NAME

INSTALL – Installation procedure for NetBSD/mac68k

DESCRIPTION

About this Document

This document describes the installation procedure for NetBSD 1.4.2 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 UN*X-like operating system derived from the Berkeley Networking Release 2 (Net/2), 4.4BSD-Lite, and 4.4BSD-Lite2 sources. NetBSD runs on twenty different system architectures featuring eight distinct families of CPUs, and is being ported to more. The NetBSD 1.4.2 release contains complete binary releases for fifteen different machine types. (The remaining ones 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, and numerous other tools, all accompanied by full source code.

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

Upgrade path to NetBSD 1.4.2

If you are not installing your system "from scratch" but instead are going to upgrade an existing system already running NetBSD you need to know which versions you can upgrade with NetBSD 1.4.2.

NetBSD 1.4.2 is an upgrade of NetBSD 1.4.1, NetBSD 1.4 and earlier releases of NetBSD such as versions 1.3.3, 1.2 etc.

The intermediate development versions of code available on the main trunk in our CVS repository (also known as "NetBSD-current") from *after* the point where the release cycle for 1.4 was started are designated by version identifiers such as 1.4A, 1.4B, 1.4P etc. These identifiers do not designate releases, but indicate major changes in internal kernel APIs. Note that the kernel from NetBSD 1.4.2 can *not* be used to upgrade a system running one of those intermediate development versions. Trying to use the NetBSD 1.4.2 kernel on such a system *will* in all probability result in problems.

Please also note that it is not possible to do a direct "version" comparison between any of the intermediate development versions mentioned above and 1.4.2 to determine if a given feature is present or absent in 1.4.2. The development of 1.4, 1.4.1 and 1.4.2 is done on a separate branch in the CVS repository which was created when the release cylcle for 1.4 was started, and during the release cycles for all these versions selective fixes (with minor impact on the stability of the code on the release branch) have been imported from the main development trunk. So, there are features in 1.4.2 which were not in e.g. 1.4H, but the reverse is also true.

Major Changes Between 1.4.1 and 1.4.2

The complete list of changes between NetBSD 1.4.1 and 1.4.2 can be found in the file CHANGES-1.4.2 in the top directory of the source tree. The following are the highlights only.

- A driver for the Alteon Gigabit Ethernet cards has been added, see `ti`(4).
- A driver for the Realtek 8129/8239 Fast Ethernet PCI cards have been added, see `rl`(4).
- A driver for the DPT SmartCache and SmartRAID III or IV SCSI adapters has been added, see `dpt`(4).
- A driver for the BOCA IOAT66 6-port ISA serial adapter has been added, see `ioat`(4).
- Support for the X-surf Amiga board has been added.
- Support has been added for ext2fs revision 1, with read-only support for the "sparse super" and the "filetype" options.
- BIND has been upgraded to version 8.2.2-P5.
- The IPF packet filtering software has been updated to version 3.3.5.
- Tcpdump now does hex/ascii dumps of packet contents if asked to do so.
- An implementation of the System V user management utilities has been added.
- The name "errno" is now always a macro which expands to a function call. This is done to ease the integration of thread libraries with the code in both system and third-party libraries. Please include <errno.h> to access the correct definition of "errno".
- A utility for making temporary files for shell scripts has been added, see `mktemp`(1).
- The automounter utility `amd`(8) has been updated to fix a security problem.
- A security problem in procfs has been fixed. Procfs is not used by default in NetBSD.
- The floating point emulation on the ports using the m68k CPU has been reverted to the version in NetBSD 1.4 (the version in 1.4.1 had problems).
- Several subsystems have received substantial work, such as RAIDframe, LFS, and the package tools.

In addition, many, many bugs have been fixed -- more than 100 problems reported through our problem tracking system have been fixed, and many other non-reported problems have also been found and fixed. See the CHANGES-1.4.2 file for the complete list.

Known caveats with 1.4.2

The following are the major known issues with NetBSD 1.4.2.

- The upgrade of `ipf`(8) caused a change of the kernel API. Thus, if you are using `ipf`(8) you need to upgrade both the kernel and the user-land utilities to control that feature in order for it to work.
- As part of fixing a kernel bug, "struct vfsnode" needed to change size. This will unfortunately, and contrary to tradition for patch releases, cause incompatibilities for users of file system LKMs compiled for 1.4 and 1.4.1.
- Although LFS has been improved between 1.4.1 and 1.4.2, it can probably still be characterized as being of "beta test" quality, e.g. filling the file system still gives "interesting" effects. It should probably not be used to store critical data quite yet.
- The version of the IPF packet filtering software in NetBSD 1.4.2 must be enabled with "ipf -E" before filtering or NAT rules can be set. Failure to do so may result in a panic.

Major Changes Between 1.4 and 1.4.1

The complete list of changes between NetBSD 1.4 and 1.4.1 can be found in the file CHANGES-1.4.1 in the top directory of the source tree.

- The NetBSD/alpha port's compatibility for Digital UNIX executables has been greatly improved.
- Many bug fixes and improvements of the installation tools and utilities.
- Support for more PCI serial/parallel cards has been added.
- It is now possible to boot NetBSD/i386 on systems with 1GB of RAM.
- The floating point emulation on the ports using the m68k CPU has been upgraded.
- A fatal problem with /dev/random has been found and fixed.
- Support for Alpha 21264 ev6 based systems has been added to NetBSD/alpha.

Major Changes Between 1.3 and 1.4

The NetBSD 1.4 release is a substantial improvement over its predecessors. We have provided 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 results of these improvements is a stable operating system fit for production use that rivals most commercially available systems.

It is impossible to completely summarize the nearly two years of development that went into the NetBSD 1.4 release. Some highlights include:

- Substantial improvements in the TCP/IP implementation, including numerous performance enhancements and bug fixes by Jason Thorpe and others.
- A new, high efficiency kernel memory pool allocator by Paul Kranenburg. This has been integrated into most kernel subsystems.
- A new, totally rewritten virtual memory subsystem, UVM, created by Chuck Cranor, which is substantially cleaner and better performing than the old Mach derived VM subsystem.
- Improved POSIX and XPG standards compliance.
- Completion of the integration of all remaining 4.4BSD Lite-2 kernel improvements and bug fixes that had not been previously integrated. (Integration of all userland components was completed before NetBSD 1.3)
- Several new ports, including macppc, bebox, sparc64, next68k, and others, have been integrated into the source tree.
- The system compilers have been upgraded to egcs 1.1.1, and the system compiler toolchain now (mostly) uses the latest versions of GNU binutils instead of the obsolete versions left over from 4.4BSD Lite.
- Everyone's favorite `ftp`(1) client has been improved even further. See the man page for details.
- A new architecture independent console driver, `wscons`(4), has been integrated into many ports.
- Numerous improvements have been made to the audio subsystem support, including support for MIDI device drivers.
- Linux compatibility support has been improved.
- A number of scheduler enhancements have yielded dramatic improvements in interactive performance and better control of background tasks.

- Several network tunneling protocols, including GRE and IP in IP, have been implemented.
- Kernel support for the CODA distributed file system has been added.
- Manuel Bouyer completed major changes to the IDE support. It is now architecture independent. Major changes have been made to the IDE code for better error handling, improved ATAPI support, 32 bit data I/O support and bus-master DMA support on PCI IDE controllers.
- Lennart Augustsson has added full USB support, permitting the use of a wide variety of Universal Serial Bus peripherals. The drivers should easily port to any future platforms that support the PCI bus. See `usb`(4) for an overview.
- RAIDframe, version 1.1, from the Parallel Data Laboratory at Carnegie Mellon University, has been integrated. Supports RAID levels 0, 1, 4, 5, and more.
- Luke Mewburn added `nsswitch.conf`(5) functionality to the system to specify the search order for system databases.
- `syslogd`(8) now supports listening on multiple sockets, to make the chrooting of servers easier.
- Most third party packages have been updated to the latest stable release.

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 1.4.2 is the fifth "real" release of NetBSD for the 68k-based Macintosh.

For the mac68k port, NetBSD 1.4.2 brings a number of improvements:

- A number of kernel changes enable support for several previously unsupported systems (such as the LC and Performa 470-series, 570/580-series, and 630-series Macs).
- Support for 800KB floppy drives has been added (i.e. machines that include the IWM or SWIM, but not the SWIM II or SWIM III)
- IBM-compatible MBR handling has been integrated to enable MS-DOS partition support
- The `mac68k/adb`(4) driver has undergone a major revamp.
- A number of bugs affecting II-series systems have been fixed.

There is still a lot of work to be done and help is welcomed. Please jump in! NetBSD 1.4.2 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. In addition, Anonymous CVS access to the NetBSD source tree has been added since NetBSD 1.4.1; see

http://www.netbsd.org/Changes/#anoncvs-available

We have also added a browsable CVS repository on the web at

http://cvsweb.netbsd.org/cgi-bin/cvsweb.cgi/

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

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

NetBSD 1.4.2 Release Contents

The root directory of the NetBSD 1.4.2 release is organized as follows:

`.../NetBSD-1.4.2/`

`BUGS`	Known bugs list (somewhat incomplete and out of date).
`CHANGES`	Changes since earlier NetBSD releases.
`LAST_MINUTE`	Last minute changes.
`MIRRORS`	A list of sites that mirror the NetBSD 1.4.2 distribution.
`README.files`	README describing the distribution's contents.
`TODO`	NetBSD's todo list (also somewhat incomplete and out of date).
`patches/`	Post-release source code patches.
`source/`	Source distribution sets; see below.

In addition to the files and directories listed above, there is one directory per architecture, for each of the architectures for which NetBSD 1.4.2 has a binary distribution. There are also 'README.export-control' files sprinkled liberally throughout the distribution tree, which point out that there are some portions of the distribution (i.e. the 'domestic' portion) that may be subject to export regulations of the United States. It is your responsibility to determine whether or not it is legal for you to export these portions and to act accordingly. The NetBSD project maintains a web page at

http://www.NetBSD.ORG/Misc/crypto-export.html

which should contain up-to-date information on this issue.

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:

secrsrc.tgz: This set contains the "domestic" sources. These sources may be subject to United States export regulations.
421K gzipped, 2M uncompressed

gnusrc.tgz: This set contains the "gnu" sources, including the source for the compiler, assembler, groff, and the other GNU utilities in the binary distribution sets.
19M gzipped, 84.3M uncompressed

syssrc.tgz: This set contains the sources to the NetBSD 1.4.2 kernel, config(8), and dbsym(8).
13.9M gzipped, 68.3M uncompressed

sharesrc.tgz: 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.
3M gzipped, 11.9M uncompressed

src.tgz: This set contains all of the NetBSD 1.4.2 sources which are not mentioned above.
14.4M gzipped, 67.4M uncompressed

Most of the above source sets are located in the `source/sets` subdirectory of the distribution tree. The secrsrc.tgz set is contained in the `source/security` subdirectory. This set, which may only be available to users in the United States and Canada, contains the sources normally found in `/usr/src/domestic` – primarily Kerberos and other cryptographic security related software. (Remember, because of United States law, it may not be legal to distribute this set to locations outside of the United States and Canada. Again, see

http://www.NetBSD.ORG/Misc/crypto-export.html

for updated information on this issue.)

The source sets are distributed as compressed tar files. They may be unpacked into `/usr/src` with the command:

```
cat set_name.tgz | gunzip | (cd /; tar xpf - )
```

The `sets/Split/` and `security/Split/` subdirectories contain 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 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.?? | gunzip | (cd /; tar xpf - )
```

In each of the source distribution set directories, there is a file named `CKSUMS` which contains the checksums of the files in that directory, as generated by the `cksum`(1) utility. You can use cksum to check the integrity of the archives, if you suspect that one of the files is corrupt and have access to a cksum binary. Checksums based on other algorithms may also be present – see the `release`(7) man page for details.

NetBSD/mac68k Subdirectory Structure

The mac68k-specific portion of the NetBSD 1.4.2 release is found in the `mac68k` subdirectory of the distribution: `.../NetBSD-1.4.2/mac68k/`

```
INSTALL.html
INSTALL.ps
INSTALL.txt
```

`INSTALL.more` Installation notes; this file. The `.more` file contains underlined text using the `more`(1) conventions for indicating italic and bold display.

`binary/`

- `sets/` mac68k binary distribution sets; see below.
- `security/` mac68k security distribution; see below.

`installation/`

Binary Distribution Sets

The NetBSD mac68k binary distribution sets contain the binaries which comprise the NetBSD 1.4.2 release for the mac68k. There are eight binary distribution sets and the *security* distribution set. The binary distribution sets can be found in the `mac68k/binary/sets` subdirectory of the NetBSD 1.4.2 distribution tree, and are as follows:

base The NetBSD 1.4.2 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.
10.2M gzipped, 28.9M 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.
8.1M gzipped, 26.6M 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.)
57K gzipped, 319K uncompressed

games This set includes the games and their manual pages.
2.8M gzipped, 7.1M uncompressed

kern
kern_sbc This set contains a NetBSD/mac68k 1.4.2 GENERIC kernel, named `/netbsd`. You *must* install this distribution set. It is the kernel that you need to boot the system. If you experience SCSI-related difficulties with your 68030-based system, you might want to try kern_sbc.tgz instead.
805K gzipped, 1.7M 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.

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

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

The mac68k security distribution set is named **secr** and can be found in the

`mac68k/binary/security`

subdirectory of the NetBSD 1.4.2 distribution tree. It contains security-related binaries which depend on cryptographic source code. You do not need this distribution set to use encrypted passwords in your password file; the **base** distribution includes a crypt library which can perform only the one-way encryption function.

The security distribution includes a version of the Kerberos IV network security system, and a Kerberized version of `telnet`(1) program. The **secr** distribution set can be found only on those sites which carry the complete NetBSD distribution and which can legally obtain it. Because of United States law, it may not be legal to distribute this set to locations outside of the United States and Canada. See

http://www.NetBSD.ORG/Misc/crypto-export.html

for updated information on this issue.

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.
2.4M gzipped, 7.7M uncompressed

xcomp The extra libraries and include files needed to compile X source code.
1.6M gzipped, 6.4M uncompressed

xcontrib Programs that were contributed to X.
178k gzipped, 664k uncompressed

xfont Fonts needed by X.

xserver The Xmac68k *monochrome* server with man pages.
1.3M gzipped, 3.3M 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 xfp`** command from /.

Additional kernels to those included in the distribution sets may be found in the `mac68k/binary/kernels` subdirectory of the NetBSD 1.4.2 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 1.4.2 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 K archived

`Installer.sea.hqx` The NetBSD/Mac68k Installer utility. This program is used to install the distribution sets onto your NetBSD partition(s).
147 K 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 K 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:

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

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

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

All SYSVSUM files are 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 System Requirements and Supported Devices

NetBSD/mac68k 1.4.2 runs on several of the older Macintosh computers. About 4MB of RAM might be sufficient to boot, and the system can probably be squeezed onto a 40MB hard disk by leaving off an unnecessary set or two. To actually do much compiling or anything more interesting than booting, at least 8MB of RAM and more disk space is recommended. About 95MB will be necessary to install all of the NetBSD 1.4.2 binary system distribution sets (note that this does not count swap space!). An additional 30MB 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 300MB).

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 on all of the above systems include:

- 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)
- 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

What isn't supported, but often asked about:

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 filesystem 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 10.2M 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 1.4.2 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 filesystem (such as the kernel and the `/etc` directory) from the more volatile parts of the filesystem. Typical setups place the `/usr` directory on a separate partition from the root partition. Generally, the root partition 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 32M partition. For a full installation, you should allocate at least 95M (150M 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 20M 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 filesystem or filesystems.
- Run the Installer to load the files onto your filesystems.
- Run the Booter to boot the system.

Preparing the filesystem(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 filesystem 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 filesystem. 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 filesystem.

Mkfs is not a well-behaved Macintosh application. It will not allow any other tasks to run while it does (co-operative 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 filesystems on. Note that you do _not_ need a filesystem 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 filesystems for the root, usr, and any other filesystems, go back to "Preparing the filesystem(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:

- Select "Build Devices" from the "File" menu.
- Select "Mini Shell" from the "File" menu.
- You can use the 'disklabel' command to get a listing of the available partitions and their types and sizes.
- Create the directory mount point(s) with the command:
  `mkdir path`
  (e.g. for the `/usr` partition type: **`mkdir /usr`**)
- Mount the filesystems 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`
- Type **`fstab force`** to create a proper `/etc/fstab` file.
- Type **`quit`** after you have mounted all the filesystems.

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[*] 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[*]. 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.

[*]Note: 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 1.4.2.

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 propperly configured state, with the most important ones described below.

1. Configuring `/etc/rc.conf`

   If you 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 filesystem mounted read-write. When the system asks you to choose a shell, simply hit 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 hit 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. If your `/usr` directory is on a separate partition and you do not know how to use 'ed' or 'ex', you will have to mount your `/usr` partition to gain access to 'vi'. Do the following:

   ```
   mount /usr
   export TERM=vt220
   ```

   If you have `/var` on a seperate 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 are new to NetBSD 1.4 and 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.

3. Adding accounts

   Use the `vipw`(8) command to add accounts to your system, *do not* edit `/etc/passwd` directly. See `adduser`(8) for more information on the process of 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 3rd party packages

   There is a lot of software freely available for Unix-based systems, almost all of which can run on NetBSD. Modifications are usually needed to when transferring programs between different Unix-like systems, so the NetBSD packages collection incorporates any such changes necessary to make that software run on NetBSD, and makes the installation (and deinstallation) of the software packages easy. There's also the option of building a package from source, in case there's no precompiled binary available.

   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
   and extracting it into `/usr/pkgsrc`. See `/usr/pkgsrc/README` then for more information.

6. Misc

   - To adjust the system to your local timezone, point the `/etc/localtime` symlink to the appropriate file under `/usr/share/zoneinfo`.
   - Edit `/etc/aliases` to forward root mail to the right place (run `newaliases`(1) afterwards.)
   - The `/etc/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` *`filename`*
     is likely to give you more information on these files.

Upgrading a previously-installed NetBSD System

The upgrade to NetBSD 1.4.2 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 1.4.2 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 filesystem(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 1.4.2 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 filesystem you will be able to reach from single-user mode.

3. Install the 1.4.2 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 **`sd`***X***`d`** or **`sd`***X***`e`** 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 1.4.2 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 1.4.2 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. *It is imperative that you change any instances of* **`ufs`** *in* `/etc/fstab` *to* **`ffs`**. To find out more about different filesystem options, read the man page for the associated mount command (e.g. `mount_mfs`(8) for MFS filesystems; note: FFS type filesystems 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 filesystem 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 1.4.2.

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 1.4.2

Note Only issues effecting an upgrade from NetBSD 1.3 or NetBSD 1.3.x are decribed here.

- "machine" directory/link in "/usr/include"

  Description

  Some architecture may fail to install the **`comp`** set because the

  ```
  /usr/include/machine
  ```

  directory changed to a symbolic link in NetBSD 1.4.

  Fix If this happens, you can use the command

  ```
  # rm -r /usr/include/machine
  ```

  to remove the old directory and it contents and reinstall the **`comp`** set.

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)m 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. 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 somewhere, then mail the appropriate list about it, or, if you'd rather not do that, mail the list saying you'll send the data to those who want it.

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

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

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