NAME

INSTALL – Installation procedure for NetBSD/pmax.

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DESCRIPTION

About this Document

This document describes the installation procedure for NetBSD 1.6.2 on the *pmax* 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.

Dedication

The NetBSD Foundation would like to dedicate the NetBSD 1.6.2 release to the memory of Erik Reid, who went missing and is presumed dead in a sailing accident on 18 February 2004. Erik's contributions to NetBSD included work on support for SGI MIPS R4000, integrating XFree86 Direct Rendering Interface (DRI), and managing the build lab. His death came as a shock, and he will be greatly missed by all of us. May he rest in peace.

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 three different system architectures (ports), featuring seventeen machine architectures across eleven distinct CPU families, and is being ported to more. The NetBSD 1.6.2 release contains complete binary releases for thirty eight different system architectures. (The fifteen remaining 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.

Upgrade path to NetBSD 1.6.2

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 1.6.2.

NetBSD 1.6.2 is an upgrade of NetBSD 1.6.1 and earlier major and patch releases of NetBSD.

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 1.6 was started are designated by version identifiers such as 1.6A, 1.6B, etc. These identifiers do not designate releases, but indicate major changes in internal kernel APIs. Note that the kernel from NetBSD 1.6 can *not* be used to upgrade a system running one of those intermediate development versions. Trying to use the NetBSD 1.6 kernel on such a system *will* probably 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 1.6 to determine if a given feature is present or absent in 1.6. The development of 1.6 and the subsequent ''point'' releases is done on a separate branch in the CVS repository. The branch was created when the release cycle for 1.6 was started, and during the release cycle of 1.6 and its patch releases selected fixes and enhancements have been imported from the main development trunk.

Changes Between The NetBSD 1.6.1 and 1.6.2 Releases

The NetBSD 1.6.2 release provides numerous significant functional enhancements, including support for many new devices, integration of hundreds of bug fixes, patches and updates to 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 over nine months of development that went into the NetBSD 1.6.2 release. Some highlights include:

Kernel

- With `pciide`(4), make Promise controllers do DMA with large disks requiring 48-bit LBA drives.
- Add error detection when running low on swap, to improve stability in low-memory situations.
- Support for more SiS controllers were added to `pciide`(4).
- Support for the new PowerBook G4 12-inch added.
- `mlx`(4) stability improved.

- Support for ICH5 added to `pciide`(4).
- A long-standing stability problem with the original Sun4c sparc systems (SS1, SS1+, and IPC) has been found and fixed. Some optimizations done for these systems as well.
- Sun3, Sun3x, and Sun2 may now boot from tape files, through addition of seek support for tape files.
- The USERCONF option has been added to the i386 kernels; see `userconf`(4) for more information.
- Hardware random number generator support for Intel 865 and 875P chipsets added.
- Fix `wdc`(4) to work with pre-ATA drives.
- Shared libraries and other files mapped executable now count as TEXT pages for vm-usage purposes. This should allow for more appropriate handling of these pages compared to other normal file buffer pages.
- General support for multi-function pcmcia cards has been fixed.
- Various fixes to linux emulation have been added.

Networking

- `rtk`(4) multicast problem fixed.
- `fxp`(4) support yet a few more chip variants.
- `tulip`(4) driver fixed so that the DEC Alpha PWS no longer panics.
- Path MTU discovery black-hole detection has been added.
- `bce`(4) driver added for Broadcom BCM4401 chipset, as seen in recent Dell laptops.
- A workaround has been added for a race condition in the networking code which could corrupt the call-out data structure.
- Various networking stack fixes for IPv4, IPv6 and IPSEC.

Security

- NetBSD-SA2003-018 DNS negative cache poisoning
- NetBSD-SA2003-017 OpenSSL multiple vulnerability
- NetBSD-SA2003-016 Sendmail - another prescan() bug CAN-2003-0694
- NetBSD-SA2003-015 Remote and local vulnerabilities in XFree86 font libraries
- NetBSD-SA2003-014 Insufficient argument checking in sysctl(2)
- NetBSD-SA2003-012 Out of bounds memset(0) in sshd
- NetBSD-SA2003-011 off-by-one error in realpath(3)
- NetBSD-SA2003-010 remote panic in OSI networking code

System administration and user tools

- Possible crash in `vi`(1) triggered by an error was fixed.
- XFree86 upgraded to version 4.3.0 for those architectures which use XFree86 version 4.
- `scsictl`(8) now supports a few new commands.

- BIND has been upgraded to version 8.3.7.
- DHCP has been upgraded to version 3.0.1rc11 with various fixes.
- CVS has been upgraded to version 1.11.10.

Miscellaneous

- At least one problem causing sysinst to crash has been fixed, and a progress bar has been added as an option to monitor the progress of the extraction of the install sets.
- Package tools upgraded to version 20030918.

And of course there have also been innumerable bug fixes and other miscellaneous enhancements. You can look for this trend to continue.

pmax specific

Changes Between The NetBSD 1.6 and 1.6.1 Releases

The NetBSD 1.6.1 release provides numerous significant functional enhancements, including support for many new devices, integration of hundreds of bug fixes, patches and updates to 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 over seven months of development that went into the NetBSD 1.6.1 release. Some highlights include:

Kernel

- Hardware random number support for some Intel chipsets has been added.
- Support for additional Adaptec RAID controllers has been added to `aac`(4).
- A number of bugs in the VM system have been fixed.
- Bug fixes to `audio`(4), `dpt`(4), `eap`(4), `emuxki`(4), `iop`(4), `siop`(4) and `umass`(4).
- Some Linux compatibility bugs have been fixed.
- A number of USB bugs have been fixed.
- acorn32 and acorn26 module recognition overhauled; APDL IDE should now work.
- `pciide`(4) support has been extended to support Promise Ultra133TX2, Promise Ultra133TX2v2, HighPoint HPT372, Ultra/133 on VIA VT8233A, and the VIA VT8235.
- Many changes to the arm architecture support, mostly triggered by evbarm port infrastructure changes.
- Amiga boot handling has been modified to better handle certain machine configurations.

Networking

- IPv6 fixes to various tools.
- Bug fixes to the `tlp`(4) and `xi`(4) drivers.
- Enhancements to the `pcn`(4) driver.
- `rtk`(4) now supports Planex FNW-3603 cardbus ethernet card.
- `ex`(4) multicast handling has been fixed.

- wi(4) now supports Netgear MA401RA card.
- wm(4) now supports more chip variants.
- aue(4) now supports SMC 2206USB/ETH EZ Connect adapter.
- sip(4) now has some Tx interrupt mitigation code, and improved support for 64-bit DP83820 cards.
- The fxp(4) driver has been improved for better support of certain i82558 revisions, and has been fixed to recognize some more chips.
- IPFilter has been upgraded to version 3.4.29. Please note that this requires a synchronized upgrade of kernel and the ipf user programs to work properly.
- Support for Broadcom Gigabit Ethernet devices has been added by the addition of the bge(4) driver.
- Some IPsec bugs have been fixed (from KAME).
- Some ftpd(8) interoperability bugs have been fixed.
- mopd(8) fixes to make the program load correctly.
- A number of pppoe(4) bugs have been fixed.

File system

- A number of FFS and NFS bugs have been fixed.
- Several fixes to ffs(4) soft dependencies handling have been incorporated.
- Some NFSv3 fixes have been applied to amd(8).
- Some fsck(8) bugs have been fixed.

Security

- BIND has been updated to 8.3.4 and security patches applied to named(8) and the libc resolver.
- Various security patches have been applied to sendmail.
- Padding has been added to minimum-sized IP packets in several ethernet drivers to prevent unintented information leakage.
- OpenSSL has been updated to 0.9.6g and a number of security patches applied.
- A potential buffer overflow in zlib has been fixed.
- Buffer overflow bugs in file(1) have been fixed.
- Some Kerberos 4 security bugs have been addressed.
- A umask security problem in GNU tar(1) has been fixed.

System administration and user tools

- user(8) has seen several fixes, some of them related to MD5 and blowfish password encryption support.
- Changes to gcc for the arm architecture introduces a minor flag day: new and old object files can not be mixed. Required for proper soft-VFP support.
- MDC2 build has been made optional, as the algorithm is patended.
- The package tools have been updated to the 20030202 version.

Miscellaneous

- Bug fixes to sysinst, the NetBSD installer.
- Various cross-build fixes have been incorporated.
- Various fixes to the toolchain and build process.
- Various fixes to the rc.d subsystem.
- A large number of sparc64 fixes have been applied.
- Timezone files have been updated to tz2002d.
- Many new packages have been added to The NetBSD *packages collection,* including the latest open source desktop KDE3, OpenOffice.org, as well as a large number of bugs fixed, many addressing security issues.

And of course there have also been innumerable bug fixes and other miscellaneous enhancements. You can look for this trend to continue.

Changes Between The NetBSD 1.5 and 1.6 Releases

The NetBSD 1.6 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 over eighteen months of development that went into the NetBSD 1.6.2 release. Some highlights include:

Kernel

- Ports to new platforms including: algor, dreamcast, evbarm, hpcarm, hpcsh, newsmips, sandpoint, sgimips, sun2, and walnut.
- Unified Buffer Cache (UBC) removes size restriction of the file system's buffer cache to use all available RAM (if not otherwise used!) and improves overall system performance.
- Round-robin page colouring implemented for various ports for better cache utilisation, more deterministic run-time behaviour, and faster program execution.
- A rewritten SCSI middle layer to provide a cleaner interface between the different kernel layers, including a kernel thread to handle error recovery outside of the interrupt context. See `scsipi`(9).
- A new pipe implementation with significantly higher performance due to lower overheads, which uses the UVM Page Loan facility.
- New boot loader flags **`-v`** (*bootverbose*) and **`-q`** (*bootquiet*), to be used by kernel code to optionally print information during boot.
- An in-kernel boot time device configuration manager `userconf`(4), activated with the **`-c`** boot loader flag.
- A work-in-progress snapshot of ACPI support, based on the 20010831 snapshot of the Intel ACPICA reference implementation.
- USB 2.0 support, in the form of a preliminary driver for the `ehci`(4) host controller.
- Basic kernel support for IrDA in the form of the `irframe`(4) IrDA frame level driver. Serial dongles and the `oboe`(4) driver are currently supported.

- Kernel configuration files can be embedded into the kernel for later retrieval. Refer to `INCLUDE_CONFIG_FILE` in `options`(4) for more information.
- Many more kernel tunable variables added to `sysctl`(8).
- Linux binary emulation has been greatly improved, and now supports Linux kernel version 2.4.18.

Networking

- Hardware assisted IPv4 TCP and UDP checksumming and caching of the IPv6 TCP pseudo header. Support for checksum offloading on the DP83820 Gigabit Ethernet, 3Com 3c90xB, 3Com 3c90xC, and Alteon Tigon/Tigon2 Gigabit Ethernet cards.
- Zero-Copy for TCP and UDP transmit path achieved through page loaning code for **sosend**().
- In-kernel ISDN support, from the ISDN4BSD project.
- 802.1Q VLAN (virtual LAN) support. See `vlan`(4).
- IPFilter now supports IPv6 filtering.
- `ndbootd`(8) added; used to netboot NetBSD/sun2 machines.
- `racoon`(8) added; IKE key management daemon for IPsec key negotiation, from the KAME project.
- WEP encryption supported in `ifconfig`(8) and `awi`(4) driver.
- `wi`(4) and `wiconfig`(8) now support scanning for access points, and defaults to BSS instead of ad-hoc mode.
- Bridging support; currently only for ethernet. See `bridge`(4).
- In-kernel PPP over Ethernet (PPPoE) - RFC 2516, with much lower overhead than user-land PPPoE clients. See `pppoe`(4).
- `ifwatchd`(8) added; invokes up-script and down-script when a network interface goes up and down. Used by `pppoe`(4).

File system

- Enhanced stability of LFS version 2, the BSD log-structured file system.
- `dump`(8), `dumpfs`(8), `fsck_ffs`(8), `fsirand`(8), `newfs`(8), and `tunefs`(8) support a **-F** option to manipulate file system images in regular files.
- `makefs`(8) added; creates file system images from a directory tree. (Currently ffs only.)
- Enhanced **ffs_dirpref**( ) by Grigoriy Orlov, which noticeably improves performance on FFS file systems when creating directories, and subsequently manipulating them.
- Fixes for free block tracking and directory block allocation in FFS softdeps.
- Correctly support FFS file systems with a large number of cylinder groups.
- Fix the endian independant FFS (FFS_EI) support.
- `newfs`(8) calculates default block size from the file system size, and uses the largest possible cylinders/group (cpg) value if **-c** isn't given.
- `dpti`(4) driver added; an implementation of the DPT/Adaptec SCSI/I2O RAID management interface. Allows the use of the Linux versions of **dptmgr**, **raidutil**, **dptelog**, (etc).

- Support for Windows 2000 'NTFS' (NTFS5).
- Tagged queueing support for SCSI drivers based on the ncr53c9x controller.

Security

- Addition of a `chroot`(8) hierarchy for services including `named`(8), `ntpd`(8), and `sshd`(8).
- Additional `passwd`(5) ciphers: MD5, and DES with more encryption rounds. See `passwd.conf`(5).
- Several more code audits were performed.
- `/etc/security` performs many more checks and is far more flexible in how it monitors changes. See `security.conf`(5).

System administration and user tools

- `sushi`(8) added; a menu based system administration tool.
- `pgrep`(1) and `pkill`(1) added; find or signal processes by name or other attributes.
- System upgrades are made easier through the `etcupdate`(8) script which helps updating the `/etc` config files interactively, and the `/etc/postinstall` script which is provided to check for or fix configuration changes that have occurred in NetBSD.
- `stat`(1) added; a user interface to the information returned by the `stat`(2) system call.
- BSD `sort`(1) replaces GNU `sort`(1).
- The "stop" operation for `rc.d`(8) scripts waits until the service terminates before returning. This improves the reliability of "restart" operations as well.
- Swap devices can be removed at system shutdown by enabling `swapoff` in `rc.conf`(5).
- An optional watchdog timer which will terminate `rc.shutdown`(8) after the number of seconds provided in `rcshutdown_timeout` from `rc.conf`(5).

Miscellaneous

- Support for multibyte LC_CTYPE locales has been integrated from the Citrus project. Many Chinese, Japanese, Korean, and other encodings are now available.
- Full support for cross-compilation of the base system, even as a non-root user! `src/build.sh` is available for doing arbitrary cross-builds; see `src/BUILDING` for more information. At least 38 ports for the NetBSD 1.6.2 release were cross-built on a NetBSD/i386 system using this mechanism.
- Migrated the following CPU platforms to ELF: arm, and m68k (including amiga, hp300, mac68k, mvme68k, sun2, and x68k).
- Updates of most third party packages that are shipped in the base system to the following latest stable releases:
  - amd 6.0.6
  - BIND 8.3.3
  - binutils 2.11.2
  - bzip2 1.0.2
  - cvs 1.11
  - dhcp 3.0.1rc9
  - file 3.38
  - gcc 2.95.3

  - groff 1.16.1
  - Heimdal 0.4e
  - IPfilter 3.4.27
  - kerberos4 1.1
  - ksh from pdksh 5.2.14p2
  - less 374
  - nvi 1.79
  - OpenSSH 3.4
  - OpenSSL 0.9.6g
  - Postfix 1.1.11
  - ppp 2.4.0
  - routed 2.24
  - sendmail 8.11.6
  - tcpdump 3.7.1

- Many new packages in the *pkgsrc* system, including the latest open source desktop KDE3, OpenOffice, perl, Apache and many more. At the time of writing, there are over 3000 third party packages available in pkgsrc.
- Added AGP GART driver `agp`(4) for faster access to graphics boards.
- `init`(8) will create an mfs (memory based file system) `/dev` if `/dev/console` is missing.
- `vmstat`(8) displays kernel hash statistics with **`-H`** and **`-h`** *`hash`*.
- `wscons`(4) supports blanking of VGA consoles.

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 sixth major release of NetBSD for the DECstation and DECsystem family of computers. Some pmax-specific changes from the previous major release include:

- Switch to the MI SCSI subsystem.
- Working Loadable Kernel Modules (LKMs).
- Two stage network boot loader.

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/Sites/net.html**.

NetBSD 1.6.2 Release Contents

The root directory of the NetBSD 1.6.2 release is organized as follows:

`.../NetBSD-1.6.2/`

`CHANGES`	Changes since earlier NetBSD releases.
`LAST_MINUTE`	Last minute changes.
`MIRRORS`	A list of sites that mirror the NetBSD 1.6.2 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 1.6.2 has a binary distribution. There are also `README.export-control` files sprinkled liberally throughout the distribution tree, which point out that there are some portions of the distribution that may be subject to export regulations of the United States, e.g. code under `src/crypto` and `src/sys/crypto`. It is your responsibility to determine whether or not it is legal for you to export these portions and to act accordingly.

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.
55 MB gzipped, 247 MB uncompressed

pkgsrc This set contains the ''pkgsrc'' sources, which contain the infrastructure to build third-party packages.
12 MB gzipped, 94 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.
4 MB gzipped, 16 MB uncompressed

src This set contains all of the base NetBSD 1.6.2 sources which are not in **gnusrc**, **sharesrc**, or **syssrc**.
27 MB gzipped, 136 MB uncompressed

syssrc This set contains the sources to the NetBSD 1.6.2 kernel for all architectures; `config`(8); and `dbsym`(8).
22 MB gzipped, 114 MB uncompressed

xsrc This set contains the sources to the X Window System.
78 MB gzipped, 394 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
```

The `sets/Split/` subdirectory contains 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 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.?? | ( cd / ; tar -zxpf - )
```

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 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/pmax subdirectory structure

The pmax-specific portion of the NetBSD 1.6.2 release is found in the `pmax` subdirectory of the distribution:

```
.../NetBSD-1.6.2/pmax/
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.
`sets/` pmax binary distribution sets; see below.
`installation/`
`misc/` Miscellaneous pmax installation utilities; see installation section, below.

Binary distribution sets

The NetBSD pmax binary distribution sets contain the binaries which comprise the NetBSD 1.6.2 release for the pmax. There are eight binary distribution sets. The binary distribution sets can be found in the `pmax/binary/sets` subdirectory of the NetBSD 1.6.2 distribution tree, and are as follows:

base The NetBSD 1.6.2 pmax **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.
22 MB gzipped, 71 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.
17 MB gzipped, 73 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, 8 MB uncompressed

kern-GENERIC
This set contains a NetBSD/pmax 1.6.2 `GENERIC` kernel, named `/netbsd`. You *must* install this distribution set.
2 MB gzipped, 4 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.
7 MB gzipped, 27 MB uncompressed

misc This set includes the (rather large) system dictionaries, the typesettable document set, and other files from `/usr/share`.
3 MB gzipped, 8 MB uncompressed

text This set includes NetBSD's text processing tools, including `groff`(1), all related programs, and their manual pages.
2 MB gzipped, 8 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 3.3.6. 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.
4 MB gzipped, 12 MB uncompressed

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

xcontrib Programs that were contributed to X.
1 MB gzipped, 1 MB uncompressed

xfont Fonts needed by X.
6 MB gzipped, 7 MB uncompressed

xmisc Miscellaneous X programs.
1 MB gzipped, 1 MB uncompressed

xserver The Xpmax server with man page.
2 MB gzipped, 6 MB uncompressed

The pmax 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 pmax binary distribution also has its own checksum files, just as the source distribution does.

NetBSD/pmax System Requirements and Supported Devices

Supported machines

- DECstation 2100 and 3100, also known as *pmin* and *pmax*
- DECsystem 5100
- Personal DECstations (5000/20, /25 and /33) also known as *MAXINE*
- DECstation 5000/120, /125, and /133, also known as *3MIN*
- DECstation 5000/200, also known as *3MAX*
- DECstation 5000/240 and DECsystem 5900, also known as *3MAXPLUS*
- DECstation 5000/50, 5000/150, 5000/260 (and DECsystem 5900-260) – R4000 and R4400 variants of the *MAXINE, 3MIN* and *3MAXPLUS*

Unsupported machines

- DECsystem 5400 and 5500 (Q-bus based systems, similar to the Vax *Mayfair* or *Mayfair II*, but with an r2000a or r3000 cpu instead of a CVAX cpu.)
- DECsystem 5800 (xbi-based multiprocessor, a Vax 6200 with Vax CPU boards replaced with Mips cpu boards)

The minimal configuration requires 8 MB of RAM and ˜60 MB of disk space. To install the entire system requires much more disk space, and to run X or compile the system, more RAM is recommended, as NetBSD with 8 MB of RAM feels like Ultrix with 8 MB of RAM - slow. Note that until you have around 16 MB of RAM, getting more RAM is more important than getting a faster CPU.

Supported devices

- DECstation 2100 and 3100 baseboard video
  - one-bit mono or 8-bit pseudocolor frame buffers.
- DECstation 5000 series TurboChannel video
  - PMAG-DV Personal DECstation baseboard 1024x768 frame buffer
  - PMAG-B (CX) 1024x768 8-bit color frame buffer
  - PMAGB-B (HX or SFB) 1280x1024 8-bit color frame buffer
  - PMAG-A (MX) 1280x1024 four-bit greyscale frame buffer
  - PMAG-C (PX) 2D 8-bit accelerated frame buffer.
  - PMAG-D (PXG) 3D 8-bit accelerated frame buffer.
  - PMAG-E (PXG+) 3D 24-bit accelerated frame buffer.
  - PMAG-F (PXG+ Turbo) 3D 24-bit accelerated frame buffer.

  Note: All supported DECstation video produces sync-on-green. Be sure to use either a DEC-compatible fixed-sync monitor or a multisync monitor that supports sync-on-green.
- Serial ports
  - ttya and ttyb (can be used as console if needed)
- Ethernet
  - on-board AMD Lance ethernet (*le0*),
  - TURBOchannel AMD Lance ethernet cards (the *PMAD*)
- SCSI
  - on-board DEC *sii* SCSI controller (2100 and 3100)
  - on-board *asc* SCSI controller (5000 series machines)
  - TurboChannel *asc* SCSI controller (the *PMAZ*)
- DEC LK-201 (or compatible) keyboard
- DEC *hockey puck* or compatible mouse

Unsupported devices

- Q-bus based DECsystems
- PrestoServe NVRAM on DECsystem 5100 and 5000/2xx machines
- Audio drivers for Personal DECstation machines
- Floppy driver for Personal DECstation machines
- TurboChannel audio hardware (LoFi)

Note: The primary obstacle to supporting the above is non-availability of sample hardware for development.

Getting the NetBSD System on to Useful Media

First-time installation on a bare machine is not supported, because most DECstations do not have any suitable load device. Some versions of the DECstation PROM are buggy and will not boot via TFTP and bootp; other versions are buggy and do not boot via MOP.

The only DECstation with a floppy-disk drive is the Personal DECstation, and that device is not supported as a boot device.

The recommended installation procedure is to boot an install kernel via TFTP, or to use a ''helper'' system to write a miniroot diskimage onto a disk, move that disk to the target installation system, and then boot the miniroot.

Installation is supported from several media types, including:

- CD-ROM
- 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 Find out where the distribution set files are on the CD-ROM.

Proceed to the instruction on installation.

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. You 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 IP address of **ftp.netbsd.org** is `204.152.184.75` (as of June, 2002).

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 only 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.

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 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 it-

self.

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 only 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.

Note: the tape devices with which NetBSD/pmax is believed to work is the DEC TK-50. This is a very slow device. Installation via disk or network is recommended if at all possible.

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-1.6.2
# cd pmax/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.

Upgrade

If you are upgrading NetBSD, you also have the option of installing NetBSD by putting the new distribution sets somewhere in your existing file system, and using them from there. To do that, you must do the following:

Place the distribution sets you wish to upgrade somewhere in your current file system tree.

At a bare minimum, you must upgrade the **base** and **kern** binary distributions, and so must put the **base** and **kern** sets somewhere in your file system. If you wish, you can do the other sets, as well, but you should *not* upgrade the **etc** distribution; it contains contains system configuration files that you should review and update by hand.

Once you have done this, you can proceed to the next step in the upgrade process, actually upgrading your system.

Preparing your System for NetBSD installation

First and foremost, before beginning the installation process, *make sure you have a reliable backup* of any data on your hard disk that you wish to keep. Mistakes in partitioning your hard disk may lead to data loss.

Installing the NetBSD System

Note: There may be updates to this procedure available from the NetBSD/pmax web page, at **http://www.netbsd.org/Ports/pmax**.

To install or upgrade NetBSD, you need to first boot an installation program and then interact with the screen-menu program **sysinst**. The installation program actually consists of the NetBSD kernel plus an in-memory file system of utility programs.

From most convenient to least convenient, the installation methods are:

1. Installation from an existing NetBSD or Ultrix system by booting the install kernel from an existing root file system (/). See the **Installing from an existing system** section later in these INSTALL notes.
2. Copying a bootable diskimage onto the beginning of a disk and installing onto that disk. See the **Install via diskimage** section later in these INSTALL notes.
3. Booting the install kernel over the network and installing onto a local disk. See the **Install via netboot install kernel** section later in these INSTALL notes.
4. Using a helper machine with a SCSI controller to copy the bootable diskimage onto the beginning of a disk, and moving the disk to the target machine. See the **Install via diskimage** section later in these INSTALL notes.
5. For machines with some PROMs that cannot netboot standard kernels, you will need to set up an NFS server with a diskless root file system for trimmed-down network install kernel and run the installation system from the NFS root file system. See the **Install via diskless boot** section later in these INSTALL notes.

You should familiarize yourself with the console PROM environment and the hardware configuration. The PROMs on the older DECstation 2100 and 3100 use one syntax. The PROMs on the TurboChannel machines use a completely different syntax. Be sure you know how to print the configuration of your machine, and how to boot from disk or network, as appropriate.

To boot from disk, use:

2100 or 3100:	**boot -f rz(0,*X*,0)netbsd**
5000/200:	**boot 5/rz*X*/netbsd**
other 5000s:	**boot 3/rz*X*/netbsd**

To boot via TFTP, use:

2100 or 3100:	**boot -f tftp()**
5000/200:	**boot 6/tftp**
other 5000s:	**boot 3/tftp**

To boot via MOP, use:

2100 or 3100:	**boot -f mop()**
5000/200:	**boot 6/mop**
other 5000s:	**boot 3/mop**

You will also need to know the total size (in sectors) and the approximate geometry of the disks you are installing onto, so that you can label your disks for the BSD fast file system (FFS). For most SCSI drives (in-

cluding all SCSI-2 drives), the kernel will correctly detect the disk geometry. The **sysinst** tool will suggest these as the default.

If you're installing NetBSD/pmax for the first time it's a very good idea to pre-plan partition sizes for the disks on which you're installing NetBSD. Changing the size of partitions after you've installed is difficult. If you do not have a spare bootable disk, it may be simpler to re-install NetBSD again from scratch.

Assuming a classic partition scheme with separate / (root) and /usr file systems, a comfortable size for the NetBSD / partition is about 32 MB. A good initial size for the swap partition is twice the amount of physical memory in your machine (though, unlike Ultrix, there are no restrictions on the size of the swap partition that would render part of your memory unusable). The default swap size is 64 MB, which is adequate for doing a full system build. A full binary installation, with X11R6.3 takes about 150 MB in /usr; a 200 MB /usr should be ample.

Install via a NetBSD CD-ROM

You can obtain the disk image or diskless boot tar file from the NetBSD 1.6.2 CD-ROM.

To mount the CD-ROM from a NetBSD/pmax host, type

```
# mount -r -t cd9660 /dev/cdXc /mnt
```

and from an Ultrix host

```
# mount -r -t cdfs -o nodefperm,noversion /dev/rzXc /mnt
```

where *X* is the SCSI-ID of the CD-ROM.

Note: Ultrix does not have Rock Ridge extensions so leave out everything between the first and last period ('.') in the paths on the CD. For example, the path NetBSD-1.4.3 would show up as NetBSD-1.3.

The diskimage file can be found on the CD-ROM at the following location (relative to the mount point of the CD)

```
pmax/installation/diskimage/diskimage.gz
```

and the diskless boot tar file can be found at

```
pmax/installation/netboot/diskimage.tgz
```

Once you have located these files, continue on to either **Install via netboot install kernel**, **Install via diskless boot**, **Install via diskimage** or **Installing from an existing system** section later in the INSTALL notes.

Installing from an existing system

Note: If you are installing NetBSD using an existing NetBSD system that is older than NetBSD 1.4, you will need to install new bootblocks before installing NetBSD 1.6.2. New bootblocks are in the tar file:

```
pmax/installation/misc/bootblocks.tgz
```

in the NetBSD 1.6.2 distribution. To install the new bootblocks, use the following commands:

```
# cd /
# tar -zxpvf .../pmax/installation/misc/bootblocks.tgz
# /usr/sbin/installboot /dev/rrzXc /usr/mdec/bootxx_ffs
```

where *X* is your boot disk SCSI-ID.

With new NetBSD bootblocks or using the Ultrix bootloader, you can boot the kernel located in:

```
pmax/binary/kernel/install.gz
```

On Ultrix systems you will need to **gunzip** this kernel before booting it. A copy of the **gunzip** binary for Ultrix systems is located in:

```
pmax/installation/misc/gunzip.ultrix
```

Then boot using one of:

2100 or 3100: **boot -f rz(0,*X*,0)install**
5000/200: **boot 5/rz*X*/install**
other 5000s: **boot 3/rz*X*/install**

where *X* is your boot disk SCSI-ID, and continue to the **Once you've booted the diskimage** section

Install via diskimage

The diskimage file is in

```
pmax/installation/diskimage/diskimage.gz.
```

It is shipped compressed and is around 1150 kbytes, uncompressing to exactly 2 MB.

To install the diskimage onto disk sd*X* on a NetBSD/pmax system, do:

```
# disklabel -W /dev/rsdXc
# gunzip -c diskimage.gz | dd of=/dev/rsdXc bs=10240
```

When installing on a disk with no NetBSD or Ultrix label, you may get a message like:

```
sdX: WARNING: trying Ultrix label, no disk label
```

or when installing on an old Ultrix disk, you may get a message like:

```
sdX: WARNING: using ULTRIX partition information
```

when issuing the **disklabel -W /dev/rsd*X*c** command. This can safely be ignored.

On NetBSD/i386, the ''raw disk partition'' is the 'd' partition, so do:

```
# disklabel -W /dev/rsdXd
# gunzip -c diskimage.gz | dd of=/dev/rsdXd bs=10240
```

On NetBSD, be sure to use **disklabel -W** to enable writing to the label area of the disk. If you forget this and/or use the 'block' device, the **dd** command may silently fail.

On Ultrix systems, do:

```
# gunzip -c diskimage.gz | dd of=/dev/rrzXc bs=10240
```

A copy of the **gunzip** program is located in

```
pmax/installation/misc/gunzip.ultrix
```

if you do not already have it.

On MS-DOS, use an 'unzip' utility, then use **rawrite**.

Then boot using one of:

2100 or 3100: **boot -f rz(0,*X*,0)netbsd**
5000/200: **boot 5/rz*X*/netbsd**
other 5000s: **boot 3/rz*X*/netbsd**

where *X* is your boot disk SCSI-ID, and continue to the **Once you've booted the diskimage** section.

Install via netboot install kernel

Booting NetBSD/pmax 1.6.2 install kernel over a network requires a BOOTP or DHCP server and a TFTP server. (These are usually all run on the same machine.) There are two basic stages to the boot:

- The pmax PROM software sends a BOOTP request to get its own address, the address of the TFTP server and the file to download.
- It downloads the file name obtained from BOOTP, which is the install kernel, via TFTP and then executes it.

You will need to set up servers for BOOTP and TFTP.

For the BOOTP server you need to specify the:

- hardware type (Ethernet)
- hardware address (Ethernet MAC address)
- IP address of the client
- subnet mask of the client
- address of the TFTP server
- name of the kernel loaded via TFTP

Here's an example for a UNIX-like system running **bootpd**:

```
myhost.mydom.com:\
         :ht=ethernet:ha=08002b123456:\
         :ip=192.168.1.2:sm=255.255.255.0:\
         :sa=192.168.1.1:bf=install:\
         :rp=/usr/export/pmax:
```

And here's an example for a UNIX-like system running the ISC **dhcpd**:

```
host pmax {
        hardware ethernet 08:0:2b:12:34:56;
        fixed-address 192.168.1.2;
        option host-name "myhost.mydom.com";
        filename "install";
        option domain-name-servers 192.168.1.1;
        option broadcast-address 255.255.255.0;
        option domain-name "my.domain";
        option root-path "/usr/export/pmax";
}
```

For the TFTP server, You will need to copy the **install.ecoff** kernel to the directory used by the TFTP server. This file must be gunzipped.

Then boot using one of:

2100 or 3100: **boot -f tftp()**
5000/200: **boot 6/tftp**
other 5000s: **boot 3/tftp**

and continue to the **Once you've booted the diskimage** section.

Install via diskless boot

The file `pmax/installation/netboot/diskimage.tar.gz` contains a suitable set of files for installing on an NFS server to set up a diskless root filesytem. (It is a tar copy of the contents of an installation ramdisk file system contained in the install kernel.) You will need to find an NFS server, unpack the tarfile, and setup BOOTP/dhcp service for your pmax. Instructions for setting up an NFS server and diskless booting are on the NetBSD/pmax netboot webpage at

http://www.netbsd.org/Ports/pmax/netboot.html

Since the system install utility, **sysinst**, requires a read/write root, installing via diskless boot is only feasible if your NFS server exports the diskless root read-write. If this is not possible, you should install via other of the other installation procedures.

Once you have booted the kernel, continue to the **Once you've booted the diskimage** section.

Once you've booted the diskimage

Once you've booted the installation kernel you will need to select your terminal type. Use **rcons** for a framebuffer console, **vt100** for a serial console with a vt100-compatible terminal, or **xterm** or **xterms** for a `tip`(1) or `cu`(1) connection running in an `xterm`(1).

The system will then start the **sysinst** program.

Running the sysinst installation program

1. *Introduction*

   Using **sysinst**, installing NetBSD is a relatively easy process. You still should read this document and have it in hand when doing the installation process. This document tries to be a good guideline for the installation and as such covers many details for the sake of completeness. Do not let this discourage you; the install program is not hard to use.

2. *General*

   The following is a walk-through of the steps you will take while getting NetBSD installed on your hard disk. **sysinst** is a menu driven installation system that allows for some freedom in doing the installation. Sometimes, questions will be asked and in many cases the default answer will be displayed in brackets ("[ ]") after the question. If you wish to stop the installation, you may press `CONTROL-C` at any time, but if you do, you'll have to begin the installation process again from scratch by running the `/sysinst` program from the command prompt. It is not necessary to reboot.

3. *Quick install*

   First, let's describe a quick install. The other sections of this document go into the installation procedure in more detail, but you may find that you do not need this. If you want detailed instructions, skip to the next section. This section describes a basic installation, using a CD-ROM install as an example.

   - What you need.
     - The distribution sets (in this example, they are on CD).
     - A CD-ROM drive (SCSI), a harddisk and a minimum of 8 MB of memory installed.
     - The harddisk should have at least 200 + *n* megabytes of space free, where *n* is the number of megabytes of main memory in your system. If you wish to install the X Window System as well, you will need at least 60 MB more.
   - The Quick Installation

- Boot the system as described above. You should be at the **sysinst** main menu.

```
.*******************************************.
* NetBSD-1.6 Install System                  *
*                                            *
*>a: Install NetBSD to hard disk             *
* b: Upgrade NetBSD on a hard disk           *
* c: Re-install sets or install additional sets *
* d: Reboot the computer                     *
* e: Utility menu                            *
* x: Exit Install System                     *
.*******************************************.
```

- If you wish, you can configure some network settings immediately by choosing the **Utility menu** and then **Configure network**. It isn't actually required at this point, but it may be more convenient. Go back to the main menu.
- Choose **install**.
- You will be guided through some steps regarding the setup of your disk, and the selection of distributed components to install. When in doubt, refer to the rest of this document for details.
- After your disk has been prepared, choose **CD-ROM** as the medium. The default values for the path and device should be ok.
- After all the files have been unpacked, go back to the main menu and select **reboot.**
- NetBSD will now boot. If you haven't already done so in **sysinst**, you should log in as `root`, and set a password for that account. You are also advised to edit the file `/etc/rc.conf` to match your system needs.
- Your installation is now complete.
- For configuring the X window system, if installed, see the files in `/usr/X11R6/lib/X11/doc`. Further information can be found on **http://www.xfree86.org/**.

4. *Booting NetBSD*

   You may want to read the boot messages, to notice your disk's name and capacity. Its name will be something like `sd0` and the geometry will be printed on a line that begins with its name. As mentioned above, you may need your disk's geometry when creating NetBSD 's partitions. You will also need to know the name, to tell **sysinst** on which disk to install. The most important thing to know is that `sd0` is your first SCSI disk, `sd1` the second, etc.

   Once NetBSD has booted and printed all the boot messages, you will be presented with a welcome message and a main menu. It will also include instructions for using the menus.

5. *Network configuration*

   If you will not use network operation during the installation, but you do want your machine to be configured for networking once it is installed, you should first go to the **Utility menu**, and select the **Configure network** option. If you only want to temporarily use networking during the installation, you can specify these parameters later. If you are not using the Domain Name System (DNS), you can give an empty response in reply to answers relating to this.

6. *Installation drive selection and parameters*

To start the installation, select **Install NetBSD to hard disk** from the main menu.

The first thing is to identify the disk on which you want to install NetBSD. **sysinst** will report a list of disks it finds and ask you for your selection. Depending on how many disks are found, you may get a different message. You should see disk names like `rz0` or `rz1`

7. *Partitioning the disk*

   - Which portion of the disk to use.

     You will be asked if you want to use the entire disk or only part of the disk. If you decide to use the entire disk for NetBSD, it will be checked if there are already other systems present on the disk, and you will be asked to confirm whether you want to overwrite these.

8. *Editing the NetBSD disklabel*

   The partition table of the NetBSD part of a disk is called a *disklabel*. There are 4 layouts for the NetBSD part of the disk that you can pick from: **Standard, Standard with X, Custom** and **Use Existing**. The first two use a set of default values (that you can change) suitable for a normal installation, possibly including X. With the **Custom** option you can specify everything yourself. The last option uses the partition info already present on the disk.

   You will be presented with the current layout of the NetBSD disklabel, and given a chance to change it. For each partition, you can set the type, offset and size, block and fragment size, and the mount point. The type that NetBSD uses for normal file storage is called **4.2BSD**. A swap partition has a special type called **swap**. Some partitions in the disklabel have a fixed purpose.

`a`	Root partition (`/`)
`b`	Swap partition.
`c`	The NetBSD portion of the disk.
`d`–`h`	Available for other use. Traditionally, `d` is the partition mounted on `/usr`, but this is historical practice and not a fixed value.

   You will then be asked to name your disk's disklabel. The default response is "**mydisk**". For most purposes this will be OK. If you choose to name it something different, make sure the name is a single word and contains no special characters. You don't need to remember this name.

9. *Preparing your hard disk*

   You are now at the point of no return. Nothing has been written to your disk yet, but if you confirm that you want to install NetBSD, your hard drive will be modified. If you are sure you want to proceed, enter `yes` at the prompt.

   The install program will now label your disk and make the file systems you specified. The file systems will be initialized to contain NetBSD bootstrapping binaries and configuration files. You will see messages on your screen from the various NetBSD disk preparation tools that are running. There should be no errors in this section of the installation. If there are, restart from the beginning of the installation process. Otherwise, you can continue the installation program after pressing the return key.

10. *Getting the distribution sets*

    The NetBSD distribution consists of a number of *sets*, that come in the form of gzipped tarfiles. A few sets must be installed for a working system, others are optional. At this point of the installation, you will be presented with a menu which enables you to choose from one of the following methods of installing the sets. Some of these methods will first load the sets on your hard disk, others will extract the sets directly.

For all these methods, the first step is making the sets available for extraction, and then do the actual installation. The sets can be made available in a few different ways. The following sections describe each of those methods. After reading the one about the method you will be using, you can continue to section labeled 'Extracting the distribution sets'.

11. *Installation using ftp*

    To be able to install using ftp, you first need to configure your network setup, if you haven't already at the start of the install procedure. **sysinst** will do this for you, asking you to provide some data, like IP address, hostname, etc. If you do not have name service set up for the machine that you are installing on, you can just press RETURN in answer to these questions, and DNS will not be used.

    You will also be asked to specify the host that you want to transfer the sets from, the directory on that host, the account name and password used to log into that host using ftp, and optionally a proxy server to use. If you did not set up DNS when answering the questions to configure networking, you will need to specify an IP address instead of a hostname for the ftp server.

    sysinst will proceed to transfer all the default set files from the remote site to your hard disk.

12. *Installation using NFS*

    To be able to install using NFS, you first need to configure your network setup, if you haven't already at the start of the install procedure. **sysinst** will do this for you, asking you to provide some data, like IP address, hostname, etc. If you do not have name service set up for the machine that you are installing on, you can just press RETURN in answer to these questions, and DNS will not be used.

    You will also be asked to specify the host that you want to transfer the sets from, and the directory on that host that the files are in. This directory should be mountable by the machine you are installing on, i.e. correctly exported to your machine.

    If you did not set up DNS when answering the questions to configure networking, you will need to specify an IP address instead of a hostname for the NFS server.

13. *Installation from CD-ROM*

    When installing from a CD-ROM, you will be asked to specify the device name for your CD-ROM player (usually cd0), and the directory name on the CD-ROM where the distribution files are.

    sysinst will then check if the files are indeed available in the specified location, and proceed to the actual extraction of the sets.

14. *Installation from an unmounted file system*

    In order to install from a local file system, you will need to specify the device that the file system resides on (for example rz1e) the type of the file system, and the directory on the specified file system where the sets are located. **sysinst** will then check if it can indeed access the sets at that location.

15. *Installation from a local directory*

    This option assumes that you have already done some preparation yourself. The sets should be located in a directory on a file system that is already accessible. **sysinst** will ask you for the name of this directory.

16. *Extracting the distribution sets*

    After the install sets containing the NetBSD distribution have been made available, you can either extract all the sets (a full installation), or only extract sets that you have selected. In the latter case, you will be shown the currently selected sets, and given the opportunity to select the sets you want. Some sets always need to be installed (**kern, base**) and **etc** they will not be shown in this selection menu.

Before extraction begins, you can elect to watch the files being extracted; the name of each file that is extracted will be shown. This can slow down the installation process considerably, especially on machines with slow graphics consoles or serial consoles.

After all the files have been extracted, all the necessary device node files will be created. If you have already configured networking, you will be asked if you want to use this configuration for normal operation. If so, these values will be installed in the network configuration files. The next menu will allow you to select the time zone that you're in, to make sure your clock has the right offset from UTC. Finally you will be asked to select a password encryption algorithm and can than set a password for the "root" account, to prevent the machine coming up without access restrictions.

17. *Finalizing your installation*

    Congratulations, you have successfully installed NetBSD 1.6.2. You can now reboot the machine, and boot NetBSD from harddisk.

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 the correct terminal type as discussed in the **Once you've booted the diskimage** section. 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=termtype
   ```

   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.

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. 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 `useradd`(8) for more information on 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 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 `1.6.2/pmax/All` subdir. You can install them with the following commands:

     ```
     # PKG_PATH=ftp://ftp.NetBSD.org/pub/NetBSD/packages/1.6.2/pmax/All
     # export PKG_PATH
     # pkg_add -v tcsh
     # pkg_add -v apache
     # pkg_add -v perl
     ...
     ```

     The above commands will install the tcsh shell, the Apache web server and the perl programming language 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, then see the `README` file 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.
   - 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

The upgrade to NetBSD 1.6.2 is a binary upgrade; it can be quite difficult to update the system from an earlier version by recompiling from source, primarily due to interdependencies in the various components.

To do the upgrade, you must install new bootblocks and boot off the **`install`** kernel as described in the **Installing from an existing system** section. You must also have at least the **base** and **kern** binary distribution sets available, so that you can upgrade with them, using one of the upgrade methods described above. Finally, you must have sufficient disk space available to install the new binaries. Since files already installed on the system are overwritten in place, you only need additional free space for files which weren't previously installed or to account for growth of the sets between releases. If you have a few megabytes free on each of your root (`/`) and `/usr` partitions, you should have enough space.

Since upgrading involves replacing the boot blocks on your NetBSD partition, the kernel, and most of the system binaries, it has the potential to cause data loss. You are strongly advised to *back up* any important data on your disk, whether on the NetBSD partition or on another operating system's partition, before beginning the upgrade process.

The upgrade procedure using the **`sysinst`** tool is similar to an installation, but without the hard disk partitioning. The original `/etc` directory is renamed to `/etc.old`, and no attempt is made to merge any of the previous configuration into the new system except that the previous `/etc/fstab` file is copied into the new configuration. Getting the binary sets is done in the same manner as the installation procedure; refer to the installation part of the document for how to do this. Also, some sanity checks are done, i.e. file systems are checked before unpacking the sets.

After a new kernel has been copied to your hard disk, your machine is a complete NetBSD 1.6.2 system. However, that doesn't mean that you're finished with the upgrade process. You will probably want to update the set of device nodes you have in `/dev`. If you've changed the contents of `/dev` by hand, you will need to be careful about this, but if not, you can just cd into `/dev`, and run the command:

```
# sh MAKEDEV all
```

Finally, you will want to delete old binaries that were part of the version of NetBSD that you upgraded from and have since been removed from the NetBSD distribution.

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 1.6.2.

Issues affecting an upgrade from NetBSD 1.5

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

```
mkdir /tmp/upgrade
cd /tmp/upgrade
pax -zrpe -f /path/to/etc.tgz
./etc/postinstall -s `pwd` check
./etc/postinstall -s `pwd` 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/*`
- The following files are now obsolete: `/etc/rc.d/NETWORK` and `/etc/rc.d/gated`.
- The following `rc.conf`(5) entries are now obsolete: `amd_master`, `ip6forwarding`, `defcorename`, and `nfsiod_flags`. `critical_filesystems_beforenet` has been replaced by `critical_filesystems_local`. `critical_filesystems` has been replaced by `critical_filesystems_remote`.
- The users and groups 'named', 'ntpd', and 'sshd' need to be created.
- The configuration files for `ssh`(1) and `sshd`(8) were moved from `/etc` to `/etc/ssh`, including `ssh_known_hosts*` files and the host key files `ssh_host*_key*`. `/etc/ssh.conf` was renamed to `/etc/ssh/ssh_config`, and `/etc/sshd.conf` was renamed to `/etc/ssh/sshd_config`.
- The **mux** entries in `wscons.conf`(5) are now obsolete.

The following issues need to be resolved manually:

- `postfix`(8) configuration files require upgrading.

```
cd /usr/share/examples/postfix
cp post-install postfix-files postfix-script /etc/postfix
postfix check
```

- The *de* ethernet driver was replaced with the *tlp* driver. This may require the renaming of the files `/etc/ifconfig.de*` to `/etc/ifconfig.tlp*`, renaming of `rc.conf`(5) entries `ifconfig_de*` to `ifconfig_tlp*`, and the reconfiguration of files such as `/etc/dhclient.conf` and `/etc/ipf.conf`.

Issues affecting an upgrade from NetBSD 1.4 or prior

- `/etc/rc` modified to use `/etc/rc.d/*`

  Prior to NetBSD 1.5, `/etc/rc` was a traditional BSD style monolithic file; each discrete program or subsystem from `/etc/rc` and `/etc/netstart` has been moved into separate scripts in `/etc/rc.d/`.

  At system startup, `/etc/rc` uses `rcorder`(8) to build a dependency list of the files in `/etc/rc.d` and then executes each script in turn with an argument of 'start'. Many `rc.d` scripts won't start unless the appropriate `rc.conf`(5) entry in `/etc/rc.conf` is set to 'YES.'

  At system shutdown, `/etc/rc.shutdown` uses `rcorder`(8) to build a dependency list of the files in `/etc/rc.d` that have a "KEYWORD: shutdown" line, reverses the resulting list, and then executes each script in turn with an argument of 'stop'. The following scripts support a specific shutdown method: `cron`, `inetd`, `local`, and `xdm`.

  Local and third-party scripts may be installed into `/etc/rc.d` as necessary. Refer to the other scripts in that directory and `rc`(8) for more information on implementing `rc.d` scripts.

- `named`(8) leaks version information.

  Previous releases of NetBSD disabled a feature of `named`(8) where the version number of the server could be determined by remote clients. This feature has not been disabled in NetBSD 1.5, because there is a `named.conf`(5) option to change the version string:

```
option {
        version "newstring";
};
```

- `sysctl`(8) was moved from `/usr/sbin/sysctl` to `/sbin/sysctl`. If you have hardcoded references to the full pathname (in shell scripts, for example) please be sure to update those.

- `sendmail`(8) configuration file pathname changed.

  Due to `sendmail`(8) upgrade from 8.9.x to 8.10.x, `/etc/sendmail.cf` is moved to `/etc/mail/sendmail.cf`. Also, the default `sendmail.cf`(5) refers different pathnames than before. For example, `/etc/aliases` is now located at `/etc/mail/aliases`, `/etc/sendmail.cw` is now called `/etc/mail/local-host-names`, and so forth. If you have customized `sendmail.cf`(5) and friends, you will need to move the files to the new locations. See `/usr/share/sendmail/README` for more information.

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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(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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