
Fedora 24

Release Notes

Release Notes for Fedora 24



Edited by The Fedora Docs Team

Copyright © 2014 Fedora Project Contributors.

The text of and illustrations in this document are licensed by Red Hat under a Creative Commons Attribution–Share Alike 3.0 Unported license ("CC-BY-SA"). An explanation of CC-BY-SA is available at <http://creativecommons.org/licenses/by-sa/3.0/>. The original authors of this document, and Red Hat, designate the Fedora Project as the "Attribution Party" for purposes of CC-BY-SA. In accordance with CC-BY-SA, if you distribute this document or an adaptation of it, you must provide the URL for the original version.

Red Hat, as the licensor of this document, waives the right to enforce, and agrees not to assert, Section 4d of CC-BY-SA to the fullest extent permitted by applicable law.

Red Hat, Red Hat Enterprise Linux, the Shadowman logo, JBoss, MetaMatrix, Fedora, the Infinity Logo, and RHCE are trademarks of Red Hat, Inc., registered in the United States and other countries.

For guidelines on the permitted uses of the Fedora trademarks, refer to https://fedoraproject.org/wiki/Legal:Trademark_guidelines.

Linux® is the registered trademark of Linus Torvalds in the United States and other countries.

Java® is a registered trademark of Oracle and/or its affiliates.

XFS® is a trademark of Silicon Graphics International Corp. or its subsidiaries in the United States and/or other countries.

MySQL® is a registered trademark of MySQL AB in the United States, the European Union and other countries.

All other trademarks are the property of their respective owners.

Abstract

This document provides the release notes for Fedora 24. It describes major changes offered as compared to Fedora 23. For a detailed listing of all changes, refer to the Fedora Technical Notes.

1. Welcome to Fedora 24	2
1.1. Welcome to Fedora	2
1.2. Overview	3
1.3. Hardware Overview	3
1.4. Feedback	4
2. Changes in Fedora for System Administrators	5
2.1. Installation	5
2.2. Server Configuration Tools	5
3. Changes in Fedora for Desktop Users	6
3.1. Desktop	6
3.2. Productivity	7
3.3. Networking	8
3.4. Internationalization	9
3.5. Graphics Editors	9
4. Changes in Fedora for Developers	9
4.1. Development	9
4.2. Development Tools	12
4.3. GCC Tools	13
4.4. Web Development	13
5. Changes in Fedora for Specific Audiences	14
5.1. Scientific and Technical	14
A. Contributors	14
A.1. Writers	14
B. Revision History	14
Index	14

1. Welcome to Fedora 24

1.1. Welcome to Fedora

You can help the Fedora Project community continue to improve Fedora if you file bug reports and enhancement requests. Refer to [Bugs And Feature Requests](http://fedoraproject.org/wiki/BugsAndFeatureRequests)¹, on the Fedora wiki, 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 pages, on the Fedora wiki (<http://fedoraproject.org/wiki/>):

- [Fedora Overview](http://fedoraproject.org/wiki/Overview)²
- [Fedora FAQ](http://fedoraproject.org/wiki/FAQ)³
- [Help and Discussions](http://fedoraproject.org/wiki/Communicate)⁴
- [Participate in the Fedora Project](http://fedoraproject.org/wiki/Join)⁵

¹ <http://fedoraproject.org/wiki/BugsAndFeatureRequests>

² <http://fedoraproject.org/wiki/Overview>

³ <http://fedoraproject.org/wiki/FAQ>

⁴ <http://fedoraproject.org/wiki/Communicate>

⁵ <http://fedoraproject.org/wiki/Join>

1.1.1. Need Help?

There are a number of places you can get assistance should you run into problems.

If you run into a problem and would like some assistance, go to <http://ask.fedoraproject.org>. Many answers are already there, but if you don't find yours, you can simply post a new question. This has the advantage that anyone else with the same problem can find the answer, too.

You may also find assistance on the **#fedora** channel on the IRC net **irc.freenode.net**. Keep in mind that the channel is populated by volunteers wanting to help, but folks knowledgeable about a specific topic might not always be available.

1.2. Overview

As always, Fedora continues to develop (*Red Hat contributions*⁶) and integrate the latest free and open source software (*Fedora 24 Features*)⁷. The following sections provide a brief overview of major changes from the last release of Fedora.

For more details about the features that are included in Fedora 24 refer to the individual wiki pages that detail feature goals and progress at <https://fedoraproject.org/wiki/Releases/24/ChangeSet>.

1.3. Hardware Overview

Fedora 24 provides software to suit a wide variety of applications. The storage, memory and processing requirements vary depending on usage. For example, a high traffic database server requires much more memory and storage than a business desktop, which in turn has higher requirements than a single-purpose virtual machine.

1.3.1. Minimum System Configuration

The figures below are a recommended minimum for the default installation. Your requirements may differ, and most applications will benefit from more than the minimum resources.

1GHz or faster processor
1GB System Memory
10GB unallocated drive space



Low memory installations

Fedora 24 can be installed and used on systems with limited resources for some applications. Text, VNC, or kickstart installations are advised over graphical installation for systems with very low memory. Larger package sets require more memory during installation, so users with less than 768MB of system memory may have better results performing a minimal install and adding to it afterward.

For best results on systems with less than 1GB of memory, use the DVD installation image.

⁶ https://fedoraproject.org/wiki/Red_Hat_contributions

⁷ <https://fedoraproject.org/wiki/Releases/24/ChangeSet>

1.3.2. Display resolution

Graphical Installation requires 800x600 resolution or higher

Graphical installation of Fedora requires a minimum screen resolution of 800x600. Owners of devices with lower resolution, such as some netbooks, should use text or VNC installation.

Once installed, Fedora will support these lower resolution devices. The minimum resolution requirement applies only to graphical installation.

1.3.3. Graphics Hardware

1.3.3.1. Minimum Hardware for Accelerated Desktops

Fedora 24 supports most display adapters. Modern, feature-rich desktop environments like GNOME3 and KDE Plasma Workspaces use video devices to provide 3D-accelerated desktops. Older graphics hardware may *not support* acceleration:

Intel prior to GMA9xx

NVIDIA prior to NV30 (GeForce FX5xxx series)

Radeon prior to R300 (Radeon 9500)

1.3.3.2. CPU Accelerated Graphics

Systems with older or no graphics acceleration devices can have accelerated desktop environments using LLVMpipe technology, which uses the CPU to render graphics. LLVMpipe requires a processor with SSE2 extensions. The extensions supported by your processor are listed in the `flags` section of `/proc/cpuinfo`

1.3.3.3. Choosing a Desktop Environment for your hardware

Fedora 24's default desktop environment, GNOME3, functions best with hardware acceleration. Alternative desktops are recommended for users with older graphics hardware or those seeing insufficient performance with LLVMpipe.

Desktop environments can be added to an existing installation and selected at login. To list the available desktops, use the `dnf grouplist` command:

```
# dnf grouplist -v hidden | grep desktop
```

Install the desired group:

```
# dnf groupinstall "KDE Plasma Workspaces"
```

Or, use the short group name to install:

```
# dnf install @mate-desktop-environment
```

1.4. 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.

1.4.1. Providing Feedback on Fedora Software

To provide feedback on Fedora software or other system elements, please refer to [Bugs And Feature Requests](#)⁸. A list of commonly reported bugs and known issues for this release is available from [Common F24; bugs](#)⁹, on the wiki.

1.4.2. 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 [Docs-Beats](#)¹⁰ page on the wiki.
- Fill out a bug request using <http://bugzilla.redhat.com/>¹¹ - This link is *ONLY* for feedback on the release notes themselves. Refer to the admonition above for details.
- E-mail the Release-Note mailing list at relnotes@fedoraproject.org

2. Changes in Fedora for System Administrators

2.1. Installation

- It is now possible to select multiple items in the **Manual Partitioning** screen.
- The space requirement check is now more accurate.
- The **list-harddrives** script has been made more robust, and it will now only report block devices, and correctly ignore zram and software raid block devices. In addition, documentation for this script is now available in the [Anaconda repository](#)¹².
- **inst.nosave=** is a new boot option controlling which **Kickstart** files and installation logs are saved to the installed system. It can be especially useful to disable saving such data when performing OEM operating system installations, or when generating images using sensitive resources (such as internal repository URLs), as these resources might otherwise be mentioned in kickstart files and/or logs on the image. Possible values for this option are:

input_ks — disables saving of the input kickstart file (if any).

output_ks — disables saving of the output kickstart file generated by Anaconda.

all_ks — disables saving of both input and output kickstart files.

logs — disables saving of all installation logs.

all — disables saving of all kickstart files and all installation logs.

Multiple values can be combined as a comma separated list, for example: **input_ks, logs**

2.2. Server Configuration Tools

⁸ <http://fedoraproject.org/wiki/BugsAndFeatureRequests>

⁹ http://fedoraproject.org/wiki/Common_F24_bugs

¹⁰ <http://fedoraproject.org/wiki/Docs/Beats>

¹¹ https://bugzilla.redhat.com/enter_bug.cgi?product= Fedora Documentation&component=release-notes

¹² <https://github.com/rhinstaller/anaconda/blob/master/docs/list-harddrives.rst>

2.2.1. Deprecation of ipcalculator

In the past, Fedora provided two tools for IP address calculations, **ipcalculator** and **ipcalc**. **ipcalculator** was geared towards being used interactively by administrators and **ipcalc** was intended for use with scripts. However, recent versions of the **ipcalc** tool can be used both interactively and from scripts. As a result of that, and the fact that **ipcalculator** is not IPv6-ready, **ipcalculator** is not provided in Fedora 24 and **ipcalc** should be used instead.

More information about **ipcalc** can be found on its [website](#)¹³.

3. Changes in Fedora for Desktop Users

3.1. Desktop

3.1.1. PulseAudio flat volumes disabled

In the Fedora 24 release, **PulseAudio**'s standard flat volume configuration has been disabled. This disablement means the system volume no longer scales with the loudest application.

Previously, it was possible for an application to set its volume to 100% on launch. This could potentially cause volumes to become suddenly loud, which poses a risk to users or their speakers or other hardware. The tradeoff for disabling this feature is that users may need to manually manage their application sound volumes more often. However, this behavior is in line with many other Linux distributions. The upstream PulseAudio, freedesktop.org, GNOME, and other communities are discussing new ways to mitigate this issue in future.

3.1.2. GNOME 3.20

Fedora 24 includes the latest version of the **GNOME desktop**. GNOME 3.20 is the latest version of GNOME 3, and is the result of 6 months' hard work by the GNOME community. Version 3.20 contains some major new features, as well as many smaller improvements and bug fixes. Some of the exciting new features are:

- Short Cut Windows: By pressing *CTRL + ?* or *CTRL + F1* launches a graphical window of all the different GNOME Shortcuts available. Many applications have Short Cut Windows available. Some of them are: **Videos**, **Files**, **Photos**, and **gedit**.
- Media Controls integration into the Notification area. Controls for media playback can be accessed in the notification area. This will make controlling media faster and more streamlined. This feature will work with a large range of devices and uses the MPRIS standard.

For more information about what is new in this GNOME release, please refer to the [GNOME 3.20 release notes](#)¹⁴.

3.1.3. QGnomePlatform

Many users run Qt applications in Fedora Workstation. By default, the Qt applications' interface settings are not very consistent with those of the GTK applications. Fedora 24 introduces **QGnomePlatform**, a Qt Platform Theme that aims to take as many of the GNOME settings as possible and apply them directly to Qt applications, thus enabling the Qt applications to fit more consistently into the GNOME Desktop.

¹³ <https://github.com/nmav/ipcalc>

¹⁴ <https://help.gnome.org/misc/release-notes/3.20/>

More information about QGnomePlatform can be found on the project's [GitHub pages](#)¹⁵.

3.2. Productivity

3.2.1. Firefox 47.0.1

Fedora 24 provides the latest version of **Mozilla Firefox**, the world-famous web browser. The powerful and extensible web browser is kept up to date to provide the most secure and enjoyable web browsing experience.

Some new features of Firefox 47 are:

- HTML5 is used for Youtube if Adobe Flash is not installed on the system
- Fast machines have the VP9 Video Codec enabled
- Search open tabs from another computer or smartphone via the sidebar
- No Cache backward and forward navigation for HTTPS resources
- Fuel: Firefox User Extension Library has been removed

For detailed information about the 47.0.1 release please visit the [Firefox Release Notes](#)¹⁶.

3.2.2. QupZilla 2

QupZilla 2, a modern, lightweight and fast browser written in Qt, is now based on QtWebEngine instead of QtWebKit, bringing it up to date with modern web and security standards. Other QtWebKit browsers such as Konqueror (with the KWebKitPart) and Rekonq are still available, but their users may find QupZilla 2 with QtWebEngine to be a more modern alternative. More information about QupZilla can be found at <https://www.qupzilla.com/>

You can install qupzilla with the command: `dnf install qupzilla`

3.2.3. Evolution 3.19.91

Evolution is an email client that provides a calendar and an address book.

Evolution supports multiple protocols and file formats:

- Exchange Web Services
- IMAP+
- POP
- USENET News
- Local Delivery
- mbox spool file
- mbox unix spool directory

¹⁵ <https://github.com/MartinBriza/QGnomePlatform>

¹⁶ <https://www.mozilla.org/en-US/firefox/47.0.1/releasesnotes/>

- Maildir-formatted mail directories

For more information please visit Evolution's upstream page at: [Evolution at gnome.org](https://wiki.gnome.org/Apps/Evolution)¹⁷

3.2.4. Thunderbird 38.7.1

The **Thunderbird** e-mail client now includes the **Lightning** calendar and scheduling extension by default. Use it for to-do lists, e-mailed invitations, and more.

New in Thunderbird 38.7.1:

- Graphite font shaping library has been disabled

For full details on changes in **Thunderbird**, see the project's [Release Notes](#)¹⁸.

3.2.5. LibreOffice 5.1

Fedora 24 provides LibreOffice version 5.1, some of the new features are:

- The Spell Check dialog box no longer closes after spell check has completed
- PNG Export has been added to **Calc**, **Writer**, and **Impress**
- Screen savers are inhibited for Mate, KDE, and XFCE Window managers during presenting mode in **Impress**

See the [Release Notes](#)¹⁹ for a comprehensive list of all new features in this release.

3.2.6. TeXLive 2015

TeX is a typesetting language designed to allow anybody to produce high-quality documents using a minimal amount of effort. Instead of visually formatting a document, the user enters manuscript text, intertwined with TeX commands, into a plain text file. When the user then runs TeX to produce formatted output, such as a PDF file. TeXLive is a packaged distribution of TeX software and the TeXLive 2015 release is the most recent version.

More information about TeX can be found on the [TeX Users Group website](#)²⁰.

3.3. Networking

3.3.1. NetworkManager 1.2

NetworkManager is the standard Linux network configuration tool suite. It supports a large range of networking setups, from desktop to servers and mobile and it integrates well with popular desktop environments and server configuration management tools. The 1.2 release brings many new features. It improves Wi-Fi and IPv6 privacy, needs less external dependencies, makes VPN support more flexible and adds support for many kinds software devices including IP tunnels, VxLANs and more.

For more information, please see the [NetworkManager web page](#)²¹ and this [blog entry](#)²² about the 1.2 release.

¹⁷ <https://wiki.gnome.org/Apps/Evolution>

¹⁸ <https://www.mozilla.org/en-US/thunderbird/38.7.1/releasenotes/>

¹⁹ <https://wiki.documentfoundation.org/ReleaseNotes/5.1>

²⁰ <http://tug.org/begin.html>

²¹ <https://wiki.gnome.org/Projects/NetworkManager>

²² <https://blogs.gnome.org/lkundrak/2016/04/20/networkmanager-1-2-is-here/>

3.4. Internationalization

3.4.1. Font Changes

- The *google-noto-fonts* package has been split into three smaller packages: *google-noto-fonts*, *google-noto-cjk-fonts*, and *google-noto-emoji-fonts*.
- New font packages have been added: *nodejs-ansi-font*, *horai-ume-fonts*, *google-noto-nastaliq-urdu-fonts*, and *google-noto-sans-tibetan-fonts*

3.4.2. Other Internationalization Changes

- The **pap_AN** locale has been removed.
- *zanata-python-client* has been upgraded to version 1.5.0, which provides a number of major improvements. See the [project changelog](#)²³ for detailed information.

3.5. Graphics Editors

3.5.1. darktable 2.0

Fedora 24 provides the latest major release of **darktable**, an open source photography workflow application and RAW developer. A virtual lighttable and darkroom for photographers, darktable manages your digital negatives in a database, lets you view them through a zoomable lighttable and enables you to develop RAW images and enhance them.

For more information, please visit the [darktable website](#)²⁴.

4. Changes in Fedora for Developers

4.1. Development

4.1.1. Python Upgrade to 3.5

Python 3.5 will be the default Python 3 stack in Fedora 24. This is an upgrade from 3.4 which was included in Fedora 23. All packages which depend on Python 3 must be rebuilt. User-written Python 3 scripts and applications may require a small amount of porting; however, Python 3.4 is forward compatible with Python 3.5 for the most part.

Notable changes include:

- Coroutines with `async` and `await` syntax.
- A new matrix multiplication operator: `a @ b`.
- New library modules: **typing** (Type Hints) and **zipapp** (Improved Python ZIP Application Support).
- Adding `%` formatting to bytes and bytearray - `bytes % args`, `bytearray % args`.

²³ <https://github.com/zanata/zanata-python-client/blob/master/CHANGELOG>

²⁴ <http://www.darktable.org/>

Release Notes

- New `bytes.hex()`, `bytearray.hex()` and `memoryview.hex()` methods. (Contributed by Arnon Yaari in issue 9951.)
- `memoryview` now supports tuple indexing (including multi-dimensional). (Contributed by Antoine Pitrou in issue 23632.)
- A new `RecursionError` exception is now raised when maximum recursion depth is reached. (Contributed by Georg Brandl in issue 19235.)
- `collections.OrderedDict` is now implemented in C, which makes it 4 to 100 times faster.
- The new `os.scandir()` function provides a better and significantly faster way of directory traversal.
- SSLv3 is now disabled throughout the standard library. It can still be enabled by instantiating a `ssl.SSLContext` manually. This change has also been backported to CPython 3.4 and 2.7.

For more detailed information see the upstream release notes at <https://docs.python.org/3.6/whatsnew/3.5.html>. Note the [Porting to Python 3.5](#)²⁵ section, which lists important information for developers who need to port their Python 3.4 applications.

4.1.2. Mono 4.2

The **Mono** stack has been upgraded to version **4.2** in Fedora 24. Notable changes include:

- More adoption of Microsoft's open source code.



Important

This brings a compatibility-breaking change in the `PasswordDeriveBytes` class. See <http://www.mono-project.com/docs/about-mono/releases/4.2.1/#systemsecuritycryptography-changes> for more information.

- Support for the PPDB debugging format.
- New threadpool implementation.
- Runtime optimizations and extensive bug fixes.

For detailed information, see the upstream release notes for Mono 4.2.1 available at <http://www.mono-project.com/docs/about-mono/releases/4.2.1/>.

4.1.3. Ruby 2.3

Ruby 2.3 is the latest stable version of Ruby. Many new features and improvements are included for the increasingly diverse and expanding demands for Ruby. With this major update from Ruby 2.2 in Fedora 22 to Ruby 2.3 in Fedora 24, alongside **JRuby**, Fedora becomes the superior Ruby development platform.

²⁵ <https://docs.python.org/3.6/whatsnew/3.5.html#porting-to-python-3-5>

Ruby 2.3 bumps soname, and therefore Ruby packages which use binary extensions should be rebuilt. Nevertheless, since upstream paid great attention to source compatibility, no changes to your code are needed.

Notable changes in this release include:

- A Frozen String Literal Pragma is introduced. With Ruby 2.1, `"str".freeze` has been optimized to reduce object allocation. Ruby 2.3 introduces a new magic comment and command line option to freeze all string literals in the source files. Additionally for debugging, you can get where the object is created on `can't modify frozen String` error by `--enable-frozen-string-literal-debug`.
- A safe navigation operator, which already exists in C#, Groovy, and Swift, is introduced to ease nil handling as `obj&.foo`. `Array#dig` and `Hash#dig` are also available.
- `RubyVM::InstructionSequence#to_binary` and `.load_from_binary` are introduced as experimental features.
- The `did_you_mean` gem is bundled. This gem provides suggestions on `NameError` and `NoMethodError` to ease debugging.
- Safe levels `SAFE=2` and `SAFE=3` are now obsolete.

For further information about this release, see the upstream release announcement at <https://www.ruby-lang.org/en/news/2015/12/25/ruby-2-3-0-released/>.

4.1.4. Go 1.6

Version 1.6 of the Go programming language is included in Fedora 24. Most of the changes from Go 1.5 are in the implementation of the language, runtime and libraries. There are no changes to the language specification.

The complete list of changes is available in the [upstream change notes](#)²⁶.

4.1.5. Erlang 18

Erlang/OTP 18.3.1 is available in Fedora 24. Erlang is a programming language used to build massively scalable, soft real-time systems that have requirements for high availability. OTP is set of Erlang libraries and design principles that provides middle-ware to develop these systems. Erlang/OTP 18.3.1 is a service release on the 18 track. It is mostly bug fixes, but it does contain a number of new features and characteristics improvements as well.

More information is available from the [Erlang website](#)²⁷.

4.1.6. QtWebEngine

Fedora 24 introduces the new QtWebEngine library. QtWebEngine is a Qt port of the Chromium web engine. Application developers are encouraged to use QtWebEngine instead of QtWebKit, which was deprecated by the Qt project in favor of QtWebEngine. More information about QtWebEngine can be found at <http://doc.qt.io/qt-5/qtwebengine-index.html>.

²⁶ <https://tip.golang.org/doc/go1.6>

²⁷ <http://www.erlang.org/>

4.2. Development Tools

4.2.1. Suds Jurko Fork

The `python-suds` package, which provides a SOAP-based web service for Python, has been unmaintained in Fedora since 2011 and does not currently support Python 3. In Fedora 24, the no longer maintained version will be replaced with a fork currently maintained by Jurko Gospodnetić (hence the name "Jurko Fork"). The package name in Fedora will change to `suds-jurko`. See the project page at <https://bitbucket.org/jurko/suds> for details about the fork.



Important

Any packages and user-written scripts and applications which currently depend on the old package will need to be tested to ensure they still work correctly with the updated package. The new fork should maintain compatibility, however, one exception has been found: two debug-related functions, `Client.last_sent()` and `Client.last_received()` have been removed. See the [relevant upstream issue](#)²⁸ for a workaround.

4.2.2. The GNU C Library (glibc) version 2.23

The GNU C Library (`glibc`) is upgraded to version 2.23 in Fedora 24. The upgraded version brings improved performance, a significant amount of bug fixes, improvements to POSIX compliance, additional locales, and other improvements. For full information about the new release, see the upstream NEWS at <https://sourceware.org/git/?p=glibc.git;a=blob;f=NEWS;hb=HEAD>.

Note that `glibc-2.23` preserves compatibility with version 2.22 which was available in Fedora 23, and no changes in packaging are required. Also see https://sourceware.org/glibc/wiki/Release/2.23#Packaging_Changes.

Notable changes in Fedora's `glibc` distribution include:

`librtkaio` removed from `glibc`

The GNU C Library version 2.23 in Fedora will no longer provide a POSIX Realtime library that is based solely around the Linux Kernel Asynchronous IO interfaces (`librtkaio`). Instead, the binary compatible POSIX Realtime library (`librt`) will be used for all applications. Applications expecting `librtkaio` may experience a performance degradation and it is suggested they upgrade to `libaio`. A compatibility symlink is being provided for this release to ensure a smooth transition; however, this symlink may be removed in future releases.

Some additional information about the removal of this library is available at the [Fedora Wiki](#)²⁹.

`glibc` language subpackages

`glibc` provides localized strings, totalling over 100MB on disk in the locale archive at `/usr/lib/locale/locale-archive`. Fedora now provides `glibc` translations for each locale in a separate package, reducing unnecessary disk usage. Use the `glibc-all-langpacks` package to provide all locales, or install the `glibc-langpack-language code` package for a given language code.

²⁸ https://bitbucket.org/jurko/suds/issues/39/missing-last_sent-and-last_received

²⁹ https://fedoraproject.org/wiki/Changes/GLIBC223_librtkaio_removal

4.2.3. BBC micro:bit

The *BBC micro:bit*³⁰ is an ARM-based, embedded system that has been designed by the BBC for use in computer education in the UK. Every 11 year old student in the UK will be given a free micro:bit before the product goes on sale to the general public. Fedora 24 introduces two new applications that will enable users to program the micro:bit. **Mu** is the Python editor that will be used to write code for the micro:bit and **uFlash** (pronounced "micro-flash") is the utility that will flash programs onto the device.

More information about these applications can be found on the *Mu*³¹ and *uFlash*³² GitHub pages.

4.2.4. Boost 1.60

Boost provides free, peer-reviewed, portable C++ source libraries. In Fedora 24, Boost has been upgraded to version 1.60.0.

For more details about this update to Boost please see the *Boost website*³³.

4.3. GCC Tools

4.3.1. GCC 6

The GNU Compiler Collection, **GCC**, is updated to version 6 in Fedora 24. GCC 6 has many new features, including:

- The default mode for C++ is now **-std=gnu++14** instead of **-std=gnu++98**.
- Added support for the musl C library. It can be selected using the new **-mmusl** option.
- Multiple optimizer improvements.
- G++ and GCC will provide suggestions for misspelled command line options.
- New languages and language-specific improvements in C, C++, and others.
- New targets and target-specific improvements.

For more information about what is new in GCC 6, see the Changes page at <http://gcc.gnu.org/gcc-6/changes.html>.

4.4. Web Development

4.4.1. Node.js 5.10

Fedora 24 features Node.js 5.10, the latest stable version of the platform built on Chrome's JavaScript runtime for easily building fast, scalable network applications.

This release includes API changes that may require dependency updates. Information about these changes is available from *the Node.js website*.³⁴

³⁰ <https://www.microbit.co.uk/>

³¹ <https://github.com/ntoll/mu>

³² <https://github.com/ntoll/uflash>

³³ http://www.boost.org/users/history/version_1_60_0.html

³⁴ <https://nodejs.org/en/blog/>

This is the first Fedora release of Node.js that has tests passing on all of the supported platforms. Requiring that all tests pass before releasing Node.js marks an important development for the project, and is essential for building a solid path moving forward.

5. Changes in Fedora for Specific Audiences

5.1. Scientific and Technical

5.1.1. Astronomy Spin

The new Fedora Astronomy spin brings a complete open source toolchain, from observation planning through to the final results, for both amateur and professional astronomers. It provides the Fedora KDE desktop enhanced with a complete scientific Python environment and the AstrOmatic software for data analysis. KStars is included to provide a full featured astrophotography tool. As KStars uses the INDI library to control equipment, various telescopes, cameras etc. are supported.

Help with using Fedora Astronomy is available in the irc channel #fedora-astronomy on irc.freenode.net and on the [Fedora Astronomy](#)³⁵ mailing list.

A. Contributors

A large number of people contribute to Fedora each release. Among these are a number of writers and translators who have prepared these release notes. The following pages list those contributors.

A.1. Writers

Fedora Documentation Project

B. Revision History

Revision
24-02

Wed Jun 08 2016

Fedora Docs Project
docs@lists.fedoraproject.org

First F24 publication

Index

B

Bug Reporting, 2

F

FAQ

Fedora, 2

³⁵ <https://lists.fedoraproject.org/mailman/listinfo/astronomy>

H

Help, 2

R

Reporting

 Bug and Feature Request, 2

W

Wiki

 Fedora, 2

