

# FreeBSD/amd64 6.4-STABLE Installation Instructions

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This article gives some brief instructions on installing FreeBSD/amd64 6.4-STABLE, with particular emphasis given to obtaining a FreeBSD distribution. Some notes on troubleshooting and frequently-asked questions are also given.

## 1 Installing FreeBSD

This section documents the process of installing a new distribution of FreeBSD. These instructions pay particular emphasis to the process of obtaining the FreeBSD 6.4-STABLE distribution and to beginning the installation procedure. The “Installing FreeBSD”<sup>1</sup> chapter of the FreeBSD Handbook<sup>2</sup> provides more in-depth information about the installation program itself, including a guided walkthrough with screenshots.

If you are upgrading from a previous release of FreeBSD, please see Section 3 for instructions on upgrading.

### 1.1 Getting Started

Probably the most important pre-installation step that can be taken is that of reading the various instruction documents provided with FreeBSD. A roadmap of documents pertaining to this release of FreeBSD can be found in `README.TXT`, which can usually be found in the same location as this file; most of these documents, such as the release notes and the hardware compatibility list, are also accessible in the Documentation menu of the installer.

Note that on-line versions of the FreeBSD FAQ<sup>3</sup> and Handbook<sup>4</sup> are also available from the FreeBSD Project Web site<sup>5</sup>, if you have an Internet connection.

This collection of documents may seem daunting, but the time spent reading them will likely be saved many times over. Being familiar with what resources are available can also be helpful in the event of problems during installation.

The best laid plans sometimes go awry, so if you run into trouble take a look at Section 4, which contains valuable troubleshooting information. You should also read an updated copy of `ERRATA.TXT` before installing, since this will alert you to any problems which have reported in the interim for your particular release.

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1. [http://www.FreeBSD.org/doc/en\\_US.ISO8859-1/books/handbook/install.html](http://www.FreeBSD.org/doc/en_US.ISO8859-1/books/handbook/install.html)

2. [http://www.FreeBSD.org/doc/en\\_US.ISO8859-1/books/handbook/](http://www.FreeBSD.org/doc/en_US.ISO8859-1/books/handbook/)

3. [http://www.FreeBSD.org/doc/en\\_US.ISO8859-1/books/faq/](http://www.FreeBSD.org/doc/en_US.ISO8859-1/books/faq/)

4. [http://www.FreeBSD.org/doc/en\\_US.ISO8859-1/books/handbook/](http://www.FreeBSD.org/doc/en_US.ISO8859-1/books/handbook/)

5. <http://www.FreeBSD.org/>

**Important:** While FreeBSD does its best to safeguard against accidental loss of data, it's still more than possible to *wipe out your entire disk* with this installation if you make a mistake. Please do not proceed to the final FreeBSD installation menu unless you've adequately backed up any important data first.

## 1.2 Hardware Requirements

FreeBSD for the AMD64 requires an Athlon64, Athlon64-FX, Opteron or better processor to run.

If you have an machine based on an nVidia nForce3 Pro-150, you **MUST** use the BIOS setup to disable the IO APIC. If you do not have an option to do this, you will likely have to disable ACPI instead. There are bugs in the Pro-150 chipset that we have not found a workaround for yet.

If you are not familiar with configuring hardware for FreeBSD, you should be sure to read the `HARDWARE.TXT` file; it contains important information on what hardware is supported by FreeBSD.

## 1.3 Floppy Disk Image Instructions

Floppy disk based install is not supported on FreeBSD/amd64.

## 1.4 Installing FreeBSD from CDROM or the Internet

The easiest type of installation is from CDROM. If you have a supported CDROM drive and a FreeBSD installation CDROM, there are 2 ways of starting the installation from it:

- If your system supports the “CDBOOT” standard for bootable CDROM media and you have booting from CD enabled, simply put the FreeBSD installation CD in your CDROM drive and boot the system to begin installation.
- Build a set of FreeBSD boot floppies from the `floppies/` directory in every FreeBSD distribution. Read Section 1.3 for more information on creating the bootable floppies under different operating systems. Then you simply boot from the first floppy and you should soon be in the FreeBSD installation.

## 1.5 Detail on various installation types

Once you've gotten yourself to the initial installation screen somehow, you should be able to follow the various menu prompts and go from there. If you've never used the FreeBSD installation before, you are also encouraged to read some of the documentation in the Documentation submenu as well as the general “Usage” instructions on the first menu.

**Note:** If you get stuck at a screen, press the **F1** key for online documentation relevant to that specific section.

If you've never installed FreeBSD before, or even if you have, the “Standard” installation mode is the most recommended since it makes sure that you'll visit all the various important checklist items along the way. If you're

much more comfortable with the FreeBSD installation process and know *exactly* what you want to do, use the “Express” or “Custom” installation options. If you’re upgrading an existing system, use the “Upgrade” option.

The FreeBSD installer supports the direct use of floppy, DOS, tape, CDROM, FTP, NFS and UFS partitions as installation media; further tips on installing from each type of media are listed below.

### 1.5.1 Installing from a Network CDROM

If you simply wish to install from a local CDROM drive then see Section 1.4. If you don’t have a CDROM drive on your system and wish to use a FreeBSD distribution CD in the CDROM drive of another system to which you have network connectivity, there are also several ways of going about it:

- If you would be able to FTP install FreeBSD directly from the CDROM drive in some FreeBSD machine, it’s quite easy: You ensure an FTP server is running and then simply add the following line to the password file (using the `vipw(8)` command):

```
ftp:*:99:99::0:0:FTP:/cdrom:/sbin/nologin
```

On the machine on which you are running the install, go to the Options menu and set Release Name to `any`. You may then choose a Media type of `FTP` and type in `ftp://machine` after picking “URL” in the ftp sites menu.

**Warning:** This may allow anyone on the local network (or Internet) to make “anonymous FTP” connections to this machine, which may not be desirable.

- If you would rather use NFS to export the CDROM directly to the machine(s) you’ll be installing from, you need to first add an entry to the `/etc/exports` file (on the machine with the CDROM drive). The example below allows the machine `ziggy.foo.com` to mount the CDROM directly via NFS during installation:

```
/cdrom -ro ziggy.foo.com
```

The machine with the CDROM must also be configured as an NFS server, of course, and if you’re not sure how to do that then an NFS installation is probably not the best choice for you unless you’re willing to read up on `rc.conf(5)` and configure things appropriately. Assuming that this part goes smoothly, you should be able to enter: `cdrom-host:/cdrom` as the path for an NFS installation when the target machine is installed, e.g. `wiggy:/cdrom`.

### 1.5.2 Installing from Floppies

If you must install from floppy disks, either due to unsupported hardware or just because you enjoy doing things the hard way, you must first prepare some floppies for the install.

First, make your boot floppies as described in Section 1.3.

Second, peruse Section 2 and pay special attention to the “Distribution Format” section since it describes which files you’re going to need to put onto floppy and which you can safely skip.

Next you will need, at minimum, as many 1.44MB floppies as it takes to hold all files in the `bin` (binary distribution) directory. If you’re preparing these floppies under DOS, then these floppies *must* be formatted using the `MS-DOS FORMAT` command. If you’re using Windows, use the Windows File Manager format command.

**Important:** Frequently, floppy disks come “factory preformatted”. While convenient, many problems reported by users in the past have resulted from the use of improperly formatted media. Re-format them yourself, just to make sure.

If you’re creating the floppies from another FreeBSD machine, a format is still not a bad idea though you don’t need to put a DOS filesystem on each floppy. You can use the `disklabel(8)` and `newfs(8)` commands to put a UFS filesystem on a floppy, as the following sequence of commands illustrates:

```
# fdformat -f 1440 fd0
# disklabel -w fd0 floppy3
# newfs -i 65536 /dev/fd0
```

After you’ve formatted the floppies for DOS or UFS, you’ll need to copy the files onto them. The distribution files are sized so that a floppy disk will hold a single file. Each distribution should go into its own subdirectory on the floppy, e.g.: `a:\bin\bin.inf`, `a:\bin\bin.aa`, `a:\bin\bin.ab`, ...

**Important:** The `bin.inf` file also needs to go on the first floppy of the `bin` set since it is read by the installation program in order to figure out how many additional pieces to look for when fetching and concatenating the distribution. When putting distributions onto floppies, the `distname.inf` file *must* occupy the first floppy of each distribution set.

Once you come to the Media screen of the install, select “Floppy” and you’ll be prompted for the rest.

### 1.5.3 Installing from a DOS partition

To prepare for installation from an MS-DOS partition you should simply copy the files from the distribution into a directory called `FREEBSD` on the Primary DOS partition (`C:`). For example, to do a minimal installation of FreeBSD from DOS using files copied from the CDROM, you might do something like this:

```
C:\> MD C:\FREEBSD
C:\> XCOPY /S E:\BASE C:\FREEBSD\BASE
```

Assuming that `E:` was where your CD was mounted.

For as many distributions as you wish to install from DOS (and you have free space for), install each one in a directory under `C:\FREEBSD` - the `BIN` dist is only the minimal requirement.

Once you’ve copied the directories, you can simply launch the installation from floppies as normal and select “DOS” as your media type when the time comes.

### 1.5.4 Installing from QIC/SCSI Tape

When installing from tape, the installation program expects the files to be simply tar’ed onto it, so after fetching all of the files for the distributions you’re interested in, simply use `tar(1)` to get them onto the tape with a command something like this:

```
# cd /where/you/have/your/dists
# tar cvf /dev/sa0 dist1 .. dist2
```

When you go to do the installation, you should also make sure that you leave enough room in some temporary directory (which you'll be allowed to choose) to accommodate the *full* contents of the tape you've created. Due to the non-random access nature of tapes, this method of installation requires quite a bit of temporary storage. You should expect to require as much temporary storage as you have stuff written on tape.

**Note:** When going to do the installation, the tape must be in the drive *before* booting from the boot floppies. The installation "probe" may otherwise fail to find it.

Now create a boot floppy as described in Section 1.3 and proceed with the installation.

### 1.5.5 Installing over a Network using FTP or NFS

After making the boot floppies as described in the first section, you can load the rest of the installation over a network using one of 3 types of connections: serial port, parallel port, or Ethernet.

#### 1.5.5.1 Serial Port

SLIP support is rather primitive, and is limited primarily to hard-wired links, such as a serial cable running between two computers. The link must be hard-wired because the SLIP installation doesn't currently offer a dialing capability. If you need to dial out with a modem or otherwise dialog with the link before connecting to it, then the PPP utility should be used instead.

If you're using PPP, make sure that you have your Internet Service Provider's IP address and DNS information handy as you'll need to know it fairly early in the installation process. You may also need to know your own IP address, though PPP supports dynamic address negotiation and may be able to pick up this information directly from your ISP if they support it.

You will also need to know how to use the various "AT commands" for dialing out with your particular brand of modem as the PPP dialer provides only a very simple terminal emulator.

#### 1.5.5.2 Parallel Port

If a hard-wired connection to another FreeBSD or Linux machine is available, you might also consider installing over a "laplink" style parallel port cable. The data rate over the parallel port is much higher than what is typically possible over a serial line (up to 50k/sec), thus resulting in a quicker installation. It's not typically necessary to use "real" IP addresses when using a point-to-point parallel cable in this way and you can generally just use RFC 1918 style addresses for the ends of the link (e.g. 10.0.0.1, 10.0.0.2, etc).

**Important:** If you use a Linux machine rather than a FreeBSD machine as your PLIP peer, you will also have to specify `link0` in the TCP/IP setup screen's "extra options for ifconfig" field in order to be compatible with Linux's slightly different PLIP protocol.

#### 1.5.5.3 Ethernet

FreeBSD supports most common Ethernet cards; a table of supported cards is provided as part of the FreeBSD Hardware Notes (see `HARDWARE.TXT` in the Documentation menu on the boot floppy or the top level directory of the

CDROM). If you are using one of the supported PCMCIA Ethernet cards, also be sure that it's plugged in *before* the laptop is powered on. FreeBSD does not, unfortunately, currently support “hot insertion” of PCMCIA cards during installation.

You will also need to know your IP address on the network, the `netmask` value for your subnet and the name of your machine. Your system administrator can tell you which values are appropriate to your particular network setup. If you will be referring to other hosts by name rather than IP address, you'll also need a name server and possibly the address of a gateway (if you're using PPP, it's your provider's IP address) to use in talking to it. If you want to install by FTP via an HTTP proxy (see below), you will also need the proxy's address.

If you do not know the answers to these questions then you should really probably talk to your system administrator *first* before trying this type of installation. Using a randomly chosen IP address or netmask on a live network is almost guaranteed not to work, and will probably result in a lecture from said system administrator.

Once you have a network connection of some sort working, the installation can continue over NFS or FTP.

#### 1.5.5.4 NFS installation tips

NFS installation is fairly straight-forward: Simply copy the FreeBSD distribution files you want onto a server somewhere and then point the NFS media selection at it.

If this server supports only “privileged port” access (this is generally the default for Sun and Linux workstations), you may need to set this option in the Options menu before installation can proceed.

If you have a poor quality Ethernet card which suffers from very slow transfer rates, you may also wish to toggle the appropriate Options flag.

In order for NFS installation to work, the server must also support “subdir mounts”, e.g. if your FreeBSD distribution directory lives on `wiggy:/usr/archive/stuff/FreeBSD`, then `wiggy` will have to allow the direct mounting of `/usr/archive/stuff/FreeBSD`, not just `/usr` or `/usr/archive/stuff`.

In FreeBSD's `/etc/exports` file this is controlled by the `-alldirs` option. Other NFS servers may have different conventions. If you are getting `Permission Denied` messages from the server then it's likely that you don't have this properly enabled.

#### 1.5.5.5 FTP Installation tips

FTP installation may be done from any mirror site containing a reasonably up-to-date version of FreeBSD. A full menu of reasonable choices for almost any location in the world is provided in the FTP site menu during installation.

If you are installing from some other FTP site not listed in this menu, or you are having troubles getting your name server configured properly, you can also specify your own URL by selecting the “URL” choice in that menu. A URL can contain a hostname or an IP address, so something like the following would work in the absence of a name server:

```
ftp://216.66.64.162/pub/FreeBSD/releases/amd64/4.2-RELEASE
```

There are three FTP installation modes you can use:

- FTP: This method uses the standard “Active” mode for transfers, in which the server initiates a connection to the client. This will not work through most firewalls but will often work best with older FTP servers that do not support passive mode. If your connection hangs with passive mode, try this one.

- **FTP Passive:** This sets the FTP "Passive" mode which prevents the server from opening connections to the client. This option is best for users to pass through firewalls that do not allow incoming connections on random port addresses.
- **FTP via an HTTP proxy:** This option instructs FreeBSD to use HTTP to connect to a proxy for all FTP operations. The proxy will translate the requests and send them to the FTP server. This allows the user to pass through firewalls that do not allow FTP at all, but offer an HTTP proxy. You must specify the hostname of the proxy in addition to the FTP server.

In the rare case that you have an FTP proxy that does not go through HTTP, you can specify the URL as something like:

```
ftp://foo.bar.com:port/pub/FreeBSD
```

In the URL above, *port* is the port number of the proxy FTP server.

### 1.5.6 Tips for Serial Console Users

If you'd like to install FreeBSD on a machine using just a serial port (e.g. you don't have or wish to use a VGA card), please follow these steps:

1. Connect some sort of ANSI (vt100) compatible terminal or terminal emulation program to the COM1 port of the PC you are installing FreeBSD onto.
2. Unplug the keyboard (yes, that's correct!) and then try to boot from floppy or the installation CDROM, depending on the type of installation media you have, with the keyboard unplugged.
3. If you don't get any output on your serial console, plug the keyboard in again. If you are booting from the CDROM, proceed to step 5 as soon as you hear the beep.
4. If booting from floppies, when access to the disk stops, insert the first of the `kernX.flp` disks and press **Enter**. When access to this disk finishes, insert the next `kernX.flp` disk and press **Enter**, and repeat until all `kernX.flp` disks have been inserted. When disk activity finishes, reinsert the `boot.flp` floppy disk and press **Enter**.
5. Once a beep is heard, hit the number **6**, then enter

```
boot -h
```

and you should now definitely be seeing everything on the serial port. If that still doesn't work, check your serial cabling as well as the settings on your terminal emulation program or actual terminal device. It should be set for 9600 baud, 8 bits, no parity.

## 1.6 Question and Answer Section for AMD64 Architecture Users

1. Help! I have no space! Do I need to delete everything first?

If your machine is already running DOS and has little or no free space available for FreeBSD's installation, there are several alternatives for resizing existing partitions so that you can install FreeBSD.

The **FIPS** utility, provided in the `tools/` subdirectory on the FreeBSD CDROM or on the various FreeBSD ftp sites, can resize an existing FAT partition. It allows you to split an existing DOS partition into two pieces, preserving the

original partition and allowing you to install onto the second free piece. You first “defrag” your DOS partition, using the DOS 6.xx `DEFRAG` utility or the **Norton Disk Tools**, then run FIPS. It will prompt you for the rest of the information it needs. Afterwards, you can reboot and install FreeBSD on the new partition. Also note that FIPS will create the second partition as a “clone” of the first, so you’ll actually see that you now have two DOS Primary partitions where you formerly had one. Don’t be alarmed! You can simply delete the extra DOS Primary partition (making sure it’s the right one by examining its size).

For systems with NTFS partitions, a different tool, such as **ntfsresize** or the commercially-available **Partition Magic**, is required. **ntfsresize**, as well as the **GParted** graphical interface for partition resizing, is available on a number of Live CD Linux distributions, such as SystemRescueCD<sup>7</sup>.

Problems have been reported resizing Microsoft Vista partitions. Having a Vista installation CDROM handy when attempting such an operation is recommended. As with all such disk maintenance tasks, a current set of backups is also strongly advised.

## 2. Can I use compressed DOS filesystems from FreeBSD?

No. If you are using a utility such as **Stacker(tm)** or **DoubleSpace(tm)**, FreeBSD will only be able to use whatever portion of the filesystem you leave uncompressed. The rest of the filesystem will show up as one large file (the stacked/dblspaced file!). *Do not remove that file* as you will probably regret it greatly!

It is probably better to create another uncompressed DOS extended partition and use this for communications between DOS and FreeBSD if such is your desire.

## 3. Can I mount my DOS extended partitions?

Yes. DOS extended partitions are mapped in at the end of the other “slices” in FreeBSD, e.g. your `D:` drive might be `/dev/da0s5`, your `E:` drive `/dev/da0s6`, and so on. This example assumes, of course, that your extended partition is on SCSI drive 0. For IDE drives, substitute `ad` for `da` appropriately. You otherwise mount extended partitions exactly like you would mount any other DOS drive, e.g.:

```
# mount -t msdos /dev/da0s5 /dos_d
```

## 4. Can I run DOS binaries under FreeBSD?

Ongoing work with BSDI’s `doscmd(1)` utility will suffice in many cases, though it still has some rough edges. The `emulators/doscmd` port/package can be found in the FreeBSD Ports Collection. If you’re interested in working on this, please send mail to the FreeBSD-emulation mailing list<sup>8</sup> and indicate that you’re interested in joining this ongoing effort!

The `emulators/pccemu` port/package in the FreeBSD Ports Collection which emulates an 8088 and enough BIOS services to run DOS text mode applications. It requires the X Window System (XFree86) to operate.

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7. <http://www.sysresccd.org/>

8. <http://lists.FreeBSD.org/mailman/listinfo/freebsd-emulation>

## 5. Can I run Microsoft® Windows® applications under FreeBSD?

There are several ports/packages in the FreeBSD Ports Collection which can enable the use of many Windows applications. The `emulators/wine` port/package provides a compatibility layer on top of FreeBSD which allow many Windows applications to be run within X Windows (XFree86).

## 6. Can I run other Operating Systems under FreeBSD?

Again, there are several ports/packages in the FreeBSD Ports Collection which simulate "virtual machines" and allow other operating systems to run on top of FreeBSD. The `emulators/bochs` port/package allows Microsoft Windows, Linux and even other copies of FreeBSD to be run within a window on the FreeBSD desktop. The `emulators/vmware2` and `emulators/vmware3` ports/packages allow the commercial VMware virtual machine software to be run on FreeBSD.

## 2 Distribution Format

A typical FreeBSD distribution directory looks something like this (exact details may vary depending on version, architecture, and other factors):

ERRATA.HTM	README.TXT	compat1x	dict	kernel
ERRATA.TXT	RELNOTES.HTM	compat20	doc	manpages
HARDWARE.HTM	RELNOTES.TXT	compat21	docbook.css	packages
HARDWARE.TXT	base	compat22	filename.txt	ports
INSTALL.HTM	boot	compat3x	floppies	proflibs
INSTALL.TXT	catpages	compat4x	games	src
README.HTM	cdrom.inf	crypto	info	tools

These same files are contained in the first CDROM of a multi-disk set, but they are laid out slightly differently on the disk. On most architectures, the installation CDROM also contains a "live filesystem" in addition to the distribution files. The live filesystem is useful when repairing or troubleshooting an existing FreeBSD installation (see Section 4 for how to use this).

The `floppies` directory will be of particular interest to users who are unable to boot from the CDROM media (but are able to read the CDROM by other means). It is easy to generate a set of 1.44MB boot floppies from the `floppies` directory (see Section 1.3 for instructions on how to do this) and use these to start an installation from CDROM, FTP, or NFS. The rest of the data needed during the installation will be obtained automatically based on your selections. If you've never installed FreeBSD before, you also want to read the entirety of this document (the installation instructions) file.

If you're trying to do some other type of installation or are merely curious about how a distribution is organized, what follows is a more thorough description of some of these items in more detail:

1. The `*.TXT` and `*.HTM` files contain documentation (for example, this document is contained in both `INSTALL.TXT` and `INSTALL.HTM`) and should be read before starting an installation. The `*.TXT` files are plain text, while the `*.HTM` files are HTML files that can be read by almost any Web browser. Some distributions may contain documentation in other formats as well, such as PDF or PostScript.
2. `docbook.css` is a Cascading Style Sheet (CSS) file used by some Web browsers for formatting the HTML documentation.

3. The `base`, `catpages`, `crypto`, `dict`, `doc`, `games`, `info`, `manpages`, `proflibs`, and `src` directories contain the primary distribution components of FreeBSD itself and are split into smaller files for easy packing onto floppies (should that be necessary).
4. The `compat1x`, `compat20`, `compat21`, `compat22`, `compat3x`, and `compat4x` directories contain distributions for compatibility with older releases and are distributed as single `gzip`'d tar files - they can be installed during release time or later by running their `install.sh` scripts.
5. The `floppies/` subdirectory contains the floppy installation images; further information on using them can be found in Section 1.3.
6. The `packages` and `ports` directories contain the FreeBSD Packages and Ports Collections. Packages may be installed from the `packages` directory by running the command:
 

```
# sysinstall configPackages
```

 Packages can also be installed by feeding individual filenames in `packages/` to the `pkg_add(1)` command. The Ports Collection may be installed like any other distribution and requires about 190MB unpacked. More information on the ports collection may be obtained from <http://www.FreeBSD.org/ports/><sup>9</sup> or locally from `/usr/share/doc/handbook` if you've installed the `doc` distribution.
7. Last of all, the `tools` directory contains various DOS tools for discovering disk geometries, installing boot managers and the like. It is purely optional and provided only for user convenience.

A typical distribution directory (for example, the `info` distribution) looks like this internally:

```
CHECKSUM.MD5    info.ab          info.ad          info.inf         install.sh
info.aa         info.ac          info.ae          info.mtree
```

The `CHECKSUM.MD5` file contains MD5 signatures for each file, should data corruption be suspected, and is purely for reference. It is not used by the actual installation and does not need to be copied with the rest of the distribution files. The `info.a*` files are split, `gzip`'d tar files, the contents of which can be viewed by doing:

```
# cat info.a* | tar tvzf -
```

During installation, they are automatically concatenated and extracted by the installation procedure.

The `info.inf` file is also necessary since it is read by the installation program in order to figure out how many pieces to look for when fetching and concatenating the distribution. When putting distributions onto floppies, the `.inf` file *must* occupy the first floppy of each distribution set!

The `info.mtree` file is another non-essential file which is provided for user reference. It contains the MD5 signatures of the *unpacked* distribution files and can be later used with the `mtree(8)` program to verify the installation permissions and checksums against any possible modifications to the file. When used with the `base` distribution, this can be an excellent way of detecting trojan horse attacks on your system.

Finally, the `install.sh` file is for use by those who want to install the distribution after installation time. To install the `info` distribution from CDROM after a system was installed, for example, you'd do:

```
# cd /cdrom/info
# sh install.sh
```

---

9. <http://www.FreeBSD.org/ports/>

## 3 Upgrading FreeBSD

These instructions describe a procedure for doing a binary upgrade from an older version of FreeBSD.

**Warning:** While the FreeBSD upgrade procedure does its best to safeguard against accidental loss of data, it is still more than possible to *wipe out your entire disk* with this installation! Please do not accept the final confirmation request unless you have adequately backed up any important data files.

**Important:** These notes assume that you are using the version of `sysinstall(8)` supplied with the version of FreeBSD to which you intend to upgrade. Using a mismatched version of `sysinstall(8)` is almost guaranteed to cause problems and has been known to leave systems in an unusable state. The most commonly made mistake in this regard is the use of an old copy of `sysinstall(8)` from an existing installation to upgrade to a newer version of FreeBSD. This is *not* recommended.

**Warning:** Binary upgrades to FreeBSD 6.4-STABLE from FreeBSD 4-STABLE are not supported at this time. There are some files present in a FreeBSD 4-STABLE whose presence can be disruptive, but are not removed by a binary upgrade. One notable example is that an old `/usr/include/g++` directory will cause C++ programs to compile incorrectly (or not at all).

These upgrade instructions are provided for the use of users upgrading from relatively recent FreeBSD 6-STABLE snapshots.

### 3.1 Introduction

The upgrade procedure replaces distributions selected by the user with those corresponding to the new FreeBSD release. It preserves standard system configuration data, as well as user data, installed packages and other software.

Administrators contemplating an upgrade are encouraged to study this section in its entirety before commencing an upgrade. Failure to do so may result in a failed upgrade or loss of data.

#### 3.1.1 Upgrade Overview

Upgrading of a distribution is performed by extracting the new version of the component over the top of the previous version. Files belonging to the old distribution are not deleted.

System configuration is preserved by retaining and restoring the previous version of the following files:

```
Xaccel.ini, XF86Config, adduser.conf, aliases, aliases.db, amd.map, crontab, csh.cshrc,
csh.login, csh.logout, cvsupfile, dhclient.conf, disktab, dm.conf, dumpdates, exports, fbt,
fstab, ftpusers, gettytab, gnats, group, hosts, hosts.allow, hosts.equiv, hosts.lpd, inetd.conf,
localtime, login.access, login.conf, mail, mail.rc, make.conf, manpath.config, master.passwd,
motd, namedb, networks, newsyslog.conf, nsmb.conf, nsswitch.conf, pam.conf, passwd, periodic,
ppp, printcap, profile, pwd.db, rc.conf, rc.conf.local, rc.firewall, rc.local, remote,
resolv.conf, rmt, sendmail.cf, sendmail.cw, services, shells, skeykeys, spwd.db, ssh,
syslog.conf, ttys, uucp
```

The versions of these files which correspond to the new version are moved to `/etc/upgrade/`. The system administrator may peruse these new versions and merge components as desired. Note that many of these files are interdependent, and the best merge procedure is to copy all site-specific data from the current files into the new.

During the upgrade procedure, the administrator is prompted for a location into which all files from `/etc/` are saved. In the event that local modifications have been made to other files, they may be subsequently retrieved from this location.

## 3.2 Procedure

This section details the upgrade procedure. Particular attention is given to items which substantially differ from a normal installation.

### 3.2.1 Backup

User data and system configuration should be backed up before upgrading. While the upgrade procedure does its best to prevent accidental mistakes, it is possible to partially or completely destroy data and configuration information.

### 3.2.2 Mount Filesystems

The disklabel editor is entered with the nominated disk's filesystem devices listed. Prior to commencing the upgrade, the administrator should make a note of the device names and corresponding mountpoints. These mountpoints should be entered here. *Do not* set the “newfs flag” for any filesystems, as this will cause data loss.

### 3.2.3 Select Distributions

When selecting distributions, there are no constraints on which must be selected. As a general rule, the `base` distribution should be selected for an update, and the `man` distribution if manpages are already installed. Other distributions may be selected beyond those originally installed if the administrator wishes to add additional functionality.

### 3.2.4 After Installation

Once the installation procedure has completed, the administrator is prompted to examine the new configuration files. At this point, checks should be made to ensure that the system configuration is valid. In particular, the `/etc/rc.conf` and `/etc/fstab` files should be checked.

## 3.3 Upgrading from Source Code

Those interested in an upgrade method that allows more flexibility and sophistication should take a look at The Cutting Edge<sup>10</sup> in the FreeBSD Handbook. This procedure involves rebuilding all of FreeBSD from source code. It requires reliable network connectivity, extra disk space, and time, but has advantages for networks and other more complex installations. This is roughly the same procedure as is used for track the `-STABLE` or `-CURRENT` development branches.

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10. [http://www.FreeBSD.org/doc/en\\_US.ISO8859-1/books/handbook/cutting-edge.html](http://www.FreeBSD.org/doc/en_US.ISO8859-1/books/handbook/cutting-edge.html)

`/usr/src/UPDATING` contains important information on updating a FreeBSD system from source code. It lists various issues resulting from changes in FreeBSD that may affect an upgrade.

## 4 Troubleshooting

### 4.1 Repairing an Existing FreeBSD Installation

FreeBSD features a “fixit” option in the top menu of the `sysinstall(8)` installation program. It provides a shell with common programs from the FreeBSD base system; this environment is useful for repairing or troubleshooting an existing FreeBSD installation. To use fixit mode, you will also need either the `fixit.flp` floppy, generated in the same fashion as the boot floppies, or the “live filesystem” CDROM. In multi-disk FreeBSD distributions, the live filesystem image is typically located on the installation disk. Note that some UNIX system administration experience is required to use the fixit option.

Generally, there are two ways of invoking fixit mode. Users who can boot from the FreeBSD installation CDROM, should do so and then choose the “fixit” item from the main `sysinstall(8)` menu. Then select the “CDROM/DVD” option from the fixit menu.

Users who cannot boot from CDROM, but can boot from floppy disk, require a few more steps. In addition to the `boot.flp` and `kernx.flp` disks required for installation, create the `fixit.flp` floppy disk, in the same way as the other floppy disks. Follow the instructions for booting the installation program from floppy disk until reaching the main `sysinstall(8)` menu. At that point, choose the “fixit” item from the main `sysinstall(8)` menu. Then select the “Floppy” option from the fixit menu, and insert the `fixit.flp` floppy disk when prompted to do so.

The CDROM and floppy fixit environments are similar, but not identical. Both offer a shell with a variety of commands available for checking, repairing and examining filesystems and their contents. The CDROM version of fixit provides all of the commands and programs available in the FreeBSD base system, through the live filesystem. By contrast, the floppy fixit environment can only offer a subset of commands due to space constraints.

In the floppy version of fixit, some standalone utilities can be found in `/stand` or `/mnt2/stand`. In the CDROM version of fixit, these same programs can be found in `/stand` or `/mnt2/rescue` (as well as the rest of the programs from the live filesystem, which can be found under `/mnt`).

### 4.2 Common Installation Problems for AMD64 Architecture Users

**1.** My system hangs while probing hardware during boot, or it behaves strangely during install, or the floppy drive isn’t probed.

FreeBSD 5.0 and above makes extensive use of the system ACPI service on the i386, amd64 and ia64 platforms to aid in system configuration if it’s detected during boot. Unfortunately, some bugs still exist in both the ACPI driver and within system motherboards and BIOS. The use of ACPI can be disabled by setting the “`hint.acpi.0.disabled`” hint in the third stage boot loader:

```
set hint.acpi.0.disabled="1"
```

This is reset each time the system is booted, so it is necessary to add `hint.acpi.0.disabled="1"` to the file `/boot/loader.conf`. More information about the boot loader can be found in the FreeBSD Handbook.

2. My system uses the nVidia nForce3 Pro-150 chipset and I get hangs at the end of boot or suddenly starts losing interrupts.

There are problems with the apic on this chipset and/or the bios on every machine that we had seen at the time of release. While disabling ACPI as above will work, a less drastic option may be to set the “hint.apic.0.disabled” hint instead. If you have the option in the bios, try disabling the APIC support. Unfortunately some machines lack this option.

4. I go to boot from the hard disk for the first time after installing FreeBSD, the kernel loads and probes my hardware, but stops with messages like:

```
changing root device to ad1s1a panic: cannot mount root
```

What is wrong? What can I do?

What is this `bios_drive:interface(unit,partition)kernel_name` thing that is displayed with the boot help?

There is a longstanding problem in the case where the boot disk is not the first disk in the system. The BIOS uses a different numbering scheme to FreeBSD, and working out which numbers correspond to which is difficult to get right.

In the case where the boot disk is not the first disk in the system, FreeBSD can need some help finding it. There are two common situations here, and in both of these cases, you need to tell FreeBSD where the root filesystem is. You do this by specifying the BIOS disk number, the disk type and the FreeBSD disk number for that type.

The first situation is where you have two IDE disks, each configured as the master on their respective IDE busses, and wish to boot FreeBSD from the second disk. The BIOS sees these as disk 0 and disk 1, while FreeBSD sees them as `ad0` and `ad2`.

FreeBSD is on BIOS disk 1, of type `ad` and the FreeBSD disk number is 2, so you would say:

```
1:ad(2,a)kernel
```

Note that if you have a slave on the primary bus, the above is not necessary (and is effectively wrong).

The second situation involves booting from a SCSI disk when you have one or more IDE disks in the system. In this case, the FreeBSD disk number is lower than the BIOS disk number. If you have two IDE disks as well as the SCSI disk, the SCSI disk is BIOS disk 2, type `da` and FreeBSD disk number 0, so you would say:

```
2:da(0,a)kernel
```

To tell FreeBSD that you want to boot from BIOS disk 2, which is the first SCSI disk in the system. If you only had one IDE disk, you would use ‘1:’ instead.

Once you have determined the correct values to use, you can put the command exactly as you would have typed it in the `/boot.config` file using a standard text editor. Unless instructed otherwise, FreeBSD will use the contents of this file as the default response to the `boot: prompt`.

**5.** I go to boot from the hard disk for the first time after installing FreeBSD, but the Boot Manager prompt just prints `F?` at the boot menu each time but the boot won't go any further.

The hard disk geometry was set incorrectly in the Partition editor when you installed FreeBSD. Go back into the partition editor and specify the actual geometry of your hard disk. You must reinstall FreeBSD again from the beginning with the correct geometry.

If you are failing entirely in figuring out the correct geometry for your machine, here's a tip: Install a small DOS partition at the beginning of the disk and install FreeBSD after that. The install program will see the DOS partition and try to infer the correct geometry from it, which usually works.

The following tip is no longer recommended, but is left here for reference:

If you are setting up a truly dedicated FreeBSD server or workstation where you don't care for (future) compatibility with DOS, Linux or another operating system, you've also got the option to use the entire disk ('A' in the partition editor), selecting the non-standard option where FreeBSD occupies the entire disk from the very first to the very last sector. This will leave all geometry considerations aside, but is somewhat limiting unless you're never going to run anything other than FreeBSD on a disk.

**7.** The system finds my `ed(4)` network card, but I keep getting device timeout errors.

Your card is probably on a different IRQ from what is specified in the `/boot/device.hints` file. The `ed` driver does not use the 'soft' configuration by default (values entered using `EZSETUP` in DOS), but it will use the software configuration if you specify `-1` in the hints for the interface.

Either move the jumper on the card to a hard configuration setting (altering the kernel settings if necessary), or specify the IRQ as `-1` by setting the hint `"hint.ed.0.irq="-1"`. This will tell the kernel to use the soft configuration.

Another possibility is that your card is at IRQ 9, which is shared by IRQ 2 and frequently a cause of problems (especially when you have a VGA card using IRQ 2!). You should not use IRQ 2 or 9 if at all possible.

**12.** I have this `CMD640` IDE controller that is said to be broken.

FreeBSD does not support this controller.

**15.** I have an IBM EtherJet PCI card, it is detected by the `fxp(4)` driver correctly, but the lights on the card don't come on and it doesn't connect to the network.

We don't understand why this happens. Neither do IBM (we asked them). The card is a standard Intel EtherExpress Pro/100 with an IBM label on it, and these cards normally work just fine. You may see these symptoms only in some IBM Netfinity servers. The only solution is to install a different Ethernet adapter.

**17.** When I install onto a drive managed by a Mylex PCI RAID controller, the system fails to boot (eg. with a `read error` message).

There is a bug in the Mylex driver which results in it ignoring the "8GB" geometry mode setting in the BIOS. Use the 2GB mode instead.