NAME

INSTALL — Installation procedure for NetBSD/vax.

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DESCRIPTION

About this Document

This document describes the installation procedure for NetBSD 3.1 on the *vax* 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 3.1 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 3.0 and 3.1 Releases

The NetBSD 3.1 release is the first functional update release of the NetBSD 3 release branch. This provides numerous functional enhancements, including support for many new devices, hundreds of bug fixes, patches and updates to kernel subsystems, and many enhancements to the user environment. In addition, all of the security fixes and critical bug fixes from the NetBSD 3.0.1 update are included as well. 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 all the changes that have gone in over the over nine months since the release of NetBSD 3.0. Some highlights include:

Supported devices

- brgphy(4): added support for BCM5714 and BCM5780 PHY's.
- Added iteide(4): driver for ITE 8212 IDE controller.
- Added support for the Pentium M 710, 730, 740, 750, 760 and 770 CPU's.
- Added support for nForce430 ATA133 and SATA controllers.
- pdcsata(4): Added support for Promise PDC2057x, PDC20771, PDC20775, PDC40518 and PDC40718 SATA Controllers.
- ums(4): Added support for Apple's "Mighty Mouse", and USB mice with more than 7 buttons
- agp(4): Added support for Intel i915 chipset integrated graphics.
- pchb(4): Added support for Intel i925X, i945G/P and i955X hardware RNG's.
- Added ciss(4): driver for the Command Interface SCSI-3 Support implemented by recent HP/Compaq Smart Array RAID controllers.
- Added nfe(4): driver for NVIDIA nForce MCP Ethernet.
- Added svwsata(4): driver for Serverworks K2, Frodo4, Frodo8 and HT-1000 SATA controllers.
- sk(4): added support for the DLink DGE-530T and DGE-560T Gigabit Ethernet adapters.
- bge(4): added support for BCM5714, BCM5715, BCM5780/HT-2000 and BCM5752 chip variants.
- wi(4): added support for Siemens SS1021 WLAN.
- Added twa(4): driver for the 3ware Apache RAID controllers.
- viaide(4): added support for nForce3 250 SATA controllers.
- hptide(4): added support for HPT368 IDE controller.

Networking

- Enabled SSL support in BIND.
- A second dhclient(8) instance now exists gracefully instead of leaving the system in a broken state.
- Removed the date from the dhclient(8) generated resolv.conf(5) file, since changes to this file are tracked by /etc/security.
- Changed the default sshd_config(8) to enable SSH version 2 only.
- Don't accept TCP connections to broadcast addresses.

File system

- The stability of the LFS file system has been vastly improved.
- Added scan_ffs(4) from OpenBSD (modified to also support FFSv2 and LFS), a utility to recover lost disklabels.
- Write performance of large files to msdos filesystems has been improved.
- We now drop into single-user mode when /etc/rc.d/fsck is interrupted by ^C at boot-time.

Libraries

- Password aging works again.

Security

- Fixed a denial of service vulnerability in sendmail when handling malformed multipart MIME messages (SA2006-017).
- Fixed a buffer overflow in the in-kernel PPP code share by ISDN PPP interfaces `ippp`(4) and `pppoe`(4) (SA2006-019).
- X11: fixed an integer overflow in FreeType (SA2006-020).
- Fixed a potential DoS attack with `sendmail`(8) (SA2006-017).
- Fixed a DoS vulnerability in BIND (SA2006-022).
- Fixed a RSA signature forgery in `openssl`(1) (SA2006-023).
- X11: fixed a vulnerability in Adobe Type 1 font handling (SA2006-021).
- Fixed a number of DoS vulnerabilities in `openssl`(1) (SA in preparation, CVE entries: 2006-2937, 2940, 3738 and 4343).
- Fixed a number of DoS vulnerabilities in `sshd`(8) (SA in preparation, CVE entries: 2006-4924 and 5051).

Miscellaneous

- Various RAIDframe bugfixes.
- Updated Postfix to 2.2.11.
- Updated BIND to 9.3.2.
- Added `ex`(1) to /rescue.
- Fixed some special case expansions in `sh`(1).
- Fixed cross-building from GCC 4.x hosts.
- Many, many more additions, improvements and bug fixes.

alpha specific

- Support booting from FFSv2 filesystems.

amd64 specific

- Make sure that the system reboots after a panic instead of halting.

mac68k specific

- sysinst now newfs'es and mounts the target filesystem(s).

sparc specific

- Disabled threading in `named`(8) on sparc and sparc64 to avoid a crash.

xen specific

- Added Xen-3 domU support.
- Renamed XEN kernel config files to be more consistent: XEN2_DOM0, XEN2_DOMU, XEN3_DOMU, INSTALL_XEN2_DOMU and INSTALL_XEN3_DOMU.

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 3.1 Release Contents

The root directory of the NetBSD 3.1 release is organized as follows:

`.../NetBSD-3.1/`

`CHANGES`	Changes since earlier NetBSD releases.
`LAST_MINUTE`	Last minute changes.
`MIRRORS`	A list of sites that mirror the NetBSD 3.1 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 3.1 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 3.1 sources which are not in **gnusrc**, **sharesrc**, or **syssrc**.
37 MB gzipped, 176 MB uncompressed

syssrc This set contains the sources to the NetBSD 3.1 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/vax subdirectory structure

The vax-specific portion of the NetBSD 3.1 release is found in the `vax` subdirectory of the distribution: `.../NetBSD-3.1/vax/`. 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/` vax binary distribution sets; see below.

`installation/`
`misc/`

Binary distribution sets

The NetBSD vax binary distribution sets contain the binaries which comprise the NetBSD 3.1 release for the vax. The binary distribution sets can be found in the `vax/binary/sets` subdirectory of the NetBSD 3.1 distribution tree, and are as follows:

base The NetBSD 3.1 vax **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.
15 MB gzipped, 44 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.
14 MB gzipped, 54 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/vax 3.1 `GENERIC` kernel, named `/netbsd`. You *must* install this distribution set.
1 MB gzipped, 3 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, 16 MB uncompressed

xcomp The extra libraries and include files needed to compile X source code.
8 MB gzipped, 29 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.
2 MB gzipped, 4 MB uncompressed

The vax 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.

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

NetBSD/vax System Requirements and Supported Devices

Supported hardware

- CPU types
  - VAX 11/750
  - VAX 11/78{0,5}
  - VAX 4000 model 100(A),105A,106A,108,200,300,400,500(A),505A,600(A),700
  - VAX 8200/8250/8300/8350
  - VAX 8600/8650
  - MicroVAX/VAXstation II
  - MicroVAX III
  - MicroVAX 3100 model 10,10e,20,20e,30,40,80,85,90,95
  - MicroVAX 3300/3400
  - MicroVAX 3500/3600
  - MicroVAX 3800/3900

  - MicroVAX 2000/VAXstation 2000
  - VAXstation 3100 model 30,38,40,48,76
  - VAXserver 3100 KA41-B and KA41-E
  - VAXserver 3600
  - VAXserver 3900
  - VAXstation 3200/3500
  - VAXstation 4000 models 60,90,90A,96 and VLC

- Networking
  - DEUNA/DELUA Unibus ethernet
  - DEQNA/DELQA Q22 bus ethernet
  - LANCE chip (where available)
  - SGEC chip (where available)

- Serial lines
  - DHU11/DHV11/DL11/DLV11/DZ11/DZQ11/DZV11 Unibus/Q22 bus asynchronous lines
  - DZ11-compatible lines on VAXstations.

- Disks
  - UDA50 Unibus MSCP controller
  - KDA50/RQDX1/2/3 Q22 bus
  - MSCP controller
  - KDB50 BI-bus MSCP controller
  - MFM and SCSI controllers on VAXstations
  - RP04/05/06/07 and RM02/03/05/80 Massbus disks
  - Console RL02 on VAX 8600.

  Some third-party controllers are also known to work, other do not.

- Tapes
  - TMSCP on Q22 bus (TK50/70, TU81)
  - TMSCP on BI bus
  - SCSI tapes on VAXstations.

- Floppy
  - RX33/RX50 on RQDX controllers
  - RX50 on VAX 8200

The minimal configuration requires 2 MB of RAM and ~40 MB of disk space, but the installation really requires 6 MB RAM unless you plan on using Jedi powers.

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

Partition	Suggested	Needed
/ (root)	32 MB	16 MB
/usr	110 MB	45 MB
/var	20 MB	5 MB
swap	*2-3 ∗RAM*	

Anything else is up to you!

Getting the NetBSD System on to Useful Media

Installing on a 'bare' machine requires some bootable device; either a tape, CD-ROM or floppy drive or a NFS server together with a machine that can act as a MOP loader, such as another machine running NetBSD. NetBSD/vax can use both BOOTP/DHCP and BOOTPARAMS for netboot installations.

Note that if you are installing or upgrading from a writable media, the media can be write-protected if you wish. These systems mount a root image from inside the kernel, and will not need to write to the media. If you booted from a floppy, the floppy disk may be removed from the drive after the system has booted.

Installation is supported from several media types, including:

- CD-ROM / DVD
- FTP
- Remote NFS partition
- Tape
- Existing NetBSD partitions, if performing an upgrade

The steps necessary to prepare the distribution sets for installation depend upon which installation medium you choose. The steps for the various media are outlined below.

CD-ROM / DVD Find out where the distribution set files are on the CD-ROM or DVD. Likely locations are `binary/sets` and `vax/binary/sets`.

Proceed to the instruction on installation.

FTP The preparations for this installation/upgrade method are easy; all you need to do is make sure that there's an FTP site from which you can retrieve the NetBSD distribution when you're about to install or upgrade. If you don't have DHCP available on your network, you will 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. If you don't have access to a functioning nameserver during installation, the IPv4 address of **ftp.NetBSD.org** is `204.152.184.75` and the IPv6 address is `2001:4f8:4:7:2e0:81ff:fe21:6563` (as of June, 2004).

Once you have this information, you can proceed to the next step in the installation or upgrade process. If you're installing NetBSD from scratch, go to the section on preparing your hard disk, below. If you're upgrading an existing installation, go directly to the section on upgrading.

Note: This method of installation is recommended for those familiar with using BSD network configuration and management commands. If you aren't, this documentation should help, but is not intended to be all-encompassing.

NFS Place the NetBSD distribution sets you wish to install into a directory on an NFS server, and make that directory mountable by the machine on which you are installing or upgrading NetBSD. This will probably require modifying the `/etc/exports` file on of the NFS server and resetting its mount daemon (mountd). (Both of these actions will probably require superuser privileges on the server.)

You need to know the numeric IP address of the NFS server, and, if you don't have DHCP available on your network and the server is 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.

Once the NFS server is set up properly and you have the information mentioned above, you can proceed to the next step in the installation or upgrade process. If you're installing NetBSD from scratch, go to the section on preparing your hard disk, below. If you're upgrading an existing installation, go directly to the section on upgrading.

Note: This method of installation is recommended for those already familiar with using BSD network configuration and management commands. If you aren't, this documentation should help, but is not intended to be all-encompassing.

Tape

To install NetBSD from a tape, you need to make a tape that contains the distribution set files, in 'tar' format.

Note: the tape devices with which NetBSD/vax is believed to work is the DEC TK-50. This is a very slow device. Installation via disk or network is recommended if possible.

If you're making the tape on a UNIX -like system, the easiest way to do so is probably something like:

```
# tar -cf tape_device dist_directories
```

where *tape_device* is the name of the tape device that describes the tape drive you're using; possibly `/dev/rst0`, or something similar, but it will vary from system to system. (If you can't figure it out, ask your system administrator.) In the above example, *dist_directories* are the distribution sets' directories, for the distribution sets you wish to place on the tape. For instance, to put the **misc, base,** and **etc** distributions on tape (in order to do the absolute minimum installation to a new disk), you would do the following:

```
# cd .../NetBSD-3.1
# cd vax/binary
# tar -cf tape_device misc etc kern
```

Note: You still need to fill in *tape_device* in the example.

Once you have the files on the tape, you can proceed to the next step in the installation or upgrade process. If you're installing NetBSD from scratch, go to the section on preparing your hard disk, below. If you're upgrading an existing installation, go directly to the section on upgrading.

Creating boot tapes

Fetch the bootable bootfs image from

```
.../NetBSD-3.1/vax/installation/bootfs/boot.fs
```

and write it on the beginning of the tape. Under NetBSD this is done (for MSCP tape, with SCSI tape the name is `nrst0`) via:

```
# mt -f /dev/nrmt0 rewind
# dd if=boot.fs of=/dev/nrmt0
# mt -f /dev/nrmt0 rewoffl
```

Under Ultrix the tape name is different:

```
# mt -f /dev/rmt0h rewind
# dd if=boot.fs of=/dev/rmt0h
# mt -f /dev/rmt0h rewoffl
```

Of course, if you have a tape unit other than unit 0 you have to use the corresponding unit number.

If you wish to install the sets from tape then stage you will need to download the *.tgz files from

```
.../NetBSD-3.1/vax/binary/sets{50,33}
```

(if your disk is less than 200 MB you will probably want to exclude the X sets) and then before the **mt ... rewoffl** run

```
# tar -cvf /dev/nrmt0 *.tgz
```

When you have booted the bootfs and completed the disk partitioning you will be prompted to **select medium** for install. At this point you will need to press CONTROL-Z to suspend the install tool, then

```
# cd /mnt
# mt -f /dev/nrmt0 rewind
# mt -f /dev/nrmt0 fsf
# tar -xvf /dev/nrmt0
# fg
```

then select "install from local dir" and give /mnt.

Note: If your disk is small you will need to be careful about filling it up.

If you are using any other OS to create bootable tapes, remember that the blocksize *must* be 512 for the file to be bootable! Otherwise it just won't work.

Creating boot floppies

Fetch the bootable bootfs image from

```
.../NetBSD-3.1/vax/installation/bootfs/boot.fs
```

and **gunzip** it. It is a 1.2MB bootable image that will boot from any floppy of size 1.2MB and bigger. Note that you *cannot* install from RX50 floppies due to the small size. This may change in the future.

All floppies except RX50 use a standardized format for storing data so writing the bootfs to the floppy can be done on any PC. From MS-DOS the preferred way to do this is using **rawrite.exe**.

Booting from NFS server

All VAXen that can boot over network uses MOP, a DEC protocol. To be able to use MOP, a MOP daemon must be present on one of the machines on the local network. The boot principle is:

- The VAX broadcast a wish to load an image.
- A mopd answers and send the boot program to the VAX.
- The boot program does rarp/bootp requests, mounts the root file system and loads the kernel.
- The kernel is loaded and starts executing.

If your machine has a disk and network connection, 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.)

There is also very useful documentation at

http://www.NetBSD.org/Documentation/network/netboot/

You also must install a MOP loader. If you are booting from another NetBSD machine, the MOP daemons are included in the distribution, otherwise you may have to install a MOP loader. A loader can be found at

ftp.stacken.kth.se:/pub/OS/NetBSD/mopd

Fetch the latest and read the installation instructions.

The file that should be loaded is called boot and is located in

```
.../NetBSD-3.1/vax/installation/netboot/boot
```

The kernel to load is the same kernel as the bootfs uses and can be found in

```
.../NetBSD-3.1/vax/installation/netboot/netbsd.ram.gz
```

From the install program started in the kernel the rest of the system can be installed. There is also a very good (if somewhat out of date) FAQ for netbooting VAXen at

http://world.std.com/~bdc/projects/vaxen/VAX-netboot-HOWTO.html

that describes netbooting of VAXen from many different OS'es.

Preparing your System for NetBSD installation

VAX 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.

If you are on a Q-bus or Unibus system the disk controller(s) need be at the standard CSR addresses for DUA (772150) or DUB (760334) to be recognized by the kernel and boot programs.

If you are installing on a VAXstation you *may* require a serial console.

Installing the NetBSD System

Installation of NetBSD/vax is now easier than ever! For the latest news, problem reports, and discussion, join the port-vax maillist by mailing a line saying

```
subscribe port-vax
```

to `majordomo@NetBSD.org`. Also, see **http://www.NetBSD.org/** for more information.

If you encounter any problems, please report them via the mailing list or the `send-pr`(1) program so that they can be fixed for the next release.

To install or upgrade NetBSD, you need to first boot the installation program and then interact with the screen-menu program **`sysinst`**. The installation program actually consists of the NetBSD kernel plus an in-memory file system of utility programs.

The usual procedure is to write the installation system to the install media, as described earlier.

Booting from install media

The built-in console monitor understands a bunch of commands, dependent of which VAX you have. To just boot from a device, type '**B**' at the prompt. Device naming in the console monitor differs a lot from the UNIX counterparts. A device looks like `ddcu`, `where` '`dd`' is the device type, '`c`' is the controller number and '`u`' is the device unit. Many console monitors also support the **`SHOW DEV`** command, which shows available units to boot from.

A summary of the most common boot devices and their name:

`B DUA0` first MSCP controller, unit 0.

`B MUA0` first TMSCP tape controller, unit 0.

`B DKB0` second SCSI bus, unit 0.

B XQA0 first Q22 bus Ethernet controller.

B ESA0 first LANCE Ethernet controller on VAXstations.

B EZA0 first SGEC Ethernet controller on VAXstations.
Other devices may be appropriate for your configuration.

Then just proceed with the program **sysinst**. The install descriptions for sysinst that follows can be easily adopted to VAX.

Running the sysinst installation program

1. *Introduction*

   Using **sysinst**, installing NetBSD is a relatively easy process. You still should read this document and have it in hand when doing the installation process. This document tries to be a good guideline for the installation and as such covers many details for the sake of completeness. Do not let this discourage you; the install program is not hard to use.

2. *Possible* PCMCIA *issues*

   Machines with PCMCIA slots may have problems during installation. If you do not have PCMCIA on your machine (PCMCIA is only really used on laptop machines), you can skip this section, and ignore the "[PCMCIA]" notes. If you do have PCMCIA in your machine, you can safely ignore this section and the "[PCMCIA]" the first time, as you are likely to not have problems. Should troubles occur during floppy boot, they may be PCMCIA specific. You should then re-read this section and try again, following the instructions in the "[PCMCIA]" notes.

   This section explains how to work around the installation problem.

   The kernel keeps careful track of what interrupts and I/O ports are in use during autoconfiguration. It then allows the PCMCIA devices to pick unused interrupts and I/O ports. Unfortunately, the `INSTALL` kernel may not detect all devices in your system. This may be because the `INSTALL` kernel only supports the minimum set of devices to install NetBSD on your system, or it may be that NetBSD does not have support for the device causing the conflict.

   For example, suppose your laptop has a soundblaster device built in; the `INSTALL` kernel has no sound support. The PCMCIA code might allocate your soundblaster's IRQ and I/O ports to PCMCIA devices, causing them not to work, or to lock up the system. This is especially bad if one of the devices in question is your ethernet card.

   The kernel attempts to probe for available interrupts that are usable by the PCIC (PCMCIA interrupt controller), which should alleviate interrupt conflicts; however, I/O port conflicts are still possible.

   This problem will impact some, but not all, users of PCMCIA. If this problem is affecting you, watch the "[PCMCIA]" notes that will appear in this document.

3. *General*

   The following is a walk-through of the steps you will take while getting NetBSD installed on your hard disk. **sysinst** is a menu driven installation system that allows for some freedom in doing the installation. Sometimes, questions will be asked and in many cases the default answer will be displayed in brackets ("[ ]") after the question. If you wish to stop the installation, you may press `CONTROL-C` at any time, but if you do, you'll have to begin the installation process again from scratch by running the `/sysinst` program from the command prompt. It is not necessary to reboot.

4. *Quick install*

   First, let's describe a quick install. The other sections of this document go into the installation procedure in more detail, but you may find that you do not need this. If you want detailed instructions, skip

to the next section. This section describes a basic installation, using a CD-ROM install as an example.

- What you need.
  - The distribution sets (in this example, they are on CD).
  - One 1.44 MB 3.5" floppy.
  - A CD-ROM drive (SCSI), a hard disk and a minimum of of memory installed.
  - The hard disk should have at least + *n* megabytes of space free, where *n* is the number of megabytes of main memory in your system. If you wish to install the X Window System as well, you will need at least 120 MB more.
- The Quick Installation
  - Insert the first boot floppy you just created. Boot the computer. After language selection, the main menu will be displayed.

```
.*********************************************.
* NetBSD-3.1 Install System                    *
*                                              *
*a: Install NetBSD to hard disk                *
* b: Upgrade NetBSD on a hard disk             *
* c: Re-install sets or install additional sets *
* d: Reboot the computer                       *
* e: Utility menu                              *
* x: Exit Install System                       *
.*********************************************.
```

  - If you wish, you can configure some network settings immediately by choosing the **Utility menu** and then **Configure network**. It isn't actually required at this point, but it may be more convenient. Go back to the main menu.
  - Choose **install**.
  - You will be guided through some steps regarding the setup of your disk, and the selection of distributed components to install. When in doubt, refer to the rest of this document for details.
  - After your disk has been prepared, choose **CD-ROM** as the medium. The default values for the path and device should be ok.
  - After all the files have been unpacked, go back to the main menu and select **reboot**, after you have removed the bootfloppy from the drive.
  - NetBSD will now boot. If you haven't already done so in **sysinst**, you should log in as `root`, and set a password for that account. You are also advised to edit the file `/etc/rc.conf` to match your system needs.
  - Your installation is now complete.
  - For configuring the X window system, if installed, see the files in `/usr/X11R6/lib/X11/doc`. Further information can be found on **http://www.xfree86.org/**.

5. *Booting NetBSD*

   [PCMCIA] Unplug your PCMCIA devices, so that they won't be found by NetBSD.

   Boot your machine. The boot loader will start, and will print a countdown and begin booting.

If the boot loader messages do not appear in a reasonable amount of time, you either have a bad boot floppy or a hardware problem. Try writing the install floppy image to a different disk, and using that.

It will take a while to load the kernel from the floppy, probably around a minute or so, then, the kernel boot messages will be displayed. This may take a little while also, as NetBSD will be probing your system to discover which hardware devices are installed. The most important thing to know is that `wd0` is NetBSD 's name for your first IDE disk, `wd1` the second, etc. `sd0` is your first SCSI disk, `sd1` the second, etc.

Note that once the system has finished booting, you need not leave the floppy in the disk drive.

Once NetBSD has booted and printed all the boot messages, you will be presented with a welcome message and a main menu. It will also include instructions for using the menus.

6. *Network configuration*

   [PCMCIA] You can skip this section, as you will only get data from floppy in the first part of the install.

   If you will not use network operation during the installation, but you do want your machine to be configured for networking once it is installed, you should first go to the **Utility menu**, and select the **Configure network** option. If you only want to temporarily use networking during the installation, you can specify these parameters later. If you are not using the Domain Name System (DNS), you can give an empty response in reply to answers relating to this.

7. *Installation drive selection and parameters*

   To start the installation, select **Install NetBSD to hard disk** from the main menu.

   The first thing is to identify the disk on which you want to install NetBSD. **`sysinst`** will report a list of disks it finds and ask you for your selection. Depending on how many disks are found, you may get a different message. You should see disk names like `sd0` or `sd1`.

8. *Partitioning the disk*

   - Which portion of the disk to use.

     You will be asked if you want to use the entire disk or only part of the disk. If you decide to use the entire disk for NetBSD, it will be checked if there are already other systems present on the disk, and you will be asked to confirm whether you want to overwrite these.

9. *Editing the NetBSD disklabel*

   The partition table of the NetBSD part of a disk is called a *disklabel*. There are 4 layouts for the NetBSD part of the disk that you can pick from: **`Standard`**, **`Standard with X`**, **`Custom`** and **`Use Existing`**. The first two use a set of default values (that you can change) suitable for a normal installation, possibly including X. With the **`Custom`** option you can specify everything yourself. The last option uses the partition info already present on the disk.

   You will be presented with the current layout of the NetBSD disklabel, and given a chance to change it. For each partition, you can set the type, offset and size, block and fragment size, and the mount point. The type that NetBSD uses for normal file storage is called **4.2BSD**. A swap partition has a special type called **swap**. Some partitions in the disklabel have a fixed purpose.

   `a` Root partition (`/`)

   `b` Swap partition.

   `c` The NetBSD portion of the disk.

`d-h` Available for other use. Traditionally, `d` is the partition mounted on `/usr`, but this is historical practice and not a fixed value.

You will then be asked to name your disk's disklabel. The default response will be ok for most purposes. If you choose to name it something different, make sure the name is a single word and contains no special characters. You don't need to remember this name.

10. *Preparing your hard disk*

    You are now at the point of no return. Nothing has been written to your disk yet, but if you confirm that you want to install NetBSD, your hard drive will be modified. If you are sure you want to proceed, enter `yes` at the prompt.

    The install program will now label your disk and make the file systems you specified. The file systems will be initialized to contain NetBSD bootstrapping binaries and configuration files. You will see messages on your screen from the various NetBSD disk preparation tools that are running. There should be no errors in this section of the installation. If there are, restart from the beginning of the installation process. Otherwise, you can continue the installation program after pressing the return key.

11. *Getting the distribution sets*

    The NetBSD distribution consists of a number of *sets*, that come in the form of gzipped tarfiles. A few sets must be installed for a working system, others are optional. At this point of the installation, you will be presented with a menu which enables you to choose from one of the following methods of installing the sets. Some of these methods will first load the sets on your hard disk, others will extract the sets directly.

    For all these methods, the first step is making the sets available for extraction, and then do the actual installation. The sets can be made available in a few different ways. The following sections describe each of those methods. After reading the one about the method you will be using, you can continue to the section labeled 'Extracting the distribution sets'.

12. *Installation using ftp*

    To be able to install using ftp, you first need to configure your network setup, if you haven't already at the start of the install procedure. **`sysinst`** will do this for you, asking you if you want to use DHCP, and if not to provide data like IP address, hostname, etc. If you do not have name service set up for the machine that you are installing on, you can just press `RETURN` in answer to these questions, and DNS will not be used.

    You will also be asked to specify the host that you want to transfer the sets from, the directory on that host, the account name and password used to log into that host using ftp, and optionally a proxy server to use. If you did not set up DNS when answering the questions to configure networking, you will need to specify an IP address instead of a hostname for the ftp server.

    `sysinst` will proceed to transfer all the default set files from the remote site to your hard disk.

13. *Installation using NFS*

    To be able to install using NFS, you first need to configure your network setup, if you haven't already at the start of the install procedure. **`sysinst`** will do this for you, asking you if you want to use DHCP, and if not to provide data like IP address, hostname, etc. If you do not have name service set up for the machine that you are installing on, you can just press `RETURN` in answer to these questions, and DNS will not be used.

    You will also be asked to specify the host that you want to transfer the sets from, and the directory on that host that the files are in. This directory should be mountable by the machine you are installing on, i.e. correctly exported to your machine.

If you did not set up DNS when answering the questions to configure networking, you will need to specify an IP address instead of a hostname for the NFS server.

14. *Installation from CD-ROM*

    When installing from a CD-ROM, you will be asked to specify the device name for your CD-ROM player (usually `cd0`), and the directory name on the CD-ROM where the distribution files are.

    sysinst will then check if the files are indeed available in the specified location, and proceed to the actual extraction of the sets.

15. *Installation from an unmounted file system*

    In order to install from a local file system, you will need to specify the device that the file system resides on (for example `sd1e`) the type of the file system, and the directory on the specified file system where the sets are located. **sysinst** will then check if it can indeed access the sets at that location.

16. *Installation from a local directory*

    This option assumes that you have already done some preparation yourself. The sets should be located in a directory on a file system that is already accessible. **sysinst** will ask you for the name of this directory.

17. *Extracting the distribution sets*

    After the install sets containing the NetBSD distribution have been made available, you can either extract all the sets (a full installation), or only extract sets that you have selected. In the latter case, you will be shown the currently selected sets, and given the opportunity to select the sets you want. Some sets always need to be installed (**kern, base**) and **etc** they will not be shown in this selection menu.

    Before extraction begins, you can elect to watch the files being extracted; the name of each file that is extracted will be shown. This can slow down the installation process considerably, especially on machines with slow graphics consoles or serial consoles.

    After all the files have been extracted, all the necessary device node files will be created. If you have already configured networking, you will be asked if you want to use this configuration for normal operation. If so, these values will be installed in the network configuration files. The next menu will allow you to select the time zone that you're in, to make sure your clock has the right offset from UTC. Finally you will be asked to select a password encryption algorithm and can than set a password for the "root" account, to prevent the machine coming up without access restrictions.

18. *Finalizing your installation*

    Congratulations, you have successfully installed NetBSD 3.1. You can now reboot the machine, and boot NetBSD from hard disk.

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 `3.1/vax/All` subdir. You can install them with the following commands under `sh`(1):

     ```
     # PKG_PATH=ftp://ftp.NetBSD.org/pub/NetBSD/packages/3.1/vax/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/3.1/vax/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

The upgrade to NetBSD 3.1 is a binary upgrade; it can be quite difficult to update the system from an earlier version by recompiling from source, primarily due to interdependencies in the various components.

To do the upgrade, you must have the boot floppy available. You must also have at least the **base** and **kern** binary distribution sets available, so that you can upgrade with them, using one of the upgrade methods described above. Finally, you must have sufficient disk space available to install the new binaries. Since files already installed on the system are overwritten in place, you only need additional free space for files which weren't previously installed or to account for growth of the sets between releases. If you have a few megabytes free on each of your root (`/`) and `/usr` partitions, you should have enough space.

Since upgrading involves replacing the kernel, the boot blocks on your NetBSD partition, and most of the system binaries, it has the potential to cause data loss. You are strongly advised to *back up* any important data on the NetBSD partition or on another operating system's partition on your disk before beginning the upgrade process.

The upgrade procedure using the **sysinst** tool is similar to an installation, but without the hard disk partitioning. **sysinst** will attempt to merge the settings stored in your `/etc` directory with the new version of NetBSD. Getting the binary sets is done in the same manner as the installation procedure; refer to the installation part of the document for how to do this. Also, some sanity checks are done, i.e. file systems are checked before unpacking the sets.

After a new kernel has been copied to your hard disk, your machine is a complete NetBSD 3.1 system. However, that doesn't mean that you're finished with the upgrade process. You will probably want to update the set of device nodes you have in `/dev`. If you've changed the contents of `/dev` by hand, you will need to be careful about this, but if not, you can just cd into `/dev`, and run the command:

```
# sh MAKEDEV all
```

Finally, you will want to delete old binaries that were part of the version of NetBSD that you upgraded from and have since been removed from the NetBSD distribution.

NetBSD/vax has switched its executable format from the old a.out format to ELF, the now more commonly used and supported format. Your old binaries will continue to work just fine. The installation procedure will try to take the necessary steps to accomplish this. The most important step is to move the old a.out shared libraries in `/usr/lib` and `/usr/X11R6/lib` (if X was installed) to `/emul/aout`, where they will be automatically found if an older a.out binary is executed. **sysinst** will use an existing `/emul` and / or `/emul/aout` directory if available, and will create it (as a symbolic link to `/usr/aout`) if necessary.

If you already had a `/emul` directory, or a symbolic link by that name, **sysinst** should rename it and tell you about it.

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 3.1.

Issues affecting an upgrade from NetBSD 3.1 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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  Atsushi YOKOYAMA
  Avalon Computer Systems
  Bay Area Internet Solutions
  Ben Collver
  Benoit Lepage
  Bernhard Moellemann
  Bill Coldwell
  Bill Sommerfeld
  Bill Squier
  Brad Salai
  Brains Corporation, Japan
  Brian Carlstrom
  Brian McGroarty
  Brian Mitchell
  Canada Connect Corporation
  Carl Shapiro
  Castor Fu

Central Iowa (Model) Railroad
Charles Conn
Charles D. Cranor
Charles M. Hannum
Chris Legrow
Chris Townsend
Christer O. Andersson
Christopher G. Demetriou
Christos Zoulas
Chuck Silvers
Cologne Chip AG
Computer und Literatur Verlag
Computertechnik Krienke & Nolte
Computing Services Department, The University of Liverpool
Convert Tools
Co-operative Research Centre for Enterprise Distributed
Curt Sampson
DAYOMON from Japan
Damicon Kraa, Finland
Daniel de Kok
Dave Burgess
Dave Rand
Dave Tyson
David Brownlee
Dayton Clark
Demon Internet, UK
Derek Fellion
Digital Equipment Corporation
Distributed Processing Technology
Distro Jockey
Douglas J. Trainor
Dr.ir. F.W. Dillema
Easynet, UK
Ed Braaten
Edward Richley
emuty
Eric and Rosemary Spahr
Erik Berls
Erik E. Fair
Erkki Ruohtula
Ernst Lehmann
Espen Randen
Ewald Kicker
Florent Parent
Frank Kardel
Free Hardware Foundation
Front Range *BSD User Group
FUKAUMI Naoki
Gan Uesli Starling
Garth R. Patil
Geert Hendrickx (ghen)
Geert Jan de Groot

GK Meier
Gordon Zaft
Grant Beattie
Greg Gingerich
Greg Girczyc
Guenther Grau
HP Sweden
Hanno Wagner
Hans Huebner
Harald Koerfgen
Haroon Khalid
Harry McDonald
Hauke Fath
Heiko W. Rupp
Herb Peyerl
Hernani Marques Madeira
Hidekichi Ookubo
Hideyuki Kido
Hisashi Fujinaka
Holger Weiss
Hubert Feyrer
IBM Corporation
IMAI Kiyoshi
Innovation Development Enterprises of America
Intel
Internet Software Consortium
Internet Users Forever IKI
Interoute Telecommunications, UK
JNUG (raised at JNUG meeting & BOF August 2005)
James Bursa
James Chacon
Jan Joris Vereijken
Jason Birnschein
Jason Brazile
Jason R. Thorpe
Jeff Rizzo
Jeff Woodall - Portland, OR
Jens Schoenfeld
Jim Wise
Joachim Nink
Joachim Thiemann
Joel CARNAT
John Heasley
John Kohl
John P. Refling
Jonathan P. Kay
Jordan K. Hubbard
Jorgen Lundman
Karl Wagner
Kenji Hisazumi
Kenneth Alan Hornstein
Kenneth P. Stox

Kevin Keith Woo
Kevin Sullivan
Klaus Lichti
Kimmo Suominen
Korea BSD User Forum
Krister Waldfridsson
Kwok Ng
Lars Mathiassen
Lehmanns Fachbochhandlung
Lex Wennmacher
LinuxFest Northwest
Luke Maurits
Luke Mewburn
MS Macro System GmbH, Germany
Maki Kato
Marc Tooley
Marcus Wyremblewski
Mark Brinicombe
Mark Houde
Mark Perkins
Mark S. Thomas
Mason Loring Bliss
Martin Cernohorsky
Martin J. Ekendahl
Matt Dainty
Matt Thomas
Matthew Jacob
Matthew Sporleder
Matthias Scheler
Mattias Karlsson
Mel Kravitz
Michael Graff
Michael "Kvedulv" Moll
Michael L. Hitch
Michael Richardson
Michael Thompson
Michael W. James
Mike Price
Mirko Thiesen (Thiesi)
Murphy Software BV, Netherlands
Neil J. McRae
Noah M. Keiserman
Norman R. McBride
Numerical Aerospace Simulation Facility, NASA Ames Research
Olaf "Rhialto" Seibert
Oliver Cahagne
Oppedahl & Larson LLP
Palle Lyckegaard
Paul Ripke
Paul Southworth
Pawel Rogocz
Pearson Education

Perry E. Metzger
Petar Bogdanovic
Peter C. Wallace
Peter J. Bui
Peter Postma
Petri T. Koistinen
Phil Thomas
Piermont Information Systems Inc.
Pierre-Philipp Braun
Precedence Technologies Ltd
Public Access Networks Corporation
Ralph Campbell
Randy Ray
Real Weasel
Reinoud Zandijk
Renewed Health Company
Richard Nelson
Rob Windsor
Robert Pankratz
Robert Thille
Roland Lichti
Ross Harvey
Ryan Campbell
SDF Public Access Unix, Inc. 501(c)(7)
SMC Networks Inc.
Salient Systems Inc.
Sander van Dijk
Scott Ellis
Scott Kaplan
Scott Walters
Sean Davis
Simon Burge
Soren Jacobsen
Soren Jorvang
Stephen Borrill
Stephen Early
Steve Allen
Steve Wadlow
Steven M. Bellovin
SunROOT# Project
Sylvain Schmitz
Takahiro Kambe
TAKEUCHI Yoji
Tamotsu Kanoh
Tasis Michalakopoulos (Athens, Greece)
Tatoku Ogaito
Ted Lemon
Ted Spradley
The Names Database
The NetBSD Mission
The People's Republic of Ames
Thierry Lacoste

Thierry Laronde
Thomas Runge
Thor Lancelot Simon
Tim Law
Timo Scholer
Tino Hanich
Tino Wildenhain
Tom Coulter
Tom Ivar Helbekkmo
Tom Lyon
Tomas Dabasinskas
Torsten Harenberg
Toru Nishimura
Toshiba
Turbocat's Development
Tyler Sarna
UTN Web Directory
VMC Harald Frank, Germany
Warped Communications, Inc.
Wasabi Systems, Inc.
Whitecross Database Systems Ltd.
William Gnadt
Worria Affordable Web Hosting
Worria Web Hosting
wwwTrace Traceroute Server Directory
Yusuke Yokota
Zach Metzinger

(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:

Allen Briggs	`briggs@NetBSD.org`
Matt Thomas	`matt@NetBSD.org`
Valeriy E. Ushakov	`uwe@NetBSD.org`
YAMAMOTO Takashi	`yamt@NetBSD.org`
Christos Zoulas	`christos@NetBSD.org`

The portmasters (and their ports):

Allen Briggs	briggs@NetBSD.org	**sandpoint**
Anders Magnusson	ragge@NetBSD.org	**vax**
Andrey Petrov	petrov@NetBSD.org	**sparc64**
Ben Harris	bjh21@NetBSD.org	**acorn26**
Chris Gilbert	chris@NetBSD.org	**cats**
Christian Limpach	cl@NetBSD.org	**xen**
Eduardo Horvath	eeh@NetBSD.org	**evbppc**
Frank van der Linden	fvdl@NetBSD.org	**amd64**
Frank van der Linden	fvdl@NetBSD.org	**i386**
Gavan Fantom	gavan@NetBSD.org	**iyonix**
IWAMOTO Toshihiro	toshii@NetBSD.org	**hpcarm**
Ichiro Fukuhara	ichiro@NetBSD.org	**hpcarm**
Ignatios Souvatzis	is@NetBSD.org	**amiga**
Izumi Tsutsui	tsutsui@NetBSD.org	**hp300**
Izumi Tsutsui	tsutsui@NetBSD.org	**news68k**
Jason Thorpe	thorpej@NetBSD.org	**algor**
Jason Thorpe	thorpej@NetBSD.org	**evbarm**
Jason Thorpe	thorpej@NetBSD.org	**shark**
Jeremy Cooper	jeremy@NetBSD.org	**sun3**
Jonathan Stone	jonathan@NetBSD.org	**pmax**
Julian Coleman	jdc@NetBSD.org	**atari**
Jun-ichiro itojun Hagino	itojun@NetBSD.org	**evbsh3**
Jun-ichiro itojun Hagino	itojun@NetBSD.org	**mmeye**
Kazuki Sakamoto	sakamoto@NetBSD.org	**bebox**
Lennart Augustsson	augustss@NetBSD.org	**pmppc**
Marcus Comstedt	marcus@NetBSD.org	**dreamcast**
Martin Husemann	martin@NetBSD.org	**sparc64**
Matt DeBergalis	deberg@NetBSD.org	**next68k**
Matt Fredette	fredette@NetBSD.org	**hp700**
Matt Fredette	fredette@NetBSD.org	**sun2**
Matt Thomas	matt@NetBSD.org	**alpha**
Matt Thomas	matt@NetBSD.org	**netwinder**
Matthias Drochner	drochner@NetBSD.org	**cesfic**
NISHIMURA Takeshi	nsmrtks@NetBSD.org	**x68k**
NONAKA Kimihiro	nonaka@NetBSD.org	**prep**
Nathan Williams	nathanw@NetBSD.org	**sun3**
Noriyuki Soda	soda@NetBSD.org	**arc**
Paul Kranenburg	pk@NetBSD.org	**sparc**
Phil Nelson	phil@NetBSD.org	**pc532**
Reinoud Zandijk	reinoud@NetBSD.org	**acorn32**
Ross Harvey	ross@NetBSD.org	**alpha**
Søren Jørvang	soren@NetBSD.org	**cobalt**
Søren Jørvang	soren@NetBSD.org	**sgimips**
Scott Reynolds	scottr@NetBSD.org	**mac68k**
Shin Takemura	takemura@NetBSD.org	**hpcmips**
Simon Burge	simonb@NetBSD.org	**evbmips**
Simon Burge	simonb@NetBSD.org	**evbppc**

Simon Burge	simonb@NetBSD.org	**pmax**
Simon Burge	simonb@NetBSD.org	**sbmips**
Steve Woodford	scw@NetBSD.org	**evbsh5**
Steve Woodford	scw@NetBSD.org	**mvme68k**
Steve Woodford	scw@NetBSD.org	**mvmeppc**
Tohru Nishimura	nisimura@NetBSD.org	**luna68k**
Tsubai Masanari	tsubai@NetBSD.org	**macppc**
Tsubai Masanari	tsubai@NetBSD.org	**newsmips**
UCHIYAMA Yasushi	uch@NetBSD.org	**hpcsh**
UCHIYAMA Yasushi	uch@NetBSD.org	**playstation2**
Wayne Knowles	wdk@NetBSD.org	**mipsco**
Wolfgang Solfrank	ws@NetBSD.org	**ofppc**

The NetBSD 3.1 Release Engineering team:

Grant Beattie	grant@NetBSD.org
Erik Berls	cyber@NetBSD.org
James Chacon	jmc@NetBSD.org
Julian Coleman	jdc@NetBSD.org
Håvard Eidnes	he@NetBSD.org
Jun-ichiro itojun Hagino	itojun@NetBSD.org
Geert Hendrickx	ghen@NetBSD.org
Soren Jacobsen	snj@NetBSD.org
SAITOH Masanobu	msaitoh@NetBSD.org
Luke Mewburn	lukem@NetBSD.org
Jeff Rizzo	riz@NetBSD.org
Matthias Scheler	tron@NetBSD.org
Curt Sampson	cjs@NetBSD.org
Jim Wise	jwise@NetBSD.org

NetBSD Developers:

Nathan Ahlstrom	nra@NetBSD.org
Steve Allen	wormey@NetBSD.org
Jukka Andberg	jandberg@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
Alan Barrett	apb@NetBSD.org
Grant Beattie	grant@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
Charles Blundell	cb@NetBSD.org

Rafal Boni	rafal@NetBSD.org
Sean Boudreau	seanb@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
Daniel Carosone	dan@NetBSD.org
James Chacon	jmc@NetBSD.org
Bill Coldwell	billc@NetBSD.org
Julian Coleman	jdc@NetBSD.org
Ben Collver	ben@NetBSD.org
Jeremy Cooper	jeremy@NetBSD.org
Chuck Cranor	chuck@NetBSD.org
Alistair Crooks	agc@NetBSD.org
Aidan Cully	aidan@NetBSD.org
Garrett D'Amore	gdamore@NetBSD.org
Johan Danielsson	joda@NetBSD.org
John Darrow	jdarrow@NetBSD.org
Jed Davis	jld@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
Elad Efrat	elad@NetBSD.org
Håvard Eidnes	he@NetBSD.org
Stoned Elipot	seb@NetBSD.org
Michael van Elst	mlelstv@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
Liam J. Foy	liamjfoy@NetBSD.org

Matt Fredette	fredette@NetBSD.org
Thorsten Frueauf	frueauf@NetBSD.org
Castor Fu	castor@NetBSD.org
Ichiro Fukuhara	ichiro@NetBSD.org
Quentin Garnier	cube@NetBSD.org
Thomas Gerner	thomas@NetBSD.org
Simon J. Gerraty	sjg@NetBSD.org
Justin Gibbs	gibbs@NetBSD.org
Chris Gilbert	chris@NetBSD.org
Eric Gillespie	epg@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
HAMAJIMA Katsuomi	hamajima@NetBSD.org
HAYAKAWA Koichi	haya@NetBSD.org
John Heasley	heas@NetBSD.org
Geert Hendrickx	ghen@NetBSD.org
René Hexel	rh@NetBSD.org
Iain Hibbert	plunky@NetBSD.org
Kouichirou Hiratsuka	hira@NetBSD.org
Michael L. Hitch	mhitch@NetBSD.org
Jachym Holecek	freza@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
Love Hörnquist Åstrand	lha@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
Soren Jacobsen	snj@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
Frank Kardel	kardel@NetBSD.org
Mattias Karlsson	keihan@NetBSD.org
KAWAMOTO Yosihisa	kawamoto@NetBSD.org
Mario Kemper	magick@NetBSD.org
Min Sik Kim	minskim@NetBSD.org
Thomas Klausner	wiz@NetBSD.org
Klaus Klein	kleink@NetBSD.org
John Klos	jklos@NetBSD.org
Wayne Knowles	wdk@NetBSD.org
Takayoshi Kochi	kochi@NetBSD.org
John Kohl	jtk@NetBSD.org
Daniel de Kok	daniel@NetBSD.org
Paul Kranenburg	pk@NetBSD.org
Martti Kuparinen	martti@NetBSD.org
Kentaro A. Kurahone	kurahone@NetBSD.org
Kevin Lahey	kml@NetBSD.org
Johnny C. Lam	jlam@NetBSD.org
Martin J. Laubach	mjl@NetBSD.org
Greg Lehey	grog@NetBSD.org
Ted Lemon	mellon@NetBSD.org
Christian Limpach	cl@NetBSD.org
Frank van der Linden	fvdl@NetBSD.org
Joel Lindholm	joel@NetBSD.org
Mike Long	mikel@NetBSD.org
Michael Lorenz	macallan@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
Simas Mockevicius	symka@NetBSD.org
Juan Romero Pardines	xtraeme@NetBSD.org
Julio M. Merino Vidal	jmmv@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
Takeshi Nakayama	nakayama@NetBSD.org
Phil Nelson	phil@NetBSD.org
John Nemeth	jnemeth@NetBSD.org
Bob Nestor	rnestor@NetBSD.org
NISHIMURA Takeshi	nsmrtks@NetBSD.org
Tohru Nishimura	nisimura@NetBSD.org
NONAKA Kimihiro	nonaka@NetBSD.org
Takehiko NOZAKI	tnozaki@NetBSD.org
Jesse Off	joff@NetBSD.org
Tatoku Ogaito	tacha@NetBSD.org
OKANO Takayoshi	kano@NetBSD.org
Masaru Oki	oki@NetBSD.org
Atsushi Onoe	onoe@NetBSD.org
Greg Oster	oster@NetBSD.org
Jonathan Perkin	sketch@NetBSD.org
Herb Peyerl	hpeyerl@NetBSD.org
Matthias Pfaller	matthias@NetBSD.org
Chris Pinnock	cjep@NetBSD.org
Adrian Portelli	adrianp@NetBSD.org
Rui Paulo	rpaulo@NetBSD.org
Peter Postma	peter@NetBSD.org
Dante Profeta	dante@NetBSD.org
Chris Provenzano	proven@NetBSD.org
Niels Provos	provos@NetBSD.org
Michael Rauch	mrauch@NetBSD.org
Marc Recht	recht@NetBSD.org
Darren Reed	darrenr@NetBSD.org
Jeremy C. Reed	reed@NetBSD.org
Antoine Reilles	tonio@NetBSD.org
Tyler R. Retzlaff	rtr@NetBSD.org
Scott Reynolds	scottr@NetBSD.org
Michael Richardson	mcr@NetBSD.org
Tim Rightnour	garbled@NetBSD.org
Alan Ritter	rittera@NetBSD.org
Jeff Rizzo	riz@NetBSD.org
Gordon Ross	gwr@NetBSD.org
Steve Rumble	rumble@NetBSD.org
Ilpo Ruotsalainen	lonewolf@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
Georg Schwarz	schwarz@NetBSD.org
Lubomir Sedlacik	salo@NetBSD.org
Christopher SEKIYA	sekiya@NetBSD.org
Reed Shadgett	dent@NetBSD.org
John Shannon	shannonjr@NetBSD.org
Tim Shepard	shep@NetBSD.org
Takeshi Shibagaki	shiba@NetBSD.org
Naoto Shimazaki	igy@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
Jörg Sonnenberger	joerg@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
Ian Lance Taylor	ian@NetBSD.org
Matt Thomas	matt@NetBSD.org
Jason Thorpe	thorpej@NetBSD.org
Christoph Toshok	toshok@NetBSD.org
Greg Troxel	gdt@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
Valeriy E. Ushakov	uwe@NetBSD.org
Todd Vierling	tv@NetBSD.org
Aymeric Vincent	aymeric@NetBSD.org
Paul Vixie	vixie@NetBSD.org
Mike M. Volokhov	mishka@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
S.P.Zeidler	spz@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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This product contains software written by Michael L. Hitch for the NetBSD project.
This product includes cryptographic software written by Eric Young (eay@cryptsoft.com)
This product includes cryptographic software written by Eric Young (eay@mincom.oz.au)
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This product includes software developed by Allen Briggs
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