NAME

INSTALL – Installation procedure for NetBSD/sun2.

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DESCRIPTION

About this Document

This document describes the installation procedure for NetBSD 1.6.1 on the *sun2* 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 three different system architectures (ports), featuring seventeen machine architectures across eleven distinct CPU families, and is being ported to more. The NetBSD 1.6.1 release contains complete binary releases for thirty eight different system architectures. (The fifteen 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 1.6

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 1.6.

NetBSD 1.6 is an upgrade of NetBSD 1.5.3 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 1.6 was started are designated by version identifiers such as 1.6A, 1.6B, etc. These identifiers do not designate releases, but indicate major changes in internal kernel APIs. Note that the kernel from NetBSD 1.6 can *not* be used to upgrade a system running one of those intermediate development versions. Trying to use the NetBSD 1.6 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 1.6 to determine if a given feature is present or absent in 1.6. The development of 1.6 and the subsequent ''point'' releases is done on a separate branch in the CVS repository. The branch was created when the release cycle for 1.6 was started, and during the release cycle of 1.6 and its patch releases selected fixes and enhancements have been imported from the main development trunk.

Changes Between The NetBSD 1.5 and 1.6 Releases

The NetBSD 1.6 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 over eighteen months of development that went into the NetBSD 1.6.1 release. Some highlights include:

Kernel

- Ports to new platforms including: algor, dreamcast, evbarm, hpcarm, hpcsh, newsmips, sandpoint, sgimips, sun2, and walnut.
- Unified Buffer Cache (UBC) removes size restriction of the file system's buffer cache to use all available RAM (if not otherwise used!) and improves overall system performance.
- Round-robin page colouring implemented for various ports for better cache utilisation, more deterministic run-time behaviour, and faster program execution.
- A rewritten SCSI middle layer to provide a cleaner interface between the different kernel layers, including a kernel thread to handle error recovery outside of the interrupt context. See `scsipi`(9).
- A new pipe implementation with significantly higher performance due to lower overheads, which uses the UVM Page Loan facility.
- New boot loader flags **`-v`** (*bootverbose*) and **`-q`** (*bootquiet*), to be used by kernel code to optionally print information during boot.
- An in-kernel boot time device configuration manager `userconf`(4), activated with the **`-c`** boot loader flag.
- A work-in-progress snapshot of ACPI support, based on the 20010831 snapshot of the Intel ACPICA reference implementation.
- USB 2.0 support, in the form of a preliminary driver for the `ehci`(4) host controller.
- Basic kernel support for IrDA in the form of the `irframe`(4) IrDA frame level driver. Serial dongles and the `oboe`(4) driver are currently supported.
- Kernel configuration files can be embedded into the kernel for later retrieval. Refer to `INCLUDE_CONFIG_FILE` in `options`(4) for more information.
- Many more kernel tunable variables added to `sysctl`(8).
- Linux binary emulation has been greatly improved, and now supports Linux kernel version 2.4.18.

Networking

- Hardware assisted IPv4 TCP and UDP checksumming and caching of the IPv6 TCP pseudo header. Support for checksum offloading on the DP83820 Gigabit Ethernet, 3Com 3c90xB, 3Com 3c90xC, and Alteon Tigon/Tigon2 Gigabit Ethernet cards.
- Zero-Copy for TCP and UDP transmit path achieved through page loaning code for **`sosend`**().
- In-kernel ISDN support, from the ISDN4BSD project.
- 802.1Q VLAN (virtual LAN) support. See `vlan`(4).
- IPFilter now supports IPv6 filtering.
- `ndbootd`(8) added; used to netboot NetBSD/sun2 machines.
- `racoon`(8) added; IKE key management daemon for IPsec key negotiation, from the KAME project.

- WEP encryption supported in `ifconfig`(8) and `awi`(4) driver.
- `wi`(4) and `wiconfig`(8) now support scanning for access points, and defaults to BSS instead of ad-hoc mode.
- Bridging support; currently only for ethernet. See `bridge`(4).
- In-kernel PPP over Ethernet (PPPoE) - RFC 2516, with much lower overhead than user-land PPPoE clients. See `pppoe`(4).
- `ifwatchd`(8) added; invokes up-script and down-script when a network interface goes up and down. Used by `pppoe`(4).

File system

- Enhanced stability of LFS version 2, the BSD log-structured file system.
- `dump`(8), `dumpfs`(8), `fsck_ffs`(8), `fsirand`(8), `newfs`(8), and `tunefs`(8) support a **`-F`** option to manipulate file system images in regular files.
- `makefs`(8) added; creates file system images from a directory tree. (Currently ffs only.)
- Enhanced **`ffs_dirpref`**( ) by Grigoriy Orlov, which noticeably improves performance on FFS file systems when creating directories, and subsequently manipulating them.
- Fixes for free block tracking and directory block allocation in FFS softdeps.
- Correctly support FFS file systems with a large number of cylinder groups.
- Fix the endian independant FFS (FFS_EI) support.
- `newfs`(8) calculates default block size from the file system size, and uses the largest possible cylinders/group (cpg) value if **`-c`** isn't given.
- `dpti`(4) driver added; an implementation of the DPT/Adaptec SCSI/I2O RAID management interface. Allows the use of the Linux versions of **`dptmgr`**, **`raidutil`**, **`dptelog`**, (etc).
- Support for Windows 2000 'NTFS' (NTFS5).
- Tagged queueing support for SCSI drivers based on the ncr53c9x controller.

Security

- Addition of a `chroot`(8) hierarchy for services including `named`(8), `ntpd`(8), and `sshd`(8).
- Additional `passwd`(5) ciphers: MD5, and DES with more encryption rounds. See `passwd.conf`(5).
- Several more code audits were performed.
- `/etc/security` performs many more checks and is far more flexible in how it monitors changes. See `security.conf`(5).

System administration and user tools

- `sushi`(8) added; a menu based system administration tool.
- `pgrep`(1) and `pkill`(1) added; find or signal processes by name or other attributes.
- System upgrades are made easier through the `etcupdate`(8) script which helps updating the `/etc` config files interactively, and the `/etc/postinstall` script which is provided to check for or fix configuration changes that have occurred in NetBSD.

- `stat`(1) added; a user interface to the information returned by the `stat`(2) system call.
- BSD `sort`(1) replaces GNU `sort`(1).
- The ''stop'' operation for `rc.d`(8) scripts waits until the service terminates before returning. This improves the reliability of ''restart'' operations as well.
- Swap devices can be removed at system shutdown by enabling `swapoff` in `rc.conf`(5).
- An optional watchdog timer which will terminate `rc.shutdown`(8) after the number of seconds provided in `rcshutdown_timeout` from `rc.conf`(5).

Miscellaneous

- Support for multibyte LC_CTYPE locales has been integrated from the Citrus project. Many Chinese, Japanese, Korean, and other encodings are now available.
- Full support for cross-compilation of the base system, even as a non-root user! `src/build.sh` is available for doing arbitrary cross-builds; see `src/BUILDING` for more information. At least 38 ports for the NetBSD 1.6.1 release were cross-built on a NetBSD/i386 system using this mechanism.
- Migrated the following CPU platforms to ELF: arm, and m68k (including amiga, hp300, mac68k, mvme68k, sun2, and x68k).
- Updates of most third party packages that are shipped in the base system to the following latest stable releases:
  - amd 6.0.6
  - BIND 8.3.3
  - binutils 2.11.2
  - bzip2 1.0.2
  - cvs 1.11
  - dhcp 3.0.1rc9
  - file 3.38
  - gcc 2.95.3
  - groff 1.16.1
  - Heimdal 0.4e
  - IPfilter 3.4.27
  - kerberos4 1.1
  - ksh from pdksh 5.2.14p2
  - less 374
  - nvi 1.79
  - OpenSSH 3.4
  - OpenSSL 0.9.6g
  - Postfix 1.1.11
  - ppp 2.4.0
  - routed 2.24
  - sendmail 8.11.6
  - tcpdump 3.7.1
- 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 3000 third party packages available in pkgsrc.
- Added AGP GART driver `agp`(4) for faster access to graphics boards.

- `init`(8) will create an mfs (memory based file system) `/dev` if `/dev/console` is missing.
- `vmstat`(8) displays kernel hash statistics with **`-H`** and **`-h`** *`hash`*.
- `wscons`(4) supports blanking of VGA consoles.

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.

sun2 specific

This is the first major release of NetBSD/sun2.

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 1.6.1 Release Contents

The root directory of the NetBSD 1.6.1 release is organized as follows:

`.../NetBSD-1.6.1/`

`CHANGES`	Changes since earlier NetBSD releases.
`LAST_MINUTE`	Last minute changes.
`MIRRORS`	A list of sites that mirror the NetBSD 1.6.1 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 1.6.1 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.
55 MB gzipped, 247 MB uncompressed

pkgsrc This set contains the ''pkgsrc'' sources, which contain the infrastructure to build third-party packages.
12 MB gzipped, 94 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.
4 MB gzipped, 16 MB uncompressed

src This set contains all of the base NetBSD 1.6.1 sources which are not in **gnusrc**, **sharesrc**, or **syssrc**.
27 MB gzipped, 136 MB uncompressed

syssrc This set contains the sources to the NetBSD 1.6.1 kernel for all architectures; `config`(8); and `dbsym`(8).
22 MB gzipped, 114 MB uncompressed

xsrc This set contains the sources to the X Window System.
78 MB gzipped, 394 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
```

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/sun2 subdirectory structure

The sun2-specific portion of the NetBSD 1.6.1 release is found in the sun2 subdirectory of the distribution:

.../NetBSD-1.6.1/sun2/

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/ sun2 binary distribution sets; see below.

installation/
miniroot/
sun2 miniroot file system image; see below.
misc/ Miscellaneous sun2 installation utilities; see installation section, below.
netboot/
Two programs needed to boot sun2 kernels over the network.

`tapeimage/`
Tape boot program, and two shell scripts used to prepare tapes.

Binary distribution sets

The NetBSD sun2 binary distribution sets contain the binaries which comprise the NetBSD 1.6.1 release for the sun2. There are eight binary distribution sets. The binary distribution sets can be found in the `sun2/binary/sets` subdirectory of the NetBSD 1.6.1 distribution tree, and are as follows:

base The NetBSD 1.6.1 sun2 **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.
53 MB gzipped, 118 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.
13 MB gzipped, 46 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.
6 MB gzipped, 13 MB uncompressed

kern-GENERIC
This set contains a NetBSD/sun2 1.6.1 `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.
7 MB gzipped, 27 MB uncompressed

misc This set includes the (rather large) system dictionaries, the typesettable document set, and other files from `/usr/share`.
3 MB gzipped, 8 MB uncompressed

text This set includes NetBSD's text processing tools, including `groff`(1), all related programs, and their manual pages.
3 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. NetBSD/sun2 currently does not ship with an X server or X clients.

The sun2 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 Sun2 kernels in the `sun2/binary/kernel` subdirectory of the NetBSD 1.6.1 distribution. The one 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-FOURMEG.gz` as appropriate.) Please note that these kernels are simply gzipped and are not tar archives.

Note: Each directory in the sun2 binary distribution also has its own checksum files, just as the source distribution does.

NetBSD/sun2 System Requirements and Supported Devices

NetBSD/sun2 1.6.1 runs on Multibus Sun2 machines, including:

2/120 2/170 2/100U

The minimal configuration requires 4 MB of RAM and about 130 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 compile the system, more RAM is recommended. Good performance requires 7 MB of RAM.

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

Partition	Suggested	Needed
/ (root)	20 MB	15 MB
/usr	210 MB	110 MB
/var	20 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 sun2 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 (12 MB).

Supported hardware

- Serial ports (RS232)
  - built-in ttya, ttyb
  - ttyc, ttyd, ttye, ttyf on first sc SCSI
  - ttyg, ttyh, ttyi, ttyj on second sc SCSI
- Video adapters
  - bwtwo
- Network interfaces:
  - Multibus Intel Ethernet
  - Multibus 3Com Ethernet
- SCSI
  - Most SCSI disks, tapes, CD-ROMs, etc
  - Multibus Sun-2 SCSI (*sc*)
- Input devices
  - Sun keyboard and mouse
- Miscellaneous

- Battery-backed real-time clock.

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-1.6.1/sun2/
```

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-1.6.1/sun2/installation/tapeimage
# sh MakeBootTape /dev/nrst0
```

The install tape is created as follows:

```
# cd .../NetBSD-1.6.1/sun2/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 sun2 expects to be able to download first and second stage bootstrap programs via ND, the Network Disk protocol. The ndbootd(8) program will attempt to serve a second-stage bootstrap file using a name derived from the machine's recently acquired IP address and an extension which corresponds to the machine architecture. (It may be handy to have a hexadecimal calculator for this next step.) The filename prefix 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. The file-

name suffix used by all sun2 machines is `SUN2`.

For example, a sun2 which has been assigned IP address 130.115.144.11 will be served a second-stage bootstrap file named `8273900B.SUN2`. Normally, this file is a symbolic link to the NetBSD/sun2 `netboot` program, which should be located in a place where the `ndbootd`(8) daemon can find it. The `netboot` program may be found in the `installation/netboot` 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.RAMDISK` kernel in the root area for your client, hard-linked under the names `netbsd` and `vmunix` (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.RAMDISK` 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 `installation/tapeimage` and `binary/kernel` (which you get via FTP). Once you have booted `netbsd.RAMDISK` (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

Sun2 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 sun2 uses confusing names for the SCSI devices: target 1 is `sd2`, target 2 is `sd4`, etc.

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/sun2 1.6.1 boot tape as described in the section entitled **Creating boot/install tapes** 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/sun2 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 sun2 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. If your machine has Intel Ethernet, this is *ie*, and if it has 3Com Ethernet, this is *ec*. Examples:

```
>b ie() -s
>b ec() -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 ie0 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 -o rdonly,-r=1024 192.233.20.195:/server/path /mnt
```

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

```
ssh> dd if=/mnt/miniroot.fs 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.fs.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.fs.gz
```

Note that decompression on a sun2 is *extremely* slow, be prepared to wait. For this reason, expanding the miniroot image on the NFS server is highly recommended.

Once the miniroot has been copied using one of the above methods, you reboot from that just installed miniroot. See the section entitled **Booting the miniroot** for details.

Installing from SunOS

To install NetBSD/sun2 onto a machine already running SunOS, you will need the miniroot image (miniroot.fs.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.fs.gz | dd of=/dev/rsd0b obs=32k
```

or if you have already decompressed the miniroot

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

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

Booting the Miniroot

If the machine is not already at the PROM monitor, run the `halt` command.

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.

   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 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 1.6.1/sun2/All subdir. You can install them with the following commands:

     ```
     # PKG_PATH=ftp://ftp.netbsd.org/pub/NetBSD/packages/1.6.1/sun2/All
     # export PKG_PATH
     # pkg_add -v tcsh
     # pkg_add -v apache
     # pkg_add -v perl
     ...
     ```

     The above commands will install the tcsh shell, 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/sun2 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 1.6.1 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 1.6.1 kernel may be incompatible with your old binaries.
- Back up your pre-existing kernel and copy the 1.6.1 kernel into your root partition (`/`).
- Reboot with the 1.6.1 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
# /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 1.6.1.

Issues affecting an upgrade from NetBSD 1.5

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

```
mkdir /tmp/upgrade
cd /tmp/upgrade
pax -zrpe -f /path/to/etc.tgz
./etc/postinstall -s `pwd` check
./etc/postinstall -s `pwd` fix
```

Issues fixed by *postinstall*:

- Various files in `/etc` need upgrading. These include:
  - `/etc/defaults/*`
  - `/etc/mtree/*`
  - `/etc/daily`
  - `/etc/weekly`
  - `/etc/monthly`
  - `/etc/security`
  - `/etc/rc.subr`
  - `/etc/rc`
  - `/etc/rc.shutdown`
  - `/etc/rc.d/*`
- The following files are now obsolete: `/etc/rc.d/NETWORK` and `/etc/rc.d/gated`.
- The following `rc.conf`(5) entries are now obsolete: `amd_master`, `ip6forwarding`, `defcorename`, and `nfsiod_flags`. `critical_filesystems_beforenet` has been replaced by `critical_filesystems_local`. `critical_filesystems` has been replaced by `critical_filesystems_remote`.

- The users and groups 'named', 'ntpd', and 'sshd' need to be created.
- The configuration files for ssh(1) and sshd(8) were moved from /etc to /etc/ssh, including ssh_known_hosts* files and the host key files ssh_host*_key*. /etc/ssh.conf was renamed to /etc/ssh/ssh_config, and /etc/sshd.conf was renamed to /etc/ssh/sshd_config.
- The **mux** entries in wscons.conf(5) are now obsolete.

The following issues need to be resolved manually:

- postfix(8) configuration files require upgrading.

```
cd /usr/share/examples/postfix
cp post-install postfix-files postfix-script /etc/postfix
postfix check
```

- The *de* ethernet driver was replaced with the *tlp* driver. This may require the renaming of the files /etc/ifconfig.de* to /etc/ifconfig.tlp*, renaming of rc.conf(5) entries ifconfig_de* to ifconfig_tlp*, and the reconfiguration of files such as /etc/dhclient.conf and /etc/ipf.conf.

Issues affecting an upgrade from NetBSD 1.4 or prior

- /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 subsystem 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.

- 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) was 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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  Charles D. Cranor
  Christopher G. Demetriou

Scott Ellis
Hubert Feyrer
Castor Fu
Greg Gingerich
William Gnadt
Michael Graff
Guenther Grau
Ross Harvey
Charles M. Hannum
Michael L. Hitch
Kenneth Alan Hornstein
Jordan K. Hubbard
Søren Jørvang
Scott Kaplan
Noah M. Keiserman
Harald Koerfgen
John Kohl
Chris Legrow
Ted Lemon
Norman R. McBride
Neil J. McRae
Perry E. Metzger
Luke Mewburn
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Dave Rand
Michael Richardson
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Kimmo Suominen
Jason R. Thorpe
Steve Wadlow
Krister Walfridsson
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Piermont Information Systems Inc.
Precedence Technologies Ltd
Salient Systems Inc.
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Warped Communications, Inc.
Whitecross Database Systems Ltd.

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

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

We are...

(in alphabetical order)

The NetBSD core group:

Jun-ichiro itojun Hagino	`itojun@netbsd.org`
Frank van der Linden	`fvdl@netbsd.org`
Luke Mewburn	`lukem@netbsd.org`
Christos Zoulas	`christos@netbsd.org`

The portmasters (and their ports):

Simon Burge	`simonb@netbsd.org`	**pmax**
Simon Burge	`simonb@netbsd.org`	**sbmips**
Jeremy Cooper	`jeremy@netbsd.org`	**sun3x**
Matt Fredette	`fredette@netbsd.org`	**sun2**
Chris Gilbert	`chris@netbsd.org`	**cats**
Ross Harvey	`ross@netbsd.org`	**alpha**
Jun-ichiro itojun Hagino	`itojun@netbsd.org`	**sh3**
Ben Harris	`bjh21@netbsd.org`	**acorn26**
Eduardo Horvath	`eeh@netbsd.org`	**sparc64**
Darrin Jewell	`dbj@netbsd.org`	**next68k**
Søren Jørvang	`soren@netbsd.org`	**cobalt**
Søren Jørvang	`soren@netbsd.org`	**sgimips**
Wayne Knowles	`wdk@netbsd.org`	**mipsco**
Paul Kranenburg	`pk@netbsd.org`	**sparc**
Frank van der Linden	`fvdl@netbsd.org`	**i386**
Anders Magnusson	`ragge@netbsd.org`	**vax**

Phil Nelson	phil@netbsd.org	**pc532**
NISHIMURA Takeshi	nsmrtks@netbsd.org	**x68k**
Tohru Nishimura	nisimura@netbsd.org	**luna68k**
NONAKA Kimihiro	nonaka@netbsd.org	**prep**
Scott Reynolds	scottr@netbsd.org	**mac68k**
Kazuki Sakamoto	sakamoto@netbsd.org	**bebox**
Noriyuki Soda	soda@netbsd.org	**arc**
Wolfgang Solfrank	ws@netbsd.org	**ofppc**
Ignatios Souvatzis	is@netbsd.org	**amiga**
Jonathan Stone	jonathan@netbsd.org	**pmax**
Shin Takemura	takemura@netbsd.org	**hpcmips**
Jason Thorpe	thorpej@netbsd.org	**alpha**
Jason Thorpe	thorpej@netbsd.org	**hp300**
Tsubai Masanari	tsubai@netbsd.org	**macppc**
Tsubai Masanari	tsubai@netbsd.org	**newsmips**
Izumi Tsutsui	tsutsui@netbsd.org	**news68k**
Leo Weppelman	leo@netbsd.org	**atari**
Nathan Williams	nathanw@netbsd.org	**sun3**
Steve Woodford	scw@netbsd.org	**mvme68k**
Steve Woodford	scw@netbsd.org	**mvmeppc**
Reinoud Zandijk	reinoud@netbsd.org	**acorn32**

The NetBSD 1.6.1 Release Engineering team:

Erik Berls	cyber@netbsd.org
Håvard Eidnes	he@netbsd.org
Perry Metzger	perry@netbsd.org
Luke Mewburn	lukem@netbsd.org
Jason Thorpe	thorpej@netbsd.org
Todd Vierling	tv@netbsd.org

NetBSD Developers:

Nathan Ahlstrom	nra@netbsd.org
Steve Allen	wormey@netbsd.org
Julian Assange	proff@netbsd.org
Lennart Augustsson	augustss@netbsd.org
Christoph Badura	bad@netbsd.org
Bang Jun-Young	junyoung@netbsd.org
Dieter Baron	dillo@netbsd.org
Robert V. Baron	rvb@netbsd.org
Jason Beegan	jtb@netbsd.org
Erik Berls	cyber@netbsd.org
Hiroyuki Bessho	bsh@netbsd.org
John Birrell	jb@netbsd.org
Mason Loring Bliss	mason@netbsd.org
Rafal Boni	rafal@netbsd.org
Manuel Bouyer	bouyer@netbsd.org
John Brezak	brezak@netbsd.org

Allen Briggs	briggs@netbsd.org
Mark Brinicombe	mark@netbsd.org
Aaron Brown	abrown@netbsd.org
Andrew Brown	atatat@netbsd.org
David Brownlee	abs@netbsd.org
Frederick Bruckman	fredb@netbsd.org
Jon Buller	jonb@netbsd.org
Simon Burge	simonb@netbsd.org
Robert Byrnes	byrnes@netbsd.org
D'Arcy J.M. Cain	darcy@netbsd.org
Dave Carrel	carrel@netbsd.org
James Chacon	jmc@netbsd.org
Bill Coldwell	billc@netbsd.org
Julian Coleman	jdc@netbsd.org
Jeremy Cooper	jeremy@netbsd.org
Chuck Cranor	chuck@netbsd.org
Alistair Crooks	agc@netbsd.org
Aidan Cully	aidan@netbsd.org
Johan Danielsson	joda@netbsd.org
Matt DeBergalis	deberg@netbsd.org
Rob Deker	deker@netbsd.org
Chris G. Demetriou	cgd@netbsd.org
Tracy Di Marco White	gendalia@netbsd.org
Jaromír Dolecek	jdolecek@netbsd.org
Andy Doran	ad@netbsd.org
Roland Dowdeswell	elric@netbsd.org
Emmanuel Dreyfus	manu@netbsd.org
Matthias Drochner	drochner@netbsd.org
Jun Ebihara	jun@netbsd.org
Håvard Eidnes	he@netbsd.org
Stoned Elipot	seb@netbsd.org
Enami Tsugutomo	enami@netbsd.org
Bernd Ernesti	veego@netbsd.org
Erik Fair	fair@netbsd.org
Gavan Fantom	gavan@netbsd.org
Hubert Feyrer	hubertf@netbsd.org
Jason R. Fink	jrf@netbsd.org
Matt Fredette	fredette@netbsd.org
Thorsten Frueauf	frueauf@netbsd.org
Castor Fu	castor@netbsd.org
Ichiro Fukuhara	ichiro@netbsd.org
Thomas Gerner	thomas@netbsd.org
Simon J. Gerraty	sjg@netbsd.org
Justin Gibbs	gibbs@netbsd.org
Chris Gilbert	chris@netbsd.org
Adam Glass	glass@netbsd.org
Michael Graff	explorer@netbsd.org
Brian C. Grayson	bgrayson@netbsd.org
Matthew Green	mrg@netbsd.org

Andreas Gustafsson	gson@netbsd.org
Jun-ichiro itojun Hagino	itojun@netbsd.org
Juergen Hannken-Illjes	hannken@netbsd.org
Charles M. Hannum	mycroft@netbsd.org
Ben Harris	bjh21@netbsd.org
Ross Harvey	ross@netbsd.org
Eric Haszlakiewicz	erh@netbsd.org
John Hawkinson	jhawk@netbsd.org
HAYAKAWA Koichi	haya@netbsd.org
René Hexel	rh@netbsd.org
Michael L. Hitch	mhitch@netbsd.org
Christian E. Hopps	chopps@netbsd.org
Ken Hornstein	kenh@netbsd.org
Marc Horowitz	marc@netbsd.org
Eduardo Horvath	eeh@netbsd.org
Nick Hudson	skrll@netbsd.org
Shell Hung	shell@netbsd.org
Martin Husemann	martin@netbsd.org
Dean Huxley	dean@netbsd.org
Bernardo Innocenti	bernie@netbsd.org
Tetsuya Isaki	isaki@netbsd.org
ITOH Yasufumi	itohy@netbsd.org
IWAMOTO Toshihiro	toshii@netbsd.org
Matthew Jacob	mjacob@netbsd.org
Lonhyn T. Jasinskyj	lonhyn@netbsd.org
Darrin Jewell	dbj@netbsd.org
Chris Jones	cjones@netbsd.org
Søren Jørvang	soren@netbsd.org
Takahiro Kambe	taca@netbsd.org
Antti Kantee	pooka@netbsd.org
Masanori Kanaoka	kanaoka@netbsd.org
Mattias Karlsson	keihan@netbsd.org
KAWAMOTO Yosihisa	kawamoto@netbsd.org
Mario Kemper	magick@netbsd.org
Thomas Klausner	wiz@netbsd.org
Klaus Klein	kleink@netbsd.org
Wayne Knowles	wdk@netbsd.org
John Kohl	jtk@netbsd.org
Paul Kranenburg	pk@netbsd.org
Martti Kuparinen	martti@netbsd.org
Kevin Lahey	kml@netbsd.org
Johnny C. Lam	jlam@netbsd.org
Martin J. Laubach	mjl@netbsd.org
Ted Lemon	mellon@netbsd.org
Frank van der Linden	fvdl@netbsd.org
Joel Lindholm	joel@netbsd.org
Mike Long	mikel@netbsd.org
Warner Losh	imp@netbsd.org
Tomasz Luchowski	zuntum@netbsd.org

Federico Lupi	federico@netbsd.org
Brett Lymn	blymn@netbsd.org
Paul Mackerras	paulus@netbsd.org
Anders Magnusson	ragge@netbsd.org
MAEKAWA Masahide	gehenna@netbsd.org
David Maxwell	david@netbsd.org
Dan McMahill	dmcmahill@netbsd.org
Gregory McGarry	gmcgarry@netbsd.org
Jared D. McNeill	jmcneill@netbsd.org
Neil J. McRae	neil@netbsd.org
Perry Metzger	perry@netbsd.org
Minoura Makoto	minoura@netbsd.org
Luke Mewburn	lukem@netbsd.org
der Mouse	mouse@netbsd.org
Joseph Myers	jsm@netbsd.org
Ken Nakata	kenn@netbsd.org
Phil Nelson	phil@netbsd.org
Bob Nestor	rnestor@netbsd.org
NISHIMURA Takeshi	nsmrtks@netbsd.org
Tohru Nishimura	nisimura@netbsd.org
NONAKA Kimihiro	nonaka@netbsd.org
Jesse Off	joff@netbsd.org
Tatoku Ogaito	tacha@netbsd.org
Masaru Oki	oki@netbsd.org
Atsushi Onoe	onoe@netbsd.org
Greg Oster	oster@netbsd.org
Herb Peyerl	hpeyerl@netbsd.org
Matthias Pfaller	matthias@netbsd.org
Chris Pinnock	cjep@netbsd.org
Dante Profeta	dante@netbsd.org
Chris Provenzano	proven@netbsd.org
Michael Rauch	mrauch@netbsd.org
Darren Reed	darrenr@netbsd.org
Scott Reynolds	scottr@netbsd.org
Michael Richardson	mcr@netbsd.org
Tim Rightnour	garbled@netbsd.org
Gordon Ross	gwr@netbsd.org
Heiko W. Rupp	hwr@netbsd.org
David Sainty	dsainty@netbsd.org
SAITOH Masanobu	msaitoh@netbsd.org
Kazuki Sakamoto	sakamoto@netbsd.org
Curt Sampson	cjs@netbsd.org
Wilfredo Sanchez	wsanchez@netbsd.org
Ty Sarna	tsarna@netbsd.org
SATO Kazumi	sato@netbsd.org
Jan Schaumann	jschauma@netbsd.org
Matthias Scheler	tron@netbsd.org
Karl Schilke (rAT)	rat@netbsd.org
Amitai Schlair	schmonz@netbsd.org

Konrad Schroder	perseant@netbsd.org
Reed Shadgett	dent@netbsd.org
Tim Shepard	shep@netbsd.org
Takeshi Shibagaki	shiba@netbsd.org
Takao Shinohara	shin@netbsd.org
Takuya SHIOZAKI	tshiozak@netbsd.org
Chuck Silvers	chs@netbsd.org
Thor Lancelot Simon	tls@netbsd.org
Jeff Smith	jeffs@netbsd.org
Noriyuki Soda	soda@netbsd.org
Wolfgang Solfrank	ws@netbsd.org
SOMEYA Yoshihiko	someya@netbsd.org
Bill Sommerfeld	sommerfeld@netbsd.org
Ignatios Souvatzis	is@netbsd.org
Bill Squier	groo@netbsd.org
Jonathan Stone	jonathan@netbsd.org
Bill Studenmund	wrstuden@netbsd.org
Kevin Sullivan	sullivan@netbsd.org
SUNAGAWA Keiki	kei@netbsd.org
Kimmo Suominen	kim@netbsd.org
Shin Takemura	takemura@netbsd.org
TAMURA Kent	kent@netbsd.org
Shin'ichiro TAYA	taya@netbsd.org
Matt Thomas	matt@netbsd.org
Jason Thorpe	thorpej@netbsd.org
Christoph Toshok	toshok@netbsd.org
Tsubai Masanari	tsubai@netbsd.org
Izumi Tsutsui	tsutsui@netbsd.org
UCHIYAMA Yasushi	uch@netbsd.org
Masao Uebayashi	uebayasi@netbsd.org
Shuichiro URATA	ur@netbsd.org
Todd Vierling	tv@netbsd.org
Aymeric Vincent	aymeric@netbsd.org
Paul Vixie	vixie@netbsd.org
Krister Walfridsson	kristerw@netbsd.org
Lex Wennmacher	wennmach@netbsd.org
Leo Weppelman	leo@netbsd.org
Assar Westerlund	assar@netbsd.org
Todd Whitesel	toddpw@netbsd.org
Nathan Williams	nathanw@netbsd.org
Rob Windsor	windsor@netbsd.org
Dan Winship	danw@netbsd.org
Jim Wise	jwise@netbsd.org
Michael Wolfson	mbw@netbsd.org
Steve Woodford	scw@netbsd.org
Colin Wood	ender@netbsd.org
YAMAMOTO Takashi	yamt@netbsd.org
Yuji Yamano	yyamano@netbsd.org
Reinoud Zandijk	reinoud@netbsd.org

Maria Zevenhoven	maria7@netbsd.org
Christos Zoulas	christos@netbsd.org

Other contributors:

Dave Burgess	burgess@cynjut.infonet.net
Brian R. Gaeke	brg@dgate.org
Brad Grantham	grantham@tenon.com
Lawrence Kesteloot	kesteloo@cs.unc.edu
Waldi Ravens	waldi@moacs.indiv.nl.net

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