NAME

INSTALL — Installation procedure for NetBSD/pmax.

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DESCRIPTION

About this Document

This document describes the installation procedure for NetBSD 8.2 on the *pmax* 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 many different different system architectures (ports) across a variety of distinct CPU families, and is being ported to more. The NetBSD 8.2 release contains complete binary releases for most of these system architectures, with preliminary support for the others included in source form. Please see the NetBSD website at **http://www.NetBSD.org/** for information on them.)

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, NetBSD would not exist.

Changes Between The NetBSD 8.1 and 8.2 Releases

The NetBSD 8.2 release is the first security/critical update of the NetBSD 8 release branch. It represents a selected subset of fixes deemed important for security or stability reasons. The complete list of changes can be found in the CHANGES-8.2:

https://cdn.netbsd.org/pub/NetBSD/NetBSD-8.2/CHANGES-8.2

file in the top level directory of the NetBSD 8.2 release tree.

The release anouncements, status, updates and links to other resources can be found at

https://www.netbsd.org/releases/formal-8/

Features to be removed in a later release

The following features are to be removed from NetBSD in the future:

- `dhclient`(8) in favor of `dhcpcd`(8).

- `groff`(1). Man pages are now handled with `mandoc`(1), and `groff`(1) can still be found in pkgsrc as `textproc/groff`.
- `rtsol`(8) and `rtsold`(8).

The NetBSD Foundation

The NetBSD Foundation is a tax exempt, not-for-profit 501(c)(3) corporation that devotes itself to the traditional goals and Spirit of the NetBSD Project and owns the trademark of the word "NetBSD". It supports the design, development, and adoption of NetBSD worldwide. More information on the NetBSD Foundation, its composition, aims, and work can be found at: **http://www.NetBSD.org/foundation/**

Sources of NetBSD

Refer to **http://www.NetBSD.org/mirrors/**

NetBSD 8.2 Release Contents

The root directory of the NetBSD 8.2 release is organized as follows:

`.../NetBSD-8.2/`

`CHANGES`	Changes between the 7.0 and 8.0 releases.
`CHANGES-8.0`	Changes between the initial 8.0 branch and final release of 8.0.
`CHANGES-8.1`	Changes between the 8.0 release and the 8.1 release.
`CHANGES-8.2`	Changes between the 8.1 release and the 8.2 release.
`CHANGES.prev`	Changes in previous NetBSD releases.
`LAST_MINUTE`	Last minute changes and notes about the release.
`README.files`	README describing the distribution's contents.
`images/`	Images (ISO 9660 or USB) for installing NetBSD. Depending on your system, these may be bootable.
`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 8.2 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.
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.
src	This set contains all of the base NetBSD 8.2 sources which are not in **gnusrc**, **sharesrc**, or **syssrc**.
syssrc	This set contains the sources to the NetBSD 8.2 kernel for all architectures as well as the `config`(1) utility.
xsrc	This set contains the sources to the X Window System.

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:

`MD5` MD5 digests in the format produced by the command:
cksum -a MD5 *file*.

`SHA512` SHA512 digests in the format produced by the command:
cksum -a SHA512 *file*.

The SHA512 digest is safer, but MD5 checksums are provided so that a wider range of operating systems can check the integrity of the release files.

NetBSD/pmax subdirectory structure

The pmax-specific portion of the NetBSD 8.2 release is found in the `pmax` subdirectory of the distribution: `.../NetBSD-8.2/pmax/`. 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/` pmax binary distribution sets; see below.

`installation/`
`misc/` Miscellaneous pmax installation utilities; see installation section below.

Binary distribution sets

The NetBSD pmax binary distribution sets contain the binaries which comprise the NetBSD 8.2 release for pmax. The binary distribution sets can be found in the `pmax/binary/sets` subdirectory of the NetBSD 8.2 distribution tree, and are as follows:

base The NetBSD 8.2 pmax **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.

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.

debug This distribution set contains debug information for all base system utilities. It is usefull when reporting issues with binaries or during developement. This set is huge, if the target disk is small, do not install it.

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.

games This set includes the games and their manual pages.

kern-GENERIC
This set contains a NetBSD/pmax 8.2 `GENERIC` kernel, named `/netbsd`. You *must* install this distribution set.

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

misc This set includes the system dictionaries, the typesettable document set, and other files from `/usr/share`.

modules This set includes kernel modules to add functionality to a running system.

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

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 4.5.0. 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.

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

xdebug This distribution set contains debug information for all X11 binaries. It is usefull when reporting issues with these binaries or during developement. This set is huge, if the target disk is small, do not install it.

xfont Fonts needed by the X server and by X clients.

xetc Configuration files for X which could be locally modified.

xserver The X server. This includes the Xpmax server with man page.

The pmax 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 -xzpf`** command from the root directory (`/`) of your system.

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

NetBSD/pmax System Requirements and Supported Devices

Supported machines

- DECstation 2100 and 3100, also known as *pmin* and *pmax*
- DECsystem 5100
- Personal DECstations (5000/20, /25 and /33) also known as *MAXINE*
- DECstation 5000/120, /125, and /133, also known as *3MIN*
- DECstation 5000/200, also known as *3MAX*

- DECstation 5000/240 and DECsystem 5900, also known as *3MAXPLUS*
- DECstation 5000/50, 5000/150, 5000/260 (and DECsystem 5900-260) – R4000 and R4400 variants of the *MAXINE, 3MIN* and *3MAXPLUS*

Unsupported machines

- DECsystem 5400 and 5500 (Q-bus based systems, similar to the Vax *Mayfair* or *Mayfair II*, but with an r2000a or r3000 CPU instead of a CVAX CPU.)
- DECsystem 5800 (xbi-based multiprocessor, a Vax 6200 with Vax CPU boards replaced with Mips CPU boards)

The minimal configuration requires 8 MB of RAM and 170 MB of disk space. To install the entire system requires much more disk space, and to run X or compile the system, more RAM is recommended, as NetBSD with 8 MB of RAM feels like Ultrix with 8 MB of RAM - slow. Note that until you have around 16 MB of RAM, getting more RAM is more important than getting a faster CPU.

Supported devices

- DECstation 2100 and 3100 baseboard video
  - one-bit mono or 8-bit pseudocolor frame buffers.
- DECstation 5000 series TurboChannel video
  - PMAG-DV Personal DECstation baseboard 1024x768 frame buffer
  - PMAG-B (CX) 1024x768 8-bit color frame buffer
  - PMAGB-B (HX or SFB) 1280x1024 8-bit color frame buffer
  - PMAG-A (MX) 1280x1024 four-bit greyscale frame buffer
  - PMAG-C (PX) 2D 8-bit accelerated frame buffer.
  - PMAG-D (PXG) 3D 8-bit accelerated frame buffer.
  - PMAG-E (PXG+) 3D 24-bit accelerated frame buffer.
  - PMAG-F (PXG+ Turbo) 3D 24-bit accelerated frame buffer.
- PMAG-JA (TX) 1024x1280 color frame buffer
- PMAG-RO (TX) 1024x1280 color frame buffer

  Note: All supported DECstation video produces sync-on-green. Be sure to use either a DEC-compatible fixed-sync monitor or a multisync monitor that supports sync-on-green.
- Serial ports
  - ttya and ttyb (can be used as console if needed)
- Ethernet
  - on-board AMD Lance ethernet (*le0*),
  - TURBOchannel AMD Lance ethernet cards (the *PMAD*)
- SCSI
  - on-board DEC *sii* SCSI controller (2100 and 3100)
  - on-board *asc* SCSI controller (5000 series machines)
  - TurboChannel *asc* SCSI controller (the *PMAZ*)
- DEC LK-201 (or compatible) keyboard
- DEC *hockey puck* or compatible mouse

Unsupported devices

- Q-bus based DECsystems
- PrestoServe NVRAM on DECsystem 5100 and 5000/2xx machines
- Audio drivers for Personal DECstation machines
- Floppy driver for Personal DECstation machines
- TurboChannel audio hardware (LoFi)

Note: The primary obstacle to supporting the above is non-availability of sample hardware for development.

Getting the NetBSD System on to Useful Media

First-time installation on a bare machine is not supported, because most DECstations do not have any suitable load device. Some versions of the DECstation PROM are buggy and will not boot via TFTP and bootp; other versions are buggy and do not boot via MOP.

The only DECstation with a floppy-disk drive is the Personal DECstation, and that device is not supported as a boot device.

The recommended installation procedure is to boot an install kernel via TFTP, or to use a "helper" system to write a miniroot diskimage onto a disk, move that disk to the target installation system, and then boot the miniroot.

Installation is supported from several media types, including:

- CD-ROM / DVD / USB-stick
- 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 / USB-stick

Find out where the distribution set files are on the CD-ROM, DVD or USB stick. Likely locations are `binary/sets` and `pmax/binary/sets`. (You only need to know this if you are mixing installer and installation media from different versions - the installer will know the proper default location for the sets it comes with).

Proceed to the instructions 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.

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.

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 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.

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/pmax 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_sets
```

where *tape_device* is the name of the tape device that represents the tape drive you're using. This might be `/dev/rst0`, or something similar, but it will vary from system to system. In the above example, *dist_sets* is a list of filenames corresponding to the distribution sets that you wish to place on the tape. For instance, to put the **kern-GENERIC, base,** and **etc** distributions on tape (the absolute minimum required for installation), you would do the following:

```
# cd .../NetBSD-8.2
# cd pmax/binary
# tar -cf tape_device kern-GENERIC.tgz
base.tgz etc.tgz
```

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.

Preparing your System for NetBSD installation

First and foremost, before beginning the installation process, *make sure you have a reliable backup* of any data on your hard disk that you wish to keep. Mistakes in partitioning your hard disk may lead to data loss.

Installing the NetBSD System

Note: There may be updates to this procedure available from the NetBSD/pmax web page at http://www.NetBSD.org/ports/pmax/ .

To install or upgrade NetBSD, you need to first boot an 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.

From most convenient to least convenient, the installation methods are:

1. Installation from an existing NetBSD or Ultrix system by booting the install kernel from an existing root file system (/). See the **Installing from an existing system** section later in these INSTALL notes.
2. Copying a bootable diskimage onto the beginning of a disk and installing onto that disk. See the **Install via diskimage** section later in these INSTALL notes.
3. Booting the install kernel over the network and installing onto a local disk. See the **Install via netboot install kernel** section later in these INSTALL notes.
4. Using a helper machine with a SCSI controller to copy the bootable diskimage onto the beginning of a disk, and moving the disk to the target machine. See the **Install via diskimage** section later in these INSTALL notes.
5. For machines with some PROMs that cannot netboot standard kernels, you will need to set up an NFS server with a diskless root file system for trimmed-down network install kernel and run the installation system from the NFS root file system. See the **Install via diskless boot** section later in these INSTALL notes.

You should familiarize yourself with the console PROM environment and the hardware configuration. The PROMs on the older DECstation 2100 and 3100 use one syntax. The PROMs on the TurboChannel machines use a completely different syntax. Be sure you know how to print the configuration of your machine, and how to boot from disk or network, as appropriate.

To boot from disk, use:

2100 or 3100:	**boot -f rz(0,*X*,0)netbsd**
5000/200:	**boot 5/rz*X*/netbsd**
other 5000s:	**boot 3/rz*X*/netbsd**

To boot via TFTP, use:

2100 or 3100:	**boot -f tftp()**
5000/200:	**boot 6/tftp**
other 5000s:	**boot 3/tftp**

To boot via MOP, use:

2100 or 3100:	**boot -f mop()**
5000/200:	**boot 6/mop**
other 5000s:	**boot 3/mop**

You will also need to know the total size (in sectors) and the approximate geometry of the disks you are installing onto, so that you can label your disks for the BSD fast file system (FFS). For most SCSI drives (including all SCSI-2 drives), the kernel will correctly detect the disk geometry. The **sysinst** tool will suggest these as the default.

If you're installing NetBSD/pmax for the first time it's a very good idea to pre-plan partition sizes for the disks on which you're installing NetBSD. Changing the size of partitions after you've installed is difficult. If you do not have a spare bootable disk, it may be simpler to re-install NetBSD again from scratch.

Assuming a classic partition scheme with separate / (root) and /usr file systems, a comfortable size for the NetBSD / partition is about 100 MB. A good initial size for the swap partition is twice the amount of physical memory in your machine (though, unlike Ultrix, there are no restrictions on the size of the swap partition that would render part of your memory unusable). The default swap size is 64 MB, which is adequate for doing a full system build.

Install via a NetBSD CD-ROM

You can obtain the disk image or diskless boot tar file from the NetBSD 8.2 CD-ROM.

To mount the CD-ROM from a NetBSD/pmax host, type

```
# mount -r -t cd9660 /dev/cdXc /mnt
```

and from an Ultrix host

```
# mount -r -t cdfs -o nodefperm,noversion /dev/rzXc /mnt
```

where *X* is the SCSI-ID of the CD-ROM.

Note: Ultrix does not have Rock Ridge extensions so leave out everything between the first and last period ('.') in the paths on the CD. For example, the path NetBSD-1.4.3 would show up as NetBSD-1.3.

The diskimage file can be found on the CD-ROM at the following location (relative to the mount point of the CD)

```
pmax/installation/diskimage/diskimage.gz
```

and the diskless boot tar file can be found at

```
pmax/installation/netboot/diskimage.tgz
```

Once you have located these files, continue on to either **Install via netboot install kernel**, **Install via diskless boot**, **Install via diskimage** or **Installing from an existing system** section later in the INSTALL notes.

Installing from an existing system

With the NetBSD bootblocks or using the Ultrix bootloader, you can boot the kernel located in:

```
pmax/binary/kernel/netbsd-INSTALL.gz
```

On Ultrix systems you will need to **gunzip** this kernel before booting it.

Then boot using one of:

2100 or 3100:	**boot -f rz(0,*X*,0)netbsd-INSTALL**
5000/200:	**boot 5/rz*X*/netbsd-INSTALL**
other 5000s:	**boot 3/rz*X*/netbsd-INSTALL**

where *X* is your boot disk SCSI-ID, and continue to the **Once you've booted the diskimage** section

Install via diskimage

The diskimage file is in

`pmax/installation/diskimage/diskimage.gz`.

It is shipped compressed and is around 1760 kbytes, uncompressing to exactly 2100 kbytes.

To install the diskimage onto disk `sd`*X* on a NetBSD/pmax system, do:

```
# disklabel -W /dev/rsdXc
# gunzip -c diskimage.gz | dd of=/dev/rsdXc bs=10240
```

When installing on a disk with no NetBSD or Ultrix label, you may get a message like:

```
sdX: WARNING: trying Ultrix label, no disk label
```

or when installing on an old Ultrix disk, you may get a message like:

```
sdX: WARNING: using ULTRIX partition information
```

when issuing the **disklabel -W /dev/rsd***X***c** command. This can safely be ignored.

On NetBSD/i386, the "raw disk partition" is the 'd' partition, so do:

```
# disklabel -W /dev/rsdXd
# gunzip -c diskimage.gz | dd of=/dev/rsdXd bs=10240
```

On NetBSD, be sure to use **disklabel -W** to enable writing to the label area of the disk. If you forget this and/or use the 'block' device, the **dd** command may silently fail.

On Ultrix systems, do:

```
# gunzip -c diskimage.gz | dd of=/dev/rrzXc bs=10240
```

On MS-DOS, use an 'unzip' utility, then use **rawrite**.

Then boot using one of:

2100 or 3100:	**boot -f rz(0,***X***,0)netbsd**
5000/200:	**boot 5/rz***X***/netbsd**
other 5000s:	**boot 3/rz***X***/netbsd**

where *X* is your boot disk SCSI-ID, and continue to the **Once you've booted the diskimage** section.

Install via netboot install kernel

Booting NetBSD/pmax 8.2 install kernel over a network requires a BOOTP or DHCP server and a TFTP server. (These are usually all run on the same machine.) There are two basic stages to the boot:

- The pmax PROM software sends a BOOTP request to get its own address, the address of the TFTP server and the file to download.
- It downloads the file name obtained from BOOTP, which is the install kernel, via TFTP and then executes it.

You will need to set up servers for BOOTP and TFTP.

For the BOOTP server you need to specify the:

- hardware type (Ethernet)
- hardware address (Ethernet MAC address)

- IP address of the client
- subnet mask of the client
- address of the TFTP server
- name of the kernel loaded via TFTP

Here's an example for a UNIX-like system running **bootpd**:

```
myhost.mydom.com:\
         :ht=ethernet:ha=08002b123456:\
         :ip=192.168.1.2:sm=255.255.255.0:\
         :sa=192.168.1.1:bf=install:\
         :rp=/usr/export/pmax:
```

And here's an example for a UNIX-like system running the ISC **dhcpd**:

```
host pmax {
        hardware ethernet 08:0:2b:12:34:56;
        fixed-address 192.168.1.2;
        option host-name "myhost.mydom.com";
        filename "install";
        option domain-name-servers 192.168.1.1;
        option broadcast-address 255.255.255.0;
        option domain-name "my.domain";
        option root-path "/usr/export/pmax";
}
```

For the TFTP server, You will need to copy the **install.ecoff** kernel to the directory used by the TFTP server. This file must be gunzipped.

Then boot using one of:

2100 or 3100: **boot -f tftp()**
5000/200: **boot 6/tftp**
other 5000s: **boot 3/tftp**

and continue to the **Once you've booted the diskimage** section.

Install via diskless boot

The file `pmax/installation/netboot/diskimage.tar.gz` contains a suitable set of files for installing on an NFS server to set up a diskless root filesytem. (It is a tar copy of the contents of an installation ramdisk file system contained in the install kernel.) You will need to find an NFS server, unpack the tarfile, and setup BOOTP/dhcp service for your pmax. Instructions for setting up an NFS server and diskless booting are on the NetBSD/pmax netboot webpage at

http://www.NetBSD.org/ports/pmax/netboot.html

Since the system install utility, **sysinst**, requires a read/write root, installing via diskless boot is only feasible if your NFS server exports the diskless root read-write. If this is not possible, you should install via other of the other installation procedures.

Once you have booted the kernel, continue to the **Once you've booted the diskimage** section.

Once you've booted the diskimage

Once you've booted the installation kernel you will need to select your terminal type. Use **vt100** for a framebuffer console or a serial console with a vt100-compatible terminal, or **xterm** or **xterms** for a tip(1) or cu(1) connection running in an xterm(1).

The system will then start the **sysinst** program.

Running the sysinst installation program

1. *Introduction*

   Using **sysinst**, installing NetBSD is a relatively easy process. Still, you should read this document and have it available during the installation process. This document tries to be a good guide to 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.

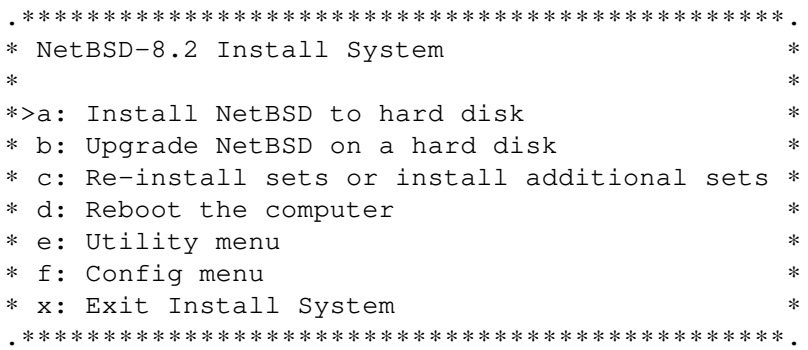
2. *General*

   The following is a walk-through of the steps you will take while installing NetBSD on your hard disk. **sysinst** is a menu driven program that guides you through the installation process. 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.

3. *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 / DVD as the install media.

   - What you need.
     - The distribution sets (in this example, they are on the CD or DVD).
     - A minimum of 8 MB of memory installed.
     - An optical drive.
     - A hard drive with at least 600 MB of free space for a complete base install, not including room for swap. If you wish to install the X Window System as well, you will need at least 225 MB more.
   - The Quick Installation
     - Boot the system as described above. You should be at the **sysinst** main menu.



- 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 the setup of your disk.
- You will be asked to choose which distribution sets to install.
- When prompted, choose **CD-ROM** as the install medium if booted from CD-ROM. The default values for the path and device should be ok.
- After the installation process has completed, you will be brought back to the main menu, where you should select **Reboot.**
- NetBSD will now boot. If you didn't set a password for the `root` user when prompted by **`sysinst`**, logging in as `root` and setting a password should be your first task. You are also advised to read `afterboot`(8).

4. *Booting NetBSD*

   You may want to read the boot messages, to notice your disk's name and capacity. Its name will be something like `sd0` and the geometry will be printed on a line that begins with its name. As mentioned above, you may need your disk's geometry when creating NetBSD's partitions. You will also need to know the name, to tell **`sysinst`** which disk to use. The most important thing to know is that `sd0` is your first SCSI disk, `sd1` the second, etc.

   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.

5. *Network configuration*

   If you do not intend to use networking 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 when asked to provide a server.

6. *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. You should see disk names like `rz0` or `rz1`

7. *Selecting which sets to install*

   The next step is to choose which distribution sets you wish to install. Options are provided for full, minimal, and custom installations. If you choose sets on your own, **base**, **etc**, and a kernel must be selected.

8. *Partitioning the disk*

   - Choosing 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, **`sysinst`** will check for the presence of other operating systems and you will be asked to confirm that you want to overwrite these.

9. *Editing the NetBSD disklabel*

   The partition table of the NetBSD part of a disk is called a *disklabel*. If your disk already has a disklabel written to it, you can choose **Use existing partition sizes**. Otherwise, select **Set sizes of NetBSD partitions**.

   After you have chosen your partitions and their sizes (or if you opted to use the existing partitions), you will be presented with the layout of the NetBSD disklabel and given one more 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 entire 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, select **yes**.

    The install program will now label your disk and create 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 tar files. At this point, 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 transfer the sets to your hard disk, others will extract the sets directly.

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

12. *Installation from CD-ROM*

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

    sysinst will then check that the files are actually present in the specified location and proceed to the extraction of the sets.

13. *Installation using FTP*

To install using ftp, you first need to configure your network setup if you haven't already done so. **sysinst** will help you with this, asking if you want to use DHCP. If you do not use DHCP, you can enter network configuration details yourself. If you do not have DNS set up for the machine that you are installing on, you can just press RETURN in answer to this question, 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, you will need to specify an IP address instead of a hostname for the ftp server.

sysinst will then transfer the set files from the remote site to your hard disk.

14. *Installation using NFS*

    To install using NFS, you first need to configure your network setup if you haven't already done so. **sysinst** will do this for you, asking you if you want to use DHCP. If you do not use DHCP, you can enter network configuration details yourself. If you do not have DNS set up for the machine that you are installing on, you can just press RETURN in answer to this question, 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, you will need to specify an IP address instead of a hostname for the NFS server.

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 rz1e), 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*

    A progress bar will be displayed while the distribution sets are being extracted.

    After all the files have been extracted, the 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.

18. *Configure additional items*

    The next menu will allow you to select a number of additional items to configure, including the time zone that you're in, to make sure your clock has the right offset from UTC, the root user's shell, and the initial root password.

    You can also enable installation of binary packages, which installs the pkgin(1) tool for managing binary packages for third-party software. This will feel familiar to users of package tools such as **apt-get** or **yum**. If you prefer to install third-party software from source, you can install the pkgsrc(7) tree.

    Finally, you can enable some daemons such as sshd(8), ntpd(8), or mdnsd(8).

19. *Finalizing your installation*

    Congratulations, you have successfully installed NetBSD 8.2. 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. The most important steps are described below.

1. Before all else, read `postinstall`(8).

2. Configuring `/etc/rc.conf`

   If you or the installation software haven't done any configuration of `/etc/rc.conf` (**sysinst** normally 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 the correct terminal type as discussed in the **Once you've booted the diskimage** section. 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).

   When you have finished editing `/etc/rc.conf`, type **exit** at the prompt to leave the single-user shell and continue with the multi-user boot.

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

   ```
   ifconfig_le0="inet 192.0.2.123 netmask 255.255.255.0"
   ```

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

   ```
   ifconfig_le0="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 networking, DHCP can be used by setting `dhcpcd=YES` in `/etc/rc.conf`.

3. Logging in

   After reboot, you can log in as `root` at the login prompt. If you didn't set a password in **sysinst**, there is no initial password. 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.

4. 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.

5. The X Window System

   If you installed the X Window System, you may want to read the chapter about X in the NetBSD Guide:
   http://www.NetBSD.org/docs/guide/en/chap-x.html

6. 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, pkgsrc. pkgsrc automatically handles any changes necessary to make the software run on NetBSD. This includes the retrieval and installation of any other packages the software may depend upon.

   - More information on the package system is available at
     http://www.NetBSD.org/docs/software/packages.html
   - A list of available packages suitable for browsing is at
     ftp://ftp.NetBSD.org/pub/pkgsrc/current/pkgsrc/README.html
   - Precompiled binaries can be found at
     ftp://ftp.NetBSD.org/pub/pkgsrc/packages/NetBSD/
     usually in the pmax/8.2/All subdir. If you installed pkgin(1) in the **sysinst** post-installation configuration menu, you can use it to automatically install binary packages over the network. Assuming that /usr/pkg/etc/pkgin/repositories.conf is correctly configured, you can install them with the following commands:

     ```
     # pkgin install tcsh
     # pkgin install bash
     # pkgin install perl
     # pkgin install apache
     # pkgin install kde
     # pkgin install firefox
     ...
     ```

     Note: Some mirror sites don't mirror the /pub/pkgsrc directory.

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

   - If you did not install it from the **sysinst** post-installation configuration menu, the pkgsrc(7) framework for compiling packages can be obtained by retrieving the file
     ftp://ftp.NetBSD.org/pub/pkgsrc/pkgsrc.tar.gz
     It is typically extracted into /usr/pkgsrc (though other locations work fine) with the commands:

     ```
     # cd /usr
     # tar -zxpf pkgsrc.tar.gz
     ```

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

7. Misc

   - Edit `/etc/mail/aliases` to forward root mail to the right place. Don't forget to run `newaliases`(1) afterwards.
   - 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 easiest way to upgrade to NetBSD 8.2 is with binaries, and that is the method documented here.

To do the upgrade, you must install new bootblocks and boot off the **install** kernel as described in the **Installing from an existing system** section. You must also have at least the **base** and **kern** binary distribution sets available. 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.

Since upgrading involves replacing the kernel, boot blocks, 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 is similar to an installation, but without the hard disk partitioning.

Fetching the binary sets is done in the same manner as the installation procedure; refer to the installation part of the document for help. 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 8.2 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
```

sysinst will attempt to merge the settings stored in your `/etc` directory with the new version of NetBSD using the `postinstall`(8) utility. However, `postinstall`(8) is only able to deal with changes that are easily automated. It is recommended that you use the `etcupdate`(8) tool to merge any remaining configuration changes.

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 8.2.

Note that **sysinst** will automatically invoke

```
postinstall fix
```

and thus all issues that are fixed by **postinstall** by default will be handled.

Issues affecting an upgrade from NetBSD 5.x releases

See the section below on upgrading from NetBSD 6.x and 7.x as well.

The following users need to be created:

- _mdnsd

- _tests
- _tcpdump
- _tss

The following groups need to be created:

- _mdnsd
- _tests
- _tcpdump
- _tss

The implementation of SHA2-HMAC in KAME_IPSEC as used in NetBSD 5.0 and before did not comply with current standards. FAST_IPSEC does, with the result that old and new systems cannot communicate over IPSEC if one of the affected authentication algorithms (hmac_sha256, hmac_sha384, hmac_sha512) is used.

Issues affecting an upgrade from NetBSD 6.x releases

See the section on upgrading from NetBSD 7.x as well

The following user needs to be created:

- _rtadvd

The following groups need to be created:

- _gpio
- _rtadvd

Issues affecting an upgrade from NetBSD 7.x releases

The following user needs to be created:

- _unbound
- _nsd

The following groups need to be created:

- _unbound
- _nsd

Using online NetBSD documentation

Documentation is available if you installed 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. See **http://www.NetBSD.org/mailinglists/** for details.

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.

Bugs also can be submitted and queried with the web interface at
http://www.NetBSD.org/support/send-pr.html

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 NetBSD, and have an idea as to how you could be useful, send us mail or subscribe to: netbsd-users@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. 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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  Ralph Campbell
  Mike Karels
  Marshall Kirk McKusick

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- The Internet Research Institute in Japan for hosting the server which runs the CVSweb interface to the NetBSD source tree.
- The Columbia University Computer Science Department for hosting the build cluster.
- The many organizations that provide NetBSD mirror sites.
- Without CVS, this project would be impossible to manage, so our hats go off to Brian Berliner, Jeff Polk, and the various other people who've had a hand in making CVS a useful tool.

- We list the individuals and organizations that have made donations or loans of hardware and/or money, to support NetBSD development, and deserve credit for it at **http://www.NetBSD.org/donations/** (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 be mentioned, tell us!)

We are...

(in alphabetical order)

The NetBSD core group:

Alistair Crooks	agc@NetBSD.org
Matthew Green	mrg@NetBSD.org
Martin Husemann	martin@NetBSD.org
Chuck Silvers	chs@NetBSD.org
Matt Thomas	matt@NetBSD.org
YAMAMOTO Takashi	yamt@NetBSD.org
Christos Zoulas	christos@NetBSD.org

The portmasters (and their ports):

Reinoud Zandijk	reinoud	**acorn32**
Matt Thomas	matt	**alpha**
Ignatios Souvatzis	is	**amiga**
Ignatios Souvatzis	is	**amigappc**
Noriyuki Soda	soda	**arc**
Julian Coleman	jdc	**atari**
Matthias Drochner	drochner	**cesfic**
Erik Berls	cyber	**cobalt**
Antti Kantee	pooka	**emips**
Simon Burge	simonb	**evbmips**
Steve Woodford	scw	**evbppc**
Izumi Tsutsui	tsutsui	**ews4800mips**
Izumi Tsutsui	tsutsui	**hp300**
Nick Hudson	skrll	**hppa**
Valeriy E. Ushakov	uwe	**hpcsh**
Matt Thomas	matt	**ibmnws**
Gavan Fantom	gavan	**iyonix**
Valeriy E. Ushakov	uwe	**landisk**
Izumi Tsutsui	tsutsui	**luna68k**
Scott Reynolds	scottr	**mac68k**
Michael Lorenz	macallan	**macppc**
Steve Woodford	scw	**mvme68k**
Steve Woodford	scw	**mvmeppc**
Matt Thomas	matt	**netwinder**
Izumi Tsutsui	tsutsui	**news68k**
Tim Rightnour	garbled	**ofppc**
Simon Burge	simonb	**pmax**

Tim Rightnour	garbled	**prep**
Tim Rightnour	garbled	**rs6000**
Tohru Nishimura	nisimura	**sandpoint**
Simon Burge	simonb	**sbmips**
Søren Jørvang	soren	**sgimips**
SAITOH Masanobu	msaitoh	**sh3**
Martin Husemann	martin	**sparc64**
Anders Magnusson	ragge	**vax**
NISHIMURA Takeshi	nsmrtks	**x68k**
Manuel Bouyer	bouyer	**xen**

The NetBSD 8.2 Release Engineering team:

Stephen Borrill	sborrill@NetBSD.org
Manuel Bouyer	bouyer@NetBSD.org
David Brownlee	abs@NetBSD.org
Julian Coleman	jdc@NetBSD.org
Alistair G. Crooks	agc@NetBSD.org
Håvard Eidnes	he@NetBSD.org
Martin Husemann	martin@NetBSD.org
Soren Jacobsen	snj@NetBSD.org
Phil Nelson	phil@NetBSD.org
Jeremy C. Reed	reed@NetBSD.org
Jeff Rizzo	riz@NetBSD.org
SAITOH Masanobu	msaitoh@NetBSD.org

NetBSD Developers:

Hikaru Abe	hikaru@NetBSD.org
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
Zafer Aydogan	zafer@NetBSD.org
Christoph Badura	bad@NetBSD.org
Marc Balmer	mbalmer@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
Erik Berls	cyber@NetBSD.org
Hiroyuki Bessho	bsh@NetBSD.org
John Birrell	jb@NetBSD.org
Rafal Boni	rafal@NetBSD.org
Stephen Borrill	sborrill@NetBSD.org
Sean Boudreau	seanb@NetBSD.org
Manuel Bouyer	bouyer@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
Jon Buller	jonb@NetBSD.org
Simon Burge	simonb@NetBSD.org
Robert Byrnes	byrnes@NetBSD.org
Pavel Cahyna	pavel@NetBSD.org
D'Arcy J.M. Cain	darcy@NetBSD.org
Taylor R. Campbell	riastradh@NetBSD.org
Daniel Carosone	dan@NetBSD.org
Dave Carrel	carrel@NetBSD.org
James Chacon	jmc@NetBSD.org
Mihai Chelaru	kefren@NetBSD.org
Aleksey Cheusov	cheusov@NetBSD.org
Bill Coldwell	billc@NetBSD.org
Sean Cole	scole@NetBSD.org
Julian Coleman	jdc@NetBSD.org
Marcus Comstedt	marcus@NetBSD.org
Jeremy Cooper	jeremy@NetBSD.org
Thomas Cort	tcort@NetBSD.org
Chuck Cranor	chuck@NetBSD.org
Alistair Crooks	agc@NetBSD.org
Masatake Daimon	pho@NetBSD.org
Johan Danielsson	joda@NetBSD.org
John Darrow	jdarrow@NetBSD.org
Jed Davis	jld@NetBSD.org
Matt DeBergalis	deberg@NetBSD.org
Arnaud Degroote	degroote@NetBSD.org
Felix Deichmann	flxd@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
Steven Drake	sbd@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
Jaime A Fournier	ober@NetBSD.org
Stoned Elipot	seb@NetBSD.org
Michael van Elst	mlelstv@NetBSD.org
Robert Elz	kre@NetBSD.org
Enami Tsugutomo	enami@NetBSD.org
Bernd Ernesti	veego@NetBSD.org

Erik Fair	fair@NetBSD.org
Gavan Fantom	gavan@NetBSD.org
Hauke Fath	hauke@NetBSD.org
Hubert Feyrer	hubertf@NetBSD.org
Jason R. Fink	jrf@NetBSD.org
Matt J. Fleming	mjf@NetBSD.org
Marty Fouts	marty@NetBSD.org
Liam J. Foy	liamjfoy@NetBSD.org
Matt Fredette	fredette@NetBSD.org
Thorsten Frueauf	frueauf@NetBSD.org
Castor Fu	castor@NetBSD.org
Hisashi Todd Fujinaka	htodd@NetBSD.org
Makoto Fujiwara	mef@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
Brian Ginsbach	ginsbach@NetBSD.org
Oliver V. Gould	ver@NetBSD.org
Paul Goyette	pgoyette@NetBSD.org
Michael Graff	explorer@NetBSD.org
Matthew Green	mrg@NetBSD.org
Andreas Gustafsson	gson@NetBSD.org
Ulrich Habel	rhaen@NetBSD.org
Jun-ichiro itojun Hagino	itojun@NetBSD.org
HAMAJIMA Katsuomi	hamajima@NetBSD.org
Adam Hamsik	haad@NetBSD.org
Juergen Hannken-Illjes	hannken@NetBSD.org
Charles M. Hannum	mycroft@NetBSD.org
Yorick Hardy	yhardy@NetBSD.org
Ben Harris	bjh21@NetBSD.org
Kenichi Hashimoto	hkenken@NetBSD.org
Eric Haszlakiewicz	erh@NetBSD.org
John Hawkinson	jhawk@NetBSD.org
Emile Heitor	imil@NetBSD.org
John Heasley	heas@NetBSD.org
Lars Heidieker	para@NetBSD.org
Geert Hendrickx	ghen@NetBSD.org
Wen Heping	wen@NetBSD.org
René Hexel	rh@NetBSD.org
Iain Hibbert	plunky@NetBSD.org
Kouichirou Hiratsuka	hira@NetBSD.org
Michael L. Hitch	mhitch@NetBSD.org
Ádám Hóka	ahoka@NetBSD.org
Jachym Holecek	freza@NetBSD.org
David A. Holland	dholland@NetBSD.org

Christian E. Hopps	chopps@NetBSD.org
Daniel Horecki	morr@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
Darran Hunt	darran@NetBSD.org
Martin Husemann	martin@NetBSD.org
Dean Huxley	dean@NetBSD.org
Love Hörnquist Åstrand	lha@NetBSD.org
Roland Illig	rillig@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
Sevan Janiyan	sevan@NetBSD.org
Lonhyn T. Jasinskyj	lonhyn@NetBSD.org
Darrin Jewell	dbj@NetBSD.org
Nicolas Joly	njoly@NetBSD.org
Søren Jørvang	soren@NetBSD.org
Takahiro Kambe	taca@NetBSD.org
Antti Kantee	pooka@NetBSD.org
Frank Kardel	kardel@NetBSD.org
KAWAMOTO Yosihisa	kawamoto@NetBSD.org
Min Sik Kim	minskim@NetBSD.org
KIYOHARA Takashi	kiyohara@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
Mateusz Kocielski	shm@NetBSD.org
Jonathan A. Kollasch	jakllsch@NetBSD.org
Joseph Koshy	jkoshy@NetBSD.org
Radoslaw Kujawa	rkujawa@NetBSD.org
Jochen Kunz	jkunz@NetBSD.org
Martti Kuparinen	martti@NetBSD.org
Arnaud Lacombe	alc@NetBSD.org
Kevin Lahey	kml@NetBSD.org
David Laight	dsl@NetBSD.org
Johnny C. Lam	jlam@NetBSD.org
Guillaume Lasmayous	gls@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
Tonnerre Lombard	tonnerre@NetBSD.org
Mike Long	mikel@NetBSD.org
Sergio Lopez	slp@NetBSD.org
Michael Lorenz	macallan@NetBSD.org
Warner Losh	imp@NetBSD.org
Tomasz Luchowski	zuntum@NetBSD.org
Federico Lupi	federico@NetBSD.org
Palle Lyckegaard	palle@NetBSD.org
Brett Lymn	blymn@NetBSD.org
MAEKAWA Masahide	gehenna@NetBSD.org
Anders Magnusson	ragge@NetBSD.org
Anthony Mallet	tho@NetBSD.org
John Marino	marino@NetBSD.org
Roy Marples	roy@NetBSD.org
Pedro Martelletto	pedro@NetBSD.org
Cherry G. Mathew	cherry@NetBSD.org
David Maxwell	david@NetBSD.org
Gregory McGarry	gmcgarry@NetBSD.org
Dan McMahill	dmcmahill@NetBSD.org
Jared D. McNeill	jmcneill@NetBSD.org
Neil J. McRae	neil@NetBSD.org
Julio M. Merino Vidal	jmmv@NetBSD.org
Perry Metzger	perry@NetBSD.org
Luke Mewburn	lukem@NetBSD.org
Jean-Yves Migeon	jym@NetBSD.org
Brook Milligan	brook@NetBSD.org
Minoura Makoto	minoura@NetBSD.org
Simas Mockevicius	symka@NetBSD.org
Ryosuke Moro	szptvlfn@NetBSD.org
der Mouse	mouse@NetBSD.org
Youri Mouton	youri@NetBSD.org
Constantine A. Murenin	cnst@NetBSD.org
Joseph Myers	jsm@NetBSD.org
Tuomo Mäkinen	tjam@NetBSD.org
Zoltán Arnold NAGY	zoltan@NetBSD.org
Kengo NAKAHARA	knakahara@NetBSD.org
Ken Nakata	kenn@NetBSD.org
Takeshi Nakayama	nakayama@NetBSD.org
Alexander Nasonov	alnsn@NetBSD.org
Phil Nelson	phil@NetBSD.org
John Nemeth	jnemeth@NetBSD.org
Lourival Pereira Vieira Neto	lneto@NetBSD.org
NISHIMURA Takeshi	nsmrtks@NetBSD.org
Tohru Nishimura	nisimura@NetBSD.org
NONAKA Kimihiro	nonaka@NetBSD.org
Takehiko NOZAKI	tnozaki@NetBSD.org
Tobias Nygren	tnn@NetBSD.org

OBATA Akio	obache@NetBSD.org
Jesse Off	joff@NetBSD.org
Tatoku Ogaito	tacha@NetBSD.org
OKANO Takayoshi	kano@NetBSD.org
Masaru Oki	oki@NetBSD.org
Rin Okuyama	rin@NetBSD.org
Ryo ONODERA	ryoon@NetBSD.org
Atsushi Onoe	onoe@NetBSD.org
Greg Oster	oster@NetBSD.org
Ryota Ozaki	ozaki-r@NetBSD.org
Jonathan Perkin	sketch@NetBSD.org
Fredrik Pettai	pettai@NetBSD.org
Herb Peyerl	hpeyerl@NetBSD.org
Matthias Pfaller	matthias@NetBSD.org
Chris Pinnock	cjep@NetBSD.org
Adrian Portelli	adrianp@NetBSD.org
Pierre Pronchery	khorben@NetBSD.org
Chris Provenzano	proven@NetBSD.org
Maya Rashish	maya@NetBSD.org
Mindaugas Rasiukevicius	rmind@NetBSD.org
Nils Ratusznik	nils@NetBSD.org
Michael Rauch	mrauch@NetBSD.org
Marc Recht	recht@NetBSD.org
Darren Reed	darrenr@NetBSD.org
Jeremy C. Reed	reed@NetBSD.org
Jens Rehsack	sno@NetBSD.org
Antoine Reilles	tonio@NetBSD.org
Tyler R. Retzlaff	rtr@NetBSD.org
Scott Reynolds	scottr@NetBSD.org
Tim Rightnour	garbled@NetBSD.org
Jeff Rizzo	riz@NetBSD.org
Hans Rosenfeld	hans@NetBSD.org
Steve Rumble	rumble@NetBSD.org
Rumko	rumko@NetBSD.org
Jukka Ruohonen	jruoho@NetBSD.org
Kamil Rytarowski	kamil@NetBSD.org
Blair J. Sadewitz	bjs@NetBSD.org
David Sainty	dsainty@NetBSD.org
SAITOH Masanobu	msaitoh@NetBSD.org
Kazuki Sakamoto	sakamoto@NetBSD.org
Guilherme Salazar	salazar@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
Silke Scheler	silke@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
Naoto Shimazaki	igy@NetBSD.org
Ryo Shimizu	ryo@NetBSD.org
Takao Shinohara	shin@NetBSD.org
Takuya SHIOZAKI	tshiozak@NetBSD.org
Daniel Sieger	dsieger@NetBSD.org
Chuck Silvers	chs@NetBSD.org
Thor Lancelot Simon	tls@NetBSD.org
Nathanial Sloss	nat@NetBSD.org
Jeff Smith	jeffs@NetBSD.org
Noriyuki Soda	soda@NetBSD.org
Wolfgang Solfrank	ws@NetBSD.org
Jörg Sonnenberger	joerg@NetBSD.org
Ignatios Souvatzis	is@NetBSD.org
T K Spindler	dogcow@NetBSD.org
Matthew Sporleder	mspo@NetBSD.org
Bill Squier	groo@NetBSD.org
Adrian Steinmann	ast@NetBSD.org
Bill Studenmund	wrstuden@NetBSD.org
Hiroki Suenaga	hsuenaga@NetBSD.org
Kevin Sullivan	sullivan@NetBSD.org
Kimmo Suominen	kim@NetBSD.org
Grégoire Sutre	gsutre@NetBSD.org
Sergey Svishchev	shattered@NetBSD.org
Robert Swindells	rjs@NetBSD.org
Leonardo Taccari	leot@NetBSD.org
Shin Takemura	takemura@NetBSD.org
TAMURA Kent	kent@NetBSD.org
Shin'ichiro TAYA	taya@NetBSD.org
Hasso Tepper	hasso@NetBSD.org
Matt Thomas	matt@NetBSD.org
Jason Thorpe	thorpej@NetBSD.org
Hiroshi Tokuda	hiroshi@NetBSD.org
Christoph Toshok	toshok@NetBSD.org
Tamás Tóth	ttoth@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
Maxime Villard	maxv@NetBSD.org
Aymeric Vincent	aymeric@NetBSD.org
Paul Vixie	vixie@NetBSD.org
Mike M. Volokhov	mishka@NetBSD.org
Krister Walfridsson	kristerw@NetBSD.org
Mark Weinem	weinem@NetBSD.org
Lex Wennmacher	wennmach@NetBSD.org
Leo Weppelman	leo@NetBSD.org
Assar Westerlund	assar@NetBSD.org
Sebastian Wiedenroth	wiedi@NetBSD.org
Frank Wille	phx@NetBSD.org
Nathan Williams	nathanw@NetBSD.org
Rob Windsor	windsor@NetBSD.org
Jim Wise	jwise@NetBSD.org
Colin Wood	ender@NetBSD.org
Steve Woodford	scw@NetBSD.org
YAMAMOTO Takashi	yamt@NetBSD.org
Abhinav Upadhyay	abhinav@NetBSD.org
Yuji Yamano	yyamano@NetBSD.org
David Young	dyoung@NetBSD.org
Arnaud Ysmal	stacktic@NetBSD.org
Reinoud Zandijk	reinoud@NetBSD.org
S.P.Zeidler	spz@NetBSD.org
Tim Zingelman	tez@NetBSD.org
Christos Zoulas	christos@NetBSD.org

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