

CHAPTER 3

Installing Fedora

This chapter shows you how to get a basic installation of Fedora up and running. You will learn how to start installation, as well as specify certain configuration options during the install. Before you even insert the disc, we will take a look at some considerations you need to think about that will affect how you install Fedora. It is impossible to take you through every single variation of the install, but you will get a step-by-step guide of a typical installation, including how to log in to your new system and shut down or reboot the system.

Before You Begin the Installation

Installing a new operating system is a major event and you should make sure that you have properly thought through what is going to take place. The first thing you should consider is how the hardware will be affected by the software that you propose to install. Although Fedora runs well on an extremely wide variety of hardware, it is worthwhile checking out your hardware components because there may be a banana peel waiting for you to slip up on. The following sections provide some areas for you to investigate and think about, and may even save you hours of frustration when something goes wrong. The sections are designed to complement the ideas and checklists presented in Chapter 2, “Preparing to Install Fedora.”

You start by researching and documenting your hardware. This information will prove helpful later on during the installation.

Research Your Hardware Specifications

At the absolute minimum you should know the basics of your system, such as how much RAM you have installed,

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what type of mouse, keyboard and importantly the type of monitor you have. Knowing the storage capacity of your hard drive is also important because it helps you plan how to divide it up for Fedora. It is also a good idea to find out whether you are using SATA drivers, or the more traditional PATA drives. A small detail such as whether your mouse uses the USB or PS/2 interface can ensure proper pointer configuration—something that should happen without fail, but you will be glad you know if something goes wrong! The more information you have, the better prepared you are for any problems.

Use the checklist shown in Table 2.2 in Chapter 2 to inventory or at least record some basic features of your system. Some items you need to know include the amount of installed memory, size of your hard drive, type of mouse, capabilities of the display monitor (such as maximum resolution), and number of installed network interfaces (if any).

Choose an Installation Type

You should also decide what the machine that you are installing Fedora on will be used for. When you know this, you are in a better position to specify packages or even leave out extraneous packages. It can also help you decide how you should slice up your hard drive to work with Fedora.

For convenience, the Fedora installer offers quick presets for a personal desktop, workstation, and server installation. Each type installs a set of preselected software libraries and applications. Use the custom installation option to select individual software packages and fine-tune your software selection. Refer to Chapter 2 for details and hardware requirements for these installs.

NOTE

Although you can support nearly any operation (such as a development workstation or server) by installing all the software included with this book's DVD, this approach generally is not a good idea unless you are testing new hardware or learning how to use Linux at home. The reason for this is that installing extraneous software not relevant to support specific operations, especially in a business or production environment, can introduce security risks.

Choose Software Installation Options

Most new users of Fedora may be tempted to go ahead and install all of the available software so they can explore their options. However, this is not necessarily a good idea particularly from a security standpoint. The more software and server software you have installed, the more potential inroads you provide to your system through any vulnerabilities. The best approach is to decide what you intend to use your system for and choose appropriate software to match. When the system is up and running, you can rely on either `pirut` or `yum` depending on whether you prefer nice GUI programs or using the command-line. Using these two tools allows you to deflect any dependency problems and the tools are pretty straightforward.

Of course you do need to give due consideration to your hardware when you choose your software packages. After all, it is a bit much to expect a multimedia system to run at an acceptable speed on a Pentium-based system. Such a system could instead be used as a file server or even a print server, two possible functions that do not require a window manager to be running. Likewise, if you are lucky enough to be running dual (or even a quad-core PowerMac), you might want to take full advantage of the processing power. Giving thought to the software and the context in which it is installed enables you to get the most out of Fedora.

Planning Partition Strategies

Partitioning is a topic that can strike fear into the hearts of novice Linux users. Coming from a Microsoft world, where you might just be used to having one hard drive, it can seem a bit strange to use an operating system that makes partitioning important. Depending on your requirements, you may opt to have a single large partition to contain all your files, or you may prefer to segment your installation across several partitions in order to match your individual needs. You also have to take into account such things as what you will use to back up your data. With the abundance of external hard drives and flash-based memory sticks you could use these, but it is important to remember to provision back up storage space that is equal to or in excess of your specific requirements. Thanks to the ever decreasing prices of storage, a 250GB SATA drive can be had for just over \$100. You will thank yourself that you backed up your data when your primary hard drive goes down!

The needs of the business should be the primary concern when deciding to implement a Linux system. Be careful when specifying a system and ensure that you build in an adequate upgrade path that allows you to extend the life of the system and add any additional storage or memory.

Knowing how software is allocated on your hard drive for Linux involves knowing how Fedora organizes its filesystem, or layout of directories on storage media. This knowledge can help you make the most out of hard drive space; and in some instances, such as planning to have user directories mounted via NFS or other means, it can help head off data loss, increase security, and accommodate future needs. Create a great system, and you'll be the hero of information services.

To plan the best partitioning scheme, research and know the answers to these questions:

- How much disk space does your system require?
- Do you expect your disk space needs to grow significantly in the future?
- Will the system boot just Fedora, or do you need a dual-boot system?
- How much data will require backup, and what backup system will work best? (See Chapter 17, "Backing Up, Restoring, and Recovery," for more information on backing up your system.)

CD-ROM INSTALLATION JUMPSTART

To install Fedora from the DVD included with this book, you must have at least a Pentium-class CPU, 800MB hard drive, and 64MB RAM. You need at least 192MB to install using Fedora's graphical installer. A 10GB hard drive can easily host the entire distribution, leaving about 3GB free for other data. Most modern systems have significantly larger drives, and it is an idea to invest in more storage from your local computer store.

To begin the installation, you need to get into your computer's BIOS to set the boot sequence so that the CD/DVD drive is the first drive that is booted. Insert the DVD into the drive and let the system boot. When the `boot:` prompt appears hit the Enter key and follow through the various dialog boxes to install Fedora.

Make sure that you make a note (mental or otherwise) of the root password because you will need it later. When the installer is finished, the DVD ejects and you are asked to reboot the computer. A few more dialog boxes appear to allow you to do some more initial configuration of the system before you are greeted with a login prompt. Make sure to log in as the user you created during the installation and not as root.

If you have a floppy drive, create a boot disk during the install (see the "Step-by-Step Installation" section). Finally, finish the install, remove the CD-ROM from your computer, and reboot. Then log in and enjoy Fedora!

The Boot Loader

You need to decide how to boot your system. For example, you can boot Fedora from a hard drive or removable USB key using the default boot loader, the Grand Unified Boot Loader (known as *GRUB*), use a commercial boot loader (as discussed in Chapter 2), or choose to not use a boot loader at all. Not using a boot loader can make booting Fedora difficult, but not impossible. For example, you can use another operating system such as DOS to jump-start to a Fedora session.

A boot loader is most often installed in the master boot record (*MBR*) of an IDE hard drive, but can also be installed in the root Linux partition, or on a floppy disk. The boot loader can be used to pass essential kernel arguments to the Linux kernel for use during the boot process. Some arguments might include special disk geometry settings or specifying additional network interfaces. Fedora's boot loader, GRUB, supports special operations, such as booting from read-only memory (*ROM*) or flashed memory chips containing boot-loading code. Using a boot loader from floppy disk works with many PCs, but you should be aware that not all PC hardware BIOS supports booting via universal serial bus (*USB*) removable media or from a floppy disk. In fact, most new PCs no longer include a floppy disk drive as standard!

The GRUB loader works with all BSD UNIX variants and many proprietary operating systems. This utility also supports menuing, command lines, installed RAM detection, and diskless and remote network booting. GRUB also offers password protection.

NOTE

If you find that `LOADLIN` fails to boot Linux and complains about a large kernel size, you can either try using `make bzimage` to build a smaller kernel or rebuild a kernel that relies less on built-in features and more on loadable modules. See Chapter 39, “Kernel and Module Management,” for more information.

When choosing a commercial boot loader, weigh its capabilities and options. A good boot loader supports multiple operating systems, the capability to boot different Linux kernels (in order to change the characteristics of a system or easily accommodate new hardware), password protection, custom boot displays, and sane defaults, such as requiring verification before overwriting existing configurations and accommodating other recognized filesystems or previously installed boot code.

If you run into trouble after installing Fedora, make sure to read the documentation for your boot loader to acquire any diagnostic information. Most boot loaders report on any problems, and the solution might be commonly known. Your best (and least expensive) bet is to use GRUB because it is the default boot loader for Fedora Core.

Choosing How to Install Fedora

Fedora can be installed in a variety of ways using different techniques and hardware. Most users install Fedora by booting to the installation directly from a CD or DVD. Other options include

- Booting to an installation using Fedora’s mini CD bootdisc.
- Using a hard drive partition to hold the installation software.
- Booting from a DOS command line.
- Booting via a virtual network session. (See the Release Notes file included on the first Fedora CD-ROM for details.)
- Booting to an installation and installing software over a network or even via the Internet using FTP or HTTP protocols.
- Booting to an installation and installing software from an NFS-mounted hard drive.

How you choose to install (and use) Fedora depends on your system’s hardware, networking capabilities, corporate information service policy, or personal preference. The following sections describe the issues surrounding each of these types of installation.

Installing from CD or DVD

Most PCs’ BIOS support booting directly from a CD or DVD drive, and offer the capability to set a specific order of devices (such as floppy, hard drive, CD-ROM, or USB) to search for bootable software. Turn on your PC, set its BIOS if required (usually accessed by

pressing a Function or Del key after powering on); then insert Fedora's first disc, and boot to install Fedora.

To use this installation method, your computer must support booting from your optical drive, and the drive itself must be recognizable by the Linux kernel. You can verify this by checking your BIOS and then booting your PC.

Older PCs might prove problematic when you desire to boot to an install using optical media. The good news is that this should no longer be a problem with most post-1995 personal computers.

The file `boot.iso` is a 4.5MB CD-ROM image found under the `images` directory on the first Fedora CD-ROM or the DVD. The image can be burned onto a CD-R, mini CD-R, or business-card sized CD-R and supports booting to a network install. This is a convenient way to boot to a network install on a PC with a bootable CD-ROM drive, but no installed floppy drive, or when you don't want to use multiple floppies during an install requiring driver disks.

You burn the image onto optical media using the `cdrecord` command. For example, copy the file to your hard drive, insert a blank CD-R into your CD-RW drive, and then use a command line like so:

```
# cdrecord -v speed=4 dev=0,0,0 -data -eject boot.iso
```

This example creates a bootable CD-ROM, and then ejects the new CD-ROM after writing the image. The speed (4, in this example) depends on the capabilities of your CD writing device. The device numbers are those returned by running `cdrecord` with its `scanbus` option, like so:

```
# cdrecord -scanbus
```

Installing Using a Network

Fedora can be installed using a local network (or even over the Internet if you have broadband access). You need access to a web, FTP, or NFS server hosting the installation packages. To boot to a network install, use a network boot floppy, a bootable CD-ROM created using the `boot.iso` boot image, or the Fedora DVD included with this book. Boot your PC with the boot floppy or, if you use CD-ROM, type **linux askmethod** at the boot prompt. Follow the prompts, and you will be asked to choose the type of network installation.

TIP

Just press Enter at the boot prompt if you boot to a network install using a CD-R created with the `boot.iso` image. You will boot a graphical network install.

To install using FTP, select the network IP address assignment for your target PC, such as DHCP, or manually enter an IP address along with optional gateway IP address and

nameserver addresses. You are then asked for the FTP site name. You can enter the name or IP address of a remote FTP server hosting the Fedora release. The name of the remote directory depends on where the Fedora install files are located on the remote server.

Installing Fedora using the File Transfer Protocol (*FTP*) requires access to an FTP server (see Chapter 24, “Remote File Serving with FTP,” to see how to set up a server and use FTP). You have to know the hostname or IP address of the server, along with the path (directory) holding the Fedora software. One way to prepare a server to host installs is to follow these steps:

1. Create a directory named `Fedora` under the FTP server’s `pub` directory. The directory is usually `/var/ftp/pub` on a Linux server.
2. Create a directory named `base` and a directory named `RPMS` underneath the `Fedora` directory.
3. Copy or download all RPM packages included with Fedora into the `pub/Fedora/RPMS` directory.
4. Copy all original base files (`comps.rpm`, `comps.xml`, `hdlist`, `hdlist2`, `hdstg2.img`, `netstg2.img`, `stage2.img`, `TRANS.TBL`) from the DVD’s base directory into the `pub/Fedora/base` directory.

Using this approach, enter **pub** when asked for the name of the remote directory holding the Fedora install software.

Installing Fedora using a remotely mounted Network File System (*NFS*) is similar to a hard drive installation, but requires access to an NFS server. You need access permission, a permitted IP address or hostname for your computer, the hostname or IP address of the NFS server, and the path to the Fedora software. See Chapter 18, “Network Connectivity,” for more information about NFS and network addressing.

To install Fedora using HTTP, you need the hostname or IP address of the remote web server, along with the directory containing Fedora’s software. See Chapter 21, “Apache Web Server Management,” to see how to set up a web server.

NOTE

See Chapter 24 for details on how to configure the `vsftpd` FTP server. Chapter 21 provides information on how to set up and configure Apache for web service. See Chapter 18 for Samba settings. Note that you can have your server perform all three duties.

Step-by-Step Installation

This section provides a basic step-by-step installation of Fedora from DVD. There are many different ways to proceed with an install, and the installer can provide a graphical or text-based interface in a variety of modes.

This example installation prepares a computer for general duties as a server, perhaps to host a File Transfer Protocol site, a web server using Apache, or Session Message Block (SMB) services using Samba.

Before you begin, you should ensure that your computer is not connected to the Internet. Although you can use the installer to set up network protection during the install, it is best to check your system settings after any install and before opening up any public services (see the section “firstboot Configuration” later in this chapter).

TIP

If you are installing to a system that has an older display monitor, it is a good idea to have your monitor’s manual handy during the installation. If the install does not detect your monitor settings, you might need to specify the monitor’s vertical and horizontal frequencies. This does not happen often, but if it does, you will be prepared.

NOTE

Fedora’s graphical installation dialogs are convenient and easy to use. However, you can use a text-based installation, which works with any PC. Simply specify **linux text** at the install boot prompt. Use the graphical install outlined here as a starting point for learning more about installing Fedora.

Starting the Install

To get started, insert the DVD into your drive and reboot your computer. You first see a boot screen that offers a variety of options for booting (see Figure 3.1). Options may be passed to the Linux install kernel by typing special keywords at the boot prompt. Note that the install kernel is different from the kernel that is installed on your system during installation!

The basic options most often used are

- **<ENTER>**—Starts the install using a graphical interface. The graphical interface supports a mouse and offers check boxes and text fields for choosing software, configuring options, and entering information.
- **linux text**—Starts the install using a graphical text interface.

To install using a text-based interface (used for our example), type **linux text** and press Enter; otherwise, just press Enter to start the install.

Several function keys can be used at this first boot screen to cycle through four help screens providing additional install information. Use these function keys at the boot prompt to jump to different screens describing alternative installation options and modes:



FIGURE 3.1 Select an installation option in this first Fedora boot screen.

- Pressing F1 returns to the initial boot screen.
- Pressing F2 details some boot options.
- Pressing F3 gives general installation information (described next in this chapter).
- Pressing F4 describes how to pass kernel video arguments, useful for configuring video hardware to support a graphical install at a specific resolution (such as 800-by-600 pixels).
- Pressing F5 describes Fedora’s rescue mode.

Some of the options you can use at the boot prompt include

- `linux noprobe`—Disables probing of the system’s hardware.
- `linux mediacheck`—Verifies the integrity of one or more install CD-ROMs or DVD.
- `linux rescue`—Boots to single-user mode with a root operator prompt, disabling X, multitasking, and networking; this option can be used if you need to reconfigure your boot loader or to rescue data from your system.
- `linux dd`—Uses a driver disk (a floppy image) and possibly one or more kernel arguments (such as `linux mem=512M expert`) to enable certain types of hardware, such as networking cards.
- `linux askmethod`—Prompts for the type of install to perform, such as over a network.
- `linux updates`—Starts an installation update.
- `memtest86`—Starts a cyclical, intensive series of memory tests of your PC’s RAM.

- `linux nofb`—Starts a graphical installation, but does not use a frame buffer (helpful with problematic or unsupported video).
- `linux resolution=width x height`—Installs using a graphical display of width-by-height pixels (such as `resolution=800x600`), which can help match older or less capable display monitors and video cards.

The F4 screen lists options that can be used at the boot prompt to set a specific resolution for the installation. For example, this is done by typing `linux resolution=` at the boot prompt, along with an option such as "`800x600`". Other options, such as optional arguments for kernel modules (in order to properly configure or initialize hardware) may be passed to the install kernel if you use the `noprobe` option.

TIP

The installer starts automatically in 60 seconds. Press the spacebar, reboot, or turn off your PC if you need to halt the install.

After you press Enter, the installer's kernel loads, and you're asked (in a text-based screen) if you would like to perform a media check of your installation media, as shown in Figure 3.2.

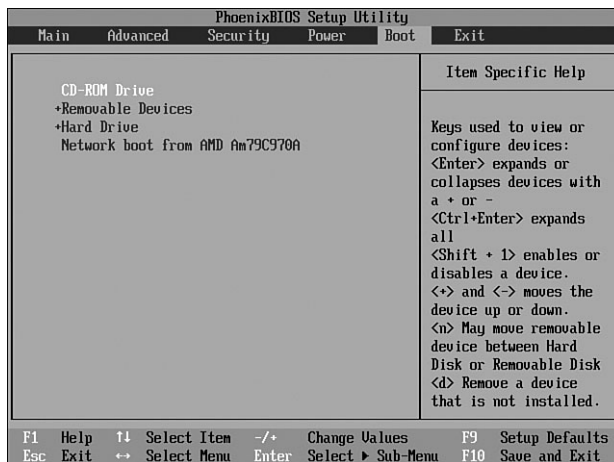


FIGURE 3.2 You can check your CD-ROM or DVD media before installing Fedora.

This check can take quite some time (depending on the speed of your optical drive), but can ensure the integrity of the CD-ROM/DVD's contents, as an `md5sum` value is embedded on each CD-ROM and DVD. This check can help foil installation of malicious software from CD-ROMs and DVDs with tampered contents. The check can also be helpful to make sure that the CD-ROM or DVD you are using works on your PC and in your optical

drive. To perform the check, choose OK; otherwise, use the Tab key to navigate to the Skip button and press Enter to choose it.

After checking your CD-ROM or DVD or even skipping the check, the display clears. The Fedora installer, Anaconda, loads, and you are presented with a graphical welcome screen as shown in Figure 3.3. The installer should recognize your PC's graphics hardware and mouse. You can then click on the Release Notes button to get detailed information about Fedora, along with tips on hardware requirements and how to perform various installs.



FIGURE 3.3 Read Release Notes before installing Fedora.

NOTE

Fedora's installer supports the ability to monitor background and install processes running during an installation. You can watch the progress of an install and hardware information reported by the Linux install kernel by navigating to a different console display or virtual console by simultaneously pressing the Ctrl, Alt, and appropriate function key (such as F1–F5).

Use this approach to watch for kernel messages, monitor hardware detection, gain access to a single-user shell, and view the progress of the installer script.

When using a graphical installer, press Ctrl+Alt+F4 (then Alt+F2 or Alt+F3) to navigate to the various screens. Press Alt+F7 to jump back to the installer. When performing a text-based installation, use Alt+F2 (then Alt+F3 or Alt+F4). Use Alt+F1 to jump back to a text-based install.

If your pointing device (mouse) is not recognized, you can press Alt+R to “press” the Release Notes button. Similarly, you can click Alt+H to hide text shown on the left side of the screen, but you should take a minute to read the frame’s contents.

Click Next (or press Alt+N) to continue, and the installer asks you to select one of 31 different languages for the installation, as shown in Figure 3.4.



FIGURE 3.4 Select a language to use when installing Fedora.

You can navigate the installer’s dialogs (during a text-based or graphical install) using the Tab key. You can scroll through lists using your cursor keys. Note that you can now step backward through the install by using a Back button. Select a language and click the Next button.

You’ll then be asked to select a keyboard for the install, as shown in Figure 3.5.

Scroll to the appropriate keyboard option. You use this option to configure the install to support one of 53 different language keyboards. Click Next after making your selection.

If your PC’s monitor was not detected, you might be asked to select your model from 132 different manufacturers. In rare instances, you might have to specify your monitor’s exact horizontal and vertical frequencies. This can happen with older displays.

If an existing Linux install is detected, you will be asked whether you want to upgrade and reinstall; otherwise, you are asked to partition your disk to make room for Fedora, as shown in Figure 3.6.

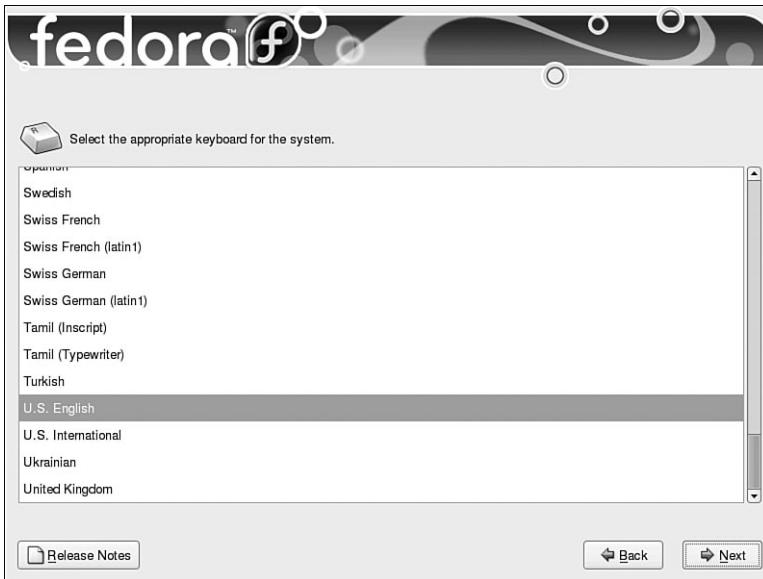


FIGURE 3.5 Select a default keyboard to use when installing and using Fedora.

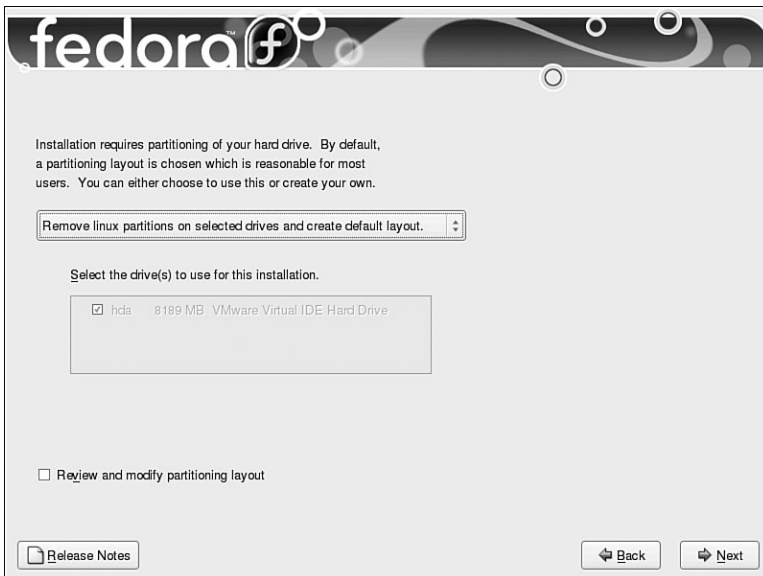


FIGURE 3.6 Select how you want to partition your drive.

Partitioning Your Hard Drive

For the moment, select Create Custom Layout and click Next to move to the screen shown in Figure 3.7. You could, however, opt to delete all partitions (including Windows partitions) on the drive, remove only Linux partitions on the drive, or use only unallocated space. If you choose one of these three, you get a default layout that uses logical volume management. This is a special type of partitioning that makes disk partitions much easier to work with.



FIGURE 3.7 Fedora’s powerful partitioning tool allows you to create a partition scheme unique to your requirements.

LOGICAL VOLUME MANAGEMENT FOR BEGINNERS

Logical volume management sounds a lot more difficult than it is. In effect, what it does is allow you to produce single logical partitions that can be made up of multiple physical drives. Logical volumes can also be resized as required, something which is usually difficult when dealing with ext3 partitions (Fedora’s native partition type). There is one thing that you need to remember and that is to create a separate /boot partition independent of the logical volumes; otherwise your system will not boot!

In this example, we look at creating a partition table that spans two physical disks. To get started click the New button to bring up the screen shown in Figure 3.8. First of all we need to create a small partition that has the mount point /boot. This is to enable Fedora to actually boot and needs to be a maximum of only about 150MB in size. Make sure that

only the first disk is ticked (hda in our example) and select `/boot` from the drop-down mount point menu. Finally change the size of the partition to 150MB and click the OK button to create our first partition.

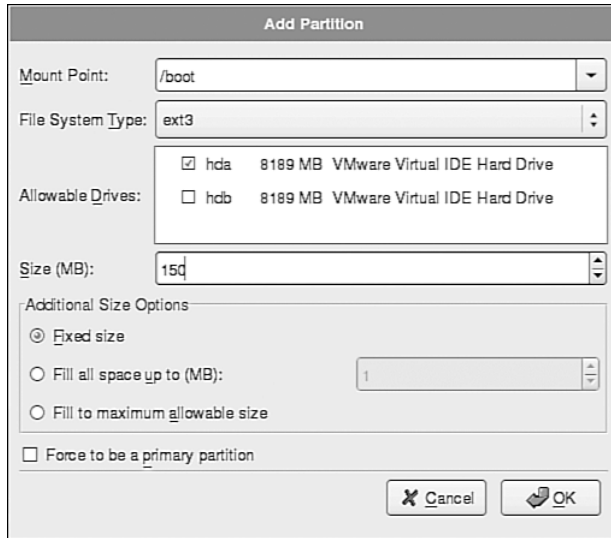


FIGURE 3.8 Make sure to create your boot partition; otherwise all your good work will be in vain!

Now we need to create our physical volumes that will allow Fedora to combine them into a logical volume. Click the New button again to bring up the same window as Figure 3.8, but this time we want to change the file system type to Physical Volume (LVM). Make sure that only one drive is ticked, and finally select the option Fill to Maximum Allowable Size to instruct Fedora to use all available space. Once you have done this, click OK and repeat this for the second drive, and again if you have more than two drives.

When you have created the physical volumes, you now need to bind them together through a logical volume. Click the LVM button in the partitioner's main window to bring up the LVM options (see Figure 3.9). You can give your logical volume group a more meaningful name than `VolGroup00`, but you must ensure that there are no spaces in the name. Next you can choose a physical extent size for your volumes, or rather the size of chunks that the disks will be "cut up into." Unless you really have a specific need to change this setting, you should leave it at 32.

Now you need to create your partitions within your logical volume group, and you do this as you would any other Linux distribution, making sure that you at least have a `/` partition and a swap partition. In our example, click the Add button to be taken to the Make Logical Volume screen (see Figure 3.10) where you can specify a mount point, file system type, volume name (again no spaces), and finally the size of the partition.



FIGURE 3.9 Harness the flexibility of logical volumes through Fedora’s easy-to-use utility.

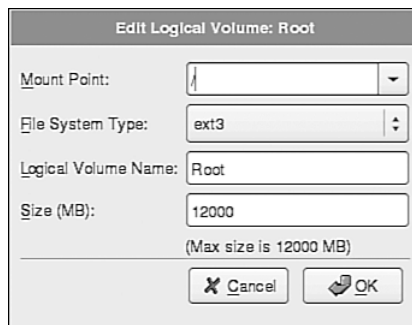


FIGURE 3.10 Use this screen to define the logical volumes that make up your logical group.

You have to create at least two partitions: the / partition and the swap partition. However, you can add several mount points depending on your specific requirements. Some users find it helpful to create a separate /home partition, which we do in our example. As you add each logical volume, it appears in the main LVM Group options screen (refer to Figure 3.9). When you are finished, click the OK button to return to the main partition screen, which should look similar to Figure 3.11.

Now you are ready to proceed to the next screen by clicking the Next button.



FIGURE 3.11 The completed masterpiece. It is worthwhile spending extra time to get the best partition layout for your requirements.

Choosing, Configuring, and Installing the Boot Loader

After you accept the partitioning scheme, a screen appears asking you to select a boot loader for booting Fedora (see Figure 3.12). This screen also enables you to choose not to use a boot loader (when booting from removable media, a commercial boot utility, a DOS partition, or over a network), and the ability to boot other operating systems if you have configured a dual-boot system. Review “The Boot Loader,” previously in this chapter, for more information on making this choice.

TIP

Fedora works well with other operating systems, but the reverse is not always true. If you need specialized help with configuring a dual-boot system, check various HOWTOs at <http://www.tldp.org> for hints and tips.

Select the GRUB boot loader. GRUB is typically installed in the MBR of the first IDE hard drive in a PC. However, the boot loader can also be installed in the first sector of the Linux boot partition, or even not installed on the hard drive. Note that you can also backtrack through the install process to change any settings.

Note that you can assign a password for the boot loader. If you choose to use this option, you have to enter a password at the GRUB boot screen (see the section “Logging In and Shutting Down” at the end of this chapter for information on graphical logins). Carefully note the password! It does not have to be the same password used to log in, but if you

password protect booting through your computer's BIOS and use a boot loader password here, you will subsequently need to enter three passwords (BIOS, boot loader, and login) to access Linux. Type in a password of at least eight characters twice (once on each line); then click OK or Cancel to exit the dialog.



FIGURE 3.12 Select whether you want to use a boot loader and configure other boot options.

NOTE

If you are planning to dual boot your PC with Windows, it will appear in the list of boot options as Other. You can click the Edit button to access options that enable you to rename it something a little more informative, or even set Windows as the default option for GRUB.

If you click the Configure Advanced Boot Loader Options button, you are asked for arguments to pass to the Linux kernel before booting. Kernel arguments are used to enable or disable various features of Linux at boot time. If you install the source to the Linux kernel, you will find documentation about the more than 200 different kernel arguments in the file `kernel-parameters.txt` under the `/usr/src/linux/Documentation` directory.

Click Next to set your boot loader configuration. You then proceed to network interface configuration, as shown in Figure 3.13.



FIGURE 3.13 Select or enter networking configuration information.

Network Configuration

If you have an installed network adapter, you are asked for network configuration details, as shown in Figure 3.13. Fedora can be set to automatically configure networking upon booting. Note that you can also configure networking following installation using Fedora’s `system-config-network` graphical network administration tool (see Chapter 14, “Managing Users,” for details about using these tools).

NOTE

If the Linux kernel finds more than one network interface installed on your computer, you might be asked to configure a second ethernet device. This might be the case, for example, if you are installing Fedora on a computer that serves as a gateway or firewall. If you configure more than one ethernet device, the device named `eth0` will be the first active interface when you start Fedora.

You can choose to have your interface information automatically set using DHCP. Otherwise, especially if you are configuring a DHCP server, manually enter an IP address, hostname, or gateway address (such as for a router), along with DNS information if you click the Edit button listed by the interface (such as `eth0` in the example). After making your selection, click Next to continue.

Setting the Time Zone

You are next shown a Time Zone Selection dialog (see Figure 3.14). There are two “clocks,” or times, when using a PC: the hardware clock, maintained by hardware in the computer and a backup battery; and the system time, set upon booting and used by the Linux kernel. It is important to keep the two times accurate and in synchronization because automated system administration might need to take place at critical times. Many computer installations use computers with hardware clocks set to GMT, which stands for *Greenwich Mean Time*. The more modern designation is UTC or *Coordinated Universal Time*. The Linux system time is then set relative to this time and the default time zone, such as Eastern Standard Time, which is -5 hours of UTC.



FIGURE 3.14 Select your time zone.

Setting the computer’s hardware clock to UTC (GMT) has the advantage of allowing the Linux system time to be easily set relative to the geographic position of the computer and resident time zone (such as a Linux laptop user who would like to create files or send electronic mail with correct timestamps, and who has traveled from New York to Tokyo). See Chapter 4, “Post-Installation Configuration,” for details on setting the date and time for Linux.

TIP

Read the man page for the `hwclock` command to learn how to keep a running Linux system synchronized with a PC’s hardware clock. See Chapter 4 for more details on using the `hwclock` command and Linux time-related software.

Choose your time configuration, and then click Next.

Creating a Root Password and User Accounts

You are next asked to enter a root operator password, as shown in Figure 3.15. Type in a password, press Tab or Enter, and then type it again to make sure that it is verified. The password, which is case sensitive, should be at least eight characters (or more) and consist of letters and numbers. Note that the password is not echoed back to the display. Your root password is important because you need it to perform any system administration or user management with Fedora.



FIGURE 3.15 Type in, and do not forget, your root password.

CAUTION

Do not forget your system's BIOS, boot loader, or root passwords! Some equipment, such as notebook computers, might require factory replacement of motherboard components if the owner forgets the BIOS password. The BIOS settings on most desktop PCs can usually be reset via a jumper or removal and insertion of the motherboard battery. If you forget your boot loader password, use a boot disk (perhaps created during installation as shown later on in this chapter) or boot to a rescue mode using your Fedora disc and reset the root password using the `passwd` command.

When finished, click Next to continue with software package selection for your new server.

NOTE

You can only create a root account during a Fedora install. You will have to create user accounts after booting, using a command-line program (such as `adduser`) or the graphical `system-config-users` client. Create an account for yourself and any additional users. Usernames traditionally consist of the first letter of a person's first name and the last name. For example, Tom Denning would have a username of `tdenning`. Do not forget to enter a password for any new user! If you create a user without a creating a password, the new user will not be able to log in.

You should create at least one user for your server besides the root operator. This is for security purposes and to avoid logging in as root, either through the keyboard at the server or remotely over the network. The default shell and home directory settings should remain set at the defaults, which are the Bourne Again SHell (`bash`) and the `/home` directory.

TIP

Good passwords are essential for system security. However, some people still rely on passwords as simple as `admin`. This is asking for trouble, and we would encourage you to create a strong password made up of letters, numbers, and even punctuation. It can be difficult to create a password that is easily memorable and that includes punctuation, but it can be simpler than you think. For instance, Damon Jordan may want to use his full name as a password, but that would be easy to crack. What he could do is use punctuation and numbers to replace similar letters in his name, such as `Dam()n]ordan`. This is a very strong password, and not easily broken, but at the same time it is very easy to remember.

NOTE

See Chapter 5 for how to become the root user or run root commands as a regular user. See Chapter 14 for details on managing users.

Software Selection and Installation

Fedora 5 has radically overhauled its package selection and installation. In previous versions, you had the choice of installing one of five different installation classes, which would include packages specific to the ultimate end use of the computer. Now, however, Fedora asks you whether you want to install additional software on top of the base system, which is designed for general Internet usage. This screen is shown in Figure 3.16.

WHAT HAPPENED TO INSTALL EVERYTHING?

In previous versions of Fedora and Red Hat Linux, there was an option to install everything available. This has now been removed from Fedora 5 for a number of reasons. First of all, installing all the packages can create dependency nightmares when upgrading and installing new packages. Second, there can literally be too many packages for new users to handle. Third, and perhaps most importantly, it can pose a huge security risk to your system. The more software you have installed, the greater the risk that someone could find a vulnerable entry point into your system.

One final thing to consider is that Fedora is not just about the Core, but it also has a large number of packages available in Extras. It would take a long time to retrieve and install all the software available!



FIGURE 3.16 Fedora's new and simplified package selection screen.

You can choose to install extra software for development, a web server and support for Xen virtualization. You are also able to specify whether you want to customize your package selection further by selecting the *Customize Now* button and clicking *Next* to go to Figure 3.17. Otherwise, just click *Next* to land at the final screen.

If you decide to customize your package choice, you will see a screen similar to Figure 3.17. On the left side are the generic categories that contain software. As you click on each category, a new set of package groups appears on the right side. Mark the check box against each package group to install the default packages associated with that group. If you want to specify additional packages within the group, click the *optional packages* button to see all the other packages available for the group. Select the ones that you require and click close to add them to your package list. After you finish selecting your packages, click *Next* to allow Fedora to scan for any dependency problems.

You finally arrive at the last screen before Fedora actually starts to install anything, so it is a good idea to take a deep breath and think about anything you might have forgotten. It is easy to go back to any stage of the installation process by clicking the *Back* button until you reach where you want to go.

When you are happy, click *Next* to allow Fedora to install the system. Now is a good time to make a cup of coffee because it can take up to an hour to install Fedora. As Fedora is

installed, it tells you which package it is currently working on as well as an approximate time left for the installation, as shown in Figure 3.18.

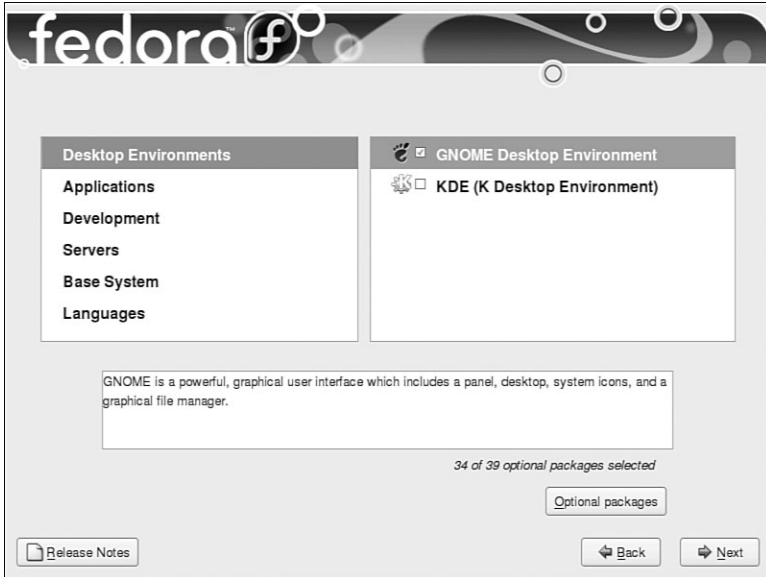


FIGURE 3.17 Specify the exact packages you want for your installation.



FIGURE 3.18 The Fedora installer formats your drive, and then installs selected software package groups.

If you are installing over a network or by DVD, take a break because the install proceeds unattended through the software installation. If you are installing Fedora using CDs, you might want to stay in eyesight of your computer because you will have to change CDs throughout the installation.

Finishing the Install

You are done! Click the Exit button, and the installer ejects any inserted media and reboots. The GRUB boot loader presents a boot prompt as shown in Figure 3.19.

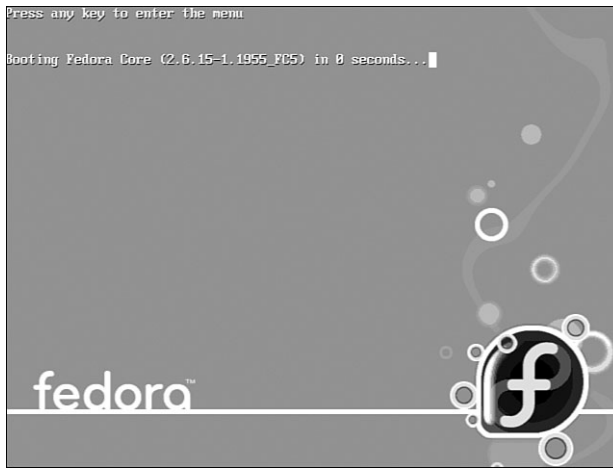


FIGURE 3.19 Boot Fedora with GRUB by pressing the Enter key or waiting 10 seconds.

If you have set a GRUB password, press the P key, type your password, and press Enter. If you do nothing for five seconds, or press Enter, either boot loader boots Linux.

NOTE

After installation, you can edit the file `/boot/grub/grub.conf` and change the `timeout=` setting to change the boot time to a value other than five seconds.

firstboot Configuration

Although the vast majority of configuration is done during the actual installation, Fedora allows you to choose some more options before you log in for the first time. When you boot Fedora, it loads `firstboot`, which is the utility responsible for personalizing your computer. It asks you a few straightforward questions and the end result is that you are able to log in to Fedora.

The first screen welcomes you to `firstboot` and you should click Next to start. The next screen asks whether you accept the GPL under which Fedora is released. If you agree with the license, click the Yes button and then click Next.

Firewall configuration is up next (see Figure 3.20), and you should always have your firewall enabled. Sensibly Fedora defaults to this, but it also asks you whether you want to allow access to specific ports to allow services to run. Depending on your requirements, you might want to select one or more of the boxes. You can also enter in specific ports and the protocol (tcp or udp), although you should be aware that the more services or ports you allow access to, the less secure your system becomes as it opens up more opportunities for attack.

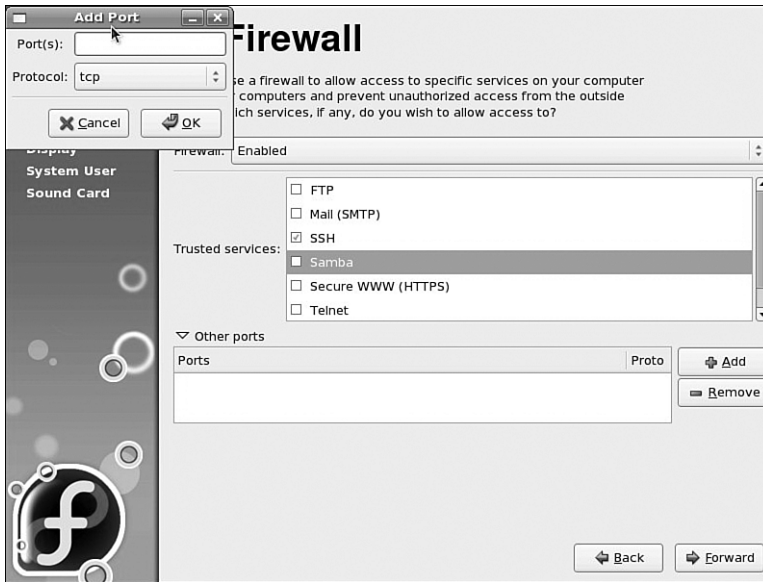


FIGURE 3.20 The firewall is a key part of your defense against would-be crackers. When you are happy with your selection, click the Next button to start configuring SELinux.

SELinux allows a much more detailed security policy, and is still in development. Introduced in Fedora Core 2, SELinux is an NSA initiative to provide Linux with an in-depth mandatory access control system that compartmentalizes the system. Basically, if an intruder gets onto the system, and then SELinux limits the amount of damage that the intruder can cause.

SELINUX

As mentioned earlier, SELinux came from the NSA (National Security Agency), one of the most secret organizations in the United States. The community's shock at having this technology released to them can be summed up by Eric S. Raymond when he said, "Let me assure you that this action by the NSA was the crypto-equivalent of the Pope coming down off the balcony in Rome, working the crowd with a few loaves of bread and some fish, and then inviting everyone to come over to his place to watch the soccer game and have a few beers. There are some things that one just never expects to see, and the NSA handing out source code along with details of the security mechanism behind it was right up there on that list."

You are able to select specific behavior according to your requirements, but unless you have a specific reason to change any of the default settings, just click the Next button to continue. The default settings provide a very secure system.

Following on from SELinux, Fedora gives you a chance to set-up your time and date settings. You already gave Fedora your location in the world, but this screen (see Figure 3.21) allows you to fine-tune your time and date, as well as opt to use the Network Time Protocol and get an accurate time from one of the many hundreds of time servers across the world.

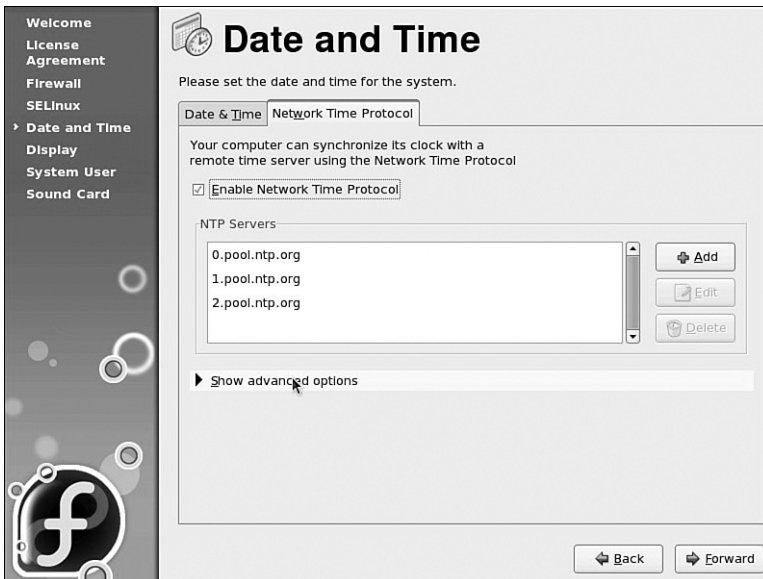


FIGURE 3.21 Never be late again by setting your system clock correctly.

When you have set your time correctly, click Next to go the Display screen. This screen (see Figure 3.22) is similar to the `system-config-display` package and allows you to define your monitor and specify color depth and resolution. Fedora usually does a good job at this, so you may not need to make any changes.

Clicking Next takes you to the System User screen (see Figure 3.23) and allows you to enter details for one user initially. You can enter the user's full name, username, and password (which you need to enter again to confirm) and also choose any other authentication settings such as use of Kerberos or NIS services. When you have completed firstboot, you can create other users using the `system-config-users` utility.

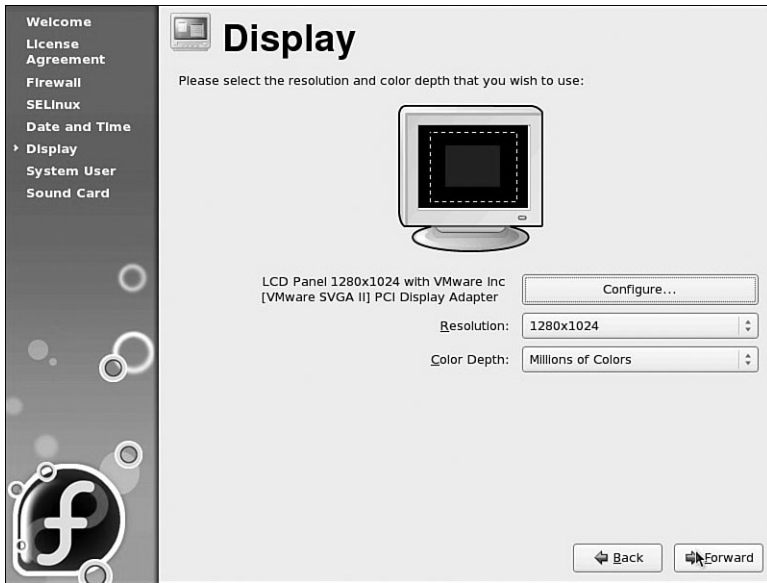


FIGURE 3.22 Make sure that you are seeing the full picture with Fedora.

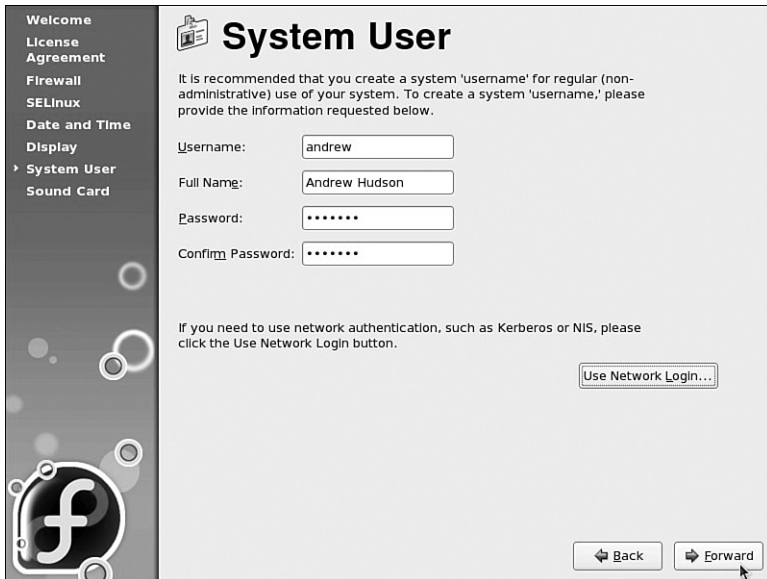


FIGURE 3.23 Create your first user and assign a password.

The final stage after clicking Next is to test your sound setup (see Figure 3.24). Click the test button to hear a short sound clip that should verify that your soundcard has been successfully detected.

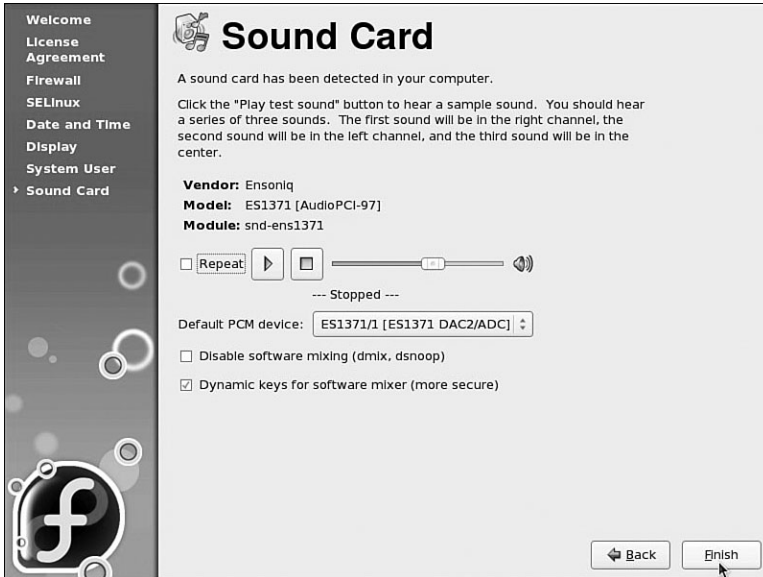


FIGURE 3.24 Fedora determines your soundcard and allows you to fine-tune the volume.

Click the Next button and, finally, the Finish button to go straight to the login prompt as shown in Figure 3.25. Here you should log in as the user you created during firstboot; do not log in as root because you can cause some serious damage if you do not know what you are doing.



FIGURE 3.25 Enter your username and password to log in to Fedora.

Logging In and Shutting Down

If you did not choose to use X11 software during the installation, you normally log in at a text-based login prompt. If you installed X, you log in using a graphical login prompt, the screen clears after your system boots, and you are presented with a graphical login screen, as shown previously in Figure 3.25.

To log in at the text-based prompt, type your username and press Enter. You are then prompted for your password. After you press Enter, you will be at the Linux command line. If you use a graphical login, you can use the shutdown or reboot menus in the screen's dialog to shut down or reboot your system. To immediately shut down your system from the command line of a text-based session, use the `su` command and its `-c` option to run the `halt` command, like this:

```
$ su -c halt
```

You can also use the `reboot` command to restart your computer like this:

```
$ su -c reboot
```

For new users, installing Fedora is just the beginning of a new and highly rewarding journey on the path to learning Linux. See Chapter 5 for additional information about using Linux commands. For Fedora system administrators, the task ahead is to fine-tune the installation and to customize the server or user environment.

Reference

<http://fedoraproject.org>—The place to start when looking for news, information, and documentation about installing, configuring, and using Fedora.

<http://tinyurl.com/c2x5u>—Symantec's PartitionMagic utility includes BootMagic, which can be used to support booting of Linux or, regrettably, other less-capable operating systems, such as Windows XP.

http://www.v-com.com/product/System_Commander_Home.html—V Communications, Inc.'s System Commander, a commercial 4.2MB download that can be used to support booting of any operating system capable of running on today's PCs. An intelligent partitioning utility, Partition Commander, is included.

<http://www.nwc.com/columnists/1101colron.html>—How to use Intel's Pre-execution Environment (PXE) protocol to remote boot workstations.

<http://www.gnu.org/software/grub/>—Home page for the GRUB boot loader.

<http://elserv.ffm.fgan.de/~lermen/HOME.html>—The somewhat outdated home of the LOADLIN Linux loader.

http://www.ibiblio.org/pub/Linux/docs/HOWTO/other-formats/html_single/BootPrompt-HOWTO.html—The BootPrompt-HOWTO, a guide to using the boot prompt for passing kernel arguments.

<http://www.tldp.org/HOWTO/Installation-HOWTO/index.html>—The Linux Installation-HOWTO, a guide to installing Linux by Eric S. Raymond.

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