
Fedora 26

Release Notes

Release Notes for Fedora 26



Edited by The Fedora Docs Team

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Abstract

This document provides the release notes for Fedora 26. It describes major changes offered as compared to Fedora 25.

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1. Welcome to Fedora 26

1.1. Welcome to Fedora

The Fedora Project is a partnership of Free software community members from around the globe. The Fedora Project builds open source software communities and produces a Linux distribution called Fedora.

The Fedora Project's mission is to lead the advancement of Free and open source software and content as a collaborative community. The three elements of this mission are clear:

- The Fedora Project always strives to lead, not follow.
- The Fedora Project consistently seeks to create, improve, and spread Free/Libre code and content.
- The Fedora Project succeeds through shared action on the part of many people throughout our community.

To find out more general information about Fedora, refer to the following pages, on the Fedora Project Wiki:

- [Fedora Overview](http://fedoraproject.org/wiki/Overview)¹

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

- [Fedora FAQ](#)²
- [Help and Discussions](#)³
- [Participate in the Fedora Project](#)⁴

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 **#fedorachannel** 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.

1.1.2. Want to Contribute?

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](#)⁵ on the Fedora Wiki for more information about bug and feature reporting. Thank you for your participation.

1.2. Overview

As always, Fedora continues to develop and integrate the latest free and open source software. The following sections provide a brief overview of major changes from the last release of Fedora.

More detailed information about changes in this release can be found on the [Fedora Project Wiki](#)⁶.

1.3. Hardware Overview

Fedora 26 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

² <http://fedoraproject.org/wiki/FAQ>

³ <http://fedoraproject.org/wiki/Communicate>

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

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

⁶ <https://fedoraproject.org/wiki/Releases//ChangeSet>



Low memory installations

Fedora 26 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.

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 26 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 26'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](#)⁷. A list of commonly reported bugs and known issues for this release is available from [Common F26 Bugs](#)⁸ 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](#)⁹ page on the wiki.
- Fill out a bug request using <http://pagure.io/>¹⁰ - *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 reInotes@fedoraproject.org

2. Changes in Fedora for System Administrators

2.1. Fedora Modularity

Fedora Modularity is attempting to disconnect the lifecycles of applications from each other and also from that of the operating system, while still maintaining the ease of use of a typical Linux distribution. More information about this work is available in the [Fedora Modularity documentation](#)¹¹.

2.1.1. Modular Server Preview

Fedora 26 contains a "preview" release of a modular Fedora Server Edition.

⁷ <http://fedoraproject.org/wiki/BugsAndFeatureRequests>

⁸ http://fedoraproject.org/wiki/Common_F26_bugs

⁹ <http://fedoraproject.org/wiki/Docs/Beats>

¹⁰ <https://pagure.io/release-notes>

¹¹ <https://docs.pagure.org/modularity/>



Not for production use

The Fedora 26 Modular Server Preview is a working version of the Server Edition but it is still a prototype and so it should not be used in a production environment.

The purpose of this preview release is to request feedback from the user community. The Modularity Working Group would like to hear from anyone experimenting with the preview about how it does or does not meet their expectations. Contact details for the Modularity Working Group are on the [Fedora Modularity home page](#)¹².

2.2. Kernel

2.2.1. aarch64 48-bit Virtual Address Space

Before Fedora 26, the aarch64 kernel in Fedora used a 42-bit process virtual address (VA) space and due to the way aarch64 paging works, this constrained the maximum physical address as well. The 42-bit VA was fairly limiting for some applications, but aarch64 processors also have support for 48-bit VAs.

For Fedora 26, Fedora has introduced a 48-bit VA and so larger aarch64 processes won't be constrained by the virtual or physical limitations of a 42-bit VA. This change also helps with things like hugetlb's and potentially provides a performance boost. Additionally, it allows Fedora to boot on a class of machines that have the majority of their RAM higher in the address space.

Its unlikely a desktop user will notice the change, except possibly that Fedora might now boot on additional hardware. A server user might find that there is more RAM available for in-memory databases etc.

2.3. Installation

2.3.1. Anaconda Changes

This section covers changes in the **Anaconda** installer, including changes in the graphical and text mode interactive installers, Kickstart, and installer boot options.

2.3.1.1. Changes in the Graphical Interface

- A new, alternate partitioning interface provided by the the **blivet-gui** tool is now available in the manual partitioning sccreen. Unlike the existing partitioning interface, **blivet-gui** allows you to configure partitioning from the "bottom up": for example, in case of LVM you first create physical volumes, then a volume group, and then logical volumes, while in the old interface, you start with logical volumes and everything else is created automatically at first.

The previous partitioning interface continues to be available as alongside the new one. For additional information, see the [Fedora Project Wiki](#)¹³.

¹² <https://docs.pagure.org/modularity/>

¹³ <https://fedoraproject.org/wiki/Changes/AnacondaBlivetGUI>

- The installer now shows more detailed indication of current progress during all phases of the installation.

2.3.1.2. Changes in the Text Mode Interface

- The text mode interface now supports setting up IP over Infiniband IPoIB connections in the Networking screen.
- The built-in help system, which was previously available in the graphical installation interface, has been extended to the text mode interface.
- The **Initial Setup** post-setup text mode interface now runs on all available consoles.

2.3.1.3. Kickstart Changes

- A new command, **snapshot**, has been added to provide LVM snapshot support for devices in an LVM thin pool. The command has the following syntax:

```
snapshot vg/lv --name snapshot_name --when [post-install|pre-install]
```

Available options are:

- **--name=** - provide a name for the snapshot.
- **--when=** - controls when the snapshot will be created. Use **pre-install** to create the snapshot before the installation begins, but after commands in the **%pre** part of the Kickstart are executed, or use **post-install** to create the snapshot after the installation and after commands in the **%post** part of the Kickstart are executed.
- Three new options are now available for the **autopart** command:
 - **--nohome** - do not create a separate **/home** partition or volume if one would be created under partitioning rules
 - **--noboot** - do not create a separate **/boot** partition or volume
 - **--noswap** - do not create any swap space

2.3.1.4. Changes in Anaconda Boot Options

- The **inst.waitfornet=** boot option is now available. Use it to force the installer to wait for network connectivity before starting the installer interface for a specified number of seconds - for example, **inst.waitfornet=30** to wait 30 seconds.
- A new option named **inst.ksstrict** is available. You can use it during a Kickstart-based installation to treat Kickstart warnings and error, meaning they will be printed on the output and the installation will terminate. Without specifying this option, warnings are printed to the log and the installation proceeds.

2.3.1.5. Other Anaconda Changes

- Driver Update Disks can now be loaded from local disk devices.
- **Installclass** can now modify rules for storage checks and their constraints.

2.3.2. ARM Support in Fedora Media Writer

Fedora Media Writer has gained the ability to write ARM images to SD cards and other portable media. Users, including those on Windows and macOS as well as on Fedora, will now be able to write Fedora images easily for Raspberry Pi 2 and above and for other supported ARM devices. Please note that this applies only for ARM devices where there are no changes/tweaks that need to be done to the Fedora image.

More information about this latest release of Fedora Media Writer can be found in the [FMW 4.1.0 Release Notes](#)¹⁴.

2.3.3. DNF Rebased to 2.0

DNF, Fedora's package manager, has been rebased to version 2.0, which brings many bugfixes and improvements over **DNF 1.x**, as well as changes required to fix incompatibilities with **Yum**, the predecessor of DNF. This required the introduction of certain incompatibilities between DNF 2.0 and DNF 1.x. See [Changes in DNF-2 compared to DNF-1](#)¹⁵ for details.

DNF 2.0 provides usability improvements, including better messages during resolution errors, showing whether a package was installed as a weak dependency, better handling of obsolete packages, fewer tracebacks, and others.

2.4. Security

2.4.1. System-wide Crypto Policy

The security of network communications is a high priority for the Fedora project, with strong TLS providing the first line of defense against traffic inspection. Two systems negotiating a TLS connection must agree on a common cipher to encrypt their communications, and as ciphers become deprecated, it is important to exclude them.

The ciphers that an administrator might consider adequately secure are determined by vulnerabilities published against specific ciphers. The acceptable cipher suite applies to all communications on the internet, and is not specific to any one system or daemon. To ease administration and increase administrator confidence in the system's security posture, Fedora has been configuring various software to use a system-global configuration so that TLS ciphers need only be updated in one place.

With Fedora 26, two more things will use the system-wide crypto policy, OpenSSH and Java.

OpenSSH Crypto

OpenSSH clients will use system preferred key exchange algorithms, encryption ciphers, and message authentication code (MAC) algorithms. This is enabled by an **Include** directive in **/etc/ssh/ssh_config** to include directives in **/etc/ssh/ssh_config.d/*.conf**, which pulls in **/etc/crypto-policies/back-ends/openssh.config**.

Java Crypto

OpenJDK has been modified to read additional security properties from the generated crypto policies file at **/etc/crypto-policies/back-ends/java.config**

¹⁴ <https://github.com/MartinBriza/MediaWriter/releases/tag/4.1.0>

¹⁵ http://dnf.readthedocs.io/en/latest/dnf-1_vs_dnf-2.html

This change may affect connections to legacy systems that do not support more strict crypto policies. While it is possible to switch the system profile from DEFAULT to LEGACY, or to set **security.useSystemPropertiesFile=false** in a project's `java.security` file (refer to <https://docs.oracle.com/javase/8/docs/technotes/guides/security/PolicyFiles.html>), it would be best to also update legacy applications to modern security standards.

2.4.2. OpenSSL 1.1.0

The introduction of OpenSSL 1.1.0 in Fedora 26 brings many big improvements, new cryptographic algorithms, and API changes that allow for keeping the ABI stable in future upgrades. There is also now a `compat-openssl10` package in Fedora that provides OpenSSL 1.0.2 for dependent applications that cannot move to 1.1.0 yet.

There is more information about OpenSSL 1.1.0 in the [OpenSSL wiki](#)¹⁶.

2.4.3. OpenSC Replaces Coolkey

Fedora 26 is not shipping the Coolkey PKCS#11 module in the NSS database by default. Instead, there will be the OpenSC PKCS#11 module, which supports more different Smart Cards. The Coolkey package will be removed in Fedora 27. If other applications were using Coolkey, they should be able to switch to OpenSC.

In case you still need Coolkey in the NSS DB, you can add it manually using `modutil -dbdir /etc/pki/nssdb -add "CoolKey PKCS #11 Module (manual)" -libfile libcoolkeypk11.so -force` (the different name is used to prevent automatic removals when updating coolkey package).

Soon (during F26 cycle) there will be fully-featured 0.17.0 update to OpenSC with all the tested features and cards that should serve as a complete replacement of Coolkey.

2.4.4. SSSD fast cache for local users

SSSD has shipped with a very fast memory cache in the last couple of Fedora releases. However, using this cache conflicts with `nscd`'s caching and `nscd` has been disabled by default. That degrades performance, because every user or group lookup must open the local files.

From Fedora 26, a new SSSD "files" provider will resolve users from the local files. That way, the "sss" NSS module can be configured before the files module in `nsswitch.conf` and the system can leverage `sss_nss` caching for both local and remote users. As a result, user and group resolution in Fedora will be much faster.

2.4.5. Authconfig cleanup

Obsolete and unmaintainable code was removed from `authconfig`. Notably:

- The graphical interface (`system-config-authentication`) and the interactive text mode, which relied on old and unmaintained libraries (GTK+2 and Glade) have been removed from the distribution.
- The command line tool, which has been deprecated previously, continues to be part of the distribution for legacy reasons. However, some deprecated and obsolete functionality such as support for WINS and HESIOD has been removed in this release.

The removal effort is happening because current modern environments support automatic configuration of remote user identities using `ReaLmd` and SSSD and do not require manual

¹⁶ https://wiki.openssl.org/index.php/OpenSSL_1.1.0_Changes

configuration through an interactive interface such as *system-config-authentication*. Some of the existing `authconfig` command line functionality is being preserved due to it still retaining some usefulness in certain environments, and to support the `auth` command in Kickstart. Removing parts of the code base that are no longer maintainable makes it easier to continue providing this functionality.

2.5. Mail Servers

2.5.1. Cyrus IMAP Server Upgraded to Version 3

In Fedora 26, the **Cyrus IMAP server** (`cyrus-imapd`) has been upgraded to version 3. This version brings significant new functionality, but it also has some new internal database formats. It has also changed the defaults for some important configuration settings. For these reasons it is important that you read and follow *upstream's upgrade documentation*¹⁷ before you initiate an update to Fedora 26.

Important changes to note:

- Cyrus version 3 has changed the defaults for two important configuration options: **unixhierarchysep** and **altnamespace**. You may need to add them with their previously default value of `0` if these are not present in your existing configuration.
- Cyrus version 3 no longer supports the **berkeley** database type. If you have essential databases in that format, it is important that you convert them to a different format before you update your system. However, if you have already updated, don't panic. The default Fedora configuration does use this format, but only for non-essential databases which you will rebuild while following the update documentation linked above.

2.6. X.Org

2.6.1. Retire Synaptics Driver

`xorg-x11-drv-synaptics` has been the main X.Org touchpad driver for over a decade. Since Fedora 22, it has been superseded by `xorg-x11-drv-libinput` which aims to provide a better touchpad experience.

Starting with Fedora 26:

- a fresh installation of Fedora will install `xorg-x11-drv-libinput` instead of `xorg-x11-drv-synaptics`;
- an upgrade from an earlier Fedora will install `xorg-x11-drv-libinput` and remove `xorg-x11-drv-synaptics`;
- users that need the synaptics driver will need to manually install `xorg-x11-drv-synaptics-legacy`, which will install the synaptics driver and give it precedence over the libinput driver;
- removing `xorg-x11-drv-synaptics-legacy` will remove the synaptics driver and the system will automatically revert to the libinput driver.

¹⁷ <https://cyrusimap.org/imap/download/upgrade.html#shut-down-existing-cyrus>

3. Changes in Fedora for Desktop Users

3.1. Desktop

3.1.1. GNOME 3.24: Portland

The GNOME 3 desktop environment has been upgraded to GNOME 3.24. This new version includes a number of major new features and enhancements, as well as many smaller improvements and bug fixes:

- Night Light is a new feature that subtly changes the screen color according to the time of day, which can help to reduce sleeplessness if you use your computer at night.
- Weather information is now included in the notifications area to show a simple summary of the day's weather, and links to the Weather application.
- Recipes is a new application that contains recipes contributed by members of the GNOME community. It has an extensive set of features for adding and editing recipes, creating shopping lists, adjusting quantities and has a hands-free cooking mode.
- Other GNOME applications that have been improved for 3.24 include Web, Photos, Polari, Games, Calendar and the Calculator.

More detailed information about GNOME 3.24 can be found in the [release notes](#)¹⁸.

3.1.2. New Spin: LXQt Desktop

Fedora LXQt provides a lightweight, well-integrated LXQt desktop environment. In addition to LXQt itself, it provides a small, well selected collection of applications, such as the **QupZilla** browser, which combines the rendering engine from **Chromium** with a nice Qt experience. As all applications use the same Qt5 toolkit and the Breeze theme known from KDE, the desktop provides a unified and well-integrated style and theming. In addition, *breeze-gtk* is provided to allow the user to integrate GTK applications too.

The LXQt Desktop spin is available for download from <http://spins.fedoraproject.org/>.

To contact other LXQt users and maintainers of the LXQt spin, connect to the **#fedora-lxqt** IRC channel on irc.freenode.net or send an email to the LXQt List at users@lists.fedoraproject.org¹⁹.

3.1.3. Fontconfig Cache Moved to /usr

Prior to this update, the *fontconfig* cache files were placed in the `/var/cache/fontconfig` directory. This location was incompatible with the OSTree model used by Fedora Atomic, which prevented using the same package for Atomic and other Fedora variants. To fix this incompatibility, the cache files have been moved to `/usr/lib/fontconfig/cache`.

3.2. Networking

¹⁸ <https://help.gnome.org/misc/release-notes/3.24/>

¹⁹ <https://admin.fedoraproject.org/mailman/listinfo/users>

3.2.1. OpenVPN Rebased to Version 2.4.3

OpenVPN has been rebased to version 2.4.3. This update adds many improvements, notably improved elliptic curve cryptography support (ECDH), support for AES-GCM, and additional encryption layer of the control channel (the `--tls-crypt` option), and a type of cipher negotiation which allows for gradually upgrading client ciphers to stronger ones without significant added complexity. Additionally, there is now a seamless client IP and port available, allowing clients to change their IP address or port without having to fully renegotiate an established tunnel.

For a full list of changes in this version, see the [upstream changelog on GitHub](#)²⁰.

Overall integration with **systemd** has also improved, and systemd can now better manage OpenVPN processes. This update ships with brand new systemd unit files, which add additional security hardening. These new unit files are preferred over the old `openvpn@.service` file. The same unit files are used in other Linux distributions which use systemd, ensuring a more consistent behavior and usage between different systemd-based systems. See installed documentation in `/usr/share/doc/openvpn/README.systemd` for more information about this topic.

Additional Notes

In other changes, Certificate Revocation List (CRL) checking is now done by **SSL** libraries directly. These libraries have a far more strict acceptance policy than the approach previously used in OpenVPN. For example, if your CRL file has expired, this will have an impact on every user, regardless of whether their certificates are revoked or not.

Additionally, OpenVPN in Fedora 26 currently use the `compat-openssl10` and `compat-openssl10-pkcs11-helper` compatibility packages, which are considered to be a workaround until more thorough testing can be done on OpenSSL 1.1, which has only been introduced in OpenVPN recently. In a later update, the OpenVPN package is expected to be upgraded to make use of the newer `openssl-1.1` library.

3.3. Internationalization

3.3.1. libpinyin 2.0

libpinyin 2.0 helps Chinese Pinyin users to increase their input speed by needing fewer key presses. ibus-libpinyin with libpinyin 2.0 provides 1-3 sentence candidates and improves the dictionary. Also the libpinyin license has changed to GPLv3+.

4. Changes in Fedora for Developers

4.1. Development Tools

4.1.1. pkgconf as System pkg-config Implementation

In Fedora 26, the pkg-config implementation has been switched to pkgconf. This is a newer, actively-maintained implementation of pkg-config that offers more advanced support for .pc files and provides a library interface for developers to integrate pkg-config processing into their applications.

More information about pkgconf can be found at [pkgconf.org](#)²¹.

²⁰ <https://github.com/OpenVPN/openvpn/blob/v2.4.3/Changes.rst>

²¹ <http://pkgconf.org/>

4.1.2. Enable systemd-coredump by Default

By default, core dumps from crashing programs are now stored by `systemd-coredump`, rather than created in the crashing process's current working directory by `ABRT`. They may be extracted using the `coredumpctl` tool. For example, simply run `'coredumpctl gdb'` to view a backtrace for the most recent crash in `gdb`. For more information on this change, refer to the manpages `coredumpctl(1)`, `systemd-coredump(8)`, and `coredump.conf(5)`.

4.2. C

4.2.1. GNU Compiler Collection (GCC) Rebased to 7.1

The **GNU Compiler Collection (GCC)** has been rebased to version 7.1, a major new release that provides a number of new features as well as many improvements and bugfixes. In addition to offering the new GCC to developers, Fedora packages have been recompiled using the new version. See [Changes, New Features, and Fixes in the GCC 7 Release Series](#)²².

Developers should see [Porting to GCC 7](#)²³ for detailed information on how to update their codebases to work with the new compilers.

4.2.2. The GNU C Library Version 2.25

The GNU C Library in Fedora 26 has been rebased to version 2.25, which brings many improvements and bug fixes over the previous version. Notable changes include:

- Additional support for floating-point extensions for C (TS 18661-1:2014) including new functions like `strfromd`, `strfromf`, and `strfroml`.
- The function `explicit_bzero`, from OpenBSD, has been added to `libc`. It is intended to be used instead of `memset()` to erase sensitive data after use.
- The `getentropy` and `getrandom` functions, and the `<sys/random.h>` header file, have been added.
- GDB pretty printers have been added for `mutex` and `condition` variable structures in POSIX Threads.
- Tunables feature added to allow tweaking of the runtime for an application program.
- New improved algorithms for condition variables and read-write locks for POSIX Threads.
- Security fixes for [CVE-2016-6323](#)²⁴, and [CVE-2015-5180](#)²⁵.

Detailed release are available as part of the [upstream release notice](#)²⁶.

4.3. Containers

²² <http://gcc.gnu.org/gcc-7/changes.html>

²³ https://gcc.gnu.org/gcc-7/porting_to.html

²⁴ <https://nvd.nist.gov/vuln/detail/CVE-2016-6323>

²⁵ <https://nvd.nist.gov/vuln/detail/CVE-2015-5180>

²⁶ <https://sourceware.org/ml/libc-alpha/2017-02/msg00079.html>

4.3.1. OverlayFS is now default for Docker

The default storage option for Docker is now OverlayFS via the Overlay2 driver, which provides better performance. Overlay2 provides performance advantages in memory sharing compared to devicemapper. Additionally, support for SELinux for the Overlay file systems have been added.

Note

Overlay is not a POSIX-compliant file system and there could be problems with running containers on Overlay. Therefore, you can easily switch back to devicemapper in these cases. For more information about switching storage options, check the documentation for the **atomic storage** commands.

Upgraded systems will not be affected.

4.3.2. Docker SDK for Python, version 2

A new version of Docker SDK for Python, the Python library which communicates with the Docker engine API, has been added to Fedora 26. It provides a new, high-level, user-focused API provided as **docker.DockerClient**. This obsoletes the existing *python-docker-py* package. The functionality is now provided by the *python2-docker* and *python3-docker* packages. The **docker.Client** class has been renamed to **docker.APIClient**. Note that the version 2 of Docker SDK is not backwards compatible with the versions earlier than 1.10.6 of the library.

4.4. Boost

4.4.1. Boost 1.63

Boost has been upgraded to version 1.63. Apart from a number of bugfixes and improvements to existing libraries, this brings six new libraries compared to Fedora 25: Boost.Compute, Boost.DLL, Boost.Hana, Boost.Metaparse, Boost.Fiber and Boost.QVM.

For more information, see the [Boost 1.63 Release Notes](#)²⁷.

4.5. D

4.5.1. LLVM-based D Compiler (LDC) v1.1.0

The LDC D compiler has been updated to version 1.1.0. More information about this release is contained in the [LDC 1.1.0 release note](#)²⁸.

²⁷ http://www.boost.org/users/history/version_1_63_0.html

²⁸ <https://github.com/ldc-developers/ldc/releases/tag/v1.1.0>

4.6. Go

4.6.1. Golang 1.8

The latest Go release, version 1.8, brings changes to the implementation of the toolchain, runtime, and libraries. There are also two minor changes to the language specification. This release maintains the Go v1 promise of compatibility and so the Go Project expects almost all Go programs to continue to compile and run as before.

More detail can be found in the [Go 1.8 Release Notes](#)²⁹.

4.6.2. Golang Buildmode PIE

Fedora 26 changes the default build mode for golang in Fedora packaging macros to `buildmode=pie`, which results in the production of Position Independent Executables. Also, the Fedora hardened linker flags are passed to the external linker, reducing the vulnerability of the generated binaries.

4.7. Haskell

4.7.1. Glasgow Haskell Compiler v8.0

The Glasgow Haskell Compiler (GHC) has been upgraded from version 7.10 to version 8.0.2, all Haskell packages in Fedora have been rebuilt and many have been updated. This GHC release brings much improved support for aarch64, ppc64, and ppc64le as well as many new features, fixes, and improvements.

More information about the new features in GHC version 8 can be found in the release notes for versions [8.0.1](#)³⁰ and [8.0.2](#)³¹.

4.8. Python

4.8.1. Python 3.6

Python 3.6 will be the default Python 3 stack in Fedora 26. This is an upgrade from 3.5 which was included in Fedora 25. 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 3.5 is forward compatible with Python 3.6 for the most part.

Notable new features include:

- Formatted string literals (f-strings): **`f"This will be evaluated to foo's value: {foo}"`**
- The order of elements in **`**kwargs`**: **keyword** arguments now preserve their order
- The new **`secrets`** module provides handy helpers for secure token generation in various formats
- Underscores in numeric literals let you break up magic constants to make them easier to read:
`1_000_000`

²⁹ <https://tip.golang.org/doc/go1.8>

³⁰ https://downloads.haskell.org/~ghc/8.0.2/docs/html/users_guide/8.0.1-notes.html

³¹ https://downloads.haskell.org/~ghc/8.0.2/docs/html/users_guide/8.0.2-notes.html

- File system path protocol: Many more standard library APIs, including the builtin `open()`, now support `pathlib.Path` and `pathlib.PurePath` objects
- A range of performance improvements.

For more detailed information see the [Fedora Magazine announcement article](#)³² or the [upstream release notes](#)³³. Note the [Porting to Python 3.6](#)³⁴ section, which lists important information for developers who need to port their Python 3.5 applications.

4.8.2. Python Classroom Lab

Fedora 26 brings in a new Python Classroom Lab. A variant of Fedora targeted at teachers and students of the Python programming language. A ready to use environment with Python, PyPy 3, virtualenv, tox, git, Jupyter Notebook and more. It's ready in three variants: as a GNOME powered desktop or headless for Vagrant and Docker.

Find out more about the Python Classroom Lab on the [Fedora Labs](#)³⁵ website.

4.8.3. Python 3 C.UTF-8 locale

An ongoing challenge within the Python 3 series has been determining a sensible default strategy for handling the “7-bit ASCII” text encoding assumption currently implied by the use of the default C locale.

Starting with Fedora 26, the Fedora system Python includes a backport of Python 3.7's upcoming [locale coercion](#)³⁶ feature, which means the Python 3 stack will automatically coerce the C locale to C.UTF-8 by setting the `LC_CTYPE` environment variable (if neither it nor `LC_ALL` are already set) before configuring the process locale. Automatically setting `LC_CTYPE` this way means that both the core interpreter and locale-aware C extensions (such as `readline`) will assume the use of UTF-8 as the default text encoding, rather than ASCII.

Full details of this new Python feature are contained in [PEP 538 -- Coercing the legacy C locale to a UTF-8 based local](#)³⁷.

4.9. Ruby

4.9.1. Ruby 2.4

Ruby 2.4 is the latest stable version of Ruby. Many new features and improvements are included, for example:

- hash table improvements
- unify Fixnum and Bignum into Integer
- String supports Unicode case mappings
- performance and debugging improvements

³² <https://fedoramagazine.org/python-3-6-0-fedora-26/>

³³ <https://docs.python.org/3.6/whatsnew/3.6.html>

³⁴ <https://docs.python.org/3.6/whatsnew/3.6.html#porting-to-python-3-6>

³⁵ <https://labs.fedoraproject.org/en/python-classroom/>

³⁶ <https://docs.python.org/dev/whatsnew/3.7.html#pep-538-legacy-c-locale-coercion>

³⁷ <https://www.python.org/dev/peps/pep-0538/>

Ruby 2.4 includes updates to soname and so Ruby packages that use binary extensions should be rebuilt. Nevertheless, since the Ruby community paid great attention to source compatibility, no changes to your code are needed.

More information about Ruby 2.4 can be found in the Ruby community's [Ruby 2.4.0 Release Notes](#)³⁸.

4.10. Web Development

4.10.1. PHP 7.1

The popular web development language PHP has been upgraded from 7.0 to 7.1 for Fedora 26. Packages providing extensions to PHP have been rebuilt to use the new release; developers using extensions from non-packaged sources should update them. While most common PHP applications should be able to use the new release without issue, impacted developers should review the links below for information provided by upstream PHP about the upgrade.

<http://php.net/manual/en/migration71.php>

<https://raw.githubusercontent.com/php/php-src/PHP-7.1/UPGRADING>

<https://raw.githubusercontent.com/php/php-src/PHP-7.1/UPGRADING.INTERNAL>

4.10.2. Zend Framework 3.0

Fedora 26 offers the latest version 3 of the popular PHP framework, Zend. Zend 3 offers increased performance, support for PHP 7, improved [project documentation](#)³⁹, and more. For detailed information, refer to the upstream release announcement at <https://framework.zend.com/blog/2016-06-28-zend-framework-3.html> or their [migration guides](#)⁴⁰.

A. Revision History

Revision Tue Jul 11 2017
26.01-2

Fedora Docs Project
[docs AT lists.fedoraproject.org](mailto:docs@lists.fedoraproject.org)

³⁸ <https://www.ruby-lang.org/en/news/2016/12/25/ruby-2-4-0-released/>

³⁹ <https://docs.zendframework.com/>

⁴⁰ <https://docs.zendframework.com/tutorials/migration/to-v3/overview/>

