NAME

INSTALL – Installation procedure for NetBSD/evbarm.

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DESCRIPTION

About this Document

This document describes the installation procedure for NetBSD 1.6 on the *evbarm* platform. It is available in four different formats titled `INSTALL.`*`ext`*, where *`.ext`* is one of `.ps`, `.html`, `.more`, or `.txt`:

`.ps` PostScript.

`.html` Standard Internet HTML.

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

`.txt` Plain old ASCII.

You are reading the *PostScript* version.

What is NetBSD?

The NetBSD Operating System is a fully functional Open Source UNIX-like operating system derived from the University of California, Berkeley Networking Release 2 (Net/2), 4.4BSD-Lite, and 4.4BSD-Lite2 sources. NetBSD runs on fifty three different system architectures (ports), featuring seventeen machine architectures across eleven distinct CPU families, and is being ported to more. The NetBSD 1.6 release contains complete binary releases for thirty eight different system architectures. (The fifteen remaining are not fully supported at this time and are thus not part of the binary distribution. For information on them, please see the NetBSD web site at **http://www.netbsd.org/**.)

NetBSD is a completely integrated system. In addition to its highly portable, high performance kernel, NetBSD features a complete set of user utilities, compilers for several languages, the X Window System, firewall software and numerous other tools, all accompanied by full source code.

NetBSD is a creation of the members of the Internet community. Without the unique cooperation and coordination the net makes possible, it's likely that NetBSD wouldn't exist.

Upgrade path to NetBSD 1.6

If you are not installing your system ''from scratch'' but instead are going to upgrade an existing system already running NetBSD you need to know which versions you can upgrade with NetBSD 1.6.

NetBSD 1.6 is an upgrade of NetBSD 1.5.3 and earlier major and patch releases of NetBSD.

The intermediate development versions of code available on the main trunk in our CVS repository (also known as ''NetBSD-current'') from *after* the point where the release cycle for 1.6 was started are designated by version identifiers such as 1.6A, 1.6B, etc. These identifiers do not designate releases, but indicate major changes in internal kernel APIs. Note that the kernel from NetBSD 1.6 can *not* be used to upgrade a system running one of those intermediate development versions. Trying to use the NetBSD 1.6 kernel on such a system *will* probably result in problems.

Please also note that it is not possible to do a direct ''version'' comparison between any of the intermediate development versions mentioned above and 1.6 to determine if a given feature is present or absent in 1.6. The development of 1.6 and the subsequent ''point'' releases is done on a separate branch in the CVS repository. The branch was created when the release cycle for 1.6 was started, and during the release cycle of 1.6 and its patch releases selected fixes and enhancements have been imported from the main development trunk.

Changes Between The NetBSD 1.5 and 1.6 Releases

The NetBSD 1.6 release provides numerous significant functional enhancements, including support for many new devices, integration of hundreds of bug fixes, new and updated kernel subsystems, and many user-land enhancements. The result of these improvements is a stable operating system fit for production use that rivals most commercially available systems.

It is impossible to completely summarize over eighteen months of development that went into the NetBSD 1.6 release. Some highlights include:

Kernel

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

Networking

- Hardware assisted IPv4 TCP and UDP checksumming and caching of the IPv6 TCP pseudo header. Support for checksum offloading on the DP83820 Gigabit Ethernet, 3Com 3c90xB, 3Com 3c90xC, and Alteon Tigon/Tigon2 Gigabit Ethernet cards.
- Zero-Copy for TCP and UDP transmit path achieved through page loaning code for **`sosend`**().
- In-kernel ISDN support, from the ISDN4BSD project.
- 802.1Q VLAN (virtual LAN) support. See `vlan`(4).
- IPFilter now supports IPv6 filtering.

- ndbootd(8) added; used to netboot NetBSD/sun2 machines.
- racoon(8) added; IKE key management daemon for IPsec key negotiation, from the KAME project.
- WEP encryption supported in ifconfig(8) and awi(4) driver.
- wi(4) and wiconfig(8) now support scanning for access points, and defaults to BSS instead of ad-hoc mode.
- Bridging support; currently only for ethernet. See bridge(4).
- In-kernel PPP over Ethernet (PPPoE) - RFC 2516, with much lower overhead than user-land PPPoE clients. See pppoe(4).
- ifwatchd(8) added; invokes up-script and down-script when a network interface goes up and down. Used by pppoe(4).

File system

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

Security

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

System administration and user tools

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

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

Miscellaneous

- Support for multibyte LC_CTYPE locales has been integrated from the Citrus project. Many Chinese, Japanese, Korean, and other encodings are now available.
- Full support for cross-compilation of the base system, even as a non-root user! `src/build.sh` is available for doing arbitrary cross-builds; see `src/BUILDING` for more information. At least 38 ports for the NetBSD 1.6 release were cross-built on a NetBSD/i386 system using this mechanism.
- Migrated the following CPU platforms to ELF: arm, and m68k (including amiga, hp300, mac68k, mvme68k, sun2, and x68k).
- Updates of most third party packages that are shipped in the base system to the following latest stable releases:
  - amd 6.0.6
  - BIND 8.3.3
  - binutils 2.11.2
  - bzip2 1.0.2
  - cvs 1.11
  - dhcp 3.0.1rc9
  - file 3.38
  - gcc 2.95.3
  - groff 1.16.1
  - Heimdal 0.4e
  - IPfilter 3.4.27
  - kerberos4 1.1
  - ksh from pdksh 5.2.14p2
  - less 374
  - nvi 1.79
  - OpenSSH 3.4
  - OpenSSL 0.9.6g
  - Postfix 1.1.11
  - ppp 2.4.0
  - routed 2.24
  - sendmail 8.11.6
  - tcpdump 3.7.1
- Many new packages in the *pkgsrc* system, including the latest open source desktop KDE3, OpenOffice, perl, Apache and many more. At the time of writing, there are over 3000 third party packages available in pkgsrc.
- Added AGP GART driver `agp`(4) for faster access to graphics boards.

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

Kernel interfaces have continued to be refined, and more subsystems and device drivers are shared among the different ports. You can look for this trend to continue.

evbarm specific

This is the first major release of NetBSD/evbarm.

Unlike previous releases of NetBSD for the ARM architecture, the evbarm port uses the ELF binary format. However, NetBSD 1.6 on evbarm is, as usual, also fully backward compatible with old NetBSD a.out ARM binaries, so you don't need to recompile all your local programs provided you set the appropriate binary compatibility options in your kernel configuration.

The Future of NetBSD

The NetBSD Foundation has been incorporated as a non-profit organization. Its purpose is to encourage, foster and promote the free exchange of computer software, namely the NetBSD Operating System. The foundation will allow for many things to be handled more smoothly than could be done with our previous informal organization. In particular, it provides the framework to deal with other parties that wish to become involved in the NetBSD Project.

The NetBSD Foundation will help improve the quality of NetBSD by:

- providing better organization to keep track of development efforts, including co-ordination with groups working in related fields.
- providing a framework to receive donations of goods and services and to own the resources necessary to run the NetBSD Project.
- providing a better position from which to undertake promotional activities.
- periodically organizing workshops for developers and other interested people to discuss ongoing work.

We intend to begin narrowing the time delay between releases. Our ambition is to provide a full release every six to eight months.

We hope to support even *more* hardware in the future, and we have a rather large number of other ideas about what can be done to improve NetBSD.

We intend to continue our current practice of making the NetBSD-current development source available on a daily basis.

We intend to integrate free, positive changes from whatever sources submit them, providing that they are well thought-out and increase the usability of the system.

Above all, we hope to create a stable and accessible system, and to be responsive to the needs and desires of NetBSD users, because it is for and because of them that NetBSD exists.

Sources of NetBSD

Refer to **http://www.netbsd.org/Sites/net.html**.

NetBSD 1.6 Release Contents

The root directory of the NetBSD 1.6 release is organized as follows:

`.../NetBSD-1.6/`

`CHANGES`	Changes since earlier NetBSD releases.
`LAST_MINUTE`	Last minute changes.
`MIRRORS`	A list of sites that mirror the NetBSD 1.6 distribution.
`README.files`	README describing the distribution's contents.
`TODO`	NetBSD 's todo list (also somewhat incomplete and out of date).
`patches/`	Post-release source code patches.
`source/`	Source distribution sets; see below.

In addition to the files and directories listed above, there is one directory per architecture, for each of the architectures for which NetBSD 1.6 has a binary distribution. There are also `README.export-control` files sprinkled liberally throughout the distribution tree, which point out that there are some portions of the distribution that may be subject to export regulations of the United States, e.g. code under `src/crypto` and `src/sys/crypto`. It is your responsibility to determine whether or not it is legal for you to export these portions and to act accordingly.

The source distribution sets can be found in subdirectories of the `source` subdirectory of the distribution tree. They contain the complete sources to the system. The source distribution sets are as follows:

gnusrc This set contains the ''gnu'' sources, including the source for the compiler, assembler, groff, and the other GNU utilities in the binary distribution sets.
55 MB gzipped, 247 MB uncompressed

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

sharesrc This set contains the ''share'' sources, which include the sources for the man pages not associated with any particular program; the sources for the typesettable document set; the dictionaries; and more.
4 MB gzipped, 16 MB uncompressed

src This set contains all of the base NetBSD 1.6 sources which are not in **gnusrc**, **sharesrc**, or **syssrc**.
27 MB gzipped, 136 MB uncompressed

syssrc This set contains the sources to the NetBSD 1.6 kernel for all architectures; `config`(8); and `dbsym`(8).
22 MB gzipped, 114 MB uncompressed

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

All the above source sets are located in the `source/sets` subdirectory of the distribution tree.

The source sets are distributed as compressed tar files. Except for the **pkgsrc** set, which is traditionally unpacked into `/usr/pkgsrc`, all sets may be unpacked into `/usr/src` with the command:

```
# ( cd / ; tar -zxpf - ) < set_name.tgz
```

The `sets/Split/` subdirectory contains split versions of the source sets for those users who need to load the source sets from floppy or otherwise need a split distribution. The split sets are named `set_name.`*xx* where `set_name` is the distribution set name, and *xx* is the sequence number of the file, starting with "aa" for the first file in the distribution set, then "ab" for the next, and so on. All of these files except the last one of each set should be exactly 240,640 bytes long. (The last file is just long enough to contain the remainder of the data for that distribution set.)

The split distributions may be reassembled and extracted with **cat** as follows:

```
# cat set_name.?? | ( cd / ; tar -zxpf - )
```

In each of the source distribution set directories, there are files which contain the checksums of the files in the directory:

`BSDSUM` Historic BSD checksums for the various files in that directory, in the format produced by the command:
cksum -o 1 *file*.

`CKSUM` POSIX checksums for the various files in that directory, in the format produced by the command:
cksum *file*.

`MD5` MD5 digests for the various files in that directory, in the format produced by the command:
cksum -m *file*.

`SYSVSUM` Historic AT&T System V UNIX checksums for the various files in that directory, in the format produced by the command:
cksum -o 2 *file*.

The MD5 digest is the safest checksum, followed by the POSIX checksum. The other two checksums are provided only to ensure that the widest possible range of system can check the integrity of the release files.

NetBSD/evbarm subdirectory structure

The evbarm-specific portion of the NetBSD 1.6 release is found in the `evbarm` subdirectory of the distribution: `.../NetBSD-1.6/evbarm/`

`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/` evbarm binary distribution sets; see below.

`installation/`
`misc/` Miscellaneous evbarm installation utilities; see installation section, below.

Binary distribution sets

The NetBSD evbarm binary distribution sets contain the binaries which comprise the NetBSD 1.6 release for the evbarm. There are eight binary distribution sets. The binary distribution sets can be found in the `evbarm/binary/sets` subdirectory of the NetBSD 1.6 distribution tree, and are as follows:

base The NetBSD 1.6 evbarm **base** binary distribution. You *must* install this distribution set. It contains the base NetBSD utilities that are necessary for the system to run and be minimally functional. It includes shared library support, and excludes everything described below.
21 MB gzipped, 50 MB uncompressed

comp Things needed for compiling programs. This set includes the system include files (`/usr/include`) and the various system libraries (except the shared libraries, which are included as part of the **base** set). This set also includes the manual pages for all of the utilities it contains, as well as the system call and library manual pages.
16 MB gzipped, 57 MB uncompressed

etc This distribution set contains the system configuration files that reside in `/etc` and in several other places. This set *must* be installed if you are installing the system from scratch, but should *not* be used if you are upgrading.
1 MB gzipped, 1 MB uncompressed

games This set includes the games and their manual pages.
3 MB gzipped, 7 MB uncompressed

kern-INTEGRATOR
(see below)
1 MB gzipped, 2 MB uncompressed

kern-IQ80310
(see below)
6 MB gzipped, 17 MB uncompressed

kern-IQ80321
(see below)
6 MB gzipped, 16 MB uncompressed

kern-TEAMASA_NPWR
11 MB gzipped, 30 MB uncompressed

These sets contain a NetBSD/evbarm 1.6 kernel, named `/netbsd`. Some of these sets also contain a binary format kernel named `/netbsd.bin` and an S-record format kernel named `/netbsd.srec` that your firmware may need to boot. You *must* install the kernel that matches your hardware.

man This set includes all of the manual pages for the binaries and other software contained in the **base** set. Note that it does not include any of the manual pages that are included in the other sets.
7 MB gzipped, 27 MB uncompressed

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

text This set includes NetBSD's text processing tools, including `groff`(1), all related programs, and their manual pages.
2 MB gzipped, 6 MB uncompressed

NetBSD maintains its own set of sources for the X Window System in order to assure tight integration and compatibility. These sources are based on XFree86, and tightly track XFree86 releases. They are currently equivalent to XFree86 3.3.6. 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.
3 MB gzipped, 8 MB uncompressed

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

xcontrib Programs that were contributed to X.
1 MB gzipped, 1 MB uncompressed

xfont Fonts needed by X.
6 MB gzipped, 7 MB uncompressed

xmisc Miscellaneous X programs.
1 MB gzipped, 1 MB uncompressed

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

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

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

NetBSD/evbarm System Requirements and Supported Devices

NetBSD 1.6 runs on the following ARM architecture evaluation boards:

- ARM, Ltd. Integrator
- Intel IQ80310
- Intel IQ80321

Supported devices (ARM, Ltd. Integrator)

For devices that have machine-independent drivers, this is not an exhaustive list, but merely reflects the devices that have been tested on this platform.

- PrimeCell PL030 Real Time Clock
- Serial ports
  - PrimeCell PL010 UART
- SCSI host adapters
  - Adaptec AHA-2910, 2915, 2920, and 2930C adapters.
  - Adaptec AHA-2x4x[U][2][W] cards and onboard PCI designs using the AIC-7770, AIC-7850, AIC-7860, AIC-7870, AIC-7880 and AIC-789x chipsets.
  - Adaptec AHA-394x[U][W] cards [b]

  - Adaptec AHA-3950U2 cards
  - Adaptec AHA-3960, 19160 and 29160 Ultra-160 adapters

- Ethernet adapters
  - Intel i82557, i82558, i82559, i82550

Supported devices (Intel IQ80310)

For devices that have machine-independent drivers, this is not an exhaustive list, but merely reflects the devices that have been tested on this platform.

- Serial ports
  - On-board ST16c550 UARTs
- Ethernet adapters
  - Intel i82557, i82558, i82559, i82550
- i80312 Companion I/O functions
  - General Purpose I/O unit

Supported devices (Intel IQ80321)

For devices that have machine-independent drivers, this is not an exhaustive list, but merely reflects the devices that have been tested on this platform.

- Serial ports
  - On-board TI 16550 UART
- Ethernet adapters
  - Intel i82542, i82543, i85244 Gigabit Ethernet

Getting the NetBSD System on to Useful Media

Installation is supported from several media types, including:

- CD-ROM
- MS-DOS floppy
- 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 Find out where the distribution set files are on the CD-ROM.

Proceed to the instruction on installation.

MS-DOS floppy Count the number of `set_name.`*xx* files that make up the distribution sets you want to install or upgrade. You will need one sixth that number of 1.44 MB floppies.

Format all of the floppies with MS-DOS. Do *not* make any of them bootable MS-DOS floppies, i.e. don't use `format /s` to format them. (If the floppies are bootable, then the MS-DOS system files that make them bootable will take up some space, and you won't be able to fit the distribution set parts on the disks.) If you're using floppies that are formatted for MS-DOS by their manufacturers, they probably aren't bootable, and you can use them out of the box.

Place all of the `set_name.xx` files on the MS-DOS disks.

Once you have the files on MS-DOS disks, 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.

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. 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. If you don't have access to a functioning nameserver during installation, the IP address of **ftp.netbsd.org** is `204.152.184.75` (as of June, 2002).

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

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

NFS

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

You need to know the numeric IP address of the NFS server, and, if the server is not on a network directly connected to the machine on which you're installing or upgrading NetBSD, you need to know the numeric IP address of the router closest to the NetBSD machine. Finally, you need to know the numeric IP address of the NetBSD machine itself.

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

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

Tape

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

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

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

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

```
# cd .../NetBSD-1.6
# cd evbarm/binary
# tar -cf tape_device misc etc kern
```

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

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

Upgrade

If you are upgrading NetBSD, you also have the option of installing NetBSD by putting the new distribution sets somewhere in your existing file system, and using them from there. To do that, you must do the following:

Place the distribution sets you wish to upgrade somewhere in your current file system tree. Please note that the /dev on the floppy used for upgrades only knows about wd0, wd1, sd0, sd1, and sd2. If you have more than two IDE drives or more than three SCSI drives, you should take care not to place the sets on the high-numbered drives.

At a bare minimum, you must upgrade the **base** and **kern** binary distributions, and so must put the **base** and **kern** sets somewhere in your file system. If you wish, you can do the other sets, as well, but you should *not* upgrade the **etc** distribution; it contains contains system configuration files that you should review and update by hand.

Once you have done this, you can proceed to the next step in the upgrade process, actually upgrading your system.

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 the target system that you wish to keep. Mistakes in e.g. partitioning your hard disk may lead to data loss.

Preparation for the Intel IQ80310

The IQ80310 uses RedBoot firmware from Red Hat, Inc. RedBoot supports loading the kernel via the serial port and the on-board Ethernet. These notes assume that the Ethernet will be used to load the kernel. RedBoot uses the Trivial File Transfer Protocol (TFTP) to load the kernel via the network.

These notes also assume that the IQ80310 will be run as a diskless system; that an NFS server will provide the root file system. The NetBSD kernel uses the Dynamic Host Configuration Protocol (DHCP) to obtain network address and root file system information.

The first step is to configure your DHCP, NFS, and TFTP server software. You will need the MAC address for the on-board Ethernet, which RedBoot can provide; see the RedBoot documentation for more information.

The next step is to configure RedBoot to obtain its IP address from your DHCP server; see the RedBoot documentation for more information.

Once your DHCP server and RedBoot are properly configured, you should see information similar to the following when the IQ80310 is reset or powered-up:

```
RedBoot(tm) debug environment - built 17:16:14, Feb 12 2001
Platform: IQ80310 (XScale)
Copyright (C) 2000, Red Hat, Inc.

RAM: 0xa0000000-0xa2000000
FLASH: 0x00000000 - 0x00800000, 64 blocks of 0x00020000 bytes each.
IP: 192.168.0.10, Default server: 192.168.0.1
RedBoot>
```

A compressed kernel image and loader suitable for placing into flash is provided with the distribution. Use of this image is optional; a kernel that can be directly loaded over the network by RedBoot is also provided.

The image for the IQ80310 can be found under the NetBSD/evbarm 1.6 distribution directory in `evbarm/binary/gzimg/gzimg_IQ80310_flash_0x00080000.gz`, and corresponds to the kernel in `evbarm/binary/kernel/netbsd-IQ80310.gz`. The following steps describe how to copy the compressed kernel image into flash.

1. Uncompress the gzimg file and place it into the TFTP server's download area (note, the kernel inside the gzimg is still compressed after this step).

   ```
   server# gzcat gzimg_IQ80310_flash_0x00080000.gz > /tftpboot/gzimg_IQ80310_flash_0x00080000
   ```

2. Load the gzimg from the TFTP server.

   ```
   RedBoot> load -r -b 0xa0200000 gzimg_IQ80310_flash_0x00080000
   Raw file loaded 0xa0200000-0xa0305fe0
   ```

3. Use the RedBoot **fis** command to copy the image into flash. For more information on the RedBoot Flash Image System, see the RedBoot documentation.

   ```
   RedBoot> fis create -b 0xa0200000 -f 0x00080000 -l 0x00200000 netbsd.gz
   ... Erase from 0x00080000-0x00280000: .....
   ... Program from 0xa0200000-0xa0400000 at 0x00080000: .....
   ... Unlock from 0x007e0000-0x00800000: .
   ... Erase from 0x007e0000-0x00800000: .
   ... Program from 0xa1fd0000-0xa1ff0000 at 0x007e0000: .
   ... Lock from 0x007e0000-0x00800000: .
   ```

Once the compressed kernel image has been copied into flash, it may be started by jumping to the flash address of the image:

```
RedBoot> g 0x00080000

>> NetBSD/IQ80310 Gzip Boot, Revision 1.1
>> (root@tgm, Thu Mar 28 18:32:45 PST 2002)
>> RAM 0xa0000000 - 0xaffffff, heap at 0xaffd0000
>> Load address: 0xa0200000
>> Image size: 741244
Uncompressing image...done.
Jumping to image @ 0xa0200000...

NetBSD/evbarm (IQ80310) booting ...
```

```
Resetting secondary PCI bus...
initarm: Configuring system ...
physmemory: 65536 pages at 0xa0000000 -> 0xaffffffff
init subsystems: stacks vectors undefined pmap irq done.
[ using 155084 bytes of netbsd ELF symbol table ]
Copyright (c) 1996, 1997, 1998, 1999, 2000, 2001, 2002
    The NetBSD Foundation, Inc.  All rights reserved.
Copyright (c) 1982, 1986, 1989, 1991, 1993
    The Regents of the University of California.  All rights reserved.

NetBSD 1.5ZC (IQ80310) #20: Fri Mar 29 10:25:53 PST 2002
    root@tgm:/u1/netbsd/src/sys/arch/evbarm/compile/IQ80310
total memory = 256 MB
avail memory = 232 MB
using 1228 buffers containing 13208 KB of memory
mainbus0 (root)
cpu0 at mainbus0: i80200 step A-0 (XScale core)
cpu0: DC enabled IC enabled WB enabled LABT
cpu0: 32KB/32B 32-way Instruction cache
cpu0: 32KB/32B 32-way write-back-locking Data cache
obio0 at mainbus0: board rev. F, CPLD rev. D, backplane present
com0 at obio0 addr 0xfe810000: ns16550a, working fifo
com0: console
com1 at obio0 addr 0xfe800000: ns16550a, working fifo
iopxs0 at mainbus0: i80312 Companion I/O, acting as PCI host
iopxs0: configuring Secondary PCI bus
pci0 at iopxs0 bus 1
pci0: i/o space, memory space enabled
ppb0 at pci0 dev 7 function 0: Digital Equipment DECchip 21154 PCI-PCI Bridge (rev. 0
pci1 at ppb0 bus 2
pci1: i/o space, memory space enabled
fxp0 at pci1 dev 0 function 0: i82559S Ethernet, rev 9
fxp0: interrupting at iq80310 irq 1
fxp0: Ethernet address 00:80:4d:46:0b:b9
inphy0 at fxp0 phy 1: i82555 10/100 media interface, rev. 4
inphy0: 10baseT, 10baseT-FDX, 100baseTX, 100baseTX-FDX, auto
clock: hz=100 stathz=0 profhz=0
boot device: <unknown>
root device:
```

Preparation for the Intel IQ80321

The IQ80321 uses RedBoot firmware from Red Hat, Inc. RedBoot supports loading the kernel via the serial port and the on-board Ethernet. These notes assume that the Ethernet will be used to load the kernel. RedBoot uses the Trivial File Transfer Protocol (TFTP) to load the kernel via the network.

These notes also assume that the IQ80321 will be run as a diskless system; that an NFS server will provide the root file system. The NetBSD kernel uses the Dynamic Host Configuration Protocol (DHCP) to obtain network address and root file system information.

The first step is to configure your DHCP, NFS, and TFTP server software. You will need the MAC address for the on-board Ethernet, which RedBoot can provide; see the RedBoot documentation for more information.

The next step is to configure RedBoot to obtain its IP address from your DHCP server; see the RedBoot documentation for more information.

Once your DHCP server and RedBoot are properly configured, you should see information similar to the following when the IQ80321 is reset or powered-up:

```
Ethernet eth0: MAC address 00:07:e9:03:38:40
IP: 192.168.0.11, Default server: 192.168.0.1

RedBoot(tm) bootstrap and debug environment [ROM]
Non-certified release, version UNKNOWN - built 11:21:56, Feb  1 2002

Platform: IQ80321 (XScale)
Copyright (C) 2000, 2001, 2002, Red Hat, Inc.

RAM: 0x00000000-0x08000000, 0x00017008-0x01ddd000 available
FLASH: 0xf0000000 - 0xf0800000, 64 blocks of 0x00020000 bytes each.
RedBoot>
```

A compressed kernel image and loader suitable for placing into flash is provided with the distribution. Use of this image is optional; a kernel that can be directly loaded over the network by RedBoot is also provided.

The image for the IQ80321 can be found under the NetBSD/evbarm 1.6 distribution directory in evbarm/binary/gzimg/gzimg_IQ80321_flash_0xf0080000.gz, and corresponds to the kernel in evbarm/binary/kernel/netbsd-IQ80321.gz. The following steps describe how to copy the compressed kernel image into flash.

1. Uncompress the gzimg file and place it into the TFTP server's download area (note, the kernel inside the gzimg is still compressed after this step).

   ```
   server# gzcat gzimg_IQ80321_flash_0xf0080000.gz > /tftpboot/gzimg_IQ80321_flash_0xf0080000
   ```

2. Load the gzimg from the TFTP server.

   ```
   RedBoot> load -r -b 0x00200000 gzimg_IQ80321_flash_0xf0080000
   Raw file loaded 0x00200000-0x00305fe4
   ```

3. Use the RedBoot **fis** command to copy the image into flash. For more information on the RedBoot Flash Image System, see the RedBoot documentation.

   ```
   RedBoot> fis create -b 0x00200000 -f 0xf0080000 -l 0x00200000 netbsd.gz
   * CAUTION * about to program 'netbsd.gz'
               at 0xf0080000..0xf027ffff from 0x00200000 - are you sure (y/n)? y
   ... Erase from 0xf0080000-0xf0280000: .....................
   ... Program from 0x00200000-0x00400000 at 0xf0080000: .....................
   ... Unlock from 0xf07e0000-0xf0800000:.
   ```

... Erase from 0xf07e0000-0xf0800000: .
... Program from 0x01ddf000-0x01dff000 at 0xf07e0000: .
... Lock from 0xf07e0000-0xf0800000: .

Once the compressed kernel image has been copied into flash, it may be started by jumping to the flash address of the image:

```
RedBoot> g 0xf0080000

>> NetBSD/IQ80321 Gzip Boot, Revision 1.1
>> (root@tgm, Thu Mar 28 18:32:45 PST 2002)
>> RAM 0xa0000000 - 0xa7ffffff, heap at 0xa7fd0000
>> Load address: 0xa0200000
>> Image size: 739495
Uncompressing image...done.
Jumping to image @ 0xa0200000...

NetBSD/evbarm (IQ80321) booting ...
initarm: Configuring system ...
physmemory: 32768 pages at 0xa0000000 -> 0xa7ffffff
init subsystems: stacks vectors undefined pmap irq done.
[ using 155076 bytes of netbsd ELF symbol table ]
Copyright (c) 1996, 1997, 1998, 1999, 2000, 2001, 2002
    The NetBSD Foundation, Inc.  All rights reserved.
Copyright (c) 1982, 1986, 1989, 1991, 1993
    The Regents of the University of California.  All rights reserved.

NetBSD 1.5ZC (IQ80321) #1: Thu Mar 28 18:31:58 PST 2002
    root@tgm:/u1/netbsd/src/sys/arch/evbarm/compile/IQ80321
total memory = 128 MB
avail memory = 113 MB
using 1228 buffers containing 6656 KB of memory
mainbus0 (root)
cpu0 at mainbus0: i80321 step A-0 (XScale core)
cpu0: DC enabled IC enabled WB enabled LABT
cpu0: 32KB/32B 32-way Instruction cache
cpu0: 32KB/32B 32-way write-back-locking Data cache
obio0 at mainbus0
com0 at obio0 addr 0xfe800000: ns16550a, working fifo
com0: console
iopxs0 at mainbus0: i80321 I/O Processor, acting as PCI host
iopxs0: configuring PCI bus
pci0 at iopxs0 bus 0
pci0: i/o space, memory space enabled, rd/line, rd/mult, wr/inv ok
wm0 at pci0 dev 4 function 0: Intel i82544 1000BASE-T Ethernet, rev. 2
wm0: interrupting at iop321 irq 27
wm0: Ethernet address 00:07:e9:03:38:40
makphy0 at wm0 phy 1: Marvell 88E1000 Gigabit PHY, rev. 0
makphy0: 10baseT, 10baseT-FDX, 100baseTX, 100baseTX-FDX, 1000baseT, 1000baseT-FDX, au
clock: hz=100 stathz=0 profhz=0
boot device: <unknown>
root device:
```

Installing the NetBSD System

Installation for the Intel IQ80310

The following steps describe how to set up an NFS root environment for the IQ80310 and how to boot the IQ80310.

1. Place the kernel into the TFTP server's download area.

   RedBoot only loads S-Records, so select a kernel with the ``.srec'' filename suffix. In this example, we will boot the kernel hard-wired to use the on-board Ethernet as the root device.

   ```
   server# cp netbsd-fxp0.srec /tftpboot/netbsd-iq80310-fxp0
   ```

2. Unpack the distribution sets into the target's root directory.

   ```
   server# cd /export/client/iq80310
   server# gzcat .../base.tgz | tar xvpf -
   server# gzcat .../etc.tgz | tar xvpf -
   [repeat for all sets you wish to unpack [0
   ```

3. Load the kernel from the TFTP server.

   ```
   RedBoot> load netbsd-iq80310-fxp0
   Entry point: 0xa0200000, address range: 0xa0200000-0xa035e07c
   RedBoot>
   ```

4. Start the kernel running. The kernel will display boot message, probe for devices, and mount the root file system. If you used a kernel hard-wired to use the on-board Ethernet, it will attempt to mount the root file system automatically. Otherwise, it will prompt for the root device to use.

   Since the system's run-time environment has not yet been configured, the system should boot into single-user mode.

   ```
   RedBoot> go

   NetBSD/evbarm (IQ80310) booting ...
   Resetting secondary PCI bus...
   initarm: Configuring system ...
   physmemory: 65536 pages at 0xa0000000 -> 0xaffffffff
   init subsystems: stacks vectors undefined pmap irq done.
   [ using 155084 bytes of netbsd ELF symbol table ]
   Copyright (c) 1996, 1997, 1998, 1999, 2000, 2001, 2002
       The NetBSD Foundation, Inc.  All rights reserved.
   Copyright (c) 1982, 1986, 1989, 1991, 1993
       The Regents of the University of California.  All rights reserved.

   NetBSD 1.5ZC (IQ80310) #20: Fri Mar 29 10:25:53 PST 2002
       root@tgm:/u1/netbsd/src/sys/arch/evbarm/compile/IQ80310
   total memory = 256 MB
   avail memory = 232 MB
   ```

```
using 1228 buffers containing 13208 KB of memory
mainbus0 (root)
cpu0 at mainbus0: i80200 step A-0 (XScale core)
cpu0: DC enabled IC enabled WB enabled LABT
cpu0: 32KB/32B 32-way Instruction cache
cpu0: 32KB/32B 32-way write-back-locking Data cache
obio0 at mainbus0: board rev. F, CPLD rev. D, backplane present
com0 at obio0 addr 0xfe810000: ns16550a, working fifo
com0: console
com1 at obio0 addr 0xfe800000: ns16550a, working fifo
iopxs0 at mainbus0: i80312 Companion I/O, acting as PCI host
iopxs0: configuring Secondary PCI bus
pci0 at iopxs0 bus 1
pci0: i/o space, memory space enabled
ppb0 at pci0 dev 7 function 0: Digital Equipment DECchip 21154 PCI-PCI Bridge (rev
pci1 at ppb0 bus 2
pci1: i/o space, memory space enabled
fxp0 at pci1 dev 0 function 0: i82559S Ethernet, rev 9
fxp0: interrupting at iq80310 irq 1
fxp0: Ethernet address 00:80:4d:46:0b:b9
inphy0 at fxp0 phy 1: i82555 10/100 media interface, rev. 4
inphy0: 10baseT, 10baseT-FDX, 100baseTX, 100baseTX-FDX, auto
clock: hz=100 stathz=0 profhz=0
boot device: <unknown>
root on fxp0
nfs_boot: trying DHCP/BOOTP
nfs_boot: DHCP next-server: 192.168.0.1
nfs_boot: my_name=iq80310.lab.wasabisystems.com
nfs_boot: my_domain=wasabisystems.com
nfs_boot: my_addr=192.168.0.10
nfs_boot: my_mask=255.255.255.0
nfs_boot: gateway=192.168.0.254
root on 192.168.0.1:/export/client/iq80310
/etc/rc.conf is not configured.  Multiuser boot aborted.
Enter pathname of shell or RETURN for sh:
```

Installation for the Intel IQ80321

The following steps describe how to set up an NFS root environment for the IQ80321 and how to boot the IQ80321.

1. Place the kernel into the TFTP server's download area.

   RedBoot only loads S-Records, so select a kernel with the ``.srec'' filename suffix. In this example, we will boot the kernel hard-wired to use the on-board Ethernet as the root device.

   ```
   server# cp netbsd-wm0.srec /tftpboot/netbsd-iq80321-wm0
   ```

2. Unpack the distribution sets into the target's root directory.

   ```
   server# cd /export/client/iq80321
   server# gzcat .../base.tgz | tar xvpf -
   server# gzcat .../etc.tgz | tar xvpf -
   [repeat for all sets you wish to unpack [0
   ```

3. Load the kernel from the TFTP server.

```
RedBoot> load netbsd-iq80321-wm0
Entry point: 0x00200000, address range: 0x00200000-0x00396a40
RedBoot>
```

4. Start the kernel running. The kernel will display boot message, probe for devices, and mount the root file system. If you used a kernel hard-wired to use the on-board Ethernet, it will attempt to mount the root file system automatically. Otherwise, it will prompt for the root device to use.

   Since the system's run-time environment has not yet been configured, the system should boot into single-user mode.

```
RedBoot> go

NetBSD/evbarm (IQ80321) booting ...
initarm: Configuring system ...
physmemory: 32768 pages at 0xa0000000 -> 0xa7ffffff
init subsystems: stacks vectors undefined pmap irq done.
[ using 156468 bytes of netbsd ELF symbol table ]
Copyright (c) 1996, 1997, 1998, 1999, 2000, 2001, 2002
    The NetBSD Foundation, Inc.  All rights reserved.
Copyright (c) 1982, 1986, 1989, 1991, 1993
    The Regents of the University of California.  All rights reserved.

NetBSD 1.5ZC (IQ80321) #1: Thu Mar 28 18:20:34 PST 2002
    root@tgm:/u1/netbsd/src/sys/arch/evbarm/compile/IQ80321
total memory = 128 MB
avail memory = 113 MB
using 1228 buffers containing 6656 KB of memory
mainbus0 (root)
cpu0 at mainbus0: i80321 step A-0 (XScale core)
cpu0: DC enabled IC enabled WB enabled LABT
cpu0: 32KB/32B 32-way Instruction cache
cpu0: 32KB/32B 32-way write-back-locking Data cache
obio0 at mainbus0
com0 at obio0 addr 0xfe800000: ns16550a, working fifo
com0: console
iopxs0 at mainbus0: i80321 I/O Processor, acting as PCI host
iopxs0: configuring PCI bus
pci0 at iopxs0 bus 0
pci0: i/o space, memory space enabled, rd/line, rd/mult, wr/inv ok
wm0 at pci0 dev 4 function 0: Intel i82544 1000BASE-T Ethernet, rev. 2
wm0: interrupting at iop321 irq 27
wm0: Ethernet address 00:07:e9:03:38:40
makphy0 at wm0 phy 1: Marvell 88E1000 Gigabit PHY, rev. 0
makphy0: 10baseT, 10baseT-FDX, 100baseTX, 100baseTX-FDX, 1000baseT, 1000baseT-FDX,
clock: hz=100 stathz=0 profhz=0
```

```
boot device: <unknown>
root on wm0
nfs_boot: trying DHCP/BOOTP
nfs_boot: DHCP next-server: 192.168.0.1
nfs_boot: my_name=iq80321.lab.wasabisystems.com
nfs_boot: my_domain=wasabisystems.com
nfs_boot: my_addr=192.168.0.11
nfs_boot: my_mask=255.255.255.0
nfs_boot: gateway=192.168.0.254
root on 192.168.0.1:/export/client/iq80321
/etc/rc.conf is not configured.  Multiuser boot aborted.
Enter pathname of shell or RETURN for sh:
```

Post installation steps

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

1. Configuring /etc/rc.conf

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

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

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

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

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

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

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

   If your /usr directory is on a separate partition and you do not know how to use **ed**, you will have to mount your /usr partition to gain access to **ex** or **vi**. Do the following:

   ```
   # mount /usr
   # export TERM=vt220
   ```

   If you have /var on a separate partition, you need to repeat that step for it. After that, you can edit /etc/rc.conf with vi(1). When you have finished, type **exit** at the prompt to leave the single-user

shell and continue with the multi-user boot.

Other values that need to be set in /etc/rc.conf for a networked environment are *hostname* and possibly *defaultroute*, furthermore add an *ifconfig_int* for your <int> network interface, along the lines of

```
ifconfig_de0="inet 123.45.67.89 netmask 255.255.255.0"
```

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

```
ifconfig_de0="inet myname.my.dom netmask 255.255.255.0"
```

To enable proper hostname resolution, you will also want to add an /etc/resolv.conf file or (if you are feeling a little more adventurous) run named(8). See resolv.conf(5) or named(8) for more information.

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

2. Logging in

   After reboot, you can log in as root at the login prompt. Unless you've set a password in **sysinst**, there is no initial password. If you're using the machine in a networked environment, you should create an account for yourself (see below) and protect it and the ``root'' account with good passwords. Unless you have connected an unusual terminal device as the console you can just press RETURN when it prompts for Terminal type? [...].

3. Adding accounts

   Use the useradd(8) command to add accounts to your system; *do not* edit /etc/passwd directly. See useradd(8) for more information on how to add a new user to the system.

4. The X Window System

   If you have installed the X Window System, look at the files in /usr/X11R6/lib/X11/doc for information.

   Don't forget to add /usr/X11R6/bin to your path in your shell's dot file so that you have access to the X binaries.

5. Installing third party packages

   If you wish to install any of the software freely available for UNIX-like systems you are strongly advised to first check the NetBSD package system. This automatically handles any changes necessary to make the software run on NetBSD, retrieval and installation of any other packages on which the software may depend, and simplifies installation (and deinstallation), both from source and precompiled binaries.

   - More information on the package system is at
     http://www.netbsd.org/Documentation/software/packages.html
   - A list of available packages suitable for browsing is at
     ftp://ftp.netbsd.org/pub/NetBSD/packages/pkgsrc/README.html
   - Precompiled binaries can be found at
     ftp://ftp.netbsd.org/pub/NetBSD/packages,
     usually in the 1.6/evbarm/All subdir. You can install them with

the following commands:

```
# PKG_PATH=ftp://ftp.netbsd.org/pub/NetBSD/packages/1.6/evbarm/All
# export PKG_PATH
# pkg_add -v tcsh
# pkg_add -v apache
# pkg_add -v perl
...
```

The above commands will install the tcsh shell, the Apache web server and the perl programming language as well as all the packages they depend on.

- Package sources for compiling packages on your own can be obtained by retrieving the file
  ftp://ftp.netbsd.org/pub/NetBSD/NetBSD-current/tar_files/pkgsrc.tar.gz
  They are typically extracted into /usr/pkgsrc (though other locations work fine), with the commands:

  ```
  # mkdir /usr/pkgsrc
  # ( cd /usr/pkgsrc ; tar -zxpf - ) < pkgsrc.tar.gz
  ```

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

6. Misc

   - Edit /etc/mail/aliases to forward root mail to the right place. Don't forget to run newaliases(1) afterwards.
   - The /etc/mail/sendmail.cf file will almost definitely need to be adjusted; files aiding in this can be found in /usr/share/sendmail. See the README file there for more information.
   - Edit /etc/rc.local to run any local daemons you use.
   - Many of the /etc files are documented in section 5 of the manual; so just invoking

     ```
     # man 5 filename
     ```

     is likely to give you more information on these files.

Upgrading a previously-installed NetBSD System

There is no previous release of NetBSD/evbarm from which to upgrade.

Compatibility Issues With Previous NetBSD Releases

Users upgrading from previous versions of NetBSD may wish to bear the following problems and compatibility issues in mind when upgrading to NetBSD 1.6.

Issues affecting an upgrade from NetBSD 1.5

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

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

Issues fixed by *postinstall*:

- Various files in /etc need upgrading. These include:
  - /etc/defaults/*
  - /etc/mtree/*
  - /etc/daily
  - /etc/weekly
  - /etc/monthly
  - /etc/security
  - /etc/rc.subr
  - /etc/rc
  - /etc/rc.shutdown
  - /etc/rc.d/*
- The following files are now obsolete: /etc/rc.d/NETWORK and /etc/rc.d/gated.
- The following rc.conf(5) entries are now obsolete: amd_master, ip6forwarding, defcorename, and nfsiod_flags. critical_filesystems_beforenet has been replaced by critical_filesystems_local. critical_filesystems has been replaced by critical_filesystems_remote.
- The users and groups 'named', 'ntpd', and 'sshd' need to be created.
- The configuration files for ssh(1) and sshd(8) were moved from /etc to /etc/ssh, including ssh_known_hosts* files and the host key files ssh_host*_key*. /etc/ssh.conf was renamed to /etc/ssh/ssh_config, and /etc/sshd.conf was renamed to /etc/ssh/sshd_config.
- The **mux** entries in wscons.conf(5) are now obsolete.

The following issues need to be resolved manually:

- postfix(8) configuration files require upgrading.

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

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

Issues affecting an upgrade from NetBSD 1.4 or prior

- /etc/rc modified to use /etc/rc.d/*

  Prior to NetBSD 1.5, /etc/rc was a traditional BSD style monolithic file; each discrete program or substem from /etc/rc and /etc/netstart has been moved into separate scripts in /etc/rc.d/.

  At system startup, /etc/rc uses rcorder(8) to build a dependency list of the files in /etc/rc.d and then executes each script in turn with an argument of 'start'. Many rc.d scripts won't start unless the appropriate rc.conf(5) entry in /etc/rc.conf is set to 'YES.'

  At system shutdown, /etc/rc.shutdown uses rcorder(8) to build a dependency list of the files in /etc/rc.d that have a ''KEYWORD: shutdown'' line, reverses the resulting list, and then executes each script in turn with an argument of 'stop'. The following scripts support a specific shutdown method: cron, inetd, local, and xdm.

  Local and third-party scripts may be installed into /etc/rc.d as necessary. Refer to the other scripts in that directory and rc(8) for more information on implementing rc.d scripts.

- named(8) leaks version information.

  Previous releases of NetBSD disabled a feature of named(8) where the version number of the server could be determined by remote clients. This feature has not been disabled in NetBSD 1.5, because there is a named.conf(5) option to change the version string:

```
option {
        version "newstring";
};
```

- sysctl(8) was moved from /usr/sbin/sysctl to /sbin/sysctl. If you have hardcoded references to the full pathname (in shell scripts, for example) please be sure to update those.

- sendmail(8) configuration file pathname changed.

  Due to sendmail(8) upgrade from 8.9.x to 8.10.x, /etc/sendmail.cf is moved to /etc/mail/sendmail.cf. Also, the default sendmail.cf(5) refers different pathnames than before. For example, /etc/aliases is now located at /etc/mail/aliases, /etc/sendmail.cw is now called /etc/mail/local-host-names, and so forth. If you have customized sendmail.cf(5) and friends, you will need to move the files to the new locations. See /usr/share/sendmail/README for more information.

Using online NetBSD documentation

Documentation is available if you first install the manual distribution set. Traditionally, the ''man pages'' (documentation) are denoted by 'name(section)'. Some examples of this are

- intro(1),
- man(1),

- apropros(1),
- passwd(1), and
- passwd(5).

The section numbers group the topics into several categories, but three are of primary interest: user commands are in section 1, file formats are in section 5, and administrative information is in section 8.

The *man* command is used to view the documentation on a topic, and is started by entering **man** [*section*] *topic*. The brackets [] around the section should not be entered, but rather indicate that the section is optional. If you don't ask for a particular section, the topic with the lowest numbered section name will be displayed. For instance, after logging in, enter

```
# man passwd
```

to read the documentation for passwd(1). To view the documentation for passwd(5), enter

```
# man 5 passwd
```

instead.

If you are unsure of what man page you are looking for, enter **apropos** *subject-word*

where *subject-word* is your topic of interest; a list of possibly related man pages will be displayed.

Administrivia

If you've got something to say, do so! We'd like your input. There are various mailing lists available via the mailing list server at majordomo@netbsd.org. To get help on using the mailing list server, send mail to that address with an empty body, and it will reply with instructions.

There are various mailing lists set up to deal with comments and questions about this release. Please send comments to: netbsd-comments@netbsd.org.

To report bugs, use the send-pr(1) command shipped with NetBSD, and fill in as much information about the problem as you can. Good bug reports include lots of details. Additionally, bug reports can be sent by mail to: netbsd-bugs@netbsd.org.

Use of send-pr(1) is encouraged, however, because bugs reported with it are entered into the NetBSD bugs database, and thus can't slip through the cracks.

There are also port-specific mailing lists, to discuss aspects of each port of NetBSD. Use majordomo to find their addresses, or visit **http://www.netbsd.org/MailingLists/**. If you're interested in doing a serious amount of work on a specific port, you probably should contact the 'owner' of that port (listed below).

If you'd like to help with this effort, and have an idea as to how you could be useful, send us mail or subscribe to: netbsd-help@netbsd.org.

As a favor, please avoid mailing huge documents or files to these mailing lists. Instead, put the material you would have sent up for FTP or WWW somewhere, then mail the appropriate list about it, or, if you'd rather not do that, mail the list saying you'll send the data to those who want it.

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- The Internet Research Institute in Japan for hosting the server which runs the CVSweb interface to the NetBSD source tree.

- The many organisations that provide NetBSD mirror sites.

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(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.)

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