NAME

INSTALL — Installation procedure for NetBSD/sun2.

CONTENTS

About this Document....2
What is NetBSD?....2
Changes Between The NetBSD 3.0 release and 3.0.1 update....2
Kernel....2
Networking....3
File system....3
Libraries....3
Security....4
Miscellaneous....4
acorn26 specific....4
amiga specific....4
hp300 specific....5
i386 specific....5
m68k specific....5
mips specific....5
powerpc specific....5
sparc specific....5
xen specific....5
Changes Between The NetBSD 2.0 and 3.0 Releases....5
Supported platforms and machines....5
Supported devices....6
Kernel....7
Networking....8
File system....8
Libraries....9
Security....9
System administration and user tools....9
Miscellaneous....9
sun2 specific....10
The Future of NetBSD....10
Sources of NetBSD....10
NetBSD 3.0.1 Release Contents....10
NetBSD/sun2 subdirectory structure....12
Binary distribution sets....12
NetBSD/sun2 System Requirements and Supported Devices....14
Supported hardware....14
Getting the NetBSD System on to Useful Media....14
Creating boot/install tapes....15
Boot/Install from NFS server....15
Install/Upgrade from CD-ROM....16
Install/Upgrade via FTP....16
Preparing your System for NetBSD installation....16
Installing the NetBSD System....16
Installing from tape....16
Installing from NFS....17
Installing from SunOS....18

Booting the Miniroot 19
Miniroot install program 19
Post installation steps.....19
Upgrading a previously-installed NetBSD System.....22
Compatibility Issues With Previous NetBSD Releases.....23
Issues affecting an upgrade from NetBSD 2.1 and older 23
Using online NetBSD documentation.....24
Administrivia.....24
Thanks go to.....25
We are.....31
Legal Mumbo-Jumbo.....38
The End.....42

DESCRIPTION

About this Document

This document describes the installation procedure for NetBSD 3.0.1 on the *sun2* 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.

sun2 specific

This is the third major release of NetBSD/sun2.

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/sun2 subdirectory structure

The sun2-specific portion of the NetBSD 3.0.1 release is found in the `sun2` subdirectory of the distribution: `.../NetBSD-3.0.1/sun2/`. 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/` sun2 binary distribution sets; see below.

`installation/`
`miniroot/`
sun2 miniroot file system image; see below.
`misc/`
`netboot/`
Two programs needed to boot sun2 kernels over the network.
`tapeimage/`
Tape boot program, and two shell scripts used to prepare tapes.

Binary distribution sets

The NetBSD sun2 binary distribution sets contain the binaries which comprise the NetBSD 3.0.1 release for the sun2. The binary distribution sets can be found in the `sun2/binary/sets` subdirectory of the NetBSD 3.0.1 distribution tree, and are as follows:

base The NetBSD 3.0.1 sun2 **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.
53 MB gzipped, 118 . 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.
13 MB gzipped, 46 . 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.
-unknown- MB gzipped, -unknown- MB uncompressed

kern-GENERIC
This set contains a NetBSD/sun2 3.0.1 `GENERIC` kernel, named `/netbsd`. You *must* install this distribution set.
-unset- MB gzipped, -unset- 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.
-unknown- MB gzipped, -unknown- MB uncompressed

NetBSD maintains its own set of sources for the X Window System in order to assure tight integration and compatibility. NetBSD/sun2 currently does not ship with an X server or X clients. 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.
-unknown- MB gzipped, -unknown- MB uncompressed

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

xfont Fonts needed by X.
-unknown- MB gzipped, -unknown- MB uncompressed

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

xserver The X server.
-unknown- MB gzipped, -unknown- MB uncompressed

The sun2 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.

There is a collection of Sun2 kernels in the `sun2/binary/kernel` subdirectory of the NetBSD 3.0.1 distribution. The one named `netbsd-RAMDISK.gz` contain a root file system image and should only be used for the initial installation. The others are included for convenience. (Most people will want to use `netbsd-GENERIC.gz` or `netbsd-FOURMEG.gz` as appropriate.) Please note that these kernels are simply gzipped and are not tar archives.

Note: Each directory in the sun2 binary distribution also has its own checksum files, just as the source distribution does.

NetBSD/sun2 System Requirements and Supported Devices

NetBSD/sun2 3.0.1 runs on Multibus Sun2 machines, including:

2/120 2/170 2/100U

The minimal configuration requires 4 MB of RAM and about 130 MB of disk space. To install the entire system requires much more disk space (approx. 100 MB additional space is necessary for full sources). To compile the system, more RAM is recommended. Good performance requires 7 MB of RAM.

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

Partition	Suggested	Needed
/ (root)	20 MB	15 MB
/usr	210 MB	110 MB
/var	20 MB	5 MB
swap	*2*RAM* ...	

Anything else is up to you!

As you may note, the recommended size of `/usr` is 100 MB greater than needed. This is to leave room for a kernel source and compile tree as you will probably want to compile your own kernel. (`GENERIC` is large and bulky to accommodate all people).

Note that the sun2 installation procedure uses a *miniroot* image which is placed into the swap area of the disk. The swap partition must be at least as large as the miniroot image (12 MB).

Supported hardware

- Serial ports (RS232)
  - built-in ttya, ttyb
  - ttyc, ttyd, ttye, ttyf on first sc SCSI
  - ttyg, ttyh, ttyi, ttyj on second sc SCSI
- Video adapters
  - bwtwo
- Network interfaces:
  - Multibus Intel Ethernet
  - Multibus 3Com Ethernet
- SCSI
  - Most SCSI disks, tapes, CD-ROMs, etc
  - Multibus Sun-2 SCSI (*sc*)
- Input devices
  - Sun keyboard and mouse
- Miscellaneous
  - Battery-backed real-time clock.

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

Getting the NetBSD System on to Useful Media

Installation is supported from several media types, including:

- Tape
- NFS
- CD-ROM
- FTP

Note: Installing on a 'bare' machine requires some bootable device; either a tape drive or Sun-compatible NFS server.

The procedure for transferring the distribution sets onto installation media depends on the type of media. Instructions for each type of media are given below.

In order to create installation media, you will need all the files in the directory

```
.../NetBSD-3.0.1/sun2/
```

Creating boot/install tapes

Installing from tape is the simplest method of all. This method uses two tapes; one called the *boot* tape, and another called the *install* tape.

The boot tape is created as follows:

```
# cd .../NetBSD-3.0.1/sun2/installation/tapeimage
# sh MakeBootTape /dev/nrst0
```

The install tape is created as follows:

```
# cd .../NetBSD-3.0.1/sun2/installation/tapeimage
# sh MakeInstallTape /dev/nrst0
```

If the tapes do not work as expected, you may need to explicitly set the EOF mark at the end of each tape segment. It may also be necessary to use the **conv=osync** argument to dd(1). Note that this argument is incompatible with the **bs=** argument. Consult the tape-related manual pages on the system where the tapes are created for more details.

Boot/Install from NFS server

If your machine has a disk and network connection, but no tape drive, it may be convenient for you to install NetBSD over the network. This involves temporarily booting your machine over NFS, just long enough so you can initialize its disk. This method requires that you have access to an NFS server on your network so you can configure it to support diskless boot for your machine. Configuring the NFS server is normally a task for a system administrator, and is not trivial.

If you are using a NetBSD system as the boot-server, have a look at the diskless(8) manual page for guidelines on how to proceed with this. If the server runs another operating system, consult the documentation that came with it (i.e. add_client(8) on SunOS).

When instructed to boot over the network, your sun2 expects to be able to download first and second stage bootstrap programs via ND, the Network Disk protocol. The ndbootd(8) program will attempt to serve a second-stage bootstrap file using a name derived from the machine's recently acquired IP address and an extension which corresponds to the machine architecture. (It may be handy to have a hexadecimal calculator for this next step.) The filename prefix is created by converting the machine's assigned IP address into hexadecimal, most-significant octet first, using uppercase characters for the non-decimal (A-F) digits. The filename suffix used by all sun2 machines is SUN2.

For example, a sun2 which has been assigned IP address 130.115.144.11 will be served a second-stage bootstrap file named 8273900B.SUN2. Normally, this file is a symbolic link to the NetBSD/sun2 netboot program, which should be located in a place where the ndbootd(8) daemon can find it. The netboot pro-

gram may be found in the `installation/netboot` directory of this distribution.

The netboot program will query a bootparamd server to find the NFS server address and path name for its root, and then load a kernel from that location. The server should have a copy of the `netbsd-RAMDISK` kernel in the root area for your client, hard-linked under the names `netbsd` and `vmunix` (no other files are needed in the client root) and `/etc/bootparams` on the server should have an entry for your client and its root directory. The client will need access to the miniroot image, which can be provided using NFS or remote shell.

If you will be installing NetBSD on several clients, it may be useful to know that you can use a single NFS root for all the clients as long as they only use the `netbsd-RAMDISK` kernel. There will be no conflict between clients because the RAM-disk kernel will not use the NFS root. No swap file is needed; the RAM-disk kernel does not use that either.

Install/Upgrade from CD-ROM

This method requires that you boot from another device (i.e. tape or network, as described above). You may need to make a boot tape on another machine using the files provided on the CD-ROM. Once you have booted netbsd-rd (the RAM-disk kernel) and loaded the miniroot, you can load any of the distribution sets directly from the CD-ROM. The **`install`** program in the miniroot automates the work required to mount the CD-ROM and extract the files.

Install/Upgrade via FTP

This method requires that you boot from another device (i.e. tape or network, as described above). You may need to make a boot tape on another machine using the files in `installation/tapeimage` and `binary/kernel` (which you get via FTP). Once you have booted `netbsd-RAMDISK` (the RAM-disk kernel) and loaded the miniroot, you can load any of the distribution sets over the net using FTP. The **`install`** program in the miniroot automates the work required to configure the network interface and transfer the files.

The preparations for this installation/upgrade method are easy; all you make sure that there's some 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.

Preparing your System for NetBSD installation

Sun2 machines usually need little or no preparation before installing NetBSD, other than the usual, well advised precaution of *backing up all data* on any attached storage devices.

You will need to know the SCSI target ID of the drive on which you will install NetBSD.

Note: SunOS on the sun2 uses confusing names for the SCSI devices: target 1 is `sd2`, target 2 is `sd4`, etc.

Installing the NetBSD System

Installing NetBSD is a relatively complex process, but if you have this document in hand it should not be too difficult.

There are several ways to install NetBSD onto your disk. If your machine has a tape drive the easiest way is **Installing from tape** (details below). If your machine is on a network with a suitable NFS server, then **Installing from NFS** is the next best method. Otherwise, if you have another Sun machine running SunOS you can initialize the disk on that machine and then move the disk. (Installing from SunOS is not recommended.)

Installing from tape

Create the NetBSD/sun2 3.0.1 boot tape as described in the section entitled **Creating boot/install tapes** and boot the tape. At the PROM monitor prompt, use one of the commands:

```
b st()
b st(0,8,0)
```

The first example will use the tape on SCSI target 4, where the second will use SCSI target 5. The is the monitor prompt.

After the tape loads, you should see many lines of configuration messages, and then the following 'welcome' screen:

```
            Welcome to the NetBSD/sun2 RAMDISK root!

This environment is designed to do only three things:
1:  Partition your disk (use the command:  edlabel /dev/rsd0c)
2:  Copy a miniroot image into the swap partition  (/dev/rsd0b)
3:  Reboot (using the swap partition, i.e. /dev/sd?b).

Note that the sun2 firmware cannot boot from a partition located
more than 1 GB from the beginning of the disk, so the swap partition
should be completely below the 1 GB boundary.

Copying the miniroot can be done several ways, allowing
the source of the miniroot image to be on any of these:
    boot tape,  NFS server, TFTP server, rsh server

The easiest is loading from tape, which is done as follows:
        mt -f /dev/nrst0 rewind
        mt -f /dev/nrst0 fsf 2
        dd bs=32k if=/dev/nrst0 of=/dev/rsd0b
(For help with other methods, please see the install notes.)

To reboot using the swap partition, first use "halt",
then at the PROM monitor prompt use a command like:
        b sd(,,1) -s

To view this message again, type:  cat /.welcome
```

Copy the miniroot as described in the welcome message, and reboot from that just installed miniroot. See the section entitled **Booting the miniroot** for details.

Installing from NFS

Before you can install from NFS, you must have already configured your NFS server to support your machine as a diskless client. Instructions for configuring the server are found in the section entitled **Getting the NetBSD System onto Useful Media** above.

First, at the Sun PROM monitor prompt, enter a boot command using the network interface as the boot device. If your machine has Intel Ethernet, this is *ie*, and if it has 3Com Ethernet, this is *ec*. Examples:

```
b ie() -s
b ec() -s
```

After the boot program loads the RAMDISK kernel, you should see the welcome screen as shown in the **Installing from tape** section above. You must configure the network interface before you can use any network resources. For example the command:

```
ssh ifconfig ie0 inet 192.233.20.198 up
```

will bring up the network interface with that address. The next step is to copy the miniroot from your server. This can be done using either NFS or remote shell. (In the examples that follow, the server has IP address 192.233.20.195.) You may then need to add a default route if the server is on a different subnet:

```
ssh route add default 192.233.20.255 1
```

You can look at the route table using:

```
ssh route show
```

Now mount the NFS file system containing the miniroot image:

```
ssh mount -o rdonly,-r=1024 192.233.20.195:/server/path /mnt
```

The procedure is simpler and much faster if you have space for an expanded (not compressed) copy of the miniroot image. In that case:

```
ssh dd if=/mnt/miniroot.fs of=/dev/rsd0b bs=8k
```

Otherwise, you will need to use **zcat** to expand the miniroot image while copying. This is tricky because the **ssh** program (small shell) does not handle sh(1) pipeline syntax. Instead, you first run the reader in the background with its input set to /dev/pipe and then run the other program in the foreground with its output to /dev/pipe. The result looks like this:

```
ssh run -bg dd if=/dev/pipe of=/dev/rsd0b obs=8k
ssh run -o /dev/pipe zcat /mnt/install/miniroot.fs.gz
```

To load the miniroot using rsh to the server, you would use a pair of commands similar to the above. Here is another example:

```
ssh run -b dd if=/dev/pipe of=/dev/rsd0b obs=8k
ssh run -o /dev/pipe rsh 192.233.20.195 zcat miniroot.fs.gz
```

Note that decompression on a sun2 is *extremely* slow, be prepared to wait. For this reason, expanding the miniroot image on the NFS server is highly recommended.

Once the miniroot has been copied using one of the above methods, you reboot from that just installed miniroot. See the section entitled **Booting the miniroot** for details.

Installing from SunOS

To install NetBSD/sun2 onto a machine already running SunOS, you will need the miniroot image (miniroot.fs.gz) and some means to decompress it.

First, boot SunOS and place the miniroot file onto the hard drive. If you do not have **gzip** for SunOS, you will need to decompress the image elsewhere before you can use it.

Next, bring SunOS down to single user mode to insure that nothing will be using the swap space on your drive. To be extra safe, reboot the machine into single-user mode rather than using the **shutdown** command.

Now copy the miniroot image onto your swap device (here /dev/rsd0b) with the command

```
gzip -dc miniroot.fs.gz | dd of=/dev/rsd0b obs=32k
```

or if you have already decompressed the miniroot

```
dd if=miniroot.fs of=/dev/rsd0b obs=32k
```

Finally, reboot the machine and instruct the PROM to boot from the swap device as described in the next section.

Booting the Miniroot

If the machine is not already at the PROM monitor, run the `halt` command.

If the miniroot was installed on partition '`b`' of the disk with SCSI target ID=0 then the PROM boot command would be:

```
b sd(0,0,1) -s
```

With SCSI target ID=2, the PROM is:

```
b sd(0,10,1) -s
```

The numbers in parentheses above are:

1. controller (usually zero)
2. unit number (SCSI-ID * 8, in hexadecimal)
3. partition number

Miniroot install program

The miniroot's install program is very simple to use. It will guide you through the entire process, and is well automated. Additional improvements are planned for future releases.

The miniroot's install program will:

- Allow you to place disklabels on additional disks. The disk we are installing on should already have been partitioned using the RAMDISK kernel.
- Create file systems on target partitions.
- Allow you to set up your system's network configuration. Remember to specify host names without the domain name appended to the end. For example use `foo` instead of `foo.bar.org`. If, during the process of configuring the network interfaces, you make a mistake, you will be able to re-configure that interface by simply selecting it for configuration again.
- Mount target file systems. You will be given the opportunity to manually edit the resulting `/etc/fstab`.
- Extract binary sets from the media of your choice.
- Copy configuration information gathered during the installation process to your root file system (`/`).
- Make device nodes in your root file system under `/dev`.
- Copy a new kernel onto your root partition (`/`).
- Install a new boot block.
- Check your file systems for integrity.

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

Post installation steps

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

1. Configuring `/etc/rc.conf`

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

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

   and with the root file system (`/`) mounted read-only. When the system asks you to choose a shell, simply press `RETURN` to get to a `/bin/sh` prompt. If you are asked for a terminal type, respond with **vt220** (or whatever is appropriate for your terminal type) 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=vt220
   ```

   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_de0="inet 123.45.67.89 netmask 255.255.255.0"
   ```

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

   ```
   ifconfig_de0="inet myname.my.dom netmask 255.255.255.0"
   ```

   To enable proper hostname resolution, you will also want to add an `/etc/resolv.conf` file or (if you are feeling a little more adventurous) run `named`(8). See `resolv.conf`(5) or `named`(8) for more information. 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/sun2/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/sun2/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/sun2/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 com-

mands:

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

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

6. Misc

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

     ```
     # man 5 filename
     ```

     is likely to give you more information on these files.

Upgrading a previously-installed NetBSD System

It is possible to easily upgrade your existing NetBSD/sun2 system using the upgrade program in the miniroot. If you wish to upgrade your system by this method, simply select the **upgrade** option once the miniroot has booted. The upgrade program with then guide you through the procedure. The upgrade program will:

- Enable the network based on your system's current network configuration.
- Mount your existing file systems.
- Extract binary sets from the media of your choice.
- Make new device nodes in your root file system under `/dev`.
- Copy a new kernel onto your root partition (`/`).

  Note: the existing kernel *will not* be backed up; doing so would be pointless, since older kernels may not be capable of running NetBSD 3.0.1 executables.
- Install a new boot block.
- Check your file systems for integrity.

Using the miniroot's upgrade program is the preferred method of upgrading your system.

However, it is possible to upgrade your system manually. To do this, follow the following procedure:

- Place *at least* the **base** binary set in a file system accessible to the target machine. A local file system is preferred, since the NFS subsystem in the NetBSD 3.0.1 kernel may be incompatible with your old binaries.
- Back up your pre-existing kernel and copy the 3.0.1 kernel into your root partition (`/`).
- Reboot with the 3.0.1 kernel into single-user mode. (Otherwise you can not install the boot block.)
- Check all file systems:

```
# /sbin/fsck -pf
```

- Mount all local file systems:

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

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

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

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

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

- Install a new boot block: (assuming root is on `/dev/rsd0a`)

```
# cd /usr/mdec
# cp -p ./ufsboot /mnt/ufsboot
# sync ; sleep 1 ; sync
# /usr/sbin/installboot -v /dev/rsd0a bootxx /ufsboot
```

- Sync the file systems:

```
sync
```

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

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

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

Compatibility Issues With Previous NetBSD Releases

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

Thanks go to

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

  Keith Bostic
  Ralph Campbell
  Mike Karels
  Marshall Kirk McKusick

  for their ongoing work on BSD systems, support, and encouragement.
- The Internet Systems Consortium, Inc. for hosting the NetBSD FTP, CVS, AnonCVS, mail, mail archive, GNATS, SUP, Rsync and WWW servers.
- The Internet Research Institute in Japan for hosting the server which runs the CVSweb interface to the NetBSD source tree.
- The Helsinki University of Technology in Finland for hosting the NetBSD backup CVS and backup server.
- SSH Communications Security in Finland for operating the backup server.
- The many organizations that provide NetBSD mirror sites.
- Without CVS, this project would be impossible to manage, so our hats go off to Brian Berliner, Jeff Polk, and the various other people who've had a hand in making CVS a useful tool.
- The following individuals and organizations (each in alphabetical order) have made donations or loans of hardware and/or money, to support NetBSD development, and deserve credit for it:

  AMD - Advanced Micro Devices, Inc.
  ASA Computers
  Aaron Wall
  ABE Masayuki
  AboveNet Communications, Inc.
  Achim Grolms
  Adam Kasper
  Adaptec

Advanced System Products, Inc.
Akihiro IIJIMA
Alex Poylisher
Algorithmics, Ltd.
Alistair Crooks
Allegro Networks
Aloys Keller
Andreas Berg
Andreas Jellinghaus
Andrew Brown
Andrew Gillham
Andy Hagans
Antonio Larripa
Arend Harrewijne
Armijn Hemel
Atsushi YOKOYAMA
Avalon Computer Systems
Bay Area Internet Solutions
Ben Collver
Benoit Lepage
Bernhard Moellemann
Bill Coldwell
Bill Sommerfeld
Bill Squier
Brad Salai
Brains Corporation, Japan
Brian Carlstrom
Brian McGroarty
Brian Mitchell
Canada Connect Corporation
Carl Shapiro
Castor Fu
Central Iowa (Model) Railroad
Charles Conn
Charles D. Cranor
Charles M. Hannum
Chris Legrow
Chris Townsend
Christer O. Andersson
Christopher G. Demetriou
Christos Zoulas
Chuck Silvers
Cologne Chip AG
Computer und Literatur Verlag
Computertechnik Krienke & Nolte
Computing Services Department, The University of Liverpool
Convert Tools
Co-operative Research Centre for Enterprise Distributed
Curt Sampson
DAYOMON from Japan
Damicon Kraa, Finland
Daniel de Kok

Dave Burgess
Dave Rand
Dave Tyson
David Brownlee
Dayton Clark
Demon Internet, UK
Derek Fellion
Digital Equipment Corporation
Distributed Processing Technology
Distro Jockey
Douglas J. Trainor
Dr.ir. F.W. Dillema
Easynet, UK
Ed Braaten
Edward Richley
emuty
Eric and Rosemary Spahr
Erik Berls
Erik E. Fair
Erkki Ruohtula
Ernst Lehmann
Espen Randen
Ewald Kicker
Florent Parent
Frank Kardel
Free Hardware Foundation
Front Range ∗BSD User Group
FUKAUMI Naoki
Gan Uesli Starling
Garth R. Patil
Geert Hendrickx (ghen)
Geert Jan de Groot
GK Meier
Gordon Zaft
Grant Beattie
Greg Gingerich
Greg Girczyc
Guenther Grau
HP Sweden
Hanno Wagner
Hans Huebner
Harald Koerfgen
Haroon Khalid
Harry McDonald
Hauke Fath
Heiko W. Rupp
Herb Peyerl
Hernani Marques Madeira
Hidekichi Ookubo
Hideyuki Kido
Hisashi Fujinaka
Holger Weiss

Hubert Feyrer
IBM Corporation
IMAI Kiyoshi
Innovation Development Enterprises of America
Intel
Internet Software Consortium
Internet Users Forever IKI
Interoute Telecommunications, UK
JNUG (raised at JNUG meeting & BOF August 2005)
James Bursa
James Chacon
Jan Joris Vereijken
Jason Birnschein
Jason Brazile
Jason R. Thorpe
Jeff Rizzo
Jeff Woodall - Portland, OR
Jens Schoenfeld
Jim Wise
Joachim Nink
Joachim Thiemann
Joel CARNAT
John Heasley
John Kohl
John P. Refling
Jonathan P. Kay
Jordan K. Hubbard
Jorgen Lundman
Karl Wagner
Kenji Hisazumi
Kenneth Alan Hornstein
Kenneth P. Stox
Kevin Keith Woo
Kevin Sullivan
Klaus Lichti
Kimmo Suominen
Korea BSD User Forum
Krister Waldfridsson
Kwok Ng
Lars Mathiassen
Lehmanns Fachbochhandlung
Lex Wennmacher
LinuxFest Northwest
Luke Maurits
Luke Mewburn
MS Macro System GmbH, Germany
Maki Kato
Marc Tooley
Marcus Wyremblewski
Mark Brinicombe
Mark Houde
Mark Perkins

Mark S. Thomas
Mason Loring Bliss
Martin Cernohorsky
Martin J. Ekendahl
Matt Dainty
Matt Thomas
Matthew Jacob
Matthew Sporleder
Matthias Scheler
Mattias Karlsson
Mel Kravitz
Michael Graff
Michael "Kvedulv" Moll
Michael L. Hitch
Michael Richardson
Michael Thompson
Michael W. James
Mike Price
Mirko Thiesen (Thiesi)
Murphy Software BV, Netherlands
Neil J. McRae
Noah M. Keiserman
Norman R. McBride
Numerical Aerospace Simulation Facility, NASA Ames Research
Olaf "Rhialto" Seibert
Oliver Cahagne
Oppedahl & Larson LLP
Palle Lyckegaard
Paul Ripke
Paul Southworth
Pawel Rogocz
Pearson Education
Perry E. Metzger
Petar Bogdanovic
Peter C. Wallace
Peter J. Bui
Peter Postma
Petri T. Koistinen
Phil Thomas
Piermont Information Systems Inc.
Pierre-Philipp Braun
Precedence Technologies Ltd
Public Access Networks Corporation
Ralph Campbell
Randy Ray
Real Weasel
Reinoud Zandijk
Renewed Health Company
Richard Nelson
Rob Windsor
Robert Pankratz
Robert Thille

Roland Lichti
Ross Harvey
Ryan Campbell
SDF Public Access Unix, Inc. 501(c)(7)
SMC Networks Inc.
Salient Systems Inc.
Sander van Dijk
Scott Ellis
Scott Kaplan
Scott Walters
Sean Davis
Simon Burge
Soren Jacobsen
Soren Jorvang
Stephen Borrill
Stephen Early
Steve Allen
Steve Wadlow
Steven M. Bellovin
SunROOT# Project
Sylvain Schmitz
Takahiro Kambe
TAKEUCHI Yoji
Tamotsu Kanoh
Tasis Michalakopoulos (Athens, Greece)
Tatoku Ogaito
Ted Lemon
Ted Spradley
The Names Database
The NetBSD Mission
The People's Republic of Ames
Thierry Lacoste
Thierry Laronde
Thomas Runge
Thor Lancelot Simon
Tim Law
Timo Scholer
Tino Hanich
Tino Wildenhain
Tom Coulter
Tom Ivar Helbekkmo
Tom Lyon
Tomas Dabasinskas
Torsten Harenberg
Toru Nishimura
Toshiba
Turbocat's Development
Tyler Sarna
UTN Web Directory
VMC Harald Frank, Germany
Warped Communications, Inc.
Wasabi Systems, Inc.

Whitecross Database Systems Ltd.
William Gnadt
Worria Affordable Web Hosting
Worria Web Hosting
wwwTrace Traceroute Server Directory
Yusuke Yokota
Zach Metzinger

(If you're not on that list and should be, tell us! We probably were not able to get in touch with you, to verify that you wanted to be listed.)

– Finally, we thank all of the people who've put sweat and tears into developing NetBSD since its inception in January, 1993. (Obviously, there are a lot more people who deserve thanks here. If you're one of them, and would like to mentioned, tell us!)

We are...

(in alphabetical order)

The NetBSD core group:

Allen Briggs	briggs@NetBSD.org
Matt Thomas	matt@NetBSD.org
Valeriy E. Ushakov	uwe@NetBSD.org
YAMAMOTO Takashi	yamt@NetBSD.org
Christos Zoulas	christos@NetBSD.org

The portmasters (and their ports):

Allen Briggs	briggs@NetBSD.org	**sandpoint**
Anders Magnusson	ragge@NetBSD.org	**vax**
Andrey Petrov	petrov@NetBSD.org	**sparc64**
Ben Harris	bjh21@NetBSD.org	**acorn26**
Chris Gilbert	chris@NetBSD.org	**cats**
Christian Limpach	cl@NetBSD.org	**xen**
Eduardo Horvath	eeh@NetBSD.org	**evbppc**
Frank van der Linden	fvdl@NetBSD.org	**amd64**
Frank van der Linden	fvdl@NetBSD.org	**i386**
Gavan Fantom	gavan@NetBSD.org	**iyonix**
IWAMOTO Toshihiro	toshii@NetBSD.org	**hpcarm**
Ichiro Fukuhara	ichiro@NetBSD.org	**hpcarm**
Ignatios Souvatzis	is@NetBSD.org	**amiga**
Izumi Tsutsui	tsutsui@NetBSD.org	**hp300**
Izumi Tsutsui	tsutsui@NetBSD.org	**news68k**
Jason Thorpe	thorpej@NetBSD.org	**algor**
Jason Thorpe	thorpej@NetBSD.org	**evbarm**
Jason Thorpe	thorpej@NetBSD.org	**shark**
Jeremy Cooper	jeremy@NetBSD.org	**sun3**
Jonathan Stone	jonathan@NetBSD.org	**pmax**
Julian Coleman	jdc@NetBSD.org	**atari**
Jun-ichiro itojun Hagino	itojun@NetBSD.org	**evbsh3**
Jun-ichiro itojun Hagino	itojun@NetBSD.org	**mmeye**

Kazuki Sakamoto	sakamoto@NetBSD.org	**bebox**
Lennart Augustsson	augustss@NetBSD.org	**pmppc**
Marcus Comstedt	marcus@NetBSD.org	**dreamcast**
Martin Husemann	martin@NetBSD.org	**sparc64**
Matt DeBergalis	deberg@NetBSD.org	**next68k**
Matt Fredette	fredette@NetBSD.org	**hp700**
Matt Fredette	fredette@NetBSD.org	**sun2**
Matt Thomas	matt@NetBSD.org	**alpha**
Matt Thomas	matt@NetBSD.org	**netwinder**
Matthias Drochner	drochner@NetBSD.org	**cesfic**
NISHIMURA Takeshi	nsmrtks@NetBSD.org	**x68k**
NONAKA Kimihiro	nonaka@NetBSD.org	**prep**
Nathan Williams	nathanw@NetBSD.org	**sun3**
Noriyuki Soda	soda@NetBSD.org	**arc**
Paul Kranenburg	pk@NetBSD.org	**sparc**
Phil Nelson	phil@NetBSD.org	**pc532**
Reinoud Zandijk	reinoud@NetBSD.org	**acorn32**
Ross Harvey	ross@NetBSD.org	**alpha**
Søren Jørvang	soren@NetBSD.org	**cobalt**
Søren Jørvang	soren@NetBSD.org	**sgimips**
Scott Reynolds	scottr@NetBSD.org	**mac68k**
Shin Takemura	takemura@NetBSD.org	**hpcmips**
Simon Burge	simonb@NetBSD.org	**evbmips**
Simon Burge	simonb@NetBSD.org	**evbppc**
Simon Burge	simonb@NetBSD.org	**pmax**
Simon Burge	simonb@NetBSD.org	**sbmips**
Steve Woodford	scw@NetBSD.org	**evbsh5**
Steve Woodford	scw@NetBSD.org	**mvme68k**
Steve Woodford	scw@NetBSD.org	**mvmeppc**
Tohru Nishimura	nisimura@NetBSD.org	**luna68k**
Tsubai Masanari	tsubai@NetBSD.org	**macppc**
Tsubai Masanari	tsubai@NetBSD.org	**newsmips**
UCHIYAMA Yasushi	uch@NetBSD.org	**hpcsh**
UCHIYAMA Yasushi	uch@NetBSD.org	**playstation2**
Wayne Knowles	wdk@NetBSD.org	**mipsco**
Wolfgang Solfrank	ws@NetBSD.org	**ofppc**

The NetBSD 3.0.1 Release Engineering team:

Grant Beattie	grant@NetBSD.org
Erik Berls	cyber@NetBSD.org
James Chacon	jmc@NetBSD.org
Julian Coleman	jdc@NetBSD.org
Håvard Eidnes	he@NetBSD.org
Jun-ichiro itojun Hagino	itojun@NetBSD.org
Geert Hendrickx	ghen@NetBSD.org
Soren Jacobsen	snj@NetBSD.org
SAITOH Masanobu	msaitoh@NetBSD.org
Luke Mewburn	lukem@NetBSD.org

Jeff Rizzo	riz@NetBSD.org
Matthias Scheler	tron@NetBSD.org
Curt Sampson	cjs@NetBSD.org
Jim Wise	jwise@NetBSD.org

NetBSD Developers:

Nathan Ahlstrom	nra@NetBSD.org
Steve Allen	wormey@NetBSD.org
Jukka Andberg	jandberg@NetBSD.org
Julian Assange	proff@NetBSD.org
Lennart Augustsson	augustss@NetBSD.org
Christoph Badura	bad@NetBSD.org
Bang Jun-Young	junyoung@NetBSD.org
Dieter Baron	dillo@NetBSD.org
Robert V. Baron	rvb@NetBSD.org
Grant Beattie	grant@NetBSD.org
Jason Beegan	jtb@NetBSD.org
Erik Berls	cyber@NetBSD.org
Hiroyuki Bessho	bsh@NetBSD.org
John Birrell	jb@NetBSD.org
Mason Loring Bliss	mason@NetBSD.org
Charles Blundell	cb@NetBSD.org
Rafal Boni	rafal@NetBSD.org
Sean Boudreau	seanb@NetBSD.org
Manuel Bouyer	bouyer@NetBSD.org
John Brezak	brezak@NetBSD.org
Allen Briggs	briggs@NetBSD.org
Mark Brinicombe	mark@NetBSD.org
Aaron Brown	abrown@NetBSD.org
Andrew Brown	atatat@NetBSD.org
David Brownlee	abs@NetBSD.org
Frederick Bruckman	fredb@NetBSD.org
Jon Buller	jonb@NetBSD.org
Simon Burge	simonb@NetBSD.org
Robert Byrnes	byrnes@NetBSD.org
D'Arcy J.M. Cain	darcy@NetBSD.org
Dave Carrel	carrel@NetBSD.org
Daniel Carosone	dan@NetBSD.org
James Chacon	jmc@NetBSD.org
Bill Coldwell	billc@NetBSD.org
Julian Coleman	jdc@NetBSD.org
Ben Collver	ben@NetBSD.org
Jeremy Cooper	jeremy@NetBSD.org
Chuck Cranor	chuck@NetBSD.org
Alistair Crooks	agc@NetBSD.org
Aidan Cully	aidan@NetBSD.org
Johan Danielsson	joda@NetBSD.org
John Darrow	jdarrow@NetBSD.org

Jed Davis	jld@NetBSD.org
Matt DeBergalis	deberg@NetBSD.org
Rob Deker	deker@NetBSD.org
Chris G. Demetriou	cgd@NetBSD.org
Tracy Di Marco White	gendalia@NetBSD.org
Jaromír Dolecek	jdolecek@NetBSD.org
Andy Doran	ad@NetBSD.org
Roland Dowdeswell	elric@NetBSD.org
Emmanuel Dreyfus	manu@NetBSD.org
Matthias Drochner	drochner@NetBSD.org
Jun Ebihara	jun@NetBSD.org
Elad Efrat	elad@NetBSD.org
Håvard Eidnes	he@NetBSD.org
Stoned Elipot	seb@NetBSD.org
Michael van Elst	mlelstv@NetBSD.org
Enami Tsugutomo	enami@NetBSD.org
Bernd Ernesti	veego@NetBSD.org
Erik Fair	fair@NetBSD.org
Gavan Fantom	gavan@NetBSD.org
Hubert Feyrer	hubertf@NetBSD.org
Jason R. Fink	jrf@NetBSD.org
Matt Fredette	fredette@NetBSD.org
Thorsten Frueauf	frueauf@NetBSD.org
Castor Fu	castor@NetBSD.org
Ichiro Fukuhara	ichiro@NetBSD.org
Quentin Garnier	cube@NetBSD.org
Thomas Gerner	thomas@NetBSD.org
Simon J. Gerraty	sjg@NetBSD.org
Justin Gibbs	gibbs@NetBSD.org
Chris Gilbert	chris@NetBSD.org
Eric Gillespie	epg@NetBSD.org
Adam Glass	glass@NetBSD.org
Michael Graff	explorer@NetBSD.org
Brian C. Grayson	bgrayson@NetBSD.org
Matthew Green	mrg@NetBSD.org
Andreas Gustafsson	gson@NetBSD.org
Jun-ichiro itojun Hagino	itojun@NetBSD.org
Juergen Hannken-Illjes	hannken@NetBSD.org
Charles M. Hannum	mycroft@NetBSD.org
Ben Harris	bjh21@NetBSD.org
Ross Harvey	ross@NetBSD.org
Eric Haszlakiewicz	erh@NetBSD.org
John Hawkinson	jhawk@NetBSD.org
HAMAJIMA Katsuomi	hamajima@NetBSD.org
HAYAKAWA Koichi	haya@NetBSD.org
John Heasley	heas@NetBSD.org
Geert Hendrickx	ghen@NetBSD.org
René Hexel	rh@NetBSD.org
Kouichirou Hiratsuka	hira@NetBSD.org

Michael L. Hitch	mhitch@NetBSD.org
Christian E. Hopps	chopps@NetBSD.org
Ken Hornstein	kenh@NetBSD.org
Marc Horowitz	marc@NetBSD.org
Eduardo Horvath	eeh@NetBSD.org
Nick Hudson	skrll@NetBSD.org
Shell Hung	shell@NetBSD.org
Martin Husemann	martin@NetBSD.org
Dean Huxley	dean@NetBSD.org
Love Hörnquist Åstrand	lha@NetBSD.org
Bernardo Innocenti	bernie@NetBSD.org
Tetsuya Isaki	isaki@NetBSD.org
ITOH Yasufumi	itohy@NetBSD.org
IWAMOTO Toshihiro	toshii@NetBSD.org
Matthew Jacob	mjacob@NetBSD.org
Soren Jacobsen	snj@NetBSD.org
Lonhyn T. Jasinskyj	lonhyn@NetBSD.org
Darrin Jewell	dbj@NetBSD.org
Chris Jones	cjones@NetBSD.org
Søren Jørvang	soren@NetBSD.org
Takahiro Kambe	taca@NetBSD.org
Antti Kantee	pooka@NetBSD.org
Masanori Kanaoka	kanaoka@NetBSD.org
Frank Kardel	kardel@NetBSD.org
Mattias Karlsson	keihan@NetBSD.org
KAWAMOTO Yosihisa	kawamoto@NetBSD.org
Mario Kemper	magick@NetBSD.org
Min Sik Kim	minskim@NetBSD.org
Thomas Klausner	wiz@NetBSD.org
Klaus Klein	kleink@NetBSD.org
John Klos	jklos@NetBSD.org
Wayne Knowles	wdk@NetBSD.org
Takayoshi Kochi	kochi@NetBSD.org
John Kohl	jtk@NetBSD.org
Daniel de Kok	daniel@NetBSD.org
Paul Kranenburg	pk@NetBSD.org
Martti Kuparinen	martti@NetBSD.org
Kentaro A. Kurahone	kurahone@NetBSD.org
Kevin Lahey	kml@NetBSD.org
Johnny C. Lam	jlam@NetBSD.org
Martin J. Laubach	mjl@NetBSD.org
Greg Lehey	grog@NetBSD.org
Ted Lemon	mellon@NetBSD.org
Christian Limpach	cl@NetBSD.org
Frank van der Linden	fvdl@NetBSD.org
Joel Lindholm	joel@NetBSD.org
Mike Long	mikel@NetBSD.org
Michael Lorenz	macallan@NetBSD.org
Warner Losh	imp@NetBSD.org

Tomasz Luchowski	zuntum@NetBSD.org
Federico Lupi	federico@NetBSD.org
Brett Lymn	blymn@NetBSD.org
Paul Mackerras	paulus@NetBSD.org
Anders Magnusson	ragge@NetBSD.org
MAEKAWA Masahide	gehenna@NetBSD.org
David Maxwell	david@NetBSD.org
Dan McMahill	dmcmahill@NetBSD.org
Gregory McGarry	gmcgarry@NetBSD.org
Jared D. McNeill	jmcneill@NetBSD.org
Neil J. McRae	neil@NetBSD.org
Perry Metzger	perry@NetBSD.org
Simas Mockevicius	symka@NetBSD.org
Juan Romero Pardines	xtraeme@NetBSD.org
Julio M. Merino Vidal	jmmv@NetBSD.org
Minoura Makoto	minoura@NetBSD.org
Luke Mewburn	lukem@NetBSD.org
der Mouse	mouse@NetBSD.org
Joseph Myers	jsm@NetBSD.org
Ken Nakata	kenn@NetBSD.org
Takeshi Nakayama	nakayama@NetBSD.org
Phil Nelson	phil@NetBSD.org
John Nemeth	jnemeth@NetBSD.org
Bob Nestor	rnestor@NetBSD.org
NISHIMURA Takeshi	nsmrtks@NetBSD.org
Tohru Nishimura	nisimura@NetBSD.org
NONAKA Kimihiro	nonaka@NetBSD.org
Takehiko NOZAKI	tnozaki@NetBSD.org
Jesse Off	joff@NetBSD.org
Tatoku Ogaito	tacha@NetBSD.org
OKANO Takayoshi	kano@NetBSD.org
Masaru Oki	oki@NetBSD.org
Atsushi Onoe	onoe@NetBSD.org
Greg Oster	oster@NetBSD.org
Jonathan Perkin	sketch@NetBSD.org
Herb Peyerl	hpeyerl@NetBSD.org
Matthias Pfaller	matthias@NetBSD.org
Chris Pinnock	cjep@NetBSD.org
Adrian Portelli	adrianp@NetBSD.org
Rui Paulo	rpaulo@NetBSD.org
Peter Postma	peter@NetBSD.org
Dante Profeta	dante@NetBSD.org
Chris Provenzano	proven@NetBSD.org
Niels Provos	provos@NetBSD.org
Michael Rauch	mrauch@NetBSD.org
Marc Recht	recht@NetBSD.org
Darren Reed	darrenr@NetBSD.org
Jeremy C. Reed	reed@NetBSD.org
Antoine Reilles	tonio@NetBSD.org

Tyler R. Retzlaff	rtr@NetBSD.org
Scott Reynolds	scottr@NetBSD.org
Michael Richardson	mcr@NetBSD.org
Tim Rightnour	garbled@NetBSD.org
Jeff Rizzo	riz@NetBSD.org
Gordon Ross	gwr@NetBSD.org
Steve Rumble	rumble@NetBSD.org
Ilpo Ruotsalainen	lonewolf@NetBSD.org
Heiko W. Rupp	hwr@NetBSD.org
David Sainty	dsainty@NetBSD.org
SAITOH Masanobu	msaitoh@NetBSD.org
Kazuki Sakamoto	sakamoto@NetBSD.org
Curt Sampson	cjs@NetBSD.org
Wilfredo Sanchez	wsanchez@NetBSD.org
Ty Sarna	tsarna@NetBSD.org
SATO Kazumi	sato@NetBSD.org
Jan Schaumann	jschauma@NetBSD.org
Matthias Scheler	tron@NetBSD.org
Karl Schilke (rAT)	rat@NetBSD.org
Amitai Schlair	schmonz@NetBSD.org
Konrad Schroder	perseant@NetBSD.org
Georg Schwarz	schwarz@NetBSD.org
Lubomir Sedlacik	salo@NetBSD.org
Christopher SEKIYA	sekiya@NetBSD.org
Reed Shadgett	dent@NetBSD.org
John Shannon	shannonjr@NetBSD.org
Tim Shepard	shep@NetBSD.org
Takeshi Shibagaki	shiba@NetBSD.org
Naoto Shimazaki	igy@NetBSD.org
Takao Shinohara	shin@NetBSD.org
Takuya SHIOZAKI	tshiozak@NetBSD.org
Chuck Silvers	chs@NetBSD.org
Thor Lancelot Simon	tls@NetBSD.org
Jeff Smith	jeffs@NetBSD.org
Noriyuki Soda	soda@NetBSD.org
Wolfgang Solfrank	ws@NetBSD.org
SOMEYA Yoshihiko	someya@NetBSD.org
Bill Sommerfeld	sommerfeld@NetBSD.org
Jörg Sonnenberger	joerg@NetBSD.org
Ignatios Souvatzis	is@NetBSD.org
Bill Squier	groo@NetBSD.org
Jonathan Stone	jonathan@NetBSD.org
Bill Studenmund	wrstuden@NetBSD.org
Kevin Sullivan	sullivan@NetBSD.org
SUNAGAWA Keiki	kei@NetBSD.org
Kimmo Suominen	kim@NetBSD.org
Shin Takemura	takemura@NetBSD.org
TAMURA Kent	kent@NetBSD.org
Shin'ichiro TAYA	taya@NetBSD.org

Ian Lance Taylor	ian@NetBSD.org
Matt Thomas	matt@NetBSD.org
Jason Thorpe	thorpej@NetBSD.org
Christoph Toshok	toshok@NetBSD.org
Greg Troxel	gdt@NetBSD.org
Tsubai Masanari	tsubai@NetBSD.org
Izumi Tsutsui	tsutsui@NetBSD.org
UCHIYAMA Yasushi	uch@NetBSD.org
Masao Uebayashi	uebayasi@NetBSD.org
Shuichiro URATA	ur@NetBSD.org
Todd Vierling	tv@NetBSD.org
Aymeric Vincent	aymeric@NetBSD.org
Paul Vixie	vixie@NetBSD.org
Mike M. Volokhov	mishka@NetBSD.org
Krister Walfridsson	kristerw@NetBSD.org
Lex Wennmacher	wennmach@NetBSD.org
Leo Weppelman	leo@NetBSD.org
Assar Westerlund	assar@NetBSD.org
Todd Whitesel	toddpw@NetBSD.org
Nathan Williams	nathanw@NetBSD.org
Rob Windsor	windsor@NetBSD.org
Dan Winship	danw@NetBSD.org
Jim Wise	jwise@NetBSD.org
Michael Wolfson	mbw@NetBSD.org
Steve Woodford	scw@NetBSD.org
Colin Wood	ender@NetBSD.org
YAMAMOTO Takashi	yamt@NetBSD.org
Yuji Yamano	yyamano@NetBSD.org
Reinoud Zandijk	reinoud@NetBSD.org
S.P.Zeidler	spz@NetBSD.org
Maria Zevenhoven	maria7@NetBSD.org
Christos Zoulas	christos@NetBSD.org

Other contributors:

Dave Burgess	burgess@cynjut.infonet.net
Brian R. Gaeke	brg@dgate.org
Brad Grantham	grantham@tenon.com
Lawrence Kesteloot	kesteloo@cs.unc.edu
Waldi Ravens	waldi@moacs.indiv.nl.net

Legal Mumbo-Jumbo

All product names mentioned herein are trademarks or registered trademarks of their respective owners.

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

This product includes software developed by the University of California, Berkeley and its contributors.
This product includes software developed by the NetBSD Foundation.
This product includes software developed by The NetBSD Foundation, Inc. and its contributors.
This product includes software developed for the NetBSD Project. See http://www.netbsd.org/ for information about NetBSD.

This product contains software developed by Ignatios Souvatzis for the NetBSD project.
This product contains software written by Ignatios Souvatzis and Michael L. Hitch for the NetBSD project.
This product contains software written by Michael L. Hitch for the NetBSD project.
This product includes cryptographic software written by Eric Young (eay@cryptsoft.com)
This product includes cryptographic software written by Eric Young (eay@mincom.oz.au)
This product includes software designed by William Allen Simpson.
This product includes software developed at Ludd, University of Lulea, Sweden and its contributors.
This product includes software developed at Ludd, University of Lulea.
This product includes software developed at the Information Technology Division, US Naval Research Laboratory.
This product includes software developed by Berkeley Software Design, Inc.
This product includes software developed by David Jones and Gordon Ross
This product includes software developed by Gordon W. Ross and Leo Weppelman.
This product includes software developed by Hellmuth Michaelis and Joerg Wunsch
This product includes software developed by Internet Research Institute, Inc.
This product includes software developed by Leo Weppelman and Waldi Ravens.
This product includes software developed by Mika Kortelainen
This product includes software developed by Aaron Brown and Harvard University.
This product includes software developed by Adam Ciarcinski for the NetBSD project.
This product includes software developed by Adam Glass and Charles M. Hannum.
This product includes software developed by Adam Glass.
This product includes software developed by Advanced Risc Machines Ltd.
This product includes software developed by Alex Zepeda, and Colin Wood for the NetBSD Projet.
This product includes software developed by Alex Zepeda.
This product includes software developed by Alistair G. Crooks.
This product includes software developed by Alistair G. Crooks. for the NetBSD project.
This product includes software developed by Allen Briggs
This product includes software developed by Amancio Hasty and Roger Hardiman
This product includes software developed by Berkeley Software Design, Inc.
This product includes software developed by Berkeley Software Design, Inc.
This product includes software developed by Bill Paul.
This product includes software developed by Bodo Moeller. (If available, substitute umlauted o for oe)
This product includes software developed by Boris Popov.
This product includes software developed by Brad Pepers
This product includes software developed by Bradley A. Grantham.
This product includes software developed by Brini.
This product includes software developed by Causality Limited.
This product includes software developed by Charles D. Cranor and Seth Widoff.
This product includes software developed by Charles D. Cranor and Washington University.
This product includes software developed by Charles D. Cranor, Washington University, and the University of California, Berkeley and its contributors.
This product includes software developed by Charles D. Cranor, Washington University, the University of California, Berkeley and its contributors.
This product includes software developed by Charles D. Cranor.
This product includes software developed by Charles Hannum.
This product includes software developed by Charles M. Hannum, by the University of Vermont and State Agricultural College and Garrett A. Wollman, by William F. Jolitz, and by the University of California, Berkeley, Lawrence Berkeley Laboratory, and its contributors.
This product includes software developed by Charles M. Hannum.
This product includes software developed by Christian E. Hopps, Ezra Story, Kari Mettinen, Markus Wild, Lutz Vieweg and Michael Teske.
This product includes software developed by Christian E. Hopps.
This product includes software developed by Christian Limpach
This product includes software developed by Christopher G. Demetriou for the NetBSD Project.
This product includes software developed by Christopher G. Demetriou.
This product includes software developed by Christos Zoulas.
This product includes software developed by Chuck Silvers.
This product includes software developed by Colin Wood for the NetBSD Project.
This product includes software developed by Colin Wood.
This product includes software developed by Cybernet Corporation and Nan Yang Computer Services Limited
This product includes software developed by Daishi Kato
This product includes software developed by Dale Rahn.
This product includes software developed by Daniel Widenfalk and Michael L. Hitch.
This product includes software developed by Daniel Widenfalk for the NetBSD Project.
This product includes software developed by Darrin B. Jewell
This product includes software developed by David Miller.
This product includes software developed by Dean Huxley.

This product includes software developed by Eduardo Horvath.
This product includes software developed by Eric S. Hvozda.
This product includes software developed by Eric S. Raymond
This product includes software developed by Eric Young (eay@@mincom.oz.au)
This product includes software developed by Eric Young (eay@cryptsoft.com)
This product includes software developed by Eric Young (eay@mincom.oz.au)
This product includes software developed by Ezra Story and by Kari Mettinen.
This product includes software developed by Ezra Story, by Kari Mettinen and by Bernd Ernesti.
This product includes software developed by Ezra Story, by Kari Mettinen, Michael Teske and by Bernd Ernesti.
This product includes software developed by Ezra Story, by Kari Mettinen, and Michael Teske.
This product includes software developed by Ezra Story.
This product includes software developed by Frank van der Linden for the NetBSD Project.
This product includes software developed by Gardner Buchanan.
This product includes software developed by Gary Thomas.
This product includes software developed by Gordon Ross
This product includes software developed by Gordon W. Ross
This product includes software developed by HAYAKAWA Koichi.
This product includes software developed by Harvard University and its contributors.
This product includes software developed by Harvard University.
This product includes software developed by Herb Peyerl.
This product includes software developed by Hubert Feyrer for the NetBSD Project.
This product includes software developed by Iain Hibbert
This product includes software developed by Ian F. Darwin and others.
This product includes software developed by Ian W. Dall.
This product includes software developed by Ichiro FUKUHARA.
This product includes software developed by Ignatios Souvatzis for the NetBSD Project.
This product includes software developed by Internet Initiative Japan Inc.
This product includes software developed by James R. Maynard III.
This product includes software developed by Jared D. McNeill.
This product includes software developed by Jason L. Wright
This product includes software developed by Jason R. Thorpe for And Communications, http://www.and.com/
This product includes software developed by Joachim Koenig-Baltes.
This product includes software developed by Jochen Pohl for The NetBSD Project.
This product includes software developed by Joerg Wunsch
This product includes software developed by John Birrell.
This product includes software developed by John P. Wittkoski.
This product includes software developed by John Polstra.
This product includes software developed by Jonathan R. Stone for the NetBSD Project.
This product includes software developed by Jonathan Stone and Jason R. Thorpe for the NetBSD Project.
This product includes software developed by Jonathan Stone.
This product includes software developed by Jukka Marin.
This product includes software developed by Julian Highfield.
This product includes software developed by Kazuhisa Shimizu.
This product includes software developed by Kazuki Sakamoto.
This product includes software developed by Kenneth Stailey.
This product includes software developed by Kiyoshi Ikehara.
This product includes software developed by Klaus Burkert,by Bernd Ernesti, by Michael van Elst, and by the University of California, Berkeley and its contributors.
This product includes software developed by LAN Media Corporation and its contributors.
This product includes software developed by Leo Weppelman for the NetBSD Project.
This product includes software developed by Leo Weppelman.
This product includes software developed by Lloyd Parkes.
This product includes software developed by Luke Mewburn.
This product includes software developed by Lutz Vieweg.
This product includes software developed by MINOURA Makoto, Takuya Harakawa.
This product includes software developed by Manuel Bouyer.
This product includes software developed by Marc Horowitz.
This product includes software developed by Marcus Comstedt.
This product includes software developed by Mark Brinicombe for the NetBSD project.
This product includes software developed by Mark Brinicombe.
This product includes software developed by Mark Murray
This product includes software developed by Mark Tinguely and Jim Lowe
This product includes software developed by Markus Wild.
This product includes software developed by Martin Husemann and Wolfgang Solfrank.
This product includes software developed by Masanobu Saitoh.
This product includes software developed by Masaru Oki.

This product includes software developed by Mats O Jansson and Charles D. Cranor.
This product includes software developed by Mats O Jansson.
This product includes software developed by Matt DeBergalis
This product includes software developed by Matthew Fredette.
This product includes software developed by Matthias Pfaller.
This product includes software developed by Michael Graff for the NetBSD Project.
This product includes software developed by Michael Graff.
This product includes software developed by Michael L. Hitch.
This product includes software developed by Michael Shalayeff.
This product includes software developed by Michael Smith.
This product includes software developed by Mike Glover and contributors.
This product includes software developed by Mike Pritchard.
This product includes software developed by Minoura Makoto.
This product includes software developed by Nan Yang Computer Services Limited.
This product includes software developed by Niels Provos.
This product includes software developed by Niklas Hallqvist, Brandon Creighton and Job de Haas.
This product includes software developed by Niklas Hallqvist.
This product includes software developed by Onno van der Linden.
This product includes software developed by Paul Kranenburg.
This product includes software developed by Paul Mackerras.
This product includes software developed by Per Fogelstrom
This product includes software developed by Peter Galbavy.
This product includes software developed by Phase One, Inc.
This product includes software developed by Philip A. Nelson.
This product includes software developed by Philip L. Budne.
This product includes software developed by RiscBSD.
This product includes software developed by Roar Thronæs.
This product includes software developed by Rodney W. Grimes.
This product includes software developed by Roger Hardiman
This product includes software developed by Roland C. Dowdeswell.
This product includes software developed by Rolf Grossmann.
This product includes software developed by Ross Harvey for the NetBSD Project.
This product includes software developed by Ross Harvey.
This product includes software developed by Scott Bartram.
This product includes software developed by Scott Stevens.
This product includes software developed by Shingo WATANABE.
This product includes software developed by Softweyr LLC, the University of California, Berkeley, and its contributors.
This product includes software developed by Soren S. Jorvang.
This product includes software developed by Stephan Thesing.
This product includes software developed by Steve Woodford.
This product includes software developed by Takashi Hamada
This product includes software developed by Takumi Nakamura.
This product includes software developed by Tatoku Ogaito for the NetBSD Project.
This product includes software developed by Terrence R. Lambert.
This product includes software developed by Tetsuya Isaki.
This product includes software developed by Thomas Gerner
This product includes software developed by Thomas Klausner for the NetBSD Project.
This product includes software developed by Tobias Weingartner.
This product includes software developed by Todd C. Miller.
This product includes software developed by Tohru Nishimura and Reinoud Zandijk for the NetBSD Project.
This product includes software developed by Tohru Nishimura for the NetBSD Project.
This product includes software developed by Tohru Nishimura. for the NetBSD Project.
This product includes software developed by TooLs GmbH.
This product includes software developed by Toru Nishimura.
This product includes software developed by Trimble Navigation, Ltd.
This product includes software developed by WIDE Project and its contributors.
This product includes software developed by Waldi Ravens.
This product includes software developed by Wasabi Systems for Zembu Labs, Inc. http://www.zembu.com/
This product includes software developed by Winning Strategies, Inc.
This product includes software developed by Wolfgang Solfrank.
This product includes software developed by Yasushi Yamasaki
This product includes software developed by Zembu Labs, Inc.
This product includes software developed by the Alice Group.
This product includes software developed by the Center for Software Science at the University of Utah.
This product includes software developed by the Charles D. Cranor, Washington University, University of California, Berkeley and its contributors.

This product includes software developed by the Computer Systems Engineering Group at Lawrence Berkeley Laboratory.
This product includes software developed by the David Muir Sharnoff.
This product includes software developed by the Harvard University and its contributors.
This product includes software developed by the Kungliga Tekniska Högskolan and its contributors.
This product includes software developed by the Network Research Group at Lawrence Berkeley Laboratory.
This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (http://www.OpenSSL.org/)
his product includes software developed by the PocketBSD project and its contributors.
This product includes software developed by the RiscBSD kernel team
This product includes software developed by the RiscBSD team.
This product includes software developed by the SMCC Technology Development Group at Sun Microsystems, Inc.
This product includes software developed by the University of California, Berkeley and its contributors, as well as the Trustees of Columbia University.
This product includes software developed by the University of California, Lawrence Berkeley Laboratory and its contributors.
This product includes software developed by the University of California, Lawrence Berkeley Laboratory.
This product includes software developed by the University of Illinois at Urbana and their contributors.
This product includes software developed by the University of Vermont and State Agricultural College and Garrett A. Wollman.
This product includes software developed by the University of Vermont and State Agricultural College and Garrett A. Wollman, by William F. Jolitz, and by the University of California, Berkeley, Lawrence Berkeley Laboratory, and its contributors.
This product includes software developed for the FreeBSD project
This product includes software developed for the NetBSD Project by Bernd Ernesti.
This product includes software developed for the NetBSD Project by Christopher G. Demetriou.
This product includes software developed for the NetBSD Project by Christos Zoulas
This product includes software developed for the NetBSD Project by Emmanuel Dreyfus.
This product includes software developed for the NetBSD Project by Frank van der Linden
This product includes software developed for the NetBSD Project by Ignatios Souvatzis.
This product includes software developed for the NetBSD Project by Jason R. Thorpe.
This product includes software developed for the NetBSD Project by John M. Vinopal.
This product includes software developed for the NetBSD Project by Matthias Drochner.
This product includes software developed for the NetBSD Project by Michael L. Hitch.
This product includes software developed for the NetBSD Project by Perry E. Metzger.
This product includes software developed for the NetBSD Project by Scott Bartram and Frank van der Linden
This product includes software developed for the NetBSD Project by Allegro Networks, Inc., and Wasabi Systems, Inc.
This product includes software developed for the NetBSD Project by Genetec Corporation.
This product includes software developed for the NetBSD Project by Jonathan Stone.
This product includes software developed for the NetBSD Project by Piermont Information Systems Inc.
This product includes software developed for the NetBSD Project by SUNET, Swedish University Computer Network.
This product includes software developed for the NetBSD Project by Shigeyuki Fukushima.
This product includes software developed for the NetBSD Project by Wasabi Systems, Inc.
This product includes software developed under OpenBSD by Per Fogelstrom Opsycon AB for RTMX Inc, North Carolina, USA.
This product includes software developed under OpenBSD by Per Fogelstrom.
This software is a component of "386BSD" developed by William F. Jolitz, TeleMuse.
This software was developed by Holger Veit and Brian Moore for use with "386BSD" and similar operating systems. "Similar operating systems" includes mainly non-profit oriented systems for research and education, including but not restricted to "NetBSD", "FreeBSD", "Mach" (by CMU).
This software includes software developed by the Computer Systems Laboratory at the University of Utah.
This product includes software developed by Computing Services at Carnegie Mellon University (http://www.cmu.edu/computing/).

The End