**NAME**

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

**CONTENTS**


About this Document....2
What is NetBSD?....2
Changes Between The NetBSD 5.0 and 6.0 Releases....2
  General kernel....3
  Networking....3
  File systems....4
  Security....4
  Drivers....4
  Platforms....7
  Userland....12
  Components removed from NetBSD....15
Features to be removed in a later release....15
The NetBSD Foundation....16
Sources of NetBSD....16
NetBSD 6.0 Release Contents....16
  NetBSD/atari subdirectory structure....17
  Binary distribution sets....17
NetBSD/atari System Requirements and Supported Devices....19
  Supported devices....19
Getting the NetBSD System on to Useful Media....20
Preparing your System for NetBSD installation....21
  Preparing your hard disk for the NetBSD installation.....21
  Booting the installer on an existing system....22
  Booting the installer on new systems.....23
  Using loadbsd.ttp....23
Installing the NetBSD System....23
  Running the sysinst installation program....24
    Introduction....24
    General....24
    Quick install....24
    Booting NetBSD....25
    Network configuration....25
    Installation drive selection and parameters....25
    Selecting which sets to install....25
    Partitioning the disk....25
    Preparing your hard disk....26
    Getting the distribution sets....26
    Installation from CD-ROM....27
    Installation using ftp....27
    Installation using NFS....27
    Installation from an unmounted file system....27
    Installation from a local directory....27
    Extracting the distribution sets....27
    Configure additional items....27
    Finalizing your installation....28
Post installation steps....28

Upgrading a previously-installed NetBSD System.....30
Compatibility Issues With Previous NetBSD Releases.....31
Issues affecting an upgrade from NetBSD 5.x releases .....31
Issues affecting an upgrade from NetBSD 4.x releases .....31
Using online NetBSD documentation.....32
Administrivia.....32
Thanks go to.....33
We are.....33
Legal Mumbo-Jumbo.....41
The End.....44

## DESCRIPTION

### About this Document

This document describes the installation procedure for NetBSD 6.0 on the *atari* platform. It is available in four different formats titled `INSTALL.`*`ext`*, where `.`*`ext`* is one of `.ps`, `.html`, `.more`, or `.txt`:

`.ps` PostScript.

`.html` Standard Internet HTML.

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

`.txt` Plain old ASCII.

You are reading the *PostScript* version.

### What is NetBSD?

The NetBSD Operating System is a fully functional Open Source UNIX-like operating system derived from the University of California, Berkeley Networking Release 2 (Net/2), 4.4BSD-Lite, and 4.4BSD-Lite2 sources. NetBSD runs on 57 different system architectures (ports) across 15 distinct CPU families, and is being ported to more. The NetBSD 6.0 release contains complete binary releases for many different system architectures. (A few ports are not fully supported at this time and are thus not part of the binary distribution. Please see the NetBSD web site at **http://www.NetBSD.org/** for information on them.)

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

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

### Changes Between The NetBSD 5.0 and 6.0 Releases

The NetBSD 6.0 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 the massive development that went into the NetBSD 6.0 release. The complete list of changes can be found in the CHANGES:

**http://ftp.NetBSD.org/pub/NetBSD/NetBSD-6.0/CHANGES**

and CHANGES-6.0:

**http://ftp.NetBSD.org/pub/NetBSD/NetBSD-6.0/CHANGES-6.0**

files in the top level directory of the NetBSD 6.0 release tree.

Some highlights include:

*General kernel*

- time_t and dev_t are now 64 bits.
- Much-improved compat_linux support for running Linux binaries.
- Added a generic producer/consumer queue.
- Added a new ptree ( Patricia / RADIX tree ) implementation.
- Removed MALLOC() and FREE() macros.
- Compute kern.ipc.shmmaxpages on startup based on physical memory. Can be overridden via sysctl(8).
- kmem_alloc(9): Add more extensive runtime debugging facilities.
- File descriptor access performance improvements were made.
- cpu_reboot(9): tear down stacks of devices and file systems in an orderly fashion during shutdown.
- Added 'show vmem' and 'show all vmems' commands to ddb(4).
- Added high-priority xcall(9) support.
- Added direct select()/poll() support.
- Add PCU (Per-CPU Unit) interface to unify synchronization of per CPU context, like lazy FPU management.
- Added new system calls pipe2(2), paccept(2), kqueue1(2), flags SOCK_CLOEXEC/SOCK_NONBLOCK to socket(2), socketpair(2), F_DUPFD_CLOEXEC to fcntl(2), and a MSG_CMSG_CLOEXEC to recvfrom(2) to be able to set close-on-exec to all newly created file descriptors.
- Major improvements to uvm_map(9), uvm_km(9), vmem(9), and kmem(9) layers.
- Removed ltsleep(9) and wakeup_one(9).
- Rewrote most of the entropy-gathering and entropy-distributing code, separating the rnd(4) pseudodevice from the bitstream generation code cprng(9) and entropy-pool code rnd(9).
- kmem_alloc(9): add more extensive runtime debugging facilities.
- Kernel support for posix_spawn(3).

*Networking*

- ip(4): added IP_RECVTTL option to let recvmsg(2) return the TTL of the received datagram.
- ip(4): added IP_MINTTL option to discard packets with a TTL lower than the option value.
- Added SOCK_SEQPACKET for local sockets.
- Added net.inet.icmp.bmcastecho sysctl(7), to disable ICMP replies to the braodcast address.
- Make TCP window size autoscaling the default.
- Derive the mbuf cluster (NMBCLUSTERS) at boot time from the available memory. The default can be raised by changing kern.mbuf.nmbclusters

- Added NPF, the NetBSD Packet Filter.
- udp(4): implement RFC6056 port selection algorithms.

*File systems*

- Added CHFS, a file system for flash devices.
- The default behavior when mounting empty msdosfs file systems has been changed to assume long filenames. The behavior with populated file systems has not changed.
- UDF: Added support for session opening/closing on sequential media.
- ext2fs: Added support for >128 byte inodes.
- Import OpenSolaris ZFS code. Experimental-only; does not work yet.
- ffs: New quota support. This adds a new on-disk format to store disk quota usage and limits, integrated with ffs metadata. Usage is checked by fsck_ffs(8) (no more quotacheck) and is covered by the WAPBL journal. Enabled with kernel option QUOTA2.

*Security*

- secmodel_bsd44(9), secmodel_securelevel(9): Add provisions to control access to gpio(4) pins.
- security.conf(5): Add check_pkg_vulnerabilities and check_pkg_signatures to validate the installed packages against the vulnerabilities database and the expected checksums for their files.

*Drivers*

- Audio:
  - Added gcscaudio(4) driver for AMD Geode CS5536.
  - Added hdaudio(4), a new standards-compliant Intel High Definition Audio driver written to replace azalia(4).
  - audio(9): Audio drivers are now MP-safe.
- Hardware Monitoring:
  - sysmon_envsys(9): Enhancements to allow access to driver-internal limit values.
  - acpicpu(4): Add a driver for ACPI-based processor functionality.
  - acpipmtr(4): Add a driver for ACPI power meters.
  - acpismbus(4): ACPI SMBus Control Method Interface driver.
  - acpiwdrt(4): ACPI Watchdog Resource Tables driver.
  - acpiwmi(4): Windows Management Instrumentation support for ACPI. Also added mappings for wmidell(4), wmieeepc(4), wmihp(4), and wmimsi(4).
  - aibs(4): New driver for ASUSTeK AI Booster (ACPI ASOC ATK0110) hardware monitor with limit support.
  - amdtemp(4): Add support for Family 12h.
  - dbcool(4): Added support for ADM1031 thermal sensor / fan controller.
- Networking:

- Added support for more chip revisions to re(4). Added hardware checksum support for newer PCIe 8168C/8111C/8102E chips.
- Switch ath(4) from the binary HAL to the open-source HAL from Sam Leffler.
- Added bwi(4) driver for Broadcom AirForce / Apple Airport Extreme network cards.
- Added flow control and RTL8211C(L) PHY support to rgephy(4).
- Added age(4) and atphy(4) drivers for Attansic/Atheros L1 Gigabit Ethernet and F1 PHY, respectively.
- Added support for flow control to sk(4).
- Added support for flow control on MCP65 to nfe(4).
- Added TCPv4/UDPv4 RX hardware checksum support for i82559 and later chips to fxp(4).
- wm(4): Added ICH10, PCH, PCH2, 82575, 82576, 82580 and I350 devices support. Added some other improvements and workarounds.
- bge(4): added misc quirk code for chip specific bugs.
- Added ale(4): Attansic/Atheros L1E Gigabit Ethernet.
- agr(4): added support for layering vlans on top, and allow LACP to be disabled.
- alc(4): Add a driver for Atheros AR813x/AR815x Ethernet.
- aue(4): Add support for I-O DATA ETX-US2.
- bnx(4): Added support for Broadcom BCM5709 and BCM5716 chips. Add support for Broadcom BCM5709S (SerDes) chip.
- et(4), etphy(4): Add a driver for Agere/LSI ET1310/ET1301 10/100/Gigabit Ethernet device and the Agere/LSI ET1011 TruePHY Gigabit Ethernet PHY.
- kue(4): fixed unaligned memory accesses so it now works on ARM and MIPS machines.
- ne(4): add proper support for NE2000 8-bit mode.
- nfe(4): Add support for flow control for MCP65.
- otus(4): Atheros AR9100U driver.
- smsh(4): Add a SMSC LAN9118 Family Ethernet driver.
- upgt(4): Add a driver for Conexant/Intersil PrismGT SoftMAC USB IEEE 802.11b/g WLAN.

• Storage:

- Added an experimental in-kernel iSCSI initiator, from Wasabi Systems.
- viaide(4): Added VT8237S Integrated SATA controller support, and VT6410 PATA RAID controller support (without RAID).
- Added LVM functionality with dm(4) driver and lvm2 userland tools.
- Added support for 82965PM to piixide(4).
- vnd(4): implemented DIOCCACHESYNC. Also, allow vnd(4) to be backed by a sparse file.
- Added sdmmc(4) driver for SD/MMC.

  - mvsata(4): support the Marvell Hercules-I/II SATA controllers.
  - flash(9): Add a subsystem to handle flash memory devices, and nand(9), a subsystem to handle NAND controllers.
  - mfi(4): Add support for LSI's newer (GEN2) RAID controller.
  - nside(4): Add a driver for the National Semiconductor PC87415 IDE controller.
  - raid(4):
    - RAIDFrame parity maps, which greatly improve parity rewrite times after unclean shutdown.
    - Added support for non 512-byte sector devices.
    - Added support for >2TB devices.
- USB:
  - uftdi(4): Added support for REX-USB60F.
  - ehci(4): work around USB subsystem freeze for SB600/SB700 chipsets.
  - ums(4): Added touchpanel support.
- Graphics and Video:
  - drm(4): updated to mesa-drm 85b9f737db0d2a845e4d7e2bbf9ad12ff9e2227c.
  - acpivga(4): ACPI Video Extensions driver.
  - agp(4): Added support for Intel G35, Intel G45, and Intel 82855GM.
  - auvitek(4): Add a driver for Auvitek AU0828 family USB video capture controllers.
  - dtv(4): Add new digital TV framework.
  - cxdtv(4): Add driver for Conexant CX23880-based DTV cards.
  - emdtv(4): Add a driver for Empia EM28xx family USB video capture controllers.
  - omapfb(4): a simple driver for OMAP 3xxx on-chip video, especially the Beagleboard.
- Miscellaneous:
  - Added Elantech multi-touch trackpad support to pms(4).
  - Added the altmem(4) "alternative memory"

    disk driver, which allows memory that is normally inaccessible by the machine-dependent pmap(9) to be used (as swap space).
  - ichlpcib(4): support 82801IEM LPC Interface Bridge.
  - Complete rework of gpio(4) to integrate with kauth(9), allow for runtime driver attachment, and naming of individual pins. Add gpiosim(4) driver to simulate a gpio(4) device for testing purposes.
  - Added gpioiic(4) driver to bit-bang an I2C bus using GPIO pins.
  - btmagic(4): Apple Magic Mouse driver.
  - vmt(4): Add a VMware Tools driver, from OpenBSD.

*Platforms*

- x86 ( i386, amd64):
  - `pxeboot`(8) now parses `boot.cfg`(5).
  - The bootloader has been enhanced to support framebuffer consoles using VESA BIOS extensions. x86 ports now work with the `genfb`(4) framebuffer, and the i386-only `vesafb`(4) framebuffer has been obsoleted.
  - Added `ucas`(9) support for x86.
  - `sysinst`(8) now defaults to UFS2 for x86 platforms.
  - CPU topology detection suport for AMD processors.
  - Enable Ext2fs support in bootloader.
  - Booting from a disk with a GUID Partition Table (GPT) is now possible.
  - Support `userconf`(4) command in `boot.cfg`(5).
- i386:
  - Use "i486"

    as GNU_ARCH.
  - Added PAE (Physical Address Extension) support.
  - Better support for VIA C7 CPUs.
- amd64:
  - Added direct map support (mapping of all physical memory using large pages).
- alpha:
  - X11: add support for X11FLAVOUR=xorg.
  - Support for Avalon A12 removed.
  - Converted Alpha to use PCU to manage FPU.
- amiga:
  - Added basic PCI support.
  - `efa`(4): ELBOX FastATA 1200 driver.
  - Add a driver for BlizzardPPC 603e+ SCSI.
- amigappc:
  - A CSPPC system with `ahsc`(4) or `cbiiisc`(4) boots into multiuser;
  - Onboard serial now works.
  - `efa`(4): ELBOX FastATA 1200 driver.
- ARM ports( acorn26, acorn32, cats, evbarm, hpcarm, iyonix, netwinder, shark, zaurus):
  - Cortex-A8 CPU support is available.
  - i.MX51 SoC support is available.

- atari:
  - Add support for the SMC Elite Ultra Ethernet with the SMC_TT VME-ISA bridge.
  - Add support for the EtherNEC, ISA NE2000 based Ethernet connected to Atari ROM cartridge slot.
- bebox:
  - Support xserver. Tested on s3(TRIO 64V+).
- cobalt:
  - Add LBA48 support to bootloader so that it can safely load a kernel from NetBSD partition beyond >137GB boundary.
- dreamcast:
  - Fixed a long standing GD-ROM driver bug so that file system on GD-ROM works properly.
  - Build and put a raw binary format kernel into distribution.
  - Switch to using Xorg servers and binaries.
- evbarm:
  -
  - Added support for Gumstix Verdex and Verdex Pro.
  - Support Marvell Sheevaplug and some Marvell SoC NAS boxes.
  - Add initial support for Sharp NetWalker MID.
  - Add driver for OMAP NAND controllers.
  - Add FriendlyARM Mini2440 support.
  - Add initial support for the RaspberryPi. No support yet for the USB controller, the Ethernet interface, or the video chip. Serial console works, and boots multiuser.
- evbmips:
  - Added `voyagerfb`(4) driver, for the Gdium Liberty 1000's video controller.
  - Added support for RMI XLS6ATX_7A board and XL SoC family.
  - Added support for RMI (NetLogic) XLS/XLR models.
- evbppc:
  - Enable builds for OEA, ibm4xx and Book-E modules.
- evbsh3:
  - Add support for Alpha Project MS104-SH4, TAC T-SH7706LAN Rev.3 and TAC T-SH7706LSR Rev.1.
- hp300:
  - Switch NetBSD/hp300 to wscons with rasops.
  - Add support for framebuffers on HP362 and HP382.
  - Add support for Apollo Domain keyboard.

- hp700:
  - Added support for UFS2 boot.
  - pmap update: Support PA 2.0 machines in 32 bit mode. Improve support for machines without the PA7100LC or PA7300LC CPUs.
  - Added `ucas`(9) support for hp700.
  - com at dino now works.
  - `lcd`(4): Driver for hp700 lcds added.
  - Add support for `elroy`(4), `astro`(4), and `ssio`(4) based 64-bit machines running in 32-bit mode.
  - Update `sti`(4) and add `pci`(4) attachment.
  - Add support for HIL devices.
  - Support added for machines with the uturn(4) I/O subsystem.
- hpcarm:
  - Add support for Sharp W-ZERO3 series.
  - Use rtc_offset passed from hpcboot.
  - Bump MAXPARTITIONS from 8 to 16.
  - Switch to using Xorg servers and binaries.
  - Improve console speed on W-ZERO3 machines using write through mapping for framebuffer memory.
  - Improve install on JORNADA720.
- hpcmips:
  - Switch to using Xorg servers and binaries.
- hpcsh:
  - Switch to using Xorg servers and binaries.
  - Add `sysinst`(8) support.
- landisk:
  - Added UFS2 boot support.
  - Enable to build a bootable install disk image.
- luna68k:
  - Enable LUNA to load -current kernels director from firmware.
  - Make SCSI work properly.
  - Use the original OMRON font derived from 4.4BSD-Lite/luna68k rather than gallant19 which is used on Sun workstations.
  - Complete LUNA-II support.
- mac68k:

  - Add timecounter support to the CSI Hurdler Centronics Parallel Interface `cpi`(4) driver.

- macppc:
  - Support new-style `module`(7) kernel modules.
- m68k ports ( amiga, atari, cesfic, hp300, luna68k, mac68k, mvme68k, news68k, next68k, sun2, sun3, x68k):
  - Re-enable m68k optimized in_cksum routine.
  - Support `module`(7) loading.
  - Fixed a regression in FPU_EMULATE code that caused weird `awk`(1) behavior.
  - Add hyperbotic and trigonometric functions to m68k FPE.
- mips ports ( algor, arc, cobalt, emips, evbmips, ews4800, hpcmips, mipsco, newsmips, pmax, sbmips, sgimips):
  - Added support for 64-bit MIPS processors (O32, N32, N64 ABIs are supported).
  - Added SMP support for MIPS architecture.
  - Rewritten interrupt handling to be much more efficient, added "fast" software interrupts and kernel preemption.
  - Converted MIPS to use PCU to manage FPU.
  - Added MIPS32R2 and MIPS64R2 support.
  - Rework Atheros MIPS-based SoC support. Add initial support for AR71xx (24K) and AR9344 (74K) SoCs
  - Added support for ralink RT3883 SoC from CradlePoint Technologies.
  - Added support for MIPS DSP v2 ASE.
- ofppc:
  - Support Gigabit Ethernet Controller for MV64361 on PegasosII.
  - Support for RDB partitions.
- pmax:
  - Added UFS2 boot support.
- powerpc ports ( amigappc, bebox, evbppc, ibmnws, macppc, mvmeppc, ofppc, pmppc, prep, rs6000, sandpoint, walnut):
  - Add support for using secure PLT (thereby allowing data and bss of powerpc programs and shared library to be set non-executable).
  - Added support for Book E Freescale MPC85xx (e500 core) processors. Added "fast" software interrupts support and SOFTFLOAT for PowerPC (Book E only), reworked FPU/VEC support for e500 SPE, other improvements.
  - Converted PowerPC to use PCU to manage FPU/AltiVec/SPE.
  - Initial SMP support for MPC85xx, reworked and unified IPI code, various other improvements.
  - Switch to using direct-mapped uareas (pcb + kernel stacks).

  - The generic PIC code now supports Matt Thomas's fast softintr code.
- prep:
  - Support Xserver. Tested with on-board s3(864).
- sandpoint:
  - Added support for Marvell-SKnet in netboot.
  - D-Link DSM-G600 support.
  - Add support for booting from RAID 1.
  - Iomega Storcenter support.
  - Netronix NH-230/231 and compatible NAS are supported.
- sgimips:
  - Added support for Personal IRIS 4D/20 and 4D/25 (IP6 and IP10).
  - `mec`(4): Added RX hardware checksum support on O2.
  -
- sh3ports ( dreamcast, evbsh3, hpcsh, landisk, mmeye):
  - Add some support for SH7706.
- shark:
  - Added support for `module`(7) -style kernel modules.
  - `chipsfb`(4) now works on shark.
- sparc:
  - Switch sparc port to use `wscons`(4)
  - `zx`(4): added `wscons`(4) support.
  - `tcx`(4): support `wsdisplay`(4) and acceleration.
  - `apc`(4): a driver for the Aurora Personality Chip (APC) found on SPARCstation-4/5 and qemu. Allows to idle the CPU when in the idle loop.
  - Re-enable sparc optimized in_cksum routine.
  - Added support for `module`(7) -style kernel modules.
- sparc64:
  - `zx`(4): added `wscons`(4) support.
  - Add a driver for LOMlite lights out management hardware monitor and watchdog timer.
  - Add real UltraSPARC-III∗ CPU support.
  - Add initial support for Fujitsu SPARC64 systems, not yet stable.
  - `ffb`(4): Added EDID (Extended Display Identification Data) reading, and video mode setting support.
  - Added fast `softint`(9) support.

  - Add support for Enterprise systems (Ex[45]00) systems.
- x68k:
  - Switched `pow`(4) to use `powerd`(8).
  - Fix bootloader failure on X68030+060turbo.
  - Removed pow(4) and rtcalarm(8).
  - `powsw`(4): a revised power switch driver.
- xen:
  - Add PCI pass-through support for Xen3. Dom0 kernel gets a `pciback`(4) driver, to which the device specified in the pciback.hide boot parameter will attach. DomU kernels get a `xpci`(4) driver, to which PCI busses will attach.
  - Added XEN3PAE_DOM0, an i386 dom0 kernel with PAE support. Requires an i386PAE or x86_64 hypervisor.
  - `balloon`(4): Balloon driver now enabled for all Xen kernels.
  - Dropped Xen 2 support. Xen 3.1 or later is now required.
  - Added support for request-rx-copy in the virtual network device backend.
  - Provide experimental support for suspend/resume in NetBSD domUs.
  - Enable no-execute bit feature for i386pae and amd64 kernels.
  - Added support for feature-flush-cache in block device backend, used in block device frontend for DIOCCACHESYNC.
- zaurus:
  - Added zboot.
  - Added playback and recording support to `zaudio`(4).
  - Add Xorg support.
  - Add ioexp driver for SL-C1000.
  - Add PXA25x based Zaurus SL-C700/750/760/860 support.

*Userland*

- 3rd party software updates:
  - `acpi`(4): ACPICA updated to 20110623.
  - `atf`(7) is version 0.15.
  - ISC `cron`(8) 4.1.
  - OpenSSH version 1.0.1c
  - lvm2tools 2.02.44 and libdevmapper 1.02.30
  - dhcpcd-5.5.4
  - am-utils updated from head; adds UDF support and `-uu`
  - CVS 1.12.13

- BIND 9.9.1-P4.
- libbind 6.0-rc1.
- FSF binutils 2.21.1a.
- `httpd`(8): bozohttpd-20111118
- `file`(1) 5.09
- ntp 4.2.6p5
- `flex`(1) version 2.5.35.
- `gcc`(1) version 4.5.3.
- `gdb`(1) version 7.3.1.
- GNU MP 5.0.2.
- `less`(1) version 444.
- libfetch 2.23
- Lua 5.1.4
- OpenLDAP 2.4.23
- SQLite 3.6.9
- `tmux`(1) 1.5
- trousers-0.3.8; tmp-tools 1.3.7.1
- `xz`(1) 5.0.0
- byacc-20110908
- tzdata2011n
- `dns-sd`(1): Import mDNSResponder 212.1.

- Libraries:
  - libc:
    - Add new ptree (Patricia / RADIX tree) implementation.
    - Added `fopendir`(3).
    - Added RFC 2045 MIME Quoted-Printable support.
    - Added `glob_pattern_p`(3).
    - Added `memrchr`(3).
    - Added `stpcpy`(3), `stpncpy`(3), and `strnlen`(3).
    - Added %s (seconds since the Epoch) to `strptime`(3), for symmetry with `strftime`(3).
    - Added the getdate(3) and getdate_err value, conforming to IEEE Std 1003.1 ( "POSIX.1" ) and the Open Group Base Specifications X/Open System Interfaces extension ( "XSI" ).

    - Added `getdelim`(3) and `getline`(3).
    - Added `posix_spawn`(3).
    - Added a space-efficient write-once database ( `cdbr`(3), `cdbw`(3) ).
    - Provide a re-entrant and thread-safe set of timezone APIs that don't require locking and can operate on user-specified timezones.
  - libm: Add f{dim,max,min}{,f,l} from FreeBSD.
  - Replaced termcap with `terminfo`(3).
  - perfuse: Add the PUFFS RElay to FUSE library, which bridges the kernel level API for FUSE filesystems with native PUFFS.
  - `rump`(3)
    - Moved VFS functionality from librump to a new library, librumpvfs.
    - Added support for remote system calls.
    - Add IPv6 support to rumpnet.
    - Support kernel config framework and devices in rumpdev.
    - rumpfs: support registering exernal files which are accessed from the host OS file system namespace instead of from within the rump virtual kernel.
    - rumpvfs: Use the unmodified kernel vnode pager.
  - `bluetooth`(3): updated the Bluetooth service discovery API and merged it into libbluetooth, retiring the separate libsdp.
- Installer (sysinst):
  - Default to `wapbl`(4) logging for UFS partitions.
  - Make sure the installer rejects UFS2 for root partitions on ports whose bootloaders don't support booting from UFS2.
- Changes to the way `make`(1) processes `.for` loops.
- `makefs`(8): Added support for encoding RISC OS metadata into ISO9660 file systems.
- `mount`(8): Added `-o rump` , which mounts the file system as a userspace server via `puffs`(4) and `rump`(3) instead of using a kernel drver.
- `dkctl`(8): Display cache, strategy and list of wedges if no command is specified on the command line.
- `ar`(1): Added support for "deterministic mode"

- Added `crash`(8), a new utility to debug kernel images, based on the in-kernel debugger, `ddb`(4).
- `eject`(1) now has `amd`(8) support.
- `mtree`(8): add -S option to sort entries.
- Imported `netpgp`(1), a BSD-licensed PGP implementation.
- `install`(1): Added support for writing sha256, sha384, or sha512 hashes to a METALOG.
- `rpcgen`(1): Added support for `hyper` and `quad` keywords.

- New `wakeonlan`(8) command to send Wake-on-LAN packets to machines on the local Ethernet.
- Added `nbperf`(1), a minimal perfect hash function generator.
- `unzip`(1): a libarchive-based unzip frontend.
- `apropos`(1): new implementation using SQLite Full Text Index.
- `audiocfg`(1): new tool to control audio defaults.
- `devpubd`(8): Add a device publishing daemon for automatic device node creation.
- `disklabel`(8): Disable COMPAT_386BSD_MBRPART.
- `dkctl`(8): Display cache, strategy, and list of wedges if no command is specified in the command line.
- `fincore`(1): Add a utility to query file cache.
- `ifconfig`(8): Add the `linkstr` command which can be used to communicate an arbitrary string with the interface driver.
- `man`(1): display a manpage when specified with a path.
- `mkubootimage`(1): Added a tool to generate u-boot kernel images.

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

*Components removed from NetBSD*

In this release of NetBSD, the following software components have been removed from the system. Some were not useful anymore, or their utility did not justify the maintenance overhead. Others were not working properly and there was a lack of interest in fixing them.

- Support for Xen 2 has been dropped. Xen 3.1 or later is now required to run NetBSD.
- Support for LKMs (Loadable Kernel Modules) was dropped; use the new `module`(7) framework.
- "softdep"

  support is no longer available in FFS; use `wapbl`(4) logging instead.
- The

  playstation2:
  **http://www.NetBSD.org/ports/playstation2/**

  port.
- tn3270 was removed from base; it is available in pkgsrc.
- Support for Darwin, Mach, IRIX and PECOFF emulation was retired.

**Features to be removed in a later release**

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

- `dhclient`(8) and `rtsol`(8) in favor of `dhcpcd`(8).
- `groff`(1) is being phased out. Man pages are handled with `mandoc`(1), and `groff`(1) can still be found in pkgsrc as `textproc/groff`.
- `kame_ipsec`(4) has been replaced by `fast_ipsec`(4). The option to use the old implementation (see `options`(4)) will be removed in the next NetBSD release.

**The NetBSD Foundation**

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

**Sources of NetBSD**

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

**NetBSD 6.0 Release Contents**

The root directory of the NetBSD 6.0 release is organized as follows:

`.../NetBSD-6.0/`

`CHANGES` Changes between the 5.0 and 6.0 releases.

`CHANGES-6.0` Changes between the initial 6.0 branch and final release of 6.0.

`CHANGES.prev` Changes in previous NetBSD releases.

`LAST_MINUTE` Last minute changes and notes about the release.

`README.files` README describing the distribution's contents.

`source/` Source distribution sets; see below.

In addition to the files and directories listed above, there is one directory per architecture, for each of the architectures for which NetBSD 6.0 has a binary distribution.

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

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

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

**src** This set contains all of the base NetBSD 6.0 sources which are not in **gnusrc**, **sharesrc**, or **syssrc**.

**syssrc** This set contains the sources to the NetBSD 6.0 kernel for all architectures as well as the `config`(1) utility.

**xsrc** This set contains the sources to the X Window System.

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

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

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

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

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

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

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

*NetBSD/atari subdirectory structure*

The atari-specific portion of the NetBSD 6.0 release is found in the `atari` subdirectory of the distribution: `.../NetBSD-6.0/atari/`. 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-SMALL030.gz`
A kernel for memory-tight 68030 Falcon and TT030 machines. This is the kernel supplied on the boot.fs floppy.
`netbsd-ATARITT.gz`
A kernel for the Atari TT030.
`netbsd-FALCON.gz`
A kernel for the Atari Falcon, including support for 68060 processor cards.
`netbsd-HADES.gz`
A kernel for 68040 or 68060 Hades.
`netbsd-MILAN-ISAIDE.gz`
A kernel for 68040 or 68060 MILAN using IDE in ISA mode - for use with disks not marked byteswapped by HDDRIVER.
`netbsd-MILAN-PCIIDE.gz`
A kernel for 68040 or 68060 MILAN using IDE in PCI mode - for use with disks marked byteswapped by HDDRIVER.
`sets/` atari binary distribution sets; see below.

`installation/`
`floppy/` atari boot and installation floppies; see below.
`miniroot/` atari miniroot file system image; see below.
`misc/` Miscellaneous atari installation utilities; see installation section below.

*Binary distribution sets*

The NetBSD atari binary distribution sets contain the binaries which comprise the NetBSD 6.0 release for atari. The binary distribution sets can be found in the `atari/binary/sets` subdirectory of the NetBSD 6.0 distribution tree, and are as follows:

**base** The NetBSD 6.0 atari **base** binary distribution. You *must* install this distribution set. It contains the base NetBSD utilities that are necessary for the system to run and be minimally functional.

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

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

**games** This set includes the games and their manual pages.

**kern-SMALL030, kern-ATARITT, kern-FALCON, kern-HADES**, **kern-MILAN-ISAIDE**, **kern-MILAN-PCIIDE**
These sets contain a NetBSD/atari 6.0 kernel, named `/netbsd`. 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.

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

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

NetBSD maintains its own set of sources for the X Window System in order to assure tight integration and compatibility. These sources are based on X.Org. Binary sets for the X Window System are distributed with NetBSD. The sets are:

**xbase** The basic files needed for a complete X client environment. This does not include the X servers.

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

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

**xetc** Configuration files for X which could be locally modified.

**xserver** The X server.

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

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

Additional kernels to those included in the distribution sets may be found in the `atari/binary/kernel` subdirectory of the NetBSD 6.0 distribution tree. These kernels are generally named something like `netbsd-BOOT.gz` or some other suitable name. Please note that these kernels are simply gzipped and are not in tar archives.

There are six atari floppy images to be found in the `atari/installation/floppies` subdirectory of the NetBSD 6.0 distribution. Three of them are bootable TOS kernel floppies and the other three are installation floppies. They are described in more detail below. There are gzipped versions of each available, for easier downloading. (The gzipped versions have the `.gz` extension added to their names.)

*Bootable Kernel floppies*

These TOS disks contains the TOS support programs (like **`loadbsd.ttp`** and **`chg_pid.ttp`** — see below) and a kernel. They are setup such that you can insert them into your floppy drive, and start the programs from GEM.

For the TT030 and Falcon, the (720 KB) floppy is named `boot.fs` and the kernel supplied is `BOOT`. For the Hades, you need the `hades-boot.fs` floppy (1.44 MB), the kernel is `HADES`.

For the Milan, you need the `milan-boot.fs` floppy (1.44 MB), the kernel is MILAN-PCIIDE.

*Installation floppy:*
This disk contains a BSD root file system setup to help you install the rest of NetBSD. This includes formatting and mounting your / (root) and `/usr` partitions and getting ready to extract (and possibly first fetching) the distribution sets. There is enough on this file system to allow you to make a slip connection, configure an ethernet, mount an NFS file system or ftp. You can also load distribution sets from a SCSI tape or from one of your existing GEMDOS partitions.

The floppies meant for 720 KB disks are named `miniroot.fs.1` and `miniroot.fs.2`. There is also an image for an 1.44 MB disk: `miniroot.fs`.

There are also TOS utilities in the `atari/installation/misc` subdirectory, which you will need to get NetBSD/atari up-and-running.

- The **`gzip.ttp`** program allows you to uncompress .gz images. The usage is:

  **`gzip.ttp -d filename.gz`**

- The **`rawwrite.ttp`** program allows you to create the installation floppy disks from the files in the `atari/floppies` directory.
- The **`aptck.ttp`** program reads the partition tables present on a given disk and tries to interpret then the same way the NetBSD kernel does. If you have a disk on which GEMDOS and NetBSD are to co-exist, It is a good idea to run this before you begin the NetBSD/atari installation just to check that the kernel's view of the partition tables agree with GEMDOS's view. If you have more than 3 partitions defined on a disk you will notice that the NetBSD/atari partition starts one sector after the GEMDOS partition. This is to allow space for the auxiliary root for the 4th and subsequent partitions.
- The **`loadbsd.ttp`** program loads the NetBSD/atari kernel from TOS (or MiNT, MultiTOS, etc.).
- The **`chg_pid.ttp`** program can be used to change the id of an AHDI compatible partition. This allows you to reserve a partition for use by NetBSD/atari (id: NBD), or for use as a swap (id: SWP) partition.
- The **`file2swp.ttp`** program can be used to transfer an installation file system image, like `sysinst.fs` to a partition with id SWP. In this way, you can run the installation from the swap partition instead of a memory disk. This is a necessity for small memory systems.

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

**NetBSD/atari System Requirements and Supported Devices**

NetBSD/atari 6.0 runs on the TT030, Falcon, Hades and MilanI machines. An FPU is not required. The minimum amount of RAM required is 4 MB. On the Hades, only the Tseng PCI VGA cards (ET4000/ET6000/ET6100) are supported in the 6.0 release. When an unsupported video card is present, you can use NetBSD with a serial console only.

A minimal installation requires around 100MB of disk space, plus a swap partition size of 2*RAM (and always greater than 20MB). You will probably want to compile your own kernel, as `GENERIC` is large and bulky in order to accommodate all people, `BOOT` is small and might not have all the features you want).

*Supported devices*

- The builtin SCSI host adapter
  - Should support most SCSI-drives.
  - Should support most tape drives.

  - Should support most CD-ROM drives.
  - Should support most ZIP/M-O drives.
- The builtin video controller
- The builtin (720 KB / 1.44 MB) floppy drive
- The serial2/modem2 ports
- The Falcon FX memory expansion
- The Atari mouse
- A 3-button mouse (see build description in the FAQ!)
- The parallel printer
- IDE interface on both Falcon and Hades (includes ATAPI support)
- The serial interface on the first 68901 UART (modem1)
- EtherNEC Ethernet on ROM cartridge slot
- VME-bus devices (TT030/Hades)
  - BVME410 Ethernet
  - Circad Leonardo 24-bit VME graphics adapter
  - Crazy Dots VME et4000 graphics adapter
  - Riebl (and possibly PAM) Ethernet cards on the VME bus.
  - SMC Elite Ultra ISA Ethernet with SMC_TT VME-ISA bridge
- PCI-bus devices (Hades and Milan only)
  - ET4000/ET6000/ET6100-PCI (VGA console)
  - ESS Technology Inc. Solo-1 Soundcard
  - 3Com 3c59x Network card
- ISA-bus devices (Hades only)
  - Teles S0/16.3-ISA ISDN adapter (with I4B)

This list is incomplete by definition. We can not test all SCSI peripherals, ISA cards or PCI cards. If you have problems with such peripherals, please contact the `port-atari@NetBSD.org` mailing list.

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

Installation is supported from several media types, including:

- GEMDOS/TOS HD partitions
- Tape

No matter what you do, however, you'll need to have three disks handy, on which you will put the install and boot floppy images.

All the images are available from the directory `installation/floppies` under the root of the NetBSD/atari tree at your favorite archive site.

If you are using NetBSD/atari to make the floppies, you should use the command `dd`(1) to write the raw floppy images (.fs files) to the disk. As an example, to write the first part of the miniroot file system onto a 720 KB floppy in fd0 use:

```
# dd if=miniroot.fs.1 of=/dev/rfd0b bs=9b
```

If you are using TOS to make the floppies, grab the **`rawwrite`** utility from the `atari/utils` directory and issue the command:

```
rawwrite boot.fs
```

This will create the boot-floppy on the floppy in drive a. The floppies should be pre-formatted on 720 KB / 1.44 MB for both the **dd** and **rawwrite** commands to work. Pre-formatting can be best done using the desktop format command. Some other utilities seem to be giving problems.

Since the 1.3 release, it is also possible to use HD-floppies. You should than use the floppy device `/dev/rfd0c` or add the **-H** flag to **rawwrite**.

The steps necessary to prepare the distribution sets for installation depend on which method of installation you choose. The various methods are explained below.

GEMDOS To install NetBSD from a GEMDOS partition, you need to get the NetBSD distribution sets you wish to install on your system on to a GEMDOS partition.

Note where you placed the files, you will need this later.

Once you have done this, you can proceed to the next step in the installation process, preparing your hard disk.

*Tape* To install NetBSD from a tape, you need to somehow get the NetBSD filesets you wish to install on your system on to the appropriate kind of tape. If you make the tape on a UNIX-like system, you can create it as follows:

```
# cd .../NetBSD-6.0/atari/binary/sets
# T=<tape_device>
# mt -f $T rewind
# for f in base etc comp games man misc text
    dd if=$f.tgz of=$T conv=osync bs=5k
# done
# mt -f $T rewind
```

where "<tape_device>" is the name of the (non-rewinding!) tape device that you're using (probably something like `/dev/nrst0`, but we make no guarantees 8-). If you can't figure it out, ask your system administrator.

Once you have done this, you can proceed to the next step in the installation process, preparing your hard disk.

**Preparing your System for NetBSD installation**

*Preparing your hard disk for the NetBSD installation.*

Note that you will be modifying your hard drives and if you mess something up here you could lose everything on all the drives that you work with. It is therefore advised that you:

- Write down your current configurations. Do this by writing down all partition info (especially their sizes).
- *Back up the partitions you are keeping.*

If NetBSD has to share the disk with another operating system, you can either take care of partitioning your harddisk before installing NetBSD or delay this until the installer requests you to do it. If you decide to do it now, please create space for at least / (root) and swap partitions. Whatever you decide, take note of the paragraphs below! You need this info to create bootable disks.

*Warning:* The AHDI partitioning function erases all partitions on your harddisk even if they are not changed! We know this is rather stupid, but don't say we didn't warn you.

If you want to use an AHDI partitioning scheme and you want to be able to boot directly into NetBSD, there are some constraints on the partition layout.

As you might know, every hard disk has a 'root sector' that contains information about the size of the hard disk and the partitions on the hard disk. The root sector can only contain the necessary data for four partitions. Nobody thought that this limitation would cause any problems. After all, 640 KByte should be enough. As hard disks grew, it was necessary to define more than four partitions. In order to be more or less compatible with the old format, a new type of partition entry was defined: XGM partitions.

An XGM partition is a 'look over there' sign: Another root sector can be found at the start of the XGM partition. This root sector contains the remaining real partitions. And this is the big mystery: Partitions defined in the root sector of the hard disk are called 'primary partitions', partitions defined in the root sector of an XGM partition are called 'extended partitions'.

The bootblock will only work if the first NBD partition is a primary partition. This is not a limitation of NetBSD but a limitation of TOS/AHDI: You can only boot from primary partitions.

If you are creating your partitions with HDX, you'll have to be very careful to fulfill this rule. HDX has some very strange ideas when it comes to extended partitions. Fortunately, you can edit this stuff: The "Edit partition scheme of the unit" dialog box has a button labeled "expert". This button is inactive unless you have defined more than four partitions. Click on it *after* you have defined the sizes of the partitions.

A new dialog box appears on the screen. The left side contains two blocks of partitions; the upper block always contains the first four partitions, the lower block contains the last three partitions. If you have defined less than 7 partitions, some fields of the lower block will contain the string "unused". Some of the partitions will be displayed in reverse video: These are the extended partitions.

The right side contains six possible ranges for the extended partitions. It is not possible to define your own range, you will have to use one of the schemes offered by HDX. To quote from Ghostbusters: Choose and die. The default scheme used by HDX is the first scheme: Extended partitions start with the second partition and end with the second to last partition. If you have defined 7 partitions, partitions #2 to #5 will be extended partitions, while partitions #1, #6 and #7 will be primary partitions.

You can move the extended partition range by clicking on one of the buttons on the right side of the dialog box. Try to find one where your first NetBSD partition is a primary partition. Golden rules:

- If the disk contains no GEMDOS partitions, don't use AHDI. Let NetBSD handle it alone.
- If the disk contains one GEMDOS partition, make it partition #1 and start the extended partition range at partition #3. This allows you to boot from both the GEMDOS and the NetBSD partitions.
- If the disk contains two GEMDOS partitions, use partitions #1 and #2 for GEMDOS, partition #3 for NetBSD-root. Start the extended partition range with partition #4.
- If your disks contains three or more GEMDOS partitions, you are in trouble. Try using partitions #1 and #2 as the first two GEMDOS partitions. Use partition #3 as the first NetBSD partition. Start the extended partition range with partition #4. Put the other NetBSD extended partition range.

*Booting the installer on an existing system*

If you already have NetBSD installed, it is easy. Just boot into single user mode on your current system, or use the **shutdown now** command to shutdown to single-user mode. Then copy the installer using **dd**:

```
dd if=sysinst.fs of=/dev/rsd0b
```

where `/dev/rsd0b` should be the device path of the swap partition your system is configured to use. Once the file is copied, reboot back to the booter and use the '-b' option to make the kernel prompt for a root device. Now enter the swap device as your root device to start the installer.

*Booting the installer on new systems.*

If your system has more than 6MB RAM, you can skip directly to the section about **loadbsd.ttp,** since the amount of RAM is enough to load the installer into.

For new new installations on small memory systems, things are a bit more complicated. The easiest way is to mark an AHDI partition as id 'SWP'. You can either accomplish this with HDdriver or use the **chg_pid.ttp** program supplied on the bootfloppy. To use the fifth partition of your first drive to a swap partition, do the following:

```
chg_pid -w 0 4 SWP
```

As you can see, both the drive and the partition numbers are zero based.

When a swap partition has been created, you can transfer the installer using the **file2swp.ttp** command, which is also on the bootfloppy. This program copies a (gzipped) file to the first AHDI partition with id 'SWP' on the designated disk. To copy sysinst.fs to your first SCSI disk, use:

```
file2swp -w -f sysinst.fs s0
```

Note that **file2swp** automatically detects a gzipped file, there is no need for a .gz extension.

*Using loadbsd.ttp*

To start the installer, you first need to load a NetBSD kernel. This can be done in a couple ways, both of which currently require GEMDOS. You need either the bootfloppy provided in the distribution or you can copy the **loadbsd.ttp** program and kernel to a boot floppy disk (1.44 MB needed) or put them on a TOS partition. Select the loadbsd program and it will ask for parameters, supply: '**-b netbsd**' (or whatever name you copied the kernel to). You can, of course, also run it from the shell command-line in MiNT:

```
loadbsd -b a:/netbsd
```

You should see the screen clear and some information about your system as the kernel configures the hardware. Then you will be prompted for a root device. If you copied the installer to a swap partition, as explained above, you have to enter the swap partition as the boot device. When you used your first SCSI disk, this will be **sd0b.** On the first IDE drive it would be **wd0b.**

If you didn't copy the installer to swap, you need to use the RAMdisk, so remove the GEMDOS kernel boot floppy from the drive if present and insert the NetBSD install floppy 1. Now enter the name of the boot device depending on the floppy type you have inserted. Use:

- **md0a** for the old installer (1MB filesystem) on 720KB floppies.
- **md1a** for the sysinst installer on 720KB floppies.
- **md2a** for the sysinst installer on 1.44MB floppies.

The kernel will load the install file system into RAMdisk. While the kernel is loading, it will show a '.' for each track loaded. After loading 80 tracks, it will ask you to insert the next floppy. At this time, insert the NetBSD install floppy 2 and press any key. The kernel continues loading another 40 tracks before it continues to boot.

### Installing the NetBSD System

Installing NetBSD is a relatively complex process, but, if you have this document in hand and are careful to read and remember the information which is presented to you by the install program, it shouldn't be too much trouble.

Before you begin, you must have already prepared your hard disk as detailed in the section on preparing your system for install.

The following is a walk-through of the steps necessary to get NetBSD installed on your hard disk.

*Running the sysinst installation program*

1. *Introduction*

   Using **sysinst**, installing NetBSD is a relatively easy process. Still, you should read this document and have it in hand when doing the installation process. This document tries to be a good guide to the installation, and as such, covers many details for the sake of completeness. Do not let this discourage you; the install program is not hard to use.

2. *General*

   The following is a walk-through of the steps you will take while getting NetBSD installed on your hard disk. **sysinst** is a menu driven installation system that allows for some freedom in doing the installation. Sometimes, questions will be asked and in many cases the default answer will be displayed in brackets ("[ ]") after the question. If you wish to stop the installation, you may press CONTROL-C at any time, but if you do, you'll have to begin the installation process again from scratch by running the /sysinst program from the command prompt. It is not necessary to reboot.

3. *Quick install*

   First, let's describe a quick install. The other sections of this document go into the installation procedure in more detail, but you may find that you do not need this. If you want detailed instructions, skip to the next section. This section describes a basic installation, using a CD-ROM install as an example.

   - What you need.
     - The distribution sets (in this example, they are on CD).
     - A floppy disk containing a suitable boot.fs and a floppy with the sysinst.fs image. See the "prepare" section about obtaining those.
     - A CD-ROM drive (SCSI or ATAPI), a hard disk and a minimum of 4 MB (TT030/Falcon) or 16 MB (Hades/Milan) of memory installed.
     - The hard disk should have at least 120 + *n* megabytes of space free, where *n* is the number of megabytes of main memory in your system. If you wish to install the X Window System as well, you will need at least 215 MB more.
   - The Quick Installation
     - Boot the system as described above. You should be at the **sysinst** main menu.

```
.*********************************************.
* NetBSD-6.0 Install System                    *
*                                              *
*>a: Install NetBSD to hard disk               *
* b: Upgrade NetBSD on a hard disk             *
* c: Re-install sets or install additional sets *
* d: Reboot the computer                       *
* e: Utility menu                              *
* f: Config menu                               *
* x: Exit Install System                       *
.*********************************************.
```

     - If you wish, you can configure some network settings immediately by choosing the **Utility menu** and then **Configure network**. It isn't actually required at this point, but it may be more convenient. Go back to the main menu.

- Choose **install**.
- You will be guided through some steps regarding the setup of your disk, and the selection of distributed components to install. When in doubt, refer to the rest of this document for details. WARNING: If you want your disk to retain an AHDI compatible partitioning, make sure to use the 'existing' disk layout.
- After your disk has been prepared, choose **CD-ROM** as the medium . The default values for the path and device should be ok.
- After all the files have been unpacked, go back to the main menu and select **reboot**, after you have removed the bootfloppy from the drive.
- NetBSD will now boot. If you haven't already done so in **sysinst**, you should log in as `root` and set a password for that account. You are also advised to edit `/etc/rc.conf` to match your needs.
- Your installation is now complete.

4. *Booting NetBSD*

   Boot the system as described in the "Booting the installer" section above.

   Once NetBSD has booted and printed all the boot messages, you will be presented with a welcome message and a main menu. It will also include instructions for using the menus.

5. *Network configuration*

   If you do not intend to use networking during the installation, but you do want your machine to be configured for networking once it is installed, you should first go to the **Utility menu** and select the **Configure network** option. If you only want to temporarily use networking during the installation, you can specify these parameters later. If you are not using the Domain Name System (DNS), you can give an empty response when asked to provide a server.

6. *Installation drive selection and parameters*

   To start the installation, select **Install NetBSD to hard disk** from the main menu.

   The first thing is to identify the disk on which you want to install NetBSD. **sysinst** will report a list of disks it finds and ask you for your selection. You should see disk names like `sd0` or `sd1`.

7. *Selecting which sets to install*

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

8. *Partitioning the disk*

   - Preparing a disk which will be used for GEM and NetBSD.

     You will be prompted if you want an AHDI compatible partitioning on your disk. If you are installing NetBSD on a dedicated drive, just answer 'no' and skip to the next section.

     If you answer 'yes', the **ahdilabel** program is started. You can now change the AHDI partition ID's on your root disk. Because NetBSD imposes a special ordering in disk partitions it uses for / (root) and swap. Also, because it wants to guard you against an unwanted demolition of partitions used by other systems, you have to tell it what partitions it is allowed to use. You have to mark the partition you want to use as swap SWP or (deprecated!) NBS and the other partitions as NBD. Note that all the changes you make to the ID's are reversible as long as you remember the original value. ahdilabel is capable of creating or changing an AHDI compatible partitioning on the disk, and in the

partition-ID editor, the partitions are shown in the order that AHDI created them. When you leave this editor and continue with **sysinst,** your changes to the ID's do have consequences to the partition order! They will show up as follows:

| | |
|---|---|
| a | the first NBD partition |
| b | the first SWP (or NBS) partition |
| d (and up) | the rest of the partitions in AHDI order |

9. *Editing the NetBSD disklabel*

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

   If you want to use NetBSD on an AHDI partitioned disk, you will have to use: **Use Existing**.

   After you have chosen your partitions and their sizes (or if you opted to use the existing partitions), you will be presented with the layout of the NetBSD disklabel and given one more chance to change it. For each partition, you can set the type, offset and size, block and fragment size, and the mount point. The type that NetBSD uses for normal file storage is called **4.2BSD**. A swap partition has a special type called **swap**. Some partitions in the disklabel have a fixed purpose.

   | | |
   |---|---|
   | a | Root partition (/) |
   | b | Swap partition. |
   | c | The NetBSD portion of the disk. |
   | d–p | Available for other use. Traditionally, d is the partition mounted on /usr, but this is historical practice and not a fixed value. |

   You will then be asked to name your disk's disklabel. The default response will be ok for most purposes. If you choose to name it something different, make sure the name is a single word and contains no special characters. You don't need to remember this name.

10. *Preparing your hard disk*

    *You are now at the point of no return*. Apart from the changes you made with **ahdilabel** nothing has been modified on your disk yet. If you confirm that you want to install NetBSD, the partitions now assigned to NetBSD will be actually written to. If you are sure you want to proceed, select **yes**.

    The install program will now label your disk and make the file systems you specified. The file systems will be initialized to contain NetBSD bootstrapping binaries and configuration files. You will see messages on your screen from the various NetBSD disk preparation tools that are running. There should be no errors in this section of the installation. If there are, restart from the beginning of the installation process. Otherwise, you can continue the installation program after pressing the return key.

11. *Getting the distribution sets*

    The NetBSD distribution consists of a number of *sets* that come in the form of gzipped tarfiles. At this point, you will be presented with a menu which enables you to choose from one of the following methods of installing the sets. Some of these methods will first load the sets on your hard disk, others will extract the sets directly.

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

12. *Installation from CD-ROM*

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

    **sysinst** will then check if the files are indeed available in the specified location, and proceed to the actual extraction of the sets.

13. *Installation using ftp*

    To be able to install using ftp, you first need to configure your network setup if you haven't already done so. **sysinst** will do this for you, asking you if you want to use DHCP. If you do not use DHCP, you can enter network configuration details yourself. If you do not have DNS set up for the machine that you are installing on, you can just press `RETURN` in answer to this question, and DNS will not be used.

    You will also be asked to specify the host that you want to transfer the sets from, the directory on that host, the account name and password used to log into that host using ftp, and optionally a proxy server to use. If you did not set up DNS, you will need to specify an IP address instead of a hostname for the ftp server.

    **sysinst** will proceed to transfer all the default set files from the remote site to your hard disk.

14. *Installation using NFS*

    To be able to install using NFS, you first need to configure your network setup if you haven't already done so. **sysinst** will do this for you, asking you if you want to use DHCP. If you do not use DHCP, you can enter network configuration details yourself. If you do not have DNS set up for the machine that you are installing on, you can just press `RETURN` in answer to this question, and DNS will not be used.

    You will also be asked to specify the host that you want to transfer the sets from and the directory on that host that the files are in. This directory should be mountable by the machine you are installing on, i.e., correctly exported to your machine.

    If you did not set up DNS, you will need to specify an IP address instead of a hostname for the NFS server.

15. *Installation from an unmounted file system*

    In order to install from a local file system, you will need to specify the device that the file system resides on (for example `sd1e`) the type of the file system, and the directory on the specified file system where the sets are located. **sysinst** will then check if it can indeed access the sets at that location.

16. *Installation from a local directory*

    This option assumes that you have already done some preparation yourself. The sets should be located in a directory on a file system that is already accessible. **sysinst** will ask you for the name of this directory.

17. *Extracting the distribution sets*

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

    After all the files have been extracted, the device node files will be created. If you have already configured networking, you will be asked if you want to use this configuration for normal operation. If so, these values will be installed in the network configuration files.

18. *Configure additional items*

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

initial root password.

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

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

19. *Finalizing your installation*

Congratulations, you have successfully installed NetBSD 6.0. You can now reboot the machine and boot NetBSD from hard disk.

**Post installation steps**

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

1. Configuring /etc/rc.conf

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

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

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

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

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

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

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

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

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

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

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

```
ifconfig_le0="inet myname.my.dom netmask 255.255.255.0"
```

To enable proper hostname resolution, you will also want to add an /etc/resolv.conf file or (if you are feeling a little more adventurous) run named(8). See resolv.conf(5) or named(8) for more information. Instead of manually configuring network and naming service, DHCP can be used by setting dhclient=YES in /etc/rc.conf.

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

2. Select the proper terminal devices

   You will have to edit the /etc/ttys file. If you don't have a Milan, you must disable the ttyEx devices. For the Milan, you will have to disable the ttyex devices. This is easy, just change 'on' to 'off' on the corresponding lines.

3. Logging in

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

4. Adding accounts

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

5. The X Window System

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

6. Installing third party packages

   If you wish to install any of the software freely available for UNIX-like systems you are strongly advised to first check the NetBSD package system, pkgsrc. pkgsrc automatically handles any changes necessary to make the software run on NetBSD. This includes the retrieval and installation of any other packages on which the software may depend.

   - More information on the package system is available at
     **http://www.NetBSD.org/docs/software/packages.html**
   - A list of available packages suitable for browsing is at
     **ftp://ftp.NetBSD.org/pub/NetBSD/packages/pkgsrc/README.html**
   - Precompiled binaries can be found at
     **ftp://ftp.NetBSD.org/pub/pkgsrc/packages/NetBSD/**
     usually in the atari/6.0/All subdir. If you installed pkgin(1) in the **sysinst** post-installation configuration menu, you can use it to automatically install binary packages over the network. Assuming that /usr/pkg/etc/pkgin/repositories.conf is correctly configured, you can install them with the following commands:

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

     *Note:* Some mirror sites don't mirror the /pub/pkgsrc directory. If you would like to use such mirrors, you could also try the /pub/NetBSD/packages/current-packages/NetBSD/atari/6.0/All directory, which may have the same contents.

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

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

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

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

7. Misc

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

     ```
     # man 5 filename
     ```

     is likely to give you more information on these files.

**Upgrading a previously-installed NetBSD System**

The easiest way to upgrade to NetBSD 6.0 is with binaries, and that is the method documented here.

To do the upgrade, you must first boot the system as described in the **Booting the installer** section. You must also have at least the **base** and **kern** binary distribution sets available. Finally, you must have sufficient disk space available to install the new binaries. Since files already installed on the system are overwritten in place, you only need additional free space for files which weren't previously installed or to account for growth of the sets between releases. If you have a few megabytes free on each of your root ( / ) and /usr partitions, you should have enough space.

Since upgrading involves replacing the kernel, boot blocks, and most of the system binaries, it has the potential to cause data loss. You are strongly advised to *back up* any important data on the NetBSD partition or on another operating system's partition on your disk before beginning the upgrade process.

The upgrade procedure is similar to an installation, but without the hard disk partitioning. **sysinst** will attempt to merge the settings stored in your /etc directory with the new version of NetBSD. Also, file systems are checked before unpacking the sets. Fetching the binary sets is done in the same manner as the installation procedure; refer to the installation part of the document for help.

After a new kernel has been copied to your hard disk, your machine is a complete NetBSD 6.0 system. However, that doesn't mean that you're finished with the upgrade process. You will probably want to update the set of device nodes you have in /dev. If you've changed the contents of /dev by hand, you will need to be careful about this, but if not, you can just cd into /dev, and run the command:

```
# sh MAKEDEV all
```

Finally, you will want to delete old binaries that were part of the version of NetBSD that you upgraded from and have since been removed from the NetBSD distribution.

**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 6.0.

Note that **sysinst** will automatically invoke

```
postinstall fix
```

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

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

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

- Running a 5.0 kernel with an older userland.
- Running an older userland inside a chroot'ed environment on a 5.0 system.
- Running older statically linked pthread applications.

The 5.0 kernel defaults to 0 for kern.no_sa_support, which covers the first case. However, please note that a full installation of 5.0 (either from scratch or through an upgrade) will set kern.no_sa_support to 1 during the boot process. This means that for the last two cases, you will have to manually set kern.no_sa_support to 0, using either the sysctl(8) command or through sysctl.conf(5).

The implementation of SHA2-HMAC in KAME_IPSEC as used in NetBSD-5 and before did not comply to current standards. FAST_IPSEC does, with the result that old and new systems cannot communicate over IPSEC, if one of the affected authentication algorithms (hmac_sha256, hmac_sha384, hmac_sha512) is used.

*Issues affecting an upgrade from NetBSD 4.x releases*

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

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

Issues fixed by *postinstall*:

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

The following issues need to be resolved manually:

- The users '_httpd' and '_timedc' and the groups '_httpd' and '_timedc' need to be created.
- Unprivileged use of the mount(8) command now requires the *nosuid* and *nodev* options to be explicitly specified. Previously, these options were automatically enforced even if they were not explicitly specified.

- A number of things have been removed from the NetBSD 6.0 release. See the "Components removed from NetBSD" section near the beginning of this document for a list.

**Using online NetBSD documentation**

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

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

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

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

```
# man passwd
```

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

```
# man 5 passwd
```

instead.

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

```
# apropos subject-word
```

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

**Administrivia**

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

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

To report bugs, use the `send-pr`(1) command shipped with NetBSD, and fill in as much information about the problem as you can. Good bug reports include lots of details.

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

There are also port-specific mailing lists, to discuss aspects of each port of NetBSD. Use majordomo to find their addresses, or visit **http://www.NetBSD.org/mailinglists/**

If you're interested in doing a serious amount of work on a specific port, you probably should contact the 'owner' of that port (listed below).

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

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

**Thanks go to**

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

  Keith Bostic
  Ralph Campbell
  Mike Karels
  Marshall Kirk McKusick

  for their work on BSD systems, support, and encouragement.
- The Internet Systems Consortium, Inc. for hosting the NetBSD FTP, CVS, AnonCVS, mail, mail archive, GNATS, SUP, Rsync and WWW servers.
- The Internet Research Institute in Japan for hosting the server which runs the CVSweb interface to the NetBSD source tree.
- The Luleå Academic Computer Society for providing the backup services server.
- The Columbia University Computer Science Department for hosting the NYC build cluster.
- The Western Washington University Computer Science Department for running the WWU build cluster.
- The many organizations that provide NetBSD mirror sites.
- Without CVS, this project would be impossible to manage, so our hats go off to Brian Berliner, Jeff Polk, and the various other people who've had a hand in making CVS a useful tool.
- We list the individuals and organizations that have made donations or loans of hardware and/or money, to support NetBSD development, and deserve credit for it at **http://www.NetBSD.org/donations/** (If you're not on that list and should be, tell us! We probably were not able to get in touch with you, to verify that you wanted to be listed.)
- Finally, we thank all of the people who've put sweat and tears into developing NetBSD since its inception in January, 1993. (Obviously, there are a lot more people who deserve thanks here. If you're one of them, and would like to be mentioned, tell us!)

**We are...**

(in alphabetical order)

*The NetBSD core group:*

| | |
|---|---|
| Alan Barrett | apb@NetBSD.org |
| Alistair Crooks | agc@NetBSD.org |
| Matthew Green | mrg@NetBSD.org |
| Chuck Silvers | chs@NetBSD.org |
| Matt Thomas | matt@NetBSD.org |
| YAMAMOTO Takashi | yamt@NetBSD.org |
| Christos Zoulas | christos@NetBSD.org |

*The portmasters (and their ports):*

| | | |
|---|---|---|
| Reinoud Zandijk | reinoud | **acorn32** |
| Matt Thomas | matt | **alpha** |
| Ignatios Souvatzis | is | **amiga** |
| Ignatios Souvatzis | is | **amigappc** |
| Noriyuki Soda | soda | **arc** |
| Julian Coleman | jdc | **atari** |
| Matthias Drochner | drochner | **cesfic** |
| Erik Berls | cyber | **cobalt** |
| Antti Kantee | pooka | **emips** |
| Simon Burge | simonb | **evbmips** |
| Steve Woodford | scw | **evbppc** |
| Izumi Tsutsui | tsutsui | **ews4800mips** |
| Izumi Tsutsui | tsutsui | **hp300** |
| Nick Hudson | skrll | **hp700** |
| Valeriy E. Ushakov | uwe | **hpcsh** |
| Matt Thomas | matt | **ibmnws** |
| Gavan Fantom | gavan | **iyonix** |
| Valeriy E. Ushakov | uwe | **landisk** |
| Izumi Tsutsui | tsutsui | **luna68k** |
| Scott Reynolds | scottr | **mac68k** |
| Michael Lorenz | macallan | **macppc** |
| Steve Woodford | scw | **mvme68k** |
| Steve Woodford | scw | **mvmeppc** |
| Matt Thomas | matt | **netwinder** |
| Izumi Tsutsui | tsutsui | **news68k** |
| Tim Rightnour | garbled | **ofppc** |
| Simon Burge | simonb | **pmax** |
| Tim Rightnour | garbled | **prep** |
| Tim Rightnour | garbled | **rs6000** |
| Tohru Nishimura | nisimura | **sandpoint** |
| Simon Burge | simonb | **sbmips** |
| Søren Jørvang | soren | **sgimips** |
| SAITOH Masanobu | msaitoh | **sh3** |
| Martin Husemann | martin | **sparc64** |
| Anders Magnusson | ragge | **vax** |
| NISHIMURA Takeshi | nsmrtks | **x68k** |
| Manuel Bouyer | bouyer | **xen** |

*The NetBSD 6.0 Release Engineering team:*

| | |
|---|---|
| Stephen Borrill | sborrill@NetBSD.org |
| Manuel Bouyer | bouyer@NetBSD.org |
| David Brownlee | abs@NetBSD.org |
| James Chacon | jmc@NetBSD.org |
| Julian Coleman | jdc@NetBSD.org |
| Alistair G. Crooks | agc@NetBSD.org |
| Håvard Eidnes | he@NetBSD.org |
| John Heasley | heas@NetBSD.org |

| | |
|---|---|
| Martin Husemann | martin@NetBSD.org |
| Soren Jacobsen | snj@NetBSD.org |
| Phil Nelson | phil@NetBSD.org |
| Jeremy C. Reed | reed@NetBSD.org |
| Jeff Rizzo | riz@NetBSD.org |
| SAITOH Masanobu | msaitoh@NetBSD.org |

*NetBSD Developers:*

| | |
|---|---|
| Nathan Ahlstrom | nra@NetBSD.org |
| Steve Allen | wormey@NetBSD.org |
| Jukka Andberg | jandberg@NetBSD.org |
| Julian Assange | proff@NetBSD.org |
| Lennart Augustsson | augustss@NetBSD.org |
| Zafer Aydogan | zafer@NetBSD.org |
| Christoph Badura | bad@NetBSD.org |
| Marc Balmer | mbalmer@NetBSD.org |
| Bang Jun-Young | junyoung@NetBSD.org |
| Dieter Baron | dillo@NetBSD.org |
| Robert V. Baron | rvb@NetBSD.org |
| Alan Barrett | apb@NetBSD.org |
| Grant Beattie | grant@NetBSD.org |
| Erik Berls | cyber@NetBSD.org |
| Hiroyuki Bessho | bsh@NetBSD.org |
| John Birrell | jb@NetBSD.org |
| Rafal Boni | rafal@NetBSD.org |
| Stephen Borrill | sborrill@NetBSD.org |
| Sean Boudreau | seanb@NetBSD.org |
| Manuel Bouyer | bouyer@NetBSD.org |
| Allen Briggs | briggs@NetBSD.org |
| Mark Brinicombe | mark@NetBSD.org |
| Aaron Brown | abrown@NetBSD.org |
| Andrew Brown | atatat@NetBSD.org |
| David Brownlee | abs@NetBSD.org |
| Jon Buller | jonb@NetBSD.org |
| Simon Burge | simonb@NetBSD.org |
| Robert Byrnes | byrnes@NetBSD.org |
| Pavel Cahyna | pavel@NetBSD.org |
| D'Arcy J.M. Cain | darcy@NetBSD.org |
| Taylor R. Campbell | riastradh@NetBSD.org |
| Daniel Carosone | dan@NetBSD.org |
| Dave Carrel | carrel@NetBSD.org |
| James Chacon | jmc@NetBSD.org |
| Mihai Chelaru | kefren@NetBSD.org |
| Aleksey Cheusov | cheusov@NetBSD.org |
| Bill Coldwell | billc@NetBSD.org |
| Julian Coleman | jdc@NetBSD.org |
| Marcus Comstedt | marcus@NetBSD.org |
| Jeremy Cooper | jeremy@NetBSD.org |

| | |
|---|---|
| Thomas Cort | tcort@NetBSD.org |
| Chuck Cranor | chuck@NetBSD.org |
| Alistair Crooks | agc@NetBSD.org |
| Johan Danielsson | joda@NetBSD.org |
| John Darrow | jdarrow@NetBSD.org |
| Jed Davis | jld@NetBSD.org |
| Matt DeBergalis | deberg@NetBSD.org |
| Arnaud Degroote | degroote@NetBSD.org |
| Rob Deker | deker@NetBSD.org |
| Chris G. Demetriou | cgd@NetBSD.org |
| Tracy Di Marco White | gendalia@NetBSD.org |
| Jaromír Dolecek | jdolecek@NetBSD.org |
| Andy Doran | ad@NetBSD.org |
| Roland Dowdeswell | elric@NetBSD.org |
| Steven Drake | sbd@NetBSD.org |
| Emmanuel Dreyfus | manu@NetBSD.org |
| Matthias Drochner | drochner@NetBSD.org |
| Jun Ebihara | jun@NetBSD.org |
| Håvard Eidnes | he@NetBSD.org |
| Jaime A Fournier | ober@NetBSD.org |
| Stoned Elipot | seb@NetBSD.org |
| Michael van Elst | mlelstv@NetBSD.org |
| Enami Tsugutomo | enami@NetBSD.org |
| Bernd Ernesti | veego@NetBSD.org |
| Erik Fair | fair@NetBSD.org |
| Gavan Fantom | gavan@NetBSD.org |
| Hauke Fath | hauke@NetBSD.org |
| Hubert Feyrer | hubertf@NetBSD.org |
| Jason R. Fink | jrf@NetBSD.org |
| Matt J. Fleming | mjf@NetBSD.org |
| Marty Fouts | marty@NetBSD.org |
| Liam J. Foy | liamjfoy@NetBSD.org |
| Matt Fredette | fredette@NetBSD.org |
| Thorsten Frueauf | frueauf@NetBSD.org |
| Castor Fu | castor@NetBSD.org |
| Makoto Fujiwara | mef@NetBSD.org |
| Ichiro Fukuhara | ichiro@NetBSD.org |
| Quentin Garnier | cube@NetBSD.org |
| Thomas Gerner | thomas@NetBSD.org |
| Simon J. Gerraty | sjg@NetBSD.org |
| Justin Gibbs | gibbs@NetBSD.org |
| Chris Gilbert | chris@NetBSD.org |
| Eric Gillespie | epg@NetBSD.org |
| Brian Ginsbach | ginsbach@NetBSD.org |
| Oliver V. Gould | ver@NetBSD.org |
| Paul Goyette | pgoyette@NetBSD.org |
| Michael Graff | explorer@NetBSD.org |
| Matthew Green | mrg@NetBSD.org |
| Andreas Gustafsson | gson@NetBSD.org |

| | |
|---|---|
| Ulrich Habel | rhaen@NetBSD.org |
| Jun-ichiro itojun Hagino | itojun@NetBSD.org |
| HAMAJIMA Katsuomi | hamajima@NetBSD.org |
| Adam Hamsik | haad@NetBSD.org |
| Juergen Hannken-Illjes | hannken@NetBSD.org |
| Charles M. Hannum | mycroft@NetBSD.org |
| Yorick Hardy | yhardy@NetBSD.org |
| Ben Harris | bjh21@NetBSD.org |
| Eric Haszlakiewicz | erh@NetBSD.org |
| John Hawkinson | jhawk@NetBSD.org |
| Emile Heitor | imil@NetBSD.org |
| John Heasley | heas@NetBSD.org |
| Lars Heidieker | para@NetBSD.org |
| Geert Hendrickx | ghen@NetBSD.org |
| René Hexel | rh@NetBSD.org |
| Iain Hibbert | plunky@NetBSD.org |
| Kouichirou Hiratsuka | hira@NetBSD.org |
| Michael L. Hitch | mhitch@NetBSD.org |
| Ádám Hóka | ahoka@NetBSD.org |
| Jachym Holecek | freza@NetBSD.org |
| David A. Holland | dholland@NetBSD.org |
| Christian E. Hopps | chopps@NetBSD.org |
| Daniel Horecki | morr@NetBSD.org |
| Ken Hornstein | kenh@NetBSD.org |
| Marc Horowitz | marc@NetBSD.org |
| Eduardo Horvath | eeh@NetBSD.org |
| Nick Hudson | skrll@NetBSD.org |
| Shell Hung | shell@NetBSD.org |
| Darran Hunt | darran@NetBSD.org |
| Martin Husemann | martin@NetBSD.org |
| Dean Huxley | dean@NetBSD.org |
| Love Hörnquist Åstrand | lha@NetBSD.org |
| Roland Illig | rillig@NetBSD.org |
| Bernardo Innocenti | bernie@NetBSD.org |
| Tetsuya Isaki | isaki@NetBSD.org |
| ITOH Yasufumi | itohy@NetBSD.org |
| IWAMOTO Toshihiro | toshii@NetBSD.org |
| Matthew Jacob | mjacob@NetBSD.org |
| Soren Jacobsen | snj@NetBSD.org |
| Lonhyn T. Jasinskyj | lonhyn@NetBSD.org |
| Darrin Jewell | dbj@NetBSD.org |
| Nicolas Joly | njoly@NetBSD.org |
| Søren Jørvang | soren@NetBSD.org |
| Takahiro Kambe | taca@NetBSD.org |
| Antti Kantee | pooka@NetBSD.org |
| Frank Kardel | kardel@NetBSD.org |
| KAWAMOTO Yosihisa | kawamoto@NetBSD.org |
| Min Sik Kim | minskim@NetBSD.org |
| KIYOHARA Takashi | kiyohara@NetBSD.org |

| | |
|---|---|
| Thomas Klausner | wiz@NetBSD.org |
| Klaus Klein | kleink@NetBSD.org |
| John Klos | jklos@NetBSD.org |
| Wayne Knowles | wdk@NetBSD.org |
| Takayoshi Kochi | kochi@NetBSD.org |
| Jonathan A. Kollasch | jakllsch@NetBSD.org |
| Radoslaw Kujawa | rkujawa@NetBSD.org |
| Jochen Kunz | jkunz@NetBSD.org |
| Martti Kuparinen | martti@NetBSD.org |
| Arnaud Lacombe | alc@NetBSD.org |
| Kevin Lahey | kml@NetBSD.org |
| David Laight | dsl@NetBSD.org |
| Johnny C. Lam | jlam@NetBSD.org |
| Guillaume Lasmayous | gls@NetBSD.org |
| Martin J. Laubach | mjl@NetBSD.org |
| Greg Lehey | grog@NetBSD.org |
| Ted Lemon | mellon@NetBSD.org |
| Christian Limpach | cl@NetBSD.org |
| Frank van der Linden | fvdl@NetBSD.org |
| Joel Lindholm | joel@NetBSD.org |
| Tonnerre Lombard | tonnerre@NetBSD.org |
| Mike Long | mikel@NetBSD.org |
| 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 |
| MAEKAWA Masahide | gehenna@NetBSD.org |
| Anders Magnusson | ragge@NetBSD.org |
| John Marino | marino@NetBSD.org |
| Roy Marples | roy@NetBSD.org |
| Cherry G. Mathew | cherry@NetBSD.org |
| David Maxwell | david@NetBSD.org |
| Gregory McGarry | gmcgarry@NetBSD.org |
| Dan McMahill | dmcmahill@NetBSD.org |
| Jared D. McNeill | jmcneill@NetBSD.org |
| Neil J. McRae | neil@NetBSD.org |
| Julio M. Merino Vidal | jmmv@NetBSD.org |
| Perry Metzger | perry@NetBSD.org |
| Luke Mewburn | lukem@NetBSD.org |
| Jean-Yves Migeon | jym@NetBSD.org |
| Brook Milligan | brook@NetBSD.org |
| Minoura Makoto | minoura@NetBSD.org |
| Simas Mockevicius | symka@NetBSD.org |
| der Mouse | mouse@NetBSD.org |
| Constantine A. Murenin | cnst@NetBSD.org |
| Joseph Myers | jsm@NetBSD.org |
| Tuomo Mäkinen | tjam@NetBSD.org |
| Zoltán Arnold NAGY | zoltan@NetBSD.org |

| | |
|---|---|
| Ken Nakata | kenn@NetBSD.org |
| Takeshi Nakayama | nakayama@NetBSD.org |
| Alexander Nasonov | alnsn@NetBSD.org |
| Phil Nelson | phil@NetBSD.org |
| John Nemeth | jnemeth@NetBSD.org |
| NISHIMURA Takeshi | nsmrtks@NetBSD.org |
| Tohru Nishimura | nisimura@NetBSD.org |
| NONAKA Kimihiro | nonaka@NetBSD.org |
| Takehiko NOZAKI | tnozaki@NetBSD.org |
| Tobias Nygren | tnn@NetBSD.org |
| OBATA Akio | obache@NetBSD.org |
| Jesse Off | joff@NetBSD.org |
| Tatoku Ogaito | tacha@NetBSD.org |
| OKANO Takayoshi | kano@NetBSD.org |
| Masaru Oki | oki@NetBSD.org |
| Ryo ONODERA | ryoon@NetBSD.org |
| Atsushi Onoe | onoe@NetBSD.org |
| Greg Oster | oster@NetBSD.org |
| Jonathan Perkin | sketch@NetBSD.org |
| Fredrik Pettai | pettai@NetBSD.org |
| Herb Peyerl | hpeyerl@NetBSD.org |
| Matthias Pfaller | matthias@NetBSD.org |
| Chris Pinnock | cjep@NetBSD.org |
| Adrian Portelli | adrianp@NetBSD.org |
| Chris Provenzano | proven@NetBSD.org |
| Mindaugas Rasiukevicius | rmind@NetBSD.org |
| Michael Rauch | mrauch@NetBSD.org |
| Marc Recht | recht@NetBSD.org |
| Darren Reed | darrenr@NetBSD.org |
| Jeremy C. Reed | reed@NetBSD.org |
| Jens Rehsack | sno@NetBSD.org |
| Antoine Reilles | tonio@NetBSD.org |
| Tyler R. Retzlaff | rtr@NetBSD.org |
| Scott Reynolds | scottr@NetBSD.org |
| Tim Rightnour | garbled@NetBSD.org |
| Jeff Rizzo | riz@NetBSD.org |
| Hans Rosenfeld | hans@NetBSD.org |
| Steve Rumble | rumble@NetBSD.org |
| Rumko | rumko@NetBSD.org |
| Jukka Ruohonen | jruoho@NetBSD.org |
| Blair J. Sadewitz | bjs@NetBSD.org |
| David Sainty | dsainty@NetBSD.org |
| SAITOH Masanobu | msaitoh@NetBSD.org |
| Kazuki Sakamoto | sakamoto@NetBSD.org |
| Curt Sampson | cjs@NetBSD.org |
| Wilfredo Sanchez | wsanchez@NetBSD.org |
| Ty Sarna | tsarna@NetBSD.org |
| SATO Kazumi | sato@NetBSD.org |
| Jan Schaumann | jschauma@NetBSD.org |

| | |
|---|---|
| Matthias Scheler | tron@NetBSD.org |
| Silke Scheler | silke@NetBSD.org |
| Karl Schilke (rAT) | rat@NetBSD.org |
| Amitai Schlair | schmonz@NetBSD.org |
| Konrad Schroder | perseant@NetBSD.org |
| Georg Schwarz | schwarz@NetBSD.org |
| Lubomir Sedlacik | salo@NetBSD.org |
| Christopher SEKIYA | sekiya@NetBSD.org |
| Reed Shadgett | dent@NetBSD.org |
| John Shannon | shannonjr@NetBSD.org |
| Tim Shepard | shep@NetBSD.org |
| Naoto Shimazaki | igy@NetBSD.org |
| Ryo Shimizu | ryo@NetBSD.org |
| Takao Shinohara | shin@NetBSD.org |
| Takuya SHIOZAKI | tshiozak@NetBSD.org |
| Daniel Sieger | dsieger@NetBSD.org |
| Chuck Silvers | chs@NetBSD.org |
| Thor Lancelot Simon | tls@NetBSD.org |
| Jeff Smith | jeffs@NetBSD.org |
| Noriyuki Soda | soda@NetBSD.org |
| Wolfgang Solfrank | ws@NetBSD.org |
| Jörg Sonnenberger | joerg@NetBSD.org |
| Ignatios Souvatzis | is@NetBSD.org |
| T K Spindler | dogcow@NetBSD.org |
| Matthew Sporleder | mspo@NetBSD.org |
| Bill Squier | groo@NetBSD.org |
| Adrian Steinmann | ast@NetBSD.org |
| Bill Studenmund | wrstuden@NetBSD.org |
| Kevin Sullivan | sullivan@NetBSD.org |
| Kimmo Suominen | kim@NetBSD.org |
| Grégoire Sutre | gsutre@NetBSD.org |
| Sergey Svishchev | shattered@NetBSD.org |
| Robert Swindells | rjs@NetBSD.org |
| Shin Takemura | takemura@NetBSD.org |
| TAMURA Kent | kent@NetBSD.org |
| Shin'ichiro TAYA | taya@NetBSD.org |
| Hasso Tepper | hasso@NetBSD.org |
| Matt Thomas | matt@NetBSD.org |
| Jason Thorpe | thorpej@NetBSD.org |
| Christoph Toshok | toshok@NetBSD.org |
| 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 |
| Mark Weinem | weinem@NetBSD.org |
| Lex Wennmacher | wennmach@NetBSD.org |
| Leo Weppelman | leo@NetBSD.org |
| Assar Westerlund | assar@NetBSD.org |
| Frank Wille | phx@NetBSD.org |
| Nathan Williams | nathanw@NetBSD.org |
| Rob Windsor | windsor@NetBSD.org |
| Jim Wise | jwise@NetBSD.org |
| Colin Wood | ender@NetBSD.org |
| Steve Woodford | scw@NetBSD.org |
| YAMAMOTO Takashi | yamt@NetBSD.org |
| Yuji Yamano | yyamano@NetBSD.org |
| David Young | dyoung@NetBSD.org |
| Arnaud Ysmal | stacktic@NetBSD.org |
| Reinoud Zandijk | reinoud@NetBSD.org |
| S.P.Zeidler | spz@NetBSD.org |
| Tim Zingelman | tez@NetBSD.org |
| Christos Zoulas | christos@NetBSD.org |

**Legal Mumbo-Jumbo**

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

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

NetBSD is a registered trademark of The NetBSD Foundation, Inc.
This product includes software developed by the University of California, Berkeley and its contributors.
This product includes software developed by the NetBSD Foundation.
This product includes software developed by The NetBSD Foundation, Inc. and its contributors.
This product includes software developed for the NetBSD Project. See http://www.netbsd.org/ for information about NetBSD.
This product includes software developed by Intel Corporation and its contributors.
This product includes cryptographic software written by Eric Young (eay@cryptsoft.com)
This product includes cryptographic software written by Eric Young (eay@mincom.oz.au)
This product includes software designed by William Allen Simpson.
This product includes software developed at Ludd, University of Lulea, Sweden and its contributors.
This product includes software developed at Ludd, University of Lulea.
This product includes software developed at the Information Technology Division, US Naval Research Laboratory.
This product includes software developed by David Jones and Gordon Ross
This product includes software developed by Hellmuth Michaelis and Joerg Wunsch
This product includes software developed by Internet Research Institute, Inc.
This product includes software developed by Leo Weppelman and Waldi Ravens.
This product includes software developed by Mika Kortelainen
This product includes software developed by Aaron Brown and Harvard University.
This product includes software developed by Adam Ciarcinski for the NetBSD project.
This product includes software developed by Adam Glass and Charles M. Hannum.
This product includes software developed by Adam Glass.
This product includes software developed by Advanced Risc Machines Ltd.
This product includes software developed by Alex Zepeda, and Colin Wood for the NetBSD Projet.
This product includes software developed by Alex Zepeda.
This product includes software developed by Amancio Hasty and Roger Hardiman
This product includes software developed by Berkeley Software Design, Inc.
This product includes software developed by Bill Paul.
This product includes software developed by Bodo Moeller. (If available, substitute umlauted o for oe)
This product includes software developed by Boris Popov.

This product includes software developed by Brini.
This product includes software developed by Bruce M. Simpson.
This product includes software developed by Causality Limited.
This product includes software developed by Charles Hannum.
This product includes software developed by Charles M. Hannum, by the University of Vermont and State Agricultural College and Garrett A. Wollman, by William F. Jolitz, and by the University of California, Berkeley, Lawrence Berkeley Laboratory, and its contributors.
This product includes software developed by Charles M. Hannum.
This product includes software developed by Christian E. Hopps, Ezra Story, Kari Mettinen, Markus Wild, Lutz Vieweg and Michael Teske.
This product includes software developed by Christian E. Hopps.
This product includes software developed by Christopher G. Demetriou for the NetBSD Project.
This product includes software developed by Christopher G. Demetriou.
This product includes software developed by Christos Zoulas.
This product includes software developed by Chuck Silvers.
This product includes software developed by Colin Wood for the NetBSD Project.
This product includes software developed by Colin Wood.
This product includes software developed by Daan Vreeken.
This product includes software developed by Daishi Kato
This product includes software developed by Daniel Widenfalk and Michael L. Hitch.
This product includes software developed by Daniel Widenfalk for the NetBSD Project.
This product includes software developed by Dean Huxley.
This product includes software developed by Eric S. Hvozda.
This product includes software developed by Eric S. Raymond
This product includes software developed by Eric Young (eay@@mincom.oz.au)
This product includes software developed by Eric Young (eay@cryptsoft.com)
This product includes software developed by Eric Young (eay@mincom.oz.au)
This product includes software developed by K. Kobayashi.
This product includes software developed by K. Kobayashi and H. Shimokawa.
This product includes software developed by Ezra Story and by Kari Mettinen.
This product includes software developed by Ezra Story, by Kari Mettinen and by Bernd Ernesti.
This product includes software developed by Ezra Story, by Kari Mettinen, Michael Teske and by Bernd Ernesti.
This product includes software developed by Ezra Story, by Kari Mettinen, and Michael Teske.
This product includes software developed by Ezra Story.
This product includes software developed by Florian Stoehr.
This product includes software developed by Frank van der Linden for the NetBSD Project.
This product includes software developed by Gardner Buchanan.
This product includes software developed by Garrett D'Amore.
This product includes software developed by Gary Thomas.
This product includes software developed by Gordon Ross
This product includes software developed by Harvard University and its contributors.
This product includes software developed by Harvard University.
This product includes software developed by Henrik Vestergaard Draboel.
This product includes software developed by Herb Peyerl.
This product includes software developed by Hidetoshi Shimokawa.
This product includes software developed by Ian W. Dall.
This product includes software developed by Ignatios Souvatzis for the NetBSD Project.
This product includes software developed by Internet Initiative Japan Inc.
This product includes software developed by James R. Maynard III.
This product includes software developed by Jason L. Wright
This product includes software developed by Jason R. Thorpe for And Communications, http://www.and.com/
This product includes software developed by Joachim Koenig-Baltes.
This product includes software developed by Jochen Pohl for The NetBSD Project.
This product includes software developed by Joerg Wunsch
This product includes software developed by John Birrell.
This product includes software developed by John P. Wittkoski.
This product includes software developed by John Polstra.
This product includes software developed by Jonathan R. Stone for the NetBSD Project.
This product includes software developed by Jonathan Stone and Jason R. Thorpe for the NetBSD Project.
This product includes software developed by Jonathan Stone.
This product includes software developed by Julian Highfield.
This product includes software developed by Kazuhisa Shimizu.
This product includes software developed by Kazuki Sakamoto.
This product includes software developed by Kenneth Stailey.
This product includes software developed by Kiyoshi Ikehara.
This product includes software developed by Klaus Burkert,by Bernd Ernesti, by Michael van Elst, and by the University of California, Berkeley and its contributors.

This product includes software developed by LAN Media Corporation and its contributors.
This product includes software developed by Lloyd Parkes.
This product includes software developed by Lutz Vieweg.
This product includes software developed by MINOURA Makoto, Takuya Harakawa.
This product includes software developed by Marc Horowitz.
This product includes software developed by Marcus Comstedt.
This product includes software developed by Mark Brinicombe for the NetBSD project.
This product includes software developed by Mark Brinicombe.
This product includes software developed by Mark Tinguely and Jim Lowe
This product includes software developed by Markus Wild.
This product includes software developed by Masanobu Saitoh.
This product includes software developed by Masaru Oki.
This product includes software developed by Matthew Fredette.
This product includes software developed by Michael Smith.
This product includes software developed by Mike Pritchard.
This product includes software developed by Mike Pritchard and contributors.
This product includes software developed by Minoura Makoto.
This product includes software developed by Niels Provos.
This product includes software developed by Niklas Hallqvist, Brandon Creighton and Job de Haas.
This product includes software developed by Niklas Hallqvist.
This product includes software developed by Paul Kranenburg.
This product includes software developed by Paul Mackerras.
This product includes software developed by Per Fogelstrom
This product includes software developed by Peter Galbavy.
This product includes software developed by Phase One, Inc.
This product includes software developed by Philip A. Nelson.
This product includes software developed by RiscBSD.
This product includes software developed by Roar Thronæs.
This product includes software developed by Rodney W. Grimes.
This product includes software developed by Roger Hardiman
This product includes software developed by Rolf Grossmann.
This product includes software developed by Ross Harvey for the NetBSD Project.
This product includes software developed by Ross Harvey.
This product includes software developed by Scott Bartram.
This product includes software developed by Scott Stevens.
This product includes software developed by Shingo WATANABE.
This product includes software developed by Softweyr LLC, the University of California, Berkeley, and its contributors.
This product includes software developed by Stephan Thesing.
This product includes software developed by Steven M. Bellovin.
This product includes software developed by Takashi Hamada.
This product includes software developed by Takumi Nakamura.
This product includes software developed by Tatoku Ogaito for the NetBSD Project.
This product includes software developed by Terrence R. Lambert.
This product includes software developed by TooLs GmbH.
This product includes software developed by Trimble Navigation, Ltd.
This product includes software developed by WIDE Project and its contributors.
This product includes software developed by Waldi Ravens.
This product includes software developed by Wasabi Systems for Zembu Labs, Inc. http://www.zembu.com/
This product includes software developed by Winning Strategies, Inc.
This product includes software developed by Wolfgang Solfrank.
This product includes software developed by Yasushi Yamasaki.
This product includes software developed by Yen Yen Lim and North Dakota State University.
This product includes software developed by Zembu Labs, Inc.
This product includes software developed by the Alice Group.
This product includes software developed by the Center for Software Science at the University of Utah.
This product includes software developed by the Charles D. Cranor, Washington University, University of California, Berkeley and its contributors.
This product includes software developed by the Computer Systems Engineering Group at Lawrence Berkeley Laboratory.
This product includes software developed by the David Muir Sharnoff.
This product includes software developed by the Harvard University and its contributors.
This product includes software developed by the Network Research Group at Lawrence Berkeley Laboratory.
This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (http://www.OpenSSL.org/)
This product includes software developed by the PocketBSD project and its contributors.
This product includes software developed by the RiscBSD kernel team
This product includes software developed by the RiscBSD team.
This product includes software developed by the SMCC Technology Development Group at Sun Microsystems, Inc.

This product includes software developed by the University of California, Berkeley and its contributors, as well as the Trustees of Columbia University.
This product includes software developed by the University of California, Lawrence Berkeley Laboratory and its contributors.
This product includes software developed by the University of California, Lawrence Berkeley Laboratory.
This product includes software developed by the University of Illinois at Urbana and their contributors.
This product includes software developed by the Urbana-Champaign Independent Media Center.
This product includes software developed by the University of Vermont and State Agricultural College and Garrett A. Wollman.
This product includes software developed by the University of Vermont and State Agricultural College and Garrett A. Wollman, by William F. Jolitz, and by the University of California, Berkeley, Lawrence Berkeley Laboratory, and its contributors.
This product includes software developed for the FreeBSD project
This product includes software developed for the NetBSD Project by Bernd Ernesti.
This product includes software developed for the NetBSD Project by Christopher G. Demetriou.
This product includes software developed for the NetBSD Project by Emmanuel Dreyfus.
This product includes software developed for the NetBSD Project by Frank van der Linden
This product includes software developed for the NetBSD Project by Ignatios Souvatzis.
This product includes software developed for the NetBSD Project by Jason R. Thorpe.
This product includes software developed for the NetBSD Project by John M. Vinopal.
This product includes software developed by Kyma Systems.
This product includes software developed for the NetBSD Project by Kyma Systems LLC.
This product includes software developed for the NetBSD Project by Matthias Drochner.
This product includes software developed for the NetBSD Project by Perry E. Metzger.
This product includes software developed for the NetBSD Project by Scott Bartram and Frank van der Linden
This product includes software developed for the NetBSD Project by Allegro Networks, Inc., and Wasabi Systems, Inc.
This product includes software developed for the NetBSD Project by Genetec Corporation.
This product includes software developed for the NetBSD Project by Jonathan Stone.
This product includes software developed for the NetBSD Project by Piermont Information Systems Inc.
This product includes software developed for the NetBSD Project by SUNET, Swedish University Computer Network.
This product includes software developed for the NetBSD Project by Shigeyuki Fukushima.
This product includes software developed for the NetBSD Project by Wasabi Systems, Inc.
This product includes software developed under OpenBSD by Per Fogelstrom Opsycon AB for RTMX Inc, North Carolina, USA.
This product includes software developed under OpenBSD by Per Fogelstrom.
This software is a component of "386BSD" developed by William F. Jolitz, TeleMuse.
This software was developed by Holger Veit and Brian Moore for use with "386BSD" and similar operating systems. "Similar operating systems" includes mainly non-profit oriented systems for research and education, including but not restricted to "NetBSD", "FreeBSD", "Mach" (by CMU).
This software includes software developed by the Computer Systems Laboratory at the University of Utah.
This product includes software developed by Computing Services at Carnegie Mellon University (http://www.cmu.edu/computing/).
This product includes software developed by Marshall M. Midden.
This product includes software developed or owned by Caldera International, Inc.
The Institute of Electrical and Electronics Engineers and The Open Group, have given us permission to reprint portions of their documentation.

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

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

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

This notice shall appear on any product containing this material

This product includes software developed by Thomas Gerner
This product includes software developed by Waldi Ravens.

## The End