Abstract
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1. Welcome to Fedora 13

1.1. Fedora 13 Overview
As always, Fedora continues to develop (http://www.fedoraproject.org/wiki/Red_Hat_contributions) 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 13 refer to their individual wiki pages that detail feature goals and progress:

http://www.fedoraproject.org/wiki/Releases/13/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 13:
• Automatic print driver installation — refer to Section 4.3, “Printing”
• Automatic language pack installation — refer to Section 4.4, “Internationalization”
• Redesigned user account tool — refer to Section 4.1, “Fedora Desktop”
• Color management to calibrate monitors and scanners — refer to Section 4.1, “Fedora Desktop”
• Experimental 3D support for NVIDIA video cards — refer to Section 4.1, “Fedora Desktop”

Some other features in this release include:
• A new way to install Fedora over the Internet — refer to Section 2, “Installation Notes”
• SSSD authentication for users — refer to Section 2, “Installation Notes”
• Updates to NFS — refer to Section 5.9, “File Systems”
• Zarafa Open Source edition, a new open-source groupware suite — refer to Section 5.4, “Mail Servers”
• System rollback for the Btrfs file system — refer to Section 5.9, “File Systems”
• Better SystemTap probes — refer to Section 6.2, “Tools”
• A Python 3 stack that can be installed parallel to an existing Python stack — refer to Section 6.2, “Tools”
• Support for the entire Java EE 6 spec in Netbeans 6.8 — refer to Section 6.4, “Java”

Features for Fedora 13 tracked on the feature list page:

http://www.fedoraproject.org/wiki/Releases/13/FeatureList

A discussion putting these features in context may be found at:

http://www.fedoraproject.org/wiki/Fedora_13_Talking_Points

1.2. Hardware Requirements

Minimums may not always be sufficient
The minimum memory listed below may not be sufficient for all situations. In particular, installation in a virtual machine may require memory closer to the “Recommended” value.

1.2.1. Processor and memory requirements for x86 Architectures
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 13 requires an Intel Pentium Pro or better processor, and is optimized for i686 and later processors.

• Recommended for text-mode: 200 MHz Pentium Pro or better

• Recommended for graphical: 400 MHz Pentium Pro or better

• Minimum RAM for text-mode: 256 MiB

• Minimum RAM for graphical: 384 MiB

• Recommended RAM for graphical: 512 MiB

1.2.2. Processor and memory requirements for x86_64 architectures
• Minimum RAM for text-mode: 256 MiB

• Minimum RAM for graphical: 384 MiB

• Recommended RAM for graphical: 512 MiB

1.2.3. Hard disk space requirements for all architectures
The complete packages can occupy over 9 GB 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.

1.3. 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.

Note
Visit [http://docs.fedoraproject.org/release-notes/](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 help the Fedora Project community continue to improve Fedora if you file bug reports and enhancement requests. Refer to [http://fedoraproject.org/wiki/Bugs_and_feature_requests](http://fedoraproject.org/wiki/Bugs_and_feature_requests) 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)

1.4. Common bugs
Most complex software contains bugs. One of the features of free and open source software is the ability to report bugs, helping to fix or improve the software you use.

A list of common bugs is maintained for each release by the Fedora Project as a good place to start when you are having a problem that might be a bug in the software:


1.5. 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. A list of commonly reported bugs and known issues for this release is available from [http://fedoraproject.org/wiki/Common_F13_bugs](http://fedoraproject.org/wiki/Common_F13_bugs).
1.5.1. We Need Feedback!

If you find a typographical error in this manual, or if you have thought of a way to make this manual better, we would love to hear from you! Please submit a report in Bugzilla: [http://bugzilla.redhat.com/bugzilla/](http://bugzilla.redhat.com/bugzilla/) against the product **Fedora Documentation**.

When submitting a bug report, be sure to mention the manual's identifier: `release-notes`.

If you have a suggestion for improving the documentation, try to be as specific as possible when describing it. If you have found an error, please include the section number and some of the surrounding text so we can find it easily.

1.5.2. Other Ways to Leave Feedback

You can learn more about the Bugzilla process at [http://fedoraproject.org/wiki/Bugs_and_feature_requests](http://fedoraproject.org/wiki/Bugs_and_feature_requests). However, if you are not comfortable leaving feedback through Bugzilla, you could also:

- If you have a Fedora account, edit content directly at [http://fedoraproject.org/wiki/Documentation_Beats](http://fedoraproject.org/wiki/Documentation_Beats).
- Email `relnotes@fedoraproject.org`.

2. Installation Notes

**Note**


**Anaconda** is the name of the Fedora installer. This section outlines issues related to **anaconda** and installing Fedora 13.

2.1. boot.fedoraproject.org

Fedora 13 introduces a new method of installing or upgrading Fedora over the Internet, using boot images available from [http://boot.fedoraproject.org/](http://boot.fedoraproject.org/). Images are available for a variety of media, including USB, CD and DVD, and floppy disk. You can use this image to start the boot process on a system, which then contacts a remote server to complete the boot process and launch the installer. The process is similar to booting on a network with a **Preboot Execution Environment** (PXE) server available.

The installation or upgrade process itself is the same as if you were performing the process with local media, such as a DVD.

There is nothing in the boot image that is specific to this version of Fedora; in future, you can use the same boot image to install or upgrade to subsequent versions of Fedora.
2.2. Selecting storage during installation

On systems with multiple storage devices (for example, more than one hard disk drive), the installation process for Fedora 13 differs from that of previous versions. Early in the installation process, anaconda asks you to select storage devices to use during installation. Devices that you do not select are excluded from the partitioning step that takes place later during installation.

2.3. Installing on multipath devices

Anaconda can now install Fedora on multipath devices. If you have multipath devices attached to your system, choose the Specialized Storage Devices option when anaconda offers it to you.

2.4. System Security Services Daemon

Fedora 13 can now take advantage of the System Security Services Daemon (SSSD) to enable high-performance, cached authentication and identity lookups, as well as support for offline authentication. Offline caching of identity data is supported for LDAP and FreeIPA servers, and offline authentication is supported for LDAP, Kerberos 5 and FreeIPA authentication servers.

To use this feature, choose the Use Network Login option when configuring a system with Firstboot. Firstboot runs automatically after installation completes and the system restarts.

3. Architecture Specific Notes

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

3.1. PPC Specifics for Fedora

In order to focus resources in common hardware today, PowerPC is no longer a primary architecture. As a consequence packages are not built for this arch by default and install media is not available for download. Interested PPC users and developers should join the PowerPC Special Interest Group (http://fedoraproject.org/wiki/Architectures/PowerPC) to help make it a succesful secondary architecture.

For a complete description of the differences between a primary architecture and a secondary architecture, refer to http://fedoraproject.org/wiki/Architectures.

4. Changes in Fedora for Desktop Users

4.1. Fedora Desktop

4.1.1. Automatic print driver installation

Refer to Section 4.3, “Printing” for details.

4.1.2. Automatic installation of language packs

Refer to Section 4.4, “Internationalization” for details.
4.1.3. PackageKit integration everywhere

Brasero has gained the ability to automatically install missing GStreamer codecs when they are needed for burning audio CDs. File-roller can now install missing tools for handling archive formats.

4.1.4. Redesigned user management interface

Tech preview
This Fedora 13 feature is an add-on option that shows future direction and progress.

The user account tool has been completely redesigned. The tool has functions to configure personal information in user accounts, and make a personal profile picture or icon. It also helps users generate strong passphrases, set up additional login options such as automatic login, and determine special roles for users such as in the case of a single owner of a personal laptop or an administrator of a shared system. This new feature was designed and implemented by several members of the Fedora Desktop SIG. Refer to Section 5.1, “Security” for details of the security enhancements included in this feature.

To install and try the new user account tool, install the accountsdialog and accountsservice packages, and then run the accounts-dialog command.

4.1.5. NetworkManager improvements including a command line interface

Refer to Section 4.2, “Networking”.

4.1.6. Experimental 3D extended to free Nouveau driver for Nvidia

Fedora 12 included experimental 3D support for newer ATI cards in the free and open source Radeon driver, and now experimental 3D support has been extended in Fedora 13 to the nouveau driver for a range of NVIDIA video cards. Fedora and its sponsor Red Hat are dedicated to improving the quality and coverage of completely free accelerated video drivers. While we support user choice and do not prevent use of closed, proprietary drivers, we also recognize that these drivers sometimes conflict with and cause problems in the software written by FOSS community members. We prefer to honor the commitment of the FOSS community with our own commitment to free drivers that complement their work, and work in the upstream Nouveau community to make these drivers better. Simply install the mesa-dri-drivers-experimental package to take advantage of this new feature.

4.1.7. Shotwell replaces Gthumb and F-Spot as default photo organizer

Shotwell is a free and open source photo organizer designed for the GNOME desktop environment and has replaced Gthumb and F-Spot by default in Fedora 13. It supports the following features:

- import photos from any digital camera supported by gPhoto
- automatically organize events containing photos taken at the same time
- use tags to organize your photo collection
• edit non-destructively when altering photos, without ruining originals or using disk space for each copy
• publish photos to Facebook, Flickr or Picasa
• one-click auto-enhancement
• rotate, mirror, and crop photos
• reduce red-eye and adjust the exposure, saturation, tint, and temperature of your photos
• edit any photo, even if it’s not imported to the Shotwell library

For more information about Shotwell, refer to http://yorba.org/shotwell/. Gthumb and F-Spot continue to be maintained and available in the Fedora repository. They are not installed by default anymore.

4.1.8. Pino microblogging
To support the rapid rise of microblogging via services like identi.ca and twitter, Pino, a desktop client is included by default. It is a simple and fast. It supports many features including the following:
• Identi.ca and twitter support
• Multiple accounts
• Follow/unfollow users
• Support for status.net sites and API proxies for use with any identi.ca-like service, secure connections for Twitter and Twitter proxies, like birdnest and twit)
• URL shortening via goo.gl and is.gd and ur1.ca
• Nicks, tags and urls highlighting in the input widget
• Direct messages with more than 140 characters
• Support for favorites (add/remove/list)
• Conversation view

For more details, refer to http://pino-app.appspot.com/.

4.1.9. Déjà Dup simple backup tool
Déjà Dup is the default simple backup tool for the GNOME desktop in Fedora 13. It hides the complexity of doing backups properly, and uses duplicity as the backend.

Features:
• Support for local or remote backup locations, including Amazon S3
• Securely encrypts and compresses your data
• Incrementally backs up, letting you restore from any particular backup

• Schedules regular backups

• Integrates well into your GNOME desktop

4.1.10. Simple Scan scanning utility

Simple Scan is the default scanning utility for Fedora 13. Simple Scan is an easy-to-use application, designed to let users connect their scanner and import the image or document in an appropriate format. More details are available at http://lwn.net/Articles/377063/.

The XSane standalone application and its GIMP plugin are still available for users who need to perform any of the following tasks:

• tweak more parameters offered by the scanner drivers

• use the scanner for directly copying or faxing

• scan directly from within the GNU Image Manipulation Program (GIMP)

The standalone application can be selected as an optional package in the Graphics group in PackageKit. The GIMP plugin is installed along with the GIMP main package if the Graphics group is selected.

4.1.11. GNOME Color Manager

Color management helps artists, photographers, designers, and others display and print work more accurately using completely free software. Color management supports setting output gamma tables for most monitors, including when they are hotplugged during a session. Users can also install vendor-supplied ICC or ICM files by double-clicking them, and calibrate displays and scanners with external devices and color targets using the ArgyllCMS package. Written by Richard Hughes, Red Hat engineer and Fedora contributor.

Color management helps you control and produce more accurate color output for displays, printers, and scanners.

4.1.12. Nautilus Enhancements

The Nautilus file manager now defaults browser mode. The user interface for this mode has been reorganized. Additionally, nautilus can now offer two directories side-by-side, in the new split-view mode. Users may need to enable the location bar via the View > Location Bar menu item.

Spatial mode is still available as an option.

4.1.13. Gnote Enhancements

Gnote is a C++ port of Tomboy. It is the default desktop note-taking application for GNOME in Fedora and has a number of enhancements and bug fixes. Gnote now has a few new add-ins, and follows the XDG directory specification from freedesktop.org. Notes stored in previous versions are automatically migrated from .gnote to .local/share/gnote in the user’s home directory.
4.1.14. GNOME DVB Daemon

DVB support in Totem is now handled through the GNOME DVB Daemon, which brings things like Electronic Program Guide (EPG) support, easy to use tuning, and Exporting of TV channels through UPNP (with Rygel).

4.1.15. Rhythmbox iPod Touch and iPhone music management

Building on the file system access added in Fedora 12, Fedora 13 adds support for music management in Rhythmbox for iPod Touch and iPhone devices through the libgpod library, as well as more appropriate icons for those devices.

4.1.16. Xfce Software Changes

The Fedora 13 Xfce Spin brings several changes to the default applications:

• Gftp has been dropped, as this functionality is provided by Thunar and Gigolo

• Totem has been replaced by Parole, a media player designed for the Xfce desktop with simplicity, speed and resource usage in mind

• Gnome-screensaver has been replaced by Xscreensaver

• TigerVNC has been replaced by Remmina, with support for additional protocols (RDP, XDMCP, SSH) and improved integration with the Xfce desktop via the accompanying panel plugin

Related feature pages:
• http://fedoraproject.org/wiki/Features/ColorManagement
• http://fedoraproject.org/wiki/Features/Gnome2.30
• http://fedoraproject.org/wiki/Features/KDE44
• http://fedoraproject.org/wiki/Features/Sugar_0.88
• http://fedoraproject.org/wiki/Features/Moblin-2.2

4.1.17. Radeon 3D no longer experimental

Support for 3D acceleration using the radeon driver is no longer considered experimental in Fedora 13.

4.1.18. Abiword not included in default Live image

Due to space considerations, Abiword is not included in the Fedora 13 Live image by default. If you have created a Live USB key using the persistent storage option, or install the image to a hard disk, you can add Abiword and any other desired applications.
4.1.19. Kudzu and hwbrowser deprecated

The kudzu package and the graphical hwbrowser application have been retired. The fwfstab package has been updated and no longer relies on kudzu. Users can now make use of the udev and udisks packages to provide necessary support and utilities.

4.2. Networking

4.2.1. NetworkManager Bluetooth DUN

Many older phones support mobile broadband sharing to computers through Bluetooth Dial-Up Networking (DUN). When the phone is paired with a computer, the computer may request that the phone provide a virtual serial port, and then the computer treats that virtual serial port as a normal mobile broadband connection card, sending AT commands and starting PPP.

Enhanced functionality in the gnome-bluetooth plugin allows users to set up their network connection with a few clicks, after which the phone and the network connection are available from the nm-applet menu.

The Fedora user now will only have one tool to use instead of having to use a 3rd-party tool that doesn't fully function with Fedora.

4.2.2. NetworkManager Command Line

NetworkManager Command Line allows a user to control the NetworkManager without using a GUI.

NetworkManager Command Line has created tools that will allow a user to control the NetworkManager from a terminal, headless machine, or the init scripts with a proper CLI client. The purpose of this program is to have very lightweight tool. Therefore, tools written in C are preferred over tools written in Python.

NetworkManager Command Line tools will benefit the Fedora user by making the NetworkManager more suitable to the server environment and consolidating network configuration.

4.2.3. NetworkManager Mobile Status

The NetworkManager applet shows the current signal strength, cellular technology (GPRS/EDGE/UMTS/HSPA or 1x/EVDO etc), and roaming status while connected for cards where this functionality is supported.

The benefits to Fedora users are Mobile Status makes it easier to use mobile broadband. Users will be able to know when their device has a signal and if they are roaming or not. This could potentially save the user money.

4.2.4. NFS

Refer to Section 5.9, “File Systems”.
4.3. Printing

4.3.1. Automatic Print Driver Installation
Fedora 13 includes a feature for automatic printer driver installation. When a supported USB printer is plugged in, PackageKit finds and installs the appropriate driver for the manufacturer and model of the printer. More information is available at the feature page on the Fedora wiki: http://fedoraproject.org/wiki/Features/AutomaticPrintDriverInstallation

4.4. Internationalization
This section includes information on language support in Fedora.

4.4.1. Fonts

4.4.1.1. New Chinese font
The default font for Simplified Chinese is now **WQY Zenhei**.

4.4.1.2. Lohit Devanagari
The new **Lohit Devanagari** font replaces the previous separate Lohit fonts for Hindi, Kashmiri, Konkani, Maithili, Marathi, and Nepali. Any distinct glyphs for these languages needed in the future can be handled in **Lohit Devanagari** with Open Type Font **locl** tags.

4.4.1.3. New Arabic script fonts
New Arabic script fonts from Paktype are available: **paktype-ajrak**, **paktype-basic-naskh-farsi**, **paktype-basic-naskh-sindhi**, **paktype-basic-naskh-urdu**, and **paktype-basic-naskh-sa**.

4.4.2. IBus
Fedora 13 ships with **IBus 1.3**.

**IBus (Intelligent Input Bus)** is an input framework for Linux that provides a full-featured and user-friendly user interface for input methods. Updates to **IBus** in Fedora 13 include:

4.4.2.1. General
- **IBus** now supports a global shared input method mode for all applications: the default is still to use separate contexts.
- **IBus** supports showing the languagebar in the status icon menu.
- The new **ibus-fbterm** package provides IBus support in the fbterm framebuffer console.
- The new **ibus-xkbc** package provides some support for **X** keyboard layouts.
4.4.2.2. Chinese
- `ibus-pinyin` engine has been reimplemented in C++ with improved performance of fuzzy pinyin.
- `ibus-table-quick` was merged into `ibus-table-cangjie`, and new tables added for Smart Cangjie 6, Quick (classic), and Easy (Big).
- `ibus-chewing` is fixed for Dvorak and Hsu support.

4.4.2.3. Japanese
- `ibus-anthy` now supports:
  - preferences of symbol style and conversion mode.
  - Thumb Shift NICOLA-J, NICOLA-F and NICOLA-A layouts.
  - dictionary customization of the default personal dictionary and extended personal dictionaries.
- The new `ibus-skk` package adds support for the *Simple Kana-to-Kanji* (SKK) input method.

4.4.2.4. Korean
- `ibus-hangul` engine now supports Romaja style input for Western users.

4.4.3. Automatic installation of language packs
A number of large suite-type packages, such as OpenOffice.org, Eclipse, and KDE, package their translated content separately as langpacks due to size issues. Now with the langpack plugin, when `yum` detects that a langpack is needed and available for a package the user requests, `yum` automatically downloads and installs the langpack as well. The user no longer needs to specifically request installation of language support for these types of suites. In the future it will be possible to extend this support further throughout the distribution. Refer to [http://dingyichen.livejournal.com/17133.html](http://dingyichen.livejournal.com/17133.html) for details.

4.4.4. Glibc Locales and Collation
The following locales for glibc (the GNU C Library) have been added or updated in Fedora 13:
- `kok_IN` (Konkani Language locale for India: around 3.6 million speakers) for Devanagari script added.
- `ps_AF` (Pashto Language locale for Afghanistan: around 35.5 million speakers) added.
- collation for Tamil and Assamese is now available in all locales.

4.4.5. GDM
GDM now reloads i18n files when users log out.
4.5. Multimedia

4.5.1. Better Webcam Support
Support for webcams continues to improve in Fedora 13, with many bug fixes and improvements to existing webcam drivers. Drivers for several dual-mode cameras (still cameras that can act as webcams) have been merged into the mainline kernel.

4.5.2. KDE PulseAudio Integration
KDE 4.4 features improved integration with PulseAudio, Fedora’s default sound solution. KDE users benefit from the following new features in Fedora 13:

- **Phonon** detects PulseAudio and no longer shows non-PulseAudio devices when PulseAudio is running.

- PulseAudio includes a new module-device-manager which allows Phonon to manage PulseAudio devices.

- Using the above, Phonon allows setting device priorities for the devices reachable through PulseAudio.

- KMix now shows PulseAudio volumes, including per-application volumes, and allows moving applications between devices.

- The traditional ALSA backend for KMix is still available, use `export KMIX_PULSEAUDIO_DISABLE=1` to force its use even if PulseAudio is detected.

4.5.3. SIP Witch Domain Telephony
Fedora 13 includes SIP Witch Domain Telephony, allowing users to create and deploy scalable secure VoIP solutions, both for managing a local SIP based telephone system, and for calling remote users over the Internet without the need for a service provider or central directory service. With SIP Witch and an SIP-compatible softphone such as Twinkle or Empathy, users can replace propriety VoIP solutions with secure, direct peer-to-peer communications using entirely free software.

4.6. Fedora Live Images
The Games Spin⁵ provides a Live DVD with a sampling of the best games available in Fedora.

For electronic designers, the Fedora Electronic Lab⁶ spin provides a complete toolchain for IC designers.

The Fedora Spins SIG (http://fedoraproject.org/wiki/SIGs/Spins) is continuously developing specialized Live images for specific purposes.

To read more about Live images, refer to http://fedoraproject.org/wiki/FedoraLiveCD#Advantages_and_Limitations.

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⁵ http://fedoraproject.org/wiki/Games_Spin
⁶ http://chitlesh.fedorapeople.org/FEL/
5. Changes in Fedora for System Administrators

5.1. Security

5.1.1. Dogtag Certificate System

Dogtag Certificate System (DGS) is an enterprise-class open-source Certificate Authority (CA) supporting all aspects of certificate lifecycle management including Certificate Authority (CA), Data Recovery Manager (DRM), Online Certificate Status Protocol (OCSP) Manager, Registration Authority (RA), Token Key Service (TKS), Token Processing System (TPS) and smartcard management, through Enterprise Security Client (ESC).


5.1.2. User Account Dialog

A new User Account Dialog is redesigned and implemented to create new users and edit user-related information in single-user systems or small deployments. This new dialog supersedes functionality that was previously available in a variety of tools, such as system-config-user, gnome-about-me, gdmsetup and polkit-gnome-authorization, and makes it available in one place.


5.1.3. Policy Kit One

PolicyKitOne replaces the old deprecated PolicyKit and gives KDE users a better experience of their applications and desktop in general. The Fedora 12 KDE Desktop Edition used Gnome Authentication Agent. PolicyKitOne makes it possible to utilize the native KDE authentication agent, KAuth in Fedora 13.

For a complete description of this feature, refer to the KDE PolicyKit One Qt page on the Fedora wiki: http://fedoraproject.org/w/index.php?title=Features/KDE_PolicyKitOneQt

5.2. Virtualization

5.2.1. Kernel Acceleration for KVM Networking

The VHost Net feature moves the task of converting virtio descriptors to skbs and back from qemu userspace to the kernel driver. This was shown to reduce latency by a factor of five, and improve bandwidth from 90% native to 95% of native on some systems.

This feature is activated by using -netdev options (instead of -net) and adding the vhost=on flag.

For more information, refer to http://fedoraproject.org/wiki/Features/VHostNet
5.2.2. KVM Stable PCI Addresses
KVM guests in Fedora now have stable PCI addresses, reducing the chance that Windows guests will require reactivation as guest configuration is modified.

KVM guest virtual machine devices retain their PCI address allocations as other devices are added or removed from the guest configuration.

For more information, refer to:
• http://fedoraproject.org/wiki/Features/KVM_Stable_PCI_Addresses
• http://fedoraproject.org/wiki/Features/KVM_Stable_Guest_ABI

5.2.3. Virt x2apic
X2apic improves guest performance by reducing the overhead of APIC access, which is used to program timers and for issuing inter-processor interrupts. By exposing x2apic to guests, and by enabling the guest to utilize x2apic, we improve guest performance.

Fedora 13 supports x2apic in both the host and guest roles.

For more information, refer to http://fedoraproject.org/wiki/Features/Virtx2apic

5.2.4. Virtio-Serial
The virtio-console pci device is now equipped to handle multiple console ports as well as generic ports for guests running on top of qemu and KVM. This facilitates simple communication between guest and host.

For more information, refer to http://fedoraproject.org/wiki/Features/VirtioSerial

5.2.5. Virtualization Technology Preview Repo
The Virtualization Preview Repository exists for people who would like to test the very latest virtualization-related packages. This repo is intended primarily as an aid to testing and early experimentation. It is not intended for deployment on production systems.

For more information, refer to http://fedoraproject.org/wiki/Virtualization_Preview_Repository

5.2.6. Xen Kernel Support
The kernel package in Fedora 13 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 13 host requires the KVM-based xenner. Xenner runs the guest kernel and a small Xen emulator together as a KVM guest.

For more information, refer to:
Important — Suitable hardware required
KVM requires hardware virtualization features in the host system. Systems lacking hardware virtualization do not support Xen guests at this time.

5.3. Web and Content Servers

5.3.1. Apache
httpd has been upgraded from 2.2.13 to 2.2.14. This upgrade involves only bugfixes. Details may be found at http://www.apache.org/dist/httpd/CHANGES_2.2.

5.3.2. varnish
varnish was upgraded from the 2.0.x to the 2.1.x version series. 2.1.x has a change in the varnish configuration language syntax that is incompatible with the older versions.

Configuration must be changed
Users upgrading from Fedora 12 to Fedora 13 will not be able to run varnish without manually changing their configuration.

The main change is as that obj.* is now called beresp.* in vcl_fetch, and obj.* is now read-only. For more information, please refer to http://varnish-cache.org/wiki/changelog_2.0.6-2.1.0.

5.4. Mail Servers

5.4.1. cyrusimap
The latest stable and current release of the cyrus-imapd server is 2.3.16 which includes support for replicated mailboxes, unified murder configuration, delayed expunge, separate metadata partitions, Sieve extensions, and much more. It requires SASLv2. For specifics about the changes refer to http://cyrusimap.web.cmu.edu/imapd/changes.html. If you are using SQL detection, some changes may be required (http://cyrusimap.web.cmu.edu/imapd/install-upgrade.html).
5.4.2. **dovecot**

*dovecot* has been upgraded to 1.2.11. In earlier versions, some very large headers were sent which could result in a denial of service. This update fixes that problem, in addition to some security improvements. Details can be found at [http://dovecot.org/doc/NEWS](http://dovecot.org/doc/NEWS). (Note that Fedora 12 included version 1.2.6).

5.4.3. **fetchmail**

Fedora 13 includes version 6.3.14 of *fetchmail*. This update fixes some security-related bugs and restores IMAP2 support for some servers. Details of the changes can be found at [http://developer.berlios.de/project/shownotes.php?group_id=1824&release_id=17213](http://developer.berlios.de/project/shownotes.php?group_id=1824&release_id=17213).

5.4.4. **sendmail**

*sendmail* has been updated to 8.14.4. There are a number of bug fixes, including some security improvements.

5.4.5. **Zaraфа Open Source edition**

*Zaraфа Open Source edition* is a groupware suite that is new to Fedora. It provides integration with existing Linux mail servers and uses *Ajax* to create a user interface that is intuitive to users of *Microsoft Outlook*. Zaraфа Open Source edition includes an IMAP4 and a POP3 gateway as well as an iCal/CalDAV gateway. It combines a high degree of usability with the stability and flexibility of a Linux server.

5.5. **Database Servers**

5.5.1. **db4**

Fedora 13 includes version 4.8.26 of the Berkeley *db4* database. This release features improved performance, a new *db_sql* tool, and additional APIs.

5.5.2. **MySQL**


5.5.3. **Postgresql**

*postgresql* has been updated to 8.4.2. Although this is primarily a bug fix release, if you have any hash indices, you should REINDEX those tables after upgrading (no dump is required). For a complete listing of bug fixes refer to [http://www.postgresql.org/docs/8.4/static/release-8-4-2.html](http://www.postgresql.org/docs/8.4/static/release-8-4-2.html).
5.5.4. sqlite
For Fedora 13, sqlite has been upgraded from 3.6.17 to 3.6.23. This release adds a number of new pragmas and functions, as well as many fixes. Refer to http://www.sqlite.org/changes.html for a complete list of changes.

5.6. Samba (Windows Compatibility)
samba and its various clients, add-ins and GUIs have been updated to 3.5.0. Changes include use of full Windows resolution for timestamps and caching of credentials. The Using Samba HTML book is no longer included, but is available at http://www.samba.org/samba/docs/using_samba/toc.html.

There are some changes to smb.conf.Administrators should review http://www.samba.org/samba/history/samba-3.5.0.html for all the details.

5.7. System Daemons

5.7.1. mdadm
The mdadm program controls Linux md devices (redundant arrays of independent disks implemented in software, or software RAID). It can create, assemble, report on, and monitor arrays and can also move spare storage between arrays when needed.

The version of mdadm in Fedora 13 has been upgraded from version 3.0.2 to version 3.1.1. The most important changes include:

• you can no longer stop a container when the members within it are still active.

• a homehost parameter has been added to the AUTO config line. When used with the -all option, this parameter causes mdadm to assemble any array that belongs to this host automatically, but not to assemble any other arrays automatically.

• previously, arrays with interdependencies had to be listed in mdadm.conf in a specific order. Now, the order is not important.

5.7.2. openssh-server
Openssh-server is a open-source server daemon for the SSH protocol.

The version of openssh-server in Fedora 13 has been upgraded from version 5.2p1 to version 5.4p1. The most important changes include:

• SSH protocol 1 is disabled by default.

• added support for PKCS#11 tokens.

• added support for certificate authentication of users and hosts using a new, minimal OpenSSH certificate format (not X.509).

• added a netcat mode that connects standard out on a client to a single port forward on a server.
• added the ability to revoke keys to `sshd` and `ssh`.

For more information, refer to [http://www.openssh.com/txt/release-5.4](http://www.openssh.com/txt/release-5.4).

### 5.8. Server Tools

This section highlights changes and additions to the various GUI server and system configuration tools in Fedora 13.

#### 5.8.1. Udisks

The `udisks` storage daemon supports LVM and multipath devices in Fedora 13. The `palimpsest` tool provides a graphical user interface to these features. It has also seen several other user interface improvements, and optionally allows remote access now.


### 5.9. File Systems

#### 5.9.1. Btrfs

Btrfs is under development as a file system capable of addressing and managing more files, larger files, and larger volumes than the ext2, ext3, and ext4 file systems. Btrfs is designed to make the file system tolerant of errors, and to facilitate the detection and repair of errors when they do occur. It uses checksums to ensure the validity of data and metadata, and maintains snapshots of the file system that can be used for backup or repair.

This filesystem snapshot feature is available in Fedora for the first time in Fedora 13. An automatic snapshot is created every time that the `yum` package manager performs an installation or upgrade.

Because Btrfs is still experimental and under development, the installation program does not offer it by default. If you want to create a Btrfs partition on a drive, you must commence the installation process with the boot option `btrfs`.

Passing the `btrfs` boot option on a DVD or CD based installation also allows Anaconda to access and mount a pre-existing btrfs partition. This option does not work with Fedora Live media.

---

**Btrfs is still experimental**

Fedora 13 includes Btrfs to allow you to experiment with this file system. You should not choose Btrfs for partitions that will contain valuable data or that are essential for the operation of important systems.

#### 5.9.2. NFS

Fedora 13 now incorporates a number of improvements in NFS support.
5.9.2.1. NFSv4 Default
Changes the default NFS protocol to version 4. NFSv4 will check to see if the server supports version 4. If the server does then it will connect. Otherwise it will connect using version 3.

One major benefit is performance. In version 4, the server has state which means it can communicate with each NFS client. This means the server can issue things called delegations (or leases) for files allowing the v4 client to aggressively cache, which drastically cuts down on network traffic between the client and server.

5.9.2.2. NFS Client IPv6
NFS Client IPv6 supports the mounting of NFS servers over IPv6. The benefits for Fedora users is that now servers and network file systems can talk to each other over IPv6 networks.

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

5.10.1. DisplayPort
DisplayPort is a new digital display connector and protocol that is much more capable than DVI. Fedora 13 introduces DisplayPort support for NVIDIA and ATI Radeon graphics chipsets.

As a benefit to Fedora users DisplayPort has a higher link bandwidth than dual-link DVI. Monitors can take advantage of this by providing higher resolutions, higher color depths, and higher refresh rates. DisplayPort also runs at a lower voltage than DVI and LVDS, using less power. Future laptops will likely switch to embedded DisplayPort for the local panel for this reason.

5.10.1.1. Nouveau DisplayPort
There is enhanced support for DisplayPort in X and kernel drivers for NVIDIA hardware. DisplayPort is a new digital display connector and protocol.

Details of this feature may be found on the Fedora Wiki at http://www.fedoraproject.org/wiki/Features/NouveauDisplayPort.

5.10.1.2. Radeon DisplayPort
There is also enhanced support for the DisplayPort in X and kernel drivers for Radeon hardware. Refer to: http://fedoraproject.org/wiki/Features/RadeonDisplayPort.

5.10.2. 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
6. Changes in Fedora for Developers

6.1. Development
Fedora 13 includes a rich set of development tools including all popular programming languages, the best and latest IDEs, and an extensive set of libraries. This section addresses the major changes for Fedora 13. For a complete list of the hundreds of updated development components see the Fedora 13 Technical Notes at http://docs.fedoraproject.org.

6.2. Tools

6.2.1. Boost
Fedora 12 includes Boost 1.39. In Fedora 13, there is an upgrade to Boost 1.40, which, due to some improvements in the way Boost is built, allows Fedora to be in closer sync with the upstream development. The release notes for Boost can be found at http://www.boost.org/users/history/version_1_40_0.

6.2.2. Systemtap Static Probes
Systemtap has been extended to support user space tracing, and in particular to support static (dtrace compatible) markers enabled in various programs in Fedora. This enables users, developers and administrators a high level overview of what is going on with their system or deep down in a specific program or subsystem.

Systemtap comes with a tutorial, a language reference manual, a tapsets reference and an examples directory.

6.2.3. Python 3
Fedora now includes a Python 3 runtime, parallel-installable with our existing Python 2 runtime.

Python 3 versions of many libraries are available with more underway. For an update on the current status refer to http://fedoraproject.org/wiki/Features/Python3F13.

6.2.4. Easier Python Debugging
The gdb debugger has been extended so that it can report detailed information on the internals of the Python 2 and Python 3 runtimes. Backtraces involving Python will now by default show mixed C and Python-level information on what such processes are doing, without requiring expertise in the use of gdb.

6.3. The GCC Compiler Collection
gcc has been upgraded from 4.4.2 to 4.4.3. This includes gcc, gcc-c++, gcc-fortran, gcc-gnat, and gcc-objc.
6.3.1. GCC now uses Implicit DSO linking

Key points:
1. `ld` will no longer automatically search in the dependencies of linked objects.

2. If your project used both libraries $A$ and $B$, it will not compile unless $A$ and $B$ are both explicitly linked.


Under the new changes, if your package fails its build with a message like:

```
/usr/bin/ld: gpx-parser.o: undefined reference to symbol 'acos@@GLIBC_2.0'
/usr/bin/ld: note: 'acos@@GLIBC_2.0' is defined in DSO /lib/libm.so.6 so try adding it to the linker command line
```

Then the line that builds the specified `.o` needs to explicitly link `libm`.

6.3.2. `_builtin_stdarg_start` has been completely removed from gcc 4.4.3.

 `_builtin_stdarg_start` will return a undefined reference to `_builtin_stdarg_start` because of the depreciation of `<stdarg.h>` in gcc 4.x The replacement is `_builtin_va_start`.

6.4. Java

The NetBeans integrated development environment has had a major update to version 6.8. Users should read the [NetBeans Release Notes page](http://netbeans.org/community/releases/68/relnotes.html) to see detailed release notes for this version.

This release also introduces the IntelliJ IDEA Community Edition integrated development environment to the Fedora package collection.

6.5. Haskell

Fedora 13 features ghc-6.12.1, which now supports shared libraries on Linux. All ghc library packages in Fedora should now provide a main shared library package for runtime, in addition to the `devel`, `doc`, and `prof` subpackages. ghc-macros has been expanded to make packaging even easier, hiding the tedious, error-prone subpackaging process.

Darcs has been upgraded to the new major version 2.4 with many new features and improvements.

6.6. Eclipse

Eclipse has had a minor update to version 3.5.1 (Galileo SR1).

Plug-ins new to Fedora include the CollabNet Merge Client (`eclipse-collabnet-merge`), an advanced source code control merging tool built on top of Subclipse and Slice2Java (`eclipse-slice2java`), a tool to manage Slice files.

---

7 [http://netbeans.org/community/releases/68/relnotes.html](http://netbeans.org/community/releases/68/relnotes.html)
Fedora now also includes more tools and frameworks for model-based development (eclipse-emf-* and eclipse-mdt-* packages.)

6.7. Linux Kernel
This section covers changes and important information regarding the 2.6.33-based kernel in Fedora 13.

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 at http://www.kernel.org.

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

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

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

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

Note that this list has entries about upstream kernel changes applied to the package as well as Fedora-specific enhancements such as bug fixes and enhancements not yet available in the upstream kernel. A detailed summary of changes in each upstream version is at http://www.kernel.org/pub/linux/kernel/v2.6/ChangeLog-<version>, e.g. the changelog for kernel 2.6.33 is at http://www.kernel.org/pub/linux/kernel/v2.6/ChangeLog-2.6.33.

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.

If you need user friendly documentation about new features in a major upstream kernel release, refer to http://wiki.kernelnewbies.org/LinuxChanges.

A complete history of changes to the kernel is available from http://git.kernel.org/?p=linux/kernel/git/torvalds/linux-2.6.git;a=summary.

Customizations made for the Fedora version are available from http://cvs.fedoraproject.org.

6.7.2. Preparing for Kernel Development
Fedora 13 does not include the kernel-source package provided by older versions, since only the kernel-devel package is required now to build external modules.

6.7.3. 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.
7. Changes in Fedora for Specific Audiences

7.1. What's new in science and mathematics
Fedora 13 includes a range of packages for science and mathematics. The following packages have been updated for Fedora 13.

A large number of other packages have undergone minor or bugfix updates. Refer to Fedora 13 Technical Notes at http://docs.fedoraproject.org for details.

7.1.1. EMBOSS
Version 6.2.0 of EMBOSS now includes the capability to read additional file formats as well as updated versions of current formats. There are a number of new capabilities, and some changes required in scripts. Details of these changes can be found at http://emboss.sourceforge.net/developers/changelog.html#0.

7.1.2. Macaulay2
Macaulay2 now includes certification of new packages that have been approved for publication in peer-reviewed journals, as well as a large number of new programs and packages. Some capabilities have been improved or changed. Users should review http://www.math.uiuc.edu/Macaulay2/doc/Macaulay2-1.3.1/share/doc/Macaulay2/Macaulay2Doc/html/_changes_cm_sp1.3.html for details on these improvements.

7.1.3. R
R has been upgraded to 2.10.1. There are a number of new features as well as a long list of bugfixes. For specifics refer to https://svn.r-project.org/R/trunk/NEWS (scroll down to 2.10 and 2.10.1). Many R-related packages and emacs modes have also been upgraded.

7.1.4. ugene
Fedora 13 includes version 1.6.1 of ugene. The upgrade is strongly recommended as there are some fixes to serious bugs. If you prefer to compile the package rather than installing from the RPM, you should review http://ugene.unipro.ru/news.html#160210 for specific actions that you need to take to make the upgrade successful. This is not necessary for a normal install using yum or PackageKit.

7.2. Circuit Design
Fedora 13 includes a complete set of applications for schematic capture, circuit simulation, and PCB layout. The following are major changes to these applications. A complete list of changes may be found in the Technical Notes available at http://docs.fedoraproject.org.

7.2.1. ngspice
ngspice and tclspice have been upgraded to Release 20. New features include .measure command for transient, ac and dc analyses (still not complete, e.g. DERIV is missing). Improved device support incudes
an updated BISM4 model to revision 4.6.5. Added PWL (PieceWise Linear) functionality for B (arbitrary generator) sources.

7.2.2. pcb
Fedora 13 includes version 0.20091103 of pcb. There are a number of new features including the ability to add attributes to layers, to add filters through the load file chooser dialog, allowing quoted and escaped strings, and many new footprints. For a complete list of new features, footprints and bug fixes, refer to the news file at http://pcb.gpleda.org/news.html#20091103.

7.2.3. Dia
A number of digital and electronic symbols have been added to the drawing package, dia. New packages include dia-CMOS, dia-Digital, dia-electric2 and dia-electronic.

7.3. Embedded Development
Fedora 13 includes a range of packages to support development of embedded applications on various targets. There is broad support for the AVR and related parts as well as for the Microchip PIC. In addition, there are packages to support development on older, less popular parts such as the Z80, 8051, and others. This section describes significant changes for Fedora 13. For a more complete description refer to Packages for embedded development on the wiki available at http://fedoraproject.org/wiki/Packages_For_Embedded_Development.

7.3.1. avrdude
avrdude has been updated from 5.8 to 5.10. The new release includes support for additional part numbers as well as a number of additional programmers.

Additional information:

7.3.2. piklab
piklab has been updated to version 0.15.7.

Major changes include:
• Support for PICkit2V2 has been removed
• ICD2 support has been greatly improved, including support for dsPIC33 devices
• Toolchain and programmer selection have been moved to the project manager
and much more.

For complete details, refer to the Piklab change log at http://piklab.sourceforge.net/changelog.php.
7.3.3. mcu8051ide

`mcu8051ide` has been upgraded to version 1.3.3. In addition to bugfixes, this release includes the following new features:

- RS232/UART debugger, tool intended for debugging in real hardware applications
- Symbol list (added on the right panel)
- Assembler has now support for assigning register names to constants. So since this version you can write code like this:

```plaintext
ABC   EQU   R0
MOV   ABC, #55h   ; <- This will be compiled as "MOV R0, #55h"
```

7.3.4. gnusim8085

Fedora 13 includes `gnusim8085` version 1.3.6. This new release is now internationalized, and includes a number of usability improvements and new features. For a complete description, refer to the announcement at https://launchpad.net/gnusim8085/+announcement/5242.

7.3.5. avr-binutils

`avr-binutils` has been updated to 2.20. There are a number of new features as well as bug fixes. Refer to the project's NEWS file for details at http://sourceware.org/cgi-bin/cvsweb.cgi/~checkout/~src/binutils/NEWS?rev=1.87&content-type=text/plain&cvsroot=src&only_with_tag=binutils-binutils-2_20.

7.3.6. avr-gcc

`avr-gcc` has been updated to 4.5.0, along with `avr-gcc-c++`. Refer to http://gcc.gnu.org/gcc-4.5/changes.html for the details of this upgrade.

7.4. What's new for amateur radio operators

Fedora 13 includes a number of applications and libraries that are of interest to amateur radio operators and electronic hobbyists. Many of these applications are included in the Fedora Electronic Lab spin. Interesting applications may also be found under Circuit Design, Embedded Development, and Science and Mathematics. For a complete list of amateur radio applications available within Fedora see Applications for amateur radio at http://fedoraproject.org/wiki/Applications_for_Amateur_Radio on the wiki.

This section outline significant changes in these applications since Fedora 12. For complete information on all changes, major or minor, refer to the Fedora 13 Technical Notes at http://docs.fedoraproject.org.

7.4.1. hamlib

`hamlib` has been updated to version 1.2.10. New capabilities include:

- New models: IC-7200, PCR-1500, PCR-2500, RX-340, R&S ESMC, BC898T, Si570 AVR-USB, Paragon (skeleton)
• New rotator backend: SPID, GS-232 (not A or B)

• Fixes and features:
  • TH-F7E, K2, FT-920, Yaesu NewCAT, IC-7000, IC-7800, IC-910, IC-718, IC-756PROIII, Tentec Orion, Jupiter, RX320, AOR-8000, PCR-1000, Video4Linux, all the Kenwood backends, GS-232A
  
  • ABI version in backend symbols
  • expose PTT/DCD setup through rig_set_conf()
  • Parallel port PTT now following cwdaemon (STROBE+INIT) interface
  • bindings
  • ltdl update

7.4.2. xastir
In addition to many bug fixes in xastir 1.9.6, shapes and terminology have been updated to conform to NIMS standard ICS usage.

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B. Revision History
Revision 5 Sat May 21 2010 John McDonough jjmcd@fedoraproject.org
Remove description of modprobe whitelist BZ#594466
Revision 4 Fri 14 May 2010 Ian MacGregor ardchoille42@fedoraproject.org
Added note for the possibility of needing to enable the location bar in nautilus, BZ#591694
Revision 3 Mon May 10 2010 John McDonough jjmcd@fedoraproject.org
Config change in varnish BZ#5889532
Incorrect link in kernel BZ#590492
Revision 2 Mon Apr 26 2010 The Fedora Documentation Team release-notes@fedoraproject.org
Incorporate all known Fedora 13 content
Revision 1 Fri Mar 19 2010 John McDonough jjmcd@fedoraproject.org
Port content from Fedora wiki
Revision 0 Wed Mar 17 2010 Rüdiger Landmann r.landmann@redhat.com
Clean out Fedora 12 content to make way for Fedora 13

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