**NAME**

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

**CONTENTS**


About this Document....2
What is NetBSD?....2
Changes Between The NetBSD 7.1.1 and 7.1.2 Releases....2
Features to be removed in a later release....2
The NetBSD Foundation....2
Sources of NetBSD....3
NetBSD 7.1.2 Release Contents....3
  NetBSD/arc subdirectory structure ....4
  Binary distribution sets ....4
NetBSD/arc System Requirements and Supported Devices....5
  Supported hardware ....5
Getting the NetBSD System on to Useful Media....6
Preparing your System for NetBSD installation....7
  Available Boot Media ....7
  Preparing the Bootable Media ....7
  Booting from CD-ROM and Hard disk ....8
Installing the NetBSD System....8
  Running the sysinst installation program ....8
    Introduction....8
    Possible hardware problems....8
    General....8
    Quick install....9
    Booting NetBSD....10
    Network configuration....10
    Installation drive selection and parameters....10
    Selecting which sets to install....10
    Partitioning the disk....10
    Preparing your hard disk....11
    Getting the distribution sets....11
    Installation from CD-ROM....11
    Installation using FTP....11
    Installation using NFS....12
    Installation from an unmounted file system....12
    Installation from a local directory....12
    Extracting the distribution sets....12
    Configure additional items....12
    Finalizing your installation....12
Post installation steps....12
Upgrading a previously-installed NetBSD System....15
Compatibility Issues With Previous NetBSD Releases....15
  Issues affecting an upgrade from NetBSD 5.x releases ....15
  Issues affecting an upgrade from NetBSD 6.x releases ....16
  Issues affecting an upgrade from NetBSD 7.1 ....16
Using online NetBSD documentation....16
Administrivia....16
Thanks go to....17

We are.....17
Legal Mumbo-Jumbo.....26
The End.....30

## DESCRIPTION

### About this Document

This document describes the installation procedure for NetBSD 7.1.2 on the *arc* 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 7.1.2 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 7.1.1 and 7.1.2 Releases

NetBSD 7.1.2 is the second security/critical update of the NetBSD 7.1 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-7.1.2 file in the top level directory of the NetBSD 7.1.2 release tree:

**http://ftp.NetBSD.org/pub/NetBSD/NetBSD-7.1.2/CHANGES-7.1.2**

See

**http://www.NetBSD.org/releases/formal-7/NetBSD-7.1.2.html**

for some of the more noteworthy changes in this release.

### Features to be removed in a later release

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

- `dhclient`(8) and `rtsol`(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 7.1.2 Release Contents**

The root directory of the NetBSD 7.1.2 release is organized as follows:

`.../NetBSD-7.1.2/`

`CHANGES` Changes between the 6.0 and 7.0 releases.

`CHANGES-7.0` Changes between the initial 7.0 branch and the final release of 7.0.

`CHANGES-7.1` Changes between the final release of 7.0 and the final release of 7.1.

`CHANGES-7.1.1`
Changes between the final release of 7.1 and the final release of 7.1.1.

`CHANGES-7.1.2`
Changes between the final release of 7.1.1 and the final release of 7.1.2.

`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 7.1.2 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 7.1.2 sources which are not in **gnusrc**, **sharesrc**, or **syssrc**.

**syssrc** This set contains the sources to the NetBSD 7.1.2 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/arc subdirectory structure*

The arc-specific portion of the NetBSD 7.1.2 release is found in the `arc` subdirectory of the distribution: `.../NetBSD-7.1.2/arc/`. 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/` arc binary distribution sets; see below.

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

*Binary distribution sets*

The NetBSD arc binary distribution sets contain the binaries which comprise the NetBSD 7.1.2 release for arc. The binary distribution sets can be found in the `arc/binary/sets` subdirectory of the NetBSD 7.1.2 distribution tree, and are as follows:

**base** The NetBSD 7.1.2 arc **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.

**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/arc 7.1.2 `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 X.Org. 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.

**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.

The arc 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 arc binary distribution also has its own checksum files, just as the source distribution does.

### NetBSD/arc System Requirements and Supported Devices

NetBSD/arc 7.1.2 will run on MIPS basec ARC-compliant machines. More information can also be found at the NetBSD/arc homepage: **http://www.NetBSD.org/ports/arc/**

*Supported hardware*

- System Models
  - Acer PICA
  - MIPS Magnum 4000 ( serial console only )
  - NEC Image RISCstation ( OEM of PICA )
  - NEC Express RISCserver
  - NEC RISCserver 2200
  - NEC RISCstation 2200
  - NEC RISCstation 2250
  - NEC Express5800/230 R4400 PCI
  - NEC Express5800/230 R4400 EISA

  - DeskStation Tyne

- Peripherals
  - 16450/16550 based serial ports on ISA and Jazz
  - SONIC Ethernet
  - Floppy disk controller
  - Jazz VGA console ( PICA and Image RISCstation )
  - ISA VGA console ( RISCserver 2200 and Express5800/240 R4400 EISA )
  - TGA frame buffer ( RISCstation 2250 and Express5800/230 R4400 PCI )
  - NCR 53C94 SCSI
  - NCR 53C700 SCSI ( xpress5800/240 R4400 EISA, RISCserver 2200 and RISCstation 22x0 )
  - NCR 53C710 SCSI
  - Most machine independent PCI devices ( Express5800/230 R4400 PCI )

If it's not on this list, there is no official support for it in this release.

**Getting the NetBSD System on to Useful Media**

You will need to create a CD with an install kernel on it or have a FAT partition and working other OS (Windows NT) which can write install files into it.

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 `arc/binary/sets`.

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.

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-7.1.2
# cd arc/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, including existing Windows NT partition. Mistakes in partitioning your hard disk may lead to data loss. NetBSD/arc is still in very experimental state so unexpected trouble could also happen even on normal operations.

*Available Boot Media*

The ARC firmware on most machines allows for system booting using:

- Local floppy disk, hard disk or CD-ROM with the following file systems:
  - MS-DOS (FAT12) file system
  - ISO9660 CD-ROM file system

Some ARC implementation might support netboot, but the NetBSD/arc bootloader doesn't support netboot due to lack of information.

There are no bootable floppies in the distribution because the NetBSD/arc bootloader doesn't support loading a kernel from multiple floppies and the installation kernel is too large to fit one floppy.

*Preparing the Bootable Media*

This section describes how to get a NetBSD/arc install kernel onto a CD-R.

Go to one of the NetBSD mirror sites and download CD-R image from the `pub/NetBSD/images` directory. **http://www.NetBSD.org/mirrors/#iso**

Get and install cdrecord. This is available in the packages collection under pkgsrc/sysutils/cdrtools. Systems not supported by the packages collection should get it from the official website:

**ftp://ftp.NetBSD.org/pub/NetBSD/packages/pkgsrc/sysutils/cdrtools/README.html**
**http://cdrecord.berlios.de/old/private/cdrecord.html**

```
# cdrecord -v speed=16 dev=/dev/cd0d NetBSD-arc-7.1.2.iso
```

You will need to substitute the correct name of the disk image file, speed for your CD writer, and the correct device for your system (for i386 it would be `/dev/cd0d`).

*Booting from CD-ROM and Hard disk*

To boot from a CD-ROM and a hard disk, choose the 'Run a program' menu on the ARC BIOS prompt and specify the '**`boot`**' program with appropriate boot device paths. The first argument is a path to bootloader, and the second argument is a path to a kernel to be loaded.

The device pathnames might be machine dependent. See "Advanced RISC Computing Specification" found in NetBSD/arc page

**http://www.NetBSD.org/ports/arc/index.html**

for details.

- Booting a kernel from the installation CD-ROM:

  ```
  scsi(0)cdrom(4)fdisk(0)boot scsi(0)cdrom(4)fdisk(0)netbsd
  ```

  *Note:* '`(0)`' after '`scsi`' is used to specify SCSI interfaces. If your boot devices are connected to the secondary SCSI, use '`scsi(1)`' instead.

  '`(4)`' after '`cdrom`' is a SCSI ID of the CD-ROM. You might have to use a different number.

- Booting a kernel in the FAT partition via bootloader in the same FAT partition:

  ```
  scsi(0)disk(0)rdisk(0)partition(1)boot scsi(0)disk(0)rdisk(0)partition(1)netbs
  ```

- Booting a kernel in the FFS partition via bootloader in the FAT partition:

  ```
  scsi(0)disk(0)rdisk(0)partition(1)boot scsi(0)disk(0)rdisk(0)partition(2)netbs
  ```

  *Note:* '`(0)`' after '`disk`' is the SCSI ID of the disk. You might have to use a different number.

  '`(1)`' and '`(2)`' after '`partition`' are the partition numbers of the FDISK (MBR) partition of the disk. Usually the FAT partition (which is mandatory for the bootloader) is in the first partition and NetBSD/arc will be installed in the second partition, so use '`partition(1)`' for a bootloader and specify '`partition(2)`' for the NetBSD/arc kernel after it's installed in the NetBSD/arc partition.

Once you have successfully installed NetBSD/arc, you can store the above default boot command into NVRAM with the '**Run setup**' and '**Manage startup**' commands on the ARC BIOS menu.

**Installing the NetBSD System**

*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. *Possible hardware problems*

   Should you encounter hardware problems during installation, try rebooting after unplugging removable devices you don't need for installation. Non-removable devices can be disabled with **userconf** (use **boot -c** to enter it).

3. *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.

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 / DVD as the install media.

   - What you need.
     - The distribution sets (in this example, they are on the CD or DVD).
     - Some form of bootable media, described above.
     - A minimum of 16 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
     - Insert the first boot floppy you just created and boot the computer. After language selection, the main menu will be displayed.

```
.*******************************************.
* NetBSD-7.1.2 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                            *
* f: Config 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 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**, after you have removed the bootfloppy from the drive.
- 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).

5. *Booting NetBSD*

   Boot your machine. The boot loader will start, which 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 SATA/PATA 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*

   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.

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. You should see disk names like `sd0` or `sd1`.

8. *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.

9. *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.

10. *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 NetBSD portion of the disk. |
    | d | The entire disk. |
    | g–p | Available for other use. Traditionally, f 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.

11. *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.

12. *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'.

13. *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.

14. *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.

15. *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.

16. *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 `wd1e`), 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.

17. *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.

18. *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.

19. *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).

20. *Finalizing your installation*

    Congratulations, you have successfully installed NetBSD 7.1.2. 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 **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).

   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_sn0="inet 192.0.2.123 netmask 255.255.255.0"
   ```

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

   ```
   ifconfig_sn0="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 `arc/7.1.2/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 7.1.2 is with binaries, and that is the method documented here.

To do the upgrade, you must have one form of boot media available. 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 7.1.2 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 7.1.2.

Note that **sysinst** will automatically invoke

```
postinstall fix
```

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

A number of things have been removed from the NetBSD 7.1.2 release. See the "Components removed from NetBSD" section near the beginning of this document for a list.

*Issues affecting an upgrade from NetBSD 5.x releases*

See the section below on upgrading from NetBSD 6.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*

The following user needs to be created:

- _rtadvd

The following groups need to be created:

- _gpio
- _rtadvd

*Issues affecting an upgrade from NetBSD 7.1*

The following modules have been removed from the autoload list: compat_freebsd, compat_ibcs2, compat_svr4, compat_svr4_32.

**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.

**Thanks go to**

- The former members of UCB's Computer Systems Research Group, including (but not limited to):

  Keith Bostic
  Ralph Campbell
  Mike Karels
  Marshall Kirk McKusick

  for their work on BSD systems, support, and encouragement.
- The Internet Systems Consortium, Inc. for hosting the NetBSD FTP, CVS, AnonCVS, mail, mail archive, GNATS, SUP, Rsync and WWW servers.
- 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:*

| | |
|---|---|
| Alan Barrett | apb@NetBSD.org |
| Alistair Crooks | agc@NetBSD.org |
| Matthew Green | mrg@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 7.1.2 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:*

| | |
|---|---|
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| Constantine A. Murenin | cnst@NetBSD.org |
| Joseph Myers | jsm@NetBSD.org |
| Tuomo Mäkinen | tjam@NetBSD.org |
| Zoltán Arnold NAGY | zoltan@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 |
| 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 |
| 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 |
| Mindaugas Rasiukevicius | rmind@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 |
| Blair J. Sadewitz | bjs@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 |
| 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 |
| 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 |
| 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 |
| 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 |


**Legal Mumbo-Jumbo**

All product names mentioned herein are trademarks or registered trademarks of their respective owners.

The following notices are required to satisfy the license terms of the software that we have mentioned in this document:

NetBSD is a registered trademark of The NetBSD Foundation, Inc.
This product includes software developed by the University of California, Berkeley and its contributors.
This product includes software developed by the NetBSD Foundation.
This product includes software developed by The NetBSD Foundation, Inc. and its contributors.
This product includes software developed for the NetBSD Project. See http://www.NetBSD.org/ for information about NetBSD.
This product includes software developed by Intel Corporation and its contributors.
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)
This product includes software designed by William Allen Simpson.
This product includes software developed at Ludd, University of Lulea, Sweden and its contributors.
This product includes software developed at Ludd, University of Lulea.
This product includes software developed at the Information Technology Division, US Naval Research Laboratory.
This product includes software developed by David Jones and Gordon Ross
This product includes software developed by Hellmuth Michaelis and Joerg Wunsch
This product includes software developed by Internet Research Institute, Inc.
This product includes software developed by Leo Weppelman and Waldi Ravens.
This product includes software developed by Mika Kortelainen
This product includes software developed by Aaron Brown and Harvard University.
This product includes software developed by Adam Ciarcinski for the NetBSD project.
This product includes software developed by Adam Glass and Charles M. Hannum.
This product includes software developed by Adam Glass.
This product includes software developed by Alex Zepeda, and Colin Wood for the NetBSD Projet.
This product includes software developed by Alex Zepeda.
This product includes software developed by Allen Briggs.
This product includes software developed by Amancio Hasty and Roger Hardiman
This product includes software developed by Berkeley Software Design, Inc.
This product includes software developed by Bill Paul.
This product includes software developed by Bodo Moeller. (If available, substitute umlauted o for oe)
This product includes software developed by Boris Popov.
This product includes software developed by Brini.
This product includes software developed by Bruce M. Simpson.
This product includes software developed by Causality Limited.
This product includes software developed by Charles Hannum.
This product includes software developed by Charles M. Hannum, by the University of Vermont and State Agricultural College and Garrett A. Wollman, by William F. Jolitz, and by the University of California, Berkeley, Lawrence Berkeley Laboratory, and its contributors.
This product includes software developed by Charles M. Hannum.
This product includes software developed by Christian E. Hopps, Ezra Story, Kari Mettinen, Markus Wild, Lutz Vieweg and Michael Teske.
This product includes software developed by Christian E. Hopps.
This product includes software developed by Christopher G. Demetriou for the NetBSD Project.
This product includes software developed by Christopher G. Demetriou.
This product includes software developed by Christos Zoulas.
This product includes software developed by Chuck Silvers.
This product includes software developed by Colin Wood for the NetBSD Project.
This product includes software developed by Colin Wood.
This product includes software developed by Daan Vreeken.
This product includes software developed by Daishi Kato
This product includes software developed by Daniel Widenfalk and Michael L. Hitch.
This product includes software developed by Daniel Widenfalk for the NetBSD Project.

This product includes software developed by David Miller.
This product includes software developed by Dean Huxley.
This product includes software developed by Emmanuel Dreyfus
This product includes software developed by Eric S. Hvozda.
This product includes software developed by Eric S. Raymond
This product includes software developed by Eric Young (eay@cryptsoft.com)
This product includes software developed by Eric Young (eay@mincom.oz.au)
This product includes software developed by Ezra Story and by Kari Mettinen.
This product includes software developed by Ezra Story, by Kari Mettinen and by Bernd Ernesti.
This product includes software developed by Ezra Story, by Kari Mettinen, Michael Teske and by Bernd Ernesti.
This product includes software developed by Ezra Story, by Kari Mettinen, and Michael Teske.
This product includes software developed by Ezra Story.
This product includes software developed by Frank van der Linden for the NetBSD Project.
This product includes software developed by Gardner Buchanan.
This product includes software developed by Garrett D'Amore.
This product includes software developed by Gary Thomas.
This product includes software developed by Gordon Ross
This product includes software developed by Harvard University and its contributors.
This product includes software developed by Harvard University.
This product includes software developed by Henrik Vestergaard Draboel.
This product includes software developed by Herb Peyerl.
This product includes software developed by Hidetoshi Shimokawa.
This product includes software developed by Hubert Feyrer for the NetBSD Project.
This product includes software developed by Ian W. Dall.
This product includes software developed by Internet Initiative Japan Inc.
This product includes software developed by James R. Maynard III.
This product includes software developed by Jared D. McNeill.
This product includes software developed by Jason L. Wright
This product includes software developed by Jason R. Thorpe for And Communications, http://www.and.com/
This product includes software developed by Joachim Koenig-Baltes.
This product includes software developed by Jochen Pohl for The NetBSD Project.
This product includes software developed by Joerg Wunsch
This product includes software developed by John Birrell.
This product includes software developed by John P. Wittkoski.
This product includes software developed by John Polstra.
This product includes software developed by Jonathan R. Stone for the NetBSD Project.
This product includes software developed by Jonathan Stone and Jason R. Thorpe for the NetBSD Project.
This product includes software developed by Jonathan Stone.
This product includes software developed by Jonathan Stone for the NetBSD Project.
This product includes software developed by Julian Highfield.
This product includes software developed by K. Kobayashi.
This product includes software developed by K. Kobayashi and H. Shimokawa.
This product includes software developed by Kazuhisa Shimizu.
This product includes software developed by Kazuki Sakamoto.
This product includes software developed by Kenneth Stailey.
This product includes software developed by Kiyoshi Ikehara.
This product includes software developed by Klaus Burkert,by Bernd Ernesti, by Michael van Elst, and by the University of California, Berkeley and its contributors.
This product includes software developed by Lloyd Parkes.
This product includes software developed by Lutz Vieweg.
This product includes software developed by MINOURA Makoto, Takuya Harakawa.
This product includes software developed by Marc Horowitz.
This product includes software developed by Marcus Comstedt.
This product includes software developed by Mark Brinicombe for the NetBSD project.
This product includes software developed by Mark Brinicombe.
This product includes software developed by Mark Tinguely and Jim Lowe
This product includes software developed by Markus Wild.
This product includes software developed by Marshall M. Midden.
This product includes software developed by Masanobu Saitoh.
This product includes software developed by Masaru Oki.
This product includes software developed by Matthew Fredette.
This product includes software developed by Matt DeBergalis.
This product includes software developed by Michael Smith.
This product includes software developed by Microsoft.
This product includes software developed by Mike Pritchard.
This product includes software developed by Mike Pritchard and contributors.

This product includes software developed by Minoura Makoto.
This product includes software developed by Niels Provos.
This product includes software developed by Niklas Hallqvist, Brandon Creighton and Job de Haas.
This product includes software developed by Niklas Hallqvist.
This product includes software developed by Paolo Abeni.
This product includes software developed by Paul Kranenburg.
This product includes software developed by Paul Mackerras.
This product includes software developed by Per Fogelstrom
This product includes software developed by Peter Galbavy.
This product includes software developed by Phase One, Inc.
This product includes software developed by Philip A. Nelson.
This product includes software developed by QUALCOMM Incorporated.
This product includes software developed by RiscBSD.
This product includes software developed by Roar Thronæs.
This product includes software developed by Rodney W. Grimes.
This product includes software developed by Roger Hardiman
This product includes software developed by Rolf Grossmann.
This product includes software developed by Ross Harvey for the NetBSD Project.
This product includes software developed by Ross Harvey.
This product includes software developed by Scott Bartram.
This product includes software developed by Scott Stevens.
This product includes software developed by Shingo WATANABE.
This product includes software developed by Softweyr LLC, the University of California, Berkeley, and its contributors.
This product includes software developed by Stephan Thesing.
This product includes software developed by Steven M. Bellovin.
This product includes software developed by Takashi Hamada.
This product includes software developed by Takumi Nakamura.
This product includes software developed by Tatoku Ogaito for the NetBSD Project.
This product includes software developed by Terrence R. Lambert.
This product includes software developed by Texas A&M University and its contributors.
This product includes software developed by Thomas Gerner.
This product includes software developed by TooLs GmbH.
This product includes software developed by Trimble Navigation, Ltd.
This product includes software developed by WIDE Project and its contributors.
This product includes software developed by Waldi Ravens.
This product includes software developed by Winning Strategies, Inc.
This product includes software developed by Yasushi Yamasaki.
This product includes software developed by Yen Yen Lim and North Dakota State University.
This product includes software developed by Zembu Labs, Inc.
This product includes software developed by the Alice Group.
This product includes software developed by the Computer Systems Engineering Group at Lawrence Berkeley Laboratory.
This product includes software developed by the David Muir Sharnoff.
This product includes software developed by the Harvard University and its contributors.
This product includes software developed by the Kungliga Tekniska Högskolan and its contributors.
This product includes software developed by the Network Research Group at Lawrence Berkeley Laboratory.
This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (http://www.OpenSSL.org/)
This product includes software developed by the PocketBSD project and its contributors.
This product includes software developed by the RiscBSD kernel team.
This product includes software developed by the RiscBSD team.
This product includes software developed by the SMCC Technology Development Group at Sun Microsystems, Inc.
This product includes software developed by the University of California, Berkeley and its contributors, as well as the Trustees of Columbia University.
This product includes software developed by the University of California, Lawrence Berkeley Laboratory and its contributors.
This product includes software developed by the University of California, Lawrence Berkeley Laboratory.
This product includes software developed by the University of Illinois at Urbana and their contributors.
This product includes software developed by the Urbana-Champaign Independent Media Center.
This product includes software developed by the University of Vermont and State Agricultural College and Garrett A. Wollman.
This product includes software developed by the University of Vermont and State Agricultural College and Garrett A. Wollman, by William F. Jolitz, and by the University of California, Berkeley, Lawrence Berkeley Laboratory, and its contributors.
This product includes software developed for the FreeBSD project
This product includes software developed for the NetBSD Project by Bernd Ernesti.
This product includes software developed for the NetBSD Project by Christopher G. Demetriou.
This product includes software developed for the NetBSD Project by Frank van der Linden
This product includes software developed for the NetBSD Project by Jason R. Thorpe.
This product includes software developed for the NetBSD Project by John M. Vinopal.
This product includes software developed by Kyma Systems.

This product includes software developed for the NetBSD Project by Kyma Systems LLC.
This product includes software developed for the NetBSD Project by Matthias Drochner.
This product includes software developed for the NetBSD Project by Perry E. Metzger.
This product includes software developed for the NetBSD Project by Scott Bartram and Frank van der Linden
This product includes software developed for the NetBSD Project by Allegro Networks, Inc., and Wasabi Systems, Inc.
This product includes software developed for the NetBSD Project by Eiji Kawauchi.
This product includes software developed for the NetBSD Project by Genetec Corporation.
This product includes software developed for the NetBSD Project by Jonathan Stone.
This product includes software developed for the NetBSD Project by Piermont Information Systems Inc.
This product includes software developed for the NetBSD Project by SUNET, Swedish University Computer Network.
This product includes software developed for the NetBSD Project by Shigeyuki Fukushima.
This product includes software developed for the NetBSD Project by Wasabi Systems, Inc.
This product includes software developed under OpenBSD by Per Fogelstrom Opsycon AB for RTMX Inc, North Carolina, USA.
This product includes software developed under OpenBSD by Per Fogelstrom.
This software was developed by Holger Veit and Brian Moore for use with "386BSD" and similar operating systems. "Similar operating systems" includes mainly non-profit oriented systems for research and education, including but not restricted to "NetBSD", "FreeBSD", "Mach" (by CMU).
This software includes software developed by the Computer Systems Laboratory at the University of Utah.
This product includes software developed by Computing Services at Carnegie Mellon University (http://www.cmu.edu/computing/).
This product includes software developed or owned by Caldera International, Inc.
The Institute of Electrical and Electronics Engineers and The Open Group, have given us permission to reprint portions of their documentation.

In the following statement, the phrase ‘‘this text’’ refers to portions of the system documentation.

Portions of this text are reprinted and reproduced in electronic form in NetBSD, from IEEE Std 1003.1, 2004 Edition, Standard for Information Technology -- Portable Operating System Interface (POSIX), The Open Group Base Specifications Issue 6, Copyright (C) 2001-2004 by the Institute of Electrical and Electronics Engineers, Inc and The Open Group. In the event of any discrepancy between these versions and the original IEEE and The Open Group Standard, the original IEEE and The Open Group Standard is the referee document.

The original Standard can be obtained online at http://www.opengroup.org/unix/online.html.

This notice shall appear on any product containing this material.

In the following statement, "This software" refers to the parallel port driver:

This software is a component of "386BSD" developed by William F. Jolitz, TeleMuse.

Some files have the following copyright:

Mach Operating System
Copyright (c) 1991,1990,1989 Carnegie Mellon University
All Rights Reserved.

Permission to use, copy, modify and distribute this software and its documentation is hereby granted, provided that both the copyright notice and this permission notice appear in all copies of the software, derivative works or modified versions, and any portions thereof, and that both notices appear in supporting documentation.

CARNEGIE MELLON ALLOWS FREE USE OF THIS SOFTWARE IN ITS CONDITION. CARNEGIE MELLON DISCLAIMS ANY LIABILITY OF ANY KIND FOR ANY DAMAGES WHATSOEVER RESULTING FROM THE USE OF THIS SOFTWARE.

Carnegie Mellon requests users of this software to return to
Software Distribution Coordinator or Software.Distribution@CS.CMU.EDU
School of Computer Science
Carnegie Mellon University
Pittsburgh PA 15213-3890

any improvements or extensions that they make and grant Carnegie the rights to redistribute these changes.

Some files have the following copyright:

Copyright (c) 1994, 1995 Carnegie-Mellon University.
All rights reserved.

Author: Chris G. Demetriou

Permission to use, copy, modify and distribute this software and its documentation is hereby granted, provided that both the copyright notice and this permission notice appear in all copies of the software, derivative works or modified versions, and any portions thereof, and that both notices appear in supporting documentation.
CARNEGIE MELLON ALLOWS FREE USE OF THIS SOFTWARE IN ITS "AS IS" CONDITION. CARNEGIE MELLON DISCLAIMS ANY LIABILITY OF ANY KIND FOR ANY DAMAGES WHATSOEVER RESULTING FROM THE USE OF THIS SOFTWARE.

Carnegie Mellon requests users of this software to return to
Software Distribution Coordinator or Software.Distribution@CS.CMU.EDU
School of Computer Science
Carnegie Mellon University
Pittsburgh PA 15213-3890

any improvements or extensions that they make and grant Carnegie the rights to redistribute these changes.

Some files have the following copyright:
Copyright (C) 1989 Digital Equipment Corporation.
Permission to use, copy, modify, and distribute this software and its documentation for any purpose and without fee is hereby granted, provided that the above copyright notice appears in all copies. Digital Equipment Corporation makes no representations about the suitability of this software for any purpose. It is provided "as is" without express or implied warranty.

Some files have the following copyright:
Copyright 1996 The Board of Trustees of The Leland Stanford Junior University. All Rights Reserved.

Permission to use, copy, modify, and distribute this software and its documentation for any purpose and without fee is hereby granted, provided that the above copyright notice appear in all copies. Stanford University makes no representations about the suitability of this software for any purpose. It is provided "as is" without express or implied warranty.

## The End