NAME

INSTALL — Installation procedure for NetBSD/hp300.

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DESCRIPTION

About this Document

This document describes the installation procedure for NetBSD 4.0_RC2 on the *hp300* platform. It is available in four different formats titled `INSTALL.`*`ext`*, where *`.ext`* is one of `.ps`, `.html`, `.more`, or `.txt`:

`.ps` PostScript.

`.html` Standard Internet HTML.

`.more` The enhanced text format used on UNIX-like systems by the `more`(1) and `less`(1) pager utility programs. This is the format in which the on-line *man* pages are generally presented.

`.txt` Plain old ASCII.

You are reading the *PostScript* version.

What is NetBSD?

The NetBSD Operating System is a fully functional Open Source UNIX-like operating system derived from the University of California, Berkeley Networking Release 2 (Net/2), 4.4BSD-Lite, and 4.4BSD-Lite2 sources. NetBSD runs on fifty four different system architectures (ports), featuring seventeen machine architectures across fifteen distinct CPU families, and is being ported to more. The NetBSD 4.0_RC2 release contains complete binary releases for many different system architectures. (A few ports are not fully supported at this time and are thus not part of the binary distribution. For information on them, please see the NetBSD web site at *.:* **http://www.NetBSD.org/**)

NetBSD is a completely integrated system. In addition to its highly portable, high performance kernel, NetBSD features a complete set of user utilities, compilers for several languages, the X Window System, firewall software and numerous other tools, all accompanied by full source code.

NetBSD is a creation of the members of the Internet community. Without the unique cooperation and coordination the net makes possible, it's likely that NetBSD wouldn't exist.

Changes Between The NetBSD 3.0 and 4.0 Releases

The NetBSD 4.0 release provides numerous significant functional enhancements, including support for many new devices, integration of hundreds of bug fixes, new and updated kernel subsystems, and many user-land enhancements. The result of these improvements is a stable operating system fit for production use that rivals most commercially available systems.

It is impossible to completely summarize more than a year of development that went into the NetBSD 4.0_RC2 release.

The complete list of changes can be found in the CHANGES:

ftp://ftp.NetBSD.org/pub/NetBSD/NetBSD-4.0/CHANGES

and CHANGES-4.0:

ftp://ftp.NetBSD.org/pub/NetBSD/NetBSD-4.0/CHANGES-4.0

files in the top level directory of the NetBSD 4.0 release tree. Some highlights include:

Networking

- `agr`(4): new pseudo-device driver for link level aggregation.
- IPv6 support was extended with an RFC 3542-compliant API and added for `gre`(4) tunnels and the `tun`(4) device.

- A NDIS-wrapper was added to use Windows binary drivers on the i386 platform, see ndiscvt(8).
- The IPv4 source-address selection policy can be set from a number of algorithms. See "IPSRCSEL" in options(4) and in_getifa(9).
- Imported wpa_supplicant(8) and wpa_cli(8). Utilities to connect and handle aspects of 802.11 WPA networks.
- Imported hostapd(8). An authenticator for IEEE 802.11 networks.
- carp(4): imported Common Address Redundancy Protocol to allow multiple hosts to share a set of IP addresses for high availability / redundancy, from OpenBSD.
- ALTQ support for the PF packet filter.
- ftpd(8) can now run in standalone mode, instead of from inetd(8).
- tftp(1) now has support for multicast TFTP operation in open-loop mode, server is in progress.

Filesystems

- scan_ffs(8), scan_lfs(8): Utilities to find FFSv1/v2 and LFS partitions to recover lost disklabels.
- tmpfs: Added a new memory-based file system aimed at replacing mfs. Contrary to mfs, it is not based on a disk file system, so it is more efficient both in overall memory consumption and speed. See mount_tmpfs(8).
- Added UDF support for optical media and block devices, see mount_udf(8). Read-only for now.
- NFS export list handling was changed to be filesystem independent.
- LFS: Lots of stability improvements and new cleaner daemon. It is now also possible to use LFS as root filesystem.
- Support for System V Boot File System was added, see newfs_sysvbfs(8) and mount_sysvbfs(8).

Drivers

- Audio:
  - Support for new models on drivers such as Intel ICH8/6300ESB, NVIDIA nForce 3/4, etc.
  - Added support for AC'97 modems.
  - auich(4): added support to handle the AC'97 modem as audio device, enabled with the kernel option "AUICH_ATTACH_MODEM"
  - azalia(4): added support for S/PDIF.
- Hardware Monitors:
  - amdpm(4): added support for the i2c bus on the AMD-8111 used on many Opteron motherboards and for the Analog Devices ADT7464 hardware monitor chip.
  - adt7467c(4): new driver for Analog Devices ADT7467 and ADM1030 hardware monitor chips.
  - ipmi(4): new driver for motherboards implementing the Intelligent Platform Management Interface 1.5 or 2.0, from OpenBSD.
  - it(4): new driver for iTE 8705F/8712F and SiS 950 hardware monitors.

  - The lm(4) driver was rewritten and support for more chips was added, for example for Winbond W83627HF, W83627THF, W83627DHG and Asus AS99127F.
  - owtemp(4): new driver for the 1-Wire temperature sensors.
  - tmp121temp(4): new driver for the Texas Instruments TMP121 temperature sensor.
  - ug(4): new driver for ASUS Abit uGuru hardware monitor found on newer ASUS motherboards.
- Networking:
  - ath(4): updated HALs with support for WiSOC (AR531x) and 32bit SPARC.
  - bge(4): added support for the following chips: BCM5753, BCM5753M, BCM5715, BCM5754, BCM5755 and BCM5787. Numerous improvements and bugfixes were made too.
  - kse(4): new driver for Micrel KSZ8842/8841 PCI network cards.
  - msk(4): new driver for Marvell Yukon 2 GigE PCI network cards, from OpenBSD.
  - nfe(4): new driver for NVIDIA nForce Ethernet network cards, from OpenBSD.
  - ral(4): new 802.11 driver for PCI/Cardbus Ralink RT2500, RT2501, RT2600, RT2661 and RT2500 USB chipsets, from OpenBSD.
  - rum(4): new 802.11 driver for USB Ralink RT2501 and RT2601 chipsets, from OpenBSD.
  - sip(4): now works on sparc64.
  - tlp(4): added support for ASIX AX88140A and AX88141.
  - vr(4): added support for the VIA Rhine III.
  - wm(4): added support for i8003, ICH8, ICH9 and others.
  - wpi(4): new driver for Intel PRO/Wireless 3945ABG PCI 802.11 network cards, from OpenBSD.
- Security:
  - glxsb(4): new driver for the AMD Geode LX AES Security Block that provides random numbers and AES acceleration, from OpenBSD.
- Power Management:
  - Support for Intel Speedstep SMI on PIIX4 PCI-ISA for i386.
  - Support for AMD PowerNow and Cool'n'Quiet Technology on K7 and K8 CPUs (both in 32 and 64 bit mode), including Athlon Mobile, Athlon64, Opteron or X2.
  - Support for more Enhanced Speedstep CPUs, including VIA C7/Eden and Intel Core Solo/Duo/Duo2.
- Storage:
  - ahcisata(4): new driver for AHCI 1.0 and 1.1 compliant SATA controllers.
  - ataraid(4): added support to handle Adaptec HostRAID and VIA V-Tech software RAID.
  - ciss(4): new driver for HP/Compaq 5th+ generation Smart ARRAY controllers, from OpenBSD.
  - fdc(4): added support for SBus based sparc64 machines and fixed formatting on sparc.
  - gcscide(4): new driver for the AMD Geode CS5535 Companion Device IDE controller.

  - jmide(4): new driver for JMicron Technology JMB36x PCIe to SATA II/PATA controllers.
  - mfi(4): new driver for LSI Logic and Dell MegaRAID SAS controllers, from OpenBSD.
  - njata(4): new driver for Workbit NinjaATA-32 CardBus IDE controller.
  - svwsata(4): new driver for Serverworks K2 SATA controllers, from OpenBSD.
  - viaide(4) added support for the VIA VT8237A SATA controller and AMD CS5536 Companion Device IDE Controller.
- USB:
  - ucycom(4): new driver for Cypress microcontroller based serial devices.
  - uipaq(4): new driver for the iPAQ devices.
  - uslsa(4): new driver for Silicon Labs CP210x series serial adapters.
  - utoppy(4): new driver for the Topfield TF5000PVR range of digital video recorders.

Platforms

- i386:
  - Added support for the for Multiboot specification. This means much improved support for loading the kernel by GRUB, including passing in parameters to the kernel.
  - vesafb(4): added new framebuffer driver that supports VESA BIOS (VBE) 2.0 extensions and up.
  - Added cd9660 file system support to the BIOS bootloader.
- evbarm: New platform support for Arcom Viper PXA255-based single board, Atmark Techno Armadillo-9 and Armadillo-210, Linksys NSLU2 (a.k.a. "Slug") and I-O DATA HDL-G Giga LANDISK NAS devices.
- evbmips: Add support for Alchemy Au1550 processors, DBAu1550 boards, Alchemy Au15XX PCI host, (OMS-AL400/128) and Atheros AR5312 SoC.
- New port ews4800mips: NEC's MIPS based EWS4800 workstations.
- cobalt: Add support from booting off raidframe RAID1 mirrors.
- hpcmips: Added the teliosio(4) driver for the Sharp Telios LCD screen and Battery unit.
- New port landisk: port to the SH4 processor based NAS appliances, supporting models by I-O DATA (USL-5P, HDL-U, HDL-AV, HDL-W and HDLM-U series, SuperTank LAN Tank, UHDL-160U and UHDL-300U) and Plextor PX-EH16L, PX-EH25L and PX-EH40L.
- prep: This port has been modernized, and support for five additional machines has been added, among them the IBM 7024-E20 and 7025-F30 models and Motorola Powerstack E1. Additionally, sysinst support was added, and the bootloader process was improved, allowing easy installation and upgrade to future releases.
- Xen: support for Xen3 domU and dom0, including support for hardware virtualization on CPUs that support it.

Kernel subsystems

- Improved Firewire (IEEE1394) support imported from FreeBSD.
- The midi(4) framework got a complete overhaul for better support of Active Sensing and improved handling of tempo and timebase changes.
- Added a Bluetooth protocol stack including:
  - hardware drivers: ubt(4) for USB controllers, and bt3c(4) for the 3Com Bluetooth PC-Card.
  - socket based access to the HCI, L2CAP, RFCOMM and SCO protocols.
  - pseudo drivers for integrating services on remote Bluetooth devices such as Keyboards, Mice and SCO Audio into the NetBSD device framework.

  See bluetooth(4), bthset(1) and btpin(1).
- Imported the bio(4) framework from OpenBSD, to query/control block device controllers. Currently supporting the mfi(4) driver.
- Kernel uses stateful read-ahead algorithm.
- dkctl(8) can be used to switch buffer queuing strategies on the fly, see also bufq(9).
- fileassoc(9) is used by Veriexec, it adds in-kernel and file-system independent file meta-data association interface.
- firmload(9): An API for loading firmware images used by various hardware devices.
- gpio(4): Imported General Purpose I/O framework from OpenBSD.
- onewire(4): Imported Dallas Semiconductor 1-wire bus framework from OpenBSD.
- The proplib(3) protocol was added for sending property lists to/from the kernel using ioctls.
- spi(4): New SPI (Serial Peripherial Interface) framework.
- timecounter(9) adds a new time-keeping infrastructure along with NTP API 4 nanokernel implementation. Almost all platforms were changed to support this API.
- Start of 32bit-Linux-emulation for amd64 (COMPAT_LINUX32).
- wscons(4) console driver supports splash screens, scrolling, progress bar for kernel and boot messages.

Kernel interfaces have continued to be refined, and more subsystems and device drivers are shared among the different ports. You can look for this trend to continue.

Security

- The FAST_IPSEC IPsec implementation was extended to use hardware acceleration for IPv6, in addition to the hardware accelerated IPv4 that was available before. See fast_ipsec(4) for more information.
- mprotect(2) got restrictions to enforce W^X policies, from PaX. See options(4), sysctl(3), and paxctl(1).
- GCC 4's support for stack smashing protection (SSP) was enabled by adding libssp, see security(8).
- The kernel authorization framework kauth(9) was added, replacing the traditional BSD credential management and privileged operation access control with an abstract layer, allowing the implementation of various security models either as part of the NetBSD distribution or as third-party LKMs.

  NetBSD's kernel authorization is a hybrid clean-room implementation of a similar interface developed by Apple, extending its capabilities and combining concepts of credential inheritance control.

Userland

- 3rd party software updates:
  - BIND 9.4.1-P1
  - OpenSSL 0.9.8d
  - CVS 1.11.21
  - OpenSSH 4.4
  - gettext 0.14.4
  - PF from OpenBSD 3.7
  - (n)awk 20050424
  - Postfix 2.4.5
  - am-utils 6.1.3
  - file 4.21
  - zlib 1.2.3
  - GNU binutils 2.16.1
  - GNU groff 1.19.2
  - IPFilter 4.1.23
  - GNU gcc 4.1.1
  - NTP 4.2.2p2
  - pppd 2.4.4
- `cksum`(1) can now verify checksums.
- `identd`(1): added support for forwarding ident queries and receiving of proxied ident queries.
- `getent`(1): added support for the ethers database.
- iSCSI target (server) code added, see `iscsi-target`(8); Initiator (client) code is underway.
- `lockstat`(8): new command to display a summary of kernel locking events recorded over the lifetime of a called program.
- Various utilities to support Bluetooth were added:
  - `btconfig`(8) for controller configuration.
  - `btdevctl`(8) to manage pseudo devices relating to remote services.
  - `bthcid`(8) and `btpin`(1) for authenticating radio connections.
  - `sdpd`(8) for providing service discovery to remote devices.
  - `sdpquery`(1) for querying services on remote devices.
  - `rfcomm_sppd`(1) to access remote services over RFCOMM via stdio or pty.
  - `bthset`(1) for making connections to Bluetooth headsets.

Besides this list, there there have also been innumerable bug fixes and other miscellaneous enhancements of course.

Components removed from NetBSD

In this release of NetBSD, some software components known from previous releases were removed from the system. In some cases those were components that are not useful anymore or their utility does not justify maintenance overhead. Other components were not working properly and there was lack of interest in fixing them.

- Sushi ...
- Vinum ...
- Sendmail was removed. Postfix is the MTA and provides the `sendmail`(1) command line tool. Postfix has been included with NetBSD since NetBSD 1.5 was released in December 2005. Details about Postfix can be found in the NetBSD Guide:
  http://www.NetBSD.org/docs/guide/en/chap-mail.html.
  For those who need Sendmail, it is available from pkgsrc in the `mail/sendmail` and `mail/sendmail813` packages.
- NETCCITT ...
- NETNS ...
- UUCP was removed. The NetBSD improvements were merged into the pkgsrc version. For those who use UUCP tools, they are available from pkgsrc in the `net/uucp` package. The `cu`(1) command is available as a frontend to `tip`(1).
- The Fortran 77 compiler (g77) has been removed with the transition from GCC 3 to GCC 4, which does not include it. For those who need it, it is available from pkgsrc in the `lang/gcc3-f77` package.
- The evbsh5 port has been removed from NetBSD due to lack of interest, compounded by a lack of available SH5 hardware.

The Future of NetBSD

The NetBSD Foundation has been incorporated as a non-profit organization. Its purpose is to encourage, foster and promote the free exchange of computer software, namely the NetBSD Operating System. The foundation will allow for many things to be handled more smoothly than could be done with our previous informal organization. In particular, it provides the framework to deal with other parties that wish to become involved in the NetBSD Project.

The NetBSD Foundation will help improve the quality of NetBSD by:

- providing better organization to keep track of development efforts, including co-ordination with groups working in related fields.
- providing a framework to receive donations of goods and services and to own the resources necessary to run the NetBSD Project.
- providing a better position from which to undertake promotional activities.
- periodically organizing workshops for developers and other interested people to discuss ongoing work.

We intend to begin narrowing the time delay between releases. Our ambition is to provide a full release every six to eight months.

We hope to support even *more* hardware in the future, and we have a rather large number of other ideas about what can be done to improve NetBSD.

We intend to continue our current practice of making the NetBSD-current development source available on a daily basis.

We intend to integrate free, positive changes from whatever sources submit them, providing that they are well thought-out and increase the usability of the system.

Above all, we hope to create a stable and accessible system, and to be responsive to the needs and desires of NetBSD users, because it is for and because of them that NetBSD exists.

Sources of NetBSD

Refer to .: **http://www.NetBSD.org/mirrors/**

NetBSD 4.0_RC2 Release Contents

The root directory of the NetBSD 4.0_RC2 release is organized as follows:

`.../NetBSD-4.0_RC2/`

`CHANGES`	Changes since earlier NetBSD releases.
`LAST_MINUTE`	Last minute changes.
`MIRRORS`	A list of sites that mirror the NetBSD 4.0_RC2 distribution.
`README.files`	README describing the distribution's contents.
`TODO`	NetBSD's todo list (also somewhat incomplete and out of date).
`patches/`	Post-release source code patches.
`source/`	Source distribution sets; see below.

In addition to the files and directories listed above, there is one directory per architecture, for each of the architectures for which NetBSD 4.0_RC2 has a binary distribution.

The source distribution sets can be found in subdirectories of the `source` subdirectory of the distribution tree. They contain the complete sources to the system. The source distribution sets are as follows:

gnusrc This set contains the "gnu" sources, including the source for the compiler, assembler, groff, and the other GNU utilities in the binary distribution sets.
79 MB gzipped, 367 MB uncompressed

pkgsrc This set contains the "pkgsrc" sources, which contain the infrastructure to build third-party packages.
24 MB gzipped, 200 MB uncompressed

sharesrc This set contains the "share" sources, which include the sources for the man pages not associated with any particular program; the sources for the typesettable document set; the dictionaries; and more.
5 MB gzipped, 20 MB uncompressed

src This set contains all of the base NetBSD 4.0_RC2 sources which are not in **gnusrc**, **sharesrc**, or **syssrc**.
37 MB gzipped, 176 MB uncompressed

syssrc This set contains the sources to the NetBSD 4.0_RC2 kernel for all architectures; `config`(1); and `dbsym`(8).
26 MB gzipped, 140 MB uncompressed

xsrc This set contains the sources to the X Window System.
84 MB gzipped, 450 MB uncompressed

All the above source sets are located in the `source/sets` subdirectory of the distribution tree.

The source sets are distributed as compressed tar files. Except for the **pkgsrc** set, which is traditionally unpacked into `/usr/pkgsrc`, all sets may be unpacked into `/usr/src` with the command:

```
# cd / ; tar -zxpf set_name.tgz
```

In each of the source distribution set directories, there are files which contain the checksums of the files in the directory:

`BSDSUM` Historic BSD checksums for the various files in that directory, in the format produced by the command:
cksum -o 1 *file*.

`CKSUM` POSIX checksums for the various files in that directory, in the format produced by the command:
cksum *file*.

`MD5` MD5 digests for the various files in that directory, in the format produced by the command:
cksum -m *file*.

`SYSVSUM` Historic ATT System V UNIX checksums for the various files in that directory, in the format produced by the command:
cksum -o 2 *file*.

The MD5 digest is the safest checksum, followed by the POSIX checksum. The other two checksums are provided only to ensure that the widest possible range of system can check the integrity of the release files.

NetBSD/hp300 subdirectory structure

The hp300-specific portion of the NetBSD 4.0_RC2 release is found in the `hp300` subdirectory of the distribution: `.../NetBSD-4.0_RC2/hp300/`. It contains the following files and directories:

`INSTALL.html`
`INSTALL.ps`
`INSTALL.txt`
`INSTALL.more` Installation notes in various file formats, including this file. The `.more` file contains underlined text using the `more`(1) conventions for indicating italic and bold display.

`binary/`
`kernel/`
`netbsd-GENERIC.gz`
A gzipped NetBSD kernel containing code for everything supported in this release.
`netbsd-RAMDISK.gz`
A gzipped NetBSD kernel containing code for all of the hardware supported in this release with an embedded ramdisk-based installer. This is the same kernel that is present on the miniroot filesystem, but uses a newer more user-friendly installation program.
`netbsd-RAMDISK.symbols.gz`
Symbols for `netbsd-RAMDISK.gz`.
`sets/` hp300 binary distribution sets; see below.

`installation/`
`miniroot/`
hp300 miniroot file system image; see below.
`misc/` Miscellaneous hp300 installation utilities; see installation section, below.

`HP-IB.geometry` A file containing geometry for some HB-IB disk drives.

`SYS_INST.gz` A gzipped copy of the SYS_INST miniroot installation program. This is only necessary if you can't use the RAMDISK based installer.

`SYS_UBOOT.gz` A gzipped copy of the universal boot block. Supports Network, tape and disk booting. This is useful if you are installing a diskless NetBSD/hp300 system.

Binary distribution sets

The NetBSD hp300 binary distribution sets contain the binaries which comprise the NetBSD 4.0_RC2 release for the hp300. The binary distribution sets can be found in the `hp300/binary/sets` subdirectory of the NetBSD 4.0_RC2 distribution tree, and are as follows:

base The NetBSD 4.0_RC2 hp300 **base** binary distribution. You *must* install this distribution set. It contains the base NetBSD utilities that are necessary for the system to run and be minimally functional. It includes shared library support, and excludes everything described below.
16 MB gzipped, 46 MB uncompressed

comp Things needed for compiling programs. This set includes the system include files (`/usr/include`) and the various system libraries (except the shared libraries, which are included as part of the **base** set). This set also includes the manual pages for all of the utilities it contains, as well as the system call and library manual pages.
18 MB gzipped, 69 MB uncompressed

etc This distribution set contains the system configuration files that reside in `/etc` and in several other places. This set *must* be installed if you are installing the system from scratch, but should *not* be used if you are upgrading.
1 MB gzipped, 1 MB uncompressed

games This set includes the games and their manual pages.
3 MB gzipped, 7 MB uncompressed

kern-GENERIC
This set contains a NetBSD/hp300 4.0_RC2 `GENERIC` kernel, named `/netbsd`. You *must* install this distribution set.
2 MB gzipped, 3 MB uncompressed

man This set includes all of the manual pages for the binaries and other software contained in the **base** set. Note that it does not include any of the manual pages that are included in the other sets.
8 MB gzipped, 30 MB uncompressed

misc This set includes the (rather large) system dictionaries, the typesettable document set, and other files from `/usr/share`.
3 MB gzipped, 9 MB uncompressed

text This set includes NetBSD's text processing tools, including `groff`(1), all related programs, and their manual pages.
2 MB gzipped, 7 MB uncompressed

NetBSD maintains its own set of sources for the X Window System in order to assure tight integration and compatibility. These sources are based on XFree86, and tightly track XFree86 releases. They are currently equivalent to XFree86 4.4.0. Binary sets for the X Window System are distributed with NetBSD. The sets are:

xbase The basic files needed for a complete X client environment. This does not include the X servers.
6 MB gzipped, 17 MB uncompressed

xcomp The extra libraries and include files needed to compile X source code.
10 MB gzipped, 37 MB uncompressed

xfont Fonts needed by the X server and by X clients.
31 MB gzipped, 39 MB uncompressed

xetc Configuration files for X which could be locally modified.
0.03 MB gzipped, 0.17 MB uncompressed

xserver The X server.
3 MB gzipped, 7 MB uncompressed

The hp300 binary distribution sets are distributed as gzipped tar files named with the extension **.tgz**, e.g. `base.tgz`.

The instructions given for extracting the source sets work equally well for the binary sets, but it is worth noting that if you use that method, the filenames stored in the sets are relative and therefore the files are extracted *below the current directory*. Therefore, if you want to extract the binaries into your system, i.e. replace the system binaries with them, you have to run the **`tar -xpf`** command from the root directory (`/`) of your system. This utility is used only in a Traditional method installation.

Note: Each directory in the hp300 binary distribution also has its own checksum files, just as the source distribution does.

NetBSD/hp300 System Requirements and Supported Devices

NetBSD/hp300 4.0_RC2 will run on most HP 9000/300- and 400-series machines. The smallest amount of RAM that has been tested is 4 MB. If you wish to run X, more RAM is recommended.

Supported hardware

- CPUs
  - 318 (16 MHz 68020, with built-in monochrome framebuffer, no expansion)
  - 319 (16 MHz 68020, with built-in 6 bit color framebuffer, no expansion)
  - 320 (16 MHz 68020, 16 KB L2 cache, up to 7.5 MB RAM)
    Requires Human Interface board
  - 330 (16 MHz 68020, 4 MB on motherboard, up to 8 MB RAM)
    Requires Human Interface board
  - 340 (16 MHz 68030, up to 16 MB RAM)
  - 345 (50 MHz 68030 with 32 KB L2 cache, up to 128 MB RAM, built-in SCSI)
  - 350 (25 MHz 68020, 32 KB L2 cache, up to 48 MB RAM)
    Requires Human Interface board
  - 360 (25 MHz 68030, with 4 MB RAM built-in, up to 48 MB RAM)
    Requires System Interface board
  - 362 (25 MHz 68030, up to 16 MB RAM, built-in SCSI)
    Framebuffer is unsupported, you must use a serial console
  - 370 (33 MHz 68030, 64 KB L2 cache, up to 48 MB RAM)
    Requires System Interface board
  - 375 (50 MHz 68030 with 32 KB L2 cache, up to 128 MB RAM, built-in SCSI)
  - 380 (25 MHz 68040, up to 128 MB RAM, built-in SCSI)
  - 382 (25 MHz 68040, up to 32 MB RAM, built-in SCSI)
    Framebuffer is unsupported, you must use a serial console

  - 385 (33 MHz 68040, up to 128 MB RAM, built-in SCSI)
  - 400s, 400t, 400dl (50 MHz 68030 with 32 KB L2 cache, built-in SCSI, up to 128 MB RAM)
  - 425s, 425t, 425dl (25 MHz 68040 with built-in SCSI, up to 128 MB RAM)
  - 425e (25 MHz 68040, built-in SCSI)
    The BootROM does not support serial console and NetBSD/hp300 *does not support the 425e framebuffer. When the* NetBSD *kernel begins to boot it will default to using the serial port for console*
  - 433s, 433t, 433dl (33 MHz 68040 with built-in SCSI, up to 128 MB RAM)

- HP-IB devices
  - *rd*; CS80 disks: 2200, 2203, 7912, 7914, 7933, 7936, 7937, 7945, 7946, 7957, 7958, and 7959
  - *rd*; CS80 floppy disks: 9122, 9134 (possibly others)
    Requires use of HP-UX LIF utilities via HP-UX emulation
  - *ct*; CS80 Low-density 16 track cartridge (67 MB): 7912, 7914, 7946, and 9144
    Cannot read or write to 32 track tapes
  - *ct*; CS80 High-density 32 track cartridge (134 MB): 9145
    Cannot write to 16 track tapes (read only)
  - *mt*; CS80 Half-inch tape: 7974A, 7978A/B, 7979A, 7980A, and 7980XC.

    Note: You should connect HP-IB tape drives and printers to the slow HP-IB interface and hard drives to the fast HP-IB interface (if present).

- SCSI devices
  - *sd*; SCSI hard drives
  - *cd*; SCSI CD-ROM drives
  - *sd*; SCSI Magneto-optical drives
  - *st*; SCSI tape drives: HP 35450A (DDS-1 DAT), Exabyte EXB-8200 (8mm), Archive (QIC-24), Archive Viper (QIC-60), Archive Viper (QIC-150), Archive Python 25501 (DAT), and Archive Python 28849 (DAT)
  - *ch*; SCSI autochangers

- Serial interfaces
  - *com*; Built-in single serial port on System Interface board and Human Interface board
  - *com*; Built-in Apollo 4-port on Series 400 workstations
  - *dcm*; 98638 8-port (DIO-II board, appears to kernel as two 98642 devices)
  - *dcm*; 98642 4-port (DIO-I board)
  - *com*; 98626, 98644 built-in or add-on (DIO-I board) single serial port

  Note: See the FAQ for more detailed specs and information on configuring:
  http://www.NetBSD.org/Ports/hp300/faq.html#serialinfo

- Network interfaces
  - *le*; 98643 built-in and add-on (DIO-I board) ethernet cards.

- Graphics Devices
  - 98544 monochrome Topcat (1024x768, 1 bit, DIO-II)
  - 98545A color Topcat (1024x768, 4 bits, DIO-II)
  - 98547 color Topcat (1024x768, 6 bits)
  - 98548A monochrome Catseye (1024x768, 1 bit)
  - 98549A color Catseye (1024x768, 6 bits)
  - 98550A Catseye Hi-Res Color (a.k.a. CH) (1280x1024 @ 60 Hz, 8 bits, DIO-II)
  - 98700 and 98710 Gatorbox (1280x1024 @ 60 Hz, 4 or 8 bits)
    Requires 98287 (DIO-I board) to connect to workstation

  - 98720 and 98721 color Renaissance SRX (1280x1024 @ 60 Hz, 8, 12 or 24 bits)
    Requires 98724 (DIO-I board) or 98725 (DIO-II board) to connect to workstation
  - 98730 and 98731 DaVinci TurboSRX (1280x1024 @ 60 Hz, 8, 16, or 24 bits)
    Requires 98726A (DIO-II board) to connect to workstation
  - A1096A monochrome Hyperion (1280x1024, 1 bit)
  - A1416A Kathmandu (a.k.a. Color VRX) (1280x1024 @ 60 hz, 8 bits, DIO-II)

- HP-HIL devices
  - Keyboards
  - Two and three button mice
  - 46094 Quadrature Port (supports normal serial mice)
  - Graphics tablets
  - Dial boxes
  - ID modules

- Miscellaneous boards/interfaces
  - 98265A/98652 SCSI interface (DIO-I board, daughtercard for 98562, or built-in)
  - 98561 Human Interface board (DIO-I board with serial port, HP-HIL, and HP-IB)
  - 98562 System Interface board (DIO-II board with serial port, HP-HIL, HP-IB, DMA, and ethernet, has optional fast HP-IB or SCSI daughterboard)
  - 98620 DMA card (DIO-I board, for use with 98561)
  - 98624 HP-IB interface (DIO-I board or built-in)
  - 98625A and 98625B 'fast' HP-IB interface (DIO-I board or daughtercard for 98562)

Each serial interface has its own quirks, and some of them use non-standard pins. The FAQ describes how to configure and connect serial consoles to hp300 systems.

http://www.NetBSD.org/Ports/hp300/faq.html#serialconsole

When you try booting from a system with a framebuffer that is not supported by NetBSD/hp300, the screen will turn black, and it will try using the serial port for the console.

Unsupported hardware

- CPUs
  - 310 (10 MHz 68010, with built-in monochrome framebuffer, rs232 (25 pin), hil, and slow hpib)
  - 332 (16? MHz 68030, with no floating point unit)

- Graphics Devices
  - SGC support (for 425e built-in EVRX framebuffer)
  - SGC support (for some rare configurations of 4XXt and 4XXdl workstations)
  - 98702 TurboVRX DIO-II graphics device
  - 98705 Tigershark PersonalVRX DIO-II graphics device
  - internal video on models 362/382

- Miscellaneous boards/interfaces
  - domain keyboard and mouse, on Series 400 workstations. Needs wscons
  - parallel port, on 345, 362, 375, 380, 382, 382, and Series 400 workstations
  - EISA support, on Series 400 workstations
  - Token Ring cards (a.k.a. ATR)
  - VME bus adapter, on Series 300 workstations
  - 98628A single port dcl (DIO-I board)
  - 98625C fast HP-IB option on models 345 and 375

- internal SCSI floppy drive on 362, 382, and 425e

Getting the NetBSD System on to Useful Media

You should wait to decide where to put the NetBSD distribution sets until you have figured out how you are going to boot your system. Refer back to this section after you have done so.

Note that if you are installing or upgrading from a writable media, the media can be write-protected if you wish. These systems mount a root image from inside the kernel, and will not need to write to the media. If you booted from a floppy, the floppy disk may be removed from the drive after the system has booted.

Installation is supported from several media types, including:

- CD-ROM / DVD
- MS-DOS floppy
- FTP
- Remote NFS partition
- Tape
- Existing NetBSD partitions, if performing an upgrade

The steps necessary to prepare the distribution sets for installation depend upon which installation medium you choose. The steps for the various media are outlined below.

CD-ROM / DVD Find out where the distribution set files are on the CD-ROM or DVD. Likely locations are `binary/sets` and `hp300/binary/sets`.

Proceed to the instruction on installation.

MS-DOS floppy NetBSD doesn't include split sets to keep the distribution size down. They can be created on a separate machine using the `split`(1) command, running e.g. **`split -b 235k base.tgz base.`** to split the `base.tgz` file from `hp300/binary/sets` into files named `base.aa`, `base.ab`, and so on. Repeat this for all `set_name.tgz` files, splitting them into `set_name.`*`xx`* files. Count the number of `set_name.`*`xx`* files that make up the distribution sets you want to install or upgrade. You will need one sixth that number of 1.44 MB floppies.

Format all of the floppies with MS-DOS. Do *not* make any of them bootable MS-DOS floppies, i.e. don't use `format /s` to format them. (If the floppies are bootable, then the MS-DOS system files that make them bootable will take up some space, and you won't be able to fit the distribution set parts on the disks.) If you're using floppies that are formatted for MS-DOS by their manufacturers, they probably aren't bootable, and you can use them out of the box.

Place all of the `set_name.`*`xx`* files on the MS-DOS disks.

Once you have the files on MS-DOS disks, you can proceed to the next step in the installation or upgrade process. If you're installing NetBSD from scratch, go to the section on preparing your hard disk, below. If you're upgrading an existing installation, go directly to the section on upgrading.

FTP The preparations for this installation/upgrade method are easy; all you need to do is make sure that there's an FTP site from which you can retrieve the NetBSD distribution when you're about to install or upgrade. If you don't have DHCP available on your network, you will need to know the numeric IP address of that site, and, if it's not on a network directly connected to the machine on which you're installing or upgrading NetBSD, you need to know the numeric IP address of the router closest to the NetBSD machine. Finally, you need to know the numeric IP address of the NetBSD machine itself. If you don't have access to a functioning nameserver during installation, the IPv4

address of **ftp.NetBSD.org** is `204.152.184.36` and the IPv6 address is `2001:4f8:1:c:230:48ff:fe31:43f2` (as of December, 2006).

Once you have this information, you can proceed to the next step in the installation or upgrade process. If you're installing NetBSD from scratch, go to the section on preparing your hard disk, below. If you're upgrading an existing installation, go directly to the section on upgrading.

Note: This method of installation is recommended for those familiar with using BSD network configuration and management commands. If you aren't, this documentation should help, but is not intended to be all-encompassing.

NFS

Place the NetBSD distribution sets you wish to install into a directory on an NFS server, and make that directory mountable by the machine on which you are installing or upgrading NetBSD. This will probably require modifying the `/etc/exports` file on of the NFS server and resetting its mount daemon (mountd). (Both of these actions will probably require superuser privileges on the server.)

You need to know the numeric IP address of the NFS server, and, if you don't have DHCP available on your network and the server is not on a network directly connected to the machine on which you're installing or upgrading NetBSD, you need to know the numeric IP address of the router closest to the NetBSD machine. Finally, you need to know the numeric IP address of the NetBSD machine itself.

Once the NFS server is set up properly and you have the information mentioned above, you can proceed to the next step in the installation or upgrade process. If you're installing NetBSD from scratch, go to the section on preparing your hard disk, below. If you're upgrading an existing installation, go directly to the section on upgrading.

Note: This method of installation is recommended for those already familiar with using BSD network configuration and management commands. If you aren't, this documentation should help, but is not intended to be all-encompassing.

Tape

To install NetBSD from a tape, you need to make a tape that contains the distribution set files, in 'tar' format.

If you're making the tape on a UNIX-like system, the easiest way to do so is probably something like:

```
# tar -cf tape_device dist_directories
```

where *tape_device* is the name of the tape device that describes the tape drive you're using; possibly `/dev/rst0`, or something similar, but it will vary from system to system. (If you can't figure it out, ask your system administrator.) In the above example, *dist_directories* are the distribution sets' directories, for the distribution sets you wish to place on the tape. For instance, to put the **misc, base,** and **etc** distributions on tape (in order to do the absolute minimum installation to a new disk), you would do the following:

```
# cd .../NetBSD-4.0_RC2
# cd hp300/binary
# tar -cf tape_device misc etc kern
```

Note: You still need to fill in *tape_device* in the example.

Once you have the files on the tape, you can proceed to the next step in the installation or upgrade process. If you're installing NetBSD from scratch, go to the section on preparing your hard disk, below. If you're upgrading an existing installation, go directly to

the section on upgrading.

Preparing your System for NetBSD installation

There are two installation tools available. The traditional miniroot installer is script-based and may be netbooted or may be dumped to a disk and run locally. The ramdisk kernel with the **sysinst** installation utility is more flexible, but can only be netbooted and has not been extensively tested.

There are several possible installation configurations described in this document. Other configurations are possible, but less common. If you are unable to install based on the information in this document, post a message to port-hp300@NetBSD.org asking for help. The configurations described in this document are as follows:

- hp300 netboots SYS_UBOOT from a NetBSD server running rbootd(8), or other server platforms (Linux, FreeBSD, SunOS, Solaris, HP-UX etc.) with YAMAMORI Takenori's sun-rbootd package and then runs the miniroot installation tools or a purely diskless installation from a server on the same subnet (you must have root access). For more information, refer to the NetBSD Diskless HOW-TO at
  http://www.NetBSD.org/Documentation/network/netboot/
  and
  http://www.NetBSD.org/Documentation/network/netboot/rbootd/
- hp300 loads SYS_UBOOT from a local disk, tape, or floppy and then runs the miniroot installation tools or a purely diskless installation from a server as described above. You will need HP-UX on your hp300 if it does not have a SCSI interface or a floppy drive.
- hp300 loads SYS_INST from a local disk. You partition the drive and then run the miniroot installation tools from that drive. You will need HP-UX on your hp300 if it does not have a SCSI interface.

The preferred method is to use another NetBSD server to netboot the hp300 client. This procedure will not work on the handful of models which are incapable of netbooting. In particular, the 320, 350, 330, 318, and 319 might not have a recent enough BootROM. The BootROM revision is printed when your workstation is first powered on (or rebooted). Revision B or later will definitely work. BootROMs with numeric revisions such as 1.1 (on a 400s) will netboot without any problems. You can netboot from any built-in or add-on ethernet board on a model with a supported BootROM.

If you have access to a NetBSD/hp300 system, it is *much* easier to simply upgrade than to install from scratch. Skip down to the section on **Upgrading a previously-installed NetBSD System**

Formatting your hard drives

NetBSD/hp300 does not have the capability to perform a low-level format of hard drives. SCSI disks can be formatted on any platform with SCSI support and then used on NetBSD/hp300. HP-IB disks can only be formatted by the HP-UX mediainit(1) command. You may need to first create the device nodes for your disk, as HP-UX was never very good about populating /dev/rdsk propertly.

```
# mknod /dev/dsk/IDs0 b 0 0xSCID00
# mknod /dev/rdsk/IDs0 c 4 0xSCID00
# mediainit -v /dev/rdsk/IDs0
```

ID is the HP-IB address (a.k.a. slave) of the disk in hexadecimal. This is usually between 00 and 07, but possibly up to 1F (31 decimal) .

SC is the Select Code of the disk controller. This is usually 07 for slow (i.e. built-in) HP-IB or 0E (14 decimal) for SCSI or fast HP-IB.

Designing your disk's partition table

This step can sometimes be a real pain, especially when using `SYS_INST`. It's best to calculate it ahead of time.

If you are installing to an HP-IB disk, you will need information about your disk's geometry, based on 512-byte sectors. The file `installation/misc/HP-IB.geometry` in the distribution has geometry information for several HP-IB disks, but may be incomplete. Geometry may be calculated from an HP-UX `/etc/disktab` entry, but note that HP-UX geometry is based on 1024 byte sectors, while NetBSD 's is based on 512 byte sectors. You should have all partitions start on cylinder boundaries.

If you are installing to a SCSI disk, you don't need to worry about the details of the geometry. Just create a disklabel based on the total number of sectors available on the disk.

A quick note about partitions: Since the target disk will become the boot disk for your new NetBSD/hp300 installation, you will need to treat the '`a`' and '`c`' partitions in a special manner. Due to the size of the NetBSD/hp300 boot program (it spills into the area after the disklabel), it is necessary to offset the beginning of the '`a`' partition. For HP-IB disks, it is best to offset it by one cylinder from the beginning of the disk. For SCSI disks, just offset it by 100 KB (200 sectors). Later, the '`c`' partition will be marked with the type '`boot`' and may not be used for a file system. (For those unfamiliar with historic BSD partition conventions, the '`c`' partition is defined as the 'entire disk', or the 'raw partition'.)

Here is a table of recommended partition sizes for a full install:

Partition	Suggested	Needed
/ (root)	25 MB	15 MB
/usr	150 MB	100 MB
/var	20 MB	5 MB
swap	*2-3 ∗RAM*	6 MB

Note: You will need at least a 6 MB swap partition if you are unable to netboot the installer, as the mini-root is temporarily placed in this partition.

Here is an example disklabel from a 7959B HP-IB hard drive:

```
# /dev/rrd0a:
type: HP-IB
disk: rd7959B
label:
flags:
bytes/sector: 512
sectors/track: 42
tracks/cylinder: 9
sectors/cylinder: 378
cylinders: 1572
total sectors: 594216
rpm: 3600
interleave: 1
trackskew: 0
cylinderskew: 0
headswitch: 0           # milliseconds
track-to-track seek: 0  # milliseconds
drivedata: 0

8 partitions:
#        size   offset    fstype   [fsize bsize   cpg]
```

```
  a:    37800      378    4.2BSD     1024  8192    16   #
  b:    66150    38178      swap     1024  8192    16   #
  c:   594216        0      boot                         # (Cyl.    0 - 1571)
  d:   489888   104328    4.2BSD     1024  8192    16   #
```

Installing the bootstrap program locally

For earlier models incapable of netbooting, you need to install the bootstrap program on a bootable local device, such as a hard disk, floppy disk, or tape drive. If you will be booting the miniroot over the network, then you will be installing `installation/misc/SYS_UBOOT`.

If you do not have access to a netboot server to serve the miniroot installer, you can use a primitive bootstrap program `installation/misc/SYS_INST` to load the miniroot from a locally attached device (such as a disk, tape or CD-R). This is not recommended, as `SYS_INST` is difficult to use, buggy, and provides no error checking when partitioning your disk.

If your system has SCSI, this is easy. Just take a scratch SCSI disk (hard disk, zip disk, or CD-R) and use any computer to dump the bootstrap program to it. For example, to dump it to the `sd1` disk on a non-i386 platform:

```
# dd if=SYS_UBOOT of=/dev/sd1c
```

If your system has a floppy drive, you can write the bootstrap program to it using any computer with a floppy drive. You will need to dump it using a utility like **rawrite** or `dd`(1). Make sure to read back from the floppy to verify that the file has been written correctly.

If your system does not have SCSI or a floppy drive, you will need a bootable operating system on your hp300 so you can write files to the HP-IB device. You should probably write the bootstrap program to the disk you will be installing NetBSD onto.

Using HP-UX to write to an HP-IB disk:

```
# dd if=SYS_UBOOT of=/dev/rdsk/IDs0
```

ID is the HP-IB address (a.k.a. slave) of the disk in hexadecimal. This is usually between `00` and `07`, but possibly up to `1F` (31 decimal) .

Using HP-UX to write to an HP-IB tape:

```
# dd if=SYS_UBOOT of=/dev/rmt/0mnb obs=20b conv=osync
```

Installing the miniroot file system locally

This step is only necessary if you are not loading the miniroot installer from a netboot server. Follow the same procedure for the bootstrap program, except use the uncompressed miniroot file system (`installation/miniroot/miniroot.fs.gz`) instead of the bootstrap program. The only quirk is that you should place it at the offset of the swap partition you calculated above in the disklabel. In the example disklabel above, the offset is 38178 sectors of 512 bytes. Therfore, the `dd`(1) command would be something like:

```
# gunzip miniroot.fs.gz
# dd if=miniroot.fs of=/dev/rdsk/IDs0 seek=38178b
```

Note the '`b`' after the offset, which specifies blocks of 512 bytes.

By dumping the miniroot to disk where the swap partition will be, you're saving a step later where `SYS_INST` tries to download the miniroot over NFS. Just make sure that when you enter the partition table into `SYS_INST` you use the same block offset for the swap partition as you dumped the miniroot.

Configuring the netboot server

This step will configure your netboot server to provide SYS_UBOOT and the miniroot installer to your hp300.

1. Introduction

   To netboot a hp300, you must configure one or more servers to provide information and files to your hp300 (the 'client'). If you are using NetBSD (any architecture) on your netboot server(s), the information provided here should be sufficient to configure everything. Additionally, you may wish to look at the diskless(8) manual page and the manual pages for each daemon you'll be configuring. If the server(s) are another operating system, you should consult the NetBSD Diskless HOW-TO, which will walk you through the steps necessary to configure the netboot services on a variety of platforms.

   http://www.NetBSD.org/Documentation/network/netboot/

   You may either netboot the installer so you can install onto a locally attached disk, or you may run your system entirely over the network.

   Briefly, the netboot process involves discovery, bootstrap, kernel and file system stages. In the first stage, the client discovers information about where to find the bootstrap program. Next, it downloads and executes the bootstrap program. The bootstrap program goes through another discovery phase to determine where the kernel is located. The bootstrap program tries to mount the NFS share containing the kernel. Once the kernel is loaded, it starts executing. For RAM disk kernels, it mounts the RAM disk file system and begins executing the installer from the RAM disk. For normal (non-RAM disk) kernels, the kernel tries to mount the NFS share that had the kernel and starts executing the installation tools or init(8). All supported hp300 systems use HP's proprietary RMP (the rbootd(8) daemon) for the first discovery stage and bootstrap download stages. The bootstrap program uses DHCP for its discovery stage. NFS is used in both the kernel and file system stages to download the kernel, and to access files on the file server.

   We will use 'CC:CC:CC:CC:CC:CC' as the MAC address (ethernet hardware address) of your netboot client machine. You should have determined this address in an earlier stage. In this example, we will use '192.168.1.10' as the IP address of your client and 'client.test.net' as its name. We will assume you're providing all of your netboot services on one machine called 'server.test.net' with the client's files exported from the directory /export/client/root. You should, of course, replace all of these with the names, addresses, and paths appropriate to your environment.

   You should set up each netboot stage in order (i.e. discovery, bootstrap, kernel, and then file system) so that you can test them as you proceed.

2. rbootd(8)

   Get SYS_UBOOT from the installation/misc directory of the distribution.

   ```
   # mkdir -p /usr/mdec/rbootd
   # cp SYS_UBOOT /usr/mdec/rbootd
   # chmod -R a+rX /usr/mdec/rbootd
   ```

   Create /etc/rbootd.conf with the following line:

   ```
   CC:CC:CC:CC:CC:CC SYS_UBOOT
   ```

   You will need to start the **rbootd**. If it's already running, you will need to restart it to force it to reread its configuration file. If the server is running NetBSD, you can achieve this with:

   ```
   # /etc/rc.d/rbootd restart
   ```

If your netboot server is not running NetBSD but other OSs (like Linux, Solaris etc.), you have to use YAMAMORI Takenori's `sun-rbootd` package instead of native `rbootd`(8). Please refer the "Setting up the rbootd server" section in the NetBSD Diskless HOW-TO

http://www.NetBSD.org/Documentation/network/netboot/rbootd/

for details.

3. `dhcpd`(8)

   The bootstrap program uses DHCP to discover the location of the kernel. Put the following lines in your `/etc/dhcpd.conf` (see `dhcpd.conf`(5) and `dhcp-options`(5) for more information):

```
ddns-update-style none;
                # Do not use any dynamic DNS features
                #
allow bootp;    # Allow bootp requests, thus the dhcp server
                # will act as a bootp server.
                #
authoritative;  # master DHCP server for this subnet
                #
subnet 192.168.1.0 netmask 255.255.255.0 {
                # Which network interface to listen on.
                # The zeros indicate the range of addresses
                # that are allowed to connect.
}
group {
                # Set of parameters common to all clients
                # in this "group".
                #
        option broadcast-address        192.168.1.255;
        option domain-name              "test.net";
        option domain-name-servers      dns.test.net;
        option routers                  router.test.net;
        option subnet-mask              255.255.255.0;
                #
                # An individual client.
                #
        host client.test.net {
                hardware ethernet       CC:CC:CC:CC:CC:CC;
                fixed-address           192.168.1.10;
                #
                # Name of the host (if the fixed address
                # doesn't resolve to a simple name).
                #
                option host-name        "client";

                #
                # The path on the NFS server.
                #
                option root-path "/export/client/root";

                #
                # If your DHCP server is not your NFS server, supply the
                # address of the NFS server. Since we assume you run everythi
```

```
                    # on one server, this is not needed.
                    #
                    # next-server server.test.net;
            }
        #you may paste another "host" entry here for additional
        #clients on this network
    }
```

You will need to make sure that the `dhcpd.leases` file exists.

```
# touch /var/db/dhcpd.leases
```

You will need to start the **dhcpd**. If it's already running, you will need to restart it to force it to re-read its configuration file. If the server is running NetBSD, you can achieve this with:

```
# /etc/rc.d/dhcpd restart
```

4. `nfsd`(8), `mountd`(8), and `rpcbind`(8)

   Now your system should be able to load the bootstrap program and start looking for the kernel. Let's set up the NFS server. Create the directory you are exporting for the netboot client:

   ```
   # mkdir -p /export/client/root
   ```

   Put the following line in `/etc/exports` to enable NFS sharing:

   /export/client/root -maproot=root client.test.net

   If your server is currently running an NFS server, you only need to restart `mountd`(8). Otherwise, you need to start `rpcbind`(8) and `nfsd`(8). If the server is running NetBSD, you can achieve this with:

   ```
   # /etc/rc.d/rpcbind start
   # /etc/rc.d/nfsd start
   # /etc/rc.d/mountd restart
   ```

5. NetBSD kernel and installation tools

   Now, if you place a kernel named `netbsd` in `/export/client/root` your client should boot the kernel. If you are netbooting the installer, you can use either the traditional miniroot-based installer `installation/miniroot/miniroot.fs.gz` or the experimental RAM disk-based installer `binary/kernel/netbsd-RAMDISK.gz`.

   To use the miniroot-based installer, mount the miniroot file system on your netboot server. This procedure does *not* work on any operating system other than NetBSD. You'll also need to either set up a new NFS share point or an FTP server for the distribution files, as they won't fit inside the miniroot file system.

   ```
   # gunzip miniroot.fs.gz
   # vnconfig -c /dev/vnd0c /path/to/miniroot.fs
   # mount -o ro /dev/vnd0c /export/client/root
   # ls /export/client/root
    .profile     dist/        install.md   mnt/         sbin/        usr/
    bin/         etc/         install.sub  mnt2/        tmp/         var/
    dev/         install*     kern/        netbsd*      upgrade*
   ```

   If there are no files present in your exported directory, then something is wrong.

   To use the RAM disk-based installer, uncompress and rename the kernel. Also, copy the distribution files to the client's root directory.

```
# cp *tgz /export/client/root
# gunzip netbsd-RAMDISK.gz
# mv netbsd-RAMDISK /export/client/root/netbsd
```

If you are running your hp300 diskless, simply use `binary/kernel/netbsd-GENERIC.gz`.

6. Client file system

You can skip this step if you do not plan to run your client diskless after installation. Otherwise, you need to extract and set up the client's installation of NetBSD. The Diskless HOW-TO describes how to provide better security and save space on the NFS server over the procedure listed here.

http://www.NetBSD.org/Documentation/network/netboot/nfs.html

- Extracting distribution sets

```
# cd /export/client/root
# tar -xpzf /path/to/files/base.tgz
# tar -xpzf /path/to/files/etc.tgz
```

Continue with the other non-essential distribution sets if desired.

- Set up swap

```
# mkdir /export/client/root/swap
# dd if=/dev/zero of=/export/client/swap bs=4k count=4k
# echo '/export/client/swap -maproot=root:wheel client.test.net' | cat  /et
# /etc/rc.d/mountd restart
```

This creates a 16 MB swap file and exports it to the client.

- Create device nodes

```
# cd /export/client/root/dev
# ./MAKEDEV all
```

This procedure only works on NetBSD hosts.

- Set up the client's `fstab`(5)

Create a file in `/export/client/root/etc/fstab` with the following lines:

```
server:/export/client/swap   none  swap  sw,nfsmntpt=/swap
server:/export/client/root   /     nfs   rw 0 0
```

- Set up the client's `rc.conf`(5)

Edit `/export/client/root/etc/rc.conf`

```
rc_configured=YES
hostname="client"
defaultroute="192.168.1.1"
nfs_client=YES
auto_ifconfig=NO
net_interfaces=""
```

Make sure rc does not reconfigure the network device since it will lose its connection to the NFS server with your root file system.

- Set up the client's `hosts`(5) file.

Edit `/export/client/root/etc/hosts`

```
::1                     localhost
127.0.0.1               localhost
192.168.1.10 client.test.net client
192.168.1.5  server.test.net server
```

7. Setting up the server daemons

   If you want these services to start up every time you boot your server, make sure the following lines are present in your `/etc/rc.conf`:

```
rbootd=YES        rbootd_flags=""
dhcpd=YES         dhcpd_flags="-q"
nfs_server=YES          # enable server daemons
mountd=YES
rpcbind=YES       rpcbind_flags="-l"   # -l logs libwrap
```

Put Series 400 systems in HP-UX Compatible Boot Mode

Series 400 systems can be configured to boot either HP-UX or DomainOS. To boot NetBSD/hp300 you must have your system configured in '`HP-UX Compatible Boot Mode`'. If, when you power on your machine, it does *not* present a menu like the following, then you need to change your configuration.

```
Copyright 1990,
Hewlett-Packard Company.
All Rights Reserved.

BOOTROM  Series 400  Rev. 1.1
MD12 REV 1.2 1990/08/07.14:27:08
[...]
```

1. Attach a Domain keyboard or an HIL keyboard.
   The BootROM knows how to use either, even if NetBSD doesn't yet.

2. Put your system into 'service mode'.
   For a 4XXs, there's a toggle switch on the back of the machine (near the top). For a 4XXt or 4XXdl, press the green button on the front, behind the silly door. For a 425e, there's a toggle switch on the back of the machine (in the middle). The second green LED should light up.

3. Reset the machine.
   Press the reset button. For a 4XXs, ther's a small plunger on the back of the machine (near the top). For a 4XXt or 4XXdl, there's a white button on the front, behind the silly door. For a 425e, there's a button on the back of the machine.

4. Press `RETURN` to get the Domain boot prompt ().
   You can type `H` to get a list of available commands.

5. Type the following sequence of commands to convert to '`HP-UX Compatible Boot Mode`'.

   `CF`
   Type [key] RETURN ? **`2`**
   Type [key] RETURN ? **`2`**
   Type T or P RETURN ? **`P`**
   Type [key] RETURN ? **`E`**

6. Be sure to turn 'service mode' *off* when you're done. It may prevent you from selecting which device to boot from.

See the FAQ for additional help.

http://www.NetBSD.org/Ports/hp300/faq.html#domain

Searching for a bootable system

All the early hp300 Boot ROMs are very primitive and only allow a few simple operations. You can only interact with it after it is first powered on. If you reboot the machine, it will ignore anything you type and start loading the same OS you previously booted.

At any time after it recognizes the keyboard, while it is doing its self test or searching for a bootable system, you can hit reset to return it to a cold-boot configuration. On HIL keybaords, this is `control-shift-break`, where `break` is the key in the upper left (where escape is on sane keyboards). There is no equivalent over serial terminal, you'll need to power-cycle your machine.

After it beeps (i.e. recognizes the HIL keyboard), press `RETURN` twice to get the list of bootable devices.

```
SEARCHING FOR A SYSTEM (RETURN To Pause)
```

The newer HP Boot ROM, present on Series 400 machines and some of the later 300s (345, 375, 380, 382, 385) is capable of a little bit more. To select which device to boot from, press `RETURN` once after it beeps twice (i.e. recognizes the HIL keyboard) to get the list of bootable devices.

```
RESET To Power-Up, SPACE clears input   Select System, type RETURN       ?
```

The FAQ lists additional things you can do with the BootROM and describes the order the BootROM looks for bootable devices.

http://www.NetBSD.org/Ports/hp300/faq.html

A normal power-on sequence (from a 400s) looks something like this:

```
Copyright 1990,
Hewlett-Packard Company.
All Rights Reserved.

BOOTROM  Series 400  Rev. 1.1
MD12 REV 1.2 1990/08/07.14:27:08
MC68030 Processor
MC68882 Coprocessor
Configuration EEPROM
Utility Chip at 41
HP-HIL.Keyboard
 RESET To Power-Up
 Loading Memory
Self-Test Mode
 RESET To Power-Up, SPACE clears input
Select System, type RETURN
HP-IB
DMA-C0
 Self-Test Mode
RAM 33554158 Bytes
HP98644 (RS-232) at 9
HP PARALLEL at 12
HP98265 (SCSI S 32) at 14
HP98643 (LAN) at 21, AUI, 080009115DB3
Bit Mapped Video at 133 (Console)
 System Search Mode
                                        :RODIME RO3000T, 1406, 0
                                           1Z SYS_UBOOT
                                        :LAN080009115DB3, 2100, 0
```

```
   2Z SYS_UBOOT
:HP7959, 702, 0, 0
   1H SYSHPUX
   1D SYSDEBUG
   1B SYSBCKUP
:HP9122, 0700, 0, 0
   3Z SYS_INST
```

You should see your bootstrap program somewhere in this list. If it's not here, then your hp300 can't boot it and there's a problem somewhere. To boot from a particular device, type in the two character name for it and press RETURN. In this example, you'd type 2Z to boot from the network.

Selecting ethernet port on Series 400

Series 400 machines have two ethernet media types built into the motherboard. You may only use one at a time. When your Series 400 workstation goes through the self-test when powered on or rebooted, it will say one of the following:

```
HP98643 (LAN) at 21, AUI
HP98643 (LAN) at 21, Thin
```

If the wrong type of network is selected, you will need to change the ethernet port. You will need to open the case (4XXt, 4XXdl, 4XXe) or remove the motherboard (4XXs) to access the jumper. Be sure to use static-prevention measures, as you could easily fry your motherboard from carelessness. If you are uncomfortable with this, ask a friend who is aware of these issues. There is a block of 8 jumpers at the rear of the motherboard, labeled AUI/Thin. You will need to put the jumpers in the position necessary for your type of ethernet.

Running SYS_INST

This step is necessary *only* if you cannot netboot.

Chose SYS_INST from the list of bootable devices that the BootROM found. SYS_INST will load and prompt you for a command.

A quick note about disk numbers: While in the SYS_INST program, you may use different unit numbers for the disks than when the NetBSD kernel is running. The unit number for a disk while in SYS_INST is calculated with the following formula:

```
unit = (controller * 8) + slaveID
```

Controllers are numbered 0, 1, ... starting with the lowest select code. SCSI controllers and HP-IB controllers are counted separately. Therefore, if you had a system with an internal HP-IB interface at select code 7, a fast HP-IB interface at select code 14, and a SCSI interface at select code 16, unit numbers might be something like the following:

Location	**Unit**	
HP-IB at 7, slaveID 2	2	(disk: rd2)
HP-IB at 14, slaveID 5	13	(disk: rd13)
SCSI at 16, slaveID 0	0	(disk: sd0)

You will need to place a disklabel on the disk.

sys_inst **disklabel**

Note: It may be worth selecting the **zap** option initially to ensure that the disklabel area is clear. This may be especially important if an HP-UX boot block had been previously installed on the disk.

Select the **edit** option, and answer the questions about your disk. There may be several questions which you may not be sure of the answers to. Listed below are guidelines for SCSI and HP-IB disks:

Bad sectoring?	NO
Ecc?	NO
Interleave?	1
Trackskew?	0
Cylinderskew?	0
Headswitch?	0
Track-to-track?	0
Drivedata 0-4?	0 (for all Drivedata values)

Next, you will be asked to fill out the partition map. You must provide responses for all 8 partitions. Remember, you must have the sector offset for the 'b' partition match the location you dumped the miniroot file system image. Set the size and offset of any unused partition to 0. Note that sizes and offsets are expressed in 'n sectors', assuming 512 byte sectors. Care should be taken to ensure that partitions begin and end on cylinder boundaries (i.e. size and offset is an even multiple of the number of sectors per cylinder). While this is not technically necessary, it is generally encouraged.

Note: When setting the partition type of the 'b' partition, make sure to specify it as an `ffs` partition so that the miniroot can be mounted (even if this will be a swap partition). You will be given a chance to clean this up later in the installation process.

Once you have edited the label, select the **show** option to verify that it is correct. If so, select **write** and **done**. Otherwise, you may re-edit the label.

In an earlier step, we already copied the miniroot image to the target disk.

Boot from the miniroot file system.

sys_inst **boot**

Enter the disk from which to boot. The kernel in the miniroot file system will be booted into single-user mode.

Chosing a kernel location

Once the bootstrap program `SYS_UBOOT` has started, it will pause and let you chose a kernel location, name, and options:

```
 NetBSD/hp300 Primary Boot, Revision 1.13
 (gregm@mcgarry, Mon Apr 15 08:46:32 NZST 2002)
 HP 9000/425e SPU
 Enter "reset" to reset system.
Boot: [[[le0a:]netbsd][-a][-c][-d][-s][-v][-q]] :-
```

If your kernel is on a different device than `SYS_UBOOT` then you will need to type in where to find it. This is the case, for example, if your model is incapable of netbooting and you started `SYS_UBOOT` from a floppy, and the miniroot installer is on a netboot server. In this case, you'd type in '`le0`' at the prompt.

If you've installed the miniroot on your disk, you can always boot from that by using partition '`b`' when prompted by `SYS_UBOOT`. For example, to boot the miniroot from an HP-IB disk on controller 0 at slave ID 2, you'd type:

Boot: [[[rd0a:]netbsd][-a][-c][-d][-s][-v][-q]] :- **rd2b:netbsd**

Installing the NetBSD System

The miniroot's install program is very simple to use. It will guide you through the entire process, and is well automated. If you need to restart the installer, hit `Control-C` which will return you to a shell prompt. From there, just start it over:

./install

The experimental RAM disk-based installer is not described here, but is very self-explanatory.

The miniroot's install program will:

1. Allow you to place disklabels on additional disks. Note that partition sizes and offsets are expressed in sectors. When you fill out the disklabel, you will need to specify partition types and file system parameters. If you're unsure what these values should be, use the following:

   ```
   fstype: 4.2BSD
   fsize: 1024
   bsize: 4096
   cpg: 16
   ```

   If the partition will be a swap partition, use the following:

   ```
   fstype: swap
   fsize: 0 (or blank)
   bsize: 0 (or blank)
   cpg: 0 (or blank)
   ```

   You will also need to specify the number of partitions. The number of partitions is determined by the 'index' of the last partition letter, where `a = 1`, `b = 2`, etc. Therefore, if the last filled partition is partition '`g`', there are 7 partitions. Any partitions with size of 0 may be removed from the list.

   Anything after a '`#`' is a comment.

   The following is an example disklabel partition map:

   ```
   7 partitions:
   #       size   offset    fstype   [fsize bsize   cpg]
   a:     30912      448    4.2BSD     1024  8192    16   # (Cyl.     1 - 69)
   b:    130816    31360      swap                        # (Cyl.    70 - 361)
   c:   1296512        0      boot                        # (Cyl.     0 - 2893)
   e:     81984   162176    4.2BSD     1024  8192    16   # (Cyl.   362 - 544)
   f:    102592   244160    4.2BSD     1024  4096    16   # (Cyl.   545 - 773)
   g:    949760   346752    4.2BSD     1024  8192    16   # (Cyl.   774 - 2893)
   ```

2. Create file systems on target partitions.

3. Allow you to set up your system's network configuration. Remember to specify host names without the domain name appended to the end. For example use `foo` instead of `foo.bar.org`. If, during the process of configuring the network interfaces, you make a mistake, you will be able to re-configure that interface by simply selecting it for configuration again.

4. Mount target file systems. You will be given the opportunity to manually edit the resulting `/etc/fstab`.

5. Extract binary sets from the media of your choice.

6. Copy configuration information gathered during the installation process to your root file system (`/`).

7. Make device nodes in your root file system under `/dev`.

8. Copy a new kernel onto your root partition (`/`).

9. Install a new boot block.

10. Check your file systems for integrity.

First-time installation on a system through a method other than the installation program is possible, but strongly discouraged.

Post installation steps

Once you've got the operating system running, there are a few things you need to do in order to bring the system into a properly configured state, with the most important ones described below.

1. Configuring `/etc/rc.conf`

   If you or the installation software haven't done any configuration of `/etc/rc.conf` (**sysinst** usually will), the system will drop you into single user mode on first reboot with the message

   ```
   /etc/rc.conf is not configured. Multiuser boot aborted.
   ```

   and with the root file system (`/`) mounted read-only. When the system asks you to choose a shell, simply press `RETURN` to get to a `/bin/sh` prompt. If you are asked for a terminal type, respond with **hp300h** for a local console, or whatever is appropriate for your serial console. and press `RETURN`. You may need to type one of the following commands to get your delete key to work properly, depending on your keyboard:

   ```
   # stty erase '^h'
   # stty erase '^?'
   ```

   At this point, you need to configure at least one file in the `/etc` directory. You will need to mount your root file system read/write with:

   ```
   # /sbin/mount -u -w /
   ```

   Change to the `/etc` directory and take a look at the `/etc/rc.conf` file. Modify it to your tastes, making sure that you set `rc_configured=YES` so that your changes will be enabled and a multi-user boot can proceed. Default values for the various programs can be found in `/etc/defaults/rc.conf`, where some in-line documentation may be found. More complete documentation can be found in `rc.conf`(5).

   If your `/usr` directory is on a separate partition and you do not know how to use **ed**, you will have to mount your `/usr` partition to gain access to **ex** or **vi**. Do the following:

   ```
   # mount /usr
   # export TERM=hp300h
   ```

   If you have `/var` on a separate partition, you need to repeat that step for it. After that, you can edit `/etc/rc.conf` with `vi`(1). When you have finished, type **exit** at the prompt to leave the single-user shell and continue with the multi-user boot.

   Other values that need to be set in `/etc/rc.conf` for a networked environment are *hostname* and possibly *defaultroute*, furthermore add an *ifconfig_int* for your ⟨int⟩ network interface, along the lines of

   ```
   ifconfig_le0="inet 123.45.67.89 netmask 255.255.255.0"
   ```

   or, if you have *myname.my.dom* in `/etc/hosts`:

   ```
   ifconfig_le0="inet myname.my.dom netmask 255.255.255.0"
   ```

   To enable proper hostname resolution, you will also want to add an `/etc/resolv.conf` file or (if you are feeling a little more adventurous) run `named`(8). See `resolv.conf`(5) or `named`(8) for more information. Instead of manually configuring network and naming service, DHCP can be used by setting `dhclient=YES` in `/etc/rc.conf`.

   Other files in `/etc` that may require modification or setting up include `/etc/mailer.conf`, `/etc/nsswitch.conf`, and `/etc/wscons.conf`.

2. Logging in

   After reboot, you can log in as `root` at the login prompt. Unless you've set a password in **sysinst**, there is no initial password. If you're using the machine in a networked environment, you should create

an account for yourself (see below) and protect it and the "root" account with good passwords. By default, root login from the network is disabled (even via ssh(1)). One way to become root over the network is to log in as a different user that belongs to group "wheel" (see group(5)) and use su(1) to become root.

Unless you have connected an unusual terminal device as the console you can just press RETURN when it prompts for `Terminal type? [...]`.

3. Adding accounts

   Use the useradd(8) command to add accounts to your system. Do not edit /etc/passwd directly! See vipw(8) and pwd_mkdb(8) if you want to edit the password database.

4. The X Window System

   If you have installed the X Window System, look at the files in /usr/X11R6/lib/X11/doc for information. Also, you may want to read through the NetBSD/hp300 FAQ entry on X11.
   http://www.NetBSD.org/Ports/hp300/faq.html#x11

   Don't forget to add /usr/X11R6/bin to your path in your shell's dot file so that you have access to the X binaries.

5. Installing third party packages

   If you wish to install any of the software freely available for UNIX-like systems you are strongly advised to first check the NetBSD package system. This automatically handles any changes necessary to make the software run on NetBSD, retrieval and installation of any other packages on which the software may depend, and simplifies installation (and deinstallation), both from source and precompiled binaries.

   - More information on the package system is at
     http://www.NetBSD.org/Documentation/software/packages.html
   - A list of available packages suitable for browsing is at
     ftp://ftp.NetBSD.org/pub/NetBSD/packages/pkgsrc/README.html
   - Precompiled binaries can be found at ,:
     ftp://ftp.NetBSD.org/pub/NetBSD/packages/
     usually in the 4.0_RC2/hp300/All subdir. You can install them with the following commands under sh(1):

     ```
     # PKG_PATH=ftp://ftp.NetBSD.org/pub/NetBSD/packages/4.0_RC2/hp300/All
     # export PKG_PATH
     # pkg_add -v tcsh
     # pkg_add -v bash
     # pkg_add -v perl
     # pkg_add -v apache
     # pkg_add -v kde
     # pkg_add -v firefox
     ...
     ```

     If you are using csh(1) then replace the first two lines with the following:

     ```
     # setenv PKG_PATH ftp://ftp.NetBSD.org/pub/NetBSD/packages/4.0_RC2/hp300/All
     ...
     ```

     The above commands will install the Tenex-csh and Bourne Again shell, the Perl programming language, Apache web server, KDE desktop environment and the Firefox web browser as well as all the packages they depend on.

- Package sources for compiling packages on your own can be obtained by retrieving the file
  ftp://ftp.NetBSD.org/pub/NetBSD/NetBSD-current/tar_files/pkgsrc.tar.gz
  They are typically extracted into `/usr/pkgsrc` (though other locations work fine), with the commands:

  ```
  # mkdir /usr/pkgsrc
  # cd /usr/pkgsrc
  # tar -zxpf pkgsrc.tar.gz
  ```

  After extracting, see the `README` and `doc/pkgsrc.txt` files in the extraction directory (e.g. `/usr/pkgsrc/README`) for more information.

6. Misc

   - Edit `/etc/mail/aliases` to forward root mail to the right place. Don't forget to run `newaliases`(1) afterwards.
   - The `/etc/mail/sendmail.cf` file will almost definitely need to be adjusted; files aiding in this can be found in `/usr/share/sendmail`. See the `README` file there for more information. If you prefer postfix as MTA, adjust `/etc/mailer.conf`.
   - Edit `/etc/rc.local` to run any local daemons you use.
   - Many of the `/etc` files are documented in section 5 of the manual; so just invoking

     ```
     # man 5 filename
     ```

     is likely to give you more information on these files.

Upgrading a previously-installed NetBSD System

It is possible to easily upgrade your existing NetBSD/hp300 system using the upgrade program in the miniroot or by manually performing the same steps as the miniroot upgrade program.

Upgrading using the miniroot

If you wish to upgrade your system by this method, simply select the **upgrade** option once the miniroot has booted. The upgrade program with then guide you through the procedure. While you can boot the miniroot using the same methods described above for a fresh install of NetBSD/hp300 there are easier and less intrusive options since your disk is already labeled and bootable. The easiest is to dump the miniroot to your swap partition and boot from that.

1. Download the files you'll need to upgrade

   In particular, make sure you have on your locally mounted file systems `base.tgz` and `miniroot.fs.gz`

2. Boot your hp300 into 'single-user mode':

   Follow the instructions in the section above on **Chosing a kernel location** and type `-s` at the prompt.

3. Extract and install a new boot block:

   Make sure you install the bootstrap program distributed with this version of NetBSD/hp300.

   ```
   # tar -xpvzf base.tgz ./usr/mdec
   # disklabel -B -b ./usr/mdec/uboot.lif root-disk
   ```

   E.g.: *root-disk* could be `sd0` or `rd0`. We'll assume `rd0` for now.

4. Install the miniroot file system:

First make sure that your 'b' partition has enough room for the uncompressed miniroot (otherwise it might overwrite another partition or the end of the disk).

```
# gunzip miniroot.fs.gz
# dd if=miniroot.fs of=/dev/rd0b
```

5. Boot the miniroot:

   Follow the instructions in the section above on **Chosing a kernel location** and type `rd0b:netbsd` at the prompt.

The upgrade program will:

1. Enable the network based on your system's current network configuration.
2. Mount your existing file systems.
3. Extract binary sets from the media of your choice.
4. Fixup your system's existing `/etc/fstab`, changing the occurrences of **ufs** to **ffs** and let you edit the resulting file.
5. Make new device nodes in your root file system under `/dev`.
6. Don't forget to extract the **kern** set from the distribution.

   Note: The existing kernel *will not* be backed up; doing so would be pointless, since older kernels may not be capable of running NetBSD 4.0_RC2 executables.
7. Install a new boot block.
8. Check your file systems for integrity.
9. You'll have to reboot your system manually

Manual upgrade

While using the miniroot's upgrade program is the preferred method of upgrading your system, it is possible to upgrade your system manually. To do this, follow the following procedure:

1. Place *at least* the **base** binary set in a file system accessible to the target machine. A local file system is preferred, since the NFS subsystem in the NetBSD 4.0_RC2 kernel may be incompatible with your old binaries.
2. Back up your pre-existing kernel and copy the 4.0_RC2 kernel into your root partition (`/`).
3. Extract and install a new boot block:

   Make sure you install the bootstrap program distributed with this version of NetBSD/hp300.

   ```
   # tar -xpvzf base.tgz ./usr/mdec
   # disklabel -B -b ./usr/mdec/uboot.lif root-disk
   ```

   E.g.: *root-disk* could be `sd0` or `rd0`.
4. Reboot with the 4.0_RC2 kernel into single-user mode.
5. Check all file systems:

   ```
   # /sbin/fsck -pf
   ```
6. Mount all local file systems:

   ```
   # /sbin/mount -a -t nonfs
   ```

7. If you keep `/usr` or `/usr/share` on an NFS server, you will want to mount those file systems as well. To do this, you will need to enable the network:

   ```
   # sh /etc/rc.d/network start
   ```

8. Make sure you are in the root file system (/) and extract the **base** binary set:

   ```
   # cd /
   # pax -zrvpe -f /path/to/base.tgz
   ```

9. Sync the file systems:

   ```
   # sync
   ```

10. At this point you may extract any other binary sets you may have placed on local file systems, or you may wish to extract additional sets at a later time. To extract these sets, use the following commands:

    ```
    # cd /
    # pax -zrvpe -f path_to_set
    ```

Note: You *should not* extract the **etc** set if upgrading. Instead, you should extract that set into another area and carefully merge the changes by hand.

Compatibility Issues With Previous NetBSD Releases

Users upgrading from previous versions of NetBSD may wish to bear the following problems and compatibility issues in mind when upgrading to NetBSD 4.0_RC2 .

Issues affecting an upgrade from NetBSD 2.1 and older releases.

See the section below on upgrading from NetBSD 3.x as well.

It is **very important** that you populate the directory `/etc/pam.d` with appropriate configuration files for the Pluggable Authentication Modules (PAM) because you will not be able to login any more otherwise. Using *postinstall* as described below will take care of this. Please refer to

http://www.netbsd.org/guide/en/chap-pam.html

for documentation about PAM.

The following issues can generally be resolved by extracting the **etc** set into a temporary directory and running *postinstall*:

```
postinstall -s /path/to/etc.tgz check
postinstall -s /path/to/etc.tgz fix
```

Issues fixed by *postinstall*:

- Various files in `/etc` need upgrading. These include:
  - `/etc/defaults/*`
  - `/etc/mtree/*`
  - `/etc/pam.d/*`
  - `/etc/daily`
  - `/etc/weekly`
  - `/etc/monthly`
  - `/etc/security`
  - `/etc/rc.subr`
  - `/etc/rc`
  - `/etc/rc.shutdown`

- /etc/rc.d/*

The following issues need to be resolved manually:

- The user '_pflogd' and the groups '_pflogd' and 'authpf' need to be created.

Issues affecting an upgrade from NetBSD 3.x releases.

The following issues can generally be resolved by extracting the **etc** set into a temporary directory and running *postinstall*:

```
postinstall -s /path/to/etc.tgz check
postinstall -s /path/to/etc.tgz fix
```

Issues fixed by *postinstall*:

- Various files in /etc need upgrading. These include:
  - /etc/defaults/*
  - /etc/mtree/*
  - /etc/daily
  - /etc/weekly
  - /etc/monthly
  - /etc/security
  - /etc/rc.subr
  - /etc/rc
  - /etc/rc.shutdown
  - /etc/rc.d/*
  - /etc/envsys.conf

The following issues need to be resolved manually:

- The users '_proxy' and 'authpf' and the groups '_proxy' and 'rwhod' need to be created and the user 'uucp' needs to be updated.
- A number of things have been removed from the NetBSD 4.0_RC2 release including: the evbsh5 port, the Fortran 77 compiler (g77), NETCCITT, NETNS, Sendmail, Sushi, UUCP, and Vinum. If you were using any of these, then please see the "Components removed from NetBSD" section near the beginning of this document.

Using online NetBSD documentation

Documentation is available if you first install the manual distribution set. Traditionally, the "man pages" (documentation) are denoted by 'name(section)'. Some examples of this are

- intro(1),
- man(1),
- apropos(1),
- passwd(1), and
- passwd(5).

The section numbers group the topics into several categories, but three are of primary interest: user commands are in section 1, file formats are in section 5, and administrative information is in section 8.

The *man* command is used to view the documentation on a topic, and is started by entering **man** [*section*] *topic*. The brackets [] around the section should not be entered, but rather indicate that the section is optional. If you don't ask for a particular section, the topic with the lowest numbered section name will be displayed. For instance, after logging in, enter

```
# man passwd
```

to read the documentation for passwd(1). To view the documentation for passwd(5), enter

```
# man 5 passwd
```

instead.

If you are unsure of what man page you are looking for, enter

```
# apropos subject-word
```

where *subject-word* is your topic of interest; a list of possibly related man pages will be displayed.

Administrivia

If you've got something to say, do so! We'd like your input. There are various mailing lists available via the mailing list server at majordomo@NetBSD.org. To get help on using the mailing list server, send mail to that address with an empty body, and it will reply with instructions.

There are various mailing lists set up to deal with comments and questions about this release. Please send comments to: netbsd-comments@NetBSD.org.

To report bugs, use the send-pr(1) command shipped with NetBSD, and fill in as much information about the problem as you can. Good bug reports include lots of details. Additionally, bug reports can be sent by mail to: netbsd-bugs@NetBSD.org.

Use of send-pr(1) is encouraged, however, because bugs reported with it are entered into the NetBSD bugs database, and thus can't slip through the cracks.

There are also port-specific mailing lists, to discuss aspects of each port of NetBSD. Use majordomo to find their addresses, or visit **http://www.NetBSD.org/MailingLists/**. If you're interested in doing a serious amount of work on a specific port, you probably should contact the 'owner' of that port (listed below).

If you'd like to help with this effort, and have an idea as to how you could be useful, send us mail or subscribe to: netbsd-help@NetBSD.org.

As a favor, please avoid mailing huge documents or files to these mailing lists. Instead, put the material you would have sent up for FTP or WWW somewhere, then mail the appropriate list about it, or, if you'd rather not do that, mail the list saying you'll send the data to those who want it.

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  Ralph Campbell
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  Marshall Kirk McKusick

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- The Helsinki University of Technology in Finland for hosting the NetBSD backup CVS and backup server.

- SSH Communications Security in Finland for operating the backup server.
- The many organizations that provide NetBSD mirror sites.
- Without CVS, this project would be impossible to manage, so our hats go off to Brian Berliner, Jeff Polk, and the various other people who've had a hand in making CVS a useful tool.
- We list the individuals and organizations that have made donations or loans of hardware and/or money, to support NetBSD development, and deserve credit for it at .: **http://www.NetBSD.org/donations** (If you're not on that list and should be, tell us! We probably were not able to get in touch with you, to verify that you wanted to be listed.)
- Finally, we thank all of the people who've put sweat and tears into developing NetBSD since its inception in January, 1993. (Obviously, there are a lot more people who deserve thanks here. If you're one of them, and would like to mentioned, tell us!)

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