
Release Notes

Fedora 10 Preview Release

Fedora Documentation Project

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Abstract

Important information about this release of Fedora

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These Notes are Placeholders

Fedora Community Help Needed!

To help update these release notes for the next release of Fedora, visit <http://fedoraproject.org/wiki/Docs/Beats/HowTo>.

Welcome to Fedora 10

Welcome to Fedora

Fedora is a Linux-based operating system that showcases the latest in free and open source software. Fedora is always free for anyone to use, modify, and distribute. It is built by people across the globe who work together as a community: the Fedora Project. The Fedora Project is open and anyone is welcome to join. The Fedora Project is out front for you, leading the advancement of free, open software and content.

Visit <http://docs.fedoraproject.org/release-notes/> to view the latest release notes for Fedora, especially if you are upgrading.

If you are migrating from a release of Fedora older than the immediately previous one, you should refer to older Release Notes for additional information. You can find older Release Notes at <http://docs.fedoraproject.org/release-notes/>

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 bug and feature reporting. 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 Discussions - <http://fedoraproject.org/wiki/Communicate>
- Participate in the Fedora Project - <http://fedoraproject.org/wiki/Join>

Fedora 10 overview

As always, Fedora continues to develop (<http://www.fedoraproject.org/wiki/RedHatContributions>) and integrate the latest free and open source software (<http://www.fedoraproject.org/wiki/Features>.) The following sections provide a brief overview of major changes from the last release of Fedora. For more details about other features that are included in Fedora 10, refer to their individual wiki pages that detail feature goals and progress:

<http://www.fedoraproject.org/wiki/Releases/10/FeatureList>

Throughout the release cycle, there are interviews with the developers behind key features giving out the inside story:

<http://www.fedoraproject.org/wiki/Interviews>

The following are major features for Fedora 10:

- Wireless connection sharing enables ad hoc network sharing -- <http://www.fedoraproject.org/wiki/Features/ConnectionSharing>
- Better setup and use of printers through improved management tools -- <http://www.fedoraproject.org/wiki/Features/BetterPrinting>
- Virtualization storage provisioning for local and remote connections now simplified -- <http://www.fedoraproject.org/wiki/Features/VirtStorage>
- SecTool is a new security audit and intrusion detections system -- <http://www.fedoraproject.org/wiki/Features/SecurityAudit>
- RPM 4.6 is a major update to the powerful, flexible software management libraries -- <http://www.fedoraproject.org/wiki/Features/RPM4.6>

Some other features in this release include:

- Glitch free audio and better performance is achieved through a rewrite of the PulseAudio sound server to use timer-based audio scheduling -- <http://www.fedoraproject.org/wiki/Features/GlitchFreeAudio>
- Improved webcam support -- <http://www.fedoraproject.org/wiki/Features/BetterWebcamSupport>
- Better support for infrared remote controls makes them easier to connect and work with many applications -- <http://www.fedoraproject.org/wiki/Features/BetterLIRCSupport>
- The paths `/usr/local/sbin:/usr/sbin:/sbin` have been added to the `PATH` for normal users, to simplify command-line administration tasks -- <http://fedoraproject.org/wiki/Features/SbinSanity>
- The online account service provides applications with credentials for online accounts listed on <http://online.gnome.org> or stored in GConf -- <http://www.fedoraproject.org/wiki/Features/OnlineAccountsService>

Features for Fedora 10 are tracked on the feature list page:

<http://www.fedoraproject.org/wiki/Releases/10/FeatureList>

Introduction to Fedora Project and technical release notes

The Fedora Project is an openly-developed project designed by Red Hat, open for general participation, led by a meritocracy, and following a set of project objectives. The results from this project include Fedora Core, which is a complete, general-purpose operating system built exclusively from open source software.

Fedora is a community supported project

Fedora is not a commercially supported product of Red Hat, Inc.

For more information, refer to the section called “Fedora Project”.

Additional important information about this release may be made available at <http://docs.fedoraproject.org/release-notes/>. Users are advised to check this link regularly for updates.

For reporting errors or other requests about these release notes, file a bug report using this pre-filled bugzilla template: <http://tinyurl.com/byvk2>

Fedora Project

The goal of the Fedora Project is to work with the Linux community to build a complete, general-purpose operating system exclusively from free and open source software. 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://join.fedoraproject.org> 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:

- <mailto:fedora-list@redhat.com>, for users of Fedora releases
- <mailto:fedora-test-list@redhat.com>, for testers of Fedora test releases
- <mailto:fedora-devel-list@redhat.com>, for developers, developers, developers
- <mailto:fedora-docs-list@redhat.com>, 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>` 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/w/index.php?title=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.

Feedback

Thank you for taking the time to provide your comments, suggestions, and bug reports to the Fedora community; this helps improve the state of Fedora, Linux, and free software worldwide.

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/F10Common>.

Providing feedback on release notes

If you feel these release notes could be improved in any way, you can provide your feedback directly to the beat writers. There are several ways to provide feedback, 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.* Refer to the admonition above for details.
- Email <mailto:relnotes@fedoraproject.org>.

What is New for Installation and Live Images

Installation notes

To learn how to install Fedora, refer to <http://docs.fedoraproject.org/install-guide/>

If you encounter a problem or have a question during installation that is not covered in these release notes, refer to <http://www.fedoraproject.org/wiki/FAQ> and <http://www.fedoraproject.org/wiki/Bugs/Common>.

Anaconda is the name of the Fedora installer. This section outlines issues related to Anaconda and installing Fedora 10.

Installation media

If you intend to download the Fedora DVD ISO image, keep in mind that not all file downloading tools can accommodate files larger than 2 GiB in size.

The programs `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 asks if it should verify the installation medium when Install or upgrade an existing system is selected during boot from an installation-only media.

For Fedora Live media, press any key during the initial boot countdown, bringing up a boot option menu. Select Verify and boot to perform the media test. The pure installation medium can be used to verify a Fedora Live medium. Anaconda asks during the mediacheck if you want to check any other disc than the one Anaconda is running from. To test another media, select eject to eject the inserted medium, then replace it with the medium you want to test instead.

Perform this test everytime after you create or receive a new installation or live medium.

The Fedora Project strongly recommends that you perform this test before reporting any installation-related bugs. Many of the bugs reported are actually due to improperly-burned CD or DVDs.

In rare cases, the testing procedure 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.

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 or DVD, however, you should still use

```
mediacheck
```

to test the integrity of the media.

Another reason for a failure during installation is faulty memory. To perform memory testing before you install Fedora, press any key to enter the boot menu, then select Memory Test. This option runs the Memtest86 standalone memory testing software in place of Anaconda. Memtest86 memory testing continues until you press the **Esc** key.

Fedora 10 supports graphical FTP and HTTP installations. However, the installer image must either fit in RAM or appear on local storage, such as the installation DVD or Live Media. Therefore, only systems with more than 192MiB of RAM or that boot from the installation DVD or Live Media 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.

Changes in Anaconda

- <http://www.fedoraproject.org/wiki/Anaconda/Features/NetConfigForNM> -- Anaconda is now using NetworkManager for configuring network interfaces during installation. The previous backend tool was `libdhcp` (which was a replacement for `libpump`). Anaconda uses NetworkManager by communicating with it via D-Bus during installation. The move to NetworkManager in Anaconda is still ongoing and some things are not yet 100% functional, but the bulk of existing functionality has been retained. NetworkManager is enabled by default on newly installed systems, so moving to NetworkManager in Anaconda allows the installer to use the same network management tool that the final system uses. The move to NetworkManager brings some changes, most notably the removal of the network interface configuration screen in Anaconda. You are no longer asked to verify the network settings during installation. The screen now simply prompts for the hostname. The settings used during installation are written to the system.
- When using `netinst.iso` to boot the installer, Anaconda defaults to using the Fedora mirrorlist URL as the installation source. The method selection screen no longer appears by default. If you do not wish to use the mirrorlist URL, either add `repo=<your installation source>` or add `askmethod`

to the installer boot parameters. The `askmethod` option causes the selection screen to appear as it did in previous releases. Boot parameters can be added by pressing the **Tab** key in the initial boot screen and appending your new parameters to the existing list. For more information, refer to the `repo=` and `stage2=` descriptions at <http://fedoraproject.org/wiki/Anaconda/Options>.

Installation related issues

PXE booting from a `.iso`

When PXE booting and using a `.iso` file for the installation media via NFS you are now required to add `method=nfsiso:server:/path` to the command line.

IDE device names

Use of `/dev/hdX` on i386 and `x86_64` for IDE drives changed to `/dev/sdX` in Fedora 7. If you are upgrading from an earlier version than Fedora 7, you need to research about the importance of labeling devices for upgrades and any partition limitations.

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.

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 causes 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.

Upgrade related issues

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

SCSI driver partition limits

Whereas older IDE drivers supported up to 63 partitions per device, SCSI devices are limited to 15 partitions per device. Anaconda uses the `libata` driver in the same fashion as the rest of Fedora, so it is unable to detect more than 15 partitions on an IDE disk during the installation or upgrade process.

If you are upgrading a system with more than 15 partitions, you may need to migrate the disk to Logical Volume Management (LVM). This restriction may cause conflicts with other installed systems if they do not support LVM. Most modern Linux distributions support LVM and drivers are available for other operating systems as well.

Disk partitions must be labeled

A change in the way that the Linux kernel handles storage devices means that device names such as `/dev/hdX` or `/dev/sdX` may differ from the values used in earlier releases. Anaconda solves this problem by relying on partition labels or UUIDs for finding devices. If these are not present, then Anaconda presents a warning indicating that partitions need to be labelled and that the upgrade can not proceed. Systems that use Logical Volume Management (LVM) and the device mapper usually do not require relabeling.

To check disk partition labels

To view partition labels, boot the existing Fedora installation, and enter the following at a terminal prompt:

```
/sbin/blkid
```

Confirm that each volume line in the list has a `LABEL=` value, as shown below:

```
    /dev/hdd1: LABEL="/boot "  
    UUID="ec6a9d6c-6f05-487e-a8bd-a2594b854406" SEC_TYPE="ext2 "  
    TYPE="ext3 "
```

To set disk partition labels

For ext2 and ext3 partitions without a label, use the following command:

```
su -c 'e2label /dev/example f7-slash'
```

For a VFAT filesystem use **dosfstlabel** from the `dosfstools` package, and for NTFS filesystem use **ntfslabel** from the `ntfsprogs` package. Before rebooting the machine, also update the file system mount entries, and the GRUB kernel root entry.

Update the file system mount entries

If any filesystem labels were added or modified, then the device entries in `/etc/fstab` must be adjusted to match:

```
su -c 'cp /etc/fstab /etc/fstab.orig' su -c 'gedit  
/etc/fstab'
```

An example of a mount by label entry is:

```
LABEL=f7-slash / ext3 defaults 1
```

1

Update the `grub.conf` kernel root entry

If the label for the / (root) filesystem was modified, the kernel boot parameter in the grub configuration file must also be modified:

```
su -c 'gedit /boot/grub/grub.conf'
```

A matching example kernel grub line is:

```
kernel /vmlinuz-2.6.20-1.2948.fc6 ro  
root=LABEL=f7-slash rhgb quiet
```

Test changes made to labels

If partition labels were adjusted, or the `/etc/fstab` file modified, then boot the existing Fedora installation to confirm that all partitions still mount normally and login is successful. When complete, reboot with the installation media to start the installer and begin the upgrade.

Upgrades versus fresh installations

In general, fresh installations are recommended over upgrades. This is particularly true 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 want 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.

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. Some previously installed packages may no longer be available in any configured repository. To list all these packages, use the following command:

```
su -c 'yum list extras'
```

Kickstart HTTP issue

When using a Kickstart configuration file via HTTP, kickstart file retrieval may fail with an error that indicates the file could not be retrieved. Click the OK button several times without making modifications to override this error successfully. As a workaround, use one of the other supported methods to retrieve Kickstart configurations.

Firstboot requires creation of non-root user

The Firstboot application requires the creation of a non-root user for the system. This is to support `gdm` no longer allowing the root user to log in to the graphical desktop.

If a network authentication mechanism is chosen during installation Firstboot does not require creating a that does not use local user.

Fedora Live images

The Fedora 10 release includes several Fedora Live ISO images in addition to the traditional installation images. These ISO images are bootable, and you can burn them to media and use them to try out Fedora. They also include a feature that allows you to install the Fedora Live image content to your hard drive for persistence and higher performance.

Available images

For a complete list of current spins available, and instructions for using them, refer to:

<http://fedoraproject.org/wiki/CustomSpins>

Usage information

To boot from the Fedora Live image, insert it into your computer and restart. To log in and use the desktop environment, enter the username `fedora`. There is no password on this account. The GNOME-based Fedora Live images automatically login after one minute, so users have time to select a preferred language. After logging in, if you wish to install the contents of the live image to your hard drive, click on the Install to Hard Drive icon on the desktop.

Text mode installation

You can do a text mode installation of the Fedora Live images using the `liveinst` command in the console.

USB booting

Another way to use these Fedora Live images is to put them on a USB stick. To do this, use the `liveusb-creator` graphical interface. Use Add/Remove Software, search for, then install `liveusb-creator`. To install using `yum`:

```
su -c 'yum install liveusb-creator'
```

Instead of the graphical tool, you can use the command line interface from the `livecd-tools` package. Then, run the `livecd-iso-to-disk` script:

```
/usr/bin/livecd-iso-to-disk /path/to/live.iso
```

```
/dev/sdb1
```

Replace `/dev/sdb1` with the partition where you want to put the image.

This is *not* a destructive process; any data you currently have on your USB stick *is preserved*.

Persistent home directory

Support for keeping a persistent `/home` with the rest of the system stateless has been added for Fedora 10. This includes support for encrypting `/home` to protect your system in the case where your USB stick is lost or stolen. To use this, download the live image and run the following command:

```
livecd-iso-to-disk --home-size-mb 512 /path/to/live.iso  
/dev/sdb1
```

Replace `/dev/sdb1` with the partition where you want to put the image.

Replace 512 with the desired size in megabytes of the persistent `/home`. The **livecd-iso-to-disk** shell script is stored in the `LiveOS` directory at the top level of the CD image. The USB media must have sufficient free space for the Fedora Live image, plus the `/home`, plus any other data to be stored on the media. By default, this encrypts your data and prompts for a passphrase to use. If you want to have an unencrypted `/home`, then you can specify `--unencrypted-home`.

Note that later runs of **livecd-iso-to-disk** preserve the `/home` that is created on the USB stick, continuing to use it even if you change your live image.

Live USB persistence

Support for persistent changes with a Fedora Live image exists for Fedora 9 and later. The primary use case is booting from a Fedora Live image on a USB flash drive and storing changes to that same device. To do this, download the Fedora Live image and then run the following command:

```
livecd-iso-to-disk --overlay-size-mb 512  
/path/to/live.iso /dev/sdb1
```

Replace `/dev/sdb1` with the partition where you want to put the image.

Replace 512 with the desired size in megabytes of the persistent data, or *overlay*. The **livecd-iso-to-disk** shell script is stored in the `LiveOS` directory at the top level of the CD image. The USB media must have sufficient free space for the Fedora Live image, plus the overlay, plus any other data to be stored on the media.

Bootting a Fedora Live image off of USB on Intel-based Apple hardware

Fedora 10 includes support for putting the live image onto a USB image and then booting it on Intel processor-based Apple hardware. Unlike for most x86 machines, this unfortunately requires reformatting the USB stick that you are using. To set up a stick for this, you can run:

```
/usr/bin/livecd-iso-to-disk --mactel /path/to/live.iso
```

`/dev/sdb1`

Replace `/dev/sdb1` with the partition where you want to put the image.

Note that all of the other arguments for the **livecd-iso-to-disk** tool as described above can be used here as well.

Differences from a regular Fedora install

The following items are different from a normal Fedora install with the Fedora Live images.

- Fedora Live images provide a subset of packages available in the regular DVD image. Both connect to the same repository that has all the packages.
- The SSH daemon `sshd` is disabled by default. The daemon is disabled because the default username in the Fedora Live images does not have a password. However, installation to hard disk prompts for creating a new username and password.
- Fedora Live image installations do not allow any package selection or upgrade capability since they copy the entire file system from media or USB disks to the hard disk. After the installation is complete, and your system has been rebooted, you can add and remove packages as desired with the Add/Remove Packages tool, **yum**, or the other software management tools.
- Fedora Live images do not work on i586 architecture.

Hardware overview

Users often request that Fedora provide a *hardware compatibility list* (HCL), which we have carefully avoided doing. Why? It is a difficult and thankless task that is best handled by the community at large than by one little Linux distribution.

However, because of our stance against closed-source hardware drivers and the problems of binary firmware for hardware, there is some additional information the Fedora Project wants to provide Fedora users.

Useful hardware information in these release notes

- For 32-bit x86 - the section called “x86 specifics for Fedora ”
- For 64-bit x86 - the section called “x86_64 specifics for Fedora”
- For PowerPC (PPC)- the section called “PPC specifics for Fedora”

Hardware stance

From <http://fedoraproject.org/wiki/ForbiddenItems>:

- If it is proprietary, it cannot be included in Fedora.
- If it is legally encumbered, it cannot be included in Fedora.
- If it violates United States federal law, it cannot be included in Fedora.

What can you do?

1. Get active. Tell your hardware vendors you only want free, open source drivers and firmware

2. Use your buying power and only purchase from hardware vendors that support their hardware with open drivers and firmware. Refer to <http://www.fsf.org/campaigns/hardware.html> for more information.

Architecture specific notes

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

RPM multiarch support on 64-bit platforms - x86_64 and 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, 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"
```

This setting changes the default query to list the architecture. Add it to `/etc/rpm/macros` (for a system wide setting) or `~/ .rpmmacros` (for a per-user setting).

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

x86 specifics for Fedora

This section covers specific information about Fedora and the x86 hardware platform.

Hardware requirements for x86

In order to use specific features of Fedora 10 during or after installation, you may need to know details of other hardware components such as video and network cards.

Processor and memory

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.

Fedora 10 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

Hard disk space

All of the packages from a DVD install can occupy over 9 GB of disk space. The final install size is determined by the installing spin and the packages selected during installation. Additional disk space is required during installation to support the installation environment. The additional disk space corresponds to the size of `/Fedora/base/stage2.img` plus the size of the files in `/var/lib/rpm` on the installed system.

In practical terms the additional space requirements may range from as little as 90 MiB for a minimal installation to as much as an additional 175 MiB for a larger installation.

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

x86_64 specifics for Fedora

This section covers specific information about Fedora and the x86_64 hardware platform.

Hardware requirements for x86_64

In order to use specific features of Fedora 10 during or after installation, you may need to know details of other hardware components such as video and network cards.

Memory requirements for x86_64

- Minimum RAM for text-mode: 256MiB
- Minimum RAM for graphical: 384MiB
- Recommended RAM for graphical: 512MiB

Hard disk space requirements for x86_64

All of the packages from a DVD install can occupy over 9 GB of disk space. The final install size is determined by the installing spin and the packages selected during installation. Additional disk space is required during installation to support the installation environment. The additional disk space corresponds to the size of `/Fedora/base/stage2.img` plus the size of the files in `/var/lib/rpm` on the installed system.

In practical terms the additional space requirements may range from as little as 90 MiB for a minimal installation to as much as an additional 175 MiB for a larger installation.

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

PPC specifics for Fedora

This section covers specific information about Fedora and the PPC (Power PC) hardware platform.

Hardware requirements for PPC

Processor and memory

- Minimum CPU: PowerPC G3 / POWER3
- Fedora 10 supports the New World generation of Apple Power Macintosh, shipped from circa 1999 onward. Although Old World machines should work, they require a special bootloader which is not included in the Fedora distribution. Fedora has also been installed and tested on POWER5 and POWER6 machines.

- Fedora 10 supports pSeries, iSeries, and Cell Broadband Engine machines.
- Fedora 10 also supports the Sony PlayStation 3 and Genesi Pegasos II and Efika.
- Fedora 10 includes new hardware support for the P.A. Semiconductor 'Electra' machines.
- Fedora 10 also includes support for Terrasoft Solutions powerstation workstations.
- Recommended for text-mode: 233 MHz G3 or better, 128MiB RAM.
- Recommended for graphical: 400 MHz G3 or better, 256MiB RAM.

Hard disk space

The complete packages can occupy over 9 GiB of disk space. Final size is entirely determined by the installing spin and the packages selected during installation. 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 a larger installation.

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

4 KiB pages on 64-bit machines

After a brief experiment with 64KiB pages in Fedora Core 6, the PowerPC64 kernel has now been switched back to 4KiB pages. The installer should reformat any swap partitions automatically during an upgrade.

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`.

PPC installation notes

Fedora 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:

- On most machines, the bootloader automatically boots the appropriate 32-bit or 64-bit installer from the install disc.
- 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 / Efika 5200B -- The Fedora kernel supports both Pegasos and Efika without the need to use the "Device Tree Supplement" from powerdeveloper.org. However, the lack of full support for

ISO9660 in the firmware means that booting via yaboot from the CD is not possible. Boot the 'netboot' image instead, either from the CD or over the network. Because of the size of the image, you must set the firmware's `load-base` variable to load files at a high address such as 32MiB instead of the default 4MiB:

```
setenv load-base 0x2000000
```

At the OpenFirmware prompt, enter the following command to boot the Efika update, if necessary, or the netboot image from the CD:

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

Or from the network:

```
boot eth ppc32.img
```

You must also manually configure OpenFirmware to make the installed Fedora system bootable. To do this, set the `boot-device` and `boot-file` environment variables appropriately, to load **yaboot** from the `/boot` partition. For example, a default installation might require the following:

```
setenv boot-device hd:0 setenv boot-file  
/yaboot/yaboot setenv auto-boot? true
```

- PA Semi Electra -- The Electra firmware does not yet support yaboot; to install on Electra, you can boot the `ppc64.img` netboot image. After the installation, you will need to manually configure the firmware to load the installed kernel and `initrd` from the `/boot` partition.

Refer to the firmware documentation for further details.

- Sony PlayStation 3 -- For installation on PlayStation 3, first update to firmware 1.60 or later. The "Other OS" boot loader must be installed into the flash, following the instructions at <http://www.playstation.com/ps3-openplatform/manual.html>. A suitable boot loader image can be found on Sony's "ADDON" CD, available from <ftp://ftp.kernel.org/pub/linux/kernel/people/geoff/cell/>.

Once the boot loader is installed, the PlayStation 3 should be able to boot from the Fedora install media. Please note that network installation works best with NFS, since that takes less memory than FTP or HTTP methods. Using the text option also reduces the amount of memory taken by the installer.

For more info on Fedora and the PlayStation3 or Fedora on PowerPC in general, join the Fedora-PPC mailing list (<http://lists.infradead.org/mailman/listinfo/fedora-ppc>) or the `#fedora-ppc` channel on FreeNode (<http://freenode.net/>.)

- 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.

- RS/6000 kernel support is currently broken (as of August 28, 2008).

PPC specific packages

- The ppc64-utils package has been split out into individual packages reflecting upstream packaging (ps3pf-utils, powerpc-utils, powerpc-utils-papr.) Although the **mkzimage** command is no longer supplied, you can use the **wrapper** script from the kernel-bootwrapper package:

```
wrapper -i initrd- $\{KERN\_VERSION\}$ .img -o  
zImage- $\{KERN\_VERSION\}$ .img vmlinuz- $\{KERN\_VERSION\}$ 
```

X Window system - graphics

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

X Configuration Changes

Fedora 10 uses the

evdev

input driver as standard mouse and keyboard driver for the X server. This driver works with HAL to provide a persistent per-device configuration that allows devices to be added or removed at runtime.

Third-party Video Drivers

Refer to the Xorg third-party drivers page for detailed guidelines on using third-party video drivers.

<http://fedoraproject.org/wiki/Xorg/3rdPartyVideoDrivers>

Resources

<http://who-t.blogspot.com/2008/07/input-configuration-in-nutshell.html> -- Evdev configuration.

Fedora 10 boot-time

Fedora 10 includes multiple boot-time updates, including changes that allow for faster booting and graphic booting changes.

Plymouth

Plymouth is the graphical boot up system debuting with Fedora 10.

- Adding **rhgb** on the **grub** command line directs Plymouth to load the appropriate plugin for your hardware.
- The graphical boot splash screen that comes with Plymouth requires kernel mode setting drivers to work best. There are not kernel modesetting drivers available for all hardware yet. To see the graphical splash before the drivers are generally available, add **vga=0x318** to the kernel **grub** command line. This uses **vesafb**, which does not necessarily give the native resolution for a flat panel, and may cause flickering

or other weird interactions with X. Without kernel modesetting drivers or **vga=0x318**, Plymouth uses a text-based plugin that is plain but functional.

- Currently, only Radeon R500 and higher users get kernel modesetting by default. There is work in progress to provide modesetting for R100 and R200. Additionally, Intel kernel modesetting drivers are in development, but not turned on by default.
- The kernel modesetting drivers are still in development and buggy. If you end up with nothing but a black screen during boot up, or a screen with nothing but random noise on it, then adding **nomodeset** to the kernel boot prompt in grub disables modesetting.
- Plymouth hides boot messages. To view boot messages, press the **Esc** key during boot, or view them in `/var/log/boot.log` after boot up. Alternatively, remove **rhgb** from the kernel command line and plymouth displays all boot messages. There is also a status icon on the login screen to view boot warnings.

Faster booting

Fedora 10 gets a faster boot from improvements in process start-up.

- Readahead is started in parallel with the boot process.
- Udev may appear to be slower but in fact readahead reads all disk buffers needed for the boot process in the background and shortens the whole boot process. Creation of the readahead file list is done monthly and can be triggered manually by touching `/.readahead_collect`. The configuration file `/etc/sysconfig/readahead` can be edited to turn off readahead-collector and/or readahead.

Kernel modesetting

Kernel modesetting (KMS) can default to either enabled or disabled in the DRM driver and it can be enabled or disabled at boot-time.

- Both Plymouth and the DDX drivers detect whether KMS is present and enabled. If it is present and enabled, Plymouth and DDX drivers will take advantage of them.
- If KMS is not present or it is present but disabled then Plymouth will automatically fall back to the text splash and the DDX driver will automatically fall back to user-space modesetting.
- Allows for faster user switching, seamless X server switching, and graphical panic messages.

Upfront About Multimedia

Multimedia

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

Multimedia players

The default installation of Fedora includes Rhythmbox and Totem for media playback. Many other programs are available in the Fedora repositories, including the popular XMMS player and KDE's Amarok.

Both GNOME and KDE have a selection of players that can be used with a variety of formats. Additional programs are available from third parties to handle other formats.

Totem, the default movie player for GNOME, now has the ability to switch playback back-ends without recompilation or switching packages. To install the Xine back-end, use Add/Remove Software to install totem-xine or run the following command:

```
su -c 'yum install totem-xine'
```

To run Totem with the Xine back-end once:

```
su -c 'totem-backend -b xine totem'
```

To change the default back-end to xine for the entire system:

```
su -c 'totem-backend -b xine'
```

While using the Xine back-end, it is possible to temporarily use the GStreamer back-end. To use the GStreamer back-end, run the following command:

```
su -c 'totem-backend -b gstreamer'
```

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 powerful and flexible alternatives to more popular, restricted formats. The Fedora Project encourages the use of open source formats in place of restricted ones. For more information on these formats and how to use them, refer to:

- Xiph.Org Foundation at <http://www.xiph.org/>
- <http://fedoraproject.org/wiki/Multimedia/Xiph>

MP3, DVD, and other excluded multimedia

Fedora 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 licenses. DVD video formats are patented and equipped with an encryption scheme. The patent holders have not provided the necessary 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 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 an MP3 plugin for GStreamer that has the related patents licensed for end users. This plugin enables MP3 support in applications that use

the GStreamer framework as a backend. We cannot distribute this plugin in Fedora for licensing reasons, but it offers a new solution for an old problem. For more information refer to these pages:

- <http://fedoraproject.org/wiki/Multimedia/fluendo-mp3>
- <http://fedoraproject.org/wiki/Multimedia/MP3>
- <http://fedoraproject.org/wiki/Multimedia/DVD>
- <http://fedoraproject.org/wiki/Multimedia/Flash>

CD and DVD authoring and burning

Default installations of Fedora and the Desktop Live spin include a built-in feature for CD and DVD burning. Fedora includes a variety of other tools for easily creating and burning CDs and DVDs. Fedora includes graphical programs such as Brasero, GnomeBaker, and K3b. Console programs including **wodim**, **readom**, and **genisoimage**. Graphical programs are found under Applications Sound & Video.

Screencasts

You can use Fedora to create and play back *screencasts*, which are recorded desktop sessions, using open technologies. Fedora includes **istanbul**, which creates screencasts using the Theora video format, and **byzanz**, which creates screencasts as animated GIF files. You can play back these videos using one of several players included in Fedora. This is the preferred way to submit screencasts to the Fedora Project for either contributors or end-users. For more comprehensive instructions, refer to the screencasting page:

<http://fedoraproject.org/wiki/ScreenCasting>

Extended support through plugins

Most of the media players in Fedora support the use of plugins to add support for additional media formats and sound output systems. Some use powerful backends such as the gstreamer package to handle media format support and sound output. Fedora offers plugin packages for these backends and for individual applications, and third parties may offer additional plugins to add even greater capabilities.

Infrared remote support

A new graphical frontend to LIRC is provided by **gnome-lirc-properties**, making it easy to connect and configure infrared remote controls. LIRC is routinely used in multimedia applications to implement support for infrared remote controls, and using it in Rhythmbox and Totem should be as easy as plugging the remote receiver into your computer, then selecting Auto-detect in the Infrared Remote Control preferences.

If you had a previous setup with LIRC, it is recommended you regenerate the configuration files with **gnome-lirc-properties**. This is required so that a majority of applications work with your new setup.

Refer to the feature page for more information:

<https://fedoraproject.org/wiki/Features/BetterLIRCSupport>

Glitch-free PulseAudio

The PulseAudio sound server has been rewritten to use timer-based audio scheduling instead of the traditional interrupt-driven approach. This is the approach that is taken by other systems such as Apple's CoreAudio and the Windows Vista audio subsystem. The timer-based audio scheduling has a number of

advantages, including reduced power consumption, minimization of drop-outs, and flexible adjustment of the latency for the needs of the application.

What is the Latest on the Desktop

Fedora desktop

This section details changes that affect Fedora graphical desktop users.

Better webcam support

Fedora 10 comes with improved support for webcams.

This support follows on the improvements to the UVC driver first introduced in Fedora 9 that added support for any webcam with a Windows Vista compliant logo. Fedora 10 features a new v4l2 version of gspca, a USB webcam driver framework with support for many different USB webcam bridges and sensors.

Userspace support for webcams has also been improved by adding `libv4l` and updating all webcam using applications to use `libv4l`. This support makes these applications understand the manufacturer specific and custom video formats emitted by many webcams, especially by many of the webcams supported by gspca.

For a list of all webcams and applications where Fedora 10's new webcam support has been tested refer to the <https://fedoraproject.org/wiki/Features/BetterWebcamSupport>. For a list of all cams supported by the original version of gspca refer to the original gspca website.

<http://mxhaard.free.fr/spca5xx.html>

The v4l2 version of gspca in Fedora 10 supports all these webcams and more.

Plymouth graphical boot

For information about the new graphical boot mode read the section called “Fedora 10 boot-time”.

Echo icon theme

Echo is an icon theme developed for Fedora by the volunteer Fedora Art community. Echo inherits the isometric perspective from the classic Bluecurve theme while introducing a refreshing new look. It follows the freedesktop.org theme specification. The current version covers essential icons from the desktop menus and applications. Future revisions will bring broader coverage.

Currently, both GNOME and Xfce use the Echo icon theme by default. KDE continues to use the Oxygen icon theme. The next release of Fedora may introduce Echo by default for KDE for a consistent look and feel across different desktop environments.

Infrared remote support

New to Fedora 10 is the `gnome-lirc-properties` package with a new graphical front-end for configuring LIRC to use with applications supporting the protocol. For more information refer to the section called “Infrared remote support”.

LIRC is routinely used in multimedia applications to implement support for infrared remote controls, and using it in Rhythmbox and Totem should be as easy as plugging the remote receiver into your computer,

then selecting Auto-detect in the Infrared Remote Control preferences. Refer to the feature page for more information:

<https://fedoraproject.org/wiki/Features/BetterLIRCSupport>

Bluetooth BlueZ 4.0

The Bluetooth support stack, called BlueZ (<http://www.bluez.org/>), has been updated to version 4.x in Fedora 10. Most changes in this version are useful for application developers, but users can notice the new, easier to use wizard for setting up keyboards, mice, and other supported Bluetooth devices. There is also the ability to turn-off the Bluetooth adapter on most brands of laptops through the preferences. This new version will also allow better support for audio devices in the future, through PulseAudio.

Note that the default Bluetooth kernel driver was also switched to **btusb**, which cuts down power consumption compared to its predecessor **hci_usb**.

GNOME

This release features GNOME 2.24. For more details refer to:

<http://www.gnome.org/start/2.24/>

Empathy instant messenger

Empathy instant messenger is the new default replacing Pidgin in this release. It has support for multiple protocols including IRC, XMPP(Jabber), Yahoo, MSN, and others via plugins. It also supports video and voice in the XMPP protocol, with support for other protocols under active development. Empathy uses the **telepathy** framework that has a number of additional plugins:

- **telepathy-gabble** - Jabber/XMPP plugin
- **telepathy-idle** - IRC plugin
- **telepathy-butterfly** - MSN plugin
- **telepathy-sofiasip** - SIP plugin
- **telepathy-haze** - Libpurple (Pidgin) library connection manager provides support for other protocols such as Yahoo

Pidgin continues to be available in the Fedora software repository and is retained as the default for users upgrading from previous releases of Fedora.

GNOME Display Manager

The GNOME Display Manager (**gdm**) has been updated to the latest upstream code, which is a complete rewrite driven by Fedora developers. PolicyKit can be used to control shutdown and reboot. The configuration tool **gdmsetup** is missing currently, and is set to be replaced. For configuration changes, refer to:

<http://live.gnome.org/GDM/2.22/Configuration>

Codec installation helper

The GStreamer codec installation helper **codeina** was replaced by a PackageKit-based solution for Fedora 10. When Totem, Rhythmbox, or another GStreamer application require a plugin to read a film or song,

a PackageKit dialogue appears, allowing the user to search for the necessary package in the configured repositories.

More details are available on the feature page:

https://fedoraproject.org/wiki/Features/GStreamer_dependencies_in_RPM

KDE

This release features KDE 4.1.2. As the kdevelop packages is not part of KDE 4.1 and kdewebdev is only partially available (no Quanta) in KDE 4.1, the KDE 3.5.10 versions of those packages are shipped. A kdegames3 package containing the games not yet ported to KDE 4 is also available.

<http://kde.org/announcements/announce-4.1.2.php>

KDE 4.1 is the latest release of KDE 4 and provides several new features, many usability improvements, and bugfixes over KDE 4.0, the first KDE 4 release series. This new release includes a folder view desktop applet (*Plasmoid*), improvements to Dolphin and Konqueror and many new and improved applications. KDE 4.1.2 is a bugfix release from the KDE 4.1 release series.

Fedora 10 does *not* include the legacy KDE 3 Desktop. It does include a compatibility KDE 3 Development Platform, which can be used to build and run KDE 3 applications within KDE 4 or any other desktop environment. Refer to the the section called “KDE 3 Development Platform and Libraries” section for more details about what is included.

Fedora 10 includes a snapshot of knetworkmanager, which works with the prerelease of NetworkManager 0.7 in Fedora 10. As it was not considered ready for production use, the KDE Live images use **nm-applet** from NetworkManager-gnome instead (as in Fedora 8 and 9). The `gnome-keyring-daemon` facility saves passwords for these encryption technologies. If you wish to try **knetworkmanager** can be installed from the repository.

As the native KWin window manager now optionally supports compositing and desktop effects, the KDE Live images no longer include Compiz/Beryl (since Fedora 9). The KWin compositing/effects mode is disabled by default, but can be enabled in systemsettings. Compiz (with KDE 4 integration) is available from the repository by installing the `compiz-kde` package.

Enhancements

- *Plasma* is more mature and panel configuration has been extended. The new panel controller makes it easy to customize your panel providing direct visual feedback. The Plasma **folderview** applet provides a view of a directory and thus allows you to store files on the desktop. It is replaces other well known icons on the desktop.

Package and application changes

- Fedora 10 ships kdepim 4.1.2 instead of 3.5.x.
- libkipi, libkexiv2, and libkdcraw have been obsoleted by the KDE 4 versions in the kdegraphics package. Accordingly, kipi-plugins, digikam, and kphotoalbum have been updated to KDE 4 versions.
- kpackagekit, a KDE frontend to PackageKit, is now available. (It may be made available as an update for Fedora 9 at a later time.)

In addition, the following changes made since the Fedora 9 release, which have been backported to Fedora 9 updates, are also part of Fedora 10:

- KDE has been upgraded from version 4.0.3 to 4.1.2.

- qt and PyQt4 have been upgraded from 4.3 to 4.4.
- kdewebdev, kdevelop, kdegames3, and the KDE 3 backwards-compatibility libraries have been upgraded from KDE 3.5.9 to 3.5.10.
- *QtWebKit* is now part of the qt package. The stand alone WebKit-qt package has been obsoleted.
- The new package qgtkstyle contains a Qt 4 style using GTK+ for drawing, providing better integration of Qt 4 and KDE 4 applications into GNOME.
- The phonon library, which was part of kdelibs in Fedora 9, is now a separate package. An optional *GStreamer* backend (phonon-backend-gstreamer) is now available, but the *xine-lib* backend, which is now packaged as phonon-backend-xine, is still the recommended default backend and is now required by the phonon package.
- The kdegames3 package no longer provides development support for the KDE 3 version of libkdegames because nothing in Fedora outside of kdegames3 itself requires that library any longer.
- The package okteta is now part of kdeutils.
- The package dragonplayer is now part of kdemultimedia.
- The program kaider has been renamed to *Lokalize* and is now part of kdesdk.
- The package ksirk has been ported to KDE 4 and is now part of kdegames.
- The package extragear-plasma has been renamed to kdeplasma-addons.

Sugar Desktop

The Sugar Desktop originated with the OLPC initiative. It allows for Fedora users and developers to do the following.

- Build upon the collaborative environment.
- Test out Sugar on an existing Fedora system by selecting the Sugar environment from their display manager.
- Developers interested in working on the Sugar interface or writing activities can have a development platform without needing an XO laptop.

Web browsers

Enabling Flash plugin

Fedora includes **swfdec** and **gnash**, which are free and open source implementations of Flash. We encourage you to try either of them before seeking out Adobe's proprietary Flash Player plugin software. The Adobe Flash Player plugin uses a legacy sound framework that does not work correctly without additional support. Run the following command to enable this support:

```
su -c 'yum install libflashsupport'
```

If you are using Flash 10, you do not need libflashsupport anymore as the usage of ALSA has been fixed in this version.

Users of Fedora x86_64 must install the `nspluginwrapper.i386` package to enable the 32-bit Adobe Flash Player plug-in in Firefox, and the `libflashsupport.i386` package to enable sound from the plugin.

Install the `nspluginwrapper.i386`, `nspluginwrapper.x86_64`, and `libflashsupport.i386` packages:

```
su -c 'yum install nspluginwrapper.{i386,x86_64} libflashsupport.i386'
```

Install `flash-plugin` after `nspluginwrapper.i386` is installed:

```
su -c 'yum install libflashsupport'
```

Run `mozilla-plugin-config` to register the flash plugin:

```
su -c 'mozilla-plugin-config -i -g -v'
```

Close all Firefox windows, and then relaunch Firefox. Type `about:plugins` in the URL bar to ensure the plugin is loaded.

Disabling PC speaker

PC speaker is enabled by default in Fedora. If you do not prefer this, there are two ways to circumvent the sounds:

- Reduce its volume to an acceptable level or completely mute the PC speaker in `alsamixer` with the setting for PC Speak.
- Disable the PC speaker system wide by running the following commands in a console:

```
su -c 'modprobe -r pcspkr' su -c 'echo "install pcspkr :'
```

Networking

This section contains information about networking changes in Fedora 10.

Wireless Connection Sharing

Connection sharing makes it possible to easily set up an ad-hoc WiFi network on a machine with a network connection and a spare wireless card. If the machine has primary network connection (wired, 3G, second wireless card), routing is set up so that devices connected to the ad-hoc WiFi network can share the connection to the outside network.

This ability is provided by the NetworkManager applet `nm-applet`. Although `nm-applet` has had a Create New Wireless Network menu item for a long time, this feature makes it work better.

When you create a new WiFi network, you have to specify the name of the network and what kind of wireless security to use. NetworkManager then sets up the wireless card to work as an ad-hoc WiFi node that others can join. The routing will be set up between the new network and the primary network

connection, and DHCP is used for assigning IP addresses on the new shared WiFi network. DNS queries are also forwarded to upstream nameservers transparently.

Printing

The print manager (**system-config-printer** or SystemAdministrationPrinting) user interface has been overhauled to look friendlier and be more in line with modern desktop applications. The **system-config-printer** application no longer needs to be run as the root user.

Other changes include:

- The configuration tool window has been made easier to use. Double-clicking on a printer icon opens a properties dialog window. This replaces the old behavior of a list of printer names on the left and properties for the selected printer on the right.
- The CUPS authentication dialog selects the appropriate user-name and allows it to be altered mid-operation.
- When the configuration tool is running, the list of printers is updated dynamically.
- All jobs queued for a specific printer can be seen by right-clicking on a printer icon and selecting View Print Queue. To see jobs queued on several printers, select the desired printers first before right-clicking. To see all jobs, right-click with no printers selected.
- The job monitoring tool displays a message when a job has failed. If the printer has been stopped as a result, this is shown in the message. A Diagnose button starts the trouble-shooter.
- The job monitoring tool now performs proxy authentication. A submitted job that requires authentication on the CUPS back-end now displays an authentication dialog so the job can proceed.
- The print status dialog (for GTK+) gives more feedback about the status of printers, for example printers that are out of paper show a small warning emblem on their icon. Paused printers also show an emblem, and printers that are rejecting jobs are shown as grayed-out to signify they are not available.

Package notes

The following sections contain information regarding software packages that have undergone significant changes for Fedora 10. For easier access, they are generally organized using the same groups that are shown in the installation system.

GIMP

Fedora 10 includes version 2.6 of the GNU Image Manipulation Program.

This new version is designed to be backwards compatible, so existing third party plug-ins and scripts should continue to work -- with a minor caveat: The included Script-Fu Scheme interpreter doesn't accept variable definitions without an initial value anymore (which isn't compliant to the language standard). Scripts included in Fedora packages should not have this problem, but if you use scripts from other sources, please refer to the GIMP release notes for more details and how you can fix scripts that have this problem:

<http://www.gimp.org/release-notes/gimp-2.6.html>

Additionally, the **gimptool** script that is used to build and install third party plug-ins and scripts has been moved from the gimp to the gimp-devel package. Install this package if you want to use **gimptool**.

Legal information

The following legal information concerns some software in Fedora.

Portions Copyright (c) 2002-2007 Charlie Poole or Copyright (c) 2002-2004 James W. Newkirk, Michael C. Two, Alexei A. Vorontsov or Copyright (c) 2000-2002 Philip A. Craig

International language support

This section includes information on language support under Fedora.

- Localization (translation) of Fedora is coordinated by the Fedora Localization Project -- <http://fedoraproject.org/wiki/L10N>
- Internationalization of Fedora is maintained by the Fedora I18n Project -- <http://fedoraproject.org/wiki/I18N>

Language coverage

Fedora features a variety of software that is translated in many languages. For a list of languages refer to the translation statistics for the Anaconda module, which is one of the core software applications in Fedora.

- <http://translate.fedoraproject.org/languages>
- <http://translate.fedoraproject.org/module/anaconda>

Language support installation

To install langpacks and additional language support from the Languages group, 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**, **telegu**, **thai**, and so on.

SCIM users upgrading from earlier releases of Fedora are strongly urged to install `scim-bridge-gtk`, which works well with third-party C++ applications linked against older versions of `libstdc++`.

Transifex

Transifex is Fedora's online tool to facilitate contributing translations to projects hosted on remote and disparate version control systems. Many of the core packages use Transifex to receive translations from numerous contributors.

<https://fedorahosted.org/transifex/>

Through a combination of new web tools (<http://translate.fedoraproject.org/>), community growth, and better processes, translators can contribute directly to any upstream project through one translator-oriented web interface. Developers of projects with no existing translation community can easily reach out to Fedora's established community for translations. In turn, translators can reach out to numerous projects related to Fedora to easily contribute translations.

<https://translate.fedoraproject.org/submit>

Fonts

Fonts for most languages are installed by default on the desktop to give good default language coverage.

Default language for Han Unification

When not using an Asian locale in GTK-based applications, Chinese characters (that is, Chinese Hanzi, Japanese Kanji, or Korean Hanja) may render with a mixture of Chinese, Japanese, and Korean fonts depending on the text. This happens when Pango does not have sufficient context to know which language is being used. The current default font configuration seems to prefer Chinese fonts. If you normally want to use Japanese or Korean say, you can tell Pango to use it by default by setting the `PANGO_LANGUAGE` environment variable. For example ...

```
export PANGO_LANGUAGE=ja
```

... tells Pango rendering to assume Japanese text when it has no other indications.

Japanese

The `fonts-japanese` package has been renamed to `japanese-bitmap-fonts`.

Khmer

Khmer OS Fonts `khmeros-fonts` have been added to Fedora for Khmer coverage in this release.

Korean

The `un-core-fonts` packages replaces `baekmuk-ttf-fonts` as the new Hangul default fonts.

Complete list of changes

All fonts changes are listed on their dedicated page:

http://fedoraproject.org/wiki/Fonts_inclusion_history#F10

Fonts in Fedora Linux

The Fonts SIG (http://fedoraproject.org/wiki/Fonts_SIG) takes loving care of Fedora Linux fonts (<http://fedoraproject.org/wiki/Fonts>). Please join this special interest group if you are interested in creating, improving, packaging, or just suggesting a font. Any help is appreciated.

http://fedoraproject.org/wiki/Joining_the_Fonts_SIG

http://fedoraproject.org/wiki/Fonts_and_text-related_creative_tasks

http://fedoraproject.org/wiki/Fonts_and_text_quality_assurance

http://fedoraproject.org/wiki/Fonts_packaging

http://fedoraproject.org/wiki/Font_wishlist

Input Methods

There is a new **yum** group called `input-methods` and *Input Methods* for many languages are now installed by default. This allows turning on the default input method system and immediately having the standard input methods for most languages available. It also brings normal installs in line with Fedora Live.

im-chooser and imsettings

It is now possible to start and stop the use of Input Methods during runtime thanks to the **imsettings** framework. The `GTK_IM_MODULE` environment variable is no longer needed by default but can still be used to override the **imsettings**.

Input Methods only start by default on desktops running in an Asian locale. The current locale list is: `as, bn, gu, hi, ja, kn, ko, ml, mr, ne, or, pa, si, ta, te, th, ur, vi, zh`. Use **im-chooser** via **System+Preferences+Personal+Input Method** to enable or disable Input Method usage on your desktop.

New ibus input method system

Fedora 10 includes **ibus**, a new input method system that has been developed to overcome some of the limitations of **scim**. It may become the default input method system in Fedora 11.

<http://code.google.com/p/ibus>

It already provides a number of input method engines and immodules:

- `ibus-anthy` (Japanese)
- `ibus-chewing` (Traditional Chinese)
- `ibus-gtk` (GTK immodule)
- `ibus-hangul` (Korean)
- `ibus-m17n` (Indic and many other languages)
- `ibus-pinyin` (Simplified Chinese)
- `ibus-qt` (Qt immodule)
- `ibus-table` (Chinese, etc)

We encourage people to install **ibus**, test it for their language, and report any problems.

Indic onscreen keyboard

Fedora 10 includes **iok**, an onscreen virtual keyboard for Indian languages, which allows input using Inscript keymap layouts and other 1:1 key mappings. For more information refer to the homepage:

<http://fedorahosted.org/iok>

Indic collation support

Fedora 10 includes sorting support for Indic languages. This support fixes listing and order of menus in these languages, representing them in sorted order and making it easy to find desired elements.

These languages are covered by this support:

- Marathi
- Hindi
- Gujarati
- Kashmiri
- indhi
- Maithili
- Nepali
- Konkani
- Telugu
- Kannada
- Punjabi

What is New for Gamers, Scientists, and Hobbyists

Games and entertainment

Fedora provides a selection of games that cover a variety of genres. Users can install a small package of games for GNOME (gnome-games) and KDE (kdegames). There are also many additional games that span every major genre available in the repositories.

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>

For a list of other games that are available for installation, select ApplicationsAdd/Remove Software, or via the command line:

```
yum groupinfo "Games and Entertainment"
```

For help using **yum** to install the assorted game packages, refer to the guide available at:

<http://docs.fedoraproject.org/yum/>

Power Users Get What Features and Fixes

Server tools

This section highlights changes and additions to the various GUI server and system configuration tools in Fedora 10.

First Aid Kit

Firstaidkit is a fully automated recovery application that makes subsystem recovery easier for technical and non-technical users. Firstaidkit is designed to automatically fix problems while focusing on maintaining user data integrity. It is available in rescue mode, on the Fedora Live CD, and on running systems.

Resources

- Project site -- <https://fedorahosted.org/firstaidkit/>

File systems

eCryptfs

While Fedora 9 debuted encrypted filesystem support, F10 builds on that and fixes a number of problems that could have resulted in data corruption.

EXT4

Fedora 9 debuted a preview of ext4 support. F10 brings a fully ext4-compatible e2fsprogs. In addition Anaconda's partition screen has an ext4 filesystem option available if you launch the installer with the ext4 option. Fedora 10 also brings delayed allocation for ext4. However, ext4 in Fedora 10 doesn't currently support filesystems larger than 16 terabytes.

XFS

XFS is now a supported filesystem and an option with the the partitioning screen of Anaconda

How are Things for Developers

Java

Best of breed free software Java implementation

Fedora includes multiple best of breed free software Java(TM) implementations, obtained through active adoption of innovative technology integrations produced by Fedora and others within upstream projects. The implementations integrated into Fedora are based on OpenJDK (<http://openjdk.java.net/>) and the IcedTea GNU/Linux distribution integration project (<http://icedtea.classpath.org/>), or based on alternatives such as the GNU Compiler for Java (GCJ - <http://gcc.gnu.org/java> and the GNU Classpath core class libraries (<http://www.gnu.org/software/classpath/>). All Fedora innovations are pushed upstream to get the widest possible integration of the technologies in general Java implementations.

The implementation of OpenJDK 6 included in Fedora 10 uses the HotSpot virtual machine runtime compiler on x86, x86_64, and SPARC. On PowerPC (PPC) it uses the zero interpreter, which is slower. On

all architectures an alternative implementation based on GCJ and GNU Classpath is included that includes an ahead-of-time compiler to produce native binaries.

Fedora binaries for selected architectures (currently only x86 and x86_64 based on OpenJDK) are tested against the Java Compatibility Kit (JCK) by Red Hat to guarantee 100% compatibility with the Java Specification (JDK 1.6 at this time).

Handling Java Applets and web start applications

In Fedora 10 **gcjwebplugin** has been replaced by **IcedTeaPlugin** that runs untrusted applets safely in a Web browser and works on any architecture. You can see which Applet Plugin is installed by typing **about:plugins** in Firefox. The new plugin adds support for the JavaScript bridge (LiveConnect) that was missing from earlier versions. For more details on "bytecode-to-JavaScript bridge (LiveConnect)", refer to the bug report:

https://bugzilla.redhat.com/show_bug.cgi?id=304021

Feedback on the security policy is very appreciated. If you suspect the security policy may be too restrictive to enable restricted applets, run the **firefox -g** command in a terminal window to see what is being restricted, then grant the restricted permission in the `/usr/lib/jvm/java-1.6.0-openjdk-1.6.0.0/jre/lib/security/java.policy` file. If you then file a bug report, your exception could end up in the packaged security policy and you won't have to hack the policy file in the future.

Experimental Web Start (**javaws**) support via NetX has been added to the IcedTea repository. When a Java Network Launching Protocol (`.jnlp`) file is embedded on a web page you can open it with the IcedTea Web Start (`/usr/bin/javaws`).

<http://jnlp.sourceforge.net/> -- NetX

New integration with other Fedora technologies

Through the IcedTea project, OpenJDK has been integrated with several new technologies that are also part of Fedora 10.

VisualVM integration through the NetBeans framework

VisualVM (

`jvisualvm`

) provides a graphical overview of any local or remotely running Java application, letting you monitor all running threads, classes, and objects allocated by the application by taking thread dumps, heap dumps, and other lightweight profiling tools.

PulseAudio integration for javax.sound

PulseAudio integrations provides all the benefits of PulseAudio to any java application using the `javax.sound` package.

Integration of Mozilla Rhino - JavaScript

Rhino is a pure-Java JavaScript implementation from Mozilla providing an easy mixing of Java and JavaScript for developers using the `javax.script` package.

Other improvements

Also in Fedora 10 Java cryptography (`javax.crypto`) is fully supported without any (regional) restrictions.

Fedora and JPackage

Fedora 10 includes many packages derived from the JPackage Project.

<http://jpackage.org>

Some of 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 for more information about 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.

Note on upgrading from Fedora 8 - OpenJDK Replaces IcedTea

Since Fedora 9 the packages called `java-1.7.0-icedtea*` in Fedora 8 have been renamed to `java-1.6.0-openjdk*`. The Fedora 8 IcedTea packages tracked the unstable OpenJDK 7 branch, whereas the `java-1.6.0-openjdk*` packages track the stable OpenJDK 6 branch. All the upstream IcedTea sources are included in the `java-1.6.0-openjdk SRPM`.

If you are upgrading from a system based on Fedora 8 that still has IcedTea installed, the package changeover does not happen automatically. The packages related to IcedTea based on OpenJDK 7 must first be erased, then the new OpenJDK 6 packages installed.

```
su -c 'yum erase java-1.7.0-icedtea{,-plugin}' su -c 'yum install ja
```

Upgrading from Fedora 9 does not require special action.

Development

This section covers various development tools and features.

Tools

Eclipse

This release of Fedora includes Fedora Eclipse, based on the Eclipse SDK version 3.4. The 3.4 series of releases has a "What's New in 3.4" page:

http://help.eclipse.org/stable/index.jsp?topic=/org.eclipse.platform.doc.user/whatsNew/platform_whatsnew.html

Release notes specific to 3.4 are also available.

http://www.eclipse.org/eclipse/development/readme_eclipse_3.4.html

Some of the notable features in 3.4 include a number of improvements in handling bookmarks, easier ways to find and install plug-ins, and additional help with refactoring.

Additional plugins

This release of Fedora includes plugins for C/C++ **eclipse-cdt**, RPM specfile editing **eclipse-rpm-editor**, PHP **eclipse-phpeclipse**, Subversion **eclipse-subclipse**, SELinux **eclipse-slide** and **eclipse-setools**, regular expression testing **eclipse-quickrex**, Fortran **eclipse-photran**, Bugzilla integration **eclipse-mylyn**, Git **eclipse-egit**, Perl **eclipse-epic**, Checkstyle **eclipse-checkstyle**, and Python **eclipse-pydev**.

Translations from the Babel project - eclipse-nls

This release also includes the Babel language packs, which provide translations for Eclipse and Eclipse plugins in a number of languages. Note that some of the languages have very low coverage: even if you have the translations installed, you will probably still see many strings in English. The Babel project accepts contributions if you would like to help their translation efforts.

<http://www.eclipse.org/babel/>

Upgrading from Fedora 9

Users upgrading from Eclipse 3.3 will need to migrate any plug-ins they have installed from sources other than RPMs. The simplest way to do this is to re-install. For plug-in developers migrating from 3.3, refer to the "Plug-in Migration Guide":

http://help.eclipse.org/ganymede/nav/2_3

GCC Compiler Collection

This release of Fedora has been built with GCC 4.3.2, which is included with the distribution.

For more information on GCC 4.3, refer to:

<http://gcc.gnu.org/gcc-4.3/>

Target-specific improvements

IA-32 x86-64

ABI changes

- Starting with GCC 4.3.1, decimal floating point variables are aligned to their natural boundaries when they are passed on the stack for i386.

Command-line changes

- Starting with GCC 4.3.1, the `-mcl` option has been added to automatically generate a `cld` instruction in the prologue of functions that use string instructions. This option is used for backward compatibility on some operating systems and can be enabled by default for 32-bit x86 targets by configuring GCC with the `--enable-cld` configure option.

Improved Haskell support

Fedora 10 introduces better support for Haskell. With a new set of packaging guidelines and tools, it is incredibly easy to support any Haskell program using the Glasgow Haskell Compiler. Package creation and deployment, leveraging Fedora's quality tools plus a few new friends has never been easier. As support for Haskell grows there will be continued development for Haskell as more libraries are introduced.

Package creation is quite simple. Haskell already provides the infrastructure for compiling and deploying packages consistently. Setting up a package for Fedora takes very little time, meaning code that works in Haskell works in Fedora too.

Fedora also provides tools for enterprise deployment of Fedora packages. With the inclusion of Haskell in Fedora, the developer is now free to write enterprise level applications in Haskell and feel secure knowing the code can be used in Fedora.

<https://fedoraproject.org/wiki/Features/GoodHaskellSupport>

Objective CAML OCaml coverage greatly extended

Fedora 10 contains the OCaml 3.10.2 advanced programming language and a very comprehensive list of packages:

http://cocan.org/getting_started_with_ocaml_on_red_hat_and_fedora#Package_status

OCaml was available as an update to Fedora 9 but not in the initial release.

NetBeans

This release of Fedora includes NetBeans IDE, version 6.1. NetBeans IDE is an Integrated Development Environment (IDE) for Java, C/C++, Ruby, PHP, etc. Default configuration of the NetBeans IDE (Java SE IDE configuration) supports development of programs for the Java platform, Standard Edition (Java SE), including development of the modules for the NetBeans Platform.

The NetBeans IDE is a modular system and includes facilities for updating and installing plugins. There is a wide spectrum of plugins for the NetBeans IDE that are provided by community members and third-party companies.

NetBean resources

- <http://www.netbeans.org/> - Official site of the NetBeans project.
- <http://wiki.netbeans.org/> - NetBeans Wiki pages.
- <mailto:linux-packaging@installer.netbeans.org> - Mailing list for discussion of the packaging issues.
- <https://admin.fedoraproject.org/pkgdb/packages/bugs/netbeans> - Bug list for the NetBeans IDE.
- <https://admin.fedoraproject.org/pkgdb/packages/bugs/netbeans-platform8> - Bug list for the NetBeans Platform.
- <http://www.netbeans.org/issues/> - Issue Tracker of the NetBeans project. Please, use Component: installer, OS: Linux, Subcomponent: rpm to file the issues related to the NetBeans RPMs.

AMQP Infrastructure

The AMQP Infrastructure package is a subset of the Red Hat Enterprise MRG. The package allows for development of scalable, interoperable, and high-performance enterprise applications.

More specifically it consists of the following.

- AMQP (protocol version 0-10) messaging broker/server
- Client bindings for C++, Python, and Java (using the JMS interface)
- A set of command line interface configuration/management utilities
- A high-performance asynchronous message store for durable messages and messaging configuration.

AMQP resources

For more information refer to the following resources.

- <http://www.redhat.com/mrg/resources> Red Hat MRG Documentation
- <http://amqp.org/> AMQP Project Site

Appliance building tools

Appliances are pre-installed and pre-configured system images. This package includes tools and meta-data that make it easier for ISVs, developers, OEMS, etc. to create and deploy virtual appliances. The two components of this feature are the ACT (Appliance Creation Tool) and the AOS (The Appliance Operating System). Install the appliance-tools package with Add/Remove Software or yum.

Appliance Creation Tool

The Appliance Creation Tool is a tool that creates Appliance Images from a kickstart file. This tool uses the live CD creator API as well as patches to the live CD API that allow for the creation of multi-partitioned disk images. These disk images can then be booted in a virtual container such as Xen, KVM, and VMware. This tool is included in the appliance-tools package. This package contains tools for building appliance images on Fedora based systems including derived distributions such as RHEL, CentOS, and others.

Appliance Operating System

The Appliance Operating System is a scaled down version of Fedora with a small footprint. It contains only the packages necessary to run an appliance. The hardware supported by this spin of Fedora would be limited, primarily focusing on virtual containers such as KVM and VMware. The goal is to create a base that developers can build their applications on top of, only pulling in packages that their software requires.

Appliance building tools resources

<http://thincrust.net/> Appliance Tool Project Site

Python NSS bindings

Python bindings for NSS/NSPR allow Python programs to utilize the NSS cryptographic libraries for SSL/TLS and PKI certificate management. The python-nss package provides a Python binding to the NSS and NSPR support libraries.

Network Security Services (NSS) is a set of libraries supporting security-enabled client and server applications. Applications built with NSS can support SSL v2 and v3, TLS, PKCS #5, PKCS #7, PKCS #11, PKCS #12, S/MIME, X.509 v3 certificates and other security standards. NSS has received FIPS 140 validation from NIST.

Python NSS bindings resources

<http://people.redhat.com/jdennis/python-nss/doc/api/html/index.html> -- Library Documentation

Linux_kernel

Deprecated or out of date content?

This content may be deprecated or out of date, it has not been updated since the Fedora 9 release notes.

This section covers changes and important information regarding the 2.6.27 based kernel in Fedora 10. The 2.6.27 kernel includes:

- The Fedora kernel offers `paravirt_ops` support in `domU`, as part of the kernel team's efforts to reduce the work required to produce current Xen kernels.
- Xen fully virtualized guests can directly boot a kernel and **initrd** image and pass kernel boot args. For more details refer to <http://fedoraproject.org/wiki/Features/XenFullvirtKernelBoot>

Version

Fedora may include additional patches to the kernel for improvements, bug fixes, or additional features. For this reason, the Fedora 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
```

Changelog

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

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

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.fedoraproject.org>.

Kernel flavors

Fedora 10 includes the following kernel builds:

- Native kernel, for use in most systems. Configured sources are available in the kernel-devel package.
- The kernel-PAE, for use in 32-bit x86 systems with more than 4GB of RAM, or with CPUs that have a NX (No eXecute) feature. This kernel support both uniprocessor and multi-processor systems. Configured sources are available in the kernel-PAE-devel package.
- Virtualization kernel for use with the Xen emulator package. Configured sources are available in the kernel-xen-devel package.

You may install kernel headers for all four kernel flavors at the same time. The files are installed in the `/usr/src/kernels/<version>[-PAE|-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.

x86 Kernel Includes Kdump

Both the x86_64 and the i686 kernels are relocatable, so they no longer require a separate kernel for kdump capability. PPC64 still requires a separate kdump kernel.

Default Kernel Provides SMP

There is no separate SMP kernel available for Fedora 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. 32-bit PowerPC does still have a separate SMP kernel.

Preparing for kernel development

Fedora 10 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 the section called “Kernel flavors”.

Custom Kernel Building

For information on kernel development and working with custom kernels, refer to http://fedoraproject.org/wiki/Building_a_custom_kernel

Reporting bugs

Refer to <http://kernel.org/pub/linux/docs/lkml/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.

Embedded

Fedora 10 includes a number of applications to support embedded development on a variety of targets. Included are assemblers, compilers, debuggers, programmers, IDEs and assorted utilities.

AVR

avrdudeSoftware for programming Atmel AVR microcontroller

AVRDUDE is a program for programming Atmel's AVR CPU's. It can program the Flash and EEPROM, and where supported by the serial programming protocol, it can program fuse and lock bits. AVRDUDE also supplies a direct instruction mode allowing one to issue any programming instruction to the AVR chip regardless of whether AVRDUDE implements that specific feature of a particular chip.

avr-gcc	Cross Compiling GNU GCC targeted at avr	This is a Cross Compiling version of GNU GCC, which can be used to compile for the AVR platform, instead of for the native i386 platform.
avr-gcc-c++	Cross Compiling GNU GCC targeted at avr	This package contains the Cross Compiling version of g++, which can be used to compile c++ code for the AVR platform, instead of for the native i386 platform.
avr-libc	C library for use with GCC on Atmel AVR microcontrollers	AVR Libc is a free software project with the goal to provide a high quality C library for use with GCC on Atmel AVR microcontrollers. AVR Libc is licensed under a single unified license. This so-called modified Berkeley license is intended to be compatible with most free software licenses such as the GPL, yet impose as little restrictions as possible for the use of the library in closed-source commercial applications.
avr-binutils	Cross Compiling GNU binutils targeted at avr	This is a Cross Compiling version of GNU binutils, which can be used to assemble and link binaries for the AVR platform, instead of for the native i386 platform.
avr-gdb	GDB for (remote) debugging avr binaries	This is a special version of GDB, the GNU Project debugger, for (remote) debugging AVR binaries. GDB allows you to see what is going on inside another program while it executes or what another program was doing at the moment it crashed.
avrice	Program for interfacing the Atmel JTAG ICE to GDB	Program for interfacing the Atmel JTAG ICE to GDB to allow users to debug their embedded AVR target

Microchip PIC

gputils	Development utilities for Microchip (TM) PIC (TM) microcontrollers	This is a collection of development tools for Microchip (TM) PIC (TM) microcontrollers. This is ALPHA software: there may be serious bugs in it, and it's nowhere near complete. The gputils package currently only implements a subset of the features available with Microchip's tools. Refer to the documentation for an up-to-date list of what gputils can do.
gpsim	A simulator for Microchip (TM) PIC (TM) microcontrollers	The gpsim software is a simulator for Microchip (TM) PIC (TM) microcontrollers. It supports most devices in Microchip's 12-bit, 14bit, and 16-bit core families. In addition, gpsim supports dynamically

ktechlab Development and simulation of microcontrollers and electronic circuits

loadable modules such as LED's, LCD's, resistors, and so forth, to extend the simulation environment beyond the PIC.

KTechlab is a development and simulation environment for microcontrollers and electronic circuits, distributed under the GNU General Public License. KTechlab consists of several well-integrated components:

- A circuit simulator, capable of simulating logic, linear devices and some nonlinear devices.
- Integration with **gpsim**, allowing PICs to be simulated in circuit.
- A schematic editor, which provides a rich real-time feedback of the simulation.
- A flowchart editor, allowing PIC programs to be constructed visually.
- MicroBASIC; a BASIC-like compiler for PICs, written as a companion program to KTechlab.
- An embedded Kate part, which provides a powerful editor for PIC programs.
- Integrated assembler and disassembler via **gpasm** and **gpdasm**.

pikdev IDE for development of PICmicro based application (under Linux/KDE)

PiKdev is a simple IDE dedicated to the development of PIC based applications under KDE. Features:

- Integrated editor
- Project management
- Integrated programming engine for 12, 14 and 16 bits PIC (flash or EPROM technology)
- Support for parallel and serial port programmers
- KDE compliant look-and-feel

The system administrator must read README.Fedora file located in the /usr/share/doc/pikdev-0.9.2 directory to complete the full feature installation.

piklab Development environment for applications based on PIC & dsPIC

Piklab is a graphic development environment for PIC and dsPIC microcontrollers. It

pikloops Code generator for PIC delays

interfaces with various toolchains for compiling and assembling and it supports several Microchip and direct programmers. The system administrator must refer to the README.Fedora file located in the /usr/share/doc/piklab-0.15.0 directory to complete full feature installation.

PiKLoop generates code to create delays for Microchip PIC microcontrollers. It is a useful companion for Pikdev or Piklab IDE.

Others and processor agnostic

dfu-programmer A device firmware update based USB programmer for Atmel chips

A linux based command-line programmer for Atmel chips with a USB bootloader supporting ISP. This is a mostly Device Firmware Update (DFU) 1.0 compliant user-space application. Currently supported chips: 8051, AVR, at89c51snd1c, at90usb1287, at89c5130, at90usb1286, at89c5131, at90usb647, at89c5132, at90usb646, at90usb162, and at90usb82.

sdcc Small Device C Compiler

The sdcc-2.6.0-12 package for SDCC is a C compiler for 8051 class and similar microcontrollers. The package includes the compiler, assemblers and linkers, a device simulator, and a core library. The processors supported (to a varying degree) include the 8051, ds390, z80, hc08, and PIC.

uisp Universal In-System Programmer for Atmel AVR and 8051

The **uisp** utility is for downloading/uploading programs to AVR devices. It can also be used for some Atmel 8051 type devices. In addition, **uisp** can erase the device, write lock bits, verify and set the active segment. For use with the following hardware to program the devices: pavr, stk500, Atmel STK500, dapa, Direct AVR Parallel Access, stk200, Parallel Starter Kit, STK200, STK300, abb, Altera, ByteBlasterMV Parallel Port Download Cable, avrisp, Atmel AVR, bsd, fbprg (parallel), dt006 (parallel), dasa serial (RESET=RTS SCK=DTR MOSI=TXD MISO=CTS), dasa2 serial (RESET=!TXD SCK=RTS MOSI=DTR MISO=CTS)

simcoupe SAM Coupe emulator (spectrum compatible)

SimCoupe emulates an 8bit Z80 based home computer, released in 1989 by Miles Gordon Technology. The SAM Coupe was largely spectrum compatible, with much improved hardware

sjasm A z80 cross assembler

SjASM is a two pass macro Z80 cross assembler

z88dk A Z80 cross compiler

The **z88dk** program is a Z80 cross compiler capable of generating binary files for a variety of Z80 based machines (such as the ZX81, Spectrum, Jupiter Ace, and some TI calculators).

KDE 3 Development Platform and Libraries

Fedora now features KDE 4, and no longer offers KDE 3 as a full desktop environment. Fedora does provide the following KDE 3.5 library packages to run and build the many existing KDE 3 applications:

- qt3, qt3-devel (and other qt3-* packages): Qt 3.3.8b
- kdelibs3, kdelibs3-devel: KDE 3 libraries
- kbase3, kbase3-pim-ioslaves, kbase3-devel: KDE 3 core files required by some applications

Moreover, the KDE 4 kbase-runtime package, which provides **khelphcenter**, also sets up **khelphcenter** as a service for KDE 3 applications, so help in KDE 3 applications works. The KDE 3 version of **khelphcenter** is no longer provided, and the KDE 4 version is used instead.

These packages are designed to:

- comply with the Filesystem Hierarchy Standard (FHS), and
- be completely safe to install in parallel with KDE 4, including the -devel packages.

In order to achieve this goal, Fedora KDE SIG members have made two changes to the KDE 4 kdelibs-devel packages:

- The library symlinks are installed to `/usr/lib/kde4/devel` or `/usr/lib64/kde4/devel` depending on system architecture.
- The **kconfig_compiler** and **makekdewidgets** tools have been renamed **kconfig_compiler4** and **makekdewidgets4**, respectively.

These changes should be completely transparent to the vast majority of KDE 4 applications that use **cmake** to build, since **FindKDE4Internal.cmake** has been patched to match these changes. The KDE SIG made these changes to the KDE 4 kdelibs-devel rather than to kdelibs3-devel because KDE 4 stores these locations in a central place, whereas KDE 3 applications usually contain hardcoded copies of the library search paths and executable names.

Note that kbase3 does *not* include the following:

- A complete KDE 3 desktop (workspace) which could be used instead of KDE 4; in particular, KDE 3 versions of KWin, KDesktop, Kicker, KSplash and KControl are *not* included.
- The KDE 3 versions of kbase applications such as Konqueror and KWrite, which are redundant with the KDE 4 versions and would conflict with them.
- The `libkdecorations` library required for KWin 3 window decorations, as those window decorations cannot be used in the KDE 4 version of KWin.
- The `libkickermain` library required by some Kicker applets, as there is no Kicker in Fedora 10 and thus Kicker applets cannot be used.

Developing new software against the legacy API is discouraged.

As with any backwards-compatibility library, you would be developing against a deprecated interface.

What Do System Administrators Care About

Security

This section highlights various security items from Fedora.

Security enhancements

Fedora continues to improve its many proactive security features.

<http://fedoraproject.org/wiki/Security/Features>

SELinux

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://docs.fedoraproject.org/selinux-faq/>
- Listing of SELinux commands:<http://fedoraproject.org/wiki/SELinux/Commands>
- Details of confined domains:<http://fedoraproject.org/wiki/SELinux/Domains>

SELinux enhancements

Different roles are now available, to allow finer-grained access control:

- `guest_t` does not allow running **setuid** binaries, making network connections, or using a GUI.
- `xguest_t` disallows network access except for HTTP via a Web browser, and no **setuid** binaries.
- `user_t` is ideal for office users: prevents becoming root via **setuid** applications.
- `staff_t` is same as `user_t`, except that root-level access via **sudo** is allowed.
- `unconfined_t` provides full access, the same as when not using SELinux.

Browser plug-ins wrapped with **nspluginwrapper**, which is the default, are confined by SELinux policy.

Security audit package

Sectool provides users with a tool that can check their systems for security issues. There are libraries included that allow for the customization of system tests. More information can be found at the project home:

<https://fedorahosted.org/sectool>

General information

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

System Services

Upstart

Fedora 10 features the Upstart initialization system. All System V **init** scripts should run fine in compatibility mode. However, users who have made customizations to their `/etc/inittab` file need to port those modifications to **upstart**. For information on how **upstart** works, refer to the **init(8)** and **initctl(8)** man pages. For information on writing upstart scripts, refer to the **events(5)** man page, and also the "Upstart Getting Started Guide":

<http://upstart.ubuntu.com/getting-started.html>

Due to the change of **init** systems, it is recommended that users who do an upgrade on a live file system to Fedora 9, reboot soon afterwards.

NetworkManager

Fedora 10 features NetworkManager. NetworkManager 0.7 provides improved mobile broadband support, including GSM and CDMA devices, and now supports multiple devices, ad-hoc networking for sharing connections, and the use of system-wide network configuration. It is now enabled by default on all installations. When using NetworkManager, be aware of the following:

- NetworkManager does not currently support all virtual device types. Users who use bridging, bonding, or VLANs may need to switch to the old **network** service after configuration of those interfaces.
- NetworkManager starts the network asynchronously. Users who have applications that require the network to be fully initialized during boot should set the `NETWORKWAIT` variable in `/etc/sysconfig/network`. Please file bugs about cases where this is necessary, so we can fix the applications in question.

https://bugzilla.redhat.com/enter_bug.cgi?product=Fedora

Autofs

Autofs is no longer installed by default. Users who wish to use Autofs can choose it from the System Tools group in the installer, or with the package installation tools.

Varnish

Varnish is updated to version 2.0. The VCL syntax has changed from version 1.x. Users who upgrade from 1.x must change their `vcl` files according to `README.redhat`. The most important changes are:

- In `vcl`, the word `insert` must be replaced by `deliver`
- In the `vcl` declaration of backends, `set backend` has been simplified to `backend`, and backend parts are now just prefixed with a dot, so the default localhost configuration looks like this:

```
backend default { .host = "127.0.0.1"; .port = "80"; }
```

Virtualization

Virtualization in Fedora 10 includes major changes, and new features, that continue to support KVM, Xen, and many other virtual machine platforms.

Unified kernel image

The kernel-xen package has been obsoleted by the integration of paravirtualization operations in the upstream kernel. The kernel package in Fedora 10 supports booting as a guest domU, but will not function as a dom0 until such support is provided upstream. The most recent Fedora release with dom0 support is Fedora 8.

Booting a Xen domU guest within a Fedora 10 host requires the KVM based **xenner**. Xenner runs the guest kernel and a small Xen emulator together as a KVM guest.

KVM requires hardware virtualization features in the host system.

Systems lacking hardware virtualization do not support Xen guests at this time.

For more information refer to:

- <http://sourceforge.net/projects/kvm>
- <http://kraxel.fedorapeople.org/xenner/>
- <http://fedoraproject.org/wiki/Features/XenPvops>
- <http://fedoraproject.org/wiki/Features/XenPvopsDom0>

Virtualization storage management

Advances in `libvirt` now provide the ability to list, create, and delete storage volumes on remote hosts. This includes the ability to create raw sparse and non-sparse files in a directory, allocate LVM logical volumes, partition physical disks, and attach to iSCSI targets.

This enables the **virt-manager** tool to remotely provision new guest domains, and manage the storage associated with them. It provides improved SELinux integration, since the APIs ensure that all storage volumes have the correct SELinux security context when being assigned to a guest.

Features

- List storage volumes in a directory, and allocate new volumes, raw files both sparse and non-sparse, and formats supported by qemu-img (cow, qcow, qcow2, vmdk, etc)
- List partitions in a disk, and allocate new partitions from free space
- Connect to an iSCSI server and list volumes associated with an exported target
- List logical volumes in an LVM volume group, and allocate new LVM logical volumes
- Automatically assign correct SELinux security context label (`virt_image_t`) to all volumes when associating with a guest.

For further details refer to:

- <http://fedoraproject.org/wiki/Features/VirtStorage>
- <http://libvirt.org/storage.html> -- libvirt Storage Management
- <http://virt-manager.et.redhat.com/page/StorageManagement> -- virt-manager Storage Management
- <http://kvm.qumranet.com/kvmwiki/Virtio>

Remote installation of virtual machines

Improvements in Virtualization storage management have enabled the creation of guests on remote host systems. By leveraging Avahi, systems supporting `libvirt` can be automatically detected by **virt-manager**. Upon detection guests can be provisioned on the remote system.

Installations can be automated with the help of **cobbler** and **koan**. Cobbler is a Linux installation server that allows for rapid setup of network installation environments. Network installs can be configured for PXE boot, reinstallations, media-based net-installs, and virtualized guest installs. Cobbler uses a helper program, **koan**, for reinstallation and virtualization support.

For further details refer to:

- <http://fedoraproject.org/wiki/Features/VirtRemoteInstall>
- <http://virt-manager.et.redhat.com/page/LibvirtDiscovery> -- virt-manager Discovery
- <http://avahi.org/>
- <http://fedorahosted.org/cobbler>

Other improvements

Fedora also includes the following virtualization improvements:

- Utilities in the new **virt-mem** package provide access to process tables, interface information, `dmesg`, and `uname` of QEmu and KVM guests from the host system. <http://et.redhat.com/~rjones/virt-mem/>

virt-mem is experimental.

Only 32 bit guests are supported at this time.

- The new **virt-df** tool provides information on the disk usage of guests from the host system. <http://et.redhat.com/~rjones/virt-df>

libvirt updated to 0.4.6

The `libvirt` package provides an API and tools to interact with the virtualization capabilities of recent versions of Linux (and other OSes). The `libvirt` software is designed to be a common denominator among all virtualization technologies with support for the following:

- The Xen hypervisor on Linux and Solaris hosts.
- The QEMU emulator

- The KVM Linux hypervisor
- The LXC Linux container system
- The OpenVZ Linux container system
- Storage on IDE/SCSI/USB disks, FibreChannel, LVM, iSCSI, and NFS

New features and improvements since 0.4.2:

- Enhanced OpenVZ support
- Enhanced Linux containers (LXC) support
- Storage pools API
- Improved iSCSI support
- USB device passthrough for QEMU and KVM
- Sound, serial, and parallel device support for QEMU and Xen
- Support for NUMA and vCPU pinning in QEMU
- Unified XML domain and network parsing for all virtualization drivers

For further details refer to:

<http://www.libvirt.org/news.html>

virt-manager Updated to 0.6.0

The virt-manager package provides a GUI implementation of **virtinst** and **libvirt** functionality.

New features and improvements since 0.5.4:

- Remote storage management and provisioning: view, add, remove, and provision **libvirt** managed storage. Attach managed storage to a remote VM.
- Remote VM installation support: Install from managed media (CDROM) or PXE. Simple install time storage provisioning.
- VM details and console windows merged: each VM is now represented by a single tabbed window.
- Use Avahi to list **libvirtd** instances on network.
- Hypervisor Autoconnect: Option to connect to hypervisor at **virt-manager** start up.
- Option to add sound device emulation when creating new guests.
- Virtio and USB options when adding a disk device.
- Allow viewing and removing VM sound, serial, parallel, and console devices.
- Allow specifying a keymap when adding display device.
- Keep app running if manager window is closed but VM window is still open.
- Allow limiting the amount of stored stats history.

For further details refer to:

<http://virt-manager.et.redhat.com/>

virtinst updated to 0.400.0

The python-virtinst package contains tools for installing and manipulating multiple VM guest image formats.

New features and improvements since 0.300.3:

- New tool **virt-convert**: Allows converting between different types of virt configuration files. Currently only supports vmx to virt-image.
- New tool **virt-pack**: Converts virt-image xml format to vmx and packs in a tar.gz. (Note this will likely be merged with **virt-convert** in the future).
- **virt-install** improvements:
 - Support for remote VM installation. Can use install media and disk images on remote host if shared via libvirt. Allows provisioning storage on remote pools.
 - Support setting CPU pinning information for QEmu/KVM VMs
 - NUMA support via `--cpuset=auto` option
 - New options:
 - `--wait` allows putting a hard time limit on installs
 - `--sound` create VM with soundcard emulation
 - `--disk` allows specifying media as a path, storage volume, or a pool to provision storage on, device type, and several other options. Deprecates `--file`, `--size`, `--nonsparse`.
 - `--prompt` Input prompting is no longer the default, this option turns it back on.
- **virt-image** improvements:
 - `--replace` option to overwrite existing VM image file
 - Support multiple network interfaces in virt-image format
- Use virtio disk/net drivers if chosen guest OS entry supports it (Fedora 9 and 10)

For further details refer to:

- <http://virt-manager.et.redhat.com/>

Xen updated to 3.3.0

Fedora 10 supports booting as a guest domU, but will not function as a dom0 until such support is provided in the upstream kernel. Support for a pv_ops dom0 is targeted for Xen 3.4.

Changes since 3.2.0:

- Power management (P & C states) in the hypervisor

- HVM emulation domains (**qemu-on-minios**) for better scalability, performance, and security
- PVGrub: boot PV kernels using real GRUB inside the PV domain
- Better PV performance: domain lock removed from pagetable-update paths
- Shadow3: optimisations to make this the best shadow pagetable algorithm yet, making HVM performance better than ever
- Hardware Assisted Paging enhancements: 2MB page support for better TLB locality
- CPUID feature levelling: allows safe domain migration across systems with different CPU models
- PVSCSI drivers for SCSI access direct into PV guests
- HVM framebuffer optimisations: scan for framebuffer updates more efficiently
- Device passthrough enhancements
- Full x86 real-mode emulation for HVM guests on Intel VT: supports a much wider range of legacy guest OSes
- New qemu merge with upstream development
- Many other changes in both x86 and IA64 ports

For further details refer to:

- <http://www.xen.org/download/roadmap.html> -- Xen roadmap
- http://xenbits.xen.org/paravirt_ops/patches.hg/ -- paravirt_ops patch queue

Web servers

PostgreSQL DBD Driver

Deprecated or out of date content?

This content may be deprecated or out of date, it has not been updated since the Fedora 9 release notes.

Users of the `mod_dbd` module should note that the `apr-util` DBD driver for PostgreSQL is now distributed as a separate dynamically-loaded module. The driver module is now included in the `apr-util-pgsql` package. A MySQL driver is now also available, in the `apr-util-mysql` package.

Drupal

Drupal has been updated to 6.4. For details, refer to:

<http://drupal.org/drupal-6.4>

If your installation is updated to the 6.4 version in Fedora 9, skip the following step.

When upgrading from earlier versions, remember to log in to your site as the admin user, and disable any third-party modules before upgrading this package. After upgrading the package:

1. Copy

`/etc/drupal/default/settings.php.rpmsave`

to

`/etc/drupal/default/settings.php`

, and repeat for any additional sites' `settings.php` files.

2. Browse to `http://host/drupal/update.php` to run the upgrade script.

Also, several modules are now available: `drupal-date`, `-cck`, `-views`, and `-service_links`.

Samba - Windows compatibility

This section contains information related to Samba, the suite of software Fedora uses to interact with Microsoft Windows systems.

Maybe you know what should be on this page?

The Fedora release notes are a collective effort of dozens of people. You can contribute by editing the wiki page that corresponds to this part of the release notes.

This section has not been updated for Fedora 10 by the beat writer (http://fedoraproject.org/wiki/Docs/Beats#Beat_Assignments.) If you have some ideas or knowledge of what should be in this part of the release notes, you are encouraged to edit the wiki directly. Read <https://fedoraproject.org/wiki/Docs/Beats/HowTo/> for more information, then get an account and start writing.

Mail servers

This section concerns electronic mail servers or mail transfer agents (MTAs).

Sendmail

By default, the Sendmail mail transport agent (MTA) does not accept network connections from any host other than the local computer. To configure Sendmail as a server for other clients:

1. Edit `/etc/mail/sendmail.mc` and either change the `DAEMON_OPTIONS` line to also listen on network devices, or comment out this option entirely using the `dn1` comment delimiter.
2. Install the `sendmail-cf` package: `su -c 'yum install sendmail-cf'`
3. Regenerate `/etc/mail/sendmail.cf`: `su -c 'make -C /etc/mail'`

File servers

This section refers to file transfer and sharing servers. Refer to <http://fedoraproject.org/wiki/Docs/Beats/WebServers> and <http://fedoraproject.org/wiki/Docs/Beats/Samba> for information on HTTP (Web) file transfer and Samba (Microsoft Windows) file sharing services.

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Database servers

You must do your own research on upgrading database packages.

Consult the release notes for the version of database you are upgrading to. There may be actions you need to do for the upgrade to be successful.

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Backwards compatibility

Fedora 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 ApplicationsAdd/Remove Software 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.

Compiler compatibility

The compat-gcc-34 package has been included for compatibility reasons:

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

KDE 3 development

Refer to the section called “KDE 3 Development Platform and Libraries”.

Updated packages in Fedora 10

This list is automatically generated by checking the difference between the (F10)-1 GOLD tree and the F10 tree on a specific date. The content is posted only on the wiki:

<http://fedoraproject.org/wiki/Docs/Beats/PackageChanges/UpdatedPackages>

Package changes

This list is automatically generated

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

This list is generated for the release and posted on the wiki only. It is made using the **treediff** utility, ran as **treediff newtree oldtree** against a rawhide or release tree.

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>.

Are There Hideous Bugs and Terrible Tigers

Visit the Fedora 10 common bugs page for details:

<http://fedoraproject.org/wiki/Bugs/Common>

Legal Stuff and Administrivia

Colophon

As we use the term, a *colophon*:

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

Contributors

This content not updated until after Preview Release occurs.

We need to finish writing and translating the notes to know who has worked on them.

Out of date content.

This content is out of date, it has not been updated since the Fedora 9 release notes.

- Alain Portal [<http://fedoraproject.org/wiki/AlainPortal>] (translator - French)
- Amanpreet Singh Alam [<http://fedoraproject.org/wiki/AmanAlam>] (translator - Punjabi)
- Andrew Martynov [<http://fedoraproject.org/wiki/AndrewMartynov>] (translator - Russian)
- Andrew Overholt [<http://fedoraproject.org/wiki/AndrewOverholt>] (beat contributor)
- Anthony Green [<http://fedoraproject.org/wiki/AnthonyGreen>] (beat writer)
- Brandon Holbrook [<http://fedoraproject.org/wiki/BrandonHolbrook>] (beat contributor)
- Bob Jensen [<http://fedoraproject.org/wiki/BobJensen>] (beat writer)

- Chris Lennert [<http://fedoraproject.org/wiki/ChrisLennert>] (beat writer)
- Dale Bewley [<http://fedoraproject.org/wiki/DaleBewley>] (beat writer)
- Dave Malcolm [<http://fedoraproject.org/wiki/DaveMalcolm>] (beat writer)
- David Eisenstein [<http://fedoraproject.org/wiki/DavidEisenstein>] (beat writer)
- David Woodhouse [<http://fedoraproject.org/wiki/DavidWoodhouse>] (beat writer)
- Deepak Bhole [<http://fedoraproject.org/wiki/DeepakBhole>] (beat contributor)
- úrigoZacarão Diego Búriço Zacarão [<http://fedoraproject.org/wiki/DiegoB>] (translator)
- Dimitris Glezos [<http://fedoraproject.org/wiki/DimitrisGlezos>] (beat writer, translator - Greek)
- Domingo Becker [<http://fedoraproject.org/wiki/DomingoBecker>] (translator - Spanish)
- Fabian Affolter [<http://fedoraproject.org/wiki/FabianAffolter>] (translator - German)
- Francesco Tombolini [<http://fedoraproject.org/wiki/FrancescoTombolini>] (translator - Italian)
- Gavin Henry [<http://fedoraproject.org/wiki/GavinHenry>] (beat writer)
- Geert Warrink [<http://fedoraproject.org/wiki/GeertWarrink>] (translator - Dutch)
- Guido Grazioli [<http://fedoraproject.org/wiki/GuidoGrazioli>] (translator - Italian)
- Hugo Cisneiros [<http://fedoraproject.org/wiki/HugoCisneiros>] (translator - Brazilian Portuguese)
- Igor Miletic [<http://fedoraproject.org/wiki/IgorMiletic>] (translator - Serbian)
- Jason Taylor [<http://fedoraproject.org/wiki/JasonMatthewTaylor>] (beat writer, editor-in-training)
- Jeff Johnston [<http://fedoraproject.org/wiki/JeffJohnston>] (beat contributor)
- Jesse Keating [<http://fedoraproject.org/wiki/JesseKeating>] (beat contributor)
- Jens Petersen [<http://fedoraproject.org/wiki/JensPetersen>] (beat writer)
- Joe Orton [<http://fedoraproject.org/wiki/JoeOrton>] (beat writer)
- éNunoCoelhoPires José Nuno Coelho Pires [<http://fedoraproject.org/wiki/Jos>] (translator - Portuguese)
- Josh Bressers [<http://fedoraproject.org/wiki/JoshBressers>] (beat writer)
- Karsten Wade [<http://fedoraproject.org/wiki/KarstenWade>] (beat writer, editor, co-publisher)
- Kevin Kofler [<http://fedoraproject.org/wiki/KevinKofler>] (beat writer)
- Kyu Lee [<http://fedoraproject.org/wiki/KyuLee>] (beat contributor)
- #elková Lenka #elková [<http://fedoraproject.org/wiki/Lenka>] (translator - Slovak)
- Licio Fonseca [<http://fedoraproject.org/wiki/LicioFonseca>] (translator - Brazilian Portuguese)
- Lubomir Kunderak [<http://fedoraproject.org/wiki/LubomirKunderak>] (beat contributor, translator - Slovak)

- Luya Tshimbalanga [<http://fedoraproject.org/wiki/LuyaTshimbalanga>] (beat writer)
- Magnus Larsson [<http://fedoraproject.org/wiki/MagnusLarsson>] (translator - Swedish)
- Marek Mahut [<http://fedoraproject.org/wiki/MarekMahut>] (translator - Slovak)
- Mathieu Schopfer [<http://fedoraproject.org/wiki/MathieuSchopfer>] (translator - French)
- Matthieu Rondeau [<http://fedoraproject.org/wiki/MatthieuRondeau>] (translator - French)
- Maxim Dziumanenko [<http://fedoraproject.org/wiki/MaximDziumanenko>] (translator - Ukrainian)
- Martin Ball [<http://fedoraproject.org/wiki/MartinBall>] (beat writer)
- Nikos Charonitakis [<http://fedoraproject.org/wiki/NikosCharonitakis>] (translator - Greek)
- Orion Poplawski [<http://fedoraproject.org/wiki/OrionPoplawski>] (beat contributor)
- Panagiota Bilianou [<http://fedoraproject.org/wiki/PanagiotaBilianou>] (translator - Greek)
- Patrick Barnes [<http://fedoraproject.org/wiki/PatrickBarnes>] (beat writer, editor)
- Paul W. Frields [<http://fedoraproject.org/wiki/PaulWFrields>] (tools, editor)
- Šimo Pavol Šimo [<http://fedoraproject.org/wiki/Pavol>] (translator - Slovak)
- Pawel Sadowski [<http://fedoraproject.org/wiki/PawelSadowski>] (translator - Polish)
- Patrick Ernzer [<http://fedoraproject.org/wiki/PatrickErnzer>] (beat contributor)
- Piotr Dr#g [<http://fedoraproject.org/wiki/User:Raven>] (translator - Polish)
- Rahul Sundaram [<http://fedoraproject.org/wiki/RahulSundaram>] (beat writer, editor)
- Sam Folk-Williams [<http://fedoraproject.org/wiki/SamFolkWilliams>] (beat writer)
- Sekine Tatsuo [<http://fedoraproject.org/wiki/SekineTatsuo>] (translator - Japanese)
- Simos Xenitellis [<http://fedoraproject.org/wiki/SimosXenitellis>] (translator - Greek)
- Steve Dickson [<http://fedoraproject.org/wiki/SteveDickson>] (beat writer)
- Teta Bilianou [<http://fedoraproject.org/wiki/TetaBilianou>] (translator - Greek)
- ThomasCanniot [<http://fedoraproject.org/wiki/ThomasCanniot>] (translator - French)
- Thomas Graf [<http://fedoraproject.org/wiki/ThomasGraf>] (beat writer)
- Tommy Reynolds [<http://fedoraproject.org/wiki/TommyReynolds>] (tools)
- Valnir Ferreira Jr. [<http://fedoraproject.org/wiki/ValnirFerreiraJr>] (translator - Brazilian Portuguese)
- Ville-Pekka Vainio [<http://fedoraproject.org/wiki/VillePekkaVainio>] (translator - Finnish)
- Will Woods [<http://fedoraproject.org/wiki/WillWoods>] (beat contributor)
- Yoshinari Takaoka [<http://fedoraproject.org/wiki/YoshinariTakaoka>] (translator, tools)
- Yuan Yijun [<http://fedoraproject.org/wiki/YuanYijun>] (translator - Simplified Chinese)

- Zhang Yang [<http://fedoraproject.org/wiki/ZhangYang>] (translator - simplified Chinese)

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

<http://docs.fedoraproject.org/release-notes/>

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 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. The publication team also makes them, and subsequent errata, available via the Web.