

Red Hat Enterprise Linux 3

Quick Installation Guide for the x86, Itanium™, and AMD64 Architectures



Red Hat Enterprise Linux 3: Quick Installation Guide for the x86, Itanium™, and AMD64 Architectures

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Introduction

Welcome to the *Red Hat Enterprise Linux Quick Installation Guide*. This brief guide contains useful information to assist you during the installation of Red Hat Enterprise Linux 3. The *Red Hat Enterprise Linux Quick Installation Guide* is a brief version of the *Red Hat Enterprise Linux Installation Guide*. If you have trouble finding information, please refer to the full version of the *Red Hat Enterprise Linux Installation Guide* available on the Documentation CD and online at <http://www.redhat.com/docs/>.

1. Document Conventions

When you read this manual, certain words are represented in different fonts, typefaces, sizes, and weights. This highlighting is systematic; different words are represented in the same style to indicate their inclusion in a specific category. The types of words that are represented this way include the following:

command

Linux commands (and other operating system commands, when used) are represented this way. This style should indicate to you that you can type the word or phrase on the command line and press [Enter] to invoke a command. Sometimes a command contains words that would be displayed in a different style on their own (such as file names). In these cases, they are considered to be part of the command, so the entire phrase is displayed as a command. For example:

Use the `cat testfile` command to view the contents of a file, named `testfile`, in the current working directory.

file name

File names, directory names, paths, and RPM package names are represented this way. This style should indicate that a particular file or directory exists by that name on your system. Examples:

The `.bashrc` file in your home directory contains bash shell definitions and aliases for your own use.

The `/etc/fstab` file contains information about different system devices and file systems.

Install the `webalizer` RPM if you want to use a Web server log file analysis program.

application

This style indicates that the program is an end-user application (as opposed to system software). For example:

Use **Mozilla** to browse the Web.

[key]

A key on the keyboard is shown in this style. For example:

To use [Tab] completion, type in a character and then press the [Tab] key. Your terminal displays the list of files in the directory that start with that letter.

[key]-[combination]

A combination of keystrokes is represented in this way. For example:

The [Ctrl]-[Alt]-[Backspace] key combination exits your graphical session and return you to the graphical login screen or the console.

text found on a GUI interface

A title, word, or phrase found on a GUI interface screen or window is shown in this style. Text shown in this style is being used to identify a particular GUI screen or an element on a GUI screen (such as text associated with a checkbox or field). Example:

Select the **Require Password** checkbox if you would like your screensaver to require a password before stopping.

top level of a menu on a GUI screen or window

A word in this style indicates that the word is the top level of a pulldown menu. If you click on the word on the GUI screen, the rest of the menu should appear. For example:

Under **File** on a GNOME terminal, the **New Tab** option allows you to open multiple shell prompts in the same window.

If you need to type in a sequence of commands from a GUI menu, they are shown like the following example:

Go to **Main Menu Button** (on the Panel) => **Programming** => **Emacs** to start the **Emacs** text editor.

button on a GUI screen or window

This style indicates that the text can be found on a clickable button on a GUI screen. For example:

Click on the **Back** button to return to the webpage you last viewed.

`computer output`

Text in this style indicates text displayed to a shell prompt such as error messages and responses to commands. For example:

The `ls` command displays the contents of a directory. For example:

```
Desktop          about.html      logs            paulwesterberg.png
Mail             backupfiles    mail            reports
```

The output returned in response to the command (in this case, the contents of the directory) is shown in this style.

`prompt`

A prompt, which is a computer's way of signifying that it is ready for you to input something, is shown in this style. Examples:

```
$
```

```
#
[stephen@maturin stephen]$
leopard login:
```

user input

Text that the user has to type, either on the command line, or into a text box on a GUI screen, is displayed in this style. In the following example, **text** is displayed in this style:

To boot your system into the text based installation program, you must type in the **text** command at the `boot:` prompt.

replaceable

Text used for examples which is meant to be replaced with data provided by the user is displayed in this style. In the following example, `<version-number>` is displayed in this style:

The directory for the kernel source is `/usr/src/<version-number>/`, where `<version-number>` is the version of the kernel installed on this system.

Additionally, we use several different strategies to draw your attention to certain pieces of information. In order of how critical the information is to your system, these items are marked as note, tip, important, caution, or a warning. For example:



Note

Remember that Linux is case sensitive. In other words, a rose is not a ROSE is not a rOsE.



Tip

The directory `/usr/share/doc/` contains additional documentation for packages installed on your system.



Important

If you modify the DHCP configuration file, the changes will not take effect until you restart the DHCP daemon.



Caution

Do not perform routine tasks as root — use a regular user account unless you need to use the root account for system administration tasks.



Warning

Be careful to remove only the necessary Red Hat Enterprise Linux partitions. Removing other partitions could result in data loss or a corrupted system environment.

2. How to Use This Manual

This manual focuses on a CD-ROM-based installation and is ideal for users (both new and old) who want a quick and simple installation solution. It helps you prepare your system and walk you through the installation of Red Hat Enterprise Linux.

If you are an experienced user and you do not need a review of the basics, you can skip ahead to Chapter 3 *Installing Red Hat Enterprise Linux* to begin the installation process.

2.1. We Need Feedback!

If you discover a typo in the *Red Hat Enterprise Linux Installation Guide* or have thought of a way to make this manual better, we would love to hear from you. Submit a bug report against the component `rhel-qig-x8664-multi` in Bugzilla at:

<http://bugzilla.redhat.com/bugzilla/>

When submitting a bug report, be sure to mention the manual's identifier:

`rhel-qig-x8664-multi(EN)-3-Print-RHI (2003-07-25T17:10)`

If you have a suggestion for improving the documentation, try to be as specific as possible when describing it. If you have found an error, please include the section number and some of the surrounding text so we can find it easily.

If you have a support question (for example, if you need help configuring X, or if you are not sure how to partition your hard drive[s]), use the online support system by registering your product at:

<http://www.redhat.com/apps/activate/>

3. Accessibility Solutions

While the graphic user interface (GUI) is convenient for sighted users, it is often inhibiting to those with visual impairments because of the difficulty speech synthesizers have interpreting graphics. Red Hat Enterprise Linux is an ideal operating system for users with visual limitations because the GUI is not required by the kernel. Most modern tools including email, news, Web browsers, calendars, calculators, and much more can run on Linux without a graphical environment. The working environment can also be customized to meet the hardware or software needs of the user.

Red Hat, Inc. is the distribution of choice for people with special needs because of the outstanding support that is offered with the purchase of any boxed set. Many Linux distributions provide limited or nonexistent support to customers. Red Hat's installation support is deliverable via email or via the telephone and special circumstances will be considered and addressed for users with physical limitations. Customers should inform the support technician if they require specialized support.

For more information, refer to:

- <http://www.tldp.org/HOWTO/Accessibility-HOWTO/>
- <http://www.tldp.org/HOWTO/Keyboard-and-Console-HOWTO.html>
- The `README-Accessibility` file provides more information and instructions for using some of the tools available for users with special needs. This file can be found in `/usr/share/doc/redhat-release-X/`, where `X` is the release number of your installed product.

Itanium System Specific Information

1.1. Itanium System Installation Overview

Installing Red Hat Enterprise Linux on an Itanium system is different from installing Red Hat Enterprise Linux on an x86-based system. In general, the sequence of steps to a successful installation are the following:

1. Boot into the Extensible Firmware Interface (EFI) Shell.
2. If you cannot boot from the CD-ROM, make an LS-120 diskette from the boot image file provided with Red Hat Enterprise Linux.
3. Using the EFI Shell and the ELILO bootloader, load and run the kernel, and boot into the Red Hat Enterprise Linux installation program.

1.2. Itanium Systems — The EFI Shell

Before you start to install Red Hat Enterprise Linux on an Itanium, you must have a basic understanding of the EFI Shell, what it does, and the information it can provide.

The EFI Shell is a console interface used to launch applications (such as the Red Hat Enterprise Linux installation program), load EFI protocols and device drivers, and execute simple scripts. It is similar to a DOS console and can only access media that is FAT16 (VFAT) formatted.

The EFI Shell also contains common utilities that can be used on the EFI system partition. These utilities include `edit`, `type`, `cp`, `rm`, and `mkdir`. For a list of utilities and other commands, type `help` at the EFI Shell prompt.

The EFI Shell contains a bootloader called ELILO. Additional information on EFI can be found at the following URL:

<http://developer.intel.com/technology/efi/index.htm>

1.2.1. Itanium Systems — EFI Device Names

The `map` command can be used to list all devices and file systems that EFI can recognize. When your Itanium system boots into the EFI shell, it probes your system in the following order:

1. LS-120 drive (if it contains media)
2. IDE hard drives on the primary IDE interface
3. IDE hard drives on the secondary IDE interface
4. SCSI hard drives on the SCSI interface
5. CD-ROM drives on the IDE interface
6. CD-ROM drives on the SCSI interface

To view the results of this system poll, type the following command at the EFI Shell prompt:

map

The output is listed in the order the system was probed. So, all FAT16 filesystems are listed first, then IDE hard drives, then SCSI hard drives, then IDE CD-ROM drives, and finally SCSI CD-ROM drives.

For example, output of the `map` command might look like the following:

Device mapping table

```
fs0 : VenHw(Unknown Device:00) /HD (Part1, Sig00000000)
fs1 : VenHw(Unknown Device:80) /HD (Part1, Sig00000000)
fs2 : VenHw(Unknown Device:FF) /CDROM (Entry1) /HD (Part1, Sig00000000)
blk0 : VenHw(Unknown Device:00)
blk1 : VenHw(Unknown Device:00) /HD (Part1, Sig00000000)
blk2 : VenHw(Unknown Device:80)
blk3 : VenHw(Unknown Device:80) /HD (Part1, Sig00000000)
blk4 : VenHw(Unknown Device:80) /HD (Part2, Sig00000000)
blk5 : VenHw(Unknown Device:80) /HD (Part3, Sig00000000)
blk6 : VenHw(Unknown Device:80) /HD (Part3, Sig00000000) /HD (Part1, Sig725F7772)
blk7 : VenHw(Unknown Device:FF)
blk8 : VenHw(Unknown Device:FF) /CDROM (Entry1)
blk9 : VenHw(Unknown Device:FF) /CDROM (Entry1) /HD (Part1, Sig00000000)
```

In this example, there is an LS-120 diskette in the LS-120 drive as well as a CD-ROM in the CD-ROM drive. All the listings beginning with `fs` are FAT16 file systems that EFI can read. All the listings beginning with `blk` are block devices that EFI recognizes. Both the file systems and block devices are listed in the order they are probed. Therefore, `fs0` is the system partition on the LS-120, `fs1` is the system partition on the hard drive, and `fs2` is the system partition on the CD-ROM.

1.2.2. Itanium Systems — EFI System Partition

When partitioning your hard drive for Linux, you must create a system partition that is FAT16 (VFAT) formatted and has a mount point of `/boot/efi/`. This partition contains the installed Linux kernel(s) as well as the ELILO configuration file (`elilo.conf`). The `elilo.conf` file contains a list of kernels from which you can boot your system.



Chapter 2.

Steps to Get You Started



Note

Although this manual reflects the most current information possible, read the *Red Hat Enterprise Linux Release Notes* for information that may not have been available prior to this documentation being finalized. The *Release Notes* can be found on the Red Hat Enterprise Linux CD #1 and online at:

<http://www.redhat.com/docs/>

2.1. Where to Find Other Manuals

If your particular product did not include all of the printed Red Hat Enterprise Linux manuals, you can find them online or on the Red Hat Enterprise Linux Documentation CD included with your Red Hat Enterprise Linux product.

To find the manuals in HTML, PDF, and RPM formats online, go to:

<http://www.redhat.com/docs/>

2.2. Registering Your Product

Registration enables access to the Red Hat Services you have purchased, such as technical support and Red Hat Network. To register your product, go to:

<http://www.redhat.com/apps/activate/>



Note

You *must* activate your product before attempting to connect to Red Hat Network. If your product has not been activated, Red Hat Network rejects registration to channels to which the system is not entitled.

2.3. Is Your Hardware Compatible?

Hardware compatibility is particularly important if you have an older system or a system that you built yourself. Red Hat Enterprise Linux 3 should be compatible with most hardware in systems that were factory built within the last two years. However, hardware specifications change almost daily, so it is hard to guarantee that your hardware will be 100% compatible.

The most recent list of supported hardware can be found at:

<http://hardware.redhat.com/hcl/>

2.4. Preparing for a Network Installation



Note

Make sure an installation CD (or any other type of CD) is not your hosting partition's drive if you are performing a network-based installation. Having a CD in the drive may cause unexpected errors.

The Red Hat Enterprise Linux installation media must be available for either a network installation (via NFS, FTP, or HTTP) or installation via local storage. Use the following steps if you are performing an NFS, FTP, or HTTP installation.

The NFS, FTP, or HTTP server to be used for installation over the network must be a separate machine which can provide the complete `RedHat/` directory. Both the `RedHat/base/` and `RedHat/RPMS/` directories must be available and populated with all files from all installation CD-ROMs.



Note

The directory specified in the following refers to `/location/of/disk/space/`. This means it is the directory up to, but *not* including, the `RedHat/` distribution directory. For example, if you have Red Hat Enterprise Linux 3 installation files located in `/export/redhat/` on the installation staging server, `/location/of/disk/space/` would be `/export/redhat/`.

To copy the `RedHat/` directory from the installation CD-ROMs to a Linux machine which acts as an installation staging server, perform the following steps:

- For each binary CD-ROM, execute the following commands:

- `mount /mnt/cdrom`
 - `cp -var /mnt/cdrom/RedHat /location/of/disk/space`
where `/location/of/disk/space/` is a directory you create such as `/export/redhat/`
 - `umount /mnt/cdrom/`
- Note that the Release Notes are not included in the `RedHat` directory. Unless they are specifically copied over, the Release Notes will not be available during your installation of Red Hat Enterprise Linux. The Release Notes are formatted in HTML files located at the root of the disc. Copy the files to your installation directory. For example:

```
cp /mnt/cdrom/RELEASE-NOTES*.html /location/of/disk/space/
```

The Release Notes are also available online from <http://www.redhat.com/docs/>.

- Next, make `/location/of/disk/space/` accessible to the installation program via NFS, FTP, or HTTP and verify access from a client.
- For NFS, export the directory by adding an entry to `/etc/exports` to export to a specific system:
`/location/of/disk/space client.ip.address(ro,no_root_squash)`

To export to all machines (not appropriate for all NFS systems), add:

```
/location/of/disk/space *(ro,no_root_squash)
```

Start the NFS daemon (on a Red Hat Enterprise Linux machine, use `/sbin/service nfs start`). If NFS is already running, reload the configuration file (on a Red Hat Enterprise Linux system, use `/usr/bin/service nfs reload`).

Be sure to test the NFS share following the directions in the *Red Hat Enterprise Linux System Administration Guide*.

If the `RedHat/` directory does not appear in the NFS shared directory, the wrong path may have been mounted and/or exported.

- FTP and HTTP installations also support a second type of tree structure. To make it easier to access the contents of the installation CD-ROMs, mount each CD-ROM or ISO image with the following mount point on the FTP or HTTP server (where *X* is the number of the CD-ROM or ISO image):

```
/location/of/disk/space/discX/
```

For example:

```
mount -o loop CD1.iso /location/of/disk/space/disc1/
```

2.4.1. Using ISO Images for NFS Installs

NFS installations can use ISO (or CD-ROM) images rather than copying an entire installation tree. After placing the required ISO images (the binary Red Hat Enterprise Linux CD-ROMs) in a directory, choose to install via NFS. You will then point the installation program at that directory to perform the installation.

Verifying that the ISO images are intact before you attempt an installation will help to avoid problems that are often encountered during an NFS installation. To verify the ISO images are intact prior to performing an installation, use an `md5sum` program (many `md5sum` programs are available for various operating systems). An `md5sum` program should be available on the same server as the ISO images.



Note

ISO images have an `md5sum` embedded in them. To test the checksum integrity of an ISO image, at the installation boot prompt, type (prepend with `elilo` for Itanium systems):

```
linux mediacheck
```

Additionally, if a file called `updates.img` exists in the directory from which you install, then it will be used for installation program updates. Refer to the file `install-methods.txt` in the `anaconda`

RPM package for detailed information on the various ways to install Red Hat Enterprise Linux, as well as how to apply the installation program updates.



Note

You can only have the ISO images for one release and one variant of Red Hat Enterprise Linux in the directory.

2.5. Preparing for a Hard Drive Installation

Hard drive installations require a working Linux system installed and the use of ISO (or CD-ROM) images rather than the entire installation tree.

Hard drive installations only work from ext2 or ext3 file systems.

- Set of CD-ROMs — Create CD-ROM ISO image files from each installation CD-ROMs. For each CD-ROM, execute the following command on a Linux system:

```
dd if=/dev/cdrom of=/tmp/file-name.iso
```

- ISO images — transfer these images to the system to be installed.

Verifying that ISO images are intact before you attempt an installation, helps to avoid problems. To verify the ISO images are intact prior to performing an installation, use an `md5sum` program (many `md5sum` programs are available for various operating systems). An `md5sum` program should be available on the same Linux machine as the ISO images.



Installing Red Hat Enterprise Linux

This chapter explains how to perform a Red Hat Enterprise Linux installation from the CD-ROM, using the graphical, mouse-based installation program. The following topics are discussed:

- Becoming familiar with the installation program's user interface
- Starting the installation program
- Selecting an installation method
- Configuration steps during the installation (language, keyboard, mouse, partitioning, etc.)
- Finishing the installation

3.1. The Graphical Installation Program User Interface

If you have used a *graphical user interface (GUI)* before, you are already familiar with this process; use your mouse to navigate the screens, click buttons, or enter text fields. You can also navigate through the installation using the [Tab] and [Enter] keys.



Note

If you are using an x86 or AMD64 system, and you do not wish to use the GUI installation program, the text mode installation program is also available. To start the text mode installation program, use the following command at the `boot:` prompt:

```
linux text
```

Refer to Section 3.2 *The Text Mode Installation Program User Interface* for a brief overview of text mode installation instructions.

It is highly recommended that installs be performed using the GUI installation program. The GUI installation program offers the full functionality of the Red Hat Enterprise Linux installation program, including LVM configuration which is not available during a text mode installation.

Users who must use the text mode installation program can follow the GUI installation instructions and obtain all needed information.



Note

If you are using an Itanium system, and you do not wish to use the GUI installation program, the text mode installation program is also available. To start the text mode installation program, type the following command at the EFI Shell prompt:

```
elilo linux text
```

3.1.1. A Note about Virtual Consoles

The Red Hat Enterprise Linux installation program offers more than the dialog boxes of the installation process. Several different kinds of diagnostic messages are available to you, in addition to providing a way to enter commands from a shell prompt. The installation program displays these messages on five *virtual consoles*, among which you can switch using a single keystroke combination.

A virtual console is a shell prompt in a non-graphical environment, accessed from the physical machine, not remotely. Multiple virtual consoles can be accessed simultaneously.

These virtual consoles can be helpful if you encounter a problem while installing Red Hat Enterprise Linux. Messages displayed on the installation or system consoles can help pinpoint a problem. Refer to Table 3-1 for a listing of the virtual consoles, keystrokes used to switch to them, and their contents.

Generally, there is no reason to leave the default console (virtual console #7 for graphical installations) unless you are attempting to diagnose installation problems.

Console	Keystrokes	Contents
1	[Ctrl]-[Alt]-[F1]	installation dialog
2	[Ctrl]-[Alt]-[F2]	shell prompt
3	[Ctrl]-[Alt]-[F3]	install log (messages from installation program)
4	[Ctrl]-[Alt]-[F4]	system-related messages
5	[Ctrl]-[Alt]-[F5]	other messages
7	[Ctrl]-[Alt]-[F7]	X graphical display

Table 3-1. Console, Keystrokes, and Contents

3.2. The Text Mode Installation Program User Interface

The Red Hat Enterprise Linux text mode installation program uses a screen-based interface that includes most of the on-screen *widg*ets commonly found on graphical user interfaces. Figure 3-1, and Figure 3-2, illustrate the screens that appear during the installation process.

**Note**

While text mode installations are not explicitly documented, those using the text mode installation program can easily follow the GUI installation instructions and obtain all needed information.

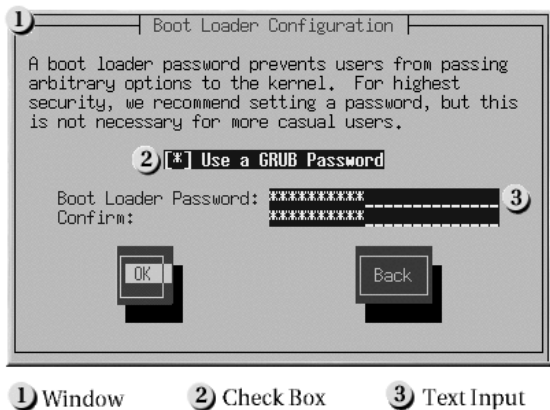


Figure 3-1. Installation Program Widgets as seen in Boot Loader Configuration

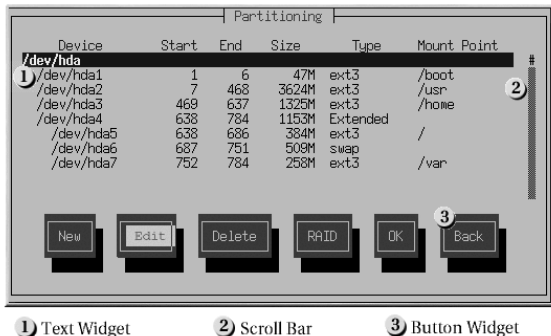


Figure 3-2. Installation Program Widgets as seen in Disk Druid

3.2.1. Using the Keyboard to Navigate

Navigation through the installation dialogs is performed through a simple set of keystrokes. To move the cursor, use the [Left], [Right], [Up], and [Down] arrow keys. Use [Tab], and [Alt]-[Tab] to cycle forward or backward through each widget on the screen. Along the bottom, most screens display a summary of available cursor positioning keys.

To "press" a button, position the cursor over the button (using [Tab], for example) and press [Space] or [Enter]. To select an item from a list of items, move the cursor to the item you wish to select and press [Enter]. To select an item with a checkbox, move the cursor to the checkbox and press [Space] to select an item. To deselect, press [Space] a second time.

Pressing [F12] accepts the current values and proceeds to the next dialog; it is equivalent to pressing the **OK** button.

**Caution**

Unless a dialog box is waiting for your input, do not press any keys during the installation process (doing so may result in unpredictable behavior).

3.3. Starting the Installation Program

To start, boot the installation program. Make sure you have all the resources you need for the installation. If you have already read through Chapter 2 *Steps to Get You Started*, and followed the instructions, you should be ready to begin.

**Note**

Occasionally, some hardware components require a *driver diskette* during the installation. A driver diskette adds support for hardware that is not otherwise supported by the installation program.

3.4. Installing from CD-ROM

To install Red Hat Enterprise Linux from a CD-ROM, choose the **CD-ROM** option and select **OK**. When prompted, insert the Red Hat Enterprise Linux CD into your CD-ROM drive (if you did not boot from the CD). Once the CD is in the CD-ROM drive, select **OK**, and press [Enter].

The installation program then probes your system and attempts to identify your CD-ROM drive. It starts by looking for an IDE (also known as an ATAPI) CD-ROM drive. If found, continue to the next stage of the installation process (refer to Section 3.6 *Language Selection*).

**Note**

To abort the installation process at this time, reboot your machine and then eject the boot diskette or CD-ROM. You can safely cancel the installation at any point before the **About to Install** screen. Refer to Section 3.19 *Preparing to Install* for more information.

If your CD-ROM drive is not detected, and it is a SCSI CD-ROM, the installation program prompts you to choose a SCSI driver. Choose the driver that most closely resembles your adapter. You may specify options for the driver if necessary; however, most drivers detect your SCSI adapter automatically.

**Tip**

A partial list of optional parameters for CD-ROM drives can be found in the *Red Hat Enterprise Linux Reference Guide*, in the *General Parameters and Modules* appendix.

3.4.1. What If the IDE CD-ROM Was Not Found?

If you have an IDE (ATAPI) CD-ROM on an x86 or AMD64 system, but the installation program fails to find your IDE (ATAPI) CD-ROM and asks you what type of CD-ROM drive you have, try the following boot command. Restart the installation, and at the `boot:` prompt enter **linux hdX=cdrom**. Replace the **X** with one of the following letters, depending on the interface the unit is connected to, and whether it is configured as master or slave (also known as primary and secondary):

- a — first IDE controller, master
- b — first IDE controller, slave
- c — second IDE controller, master
- d — second IDE controller, slave

If you have a third and/or fourth controller, continue assigning letters in alphabetical order, going from controller to controller, and master to slave.

3.5. Welcome to Red Hat Enterprise Linux

The **Welcome** screen does not prompt you for any input. Read over the help text in the left panel for additional instructions and information on where to register your Red Hat Enterprise Linux product.

Notice the **Hide Help** button at the bottom left corner of the screen. The help screen is open by default. If you do not want to view the help information, click on **Hide Help** to minimize the help portion of the screen.

Click on the **Next** button to continue.

3.6. Language Selection

Using your mouse, select the language you would prefer to use for the installation.

Selecting the appropriate language also helps target your time zone configuration later in the installation. The installation program tries to define the appropriate time zone based on what you specify on this screen.

Once you select the appropriate language, click **Next** to continue.

3.7. Keyboard Configuration

Using your mouse, select the correct layout type (for example, U.S. English) for the keyboard you would prefer to use for the installation and as the system default .

Once you have made your selection, click **Next** to continue.



Tip

To change your keyboard layout type after you have completed the installation, use the **Keyboard Configuration Tool**.

Type the `redhat-config-keyboard` command in a shell prompt to launch the **Keyboard Configuration Tool**. If you are not root, it prompts you for the root password to continue.

3.8. Mouse Configuration

Choose the correct mouse type for your system. If you cannot find an exact match, choose a mouse type that you are sure is compatible with your system.

To determine your mouse's interface, follow the mouse cable back to where it plugs into your system and use the following diagrams.

If you cannot find a mouse that you are sure is compatible with your system, select one of the **Generic** entries, based on your mouse's number of buttons, and its interface.



Tip

If you have a scroll mouse, select the **Generic - Wheel Mouse** entry (with your proper mouse port) as the compatible mouse type.

If you have a PS/2, USB, or Bus mouse, you do not need to pick a port and device. If you have a serial mouse, choose the correct port and device that your serial mouse is on.

The **Emulate 3 buttons** checkbox allows you to use a two-button mouse as if it had three buttons. In general, the graphical interface (the X Window System) is easier to use with a three-button mouse. If you select this checkbox, you can emulate a third, "middle" button by pressing both mouse buttons simultaneously.

**Tip**

To change your mouse configuration after you have completed the installation, use the **Mouse Configuration Tool**.

Type the `redhat-config-mouse` command in a shell prompt to launch the **Mouse Configuration Tool**. If you are not root, it prompts you for the root password to continue.

To configure your mouse to work as a left-handed mouse, reset the order of the mouse buttons. To do this, after you have booted the system, go to the **Main Menu Button** (on the Panel) => **Preferences** => **Mouse**.

3.9. Disk Partitioning Setup

Partitioning allows you to divide your hard drive into isolated sections, where each section behaves as its own hard drive. Partitioning is particularly useful if you run multiple operating systems.

On this screen, you can choose to perform automatic partitioning, or manual partitioning using **Disk Druid**.

Automatic partitioning allows you to perform an installation without having to partition your drive(s) yourself. If you do not feel comfortable with partitioning your system, it is recommended that you *do not* choose to partition manually and instead let the installation program partition for you.

To partition manually, choose the **Disk Druid** partitioning tool.

**Warning**

The **Red Hat Update Agent** downloads updated packages to `/var/spool/updates/` by default. If you partition the system manually, and create a separate `/var/` partition, be sure to create the partition large enough (3.0 GB or more) to download package updates.

If you chose to manually partition using **Disk Druid**, refer to Section 3.11 *Partitioning Your System*.

**Warning**

If you receive an error after the **Disk Partitioning Setup** phase of the installation saying something similar to

The partition table on device hda was unreadable. To create new partitions it must be initialized, causing the loss of ALL DATA on this drive.

You may not have a partition table on that drive or the partition table on the drive may not be recognizable by the partitioning software used in the installation program.

Users who have used programs such as **EZ-BIOS** have experienced similar problems, causing data to be lost (assuming the data was not backed up before the installation began).

No matter what type of installation you are performing, backups of the existing data on your systems should always be made.

3.10. Automatic Partitioning

Automatic partitioning allows you to have some control concerning what data is removed (if any) from your system. Your options are:

- **Remove all Linux partitions on this system** — select this option to remove only Linux partitions (partitions created from a previous Linux installation). This will not remove other partitions you may have on your hard drive(s) (such as VFAT or FAT32 partitions).
- **Remove all partitions on this system** — select this option to remove all partitions on your hard drive(s) (this includes partitions created by other operating systems such as Windows or NTFS partitions).



Caution

If you select this option, all data on the selected hard drive(s) is removed by the installation program. Do not select this option if you have information that you want to keep on the hard drive(s) where you are installing Red Hat Enterprise Linux.

- **Keep all partitions and use existing free space** — select this option to retain your current data and partitions, assuming you have enough free space available on your hard drive(s).

Using your mouse, choose the hard drive(s) on which you want Red Hat Enterprise Linux to be installed. If you have two or more hard drives, you can choose which hard drive(s) should contain this installation. Unselected hard drives, and any data on them, are not touched.



Note

It is always a good idea to back up any data that you have on your systems. For example, if you are upgrading or creating a dual-boot system, you should back up any data you wish to keep on your hard drive(s). Mistakes do happen and can result in the loss of all your data.

**Caution**

If you have a RAID card, be aware that some BIOSes do not support booting from the RAID card. In cases such as these, the `/boot/` partition must be created on a partition outside of the RAID array, such as on a separate hard drive. An internal hard drive is necessary to use for partition creation with problematic RAID cards.

A `/boot/` partition is also necessary for software RAID setups.

If you have chosen to automatically partition your system, you should select **Review** and manually edit your `/boot/` partition.

To review and make any necessary changes to the partitions created by automatic partitioning, select the **Review** option. After selecting **Review** and clicking **Next** to move forward, the partitions created for you in **Disk Druid** appear. You can make modifications to these partitions if they do not meet your needs.

Click **Next** once you have made your selections to proceed.

3.11. Partitioning Your System

If you chose automatic partitioning and did not select **Review**, skip ahead to Section 3.13 *Network Configuration*.

If you chose automatic partitioning and selected **Review**, you can either accept the current partition settings (click **Next**), or modify the setup using **Disk Druid**, the manual partitioning tool.

At this point, you must tell the installation program where to install Red Hat Enterprise Linux. This is done by defining mount points for one or more disk partitions in which Red Hat Enterprise Linux will be installed. You may also need to create and/or delete partitions at this time.



Note

At a bare minimum, you need an appropriately-sized root partition, and a swap partition equal to twice the amount of RAM you have on the system. Itanium system users will need a `/boot/efi/` partition of approximately 100 MB and of type FAT (VFAT), a swap partition of at least 512 MB, and an appropriately-sized root (`/`) partition.

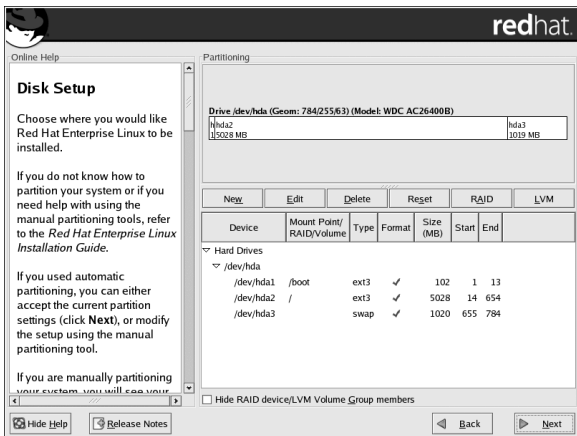


Figure 3-3. Partitioning with Disk Druid on x86 and AMD64 Systems

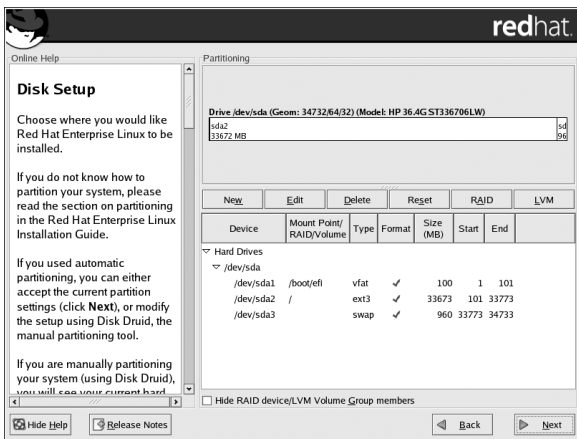


Figure 3-4. Partitioning with Disk Druid on Itanium Systems

The partitioning tool used by the installation program is **Disk Druid**. With the exception of certain esoteric situations, **Disk Druid** can handle the partitioning requirements for a typical installation.

3.11.1. Graphical Display of Hard Drive(s)

Disk Druid offers a graphical representation of your hard drive(s).

Using your mouse, click once to highlight a particular field in the graphical display. Double-click to edit an existing partition or to create a partition out of existing free space.

Above the display, you can review the **Drive** name (such as `/dev/hda`), the **Geom** (which shows the hard disk's geometry and consists of three numbers representing the number of cylinders, heads, and sectors

as reported by the hard disk), and the **Model** of the hard drive as detected by the installation program.

3.11.2. Disk Druid's Buttons

These buttons control **Disk Druid's** actions. They are used to change the attributes of a partition (for example the file system type and mount point) and also to create RAID devices. Buttons on this screen are also used to accept the changes you have made, or to exit **Disk Druid**. For further explanation, take a look at each button in order:

- **New:** Used to request a new partition. When selected, a dialog box appears containing fields (such as mount point and size) that must be filled in.
- **Edit:** Used to modify attributes of the partition currently selected in the **Partitions** section. Selecting **Edit** opens a dialog box. Some or all of the fields can be edited, depending on whether the partition information has already been written to disk.

You can also edit free space as represented in the graphical display to create a new partition within that space. Either highlight the free space and then select the **Edit** button, or double-click on the free space to edit it.

- To make a RAID device, you must first create (or reuse existing) software RAID partitions. Once you have created two or more software RAID partitions, select **Make RAID** to join the software RAID partitions into a RAID device.
- **Delete:** Used to remove the partition currently highlighted in the **Current Disk Partitions** section. You will be asked to confirm the deletion of any partition.
- **Reset:** Used to restore **Disk Druid** to its original state. All changes made will be lost if you **Reset** the partitions.
- **RAID:** Used to provide redundancy to any or all disk partitions. *It should only be used if you have experience using RAID.* To read more about RAID, refer to the *Red Hat Enterprise Linux System Administration Guide*.

To make a RAID device, you must first create software RAID partitions. Once you have created two or more software RAID partitions, select **RAID** to join the software RAID partitions into a RAID device.

- **LVM:** Allows you to create an LVM logical volume. The role of LVM (Logical Volume Manager) is to present a simple logical view of underlying physical storage space, such as a hard drive(s). LVM manages individual physical disks — or to be more precise, the individual partitions present on them. *It should only be used if you have experience using LVM.* To read more about LVM, refer to the *Red Hat Enterprise Linux System Administration Guide*. Note, LVM is only available in the graphical installation program.

To create an LVM logical volume, you must first create partitions of type physical volume (LVM). Once you have created one or more physical volume (LVM) partitions, select **LVM** to create an LVM logical volume.

3.11.3. Partition Fields

Above the partition hierarchy are labels which present information about the partitions you are creating. The labels are defined as follows:

- **Device:** This field displays the partition's device name.
- **Mount Point/RAID/Volume:** A mount point is the location within the directory hierarchy at which a volume exists; the volume is "mounted" at this location. This field indicates where the partition is mounted. If a partition exists, but is not set, then you need to define its mount point. Double-click on the partition or click the **Edit** button.
- **Type:** This field shows the partition's type (for example, ext2, ext3, or vfat).
- **Format:** This field shows if the partition being created will be formatted.
- **Size (MB):** This field shows the partition's size (in MB).
- **Start:** This field shows the cylinder on your hard drive where the partition begins.

- **End:** This field shows the cylinder on your hard drive where the partition ends.

Hide RAID device/LVM Volume Group members: Select this option if you do not want to view any RAID device or LVM Volume Group members that have been created.

3.11.4. Recommended Partitioning Scheme

*Unless you have a reason for doing otherwise, we recommend that you create the following partitions for **Itanium** systems:*

- A `/boot/efi/` partition (100 MB minimum) — the partition mounted on `/boot/efi/` contains all the installed kernels, the `initrd` images, and ELILO configuration files.



Warning

You must create a `/boot/efi/` partition of type VFAT and at least 100 MB in size as the first primary partition.

- A swap partition (512 MB minimum) — swap partitions are used to support virtual memory. In other words, data is written to a swap partition when there is not enough RAM to store the data your system is processing. If you are unsure about what size swap partition to create, make it twice the amount of RAM on your machine (but no larger than 2 GB). It must be of type swap.



Tip

If your partitioning scheme requires a swap partition that is larger than 2 GB, you should create an additional swap partition. For example, if you have 4 GB of RAM, you may want to create two 2 GB swap partitions.

- A `root` partition (900 MB - 5.0 GB) — this is where `/` (the root directory) is located. In this setup, all files (except those stored in `/boot/efi/`) are on the root partition. It must be of type `ext3` or `ext2`.

- A `/var/` partition (3.0 GB or larger) — the `/var/` partition is where variable data files are written. This includes spool directories and files, administrative and logging data, and transient and temporary files. Updates that are applied to Red Hat Enterprise Linux are written to the `/var/` partition.

Unless you have a reason for doing otherwise, we recommend that you create the following partitions for x86 and AMD64 systems:

- A swap partition (at least 256 MB) — swap partitions are used to support virtual memory. In other words, data is written to a swap partition when there is not enough RAM to store the data your system is processing. If you are unsure about what size swap partition to create, make it twice the amount of RAM on your machine, but no more than 2048 MB (or 2 GB). It must be of type swap.

For example, if you have 1 GB of RAM or less, your swap partition should be at least equal to the amount of RAM on your system, up to two times the RAM. For more than 1 GB of RAM, 2 GB of swap is recommended. Creating a large swap space partition can be especially helpful if you plan to upgrade your RAM at a later time.

**Tip**

If your partitioning scheme requires a swap partition that is larger than 2 GB, you should create an additional swap partition. For example, if you have 4 GB of RAM, you may want to create two 2 GB swap partitions.

- A `/boot/` partition (100 MB) — the partition mounted on `/boot/` contains the operating system kernel (which allows your system to boot Red Hat Enterprise Linux, along with files used during the bootstrap process). Due to the limitations of most PC BIOSes, creating a small partition to hold these files is a good idea. For most users, a 100 MB boot partition is sufficient.

**Caution**

If your hard drive is more than 1024 cylinders (and your system was manufactured more than two years ago), you may need to create a `/boot/` partition if you want the `/` (root) partition to use all of the remaining space on your hard drive.

**Caution**

If you have a RAID card, be aware that some BIOSes do not support booting from the RAID card. In cases such as these, the `/boot/` partition must be created on a partition outside of the RAID array, such as on a separate hard drive.

- A `root` partition (350 MB - 5.0 GB) — this is where `/` (the root directory) is located. In this setup, all files (except those stored in `/boot`) are on the root partition.

A 350 MB partition allows you to install a minimal installation, while a 5.0 GB root partition lets you perform a full installation, choosing all package groups.

- A `/var/` partition (3.0 GB or larger) — the `/var/` partition is where variable data files are written. This includes spool directories and files, administrative and logging data, and transient and temporary files. Updates that are applied to Red Hat Enterprise Linux are written to the `/var/` partition.

3.11.5. Adding Partitions

To add a new partition, select the **New** button.

**Note**

You must dedicate at least one partition for this installation, and optionally more.

- **Mount Point:** Enter the partition's mount point. For example, if this partition should be the root partition, enter `/`; enter `/boot` for the `/boot` partition, and so on. You can also use the pull-down menu to choose the correct mount point for your partition.
- **File System Type:** Using the pull-down menu, select the appropriate file system type for this partition. For more information on file system types, refer to Section 3.11.5.1 *File System Types*.
- **Allowable Drives:** This field contains a list of the hard disks installed on your system. If a hard disk's box is highlighted, then a desired partition can be created on that hard disk. If the box is *not* checked, then the partition will *never* be created on that hard disk. By using different checkbox settings, you can have **Disk Druid** place partitions where you need them, or let **Disk Druid** decide where partitions should go.
- **Size (MB):** Enter the size (in megabytes) of the partition. Note, this field starts with 100 MB; unless changed, only a 100 MB partition will be created.
- **Additional Size Options:** Choose whether to keep this partition at a fixed size, to allow it to "grow" (fill up the available hard drive space) to a certain point, or to allow it to grow to fill any remaining hard drive space available.

If you choose **Fill all space up to (MB)**, you must give size constraints in the field to the right of this option. This allows you to keep a certain amount of space free on your hard drive for future use.

- **Force to be a primary partition:** Select whether the partition you are creating should be one of the first four partitions on the hard drive. If unselected, the partition is created as a logical partition.
- **OK:** Select **OK** once you are satisfied with the settings and wish to create the partition.
- **Cancel:** Select **Cancel** if you do not want to create the partition.

3.11.5.1. File System Types

Red Hat Enterprise Linux allows you to create different partition types, based on the file system they will use. The following is a brief description of the different file systems available, and how they can be utilized.

- **ext2** — An ext2 file system supports standard Unix file types (regular files, directories, symbolic links, etc). It provides the ability to assign long file names, up to 255 characters.
- **ext3** — The ext3 file system is based on the ext2 file system and has one main advantage — journaling. Using a journaling file system reduces time spent recovering a file system after a crash as there is no need to `fsck`¹ the file system. The ext3 file system is selected by default and is highly recommended.
- **physical volume (LVM)** — Creating one or more physical volume (LVM) partitions allows you to create an LVM logical volume. LVM can improve performance when using physical disks. For more information regarding LVM, refer to the *Red Hat Enterprise Linux System Administration Guide*.
- **software RAID** — Creating two or more software RAID partitions allows you to create a RAID device. For more information regarding RAID, refer to the chapter *RAID (Redundant Array of Independent Disks)* in the *Red Hat Enterprise Linux System Administration Guide*.
- **swap** — Swap partitions are used to support virtual memory. In other words, data is written to a swap partition when there is not enough RAM to store the data your system is processing. Refer to the *Red Hat Enterprise Linux System Administration Guide* for additional information.
- **vfat** — The VFAT file system is a Linux file system that is compatible with Microsoft Windows long filenames on the FAT file system. This file system must be used for the `/boot/efi/` partition on Itanium systems.

3.11.6. Editing Partitions

To edit a partition, select the **Edit** button or double-click on the existing partition.

1. The `fsck` application is used to check the file system for metadata consistency and optionally repair one or more Linux file systems.

**Note**

If the partition already exists on your hard disk, you can only change the partition's mount point. To make any other changes, you must delete the partition and recreate it.

3.11.7. Deleting a Partition

To delete a partition, highlight it in the **Partitions** section and click the **Delete** button. Confirm the deletion when prompted.

For further installation instructions for x86 and AMD64 systems, skip to Section 3.12 *x86 and AMD64 Boot Loader Configuration*.

For further installation instructions for Itanium systems, skip to Section 3.13 *Network Configuration*.

3.12. x86 and AMD64 Boot Loader Configuration

To boot the system without a boot diskette, you usually need to install a boot loader. A boot loader is the first software program that runs when a computer starts. It is responsible for loading and transferring control to the operating system kernel software. The kernel, in turn, initializes the rest of the operating system.

The x86-based installation program provides two boot loaders for you to choose from, GRUB and LILO. On AMD64-based systems, only the GRUB boot loader is provided.

GRUB (GRand Unified Bootloader), which is installed by default, is a very powerful boot loader. GRUB can load a variety of free operating systems, as well as proprietary operating systems with chain-loading (the mechanism for loading unsupported operating systems, such as DOS or Windows, by loading another boot loader).

LILO (Linux LOader) is a versatile boot loader for Linux. It does not depend on a specific file system, can boot Linux kernel images from floppy diskettes and hard disks, and can even boot other operating systems.

**Note**

LILO does not apply as a boot loader option to users of AMD64 systems.

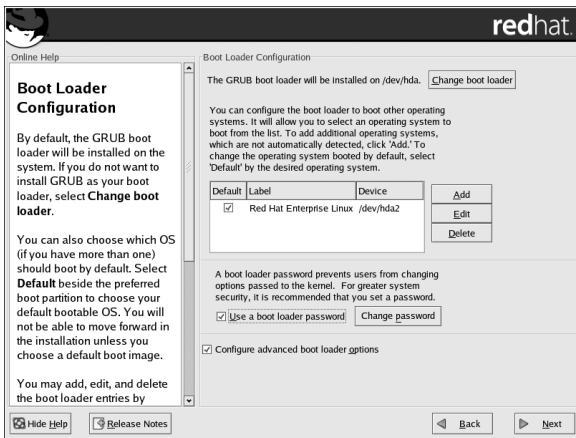


Figure 3-5. Boot Loader Configuration

If you do not want to install GRUB as your boot loader, click **Change boot loader**. You can then choose to install LILO or choose not to install a boot loader at all.

If you already have a boot loader that can boot Red Hat Enterprise Linux and do not want to overwrite your current boot loader, choose **Do not install a boot loader** by clicking on the **Change boot loader** button.



Caution

If you choose not to install GRUB or LILO for any reason, you will not be able to boot the system directly, and you must use another boot method (such as a commercial boot loader application). Use this option

only if you are sure you have another way of booting the system!

Every bootable partition is listed, including partitions used by other operating systems. The partition holding the system's root file system will have a **Label** of `Red Hat Enterprise Linux` (for GRUB) or `linux` (for LILO). Other partitions may also have boot labels. To add or change the boot label for other partitions that have been detected by the installation program, click once on the partition to select it. Once selected, you can change the boot label by clicking the **Edit** button.

Select **Default** beside the preferred boot partition to choose your default bootable OS. You will not be able to move forward in the installation unless you choose a default boot image.



Note

The **Label** column lists what you must enter at the boot prompt, in non-graphical boot loaders, in order to boot the desired operating system.

Once you have loaded the GRUB boot screen, use the arrow keys to choose a boot label or type [e] for edit. You will be presented with a list of items in the configuration file for the boot label you have selected.

At the graphical LILO screen, press [Ctrl]-[x] to exit to the `boot:` prompt. If you forget the boot labels defined on your system, you can always press [Tab] at the prompt to display a list of defined boot labels.

Boot loader passwords provide a security mechanism in an environment where physical access to your server is available.

If you are installing a boot loader, you should create a password to protect your system. Without a boot loader password, users with access to your system can pass options to the kernel which can compromise your system security. With a boot loader password in place, the password must first be entered before selecting any non-standard boot options.

If you choose to use a boot loader password to enhance your system security, be sure to select the checkbox labeled **Use a boot loader password**.

Once selected, enter a password and confirm it.

To configure more advanced boot loader options, such as changing the drive order or passing options to the kernel, be sure **Configure advanced boot loader options** is selected before clicking **Next**.

3.12.1. Advanced Boot Loader Configuration

Now that you have chosen which boot loader to install, you can also determine where you want the boot loader to be installed. You may install the boot loader in one of two places:

- The master boot record (MBR) — This is the recommended place to install a boot loader, unless the MBR already starts another operating system loader, such as System Commander. The MBR is a special area on your hard drive that is automatically loaded by your computer's BIOS, and is the earliest point at which the boot loader can take control of the boot process. If you install it in the MBR, when your machine boots, GRUB (or LILO) will present a boot prompt. You can then boot Red Hat Enterprise Linux or any other operating system that you have configured the boot loader to boot.
- The first sector of your boot partition — This is recommended if you are already using another boot loader on your system. In this case, your other boot loader will take control first. You can then configure that boot loader to start GRUB (or LILO), which will then boot Red Hat Enterprise Linux.

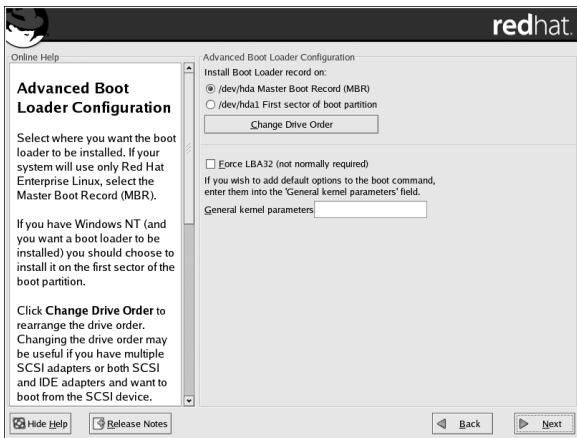


Figure 3-6. Boot Loader Installation



Caution

If you have a RAID card, be aware that some BIOSes do not support booting from the RAID card. In cases such as these, the boot loader *should not* be installed on the MBR of the RAID array. Rather, the boot loader should be installed on the MBR of the same drive as the `/boot/` partition was created.

If your system will use only Red Hat Enterprise Linux, you should choose the MBR.

Click the **Change Drive Order** button if you would like to rearrange the drive order or if your BIOS does not return the correct drive order. Changing the drive order may be useful if you have multiple SCSI adapters, or both SCSI and IDE adapters, and you want to boot from the SCSI device.

The **Force LBA32 (not normally required)** option allows you to exceed the 1024 cylinder limit for the `/boot/` partition. If you have a system which supports the LBA32 extension for booting operating systems above the 1024 cylinder limit, and you want to place your `/boot/` partition above cylinder 1024, you should select this option.

**Tip**

While partitioning your hard drive, keep in mind that the BIOS in some older systems cannot access more than the first 1024 cylinders on a hard drive. If this is the case, leave enough room for the `/boot` Linux partition on the first 1024 cylinders of your hard drive to boot Linux. The other Linux partitions can be after cylinder 1024.

In `parted`, 1024 cylinders equals 528MB. For more information, refer to:

<http://www.pcguide.com/ref/hdd/bios/sizeMB504-c.html>

To add default options to the boot command, enter them into the **Kernel parameters** field. Any options you enter are passed to the Linux kernel every time it boots.

3.12.2. Rescue Mode

Rescue mode provides the ability to boot a small Red Hat Enterprise Linux environment entirely from a diskette, CD-ROM, or some other boot method instead of the system's hard drive. There may be times when you are unable to get Red Hat Enterprise Linux running completely enough to access files on your system's hard drive. Using rescue mode, you can access the files stored on your system's hard drive,

even if you cannot actually run Red Hat Enterprise Linux from that hard drive. If you need to use rescue mode, there are several options available to you.

- Using the CD-ROM to boot an x86 or AMD64 system, type **linux rescue** at the installation boot prompt. Itanium users should type **elilo linux rescue** to enter rescue mode.
- By booting your system from an installation boot diskette made from the `bootdisk.img` image. This method requires that the Red Hat Enterprise Linux CD-ROM #1 be inserted as the rescue image or that the rescue image be on the hard drive as an ISO image. Once you have booted using this diskette, type **linux rescue** at the `boot:` prompt. Itanium users should type **elilo linux rescue** to enter rescue mode.

For additional information, refer to the *Red Hat Enterprise Linux System Administration Guide*.

3.12.3. Alternative Boot Loaders

If you do not wish to use a boot loader, you have several alternatives:

LOADLIN

You can load Linux from MS-DOS. Unfortunately, this requires a copy of the Linux kernel (and an initial RAM disk, if you have a SCSI adapter) to be available on an MS-DOS partition. The only way to accomplish this is to boot your Red Hat Enterprise Linux system using some other method (for example, from a boot diskette) and then copy the kernel to an MS-DOS partition. LOADLIN is available from

```
ftp://metalab.unc.edu/pub/Linux/system/boot/dualboot/
```

and associated mirror sites.

SYSLINUX

SYSLINUX is an MS-DOS program very similar to LOADLIN. It is also available from

```
ftp://metalab.unc.edu/pub/Linux/system/boot/loaders/
```


and associated mirror sites.

Commercial boot loaders

You can load Linux using commercial boot loaders. For example, System Commander and Partition Magic are able to boot Linux (but still require GRUB or LILO to be installed in your Linux root partition).



Note

Boot loaders such as LOADLIN and System Commander are considered to be third-party boot loaders and are not supported by Red Hat.

3.12.4. SMP Motherboards, GRUB, and LILO

This section is specific to SMP motherboards only. SMP, short for Symmetric Multiprocessing, is a computer architecture providing fast performance by making multiple CPUs available to complete individual processes simultaneously (multiprocessing).

If the installation program detects an SMP motherboard on your system, it will automatically create two boot loader entries.



Note

Intel® Pentium® 4 systems with hyperthreading will have an SMP kernel installed by default.

The two GRUB entries will be Red Hat Enterprise Linux (*kernel version*) and Red Hat Enterprise Linux (*kernel version-smp*). The Red Hat Enterprise Linux (*kernel version-smp*) will boot by default. However, if you have trouble with the SMP kernel, you can elect to boot the Red Hat Enterprise Linux (*kernel version*) entry instead. You will retain all the functionality as before, but you will only be operating with a single processor.

The two LILO entries will be `linux` and `linux-up`. The `linux` entry will boot by default. However, if you have trouble with the SMP kernel, you can elect to boot the `linux-up` entry instead. You will retain all the functionality as before, but you will only be operating with a single processor.

3.13. Network Configuration

If you do not have a network device this screen is not shown. Skip ahead to Section 3.14 *Firewall Configuration*.

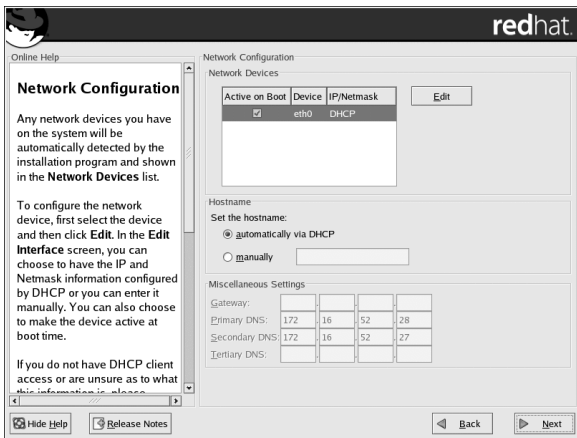


Figure 3-7. Network Configuration

The installation program automatically detects any network devices you have and display them in the **Network Devices** list.

Once you have selected a network device, click **Edit**. From the **Edit Interface** pop-up screen, you can choose to configure the IP address and Netmask of the device via DHCP (or manually if DHCP is not selected) and you can choose to activate the device at boot time. If you select **Activate on boot**, your network interface is started when you boot. If you do not have DHCP client access or you are unsure what to provide here, please contact your network administrator.

**Note**

Do not use the numbers as seen in this sample configuration. These values will not work for your own network configuration. If you are not sure what values to enter, contact your network administrator for assistance.

If you have a hostname (fully qualified domain name) for the network device, you can choose to have DHCP (Dynamic Host Configuration Protocol) automatically detect it or you can manually enter the hostname in the field provided.

Finally, if you entered the IP and Netmask information manually, you may also enter the Gateway address and the Primary, Secondary, and Tertiary DNS addresses.

**Tip**

Even if your computer is not part of a network, you can enter a hostname for your system. If you do not take this opportunity to enter a name, your system will be known as `localhost`.

**Tip**

To change your network configuration after you have completed the installation, use the **Network Administration Tool**.

Type the `redhat-config-network` command in a shell prompt to launch the **Network Administration Tool**. If you are not root, it prompts you for the root password to continue.

3.14. Firewall Configuration

Red Hat Enterprise Linux offers firewall protection for enhanced system security. A firewall exists between your computer and the network, and determines which resources on your computer remote users on the network can access. A properly configured firewall can greatly increase the security of your system.

Choose the appropriate security level for your system.

No firewall

No firewall provides complete access to your system and does no security checking. Security checking is the disabling of access to certain services. This should only be selected if you are running on a trusted network (not the Internet) or plan to do more firewall configuration later.

Enable firewall

If you choose **Enable firewall**, connections are not accepted by your system (other than the default settings) that are not explicitly defined by you. By default, only connections in response to out-bound requests, such as DNS replies or DHCP requests, are allowed. If access to services running on this machine is needed, you can choose to allow specific services through the firewall.

If you are connecting your system to the Internet, but do not plan to run a server, this is the safest choice.

Next, select which services, if any, should be allowed to pass through the firewall.

Enabling these options allow the specified services to pass through the firewall. Note, these services may *not* be installed on the system by default. Make sure you choose to enable any options that you may need.

WWW (HTTP)

The HTTP protocol is used by Apache (and by other Web servers) to serve webpages. If you plan on making your Web server publicly available, enable this option. This option is not required for

viewing pages locally or for developing webpages. You must install the `httpd` package if you want to serve webpages.

Enabling **WWW (HTTP)** does not open a port for HTTPS. To enable HTTPS, specify it in the **Other ports** field.

FTP

The FTP protocol is used to transfer files between machines on a network. If you plan on making your FTP server publicly available, enable this option. You must install the `vsftpd` package for this option to be useful.

SSH

Secure *SHell* (SSH) is a suite of tools for logging in to and executing commands on a remote machine. If you plan to use SSH tools to access your machine through a firewall, enable this option. You need to have the `openssh-server` package installed in order to access your machine remotely, using SSH tools.

Telnet

Telnet is a protocol for logging in to remote machines. Telnet communications are unencrypted and provide no security from network snooping. Allowing incoming Telnet access is not recommended. To allow inbound Telnet access, you must install the `telnet-server` package.

Mail (SMTP)

If you want to allow incoming mail delivery through your firewall, so that remote hosts can connect directly to your machine to deliver mail, enable this option. You do not need to enable this if you collect your mail from your ISP's server using POP3 or IMAP, or if you use a tool such as `fetchmail`. Note that an improperly configured SMTP server can allow remote machines to use your server to send spam.

You can allow access to ports which are not listed here by listing them in the **Other ports** field. Use the following format: **port:protocol**. For example, if you want to allow IMAP access through

your firewall, you can specify `imap:tcp`. You can also explicitly specify numeric ports; to allow UDP packets on port 1234 through the firewall, enter `1234:udp`. To specify multiple ports, separate them with commas.

Finally, select any devices should allow access to your system for all traffic from that device.

Selecting any of these trusted devices excludes them from the firewall rules. For example, if you are running a local network, but are connected to the Internet via a PPP dialup, you can check `eth0` and any traffic coming from your local network is allowed. Selecting `eth0` as trusted means all traffic over the Ethernet is allowed, but the `ppp0` interface is still firewalled. If you want to restrict traffic on an interface, leave it unchecked.

It is not recommended that you make any device that is connected to public networks, such as the Internet, a trusted device.

**Tip**

To change your security level configuration after you have completed the installation, use the **Security Level Configuration Tool**.

Type the `redhat-config-securitylevel` command in a shell prompt to launch the **Security Level Configuration Tool**. If you are not root, it prompts you for the root password to continue.

3.15. Language Support Selection

You can install and support multiple languages for use on your system.

You must select a language to use as the default language. The default language is the language used on the system once the installation is complete. If you choose to install other languages during this installation, you can change your default language after the installation.

If you are only going to use one language on your system, selecting only that language saves significant disk space. The default language is the language you selected to use during the installation.

**Caution**

If you select only one language, you can only use that specified language after the installation is complete.

To use more than one language on your system, choose specific languages to be installed or select all languages to have all available languages installed on your Red Hat Enterprise Linux system.

Use the **Reset** button to cancel your selections. Resetting reverts to the default; only the language you selected for use during the installation is installed.

**Tip**

To change the language configuration after you have completed the installation, use the **Language Configuration Tool**.

Type the `redhat-config-language` command in a shell prompt to launch the **Language Configuration Tool**. If you are not root, it prompts you for the root password to continue.

3.16. Time Zone Configuration

You can set your time zone by selecting your computer's physical location or by specifying your time zone's offset from Universal Time, Coordinated (UTC).

Notice the two tabs at the top of the screen. The first tab allows you to configure your time zone by your location.

On the interactive map, you can also click on a specific city, which is marked by a yellow dot; a red **X** appears indicating your selection. You can also scroll through a list and choose a time zone.

The second tab allows you to specify a UTC offset. The tab displays a list of offsets to choose from, as well as an option to set daylight saving time.

On both tabs, you can select **System Clock uses UTC**. Please select this if you know that your system is set to UTC.

**Tip**

To change your time zone configuration after you have completed the installation, use the **Time and Date Properties Tool**.

Type the `redhat-config-date` command in a shell prompt to launch the **Time and Date Properties Tool**. If you are not root, it prompts you for the root password to continue.

To run the **Time and Date Properties Tool** as a text-based application, use the command `timeconfig`.

3.17. Set Root Password

Setting up a root account and password is one of the most important steps during your installation. Your root account is similar to the administrator account used on Windows NT machines. The root account is used to install packages, upgrade RPMs, and perform most system maintenance. Logging in as root gives you complete control over your system.

**Note**

The root user (also known as the superuser) has complete access to the entire system; for this reason, logging in as the root user is best done *only* to perform system maintenance or administration.

Use the root account only for system administration. Create a non-root account for your general use and `su -` to root when you need to fix something quickly. These basic rules minimize the chances of a typo or an incorrect command doing damage to your system.

**Tip**

To become root, type `su -` at the shell prompt in a terminal window and then press [Enter]. Then, enter the root password and press [Enter].

The installation program prompts you to set a root password² for your system. *You cannot proceed to the next stage of the installation process without entering a root password.*

The root password must be at least six characters long; the password you type is not echoed to the screen. You must enter the password twice; if the two passwords do not match, the installation program asks you to enter them again.

You should make the root password something you can remember, but not something that is easy for someone else to guess. Your name, your phone number, *qwerty*, *password*, *root*, *123456*, and *anteater* are all examples of bad passwords. Good passwords mix numerals with upper and lower case letters

2. A root password is the administrative password for your Red Hat Enterprise Linux system. You should only log in as root when needed for system maintenance. The root account does not operate within the restrictions placed on normal user accounts, so changes made as root can have implications for your entire system.

and do not contain dictionary words: *Aard387vark* or *420BMttNT*, for example. Remember that the password is case-sensitive. If you write down your password, keep it in a secure place. However, it is recommended that you do not write down this or any password you create.



Note

Do not use one of the example passwords offered in this manual. Using one of these passwords could be considered a security risk.



Tip

To change your root password after you have completed the installation, use the **Root Password Tool**.

Type the `redhat-config-rootpassword` command in a shell prompt to launch the **Root Password Tool**. If you are not root, it prompts you for the root password to continue.

3.18. Package Group Selection

After your partitions have been selected and configured for formatting, you are ready to select packages for installation.

First, a screen appears that details the default package set for your Red Hat Enterprise Linux installation. This screen varies depending on the version of Red Hat Enterprise Linux you are installing.

To customize your package set further, select **Customize the set of packages to be installed** option on the screen. Clicking **Next** takes you to the **Package Group Selection** screen.

If you choose to accept the current package list, skip ahead to Section 3.19 *Preparing to Install*.

You can select package groups, which group components together according to function (for example, **X Window System** and **Editors**), individual packages, or a combination of the two.



Note

Users of AMD64 and Itanium systems who want support for developing or running 32-bit applications are encouraged to select the **Compatibility Arch Support** and **Compatibility Arch Development Support** packages to install architecture specific support for their systems.

To select a component, click on the checkbox beside it.

Select each component you wish to install. Selecting **Everything** (at the end of the component list) installs all packages included with Red Hat Enterprise Linux.

Once a package group has been selected, click on **Details** to view which packages will be installed by default, and to add or remove optional packages from that group.

3.19. Preparing to Install

A screen preparing you for the installation of Red Hat Enterprise Linux now appears.

For your reference, a complete log of your installation can be found in `/root/install.log` once you reboot your system.



If, for some reason, you would rather not continue with the installation process, this is your last opportunity to safely cancel the process and reboot your machine. Once you press the **Next** button, partitions will be written and packages will be installed. If you wish to abort the installation, you should reboot now before any existing information on any hard drive is rewritten.

To cancel this installation process, press your computer's Reset button or use the [Control]-[Alt]-[Delete] key combination to restart your machine.

3.20. Installing Packages

At this point there is nothing left for you to do until all the packages have been installed. How quickly this happens depends on the number of packages you have selected and your computer's speed.

3.21. Video Card Configuration

The installation program now presents a list of video cards for you to choose from.

If you decided to install the X Window System packages, you now have the opportunity to configure an X server for your system. If you did not choose to install the X Window System packages, skip ahead to Section 3.19 *Preparing to Install*.

If your video card does not appear on the list, X may not support it. However, if you have technical knowledge about your card, you may choose **Unlisted Card** and attempt to configure it by matching your card's video chipset with one of the available X servers.

Next, enter the amount of video memory installed on your video card. If you are not sure, please consult the documentation accompanying your video card. You will not damage your video card by choosing more memory than is available, but the X server may not start correctly if you do.

If you decide that the values you have selected are incorrect, you can click the **Restore original values** button to return to the suggested settings.

You can also select **Skip X Configuration** if you would rather configure X after the installation or not at all.

**Tip**

To change your X configuration after you have completed the installation, use the **X Configuration Tool**.

Type the `redhat-config-xfree86` command in a shell prompt to launch the **X Configuration Tool**. If you are not root, it prompts you for the root password to continue.

3.22. X Configuration — Monitor and Customization

To complete X configuration, you must configure your monitor and customize your X settings.

To skip X configuration, go to Section 3.23 *Installation Complete*.

3.22.1. Configuring Your Monitor

The installation program presents you with a list of monitors to select from. From this list, you can either use the monitor that is automatically detected for you, or choose another monitor.

**Note**

If you are installing Red Hat Enterprise Linux on a laptop with an LCD screen, you should select the most appropriate **Generic LCD** model available.

If your monitor does not appear on the list, select the most appropriate **Generic CRT** or **Generic LCD** model available. If you select a **Generic CRT** or **Generic LCD** monitor, the installation program suggests horizontal and vertical sync ranges. These values are generally available in the documentation which accompanies your monitor, or from your monitor's vendor or manufacturer; please check your documentation to make sure these values are set correctly.

**Caution**

Do not select a monitor *similar* to your monitor unless you are certain that the monitor you are selecting does not exceed the capabilities of your monitor. Doing so may overclock your monitor and damage or destroy it.

The horizontal and vertical ranges that the installation program suggests for the selected monitor are also displayed below the list of monitors.

If you decide that your monitor selection or the horizontal and vertical ranges are incorrect, you can click the **Restore original values** button to return to the original suggested settings.

Click **Next** when you have finished configuring your monitor.

3.22.2. Custom Configuration

Choose the correct color depth and resolution for your X configuration.

You can also choose whether you want to boot your system into a graphical or text environment once the installation is complete. Unless you have special needs, booting into a graphical environment (similar to a Windows environment) is recommended. If you choose to boot into a text environment, a command prompt (similar to a DOS environment) appears.

**Tip**

To change your X configuration after you have completed the installation, use the **X Configuration Tool**.

Type the `redhat-config-xfree86` command in a shell prompt to launch the **X Configuration Tool**. If you are not root, it prompts you for the root password to continue.

3.23. Installation Complete

Congratulations! Your Red Hat Enterprise Linux 3 installation is now complete!

The installation program prompts you to prepare your system for reboot. Remember to remove any installation media (diskette in the diskette drive or CD in the CD-ROM drive) if they are not ejected automatically upon reboot.

After your computer's normal power-up sequence has completed, the graphical boot loader prompt appears at which you can do any of the following things:

- Press [Enter] — causes the default boot entry to be booted.
- Select a boot label, followed by [Enter] — causes the boot loader to boot the operating system corresponding to the boot label. (Press [?] or [Tab] at LILO's text mode boot loader prompt for a list of valid boot labels.)

- Do nothing — after the boot loader's timeout period, (by default, five seconds) the boot loader automatically boots the default boot entry.

Do whatever is appropriate to boot Red Hat Enterprise Linux. One or more screens of messages should scroll by. Eventually, a `login:` prompt or a GUI login screen (if you installed the X Window System and chose to start X automatically) appears.

The first time you start your Red Hat Enterprise Linux machine in run level 5 (the graphical run level), the **Setup Agent** is presented, which guides you through the Red Hat Enterprise Linux configuration. Using this tool, you can set your system time and date, install software, register your machine with Red Hat Network, and more. The **Setup Agent** lets you configure your environment at the beginning, so that you can get started using your Red Hat Enterprise Linux system quickly.

If you are not sure what to do next, we suggest you begin with the other Red Hat Enterprise Linux manuals available online or on the Red Hat Enterprise Linux Documentation CD included with your Red Hat Enterprise Linux product.

HTML, PDF, and RPM versions of the manuals are available on the Red Hat Enterprise Linux Documentation CD and online at <http://www.redhat.com/docs/>.



Note

Although this manual reflects the most current information possible, read the *Red Hat Enterprise Linux Release Notes* for information that may not have been available prior to our documentation being finalized. They can be found on the Red Hat Enterprise Linux CD #1 and online at <http://www.redhat.com/docs/>.

If you are a more experienced user looking for information on administration topics, you may find the *Red Hat Enterprise Linux Reference Guide* to be more helpful.

For an overview of system administration, refer to the *Red Hat Enterprise Linux Introduction to System Administration*. If you are looking for information on system configuration, you may find the *Red Hat Enterprise Linux System Administration Guide* to be helpful.

If you are looking for information on securing your system, refer to the *Red Hat Enterprise Linux Security Guide*.

Do not forget to register for the benefits you are entitled to as a Red Hat customer. Registration enables access to the Red Hat Services you have purchased, such as technical support and Red Hat Network.

To register your product, go to:

<http://www.redhat.com/apps/activate/>

3.24. Itanium Systems — Booting Your Machine and Post-Installation Setup

This section describes how to boot your Itanium into Red Hat Enterprise Linux and how to set your EFI console variables so that Red Hat Enterprise Linux is automatically booted when the machine is powered on.

After you reboot your system at the end of the installation program, type the following command to boot into Red Hat Enterprise Linux:

```
elilo
```

After you type `elilo`, the default kernel listed in the `/boot/efi/elilo.conf` configuration file is loaded. (The first kernel listed in the file is the default.)

If you want to load a different kernel, type the label name of the kernel from the file `/boot/efi/elilo.conf` after the `elilo` command. For example, to load the kernel named `linux`, type:

```
elilo linux
```

If you do not know the names of the installed kernels, you can view the `/boot/efi/elilo.conf` file in EFI with the following instructions:

1. At the `Shell>` prompt, change devices to the system partition (mounted as `/boot/efi` in Linux). For example, if `fs0` is the system boot partition, type `fs0`: at the EFI Shell prompt.
2. Type `ls` at the `fs0:\>` to make sure you are in the correct partition.
3. Then type:

```
Shell>type elilo.conf
```

This command displays the contents of the configuration file. Each stanza contains a line beginning with `label` followed by a label name for that kernel. The label name is what you type after `elilo` to boot the different kernels.

3.24.1. Post-Installation Boot Loader Options

In addition to specifying a kernel to load, you can also enter other boot options such as `single` for single user mode or `mem=1024M` to force Red Hat Enterprise Linux to use 1024 MB of memory. To pass options to the boot loader, enter the following at the EFI Shell prompt (replace `linux` with the label name of the kernel you want to boot and `option` with the boot options you want to pass to the kernel):

```
elilo linux option
```

3.24.2. Booting Red Hat Enterprise Linux Automatically

After installing Red Hat Enterprise Linux you can type `elilo` and any boot options at the EFI Shell prompt each time you wish to boot your Itanium system. However, if you wish to configure your system to boot into Red Hat Enterprise Linux automatically, you need to configure the **EFI Boot Manager**.

To configure the **EFI Boot Manager** (may vary slightly depending on your hardware):

1. Boot the Itanium system and choose **Boot option maintenance menu** from the **EFI Boot Manager** menu.
2. Choose **Add a Boot Option** from the Main Menu.
3. Select the system partition that is mounted as `/boot/efi/` in Linux.
4. Select the `elilo.efi` file.
5. At the `Enter New Description:` prompt, type **Red Hat Enterprise Linux 3**, or any name that you want to appear on the **EFI Boot Manager** menu.
6. At the `Enter Boot Option Data Type` prompt, enter **N** for **No Boot Option** if you do not want to pass options to the ELILO boot loader. This option works for most cases. If you want to pass options to the boot loader, you can configure it in the `/boot/efi/elilo.conf` configuration file instead.
7. Answer **Yes** to the `Save changes to NVRAM` prompt. This returns you to the **EFI Boot Maintenance Manager** menu.
8. Next, you want to make the **Red Hat Enterprise Linux 3** menu item the default. A list of boot options appears. Move the **Red Hat Enterprise Linux 3** menu item up to the top of the list by selecting it with the arrow keys and pressing the `[u]` key to move it up the list. You can move items down the list by selecting it and pressing the `[d]` key. After changing the boot order, choose **Save changes to NVRAM**. Choose **Exit** to return to the Main Menu.
9. Optionally, you can change to boot timeout value by choosing **Set Auto Boot TimeOut => Set Timeout Value** from the Main Menu.

10. Return to the **EFI Boot Manager** by selecting **Exit**.

3.24.2.1. Using a Startup Script

It is recommended that you configure the ELILO Boot Manager to boot Red Hat Enterprise Linux automatically. However, if you require additional commands to be executed before starting the ELILO boot loader, you can create a startup script named `startup.nsh`. The last command should be `elilo` to boot into Linux.

The `startup.nsh` script should be in the `/boot/efi` partition (`/boot/efi/startup.nsh`) and contain the following text:

```
echo -off
your set of commands
elilo
```

If you want to pass options to the boot loader (refer to Section 3.24.1 *Post-Installation Boot Loader Options*) add them after **elilo**.

You can either create this file after booting into Red Hat Enterprise Linux or use the editor built into the EFI shell. To use the EFI shell, at the `Shell>` prompt, change devices to the system partition (mounted as `/boot/efi` in Linux). For example, if `fs0` is the system boot partition, type `fs0:` at the EFI Shell prompt. Type `ls` to make sure you are in the correct partition. Then type `edit startup.nsh`. Type the contents of the file and save it.

The next time the system boots, EFI detects the `startup.nsh` file and use it to boot the system. To stop EFI from loading the file, type `[Ctrl]-[c]`. This aborts the process, and returns you to the EFI shell prompt.

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Colophon

The manuals are written in DocBook SGML v4.1 format. The HTML and PDF formats are produced using custom DSSSL stylesheets and custom jade wrapper scripts. The DocBook SGML files are written in **Emacs** with the help of PSGML mode.

Garrett LeSage created the admonition graphics (note, tip, important, caution, and warning). They may be freely redistributed with the Red Hat documentation.

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