ntnu.no>
sub 2048g/B5409122 2009-08-19 [expires: 2014-08-18]
```

### D.3.183 Clive Lin <clove@FreeBSD.org>

```
pub 1024D/A008C03E 2001-07-30 Clive Lin <clove@tongi.org>
      Key fingerprint = FA3F 20B6 A77A 6CEC 1856 09B0 7455 2805 A008 C03E
uid          Clive Lin <clove@CirX.ORG>
uid          Clive Lin <clove@FreeBSD.org>
sub 1024g/03C2DC87 2001-07-30 [expires: 2005-08-25]
```

### D.3.184 Yi-Jheng Lin <yzlin@FreeBSD.org>

```
pub 2048R/A34C6A8A 2009-07-20
      Key fingerprint = 7E3A E981 BB7C 5D73 9534 ED39 0222 04D3 A34C 6A8A
uid          Yi-Jheng Lin (FreeBSD) <yzlin@FreeBSD.org>
sub 2048R/B4D776FE 2009-07-20
```

### D.3.185 Mark Linimon <linimon@FreeBSD.org>

```
pub 1024D/84C83473 2003-10-09
      Key fingerprint = 8D43 1B55 D127 0BFC 842E 1C96 803C 5A34 84C8 3473
uid          Mark Linimon <linimon@FreeBSD.org>
uid          Mark Linimon <linimon@lonesome.com>
sub 1024g/24BFF840 2003-10-09
```

**D.3.186 Tilman Keskinöz <arved@FreeBSD.org>**

```
pub 1024D/807AC53A 2002-06-03 [expires: 2013-09-07]
Key fingerprint = A92F 344F 31A8 B8DE DDFA 7FB4 7C22 C39F 807A C53A
uid             Tilman Keskin z <arved@arved.at>
uid             Tilman Keskin z <arved@FreeBSD.org>
sub 1024g/FA351986 2002-06-03 [expires: 2013-09-07]
```

**D.3.187 Dryice Liu <dryice@FreeBSD.org>**

```
pub 1024D/77B67874 2005-01-28
Key fingerprint = 8D7C F82D D28D 07E5 EF7F CD25 6B5B 78A8 77B6 7874
uid             Dryice Dong Liu (Dryice) <dryice@FreeBSD.org>
uid             Dryice Dong Liu (Dryice) <dryice@liu.com.cn>
uid             Dryice Dong Liu (Dryice) <dryice@hotpop.com>
uid             Dryice Dong Liu (Dryice) <dryiceliu@gmail.com>
uid             Dryice Dong Liu (Dryice) <dryice@dryice.name>
sub 2048g/ECFA49E4 2005-01-28
```

**D.3.188 Tong Liu <nemoliu@FreeBSD.org>**

```
pub 1024D/ECC7C907 2007-07-10
Key fingerprint = B62E 3109 896B B283 E2FA 60FE A1BA F92E ECC7 C907
uid             Tong LIU <nemoliu@FreeBSD.org>
sub 4096g/B6D7B15D 2007-07-10
```

**D.3.189 Zachary Loafman <zml@FreeBSD.org>**

```
pub 1024D/4D65492D 2009-05-26
Key fingerprint = E513 4AE9 5D6D 8BF9 1CD3 4389 4860 D79B 4D65 492D
uid             Zachary Loafman <zml@FreeBSD.org>
sub 2048g/1AD659F0 2009-05-26
```

**D.3.190 Juergen Lock <nox@FreeBSD.org>**

```
pub 1024D/1B6BFBFD 2006-12-22
Key fingerprint = 33A7 7FAE 51AF 00BC F0D3 ECCE FAFD 34C1 1B6B FBFD
uid             Juergen Lock <nox@FreeBSD.org>
sub 2048g/251229D1 2006-12-22
```

### D.3.191 Remko Lodder <remko@FreeBSD.org>

```
pub 2048R/6EB8C8C8 2010-05-28 [expires: 2012-05-27]
Key fingerprint = D692 91F9 F4EF D363 7F3F 4D17 9C75 DF7B 6EB8 C8C8
uid             Remko Lodder (Remko Lodder's Key) <remko@FreeBSD.org>
sub 2048R/011C6AA0 2010-05-28 [expires: 2012-05-27]
```

### D.3.192 Alexander Logvinov <avl@FreeBSD.org>

```
pub 1024D/1C47D5C0 2009-05-28
Key fingerprint = 8B5F 880A 382B 075E E707 9DB2 E135 4176 1C47 D5C0
uid             Alexander Logvinov <alexander@logvinov.com>
uid             Alexander Logvinov (FreeBSD Ports Committer) <avl@FreeBSD.org>
uid             Alexander Logvinov <ports@logvinov.com>
uid             Alexander Logvinov <logvinov@gmail.com>
uid             Alexander Logvinov <logvinov@yandex.ru>
sub 2048g/60BDD4BB 2009-05-28
```

### D.3.193 Scott Long <scottl@FreeBSD.org>

```
pub 1024D/017C5EBF 2003-01-18 Scott A. Long (This is my official FreeBSD key) <scottl@freebsd.org>
Key fingerprint = 34EA BD06 44F7 F8C3 22BC B52C 1D3A F6D1 017C 5EBF
sub 1024g/F61C8F91 2003-01-18
```

### D.3.194 Rick Macklem <rmacklem@FreeBSD.org>

```
pub 1024D/7FB9C5F1 2009-04-05
Key fingerprint = B9EA 767A F6F3 3786 E0C7 434A 05C6 70D6 7FB9 C5F1
uid             Rick Macklem <rmacklem@freebsd.org>
sub 1024g/D0B20E8A 2009-04-05
```

### D.3.195 Bruce A. Mah <bmah@FreeBSD.org>

```
pub 1024D/5BA052C3 1997-12-08
Key fingerprint = F829 B805 207D 14C7 7197 7832 D8CA 3171 5BA0 52C3
uid             Bruce A. Mah <bmah@acm.org>
uid             Bruce A. Mah <bmah@ca.sandia.gov>
uid             Bruce A. Mah <bmah@ieee.org>
uid             Bruce A. Mah <bmah@cisco.com>
uid             Bruce A. Mah <bmah@employees.org>
uid             Bruce A. Mah <bmah@freebsd.org>
uid             Bruce A. Mah <bmah@packetdesign.com>
uid             Bruce A. Mah <bmah@kitchenlab.org>
sub 2048g/B4E60EA1 1997-12-08
```

### D.3.196 Ruslan Mahmatkhanov <rm@FreeBSD.org>

```
pub 2048R/F60D756F 2011-11-10
Key fingerprint = 9D18 8A88 304C B78B 8003 0379 4574 0BAF F60D 756F
uid          Ruslan Mahmatkhanov <rm@FreeBSD.org>
sub 2048R/B658C269 2011-11-10
```

### D.3.197 Mike Makonnen <mtm@FreeBSD.org>

```
pub 1024D/7CD41F55 2004-02-06 Michael Telahun Makonnen <mtm@FreeBSD.Org>
Key fingerprint = AC7B 5672 2D11 F4D0 EBF8 5279 5359 2B82 7CD4 1F55
uid          Michael Telahun Makonnen <mtm@tmsa-inc.com>
uid          Mike Makonnen <mtm@identd.net>
uid          Michael Telahun Makonnen <mtm@acs-et.com>
sub 2048g/E7DC936B 2004-02-06
```

### D.3.198 David Malone <dwmalone@FreeBSD.org>

```
pub 512/40378991 1994/04/21 David Malone <dwmalone@maths.tcd.ie>
Key fingerprint = 86 A7 F4 86 39 2C 47 2C C1 C2 35 78 8E 2F B8 F5
```

### D.3.199 Dmitry Marakasov <amdmi3@FreeBSD.org>

```
pub 1024D/F9D2F77D 2008-06-15 [expires: 2010-06-15]
Key fingerprint = 55B5 0596 FF1E 8D84 5F56 9510 D35A 80DD F9D2 F77D
uid          Dmitry Marakasov <amdmi3@amdmi3.ru>
uid          Dmitry Marakasov <amdmi3@FreeBSD.org>
sub 2048g/2042CDD8 2008-06-15
```

### D.3.200 Koop Mast <kwm@FreeBSD.org>

```
pub 1024D/F95426DA 2004-09-10 Koop Mast <kwm@rainbow-runner.nl>
Key fingerprint = C66F 1835 0548 3440 8576 0FFE 6879 B7CD F954 26DA
uid          Koop Mast <kwm@FreeBSD.org>
sub 1024g/A782EEDD 2004-09-10
```

### D.3.201 Makoto Matsushita <matusita@FreeBSD.org>

```
pub 1024D/20544576 1999-04-18
Key fingerprint = 71B6 13BF B262 2DD8 2B7C 6CDO EB2D 4147 2054 4576
uid          Makoto Matsushita <matusita@matatabi.or.jp>
uid          Makoto Matsushita <matusita@FreeBSD.org>
uid          Makoto Matsushita <matusita@jp.FreeBSD.ORG>
uid          Makoto Matsushita <matusita@ist.osaka-u.ac.jp>
```

sub 1024g/F1F3C94D 1999-04-18

### D.3.202 Martin Matuska <mm@FreeBSD.org>

```
pub 1024D/4261B0D1 2007-02-05
    Key fingerprint = 17C4 3F32 B3DE 3ED7 E84E 5592 A76B 8B03 4261 B0D1
uid          Martin Matuska <martin@matuska.org>
uid          Martin Matuska <mm@FreeBSD.org>
uid          Martin Matuska <martin.matuska@wu-wien.ac.at>
sub 2048g/3AC9A5A6 2007-02-05
```

### D.3.203 Sergey Matveychuk <sem@FreeBSD.org>

```
pub 1024D/B71F605D 1999-10-13
    Key fingerprint = 4704 F374 DB28 BEC6 51C8 1322 4DC9 4BD8 B71F 605D
uid          Sergey Matveychuk <sem@FreeBSD.org>
uid          Sergey Matveychuk <sem@ciam.ru>
uid          Sergey Matveychuk <sem@core.inec.ru>
sub 2048g/DEAF9D91 1999-10-13
```

### D.3.204 Tom McLaughlin <tmclaugh@FreeBSD.org>

```
pub 1024D/E2F7B3D8 2005-05-24
    Key fingerprint = 7692 B222 8D23 CF94 1993 0138 E339 E225 E2F7 B3D8
uid          Tom McLaughlin (Personal email address) <tmclaugh@sdf.lonestar.org>
uid          Tom McLaughlin (Work email address) <tmclaughlin@meditech.com>
uid          Tom McLaughlin (FreeBSD email address) <tmclaugh@FreeBSD.org>
sub 2048g/16838F62 2005-05-24
```

### D.3.205 Jean Milanez Melo <jmelo@FreeBSD.org>

```
pub 1024D/AA5114BF 2006-03-03
    Key fingerprint = 826D C2AA 6CF2 E29A EBE7 4776 D38A AB83 AA51 14BF
uid          Jean Milanez Melo <jmelo@FreeBSD.org>
uid          Jean Milanez Melo <jmelo@freebsdbrasil.com.br>
sub 4096g/E9E1CBD9 2006-03-03
```

### D.3.206 Kenneth D. Merry <ken@FreeBSD.org>

```
pub 1024D/54C745B5 2000-05-15 Kenneth D. Merry <ken@FreeBSD.org>
    Key fingerprint = D25E EBC5 F17A 9E52 84B4 BF14 9248 F0DA 54C7 45B5
uid          Kenneth D. Merry <ken@kdm.org>
sub 2048g/89D0F797 2000-05-15
```

```
pub 1024R/2FA0A505 1995-10-30 Kenneth D. Merry <ken@plutotech.com>
Key fingerprint = FD FA 85 85 95 C4 8E E8 98 1A CA 18 56 F0 00 1F
```

### **D.3.207 Dirk Meyer <dinoex@FreeBSD.org>**

```
pub 1024R/331CDA5D 1995-06-04 Dirk Meyer <dinoex@FreeBSD.org>
Key fingerprint = 44 16 EC 0A D3 3A 4F 28 8A 8A 47 93 F1 CF 2F 12
uid               Dirk Meyer <dirk.meyer@dinoex.sub.org>
uid               Dirk Meyer <dirk.meyer@guug.de>
```

### **D.3.208 Yoshiro Sanpei MIHIRA <sanpei@FreeBSD.org>**

```
pub 1024R/391C5D69 1996-11-21 sanpei@SEAPLE.ICC.NE.JP
Key fingerprint = EC 04 30 24 B0 6C 1E 63 5F 5D 25 59 3E 83 64 51
uid               MIHIRA Yoshiro <sanpei@sanpei.org>
uid               Yoshiro MIHIRA <sanpei@FreeBSD.org>
uid               MIHIRA Yoshiro <sanpei@yy.cs.keio.ac.jp>
uid               MIHIRA Yoshiro <sanpei@cc.keio.ac.jp>
uid               MIHIRA Yoshiro <sanpei@educ.cc.keio.ac.jp>
uid               MIHIRA Yoshiro <sanpei@st.keio.ac.jp>
```

### **D.3.209 Robert Millan <rmh@FreeBSD.org>**

```
pub 4096R/DEA2C38E 2009-08-14
Key fingerprint = A537 F029 AAAE 0E9C 39A7 C22C BB9D 98D9 DEA2 C38E
uid               Robert Millan <rmh@debian.org>
uid               Robert Millan <rmh@freebsd.org>
uid               Robert Millan <rmh@gnu.org>
sub 4096R/65A0A9CE 2009-08-14
sub 4096R/41F37946 2009-08-14
```

### **D.3.210 Stephen Montgomery-Smith <stephen@FreeBSD.org>**

```
pub 2048R/9A92D807 2011-06-14
Key fingerprint = 2B61 D82E 168E F08B 6E08 712E 2DF1 2BD1 9A92 D807
uid               Stephen Montgomery-Smith <stephen@freebsd.org>
sub 2048R/A4BA6560 2011-06-14
```

### **D.3.211 Marcel Moolenaar <marcel@FreeBSD.org>**

```
pub 1024D/61EE89F6 2002-02-09 Marcel Moolenaar <marcel@xclnt.net>
Key fingerprint = 68BB E2B7 49AA FF69 CA3A DF71 A605 A52D 61EE 89F6
sub 1024g/6EAAB456 2002-02-09
```

### D.3.212 Kris Moore <kmoore@FreeBSD.org>

```
pub 1024D/6294612C 2009-05-26
Key fingerprint = 8B70 9876 346F 1F97 5687 6950 4C92 D789 6294 612C
uid Kris Moore <kmoore@freebsd.org>
sub 2048g/A7FFE8FB 2009-05-26
```

### D.3.213 Dmitry Morozovsky <marck@FreeBSD.org>

```
pub 1024D/6B691B03 2001-07-20
Key fingerprint = 39AC E336 F03D C0F8 5305 B725 85D4 5045 6B69 1B03
uid Dmitry Morozovsky <marck@rinet.ru>
uid Dmitry Morozovsky <marck@FreeBSD.org>
sub 2048g/44D656F8 2001-07-20
```

### D.3.214 Alexander Motin <mav@FreeBSD.org>

```
pub 1024D/0577BACA 2007-04-20 [expires: 2012-04-18]
Key fingerprint = 0E84 B263 E97D 3E48 161B 98A2 D240 A09E 0577 BACA
uid Alexander Motin <mav@freebsd.org>
uid Alexander Motin <mav@mavhome.dp.ua>
uid Alexander Motin <mav@alkar.net>
sub 2048g/4D59D1C2 2007-04-20 [expires: 2012-04-18]
```

### D.3.215 Felipe de Meirelles Motta <lippe@FreeBSD.org>

```
pub 1024D/F2CF7DAE 2008-09-02 [expires: 2010-09-02]
Key fingerprint = 0532 A900 286D DAFD 099D 394D 231B AF20 F2CF 7DAE
uid Felipe de Meirelles Motta (FreeBSD Ports Committer) <lippe@FreeBSD.org>
sub 2048g/38E8EEF3 2008-09-02 [expires: 2010-09-02]
```

### D.3.216 Rich Murphey <rich@FreeBSD.org>

```
pub 1024R/583443A9 1995-03-31 Rich Murphey <rich@lamprey.utmb.edu>
Key fingerprint = AF A0 60 C4 84 D6 0C 73 D1 EF C0 E9 9D 21 DB E4
```

### D.3.217 Akinori MUSHA <knu@FreeBSD.org>

```
pub 1024D/9FD9E1EE 2000-03-21 Akinori MUSHA <knu@and.or.jp>
Key fingerprint = 081D 099C 1705 861D 4B70 B04A 920B EFC7 9FD9 E1EE
uid Akinori MUSHA <knu@FreeBSD.org>
uid Akinori MUSHA <knu@idaemons.org>
uid Akinori MUSHA <knu@ruby-lang.org>
sub 1024g/71BA9D45 2000-03-21
```

### D.3.218 Thomas Möstl <tmm@FreeBSD.org>

```
pub 1024D/419C776C 2000-11-28 Thomas Moestl <tmm@FreeBSD.org>
      Key fingerprint = 1C97 A604 2BD0 E492 51D0 9C0F 1FE6 4F1D 419C 776C
uid             Thomas Moestl <tmoestl@gmx.net>
uid             Thomas Moestl <t.moestl@tu-bs.de>
sub 2048g/ECE63CE6 2000-11-28
```

### D.3.219 Masafumi NAKANE <max@FreeBSD.org>

```
pub 1024D/CE356B59 2000-02-19 Masafumi NAKANE <max@wide.ad.jp>
      Key fingerprint = EB40 BCAB 4CE5 0764 9942 378C 9596 159E CE35 6B59
uid             Masafumi NAKANE <max@FreeBSD.org>
uid             Masafumi NAKANE <max@accessibility.org>
uid             Masafumi NAKANE <kd5pdi@qsl.net>
sub 1024g/FA9BD48B 2000-02-19
```

### D.3.220 Maho Nakata <maho@FreeBSD.org>

```
pub 1024D/F28B4069 2009-02-09
      Key fingerprint = 3FE4 99A9 6F41 8161 4F5F 240C 8615 A60C F28B 4069
uid             Maho NAKATA (NAKATA's FreeBSD.org alias) <maho@FreeBSD.org>
sub 2048g/6B49098E 2009-02-09
```

### D.3.221 Yoichi NAKAYAMA <yoichi@FreeBSD.org>

```
pub 1024D/E0788E46 2000-12-28 Yoichi NAKAYAMA <yoichi@assist.media.nagoya-u.ac.jp>
      Key fingerprint = 1550 2662 46B3 096C 0460 BC03 800D 0C8A E078 8E46
uid             Yoichi NAKAYAMA <yoichi@eken.phys.nagoya-u.ac.jp>
uid             Yoichi NAKAYAMA <yoichi@FreeBSD.org>
sub 1024g/B987A394 2000-12-28
```

### D.3.222 Edward Tomasz Napierala <trasz@FreeBSD.org>

```
pub 1024D/8E53F00E 2007-04-13
      Key fingerprint = DD8F 91B0 12D9 6237 42D9 DBE1 AFC8 CDE9 8E53 F00E
uid             Edward Tomasz Napierala <trasz@FreeBSD.org>
sub 2048g/7C1F5D67 2007-04-13
```

### D.3.223 Alexander Nedotsukov <bland@FreeBSD.org>

```
pub 1024D/D004116C 2003-08-14 Alexander Nedotsukov <bland@FreeBSD.org>
      Key fingerprint = 35E2 5020 55FC 2071 4ADD 1A4A 86B6 8A5D D004 116C
sub 1024g/1CCA8D46 2003-08-14
```

**D.3.224 George V. Neville-Neil <gnn@FreeBSD.org>**

```
pub 1024D/440A33D2 2002-09-17
Key fingerprint = AF66 410F CC8D 1FC9 17DB 6225 61D8 76C1 440A 33D2
uid             George V. Neville-Neil <gnn@freebsd.org>
uid             George V. Neville-Neil <gnn@nevile-neil.com>
sub 2048g/95A74F6E 2002-09-17
```

**D.3.225 Simon L. Nielsen <simon@FreeBSD.org>**

```
pub 1024D/FF7490AB 2007-01-14
Key fingerprint = 4E92 BA8D E45E 85E2 0380 B264 049C 7480 FF74 90AB
uid             Simon L. Nielsen <simon@FreeBSD.org>
uid             Simon L. Nielsen <simon@nitro.dk>
sub 2048g/E3F5A76E 2007-01-14
```

**D.3.226 Robert Noland <rnloland@FreeBSD.org>**

```
pub 1024D/8A9F44E3 2007-07-24
Key fingerprint = 107A 0C87 E9D0 E581 677B 2A28 3384 EB43 8A9F 44E3
uid             Robert C. Noland III <rnloland@FreeBSD.org>
uid             Robert C. Noland III (Personal Key) <rnloland@2hip.net>
sub 2048g/76C3CF00 2007-07-24
```

**D.3.227 Anders Nordby <anders@FreeBSD.org>**

```
pub 1024D/00835956 2000-08-13 Anders Nordby <anders@fix.no>
Key fingerprint = 1E0F C53C D8DF 6A8F EAAD 19C5 D12A BC9F 0083 5956
uid             Anders Nordby <anders@FreeBSD.org>
sub 2048g/4B160901 2000-08-13
```

**D.3.228 Michael Nottebrock <lofi@FreeBSD.org>**

```
pub 1024D/6B2974B0 2002-06-06 Michael Nottebrock <michaelnottebrock@gmx.net>
Key fingerprint = 1079 3C72 0726 F300 B8EC 60F9 5E17 3AF1 6B29 74B0
uid             Michael Nottebrock <lofi@freebsd.org>
uid             Michael Nottebrock <lofi@tigress.com>
uid             Michael Nottebrock <lofi@lofi.dyndns.org>
uid             Michael Nottebrock <michaelnottebrock@web.de>
uid             Michael Nottebrock <michaelnottebrock@meitner.wh.uni-dortmund.de>
sub 1024g/EF652E04 2002-06-06 [expires: 2004-06-15]
```

### D.3.229 David O'Brien <obrien@FreeBSD.org>

```
pub 1024R/34F9F9D5 1995-04-23 David E. O'Brien <defunct - obrien@Sea.Legent.com>
Key fingerprint = B7 4D 3E E9 11 39 5F A3 90 76 5D 69 58 D9 98 7A
uid             David E. O'Brien <obrien@NUXI.com>
uid             deobrien@ucdavis.edu
uid             David E. O'Brien <whois Do38>
uid             David E. O'Brien <obrien@FreeBSD.org>
uid             David E. O'Brien <dobrien@seas.gwu.edu>
uid             David E. O'Brien <obrien@cs.ucdavis.edu>
uid             David E. O'Brien <defunct - obrien@media.sra.com>
uid             David E. O'Brien <obrien@elsewhere.roanoke.va.us>
uid             David E. O'Brien <obrien@Nuxi.com>

pub 1024D/7F9A9BA2 1998-06-10 "David E. O'Brien" <obrien@cs.ucdavis.edu>
Key fingerprint = 02FD 495F D03C 9AF2 5DB7 F496 6FC8 DABD 7F9A 9BA2
uid             "David E. O'Brien" <obrien@NUXI.com>
uid             "David E. O'Brien" <obrien@FreeBSD.org>
sub 3072g/BA32C20D 1998-06-10
```

### D.3.230 Philip Paeps <philip@FreeBSD.org>

```
pub 4096R/C5D34D05 2006-10-22
Key fingerprint = 356B AE02 4763 F739 2FA2 E438 2649 E628 C5D3 4D05
uid             Philip Paeps <philip@paeps.cx>
uid             Philip Paeps <philip@nixsys.be>
uid             Philip Paeps <philip@fosdem.org>
uid             Philip Paeps <philip@freebsd.org>
uid             Philip Paeps <philip@pub.telenet.be>
sub 1024D/035EFC58 2006-10-22 [expires: 2010-10-13]
sub 2048g/6E5FD7D6 2006-10-22 [expires: 2010-10-14]
```

### D.3.231 Josh Paetzl <jpaetzl@FreeBSD.org>

```
pub 1024D/27AFAECB 2007-05-11
Key fingerprint = 8A48 EF36 5E9F 4EDA 5A8C 11B4 26F9 01F1 27AF AECB
uid             Josh Paetzl (BSD UNIX) <josh@tcbug.org>
uid             Josh Paetzl <josh@rephunter.net>
uid             Josh Paetzl <josh@pcbsd.org>
uid             Josh Paetzl <jpaetzl@FreeBSD.org>
sub 2048g/E0F5996B 2007-05-11
```

### D.3.232 Gábor Páli <pgj@FreeBSD.org>

```
pub 1024D/9E3F9BE6 2008-04-17 [expires: 2013-04-16]
Key fingerprint = DA0B 2143 0FC8 EE5F E211 D329 7D4B 6E18 9E3F 9BE6
uid             Gabor PALI <pgj@FreeBSD.org>
uid             PÁLI Gábor János <pali.gabor@gmail.com>
```

```
sub 2048g/A780C60B 2008-04-17 [expires: 2013-04-16]
```

### D.3.233 Hiten Pandya <hmp@FreeBSD.org>

```
pub 1024D/938CACAA 2004-02-13 Hiten Pandya (FreeBSD) <hmp@FreeBSD.org>
Key fingerprint = 84EB C75E C75A 50ED 304E E446 D974 7842 938C ACA8
uid             Hiten Pandya <hmp@backplane.com>
sub 2048g/783874B5 2004-02-13
```

### D.3.234 Dima Panov <fluffy@FreeBSD.org>

```
pub 1024D/93E3B018 2006-11-08
Key fingerprint = C73E 2B72 1FFD 61BD E206 1234 A626 76ED 93E3 B018
uid             Dima Panov (FreeBSD.ORG Committer) <fluffy@FreeBSD.ORG>
uid             Dima Panov (at home) <Fluffy@Fluffy.Khv.RU>
uid             Dima Panov (at home) <fluffy.khv@gmail.com>
sub 2048g/89047419 2006-11-08

pub 4096R/D5398F29 2009-08-09
Key fingerprint = 2D30 2CCB 9984 130C 6F87 BAFC FB8B A09D D539 8F29
uid             Dima Panov (FreeBSD.ORG Committer) <fluffy@FreeBSD.ORG>
uid             Dima Panov (at Home) <fluffy@Fluffy.Khv.RU>
uid             Dima Panov (at GMail) <fluffy.khv@gmail.com>
sub 4096R/915A7785 2009-08-09
```

### D.3.235 Andrew Pantyukhin <sat@FreeBSD.org>

```
pub 1024D/6F38A569 2006-05-06
Key fingerprint = 4E94 994A C2EF CB86 C144 3B04 3381 67C0 6F38 A569
uid             Andrew Pantyukhin <infofarmer@gubkin.ru>
uid             Andrew Pantyukhin <sat@FreeBSD.org>
uid             Andrew Pantyukhin <infofarmer@gmail.com>
uid             Andrew Pantyukhin <infofarmer@mail.ru>
sub 2048g/5BD4D469 2006-05-06
```

### D.3.236 Navdeep Parhar <np@FreeBSD.org>

```
pub 1024D/ACAB8812 2009-06-08
Key fingerprint = C897 7AFB AFC0 4DA9 7B76 D991 CAB2 2B93 ACAB 8812
uid             Navdeep Parhar <np@FreeBSD.org>
sub 2048g/AB61D2DC 2009-06-08
```

### D.3.237 Rui Paulo <rpaulo@FreeBSD.org>

```
pub 4096R/39CB4153 2010-02-03
Key fingerprint = ABE8 8465 DE8F F04D E9C8 3FF6 AF89 B2E6 39CB 4153
uid             Rui Paulo <rpaulo@FreeBSD.org>
uid             Rui Paulo <rpaulo@gmail.com>
sub 4096R/F87D2F34 2010-02-03
```

### D.3.238 Mark Peek <mp@FreeBSD.org>

```
pub 1024D/330D4D01 2002-01-27 Mark Peek <mp@FreeBSD.org>
Key fingerprint = 510C 96EE B4FB 1B0A 2CF8 A0AF 74B0 0B0E 330D 4D01
sub 1024g/9C6CAC09 2002-01-27
```

### D.3.239 Peter Pentchev <roam@FreeBSD.org>

```
pub 1024D/16194553 2002-02-01
Key fingerprint = FDBA FD79 C26F 3C51 C95E DF9E ED18 B68D 1619 4553
uid             Peter Pentchev <roam@ringlet.net>
uid             Peter Pentchev <roam@cnsys.bg>
uid             Peter Pentchev <roam@sbnd.net>
uid             Peter Pentchev <roam@online.bg>
uid             Peter Pentchev <roam@orbitel.bg>
uid             Peter Pentchev <roam@FreeBSD.org>
uid             Peter Pentchev <roam@techlab.office1.bg>
uid             Peter Pentchev <roam@hoster.bg>
uid             Peter Pentchev <roam@space.bg>
sub 1024g/7074473C 2002-02-01

pub 4096R/2527DF13 2009-10-16
Key fingerprint = 2EE7 A7A5 17FC 124C F115 C354 651E EFB0 2527 DF13
uid             Peter Pentchev <roam@ringlet.net>
uid             Peter Pentchev <roamer@users.sourceforge.net>
uid             Peter Pentchev <roam@cpan.org>
uid             Peter Pentchev <roam@cnsys.bg>
uid             Peter Pentchev <roam@sbnd.net>
uid             Peter Pentchev <roam@online.bg>
uid             Peter Pentchev <roam@orbitel.bg>
uid             Peter Pentchev <roam@FreeBSD.org>
uid             Peter Pentchev <roam@techlab.office1.bg>
uid             Peter Pentchev <roam@hoster.bg>
uid             Peter Pentchev <roam@space.bg>
uid             Peter Pentchev <roam-guest@alioth.debian.org>
uid             Peter Pentchev <ppentchev@alumni.princeton.edu>
sub 4096R/D0B337AA 2009-10-16
```

**D.3.240 Denis Peplin <den@FreeBSD.org>**

```
pub 1024D/485DDDF5 2003-09-11 Denis Peplin <den@FreeBSD.org>
Key fingerprint = 495D 158C 8EC9 C2C1 80F5 EA96 6F72 7C1C 485D DDF5
sub 1024g/E70BA158 2003-09-11
```

**D.3.241 Christian S.J. Peron <csjp@FreeBSD.org>**

```
pub 1024D/033FA33C 2009-05-16
Key fingerprint = 74AA 6040 89A7 936E D970 DDC0 CC71 6954 033F A33C
uid Christian S.J. Peron <csjp@FreeBSD.ORG>
sub 2048g/856B194A 2009-05-16
```

**D.3.242 Gerald Pfeifer <gerald@FreeBSD.org>**

```
pub 1024D/745C015A 1999-11-09 Gerald Pfeifer <gerald@pfeifer.com>
Key fingerprint = B215 C163 3BCA 0477 615F 1B35 A5B3 A004 745C 015A
uid Gerald Pfeifer <Gerald.Pfeifer@vibe.at>
uid Gerald Pfeifer <pfeifer@dbai.tuwien.ac.at>
uid Gerald Pfeifer <gerald@pfeifer.at>
uid Gerald Pfeifer <gerald@FreeBSD.org>
sub 1536g/F0156927 1999-11-09
```

**D.3.243 Giuseppe Pilichi <jacula@FreeBSD.org>**

```
pub 4096R/8B9F4B8B 2006-03-08
Key fingerprint = 31AD 73AE 0EC0 16E5 4108 8391 D942 5F20 8B9F 4B8B
uid Giuseppe Pilichi (Jacula Modyun) <jacula@FreeBSD.org>
uid Giuseppe Pilichi (Jacula Modyun) <jaculamodyun@gmail.com>
uid Giuseppe Pilichi (Jacula Modyun) <gpilch@gmail.com>
uid Giuseppe Pilichi (Jacula Modyun) <jacula@gmail.com>
sub 4096R/FB4D05A3 2006-03-08
```

**D.3.244 John Polstra <jdp@FreeBSD.org>**

```
pub 1024R/BFBCF449 1997-02-14 John D. Polstra <jdp@polstra.com>
Key fingerprint = 54 3A 90 59 6B A4 9D 61 BF 1D 03 09 35 8D F6 0D
```

**D.3.245 Kirill Ponomarew <krion@FreeBSD.org>**

```
pub 1024D/AEB426E5 2002-04-07
Key fingerprint = 58E7 B953 57A2 D9DD 4960 2A2D 402D 46E9 AEB4 26E5
uid Kirill Ponomarew <krion@voodoo.bawue.com>
uid Kirill Ponomarew <krion@guug.de>
```

```
uid Kirill Ponomarew <krion@FreeBSD.org>
sub 1024D/05AC7CA0 2006-01-30 [expires: 2008-01-30]
sub 2048g/C3EE5537 2006-01-30 [expires: 2008-01-30]
```

### D.3.246 Stephane E. Potvin <sepotvin@FreeBSD.org>

```
pub 1024D/3097FE7B 2002-08-06
    Key fingerprint = 6B56 62FA ADE1 6F46 BB62 8B1C 99D3 97B5 3097 FE7B
uid             Stephane E. Potvin <sepotvin@videotron.ca>
uid             Stephane E. Potvin <stephane.potvin@telcobridges.com>
uid             Stephane E. Potvin <stephane_potvin@telcobridges.com>
uid             Stephane E. Potvin <sepotvin@FreeBSD.org>
sub 2048g/0C427BC9 2002-08-06
```

### D.3.247 Mark Pulford <markp@FreeBSD.org>

```
pub 1024D/182C368F 2000-05-10 Mark Pulford <markp@FreeBSD.org>
    Key fingerprint = 58C9 C9BF C758 D8D4 7022 8EF5 559F 7F7B 182C 368F
uid             Mark Pulford <mark@kyne.com.au>
sub 2048g/380573E8 2000-05-10
```

### D.3.248 Alejandro Pulver <alepulver@FreeBSD.org>

```
pub 1024D/945C3F61 2005-11-13
    Key fingerprint = 085F E8A2 4896 4B19 42A4 4179 895D 3912 945C 3F61
uid             Alejandro Pulver (Ale's GPG key pair) <alepulver@FreeBSD.org>
uid             Alejandro Pulver (Ale's GPG key pair) <alejandro@varnet.biz>
sub 2048g/6890C6CA 2005-11-13
```

### D.3.249 Thomas Quinot <thomas@FreeBSD.org>

```
pub 1024D/393D2469 1999-09-23 Thomas Quinot <thomas@cuvre.fr.eu.org>
    Empreinte de la clé = 4737 A0AD E596 6D30 4356 29B8 004D 54B8 393D 2469
uid             Thomas Quinot <thomas@debian.org>
uid             Thomas Quinot <thomas@FreeBSD.org>
sub 1024g/8DE13BB2 1999-09-23
```

### D.3.250 Herve Quiroz <hq@FreeBSD.org>

```
pub 1024D/85AC8A80 2004-07-22 Herve Quiroz <hq@FreeBSD.org>
    Key fingerprint = 14F5 BC56 D736 102D 41AF A07B 1D97 CE6C 85AC 8A80
uid             Herve Quiroz <herve.quiroz@esil.univ-mrs.fr>
sub 1024g/8ECCAFED 2004-07-22
```

### D.3.251 Doug Rabson <dfr@FreeBSD.org>

```
pub 1024D/59F57821 2004-02-07
    Key fingerprint = 9451 C4FE 1A7E 117B B95F  1F8F B123 456E 59F5 7821
uid          Doug Rabson <dfr@nlsystems.com>
sub 1024g/6207AA32 2004-02-07
```

### D.3.252 Lars Balker Rasmussen <lbr@FreeBSD.org>

```
pub 1024D/9EF6F27F 2006-04-30
    Key fingerprint = F251 28B7 897C 293E 04F8  71EE 4697 F477 9EF6 F27F
uid          Lars Balker Rasmussen <lbr@FreeBSD.org>
sub 2048g/A8C1CFD4 2006-04-30
```

### D.3.253 Chris Rees <crees@FreeBSD.org>

```
pub 2048R/E1EBCAC4 2011-06-11 [expires: 2012-06-10]
    Key fingerprint = 2066 B855 E4B1 226A 8B4C  B6E6 B084 92D1 E1EB CAC4
uid          Chris Rees <crees@freebsd.org>
sub 2048R/FA45D5D6 2011-06-11 [expires: 2012-06-10]
```

### D.3.254 Jim Rees <rees@FreeBSD.org>

```
pub 512/B623C791 1995/02/21 Jim Rees <rees@umich.edu>
    Key fingerprint = 02 5F 1B 15 B4 6E F1 3E  F1 C5 E0 1D EA CC 17 88
```

### D.3.255 Benedict Reuschling <bcr@FreeBSD.org>

```
pub 1024D/4A819348 2009-05-24
    Key fingerprint = 2D8C BDF9 30FA 75A5 A0DF  D724 4D26 502E 4A81 9348
uid          Benedict Reuschling <bcr@FreeBSD.org>
sub 2048g/8DA16EDD 2009-05-24
```

### D.3.256 Tom Rhodes <trhodes@FreeBSD.org>

```
pub 1024D/FB7D88E1 2008-05-07
    Key fingerprint = 8279 3100 2DF2 F00E 7FDD  AC2C 5776 23AB FB7D 88E1
uid          Tom Rhodes (trhodes) <trhodes@FreeBSD.org>
sub 4096g/7B0CD79F 2008-05-07
```

### D.3.257 Benno Rice <benno@FreeBSD.org>

```
pub 1024D/87C59909 2002-01-16 Benno Rice <benno@FreeBSD.org>
      Key fingerprint = CE27 DADA 08E3 FAA3 88F1 5B31 5E34 705A 87C5 9909
uid             Benno Rice <benno@jeamland.net>
sub 1024g/4F7C2BAD 2002-01-16 [expires: 2007-01-15]
```

### D.3.258 Beech Rintoul <beech@FreeBSD.org>

```
pub 1024D/ECBFDC44 2011-08-29
      Key fingerprint = 6921 47CC 8B61 7C02 70EF 4D00 16B4 EAB7 ECBF DC44
uid             Beech Rintoul <beech@freebsd.org>
sub 1024g/F1FD1C3D 2011-08-29
```

### D.3.259 Matteo Riondato <matteo@FreeBSD.org>

```
pub 1024D/1EC56BEC 2003-01-05 [expires: 2009-09-07]
      Key fingerprint = F0F3 1B43 035D 65B1 08E9 4D66 D8CA 78A5 1EC5 6BEC
uid             Matteo Riondato (Rionda) <matteo@FreeBSD.ORG>
uid             Matteo Riondato (Rionda) <rionda@riondabsd.net>
uid             Matteo Riondato (Rionda) <rionda@gufi.org>
uid             Matteo Riondato (Rionda) <matteo@riondato.com>
uid             Matteo Riondato (Rionda) <rionda@riondato.com>
uid             Matteo Riondato (Rionda) <rionda@FreeSBIE.ORG>
uid             Matteo Riondato (Rionda) <rionda@autistici.org>
sub 2048g/87C44A55 2008-09-23 [expires: 2009-09-23]
```

### D.3.260 Ollivier Robert <roberto@FreeBSD.org>

```
pub 1024D/7DCAE9D3 1997-08-21
      Key fingerprint = 2945 61E7 D4E5 1D32 C100 DBEC A04F FB1B 7DCA E9D3
uid             Ollivier Robert <roberto@keltia.freenix.fr>
uid             Ollivier Robert <roberto@FreeBSD.org>
sub 2048g/C267084D 1997-08-21
```

### D.3.261 Craig Rodrigues <rodrigc@FreeBSD.org>

```
pub 1024D/3998479D 2005-05-20
      Key fingerprint = F01F EBE6 F5C8 6DC2 954F 098F D20A 8A2A 3998 479D
uid             Craig Rodrigues <rodrigc@freebsd.org>
uid             Craig Rodrigues <rodrigc@crodrigues.org>
sub 2048g/AA77E09B 2005-05-20
```

### D.3.262 Guido van Rooij <guido@FreeBSD.org>

```
pub 1024R/599F323D 1996-05-18 Guido van Rooij <guido@gvr.org>
Key fingerprint = 16 79 09 F3 C0 E4 28 A7 32 62 FA F6 60 31 C0 ED
uid Guido van Rooij <guido@gvr.win.tue.nl>

pub 1024D/A95102C1 2000-10-25 Guido van Rooij <guido@madison-gurkha.nl>
Key fingerprint = 5B3E 51B7 0E7A D170 0574 1E51 2471 117F A951 02C1
uid Guido van Rooij <guido@madison-gurkha.com>
sub 1024g/A5F20553 2000-10-25
```

### D.3.263 Eygene Ryabinkin <rea@FreeBSD.org>

```
pub 3072D/8152ECFB 2010-10-27
Key fingerprint = 82FE 06BC D497 C0DE 49EC 4FF0 16AF 9EAE 8152 ECFB
uid Eygene Ryabinkin <rea-fbsd@codelabs.ru>
uid Eygene Ryabinkin <rea@freebsd.org>
uid Eygene Ryabinkin <rea@codelabs.ru>
sub 3072g/5FC03749 2010-10-27
```

### D.3.264 Aleksandr Rybalko <ray@FreeBSD.org>

```
pub 2048R/4B7B7A4E 2011-05-24
Key fingerprint = BB9F D01D 7327 0B33 B2F5 6C72 EC49 E6ED 4B7B 7A4E
uid Aleksandr Rybalko (Aleksandr Rybalko FreeBSD project identification) <ray@fr
sub 2048R/99F9F9EF 2011-05-24
```

### D.3.265 Niklas Saers <niklas@FreeBSD.org>

```
pub 1024D/C822A476 2004-03-09 Niklas Saers <niklas@saers.com>
Key fingerprint = C41E F734 AF0E 3D21 7499 9EB1 9A31 2E7E C822 A476
sub 1024g/81E2FF36 2004-03-09
```

### D.3.266 Boris Samorodov <bksam@FreeBSD.org>

```
pub 1024D/ADFD5C9A 2006-06-21
Key fingerprint = 81AA FED0 6050 208C 0303 4007 6C03 7263 ADFD 5C9A
uid Boris Samorodov (FreeBSD) <bksam@freebsd.org>
sub 2048g/7753A3F1 2006-06-21
```

### D.3.267 Mark Santcroos <marks@FreeBSD.org>

```
pub 1024D/DBE7EB8E 2005-03-08
Key fingerprint = C0F0 44F3 3F15 520F 6E32 186B BE0A BA42 DBE7 EB8E
uid             Mark Santcroos <marks@ripe.net>
uid             Mark Santcroos <mark@santcroos.net>
uid             Mark Santcroos <marks@freebsd.org>
sub 2048g/FFF80F85 2005-03-08
```

### D.3.268 Bernhard Schmidt <bschmidt@FreeBSD.org>

```
pub 1024D/5F754FBC 2009-06-15
Key fingerprint = 6B87 C8A9 6BA5 6B18 11CF 8C38 A1B7 0731 5F75 4FBC
uid             Bernhard Schmidt <bschmidt@FreeBSD.org>
uid             Bernhard Schmidt <bschmidt@techwires.net>
sub 1024g/1945DC1D 2009-06-15
```

### D.3.269 Wolfram Schneider <wosch@FreeBSD.org>

```
Type Bits/KeyID      Date        User ID
pub 1024/2B7181AD 1997/08/09 Wolfram Schneider <wosch@FreeBSD.org>
                               Key fingerprint = CA 16 91 D9 75 33 F1 07 1B F0 B4 9F 3E 95 B6 09
```

### D.3.270 Ed Schouten <ed@FreeBSD.org>

```
pub 4096R/3491A2BB 2011-03-12 [expires: 2016-03-10]
Key fingerprint = A110 5982 A887 74A2 F4B1 D70A 6E5E D8FE 3491 A2BB
uid             Ed Schouten (The FreeBSD Project) <ed@FreeBSD.org>
uid             Ed Schouten <ed@80386.nl>
sub 4096R/81BB41E6 2011-03-12 [expires: 2016-03-10]
```

### D.3.271 David Schultz <das@FreeBSD.org>

```
pub 1024D/BE848B57 2001-07-19 David Schultz <das@FreeBSD.ORG>
Key fingerprint = 0C12 797B A9CB 19D9 FDAF 2A39 2D76 A2DB BE84 8B57
uid             David Schultz <dschultz@uclink.Berkeley.EDU>
uid             David Schultz <das@FreeBSD.ORG>
sub 2048g/69206E8E 2001-07-19
```

### D.3.272 Michael Scheidell <scheidell@FreeBSD.org>

```
pub 2048R/34622C1D 2011-11-16
Key fingerprint = 0A0C 9ECA 18EC 47AC C715 2187 91B9 F9FE 3462 2C1D
uid             Michael Scheidell <scheidell@freebsd.org>
```

sub 2048R/8F241971 2011-11-16

### D.3.273 Jens Schweikhardt <schweikh@FreeBSD.org>

```
pub 1024D/0FF231FD 2002-01-27 Jens Schweikhardt <schweikh@FreeBSD.org>
      Key fingerprint = 3F35 E705 F02F 35A1 A23E 330E 16FE EA33 0FF2 31FD
uid          Jens Schweikhardt <schweikh@schweikhardt.net>
sub 1024g/6E93CACC 2002-01-27 [expires: 2005-01-26]
```

### D.3.274 Matthew Seaman <mattthew@FreeBSD.org>

```
pub 1024D/60AE908C 2005-12-17 [expires: 2012-03-21]
      Key fingerprint = B555 2A96 274E D248 5734 0EB4 F0C8 E4E7 60AE 908C
uid          Matthew Seaman <m.seaman@infracaninophile.co.uk>
uid          Matthew Seaman <m.seaman@black-earth.co.uk>
uid          Matthew Seaman <matthew@freebsd.org>
sub 2048g/58BFDA29 2005-12-17 [expires: 2012-03-21]
sub 1024D/9B19F956 2006-12-18 [expires: 2012-03-21]
```

### D.3.275 Stanislav Sedov <stas@FreeBSD.org>

```
pub 4096R/092FD9F0 2009-05-23
      Key fingerprint = B83A B15D 929A 364A D8BC B3F9 BF25 A231 092F D9F0
uid          Stanislav Sedov <stas@FreeBSD.org>
uid          Stanislav Sedov <stas@SpringDaemons.com>
uid          Stanislav Sedov (Corporate email) <stas@deglitch.com>
uid          Stanislav Sedov (Corporate email) <stas@ht-systems.ru>
uid          Stanislav Sedov (Corporate email) <ssedov@3playnet.com>
uid          Stanislav Sedov <ssedov@mbsd.msk.ru>
uid          Stanislav Sedov (Corporate email) <ssedov@swiftest.com>
sub 4096R/6FD2025F 2009-05-23
```

### D.3.276 Johan van Selst <johans@FreeBSD.org>

```
pub 4096R/D3AE8D3A 2009-09-01
      Key fingerprint = 31C8 D089 DDB6 96C6 F3C1 29C0 A9C8 6C8D D3AE 8D3A
uid          Johan van Selst
uid          Johan van Selst <johans@gletsjer.net>
uid          Johan van Selst <johans@stack.nl>
uid          Johan van Selst <johans@FreeBSD.org>
uid          Johan van Selst (GSWoT:NL50) <johans@gswot.org>
sub 2048R/B002E38C 2009-09-01
sub 2048R/1EBCAECB 2009-09-01
sub 2048R/639A1446 2009-09-01
sub 3072D/6F2708F4 2009-09-01
sub 4096g/D6F89E83 2009-09-01
```

### D.3.277 Bakul Shah <bakul@FreeBSD.org>

```
pub 1024D/86AEE4CB 2006-04-20
    Key fingerprint = 0389 26E8 381C 6980 AEC0 10A5 E540 A157 86AE E4CB
uid             Bakul Shah <bakul@freebsd.org>
sub 2048g/5C3DCC24 2006-04-20
```

### D.3.278 Gregory Neil Shapiro <gshapiro@FreeBSD.org>

```
pub 1024R/4FBE2ADD 2000-10-13 Gregory Neil Shapiro <gshapiro@gshapiro.net>
    Key fingerprint = 56 D5 FF A7 A6 54 A6 B5 59 10 00 B9 5F 5F 20 09
uid             Gregory Neil Shapiro <gshapiro@FreeBSD.org>
pub 1024D/F76A9BF5 2001-11-14 Gregory Neil Shapiro <gshapiro@FreeBSD.org>
    Key fingerprint = 3B5E DAF1 4B04 97BA EE20 F841 21F9 C5BC F76A 9BF5
uid             Gregory Neil Shapiro <gshapiro@gshapiro.net>
sub 2048g/935657DC 2001-11-14
pub 1024D/FCE56561 2000-10-14 Gregory Neil Shapiro <gshapiro@FreeBSD.org>
    Key fingerprint = 42C4 A87A FD85 C34F E77F 5EA1 88E1 7B1D FCE5 6561
uid             Gregory Neil Shapiro <gshapiro@gshapiro.net>
sub 1024g/285DC8A0 2000-10-14 [expires: 2001-10-14]
```

### D.3.279 Arun Sharma <arun@FreeBSD.org>

```
pub 1024D/7D112181 2003-03-06 Arun Sharma <arun@sharma-home.net>
    Key fingerprint = A074 41D6 8537 C7D5 070E 0F78 0247 1AE2 7D11 2181
uid             Arun Sharma <arun@freebsd.org>
uid             Arun Sharma <arun.sharma@intel.com>
sub 1024g/ACAD98DA 2003-03-06 [expires: 2005-03-05]
```

### D.3.280 Wesley Shields <wxs@FreeBSD.org>

```
pub 1024D/17F0AA37 2007-12-27
    Key fingerprint = 96D1 2E6B F61C 2F3D 83EF 8F0B BE54 310C 17F0 AA37
uid             Wesley Shields <wxs@FreeBSD.org>
uid             Wesley Shields <wxs@atarininja.org>
sub 2048g/2EDA1BB8 2007-12-27
```

### D.3.281 Norikatsu Shigemura <nork@FreeBSD.org>

```
pub 1024D/7104EA4E 2005-02-14
    Key fingerprint = 9580 60A3 B58A 0864 79CB 779A 6FAE 229B 7104 EA4E
uid             Norikatsu Shigemura <nork@cityfujisawa.ne.jp>
uid             Norikatsu Shigemura <nork@ninth-nine.com>
uid             Norikatsu Shigemura <nork@FreeBSD.org>
```

sub 4096g/EF56997E 2005-02-14

**D.3.282 Shteryana Shopova <syrinx@FreeBSD.org>**

```
pub 1024D/1C139BC5 2006-10-07
    Key fingerprint = B83D 2451 27AB B767 504F CB85 4FB1 C88B 1C13 9BC5
uid          Shteryana Shopova (syrinx) <shteryana@FreeBSD.org>
sub 2048g/6D2E9C98 2006-10-07
```

**D.3.283 Vanilla I. Shu <vanilla@FreeBSD.org>**

```
pub 1024D/ACE75853 2001-11-20 Vanilla I. Shu <vanilla@FreeBSD.org>
    Key fingerprint = 290F 9DB8 42A3 6257 5D9A 5585 B25A 909E ACE7 5853
sub 1024g/CE695D0E 2001-11-20
```

**D.3.284 Ashish SHUKLA <ashish@FreeBSD.org>**

```
pub 4096R/E74FA4B0 2010-04-13
    Key fingerprint = F682 CDCC 39DC 0FEA E116 20B6 C746 CFA9 E74F A4B0
uid          Ashish SHUKLA <wahjava@gmail.com>
uid          Ashish SHUKLA <wahjava@googlemail.com>
uid          Ashish SHUKLA <wahjava.ml@gmail.com>
uid          Ashish SHUKLA <wahjava@members.fsf.org>
uid          Ashish SHUKLA <wahjava@perl.org.in>
uid          Ashish SHUKLA <wahjava@users.sourceforge.net>
uid          Ashish SHUKLA <wah.java@yahoo.com>
uid          Ashish SHUKLA <wah_java@hotmail.com>
uid          Ashish SHUKLA <ashish.shukla@airtelmail.in>
uid          Ashish SHUKLA <wahjava@member.fsf.org>
uid          [jpeg image of size 4655]
uid          Ashish SHUKLA (FreeBSD Committer Address) <ashish@FreeBSD.ORG>
sub 4096R/F20D202D 2010-04-13
```

**D.3.285 Bruce M. Simpson <bms@FreeBSD.org>**

```
pub 1024D/860DB53B 2003-08-06 Bruce M Simpson <bms@freebsd.org>
    Key fingerprint = 0D5F 1571 44DF 51B7 8B12 041E B9E5 2901 860D B53B
sub 2048g/A2A32D8B 2003-08-06 [expires: 2006-08-05]
```

**D.3.286 Dmitry Sivachenko <demon@FreeBSD.org>**

```
pub 1024D/13D5DF80 2002-03-18 Dmitry Sivachenko <mitya@cavia.pp.ru>
    Key fingerprint = 72A9 12C9 BB02 46D4 4B13 E5FE 1194 9963 13D5 DF80
uid          Dmitry S. Sivachenko <demon@FreeBSD.org>
```

sub 1024g/060F6DBD 2002-03-18

### **D.3.287 Jesper Skriver <jesper@FreeBSD.org>**

```
pub 1024D/F9561C31 2001-03-09 Jesper Skriver <jesper@FreeBSD.org>
Key fingerprint = 6B88 9CE8 66E9 E631 C9C5 5EB4 22AB F0EC F956 1C31
uid             Jesper Skriver <jesper@skriver.dk>
uid             Jesper Skriver <jesper@wheel.dk>
sub 1024g/777C378C 2001-03-09
```

### **D.3.288 Ville Skyttä <scop@FreeBSD.org>**

```
pub 1024D/BCD241CB 2002-04-07 Ville Skyttä <ville.skytta@iki.fi>
Key fingerprint = 4E0D EBAB 3106 F1FA 3FA9 B875 D98C D635 BCD2 41CB
uid             Ville Skyttä <ville.skytta@xemacs.org>
uid             Ville Skyttä <scop@FreeBSD.org>
sub 2048g/9426F4D1 2002-04-07
```

### **D.3.289 Andrey Slusar <anray@FreeBSD.org>**

```
pub 1024D/AE7B5418 2005-12-12
Key fingerprint = DE70 C24B 55A0 4A06 68A1 D425 3C59 9A9B AE7B 5418
uid             Andrey Slusar <anray@ext.by>
uid             Andrey Slusar <anrays@gmail.com>
uid             Andrey Slusar <anray@FreeBSD.org>
sub 2048g/7D0EB77D 2005-12-12
```

### **D.3.290 Florian Smeets <flo@FreeBSD.org>**

```
pub 1024D/C942BF09 2008-10-24
Key fingerprint = 54BB 157B 8DB2 9E46 4A3C 69AB 6A9A 3C3F C942 BF09
uid             Florian Smeets <flo@smeets.im>
uid             Florian Smeets <flo@kasimir.com>
uid             Florian Smeets <flo@FreeBSD.org>
sub 2048g/4AAF040E 2008-10-24
```

### **D.3.291 Gleb Smirnoff <glebius@FreeBSD.org>**

```
pub 1024D/1949DC80 2003-08-25
Key fingerprint = 872C E14A 2F03 A3E8 D882 026E 5DE4 D7FE 1949 DC80
uid             Gleb Smirnoff <glebius@FreeBSD.org>
uid             Gleb Smirnoff <glebius@cell.sick.ru>
uid             Gleb Smirnoff <glebius@bestcom.ru>
uid             Gleb Smirnoff <glebius@rambler-co.ru>
```

```
uid          Gleb Smirnoff <glebius@freebsd.org>
uid          Gleb Smirnoff <glebius@freebsd.int.ru>
sub 1024g/A05118BD 2003-08-25
```

### D.3.292 Ken Smith <kensmith@FreeBSD.org>

```
pub 1024D/29AEA7F6 2003-12-02 Ken Smith <kensmith@cse.buffalo.edu>
     Key fingerprint = 4AB7 D302 0753 8215 31E7 F1AD FC6D 7855 29AE A7F6
uid          Ken Smith <kensmith@freebsd.org>
sub 1024g/0D509C6C 2003-12-02
```

### D.3.293 Ben Smithurst <ben@FreeBSD.org>

```
pub 1024D/2CEF442C 2001-07-11 Ben Smithurst <ben@LSRfm.com>
     Key fingerprint = 355D 0FFF B83A 90A9 D648 E409 6CFC C9FB 2CEF 442C
uid          Ben Smithurst <ben@vinosystems.com>
uid          Ben Smithurst <ben@smithurst.org>
uid          Ben Smithurst <ben@FreeBSD.org>
uid          Ben Smithurst <csxbcs@comp.leeds.ac.uk>
uid          Ben Smithurst <ben@scientia.demon.co.uk>
sub 1024g/347071FF 2001-07-11
```

### D.3.294 Dag-Erling C. Smørgrav <des@FreeBSD.org>

```
pub 1024D/64EBE220 2006-11-11 [expires: 2011-05-31]
     Key fingerprint = 3A1C 8E68 952C 3305 6984 6486 30D4 3A6E 64EB E220
uid          Dag-Erling Smørgrav <des@des.no>
uid          Dag-Erling Smørgrav <des@freebsd.org>
uid          [jpeg image of size 3315]
sub 2048g/920C3313 2006-11-11 [expires: 2011-05-31]
```

### D.3.295 Maxim Sobolev <sobomax@FreeBSD.org>

```
pub 1024D/888205AF 2001-11-21 Maxim Sobolev <sobomax@FreeBSD.org>
     Key fingerprint = 85C9 DCB0 6828 087C C977 3034 A0DB B9B7 8882 05AF
uid          Maxim Sobolev <sobomax@mail.ru>
uid          Maxim Sobolev <sobomax@altavista.net>
uid          Maxim Sobolev <vegacap@i.com.ua>

pub 1024D/468EE6D8 2003-03-21 Maxim Sobolev <sobomax@portaone.com>
     Key fingerprint = 711B D315 3360 A58F 9A0E 89DB 6D40 2558 468E E6D8
uid          Maxim Sobolev <sobomax@FreeBSD.org>
uid          Maxim Sobolev <sobomax@mail.ru>
uid          Maxim Sobolev <vegacap@i.com.ua>

pub 1024D/6BEC980A 2004-02-13 Maxim Sobolev <sobomax@portaone.com>
```

```
Key fingerprint = 09D5 47B4 8D23 626F B643 76EB DFEE 3794 6BEC 980A
uid             Maxim Sobolev <sobomax@FreeBSD.org>
uid             Maksym Sobolyev (It's how they call me in official documents. Prett
uid             Maksym Sobolyev (It's how they call me in official documents. Prett
sub 2048g/16D049AB 2004-02-13 [expires: 2005-02-12]
```

### **D.3.296 Brian Somers <brian@FreeBSD.org>**

```
pub 1024R/666A7421 1997-04-30 Brian Somers <brian@freebsd-services.com>
     Key fingerprint = 2D 91 BD C2 94 2C 46 8F 8F 09 C4 FC AD 12 3B 21
uid             Brian Somers <brian@awfulhak.org>
uid             Brian Somers <brian@FreeBSD.org>
uid             Brian Somers <brian@OpenBSD.org>
uid             Brian Somers <brian@uk.FreeBSD.org>
uid             Brian Somers <brian@uk.OpenBSD.org>
```

### **D.3.297 Stacey Son <sson@FreeBSD.org>**

```
pub 1024D/CE8319F3 2008-07-08
     Key fingerprint = 64C7 8D92 C1DF B940 1171 5ED3 186A 758A CE83 19F3
uid             Stacey Son <sson@FreeBSD.org>
uid             Stacey Son <stacey@son.org>
uid             Stacey Son <sson@byu.net>
uid             Stacey Son <sson@secure.net>
uid             Stacey Son <sson@dev-random.com>
sub 2048g/0F724E52 2008-07-08
```

### **D.3.298 Nicolas Souchu <nsouch@FreeBSD.org>**

```
pub 1024D/C744F18B 2002-02-13 Nicholas Souchu <nsouch@freebsd.org>
     Key fingerprint = 992A 144F AC0F 40BA 55AE DE6D 752D 0A6C C744 F18B
sub 1024g/90BD3231 2002-02-13
```

### **D.3.299 Suleiman Souhlal <ssouhlal@FreeBSD.org>**

```
pub 1024D/2EA50469 2004-07-24 Suleiman Souhlal <ssouhlal@FreeBSD.org>
     Key fingerprint = DACF 89DB 54C7 DA1D 37AF 9A94 EB55 E272 2EA5 0469
sub 2048g/0CDCC535 2004-07-24
```

### **D.3.300 Ulrich Spörlein <uqs@FreeBSD.org>**

```
pub 2048R/4AAF82CE 2010-01-27 [expires: 2015-01-26]
     Key fingerprint = 08DF A6A0 B1EB 98A5 EDDA 9005 A3A6 9864 4AAF 82CE
uid             Ulrich SpÃ¶rlein <uqs@spoerlein.net>
```

```
uid          Ulrich Spoerlein <uspoerlein@gmail.com>
uid          Ulrich SpÃ¶rlein (The FreeBSD Project) <uqs@FreeBSD.org>
uid          Ulrich SpÃ¶rlein <ulrich.spoerlein@web.de>
sub 2048R/162E8BD2 2010-01-27 [expires: 2015-01-26]
```

### D.3.301 Rink Springer <rink@FreeBSD.org>

```
pub 1024D/ECEDBFFF 2003-09-19
    Key fingerprint = A8BE 9C82 9B81 4289 A905 418D 6F73 BAD2 ECED BFFF
uid          Rink Springer <rink@il.fontys.nl>
uid          Rink Springer (FreeBSD Project) <rink@FreeBSD.org>
uid          Rink Springer <rink@stack.nl>
sub 2048g/3BC3E67E 2003-09-19
```

### D.3.302 Vsevolod Stakhov <vsevolod@FreeBSD.org>

```
pub 1024D/213D0033 2005-03-14 [expires: 2008-03-13]
    Key fingerprint = B852 0010 761E 944A C76D D447 A25D C12C 213D 0033
uid          Vsevolod Stakhov <vsevolod@FreeBSD.org>
uid          Vsevolod Stakhov <cebka@jet.msk.su>
uid          Vsevolod Stakhov <vsevolod@highsecure.ru>
sub 2048g/786F2187 2005-03-14 [expires: 2008-03-13]
```

### D.3.303 Ryan Steinmetz <zi@FreeBSD.org>

```
pub 1024D/7AD7FAF2 2004-01-21
    Key fingerprint = EF36 D45A 5CA9 28B1 A550 18CD A43C D111 7AD7 FAF2
uid          Ryan Steinmetz <zi@FreeBSD.org>
uid          Ryan Steinmetz <rpsfa@rit.edu>
uid          Ryan Steinmetz <zi@zi0r.com>
sub 1024g/058BC057 2004-01-21
sub 4096g/0EB108D2 2006-02-27
sub 1024D/FEF36DD7 2006-02-27
```

### D.3.304 Randall R. Stewart <rrs@FreeBSD.org>

```
pub 1024D/0373B8B2 2006-09-01
    Key fingerprint = 74A6 810E 6DEA D69B 6496 5FA9 8AEF 4166 0373 B8B2
uid          Randall R Stewart <randall@lakerest.net>
uid          Randall R Stewart <rrs@cisco.com>
uid          Randall R Stewart <rrs@FreeBSD.org>
sub 2048g/88027C0B 2006-09-01
```

### D.3.305 Murray Stokely <murray@FreeBSD.org>

```
pub 1024D/0E451F7D 2001-02-12 Murray Stokely <murray@freebsd.org>
Key fingerprint = E2CA 411D DD44 53FD BB4B 3CB5 B4D7 10A2 0E45 1F7D
sub 1024g/965A770C 2001-02-12
```

### D.3.306 Volker Stolz <vs@FreeBSD.org>

```
pub 1024R/3FD1B6B5 1998-06-16 Volker Stolz <vs@freebsd.org>
Key fingerprint = 69 6F BD A0 2E FE 19 66 CF B9 68 6E 41 7D F9 B9
uid Volker Stolz <stolz@i2.informatik.rwth-aachen.de> (LSK)
uid Volker Stolz <vs@foldr.org>
```

### D.3.307 Ryan Stone <rstone@FreeBSD.org>

```
pub 1024D/3141B73A 2010-04-13
Key fingerprint = 4A6D DC04 DDC5 0822 2687 A086 FD3F 16CB 3141 B73A
uid Ryan Stone (FreeBSD) <rstone@freebsd.org>
sub 2048g/A8500B5F 2010-04-13
```

### D.3.308 Søren Straarup <xride@FreeBSD.org>

```
pub 1024D/E683AD40 2006-09-28
Key fingerprint = 8A0E 7E57 144B BC25 24A9 EC1A 0DBC 3408 E683 AD40
uid Soeren Straarup <xride@xride.dk>
uid Soeren Straarup <xride@FreeBSD.org>
uid Soeren Straarup <xride@x12.dk>
sub 2048g/2B18B3B8 2006-09-28
```

### D.3.309 Marius Strobl <marius@FreeBSD.org>

```
pub 1024D/E0AC6F8D 2004-04-16
Key fingerprint = 3A6C 4FB1 8BB9 4F2E BDDC 4AB6 D035 799C E0AC 6F8D
uid Marius Strobl <marius@FreeBSD.org>
uid Marius Strobl <marius@alchemy.franken.de>
sub 1024g/08BBD875 2004-04-16
```

### D.3.310 Carlo Strub <cs@FreeBSD.org>

```
pub 4096R/1ACAF57A 2011-06-29 [expires: 2012-06-28]
Key fingerprint = 3019 F948 5F92 E45B 5B33 6EA2 22A3 B308 1ACA F57A
uid Carlo Strub <cs@carlostrub.ch>
uid Carlo Strub <cs@freebsd.org>
sub 4096R/648E9F32 2011-06-29 [expires: 2012-06-28]
```

### D.3.311 Cheng-Lung Sung <clsung@FreeBSD.org>

```
pub 1024D/956E8BC1 2003-09-12 Cheng-Lung Sung <clsung@FreeBSD.org>
Key fingerprint = E0BC 57F9 F44B 46C6 DB53 8462 F807 89F3 956E 8BC1
uid             Cheng-Lung Sung (Software Engineer) <clsung@dragon2.net>
uid             Cheng-Lung Sung (Alumnus of CSIE, NCTU, Taiwan) <clsung@sungsung.csie.nctu.edu.tw>
uid             Cheng-Lung Sung (AlanSung) <clsung@tiger2.net>
uid             Cheng-Lung Sung (FreeBSD@Taiwan) <clsung@freebsd.csie.nctu.edu.tw>
uid             Cheng-Lung Sung (Ph.D. Student of NTU.EECS) <d92921016@ntu.edu.tw>
uid             Cheng-Lung Sung (FreeBSD Freshman) <clsung@tw.freebsd.org>
uid             Cheng-Lung Sung (ports committer) <clsung@FreeBSD.org>
sub 1024g/1FB800C2 2003-09-12
```

### D.3.312 Gregory Sutter <gsutter@FreeBSD.org>

```
pub 1024D/845DFEDD 2000-10-10 Gregory S. Sutter <gsutter@zer0.org>
Key fingerprint = D161 E4EA 4BFA 2427 F3F9 5B1F 2015 31D5 845D FEDD
uid             Gregory S. Sutter <gsutter@freebsd.org>
uid             Gregory S. Sutter <gsutter@daemonnews.org>
uid             Gregory S. Sutter <gsutter@pobox.com>
sub 2048g/0A37BBCE 2000-10-10
```

### D.3.313 Koichi Suzuki <metal@FreeBSD.org>

```
pub 1024D/AE562682 2004-05-23 SUZUKI Koichi <metal@FreeBSD.org>
Key fingerprint = 92B9 A202 B5AB 8CB6 89FC 6DD1 5737 C702 AE56 2682
sub 4096g/730E604B 2004-05-23
```

### D.3.314 Ryusuke SUZUKI <ryusuke@FreeBSD.org>

```
pub 1024D/63D29724 2009-12-18
Key fingerprint = B108 7109 2E62 BECB 0F78 FE65 1B9A D1BE 63D2 9724
uid             Ryusuke SUZUKI <ryusuke@FreeBSD.org>
uid             Ryusuke SUZUKI <ryusuke@jp.FreeBSD.org>
sub 1024g/5E4DD044 2009-12-18
```

### D.3.315 Gary W. Swearingen <garys@FreeBSD.org>

```
pub 1024D/FAA48AD5 2005-08-22 [expires: 2007-08-22]
Key fingerprint = 8292 CC3E 81B5 E54F E3DD F987 FA52 E643 FAA4 8AD5
uid             Gary W. Swearingen <garys@freebsd.org>
sub 2048g/E34C3CA0 2005-08-22 [expires: 2007-08-22]
```

### D.3.316 Yoshihiro Takahashi <nyan@FreeBSD.org>

```
pub 1024D/8394B81F 2001-10-15 Yoshihiro TAKAHASHI <nyan@jp.FreeBSD.org>
      Key fingerprint = D4FA D8CA 2AED FCF4 90A3 3569 8666 0500 8394 B81F
uid           Yoshihiro TAKAHASHI <nyan@furiru.org>
uid           Yoshihiro TAKAHASHI <nyan@FreeBSD.org>
sub 1024g/B796F020 2001-10-15
```

### D.3.317 Sahil Tandon <sahil@FreeBSD.org>

```
pub 2048R/C016D977 2010-04-08
      Key fingerprint = 6AD2 BA99 8E3A 8DA6 DFC1 53CF DBD0 6001 C016 D977
uid           Sahil Tandon <sahil@tandon.net>
uid           Sahil Tandon <sahil@FreeBSD.org>
sub 2048R/F7776FBC 2010-04-08
```

### D.3.318 TAKATSU Tomonari <tota@FreeBSD.org>

```
pub 1024D/67F58F29 2009-05-17
      Key fingerprint = 6940 B575 FC4A FA26 C094 279A 4B9B 6326 67F5 8F29
uid           TAKATSU Tomonari <tota@FreeBSD.org>
sub 2048g/18B112CD 2009-05-17
```

### D.3.319 Romain Tartière <romain@FreeBSD.org>

```
pub 3072R/5112336F 2010-04-09
      Key fingerprint = 8234 9A78 E7C0 B807 0B59 80FF BA4D 1D95 5112 336F
uid           Romain Tartière <romain@blogreen.org>
uid           Romain Tartière (FreeBSD) <romain@FreeBSD.org>
sub 3072R/C1B2B656 2010-04-09
sub 3072R/8F8125F4 2010-04-09
```

### D.3.320 Sylvio Cesar Teixeira <sylvio@FreeBSD.org>

```
pub 2048R/AA7395A1 2009-10-28
      Key fingerprint = B319 6AAF 0016 4308 6D93 E652 3C5F 21A2 AA73 95A1
uid           Sylvio Cesar Teixeira (My key) <sylvio@FreeBSD.org>
sub 2048R/F758F556 2009-10-28
```

### D.3.321 Ion-Mihai Tetcu <itetcu@FreeBSD.org>

```
pub 1024D/21FFA1E5 2008-05-08 [expires: 2010-05-08]
      Key fingerprint = A880 42DD BD71 BAA5 AED7 AEA2 27B1 88BA 21FF A1E5
uid           Ion-Mihai "IONut" Tetcu <itetcu@FreeBSD.org>
```

```
sub 2048g/0B30E680 2008-05-08 [expires: 2010-05-08]
```

### **D.3.322 Mikhail Teterin <mi@FreeBSD.org>**

```
pub 1024R/3FC71479 1995-09-08 Mikhail Teterin <mi@aldan.star89.galstar.com>
Key fingerprint = 5F 15 EA 78 A5 40 6A 0F 14 D7 D9 EA 6E 2B DA A4
```

### **D.3.323 Gordon Tetlow <gordon@FreeBSD.org>**

```
pub 1024D/357D65FB 2002-05-14 Gordon Tetlow <gordont@gnf.org>
Key fingerprint = 34EF AD12 10AF 560E C3AE CE55 46ED ADF4 357D 65FB
uid Gordon Tetlow <gordon@FreeBSD.org>
sub 1024g/243694AB 2002-05-14
```

### **D.3.324 Lars Thegler <lth@FreeBSD.org>**

```
pub 1024D/56B0CA08 2004-05-31 Lars Thegler <lth@FreeBSD.org>
Key fingerprint = ABAE F98C EA78 1C8D 6FDD CB27 1CA9 5A63 56B0 CA08
uid Lars Thegler <lars@thegler.dk>
sub 1024g/E8C58EF3 2004-05-31
```

### **D.3.325 David Thiel <lx@FreeBSD.org>**

```
pub 1024D/A887A9B4 2006-11-30 [expires: 2011-11-29]
Key fingerprint = F08F 6A12 738F C9DF 51AC 8C62 1E30 7CBE A887 A9B4
uid David Thiel <lx@FreeBSD.org>
sub 2048g/B9BD92C5 2006-11-30 [expires: 2011-11-29]
```

### **D.3.326 Fabien Thomas <fabient@FreeBSD.org>**

```
pub 1024D/07745930 2009-03-16
Key fingerprint = D8AC EFA2 2FBD 7788 9628 4E8D 3F35 3B88 0774 5930
uid Fabien Thomas <fabient@FreeBSD.org>
sub 2048g/BC173395 2009-03-16
```

### **D.3.327 Thierry Thomas <thierry@FreeBSD.org>**

```
pub 1024D/C71405A2 1997-10-11
Key fingerprint = 3BB8 F358 C2F1 776C 65C9 AE51 73DE 698C C714 05A2
uid Thierry Thomas <thierry@pompo.net>
uid Thierry Thomas <tthomas@mail.dotcom.fr>
uid Thierry Thomas (FreeBSD committer) <thierry@FreeBSD.org>
```

```
sub 1024R/C5529925 2003-11-26
sub 2048g/05CF3992 2008-02-05
```

### D.3.328 Andrew Thompson <thompsa@FreeBSD.org>

```
pub 1024D/BC6B839B 2005-05-05
Key fingerprint = DE74 3F49 B97C A170 C8F1 8423 CAB6 9D57 BC6B 839B
uid           Andrew Thompson <thompsa@freebsd.org>
uid           Andrew Thompson <andy@fud.org.nz>
sub 2048g/92E370FB 2005-05-05
```

### D.3.329 Florent Thoumie <flz@FreeBSD.org>

```
pub 1024D/5147DCF4 2004-12-04
Key fingerprint = D203 AF5F F31A 63E2 BFD5 742B 3311 246D 5147 DCF4
uid           Florent Thoumie (FreeBSD committer address) <flz@FreeBSD.org>
uid           Florent Thoumie (flz) <florent@thoumie.net>
uid           Florent Thoumie (flz) <flz@xbsd.org>
uid           [jpeg image of size 1796]
sub 2048g/15D930B9 2004-12-04
```

### D.3.330 Yar Tikhiy <yar@FreeBSD.org>

```
pub 1024D/EA04CF5A 2008-08-31
Key fingerprint = C063 6788 AFF2 A62F 06B7 516D 200F 06AF EA04 CF5A
uid           Yar Tikhiy <yar@freebsd.org>
sub 2048g/20443F06 2008-08-31
```

### D.3.331 Jilles Tjoelker <jilles@FreeBSD.org>

```
pub 4096R/D5AE6220 2011-07-02
Key fingerprint = 4AF5 F1CC BDD7 700B F005 79A4 A2C4 C4D4 D5AE 6220
uid           Jilles Tjoelker <jilles@stack.nl>
uid           Jilles Tjoelker <tjoelker@zonnet.nl>
uid           Jilles Tjoelker (FreeBSD) <jilles@FreeBSD.org>
sub 4096R/14CB5775 2011-07-02
```

### D.3.332 Ganbold Tsagaankhuu <ganbold@FreeBSD.org>

```
pub 1024D/78F6425E 2008-02-26 [expires: 2013-02-24]
Key fingerprint = 9B8E DC41 D3F4 F7FC D8EA 417C D4F7 2AEF 78F6 425E
uid           Ganbold <ganbold@freebsd.org>
sub 2048g/716FCBF9 2008-02-26 [expires: 2013-02-24]
```

### D.3.333 Michael Tuexen <tuexen@FreeBSD.org>

```
pub 1024D/04EEDABE 2009-06-08
Key fingerprint = 493A CCB8 60E6 5510 A01D 360E 8497 B854 04EE DABE
uid             Michael Tuexen <tuexen@FreeBSD.org>
sub 2048g/F653AA03 2009-06-08
```

### D.3.334 Andrew Turner <andrew@FreeBSD.org>

```
pub 2048R/31B31614 2010-07-01
Key fingerprint = 08AC 2C57 F14F FDD1 2232 B5CD AA16 EFB8 31B3 1614
uid             Andrew Turner <andrew@freebsd.org>
uid             Andrew Turner <andrew@fubar.geek.nz>
sub 2048R/9ACBF138 2010-07-01
```

### D.3.335 Hajimu UMEMOTO <ume@FreeBSD.org>

```
pub 1024D/BF9071FE 2005-03-17
Key fingerprint = 1F00 0B9E 2164 70FC 6DC5 BF5F 04E9 F086 BF90 71FE
uid             Hajimu UMEMOTO <ume@mahoroba.org>
uid             Hajimu UMEMOTO <ume@FreeBSD.org>
uid             Hajimu UMEMOTO <ume@jp.FreeBSD.org>
sub 2048g/748DB3B0 2005-03-17
```

### D.3.336 Stephan Uphoff <ups@FreeBSD.org>

```
pub 2048R/D684B04A 2004-10-06 Stephan Uphoff <ups@freebsd.org>
Key fingerprint = B5D2 04AE CA8F 7055 7474 3C85 F908 7F55 D684 B04A
uid             Stephan Uphoff <ups@tree.com>
sub 2048R/A15F921B 2004-10-06
```

### D.3.337 Jacques Vidrine <nectar@FreeBSD.org>

```
pub 2048R/33C1627B 2001-07-05 Jacques A. Vidrine <nectar@celabo.org>
Key fingerprint = CB CE 7D A0 6E 01 DC 61 E5 91 0A BE 79 17 D3 82
uid             Jacques A. Vidrine <jvidrine@verio.net>
uid             Jacques A. Vidrine <n@nectar.com>
uid             Jacques A. Vidrine <jacques@vidrine.cc>
uid             Jacques A. Vidrine <nectar@FreeBSD.org>
uid             Jacques A. Vidrine <n@nectar.cc>

pub 1024D/1606DB95 2001-07-05 Jacques A. Vidrine <nectar@celabo.org>
Key fingerprint = 46BC EA5B F70A CC81 5332 0832 8C32 8CFF 1606 DB95
uid             Jacques A. Vidrine <jvidrine@verio.net>
uid             Jacques A. Vidrine <n@nectar.com>
uid             Jacques A. Vidrine <jacques@vidrine.cc>
```

```
uid          Jacques A. Virdrine <nectar@FreeBSD.org>
uid          Jacques A. Virdrine <n@nectar.cc>
sub 2048g/57EDEA6F 2001-07-05
```

### D.3.338 Alberto Villa <avilla@FreeBSD.org>

```
pub 1024R/44350A8B 2010-01-24
Key fingerprint = F740 CE4E EDDD DA9B 4A1B 1445 DF18 82EA 4435 0A8B
uid          Alberto Villa <avilla@FreeBSD.org>
sub 1024R/F7C8254C 2010-01-24
```

### D.3.339 Nicola Vitale <nivit@FreeBSD.org>

```
pub 1024D/F11699E5 2006-12-05
Key fingerprint = 2C17 C591 2C6D 82BD F3DB F1BF 8FC9 6763 F116 99E5
uid          Nicola Vitale (Public key for nivit@FreeBSD.org) <nivit@FreeBSD.org>
sub 2048g/4C90805D 2006-12-05
```

### D.3.340 Ivan Voras <ivoras@FreeBSD.org>

```
pub 1024D/569C05C8 2000-05-24
Key fingerprint = AB9A A555 C47C B61D BF83 154C 95D9 C041 569C 05C8
uid          Ivan Voras <ivoras@fer.hr>
uid          Ivan Voras <iwan.voras@fer.hr>
uid          Ivan Voras <ivoras@geri.cc.fer.hr>
uid          [jpeg image of size 4567]
uid          Ivan Voras <ivoras@sharanet.org>
uid          Ivan Voras <ivoras@gmail.com>
uid          Ivan Voras <ivoras@yahoo.com>
uid          Ivan Voras <ivoras@freebsd.org>
uid          Ivan Voras <iwan.voras@zg.t-com.hr>
sub 1536g/149FDD60 2000-05-24
```

### D.3.341 Stefan Walter <stefan@FreeBSD.org>

```
pub 3072R/12B9E0B3 2003-03-06
Key fingerprint = 85D8 6A49 22C7 6CD9 B011 5D6A 5691 111B 12B9 E0B3
uid          Stefan Walter <stefan@freebsd.org>
uid          Stefan Walter <sw@gegenunendlich.de>
sub 3072R/6D35457A 2003-03-06
```

### D.3.342 Kai Wang <kaiw@FreeBSD.org>

```
pub 1024D/AEB910EB 2006-09-27
    Key fingerprint = 3534 10A3 F143 B760 EF3E BEDF 8509 6A06 AEB9 10EB
uid          Kai Wang <kaiw@FreeBSD.org>
uid          Kai Wang <kaiw@student.chalmers.se>
uid          Kai Wang <kaiwang27@gmail.com>
uid          Kai Wang <kaiw27@gmail.com>
sub 2048g/1D5AA4DD 2006-09-27
```

### D.3.343 Adam Weinberger <adamw@FreeBSD.org>

```
pub 1024D/42C743FD 2002-10-12 Adam Weinberger <adam@vectors.cx>
    Key fingerprint = A980 3F2E 80A8 9619 9D1C 82E8 A3C2 8CD9 42C7 43FD
sub 1024g/15D67628 2002-10-12
```

### D.3.344 Peter Wemmm <peter@FreeBSD.org>

```
pub 1024D/7277717F 2003-12-14 Peter Wemmm <peter@wemmm.org>
    Key fingerprint = 622B 2282 E92B 3BAB 57D1 A417 1512 AE52 7277 717F
uid          Peter Wemmm <peter@FreeBSD.ORG>
sub 1024g/8B40D9D1 2003-12-14
pub 1024R/D89CE319 1995-04-02 Peter Wemmm <peter@netplex.com.au>
    Key fingerprint = 47 05 04 CA 4C EE F8 93 F6 DB 02 92 6D F5 58 8A
uid          Peter Wemmm <peter@perth.dialix.oz.au>
uid          Peter Wemmm <peter@haywire.dialix.com>
```

### D.3.345 Nathan Whitehorn <nwhitehorn@FreeBSD.org>

```
pub 1024D/FC118258 2008-07-03
    Key fingerprint = A399 BEA0 8D2B 63B3 47B5 056D 8513 5B96 FC11 8258
uid          Nathan Whitehorn <nwhitehorn@freebsd.org>
uid          Nathan Whitehorn <nwhitehorn@icecube.wisc.edu>
uid          Nathan Whitehorn <nwhitehorn@physics.wisc.edu>
uid          Nathan Whitehorn <whitehorn@wisc.edu>
sub 2048g/EDB55363 2008-07-03
```

### D.3.346 Martin Wilke <miwi@FreeBSD.org>

```
pub 1024D/B1E6FCE9 2009-01-31
    Key fingerprint = C022 7D60 F598 8188 2635 0F6E 74B2 4884 B1E6 FCE9
uid          Martin Wilke <miwi@FreeBSD.org>
sub 4096g/096DA69D 2009-01-31
```

### D.3.347 Nate Williams <nate@FreeBSD.org>

```
pub 1024D/C2AC6BA4 2002-01-28 Nate Williams (FreeBSD) <nate@FreeBSD.org>
Key fingerprint = 8EE8 5E72 8A94 51FA EA68 E001 FFF9 8AA9 C2AC 6BA4
sub 1024g/03EE46D2 2002-01-28
```

### D.3.348 Steve Wills <swills@FreeBSD.org>

```
pub 2048R/207B1BA1 2010-09-02 [expires: 2011-09-02]
Key fingerprint = 98FA 414A 5C2A 0EF9 CFD0 AD0D F5CF 62B3 207B 1BA1
uid             Steve Wills <swills@freebsd.org>
uid             Steve Wills <steve@mouf.net>
sub 2048R/E9B254FD 2010-09-02 [expires: 2011-09-02]
```

### D.3.349 Thomas Wintergerst <twinterg@FreeBSD.org>

```
pub 1024D/C45CB978 2006-01-08
Key fingerprint = 04EE 8114 7C6D 22CE CDC8 D7F8 112D 01DB C45C B978
uid             Thomas Wintergerst <twinterg@gmx.de>
uid             Thomas Wintergerst <twinterg@freebsd.org>
uid             Thomas Wintergerst
uid             Thomas Wintergerst <thomas.wintergerst@nord-com.net>
uid             Thomas Wintergerst <thomas.wintergerst@materna.de>
sub 2048g/3BEBEF8A 2006-01-08
sub 1024D/8F631374 2006-01-08
sub 2048g/34F631DC 2006-01-08
```

### D.3.350 Garrett Wollman <wollman@FreeBSD.org>

```
pub 1024D/0B92FAEA 2000-01-20 Garrett Wollman <wollman@FreeBSD.org>
Key fingerprint = 4627 19AF 4649 31BF DE2E 3C66 3ECF 741B 0B92 FAEA
sub 1024g/90D5EBC2 2000-01-20
```

### D.3.351 Jörg Wunsch <joerg@FreeBSD.org>

```
pub 1024D/69A85873 2001-12-11 Joerg Wunsch <j@uriyah.heep.sax.de>
Key fingerprint = 5E84 F980 C3CA FD4B B584 1070 F48C A81B 69A8 5873
pub 1024D/69A85873 2001-12-11 Joerg Wunsch <j@uriyah.heep.sax.de>
uid             Joerg Wunsch <joerg_wunsch@interface-systems.de>
uid             Joerg Wunsch <joerg@FreeBSD.org>
uid             Joerg Wunsch <j@ida.interface-business.de>
sub 1024g/21DC9924 2001-12-11
```

**D.3.352 David Xu <davidxu@FreeBSD.org>**

```
pub 1024D/48F2BDAB 2006-07-13 [expires: 2009-07-12]
Key fingerprint = 7182 434F 8809 A4AF 9AE8 F1B5 12F6 3390 48F2 BDAB
uid             David Xu <davidxu@freebsd.org>
sub 4096g/ED7DB38A 2006-07-13 [expires: 2009-07-12]
```

**D.3.353 Maksim Yevmenkin <emax@FreeBSD.org>**

```
pub 1024D/F050D2DD 2003-10-01 Maksim Yevmenkin <m_evmenkin@yahoo.com>
Key fingerprint = 8F3F D359 E318 5641 8C81 34AD 791D 53F5 F050 D2DD
```

**D.3.354 Bjoern A. Zeeb <bz@FreeBSD.org>**

```
pub 1024D/3CCF1842 2007-02-20
Key fingerprint = 1400 3F19 8FEF A3E7 7207 EE8D 2B58 B8F8 3CCF 1842
uid             Bjoern A. Zeeb <bz@zabbadoz.net>
uid             Bjoern A. Zeeb <bzeeb@zabbadoz.net>
uid             Bjoern A. Zeeb <bz@FreeBSD.org>
uid             Bjoern A. Zeeb <bzeeb-lists@lists.zabbadoz.net>
sub 4096g/F36BDC5D 2007-02-20
```

**D.3.355 Alexey Zelkin <phantom@FreeBSD.org>**

```
pub 1024D/9196B7D9 2002-01-28 Alexey Zelkin <phantom@FreeBSD.org>
Key fingerprint = 4465 F2A4 28C1 C2E4 BB95 1EA0 C70D 4964 9196 B7D9
sub 1024g/E590ABA4 2002-01-28
```

**D.3.356 Sepherosa Ziehau <sephe@FreeBSD.org>**

```
pub 2048R/3E51FB42 2005-10-21
Key fingerprint = 5F47 3861 7ABA 8773 9E32 0474 5C33 841C 3E51 FB42
uid             Sepherosa Ziehau (freebsd) <sephe@freebsd.org>
uid             Sepherosa Ziehau (sephe) <sepherosa@gmail.com>
sub 2048R/7AA31321 2005-10-21
```

# Ëåîéêü ôïõ FreeBSD

Áôöü ôï ëåîéêü ðâñéÝ ÷ åé üññöò êáé áêñùíýíéá ðïõ ÷ ñçóéiiðïéiyíöáé áðü ôçí ëïéíüöçöá éé áðü ôá êåßiåíá ôçò ôåéïçñßùóçò ôïõ FreeBSD.

## A

### ACL

Äåßôå: Access Control List

### ACPI

Äåßôå: Advanced Configuration and Power Interface

### AMD

Äåßôå: Automatic Mount Daemon

### AML

Äåßôå: ACPI Machine Language

### API

Äåßôå: Application Programming Interface

### APIC

Äåßôå: Advanced Programmable Interrupt Controller

### APM

Äåßôå: Advanced Power Management

### APOP

Äåßôå: Authenticated Post Office Protocol

### ASL

Äåßôå: ACPI Source Language

### ATA

Äåßôå: Advanced Technology Attachment

### ATM

Äåßôå: Asynchronous Transfer Mode

### ACPI Machine Language

Øåðäiêþäéêáð, ðïõ áêôåëåßôáé áðü Ýíá virtual machine óå êÙèå ëåéôïðñäéêü óýóôçìá óðìâáðü ìå ôï ðñüôððí ACPI, ðâñÝ ÷ iïðâð Ýíá ôñüðü åðééïéùíßáð ôïõ õëééïý ìå ôï ôåéïçñéùìÝí interface ôï iðiñi ÷ ñçóéiiðïéåß ôï ßæéí ôï ëåéôïðñäéêü óýóôçìá.

# ACPI Source Language

Ҫ әєþóóá ðñïäñâìáôéóìíý ìå ôçí iðiþá ãñÜöåôáé ç AML.

## Access Control List

Íéá ëßóôá áðü Üääåéò êáé äééåéþìåôá ðññioðÝëáóçò, ç iðiißá Ý÷åé óóïäåèåß ià Ýíá áíôééåßìåñi, üðùò ð.÷. Ýíá áñ÷åßi P íéá äééôôáðP óóôéåðP.

## Advanced Configuration and Power Interface

Íá ðññüôððí ðí iðiþíþ êáèiñþbaðæé ðíið ðññüði áðééiñþuñþáð ðíð ðééëiý laði áði êáéðiññäéú ýóðóçíá. Í óéiðuð ýðáññíçò ðíð ACPI áðíáé íá iðiñðb ðíið ËÓ íá áðééiñþuñþáðe íá ðí ðééëu áðið ððíëiñáéðòþ êáé íá áðiñðaðæéðòðaðb uðiði ðí ãðiñðaðuúí êáéyðaðná áððu ðí ðééëu, áðiñðiç eé áí ãði ÞÝñðe óá ðÜíða áðá áððu. Óið ACPI áðiñðaðæðb laðoði Þyééç ðúñí APM, PNPBIOS êáé áiðþðóðié ÷uñ ðá ðí ñiðiñðaðp, ðóði iðiþbáð êáé áiðóðéêáéðòðU. Óið ACPI ðáñY ÷áé ðíç áðiñðaðuðóçðá íá ðí ÞYñðiñðað ðíçí êáðaði Úðeñðc éó ÷yði, ðíçí áiðaðiñðp ëáéðiññäþáð ðíð ðóðóðiñðaðið, ðíçí áiðaðiññäiðiñðcóç êáé áðaðiññäiðiñðcóç ðóðóðaðbí, eëð.

## **Application Programming Interface**

þá óýñiðri áðu áæðññáðbåð, ðñùñðúðiðiðéá þáé áññáæðbá ðið éaðiðñbæðið óiði ááðaðuñðeóí Ýí ðið ñiðiðið áððeéiðiñbáð aðaðaðiý aðyí þ ðaðñéóðuðaðuñi ðiðiçüðuñi eðaðéiðeý. Óð aðoð ðaðñééðaðuñbáð aðeçñiðiñbåð aðaði ðiðuð, ðiðuða, eðað aðaðb óða ðiðiðaða áðoð ðið eðaðéiðeý eða ðoðaðaðuñbáð aðaðiða, eðaði ðið aðaðið ðiðiñiðiý ía áðaðeëðuñiði, ía ñiðaðoðiý þ ía aðaðaðaðaðaðiý.

### **Advanced Power Management**

þá API ói iðiðbi ðáni Ý ÷ áe óoi ëæðiðnæéü óyóðciá óc aðiðiðuðçóá ía óoíðnæáðóðab ìa ói BIOS ãðeðooða ÷ Üriðiðáð êaéýððanç aéa ÷ abñneðc óc òðc éo ÷ yðið oíðið óðððPiaðið. Ói APM Ý ÷ áe áiðeðaðóðaðab áðü oí ðñuðoði ACPI, oí iðiðbi abñíáð ðei iðiðeðcñi Ý iiði ñáe ðei ðoÝ eðeði áðü oí APM.

## Advanced Programmable Interrupt Controller

## **Advanced Technology Attachment**

## Asynchronous Transfer Mode

## Authenticated Post Office Protocol

### Automatic Mount Daemon

Íéá õðçñåóßá óôôôÞìáôïò ç iðiñá ðëiðiéåß ôçí áôôùìáôç ðñiõÜñôçóç óôôôçìÜôùí áñ÷åßùí üôáí åßíåôáé ðñiõðÜèåéá ðñiõðÝéåóçð áíüð áñ÷åßiõ P êáôáëüäiõ ðiõ ðåñéÝ÷åôáé óå áôôÜ.

## B

### BAR

Äåßôå: Base Address Register

### BIND

Äåßôå: Berkeley Internet Name Domain

### BIOS

Äåßôå: Basic Input/Output System

### BSD

Äåßôå: Berkeley Software Distribution

### Base Address Register

Íé éâôá÷ùñçôÝò ðiõ êâeññæiõí ôçí áñ÷éêP äéåýèoíóç iñÞìçò óôçí iðiñá áðáíðÜ íéá óôôêåôP PCI.

### Basic Input/Output System

Í áéñéâPò iñéóìüò ôiõ BIOS áîáñôÜôáé ëßäí êáé áðü ôá óôìöñæüìåíá. ÈÜðiðié áíáöÝñiðôáé óå áôôü ùò ôi ROM chip ðiõ ðëiðiéåß áâóééÝò êâéöiññåßåò áðééiéíùíßåò iåôáíý ðëééiy êáé ëíæéóìéëy. ¶ëëié áíáöÝñiðôáé óå áôôü ùò Ýíá áâóééü óâô áðü ñiðôßíåð áéá ôçí áâéßíçóç ôiõ óôôôÞìáôïò. ¶ëëåò ñiñÝò iñ üñiõ BIOS áíáöÝñåôáé óôçí iëüíç êáé ôi iåíý iå ôi iðiñí ñiðèñæåðáéç áéâæééåóßá áâéßíçóçð ôiõ óôôôÞìáôiò. Í üñiõ BIOS áíáöÝñåôáé óôiÞèùò áéá óôôôÞìáôá PC, áëëÜ ç êâéöiññæéüôçðå ðiõ ðëiðiéåß ððÜñ÷åé iå ðáñüìiéí ñiñüðí êáé óå ó÷åäüí üëá ôá Üëëá óôôôÞìáôá.

### Berkeley Internet Name Domain

Íéá ðëiðiñçóç ôiõ ðñuôiêüëëiõ DNS.

## Berkeley Software Distribution

Áõõü áßíáé õi üññá ðiõ Ýäùóå ôi Computer Systems Research Group (CSRG) óõi ÐáíåðéóôPiëi ôçò Êáééöüñíéá ôiõ Berkeley (<http://www.berkeley.edu>) óõéò áâéõéþóåéò éáé iåôáâiëÝò ðiõ Ýéáíå óõi UNIX 32V ôçò A&T. Ôi FreeBSD áßíáé Ýíåò áðüäññò ôçò äiõëåæÜò ôiõ CSRG.

## Bikeshed Building

Íá öáééñüññí ááôÜ ôç aéÜñêåéá ðiõ iðiñiõ ðiæýò êüññò ëÝåé ôç áñþìç ôiõ áéá Ýíá áæéÜññí Þ áóÞláíôi eÝíá, áíþ ôçí ßæáá óõéäìÞ Ýíá ðiæýðëiëi (áñ ÷éü) eÝíá iÝíå áéôüò áíäéäöÝñññò. Áåßôå áéé ôç eßóôá FAQ ôiõ FreeBSD (../faq/misc.html#BIKESHED-PAINTING) áéá ôçí ááôáâññäÞ ôiõ üññò.

## C

### CD

Äåßôå: Carrier Detect

### CHAP

Äåßôå: Challenge Handshake Authentication Protocol

### CLIP

Äåßôå: Classical IP over ATM

### COFF

Äåßôå: Common Object File Format

### CPU

Äåßôå: Central Processing Unit

### CTS

Äåßôå: Clear To Send

### CVS

Äåßôå: Concurrent Versions System

### Carrier Detect

Íá óPiá RS232C ðiõ õðiññåééíýåé üôé áíé ÷íåýèçêå öÝññí óPiá (carrier).

## Central Processing Unit

Ç ññÜää ðiõ áßíáé áññóôÞ êáé ùò “áðåíññääóôÞò”. ÁõõÞ áßíáé i áâéÝöáëiò áññò õðiññåéóôÞ, óõií iðiñi ãßñññðáé üëëé ié õðiññåéóîß. ÕðÜñ ÷iõi ðiæéÝò áñ ÷éôåéôiíééÝò ó÷áäßáóçò áðåíññääóôÞí, iå áéÜññá óýññéá áíôïëþí. Íé ðeñi áññóôÝò áßíáé ié áñ ÷éôåéôiíééÝò Intel-x86 êáé ié ðáñÜññäÝò ôçò, ç Sun SPARC, ç PowerPC êáé ç Alpha.

## Challenge Handshake Authentication Protocol

Íéá iÝeïäö ðéóôïðíßçóçò áõèåíôéêüôçôáò áíüò ÷ nPóôç, ç iðíßá ááóßæåôáé óå iéá iõóôéêP ðëçñïöiñßá ôçí iðíßá áíùñßæåé ôüöi i ðåëÜôçò üöi éáé i áîõðçñåôçôPò.

## Classical IP over ATM

### Clear To Send

já óPia RS232C ðiõ äßíâé Üääéá óõi áðñáêñõiÝí óýóôçìá íá óôåßëåé äåäñÝíá.

Äåßôå Áðßóçò: Request To Send.

## Common Object File Format

### Concurrent Versions System

já óýóôçìá äéá ÷ åßñéóçò åâäüöåùí áñ ÷ åßùí (version control system). ÐáñÝ ÷ áé ôç äõíáôüôçôá íá áðåíâñåæüíáóôå êáé íá êñáôÜìå éóôïñéêü áéëåäþí áéá ðiëëÝò åêäüöåéò áíüò óõiùëiõ áñ ÷ åßùí. Ôi CVS ðáñÝ ÷ áé ôç äõíáôüôçôá íá åíÜäiõå, íá óõã ÷ ùíåýöiõå (merge) êáé íá ááéñÝöiõå (revert) iðíéåäPðiõå áéëååP ðiõå áéëåäÝò ïíÜää áéëåäþí. Åðßóçò iáò äßíâé ôç äõíáôüôçôá íá êñáôÜìå éóôïñéêü êÜèå áéëåäPò, iå ðëçñïöiñßåò üðùò ðiéåò áéëåäÝò ÷ iõí äßíâé, áðü ðiëüí, ðüôå éáé äéåôß.

## D

### DAC

Äåßôå: Discretionary Access Control

### DDB

Äåßôå: Debugger

### DES

Äåßôå: Data Encryption Standard

### DHCP

Äåßôå: Dynamic Host Configuration Protocol

### DNS

Äåßôå: Domain Name System

## DSDT

Äåßôå: Differentiated System Description Table

## DSR

Äåßôå: Data Set Ready

## DTR

Äåßôå: Data Terminal Ready

## DVMRP

Äåßôå: Distance-Vector Multicast Routing Protocol

## Discretionary Access Control

## Data Encryption Standard

Íéá iÝeïäìò êñôðôïäñÜöçóçò ðëçñïöïñßáò, ç iðïßá ðáëëüôåñá áðïôåëïýóå ôç âáóéêP iÝeïäì êñôðôïäñÜöçóçò ôùí èùäéêphí (passwords) óði UNIX. ×ñçóëiïðiéiyíðáí áðßóçò êáé áðü ôç óðiÜñôçóç crypt(3).

## Data Set Ready

Íá óÞia RS232C ði iðïßi óðÝéíåôáé áðü ôi modem óði ððïëiæéôP P ði ôåññåðéêü, ùò Ýíââéïç ôçò áðïéiüôçôáò áéá ëÞøç P áðïóðiëP äåäññÝñú.

Äåßôå Áðßóçò: Data Terminal Ready.

## Data Terminal Ready

Íá óÞia RS232C ði iðïßi óðÝéíåôáé áðü ôi ððïëiæéôP P ði ôåññåðéêü óði modem, ùò Ýíââéïç ôçò áðïéiüôçôáò áéá ëÞøç P áðïóðiëP äåäññÝñú.

## Debugger

Íá äéââñáóðéêü (interactive) ððïóýóðçíà ôiõ ððñÞíá, ði iðïßi ðáññÝ ÷ áé áññåëåßá ãéá áíÝôáóç ôçò êáðÜóðåóçò ôiõ óðóðóÞíáò. Óð ÷ iÜ ÷ ñçóëiïðiéåßóáé áöiy ôi óýóðçíà Ý ÷ áé óðââðóðóðåé íá ëåéòiññåß êáññéêÜ, ãéá íá êâðåëÜâiðiå üði ðâññéðóðüôåñá ðñÜâiðáð iðiññýíå ó ÷ áðéêÜ íå ðéð áéðßåð ôiõ ðññâëÞíáò.

## Differentiated System Description Table

Íáò ðßíáêáò ôiõ ACPI ðiõ ðáññÝ ÷ áé âáóéêÝò ðëçñïöïñßáò ññèìßóåùí ó ÷ áðéêÜ íå ôi âáóéêü óýóðçíà.

## Distance-Vector Multicast Routing Protocol

## Domain Name System

Ôi óyóôciá ðiõ ìåôáôñ Ýðåé ôi åõáíÜäíùóõi, óõìâíeeéü üîñá êÜèå iç ÷ áíPiáôïò (hostname), üðùò ð.÷. ôi mail.example.net, óõçí áñéèìçôéêP äéâýèõíóç Internet ðiõ òiõ áíðéóõié ÷ åß êáé ôi áíÜðiäi.

## Dynamic Host Configuration Protocol

Íá óyóôciá äõíáìéêPò áíÜèåóçò äéâõèýíóåùí IP. ÊÜèå õðiëíæéóPò (host) ìðiñåß íá æçôÞoåé iéá äéâýèõíóç IP áðü Ýíáí åîððçñåôçôP DHCP. Ç áíÜèåóç ôçò äéâýèõíóçò ëÝâåðáé êáé “lease”.

# E

## ECOFF

Äåßôå: Extended COFF

## ELF

Äåßôå: Executable and Linking Format

## ESP

Äåßôå: Encapsulated Security Payload

## Encapsulated Security Payload

## Executable and Linking Format

## Extended COFF

# F

## FADT

Äåßôå: Fixed ACPI Description Table

## FAT

Äåßôå: File Allocation Table

## FAT16

Äåßôå: File Allocation Table (16-bit)

## FTP

Äåßôå: File Transfer Protocol

## File Allocation Table

### File Allocation Table (16-bit)

## File Transfer Protocol

јá iÝeïò ôçò iéëíäÝiâéáò ðñùôíêüëëùí ðøçëïý åðéðÝäïò, óá iðíßá Ý÷iöí ðëiðíëçèåß iå âÜóç ñi TCP åéá ôç iåôåöñÜ áñ ÷åßùí óå Ýiá äßêööñ TCP/IP.

## Fixed ACPI Description Table

# G

## GUI

Äåßôå: Graphical User Interface

## Giant

Ôi üññá åñüò iç ÷ áíéöiiý áíiæåßiò áðiêëåéöiý (Ýiá sleep mutex) ðiö ðñiööåååýåé Ýiá iååÜei iÝñiò ôúí ðçäþí ñiö ðöñþíá. Đáñüei ðiö Ýiáò ôÝöiëiò áðëüò iç ÷ áíéöiüò Þoáí áñêåöüò óå ðáëéüöåññåò åði÷Ýò (ðiö Ýiá iç ÷ Üíçìá iðiññå ìá Ýôñå ÷ å òi ðiëý iåñééÝò ååêÜäåò åéåññåóßåò, åß ÷ å iéá êÜñðå åééööiö éåé öööééÜ iüñí Ýiá åðåññåñåóðP) óPiåñá ðeÝií áðiöåëåß ðçäþ áðáñÜäåêöçò êáèöööÝñççò. Ç iñÜäá áíÜðööñçò ñiö FreeBSD åññÜæåöåé öéëçñÜ æåá iá áíðééååöåðPóåé ñi Giant iå ðei iiöíÝññiòò, èåðöiýò iç ÷ áíéöiýò áíiæåßiò áðiêëåéöiý, ié iðiñüé eå áðéöñÝðiò iååáyöåññ åáèiü ðáñáëëçëéöiý ôüöi óå iç ÷ áíPiåóá iå Ýiá üöi éåé óå óðåæiýò åññåóßåò iå ðiëëiýò åðåññååööÝò.

## Graphical User Interface

јá åéåæññåóðéü öýóðçìá åðééëíùíßåò iåôåíý áíèñþðiò éåé iç ÷ áíÞò, åáóéöiÝií óå åééüíåò (graphics).

# H

## HTML

Äåßôå: HyperText Markup Language

## HUP

Äåßôå: HangUp

## HangUp

## HyperText Markup Language

Ç äéþóóá ðåñéãñáöþò êåéíÝíõ (markup language) ðiõ ÷ ñçóéiiðiéåßôáé ãéá ôç äçìéiõñãßá éóóïóåëßäùí (web pages).

# I

## I/O

Äåßôå: Input/Output

## IASL

Äåßôå: Intel's ASL compiler

## IMAP

Äåßôå: Internet Message Access Protocol

## IP

Äåßôå: Internet Protocol

## IPFW

Äåßôå: IP Firewall

## IPP

Äåßôå: Internet Printing Protocol

## IPv4

Äåßôå: IP Version 4

## IPv6

Äåßôå: IP Version 6

## ISP

Äåßôå: Internet Service Provider

## IP Firewall

### IP Version 4

Ç Ýêäïöç 4 õiõ ðñùõiêüëëiõ IP, ç iõiõá ÷ ñçóéiiõiéåß 32 bits ãéá ôçí äéåõèõíóéïüôçóç. Ç Ýêäïöç áõõP áâáêëiõõðåß íá åßíáé ç ðëÝíí ÷ ñçóéiiõiéïýâíç, áëëÜ áíõééâèBóôáðåé Ü íå ôçí Ýêäïöç IPv6.  
Äåßôå Åðþóçò: IP Version 6.

### IP Version 6

Ç iÝá Ýêäïöç õiõ ðñùõiêüëëiõ IP. Ç äçìéiõñãßá õiõ êñßèçéå áíáãéáßá êáéþò ç ðåñéi÷P äéåõèýíóåùí õiõ IPv4 ëiõôåýåé íá åâáîõõèçéåß. Ç Ýêäïöç áõõP ÷ ñçóéiiõiéåß 128 bits ãéá ôç äéåõèõíóéïüôçóç.

## Input/Output

### Intel's ASL compiler

Í íåôáãëùôôéõõPò ôçò Intel ãéá ôç íåôáõñiõP õiõ ASL óå AML.

### Internet Message Access Protocol

Íá ðñùõüéëëi ãéá ðñüöâáóç ôùí ìçíõlÜôùí ôá ÷ õäññiâßiõ ðiõ áñßóéiiõáé óå Ýíá áîõðçñåôçôP ôá ÷ õäññiâßiõ. ÔõðééÜ, ôá ìçíýâíâðá íÝíõi áðièçéâði Ýíá óõíí áîõðçñåôçôP áíðß íá íåôáõñiõphñíðåé óõíí ðñüãñâíâá èPøçò email õiõ ðåëÜðç.

Äåßôå Åðþóçò: Post Office Protocol Version 3.

### Internet Printing Protocol

### Internet Protocol

Ôi ðñùõüéëëi íåôÜäïöçò ðáéÝôùí, ôi iõiõá áðiõåååß ôi âáóéëü ðñùõüéëëi õiõ Internet. Áíáðôý ÷ èçéå áñ ÷ ééÜ óõi õiPìá Áìýíçò ôùí ÇÐÁ éáé áðiõåååß Ýíá éæéáßôåñá óçìáíõéëü ëñiÜôé ôiõ ðñùõüéëëiõ TCP/IP. ×ùñßò ôi ðñùõüéëëi áõõü, ôi Internet ãáí èá åß ÷ å åâéé ÷ èåß óå áõõü ðiõ åßíáé óPìåñá. Äéá ðåñéóóüöåñåò ðëçñiõñßåò, ååßôå ôi RFC 791 (<ftp://ftp.rfc-editor.org/in-notes/rfc791.txt>).

### Internet Service Provider

Íéá åôáéñßá ðiõ ðáñÝ ÷ åé ôðçñåóßåò ðñüöâáóçò óõi Internet.

K

KAME

Í Éaðuúéêüö üñiö ãéá ôc “÷-åëþíá”. Í üñiö KAME ÷-ñçóéiðiéåßôáé óoiñöö êýéëiöö ôc ðeçñiöm  þò ãéá áíáöiñÜ óoiñ KAME Project (<http://www.kame.net/>), ôi ïðiþí åñâÜ Åæðôáé ðñiö iéá õeïðiþçóç öiñ IPv6.

KDC

Äåßôå: Key Distribution Center

KLD

Äåßôå: Kernel 1d(1)

KSE

Äåßôå: Kernel Scheduler Entities

KVA

Äåßôå: Kernel Virtual Address

**Kbps**

Äåßôå: Kilo Bits Per Second

## Kernel Id(1)

Íéá ìÝeíaiò äöíáiéêþò öüñôúöçò éåéöiõñäéêüöçôáò óöiíí ðõñþá ôiõ FreeBSD ÷ùñþò íá ÷ñåéÜæåôáé åðáíåéêþíçóç ôiõ óoôôþìáöiò.

## Kernel Scheduler Entities

Íjáò iç ÷ áíéóíùò ôiõ ðõñþíá ãéá õðiööþñéïç ðïëöíçìáöéêþò åðåññåáöþáò. Äåßôå ôç óåëßää ôçò ïÜäáò åññåáöþáò ôuì KSE (<http://www.FreeBSD.org/kse>) ãéá ðãñéööüöññåò èåðöiiÝñåéåò.

## Kernel Virtual Address

## Key Distribution Center

## Kilo Bits Per Second

× ñçóéïïðíéåßôáé áæá ôç iÝôñçóç ôïïò åýñïïò æþíçò (ôçí ðïöüöçôá ôùí äåäñíÝùí ðïï ðåññíÜåé áðú êÜðiéí ôðåæåêñéíÝíí óçiåßí óå Yíá êåèñéöíYíí ÷ñiiéüü æéÜóôçìá). ÁíáëéæöééÜ ðñièYíáóá æá oí Kilo ðåññéäåíÜíññí ôá Mega, Giga, Tera, é.i.e.

L

LAN

Äåßôå: Local Area Network

LOR

Äåßôå: Lock Order Reversal

LPD

Äåßôå: Line Printer Daemon

## Line Printer Daemon

## Local Area Network

Äßêööï ðiö ÷ ñcöéï ðiéåßôáé óå iéá òiðééë ðåñéï ÷ ï, ð. ÷. ãñáöåßi, óðßöé ê.í.é.

## Lock Order Reversal

Óá ðñáâíáðéêÜ LOR, óðíþeùð, äcíñéþñíðóáé ãñþäiñá, iðüðå íá áæÝã ÷ áðåá ôç  
http://lists.FreeBSD.org/mailman/listinfo/freebsd-current êáé ôç óåðëßää ðúí LOR ðið åþíáé ãíúóðÜ iÝ÷ñé  
óþiâñá (http://sources.zabbix.net/freebsd/lor.html) ðñéí óðåðëðåðò ïþíðiá óå êÜðiéá áðü ôðeo ëþðóðåð  
çæðéññíééiy óá ÷ ðæññíåþið.

M

MAC

Äåßôå: Mandatory Access Control

MADT

Æðþôå: Multiple APIC Description Table

MFC

Äåßôå: Merge From Current

## MFP4

Äåßôå: Merge From Perforce

## MFS

Äåßôå: Merge From Stable

## MIT

Äåßôå: Massachusetts Institute of Technology

## MLS

Äåßôå: Multi-Level Security

## MOTD

Äåßôå: Message Of The Day

## MTA

Äåßôå: Mail Transfer Agent

## MUA

Äåßôå: Mail User Agent

## Mail Transfer Agent

Íéá åöáññäþ ðiõ ÷ñçóeiõíéåßôåé ãéá ôçí iåôáöiñÜ email. ÈáôÜ ðáñÜäïóç, ôi MTA áðiøåëiyóå ôiþia ôiõ ááóééiy óðóðþiáôi ðiõ BSD. Óþiâñá, ôi sendmail ðâñééäiâÜíâôåé óðiâáóéêü óýóðçíá áééÜ ððÜñ÷iõí êáé ðíeeÜ Üeeá MTAs, üðùò ôá postfix, qmail êáé Exim.

## Mail User Agent

Íéá åöáññäþ âéá ôç äéá÷åßñéóç, áíÜäñùóç içíðiÜðùí çëåêôñííééþò áëëçëiäñáößáð êáé ôçí áðiøåëiyóå áðáíóþóåñí óå áñôÜ.

## Mandatory Access Control

## Massachusetts Institute of Technology

## Merge From Current

Ç óðâ÷þíâñóç þ iåôáöiñÜ åíüò ÷áñáêôçñéóôééiy þ íéáò äéüñèùóçò áðü ôií èéÜäí áíÜðôõîçò -CURRENT óå Ýíá Üeeí èéÜäí (óðíþèùò Ýíá áðü ôiõò èéÜäíò -STABLE).

## Merge From Perforce

Ç óðã ÷ þíâõóç P ìåðáöiñÜ áitü ÷ áñáêôçñéóðééiy P ieáò äeüñèùóçò áðü òi áðíèåôPñéi Perforce óðií êëÜäií áíÜðôðíçò -CURRENT.

Äåßôå Äðßóçò: Perforce.

## Merge From Stable

Ç öððééüäéêP äéáæéáóßá áíÜðôðíçò óðiõ FreeBSD ááóßæåðáé óði ùðé êÜeå äeëåäP áßíåðáé ðñþôá óði -CURRENT branch áéá íá äiêéíáóðåß ðñéí áíðùñåðùèåß óði -STABLE. Iññi óå ðíëý áéæééÝò ðåñéðôþôåð áßíåðáé êÜðiéá áeëåäP ðñþôá óði -STABLE êáé iåðÜ óði -CURRENT.

Í ßæéiò üññi ÷ ñçóéiiðíéåßôáé üðáí ieá áeëåäP låðáöÝñåðáé áðü òi -STABLE branch óå êÜðiéí áðü óá security branches.

Äåßôå Äðßóçò: Merge From Current.

## Message Of The Day

Íá iÞíòiá ói iðiñi áìðáíßæåðáé óðiPøùò êáðÜ óç äéáæéáóßá åéóúäið êáé ÷ ñçóéiiðíéåßôáé óði ÷ iÜ áéá óç äéáññP ðëçññiññéþí óðiò ÷ ñPøôåò óiõ óðóôPìáñiò.

## Multi-Level Security

### Multiple APIC Description Table

## N

### NAT

Äåßôå: Network Address Translation

### NDISulator

Äåßôå: Project Evil

### NFS

Äåßôå: Network File System

### NTFS

Äåßôå: New Technology File System

### NTP

Äåßôå: Network Time Protocol

## Network Address Translation

Íéá ôá ÷ íééP êáðÜ ôçí iðiñá óá ðáðéÝóá IP iàðôááÜ ñëëiñóáé êáðÜ ôçí Ýñiñä ôiñðò áðü íéá ðýëç àéêôýíö (gateway), áðééñÝðiñóá Ýóóé óá ðiñëeÜ lç ÷ áíPiáðá ðiñò áññbóëñóáé ðbóù áðü ôçí ðýëç íá iiéñÜæiñóáé íéá êíéíP áññôåññéP äéâýëõíç IP.

# Network File System

## New Technology File System

јá óyóôçìá áñ ÷ åßùí ðiö áiaðöý ÷ èçéå áðü ôç Microsoft êáé æáíÝlåôáé iå ôá eåéöiñäéêÜ ôýðiö “New Technology”, ð.÷. ôá Windows 2000, Windows NT êáé Windows XP.

## Network Time Protocol

íáò ôñüðiò óðã ÷ ñiiéóiiý ðiò ñieiaéiy ðñáâiáôéëiy ÷ ñüñiò ìÝóù äéêôýiò.

0

OBE

Äåßôå: Overtaken By Events

ODMR

Äåßôå: On-Demand Mail Relay

os

Äåßôå: Operating System

## On-Demand Mail Relay

## Operating System

јá óýñíei ðñiäññáii Úöñú, áéæéèëçéþí áéé åññáéåßñü óá iðiñßá ðáñÝ - iðiñ ðññüôåáóç óðiñðò ðññüñðò ðéëéëý ðið õðiñëiæéðóþ. Óá óçìåñéñÜ eäéöiññáééÜ óðiñðíàóá êðiñåßññóáé áðü áðëiñüéÝ ð õðiñðíéÞoåéò iå äðiñåññóåá åéóÝëåóçò åññü ïüññ ðñiäññáiiðò eÜëå öiñÜ eäé iå äðiñåññóåé ðññüôåáóçò óå iéá ïüññ óðiñðóþ, ùò eäé óðiñðíàóá ðið õðiñðóçñßæiði ðiçëéåðéÜ ðñiäññáiiðåá eäé ÷ ñÞóðåð iå äðiñåññóåé ðið õðiññÝ ðóçñðò ÷ éëéÜäñù ÷ ñçóðóþí eÜëå óðiñðóþ. EÜëå ÷ ñÞóðåð iðiññåß iå åññóåëåß åññéÜäåð åéáóñññóðééÝ ð åðáñññáÝ.

## Overtaken By Events

× ñçóëiiðíéåßôáé ãéá íá ðåñéãñÜøåé ïéá ðñïøåéíüìåíç áëëåãP (üðùò ïéá ÁíáöññÜ ÐñïâéÞìåôïò P ïéá áßôççç áéá Ûðíëi íÝí ÷ áñáêôçñéóôéü) ðiõ äåí éó ÷ ýåé ðéÝí P äåí Ý ÷ åé áîßá ëüäù êÛðíéåò ðñüóöåôçò áëëåãPò óôí FreeBSD, áëëåãÝò óå êÛðíëi ðñüôôði, åðåéäP òi ó ÷ åôééü ðöééü èåññåßôáé ðéÝí îåðåñáóíÝñ, êëð.

# P

## p4

Äåßôå: Perforce

## PAE

Äåßôå: Physical Address Extensions

## PAM

Äåßôå: Pluggable Authentication Modules

## PAP

Äåßôå: Password Authentication Protocol

## PC

Äåßôå: Personal Computer

## PCNSFD

Äåßôå: Personal Computer Network File System Daemon

## PDF

Äåßôå: Portable Document Format

## PID

Äåßôå: Process ID

## POLA

Äåßôå: Principle Of Least Astonishment

## POP

Äåßôå: Post Office Protocol

## POP3

Äåßôå: Post Office Protocol Version 3

## PPD

Äåßôå: PostScript Printer Description

PPP

Äåßôå: Point-to-Point Protocol

PPPoA

Äåßôå: PPP over ATM

## PPPoE

Äåßôå: PPP over Ethernet

PPP over ATM

## PPP over Ethernet

PR

Äåßôå: Problem Report

PXE

Äåßôå: Preboot eXecution Environment

## Password Authentication Protocol

**Perforce**

Íá óýóðçíà áæÝä ÷ iö áâéüöåðú òi iðibí ãñÜöåðáé áðú ôçí Perforce Software (<http://www.perforce.com/>) êáé òi iðibí áßíáé ðeí ðñï ÷ ùñçìÝí áðú òi CVS. Áí êáé äáí áßíáé áiiéööiy êþäééá, ç ÷ñþöç öiõ áßíáé áæäýèåñç óå Ýññá áiiéööiy êþäééá üðùò òi FreeBSD.

ÊÜðiéá iÝéç ôçò iñÜäáo áíÜðôõíçò ôïõ FreeBSD ÷ñçóéïõíéiyí Ýíá áðïèåðþñéï Perforce ùò ðåéñááôééþ ðåñéï ÷þ áéá êþæéá ðïõ èåùñâþôáé ëäéåþôåñá ðåéñááôééüò áêutíä êáé áéá ôíï êéÜäí -CURRENT.

## Personal Computer

Personal Computer Network File System Daemon

## Physical Address Extensions

Íéá iÝeíäò ãéá áíññáïðíßçóç ðñüöåáóçò iÝ ÷ñé êáé óå 64 GB RAM óå óooôðíáôå óá iðibá äéáèÝôiñí iùñ 32 bit ðåñéï ÷ P äéáèýíóåú (äéáöñåðéêÜ èá ðåñéïñßæíñóá óå 4 GB ÷ùñßò PAE).

## Pluggable Authentication Modules

### Point-to-Point Protocol

#### Pointy Hat

þá iõèéêü ó÷åäüí êáðÝëi, ðiõ iiéÜæåé ðiøý ia Ýia duncë cap, oï iðiñi ÷áñßæåôáé óôá iÝëç oçò iñÜäáð áíÜððöiçò ôiõ FreeBSD üðáá açleïoñäýí ðñiâæÞiaðá ia óç iåðåâæþôðéóç ôiõ FreeBSD, üðáá ëÜñiõí aëëååÝò ðiõ åái ÷ñæÜæiióáé, P ååíééÜ óå iðiæåäÞðiðå ðåñßððùóç ðñiâæýí ðñiâæÞiaðá óoíí êþæééá. ÅåíééÜ, ueá óá iÝëç oçò iñÜäáð áíÜððöiçò ðiõ ëÜñiõí ðñáñiâðééÜ aïðeâéÜ iáæâýiði ó÷åôééÜ óýíðñâ iéá iåñÜëç óðeeiñP áðü áðôÜ óá êáðâæÜééá. Ç ÷ñPóç oïi ùñiõ ãßíáé (ó÷åäüí ðÜñiõå) ÷éiñiñéóðééP.

### Portable Document Format

#### Post Office Protocol

Äåßôå Áðþóçò: Post Office Protocol Version 3.

#### Post Office Protocol Version 3

þá ðñùðüééëi ãéá ðñüðâáóç óùí lçíðiÜôùí óå Ýia åîððçñâðçôP óá ÷óäññâñiõ. Óoí ðñùðüééëi áðôü, óá lçíýlåðá iåðåöiñðþñiðåé áðü ðiñ åîððçñâðçôP óðií ðåæÜðç, áîðß íá ðáñâiÝñði óðií åîððçñâðçôP.

Äåßôå Áðþóçò: Internet Message Access Protocol.

#### PostScript Printer Description

### Preboot eXecution Environment

#### Principle Of Least Astonishment

Èåèþò áíáððýðâðåé oï FreeBSD ie áæéååÝò ðiõ åßíáé iñáðÝð óðií ðåæéêü ÷ñPóðç ðñÝðåé íá ðñiâæýí uði ði ãðíâðúí iééñüðâñâð èáé eeéüðâñâð åéðëÞâæð. Åéá ðáñÜäæâá, ç Üóeiðç iåðiññâðâ iåðåâæçôþí ðiõ åðçñâÜæiði ðçí Ýiañiç ðiõ óðñðâðiâði ðiõ áñ÷åßí /etc/default/rc.conf èåññâðâé ðáñââðâóç ðiõ POLA. Óá iÝëç oçò iñÜäáð áíÜððöiçò Ý ÷iõi êáðÜ ñiõ oïi ðiõ POLA üðáá ëÜñiõí aëëååÝò óðií óýóðçìá ie iðiñbâð åðçñâÜæiði ðiõ ðåæéêü ÷ñPóðç.

## Problem Report

Íéá ðåñéãñáöþ êÜðiéïò áßäiïò ðñïâëþiáöìò ói iðiþi âñÝèçéå óóii ðçãáßri êþäééå P óôçí óââèçñßùóç óiõ FreeBSD. Áâßôå ói Üñèñi ãñÜöiöáò ÁiaöiñÝò ÐñïâëçìÜôùí ãéá ói FreeBSD ([http://www.FreeBSD.org/doc/el\\_GR.ISO8859-7/articles/problem-reports/index.html](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/problem-reports/index.html)).

## Process ID

Íáð áñéèìüò ðiõ áíáâññßæåé ìå ïííáæéü òññüði íéá áéâññáóßá óiõ óðóðþiáöìò éáé ìáð áðéôñÝðåé íá âñÜóïöìå óå áôôþ.

## Project Evil

Í ðñáâñáðééüò ðßðeïò óiõ NDISulator ðrõ Ýâñáøå i Bill Paul, i iðiþi ði iññiáðå Ýðóé áéá íá áâßîåé ðüóï áðáßóéï áßíáé (áðü öéëïöiðééþò Üðiøçò) íá ððÜñ ÷åé ç áfÜäéç áéá êÜðé ðÝðié. Ói NDISulator áßíáé Ýíá áéæéü Üñèñùá óðìâáðüðçôå ði iðiþi áðéôñÝðåé óå iäçäiyò óðóðâðþj áéêðýið óýðiõ Microsoft Windows™ NDIS miniport íá ÷ñçóëiðiéçèiyí óöi FreeBSD/i386. Áðóùò áßíáé óðiðpèùò i ìüñiò òññüðiò íá ÷ñçóëiðiéçèiyí êÜñôåò áééðýið òñí iðiþuí ié iäçäið áâí áßíáé áééðÝóéiié óå iññöþ áéâýèâñið P áñié ÷ðiý eññéééiý. Áâßôå éáé ói áñ ÷âßi src/sys/compat/ndis/subr\_ndis.c ãéá ðåñéóóüòðâñåò eâðoññÝñâéåò.

## R

### RA

Äâßôå: Router Advertisement

### RAID

Äâßôå: Redundant Array of Inexpensive Disks

### RAM

Äâßôå: Random Access Memory

### RD

Äâßôå: Received Data

### RFC

Äâßôå: Request For Comments

### RISC

Äâßôå: Reduced Instruction Set Computer

### RPC

Äâßôå: Remote Procedure Call

## RS232C

Äåßôå: Recommended Standard 232C

## RTS

Äåßôå: Request To Send

## Random Access Memory

## Revision Control System

To *Revision Control System* (RCS) áßíáé Ýíá áðü óá ðáëéüöåñá óooôÞìáóá ðiõ ñëiðieíýí “Ýëåä÷i åêäüöåñí” áéá áðëÜ áñ ÷ åßá. ÁðéõñÝðåé óçí áðièÞêåôóç, áíÜêôçóç, áñ ÷ åëièÝôçóç, éåôåññáöþ, áíáññéóç êáé óooä÷þíåñóç ðiæéáðþí åêäüöåñí áéá èÜèå áñ ÷ åßí. Ôi RCS áðiðåçåßôáé áðü ðiæéÜ iééñÜ áññáæåßá ðiõ óooôññáÜæiñðåé iåðåñý ðiõð. Áåñ áéáèÝðåé iñéóí Ýíá áðü óá ÷ åññéôçñéóðééÜ ðiõ ðáñÝ ÷ iñðåé áðü ðeí iñðóÝññá óooôÞìáóá åéÝä÷iõ åêäüöåñí, áéëÜ áßíáé ðiæý åýéí òðçí åâéåðÜóðåóç êáé ñyéíéóç êáé ðiæý áðëü óðç ÷ nÞóç åéá iééñü áññééñü åéåä÷üññí áñ ÷ åßùí. Ôi RCS áéáôßèåðåé ðñáéðééÜ áéá èÜèå èåéôiññééü ðiõ áâóßæåðåé óôéó áñ ÷ Ýð èåéôiññåßå ðiõ UNIX.

Äåßôå Åðþóçò: Concurrent Versions System, Subversion.

## Received Data

Íá êáëþäéí þ áêññäÝêôçò ðiõ RS232C óóï iðiñüí áßíåðåé èþþç ååäññÝññí.

Äåßôå Åðþóçò: Transmitted Data.

## Recommended Standard 232C

Íá ðñüööði áéá áðééíéíñíßá iåðåñý óåéñéåþí óooéåðþí.

## Reduced Instruction Set Computer

Íéá ðñiøÝäæóç óðç ó÷ååßáóç áðåññåáóðþí ðiõ áðëiðieåß ði ãßäiò óùí èåéôiññåéþí ðiõ iðiñåß íá åêôåéÝðåé ði ñééüþ þöðå íá áßíáé êáôÜ ði ãðiáðüí åáiééiy öéiðiy. Áðou iäçãåß óá ÷ åíçëüöåñç êáôáíÜëüóç áíÝññåéåð, ÷ñçóéiðieåß èéäüöåññðò çiéáññäýò êáé óá iñéóíÝíåò ðåñéðþóåéò áðéôðä÷Üíåé êáëýåñç áðüäiøç êáé áðiçÝíç ðóéíüöçðå êþäééå. Dáññáæåßäiáóá áðåññåáóðþí RISC ðåñéëáíÜññí ðiõ Alpha, SPARC, ARM êáé PowerPC.

## Redundant Array of Inexpensive Disks

## Remote Procedure Call

## repocopy

Äåßôå: Repository Copy

### Repository Copy

Áðåöèåßáò áíðéäñáöþ áñ÷åßùí iÝóá óå Yíá áðièåöþñéi CVS.

×ùñßò ôç äéäæéåöþá ôiõ repocopy, áí Yíá áñ÷åßí ÷ñâéÜæåöåé íá áíðéäñáöþ áí ñâðåöåñèåß óå Yíá Üëëi òçìåßí iÝóá óoi áðièåöþñéi, i committer èá ðñÝðåé íá åéðåé òçí åíðiëþ cvs add íá ñiðièåöþóåé ói áñ÷åßí óðçí iÝá ðiõ èÝóç êáé Ýðåéöå óçí åíðiëþ cvs rm óoi ðáééü áñ÷åßí ãéá íá ði ãéáäñÜøåé.

Ôi ñâðiíÝêöçíá áðöþò ôçò ìåèüäið åßíáé üöé äáí áíðéäñÜöåöåé ói éooïñéü (íé êáöá÷ùñþóåéò óoi áñ÷åßí êåðåäñáöþò ôiõ CVS) óðç iÝá èÝóç. Èåèþò ôi FreeBSD Project èåùñåß ðiëý ÷ñþóéïåò áðöÝð ðéð ðéçñiöñßåò, åßíåöåé óo÷iÜ ÷ñþóç ôçò äéäæéåöþáò repocopy. ÈåðÜ ôç äéäæéåöþá áðöþ, i äéá÷åéñéöþò ôiõ áðièåöçñßiõ áíðéäñÜöåé óá áñ÷åßá áðåðèåßáò óðçí iÝá èÝóç ðiõ áðièåöçñßiõ, áíðß íá ÷ñçóéiiðiéþóåé ði ðñüäñáii cvs(1).

## Request For Comments

Íá óýñéií ååññÜöùí ðiõ ðåñéäñÜöiõí óá ðñüööðá, óá ðñùöüéïééá êáé ôéó ëééðYð äéäññáöþåò ðiõ äéÝðiõí ôç èåéöiññåßá ôiõ Internet. Äåßôå ôi www.rfc-editor.org (<http://www.rfc-editor.org/>).

×ñçóéiiðiéåßöåé åðßöçò ùò ååíééüò üñriò üðáí êÜðiëiò ðññöåßíåé íéá åéëäþ êáé ðåñéiÝíåé ó÷üééá ó÷åöééÜ ìå áðöþ.

## Request To Send

Íá óþíá óoi RS232C ðiõ æçôÜåé áðü ôi áðññáêññóíÝñí óýóöçíá íá óðíå÷ßóåé ôç ìåðÜäiõç ôùí ååäññÝñú.

Äåßôå Äðþóçò: Clear To Send.

## Router Advertisement

# S

## SCI

Äåßôå: System Control Interrupt

## SCSI

Äåßôå: Small Computer System Interface

## SG

Äåßôå: Signal Ground

## SMB

Äåßôå: Server Message Block

## SMP

Äåßôå: Symmetric MultiProcessor

## SMTP

Äåßôå: Simple Mail Transfer Protocol

## SMTP AUTH

Äåßôå: SMTP Authentication

## SSH

Äåßôå: Secure Shell

## STR

Äåßôå: Suspend To RAM

## SVN

Äåßôå: Subversion

## SMTP Authentication

## Server Message Block

## Signal Ground

Íáò áêñïäÝêôçò P êáëþäéí ôiõ RS232 ðiõ áðiøåëåß ðçãP áíáöñÜò ãéá ôç ãåßùóç ôiõ ìåðåäéäüìåñò óÐiáòiò.

## Simple Mail Transfer Protocol

## Secure Shell

## Small Computer System Interface

## Subversion

Ôi Subversion åßíáé Ýíá óýóôçìá åëÝâ-íõ åêäüóåùí, ðáñüìíéí iå ôi CVS åëëÜ iå ðéí ðñi-ùñçíÝíåò äñíáðüôçôåò.

Äåßôå Åðþóçò: Concurrent Versions System.

## Suspend To RAM

## Symmetric MultiProcessor

## System Control Interrupt

# T

### TCP

Äåßôå: Transmission Control Protocol

### TCP/IP

Äåßôå: Transmission Control Protocol/Internet Protocol

### TD

Äåßôå: Transmitted Data

### TFTP

Äåßôå: Trivial FTP

### TGT

Äåßôå: Ticket-Granting Ticket

### TSC

Äåßôå: Time Stamp Counter

### Ticket-Granting Ticket

### Time Stamp Counter

Ðñüêåéåé ãéá Ýíá åíóùìáòùìÝíí ìåôñçôP áðüäïóçò óôïöö ïïöÝñíïöö áðåïåñääóôÝò Pentium, í iðiðiò áðáñéèìåß ôïöö ðåëiïýò ðiõ ááðééïý ñiïëiæïý óðóðPiáöiò.

### Transmission Control Protocol

þá ðñùôüéïëëí ðiõ áñßóêååé ðÜíù áðü õi (ãéá ðáñÜääéäíá) IP êáé åâáóöáëßæåé üöé õá ðáêÝôá èá ìåôáäïëïýí áíéüðéóðá êáé óðó òùóðP óåéñÜ.

## Transmission Control Protocol/Internet Protocol

Í üñiò ÷ áñáêôçñßæåé ôiõ óõfääáóíü ôiõ TCP ðñùôïéüëëiõ, êáèþò åêôåëåßôáé ðÜíù áðü ôiõ ðñùôüéëëiõ IP. Ôi Internet éáôÜ ëýñéí ëüäí ÷ ñçóéiiðiéåß ôiõ TCP/IP.

## Transmitted Data

Íjáò áenñäÝêôçò P êáëþäéí ôiõ RS232C iÝóù ôiõ iðiðiõ áßíåôáé laôÜäiõç äåäñÝíùí.

Äåßôå Åðßóçò: Received Data.

## Trivial FTP

# U

## UDP

Äåßôå: User Datagram Protocol

## UFS1

Äåßôå: Unix File System Version 1

## UFS2

Äåßôå: Unix File System Version 2

## UID

Äåßôå: User ID

## URL

Äåßôå: Uniform Resource Locator

## USB

Äåßôå: Universal Serial Bus

## Uniform Resource Locator

Íéá iÝëiäiò áéá ôçí áýñåóç áíüò ðüñiõ (üðùò ð.÷. áíüò áããñÜöiõ) óõi Internet, êáèþò êáé Yíá iÝóí áéá ôçí áíáãíþñéóç ôiõ la ñíáäééü ôñüði.

## Unix File System Version 1

Ôi ðñùôáñ ÷ ééü óýóôçìá áñ ÷ åßùí ôiõ UNIX, áíùóôü åðßóçò êáé ùò Berkeley Fast File System.

## Unix File System Version 2

Íéá áðÝêôáóç ôiõ UFS1, ç iðrißá ðñùôïâiöáíßóôçêå óóï FreeBSD 5-CURRENT. Ôi UFS2 ðñiøeÝôåé äåßêôåò ïðeië 64 bit ðâñíþíôå Ýôóé ôi ñÜäia ôiõ 1Ô. ÄéáeÝôåé áêüia ððiøôþñéïc áêôåôáiÝfùí áñ ÷åßùí éáé Üeeá ðñiçaiÝíá ÷åñáêôçñéóôééÜ.

## Universal Serial Bus

Íá ðñüôðði ðeeéiý ðiõ ÷ñçóéiðiéåßôåé áéá ôçí áéáóýíååóç iåäÜeïõ ðëþeïõ ðåñéðåñåéåéþí ððiøiæóôþí, ÷ñçóéiðiéþíôå iéá ôððiðiéçìÝíç áéåðåöþ.

## User ID

Íá ìííåæéüò áñéèìùò ðiõ áíáðßèåôåé óå êÜeå ÷ñþðôç åíüò ððiøiæóôþ ëáé ÷ñçóéiðiéåßôåé áéá ôçí áíáäíþñéóç ôúí ðüñùí éáé ôùí áééáéùìÜòùí ðiõ Ý ÷iõí åé ÷ùñçéåß óå áðòüí.

## User Datagram Protocol

Íá áðëü êáé iç áíéüðéóôi ðñùôüêiæi ðiõ ÷ñçóéiðiéåßôåé áéá ôçí áíðåééååþ äåäñÝfùí óå Ýíá äßêôði TCP/IP. Ôi UDP äái ðáñÝ ÷åé Ýëåå ÷i éáé áéüñèùóç eáèþí üðùò ôi TCP.

# V

## VPN

Äåßôå: Virtual Private Network

## Virtual Private Network

Íéá iÝeïäiò ðiõ ÷ñçóéiðiéåß Ýíá äçìüóéi äßêôði áðééiéùíßáò (üðùò ôi Internet), áéá íá ðáñÝ ÷åé áðiñáêñðiÝíç ðñüóååóç óå Ýíá ôiðééü äßêôði, üðùò ôi LAN iéáò áðé ÷åßñçóçò.

# Êiñùíßääá

Áðóü òi áéâëßí áßíáé òi áðiô Ýëåóíá ôçò iñáæéêÞò áññááóßáò áéáôíîôÜäúí áèåëííôþí ôçò “ÍiÜääò Ôåéìçñßùóçò òiô FreeBSD”. Áðóü òi éâßíáñi ãñÜöôçêå óå iññöÞ SGML, óýiðuñá iå òi DocBook DTD êáé Ý÷åé iññöiðiéçèåß áðü ôçí SGML óå ðiëëÝò áéáöñmåôééÝò iññöÝò ðáññöóßáóçò ÷ñçóéiiðiéþfóåò ôçí áöáññiãÞ **Jade**, iéá ìç ÷áíÞ DSSSL áñíé÷òïý êþäééá. ×ñçóéiiðiéþeçéáí óå DSSSL stylesheets òiô Norm Walsh iå Ýíá áðéðëÝíí áðßðåäí òññöiðiþçóçò áéá íá áþðöiðí òéð iäçäßåò ðáññöóßáóçò óôçí **Jade**. Ç Ýíôðç iññöÞ áðöiy òiô éâéíÝññ ãåí èá òðþñ ÷å ÷ùñßò ôçí áéþóóá óôïé÷åéíèåóßáò T<sub>E</sub>X òiô Donald Knuth, òi L<sub>A</sub>T<sub>E</sub>X òiô Leslie Lamport, Þ òi macro package **JadeTeX** òiô Sebastian Rahtz.