## NAME

**INSTALL** — Installation procedure for NetBSD/sun3.

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## DESCRIPTION

**About this Document**

This document describes the installation procedure for NetBSD 3.0 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 fifty four different system architectures (ports), featuring seventeen machine architectures across fifteen distinct CPU families, and is being ported to more. The NetBSD 3.0 release contains complete binary releases for many different system architectures. (A few ports are not fully supported at this time and are thus not part of the binary distribution. For information on them, please see the NetBSD web site at .: **http://www.NetBSD.org/**)

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

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

**Changes Between The NetBSD 2.0 and 3.0 Releases**

The NetBSD 3.0 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 user-land 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 a year of development that went into the NetBSD 3.0 release. Some highlights include:

*Supported platforms and machines*

- A port to new platform: iyonix. The iyonix port supports the Iyonix PC, which is a desktop computer from Castle Technology, based on a 600MHz XScale 80321 processor.
- The xen port now supports Xen 2.0, both in privileged and unprivileged mode.
- The evbarm port has support for the TS-7200 single board computer, which is also known as "the NetBSD Controlled Toaster".
- The sgimips port now supports IP12 (Personal Iris 4D/30, 4D/35, and Indigo R3K) machines.
- The PowerPC 601 support has been added, and the prep port now supports IBM RS/6000 60P 7020-011.

*Supported devices*

- Added iteide(4): driver for ITE 8212 IDE controller.
- Added ixpide(4): driver for ATI IXP series chipset IDE controller.
- Added pdcsata(4): driver for Promise SATA150 (aka PDC203xx) controllers.
- Added ipw(4): driver for Intel PRO/Wireless 2100.
- Added iwi(4): driver for Intel PRO/Wireless 2200AG/2915ABG.
- Added rtw(4): driver for Realtek RTL8180L IEEE 802.11b wireless network.
- Added vge(4): driver for VIA VT612X Gigabit Ethernet controller.
- Added xge(4): driver for Neterion Xframe-I 10 gigabit Ethernet.
- Added cdce(4): driver for CDC USB Ethernet.
- Added atu(4): driver for Atmel AT76C50x based 802.11b wireless network interfaces.
- Added uep(4): driver for eGalax USB touchpanel controller.
- Added ugensa(4): driver for USB generic serial adapter, which currently supports CDMA Wireless PC Card.
- Added auixp(4): driver for ATI IXP series chipset audio controller.
- Added auacer(4): driver for ALi M5455 audio controller.
- Added azalia(4): driver for High Definition Audio controller.
- Added spif(4): driver for Sun SUNW,spif multi-port Sbus card.
- viaide(4) now supports nForce2 Ultra 400, nForce3 250 IDE and SATA, and nForce4 IDE and SATA controllers. viaide(4) also supports VIA VT6421 SATA RAID controller though drives on the controller need to be configured into RAID/JOBS sets via its BIOS.
- siside(4) now supports SiS 180 and 741 SATA controllers.
- artsata(4), which is the Intel i31244 Serial ATA disk controller driver, now supports DPA mode.
- satalink(4) now supports Silicon Image 3512 SATA.
- piixide(4) now supports Intel 82801FB/FR (ICH6/6R) IDE and SATA, 82801FBM SATA, 82801G (ICH7) IDE and SATA, and i6300ESB IDE and SATA controllers. Also added basic support for RAID0 and RAID1 for the Adaptec HostRAID format as found on the Intel 6300ESB on-board RAID.
- stge(4) now works on big-endian machines including sparc64 with hardware checksums.
- aac(4) now supports Adaptec SATA RAID 2810SA.
- mpt(4) now supports LSI Logic FC919x SCSI controllers.
- spc(4) now has support for Fujitsu MB87030-based PCMCIA SCSI controller.
- bge(4) now supports Broadcom BCM5788, BCM5705K, BCM5721, and BCM5751M Gigabit Ethernet controllers, and has 802.3x flow control support.
- gem(4) and hme(4) now have hardware checksums support.
- re(4) and wm(4) now supports TCPv4 hardware transmit segment offload.

- wm(4) now supports more Intel Gigabit Ethernet chips and 64bit PCI DMA transfer,
- re(4) now supports Corega CG-LAPCIGT Gigabit Ethernet, and RTL8169 based CardBus Ethernet interfaces, including NetGear GA-511.
- ex(4) now supports 3Com 3c920B-EMB-WNM Integrated Fast Ethernet.
- sk(4) now supports Belkin Gigabit Desktop Network card.
- bce(4) now supports Broadcom BCM4401-B0 Ethernet.
- tl(4) now supports Compaq Netelligent 10 T/2 PCI UTP/Coax Controller.
- wi(4) now supports SMC2531W-B EliteConnect Wireless Adapter.
- fxp(4) now supports Intel 82801FB (ICH6) 10/100 Ethernet.
- tlp(4) now supports LinkSys PCMPC200 Cardbus Ethernet and ASIX AX88140A/AX88141 chipsets.
- Many improvements for atw(4) ADMtek ADM8211 802.11 wireless network driver.
- auich(4) now supports nForce2 Ultra 400, nForce3 250 MCP-T AC-97, nForce4, Intel ICH7, and Intel 6300ESB audio controllers.
- auvia(4) now supports suspend and resume.
- puc(4) now supports VS-Com PCI-210H 2S/1P card, VScom PCI-200 2S card, and ADDI-DATA APCI-7800 8-port serial adapter.
- uftdi(4) now supports Sealevel Systems' uftdi-based USB-Serial adapter.
- uvscom(4) now supports SUNTAC U-Cable type A4 USB serial adapter.
- pms(4) now supports synaptics touchpad.
- lm(4) now supports iTE IT8705f and Winbond 83627THF environment monitor controllers.
- Many bug fixes and improvements for ehci(4) USB 2.0 controllers.
- Many fixes for uaudio(4) devices.
- uax(4) ASIX AX88172 USB Ethernet driver has been replaced by axe(4) driver derived from FreeBSD.
- vnd(4) pseudo-device now support compressed image.

*Kernel*

- The i386 port now supports the Enhanced SpeedStep Technology.
- Added statvfs(2) family of system calls.
- Added ptm(4), pty/98 pty multiplexor device.
- Added swwdog(4), a software watchdog timer facility.
- Autoconfiguration framework is rewritten for device driver LKMs.
- compat_darwin(8) emulation now supports MacOS X.3 binaries.
- sparc64 and shark ports have switched to wscons(9), the machine-independent console framework. Additionally sparc64 port switched to a XFree86 based X server and now supports the cg6, mach64 and ffb/afb framebuffers with acceleration.
- Added new pselect(2) and pollts(2) synchronous I/O multiplexing system calls.

- Added another experimental buffer queue strategy, BUFQ_PRIOCSCAN, Per-priority cyclical scan. Note the existing strategy NEW_BUFQ_STRATEGY is renamed to BUFQ_READPRIO, since that gives priority to issuing read requests over write requests.
- The way to allocate a kernel structure, map entry, was improved so that it doesn't need preliminary knowledge of system load, i.e. users no longer have to define "options MAX_KMAPENT" in their kernel configurations even on busy servers.

*Networking*

- TCP now supports TCP Selective Acknowledgement Options (RFC 2018) for enhanced performance especially on long distance connections and TCP MD5 signatures (RFC 2385) for enhanced protection against attacks.
- TCP can take advantage of hardware-assisted TCP/IPv4 segmentation on `re`(4), `wm`(4) and `xge`(4) interfaces.
- The OpenBSD Packet Filter has been integrated as alternative packet filter solution.
- IP Filter has been upgraded to version 4.1.8.
- The KAME IPsec stack now supports ESP over NAT connections (RFC 3948).
- IPv4 Protocol Independent Multicast (PIM) routing support has been added.
- ipsec-tools 0.6.3 provide IKE support for ESP over NAT connections (RFC 3947), user authentication via XAuth and automatic network configurations of VPN clients via Mode Config.
- Added RFC 3378 EtherIP support, which makes it possible to add `gif`(4) interface to bridges.
- Added `tap`(4), the virtual Ethernet device.
- `ppp`(4) has been updated to 2.4.3.
- `gre`(4) now supports tunneling of the IPv6 Protocol.

*File system*

- UFS_DIRHASH support has been added from FreeBSD, which increase lookup performance by maintaining in-core hash tables for large directories on UFS.
- `fss`(4), file system snapshot support has been added.
- Added ptyfs, pseudo-terminal file system.
- CD9660 file system now supports UTF-8 filename on Joliet extension.
- Ext2fs now supports large files (larger than 2G bytes). `fsck_ext2fs`(8) also handles them and supports conversion from old file systems.
- The stability of the LFS file system has been improved.

*Libraries*

- Added PAM (Pluggable Authentication Modules framework).
- Support wide strings in C++.
- Re-entrant library functions like getpwent_r() have been added.
- Some libc string functions for i386 have been replaced with optimized version.
- Added DCE 1.1 RPC compatible UUID (Universally Unique Identifier) routines to libc.

- Added memmem(3) to libc, which is API compatible with the functions in FreeBSD and Linux.

*Security*

- The Veriexec framework is now using hash tables to store per-file data, resulting in much faster operation. It supports four different enforcement levels and full control over verbosity. Signature files are easier to generate and are more flexible than in the previous version.
- Added SHA2 to libc to provide more secure hashing algorithms and made cksum(1) and mtree(8) support them.

*System administration and user tools*

- Various improvements for the "sysinst" installation program, including Spanish language translation.
- Numerous improvements for syslogd(8), mostly from FreeBSD.
- fsck(8) now has a progress meter option.
- dump(8) now supports file system snapshots.
- Added sockstat(1), which lists open sockets.
- Added seq(1), a utility which prints a sequence of numbers, derived from Plan 9.

*Miscellaneous*

- audio(9) interface is improved. Added capability of audio software filter pipeline, which makes it easy for hardware drivers to add encoding support or sample rates support.
- Updates of most third party packages that are shipped in the base system to the following latest stable releases:
  - am-utils 6.1-rc2
  - BIND 9.3.0
  - binutils 2.15-20041204
  - cvs 1.11.20
  - file 4.13
  - gcc 3.3.3
  - groff 1.19.1
  - OpenSSH 3.9
  - OpenSSL 0.9.7d
  - Postfix 2.1.5
  - sendmail 8.13.3
  - tcpdump 3.8.3
  - texinfo 4.7
  - tzdata2005o
  - XFree86 4.5.0
- Many new packages in the *pkgsrc* system, including the latest open source desktop KDE3, OpenOffice, perl, Apache and many more. At the time of writing, there are over 5400 third party packages available in pkgsrc.

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.

*sun3 specific*

This is the eighth 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/mirrors/**

**NetBSD 3.0 Release Contents**

The root directory of the NetBSD 3.0 release is organized as follows:

`.../NetBSD-3.0/`

| | |
|---|---|
| `CHANGES` | Changes since earlier NetBSD releases. |
| `LAST_MINUTE` | Last minute changes. |
| `MIRRORS` | A list of sites that mirror the NetBSD 3.0 distribution. |
| `README.files` | README describing the distribution's contents. |
| `TODO` | NetBSD 's todo list (also somewhat incomplete and out of date). |
| `patches/` | Post-release source code patches. |
| `source/` | Source distribution sets; see below. |

In addition to the files and directories listed above, there is one directory per architecture, for each of the architectures for which NetBSD 3.0 has a binary distribution.

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

**gnusrc** This set contains the "gnu" sources, including the source for the compiler, assembler, groff, and the other GNU utilities in the binary distribution sets.
*79 MB gzipped, 367 MB uncompressed*

**pkgsrc** This set contains the "pkgsrc" sources, which contain the infrastructure to build third-party packages.
*24 MB gzipped, 200 MB uncompressed*

**sharesrc** This set contains the "share" sources, which include the sources for the man pages not associated with any particular program; the sources for the typesettable document set; the dictionaries; and more.
*5 MB gzipped, 20 MB uncompressed*

**src** This set contains all of the base NetBSD 3.0 sources which are not in **gnusrc**, **sharesrc**, or **syssrc**.
*37 MB gzipped, 176 MB uncompressed*

**syssrc** This set contains the sources to the NetBSD 3.0 kernel for all architectures; `config`(8); and `dbsym`(8).
*26 MB gzipped, 140 MB uncompressed*

**xsrc** This set contains the sources to the X Window System.
*84 MB gzipped, 450 MB uncompressed*

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

The source sets are distributed as compressed tar files. Except for the **pkgsrc** set, which is traditionally unpacked into `/usr/pkgsrc`, all sets may be unpacked into `/usr/src` with the command:

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

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

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

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

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

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

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

*NetBSD/sun3 subdirectory structure*

The sun3-specific portion of the NetBSD 3.0 release is found in the `sun3` subdirectory of the distribution: `.../NetBSD-3.0/sun3/`. It contains the following files and directories:

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

`binary/`
`kernel/`
`netbsd-GENERIC.gz`
A gzipped NetBSD kernel containing code for everything supported in this release.
`sets/` sun3 binary distribution sets; see below.

`installation/`
`miniroot/`
sun3 miniroot file system image; see below.
`misc/`
`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 3.0 release for the sun3. The binary distribution sets can be found in the `sun3/binary/sets` subdirectory of the NetBSD 3.0 distribution tree, and are as follows:

**base** The NetBSD 3.0 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.
*16 MB gzipped, 45 MB uncompressed*

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

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

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

**kern-GENERIC**
This set contains a NetBSD/sun3 3.0 `GENERIC` kernel, named `/netbsd`. You *must* install this distribution set.
*1 MB gzipped, 2 MB uncompressed*

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

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

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

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

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

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

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

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

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

The 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 filenames stored in the sets are relative and therefore the files are extracted *below the current directory*. Therefore, if you want to extract the binaries into your system, i.e. replace the system binaries with them, you have to run the **`tar -xpf`** command from the root directory ( `/` ) of your system. This utility is used only in a Traditional method installation.

There is a collection of Sun3 and Sun3X kernels in the `sun3/binary/kernels` subdirectory of the NetBSD 3.0 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 3.0 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-3.0/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-3.0/sun3/installation/tapeimage
# sh MakeBootTape /dev/nrst0
```

The install tape is created as follows:

```
# cd .../NetBSD-3.0/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 acquired IP address, and in the case of sun3x machines, an extension which corresponds to the machine architecture. (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. sun3x

machines use a filename suffix of `.SUN3X`.

For example, a sun3 which has been assigned IP address 130.115.144.11 will make an TFTP request for `8273900B`, and a sun3x will try `8273900B.SUN3X`. 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 3.0 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:  Partition 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).

Note that the sun3 firmware cannot boot from a partition located
more than 1 GB from the beginning of the disk, so the swap partition
should be completely below the 1 GB boundary.

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

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

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

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

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

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

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

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

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

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

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

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

To enable proper hostname resolution, you will also want to add an `/etc/resolv.conf` file or (if you are feeling a little more adventurous) run `named`(8). See `resolv.conf`(5) or `named`(8) for more information. Instead of manually configuring network and naming service, DHCP can be used by setting `dhclient=YES` in `/etc/rc.conf`.

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

2. Logging in

   After reboot, you can log in as `root` at the login prompt. Unless you've set a password in **sysinst**, there is no initial password. If you're using the machine in a networked environment, you should create an account for yourself (see below) and protect it and the "root" account with good passwords. By default, root login from the network is disabled (even via `ssh`(1)). One way to become root over the network is to log in as a different user that belongs to group "wheel" (see `group`(5)) and use `su`(1) to become root.

   Unless you have connected an unusual terminal device as the console you can just press `RETURN` when it prompts for `Terminal type? [...]`.

3. Adding accounts

   Use the `useradd`(8) command to add accounts to your system. Do not edit `/etc/passwd` directly! See `vipw`(8) and `pwd_mkdb`(8) if you want to edit the password database.

4. The X Window System

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

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

5. Installing third party packages

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

   - More information on the package system is at
     **http://www.NetBSD.org/Documentation/software/packages.html**
   - A list of available packages suitable for browsing is at
     **ftp://ftp.NetBSD.org/pub/NetBSD/packages/pkgsrc/README.html**
   - Precompiled binaries can be found at ,:
     **ftp://ftp.NetBSD.org/pub/NetBSD/packages/**
     usually in the `3.0/sun3/All` subdir. You can install them with the following commands under `sh`(1):

     ```
     # PKG_PATH=ftp://ftp.NetBSD.org/pub/NetBSD/packages/3.0/sun3/All
     # export PKG_PATH
     # pkg_add -v tcsh
     # pkg_add -v bash
     # pkg_add -v perl
     # pkg_add -v apache
     # pkg_add -v kde
     ```

```
# pkg_add -v mozilla
...
```

If you are using `csh`(1) then replace the first two lines with the following:

```
# setenv PKG_PATH ftp://ftp.NetBSD.org/pub/NetBSD/packages/3.0/sun3/All
...
```

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

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

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

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

6. Misc

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

     ```
     # man 5 filename
     ```

     is likely to give you more information on these files.

**Upgrading a previously-installed NetBSD System**

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 3.0 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 3.0 kernel may be incompatible with your old binaries.
- Back up your pre-existing kernel and copy the 3.0 kernel into your root partition (`/`).
- Reboot with the 3.0 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
# /usr/sbin/installboot -v /dev/rsd0a bootxx /ufsboot
```

- 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:

```
# 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 3.0.

*Issues affecting an upgrade from NetBSD 2.1 and older releases.*

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

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

for documentation about PAM.

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

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

Issues fixed by *postinstall*:

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

  The following issues need to be resolved manually:

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

**Using online NetBSD documentation**

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

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

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

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

```
# man passwd
```

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

```
# man 5 passwd
```

instead.

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

**apropos** *subject-word*

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

**Administrivia**

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

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

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

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

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

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

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

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Hanno Wagner
Hans Huebner
Harald Koerfgen
Haroon Khalid
Harry McDonald
Hauke Fath
Heiko W. Rupp
Herb Peyerl
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James Chacon
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