NAME

INSTALL – Installation procedure for NetBSD/sun3

DESCRIPTION

About this Document

This document describes the installation procedure for NetBSD 1.4.2 on the *sun3* 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 ''file-type'' 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.

For the sun3, NetBSD 1.4.2 brings combined Sun3 and Sun3X support with the same installation media.

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/sun3 Subdirectory Structure

The sun3-specific portion of the NetBSD 1.4.2 release is found in the `sun3` subdirectory of the distribution:

`.../NetBSD-1.4.2/sun3/`

`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/` sun3 binary distribution sets; see below.
`security/` sun3 security distribution; see below.
`installation/`
`miniroot/` Sun3 miniroot boot-image.
`netboot/` Server boot-file image for diskless machines.
`tapeboot/` Scripts and boot block for making a boot tape.

Binary Distribution Sets

The NetBSD sun3 binary distribution sets contain the binaries which comprise the NetBSD 1.4.2 release for the sun3. There are eight binary distribution sets and the *security* distribution set. The binary distribution sets can be found in the `sun3/binary/sets` subdirectory of the NetBSD 1.4.2 distribution tree, and are as follows:

base The NetBSD 1.4.2 sun3 **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.

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.

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.)

games This set includes the games and their manual pages.

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.

The sun3 security distribution set is named **secr** and can be found in the

`sun3/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.

xcomp The extra libraries and include files needed to compile X source code.

xcontrib Programs that were contributed to X.

xfont Fonts needed by X.

The sun3 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 /.

There is a collection of Sun3 and Sun3X kernels in the `sun3/binary/kernels` subdirectory of the NetBSD 1.4.2 distribution. The ones named `netbsd-ramdisk*.gz` contain a root file system image and should only be used for the initial installation. The others are included for convenience. (Most people will want to use `netbsd-generic.gz` or `netbsd-generic3x.gz` as appropriate.) Please note that these kernels are simply gzipped and are not in tar archives.

Note Each directory in the sun3 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/sun3 System Requirements and Supported Devices

NetBSD/sun3 1.4.2 runs on most Sun3 machines, including:

3/50	3/60	3/110
3/75	3/150	3/160
3/260	3/280	3/E
3/80	3/470	

Note that NetBSD/sun3 now includes support for "Sun3X" machines, which used to be supported with a separate distribution.

The minimal configuration requires 4M of RAM and about 80MB of disk space. To install the entire system requires much more disk space (approx. 100MB additional space is necessary for full sources). To run X or compile the system, more RAM is recommended. Good performance requires 8MB of RAM, or 16 MB when running the X Window System.

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

Partition	Advised	With X	Needed	With X
root (/)	20M	20M	15M	15M
user (/usr)	95M	125M	75M	105M
swap	ram*2 ...			
local (/usr/local)	up to you ...			

As you may note, the recommended size of /usr is 20M greater than needed. This is to leave room for a kernel source and compile tree as you will probably want to compile your own kernel. (GENERIC is large and bulky to accommodate all people).

Note that the sun3 installation procedure uses a 'miniroot' image which is placed into the swap area of the disk. The swap partition must be at least as large as the miniroot image (10MB).

The following Sun3 hardware is supported:

Serial ports (RS232):
built-in ttya, ttyb

Video adapters:
bwtwo, cgtwo, cgfour

Network interfaces:
On-board Lance Ethernet
On-board or VME Intel Ethernet
Sun3/E SCSI/Ethernet board

SCSI: (Most SCSI disks, tapes, CD-ROMs, etc.)
On-board "esp" (Sun3/80 SCSI)
On-board "si" (SCSI-3)
VME "si" (SCSI-3) board
Sun3/E SCSI/Ethernet board

SMD Disks: (the big, heavy ones 8^)
Xylogics 450/451
Xylogics 753/7053

Input devices:
Sun keyboard and mouse

Miscellaneous:
Battery-backed real-time clock.
On-board floppy controller (Sun3/80 floppy)

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

Getting the NetBSD System on to Useful Media

Installation is supported from several media types, including:

- Tape
- NFS
- CD-ROM
- FTP

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

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

In order to create installation media, you will need all the files in the directory
`.../NetBSD-1.4.2/sun3/`

Creating boot/install tapes

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

The boot tape is created as follows:

```
cd .../NetBSD-1.4.2/sun3/installation/tapeimage
sh MakeBootTape /dev/nrst0
```

The install tape is created as follows:

```
cd .../NetBSD-1.4.2/sun3/installation/tapeimage
sh MakeInstallTape /dev/nrst0
```

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

Boot/Install from NFS server:

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

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

When instructed to boot over the network, your sun3 expects to be able to download a second stage bootstrap program via TFTP after it has acquired its IP address through RARP. It will attempt to download a file using a name derived from the machine's recently aquired IP address. (It may be handy to have a hexadecimal calculator for this next step.) The filename is created by converting the machine's assigned IP address into hexadecimal, most-significant octet first, using uppercase characters for the non-decimal (A-F) digits.

For example, a sun3 which has been assigned IP address 130.115.144.11 will make an TFTP request for 8273900B. Normally, this file is a symbolic link to the NetBSD/sun3 netboot program, which should be located in a place where the TFTP daemon can find it. (Remember, many TFTP daemons run in a chroot'ed environment.) The netboot program may be found in the install directory of this distribution.

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

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

Install/Upgrade from CD-ROM

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

Install/Upgrade via FTP

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

The preparations for this installation/upgrade method are easy; all you make sure that there's some FTP site from which you can retrieve the NetBSD distribution when you're about to install or upgrade. You need to

know the numeric IP address of that site, and, if it's not on a network directly connected to the machine on which you're installing or upgrading NetBSD, you need to know the numeric IP address of the router closest to the NetBSD machine. Finally, you need to know the numeric IP address of the NetBSD machine itself.

Preparing your System for NetBSD Installation

Sun3 machines usually need little or no preparation before installing NetBSD, other than the usual, well advised precaution of *backing up all data* on any attached storage devices.

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

Note SunOS/sun3 uses confusing names for the SCSI devices: target 1 is sd2, target 2 is sd4, etc.

It might be a good time to run the diagnostics on your Sun3. First, attach a terminal to the "ttya" serial port, then set the "Diag/Norm" switch to the Diagnostic position, and power-on the machine. The Diag. switch setting forces console interaction to occur on ttya. Note that the 3/80 has a "software" diag switch you can set at the PROM monitor prompt. To turn on diag boot mode, do: **`q 70b 12`** To return to normal boot mode, do: **`q 70b 6`**.

The console location (ttya, ttyb, or keyboard/display) is controlled by address 0x1F in the EEPROM, which you can examine and change in the PROM monitor by entering "q1f" followed by a numeric value (or just a '.' if you don't want to change it). Console values are:

`00:` default graphics display
`10:` tty a (9600-N-8-1)
`11:` tty b (1200-N-8-1)
`20:` Color option board on P4

Installing the NetBSD System

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

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

Installing from tape

Create the NetBSD/sun3 _VER boot tape as described in the section entitled "Preparing a boot tape" and boot the tape. At the PROM monitor prompt, use one of the commands:

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

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

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

```
            Welcome to the NetBSD/sun3 RAMDISK root!

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

Copying the miniroot can be done several ways, allowing
```

```
the source of the miniroot image to be on any of these:
    boot tape,  NFS server, TFTP server, rsh server

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

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

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

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

Installing from NFS

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

First, at the Sun PROM monitor prompt, enter a boot command using the network interface as the boot device. On desktop machines this is "le", and "ie" on the others. Examples:

```
>b le() -s
>b ie() -s
```

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

```
ssh> ifconfig le0 inet 192.233.20.198 up
```

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

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

You can look at the route table using:

```
ssh> route show
```

Now mount the NFS filesystem containing the miniroot image:

```
ssh> mount -r 192.233.20.195:/server/path /mnt
```

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

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

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

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

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

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

Installing from SunOS

To install NetBSD/sun3 onto a machine already running SunOS, you will need the miniroot image (miniroot.gz) and some means to decompress it.

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

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

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

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

or if you have already decompressed the miniroot

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

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

Booting the Miniroot

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

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

With SCSI target ID=2, the the PROM is:

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

The numbers in parentheses above are:

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

Miniroot Install Program

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

The miniroot's install program will:

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

- Copy a new kernel onto your root partition.
- Install a new boot block.
- Check your filesystems for integrity.

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

Post installation steps

Once you've got the operating system running, there are a few things you need to do in order to bring the system into a 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

It is possible to easily upgrade your existing NetBSD/sun3 system using the upgrade program in the miniroot. If you wish to upgrade your system by this method, simply select the 'upgrade' option once the miniroot has booted. The upgrade program with then guide you through the procedure. The upgrade program will:

- Enable the network based on your system's current network configuration.
- Mount your existing filesystems.
- Extract binary sets from the media of your choice.
- Make new device nodes in your root filesystem.
- Copy a new kernel onto your root partition.

  Note the existing kernel *will not* be backed up; doing so would be pointless, since older kernels may not be capable of running NetBSD 1.4.2 executables.

- Install a new boot block.
- Check your filesystems for integrity.

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

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

- Place *at least* the 'base' binary set in a filesystem accessible to the target machine. A local filesystem is preferred, since the NFS subsystem in the NetBSD 1.4.2 kernel may be incompatible with your old binaries.
- Back up your pre-existing kernel and copy the 1.4.2 kernel into your root partition.
- Reboot with the 1.4.2 kernel into single-user mode. (Otherwise you can not install the boot block.)
- Check all filesystems:
  /sbin/fsck -pf
- Mount all local filesystems:
  /sbin/mount -a -t nonfs
- If you keep /usr or /usr/share on an NFS server, you will want to mount those filesystems as well. To do this, you will need to enable the network:
  sh /etc/netstart
- Run the update(8) daemon, to ensure that new programs are actually stored on disk.
  update
- Make sure you are in the root filesystem and extract the 'base' binary set:
  cd /
  pax -zrvpe -f *`/path/to/base.tar.gz`*
- Install a new boot block: (assuming root is on /dev/rsd0a)
  cd /usr/mdec
  cp -p ./ufsboot /mnt/ufsboot
  sync ; sleep 1 ; sync
  ./installboot -v /ufsboot bootxx /dev/rsd0a
- Sync the filesystems:
  sync
- At this point you may extract any other binary sets you may have placed on local filesystems, or you may wish to extract additional sets at a later time. To extract these sets, use the following commands:
  cd /
  pax -zrvpe -f *`path to set`*

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

Compatibility Issues With Previous NetBSD Releases

Users upgrading from previous versions of NetBSD may wish to bear the following problems and compatibility issues in mind when upgrading to NetBSD 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),
- `apropos`(1),
- `passwd`(1), and
- `passwd`(5).

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

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

man passwd

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