
Fedora Core 6

Release Notes



Fedora Documentation Project

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1. Welcome to Fedora Core

Fedora is a set of projects sponsored by Red Hat and guided by the contributors. These projects are developed by a large community of people who strive to provide and maintain the very best in free, open source software and standards. Fedora Core, the central Fedora project, is an operating system and platform based on Linux which is always free for anyone to use, modify, and distribute, now and forever.



Latest Release Notes on the Web

These release notes may be updated. Visit <http://fedora.redhat.com/docs/release-notes/> to view the latest release notes for Fedora Core 6.

You can help the Fedora Project community continue to improve Fedora if you file bug reports and enhancement requests. Refer to <http://fedoraproject.org/wiki/BugsAndFeatureRequests> for more information about bugs. Thank you for your participation.

To find out more general information about Fedora, refer to the following Web pages:

- Fedora Overview (<http://fedoraproject.org/wiki/Overview>)
- Fedora FAQ (<http://fedoraproject.org/wiki/FAQ>)
- Help and Support (<http://fedoraproject.org/wiki/Communicate>)
- Participate in the Fedora Project (<http://fedoraproject.org/wiki/HelpWanted>)
- About the Fedora Project (<http://fedora.redhat.com/About/>)



Document Links

If you are reading these release notes during the Fedora Core installation process, many links may not work properly. The release notes are also available post-installation as part of the desktop Web browser's default home page. If you are connected to the internet, use these links to find other helpful information about Fedora and the community that creates and supports it.

2. Release Highlights

2.1. Fedora Core 6 Tour

You can find a tour filled with pictures and videos of this exciting new release at <http://fedoraproject.org/wiki/Tours/FedoraCore6>.

2.2. New in Fedora Core 6

This release includes significant new versions of many key components and technologies. The following sections provide a brief overview of major changes from the last release of Fedora Core.

2.2.1. Desktop

- This release has an improved look and feel for various international languages, with a new *DejaVu*¹ default font.
- The **Compiz** window manager provides better visual feedback and a variety of desktop effects by using the AIGLX framework. More information is available from the *Fedora Rendering Project*².
- This release features an update applet called **puplet** that provides user notifications when software updates are available. For more information, refer to <http://fedoraproject.org/wiki/YumApplet>.
- This release includes a completely rewritten and enhanced *system-config-printer*³ that uses the latest CUPS 1.2. More technical details are available at <http://fedoraproject.org/wiki/Printing/AdminToolOutline> and <http://fedoraproject.org/wiki/Printing/AdminToolSpecifics>.
- This release features *GNOME 2.16*⁴ and KDE 3.5.4.
- Fedora Core 6 includes a refreshing new "DNA" theme, which is part of a continuous team effort from the *Fedora Artwork Project*⁵.
- This release includes *Dogtail*⁶ which provides a graphical test and automation framework for the desktop.

- This release features the [GnuCash 2.0](#)⁷ accounting application, which provides major new features and interface improvements. For more information, refer to [GnuCash Features](#)⁸.
- **Helix Player** has been moved to Fedora Extras, since the included **Totem** media player provides similar functionality.

2.2.2. Performance

- All Fedora Core applications have been rebuilt using `DT_GNU_HASH`⁹, which provides up to a 50% [performance boost](#)¹⁰ on applications using dynamic linking.
- IMAP support for the **Evolution** personal information manager is much improved in this release.
- This release improves performance and manageability by splitting up package dependencies in a much more granular way. Affected packages include *beagle*, *evince*, and *NetworkManager*. For more information on these and other related changes, refer to [Section 6, “Package Notes”](#).
- In this release, the performance of **yum**, **Pirut**, and **Pup** has been significantly improved.
- [Fontconfig 2.4](#)¹¹ improves startup performance and memory footprint significantly.
- The performance of the Fedora's default ext3 filesystem has been [boosted](#)¹² in recent versions of the Linux kernel.
- A new background service caches and increases the performance of network filesystems such as AFS and NFS. This service is part of the ongoing [CacheFS development](#)¹³ by Red Hat.
- CUPS printing service starts much more faster since it now detects devices on demand.

2.2.3. System Administration

- The Fedora installer, **Anaconda**, can now connect to additional repositories such as Updates and Fedora Extras, and users can install applications from these repositories directly. Support for Fedora Extras is included by default on network-connected interactive installs.
- **Anaconda** also now supports IPv6.
- This release features a new virtualization manager, [virt-manager](#)¹⁴, which adds a graphical management interface layer on top of **Xen**.
- This release increases usability of SELinux by providing a [graphical troubleshooting tool](#)¹⁵ and enhancements to the **Nautilus** file manager.
- Fedora now features integrated smart card capabilities, for secure authentication out of the box using the new [CoolKey](#)¹⁶ system.
- This release introduces a new tool, **lvm2-cluster**, for intuitively managing cluster volumes.

2.2.4. System Level Changes

- Fedora Core 6 features a 2.6.18 based kernel. There are no longer separate kernels for SMP and UP processors on any architecture. A single kernel now automatically detects your processor configuration and enables the proper bits for it.

- **X.org 7.1** now dynamically configures monitor resolution and refresh rates to limit the amount of required user configuration.
- This release supports *Apple Macintosh systems*¹⁷ running the new Intel processors.
- This release includes better i18n support using the default **SCIM** input method, including more languages such as Sinhalese (Sri Lanka) and Oriya, Kannada, and Malayalam (India). Fedora now provides an easy interface to switch the input methods using **im-chooser**.
- The **GNOME 1.x** legacy stack has been removed from Fedora Core, and added to Fedora Extras.

2.3. Road Map

The proposed plans for the next release of Fedora are available at <http://fedoraproject.org/wiki/RoadMap>.

3. Feedback

Thank you for taking the time to provide your comments, suggestions, and bug reports to the Fedora community. By doing so, you help improve the state of Fedora, Linux, and free software worldwide.

3.1. Providing Feedback on Fedora Software

To provide feedback on Fedora software or other system elements, please refer to <http://fedoraproject.org/wiki/BugsAndFeatureRequests>. A list of commonly reported bugs and known issues for this release is available from <http://fedoraproject.org/wiki/Bugs/FC6Common>.

3.2. Providing Feedback on Release Notes



Feedback for Release Notes Only

This section concerns feedback on the release notes themselves.

If you feel these release notes could be improved in any way, you can provide your feedback directly to the beat writers. Here are several ways to do so, in order of preference:

- If you have a Fedora account, edit content directly at <http://fedoraproject.org/wiki/Docs/Beats>
- Fill out a bug request using this template: <http://tinyurl.com/nej3u> - **This link is ONLY for feedback on the release notes themselves**
- Email relnotes@fedoraproject.org¹⁸

4. Installation Notes



Fedora Installation Guide

For information on how to install Fedora Core, refer to <http://fedora.redhat.com/docs/install-guide/>.

Anaconda is the name of the Fedora Installer. This section outlines those issues that are related to **Anaconda** (the Fedora Core installation program) and installing Fedora Core 6.



Downloading Large Files

If you intend to download the Fedora Core 6 DVD ISO image, keep in mind that not all file downloading tools can accommodate files larger than 2 GiB in size. **wget** 1.9.1-16 and above, **curl** and **ncftpget** do not have this limitation, and can successfully download files larger than 2 GiB. **BitTorrent** is another method for downloading large files. For information about obtaining and using the torrent file, refer to <http://torrent.fedoraproject.org/>.

Anaconda tests the integrity of installation media by default. This function works with the CD, DVD, hard drive ISO, and NFS ISO installation methods. The Fedora Project recommends that you test all installation media before starting the installation process, and before reporting any installation-related bugs. Many of the bugs reported are actually due to improperly-burned CDs. To use this test, type **linux mediacheck** at the **boot:** prompt presented at the start of installation.

The **mediacheck** function is highly sensitive, and may report some usable discs as faulty. This result is often caused by disc writing software that does not include padding when creating discs from ISO files. For best results with **mediacheck**, boot with the following option:

```
linux ide=nodma
```

After you complete the **mediacheck** function successfully, reboot to return DMA mode to its normal state. On many systems this results in a faster installation process from disc. You may skip the **mediacheck** option when rebooting.

Use the **sha1sum** utility to verify discs before carrying out an installation. This test accurately identifies discs that are not valid or identical to the ISO image files.



BitTorrent Automatically Verifies File Integrity

If you use **BitTorrent**, any files you download are automatically validated. If your file completes downloading, you do not need to check it. Once you burn your CD, however, you should still use **mediacheck**.

You may perform memory testing before you install Fedora Core by entering **memtest86** at the **boot:** prompt. This option runs the **Memtest86** standalone memory testing software in place of **Anaconda**. **Memtest86** memory testing continues until the **Esc** key is pressed.



Memtest86 Availability

You must boot from Installation Disc 1 or a rescue CD in order to use this feature.

Fedora Core 6 supports graphical FTP and HTTP installations. However, the installer image must either fit in RAM or appear on local storage such as Installation Disc 1. Therefore, only systems with more than 192MiB of RAM, or which boot from Installation Disc 1, can use the graphical installer.

Systems with 192MiB RAM or less fall back to using the text-based installer automatically. If you prefer to use the text-based installer, type **linux text** at the **boot:** prompt.

4.1. Changes in Anaconda

- **Anaconda** now features the ability to install packages from Fedora Extras or any custom **yum**-compatible software repository. Fedora Extras is available by default on interactive installs with network connectivity.



Yum Repository Support

Only HTTP and FTP repositories are supported; repositories on CDs or NFS are not currently supported.

- You can now use the installer to generate a Live CD for Kadischi. Refer to <http://fedoraproject.org/wiki/Kadischi/> for more details.
- **Anaconda** uses SquashFS to compress and store packages on images.
- **Anaconda** now supports installation using IPv6.
- **Anaconda** now supports installation from *FireWire*¹⁹ and USB storage devices.
- **Anaconda's** backend, **yum**, has been updated to 2.9.x.
- The installer provides enhanced support for the ppc64 architecture.
- The installer now supports Apple Macintosh systems with Intel processors.
- The installer now supports multipathing.
- Vera fonts are retired and replaced by *DejaVu*²⁰ as default for the installer.
- The installer is now translated in Greek, Kannada, Malayalam, Marathi and Oriya.

4.2. Kickstart Changes

Three new kickstart keywords have been added.

repo --name=<repoid> [--baseurl=<url>|--mirrorlist=<url>]

repo specifies additional package repositories to use for installation. **baseurl** specifies the URL for the repository, while **mirrorlist** specifies a list of mirrors. One and only one of these options may be specified per repository definition.

services [--disabled=<list>] [--enabled=<list>]

services modifies the default set of services that are started in the default runlevel. **enabled** and **disabled** take comma-separated lists, with **enabled** services taking priority.

user --name=<username> [--groups=<list>] [--homedir=<homedir>] [--password=<password>] [--iscrypted] [--shell=<shell>] [--uid=<uid>]

user creates a new user with the specified parameters. **name** is required; all other parameters are optional.

More documentation on `kickstart` is available in the *anaconda* package. To install it, run the command `su -c 'yum install anaconda'` and read the `/usr/share/doc/anaconda*/kickstart-docs.txt` file for more information.

4.3. Installation Related Issues

4.3.1. Sony VAIO Notebooks

Some Sony VAIO notebook systems may experience problems installing Fedora Core from CD-ROM. If this happens, restart the installation process and add the following option to the boot command line:

```
pci=off ide1=0x180,0x386
```

Installation should proceed normally, and any devices not detected are configured the first time Fedora Core is booted.

4.3.2. IDE RAID

Not all IDE RAID controllers are supported. If your RAID controller is not yet supported by **dmraid**, you may combine drives into RAID arrays by configuring Linux software RAID. For supported controllers, configure the RAID functions in the computer BIOS.

4.3.3. Multiple NICs and PXE Installation

Some servers with multiple network interfaces may not assign `eth0` to the first network interface as BIOS knows it, which can cause the installer to try using a different network interface than was used by PXE. To change this behavior, use the following in **pxelinux.cfg/*** config files:

```
IPAPPEND 2
APPEND ksdevice=bootif
```

The configuration options above cause the installer to use the same network interface as BIOS and PXE use. You can also use the following option:

```
ksdevice=link
```

This option causes the installer to use the first network device it finds that is linked to a network switch.

4.4. Upgrade Related Issues

Refer to <http://fedoraproject.org/wiki/DistributionUpgrades> for detailed recommended procedures for upgrading Fedora.

In general, fresh installations are recommended over upgrades, particularly for systems that include software from third-party repositories. Third-party packages remaining from a previous installation may not work as expected on an upgraded Fedora system. If you decide to perform an upgrade anyway, the following information may be helpful:

- Before you upgrade, back up the system completely. In particular, preserve **/etc**, **/home**, and possibly **/opt** and **/usr/local** if customized packages are installed there. You may wish to use a

multi-boot approach with a "clone" of the old installation on alternate partition(s) as a fallback. In that case, create alternate boot media such as a GRUB boot floppy.



System Configuration Backups

Backups of configurations in `/etc` are also useful in reconstructing system settings after a fresh installation.

- After you complete the upgrade, run the following command:

```
rpm -qa --last > RPMS_by_Install_Time.txt
```

Inspect the end of the output for packages that pre-date the upgrade. Remove or upgrade those packages from third-party repositories, or otherwise deal with them as necessary.

5. Architecture Specific Notes

This section provides notes that are specific to the supported hardware architectures of Fedora Core.

5.1. RPM Multiarch Support on 64-bit platforms (x86_64, ppc64)

RPM supports parallel installation of multiple architectures of the same package. A default package listing such as **rpm -qa** might appear to include duplicate packages, since the architecture is not displayed. Instead, use the **repoquery** command, part of the *yum-utils* package in Fedora Extras, which displays architecture by default. To install *yum-utils*, run the following command:

```
su -c 'yum install yum-utils'
```

To list all packages with their architecture using **rpm**, run the following command:

```
rpm -qa --queryformat "%{name}-%{version}-%{release}-%{arch}\n"
```

You can add this to `/etc/rpm/macros` (for a system wide setting) or `~/.rpmmacros` (for a per-user setting). It changes the default query to list the architecture:

```
%_query_all_fmt          %%{name}-%{version}-%{release}-%{arch}
```

5.2. PPC Specifics for Fedora

This section covers any specific information you may need to know about Fedora Core and the PPC hardware platform.

5.2.1. PPC Hardware Requirements

5.2.1.1. Processor and Memory

- Minimum CPU: PowerPC G3 / POWER3

- Fedora Core 6 supports only the "New World" generation of Apple Power Macintosh, shipped from circa 1999 onward.
- Fedora Core 6 also supports IBM pSeries, IBM iSeries, IBM RS/6000, Genesi Pegasos II, and IBM Cell Broadband Engine machines.
- Recommended for text-mode: 233 MHz G3 or better, 128MiB RAM.
- Recommended for graphical: 400 MHz G3 or better, 256MiB RAM.

5.2.1.2. Hard Disk Space Requirements

The disk space requirements listed below represent the disk space taken up by Fedora Core 6 after installation is complete. However, additional disk space is required during installation to support the installation environment. This additional disk space corresponds to the size of **/Fedora/base/stage2.img** (on Installation Disc 1) plus the size of the files in **/var/lib/rpm** on the installed system.

In practical terms, additional space requirements may range from as little as 90 MiB for a minimal installation to as much as an additional 175 MiB for an installation that includes nearly all the packages. The complete installed packages can occupy over 9 GB of disk space.

Additional space is also required for any user data, and at least 5% free space should be maintained for proper system operation.

5.2.2. The Apple keyboard

The **Option** key on Apple systems is equivalent to the **Alt** key on the PC. Where documentation and the installer refer to the **Alt** key, use the **Option** key. For some key combinations you may need to use the **Option** key in conjunction with the **Fn** key, such as **Option+Fn+F3** to switch to virtual terminal tty3.

5.2.3. PPC Installation Notes

Fedora Core Installation Disc 1 is bootable on supported hardware. In addition, a bootable CD image appears in the **images/** directory of this disc. These images behave differently according to your system hardware:

- Apple Macintosh The bootloader automatically boots the appropriate 32-bit or 64-bit installer.

The default *gnome-power-manager* package includes power management support, including sleep and backlight level management. Users with more complex requirements can use the *apmud* package in Fedora Extras. To install *apmud* after installation, use the following command:

```
su -c 'yum install apmud'
```

- 64-bit IBM pSeries (POWER4/POWER5), current iSeries models

After using OpenFirmware to boot the CD, the bootloader, **yaboot**, automatically boots the 64-bit installer.

- IBM "Legacy" iSeries (POWER4)

So-called "Legacy" iSeries models, which do not use OpenFirmware, require use of the boot image located in the **images/iSeries** directory of the installation tree.

- 32-bit CHRP (IBM RS/6000 and others)

After using OpenFirmware to boot the CD, select the **linux32** boot image at the boot : prompt to start the 32-bit installer. Otherwise, the 64-bit installer starts and fails.

- Genesi Pegasos II

At the time of writing, firmware with full support for ISO9660 file systems has not yet been released for the Pegasos. You can use the network boot image, however. At the OpenFirmware prompt, enter the following command:

```
boot cd: /images/netboot/ppc32.img
```

You must also configure OpenFirmware on the Pegasos manually to make the installed Fedora Core system bootable. To do this, set the boot-device and boot-file environment variables appropriately.

- Network booting

Combined images containing the installer kernel and ramdisk are located in the **images/netboot/** directory of the installation tree. They are intended for network booting with TFTP, but can be used in many ways.

The **yaboot** loader supports TFTP booting for IBM pSeries and Apple Macintosh. The Fedora Project encourages the use of **yaboot** over the **netboot** images.

5.3. x86 Specifics for Fedora

This section covers any specific information you may need to know about Fedora Core and the x86 hardware platform.

5.3.1. x86 Hardware Requirements

In order to use specific features of Fedora Core 6 during or after installation, you may need to know details of other hardware components such as video and network cards.

5.3.1.1. Processor and Memory Requirements

The following CPU specifications are stated in terms of Intel processors. Other processors, such as those from AMD, Cyrix, and VIA that are compatible with and equivalent to the following Intel processors, may also be used with Fedora Core.

Fedora Core 6 requires an Intel Pentium or better processor, and is optimized for Pentium 4 and later processors.

- Recommended for text-mode: 200 MHz Pentium-class or better
- Recommended for graphical: 400 MHz Pentium II or better
- Minimum RAM for text-mode: 128MiB

- Minimum RAM for graphical: 192MiB
- Recommended RAM for graphical: 256MiB

5.3.1.2. Hard Disk Space Requirements

The disk space requirements listed below represent the disk space taken up by Fedora Core 6 after the installation is complete. However, additional disk space is required during the installation to support the installation environment. This additional disk space corresponds to the size of **/Fedora/base/stage2.img** on Installation Disc 1 plus the size of the files in **/var/lib/rpm** on the installed system.

In practical terms, additional space requirements may range from as little as 90 MiB for a minimal installation to as much as an additional 175 MiB for an installation that includes nearly all the packages. The complete installed packages can occupy over 9 GB of disk space.

Additional space is also required for any user data, and at least 5% free space should be maintained for proper system operation.

5.4. x86_64 Specifics for Fedora

This section covers any specific information you may need to know about Fedora Core and the x86_64 hardware platform.

5.4.1. x86_64 Hardware Requirements

In order to use specific features of Fedora Core 6 during or after installation, you may need to know details of other hardware components such as video and network cards.

5.4.1.1. x86_64 Memory Requirements

- Minimum RAM for text-mode: 128MiB
- Minimum RAM for graphical: 256MiB
- Recommended RAM for graphical: 512MiB

5.4.1.2. Hard Disk Space Requirements

The disk space requirements listed below represent the disk space taken up by Fedora Core 6 after the installation is complete. However, additional disk space is required during the installation to support the installation environment. This additional disk space corresponds to the size of **/Fedora/base/stage2.img** on Installation Disc 1 plus the size of the files in **/var/lib/rpm** on the installed system.

In practical terms, additional space requirements may range from as little as 90 MiB for a minimal installation to as much as an additional 175 MiB for an installation that includes nearly all the packages. The complete installed packages can occupy over 9 GB of disk space.

Additional space is also required for any user data, and at least 5% free space should be maintained for proper system operation.

6. Package Notes

The following sections contain information regarding software packages that have undergone significant changes for Fedora Core 6. For easier access, they are generally organized using the same groups that are shown in the installation system.

6.1. GNOME Desktop Environment

The following packages have been split into several packages to improve performance and manageability as noted:

- *gnome-utils*
- *beagle*, which no longer depends on **Evolution**
- *evince*, which no longer depends on **Nautilus**
- *NetworkManager*, which no longer depends on *bind* and *caching-nameserver*

6.2. Web Server

The *php* package has been split to separate the command line binary from the CGI executable.

6.3. Ext3 File System Utilities

A new version of *e2fsprogs* included in this release has a number of bug fixes. The **ext2online** feature has been integrated into **resize2fs**, so the **ext2online** program has been removed from this package.

6.4. Licensing Audit

The *Fedora Project Board*²¹ initiated a *licensing audit*²² to ensure all software included in Fedora Core is compliant with the package licensing guidelines. This process is now complete, and several changes were made as a result:

- The *openmotif* package has been *dropped*²³ due to a non-free license. Software packages previously dependent on the *openmotif* library have been rebuilt to use *lesstif*.
- The *macutils* package has been *dropped*²⁴ due to a non-free license.
- The *ckernit* package has been *dropped*²⁵ due to a non-free license.
- The *cleanfeed* package has been *dropped*²⁶ due to a non-free license.
- The *aspell-nl* package has been *changed*²⁷ to include GPL licensed data.
- The *crypto-utils* package has been *changed*²⁸ to remove PGP licensed code in favor of new GPL licensed code.
- The *netpbm* package has been *changed*²⁹ to remove all unlicensed or improper files from the source tarball.

²¹ <http://fedoraproject.org/wiki/Board>

²² <http://fedoraproject.org/wiki/FreeSoftwareAnalysis>

6.5. Kernel Headers

The process of generating kernel headers has been *changed*³⁰, which provides several *benefits*³¹ included easier maintenance and consistency.

7. Linux Kernel

This section covers changes and important information regarding the 2.6.18 based kernel in Fedora Core 6. The 2.6.18 kernel includes:

- Lightweight user space priority inheritance support (<http://lwn.net/Articles/178253/>)
- A "lock validator" debugging tool (<http://lwn.net/Articles/185666/>)
- A new power saving policy for multicore systems, SMPnice (<http://lwn.net/Articles/186438/>)
- A much improved SATA layer (<http://lwn.net/Articles/183734/>)
- Swapless page migration (<http://lwn.net/Articles/160201/>)
- Per-zone VM counters
- Per-task delay accounting
- A new per-packet access control for SELinux called **secmark** (<http://james-morris.livejournal.com/11010.html>)
- Randomized i386 vDSO
- New drivers and additional device support for many existing drivers
- Many bug fixes and other small improvements

7.1. Version

Fedora Core may include additional patches to the kernel for improvements, bug fixes, or additional features. For this reason, the Fedora Core kernel may not be line-for-line equivalent to the so-called *vanilla kernel* from the kernel.org web site:

<http://www.kernel.org/>

To obtain a list of these patches, download the source RPM package and run the following command against it:

```
rpm -qpl kernel-<version>.src.rpm
```

7.2. Changelog

To retrieve a log of changes to the package, run the following command:

```
rpm -q --changelog kernel-<version>
```

³⁰ <http://kernel.org/git/?p=linux/kernel/git/torvalds/linux-2.6.git;a=commit;h=8d730cfb50cc77da6d00f941daef440918a1922f>

³¹ <http://lkml.org/lkml/2006/7/2/24>

If you need a user friendly version of the changelog, refer to <http://wiki.kernelnewbies.org/LinuxChanges>. A short and full diff of the kernel is available from <http://kernel.org/git>. The Fedora version kernel is based on the Linus tree.

Customizations made for the Fedora version are available from <http://cvs.fedora.redhat.com>.

7.3. Kernel Flavors

Fedora Core 6 includes the following kernel builds:

- Native kernel, for use in most systems. Configured sources are available in the **kernel-devel-*<version>.<arch>.rpm*** package.
- kernel-PAE, for use in 32-bit x86 systems with > 4GB of RAM, or with CPUs that have a 'NX (No eXecute)' feature. This kernel support both uniprocessor and multi-processor systems.
- Virtualization kernel for use with the Xen emulator package. Configured sources are available in the **kernel-xen-devel-*<version>.<arch>.rpm*** package.
- Kdump kernel for use with kexec/kdump capabilities. Configured sources are available in the **kernel-kdump-devel-*<version>.<arch>.rpm*** package.

You may install kernel headers for all kernel flavors at the same time. The files are installed in the `/usr/src/kernels/<version>-[xen|kdump]-<arch>/` tree. Use the following command:

```
su -c 'yum install kernel-{PAE,xen,kdump}-devel'
```

Select one or more of these flavors, separated by commas and no spaces, as appropriate. Enter the root password when prompted.



Default Kernel Provides SMP

There is no separate SMP kernel available for Fedora Core 6 on i386, x86_64 and ppc64. Multiprocessor support is provided by the native kernel.



PowerPC Kernel Support

There is no support for Xen or kdump for the PowerPC architecture in Fedora Core 6 test3. 32-bit PowerPC does still have a separate SMP kernel.

7.4. Reporting Bugs

Refer to <http://kernel.org/pub/linux/docs/llkml/reporting-bugs.html> for information on reporting bugs in the Linux kernel. You may also use <http://bugzilla.redhat.com> for reporting bugs that are specific to Fedora.

7.5. Following Generic Textbooks

Many of the tutorials, examples, and textbooks about Linux kernel development assume the kernel sources are installed under the `/usr/src/linux/` directory. If you make a symbolic link, as shown

below, you should be able to use those learning materials with the Fedora Core packages. Install the appropriate kernel sources, as shown earlier, and then run the following command:

```
su -c 'ln -s /usr/src/kernels/<version>.<release>-<arch> /usr/src/linux'
```

Enter the root password when prompted.

7.6. Preparing for Kernel Development

Fedora Core 6 does not include the **kernel-source** package provided by older versions since only the **kernel-devel** package is required now to build external modules. Configured sources are available, as described in this kernel flavors section.



Instructions Refer to Current Kernel

To simplify the following directions, we have assumed that you want to configure the kernel sources to match your currently-running kernel. In the steps below, the expression **<version>** refers to the kernel version shown by the command: **uname -r**.

Users who require access to Fedora Core original kernel sources can find them in the kernel **.src.rpm** package. To create an exploded source tree from this file, perform the following steps:



Do Not Build Packages as Super-user (root)

Building packages as the superuser is inherently dangerous and is not required, even for the kernel. These instructions allow you to install the kernel source as a normal user. Many general information sites refer to **/usr/src/linux** in their kernel instructions. If you use these instructions, simply substitute **~/rpmbuild/BUILD/kernel-<version>/linux-<version>.<arch>.**]]

1. Prepare a RPM package building environment in your home directory. Run the following commands:
2. Enter the root password when prompted.
3. Download the **kernel-<version>.src.rpm** file. Enable any appropriate source repositories, such as Core, Updates, or Testing, with the **-e** switch:

```
yumdownloader -e core-source -e updates-source --source kernel
```

4. Enter the root password when prompted.
5. Install **kernel-<version>.src.rpm** using the command:

```
rpm -Uvh kernel-<version>.src.rpm
```

- This command writes the RPM contents into **`${HOME}/rpmbuild/SOURCES`** and **`${HOME}/rpmbuild/SPECS`**, where `${HOME}` is your home directory.



Space Required

The full kernel building process may require several gigabytes of extra space on the file system containing your home directory.

- Prepare the kernel sources using the commands:

```
cd ~/rpmbuild/SPECS
rpmbuild -bp --target $(uname -m) kernel-2.6.spec
```

- The kernel source tree is located in the **`~/rpmbuild/BUILD/kernel-<version>/linux-<version>.<arch>`** directory.

The configurations for the specific kernels shipped in Fedora Core 6 are in the **`~/rpmbuild/BUILD/kernel-<version>/linux-<version>.<arch>/configs`** directory. For example, the i686 configuration file is named **`~/rpmbuild/BUILD/kernel-<version>/linux-<version>.<arch>/configs/kernel-<version>-i686.config`**. Issue the following command to place the desired configuration file in the proper place for building:

```
cp configs/<desired-config-file> .config
```

- Every kernel gets a name based on its version number. This is the value the **`uname -r`** command displays. The kernel name is defined by the first four lines of the kernel **Makefile**. The **Makefile** has been changed to generate a kernel with a *different* name from that of the running kernel. To be accepted by the running kernel, a module must be compiled for a kernel with the correct name. To do this, you must edit the kernel **Makefile**.

For example, if the **`uname -r`** returns the string **`2.6.17-1.2345_FC6`**, change the **EXTRAVERSION** definition from this:

```
EXTRAVERSION = -prep
```

to this:

```
EXTRAVERSION = -1.2345_FC6
```

That is, substitute everything from the final dash onward.

- Run the following command:

```
make oldconfig
```

You may then proceed as usual.



Building Kernel Binary RPMs

Normally, kernels for Fedora are built using the **rpmbuild** utility and a specfile. Your results may vary if you use the kernel's built-in **make rpm** target.

7.7. Building Only Kernel Modules

An exploded source tree is not required to build a kernel module, such as your own device driver, against the currently in-use kernel. Only the **kernel-devel** package is required to build external modules. If you did not select it during installation, use **Pirut** to install it, going to **Applications** → **Add/Remove Software** or use **yum** to install it. Run the following command to install the **kernel-devel** package using **yum**.

```
su -c 'yum install kernel-devel'
```

For example, to build the **foo.ko** module, create the following **Makefile** in the directory containing the **foo.c** file:

```
obj-m := foo.o

KDIR := /lib/modules/$(shell uname -r)/build
PWD := $(shell pwd)

default:
    $(MAKE) -C $(KDIR) M=$(PWD) modules
```

Issue the **make** command to build the **foo.ko** module.

8. Fedora Desktop

This section details changes that affect Fedora graphical desktop users.

8.1. Desktop Effects

AIGLX, from the [Fedora Rendering Project](http://fedoraproject.org/wiki/RenderingProject)³², is part of the upstream **X.org** 7.1 release included in Fedora Core 6. **X.org** compositing is enabled by default in this release. Compositing features in **Metacity**, the default window manager provided in GNOME, are disabled in this release. When desktop effects are enabled, **Metacity** is replaced by **Compiz**, an OpenGL compositing window manager that uses AIGLX to provide desktop effects.

To enable the fancy desktop effects, follow these steps:

1. **System** → **Preferences** → **Desktop Effects**
2. Log out
3. Log back in. **compiz** should be enabled

³² <http://fedoraproject.org/wiki/RenderingProject>

If you get stuck, refer to the following thread:

- <http://www.redhat.com/archives/fedora-devel-list/2006-September/msg00382.html>
- <http://www.redhat.com/archives/fedora-devel-list/2006-September/msg00383.html>

A list of hardware that supports these effects is available at <http://fedoraproject.org/wiki/RenderingProject/aiglx>.

8.2. Software Management

The performance for the **yum** software management utility has been greatly improved in Fedora Core 6. The repository metadata parser has now been implemented in C. A new mirror management infrastructure also ensures better mirror selection and, in most cases, faster performance. The **Pirut** package management tool and the **Pup** software update utility are based on **yum**, so their performance is likewise improved.

8.3. GNOME

This release features **GNOME 2.16**³³. Many of the changes in GNOME 2.16, such as **Tomboy** and the **GNOME Power Manager**, were added in Fedora Core 5. Fedora Core 6 also features the **Orca** screen reader, and the **Alacarte** menu editor previously available from Fedora Extras.

The **GNOME Power Manager** utility now provides detailed, graphical information about power consumption. To access this information, right click on the applet and select the **Information** menu item.

The GNOME splash screen has been disabled upstream intentionally. To enable it, use **gconf-editor** or the following command:

```
gconftool-2 --set /apps/gnome-session/options/show_splash_screen --type bool true
```

The lock screen dialog theme is not connected to the selected screensaver in this release. To enable it, use **gconf-editor** or the following command:

```
gconftool-2 --set --type string /apps/gnome-screensaver/lock_dialog_theme "system"
```

8.4. Web Browsers

There is no longer a *browser suite* package contained in Fedora Core 6. The *mozilla* package has been removed. For equivalent functionality, use *firefox* as a web browser and *thunderbird* as a mail client, or use *seamonkey*, a browser suite distributed in Fedora Extras.

To better support certain scripts (such as Indic and some CJK scripts), Fedora builds its **Firefox** using the Pango system as its text renderer. Pango is used with the permission of the Mozilla Corporation. This change may negatively impact performance on some pages. To disable the use of Pango, set **MOZ_DISABLE_PANGO=1** in your environment before launching **Firefox**.

³³ <http://www.gnome.org/start/2.16/>

```
export MOZ_DISABLE_PANGO=1
/usr/bin/firefox
```

Gecko based browsers **Firefox** and **Epiphany** now properly render MathML when using the Pango text backend. Additionally, several issues with the rendering and behavior of text when using the Pango text backend have been resolved. **Epiphany** now renders using Pango by default.

8.5. Mail Clients

Thunderbird in Fedora now enables Pango by default for all locales with permission from the Mozilla Corporation. This change may negatively impact performance on some pages. To disable the use of Pango, set `MOZ_DISABLE_PANGO=1` in your environment before launching **Thunderbird**.

```
export MOZ_DISABLE_PANGO=1
/usr/bin/thunderbird
```

9. File Systems

Fedora Core 6 provides basic support for encrypted swap partitions and non-root file systems. To use it, add entries to `/etc/crypttab` and reference the created devices in `/etc/fstab`.



Encrypted FS Support Unavailable During Install

Enable file system encryption after installation. Anaconda does not have support for creating encrypted block devices.

The following example shows an `/etc/crypttab` entry for a swap partition:

```
my_swap /dev/hdb1 /dev/urandom swap,cipher=aes-cbc-essiv:sha256
```

This creates an encrypted block device `/dev/mapper/my_swap`, which can be referenced in `/etc/fstab`. The next example shows an entry for a filesystem volume:

```
my_volume /dev/hda5 /etc/volume_key cipher=aes-cbc-essiv:sha256
```

The `/etc/volume_key` file contains a plaintext encryption key. You can also specify **none** as the key file name, and the system instead asks for the encryption key during boot.

The recommended method is to use **LUKS** for file system volumes:

- Create the encrypted volume using **cryptsetup luksFormat**
- Add the necessary entry to `/etc/crypttab`
- Set up the volume manually using **cryptsetup luksOpen** or reboot
- Create a filesystem on the encrypted volume

- Set up an **/etc/fstab** entry

10. Web Servers

Fedora Core 6 includes version 2.2 of the **Apache HTTP Server**. Users upgrading from version 2.0 (included in Fedora Core 4 and earlier) need to make changes to their **httpd** configuration; refer to <http://httpd.apache.org/docs/2.2/upgrading.html> for more details.

11. Development

This section covers various development tools and features.

11.1. Runtime

These are the new features in *glibc*:

- Support for priority inheriting and priority protecting mutexes. These are two features described in the POSIX standards.
 - Priority inheriting mutexes automatically prevent priority inversion caused by waiting for the availability of mutexes. The kernel automatically boosts the priority of the thread holding the mutex until it unlocks the mutex.
 - Priority protection allows to specify a priority that all threads that acquire the mutex will run with until the mutex is unlocked. This feature is not available for robust mutexes.
- The destination address sorting performed by the `getaddrinfo()` interface for hostname lookup can now be customized by rules in the **/etc/gai.conf** file.
- Significant speed-ups in NIS and NIS+ processing.
- RFC 3542 support completed (advanced socket APIs for IPv6).
- Significant speed-ups of dynamic symbol lookup.

11.2. Tools

The linker includes support for the new ELF symbol hash table format. Use the **-hash-style** option of the linker to select the format(s).

11.2.1. Kernel header files


This release of Fedora has been built using Linux kernel headers exported directly from the kernel, using the new **headers_install** feature of the 2.6.18 kernel. Thus, the *glibc-kernheaders* package has been removed and replaced with *kernel-headers*, a subpackage of *kernel*.

Developers may notice some changes between these new kernel headers and what was present before, including but not limited to the following:

- The **<linux/compiler.h>** header file has been removed, since it contains nothing of use to userspace.
- The `_syscallX()` macros are removed. Userspace should use `syscall()` from the C library instead.

- The `PAGE_SIZE` macro is removed from some architectures, since the page size is variable. Userspace should be using `sysconf(_SC_PAGE_SIZE)` or `getpagesize()` instead.
- The `<asm/atomic.h>` and `<asm/bitops.h>` header files have been removed. These were not designed for use in userspace, and would fail to compile on some architectures while silently giving non-atomic behaviour on others. The C compiler provides its own [atomic builtin functions](#)³⁴ that are suitable for use in userspace programs instead.
- Content that was previously protected with `#ifdef __KERNEL__` is now elided completely with the `unifdef` tool. Defining `__KERNEL__` in order to see parts that should not be visible to userspace is no longer effective.

In addition, some other header files that are not suitable for use in userspace have been removed, and still more headers have been edited to remove unsuitable content.



Kernel header changes are not Fedora-specific

These changes are inherited from the upstream kernel and are not specific to Fedora. Any distribution using the current officially-exported kernel headers would be the same.

11.2.2. GCC Compiler Collection

This release of Fedora has been built with GCC 4.1, which is included with the distribution.

11.2.2.1. Caveats

- Fedora developers have introduced changes in the ELF `.hash` section that provides symbols for dynamic linking. This new `.gnu.hash` section, which is produced with the new default `--hash-style=gnu` option for `gcc`, serves the same purpose as previous hash sections. It provides, however, an approximately 50% increase in dynamic linking speed. Binaries and libraries produced with the new hashing function are incompatible with older `glibc` and dynamic linker releases. To use the old-style hashing routines for compatibility with older `glibc`-based systems, pass the `--hash-style=sysv` option instead.
- You need GDB 6.1 or newer to debug binaries, unless they are compiled using the `-fno-var-tracking` compilation option.
- The `-fwritable-strings` option is no longer accepted.
- English-language diagnostic messages now use Unicode quotes. If you cannot read this, set your `LC_CTYPE` environment variable to C or change your terminal emulator.
- The `specs` file is no longer installed on most systems. Ordinary users will not notice, but developers who need to alter the file can use the `-dumpspecs` option to generate the file for editing.

11.2.2.2. Code Generation

- The SSA code optimizer is now included and brings with it better constant propagation, partial redundancy elimination, load and store code motion, strength reduction, dead storage elimination, better detection of unreachable code, and tail recursion by accumulation.
- Autovectorization is supported. This technique achieves higher performance for repetitive loop code, in some circumstances.

11.2.2.3. Language Extensions

- The new sentinel attribute causes the compiler to issue a warning if a function such as `execl(char *path, const char *arg, ...)`, which requires a NULL list terminator, is missing the NULL.
- The `cast-as-lvalue`, `conditional-expression-as-lvalue`, and `compund-expression-as-lvalue` extensions have been removed.
- The `#pragma pack()` semantics are now closer to those used by other compilers.
- Taking the address of a variable declared with the register modifier now generates an error instead of a warning.
- Arrays of incomplete element types now generate an error. This implies no forward reference to structure definitions.
- The basic compiler, without any optimization (**-O0**), has been measured as much as 25% faster in real-world code.
- Libraries may now contain function-scope static variables in multi-threaded programs. Embedded developers can use the **-fno-threadsafe-statics** to turn off this feature, but ordinary users should never do this.

11.3. Ruby

The standard search path for Ruby libraries, `$:`, has changed in accordance with [the packaging guidelines](#)³⁵. Changes were also made to some of the entries in **Config::CONFIG** in the **rbconfig** module. The most important changes include:

- **sitedir** and related directories (**sitelibdir**, **sitearchdir**) are now under **rubylibdir**. Instead of `/usr/lib/site_ruby` they are underneath `/usr/lib/ruby/site_ruby`.
- The directories for architecture-independent pure Ruby code are always under `/usr/lib`, even on x86_64 architecture, where they used to be under `/usr/lib64`. This change affects the **Config::CONFIG** entries **rubylibdir** and **sitelibdir**.

Directories that were previously in `$:` remain there for the time being, so that existing code, such as `/usr/lib/site_ruby`, does not need to be modified. These directories are deprecated though, and will be removed by the release of Fedora Core 8. Build Ruby RPM packages in accordance with [the packaging guidelines](#)³⁶. In particular, Ruby libraries should only be installed into **sitelibdir** and **sitearchdir**. You should also follow this rule for Ruby code that is not packaged as an RPM.

12. Security

This section highlights various security items from Fedora Core.

12.1. General Information

A general introduction to the many proactive security features in Fedora, the current status, and policies is available at <http://fedoraproject.org/wiki/Security>.

³⁵ <http://fedora-test.fedoraproject.org/fedora-docs/fedora-docs/Packaging/Ruby>

³⁶ <http://fedora-test.fedoraproject.org/fedora-docs/fedora-docs/Packaging/Ruby>

12.2. SELinux

This release increases usability of SELinux by providing a graphical troubleshooting tool, [settroubleshoot](http://fedoraproject.org/wiki/SELinux/settroubleshoot)³⁷. SELinux developer Dan Walsh explains the tool and its usage in his [blog](http://danwalsh.livejournal.com/7212.html)³⁸. The **Nautilus** file manager has also been improved in GNOME 2.16 to display SELinux contexts.

The SELinux project pages have troubleshooting tips, explanations, and pointers to documentation and references. Some useful links include the following:

- New SELinux project pages: <http://fedoraproject.org/wiki/SELinux>
- Troubleshooting tips: <http://fedoraproject.org/wiki/SELinux/Troubleshooting>
- Frequently Asked Questions: <http://fedora.redhat.com/docs/selinux-faq/>
- Listing of SELinux commands: <http://fedoraproject.org/wiki/SELinux/Commands>
- Details of confined domains: <http://fedoraproject.org/wiki/SELinux/Domains>

13. Java and java-gcj-compat

This release of Fedora Core includes a free and open source Java environment called `java-gcj-compat`. The `java-gcj-compat` collection includes a tool suite and execution environment that is capable of building and running many useful programs that are written in the Java programming language.



Fedora Core Does Not Include Java

Java is a trademark of Sun Microsystems. `java-gcj-compat` is an entirely free software stack that is *not* Java, but may run Java software.

The `java-gcj-compat` infrastructure has three key components: a **GNU Java** runtime (`libgcj`), the **Eclipse Java** compiler (`ecj`), and a set of wrappers and links (`java-gcj-compat`) that present the runtime and compiler to the user in a manner similar to other Java environments.

The Java software packages in this Fedora release use the `java-gcj-compat` environment. These packages include **OpenOffice.org Base**, **Eclipse**, and **Apache Tomcat**. Refer to the Java FAQ at <http://www.fedoraproject.org/wiki/JavaFAQ> for more information on the `java-gcj-compat` free Java environment in Fedora.



Include Location and Version Information in Bug Reports

When making a bug report, be sure to include the output from these commands:

```
which java && java -version && which javac && javac -version
```

³⁷ <http://fedoraproject.org/wiki/SELinux/settroubleshoot>

³⁸ <http://danwalsh.livejournal.com/7212.html>

13.1. Handling Java and Java-like Packages

In addition to the `java-gcj-compat` free software stack, Fedora Core lets you install multiple Java implementations and switch between them using the **alternatives** command line tool. However, every Java system you install must be packaged using the JPackage Project packaging guidelines to take advantage of **alternatives**. Once these packages are installed properly, the root user may switch between `java` and `javac` implementations using the **alternatives** command:

```
alternatives --config java
alternatives --config javac
```

13.2. 64-bit JNI Libraries

The 64-bit JNI libraries shipped by default on `x86_64` systems in Fedora Core and Extras do not run on 32-bit JREs. Either switch to a 64-bit Java alternative, or install the 32-bit version of the packages, if available. To install a 32-bit version, use the following command:

```
yum install <package_name>.i386
```

Likewise, the 32-bit JNI libraries shipped by default on `ppc64` systems do not run with a 64-bit JRE. To install the 64-bit version, use the following command:

```
yum install <package_name>.ppc64
```

13.3. Handling Java Applets

This release of Fedora Core includes a preview release of `gcjwebplugin`, a **Firefox** plugin for Java applets. `gcjwebplugin` is not enabled by default. Although the security implementation in **GNU Classpath** is being actively developed, it is not mature enough to run untrusted applets safely. That said, the AWT and Swing implementations in **GNU Classpath** are now sufficiently mature that they can run many applets deployed on the web. Adventurous users who want to try `gcjwebplugin` can read `/usr/share/doc/libgcj-4.1.1/README.libgcjwebplugin.so`, as installed by the `gcc` rpm. The README explains how to enable the plugin and the risks associated with doing so.

13.4. Fedora and the JPackage Java Packages

Fedora Core includes many packages derived from the JPackage Project, which provides a Java software repository. These packages are modified in Fedora to remove proprietary software dependencies and to make use of GCJ's ahead-of-time compilation feature. Use the Fedora repositories to update these packages, or use the JPackage repository for packages not provided by Fedora. Refer to the JPackage website at <http://jpackage.org> for more information on the project and the software it provides.



Mixing Packages from Fedora and JPackage

Research package compatibility before you install software from both the Fedora and JPackage repositories on the same system. Incompatible packages may cause complex issues.

13.5. Eclipse

This release of Fedora Core includes Fedora Eclipse, which is based on the [Eclipse](#)³⁹ SDK version 3.2. The "New and Noteworthy" page for this release can be accessed [here](#)⁴⁰.

Released in June 2006, the SDK is known variously as "the Eclipse Platform," "the Eclipse IDE," and "Eclipse." The Eclipse SDK is the foundation for the combined release of ten Eclipse projects under the [Callisto](#)⁴¹ combined release umbrella. A few of these Callisto projects are included in Fedora Core and Extras: [CDT](#)⁴², for C/C++ development, and [GEF](#)⁴³, the Graphical Editing Framework.

We hope to augment these projects with others as this Fedora cycle goes on. Likely candidates for inclusion include [EMF](#)⁴⁴, the Eclipse Modeling Framework, and [VE](#)⁴⁵, the Visual Editor. As of this writing, it is expected that an updated version of [PyDev](#)⁴⁶, the Python development tools, is going to be available in Fedora Extras. Assistance in getting these projects packaged and tested with GCJ is always welcome. Contact the interested parties through [fedora-devel-java-list](#)⁴⁷ and/or #fedora-java on freenode.

Fedora also includes plugins and features that are particularly useful to FOSS hackers: [ChangeLog](#)⁴⁸ editing with `eclipse-change.log` and Bugzilla interaction with `eclipse-bugzilla`. Our CDT package also includes work-in-progress support for the GNU Autotools. The latest information regarding these projects can be found at the [Fedora Eclipse Project](#)⁴⁹ page.

13.5.1. Non-packaged Plugins/Feature

Fedora Eclipse contains a patch to allow non-root users to make use of the Update Manager functionality for installing non-packaged plugins and features. Such plugins are installed in the user's home directory under the `.eclipse` directory. Please note, however, that these plugins do not have associated GCJ-compiled bits and may therefore run slower than expected.

14. Multimedia

Fedora Core includes applications for assorted multimedia functions, including playback, recording and editing. Additional packages are available through the Fedora Extras repository. For additional information about multimedia in Fedora, refer to the Multimedia section of the Fedora Project website at <http://fedoraproject.org/wiki/Multimedia>.

14.1. Multimedia Players

The default installation of Fedora Core includes **Rhythmbox** and **Totem** for media playback. The Fedora Core and Fedora Extras repositories include many other popular programs such as the **XMMS** player and KDE's **amaroK**. Both GNOME and KDE have a selection of players that can be used with a variety of formats. Third parties may offer additional programs to handle other formats.

³⁹ <http://www.eclipse.org>

⁴⁰ http://download.eclipse.org/eclipse/downloads/drops/R-3.2-200606291905/new_noteworthy/eclipse-news.html

⁴¹ <http://www.eclipse.org/callisto>

⁴² <http://www.eclipse.org/cdt>

⁴³ <http://www.eclipse.org/gef>

⁴⁴ <http://www.eclipse.org/emf>

⁴⁵ <http://www.eclipse.org/vep>

⁴⁶ <http://pydev.sf.net>

⁴⁷ <http://www.redhat.com/mailman/listinfo/fedora-devel-java-list/>

⁴⁸ <http://fedora-test.fedoraproject.org/fedora-docs/fedora-docs/ChangeLog>

⁴⁹ <http://sourceware.org/eclipse/>

Fedora Core also takes full advantage of the Advanced Linux Sound Architecture (ALSA) sound system. Many programs can play sound simultaneously, which was once difficult on Linux systems. When all multimedia software is configured to use ALSA for sound support, this limitation disappears. For more information about ALSA, visit the project website at <http://www.alsa-project.org/>. Users may still experience issues when multiple users log into the system. Depending upon hardware and software configurations, multiple users may not be able to use the sound hardware simultaneously.

Helix Player has been removed from this release since it duplicates the functionality of **Totem**. **Totem** also uses the **GStreamer** media framework, which is used by other multimedia applications in Fedora Core. With **GStreamer**, users can easily add support for additional codecs to all included applications.

14.2. Ogg and Xiph.Org Foundation Formats

Fedora includes complete support for the Ogg media container format and the Vorbis audio, Theora video, Speex audio, and FLAC lossless audio formats. These freely-distributable formats are not encumbered by patent or license restrictions. They provide flexible alternatives to more popular, restricted formats. The Fedora Project encourages the use of open formats in place of restricted ones. For more information on these formats and how to use them, refer to the Xiph.Org Foundation's web site at <http://www.xiph.org/>.

14.3. MP3, DVD, and Other Excluded Multimedia Formats

Fedora Core and Fedora Extras software repositories cannot include support for MP3 or DVD video playback or recording. The MP3 formats are patented, and the patent holders have not provided the necessary patent licenses. DVD video formats are patented and equipped with an encryption scheme. The patent holders have not provided the necessary patent licenses, and the code needed to decrypt CSS-encrypted discs may violate the Digital Millennium Copyright Act, a copyright law of the United States. Fedora also excludes other multimedia software due to patent, copyright or license restrictions, including Adobe's Flash Player and and Real Media's Real Player. For more on this subject, please refer to <http://fedoraproject.org/wiki/ForbiddenItems>.

While other MP3 options may be available for Fedora, Fluendo now offers a free MP3 plugin for GStreamer that has the necessary patent license for end users. This plugin enables MP3 support in applications that use the GStreamer framework as a backend. Fedora does not include this plugin since we prefer to support and encourage the use of patent unrestricted open formats instead. For more information about the MP3 plugin, visit Fluendo's website at <http://www.fluendo.com/>.

14.4. CD and DVD Authoring and Burning

Fedora Core and Fedora Extras software repositories includes a variety of tools for easily mastering and burning CDs and DVDs. GNOME users can burn directly from the Nautilus file manager, or choose the **gnomebaker** or **graveman** packages from Fedora Extras, or the older **xcdroast** package from Fedora Core. KDE users can use the robust **k3b** package, available in Fedora Extras, for these tasks. Console tools include **cdrecord**, **readcd**, **mkisofs**, and other popular applications.

14.5. Screencasts

You can use Fedora to create and play back *screencasts*, which are recorded desktop sessions, using open technologies. Fedora Extras software repository includes **istanbul**, which creates screencasts using the Theora video format. These videos can be played back using one of several players included in Fedora Core. This is the preferred way to submit screencasts to the Fedora Project for either developer or end-user use. For a more comprehensive how-to, refer to <http://fedoraproject.org/wiki/ScreenCasting>.

14.6. Extended Support through Plugins

Most of the media players in Fedora Core and Fedora Extras software repositories can use plugins to add support for additional media formats and sound output systems. Some use powerful multimedia frameworks, such as the **gstreamer** package, to handle media format support and sound output. Fedora Core and Fedora Extras software repositories offer plugin packages for these backends and for individual applications. Third parties may provide additional plugins to add even greater capabilities.

15. Games and Entertainment

Fedora Core and Fedora Extras provide a selection of games that cover a variety of genres. By default, Fedora Core includes a small package of games for GNOME (called *gnome-games*) and KDE (*kdegames*). Fedora Extras provides additional games that span every major genre.

The Fedora Project website features a section dedicated to games that details many of the available games, including overviews and installation instructions. For more information, refer to <http://fedoraproject.org/wiki/Games>.

16. Virtualization

Virtualization in Fedora Core is based on Xen 3.0.2, and is integrated within the Fedora Core 6 installer. Refer to <http://fedoraproject.org/wiki/Tools/Xen> for more information about Xen.

16.1. Types of Virtualization

Under Fedora Core 6 using Xen 3.0.2, both paravirtualization and full virtualization can be implemented. Full virtualization requires a VT-capable processor. Paravirtualization does not require special hardware, but does require the guest OS to be modified. To learn more about how to configure and use Xen, refer to <http://fedoraproject.org/wiki/FedoraXenQuickstartFC6>.

16.2. Guest Operating Systems

The Fedora Core 6 development team has tested Xen with Fedora Core 6 and Red Hat Enterprise Linux 5 Beta1 guests. Other guests have not been tested. With paravirtualization, however, users can expect reasonable success running any Linux guest OS that was built for Xen 3.0.2. With full virtualization using VT hardware, users can expect reasonable success with a larger variety of operating systems, including some proprietary operating systems.

16.3. Changes to the Xen Packages

In Fedora Core 6 a single kernel supports both the host and the guest operating systems. In previous versions, there was one kernel, *kernel-xenU*, for the host or hypervisor and a separate kernel, *kernel-xen0*, for the guests. In Fedora Core 6 the *kernel-xen* package is the only kernel needed.

Fedora Core 6 introduces **virt-manager**, a GUI application for installing and managing virtual machines. Features of **virt-manager** include:

- Integrated graphical framebuffer. Both the GUI installer and the guest operating system's graphical environment can be accessed from **virt-manager** without the need for VNC.
- An embedded serial console viewer. The console can now be accessed from **virt-manager** without opening a separate terminal and using **xm console**.

- CPU and memory management. The vCPUs and memory of active guest operating systems can be adjusted on the fly.
- Extended RFB protocol handler. If the guest operating system changes screen resolution, the **virt-manager** graphical console adjusts its size accordingly.

In Fedora Core 6 there are two methods to install a guest OS: via the command line using the **xenguest -install** program, or via the GUI application **virt-manager**.



xenguest-install Script Renamed

The **xenguest -install** script was named **xenguest -install.py** in previous versions.

Xen log messages are stored under **/var/log/xen**, which separates Xen related log messages from other system messages.



i386 Guest Kernels Require PAE

PAE support in the CPU is required by i386 guests. Some older computers might not have this functionality.

17. X Window System (Graphics)

This section contains information related to the X Window System implementation provided with Fedora.

17.1. X Configuration Changes

The **X.org 7.1** X server has been modified to automatically detect and configure most hardware, eliminating the need for users or administrators to modify the **/etc/X11/xorg.conf** configuration file. The only hardware configured by default in the **xorg.conf** file written by anaconda is:

- the graphics driver
- the keyboard map

All other hardware, such as monitors (both LCD and CRT), USB mice, and touchpads should be detected and configured automatically.

The X server queries the attached monitor for supported resolution ranges, and attempts to pick the highest resolution available with the correct aspect ratio for the display. Users can set their preferred resolution in **System** → **Preferences** → **Screen Resolution**, and the default resolution for the system can be changed with **System** → **Administration** → **Display**.

If the **/etc/X11/xorg.conf** configuration file is not present, X also automatically detects the appropriate driver, and assumes a 105-key US keyboard layout.

17.2. Intel Driver notes

Fedora Core 6 contains two drivers for Intel integrated graphics controllers:

- The default `i810` driver, which contains support for Intel graphics chipsets up to and including i945 and i965
- The experimental `intel` driver, which contains support for Intel graphics chipsets up to and including i945

The `i810` driver is limited to resolutions available in the BIOS. If you need support for non-standard resolutions, such as those used in some widescreen displays, you may want to switch to the `intel` driver. You may switch drivers by using `system-config-display`, available in the menus under **System** → **Administration** → **Display**.

We welcome feedback on the experimental `intel` driver. Please report success in [Bugzilla](#)⁵⁰, attaching the full output of `lspci -vn` for your machine. Given success reports, various chipsets may be switched to use the `intel` driver by default.

18. Database Servers

18.1. MySQL

Fedora now provides **MySQL** 5.0. For a list of the enhancements provided by this version, refer to <http://dev.mysql.com/doc/refman/5.0/en/mysql-5-0-nutshell.html>.

For more information on upgrading databases from previous releases of **MySQL**, refer to the **MySQL** web site at <http://dev.mysql.com/doc/refman/5.0/en/upgrade.html>.

18.2. PostgreSQL

This release of Fedora includes **PostgreSQL** 8.1. For more information on this new version, refer to <http://www.postgresql.org/docs/whatsnew>.



Upgrading Databases

Fedora Core 4 provided version 8.0 of **PostgreSQL**. If you upgrade an existing Fedora system with a **PostgreSQL** database, you must upgrade the database to access the data. To upgrade a database from a previous version of PostgreSQL, follow the procedure described at <http://www.postgresql.org/docs/8.1/interactive/install-upgrading.html>

19. Internationalization (i18n)

This section includes information on language support under Fedora Core.

19.1. Input Methods

The default SCIM (Simple Common Input Method) GTK Input Method Module is now **scim-bridge**, written from scratch in C by Ryo Dairiki. SCIM is no longer linked against `libstdc++so7`, and `scim-qt-imm` works again.

⁵⁰ <http://bugzilla.redhat.com/bugzilla/>

After upgrading from Fedora Core, install *scim-bridge-gtk*, otherwise the SCIM GTK Input Method Module is used. This may conflict with 3rd party C++ applications linked against older versions of **libstdc++**.

If SCIM is installed, it now runs by default for users of all locales rather than only some Asian locales as in the previous release. The following table lists the default trigger hotkeys for different languages:

Language	Trigger hotkeys
all	Ctrl-Space
Japanese	Zenkaku_Hankaku or Alt+`
Korean	Shift+Space

19.1.1. Language Installation

To install additional language support from the Languages group, use **pirut** or **Applications+Add/Remove Software**, or run this command:

```
su -c 'yum groupinstall <language>-support'
```

In the command above, *<language>* is one of **assamese**, **bengali**, **chinese**, **gujarati**, **hindi**, **japanese**, **kannada**, **korean**, **malayalam**, **marathi**, **oriya**, **punjabi**, **sinhala**, **tamil**, **thai**, or **telegu**.

19.2. im-chooser

A new user configuration tool called **im-chooser** has been added that allows you to disable or enable the usage of input methods on your desktop. If SCIM is installed but you do not wish to run it on your desktop, you can disable it using **im-chooser**.

19.3. xinputrc

At X startup, **xinput.sh** now sources **~/.xinputrc** or **/etc/X11/xinit/xinputrc** instead of searching config files under **~/.xinput.d/** or **/etc/xinit/xinput.d/**.

20. Backwards Compatibility

Fedora Core provides legacy system libraries for compatibility with older software. This software is part of the Legacy Software Development group, which is not installed by default. Users who require this functionality may select this group either during installation, or after the installation process is complete. To install the package group on a Fedora system, use **Applications → Add/Remove Software**, **Pirut**, or enter the following command in a terminal window:

```
su -c 'yum groupinstall "Legacy Software Development"'
```

Enter the password for the root account when prompted.

20.1. Compiler Compatibility

The **compat-gcc-34** package has been included in this release for compatibility reasons:

<https://www.redhat.com/archives/fedora-devel-list/2006-August/msg00409.html>

21. Package Changes



This list is automatically generated

This list is automatically generated. It is not a good choice for translation.

For a list of which packages were updated since the previous release, refer to <http://fedoraproject.org/wiki/Docs/Beats/PackageChanges/UpdatedPackages>. You can also find a comparison of major packages between all Fedora versions at <http://distrowatch.com/fedora>.

```
# 2006-09-29 -- treediff <oldtree> <newtree>

New package alacarte
  Simple menu editor for GNOME

New package bouncycastle
  Bouncy Castle Crypto Package for Java

New package cachefilesd
  CacheFiles userspace management daemon

New package ccid
  Generic USB CCID smart card reader driver

New package compat-gcc-34
  Compatibility GNU Compiler Collection

New package compiz
  OpenGL window and compositing manager

New package coolkey
  CoolKey PKCS #11 module

New package dbus-glib
  GLib bindings for D-Bus

New package dbus-python
  D-Bus Python Bindings

New package dbus-sharp
  C# bindings for D-Bus

New package dejavu-lgc-fonts
  DejaVu LGC Fonts

New package dogtail
  GUI test tool and automation framework

New package esc
  Enterprise Security Client Smart Card Client

New package fedora-release-notes
  Release Notes for Fedora Core 5.92
```

Release Notes

New package fonts-sinhala
Fonts for Sinhala

New package gcalctool
A desktop calculator

New package gfs2-utils
Utilities for managing the global filesystem (GFS)

New package gnome-sharp
GTK+ and GNOME bindings for Mono

New package gnome-vfs2-monikers
Monikers for the GNOME virtual file-system

New package gnu-efi
Development Libraries and headers for EFI

New package gnu-getopt
Java getopt implementation

New package gucharmap
Unicode character picker and font browser

New package hesinfo
Command-line Hesiod client.

New package ifd-egate
Axalto Egate SmartCard device driver for PCSC-lite

New package im-chooser
Desktop Input Method configuration tool

New package jakarta-oro
Full regular expressions API

New package kdnssd-avahi
KDE zeroconf implementation based on avahi

New package libdhcp
A library for network interface configuration with DHCP

New package libpfm
a performance monitoring library for Linux/ia64

New package libtirpc
Transport Independent RPC Library

New package libutempter
A privileged helper for utmp/wtmp updates

New package lvm2-cluster
Cluster extensions for userland logical volume management tools

New package mcstrans
SELinux Translation Daemon

New package notification-daemon
Notification Daemon

New package notify-python
Python bindings for libnotify

New package openais

The openais Standards-Based Cluster Framework executive and APIs

New package openmpi
Open Message Passing Interface

New package orca
Flexible, extensible, and powerful assistive technology

New package pam_pkcs11
PKCS #11/NSS PAM login module

New package paps
Plain Text to PostScript converter

New package pcsc-lite
PC/SC Lite smart card framework and applications

New package perl-IO-Socket-INET6
Perl Object interface for AF_INET|AF_INET6 domain sockets

New package perl-IO-Socket-SSL
Perl library for transparent SSL

New package perl-Net-SSLeay
Perl extension for using OpenSSL

New package perl-Socket6
IPv6 related part of the C socket.h defines and structure manipulators

New package pfmon
a performance monitoring tool for Linux/ia64

New package postgresql-jdbc
JDBC driver for PostgreSQL

New package pygobject2
Python bindings for gobjects

New package pyspi
Python bindings for AT-SPI

New package python-xeninst
Python modules for starting Xen guest installations

New package scim-bridge
SCIM Bridge Gtk IM module

New package scim-sinhala
Sri Lankan input method for SCIM

New package setroubleshoot
Helps troubleshoot SELinux problems

New package undef
Unifdef tool for removing ifdef'd lines

New package virt-manager
Virtual Machine Manager

New package werken-xpath
XPath implementation using JDOM

New package wireshark
Network traffic analyzer

New package xkeyboard-config
xkeyboard-config alternative xkb data files

New package xorg-sgml-doctools
X.Org SGML documentation generation tools

New package xorg-x11-docs
X.Org X11 documentation

New package xorg-x11-drv-amd
Xorg X11 AMD Geode video driver

New package xorg-x11-drv-ast
Xorg X11 ast video driver

New package xorg-x11-drv-vmmouse
Xorg X11 vmmouse input driver

New package yum-metadata-parser
A fast metadata parser for yum

New package zenity
Display dialog boxes from shell scripts

Removed package GFS-kernel

Removed package GFS

Removed package Guppi

Removed package HelixPlayer

Removed package bg5ps

Removed package caching-nameserver

Removed package ccs

Removed package ckernit

Removed package cman-kernel

Removed package ddd

Removed package dlm

Removed package dlm-kernel

Removed package eclipse-pydev

Removed package ethereal

Removed package fence

Removed package fence

Removed package freeglut

Removed package gal

Removed package gdk-pixbuf

Removed package gkrellm
Removed package glibc-kernheaders
Removed package gnbd
Removed package gnbd-kernel
Removed package gnome-libs
Removed package gnome-print
Removed package gnopernicus
Removed package gnu.getopt
Removed package gtk+
Removed package gtk-engines
Removed package guil
Removed package h2ps
Removed package iddev
Removed package imlib
Removed package kon2
Removed package lha
Removed package libhttp
Removed package liblbuutil
Removed package libpng10
Removed package liboldX
Removed package libsetrans
Removed package libstdc++so7
Removed package libxkbui
Removed package longrun
Removed package magma-plugins
Removed package macutils
Removed package magma
Removed package mozilla
Removed package notify-daemon
Removed package oaf
Removed package openmotif
Removed package openobex-apps

Removed package oro

Removed package rhnlib

Removed package valgrind-callgrind

Removed package utempter

Removed package werken.xpath

Removed package xorg-x11-xkbdata

Removed package xpdf

Removed package xscreensaver

22. Fedora Extras - Community Package Repository

Fedora Extras is an extension of Fedora Core that provides many additional packages for users of the Fedora distribution.

22.1. Using the Repository



Fedora Extras are Available by Default

Fedora systems automatically use both the Fedora Core and Fedora Extras repositories to install and update software.

To install software from either the Core or Extras repositories, choose **Applications** → **Add/Remove Software**. Enter the root password when prompted. Select the software you require from the list, and choose **Apply**.

You may also install software with the **yum** command-line utility. For example, this command automatically installs the **abiword** package, and all of the dependencies that are required:

```
su -c 'yum install abiword'
```

Enter the root password when prompted.

22.2. About Fedora Extras

As of the release of Fedora Core 6, there are approximately 2,000 packages in Fedora Extras, built from 1,350 source packages. The following list includes some popular and well-known applications that are maintained by community members in Fedora Extras:

- *abiword* - elegant word-processing application
- *balsa* - lightweight e-mail reader
- *bash-completion* - advanced command-line completion for power users
- *bluefish* - HTML editor

- *clamav* - open source anti-virus scanner for servers and desktops
- *exim* - flexible and powerful mail transfer agent
- *fuse* - tool for attaching non-standard devices and network services as directories
- *fwbuilder* - graphical utility for building Linux and Cisco firewall rulesets
- *gaim-guifications* - enhancements to the Gaim Instant Messenger
- *gdesklets* - widgets for the GNOME desktop
- *gnnumeric* - powerful spreadsheet application
- *gramps* - genealogy application
- *inkscape* - illustration and vector drawing application
- *koffice* - complete office suite for the KDE desktop
- *mail-notification* - alerts you as new mail arrives
- *mediawiki* - the Wikipedia solution for collaborative websites
- *nautilus-open-terminal* - extension to the GNOME file manager
- *pan* - the Usenet news reader
- *revelation* - password management utility
- *scribus* - desktop publishing (DTP) application
- *wine* - a compatibility layer to run Windows(TM) programs
- *xfce* - lightweight desktop environment
- *xmms* - the popular audio player
- lots of Perl and Python tools and libraries
- ...and much more!

Is your favorite open source application missing from Fedora Extras? Package the application as an RPM, and submit it for review to Fedora Extras. After a successful review, import it to Extras and you can maintain it there. If you don't know how to create RPM packages, there are many other ways to get involved in Fedora Extras and help the project.

To learn more about how to use Fedora Extras or how to get involved, refer to <http://fedoraproject.org/wiki/Extras>.

22.3. Package Updates

This section discusses changes in Fedora Extras packages that affect this release of Fedora Core.

22.3.1. `exim-sa`

The `exim-sa` package is deprecated, and is not provided in Fedora Extras 6. It was the original implementation of [SpamAssassin](#)⁵¹ integration with Exim, and was functionally similar to `sendmail` filters or `postfix` filters. However, that functionality is rather limited, and Exim now has far better support for content checking, fully integrated into its general-purpose Access Control Lists.

Since the `sa_exim` feature was not enabled in the default configuration, the package can normally be safely uninstalled to allow Exim to be upgraded. Users who have modified their configuration to use `sa_exim` features should either reconfigure to use Exim's full content scanning abilities or rebuild the package for themselves to include the `exim-sa` subpackage. For further details on Exim's built-in content scanning, see the [Exim documentation](#)⁵².

22.3.2. `mail-notification`

The `mail-notification` package has been split. The **Evolution** plugin is now in a separate package called `mail-notification-evolution-plugin`. When you update the `mail-notification` package, the plugin is added automatically.

23. Fedora Legacy - Community Maintenance Project

The Fedora Legacy Project is a community-supported open source project to extend the lifecycle of select *maintenance mode* Red Hat Linux and Fedora Core distributions. The Fedora Legacy Project works with the Linux community to provide security and critical bug fix errata packages. This work extends the effective lifetime of older distributions in environments where frequent upgrades are not possible or desirable. For more information about the Fedora Legacy Project, refer to <http://fedoraproject.org/wiki/Legacy>.



Legacy Repo Included in Fedora Core 6

Fedora Core 6 ships with a software repository configuration for Fedora Legacy. This is a huge step in integrating Fedora Legacy with the Fedora Project at large and Fedora Core specifically. This repository is not enabled by default in this release.

Currently the Fedora Legacy Project maintains the following distributions and releases in maintenance mode:

- Fedora Core 3
- Fedora Core 4

The Fedora Legacy Project provides updates for these releases as long as there is community interest and participation. When interest is not sustained further, maintenance mode ends with the second test release for the fourth subsequent Core release. For example, maintenance mode for Fedora Core 3, if not sustained by the community, ends with the release of Fedora Core 7 test2. This provides an effective supported lifetime (Fedora Core plus Fedora Legacy Support) of about 18 months.

The Fedora Legacy Project always needs volunteers to perform quality assurance testing on packages waiting to be published as updates. Refer to <http://fedoraproject.org/wiki/Legacy/QATesting> for more information. Also visit our issues list at <http://fedoraproject.org/wiki/Legacy/QATesting#issues> for further information and pointers to bugs we have in the queue.

⁵¹ <http://fedora-test.fedoraproject.org/fedora-docs/fedora-docs/SpamAssassin>

⁵² http://www.exim.org/exim-html-4.62/doc/html/spec_html/ch40.html

If you need help in getting started, visit the project home page on the Wiki at <http://fedoraproject.org/wiki/Legacy>, or the Mentors page at <http://fedoraproject.org/wiki/Mentors>. If you are looking for others ways to participate in Fedora, refer to <http://fedoraproject.org/wiki/HelpWanted>.

24. Fedora Project - Freedom to the Core

The goal of the Fedora Project is to work with the Linux community to build a complete, general-purpose operating system exclusively from open source software. Development is done in a public forum. The project produces time-based releases of Fedora Core approximately 2-3 times a year, with a public release schedule available at <http://fedora.redhat.com/About/schedule/>. The Red Hat engineering team continues to participate in building Fedora Core and invites and encourages more outside participation than was possible in the past. By using this more open process, we hope to provide an operating system more in line with the ideals of free software and more appealing to the open source community. For more information, refer to the Fedora Project website at <http://fedoraproject.org/>.

The Fedora Project is driven by the individuals that contribute to it. As a tester, developer, documenter, or translator, you can make a difference. Refer to <http://fedoraproject.org/wiki/HelpWanted> for details. For information on the channels of communication for Fedora users and contributors, refer to <http://fedoraproject.org/wiki/Communicate>.

In addition to the website, the following mailing lists are available:

- fedora-list@redhat.com⁵³, for users of Fedora Core releases
- fedora-test-list@redhat.com⁵⁴, for testers of Fedora Core test releases
- fedora-devel-list@redhat.com⁵⁵, for developers, developers, developers
- fedora-docs-list@redhat.com⁵⁶, for participants of the Documentation Project

To subscribe to any of these lists, send an email with the word "subscribe" in the subject to <listname>-request, where [<listname>](mailto:<listname>-request) is one of the above list names. Alternately, you can subscribe to Fedora mailing lists through the Web interface at <http://www.redhat.com/mailman/listinfo/>.

The Fedora Project also uses several IRC (Internet Relay Chat) channels. IRC is a real-time, text-based form of communication, similar to Instant Messaging. With it, you may have conversations with multiple people in an open channel, or chat with someone privately one-on-one. To talk with other Fedora Project participants via IRC, access the Freenode IRC network. Refer to the Freenode website at <http://www.freenode.net/> for more information.

Fedora Project participants frequent the #fedora channel on the Freenode network, while Fedora Project developers may often be found on the #fedora-devel channel. Some of the larger projects may have their own channels as well. This information may be found on the webpage for the project, and at <http://fedoraproject.org/wiki/Communicate>.

In order to talk on the #fedora channel, you need to register your nickname, or *nick*. Instructions are given when you **/join** the channel.



IRC Channels

The Fedora Project and Red Hat have no control over the Fedora Project IRC channels or their content.

25. Colophon

As we use the term, a *colophon*:

- recognizes contributors and provides accountability, and
- explains tools and production methods.

25.1. Contributors

- [Bob Jensen](#)⁵⁷ (editor-in-chief, beat writer)
- [Andrew Martynov](#)⁵⁸ (translator, Russian)
- [Anthony Green](#)⁵⁹ (beat writer)
- [Chris Lennert](#)⁶⁰ (beat writer)
- [Dave Malcolm](#)⁶¹ (beat writer)
- [David Eisenstein](#)⁶² (beat writer)
- [David Woodhouse](#)⁶³ (beat writer)
- [Diego Búrigo Zacarão](#)⁶⁴ (translator - Brazilian Portuguese)
- [Dimitris Glezos](#)⁶⁵ (translator, tools)
- [Domingo Becker](#)⁶⁶ (translator - Spanish)
- [Francesco Tombolini](#)⁶⁷ (translator, Italian)
- [Gavin Henry](#)⁶⁸ (beat writer)
- [Hugo Cisneiros](#)⁶⁹ (translator, Brazilian Portuguese)
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- [Karsten Wade](#)⁷⁴ (beat writer, editor, co-publisher)
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- [Nikos Charonitakis](#)⁷⁷ (translator - Greek)
- [Panagiota Biliadou](#)⁷⁸ (translator - Greek)
- [Patrick Barnes](#)⁷⁹ (beat writer, editor)
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- [Pawel Sadowski](#)⁸¹ (translator - Polish)
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- [Thomas Graf](#)⁸⁸ (beat writer)
- [Tommy Reynolds](#)⁸⁹ (tools)
- [Valnir Ferreira Jr.](#)⁹⁰ (translator - Brazilian Portuguese)
- [Yoshinari Takaoka](#)⁹¹ (translator, tools)
- [Yuan Yijun](#)⁹² (translator, Simplified Chinese)
- [Zhang Yang](#)⁹³ (translator - simplified Chinese)

... and many more translators. Refer to the Web-updated version of these release notes as we add translators after release:

<http://fedora.redhat.com/docs/release-notes/>

25.2. Production Methods

Beat writers produce the release notes directly on the Fedora Project Wiki. They collaborate with other subject matter experts during the test release phase of Fedora Core to explain important changes and enhancements. The editorial team ensures consistency and quality of the finished beats, and ports the Wiki material to DocBook XML in a revision control repository. At this point, the team of translators produces other language versions of the release notes, and then they become available to the general public as part of Fedora Core. The publication team also makes them, and subsequent errata, available via the Web.

