NAME

INSTALL – Installation procedure for NetBSD/mac68k.

DESCRIPTION

About this Document

This document describes the installation procedure for NetBSD 1.5 on the *mac68k* 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 thirty-one different system architectures featuring twelve distinct families of CPUs, and is being ported to more. The NetBSD 1.5 release contains complete binary releases for fifteen different machine types. (The sixteen remaining are not fully supported at this time and are thus not part of the binary distribution. For information on them, please see the NetBSD web site at **http://www.netbsd.org/**)

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

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

Changes Since The Last Release

The NetBSD 1.5 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 userland enhancements. The result of these improvements is a stable operating system fit for production use that rivals most commercially available systems.

It is impossible to completely summarize over one year of development that went into the NetBSD 1.5 release. Some highlights include:

Kernel

- Ports to new platforms including: arc, cobalt, hpcmips, news68k, sgimips, and sparc64.
- Improved performance and stability of the UVM virtual memory subsystem.
- Implementation of generic kernel locking code, as well as a restructure and re-tuning of the scheduler, to be used by the future symmetric multi-processing (SMP) implementation.
- Improved compatibility support for Linux, OSF1, and SVR4 programs.

- New compatibility support for Win32 programs.
- Support for dynamically loaded ELF kernel modules.
- Kernel process tracing using `ktruss`(1).
- Deletion of swap devices using `swapctl`(8).
- Easier hot-pluggability of keyboards and mice using a new wscons device - wsmux.
- Improved PCMCIA and Cardbus support, including support for detaching of devices and cards, resulting in better support for notebooks and PDA devices.
- Numerous hardware improvements, including areas such as: audio, UDMA/66 support for ATA drives, USB, and wireless networking.

Networking

- Addition of IP version 6 (IPv6) and IPsec to the networking stack, from the KAME project. This includes addition of kernel code for IPv6/IPsec, IPv4/v6 dual-stack user applications and supporting libraries. Due to this, the shlib major version for `pcap`(3) is incremented and you may need to recompile userland tools. The KAME IPv6 part includes results from the unified-ipv6 effort.

File system

- Significant Fast file system (FFS) performance enhancements via integration of Kirk McKusick's soft updates and trickle sync code.
- Support for the Windows NT 'NTFS' file system (read-only at this stage).
- Support for revision 1 of the Linux 'ext2fs' file system.
- Enhanced stability and usability of LFS (the BSD log-structured file system).
- Various RAIDframe enhancements including: auto-detection of RAID components and auto-configuration of RAID sets, and the ability to configure the root file system (`/`) on a RAID set.
- Support for Microsoft Joliet extensions to the ISO9660 CD file system.
- Improved file system vnode locking mechanisms, thus resolving a source of several panics in the past.
- Support for NFS and RPC over IPv6.
- Server part of NFS locking (implemented by `rpc.lockd`(8)) now works.

Security

- Strong cryptographic libraries and applications integrated, including the AES cipher Rijndael, the OpenSSL library, more complete Kerberos IV and Kerberos V support, and an SSH server and client.
- `sysctl`(3) interfaces to various elements of process and system information, allowing programs such as `ps`(1), `dmesg`(1) and the like to operate without recompilation after kernel upgrades, and remove the necessity to run setgid kmem (thus improving system security).
- Disable various services by default, and set the default options for disabled daemons to a higher level of logging.
- Several code audits were performed. One audit replaced string routines that were used without bound checking, and another one to identify and disable places where format strings were used in an unsafe way, allowing arbitrary data entered by (possibly) malicious users to overwrite application code, and leading from Denial of Service attacks to compromised system.

System administration and user tools

- Conversion of the rc(8) system startup and shutdown scripts to an 'rc.d' mechanism, with separate control scripts for each service, and appropriate dependency ordering provided by rcorder(8).
- postfix(1) provided as alternative mail transport agent to sendmail(8).
- User management tools useradd(8), usermod(8), userdel(8), groupadd(8), groupmod(8), and groupdel(8) added to the system.
- Incorporation of a login class capability database (/etc/login.conf) from BSD/OS.
- Improved support for usernames longer than eight characters in programs such as at(1) and w(1).
- Many enhancements to ftpd(8) providing features found in larger and less secure FTP daemons, such as user classes, connection limits, improved support for virtual hosting, transfer statistics, transfer rate throttling, and support for various IETF ftpext working group extensions.
- The ftp(1) client has been improved even further, including transfer rate throttling, improved URL support, command line uploads. See the man page for details.

Miscellaneous

- Updates to the NetBSD source code style code (located in /usr/share/misc/style) to use ANSI C only (instead of K&R) and reflect current (best) practice, and begin migrating the NetBSD source code to follow it.
- Implementation of many SUSv2 features to the curses(3) library, including support for color.
- Updates of most third party packages that are shipped in the base system, including file(1), ipfilter(4), ppp(4), and sendmail(8) to the latest stable release.
- Many new packages in the *pkgsrc* system, including standard desktops like KDE and GNOME as well as latest Tcl/Tk and perl and many of the components of the Java Enterprise platform. The package framework itself now has full wildcard dependency support.

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

Kernel interfaces have continued to be refined, and more subsystems and device drivers are shared among the different ports. You can look for this trend to continue.

NetBSD 1.5 is the sixth major release of NetBSD for the m68k-based Macintosh.

For the mac68k port, NetBSD 1.5 brings a number of improvements:

- Serial console support on the Quadra 900/950.
- wscons integration.

There is still a lot of work to be done and help is welcomed. Please jump in! NetBSD 1.5 on mac68k is, as usual, also fully backward compatible with old NetBSD/mac68k binaries, so you don't need to recompile all of your local programs.

The Future of NetBSD

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

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

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

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

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

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

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

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

Sources of NetBSD

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

NetBSD 1.5 Release Contents

The root directory of the NetBSD 1.5 release is organized as follows:

`.../NetBSD-1.5/`

`CHANGES` Changes since earlier NetBSD releases.

`LAST_MINUTE` Last minute changes.

`MIRRORS` A list of sites that mirror the NetBSD 1.5 distribution.

`README.files`
README describing the distribution's contents.

`TODO` NetBSD 's todo list (also somewhat incomplete and out of date).

`patches/` Post-release source code patches.

`source/` Source distribution sets; see below.

In addition to the files and directories listed above, there is one directory per architecture, for each of the architectures for which NetBSD 1.5 has a binary distribution. There are also `README.export-control` files sprinkled liberally throughout the distribution tree, which point out that there are some portions of the distribution that may be subject to export regulations of the United States, e.g. code under `src/crypto` and `src/sys/crypto`. It is your responsibility to determine whether or not it is legal for you to export these portions and to act accordingly.

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

gnusrc This set contains the ''gnu'' sources, including the source for the compiler, assembler, groff, and the other GNU utilities in the binary distribution sets.
22.3 MB gzipped, 98.8 MB uncompressed

pkgsrc This set contains the ''pkgsrc'' sources, which contain the infrastructure to build third-party packages.
5.6 MB gzipped, 57.0 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.
3.3 MB gzipped, 13.2 MB uncompressed

src This set contains all of the base NetBSD 1.5 sources which are not in **gnusrc**, **sharesrc**, or **syssrc**.
24.2 MB gzipped, 120.6 MB uncompressed

syssrc This set contains the sources to the NetBSD 1.5 kernel for all architectures, `config`(8), and `dbsym`(8).
17.6 MB gzipped, 88.6 MB uncompressed

xsrc This set contains the sources to the X Window System.
35.2 MB gzipped, 176.8 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. They may be unpacked into `/usr/src` with the command:

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

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

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

```
# cat set_name.?? | ( cd / ; tar -zxpf - )
```

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

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

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

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

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

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

NetBSD/mac68k subdirectory structure

The mac68k-specific portion of the NetBSD 1.5 release is found in the `mac68k` subdirectory of the distribution: `.../NetBSD-1.5/mac68k/`

`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/` mac68k binary distribution sets; see below.

`installation/`
- `floppy/` mac68k boot and installation floppies; see below.
- `misc/` Miscellaneous mac68k installation utilities; see installation section, below.

Binary distribution sets

The NetBSD mac68k binary distribution sets contain the binaries which comprise the NetBSD 1.5 release for the mac68k. There are eight binary distribution sets. The binary distribution sets can be found in the `mac68k/binary/sets` subdirectory of the NetBSD 1.5 distribution tree, and are as follows:

base The NetBSD 1.5 mac68k **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.
15.7 MB gzipped, 41.6 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.
11.8 MB gzipped, 39.7 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. (If you are upgrading, it's recommended that you get a copy of this set and *carefully* upgrade your configuration files by hand.)
0.1 MB gzipped, 0.6 MB uncompressed

games This set includes the games and their manual pages.
3.0 MB gzipped, 7.4 MB uncompressed

kern This set contains a NetBSD/mac68k 1.5 `GENERIC` kernel, named `/netbsd`. You *must* install this distribution set.

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.
5.0 MB gzipped, 19.9 MB uncompressed

misc This set includes the (rather large) system dictionaries, the typesettable document set, and other files from `/usr/share`.
2.6 MB gzipped, 10.1 MB uncompressed

text This set includes NetBSD 's text processing tools, including `groff`(1), all related programs, and their manual pages.
1.3 MB gzipped, 4.7 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 3.3.6. Binary sets for the X Window system are distributed with NetBSD. The sets are:

xbase The basic files needed for a complete X client environment. This does not include the X servers.
2.6 MB gzipped, 8.2 MB uncompressed

xcomp The extra libraries and include files needed to compile X source code.
1.7 MB gzipped, 7.2 MB uncompressed

xcontrib Programs that were contributed to X.
0.2 MB gzipped, 0.7 MB uncompressed

xfont Fonts needed by X.
6.2 MB gzipped, 7.5 MB uncompressed

xserver The Xmac68k Em monochrome server with man pages.
1.4 MB gzipped, 3.4 MB uncompressed

The mac68k binary distribution sets are distributed as gzipped tar files named with the extension **.tgz**, e.g. `base.tgz`.

The instructions given for extracting the source sets work equally well for the binary sets, but it is worth noting that if you use that method, the files are `/`-relative and therefore are extracted *below* the current directory. That is, if you want to extract the binaries into your system, i.e. replace the system binaries with them, you have to run the **`tar -xpf`** command from `/`.

Additional kernels to those included in the distribution sets may be found in the `mac68k/binary/kernels` subdirectory of the NetBSD 1.5 distribution tree. These kernels are generally named something like `netbsd-GENERIC.gz` or some other suitable name. Please note that these kernels are simply gzipped and are not in tar archives.

The MacOS based utilities necessary for installing and running NetBSD can be found in the `mac68k/installation/misc` subdirectory of the NetBSD 1.5 distribution tree. The important files in this directory are as follows:

`Booter.sea.hqx` The NetBSD/mac68k Booter utility. This program is used to boot the NetBSD kernel from within MacOS.
141 KB archived

`Installer.sea.hqx` The NetBSD/mac68k Installer utility. This program is used to install the distribution sets onto your NetBSD partition(s).
147 KB archived

`Mkfs.sea.hqx` The Mkfs utility. This program is used to format your chosen partitions so that they can be used with NetBSD.
76 KB archived

These files are all binhexed, self-extracting archives. If you need them, the sources for these utilities are in the `src` subdirectory.

Note: Each directory in the mac68k binary distribution also has its own checksum files, just as the source distribution does.

NetBSD/mac68k System Requirements and Supported Devices

NetBSD/mac68k 1.5 runs on several of the older Macintosh computers. About 4 MB of RAM might be sufficient to boot, and the system can probably be squeezed onto a 40 MB hard disk by leaving off an unnecessary set or two. To actually do much compiling or anything more interesting than booting, at least 8 MB of RAM and more disk space is recommended. About 95 MB will be necessary to install all of the NetBSD 1.5 binary system distribution sets (note that this does not count swap space!). An additional 30 MB or so is needed for the binary X11 distribution sets. Much more disk space is required to install the source and objects as well (at least another 300 MB).

Supported models

- Mac II, IIx, IIcx, SE/30, IIci, IIsi, IIvx, IIvi
- Performa 400/405/410/430, Performa 450, Performa 460/466/467
- Performa 520, Performa 550/560, Performa 600
- LC II, LC III, LC III+, LC 520, LC 550
- MacTV
- Centris 650
- Quadra 610, Quadra 630, Quadra 650, Quadra 700, Quadra 800
- Quadra/Centris 660AV, Quadra 840AV

Supported devices

- Onboard SCSI bus and most SCSI tapes, hard drives, and CD-ROMs
- Internal sound - enough to beep on some machines, anyway
- Most basic NuBus video cards (there have been some problems with some 24-bit color cards and with most QuickDraw acclerators)
- Both internal serial ports
- ADB keyboards and mice (both Apple and a number of third party multi-button mice and trackballs are supported)
- Ethernet cards based on the National Semiconductor 8390 and the SONIC (DP83932) chips (Asante, Apple, and a few others - problems still with Ethernet and many NuBus video cards)
- Ethernet cards based on the SMC 91c92 and 91c100 (FEAST) chips. This includes the Asante-FAST 10/100 cards
- Onboard Ethernet based on the SONIC chip for Quadra-series Macs
- Onboard Ethernet based on the MACE (Am79C940) chip for the Quadra AV-series Macs
- Comm-slot Ethernet should be working for most machines/cards

If your 68030 system is not listed above, it may be because of a problem with accessing onboard video, and it may still work with a serial console. Some of the known ones in this category:

- Classic-series Macs
- PowerBook 100-series and Duo-series Macs

If your 68LC040 system is not listed above, it is due to a problem with floating point emulation (FPE) for this type of processor. Machines in this category include:

- Newer LC-series machines
- Newer Performa-series machines
- Some PowerBook 500-series Macs

Unsupported models

- Macintosh IIfx

  This machine has unusual custom chips for the ADB and serial interfaces which make support for it difficult. Work is in progress on this, though.

- Quadra 900/950

  These machines have I/O processor chips for their ADB interfaces similar to those used in the IIfx and thus face similar support problems.

- PowerPC-based Macs

  This is a separate effort from the mac68k port. PowerMacs use hardware that is often fairly different from that of the mac68k port. If you are interested in this, you might want to take a look at the new NetBSD/macppc port:

  http://www.netbsd.org/Ports/macppc/index.html

Known hardware issues with this release

- Real Time Clock

  Due to oddities of the Macintosh hardware interrupt priority scheme, NetBSD/mac68k keeps very poor time. Under a high interrupt load (e.g. SCSI or serial port activity) , a machine can lose several minutes per hour. A consequence of this problem is that attempting to run **xntpd** is rather pointless unless you periodically call **ntpdate**.

- SCSI difficulties

  The NetBSD/mac68k SCSI drivers are not quite as robust as their MacOS counterparts. Symptoms of these problems are that some SCSI disks will not work under NetBSD that work fine under MacOS. Other problems include occasional file system corruption with some types of drives and the general unreliability of removable SCSI media. Keep in mind that there are no clear patterns with these problems, and they do not appear to affect the majority of users.

Getting the NetBSD System on to Useful Media

Installation is currently only supported from the local Macintosh hard drive, from a CD-ROM, or from an AppleShare volume (however, you may upgrade a system from within NetBSD ; see the section on upgrading for more details). If you are installing from a local hard drive, this means that you'll need at least enough room for the largest file that you will have to install. This is the 15.2 MB `base.tgz` file. There has been talk of allowing an install from split files. If you have the time, desire, and knowledge, please feel free to add that functionality.

If the install is being done from an AppleShare-mounted volume, the install utility must be in the same folder as the binary distribution sets.

Each distribution file is in *raw* archive format.

- Distribution files must be downloaded in binary mode. Common web browsers may not be suitable for this task; FTP clients such as Fetch and Anarchie work fine, but be sure to specify a binary file transfer.
- The files should not be unpacked. If you have the Internet Config extension installed, you can disable this in the "Helpers" dialog by removing the entry associated with ".tgz" files. Other FTP clients may require separate changes; consult your package's documentation.
- If you are installing from a CD-ROM, the distribution sets are already in the proper format and no special handling is required.

You will also need to collect the MacOS installation tools from the `mac68k/installation/misc` subdirectory of the NetBSD 1.5 distribution: Mkfs, NetBSD/mac68k Installer, and NetBSD/mac68k Booter. These three are in binhexed, self-extracting archives as Mkfs.sea.hqx, Installer.sea.hqx, and Booter.sea.hqx, respectively. Extract them as you would any other Macintosh application.

Preparing your System for NetBSD installation

Find your favorite disk partitioning utility. Any formatter capable of partitioning a SCSI disk should work. Some of the ones that have been tried and seem to work are:

- Apple HD SC Setup
- Hard Disk ToolKit from FWB
- SCSI Director Lite
- Disk Manager Mac from OnTrack
- Silverlining from LaCie
- APS Disk Tools

Apple's HD SC Setup is probably the easiest to use and the most commonly available. Instructions for patching HD SC Setup so that it will recognize non-Apple drives is available at:

http://www.euronet.nl/users/ernstoud/patch.html

First, you need to choose a drive on which to install NetBSD. Try to pick a drive with a low SCSI-ID number, especially if you are likely to add or remove drives to your SCSI chain in the future.

Note: Be sure you have a reliable backup of any data which you may want to keep. Repartitioning your hard drive is an excellent way to destroy important data.

Second, decide how you want to set up your partitions. At minimum, you need a partition to hold the NetBSD installation (the root partition - `/`) and a partition to serve as swap. You may choose to use more than one partition to hold the installation. This allows you to separate the more vital portions of the file system (such as the kernel and the `/etc` directory) from the more volatile parts of the file system. Typical setups place the `/usr` directory on a separate partition from the root partition `(/)`. Generally, `/` can be fairly small while the `/usr` partition should be fairly large. If you plan to use this machine as a server, you may also want a separate `/var` partition.

Once you have decided how to lay out your partitions, you need to calculate how much space to allocate to each partition. A minimal install of NetBSD (i.e. `netbsd.tgz`, `base.tgz`, and `etc.tgz`) should just fit in a 32 MB partition. For a full installation, you should allocate at least 95 MB (150 MB if you wish to install the X sets as well). A general rule of thumb for sizing the swap partition is to allocate twice as much swap space as you have real memory. Having your swap + real memory total at least 20 MB is also a good idea. Systems that will be heavily used or that are low on real memory should have more swap space allocated. Systems that will be only lightly used or have a very large amount of real memory can get away with less.

Keep in mind that NetBSD currently requires MacOS in order to boot, so it is likely that you will want to keep at least a minimal install of MacOS around on an HFS partition for this purpose. The size of this partition may vary depending on the size requirements for the version of MacOS you are using. Of course, if you have MacOS on another hard drive or can boot from a floppy, feel free to dedicate the entire drive to NetBSD.

Next, use your favorite partitioning utility to make partitions of the necessary sizes. You can use any type of partition, but partitions of type `Apple_Free` might save you some confusion in the future.

You are now set to install NetBSD on your hard drive.

Installing the NetBSD System

The installation can be broken down into three basic steps:

- Run Mkfs to build a file system or file systems.
- Run the Installer to load the files onto your file systems.
- Run the Booter to boot the system.

Preparing the file system(s)

Double-click on the Mkfs application icon to start it up. It will ask you for the SCSI-ID of the drive that you are installing upon. Once this is selected, it will present a list of the partitions on that disk. You must first convert the partitions to a type which NetBSD can understand. Select each partition on which you wish to build a file system and click on the ''Change'' button. If you are placing the entire installation on a single partition, select the ''NetBSD Root&Usr'' radio button. If you are using multiple partitions, select ''NetBSD Root'' for the root partition (/) and ''NetBSD Usr'' for all the other partitions. You should select ''NetBSD Swap'' for the swap partition.

When you have finished converting each partition, select each partition and click on the ''Format'' button. You will now be asked for a bunch of parameters for the hard drive and the file system. Usually, you can just take the defaults. If you are installing onto removable media (e.g. a Zip, Jaz, or Syquest), please see the FAQ. Note that although this dialog only has the ''OK'' button, you are not committed, yet. Once you get the values you want, press the ''OK'' button. A dialog will be presented at this point with two options: ''Format'' and ''Cancel''. If you choose ''Cancel'', nothing will be written to your drive. If you choose ''Format'', the program will proceed to make a file system.

Mkfs is not a well-behaved Macintosh application. It will not allow any other tasks to run while it does (cooperative multitasking at its best). When it's finished, the program will put up a dialog to ask if you have scanned the output for any error messages. Usually there won't have been any errors, but do scan the output to make sure. Simply click on the ''I Read It'' button and the program will quit.

Repeat as necessary for any extra partitions that you wish to make file systems on. Note that you do *not* need a file system on your swap partition.

When you are finished, click on the ''Done'' button and choose ''Quit'' from the ''File'' menu to exit Mkfs.

Installing the files

Before using the Installer, it is probably a good idea to increase its memory allocation. Select the Installer icon by clicking on it and choose ''Get Info'' from the File menu. Increase both the Minimum and Preferred sizes to as much as you can spare.

Double-click on the Installer icon to start it up. The Installer will present the same SCSI-ID menu that Mkfs did. Select the same SCSI-ID that you did for Mkfs - i.e., the one you are installing onto.

If you are installing onto a single root partition (/), proceed to the **Installation of base files** section, below.

If you have not created file systems for / (root), `usr`, and any other file systems, go back to **Preparing the file system(s)** above.

When you started the Installer, it mounted your root partition (/). Just before it printed,

```
Mounting partition 'A' as / ,
```

it printed lines like:

```
sd1 at scsi ID 5.
```

This means that the device for SCSI-ID 5 is `sd1`. The partitions are signified by a trailing letter. For instance, `sd1a` would be the root partition (`/`) of the second SCSI disk in the chain, and `sd0g` would be the first Usr partition on the first SCSI disk.

You will need to know the proper device to mount the remaining partition(s) by hand:

1. Select "Build Devices" from the "File" menu.
2. Select "Mini Shell" from the "File" menu.
3. You can use the **disklabel** command to get a listing of the available partitions and their types and sizes.
4. Create the directory mount point(s) with the command:

   # **mkdir path**

   E.g. for the `/usr` partition type:

   # **mkdir /usr**
5. Mount the file systems you wish with the command:

   # **mount device path**
   For example, if you wish to mount a `/usr` partition from the first SCSI disk `sd0`, on `/usr`, you would type:

   # **mount /dev/sd0g /usr**
6. Type
   # **fstab force**
   to create a proper `/etc/fstab` file.
7. Type **quit** after you have mounted all the file systems.

Installation of base files

Select the **Install** menu item from the **File** menu and install `base.tgz`, `etc.tgz`, `netbsd.tgz`, and any other sets you wish to install at this time. (See the contents section for information about what's in each set.) The Installer will print out the filename of each file as it is installed, and will take quite some time to install everything (the base package alone can take over an hour on a slow hard drive).

As is the case with Mkfs, this is not a particularly well-behaved Macintosh application and the machine will be completely tied up while the installation takes place.

At some point after installing the base set, select the **Build Devices** option from the **File** menu if you have not already done so. This will create a bunch of device nodes for you and will create your initial `/etc/fstab`. The Installer program also has an option to give you a mini-shell. Do not use this unless you are sure know what you are doing.

When you are finished installing all of the sets you wish to install, exit the Installer by choosing **Quit** from the **File** menu.

Booting the system

Prior to attempting to boot NetBSD/mac68k, please verify that all of the following are true:

1. 32-bit addressing is enabled [1] in the Memory control panel;
2. All forms of virtual memory are disabled (the Memory control panel, RAM Doubler, or other software-based memory enhancement products); and

3. Your system is in B&W mode (1-bit color or grayscale) as shown by the Monitors control panel. You may choose to have the Booter do this for you automatically by selecting the appropriate check box and radio button in the **Monitors** dialog on the **Options** menu.

It is probably best to boot your machine with all extensions turned off [1]. You can do this by booting into MacOS with the SHIFT key held down. You may have to restart your Macintosh for changes to take effect before proceeding.

[1] If your version of the Memory control panel does not have a 32-bit addressing mode radio button, this means that your system is already 32-bit clean and is running in 32-bit addressing mode by default. If the Booter complains that your are not in 32-bit mode, it may be necessary for you to press the "Use Defaults" button in the Memory control panel to restore 32-bit addressing. You should probably reboot after doing so. If you have an older II-class system (including the II, IIx, IIcx, and SE/30), it is necessary to install Connectix's MODE32 to work around ROM issues which prevent you from enabling 32-bit addressing. Please see
the FAQ:
http://www.netbsd.org/Ports/mac68k/faq/
for more information.

Double-click on the NetBSD/mac68k Booter icon to start the application. Select **Booting** from the **Options** menu. Check that all of the items in the resulting dialog look sane - especially the SCSI-ID. If not, correct them to your preference (the SCSI-ID should be the only thing you need to change). When you are satisfied with your choices, try booting NetBSD by selecting **Boot Now** from the **Options** menu.

If you wish to save your preferences, choose **Save Options** from the **File** menu before Booting (your preferences will not be saved if you forget to do this).

If the system does not come up, send mail to `port-mac68k@netbsd.org` describing your software, your hardware, and as complete a description of the problem as you can.

If the system does come up, congratulations, you have successfully installed NetBSD 1.5.

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`, 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-write. When the system asks you to choose a shell, simply press RETURN to get to a prompt. If you are asked for a terminal type, respond with **vt220** (or whatever is appropriate for your terminal type) and press RETURN. At this point, you need to configure at least one file in the `/etc` directory. Change to the `/etc` directory and take a look at the `/etc/rc.conf` file. Modify it to your tastes, making sure that you set `rc_configured=YES` so that your changes will be enabled and a multi-user boot can proceed. 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 interface <int>, along the lines of

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

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

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

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

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

2. Logging in

   After reboot, you can log in as `root` at the login prompt. There is no initial password, but if you're using the machine in a networked environment, you should create an account for yourself (see below) and protect it and the "root" account with good passwords. Unless you have connected an unusual terminal device as the console you can just press RETURN when it prompts for `Terminal type? [...]`

3. Adding accounts

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

4. The X Window System

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

   Don't forget to add `/usr/X11R6/bin` to your path in your shell's dot file so that you have access to the X binaries.

5. Installing third party packages

   If you wish to install any of the software freely available for UNIX-like systems you are strongly advised to first check the NetBSD package system. This automatically handles any changes necessary to make the software run on NetBSD, retrieval and installation of any other packages on which the software may depend, and simplifies installation (and deinstallation), both from source and precompiled binaries.

   – More information on the package system is at
     http://www.netbsd.org/Documentation/software/packages.html

   – A browsable listing of available packages 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/

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

  ```
  # mkdir /usr/pkgsrc; tar -C /usr/pkgsrc -zxpf pkgsrc.tar.gz
  ```

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

6. Misc

   – Edit `/etc/mail/aliases` to forward root mail to the right place (run `newaliases`(1) afterwards.)

   – The `/etc/mail/sendmail.cf` file will almost definitely need to be adjusted; files aiding in this can be found in `/usr/share/sendmail`. See the README file there for more information.

   – Edit `/etc/rc.local` to run any local daemons you use.

   – Many of the `/etc` files are documented in section 5 of the manual; so just invoking

     ```
     # man 5 filename
     ```

     is likely to give you more information on these files.

Upgrading a previously-installed NetBSD System

The upgrade to NetBSD 1.5 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.

No automated upgrade procedure exists for upgrading to release 1.5 for the NetBSD/mac68k architecture. The current procedure is essentially to perform a new install from scratch. It is hoped that there will be a good upgrade procedure for future releases. Please feel free to volunteer to help replace these installation tools.

The following steps outline the current upgrade procedure. These steps should help ease the upgrade process. Please read these instructions carefully and completely before proceeding.

1. 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. Although the upgrade should not damage your file system(s) in any way, you never know what may happen.

2. Download the distribution sets you want from the `mac68k/binary/sets` subdirectory of the NetBSD 1.5 distribution. You will need the base set and the kernel at a minimum. Be sure to download the files in *binary* mode. If you will be upgrading from within NetBSD, make sure that you place the distribution sets on a file system you will be able to reach from single-user mode.

3. Install the 1.5 kernel. You may either use the Installer utility (included in the `installation/misc` subdirectory) or install from within NetBSD (the latter is recommended for speed reasons). If you choose the former, proceed as you normally would. If you choose to install from within NetBSD, then boot (or shutdown) into single-user mode and do the following:

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

There is no need to backup your old kernel explicitly since it will be incapable of running many of the newer binaries you are about to install. (Unless, of course, you have a backup copy of your older binaries and want to revert to them for some reason.) However, you might want to keep a backup if you are upgrading from within NetBSD just in case the newer kernel has trouble booting your machine.

4. If you are installing using the Installer, skip to step 5. Otherwise, reboot into NetBSD in single-user mode. Run **fsck -f** and then mount all local partitions read/write. Usually **mount -a -t nonfs** should do the trick, but if you have several partitions on the same disk, take note of the fact that a change in partition numbering may have moved a few of your partitions around. You can do a **disklabel sd***X* (where *X* is a drive on which you have NetBSD partitions) to see how the partitions are currently layed out. It is likely that a partition has shifted into the `sdXd` or `sdXe` slots, slots that often were not available under previous releases of NetBSD. If this is the case, you will need to manually mount your root partition (/) via **mount -w /** and edit your `/etc/fstab` file to reflect the new partition layout. Unless you are familiar with `ex`(1) or `ed`(1). the easiest way to fix your `/etc/fstab` file is probably to simply do a **cat > /etc/fstab** and type in the corrected file in its entirety.

5. Install the distribution sets. Keep in mind that the NetBSD 1.5 distribution takes up a considerably larger amount of disk space than did the 1.3 family of distributions. If you are using the Installer, proceed normally (remember that you will need to mount non-root partitions by hand using the MiniShell before installing). If you are installing from within NetBSD, do the following:

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

Keep in mind that there is no going back once you have installed the base set short of a complete re-install of an earlier distribution. Continue with the appropriate command line for each of the other sets you wish to install except for the etc set. If you are in the Installer, open up the Minishell and do the following:

```
cd /tmp
exit
```

Ignore the warning message this will cause. Now, use the Installer to install the **etc** set (it will install into `/tmp` instead of the `/etc` directory).

If you are in NetBSD, do the following instead:

```
# cd /tmp
# pax -zrvpe -f /path/to/etc.tgz
```

6. If you are in the Installer, quit it and boot into NetBSD in single-user mode. From there, **cd** to the `/tmp/etc` directory and compare each file there with your old files in `/etc`. 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 should take note of the following when upgrading to the NetBSD 1.5 etc.tgz set:

– Several of the options given to many of the file systems have changed, and some of the file systems have changed names.

  Note: It is imperative that you change any instances of **ufs** `/etc/fstab` to **ffs**.
  To find out more about different file system options, read the man page for the associated **mount** command (e.g. `mount_mfs`(8) for MFS file systems; note: FFS type file systems are documented in the `mount`(8) man page). If you have not already done so, you may also need to correct `/etc/fstab` for a shift in the partition numbering scheme. See step 4 above for more details.

– You will also probably want to upgrade your device nodes at this time as well. Make sure you have installed the latest MAKEDEV script (it should be included in the etc set) and perform the following commands:

```
# cd /dev
# sh MAKEDEV all
```

7. Run **fsck -f** to make sure that your file system is still consistent. If fsck reports any errors, fix them by answering '**y**' to its suggested solutions

   Note: If there are a large number of errors, you may wish to stop and run **fsck -fy** to automatically answer **yes** instead.

8. Exit from single-user mode and it should continue to boot into multi-user mode.

At this point you have successfully upgraded to NetBSD 1.5.

Compatibility Issues With Previous NetBSD Releases

Users upgrading from previous versions of NetBSD may wish to bear the following problems and compatibility issues in mind when upgrading to NetBSD 1.5.

General issues

– /etc/rc modified to use /etc/rc.d/*

  In previous releases of NetBSD, /etc/rc was a traditional BSD style monolithic file. As of NetBSD 1.5, each discrete program or substem from /etc/rc and /etc/netstart has been moved into separate scripts in /etc/rc.d/.

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

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

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

Issues affecting an upgrading from NetBSD 1.4 or later

– named(8) leaks version information

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

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

– sysctl(8) pathname changed

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

– sendmail(8) configuration file pathname changed

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

Using online NetBSD documentation

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

- `intro`(1),
- `man`(1),
- `apropros`(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.

- Also, our thanks go to:

  Mike Hibler
  Rick Macklem
  Jan-Simon Pendry
  Chris Torek

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

- UC Berkeley's Experimental Computing Facility provided a home for sun-lamp in the past, people to look after it, and a sense of humor. Rob Robertson, too, has added his unique sense of humor to things, and for a long time provided the primary FTP site for NetBSD.
- Vixie Enterprises for hosting the NetBSD FTP, SUP, and WWW servers.
- Redback Networks, Inc. for hosting the NetBSD mail and GNATS server.
- The Helsinki University of Technology in Finland for hosting the NetBSD CVS server.
- The Internet Research Institute in Japan for hosting the server which runs the CVSweb interface to the NetBSD source tree.
- The many organisations 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.
- Dave Burgess `burgess@cynjut.infonet.net` has been maintaining the 386BSD/NetBSD/FreeBSD FAQ for quite some time, and deserves to be recognized for it.
- The following individuals and organizations (each in alphabetical order) have made donations or loans of hardware and/or money, to support NetBSD development, and deserve credit for it:

  Steve Allen
  Jason Birnschein
  Mason Loring Bliss
  Jason Brazile
  Mark Brinicombe
  David Brownlee
  Simon Burge
  Dave Burgess
  Ralph Campbell
  Brian Carlstrom
  James Chacon
  Bill Coldwell
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Scott Kaplan
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Chuck Silvers
Thor Lancelot Simon
Bill Sommerfeld
Paul Southworth
Eric and Rosemary Spahr
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Kimmo Suominen
Jason R. Thorpe
Steve Wadlow
Krister Walfridsson
Jim Wise
Christos Zoulas

AboveNet Communications, Inc.
Advanced System Products, Inc.
Avalon Computer Systems
Bay Area Internet Solutions
Brains Corporation, Japan
Canada Connect Corporation
Co-operative Research Centre for Enterprise Distributed Systems Technology
Demon Internet, UK
Digital Equipment Corporation
Distributed Processing Technology

Easynet, UK
Free Hardware Foundation
Innovation Development Enterprises of America
Internet Software Consortium
MS Macro System GmbH, Germany
Numerical Aerospace Simulation Facility, NASA Ames Research Center
Piermont Information Systems Inc.
Salient Systems Inc.
VMC Harald Frank, Germany
Warped Communications, Inc.
Whitecross Database Systems Ltd.

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

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

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Contributions

The following people have made contributions of various sorts specifically for the Macintosh port (in alphabetical order):

- All of the users who have supplied us with good bug reports and moral support.
- The Alice Group (Allen K. Briggs, Chris P. Caputo, Michael L. Finch, Bradley A. Grantham, and Lawrence A. Kesteloot), without whom there would be no NetBSD port for the Macintosh.
- Steven R. Allen for keeping our snapshot distributions up-to-date.
- Stephen C. Brown for maintaining the Installer application.
- Denton Gentry and Yanagisawa Takeshi for their work on the SONIC Ethernet driver.
- Paul Goyette, Taras Ivanenko, Ken Nakata, and Michael R. Zucca for invaluable work towards supporting color X.
- Takashi Hamada and John Wittkoski beating the direct ADB hardware driver into submission.
- David Huang for getting MACE Ethernet and basic DMA working on the AV Macs.
- Scott Jann for acquiring a IIx and a IIci, used for building and testing release sets.
- Scott Kaplan for lending his IIci and Kensington Turbo Mouse for IIci/IIsi banked memory and internal video as well as non-Apple ADB devices.
- Noah M. Kieserman for lending a PowerBook 520C for tracking down several bugs on that platform.
- Markus Krummenacker for monetary donations.
- Glan Lalonde for an invaluable IIci page table dump.
- Bob Nestor for (unofficially) maintaining the Mkfs utility, and providing a lot of useful information about the ROM vectors used by different systems.
- Brad Parker for serial and Ethernet drivers/improvements.
- Brian R. Gaeke and Nigel Pearson for tweaking and polishing the Booter application.
- Scott Redman for lending Brad Grantham a PowerBook 160.
- Craig Ruff for assembling an '030 `pmove ttx` instruction.
- Brad Salai for lending an Ethernet card to help resolve interrupt conflicts.

- Larry Samuels for monetary donations.
- Peter Siebold for lending his IIvx in support of ADB and IIvx internal video.
- Glen Stewart for lending a Carrera040 accelerator which, while still unsupported, helped to track down memory management bugs for '030-based machines.
- Bill Studenmund for providing a stable front end to the machine- independent serial driver.
- Schuyler Stultz for the loan of his Macintosh II when we desperately needed another machine on which to compile and test during the '93 Xmas vacation.
- Tenon Intersystems for monetary donations, MachTen, and Brad's access to several machines and documentation after hours.
- Virginia Tech English Department for loan of a IIci w/ NuBus video and 32 MB of RAM - the first IIci to run NetBSD/mac68k.
- Colin Wood for maintaining a host of NetBSD/mac68k documentation, including the FAQ, Meta-FAQ, and OS Info documents.