NAME

INSTALL – Installation procedure for NetBSD/sun3.

DESCRIPTION

About this Document

This document describes the installation procedure for NetBSD 1.5.1 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 UNIX-like operating system derived from the University of California, Berkeley Networking Release 2 (Net/2), 4.4BSD-Lite, and 4.4BSD-Lite2 sources. NetBSD runs on thirty-one different system architectures featuring twelve distinct families of CPUs, and is being ported to more. The NetBSD 1.5.1 release contains complete binary releases for fifteen different machine types. (The sixteen remaining are not fully supported at this time and are thus not part of the binary distribution. For information on them, please see the NetBSD web site at **http://www.netbsd.org/**.)

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

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

Upgrade path to NetBSD 1.5.1

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 1.5.1.

NetBSD 1.5.1 is an upgrade of NetBSD 1.5 and earlier major and patch releases of NetBSD.

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 1.5 was started are designated by version identifiers such as 1.5A, 1.5B, etc. These identifiers do not designate releases, but indicate major changes in internal kernel APIs. Note that the kernel from NetBSD 1.5.1 can *not* be used to upgrade a system running one of those intermediate development versions. Trying to use the NetBSD 1.5.1 kernel on such a system *will* probably 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 1.5.1 to determine if a given feature is present or absent in 1.5.1. The development of 1.5 and the subsequent ''point'' releases is done on a separate branch in the CVS repository. The branch was created when the release cycle for 1.5 was started, and during the release cycle of 1.5 and its patch releases, selected fixes and enhancements have been imported from the main development trunk. So, there are features in 1.5.1 which were not in, e.g. 1.5B, and vice versa.

Major Changes Between 1.5 and 1.5.1

The complete list of changes between NetBSD 1.5 and 1.5.1 can be found in the file CHANGES-1.5.1 in the top directory of the source tree. The following are highlights only:

- A driver for the Aironet/Cisco wireless PCMCIA cards has been added; see an(4).
- NFS client performance has been improved, typically by 40% for writes but possibly up to 100% in certain setups.
- The siop(4) driver has improved in performance and robustness.
- Support for cloning pseudo-interfaces has been added. See ifconfig(8).
- Support for 802.1Q virtual LANs has been added. See vlan(4).
- The isp(4) driver has been upgraded to (among other things) work on MacPPC.
- BIND has been upgraded to version 8.2.3 (SA2001-001).
- Support for booting from RAIDframe RAID1 mirrors on i386 added.
- The lfs(4) file system has again been substantially updated, but is still experimental.
- Ultra/66 support has been added for capable VIA chipsets, and Ultra/100 support has been added for the HPT370, Promise and Intel ICH2 controllers in the pciide(4) driver. Support for Intel 82801BAM controllers has also been added, and handling of Ali controllers has been improved.
- OpenSSH has been updated to deal with a security issue (SA2001-003).
- Sendmail has been upgraded to version 8.11.3.
- The ex(4) driver has added support for 3Com 3c555, 3c556 and 3c556B MiniPCI Ethernet cards.
- A driver for the on-board audio hardware found on many Apple PowerMacs has been added; see awacs(4).
- The sip(4) driver has been fixed to properly support the dp83815, as found in current Netgear FA311 10/100 cards.
- ftpd(8) has been updated to deal with two security issues (SA2000-018 and SA2001-005).
- ntpd(8) has been updated to deal with a security issue (SA2001-004).
- telnetd(8) has been updated to deal with a security issue (SA2000-017).
- A vulnerability on i386 related to USER_LDT has been fixed (SA2001-002).
- The Linux emulation has been enhanced to prepare for the support of using the Linux version of VMware.
- IP checksumming speed has been improved on i386 compared to NetBSD 1.5 by about 10%.
- Support for the Socket Communications LP-E Type II PCMCIA NE2000 clone card has been added to ne(4).
- The DHCP software has been upgraded to ISC version 3, Beta 2, patchlevel 23, to fix core dumps in dhclient(8), among other things. Please note that the new dhcpd(8) forces you to configure a "ddns-update-style" of either "ad-hoc", "interim" or "none".
- Various fixes and enhancements to INET6 and IPSEC code; among them improved interaction between IPF/Nat and IPSEC.

- The Heimdal `kerberos`(8) implementation has been upgraded to version 0.3e.
- Support for Accton EN2242 and other AmdTek AN985 cards added to the `tlp`(4) driver.
- Several country-specific keyboard mappings have been added for USB keyboards.
- A driver for Yamaha YMF724/740/744/745-based sound cards has been added, see `yds`(4).
- The maximum number of BSD disklabel partitions on the i386 port has been increased from 8 to 16.
- Drivers for the AC'97 based audio sound chips ESS Technology Maestro 1, 2, and 2E (see `esm`(4)), NeoMagic 256 (see `neo`(4)), and Cirrus Logic CrystalClear PCI Audio CS4281 (see `clct`(4)) have been added.

In addition, many bugs have been fixed—more than 95 problems reported through our problem tracking system have been fixed, and some other non-reported problems have also been found and fixed. See the CHANGES-1.5.1 file for the complete list.

The NetBSD Packages Collection (pkgsrc) which is used to maintain, build, track dependencies, and maintain NetBSD-specific fixes to third-party programs, has received a major overhaul for NetBSD 1.5.1. Some highlights are:

- Many new packages were added to the collection, which now includes about 2100 packages. Many of them are also available as pre-compiled binaries on ftp.netbsd.org and its mirrors. All packages have been verified on a release candidate of 1.5.1/i386, and have been found to compile, install and de-install cleanly. Many packages have been modified and enhanced to compile and function properly on big-endian (m68k, sparc), and LP64 architectures (alpha, sparc64).
- KDE2 and KOffice together consitutes a fully integrated office environment with no license problems, available for i386, alpha and many other architectures.
- Mozilla 0.9, KDE2's Konqueror, and Links 0.95 are just a few examples of the web browsers available.
- A support package for running VMware on NetBSD/i386 was added, it's called suse_vmware. The official VMware code, a valid license, and Wasabi Systems' compatibility package are all needed to run VMware.
- Internal changes of the pkgsrc system include strong checksums to prevent malicious distribution files, as well as restructuring of the package structure in pkgsrc for faster extraction of pkgsrc tar files and upgrades via SUP and CVS.

Please note that at the moment, **`sysinst`** will not assist you in installing pre-built third-party binary packages or the pkgsrc system itself, so you will have to manually install packages using **`pkg_install`** or fetch and extract the pkgsrc.tgz tar file to get started.

Lastly, it should be noted that the X11 binaries shipped in NetBSD 1.5.1 is still based on XFree86 version 3.3.6. Several newer graphics cards are inadequately supported by that code base, but on the other hand support for several older graphics cards is not available in newer XFree86 code. NetBSD is in the process of moving to XFree86 version 4, and is currently maintaining both the XFree86 3.3.6 and the XFree86 version 4 code in the **xsrc** source set, and you may at compile time pick which sources to build and install. To ease installation, testing and use of the XFree86 version 4 code, a binary snapshot based on XFree86 version 4.0.3 will be made available for at least the i386 architecture shortly after the release of NetBSD 1.5.1.

Changes Between The NetBSD 1.4 and 1.5 Releases

The NetBSD 1.5 release provides numerous significant functional enhancements, including support for many new devices, integration of hundreds of bug fixes, new and updated kernel subsystems, and many userland enhancements. The result of these improvements is a stable operating system fit for production use that rivals most commercially available systems.

It is impossible to completely summarize over one year of development that went into the NetBSD 1.5.1 release. Some highlights include:

Kernel

- Ports to new platforms including: arc, cobalt, hpcmips, news68k, sgimips, and sparc64.
- Improved performance and stability of the UVM virtual memory subsystem.
- Implementation of generic kernel locking code, as well as a restructure and re-tuning of the scheduler, to be used by the future symmetric multi-processing (SMP) implementation.
- Improved compatibility support for Linux, OSF1, and SVR4 programs.
- New compatibility support for Win32 programs.
- Support for dynamically loaded ELF kernel modules.
- Kernel process tracing using `ktruss`(1).
- Deletion of swap devices using `swapctl`(8).
- Easier hot-pluggability of keyboards and mice using a new wscons device—wsmux.
- Improved PCMCIA and CardBus support, including support for detaching of devices and cards, resulting in better support for notebooks and PDA devices.
- Numerous hardware improvements, including areas such as: audio, UDMA/66 support for ATA drives, USB, and wireless networking.

Networking

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

File system

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

Security

- Strong cryptographic libraries and applications integrated, including the AES cipher Rijndael, the OpenSSL library, more complete Kerberos IV and Kerberos V support, and an SSH server and client.
- `sysctl`(3) interfaces to various elements of process and system information, allowing programs such as `ps`(1), `dmesg`(1) and the like to operate without recompilation after kernel upgrades, and remove the necessity to run setgid kmem (thus improving system security).
- Disable various services by default, and set the default options for disabled daemons to a higher level of logging.
- Several code audits were performed. One audit replaced string routines that were used without bounds checking, and another one identified and disabled places where format strings were used in unsafe ways, allowing arbitrary data to be entered by (possibly) malicious users to overwrite application code, and leading from Denial of Service attacks to compromised systems.
- `sshd`(8) and `ssh`(1) now require `rnd`(4) kernel random number devices.

System administration and user tools

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

Miscellaneous

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

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.

This is the fifth major release of NetBSD/sun3.

The Future of NetBSD

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

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

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

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

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

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

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

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

Sources of NetBSD

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

NetBSD 1.5.1 Release Contents

The root directory of the NetBSD 1.5.1 release is organized as follows:

`.../NetBSD-1.5.1/`

`CHANGES`	Changes since earlier NetBSD releases.
`LAST_MINUTE`	Last minute changes.
`MIRRORS`	A list of sites that mirror the NetBSD 1.5.1 distribution.
`README.files`	README describing the distribution's contents.
`TODO`	NetBSD 's todo list (also somewhat incomplete and out of date).
`patches/`	Post-release source code patches.
`source/`	Source distribution sets; see below.

In addition to the files and directories listed above, there is one directory per architecture, for each of the architectures for which NetBSD 1.5.1 has a binary distribution. There are also `README.export-control` files sprinkled liberally throughout the distribution tree, which point out that there are some portions of the distribution that may be subject to export regulations of the United States, e.g. code under `src/crypto`

and `src/sys/crypto`. It is your responsibility to determine whether or not it is legal for you to export these portions and to act accordingly.

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

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

pkgsrc This set contains the ''pkgsrc'' sources, which contain the infrastructure to build third-party packages.
7.4 MB gzipped, 73.0 MB uncompressed

sharesrc This set contains the ''share'' sources, which include the sources for the man pages not associated with any particular program; the sources for the typesettable document set; the dictionaries; and more.
3.3 MB gzipped, 13.2 MB uncompressed

src This set contains all of the base NetBSD 1.5.1 sources which are not in **gnusrc**, **sharesrc**, or **syssrc**.
24.8 MB gzipped, 123.1 MB uncompressed

syssrc This set contains the sources to the NetBSD 1.5.1 kernel for all architectures; `config`(8); and `dbsym`(8).
18.0 MB gzipped, 90.9 MB uncompressed

xsrc This set contains the sources to the X Window System.
78.1 MB gzipped, 393.6 MB uncompressed

All the above source sets are located in the `source/sets` subdirectory of the distribution tree.

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

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

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

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

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

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

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

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

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

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

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

NetBSD/sun3 subdirectory structure

The sun3-specific portion of the NetBSD 1.5.1 release is found in the `sun3` subdirectory of the distribution:

`.../NetBSD-1.5.1/sun3/`

`INSTALL.html`

`INSTALL.ps`

`INSTALL.txt`

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

`binary/`

`kernel/`

`netbsd.GENERIC.gz` A gzipped NetBSD kernel containing code for everything supported in this release.

`sets/` sun3 binary distribution sets; see below.

`installation/`

`floppy/` sun3 boot and installation floppies; see below.

`miniroot/` sun3 miniroot file system image; see below.

`misc/` Miscellaneous sun3 installation utilities; see installation section, below.

`netboot/` Two programs needed to boot sun3 kernels over the network.

`tapeimage/` Tape boot programs, and a RAMDISK kernel.

Binary distribution sets

The NetBSD sun3 binary distribution sets contain the binaries which comprise the NetBSD 1.5.1 release for the sun3. There are eight binary distribution sets. The binary distribution sets can be found in the `sun3/binary/sets` subdirectory of the NetBSD 1.5.1 distribution tree, and are as follows:

base The NetBSD 1.5.1 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.
14.5 MB gzipped, 38.1 MB uncompressed

comp Things needed for compiling programs. This set includes the system include files (`/usr/include`) and the various system libraries (except the shared libraries, which are included as part of the **base** set). This set also includes the manual pages for all of the utilities it contains, as well as the system call and library manual pages.
9.5 MB gzipped, 32.5 MB uncompressed

etc This distribution set contains the system configuration files that reside in `/etc` and in several other places. This set *must* be installed if you are installing the system from scratch, but should *not* be used if you are upgrading.
0.1 MB gzipped, 0.6 MB uncompressed

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

kern This set contains a NetBSD/sun3 1.5.1 `GENERIC` kernel, named `/netbsd`. You *must* install this distribution set.

man This set includes all of the manual pages for the binaries and other software contained in the **base** set. Note that it does not include any of the manual pages that are included in the other sets.
5.0 MB gzipped, 19.9 MB uncompressed

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

text This set includes NetBSD's text processing tools, including `groff`(1), all related programs, and their manual pages.
1.3 MB gzipped, 4.7 MB uncompressed

NetBSD maintains its own set of sources for the X Window System in order to assure tight integration and compatibility. These sources are based on XFree86, and tightly track XFree86 releases. The binaries shipped with NetBSD 1.5.1 are based on XFree86 version 3.3.6. NetBSD is in the process of moving to XFree86 version 4, and the X source set actually contains source for both XFree86 3.3.6 and XFree86 4, and the ability to decide at compile-time which one to build and install. The X Window System binary sets distributed with NetBSD are:

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

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

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

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

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 -xpf`** command from `/`.

There is a collection of Sun3 and Sun3X kernels in the `sun3/binary/kernels` subdirectory of the NetBSD 1.5.1 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 tar archives.

Note: Each directory in the sun3 binary distribution also has its own checksum files, just as the source distribution does.

NetBSD/sun3 System Requirements and Supported Devices

NetBSD/sun3 1.5.1 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 NetBSD/sun3x distribution.

The minimal configuration requires 4 MB of RAM and about 80 MB of disk space. To install the entire system requires much more disk space (approx. 100 MB additional space is necessary for full sources). To run X or compile the system, more RAM is recommended. Good performance requires 8 MB 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	Suggested	+ X	Needed	+ X
/ (root)	20 MB	20 MB	15 MB	15 MB
/usr	175 MB	205 MB	75 MB	105 MB
/var	20 MB	20 MB	5 MB	5 MB
swap	*2*RAM* ...			

Anything else is up to you!

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

Note that the 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 (10 MB).

Supported hardware

- 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 Sun3/80 SCSI (*esp*)
  - On-board SCSI-3 (*si*)
  - VME SCSI-3 board (*si*)
  - Sun3/E SCSI/Ethernet board
- SMD Disks
  - 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-1.5.1/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-1.5.1/sun3/installation/tapeimage
# sh MakeBootTape /dev/nrst0
```

The install tape is created as follows:

```
# cd .../NetBSD-1.5.1/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 hex-

adecimal, 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 on the 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 1.5.1 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 file system 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 PROM is:

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

The numbers in parentheses above are:

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

Miniroot install program

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

The miniroot's install program will:

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

- Check your file systems for integrity.

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

Post installation steps

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

1. Configuring `/etc/rc.conf`

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

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

   and with the root file system (`/`) mounted read-write. When the system asks you to choose a shell, simply press `RETURN` to get to a `/bin/sh` prompt. If you are asked for a terminal type, respond with **vt220** (or whatever is appropriate for your terminal type) and press `RETURN`. You may need to type one of the following commands to get your delete key to work properly, depending on your keyboard:

   ```
   # stty erase '^h'
   # stty erase '^?'
   ```

   At this point, you need to configure at least one file in the `/etc` directory. You will need to mount your root filesystem read/write with:

   ```
   # /sbin/mount -u -w /
   ```

   Change to the `/etc` directory and take a look at the `/etc/rc.conf` file. Modify it to your tastes, making sure that you set `rc_configured=YES` so that your changes will be enabled and a multi-user boot can proceed. Default values for the various programs can be found in `/etc/defaults/rc.conf`, where some in-line documentation may be found. More complete documentation can be found in `rc.conf`(5).

   If your `/usr` directory is on a separate partition and you do not know how to use **ed**, you will have to mount your `/usr` partition to gain access to **ex** or **vi**. Do the following:

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

   If you have `/var` on a separate partition, you need to repeat that step for it. After that, you can edit `/etc/rc.conf` with `vi`(1). When you have finished, type **exit** at the prompt to leave the single-user shell and continue with the multi-user boot.

   Other values that need to be set in `/etc/rc.conf` for a networked environment are *hostname* and possibly *defaultroute*, furthermore add an *ifconfig_int* for your <int> network interface, along the lines of

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

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

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

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

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

2. Logging in

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

3. Adding accounts

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

4. The X Window System

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

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

5. Installing third party packages

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

   - More information on the package system is at
     http://www.netbsd.org/Documentation/software/packages.html
   - A browsable listing of available packages is at
     ftp://ftp.netbsd.org/pub/NetBSD/packages/pkgsrc/README.html
   - Precompiled binaries can be found at
     ftp://ftp.netbsd.org/pub/NetBSD/packages,
     usually in the `1.5.1/sun3/All` subdir. You can install them with the following commands:

     ```
     # export PKG_PATH=ftp://ftp.netbsd.org/pub/NetBSD/packages/1.5.1/sun3/All
     # pkg_add -v tcsh
     # pkg_add -v cvs
     # pkg_add -v apache
     # pkg_add -v perl
     ...
     ```

     The above commands will install the tcsh shell, the CVS source code management system, the Apache web server and the perl programming language as well as all the packages they depend on.

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

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

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

6. Misc

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

     ```
     # man 5 filename
     ```

     is likely to give you more information on these files.

Upgrading a previously-installed NetBSD System

It is possible to easily upgrade your existing NetBSD/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 file systems.
- Extract binary sets from the media of your choice.
- Make new device nodes in your root file system under `/dev`.
- Copy a new kernel onto your root partition (`/`).

  Note: the existing kernel *will not* be backed up; doing so would be pointless, since older kernels may not be capable of running NetBSD 1.5.1 executables.
- Install a new boot block.
- Check your file systems for integrity.

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

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

- Place *at least* the **base** binary set in a file system accessible to the target machine. A local file system is preferred, since the NFS subsystem in the NetBSD 1.5.1 kernel may be incompatible with your old binaries.
- Back up your pre-existing kernel and copy the 1.5.1 kernel into your root partition (`/`).
- Reboot with the 1.5.1 kernel into single-user mode. (Otherwise you can not install the boot block.)
- Check all file systems:

  ```
  # /sbin/fsck -pf
  ```
- Mount all local file systems:

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

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

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

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

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

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

- Sync the file systems:

```
sync
```

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

```
# Ic cd /
# Ic 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 1.5.1.

General issues

- `/etc/rc` modified to use `/etc/rc.d/*`

  Prior to NetBSD 1.5, `/etc/rc` was a traditional BSD style monolithic file; each discrete program or substem from `/etc/rc` and `/etc/netstart` has been moved into separate scripts in `/etc/rc.d/`.

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

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

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

Issues affecting an upgrade from NetBSD 1.4 or prior

- `named`(8) leaks version information

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

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

- sysctl(8) pathname changed

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

- sendmail(8) configuration file pathname changed

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

Using online NetBSD documentation

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

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

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

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

```
# man passwd
```

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

```
# man 5 passwd
```

instead.

If you are unsure of what man page you are looking for, enter **apropos** *subject-word*

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

Administrivia

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

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

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

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

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

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

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

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- The Internet Research Institute in Japan for hosting the server which runs the CVSweb interface to the NetBSD source tree.

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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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