



Red Hat Enterprise Linux 9.0 Beta

Considerations in adopting RHEL 9

Key differences between RHEL 8 and RHEL 9

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Abstract

This document provides an overview of changes in RHEL 9 since RHEL 8 to help you evaluate an upgrade to RHEL 9.

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RHEL BETA RELEASE

Red Hat provides Red Hat Enterprise Linux Beta access to all subscribed Red Hat accounts. The purpose of Beta access is to:

- Provide an opportunity to customers to test major features and capabilities prior to the general availability release and provide feedback or report issues.
- Provide Beta product documentation as a preview. Beta product documentation is under development and is subject to substantial change.

Note that Red Hat does not support the usage of RHEL Beta releases in production use cases. For more information, see [What does Beta mean in Red Hat Enterprise Linux and can I upgrade a RHEL Beta installation to a General Availability \(GA\) release?](#).

MAKING OPEN SOURCE MORE INCLUSIVE

Red Hat is committed to replacing problematic language in our code, documentation, and web properties. We are beginning with these four terms: master, slave, blacklist, and whitelist. Because of the enormity of this endeavor, these changes will be implemented gradually over several upcoming releases. For more details, see [our CTO Chris Wright's message](#).

PROVIDING FEEDBACK ON RED HAT DOCUMENTATION

We appreciate your input on our documentation. Please let us know how we could make it better. To do so:

- For simple comments on specific passages:
 1. Make sure you are viewing the documentation in the *Multi-page HTML* format. In addition, ensure you see the **Feedback** button in the upper right corner of the document.
 2. Use your mouse cursor to highlight the part of text that you want to comment on.
 3. Click the **Add Feedback** pop-up that appears below the highlighted text.
 4. Follow the displayed instructions.
- For submitting more complex feedback, create a Bugzilla ticket:
 1. Go to the [Bugzilla](#) website.
 2. As the Component, use **Documentation**.
 3. Fill in the **Description** field with your suggestion for improvement. Include a link to the relevant part(s) of documentation.
 4. Click **Submit Bug**.

CHAPTER 1. PREFACE

This document provides an overview of differences between two major versions of Red Hat Enterprise Linux: RHEL 8 and RHEL 9. It provides a list of changes relevant for evaluating an upgrade to RHEL 9 rather than an exhaustive list of all alterations.

For details regarding RHEL 9 usage, see the [RHEL 9 product documentation](#).

For information about major differences between RHEL 7 and RHEL 8, see [Considerations in adopting RHEL 8](#).

CHAPTER 2. ARCHITECTURES

Red Hat Enterprise Linux 9.0 Beta is distributed with the kernel version 5.14, which provides support for the following architectures:

- AMD and Intel 64-bit architectures (x86-64-v2)
- The 64-bit ARM architecture (ARMv8.0-A)
- IBM Power Systems, Little Endian (POWER9)
- 64-bit IBM Z (z14)

Make sure you purchase the appropriate subscription for each architecture.

Additional resources

- [Get Started with Red Hat Enterprise Linux - additional architectures](#)

CHAPTER 3. REPOSITORIES

Red Hat Enterprise Linux 9 is distributed through two main repositories:

- BaseOS
- AppStream

Both repositories are required for a basic RHEL installation, and are available with all RHEL subscriptions.

Content in the BaseOS repository is intended to provide the core set of the underlying OS functionality that provides the foundation for all installations. This content is available in the RPM format and is subject to support terms similar to those in previous releases of RHEL.

Content in the AppStream repository includes additional user-space applications, runtime languages, and databases in support of the varied workloads and use cases.

In addition, the CodeReady Linux Builder repository is available with all RHEL subscriptions. It provides additional packages for use by developers. Packages included in the CodeReady Linux Builder repository are unsupported.

CHAPTER 4. APPLICATION STREAMS

Multiple versions of user-space components are delivered as Application Streams and updated more frequently than the core operating system packages. This provides greater flexibility to customize RHEL without impacting the underlying stability of the platform or specific deployments.

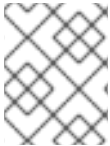
Application Streams are available in the familiar RPM format, as an extension to the RPM format called modules, as Software Collections, or as Flatpaks.

Each Application Stream component has a given life cycle, either the same as RHEL 9 or shorter.

RHEL 9 improves the Application Streams experience by providing initial Application Stream versions that can be installed as RPM packages using the traditional **yum install** command.

Some additional Application Stream versions will be distributed as modules with a shorter life cycle in future minor RHEL 9 releases.

Content that needs rapid updating, such as alternate compilers and container tools, is available in rolling streams that will not provide alternative versions in parallel. Rolling streams can be packaged as RPMs or modules.



NOTE

Application Streams versions and formats distributed in RHEL 9.0 Beta might differ from versions and formats provided at the time of general availability of RHEL 9.0.

Additional resources

- [Managing software with YUM](#)

CHAPTER 5. INSTALLER AND IMAGE CREATION

This chapter lists the most notable changes to installer and image creation between RHEL 8 and RHEL 9.

5.1. INSTALLER

Anaconda activates network automatically for interactive installations

Anaconda now activates the network automatically when performing interactive installation, without requiring users to manually activate it in the network spoke. This update does not change the installation experience for kickstart installations and installations using the **ip=** boot option.

New options to Lock root account and enable password-based SSH root login

RHEL 9 adds following new options to the root password configuration screen:

- **Lock root account:** To lock the root access to the machine
- **Allow root SSH login with password:** To enable password-based SSH root logins.

During the kickstart installation method, enable the password-based SSH root logins by adding the following line to the kickstart file.

```
%post
echo "PermitRootLogin yes" > /etc/ssh/sshd_config.d/01-permitrootlogin.conf
%end
```

Licensing, system, and user setting configuration screens have been disabled post standard installation

Previously, RHEL users configured Licensing, System (Subscription manager), and User Settings prior to **gnome-initial-setup** and **login** screens. Starting with RHEL 9, the initial setup screens have been disabled by default to improve user experience. If you must run the initial setup for user creation or license display, install the following packages based on the requirements.

1. To install initial setup packages: **# yum install initial-setup initial-setup-gui**
2. To enable initial setup while next reboot of the system. **# systemctl enable initial-setup**
3. Reboot the system to view initial setup.

For kickstart installations, add **initial-setup-gui** to the packages section and enable the **initial-setup** service.

```
firstboot --enable
%packages
@^graphical-server-environment
initial-setup-gui
%end
```

The **rhsm** command for machine provisioning via Kickstart installations for satellite is now available

The **rhsm** command replaces the **%post** scripts for machine provisioning on RHEL 9. The **rhsm** command helps with all provisioning tasks such as registering the system, attaching RHEL subscriptions,

and installing from a satellite instance. For more information, see the [Registering and installing RHEL from Satellite using Kickstart](#) section under the Performing an advanced RHEL installation guide.

Merged system purpose commands under the **subscription-manager syspurpose** command

Previously, there were two different commands to set system purpose attributes; **syspurpose** and **subscriptions-manager**. To unify all the system purpose attributes under one module, all the 'addons', 'role', 'service-level', and 'usage' commands from subscription-manager have been moved to the new submodule, **subscription-manager syspurpose**.

Existing **subscription-manager** commands outside the new submodule are deprecated. The separate package (**python3-syspurpose**) that provides the **syspurpose** command line tool has been removed in RHEL 9.

This update provides a consistent way to view, set, and update all system purpose attributes using a single command of subscription-manager. This command replaces all the existing system purpose commands with their equivalent versions available as a new subcommand. For example, **subscription-manager role --set SystemRole** becomes **subscription-manager syspurpose role --set SystemRole** and so on.

For complete information about the new commands, options, and other attributes, see the **SYSPURPOSE OPTIONS** section in the **subscription-manager** man page.

New kickstart command - **timesource**

The new **timesource** kickstart command is optional and it helps to set NTP, NTS servers, and NTP pools that provide time data. It also helps to control enabling or disabling the NTP services on the system. The **--ntpservers** option from the timezone command has been deprecated and has been replaced with this new command.

Support for Anaconda boot arguments without **inst.** prefix is no longer available

Anaconda boot arguments without the **inst.** prefix have been deprecated since RHEL 7. Support for these boot arguments has been removed in RHEL 9. To continue using these options, use the **inst.** prefix

For example, to force the installation program to run in the **text** mode instead of the **graphical** mode, use the following option:

```
inst.text
```

Deprecated Kickstart commands and options

The following Kickstart commands and options have been deprecated on RHEL9.

- **timezone --ntpservers** - use the **timesource** command instead
- **timezone --nntp**
- **logging --level**
- **%packages --excludeWeakdeps** - use **--exclude-weakdeps** instead
- **%packages --instLangs** - use **--inst-langs** instead
- **%anaconda**
- **pwpolicy** - use the Anaconda configuration files instead

Where only specific options are listed, the base command and its other options are still available and not deprecated. Using the deprecated commands in Kickstart files prints a warning in the logs. You can turn the deprecated command warnings into errors with the **inst.ksstrict** boot option.

Removed Kickstart commands and options

The following Kickstart commands and options have been removed on RHEL 9. Using them in Kickstart files will cause an error.

- **device**
- **deviceprobe**
- **dmraid**
- **install** - use the subcommands or methods directly as commands
- **multipath**
- **bootloader --upgrade**
- **ignoredisk --interactive**
- **partition --active**
- **harddrive --biospart**
- **autostep**

Where only specific options and values are listed, the base command and its other options are still available and not removed.

Removed Boot Options

The following boot options have been removed from Red Hat Enterprise Linux.

- **inst.zram**
The **zram.service** is not supported on RHEL 9. See `zram-generator` for more information.
- **inst.singlelang**
The single language mode is not supported on RHEL 9.
- **inst.loglevel**
The log level is always set to debug.

5.2. IMAGE CREATION

Image Builder now supports multiversion image creation

As of Red Hat Enterprise Linux 9.0 Beta, Image Builder supports creating images of multiple RHEL major and minor releases, such as RHEL 8.3, 8.4, and 8.5.

Image Builder now supports file system configuration

As of Red Hat Enterprise Linux 9.0 Beta, Image Builder provide support for users to specify a custom filesystem configuration in blueprints to create images with a specific disk layout, instead of using the default layout configuration.

Image builder can create bootable ISO Installer images

You can use Image Builder to create bootable ISO Installer images. These images consist of a tarball that contains a root file system which you can use to install directly to a bare metal server.

CHAPTER 6. SOFTWARE MANAGEMENT

This chapter lists the most notable changes to software management between RHEL 8 and RHEL 9.

6.1. NOTABLE CHANGES TO SOFTWARE MANAGEMENT

Package management with YUM/DNF

Throughout this document, **YUM** and **DNF** can be used interchangeably.

In Red Hat Enterprise Linux 9, software installation is ensured by **DNF**. Red Hat continues to support the usage of the **yum** term for consistency with previous major versions of RHEL. If you type **dnf** instead of **yum**, the command works as expected because both are aliases for compatibility.

Although RHEL 8 and RHEL 9 are based on **DNF**, they are compatible with **YUM** used in RHEL 7.

For more information, see [Managing software with YUM](#).

Notable RPM features and changes

Red Hat Enterprise Linux 9 is distributed with RPM version 4.16. This version introduces many enhancements over its previous versions.

Notable features include:

- New SPEC features, most notably:
 - Fast macro-based dependency generators

It is now possible to define dependency generators as regular RPM macros. This is especially useful in combination with the embedded Lua interpreter (`%{lua:...}`) because it enables writing sophisticated yet fast generators and avoiding redundant forking and executing a shell script.

Example:

```
%__foo_provides()  %{basename:%{1}}
```

- The **%generate_buildrequires** section that enables generating dynamic build dependencies

Additional build dependencies can now be generated programmatically at RPM build time, using the newly available **%generate_buildrequires** section. This is useful when packaging software written in a language in which a specialized utility is commonly used to determine run-time or build-time dependencies, such as Rust, Golang, Node.js, Ruby, Python or Haskell.
- Meta (unordered) dependencies

A new dependency qualifier called **meta** enables expressing dependencies that are not specifically install-time or run-time dependencies. This is useful for avoiding unnecessary dependency loops that could otherwise arise from the normal dependency ordering, such as when specifying the dependencies of a meta package.

Example:

```
Requires(meta): <pkgname>
```

- Native version comparison in expressions
It is now possible to compare arbitrary version strings in expressions by using the newly supported **v"..."** format.

Example:

```
%if v"%{python_version}" < v"3.9"
```

- Caret version operator, opposite of tilde
The new caret (^) operator can be used to express a version that is higher than the base version. It is a complement to the existing tilde (~) operator which has the opposite semantics.
- **%elif**, **%elifos** and **%elifarch** statements
- Optional automatic patch and source numbering
Patch: and **Source:** tags without a number are now automatically numbered based on the order in which they are listed.
- **%autopatch** now accepts patch ranges
The **%autopatch** macro now accepts the **-m** and **-M** parameters to limit the minimum and maximum patch number to apply, respectively.
- **%patchlist** and **%sourcelist** sections
It is now possible to list patch and source files without preceding each item with the respective **Patch:** and **Source:** tags by using the newly added **%patchlist** and **%sourcelist** sections.
- The rpm database is now based on the **sqlite** library. Read-only support for **BerkeleyDB** databases has been retained for migration and query purposes.
- A new **rpm-plugin-audit** plug-in for issuing audit log events on transactions, previously built into RPM itself
- Increased parallelism in package builds
There have been numerous improvements to the way the package build process is parallelized. These improvements involve various buildroot policy scripts and sanity checks, file classification, and subpackage creation and ordering. As a result, package builds on multiprocessor systems, particularly for large packages, should now be faster and more efficient.
- Enforced UTF-8 validation of header data at build-time

CHAPTER 7. INFRASTRUCTURE SERVICES

This chapter lists the most notable changes to infrastructure services between RHEL 8 and RHEL 9.

7.1. NOTABLE CHANGES TO INFRASTRUCTURE SERVICES

Support for **Berkeley DB** dynamic back end has been removed

With this release, the **Berkeley DB (libdb)** dynamic back end is no longer supported. The **named-sdb** build is no longer provided. You can use the **DLZ loadable plugins** for each back end, for example, **sqlite3** or **mysql**. Those plugins are not built or shipped and have to be built from the source.

CHAPTER 8. SECURITY

This chapter lists the most notable changes to security between RHEL 8 and RHEL 9.

8.1. SECURITY COMPLIANCE

scap-security-guide does not provide RHEL 9 STIG and CIS profiles

In RHEL 9.0 Beta, the **scap-security-guide** packages do not contain RHEL 9 versions of the following security profiles:

- STIG
- CIS

8.2. CRYPTO-POLICIES, RHEL CORE CRYPTOGRAPHIC COMPONENTS, AND PROTOCOLS

Algorithms disabled in all policy levels

The following algorithms are disabled in the **LEGACY**, **DEFAULT** and **FUTURE** crypto policies provided with RHEL 9:

- TLS older than version 1.2 (since RHEL 9, was < 1.0 in RHEL 8)
- DTLS older than version 1.2 (since RHEL 9, was < 1.0 in RHEL 8)
- DH with parameters < 2048 bits (since RHEL 9, was < 1024 bits in RHEL 8)
- RSA with key size < 2048 bits (since RHEL 9, was < 1024 bits in RHEL 8)
- DSA (since RHEL 9, was < 1024 bits in RHEL 8)
- 3DES (since RHEL 9)
- RC4 (since RHEL 9)
- FFDHE-1024 (since RHEL 9)
- DHE-DSS (since RHEL 9)
- Camellia (since RHEL 9)
- ARIA
- SEED
- IDEA
- Integrity-only cipher suites
- TLS CBC mode cipher suites using SHA-384 HMAC
- AES-CCM8
- All ECC curves incompatible with TLS 1.3, including secp256k1

- IKEv1 (since RHEL 8)

CAUTION

If your scenario requires a policy that has been disabled, you can enable it by applying a custom cryptographic policy or by an explicit configuration of individual applications, but the resulting configuration will not be supported.

Changes to SHA-1

In RHEL 9, SHA-1 usage is restricted in the **DEFAULT** system-wide cryptographic policy. With the exception of HMAC and DNSSEC usage, SHA-1 is no longer allowed in TLS, DTLS, SSH, IKEv2 and Kerberos protocols. Individual applications not controlled by crypto policies are also moving away from using SHA-1 hashes in RHEL 9.

Changes to TLS

In RHEL 9, TLS configuration is performed using the system-wide cryptographic policies mechanism. TLS versions below 1.2 are not supported anymore. **DEFAULT**, **FUTURE** and **LEGACY** cryptographic policies allow only TLS 1.2 and 1.3. See [Using system-wide cryptographic policies](#) for more information.

The default settings provided by libraries included in RHEL 9 are secure enough for most deployments. The TLS implementations use secure algorithms where possible while not preventing connections from or to legacy clients or servers. Apply hardened settings in environments with strict security requirements where legacy clients or servers that do not support secure algorithms or protocols are not expected or allowed to connect.

OpenSSH root password login disabled by default

The default configuration of OpenSSH in RHEL 9 disallows users to log in as **root** with a password to prevent attackers from gaining access through brute-force attacks on passwords.

GnuTLS no longer supports TPM 1.2

The GnuTLS library no longer supports the Trusted Platform Module (TPM) 1.2 technology. Your applications using TPM through the GnuTLS API must support TPM 2.0.

GnuTLS support for GOST has been removed

In RHEL 8, the GOST ciphers have been disabled through the system-wide cryptographic policies. In RHEL 9, support for these ciphers has been removed from the GnuTLS library.

cyrus-sasl now uses GDBM instead of Berkeley DB

The **cyrus-sasl** package is now built without the **libdb** dependency, and the **sasldb** plugin uses the GDBM database format instead of Berkeley DB. To migrate your existing Simple Authentication and Security Layer (SASL) databases stored in the old Berkeley DB format, use the **cyrusbdb2current** tool with the following syntax:

```
cyrusbdb2current <sasldb_path> <new_path>
```

NSS no longer support DBM and pk12util defaults changed

The Network Security Services (NSS) libraries no longer support the DBM file format for the trust database. In RHEL 8, the SQLite file format became the default format, and the existing DBM databases were opened on read-only mode and automatically converted to SQLite. Before you upgrade

to RHEL 9, update all trust databases from DBM to SQLite.

Additionally, the **pk12util** tool now uses the AES and SHA-256 algorithms instead of DES-3 and SHA-1 by default when exporting private keys.

Note that SHA-1 is disabled by the default system-wide cryptographic policy for all signatures in RHEL 9.

8.3. SELINUX

Support for disabling SELinux through `/etc/selinux/config` has been removed

With this release, support for disabling SELinux through the **SELINUX=disabled** option in the `/etc/selinux/config` file has been removed from the kernel. When you disable SELinux only through `/etc/selinux/config`, the system starts with SELinux enabled but with no policy loaded.

Furthermore, the Anaconda installation program and the corresponding man pages have been updated to reflect this change. This change also enables read-only-after-initialization protection for the Linux Security Module (LSM) hooks.

If your scenario requires disabling SELinux, add the **selinux=0** parameter to your kernel command line.

CHAPTER 9. NETWORKING

This chapter lists the most notable changes to networking between RHEL 8 and RHEL 9.

9.1. KERNEL

WireGuard VPN is available as a Technology Preview

WireGuard, which Red Hat provides as an unsupported Technology Preview, is a high-performance VPN solution that runs in the Linux kernel. It uses modern cryptography and is easier to configure than other VPN solutions. Additionally, the small code-basis of WireGuard reduces the surface for attacks and, therefore, improves the security.

For further details, see [Setting up a WireGuard VPN](#).

9.2. NETWORK TYPES

Network teams are deprecated

The **teamd** service and the **libteam** library are deprecated in Red Hat Enterprise Linux 9 and will be removed in the next major release. As a replacement, configure a bond instead of a network team.

For details about how to migrate a team to a bond, see [Migrating a network team configuration to network bond](#).

9.3. NETWORKMANAGER

NetworkManager stores new network configurations in a key file format

Previously, NetworkManager stored new network configurations to `/etc/sysconfig/network-scripts/` in the **ifcfg** format. Starting with RHEL 9.0, RHEL stores new network configurations at `/etc/NetworkManager/system-connections/` in a key file format. The connections for which the configurations are stored to `/etc/sysconfig/network-scripts/` in the old format still work uninterrupted. Modifications in existing profiles continue updating the older files.

9.4. FIREWALL

The ipset and iptables-nft packages have been deprecated

The **ipset** and **iptables-nft** packages have been deprecated in RHEL. The **iptables-nft** package contains different tools such as **iptables**, **ip6tables**, **ebtables** and **arptables**. These tools will no longer receive new features and using them for new deployments is not recommended. As a replacement, it is recommended to use the **nft** command line tool provided by the **nftables** package. Existing setups should migrate to **nft** when possible.

For more information on migrating to nftables, see [Migrating from iptables to nftables](#) and **iptables-translate(8)/ip6tables-translate(8)** man pages.

9.5. REMOVED FUNCTIONALITY

RHEL 9 does not contain the legacy network scripts

RHEL 9 does not contain the **network-scripts** package that provided the deprecated legacy network scripts in RHEL 8. To configure network connections in RHEL 9, use NetworkManager. For details, see the [Configuring and managing networking](#) documentation.

CHAPTER 10. KERNEL

This chapter lists the most notable changes to kernel between RHEL 8 and RHEL 9.

10.1. NOTABLE CHANGES TO KDUMP MEMORY ALLOCATION

A new `crashkernel.default` file for `kdump` memory allocation

A new `crashkernel.default` file is now available on the RHEL 9 version of `kdump`.

The `crashkernel.default` file is shipped with kernel and it contains the default crash kernel value for the corresponding kernel build. The default value is used by `kdump` to control the default crash kernel memory value of each kernel. The value forms a good reference for `kdump` memory reservation. Using this value as the base to estimate the required memory, you can configure the desired `crashkernel=` value.

This implementation improves the memory allocation for `kdump` when a system has less than 4 GB available memory.

Note that the `crashkernel=auto` option in the boot command line is no longer supported on RHEL 9 and later releases.

For more information, see the `/usr/share/doc/kexec-tools/crashkernel-howto.txt` file.

10.2. NOTABLE CHANGES TO TPM 1.2 SECURE CRYPTOPROCESSOR SUPPORT ON RHEL 9

The TPM 1.2 secure cryptoprocessor is no longer supported on RHEL 9

The Trusted Platform Module (TPM) secure cryptoprocessor version 1.2 has been removed and is no longer supported on RHEL 9 and later versions. TPM 2.0 replaces TPM 1.2 and provides many improvements over TPM 1.2. TPM 2.0 is not backward compatible.

Note that for applications that require support for TPM 1.2, Red Hat recommends that you use RHEL 8.

10.3. NOTABLE CHANGES TO KERNEL

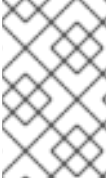
`cgroup-v2` enabled by default in RHEL 9

The control groups version 2 (`cgroup-v2`) feature implements a single hierarchy model that simplifies the management of control groups. Also, it ensures that a process can only be a member of a single control group at a time. Deep integration with `systemd` improves the end-user experience when configuring resource control on a RHEL system.

Development of new features is mostly done for `cgroup-v2`, which has some features that are missing in `cgroup-v1`. Similarly, `cgroup-v1` contains some legacy features that are missing in `cgroup-v2`. Also, the control interfaces are different. Therefore, third party software with direct dependency on `cgroup-v1` may not run properly in the `cgroup-v2` environment.

To use `cgroup-v1`, you need to add the following parameters to the kernel command-line:

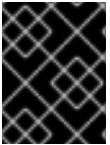
```
systemd.unified_cgroup_hierarchy=0
systemd.legacy_systemd_cgroup_controller
```

**NOTE**

Both **cgroup-v1** and **cgroup-v2** are fully enabled in the kernel. There is no default control group version from the kernel point of view, and is decided by **systemd** to mount at startup.

Kernel changes potentially affecting third party kernel modules

Linux distributions with a kernel version prior to 5.9 supported exporting GPL functions as non-GPL functions. As a result, users could link proprietary functions to GPL kernel functions through the **shim** mechanism. With this release, the RHEL kernel incorporates upstream changes that enhance the ability of RHEL to enforce GPL by rebuffing **shim**.

**IMPORTANT**

Partners and independent software vendors (ISVs) should test their kernel modules with RHEL 9 Alpha to ensure their compliance with GPL.

Core scheduling is supported in RHEL 9

With the core scheduling functionality users can prevent tasks that should not trust each other from sharing the same CPU core. Likewise, users can define groups of tasks that can share a CPU core.

These groups can be specified:

- To improve security by mitigating some cross-Symmetric Multithreading (SMT) attacks
- To isolate tasks that need a whole core. For example for tasks in real-time environments, or for tasks that rely on specific processor features such as Single Instruction, Multiple Data (SIMD) processing

For more information, see [Core Scheduling](#).

CHAPTER 11. HARDWARE ENABLEMENT

This chapter lists the most notable changes to hardware enablement between RHEL 8 and RHEL 9.

11.1. REMOVED HARDWARE SUPPORT

This section lists devices (drivers, adapters) that are no longer being tested or updated on a routine basis in RHEL 9. Red Hat may fix serious bugs, including security bugs, at its discretion. These devices should no longer be used in production, and it is likely they will be disabled in the next major release.

PCI device IDs are in the format of *vendor:device:subvendor:subdevice*. If no device ID is listed, all devices associated with the corresponding driver are unmaintained. To check the PCI IDs of the hardware on your system, run the **lspci -nn** command.

Device ID	Driver	Device name
	bnx2	QLogic BCM5706/5708/5709/5716 Driver
	e1000	Intel® PRO/1000 Network Driver
0x103C:0x3239:0x103C:0x21C4	hpsa	Hewlett-Packard Company: Smart Array Gen9 Controllers: Smart Array
0x103C:0x3239:0x103C:0x21C9	hpsa	Hewlett-Packard Company: Smart Array Gen9 Controllers: Smart Array
0x103C:0x3239:0x103C:0x21CC	hpsa	Hewlett-Packard Company: Smart Array Gen9 Controllers: Smart Array
0x103C:0x3239:0x103C:0x21CD	hpsa	Hewlett-Packard Company: Smart Array Gen9 Controllers: P240nr
0x103C:0x3239:0x103C:0x21CE	hpsa	Hewlett-Packard Company: Smart Array Gen9 Controllers: H240nr
0x103C:0x323a:0x103C:0x3233	hpsa	Hewlett-Packard Company: Smart Array G6 controllers
0x103C:0x323a:0x103C:0x3241	hpsa	Hewlett-Packard Company: Smart Array G6 controllers: Smart Array P212
0x103C:0x323a:0x103C:0x3243	hpsa	Hewlett-Packard Company: Smart Array G6 controllers: Smart Array P410
0x103C:0x323a:0x103C:0x3245	hpsa	Hewlett-Packard Company: Smart Array G6 controllers: Smart Array P410i
0x103C:0x323a:0x103C:0x3247	hpsa	Hewlett-Packard Company: Smart Array G6 controllers: Smart Array P411

Device ID	Driver	Device name
0x103C:0x323a:0x103C:0x3249	hpsa	Hewlett-Packard Company: Smart Array G6 controllers: Smart Array P812
0x103C:0x323a:0x103C:0x324A	hpsa	Hewlett-Packard Company: Smart Array G6 controllers: Smart Array 712m (Mezzanine RAID controller)
0x103C:0x323a:0x103C:0x324B	hpsa	Hewlett-Packard Company: Smart Array G6 controllers: Smart Array P711m (Mezzanine RAID controller)
0x103C:0x323b:0x103C:0x3350	hpsa	Hewlett-Packard Company: Smart Array Gen8 Controllers: P222
0x103C:0x323b:0x103C:0x3351	hpsa	Hewlett-Packard Company: Smart Array Gen8 Controllers: P420
0x103C:0x323b:0x103C:0x3352	hpsa	Hewlett-Packard Company: Smart Array Gen8 Controllers: P421
0x103C:0x323b:0x103C:0x3353	hpsa	Hewlett-Packard Company: Smart Array Gen8 Controllers
0x103C:0x323b:0x103C:0x3354	hpsa	Hewlett-Packard Company: Smart Array Gen8 Controllers: P420i
0x103C:0x323b:0x103C:0x3355	hpsa	Hewlett-Packard Company: Smart Array Gen8 Controllers: P220i
0x103C:0x323b:0x103C:0x3356	hpsa	Hewlett-Packard Company: Smart Array Gen8 Controllers
0x103C:0x333f:0x103c:0x333f	hpsa	HP StorageWorks 1210m Array Controller Array Controller
0x10df:0x0724	lpfc	Emulex Corporation: OneConnect FCoE Initiator (Skyhawk)
0x10df:0xe200	lpfc	Emulex Corporation: LPe15000/LPe16000 Series 8Gb/16Gb Fibre Channel Adapter
0x10df:0xe220	lpfc	Emulex Corporation: OneConnect NIC (Lancer)
0x10df:0xf011	lpfc	Emulex Corporation: Saturn: LightPulse Fibre Channel Host Adapter
0x10df:0xf015	lpfc	Emulex Corporation: Saturn: LightPulse Fibre Channel Host Adapter
0x10df:0xf100	lpfc	Emulex Corporation: LPe12000 Series 8Gb Fibre Channel Adapter

Device ID	Driver	Device name
0x10df:0xfc40	lpfc	Emulex Corporation: Saturn-X: LightPulse Fibre Channel Host Adapter
0x1000:0x0071	megaraid_sas	Broadcom / LSI: MR SAS HBA 2004
0x1000:0x0073	megaraid_sas	Broadcom / LSI: MegaRAID SAS 2008 [Falcon]
0x1000:0x0079	megaraid_sas	Broadcom / LSI: MegaRAID SAS 2108 [Liberator]
0x1000:0x005b	megaraid_sas	Broadcom / LSI: MegaRAID SAS 2208 [Thunderbolt]
0x1000:0x006E	mpt3sas	Broadcom / LSI: SAS2308 PCI-Express Fusion-MPT SAS-2
0x1000:0x0080	mpt3sas	Broadcom / LSI: SAS2208 PCI-Express Fusion-MPT SAS-2
0x1000:0x0081	mpt3sas	Broadcom / LSI: SAS2208 PCI-Express Fusion-MPT SAS-2
0x1000:0x0082	mpt3sas	Broadcom / LSI: SAS2208 PCI-Express Fusion-MPT SAS-2
0x1000:0x0083	mpt3sas	Broadcom / LSI: SAS2208 PCI-Express Fusion-MPT SAS-2
0x1000:0x0084	mpt3sas	Broadcom / LSI: SAS2208 PCI-Express Fusion-MPT SAS-2
0x1000:0x0085	mpt3sas	Broadcom / LSI: SAS2208 PCI-Express Fusion-MPT SAS-2
0x1000:0x0086	mpt3sas	Broadcom / LSI: SAS2308 PCI-Express Fusion-MPT SAS-2
0x1000:0x0087	mpt3sas	Broadcom / LSI: SAS2308 PCI-Express Fusion-MPT SAS-2
	mptbase	Fusion MPT SAS Host driver
	mptsas	Fusion MPT SAS Host driver
	mptscsih	Fusion MPT SCSI Host driver
	mptspi	Fusion MPT SAS Host driver
	myri10ge	Myricom 10G driver (10GbE)

Device ID	Driver	Device name
	netxen_nic	QLogic/NetXen (1/10) GbE Intelligent Ethernet Driver
0x1077:0x2031	qla2xxx	QLogic Corp.: ISP8324-based 16Gb Fibre Channel to PCI Express Adapter
0x1077:0x2532	qla2xxx	QLogic Corp.: ISP2532-based 8Gb Fibre Channel to PCI Express HBA
0x1077:0x8031	qla2xxx	QLogic Corp.: 8300 Series 10GbE Converged Network Adapter (FCoE)
	qla3xxx	QLogic ISP3XXX Network Driver v2.03.00-k5
0x1924:0x0803	sfc	Solarflare Communications: SFC9020 10G Ethernet Controller
0x1924:0x0813	sfc	Solarflare Communications: SFL9021 10GBASE-T Ethernet Controller

CHAPTER 12. FILE SYSTEMS AND STORAGE

This chapter lists the most notable changes to file systems and storage between RHEL 8 and RHEL 9.

12.1. FILE SYSTEMS

The XFS filesystem now supports **bigtime** and **inobtcount** features

The XFS filesystem now supports two new on-disk features, each of which is enabled by default by **mkfs.xfs** in RHEL 9. These two new features are:

- Timestamp support beyond the year 2038 (**bigtime**).
- Inode btree counters (**inobtcount**), to reduce mount time on large filesystems.

As a result of this update, filesystems created with default **mkfs.xfs** parameters will not be mountable on RHEL 8 systems.

To create a new filesystem that will be compatible with the RHEL 8 kernel, disable these new features by adding **-m bigtime=0,inobtcount=0** to the **mkfs.xfs** command line. A filesystem created in this way will not support timestamps beyond the year 2038.

A filesystem created in RHEL 8 which does not support these features may be upgraded using the **xfs_admin** utility on the unmounted block device containing the filesystem. It is recommended to check the filesystem for consistency prior to this operation. The command will also cause an **xfs_repair** to be run on the device after the change.

To enable **bigtime** support:

- **xfs_admin -O bigtime=1 /dev/device**

To enable inode btree counters:

- **xfs_admin -O inobtcount=1 /dev/device**

To enable both at the same time:

- **xfs_admin -O bigtime=1,inobtcount=1 /dev/device**

See the **xfs_admin(8)** man page for details.

The exFAT filesystem is now supported in RHEL 9

The exFAT filesystem is now supported in RHEL 9. This is a filesystem designed for external USB storage and interoperability and data exchange with other operating systems. The filesystem is not intended as a general-purpose, performant, or scalable Linux filesystem. An exFAT filesystem may be created by installing the **exfatprogs** package and using the **mkfs.exfat** utility.

See the **mkfs.exfat(8)** man page for details.

ext4 filesystem now supports timestamps beyond the year 2038

The ext4 filesystem is now supporting timestamps beyond the year 2038. This feature is fully automatic and does not require any user action to leverage it. The only requirement is that the inode size is larger than 128 bytes, which it is by default.

New **nfs-v4-utils** package

New package **nfs-v4-utils**, which contains a minimal set of the demons and tool required to support only NFSv4 has been added. This is a replacement for the standard **nfs-utils** package.

GFS2 file systems are now created with format version 1802

GFS2 file systems in RHEL 9 are created with format version 1802. This enables the following features:

- Extended attributes in the **trusted** namespace ("trusted.* xattrs") are recognized by **gfs2** and **gfs2-utils**.
- The **rgrplvb** option is active by default. This allows **gfs2** to attach updated resource group data to DLM lock requests, so the node acquiring the lock does not need to update the resource group information from disk. This improves performance in some cases.

File systems created with the new format version will not be able to be mounted under earlier RHEL versions and older versions of the **fsck.gfs2** utility will not be able to check them.

Users can create a file system with the older format version by running the **mkfs.gfs2** command with the option **-o format=1801**.

Users can upgrade the format version of an older file system running **tunegfs2 -r 1802 device** on an unmounted file system. Downgrading the format version is not supported.

12.2. STORAGE

VDO Management software has been removed

The python-based VDO Management software is no longer available in RHEL 9. Instead of this software, use the LVM-VDO implementation for managing VDO volumes.

Multiple write policies from VDO has been removed

VDO no longer has multiple write policies. VDO now uses the **async** write policy exclusively. The 'sync' and 'async-unsafe' write policies have been removed.

CHAPTER 13. HIGH AVAILABILITY AND CLUSTERS

This chapter lists the most notable changes to high availability and clusters between RHEL 8 and RHEL 9.

13.1. NOTABLE CHANGES TO HIGH AVAILABILITY AND CLUSTERS

pcs commands that support the **cluftr** tool have been removed

The **pcs** commands that support the **cluftr** tool for analyzing cluster configuration formats have been removed. The following commands have been removed:

- **pcs config import-cman** for importing CMAN / RHEL6 HA cluster configuration
- **pcs config export** for exporting cluster configuration to a list of **pcs** commands which recreate the same cluster

CHAPTER 14. DYNAMIC PROGRAMMING LANGUAGES, WEB SERVERS, DATABASE SERVERS

This chapter lists the most notable changes to dynamic programming languages, web servers, and database servers between RHEL 8 and RHEL 9.

14.1. NOTABLE CHANGES TO DYNAMIC PROGRAMMING LANGUAGES, WEB AND DATABASE SERVERS

Initial Application Streams versions in RHEL 9

RHEL 9 improves the Application Streams experience by providing initial Application Stream versions that can be installed as RPM packages using the traditional yum install command.

RHEL 9.0 Beta provides the following dynamic programming languages:

- **Node.js 16**
- **Perl 5.32**
- **PHP 8.0**
- **Python 3.9**
- **Ruby 3.0**

RHEL 9.0 Beta includes the following version control systems:

- **Git 2.31**
- **Subversion 1.14**

The following web servers are distributed with RHEL 9.0 Beta:

- **Apache HTTP Server 2.4**
- **nginx 1.20**

The following proxy caching servers are available:

- **Varnish Cache 6.5**
- **Squid 5.14**

RHEL 9.0 Beta offers the following database servers:

- **MariaDB 10.5**
- **MySQL 8.0**
- **PostgreSQL 13**
- **Redis 6.2**

Some additional Application Stream versions will be distributed as modules with a shorter life cycle in future minor RHEL 9 releases.

Major differences in the Python ecosystem since RHEL 8

This section summarizes major changes in the Python ecosystem in RHEL 9 compared to RHEL 8.

The unversioned `python` command

The unversioned form of the `python` command (`/usr/bin/python`) is available in the `python-unversioned-command` package. On some systems, this package is not installed by default. To install the unversioned form of the `python` command manually, use the `yum install /usr/bin/python` command.

In RHEL 9, the unversioned form of the `python` command points to the default Python 3.9 version and it is an equivalent to the `python3` and `python3.9` commands.

The `python` command is intended for interactive sessions. In production, Red Hat recommends using `python3` or `python3.9` explicitly.

You can uninstall the unversioned `python` command by using the `yum remove /usr/bin/python` command. If you need a different python command, you can create custom symlinks in `/usr/local/bin` or `~/local/bin` or a Python virtual environment.

Several other unversioned commands are available, such as `/usr/bin/pip` in the `python3-pip` package. In RHEL 9, all unversioned commands point to the default Python 3.9 version.

Architecture-specific Python wheels

Architecture-specific Python `wheels` built on RHEL 9 newly adhere to the upstream architecture naming, which allows customers to build their Python `wheels` on RHEL 9 and install them on non-RHEL systems. Python `wheels` built on previous releases of RHEL are forward compatible and can be installed on RHEL 9. Note that this affects only `wheels` containing Python extensions, which are built for each architecture, not Python `wheels` with pure Python code, which is not architecture-specific.

Notable changes to `libdb`

RHEL 8 and RHEL 9 currently provide Berkeley DB (`libdb`) version 5.3.28, which is distributed under the LGPLv2 license. The upstream Berkeley DB version 6 is available under the AGPLv3 license, which is more restrictive.

The `libdb` package is deprecated as of RHEL 9 and might not be available in future major RHEL releases. Cryptographic algorithms have been removed from `libdb` in RHEL 9. Multiple `libdb` dependencies have been removed from RHEL 9.

Users of `libdb` are advised to migrate to a different key-value database. For more information, see the Knowledgebase article [Available replacements for the deprecated Berkeley DB \(libdb\) in RHEL](#) .

CHAPTER 15. IDENTITY MANAGEMENT

This chapter lists the most notable changes to Identity Management (IdM) between RHEL 8 and RHEL 9.

15.1. NEW FEATURES

Identity Management installation packages have been demodularized

Previously in RHEL 8, IdM packages were distributed as modules, which required you to enable a stream and install the profile that corresponds to your desired installation. IdM installation packages have been demodularized in RHEL 9, so you can use the following yum commands to install IdM servers:

- For a server without integrated DNS services:

```
# yum install ipa-server
```

- For a server with integrated DNS services:

```
# yum install ipa-server ipa-server-dns
```

If you prefer, you can still use the RHEL 8 installation commands, see [Installing packages required for an IdM server](#).

The SSSD implicit files provider domain is disabled by default

The SSSD implicit **files** provider domain, which retrieves user information from local files such as **/etc/shadow** and group information from **/etc/groups**, is now disabled by default.

To retrieve user and group information from local files with SSSD:

1. Configure SSSD. Choose one of the following options:
 - a. Explicitly configure a local domain with the **id_provider=files** option in the **sssd.conf** configuration file.

```
[domain/local]
id_provider=files
...
```

- b. Enable the **files** provider by setting the **enable_files_domain=true** option in the **sssd.conf** configuration file.

```
[sssd]
enable_files_domain = true
```

2. Configure the name services switch.

```
# authselect enable-feature with-files-provider
```

15.2. RELOCATED PACKAGES

ansible-freeipa is now available in the AppStream repository with all dependencies

Previously in RHEL 8, before installing the **ansible-freeipa** package, you first had to enable the Ansible repository and install the **ansible** package. In RHEL 9, you can install **ansible-freeipa** without any preliminary steps. Installing **ansible-freeipa** automatically installs **ansible-core** as a dependency. Both packages are available in the **rhel-9-for-x86_64-appstream-rpms** repository.

ansible-freeipa in RHEL 9 contains all the modules that it contained in RHEL 8.

Clustered Samba packages are now available from the Resilient Storage and Gluster Samba Repository

The **ctdb** clustered Samba packages are now available from the Resilient Storage and Gluster Samba Repository. Previously in RHEL 8, clustered Samba packages were available from the BaseOS repository.

15.3. REMOVED FUNCTIONALITY

The **nss-pam-ldapd** package has been removed

The **nss-pam-ldapd** package has been removed from RHEL. Red Hat recommends migrating to SSSD and its **ldap** provider, which fully replaces the functionality of the **nslcd** service. SSSD has features that specifically address the needs of **nss-pam-ldapd** users, such as:

- hosts databases
- networks databases
- services databases

NIS packages have been removed

The following Network Information Service (NIS) components have been removed from RHEL:

- **nss_nis**
- **yp-tools**
- **ypbind**
- **ypserv**

There is no direct replacement with fully compatible features because the NIS technology is based on outdated design patterns and is no longer considered secure.

Red Hat recommends using RHEL Identity Management and SSSD instead.

The **openssh-ldap** package has been removed

As the **openssh-ldap** subpackage is not maintained upstream, it has been removed from RHEL. Red Hat recommends using SSSD and the **sss_ssh_authorizedkeys** helper, which integrate better with other IdM solutions and are more secure.

By default, the SSSD **ldap** and **ipa** providers read the **sshPublicKey** LDAP attribute of the user object, if available. Note that you cannot use the default SSSD configuration for the **ad** provider or IdM trusted domains to retrieve SSH public keys from Active Directory (AD), since AD does not have a default LDAP attribute to store a public key.

To allow the **sss_ssh_authorizedkeys** helper to get the key from SSSD, enable the **ssh** responder by adding **ssh** to the **services** option in the **sssd.conf** file. See the **sssd.conf(5)** man page for details.

To allow **sshd** to use **sss_ssh_authorizedkeys**, add the following options to the `/etc/ssh/sshd_config` file as described by the **sss_ssh_authorizedkeys(1)** man page:

```
AuthorizedKeysCommand /usr/bin/sss_ssh_authorizedkeys
AuthorizedKeysCommandUser nobody
```

The **custodia** package has been removed

The **custodia** package has been integrated into Red Hat Identity Management in RHEL 9 and is no longer shipped as a separate service.

The **gssntlmssp** package has been removed

As Windows New Technology LAN Manager (NTLM) is considered insecure, the **gssntlmssp** package has been removed.

CHAPTER 16. VIRTUALIZATION

This chapter lists the most notable changes to virtualization between RHEL 8 and RHEL 9.

16.1. NOTABLE CHANGES TO VIRTUALIZATION

KVM virtualization is no longer supported on IBM POWER

Red Hat Kernel-based Virtual Machine (KVM) for Red Hat Enterprise Linux 9.0 and later is not supported on IBM POWER hardware.

SPICE has become unsupported

In RHEL 9, the SPICE remote display protocol is no longer supported. Instead, Red Hat recommends using alternate solutions for remote display streaming:

- For remote console access, use the VNC protocol.
- For advanced remote display functions, use third party tools such as RDP, HP RGS, or Mechdyne TGX.

For graphical VMs hosted on RHEL 9, Red Hat recommends using the **virtio-vga** and **virtio-gpu** virtual graphics cards.

QEMU no longer includes the SGA Option ROM

The Serial Graphics Adapter (SGA) Option ROM made it possible for messages that are normally sent to the virtual video card to be directed to the serial port. The SGA Option ROM is still present in the initial release of RHEL 9 Beta, but will be removed before RHEL 9 General Availability. To avoid being affected by this removal, continue using the following **libvirt** XML fragment, as it will enable an equivalent replacement functionality in the virtual firmware:

```
<bios useserial='yes'/>
```

CHAPTER 17. CONTAINERS

This chapter lists the most notable changes to containers between RHEL 8 and RHEL 9.

17.1. NOTABLE CHANGES TO CONTAINERS

Podman now supports secure short names

Short-name aliases for images can now be configured in the **registries.conf** file in the **[aliases]** table. The short-names modes are:

- **Enforcing:** If no matching alias is found during the image pull, Podman prompts the user to choose one of the unqualified-search registries. If the selected image is pulled successfully, Podman automatically records a new short-name alias in the **\$HOME/.cache/containers/short-name-aliases.conf** file (rootless user) and in the **/var/cache/containers/short-name-aliases.conf** (root user). If the user cannot be prompted (for example, stdin or stdout are not a TTY), Podman fails. Note that the **short-name-aliases.conf** file has precedence over **registries.conf** file if both specify the same alias. The enforcing mode is default in RHEL 9.
- **Permissive:** Similar to enforcing mode, but Podman does not fail if the user cannot be prompted. Instead, Podman searches in all unqualified-search registries in the given order. Note that no alias is recorded. The enforcing mode is default in RHEL 8.

Example:

```
unqualified-search-registries=["registry.fedoraproject.org", "quay.io"]
[aliases]
"fedora"="registry.fedoraproject.org/fedora"
```

Default container image signature verification is now available

Previously, the policy YAML files for the Red Hat Container Registries had to be manually created in the **/etc/containers/registries.d/ directory**. Now, the **registry.access.redhat.com.yaml** and **registry.redhat.io.yaml** files are included in the **containers-common** package. You can now use the **podman image trust** command to verify the container image signatures. Image signature verification is enabled by default in RHEL 8 and RHEL 9.

Default container registries in **registries.conf**

You can find the list of container registries in the **/etc/containers/registries.conf** file as a root user and in **\$HOME/.config/containers/registries.conf** as a non-root user. By changing the **registries.conf** file you can change the default system-wide search settings.

For RHEL 8, the **unqualified-search-registries** is:

```
unqualified-search-registries = ["registry.fedoraproject.org", "registry.access.redhat.com",
"registry.centos.org", "docker.io"]
```

For RHEL 9, the **unqualified-search-registries** is:

```
unqualified-search-registries = ["registry.fedoraproject.org", "registry.access.redhat.com",
"registry.centos.org", "quay.io", "docker.io"]
```

Default cgroup change

The cgroupV2 is enabled by default in RHEL 9. It enables you to use systemd services, container tools, delegation of cgroup hierarchies. For example, the Podman tool is now able to use cgroup in a rootless mode.

The **container-tools:latest** rolling stream has been updated

The **container-tools:rhel8** rolling stream is now renamed to **container-tools:latest**. The numbers for stable streams remain the same (for example 2.0, 3.0). The **container-tools:latest** rolling stream, which contains the Podman, Buildah, Skopeo, and runc tools is now available. This update provides bug fixes and enhancements over the previous version.

For more information, see <https://access.redhat.com/support/policy/updates/containertools>.

Default OCI runtime change

The **crun** OCI runtime is now available for the **container-tools:rhel8** module. The **crun** container runtime supports an annotation that enables the container to access the rootless user's additional groups. This is useful for container operations when volume mounting in a directory where setgid is set, or where the user only has group access.

The default container runtime in RHEL 8 is **runc**. The default container runtime in RHEL 9 is **crun**.

Running RHEL 9 containers on a RHEL 7 host is not supported

Running RHEL 9 containers on a RHEL 7 host is not supported. It might work, but it is not guaranteed.

For more information, see [Red Hat Enterprise Linux Container Compatibility Matrix](#) .

CHAPTER 18. DESKTOP

This chapter lists the most notable changes to desktop between RHEL 8 and RHEL 9.

18.1. NOTABLE CHANGES TO DESKTOP

GNOME updated to version 40

The GNOME environment is now updated from GNOME 3.28 to GNOME 40 with many new features.

GNOME 40 includes a new and improved **Activities Overview** design. This gives the overview a more coherent look, and provides an improved experience for navigating the system and launching applications. Workspaces are now arranged horizontally, and the window overview and application grid are accessed vertically.

Other improvements to GNOME include:

- The performance and resource usage of GNOME has been significantly improved.
- The visual style, including the user interface, the icons, and the desktop, has been refreshed.
- GNOME applications no longer use the application menu, which was available from the top panel. The functionality is now located in a primary menu within the application window.
- The **Settings** application has been redesigned.
- Screen sharing and remote desktop sessions have been improved.
- If you use the proprietary NVIDIA drivers, you can now launch applications using the discrete GPU:
 - a. Open the overview.
 - b. Right-click the application icon in the dash.
 - c. Select the **Launch on Discrete GPU** item in the menu.
- The **Power Off / Log Out** menu now includes the **Suspend** option and a new **Restart** option, which can reboot the system to the boot loader menu when you hold **Alt**.
- Flatpak applications now update automatically.
- You can now group application icons in the overview together into folders using drag and drop.
- The **Terminal** application now supports right-to-left and bi-directional text.
- The **Pointer Location** accessibility feature now works in the Wayland session. When the feature is enabled, pressing **Ctrl** highlights the pointer location on the screen.
- GNOME shell extensions are now managed by the **Extensions** application, rather than **Software**. The **Extensions** application handles updating extensions, configuring extension preferences, and removing or disabling extensions.
- The notifications popover now includes a **Do Not Disturb** button. When the button enabled, notifications do not appear on the screen.

- System dialogs that require a password now have an option to reveal the password text by clicking the eye (👁) icon.
- The **Software** application now automatically detects metered networks, such as mobile data networks. When the current network is metered, **Software** pauses updates in order to reduce data usage.
- Each connected display can now use a different refresh rate in the Wayland session.
- Fractional display scaling is available as an experimental option. It includes several preconfigured fractional ratios.
To enable the experimental fractional scaling, add the **scale-monitor-framebuffer** value to the list of enabled experimental features:

```
$ dconf write \
  /org/gnome/mutter/experimental-features \
  "['scale-monitor-framebuffer']"
```

As a result, fractional scaling options are accessible on the **Display** panel in **Settings**.

For more details on the changes in GNOME, see versions 3.30 to 40.0 in [Release Notes](#).

PipeWire is now the default audio service

The **Pipewire** service now manages all audio output and input. **Pipewire** replaces the **PulseAudio** service in general use cases and the **JACK** service in professional use cases. The system now redirects audio from applications that use **PulseAudio**, **JACK**, or the **ALSA** framework into **Pipewire**.

Benefits of **Pipewire** over the previous solutions include:

- A unified solution for consumer and professional users
- A flexible, modular architecture
- High performance and low latency, similar to the **JACK** service
- Isolation between audio clients for better security

You no longer have to configure the **JACK** service for applications that use it. All **JACK** applications now work in the default RHEL configuration.

Power profiles are available in GNOME

You can now switch between several power profiles in the **Power** panel of **Settings** in the GNOME environment. The power profiles optimize various system settings for the selected goal.

The following power profiles are available:

Performance

Optimizes for high system performance and reduces battery life. This profile is only available on certain selected system configurations.

Balanced

Provides standard system performance and power consumption. This is the default profile.

Power Saver

Increases battery life and reduces system performance. This profile activates automatically on low battery.

Your power profile configuration persists across system reboots.

The power profiles functionality is available from the **power-profiles-daemon** package, which is installed by default.

Boot loader menu hidden by default

The GRUB boot loader is now configured to hide the boot menu by default if RHEL is the only installed operating system and if the previous boot succeeded. This results in a smoother boot experience on such systems.

To access the boot menu, use one of the following options:

- Repeatedly press **Esc** after booting the system.
- Repeatedly press **F8** after booting the system.
- Hold **Shift** during boot.

To disable this function and configure the boot loader menu to display by default, use the following command:

```
# grub2-editenv - unset menu_auto_hide
```

Boot loader configuration files are unified across CPU architectures

Configuration files for the GRUB boot loader are now stored in the **/boot/grub2/** directory on all supported CPU architectures. The **/boot/efi/EFI/redhat/grub.cfg** file, which GRUB previously used on UEFI systems, is now a symbolic link to the **/boot/grub2/grub.cfg** file.

This change simplifies the layout of the GRUB configuration file, improves user experience, and provides the following notable benefits:

- You can boot the same installation with either EFI or legacy BIOS.
- You can use the same documentation and commands for all architectures.
- GRUB configuration tools are more robust, because they no longer rely on symbolic links and they do not have to handle platform-specific cases.
- The usage of the GRUB configuration files is aligned with images generated by CoreOS Assembler (COSA) and OSBuild.
- The usage of the GRUB configuration files is aligned with other Linux distributions.

Lightweight, single-application environment

For graphical use cases that only present a single application, a lightweight user interface (UI) is now available.

You can start GNOME in a single-application session, also known as kiosk mode. In this session, GNOME displays only a full-screen window of an application that you have configured.

The single-application session is significantly less resource intensive than the standard GNOME session.

For more information, see [Restricting the session to a single application](#).

Langpacks replace comps language groups

Support for various languages is now available from **langpacks** packages. You can customize the level of language support that you want to install using the following package names, where **code** is the short ISO code for the language, such as **es** for Spanish:

langpacks-core-code

Provides a basic language support, including:

- The **glibc** locale
- The default font
- The default input method if the language requires it

langpacks-core-font-code

Provides only the default font for the language.

langpacks-code

Provides the complete language support, including the following in addition to the basic language support:

- Translations
- Spell checker dictionaries
- Additional fonts

In previous RHEL releases, language support was available from **comps** language groups. To enable support for a language, you previously installed the **code-support** package. The **langpacks-code** packages now replace the **comps** language groups.

Motif has been removed

The Motif widget toolkit has been removed from RHEL, because development in the upstream Motif community is inactive.

The following Motif packages have been removed, including their development and debugging variants:

- **motif**
- **motif-static**
- **openmotif**
- **openmotif21**
- **openmotif22**

Red Hat recommends using the GTK toolkit as a replacement. GTK is more maintainable and provides new features compared to Motif.

CHAPTER 19. .NET

This chapter lists the most notable changes to .NET between RHEL 8 and RHEL 9.

19.1. NOTABLE CHANGES TO .NET

RHEL 9.0 Beta .NET version support

RHEL 9.0 Beta supports .NET Core 3.1. This is planned to be removed in RHEL 9.0 GA and replaced with .NET 6.

CHAPTER 20. EDGE

This chapter lists the most notable changes to RHEL Edge between RHEL 8 and RHEL 9.

20.1. RHEL FOR EDGE

Supported RHEL for Edge image types

With RHEL for Edge, you can compose customized RHEL (rpm-ostree) images using Image Builder, and then remotely install and manage the images on Edge servers.

The following image types are supported in RHEL 9 Beta:

- RHEL for Edge Commit (.tar)
- RHEL for Edge Container (.tar)
- RHEL for Edge Installer (.iso)

Supported RHEL for Edge image names

Previously, the image types were prefixed by **rhel-**. This prefix was removed, but the previous image names, such as **rhel-edge-container** and **rhel-edge-installer** still work as aliases to the new names. These names are considered deprecated and may be removed completely in future versions. The following RHEL for Edge image names are supported in RHEL 9 Beta:

- edge-commit
- edge-container
- edge-installer

CHAPTER 21. PERFORMANCE

This chapter lists the most notable changes to performance between RHEL 8 and RHEL 9.

21.1. NOTABLE CHANGES TO PERFORMANCE

The **sadf(1)** tool now generates PCP archives from native **sadc(1)** archives

Starting in RHEL 9, the **sadf(1)** tool provided by the **sysstat** package can generate PCP archives from native **sadc(1)** archives.

By default, when the `-` flag is used with **sadc(1)**, **sadc(1)** writes the data to the standard system activity daily data file. This file is named **saDD** and is located in the `/var/log/sa` directory by default. Conversely, when no input datafile is specified, the **sadf(1)** tool uses the standard system activity daily data file to generate archives. Pass numbers as an argument to tell **sadf(1)** to generate archives from data recorded that specified number of days in the past.

- To generate a PCP archive from an **sadc(1)** archive recorded 2 days ago, run:

```
# sadf -l -O pcparchive=/tmp/recording -2
```

- To show a list of metrics in the PCP archive generated from an **sadc(1)** archive, run:

```
$ pminfo --archive /tmp/recording
Disk.dev.avactive
Disk.dev.read
Disk.dev.write
Disk.dev.blkread
[...]
```

- To show the timespace of the archive and hostname of the PCP archive generated from an **sadc(1)** archive

```
$ pmdumplog --label /tmp/recording
Log Label (Log Format Version 2)
Performance metrics from host shard
    commencing Tue Jul 20 00:10:30.642477 2021
    ending    Wed Jul 21 00:10:30.222176 2021
```

- You can then analyze the PCP archive generated from an **sadc(1)** archive by using PCP commands, for example:

```
$ pmchart --archive /tmp/recording
```

CHAPTER 22. SYSTEM ROLES

This chapter lists the most notable changes to system roles between RHEL 8 and RHEL 9.

22.1. PERFORMING SYSTEM ADMINISTRATION TASKS WITH RHEL SYSTEM ROLES

Available System Roles

As of Red Hat Enterprise Linux 9.0 Beta, the RHEL System Roles includes the **ansible-core 2.11** package. This is a version of Ansible that has only the core functionality - that is, it does not include modules such as **firewalld**, and plugins such as **json_query**, among many others. Consequently, some of the system roles will not work in RHEL 9.0 Beta. The following roles will work in RHEL 9.0 Beta:

- **network**
- **postfix**
- **kernel_settings**
- **metrics**
- **nbde_client**
- **nbde_server**
- **certificate**
- **tlog**
- **ssh**
- **sshd**
- **crypto_policies**
- **IPA roles**

RHEL System Roles support

Support for the following roles are available:

- The Microsoft SQL (**MSSQL**) RHEL System Role for Microsoft SQL Server. It simplifies and automates the configuration of RHEL with recommended settings for MSSQL Server workloads.
- The **VPN** RHEL System Role, to configure VPN connections on RHEL systems by using Red Hat Ansible Automation Platform. Users can use it to set up host-to-host, network-to-network, VPN Remote Access Server, and Mesh configurations.
- The **IPMI** modules, to automate hardware management interfaces available in the **rhel_mgmt** Collection.

To learn more about the RHEL System Roles, see the documentation title [Administration and configuration tasks using System Roles in RHEL](#).

Support for Ansible Engine 2.9 is no longer available in RHEL 9

Ansible Engine 2.9 is no longer available in Red Hat Enterprise Linux 9.

RHEL System Roles now uses Ansible Core

RHEL System Roles now utilize Ansible Core, which is available in RHEL 9 AppStream. **Ansible Engine 2.9** will not be available on RHEL 9 Beta onward.



NOTE

As of Red Hat Enterprise Linux 9.0 Beta, the scope of support for Ansible Core in the RHEL AppStream is limited to any Ansible playbooks, roles, and modules that are included with or generated by a Red Hat product, such as RHEL System Roles.

APPENDIX A. CHANGES TO PACKAGES

This chapter lists changes to packages between RHEL 8 and RHEL 9.

A.1. NEW PACKAGES

The following packages were added in RHEL 9:

Package	Repository	New in
a52dec	rhel9-AppStream	RHEL 9.0
alternatives	rhel9-BaseOS	RHEL 9.0
anaconda-install-img-deps	rhel9-AppStream	RHEL 9.0
ansible-core	rhel9-AppStream	RHEL 9.0
ansible-test	rhel9-AppStream	RHEL 9.0
ant-junit5	rhel9-AppStream	RHEL 9.0
anthy-unicode	rhel9-AppStream	RHEL 9.0
appstream	rhel9-AppStream	RHEL 9.0
autocorr-dsb	rhel9-AppStream	RHEL 9.0
autocorr-el	rhel9-AppStream	RHEL 9.0
autocorr-hsb	rhel9-AppStream	RHEL 9.0
autocorr-vro	rhel9-AppStream	RHEL 9.0
babel-doc	rhel9-CRB	RHEL 9.0
bacula-console-bat	rhel9-AppStream	RHEL 9.0
bacula-traymonitor	rhel9-AppStream	RHEL 9.0
bind-dnssec-doc	rhel9-AppStream	RHEL 9.0
bind-dnssec-utils	rhel9-AppStream	RHEL 9.0
binutils-gold	rhel9-BaseOS	RHEL 9.0
blas64_	rhel9-CRB	RHEL 9.0

Package	Repository	New in
bmc-snmp-proxy	rhel9-AppStream	RHEL 9.0
boost-b2	rhel9-CRB	RHEL 9.0
boost-contract	rhel9-AppStream	RHEL 9.0
boost-doctools	rhel9-CRB	RHEL 9.0
boost-json	rhel9-AppStream	RHEL 9.0
boost-nowide	rhel9-AppStream	RHEL 9.0
Box2D	rhel9-AppStream	RHEL 9.0
byte-buddy	rhel9-AppStream	RHEL 9.0
byte-buddy-agent	rhel9-CRB	RHEL 9.0
byteman-bmunit	rhel9-AppStream	RHEL 9.0
cldr-emoji-annotation-dtd	rhel9-AppStream	RHEL 9.0
compat-hesiod	rhel9-AppStream	RHEL 9.0
compat-openssl11	rhel9-AppStream	RHEL 9.0
compat-paratype-pt-sans-fonts-f33-f34	rhel9-AppStream	RHEL 9.0
console-setup	rhel9-AppStream	RHEL 9.0
cups-printerapp	rhel9-AppStream	RHEL 9.0
curl-minimal	rhel9-AppStream	RHEL 9.0
cyrus-imapd-libs	rhel9-AppStream	RHEL 9.0
dbus-broker	rhel9-BaseOS	RHEL 9.0
ddiskit	rhel9-AppStream	RHEL 9.0
debugedit	rhel9-AppStream	RHEL 9.0
dejavu-lgc-sans-mono-fonts	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
dejavu-lgc-serif-fonts	rhel9-AppStream	RHEL 9.0
docbook-utils-pdf	rhel9-AppStream	RHEL 9.0
docbook5-style-xsl	rhel9-AppStream	RHEL 9.0
docbook5-style-xsl-extensions	rhel9-AppStream	RHEL 9.0
double-conversion	rhel9-AppStream	RHEL 9.0
emacs-auctex	rhel9-AppStream	RHEL 9.0
emacs-cython-mode	rhel9-CRB	RHEL 9.0
evince-previewer	rhel9-AppStream	RHEL 9.0
evince-thumbnailer	rhel9-AppStream	RHEL 9.0
exfatprogs	rhel9-BaseOS	RHEL 9.0
fapolicyd-dnf-plugin	rhel9-AppStream	RHEL 9.0
fdk-aac-free	rhel9-AppStream	RHEL 9.0
fence-agents-openstack	rhel9-HighAvailability	RHEL 9.0
festival	rhel9-AppStream	RHEL 9.0
festival-data	rhel9-AppStream	RHEL 9.0
festvox-slt-arctic-hts	rhel9-AppStream	RHEL 9.0
fio-engine-dev-dax	rhel9-AppStream	RHEL 9.0
fio-engine-http	rhel9-AppStream	RHEL 9.0
fio-engine-libaio	rhel9-AppStream	RHEL 9.0
fio-engine-libpmem	rhel9-AppStream	RHEL 9.0
fio-engine-nbd	rhel9-AppStream	RHEL 9.0
fio-engine-pmemblk	rhel9-AppStream	RHEL 9.0
fio-engine-rados	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
fio-engine-rbd	rhel9-AppStream	RHEL 9.0
fio-engine-rdma	rhel9-AppStream	RHEL 9.0
flashrom	rhel9-AppStream	RHEL 9.0
flexiblas	rhel9-AppStream	RHEL 9.0
flexiblas-netlib	rhel9-AppStream	RHEL 9.0
flexiblas-openblas-openmp	rhel9-AppStream	RHEL 9.0
fonts-filesystem	rhel9-BaseOS	RHEL 9.0
fonts-rpm-macros	rhel9-CRB	RHEL 9.0
fonts-srpm-macros	rhel9-AppStream	RHEL 9.0
fwupd-plugin-flashrom	rhel9-AppStream	RHEL 9.0
gawk-all-langpacks	rhel9-AppStream	RHEL 9.0
gcr-base	rhel9-AppStream	RHEL 9.0
gdb-minimal	rhel9-AppStream	RHEL 9.0
gedit-plugin-sessionsaver	rhel9-AppStream	RHEL 9.0
gedit-plugin-syntex	rhel9-AppStream	RHEL 9.0
gegl04-devel-docs	rhel9-AppStream	RHEL 9.0
gegl04-tools	rhel9-AppStream	RHEL 9.0
glade	rhel9-AppStream	RHEL 9.0
glibc-doc	rhel9-AppStream	RHEL 9.0
glibc-gconv-extra	rhel9-BaseOS	RHEL 9.0
glibc-langpack-ckb	rhel9-BaseOS	RHEL 9.0
glibc-langpack-mnw	rhel9-BaseOS	RHEL 9.0
glslang	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
glusterfs-cloudsync-plugins	rhel9-AppStream	RHEL 9.0
gnome-connections	rhel9-AppStream	RHEL 9.0
gnome-devel-docs	rhel9-AppStream	RHEL 9.0
gnome-extensions-app	rhel9-AppStream	RHEL 9.0
gnome-kiosk	rhel9-AppStream	RHEL 9.0
gnome-themes-extra	rhel9-AppStream	RHEL 9.0
gnome-tour	rhel9-AppStream	RHEL 9.0
gnu-efi-compat	rhel9-CRB	RHEL 9.0
go-filesystem	rhel9-AppStream	RHEL 9.0
go-rpm-macros	rhel9-AppStream	RHEL 9.0
go-rpm-templates	rhel9-AppStream	RHEL 9.0
google-carlito-fonts	rhel9-AppStream	RHEL 9.0
google-noto-sans-sinhala-vf-fonts	rhel9-AppStream	RHEL 9.0
google-noto-serif-gurmukhi-vf-fonts	rhel9-AppStream	RHEL 9.0
google-noto-serif-sinhala-vf-fonts	rhel9-AppStream	RHEL 9.0
graphene	rhel9-AppStream	RHEL 9.0
graphene-devel	rhel9-CRB	RHEL 9.0
gtk4	rhel9-AppStream	RHEL 9.0
gtksourceview4	rhel9-AppStream	RHEL 9.0
guestfs-tools	rhel9-AppStream	RHEL 9.0
ha-cloud-support	rhel9-HighAvailability	RHEL 9.0
ha-openstack-support	rhel9-AppStream	RHEL 9.0
highcontrast-icon-theme	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
hivex-libs	rhel9-AppStream	RHEL 9.0
ht-caladea-fonts	rhel9-AppStream	RHEL 9.0
hunspell-filesystem	rhel9-AppStream	RHEL 9.0
hyphen-eo	rhel9-AppStream	RHEL 9.0
ibus-anthy	rhel9-AppStream	RHEL 9.0
ibus-anthy-python	rhel9-AppStream	RHEL 9.0
ignition	rhel9-AppStream	RHEL 9.0
imath	rhel9-AppStream	RHEL 9.0
imath-devel	rhel9-CRB	RHEL 9.0
inih	rhel9-BaseOS	RHEL 9.0
initscripts-service	rhel9-BaseOS	RHEL 9.0
iptables-nft	rhel9-BaseOS	RHEL 9.0
iptables-nft-services	rhel9-AppStream	RHEL 9.0
jakarta-activation	rhel9-AppStream	RHEL 9.0
jakarta-annotations	rhel9-AppStream	RHEL 9.0
jakarta-mail	rhel9-AppStream	RHEL 9.0
jakarta-servlet	rhel9-CRB	RHEL 9.0
jasper	rhel9-AppStream	RHEL 9.0
jasper-utils	rhel9-AppStream	RHEL 9.0
javapackages-generators	rhel9-CRB	RHEL 9.0
jaxb-api	rhel9-AppStream	RHEL 9.0
jbigkit	rhel9-AppStream	RHEL 9.0
jitterentropy	rhel9-BaseOS	RHEL 9.0

Package	Repository	New in
jitterentropy-devel	rhel9-CRB	RHEL 9.0
jna-contrib	rhel9-AppStream	RHEL 9.0
kasumi-common	rhel9-AppStream	RHEL 9.0
kasumi-unicode	rhel9-AppStream	RHEL 9.0
kernel-debug-devel-matched	rhel9-AppStream	RHEL 9.0
kernel-devel-matched	rhel9-AppStream	RHEL 9.0
kernel-srpm-macros	rhel9-AppStream	RHEL 9.0
khmer-os-battambang-fonts	rhel9-AppStream	RHEL 9.0
khmer-os-bokor-fonts	rhel9-AppStream	RHEL 9.0
khmer-os-content-fonts	rhel9-AppStream	RHEL 9.0
khmer-os-fasthand-fonts	rhel9-AppStream	RHEL 9.0
khmer-os-freehand-fonts	rhel9-AppStream	RHEL 9.0
khmer-os-handwritten-fonts	rhel9-AppStream	RHEL 9.0
khmer-os-metal-chrieng-fonts	rhel9-AppStream	RHEL 9.0
khmer-os-muol-fonts	rhel9-AppStream	RHEL 9.0
khmer-os-muol-fonts-all	rhel9-AppStream	RHEL 9.0
khmer-os-muol-pali-fonts	rhel9-AppStream	RHEL 9.0
khmer-os-siemreap-fonts	rhel9-AppStream	RHEL 9.0
khmer-os-system-fonts	rhel9-AppStream	RHEL 9.0
lame	rhel9-AppStream	RHEL 9.0
langpacks-bo	rhel9-AppStream	RHEL 9.0
langpacks-core-af	rhel9-AppStream	RHEL 9.0
langpacks-core-am	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
langpacks-core-ar	rhel9-AppStream	RHEL 9.0
langpacks-core-as	rhel9-AppStream	RHEL 9.0
langpacks-core-ast	rhel9-AppStream	RHEL 9.0
langpacks-core-be	rhel9-AppStream	RHEL 9.0
langpacks-core-bg	rhel9-AppStream	RHEL 9.0
langpacks-core-bn	rhel9-AppStream	RHEL 9.0
langpacks-core-bo	rhel9-AppStream	RHEL 9.0
langpacks-core-br	rhel9-AppStream	RHEL 9.0
langpacks-core-bs	rhel9-AppStream	RHEL 9.0
langpacks-core-ca	rhel9-AppStream	RHEL 9.0
langpacks-core-cs	rhel9-AppStream	RHEL 9.0
langpacks-core-cy	rhel9-AppStream	RHEL 9.0
langpacks-core-da	rhel9-AppStream	RHEL 9.0
langpacks-core-de	rhel9-AppStream	RHEL 9.0
langpacks-core-dz	rhel9-AppStream	RHEL 9.0
langpacks-core-el	rhel9-AppStream	RHEL 9.0
langpacks-core-en	rhel9-AppStream	RHEL 9.0
langpacks-core-en_GB	rhel9-AppStream	RHEL 9.0
langpacks-core-eo	rhel9-AppStream	RHEL 9.0
langpacks-core-es	rhel9-AppStream	RHEL 9.0
langpacks-core-et	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
langpacks-core-eu	rhel9-AppStream	RHEL 9.0
langpacks-core-fa	rhel9-AppStream	RHEL 9.0
langpacks-core-fi	rhel9-AppStream	RHEL 9.0
langpacks-core-font-af	rhel9-AppStream	RHEL 9.0
langpacks-core-font-am	rhel9-AppStream	RHEL 9.0
langpacks-core-font-ar	rhel9-AppStream	RHEL 9.0
langpacks-core-font-as	rhel9-AppStream	RHEL 9.0
langpacks-core-font-ast	rhel9-AppStream	RHEL 9.0
langpacks-core-font-be	rhel9-AppStream	RHEL 9.0
langpacks-core-font-bg	rhel9-AppStream	RHEL 9.0
langpacks-core-font-bn	rhel9-AppStream	RHEL 9.0
langpacks-core-font-bo	rhel9-AppStream	RHEL 9.0
langpacks-core-font-br	rhel9-AppStream	RHEL 9.0
langpacks-core-font-bs	rhel9-AppStream	RHEL 9.0
langpacks-core-font-ca	rhel9-AppStream	RHEL 9.0
langpacks-core-font-cs	rhel9-AppStream	RHEL 9.0
langpacks-core-font-cy	rhel9-AppStream	RHEL 9.0
langpacks-core-font-da	rhel9-AppStream	RHEL 9.0
langpacks-core-font-de	rhel9-AppStream	RHEL 9.0
langpacks-core-font-dz	rhel9-AppStream	RHEL 9.0
langpacks-core-font-el	rhel9-AppStream	RHEL 9.0
langpacks-core-font-en	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
langpacks-core-font-eo	rhel9-AppStream	RHEL 9.0
langpacks-core-font-es	rhel9-AppStream	RHEL 9.0
langpacks-core-font-et	rhel9-AppStream	RHEL 9.0
langpacks-core-font-eu	rhel9-AppStream	RHEL 9.0
langpacks-core-font-fa	rhel9-AppStream	RHEL 9.0
langpacks-core-font-fi	rhel9-AppStream	RHEL 9.0
langpacks-core-font-fr	rhel9-AppStream	RHEL 9.0
langpacks-core-font-ga	rhel9-AppStream	RHEL 9.0
langpacks-core-font-gl	rhel9-AppStream	RHEL 9.0
langpacks-core-font-gu	rhel9-AppStream	RHEL 9.0
langpacks-core-font-he	rhel9-AppStream	RHEL 9.0
langpacks-core-font-hi	rhel9-AppStream	RHEL 9.0
langpacks-core-font-hr	rhel9-AppStream	RHEL 9.0
langpacks-core-font-hu	rhel9-AppStream	RHEL 9.0
langpacks-core-font-ia	rhel9-AppStream	RHEL 9.0
langpacks-core-font-id	rhel9-AppStream	RHEL 9.0
langpacks-core-font-is	rhel9-AppStream	RHEL 9.0
langpacks-core-font-it	rhel9-AppStream	RHEL 9.0
langpacks-core-font-ja	rhel9-AppStream	RHEL 9.0
langpacks-core-font-ka	rhel9-AppStream	RHEL 9.0
langpacks-core-font-kk	rhel9-AppStream	RHEL 9.0
langpacks-core-font-km	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
langpacks-core-font-kn	rhel9-AppStream	RHEL 9.0
langpacks-core-font-ko	rhel9-AppStream	RHEL 9.0
langpacks-core-font-ku	rhel9-AppStream	RHEL 9.0
langpacks-core-font-lt	rhel9-AppStream	RHEL 9.0
langpacks-core-font-lv	rhel9-AppStream	RHEL 9.0
langpacks-core-font-mai	rhel9-AppStream	RHEL 9.0
langpacks-core-font-mk	rhel9-AppStream	RHEL 9.0
langpacks-core-font-ml	rhel9-AppStream	RHEL 9.0
langpacks-core-font-mr	rhel9-AppStream	RHEL 9.0
langpacks-core-font-ms	rhel9-AppStream	RHEL 9.0
langpacks-core-font-my	rhel9-AppStream	RHEL 9.0
langpacks-core-font-nb	rhel9-AppStream	RHEL 9.0
langpacks-core-font-ne	rhel9-AppStream	RHEL 9.0
langpacks-core-font-nl	rhel9-AppStream	RHEL 9.0
langpacks-core-font-nn	rhel9-AppStream	RHEL 9.0
langpacks-core-font-nr	rhel9-AppStream	RHEL 9.0
langpacks-core-font-nso	rhel9-AppStream	RHEL 9.0
langpacks-core-font-or	rhel9-AppStream	RHEL 9.0
langpacks-core-font-pa	rhel9-AppStream	RHEL 9.0
langpacks-core-font-pl	rhel9-AppStream	RHEL 9.0
langpacks-core-font-pt	rhel9-AppStream	RHEL 9.0
langpacks-core-font-ro	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
langpacks-core-font-ru	rhel9-AppStream	RHEL 9.0
langpacks-core-font-si	rhel9-AppStream	RHEL 9.0
langpacks-core-font-sk	rhel9-AppStream	RHEL 9.0
langpacks-core-font-sl	rhel9-AppStream	RHEL 9.0
langpacks-core-font-sq	rhel9-AppStream	RHEL 9.0
langpacks-core-font-sr	rhel9-AppStream	RHEL 9.0
langpacks-core-font-ss	rhel9-AppStream	RHEL 9.0
langpacks-core-font-sv	rhel9-AppStream	RHEL 9.0
langpacks-core-font-ta	rhel9-AppStream	RHEL 9.0
langpacks-core-font-te	rhel9-AppStream	RHEL 9.0
langpacks-core-font-th	rhel9-AppStream	RHEL 9.0
langpacks-core-font-tn	rhel9-AppStream	RHEL 9.0
langpacks-core-font-tr	rhel9-AppStream	RHEL 9.0
langpacks-core-font-ts	rhel9-AppStream	RHEL 9.0
langpacks-core-font-uk	rhel9-AppStream	RHEL 9.0
langpacks-core-font-ur	rhel9-AppStream	RHEL 9.0
langpacks-core-font-ve	rhel9-AppStream	RHEL 9.0
langpacks-core-font-vi	rhel9-AppStream	RHEL 9.0
langpacks-core-font-xh	rhel9-AppStream	RHEL 9.0
langpacks-core-font-yi	rhel9-AppStream	RHEL 9.0
langpacks-core-font-zh_CN	rhel9-AppStream	RHEL 9.0
langpacks-core-font-zh_HK	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
langpacks-core-font-zh_TW	rhel9-AppStream	RHEL 9.0
langpacks-core-font-zu	rhel9-AppStream	RHEL 9.0
langpacks-core-fr	rhel9-AppStream	RHEL 9.0
langpacks-core-ga	rhel9-AppStream	RHEL 9.0
langpacks-core-gl	rhel9-AppStream	RHEL 9.0
langpacks-core-gu	rhel9-AppStream	RHEL 9.0
langpacks-core-he	rhel9-AppStream	RHEL 9.0
langpacks-core-hi	rhel9-AppStream	RHEL 9.0
langpacks-core-hr	rhel9-AppStream	RHEL 9.0
langpacks-core-hu	rhel9-AppStream	RHEL 9.0
langpacks-core-ia	rhel9-AppStream	RHEL 9.0
langpacks-core-id	rhel9-AppStream	RHEL 9.0
langpacks-core-is	rhel9-AppStream	RHEL 9.0
langpacks-core-it	rhel9-AppStream	RHEL 9.0
langpacks-core-ja	rhel9-AppStream	RHEL 9.0
langpacks-core-ka	rhel9-AppStream	RHEL 9.0
langpacks-core-kk	rhel9-AppStream	RHEL 9.0
langpacks-core-km	rhel9-AppStream	RHEL 9.0
langpacks-core-kn	rhel9-AppStream	RHEL 9.0
langpacks-core-ko	rhel9-AppStream	RHEL 9.0
langpacks-core-ku	rhel9-AppStream	RHEL 9.0
langpacks-core-lt	rhel9-AppStream	RHEL 9.0
langpacks-core-lv	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
langpacks-core-mai	rhel9-AppStream	RHEL 9.0
langpacks-core-mk	rhel9-AppStream	RHEL 9.0
langpacks-core-ml	rhel9-AppStream	RHEL 9.0
langpacks-core-mr	rhel9-AppStream	RHEL 9.0
langpacks-core-ms	rhel9-AppStream	RHEL 9.0
langpacks-core-my	rhel9-AppStream	RHEL 9.0
langpacks-core-nb	rhel9-AppStream	RHEL 9.0
langpacks-core-ne	rhel9-AppStream	RHEL 9.0
langpacks-core-nl	rhel9-AppStream	RHEL 9.0
langpacks-core-nn	rhel9-AppStream	RHEL 9.0
langpacks-core-nr	rhel9-AppStream	RHEL 9.0
langpacks-core-nso	rhel9-AppStream	RHEL 9.0
langpacks-core-or	rhel9-AppStream	RHEL 9.0
langpacks-core-pa	rhel9-AppStream	RHEL 9.0
langpacks-core-pl	rhel9-AppStream	RHEL 9.0
langpacks-core-pt	rhel9-AppStream	RHEL 9.0
langpacks-core-pt_BR	rhel9-AppStream	RHEL 9.0
langpacks-core-ro	rhel9-AppStream	RHEL 9.0
langpacks-core-ru	rhel9-AppStream	RHEL 9.0
langpacks-core-si	rhel9-AppStream	RHEL 9.0
langpacks-core-sk	rhel9-AppStream	RHEL 9.0
langpacks-core-sl	rhel9-AppStream	RHEL 9.0
langpacks-core-sq	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
langpacks-core-sr	rhel9-AppStream	RHEL 9.0
langpacks-core-ss	rhel9-AppStream	RHEL 9.0
langpacks-core-sv	rhel9-AppStream	RHEL 9.0
langpacks-core-ta	rhel9-AppStream	RHEL 9.0
langpacks-core-te	rhel9-AppStream	RHEL 9.0
langpacks-core-th	rhel9-AppStream	RHEL 9.0
langpacks-core-tn	rhel9-AppStream	RHEL 9.0
langpacks-core-tr	rhel9-AppStream	RHEL 9.0
langpacks-core-ts	rhel9-AppStream	RHEL 9.0
langpacks-core-uk	rhel9-AppStream	RHEL 9.0
langpacks-core-ur	rhel9-AppStream	RHEL 9.0
langpacks-core-ve	rhel9-AppStream	RHEL 9.0
langpacks-core-vi	rhel9-AppStream	RHEL 9.0
langpacks-core-xh	rhel9-AppStream	RHEL 9.0
langpacks-core-yi	rhel9-AppStream	RHEL 9.0
langpacks-core-zh_CN	rhel9-AppStream	RHEL 9.0
langpacks-core-zh_HK	rhel9-AppStream	RHEL 9.0
langpacks-core-zh_TW	rhel9-AppStream	RHEL 9.0
langpacks-core-zu	rhel9-AppStream	RHEL 9.0
langpacks-dz	rhel9-AppStream	RHEL 9.0
langpacks-eo	rhel9-AppStream	RHEL 9.0
langpacks-ka	rhel9-AppStream	RHEL 9.0
langpacks-km	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
langpacks-ku	rhel9-AppStream	RHEL 9.0
langpacks-my	rhel9-AppStream	RHEL 9.0
langpacks-yi	rhel9-AppStream	RHEL 9.0
langpacks-zh_HK	rhel9-AppStream	RHEL 9.0
lapack64_	rhel9-CRB	RHEL 9.0
libblockdev-tools	rhel9-AppStream	RHEL 9.0
libbpf-tools	rhel9-AppStream	RHEL 9.0
libbrotli	rhel9-BaseOS	RHEL 9.0
libburn-doc	rhel9-AppStream	RHEL 9.0
libcbor	rhel9-BaseOS	RHEL 9.0
libdnf-plugin-subscription-manager	rhel9-BaseOS	RHEL 9.0
libeconf	rhel9-BaseOS	RHEL 9.0
libell	rhel9-AppStream	RHEL 9.0
libfido2	rhel9-BaseOS	RHEL 9.0
libfl-static	rhel9-CRB	RHEL 9.0
libgccjit	rhel9-AppStream	RHEL 9.0
libgccjit-devel	rhel9-AppStream	RHEL 9.0
libguestfs-appliance	rhel9-AppStream	RHEL 9.0
libhandy	rhel9-AppStream	RHEL 9.0
libical-glib	rhel9-AppStream	RHEL 9.0
libical-glib-devel	rhel9-AppStream	RHEL 9.0
libisoburn-doc	rhel9-AppStream	RHEL 9.0
libisofs-doc	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
libjcat	rhel9-BaseOS	RHEL 9.0
libknet1-compress-zstd-plugin	rhel9-HighAvailability	RHEL 9.0
libldac	rhel9-AppStream	RHEL 9.0
libmemcached-awesome	rhel9-CRB	RHEL 9.0
libmemcached-awesome-devel	rhel9-CRB	RHEL 9.0
libmpeg2	rhel9-AppStream	RHEL 9.0
libnbd-bash-completion	rhel9-AppStream	RHEL 9.0
libotr	rhel9-AppStream	RHEL 9.0
libpmem2	rhel9-AppStream	RHEL 9.0
libpmem2-debug	rhel9-AppStream	RHEL 9.0
libpmem2-devel	rhel9-AppStream	RHEL 9.0
librabbitmq-tools	rhel9-AppStream	RHEL 9.0
libradospp-devel	rhel9-CRB	RHEL 9.0
libreoffice-help-eo	rhel9-AppStream	RHEL 9.0
libreoffice-langpack-eo	rhel9-AppStream	RHEL 9.0
libreoffice-langpack-fy	rhel9-AppStream	RHEL 9.0
libsane-airscan	rhel9-AppStream	RHEL 9.0
libsbc	rhel9-AppStream	RHEL 9.0
libsndfile-utils	rhel9-AppStream	RHEL 9.0
libstoragemgmt-nfs-plugin	rhel9-AppStream	RHEL 9.0
libstoragemgmt-targetd-plugin	rhel9-AppStream	RHEL 9.0
libtpms	rhel9-AppStream	RHEL 9.0
libtracecmd	rhel9-BaseOS	RHEL 9.0

Package	Repository	New in
libtracecmd-devel	rhel9-CRB	RHEL 9.0
libtraceevent	rhel9-BaseOS	RHEL 9.0
libtraceevent-devel	rhel9-CRB	RHEL 9.0
libtracefs	rhel9-BaseOS	RHEL 9.0
libtracefs-devel	rhel9-CRB	RHEL 9.0
libtracker-sparql	rhel9-AppStream	RHEL 9.0
libuser-devel	rhel9-CRB	RHEL 9.0
libvala	rhel9-CRB	RHEL 9.0
libvala-devel	rhel9-CRB	RHEL 9.0
libvdpau-trace	rhel9-AppStream	RHEL 9.0
libverto-libev	rhel9-BaseOS	RHEL 9.0
libvma-utils	rhel9-AppStream	RHEL 9.0
libwpe	rhel9-AppStream	RHEL 9.0
libxcrypt-compat	rhel9-AppStream	RHEL 9.0
linux-firmware-whence	rhel9-BaseOS	RHEL 9.0
lorax-docs	rhel9-AppStream	RHEL 9.0
low-memory-monitor	rhel9-AppStream	RHEL 9.0
lua-rpm-macros	rhel9-AppStream	RHEL 9.0
lua-srpm-macros	rhel9-AppStream	RHEL 9.0
mariadb-connector-c-test	rhel9-CRB	RHEL 9.0
maven-surefire-provider-junit5	rhel9-CRB	RHEL 9.0
memcached-selinux	rhel9-AppStream	RHEL 9.0
mesa-demos	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
mingw32-srvany	rhel9-AppStream	RHEL 9.0
mkfontscale	rhel9-AppStream	RHEL 9.0
mod_jk	rhel9-AppStream	RHEL 9.0
mod_lua	rhel9-AppStream	RHEL 9.0
mod_proxy_cluster	rhel9-AppStream	RHEL 9.0
mpich-autoload	rhel9-AppStream	RHEL 9.0
mptcpd	rhel9-AppStream	RHEL 9.0
mythes-eo	rhel9-AppStream	RHEL 9.0
nbdkit-gzip-filter	rhel9-AppStream	RHEL 9.0
nbdkit-nbd-plugin	rhel9-AppStream	RHEL 9.0
nbdkit-tar-filter	rhel9-AppStream	RHEL 9.0
nbdkit-tmpdisk-plugin	rhel9-AppStream	RHEL 9.0
netronome-firmware	rhel9-BaseOS	RHEL 9.0
nfs-utils-coreos	rhel9-AppStream	RHEL 9.0
nodejs-libs	rhel9-AppStream	RHEL 9.0
npth-devel	rhel9-CRB	RHEL 9.0
open-vm-tools-test	rhel9-AppStream	RHEL 9.0
openblas-serial	rhel9-AppStream	RHEL 9.0
openexr	rhel9-AppStream	RHEL 9.0
openexr-devel	rhel9-CRB	RHEL 9.0
openexr-libs	rhel9-AppStream	RHEL 9.0
openldap-compat	rhel9-BaseOS	RHEL 9.0
openmpi-java	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
openssl-server	rhel9-AppStream	RHEL 9.0
pam-docs	rhel9-AppStream	RHEL 9.0
pbzip2	rhel9-AppStream	RHEL 9.0
pcre2-syntax	rhel9-BaseOS	RHEL 9.0
perl-AutoLoader	rhel9-AppStream	RHEL 9.0
perl-AutoSplit	rhel9-AppStream	RHEL 9.0
perl-autouse	rhel9-AppStream	RHEL 9.0
perl-B	rhel9-AppStream	RHEL 9.0
perl-base	rhel9-AppStream	RHEL 9.0
perl-Benchmark	rhel9-AppStream	RHEL 9.0
perl-blib	rhel9-AppStream	RHEL 9.0
perl-BSD-Resource	rhel9-AppStream	RHEL 9.0
perl-Class-Struct	rhel9-AppStream	RHEL 9.0
perl-Compress-Raw-Lzma	rhel9-AppStream	RHEL 9.0
perl-Config-Extensions	rhel9-AppStream	RHEL 9.0
perl-Cyrus	rhel9-AppStream	RHEL 9.0
perl-DBD-MariaDB	rhel9-AppStream	RHEL 9.0
perl-DBM_Filter	rhel9-AppStream	RHEL 9.0
perl-debugger	rhel9-AppStream	RHEL 9.0
perl-deprecate	rhel9-AppStream	RHEL 9.0
perl-diagnostics	rhel9-AppStream	RHEL 9.0
perl-DirHandle	rhel9-AppStream	RHEL 9.0
perl-doc	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
perl-Dumpvalue	rhel9-AppStream	RHEL 9.0
perl-DynaLoader	rhel9-AppStream	RHEL 9.0
perl-encoding-warnings	rhel9-AppStream	RHEL 9.0
perl-English	rhel9-AppStream	RHEL 9.0
perl-ExtUtils-Constant	rhel9-AppStream	RHEL 9.0
perl-Fcntl	rhel9-AppStream	RHEL 9.0
perl-fields	rhel9-AppStream	RHEL 9.0
perl-File-Basename	rhel9-AppStream	RHEL 9.0
perl-File-Compare	rhel9-AppStream	RHEL 9.0
perl-File-Copy	rhel9-AppStream	RHEL 9.0
perl-File-DosGlob	rhel9-AppStream	RHEL 9.0
perl-File-Find	rhel9-AppStream	RHEL 9.0
perl-File-stat	rhel9-AppStream	RHEL 9.0
perl-FileCache	rhel9-AppStream	RHEL 9.0
perl-FileHandle	rhel9-AppStream	RHEL 9.0
perl-filetest	rhel9-AppStream	RHEL 9.0
perl-FindBin	rhel9-AppStream	RHEL 9.0
perl-GDBM_File	rhel9-AppStream	RHEL 9.0
perl-Getopt-Std	rhel9-AppStream	RHEL 9.0
perl-Hash-Util	rhel9-AppStream	RHEL 9.0
perl-Hash-Util-FieldHash	rhel9-AppStream	RHEL 9.0
perl-I18N-Collate	rhel9-AppStream	RHEL 9.0
perl-I18N-Langinfo	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
perl-I18N-LangTags	rhel9-AppStream	RHEL 9.0
perl-if	rhel9-AppStream	RHEL 9.0
perl-IO-Compress-Lzma	rhel9-AppStream	RHEL 9.0
perl-IPC-Open3	rhel9-AppStream	RHEL 9.0
perl-less	rhel9-AppStream	RHEL 9.0
perl-lib	rhel9-AppStream	RHEL 9.0
perl-locale	rhel9-AppStream	RHEL 9.0
perl-Mail-AuthenticationResults	rhel9-AppStream	RHEL 9.0
perl-meta-notation	rhel9-AppStream	RHEL 9.0
perl-mro	rhel9-AppStream	RHEL 9.0
perl-NDBM_File	rhel9-AppStream	RHEL 9.0
perl-Net	rhel9-AppStream	RHEL 9.0
perl-Net-CIDR-Lite	rhel9-AppStream	RHEL 9.0
perl-NEXT	rhel9-AppStream	RHEL 9.0
perl-ODBM_File	rhel9-AppStream	RHEL 9.0
perl-Opcode	rhel9-AppStream	RHEL 9.0
perl-overload	rhel9-AppStream	RHEL 9.0
perl-overloading	rhel9-AppStream	RHEL 9.0
perl-ph	rhel9-AppStream	RHEL 9.0
perl-Pod-Functions	rhel9-AppStream	RHEL 9.0
perl-POSIX	rhel9-AppStream	RHEL 9.0
perl-Safe	rhel9-AppStream	RHEL 9.0
perl-Search-Dict	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
perl-SelectSaver	rhel9-AppStream	RHEL 9.0
perl-sigtrap	rhel9-AppStream	RHEL 9.0
perl-sort	rhel9-AppStream	RHEL 9.0
perl-subst	rhel9-AppStream	RHEL 9.0
perl-Symbol	rhel9-AppStream	RHEL 9.0
perl-Sys-Hostname	rhel9-AppStream	RHEL 9.0
perl-Term-Complete	rhel9-AppStream	RHEL 9.0
perl-Term-ReadLine	rhel9-AppStream	RHEL 9.0
perl-Term-Size-Any	rhel9-AppStream	RHEL 9.0
perl-Term-Size-Perl	rhel9-AppStream	RHEL 9.0
perl-Text-Abbrev	rhel9-AppStream	RHEL 9.0
perl-Thread	rhel9-AppStream	RHEL 9.0
perl-Thread-Semaphore	rhel9-AppStream	RHEL 9.0
perl-Tie	rhel9-AppStream	RHEL 9.0
perl-Tie-File	rhel9-AppStream	RHEL 9.0
perl-Tie-Memoize	rhel9-AppStream	RHEL 9.0
perl-Tie-RefHash	rhel9-AppStream	RHEL 9.0
perl-Time	rhel9-AppStream	RHEL 9.0
perl-Unicode-UCD	rhel9-AppStream	RHEL 9.0
perl-User-pwent	rhel9-AppStream	RHEL 9.0
perl-vars	rhel9-AppStream	RHEL 9.0
perl-vmsish	rhel9-AppStream	RHEL 9.0
perl-XString	rhel9-CRB	RHEL 9.0

Package	Repository	New in
php-pecl-xdebug3	rhel9-AppStream	RHEL 9.0
pinentry-tty	rhel9-AppStream	RHEL 9.0
pipewire-alsa	rhel9-AppStream	RHEL 9.0
pipewire-gstreamer	rhel9-AppStream	RHEL 9.0
pipewire-jack-audio-connection-kit	rhel9-AppStream	RHEL 9.0
pipewire-jack-audio-connection-kit-devel	rhel9-AppStream	RHEL 9.0
pipewire-media-session	rhel9-AppStream	RHEL 9.0
pipewire-pulseaudio	rhel9-AppStream	RHEL 9.0
pki-jackson-annotations	rhel9-AppStream	RHEL 9.0
pki-jackson-core	rhel9-AppStream	RHEL 9.0
pki-jackson-databind	rhel9-AppStream	RHEL 9.0
pki-jackson-jaxrs-json-provider	rhel9-AppStream	RHEL 9.0
pki-jackson-jaxrs-providers	rhel9-AppStream	RHEL 9.0
pki-jackson-module-jaxb-annotations	rhel9-AppStream	RHEL 9.0
pki-resteasy-client	rhel9-AppStream	RHEL 9.0
pki-resteasy-core	rhel9-AppStream	RHEL 9.0
pki-resteasy-jackson2-provider	rhel9-AppStream	RHEL 9.0
plotnetcfg	rhel9-AppStream	RHEL 9.0
pmix-pmi	rhel9-AppStream	RHEL 9.0
pmix-pmi-devel	rhel9-CRB	RHEL 9.0
pmix-tools	rhel9-AppStream	RHEL 9.0
postgresql-private-devel	rhel9-CRB	RHEL 9.0

Package	Repository	New in
postgresql-private-libs	rhel9-AppStream	RHEL 9.0
power-profiles-daemon	rhel9-AppStream	RHEL 9.0
pt-sans-fonts	rhel9-AppStream	RHEL 9.0
pyarsing-doc	rhel9-CRB	RHEL 9.0
pyproject-rpm-macros	rhel9-CRB	RHEL 9.0
python-dateutil-doc	rhel9-CRB	RHEL 9.0
python-packaging-doc	rhel9-CRB	RHEL 9.0
python-pip-wheel	rhel9-BaseOS	RHEL 9.0
python-setuptools-wheel	rhel9-BaseOS	RHEL 9.0
python-sphinx-doc	rhel9-CRB	RHEL 9.0
python-sphinx_rtd_theme-doc	rhel9-CRB	RHEL 9.0
python-unversioned-command	rhel9-AppStream	RHEL 9.0
python-wheel-wheel	rhel9-CRB	RHEL 9.0
python3	rhel9-BaseOS	RHEL 9.0
python3-debug	rhel9-CRB	RHEL 9.0
python3-devel	rhel9-AppStream	RHEL 9.0
python3-file-magic	rhel9-AppStream	RHEL 9.0
python3-gluster	rhel9-AppStream	RHEL 9.0
python3-gobject-devel	rhel9-CRB	RHEL 9.0
python3-imath	rhel9-AppStream	RHEL 9.0
python3-iniconfig	rhel9-CRB	RHEL 9.0
python3-libevdev	rhel9-AppStream	RHEL 9.0
python3-net-snmp	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
python3-pycdlib	rhel9-AppStream	RHEL 9.0
python3-pyelftools	rhel9-AppStream	RHEL 9.0
python3-pyrsistent	rhel9-AppStream	RHEL 9.0
python3-pytest-subtests	rhel9-CRB	RHEL 9.0
python3-pytest-timeout	rhel9-CRB	RHEL 9.0
python3-readthedocs-sphinx-ext	rhel9-CRB	RHEL 9.0
python3-requests+security	rhel9-AppStream	RHEL 9.0
python3-requests+socks	rhel9-AppStream	RHEL 9.0
python3-requests-gssapi	rhel9-AppStream	RHEL 9.0
python3-resolvelib	rhel9-AppStream	RHEL 9.0
python3-ruamel-yaml	rhel9-CRB	RHEL 9.0
python3-ruamel-yaml-clib	rhel9-CRB	RHEL 9.0
python3-scapy	rhel9-AppStream	RHEL 9.0
python3-scour	rhel9-AppStream	RHEL 9.0
python3-setuptools_scm+toml	rhel9-CRB	RHEL 9.0
python3-sphinx-latex	rhel9-CRB	RHEL 9.0
python3-sphinxcontrib-applehelp	rhel9-CRB	RHEL 9.0
python3-sphinxcontrib-devhelp	rhel9-CRB	RHEL 9.0
python3-sphinxcontrib-htmlhelp	rhel9-CRB	RHEL 9.0
python3-sphinxcontrib-httpdomain	rhel9-CRB	RHEL 9.0
python3-sphinxcontrib-jsmath	rhel9-CRB	RHEL 9.0
python3-sphinxcontrib-qthelp	rhel9-CRB	RHEL 9.0
python3-sphinxcontrib-serializinghtml	rhel9-CRB	RHEL 9.0

Package	Repository	New in
python3-toml	rhel9-AppStream	RHEL 9.0
python3-urllib-gssapi	rhel9-AppStream	RHEL 9.0
python3-volume_key	rhel9-AppStream	RHEL 9.0
python3-wcwidth	rhel9-CRB	RHEL 9.0
qemu-kvm-docs	rhel9-AppStream	RHEL 9.0
qemu-kvm-hw-usbredir	rhel9-AppStream	RHEL 9.0
qemu-kvm-tools	rhel9-AppStream	RHEL 9.0
qemu-kvm-ui-opengl	rhel9-AppStream	RHEL 9.0
qemu-pr-helper	rhel9-AppStream	RHEL 9.0
qemu-virtiofsd	rhel9-AppStream	RHEL 9.0
qt5	rhel9-AppStream	RHEL 9.0
qt5-doc	rhel9-AppStream	RHEL 9.0
qt5-qt3d-doc	rhel9-AppStream	RHEL 9.0
qt5-qtbase-doc	rhel9-AppStream	RHEL 9.0
qt5-qtcharts-doc	rhel9-AppStream	RHEL 9.0
qt5-qtconnectivity-doc	rhel9-AppStream	RHEL 9.0
qt5-qtdataavis3d-doc	rhel9-AppStream	RHEL 9.0
qt5-qtdeclarative-doc	rhel9-AppStream	RHEL 9.0
qt5-qtgamepad-doc	rhel9-AppStream	RHEL 9.0
qt5-qtgraphicaleffects-doc	rhel9-AppStream	RHEL 9.0
qt5-qtimageformats-doc	rhel9-AppStream	RHEL 9.0
qt5-qtlocation-doc	rhel9-AppStream	RHEL 9.0
qt5-qtmultimedia-doc	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
qt5-qt purchasing-doc	rhel9-AppStream	RHEL 9.0
qt5-qtquickcontrols-doc	rhel9-AppStream	RHEL 9.0
qt5-qtquickcontrols2-doc	rhel9-AppStream	RHEL 9.0
qt5-qtremoteobjects-doc	rhel9-AppStream	RHEL 9.0
qt5-qtscript-doc	rhel9-AppStream	RHEL 9.0
qt5-qtscxml-doc	rhel9-AppStream	RHEL 9.0
qt5-qt sensors-doc	rhel9-AppStream	RHEL 9.0
qt5-qtserialbus-doc	rhel9-AppStream	RHEL 9.0
qt5-qtserialport-doc	rhel9-AppStream	RHEL 9.0
qt5-qt speech-doc	rhel9-AppStream	RHEL 9.0
qt5-qtsvg-doc	rhel9-AppStream	RHEL 9.0
qt5-qttools-doc	rhel9-AppStream	RHEL 9.0
qt5-qtvirtualkeyboard-doc	rhel9-AppStream	RHEL 9.0
qt5-qtwayland-doc	rhel9-AppStream	RHEL 9.0
qt5-qtwebchannel-doc	rhel9-AppStream	RHEL 9.0
qt5-qtwebsockets-doc	rhel9-AppStream	RHEL 9.0
qt5-qtwebview-doc	rhel9-AppStream	RHEL 9.0
qt5-qt x11extras-doc	rhel9-AppStream	RHEL 9.0
qt5-qt xmlpatterns-doc	rhel9-AppStream	RHEL 9.0
realtime-setup	rhel9-NFV	RHEL 9.0
realtime-tests	rhel9-AppStream	RHEL 9.0
resource-agents-cloud	rhel9-HighAvailability	RHEL 9.0
restore	rhel9-BaseOS	RHEL 9.0

Package	Repository	New in
rig	rhel9-AppStream	RHEL 9.0
rpm-plugin-audit	rhel9-BaseOS	RHEL 9.0
rpm-sign-libs	rhel9-BaseOS	RHEL 9.0
rubygem-thread_order	rhel9-AppStream	RHEL 9.0
s-nail	rhel9-AppStream	RHEL 9.0
sane-airscan	rhel9-AppStream	RHEL 9.0
setxkbmap	rhel9-AppStream	RHEL 9.0
shadow-utils-subid	rhel9-BaseOS	RHEL 9.0
shadow-utils-subid-devel	rhel9-CRB	RHEL 9.0
sid	rhel9-AppStream	RHEL 9.0
sid-base-libs	rhel9-AppStream	RHEL 9.0
sid-iface-libs	rhel9-AppStream	RHEL 9.0
sid-log-libs	rhel9-AppStream	RHEL 9.0
sid-mod-block-blkid	rhel9-AppStream	RHEL 9.0
sid-mod-block-dm-mpath	rhel9-AppStream	RHEL 9.0
sid-mod-dummies	rhel9-AppStream	RHEL 9.0
sid-resource-libs	rhel9-AppStream	RHEL 9.0
sid-tools	rhel9-AppStream	RHEL 9.0
speech-tools-libs	rhel9-AppStream	RHEL 9.0
sshpas	rhel9-AppStream	RHEL 9.0
sudo-python-plugin	rhel9-AppStream	RHEL 9.0
swtpm	rhel9-AppStream	RHEL 9.0
swtpm-libs	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
swtpm-tools	rhel9-AppStream	RHEL 9.0
sysprof-capture-devel	rhel9-AppStream	RHEL 9.0
systemd-oomd	rhel9-BaseOS	RHEL 9.0
systemd-rpm-macros	rhel9-BaseOS	RHEL 9.0
tex-preview	rhel9-AppStream	RHEL 9.0
texlive-alphalph	rhel9-AppStream	RHEL 9.0
texlive-atbegshi	rhel9-AppStream	RHEL 9.0
texlive-attachfile2	rhel9-AppStream	RHEL 9.0
texlive-atveryend	rhel9-AppStream	RHEL 9.0
texlive-auxhook	rhel9-AppStream	RHEL 9.0
texlive-bigintcalc	rhel9-AppStream	RHEL 9.0
texlive-bitset	rhel9-AppStream	RHEL 9.0
texlive-bookmark	rhel9-AppStream	RHEL 9.0
texlive-catchfile	rhel9-AppStream	RHEL 9.0
texlive-colorprofiles	rhel9-AppStream	RHEL 9.0
texlive-dehyph	rhel9-AppStream	RHEL 9.0
texlive-epstopdf-pkg	rhel9-AppStream	RHEL 9.0
texlive-etexcmds	rhel9-AppStream	RHEL 9.0
texlive-etoc	rhel9-AppStream	RHEL 9.0
texlive-footnotehyper	rhel9-AppStream	RHEL 9.0
texlive-gettitlestring	rhel9-AppStream	RHEL 9.0
texlive-gnu-freefont	rhel9-CRB	RHEL 9.0
texlive-grfext	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
texlive-grffile	rhel9-AppStream	RHEL 9.0
texlive-hanging	rhel9-AppStream	RHEL 9.0
texlive-hobsub	rhel9-AppStream	RHEL 9.0
texlive-hologo	rhel9-AppStream	RHEL 9.0
texlive-hycolor	rhel9-AppStream	RHEL 9.0
texlive-hyphenex	rhel9-AppStream	RHEL 9.0
texlive-ifplatform	rhel9-AppStream	RHEL 9.0
texlive-infwarerr	rhel9-AppStream	RHEL 9.0
texlive-intcalc	rhel9-AppStream	RHEL 9.0
texlive-kvdefinekeys	rhel9-AppStream	RHEL 9.0
texlive-kvoptions	rhel9-AppStream	RHEL 9.0
texlive-kvsetkeys	rhel9-AppStream	RHEL 9.0
texlive-l3backend	rhel9-AppStream	RHEL 9.0
texlive-latexbug	rhel9-AppStream	RHEL 9.0
texlive-letltxmacro	rhel9-AppStream	RHEL 9.0
texlive-listofitems	rhel9-AppStream	RHEL 9.0
texlive-ltxcmds	rhel9-AppStream	RHEL 9.0
texlive-luahbtex	rhel9-AppStream	RHEL 9.0
texlive-lwarp	rhel9-AppStream	RHEL 9.0
texlive-minitoc	rhel9-AppStream	RHEL 9.0
texlive-modes	rhel9-AppStream	RHEL 9.0
texlive-newfloat	rhel9-AppStream	RHEL 9.0
texlive-newunicodechar	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
texlive-notoccite	rhel9-AppStream	RHEL 9.0
texlive-obsolete	rhel9-AppStream	RHEL 9.0
texlive-pdfcolmk	rhel9-AppStream	RHEL 9.0
texlive-pdfescape	rhel9-AppStream	RHEL 9.0
texlive-pdflscape	rhel9-AppStream	RHEL 9.0
texlive-pdftexcmds	rhel9-AppStream	RHEL 9.0
texlive-ragged2e	rhel9-AppStream	RHEL 9.0
texlive-refcount	rhel9-AppStream	RHEL 9.0
texlive-rerunfilecheck	rhel9-AppStream	RHEL 9.0
texlive-sansmathaccent	rhel9-AppStream	RHEL 9.0
texlive-stackengine	rhel9-AppStream	RHEL 9.0
texlive-stringenc	rhel9-AppStream	RHEL 9.0
texlive-texlive-scripts-extra	rhel9-AppStream	RHEL 9.0
texlive-translator	rhel9-AppStream	RHEL 9.0
texlive-ucharcat	rhel9-AppStream	RHEL 9.0
texlive-uniquecounter	rhel9-AppStream	RHEL 9.0
texlive-wasy-type1	rhel9-AppStream	RHEL 9.0
texlive-zref	rhel9-AppStream	RHEL 9.0
totem-video-thumbnailer	rhel9-AppStream	RHEL 9.0
tpm2-pkcs11	rhel9-AppStream	RHEL 9.0
tpm2-pkcs11-tools	rhel9-AppStream	RHEL 9.0
tuned-profiles-spectrumscale	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
twolame	rhel9-AppStream	RHEL 9.0
uchardet	rhel9-CRB	RHEL 9.0
uresourced	rhel9-AppStream	RHEL 9.0
util-linux-core	rhel9-BaseOS	RHEL 9.0
uuid-c++	rhel9-AppStream	RHEL 9.0
uuid-dce	rhel9-AppStream	RHEL 9.0
virt-p2v	rhel9-AppStream	RHEL 9.0
virt-v2v-bash-completion	rhel9-AppStream	RHEL 9.0
virt-v2v-man-pages-ja	rhel9-CRB	RHEL 9.0
virt-v2v-man-pages-uk	rhel9-CRB	RHEL 9.0
virt-win-reg	rhel9-AppStream	RHEL 9.0
voikko-fi	rhel9-AppStream	RHEL 9.0
wayland-utils	rhel9-AppStream	RHEL 9.0
waypipe	rhel9-AppStream	RHEL 9.0
weldr-client	rhel9-AppStream	RHEL 9.0
wireguard-tools	rhel9-AppStream	RHEL 9.0
wireless-regdb	rhel9-BaseOS	RHEL 9.0
wireplumber	rhel9-AppStream	RHEL 9.0
wireplumber-libs	rhel9-AppStream	RHEL 9.0
wpebackend-fdo	rhel9-AppStream	RHEL 9.0
xdg-dbus-proxy	rhel9-AppStream	RHEL 9.0
xfspgrog-xfs_scrub	rhel9-AppStream	RHEL 9.0

Package	Repository	New in
xhtml2fo-style-xsl	rhel9-AppStream	RHEL 9.0
xkbcomp	rhel9-AppStream	RHEL 9.0
xmlto-tex	rhel9-AppStream	RHEL 9.0
xmlto-xhtml	rhel9-AppStream	RHEL 9.0
xmvn-tools	rhel9-CRB	RHEL 9.0
zchunk-libs	rhel9-BaseOS	RHEL 9.0
zram-generator	rhel9-AppStream	RHEL 9.0

A.2. PACKAGE REPLACEMENTS

The following table lists packages that were replaced, renamed, merged, or split:

Original package(s)	New package(s)	Changed since	Note
apache-commons-lang (pki-deps:10.6), apache-commons-lang3 (maven:3.6)	apache-commons-lang3	RHEL 9.0	
binutils	binutils, binutils-gold	RHEL 9.0	
composer-cli	weldr-client	RHEL 9.0	
dnf-plugin-subscription-manager, subscription-manager	subscription-manager	RHEL 9.0	
fio	fio, fio-engine-devdax, fio-engine-http, fio-engine-libaio, fio-engine-libpmem, fio-engine-nbd, fio-engine-pmemblk, fio-engine-rados, fio-engine-rbd, fio-engine-rdma	RHEL 9.0	

Original package(s)	New package(s)	Changed since	Note
fio	fio, fio-engine-http, fio-engine-libaio, fio-engine-nbd, fio-engine-rados, fio-engine-rbd, fio-engine-rdma	RHEL 9.0	
flex-devel	libfl-devel, libfl-static	RHEL 9.0	
glassfish-jaxb-api (pki-deps:10.6)	jaxb-api	RHEL 9.0	
glassfish-jaxb-runtime (pki-deps:10.6)	jaxb-impl	RHEL 9.0	
gnome-session-kiosk-session	gnome-kiosk	RHEL 9.0	
guava (maven:3.6), guava20 (maven:3.5)	guava	RHEL 9.0	
hesiod	compat-hesiod	RHEL 9.0	
httpcomponents-client (maven:3.6), jakarta-commons-httpclient (pki-deps:10.6)	httpcomponents-client	RHEL 9.0	The jakarta-commons-httpclient package has been replaced by the httpcomponents-client package, which has a slightly different API. You must port code changes from jakarta-commons-httpclient to httpcomponents-client .
ilmbase	imath, openexr-devel	RHEL 9.0	
ipa-client (idm:client), ipa-client (idm:DL1)	ipa-client	RHEL 9.0	
ipa-client-common (idm:client), ipa-client-common (idm:DL1)	ipa-client-common	RHEL 9.0	
ipa-client-epn (idm:client), ipa-client-epn (idm:DL1)	ipa-client-epn	RHEL 9.0	

Original package(s)	New package(s)	Changed since	Note
ipa-client-samba (idm:client), ipa-client-samba (idm:DL1)	ipa-client-samba	RHEL 9.0	
ipa-common (idm:client), ipa-common (idm:DL1)	ipa-common	RHEL 9.0	
ipa-healthcheck-core (idm:client), ipa-healthcheck-core (idm:DL1)	ipa-healthcheck-core	RHEL 9.0	
ipa-selinux (idm:client), ipa-selinux (idm:DL1)	ipa-selinux	RHEL 9.0	
istack-commons	jaxb-istack-commons	RHEL 9.0	
jackson-annotations (pki-deps:10.6)	pki-jackson-annotations	RHEL 9.0	
jackson-core (pki-deps:10.6)	pki-jackson-core	RHEL 9.0	
jackson-databind (pki-deps:10.6)	pki-jackson-databind	RHEL 9.0	
jackson-jaxrs-json-provider (pki-deps:10.6)	pki-jackson-jaxrs-json-provider	RHEL 9.0	
jackson-jaxrs-providers (pki-deps:10.6)	pki-jackson-jaxrs-providers	RHEL 9.0	
jackson-module-jaxb-annotations (pki-deps:10.6)	pki-jackson-module-jaxb-annotations	RHEL 9.0	
javamail (javapackages-tools:201801)	jakarta-mail	RHEL 9.0	

Original package(s)	New package(s)	Changed since	Note
kernel-abi-whitelists	kernel-abi-stablelists	RHEL 9.0	
libmemcached	libmemcached-awesome	RHEL 9.0	The libmemcached library, which is no longer actively developed upstream, has been replaced by the libmemcached-awesome fork. The package has also been moved from the AppStream repository to the unsupported CodeReady Linux Builder repository.
lorax-composer	osbuild-composer	RHEL 9.0	
mailx	s-nail	RHEL 9.0	The mailx mail processing system has been replaced by s-nail . The s-nail utility is compatible with mailx and adds numerous new features. The mailx package is no longer maintained in upstream.
maven-artifact-resolver (javapackages-tools:201801), maven-artifact-transfer (javapackages-tools:201801)	maven-artifact-transfer	RHEL 9.0	
metacity	gnome-kiosk	RHEL 9.0	
OpenEXR-libs	openexr-libs	RHEL 9.0	
perl	perl, perl-AutoLoader, perl-AutoSplit, perl-autouse, perl-B, perl-base, perl-Benchmark, perl-blib, perl-Class-Struct, perl-Config-Extensions, perl-DBM_Filter, perl-debugger, perl-deprecate, perl-diagnostics, perl-DirHandle, perl-doc, perl-Dumpvalue, perl-DynaLoader,	RHEL 9.0	

Original package(s)	New package(s) perl-encoding-warnings, perl-English, perl-ExtUtils-Constant, perl-Fcntl, perl-fields, perl-File-Basename, perl-File-Compare, perl-File-Copy, perl-File-DosGlob, perl-File-Find, perl-File-stat, perl-FileCache, perl-FileHandle, perl-filetest, perl-FindBin, perl-GDBM_File, perl-Getopt-Std, perl-Hash-Util, perl-Hash-Util-FieldHash, perl-I18N-Collate, perl-I18N-Langinfo, perl-I18N-LangTags, perl-if, perl-IPC-Open3, perl-less, perl-lib, perl-locale, perl-meta-notation, perl-mro, perl-NDBM_File, perl-Net, perl-NEXT, perl-ODBM_File, perl-Opcode, perl-overload, perl-overloading, perl-ph, perl-Pod-Functions, perl-POSIX, perl-Safe, perl-Search-Dict, perl-SelectSaver, perl-sigtrap, perl-sort, perl-subst, perl-Symbol, perl-Sys-Hostname, perl-Term-Complete, perl-Term-ReadLine, perl-Text-Abbrev, perl-Thread, perl-Thread-Semaphore, perl-Tie, perl-Tie-File, perl-Tie-Memoize, perl-Time, perl-Unicode-UCD, perl-Userpwent, perl-vars, perl-vmsish	Changed since	Note

Original package(s)	New package(s)	Changed since	Note
perl-core (perl:5.24)	perl	RHEL 9.0	
php-pecl-xdebug	php-pecl-xdebug3	RHEL 9.0	
pulseaudio	pipewire-pulseaudio	RHEL 9.0	
python3-ipaclient (idm:client), python3-ipaclient (idm:DL1)	python3-ipaclient	RHEL 9.0	
python3-ipalib (idm:client), python3-ipalib (idm:DL1)	python3-ipalib	RHEL 9.0	
python3-jwcrypto (idm:client), python3-jwcrypto (idm:DL1)	python3-jwcrypto	RHEL 9.0	
python3-pyusb (idm:client), python3-pyusb (idm:DL1)	python3-pyusb	RHEL 9.0	
python3-qrcode (idm:client), python3-qrcode (idm:DL1)	python3-qrcode-core	RHEL 9.0	
python3-yubico (idm:client), python3-yubico (idm:DL1)	python3-yubico	RHEL 9.0	
qemu-kvm	ksmtuned, qemu-kvm	RHEL 9.0	
resteasy (pki-deps:10.6)	pki-resteasy-client, pki-resteasy-core, pki-resteasy-jackson2-provider, pki-resteasy-jaxb-provider	RHEL 9.0	

Original package(s)	New package(s)	Changed since	Note
rng-tools	jitterentropy, jitterentropy-devel, rng-tools	RHEL 9.0	
rpm	rpm, rpm-plugin-audit	RHEL 9.0	
rpm-build-libs	rpm-build-libs, rpm-sign-libs	RHEL 9.0	
rsyslog	rsyslog, rsyslog-logrotate	RHEL 9.0	
rt-setup	realtime-setup	RHEL 9.0	
rt-tests	realtime-tests	RHEL 9.0	
trace-cmd	libtracecmd, libtracecmd-devel, trace-cmd	RHEL 9.0	
xfspgrog	xfspgrog, xfspgrog-xfscrub	RHEL 9.0	
xorg-x11-font-utils	mkfontscale	RHEL 9.0	
xorg-x11-server-utils	xorg-x11-server-utils	RHEL 9.0	
xorg-x11-xkb-utils	setxkbmap, xkbcomp	RHEL 9.0	

A.3. MOVED PACKAGES

The following packages were moved between repositories since RHEL 8:

Package	Original repository*	Current repository*	Changed since
aajohan-comfortaa-fonts	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
alsa-sof-firmware	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
ant	rhel8-CRB	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
ant-antlr	rhel8-CRB	rhel9-AppStream	RHEL 9.0
ant-apache-bcel	rhel8-CRB	rhel9-AppStream	RHEL 9.0
ant-apache-bsf	rhel8-CRB	rhel9-AppStream	RHEL 9.0
ant-apache-oro	rhel8-CRB	rhel9-AppStream	RHEL 9.0
ant-apache-regexp	rhel8-CRB	rhel9-AppStream	RHEL 9.0
ant-apache-resolver	rhel8-CRB	rhel9-AppStream	RHEL 9.0
ant-apache-xalan2	rhel8-CRB	rhel9-AppStream	RHEL 9.0
ant-commons-logging	rhel8-CRB	rhel9-AppStream	RHEL 9.0
ant-commons-net	rhel8-CRB	rhel9-AppStream	RHEL 9.0
ant-javamail	rhel8-CRB	rhel9-AppStream	RHEL 9.0
ant-jdepend	rhel8-CRB	rhel9-AppStream	RHEL 9.0
ant-jmf	rhel8-CRB	rhel9-AppStream	RHEL 9.0
ant-jsch	rhel8-CRB	rhel9-AppStream	RHEL 9.0
ant-junit	rhel8-CRB	rhel9-AppStream	RHEL 9.0
ant-lib	rhel8-CRB	rhel9-AppStream	RHEL 9.0
ant-swing	rhel8-CRB	rhel9-AppStream	RHEL 9.0
ant-testutil	rhel8-CRB	rhel9-AppStream	RHEL 9.0
ant-xz	rhel8-CRB	rhel9-AppStream	RHEL 9.0
antlr-tool	rhel8-CRB	rhel9-AppStream	RHEL 9.0
apache-commons-cli	rhel8-CRB	rhel9-AppStream	RHEL 9.0
apache-commons-codec	rhel8-CRB	rhel9-AppStream	RHEL 9.0
apache-commons-collections	rhel8-AppStream	rhel9-CRB	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
apache-commons-compress	rhel8-AppStream	rhel9-CRB	RHEL 9.0
apache-commons-io	rhel8-CRB	rhel9-AppStream	RHEL 9.0
apache-commons-lang3	rhel8-CRB	rhel9-AppStream	RHEL 9.0
apache-commons-logging	rhel8-CRB	rhel9-AppStream	RHEL 9.0
apache-commons-net	rhel8-CRB	rhel9-AppStream	RHEL 9.0
aspell	rhel8-AppStream	rhel9-CRB	RHEL 9.0
assertj-core	rhel8-CRB	rhel9-AppStream	RHEL 9.0
atinject	rhel8-CRB	rhel9-AppStream	RHEL 9.0
atlas-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
atlas-z14	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
audit-libs-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
augeas	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
augeas-libs	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
autoconf-archive	rhel8-CRB	rhel9-AppStream	RHEL 9.0
avahi-glib	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
babl-devel	rhel8-CRB	rhel9-AppStream	RHEL 9.0
babl-devel-docs	rhel8-CRB	rhel9-AppStream	RHEL 9.0
bcel	rhel8-CRB	rhel9-AppStream	RHEL 9.0
blktrace	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
bluez-obexd	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
boom-boot	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
boom-boot-conf	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
boom-boot-grub2	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
boost-numpy3	rhel8-CRB	rhel9-AppStream	RHEL 9.0
boost-python3	rhel8-CRB	rhel9-AppStream	RHEL 9.0
brotli	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
bsdtar	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
bsf	rhel8-CRB	rhel9-AppStream	RHEL 9.0
bzip2-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
c-ares-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
cdi-api	rhel8-CRB	rhel9-AppStream	RHEL 9.0
checkpolicy	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
contrack-tools	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
corosynclib	rhel8-AppStream	rhel9- HighAvailability	RHEL 9.0
corosynclib	rhel8-AppStream	rhel9-CRB	RHEL 9.0
corosynclib	rhel8-AppStream	rhel9- ResilientStorage	RHEL 9.0
createrepo_c-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
criu-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
cryptsetup-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
ctdb	rhel8-BaseOS	rhel9- ResilientStorage	RHEL 9.0
cyrus-sasl-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
cyrus-sasl-gs2	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
cyrus-sasl-ldap	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
cyrus-sasl-md5	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
cyrus-sasl-ntlm	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
daxctl	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
dbus-daemon	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
dbus-glib	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
dlm-lib	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
docbook-style-dsssl	rhel8-CRB	rhel9-AppStream	RHEL 9.0
docbook-utils	rhel8-CRB	rhel9-AppStream	RHEL 9.0
docbook5-schemas	rhel8-CRB	rhel9-AppStream	RHEL 9.0
doxygen	rhel8-CRB	rhel9-AppStream	RHEL 9.0
doxygen-doxywizard	rhel8-CRB	rhel9-AppStream	RHEL 9.0
doxygen-latex	rhel8-CRB	rhel9-AppStream	RHEL 9.0
dracut-caps	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
dracut-live	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
dtc	rhel8-CRB	rhel9-AppStream	RHEL 9.0
dwarves	rhel8-CRB	rhel9-AppStream	RHEL 9.0
e2fsprogs-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
efivar	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
elfutils-debuginfod	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
elfutils-debuginfod-client-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
elfutils-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
elfutils-libelf-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
emacs-filesystem	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
evolution-data-server-doc	rhel8-CRB	rhel9-AppStream	RHEL 9.0
evolution-data-server-perl	rhel8-CRB	rhel9-AppStream	RHEL 9.0
evolution-data-server-tests	rhel8-CRB	rhel9-AppStream	RHEL 9.0
expat-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
expect	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
fence-agents-all	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-all	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-amt-ws	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-amt-ws	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-apc	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-apc	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-apc-snmp	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-apc-snmp	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-bladecenter	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-bladecenter	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-brocade	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-brocade	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
fence-agents-cisco-mds	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-cisco-mds	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-cisco-ucs	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-cisco-ucs	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-drac5	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-drac5	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-eaton-snmp	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-eaton-snmp	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-emerson	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-emerson	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-eps	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-eps	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-heuristics-ping	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-heuristics-ping	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-hpblade	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
fence-agents-hpblade	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-ibmblade	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-ibmblade	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-ifmib	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-ifmib	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-ilo-moonshot	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-ilo-moonshot	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-ilo-mp	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-ilo-mp	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-ilo-ssh	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-ilo-ssh	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-ilo2	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-ilo2	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-intelmodular	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-intelmodular	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
fence-agents-ipdu	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-ipdu	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-ipmilan	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-ipmilan	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-kdump	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-kdump	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-lpar	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-lpar	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-mpath	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-mpath	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-redfish	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-redfish	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-rhev	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-rhev	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-rsa	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-rsa	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
fence-agents-rsb	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-rsb	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-sbd	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-sbd	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-scsi	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-scsi	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-vmware-rest	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-vmware-rest	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-vmware-soap	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-vmware-soap	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-wti	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-wti	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
fence-agents-zvm	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
fence-agents-zvm	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
flite	rhel8-CRB	rhel9-AppStream	RHEL 9.0
fontconfig	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
fontconfig-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
freeipmi	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
freeipmi-bmc-watchdog	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
freeipmi-ipmidetectd	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
freeipmi-ipmiseld	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
freetype-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
fuse-devel	rhel8-BaseOS	rhel9-CRB	RHEL 9.0
fuse3	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
fuse3-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
fuse3-libs	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
fxload	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
galera	rhel8-CRB	rhel9-AppStream	RHEL 9.0
gdisk	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
gdk-pixbuf2	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
gettext-common-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
gettext-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
gfs2-utils	rhel8-BaseOS	rhel9-ResilientStorage	RHEL 9.0
ghostscript-doc	rhel8-CRB	rhel9-AppStream	RHEL 9.0
ghostscript-tools-dvipdf	rhel8-CRB	rhel9-AppStream	RHEL 9.0
glib2-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
glib2-doc	rhel8-CRB	rhel9-AppStream	RHEL 9.0
glib2-tests	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
glibc-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
glibc-headers	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
glibc-locale-source	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
glusterfs	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
glusterfs-client-xlators	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
glusterfs-fuse	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
glusterfs-libs	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
glusterfs-rdma	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
gmp-c++	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
gmp-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
gnome-common	rhel8-CRB	rhel9-AppStream	RHEL 9.0
gnu-efi	rhel8-CRB	rhel9-AppStream	RHEL 9.0
gnupg2-smime	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
gobject-introspection-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
google-guice	rhel8-CRB	rhel9-AppStream	RHEL 9.0
google-roboto-slab-fonts	rhel8-CRB	rhel9-AppStream	RHEL 9.0
gperf	rhel8-CRB	rhel9-AppStream	RHEL 9.0
gpgmepp	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
gpgmepp	rhel8-BaseOS	rhel9-CRB	RHEL 9.0
graphviz-doc	rhel8-CRB	rhel9-AppStream	RHEL 9.0
graphviz-python3	rhel8-CRB	rhel9-AppStream	RHEL 9.0
groff	rhel8-CRB	rhel9-AppStream	RHEL 9.0
gtkspell3	rhel8-AppStream	rhel9-CRB	RHEL 9.0
hamcrest	rhel8-CRB	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
help2man	rhel8-CRB	rhel9-AppStream	RHEL 9.0
hivex	rhel8-CRB	rhel9-AppStream	RHEL 9.0
hivex-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
httpcomponents-client	rhel8-CRB	rhel9-AppStream	RHEL 9.0
httpcomponents-core	rhel8-CRB	rhel9-AppStream	RHEL 9.0
hwloc-devel	rhel8-CRB	rhel9-AppStream	RHEL 9.0
hyphen-devel	rhel8-CRB	rhel9-AppStream	RHEL 9.0
icu	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
infiniband-diags	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
ipset-service	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
iptables-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
iputils-ninfod	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
jakarta-oro	rhel8-CRB	rhel9-AppStream	RHEL 9.0
jansi	rhel8-CRB	rhel9-AppStream	RHEL 9.0
jansson-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
javapackages-filesystem	rhel8-CRB	rhel9-AppStream	RHEL 9.0
javapackages-tools	rhel8-CRB	rhel9-AppStream	RHEL 9.0
jcl-over-slf4j	rhel8-CRB	rhel9-AppStream	RHEL 9.0
jdepend	rhel8-CRB	rhel9-AppStream	RHEL 9.0
jsch	rhel8-CRB	rhel9-AppStream	RHEL 9.0
json-c-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
jsoup	rhel8-CRB	rhel9-AppStream	RHEL 9.0
jsr-305	rhel8-CRB	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
Judy	rhel8-CRB	rhel9-AppStream	RHEL 9.0
junit	rhel8-CRB	rhel9-AppStream	RHEL 9.0
jzlib	rhel8-CRB	rhel9-AppStream	RHEL 9.0
kabi-dw	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
kbd-legacy	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
kernel-cross-headers	rhel8-BaseOS	rhel9-CRB	RHEL 9.0
kernel-debug-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
kernel-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
kernel-doc	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
kernel-headers	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
kernel-zfcpdump-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
keyutils-libs-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
krb5-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
ksc	rhel8-BaseOS	rhel9-CRB	RHEL 9.0
latex2html	rhel8-CRB	rhel9-AppStream	RHEL 9.0
lcms2-devel	rhel8-CRB	rhel9-AppStream	RHEL 9.0
leptonica	rhel8-AppStream	rhel9-CRB	RHEL 9.0
libacl-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libaio-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libappstream-glib	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libasan	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libatomic_ops	rhel8-AppStream	rhel9-CRB	RHEL 9.0
libattr-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
libbabeltrace	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libblkid-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libcap-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libcap-ng-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libcap-ng-python3	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libcom_err-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libcurl-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libdattrie-devel	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libdb-utils	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libdwarves1	rhel8-CRB	rhel9-AppStream	RHEL 9.0
liberation-fonts	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
liberation-fonts-common	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
liberation-mono-fonts	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
liberation-narrow-fonts	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
liberation-sans-fonts	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
liberation-serif-fonts	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libev	rhel8-AppStream	rhel9-BaseOS	RHEL 9.0
libevent-doc	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libfabric	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libffi-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libgcrypt-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libgomp-offload-nvptx	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libgpg-error-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
libguestfs-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
libguestfs-gobject	rhel8-AppStream	rhel9-CRB	RHEL 9.0
libguestfs-gobject-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
libguestfs-man-pages-ja	rhel8-AppStream	rhel9-CRB	RHEL 9.0
libguestfs-man-pages-uk	rhel8-AppStream	rhel9-CRB	RHEL 9.0
libguestfs-winsupport	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libica-devel	rhel8-BaseOS	rhel9-CRB	RHEL 9.0
libical	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libicu-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libiscsi	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libiscsi-utils	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libitm	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libjose-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
libkeepalive	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libldb-devel	rhel8-BaseOS	rhel9-CRB	RHEL 9.0
liblsan	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libluksmeta-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
libmaxminddb-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
libmicrohttpd	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libmount-devel	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libmpc-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
libnbd	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libnbd-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
libnetfilter_cthelper	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libnetfilter_cttimeout	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libnetfilter_queue	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libnl3-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libnsl2	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libocxl	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libogg-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
libpmem-debug	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libpmemblk-debug	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libpmemlog-debug	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libpmemobj-debug	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libpmempool-debug	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libpng-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libproxy	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libpsl-devel	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libpsm2	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libqb	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libqb-devel	rhel8-BaseOS	rhel9-HighAvailability	RHEL 9.0
libqb-devel	rhel8-BaseOS	rhel9-ResilientStorage	RHEL 9.0
librabbitmq	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
librx	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libsecret	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
libsecret-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libselenium-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libsepol-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libsoup	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libstemmer	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libstoragemgmt	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libstoragemgmt-arcconf-plugin	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libstoragemgmt-hpsa-plugin	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libstoragemgmt-local-plugin	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libstoragemgmt-megaraid-plugin	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libstoragemgmt-smis-plugin	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libstoragemgmt-udev	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libtalloc-devel	rhel8-BaseOS	rhel9-CRB	RHEL 9.0
libtdb-devel	rhel8-BaseOS	rhel9-CRB	RHEL 9.0
libtevent-devel	rhel8-BaseOS	rhel9-CRB	RHEL 9.0
libthai-devel	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libtirpc-devel	rhel8-BaseOS	rhel9-CRB	RHEL 9.0
libtool-ltdl	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libtool-ltdl-devel	rhel8-AppStream	rhel9- HighAvailability	RHEL 9.0
libtool-ltdl-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
libtool-ltdl-devel	rhel8-AppStream	rhel9- ResilientStorage	RHEL 9.0
libtsan	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
libubsan	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libusb	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libusbx-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libuuid-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libvirt-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libvirt	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libvirt-client	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libvirt-daemon	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libvirt-daemon-config-network	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libvirt-daemon-config-nwfilter	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libvirt-daemon-driver-interface	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libvirt-daemon-driver-network	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libvirt-daemon-driver-nodedev	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libvirt-daemon-driver-nwfilter	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libvirt-daemon-driver-secret	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libvirt-daemon-driver-storage	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libvirt-daemon-driver-storage-core	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libvirt-daemon-driver-storage-disk	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libvirt-daemon-driver-storage-iscsi	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libvirt-daemon-driver-storage-logical	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libvirt-daemon-driver-storage-mpath	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libvirt-daemon-driver-storage-rbd	rhel8-CRB	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
libvirt-daemon-driver-storage-scsi	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libvirt-dbus	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libvirt-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
libvirt-docs	rhel8-AppStream	rhel9-CRB	RHEL 9.0
libvirt-libs	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libvirt-lock-sanlock	rhel8-AppStream	rhel9-CRB	RHEL 9.0
libvirt-nss	rhel8-CRB	rhel9-AppStream	RHEL 9.0
libwinpr-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
libxcrypt-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libxslt	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libXxf86vm-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
libzfcphbaapi-docs	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
libzstd-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
linuxdoc-tools	rhel8-CRB	rhel9-AppStream	RHEL 9.0
lksctp-tools-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
lksctp-tools-doc	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
lm_sensors	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
lm_sensors-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
lm_sensors-libs	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
logwatch	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
lua-guestfs	rhel8-AppStream	rhel9-CRB	RHEL 9.0
lua-posix	rhel8-CRB	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
lvm2-dbusd	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
lvm2-lockd	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
lynx	rhel8-CRB	rhel9-AppStream	RHEL 9.0
lz4-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
lzo-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
lzo-minilzo	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
m4	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
mariadb	rhel8-CRB	rhel9-AppStream	RHEL 9.0
mariadb-backup	rhel8-CRB	rhel9-AppStream	RHEL 9.0
mariadb-common	rhel8-CRB	rhel9-AppStream	RHEL 9.0
mariadb-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
mariadb-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
mariadb-embedded	rhel8-CRB	rhel9-AppStream	RHEL 9.0
mariadb-embedded-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
mariadb-embedded-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
mariadb-errmsg	rhel8-CRB	rhel9-AppStream	RHEL 9.0
mariadb-gssapi-server	rhel8-CRB	rhel9-AppStream	RHEL 9.0
mariadb-oqgraph-engine	rhel8-CRB	rhel9-AppStream	RHEL 9.0
mariadb-server	rhel8-CRB	rhel9-AppStream	RHEL 9.0
mariadb-server-galera	rhel8-CRB	rhel9-AppStream	RHEL 9.0
mariadb-server-utils	rhel8-CRB	rhel9-AppStream	RHEL 9.0
mariadb-test	rhel8-AppStream	rhel9-CRB	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
mariadb-test	rhel8-AppStream	rhel9-CRB	RHEL 9.0
maven	rhel8-CRB	rhel9-AppStream	RHEL 9.0
maven-lib	rhel8-CRB	rhel9-AppStream	RHEL 9.0
maven-resolver	rhel8-CRB	rhel9-AppStream	RHEL 9.0
maven-shared-utils	rhel8-CRB	rhel9-AppStream	RHEL 9.0
maven-wagon	rhel8-CRB	rhel9-AppStream	RHEL 9.0
memstrack	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
memtest86+	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
mesa-libOSMesa	rhel8-AppStream	rhel9-CRB	RHEL 9.0
mobile-broadband-provider-info	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
mvapich2-psm2-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
mysql-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
mysql-libs	rhel8-AppStream	rhel9-CRB	RHEL 9.0
mysql-test	rhel8-AppStream	rhel9-CRB	RHEL 9.0
nbdfuse	rhel8-CRB	rhel9-AppStream	RHEL 9.0
nbdkit-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
nbdkit-example-plugins	rhel8-AppStream	rhel9-CRB	RHEL 9.0
ncurses-c++-libs	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
ncurses-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
ncurses-term	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
net-snmp-libs	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
netpbm-doc	rhel8-CRB	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
NetworkManager-config-connectivity-redhat	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
NetworkManager-dispatcher-routing-rules	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
NetworkManager-ovs	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
NetworkManager-ppp	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
nispor-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
nss_db	rhel8-BaseOS	rhel9-CRB	RHEL 9.0
ntsysv	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
numactl-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
objectweb-asm	rhel8-CRB	rhel9-AppStream	RHEL 9.0
opa-address-resolution	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
opa-basic-tools	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
opa-fastfabric	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
opa-fm	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
opa-libopamgt	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
opal-firmware	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
opal-utils	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
openblas-openmp	rhel8-CRB	rhel9-AppStream	RHEL 9.0
openblas-threads	rhel8-AppStream	rhel9-CRB	RHEL 9.0
opencl-headers	rhel8-CRB	rhel9-AppStream	RHEL 9.0
opencsd	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
OpenIPMI	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
OpenIPMI-lanserv	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
OpenIPMI-libs	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
openjade	rhel8-CRB	rhel9-AppStream	RHEL 9.0
openldap-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
opensp	rhel8-CRB	rhel9-AppStream	RHEL 9.0
openssl-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
openssl-perl	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
openwsman-client	rhel8-AppStream	rhel9-CRB	RHEL 9.0
openwsman-python3	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
openwsman-python3	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
opus-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
ostree-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
p11-kit-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
p11-kit-server	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
pacemaker-cluster-libs	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
pacemaker-cluster-libs	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
pacemaker-libs	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
pacemaker-libs	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
pacemaker-schemas	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
pacemaker-schemas	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
pam-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
pam_cifscreds	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
pam_ssh_agent_auth	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
patch	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
pciutils-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
pcre-cpp	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
pcre-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
pcre-utf16	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
pcre-utf32	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
pcre2-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
pcre2-utf16	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
pcre2-utf32	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perf	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Algorithm-Diff	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Archive-Tar	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Carp	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Clone	rhel8-CRB	rhel9-AppStream	RHEL 9.0
perl-Compress-Raw-Bzip2	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Compress-Raw-Zlib	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-constant	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Data-Dumper	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Date-Manip	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
perl-DBD-SQLite	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-DBI	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Errno	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Exporter	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Exporter-Tiny	rhel8-CRB	rhel9-AppStream	RHEL 9.0
perl-File-Path	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-File-Temp	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Getopt-Long	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-hivex	rhel8-CRB	rhel9-AppStream	RHEL 9.0
perl-HTTP-Tiny	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Importer	rhel8-CRB	rhel9-AppStream	RHEL 9.0
perl-interpreter	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-IO	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-IO-Compress	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-IO-String	rhel8-AppStream	rhel9-CRB	RHEL 9.0
perl-IO-Zlib	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-libs	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-List-MoreUtils	rhel8-CRB	rhel9-AppStream	RHEL 9.0
perl-List-MoreUtils-XS	rhel8-CRB	rhel9-AppStream	RHEL 9.0
perl-macros	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Math-Complex	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-MIME-Base64	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
perl-MIME-Charset	rhel8-CRB	rhel9-AppStream	RHEL 9.0
perl-Module-Pluggable	rhel8-AppStream	rhel9-CRB	RHEL 9.0
perl-Module-Runtime	rhel8-AppStream	rhel9-CRB	RHEL 9.0
perl-parent	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Parse-Yapp	rhel8-BaseOS	rhel9-CRB	RHEL 9.0
perl-PathTools	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Pod-Escapes	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Pod-Parser	rhel8-AppStream	rhel9-CRB	RHEL 9.0
perl-Pod-Parser	rhel8-AppStream	rhel9-CRB	RHEL 9.0
perl-Pod-Parser	rhel8-AppStream	rhel9-CRB	RHEL 9.0
perl-Pod-Perldoc	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Pod-Simple	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Pod-Usage	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-podlators	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Scalar-List-Utils	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-SGMLSpm	rhel8-CRB	rhel9-AppStream	RHEL 9.0
perl-Socket	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Storable	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Sys-CPU	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Sys-MemInfo	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Term-ANSIColor	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Term-Cap	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
perl-Term-Table	rhel8-CRB	rhel9-AppStream	RHEL 9.0
perl-Text-Diff	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Text-ParseWords	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Text-Tabs+Wrap	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-threads	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-threads-shared	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Time-Local	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
perl-Tk	rhel8-AppStream	rhel9-CRB	RHEL 9.0
perl-Unicode-EastAsianWidth	rhel8-CRB	rhel9-AppStream	RHEL 9.0
perl-Unicode-LineBreak	rhel8-CRB	rhel9-AppStream	RHEL 9.0
perl-Unicode-Normalize	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
pigz	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
plexus-cipher	rhel8-CRB	rhel9-AppStream	RHEL 9.0
plexus-classworlds	rhel8-CRB	rhel9-AppStream	RHEL 9.0
plexus-containers-component-annotations	rhel8-CRB	rhel9-AppStream	RHEL 9.0
plexus-interpolation	rhel8-CRB	rhel9-AppStream	RHEL 9.0
plexus-sec-dispatcher	rhel8-CRB	rhel9-AppStream	RHEL 9.0
plexus-utils	rhel8-CRB	rhel9-AppStream	RHEL 9.0
plotutils	rhel8-CRB	rhel9-AppStream	RHEL 9.0
pmix-devel	rhel8-CRB	rhel9-AppStream	RHEL 9.0
polycoreutils-dbus	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
polycoreutils-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
polycoreutils-python-utils	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
polkit-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
polkit-docs	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
poppler-cpp	rhel8-CRB	rhel9-AppStream	RHEL 9.0
popt-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
postfix	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
postgresql-server-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
postgresql-server-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
postgresql-server-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
postgresql-server-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
postgresql-test	rhel8-AppStream	rhel9-CRB	RHEL 9.0
postgresql-test	rhel8-AppStream	rhel9-CRB	RHEL 9.0
postgresql-test	rhel8-AppStream	rhel9-CRB	RHEL 9.0
postgresql-test	rhel8-AppStream	rhel9-CRB	RHEL 9.0
powerpc-utils	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
ppc64-diag	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
protobuf-c-compiler	rhel8-AppStream	rhel9-CRB	RHEL 9.0
protobuf-c-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
protobuf-compiler	rhel8-AppStream	rhel9-CRB	RHEL 9.0
ps_mem	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
publicsuffix-list	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python-cups-doc	rhel8-CRB	rhel9-AppStream	RHEL 9.0
python3-audit	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
python3-boom	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-cffi	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-configobj	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-cryptography	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-dns	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-docutils	rhel8-AppStream	rhel9-CRB	RHEL 9.0
python3-gobject-base	rhel8-AppStream	rhel9-CRB	RHEL 9.0
python3-hivex	rhel8-AppStream	rhel9-CRB	RHEL 9.0
python3-idle	rhel8-AppStream	rhel9-CRB	RHEL 9.0
python3-ipatests	rhel8-AppStream	rhel9-CRB	RHEL 9.0
python3-iscsi-initiator-utils	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-ldb	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-libguestfs	rhel8-AppStream	rhel9-CRB	RHEL 9.0
python3-libnbd	rhel8-CRB	rhel9-AppStream	RHEL 9.0
python3-libproxy	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-libselenium	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-libsemanage	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-libstoragemgmt	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-libvirt	rhel8-CRB	rhel9-AppStream	RHEL 9.0
python3-oauthlib	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-packaging	rhel8-CRB	rhel9-AppStream	RHEL 9.0
python3-pexpect	rhel8-AppStream	rhel9-BaseOS	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
python3-pluggy	rhel8-AppStream	rhel9-CRB	RHEL 9.0
python3-ply	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-policycoreutils	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-ptyprocess	rhel8-AppStream	rhel9-BaseOS	RHEL 9.0
python3-pwquality	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-py	rhel8-AppStream	rhel9-CRB	RHEL 9.0
python3-pycparser	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-pygments	rhel8-AppStream	rhel9-CRB	RHEL 9.0
python3-pytest	rhel8-AppStream	rhel9-CRB	RHEL 9.0
python3-pyverbs	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-pywbem	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-requests-oauthlib	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-rtslib	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-samba	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-solv	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-talloc	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-tdb	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-test	rhel8-AppStream	rhel9-CRB	RHEL 9.0
python3-test	rhel8-BaseOS	rhel9-CRB	RHEL 9.0
python3-tevent	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
python3-wheel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
qclib	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
quota-doc	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
quota-nld	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
quota-rpc	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
quota-warnquota	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
rasdaemon	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
rdma-core-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
readline-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
redhat-indexhtml	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
redhat-logos	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
redhat-logos-httpd	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
regex	rhel8-CRB	rhel9-AppStream	RHEL 9.0
rpcgen	rhel8-CRB	rhel9-AppStream	RHEL 9.0
rpm-apidocs	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
rpm-cron	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
rpm-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
rpm-plugin-ima	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
rpm-plugin-syslog	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
rpm-plugin-systemd-inhibit	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
rsync-daemon	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
ruby-hivex	rhel8-AppStream	rhel9-CRB	RHEL 9.0
ruby-libguestfs	rhel8-AppStream	rhel9-CRB	RHEL 9.0
s390utils-base	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
samba-client	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
samba-krb5-printing	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
samba-pidl	rhel8-BaseOS	rhel9-CRB	RHEL 9.0
samba-test	rhel8-BaseOS	rhel9-CRB	RHEL 9.0
samba-test-libs	rhel8-BaseOS	rhel9-CRB	RHEL 9.0
samba-winbind-clients	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
samba-winbind-krb5-locator	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
samba-winexe	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
sbd	rhel8-AppStream	rhel9-HighAvailability	RHEL 9.0
sbd	rhel8-AppStream	rhel9-ResilientStorage	RHEL 9.0
SDL2	rhel8-CRB	rhel9-AppStream	RHEL 9.0
selinux-policy-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
sendmail-milter	rhel8-AppStream	rhel9-CRB	RHEL 9.0
sgabios	rhel8-CRB	rhel9-AppStream	RHEL 9.0
sgml-common	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
sgpio	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
shim-unsigned-aarch64	rhel8-CRB	rhel9-AppStream	RHEL 9.0
slf4j	rhel8-CRB	rhel9-AppStream	RHEL 9.0
slf4j-jdk14	rhel8-CRB	rhel9-AppStream	RHEL 9.0
smc-tools	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
sombok	rhel8-CRB	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
speech-dispatcher-doc	rhel8-CRB	rhel9-AppStream	RHEL 9.0
spice-protocol	rhel8-AppStream	rhel9-CRB	RHEL 9.0
sqlite	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
sqlite-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
stress-ng	rhel8-RT	rhel9-AppStream	RHEL 9.0
stress-ng	rhel8-NFV	rhel9-AppStream	RHEL 9.0
supermin-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
swig	rhel8-AppStream	rhel9-CRB	RHEL 9.0
swig	rhel8-AppStream	rhel9-CRB	RHEL 9.0
swig-doc	rhel8-AppStream	rhel9-CRB	RHEL 9.0
swig-doc	rhel8-AppStream	rhel9-CRB	RHEL 9.0
swig-gdb	rhel8-AppStream	rhel9-CRB	RHEL 9.0
swig-gdb	rhel8-AppStream	rhel9-CRB	RHEL 9.0
syslinux-tftpboot	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
systemd-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
systemd-journal-remote	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
target-restore	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
tcl	rhel8-AppStream	rhel9-CRB	RHEL 9.0
tcl-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
tcl-doc	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
tdb-tools	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
texi2html	rhel8-CRB	rhel9-AppStream	RHEL 9.0
texinfo	rhel8-CRB	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
texinfo-tex	rhel8-CRB	rhel9-AppStream	RHEL 9.0
tmpwatch	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
tpm2-abrmd	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
tpm2-abrmd-selinux	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
tpm2-tss-devel	rhel8-BaseOS	rhel9-CRB	RHEL 9.0
tuned-profiles-atomic	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
tuned-profiles-mssql	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
tuned-profiles-oracle	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
turbojpeg	rhel8-AppStream	rhel9-CRB	RHEL 9.0
unixODBC-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
usbredir-devel	rhel8-AppStream	rhel9-CRB	RHEL 9.0
uuid	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
velocity	rhel8-AppStream	rhel9-CRB	RHEL 9.0
vhostmd	rhel8-AppStream	rhel9-SAP-NetWeaver	RHEL 9.0
vhostmd	rhel8-AppStream	rhel9-SAP-Solutions	RHEL 9.0
vim-filesystem	rhel8-AppStream	rhel9-BaseOS	RHEL 9.0
vm-dump-metrics	rhel8-BaseOS	rhel9-SAP-NetWeaver	RHEL 9.0
vm-dump-metrics	rhel8-BaseOS	rhel9-SAP-Solutions	RHEL 9.0
watchdog	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
web-assets-filesystem	rhel8-CRB	rhel9-AppStream	RHEL 9.0
xalan-j2	rhel8-CRB	rhel9-AppStream	RHEL 9.0
xerces-j2	rhel8-CRB	rhel9-AppStream	RHEL 9.0

Package	Original repository*	Current repository*	Changed since
xfsprogs-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
xhtml1-dtds	rhel8-CRB	rhel9-AppStream	RHEL 9.0
xml-common	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
xml-commons-apis	rhel8-CRB	rhel9-AppStream	RHEL 9.0
xml-commons-resolver	rhel8-CRB	rhel9-AppStream	RHEL 9.0
xmlrpc-c	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
xmlrpc-c-client	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
xmletoman	rhel8-CRB	rhel9-AppStream	RHEL 9.0
xz-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0
xz-java	rhel8-CRB	rhel9-AppStream	RHEL 9.0
xz-lzma-compat	rhel8-CRB	rhel9-AppStream	RHEL 9.0
zlib-devel	rhel8-BaseOS	rhel9-AppStream	RHEL 9.0

*This table uses abbreviated names for the repository ID. Use the following examples to help identify the full repository ID, where *<arch>* is the specific architecture:

- **rhel9-BaseOS:** *rhel-9-for-<arch>-baseos-rpms*, *rhel-9-for-<arch>-baseos-eus-rpms*, *rhel-9-for-<arch>-baseos-e4s-rpms*.
- **rhel9-AppStream:** *rhel-9-for-<arch>-appstream-rpms*, *rhel-9-for-<arch>-appstream-eus-rpms*, *rhel-9-for-<arch>-appstream-e4s-rpms*.
- **rhel9-CRB:** *codeready-builder-for-rhel-9-<arch>-rpms*, *codeready-builder-for-rhel-9-<arch>-eus-rpms*.
- **rhel9-SAP-Solutions:** *rhel-9-for-<arch>-sap-solutions-rpms*, *rhel-9-for-<arch>-sap-solutions-eus-rpms*, *rhel-9-for-<arch>-sap-solutions-e4s-rpms*.
- **rhel9-SAP-NetWeaver:** *rhel-9-for-<arch>-sap-netweaver-rpms*, *rhel-9-for-<arch>-sap-netweaver-eus-rpms*, *rhel-9-for-<arch>-sap-netweaver-e4s-rpms*.

A.4. REMOVED PACKAGES

The following packages are part of RHEL 8 but are not distributed with RHEL 9:

Package	Note
adobe-source-sans-pro-fonts-3.02803.el9.noarch.rpm	
adwaita-qt	
amanda	
amanda-client	
amanda-libs	
amanda-server	
ant-contrib	
antlr3	
antlr32	
aopalliance	
apache-commons-collections	
apache-commons-compress	
apache-commons-exec	
apache-commons-jxpath	
apache-commons-parent	
apache-ivy	
apache-parent	
apache-resource-bundles	
apache-sshd	
apiguardian	
assertj-core	
auto	

Package	Note
autoconf213	
autogen	
base64coder	
batik	
bea-stax	
bea-stax-api	
bouncycastle	
bsh	
buildnumber-maven-plugin	
byaccj	
cal10n	
cbi-plugins	
cdparanoia	
cdparanoia-devel	
cdparanoia-libs	
cdrdao	
cmirror	
codehaus-parent	
codemodel	
compat-exiv2-026	
compat-guile18	
compat-libpthread-nonshared	
compat-openssl10	

Package	Note
compat-sap-c++-10	
ctags	
ctags-etags	
custodia	
dbus-c++	
dbus-c++-devel	
dbus-c++-glib	
dbxtool	
dirsplit	
dleyna-connector-dbus	
dleyna-core	
dleyna-renderer	
dleyna-server	
dnssec-trigger	
dptfextract	
drpm	
drpm-devel	
dvd+rw-tools	
dyninst-static	
eclipse-ecf	
eclipse-emf	
eclipse-license	
ed25519-java	

Package	Note
ee4j-parent	
elfutils-devel-static	
elfutils-libelf-devel-static	
enca	
enca-devel	
environment-modules-compat	
evince-browser-plugin	
exec-maven-plugin	
farstream02	
felix-osgi-compendium	
felix-osgi-core	
felix-osgi-foundation	
felix-parent	
file-roller	
fipscheck	
fipscheck-devel	
fipscheck-lib	
forge-parent	
fuse-sshfs	
fusesource-pom	
future	
gamin	

Package	Note
gamin-devel	
gavl	
gcc-toolset-10	
gcc-toolset-10-annobin	
gcc-toolset-10-binutils	
gcc-toolset-10-binutils-devel	
gcc-toolset-10-build	
gcc-toolset-10-dwz	
gcc-toolset-10-dyninst	
gcc-toolset-10-dyninst-devel	
gcc-toolset-10-elfutils	
gcc-toolset-10-elfutils-debuginfod-client	
gcc-toolset-10-elfutils-debuginfod-client-devel	
gcc-toolset-10-elfutils-devel	
gcc-toolset-10-elfutils-libelf	
gcc-toolset-10-elfutils-libelf-devel	
gcc-toolset-10-elfutils-libs	
gcc-toolset-10-gcc	
gcc-toolset-10-gcc-c++	
gcc-toolset-10-gcc-gdb-plugin	
gcc-toolset-10-gcc-gfortran	

Package	Note
gcc-toolset-10-gdb	
gcc-toolset-10-gdb-doc	
gcc-toolset-10-gdb-gdbserver	
gcc-toolset-10-libasan-devel	
gcc-toolset-10-libatomic-devel	
gcc-toolset-10-libitm-devel	
gcc-toolset-10-liblsan-devel	
gcc-toolset-10-libquadmath-devel	
gcc-toolset-10-libstdc++-devel	
gcc-toolset-10-libstdc++-docs	
gcc-toolset-10-libtsan-devel	
gcc-toolset-10-libubsan-devel	
gcc-toolset-10-ltrace	
gcc-toolset-10-make	
gcc-toolset-10-make-devel	
gcc-toolset-10-perftools	
gcc-toolset-10-runtime	
gcc-toolset-10-strace	
gcc-toolset-10-systemtap	
gcc-toolset-10-systemtap-client	

Package	Note
gcc-toolset-10-systemtap-devel	
gcc-toolset-10-systemtap-initscript	
gcc-toolset-10-systemtap-runtime	
gcc-toolset-10-systemtap-sdt-devel	
gcc-toolset-10-systemtap-server	
gcc-toolset-10-toolchain	
gcc-toolset-10-valgrind	
gcc-toolset-10-valgrind-devel	
gcc-toolset-9	
gcc-toolset-9-annobin	
gcc-toolset-9-build	
gcc-toolset-9-perftools	
gcc-toolset-9-runtime	
gcc-toolset-9-toolchain	
GConf2	
GConf2-devel	
genisoimage	
genwqe-tools	
genwqe-vpd	
genwqe-zlib	

Package	Note
genwqe-zlib-devel	
geoipupdate	
geronimo-annotation	
geronimo-jms	
geronimo-jpa	
geronimo-parent-poms	
gfbgraph	
gflags	
gflags-devel	
glassfish-annotation-api	
glassfish-el	
glassfish-fastinfoset	
glassfish-jaxb-core	
glassfish-jaxb-txw2	
glassfish-jsp	
glassfish-jsp-api	
glassfish-legal	
glassfish-master-pom	
glassfish-servlet-api	
glew-devel	
glib2-fam	
glog	

Package	Note
glog-devel	
gmock	
gmock-devel	
gnome-boxes	
gnome-menus-devel	
gnome-online-miners	
gnome-shell-extension-disable-screenshield	
gnome-shell-extension-horizontal-workspaces	
gnome-shell-extension-no-hot-corner	
gnome-shell-extension-window-grouper	
gnome-themes-standard	
google-gson	
gphoto2	
gssntlmssp	
gtest	
gtest-devel	
gtkmm24	
gtkmm24-devel	
gtkmm24-docs	
gtksourceview3	
gtksourceview3-devel	

Package	Note
gtkspell	
gtkspell-devel	
guile	
gutenprint-gimp	
gvfs-afc	
gvfs-afp	
gvfs-archive	
hawtjni	
hawtjni	
highlight-gui	
hplip-gui	
httpcomponents-project	
icedax	
icu4j	
idm-console-framework	
ipython	
isl	
isl-devel	
isorelax	
istack-commons-runtime	
istack-commons-tools	
iwl3945-firmware	
iwl4965-firmware	

Package	Note
iwl6000-firmware	
jacoco	
jaf	
jakarta-oro	
janino	
jansi-native	
jarjar	
java-atk-wrapper	
java_cup	
javacc	
javacc-maven-plugin	
javaewah	
javaparser	
javapoet	
javassist	
jaxen	
jboss-annotations-1.2-api	
jboss-interceptors-1.2-api	
jboss-logmanager	
jboss-parent	
jctools	
jdepend	
jdependency	

Package	Note
jdom	
jdom2	
jetty	
jffi	
jflex	
jgit	
jline	
jnr-netdb	
jolokia-jvm-agent	
js-uglify	
jsch	
json_simple	
jss-javadoc	
jtidy	
junit5	
jvnet-parent	
jzlib	
ldapjdk-javadoc	
lensfun	
lensfun-devel	
libaec	
libaec-devel	
libappindicator-gtk3	

Package	Note
libappindicator-gtk3-devel	
libavc1394	
libblocksruntime	
libcacard	
libcacard-devel	
libcgroup	
libchamplain	
libchamplain-devel	
libchamplain-gtk	
libcroco	
libcroco-devel	
libcxl	
libcxl-devel	
libdap	
libdap-devel	
libdazzle-devel	
libdbusmenu	
libdbusmenu-devel	
libdbusmenu-doc	
libdbusmenu-gtk3	
libdbusmenu-gtk3-devel	
libdnet	
libdnet-devel	

Package	Note
libdv	
libdwarf	
libdwarf-devel	
libdwarf-static	
libdwarf-tools	
libepubgen-devel	
libertas-sd8686-firmware	
libertas-usb8388-firmware	
libertas-usb8388-olpc-firmware	
libgdither	
libGLEW	
libgovirt	
libguestfs-benchmarking	
libguestfs-gfs2	
libguestfs-java	
libguestfs-java-devel	
libguestfs-javadoc	
libguestfs-tools	
libguestfs-tools-c	
libhugetlbfs	
libhugetlbfs-devel	
libhugetlbfs-utils	

Package	Note
libIDL	
libIDL-devel	
libidn	
libiec61883	
libindicator-gtk3	
libindicator-gtk3-devel	
libiscsi-devel	
liblogging	
libmcpp	
libmetalink	
libmodulemd1	
libmongocrypt	
libmtp-devel	
libmusicbrainz5	
libmusicbrainz5-devel	
liboauth	
liboauth-devel	
libpfm-static	
libpurple	
libpurple-devel	
libraw1394	
libsass	
libsass-devel	

Package	Note
libselenium-python	
libsqlite3x	
libtar	
libunwind	
libusal	
libvarlink	
libvirt-admin	
libvirt-bash-completion	
libvirt-daemon-driver-storage-gluster	
libvirt-daemon-driver-storage-iscsi-direct	
libvirt-gconfig	
libvirt-gobject	
libvncserver	
libwmf	
libwmf-devel	
libwmf-lite	
libXNVCtrl	
libyami	
log4j12	
lucene	
mailman	
make-devel	

Package	Note
maven-antrun-plugin	
maven-assembly-plugin	
maven-clean-plugin	
maven-dependency-analyzer	
maven-dependency-plugin	
maven-doxia	
maven-doxia-sitetools	
maven-install-plugin	
maven-invoker	
maven-invoker-plugin	
maven-parent	
maven-plugins-pom	
maven-reporting-api	
maven-reporting-impl	
maven-scm	
maven-script-interpreter	
maven-shade-plugin	
maven-shared	
maven-verifier	
maven2	
meanwhile	
mercurial	
metis	

Package	Note
metis-devel	
mingw32-bzip2	
mingw32-bzip2-static	
mingw32-cairo	
mingw32-expat	
mingw32-fontconfig	
mingw32-freetype	
mingw32-freetype-static	
mingw32-gstreamer1	
mingw32-harfbuzz	
mingw32-harfbuzz-static	
mingw32-icu	
mingw32-libjpeg-turbo	
mingw32-libjpeg-turbo-static	
mingw32-libpng	
mingw32-libpng-static	
mingw32-libtiff	
mingw32-libtiff-static	
mingw32-openssl	
mingw32-readline	
mingw32-sqlite	
mingw32-sqlite-static	

Package	Note
mingw64-adwaita-icon-theme	
mingw64-bzip2	
mingw64-bzip2-static	
mingw64-cairo	
mingw64-expat	
mingw64-fontconfig	
mingw64-freetype	
mingw64-freetype-static	
mingw64-gstreamer1	
mingw64-harfbuzz	
mingw64-harfbuzz-static	
mingw64-icu	
mingw64-libjpeg-turbo	
mingw64-libjpeg-turbo-static	
mingw64-libpng	
mingw64-libpng-static	
mingw64-libtiff	
mingw64-libtiff-static	
mingw64-nettle	
mingw64-openssl	
mingw64-readline	
mingw64-sqlite	

Package	Note
mingw64-sqlite-static	
modello	
mojo-parent	
mongo-c-driver	
mousetweaks	
mozjs52	
mozjs52-devel	
mozjs60	
mozjs60-devel	
mozvoikko	
msv-javadoc	
msv-manual	
munge-maven-plugin	
nbd-3.21-2.el9	
nbdkit-gzip-plugin	
netcf	
netcf-devel	
netcf-libs	
nkf	
nss-pam-ldapd	We recommend to migrate from nss-pam-ldapd to SSSD.
nss_nis	
objectweb-asm	
objectweb-pom	

Package	Note
ocaml-bisect-ppx	
ocaml-camlp4	
ocaml-camlp4-devel	
ocaml-lwt-5.3.0-7.el9	
ocaml-mmap-1.1.0-16.el9	
ocaml-ocplib-endian-1.1-5.el9	
ocaml-ounit-2.2.2-15.el9	
ocaml-result-1.5-7.el9	
ocaml-seq-0.2.2-4.el9	
opencv-contrib	
opencv-core	
opencv-devel	
openhpi	
openhpi-libs	
OpenIPMI-perl	
openssh-cavs	
openssh-ldap	
openssl-ibmpkcs11	
opentest4j	
os-maven-plugin	
pakchois	
pandoc	
paranamer	

Package	Note
parfait	
parfait-examples	
parfait-javadoc	
pcp-parfait-agent	
pcp-pmda-rpm	
pcsc-lite-doc	
perl-B-Debug	
perl-B-Lint	
perl-Class-Factory-Util	
perl-Class-ISA	
perl-DateTime-Format-HTTP	
perl-DateTime-Format-Mail	
perl-File-CheckTree	
perl-homedir	
perl-homedir	
perl-libxml-perl	
perl-Locale-Codes	
perl-Mozilla-LDAP	
perl-NKF	
perl-Object-HashBase-tools	
perl-Package-DeprecationManager	
perl-Pod-LaTeX	

Package	Note
perl-Pod-Plainer	
perl-prefork	
perl-String-CRC32	
perl-SUPER	
perl-Sys-Virt	
perl-tests	
perl-YAML-Syck	
phodav-2.5-4.el9	
pidgin	
pidgin-devel	
pidgin-sipe	
pinentry-emacs	
pinentry-gtk	
pipewire0.2-devel	
pipewire0.2-libs	
plexus-ant-factory	
plexus-bsh-factory	
plexus-cli	
plexus-component-api	
plexus-component-factories-pom	
plexus-components-pom	
plexus-i18n	

Package	Note
plexus-interactivity	
plexus-pom	
plexus-velocity	
plymouth-plugin-throbgress	
powermock	
ptscotch-mpich	
ptscotch-mpich-devel	
ptscotch-mpich-devel- parmetis	
ptscotch-openmpi	
ptscotch-openmpi-devel	
purple-sipe	
python-nss-doc	
python-redis	
python-schedutils	
python-slip	
python-varlink	
python2-mock	
python3-click	
python3-cpio	
python3-custodia	
python3-flask	
python3-gevent	

Package	Note
python3-html5lib	
python3-hypothesis	
python3-itsdangerous	
python3-jwt	
python3-mock	
python3-networkx-core	
python3-nss	
python3-openipmi	The python3-openipmi package is no longer provided. python3-pyghmi has been introduced in order to provide a simpler Python API for the IPMI protocol, but the API is not compatible with the one of python3-openipmi .
python3-pillow	
python3-pydbus	
python3-pymongo	
python3-pyOpenSSL	
python3-reportlab	
python3-schedutils	
python3-scons	
python3-semantic_version	
python3-syspurpose	
python3-virtualenv	Use the venv module in Python 3 instead.
python3-webencodings	
python3-werkzeug	
qemu-kvm-block-gluster	

Package	Note
qemu-kvm-block-iscsi	
qemu-kvm-tests	
qpdf	
qpidd-proton	
qrencode	
qrencode-devel	
qrencode-libs	
qt5-qtcanvas3d	
qt5-qtcanvas3d-examples	
rarian	
rarian-compat	
re2c	
redhat-menus	
redhat-support-lib-python	
redhat-support-tool	
reflections	
regexp	
relaxngDatatype	
rhsm-gtk	
rpm-plugin-priorreset	
rubygem-abrt	
rubygem-abrt-doc	

Package	Note
rubygem-mongo	
rubygem-mongo-doc	
sane-frontends	
sank-reset	
scala	
scotch	
scotch-devel	
SDL_sound	
selinux-policy-minimum	
shrinkwrap	
sisu-mojos	
SLOF	
sonatype-oss-parent	
sonatype-plugins-parent	
sparsehash-devel	
spec-version-maven-plugin	
spice-0.14.3-4.el9	
spice-client-win-x64	
spice-client-win-x86	
spice-glib	
spice-glib-devel	
spice-gtk	

Package	Note
spice-gtk-tools	
spice-gtk3	
spice-gtk3-devel	
spice-gtk3-vala	
spice-parent	
spice-qxl-wddm-dod	
spice-server-devel	
spice-streaming-agent	
spice-vdagent-win-x64	
spice-vdagent-win-x86	
stax-ex	
stax2-api	
stringtemplate	
stringtemplate4	
subscription-manager-initial-setup-addon	
subscription-manager-migration	
subscription-manager-migration-data	
subversion-javahl	
SuperLU	
SuperLU-devel	
system-storage-manager	

Package	Note
testng	
timedatex	
treelayout	
trousers	
tycho	
uglify-js	
univocity-output-tester	
univocity-parsers	
usbguard-notifier	
utf8cpp	
uthash	
velocity	
vinagre	
vino	
virt-dib	
virt-p2v-maker	
vm-dump-metrics-devel	
weld-parent	
wodim	
woodstox-core	
xmlgraphics-commons	
xmlstreambuffer	

Package	Note
xorg-x11-apps	
xorg-x11-drv-qxl	
xorg-x11-server-Xspice	
xpp3	
xsane-gimp	
xsom	
xz-java	
yajl-devel	
yp-tools	
ypbind	
ypserv	

A.5. PACKAGES WITH REMOVED SUPPORT

Certain packages in RHEL 9 are distributed through the CodeReady Linux Builder repository, which contains unsupported packages for use by developers.

This section covers only packages that are supported in RHEL 8 but not in RHEL 9.

The following packages are distributed in a supported repository in RHEL 8 and in RHEL 9 they are a part of the CodeReady Linux Builder repository:

Package	RHEL 8 repository
createrepo_c-devel	rhel8-AppStream
gobject-introspection-devel	rhel8-AppStream
gtkspell3	rhel8-AppStream
hivex-devel	rhel8-AppStream
kernel-cross-headers	rhel8-BaseOS
ksc	rhel8-BaseOS

Package	RHEL 8 repository
libguestfs-devel	rhel8-AppStream
libguestfs-gobject	rhel8-AppStream
libguestfs-gobject-devel	rhel8-AppStream
libguestfs-man-pages-ja	rhel8-AppStream
libguestfs-man-pages-uk	rhel8-AppStream
libjose-devel	rhel8-AppStream
libldb-devel	rhel8-BaseOS
libluksmeta-devel	rhel8-AppStream
libnbd-devel	rhel8-AppStream
libtalloc-devel	rhel8-BaseOS
libtdb-devel	rhel8-BaseOS
libtevent-devel	rhel8-BaseOS
libvirt-devel	rhel8-AppStream
libvirt-docs	rhel8-AppStream
libvirt-lock-sanlock	rhel8-AppStream
libwinpr-devel	rhel8-AppStream
lua-guestfs	rhel8-AppStream
nbdkit-devel	rhel8-AppStream
nbdkit-example-plugins	rhel8-AppStream
python3-gobject-base	rhel8-AppStream
python3-hivex	rhel8-AppStream
python3-ipatests	rhel8-AppStream
python3-libguestfs	rhel8-AppStream

Package	RHEL 8 repository
ruby-hivex	rhel8-AppStream
ruby-libguestfs	rhel8-AppStream
samba-pidl	rhel8-BaseOS
samba-test	rhel8-BaseOS
samba-test-libs	rhel8-BaseOS
spice-protocol	rhel8-BaseOS
supermin-devel	rhel8-AppStream
swig	rhel8-AppStream
swig-doc	rhel8-AppStream
swig-gdb	rhel8-AppStream
usbredir-devel	rhel8-AppStream