NAME

INSTALL — Installation procedure for NetBSD/evbarm.

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DESCRIPTION

About this Document

This document describes the installation procedure for NetBSD 4.0_RC2 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 four different system architectures (ports), featuring seventeen machine architectures across fifteen distinct CPU families, and is being ported to more. The NetBSD 4.0_RC2 release contains complete binary releases for many different system architectures. (A few ports are not fully supported at this time and are thus not part of the binary distribution. For information on them, please see the NetBSD web site at .: **http://www.NetBSD.org/**)

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

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

Changes Between The NetBSD 3.0 and 4.0 Releases

The NetBSD 4.0 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 more than a year of development that went into the NetBSD 4.0_RC2 release.

The complete list of changes can be found in the CHANGES:

ftp://ftp.NetBSD.org/pub/NetBSD/NetBSD-4.0/CHANGES

and CHANGES-4.0:

ftp://ftp.NetBSD.org/pub/NetBSD/NetBSD-4.0/CHANGES-4.0

files in the top level directory of the NetBSD 4.0 release tree. Some highlights include:

Networking

- `agr`(4): new pseudo-device driver for link level aggregation.
- IPv6 support was extended with an RFC 3542-compliant API and added for `gre`(4) tunnels and the `tun`(4) device.
- A NDIS-wrapper was added to use Windows binary drivers on the i386 platform, see `ndiscvt`(8).
- The IPv4 source-address selection policy can be set from a number of algorithms. See "IPSRCSEL" in `options`(4) and `in_getifa`(9).
- Imported `wpa_supplicant`(8) and `wpa_cli`(8). Utilities to connect and handle aspects of 802.11 WPA networks.
- Imported `hostapd`(8). An authenticator for IEEE 802.11 networks.
- `carp`(4): imported Common Address Redundancy Protocol to allow multiple hosts to share a set of IP addresses for high availability / redundancy, from OpenBSD.
- ALTQ support for the PF packet filter.
- `ftpd`(8) can now run in standalone mode, instead of from `inetd`(8).
- `tftp`(1) now has support for multicast TFTP operation in open-loop mode, server is in progress.

Filesystems

- `scan_ffs`(8), `scan_lfs`(8): Utilities to find FFSv1/v2 and LFS partitions to recover lost disklabels.
- tmpfs: Added a new memory-based file system aimed at replacing mfs. Contrary to mfs, it is not based on a disk file system, so it is more efficient both in overall memory consumption and speed. See `mount_tmpfs`(8).
- Added UDF support for optical media and block devices, see `mount_udf`(8). Read-only for now.
- NFS export list handling was changed to be filesystem independent.
- LFS: Lots of stability improvements and new cleaner daemon. It is now also possible to use LFS as root filesystem.
- Support for System V Boot File System was added, see `newfs_sysvbfs`(8) and `mount_sysvbfs`(8).

Drivers

- Audio:
  - Support for new models on drivers such as Intel ICH8/6300ESB, NVIDIA nForce 3/4, etc.
  - Added support for AC'97 modems.
  - auich(4): added support to handle the AC'97 modem as audio device, enabled with the kernel option "AUICH_ATTACH_MODEM"
  - azalia(4): added support for S/PDIF.
- Hardware Monitors:
  - amdpm(4): added support for the i2c bus on the AMD-8111 used on many Opteron motherboards and for the Analog Devices ADT7464 hardware monitor chip.
  - adt7467c(4): new driver for Analog Devices ADT7467 and ADM1030 hardware monitor chips.
  - ipmi(4): new driver for motherboards implementing the Intelligent Platform Management Interface 1.5 or 2.0, from OpenBSD.
  - it(4): new driver for iTE 8705F/8712F and SiS 950 hardware monitors.
  - The lm(4) driver was rewritten and support for more chips was added, for example for Winbond W83627HF, W83627THF, W83627DHG and Asus AS99127F.
  - owtemp(4): new driver for the 1-Wire temperature sensors.
  - tmp121temp(4): new driver for the Texas Instruments TMP121 temperature sensor.
  - ug(4): new driver for ASUS Abit uGuru hardware monitor found on newer ASUS motherboards.
- Networking:
  - ath(4): updated HALs with support for WiSOC (AR531x) and 32bit SPARC.
  - bge(4): added support for the following chips: BCM5753, BCM5753M, BCM5715, BCM5754, BCM5755 and BCM5787. Numerous improvements and bugfixes were made too.
  - kse(4): new driver for Micrel KSZ8842/8841 PCI network cards.
  - msk(4): new driver for Marvell Yukon 2 GigE PCI network cards, from OpenBSD.
  - nfe(4): new driver for NVIDIA nForce Ethernet network cards, from OpenBSD.
  - ral(4): new 802.11 driver for PCI/Cardbus Ralink RT2500, RT2501, RT2600, RT2661 and RT2500 USB chipsets, from OpenBSD.
  - rum(4): new 802.11 driver for USB Ralink RT2501 and RT2601 chipsets, from OpenBSD.
  - sip(4): now works on sparc64.
  - tlp(4): added support for ASIX AX88140A and AX88141.
  - vr(4): added support for the VIA Rhine III.
  - wm(4): added support for i8003, ICH8, ICH9 and others.
  - wpi(4): new driver for Intel PRO/Wireless 3945ABG PCI 802.11 network cards, from OpenBSD.
- Security:

  - glxsb(4): new driver for the AMD Geode LX AES Security Block that provides random numbers and AES acceleration, from OpenBSD.

- Power Management:
  - Support for Intel Speedstep SMI on PIIX4 PCI-ISA for i386.
  - Support for AMD PowerNow and Cool'n'Quiet Technology on K7 and K8 CPUs (both in 32 and 64 bit mode), including Athlon Mobile, Athlon64, Opteron or X2.
  - Support for more Enhanced Speedstep CPUs, including VIA C7/Eden and Intel Core Solo/Duo/Duo2.
- Storage:
  - ahcisata(4): new driver for AHCI 1.0 and 1.1 compliant SATA controllers.
  - ataraid(4): added support to handle Adaptec HostRAID and VIA V-Tech software RAID.
  - ciss(4): new driver for HP/Compaq 5th+ generation Smart ARRAY controllers, from OpenBSD.
  - fdc(4): added support for SBus based sparc64 machines and fixed formatting on sparc.
  - gcscide(4): new driver for the AMD Geode CS5535 Companion Device IDE controller.
  - jmide(4): new driver for JMicron Technology JMB36x PCIe to SATA II/PATA controllers.
  - mfi(4): new driver for LSI Logic and Dell MegaRAID SAS controllers, from OpenBSD.
  - njata(4): new driver for Workbit NinjaATA-32 CardBus IDE controller.
  - svwsata(4): new driver for Serverworks K2 SATA controllers, from OpenBSD.
  - viaide(4) added support for the VIA VT8237A SATA controller and AMD CS5536 Companion Device IDE Controller.
- USB:
  - ucycom(4): new driver for Cypress microcontroller based serial devices.
  - uipaq(4): new driver for the iPAQ devices.
  - uslsa(4): new driver for Silicon Labs CP210x series serial adapters.
  - utoppy(4): new driver for the Topfield TF5000PVR range of digital video recorders.

Platforms

- i386:
  - Added support for the for Multiboot specification. This means much improved support for loading the kernel by GRUB, including passing in parameters to the kernel.
  - vesafb(4): added new framebuffer driver that supports VESA BIOS (VBE) 2.0 extensions and up.
  - Added cd9660 file system support to the BIOS bootloader.
- evbarm: New platform support for Arcom Viper PXA255-based single board, Atmark Techno Armadillo-9 and Armadillo-210, Linksys NSLU2 (a.k.a. "Slug") and I-O DATA HDL-G Giga LANDISK NAS devices.
- evbmips: Add support for Alchemy Au1550 processors, DBAu1550 boards, Alchemy Au15XX PCI host, (OMS-AL400/128) and Atheros AR5312 SoC.

- New port ews4800mips: NEC's MIPS based EWS4800 workstations.
- cobalt: Add support from booting off raidframe RAID1 mirrors.
- hpcmips: Added the `teliosio`(4) driver for the Sharp Telios LCD screen and Battery unit.
- New port landisk: port to the SH4 processor based NAS appliances, supporting models by I-O DATA (USL-5P, HDL-U, HDL-AV, HDL-W and HDLM-U series, SuperTank LAN Tank, UHDL-160U and UHDL-300U) and Plextor PX-EH16L, PX-EH25L and PX-EH40L.
- prep: This port has been modernized, and support for five additional machines has been added, among them the IBM 7024-E20 and 7025-F30 models and Motorola Powerstack E1. Additionally, sysinst support was added, and the bootloader process was improved, allowing easy installation and upgrade to future releases.
- Xen: support for Xen3 domU and dom0, including support for hardware virtualization on CPUs that support it.

Kernel subsystems

- Improved Firewire (IEEE1394) support imported from FreeBSD.
- The `midi`(4) framework got a complete overhaul for better support of Active Sensing and improved handling of tempo and timebase changes.
- Added a Bluetooth protocol stack including:
  - hardware drivers: `ubt`(4) for USB controllers, and `bt3c`(4) for the 3Com Bluetooth PC-Card.
  - socket based access to the HCI, L2CAP, RFCOMM and SCO protocols.
  - pseudo drivers for integrating services on remote Bluetooth devices such as Keyboards, Mice and SCO Audio into the NetBSD device framework.

  See `bluetooth`(4), `bthset`(1) and `btpin`(1).
- Imported the `bio`(4) framework from OpenBSD, to query/control block device controllers. Currently supporting the `mfi`(4) driver.
- Kernel uses stateful read-ahead algorithm.
- `dkctl`(8) can be used to switch buffer queuing strategies on the fly, see also `bufq`(9).
- `fileassoc`(9) is used by Veriexec, it adds in-kernel and file-system independent file meta-data association interface.
- `firmload`(9): An API for loading firmware images used by various hardware devices.
- `gpio`(4): Imported General Purpose I/O framework from OpenBSD.
- `onewire`(4): Imported Dallas Semiconductor 1-wire bus framework from OpenBSD.
- The `proplib`(3) protocol was added for sending property lists to/from the kernel using ioctls.
- `spi`(4): New SPI (Serial Peripherial Interface) framework.
- `timecounter`(9) adds a new time-keeping infrastructure along with NTP API 4 nanokernel implementation. Almost all platforms were changed to support this API.
- Start of 32bit-Linux-emulation for amd64 (COMPAT_LINUX32).
- `wscons`(4) console driver supports splash screens, scrolling, progress bar for kernel and boot messages.

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.

Security

- The FAST_IPSEC IPsec implementation was extended to use hardware acceleration for IPv6, in addition to the hardware accelerated IPv4 that was available before. See `fast_ipsec`(4) for more information.
- `mprotect`(2) got restrictions to enforce W^X policies, from PaX. See `options`(4), `sysctl`(3), and `paxctl`(1).
- GCC 4's support for stack smashing protection (SSP) was enabled by adding libssp, see `security`(8).
- The kernel authorization framework `kauth`(9) was added, replacing the traditional BSD credential management and privileged operation access control with an abstract layer, allowing the implementation of various security models either as part of the NetBSD distribution or as third-party LKMs.

  NetBSD's kernel authorization is a hybrid clean-room implementation of a similar interface developed by Apple, extending its capabilities and combining concepts of credential inheritance control.

Userland

- 3rd party software updates:
  - BIND 9.4.1-P1
  - OpenSSL 0.9.8d
  - CVS 1.11.21
  - OpenSSH 4.4
  - gettext 0.14.4
  - PF from OpenBSD 3.7
  - (n)awk 20050424
  - Postfix 2.4.5
  - am-utils 6.1.3
  - file 4.21
  - zlib 1.2.3
  - GNU binutils 2.16.1
  - GNU groff 1.19.2
  - IPFilter 4.1.23
  - GNU gcc 4.1.1
  - NTP 4.2.2p2
  - pppd 2.4.4
- `cksum`(1) can now verify checksums.
- `identd`(1): added support for forwarding ident queries and receiving of proxied ident queries.
- `getent`(1): added support for the ethers database.

- iSCSI target (server) code added, see `iscsi-target`(8); Initiator (client) code is underway.
- `lockstat`(8): new command to display a summary of kernel locking events recorded over the lifetime of a called program.
- Various utilities to support Bluetooth were added:
  - `btconfig`(8) for controller configuration.
  - `btdevctl`(8) to manage pseudo devices relating to remote services.
  - `bthcid`(8) and `btpin`(1) for authenticating radio connections.
  - `sdpd`(8) for providing service discovery to remote devices.
  - `sdpquery`(1) for querying services on remote devices.
  - `rfcomm_sppd`(1) to access remote services over RFCOMM via stdio or pty.
  - `bthset`(1) for making connections to Bluetooth headsets.

Besides this list, there there have also been innumerable bug fixes and other miscellaneous enhancements of course.

Components removed from NetBSD

In this release of NetBSD, some software components known from previous releases were removed from the system. In some cases those were components that are not useful anymore or their utility does not justify maintenance overhead. Other components were not working properly and there was lack of interest in fixing them.

- Sushi ...
- Vinum ...
- Sendmail was removed. Postfix is the MTA and provides the `sendmail`(1) command line tool. Postfix has been included with NetBSD since NetBSD 1.5 was released in December 2005. Details about Postfix can be found in the NetBSD Guide:
  http://www.NetBSD.org/docs/guide/en/chap-mail.html.
  For those who need Sendmail, it is available from pkgsrc in the `mail/sendmail` and `mail/sendmail813` packages.
- NETCCITT ...
- NETNS ...
- UUCP was removed. The NetBSD improvements were merged into the pkgsrc version. For those who use UUCP tools, they are available from pkgsrc in the `net/uucp` package. The `cu`(1) command is available as a frontend to `tip`(1).
- The Fortran 77 compiler (g77) has been removed with the transition from GCC 3 to GCC 4, which does not include it. For those who need it, it is available from pkgsrc in the `lang/gcc3-f77` package.
- The evbsh5 port has been removed from NetBSD due to lack of interest, compounded by a lack of available SH5 hardware.

The Future of NetBSD

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

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

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

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

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

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

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

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

Sources of NetBSD

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

NetBSD 4.0_RC2 Release Contents

The root directory of the NetBSD 4.0_RC2 release is organized as follows:

`.../NetBSD-4.0_RC2/`

`CHANGES`	Changes since earlier NetBSD releases.
`LAST_MINUTE`	Last minute changes.
`MIRRORS`	A list of sites that mirror the NetBSD 4.0_RC2 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 4.0_RC2 has a binary distribution.

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

gnusrc This set contains the "gnu" sources, including the source for the compiler, assembler, groff, and the other GNU utilities in the binary distribution sets.
79 MB gzipped, 367 MB uncompressed

pkgsrc This set contains the "pkgsrc" sources, which contain the infrastructure to build third-party packages.
24 MB gzipped, 200 MB uncompressed

sharesrc This set contains the "share" sources, which include the sources for the man pages not associated with any particular program; the sources for the typesettable document set; the dictionaries; and more.
5 MB gzipped, 20 MB uncompressed

src This set contains all of the base NetBSD 4.0_RC2 sources which are not in **gnusrc**, **sharesrc**, or **syssrc**.
37 MB gzipped, 176 MB uncompressed

syssrc This set contains the sources to the NetBSD 4.0_RC2 kernel for all architectures; `config`(1); and `dbsym`(8).
26 MB gzipped, 140 MB uncompressed

xsrc This set contains the sources to the X Window System.
84 MB gzipped, 450 MB uncompressed

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

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

```
# cd / ; tar -zxpf set_name.tgz
```

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

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

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

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

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

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

NetBSD/evbarm subdirectory structure

The evbarm-specific portion of the NetBSD 4.0_RC2 release is found in the `evbarm` subdirectory of the distribution: `.../NetBSD-4.0_RC2/evbarm/`. 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/`
: 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 4.0_RC2 release for the evbarm. The binary distribution sets can be found in the `evbarm/binary/sets` subdirectory of the NetBSD 4.0_RC2 distribution tree, and are as follows:

base
: The NetBSD 4.0_RC2 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.
18 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.
21 MB gzipped, 76 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, 8 MB uncompressed

kern-INTEGRATOR
: (see below)
4 MB gzipped, 10 MB uncompressed

kern-IQ80310
: (see below)
20 MB gzipped, 54 MB uncompressed

kern-IQ80321
: (see below)
21 MB gzipped, 55 MB uncompressed

kern-TEAMASA_NPWR
: *12 MB gzipped, 35 MB uncompressed*

These sets contain a NetBSD/evbarm 4.0_RC2 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.
8 MB gzipped, 30 MB uncompressed

misc This set includes the (rather large) system dictionaries, the typesettable document set, and other files from `/usr/share`.
3 MB gzipped, 9 MB uncompressed

text This set includes NetBSD's text processing tools, including `groff`(1), all related programs, and their manual pages.
2 MB gzipped, 7 MB uncompressed

NetBSD maintains its own set of sources for the X Window System in order to assure tight integration and compatibility. These sources are based on XFree86, and tightly track XFree86 releases. They are currently equivalent to XFree86 4.4.0. Binary sets for the X Window System are distributed with NetBSD. The sets are:

xbase The basic files needed for a complete X client environment. This does not include the X servers.
6 MB gzipped, 18 MB uncompressed

xcomp The extra libraries and include files needed to compile X source code.
13 MB gzipped, 44 MB uncompressed

xfont Fonts needed by the X server and by X clients.
31 MB gzipped, 39 MB uncompressed

xetc Configuration files for X which could be locally modified.
0.03 MB gzipped, 0.17 MB uncompressed

xserver The X server.
4 MB gzipped, 9 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 4.0_RC2 runs on the following ARM architecture evaluation boards:

- Technologic Systems TS-7200
- ARM, Ltd. Integrator
- Intel IQ80310
- Intel IQ80321
- Team ASA, Inc. Npwr
- Intel IXM1200
- Samsung SMDK2800
- ADI Engineering, Inc. BRH ("Big Red Head")

- Arcom Viper

Supported devices (Technologic Systems TS-7200)

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.

- TS-5620 Real Time Clock
- Serial ports
  - On-chip EP9302 UARTs
  - TS-SER1, TS-SER2, TS-SER4 PC/104 serial adapters
  - TS-MODEM, TS-MODEM2 PC/104 land-line/cellular modems
- Ethernet adapters
  - On-chip EP9302 10/100 ethernet
  - TS-ETH10 PC/104 expansion ethernet adapters
- Other on-board functions
  - CompactFlash socket
  - USB OHCI host
  - Text-mode HD44780 LCD display header
  - Matrix keypad/GPIO header
  - Board temperature sensor and watchdog timer

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
- i80321 I/O Processor functions
  - Application Accelerator Unit
  - Watchdog timer

Supported devices (Team ASA Npwr)

The Npwr is a storage appliance based on the Intel IOP310 I/O processor chipset. This is an exhaustive list of devices supported on the Npwr as the Npwr has no expansion capability.

- Serial ports
  - On-board TI 16550 UART
- SCSI host adapters
  - On-board LSI Logic 53c1010 Ultra160 SCSI adapter
- Ethernet adapters
  - On-board Intel i82544 Gigabit Ethernet

Supported devices (Intel IXM1200)

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
  - IXP1200 on-chip serial port
- Ethernet adapters
  - Intel i82557, i82558, i82559, i82550

Supported devices (Samsung SMDK2800)

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
  - S3C2800 on-chip serial ports

Supported devices (ADI BRH)

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 16752 DUART
- Ethernet adapters

- Intel i82557, i82558, i82559, i82550
- Intel i82544, i82546 Gigabit Ethernet

Supported devices (Arcom Viper)

Current this is an exhaustive list, since expansion ports such as PC/104 and USB are not yet supported.

- Serial ports
  - On-chip PXA255 UARTs

  Ethernet adapters
  - On-board SMC91C111

Getting the NetBSD System on to Useful Media

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

Installation is supported from several media types, including:

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

Proceed to the instruction on installation.

MS-DOS floppy NetBSD doesn't include split sets to keep the distribution size down. They can be created on a separate machine using the `split`(1) command, running e.g. **`split -b 235k base.tgz base.`** to split the `base.tgz` file from `evbarm/binary/sets` into files named `base.aa`, `base.ab`, and so on. Repeat this for all `set_name.tgz` files, splitting them into `set_name.`*`xx`* files. 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. If you don't have DHCP available on your network, you will need to know the numeric IP address of that site, and, if it's not on a network directly connected to the machine on which you're installing or upgrading NetBSD, you need to know the numeric IP address of the router closest to the NetBSD machine. Finally, you need to know the numeric IP address of the NetBSD machine itself. If you don't have access to a functioning nameserver during installation, the IPv4 address of **ftp.NetBSD.org** is `204.152.184.36` and the IPv6 address is `2001:4f8:1:c:230:48ff:fe31:43f2` (as of December, 2006).

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

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

NFS

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

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

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

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

Tape

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

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-4.0_RC2
# 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.

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 Technologic Systems TS-7200

The TS-7200 uses RedBoot firmware which supports loading the kernel via serial port and the on-chip Ethernet. These notes assume that the Ethernet will be used to load the kernel. RedBoot can either use TFTP or HTTP to load the kernel via the network.

These notes also assume the the TS-7200 will be run from the CompactFlash; that a FFS filesystem on the CompactFlash card will provide the root file system. The minimum size of the CompactFlash card is 64MB with 512MB being the recommended minimum size if attempting a full installation.

The first step to install NetBSD is to interrupt normal system bootup and drop to the RedBoot prompt by hitting Ctrl-C immediately after applying power. To load both the installation kernel and the generic post-installation TS7200 kernel you will need network connectivity from RedBoot which you will have to configure using the RedBoot **fconfig** command; see the RedBoot documentation for more information.

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 TS-7200 can be found under the NetBSD/evbarm 4.0_RC2 distribution directory in `evbarm/binary/gzimg/gzimg_TS7200_flash_0x60660000.gz`, and corresponds to the kernel in `evbarm/binary/kernel/netbsd-TS7200.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_TS7200_flash_0x60660000.gz > /tftpboot/gzimg_TS7200_flash_0x60660000
   ```

2. Load the gzimg from the TFTP server.

   ```
   RedBoot load -r -b 0x00200000 gzimg_TS7200_flash_0x60660000
   Raw file loaded 0x00200000-0x00605fe0
   ```

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. The factory default Linux image may already be present in flash and must be deleted before continuing.

   ```
   RedBoot fis delete vmlinux
   RedBoot fis create -b 0x00200000 -f 0x60660000 -l 0x00160000 netbsd.gz
   ```

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 0x60660000
```

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 4.0_RC2 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 - 0xafffffff, 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 - 0xafffffff
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 4.0_RC2 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 Technologic Systems TS-7200

The following steps describe how to set up a CompactFlash card for the TS-7200. The TS-7200 can use the interactive installation program **sysinst** to perform an internet installation from ftp.netbsd.org on the CompactFlash.

1. Place the netbsd-TS7200_INSTALL.bin kernel into the TFTP server's download area. It must be decompressed from the gzipped image in the release directory evbarm/installation/instkernel/netbsd-TS7200_INSTALL.srec.gz

   ```
   server# gunzip netbsd-TS7200_INSTALL.srec.gz
   server# cp netbsd-TS7200_INSTALL.srec
   /tftpboot/netbsd-TS7200_INSTALL
   ```

2. Load the kernel from the TFTP server.

   ```
   RedBoot load netbsd-TS7200_INSTALL
   ```

3. Start the kernel running.

   ```
   RedBoot go
   ```

   The kernel will display boot messages, probe for devices, and invoke the interactive sysinst installation tool. Once sysinst has completed installation, the system will reboot back into RedBoot. If the preparation instructions above have been followed, the post-installation NetBSD kernel will be in the FIS ready to be jumped into. You can have RedBoot automatically start NetBSD by putting the command **go 0x60660000** into the RedBoot bootscript using the **fconfig** command.

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]
   ```

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]
   ```

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

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

2. Logging in

   After reboot, you can log in as root at the login prompt. Unless you've set a password in **sysinst**, there is no initial password. If you're using the machine in a networked environment, you should create an account for yourself (see below) and protect it and the "root" account with good passwords. By default, root login from the network is disabled (even via ssh(1)). One way to become root over the network is to log in as a different user that belongs to group "wheel" (see group(5)) and use su(1) to become root.

   Unless you have connected an unusual terminal device as the console you can just press RETURN when it prompts for Terminal type? [...].

3. Adding accounts

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

4. The X Window System

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

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

5. Installing third party packages

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

- More information on the package system is at
  http://www.NetBSD.org/Documentation/software/packages.html
- A list of available packages suitable for browsing is at
  ftp://ftp.NetBSD.org/pub/NetBSD/packages/pkgsrc/README.html
- Precompiled binaries can be found at ,:
  ftp://ftp.NetBSD.org/pub/NetBSD/packages/
  usually in the `4.0_RC2/evbarm/All` subdir. You can install them with the following commands under `sh`(1):

  ```
  # PKG_PATH=ftp://ftp.NetBSD.org/pub/NetBSD/packages/4.0_RC2/evbarm/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/NetBSD/packages/4.0_RC2/evbarm/All
  ...
  ```

  The above commands will install the Tenex-csh and Bourne Again shell, the Perl programming language, Apache web server, KDE desktop environment and the Firefox web browser as well as all the packages they depend on.
- Package sources for compiling packages on your own can be obtained by retrieving the file
  ftp://ftp.NetBSD.org/pub/NetBSD/NetBSD-current/tar_files/pkgsrc.tar.gz
  They are typically extracted into `/usr/pkgsrc` (though other locations work fine), with the commands:

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

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

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

     ```
     # man 5 filename
     ```

     is likely to give you more information on these files.

Upgrading a previously-installed NetBSD System

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 4.0_RC2 .

Issues affecting an upgrade from NetBSD 2.1 and older releases.

See the section below on upgrading from NetBSD 3.x as well.

It is **very important** that you populate the directory `/etc/pam.d` with appropriate configuration files for the Pluggable Authentication Modules (PAM) because you will not be able to login any more otherwise. Using *postinstall* as described below will take care of this. Please refer to

http://www.netbsd.org/guide/en/chap-pam.html

for documentation about PAM.

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

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

Issues fixed by *postinstall*:

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

The following issues need to be resolved manually:

- The user '_pflogd' and the groups '_pflogd' and 'authpf" need to be created.

Issues affecting an upgrade from NetBSD 3.x releases.

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

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

Issues fixed by *postinstall*:

- Various files in `/etc` need upgrading. These include:
  - `/etc/defaults/*`
  - `/etc/mtree/*`
  - `/etc/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' and 'authpf' and the groups '_proxy' and 'rwhod' need to be created and the user 'uucp' needs to be updated.
- A number of things have been removed from the NetBSD 4.0_RC2 release including: the evbsh5 port, the Fortran 77 compiler (g77), NETCCITT, NETNS, Sendmail, Sushi, UUCP, and Vinum. If you were using any of these, then please see the "Components removed from NetBSD" section near the beginning of this document.

Using online NetBSD documentation

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

- intro(1),
- man(1),
- apropos(1),
- passwd(1), and
- passwd(5).

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

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

```
# man passwd
```

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

```
# man 5 passwd
```

instead.

If you are unsure of what man page you are looking for, enter

```
# apropos subject-word
```

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

Administrivia

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

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

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

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

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

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

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

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  Ralph Campbell
  Mike Karels
  Marshall Kirk McKusick

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- The Helsinki University of Technology in Finland for hosting the NetBSD backup CVS and backup server.
- SSH Communications Security in Finland for operating the backup server.
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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 mentioned, tell us!)

We are...

(in alphabetical order)

The NetBSD core group:

Alistair Crooks	agc@NetBSD.org
YAMAMOTO Takashi	yamt@NetBSD.org
Matt Thomas	matt@NetBSD.org
Valeriy E. Ushakov	uwe@NetBSD.org
Christos Zoulas	christos@NetBSD.org

The portmasters (and their ports):

Anders Magnusson	ragge	**vax**
Andrey Petrov	petrov	**sparc64**
Ben Harris	bjh21	**acorn26**
Cherry G. Mathew	cherry	**ia64**
Chris Gilbert	chris	**cats**
Darrin Jewell	dbj	**next68k**
Erik Berls	cyber	**cobalt**
Frank van der Linden	fvdl	**amd64**
Frank van der Linden	fvdl	**i386**
Gavan Fantom	gavan	**iyonix**
IWAMOTO Toshihiro	toshii	**hpcarm**
Ichiro FUKUHARA	ichiro	**hpcarm**
Ignatios Souvatzis	is	**amiga**
Izumi Tsutsui	tsutsui	**ews4800mips**
Izumi Tsutsui	tsutsui	**hp300**
Izumi Tsutsui	tsutsui	**news68k**
Jaime A Fournier	ober	**zaurus**
Jason Thorpe	thorpej	**algor**
Jason Thorpe	thorpej	**evbarm**
Jason Thorpe	thorpej	**shark**
Jonathan Stone	jonathan	**pmax**
Julian Coleman	jdc	**atari**
Manuel Bouyer	bouyer	**xen**
Marcus Comstedt	marcus	**dreamcast**
Martin Husemann	martin	**sparc64**
Matt Fredette	fredette	**sun2**
Matt Thomas	matt	**alpha**
Matt Thomas	matt	**netwinder**
Matthias Drochner	drochner	**cesfic**
Michael Lorenz	macallan	**macppc**
NISHIMURA Takeshi	nsmrtks	**x68k**
Nathan Williams	nathanw	**sun3**
Nick Hudson	skrll	**hp700**
Noriyuki Soda	soda	**arc**
Paul Kranenburg	pk	**sparc**
Phil Nelson	phil	**pc532**
Reinoud Zandijk	reinoud	**acorn32**
Ross Harvey	ross	**alpha**
Søren Jørvang	soren	**sgimips**

Scott Reynolds	scottr	**mac68k**
Shin Takemura	takemura	**hpcmips**
Simon Burge	simonb	**evbmips**
Simon Burge	simonb	**pmax**
Simon Burge	simonb	**sbmips**
Steve Woodford	scw	**evbppc**
Steve Woodford	scw	**mvme68k**
Steve Woodford	scw	**mvmeppc**
Takayoshi Kochi	kochi	**ia64**
Tim Rightnour	garbled	**prep**
Tohru Nishimura	nisimura	**luna68k**
Tohru Nishimura	nisimura	**sandpoint**
UCHIYAMA Yasushi	uch	**hpcsh**
UCHIYAMA Yasushi	uch	**playstation2**
Wayne Knowles	wdk	**mipsco**
Wolfgang Solfrank	ws	**ofppc**

The NetBSD 4.0_RC2 Release Engineering team:

Grant Beattie	grant@NetBSD.org
Manuel Bouyer	bouyer@NetBSD.org
David Brownlee	abs@NetBSD.org
Pavel Cahyna	pavel@NetBSD.org
James Chacon	jmc@NetBSD.org
Julian Coleman	jdc@NetBSD.org
Håvard Eidnes	he@NetBSD.org
Liam J. Foy	liamjfoy@NetBSD.org
John Heasley	heas@NetBSD.org
Geert Hendrickx	ghen@NetBSD.org
Soren Jacobsen	snj@NetBSD.org
Daniel de Kok	daniel@NetBSD.org
Phil Nelson	phil@NetBSD.org
Jeff Rizzo	riz@NetBSD.org

NetBSD Developers:

Nathan Ahlstrom	nra@NetBSD.org
Steve Allen	wormey@NetBSD.org
Jukka Andberg	jandberg@NetBSD.org
Julian Assange	proff@NetBSD.org
Lennart Augustsson	augustss@NetBSD.org
Christoph Badura	bad@NetBSD.org
Bang Jun-Young	junyoung@NetBSD.org
Dieter Baron	dillo@NetBSD.org
Robert V. Baron	rvb@NetBSD.org
Alan Barrett	apb@NetBSD.org
Grant Beattie	grant@NetBSD.org
Jason Beegan	jtb@NetBSD.org
Erik Berls	cyber@NetBSD.org

Hiroyuki Bessho	bsh@NetBSD.org
John Birrell	jb@NetBSD.org
Mason Loring Bliss	mason@NetBSD.org
Charles Blundell	cb@NetBSD.org
Rafal Boni	rafal@NetBSD.org
Stephen Borrill	sborrill@NetBSD.org
Sean Boudreau	seanb@NetBSD.org
Manuel Bouyer	bouyer@NetBSD.org
John Brezak	brezak@NetBSD.org
Allen Briggs	briggs@NetBSD.org
Mark Brinicombe	mark@NetBSD.org
Aaron Brown	abrown@NetBSD.org
Andrew Brown	atatat@NetBSD.org
David Brownlee	abs@NetBSD.org
Frederick Bruckman	fredb@NetBSD.org
Jon Buller	jonb@NetBSD.org
Simon Burge	simonb@NetBSD.org
Robert Byrnes	byrnes@NetBSD.org
Pavel Cahyna	pavel@NetBSD.org
D'Arcy J.M. Cain	darcy@NetBSD.org
Dave Carrel	carrel@NetBSD.org
Daniel Carosone	dan@NetBSD.org
James Chacon	jmc@NetBSD.org
Bill Coldwell	billc@NetBSD.org
Julian Coleman	jdc@NetBSD.org
Ben Collver	ben@NetBSD.org
Jeremy Cooper	jeremy@NetBSD.org
Chuck Cranor	chuck@NetBSD.org
Alistair Crooks	agc@NetBSD.org
Aidan Cully	aidan@NetBSD.org
Garrett D'Amore	gdamore@NetBSD.org
Johan Danielsson	joda@NetBSD.org
John Darrow	jdarrow@NetBSD.org
Jed Davis	jld@NetBSD.org
Matt DeBergalis	deberg@NetBSD.org
Arnaud Degroote	degroote@NetBSD.org
Rob Deker	deker@NetBSD.org
Chris G. Demetriou	cgd@NetBSD.org
Tracy Di Marco White	gendalia@NetBSD.org
Jaromír Dolecek	jdolecek@NetBSD.org
Andy Doran	ad@NetBSD.org
Roland Dowdeswell	elric@NetBSD.org
Emmanuel Dreyfus	manu@NetBSD.org
Matthias Drochner	drochner@NetBSD.org
Jun Ebihara	jun@NetBSD.org
Håvard Eidnes	he@NetBSD.org
Stoned Elipot	seb@NetBSD.org
Michael van Elst	mlelstv@NetBSD.org
Enami Tsugutomo	enami@NetBSD.org

Bernd Ernesti	veego@NetBSD.org
Erik Fair	fair@NetBSD.org
Gavan Fantom	gavan@NetBSD.org
Hauke Fath	hauke@NetBSD.org
Hubert Feyrer	hubertf@NetBSD.org
Jason R. Fink	jrf@NetBSD.org
Matt J. Fleming	mjf@NetBSD.org
Liam J. Foy	liamjfoy@NetBSD.org
Matt Fredette	fredette@NetBSD.org
Thorsten Frueauf	frueauf@NetBSD.org
Castor Fu	castor@NetBSD.org
Ichiro Fukuhara	ichiro@NetBSD.org
Quentin Garnier	cube@NetBSD.org
Thomas Gerner	thomas@NetBSD.org
Simon J. Gerraty	sjg@NetBSD.org
Justin Gibbs	gibbs@NetBSD.org
Chris Gilbert	chris@NetBSD.org
Eric Gillespie	epg@NetBSD.org
Adam Glass	glass@NetBSD.org
Michael Graff	explorer@NetBSD.org
Brian C. Grayson	bgrayson@NetBSD.org
Matthew Green	mrg@NetBSD.org
Andreas Gustafsson	gson@NetBSD.org
Jun-ichiro itojun Hagino	itojun@NetBSD.org
Juergen Hannken-Illjes	hannken@NetBSD.org
Charles M. Hannum	mycroft@NetBSD.org
Ben Harris	bjh21@NetBSD.org
Ross Harvey	ross@NetBSD.org
Eric Haszlakiewicz	erh@NetBSD.org
John Hawkinson	jhawk@NetBSD.org
HAMAJIMA Katsuomi	hamajima@NetBSD.org
HAYAKAWA Koichi	haya@NetBSD.org
John Heasley	heas@NetBSD.org
Geert Hendrickx	ghen@NetBSD.org
René Hexel	rh@NetBSD.org
Iain Hibbert	plunky@NetBSD.org
Kouichirou Hiratsuka	hira@NetBSD.org
Michael L. Hitch	mhitch@NetBSD.org
Jachym Holecek	freza@NetBSD.org
Christian E. Hopps	chopps@NetBSD.org
Ken Hornstein	kenh@NetBSD.org
Marc Horowitz	marc@NetBSD.org
Eduardo Horvath	eeh@NetBSD.org
Nick Hudson	skrll@NetBSD.org
Shell Hung	shell@NetBSD.org
Martin Husemann	martin@NetBSD.org
Dean Huxley	dean@NetBSD.org
Love Hörnquist Åstrand	lha@NetBSD.org
Bernardo Innocenti	bernie@NetBSD.org

Tetsuya Isaki	isaki@NetBSD.org
ITOH Yasufumi	itohy@NetBSD.org
IWAMOTO Toshihiro	toshii@NetBSD.org
Matthew Jacob	mjacob@NetBSD.org
Soren Jacobsen	snj@NetBSD.org
Lonhyn T. Jasinskyj	lonhyn@NetBSD.org
Darrin Jewell	dbj@NetBSD.org
Nicolas Joly	njoly@NetBSD.org
Chris Jones	cjones@NetBSD.org
Søren Jørvang	soren@NetBSD.org
Takahiro Kambe	taca@NetBSD.org
Antti Kantee	pooka@NetBSD.org
Masanori Kanaoka	kanaoka@NetBSD.org
Frank Kardel	kardel@NetBSD.org
Mattias Karlsson	keihan@NetBSD.org
KAWAMOTO Yosihisa	kawamoto@NetBSD.org
Mario Kemper	magick@NetBSD.org
Min Sik Kim	minskim@NetBSD.org
Thomas Klausner	wiz@NetBSD.org
Klaus Klein	kleink@NetBSD.org
John Klos	jklos@NetBSD.org
Wayne Knowles	wdk@NetBSD.org
Takayoshi Kochi	kochi@NetBSD.org
John Kohl	jtk@NetBSD.org
Daniel de Kok	daniel@NetBSD.org
Paul Kranenburg	pk@NetBSD.org
Lubomir Kundrak	lkundrak@NetBSD.org
Martti Kuparinen	martti@NetBSD.org
Kentaro A. Kurahone	kurahone@NetBSD.org
Kevin Lahey	kml@NetBSD.org
David Laight	dsl@NetBSD.org
Johnny C. Lam	jlam@NetBSD.org
Martin J. Laubach	mjl@NetBSD.org
Greg Lehey	grog@NetBSD.org
Ted Lemon	mellon@NetBSD.org
Christian Limpach	cl@NetBSD.org
Frank van der Linden	fvdl@NetBSD.org
Joel Lindholm	joel@NetBSD.org
Mike Long	mikel@NetBSD.org
Michael Lorenz	macallan@NetBSD.org
Warner Losh	imp@NetBSD.org
Tomasz Luchowski	zuntum@NetBSD.org
Federico Lupi	federico@NetBSD.org
Brett Lymn	blymn@NetBSD.org
Paul Mackerras	paulus@NetBSD.org
Anders Magnusson	ragge@NetBSD.org
MAEKAWA Masahide	gehenna@NetBSD.org
David Maxwell	david@NetBSD.org
Dan McMahill	dmcmahill@NetBSD.org

Gregory McGarry	gmcgarry@NetBSD.org
Jared D. McNeill	jmcneill@NetBSD.org
Neil J. McRae	neil@NetBSD.org
Perry Metzger	perry@NetBSD.org
Simas Mockevicius	symka@NetBSD.org
Juan Romero Pardines	xtraeme@NetBSD.org
Julio M. Merino Vidal	jmmv@NetBSD.org
Minoura Makoto	minoura@NetBSD.org
Luke Mewburn	lukem@NetBSD.org
der Mouse	mouse@NetBSD.org
Joseph Myers	jsm@NetBSD.org
Ken Nakata	kenn@NetBSD.org
Takeshi Nakayama	nakayama@NetBSD.org
Phil Nelson	phil@NetBSD.org
John Nemeth	jnemeth@NetBSD.org
Bob Nestor	rnestor@NetBSD.org
NISHIMURA Takeshi	nsmrtks@NetBSD.org
Tohru Nishimura	nisimura@NetBSD.org
NONAKA Kimihiro	nonaka@NetBSD.org
Takehiko NOZAKI	tnozaki@NetBSD.org
Tobias Nygren	tnn@NetBSD.org
OBATA Akio	obache@NetBSD.org
Jesse Off	joff@NetBSD.org
Tatoku Ogaito	tacha@NetBSD.org
OKANO Takayoshi	kano@NetBSD.org
Masaru Oki	oki@NetBSD.org
Atsushi Onoe	onoe@NetBSD.org
Greg Oster	oster@NetBSD.org
Jonathan Perkin	sketch@NetBSD.org
Herb Peyerl	hpeyerl@NetBSD.org
Matthias Pfaller	matthias@NetBSD.org
Chris Pinnock	cjep@NetBSD.org
Adrian Portelli	adrianp@NetBSD.org
Rui Paulo	rpaulo@NetBSD.org
Peter Postma	peter@NetBSD.org
Dante Profeta	dante@NetBSD.org
Chris Provenzano	proven@NetBSD.org
Niels Provos	provos@NetBSD.org
Mindaugas Rasiukevicius	rmind@NetBSD.org
Michael Rauch	mrauch@NetBSD.org
Marc Recht	recht@NetBSD.org
Darren Reed	darrenr@NetBSD.org
Jeremy C. Reed	reed@NetBSD.org
Antoine Reilles	tonio@NetBSD.org
Tyler R. Retzlaff	rtr@NetBSD.org
Scott Reynolds	scottr@NetBSD.org
Michael Richardson	mcr@NetBSD.org
Tim Rightnour	garbled@NetBSD.org
Alan Ritter	rittera@NetBSD.org

Jeff Rizzo	riz@NetBSD.org
Gordon Ross	gwr@NetBSD.org
Steve Rumble	rumble@NetBSD.org
Ilpo Ruotsalainen	lonewolf@NetBSD.org
Heiko W. Rupp	hwr@NetBSD.org
David Sainty	dsainty@NetBSD.org
SAITOH Masanobu	msaitoh@NetBSD.org
Kazuki Sakamoto	sakamoto@NetBSD.org
Curt Sampson	cjs@NetBSD.org
Wilfredo Sanchez	wsanchez@NetBSD.org
Ty Sarna	tsarna@NetBSD.org
SATO Kazumi	sato@NetBSD.org
Jan Schaumann	jschauma@NetBSD.org
Matthias Scheler	tron@NetBSD.org
Karl Schilke (rAT)	rat@NetBSD.org
Amitai Schlair	schmonz@NetBSD.org
Konrad Schroder	perseant@NetBSD.org
Georg Schwarz	schwarz@NetBSD.org
Lubomir Sedlacik	salo@NetBSD.org
Christopher SEKIYA	sekiya@NetBSD.org
Reed Shadgett	dent@NetBSD.org
John Shannon	shannonjr@NetBSD.org
Tim Shepard	shep@NetBSD.org
Takeshi Shibagaki	shiba@NetBSD.org
Naoto Shimazaki	igy@NetBSD.org
Takao Shinohara	shin@NetBSD.org
Takuya SHIOZAKI	tshiozak@NetBSD.org
Daniel Sieger	dsieger@NetBSD.org
Chuck Silvers	chs@NetBSD.org
Thor Lancelot Simon	tls@NetBSD.org
Jeff Smith	jeffs@NetBSD.org
Noriyuki Soda	soda@NetBSD.org
Wolfgang Solfrank	ws@NetBSD.org
T K Spindler	dogcow@NetBSD.org
SOMEYA Yoshihiko	someya@NetBSD.org
Bill Sommerfeld	sommerfeld@NetBSD.org
Jörg Sonnenberger	joerg@NetBSD.org
Ignatios Souvatzis	is@NetBSD.org
Bill Squier	groo@NetBSD.org
Jonathan Stone	jonathan@NetBSD.org
Bill Studenmund	wrstuden@NetBSD.org
Kevin Sullivan	sullivan@NetBSD.org
SUNAGAWA Keiki	kei@NetBSD.org
Kimmo Suominen	kim@NetBSD.org
Shin Takemura	takemura@NetBSD.org
TAMURA Kent	kent@NetBSD.org
Shin'ichiro TAYA	taya@NetBSD.org
Ian Lance Taylor	ian@NetBSD.org
Matt Thomas	matt@NetBSD.org

Jason Thorpe	thorpej@NetBSD.org
Christoph Toshok	toshok@NetBSD.org
Greg Troxel	gdt@NetBSD.org
Tsubai Masanari	tsubai@NetBSD.org
Izumi Tsutsui	tsutsui@NetBSD.org
UCHIYAMA Yasushi	uch@NetBSD.org
Masao Uebayashi	uebayasi@NetBSD.org
Shuichiro URATA	ur@NetBSD.org
Valeriy E. Ushakov	uwe@NetBSD.org
Todd Vierling	tv@NetBSD.org
Aymeric Vincent	aymeric@NetBSD.org
Paul Vixie	vixie@NetBSD.org
Mike M. Volokhov	mishka@NetBSD.org
Krister Walfridsson	kristerw@NetBSD.org
Lex Wennmacher	wennmach@NetBSD.org
Leo Weppelman	leo@NetBSD.org
Assar Westerlund	assar@NetBSD.org
Todd Whitesel	toddpw@NetBSD.org
Nathan Williams	nathanw@NetBSD.org
Rob Windsor	windsor@NetBSD.org
Dan Winship	danw@NetBSD.org
Arnaud Lacombe	alc@NetBSD.org
Jim Wise	jwise@NetBSD.org
Michael Wolfson	mbw@NetBSD.org
Steve Woodford	scw@NetBSD.org
Colin Wood	ender@NetBSD.org
YAMAMOTO Takashi	yamt@NetBSD.org
Yuji Yamano	yyamano@NetBSD.org
Reinoud Zandijk	reinoud@NetBSD.org
S.P.Zeidler	spz@NetBSD.org
Maria Zevenhoven	maria7@NetBSD.org
Christos Zoulas	christos@NetBSD.org

Other contributors:

Dave Burgess	burgess@cynjut.infonet.net
Brian R. Gaeke	brg@dgate.org
Brad Grantham	grantham@tenon.com
Lawrence Kesteloot	kesteloo@cs.unc.edu
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