NAME

INSTALL — Installation procedure for NetBSD/amiga.

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DESCRIPTION

About this Document

This document describes the installation procedure for NetBSD 3.1.1 on the *amiga* 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 3.1.1 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 3.1 release and 3.1.1 update

The NetBSD 3.1.1 update is the first security/critical update of the NetBSD 3.1 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 3.2 etc), together with other less-critical fixes and feature enhancements.

Specific updates are as follows:

Supported devices

- `wd`(4): fix broken Seagate drive ST3160811A.

Kernel

- Don't accept a compressed `vnd`(4) image with block size 0 to avoid a kernel panic.

Networking

- Fix get-lease-hostnames option in `dhcpd.conf`(5) to make `dhcpd`(8) use the DNS hostname as the DHCP hostname given to the client.
- Fix TCP window scaling in `ipfilter`(4).

File system

- Prevent a kernel panic when creating snapshots on filesystems which use quota's.
- Fix a coredump in `dump`(8) when using -X (filesystem internal snapshots).
- Fix a panic when one user has 65536 active vnodes on a quota-enabled file system.

Security

- Fix a buffer overflow in `glob`(3), which affected `ftpd`(8) and possibly other programs (SA2006-027).
- X11: fix an integer overflow in the Render and DBE extensions (SA2007-002).
- BIND: fix multiple Denial of Service vulnerabilities (SA2007-003).
- Fix a buffer overflow in `iso`(4) which could potentially lead to a local root compromise (SA2007-004).
- Fix an integer underflow in `file`(1) which could lead to an exploitable heap overflow.
- X11: fix a number of possible memory corruptions due to integer overflows (CVE 2007-1003, 1351, 1352, 1667).
- Fix a denial of service vulnerability in `racoon`(8) which could allow an attacker to disrupt a connection between IPSec peers.
- Disable processing or routing header type 0 (RH0) IPv6 packets since they can be used for DoS attacks (CVE-2007-2242). Provide a sysctl (net.inet6.ip6.rht0) to re-enable them. Note: the sysctl may be removed completely in future NetBSD releases.
- Two `veriexec`(4) flaws have been fixed: users can no longer rename a file to a veriexec protected file or run unfingerprinted files at strict level two or above.
- `file`(1) has been updated to version 4.21, including and integer underflow and an integer overflow fix (CVE-2007-1536 and CVE-2007-2799).

Miscellaneous

- Fix some problems with `etcupdate`(8) for upgrading.
- Update time zoneinfo to tzdata2007f.
- Set /etc/postfix/post-install mode 555 (executable) instead of 444.
- `passwd`(1): display a message indicating who's password is being changed, to avoid confusion after `su`(1).
- The /etc/daily, weekly, monthly and security scripts now use $TMPDIR instead of /tmp.

alpha specific

- Fix alignment problems causing regular panics on NetBSD/alpha and NetBSD/sparc.

mac68k specific

- Avoid a kernel panic before reboot.

sparc specific

- Fix alignment problems causing regular panics on NetBSD/alpha and NetBSD/sparc.

xen specific

- Prevent xennet from occasionally becoming unable to receive packets for several minutes when under certain types of load.
- Don't try to handle xbd interrupts if the device is not yet connected, to fix a Xen3 xbd panic at boot when more than one xbd device is configured.
- Fix Xen console hangs.

- Fix occasional panics in NetBSD domU's caused by a race condition.
- Avoid block I/O stalls in Xen 3 guests on SMP systems.

This is the tenth major release of NetBSD for the Amiga and DraCo line of computers.

The Future of NetBSD

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

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

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

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

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

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

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

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

Sources of NetBSD

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

NetBSD 3.1.1 Release Contents

The root directory of the NetBSD 3.1.1 release is organized as follows:

`.../NetBSD-3.1.1/`

`CHANGES`	Changes since earlier NetBSD releases.
`LAST_MINUTE`	Last minute changes.
`MIRRORS`	A list of sites that mirror the NetBSD 3.1.1 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 3.1.1 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 3.1.1 sources which are not in **gnusrc**, **sharesrc**, or **syssrc**.
37 MB gzipped, 176 MB uncompressed

syssrc This set contains the sources to the NetBSD 3.1.1 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/amiga subdirectory structure

The amiga-specific portion of the NetBSD 3.1.1 release is found in the `amiga` subdirectory of the distribution: `.../NetBSD-3.1.1/amiga/`. 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/` amiga binary distribution sets; see below.
`installation/`
`floppy/` amiga boot and installation floppies; see below.
`miniroot/`
amiga miniroot file system image; see below.
`misc/`

Miniroot file system

The Amiga now uses a single miniroot file system for both an initial installation and for an upgrade. A gzipped version is available, for easier downloading. (The gzipped version has the **.gz** extension added to their names.)

`miniroot.fs` This file contains a BSD root file system setup to help you install the rest of NetBSD or to upgrade a previous version of NetBSD. This includes formatting and mounting your `/` (root) and `/usr` partitions and getting ready to extract (and possibly first fetching) the distribution sets. There is enough on this file system to allow you to make a SLIP or PPP connection, configure an Ethernet, mount an NFS file system or ftp. You can also load distribution sets from a SCSI tape or from one of your existing AmigaDOS partitions.

Binary distribution sets

The NetBSD amiga binary distribution sets contain the binaries which comprise the NetBSD 3.1.1 release for the amiga. The binary distribution sets can be found in the `amiga/binary/sets` subdirectory of the NetBSD 3.1.1 distribution tree, and are as follows:

base The NetBSD 3.1.1 amiga **base** binary distribution. You *must* install this distribution set. It contains the base NetBSD utilities that are necessary for the system to run and be minimally functional. It includes shared library support, and excludes everything described below.
16 MB gzipped, 46 MB uncompressed

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

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

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

kern-GENERIC
This set contains a NetBSD/amiga 3.1.1 `GENERIC` kernel, named `/netbsd`. You *must* install this distribution set.
2 MB gzipped, 4 MB uncompressed

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

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

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

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

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

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

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

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

xserver The X server.
4 MB gzipped, 9 MB uncompressed

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

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

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

NetBSD/amiga System Requirements and Supported Devices

NetBSD 3.1.1 runs on any Amiga that has a 68020 or better CPU with some form of MMU, and on 68060 DraCos.

NetBSD does not, and will never, run on run on A1000, A500, A600, A1200, A2000, A4000/EC030, CDTV and CD32 systems that are not enhanced by a CPU board.

For 68020 and 68030 systems, a FPU is recommended but not required for the system utilities. 68LC040, 68040V and 68LC060 systems don't work correctly at the moment.

The minimal configuration requires 6 MB of RAM (not including CHIPMEM!) and about 75 MB of disk space. To install the entire system requires much more disk space, and to run X or compile the system, more RAM is recommended. (6 MB of RAM will actually allow you to compile, however it won't be speedy. X really isn't usable on a 6 MB system.)

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

Partition	Suggested	+ X	Needed	+ X
/ (root)	25 MB	25 MB	20 MB	20 MB
/usr	245 MB	270 MB	120 MB	145 MB
/var	20 MB	20 MB	5 MB	5 MB
swap	*2*RAM below 32 MB, then up to you*			

Anything else is up to you!

As you may note the recommended size of `/usr` is 125 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. For example, most people's machines have an FPU, so you do not need the bulky FPU_EMULATE option.

Preconfigured or precompiled packages are installed below `/usr/pkg` by default. You should either make `/usr` larger (if you intend to install a lot of them), make `/usr/pkg` an additional partition, use the **`-p`** option to **`pkg_add`** to install them in a different place, or link `/usr/pkg` to a different place.

If you only have less than 8 MB of fast memory, you should make your swap partition larger, as your system will be doing much more swapping. Especially: do *not* place it onto a old small (and normally slow) disk!

Supported devices

- A4000/A1200 IDE controller, including ATAPI devices
- SCSI host adapters
  - 33c93 based boards: A2091, A3000 builtin, A3000 builtin modified for Apollo accelerator board (please note that this is not the same as the SCSI host adapter on the Apollo accelerator board itself, which is unsupported), and GVP series II.
  - 53c80 based boards: 12 Gauge, IVS, Wordsync/Bytesync and Emplant The Emplant SCSI adapter has been reported by a party to hang after doing part of the installation without problems
  - 53c710 based boards: A4091, Magnum, Warp Engine, Zeus and DraCo builtin
  - FAS216 based SCSI boards: FastLane Z3, Blizzard I and II, Blizzard IV, Blizzard 2060, CyberSCSI Mk I and II
  - 53c770 based SCSI boards: Cyberstorm Mk III SCSI, Cyberstorm PPC SCSI
- Video controllers
  - ECS, AGA and A2024 built in on various Amigas
  - Retina Z2 (no X server available), Retina Z3 and Altais
  - Cirrus CL GD 54xx based boards: GVP Spectrum, Picasso II, II+ and IV, Piccolo and Piccolo SD64
  - Tseng ET4000 based boards: Domino and Domino16M proto, oMniBus, Merlin
  - A2410 (no X server available)
  - Cybervision 64
  - Cybervision 64/3D

- Audio I/O
  - Amiga builtin
  - Melody Mpeg-audio layer 2 board
  - Repulse audio board
- Ethernet controllers
  - A2065 Ethernet
  - Hydra Ethernet
  - ASDG Ethernet
  - A4066 Ethernet
  - Ariadne Ethernet
  - Ariadne II Ethernet
  - Quicknet Ethernet
  - X-surf Ethernet port
- ARCnet controllers
  - A2060 ARCnet
- Most SCSI tape drives, including Archive Viper, Cipher SCSI-2 ST150
- SCSI-2 scanners behaving as SCSI-2 scanner devices, HP Scanjet II, Mustek SCSI scanner. SCSI scanner support is machine independent, so it should work, but hasn't been tested yet on most Amiga configurations. There are reports that the Mustek and HP ScanJet hang if accessed from the A3000. This might apply to other 33C93-Adapters, too.
- Most SCSI CD-ROM drives
- Serial/Parallel cards
  - HyperCom 3Z, HyperCom 4, HyperCom 3+ and 4+
  - MultiFaceCard II and III
  - A2232 (normal and clockdoubled)
  - IOBlix Zorro-Bus
- Amiga floppy drives with Amiga (880/1760kB) and IBM (720/1440kB) encoding. Our floppy driver doesn't notice when mounted floppies are write-protected at the moment. Your floppy will stay unchanged, but you might not notice that you didn't write anything due to the buffer cache. Also note that HD floppy drives only get detected as such if a HD floppy is inserted at boot time.
- Amiga parallel port
- Amiga serial port
- Amiga mouse
- DraCo serial port, including serial mouse
- DraCo parallel printer port
- Real-time clocks
  - A2000, A3000, A4000 builtin (r/w)
  - DraCo builtin (r/o)

If its not on the above lists, there is no support for it in this release. Especially (but this is an incomplete list), there are no drivers for: Blizzard III SCSI option, Ferret SCSI, Oktagon SCSI.

Getting the NetBSD System on to Useful Media

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

Installation is supported from several media types, including:

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

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

AmigaDOS partition

To install NetBSD from an AmigaDOS partition, you need to get the NetBSD distribution sets you wish to install on your system on to an AmigaDOS partition.

Note where you place the files as you will need this later.

Once you have done this, you can proceed to the next step in the installation process, preparing your hard disk.

CD-ROM / DVD

To install NetBSD from a CD-ROM drive, make sure it is a SCSI CD-ROM on a SCSI bus currently supported by NetBSD (refer to the supported hardware list) or an ATAPI CD-ROM connected to the A1200 or A4000 internal IDE connector. If it is a SCSI CD-ROM on a non-supported SCSI bus like Blizzard-3 SCSI or Apollo SCSI you must first copy the distribution sets to an AmigaDOS partition as described above.

If your SCSI CD-ROM is connected to a supported SCSI host adapter, or it is an ATAPI cd-rom connected to the A1200/A4000 internal IDE connector, simply put the CD into the drive before installation.

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

Proceed to the instruction on installation.

MS-DOS floppy

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

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

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

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

FTP

The preparations for this installation/upgrade method are easy; all you need to do is make sure that there's an FTP site from which you can retrieve the NetBSD distribution when you're about to install or upgrade. If you don't have DHCP available on your network, you will need to know the numeric IP address of that site, and, if it's not on a network directly connected to the machine on which you're installing or upgrading NetBSD, you need to know the numeric IP address of the router closest to the NetBSD machine. Finally, you need to know the numeric IP address of the NetBSD machine itself. If you don't have access to a functioning nameserver during installation, the IPv4 address of **ftp.NetBSD.org** is `204.152.184.75` and the IPv6 address is `2001:4f8:4:7:2e0:81ff:fe21:6563` (as of June, 2004).

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

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

NFS

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

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

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

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

Tape

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

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

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

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

```
# cd .../NetBSD-3.1.1
# cd amiga/binary
# tar -cf tape_device misc etc kern
```

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

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

Preparing your System for NetBSD installation

You will need an AmigaDOS hard drive prep tool to prepare your hard drives for use with NetBSD/amiga. HDToolBox is provided with the system software and on floppy installation disks since Release 2.0 of AmigaDOS, so we will provide instructions for its use.

Note that NetBSD can't currently be installed on disks with a sector size other than 512 bytes (e.g., "640 MB" 90mm M-O media). You can, however, mount ADOSFS partitions on such M-O's.

Preparing your hard disk with HDToolBox

A full explanation of HDToolBox can be found with your AmigaDOS manuals and is beyond the scope of this document.

The first time you partition a drive, you need to set its drive type so that you have working geometry parameters. To do this you enter the "Change drive type" menu, and either use "read parameters from drive" or set them manually.

Note you will be modifying your HD's. If you mess something up here you could lose everything on all the drives that you configure. It is therefore advised that you:

1. Write down your current configurations. Do this by examining each partition on the drive and the drives parameters (from Change drive type.)
2. Back up the partitions you are keeping.

What you need to do is partition your drives; creating at least root, swap and /usr partitions and possibly at least one more for /usr/local if you have the space.

This should be done as the HDToolBox manual describes. One thing to note is that if you are not using a Commodore controller you will need to specify the device your SCSI controller uses, e.g. if you have a Warp Engine you would:

From cli

```
hdtoolbox warpdrive.device
```

From wb Set the tooltype

```
SCSI_DEVICE_NAME=warpdrive.device
```

The important things you need to do above and beyond normal partitioning includes (from Partition Drive section):

1. Marking all NetBSD partitions as non-bootable, with two exceptions: the root partition (/), if you want to boot NetBSD directly, or the swap partition, if you want to boot the installation miniroot directly.
2. Changing the file system parameters of the partitions to NetBSD ones. This must be done from the partitioning section and "Advanced options" must be enabled.

To make the needed changes:

1. Click the "Adv. Options" button
2. Click the "Change file system" button
3. Choose "Custom File System"
4. Turn off "Automount" if on.
5. Set the dostype to one of these three choices:

```
root partition  : 0x4e425207  (NBR\007)
swap partition  : 0x4e425301  (NBS\001)
other partitions: 0x4e425507  (NBU\007)
```

   Here 'other' refers to other partitions you will format for reading and writing under NetBSD (e.g. /usr)

   Make sure you press RETURN to enter this value as some versions of HDToolBox will forget your entry if you don't.
6. Turn custom boot code off
7. Set Reserved Blocks start and end to 0.
8. Click Ok.

On the root (/) (and, for installation, swap) partition, set instead this:

1. Turn custom boot code on
2. Set Reserved Blocks start and end to 0.
3. Set Number of Custom Boot Blocks to 16.
4. Set Automount This Partition on
5. Click Ok.

   Mask and maxtransfer are not used with NetBSD.

Caveat: The swap (for installation) and the root partition (if you plan to use the bootblocks) *must be within the first* 4 gigabytes of the disk! The reason for the former is that xstreamtodev uses trackdisk.device compatible I/O-calls, the reason for the latter is that the bootblock gets a 32bit partition offset from the operating system.

Once this is done NetBSD/amiga will be able to recognize your disks and which partitions it should use.

Transferring the miniroot file system

The NetBSD/amiga installation or upgrade now uses a *miniroot* file system which is installed on the partition used by NetBSD for swapping. This removes the requirement of using a floppy disk for the file system used by the installation or upgrade process. It also allows more utilities to be present on the file system than would be available when using an 880 KB floppy disk.

Once the hard disk has been prepared for NetBSD, the miniroot file system (miniroot.fs) is transferred to the swap partition configured during the hard disk prep (or the existing swap partition in the case of an upgrade). The xstreamtodev utility provided in the amiga/installation/misc directory can be used on AmigaDOS to transfer the file system for either a new installation or an upgrade. The file system can also be transferred on an existing NetBSD system for an update by using dd. This should only be done after boot-

ing NetBSD into single-user state. It may also be possible to shutdown to single-user, providing that the single-user state processes are not using the swap partition.

On AmigaDOS, the command:

```
xstreamtodev --input=miniroot.fs --rdb-name=swap partition
```

where swap partition is the name you gave to the NetBSD partition to be used for swapping. If **xstreamtodev** is unable to determine the SCSI driver device name or the unit number of the specified partition, you may also need to include the option

```
--device=driver.name
```

and/or

```
--unit=SCSI unit number
```

To transfer the miniroot using NetBSD, you should be booted up in single user state on the current NetBSD system, or use the **shutdown now** command to shutdown to single-user state. Then copy the miniroot using **dd**:

```
dd if=miniroot.fs of=/dev/rsd0b
```

where `/dev/rsd0b` should be the device path of the swap partition your system is configured to use. Once the file is copied, reboot back to AmigaDOS to boot the upgrade kernel.

Caveat: Once you have started installation, if you abort it and want to retry you must reinstall the `miniroot.fs` on the swap partition.

Installing the NetBSD System

Installing NetBSD is a relatively complex process, but, if you have this document in hand and are careful to read and remember the information which is presented to you by the install program, it shouldn't be too much trouble.

Before you begin, you must have already prepared your hard disk as detailed in the section on preparing your system for install.

The following is a walk-through of the steps necessary to get NetBSD installed on your hard disk. If you wish to stop the installation, you may press `CONTROL-C` at any prompt, but if you do, you'll have to begin again from scratch.

Transfer the miniroot file system onto the hard disk partition used by NetBSD for swapping, as described in the "Preparing your System for NetBSD Installation" section above.

Booting

NetBSD, with boot blocks installed

[This description is for V40 (OS 3.1) ROMs. For older ROMs, there might be small differences. Check your AmigaDOS documentation to learn about the exact procedure.] Using bootblocks may not work on some systems, and may require a mountable file system on others.

Reboot your machine, holding down both mouse buttons if you have a 2-button mouse, the outer mouse buttons if you have a 3-button mouse. On the DraCo, press the left mouse button instead, when the boot screen prompts you for it.

From the boot menu, select **Boot Options**. Select the swap partition with the miniroot, and then **ok**. Select **Boot** now. The machine will boot the bootblock, which will prompt your for a command line. You have a few seconds time to change the default. Entering an empty line will accept the default.

The bootblock uses command lines of the form:

file [*options*]

where *file* is the kernel file name on the partition where the boot block is on, and [options] may contain the following:

If you have an AGA machine, and your monitor will handle the dblNTSC mode, you may include the **-A** option to enable the dblNTSC display mode.

If your machine has a fragmented physical memory space, as, e.g., DraCo machines, you should add the **-n2** option to enable the use of all memory segments.

Once your kernel boots

You should see the screen clear and some information about your system as the kernel configures the hardware. Note which hard disk device(s) are configured (`sd0`, `sd1`, etc.) Then you will be prompted for a root device. At this time type `sd0b`, where `sd0` is the device which contains the swap partition you created during the hard disk preparation. When prompted for a dump device, answer '**none**' for the install (normally, you would tell it one of the swap devices). When prompted for the root file system type, confirm '**generic**', which will auto-detect it.

If the system should hang after entering the root device, try again with

netbsd -I ff -b

This disables synchronous transfer on all SCSI devices on the first bus.

The system should continue to boot. For now ignore "WARNING" messages about bad dates in clocks, and a warning about `/etc/rc` not existing. Eventually you will be be asked to enter the pathname of the shell, just press `RETURN`. After a short while, you will be asked to select the type of your keyboard. After you have entered a valid response here, the system asks you if you want to install or upgrade your system. Since you are reading the *install* section, '**i**' would be the proper response here...

The installer starts with a nice welcome messages. Read this message carefully, it also informs you of the risks involved in continuing! If you still want to go on, type '**y**'. The installer now continues by trying to figure out your disk configuration. When it is done, you will be prompted to select a root device from the list of disks it has found.

You should know at this point that the disks are *not* numbered according to their SCSI-ID! The NetBSD kernel numbers the SCSI drives (and other devices on the SCSI bus) sequentially as it finds them. The drive with the lowest SCSI-ID will be called `sd0`, the next one `sd1`, etc. Also, any ATAPI disk drives (e.g. ZIP) will be configured as "SCSI" drives, too, and will be configured before any 'real' SCSI drives if connected to the Amiga internal port on A4000/A1200 (if any are present). Real IDE drives will be configured as `wd0`, `wd1`, etc.

The installer will offer you to look at the NetBSD disk label of the disks at this point. You should do this, to find out what partition letters the NetBSD kernel assigned to the partitions you created, and as a check whether the disk number you are going to use is right.

you are now at the point of no return. If you confirm that you want to install NetBSD, your hard drive will be modified, and perhaps its contents scrambled at the whim of the install program. Type `Control-C` *now* if you don't want this.

At this time, you will need to tell the installer which partition will be associated with the different file systems. Normally, you'll want to add a partition for `/usr`, at least.

Caveat: Do not use the `rsd`*N*`c` or `sd`*N*`c` partitions for anything! They are for access to the whole disk only and do *not* correspond to any Amiga partition!

The install program will now make the file systems you specified. There should be only one error per file system in this section of the installation. It will look like this:

```
newfs: ioctl (WDINFO): Invalid argument
newfs: /dev/rsd0a: can't rewrite disk label
```

If there are any others, restart from the beginning of the installation process. This error is ok as the Amiga does not write disklabels currently. You should expect this error whenever using newfs.

The install will now ask you want to configure any network information. It ill ask for the machine's host name, domain name, and other network configuration information.

Since the network configuration might have lead to additional (nfs) file system entries, you get another chance to modify your fstab.

You are finally at the point where some real data will be put on your freshly made file systems. Select the device type you wish to install from and off you go....

Some notes:

- If you want to install from tape, please read the section about how to create such a tape.
- Some tapes (e.g. Archive Viper 150) refuse to operate with the default tape density (`nrst0`). Try `nrst0h`, `nrst0m`, or `nrst0l` instead.
- Install at least the **base** and **etc** sets.
- If you have to specify a path relative to the mount-point and you need the mount-point itself, use '`.`'.

Next you will be asked to specify the timezone. Just select the timezone you are in. The installer will make the correct setup on your root file system (`/`). After the timezone-link is installed, the installer will proceed by creating the device nodes on your root file system under `/dev`.

Be patient, this will take a while...

Next, the installer will copy your keymap settings to the new system. After this, it will copy the kernel from the installation miniroot to the newly installed / upgraded system. If the installed system already has a kernel, it will ask you for confirmation.

kern.tgz distribution set, this is an old kernel, and you should answer "y" to install a working (although restricted) INSTALL kernel.

If you did install the kern.tgz kernel, you normally should answer "n".

Finally, the installer ask you if you want to install the bootblock code on your root disk. This is a matter of personal choice and can also be done from a running NetBSD system. See the `installboot`(8) manual page about how to do this.

Once the installer is done, halt the system with the **`halt`** command (wait for `halted` to be displayed) and reboot. Then again boot NetBSD this time selecting the root partition (`/`) from the boot menu, and tell it to boot

```
netbsd -s
```

You need to do your final tweaks now. First mount your file systems like so:

```
mount -av
```

Your system is now complete but not completely configured; you should adjust the `/etc/sendmail.cf` file as necessary to suit your site. You should also examine and adjust the settings in `/etc/rc.conf`. You can use `vi`(1) or `ed`(1) to edit the files. If you installed the man pages you can type **`man vi`** or **`man ed`**

for instructions on how to use these somewhat non-intuitive editors.

Once you are done with the rest of configuration unmount your file systems and halt your system, then reboot:

```
# cd /
# umount -av
# halt
```

Finally you can now boot your system and it will be completely functional:

```
netbsd
```

When it boots off of the hard drive, you will have a complete NetBSD system! *Congratulations!* (You really deserve them!!!)

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 3.1.1/amiga/All subdir. You can install them with the following commands under sh(1):

     ```
     # PKG_PATH=ftp://ftp.NetBSD.org/pub/NetBSD/packages/3.1.1/amiga/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/3.1.1/amiga/All
...
```

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

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

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

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

6. Misc

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

     ```
     # man 5 filename
     ```

     is likely to give you more information on these files.

Upgrading a previously-installed NetBSD System

The upgrade to NetBSD 3.1.1 is a binary upgrade; it can be quite difficult to advance to a later version by recompiling from source due primarily to interdependencies in the various components.

To do the upgrade, you must have the NetBSD kernel on AmigaDOS and you must transfer the miniroot file system miniroot.fs onto the swap partition of the NetBSD hard disk. You must also have at least the **base** binary distribution set available, so that you can upgrade with it, using one of the upgrade methods described above. Finally, you must have sufficient disk space available to install the new binaries. Since the old binaries are being overwritten in place, you only need space for the new binaries, which weren't previously on the system. If you have a few megabytes free on each of your / (root) and /usr partitions, you should have enough space.

Since upgrading involves replacing the kernel, and most of the system binaries, it has the potential to cause data loss. You are strongly advised to BACK UP ANY IMPORTANT DATA ON YOUR DISK, whether on the NetBSD partition or on another operating system's partition, before beginning the upgrade process.

To upgrade your system, follow the following instructions:

Transfer the miniroot file system onto the hard disk partition used by NetBSD for swapping, as described in the "Preparing your System for NetBSD Installation" section above.

Now boot up NetBSD, with boot blocks installed

Note: This description is for V40 (OS 3.1) ROMs. For older ROMs, there might be small differences. Check your AmigaDOS documentation to learn about the exact procedure. Booting using bootblocks doesn't work at all on some systems, and may require a mountable file system on others.

Reboot your machine, holding down both mouse buttons if you have a 2-button mouse, the outer mouse buttons if you have a 3-button mouse. On the DraCo, press the left mouse button instead, when the boot screen prompts you for it.

From the boot menu, select **Boot Options**. Select the swap partition with the miniroot, and then **ok**. Select **Boot** now. The machine will boot the bootblock, which will prompt your for a command line. You have a few seconds time to change the default. Entering an empty line will accept the default.

The bootblock uses command lines of the form:

file [*options*]

where *file* is the kernel file name on the partition where the boot block is on, and *options* may contain the same as described in the INSTALL section.

For installing, use

netbsd -b

If you machine has a split memory space, like, e.g., DraCo machines, use this instead:

netbsd -bn2

Once your kernel boots

You should see the screen clear and some information about your system as the kernel configures the hardware. Note which hard disk device is configured that contains your root (/) and swap partitions. When prompted for the root device, type sd0b (replacing '0' with the disk number that NetBSD used for your root/swap device). When prompted for a dump device, answer '**none**' for the upgrade. (For a normal boot, you would tell it one of the swap devices). When prompted for the root file system type, confirm '**generic**', which will auto-detect it.

You will be presented with some information about the upgrade process and a warning message, and will be asked if you wish to proceed with the upgrade process. If you answer negatively, the upgrade process will stop, and your disk will not be modified. If you answer affirmatively, the upgrade process will begin, and your disk will be modified. You may press CONTROL-C to stop the upgrade process at any time. However, if you press it at an inopportune moment, your system may be left in an inconsistent (and possibly unusable) state.

You will now be greeted and reminded of the fact that this is a potential dangerous procedure and that you should not upgrade the **etc** set.

When you decide to proceed, you will be prompted to enter your root disk. After you've done this, it will be checked automatically to make sure that the file system is in a sane state before making any modifications. After this is done, you will be asked if you want to configure your network.

You are now allowed to edit your fstab. Normally you don't have to. Note that the upgrade-kit uses its own copy of the fstab. Whatever you do here *won't* affect your actual fstab. After you are satisfied with your fstab, the upgrade-kit will check all file systems mentioned in it. When they're ok, they will be mounted.

You will now be asked if your sets are stored on a normally mounted file system. You should answer '**y**' to this question if you have the sets stored on a file system that was present in the fstab. The actions you should take for the set extraction are pretty logical (we think).

After you have extracted the sets, the upgrade kit will proceed with setting the timezone and installing the kernel and bootcode. This is all exactly the same as described in the installation section.

Your system has now been upgraded to NetBSD 3.1.1.

After a new kernel has been copied to your hard disk, your machine is a complete NetBSD 3.1.1 system. However, that doesn't mean that you're finished with the upgrade process. There are several things that you should do, or might have to do, to insure that the system works properly.

You will probably want to get the **etc** distribution, extract it, and compare its contents with those in your `/etc` directory. You will probably want to replace some of your system configuration files, or incorporate some of the changes in the new versions into yours.

You will want to delete old binaries that were part of the version of NetBSD that you upgraded from and have since been removed from the NetBSD distribution. If upgrading from a NetBSD version older than 1.0, you might also want to recompile any locally-built binaries, to take advantage of the shared libraries. (Note that any new binaries that you build will be dynamically linked, and therefore take advantage of the shared libraries, by default. For information on how to make statically linked binaries, see the `cc`(1) and `ld`(1) manual pages.)

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 3.1.1.

Issues affecting an upgrade from NetBSD 3.1 and older releases.

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

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

for documentation about PAM.

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

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

Issues fixed by *postinstall*:

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

- `/etc/rc.shutdown`
- `/etc/rc.d/*`

The following issues need to be resolved manually:

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

Using online NetBSD documentation

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

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

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

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

```
# man passwd
```

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

```
# man 5 passwd
```

instead.

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

apropos *subject-word*

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

Administrivia

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

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

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

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

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

that port (listed below).

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

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

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

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