

Óõ÷íÝò ÅñùôÞóåéò ãéá ôï FreeBSD 6.x êáé 7.x

Ç ìÛäá Ôåêçñßúóçò ôïõ FreeBSD

Όδ ÷ ιΥδ ΆννὸΠρόαέδ ἀέα οἱ FreeBSD 6.x ἐάέ 7.x

ἀδὺ Ç Ἡῦᾶᾶ ὬᾶἔιçñḂùόçδ ðἰῶ FreeBSD

ἈçἰἰόἔᾶἰΥῖ \$FreeBSD: doc/el_GR.ISO8859-7/books/faq/book.sgml,v 1.16 2009/02/09 18:04:38 keramida Exp \$
Ἐῖᾶἰᾶἰᾶἔἔῦ Ἀἔἔᾶἔῖᾶᾶ © 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008 Ç
Ἡῦᾶᾶ ὬᾶἔιçñḂùόçδ ðἰῶ FreeBSD

Ὀῖ ἐᾶḂἰᾶῖ ᾶἰἰᾶ ḂᾶñἔΥ ÷ ᾶἔ ἰἰᾶ Ὀδ ÷ ιΥδ ἈννὸΠρόαέδ ἀέα ἰἰᾶ ᾶἔᾶῦᾶᾶᾶ 6.x ἐάέ 7.x ἰἰᾶ FreeBSD. ¼ἔᾶᾶ ἰἔ
ἔᾶἰᾶ ÷ ἡñΠᾶᾶᾶ ἔᾶḂñḂᾶἔ ῡἰἔ ἔᾶ ÷ ῡἰᾶ ᾶἔᾶ ὁçἰ Υἔᾶἰᾶ 6.x ἐάέ ἰἰᾶ ἰᾶἰᾶᾶᾶΥᾶἰᾶᾶ ᾶἔᾶῦᾶᾶᾶ, ᾶἔῦᾶ ᾶἰ ᾶἰᾶᾶΥᾶᾶᾶᾶ
ᾶἔᾶἰᾶᾶᾶἔῦ. Ἀἰ ᾶἰᾶᾶᾶΥᾶᾶᾶᾶ ἰᾶ ἰᾶᾶ ᾶἰçḂᾶᾶᾶ ᾶᾶ ᾶἰᾶ Ὀῖ Υᾶῖ, ᾶᾶḂἔᾶᾶ Υἰᾶ email ὁçἰ çἔᾶἔᾶᾶἰἔἔᾶ ἔḂᾶᾶ ἡῦᾶᾶ
ᾶᾶἔιçñḂùόçδ ἰἰᾶ FreeBSD (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-doc>). Ç ᾶᾶᾶᾶᾶᾶ Υἔᾶἰᾶ ᾶἰᾶᾶ Ὀῖ
ἔᾶἔἰΥῖᾶ ᾶḂἰᾶ Ḃᾶἰᾶ ḂᾶἔᾶΥᾶἔἰ ὁçἰ ᾶἔἔᾶᾶᾶᾶ ὈἰḂἔᾶᾶᾶ Ὀῖ FreeBSD
(http://www.FreeBSD.org/doc/en_US.ISO8859-1/books/faq/index.html). ἸḂῖñḂᾶᾶ ᾶḂᾶᾶ ἰᾶ ὁçἰ ἔᾶᾶᾶᾶᾶᾶ ῡᾶ Υἰᾶ
ἰᾶᾶᾶᾶ ᾶñ ÷ ᾶḂἰ HTML (book.html) ἰΥᾶᾶ HTTP ᾶ ᾶἔῦᾶ ἔᾶἔ ῡᾶ ᾶḂᾶᾶᾶ, PostScript®, PDF, ἔἔḂ. ᾶḂᾶ Ὀἰᾶ
ᾶἰḂçḂᾶᾶᾶᾶᾶ FTP Ὀῖ FreeBSD (<ftp://ftp.FreeBSD.org/pub/FreeBSD/doc/>). ἸḂῖñḂᾶᾶ ᾶἔῦᾶ ἰᾶ ᾶᾶᾶᾶ ὁἔᾶ Ὀδ ÷ ιΥδ
ἈννὸΠρόαέδ (<http://www.FreeBSD.org/search/index.html>).

Ç ᾶἔᾶᾶᾶ ἔᾶἔ ÷ ñᾶᾶ ὁᾶ ἡñᾶᾶ ḂçᾶᾶḂᾶᾶ ἔᾶᾶἔᾶ (SGML DocBook) ᾶ ὁᾶ 'ἰᾶᾶᾶᾶᾶᾶᾶᾶᾶᾶ' ἡñᾶᾶ (SGML, HTML, PDF, PostScript, RTF ἔἔᾶ) ἰᾶ ᾶ
÷ ἡñᾶᾶ ᾶἔᾶᾶᾶᾶ, ᾶḂᾶᾶᾶᾶᾶ ᾶἰᾶᾶᾶ ἰἔ Ḃᾶᾶᾶᾶᾶ ḂᾶḂᾶᾶᾶᾶᾶᾶ ὁçḂῡᾶᾶᾶ:

1. Ç ᾶἔᾶᾶᾶ ὁᾶ ἡñᾶᾶ ḂçᾶᾶḂᾶᾶ ἔᾶᾶἔᾶ (SGML DocBook) ḂñΥḂᾶἔ ἰᾶ ᾶἔᾶᾶᾶᾶ ὁçἰ Ḃᾶᾶᾶᾶᾶ ᾶḂᾶᾶᾶ Ḃᾶᾶᾶᾶᾶᾶ
ᾶἔᾶᾶᾶᾶᾶᾶ, ᾶᾶᾶ ὁç ἔḂᾶᾶ ἰᾶ ḂᾶḂᾶᾶᾶᾶᾶᾶ ἔᾶἔ ὁçἰ ᾶḂᾶᾶᾶ ḂᾶḂᾶᾶᾶᾶ ὁἔᾶ Ḃᾶᾶᾶ ᾶᾶᾶᾶ Ὀῖ ᾶñ ÷ ᾶḂᾶᾶ,
ᾶᾶᾶᾶᾶᾶᾶ.
2. Ç ᾶἔᾶᾶᾶ ὁᾶ ἰᾶᾶᾶᾶᾶᾶᾶᾶᾶᾶᾶ ἡñᾶᾶᾶ (ἰᾶᾶᾶᾶᾶᾶ ὁᾶ ῦἔᾶ DTD, ἰᾶᾶᾶᾶᾶᾶ ὁᾶ PDF, PostScript, RTF ᾶ ῦἔᾶᾶ
ἡñᾶᾶᾶ) ḂñΥḂᾶἔ ἰᾶ ᾶἰᾶḂᾶᾶᾶᾶ ὁçἰ Ḃᾶᾶᾶᾶᾶ ᾶḂᾶᾶᾶ Ḃᾶᾶᾶᾶᾶᾶᾶ ᾶἔᾶᾶᾶᾶᾶᾶ, ᾶᾶᾶ ὁç ἔḂᾶᾶ ἰᾶ ḂᾶḂᾶᾶᾶᾶᾶᾶ,
ἔᾶἔ ὁçἰ Ḃᾶᾶᾶᾶᾶ ḂᾶḂᾶᾶᾶᾶ ὁῡᾶᾶ ὁçἰ ᾶᾶἔιçñḂùόç ῡᾶᾶ ἔᾶἔ ὁᾶ ῦἔᾶ ὁἔἔῦ Ḃᾶᾶᾶ ÷ ᾶᾶᾶ ἰᾶᾶ ἰᾶ ὁçἰ ᾶἔᾶᾶᾶ.

Ὀçἰᾶἰᾶᾶᾶ: Ἀᾶᾶ Ç ὬᾶἔιçñḂᾶᾶ Ἀἔἰᾶᾶᾶ ἈḂἰ Ὀçἰ ἡᾶᾶ ὬᾶἔιçñḂᾶᾶ Ὀῖᾶ FREEBSD "ῡᾶ Ἀ×Ἀἔ"
ἔᾶἔ Ἀᾶἰ Ḃᾶᾶ×Ἀᾶᾶ ἔᾶἔᾶ Ἀᾶᾶ Ç Ἀᾶᾶ Ἀᾶᾶᾶᾶ, ὈἰḂᾶᾶᾶᾶᾶᾶᾶᾶᾶ, Ἀἔἔᾶ ×ῦᾶᾶ ἰᾶ
Ḃᾶᾶᾶᾶᾶᾶᾶ ἡᾶᾶ Ὀᾶ Ἀᾶᾶᾶ, ἔᾶἔ Ὀῡᾶ Ἀᾶᾶᾶᾶ Ἀᾶᾶᾶᾶᾶ Ἀἔᾶ ἈἰḂᾶᾶᾶᾶᾶᾶᾶ Ç
ἔᾶᾶᾶᾶᾶᾶᾶ Ἀἔᾶ ἰḂἔἔἰᾶᾶᾶᾶ Ὀᾶᾶᾶᾶᾶᾶᾶ Ὀἔἔἔἔ. Ὀᾶ ἔᾶἔᾶ Ḃᾶᾶᾶᾶᾶ Ἀᾶᾶ Ἀᾶᾶᾶᾶᾶ Ç
ἡᾶᾶ ὬᾶἔιçñḂᾶᾶ Ὀῖᾶ FREEBSD Ἀἔᾶ ἰḂἔᾶᾶᾶᾶᾶᾶ Ἀᾶᾶᾶ, Ἀᾶᾶᾶ, Ὤ×Ἀἔᾶ, Ἀἔᾶἔᾶᾶ,
Ὀçἰᾶἰᾶᾶᾶ, Ç ἔᾶᾶ Ḃᾶᾶᾶᾶᾶ Ἀἔᾶᾶᾶ (ὈἰḂᾶᾶᾶᾶᾶᾶᾶᾶᾶ, Ἀἔἔᾶ ×ῦᾶᾶ ἰᾶ Ḃᾶᾶᾶᾶᾶᾶᾶ
ἡᾶᾶ Ὀᾶ Ἀᾶᾶᾶ, ἔᾶἔ Ὀçἰ Ἀᾶᾶᾶᾶ Ḃᾶᾶᾶᾶᾶ Ὀᾶ Ἀᾶᾶᾶᾶᾶᾶᾶ Ḃçᾶᾶ Ç ὈḂçᾶᾶᾶᾶ, Ὀçἰ
Ἀᾶᾶᾶᾶ ×ᾶᾶᾶᾶ, Ὀçἰ ἈḂᾶᾶᾶ Ἀᾶᾶᾶᾶᾶ Ç ἔᾶᾶᾶᾶ, ἔᾶἔ Ὀçἰ Ἀἔᾶἔἔᾶ ἈḂᾶ×Ἀἔᾶᾶᾶᾶᾶᾶ
ἔᾶᾶᾶᾶᾶᾶ), Ḃᾶᾶ Ḃᾶᾶᾶᾶᾶᾶ ἰᾶ ἰḂἔἔᾶᾶᾶᾶ Ὀᾶᾶᾶ ἈḂἰ Ὀç ×ᾶᾶᾶ Ἀᾶᾶᾶ Ὀçᾶ ὬᾶἔιçñḂᾶᾶ.

Ὀῖ FreeBSD ᾶḂἰᾶᾶ Υἰᾶ ἔᾶᾶᾶ ÷ Ḃᾶᾶᾶᾶ ᾶḂᾶᾶᾶᾶ ὲᾶᾶᾶᾶᾶᾶ.

ἰἔ ἔΥἰᾶᾶ 3Com ἔᾶἔ HomeConnect ᾶḂἰᾶᾶ ἔᾶᾶᾶ ÷ Ḃᾶᾶᾶᾶ ᾶḂᾶᾶᾶᾶ ὲᾶᾶᾶᾶ ὁçᾶ 3Com Corporation.

ἰἔ ἔΥἰᾶᾶ ᾶ Ḃᾶᾶᾶᾶ Adobe, Acrobat, Acrobat Reader, ἔᾶἔ PostScript ᾶḂἰᾶᾶ ᾶḂᾶᾶ ἔᾶᾶᾶ ÷ Ḃᾶᾶᾶᾶ ᾶḂᾶᾶᾶᾶ ὲᾶᾶᾶᾶ ᾶ ᾶḂᾶᾶᾶᾶ ὲᾶᾶᾶᾶ ὁçᾶ Adobe
Systems Incorporated ὁἔᾶ Çᾶᾶᾶᾶ Ḃᾶᾶᾶᾶᾶ ᾶᾶᾶ ὁᾶ ῦἔᾶᾶ ÷ ᾶᾶᾶ.

Ç Ḃᾶᾶᾶ Sound Blaster ᾶḂἰᾶᾶ ᾶḂᾶᾶᾶᾶ ὲᾶᾶᾶᾶ ὁçᾶ Creative Technology Ltd. ὁἔᾶ Çᾶᾶᾶᾶ Ḃᾶᾶᾶᾶᾶ ᾶᾶᾶ ὁᾶ ῦἔᾶᾶ ÷ ᾶᾶᾶ.

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3. ÕðÛñ ÷ òí êÛðíéíε ðāñéíñéóüñB óôçí Ûāáéá ôíø FreeBSD;

Íáé. Íε ðāñéíñéóüñB áðôíB āāí āēÝā ÷ òíø ðüð ÷ ñçóéíðíéāßôā ôíí êpāééā, āēēÛ üüñ ðüð íāôā ÷ āéñßāēāôā ôí Bāéí ôí FreeBSD Project. Áí óāð āíāéāüÝñāé ôíāāñÛ ç Ûāāéā, āéāāÛóôā ôçí āāp (<http://www.FreeBSD.org/copyright/freebsd-license.html>). Áéā ôíðð áðēð ðāñßāñāñôð, ç Ûāāéā ðāñééçððéēÛ āñÛôāé:

- Ìçí éó ÷ ðñéóéāßôā üðé āñÛôāôā áðôü ôí ēíāéóíéēü.
- Ìç íāð íçíýóāôā áí ÷ āēÛôāé.

4. Ìðñāß ôí FreeBSD íā áíðééāóāóðPóāé ôí ðñÝ ÷ íí ēāéôíðñāéēü ííø óýóôçíā;

Áéā ôíðð ðāñéóóüðāññôð āíēñððíðð, íāé. ÁēēÛ áððP ç áðÛíðçóç āāí ìðñāß íā āñēāß ôüóí íāñÛ.

Íε ðāñéóóüðāññé Ûíēñððíé āāí ÷ ñçóéíðíééýí óôçí ðñāāíāóéēüðçóā êÛðíéí ēāéôíðñāéēü óýóôçíā. ×ñçóéíðíééýí āóāññāÝð. Íε āóāññāÝð āßíāé áððÝð ðíø ÷ ñçóéíðíééýí ôí ēāéôíðñāéēü óýóôçíā. Ôí FreeBSD āßíāé ó ÷ āāéāóíÝñí āéā íā ðāñÝ ÷ āé Ýíā óðéāññü ēāé íēíēçññüÝñí ðāñéāÛēēíí āéā āóāññāÝð. Ôðíóôçñßāéé íāāÛēç ðíéééēßā áðü óðēēñāðñçðÝð, óíðßðāð āñāóāßíð, ðññāñÛñāóā çēāéðññíééýí óā ÷ ðāññāßíð, ðññāñÛñāóā āñāóéēpí, ðāñéāÛēēííóā ðññāñññāóéóíýí, āíðççñāðçðÝð āééðýíð, ēāé íðóéāóóéēÛ íðéāPðíðā Ûēēí ìðñāß íā ēāēPóāôā. Ìðñāßôā íā āéā ÷ āéñéóðāßôā ðéð ðāñéóóüðāññāð áðü áððÝð ðéð āóāññāÝð íÝóü ôçð ÕðēēñāPð ôüñ Ports (<http://www.FreeBSD.org/ports/>).

Áí ÷ ñāéÛāēāóāé íā ÷ ñçóéíðíéPóāôā íéā āóāññāP ðíø āßíāé āéāēÝóéíç óā Ýíā üüñ ēāéôíðñāéēü óýóôçíā, ôüðā áðēÛ āāí ìðñāßôā íā áíðééāóāóðPóāôā áðôü ôí ēāéôíðñāéēü óýóôçíā. Áßíāé, üüð, ðíēý ðéēāíü üðé ēā āñāßôā íéā áíðßóðíé ÷ ç āóāññāP óôí FreeBSD. Áí ēÝēāôā Ýíāí óðāēññü āíðççñāðçðP āéā ôí āñāóāßí óāð P āéā ôí Internet, Ýíā āíéüðéóóí óðāēíü āñāóāßāð, P áðēð ôçí éēāíüðçóā íā êÛíāôā ôçí āñāóāßā óāð ÷ ùñßð āéāēíðÝð, āßíāé ó ÷ āāññí óßāñññü üðé ôí FreeBSD ìðñāß íā êÛíāé üðé ÷ ñāéÛāēāóā. Ðíēēíß ÷ ñPóóāð ððíēñāéóôpí óā üēí ôíí êüóíñ — ôüóí āñ ÷ Ûñéíé üóí ēāé Ýñðāēññé āéā ÷ āéñéóðÝð óððôçíÛðñí UNIX — ÷ ñçóéíðíééýí ôí FreeBSD ùð ôí āāóéēü ēāéôíðñāéēü óýóôçíā óðíðð óðāēíýð āñāóāßāð ôíðð.

Áí Ýñ ÷ āóôā óôí FreeBSD áðü êÛðíéí Ûēēí ðāñéāÛēēíí óýðíð UNIX, íÝñāôā Pāç óā ðāñéóóüðāññā áðü áððÛ ðíø ÷ ñāéÛāēāóā. Áí üððüóí ç āíðāēñßā óāð ðññÝñ ÷ āóāé áðü ēāéôíðñāéēÛ óðððPíāóā íā āñāóéēü ðāñéāÛēēíí, üððð óā Windows® ēāé íé ðāéēüðāññāð āēāüóāéð ôíø Mac OS®, ēā ðñÝðāé íā āðāíāýóāôā, üððð āßíāé áíāíāñññññ, āðēðēÝñí ÷ ñññí āéā íā āñēēāēüēāßôā íā ôíí ðññðñí āñāóāßāð óā Ýíā óýóôçíā UNIX. Áðôü ôí FAQ, ēāēð ēāé ôí Åā ÷ āéñßāéí ôíø FreeBSD (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/index.html) áðñāēññíí āíāēñāðéēÛ áíāñpóíāôā āéā íā íāēíPóāôā.

5. Áéāðß íññÛāēāé FreeBSD;

- Ìðñāß íā ÷ ñçóéíðíééçēāß ÷ ùñßð ÷ ñÝüóç, āēüñā ēāé āéā āíðññéēýðð óéíðíýð.
- Áéāðßēāóāé í ðēPñçð ðçāāßíð êpāééāð āéā ôí ēāéôíðñāéēü óýóôçíā, ēāé íā ôíðð āēÛ ÷ éóðíðð āðíāðíýð ðāñéíñéóíýðð ó ÷ āðéēÛ íā ôç ÷ ñPóç ôíø, ôç āéāññP ôíø ēāé ôçí āíóññÛðüóç ôíø óā Ûēēā Ýñāā (āíðññéēÛ P íç).
- ÌðíéíāPðíðā Ý ÷ āé íā ðññðāßíāé íéā āāēðßüóç P āēññēüóç, āßíāé āēāýēāññð íā ððñāÛēēāé ôíí êpāééā ôíø, í ððñíðð ēāé ēā ðññíðāēāß óôí āÝíðññí ðçāāßíð êpāééā (āñēāß íā ðççññýíóāé íéā-āññí āāóéēÝð ðññíññāßð ðñññðíēÝóāéð).

ÁíPāēé íā áíāóÝñññññ üðé ç ēÝíç “āēāýēāññ” ÷ ñçóéíðíéēāßôāé āāp íā āýí ðññðíðð, í Ýíāð óçíāßíāé “āññāÛñ”, ēāé í Ûēēíð óçíāßíāé “ìðñāßôā íā ôí êÛíāôā üðé ēÝēāôā”. Áēôüð áðü Ýíā-āýí ðññññāóā ðíø *aaí* ìðñāßôā íā êÛíāôā íā ôíí êpāééā ôíø FreeBSD, āéā ðāñÛāēēññā íā éó ÷ ðñéóéāßôā üðé ôíí āñÛôāôā, ìðñāßôā óóā āēPēāéā íā ôíí êÛíāôā üðé ēÝēāôā.

6. Διὰ τὴν ἀρίστην τὴν ἀπόφασιν τοῦ FreeBSD ἐπὶ τοῦ NetBSD, OpenBSD ἐπὶ τοῦ ἑξῆς BSD ὁμοῦς ἀντιθέτως ἐπαίρει;

Ἦ James Howard ὅτι ἀνὰ τὴν ἑξῆς ἀπόφασιν ὁμοῦς ἀντιθέτως τοῦ ἑξῆς FreeBSD ὁμοῦς ἀντιθέτως τοῦ DaemonNews (<http://www.daemonnews.org/>), ὁμοῦς ἑξῆς τὴν ἑξῆς BSD (http://ezine.daemonnews.org/200104/bsd_family.html).

7. Διὰ τὴν ἀρίστην τὴν ἀπόφασιν τοῦ FreeBSD;

Ἀπόφασιν ὁμοῦς ἀντιθέτως τοῦ FreeBSD. Ἦ ἀπόφασιν τοῦ FreeBSD ὁμοῦς ἀντιθέτως τοῦ FreeBSD ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD ὁμοῦς ἀντιθέτως τοῦ FreeBSD.

Ἦ τὴν ἀρίστην τὴν ἀπόφασιν τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD.

Version 8.0 (<ftp://ftp.FreeBSD.org/pub/FreeBSD/releases/i386/8.0-RELEASE/>) is the latest release from the 7-STABLE branch; it was released in Ἰούλιος 2009. Version 7.3 (<ftp://ftp.FreeBSD.org/pub/FreeBSD/releases/i386/7.3-RELEASE/>) is the latest release from the 6-STABLE branch; it was released in Ἰούλιος 2008.

ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD.

Ἀνὰ τὴν ἀρίστην τὴν ἀπόφασιν τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD.

Ἦ τὴν ἀρίστην τὴν ἀπόφασιν τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD.

Διὰ τὴν ἀρίστην τὴν ἀπόφασιν τοῦ FreeBSD ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD.

8. Ὅτι ἀρίστην τὴν ἀπόφασιν τοῦ FreeBSD-CURRENT;

Ὅτι FreeBSD-CURRENT

(http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/current-stable.html#CURRENT) ἀνὰ τὴν ἀρίστην τὴν ἀπόφασιν τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD. ὁμοῦς ἀντιθέτως τοῦ FreeBSD.

- Áëäüöáëð ðíð ááóðæííóáé óáÓóéäíëüðððá (<http://www.FreeBSD.org/snapshots/>) äðíííóáé êäèçìñíííÛ áðü òíðð êêÛäíðð -CURRENT êáé -STABLE, êáé áíððçññáðíííí êáðÛ áÛóç üóíðð áó÷íëíííóáé íá òçí áíÛðððíç êáé òíí Ýëää÷í òíí òäëäððáðáð äáíëÛð ðñíññáñíÛðíí.
- Ç òäëäððáðá êðêëííííá ðíð ááóðæííóáé òðíí êêÛäí 5-STABLE, ç 7.3-RELEASE, ìðíññ íá ãñäëñ òðíí êáðÛëíí 7.3-RELEASE (<ftp://ftp.FreeBSD.org/pub/FreeBSD/releases/i386/7.3-RELEASE/>).

ðëçñííííáð ò÷áðéêÛ íá òç äëÛëáóç òíð FreeBSD óá CD, DVD êáé Ûëëá ìÝóá ìðíííí íá ãñäëíííí òðíí Áã÷äëñðáëí (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/mirrors.html).

13. Ðüð ìðíñP íá Ý÷ü ðñüóááóç óóç ÁÛóç ÄããñÝííí íá òéð ÁíáóíñÝð ðñíñäèçìÛðíí;

Ìðíññáðá íá êÛíáðá áíáæçððóáéð óóç áÛóç äããñÝííí íá òéð áíáóíñÝð ðñíñäèçìÛðíí ìÝóü òçð äéáðáððð áíáæçððóáíí òðíí Web (<http://www.FreeBSD.org/cgi/query-pr-summary.cgi?query>).

Ç áíðíëP send-pr(1) ìðíññ íá ÷ñçóéííðíéçëññ äéá òçí òðíñäèçìP áíáóíñíí ðñíñäèçìÛðíí, êäèðð êáé áéððóáíí äéá äëëääÝð, ìÝóü çëäèðñííéëíí óá÷ðãñññáðíð. ÁíáëëäéðéêÛ, ìðíññáðá íá ÷ñçóéííðíéçðóáðá òçí áíóðóðíé÷ç äííáðüðçðá òðíñäèçìP áíáóíñíí ðñíñäèçìÛðíí ìÝóü òçð äéáðáððð web (<http://www.freebsd.org/send-pr.html>) íá òç äíðëäéá áíüð ðñíññíííáðíð òðëëññáðñçðP.

ðñéí òðíñäèçìP íéá áíáóíñÛ ðñíñäèçìP, ðãñäéäéíííí äéááÛóðá òí ÄñÛíííóáð ÁíáóíñÝð ðñíñäèçìÛðíí äéá òí FreeBSD (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/problem-reports/article.html), Ýíá Ûñëñí äéá òí ðüð íá äñÛóðá êáéÝð áíáóíñÝð ðñíñäèçìÛðíí.

14. Óé Ûëëäð ðçãÝð ðëçñííííéíí òðÛñ÷íí;

ðãñäéäéíííí äëÝáíðá òç ëðóðá òçð Óäëíçñññóçð (<http://www.FreeBSD.org/docs.html>) óóçí êýñéá äéêððáëP òíðíëäóðá òíð FreeBSD (<http://www.FreeBSD.org>).

ΕὰοÛεάέϊ 2 Ôâêìçñßùόç êáé Õðïóôßñêîç

1. Διέα έάέÛ άέάέßá ððÛñ÷ïïí ó÷áðéέÛ ìá ôï FreeBSD;

Ôï Project ðáñÛááé ìéá ìááÛέç æέÛíá ôâêìçñßùόçð ðïð æéáðßæáðáé online áðù ôï ðáñáέÛðù óýíááóïï: <http://www.FreeBSD.org/docs.html>. Ôá ßáéá áðòÛ Ýáñáðáá áßíáé æéáέÝóέíá έάέ ùð ðáέÝóá óá ïðíßá ìðñáßðá ìá ááέáðáðóðóáðá áýêéá óðï FreeBSD óýóóçíá óáð. Ðáñέóóúðáñáð èáððñÝñáέáð ó÷áðéέÛ ìá óá ðáέÝóá ôâêìçñßùόçð, έá áñáßðá óðéð áέúêïðéáð ðáñááñÛïïðð.

Áðððñúéáðá, έá áñáßðá έάέ Ûέéá óðíέóðñíáíá áέáέßá óðçí Áέáέéíáñáðá óðï ðÝêïð áððïý ðïð FAQ, έάέ ðïð Áá÷áέñéáßïð.

2. Áßíáé æéáέÝóέíç ç ôâêìçñßùόç έάέ óá Ûέéáð ìñðÝð, ùððð áðέú èáßíáñ (ASCII) ð PostScript;

Íáέ. Ç ôâêìçñßùόç áßíáé æéáέÝóέíç óá ðéðèð æéáðñáðéέðí ìñðñí έάέ ðñúðúí óðïðßáóçð, óðï æéáέñéóðð FTP ðïð FreeBSD, óðïí έáðÛέíáñ /pub/FreeBSD/doc/ (<ftp://ftp.FreeBSD.org/pub/FreeBSD/doc/>).

Ç ôâêìçñßùόç áßíáé έáðçáññéíðíέçìÝíç ìá æέÛïññïð ðñúðïðð. Áððïß ðáñééáíáÛñïí:

- Ôï ùñá ðïð áááñÛïïð, ùððð ð.÷. **faq**, **ð handbook**.
- H æéðóóá έάέ ç èúáééïðíßçðç ðïð έáέíÝñð. ÁðòÛ ááðßæíðáé óá ìñíáðá ðïð Ý÷ïïí áñéáß óðéð ðïðéέÝð ððéìßóáéð έάέ ðïð ìðñáßðá ìá áñáßðá óðïí έáðÛέíáñ /usr/share/locale óðï FreeBSD óýóóçìÛ óáð. Íé ðñÝ÷ïðáð æéðóóáð έάέ èúáééïðíéðóáéð ðïð Ý÷ïïíá æéáέÝóέíáð áððð óç óðéáìð óðçí ôâêìçñßùόç áßíáé ìé ðáñáέÛðù:

¼ññá	Áñíçíáßá
en_US.ISO8859-1	ÁááéέέÛ ÇÐÁ
bn_BD.ISO10646-1	Bengali (ð Bangla)
da_DK.ISO8859-1	ÄáíÝæéέá
de_DE.ISO8859-1	ÄáñíáíéέÛ
es_ES.ISO8859-1	ÉóðáíéέÛ
fr_FR.ISO8859-1	ÄáééέέÛ
hu_HU.ISO8859-2	ÏðáááñÝæéέá
it_IT.ISO8859-15	ÉóáéέέÛ
ja_JP.eucJP	ÄéáðñíÝæééá (èúáééïðíßçðç EUC)
mn_MN.UTF-8	ÏááñééέÛ (èúáééïðíßçðç UTF-8)
n1_NL.ISO8859-1	ÏééáíáéέÛ
pl_PL.ISO8859-2	ÐñúíéέέÛ
pt_BR.ISO8859-1	ÐñðñááéέέÛ (Äñáæéέßá)
ru_RU.KOI8-R	Ñðóééá (èúáééïðíßçðç KOI8-R)
sr_YU.ISO8859-2	ÓÝñáéέá
tr_TR.ISO8859-9	Ôñýñééέá
zh_CN.GB2312	ÁðéïðíéçìÝíá ÊéíÝæééá (èúáééïðíßçðç GB2312)
zh_TW.Big5	ÐáñááñóéáέÛ ÊéíÝæééá (èúáééïðíßçðç Big5)

Αἰοίγ ἀδεεΐΥῖαὸὰ ὁς ιῖηὶP εαε οἱ ις-τ-ἀρίεσιυ ὀδιθβασφδ θῖρ ἀδεεσιῖαβσὰ ῖά ἐαὸαᾶṲσὸαὸ, ἐὰ θῆYṲᾶε YṲᾶέσᾶ ῖά
 ᾠῖσᾶσὸβσὸαὸ αῖ εYṲεᾶὸ P υ-ε ῖά ἐαὸαᾶṲσὸαὸ οἱ Yᾶᾦᾦᾦσᾶι ῖᾶ ὁς ιῖηὶP δαεYṲοῖρ οἷρ FreeBSD.

[illegible][illegible]

Άέά άάνÜääέäíá, öi FAQ, óóá ÁáääééêÜ, óá ïñöÞ PDF, åbíáé óöi άάéÝöi ïå üíñá faq.en_US.ISO8859-1.pdf.tgz.

Άí ôî ÌŸñáôá áôôü ððñáßôá íá ÷ñçóéñððēßôáôá ôçí áéüēñðēç áñðñēß áéá íá ääēáôáôôßôáôá ôñ ðáēŸôñ ôñô ÁääēēēñŸ
 PDF FAQ:

```
# pkg_add ftp://ftp.FreeBSD.org/pub/FreeBSD/doc/packages/faq.en_US.ISO8859-1.pdf.tgz
```

Άοῖς οἱ ἐὺτῆροσ ἀδοῦν, ἰδιῆῆροσ ἰά ÷ ἡςοῖνῖεῖροσῶδσ ὁςῖ ἀῖοῖεῖ pkg_info(1) ἁῖ ἰά ἡῆῆροσ δῖο Ὠ ÷ ἁῖ ἡῖῖῖῖῖῖῖῖ οἱ ἡῆ ÷ ἁῖ.

```
# pkg_info -f faq.en_US.ISO8859-1.pdf
```

Information for [faq.en_US.ISO8859-1.pdf](#):

Packing list:

Package name: `faq.en_US.ISO8859-1.pdf`

```
CWD to /usr/share/doc/en_US.ISO8859-1/books/faq
```

File: book.pdf

CWD to .

File: +COMMENT (ignored)

File: +DESC (ignored)

¼ðuò ìðĩñâßôâ íá äâßôâ, ôĩ book.pdf èà Ý÷æ äâêâóóôâèß óóĩ êáoÛeĩĩ

```
/usr/share/doc/en_US.ISO8859-1/books/faq.
```

Áí áái èYéââ íá ÷ñçóèîüðíèÞóâââ ôâ áâéYôâ, èâ ðñYðâé íá éââââÜôâââ iüüíé óâð ôâ ôöüðéâóíYíá áñ÷ââá, íá ôâ áðíóóüðéYôâââ éâé Yðââââ íá áíóéâñÜðâââ ôâ áíóðóðíé÷â Yáññââââ ôçç èYóç ôîöð.

Ἄεά ὁάνÜäæëàíá, ç Ýëäîç òïð FAQ óå öôíääâàìÝíá äñ÷:âßá HTML, öòìðëäöìÝíc îä ÷ñßóç òïð bzip2(1), ìðññâß íá äñäèâß öòì äñ÷:âßì doc/en_US.ISO8859-1/books/faq/book.html-split.tar.bz2 . Ἀέά íá éäöââÜöäðä éác íá äðìöòìðéÝöäðä äöòü òì äñ÷:âßì èä ðñÝðäé íá eÜíäðä òì ðäñäeÜòù:

```
# fetch ftp://ftp.FreeBSD.org/pub/FreeBSD/doc/en_US.ISO8859-1/books/faq/book.html-split.tar.bz2
```

```
# bzip2 -d book.html-split.tar.bz2
```

```
# tar xvf book.html-split.tar
```

Éá éáóáéΠιάόά ιά ιέα óðēēīāP áðū āñ÷āBá .html. Ōī ááóéú īīīŪæáóáé index.html, éáé éá ðānéY÷áé ōīī ðBíáéá ðānéá÷ñYīuī, áéóááūāééú ðēééú, éáé āāōīŷð ðñīð óá Ūēēá òīΠιάόá òīŷ āāāñŪōīŷ. İðīñāBōā Yðāéóá íá áíóéāñŪøáðā P íá íāóáééīPóáðā óá āñ÷āBá áðōŪ óóéð óāēééYð òīŷð èYóáéð. üðūð áðāéóāBōáé.

6. Ḑῖῖ ἰῖῖῖ ἰά ἁῖῖ ἁῖῖ ḑῖῖῖῖῖ ὠῖῖῖῖῖῖ ἑάῖ ἁῖῖῖῖῖῖ ἁῖῖ ὠῖ FreeBSD;

Ὤῖ DaemonNews ḑḁῖῖ ÷ ἁῖ ἁῖῖ ḑῖῖῖῖῖ ἁῖῖῖῖῖῖῖ ἑάῖ ὠῖῖῖῖῖῖ ἁῖῖ ὠῖ FreeBSD. Ḑḁῖῖῖῖῖῖῖῖ ḑῖῖῖῖῖῖῖῖ ἰῖῖῖῖῖῖ ἰά ἁῖῖῖῖῖ ὠῖῖ ἁῖῖῖῖῖῖ ὠῖῖῖ ὠῖῖῖῖῖῖ BSD Mall (<http://www.bsdmall.com/>).

Ὤῖ FreeBSD Mall ḑḁῖῖ ÷ ἁῖ ἁῖῖῖῖ ἁῖῖ ḑῖῖῖῖῖ ὠῖῖῖῖῖῖ ἁῖῖ ὠῖ FreeBSD. ἰῖῖῖῖῖῖ ἰά ἁῖῖῖῖῖ ḑḁῖῖῖῖῖῖῖῖ ḑῖῖῖῖῖῖῖῖ ὠῖῖ ἁῖῖῖῖῖῖ ὠῖῖῖ ὠῖῖῖῖῖῖῖ (<http://www.freebsdmall.com/>).

ἰῖῖῖῖῖῖῖῖ Ὤῖῖῖ ἰῖḁḁῖῖῖῖῖ ḑḁῖῖ ÷ ἁῖ ἁῖῖῖῖῖῖῖ ἑάῖ ὠῖῖῖῖῖῖ, ἑά ḑῖῖῖῖ ἰά ἁῖῖῖῖῖῖῖῖ ἰά ὠῖ Project ἁῖῖ ἰά ἑάῖῖ ÷ ἰῖῖῖῖῖ ὠῖ ἁῖῖῖ ὠῖ ῖῖῖῖ.

ðññëñÛöííóáé óóíí íäçäü ääëäöÛóóáóçò ôíö FreeBSD
(http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/install.html).

3. Ðíö ãñßóëííóáé íé íäçäüä ãéá ôçí ääëäöÛóóáóçò ôíö FreeBSD;

Ìðíñáßòá íá ãñáßòá óéð íäçäüä óóçí éáóá÷þñçóç ôíö Ää÷äëñéäßíö ó÷äóëÛ íá ôçí ääëäöÛóóáóçò ôíö FreeBSD
(http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/install.html).

4. Óé ÷ñäéÛäñíáé áéá íá äéðäëÝóó ôí FreeBSD;

Äéá äéäüóáéð ôíö FreeBSD áðü ôí 5.X éáé íäðÛ ÷ñäéÛäóóá Ýíá PC íá äðáíññááóð 486 Þ éäëýóáñí, íá 24 MB Þ ðññéóóóðñç RAM, éáé ôíðëÛ÷éóðíí 150 MB ÷þñíö óóí óéççñü óáð äßóëí.

Ìðíñáßòá íá äéðäëÝóóáä üëäð óéð äéäüóáéð ôíö FreeBSD íá íéá ÷äíçëþí ðñíäéáññáóþí, ïíü÷÷ñùç (MDA) ëÛñóá ãñáóéëþí, äëëÛ áéá íá ÷ñçóëíðíéðóáðá ôí Xorg, éá ÷ñäéáóðáßòá ëÛñóá VGA Þ éäëýóáñç.

Äáßòá äðßóçð éáé ôí ÊäöÛëáëí 4.

5. Ðüð ìðíñ íá äçíëíðñáÞóó ôç äéëÞ ííö, ðñíóáñííóíÝíç äéóéÝóá ääëäöÛóóáóçò;

Óç äáññÝíç óóëäíÞ, äáí ððÛñ÷äé ðñüðíð íá öðéÛíäòá äðëðð íéá ðñíóáñííóíÝíç äéóéÝóá ääëäöÛóóáóçò. Èá ðñÝðäé íá äçíëíðñáÞóáðá íëüðëçñç íÝá Ýëäíóç, ç ìðíá éá ðññéëáíäÛíäé éáé ôçí ðñíóáñííóíÝíç äéóéÝóá ääëäöÛóóáóçò óáð.

Äéá íá äçíëíðñáÞóáðá íéá ðñíóáñííóíÝíç Ýëäíóç, äéíëíðëÞóáðá óéð íäçäüä óóí Ûñëñí ó÷äóëÛ íá ôçí ÌñäÛíóç Äéäüóáíí (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/releng/article.html).

6. Ìðíñ íá Ý÷÷ ðññéóóóðññá áðü Ýíá éäéóíðñäéÛ óóóðÞíáðá óóíí ððíëíäéóðÞ ííö;

Ñßíðá íéá íáðéÛ óóçí óäëäá ðíëäðëþí éäéóíðñäéëþí
(http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/multi-os/index.html).

7. Ìðíñíýí íá óóíððÛñííóí óá Windows íá ôí FreeBSD;

ÄäëäóáóðÞóá ðñÞóá óá Windows, éáé íäðÛ ôí FreeBSD. Í äéá÷äëñéóðÞð äêëßíçóçð ôíö FreeBSD éá óáð äðéðñÝðäé Ýðäéáð íá äðéëÝíäòá ôçí äêëßíçóç áßòá ðñí Windows áßòá ôíö FreeBSD. Áí ääëäóáóðÞóáðá óá Windows íäðÛ ôí FreeBSD, éá óáð óáÞóíóí ðñí äéá÷äëñéóðÞð äêëßíçóçð, ÷ññðð éáí íá óáð ññðÞóíóí. Áí óáð óóíääß, áðüü äáßòá ôí äðüíäíí ðíÞíá.

8. Óá Windows éáðÝóðññáíí ôí äéá÷äëñéóðÞð äêëßíçóçð ííö! Ðüð éá ôñí äðáíäóÝññ;

Ìðíñáßòá íá äðáíääëäóáóðÞóáðá ôí äéá÷äëñéóðÞð äêëßíçóçð ôíö FreeBSD ÷ñçóëíðíéþíðáð Ýíáí áðü ôíðð ðññéð ðáñäéÛðü ðñüðíðð:

- Äéðäëþíðáð ôí DOS, íäóáééíçèáßòá óóíí éáðÛëíñí tools/ óçð FreeBSD äéáñíÞð óáð, éáé øÛíðá áéá ôí äñ÷áßí `bootinst.exe`. ÄéðäëÝóóá ôí üðüð óáßíáóáé ðáñäéÛðü:

```
... \TOOLS> bootinst.exe boot.bin
```

éáé í äéá÷äëñéóðÞð äêëßíçóçð éá äðáíääëäóáóðáëß.

- ÌäëëíÞóá íáíÛ ÷ñçóëíðíéþíðáð ôç äéóéÝóá äêëßíçóçð ôíö FreeBSD éáé ðçááßíáðá óóçí äðéëñäÞ Custom Installation ôíö íäñý. ÄðéëÝíðá Partition. ÄðéëÝíðá ôñí íäçäü ðíö éáíííéëÛ éá ðññéäß÷á ôñí äéá÷äëñéóðÞð äêëßíçóçð óáð (öðóëíëíäéÛ ôñí ðñÞðí) éáé üðáí öðÛóáðá óóíí äðáíññááóðÞ éáóáðíÞóáíí (partition editor) áéá ôñí

þóðá íá Ý÷äðä ðäëëËÛ íéá ääëäöÛóóáóç ðíð FreeBSD ðíð íá ëäëðíðññäð.

1. ÊäðäöÛóóá óëð äëóëÝðð boot1 éäé boot2 áðü http://people.FreeBSD.org/~bmah/ThinkPad/. Áðíççëäýóðä ðá äñ÷äðá áðöÛ ëÛðíð ðíð ëá íðññäðá íá ðá íáíáññäðá äñüðññá.
2. Ääëäöðóðóðä éäííëËÛ ðí FreeBSD óðí ThinkPad. Íçí ÷ñçóëíðíëðóðä ðçí éäöÛóóáóç Dangerously Dedicated. Íçí ëÛíäðä äðáíäëëðíçç üðáí ðäëäëðóäé ç ääëäöÛóóáóç.
3. ×ñçóëíðíëðóðä äðä ðí “Emergency Holographic Shell” (ALT+F4) äðä ðí ëÝëððíð “fixit”.
4. ×ñçóëíðíëðóðä ðçí fdisk(8) äéá íá äëËÛíäð ðíí áíáíññëóðéëü äñëëü ðçð éäöÛóóáóç ðíð FreeBSD áðü 165 óá 166 (áðöðü äðíáé í ðýðíð ðíð ÷ñçóëíðíëðóðäé áðü ðí OpenBSD).
5. ÄñÛððä ðá äñ÷äðá boot1 éäé boot2 óðí ðíðëëü óýóðçíá äñ÷äðí.
6. ×ñçóëíðíëðóðä ðí disklabel(8) äéá íá äñÛððä ðá boot1 éäé boot2 óðí slice ðíð FreeBSD.
disklabel -B -b boot1 -s boot2 ad0sn
Ïí n äðíáé í äñëëüð ðíð slice ðíð Ý÷äðä ääëäöðóðóðä ðí FreeBSD.
7. ÊÛíðä äðáíäëëðíçç. Óðçí ðñíðñíð äëëðíççð ëá äððä ðçí äðëëäð íá íäëéíðóðä ðí OpenBSD. Óðçí ðñäíäóëëüðçð, íá áðöðü ðíí ðñüðí ëá íäëéíðóðä ðí FreeBSD.

Ïí íá ëÛíäðä ðí ðáñáðÛíü íá ëäëðíðññäðóäé óðçí ðññððöüç ðíð ëÝëððá íá Ý÷äðä äëðð äëëðíçç OpenBSD éäé FreeBSD óðíí ðäëí ðíñçðü ððíëäëóðð, ðí áððíðíä ùð Ûóðçç óðíí áíáíññóðç.

10. ðíñð íá ëÛíü ääëäöÛóóáóç óá Ýíá äðóëí íá ÷äëáóíÝíðð ðññäð;

ðíññäðä, äëËÛ äðíáé éäëð éäÝá.

Áí ääðä ÷äëáóíÝíðð ðññäð óá Ýíá óýá÷ñíí íäçäü IDE, ððÛñ÷äé íääÛëç ðëéáíüççðá í íäçäü áðöðü, ðíçý óýíðñá, íá ððáíäðóäé íá ëäëðíðññäð áíðäëðð (í íäçäü äñí Ý÷äé Ûëëíðð áíäëäëðéëýð ëðëíññíðð ðíð íá ðíñíýí íá áíðëäðóððíðí ðíðð ÷äëáóíÝíðð íÝöü ðçð áóüðäñëëðð ëäëðíðññäð äðáíäíðíëÝóççð ðíí ääñÝíñí, ëÛóé ðí ðíðí óçíáíáé üðé í äðóëíð Ý÷äé óçíáíðëëð ðëñÛ). Óáð óðíéóðíýíá íá ääñÛóðä éäëíýñéí äðóëí.

Áí Ý÷äðä íäçäü SCSI íá ÷äëáóíÝíðð ðññäð ääðä áððð ðçí áðÛíðçç.

11. ÄëÛðíñä ðññðññää ðñÛäíäóá óðíääðííí üðáí äëëéñ íá ðç äëóëÝðä äëëðíççð! Óé óðíääðíáé;

Áí äëÝððä éäðáóðÛóäéð üððð ðí íç÷Ûíçíá íá íçí äðíëñíñíäé ð íá ëÛíäé äðáíäëëðíçç íñí ðíð üðáí ðñíððäëäððá íá äëëéíðóðä íá ðçí äëóëÝðä äëëðíçççð, ëá ðñÝðäé íá ëÛíäðä óðíí ááðöü óáð ðñäéð äñüððóäéð:

1. ×ñçóëíðíëðóðä éäëíýñéäð, ðñäóëí-äëäíññüíÝíäð, éäé ÷ññðð ëÛëç äëóëÝðäð (éäöÛ ðñíððíççç éäëðð äðäëññäð óëð ðíðäð íñëéð ääÛéäð éäëíýñéäð áðü ðí ëíððð ðíðð, óá áíððëäóç íá ðç äëóëÝðä ðíð ððñáðá íäëð íá ëÛíéí ðññéñäëëü éäé ç ðíðá äñðóëíðáí ëÛöü áðü ðí ëñääÛóé óá ðñðá ðäëäððáá ÷ññéá);
2. ÊäðäöÛóóáðä ðí image ðçð äëóëÝðäð íá äðääëëü (binary ð image) ðñüðí íäðáóíñÛð; (íç íðñÝððóðä, äëñíá éäé íé éäëýðññíé áðü íäð Ý÷íí éäöÛ ëÛëðð éäðäöÛóäé ëÛíéí äðääëëü äñ÷äðí óá éäöÛóóáóç ASCII (éäëÝíñ), ðíðëÛ÷óðíí íéá ðíñÛ!)
3. Áí ÷ñçóëíðíëäðä Windows 95 ð 98, äëðäëÝððä ðí fdimage ð ðí rawrite óá éäëäñð éäöÛóóáóç DOS; Óá ëäëðíðññäëÛ áðöÛ ðíññäð íá ðññäíäëççíýí óá ðññäñÛíäóá ðá ðíðá äñÛíðíí äðäëäððáð óðí ðëëëü, ëÛóé ðí ðíðí óðíääðíáé éäé íá ðá ðññäñÛíäóá äçíéíðññäð ðíí äëóëäðí. ðíññäð íá äçíéíðññäð ðññäëççíá, äëñíá éäé áí ðá äëðäëäððá ðá ðññÛëðñí DOS íÝóá áðü ðí äñäóëëü ðññéäÛëëí.

Άí αάρ αΒρόά οΒαίρσντν αέα οι οανάρδΰιυ, π αί οι FreeBSD αδιόγ÷αε οόγί αίβ÷-ίαόος οςος ουοόπδ ααυιαόνβαδ έαόΰ ογί ααεαόΰοόας, ι αδεγίροόαντν ονυδρν αέα ία οι οαναέΰιθαόα, αβίάε οοίπευδ ία αγείρσναόαα Ύία ιέένυ αεαίΎνείοία DOS οοί αΒοεί. Οι BIOS Ύθαέαδ έα αίε÷-ίáyοαε ος ουοόπ ααυιαόνβ, έαε ιδινάβαδ δΰίόα ία αέαανΰιθαόα οι αεαίΎνείοία DOS ιΎόα αδυ οι αδαιανάροόπ έαόαοιόαυι, αί αα εΎεαόα ία οι έναόπόαοα. Ιδινάβ υόουοί ία έαεόαοα ία οι αόπόαοα, αέα ία ονιανανιαόβαέαδ εΰνδνδ αέέογρν έαε αέα ΰεεαδ, αίοβόοίε÷-αδ, ανααόβαδ.

[illegible]

15. ŌđŨñ÷ĩōĩ ēŬđięię đăñēĩñéōĩĩß óōĩ đũò đñÝđăē íá ÷ũñßóũ òĩ äßóēĩ;

Íáé. ÐñÝðáé íá ááááéùèâððá üðé ç ñéæéêP (root) êáoÜðìçóç ânßóéâðáé êÜðù áðu òïðò 1024 êðéßíáñïðò, þóðá òï BIOS íá ìðñíâß íá áêéérPðáé òïr ðññPíá áðu áððP. (Ôçíáéþðóá üðé áððùð áßíáé Ýíáð ðññéíñéóíüð óòï BIOS òïr PC, êáé ü÷÷é óòï FreeBSD).

Ἄεά Ὡία ἀβ6ει SCSi, 66iPeu0 α66u 6ciαβiαé u6é ç ñéæéP éα6U6ic6ç éα αñβ6éα6áé 66á ðñp6á 1024MB (P 66á ðñp6á 4096iA αi ÷ñç6éiðiεi6á6áé ç áé6α6aiYic iα6U6ñα6ç - αβ6á 6çf ðñiçäiYiαic αñp6ç6ç). Ἄεά ἀβ6éi60 IDE, 6i αi6β66ié÷i uñéi αβiαé 6á 504MB.

16. Άβιάέ οοίââöü ôî FreeBSD îâ ðñĩãñÛîâôâ äéâ÷âßñéóçð äßóèùí (disk managers);

To FreeBSD áíáíáíüñßæáé éáé äðéôñÝðáé ôç ÷ñßóç ôïô Ontrack Disk Manager. Äáí ôðíóôçñßæáííóáé Üëëíé äéá÷áéñéóóÝð äßóéùí.

Αί εΥέαθα αδερο ία ÷ ñçóειðιεßαόα οι αβόει ία οι FreeBSD, αάρ ÷ ñάεÜαάόα αέα ÷ αέñέόόß αβόειò. Αδερο ñέειßόα οι αβόει αέα υοί ðñέόόóóðñí ÷ ññí ιðññá ία αάε οι BIOS (όóíßεòð 504ÎÄ), έάε οι FreeBSD έα άίάέάýóάε ðυοί αέάýέñí ÷ ññí Ý ÷ άα όόçí ðñññάόέέυόçόά. Αί ÷ ñçóειðιεßαόα εÜðιεí ðάέέυ αβόει όά αέάάεòß MFM, βόòð ία ðñÝðάε ία ðάßα όόí FreeBSD ðυοίòð έöέßññíòð ία ÷ ñçóéιðιεßόάε.

Αί εΥέαοά ίά ÷ ñçóείüðιεΡόαοά οί αΒόεί ουοί ία οί FreeBSD υοί έάε ία εÜðιεί Üεεί εάεοίοναέευ ούοόçíá, εά ðñÝðáε ίά ίðñáΒόá ίά οί εÜíαοά ÷ ùñΒò áεά ÷ áεñέóóÐ αΒόεíο: áðεðò ááááευεαΒόá υοε οί áεáÝñεοίá áεεΒίçóçò οίò FreeBSD έáεðò έáε ç έαóÜοιçόç οίò Üεεíò εάεοίοναέεý óóóðΠιáοίò áñΒόεíοáε ίÝόá οοίò ðñðοίò 1024 έεεΒññíòð. Αί αΒόόá áñεáóÜ ðñíόáεóεεü. Ýíá áεáÝñεοίá áεεΒίçóçò (boot) ίááÝεíò 20MB εά áΒίáε áñεáóü.

17. ¼ôáí âêêíp ôĩ FreeBSD áéá ðñþôç öĩñÛ, ðáßñíù ôĩ ìííõíá “Missing Operating System”. Ôé öõíâáßíáé;

Αὐτὸ πρὸς ἀβιὰ ἐὰ ἐεῶεπ δᾶνδδουός ἐεΐαῖδ ιαοαίγ οἷο FreeBSD ἐὰ οἷο DOS π ἐῦδῖεῖο ὕεῖο ἐαεοῖοᾶεῖγ
 ο÷ᾶεεῦ ἰὰ οῖς ἐαΐα δῖο ὕ÷ᾶε οἱ ἐαεΐα ἐὰ οῖς ἀαῖαδῖοᾶ οἷο ἀβῖοῖο. Ἐὰ δνΎδᾶε ἰὰ ἀδᾶῖᾶεᾶοᾶοδῖοᾶ οἱ
 FreeBSD ἀεῦ ὀνῖπῖοᾶ δῖοᾶεεῦ οεὸ ῖᾶῖᾶδῖο δῖο ἀβῖοᾶ δῖο δῖο, ἀβιὰ ο÷ᾶῖ οἶᾶῖ οἶᾶῖ ὕεῖ οἶ ὀᾶ ἐᾶοᾶΎᾶοᾶ.

18. Ἀέαὸβ ἀάι ιῶιη̃ρ ίά οῶίᾱ÷Βού θΎñá αῑυ ὀcí ὄñíοñīθP F? οἰῶ áéá÷áénéοόP âêêβícòçð;

Άρτι ἀβιάε Ὑεῖ Ἰά ὀγιδδουιά ὄτῳ δῆιᾶεΠιᾶότῳ δῖτῳ δᾶνῆεᾶνῶσᾶόᾶε ὀόϋ ὀῆιϋᾶῖᾶῖᾶ ᾶῖῖῖῖῖῖ. Ἀῖ ὀῖῖῖῖῖῖῖ ῖ ᾶῖῖῖῖῖῖῖῖ ὄτῳ BIOS ἰᾶ ᾶῖῖῖ ὄτῳ FreeBSD! Ἀῖ ῖ ᾶῖῖῖῖῖῖῖ ῖ ὀῖ BIOS ὀᾶ ὀῖῖῖῖῖῖῖῖ ἰᾶῖῖῖῖῖῖ ῖῖῖῖῖῖῖῖ (ὀῖ÷ῖῖ ᾶῖᾶῖῖῖῖῖῖ ῖῖ “>1GB drive support”), ᾶῖῖῖῖῖῖῖ ἰᾶ ᾶῖῖῖῖῖῖῖ ᾶῖῖῖ ὀῖ ὀῖῖῖ ῖῖ ἰᾶ ᾶῖᾶῖᾶῖᾶῖᾶῖᾶῖᾶ ὀῖ FreeBSD.

23. Äëäöð ðáβññü öí ìÞíðíä ëÛëíðð “panic: can’t mount root” üðáí äëëéíÞ öí óýóðçíä äëä ðñÞðç öíñÛ ìäðÛ öçí ääëäöÛóóäóç;

Ôí óöÛëíä áððü ðñíÝñ÷äðäé áðü öçí óýä÷ðóç ðíð ðñíëäëäððäé áíäëððäð öíð äëäöíñäðëëéý ðñüðíð ìä öíí ìðíβí öí BIOS ääé öí boot block áíðëëäíäÛííðäé öíðð óëëçñíýð äðóëíðð. Ôí ðñüäëçíä óñíÞëðð äíðáíβæäðäé óä óðóðÞíäðä ìä äýí äðóëíðð IDE, äëäëëÛ üðáí íë äðóëíë äðíäé master (Þ ìüííë öíðð) í ääëÝíäð öðí äëëü öíð äëääëðÞ IDE ääé ìä öí FreeBSD íä äðíäé ääëäðäóóçíÝíð öðí äðóëíë ðíð äñβðëäðäé öðí ääððäñäýííðä äëääëðÞ. Ôí boot block ìñβæäé üðé öí óýóðçíä äðíäé ääëäðäóóçíÝíð öðí ad0 (öí ääýóäñí äðóëíë öíð BIOS) áíÞ ì ððñÞíäð áíäëÝðäé öíí ðñÞðí äðóëíë öðí ääððäñäýííðä äëääëðÞ, ad2. ìäðÛ öçí áíβ÷íäðóç öüí óðóëäðÞí, ì ððñÞíäð ðñíððäëäð íä ðñíðáñðÞðäé áððü ðíð öí boot block ðëóðäýäé üðé äðíäé ì äðóëíð äëëβíççðð, ad0 áíÞ óóçí ðñäñíäðëëëüðçðä äðíäé ì ad2 ääé öðóëëÛ áðíððä÷Ûíäé.

Äëä íä äëíñëÞðäðä öí ðñüäëçíä, ëÛíðä Ýíä áðü óä ðáñäëÛðð:

1. ÄðáíäëëéíÞððä öí óýóðçíä ääé ðëÝóðä **Enter** óóçí ðñíðñíðÞ Booting kernel in 10 seconds; hit [Enter] to interrupt. ìä öíí ðñüðí áððü ëä äääððä öðí ðñüäñäíä öíð öíñðüðÞ äëëβíççðð.

Êäðüðëí äñÛððä set root_disk_unit="disk_number" . Ôí disk_number ëä äðíäé 0 áí öí FreeBSD äðíäé ääëäðäóóçíÝíð öðí master äðóëíë öíð ðñÞðíð äëääëðÞ IDE, 1 áí äðíäé ääëäðäóóçíÝíð öðí slave äðóëíë öíð ðñÞðíð äëääëðÞ, 2 áí äðíäé ääëäðäóóçíÝíð öðí master äðóëíë öíð ääððäñäýííðð IDE ëáíäëéý ääé öÝëíð, 3 áí äðíäé ääëäðäóóçíÝíð öðí slave äðóëíë öíð ääððäñäýííðð IDE ëáíäëéý.

ðäëðä äñÛððä boot, ääé öí óýóðçíä óäð ëä ðñÝðäé íä äëëéíÞðäé ëáííëëÛ.

Äëä íä ëÛíðäð ìüííëç áððÞ öçí äëëäðÞ (Þððä íä íçí ÷ñäëÛäðäé íä ëÛíðäð öí ðáñäðÛíð ëÛëä öíñÛ ðíð äðáíäëëéíÞðä Þ áíäñäíðíëäððä öí FreeBSD íç÷Ûíçíä óäð), äÛëðä öç äñäñÞ root_disk_unit="disk_number" öðí äñ÷äβí /boot/loader.conf.local.

2. ìäðäëëéíÞððä öí äðóëíë öíð FreeBSD öðíí ðñüðäýííðä äëääëðÞ IDE, Þððä íë óëëçñíβ äðóëíë íä äðíäé óñíä÷üíäíë.

24. Ðíëä äðíäé óä üñëä öçð ìíÞíçð;

Ôí üñëí äðíäé óä 4 gigabytes óä ìëä óñíçëëöíÝíç ääëäöÛóóäóç óä äñ÷ëðäëðíëëÞ í386. ìäëëíÞíðäð áðü óëð äëäüðäëð FreeBSD 4.9 ääé 5.1, ððíðçññβæäðäé ääé ðáñëóóüðäñç ìíÞíç íÝóü öíð pae(4). ×ñäëÛäðäé üððüöí íä ìäðäëëüððëóððä ìáíÛ ì ððñÞíäð ðáñëëäíäÛííðäð ääé ìëä Ýíðñä äðëëíäÞ äëä öçí áíäñäíðíβççð öíð PAE:

options PAE

Ôí FreeBSD/pc98 Ý÷äë üñëí óä 4 GB ìíÞíçð, ääé äáí ìðíñäð íä ÷ñçóëíðíëçëäð PAE óä áððÞ öçí äñ÷ëðäëðíëëÞ. Ôðí FreeBSD/alpha, öí üñëí öçð ìíÞíçð äíäñðÛðäé áðü öíí óýðí öíð ðëëëéý ðíð ÷ñçóëíðíëäðäé - äëä ëäððñÝñäëäð ääððä óëð ÓçíäëÞðäëð ëäíðçð Õëëéý äëä Alpha. ¶ëëäð äñ÷ëðäëðíëëÝð ðíð ððíðçññβæííðäé áðü öí FreeBSD, Ý÷íðí äñëäðÛ ìäääëýðäñä ëäñçðëëÛ üñëä ó÷äðëëÛ ìä öç íÝäëóóç ðíðüðçðä ìíÞíçð (ðíëëÛ terabytes).

25. Ðíëä äðíäé óä üñëä öíð óðóðÞíäðíð äñ÷äβí ffs;

Äëä óðóðÞíäðä äñ÷äβí ffs, öí íÝäëóóí ëäñçðëëü üñëí äðíäé óä 8 terabytes (2G blocks), Þ 16ÖÂ äëä ðñíäðëëäñÝí ìÝääëð block öüí 8Ê. Óóçí ðñäñíäðëëëüðçðä, ððÛñ÷äë Ýíä äñ÷ëëü üñëí 1 terabyte, äëëÛ ìä ëÛðíëäð ìäðäðñíðÝð, äðíäé äñíäüðí íä äçíëíðñäçëýí (ääé ððÛñ÷äíð) óðóðÞíäðä äñ÷äβí ìääÝëíðð 4 terabytes.

Ôí íÝäëóóí ìÝääëðð áíüð äñ÷äβíð óä Ýíä óýóðçíä ffs äðíäé ðáññðíð 1G blocks, Þ 4TB ìä ìÝääëðð block öüí 4K.

Ðßíáëäò 3-1. ÌÝãéóðá ìããÝëç áñ÷åßùí

ÌÝããëò block fs	ëäëöíðñãåß	ðñÝðäë íá ëäëöíðñãåß
4K	4T-1	>4T
8K	>32G	32T-1
16K	>128G	32T-1
32K	>512G	64T-1
64K	>2048G	128T-1

¼ðáí ðí ÌÝããëò block ðíò fs åßíáë 4K, ëäëöíðñãýí ðá ðñëðëÛ Ýíìáóá blocks (triple indirect blocks) ëäë ðá ðÛíðá ëá Ýðñäðá íá ðññëíñßæíðáë ìùíí áðù ðí ÌÝãéóðí áñëëíù block ðíò ìðíñåß íá áíáðñáóóäëåß ìå ðç ÷ñðóç ðñëðëðí Ýíìáóúí blocks (ðññßðíò $1K^3 + 1K^2 + 1K$), äëëÛ ðäëëëÛ í ðññëíñëóíùð òðåßëäðäë óå Ýíá (ëÛëò) ùñëí 1G-1 óðíòð ãñëëíýð ðùí blocks. Õí ùñëí óðíòð ãñëëíýð ðùí block ëá Ýðñäðá íá åßíáë 2G-1. ÕðÛñ÷íðí ëÛðíëá ðñíäëðíäðá ùðáí íë áñëëíùß ðùí block ðíò fs ðëçóëÛæíðí ðí 2G-1, äëëÛ ðÝðíëëë áñëëíùß block äáí ìðíñýí íá ðñíóääëóðíýí ùðáí ðí ÌÝããëò block fs åßíáë 4Ê.

Ãéá ìããÝëç block 8Ê ëäë ìããäëýðãñá, ðá ðÛíðá ëá Ýðñäðá íá ðññëíñßæíðáë áðù ðí ùñëí 2G-1 óðíòð ãñëëíýð ðùí block ðíò fs, äëëÛ óðçí ðñáñíáðëëùðçðá í ðññëíñëóíùð òðåßëäðäë óðí ëÛëò ùñëí 1G-1 óðíòð ãñëëíýð ðùí block ðíò fs. H ÷ñðóç ðíò óóðóýí ìñßò ðùí 2G-1 blocks, æçíëíðñãåß ðñÛáíäðë ðñíäëðíäðá.

26. Ãéáðß ðáßñíù ðí ìðíðíá ëÛëò, “archsw.readin.failed” ìåðÛ ðçí ìåðãæðððëóç ëäë äëëßçóç íÝò ððñðíá; Ãéáðß í ððñðíáð óåð ëäë ðí ððùëíëðí ðíò äáóëëýý óðóððíáðíð (world) åßíáë äëðùð óðã÷ñííëóíýý. Ç ëäëöíðñãá óå äððð ðçí ëåðÛóðáóç äáí ððíóðçñßæåðäë. Åããäëùåßðå ùðë ÷ñçóëíðíëåßðå ðëð áíðíëÝð make buildworld ëäë make buildkernel äëá íá áíáäëíßðåðå ðíí ððñðíá óåð.

Ìðíñåßðå íá äëëëíðóåðå ìñßæíðáð ðíí ððñðíá áðððëåßðå áðù ðí ääýðãñí óðÛäëí, ðëÝæíðáð ìðíëäððíðå ðëðëðñí ìùëëð äåßðå ðí ìäë ðñëí ìäëëíðóäë í loader.

27. Ç äãëäðÛóðáóç ëåðãññÝäë ëåðÛ ðçí äëëßçóç. Õë ìðíð íá ëÛíù; ÄíëëíÛóðå íá áðñáññáíðíëðóåðå ðçí ððíóððññëç ACPI. ìùëëð ìäëëíðóäë í òíðòòðð äëëßçóçð, ðëÝóðå ðí ðëðëðñí space. To óýóðçíá óåð ëá äíðáíßóäë

OK

. ÅñÛðåå

`unset acpi_load`

ëäë ëåðùðëí

`boot`

.

Óçìáépóáéò

1. Óå Ýía e-mail áðü ôíí Keith Frechette <kfrechet@us.ibm.com>.

ΕὰοÛεάεί 4 Óõìâáôüôçôá Ôëéëÿ

4.1 ΆάίεëÛ

1. ÈÝèù íá áãñÛòù òëéëù áéá ôï FreeBSD óýóçíá ïò. Ðíéï ïïðÝéï / ïÛñéá / óýðïð áβίáé ôï éáéýðãñï;

ÕðÛñ÷ïïí óõíÝ÷·áéá óðæçððóáéð áéá ôï èÝìá áðòü óðéð èβóðáð çèáèòñïíééý ðá÷·ðãññáβïò ôïò FreeBSD. Áðòü ùóòüóïí áβíáé áíáíáíüíáí, éáèðð ôï òëéëù ðùí òðñéíáéóððí áëëÛæáé ðñéý ãñðáñá. Άíáβð *átáèñéíðñéýíá* íá óõíéóðñéýíá ïá Ýìóáç, íá áéááÛóáððá ðéð Óçìáèðóáéð Ôëééý ðïò FreeBSD 8.0

(<http://www.FreeBSD.org/releases/8.0R/hardware.html>) Þ 7.3

(<http://www.FreeBSD.org/releases/7.3R/hardware.html>) éáé íá øÛíáðá óðá áñ÷·áβá

(<http://www.FreeBSD.org/search/#mailinglists>) ðùí ééóððí çèáèòñïíééý ðá÷·ðãññáβïò, ðñéí áñ÷·βóðáð íá ñùðÛðá ó÷·áðéëÛ ïá ôï ðáéáððáβï éáé éáéýðãñï òëéëù. Άβíáé áñéáðÛ ðééáíü íá áéáðéóððóáððá, ùðé áéá ôï òëéëù ðïò áíáæçðÛðá, òððñíá ó÷·áðéëÛ óðæðçççç ïüééð ðñéí íéá áããñÛáá.

Áí øÛ÷·íáðá áéá òñççòü òðñéíáéóðð, áéÝáíðá ðá áñ÷·áβá ððð èβóðáð çèáèòñïíééý ðá÷·ðãññáβïò freebsd-mobile (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-mobile>). ÁéáðññáðéëÛ, ïÛëéí éá èÝéáðá íá ááβðá ðá áñ÷·áβá ðçð freebsd-questions (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-questions>) Þ ðééáíüí íéá èβóðá ðïò íá áíáéééáýáðáé óõí óýðï ðïò òëééý ðïò øÛ÷·íáðá.

4.2 Άñ÷·éðáèòñïíééÝð éáé ΆðáíáññáóðÝð

1. Ôðïóççñβæáé ôï FreeBSD áñ÷·éðáèòñïíééÝð áéáðññáðééÝð áðü ðçí x86;

Íáé. Áððð ðç óðéáìð ôï FreeBSD ïðññáβ íá áéðáéáððáβ ðá áñ÷·éðáèòñïíééÝð x86 éáé DEC (ððñá ðéÝïí Compaq) Alpha. Áðü ôï FreeBSD 5.0 éáé ïáðÛ, òðïóççñβæííðáé áðβçðð íé áñ÷·éðáèòñïíééÝð AMD64 éáé Intel EM64T, ç IA-64 éáèðð éáé ç Sparc64®. Άñ÷·éðáèòñïíééÝð ðïò éá òðïóççñβæííðáé ïáéëñíðéëÛ, ðãñééáíáÛñïí ðçí MIPS® éáé PowerPC. Ìðñáβðá íá áããñáóðáβðá óðéð èβóðáð ðá÷·ðãññáβïò freebsd-ppc (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-ppc>) éáé freebsd-mips (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-mips>) áíðβðïíé÷·á áéá ðççññïññáð ó÷·áðéëÛ ïá ðçí ðñüñáí ðùí áññáóéðí ðá áððÝð ðéð áñ÷·éðáèòñïíééÝð. Áéá ááíééÝð ðççññïññáð ó÷·áðéëÛ ïá íÝáð áñ÷·éðáèòñïíééÝð, áããñáóðáβðá ðççí çèáèòñïíééð èβóðá ðïò FreeBSD áéá ðéð ïç·Intel ðéáððüññáð (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-platforms>).

Áí ôï ïç÷·Ûíçíá óáð áβíáé áéáðññáðééðð áñ÷·éðáèòñïíééðð éáé ÷ñáéÛæáððá éáéðïññáéëù Ûíáóá, óáð óõíéóðñéýíá íá ñβíáðá íéá ïáðéÛ óðá NetBSD (<http://www.netbsd.org/>) Þ OpenBSD (<http://www.openbsd.org/>).

2. Ôðïóççñβæáé ôï FreeBSD Óðñáðñéèð Ðñéðáðáíáññáóðá (SMP);

Íáé. Ôï SMP Þðáí áíáñáðñéçíÝñ áðü ðññáðééñáÞ óõí ððñíá *GENERIC* Þæç áðü ôï FreeBSD 5.2.

Ç áñ÷·éëÞ ðññéáçç Þðáí íá áβíáé áíáñáðñéçíÝñ áðβçðð áðü ðññáðééñáÞ éáé óõí ððñíá ððð Ýéäñçðð 5.3 ðïò FreeBSD, áéëÛ èüäü èÛðñéñ ðññáççíÛðùí ðççí áéðÝéáçç ðïò ððñíá SMP ðá ïç÷·áíðíáðá ÷·ññð ðñééáðñéýð áðáíáññáóðÝð, áðñóáóβðççá íá ïáβíáé áíáíáññá ïÝ÷·ñé ðçí áíðéíáðððéçç ðïòð. Áðòü ùóòüóïí áðñóáèáβ ðññáðñáéýðçðá áéá ðçí Ýéäñçç 5.4 ðïò FreeBSD.

6. Õí ðííóðëë ïí ÿ ÷ äë äëÛöíñá Ýíððíá ðëðëðñá éäë ñíäÝëä éýëëóçð. Ìðíñ íá óá ÷ ñçóëíðíëðóó òðí FreeBSD;

Ç áðÛíðçç, äððð÷ðð, áðíäë “áíáñðÛóäë”. Óá ðííóðëëá ïá Ýíðñá äöíáóóççðð òðíðëò áðäëðíýí áíäëäëäðíÝíá ðñíáñÛíáðá íäðäççðð. Áí òí ðñüáñáíá íäðäççðð òíð ðííóðëëýð ð òí áíððóðíë÷í ðñüáñáíá òíð ÷ ñðóðç ääí ðáñÝ ÷ ïðí òðäëäëñëÝíç òðíðððñëíç äëä òí ðííóðëë, éä éäëðíðñáð ùð Ýíá áðëü ðííóðëë äýí ð òñëðí ðëðëðñíí.

Ãëá ðëäíð ÷ ñðóç òçð ñíäÝëäð óá ðáñëáÛëëí X Window, ääððá òçí áíððóðíë÷ç áíüðçðá.

7. Ðùð ïðíñ íá ÷ ñçóëíðíëðóó òí ðííóðëë / trackball / touchpad òðí òñçðü ïð òðíëäëððð;

Ãäððá òçí áðÛíðçç òççí ðñíçáíýíáíç áñðççç.

8. Ðùð ïðíñ íá ÷ ñçóëíðíëðóó òí ðëðëðñí delete òðí sh éäë csh;

Ãëá òí **ÊÝëððð Bourne**, ðñíðëÝóðá òëð äëüëðëðð áñáíÝð òðí áñ÷áðí óáð .shrc. Ãäððá áððçðð òëð óäëðäð manual sh(1) éäë editrc(5).

```
bind ^? ed-delete-next-char # for console
bind ^[[3~ ed-delete-next-char # for xterm
```

Ãëá òí **ÊÝëððð C**, ðñíðëÝóðá òëð äëüëðëðð áñáíÝð òðí áñ÷áðí óáð .cshrc. Ãäððá áððçðð òç óäëðäá manual òíð csh(1).

```
bindkey ^? delete-char # for console
bindkey ^[[3~ delete-char # for xterm
```

Ãëá ðáñëóóóðððð ðëçñíðñðð, ääððá áððð òç óäëðäá (<http://www.ibb.net/~anne/keyboard.html>).

4.5 ÓððëäðÝò óäëñëäëðð áðëëíëííðáð éäë Äëëðýóçð

1. Ðíëðð ìÛñððð äëëðýíð òðíðççñðäë òí FreeBSD;

Ãëá òçí ðëðñç ëððá, ääððá òëð Óçíäëððäëð Õëëëíý ðíð ðáñÝ ÷ ïíðäë ïá ìÛëä Ýëäíðç òíð FreeBSD.

2. Õðíðççñðäë òí FreeBSD modems ðíð ëäëðíðñáíýí ïá òç áíðëäëä ëíäëðíëëýí ùððð óá Winmodems;

To FreeBSD òðíðççñðäë áñëäðÛ software modems ïá òçí áíðëäëä áðëðñüðëäðíð ëíäëðíëëýí. Õí port comms/ltmdm ðñíðëÝóäë òðíðððñëíç äëä modems ðíð áäóðæííðäë òðí äçíðëëÝð éýëëüíá Lucent LT. Õí port comms/mwavem òðíðççñðäë òí modem ðíð äëäëÝðíðí íë òñçðíð òðíëäëððÝð Thinkpad 600 éäë 700 òçð IBM.

Ãäí ïðíñððá íá ääëäóáððððð òí FreeBSD ïÝð software modem. Õí ëíäëðíëëü áððü ðñÝðäë íá ääëäóáððäëð ïáðÛ òçí ääëäðÛóðáç òíð FreeBSD.

3. ÕðÛñ÷äë äääáíÝð ðñüáñáíá íäðäççðð äëä òëð ìÛñððð Broadcom 43xx;

¼÷é, éäë ïÛëëí ääí éä òðÛñäë.

Ç Broadcom áñíððäë íá äððäë äçíðëä ðëçñíðñðð ò÷äëëÛ ïá òí ðñíáñáíáðëðíü òíð íëíëëçññíÝíí òçð ðíð ÷ ñçóëíðíëíýíðäë óá äðáñíáÝð áóýñíáðíü äëëðýí, ðëäáííü áðäëäð éäë òí òíðíá òíð ðñðíäÝëðç òçð ìÛñððð

7. Ç PCMCIA êÛñôá ïï äâí ëäéôïðñãâ. ÂëÝð òí âíðò ìííðíá: “cbb0: unsupported card type detected.” Òé ìðñí íá êÛñ;

Ìðññâðâ íá äíëéìÛóâðâ íá ÷ñçóéìðñéðóâðâ ôçí áñ÷éð òëððíðçóç OLDCARD. Òñðððñéðóâðâ òí áñ÷âí ñýèìéóçð òïð ððñíá óáð, êáé áðáéñÝóâð òéð áêüëððéâð ãñáìÝð:

```
device cbb
device pccard
device cardbus
```

ÌáðÛ ðñíóèÝóâð:

```
device pcic
device card 1
```

Ìáðääëùðððóâðâ íáíÛ êáé ääéáðáóððóâðâ òí íÝí ððñíá üðùð ðññéãñÛððáé óðçí Ñýèìéóç ððñíá òïð FreeBSD (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/kernelconfig.html).

ΕὰοÛεάέϊ 5 Αίôείαôþðέος ÐñïäēçïÛôùϊ

1. Ἀέάðß ðï FreeBSD äñßóēāē ēÛēïð ðïóüðçðά ιίþìçð;

Ἀððü ãðāßēāðāē óðç äēáðïñÛ ïāðáíý òðóēēþï ēāē äēēïēēþï äēāðēýïðāùï ιίþìçð.

Ç óýìāáóç ðïð éäðÛ äÛóç äēïēïðēāßðāē óðï ðēēēü ðïð PC, āßíāē íā ÷ñçóēïïðïēāßðāē ç ιίþìç ïāðáíý 3.5G ēāē 4G āēā äēāēēü óēïðü, óðïþēüð āēā ðçï ðñüóāáóç óā ēÛñðāð PCI. Ἀððü Ý÷āē ùð äðïðÝēāóíā íā ιçï ïðññāß íā áïðēóðïē÷çēāß òðóēēþ ιίþìç óā äððþ ðçï ðññēï÷þ äēāðēýïðāùï.

Ôï ðēēēü ðïð ððïēïäēóðþ óāð ēā ēāēïñßðāē ðē āßíāðāē ïā ðçï ιίþìç ðïð ēāñïēēÛ āïðáíßæāðāē óā äððþ ðç ēÝóç. Ἀðððð÷þð, óā ēÛðïēāð ðññēððððāēð ðï ðēēēü āāï ēÛíāē ðßðïðā, ēāē ÷Ûíāðāē ç āðïáðüðçðā ÷ñþóçð ðüï ðāēāððāßüï 500ï ιίþìçð RAM.

Ἀððð÷þð, óðēð ðññēóóüðññāð ðññēððððāēð ðï ðēēēü áíāēāðððēýíāē ðç ιίþìç óā ððçēüðññç ēÝóç, þððā íā āßíāē äēüïā āðïāðþ ç ÷ñþóç ðçð. Ἀððü ïðññāß ùððüðï íā óāð ðññēāēÝðāē ēÛðïēā óýā÷ðóç áï ðññāēïēïðēāßðā óā ιçïýíāðā āēēßíçðçð.

Óðçï 32 bit Ýēāïðç ðïð FreeBSD, ç ιίþìç ðāßíāðāē íā Ý÷āē ÷āēāß ēāēþð áíāēāðððēýíāðāē ðÛï ðāð ðā 4G, ðā ïðññā āāï āßíāē ðññóāÛðēíā äðü 32 bit ððñþíā. Óðçï ðññßððððç äððþ ç ēýóç āßíāē íā ððēÛíāðā Ýíā ððñþíā óýðïð PAE. Ἀāßðā äððþï ðçï ēāðā÷þñçóç óðï FAQ āēā ðññēóóüðññāð ðççñïïññāð.

Óðçï 64 bit Ýēāïðç ðïð FreeBSD, þ ùðāí ÷ñçóēïïðïēāßðāē ððñþíāð óýðïð PAE, ðï FreeBSD ēā áíē÷íāýðāē ēāē ēā áíāēāðððēýíāē ðüððÛ ðç ιίþìç þððā íā āßíāē ÷ñçóēïïðïēþðēíç. ἘäðÛ ðçï āēēßíçðç ùððüðï, ïðññāß íā ðāßíāðāē ùðē ðï FreeBSD áíē÷íāýāē ðññēóóüðññç ιίþìç äðü äððþ ðïð Ý÷āē óðçï ðññāñíāðēēüðçðā ðï óýóðçíā. Ἀððü āßíāē ððóēēïēāēēü ēāē ç äēāēÝðēíç ιίþìç ēā äēïññēðēāß ēāēþð ïēïēçññþíāðāē ç äēāēēāððā ðçð āēēßíçðçð.

2. ïðēççñüð ïïð āßðēïð Ý÷āē ÷āēáðïÝñðð ðññāð. Ôē ïðñþ íā ēÛï;

Óðïðð āßðēïðð SCSI, ï ïāçāüð ïðññāß óðïþēüð íā āðāíāðïðïēāðððāē äððüïāðā óā āāññÝíā óā áíāēēāēðēēïýð ðññāð. Ûððüðï ïē ðññēóóüðññē āßðēïē Ýñ÷íðāē ïā ðçï āðïáðüðçðā äððþ äðññāññäïēçïÝíç.

Ἀēā íā áññāññäïēþðāðā ðçï āðāíāðïðïēÝðçðç ÷āēáðïÝññ ðññÝñ, āðñññāññāððāððā ðçï ðñþðç óāēßāā ēäðÛððāóçð ðçð ðððēāððð (modepage), āßññíðāð ðçï ðññāēÛðð áíðïēþ (ùð root):

```
# camcontrol modepage sd0 -m 1 -e -P 3
```

ēāē äēēÛíðā ðēð ðēïÝð ðüï AWRE ēāē ARRE äðü 0 óā 1:

```
AWRE (Auto Write Reallocation Enbld): 1
ARRE (Auto Read Reallocation Enbld): 1
```

Ïē óýā÷ñññē ïāçāñß óýðïð IDE Ý÷íðï āðßðçð áññññäïēçïÝíç äðü ðï āñññóðÛðēï ðç āðïáðüðçðā āðāíāðïðïēÝðçðçð ÷āēáðïÝññ ðññÝñ.

Áï āāßðā ðññāēāññäïēþðāēð ð÷āðēēÛ ïā ÷āēáðïÝññðð ðññāðð (óā ïðïēïþððïðā āāññð āßðēïð), āßíāē þñā íā óēāððāßðā íā äēēÛíāðā ðññ ïāçāñ. ðððð ïðññÝðāðā íā ÷ñçóēïïðïēþðāðā ðï äēāññððēēü ðñññññññä ðïð āßíāē ï ēäðāóēāððāððð ðïð āßðēïð āēā íā äðñññþðāðā ðïðð ÷āēáðïÝññðð ðññāðð, äēēÛ óðçï ēāēýðññç ðññßððððç äðēþð ēā ēāññāßðāðā ēßññ ðññēóóüðñññ ÷ññññ.

16. ¼ðáí íáèéíþ òí òýóðçíá ïð ðáßññü òí ëÙèðð “ahc0: illegal cable configuration”. Ç éáèùääßðóç ïðð áßíáé ðùððð. Õé ððíááßíáé;

Ç içönéeP ðeéeÝóá oáo aái Ý÷æ óá aðáéeiýiáíá áìuòáñéèÛ òèèèpiáoá þóóá íá oðíróçñBææé áóóuìáòì ðáñiáoéóuì òìò áéáyèìò SCSI. ÁíòB íá ááoBæáóóá óòíí áóóuìáòì ðáñiáoéóuì, açèþóðá óòí SCSI BIOS òíí óuòóu ðáñiáoéóuì áéá òç áéÛóáiç óóóèáðpí ðìò Ý÷áoá. Òì ðñuāñáíá íāþāçóçð òìò AIC7XXX aái iðināB íá éáèinBóáé áí āBíáé áéáéÝóéì òí éýèèuìá ðìò ÷ñçóéìðíeāBóáé áéá òçí áíB÷íáoóç òìò éáèuāBìò (Ûñā éáé òìò áóóuìáòì ðáñiáoéóuìý). Òì ðñuāñáíá íāþāçóçð ððìèÝóáé uóé ððÛñ÷æ ððíóðPñéíç, áóóuìí íé ñòèìBóáéð ðìò ðáñéÝ÷ííóáé óóç óáéñéáèP EEPROM áíáoÝñìòí "áóóuìáòì ðáñiáoéóuì". Óó÷íÛ, ÷ññB òí áìuòáñéèè éýèèuìá áíB÷íáoóçð òìò éáèuāBìò, òí ðñuāñáíá íāþāçóçð éā ñòèìBæáé éáíeáóíÝíá òíí ðáñiáoéóuì, èÛóé ðìò iðināB íá açìéìñāBóáé ðñuāèçìá óóçí áíéìðéóóBá òìò áéáyèìò SCSI.

17. Ἀέαὸβ οἱ Sendmail ἀβίαέ οἱ ἰρίοιά εὐέϊοὸ ““mail loops back to myself””;

Áõöü đăñéăñŬöăôăé ôôi sendmail FAQ üđùò öăβíăôăé đăñăêŬôù:

* Ðáßñíù ìçýíáôá ëÛèïðð "Local configuration error" üðùð ôï:

553 relay.domain.net config error: mail loops back to myself

554 <user@domain.net>... Local configuration error

Đuò ìđĩñþ íá ǎđéěýòù ôĩ đñüâęcíá;

÷ ãð ãæçððóáé íá éáðãðëýíðáð ðí mail ðñíð ðí domain (ð.÷. domain.net)
ðñíð ëÛðíëí òðãããñëíËÝí ìç ÷ Ûíçíá (óðçí ðãñðððóðç áððð, ðí
relay.domain.net) ÷ ñçóëíðíëíðíóáð íéá áããñáðð MX, áëÛ Ò ðí ìç ÷ Ûíçíá
ðíð ëÛíáé ðçí áíáéáðáýëðíðç ááí áíááíññðæáé ðíí ááððü ðíð ùð
domain.net. ÐñíðëËÝðá ðí domain.net ððí /etc/mail/local-host-names
(áí ÷ ñçóëíðíëíáððá ðí FEATURE(use_cw_file)) ð ðñíðëËÝðá
"Cw domain.net" ððí /etc/mail/sendmail.cf.

Ç õñÝ÷÷÷÷÷÷ Ñëäíõç ðí÷ sendmail FAQ (<ftp://rtfm.mit.edu/pub/usenet/news.answers/mail/sendmail-faq>) ääí
 ððíðçñäðäðä ðëÝíí ìä ëÙëä Ñëäíõç ðí÷ sendmail. Ùððúíí, äçííóëäýäðäé áíÙ ääëðÙ äëäóððíäðä óðëð ëððóäð
 comp.mail.sendmail (news:comp.mail.sendmail), comp.mail.misc (news:comp.mail.misc), comp.mail.smail
 (news:comp.mail.smail), comp.answers (news:comp.answers), êäé news.answers (news:news.answers). Ìðñíäðä
 äððóçð ìä ëÙääðä áíððäñäíí ÙÝòù email, óðÝëñííóä Ñíá Ìðñíä óðí <mail-server@rtfm.mit.edu> ìä ðçí áíðíëð
 send usenet/news.answers/mail/sendmail-faq óðí ëýñëí ÙÝñíð ðí÷ ìçíýíäððð.

18. Ἀέαὸβ ἀαί οὐιδᾶνεὸΎννιὸαέ οὐοὸὔ ιέ ἀοᾶνιῖᾱΎὸ δῆPνιῖὸδ ιεὐιϕὸ οᾶ ἀδῖᾱᾶἐνῖοίΎία ιϕ÷αίPῖαὸᾶ;

Ἄβριας δεεσίου οἱ ἀδναῖνοι ὧν ἱς ÷ Ὑρία ἰά ηῶι βεαῖς οἱ δὲ οἱ οἰαῖοεῖς ῥαὸ ῥα εὔοε ἀεῖοιναῖοεῖς ἀδὺ οἱ δὲ οἱ δὲ
cons25 δῖο ἀδαιῖοαῖοεῖς ἀδὺ ὁαῖ εἰοῖα οἱ οἱ FreeBSD.

ÕðÛñ ÷ iõí æéÛöirié ôñuðié æéá íá ðañaéÛìøåðå áõöü ôi ðñuâëçíá:

- [illegible]

31. Ôé åbíáé ôï “lock order reversal”;

I Robert Watson <rwatson@FreeBSD.org> ἀδὴρ ὁ ὅτι ἡ ἀντιμετώπιση τοῦ ἐνὶ τῷ freebsd-current (http://lists.FreeBSD.org/mailman/listinfo/freebsd-current), ὅτι ἡ ἀντιμετώπιση τοῦ ἐνὶ τῷ "lock order reversals - ὁ ἐνὶ τῷ freebsd-current (http://docs.freebsd.org/cgi/getmsg.cgi?fetch=65165+0+usr/local/www/db/text/2003/freebsd-current/20031221.freebsd-current)"

Ιε δηλαειαιδιεΠωαιο αοοΥο δηΥν÷ηοας αδι οι Witness, Υια αεαφιοοεου ογοογια αεα εεαεπιαοα εαοΥ οε εαοιοηαβ (run-time lock) οι ιοηβι ανηοεαοαε οοιοο δηηβιαο -CURRENT οιο FreeBSD (αεεΥ αοαεηαβοαε οοοο αηοβογιαο αεαυοαοε). Ιοηαβοα ια αεαΥΟαοαα δηαεοοουαηα αεα οι Witness εαε οεο αοιαοιουογαοο οιο, οοε οαεβαα manual witness(4). ΙαοαφΥ Υεευι οι Witness αηαεεεαηαε οε οαεηΥ ουι run-time locks ÷ηεοεοιδηεβιαοο Υια οοιαοαοιυ αδι αηουααοιυΥιαο οαεηΥο εεαεαυιΥοιυ εαεβο εαε αδι οε οαεηΥ οιο αιε÷ηαηαοαε εαοΥ οεα αεοΥεαοε, εαε δηηΥααε δηλαειαιδιεΠωαιο οοεα εηιοεα ηοαη δηαηαεΥαηιοαε. Οεηοιυ αοοβο οεο εαοιοηαβαο αβιαε ια αιε÷ηαηηοαε δεαηΥ deadlocks οα ιοηβι ιοηαβ ια ιαβειηιοαε οα δηαηαεΥοαοεο οεο οαεηΥο ουι εεαεαυιΥοιυ. Αβιαε αηειογιαβηοι ηοε οι Witness αβιαε εΥοιυ οοιοηεηοεεε, εαε αβιαε δεαηηι ια αηοαε εΥοιυ δηλαειαιδιεΠωαιο. Οοεα δηαηοδουοε οιο οι Witness αηαοΥηαε Υια δηαηαοεεε ηηυαεγια ια οεα οαεηΥ ουι εεαεαυιΥοιυ, αβιαε οα ια εΥαε "αη οαοοαη Υοο÷ηο, εα οαο αβ÷α οοιααε deadlock οα αοοι οη ογιαβι". ΟδΥο÷ηοι εΥοηεαο αηυοοΥο δηαεδηοβαοεο "εαεαοιΥιχε εαηΥαηιοο" αεα οεο ιοηβιαο ÷ηαεΥαοαε ια αηειοηαβοηοια εαεηοαηε οαεηηηβιοο οβοα ια αηεηοηαβια εαε οεο δηαεδηοΥο αηαοηηΥο οαεαεΥοιυ. Ιε εεαυοαηι αηυοοΥο δηαεδηοβαοεο ιαβειηιοαε δηαεοοουαηι οα ιΥα εεαεπιαοα, εαεβο ηε αηεοεοηηοΥο οεο οαεηΥ ουι εεαεαυιΥοιυ αεηηεβηηιοαε αηβαηηα αηαεαβ οι Witness αβιαε οΥοηα αηαο÷ηεηιΥηι εαε αηειοηαβ οοηΥ÷αεα ιΥαο δηλαειαιδιεΠωαιο :-).

—Áðũ õĩ Robert Watson <rwatson@FreeBSD.org> óôç ëßóá freebsd-current
(<http://lists.FreeBSD.org/mailman/listinfo/freebsd-current>), óóó 14 Äââîâñßĩ 2003

Όçiaßuoc: Áðü ðï áðieáeriá "eáieáoYíc æeÜáiuoc" açietõnããßoáe oçç ðñãããioéeüoçðã üoá ði Witness ãñóeáe eÜðieí ðieý ðet oíããñü eÜeio. ÖYóieá eÜeç áßiáe oððeáÜ ði oðÜeíã oáëßãáo (page fault) Þ eáieáoYiá äããñYiá oçç líÞic YÝóá oðii ðõñÞiá, Þ öYeio óýãeñiõoc iñiáoßáo iã eÜðieá mutexes.

Όγιαβυός: Άαβδὰ όγι όαββΑά όϊό Bjoern Zeeb ό÷άόέέÜ ιά όέό άίόέόόñϊόÝο έέάέαυιÜόυι
(<http://sources.zabbadoz.net/freebsd/lor.html>) άέά όγι έάόÜόόάόό όυι άϊυόόβι άίόέόόñϊόβι.

32. Ôé óçíáβíáé ôî ìΠíõîá “Called ... with the following non-sleepable locks held”;

Όσιαβίαε υόε έερεεεά ιεά οοίŨñόοςό ιά άοίαόουόοςά sleep άπ όςι βάεά όόεάιP Pόάί άίάñāü ēŨñēí έέάβāüιά mutex (P άίόβόόίε÷í ÷ ũñβó άοίαόουόοςά sleep).

Ἴ euaro aea oti idhiti adou abiaae eUero abiaae adaapea oa mutexes aai dhnthbaefioae ia enaioiyioae aea iaauaea +nueeu aeaodpidaa. Abiaae iuthi aea oc oioipnchoc ieenpi dapeuaui ooa+nueoiiy. Adop c dhnthbaiaaeoodeeP oioiuiBa adoonYdae ooiro iagayod oodeaopri ia +nchoeiidieiyi mutexes aea ia ooa+nibaeioae ia oa odueieda dhnthbaiaa oio dhnpi aeou oc i aeUneaee ou interrupts. Oa interrupts (odi FreeBSD) aai idhiiyi ia dapeYeeioi oa aeouoaaoc sleep. Aea oi euai adou abiaae adanaochoi ia ici idieeUnaaae i dhnpiad aea iaaueti aeUoocia adu eUdiei odioyocia oio enaouae Yia mutex.

[illegible]

Áí óõíõñßá, áðõíý õîð åßäïðð ïé ðññáéäïðéþóáéð åáí åßíáé óõíþèùð ïïéñáßåð, áëëÛ òðù ïñéóìÝíåð áðð÷åßð ðññùðñèÝóáéð, ïðññåß íá ðññéáéÝóìõí áíåðéèýìçðåä öáéíìííá íåä ïðññåä èõìåßññíóáé áðù ïéå öðéåìéååßåä ððþóç óðçíí áðùèñéóç õîð óðóðþíåðò, ïÝ÷ñé ðèþñçð éåðÛññåðóç.

33. Åéåðß ç äéåäééåóåßåä buildworld/installworld óðåìåðÛåé ïå õì ïþñòìåä “touch: not found”;

Ôñ ïþñòìåä áððù åáí óçìåßíåé ùðé óåð èåßðåé õñ äñçèçðéèù ðññåññåìíåä touch(1). Ôñ èÛèðð áððù ðññéåååßðåé óõíþèùð áðù éåíéåóìÝíç, ïåëëíðééþ, óþíåíóç çìññçíåðð õñí åñ÷åßíí. Áí õñ ïññüé CMOS õñð ððññéåóððþ óåð åßíåé ïðèíéóìÝíñ äéåä õñðééþþ þñå, ðñÝðåé íåðåéÝóåðåä óçí åñðñéþþ adjkerntz -i åéå íåä ïåä ïðèñóåðåä õñ ïññüé õñð ððñþñåä ùðåí åèééíåðåä óå éåðÛððåóç èåéõñðñåðð åñùð ÷ñþóç.

ΕὰöÜëáéĩ 6 ÅìðĩñééÝò ÅöáñĩĩãÝò

ΌçĩăBũóç: This section is still very sparse, though we are hoping, of course, that companies will add to it! :) The FreeBSD group has no financial interest in any of the companies listed here but simply lists them as a public service (and feels that commercial interest in FreeBSD can have very positive effects on FreeBSD's long-term viability). We encourage commercial software vendors to send their entries here for inclusion. See the Vendors page (<http://www.FreeBSD.org/commercial/index.html>) for a longer list.

1. Where can I get an Office Suite for FreeBSD?

The open-source OpenOffice.org (<http://www.openoffice.org>) office suite works natively on FreeBSD. The Linux version of StarOffice (<http://www.sun.com/staroffice/>), the value-added closed-source version of OpenOffice.org, also works on FreeBSD.

FreeBSD also includes a variety of text editors, spreadsheets, and drawing programs in the Ports Collection.

2. Where can I get Motif® for FreeBSD?

The Open Group has released the source code to Motif 2.2.2. You can install the `open-motif` package, or compile it from ports. Refer to the ports section of the Handbook

(http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/ports.html) for more information on how to do this.

ΌçĩăBũóç: The Open Motif distribution only allows redistribution if it is running on an open source (<http://www.opensource.org/>) operating system.

In addition, there are commercial distributions of the Motif software available. These, however, are not for free, but their license allows them to be used in closed-source software. Contact Apps2go for the least expensive ELF Motif 2.1.20 distribution for FreeBSD (either i386 or Alpha).

There are two distributions, the “development edition” and the “runtime edition” (for much less). These distributions includes:

- OSF/Motif manager, xmbind, panner, wsm.
- Development kit with uil, mrm, xm, xmcxx, include and Imake files.
- Static and dynamic ELF libraries.
- Demonstration applets.

Be sure to specify that you want the FreeBSD version of Motif when ordering (do not forget to mention the architecture you want too)! Versions for NetBSD and OpenBSD are also sold by *Apps2go*. This is currently a FTP only download.

More info

Apps2go WWW page (<http://www.apps2go.com/>)

or

<sales@apps2go.com> or <support@apps2go.com>

or

phone (817) 431 8775 or +1 817 431-8775

Contact Xi Graphics for an a.out Motif 2.0 distribution for FreeBSD.

This distribution includes:

- OSF/Motif manager, xmbind, panner, wsm.
- Development kit with uil, mrm, xm, xmcxx, include and Imake files.
- Static and dynamic libraries (for use with FreeBSD 2.2.8 and earlier).
- Demonstration applets.
- Preformatted manual pages.

Be sure to specify that you want the FreeBSD version of Motif when ordering! Versions for BSDI and Linux are also sold by *Xi Graphics*. This is currently a 4 diskette set... in the future this will change to a unified CD distribution like their CDE.

3. Where can I get CDE for FreeBSD?

Xi Graphics used to sell CDE for FreeBSD, but no longer do.

KDE (<http://www.kde.org/>) is an open source X11 desktop which is similar to CDE in many respects. You might also like the look and feel of xfce (<http://www.xfce.org/>). KDE and xfce are both in the ports system (<http://www.FreeBSD.org/ports/index.html>).

4. Are there any commercial high-performance X servers?

Yes, Xi Graphics (<http://www.xig.com/>) sells Accelerated-X products for FreeBSD and other Intel based systems.

The Xi Graphics offering is a high performance X Server that offers easy configuration, support for multiple concurrent video boards and is distributed in binary form only, in a unified diskette distribution for FreeBSD and Linux. Xi Graphics also offers a high performance X Server tailored for laptop support.

There is a free “compatibility demo” of version 5.0 available.

Xi Graphics also sells Motif and CDE for FreeBSD (see above).

More info

Xi Graphics WWW page (<http://www.xig.com/>)

or

<sales@xig.com> or <support@xig.com>

or

phone (800) 946 7433 or +1 303 298-7478.

5. Are there any Database systems for FreeBSD?

Yes! See the Commercial Vendors

(http://www.FreeBSD.org/commercial/software_bycat.html#CATEGORY_DATABASE) section of FreeBSD's Web site.

Also see the Databases (<http://www.FreeBSD.org/ports/databases.html>) section of the Ports collection.

6. Can I run Oracle® on FreeBSD?

Yes. The following pages tell you exactly how to set up Linux-Oracle on FreeBSD:

- <http://www.unixcities.com/oracle/index.html> (<http://www.unixcities.com/oracle/index.html>)
- <http://www.shadowcom.net/freebsd-oracle9i/> (<http://www.shadowcom.net/freebsd-oracle9i/>)

ΕὰöÜëáéï 7 ÅöáñïïãÝò Ôãëëëïÿ × ñÞóôç

1. So, where are all the user applications?

Please take a look at the ports page (<http://www.FreeBSD.org/ports/index.html>) for info on software packages ported to FreeBSD. The list currently tops 20,000 and is growing daily, so come back to check often or subscribe to the `freebsd-announce` mailing list for periodic updates on new entries.

Most ports should work on the 4.X, 5.X, and 6.X branches. Each time a FreeBSD release is made, a snapshot of the ports tree at the time of release is also included in the `ports/` directory.

We also support the concept of a “package”, essentially no more than a compressed binary distribution with a little extra intelligence embedded in it for doing whatever custom installation work is required. A package can be installed and uninstalled again easily without having to know the gory details of which files it includes.

Use the package installation menu in `/stand/sysinstall` (under the post-configuration menu item) or invoke the `pkg_add(1)` command on the specific package files you are interested in installing. Package files can usually be identified by their `.tgz` or `.tbz` suffix and CDROM distribution people will have a `packages/All` directory on their CD which contains such files. They can also be downloaded over the net for various versions of FreeBSD at the following locations:

for 4.X-RELEASE/4-STABLE

`ftp://ftp.FreeBSD.org/pub/FreeBSD/ports/i386/packages-4-stable/`
(`ftp://ftp.FreeBSD.org/pub/FreeBSD/ports/i386/packages-4-stable/`)

for 5.X-RELEASE/5-STABLE

`ftp://ftp.FreeBSD.org/pub/FreeBSD/ports/i386/packages-5-stable`
(`ftp://ftp.FreeBSD.org/pub/FreeBSD/ports/i386/packages-5-stable/`)

for 6.X-RELEASE/6-STABLE

`ftp://ftp.FreeBSD.org/pub/FreeBSD/ports/i386/packages-6-stable`
(`ftp://ftp.FreeBSD.org/pub/FreeBSD/ports/i386/packages-6-stable/`)

for 7-CURRENT

`ftp://ftp.FreeBSD.org/pub/FreeBSD/ports/i386/packages-7-current`
(`ftp://ftp.FreeBSD.org/pub/FreeBSD/ports/i386/packages-7-current/`)

or your nearest local mirror site.

Note that all ports may not be available as packages since new ones are constantly being added. It is always a good idea to check back periodically to see which packages are available at the `ftp.FreeBSD.org` (`ftp://ftp.FreeBSD.org/pub/FreeBSD/`) master site.

2. How do I configure INN (Internet News) for my machine?

After installing the `news/inn` package or port, an excellent place to start is Dave Barr’s INN Page (<http://www.visi.com/~barr/INN.html>) where you will find the INN FAQ.

3. Does FreeBSD support Java™?

Yes. Please see <http://www.FreeBSD.org/java/> (<http://www.FreeBSD.org/java/index.html>).

4. Why can I not build this port on my 4.X-STABLE machine?

If you are running a FreeBSD version that lags significantly behind -CURRENT or -STABLE, you may need to update your ports collection; see the *Keeping Up* (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/porters-handbook/keeping-up.html) section of the Porter's Handbook for further information on how to do this. If you are up to date, then someone might have committed a change to the port which works for -CURRENT but which broke the port for -STABLE. Please submit a bug report on this with the `send-pr(1)` command, since the ports collection is supposed to work for both the -CURRENT and -STABLE branches.

5. I just tried to build INDEX using `make index`, and it failed. Why?

First, always make sure that you have a completely up-to-date Ports Collection. Errors that affect building INDEX from an up-to-date copy of the Ports Collection are high-visibility and are thus almost always fixed immediately.

However, if you are up-to-date, perhaps you are seeing another problem. `make index` has a known bug in dealing with incomplete copies of the Ports Collection. It assumes that you have a local copy of every single port that every other port that you have a local copy of depends on. To explain, if you have a copy of `foo/bar` on your disk, and `foo/bar` depends on `baz/quux`, then you must also have a copy of `baz/quux` on your disk, and the ports `baz/quux` depends on, and so on. Otherwise, `make index` has insufficient information to create its dependency tree.

This is particularly a problem for FreeBSD users who utilize `cvsup(1)` to track the Ports Collection but choose not to install certain categories by specifying them in `refuse`. In theory, one should be able to refuse categories, but in practice there are too many ports that depend on ports in other categories. Until someone comes up with a solution for this problem, the general rule is that if you want to build INDEX, you must have a complete copy of the Ports Collection.

There are rare cases where INDEX will not build due to odd cases involving `WITH_*` or `WITHOUT_*` variables being set in `make.conf`. If you suspect that this is the case, please try to make INDEX with those Makevars turned off before reporting it to freebsd-ports@lists.FreeBSD.org (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-ports>).

6. Why is CVSup not integrated in the main FreeBSD tree?

The FreeBSD base system is designed as self-hosting - it should be possible to build the whole operating system starting with a very limited set of tools. Thus, the actual build tools needed to compile the FreeBSD sources are bundled with the sources themselves. This includes a C compiler (`gcc(1)`), `make(1)`, `awk(1)`, and similar tools.

Since CVSup is written in Modula-3, adding it to the FreeBSD base system would also require adding and maintaining a Modula-3 compiler. This would lead to both an increase in the disk space consumed by the FreeBSD sources and additional maintenance work. Thus, it is much easier for both the developers and users to keep CVSup as a separate port, which can be easily installed as a package bundled on the FreeBSD installation CDs.

7. I updated the sources, now how do I update my installed ports?

FreeBSD does not include a port upgrading tool, but it does have some tools to make the upgrade process somewhat easier. You can also install additional tools to simplify port handling.

The `pkg_version(1)` command can generate a script that will update installed ports to the latest version in the ports tree.

```
# pkg_version -c > /tmp/myscript
```

The output script *must* be edited by hand before you use it. Recent versions of `pkg_version(1)` force this by inserting an `exit(1)` at the beginning of the script.

You should save the output of the script, as it will note packages that depend on the one that has been updated. These may or may not need to be updated as well. The usual case where they need to be updated is that a shared library has changed version numbers, so the ports that used that library need to be rebuilt to use the new version.

Όχι Ἀβούς: Beginning with FreeBSD 5.0 (and higher revisions), `pkg_version(1)` no longer supports the `-c` option.

If you have the disk space, you can use the `portupgrade` tool to automate all of this. `portupgrade` includes various tools to simplify package handling. It is available under `ports-mgmt/portupgrade`. Since it is written in Ruby, `portupgrade` is an unlikely candidate for integration with the main FreeBSD tree. That should not stop anyone from using it, however.

If your system is up full time, the `periodic(8)` system can be used to generate a weekly list of ports that might need updating by setting `weekly_status_pkg_enable="YES"` in `/etc/periodic.conf`.

8. Why is `/bin/sh` so minimal? Why does FreeBSD not use `bash` or another shell?

Because POSIX® says that there shall be such a shell.

The more complicated answer: many people need to write shell scripts which will be portable across many systems. That is why POSIX specifies the shell and utility commands in great detail. Most scripts are written in Bourne shell, and because several important programming interfaces (`make(1)`, `system(3)`, `popen(3)`, and analogues in higher-level scripting languages like Perl and Tcl) are specified to use the Bourne shell to interpret commands. Because the Bourne shell is so often and widely used, it is important for it to be quick to start, be deterministic in its behavior, and have a small memory footprint.

The existing implementation is our best effort at meeting as many of these requirements simultaneously as we can. In order to keep `/bin/sh` small, we have not provided many of the convenience features that other shells have. That is why the Ports Collection includes more featureful shells like `bash`, `scsh`, `tcsh`, and `zsh`. (You can compare for yourself the memory utilization of all these shells by looking at the “VSZ” and “RSS” columns in a `ps -u` listing.)

9. Why do Netscape and Opera take so long to start?

The usual answer is that DNS on your system is misconfigured. Both Netscape and Opera perform DNS checks when starting up. The browser will not appear on your desktop until the program either gets a response or determines that the system has no network connection.

10. I updated parts of the Ports Collection using CVSup, and now many ports fail to build with mysterious error messages! What happened? Is the Ports Collection broken in some major way?

If you only update parts of the Ports Collection, using one of its CVSup subcollections and not the `ports-all` CVSup collection, you should *always* update the `ports-base` subcollection too! The reasons are described in the

Handbook

(http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/cvsup.html#CVSUP-COLLEC-PBASE-WARN).

11. How do I create audio CDs from my MIDI files?

To create audio CDs from MIDI files, first install `audio/timidity++` from ports then install manually the GUS patches set by Eric A. Welsh, available at <http://www.stardate.bc.ca/eawpatches/html/default.htm>. After `timidity++` has been installed properly, midi files may be converted to wav files with the following command line:

```
% timidity -Ow -s 44100 -o /tmp/juke/01.wav 01.mid
```

The wav files can then be converted to other formats or burned onto audio CDs, as described in the FreeBSD Handbook.

ΕὰöÛëáéï 8 Ñýèìéόç ÐõñÞíá

1. I would like to customize my kernel. Is it difficult?

Not at all! Check out the `kernel config` section of the Handbook

(http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/kernelconfig.html).

Όçìáßùόç: We recommend that you make a dated snapshot of your new `/kernel` called `/kernel.YYMMDD` after you get it working properly. Also back up your new `/modules` directory to `/modules.YYMMDD`. That way, if you make a mistake the next time you play with your configuration you can boot the backup kernel instead of having to fall back to `kernel.GENERIC`. This is particularly important if you are now booting from a controller that `GENERIC` does not support.

2. My kernel compiles fail because `_hw_float` is missing. How do I solve this problem?

You probably removed `npx0` (see `npx(4)`) from your kernel configuration file because you do not have a math co-processor. The `npx0` device is *MANDATORY*. Somewhere inside your hardware lies a device that provides hardware floating-point support, even if it is no longer a separate device as used in the good old 386 days. You *must* include the `npx0` device. Even if you manage to build a kernel without `npx0` support, it will not boot anyway.

3. Why is my kernel so big (over 10MB)?

Chances are, you compiled your kernel in *debug mode*. Kernels built in debug mode contain many symbols that are used for debugging, thus greatly increasing the size of the kernel. Note that there will be little or no performance decrease from running a debug kernel, and it is useful to keep one around in case of a system panic.

However, if you are running low on disk space, or you simply do not want to run a debug kernel, make sure that both of the following are true:

- You do not have a line in your kernel configuration file that reads:

```
makeoptions DEBUG=-g
```

- You are not running `config(8)` with the `-g` option.

Either of the above settings will cause your kernel to be built in debug mode. As long as you make sure you follow the steps above, you can build your kernel normally, and you should notice a fairly large size decrease; most kernels tend to be around 1.5MB to 2MB.

4. Why do I get interrupt conflicts with multi-port serial code?

When I compile a kernel with multi-port serial code, it tells me that only the first port is probed and the rest skipped due to interrupt conflicts. How do I fix this?

The problem here is that FreeBSD has code built-in to keep the kernel from getting trashed due to hardware or software conflicts. The way to fix this is to leave out the IRQ settings on all but one port. Here is an example:

```
#
```

```
# Multiport high-speed serial line - 16550 UARTS
#
device sio2 at isa? port 0x2a0 tty irq 5 flags 0x501 vector siointr
device sio3 at isa? port 0x2a8 tty flags 0x501 vector siointr
device sio4 at isa? port 0x2b0 tty flags 0x501 vector siointr
device sio5 at isa? port 0x2b8 tty flags 0x501 vector siointr
```

5. Why does every kernel I try to build fail to compile, even GENERIC?

There are a number of possible causes for this problem. They are, in no particular order:

- You are not using the new `make buildkernel` and `make installkernel` targets, and your source tree is different from the one used to build the currently running system (e.g., you are compiling 4.3-RELEASE on a 4.0-RELEASE system). If you are attempting an upgrade, please read the `/usr/src/UPDATING` file, paying particular attention to the “COMMON ITEMS” section at the end.
- You are using the new `make buildkernel` and `make installkernel` targets, but you failed to assert the completion of the `make buildworld` target. The `make buildkernel` target relies on files generated by the `make buildworld` target to complete its job correctly.
- Even if you are trying to build FreeBSD-STABLE, it is possible that you fetched the source tree at a time when it was either being modified, or broken for other reasons; only releases are absolutely guaranteed to be buildable, although FreeBSD-STABLE builds fine the majority of the time. If you have not already done so, try re-fetching the source tree and see if the problem goes away. Try using a different server in case the one you are using is having problems.

6. How can I verify which scheduler is in use on a running system?

If you are running FreeBSD version 5.2.1 or earlier, check for the existence of the `kern.quantum` sysctl. If you have it, you should see something like this:

```
% sysctl kern.quantum
kern.sched.quantum: 99960
```

If the `kern.quantum` sysctl exists, you are using the 4BSD scheduler. If not, you will get an error printed by `sysctl(8)` (which you can safely ignore):

```
% sysctl kern.sched.quantum
sysctl: unknown oid 'kern.sched.quantum'
```

In FreeBSD version 5.3-RELEASE and later, the name of the scheduler currently being used is directly available as the value of the `kern.sched.name` sysctl:

```
% sysctl kern.sched.name
kern.sched.name: 4BSD
```

7. What is `kern.quantum`?

`kern.quantum` is the maximum number of ticks a process can run without being preempted. It is specific to the 4BSD scheduler, so you can use its presence or absence to determine which scheduler is in use. In FreeBSD 5.X or later `kern.quantum` has been renamed to `kern.sched.quantum`.

8. What is `kern.sched.quantum`?

See Å: 7.

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1. How can I add my new hard disk to my FreeBSD system?

See the Disk Formatting Tutorial at [www.FreeBSD.org](http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/formatting-media/index.html)
(http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/formatting-media/index.html).

2. How do I move my system over to my huge new disk?

The best way is to reinstall the OS on the new disk, then move the user data over. This is highly recommended if you have been tracking -STABLE for more than one release, or have updated a release instead of installing a new one. You can install booteasy on both disks with `boot0cfg(8)`, and dual boot them until you are happy with the new configuration. Skip the next paragraph to find out how to move the data after doing this.

Should you decide not to do a fresh install, you need to partition and label the new disk with either `/stand/sysinstall`, or `fdisk(8)` and `disklabel(8)`. You should also install booteasy on both disks with `boot0cfg(8)`, so that you can dual boot to the old or new system after the copying is done. See the `formatting-media` article (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/formatting-media/index.html) for details on this process.

Now you have the new disk set up, and are ready to move the data. Unfortunately, you cannot just blindly copy the data. Things like device files (in `/dev`), flags, and links tend to screw that up. You need to use tools that understand these things, which means `dump(8)`. Although it is suggested that you move the data in single user mode, it is not required.

You should never use anything but `dump(8)` and `restore(8)` to move the root filesystem. The `tar(1)` command may work - then again, it may not. You should also use `dump(8)` and `restore(8)` if you are moving a single partition to another empty partition. The sequence of steps to use `dump` to move a partitions data to a new partition is:

1. `newfs` the new partition.
2. `mount` it on a temporary mount point.
3. `cd` to that directory.
4. `dump` the old partition, piping output to the new one.

For example, if you are going to move root to `/dev/ad1s1a`, with `/mnt` as the temporary mount point, it is:

```
# newfs /dev/ad1s1a
# mount /dev/ad1s1a /mnt
# cd /mnt
# dump 0af - / | restore xf -
```

Rearranging your partitions with `dump` takes a bit more work. To merge a partition like `/var` into its parent, create the new partition large enough for both, move the parent partition as described above, then move the child partition into the empty directory that the first move created:

```
# newfs /dev/ad1s1a
# mount /dev/ad1s1a /mnt
# cd /mnt
# dump 0af - / | restore xf -
```

```
# cd var
# dump 0af - /var | restore xf -
```

To split a directory from its parent, say putting `/var` on its own partition when it was not before, create both partitions, then mount the child partition on the appropriate directory in the temporary mount point, then move the old single partition:

```
# newfs /dev/ad1s1a
# newfs /dev/ad1s1d
# mount /dev/ad1s1a /mnt
# mkdir /mnt/var
# mount /dev/ad1s1d /mnt/var
# cd /mnt
# dump 0af - / | restore xf -
```

You might prefer `cpio(1)`, `pax(1)`, `tar(1)` to `dump(8)` for user data. At the time of this writing, these are known to lose file flag information, so use them with caution.

3. Will a “dangerously dedicated” disk endanger my health?

The installation procedure allows you to chose two different methods in partitioning your hard disk(s). The default way makes it compatible with other operating systems on the same machine, by using `fdisk` table entries (called “slices” in FreeBSD), with a FreeBSD slice that employs partitions of its own. Optionally, one can chose to install a boot-selector to switch between the possible operating systems on the disk(s). The alternative uses the entire disk for FreeBSD, and makes no attempt to be compatible with other operating systems.

So why it is called “dangerous”? A disk in this mode does not contain what normal PC utilities would consider a valid `fdisk` table. Depending on how well they have been designed, they might complain at you once they are getting in contact with such a disk, or even worse, they might damage the BSD bootstrap without even asking or notifying you. In addition, the “dangerously dedicated” disk’s layout is known to confuse many BIOSes, including those from AWARD (e.g. as found in HP Netserver and Micronics systems as well as many others) and Symbios/NCR (for the popular 53C8xx range of SCSI controllers). This is not a complete list, there are more. Symptoms of this confusion include the “`read error`” message printed by the FreeBSD bootstrap when it cannot find itself, as well as system lockups when booting.

Why have this mode at all then? It only saves a few kbytes of disk space, and it can cause real problems for a new installation. “Dangerously dedicated” mode’s origins lie in a desire to avoid one of the most common problems plaguing new FreeBSD installers - matching the BIOS “geometry” numbers for a disk to the disk itself.

“Geometry” is an outdated concept, but one still at the heart of the PC’s BIOS and its interaction with disks. When the FreeBSD installer creates slices, it has to record the location of these slices on the disk in a fashion that corresponds with the way the BIOS expects to find them. If it gets it wrong, you will not be able to boot.

“Dangerously dedicated” mode tries to work around this by making the problem simpler. In some cases, it gets it right. But it is meant to be used as a last-ditch alternative - there are better ways to solve the problem 99 times out of 100.

So, how do you avoid the need for “DD” mode when you are installing? Start by making a note of the geometry that your BIOS claims to be using for your disks. You can arrange to have the kernel print this as it boots by specifying `-v` at the `boot:` prompt, or using `boot -v` in the loader. Just before the installer starts, the kernel will print a list of BIOS geometries. Do not panic - wait for the installer to start and then use scrollback to read the numbers. Typically the BIOS disk units will be in the same order that FreeBSD lists your disks, first IDE, then SCSI.

When you are slicing up your disk, check that the disk geometry displayed in the FDISK screen is correct (ie. it matches the BIOS numbers); if it is wrong, use the **g** key to fix it. You may have to do this if there is absolutely nothing on the disk, or if the disk has been moved from another system. Note that this is only an issue with the disk that you are going to boot from; FreeBSD will sort itself out just fine with any other disks you may have.

Once you have got the BIOS and FreeBSD agreeing about the geometry of the disk, your problems are almost guaranteed to be over, and with no need for “DD” mode at all. If, however, you are still greeted with the dreaded “read error” message when you try to boot, it is time to cross your fingers and go for it - there is nothing left to lose.

To return a “dangerously dedicated” disk for normal PC use, there are basically two options. The first is, you write enough NULL bytes over the MBR to make any subsequent installation believe this to be a blank disk. You can do this for example with

```
# dd if=/dev/zero of=/dev/rda0 count=15
```

Alternatively, the undocumented DOS “feature”

```
C:\> fdisk /mbr
```

will to install a new master boot record as well, thus clobbering the BSD bootstrap.

4. Which partitions can safely use Soft Updates? I have heard that Soft Updates on / can cause problems.

Short answer: you can usually use Soft Updates safely on all partitions.

Long answer: There used to be some concern over using Soft Updates on the root partition. Soft Updates has two characteristics that caused this. First, a Soft Updates partition has a small chance of losing data during a system crash. (The partition will not be corrupted; the data will simply be lost.) Also, Soft Updates can cause temporary space shortages.

When using Soft Updates, the kernel can take up to thirty seconds to actually write changes to the physical disk. If you delete a large file, the file still resides on disk until the kernel actually performs the deletion. This can cause a very simple race condition. Suppose you delete one large file and immediately create another large file. The first large file is not yet actually removed from the physical disk, so the disk might not have enough room for the second large file. You get an error that the partition does not have enough space, although you know perfectly well that you just released a large chunk of space! When you try again mere seconds later, the file creation works as you expect. This has left more than one user scratching his head and doubting his sanity, the FreeBSD filesystem, or both.

If a system should crash after the kernel accepts a chunk of data for writing to disk, but before that data is actually written out, data could be lost or corrupted. This risk is extremely small, but generally manageable. Use of IDE write caching greatly increases this risk; it is strongly recommended that you disable IDE write caching when using Soft Updates.

These issues affect all partitions using Soft Updates. So, what does this mean for the root partition?

Vital information on the root partition changes very rarely. Files such as `/kernel` and the contents of `/etc` only change during system maintenance, or when users change their passwords. If the system crashed during the thirty-second window after such a change is made, it is possible that data could be lost. This risk is negligible for most applications, but you should be aware that it exists. If your system cannot tolerate this much risk, do not use Soft Updates on the root filesystem!

/ is traditionally one of the smallest partitions. By default, FreeBSD puts the /tmp directory on /. If you have a busy /tmp, you might see intermittent space problems. Symlinking /tmp to /var/tmp will solve this problem.

5. What is inappropriate about my ccd?

The symptom of this is:

```
# ccdconfig -C
ccdconfig: ioctl (CCDIOCSET): /dev/ccd0c: Inappropriate file type or format
```

This usually happens when you are trying to concatenate the c partitions, which default to type unused. The ccd driver requires the underlying partition type to be FS_BSDFFS. Edit the disklabel of the disks you are trying to concatenate and change the types of partitions to 4.2BSD.

6. Why can I not edit the disklabel on my ccd?

The symptom of this is:

```
# disklabel ccd0
(it prints something sensible here, so let us try to edit it)
# disklabel -e ccd0
(edit, save, quit)
disklabel: ioctl DIIOCWDINFO: No disk label on disk;
use "disklabel -r" to install initial label
```

This is because the disklabel returned by ccd is actually a “fake” one that is not really on the disk. You can solve this problem by writing it back explicitly, as in:

```
# disklabel ccd0 > /tmp/disklabel.tmp
# disklabel -Rr ccd0 /tmp/disklabel.tmp
# disklabel -e ccd0
(this will work now)
```

7. Can I mount other foreign filesystems under FreeBSD?

FreeBSD supports a variety of other filesystems.

Digital UNIX

UFS CDRoms can be mounted directly on FreeBSD. Mounting disk partitions from Digital UNIX and other systems that support UFS may be more complex, depending on the details of the disk partitioning for the operating system in question.

Linux

FreeBSD supports ext2fs partitions. See mount_ext2fs(8) for more information.

Windows NT®

FreeBSD includes a read-only NTFS driver. For more information, see mount_ntfs(8).

FAT

FreeBSD includes a read-write FAT driver. For more information, see `mount_msdosfs(8)`.

ReiserFS

FreeBSD includes a read-only ReiserFS driver. For more information, see `mount_reiserfs(8)`.

FreeBSD also supports network filesystems such as NFS (see `mount_nfs(8)`), NetWare (see `mount_nwfs(8)`), and Microsoft-style SMB filesystems (see `mount_smbfs(8)`).

8. How do I mount a secondary DOS partition?

The secondary DOS partitions are found after ALL the primary partitions. For example, if you have an “E” partition as the second DOS partition on the second SCSI drive, you need to create the special files for “slice 5” in `/dev`, then `mount /dev/dals5:`

```
# cd /dev
# sh MAKEDEV dals5
# mount -t msdosfs /dev/dals5 /dos/e
```

Ὁ ἰᾶβῦός: You can omit this step if you are running FreeBSD 5.0-RELEASE or newer with `devfs(5)` enabled.

9. Is there a cryptographic filesystem for FreeBSD?

Yes. FreeBSD 5.0 includes `gbde(8)`, and FreeBSD 6.0 added `geli(8)`. For earlier releases, see the `security/cfs` port.

10. How can I use the Windows NT loader to boot FreeBSD?

The general idea is that you copy the first sector of your native root FreeBSD partition into a file in the DOS/Windows NT partition. Assuming you name that file something like `c:\bootsect.bsd` (inspired by `c:\bootsect.dos`), you can then edit the `c:\boot.ini` file to come up with something like this:

```
[boot loader]
timeout=30
default=multi(0)disk(0)rdisk(0)partition(1)\WINDOWS
[operating systems]
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS="Windows NT"
C:\BOOTSECT.BSD="FreeBSD"
C:\!="DOS"
```

If FreeBSD is installed on the same disk as the Windows NT boot partition simply copy `/boot/boot1` to `C:\BOOTSECT.BSD`. However, if FreeBSD is installed on a different disk `/boot/boot1` will not work, `/boot/boot0` is needed.

`/boot/boot0` needs to be installed using `sysinstall` by selecting the FreeBSD boot manager on the screen which asks if you wish to use a boot manager. This is because `/boot/boot0` has the partition table area filled with NULL characters but `sysinstall` copies the partition table before copying `/boot/boot0` to the MBR.

Δηῖαῖαῖαῖαῖαῖα: *Do not simply copy /boot/boot0 instead of /boot/boot1; you will overwrite your partition table and render your computer un-bootable!*

When the FreeBSD boot manager runs it records the last OS booted by setting the active flag on the partition table entry for that OS and then writes the whole 512-bytes of itself back to the MBR so if you just copy /boot/boot0 to C:\BOOTSECT.BSD then it writes an empty partition table, with the active flag set on one entry, to the MBR.

11. How do I boot FreeBSD and Linux from LILO?

If you have FreeBSD and Linux on the same disk, just follow LILO's installation instructions for booting a non-Linux operating system. Very briefly, these are:

Boot Linux, and add the following lines to /etc/lilo.conf:

```
other=/dev/hda2
    table=/dev/hda
    label=FreeBSD
```

(the above assumes that your FreeBSD slice is known to Linux as /dev/hda2; tailor to suit your setup). Then, run lilo as root and you should be done.

If FreeBSD resides on another disk, you need to add loader=/boot/chain.b to the LILO entry. For example:

```
other=/dev/dab4
    table=/dev/dab
    loader=/boot/chain.b
    label=FreeBSD
```

In some cases you may need to specify the BIOS drive number to the FreeBSD boot loader to successfully boot off the second disk. For example, if your FreeBSD SCSI disk is probed by BIOS as BIOS disk 1, at the FreeBSD boot loader prompt you need to specify:

```
Boot: 1:da(0,a)/kernel
```

You can configure boot(8) to automatically do this for you at boot time.

The Linux+FreeBSD mini-HOWTO (<http://sunsite.unc.edu/LDP/HOWTO/mini/Linux+FreeBSD.html>) is a good reference for FreeBSD and Linux interoperability issues.

12. How do I boot FreeBSD and Linux using GRUB

Booting FreeBSD using GRUB is very simple. Just add the following to your configuration file /boot/grub/grub.conf.

```
title FreeBSD 6.1
    root (hd0,a)
    kernel /boot/loader
```

Where `hd0, a` points to your root partition on the first disk. If you need to specify which slice number should be used, use something like this `(hd0, 2, a)`. By default, if the slice number is omitted, GRUB searches the first slice which has 'a' partition.

13. How do I boot FreeBSD and Linux using BootEasy?

Install LILO at the start of your Linux boot partition instead of in the Master Boot Record. You can then boot LILO from BootEasy.

If you are running Windows 95 and Linux this is recommended anyway, to make it simpler to get Linux booting again if you should need to reinstall Windows 95 (which is a Jealous Operating System, and will bear no other Operating Systems in the Master Boot Record).

14. How do I change the boot prompt from ??? to something more meaningful?

You can not do that with the standard boot manager without rewriting it. There are a number of other boot managers in the `sysutils` ports category that provide this functionality.

15. I have a new removable drive, how do I use it?

Whether it is a removable drive like a Zip or an EZ drive (or even a floppy, if you want to use it that way), or a new hard disk, once it is installed and recognized by the system, and you have your cartridge/floppy/whatever slotted in, things are pretty much the same for all devices.

(this section is based on Mark Mayo's ZIP FAQ (<http://www.vmunix.com/mark/FreeBSD/ZIP-FAQ.html>))

If it is a ZIP drive or a floppy, you have already got a DOS filesystem on it, you can use a command like this:

```
# mount -t msdosfs /dev/fd0c /floppy
```

if it is a floppy, or this:

```
# mount -t msdosfs /dev/da2s4 /zip
```

for a ZIP disk with the factory configuration.

For other disks, see how they are laid out using `fdisk(8)` or `sysinstall(8)`.

The rest of the examples will be for a ZIP drive on `da2`, the third SCSI disk.

Unless it is a floppy, or a removable you plan on sharing with other people, it is probably a better idea to stick a BSD filesystem on it. You will get long filename support, at least a 2X improvement in performance, and a lot more stability. First, you need to redo the DOS-level partitions/filesystems. You can either use `fdisk(8)` or `/stand/sysinstall`, or for a small drive that you do not want to bother with multiple operating system support on, just blow away the whole FAT partition table (slices) and just use the BSD partitioning:

```
# dd if=/dev/zero of=/dev/rda2 count=2
# disklabel -Brw da2 auto
```

You can use `disklabel` or `/stand/sysinstall` to create multiple BSD partitions. You will certainly want to do this if you are adding swap space on a fixed disk, but it is probably irrelevant on a removable drive like a ZIP.

Finally, create a new filesystem, this one is on our ZIP drive using the whole disk:

```
# newfs /dev/rda2c
```

and mount it:

```
# mount /dev/da2c /zip
```

and it is probably a good idea to add a line like this to `/etc/fstab` (see `fstab(5)`) so you can just type `mount /zip` in the future:

```
/dev/da2c /zip ffs rw,noauto 0 0
```

16. Why do I get “Incorrect super block” when mounting a CDROM?

You have to tell `mount(8)` the type of the device that you want to mount. This is described in the Handbook section on optical media (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/creating-cds.html), specifically the section Using Data CDs (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/creating-cds.html#MOUNTING-CD).

17. Why do I get “Device not configured” when mounting a CDROM?

This generally means that there is no CDROM in the CDROM drive, or the drive is not visible on the bus. Please see the Using Data CDs (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/creating-cds.html#MOUNTING-CD) section of the Handbook for a detailed discussion of this issue.

18. Why do all non-English characters in filenames show up as “?” on my CDs when mounted in FreeBSD?

Your CDROM probably uses the “Joliet” extension for storing information about files and directories. This is discussed in the Handbook chapter on creating and using CDROMs (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/creating-cds.html), specifically the section on Using Data CDROMs (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/creating-cds.html#MOUNTING-CD).

19. I burned a CD under FreeBSD and now I can not read it under any other operating system. Why?

You most likely burned a raw file to your CD, rather than creating an ISO 9660 filesystem. Take a look at the Handbook chapter on creating CDROMs (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/creating-cds.html), particularly the section on burning raw data CDs (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/creating-cds.html#RAWDATA-CD).

20. How can I create an image of a data CD?

This is discussed in the Handbook section on duplicating data CDs (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/creating-cds.html#IMAGING-CD). For more on working with CDROMs, see the Creating CDs Section (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/creating-cds.html) in the Storage chapter in the Handbook.

21. Why can I not mount an audio CD?

If you try to mount an audio CD, you will get an error like “cd9660: /dev/acd0c: Invalid argument”. This is because `mount` only works on filesystems. Audio CDs do not have filesystems; they just have data. You need a program that reads audio CDs, such as the `audio/xmcd` port.

22. How do I mount a multi-session CD?

By default, `mount(8)` will attempt to mount the last data track (session) of a CD. If you would like to load an earlier session, you must use the `-s` command line argument. Please see `mount_cd9660(8)` for specific examples.

23. How do I let ordinary users mount floppies, CDROMs and other removable media?

Ordinary users can be permitted to mount devices. Here is how:

1. As `root` set the `sysctl` variable `vfs.usermount` to 1.

```
# sysctl -w vfs.usermount=1
```

2. As `root` assign the appropriate permissions to the block device associated with the removable media.

For example, to allow users to mount the first floppy drive, use:

```
# chmod 666 /dev/fd0
```

To allow users in the group `operator` to mount the CDROM drive, use:

```
# chgrp operator /dev/acd0c
# chmod 640 /dev/acd0c
```

3. If you are running FreeBSD 5.X or later, you will need to alter `/etc/devfs.conf` to make these changes permanent across reboots.

As `root`, add the necessary lines to `/etc/devfs.conf`. For example, to allow users to mount the first floppy drive add:

```
# Allow all users to mount the floppy disk.
own      /dev/fd0    root:operator
perm     /dev/fd0    0666
```

To allow users in the group `operator` to mount the CD-ROM drive add:

```
# Allow members of the group operator to mount CD-ROMs.
own      /dev/acd0   root:operator
perm     /dev/acd0   0660
```

4. Finally, add the line `vfs.usermount=1` to the file `/etc/sysctl.conf` so that it is reset at system boot time.

All users can now mount the floppy `/dev/fd0` onto a directory that they own:

```
% mkdir ~/my-mount-point
% mount -t msdosfs /dev/fd0 ~/my-mount-point
```

Users in group `operator` can now mount the CDROM `/dev/acd0c` onto a directory that they own:

```
% mkdir ~/my-mount-point
% mount -t cd9660 /dev/acd0c ~/my-mount-point
```

Unmounting the device is simple:

```
% umount ~/my-mount-point
```

Enabling `vfs.usermount`, however, has negative security implications. A better way to access MS-DOS formatted media is to use the `emulators/mtools` package in the ports collection.

Ὀϊὰβὺός: The device name used in the previous examples must be changed according to your configuration.

24. The `du` and `df` commands show different amounts of disk space available. What is going on?

You need to understand what `du` and `df` really do. `du` goes through the directory tree, measures how large each file is, and presents the totals. `df` just asks the filesystem how much space it has left. They seem to be the same thing, but a file without a directory entry will affect `df` but not `du`.

When a program is using a file, and you delete the file, the file is not really removed from the filesystem until the program stops using it. The file is immediately deleted from the directory listing, however. You can see this easily enough with a program such as `more`. Assume you have a file large enough that its presence affects the output of `du` and `df`. (Since disks can be so large today, this might be a *very* large file!) If you delete this file while using `more` on it, `more` does not immediately choke and complain that it cannot view the file. The entry is simply removed from the directory so no other program or user can access it. `du` shows that it is gone — it has walked the directory tree and the file is not listed. `df` shows that it is still there, as the filesystem knows that `more` is still using that space. Once you end the `more` session, `du` and `df` will agree.

Note that Soft Updates can delay the freeing of disk space; you might need to wait up to 30 seconds for the change to be visible!

This situation is common on web servers. Many people set up a FreeBSD web server and forget to rotate the log files. The access log fills up `/var`. The new administrator deletes the file, but the system still complains that the partition is full. Stopping and restarting the web server program would free the file, allowing the system to release the disk space. To prevent this from happening, set up `newsyslog(8)`.

25. How can I add more swap space?

In the Configuration and Tuning

(http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/config-tuning.html) section of the Handbook, you will find a section (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/adding-swap-space.html) describing how to do this.

26. Why does FreeBSD see my disk as smaller than the manufacturer says it is?

Disk manufacturers calculate gigabytes as a billion bytes each, whereas FreeBSD calculates them as 1,073,741,824 bytes each. This explains why, for example, FreeBSD's boot messages will report a disk that supposedly has 80GB as holding 76319MB.

Also note that FreeBSD will (by default) reserve 8% of the disk space.

27. How is it possible for a partition to be more than 100% full?

A portion of each UFS partition (8%, by default) is reserved for use by the operating system and the `root` user. `df(1)` does not count that space when calculating the `Capacity` column, so it can exceed 100%. Also, you will notice that the `Blocks` column is always greater than the sum of the `Used` and `Avail` columns, usually by a factor of 8%.

For more details, look up the `-m` option in `tuneufs(8)`.

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1. Where are the system start-up configuration files?

The primary configuration file is `/etc/defaults/rc.conf` (see `rc.conf(5)`) System startup scripts such as `/etc/rc` and `/etc/rc.d` (see `rc(8)`) just include this file. *Do not edit this file!* Instead, if there is any entry in `/etc/defaults/rc.conf` that you want to change, you should copy the line into `/etc/rc.conf` and change it there.

For example, if you wish to start `named`, the included DNS server, all you need to do is:

```
# echo named_enable="YES" >> /etc/rc.conf
```

To start up local services, place shell scripts in the `/usr/local/etc/rc.d` directory. These shell scripts should be set executable, and end with a `.sh`.

2. How do I add a user easily?

Use the `adduser(8)` command, or the `pw(8)` command for more complicated situations.

To remove the user, use the `rmuser(8)` command or, if necessary, `pw(8)`.

3. Why do I keep getting messages like “root: not found” after editing my crontab file?

This is normally caused by editing the system crontab (`/etc/crontab`) and then using `crontab(1)` to install it:

```
# crontab /etc/crontab
```

This is not the correct way to do things. The system crontab has a different format to the per-user crontabs which `crontab(1)` updates (the `crontab(5)` manual page explains the differences in more detail).

If this is what you did, the extra crontab is simply a copy of `/etc/crontab` in the wrong format it. Delete it with the command:

```
# crontab -r
```

Next time, when you edit `/etc/crontab`, you should not do anything to inform `cron(8)` of the changes, since it will notice them automatically.

If you want something to be run once per day, week, or month, it is probably better to add shell scripts `/usr/local/etc/periodic`, and let the `periodic(8)` command run from the system cron schedule it with the other periodic system tasks.

The actual reason for the error is that the system crontab has an extra field, specifying which user to run the command as. In the default system crontab provided with FreeBSD, this is `root` for all entries. When this crontab is used as the `root` user’s crontab (which is *not* the same as the system crontab), `cron(8)` assumes the string `root` is the first word of the command to execute, but no such command exists.

4. Why do I get the error, “you are not in the correct group to su root” when I try to su to root?

This is a security feature. In order to su to root (or any other account with superuser privileges), you must be in the wheel group. If this feature were not there, anybody with an account on a system who also found out root’s password would be able to gain superuser level access to the system. With this feature, this is not strictly true; su(1) will prevent them from even trying to enter the password if they are not in wheel.

To allow someone to su to root, simply put them in the wheel group.

5. I made a mistake in rc.conf, or another startup file, and now I cannot edit it because the filesystem is read-only. What should I do?

When you get the prompt to enter the shell pathname, simply press ENTER, and run `mount /` to re-mount the root filesystem in read/write mode. You may also need to run `mount -a -t ufs` to mount the filesystem where your favorite editor is defined. If your favorite editor is on a network filesystem, you will need to either configure the network manually before you can mount network filesystems, or use an editor which resides on a local filesystem, such as ed(1).

If you intend to use a full screen editor such as vi(1) or emacs(1), you may also need to run `export TERM=cons25` so that these editors can load the correct data from the termcap(5) database.

Once you have performed these steps, you can edit `/etc/rc.conf` as you usually would to fix the syntax error. The error message displayed immediately after the kernel boot messages should tell you the number of the line in the file which is at fault.

6. Why am I having trouble setting up my printer?

Please have a look at the Handbook entry on printing. It should cover most of your problem. See the Handbook entry on printing (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/printing.html).

Some printers require a host-based driver to do any kind of printing. These so-called “WinPrinters” are not natively supported by FreeBSD. If your printer does not work in DOS or Windows NT 4.0, it is probably a WinPrinter. Your only hope of getting one of these to work is to check if the `print/pnm2ppa` port supports it.

7. How can I correct the keyboard mappings for my system?

Please see the Handbook section on using localization (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/using-localization.html), specifically the section on console setup (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/using-localization.html#SETTING-CONSOLE).

8. Why do I get messages like: “unknown: <PNP0303> can’t assign resources” on boot?

The following is an excerpt from a post to the freebsd-current mailing list.

The “can’t assign resources” messages indicate that the devices are legacy ISA devices for which a non-PnP-aware driver is compiled into the kernel. These include devices such as keyboard controllers, the programmable interrupt controller chip, and several other bits of standard infrastructure. The resources cannot be assigned because there is already a driver using those addresses.

—Garrett Wollman <wollman@FreeBSD.org>, 24 April 2001

9. Why can I not get user quotas to work properly?

1. It is possible that your kernel is not configured to use quotas. If this is the case, you will need to add the following line to your kernel configuration file and recompile:

```
options QUOTA
```

Please read the Handbook entry on quotas

(http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/quotas.html) for full details.

2. Do not turn on quotas on /.
 3. Put the quota file on the filesystem that the quotas are to be enforced on, i.e.:

Filesystem	Quota file
/usr	/usr/admin/quotas
/home	/home/admin/quotas
...	...

10. Does FreeBSD support System V IPC primitives?

Yes, FreeBSD supports System V-style IPC, including shared memory, messages and semaphores, in the GENERIC kernel. In a custom kernel, enable this support by adding the following lines to your kernel config.

```
options    SYSVSHM        # enable shared memory
options    SYSVSEM        # enable for semaphores
options    SYSVMSG        # enable for messaging
```

Recompile and install your kernel.

11. What other mail-server software can I use instead of Sendmail?

Sendmail (<http://www.sendmail.org/>) is the default mail-server software for FreeBSD, but you can easily replace it with one of the other MTA (for instance, an MTA installed from the ports).

There are various alternative MTAs in the ports tree already, with mail/exim, mail/postfix, mail/qmail, and mail/zmailer being some of the most popular choices.

Diversity is nice, and the fact that you have many different mail-servers to chose from is considered a good thing; therefore try to avoid asking questions like “Is Sendmail better than Qmail?” in the mailing lists. If you do feel like asking, first check the mailing list archives. The advantages and disadvantages of each and every one of the available MTAs have already been discussed a few times.

12. I have forgotten the root password! What do I do?

Do not panic! Restart the system, type **boot -s** at the Boot: prompt to enter Single User mode. At the question about the shell to use, hit ENTER. You will be dropped to a # prompt. Enter **mount -u /** to remount your root filesystem read/write, then run **mount -a** to remount all the filesystems. Run **passwd root** to change the root password then run **exit(1)** to continue booting.

13. How do I keep **Control+Alt+Delete** from rebooting the system?

If you are using syscons (the default console driver) build and install a new kernel with the line:

```
options SC_DISABLE_REBOOT
```

in the configuration file. If you use the PCVT console driver, use the following kernel configuration line instead.

This can also be done by setting the following sysctl which does not require a reboot or kernel recompile:

```
# sysctl hw.syscons.kbd_reboot=0
```

```
options PCVT_CTRL_ALT_DEL
```

14. How do I reformat DOS text files to UNIX ones?

Use this perl command:

```
% perl -i.bak -npe 's/\r\n/\n/g' file ...
```

file is the file(s) to process. The modification is done in-place, with the original file stored with a .bak extension.

Alternatively you can use the tr(1) command:

```
% tr -d '\r' < dos-text-file > unix-file
```

dos-text-file is the file containing DOS text while *unix-file* will contain the converted output. This can be quite a bit faster than using perl.

15. How do I kill processes by name?

Use killall(1).

16. Why is su bugging me about not being in root's ACL?

The error comes from the Kerberos distributed authentication system. The problem is not fatal but annoying. You can either run su with the -K option, or uninstall Kerberos as described in the next question.

17. How do I uninstall Kerberos?

To remove Kerberos from the system, reinstall the bin distribution for the release you are running. If you have the CDROM, you can mount the cd (we will assume on /cdrom) and run

```
# cd /cdrom/bin
# ./install.sh
```

Alternately, you can remove all MAKE_KERBEROS options from /etc/make.conf and rebuild world.

18. What happened to /dev/MAKEDEV?

FreeBSD 5.X and beyond use the devfs(8) device-on-demand system. Device drivers automatically create new device nodes as they are needed, obsoleting /dev/MAKEDEV.

If you are running FreeBSD 4.X or earlier and /dev/MAKEDEV is missing, then you really do have a problem. Grab a copy from the system source code, probably in /usr/src/etc/MAKEDEV.

19. How do I add pseudoterminals to the system?

If you have lots of telnet, ssh, X, or screen users, you will probably run out of pseudoterminals. Here is how to add more:

1. Build and install a new kernel with the line

```
pseudo-device pty 256
```

in the configuration file.

2. Run the commands

```
# cd /dev
# sh MAKEDEV pty{1,2,3,4,5,6,7}
```

to make 256 device nodes for the new terminals.

3. Edit /etc/ttys and add lines for each of the 256 terminals. They should match the form of the existing entries, i.e. they look like

```
ttymq none network
```

The order of the letter designations is `ttym[pqrsPQRS][0-9a-v]`, using a regular expression.

4. Reboot the system with the new kernel and you are ready to go.

20. Why can I not create the snd0 device?

There is no `snd` device. The name is used as a shorthand for the various devices that make up the FreeBSD sound driver, such as `mixer`, `sequencer`, and `dsp`.

To create these devices you should

```
# cd /dev
# sh MAKEDEV snd0
```

Όχι! Βùόç: You can omit this step if you are running FreeBSD 5.0-RELEASE or newer with devfs(5) enabled.

21. How do I re-read `/etc/rc.conf` and re-start `/etc/rc` without a reboot?

Go into single user mode and then back to multi user mode.

On the console do:

```
# shutdown now
(Note: without -r or -h)

# return
# exit
```

22. I tried to update my system to the latest -STABLE, but got -BETAx, -RC or -PRERELEASE! What is going on?

Short answer: it is just a name. RC stands for “Release Candidate”. It signifies that a release is imminent. In FreeBSD, -PRERELEASE is typically synonymous with the code freeze before a release. (For some releases, the -BETA label was used in the same way as -PRERELEASE.)

Long answer: FreeBSD derives its releases from one of two places. Major, dot-zero, releases, such as 4.0-RELEASE and 5.0-RELEASE, are branched from the head of the development stream, commonly referred to as -CURRENT. Minor releases, such as 4.1-RELEASE or 5.2-RELEASE, have been snapshots of the active -STABLE branch. Starting with 4.3-RELEASE, each release also now has its own branch which can be tracked by people requiring an extremely conservative rate of development (typically only security advisories).

When a release is about to be made, the branch from which it will be derived from has to undergo a certain process. Part of this process is a code freeze. When a code freeze is initiated, the name of the branch is changed to reflect that it is about to become a release. For example, if the branch used to be called 4.5-STABLE, its name will be changed to 4.6-PRERELEASE to signify the code freeze and signify that extra pre-release testing should be happening. Bug fixes can still be committed to be part of the release. When the source code is in shape for the release the name will be changed to 4.6-RC to signify that a release is about to be made from it. Once in the RC stage, only the most critical bugs found can be fixed. Once the release (4.6-RELEASE in this example) and release branch have been made, the branch will be renamed to 4.6-STABLE.

For more information on version numbers and the various CVS branches, refer to the Release Engineering (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/releng/article.html) article.

23. I tried to install a new kernel, and the `chflags` failed. How do I get around this?

Short answer: You are probably at security level greater than 0. Reboot directly to single user mode to install the kernel.

Long answer: FreeBSD disallows changing system flags at security levels greater than 0. You can check your security level with the command:

```
# sysctl kern.securelevel
```

You cannot lower the security level; you have to boot to single mode to install the kernel, or change the security level in `/etc/rc.conf` then reboot. See the `init(8)` manual page for details on `securelevel`, and see `/etc/defaults/rc.conf` and the `rc.conf(5)` manual page for more information on `rc.conf`.

24. I cannot change the time on my system by more than one second! How do I get around this?

Short answer: You are probably at security level greater than 1. Reboot directly to single user mode to change the date.

Long answer: FreeBSD disallows changing the time by more than one second at security levels greater than 1. You can check your security level with the command:

```
# sysctl kern.securelevel
```

You cannot lower the security level; you have to boot to single mode to change the date, or change the security level in `/etc/rc.conf` then reboot. See the `init(8)` manual page for details on `securelevel`, and see `/etc/defaults/rc.conf` and the `rc.conf(5)` manual page for more information on `rc.conf`.

25. Why is `rpc.statd` using 256 megabytes of memory?

No, there is no memory leak, and it is not using 256 Mbytes of memory. For convenience, `rpc.statd` maps an obscene amount of memory into its address space. There is nothing terribly wrong with this from a technical standpoint; it just throws off things like `top(1)` and `ps(1)`.

`rpc.statd(8)` maps its status file (resident on `/var`) into its address space; to save worrying about remapping it later when it needs to grow, it maps it with a generous size. This is very evident from the source code, where one can see that the length argument to `mmap(2)` is `0x10000000`, or one sixteenth of the address space on an IA32, or exactly 256MB.

26. Why can I not unset the `schg` file flag?

You are running at an elevated (i.e., greater than 0) `securelevel`. Lower the `securelevel` and try again. For more information, see the FAQ entry on `securelevel` and the `init(8)` manual page.

27. Why does SSH authentication through `.shosts` not work by default in recent versions of FreeBSD?

The reason why `.shosts` authentication does not work by default in more recent versions of FreeBSD is because `ssh(1)` is not installed `suid root` by default. To “fix” this, you can do one of the following:

- As a permanent fix, set `ENABLE_SUID_SSH` to `true` in `/etc/make.conf` and rebuild `ssh` (or run `make world`).
- As a temporary fix, change the mode on `/usr/bin/ssh` to `4555` by running `chmod 4555 /usr/bin/ssh` as `root`. Then add `ENABLE_SUID_SSH= true` to `/etc/make.conf` so the change takes effect the next time `make world` is run.

28. What is `vnlr`?

`vnlr` flushes and frees `vnodes` when the system hits the `kern.maxvnodes` limit. This kernel thread sits mostly idle, and only activates if you have a huge amount of RAM and are accessing tens of thousands of tiny files.

29. What do the various memory states displayed by `top` mean?

- **Active:** pages recently statistically used.
- **Inactive:** pages recently statistically unused.

- **Cache:** (most often) pages that have percolated from inactive to a status where they maintain their data, but can often be immediately reused (either with their old association, or reused with a new association.) There can be certain immediate transitions from `active` to `cache` state if the page is known to be clean (unmodified), but that transition is a matter of policy, depending upon the algorithm choice of the VM system maintainer.
- **Free:** pages without data content, and can be immediately used in certain circumstances where cache pages might be ineligible. Free pages can be reused at interrupt or process state.
- **Wired:** pages that are fixed into memory, usually for kernel purposes, but also sometimes for special use in processes.

Pages are most often written to disk (sort of a VM sync) when they are in the inactive state, but active pages can also be synced (but requires the availability of certain CPU features.) This depends upon the CPU tracking of the modified bit being available, and in certain situations there can be an advantage for a block of VM pages to be synced, whether they are active or inactive. In most common cases, it is best to think of the inactive queue to be a queue of relatively unused pages that might or might not be in the process of being written to disk. Cached pages are already synced, not mapped, but available for immediate process use with their old association or with a new association. Free pages are available at interrupt level, but cached or free pages can be used at process state for reuse. Cache pages are not adequately locked to be available at interrupt level.

There are some other flags (e.g., busy flag or busy count) that might modify some of the rules that I described.

30. How much free memory is available?

There are a couple of kinds of “free memory”. One kind is the amount of memory immediately available without paging anything else out. That is approximately the size of cache queue + size of free queue (with a derating factor, depending upon system tuning.) Another kind of “free memory” is the total amount of VM space. That can be complex, but is dependent upon the amount of swap space and memory. Other kinds of “free memory” descriptions are also possible, but it is relatively useless to define these, but rather it is important to make sure that the paging rate is kept low, and to avoid running out of swap space.

31. What is `/var/empty`? I can not delete it!

`/var/empty` is a directory that the `sshd(8)` program uses when performing privilege separation. The `/var/empty` directory is empty, owned by `root` and has the `schg` flag set.

Although it is not recommended to delete this directory, to do so you will need to unset the `schg` flag first. See the `chflags(1)` manual page for more information (and bear in mind the answer to the question on unsetting the `schg` flag).

3. Will my existing applications run with the Xorg suite?

The Xorg software is written to the same X11R6 specification that XFree86 is, so basic applications should work unchanged. A few lesser-used protocols have been deprecated (XIE, PEX, and `lbxproxy`), but in the first two cases, the FreeBSD port of XFree86 did not support them either.

4. Why did the X projects split, anyway?

The answer to this question is outside the scope of this FAQ. Note that there are voluminous postings in various mailing list archives on the Internet; please use your favorite search engine to investigate the history instead of asking this question on the FreeBSD mailing lists. It may even be the case that only the participants will ever know for certain.

5. Why did FreeBSD choose to go with the Xorg ports by default?

The Xorg developers claim that their goal is to release more often and incorporate new features more quickly. If they are able to do so, this will be very attractive. Also, their software still uses the traditional X license, while XFree86 is now using their modified one.

ὉΐαΒύος: This decision is still controversial. Only time will tell which implementation proves technically superior. Each FreeBSD user should decide which they prefer.

6. I want to run X, how do I go about it?

If you would like to add X to an existing installation, you should use the `x11/xorg` meta-port, which will build and install all the necessary components.

Then read and follow the documentation on the `xorgconfig(1)` tool, which assists you in configuring Xorg for your particular graphics card/mouse/etc. You may also wish to examine the `xorgcfg(1)` tool, which provides a graphical interface to the X configuration process.

For further information, read the X11 (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/x11.html) section of the FreeBSD Handbook.

You may also wish to investigate the Xaccel server. See the section on Xi Graphics for more details.

7. I tried to run X, but I get an “KDENABIO failed (Operation not permitted)” error when I type `startx`. What do I do now?

Your system is probably running at a raised `securelevel`. It is not possible to start X at a raised `securelevel` because X requires write access to `/dev/io`. For more information, see at the `init(8)` manual page.

So the question is what else you should do instead, and you basically have two choices: set your `securelevel` back down to zero (usually from `/etc/rc.conf`), or run `xdm(1)` at boot time (before the `securelevel` is raised).

See Α: 14. for more information about running `xdm(1)` at boot time.

8. Why does my mouse not work with X?

If you are using `syscons` (the default console driver), you can configure FreeBSD to support a mouse pointer on each virtual screen. In order to avoid conflicting with X, `syscons` supports a virtual device called `/dev/sysmouse`. All mouse events received from the real mouse device are written to the `sysmouse` device via `moused`. If you wish to use your mouse on one or more virtual consoles, *and* use X, see § 4. and set up `moused`.

Then edit `/etc/X11/xorg.conf` and make sure you have the following lines:

```
Section "InputDevice"
    Option          "Protocol" "SysMouse"
    Option          "Device"   "/dev/sysmouse"
    . . . . .
```

Some people prefer to use `/dev/mouse` under X. To make this work, `/dev/mouse` should be linked to `/dev/sysmouse` (see `sysmouse(4)`):

```
# cd /dev
# rm -f mouse
# ln -s sysmouse mouse
```

9. My mouse has a fancy wheel. Can I use it in X?

Yes.

You need to tell X that you have a 5 button mouse. To do this, simply add the lines `Buttons 5` and `ZAxisMapping 4 5` to the “InputDevice” section of `/etc/X11/xorg.conf`. For example, you might have the following “InputDevice” section in `/etc/X11/xorg.conf`.

Εἰσαγωγή 11-1. “InputDevice” Section for Wheeled Mouse in Xorg configuration file

```
Section "InputDevice"
    Identifier      "Mouse1"
    Driver          "mouse"
    Option          "Protocol" "auto"
    Option          "Device"   "/dev/sysmouse"
    Option          "Buttons"  "5"
    Option          "ZAxisMapping" "4 5"
EndSection
```

Εἰσαγωγή 11-2. “.emacs” example for naive page scrolling with Wheeled Mouse (optional)

```
;; wheel mouse
(global-set-key [mouse-4] 'scroll-down)
(global-set-key [mouse-5] 'scroll-up)
```

10. How do I use remote X displays?

For security reasons, the default setting is to not allow a machine to remotely open a window.

To enable this feature, simply start **X** with the optional `-listen_tcp` argument:

```
% startx -listen_tcp
```

11. Why do X Window menus and dialog boxes not work right?

Try turning off the **Num Lock** key.

If your **Num Lock** key is on by default at boot-time, you may add the following line in the `Keyboard` section of the `/etc/X11/xorg.conf` file.

```
# Let the server do the NumLock processing. This should only be
# required when using pre-R6 clients
    ServerNumLock
```

12. What is a virtual console and how do I make more?

Virtual consoles, put simply, enable you to have several simultaneous sessions on the same machine without doing anything complicated like setting up a network or running X.

When the system starts, it will display a login prompt on the monitor after displaying all the boot messages. You can then type in your login name and password and start working (or playing!) on the first virtual console.

At some point, you will probably wish to start another session, perhaps to look at documentation for a program you are running or to read your mail while waiting for an FTP transfer to finish. Just do **Alt+F2** (hold down the **Alt** key and press the **F2** key), and you will find a login prompt waiting for you on the second “virtual console”! When you want to go back to the original session, do **Alt+F1**.

The default FreeBSD installation has eight virtual consoles enabled. **Alt+F1**, **Alt+F2**, **Alt+F3**, and so on will switch between these virtual consoles.

To enable more of them, edit `/etc/ttys` (see `ttys(5)`) and add entries for `ttyv4` to `ttyvc` after the comment on “Virtual terminals”:

```
# Edit the existing entry for ttyv3 in /etc/ttys and change
# "off" to "on".
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/libexec/getty Pc"          cons25  on secure
ttyv9  "/usr/libexec/getty Pc"          cons25  on secure
ttyva  "/usr/libexec/getty Pc"          cons25  on secure
ttyvb  "/usr/libexec/getty Pc"          cons25  on secure
```

Use as many or as few as you want. The more virtual terminals you have, the more resources that are used; this can be important if you have 8MB RAM or less. You may also want to change the `secure` to `insecure`.

Ὁῖαῖοῖεῖ: If you want to run an X server you *must* leave at least one virtual terminal unused (or turned off) for it to use. That is to say that if you want to have a login prompt pop up for all twelve of your Alt-function keys, you are out of luck - you can only do this for eleven of them if you also want to run an X server on the same machine.

The easiest way to disable a console is by turning it off. For example, if you had the full 12 terminal allocation mentioned above and you wanted to run X, you would change settings for virtual terminal 12 from:

```
ttyvb "/usr/libexec/getty Pc"          cons25  on  secure
```

to:

```
ttyvb "/usr/libexec/getty Pc"          cons25  off secure
```

If your keyboard has only ten function keys, you would end up with:

```
ttv9  "/usr/libexec/getty Pc"          cons25  off secure
ttyva "/usr/libexec/getty Pc"          cons25  off secure
ttyvb "/usr/libexec/getty Pc"          cons25  off secure
```

(You could also just delete these lines.)

Next, the easiest (and cleanest) way to activate the virtual consoles is to reboot. However, if you really do not want to reboot, you can just shut down the X Window system and execute (as `root`):

```
# kill -HUP 1
```

It is imperative that you completely shut down X Window if it is running, before running this command. If you do not, your system will probably appear to hang/lock up after executing the kill command.

13. How do I access the virtual consoles from X?

Use **Ctrl+Alt+F_n** to switch back to a virtual console. **Ctrl+Alt+F1** would return you to the first virtual console.

Once you are back to a text console, you can then use **Alt+F_n** as normal to move between them.

To return to the X session, you must switch to the virtual console running X. If you invoked X from the command line, (e.g., using `startx`) then the X session will attach to the next unused virtual console, not the text console from which it was invoked. If you have eight active virtual terminals then X will be running on the ninth, and you would use **Alt+F9** to return.

14. How do I start XDM on boot?

There are two schools of thought on how to start xdm(1). One school starts xdm from `/etc/ttys` (see `ttys(5)`) using the supplied example, while the other simply runs xdm from `rc.local` (see `rc(8)`) or from a `X.sh` script in `/usr/local/etc/rc.d`. Both are equally valid, and one may work in situations where the other does not. In both cases the result is the same: X will pop up a graphical login: prompt.

The `ttys` method has the advantage of documenting which vty X will start on and passing the responsibility of restarting the X server on logout to `init`. The `rc.local` method makes it easy to kill xdm if there is a problem starting the X server.

If loaded from `rc.local`, `xm` should be started without any arguments (i.e., as a daemon). `xm` must start AFTER `getty` runs, or else `getty` and `xm` will conflict, locking out the console. The best way around this is to have the script sleep 10 seconds or so then launch `xm`.

If you are to start `xm` from `/etc/ttys`, there still is a chance of conflict between `xm` and `getty(8)`. One way to avoid this is to add the `vt` number in the `/usr/local/lib/X11/xm/Xservers` file.

```
:0 local /usr/local/bin/X vt4
```

The above example will direct the X server to run in `/dev/ttyv3`. Note the number is offset by one. The X server counts the `vt`y from one, whereas the FreeBSD kernel numbers the `vt`y from zero.

15. Why do I get “Couldn’t open console” when I run `xconsole`?

If you start X with `startx`, the permissions on `/dev/console` will *not* get changed, resulting in things like `xterm -C` and `xconsole` not working.

This is because of the way console permissions are set by default. On a multi-user system, one does not necessarily want just any user to be able to write on the system console. For users who are logging directly onto a machine with a VTY, the `fctab(5)` file exists to solve such problems.

In a nutshell, make sure an uncommented line of the form

```
/dev/ttyv0 0600 /dev/console
```

is in `/etc/fctab` (see `fctab(5)`) and it will ensure that whomever logs in on `/dev/ttyv0` will own the console.

16. Before, I was able to run XFree86 as a regular user. Why does it now say that I must be `root`?

All X servers need to be run as `root` in order to get direct access to your video hardware. Older versions of XFree86 ($\leq 3.3.6$) installed all bundled servers to be automatically run as `root` (`setuid` to `root`). This is obviously a security hazard because X servers are large, complicated programs. Newer versions of XFree86 do not install the servers `setuid` to `root` for just this reason.

Obviously, running an X server as the `root` user is not acceptable, nor a good idea security-wise. There are two ways to be able to use X as a regular user. The first is to use `xm` or another display manager (e.g., `kdm`); the second is to use the `Xwrapper`.

`xm` is a daemon that handles graphical logins. It is usually started at boot time, and is responsible for authenticating users and starting their sessions; it is essentially the graphical counterpart of `getty(8)` and `login(1)`. For more information on `xm` see the XFree86 documentation (<http://www.xfree86.org/sos/resources.html>), and the the FAQ entry on it.

`Xwrapper` is the X server wrapper; it is a small utility to enable one to manually run an X server while maintaining reasonable safety. It performs some sanity checks on the command line arguments given, and if they pass, runs the appropriate X server. If you do not want to run a display manager for whatever reason, this is for you. If you have installed the complete ports collection, you can find the port in `/usr/ports/x11/wrapper`.

17. Why does my PS/2 mouse misbehave under X?

Your mouse and the mouse driver may have somewhat become out of synchronization.

In rare cases the driver may erroneously report synchronization problem and you may see the kernel message:

```
psmintr: out of sync (xxxx != yyyy)
```

and notice that your mouse does not work properly.

If this happens, disable the synchronization check code by setting the driver flags for the PS/2 mouse driver to 0x100. Enter *UserConfig* by giving the `-c` option at the boot prompt:

```
boot: -c
```

Then, in the *UserConfig* command line, type:

```
UserConfig> flags psm0 0x100
UserConfig> quit
```

18. Why does my PS/2 mouse from MouseSystems not work?

There have been some reports that certain model of PS/2 mouse from MouseSystems works only if it is put into the “high resolution” mode. Otherwise, the mouse cursor may jump to the upper-left corner of the screen every so often.

Specify the flags 0x04 to the PS/2 mouse driver to put the mouse into the high resolution mode. Enter *UserConfig* by giving the `-c` option at the boot prompt:

```
boot: -c
```

Then, in the *UserConfig* command line, type:

```
UserConfig> flags psm0 0x04
UserConfig> quit
```

See the previous section for another possible cause of mouse problems.

19. I want to install different X server.

FreeBSD versions prior 5.3 will use the default **XFree86 4.X**, while latter versions will default to **Xorg**. If you want to run a different X11 implementation than the default one, add the following line to `/etc/make.conf`, (if you do not have this file, create it):

```
X_WINDOW_SYSTEM=          xorg
```

This variable may be set to `xorg`, `xfree86-4`, or `xfree86-3`.

20. How do I reverse the mouse buttons?

Run the command `xmodmap -e "pointer = 3 2 1"` from your `.xinitrc` or `.xsession`.

21. How do I install a splash screen and where do I find them?

FreeBSD have a feature to allow the display of “splash” screens during the boot messages. The splash screens currently must be a 256 color bitmap (`*.BMP`) or ZSoft PCX (`*.PCX`) file. In addition, they must have a resolution of

320x200 or less to work on standard VGA adapters. If you compile VESA support into your kernel, then you can use larger bitmaps up to 1024x768. The actual VESA support can either be compiled directly into the kernel with the VESA kernel config option or by loading the VESA kld module during bootup.

To use a splash screen, you need to modify the startup files that control the boot process for FreeBSD.

You need to create a `/boot/loader.rc` file that contains the following lines:

```
include /boot/loader.4th
start
```

and a `/boot/loader.conf` that contains the following:

```
splash_bmp_load="YES"
bitmap_load="YES"
```

This assumes you are using `/boot/splash.bmp` for your splash screen. If you would rather use a PCX file, copy it to `/boot/splash.pcx`, create a `/boot/loader.rc` as instructed above, and create a `/boot/loader.conf` that contains:

```
splash_pcx_load="YES"
bitmap_load="YES"
bitmap_name="/boot/splash.pcx"
```

Now all you need is a splash screen. For that you can surf on over to the gallery at <http://www.baldwin.cx/splash/>.

22. Can I use the Windows keys on my keyboard in X?

Yes. All you need to do is use `xmodmap(1)` to define what function you wish them to perform.

Assuming all “Windows” keyboards are standard then the keycodes for the 3 keys are

- 115 - Windows key, between the left-hand Ctrl and Alt keys
- 116 - Windows key, to the right of the **AltGr** key
- 117 - **Menu** key, to the left of the right-hand **Ctrl** key

To have the left Windows key print a comma, try this.

```
# xmodmap -e "keycode 115 = comma"
```

You will probably have to re-start your window manager to see the result.

To have the Windows key-mappings enabled automatically every time you start X either put the `xmodmap` commands in your `~/.xinitrc` file or, preferably, create a file `~/.xmodmaprc` and include the `xmodmap` options, one per line, then add the line

```
xmodmap $HOME/.xmodmaprc
```

to your `~/.xinitrc`.

For example, you could map the 3 keys to be **F13**, **F14**, and **F15**, respectively. This would make it easy to map them to useful functions within applications or your window manager, as demonstrated further down.

To do this put the following in `~/.xmodmaprc`.

```
keycode 115 = F13
keycode 116 = F14
keycode 117 = F15
```

If you use `fvwm2`, for example, you could map the keys so that **F13** iconifies (or de-iconifies) the window the cursor is in, **F14** brings the window the cursor is in to the front or, if it is already at the front, pushes it to the back, and **F15** pops up the main Workplace (application) menu even if the cursor is not on the desktop, which is useful if you do not have any part of the desktop visible (and the logo on the key matches its functionality).

The following entries in `~/ .fvwmrc` implement the aforementioned setup:

Key F13	FTIWS	A	Iconify
Key F14	FTIWS	A	RaiseLower
Key F15	A	A	Menu Workplace Nop

23. How can I get 3D hardware acceleration for OpenGL®?

The availability of 3D acceleration depends on the version of XFree86 or Xorg that you are using and the type of video chip you have. If you have an NVIDIA chip, you can use the binary drivers provided for FreeBSD on the Drivers (<http://www.nvidia.com/content/drivers/drivers.asp>) section of their website. For other cards with XFree86-4 or Xorg, including the Matrox G200/G400, ATI Rage 128/Radeon, and 3dfx Voodoo 3, 4, 5, and Banshee, information on hardware acceleration is available on the XFree86-4 Direct Rendering on FreeBSD (<http://people.FreeBSD.org/~anholt/dri/>) page.

ΕὰöÛëáéï 12 Äéêôýùόç

1. Where can I get information on “diskless booting”?

“Diskless booting” means that the FreeBSD box is booted over a network, and reads the necessary files from a server instead of its hard disk. For full details, please read the Handbook entry on diskless booting (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/network-diskless.html)

2. Can a FreeBSD box be used as a dedicated network router?

Yes. Please see the Handbook entry on advanced networking (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/advanced-networking.html), specifically the section on routing and gateways (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/network-routing.html).

3. Can I connect my Windows box to the Internet via FreeBSD?

Typically, people who ask this question have two PCs at home, one with FreeBSD and one with some version of Windows the idea is to use the FreeBSD box to connect to the Internet and then be able to access the Internet from the Windows box through the FreeBSD box. This is really just a special case of the previous question and works perfectly well.

If you are using dialup to connect to the Internet user-mode `ppp(8)` contains a `-nat` option. If you run `ppp(8)` with the `-nat` option, set `gateway_enable` to `YES` in `/etc/rc.conf`, and configure your Windows machine correctly, this should work fine. For more information, please see the `ppp(8)` manual page or the Handbook entry on user PPP (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/userppp.html).

If you are using kernel-mode PPP or have an Ethernet connection to the Internet, you need to use `natd(8)`. Please look at the `natd` (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/network-natd.html) section of the Handbook for a tutorial.

4. Does FreeBSD support SLIP and PPP?

Yes. See the manual pages for `slattach(8)`, `sliplogin(8)`, `ppp(8)`, and `pppd(8)`. `ppp(8)` and `pppd(8)` provide support for both incoming and outgoing connections, while `sliplogin(8)` deals exclusively with incoming connections, and `slattach(8)` deals exclusively with outgoing connections.

For more information on how to use these, please see the Handbook chapter on PPP and SLIP (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/ppp-and-slip.html).

If you only have access to the Internet through a “shell account”, you may want to have a look at the `net/slirp` package. It can provide you with (limited) access to services such as `ftp` and `http` direct from your local machine.

5. Does FreeBSD support NAT or Masquerading?

Yes. If you want to use NAT over a user PPP connection, please see the Handbook entry on user PPP (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/userppp.html). If you want to use NAT over some other sort of network connection, please look at the `natd` (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/network-natd.html) section of the Handbook.

6. How do I connect two FreeBSD systems over a parallel line using PLIP?

Please see the PLIP section (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/network-plip.html) of the Handbook.

7. Why can I not create a `/dev/ed0` device?

Because they are not necessary. In the Berkeley networking framework, network interfaces are only directly accessible by kernel code. Please see the `/etc/rc.network` file and the manual pages for the various network programs mentioned there for more information. If this leaves you totally confused, then you should pick up a book describing network administration on another BSD-related operating system; with few significant exceptions, administering networking on FreeBSD is basically the same as on SunOS™ 4.0 or Ultrix.

8. How can I set up Ethernet aliases?

If the alias is on the same subnet as an address already configured on the interface, then add `netmask 0xffffffff` to your `ifconfig(8)` command-line, as in the following:

```
# ifconfig ed0 alias 192.0.2.2 netmask 0xffffffff
```

Otherwise, just specify the network address and netmask as usual:

```
# ifconfig ed0 alias 172.16.141.5 netmask 0xfffff00
```

9. How do I get my 3C503 to use the other network port?

If you want to use the other ports, you will have to specify an additional parameter on the `ifconfig(8)` command line. The default port is `link0`. To use the AUI port instead of the BNC one, use `link2`. These flags should be specified using the `ifconfig_*` variables in `/etc/rc.conf` (see `rc.conf(5)`).

10. Why am I having trouble with NFS and FreeBSD?

Certain PC network cards are better than others (to put it mildly) and can sometimes cause problems with network intensive applications like NFS.

See the Handbook entry on NFS

(http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/network-nfs.html) for more information on this topic.

11. Why can I not NFS-mount from a Linux box?

Some versions of the Linux NFS code only accept mount requests from a privileged port; try

```
# mount -o -P linuxbox:/blah /mnt
```

12. Why can I not NFS-mount from a Sun box?

Sun™ workstations running SunOS 4.X only accept mount requests from a privileged port; try

```
# mount -o -P sunbox:/blah /mnt
```

13. Why does mountd keep telling me it “can’t change attributes” and that I have a “bad exports list” on my FreeBSD NFS server?

The most frequent problem is not understanding the correct format of `/etc/exports`. Please review `exports(5)` and the NFS (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/network-nfs.html) entry in the Handbook, especially the section on configuring NFS (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/network-nfs.html#CONFIGURING-NFS).

14. Why am I having problems talking PPP to NeXTStep machines?

Try disabling the TCP extensions in `/etc/rc.conf` (see `rc.conf(5)`) by changing the following variable to NO:

```
tcp_extensions=NO
```

Xylogic’s Annex boxes are also broken in this regard and you must use the above change to connect through them.

15. How do I enable IP multicast support?

FreeBSD supports multicast host operations by default. If you want your box to run as a multicast router, you need to recompile your kernel with the `MROUTING` option and run `mrouted(8)`. FreeBSD will start `mrouted(8)` at boot time if the flag `mrouted_enable` is set to "YES" in `/etc/rc.conf`.

MBONE tools are available in their own ports category, `mbone` (<http://www.FreeBSD.org/ports/mbone.html>). If you are looking for the conference tools `vic` and `vat`, look there!

16. Which network cards are based on the DEC PCI chipset?

Here is a list compiled by Glen Foster <gfooster@driver.nsta.org>, with some more modern additions:

Ενότητα 12-1. Network cards based on the DEC PCI chipset

Vendor	Model
ASUS	PCI-L101-TB
Accton	ENI1203
Cogent	EM960PCI
Compex	ENET32-PCI
D-Link	DE-530
Dayna	DP1203, DP2100
DEC	DE435, DE450
Danpex	EN-9400P3
JCIS	Condor JC1260
Linksys	EtherPCI
Mylex	LNP101
SMC	EtherPower 10/100 (Model 9332)
SMC	EtherPower (Model 8432)

Vendor	Model
TopWare	TE-3500P
Znyx (2.2.x)	ZX312, ZX314, ZX342, ZX345, ZX346, ZX348
Znyx (3.x)	ZX345Q, ZX346Q, ZX348Q, ZX412Q, ZX414, ZX442, ZX444, ZX474, ZX478, ZX212, ZX214 (10mbps/hd)

17. Why do I have to use the FQDN for hosts on my site?

You will probably find that the host is actually in a different domain; for example, if you are in `foo.example.org` and you wish to reach a host called `mumble` in the `example.org` domain, you will have to refer to it by the fully-qualified domain name, `mumble.example.org`, instead of just `mumble`.

Traditionally, this was allowed by BSD BIND resolvers. However the current version of **bind** (see `named(8)`) that ships with FreeBSD no longer provides default abbreviations for non-fully qualified domain names other than the domain you are in. So an unqualified host `mumble` must either be found as `mumble.foo.example.org`, or it will be searched for in the root domain.

This is different from the previous behavior, where the search continued across `mumble.example.org`, and `mumble.edu`. Have a look at RFC 1535 for why this was considered bad practice, or even a security hole.

As a good workaround, you can place the line

```
search foo.example.org example.org
```

instead of the previous

```
domain foo.example.org
```

into your `/etc/resolv.conf` file (see `resolv.conf(5)`). However, make sure that the search order does not go beyond the “boundary between local and public administration”, as RFC 1535 calls it.

18. Why do I get an error, “Permission denied”, for all networking operations?

If you have compiled your kernel with the `IPFIREWALL` option, you need to be aware that the default policy is to deny all packets that are not explicitly allowed.

If you had unintentionally misconfigured your system for firewalling, you can restore network operability by typing the following while logged in as `root`:

```
# ipfw add 65534 allow all from any to any
```

You can also set `firewall_type="open"` in `/etc/rc.conf`.

For further information on configuring a FreeBSD firewall, see the Handbook chapter (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/firewalls.html).

19. How much overhead does IPFW incur?

Please see the Handbook’s Firewalls

(http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/firewalls.html) section, specifically the section on

IPFW Overhead & Optimization

(http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/firewalls.html#IPFW-OVERHEAD).

20. Why is my `ipfw` “fwd” rule to redirect a service to another machine not working?

Possibly because you want to do network address translation (NAT) and not just forward packets. A “fwd” rule does exactly what it says; it forwards packets. It does not actually change the data inside the packet. Say we have a rule like:

```
01000 fwd 10.0.0.1 from any to foo 21
```

When a packet with a destination address of `foo` arrives at the machine with this rule, the packet is forwarded to `10.0.0.1`, but it still has the destination address of `foo`! The destination address of the packet is *not* changed to `10.0.0.1`. Most machines would probably drop a packet that they receive with a destination address that is not their own. Therefore, using a “fwd” rule does not often work the way the user expects. This behavior is a feature and not a bug.

See the FAQ about redirecting services, the `natd(8)` manual, or one of the several port redirecting utilities in the ports collection (<http://www.FreeBSD.org/ports/index.html>) for a correct way to do this.

21. How can I redirect service requests from one machine to another?

You can redirect FTP (and other service) request with the `socket` package, available in the ports tree in category “sysutils”. Simply replace the service’s command line to call `socket` instead, like so:

```
ftp stream tcp nowait nobody /usr/local/bin/socket socket ftp.example.com ftp
```

where `ftp.example.com` and `ftp` are the host and port to redirect to, respectively.

22. Where can I get a bandwidth management tool?

There are three bandwidth management tools available for FreeBSD. `dummynet(4)` is integrated into FreeBSD as part of `ipfw(4)`. ALTQ (<http://www.csl.sony.co.jp/person/kjc/programs.html>) is available for free on FreeBSD 4.X and has been integrated into FreeBSD 5.X as part of `pf(4)`. Bandwidth Manager from Emerging Technologies (<http://www.etinc.com/>) is a commercial product.

23. Why do I get “/dev/bpf0: device not configured”?

You are running a program that requires the Berkeley Packet Filter (`bpf(4)`), but it is not in your kernel. Add this to your kernel config file and build a new kernel:

```
pseudo-device bpf          # Berkeley Packet Filter
```

On FreeBSD 4.X and earlier, you must also create the device node. After rebooting, go to the `/dev` directory and run:

```
# sh MAKEDEV bpf0
```

Please see the Handbook entry on device nodes

(http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/kernelconfig-nodes.html) for more information on managing devices.

24. How do I mount a disk from a Windows machine that is on my network, like `smbmount` in Linux?

Use the **SMBFS** toolset. It includes a set of kernel modifications and a set of userland programs. The programs and information are available as `net/smbfs` in the ports collection, or in the base system as of 4.5-RELEASE and later.

25. What are these messages about “icmp-response bandwidth limit 300/200 pps” in my log files?

This is the kernel telling you that some activity is provoking it to send more ICMP or TCP reset (RST) responses than it thinks it should. ICMP responses are often generated as a result of attempted connections to unused UDP ports. TCP resets are generated as a result of attempted connections to unopened TCP ports. Among others, these are the kinds of activities which may cause these messages:

- Brute-force denial of service (DoS) attacks (as opposed to single-packet attacks which exploit a specific vulnerability).
- Port scans which attempt to connect to a large number of ports (as opposed to only trying a few well-known ports).

The first number in the message tells you how many packets the kernel would have sent if the limit was not in place, and the second number tells you the limit. You can control the limit using the `net.inet.icmp.icmplim` sysctl variable like this, where 300 is the limit in packets per second:

```
# sysctl -w net.inet.icmp.icmplim=300
```

If you do not want to see messages about this in your log files, but you still want the kernel to do response limiting, you can use the `net.inet.icmp.icmplim_output` sysctl variable to disable the output like this:

```
# sysctl -w net.inet.icmp.icmplim_output=0
```

Finally, if you want to disable response limiting, you can set the `net.inet.icmp.icmplim` sysctl variable (see above for an example) to 0. Disabling response limiting is discouraged for the reasons listed above.

26. What are these “arp: unknown hardware address format” error messages?

This means that some device on your local Ethernet is using a MAC address in a format that FreeBSD does not recognize. This is probably caused by someone experimenting with an Ethernet card somewhere else on the network. You will see this most commonly on cable modem networks. It is harmless, and should not affect the performance of your FreeBSD machine.

27. I have just installed CVSup but trying to execute it produces errors. What is wrong?

First, see if the error message you are receiving is like the one shown below.

```
/usr/libexec/ld-elf.so.1: Shared object "libXaw.so.6" not found
```

Errors like these are caused by installing the `net/cvsup` port on a machine which does not have the **XFree86** suite. If you want to use the GUI included with **CVSup** you will need to install **XFree86** now. Alternatively if you just wish to use **CVSup** from a command line you should delete the package previously installed. Then install the `net/cvsup-without-gui` port. This is covered in more detail in the CVSup section (http://www.FreeBSD.org/doc/en_US.ISO8859-1/books/handbook/cvsup.html) of the Handbook.

Chapter 13 Sandboxing

1. What is a sandbox?

“Sandbox” is a security term. It can mean two things:

- A process which is placed inside a set of virtual walls that are designed to prevent someone who breaks into the process from being able to break into the wider system.

The process is said to be able to “play” inside the walls. That is, nothing the process does in regards to executing code is supposed to be able to breach the walls so you do not have to do a detailed audit of its code to be able to say certain things about its security.

The walls might be a `userid`, for example. This is the definition used in the `security(7)` and `named(8)` man pages.

Take the `ntalk` service, for example (see `/etc/inetd.conf`). This service used to run as `userid root`. Now it runs as `userid tty`. The `tty` user is a sandbox designed to make it more difficult for someone who has successfully hacked into the system via `ntalk` from being able to hack beyond that user id.

- A process which is placed inside a simulation of the machine. This is more hard-core. Basically it means that someone who is able to break into the process may believe that he can break into the wider machine but is, in fact, only breaking into a simulation of that machine and not modifying any real data.

The most common way to accomplish this is to build a simulated environment in a subdirectory and then run the processes in that directory `chroot'd` (i.e. `/` for that process is this directory, not the real `/` of the system).

Another common use is to mount an underlying filesystem read-only and then create a filesystem layer on top of it that gives a process a seemingly writeable view into that filesystem. The process may believe it is able to write to those files, but only the process sees the effects - other processes in the system do not, necessarily.

An attempt is made to make this sort of sandbox so transparent that the user (or hacker) does not realize that he is sitting in it.

UNIX implements two core sandboxes. One is at the process level, and one is at the `userid` level.

Every UNIX process is completely firewalled off from every other UNIX process. One process cannot modify the address space of another. This is unlike Windows where a process can easily overwrite the address space of any other, leading to a crash.

A UNIX process is owned by a particular `userid`. If the `userid` is not the `root` user, it serves to firewall the process off from processes owned by other users. The `userid` is also used to firewall off on-disk data.

2. What is `securelevel`?

The `securelevel` is a security mechanism implemented in the kernel. Basically, when the `securelevel` is positive, the kernel restricts certain tasks; not even the superuser (i.e., `root`) is allowed to do them. At the time of this writing, the `securelevel` mechanism is capable of, among other things, limiting the ability to,

- unset certain file flags, such as `schg` (the system immutable flag),
- write to kernel memory via `/dev/mem` and `/dev/kmem`,
- load kernel modules, and
- alter firewall rules.

To check the status of the `securelevel` on a running system, simply execute the following command:

```
# sysctl kern.securelevel
```

The output will contain the name of the `sysctl(8)` variable (in this case, `kern.securelevel`) and a number. The latter is the current value of the `securelevel`. If it is positive (i.e., greater than 0), at least some of the `securelevel`'s protections are enabled.

You cannot lower the `securelevel` of a running system; being able to do that would defeat its purpose. If you need to do a task that requires that the `securelevel` be non-positive (e.g., an `installworld` or changing the date), you will have to change the `securelevel` setting in `/etc/rc.conf` (you want to look for the `kern_securelevel` and `kern_securelevel_enable` variables) and reboot.

For more information on `securelevel` and the specific things all the levels do, please consult the `init(8)` manual page.

Διάρκεια: `Securelevel` is not a silver bullet; it has many known deficiencies. More often than not, it provides a false sense of security.

One of its biggest problems is that in order for it to be at all effective, all files used in the boot process up until the `securelevel` is set must be protected. If an attacker can get the system to execute their code prior to the `securelevel` being set (which happens quite late in the boot process since some things the system must do at start-up cannot be done at an elevated `securelevel`), its protections are invalidated. While this task of protecting all files used in the boot process is not technically impossible, if it is achieved, system maintenance will become a nightmare since one would have to take the system down, at least to single-user mode, to modify a configuration file.

This point and others are often discussed on the mailing lists, particularly the `FreeBSD` `security` (http://lists.FreeBSD.org/mailman/listinfo/freebsd-security). Please search the archives here (http://www.FreeBSD.org/search/index.html) for an extensive discussion. Some people are hopeful that `securelevel` will soon go away in favor of a more fine-grained mechanism, but things are still hazy in this respect.

Consider yourself warned.

3. BIND (named) is listening on port 53 and some other high-numbered port. What is going on?

BIND uses a random high-numbered port for outgoing queries. If you want to use port 53 for outgoing queries, either to get past a firewall or to make yourself feel better, you can try the following in `/etc/namedb/named.conf`:

```
options {
    query-source address * port 53;
};
```

You can replace the `*` with a single IP address if you want to tighten things further.

Congratulations, by the way. It is good practice to read your `sockstat(1)` output and notice odd things!

4. Sendmail is listening on port 587 as well as the standard port 25! What is going on?

Recent versions of Sendmail support a mail submission feature that runs over port 587. This is not yet widely supported, but is growing in popularity.

5. What is this UID 0 `toor` account? Have I been compromised?

Do not worry. `toor` is an “alternative” superuser account (`toor` is `root` spelt backwards). Previously it was created when the `bash(1)` shell was installed but now it is created by default. It is intended to be used with a non-standard shell so you do not have to change `root`’s default shell. This is important as shells which are not part of the base distribution (for example a shell installed from ports or packages) are likely to be installed in `/usr/local/bin` which, by default, resides on a different filesystem. If `root`’s shell is located in `/usr/local/bin` and `/usr` (or whatever filesystem contains `/usr/local/bin`) is not mounted for some reason, `root` will not be able to log in to fix a problem (although if you reboot into single user mode you will be prompted for the path to a shell).

Some people use `toor` for day-to-day `root` tasks with a non-standard shell, leaving `root`, with a standard shell, for single user mode or emergencies. By default you cannot log in using `toor` as it does not have a password, so log in as `root` and set a password for `toor` if you want to use it.

6. Why is `suidperl` not working properly?

For security reasons, `suidperl` is installed without the `suid` bit by default. The system administrator can enable `suid` behavior with the following command.

```
# chmod u+s /usr/bin/suidperl
```

If you want `suidperl` to be built `suid` during upgrades from source, edit `/etc/make.conf` and add `ENABLE_SUIDPERL=true` before you run `make buildworld`.

Chapter 14 PPP

1. I cannot make ppp(8) work. What am I doing wrong?

You should first read the ppp(8) manual page and the PPP section of the handbook (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/ppp-and-slip.html#USERPPP). Enable logging with the command

```
set log Phase Chat Connect Carrier lcp ipcp ccp command
```

This command may be typed at the ppp(8) command prompt or it may be entered in the `/etc/ppp/ppp.conf` configuration file (the start of the `default` section is the best place to put it). Make sure that `/etc/syslog.conf` (see `syslog.conf(5)`) contains the lines

```
!ppp
*. *      /var/log/ppp.log
```

and that the file `/var/log/ppp.log` exists. You can now find out a lot about what is going on from the log file. Do not worry if it does not all make sense. If you need to get help from someone, it may make sense to them.

2. Why does ppp(8) hang when I run it?

This is usually because your hostname will not resolve. The best way to fix this is to make sure that `/etc/hosts` is consulted by your resolver first by editing `/etc/host.conf` and putting the `hosts` line first. Then, simply put an entry in `/etc/hosts` for your local machine. If you have no local network, change your `localhost` line:

```
127.0.0.1      foo.example.com foo localhost
```

Otherwise, simply add another entry for your host. Consult the relevant manual pages for more details.

You should be able to successfully `ping -c1 'hostname'` when you are done.

3. Why will ppp(8) not dial in -auto mode?

First, check that you have got a default route. By running `netstat -rn` (see `netstat(1)`), you should see two entries like this:

Destination	Gateway	Flags	Refs	Use	Netif	Expire
default	10.0.0.2	UGSc	0	0	tun0	
10.0.0.2	10.0.0.1	UH	0	0	tun0	

This is assuming that you have used the addresses from the handbook, the manual page or from the `ppp.conf.sample` file. If you do not have a default route, it may be because you are running an old version of ppp(8) that does not understand the word `HISADDR` in the `ppp.conf` file.

Another reason for the default route line being missing is that you have mistakenly set up a default router in your `/etc/rc.conf` (see `rc.conf(5)`) file and you have omitted the line saying

```
delete ALL
```

from `ppp.conf`. If this is the case, go back to the Final system configuration (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/ppp-and-slip.html#USERPPP-FINAL) section of the handbook.

4. What does “No route to host” mean?

This error is usually due to a missing

```
MYADDR:
    delete ALL
    add 0 0 HISADDR
```

section in your `/etc/ppp/ppp.linkup` file. This is only necessary if you have a dynamic IP address or do not know the address of your gateway. If you are using interactive mode, you can type the following after entering packet mode (packet mode is indicated by the capitalized PPP in the prompt):

```
delete ALL
add 0 0 HISADDR
```

Refer to the PPP and Dynamic IP addresses

(http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/ppp-and-slip.html#USERPPP-DYNAMICIP) section of the handbook for further details.

5. Why does my connection drop after about 3 minutes?

The default PPP timeout is 3 minutes. This can be adjusted with the line

```
set timeout NNN
```

where `NNN` is the number of seconds of inactivity before the connection is closed. If `NNN` is zero, the connection is never closed due to a timeout. It is possible to put this command in the `ppp.conf` file, or to type it at the prompt in interactive mode. It is also possible to adjust it on the fly while the line is active by connecting to **ppp**'s server socket using `telnet(1)` or `pppctl(8)`. Refer to the `ppp(8)` man page for further details.

6. Why does my connection drop under heavy load?

If you have Link Quality Reporting (LQR) configured, it is possible that too many LQR packets are lost between your machine and the peer. Ppp deduces that the line must therefore be bad, and disconnects. Prior to FreeBSD version 2.2.5, LQR was enabled by default. It is now disabled by default. LQR can be disabled with the line

```
disable lqr
```

7. Why does my connection drop after a random amount of time?

Sometimes, on a noisy phone line or even on a line with call waiting enabled, your modem may hang up because it thinks (incorrectly) that it lost carrier.

There is a setting on most modems for determining how tolerant it should be to temporary losses of carrier. On a USR Sportster® for example, this is measured by the S10 register in tenths of a second. To make your modem more forgiving, you could add the following send-expect sequence to your dial string:

```
set dial "..... ATS10=10 OK ....."
```

Refer to your modem manual for details.

8. Why does my connection hang after a random amount of time?

Many people experience hung connections with no apparent explanation. The first thing to establish is which side of the link is hung.

If you are using an external modem, you can simply try using ping(8) to see if the TD light is flashing when you transmit data. If it flashes (and the RD light does not), the problem is with the remote end. If TD does not flash, the problem is local. With an internal modem, you will need to use the `set server` command in your `ppp.conf` file. When the hang occurs, connect to ppp(8) using pppctl(8). If your network connection suddenly revives (PPP was revived due to the activity on the diagnostic socket) or if you cannot connect (assuming the `set socket` command succeeded at startup time), the problem is local. If you can connect and things are still hung, enable local async logging with `set log local async` and use ping(8) from another window or terminal to make use of the link. The async logging will show you the data being transmitted and received on the link. If data is going out and not coming back, the problem is remote.

Having established whether the problem is local or remote, you now have two possibilities:

- If the problem is remote, read on entry Å: 9..
- If the problem is local, read on entry Å: 10..

9. The remote end is not responding. What can I do?

There is very little you can do about this. Most ISPs will refuse to help if you are not running a Microsoft OS. You can enable `lqr` in your `ppp.conf` file, allowing ppp(8) to detect the remote failure and hang up, but this detection is relatively slow and therefore not that useful. You may want to avoid telling your ISP that you are running user-PPP...

First, try disabling all local compression by adding the following to your configuration:

```
disable pred1 deflate deflate24 protocomp acfcomp shortseq vj
deny pred1 deflate deflate24 protocomp acfcomp shortseq vj
```

Then reconnect to ensure that this makes no difference. If things improve or if the problem is solved completely, determine which setting makes the difference through trial and error. This will provide good ammunition when you contact your ISP (although it may make it apparent that you are not running a Microsoft product).

Before contacting your ISP, enable async logging locally and wait until the connection hangs again. This may use up quite a bit of disk space. The last data read from the port may be of interest. It is usually ascii data, and may even describe the problem ("Memory fault, core dumped"?).

If your ISP is helpful, they should be able to enable logging on their end, then when the next link drop occurs, they may be able to tell you why their side is having a problem. Feel free to send the details to Brian Somers <brian@FreeBSD.org>, or even to ask your ISP to contact me directly.

10. ppp(8) has hung. What can I do?

Your best bet here is to rebuild ppp(8) by adding `CFLAGS+=-g` and `STRIP=` to the end of the Makefile, then doing a `make clean && make && make install`. When ppp(8) hangs, find the ppp(8) process id with `ps ajxww | fgrep ppp` and run `gdb ppp PID`. From the gdb prompt, you can then use `bt` to get a stack trace.

Send the results to Brian Somers <brian@FreeBSD.org>.

11. Why does nothing happen after the “Login OK!” message?

Prior to FreeBSD version 2.2.5, once the link was established, ppp(8) would wait for the peer to initiate the Line Control Protocol (LCP). Many ISPs will not initiate negotiations and expect the client to do so. To force ppp(8) to initiate the LCP, use the following line:

```
set openmode active
```

Warning: It usually does no harm if both sides initiate negotiation, so openmode is now active by default. However, the next section explains when it *does* do some harm.

12. I keep seeing errors about magic being the same. What does it mean?

Occasionally, just after connecting, you may see messages in the log that say “magic is the same”. Sometimes, these messages are harmless, and sometimes one side or the other exits. Most PPP implementations cannot survive this problem, and even if the link seems to come up, you will see repeated configure requests and configure acknowledgments in the log file until ppp(8) eventually gives up and closes the connection.

This normally happens on server machines with slow disks that are spawning a getty on the port, and executing ppp(8) from a login script or program after login. I have also heard reports of it happening consistently when using slirp. The reason is that in the time taken between getty(8) exiting and ppp(8) starting, the client-side ppp(8) starts sending Line Control Protocol (LCP) packets. Because ECHO is still switched on for the port on the server, the client ppp(8) sees these packets “reflect” back.

One part of the LCP negotiation is to establish a magic number for each side of the link so that “reflections” can be detected. The protocol says that when the peer tries to negotiate the same magic number, a NAK should be sent and a new magic number should be chosen. During the period that the server port has ECHO turned on, the client ppp(8) sends LCP packets, sees the same magic in the reflected packet and NAKs it. It also sees the NAK reflect (which also means ppp(8) must change its magic). This produces a potentially enormous number of magic number changes, all of which are happily piling into the server’s tty buffer. As soon as ppp(8) starts on the server, it is flooded with magic number changes and almost immediately decides it has tried enough to negotiate LCP and gives up. Meanwhile, the client, who no longer sees the reflections, becomes happy just in time to see a hangup from the server.

This can be avoided by allowing the peer to start negotiating with the following line in your ppp.conf file:

```
set openmode passive
```

This tells ppp(8) to wait for the server to initiate LCP negotiations. Some servers however may never initiate negotiations. If this is the case, you can do something like:

```
set openmode active 3
```

This tells ppp(8) to be passive for 3 seconds, and then to start sending LCP requests. If the peer starts sending requests during this period, ppp(8) will immediately respond rather than waiting for the full 3 second period.

13. LCP negotiations continue until the connection is closed. What is wrong?

There is currently an implementation mis-feature in ppp(8) where it does not associate LCP, CCP & IPCP responses with their original requests. As a result, if one PPP implementation is more than 6 seconds slower than the other side, the other side will send two additional LCP configuration requests. This is fatal.

Consider two implementations, A and B. A starts sending LCP requests immediately after connecting and B takes 7 seconds to start. When B starts, A has sent 3 LCP REQs. We are assuming the line has ECHO switched off, otherwise we would see magic number problems as described in the previous section. B sends a REQ, then an ACK to the first of A's REQs. This results in A entering the OPENED state and sending an ACK (the first) back to B. In the meantime, B sends back two more ACKs in response to the two additional REQs sent by A before B started up. B then receives the first ACK from A and enters the OPENED state. A receives the second ACK from B and goes back to the REQ-SENT state, sending another (forth) REQ as per the RFC. It then receives the third ACK and enters the OPENED state. In the meantime, B receives the forth REQ from A, resulting in it reverting to the ACK-SENT state and sending another (second) REQ and (forth) ACK as per the RFC. A gets the REQ, goes into REQ-SENT and sends another REQ. It immediately receives the following ACK and enters OPENED.

This goes on until one side figures out that they are getting nowhere and gives up.

The best way to avoid this is to configure one side to be `passive` - that is, make one side wait for the other to start negotiating. This can be done with the

```
set openmode passive
```

command. Care should be taken with this option. You should also use the

```
set stopped N
```

command to limit the amount of time that ppp(8) waits for the peer to begin negotiations. Alternatively, the

```
set openmode active N
```

command (where *N* is the number of seconds to wait before starting negotiations) can be used. Check the manual page for details.

14. Why does ppp(8) lock up when I shell out to test it?

When you execute the `shell` or `!` command, ppp(8) executes a shell (or if you have passed any arguments, ppp(8) will execute those arguments). Ppp will wait for the command to complete before continuing. If you attempt to use the PPP link while running the command, the link will appear to have frozen. This is because ppp(8) is waiting for the command to complete.

If you wish to execute commands like this, use the `!bg` command instead. This will execute the given command in the background, and `ppp(8)` can continue to service the link.

15. Why does `ppp(8)` over a null-modem cable never exit?

There is no way for `ppp(8)` to automatically determine that a direct connection has been dropped. This is due to the lines that are used in a null-modem serial cable. When using this sort of connection, LQR should always be enabled with the line

```
enable lqr
```

LQR is accepted by default if negotiated by the peer.

16. Why does `ppp(8)` dial for no reason in -auto mode?

If `ppp(8)` is dialing unexpectedly, you must determine the cause, and set up Dial filters (dfilters) to prevent such dialing.

To determine the cause, use the following line:

```
set log +tcp/ip
```

This will log all traffic through the connection. The next time the line comes up unexpectedly, you will see the reason logged with a convenient timestamp next to it.

You can now disable dialing under these circumstances. Usually, this sort of problem arises due to DNS lookups. To prevent DNS lookups from establishing a connection (this will *not* prevent `ppp(8)` from passing the packets through an established connection), use the following:

```
set dfilter 1 deny udp src eq 53
set dfilter 2 deny udp dst eq 53
set dfilter 3 permit 0/0 0/0
```

This is not always suitable, as it will effectively break your demand-dial capabilities - most programs will need a DNS lookup before doing any other network related things.

In the DNS case, you should try to determine what is actually trying to resolve a host name. A lot of the time, `sendmail(8)` is the culprit. You should make sure that you tell `sendmail` not to do any DNS lookups in its configuration file. See the section on using email with a dialup connection (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/smtp-dialup.html) in the FreeBSD Handbook for details on how to create your own configuration file and what should go into it. You may also want to add the following line to your `.mc` file:

```
define(`confDELIVERY_MODE', `d')dnl
```

This will make `sendmail` queue everything until the queue is run (usually, `sendmail` is invoked with `-bd -q30m`, telling it to run the queue every 30 minutes) or until a `sendmail -q` is done (perhaps from your `ppp.linkup` file).

17. What do these CCP errors mean?

I keep seeing the following errors in my log file:

```
CCP: CcpSendConfigReq
CCP: Received Terminate Ack (1) state = Req-Sent (6)
```

This is because ppp(8) is trying to negotiate Predictor1 compression, and the peer does not want to negotiate any compression at all. The messages are harmless, but if you wish to remove them, you can disable Predictor1 compression locally too:

```
disable pred1
```

18. Why does ppp(8) not log my connection speed?

In order to log all lines of your modem “conversation”, you must enable the following:

```
set log +connect
```

This will make ppp(8) log everything up until the last requested “expect” string.

If you wish to see your connect speed and are using PAP or CHAP (and therefore do not have anything to “chat” after the CONNECT in the dial script - no `set login` script), you must make sure that you instruct ppp(8) to “expect” the whole CONNECT line, something like this:

```
set dial "ABORT BUSY ABORT NO\\sCARRIER TIMEOUT 4 \
\\" ATZ OK-ATZ-OK ATDT\\T TIMEOUT 60 CONNECT \\c \\n"
```

Here, we get our CONNECT, send nothing, then expect a line-feed, forcing ppp(8) to read the whole CONNECT response.

19. Why does ppp(8) ignore the \ character in my chat script?

Ppp parses each line in your config files so that it can interpret strings such as `set phone "123 456 789"` correctly and realize that the number is actually only *one* argument. In order to specify a " character, you must escape it using a backslash (\).

When the chat interpreter parses each argument, it re-interprets the argument in order to find any special escape sequences such as \P or \T (see the manual page). As a result of this double-parsing, you must remember to use the correct number of escapes.

If you wish to actually send a \ character to (say) your modem, you would need something like:

```
set dial "\" ATZ OK-ATZ-OK AT\\\\X OK"
```

resulting in the following sequence:

```
ATZ
OK
AT\\X
OK
```


or

```
set phone 1234567
set dial "\"\" ATZ OK ATDT\\T"
```

resulting in the following sequence:

```
ATZ
OK
ATDT1234567
```

20. Why does ppp(8) get a seg-fault, but I see no ppp.core file?

Ppp (or any other program for that matter) should never dump core. Because ppp(8) runs with an effective user id of 0, the operating system will not write ppp(8)'s core image to disk before terminating it. If, however ppp(8) is actually terminating due to a segmentation violation or some other signal that normally causes core to be dumped, *and* you are sure you are using the latest version (see the start of this section), then you should do the following:

```
% tar xfz ppp-*.src.tar.gz
% cd ppp*/ppp
% echo STRIP= >>Makefile
% echo CFLAGS+=-g >>Makefile
% make clean all
% su
# make install
# chmod 555 /usr/sbin/ppp
```

You will now have a debuggable version of ppp(8) installed. You will have to be `root` to run ppp(8) as all of its privileges have been revoked. When you start ppp(8), take a careful note of what your current directory was at the time.

Now, if and when ppp(8) receives the segmentation violation, it will dump a core file called `ppp.core`. You should then do the following:

```
% su
# gdb /usr/sbin/ppp ppp.core
(gdb) bt
.....
(gdb) f 0
....
(gdb) i args
....
(gdb) l
.....
```

All of this information should be given alongside your question, making it possible to diagnose the problem.

If you are familiar with `gdb`, you may wish to find out some other bits and pieces such as what actually caused the dump and the addresses & values of the relevant variables.

21. Why does the process that forces a dial in auto mode never connect?

This was a known problem with ppp(8) set up to negotiate a dynamic local IP number with the peer in auto mode. It is fixed in the latest version - search the manual page for `iface`.

The problem was that when that initial program calls `connect(2)`, the IP number of the tun interface is assigned to the socket endpoint. The kernel creates the first outgoing packet and writes it to the tun device. ppp(8) then reads the packet and establishes a connection. If, as a result of ppp(8)'s dynamic IP assignment, the interface address is changed, the original socket endpoint will be invalid. Any subsequent packets sent to the peer will usually be dropped. Even if they are not, any responses will not route back to the originating machine as the IP number is no longer owned by that machine.

There are several theoretical ways to approach this problem. It would be nicest if the peer would re-assign the same IP number if possible :-). The current version of ppp(8) does this, but most other implementations do not.

The easiest method from our side would be to never change the tun interface IP number, but instead to change all outgoing packets so that the source IP number is changed from the interface IP to the negotiated IP on the fly. This is essentially what the `iface-alias` option in the latest version of ppp(8) is doing (with the help of `libalias(3)` and ppp(8)'s `-nat` switch) - it is maintaining all previous interface addresses and NATing them to the last negotiated address.

Another alternative (and probably the most reliable) would be to implement a system call that changes all bound sockets from one IP to another. ppp(8) would use this call to modify the sockets of all existing programs when a new IP number is negotiated. The same system call could be used by dhcp clients when they are forced to re-bind() their sockets.

Yet another possibility is to allow an interface to be brought up without an IP number. Outgoing packets would be given an IP number of 255.255.255.255 up until the first `SIOCAIFADDR` ioctl is done. This would result in fully binding the socket. It would be up to ppp(8) to change the source IP number, but only if it is set to 255.255.255.255, and only the IP number and IP checksum would need to change. This, however is a bit of a hack as the kernel would be sending bad packets to an improperly configured interface, on the assumption that some other mechanism is capable of fixing things retrospectively.

22. Why do most games not work with the -nat switch?

The reason games and the like do not work when `libalias` is in use is that the machine on the outside will try to open a connection or send (unsolicited) UDP packets to the machine on the inside. The NAT software does not know that it should send these packets to the interior machine.

To make things work, make sure that the only thing running is the software that you are having problems with, then either run `tcpdump` on the tun interface of the gateway or enable ppp(8) tcp/ip logging (`set log +tcp/ip`) on the gateway.

When you start the offending software, you should see packets passing through the gateway machine. When something comes back from the outside, it will be dropped (that is the problem). Note the port number of these packets then shut down the offending software. Do this a few times to see if the port numbers are consistent. If they are, then the following line in the relevant section of `/etc/ppp/ppp.conf` will make the software functional:

```
nat port proto internalmachine:port port
```

where `proto` is either `tcp` or `udp`, `internalmachine` is the machine that you want the packets to be sent to and `port` is the destination port number of the packets.

You will not be able to use the software on other machines without changing the above command, and running the software on two internal machines at the same time is out of the question - after all, the outside world is seeing your entire internal network as being just a single machine.

If the port numbers are not consistent, there are three more options:

1. Submit support in libalias. Examples of “special cases” can be found in `/usr/src/lib/libalias/alias_*.c` (`alias_ftp.c` is a good prototype). This usually involves reading certain recognised outgoing packets, identifying the instruction that tells the outside machine to initiate a connection back to the internal machine on a specific (random) port and setting up a “route” in the alias table so that the subsequent packets know where to go.

This is the most difficult solution, but it is the best and will make the software work with multiple machines.

2. Use a proxy. The application may support socks5 for example, or (as in the “cvsup” case) may have a “passive” option that avoids ever requesting that the peer open connections back to the local machine.
3. Redirect everything to the internal machine using `nat addr`. This is the sledge-hammer approach.

23. Has anybody made a list of useful port numbers?

Not yet, but this is intended to grow into such a list (if any interest is shown). In each example, *internal* should be replaced with the IP number of the machine playing the game.

- **Asheron’s Call**

```
nat port udp internal :65000 65000
```

Manually change the port number within the game to 65000. If you have got a number of machines that you wish to play on assign a unique port number for each (i.e. 65001, 65002, etc) and add a `nat port` line for each one.

- **Half Life**

```
nat port udp internal:27005 27015
```

- **PCAnywhere 8.0**

```
nat port udp internal:5632 5632
```

```
nat port tcp internal:5631 5631
```

- **Quake**

```
nat port udp internal:6112 6112
```

- **Quake 2**

```
nat port udp internal:27901 27910
```

```
nat port udp internal:60021 60021
```

```
nat port udp internal:60040 60040
```

- **Red Alert**

```
nat port udp internal:8675 8675
```

```
nat port udp internal:5009 5009
```

24. What are FCS errors?

FCS stands for `Frame Check Sequence`. Each PPP packet has a checksum attached to ensure that the data being received is the data being sent. If the FCS of an incoming packet is incorrect, the packet is dropped and the HDLC FCS count is increased. The HDLC error values can be displayed using the `show hdlc` command.

If your link is bad (or if your serial driver is dropping packets), you will see the occasional FCS error. This is not usually worth worrying about although it does slow down the compression protocols substantially. If you have an external modem, make sure your cable is properly shielded from interference - this may eradicate the problem.

If your link freezes as soon as you have connected and you see a large number of FCS errors, this may be because your link is not 8 bit clean. Make sure your modem is not using software flow control (XON/XOFF). If your datalink *must* use software flow control, use the command `set accmap 0x000a0000` to tell ppp(8) to escape the ^Q and ^S characters.

Another reason for seeing too many FCS errors may be that the remote end has stopped talking PPP. You may want to enable `async` logging at this point to determine if the incoming data is actually a login or shell prompt. If you have a shell prompt at the remote end, it is possible to terminate ppp(8) without dropping the line by using the `close lcp` command (a following `term` command will reconnect you to the shell on the remote machine).

If nothing in your log file indicates why the link might have been terminated, you should ask the remote administrator (your ISP?) why the session was terminated.

25. Why do Mac OS and Windows 98 connections freeze when running PPPoE on the gateway?

Thanks to Michael Wozniak <mwozniak@netcom.ca> for figuring this out and Dan Flemming <danflemming@mac.com> for the Mac solution:

This is due to what is called a “Black Hole” router. Mac OS and Windows 98 (and maybe other Microsoft OSs) send TCP packets with a requested segment size too big to fit into a PPPoE frame (MTU is 1500 by default for Ethernet) *and* have the “do not fragment” bit set (default of TCP) and the Telco router is not sending ICMP “must fragment” back to the www site you are trying to load. (Alternatively, the router is sending the ICMP packet correctly, but the firewall at the www site is dropping it.) When the www server is sending you frames that do not fit into the PPPoE pipe the Telco router drops them on the floor and your page does not load (some pages/graphics do as they are smaller than a MSS.) This seems to be the default of most Telco PPPoE configurations (if only they knew how to program a router... sigh...)

One fix is to use regedit on your 95/98 boxes to add the following registry entry...

```
HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\Class\NetTrans\0000\MaxMTU
```

It should be a string with a value “1436”, as some ADSL routers are reported to be unable to deal with packets larger than this. This registry key has been changed to `Tcpip\Parameters\Interfaces\ID for adapter\MTU` in Windows 2000 and becomes a `DWORD`.

Refer to the Microsoft Knowledge Base documents Q158474 - Windows TCPIP Registry Entries (<http://support.microsoft.com/support/kb/articles/Q158/4/74.asp>) and Q120642 - TCPIP & NBT Configuration Parameters for Windows NT (<http://support.microsoft.com/support/kb/articles/Q120/6/42.asp>) for more information on changing Windows MTU to work with a NAT router.

Another regedit possibility under Windows 2000 is to set the `Tcpip\Parameters\Interfaces\ID for adapter\EnablePMTUBHDetect` `DWORD` to 1 as mentioned in the Microsoft document 120642 mentioned above.

Unfortunately, Mac OS does not provide an interface for changing TCP/IP settings. However, there is commercial software available, such as OTAdvancedTuner (OT for OpenTransport, the Mac OS TCP/IP stack) by Sustainable Softworks (<http://www.softworks.com/>), that will allow users to customize TCP/IP settings. Mac OS NAT users should select `ip_interface_MTU` from the drop-down menu, enter 1450 instead of 1500 in the box, click the box next to `Save as Auto Configure`, and click `Make Active`.

The latest version of `ppp(8)` (2.3 or greater) has an `enable tcpmssfixup` command that will automatically adjust the MSS to an appropriate value. This facility is enabled by default. If you are stuck with an older version of `ppp(8)`, you may want to look at the `tcpmssd` port.

26. None of this helps - I am desperate! What can I do?

If all else fails, send as much information as you can, including your config files, how you are starting `ppp(8)`, the relevant parts of your log file and the output of the `netstat -rn` command (before and after connecting) to the `freebsd-questions` mailing list at FreeBSD (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-questions>) or the `comp.unix.bsd.freebsd.misc` (`news:comp.unix.bsd.freebsd.misc`) news group, and someone should point you in the right direction.

Chapter 15 Serial Communications

This section answers common questions about serial communications with FreeBSD. PPP and SLIP are covered in the Networking section.

1. How do I tell if FreeBSD found my serial ports?

As the FreeBSD kernel boots, it will probe for the serial ports in your system for which the kernel was configured. You can either watch your system closely for the messages it prints or run the command

```
% dmesg | grep sio
```

after your system is up and running.

Here is some example output from the above command:

```
sio0 at 0x3f8-0x3ff irq 4 on isa
sio0: type 16550A
sio1 at 0x2f8-0x2ff irq 3 on isa
sio1: type 16550A
```

This shows two serial ports. The first is on irq 4, is using port address 0x3f8, and has a 16550A-type UART chip. The second uses the same kind of chip but is on irq 3 and is at port address 0x2f8. Internal modem cards are treated just like serial ports---except that they always have a modem “attached” to the port.

The GENERIC kernel includes support for two serial ports using the same irq and port address settings in the above example. If these settings are not right for your system, or if you have added modem cards or have more serial ports than your kernel is configured for, just reconfigure your kernel. See section about building a kernel for more details.

2. How do I tell if FreeBSD found my modem cards?

Refer to the answer to the previous question.

3. How do I access the serial ports on FreeBSD?

The third serial port, sio2 (see sio(4), known as COM3 in DOS), is on /dev/cuaa2 for dial-out devices, and on /dev/ttyd2 for dial-in devices. What is the difference between these two classes of devices?

You use ttydx for dial-ins. When opening /dev/ttydx in blocking mode, a process will wait for the corresponding cuaax device to become inactive, and then wait for the carrier detect line to go active. When you open the cuaax device, it makes sure the serial port is not already in use by the ttydx device. If the port is available, it “steals” it from the ttydx device. Also, the cuaax device does not care about carrier detect. With this scheme and an auto-answer modem, you can have remote users log in and you can still dial out with the same modem and the system will take care of all the conflicts.

4. How do I enable support for a multiport serial card?

Again, the section on kernel configuration provides information about configuring your kernel. For a multiport serial card, place an sio(4) line for each serial port on the card in the kernel configuration file. But place the irq and vector specifiers on only one of the entries. All of the ports on the card should share one irq. For consistency, use the last serial port to specify the irq. Also, specify the COM_MULTIPORT option.

The following example is for an AST 4-port serial card on irq 7:

```
options "COM_MULTIPORT"
device sio4 at isa? port 0x2a0 tty flags 0x781
device sio5 at isa? port 0x2a8 tty flags 0x781
device sio6 at isa? port 0x2b0 tty flags 0x781
device sio7 at isa? port 0x2b8 tty flags 0x781 irq 7 vector siointr
```

The flags indicate that the master port has minor number 7 (0x700), diagnostics enabled during probe (0x080), and all the ports share an irq (0x001).

5. Can FreeBSD handle multiport serial cards sharing irqs?

Not yet. You will have to use a different irq for each card.

6. Can I set the default serial parameters for a port?

The `ttidx` (or `cuaax`) device is the regular device you will want to open for your applications. When a process opens the device, it will have a default set of terminal I/O settings. You can see these settings with the command

```
# stty -a -f /dev/ttidx1
```

When you change the settings to this device, the settings are in effect until the device is closed. When it is reopened, it goes back to the default set. To make changes to the default set, you can open and adjust the settings of the “initial state” device. For example, to turn on CLOCAL mode, 8 bits, and XON/XOFF flow control by default for `ttid5`, do:

```
# stty -f /dev/ttid5 clocal cs8 ixon ixoff
```

A good place to do this is in `/etc/rc.serial`. Now, an application will have these settings by default when it opens `ttid5`. It can still change these settings to its liking, though.

You can also prevent certain settings from being changed by an application by making adjustments to the “lock state” device. For example, to lock the speed of `ttid5` to 57600 bps, do

```
# stty -f /dev/ttid5 57600
```

Now, an application that opens `ttid5` and tries to change the speed of the port will be stuck with 57600 bps.

Naturally, you should make the initial state and lock state devices writable only by `root`. The `MAKEDEV(8)` script does *NOT* do this when it creates the device entries.

7. How can I enable dialup logins on my modem?

So you want to become an Internet service provider, eh? First, you will need one or more modems that can auto-answer. Your modem will need to assert carrier-detect when it detects a carrier and not assert it all the time. It will need to hang up the phone and reset itself when the data terminal ready (DTR) line goes from on to off. It should probably use RTS/CTS flow control or no local flow control at all. Finally, it must use a constant speed between the computer and itself, but (to be nice to your callers) it should negotiate a speed between itself and the remote modem.

For many Hayes command-set-compatible modems, this command will make these settings and store them in nonvolatile memory:

```
AT &C1 &D3 &K3 &Q6 S0=1 &W
```

See the section on sending AT commands below for information on how to make these settings without resorting to an MS-DOS terminal program.

Next, make an entry in `/etc/ttys` (see `ttys(5)`) for the modem. This file lists all the ports on which the operating system will await logins. Add a line that looks something like this:

```
ttyd1 "/usr/libexec/getty std.57600" dialup on insecure
```

This line indicates that the second serial port (`/dev/ttyd1`) has a modem connected running at 57600 bps and no parity (`std.57600`, which comes from the file `/etc/gettytab`, see `gettytab(5)`). The terminal type for this port is `dialup`. The port is `on` and is `insecure`---meaning `root` logins on the port are not allowed. For dialin ports like this one, use the `ttidx` entry.

It is common practice to use `dialup` as the terminal type. Many users set up in their `.profile` or `.login` files a prompt for the actual terminal type if the starting type is `dialup`. The example shows the port as `insecure`. To become `root` on this port, you have to login as a regular user, then `su(1)` to become `root`. If you use `secure` then `root` can login in directly.

After making modifications to `/etc/ttys`, you need to send a hangup or HUP signal to the `init(8)` process:

```
# kill -HUP 1
```

This forces the `init(8)` process to reread `/etc/ttys`. The `init` process will then start `getty` processes on all `on` ports. You can find out if logins are available for your port by typing

```
% ps -ax | grep '[t]tyd1'
```

You should see something like:

```
747 ?? I      0:00.04 /usr/libexec/getty std.57600 ttyd1
```

8. How can I connect a dumb terminal to my FreeBSD box?

If you are using another computer as a terminal into your FreeBSD system, get a null-modem cable to go between the two serial ports. If you are using an actual terminal, see its accompanying instructions.

Then, modify `/etc/ttys` (see `ttys(5)`), like above. For example, if you are hooking up a WYSE-50 terminal to the fifth serial port, use an entry like this:

```
ttyd4 "/usr/libexec/getty std.38400" wyse50 on secure
```

This example shows that the port on `/dev/ttyd4` has a `wyse50` terminal connected at 38400 bps with no parity (`std.38400` from `/etc/gettytab`, see `gettytab(5)`) and `root` logins are allowed (`secure`).

9. Why can I not run `tip` or `cu`?

On your system, the programs `tip(1)` and `cu(1)` are probably executable only by `uucp` and group `dialer`. You can use the group `dialer` to control who has access to your modem or remote systems. Just add yourself to group `dialer`.

Alternatively, you can let everyone on your system run `tip(1)` and `cu(1)` by typing:


```
# chmod 4511 /usr/bin/cu
# chmod 4511 /usr/bin/tip
```

10. My stock Hayes modem is not supported---what can I do?

Actually, the manual page for tip(1) is out of date. There is a generic Hayes dialer already built in. Just use `at=hayes` in your `/etc/remote` (see `remote(5)`) file.

The Hayes driver is not smart enough to recognize some of the advanced features of newer modems---messages like `BUSY`, `NO DIALTONE`, or `CONNECT 115200` will just confuse it. You should turn those messages off when you use tip(1) (using `ATX0&W`).

Also, the dial timeout for tip(1) is 60 seconds. Your modem should use something less, or else tip will think there is a communication problem. Try `ATS7=45&W`.

Actually, as shipped tip(1) does not yet support it fully. The solution is to edit the file `tipconf.h` in the directory `/usr/src/usr.bin/tip/tip`. Obviously you need the source distribution to do this.

Edit the line `#define HAYES 0` to `#define HAYES 1`. Then make and make `install`. Everything works nicely after that.

11. How am I expected to enter these AT commands?

Make what is called a “direct” entry in your `/etc/remote` file (see `remote(5)`). For example, if your modem is hooked up to the first serial port, `/dev/cuaa0`, then put in the following line:

```
cuaa0:dv=/dev/cuaa0:br#19200:pa=none
```

Use the highest bps rate your modem supports in the `br` capability. Then, type `tip cuaa0` (see `tip(1)`) and you will be connected to your modem.

If there is no `/dev/cuaa0` on your system, do this:

```
# cd /dev
# sh MAKEDEV cuaa0
```

Or use `cu` as `root` with the following command:

```
# cu -lline -speed
```

with `line` being the serial port (e.g. `/dev/cuaa0`) and `speed` being the speed (e.g. `57600`). When you are done entering the AT commands hit `~.` to exit.

12. Why does the `<@>` sign for the `pn` capability not work?

The `<@>` sign in the phone number capability tells tip to look in `/etc/phones` for a phone number. But the `<@>` sign is also a special character in capability files like `/etc/remote`. Escape it with a backslash:

```
pn=\@
```

13. How can I dial a phone number on the command line?

Put what is called a “generic” entry in your `/etc/remote` file (see `remote(5)`). For example:

```
tip115200|Dial any phone number at 115200 bps:\
      :dv=/dev/cuaa0:br#115200:at=hayes:pa=none:du:
tip57600|Dial any phone number at 57600 bps:\
      :dv=/dev/cuaa0:br#57600:at=hayes:pa=none:du:
```

Then you can do something like `tip -115200 5551234`. If you prefer `cu(1)` over `tip(1)`, use a generic `cu` entry:

```
cu115200|Use cu to dial any number at 115200bps:\
      :dv=/dev/cuaa1:br#57600:at=hayes:pa=none:du:
```

and type `cu 5551234 -s 115200`.

14. Do I have to type in the bps rate every time I do that?

Put in an entry for `tip1200` or `cu1200`, but go ahead and use whatever bps rate is appropriate with the `br` capability. `tip(1)` thinks a good default is 1200 bps which is why it looks for a `tip1200` entry. You do not have to use 1200 bps, though.

15. How can I more easily access a number of hosts through a terminal server?

Rather than waiting until you are connected and typing `CONNECT host` each time, use `tip`’s `cm` capability. For example, these entries in `/etc/remote` (see `remote(5)`):

```
pain|pain.deep13.com|Forrester’s machine:\
      :cm=CONNECT pain\n:tc=deep13:
muffin|muffin.deep13.com|Frank’s machine:\
      :cm=CONNECT muffin\n:tc=deep13:
deep13:Gizmonics Institute terminal server:\
      :dv=/dev/cuaa2:br#38400:at=hayes:du:pa=none:pn=5551234:
```

will let you type `tip pain` or `tip muffin` to connect to the hosts `pain` or `muffin`; and `tip deep13` to get to the terminal server.

16. Can `tip` try more than one line for each site?

This is often a problem where a university has several modem lines and several thousand students trying to use them...

Make an entry for your university in `/etc/remote` (see `remote(5)`) and use `<\@>` for the `pn` capability:

```
big-university:\
      :pn=\@:tc=dialout
dialout:\
      :dv=/dev/cuaa3:br#9600:at=courier:du:pa=none:
```

Then, list the phone numbers for the university in `/etc/phones` (see `phones(5)`):

```
big-university 5551111
big-university 5551112
```

```
big-university 5551113
big-university 5551114
```

tip(1) will try each one in the listed order, then give up. If you want to keep retrying, run tip(1) in a while loop.

17. Why do I have to hit **CTRL+P** twice to send **CTRL+P** once?

CTRL+P is the default “force” character, used to tell tip(1) that the next character is literal data. You can set the force character to any other character with the `~s` escape, which means “set a variable”.

Type `~sforce=single-char` followed by a newline. *single-char* is any single character. If you leave out *single-char*, then the force character is the nul character, which you can get by typing **CTRL+2** or **CTRL+SPACE**. A pretty good value for *single-char* is **SHIFT+CTRL+6**, which I have seen only used on some terminal servers.

You can have the force character be whatever you want by specifying the following in your `$HOME/.tiprc` file:

```
force=single-char
```

18. Why is everything I type suddenly in UPPER CASE?

You must have pressed **CTRL+A**, tip(1) “raise character”, specially designed for people with broken **Caps Lock** keys. Use `~s` as above and set the variable “raisechar” to something reasonable. In fact, you can set it to the same as the force character, if you never expect to use either of these features.

Here is a sample .tiprc file perfect for Emacs users who need to type **CTRL+2** and **CTRL+A** a lot:

```
force=^^
raisechar=^^
```

The ^^ is **SHIFT+CTRL+6**.

19. How can I do file transfers with tip?

If you are talking to another UNIX system, you can send and receive files with `~p` (put) and `~t` (take). These commands run `cat(1)` and `echo(1)` on the remote system to accept and send files. The syntax is:

```
~p <local-file> [<remote-file>]
~t <remote-file> [<local-file>]
```

There is no error checking, so you probably should use another protocol, like `zmodem`.

20. How can I run zmodem with tip?

First, install one of the `zmodem` programs from the ports collection (such as one of the two from the `comms` category, **lrzsz** or **rzsz**).

To receive files, start the sending program on the remote end. Then, press enter and type `~C rz` (or `~C lrz` if you installed **lrzsz**) to begin receiving them locally.

To send files, start the receiving program on the remote end. Then, press enter and type `~C sz files` (or `~C lsz files`) to send them to the remote system.

Ερώτημα 16 Αέϋϋñà ÆùôΡάέò

1. FreeBSD uses far more swap space than Linux. Why?

FreeBSD only appears to use more swap than Linux. In actual fact, it does not. The main difference between FreeBSD and Linux in this regard is that FreeBSD will proactively move entirely idle, unused pages of main memory into swap in order to make more main memory available for active use. Linux tends to only move pages to swap as a last resort. The perceived heavier use of swap is balanced by the more efficient use of main memory.

Note that while FreeBSD is proactive in this regard, it does not arbitrarily decide to swap pages when the system is truly idle. Thus you will not find your system all paged out when you get up in the morning after leaving it idle overnight.

2. Why does `top` show very little free memory even when I have very few programs running?

The simple answer is that free memory is wasted memory. Any memory that your programs do not actively allocate is used within the FreeBSD kernel as disk cache. The values shown by `top(1)` labeled as `Inact`, `Cache`, and `Buf` are all cached data at different aging levels. This cached data means the system does not have to access a slow disk again for data it has accessed recently, thus increasing overall performance. In general, a low value shown for `Free` memory in `top(1)` is good, provided it is not very low.

3. Why will `chmod` not change the permissions on symlinks?

Symlinks do not have permissions, and by default, `chmod(1)` will not follow symlinks to change the permissions on the target file. So if you have a file, `foo`, and a symlink to that file, `bar`, then this command will always succeed.

```
% chmod g-w bar
```

However, the permissions on `foo` will not have changed.

You have to use either `-H` or `-L` together with the `-R` option to make this work. See the `chmod(1)` and `symlink(7)` manual pages for more info.

Εἰάέϋϋñà: The `-R` option does a *RECURSIVE* `chmod(1)`. Be careful about specifying directories or symlinks to directories to `chmod(1)`. If you want to change the permissions of a directory referenced by a symlink, use `chmod(1)` without any options and follow the symlink with a trailing slash (`/`). For example, if `foo` is a symlink to directory `bar`, and you want to change the permissions of `foo` (actually `bar`), you would do something like:

```
% chmod 555 foo/
```

With the trailing slash, `chmod(1)` will follow the symlink, `foo`, to change the permissions of the directory, `bar`.

4. Can I run DOS binaries under FreeBSD?

Yes, you can use `emulators/doscmd`, a DOS emulation program, available in the FreeBSD Ports Collection.

ΌçιάΒùόç: The **doscmd** program used to be an integrated part of FreeBSD, but was removed before the release of FreeBSD 5.3.

If **doscmd** will not suffice, the add-on utility `emulators/pccemu` emulates an 8088 and enough BIOS services to run many DOS text mode applications. It requires the X Window System.

5. What do I need to do to translate a FreeBSD document into my native language?

See the Translation FAQ (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/fdp-primer/translations.html) in the FreeBSD Documentation Project Primer.

6. Why does my email to any address at FreeBSD.org bounce?

The FreeBSD.org mail system implements some of the stricter Postfix checks on incoming mail and rejects mail that is either misconfigured or is potential spam. Your mail might bounce for one of the following reasons:

- The email is being sent from a known spam domain or IP block.

The FreeBSD mail servers reject email from known spam sources. If you have service through a company or domain who generates or relays spam, please switch to a service provider who does not.

- The body of the email only contains HTML.

Mail should be sent in plain text only. Please configure your mail user agent to send plain text.

- The mailer at FreeBSD.org cannot resolve the IP address of the connecting host back to a symbolic name.

Working reverse DNS is a standard requirement for accepting mail from a host. Set up reverse DNS for your mail server's IP address. Many home services (DSL, cable, dialup, etc.) will not give you this option. In this case, relay your email through your service provider's mail server.

- The hostname given in the EHLO/HELO part of the SMTP exchange cannot be resolved to an IP address.

A fully qualified, resolvable host name is necessary in this part of the SMTP dialogue before mail will be accepted. If you do not have a host name that is registered in the DNS, then you should use your service provider's mail server to relay your mail.

- Your message had a message ID ending with the string "localhost".

Some mail user agents generate bad message IDs which will not be accepted. You will need to persuade your mail user agent to generate a valid message ID or else configure your mail transfer agent to rewrite them.

7. Where can I find a free FreeBSD account?

While FreeBSD does not provide open access to any of their servers, others do provide open access UNIX systems. The charge varies and limited services may be available.

Arbornet, Inc (<http://www.arbornet.org/>), also known as M-Net, has been providing open access to UNIX systems since 1983. Starting on an Altos running System III, the site switched to BSD/OS in 1991. In June of 2000, the site switched again to FreeBSD. M-Net can be accessed via telnet and SSH and provides basic access to the entire FreeBSD software suite. However, network access is limited to members and patrons who donate to the system, which is run as a non-profit organization. M-Net also provides an bulletin board system and interactive chat.

GreX (<http://www.grex.org/>) provides a site very similar to M-Net including the same bulletin board and interactive chat software. However, the machine is a Sun 4M and is running SunOS.

8. What is `sup`, and how do I use it?

SUP (<http://www.FreeBSD.org/cgi/ports.cgi?^sup>) stands for Software Update Protocol, and was developed by CMU for keeping their development trees in sync. We used it to keep remote sites in sync with our central development sources.

SUP is not bandwidth friendly, and has been retired. The current recommended method to keep your sources up to date is CVSUP (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/synching.html#CVSUP)

9. What is the cute little red guy's name?

He does not have one, and is just called "the BSD daemon". If you insist upon using a name, call him "beastie". Note that "beastie" is pronounced "BSD".

You can learn more about the BSD daemon on his home page (<http://www.mckusick.com/beastie/index.html>).

10. Can I use the BSD daemon image?

Perhaps. The BSD daemon is copyrighted by Marshall Kirk McKusick. You will want to check his Statement on the Use of the BSD Daemon Figure (<http://www.mckusick.com/beastie/mainpage/copyright.html>) for detailed usage terms.

In summary, you are free to use the image in a tasteful manner, for personal use, so long as appropriate credit is given. If you want to use him commercially, you must contact Kirk McKusick. More details are available on the BSD Daemon's home page (<http://www.mckusick.com/beastie/index.html>).

11. Do you have any BSD daemon images I could use?

You will find eps and Xfig drawings under `/usr/share/examples/BSD_daemon/`.

12. I have seen an acronym or other term on the mailing lists and I do not understand what it means. Where should I look?

Please see the FreeBSD Glossary (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/freebsd-glossary.html).

13. Why should I care what color the bikeshed is?

The really, really short answer is that you should not. The somewhat longer answer is that just because you are capable of building a bikeshed does not mean you should stop others from building one just because you do not like the color they plan to paint it. This is a metaphor indicating that you need not argue about every little feature just because you know enough to do so. Some people have commented that the amount of noise generated by a change is inversely proportional to the complexity of the change.

The longer and more complete answer is that after a very long argument about whether sleep(1) should take fractional second arguments, Poul-Henning Kamp <phk@FreeBSD.org> posted a long message entitled "A bike shed (any color will do) on greener grass..."

(<http://www.FreeBSD.org/cgi/getmsg.cgi?fetch=506636+517178+/usr/local/www/db/text/1999/freebsd-hackers/19991003.freebsd-hackers>)". The appropriate portions of that message are quoted below.

"What is it about this bike shed?" Some of you have asked me.

It is a long story, or rather it is an old story, but it is quite short actually. C. Northcote Parkinson wrote a book in the early 1960s, called "Parkinson's Law", which contains a lot of insight into the dynamics of management.

[snip a bit of commentary on the book]

In the specific example involving the bike shed, the other vital component is an atomic power-plant, I guess that illustrates the age of the book.

Parkinson shows how you can go into the board of directors and get approval for building a multi-million or even billion dollar atomic power plant, but if you want to build a bike shed you will be tangled up in endless discussions.

Parkinson explains that this is because an atomic plant is so vast, so expensive and so complicated that people cannot grasp it, and rather than try, they fall back on the assumption that somebody else checked all the details before it got this far. Richard P. Feynmann gives a couple of interesting, and very much to the point, examples relating to Los Alamos in his books.

A bike shed on the other hand. Anyone can build one of those over a weekend, and still have time to watch the game on TV. So no matter how well prepared, no matter how reasonable you are with your proposal, somebody will seize the chance to show that he is doing his job, that he is paying attention, that he is *here*.

In Denmark we call it "setting your fingerprint". It is about personal pride and prestige, it is about being able to point somewhere and say "There! *I* did that." It is a strong trait in politicians, but present in most people given the chance. Just think about footsteps in wet cement.

—Poul-Henning Kamp <phk@FreeBSD.org> on freebsd-hackers, October 2, 1999

ÊäöÛëáéï 17 × éïýìñ êáé FreeBSD

1. How cool is FreeBSD?

Q. Has anyone done any temperature testing while running FreeBSD? I know Linux runs cooler than DOS, but have never seen a mention of FreeBSD. It seems to run really hot.

A. No, but we have done numerous taste tests on blindfolded volunteers who have also had 250 micrograms of LSD-25 administered beforehand. 35% of the volunteers said that FreeBSD tasted sort of orange, whereas Linux tasted like purple haze. Neither group mentioned any significant variances in temperature. We eventually had to throw the results of this survey out entirely anyway when we found that too many volunteers were wandering out of the room during the tests, thus skewing the results. We think most of the volunteers are at Apple now, working on their new “scratch and sniff” GUI. It is a funny old business we are in!

Seriously, both FreeBSD and Linux use the HLT (halt) instruction when the system is idle thus lowering its energy consumption and therefore the heat it generates. Also if you have APM (advanced power management) configured, then FreeBSD can also put the CPU into a low power mode.

2. Who is scratching in my memory banks??

Q. Is there anything “odd” that FreeBSD does when compiling the kernel which would cause the memory to make a scratchy sound? When compiling (and for a brief moment after recognizing the floppy drive upon startup, as well), a strange scratchy sound emanates from what appears to be the memory banks.

A. Yes! You will see frequent references to “daemons” in the BSD documentation, and what most people do not know is that this refers to genuine, non-corporeal entities that now possess your computer. The scratchy sound coming from your memory is actually high-pitched whispering exchanged among the daemons as they best decide how to deal with various system administration tasks.

If the noise gets to you, a good `fdisk /mbr` from DOS will get rid of them, but do not be surprised if they react adversely and try to stop you. In fact, if at any point during the exercise you hear the satanic voice of Bill Gates coming from the built-in speaker, take off running and do not ever look back! Freed from the counterbalancing influence of the BSD daemons, the twin demons of DOS and Windows are often able to re-assert total control over your machine to the eternal damnation of your soul. Now that you know, given a choice you would probably prefer to get used to the scratchy noises, no?

3. How many FreeBSD hackers does it take to change a lightbulb?

One thousand, one hundred and sixty-nine:

Twenty-three to complain to -CURRENT about the lights being out;

Four to claim that it is a configuration problem, and that such matters really belong on -questions;

Three to submit PRs about it, one of which is misfiled under doc and consists only of “it’s dark”;

One to commit an untested lightbulb which breaks buildworld, then back it out five minutes later;

Eight to flame the PR originators for not including patches in their PRs;

Five to complain about buildworld being broken;

Thirty-one to answer that it works for them, and they must have cvsupperd at a bad time;

One to post a patch for a new lightbulb to -hackers;

One to complain that he had patches for this three years ago, but when he sent them to -CURRENT they were just ignored, and he has had bad experiences with the PR system; besides, the proposed new lightbulb is non-reflexive;

Thirty-seven to scream that lightbulbs do not belong in the base system, that committers have no right to do things like this without consulting the Community, and WHAT IS -CORE DOING ABOUT IT!?

Two hundred to complain about the color of the bicycle shed;

Three to point out that the patch breaks style(9);

Seventeen to complain that the proposed new lightbulb is under GPL;

Five hundred and eighty-six to engage in a flame war about the comparative advantages of the GPL, the BSD license, the MIT license, the NPL, and the personal hygiene of unnamed FSF founders;

Seven to move various portions of the thread to -chat and -advocacy;

One to commit the suggested lightbulb, even though it shines dimmer than the old one;

Two to back it out with a furious flame of a commit message, arguing that FreeBSD is better off in the dark than with a dim lightbulb;

Forty-six to argue vociferously about the backing out of the dim lightbulb and demanding a statement from -core;

Eleven to request a smaller lightbulb so it will fit their Tamagotchi if we ever decide to port FreeBSD to that platform;

Seventy-three to complain about the SNR on -hackers and -chat and unsubscribe in protest;

Thirteen to post “unsubscribe”, “How do I unsubscribe?”, or “Please remove me from the list”, followed by the usual footer;

One to commit a working lightbulb while everybody is too busy flaming everybody else to notice;

Thirty-one to point out that the new lightbulb would shine 0.364% brighter if compiled with TenDRA (although it will have to be reshaped into a cube), and that FreeBSD should therefore switch to TenDRA instead of GCC;

One to complain that the new lightbulb lacks fairings;

Nine (including the PR originators) to ask “what is MFC?”;

Fifty-seven to complain about the lights being out two weeks after the bulb has been changed.

Nik Clayton <nik@FreeBSD.org> adds:

I was laughing quite hard at this.

And then I thought, “Hang on, shouldn’t there be ‘I to document it.’ in that list somewhere?”

And then I was enlightened :-)

4. Where does data written to /dev/null go?

It goes into a special data sink in the CPU where it is converted to heat which is vented through the heatsink / fan assembly. This is why CPU cooling is increasingly important; as people get used to faster processors, they become careless with their data and more and more of it ends up in /dev/null, overheating their CPUs. If you delete /dev/null (which effectively disables the CPU data sink) your CPU may run cooler but your system will quickly become constipated with all that excess data and start to behave erratically. If you have a fast network connection you

can cool down your CPU by reading data out of `/dev/random` and sending it off somewhere; however you run the risk of overheating your network connection and / or angering your ISP, as most of the data will end up getting converted to heat by their equipment, but they generally have good cooling, so if you do not overdo it you should be OK.

Paul Robinson adds:

There are other methods. As every good sysadmin knows, it is part of standard practice to send data to the screen of interesting variety to keep all the pixies that make up your picture happy. Screen pixies (commonly mis-typed or re-named as “pixels” are categorized by the type of hat they wear (red, green or blue) and will hide or appear (thereby showing the color of their hat) whenever they receive a little piece of food. Video cards turn data into pixie-food, and then send them to the pixies - the more expensive the card, the better the food, so the better behaved the pixies are. They also need constant stimulation - this is why screen savers exist.

To take your suggestions further, you could just throw the random data to console, thereby letting the pixies consume it. This causes no heat to be produced at all, keeps the pixies happy and gets rid of your data quite quickly, even if it does make things look a bit messy on your screen.

Incidentally, as an ex-admin of a large ISP who experienced many problems attempting to maintain a stable temperature in a server room, I would strongly discourage people sending the data they do not want out to the network. The fairies who do the packet switching and routing get annoyed by it as well.

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1. How can I learn more about FreeBSD's internals?

At this time, there is only one book on FreeBSD-specific OS internals, namely “The Design and Implementation of the FreeBSD Operating System” by Marshall Kirk McKusick and George V. Neville-Neil, ISBN 0-201-70245-2, which focuses on version 5.X of FreeBSD.

Additionally, much general UNIX knowledge is directly applicable to FreeBSD.

For a list of relevant books, please check the Handbook's Operating System Internals Bibliography (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/bibliography-osinternals.html).

2. How can I contribute to FreeBSD?

Please see the article on Contributing to FreeBSD

(http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/contributing/article.html) for specific advice on how to do this. Assistance is more than welcome!

3. What are SNAPS and RELEASEs?

There are currently three active/semi-active branches in the FreeBSD CVS Repository

(<http://www.FreeBSD.org/cgi/cvsweb.cgi>). (Earlier branches are only changed very rarely, which is why there are only three active branches of development):

- `RELENG_5` AKA *5-STABLE*
- `RELENG_6` AKA *6-STABLE*
- `HEAD` AKA *-CURRENT* AKA *7.X-CURRENT*

`HEAD` is not an actual branch tag, like the other two; it is simply a symbolic constant for “*the current, non-branched development stream*” which we simply refer to as “*-CURRENT*”.

Right now, “*-CURRENT*” is the 7.X development stream; the *5-STABLE* branch, `RELENG_5`, forked off from “*-CURRENT*” in October 2004, and the *6-STABLE* branch, `RELENG_6`, forked off from “*-CURRENT*” in November 2005.

4. How do I make my own custom release?

Please see the Release Engineering (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/releng/article.html) article.

5. Why does `make world` clobber my existing installed binaries?

Yes, this is the general idea; as its name might suggest, `make world` rebuilds every system binary from scratch, so you can be certain of having a clean and consistent environment at the end (which is why it takes so long).

If the environment variable `DESTDIR` is defined while running `make world` or `make install`, the newly-created binaries will be deposited in a directory tree identical to the installed one, rooted at `${DESTDIR}`. Some random combination of shared libraries modifications and program rebuilds can cause this to fail in `make world` however.

6. Why isn't cvsup.FreeBSD.org a round robin DNS entry to share the load amongst the various CVSup servers?

While CVSup mirrors update from the master CVSup server hourly, this update might happen at any time during the hour. This means that some servers have newer code than others, even though all servers have code that is less than an hour old. If `cvsup.FreeBSD.org` was a round robin DNS entry that simply redirected users to a random CVSup server, running CVSup twice in a row could download code older than the code already on the system.

7. Why does my system say “(bus speed defaulted)” when it boots?

The Adaptec 1542 SCSI host adapters allow the user to configure their bus access speed in software. Previous versions of the 1542 driver tried to determine the fastest usable speed and set the adapter to that. We found that this breaks some users' systems, so you now have to define the `TUNE_1542` kernel configuration option in order to have this take place. Using it on those systems where it works may make your disks run faster, but on those systems where it does not, your data could be corrupted.

8. Can I follow -CURRENT with limited Internet access?

Yes, you can do this *without* downloading the whole source tree by using the CTM facility (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/books/handbook/synching.html#CTM).

9. How did you split the distribution into 240k files?

Newer BSD based systems have a `-b` option to `split(1)` that allows them to split files on arbitrary byte boundaries.

Here is an example from `/usr/src/Makefile`.

```
bin-tarball:
(cd ${DISTDIR}; \
tar cf - . \
gzip --no-name -9 -c | \
split -b 240640 - \
${RELEASEDIR}/tarballs/bindist/bin_tgz.)
```

10. I have written a kernel extension, who do I send it to?

Please take a look at the article on Contributing to FreeBSD (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/contributing/article.html) to learn how to submit code.

And thanks for the thought!

11. How are Plug N Play ISA cards detected and initialized?

By: Frank Durda IV <uhclem@nemesis.lonestar.org>

In a nutshell, there are a few I/O ports that all of the PnP boards respond to when the host asks if anyone is out there. So when the PnP probe routine starts, it asks if there are any PnP boards present, and all the PnP boards respond with their model # to a I/O read of the same port, so the probe routine gets a wired-OR “yes” to that question. At least one bit will be on in that reply. Then the probe code is able to cause boards with board model IDs (assigned by Microsoft/Intel) lower than X to go “off-line”. It then looks to see if any boards are still responding to the query. If the answer was 0, then there are no boards with IDs above X. Now probe asks if there are any boards below X. If so, probe knows there are boards with a model numbers below X. Probe then asks for boards greater than X-(limit/4) to go off-line. It repeats the query. By repeating this semi-binary search of IDs-in-range enough times, the probing code

will eventually identify all PnP boards present in a given machine with a number of iterations that is much lower than what 2^{64} would take.

The IDs are two 32-bit fields (hence 2^{64}) + 8 bit checksum. The first 32 bits are a vendor identifier. They never come out and say it, but it appears to be assumed that different types of boards from the same vendor could have different 32-bit vendor ids. The idea of needing 32 bits just for unique manufacturers is a bit excessive.

The lower 32 bits are a serial #, Ethernet address, something that makes this one board unique. The vendor must never produce a second board that has the same lower 32 bits unless the upper 32 bits are also different. So you can have multiple boards of the same type in the machine and the full 64 bits will still be unique.

The 32 bit groups can never be all zero. This allows the wired-OR to show non-zero bits during the initial binary search.

Once the system has identified all the board IDs present, it will reactivate each board, one at a time (via the same I/O ports), and find out what resources the given board needs, what interrupt choices are available, etc. A scan is made over all the boards to collect this information.

This info is then combined with info from any ECU files on the hard disk or wired into the MLB BIOS. The ECU and BIOS PnP support for hardware on the MLB is usually synthetic, and the peripherals do not really do genuine PnP. However by examining the BIOS info plus the ECU info, the probe routines can cause the devices that are PnP to avoid those devices the probe code cannot relocate.

Then the PnP devices are visited once more and given their I/O, DMA, IRQ and Memory-map address assignments. The devices will then appear at those locations and remain there until the next reboot, although there is nothing that says you cannot move them around whenever you want.

There is a lot of oversimplification above, but you should get the general idea.

Microsoft took over some of the primary printer status ports to do PnP, on the logic that no boards decoded those addresses for the opposing I/O cycles. I found a genuine IBM printer board that did decode writes of the status port during the early PnP proposal review period, but MS said "tough". So they do a write to the printer status port for setting addresses, plus that use that address + $0x800$, and a third I/O port for reading that can be located anywhere between $0x200$ and $0x3ff$.

12. Can you assign a major number for a device driver I have written?

FreeBSD-CURRENT after February 2003 has a facility for dynamically and automatically allocating major numbers for device drivers at runtime. This mechanism is highly preferred to the older procedure of statically allocating device numbers. Some comments on this subject can be found in `src/sys/conf/majors`.

If you are forced for some reason to use a static major number, the procedure for obtaining one depends on whether or not you plan on making the driver publicly available. If you do, then please send us a copy of the driver source code, plus the appropriate modifications to `files.i386`, a sample configuration file entry, and the appropriate `MAKEDEV(8)` code to create any special files your device uses. If you do not, or are unable to because of licensing restrictions, then character major number 32 and block major number 8 have been reserved specifically for this purpose; please use them. In any case, we would appreciate hearing about your driver on the çäâêññíéê ðëóóá ôâ÷ íéêþí óðæçôþóâúí ôïð FreeBSD (<http://lists.FreeBSD.org/mailman/listinfo/freebsd-hackers>).

13. What about alternative layout policies for directories?

In answer to the question of alternative layout policies for directories, the scheme that is currently in use is unchanged from what I wrote in 1983. I wrote that policy for the original fast filesystem, and never revisited it. It works well at keeping cylinder groups from filling up. As several of you have noted, it works poorly for find. Most filesystems are created from archives that were created by a depth first search (aka ftw). These directories end up being striped across the cylinder groups thus creating a worst possible scenario for future depth first searches. If one knew the total number of directories to be created, the solution would be to create (total / fs_ncg) per cylinder group before moving on. Obviously, one would have to create some heuristic to guess at this number. Even using a small fixed number like say 10 would make an order of magnitude improvement. To differentiate restores from normal operation (when the current algorithm is probably more sensible), you could use the clustering of up to 10 if they were all done within a ten second window. Anyway, my conclusion is that this is an area ripe for experimentation.

Kirk McKusick, September 1998

14. How can I make the most of the data I see when my kernel panics?

[This section was extracted from a mail written by Bill Paul <wpaul@FreeBSD.org> on the freebsd-current mailing list by Dag-Erling C. Smørgrav <des@FreeBSD.org>, who fixed a few typos and added the bracketed comments]

From: Bill Paul <wpaul@skynet.ctr.columbia.edu>
 Subject: Re: the fs fun never stops
 To: Ben Rosengart
 Date: Sun, 20 Sep 1998 15:22:50 -0400 (EDT)
 Cc: current@FreeBSD.org

Ben Rosengart posted the following panic message]

```
> Fatal trap 12: page fault while in kernel mode
> fault virtual address   = 0x40
> fault code              = supervisor read, page not present
> instruction pointer      = 0x8:0xf014a7e5
                        ^^^^^^^^^^^
> stack pointer           = 0x10:0xf4ed6f24
> frame pointer           = 0x10:0xf4ed6f28
> code segment            = base 0x0, limit 0xfffff, type 0x1b
>                         = DPL 0, pres 1, def32 1, gran 1
> processor eflags        = interrupt enabled, resume, IOPL = 0
> current process         = 80 (mount)
> interrupt mask          =
> trap number             = 12
> panic: page fault
```

[When] you see a message like this, it is not enough to just reproduce it and send it in. The instruction pointer value that I highlighted up there is important; unfortunately, it is also configuration dependent. In other words, the value varies depending on the exact kernel image that you are using. If you are using a GENERIC kernel image from one of the snapshots, then it is possible for somebody else to track down the offending function, but if you are running a custom kernel then only *you* can tell us where the fault occurred.

What you should do is this:

1. Write down the instruction pointer value. Note that the 0x8: part at the beginning is not significant in this case: it is the 0xf0xxxxxx part that we want.
2. When the system reboots, do the following:

```
% nm -n /kernel.that.caused.the.panic | grep f0xxxxxx
```

where f0xxxxxx is the instruction pointer value. The odds are you will not get an exact match since the symbols in the kernel symbol table are for the entry points of functions and the instruction pointer address will be somewhere inside a function, not at the start. If you do not get an exact match, omit the last digit from the instruction pointer value and try again, i.e.:

```
% nm -n /kernel.that.caused.the.panic | grep f0xxxxx
```

If that does not yield any results, chop off another digit. Repeat until you get some sort of output. The result will be a possible list of functions which caused the panic. This is a less than exact mechanism for tracking down the point of failure, but it is better than nothing.

I see people constantly show panic messages like this but rarely do I see someone take the time to match up the instruction pointer with a function in the kernel symbol table.

The best way to track down the cause of a panic is by capturing a crash dump, then using gdb(1) to generate a stack trace on the crash dump.

In any case, the method I normally use is this:

1. Set up a kernel config file, optionally adding options DDB if you think you need the kernel debugger for something. (I use this mainly for setting breakpoints if I suspect an infinite loop condition of some kind.)
2. Use config -g KERNELCONFIG to set up the build directory.
3. cd /sys/compile/KERNELCONFIG; make
4. Wait for kernel to finish compiling.
5. make install
6. reboot

The make(1) process will have built two kernels. kernel and kernel.debug. kernel was installed as /kernel, while kernel.debug can be used as the source of debugging symbols for gdb(1).

To make sure you capture a crash dump, you need edit /etc/rc.conf and set dumpdev to point to your swap partition. This will cause the rc(8) scripts to use the dumpon(8) command to enable crash dumps. You can also run dumpon(8) manually. After a panic, the crash dump can be recovered using savecore(8); if dumpdev is set in /etc/rc.conf, the rc(8) scripts will run savecore(8) automatically and put the crash dump in /var/crash.

Óçîâßúóç: FreeBSD crash dumps are usually the same size as the physical RAM size of your machine. That is, if you have 64MB of RAM, you will get a 64MB crash dump. Therefore you must make sure there is enough space in /var/crash to hold the dump. Alternatively, you run savecore(8) manually and have it recover the crash dump to another directory where you have more room. It is possible to limit the size of the crash dump by using options MAXMEM=(foo) to set the amount of memory the kernel will use to something a little more sensible. For example, if you have 128MB of RAM, you can limit the kernel's memory usage to 16MB so that your crash dump size will be 16MB instead of 128MB.

Once you have recovered the crash dump, you can get a stack trace with gdb(1) as follows:


```
% gdb -k /sys/compile/KERNELCONFIG/kernel.debug /var/crash/vmcore.0
(gdb) where
```

Note that there may be several screens worth of information; ideally you should use script(1) to capture all of them. Using the unstripped kernel image with all the debug symbols should show the exact line of kernel source code where the panic occurred. Usually you have to read the stack trace from the bottom up in order to trace the exact sequence of events that lead to the crash. You can also use gdb(1) to print out the contents of various variables or structures in order to examine the system state at the time of the crash.

Now, if you are really insane and have a second computer, you can also configure gdb(1) to do remote debugging such that you can use gdb(1) on one system to debug the kernel on another system, including setting breakpoints, single-stepping through the kernel code, just like you can do with a normal user-mode program. I have not played with this yet as I do not often have the chance to set up two machines side by side for debugging purposes.

[Bill adds: "I forgot to mention one thing: if you have DDB enabled and the kernel drops into the debugger, you can force a panic (and a crash dump) just by typing 'panic' at the ddb prompt. It may stop in the debugger again during the panic phase. If it does, type 'continue' and it will finish the crash dump." -ed]

15. Why has dlsym() stopped working for ELF executables?

The ELF toolchain does not, by default, make the symbols defined in an executable visible to the dynamic linker. Consequently dlsym() searches on handles obtained from calls to dlopen(NULL, flags) will fail to find such symbols.

If you want to search, using dlsym(), for symbols present in the main executable of a process, you need to link the executable using the -export-dynamic option to the ELF linker (ld(1)).

16. How can I increase or reduce the kernel address space?

By default, the kernel address space is 256 MB on FreeBSD 3.X and 1 GB on FreeBSD 4.X. If you run a network-intensive server (e.g. a large FTP or HTTP server), you might find that 256 MB is not enough.

So how do you increase the address space? There are two aspects to this. First, you need to tell the kernel to reserve a larger portion of the address space for itself. Second, since the kernel is loaded at the top of the address space, you need to lower the load address so it does not bump its head against the ceiling.

The first goal is achieved by increasing the value of NKPDE in src/sys/i386/include/pmap.h. Here is what it looks like for a 1 GB address space:

```
#ifndef NKPDE
#ifdef SMP
#define NKPDE                254        /* addressable number of page tables/pde's */
#else
#define NKPDE                255        /* addressable number of page tables/pde's */
#endif /* SMP */
#endif
```

To find the correct value of NKPDE, divide the desired address space size (in megabytes) by four, then subtract one for UP and two for SMP.

To achieve the second goal, you need to compute the correct load address: simply subtract the address space size (in bytes) from 0x100100000; the result is 0xc0100000 for a 1 GB address space. Set LOAD_ADDRESS in

`src/sys/i386/conf/Makefile.i386` to that value; then set the location counter in the beginning of the section listing in `src/sys/i386/conf/kernel.script` to the same value, as follows:

```
OUTPUT_FORMAT("elf32-i386", "elf32-i386", "elf32-i386")
OUTPUT_ARCH(i386)
ENTRY(bttext)
SEARCH_DIR(/usr/lib); SEARCH_DIR(/usr/obj/elf/home/src/tmp/usr/i386-unknown-freebsdelf/lib);
SECTIONS
{
    /* Read-only sections, merged into text segment: */
    . = 0xc0100000 + SIZEOF_HEADERS;
    .interp      : { *(.interp)      }
```

Then reconfig and rebuild your kernel. You will probably have problems with `ps(1)` `top(1)` and the like; make `world` should take care of it (or a manual rebuild of `libkvm`, `ps(1)` and `top(1)` after copying the patched `pmap.h` to `/usr/include/vm/`).

NOTE: the size of the kernel address space must be a multiple of four megabytes.

[David Greenman <dg@FreeBSD.org> adds: *I think the kernel address space needs to be a power of two, but I am not certain about that. The old(er) boot code used to monkey with the high order address bits and I think expected at least 256MB granularity.*]

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This innocent little Frequently Asked Questions document has been written, rewritten, edited, folded, spindled, mutilated, eviscerated, contemplated, discombobulated, cogitated, regurgitated, rebuilt, castigated, and reinvigorated over the last decade, by a cast of hundreds if not thousands. Repeatedly.

We wish to thank every one of the people responsible, and we encourage you to to join them (http://www.FreeBSD.org/doc/el_GR.ISO8859-7/articles/contributing/article.html) in making this FAQ even better.

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