NAME

INSTALL — Installation procedure for NetBSD/i386.

CONTENTS

DESCRIPTION

About this Document

This document describes the installation procedure for NetBSD 7.1_STABLE on the *i386* 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.

Quick install notes for the impatient

This section contains some brief notes describing what you need to install NetBSD 7.1_STABLE on a machine of the i386 architecture.

- Fetch files needed to install NetBSD.

  Option 1: bootable CD-ROM images or USB images containing the full distribution.

  These can be found on an FTP site near you, usually located in the `/pub/NetBSD/images/` directory. Check the list of NetBSD mirrors at **http://www.NetBSD.org/mirrors** for details.

  Option 2: bootable CD-ROM images from `i386/installation/cdrom/`.

  These images are bootable, but do not contain binary sets. They are intended for network installs or system repair. `boot.iso` is for VGA console installation, and `boot-com.iso` is for installation over serial console (com0, 9600 baud).

Option 3: boot floppy images from `i386/installation/floppy/`.

`boot1.fs` and `boot2.fs` are floppy images for VGA console installation. `boot-com1.fs` and `boot-com2.fs` are for installation via serial console (com0, 9600 baud).

- The default kernel on CD-ROMs has ACPI enabled. This is known to cause issues on a few machines which have buggy ACPI implementations.

  To boot with ACPI disabled, choose the "no ACPI" option from the boot menu, or interrupt the menu and enter the NetBSD boot prompt. Type **boot -2** to boot with ACPI disabled.

- The actual binary distribution is in the `i386/binary/sets/` directory. When you boot the install image, CD-ROM or floppies, the installation program can fetch these files for you (using, e.g., ftp) if you have a network connection. There are several other methods to get the binary sets onto your machine.

  You will at a minimum need one of the kernel sets, typically `kern-GENERIC.tgz`, as well as `base.tgz` and `etc.tgz`. In a typical workstation installation you will probably want all the installation sets.

- Write the boot images

  Many commercial and freeware programs are available to burn CD-ROMs.

  If installing via USB, you must first uncompress the USB image, which is gzipped.

  ```
  $ gunzip NetBSD-7.1_STABLE-i386-install.img.gz
  ```

  Next, write the USB image to a USB stick/drive. Note that this will overwrite any existing data on the device that you specify, so double check the device before running! On UNIX-like operating systems, use a command similar to the following, replacing `/dev/rsd0d` with the appropriate device for your system:

  ```
  # dd if=NetBSD-7.1_STABLE-i386-install.img of=/dev/rsd0d bs=32k
  ```

  On Windows, you will need to use a program such as Win32 Disk Imager, which can be found at

  http://sourceforge.net/projects/win32diskimager/

  If you have problems writing a raw image to a floppy, the **rawrite.exe** MS-DOS program or the **Rawrite32** Windows32 program (installed by `rawr32.exe`) in the `i386/installation/misc/` directory may be of help.

  The media you just prepared will be used to boot the installation kernel, which contains all the tools required to install NetBSD.

- For third-party programs which are not part of the base NetBSD distribution, you will want to explore the **pkgsrc** package management system, which contains thousands of third party software applications.

What is NetBSD?

The NetBSD Operating System is a fully functional Open Source UNIX-like operating system derived from the University of California, Berkeley Networking Release 2 (Net/2), 4.4BSD-Lite, and 4.4BSD-Lite2 sources. NetBSD runs on many different different system architectures (ports) across a variety of distinct CPU families, and is being ported to more. The NetBSD 7.1_STABLE release contains complete binary releases for most of these system architectures, with preliminary support for the others included in source form. Please see the NetBSD website at **http://www.NetBSD.org/** for information on them.)

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

NetBSD is a creation of the members of the Internet community. Without the unique cooperation and coordination the net makes possible, NetBSD would not exist.

Changes Between The NetBSD 6.0 and 7.0 Releases

The NetBSD 7.1_STABLE release provides many significant changes, including support for many new devices, hundreds of bug fixes, new and updated kernel subsystems, and numerous userland 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 7.1_STABLE release. See

http://www.NetBSD.org/releases/formal-7/NetBSD-7.0.html

for some of the more noteworthy changes in this release.

A more extensive list of changes can be found in the CHANGES:

http://ftp.NetBSD.org/pub/NetBSD/NetBSD-7.0/CHANGES

and CHANGES-7.0:

http://ftp.NetBSD.org/pub/NetBSD/NetBSD-7.0/CHANGES-7.0

files in the top level directory of the NetBSD 7.0 release tree.

Features to be removed in a later release

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

- `dhclient`(8) and `rtsol`(8) in favor of `dhcpcd`(8).
- `groff`(1). Man pages are now handled with `mandoc`(1), and `groff`(1) can still be found in pkgsrc as `textproc/groff`.
- `rtsol`(8) and `rtsold`(8).

The NetBSD Foundation

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

Sources of NetBSD

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

NetBSD 7.1_STABLE Release Contents

The root directory of the NetBSD 7.1_STABLE release is organized as follows:

`.../NetBSD-7.1_STABLE/`

`CHANGES`	Changes between the 6.0 and 7.0 releases.
`CHANGES-7.0`	Changes between the initial 7.0 branch and the final release of 7.0.
`CHANGES.prev`	Changes in previous NetBSD releases.
`LAST_MINUTE`	Last minute changes and notes about the release.
`README.files`	README describing the distribution's contents.
`images/`	Images (ISO 9660 or USB) for installing NetBSD. Depending on your system, these may be bootable.
`source/`	Source distribution sets; see below.

In addition to the files and directories listed above, there is one directory per architecture, for each of the architectures for which NetBSD 7.1_STABLE has a binary distribution.

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

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

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

src This set contains all of the base NetBSD 7.1_STABLE sources which are not in **gnusrc**, **sharesrc**, or **syssrc**.

syssrc This set contains the sources to the NetBSD 7.1_STABLE 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/i386 subdirectory structure

The i386-specific portion of the NetBSD 7.1_STABLE release is found in the `i386` subdirectory of the distribution: `.../NetBSD-7.1_STABLE/i386/`. It contains the following files and directories:

`INSTALL.html`
`INSTALL.ps`
`INSTALL.txt`
`INSTALL.more` Installation notes in various file formats, including this file. The `.more` file contains underlined text using the `more`(1) conventions for indicating italic and bold display.

`binary/`
- `kernel/`
  - `netbsd-GENERIC.gz`
    A gzipped NetBSD kernel containing code for everything supported in this release.
  - `netbsd-MONOLITHIC.gz`
    The monolithic kernel which doesn't use kernel modules.
  - `netbsd-INSTALL.gz`
    The installation kernel.
  - `netbsd-LEGACY.gz`
    The kernel containing support for ISA (VGA and PC Display) display devices.

```
                    netbsd-INSTALL_XEN3PAE_DOMU.gz
                    netbsd-INSTALL_XEN3_DOMU.gz
                    netbsd-XEN3PAE_DOMU.gz
                    netbsd-XEN3_DOM0.gz
                    netbsd-XEN3_DOMU.gz
        sets/       i386 binary distribution sets; see below.
installation/
        cdrom/      i386 bootable cdrom images; see below.
        floppy/     i386 boot and installation floppies; see below.
        misc/       Miscellaneous i386 installation utilities; see installation section below.
```

Binary distribution sets

The NetBSD i386 binary distribution sets contain the binaries which comprise the NetBSD 7.1_STABLE release for i386. The binary distribution sets can be found in the `i386/binary/sets` subdirectory of the NetBSD 7.1_STABLE distribution tree, and are as follows:

base The NetBSD 7.1_STABLE i386 **base** binary distribution. You *must* install this distribution set. It contains the base NetBSD utilities that are necessary for the system to run and be minimally functional.

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

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

games This set includes the games and their manual pages.

kern-GENERIC
This set contains a NetBSD/i386 7.1_STABLE `GENERIC` kernel, named `/netbsd`. You *must* install this distribution set.

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

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

modules This set includes kernel modules to add functionality to a running system.

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

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

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

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

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

xetc Configuration files for X which could be locally modified.

xserver The X server. This includes the modular Xorg server.

The i386 binary distribution sets are distributed as gzipped tar files named with the extension **.tgz**, e.g. `base.tgz`.

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

Note: Each directory in the i386 binary distribution also has its own checksum files, just as the source distribution does.

NetBSD/i386 System Requirements and Supported Devices

NetBSD 7.1_STABLE runs on all i486 or later PC-compatible systems with 1 to 32 processors. The minimal configuration for a full, standard installation is 32MB of RAM and 250MB of disk space.

NetBSD requires a numeric co-processor. The target system must have one of the following processors:

- an i486DX or compatible
- an i486SX with an i487 numeric co-processor installed
- a Pentium compatible or later processor

On systems with under 32MB of memory, a custom installation of NetBSD can be performed manually. That procedure is not documented here.

Supported devices

Explanation of bracketed footnote tags [] follows this listing.

- Floppy controllers.
- MFM, ESDI, IDE, and RLL hard disk controllers
  There is complete support (including IDE DMA or Ultra-DMA) for the following PCI controllers
  - Acard ATA-850 and 860 based IDE Controllers
  - Acer labs M5229 IDE Controller
  - Advanced Micro Devices AMD-756, 766, and 768 IDE Controllers
  - CMD Tech PCI0643, 0646, 0648, and 0649 IDE Controllers
  - Contaq Microsystems/Cypress CY82C693 IDE Controller
  - HighPoint HPT366, HPT370, HPT372, and HPT374.
  - IBM ESDI Fixed Disk Controllers [m]
  - Intel PIIX, PIIX3, and PIIX4 IDE Controllers
  - Intel 82801 (ICH/ICH0/ICH2/ICH4/ICH5/ICH6/ICH7/ICH8/ICH9) IDE/SATA Controllers
  - Promise PDC20246 (Ultra/33), PDC20262 (Ultra/66), PDC20265/PDC20267 (Ultra/100), PDC20268 (Ultra/100TX2 and Ultra/100TX2v2), Ultra/133, Ultra/133TX2, and Ultra/133TX2v2.
  - Promise SATA150 serial-ATA controllers: PDC20318, PDC20319, PDC20371, PDC20375, PDC20376, PDC20377, PDC20378 and PDC20379.
  - Silicon Integrated System 5597/5598 IDE controller
  - VIA Technologies VT82C586, VT82C586A, VT82C596A, VT82C686A, and VT8233A IDE Controllers
  - Silicon Image SATALink controllers
  - Silicon Image SteelVine SATA controllers [*] [+]

Most of these controllers are only available in multifunction PCI chips. Other PCI IDE controllers are supported, but performance may not be optimal. ISA, ISA Plug and Play and PCMCIA IDE controllers are supported as well.

- SCSI host adapters
  - Adaptec AHA-154xA, -B, -C, and -CF
  - Adaptec AHA-1640 cards (MCA variant of AHA-1540) [m]
  - Adaptec AHA-174x
  - Adaptec AIC-6260 and AIC-6360 based boards, including the Adaptec AHA-152x, Adaptec APA-1460 (PCMCIA) and APA-1480 (CardBus), and the SoundBlaster SCSI host adapter.

    Note: You cannot boot from these boards if they do not have a boot ROM; consequently only the AHA-152x and motherboards using this chip are likely to be bootable.
  - Adaptec AHA-2910, 2915, 2920, and 2930C adapters.
  - Adaptec AHA-2x4x[U][2][W] cards and onboard PCI designs using the AIC-7770, AIC-7850, AIC-7860, AIC-7870, AIC-7880 and AIC-789x chipsets.
  - Adaptec AHA-394x[U][W] cards [b]
  - Adaptec AHA-3950U2 cards
  - Adaptec AHA-3960, 19160, and 29160 Ultra-160 adapters
  - AdvanSys ABP-9x0[U][A] cards
  - AdvanSys ABP-940UW[68], ABP-970UW[68], and ASB3940UW-00 cards
  - AMD PCscsi-PCI (Am53c974) based SCSI adapters, including Tekram DC-390
  - BusLogic 54x (Adaptec AHA-154x clones)
  - BusLogic 445, 74x, 9xx (but not the new 'FlashPoint' series of BusLogic SCSI adapters)
  - Qlogic ISP [12]0x0 SCSI/FibreChannel boards
  - Seagate/Future Domain ISA SCSI adapter cards
    - ST01/02
    - Future Domain TMC-885
    - Future Domain TMC-950
  - Symbios Logic (NCR) 53C8xx-based PCI SCSI host adapters
    - Acculogic PCIpport
    - ASUS SC-200 (requires NCR BIOS on motherboard to boot from disks)
    - ASUS SC-875
    - ASUS SP3[G] motherboard onboard SCSI
    - DEC Celebris XL/590 onboard SCSI
    - Diamond FirePort 40
    - Lomas Data SCSI adapters
    - NCR/SYM 8125 (and its many clones; be careful, some of these cards have a jumper to set the PCI interrupt; leave it on INT A!)
    - Promise DC540 (a particularly common OEM model of the SYM 8125)
    - Tekram DC-390U/F
    - Tyan Yorktown
  - Symbios Logic (NCR) 5380/53C400-based ISA SCSI host adapters [*]
  - Ultrastor 14f, 34f, and (possibly) 24f
  - Western Digital WD7000 SCSI and TMC-7000 host adapters (ISA cards only)
- MDA, CGA, VGA, SVGA, and HGC Display Adapters

  Note: Not all of the display adapters NetBSD/i386 can work with are supported by X. See the NetBSD Guide chapter on X for more information:

  http://www.NetBSD.org/docs/guide/en/chap-x.html

- Serial ports
  - 8250/16450-based ports
  - 16550/16650/16750-based ports
  - AST-style 4-port serial cards [∗]
  - BOCA 8-port serial cards [∗]
  - BOCA 6-port (ioat) serial cards [∗]
  - IBM PC-RT 4-port serial cards [∗]
  - TCOM TC-400 (4-port), TC-800 (8-port) serial cards [∗]
  - Single-port Hayes ESP serial cards [∗]
  - Cyclades Cyclom-Y serial cards [∗] [+]
  - Addonics FlexPort 8S 8-port serial cards [∗]
  - Byte Runner Technologies TC-400 and TC-800 serial cards [∗]
  - PCI universal communication cards
- Parallel ports. [∗] [+]
- Ethernet adapters
  - Agere/LSI ET1310/ET1301 10/100/Gigabit Ethernet device
  - AMD LANCE and PCnet-based ISA Ethernet adapters [∗]
    - Novell NE1500T
    - Novell NE2100
    - Kingston 21xx
    - Digital EtherWORKS II ISA adapters (DE200/DE201/DE202)
  - AMD LANCE and PCnet-based MCA Ethernet adapters [m]
    - SKNET Personal
    - SKNET MC+
  - AMD PCnet-based PCI Ethernet adapters
    - Addtron AE-350
    - BOCALANcard/PCI
    - SVEC FD0455
    - X/Lan Add-On Adapter
    - IBM #13H9237 PCI Ethernet Adapter
  - AT&T StarLAN 10, EN100, and StarLAN Fiber
  - Attansic/Atheros L2 Fast-Ethernet card
  - 3COM 3c501
  - 3COM 3c503
  - 3COM 3c505 [∗]
  - 3COM 3c507
  - 3COM 3c509, 3c579, 3c589, and 3c59X
  - 3COM 3c523 EtherLink/MC [m]
  - 3COM 3c529 EtherLink III [m]
  - 3COM 3c90X (including 3c905B), 3c450, 3c55X, 3c575, 3c980, 3cSOHO100
  - Digital DC21x4x-based PCI Ethernet adapters
    - Accton EN2242
    - ASUS PCI-DEC100TX+
    - Cogent EM1X0, EM960 (a.k.a. Adaptec ANA-69XX)
    - Cogent EM964 [b]
    - Cogent EM4XX [b]
    - Compex Readylink PCI
    - DANPEX EN-9400P3

        - Digital Celebris GL, GLST on-board ethernet
        - DEC (Digital) PCI Ethernet/Fast Ethernet adapters (all)
        - DLINK DFE500-TX
        - JCIS Condor JC1260
        - JMicron Technologies JMC250/JMC260 controllers [∗] [+]
        - Linksys PCI Fast Ethernet
        - SMC EtherPower 10, 10/100 (PCI only!)
        - SMC EtherPower^2 [b]
        - Sundance ST-201 based ethernet adapters (including DLINK DFE550-TX and DFE580-TX)
        - SVEC PN0455
        - SVEC FD1000-TP
        - Znyx ZX34X
    - Digital EtherWORKS III ISA adapters (DE203/DE204/DE205) [∗]
    - Digital DEPCM-BA (PCMCIA) and DE305 (ISA) NE2000-compatible cards
    - BICC Isolan [∗ and not recently tested]
    - Efficient Networks EN-155 and Adaptec AIC-590x ATM interfaces
    - Essential Communications Hippi (800 Mbit/s)
    - Fujitsu MB86960A/MB86965A based cards
        - Fujitsu FMV-180 series
        - Allied-Telesis AT1700 series
        - Allied-Telesis AT1700 series MCA [m]
        - Allied-Telesis RE2000 series
    - Intel EtherExpress 16
    - Intel EtherExpress PRO/10
    - Intel EtherExpress 100 Fast Ethernet adapters
    - Intel Intel PRO/1000 Gigabit Ethernet adapters
    - Novell NE1000, NE2000 (ISA, PCI, PCMCIA, ISA PnP)
    - Realtek 8129/8139 based boards
    - Realtek 8139C+/8169/8169S/8110S based boards
    - SMC/WD 8003, 8013, and the SMC 'Elite16' ISA boards
    - SMC/WD 8003, 8013 and IBM PS/2 Adapter/A MCA boards [m]
    - SMC/WD 8216 (the SMC 'Elite16 Ultra' ISA boards)
    - SMC 91C9x-based boards (ISA and PCMCIA)
    - SMC EPIC/100 Fast Ethernet boards
        - SMC Etherpower-II
    - Texas Instruments ThunderLAN based ethernet boards
        - Compaq Netelligent 10/100 TX
        - Compaq ProLiant Integrated Netelligent 10/100 TX
        - Compaq Netelligent 10 T (untested)
        - Compaq Integrated NetFlex 3/P
        - Compaq NetFlex 3/P in baseboard variant (the PCI variant doesn't use the same chip!)
        - Compaq Dual Port Netelligent 10/100 TX
        - Compaq Deskpro 4000 5233MMX (untested)
        - Texas Instruments TravelMate 5000 series laptop docking station Ethernet board
    - VIA VT3043 (Rhine) and VT86C100A (Rhine-II) based ethernet boards
        - D-Link DFE530TX

- FDDI adapters
    - Digital DEFPA PCI FDDI adapters [∗] [+]

  - Digital DEFEA EISA FDDI adapters [∗] [+]
- Token-Ring adapters
  - IBM Token-Ring Network PC Adapter [+]
  - IBM Token-Ring Network PC Adapter II [+]
  - IBM Token-Ring Network Adapter/A [+]
  - IBM Token-Ring Network 16/4 Adapter [+]
  - IBM Token-Ring Network 16/4 Adapter/A [m]
  - IBM 16/4 ISA Adapter [+]
  - IBM Auto 16/4 Token-Ring ISA Adapter [+]
  - 3COM 3C619 TokenLink [+]
  - 3COM 3C319 TokenLink Velocity [+]
- Wireless network adapters
  - Many Atheros 802.11 cards
  - 3Com AirConnect Wireless LAN
  - AT&T/Lucent/Agere WaveLAN/ORiNOCO IEEE (802.11) PCMCIA cards
  - Aironet 4500/4800 and Cisco 340 series PCMCIA cards
  - BayStack 650 802.11FH PCMCIA cards [∗] [+]
  - Corega Wireless LAN PCC-11 cards [∗] [+]
  - DEC/Cabletron RoamAbout 802.11 DS High Rate cards [∗] [+]
  - ELSA AirLancer MC-11 card [∗] [+]
  - Intel 2100/2200BG/2915ABG/4965AGN cards [∗] [+]
  - Intersil Prism II
  - Melco AIR CONNECT WLI-PCM-L11 cards [∗] [+]
  - NetWave AirSurfer PCMCIA cards [∗] [+]
- High Speed Serial
  - LAN Media Corporation SSI/LMC10000 (up to 10 Mbps) [∗] [+]
  - LAN Media Corporation HSSI/LMC5200 [∗] [+]
  - LAN Media Corporation DS3/LMC5245 [∗] [+]
- Tape drives
  - Most SCSI tape drives
  - Seagate and OnStream ATAPI tape drives, possibly others
  - QIC-02 and QIC-36 format (Archive- and Wangtek- compatible) tape drives [∗] [+]
- CD-ROM drives
  - Non-IDE Mitsumi CD-ROM drives [∗] [+]

    Note: The Mitsumi driver device probe is known to cause trouble with several devices!
  - Most SCSI CD-ROM drives
  - Most ATAPI CD-ROM drives.

    Note: Some low-priced IDE CD-ROM drives are known for being not or not fully ATAPI compliant, and thus require some hack (generally an entry to a quirk table) to work with NetBSD.
- Mice
  - “Logitech” -style bus mice [∗] [+]
  - Microsoft-style bus mice [∗] [+]
  - “PS/2” -style mice [∗] [+]
  - Serial mice (no kernel support necessary)

- Sound Cards
  - Aria based sound cards [∗]
  - Cirrus Logic CS461x, CS4280 and CS4281 audio [∗] [+]
  - Ensoniq AudioPCI [∗] [+]
  - ESS Technology ESS 1688 Audiodrive, ES1777/1868/1869/1887/1888/888, Maestro 1/2/2E and Solo-1 ES1938/1946 [∗] [+]
  - Gravis Ultrasound Plug and Play [∗] [+]
  - Gravis Ultrasound and Ultrasound Max [∗] [+]
  - NeoMagic MagicMedia 256AV / 256ZX AC'97 audio [∗] [+]
  - Personal Sound System [∗] [+]
  - ProAudio Spectrum [∗] [+]
  - S3 SonicVibes [∗] [+]
  - SoundBlaster, SoundBlaster Pro, SoundBlaster 16 [∗] [+]
  - VIA VT82C686A southbridge integrated AC97 audio [∗] [+]
  - Windows Sound System [∗] [+]
  - Yamaha YMF724/740/744/754 audio (DS-1 series) [∗] [+]
  - Yamaha OPL3-SA3 audio [∗] [+]
- Game Ports (Joysticks) [∗] [+]
- Miscellaneous
  - Advanced power management (APM) [∗]
  - Advanced Configuration and Power Interface (ACPI) [∗] [+]
- Universal Serial Bus (USB)
  - UHCI host controllers [∗] [+]
  - OHCI host controllers [∗] [+]
  - Hubs [∗] [+]
  - Keyboards using the boot protocol [∗] [+]
  - Mice [∗] [+]
  - Printers [∗] [+]
  - Modems using Abstract Control Model [∗] [+]
  - 3G wireless modems [∗] [+]
  - Generic support for HID devices [∗] [+]
  - Ethernet adapters [∗] [+]
  - Audio devices [∗] [+]
  - FTDI based serial adapters [∗] [+]
  - Silicon Labs CP210x serial adapters [∗] [+]
  - Mass storage devices such as disks, ZIP drives and digital cameras [∗] [+]
  - driver for the Prolific host-to-host adapter [∗] [+]
  - Handspring Visor driver [∗] [+]
- PCMCIA Controllers.
  ISA, PCI, and ISA Plug and Play attachments
  - Intel 82365 PCIC, rev 0 and rev 1
  - Cirrus PD6710
  - Cirrus PD672X

  Note: This will work with most laptops as well as with ISA cards which provide PCMCIA slots for desktops.
- RAID Controllers

- 3ware Escalade family of controllers
- Compaq Integrated Array (PCI) [b]
- Compaq IAES (EISA)
- Compaq IDA, IDA-2 (EISA)
- Compaq Smart Array 221, 3100ES, 3200, 4200, 4250ES (PCI) [b]
- Compaq Smart Array 431, RAID LC2 [b]
- Compaq SMART 2, 2/E (EISA)
- Compaq SMART 2/E, 2/P, 2DH, 2SL (PCI) [b]
- DELL RAID controllers
  - PERC 2/SC
  - PERC 2/DC
  - PERC 4/Di
  - PERC 4/SC
  - PERC 4e/Si
  - CERC 1.5
- DPT SCSI RAID boards (ISA [∗], EISA and PCI)
  - SmartCache III
  - SmartCache IV
  - SmartRAID III
  - SmartRAID IV
- MegaRAID controllers
  - 320-1
  - 320-2
  - Series 418
  - Enterprise 1200 (Series 428)
  - Enterprise 1300 (Series 434)
  - Enterprise 1400 (Series 438)
  - Enterprise 1500 (Series 467)
  - Enterprise 1600 (Series 471)
  - Elite 1500 (Series 467)
  - Elite 1600 (Series 493)
  - Express 100 (Series 466WS)
  - Express 200 (Series 466)
  - Express 300 (Series 490)
  - Express 500 (Series 475)

Specific driver footnotes:

[∗] Drivers are *not* present in kernels on the distribution floppies. Except as noted above, all drivers are present on all disks. Also, at the present time, the distributed kernels support only one SCSI host adapter per machine. NetBSD normally allows more, though, so if you have more than one, you can use all of them by compiling a custom kernel once NetBSD is installed.

[+] Support *is* included in the `GENERIC` kernels, although it is not in the kernels which are on the distribution floppies.

[b] Devices require BIOS support for PCI-PCI bridging on your motherboard. Most reasonably modern Pentium motherboards have this support, or can acquire it via a BIOS upgrade.

[m] Devices are only supported by MCA-enabled kernels.

Getting the NetBSD System on to Useful Media

If you are not booting off a CD-ROM, you will need to have some floppy disks to boot off; either three 1.44 MB floppies or one 1.2 MB floppy.

Use `boot1.fs` and `boot2.fs` for VGA installation. `boot-com1.fs` and `boot-com2.fs` are available if you wish to use a serial console.

If you are using a UNIX-like system to write the floppy images to disks, you should use the `dd` command to copy the file system image(s) (.fs file) directly to the raw floppy disk. It is suggested that you read the `dd`(1) manual page or ask your system administrator to determine the correct set of arguments to use; it will be slightly different from system to system, and a comprehensive list of the possibilities is beyond the scope of this document.

If you are using Microsoft Windows to write the floppy image(s) to floppy disk, you can use the **Rawrite32** Windows32 program. It can be installed by Pa rawr32.exe provieded in the `i386/installation/misc` directory of the NetBSD distribution. A **rawrite** utility for the MS-DOS environment is also available in the `i386/installation/misc/` directory.

Installation is supported from several media types, including:

- CD-ROM / DVD
- FTP
- Remote NFS partition
- Tape
- Existing NetBSD partitions, if performing an upgrade

The steps necessary to prepare the distribution sets for installation depend upon which installation medium you choose. The steps for the various media are outlined below.

CD-ROM / DVD Find out where the distribution set files are on the CD-ROM or DVD. Likely locations are `binary/sets` and `i386/binary/sets`.

Proceed to the instructions on installation.

FTP The preparations for this installation/upgrade method are easy; all you need to do is make sure that there's an FTP site from which you can retrieve the NetBSD distribution when you're about to install or upgrade. If you don't have DHCP available on your network, you will need to know the numeric IP address of that site, and, if it's not on a network directly connected to the machine on which you're installing or upgrading NetBSD, you need to know the numeric IP address of the router closest to the NetBSD machine. Finally, you need to know the numeric IP address of the NetBSD machine itself.

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

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

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

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

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

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

```
# tar -cf tape_device dist_sets
```

where `tape_device` is the name of the tape device that represents the tape drive you're using. This might be `/dev/rst0`, or something similar, but it will vary from system to system. In the above example, `dist_sets` is a list of filenames corresponding to the distribution sets that you wish to place on the tape. For instance, to put the **kern-GENERIC, base,** and **etc** distributions on tape (the absolute minimum required for installation), you would do the following:

```
# cd .../NetBSD-7.1_STABLE
# cd i386/binary
# tar -cf tape_device kern-GENERIC.tgz base.tgz etc.tgz
```

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

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

Preparing your System for NetBSD installation

First and foremost, before beginning the installation process, *make sure you have a reliable backup* of any data on your hard disk that you wish to keep. Mistakes in partitioning your hard disk may lead to data loss.

It is strongly recommended that as part of the installation procedure, you upgrade your system's BIOS to the latest version available from your system vendor. Later BIOSes often contain workarounds for CPU and chipset bugs, workarounds that cannot be provided by the operating system.

In the past, bugs fixed this way have been known to cause unpredictable behaviour and frequent system crashes with NetBSD and other UNIX-like operating systems on x86 hardware.

Before you begin, you should be aware of the geometry issues that may arise in relation to your hard disk. First of all, you should know about sector size. You can count on this to be 512 bytes; other sizes are rare (and currently not supported). Of particular interest are the number of sectors per track, the number of tracks per cylinder (also known as the number of heads), and the number of cylinders. Together they describe the disk geometry.

The BIOS has a limit of 1024 cylinders and 63 sectors per track for doing BIOS I/O. This is because of the old programming interface to the BIOS that restricts these values. Most of the big disks currently being used have more than 1024 real cylinders. Some have more than 63 sectors per track. Therefore, the BIOS can be instructed to use a fake geometry that accesses most of the disk and the fake geometry has less than or equal to 1024 cylinders and less than or equal to 63 sectors. This is possible because the disks can be addressed in a way that is not restricted to these values, and the BIOS can internally perform a translation. This can be activated in most modern BIOSes by using *Large* or *LBA* mode for the disk.

NetBSD does not have the mentioned limitations with regard to the geometry. However, since the BIOS has to be used during startup, it is important to know about the geometry the BIOS uses. The NetBSD kernel should be on a part of the disk where it can be loaded using the BIOS, within the limitations of the BIOS geometry. The install program will check this for you, and will give you a chance to correct this if this is not the case.

If you have not yet installed any other systems on the hard disk that you plan to install NetBSD on, or if you plan to use the disk entirely for NetBSD, you may wish to check your BIOS settings for the 'Large' or 'LBA' modes, and activate them for the hard disk in question. While they are not needed by NetBSD as such, doing so will remove the limitations mentioned above, and will avoid hassle should you wish to share the disk with other systems. Do *not* change these settings if you already have data on the disk that you want to preserve!

In any case, it is wise to check your the BIOS settings for the hard disk geometry before beginning the installation, and write them down. While this should usually not be needed, it enables you to verify that the install program determines these values correctly.

The geometry that the BIOS uses will be referred to as the *BIOS geometry*, the geometry that NetBSD uses is the *real geometry*.

sysinst, the NetBSD installation program, will try to discover both the real geometry and BIOS geometry.

It is *important* that **sysinst** know the proper BIOS geometry to be able to get NetBSD to boot, regardless of where on your disk you put it. It is less of a concern if the disk is going to be used entirely for NetBSD. If you intend to have several OSes on your disk, this becomes a much larger issue.

Installing the NetBSD System

Running the sysinst installation program

1. *Introduction*

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

2. *Possible hardware problems*

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

3. *General*

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

4. *Quick install*

   First, let's describe a quick install. The other sections of this document go into the installation procedure in more detail, but you may find that you do not need this. If you want detailed instructions, skip to the next section. This section describes a basic installation, using a CD / DVD (or USB stick) as the install media.

- What you need.
  - The distribution sets (in this example, they are on the CD or DVD).
  - A minimum of 32 MB of memory installed.
  - An optical drive.
  - A hard drive with at least 600 MB of free space for a complete base install, not including room for swap. If you wish to install the X Window System as well, you will need at least 225 MB more.
- The Quick Installation
  - Insert the CD into the drive or the USB memstick into an available USB port and boot the computer from it.

```
.**********************************************.
* NetBSD-7.1_STABLE Install System             *
*                                              *
*>a: Install NetBSD to hard disk               *
* b: Upgrade NetBSD on a hard disk             *
* c: Re-install sets or install additional sets *
* d: Reboot the computer                       *
* e: Utility menu                              *
* f: Config menu                               *
* x: Exit Install System                       *
.**********************************************.
```

  - If you wish, you can configure some network settings immediately by choosing the **Utility menu** and then **Configure network**. It isn't actually required at this point, but it may be more convenient. Go back to the main menu.
  - Choose **Install**.
  - You will be guided through the setup of your disk.
  - You will be asked to choose which distribution sets to install.
  - When prompted, choose **CD-ROM** as the install medium if booted from CD-ROM. The default values for the path and device should be ok. If you booted using a USB image, choose **Local directory**.
  - After the installation process has completed, you will be brought back to the main menu, where you should select **Reboot.**
  - NetBSD will now boot. If you didn't set a password for the `root` user when prompted by **`sysinst`**, logging in as `root` and setting a password should be your first task. You are also advised to read `afterboot`(8).

5. *Booting NetBSD*

   Boot your machine. The boot loader will start, which will print a countdown and begin booting. You may want to read the boot messages, to notice your disk's name and geometry. Its name will be something like `sd0` or `wd0` and the geometry will be printed on a line that begins with its name. As mentioned above, you may need your disk's geometry when creating NetBSD's partitions. You will also need to know the name, to tell **`sysinst`** on which disk to install. The most important thing to know is that `wd0` is NetBSD's name for your first SATA/PATA disk, `wd1` the second, etc. `sd0` is your first SCSI disk, `sd1` the second, etc.

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

6. *Network configuration*

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

7. *Installation drive selection and parameters*

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

   The first thing is to identify the disk on which you want to install NetBSD. **`sysinst`** will report a list of disks it finds and ask you for your selection. You should see disk names like `wd0`, `wd1`, `sd0` or `sd1`.

   `sysinst` next tries to figure out the real and BIOS geometry of your disk. It will present you with the values it found, if any, and will give you a chance to change them. Normally, the values it presents will be correct.

8. *Selecting which sets to install*

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

9. *Partitioning the disk*

   - Choosing which portion of the disk to use.

     You will be asked if you want to use the entire disk or only part of the disk. If you decide to use the entire disk for NetBSD, **`sysinst`** will check for the presence of other operating systems and you will be asked to confirm that you want to overwrite these.

   If you want to use the entire disk for NetBSD, you can skip the following section and go to *Editing the NetBSD disklabel*.

10. *Editing the Master Boot Record*

    You will be presented with the current values stored in the MBR, and will be given the opportunity to change, create or delete partitions. For each partition you can set the type, the start and the size. Setting the type to **`unused`** will delete a partition. You can also mark a partition as active, meaning that this is the one that the BIOS will start from at boot time.

    Be sure to mark the partition you want to boot from as active!

    After you are done editing the MBR, a sanity check will be done, checking for partitions that overlap. Depending on the BIOS capabilities of your machine and the parameters of the NetBSD partition you have specified, you may also be asked if you want to install newer bootcode in your MBR. If you have multiple operating systems on the disk that you are installing on, you will also be given the option to install a bootselector, which will allow you to pick the operating system to start up when your computer is (re-)started.

    If everything is ok, you can go on to the next step, editing the NetBSD disklabel.

11. *Editing the NetBSD disklabel*

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

of NetBSD partitions.

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

`a` Root partition (/)

`b` Swap partition.

`c` The NetBSD portion of the disk.

`d` The entire disk.

`e-p` Available for other use. Traditionally, `e` 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.

12. *Preparing your hard disk*

    You are now at the point of no return. Nothing has been written to your disk yet, but if you confirm that you want to install NetBSD, your hard drive will be modified. If you are sure you want to proceed, select **yes**.

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

13. *Getting the distribution sets*

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

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

14. *Installation from CD-ROM*

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

    sysinst will then check that the files are actually present in the specified location and proceed to the extraction of the sets.

15. *Installation using FTP*

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

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

sysinst will then transfer the set files from the remote site to your hard disk.

16. *Installation using NFS*

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

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

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

17. *Installation from a floppy set*

    Because the installation sets are too big to fit on one floppy, the floppies are expected to be filled with the split set files. The floppies are expected to be in MS-DOS format. You will be asked for a directory where the sets should be reassembled. Then you will be prompted to insert the floppies containing the split sets. This process will continue until all the sets have been loaded from floppy.

18. *Installation from an unmounted file system*

    In order to install from a local file system, you will need to specify the device that the file system resides on (for example `wd1e`), the type of the file system, and the directory on the specified file system where the sets are located. **sysinst** will then check if it can indeed access the sets at that location.

19. *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.

20. *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.

21. *Configure additional items*

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

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

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

22. *Finalizing your installation*

    Congratulations, you have successfully installed NetBSD 7.1_STABLE. You can now reboot the machine and boot NetBSD from hard disk.

Post installation steps

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

1. Before all else, read `postinstall`(8).

2. Configuring `/etc/rc.conf`

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

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

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

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

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

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

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

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

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

   ```
   ifconfig_wm0="inet 192.0.2.123 netmask 255.255.255.0"
   ```

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

   ```
   ifconfig_wm0="inet myname.my.dom netmask 255.255.255.0"
   ```

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

   Instead of manually configuring networking, DHCP can be used by setting `dhcpcd=YES` in `/etc/rc.conf`.

3. Logging in

   After reboot, you can log in as `root` at the login prompt. If you didn't set a password in **sysinst**, there is no initial password. You should create an account for yourself (see below) and protect it and the "root" account with good passwords. By default, root login from the network is disabled (even via ssh(1)). One way to become root over the network is to log in as a different user that belongs to group "wheel" (see group(5)) and use su(1) to become root.

4. Adding accounts

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

5. The X Window System

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

6. Installing third party packages

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

   - More information on the package system is available at
     http://www.NetBSD.org/docs/software/packages.html

   - A list of available packages suitable for browsing is at
     ftp://ftp.NetBSD.org/pub/pkgsrc/current/pkgsrc/README.html

   - Precompiled binaries can be found at
     ftp://ftp.NetBSD.org/pub/pkgsrc/packages/NetBSD/
     usually in the i386/7.1_STABLE/All subdir. If you installed pkgin(1) in the **sysinst** post-installation configuration menu, you can use it to automatically install binary packages over the network. Assuming that /usr/pkg/etc/pkgin/repositories.conf is correctly configured, you can install them with the following commands:

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

     Note: Some mirror sites don't mirror the /pub/pkgsrc directory.

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

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

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

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

7. Misc

   - Edit `/etc/mail/aliases` to forward root mail to the right place. Don't forget to run `newaliases`(1) afterwards.
   - Edit `/etc/rc.local` to run any local daemons you use.
   - Many of the `/etc` files are documented in section 5 of the manual; so just invoking

     ```
     # man 5 filename
     ```

     is likely to give you more information on these files.

Upgrading a previously-installed NetBSD System

The easiest way to upgrade to NetBSD 7.1_STABLE is with binaries, and that is the method documented here.

To do the upgrade, you must have one form of boot media available. You must also have at least the **base** and **kern** binary distribution sets available. Finally, you must have sufficient disk space available to install the new binaries. Since files already installed on the system are overwritten in place, you only need additional free space for files which weren't previously installed or to account for growth of the sets between releases.

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

The upgrade procedure is similar to an installation, but without the hard disk partitioning.

Fetching the binary sets is done in the same manner as the installation procedure; refer to the installation part of the document for help. File systems are checked before unpacking the sets.

After a new kernel has been copied to your hard disk, your machine is a complete NetBSD 7.1_STABLE system. However, that doesn't mean that you're finished with the upgrade process. You will probably want to update the set of device nodes you have in `/dev`. If you've changed the contents of `/dev` by hand, you will need to be careful about this, but if not, you can just cd into `/dev`, and run the command:

```
# sh MAKEDEV all
```

sysinst will attempt to merge the settings stored in your `/etc` directory with the new version of NetBSD using the `postinstall`(8) utility. However, `postinstall`(8) is only able to deal with changes that are easily automated. It is recommended that you use the `etcupdate`(8) tool to merge any remaining configuration changes.

Compatibility Issues With Previous NetBSD Releases

Users upgrading from previous versions of NetBSD may wish to bear the following problems and compatibility issues in mind when upgrading to NetBSD 7.1_STABLE.

Note that **sysinst** will automatically invoke

```
postinstall fix
```

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

A number of things have been removed from the NetBSD 7.1_STABLE release. See the "Components removed from NetBSD" section near the beginning of this document for a list.

Issues affecting an upgrade from NetBSD 5.x releases

See the section below on upgrading from NetBSD 6.x as well.

The following users need to be created:

- _mdnsd
- _tests
- _tcpdump
- _tss

The following groups need to be created:

- _mdnsd
- _tests
- _tcpdump
- _tss

The implementation of SHA2-HMAC in KAME_IPSEC as used in NetBSD 5.0 and before did not comply with current standards. FAST_IPSEC does, with the result that old and new systems cannot communicate over IPSEC if one of the affected authentication algorithms (hmac_sha256, hmac_sha384, hmac_sha512) is used.

Issues affecting an upgrade from NetBSD 6.x releases

The following user needs to be created:

- _rtadvd

The following groups need to be created:

- _gpio
- _rtadvd

Using online NetBSD documentation

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

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

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

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

```
# man passwd
```

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

```
# man 5 passwd
```

instead.

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

```
# apropos subject-word
```

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

Administrivia

If you've got something to say, do so! We'd like your input. There are various mailing lists available via the mailing list server at majordomo@NetBSD.org. See **http://www.NetBSD.org/mailinglists/** for details.

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

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

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

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

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

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

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

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  Ralph Campbell
  Mike Karels
  Marshall Kirk McKusick

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- The Internet Research Institute in Japan for hosting the server which runs the CVSweb interface to the NetBSD source tree.
- The Columbia University Computer Science Department for hosting the build cluster.
- The many organizations that provide NetBSD mirror sites.
- Without CVS, this project would be impossible to manage, so our hats go off to Brian Berliner, Jeff Polk, and the various other people who've had a hand in making CVS a useful tool.
- We list the individuals and organizations that have made donations or loans of hardware and/or money, to support NetBSD development, and deserve credit for it at **http://www.NetBSD.org/donations/** (If you're not on that list and should be, tell us! We probably were not able to get in touch with you, to verify that you wanted to be listed.)

- Finally, we thank all of the people who've put sweat and tears into developing NetBSD since its inception in January, 1993. (Obviously, there are a lot more people who deserve thanks here. If you're one of them, and would like to be mentioned, tell us!)

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