NAME

INSTALL – Installation procedure for NetBSD/hp300

DESCRIPTION

About this Document

This document describes the installation procedure for NetBSD 1.4.3 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 UN*X-like operating system derived from the Berkeley Networking Release 2 (Net/2), 4.4BSD-Lite, and 4.4BSD-Lite2 sources. NetBSD runs on twenty different system architectures featuring eight distinct families of CPUs, and is being ported to more. The NetBSD 1.4.3 release contains complete binary releases for fifteen different machine types. (The remaining ones 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, 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.

Upgrade path to NetBSD 1.4.3

If you are not installing your system ''from scratch'' but instead are going to upgrade an existing system already running NetBSD you need to know which versions you can upgrade with NetBSD 1.4.3.

NetBSD 1.4.3 is an upgrade of NetBSD 1.4.2, 1.4.1, NetBSD 1.4 and earlier major and patch releases of NetBSD such as versions 1.3.3, 1.2 etc.

The intermediate development versions of code available on the main trunk in our CVS repository (also known as ''NetBSD-current'') from *after* the point where the release cycle for 1.4 was started are designated by version identifiers such as 1.4A, 1.4B, 1.4P etc. These identifiers do not designate releases, but indicate major changes in internal kernel APIs. Note that the kernel from NetBSD 1.4.3 can *not* be used to upgrade a system running one of those intermediate development versions. Trying to use the NetBSD 1.4.3 kernel on such a system *will* in all probability result in problems.

Please also note that it is not possible to do a direct ''version'' comparison between any of the intermediate development versions mentioned above and 1.4.3 to determine if a given feature is present or absent in 1.4.3. The development of 1.4 and the subsequent patch or ''point'' releases is done on a separate branch in the CVS repository which was created when the release cylcle for 1.4 was started, and during the release cycle of 1.4 and its patch releases, selective fixes have been imported from the main development trunk (the intent is to only import fixes with no or minor impact on the stability of the release branch). So, there are features in 1.4.3 which were not in e.g. 1.4H, but the reverse is also true.

Major Changes Between 1.4.2 and 1.4.3

The complete list of changes between NetBSD 1.4.2 and 1.4.3 can be found in the file CHANGES-1.4.3 in the top directory of the source tree. The following are the highlights only.

- A driver for the Lucent Wavelan (Orinoco) 802.11B wireless Ethernet PCMCIA card has been added, see `wi`(4).
- The PCI Cyclom-4Y and -8Y multiport serial cards are now supported.
- The Macintosh LC Ethernet Adapter is now supported.
- The on-board video on Macintosh Quadra 605 is now supported.
- Bugfixes to the Alteon Gigabit Ethernet driver, `ti`(4).
- Support for several new PCI IDE controllers have been added, see `pciide`(4.)
- The i386 port may now be installed on wd2 or wd3.
- A possible CPU hog problem related to large I/Os has been fixed. Fixes SA#2000-005.
- A denial-of-service problem related to handling of IP options has been fixed. Fixes SA#2000-002.
- A problem with /etc/ftpchroot has been fixed. Fixes SA#2000-006.
- A minor problem related to locking of semaphore resources has been fixed. Fixes SA#2000-004.
- The DHCP software has been updated to ISC 2.0pl3. This also fixes SA#2000-008 -- a security problem in the dhcp client code.
- A problem with use of user-supplied data as a format string in ftpd has been fixed. Fixes SA#2000-009.
- The sparc c++rt0.o code is now compiled with -fPIC. This means that libraries with global constructors (which must link in c++rt0.o on sparc/a.out) must also be compiled -fPIC.
- Most countries can now import the full release without restriction, including the previously restricted *domestic* portion. The only ''problem spots'' are US-embargoed countries. See
  http://www.NetBSD.ORG/Misc/crypto-export.html
  for the full details.
- An extensive audit of the code (and corresponding fixes) has been done to eliminate possible buffer overruns caused by possible user-specified format strings.

In addition, many bugs have been fixed -- more than 40 problems reported through our problem tracking system have been fixed, and some other non-reported problems have also been found and fixed. See the CHANGES-1.4.3 file for the complete list.

Known caveats with 1.4.3

The following are the major known issues with NetBSD 1.4.3.

- Some of the fixes in NetBSD 1.4.3 required the introduction of a new system call, `issetugid`(2). This means that you *will* have to upgrade the kernel before installing the new user-land code.
- The more strict format checking required a minor fix to the C compiler to allow NULL format strings. Thus, you will need to update your compiler before doing a ''make build'' during a source-based upgrade.
- PCMCIA support may require manual adjustment to function properly. See **Possible** PCMCIA **issues** under **Installing the NetBSD System** for more details.

- No major changes have been made to LFS in 1.4.3, so it is still of ''beta test'' quality.
- The version of the IPF packet filtering software in NetBSD 1.4.3 must be enabled with ''ipf -E'' before filtering rules can be set. Failure to do so may result in a panic. (Enabling NAT will however auto-enable IPF.)

Major Changes Between 1.4.1 and 1.4.2

The complete list of changes between NetBSD 1.4.1 and 1.4.2 can be found in the file CHANGES-1.4.2 in the top directory of the source tree. The following are the highlights only.

- A driver for the Alteon Gigabit Ethernet cards has been added, see `ti`(4).
- A driver for the Realtek 8129/8239 Fast Ethernet PCI cards have been added, see `rl`(4).
- A driver for the DPT SmartCache and SmartRAID III or IV SCSI adapters has been added, see `dpt`(4).
- A driver for the BOCA IOAT66 6-port ISA serial adapter has been added, see `ioat`(4).
- Support for the X-surf Amiga board has been added.
- Support has been added for ext2fs revision 1, with read-only support for the ''sparse super'' and the ''filetype'' options.
- BIND has been upgraded to version 8.2.2-P5.
- The IPF packet filtering software has been updated to version 3.3.6.
- Tcpdump now does hex/ascii dumps of packet contents if asked to do so.
- An implementation of the System V user management utilities has been added.
- The name ''errno'' is now always a macro which expands to a function call. This is done to ease the integration of thread libraries with the code in both system and third-party libraries. Please include <errno.h> to access the correct definition of ''errno''.
- A utility for making temporary files for shell scripts has been added, see `mktemp`(1).
- The automounter utility `amd`(8) has been updated to fix a security problem.
- A security problem in procfs has been fixed. Procfs is not used by default in NetBSD.
- The floating point emulation on the ports using the m68k CPU has been reverted to the version in NetBSD 1.4 (the version in 1.4.1 had problems).
- Several subsystems have received substantial work, such as RAIDframe, LFS, and the package tools.

In addition, many, many bugs have been fixed -- more than 100 problems reported through our problem tracking system have been fixed, and many other non-reported problems have also been found and fixed. See the CHANGES-1.4.2 file for the complete list.

Known caveats with 1.4.2

The following are the major known issues with NetBSD 1.4.2.

- The upgrade of `ipf`(8) caused a change of the kernel API. Thus, if you are using `ipf`(8) you need to upgrade both the kernel and the user-land utilities to control that feature in order for it to work.
- As part of fixing a kernel bug, ''struct vfsnode'' needed to change size. This will unfortunately, and contrary to tradition for patch releases, cause incompatibilities for users of file system LKMs compiled for 1.4 and 1.4.1.

- Although LFS has been improved between 1.4.1 and 1.4.2, it can probably still be characterized as being of ''beta test'' quality, e.g. filling the file system still gives ''interesting'' effects. It should probably not be used to store critical data quite yet.
- The version of the IPF packet filtering software in NetBSD 1.4.2 must be enabled with ''ipf -E'' before filtering or NAT rules can be set. Failure to do so may result in a panic.

Major Changes Between 1.4 and 1.4.1

The complete list of changes between NetBSD 1.4 and 1.4.1 can be found in the file CHANGES-1.4.1 in the top directory of the source tree.

- The NetBSD/alpha port's compatibility for Digital UNIX executables has been greatly improved.
- Many bug fixes and improvements of the installation tools and utilities.
- Support for more PCI serial/parallel cards has been added.
- It is now possible to boot NetBSD/i386 on systems with 1GB of RAM.
- The floating point emulation on the ports using the m68k CPU has been upgraded.
- A fatal problem with /dev/random has been found and fixed.
- Support for Alpha 21264 ev6 based systems has been added to NetBSD/alpha.

Major Changes Between 1.3 and 1.4

The NetBSD 1.4 release is a substantial improvement over its predecessors. We have provided numerous significant functional enhancements, including support for many new devices, integration of hundreds of bug fixes, new and updated kernel subsystems, and many userland enhancements. The results of these improvements is a stable operating system fit for production use that rivals most commercially available systems.

It is impossible to completely summarize the nearly two years of development that went into the NetBSD 1.4 release. Some highlights include:

- Substantial improvements in the TCP/IP implementation, including numerous performance enhancements and bug fixes by Jason Thorpe and others.
- A new, high efficiency kernel memory pool allocator by Paul Kranenburg. This has been integrated into most kernel subsystems.
- A new, totally rewritten virtual memory subsystem, UVM, created by Chuck Cranor, which is substantially cleaner and better performing than the old Mach derived VM subsystem.
- Improved POSIX and XPG standards compliance.
- Completion of the integration of all remaining 4.4BSD Lite-2 kernel improvements and bug fixes that had not been previously integrated. (Integration of all userland components was completed before NetBSD 1.3)
- Several new ports, including macppc, bebox, sparc64, next68k, and others, have been integrated into the source tree.
- The system compilers have been upgraded to egcs 1.1.1, and the system compiler toolchain now (mostly) uses the latest versions of GNU binutils instead of the obsolete versions left over from 4.4BSD Lite.
- Everyone's favorite `ftp`(1) client has been improved even further. See the man page for details.

- A new architecture independent console driver, `wscons`(4), has been integrated into many ports.
- Numerous improvements have been made to the audio subsystem support, including support for MIDI device drivers.
- Linux compatibility support has been improved.
- A number of scheduler enhancements have yielded dramatic improvements in interactive performance and better control of background tasks.
- Several network tunneling protocols, including GRE and IP in IP, have been implemented.
- Kernel support for the CODA distributed file system has been added.
- Manuel Bouyer completed major changes to the IDE support. It is now architecture independent. Major changes have been made to the IDE code for better error handling, improved ATAPI support, 32 bit data I/O support and bus-master DMA support on PCI IDE controllers.
- Lennart Augustsson has added full USB support, permitting the use of a wide variety of Universal Serial Bus peripherals. The drivers should easily port to any future platforms that support the PCI bus. See `usb`(4) for an overview.
- RAIDframe, version 1.1, from the Parallel Data Laboratory at Carnegie Mellon University, has been integrated. Supports RAID levels 0, 1, 4, 5, and more.
- Luke Mewburn added `nsswitch.conf`(5) functionality to the system to specify the search order for system databases.
- `syslogd`(8) now supports listening on multiple sockets, to make the chrooting of servers easier.
- Most third party packages have been updated to the latest stable release.

As has been noted, there have also been innumerable bug fixes.

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.

This is the third public release of NetBSD for the HP 9000/300 series of computers.

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. In addition, Anonymous CVS access to the NetBSD source tree has been added since NetBSD 1.4.1; see

http://www.netbsd.org/Changes/#anoncvs-available

We have also added a browsable CVS repository on the web at

http://cvsweb.netbsd.org/cgi-bin/cvsweb.cgi/

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

Please refer to **http://www.netbsd.org/Sites/net.html**.

NetBSD 1.4.3 Release Contents

The root directory of the NetBSD 1.4.3 release is organized as follows:

`.../NetBSD-1.4.3/`

`BUGS` Known bugs list (somewhat incomplete and out of date).

`CHANGES` Changes since earlier NetBSD releases.

`LAST_MINUTE` Last minute changes.

`MIRRORS` A list of sites that mirror the NetBSD 1.4.3 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 1.4.3 has a binary distribution. There are also 'README.export-control' files sprinkled liberally throughout the distribution tree, which spell out the current restrictions related to export of this code from the United States of America. Note that these regulations were recently changed so that most countries can import the entire release without significant restrictions. See

http://www.NetBSD.ORG/Misc/crypto-export.html

which contains up-to-date information on this issue.

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:

secrsrc.tgz: This set contains the "domestic" sources. These sources may be subject to United States export regulations.
423K gzipped, 2M uncompressed

gnusrc.tgz: This set contains the "gnu" sources, including the source for the compiler, assembler, groff, and the other GNU utilities in the binary distribution sets.
19M gzipped, 84.3M uncompressed

syssrc.tgz: This set contains the sources to the NetBSD 1.4.3 kernel, config(8), and dbsym(8).
13.9M gzipped, 68.8M uncompressed

sharesrc.tgz: 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.
3.1M gzipped, 11.8M uncompressed

src.tgz: This set contains all of the NetBSD 1.4.3 sources which are not mentioned above.
14.5M gzipped, 67.5M uncompressed

Most of the above source sets are located in the `source/sets` subdirectory of the distribution tree. The secrsrc.tgz set is contained in the `source/security` subdirectory. This set contains the sources normally found in `/usr/src/domestic` – primarily Kerberos (version 4) and other cryptographic security related software. This code can now be exported from the US to most countries. The document on

http://www.NetBSD.ORG/Misc/crypto-export.html

spells out the current (rather lenient) restrictions applicable for the export of this code.

The source sets are distributed as compressed tar files. They may be unpacked into `/usr/src` with the command:

```
cat set_name.tgz | gunzip | (cd /; tar xpf - )
```

The `sets/Split/` and `security/Split/` subdirectories contain split versions of the source sets for those users who need to load the source sets from floppy or otherwise need a split distribution. The split sets are are named "set_name.xx" where "set_name" is the distribution set name, and "xx" is the sequence number of the file, starting with "aa" for the first file in the distribution set, then "ab" for the next, and so on. All of these files except the last one of each set should be exactly 240,640 bytes long. (The last file is just long enough to contain the remainder of the data for that distribution set.)

The split distributions may be reassembled and extracted with **cat** as follows:

```
cat set_name.?? | gunzip | (cd /; tar xpf - )
```

In each of the source distribution set directories, there is a file named `CKSUMS` which contains the checksums of the files in that directory, as generated by the `cksum`(1) utility. You can use cksum to check the integrity of the archives, if you suspect that one of the files is corrupt and have access to a cksum binary. Checksums based on other algorithms may also be present – see the `release`(7) man page for details.

NetBSD/hp300 Subdirectory Structure

The hp300-specific portion of the NetBSD 1.4.3 release is found in the `hp300` subdirectory of the distribution: `.../NetBSD-1.4.3/hp300/`

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

`binary/`
- `sets/` hp300 binary distribution sets; see below.
- `security/` hp300 security distribution; see below.

`installation/`
- `miniroot/` hp300 miniroot images; see below.
- `misc/` Miscellaneous hp300 installation helper utilities; see installation section below.

Binary Distribution Sets

The NetBSD hp300 binary distribution sets contain the binaries which comprise the NetBSD 1.4.3 release for the hp300. There are eight binary distribution sets and the *security* distribution set. The binary distribution sets can be found in the `hp300/binary/sets` subdirectory of the NetBSD 1.4.3 distribution tree, and are as follows:

base The NetBSD 1.4.3 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.
10.7M gzipped, 29.7M 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.
8.2M gzipped, 28M 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. (If you are upgrading, it's recommended that you get a copy of this set and *carefully* upgrade your configuration files by hand.)
59K gzipped, 370K uncompressed

games This set includes the games and their manual pages.
2.8M gzipped, 7M uncompressed

kern This set contains a NetBSD/hp300 1.4.3 GENERIC kernel, named `/netbsd`. You *must* install this distribution set.
563k gzipped, 1.2M 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.
4.2M gzipped, 16.6M uncompressed

misc This set includes the (rather large) system dictionaries, the typesettable document set, and other files from `/usr/share`.
2.2M gzipped, 8.3M uncompressed

text This set includes NetBSD's text processing tools, including `groff`(1), all related programs, and their manual pages.
1.3M gzipped, 4.5M uncompressed

The hp300 security distribution set is named **secr** and can be found in the

`hp300/binary/security`

subdirectory of the NetBSD 1.4.3 distribution tree. It contains security-related binaries which depend on cryptographic source code. You do not need this distribution set to use encrypted passwords in your password file; the **base** distribution includes a crypt library which can perform only the one-way encryption function. The security distribution includes a version of the Kerberos IV network security system, and a Kerberized version of `telnet`(1) program. The **secr** distribution set can be found only on those sites which carry the complete NetBSD distribution and which can legally obtain it. Because of United States law, it may not be legal to distribute this set to locations outside of the United States and Canada. See

http://www.NetBSD.ORG/Misc/crypto-export.html

for updated information on this issue.

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 3.3.6. Binary sets for the X Window system are distributed with NetBSD. Unfortunately there is no R6.3 Xserver for NetBSD/hp300 yet, so we can only distribute the X clients this time. The sets are:

xbase The basic files needed for a complete X client environment. This does not include the X servers.
2.5M gzipped, 7.6M uncompressed

xcomp The extra libraries and include files needed to compile X source code.
1.7M gzipped, 7.1M uncompressed

xcontrib Programs that were contributed to X.
183k gzipped, 686k uncompressed

xfont Fonts needed by X.

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 files are /-relative and therefore are extracted *below* the current directory. That is, if you want to extract the binaries into your system, i.e. replace the system binaries with them, you have to run the **`tar xfp`** command from /.

The following are included in the `hp300/installation` directory:

`miniroot/`

miniroot.fs.gz	A copy of the miniroot filesystem.

`misc/`

`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.
`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.
`rbootd.tgz`	Source code for the rbootd program included with NetBSD. It requires that the server has a Berkeley Packet Filter (bpf). You will need to compile this version of rbootd if server system does not have this utility already.

The following are included in the `hp300/binary/kernel` directory:

`netbsd.gdb.gz`	A gzipped GENERIC kernel with debugging symbols.
`netbsd.gz`	A gzipped GENERIC kernel.

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

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

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

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

All SYSVSUM files are historic AT&T 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 System Requirements and Supported Devices

NetBSD/hp300 1.4.3 will run on most HP 9000/300- and 400-series machines. The smallest amount of RAM that has been tested is 4M. If you wish to run X, more RAM is recommended.

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

```
partition:     advise          needed
root (/)       25M             15M
user (/usr)    150M           100M
swap           (2 or 3 * RAM)   6M     (see note below)
Anything else is up to you!
```

Note: The hp300 installation procedure uses a 'miniroot' filesystem which is placed into the swap area of the disk. The swap partition must be large enough to hold this miniroot image.

The following HP hardware is supported:

CPUs:

- 68020-based: 318, 319, 320, 330, and 350.
- 68030-based: 340, 345, 360, 370, 375, and 400(*).
- 68040-based: 380, 425(*), and 433(*).

Disks:

- HP-IB/CS80: 7912, 7914, 7933, 7936, 7937, 7945, 7957, 7958, 7959, 2200, and 2203.
- SCSI-I(**), including magneto-optical and CD-ROM.

Tape drives:

- Low-density HP-IB/CS80 cartridge: 7914, 7946, and 9144.
- High-density HP-IB/CS80 cartridge: 9145.
- HP-IB/CS80 1/2": 7974A, 7978A/B, 7979A, 7980A, and 7980XC.
- SCSI: HP DAT, Exabyte, and SCSI QIC drives such as the Archive Viper.

RS232 interfaces:

- 98644 built-in single port (dca).
- 98642 4-port (dcm).
- 98638 8-port (dcm).

Network interfaces:

- 98643 built-in and add-on LAN cards.

Displays:

- 98544, 98545, and 98547 color and monochrome Topcat.
- 98548, 98549, and 98550 color and monochrome Catseye.

- 98700 and 98710 Gatorbox.
- 98720 and 98721 Renaissance.
- 98730 and 98731 DaVinci.
- A1096A monochrome Hyperion.

Input devices:

- General interface supporting all HIL devices: keyboard, 2 and 3 button mice(***), and ID module.

Miscellaneous:

- Battery-backed real-time clock.
- 98624 built-in HP-IB interface.
- 98625A and 98625B 'fast' HP-IB interface.
- 98658A built-in and add-on SCSI interface.
- Printers and plotters on RS232 and HP-IB.
- SCSI autochanger.

(*) 400-series machines configured for Domain/OS are not fully supported, notably, the keyboard doesn't work and the ROMs must be in 'HP-UX mode'.

(**) SCSI-II drives are known to work, though this may require changing a jumper on some drives. See your disk's documentation for details.

(***) Serial mice connected to a 'HIL to quad' converter are also known to work.

If it's not on this list, there is no official support for it in this release.

Getting the NetBSD System on to Useful Media

Installation is supported from several media types, including:

- Tape
- CD-ROM
- NFS
- FTP

The steps necessary to prepare the distribution sets for installation depend on which method of installation you choose. The various methods are explained below.

To prepare for installing via a tape:

If you wish to load SYS_INST from tape, it must appear on the tape before any other files. To copy this onto tape, use a command like the following:

```
dd if=SYS_INST of=<tape_device> obs=20b conv=osync
```

Note that not all HP BOOTROMs support booting from SCSI tapes.

Copying the miniroot to disk from tape is not currently supported. However, it is planned for a future release.

If you wish to extract binary sets onto your disk from tape, you must first place them on the tape. The easiest way to do this is with the dd(1) command. Make sure you use a 'no-rewind-on-close' tape device. For example:

```
for file in base.tgz etc.tgz; do
        dd if=${file} of=/dev/nrst0
done
```

Note that depending on your tape drive, you may need to explicitly set the EOF marker at the end of each file. It may also be necessary to use the 'conv=osync' argument to dd(1). Note that this argument is incom-

patible with the 'bs=' argument. Consult the tape-related manual pages on the system where the tapes are created for more details.

To prepare for installing via NFS:

SYS_INST currently requires an NFS server from which to copy the miniroot.

- This filesystem must be exported with root permissions, but may be exported read-only.
- The miniroot image _must_ reside in the 'root' of the mounted filesystem. For example, if the client system mounts 'server:/u', then the miniroot image must reside in /u on the server. This is due to limitations in the file lookup code used in SYS_INST, and may be fixed in a future release.
- If you also wish to install the binary sets from the NFS server, place them in a properly exported filesystem on the server. Note that these files do not suffer from the same placement restrictions as the miniroot.

To prepare for installing via FTP:

It is possible, using the 'install' and 'upgrade' programs in the miniroot, to extract the binary sets directly onto disk from an FTP server. This is by far the easiest installation method, as you may specify to have all sets extracted at once, providing that they are located in the same directory on the server.

All that is required in this case is that you have network access to an FTP server. This may be your account on another system, or may even be ftp.NetBSD.ORG itself. If you wish to use ftp.NetBSD.ORG as your FTP file server, you may want to keep the following information handy:

IP Address: ftp.NetBSD.ORG Login: anonymous Password: <your e-mail address> Server path: /pub/NetBSD/NetBSD-_VER/hp300/binary/sets
Note: if you're not using a nameserver during installation, you might find 204.152.184.75 handy; it's the IP address of ftp.NetBSD.ORG as of December, 29, 1997.

Preparing your System for NetBSD Installation

Currently, only installing the miniroot from the network is supported. This may change in a future release.

You will need information about your disk's geometry, based on 512-byte sectors. You must have this information before proceeding. The file '.../installation/misc/HP-IB.geometry' has geometry inforomation 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.

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 'a' partition one cylinder from the beginning of the disk. Later, the 'c' partition will be marked with the type 'FS_BOOT' and may not be used for a filesystem. (For those unfamiliar with historic BSD partition conventions, the 'c' partition is defined as 'the entire disk', or the 'raw partition'.)

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) + slave
```

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 numers might be something like the following:

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

Miniroot installation via network

Note: Booting sys_inst via the network on early hp300 models *is only possible if your bootrom is* rev. c *or later.* When checking the revision of your BOOTROM, use what it printed on the console during the self-test, not what may be printed on a sticker on the chip itself.

In order to complete this process, you will need the following from the `.../installation/misc` directory of the distribution:

SYS_INST.gz The standalone disklabel and miniroot installation tool. This file must be un-gzipped before using.

And you will need the following from the `.../installation/miniroot` directory of of the distribution:

miniroot.fs.gz A miniroot filesystem image.

To boot SYS_INST via the network, you will need a system capable of handling boot requests for an HP workstation. If you will use this method, see the special note below.

To boot SYS_INST from tape, you need only place SYS_INST on the tape as the first file.

Loading SYS_INST via the network xxxxxxx

If you wish to load the SYS_INST program via the network, you may need the following from the '.../installation/misc' directory in addition to the items listed above:

`rbootd.tgz` Source code for the rbootd program included with NetBSD. It requires that the server has a Berkeley Packet Filter (bpf). You will need to compile this version of rbootd if your server system does not have this utility already.

First of all, configure your rbootd to handle boot requests from the client. NOTE: NetBSD's 'rbootd' is slightly different from HP-UX's. To configure NetBSD's 'rbootd', create a file called '/etc/rbootd.conf' and place in it an entry like the following:

```
08:00:09:04:AA:33 SYS_INST # thunder-egg
```

The first column is the ethernet address of the client's network interface. The second column is the program to send to the client, and anything after the '#' is a comment. Once you have rbootd running, copy the SYS_INST program to the /usr/mdec/rbootd directory on your server. If this directory doesn't exist already, you will need to create it.

For information on configuring rbootd under HP-UX, see the rbootd(1M) manual page on your server system.

Once 'rbootd' is configured and running, you will be ready to continue.

Make sure that the miniroot filesystem image has been un-gzipped, and that it resides in a filesystem what is exported to the client. See the manual pages on your server system if you need more information about exporting filesystems.

You are now ready to SYS_INST. During the client's self-test cycle, press the space bar a few times. Shortly, you should see a menu of possible boot options appear. Select the option corresponding to SYS_INST. SYS_INST will load and prompt you for a command.

If this is a new NetBSD installation, 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 allocate at least 6M for the 'b' partition, or else the miniroot will not fit. 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.

The next step is to copy the miniroot image onto the target disk.

```
sys_inst> miniroot
```

You will be prompted for the target disk and the source of the miniroot filesytem image.

Enter the filename of the miniroot image. Note that this file *must* reside in the server directory being mounted. Next you will be asked for the client's IP address, netmask, and default router, the server's IP address, and the directory on the server to mount. Once you have entered this information, SYS_INST will attempt to mount the NFS server and begin copying the miniroot filesystem to the 'b' partition of the target disk.

Is is worth noting that this copy may take a while. It might be worth grabbing a cup of coffee at this point.

Once the miniroot filesystem image has been copied onto the target disk, you may boot from the miniroot filesystem.

```
sys_inst> boot
```

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

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. Additional improvements are planned for future releases.

The miniroot's install program will:

- 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 filesystem parameters. If you're unsure what the 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.

If the disk is the boot disk, you _must_ offset the root partition ('a') one cylinder, as the hp300 boot code if large enough to spill past the label area. In this case, the 'c' partition must be fstype 'boot'.

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)
```

- Create filesystems on target partitions.
- 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.
- Mount target filesystems. You will be given the opportunity to manually edit the resulting `/etc/fstab`.
- Extract binary sets from the media of your choice.
- Copy configuration information gathered during the installation process to your root filesystem.
- Make device nodes in your root filesystem.
- Copy a new kernel onto your root partition.
- Install a new boot block.
- Check your filesystems 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 propperly configured state, with the most important ones described below.

1. Configuring `/etc/rc.conf`

   If you haven't done any configuration of `/etc/rc.conf`, 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 filesystem mounted read-write. When the system asks you to choose a shell, simply hit return to get to a prompt. If you are asked for a terminal type, respond with **`vt220`** (or whatever is ap-

propriate for your terminal type) and hit return. At this point, you need to configure at least one file in the `/etc` directory. 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. If your `/usr` directory is on a separate partition and you do not know how to use 'ed' or 'ex', you will have to mount your `/usr` partition to gain access to 'vi'. Do the following:

```
mount /usr
export TERM=vt220
```

If you have `/var` on a seperate 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 interface <int>, along the lines of

```
ifconfig_de0="inet 123.45.67.89 netmask 255.255.255.0"
```

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

```
ifconfig_de0="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.

Other files in `/etc` that are new to NetBSD 1.4 and 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. There is no initial password, but 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.

3. Adding accounts

   Use the `vipw`(8) command to add accounts to your system, *do not* edit `/etc/passwd` directly. See `adduser`(8) for more information on the process of how to add a new user to the system.

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.

   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 3rd party packages

   There is a lot of software freely available for Unix-based systems, almost all of which can run on NetBSD. Modifications are usually needed to when transferring programs between different Unix-like systems, so the NetBSD packages collection incorporates any such changes necessary to make that software run on NetBSD, and makes the installation (and deinstallation) of the software packages easy. There's also the option of building a package from source, in case there's no precompiled binary available.

   Precompiled binaries can be found at

   ftp://ftp.netbsd.org/pub/NetBSD/packages/

   Package sources for compiling packages 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), as with the com-

mand:

```
cat pkgsrc.tar.gz | gunzip | (mkdir /usr/pkgsrc;
cd /usr/pkgsrc; tar xpf - )
```

After extracting, then see the README file in the extraction directory (e.g. /usr/pkgsrc/README) for more information.

6. Misc

   - To adjust the system to your local timezone, point the /etc/localtime symlink to the appropriate file under /usr/share/zoneinfo.
   - Edit /etc/aliases to forward root mail to the right place (run newaliases(1) afterwards.)
   - The /etc/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.
   - 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 *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. 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. The upgrade program will:

- Enable the network based on your system's current network configuration.
- Mount your existing filesystems.
- Extract binary sets from the media of your choice.
- Fixup your system's existing /etc/fstab, changing the occurrences of 'ufs' to 'ffs' and let you edit the resulting file.
- Make new device nodes in your root filesystem.
- 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 _VER executables.
- Install a new boot block.
- Check your filesystems for integrity.

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:

- Place _at least_ the 'base' binary set in a filesystem accessible to the target machine. A local filesystem is preferred, since the NFS subsystem in the NetBSD _VER kernel may be incompatible with your old binaries.
- Back up your pre-existing kernel and copy the _VER kernel into your root partition.
- Reboot with the _VER kernel into single-user mode.
- Check all filesystems:
  ```
  /sbin/fsck -pf
  ```

- Mount all local filesystems:
  `/sbin/mount -a -t nonfs`
- If you keep /usr or /usr/share on an NFS server, you will want to mount those filesystems as well. To do this, you will need to enable the network:
  `sh /etc/netstart`
- Run the update(8) daemon, to ensure that new programs are actually stored on disk.
  `update`
- Make sure you are in the root filesystem and extract the 'base' binary set:

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

- Install a new boot block:
  `cd /usr/mdec`
  `disklabel -B` *root disk (e.g. sd0)*
- Sync the filesystems:
  `sync`
- At this point you may extract any other binary sets you may have placed on local filesystems, 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 1.4.3

Note Only issues effecting an upgrade from NetBSD 1.3 or NetBSD 1.3.x are decribed here.

- "machine" directory/link in "/usr/include"

  Description
  Some architecture may fail to install the **`comp`** set because the
  `/usr/include/machine`
  directory changed to a symbolic link in NetBSD 1.4.

  Fix If this happens, you can use the command
  `# rm -r /usr/include/machine`
  to remove the old directory and it contents and reinstall the **`comp`** set.

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)m 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. 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 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.

Thanks go to

- The former members of UCB's Computer Systems Research Group, including (but not limited to):

  Keith Bostic
  Ralph Campbell
  Mike Karels
  Marshall Kirk McKusick

  for their ongoing work on BSD systems, support, and encouragement.

- Also, our thanks go to:

  Mike Hibler
  Rick Macklem
  Jan-Simon Pendry
  Chris Torek

for answering lots of questions, fixing bugs, and doing the various work they've done.

- UC Berkeley's Experimental Computing Facility provided a home for sun-lamp in the past, people to look after it, and a sense of humor. Rob Robertson, too, has added his unique sense of humor to things, and for a long time provided the primary FTP site for NetBSD.
- Vixie Enterprises for hosting the NetBSD FTP, WWW and SUP server.
- Redback Networks, Inc. for hosting the NetBSD Mail server.
- 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.
- Dave Burgess `burgess@cynjut.infonet.net` has been maintaining the 386BSD/NetBSD/FreeBSD FAQ for quite some time, and deserves to be recognized for it.
- The following individuals and organiztions (each in alphabetical order) have made donations or loans of hardware and/or money, to support NetBSD development, and deserve credit for it:

  Steve Allen
  Jason Birnschein
  Mason Loring Bliss
  Jason Brazile
  Mark Brinicombe
  David Brownlee
  Simon Burge
  Dave Burgess
  Ralph Campbell
  Brian Carlstrom
  James Chacon
  Bill Coldwell
  Charles Conn
  Tom Coulter
  Charles D. Cranor
  Christopher G. Demetriou
  Scott Ellis
  Hubert Feyrer
  Castor Fu
  Greg Gingerich
  William Gnadt
  Michael Graff
  Guenther Grau
  Ross Harvey
  Charles M. Hannum
  Michael L. Hitch
  Kenneth Alan Hornstein
  Jordan K. Hubbard
  Soren Jorvang
  Scott Kaplan
  Noah M. Keiserman
  John Kohl
  Chris Legrow
  Ted Lemon
  Neil J. McRae
  Perry E. Metzger

Herb Peyerl
Mike Price
Dave Rand
Michael Richardson
Heiko W. Rupp
Brad Salai
Chuck Silvers
Thor Lancelot Simon
Bill Sommerfeld
Paul Southworth
Ted Spradley
Kimmo Suominen
Jason R. Thorpe
Steve Wadlow
Krister Walfridsson
Jim Wise
Christos Zoulas

AboveNet Communications, Inc.
Advanced System Products, Inc.
Avalon Computer Systems
Bay Area Internet Solutions
Brains Corporation, Japan
Canada Connect Corporation
Co-operative Research Centre for Enterprise Distributed Systems Technology
Demon Internet, UK
Digital Equipment Corporation
Easynet, UK
Free Hardware Foundation
Innovation Development Enterprises of America
Internet Software Consortium
MS Macro System GmbH, Germany
Numerical Aerospace Simulation Facility, NASA Ames Research Center
Piermont Information Systems Inc.
VMC Harald Frank, Germany
Warped Communications, Inc.

(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!)

We are...

(in alphabetical order)

The NetBSD core group:

Alistair Crooks	agc@NetBSD.ORG
Jun-ichiro itojun Hagino	itojun@NetBSD.ORG
Frank van der Linden	fvdl@NetBSD.ORG
Luke Mewburn	lukem@NetBSD.ORG
Christos Zoulas	christos@NetBSD.ORG

The portmasters (and their ports):

Mark Brinicombe	mark@NetBSD.ORG	**arm32**
Jeremy Cooper	jeremy@NetBSD.ORG	**sun3x**
Ross Harvey	ross@NetBSD.ORG	**alpha**
Ignatios Souvatzis	is@NetBSD.ORG	**amiga**
Jun-ichiro itojun Hagino	itojun@NetBSD.ORG	**sh3**
Eduardo Horvath	eeh@NetBSD.ORG	**sparc64**
Paul Kranenburg	pk@NetBSD.ORG	**sparc**
Anders Magnusson	ragge@NetBSD.ORG	**vax**
Tsubai Masanari	tsubai@NetBSD.ORG	**macppc**
Tsubai Masanari	tsubai@NetBSD.ORG	**newsmips**
Minoura Makoto	minoura@NetBSD.ORG	**x68k**
Phil Nelson	phil@NetBSD.ORG	**pc532**
Scott Reynolds	scottr@NetBSD.ORG	**mac68k**
Darrin Jewell	dbj@NetBSD.ORG	**next68k**
Kazuki Sakamoto	sakamoto@NetBSD.ORG	**bebox**
Wolfgang Solfrank	ws@NetBSD.ORG	**ofppc**
Jonathan Stone	jonathan@NetBSD.ORG	**pmax**
Shin Takemura	takemura@NetBSD.ORG	**hpcmips**
Jason Thorpe	thorpej@NetBSD.ORG	**hp300**
Frank van der Linden	fvdl@NetBSD.ORG	**i386**
Leo Weppelman	leo@NetBSD.ORG	**atari**
Nathan Williams	nathanw@NetBSD.ORG	**sun3**
Steve Woodford	scw@NetBSD.ORG	**mvme68k**

The NetBSD 1.4.3 Release Engineering team:

Chris G. Demetriou	cgd@NetBSD.ORG
Havard Eidnes	he@NetBSD.ORG
Ted Lemon	mellon@NetBSD.ORG
Perry Metzger	perry@NetBSD.ORG
Curt Sampson	cjs@NetBSD.ORG

Developers and other contributors:

Steve Allen	wormey@NetBSD.ORG
Julian Assange	proff@NetBSD.ORG
Lennart Augustsson	augustss@NetBSD.ORG
Christoph Badura	bad@NetBSD.ORG
Robert V. Baron	rvb@NetBSD.ORG
Erik Berls	cyber@NetBSD.ORG
John Birrell	jb@NetBSD.ORG
Mason Loring Bliss	mason@NetBSD.ORG
Manuel Bouyer	bouyer@NetBSD.ORG
John Brezak	brezak@NetBSD.ORG
Allen Briggs	briggs@NetBSD.ORG
Aaron Brown	abrown@NetBSD.ORG
David Brownlee	abs@NetBSD.ORG
Frederick Bruckman	fredb@NetBSD.ORG
Jon Buller	jonb@NetBSD.ORG
Simon Burge	simonb@NetBSD.ORG
Dave Burgess	burgess@cynjut.infonet.net
Robert Byrnes	byrnes@NetBSD.org
D'Arcy J.M. Cain	darcy@NetBSD.ORG
Dave Carrel	carrel@NetBSD.ORG
Bill Coldwell	billc@NetBSD.ORG
Julian Coleman	jdc@NetBSD.ORG
Chuck Cranor	chuck@NetBSD.ORG
Aidan Cully	aidan@NetBSD.ORG
Johan Danielsson	joda@NetBSD.ORG
Matt DeBergalis	deberg@NetBSD.ORG
Rob Deker	deker@NetBSD.ORG
Chris G. Demetriou	cgd@NetBSD.ORG
Jaromir Dolecek	jdolecek@NetBSD.ORG
Andy Doran	ad@NetBSD.ORG
Roland Dowdeswell	elric@NetBSD.ORG
Matthias Drochner	drochner@NetBSD.ORG
Jun Ebihara	jun@NetBSD.ORG
Havard Eidnes	he@NetBSD.ORG
Enami Tsugutomo	enami@NetBSD.ORG
Bernd Ernesti	veego@NetBSD.ORG
Erik Fair	fair@NetBSD.ORG
Hubert Feyrer	hubertf@NetBSD.ORG
Thorsten Frueauf	frueauf@NetBSD.ORG
Castor Fu	castor@NetBSD.ORG
Ichiro Fukuhara	ichiro@NetBSD.ORG
Brian R. Gaeke	brg@dgate.org
Thomas Gerner	thomas@NetBSD.ORG
Simon J. Gerraty	sjg@NetBSD.ORG
Justin Gibbs	gibbs@NetBSD.ORG
Adam Glass	glass@NetBSD.ORG
Michael Graff	explorer@NetBSD.ORG

Brian C. Grayson	bgrayson@NetBSD.ORG
Brad Grantham	grantham@tenon.com
Matthew Green	mrg@NetBSD.ORG
Juergen Hannken-Illjes	hannken@NetBSD.ORG
Charles M. Hannum	mycroft@NetBSD.ORG
Eric Haszlakiewicz	erh@NetBSD.ORG
HAYAKAWA Koichi	haya@NetBSD.ORG
Rene Hexel	rh@NetBSD.ORG
Michael L. Hitch	mhitch@NetBSD.ORG
Christian E. Hopps	chopps@NetBSD.ORG
Ken Hornstein	kenh@NetBSD.ORG
Marc Horowitz	marc@NetBSD.ORG
Dean Huxley	dean@netbsd.org
ITOH Yasufumi	itohy@NetBSD.ORG
IWAMOTO Toshihiro	toshii@NetBSD.ORG
Matthew Jacob	mjacob@NetBSD.ORG
Lonhyn T. Jasinskyj	lonhyn@NetBSD.ORG
Chris Jones	cjones@NetBSD.ORG
Soren Jorvang	soren@NetBSD.ORG
Takahiro Kambe	taca@NetBSD.ORG
Antti Kantee	pooka@NetBSD.ORG
Lawrence Kesteloot	kesteloo@cs.unc.edu
Thomas Klausner	wiz@NetBSD.ORG
Klaus Klein	kleink@NetBSD.ORG
John Kohl	jtk@NetBSD.ORG
Kevin Lahey	kml@NetBSD.ORG
Johnny C. Lam	jlam@NetBSD.ORG
Martin J. Laubach	mjl@NetBSD.ORG
Ted Lemon	mellon@NetBSD.ORG
Joel Lindholm	joel@NetBSD.ORG
Mike Long	mikel@NetBSD.ORG
Warner Losh	imp@NetBSD.ORG
Brett Lymn	blymn@NetBSD.ORG
Paul Mackerras	paulus@NetBSD.ORG
Dan McMahill	dmcmahill@NetBSD.ORG
Neil J. McRae	neil@NetBSD.ORG
Perry Metzger	perry@NetBSD.ORG
der Mouse	mouse@NetBSD.ORG
Joseph Myers	jsm@NetBSD.ORG
Ken Nakata	kenn@NetBSD.ORG
Bob Nestor	rnestor@NetBSD.ORG
Tohru Nishimura	nisimura@NetBSD.ORG
Masaru Oki	oki@NetBSD.ORG
Greg Oster	oster@NetBSD.ORG
Herb Peyerl	hpeyerl@NetBSD.ORG
Matthias Pfaller	matthias@NetBSD.ORG
Dante Profeta	dante@NetBSD.ORG
Chris Provenzano	proven@NetBSD.ORG
Waldi Ravens	waldi@moacs.indiv.nl.net

Darren Reed	darrenr@NetBSD.ORG
Michael Richardson	mcr@NetBSD.ORG
Tim Rightnour	garbled@NetBSD.ORG
Gordon Ross	gwr@NetBSD.ORG
Heiko W. Rupp	hwr@NetBSD.ORG
SAITOH Masanobu	msaitoh@NetBSD.ORG
Curt Sampson	cjs@NetBSD.ORG
Wilfredo Sanchez	wsanchez@NetBSD.ORG
Ty Sarna	tsarna@NetBSD.ORG
SATO Kazumi	sato@NetBSD.ORG
Matthias Scheler	tron@NetBSD.ORG
Karl Schilke (rAT)	rat@NetBSD.ORG
Konrad Schroder	perseant@NetBSD.ORG
Tim Shepard	shep@NetBSD.ORG
Takao Shinohara	shin@NetBSD.ORG
Takuya SHIOZAKI	tshiozak@NetBSD.ORG
Chuck Silvers	chs@NetBSD.ORG
Thor Lancelot Simon	tls@NetBSD.ORG
Noriyuki Soda	soda@NetBSD.ORG
Bill Sommerfeld	sommerfeld@NetBSD.ORG
Bill Studenmund	wrstuden@NetBSD.ORG
Kevin Sullivan	sullivan@NetBSD.ORG
SUNAGAWA Keiki	kei@NetBSD.ORG
Kimmo Suominen	kim@NetBSD.ORG
Matt Thomas	matt@NetBSD.ORG
Christoph Toshok	toshok@NetBSD.ORG
Izumi Tsutsui	tsutsui@NetBSD.ORG
UCHIYAMA Yasushi	uch@NetBSD.ORG
Todd Vierling	tv@NetBSD.ORG
Aymeric Vincent	aymeric@NetBSD.ORG
Paul Vixie	vixie@NetBSD.ORG
Krister Walfridsson	kristerw@NetBSD.ORG
Lex Wennmacher	wennmach@NetBSD.ORG
Assar Westerlund	assar@NetBSD.ORG
Rob Windsor	windsor@NetBSD.ORG
Dan Winship	danw@NetBSD.ORG
Jim Wise	jwise@NetBSD.ORG
Colin Wood	ender@NetBSD.ORG

Legal Mumbo-Jumbo

The following notices are required to satisfy the license terms of the software that we have mentioned in this document:

This product includes software developed by the University of California, Berkeley and its contributors.

This product includes software developed by the Computer Systems Engineering Group at Lawrence Berkeley Laboratory.

This product includes software developed by the NetBSD Foundation, Inc. and its contributors.

This product includes software developed by Adam Glass and Charles Hannum.

This product includes software developed by Adam Glass.

This product includes software developed by Berkeley Software Design, Inc.

This product includes software developed by Charles D. Cranor and Washington University.

This product includes software developed by Charles D. Cranor.

This product includes software developed by Charles Hannum, by the University of Vermont and State Agricultural College and Garrett A. Wollman, by William F. Jolitz, and by the University of California, Berkeley, Lawrence Berkeley Laboratory, and its contributors.

This product includes software developed by Charles Hannum.

This product includes software developed by Charles M. Hannum.

This product includes software developed by Chris Provenzano.

This product includes software developed by Christian E. Hopps.

This product includes software developed by Christopher G. Demetriou for the NetBSD Project.

This product includes software developed by Christopher G. Demetriou.

This product includes software developed by Christos Zoulas.

This product includes software developed by David Jones and Gordon Ross.

This product includes software developed by Dean Huxley.

This product includes software developed by Eric S. Hvozda.

This product includes software developed by Ezra Story.

This product includes software developed by Gordon Ross.

This product includes software developed by Gordon W. Ross and Leo Weppelman.

This product includes software developed by Gordon W. Ross.

This product includes software developed by Herb Peyerl.

This product includes software developed by Ian W. Dall.

This product includes software developed by Ignatios Souvatzis for the NetBSD Project.

This product includes software developed by Jason R. Thorpe for And Communications, http://www.and.com/.

This product includes software developed by Joachim Koenig-Baltes.

This product includes software developed by Jochen Pohl for The NetBSD Project.

This product includes software developed by John Polstra.

This product includes software developed by Jonathan Stone and Jason R. Thorpe for the NetBSD Project.

This product includes software developed by Jonathan Stone for the NetBSD Project.

This product includes software developed by Jonathan Stone.

This product includes software developed by Julian Highfield.

This product includes software developed by Kenneth Stailey.

This product includes software developed by Leo Weppelman.

This product includes software developed by Lloyd Parkes.

This product includes software developed by Mark Brinicombe.

This product includes software developed by Markus Wild.

This product includes software developed by Martin Husemann and Wolfgang Solfrank.

This product includes software developed by Mats O Jansson and Charles D. Cranor.

This product includes software developed by Mats O Jansson.

This product includes software developed by Matthias Pfaller.

This product includes software developed by Paul Kranenburg.

This product includes software developed by Paul Mackerras.

This product includes software developed by Peter Galbavy.

This product includes software developed by Philip A. Nelson.

This product includes software developed by Rodney W. Grimes.

This product includes software developed by Scott Bartram.

This product includes software developed by SigmaSoft, Th. Lockert.

This product includes software developed by Terrence R. Lambert.

This product includes software developed by Theo de Raadt and John Brezak.

This product includes software developed by Theo de Raadt.

This product includes software developed by TooLs GmbH.

This product includes software developed by Winning Strategies, Inc.

This product includes software developed by the Center for Software Science at the University of Utah.

This product includes software developed by the University of Calgary Department of Computer Science and its contributors.

This product includes software developed by the University of Vermont and State Agricultural College and Garrett A. Wollman.

This product includes software developed for the FreeBSD project.

This product includes software developed for the Internet Software Consortium by Ted Lemon.

This product includes software developed for the NetBSD Project by Frank van der Linden.

This product includes software developed for the NetBSD Project by Jason R. Thorpe.

This product includes software developed for the NetBSD Project by John M. Vinopal.

This product includes software developed for the NetBSD Project by Matthias Drochner.

This product includes software developed for the NetBSD Project by Matthieu Herrb.

This product includes software developed for the NetBSD Project by Perry E. Metzger.

This product includes software developed for the NetBSD Project by Piermont Information Systems Inc.

This product includes software developed for the NetBSD Project by Ted Lemon.

This product includes software developed by LAN Media Corporation and its contributors.

This product includes software developed by Michael Graff for the NetBSD Project.

This product includes software developed by Niklas Hallqvist, C Stone and Job de Haas.

This product includes software developed by the Computer Systems Laboratory at the University of Utah.

This product includes software developed at Ludd, University of Lule}, Sweden and its contributors.

This product includes software developed by Gordon W. Ross.