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Starting with Fedora Linux

Whether you use Fedora Linux every day or just tweak it once in a while, a book that presents efficient ways to use, check, fix, secure, and enhance your system can be an invaluable resource. *Fedora Linux Toolbox* is that resource.

*Fedora Linux Toolbox* is aimed primarily at Fedora and Red Hat Enterprise Linux power users and systems administrators. To give you what you need, we tell you how to quickly locate and get software, monitor the health and security of your systems, and access network resources. In short, we cut to the most efficient ways of using Fedora.

Our goal with *Fedora Linux Toolbox* is to pack a lot of useful information for using Fedora Linux into a small package that you can carry around with you. To that end, we describe:

- **Commands** — Tons of command line examples to use Fedora in helpful and clever ways.
- **GUI tools** — Quick pointers to graphical administration tools to configure your system.
- **Software repositories** — Short procedures to find and download thousands of applications.
- **Online resources** — Listings of the best locations to find Fedora forums, mailing lists, IRC channels, and other online resources.
- **Local documentation** — Tools for gathering more information from man pages, doc directories, help commands, and other resources on your Fedora system.

Because you’re not a beginner with Linux, you won’t see a lot of screenshots of windows, icons, and menus. What you will see, however, is the
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quickest path to getting the information you need to use your Fedora Linux system to its fullest extent.

If this sounds useful to you, please read on.

About Fedora, Red Hat, and Linux

Fedora is a Linux operating system that is sponsored by Red Hat, Inc. Its roots come from Red Hat Linux, which ended its development life under that name in 2003. At that time, Red Hat transitioned its single Red Hat Linux distribution into Fedora Core (now called simply Fedora) and Red Hat Enterprise Linux.

- **Fedora** ([http://fedoraproject.org](http://fedoraproject.org)) became the community-driven, rapid-development operating system that was distributed for free (as is) every six to nine months. The goal was to stay on the cutting edge of open source technology, while also providing a development platform for enterprise-quality software that could become part of Red Hat Enterprise Linux.

- **Red Hat Enterprise Linux** (RHEL) became the commercial, subscription-based Linux operating system produced by Red Hat, Inc. ([www.redhat.com](http://www.redhat.com)). The goal was to release RHEL on about an 18-month schedule. Red Hat has since built its product line around RHEL, offering support, training, documentation, hardware certification, and other products to support RHEL customers. In 2006, Red Hat purchased the open source Java development vendor JBoss, so Red Hat can now offer a complete application stack composed of middleware running on top of its RHEL product line.

Because Fedora and RHEL are open source operating systems, built on the GNU public license, people can take the source code from those Linux systems and create their own Linux distributions. And that’s just what they have done. For that reason, the skills you learn here with Fedora could also help you if you use any of the following operating systems:

- **CentOS** ([www.centos.org](http://www.centos.org)) — Many Linux consultants who don’t need Red Hat’s commercial support and don’t want to pay Red Hat subscription fees have migrated to CentOS. CentOS is a rebuild of RHEL source code, with a goal of 100-percent binary compatibility with RHEL.

  Aside from logos and other Red Hat branding information (which CentOS removed), applications and interfaces should be exactly the same for CentOS and RHEL. Of all the RHEL rebuilds, CentOS is the one most widely adopted and the one we recommend.

- **Yellow Dog Linux** ([www.yellowdoglinux.com](http://www.yellowdoglinux.com)) — Based originally on Red Hat Linux, Yellow Dog Linux runs on a variety of Apple hardware (PowerBook, iBook, iMac, G3, G4, G5, and so on) as well as on PlayStation 3.
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- **Other RHEL and Fedora rebuilds** — Other rebuilds of RHEL include Lineox ([www.lineox.net](http://www.lineox.net)) from Finland and Scientific Linux ([www.scientificlinux.org](http://www.scientificlinux.org)), which was created by Fermilab of the U.S. Department of Energy. Linux distributions such as those just mentioned were created primarily to allow an organization that once relied on Red Hat Linux to roll their own enterprise-quality distribution for their organization’s needs.

There is a larger list of Linux distributions built on Fedora and RHEL at DistroWatch ([http://distrowatch.com/dwres.php?resource=independence](http://distrowatch.com/dwres.php?resource=independence)). Other Linux systems also have drawn heavily from technology developed at least in part by Red Hat. For example, distributions such as Mandriva, PCLinuxOS, and Linspire use the RPM package management system described in this book for managing software packages, so descriptions of rpm in Chapter 2 will help you with Mandriva, PCLinuxOS, and Linspire as well.

**Comparing Fedora to Other Linuxes**

Fedora is the rapid-development, cutting edge Linux system, as compared with the more stable, less-often-updated Red Hat Enterprise Linux. The speed at which Fedora is developed (with a new release about every six months) makes it perfect for the Linux enthusiast who wants the latest releases of software and can deal with some level of instability.

Using Fedora Linux might be the best way to learn Linux if you have an eye toward becoming a Linux professional. With its short development cycle, you can be assured that you have the newest cool features to use. Because Red Hat uses Fedora as a platform for testing its commercial software, the skills you learn will scale up nicely to the largest enterprise computing environments.

Besides Red Hat, Novell is the other major corporation that is marketing Linux in the enterprise market. Novell’s operating systems follow the same basic dual-distribution model, with SUSE Linux Enterprise as the basis of its commercial products and OpenSUSE as its free, community-driven Linux system. Some open source enthusiasts, however, question Novell’s long-term commitment to open source because of its 2006 “covenant not to sue” with Microsoft (see [www.novell.com/linux/microsoft/covenant.html](http://www.novell.com/linux/microsoft/covenant.html)).

Debian is considered to be a high-quality Linux distribution with a strong commitment to the ideals of open source software. Many derivative Linux distributions, such as the popular Ubuntu Linux and the KNOPPIX live CD, are based on Debian. Although Debian is good for use in small business, the project doesn’t have the same enterprise infrastructure (training, support, documentation, and so on) that is built around RHEL. However, Ubuntu has begun offering paid enterprise-level support contracts ([www.ubuntu.com/support/paid](http://www.ubuntu.com/support/paid)).
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Finding Fedora Resources

The center for information about the Fedora project is the FedoraProject.org web site (http://fedoraproject.org/wiki). This is the official site for the Fedora project. Particularly useful pages from this site include the following:

- fedoraproject.org/wiki/Communicate — From the Communicating and Getting Help page, follow links to documentation, FAQs, bug reporting, mailing lists, IRC chats, forums, and community web sites.

- fedoraproject.org/wiki/Distribution — Links to information for downloading or purchasing Fedora installation CDs or DVDs are listed on this site. Some links also take you to details on upgrading and life cycles of each Fedora release.

- fedoraproject.org/wiki/FAQ — This FAQ contains excellent information on how to start with Fedora, use it, get help and support, and understand the parts that make up the Fedora project. This is also the first place to go for questions on hardware compatibility and on what software is and isn’t included in Fedora.

- fedoraproject.org/wiki/ForbiddenItems — Software that is available for Linux, but not included in Fedora because it does not meet Fedora’s requirements relating to legal restrictions or source code availability, is listed on this page. We indicate how you can legally get some of these items in appropriate sections of this book.

- fedoraproject.org/wiki/Bugs/FC6Common — Problems you may encounter that have not yet been fixed are described on this page. There is also information on getting update disks that include software fixes.

Fedora Community Connections

If you want to communicate with the Fedora community, Table 1-1 shows a quick list of links to the most useful Fedora and RHEL communications venues.

Table 1-1: Online Resources to Connect to the Fedora Community

<table>
<thead>
<tr>
<th>Fedora Activities</th>
<th>Internet Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mailing lists</td>
<td><a href="http://www.redhat.com/mailman/listinfo">www.redhat.com/mailman/listinfo</a></td>
</tr>
<tr>
<td>IRC chats</td>
<td>fedoraproject.org/wiki/Communicate#IRC</td>
</tr>
<tr>
<td>Forums</td>
<td>FedoraForum.org</td>
</tr>
<tr>
<td>Communities</td>
<td>FedoraFaq.org</td>
</tr>
<tr>
<td></td>
<td>fcp.surfsite.org</td>
</tr>
<tr>
<td></td>
<td>FedoraUnity.org</td>
</tr>
<tr>
<td></td>
<td>FedoraSolved.org</td>
</tr>
</tbody>
</table>
Table 1-1: Online Resources to Connect to the Fedora Community (continued)

<table>
<thead>
<tr>
<th>Fedora Activities</th>
<th>Internet Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>News</td>
<td>FedoraNEWS.org</td>
</tr>
<tr>
<td>Social Networks</td>
<td>groups.myspace.com/fedoraproject</td>
</tr>
<tr>
<td></td>
<td><a href="http://www.frappr.com/fedora">www.frappr.com/fedora</a></td>
</tr>
<tr>
<td></td>
<td><a href="http://www.flickr.com/groups/fedora">www.flickr.com/groups/fedora</a></td>
</tr>
</tbody>
</table>

Fedora Software

Before Fedora 7, development of Fedora software consisted of the basic operating system (Fedora Core) and contributed outside packages (Fedora Extras). With the merge of Fedora Core and Fedora Extras software into one massive repository simply named Fedora, you can now go to one location to get all the software projects that have been packaged to run on Fedora Linux (see http://fedoraproject.org/get-fedora.html).

Sites that offer software packages built for Fedora that are outside the Fedora project jurisdiction include http://rpm.livna.org, http://atrpms.net, http://freshrpms.net, and http://dag.wieers.com/rpm. Information on how to use these and other Fedora software repositories is contained in Chapter 2.

Focusing on Linux Commands

These days, many important tasks in Linux can be done from both graphical interfaces and from commands. However, the command line has always been, and still remains, the interface of choice for Linux power users.

Graphical user interfaces (GUIs) are meant to be intuitive. With some computer experience, you can probably figure out, for example, how to add a user, change the time and date, and configure a sound card from a GUI. For these cases, we’ll mention which graphical tool you could use for the job. For the following cases, however, you will probably need to rely on the command line:

- **Almost any time something goes wrong** — Ask a question at an online forum to solve some Linux problem you are having and the help you get will almost always come in the form of commands to run. Also, command line tools typically offer much more feedback if there is a problem configuring a device or accessing files and directories.

- **Remote systems administration** — If you are administering a remote server, you may not have graphical tools available. Although remote GUI access (using X applications or VNC) and web-based administration tools may be available, they usually run more slowly than what you can do from the command line.
Features not supported by GUI — GUI administration tools tend to present the most basic ways of performing a task. More complex operations often require options that are only available from the command line.

GUI is broken or not installed — If no graphical interface is available, or if the installed GUI isn’t working properly, you may be forced to work from the command line. Broken GUIs can happen for lots of reasons, such as when you use a third-party, binary-only driver from NVIDIA or ATI and a kernel upgrade makes the driver incompatible.

The bottom line is that to unlock the full power of your Linux system, you must be able to use shell commands. Thousands of commands are available for Linux to monitor and manage every aspect of your Linux system.

But whether you are a Linux guru or novice, one challenge looms large. How do you remember the most critical commands and options you need, when a command shell might only show you this:

Fedora Linux Toolbox is not just another command reference or rehash of man pages. Instead, this book presents commands in Fedora Linux by the way you use them. In other words, instead of listing commands alphabetically, we group commands for working with file systems, connecting to networks, and managing processes in their own sections, so you can access commands by what you want to do, not only by how they’re named.

Likewise, we won’t just give you a listing of every option available for every command. Instead, we’ll show you working examples of the most important and useful options to use with each command. From there, we’ll tell you quick ways to find more options, if you need them, from man pages, the info facility, and help options.

Finding Commands

Some of the commands described in this book may not be installed when you go to run them. You might type a command and see a message similar to:

bash: mycommand: command not found

This might happen for the following reasons:

- You mistyped the command name.
- The command is not in your PATH.
- You may need to be the root user for the command to be in your PATH.
- The command is not installed on your computer.
Table 1-2 shows some commands you can run to look for a command you want to use.

### Table 1-2: Finding Commands

<table>
<thead>
<tr>
<th>Command and Sample Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ type mount</td>
<td>mount is hashed (/bin/mount) Show the first mount command in PATH.</td>
</tr>
<tr>
<td>$ locate bash.ps</td>
<td>Find bash.ps anywhere in the file system.</td>
</tr>
<tr>
<td>$ which umount</td>
<td>/bin/umount Find the umount command anywhere in your PATH or aliases.</td>
</tr>
<tr>
<td>$ rpm --qal</td>
<td>grep umount</td>
</tr>
<tr>
<td>$ yum whatprovides bzfs</td>
<td>... bzflag.i386 2.0.8-4.fc7 extras Matched from: /usr/bin/bzfs /usr/share/man/man6/bzfs.6.gz Find bzfs in the bzflag package.</td>
</tr>
</tbody>
</table>

If you suspect that the command you want is not installed, you can search your Fedora repositories for terms that might be in the description of the package it contains. If you find the right package (for example, bzflag) and it isn’t installed, install it from the Internet as root by typing the following:

```bash
# yum search "capture-the-flag"
Searching Packages:
Setting up repositories
Reading repository metadata in from local files

bzflag.i386 2.0.8-4.fc7 fedora
Matched from:
BZflag is a 3D multi-player tank battle game that allows users to play...
...
There are two main styles of play: capture-the-flag and free-for-all.
# yum install bzflag
```
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Command Reference Information in Fedora

Original Linux and UNIX documentation was all done on manual pages, generally referred to as man pages. A slightly more sophisticated documentation effort came a bit later with the info facility. Within each command itself, help messages are almost always available.

This reference information is component oriented — in other words, there are separate man pages for nearly every command, file format, system call, device, and other component of a Linux system. Documentation more closely aligned to whole software packages is typically stored in a subdirectory of the /usr/share/doc directory.

All three reference features — man pages, info documents, and help messages — are available in Fedora.

Using help Messages

The -h or --help options are often used to display help messages for a command. The following example illustrates how to display help for the ls command:

```bash
$ ls --help | less
```

Usage: ls [OPTION]... [FILE]...
List information about the FILEs (the current directory by default).
Sort entries alphabetically if none of -cftuSUX nor --sort.

Mandatory arguments to long options are mandatory for short options.
- a, --all                  do not hide entries starting with .
- A, --almost-all           do not list implied . and ..
...

The preceding output shows how the ls command line is used and lists available options. Piping the output to the less command lets you page through it. You can format the help messages into a reference card using the card command. For example:

```bash
$ card ls --output=/tmp/ls.ps
$ lpr ls.ps
```

The result shown here is a file named ls.ps that you can open in a PostScript document reader (such as evince) to view the card. (Select View ➪ Rotate Right to view the card properly.) You can use the lpr command to print the card or, if you don’t use the --output option, it is sent to your default printer automatically.

Using man Pages

Suppose you want to find man pages for commands related to a certain word. Use the apropos command to search the man page database. This shows man pages that have crontab in the man page NAME line:

```bash
$ apropos crontab
...
```
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/etc/anacrontab [anacrontab] (5) - configuration file for anacron
crontab (1) - maintain crontab files for individual users (ISC Cron V4.1)
crontab (1p) - schedule periodic background work
crontab (5) - tables for driving cron (ISC Cron V4.1)
crontabs (rpm) - Root crontab files used to schedule the execution of programs.
...

The `apropos` output here shows each man page NAME line that contains `crontab`. The number shows the man page section in which the man page appears. (We discuss sections shortly.)

The `whatis` command is a way to show NAME lines alone for commands that contain the word you enter:

```
$ whatis cat
  cat        (1)  - concatenate files and print on the standard output
  cat        (1p) - concatenate and print files
```

The easiest way to display the man page for a term is with the `man` command and the command name. For example:

```
$ man find
FIND(1)

NAME
  find - search for files in a directory hierarchy

SYNOPSIS
  find [-H] [-L] [-P] [path...] [expression]
...
```

The preceding command displays the first man page found for the `find` command. As you saw in the earlier example, some terms have multiple man pages. For example, there is a man page for the `crontab` command and one for the `crontab` files.

Man pages are organized into sections, as shown in Table 1-3.

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General user commands</td>
</tr>
<tr>
<td>2</td>
<td>System calls</td>
</tr>
<tr>
<td>3</td>
<td>Programming routines / library functions</td>
</tr>
<tr>
<td>4</td>
<td>Special files</td>
</tr>
</tbody>
</table>

Table 1-3: man Page Sections

Continued
The following code shows some other examples of useful options with the `man` command.

```
$ man mount -a                      Shows all man pages related to component
$ man 5 crontab                    Shows section 5 man page for component
$ man mount -P more                Use more, not less to page through
$ man --path                       List locations of man directories
/usr/kerberos/man:/usr/local/share/man:/usr/share/man/en:
/usr/share/man:/usr/X11R6/man:/usr/local/man
$ man -f mount                     Same as the whatis command
$ man -k mount                     Same as the apropos command
```

Over the years, more ways of displaying and working with man pages have developed. For example, you can convert a man page into a web page (HTML) using the `man2html` command. For example:

```
$ whereis -m cat
  cat: /usr/share/man/man1/cat.1.gz /usr/share/man/manlp/cat.1p.gz
$ cd /tmp ; cp /usr/share/man/man1/cat.1.gz .
$ gunzip cat.1.gz
$ man2html cat.1 > cat.1.html
$ links cat.1.html
```

The first command looks for the `cat` man page. The following commands copy that man page to the `/tmp` directory and unzip it. Next the `man2html` command converts the man page to HTML (`cat.1.html` file). The `links` command-line web browser then lets you view the webified man page from the shell. (You may need to install the `elinks` package to use the `links` or `elinks` text-based web browsers.)

Man pages are also available on the Internet. A nicely organized reference site is [http://linuxmanpages.com](http://linuxmanpages.com).

### Using info Documents

In some cases, developers have put more complete descriptions of commands, file formats, devices, or other Linux components in the info database. You can enter the
info database by simply typing the `info` command or by opening a particular component:

```
$ info ls
```

The previous command shows information on the `ls` command. Use up, down, left, and right arrows and Page Up and Page Down to move around the screen. Home and End keys go to the beginning and end of a node, respectively. When you are displaying the info screen, you can get around using the keystrokes shown in Table 1-4.

### Table 1-4: Moving Through the info Screen

<table>
<thead>
<tr>
<th>Keystroke</th>
<th>Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Display the basic commands to use in info windows.</td>
</tr>
<tr>
<td>Shift+l</td>
<td>Go back to the previous node you were viewing.</td>
</tr>
<tr>
<td>n, p, u</td>
<td>Go to the node that is next, previous, or up.</td>
</tr>
<tr>
<td>Tab</td>
<td>Go to the next hyperlink that is in this node.</td>
</tr>
<tr>
<td>Enter</td>
<td>Go to the hyperlink that is under the cursor.</td>
</tr>
<tr>
<td>Shift+r</td>
<td>Follow a cross-reference.</td>
</tr>
<tr>
<td>Shift+q</td>
<td>Quit and exit from info.</td>
</tr>
</tbody>
</table>

Software packages that have particularly extensive text available in the info database include gimp, festival, libc, automake, zsh, sed, tar, and bash. Files used by the info database are stored in the `/usr/share/info` directory.

### Summary

Although you certainly can read this book from cover to cover if you like, the book is designed to be a reference to hundreds of features in Fedora Linux that are most useful to power users and systems administrators. Because information is organized by topic, instead of alphabetically, you don’t have to know the commands in advance to find what you need to get the job done.

Most of the features described in this book will work equally well in Fedora, Red Hat Enterprise Linux, CentOS, and other Linux systems based on technology from Red Hat, Inc. In fact, many of the commands described here are in such widespread use that you could use them exactly as described here on most Linux and UNIX systems.

The next chapter describes how to get and install Fedora Linux software.