Chapter 1

An Overview of Fedora

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Linux was a phenomenon waiting to happen. The computer industry suffered from a rift. In the 1980s and 1990s, people had to choose between inexpensive, market-driven PC operating systems from Microsoft and expensive, technology-driven operating systems such as UNIX. Free software was being created all over the world, but lacked a common platform to rally around. Linux has become that common platform.

For several years, Red Hat Linux has been the most popular commercial distribution of Linux. In 2003, Red Hat, Inc. changed the name of the distribution from Red Hat Linux to Fedora Core and moved its commercial efforts toward its Red Hat Enterprise Linux products. It then set up Fedora to be:

- Sponsored by Red Hat
- Supported by the Linux community
- Inclusive of high-quality, cutting-edge open source technology
- A proving ground for software slated for commercial Red Hat deployment and support

The complete Fedora operating system (referred to as Fedora Core 3) is included on the DVD that comes with this book and is described in this book.

Introducing Fedora and Red Hat Enterprise Linux

With the recent split between community (Fedora) and commercial (Red Hat Enterprise Linux) versions of Red Hat Linux, Red Hat has created a model that can suit the fast-paced changes in the open source world, while still meeting the demands for a well-supported commercial Linux distribution.

Technical people have chosen Red Hat Linux because of its reputation for solid performance. With the new Fedora Project, Red Hat has created an environment where open source developers can bring high-quality software packages to Red Hat Linux that would be beyond the resources of Red Hat, Inc. to test and maintain on its own.

Over 1,600 individual software packages (compared to just over 600 in Red Hat Linux 6.2) are included in Fedora Core 3. These packages contain features that would cost you hundreds or thousands of dollars to duplicate if you bought them as separate commercial products. These features let you:

- Connect your computers to a LAN or the Internet.
- Create documents and publish your work on paper or on the Web.
- Work with multimedia content to manipulate images, play music files, view video, and even burn your own CDs.
- Play games individually or over a network.
- Communicate over the Internet using a variety of Web tools for browsing, chatting, transferring files, participating in newsgroups, and sending and receiving e-mail.
- Protect your computing resources by having Red Hat Linux act as a firewall and/or a router to protect against intruders coming in through public networks.
- Configure a computer to act as a network server, such as a print server, Web server, file server, mail server, news server, and a database server.

This is just a partial list of what you can do with Red Hat's Fedora. Using this book as your guide, you will find that there are many more features built into Fedora as well.

Support for new video cards, printers, storage devices, and applications are being added every day. Linux programmers around the world are no longer the only ones creating hardware drivers. Every day more hardware vendors are creating their own drivers, so they can sell products to the growing Linux market. New applications are being created to cover everything from personal productivity tools to programs that access massive corporate databases.

Remember that old Pentium computer in your closet? Don't throw it away! Just because a new release of Fedora is out doesn’t mean that you need all new hardware for it to run. Support for many old computer components get carried from one release to the next. There are old PCs running Fedora today as routers (to route data between your LAN and the Internet), firewalls (to protect your network from outside intrusion), and file servers (to store shared files on your LAN) — with maybe an Ethernet card or an extra hard disk added.

At this point, you may feel that Linux is something you want to try out. This brings us to the basic question: What is Linux?

What Is Linux?

Linux is a free operating system that was created by Linus Torvalds when he was a student at the University of Helsinki in 1991. Torvalds started Linux by writing a *kernel* — the heart of the operating system — partly from scratch and partly by using publicly available software. (For the definition of an operating system and a kernel, see the sidebar "What Is an Operating System?" later in this chapter.) Torvalds then released the system to his friends and to a community of "hackers" on the Internet and asked them to work with it, fix it, and enhance it. It took off.

CROSS-REFERENCE: See Chapter 14 for a discussion about the difference between hackers (who just like to play with computers) and crackers (who break into computer systems and cause damage).

Today, there are hundreds of software developers around the world contributing software to the open source community that feeds the Linux initiative. Because the source code for the software is freely available, anyone can work on it, change it, or enhance it. Developers are encouraged to pass their fixes and improvements back into the community so that Linux can continue to grow and improve.

On top of the Linux kernel effort, the creators of Linux also drew on a great deal of system software and applications that are now bundled with Linux distributions from the GNU software effort (GNU stands for "GNU is Not UNIX"), which is directed by the Free Software Foundation (`www.gnu.org`). There is a vast amount of software that can be used with Linux, making it an operating system that can compete with or surpass features available in any other operating system in the world.

If you have heard Linux described as a free version of UNIX, there is good reason for it. Although much of the code for Linux started from scratch, the blueprint for what the code would do was created to follow POSIX (Portable Operating System Interface for UNIX) standards. POSIX is a computer industry operating system standard that every major version of UNIX complied with. In other words, if your operating system was POSIX-compliant, it was UNIX.

Linux's Roots in UNIX

Linux grew within a culture of free exchange of ideas and software. Like UNIX — the operating system on which Linux is based — the focus was on keeping communications open among software developers. Getting the code to work was the goal and the Internet was the primary communications medium. Keeping the software free and redistributable was a means to that goal. What, then, were the conditions that made the world ripe for a computer system such as Linux?

What Is an Operating System?

An operating system is made up of software instructions that lie between the computer hardware (disks, memory, ports, and so on) and the application programs (word processors, Web browsers, spreadsheets, and so on). At the center is the kernel, which provides the most basic computing functions (managing system memory, sharing the processor, opening and closing devices, and so on). Besides the kernel, an operating system provides other basic services needed to operate the computer, including:

- **File systems** — The file system provides the structure in which information is stored on the computer. Information is stored in files, primarily on hard disks inside the computer. Files are organized within a hierarchy of directories. The Linux file system holds the data files that you save, the programs you run, and the configuration files that set up the system.
- **Device drivers** — These provide the interfaces to each of the hardware devices connected to your computer. A device driver enables a program to write to a device without needing to know details about how each piece of hardware is implemented. The program opens a device, sends and receives data, and closes a device.
- **User interfaces** — An operating system needs to provide a way for users to run programs and access the file system. Linux has both graphical and text-based user interfaces. GNOME and KDE provide graphical user interfaces, whereas shell command interpreters (such as bash) run programs by typing commands and options.
- **System services** — An operating system provides system services, many of which can be started automatically when the computer boots. In Linux, system services can include processes that mount file systems, start your network, and run scheduled tasks. In Linux, many services run continuously, enabling users to access printers, Web pages, files, databases, and other computing assets over a network.

Without an operating system, an application program would have to know the details of each piece of hardware, instead of just being able to say, “open that device and write a file there.”

In the 1980s and 1990s, while Microsoft flooded the world with personal computers running DOS and Windows operating systems, power users demanded more from an operating system. They ached for systems that could run on networks, support many users at once (multiuser), and run many programs at once (multitasking). DOS (Disk Operating System) and Windows didn’t cut it.

UNIX, on the other hand, grew out of a culture where technology was king and marketing people were, well, hard to find. Bell Laboratories in Murray Hill, New Jersey, was a think tank where ideas came first and profits were somebody else's problem. A quote from Dennis Ritchie, co-creator of UNIX and designer of the C programming language, in a 1980 lecture on the evolution of UNIX, sums up the spirit that started UNIX. He was commenting on both his hopes and those of his colleagues for the UNIX project after a similar project called Multics had just failed:

> *What we wanted to preserve was not just a good environment in which to do programming, but a system around which a fellowship could form. We knew from experience that the essence of communal computing as supplied by remote-access, time-shared machines, is not just to type programs into a terminal instead of a keypunch, but to encourage close communication.*

In that spirit, the first source code of UNIX was distributed free to universities. Like Linux, the availability of UNIX source code made it possible for a diverse population of software developers to make their own enhancements to UNIX and share them with others.

By the early 1980s, UNIX development moved from the organization in Murray Hill to a more commercially oriented development laboratory in Summit, New Jersey (a few miles down the road). During that time, UNIX began to find commercial success as the computing system of choice for applications such as AT&T's telephone switching equipment, for supercomputer applications such as modeling weather patterns, and for controlling NASA space projects.

Major computer hardware vendors licensed the UNIX source code to run on their computers. To try to create an environment of fairness and community to its OEMs (original equipment manufacturers), AT&T began standardizing what these different ports of UNIX had to be able to do to still be called UNIX. To that end, compliance with POSIX standards and the AT&T UNIX System V Interface Definition (SVID) were specifications UNIX vendors could use to create compliant UNIX systems. Those same documents also served as road maps for the creation of Linux.

Elsewhere, the UNIX source code that had been distributed to universities had taken on a life of its own. The Berkeley Software Distribution (BSD) began life in the late 1970s as patches to the AT&T UNIX source code from students and staff at the University of California at Berkeley. Over the years, the AT&T code was rewritten and BSD became freely distributed, with offshoot projects such as FreeBSD, OpenBSD, and NetBSD still available.

Linux has been described as a UNIX-like operating system that reflects a combination of SVID, POSIX, and BSD compliance. Linux continues to aim toward POSIX compliance, as well as compliance with standards set by the new owner of the UNIX trademark, The Open Group (`www.unix.org/`). Much of the direction of Linux today comes from the Open Source Development Labs (`www.osdl.org`), which includes Linus Torvalds on its staff and whose members include most of the major commercial vendors.

Common Linux Features

No matter what version of Linux you use, the piece of code common to all is the Linux kernel. Although the kernel can be modified to include support for the features you want, every Linux kernel can offer the following features:

- **Multiuser** — Not only can you have many user accounts available on a Linux system, you can also have multiple users logged in and working on the system at the same time. Users can have their own environments arranged the way they want: their own home directory for storing files and their own desktop interface (with icons, menus, and applications arranged to suit them). User accounts can be password-protected, so that users can control who has access to their applications and data.
- **Multitasking** — In Linux, it is possible to have many programs running at the same time, which means that not only can you have many programs going at once, but that the Linux operating system can itself have programs running in the background. Many of these system processes make it possible for Linux to work as a server, with these background processes listening to the network for requests to log in to your system, view a Web page, print a document, or copy a file. These background processes are referred to as *daemons*.
- **Graphical User Interface (X Window System)** — The powerful framework for working with graphical applications in Linux is referred to as the X Window System (or simply X). X handles the functions of opening X-based graphical user interface (GUI) applications and displaying them on an X server process (the process that manages your screen, mouse, and keyboard).

  On top of X, you use an X-based desktop environment to provide a desktop metaphor and window manager to provide the look-and-feel of your GUI (icons, window frames, menus, and colors, or a combination of those items called *themes*). There are several desktop environments and several desktop managers to choose from. (Fedora includes a few desktop managers, but focuses on the GNOME and KDE desktop environments.)
- **Hardware support** — You can configure support for almost every type of hardware that can be connected to a computer. There is support for floppy disk drives, CD-ROMs, removable disks (such as DVDs and Zip drives), sound cards, tape devices, video cards, and most anything else you can think of. As device interfaces, such as USB and Firewire, have been added to computers, support for those devices has been added to Linux as well.

> **NOTE:** Most hardware manufacturers don't provide Linux drivers with their peripheral devices and adapter cards. Although most popular hardware will be supported eventually in Linux, it can sometimes take a while for a member of the Linux community to write a driver.

- **Networking connectivity** — To connect your Linux system to a network, Linux offers support for a variety of local area network (LAN) boards, modems, and serial devices. In

addition to LAN protocols, such as Ethernet (both wired and wireless), all the most popular upper-level networking protocols can be built-in. The most popular of these protocols is TCP/IP (used to connect to the Internet). Other protocols, such as IPX (for Novell networks) and X.25 (a packet-switching network type that is popular in Europe), are also available.

- **Network servers** — Providing networking services to the client computers on the LAN or to the entire Internet is what Linux does best. A variety of software packages are available that enable you to use Linux as a print server, file server, FTP server, mail server, Web server, news server, or workgroup (DHCP or NIS) server.
- **Application support** — Because of compatibility with POSIX and several different application programming interfaces (APIs), a wide range of freeware and shareware software is available for Linux. Most GNU software from the Free Software Foundation will run in Linux (although some may take a bit of tweaking).

NOTE: Because of the popularity of the RPM Package Management (RPM) format for packaging software, many software packages are available on the Internet in RPM format. If the RPM version matches your processor type (most have i386 and or i686 versions available), you can install the package without building and compiling the package. In fact, there are major software repositories that include software packaged specifically for Fedora. See Chapters 2 and 5 for information on working with RPM packages.

Primary Advantages of Linux

When compared to different commercially available operating systems, Linux's best assets are its price and its reliability. With the latest 2.6 Linux kernel, you can also argue that scalability is one of its greatest assets.

Most people know that its initial price is free (or at least under $50 when it comes in a box or with a book). However, when people talk about Linux's affordability, they are usually thinking of its total cost, which includes no (or low) licensing fees and the capability of using inexpensive hardware and compatible free add-on applications. Although commercial operating systems tend to encourage upgrading to later hardware, Linux doesn't (although faster hardware and larger disks are nice to have).

In terms of reliability, the general consensus is that Linux is comparable to many commercial UNIX systems but more reliable than most desktop-oriented operating systems. This is especially true if you rely on your computer system to stay up because it is a Web server or a file server. (You don't have to reboot every time you change something.)

Another advantage of using Linux is that help is always available on the Internet. There is probably someone out there in a Linux newsgroup or mailing list willing to help you get around your problem. Because the source code is available, if you need something fixed you can even patch the code yourself! On the other hand, I've seen commercial operating system

vendors sit on reported problems for months without fixing them. Remember that the culture of Linux is one that thrives on people helping other people.

What Are Red Hat Enterprise Linux and Fedora?

Having directories of software packages floating extraneously around the Internet was not a bad way for hackers to share software. However, for Linux to be acceptable to a less technical population of computer users, it needed to be simple to install and use. Likewise, businesses that were thinking about committing their mission-critical applications to a computer system would want to know that this system had been carefully tested and well supported.

To those ends, several companies and organizations began gathering and packaging Linux software together into usable forms called *distributions.* The main goal of a Linux distribution is to make the hundreds of unrelated software packages that make up Linux work together as a cohesive whole. For the past few years, the most popular commercial distribution has been Red Hat Linux.

In September 2003, Red Hat, Inc., changed its way of doing business. That change resulted in the formation of the Red Hat–sponsored Fedora Project to take the development of Red Hat Linux technology into the future. But what does that mean to individuals and businesses that have come to rely on Red Hat Linux?

Red Hat forms the Fedora Project

The announcement of the Fedora Project by Red Hat, Inc. at first prompted more questions than answers about the future direction of the company and its flagship Red Hat Linux product. In fact, it seemed that nothing named Red Hat Linux even existed anymore. Instead, what *was* Red Hat Linux would be reflected by Linux distributions coming from two paths:

- **Fedora Project** (`http://fedora.redhat.com`) — An open source project, beginning from a Red Hat Linux 9 base, that produces its own Linux distribution. While the project is sponsored by Red Hat, Inc., there is no official support for the Linux distribution (called Fedora Core) that the project produces.
- **Red Hat Enterprise Linux** (`www.redhat.com/software/rhel`) — An official set of commercial Linux products from Red Hat, Inc. that are offered on an annual subscription basis. Red Hat backs up its Enterprise product line with technical support, training, and documentation.

The primary result of the Fedora Project are sets of binary and source code packages (distributed on DVD or CDs) containing the Linux distribution referred to as Fedora Core. Before its name was changed to Fedora Core 1, that distribution was being tested simply as the next in the series of Red Hat Linux distributions (presumably, Red Hat Linux 10). The complete set of binary and source code included on the DVD that comes with this book are distributed as the official third release of that software: Fedora Core 3.

The name change from Red Hat Linux to Fedora Core wasn't the only difference between Fedora and Red Hat Enterprise Linux, however. Red Hat, Inc. also changed its association with Fedora Core in the following ways:

- **No boxed sets** — Red Hat decided to not sell Fedora through retail channels. The ever-shortening release cycle was making it difficult to manage the flow of boxed sets to and from retail channels every few months, and Red Hat believed that early adopters of Linux technology were clever enough to get the software themselves.
- **No technical support offerings** — There are no technical support programs available from Red Hat for Fedora.
- **No Red Hat documentation** — The set of manuals that came with the previous Red Hat Linux product was not brought over to Fedora. Instead, a series of small task-oriented documents are being collected for the project in article format.

By not creating a whole support industry around Fedora, that project is free to produce software release on a much shorter schedule (possibly two or three times per year). This allows Fedora users to always have the latest software features and fixes included with a recent version of the operating system.

Another potential upside to Fedora is that the Fedora Project hopes to encourage community software developers to create compatible software. By including software download and installation tools (such as the yum utility) in Fedora Core, the Fedora Project hopes to encourage people to contribute to software repositories that Fedora users can rely on to download additional software packages.

Red Hat shifts to Enterprise Linux

The major shift of attention to Red Hat Enterprise Linux as the focus of Red Hat, Inc.'s commercial efforts has been on the horizon for some time. Some characteristics of Red Hat Enterprise Linux are:

- **Longer release intervals** — Instead of offering releases every 4 to 6 months, Enterprise software will have a 12 to 18 month update cycle. Customers can be assured of a longer support cycle without having to upgrade to a later release.
- **Multiple support options** — Customers will have the choice of purchasing different levels of support. All subscriptions will include the Update Module, which allows easy access to updates for Red Hat Enterprise Linux systems. The Management Module lets customers develop custom channels and automate management of multiple systems. The Monitoring Module allows customers to monitor and maintain an entire infrastructure of systems.
- **Documentation and training** — Manuals and training courses will center on the Red Hat Enterprise Linux distribution.

Red Hat Enterprise Linux install types focus on three different types of computer systems, referred to as WS (for workstations), AS (for high-end systems), and ES (for small and mid-range servers). Red Hat has also recently released a new Red Hat Desktop product targeted for wide-scale desktop deployments.

Each system in the Red Hat Enterprise Linux family is meant to be compatible with the others. There are Basic, Standard, and Premium editions of these Enterprise systems. While Basic offers only software downloads, standard and premium editions offer hard copy documentation and additional technical support.

Choosing between Fedora and Enterprise

If you bought this book to try out Linux for the first time, rest assured that what you have on the DVD with this book is a solid, battle-tested operating system. There is still a lot of overlap between Fedora Core and Red Hat Enterprise Linux. However, the newest features of Fedora Core 3 provide a way to test out much of the software that is slated to go in Red Hat Enterprise Linux 4 editions.

Although Fedora may not be right for everyone, Fedora is still great for students, home users, most small businesses, and anyone just wanting to try out the latest Linux technology. Larger businesses should seriously consider the implications on support, training, and future upgrade paths before choosing whether to go the Fedora route or sign on with Red Hat Enterprise Linux. But as a way to learn and use the latest Linux technology before it makes its way to Red Hat Enterprise Linux, Fedora Core 3 is a great choice.

Why Choose Fedora or Red Hat Enterprise Linux?

To distinguish itself from other versions of Linux, each distribution adds some extra features. Because many power features included in most Linux distributions come from established open source projects (such as Apache, Samba, KDE, and so on), often enhancements for a particular distribution exist to make it easier to install, configure, and use Linux. Also, because there are different software packages available to do the same jobs (such as window managers or a particular server type), a distribution can distinguish itself by which packages it chooses to include and feature.

Fedora is continuing the Red Hat Linux by offering many features that set it apart from other Linux distributions. Those features include:

- **Cutting-edge Linux technology** — In Fedora Core 3, major new features include the Linux 2.6 kernel, Security Enhanced Linux, and a new X server from X.Org. You can get your hands on those and many other new Linux features before they go into commercial Linux products.
- **Software packaging** — Red Hat, Inc. created the RPM Package Management (RPM) method of packaging Linux. RPMs allow less technically savvy users to easily install Linux software. With RPM tools, you can install from CD, hard disk, over your LAN, or

over the Internet. It's easy to track which packages are installed or to look at the contents of a package. Because RPM is available to the Linux community, it has become one of the de facto standards for packaging Linux software.

CROSS-REFERENCE: Chapter 5 describes how to install RPM packages.

- **Easy installation** — The Fedora installation process (called *anaconda*) provides easy steps for installing Linux. During installation, anaconda also helps you take the first few steps toward configuring Linux. You can choose which packages to install and how to partition your hard disk. You can even get your desktop GUI ready to go by configuring your video card, user accounts, and even your network connection.

CROSS-REFERENCE: Chapter 2 covers Fedora Core installation.

- **UNIX System V–style run-level scripts** — To have your system services (daemon processes) start up and shut down in an organized way, Fedora uses the UNIX System V mechanism for starting and stopping services. Shell scripts (that are easy to read and change) are contained in subdirectories of `/etc`. When the run level changes, such as when the system boots up or you change to single-user mode, messages tell you whether each service started correctly or failed to execute properly. Chapter 12 describes how to use runlevel scripts.
- **Desktop environments (GNOME and KDE)** — To make it easier to use Linux, Fedora comes packaged with the GNOME and KDE desktop environments. GNOME is installed by default and offers some nice features that include drag-and-drop protocols and tools for configuring the desktop look and feel. KDE is another popular desktop manager that includes a wide range of tools tailored for the KDE environment, such as the KDE Control Center for configuring the desktop.
- **Desktop look-and-feel** — With the latest Fedora and other Red Hat Linux distributions, whether you use KDE or GNOME as your desktop environment, you can expect to see many of the same icons and menus to help standardize how you use your Linux system. Tools you can launch from those environments help you configure your network, set up servers, watch log files, and manage system services.
- **GUI Administration tools** — There are some helpful configuration tools for setting up some of the trickier tasks in Linux. Several different GUI tools provide a graphical, form-driven interface for configuring networking, users, file systems, and initialization services. Instead of creating obtuse command lines or having to create tricky configuration files, these graphical tools can set up those files automatically. (Prior to Fedora Core 2, many of these GUI administration tools were launched from commands that began with `redhat-config-*`. Now, those commands have been renamed to start with `system-config-*`.)

NOTE: There are advantages and disadvantages of using a GUI-based program to manipulate text-based configuration files. GUI-based configuration tools can lead you through a setup procedure and error-check the information you enter. However, some features can't be accessed through the GUI, and if something goes wrong, it can be trickier to debug. With Linux, you have the command-line options available as well as the GUI administration tools.

- **Testing** — The exact configuration that you get on the Fedora distribution has been thoroughly tested by experts around the world. The simple fact that a software package is included in Fedora or other Red Hat Linux distributions is an indication that Red Hat and the community that supports Fedora believes it has achieved a certain level of quality. By opening testing of early versions of Fedora to the open source community, many more bugs have been uncovered and fixed than might otherwise have been the case.
- **Automatic updates** — The software packages that make up Fedora are constantly being fixed in various ways. To provide a mechanism for the automatic selection, download, and installation of updated software packages, Red Hat created the up2date facility. For officially supported Red Hat Linux distributions, the Red Hat Network provides a focal point for software updates. While Fedora also supports the up2date facility to allow you to get software updates, on the back end Fedora will point up2date at community-supported yum and apt software repositories for providing those updates. Using the `up2date` command, as a Fedora user you can receive critical security fixes and patches very simply over the Internet.

Features in Fedora Core 3

The major components in Fedora Core 3 include (with version numbers):

- Linux kernel: version 2.6.8 — This reflects a major upgrade over the 2.4.22 kernel included in Fedora Core 1 and a more stable kernel than the 2.6.5 kernel included with Fedora Core 2. (See Chapter 27 for information about the Linux 2.6 kernel.)
- GNOME (desktop environment): version 2.8
- KDE (desktop environment): version 3.3
- X Window System (X.org graphical windowing system): version 6.8
- GCC (GNU C language compilation system): version 3.4.2
- Apache (Web server): version 2.0.52
- Samba (Windows SMB file/printer sharing): version 3.0.8
- CUPS (print services): version 1.1.21
- Sendmail (mail transport agent): version 8.13.1
- vsFTPd (secure FTP server): version 2.0.1
- INN (Usenet news server): version 2.3.5

- MySQL (database server): version 3.23.58
- BIND (Domain name system server): version 9.2.4

TIP: If you want the latest features in Linux when looking at different Linux distributions, compare the version numbers shown above. Version numbers and names that Linux distributors such as Mandrake, SUSE, and Red Hat associate with their releases can be arbitrary. By comparing versions of the kernel, KDE and GNOME desktops, and GNU compiler they are using, you can tell which distribution actually has the latest features.

As Fedora continues to consolidate its distribution, some popular packages have been dropped from Fedora Core since the previous version of Fedora. In particular, many packages for developing Java applications were dropped from the current release of Fedora. Others that were in Fedora Core 2 that are not in Fedora Core 3 include the following:

- **chromium** — Arcade-style shooting game
- **commons*** — Set of packages for developing JAVA components under the Apache Jakarta Commons project (`http://jakarta.apache.org/commons`)
- **gqview** — Image viewer
- **gtkam** — GTK-based front end for managing digital photos from gPhoto
- **kernel-source** — Kernel source code (this was once included with the Fedora installation binary packages, but has now been moved to a kernel*.src.rpm package in the SRPMS directory)
- **licq** — ICQ chat utility
- **magicdev** — Contains process for monitoring CD drives, and optionally mounting the medium (replaced with GNOME volume manager)
- **modutils** — Contains module administration utilities (repackaged into the module-init-tools package)
- **quanta** — HTML editor for KDE

See Appendix B for information on other packages no longer included in Fedora.

NOTE: Just because a package has been dropped from Fedora doesn't mean that you can't still get and use the package. In fact, in this book I tell you how to find and install packages like wine that have been dropped from previous versions of Fedora and Red Hat Linux.

The following paragraphs describe many of the major features in Fedora Core 3.

Linux 2.6 Kernel

The Linux 2.6 kernel represents a major rewrite and reorganization of the Linux kernel included with the Fedora 1 release (2.4.22). The 2.6 kernel could result in better performance from your Linux desktop, support for additional devices, and a kernel that can scale efficiently

from hand-held devices to PCs to enterprise servers. Chapter 27 contains a more complete description of 2.6 kernel features.

ALSA Sound System

The ALSA sound system replaces the OSS sound system used in Fedora Core 1 and previous versions of Red Hat Linux. See Chapter 8 for information on features in the ALSA sound system.

Security Enhanced Linux

Security Enhanced Linux (SELinux), added in Fedora Core 2 and enhanced in Fedora Core 3, represents a new model for managing the security of your Linux system. When SELinux is enabled, a set of policies is used to define the permissions that users and processes have to manipulate different components of the operating system.

SELinux is turned on by default, with the *targeted* policy enabled. The targeted policy provides a contained, useful set of rules that are used to protect the system from infiltration through a common set of daemon processes. So, for example, if someone were to infiltrate the computers Web server (httpd daemon), potential damage could be limited to a small set of files and processes on the system. A *strict* policy set (which is included by not enabled by default), provides a broader range of SELinux policies that can be useful for someone configuring their own secure system using SELinux.

To work with SELinux, a useful set of graphical tools called setools-gui has been added to Fedora Core 3. Those tools include seaudit (an audit log analysis tool) and seuserx (a system user manager for managing roles in SELinux). See Chapter 28 for further information on SELinux.

System config tools

Red Hat has renamed and continued to enhance its growing arsenal of graphical administrative tools. Since dropping the linuxconf and bypassing the Webmin graphical administrative interfaces, Red Hat has been steadily developing and adding its own administrative tools to its Fedora and Red Hat Linux distributions. As a result, a systems administrator can often skip running shell commands and editing plain-text configuration files to set up servers, manage system resources, or add users.

The following list provides an overview of GUI administration tools and what each is used to configure:

- **system-config-bind** — Domain Name System server
- **system-config-boot** — Change boot loader settings
- **system-config-date** — System time and date
- **system-config-display** — Configure the X display, monitor and video card

- **system-config-httpd** — Apache Web server
- **system-config-keyboard** — Keyboard selection
- **system-config-kickstart** — Kickstart files for unattended Fedora Core installations
- **system-config-language** — Languages for Fedora
- **system-config-mouse** — A mouse
- **system-config-netboot** — Diskless environments and network installs
- **system-config-network** — Network interfaces
- **system-config-nfs** — Network File System shared directories
- **system-config-packages** — Fedora software packages
- **system-config-printer** — Printers
- **system-config-printer-gui** — Printers (GUI)
- **system-config-printer-tui** — Printers (text-based)
- **system-config-rootpassword** — Change your root password
- **system-config-samba** — Samba Windows file and printer sharing
- **system-config-securitylevel** — Iptables firewalls
- **system-config-services** — System services
- **system-config-soundcard** — Sound card
- **system-config-users** — User accounts
- **system-logviewer** — System log file viewer

You can launch the tools associated with the previous packages either from the main desktop menu or from a Terminal window. In most cases, the name of the command you run to launch the window is the same name as the package it comes in.

X and other desktop interfaces

Because of licensing issues, the XFree86 X server has been replaced by the X server from X.Org. Because most of the look-and-feel of the desktop is provided by the GNOME or KDE environment you choose (or other window manager you use with X), the new X server itself should not have much impact on how you use your desktop.

KDE and GNOME are desktop environments that provide a framework for running and developing graphical applications and offer a full range of preferences to allow users to tailor the exact desktop look-and-feel. The new GNOME version 2.8, in particular, has many look-and-feel changes over the version delivered with earlier Red Hat Linux systems. For example, the Nautilus window has been streamlined, and double-clicking the title bar does a maximize behavior instead of a window scroll. Refer to Chapter 3 for descriptions of how the new

GNOME behaves differently (and how to change back to some of the previous GNOME defaults, if you are so inclined).

Unlike previous releases of Fedora and Red Hat Linux, you have to work a bit to get the KDE desktop. If you choose to install Fedora Core as a Personal Desktop or Workstation system, you get the GNOME desktop by default. You must specifically ask to install additional packages to get KDE. By default, it is only included in an Everything install.

Fedora Core 3 offers new versions of the GNOME (2.8) and KDE (3.3) desktop environments. You can read about X, GNOME, and KDE in Chapter 3.

More software packages

By far, most of the enhancements to Fedora Core over previous versions of Red Hat Linux have come in existing packages. For a complete list of software packages in Fedora Core 3, refer to Appendix B. There are also dozens of new packages added to Fedora Core 3, however. Here are some examples:

- **bzflag** — A 3D multiplayer tank battle game you can play against other on a network
- **dasher** — Text-entry interface made for those who cannot operate a keyboard
- **diskcheck** — Utility to monitor space available on your hard drive
- **evolution-connector** — Contains important enhancement to Evolution e-mail client to allow it to connect with Microsoft Exchange Servers
- **exim** — Popular mail transport agent (like sendmail or postfix)
- **firefox** — Leading-edge Web browser from the Mozilla project
- **gnome-keyring-manager** — Contains tools for managing password and other secret information stored on your keyring
- **gnome-nettool** — Contains the graphical Network Tools window for monitoring network interfaces
- **gnome-volume-manager** — Contains tools for monitoring and mounting removable media
- **HelixPlayer** — Contains the Helix Player applications for playing a variety of audio and video content
- **kdeedu** — Educational, entertaining applications for the KDE desktop
- **openswan** — Virtual private network software, baed on the FreeS/WAN project
- **thunderbird** — New e-mail client from the Mozilla project
- **tree** — Contains the tree utility, to recursively display the contents of directory in a tree format (this is a port of the DOS tree utility)
- **ttcp** — Contains the ttcp tool for testing the performance of TCP and UDP protocols

- **usbview** — Contains the usbview tool for displaying information about device connected to your USB bus
- **vino** — A VNC server for GNOME

The Culture of Free Software

I would be remiss to not say something about the culture of free software development from which Linux has thrived and will continue to thrive. The copyright for Fedora and other Red Hat Linux systems is covered under the GNU public license. That license, which most free software falls under, provides the following:

- **Author rights** — The original author retains the rights to his or her software.
- **Free distribution** — People can use the GNU software in their own software, changing and redistributing it as they please. They do, however, have to include the source code with their distribution (or make it easily available).
- **Copyright maintained** — Even if you were to repackage and resell the software, the original GNU agreement must be maintained with the software. This means that all future recipients of the software must have the opportunity to change the source code, just as you did.

It is important to remember that there is no warranty on GNU software. If something goes wrong, the original developer of the software has no obligation to fix the problem. However, the Linux culture has provided resources for that event. Experts on the Internet can help you iron out your problems, or you can access one of the many Linux newsgroups to read how others have dealt with their problems and to post your own questions about how to fix yours. Chances are that someone will know what to do — maybe even going so far as to provide the software or configuration file you need.

NOTE: The GNU project uses the term *free software* to describe the software that is covered by the GNU license. On occasion, you may see the term *open-source software* being used to describe software. Though source code availability is part of the GNU license, the GNU project claims that software defined as open source is not the same as free software because it can encompass semi-free programs and even some proprietary programs. See `www.opensource.org` for a description of open-source software.

Summary

Linux is a free computer operating system that was created by Linus Torvalds in 1991 and has grown from contributions from software developers all over the world. Fedora Core and Red Hat Enterprise versions of Red Hat Linux are distributions of Linux that package together the software needed to run Linux and make it easier to install and use.

This book specifically describes Fedora Core 3, a complete version of which is included on the DVD that come with this book. Fedora Core includes cutting-edge Linux technology that is

slated for inclusion in commercial Red Hat Linux systems. Features in Fedora Core 3 include a simplified installation procedure, RPM Package Management (RPM) tools for managing the software, and easy-to-use GNOME and KDE desktop environments. You can get Fedora Core from the Internet or from distributions that come with books such as this one.

Linux is based on a culture of free exchange of software. Linux's roots are based in the UNIX operating system. UNIX provided most of the framework that was used to create Linux. That framework came from the POSIX standard, the System V Interface Definition, and the Berkeley Software Distribution, pieces of which have all found their way into Linux.