NAME

INSTALL — Installation procedure for NetBSD/pmax.

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DESCRIPTION

About this Document

This document describes the installation procedure for NetBSD 3.0.1 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.

What is NetBSD?

The NetBSD Operating System is a fully functional Open Source UNIX -like operating system derived from the University of California, Berkeley Networking Release 2 (Net/2), 4.4BSD-Lite, and 4.4BSD-Lite2 sources. NetBSD runs on fifty four different system architectures (ports), featuring seventeen machine architectures across fifteen distinct CPU families, and is being ported to more. The NetBSD 3.0.1 release contains complete binary releases for many different system architectures. (A few ports are not fully supported at this time and are thus not part of the binary distribution. For information on them, please see the NetBSD web

site at .: **http://www.NetBSD.org/**)

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

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

Changes Between The NetBSD 3.0 release and 3.0.1 update

The NetBSD 3.0.1 update is the first security/critical update of the NetBSD 3.0 release branch. This represents a selected subset of fixes deemed critical in nature for stability or security reasons.

These fixes will also appear in future releases (NetBSD 3.1 etc), together with other less-critical fixes and feature enhancements.

Specific updates are as follows:

Kernel

- Hold kernel_lock while calling systrace_exit().
- In systrace_make_msg(), sleep uninterruptibly while waiting for the response from the systrace daemon, so that the message protocol between the kernel and the daemon doesn't get out of sync.
- RAIDframe: mark used spares as failed if they encounter IO errors.
- `wdc`(4): after a reset don't wait for drives to come ready if there are no drives (fixes a 30s hang after resume).
- Fix support in `wd`(4) for 1 and 2TB disks.
- Fix a bug in the fragment cache which could cause kernel panics (SA2006-004).
- Fix a crash caused by `azalia`(4) when a connection list has invalid NIDs.
- `aic`(4): work around an rbus resource allocation problem so cards work again.
- RAIDframe was erroneously re-initializing the Parity Stripe Status pool each time a new array was configured. This causes grief with things like 'vmstat -m' by causing it to loop. Make RAIDframe only initialize PSS bits once.
- `twe`(4): fix a memory leak in the TWEIO_GET_PARAM ioctl.
- Prevent system crashes caused by malformed ELF interpreters (SA2006-008).
- `usb`(4): Allow a NULL pointer as argument to usb_get_next_event(), and don't allocate a "struct usb_event" on stack in usb_add_event().
- Check the "oldlen" argument to `sysctl`(2) before passing it to `vslock`(9). This prevents a local DOS (SA2006-013).
- Use a `pmatch`(9) expression which should catch all present and future seagate drives larger than 200GB for the WD_QUIRK_FORCE_LBA48 quirks.
- Fix the 'audioctl of death' problem (SA2006-014).
- Limit the size of any kernel buffers allocated by the VOP_READDIR routines to MAXBSIZE.

Networking

- Make sure all `bridge`(4) structs are initialized to 0.
- Fix a memory disclosure in `bridge`(4) (SA2006-005).
- Use `sigaction`(2) to setup automatic disposal of child processes after daemonizing `rpc.statd`(8). This is more portable and avoids zombie `rpc.statd`(8) processes after an NFS client running e.g. Mac OS X shuts down.
- Prevent system crash when attempting to gather information about a non-existing alias of a network interface via the SIOCGIFALIAS ioctl (SA2006-012).
- Fix a panic caused by insufficient validation when parsing IPv6 socket options (SA2006-016).

File system

- Change union_unmount() to not play with the fs root vnode explicitly. Let it get recycled along with all of the others. This is important as if the root vnode has already been reclaimed, then we get a panic when we try to vget it.

Libraries

- xdr_rec.c missing a bugfix for an improper security check. The correct way to check for a zero record length is to check for it without the LAST_FRAG marker in it, since it's legal to send a LAST_FRAG marker with 0 bytes of data.
- `pam_nologin`(8): use the class of the user, not then default class, when checking for nologin and ignorelogin login.conf(5) capabilities.
- `pam_unix`(8): fix an uninitialized variable, and remove some unreachable code.
- Make PAM work on NetBSD ports without shared library support.
- Make password aging work again.
- Fix a bug in signal handling which could e.g get the MySQL daemon stuck in a tight loop after receiving a HUP signal.

Security

- Improve `rnd`(4) code probing for the Intel hardware RNG to avoid false detections (SA2006-009).
- `mail`(1) creates record file with insecure umask (SA2006-007).
- Fix a remote code execution vulnerability in sendmail (SA2006-010).
- A vulnerability was found in the `fast_ipsec`(4) stack that renders the IPSec anti-replay service ineffective under certain circumstances (SA2006-011).
- Fix a number of small security problems with the games.
- Fix an FPU Information leak on i386/amd64/Xen platforms with AMD CPUs (SA2006-015).
- Fix several integer overflows and NULL-pointer dereferences in freetype2.
- Fix a denial of service vulnerability in sendmail when handling malformed multipart MIME messages (SA2006-017).

Miscellaneous

- Sync the Nvidia drivers with XFree86's sources as of December 24th, 2005. These changes fix lots of problems (i.e. freezes) with the latest cards (such as a GeForce 6600GT).
- Give systrace its own version of realpath() that does what it wants, call it intercept_realpath(). Unbreaks systrace.
- `login`(1), `pam_securetty`(8): don't issue a different message for root login on an insecure terminal.
- Fix some unpaired sigblocks which possibly leave a process with all signals blocked (esp. apparant under Gnome).
- Fix a NULL pointer dereference in `ftp`(1).
- Make `sh`(1) expand "$@" correctly again.

acorn26 specific

- Avoid panics under NetBSD/acorn26 whenever a process exits.
- Stop NetBSD/acorn26 from allocating eight times as much pool memory as it needs, leading to a rapid exhaustion of physical memory. NetBSD/acorn26 now boots multi-user again.

amiga specific

- Installer: don't ask for the root device before the user had a chance to identify how it's called under NetBSD.

hp300 specific

- Fix the bootloader so it doesn't print garbage to the bitmap console.
- Fix a huge number of pkgsrc build problems.
- Fix boot failure problem on HP400t with fb console.
- Fix a problem with the probe of SCSI disks in the installer.

i386 specific

- Update pciide at pnpbios to work with the last changes to `wdc`(4), especially the deferral of drive probe.

m68k specific

- Fix a huge number of pkgsrc build problems.

mips specific

- Avoid kernel panics caused by binaries compiled with "-mips2" or better.
- Update FPE trapsignal functions for new siginfo.

powerpc specific

- Avoid pthreads program crashes.

sparc specific

- For GCC3 and later, use the __builtin_va* constructs. Avoids a build problem with Firefox.

xen specific

- Avoid dom0 kernel crash when destroying a domain with active I/O going.
- Fix the FPU problems detected by paranoia on a NetBSD/Xen guest.
- Check the destination ethernet address when not in promiscous mode. Fix a problem where packets would be duplicated, possibly looping, when a domU is doing IP routing.
- Avoid panics under high system load.

Changes Between The NetBSD 2.0 and 3.0 Releases

The NetBSD 3.0 release provides numerous significant functional enhancements, including support for many new devices, integration of hundreds of bug fixes, new and updated kernel subsystems, and many user-land enhancements. The result of these improvements is a stable operating system fit for production use that rivals most commercially available systems.

It is impossible to completely summarize a year of development that went into the NetBSD 3.0.1 release. Some highlights include:

Supported platforms and machines

- A port to new platform: iyonix. The iyonix port supports the Iyonix PC, which is a desktop computer from Castle Technology, based on a 600MHz XScale 80321 processor.
- The xen port now supports Xen 2.0, both in privileged and unprivileged mode.
- The evbarm port has support for the TS-7200 single board computer, which is also known as "the NetBSD Controlled Toaster".
- The sgimips port now supports IP12 (Personal Iris 4D/30, 4D/35, and Indigo R3K) machines.
- The PowerPC 601 support has been added, and the prep port now supports IBM RS/6000 60P 7020-011.

Supported devices

- Added `iteide`(4): driver for ITE 8212 IDE controller.
- Added `ixpide`(4): driver for ATI IXP series chipset IDE controller.
- Added `pdcsata`(4): driver for Promise SATA150 (aka PDC203xx) controllers.
- Added `ipw`(4): driver for Intel PRO/Wireless 2100.
- Added `iwi`(4): driver for Intel PRO/Wireless 2200AG/2915ABG.
- Added `rtw`(4): driver for Realtek RTL8180L IEEE 802.11b wireless network.
- Added `vge`(4): driver for VIA VT612X Gigabit Ethernet controller.
- Added `xge`(4): driver for Neterion Xframe-I 10 gigabit Ethernet.
- Added `cdce`(4): driver for CDC USB Ethernet.
- Added `atu`(4): driver for Atmel AT76C50x based 802.11b wireless network interfaces.
- Added `uep`(4): driver for eGalax USB touchpanel controller.

- Added ugensa(4): driver for USB generic serial adapter, which currently supports CDMA Wireless PC Card.
- Added auixp(4): driver for ATI IXP series chipset audio controller.
- Added auacer(4): driver for ALi M5455 audio controller.
- Added azalia(4): driver for High Definition Audio controller.
- Added spif(4): driver for Sun SUNW,spif multi-port Sbus card.
- viaide(4) now supports nForce2 Ultra 400, nForce3 250 IDE and SATA, and nForce4 IDE and SATA controllers. viaide(4) also supports VIA VT6421 SATA RAID controller though drives on the controller need to be configured into RAID/JOBS sets via its BIOS.
- siside(4) now supports SiS 180 and 741 SATA controllers.
- artsata(4), which is the Intel i31244 Serial ATA disk controller driver, now supports DPA mode.
- satalink(4) now supports Silicon Image 3512 SATA.
- piixide(4) now supports Intel 82801FB/FR (ICH6/6R) IDE and SATA, 82801FBM SATA, 82801G (ICH7) IDE and SATA, and i6300ESB IDE and SATA controllers. Also added basic support for RAID0 and RAID1 for the Adaptec HostRAID format as found on the Intel 6300ESB on-board RAID.
- stge(4) now works on big-endian machines including sparc64 with hardware checksums.
- aac(4) now supports Adaptec SATA RAID 2810SA.
- mpt(4) now supports LSI Logic FC919x SCSI controllers.
- spc(4) now has support for Fujitsu MB87030-based PCMCIA SCSI controller.
- bge(4) now supports Broadcom BCM5788, BCM5705K, BCM5721, and BCM5751M Gigabit Ethernet controllers, and has 802.3x flow control support.
- gem(4) and hme(4) now have hardware checksums support.
- re(4) and wm(4) now supports TCPv4 hardware transmit segment offload.
- wm(4) now supports more Intel Gigabit Ethernet chips and 64bit PCI DMA transfer,
- re(4) now supports Corega CG-LAPCIGT Gigabit Ethernet, and RTL8169 based CardBus Ethernet interfaces, including NetGear GA-511.
- ex(4) now supports 3Com 3c920B-EMB-WNM Integrated Fast Ethernet.
- sk(4) now supports Belkin Gigabit Desktop Network card.
- bce(4) now supports Broadcom BCM4401-B0 Ethernet.
- tl(4) now supports Compaq Netelligent 10 T/2 PCI UTP/Coax Controller.
- wi(4) now supports SMC2531W-B EliteConnect Wireless Adapter.
- fxp(4) now supports Intel 82801FB (ICH6) 10/100 Ethernet.
- tlp(4) now supports LinkSys PCMPC200 Cardbus Ethernet and ASIX AX88140A/AX88141 chipsets.
- Many improvements for atw(4) ADMtek ADM8211 802.11 wireless network driver.
- auich(4) now supports nForce2 Ultra 400, nForce3 250 MCP-T AC-97, nForce4, Intel ICH7, and Intel 6300ESB audio controllers.

- auvia(4) now supports suspend and resume.
- puc(4) now supports VS-Com PCI-210H 2S/1P card, VScom PCI-200 2S card, and ADDI-DATA APCI-7800 8-port serial adapter.
- uftdi(4) now supports Sealevel Systems' uftdi-based USB-Serial adapter.
- uvscom(4) now supports SUNTAC U-Cable type A4 USB serial adapter.
- pms(4) now supports synaptics touchpad.
- lm(4) now supports iTE IT8705f and Winbond 83627THF environment monitor controllers.
- Many bug fixes and improvements for ehci(4) USB 2.0 controllers.
- Many fixes for uaudio(4) devices.
- uax(4) ASIX AX88172 USB Ethernet driver has been replaced by axe(4) driver derived from FreeBSD.
- vnd(4) pseudo-device now support compressed image.

Kernel

- The i386 port now supports the Enhanced SpeedStep Technology.
- Added statvfs(2) family of system calls.
- Added ptm(4), pty/98 pty multiplexor device.
- Added swwdog(4), a software watchdog timer facility.
- Autoconfiguration framework is rewritten for device driver LKMs.
- compat_darwin(8) emulation now supports MacOS X.3 binaries.
- sparc64 and shark ports have switched to wscons(9), the machine-independent console framework. Additionally sparc64 port switched to a XFree86 based X server and now supports the cg6, mach64 and ffb/afb framebuffers with acceleration.
- Added new pselect(2) and pollts(2) synchronous I/O multiplexing system calls.
- Added another experimental buffer queue strategy, BUFQ_PRIOCSCAN, Per-priority cyclical scan. Note the existing strategy NEW_BUFQ_STRATEGY is renamed to BUFQ_READPRIO, since that gives priority to issuing read requests over write requests.
- The way to allocate a kernel structure, map entry, was improved so that it doesn't need preliminary knowledge of system load, i.e. users no longer have to define "options MAX_KMAPENT" in their kernel configurations even on busy servers.

Networking

- TCP now supports TCP Selective Acknowledgement Options (RFC 2018) for enhanced performance especially on long distance connections and TCP MD5 signatures (RFC 2385) for enhanced protection against attacks.
- TCP can take advantage of hardware-assisted TCP/IPv4 segmentation on re(4), wm(4) and xge(4) interfaces.
- The OpenBSD Packet Filter has been integrated as alternative packet filter solution.
- IP Filter has been upgraded to version 4.1.8.
- The KAME IPsec stack now supports ESP over NAT connections (RFC 3948).

- IPv4 Protocol Independent Multicast (PIM) routing support has been added.
- ipsec-tools 0.6.3 provide IKE support for ESP over NAT connections (RFC 3947), user authentication via XAuth and automatic network configurations of VPN clients via Mode Config.
- Added RFC 3378 EtherIP support, which makes it possible to add `gif`(4) interface to bridges.
- Added `tap`(4), the virtual Ethernet device.
- `ppp`(4) has been updated to 2.4.3.
- `gre`(4) now supports tunneling of the IPv6 Protocol.

File system

- UFS_DIRHASH support has been added from FreeBSD, which increase lookup performance by maintaining in-core hash tables for large directories on UFS.
- `fss`(4), file system snapshot support has been added.
- Added ptyfs, pseudo-terminal file system.
- CD9660 file system now supports UTF-8 filename on Joliet extension.
- Ext2fs now supports large files (larger than 2G bytes). `fsck_ext2fs`(8) also handles them and supports conversion from old file systems.
- The stability of the LFS file system has been improved.

Libraries

- Added PAM (Pluggable Authentication Modules framework).
- Support wide strings in C++.
- Re-entrant library functions like getpwent_r() have been added.
- Some libc string functions for i386 have been replaced with optimized version.
- Added DCE 1.1 RPC compatible UUID (Universally Unique Identifier) routines to libc.
- Added `memmem`(3) to libc, which is API compatible with the functions in FreeBSD and Linux.

Security

- The Veriexec framework is now using hash tables to store per-file data, resulting in much faster operation. It supports four different enforcement levels and full control over verbosity. Signature files are easier to generate and are more flexible than in the previous version.
- Added SHA2 to libc to provide more secure hashing algorithms and made cksum(1) and mtree(8) support them.

System administration and user tools

- Various improvements for the "sysinst" installation program, including Spanish language translation.
- Numerous improvements for `syslogd`(8), mostly from FreeBSD.
- `fsck`(8) now has a progress meter option.
- `dump`(8) now supports file system snapshots.
- Added `sockstat`(1), which lists open sockets.

- Added `seq`(1), a utility which prints a sequence of numbers, derived from Plan 9.

Miscellaneous

- `audio`(9) interface is improved. Added capability of audio software filter pipeline, which makes it easy for hardware drivers to add encoding support or sample rates support.
- Updates of most third party packages that are shipped in the base system to the following latest stable releases:
  - am-utils 6.1-rc2
  - BIND 9.3.0
  - binutils 2.15-20041204
  - cvs 1.11.20
  - file 4.13
  - gcc 3.3.3
  - groff 1.19.1
  - OpenSSH 3.9
  - OpenSSL 0.9.7d
  - Postfix 2.1.5
  - sendmail 8.13.3
  - tcpdump 3.8.3
  - texinfo 4.7
  - tzdata2005o
  - XFree86 4.5.0
- 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 5400 third party packages available in pkgsrc.

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.

pmax specific

This is the eighth major release of NetBSD for the DECstation and DECsystem family 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.

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

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

Sources of NetBSD

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

NetBSD 3.0.1 Release Contents

The root directory of the NetBSD 3.0.1 release is organized as follows:

`.../NetBSD-3.0.1/`

`CHANGES`	Changes since earlier NetBSD releases.
`LAST_MINUTE`	Last minute changes.
`MIRRORS`	A list of sites that mirror the NetBSD 3.0.1 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 3.0.1 has a binary distribution.

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

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

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

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

src This set contains all of the base NetBSD 3.0.1 sources which are not in **gnusrc**, **sharesrc**, or **syssrc**.
37 MB gzipped, 176 MB uncompressed

syssrc This set contains the sources to the NetBSD 3.0.1 kernel for all architectures; `config`(8); and `dbsym`(8).
26 MB gzipped, 140 MB uncompressed

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

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

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

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

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

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

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

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

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

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

NetBSD/pmax subdirectory structure

The pmax-specific portion of the NetBSD 3.0.1 release is found in the `pmax` subdirectory of the distribution: `.../NetBSD-3.0.1/pmax/`. It contains the following files and directories:

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

`binary/`
`kernel/`
`netbsd-GENERIC.gz`
A gzipped NetBSD kernel containing code for everything supported in this release.
`sets/` pmax binary distribution sets; see below.

`installation/`
`misc/`

Binary distribution sets

The NetBSD pmax binary distribution sets contain the binaries which comprise the NetBSD 3.0.1 release for the pmax. The binary distribution sets can be found in the `pmax/binary/sets` subdirectory of the NetBSD 3.0.1 distribution tree, and are as follows:

base The NetBSD 3.0.1 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.

20 MB gzipped, 73 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.
21 MB gzipped, 88 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.
4 MB gzipped, 9 MB uncompressed

kern-GENERIC
This set contains a NetBSD/pmax 3.0.1 `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.
8 MB gzipped, 30 MB uncompressed

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

text This set includes NetBSD's text processing tools, including `groff`(1), all related programs, and their manual pages.
3 MB gzipped, 9 MB uncompressed

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

xbase The basic files needed for a complete X client environment. This does not include the X servers.
7 MB gzipped, 24 MB uncompressed

xcomp The extra libraries and include files needed to compile X source code.
10 MB gzipped, 40 MB uncompressed

xfont Fonts needed by X.
31 MB gzipped, 39 MB uncompressed

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

xserver The X server. This includes the Xpmax server with man page.
5 MB gzipped, 15 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.

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

Installation is supported from several media types, including:

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

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

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

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. If you don't have DHCP available on your network, you will need to know the numeric IP address of that site, and, if it's not on a network directly connected to the machine on which you're installing or upgrading NetBSD, you need to know the numeric IP address of the router closest to the NetBSD machine. Finally, you need to know the numeric IP address of the NetBSD machine itself. If you don't have access to a functioning nameserver during installation, the IPv4 address of **ftp.NetBSD.org** is `204.152.184.75` and the IPv6 address is `2001:4f8:4:7:2e0:81ff:fe21:6563` (as of June, 2004).

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

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

NFS

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

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

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

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

Tape

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

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 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 distribu-

tion 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-3.0.1
# 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.

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 (including 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 3.0.1 CD-ROM.

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

```
# mount -r -t cd9660 /dev/cdX c /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 3.0.1. New bootblocks are in the tar file:

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

in the NetBSD 3.0.1 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 3.0.1 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 hard disk and a minimum of 8 MB of memory installed.
  - The hard disk 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 120 MB more.
- The Quick Installation
  - Boot the system as described above. You should be at the **sysinst** main menu.

```
.*******************************************.
* NetBSD-3.0.1 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 will be ok for most purposes. 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 the 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 if you want to use DHCP, and if not to provide 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 if you want to use DHCP, and if not to provide 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 3.0.1. You can now reboot the machine, and boot NetBSD from hard disk.

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. Instead of manually configuring network and naming service, DHCP can be used by setting `dhclient=YES` in `/etc/rc.conf`.

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

2. Logging in

   After reboot, you can log in as `root` at the login prompt. Unless you've set a password in **sysinst**, there is no initial password. If you're using the machine in a networked environment, you should create an account for yourself (see below) and protect it and the "root" account with good passwords. By default, root login from the network is disabled (even via `ssh`(1)). One way to become root over the network is to log in as a different user that belongs to group "wheel" (see `group`(5)) and use `su`(1) to become root.

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

3. Adding accounts

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

4. The X Window System

   If you have installed the X Window System, look at the files in `/usr/X11R6/lib/X11/doc` for information.

   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 `3.0.1/pmax/All` subdir. You can install them with the following commands under `sh`(1):

  ```
  # PKG_PATH=ftp://ftp.NetBSD.org/pub/NetBSD/packages/3.0.1/pmax/All
  # export PKG_PATH
  # pkg_add -v tcsh
  # pkg_add -v bash
  # pkg_add -v perl
  # pkg_add -v apache
  # pkg_add -v kde
  # pkg_add -v mozilla
  ...
  ```

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

  ```
  # setenv PKG_PATH ftp://ftp.NetBSD.org/pub/NetBSD/packages/3.0.1/pmax/All
  ...
  ```

  The above commands will install the Tenex-csh and Bourne Again shell, the Perl programming language, Apache web server, KDE desktop environment and the Mozilla web browser as well as all the packages they depend on.
- Package sources for compiling packages on your own can be obtained by retrieving the file
  ftp://ftp.NetBSD.org/pub/NetBSD/NetBSD-current/tar_files/pkgsrc.tar.gz
  They are typically extracted into `/usr/pkgsrc` (though other locations work fine), with the commands:

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

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

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

     ```
     # man 5 filename
     ```

     is likely to give you more information on these files.

Upgrading a previously-installed NetBSD System

The upgrade to NetBSD 3.0.1 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 kernel, the boot blocks on your NetBSD partition, 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 the NetBSD partition or on another operating system's partition on your disk before beginning the upgrade process.

The upgrade procedure using the **`sysinst`** tool is similar to an installation, but without the hard disk partitioning. **`sysinst`** will attempt to merge the settings stored in your `/etc` directory with the new version of NetBSD. 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 3.0.1 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 3.0.1.

Issues affecting an upgrade from NetBSD 2.1 and older releases.

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

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

for documentation about PAM.

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

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

Issues fixed by *postinstall*:

- Various files in `/etc` need upgrading. These include:
  - `/etc/defaults/*`

- /etc/mtree/*
- /etc/pam.d/*
- /etc/daily
- /etc/weekly
- /etc/monthly
- /etc/security
- /etc/rc.subr
- /etc/rc
- /etc/rc.shutdown
- /etc/rc.d/*

The following issues need to be resolved manually:

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

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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