NAME

INSTALL — Installation procedure for NetBSD/sun2.

CONTENTS

About this Document....1
What is NetBSD?....2
Changes Between The NetBSD 5.1.4 and 5.1.5 Releases....2
  Kernel....3
  Miscellaneous....3
Features to be removed in a later release....3
The NetBSD Foundation....3
Sources of NetBSD....3
NetBSD 5.1.5 Release Contents....4
  NetBSD/sun2 subdirectory structure....5
  Binary distribution sets....5
NetBSD/sun2 System Requirements and Supported Devices....6
  Supported hardware....6
Getting the NetBSD System on to Useful Media....7
  Creating boot/install tapes....7
  Boot/Install from NFS server....7
  Install/Upgrade from CD-ROM....8
  Install/Upgrade via FTP....8
Preparing your System for NetBSD installation....9
Installing the NetBSD System....9
  Installing from tape....9
  Installing from NFS....10
  Installing from SunOS....11
  Booting the Miniroot....11
  Miniroot install program....11
Post installation steps....12
Upgrading a previously-installed NetBSD System....14
Compatibility Issues With Previous NetBSD Releases....15
  Issues when running older binaries on NetBSD 5.1.5....16
  Issues affecting an upgrade from NetBSD 3.x releases....16
  Issues affecting an upgrade from NetBSD 4.x releases....17
Using online NetBSD documentation....18
Administrivia....18
Thanks go to....19
We are....19
Legal Mumbo-Jumbo....28
The End....32

DESCRIPTION

About this Document

This document describes the installation procedure for NetBSD 5.1.5 on the *sun2* platform. It is available in four different formats titled `INSTALL.`*`ext`*, where *`.ext`* is one of `.ps`, `.html`, `.more`, or `.txt`:

`.ps` PostScript.

`.html` Standard Internet HTML.

`.more` The enhanced text format used on UNIX-like systems by the `more`(1) and `less`(1) pager utility programs. This is the format in which the on-line *man* pages are generally presented.

`.txt` Plain old ASCII.

You are reading the *PostScript* version.

What is NetBSD?

The NetBSD Operating System is a fully functional Open Source UNIX-like operating system derived from the University of California, Berkeley Networking Release 2 (Net/2), 4.4BSD-Lite, and 4.4BSD-Lite2 sources. NetBSD runs on 57 different system architectures (ports) across 15 distinct CPU families, and is being ported to more. The NetBSD 5.1.5 release contains complete binary releases for many different system architectures. (A few ports are not fully supported at this time and are thus not part of the binary distribution. Please see the NetBSD web site 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, it's likely that NetBSD wouldn't exist.

Changes Between The NetBSD 5.1.4 and 5.1.5 Releases

NetBSD 5.1.5 is the fifth critical/security update of the NetBSD 5.1 release branch. It represents a selected subset of fixes deemed critical for security or stability reasons.

The complete list of changes can be found in the CHANGES-5.1.5:
http://ftp.NetBSD.org/pub/NetBSD/NetBSD-5.1.5/CHANGES-5.1.5
file in the top level directory of the NetBSD 5.1.5 release tree. An abbreviated list is as follows:

- NetBSD-SA2014-005:
  http://ftp.NetBSD.org/pub/NetBSD/security/advisories/NetBSD-SA2014-005.txt.asc
  libXfont multiple vulnerabilities
- NetBSD-SA2014-006:
  http://ftp.netbsd.org/pub/NetBSD/security/advisories/NetBSD-SA2014-006.txt.asc
  Multiple OpenSSL vulnerabilities
- NetBSD-SA2014-007:
  http://ftp.netbsd.org/pub/NetBSD/security/advisories/NetBSD-SA2014-007.txt.asc
  bozohttpd basic http authentication bypass
- NetBSD-SA2014-008:
  http://ftp.netbsd.org/pub/NetBSD/security/advisories/NetBSD-SA2014-008.txt.asc
  Multiple OpenSSL vulnerabilities
- NetBSD-SA2014-010:
  http://ftp.netbsd.org/pub/NetBSD/security/advisories/NetBSD-SA2014-010.txt.asc
  Multiple vulnerabilities in the compatibility layers
- NetBSD-SA2014-011:
  http://ftp.netbsd.org/pub/NetBSD/security/advisories/NetBSD-SA2014-011.txt.asc
  User-controlled memory allocation in the `modctl`(2) system call

- NetBSD-SA2014-012:
  http://ftp.netbsd.org/pub/NetBSD/security/advisories/NetBSD-SA2014-012.txt.asc
  Memory leak in the `setsockopt`(2) system call
- NetBSD-SA2014-013:
  http://ftp.netbsd.org/pub/NetBSD/security/advisories/NetBSD-SA2014-013.txt.asc
  `ftp`(1) can be made to execute arbitrary commands
- NetBSD-SA2014-014:
  http://ftp.netbsd.org/pub/NetBSD/security/advisories/NetBSD-SA2014-014.txt.asc
  Multiple vulnerabilities in the `mount`(2) system call
- NetBSD-SA2014-015:
  http://ftp.netbsd.org/pub/NetBSD/security/advisories/NetBSD-SA2014-015.txt.asc
  OpenSSL and SSLv3 vulnerabilities

Advisories prior to NetBSD-SA2014-005 do not affect NetBSD 5.1.5: .:
http://www.NetBSD.org/support/security/patches-5.1.5.html

Kernel

- Reject unaligned PCI config register ioctl requests before we kassert.

Miscellaneous

- Update to tzdata2014f.
- Update root.cache to 2014060201.
- For consistency with newer branches, ISO images built with "build.sh iso-images" are now named `NetBSD-<version>-<machine>.iso` and placed under the `images` directory instead of `iso`.

Features to be removed in a later release

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

- Support for soft dependencies, also knows as soft updates (see "softdep" in `mount`(8)) will be removed in the next major release.

  NetBSD 5.1.5 includes a preview of WAPBL (Write Ahead Physical Block Logging), which will replace soft dependencies in the next major release. See `wapbl`(4) and
  http://mail-index.netbsd.org/netbsd-announce/2008/12/14/msg000051.html
  for details.
- Support for Xen 2.0.x. The Xen-3 and hypervisor interface is diverging from Xen-2 as development is ongoing, increasing the maintenance cost for NetBSD.

  It should be considered as deprecated. Users are expected to not rely on it any more beyond this major release.

  Further, at least version 3.1 of Xen will be required to run NetBSD as Dom0 or DomU.

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 5.1.5 Release Contents

The root directory of the NetBSD 5.1.5 release is organized as follows:

`.../NetBSD-5.1.5/`

`CHANGES` Changes between the 4.0 and 5.0 releases.

`CHANGES-5.0` Changes between the initial 5.0 branch and final release of 5.0.

`CHANGES-5.1` Changes between the 5.0 and 5.1 releases.

`CHANGES-5.1.1`
Changes between the 5.1 and 5.1.1 releases.

`CHANGES-5.1.2`
Changes between the 5.1.1 and 5.1.2 releases.

`CHANGES-5.1.3`
Changes between the 5.1.2 and 5.1.3 releases.

`CHANGES-5.1.4`
Changes between the 5.1.3 and 5.1.4 releases.

`CHANGES-5.1.5`
Changes between the 5.1.4 and 5.1.5 releases.

`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.

`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 5.1.5 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 5.1.5 sources which are not in **gnusrc**, **sharesrc**, or **syssrc**.

syssrc This set contains the sources to the NetBSD 5.1.5 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/sun2 subdirectory structure

The sun2-specific portion of the NetBSD 5.1.5 release is found in the `sun2` subdirectory of the distribution: `.../NetBSD-5.1.5/sun2/`. 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/` sun2 binary distribution sets; see below.
`installation/`
`miniroot/` sun2 miniroot file system image; see below.
`misc/` Miscellaneous sun2 installation utilities; see installation section below.
`netboot/` Two programs needed to boot sun2 kernels over the network.
`tapeimage/`
Tape boot program, and two shell scripts used to prepare tapes.

Binary distribution sets

The NetBSD sun2 binary distribution sets contain the binaries which comprise the NetBSD 5.1.5 release for sun2. The binary distribution sets can be found in the `sun2/binary/sets` subdirectory of the NetBSD 5.1.5 distribution tree, and are as follows:

base The NetBSD 5.1.5 sun2 **base** binary distribution. You *must* install this distribution set. It contains the base NetBSD utilities that are necessary for the system to run and be minimally functional.

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/sun2 5.1.5 `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`.

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. NetBSD/sun2 currently does not ship with an X server or X clients.

The sun2 binary distribution sets are distributed as gzipped tar files named with the extension **.tgz**, e.g. `base.tgz`.

The instructions given for extracting the source sets work equally well for the binary sets, but it is worth noting that if you use that method, the filenames stored in the sets are relative and therefore the files are extracted *below the current directory*. Therefore, if you want to extract the binaries into your system, i.e. replace the system binaries with them, you have to run the **`tar -xzpf`** command from the root directory (`/`) of your system.

There is a collection of Sun2 kernels in the `sun2/binary/kernel` subdirectory of the NetBSD 5.1.5 distribution. The one named `netbsd-RAMDISK.gz` contain a root file system image and should only be used for the initial installation. The others are included for convenience. (Most people will want to use `netbsd-GENERIC.gz` or `netbsd-FOURMEG.gz` as appropriate.) Please note that these kernels are simply gzipped and are not tar archives.

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

NetBSD/sun2 System Requirements and Supported Devices

NetBSD/sun2 5.1.5 runs on Multibus Sun2 machines, including:

2/120 2/170 2/100U

The minimal configuration requires 4 MB of RAM and about 130 MB of disk space. To install the entire system requires much more disk space. To compile the system, more RAM is recommended. Good performance requires 7 MB of RAM. A good rule of thumb is to have a swap partition twice the size of the amount of RAM in your machine. You will probably want to compile your own kernel, as `GENERIC` is large and bulky to accommodate all people.

Note that the sun2 installation procedure uses a *miniroot* image which is placed into the swap area of the disk. The swap partition must be at least as large as the miniroot image (12 MB).

Supported hardware

- Serial ports (RS232)
  - built-in ttya, ttyb
  - ttyc, ttyd, ttye, ttyf on first sc SCSI
  - ttyg, ttyh, ttyi, ttyj on second sc SCSI
- Video adapters

  - bwtwo
- Network interfaces:
  - Multibus Intel Ethernet
  - Multibus 3Com Ethernet
- SCSI
  - Most SCSI disks, tapes, CD-ROMs, etc
  - Multibus Sun-2 SCSI (*sc*)
- Input devices
  - Sun keyboard and mouse
- Miscellaneous
  - Battery-backed real-time clock.

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

Getting the NetBSD System on to Useful Media

Installation is supported from several media types, including:

- Tape
- NFS
- CD-ROM
- FTP

Note: Installing on a 'bare' machine requires some bootable device; either a tape drive or Sun-compatible NFS server.

The procedure for transferring the distribution sets onto installation media depends on the type of media. Instructions for each type of media are given below.

In order to create installation media, you will need all the files in the directory

```
.../NetBSD-5.1.5/sun2/
```

Creating boot/install tapes

Installing from tape is the simplest method of all. This method uses two tapes; one called the *boot* tape, and another called the *install* tape.

The boot tape is created as follows:

```
# cd .../NetBSD-5.1.5/sun2/installation/tapeimage
# sh MakeBootTape /dev/nrst0
```

The install tape is created as follows:

```
# cd .../NetBSD-5.1.5/sun2/installation/tapeimage
# sh MakeInstallTape /dev/nrst0
```

If the tapes do not work as expected, you may need to explicitly set the EOF mark at the end of each tape segment. It may also be necessary to use the **conv=osync** argument to dd(1). Note that this argument is incompatible with the **bs=** argument. Consult the tape-related manual pages on the system where the tapes are created for more details.

Boot/Install from NFS server

If your machine has a disk and network connection, but no tape drive, it may be convenient for you to install NetBSD over the network. This involves temporarily booting your machine over NFS, just long enough so you can initialize its disk. This method requires that you have access to an NFS server on your network so you can configure it to support diskless boot for your machine. Configuring the NFS server is normally a task for a system administrator, and is not trivial.

If you are using a NetBSD system as the boot-server, have a look at the `diskless`(8) manual page for guidelines on how to proceed with this. If the server runs another operating system, consult the documentation that came with it (i.e. `add_client`(8) on SunOS).

When instructed to boot over the network, your sun2 expects to be able to download first and second stage bootstrap programs via ND, the Network Disk protocol. The `ndbootd`(8) program will attempt to serve a second-stage bootstrap file using a name derived from the machine's recently acquired IP address and an extension which corresponds to the machine architecture. (It may be handy to have a hexadecimal calculator for this next step.) The filename prefix is created by converting the machine's assigned IP address into hexadecimal, most-significant octet first, using uppercase characters for the non-decimal (A-F) digits. The filename suffix used by all sun2 machines is `SUN2`.

For example, a sun2 which has been assigned IP address 130.115.144.11 will be served a second-stage bootstrap file named `8273900B.SUN2`. Normally, this file is a symbolic link to the NetBSD/sun2 `netboot` program, which should be located in a place where the `ndbootd`(8) daemon can find it. The `netboot` program may be found in the `installation/netboot` directory of this distribution.

The netboot program will query a bootparamd server to find the NFS server address and path name for its root, and then load a kernel from that location. The server should have a copy of the `netbsd-RAMDISK` kernel in the root area for your client, hard-linked under the names `netbsd` and `vmunix` (no other files are needed in the client root) and `/etc/bootparams` on the server should have an entry for your client and its root directory. The client will need access to the miniroot image, which can be provided using NFS or remote shell.

If you will be installing NetBSD on several clients, it may be useful to know that you can use a single NFS root for all the clients as long as they only use the `netbsd-RAMDISK` kernel. There will be no conflict between clients because the RAM-disk kernel will not use the NFS root. No swap file is needed; the RAM-disk kernel does not use that either.

Install/Upgrade from CD-ROM

This method requires that you boot from another device (i.e. tape or network, as described above). You may need to make a boot tape on another machine using the files provided on the CD-ROM. Once you have booted netbsd-rd (the RAM-disk kernel) and loaded the miniroot, you can load any of the distribution sets directly from the CD-ROM. The **`install`** program in the miniroot automates the work required to mount the CD-ROM and extract the files.

Install/Upgrade via FTP

This method requires that you boot from another device (i.e. tape or network, as described above). You may need to make a boot tape on another machine using the files in `installation/tapeimage` and `binary/kernel` (which you get via FTP). Once you have booted `netbsd-RAMDISK` (the RAM-disk kernel) and loaded the miniroot, you can load any of the distribution sets over the net using FTP. The **`install`** program in the miniroot automates the work required to configure the network interface and transfer the files.

The preparations for this installation/upgrade method are easy; all you make sure that there's some FTP site from which you can retrieve the NetBSD distribution when you're about to install or upgrade. You need to know the numeric IP address of that site, and, if it's not on a network directly connected to the machine on

which you're installing or upgrading NetBSD, you need to know the numeric IP address of the router closest to the NetBSD machine. Finally, you need to know the numeric IP address of the NetBSD machine itself.

Preparing your System for NetBSD installation

Sun2 machines usually need little or no preparation before installing NetBSD, other than the usual, well advised precaution of *backing up all data* on any attached storage devices.

You will need to know the SCSI target ID of the drive on which you will install NetBSD.

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

Installing the NetBSD System

Installing NetBSD is a relatively complex process, but if you have this document in hand it should not be too difficult.

There are several ways to install NetBSD onto your disk. If your machine has a tape drive the easiest way is **Installing from tape** (details below). If your machine is on a network with a suitable NFS server, then **Installing from NFS** is the next best method. Otherwise, if you have another Sun machine running SunOS you can initialize the disk on that machine and then move the disk. (Installing from SunOS is not recommended.)

Installing from tape

Create the NetBSD/sun2 5.1.5 boot tape as described in the section entitled **Creating boot/install tapes** and boot the tape. At the PROM monitor prompt, use one of the commands:

```
>b st()
>b st(0,8,0)
```

The first example will use the tape on SCSI target 4, where the second will use SCSI target 5. The > is the monitor prompt.

After the tape loads, you should see many lines of configuration messages, and then the following 'welcome' screen:

```
            Welcome to the NetBSD/sun2 RAMDISK root!

This environment is designed to do only three things:
1:  Partition your disk (use the command:  edlabel /dev/rsd0c)
2:  Copy a miniroot image into the swap partition  (/dev/rsd0b)
3:  Reboot (using the swap partition, i.e. /dev/sd?b).

Note that the sun2 firmware cannot boot from a partition located
more than 1 GB from the beginning of the disk, so the swap partition
should be completely below the 1 GB boundary.

Copying the miniroot can be done several ways, allowing
the source of the miniroot image to be on any of these:
    boot tape,  NFS server, TFTP server, rsh server

The easiest is loading from tape, which is done as follows:
        mt -f /dev/nrst0 rewind
        mt -f /dev/nrst0 fsf 2
        dd if=/dev/nrst0 of=/dev/rsd0b bs=32k conv=sync
(For help with other methods, please see the install notes.)
```

```
To reboot using the swap partition, first use "halt",
then at the PROM monitor prompt use a command like:
        b sd(,,1) -s

To view this message again, type:  cat /.welcome
```

Copy the miniroot as described in the welcome message, and reboot from that just installed miniroot. See the section entitled **Booting the miniroot** for details.

Installing from NFS

Before you can install from NFS, you must have already configured your NFS server to support your machine as a diskless client. Instructions for configuring the server are found in the section entitled **Getting the NetBSD System onto Useful Media** above.

First, at the Sun PROM monitor prompt, enter a boot command using the network interface as the boot device. If your machine has Intel Ethernet, this is *ie*, and if it has 3Com Ethernet, this is *ec*. Examples:

```
>b ie() -s
>b ec() -s
```

After the boot program loads the RAMDISK kernel, you should see the welcome screen as shown in the **Installing from tape** section above. You must configure the network interface before you can use any network resources. For example the command:

```
ssh> ifconfig ie0 inet 192.233.20.198 up
```

will bring up the network interface with that address. The next step is to copy the miniroot from your server. This can be done using either NFS or remote shell. (In the examples that follow, the server has IP address 192.233.20.195.) You may then need to add a default route if the server is on a different subnet:

```
ssh> route add default 192.233.20.255 1
```

You can look at the route table using:

```
ssh> route show
```

Now mount the NFS file system containing the miniroot image:

```
ssh> mount -o rdonly,-r=1024 192.233.20.195:/server/path /mnt
```

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

```
ssh> dd if=/mnt/miniroot.fs of=/dev/rsd0b bs=8k
```

Otherwise, you will need to use **zcat** to expand the miniroot image while copying. This is tricky because the **ssh** program (small shell) does not handle sh(1) pipeline syntax. Instead, you first run the reader in the background with its input set to /dev/pipe and then run the other program in the foreground with its output to /dev/pipe. The result looks like this:

```
ssh> run -bg dd if=/dev/pipe of=/dev/rsd0b obs=8k
ssh> run -o /dev/pipe zcat /mnt/install/miniroot.fs.gz
```

To load the miniroot using rsh to the server, you would use a pair of commands similar to the above. Here is another example:

```
ssh> run -b dd if=/dev/pipe of=/dev/rsd0b obs=8k
ssh> run -o /dev/pipe rsh 192.233.20.195 zcat miniroot.fs.gz
```

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

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

Installing from SunOS

To install NetBSD/sun2 onto a machine already running SunOS, you will need the miniroot image (miniroot.fs.gz) and some means to decompress it.

First, boot SunOS and place the miniroot file onto the hard drive. If you do not have **gzip** for SunOS, you will need to decompress the image elsewhere before you can use it.

Next, bring SunOS down to single user mode to insure that nothing will be using the swap space on your drive. To be extra safe, reboot the machine into single-user mode rather than using the **shutdown** command.

Now copy the miniroot image onto your swap device (here `/dev/rsd0b`) with the command

```
gzip -dc miniroot.fs.gz | dd of=/dev/rsd0b obs=32k
```

or if you have already decompressed the miniroot

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

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

Booting the Miniroot

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

If the miniroot was installed on partition 'b' of the disk with SCSI target ID=0 then the PROM boot command would be:

```
>b sd(0,0,1) -s
```

With SCSI target ID=2, the PROM is:

```
>b sd(0,10,1) -s
```

The numbers in parentheses above are:

1. controller (usually zero)
2. unit number (SCSI-ID * 8, in hexadecimal)
3. partition number

Miniroot install program

The miniroot's install program is very simple to use. It will guide you through the entire process, and is well automated. Additional improvements are planned for future releases.

The miniroot's install program will:

- Allow you to place disklabels on additional disks. The disk we are installing on should already have been partitioned using the RAMDISK kernel.
- Create file systems on target partitions.
- Allow you to set up your system's network configuration. Remember to specify host names without the domain name appended to the end. For example use `foo` instead of `foo.bar.org`. If, during the process of configuring the network interfaces, you make a mistake, you will be able to re-configure that interface by simply selecting it for configuration again.

- Mount target file systems. You will be given the opportunity to manually edit the resulting `/etc/fstab`.
- Extract binary sets from the media of your choice.
- Copy configuration information gathered during the installation process to your root file system (`/`).
- Make device nodes in your root file system under `/dev`.
- Copy a new kernel onto your root partition (`/`).
- Install a new boot block.
- Check your file systems for integrity.

First-time installation on a system through a method other than the installation program is possible, but strongly discouraged.

Post installation steps

Once you've got the operating system running, there are a few things you need to do in order to bring the system into a properly configured state. The most important steps are described below.

1. Configuring `/etc/rc.conf`

   If you or the installation software haven't done any configuration of `/etc/rc.conf` (**sysinst** usually will), the system will drop you into single user mode on first reboot with the message

   ```
   /etc/rc.conf is not configured. Multiuser boot aborted.
   ```

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

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

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

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

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

   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 network and naming service, DHCP can be used by setting `dhclient=YES` in `/etc/rc.conf`.

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

2. Logging in

   After reboot, you can log in as `root` at the login prompt. Unless you've set a password in **sysinst**, there is no initial password. 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.

3. Adding accounts

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

4. 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 on which the software may depend.

   - 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/NetBSD/packages/pkgsrc/README.html
   - Precompiled binaries can be found at
     ftp://ftp.NetBSD.org/pub/pkgsrc/packages/NetBSD/
     usually in the `sun2/5.1.5/All` subdir. You can install them with the following commands under `sh`(1):

     ```
     # PKG_PATH=ftp://ftp.NetBSD.org/pub/pkgsrc/packages/NetBSD/sun2/5.1.5/All
     # export PKG_PATH
     # pkg_add -v tcsh
     # pkg_add -v bash
     # pkg_add -v perl
     # pkg_add -v apache
     # pkg_add -v kde
     # pkg_add -v firefox
     ...
     ```

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

     ```
     # setenv PKG_PATH ftp://ftp.NetBSD.org/pub/pkgsrc/packages/NetBSD/sun2/5.1.5/Al
     ```

     Note: Some mirror sites don't mirror the `/pub/pkgsrc` directory. If you would like to use such mirrors, you could also try the `/pub/NetBSD/packages/current-packages/NetBSD/sun2/5.1.5/All` directory, which may have the same contents.

   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.

Note: In some cases the `pkg_add`(1) command will complain about a version mismatch of packages with a message like the following:

```
Warning: package 'foo' was built for a different version
of the OS:
NetBSD/i386 M.N (pkg) vs. NetBSD/i386 5.1.5 (this host),
```

This warning is harmless if the formal major release numbers are the same between the pkg and your host. Please refer to the NetBSD release glossary and graphs at

http://www.NetBSD.org/releases/release-map.html

for more information about NetBSD's release numbering scheme.

- The framework for compiling packages can be obtained by retrieving the file

  ftp://ftp.NetBSD.org/pub/NetBSD/packages/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.

5. Misc

   - Edit `/etc/mail/aliases` to forward root mail to the right place. Don't forget to run `newaliases`(1) afterwards.
   - The `/etc/postfix/main.cf` file will almost definitely need to be adjusted. If you prefer a different MTA, then install it using pkgsrc or by hand and adjust `/etc/mailer.conf`.
   - Edit `/etc/rc.local` to run any local daemons you use.
   - Many of the `/etc` files are documented in section 5 of the manual; so just invoking

     ```
     # man 5 filename
     ```

     is likely to give you more information on these files.

Upgrading a previously-installed NetBSD System

It is possible to easily upgrade your existing NetBSD/sun2 system using the upgrade program in the miniroot. If you wish to upgrade your system by this method, simply select the **upgrade** option once the miniroot has booted. The upgrade program with then guide you through the procedure. The upgrade program will:

- Enable the network based on your system's current network configuration.
- Mount your existing file systems.
- Extract binary sets from the media of your choice.
- Make new device nodes in your root file system under `/dev`.
- Copy a new kernel onto your root partition (`/`).

  Note: the existing kernel *will not* be backed up; doing so would be pointless, since older kernels may not be capable of running NetBSD 5.1.5 executables.

- Install a new boot block.
- Check your file systems for integrity.

Using the miniroot's upgrade program is the preferred method of upgrading your system.

However, it is possible to upgrade your system manually. To do this, follow the following procedure:

- Place *at least* the **base** binary set in a file system accessible to the target machine. A local file system is preferred, since the NFS subsystem in the NetBSD 5.1.5 kernel may be incompatible with your old binaries.
- Back up your pre-existing kernel and copy the 5.1.5 kernel into your root partition (`/`).
- Reboot with the 5.1.5 kernel into single-user mode. (Otherwise you can not install the boot block.)
- Check all file systems:

```
# /sbin/fsck -pf
```

- Mount all local file systems:

```
# /sbin/mount -a -t nonfs
```

- If you keep `/usr` or `/usr/share` on an NFS server, you will want to mount those file systems as well. To do this, you will need to enable the network:

```
# sh /etc/rc.d/network start
```

- Make sure you are in the root file system (`/ and extract the`) **base** binary set:

```
# cd /
# pax -zrvpe -f Ar /path/to/base.tgz
```

- Install a new boot block: (assuming root is on `/dev/rsd0a`)

```
# cd /usr/mdec
# cp -p ./ufsboot /mnt/ufsboot
# sync ; sleep 1 ; sync
# /usr/sbin/installboot -v /dev/rsd0a bootxx /ufsboot
```

- Sync the file systems:

```
sync
```

- At this point you may extract any other binary sets you may have placed on local file systems, or you may wish to extract additional sets at a later time. To extract these sets, use the following commands:

```
# cd /
# pax -zrvpe -f path_to_set
```

Note: You *should not* extract the **etc** set if upgrading. Instead, you should extract that set into another area and carefully merge the changes by hand.

Compatibility Issues With Previous NetBSD Releases

Users upgrading from previous versions of NetBSD may wish to bear the following problems and compatibility issues in mind when upgrading to NetBSD 5.1.5.

Note: None of the items mentioned below are relevant if upgrading from 5.1. They still apply if you are upgrading from a pre-5.1 release, though.

If your port uses X.Org and you see messages from the X server indicating that no devices were found, you may need to run **X -configure** and update your existing xorg.conf to use the BusID line from the newly-generated config file.

Dual-head support for PC systems has become broken for many configurations with the update to xorg-server 1.6.x, which has removed the userland PCI configuration mechanism, and needs to rely upon the OS. We hope to correct this for future releases. Workaround: The only workaround is non-trivial and requires programming several PCI BAR registers as they previously were in NetBSD 5.0.

If you are updating to NetBSD 5.1.5 without the aid of sysinst or postinstall and your port uses X.Org, be sure to remove `/usr/X11R7/lib/X11/xkb/symbols/pc` before extracting the xbase set. In the version of X.Org shipped with 5.0, this was a directory, but in more recent X.Org versions it is a file.

pkg_install now depends on the pkgdb cache for automatic conflict detection. It is recommended to rebuild the cache with

```
# pkg_admin rebuild
```

`audit-packages.conf`(5) has been superseded by `pkg_install.conf`(5). The default configuration is the same.

Support for `pkg_view`(1) has been retired.

The functionality of `audit-packages`(1) and `download-vulnerability-list`(1) has moved into `pkg_admin`(1). However, wrapper scripts that handle the common use cases are provided.

Issues when running older binaries on NetBSD 5.1.5

The pthread libraries from previous versions of NetBSD require that the `sysctl`(3) node `kern.no_sa_support` be set to `0`. This affects the following environments:

- Running a 5.x kernel with an older userland.
- Running an older userland inside a chroot'ed environment on a 5.x system.
- Running older statically linked pthread applications.

The 5.x kernel defaults to `0` for `kern.no_sa_support`, which covers the first case. However, please note that a full installation of 5.x (either from scratch or through an upgrade) will set `kern.no_sa_support` to 1 during the boot process. This means that for the last two cases, you will have to manually set `kern.no_sa_support` to `0`, using either the `sysctl`(8) command or through `sysctl.conf`(5).

Note that **`sysinst`** will automatically invoke

```
postinstall fix
```

and thus all issues that are fixed by **`postinstall`** by default (see below) will be handled.

Issues affecting an upgrade from NetBSD 3.x releases

See the section below on upgrading from NetBSD 4.x as well.

The following issues can generally be resolved by running *postinstall* with the **etc** set:

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

Issues fixed by *postinstall*:

- Various files in `/etc` need upgrading. These include:
  - `/etc/defaults/*`
  - `/etc/mtree/*`
  - `/etc/daily`

- /etc/weekly
- /etc/monthly
- /etc/security
- /etc/rc.subr
- /etc/rc
- /etc/rc.shutdown
- /etc/rc.d/*
- /etc/envsys.conf

The following issues need to be resolved manually:

- The users '_proxy', '_rwhod', and '_sdpd' and the groups '_proxy', '_rwhod' and '_sdpd' need to be created and the user 'uucp' needs to be updated.
- A number of things were removed in the NetBSD 4.0 release, including: the evbsh5 port, the Fortran 77 compiler (g77), NETCCITT, NETNS, Sendmail, Sushi, UUCP, and Vinum. If you were using any of these, please see the "Components removed from NetBSD" at
  http://www.NetBSD.org/releases/formal-4/NetBSD-4.0.html#removals
- The replacement of Sendmail by Postfix can be handled automatically by *postinstall* but it is not done by default. If you want to transition to Postfix, the command

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

  will update your /etc/mailer.conf file to use Postfix as the MTA. When using **sysinst** to upgrade the system, it will ask if you want this to be done.

  Note that if you have a customized Sendmail setup, you need to set up Postfix in an equivalent way; there is no tool for automatic conversion of Sendmail configuration to a Postfix one.

  Postfix will be started automatically when the system boots. You may see messages like "$sendmail is not set properly" at boot. You can suppress them by removing /etc/rc.d/sendmail and /etc/rc.d/smmsp. Those files and other parts of sendmail configuration like files under /usr/share/sendmail are not removed by default while upgrading for those who want to continue using sendmail from outside the base system. If you want to delete them, *postinstall* can be used:

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

Issues affecting an upgrade from NetBSD 4.x releases

The following issues can generally be resolved by running *postinstall* with the **etc** set:

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

Issues fixed by *postinstall*:

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

- /etc/rc.shutdown
- /etc/rc.d/*
- /etc/envsys.conf

The following issues need to be resolved manually:

- The users '_httpd' and '_timedc' and the groups '_httpd' and '_timedc' need to be created.
- Unprivileged use of the mount(8) command now requires the *nosuid* and *nodev* options to be explicitly specified. Previously, these options were automatically enforced even if they were not explicitly specified.
- A number of things have been removed from the NetBSD 5.1.5 release. See the "Components removed from NetBSD" section near the beginning of this document for a list.

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. To get help on using the mailing list server, send mail to that address with an empty body, and it will reply with instructions. See **http://www.NetBSD.org/mailinglists/** for a web interface.

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 this effort, 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, or, if you'd rather not do that, mail the list saying you'll send the data to those who want it.

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- 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!)

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