

# Oracle Linux 8

## Release Notes for Oracle Linux 8.8



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# Preface

[Oracle Linux 8: Release Notes for Oracle Linux 8.8](#) provides information about the new features and known issues in the Oracle Linux 8.8 release. The information applies to both x86\_64 and 64-bit Arm (aarch64) architectures. This document might be updated after first publication.

## Conventions

The following text conventions are used in this document:

Convention	Meaning
<b>boldface</b>	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
<i>italic</i>	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
monospace	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

## Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at <https://www.oracle.com/corporate/accessibility/>.

For information about the accessibility of the Oracle Help Center, see the Oracle Accessibility Conformance Report at <https://www.oracle.com/corporate/accessibility/templates/t2-11535.html>.

## Access to Oracle Support for Accessibility

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit <https://www.oracle.com/corporate/accessibility/learning-support.html#support-tab>.

## Diversity and Inclusion

Oracle is fully committed to diversity and inclusion. Oracle respects and values having a diverse workforce that increases thought leadership and innovation. As part of our initiative to build a more inclusive culture that positively impacts our employees, customers, and partners, we are working to remove insensitive terms from our products and documentation. We are also mindful of the necessity to maintain compatibility with our customers' existing

technologies and the need to ensure continuity of service as Oracle's offerings and industry standards evolve. Because of these technical constraints, our effort to remove insensitive terms is ongoing and will take time and external cooperation.

# 1

## About Oracle Linux 8

The current Oracle Linux 8 release contains new features and enhancements that improve performance in different areas including automation and management, security, and compliance, container management, and developer tools. These enhancements are especially designed to make the OS adaptable to different types of deployment such as on-premises installations, hybrid deployments that combine on-premises and cloud installations, and full cloud deployment.

### ! Important:

Upgrading from an Oracle Linux Developer Preview release to its later official version isn't supported. If you're running the Developer Preview version, you must reinstall the official Oracle Linux release upon its general availability.

## System Requirements and Limitations

To check whether a specific hardware can be used with the current Oracle Linux 8 release, see the Hardware Certification List at <https://linux.oracle.com/hardware-certifications>. Note that as hardware becomes available and validated, the hardware is added to the list.

Oracle Linux 8 for the aarch64 platform is primarily engineered for use with Ampere™ eMAG™-based EVK platform and the Marvell ThunderX2® processor. Other hardware might be supported and added to the Hardware Certification List in the future.

CPU, memory, disk, and file system limits for all Oracle Linux releases are described in [Oracle Linux: Limits](#).

## Available Architectures

The release is available on the following platforms:

- Intel® 64-bit (x86\_64)
- AMD 64-bit (x86\_64)
- Arm 64-bit (aarch64)

The Arm platform runs only with Unbreakable Enterprise Kernel Release (UEK).

## Shipped Kernels

On the x86\_64 platform, Oracle Linux 8.8 release ships with the following default kernel packages:

- `kernel-4.18.0-477.10` (Red Hat Compatible Kernel (RHCK))

- `kernel-uek-5.15.0-101.103.2.1` (Unbreakable Enterprise Kernel Release 7 Updater 1 (UEK R7U1))

For new installations, the UEK R7 is automatically enabled and installed. It also becomes the default kernel on first boot.

On the aarch64 platform, Oracle Linux ships with the UEK kernel only.

**! Important:**

If you're upgrading from a previous Oracle Linux 8 version, the kernel isn't automatically upgraded to UEK R7.

The Oracle Linux release is tested as a bundle, as shipped on the installation media image. When installed from the installation media image, the kernel's version included in the image is the minimum version that's supported. Downgrading kernel packages is unsupported, unless recommended by Oracle Support.

## About the Unbreakable Enterprise Kernel

The Unbreakable Enterprise Kernel (UEK) is a Linux kernel built by Oracle and supported through Oracle Linux support. UEK is tested on Arm (aarch64), Intel® x86, and AMD x86 (x86\_64) platforms. Each release contains added features, bug fixes, and updated drivers to provide support for key functional requirements, improve performance, and optimize the kernel for use on Oracle products such as Oracle's Engineered Systems, Oracle Cloud Infrastructure, and large enterprise deployments for Oracle customers.

Typically, a UEK release contains changes to the kernel ABI relative to a previous UEK release. These changes require recompilation of third-party kernel modules on the system. To minimize impact on interoperability during releases, the Oracle Linux team works with third-party vendors regarding hardware and software that have dependencies on kernel modules. Thus, before installing the latest UEK release, verify its support status with the application vendor.

The kernel ABI for a UEK release remains unchanged in all later updates to the initial release.

The kernel source code for UEK is available after the initial release through a public git source code repository at <https://github.com/oracle/linux-uek>.

For more information about UEK such as tutorials, notices, and release notes of different UEK versions, go to [Unbreakable Enterprise Kernel documentation](#).

## User Space Compatibility

Oracle Linux maintains user space compatibility with Red Hat Enterprise Linux (RHEL) that's independent of the kernel version that underlies the OS. Existing applications in user space continue to run unmodified on UEK R6 and UEK R7, with no required recertifications for RHEL certified applications.

## Obtaining Installation Images

The following installation images for the current Oracle Linux 8 release are available:

- Full ISO of Oracle Linux for typical installations on premises.
- Boot ISO of Oracle Linux for network installations
- Boot ISO of the official UEK release for installing on hardware which is supported only on UEK
- Source DVDs

You can download these images from the following locations. Note that the images in these locations are for both the x86\_64 and aarch64 platforms, unless indicated otherwise:

- Oracle Software Delivery Cloud at <https://edelivery.oracle.com>
- Oracle Linux yum server at <https://yum.oracle.com/oracle-linux-downloads.html>

To prepare a downloaded image for installing Oracle Linux, see [Oracle Linux 8: Installing Oracle Linux](#).

For information about the available ISO images for the three most recent updates to the Oracle Linux releases, see <https://yum.oracle.com/oracle-linux-isos.html>.

For developers who use the Raspberry Pi hardware platform, Oracle provides an unsupported developer release image, which includes the required firmware to boot this platform. For more information about using the Raspberry Pi hardware platform, see [Install Oracle Linux on a Raspberry Pi](#).

### Note:

Aside from installation ISO images, you can also use Oracle Linux images to create compute instances on Oracle Cloud Infrastructure. For information about these images, see the release notes for the specific image that you're using on the [Oracle Cloud Infrastructure Documentation](#) page.

To use Oracle Linux on Oracle Cloud Infrastructure, see <https://docs.oracle.com/iaas/oracle-linux/home.htm>.

## Upgrading From Oracle Linux 7 to Oracle Linux 8

You can upgrade an Oracle Linux 7 system to the latest Oracle Linux 8 release by using the `leapp` utility. For step-by-step instructions and information about any known issues that might arise when upgrading the system, see [Oracle Linux 8: Upgrading Systems With Leapp](#).

## Installing Oracle-Supported RDMA Packages

Oracle Linux 8 releases earlier than Oracle Linux 8.7 ship with UEK R6 as the default kernel.

Starting with Oracle Linux 8.5, you also have the option of installing UEK R7. From Oracle Linux 8.7 onward, UEK R7 is the default kernel.

Oracle provides Remote Direct Memory Access (RDMA) packages for use with UEK R6 and UEK R7. The RDMA feature provides direct memory access between two systems that are connected by a network. RDMA improves high-throughput and low-latency networking in clusters.

To use RDMA features, you must first install the Oracle-supported RDMA packages. To do so, ensure that the system is subscribed to the appropriate channels on ULN or that you have enabled the appropriate repositories on the Oracle Linux yum server.

For more information about RDMA, including any known issues, see [Unbreakable Enterprise Kernel documentation](#) for the required kernel.

### RDMA With UEK R6

If you're subscribed to ULN, enable the following channels:

- `ol8_x86_64_UEKR6`
- `ol8_x86_64_baseos_latest`
- `ol8_x86_64_appstream`
- `ol8_x86_64_UEKR6_RDMA`

Note that if the system is newly registered on ULN, then the system is already subscribed to the `ol8_x86_64_UEKR6`, `ol8_x86_64_baseos_latest`, and `ol8_x86_64_appstream` channels by default. However, you must explicitly subscribe to the `ol8_x86_64_UEKR6_RDMA` channel before installing RDMA packages.

If you're using the Oracle Linux yum server, enable the following repositories:

- `ol8_UEKR6`
- `ol8_baseos_latest`
- `ol8_appstream`
- `ol8_UEKR6_RDMA`

Note that if the system already uses the Oracle Linux yum server, the `ol8_UEKR6`, `ol8_baseos_latest`, and `ol8_appstream` repositories are enabled by default. However, you must explicitly enable the `ol8_UEKR6_RDMA` repository before installing RDMA packages.

### RDMA With UEK R7

If you're subscribed to ULN, enable the following channels:

- `ol8_x86_64_UEKR7`
- `ol8_x86_64_baseos_latest`
- `ol8_x86_64_appstream`
- `ol8_x86_64_UEKR7_RDMA`

Note that if the system is newly registered on ULN, then the system is already subscribed to the `ol8_x86_64_UEKR6`, `ol8_x86_64_baseos_latest`, and `ol8_x86_64_appstream` channels by default. Disable `ol8_x86_64_UEKR6` and then explicitly subscribe to the `ol8_x86_64_UEKR7_RDMA` and `ol8_x86_64_UEKR7_RDMA` channels before installing RDMA packages.

If you're using the Oracle Linux yum server, enable the following repositories:

- `ol8_UEKR7`
- `ol8_baseos_latest`
- `ol8_appstream`
- `ol8_UEKR7_RDMA`

Note that if the system already uses the Oracle Linux yum server, the `ol8_UEKR6`, `ol8_baseos_latest`, and `ol8_appstream` repositories are enabled by default. Disable `ol8_UEKR6` and then explicitly subscribe to the `ol8_UEKR7_RDMA` and `ol8_UEKR7_RDMA` repositories before installing RDMA packages.

# 2

## New Features and Changes

This chapter describes the new features, major enhancements, bug fixes, and other changes that are included in this release of Oracle Linux 8.

### Operating System and Software Management

#### DNF Includes an `offline-upgrade` Command

Oracle Linux includes the `dnf offline-upgrade` command from the DNF `system-upgrade` plugin. Offline upgrades help protect a system during upgrades by performing package installations after a reboot and before libraries that might be affected by package updates are loaded.

This feature includes the option to apply security advisory filters, such as `--advisory`, `--security`, and `--bugfix`, to limit the download of packages and their dependencies to a specified advisory.

#### DNF API Includes an `unload_plugins` Function

The DNF API supports the `unload_plugins` function which enables you to unload plugins. To use this feature, first run the `init_plugins` function, and then run the `unload_plugins` function.

#### `rpm2archive` Includes a `--nocompression` Option

The `rpm2archive` command includes a `--nocompression` option that prevents compression when unpacking an RPM package.

### Compilers and Development Toolsets

#### Updated Compilers and Development Tools

The following performance tools and debuggers are updated:

- Valgrind 3.19
- SystemTap 4.8
- Dyninst 12.1.0
- elfutils 0.188

The following performance monitoring tools are updated:

- PCP 5.3.7
- Grafana 7.5.15

The following compiler toolsets are updated :

- GCC Toolset 12



- LLVM Toolset 15.0.7
- Rust Toolset 1.66
- Go Toolset 1.19.4

### **GCC Toolset 12**

GCC Toolset 12 is a compiler toolset that provides recent versions of development tools. The toolset is available as an Application Stream in the form of a Software Collection in the `AppStream` repository.

The following tools and versions are available in the GCC Toolset 12:

- GCC 12.2.1
- GDB 11.2
- binutils 2.38
- dwz 0.14
- anobin 11.08

To install the toolset, type:

```
sudo dnf install gcc-toolset-12
```

To run a tool from GCC Toolset 12, type:

```
scl enable gcc-toolset-12 tool
```

To run a shell session where tool versions from GCC Toolset 12 override system versions of these tools:

```
scl enable gcc-toolset-12 bash
```

### **swig:4.1 Module Stream Introduced**

Oracle Linux 8 introduces the Simplified Wrapper and Interface Generator (SWIG) version 4.1, which is available as a new module stream, `swig:4.1`.

To install the `swig:4.1` module stream, type:

```
sudo dnf module install swig:4.1
```

### **jaxb:4 Module Stream Is Introduced**

Jakarta XML Binding (JAXB) 4 is the new `jaxb:4` module stream. With the JAXB framework, developers can map Java classes to and from XML representations. To install `jaxb:4`, type:

```
sudo dnf install jaxb:4
```

### **Security Improvements for glibc**

The `SafeLinking` feature is added to `glibc`, which improves protection for the `malloc` family of functions against certain single-linked list corruption, including the allocator's thread-local cache.

### **Rust Toolset Updated to Version 1.66.1**

The updated version includes the following features:

- Additions to the toolset's API
- Keyword and statement changes
- Generic associated types (GATs) for new abstractions over types and lifetimes
- `rust-analyzer` as a new Language Server Protocol implementation
- Additional subcommands

#### **tzdata Package Includes the `leap-seconds.list` File**

The `/usr/share/zoneinfo/leap-seconds.list` file accommodates an alternate format to the `/usr/share/zoneinfo/leapseconds` file that is shipped with the `tzdata` package. With the two files, applications can use either format to calculate International Atomic Time (TAI) from Coordinated Universal Time (UTC) values.

#### **Improved `glibc` Dynamic Loader Algorithm**

While processing shared objects with deeply nested dependencies, the `glibc` dynamic loader algorithm can slow down application startup and shutdown times. The updated algorithm avoids this impact by using depth-first search (DFS).

The dynamic loader's  $O(n^3)$  algorithm is used through the `glibc.rtld.dynamic_sort` tunable, whose new default setting is 2 to use the updated version. To use the previous algorithm, set the tunable to 1, as follows:

```
GLIBC_TUNABLES=glibc.rtld.dynamic_sort=1
export GLIBC_TUNABLES
```

## Dynamic Programming Languages, Web and Database Servers

### **Python 3.11 Is Available**

Python 3.11 is an update from Python 3.9. Some notable changes that are introduced in this version include the following:

- Availability of the `match` keyword for Structural Pattern Matching
- Availability of the `tomllib` standard library module for parsing Tom's Obvious Minimal Language (TOML) formats
- Additional features related to type hints and the `typing` module, such as the new `X | Y` type union operator, variadic generics, and the new `Self` type
- Capability for raising and handling multiple unrelated exceptions simultaneously through Exception Groups and the new `except*` syntax
- Better error handling by providing precise error locations in tracebacks that point to the expression that caused the error, improved error messages, and so on

Python 3.11 can be installed in parallel with Python 3.9, Python 3.8, and Python 3.6. Note that, unlike the previous versions, Python 3.11 is distributed as standard RPM packages instead of a module.

To install packages from the `python3.11` stack, type:

```
sudo dnf install python3.11
sudo dnf install python3.11-pip
```

To run the interpreter, type:

```
python3.11
python3.11 -m pip --help
```

### git Updated to Version 2.39.1

- Logging function accepts specification of a description of the output by using the `git log --format=%(describe)` command syntax.
- Options are added to the commit operation:
  - `--fixup<commit>` fixes the content of the commit without changing the log message.
  - `--fixup=amend:<commit>` changes both the message and the content.
  - `--fixup=reword:<commit>` updates only the commit message.
- Cloning accepts the new `--reject-shallow` option to disable cloning from a shallow repository.
- Branching accepts the new `--recurse-submodules` option.
- The `git merge-tree` command can be used to test if two branches can merge or to compute a tree that results from a merge commit that merges the branches.:
- The new `safe.bareRepository` configuration variable can filter out bare repositories.

### git-lfs Updated to Version 3.2.0

Some notable features of the updated Git Large File Storage include the following:

- Introduction of a pure SSH based transport protocol
- Provision of a merge driver
- The `git lfs fsck` command also checks that pointers are canonical and that expected LFS files have the correct format
- Removal of support for the NT LAN Manager (NTLM) authentication protocol, which is replaced by Kerberos or Basic authentication

### New nginx Module Stream

The `nginx 1.22` web and proxy server is available as the `nginx:1.22` module stream and contains new features such as the following:

- Support for OpenSSL 3.0 and the `SSL_sendfile()` function, the PCRE2 library, and the POP3 and IMAP pipelining in the `mail proxy` module.
- Passes the `Auth-SSL-Protocol` and `Auth-SSL-Cipher` header lines to the mail proxy authentication server.
- Multiple enhanced directives.
- Better error handling capabilities.
- Uses the Application Layer Protocol Negotiation (ALPN) for HTTP/2 connections and no longer supports the Next Protocol Negotiation (NPN) protocol.

To install the `nginx:1.22` stream, type:

```
sudo dnf install nginx:1.22
```

### **mod\_security Updated to 2.9.6**

This updated `mod_security` module for the Apache HTTP Server includes adjusted parser activation rules in the `modsecurity.conf-recommended` file as well as enhancements to the way the module parses HTTP multipart requests. The module also includes the following additions:

- New `MULTIPART_PART_HEADERS` collection.
- Microsec timestamp resolution to the formatted log timestamp.
- Missing Geo Countries.

### **postgresql:15 Module Stream Added**

PostgreSQL version 15 is made available as the `postgresql:15` module stream. PostgreSQL 15 includes several new features and enhancements over version 13. See <https://www.postgresql.org/docs/release/15.0/> for more information.

Module stream life cycle information is available in [Oracle Linux: Product Life Cycle Information](#).

### **New Tomcat Package Introduced**

The current Oracle Linux release includes the Apache Tomcat server version 9. Tomcat is the servlet container that is used in the official Reference Implementation for the Java Servlet and JavaServer Pages technologies. Tomcat is developed in an open and participatory environment and released under the Apache Software License version 2.0.

### **nodejs:18 Updated to Version 18.14 With npm Updated to Version 9**

The updated `Node.js` 18.14 includes a SemVer major upgrade of `npm` from version 8 to version 9. In this update, support for unscoped authentication configurations is removed to improve security. This update might require adjustments to the current `npm` configuration.

If you use unscoped authentication tokens, generate and supply registry-scoped tokens in the `.npmrc` file. If the `.npmrc` file contains lines that use `_auth`, for example, `///registry.npmjs.org/:_auth`, replace these lines with `///registry.npmjs.org:_authToken=${NPM_TOKEN}`. Then apply the scoped token that is generated.

## High Availability and Clusters

### **Pacemaker Can Run the validate-all Action for Resource and STONITH Agents**

Use the `validate-all --agent-validation` command option when creating or updating a resource or a STONITH device to trigger additional validation to that performed by `pcs` based on the agent's metadata.

## Infrastructure Services

### **synce41 Package for Frequency Synchronization Added**

The `synce41` package manages devices that include the SyncE (Synchronous Ethernet), a hardware feature that helps PTP clocks to achieve precise synchronization of frequency at

the physical layer. SyncE is available in certain network interface cards (NICs) and network switches and helps Telco Radio Access Network (RAN) applications to achieve accurate time synchronization for better communication efficiency. See <https://github.com/intel/synce4l> for more information.

### **powertop Updated to Version 2.15**

The updated `powertop` package includes the following features and changes:

- General fixes and stability improvements
- Improved compatibility with Ryzen processors and Kaby Lake platforms
- Enabled Lake Field, Alder Lake N, and Raptor Lake platform functionality
- Enabled Ice Lake NNPI and Meteor Lake mobile and desktop functionality

### **tuned Updated Version 2.20.0**

The updated `tuned` package includes the following features and changes:

- API update to facilitate moving devices between plugin instances at runtime.
- Updates to the `plugin_cpu` module:
  - The `pm_qos_resume_latency_us` feature limits the maximum time permitted for each CPU to transition from an idle state to an active state.
  - The `intel_pstate` scaling driver provides scaling algorithms to tune power management for a system based on usage scenarios.
- Addition of a socket API to control TuneD through a UNIX domain socket is now available as a technology preview.

### **samba Updated to Version 4.17.5**

The updated `samba` packages include the following features and changes:

- Improvements in performance around security for the Server Message Block (SMB) server when working with high metadata workloads.
- Addition of a `--json` option to the `smbstatus` command to display status information in JSON format.
- Addition of `samba.smb.conf` and `samba.samba3.smb.conf` modules to the `smbconf` Python API to facilitate reading and writing the Samba configuration directly from Python programs.

Server Message Block version 1 (SMB1) protocol is deprecated in Samba 4.11 and later and might be removed in a future release. Back up the database files before starting Samba. When the `smbd`, `nmbd`, or `winbind` services start, Samba automatically updates its `tdb` database files. Downgrading `tdb` database files isn't supported. After updating Samba, use the `testparm` utility to verify the `/etc/samba/smb.conf` file.

## Networking

### **NetworkManager Updated to Version 1.40.16**

The updated version includes the following features:

- Correctly calculates expiration times for items configured from IPv6 neighbor discovery messages.
- Automatically updates the `/etc/resolv.conf` file when the configuration changes.
- Rejects DHCPv6 leases if all addresses fail IPv6 duplicate address detection (DAD).
- Resolves system hostname on interfaces from DNS only after the interfaces are connected.
- No longer sets nonexistent interfaces as primary when activating a bond.

The following changes are also implemented:

- The `--print-config` subcommand no longer prints duplicate entries.
- The `nm-cloud-setup` utility preserves externally added addresses.
- Setting a primary interface in a bond now always works, even if the interface doesn't exist when you activate the bond.
- The `ifcfg-rh` plugin can now read InfiniBand P-Key connection profiles without an explicit interface name.
- The `nmcli` utility can now remove a bond port connection profile from a bond.
- A race condition was fixed that could occur during the activation of `veth` profiles if the peer already existed.
- Profiles created by the `nm-initrd-generator` utility now have a lower-than-default priority.
- A race condition was fixed that prevented the automatic activation of MACsec connections at boot.

### **nm-initrd-generator Profiles Have Lower Priority Than Autoconnect Profiles**

NetworkManager's configuration generator utility creates connection profiles that have lower priority than that of autoconnect connection profiles. Consequently, generated network profiles can coexist with user configuration in the default `root` account.

### **nispor Updated to Version 1.2.10**

The updated `nispor` packages include the following enhancements and bug fixes:

- `NetStateFilter` can use the kernel filter on network routes and interfaces.
- Single Root Input and Output Virtualization (SR-IOV) interfaces can query SR-IOV Virtual Function (SR-IOV VF) information per (VF).
- Additional bonding options, namely, `lACP_active`, `arp_missed_max`, and `ns_ip6_target`.

## Security

### **fapolicyd Provides Filtering of the RPM Database**

The list of RPM-database files that `fapolicyd` stores in the trust database can be customized by editing a new `/etc/fapolicyd/rpm-filter.conf` configuration file. By using this feature, you can override the default configuration filter to specify which applications installed by RPM are permitted or excluded.

### Libreswan Updated to Version 4.9

The following features were added:

- `{left,right}pubkey=` to `addconn` and `whack`
- KDF self-tests to `Crypto`
- Updated `syscall` allow-list in `seccomp`
- Support of show host's authentication key (`showhostkey`) for ECDSA pubkeys and for printing PEM encoded public key through the `--pem` option
- New functionalities for the Internet Key Exchange Protocol Version 2 (IKEv2) and the `pluto` IKE daemon

### Changes and Updates to SELinux

Updates include confining `ufdttools` and introducing an SELinux policy for `systemd-socket-proxyd` with rules for the service to run in its SELinux domain.

### OpenSCAP Updated to Version 1.3.7

The updated OpenSCAP packages include the following features and changes:

- Fixed error when processing OVAL filters.
- OpenSCAP no longer generates invalid empty `xmlfilecontent` items if an XPath doesn't match.
- Removed `Failed to check available memory errors`.

### OpenSSL Driver Can Use Certificates Chains in Rsyslog

With this update, the OpenSSL library can validate multiple CA files that you might specify. Consequently, you can use certificate chains in `Rsyslog` with the OpenSSL driver.

### FIPS Mode Better Conforms to FIPS 140-3

The FIPS mode settings in the RHCK kernel have been adjusted to conform to the Federal Information Processing Standard (FIPS) 140-3. This change introduces stricter settings to many cryptographic algorithms, functions, and cipher suites such as the following:

- The Triple Data Encryption Standard (3DES), Elliptic-curve Diffie-Hellman (ECDH), and Finite-Field Diffie-Hellman (FFDH) algorithms are disabled. This change affects Bluetooth, DH-related operations in the kernel keyring, and Intel QuickAssist Technology (QAT) cryptographic accelerators.
- The hash-based message authentication code (HMAC) key can no longer be shorter than 112 bits. The minimum key length is set to 2048 bits for Rivest-Shamir-Adleman (RSA) algorithms.
- Drivers that used the `xts_check_key()` function have been updated to use the `xts_verify_key()` function instead.
- The following Deterministic Random Bit Generator (DRBG) hash functions are disabled: SHA-224, SHA-384, SHA512-224, SHA512-256, SHA3-224, and SHA3-384.

### SELinux Confines udfutils

With updated `selinux-policy` packages, SELinux confines `udfutils` services.

### Compatibility Between `scap-security-guide` Rules and RainerScript logs

Rules in `scap-security-guide` are now compatible with the RainerScript syntax. Therefore, `scap-security-guide` rules can check and remediate ownership, group ownership, and permissions of Rsyslog log files in both available syntaxes.

### SCAP Security Guide Updated to Version 0.1.66

The SCAP Security Guide (SSG) packages are updated to the upstream version 0.1.66 and provides enhancements and bug fixes such as the following:

- Oracle Linux 8 `stig` and `stig_gui` profiles are aligned with DISA STIG for Oracle Linux 8 V1r6.
- `account_passwords_pam_faillock_audit` rule is deprecated in favor of `accounts_passwords_pam_faillock_audit`.
- `accounts_user_dot_no_world_writable_programs` rule is updated to look for initialization files on the users' home directories only and to prevent the search for world-writables to descend to other file systems.
- New OVAL macro is introduced to consistently identify interactive users.
- Remediation of `sebool_secure_mode_insmode` is fixed, which was preventing system boot when the `anssi-high` profile is applied.

### opencryptoki Updated to 3.19.0

The updated package version provides notable features such as the following:

- Dual-function cryptographic functions
- New `C_SessionCancel` function cancels active session-based operations, as described in the PKCS #11 Cryptographic Token Interface Base Specification v3.0

## Containers

The following features, enhancements, and changes related to container tools are introduced in this Oracle Linux 8.

### Updated `container-tools` Package

The `container-tools` package is updated for Podman v4.4. The package contains the Podman, Buildah, Skopeo, `crun` and `runc` tools. The updates have the following features and changes:

- Information about a container can be audited directly from a `journald` entry in Podman v4.4 and later. To enable Podman auditing, modify the `container.conf` file and add the `events_container_create_inspect_data=true` option to the `[engine]` section. The audit data is in JSON format, equivalent to the output of the `podman container inspect` command.
- The `podman network update` command is added to update networks for containers and pods.



- The `podman buildx version` command is added to display the Buildah version.
- Container startup health checks are available to trigger a command to check that the container is fully started before the regular health check is activated.
- New Docker compatibility options and aliases are included.
- Improved Kubernetes integration by consolidating `kube` commands: the `podman kube generate` and `podman kube play` replace the `podman generate kube` and `podman play kube` commands.
- The following feature support are added to pods that are created by the `podman kube play` command and managed by `systemd`:
  - The pods can integrate with `sd-notify` through the `io.containers.sdnotify` annotation or, for specific containers, the `io.containers.sdnotify/$name` annotation.
  - The pods can be auto updated through the `io.containers.auto-update` annotation or, for specific containers, the `io.containers.auto-update/$name` annotation.

### Custom DNS Server Selection Is Available for Aardvark and Netavark

Custom DNS server selection for containers using the Aardvark and Netavark network stack is available. Containers are able to use customer DNS servers instead of the default DNS servers on the host. To enable a custom DNS server, either add the `dns_servers` field in the `containers.conf` configuration file or use the new `--dns` option to specify the IP address of the DNS server when running the `podman` command. The `--dns` option overrides any values that are set in the `container.conf` file.

### Generate Sigstore Key Pairs With Skopeo

Skopeo can generate sigstore key pairs through the `skopeo generate-sigstore-key` command. For more information, see [skopeo-generate-sigstore-key manual page](#).

### Toolbox Utility Is Available

Use the `toolbox` utility to access the container command line environment without installing additional troubleshooting tools directly on the system. Toolbox uses Podman and other standard container technologies from the Open Container Initiative. For more information, see [toolbox](#).

### sigstore Signatures Available

Beginning with Podman 4.2, you can use the `sigstore` format of container image signatures. These signatures are stored in the container registry together with the container image instead of in a separate signature server for storing image signatures.

### Podman Supports Pre-execution Hooks

Podman can be configured with pre-execution hooks that can be used to control container operations by creating plugin scripts in `/usr/libexec/podman/pre-exec-hooks` or `/etc/containers/pre-exec-hooks`. Pre-execution scripts are only run if a file named `/etc/containers/podman_preexec_hooks.txt` exists. If all plugin scripts return

zero value, then the `podman` command is run, otherwise, the `podman` command exits with the exit code returned by the script that failed.

## Support

### `sos clean` Command Obfuscates IPv6 Addresses

`sos clean` detects and obfuscates IPv6 addresses to ensure that customer-sensitive data is appropriately obfuscated.

# 3

## Technology Preview

For the Red Hat Compatible Kernel in the current Oracle Linux 8 release, the following features are under technology preview:

### Infrastructure Services

The following features for infrastructure services are available as technology previews.

#### Socket API for Tuned

The socket API for Tuned maps one-to-one with the D-Bus API and provides an alternative communication method for cases where D-Bus isn't available. With the socket API, you can control the Tuned daemon to optimize the performance, and change the values of various tuning parameters. The socket API is disabled by default. You can enable it in the `tuned-main.conf` file.

### Networking

The following networking features are available as technology previews.

#### Multi-Protocol Label Switching

Multi-protocol Label Switching (MPLS) is an in-kernel data-forwarding mechanism that routes the traffic flow across enterprise networks. In an MPLS network, the router that receives packets decides the further route of the packets, based on the labels that are attached to the packet. With the usage of labels, the MPLS network can handle packets with particular characteristics.

#### XDP Features

XDP programs can be loaded on architectures other than AMD and Intel® 64-bit. Note, however, that the `libxdp` library is available only for AMD and Intel® 64-bit platforms. Likewise, in this technology preview feature, you can offload XDP hardware.

Also, XDP includes the Address Family eXpress Data Path (`AF_XDP`) socket for high-performance packet processing. It grants efficient redirection of programmatically selected packets to user space applications for further processing.

#### `act_mpls` Module

The `act_mpls` module in the `kernel-modules-extra` rpm applies Multi-Protocol Label Switching (MPLS) actions with Traffic Control (TC) filters, for example, push and pop MPLS label stack entries with TC filters. The module also accepts the Label, Traffic Class, Bottom of Stack, and Time to Live fields to be set independently.

## systemd-resolved Service

The `systemd-resolved` service provides name resolution to local applications. Its components include a caching and validating DNS stub resolver, a Link-Local Multicast Name Resolution (LLMNR), and Multicast DNS resolver and responder.

## nispor Package

The `nispor` package is a unified interface for Linux network state querying all running network status. Version 1.2.10 includes the following features and changes:

- `NetstateFilter` can use the kernel filter on network routes and interfaces.
- SR-IOV interfaces can query SR-IOV Virtual Function (SR-IOV VF) for every (VF).
- The `lacp_active`, `missed_max`, and `ns_ip6_target` bonding options are available.

You can install `nispor` in one of two ways:

- As an individual package:

```
sudo dnf install nispor
```

- As a dependency of `nmstate`:

```
sudo dnf install nmstate
```

`nispor` is listed as the dependency.

For more information on using `nispor`, see the `/usr/share/doc/nispor/README.md` file.

## Kernel

The following kernel features are available as technology previews.

### kexec Fast Reboot

The `kexec fast reboot` feature is available as a technology preview feature in Oracle Linux 8. This feature significantly speeds up the boot process by enabling the kernel to boot directly into the second kernel without first passing through the Basic Input/Output System (BIOS). To use this feature, load the `kexec` module first, then reboot the system.

## SGX Available

Software Guard Extensions (SGX) from Intel® protects software code and data from disclosure and modification. The Linux kernel partially supports SGX v1 and SGX v1.5. Version 1 enables platofmrs by using the Flexible Launch Control mechanism to use the SGX technology.

## Soft-RoCE Driver

The Soft-RoCE `rdma_rxe` is the software implementation of the Remote Direct Memory Access (RDMA) over Converged Ethernet (RoCE) network protocol for processing RDMA over Ethernet. Soft-RoCE maintains two protocol versions, RoCE v1 and RoCE v2.

## Extended Berkeley Packet Filter (eBPF)

eBPF is an in-kernel virtual machine code is processed in the kernel space, in the restricted sandbox environment with access to a limited set of functions.

eBPF has a new system call `bpf()` for creating various types of maps and for loading programs that can be attached onto various points (sockets, tracepoints, packet reception) to receive and process data.

An eBPF component is `AF_XDP`, a socket for connecting the **eXpress Data Path (XDP)** path to user space for applications that prioritize packet processing performance.

## Intel® Data Streaming Accelerator Driver

The driver is an Intel® CPU integrated accelerator and shares a work queue with process address space ID (`pasid`) submission and shared virtual memory (SVM).

## `accel-config` Package

The `accel-config` package is available on Intel® EM64T and AMD64 architectures for managing data-streaming accelerator (DSA) subsystem in the Linux kernel. Also, it configures devices through `sysfs` (pseudo file system), saves and loads the configuration in the `json` format.

## File Systems and Storage

The following features that are related to file systems and storage are available as technology preview.

### DAX File System Available

In this release, the DAX file system is available as a Technology Preview for the ext4 and XFS file systems. DAX enables an application to directly map persistent memory into its address space. The system must have some form of persistent memory available to use DAX. Persistent memory can be in the form of one or more Non-Volatile Dual In-line Memory Modules (NVDIMMs). In addition, a file system that supports DAX must be created on the NVDIMMs; the file system must be mounted with the `dax` mount option. Then, an `mmap` of a file on the DAX mounted file system results in a direct mapping of storage into the application's address space.

### NVMe/TCP Available

NVMe over Fabrics TCP host and the target drivers are included in RHCK as a technology preview in this release.

**Note:**

Support for NVMe/TCP is already available in Unbreakable Enterprise Kernel Release 6.

## OverlayFS

OverlayFS is a type of union file system. With OverlayFS, you can overlay one file system on top of another. Changes are recorded in the upper file system, while the lower file system remains unmodified. Several users can then share a file-system image, such as a container or a DVD-ROM, where the base image is on read-only media.

As a technology preview, use of OverlayFS with containers is under certain restrictions. Certain cases of OverlayFS use aren't compliant with POSIX. Therefore you must test any applications before deploying them with OverlayFS.

To check if an existing XFS file system can be used as an overlay, type the following command and see if `ftype` is enabled (`ftype=1`):

```
# xfs_info /mount-point | grep ftype
```

For more information about OverlayFS, including known issues, see [Linux kernel documentation](#)

## Stratis

A local storage manager, Stratis manages file systems on top of pools of storage and provides features such as the following:

- Manage snapshots and thin provisioning
- Automatically grow file system sizes as needed
- Maintain file systems

You administer Stratis storage through the `stratis` utility, which communicates with the `stratisd` background service.

## High Availability and Clusters

The following features for high availability and clusters are available as technology previews.

## Pacemaker Podman Bundles

Pacemaker container bundles now run on Podman, with the container bundle feature being available as a Technology Preview.

## Heuristics in `corosync-qdevice`

Heuristics are a set of commands that run locally on startup, cluster membership change, successful connect to `corosync-qnetd`, and, optionally, on a periodic basis. When all commands finish successfully, heuristics have passed; otherwise, they have failed. The heuristics result is sent to `corosync-qnetd` where it's used in calculations to decide which partition is quorate.

## Fence Agent

The `fence_heuristics_ping` agent is available with Pacemaker. The agent aims to open a class of experimental fence agents that do no actual fencing by themselves but instead exploit the behavior of fencing levels in a new way.

Through the agent, particularly by its issuing an `off` action, Pacemaker can be informed if fencing would succeed or not. The heuristics agent can prevent the agent that does the actual fencing from fencing a node under certain conditions.

## Desktop

The following desktop features are available as a technology preview.

### GNOME for 64-Bit Arm

You can use the Gnome desktop on an aarch64 system as a technical preview.

A limited set of graphical applications is available, including:

- The Firefox web browser
- Firewall Configuration (`firewall-config`)
- Disk Usage Analyzer (`baobab`)

You can use Firefox to connect to the Cockpit service on the server.

Certain applications, such as LibreOffice, only provide a CLI, and their graphical interface is disabled.

## Graphics

The following graphics features are available as technology previews in Oracle Linux.

### VNC Remote

The Virtual Network Computing (VNC) remote console is available on the 64-bit ARM architecture. Note that the rest of the graphics stack is currently unverified for the 64-bit ARM architecture.

### Intel® Arc A-Series Graphics

Intel® Arc A-Series graphics are also known as Alchemist or DG2. To enable hardware acceleration with these graphics, add the following option to the kernel command line:

```
i915.force_probe=pci-id
```

*pci-id* is the PCI ID of the Intel® GPU.

## Virtualization

The following virtualization features are available as technology previews.

### KVM Virtualization

Nested KVM virtualization can be used on the Microsoft Hyper-V hypervisor. You can create virtual machines on an Oracle Linux 8 guest system running on a Hyper-V host.

Note that currently, this feature only works on Intel® and AMD systems. In addition, nested virtualization is sometimes not enabled by default on Hyper-V. To enable it, see the <https://docs.microsoft.com/en-us/virtualization/hyper-v-on-windows/user-guide/nested-virtualization>.

### SEV and SEV-ES

The Secure Encrypted Virtualization (SEV) feature is provided for AMD EPYC host machines that use the KVM hypervisor. It encrypts a virtual machine's memory and protects the VM from access by the host.

SEV's enhanced Encrypted State version (SEV-ES) encrypts all CPU register contents when a VM stops running, thus preventing the host from modifying the VM's CPU registers or reading any information from them.

Note that SEV is supported in UEK.

### Intel® vGPU

A physical Intel® GPU device can be divided into several virtual devices referred to as *mediated devices*. These mediated devices can then be assigned to several virtual machines (VMs) as virtual GPUs. Thus, these VMs share the performance of a single physical Intel® GPU.

Note that only selected Intel® GPUs are compatible with the vGPU feature.

You can also enable a VNC console operated by Intel® vGPU. Then, users can connect to a VNC console of the VM and see the VM's desktop hosted by Intel® vGPU. However, this functionality currently only works for Oracle Linux guest operating systems.

### Nested Virtual Machines

Nested KVM virtualization is provided for KVM virtual machines (VMs) running on Intel® based systems and AMD64 systems. With this feature, an Oracle Linux 7 VM or an Oracle Linux 8 VM that runs on a physical Oracle Linux 8 host can act as a hypervisor, and host its own VMs.



## SR-IOV Adapters

Oracle Linux guest operating systems running on a Hyper-V hypervisor can now use the single-root I/O virtualization (SR-IOV) feature for Intel® network adapters that are supported by the `ixgbevf` and `iavf` drivers. This feature is enabled when the following conditions are met:

- SR-IOV support is enabled for the network interface controller (NIC), the virtual NIC, and the virtual switch.
- The virtual function (VF) from the NIC is attached to the virtual machine.

The feature is currently provided with Microsoft Windows Server 2016 and later.

## File Sharing Using virtiofs

With the `virtio` file system, you can efficiently share files between the host system and its virtual machines.

## Containers

The following features for containers are available as technology previews.

## Podman Sigstore Signatures

Podman recognizes the sigstore format of container image signatures. The sigstore signatures can be stored in the container registry with the container image without the need to have a separate signature server to store image signatures.

## Quadlet for Podman

Quadlet for Podman v4.4 and later can be used to automatically generate a `systemd` service file from the container description. Quadlet formatted descriptions are easier to write and maintain than `systemd` unit files. See the [upstream documentation](#) for more information.

## Creating Sigstore Signatures With Fulcio and Rekor Are Available

With Fulcio and Rekor servers, you can create signatures by using short-term certificates based on an OpenID Connect (OIDC) server authentication instead of manually managing a private key. This added functionality is the client side support only, and doesn't include either the Fulcio or Rekor servers. To use Fulcio, add the `fulcio` section in the `policy.json` file.

To sign container images, use the `podman push --sign-by-sigstore=file.yml` or `skopeo copy --sign-by-sigstore=file.yml` commands, where `file.yml` is the sigstore signing parameter file.

To verify signatures, add the `fulcio` section and the `rekorPublicKeyPath` or `rekorPublicKeyData` fields in the `policy.json` file. For more information, see `containers-policy.json` manual page.

# 4

## Deprecated Features

This chapter lists features and functionalities that are deprecated in Oracle Linux 8. While these features might be currently included and operative in the release, support is not guaranteed in future major releases. Thus, they should not be used in new Oracle Linux 8 deployments.

### Installation

The following installation related features and functionalities are deprecated in Oracle Linux 8.

#### Kickstart Commands

- `auth` OR `authconfig`
- `device`
- `deviceprobe`
- `dmraid`
- `install`
- `lilo`
- `lilocheck`
- `mouse`
- `multipath`
- `bootloader --upgrade`
- `ignoredisk --interactive`

Using the `--interactive` option causes a fatal installation error. You must remove this option from any kickstart files.

- `partition --active`
- `reboot --kexec`
- `autostep`

Even though specific options are listed as deprecated, the base command and the other options remain available and operative.

### Software Management

The following features and functionalities related to software management are deprecated in Oracle Linux 8.

```
rpmbuild --sign
```

Using `rpmbuild --sign` can cause a fatal error in the system. Use the `rpmsign` command instead.

## Shells and Command Lines

The following shell and command line components are deprecated in Oracle Linux 8.

### OpenEXR

As a consequence of the OpenEXR deprecation, the EXR image format is no longer supported in the `imagecodex` module.

### Dump Utility

With this removal of support for the `dump` utility, use other commands to back up file systems, for example, `tar`, `dd`, or `bacula`.

The `restore` component of the `dump` package remains supported and available as a separate `restore` package.

### hidepid=n Mount Option

As a `mount` option, `hidepid=n` controls access to `/proc/[pip]`. The option is incompatible with the `systemd` infrastructure and might cause certain `systemd` services to generate SELinux AVC denial messages, which would inhibit completion of other operations.

### ABRT Tool

The Automatic Bug Reporting Tool (ABRT) is used to detect and report application crashes. Instead of this tool, use the `systemd-coredump` tool for logging and storing core dumps that are generated when program crash.

### ReaR Crontab

The `/etc/cron.d/rear` crontab is deprecated in the `rear` package. The crontab utility monitors for any changes in the disk layout and runs `rear mkrescue` if changes are detected. If you require the `rear` functionality, configure the ReaR utility to run periodically.

### SQLite in Bacula

Support is deprecated for SQLite as a database backend of the Bacula backup system. You should migrate to one of the backends that Bacula supports, such as PostgreSQL or MySQL.

## raw Command

Use of the deprecated `/usr/bin/raw` command in future Oracle Linux releases might generate errors.

## Security

The following security related features and functionalities are deprecated in Oracle Linux 8.

### NSS SEED Ciphers

Support for TLS cipher suites that use a SEED cipher is deprecated in the Network Security Services (NSS) library from Mozilla. If your setup relies on SEED ciphers, you should enable support for other cipher suites in preparation for the complete removal of SEED ciphers from NSS.

### TLS 1.0 and TLS 1.1

These two protocols are disabled in the `DEFAULT` system-wide cryptographic policy level. If you require these protocols, switch the policy to the `LEGACY` level as follows:

```
sudo update-crypto-policies --set LEGACY
```

## DSA

Authentication mechanisms that are based on the deprecated Digital Signature Algorithm (DSA) keys no longer work in the default configuration. OpenSSH clients do not accept DSA host keys even when the system-wide cryptographic policy level is set to `LEGACY`.

`fapolicyd.rules`

Policies for allowing and denying execution rules used to be specified in the `/etc/fapolicyd/fapolicyd.rules` file. This file is being replaced by files inside the `/etc/fapolicyd/rules.d` directory.

The `fagenrules` script now merges all component rule files in this directory to the `/etc/fapolicyd/compiled.rules` file. Rules in `/etc/fapolicyd/fapolicyd.trust` are still processed by the `fapolicyd` framework but only for ensuring backward compatibility.

### SSL2 Client Hello

Secure Socket Layer 2's `Client Hello` message used to be supported by earlier versions of the Transport Layer Security (TLS) protocol. Being deprecated in the NSS library, this feature is now disabled by default.

If your application requires support for `Client Hello`, enable the feature by using the `SSL_ENABLE_V2_COMPATIBLE_HELLO` API.

## Runtime Disabling of SELinux

Setting the `SELINUX=disabled` option in `/etc/selinux/config` to disable SELinux at runtime has deprecated support. If you use only this option to disable SELinux, then SELinux remains enabled but with no loaded policy.

To completely disable SELinux, add the `selinux=0` parameter to the kernel command line.

## ipa SELinux Module

This module is no longer maintained and hence removed from the `selinux-policy` package. The functionality is now included in the `ipa-selinux` package.

## TPM 1.2

The Trusted Platform Module (TPM) is updated to 2.0 with multiple improvements. However, the updated version is not backward compatible with earlier versions. Consequently, version 1.2 is deprecated.

### crypto-policies

The introduction of scopes for `crypto-policies` directives in custom policies has resulted in the deprecation of the following derived properties of `crypto-policies`:

- `tls_cipher`
- `ssh_cipher`
- `ssh_group`
- `ike_protocol`
- `sha1_in_dnssec`

Use of the `protocol` property now requires a scope. For more information, see the `crypto-policies(7)` manual page.

## Networking

The following network related features and functionalities are deprecated in Oracle Linux 8.

## Network Scripts

Network scripts are no longer available by default. New versions of `ifup` and `ifdown` scripts call the NetworkManager service through the `nmcli` tools. Therefore, to run these scripts in Oracle Linux 8, the NetworkManager service must be running.

Other commands in `/sbin/ifup-local`, `ifdown-pre-local`, and `ifdown-local` scripts are ignored. If you manually install the legacy `network-scripts` package and use the scripts, a warning is displayed about their deprecated state.

## dropwatch Tool

Instead of the `dropwatch` tool, use the replacement `perf` command line tool in future Oracle Linux deployments, which provides the same functionality.

## xinetd Service

The `xinetd` service is replaced by `systemd`.

## cgdcbxd Package

The deprecated control group data center bridging exchange daemon (`cgdcbxd`) monitors data center bridging (DCB) netlink events and manages the `net_prio` control group subsystem. Support for this feature might be removed.

## WEP Wi-Fi Connection

Instead of using this connection method, use the Wi-Fi Protected Access 3 (WPA3) or WPA2 connection methods.

## xt\_u32 Module

The `xt_32` module enables users to match arbitrary 32 bits in the packet header or payload for their `iptables`. Because this module is unsupported, migrate to the `nftables` packet filtering framework.

First, change the firewall to use `iptables` with native matches to incrementally replace individual rules. Then, use the `iptables-translate` command and accompanying utilities to migrate to `nftables`. If the `iptables` rules have no native match in `nftables`, use the raw payload matching feature of `nftables` instead.

For more information, see the *raw payload expression* section in the `nft(8)` manual page.

## Kernel

The following kernel related features and functionalities are deprecated in Oracle Linux 8.

## rdma-rxe Driver

Software Remote Direct Memory Access over Converged Ethernet (Soft-RoCE), or RXE, emulates RDMA. Because of instability issues, this driver is now deprecated.

## Linux firewire Subsystems and Associated User Space Components

The `firewire` subsystem provides interfaces to use and maintain any resources on the IEEE 1394 bus. This subsystem is deprecated in the `kernel` package and likewise, associated user space components that are provided by the `libavc1394`, `libdc1394`, and `libram1394` packages.

## Using Diskless Boot for installing Oracle Linux for Real Time 8

Diskless boot can risk introducing network latency in real-time workloads. Therefore, this feature for installing Oracle Linux for Real Time 8 is deprecated.

### `crash-ptdump-command` Package

The `crash-ptdump-command` package is a `ptdump` extension module for the `crash` utility. The package isn't maintained upstream and is deprecated in this Oracle Linux 8 release.

## Bootloader

The following features and functionalities that are related to the bootloader are deprecated in Oracle Linux 8.

## File Systems and Storage

The following features and functionalities related to file systems and storage are deprecated in Oracle Linux 8.

### `elevator` Kernel Command

The `elevator` kernel command line parameter sets the disk scheduler for all devices. If you require a different scheduler than what the kernel automatically selects, use `udev` rule or the TuneD service to configure the preferred scheduler.

## NFSv3 Over UDP

The NFS server no longer opens or listens on a User Datagram Protocol (UDP) socket by default. Therefore, NFSv3 over UDP is disabled and no longer supported.

### `peripety` Package

The `peripety` package is deprecated. The Peripety storage event notification daemon parses system storage logs into structured storage events to enable you investigate storage issues.

## VDO Write Modes

- `sync`
- `async-unsafe`
- `auto`

In place of these modes, `async` is the recommended write mode to use.

## VDO Manager

The VDO Manager is deprecated and is replaced by the LVM-VDO integration. To create VDO volumes, preferably use the `lvcreate` command instead.

You can use the `/usr/sbin/lvm_import_vdo` script in the `lvm2` package to convert existing volumes that were created with the VDO Manager. In this manner, these volumes can be managed through the LVM-VDO integration.

## cramfs Kernel Module

In place of the deprecated `cramfs` kernel module, use `squashfs`, which is the recommended replacement.

## High Availability and Clusters

The following features and functionalities that related to high availability and clusters are deprecated in Oracle Linux 8.

### `pcs` Commands Support for `clufter` Tool

The `clufter` tool is used for analyzing cluster configuration formats. The `pcs` commands that support the `clufter` tool are deprecated. Using these commands generate a warning about their deprecations. Sections that are related to these commands are removed from the `pcs` help display and the `pcs(8)` manual page.

Specifically, the following commands are deprecated:

- `pcs config import-cman`
- `pcs config export`

## Compilers and Development Tools

The following compilers and development tools are deprecated in Oracle Linux 8.

### `libdwarf` Library

In place of the deprecated `libdwarf` library, use the `elfutils` and `libdw` libraries for applications that need to process ELF/DWARF files.

As an alternative to the `libdwarf-tools dwarfdump` program, you can use the `binutils readelf` program or the `elfutils eu-readelf` program. Both programs can be used by passing the `--debug-dump` flag.

### `gdb.i686` Packages

These packages were distributed in earlier Oracle Linux releases to support 32-bit versions of the GNU Debugger (GDB). With the removal of support for 32-bit hardware, these packages are no longer supported or available. The 64-bit version of GDB in `gdb.x86_64` packages can debug 32-bit applications.



## Desktop

The following desktop related features and functionalities are deprecated in Oracle Linux 8.

### `libgnome-keyring` Library

The `libgnome-keyring` library is deprecated in favor of the `libsecret` library, which is more compliant with security standards.

## Motif Toolkit

The Motif widget tool is deprecated, including the following packages:

- `motif`
- `openmotif`
- `openmotif21`
- `openmotif22`

Likewise, the `motif-static` package has been removed. In place of Motif, use the GTK toolkit.

## Virtualization

The following virtualization related features and functionalities are deprecated in Oracle Linux 8.

## Web Console Translation Support

The web console no longer performs translations for languages whose available translations are less than 50% of the console's translatable strings. For these languages, the user interface will be in English.

### `virsh iface-*` Commands

`virsh iface-*` commands such as `virsh iface-start`, `virsh iface-destroy`, and so on are deprecated. To configure and manage host network connections, use instead the NetworkManager tool and its related management applications, for example `nmcli`.

## Virtual Machine Manager

In place of the deprecated Virtual Machine Manager (`virt-manager`), use the web console, otherwise known as Cockpit.

## Virtual Machine Snapshots

Support for creating snapshots of VMs is limited only to those that don't use UEFI firmware. However, the operation might cause the QEMU monitor to become blocked and affects hypervisor operations.

As an alternative, use external snapshots.

## Cirrus VGA Virtual GPU Type

The Cirrus VGA GPU device is deprecated and support for it might be removed in KVM virtual machines. In its place, use `stdvga`, `virtio-vga`, or `qxi` devices.

## Signatures Using SHA-1

The use of SHA1-based signatures to perform SecureBoot image verification on UEFI (PE/COFF) executable files is deprecated. Instead, use signatures that are based on SHA-2 or later.

## SPICE Remote Display Protocol

With the deprecation of the SPICE remote display protocol, the functionality of attaching smart card readers to virtual machines (VMs) will be provided by third party remote virtualization solutions.

Also, the deprecation of this protocol has the following consequences:

- 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.

## Containers

The following features and functionalities that are related to containers are deprecated in Oracle Linux 8.

### `container-tools` Modules

The `container-tools:1.0`, `container-tools:2.0`, and `container-tools:3.0` modules are deprecated and no longer support security updates.

Use newer supported stable module streams, such as `container-tools:4.0` instead.

# 5

## Known Issues

This chapter lists known issues in the current Oracle Linux 8 release. The list covers issues that might affect both x86 and aarch64 platforms. In the list, additional issues that are specific only to aarch64 platforms are labeled `aarch64 only`:

The following guides provide additional information about known issues that related to specific Oracle Linux components:

- Podman container management tool: [Oracle Linux: Podman User's Guide](#)
- System and Oracle Cloud Infrastructure instance upgrade using Leapp: [Oracle Linux 8: Upgrading Systems With Leapp](#)

## Installation and Upgrade Issues

The following are known installation and upgrade issues for Oracle Linux 8.6.

### Messages Referring to `tmpfiles.d` Files Appear During Upgrade

During an upgrade from Oracle Linux 8.5 to Oracle Linux 8.6, and with the appropriate Oracle Linux 8 repositories enabled, the `dnf upgrade` command displays messages similar to the following:

```
Running scriptlet: systemd-239-44.0.1.el8.x86_64
4550/4550
[/usr/lib/tmpfiles.d/dnssec-trigger.conf:1] Line references path below legacy
directory /var/run/, updating /var/run/dnssec-trigger → /run/dnssec-trigger;
please update the tmpfiles.d/ drop-in file accordingly.
[/usr/lib/tmpfiles.d/krb5-krb5kdc.conf:1] Line references path below legacy
directory /var/run/, updating /var/run/krb5kdc → /run/krb5kdc; please update
the tmpfiles.d/ drop-in file accordingly.
[/usr/lib/tmpfiles.d/nss-pam-ldapd.conf:2] Line references path below legacy
directory /var/run/, updating /var/run/nslcd → /run/nslcd; please update the
tmpfiles.d/ drop-in file accordingly.
[/usr/lib/tmpfiles.d/pesign.conf:1] Line references path below legacy
directory /var/run/, updating /var/run/pesign → /run/pesign; please update
the tmpfiles.d/ drop-in file accordingly.
[/usr/lib/tmpfiles.d/portreserve.conf:1] Line references path below legacy
directory /var/run/, updating /var/run/portreserve → /run/portreserve; please
update the tmpfiles.d/ drop-in file accordingly.
.
.
.
```

These messages can be safely ignored, as the upgrade or package installation completes successfully.

As an alternative workaround, update the configuration by following the instructions in the message. Change the legacy `var/run/<...>` directory path to `/run/<...>`.

(Bug ID 32852433)

## Installer Automatically Enables Ethernet Over USB Network Interface During a PXE Installation

During a Preboot Execution Environment (PXE) installation of Oracle Linux 8, the installer automatically enables the Ethernet over USB network interface with the `bootproto=dhcp` and `ONBOOT=yes` parameters. These default settings causes the `NetworkManager` service to fail to start.

To prevent this issue from occurring, or to resolve the issue if you have already encountered it, use one of the following workarounds:

- Prior to installation, disable the `ONBOOT` parameter for the Ethernet over USB network interface in the kickstart file, as follows:

```
network --bootproto=dhcp --device=enp0s20f0u8u3c2 --onboot=off --  
ipv6=auto
```

- During installation, on the Network & Host Name screen, do not select the **Connect automatically with priority** check box to connect automatically on every reboot for the Ethernet over USB network interface.
- If you have already encountered this issue, then after the installation, change the network configuration setting for the Ethernet over USB network interface to `ONBOOT=no`. Then reboot the system.

(Bug ID 31888490)

## Interactive Text-Based Installation Wizard Unable to Complete When An Alternate Language Is Selected

If you selected an alternate language while using the text-based installer to install the OS, you cannot proceed with the installation. The installation is blocked with [!] flags for **Software Selection** and **Installation Destination** regardless of what you have set for these two options.

However, this issue does not occur if you are performing an installation by using the default English language selection or by using the graphical installation program.

(Bug IDs 30535416, 29648703)

## Graphical Installation Program Fails to Produce Error When an Unacceptable Kdump Value Is Entered

A minor upstream usability error affects the graphical installation program during the configuration of Kdump.

If you specify an unacceptable value when manually configuring the Kdump memory reservation, you can click `Done` to return to the Installation Summary screen. The installer does not generate a warning or error message. Instead, the installer

automatically resets the value either to the last known acceptable value or the default value of 512 MB, which enables the installation to succeed. However, because this corrected setting is not displayed on the screen, you might not become aware that your specified value was ignored.

This issue does not occur with the text-based installer, which correctly returns an error if you enter an unacceptable value and prevents you from continuing.

(Bug IDs 31133351, 31182708)

## Graphical Installation Program Does Not Display the Reserved Memory That's Manually Set For Kdump

A minor usability error affects the graphical installation program during the configuration of Kdump. If you manually change the default memory size that is reserved for Kdump, the new setting is not displayed when the screen is refreshed. Instead, only the values for the total system memory and usable system memory are displayed. Consequently, the limits for the parameter "Memory to be reserved (Mb)" become unknown for future Kdump configuration.



### Note:

The default setting `auto` for Kdump memory reservation is adequate as the kernel determines what size to use when it boots

(Bug IDs 31133287 and 31182699)

## Scriptlet-Related Error for `microcode_ctl` Might Be Displayed During Upgrade

A scriptlet-related error message might be displayed during an upgrade of an Oracle Linux 8 release to its next version. When you run the `dnf update` command, an output similar to the following might appear:

```
Running scriptlet:
tuned-2.13.0-6.0.2.el8.noarch
    1089/1089
Running scriptlet:
microcode_ctl-4:20191115-4.el8.x86_64
    1089/1089
realpath: weak-updates/kmod-kvdo/vdo/kvdo.ko: No such file or directory
realpath: weak-updates/kmod-kvdo/uds/uds.ko: No such file or directory
dracut: installkernel failed in module kernel-modules-extra
warning: %posttrans(microcode_ctl-4:20191115-4.el8.x86_64) scriptlet failed,
exit status 1

Error in POSTTRANS scriptlet in rpm package microcode_ctl
Running scriptlet:
libgcc-8.3.1-4.5.0.7.el8.x86_64
    1089/1089
Running scriptlet: glibc-common-2.28-101.0.1.el8.x86_64
    1089/1089
Running scriptlet:
```

```
info-6.5-6.el8.x86_64
1089/1089
```

This error message is displayed if you use the Server with GUI environment to install Oracle Linux 8 and then you reboot the server by using RHCK. This installation method installs the kernel dependent, `kmod-kvdo` package or module, which is a different version in the previous Oracle Linux 8 release.

However, you can safely ignore the message because the `kmod-kvdo` package is successfully installed during the upgrade process.

 **Note:**

This error does not occur if you install the Minimal Install base environment or if you boot the server with UEK R6 or UEK R7.

(Bug ID 31292199)

## `rhnreg_ks` Register Command Might Fail If `python3-rhn-virtualization-host` Package Is Installed

Beginning with Oracle Linux 8.1, using the `rhnreg_ks` command to register a system with the Unbreakable Linux Network (ULN) might fail if the `python3-rhn-virtualization-hosts` package is installed on the system. This issue has been observed when the `libvirtd` service is not running.

To work around this issue, ensure that the `libvirtd` packages are installed on your system and that the service is enabled and running prior to issuing the `rhnreg_ks` command.

(Bug ID 30366521)

## Package Conflict Between `usbguard-1.0.0-2.el8.i686` And `usbguard-1.0.0-8.el8.x86_64` on Oracle Linux 8 Upgrades

Beginning with Oracle Linux 8.5, when you upgrade Oracle Linux 8 with both the `ol8_baseos_latest` and `ol8_appstream` yum repositories enabled, a conflict between the `usbguard-1.0.0-2.el8.i686` and `usbguard-1.0.0-8.el8.x86_64` packages occurs.

The following error is produced:

```
Problem: package usbguard-1.0.0-8.el8.x86_64 conflicts with usbguard
provided by usbguard-1.0.0-2.el8.i686
- cannot install the best candidate for the job
- problem with installed package usbguard-1.0.0-2.el8.i686
(tr try to add '--alloweraseing' to command line to replace conflicting
packages
or '--skip-broken' to skip uninstalleable packages or '--nobest' to use
```

not  
only best candidate packages)

This conflict occurs because in Oracle Linux 8.6 and later releases, the `usbguard-1.0.0-2.el8.i686` and the `usbguard-1.0.0-8.el8.x86_64` packages conflict with each other and could no longer be installed together, unlike in previous Oracle Linux 8 releases.

To work around this issue, remove the `usbguard-1.0.0-2.el8.i686` package from your Oracle Linux 8 system prior to upgrading to the current release.

(Bug ID 34097708)

## Presence of `beignet` Package Could Result in Dependency Issue During An Upgrade

While upgrading a system to the current Oracle Linux 8 release, you might encounter a dependency issue if the `beignet` package exists on the system to be upgraded.

This issue exists specifically in cases where you upgrade systems running Oracle Linux 8.2 or earlier releases to the current Oracle Linux version. In these earlier releases, the `beignet` package requires earlier versions of the `clang-libs` package.

However, the `beignet` package is currently not available for Oracle Linux 8.4 and later Oracle Linux 8 releases. Therefore, the issue does not exist for these cases.

To work around this issue, remove the `beignet` package from the system prior to upgrading to the current Oracle Linux 8 release.

(Bug ID 31213935)

## ULN Registration Wizard Not Displayed on First Boot After An Installation

On new installations of Oracle Linux 8, the ULN registration wizard that presents the options to register with ULN and to use Oracle Ksplice isn't displayed on first boot.

As an alternative, you can register with ULN after the installation completes. For instructions, see <https://linux.oracle.com/>.

(Bug ID 29933974)

## Graphics Controller Requirements for an Installation on an Oracle VM VirtualBox Guest

To successfully install Oracle Linux 8 on an Oracle VM VirtualBox guest, where the graphical installation program is used and the default `Server with GUI` environment is selected, you must set the guest to use the `VMSVGA` graphics controller and configure the guest with at least 64MB of memory. Otherwise, the graphical display is unable to start correctly.

Beginning with Oracle VM VirtualBox 6.0, the `VMSVGA` graphics controller is the default controller for guests running Linux operating systems. This issue is more likely to appear if install Oracle Linux 8 on an existing guest that was created on an earlier Oracle VM VirtualBox release. To configure Oracle Linux 8 guests, Oracle recommends that you use Oracle VM VirtualBox 6.0 or later.

(Bug ID 30004543)

## aarch64 Only: Installer Displays Error: 'Failed to set new efi boot target' on Systems With a Multipath-Enabled NVMe Controller

The Oracle Linux 8.7 installer displays the following error on aarch64 systems that have a multipath-enabled NVMe controller:

```
Failed to set new efi boot target . This is most likely a kernel or
firmware bug.
```

To work around this issue, disable native multipath support for the installation at boot time by adding the `nvme_core.multipath=N` command-line argument on the target system.

(Bug IDs 34233800, 34215333, 31758304)

## Mellanox NIC interface name subject to change after upgrading from RHCK or UEK R6 to UEK R7

During a kernel upgrade of x86\_64 systems from RHCK or UEK R6 to UEK R7, the `mlx5_core` device name is subject to change, from `ens2f0` (RHCK or UEK R6) to `ens2f0np0` (UEK R7).

You might encounter this issue if you selected Server With GUI as the installation profile and under the following circumstances:

- When upgrading an Oracle Linux 8 system that's running RHCK or UEKR6 to UEK R7.
- When upgrading an Oracle Linux 8 system that's running RHCK or UEK R6 to Oracle Linux 9, which ships with UEK R7 by default.
- When upgrading an Oracle Linux 8 system that's already running UEK R7 to Oracle Linux 9.

### Note:

In the case where an Oracle Linux 8 system is already running UEK R7, if you previously configured the system to use backward-compatible device names (`ens2f0`), you might need to apply the workaround that follows to the GRUB configuration after the upgrade to Oracle Linux 9 has completed.

Note that fresh installations of UEK R7 on Oracle Linux 8 and Oracle Linux 9 use the default naming convention for UEK R7 (`enp2s0f0np0`) by default.

To retain backward-compatible (RHCK) device names for the `mlx5_core` driver-based network interface card (NIC), perform the following workaround after upgrading to UEK R7, prior to rebooting the system. We recommended that you back up the existing `grub.cfg` file before making this change.



1. Edit the `/etc/default/grub` file and append the end of the line in the `GRUB_CMDLINE_LINUX=` module as follows:

```
GRUB_CMDLINE_LINUX="console=xxxx mlx5_core.expose_pf_phys_port_name=0"
```

2. After editing the file, locate the `grub.cfg` file on the system, then run the command to update GRUB configuration, as appropriate:

- On BIOS-based systems, the `grub.cfg` output/target file is typically located at `/boot/grub2/grub.cfg` and you would run the following command:

```
sudo grub2-mkconfig -o /boot/grub2/grub.cfg
```

- On UEFI-based systems, the `grub.cfg` output/target file could be located at `/etc/grub2-efi.cfg` or `/boot/efi/EFI/redhat/grub.cfg`. Depending on the location of the file, you would run one of the following commands:

```
sudo grub2-mkconfig -o /etc/grub2-efi.cfg
```

```
sudo grub2-mkconfig -o /boot/efi/EFI/redhat/grub.cfg
```

3. Reboot the system for the changes to take effect.

(Bug IDs 34103369, 34145887, 35270018)

## openssh-askpass Installation Fails on Systems With Locked Channels

On Oracle Linux 8 systems that are locked to the `ol8_u8_baseos_base` repository, updating the `openssh-askpass` package for Oracle Linux 8.8 might fail because updating the package requires that the system is subscribed to the `baseos_latest` channel.

To work around this issue, ensure that the system is subscribed to the `baseos_latest` channel or repository to obtain the latest `openssh` packages.

If you need to lock the system to the `baseos_base` repository, you must also lock the `appstream` repository to the one that is provided in the Oracle Linux 8.8 ISO image. If you intend to lock a system to a particular update release for a period, consider configuring a mirror of all of the repositories that you require and schedule system updates appropriately.

Bug 35406432

## Removing `container-selinux` Package Might Also Remove The `selinux-policy-targeted` Package

If you remove the `container-selinux` package from the system after installing the current Oracle Linux 8 release, the `selinux-policy-targeted` package might also be removed.

When this problem occurs, you might also see an error message about being unable to load SELinux policy.

To avoid this issue, use the following syntax with the `dnf remove` command:

```
sudo dnf remove container-selinux --setopt=exclude=selinux-policy-targeted
```

(Bug ID 32860334)

## Running `dnf update glusterfs-*` Command Fails to Upgrade Previously Installed Packages

If `glusterfs-*`.i686 packages exist on an Oracle Linux 8 system which you then upgrade to the next update version, running the `dnf update glusterfs*` command later fails to upgrade GlusterFS packages.

As a workaround, first remove the `glusterfs-*`.i686 packages from the system, and then run the `dnf update glusterfs*` command.

(Bug ID 30279840)

## Updating `libss` Package Might Fail if `libss-devel` Package Is Installed

The `libss` package might fail to update if the `libss-devel` package is installed on the system.

This issue persists if UEK R6 is enabled. However, after updating the kernel and enabling UEK R7, the issue is no longer encountered.

However, this issue is fixed in UEK R7. Therefore, to work around this issue, enable the UEK R7 yum repository or ULN channel, and then install UEK R7. Reboot the system after the installation.

(Bug ID 32005190)

## ACPI Error Messages Displayed on Dell EMC PowerEdge Server During Boot

During a system boot of an Intel-based Dell EMC PowerEdge Server, error messages similar to the following might be displayed if the Dell Active Power Controller (DAPC) setting is enabled in the BIOS:

```
kernel: ACPI Error: No handler for Region [SYSI] (0000000061df8ef3)
[IPMI] (20190816/evregion-132)
kernel: ACPI Error: Region IPMI (ID=7) has no handler (20190816/
exfldio-265)
kernel: ACPI Error: Aborting method \_SB.PMI0._GHL due to previous
error (AE_NOT_EXIST) (20190816/psparse-531)
kernel: ACPI Error: Aborting method \_SB.PMI0._PMC due to previous
error (AE_NOT_EXIST) (20190816/psparse-531)
```

```
kernel: ACPI Error: AE_NOT_EXIST, Evaluating _PMC (20190816/power_meter-743)
```

To work around this issue, disable the `apci_power_meter` kernel module as follows:

```
echo "blacklist apci_power_meter" >> /etc/modprobe.d/hwmon.conf
```

After disabling the `apci_power_meter` kernel module, reboot the system for the change to take effect.

For environments that do not require the DAPC feature, as an alternative workaround, you can disable the DAPC BIOS setting.

(Bug ID 32105233)

## Oracle Linux 8 Doesn't Recognize SAS Controllers on Older Oracle Sun Hardware

The Oracle Linux 8 installer does not recognize some Serial Attached SCSI (SAS) controllers that are found in older Oracle Sun server models. If you attempt to install Oracle Linux 8 on these server models, the installer does not recognize the local disk and the installation fails. Examples of these server models include, but are not limited to, the following: Oracle Sun Fire X4170 M2 Server, Oracle Sun Fire X4170 M3 Server, Oracle Sun OVCA X3-2 Server, and the Oracle Sun X4-2 Server.

The following SAS controllers are removed from the `mpt2sas` driver in RHCK:

- SAS2004, PCI ID 0x1000:0x0070
- SAS2008, PCI ID 0x1000:0x0072
- SAS2108\_1, PCI ID 0x1000:0x0074
- SAS2108\_2, PCI ID 0x1000:0x0076
- SAS2108\_3, PCI ID 0x1000:0x0077
- SAS2116\_1, PCI ID 0x1000:0x0064
- SAS2116\_2, PCI ID 0x1000:0x0065
- SSS6200, PCI ID 0x1000:0x007E

The following SAS controllers are removed from the `megaraid_sas` driver in RHCK:

- Dell PERC5, PCI ID 0x1028:0x15
- SAS1078R, PCI ID 0x1000:0x60
- SAS1078DE, PCI ID 0x1000:0x7C
- SAS1064R, PCI ID 0x1000:0x411
- VERDE\_ZCR, PCI ID 0x1000:0x413
- SAS1078GEN2, PCI ID 0x1000:0x78
- SAS0079GEN2, PCI ID 0x1000:0x79
- SAS0073SKINNY, PCI ID 0x1000:0x73
- SAS0071SKINNY, PCI ID 0x1000:0x71

The workaround for this issue is to use the Unbreakable Enterprise Kernel Release 6 (UEK R6) boot ISO, and then run UEK R6 with Oracle Linux 8, as these controllers are supported in the Unbreakable Enterprise Kernel release.

(Bug ID 29120478)

## File System Issues

The following are known file systems issues that have been encountered in this release of Oracle Linux 8.

### BTRFS File System Not Supported on RHCK

The Btrfs file system is removed from RHCK in Oracle Linux 8, which means you cannot create or mount this file system when using this kernel. Also, any Btrfs user space packages that are provided are not supported with RHCK.

Support for the Btrfs file system is enabled in UEK R7 and UEK R6. Starting with Oracle Linux 8.3, during an installation, you have the option to create a Btrfs root file system, as well as select Btrfs as the file system type when formatting devices.

For further details about these changes, see the following documentation:

- For information about creating a Btrfs root file system during an installation, see [Oracle Linux 8: Installing Oracle Linux](#).
- For information about managing the Btrfs file system, see [Oracle Linux 8: Managing Local File Systems](#).
- For the latest information about other enhancements that have been made to Btrfs in UEK R6, see [Unbreakable Enterprise Kernel Release 6 Update 3: Release Notes \(5.4.17-2136\)](#).

For information about UEK R7, see [Unbreakable Enterprise Kernel Release 7: Release Notes \(5.15.0-0.30\)](#).

### OCFS2 File System Not Supported on RHCK

The OCFS2 file system is removed from RHCK in Oracle Linux 8, which means you cannot create or mount this file system when using this kernel. Also, OCFS2 user space packages that are provided are not supported with RHCK.

Note that support for OCFS2 file systems is enabled in UEK R7 and UEK R6. For the latest information and other enhancements that have been made to OCFS2 in UEK R6, see [Unbreakable Enterprise Kernel Release 6 Update 3: Release Notes \(5.4.17-2136\)](#). See also [Unbreakable Enterprise Kernel Release 7: Release Notes \(5.15.0-0.30\)](#).

### `ext4`: Frequent or Repeated System Shutdowns Can Cause File System Corruption

If a system that is using the `ext4` file system is repeatedly or frequently shut down, the file system might become corrupted. This issue is difficult to replicate and is therefore considered to be a corner-case issue. The issue exists in the upstream code and proposed patches are currently under review.

(Bug ID 27547113)

## Kernel Issues

The following are known kernel issues that have been encountered in this release of Oracle Linux 8.

### KVM Guests Boot With "amd64\_edac\_mod: Unknown symbol" Errors on AMD 64-Bit Platforms

The following errors might be displayed repeatedly when KVM guests are booting on 64-bit AMD hosts:

```
[ 12.474069] amd64_edac_mod: Unknown symbol amd_register_ecc_decoder (err
[ 120)
[ 12.474083] amd64_edac_mod: Unknown symbol amd_report_gart_errors (err 0)
[ 12.852250] amd64_edac_mod: Unknown symbol amd_unregister_ecc_decoder
(err 0)
[ 12.852297] amd64_edac_mod: Unknown symbol amd_register_ecc_decoder (err
0)
.
.
.
```

These errors occur because the module code for the kernel erroneously returns `-EEXIST` for modules that failed to load and are in the process of being removed from the module list. The `amd64_edac_mod` module will not be loaded in a VM. These errors can be ignored, as they do not impact functionality in any way.

This issue occurs on Oracle Linux 8 hosts that are running RHCK *only* and is not encountered on UEK R6 hosts.

(Bug ID 29853602)

### Output of `modinfo` Command Doesn't Show Retpoline Support

A bug in the Oracle Linux 8 code causes Retpoline support to not be displayed in the output of the `modinfo -F retpoline` command, even though the `CONFIG_RETPOLINE` flag is set to `Y`, for example:

```
sudo modinfo -F retpoline
/usr/lib/modules/4.18.0-80.el8.x86_64/kernel/sound/usb/usx2y/snd-usb-
us1221.ko
.xz
```

The `CONFIG_RETPOLINE=Y` flag is still required to add and display Retpoline support. If the parameter is enabled, the kernel builds with a retpoline capable compiler.

To confirm that the `CONFIG_RETPOLINE` flag is enabled, search for the parameter in the kernel's `config-kernel` configuration file, for example:

```
cat /boot/config-5.4.17-2011.7.4.el8uek.x86_64 | grep RETPOLINE.
```

```
CONFIG_RETPOLINE=y
```

(Bug ID 29894295)

## Kdump Might Fail on Some AMD Hardware

Kdump might fail on some AMD hardware that is running the current Oracle Linux release. Impacted hardware includes the AMD EPYC CPU servers.

To work around this issue, modify the `/etc/sysconfig/kdump` configuration file and remove the `iommu=off` command-line option from the `KDUMP_COMMANDLINE_APPEND` variable. Restart the `kdump` service for the changes to take effect.

(Bug ID 31274238, 34312626)

## Limitations of the LVM `dm-writecache` Caching Method

The new LVM `dm-writecache` caching method has certain limitations that don't exist with the `dm-cache` method, including the following:

- Can't attach or detach `dm-writecache` when a logical volume is active.
- Can't take a snapshot of a logical volume when the logical volume is using `dm-writecache`.
- Must use a `dm-writecache` block size that matches the existing file system block size when attaching `dm-writecache` to an inactive logical volume.
- Can't resize a logical volume when `dm-writecache` is attached to the volume.
- Can't use `pvmove` commands on devices that are used with `dm-writecache`.
- Can't use logical volumes with `dm-writecache` when using thin pools or the virtual data optimizer (VDO).

For more information about the `dm-writecache` caching method, see the File Systems and Storage features section of [Oracle Linux 8: Release Notes for Oracle Linux 8.2](#). See also the `lvmcache(7)` manual page.

## Error: "mcelog service does not support this processor"

An error indicating that the `mcelog` service doesn't support the processor can appear in the system log on systems with AMD processors, such as some Oracle Server hardware. The message might be displayed as follows:

```
mcelog: ERROR: AMD Processor family
23: mcelog does not support this processor. Please use the
edac_mce_amd
module instead.
```

The `mcelog` daemon is a service that is used on `x86_64` platforms to log and handle hardware error messaging. However, on AMD systems, the `edac_mce_amd` kernel module handles machine exception logging. AMD systems do not require the `mcelog` daemon. Therefore, the `mcelog` error on these systems can be disregarded.

(Bug ID 29501190)

## Power Button Defaults to ACPI Suspend Mode

By default, the Oracle Linux 8 graphical user interface (GUI) console mode treats the hardware power button as the equivalent of the ACPI "Sleep" button, which puts the system into low-power sleep mode. This behavior is specific to the GNOME desktop environment.

In previous Oracle Linux releases, the hardware power button initiated a system shutdown. To ensure that Oracle Linux 8 behaves the same way, do the following:

1. Create a file named `/etc/dconf/db/local.d/01-shutdown-button-action` with following content:

```
[org/gnome/settings-daemon/plugins/power]
power-button-action='interactive'
```

2. Create a file named `/etc/dconf/db/local.d/locks/01-power` with the following content:

```
/org/gnome/settings-daemon/plugins/power/power-button-action
```

3. Run the following command:

```
sudo dconf update
```

4. Log out of the desktop environment and then log back in for the new settings to take effect.

(Bug ID 25597898)

## Certain SEV Guest Configurations Might Cause Hypervisor CPU Soft-Lockup Warnings

On older generation AMD systems that are based on the AMD Rome processors, such as E2 and E3 systems, a guest with more than 350GB memory that's configured to use Secure Encrypted Virtualization (SEV) memory encryption can trigger a CPU soft-lockup warning on the hypervisor host during guest boot or shutdown operations.

The time that's needed to flush the pinned memory that's being encrypted is proportional to the amount of guest memory. However, with larger amounts of memory in excess of 350GB, the time on the CPU to flush the memory becomes excessive, which consequently triggers a warning. After the memory is flushed, the hypervisor resumes normal operations.

Newer systems that are based on the AMD Milan processor, such as E4 systems, have hardware support that can minimize the time required for flushing the memory. Therefore, the CPU soft-hang issue isn't encountered.

As a workaround, if a SEV enabled guest with more than 350GB of memory is required, create the guest on a system that's based on the AMD Milan processor. If you are using systems with the AMD Rome processor, limit the guest memory to less than 350GB if the guest is configured with SEV memory encryption.

(Bug ID 34050377)

## (aarch64) Some GUI Elements Aren't Displayed During Installation and Boot Using VGA Output

During installations on the Arm platform, the Oracle Linux installer does not display some GUI elements, such as the progress update screen, on VGA output. Output is displayed on the serial console, instead.

Additionally, if you install Oracle Linux with GUI on an encrypted disk, for example, by choosing Server with GUI during the installation stage, and VGA is enabled, the password prompt doesn't appear on the VGA output at system boot, and consequently, the boot process can not be completed. The prompt appears only on a serial console, and therefore, you would need to switch to a serial console to provide the password there.

This issue is specific to systems on the Arm platform only and occurs regardless of whether you are using secure boot or non secure boot. Further, the issue applies to Oracle Linux 8 or Oracle Linux 9 systems that use UEKR6 or UEKR7. The issue occurs wherever Plymouth graphical elements are loaded in the GUI.

To resolve these GUI issues and to cause these elements to display on VGA output without using a serial console, add `plymouth.ignore-serial- consoles` to the kernel command line in the GRUB configuration. For instructions, see the *Managing Kernels and System Boot* chapter in [Oracle Linux 8: Managing Core System Configuration](#).

(Bug ID 35034465 and 35270637)

## Virtual Function MAC Address Differences With Host After VF Migration

On some VF hardware, after a VF migration, the MAC address of the VF might be different from the MAC address of the destination host, unless you preset the destination host's address on the VF guest before starting the migration. When migration is completed, the guest and host MAC addresses match without requiring a guest reboot.

As an alternative to presetting the address, reboot the guest after migration to synchronize the guest VF's MAC address with that of the destination host.

(Bug ID 35508407)



## Systems With Btrfs Fail to Boot in FIPS Mode

When booted in FIPS mode, a system using Btrfs fails with the following message:

```
FATAL: FIPS integrity test failed  
Refusing to continue
```

# 6

## Package Changes from the Upstream Release

The following sections list the changes to binary and source packages from the upstream release.

### Changes to Binary Packages

This section contains information about the removed, modified, and new **binary** packages in this release. For information about the **source** package changes, see [Changes to Source Packages](#).

### Added Binary Packages for BaseOS by Oracle

The following binary packages have been added to BaseOS by Oracle:

- bcache-tools
- btrfs-progs
- dtrace
- iwlax2xx-firmware
- kernel-uek
- kernel-uek-core
- kernel-uek-debug
- kernel-uek-debug-core
- kernel-uek-debug-devel
- kernel-uek-debug-modules
- kernel-uek-debug-modules-extra
- kernel-uek-devel
- kernel-uek-doc
- kernel-uek-modules
- kernel-uek-modules-extra
- linux-firmware-core
- NetworkManager-config-connectivity-oracle
- ocfs2-tools
- oracle-backgrounds
- oracle-indexhtml

- oraclelinux-release
- oraclelinux-release-el8
- oracle-logos
- oracle-logos-httpd
- oracle-logos-ipa

## Added Binary Packages for AppStream by Oracle:

The following binary packages have been added to AppStream by Oracle:

- dtrace-devel
- dtrace-testsuite
- libblockdev-btrfs
- oracle-database-preinstall-21c
- python3-dnf-plugin-ulninfo

## Added Binary Packages for CodeReady Linux Builder by Oracle

The following binary packages have been added to CodeReady Linux Builder by Oracle:

- qemu-kvm-tests
- shim-unsigned-ia32

## Modified BaseOS Binary Packages

The following binary packages from the BaseOS upstream release have been modified:

- autofs
- binutils
- biosdevname
- boom-boot
- boom-boot-conf
- boom-boot-grub2
- chkconfig
- chrony
- cockpit
- cockpit-bridge
- cockpit-doc
- cockpit-system
- cockpit-ws

- coreutils
- coreutils-common
- coreutils-single
- ctdb
- dbus
- dbus-common
- dbus-daemon
- dbus-libs
- dbus-tools
- dbxtool
- dnf
- dnf-automatic
- dnf-data
- dnf-plugins-core
- dracut
- dracut-caps
- dracut-config-generic
- dracut-config-rescue
- dracut-live
- dracut-network
- dracut-squash
- dracut-tools
- efibootmgr
- efi-filesystem
- expat
- expat-devel
- firewalld
- firewalld-filesystem
- fuse
- fuse3
- fuse3-devel
- fuse3-libs
- fuse-common
- fuse-devel
- fuse-libs

- fwupd
- fwupdate
- fwupdate-efi
- fwupdate-libs
- glibc
- glibc-all-langpacks
- glibc-common
- glibc-devel
- glibc-doc
- glibc-gconv-extra
- glibc-headers
- glibc-langpack-aa
- glibc-langpack-af
- glibc-langpack-agr
- glibc-langpack-ak
- glibc-langpack-am
- glibc-langpack-an
- glibc-langpack-anp
- glibc-langpack-ar
- glibc-langpack-as
- glibc-langpack-ast
- glibc-langpack-ayc
- glibc-langpack-az
- glibc-langpack-be
- glibc-langpack-bem
- glibc-langpack-ber
- glibc-langpack-bg
- glibc-langpack-bhb
- glibc-langpack-bho
- glibc-langpack-bi
- glibc-langpack-bn
- glibc-langpack-bo
- glibc-langpack-br
- glibc-langpack-brx
- glibc-langpack-bs

- glibc-langpack-by
- glibc-langpack-ca
- glibc-langpack-ce
- glibc-langpack-chr
- glibc-langpack-cmn
- glibc-langpack-crh
- glibc-langpack-cs
- glibc-langpack-csb
- glibc-langpack-cv
- glibc-langpack-cy
- glibc-langpack-da
- glibc-langpack-de
- glibc-langpack-doi
- glibc-langpack-dsb
- glibc-langpack-dv
- glibc-langpack-dz
- glibc-langpack-el
- glibc-langpack-en
- glibc-langpack-eo
- glibc-langpack-es
- glibc-langpack-et
- glibc-langpack-eu
- glibc-langpack-fa
- glibc-langpack-ff
- glibc-langpack-fi
- glibc-langpack-fil
- glibc-langpack-fo
- glibc-langpack-fr
- glibc-langpack-fur
- glibc-langpack-fy
- glibc-langpack-ga
- glibc-langpack-gd
- glibc-langpack-gez
- glibc-langpack-gl
- glibc-langpack-gu

- glibc-langpack-gv
- glibc-langpack-ha
- glibc-langpack-hak
- glibc-langpack-he
- glibc-langpack-hi
- glibc-langpack-hif
- glibc-langpack-hne
- glibc-langpack-hr
- glibc-langpack-hsb
- glibc-langpack-ht
- glibc-langpack-hu
- glibc-langpack-hy
- glibc-langpack-ia
- glibc-langpack-id
- glibc-langpack-ig
- glibc-langpack-ik
- glibc-langpack-is
- glibc-langpack-it
- glibc-langpack-iu
- glibc-langpack-ja
- glibc-langpack-ka
- glibc-langpack-kab
- glibc-langpack-kk
- glibc-langpack-kl
- glibc-langpack-km
- glibc-langpack-kn
- glibc-langpack-ko
- glibc-langpack-kok
- glibc-langpack-ks
- glibc-langpack-ku
- glibc-langpack-kw
- glibc-langpack-ky
- glibc-langpack-lb
- glibc-langpack-lg
- glibc-langpack-li

- glibc-langpack-lij
- glibc-langpack-ln
- glibc-langpack-lo
- glibc-langpack-lt
- glibc-langpack-lv
- glibc-langpack-lzh
- glibc-langpack-mag
- glibc-langpack-mai
- glibc-langpack-mfe
- glibc-langpack-mg
- glibc-langpack-mhr
- glibc-langpack-mi
- glibc-langpack-miq
- glibc-langpack-mjw
- glibc-langpack-mk
- glibc-langpack-ml
- glibc-langpack-mn
- glibc-langpack-mni
- glibc-langpack-mr
- glibc-langpack-ms
- glibc-langpack-mt
- glibc-langpack-my
- glibc-langpack-nan
- glibc-langpack-nb
- glibc-langpack-nds
- glibc-langpack-ne
- glibc-langpack-nhn
- glibc-langpack-niu
- glibc-langpack-nl
- glibc-langpack-nn
- glibc-langpack-nr
- glibc-langpack-nso
- glibc-langpack-oc
- glibc-langpack-om
- glibc-langpack-or



- glibc-langpack-os
- glibc-langpack-pa
- glibc-langpack-pap
- glibc-langpack-pl
- glibc-langpack-ps
- glibc-langpack-pt
- glibc-langpack-quz
- glibc-langpack-raj
- glibc-langpack-ro
- glibc-langpack-ru
- glibc-langpack-rw
- glibc-langpack-sa
- glibc-langpack-sah
- glibc-langpack-sat
- glibc-langpack-sc
- glibc-langpack-sd
- glibc-langpack-se
- glibc-langpack-sgs
- glibc-langpack-shn
- glibc-langpack-shs
- glibc-langpack-si
- glibc-langpack-sid
- glibc-langpack-sk
- glibc-langpack-sl
- glibc-langpack-sm
- glibc-langpack-so
- glibc-langpack-sq
- glibc-langpack-sr
- glibc-langpack-ss
- glibc-langpack-st
- glibc-langpack-sv
- glibc-langpack-sw
- glibc-langpack-szl
- glibc-langpack-ta
- glibc-langpack-tcy

- glibc-langpack-te
- glibc-langpack-tg
- glibc-langpack-th
- glibc-langpack-the
- glibc-langpack-ti
- glibc-langpack-tig
- glibc-langpack-tk
- glibc-langpack-tl
- glibc-langpack-tn
- glibc-langpack-to
- glibc-langpack-tpi
- glibc-langpack-tr
- glibc-langpack-ts
- glibc-langpack-tt
- glibc-langpack-ug
- glibc-langpack-uk
- glibc-langpack-unm
- glibc-langpack-ur
- glibc-langpack-uz
- glibc-langpack-ve
- glibc-langpack-vi
- glibc-langpack-wa
- glibc-langpack-wae
- glibc-langpack-wal
- glibc-langpack-wo
- glibc-langpack-xh
- glibc-langpack-yi
- glibc-langpack-yo
- glibc-langpack-yue
- glibc-langpack-yuw
- glibc-langpack-zh
- glibc-langpack-zu
- glibc-locale-source
- glibc-minimal-langpack
- grub2-common

- grub2-efi-aa64-modules
- grub2-efi-ia32
- grub2-efi-ia32-cdboot
- grub2-efi-ia32-modules
- grub2-efi-x64
- grub2-efi-x64-cdboot
- grub2-efi-x64-modules
- grub2-pc
- grub2-pc-modules
- grub2-tools
- grub2-tools-efi
- grub2-tools-extra
- grub2-tools-minimal
- grubby
- iproute
- iproute-tc
- iptables
- iptables-arptables
- iptables-devel
- iptables-ebtables
- iptables-libs
- iptables-services
- iptables-utils
- iscsi-initiator-utils
- iscsi-initiator-utils-iscsiuio
- iwl1000-firmware
- iwl100-firmware
- iwl105-firmware
- iwl135-firmware
- iwl2000-firmware
- iwl2030-firmware
- iwl3160-firmware
- iwl3945-firmware
- iwl4965-firmware
- iwl5000-firmware

- iwl5150-firmware
- iwl6000-firmware
- iwl6000g2a-firmware
- iwl6000g2b-firmware
- iwl6050-firmware
- iwl7260-firmware
- iwlax2xx-firmware
- kexec-tools
- kmod
- kmod-kvdo
- kmod-libs
- kmod-redhat-oracleasm
- krb5-devel
- krb5-libs
- krb5-pkinit
- krb5-server
- krb5-server-ldap
- krb5-workstation
- ksc
- libasan
- libatomic
- libatomic-static
- libdnf
- libertas-sd8686-firmware
- libertas-sd8787-firmware
- libertas-usb8388-firmware
- libertas-usb8388-olpc-firmware
- libgcc
- libgfortran
- libgomp
- libgomp-offload-nvptx
- libipa\_hbac
- libitm
- libkadm5
- libkcapi

- libkcapi-hmaccalc
- liblsan
- libnetapi
- libnsl
- libquadmath
- libreport-filessystem
- libsmbclient
- libsss\_autofs
- libsss\_certmap
- libsss\_idmap
- libsss\_nss\_idmap
- libsss\_simpleifp
- libsss\_sudo
- libstdc++
- libtsan
- libubsan
- libwbclient
- libxslt
- libzstd
- libzstd-devel
- linux-firmware
- linux-firmware-core
- mcelog
- microcode\_ctl
- mokutil
- mozjs52
- mozjs60
- net-snmp-libs
- NetworkManager
- NetworkManager-adsl
- NetworkManager-bluetooth
- NetworkManager-config-connectivity-oracle
- NetworkManager-config-server
- NetworkManager-dispatcher-routing-rules
- NetworkManager-initscripts-updown

- NetworkManager-libnm
- NetworkManager-ovs
- NetworkManager-ppp
- NetworkManager-team
- NetworkManager-tui
- NetworkManager-wifi
- NetworkManager-wwan
- nscd
- nss\_db
- ntsysv
- nvmetcli
- opa-address-resolution
- opa-basic-tools
- opa-fastfabric
- opa-fm
- opa-libopamgt
- OpenIPMI
- OpenIPMI-lanserv
- OpenIPMI-libs
- OpenIPMI-perl
- os-prober
- parted
- platform-python
- policycoreutils
- policycoreutils-dbus
- policycoreutils-devel
- policycoreutils-newrole
- policycoreutils-python-utils
- policycoreutils-restorecond
- polkit
- polkit-devel
- polkit-docs
- polkit-libs
- procps-ng
- procps-ng-i18n

- python3-boom
- python3-configshell
- python3-dnf
- python3-dnf-plugin-post-transaction-actions
- python3-dnf-plugins-core
- python3-dnf-plugin-versionlock
- python3-firewall
- python3-hawkey
- python3-iscsi-initiator-utils
- python3-libdnf
- python3-libipa\_hbac
- python3-libs
- python3-libsss\_nss\_idmap
- python3-openipmi
- python3-policycoreutils
- python3-rtslib
- python3-samba
- python3-samba-dc
- python3-samba-test
- python3-sss
- python3-sssdconfig
- python3-sss-murmur
- python3-test
- redhat-release
- samba
- samba-client
- samba-client-libs
- samba-common
- samba-common-libs
- samba-common-tools
- samba-dcerpc
- samba-dc-libs
- samba-krb5-printing
- samba-ldb-ldap-modules
- samba-libs

- samba-pidl
- samba-test
- samba-test-libs
- samba-tools
- samba-usershares
- samba-winbind
- samba-winbind-clients
- samba-winbind-krb5-locator
- samba-winbind-modules
- samba-winexe
- sanlock-lib
- selinux-policy
- selinux-policy-devel
- selinux-policy-doc
- selinux-policy-minimum
- selinux-policy-mls
- selinux-policy-sandbox
- selinux-policy-targeted
- shim-ia32
- shim-x64
- sos
- sos-audit
- sssd
- sssd-ad
- sssd-client
- sssd-common
- sssd-common-pac
- sssd-dbus
- sssd-ipa
- sssd-kcm
- sssd-krb5
- sssd-krb5-common
- sssd-ldap
- sssd-nfs-idmap
- sssd-polkit-rules



- sssd-proxy
- sssd-tools
- sssd-winbind-idmap
- systemd
- systemd-container
- systemd-devel
- systemd-journal-remote
- systemd-libs
- systemd-pam
- systemd-tests
- systemd-udev
- target-restore
- trace-cmd
- tuned
- tuned-profiles-atomic
- tuned-profiles-compat
- tuned-profiles-cpu-partitioning
- tuned-profiles-mssql
- tuned-profiles-oracle
- unzip
- vim-minimal
- yum
- yum-utils

## Modified Binary Packages for CodeReady Linux Builder by Oracle

The following binary packages to CodeReady Linux Builder by Oracle have been modified:

- anaconda-widgets-devel
- crash-devel
- cups-filters-devel
- dconf-devel
- dotnet-sdk-3.1-source-built-artifacts
- dotnet-sdk-5.0-source-built-artifacts
- dotnet-sdk-6.0-source-built-artifacts
- dotnet-sdk-7.0-source-built-artifacts
- fwupd-devel

- galera
- gcc-plugin-devel
- gcc-toolset-10-gcc-plugin-devel
- glibc-benchtests
- glibc-nss-devel
- glibc-static
- guile-devel
- iproute-devel
- iscsi-initiator-utils-devel
- Judy
- Judy-devel
- kmod-devel
- libblockdev-crypto-devel
- libblockdev-devel
- libblockdev-fs-devel
- libblockdev-loop-devel
- libblockdev-lvm-devel
- libblockdev-mdraid-devel
- libblockdev-part-devel
- libblockdev-swap-devel
- libblockdev-utils-devel
- libblockdev-vdo-devel
- libcephfs2
- libcephfs-devel
- libdnf-devel
- librados-devel
- libradosstriper1
- libradosstriper-devel
- librbid-devel
- libreoffice-sdk
- libreoffice-sdk-doc
- libsmbclient-devel
- libsss\_nss\_idmap-devel
- libstdc++-static
- libvirt

- libvirt-client
- libvirt-daemon
- libvirt-daemon-config-network
- libvirt-daemon-config-nwfilter
- libvirt-daemon-driver-interface
- libvirt-daemon-driver-network
- libvirt-daemon-driver-nodedev
- libvirt-daemon-driver-nwfilter
- libvirt-daemon-driver-secret
- libvirt-daemon-driver-storage
- libvirt-daemon-driver-storage-core
- libvirt-daemon-driver-storage-disk
- libvirt-daemon-driver-storage-iscsi
- libvirt-daemon-driver-storage-iscsi-direct
- libvirt-daemon-driver-storage-logical
- libvirt-daemon-driver-storage-mpath
- libvirt-daemon-driver-storage-scsi
- libvirt-devel
- libvirt-docs
- libvirt-libs
- libvirt-nss
- libvirt-wireshark
- libwbclient-devel
- mariadb
- mariadb-backup
- mariadb-common
- mariadb-devel
- mariadb-embedded
- mariadb-embedded-devel
- mariadb-errmsg
- mariadb-gssapi-server
- mariadb-oggraph-engine
- mariadb-server
- mariadb-server-galera
- mariadb-server-utils

- mariadb-test
- mozjs52-devel
- mozjs60-devel
- NetworkManager-libnm-devel
- nss\_hesiod
- ocaml-libguestfs
- ocaml-libguestfs-devel
- OpenIPMI-devel
- openscap-engine-sce-devel
- PackageKit
- PackageKit-glib-devel
- parted-devel
- procps-ng-devel
- python3-mpich
- samba-devel
- sanlock-devel
- sblim-cmpi-devel
- sendmail-milter-devel
- tog-pegasus-devel

## Modified AppStream Binary Packages

The following binary packages from the AppStream upstream release have been modified:

- aardvark-dns
- abrt
- abrt-addon-ccpp
- abrt-addon-coredump-helper
- abrt-addon-kerneloops
- abrt-addon-pstoreoops
- abrt-addon-vmcore
- abrt-addon-xorg
- abrt-cli
- abrt-cli-ng
- abrt-console-notification
- abrt-dbus
- abrt-desktop

- abrt-gui
- abrt-gui-libs
- abrt-java-connector
- abrt-libs
- abrt-plugin-machine-id
- abrt-plugin-sosreport
- abrt-tui
- adwaita-gtk2-theme
- anaconda
- anaconda-core
- anaconda-dracut
- anaconda-gui
- anaconda-install-env-deps
- anaconda-tui
- anaconda-user-help
- anaconda-widgets
- ansible-pcp
- aspnetcore-runtime-3.0
- aspnetcore-runtime-3.1
- aspnetcore-runtime-5.0
- aspnetcore-runtime-6.0
- aspnetcore-runtime-7.0
- aspnetcore-targeting-pack-3.0
- aspnetcore-targeting-pack-3.1
- aspnetcore-targeting-pack-5.0
- aspnetcore-targeting-pack-6.0
- aspnetcore-targeting-pack-7.0
- authd
- autocorr-af
- autocorr-bg
- autocorr-ca
- autocorr-cs
- autocorr-da
- autocorr-de
- autocorr-en

- autocorr-es
- autocorr-fa
- autocorr-fi
- autocorr-fr
- autocorr-ga
- autocorr-hr
- autocorr-hu
- autocorr-is
- autocorr-it
- autocorr-ja
- autocorr-ko
- autocorr-lb
- autocorr-lt
- autocorr-mn
- autocorr-nl
- autocorr-pl
- autocorr-pt
- autocorr-ro
- autocorr-ru
- autocorr-sk
- autocorr-sl
- autocorr-sr
- autocorr-sv
- autocorr-tr
- autocorr-vi
- autocorr-zh
- binutils-devel
- blivet-data
- buildah
- buildah-tests
- clang
- clang-analyzer
- clang-devel
- clang-libs
- clang-resource-filesystem

- clang-tools-extra
- cloud-init
- cockpit-composer
- cockpit-machines
- cockpit-packagekit
- cockpit-pcp
- cockpit-session-recording
- cockpit-storaged
- compat-libgfortran-48
- compat-libpthread-nonshared
- composer-cli
- containernetworking-plugins
- containers-common
- cpp
- crash
- cups-filters
- cups-filters-libs
- dbus-devel
- dbus-x11
- dconf
- delve
- dnf-plugin-spacewalk
- dotnet
- dotnet-apphost-pack-3.0
- dotnet-apphost-pack-3.1
- dotnet-apphost-pack-5.0
- dotnet-apphost-pack-6.0
- dotnet-apphost-pack-7.0
- dotnet-host
- dotnet-hostfxr-3.0
- dotnet-hostfxr-3.1
- dotnet-hostfxr-5.0
- dotnet-hostfxr-6.0
- dotnet-hostfxr-7.0
- dotnet-runtime-3.0

- dotnet-runtime-3.1
- dotnet-runtime-5.0
- dotnet-runtime-6.0
- dotnet-runtime-7.0
- dotnet-sdk-3.0
- dotnet-sdk-3.1
- dotnet-sdk-5.0
- dotnet-sdk-6.0
- dotnet-sdk-7.0
- dotnet-targeting-pack-3.0
- dotnet-targeting-pack-3.1
- dotnet-targeting-pack-5.0
- dotnet-targeting-pack-6.0
- dotnet-targeting-pack-7.0
- dotnet-templates-3.0
- dotnet-templates-3.1
- dotnet-templates-5.0
- dotnet-templates-6.0
- dotnet-templates-7.0
- eclipse-ecf-core
- eclipse-ecf-runtime
- eclipse-emf-core
- eclipse-emf-runtime
- eclipse-emf-xsd
- eclipse-equinox-osgi
- eclipse-jdt
- eclipse-p2-discovery
- eclipse-pde
- eclipse-platform
- eclipse-swt
- efi-srpm-macros
- eth-tools-basic
- eth-tools-fastfabric
- fapolicyd
- fapolicyd-selinux



- firefox
- firewall-applet
- firewall-config
- frr
- frr-selinux
- gcc
- gcc-c++
- gcc-gdb-plugin
- gcc-gfortran
- gcc-offload-nvptx
- gcc-plugin-annobin
- gcc-toolset-10-gcc
- gcc-toolset-10-gcc-c++
- gcc-toolset-10-gcc-gdb-plugin
- gcc-toolset-10-gcc-gfortran
- 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-11-binutils
- gcc-toolset-11-binutils-devel
- gcc-toolset-11-gcc
- gcc-toolset-11-gcc-c++
- gcc-toolset-11-gcc-gdb-plugin
- gcc-toolset-11-gcc-gfortran
- gcc-toolset-11-gcc-plugin-devel
- gcc-toolset-11-gdb
- gcc-toolset-11-gdb-doc
- gcc-toolset-11-gdb-gdbserver
- gcc-toolset-11-libasan-devel

- gcc-toolset-11-libatomic-devel
- gcc-toolset-11-libgccjit
- gcc-toolset-11-libgccjit-devel
- gcc-toolset-11-libgccjit-docs
- gcc-toolset-11-libitm-devel
- gcc-toolset-11-liblsan-devel
- gcc-toolset-11-libquadmath-devel
- gcc-toolset-11-libstdc++-devel
- gcc-toolset-11-libstdc++-docs
- gcc-toolset-11-libtsan-devel
- gcc-toolset-11-libubsan-devel
- gcc-toolset-12-gdb
- gdb
- gdb-doc
- gdb-gdbserver
- gdb-headless
- git-clang-format
- glibc-utils
- gnome-boxes
- gnome-session
- gnome-session-kiosk-session
- gnome-session-wayland-session
- gnome-session-xsession
- gnome-themes-standard
- guile
- httpd
- httpd-devel
- httpd-filesystem
- httpd-manual
- httpd-tools
- icedtea-web
- icedtea-web-javadoc
- idm-pki-acme
- idm-pki-base
- idm-pki-base-java

- idm-pki-ca
- idm-pki-kra
- idm-pki-server
- idm-pki-symkey
- idm-pki-tools
- initial-setup
- initial-setup-gui
- ipa-client
- ipa-client-common
- ipa-client-epn
- ipa-client-samba
- ipa-common
- ipa-python-compat
- ipa-selinux
- ipa-server
- ipa-server-common
- ipa-server-dns
- ipa-server-trust-ad
- Judy
- kernel-rpm-macros
- kernelshark
- ksh
- leapp-upgrade-el8toel9
- leapp-upgrade-el8toel9-deps
- libasan6
- libblockdev
- libblockdev-btrfs
- libblockdev-crypto
- libblockdev-dm
- libblockdev-fs
- libblockdev-kbd
- libblockdev-loop
- libblockdev-lvm
- libblockdev-lvm-dbus
- libblockdev-mdraid

- libblockdev-mpath
- libblockdev-nvdim
- libblockdev-part
- libblockdev-plugins-all
- libblockdev-swap
- libblockdev-utils
- libblockdev-vdo
- libcmiCpImpl0
- libguestfs
- libguestfs-appliance
- libguestfs-bash-completion
- libguestfs-devel
- libguestfs-gfs2
- libguestfs-gobject
- libguestfs-gobject-devel
- libguestfs-inspect-icons
- libguestfs-java
- libguestfs-java-devel
- libguestfs-javadoc
- libguestfs-man-pages-ja
- libguestfs-man-pages-uk
- libguestfs-rescue
- libguestfs-rsync
- libguestfs-tools
- libguestfs-tools-c
- libguestfs-xf
- libitm-devel
- libquadmath-devel
- librados2
- librbd1
- libreoffice
- libreoffice-base
- libreoffice-calc
- libreoffice-core
- libreoffice-data

- libreoffice-draw
- libreoffice-emailmerge
- libreoffice-filters
- libreoffice-gdb-debug-support
- libreoffice-graphicsfilter
- libreoffice-gtk3
- libreoffice-help-ar
- libreoffice-help-bg
- libreoffice-help-bn
- libreoffice-help-ca
- libreoffice-help-cs
- libreoffice-help-da
- libreoffice-help-de
- libreoffice-help-dz
- libreoffice-help-el
- libreoffice-help-en
- libreoffice-help-es
- libreoffice-help-et
- libreoffice-help-eu
- libreoffice-help-fi
- libreoffice-help-fr
- libreoffice-help-gl
- libreoffice-help-gu
- libreoffice-help-he
- libreoffice-help-hi
- libreoffice-help-hr
- libreoffice-help-hu
- libreoffice-help-id
- libreoffice-help-it
- libreoffice-help-ja
- libreoffice-help-ko
- libreoffice-help-lt
- libreoffice-help-lv
- libreoffice-help-nb
- libreoffice-help-nl

- libreoffice-help-nn
- libreoffice-help-pl
- libreoffice-help-pt-BR
- libreoffice-help-pt-PT
- libreoffice-help-ro
- libreoffice-help-ru
- libreoffice-help-si
- libreoffice-help-sk
- libreoffice-help-sl
- libreoffice-help-sv
- libreoffice-help-ta
- libreoffice-help-tr
- libreoffice-help-uk
- libreoffice-help-zh-Hans
- libreoffice-help-zh-Hant
- libreoffice-impress
- libreofficekit
- libreoffice-langpack-af
- libreoffice-langpack-ar
- libreoffice-langpack-as
- libreoffice-langpack-bg
- libreoffice-langpack-bn
- libreoffice-langpack-br
- libreoffice-langpack-ca
- libreoffice-langpack-cs
- libreoffice-langpack-cy
- libreoffice-langpack-da
- libreoffice-langpack-de
- libreoffice-langpack-dz
- libreoffice-langpack-el
- libreoffice-langpack-en
- libreoffice-langpack-es
- libreoffice-langpack-et
- libreoffice-langpack-eu
- libreoffice-langpack-fa

- libreoffice-langpack-fi
- libreoffice-langpack-fr
- libreoffice-langpack-ga
- libreoffice-langpack-gl
- libreoffice-langpack-gu
- libreoffice-langpack-he
- libreoffice-langpack-hi
- libreoffice-langpack-hr
- libreoffice-langpack-hu
- libreoffice-langpack-id
- libreoffice-langpack-it
- libreoffice-langpack-ja
- libreoffice-langpack-kk
- libreoffice-langpack-kn
- libreoffice-langpack-ko
- libreoffice-langpack-lt
- libreoffice-langpack-lv
- libreoffice-langpack-mai
- libreoffice-langpack-ml
- libreoffice-langpack-mr
- libreoffice-langpack-nb
- libreoffice-langpack-nl
- libreoffice-langpack-nn
- libreoffice-langpack-nr
- libreoffice-langpack-nso
- libreoffice-langpack-or
- libreoffice-langpack-pa
- libreoffice-langpack-pl
- libreoffice-langpack-pt-BR
- libreoffice-langpack-pt-PT
- libreoffice-langpack-ro
- libreoffice-langpack-ru
- libreoffice-langpack-si
- libreoffice-langpack-sk
- libreoffice-langpack-sl

- libreoffice-langpack-sr
- libreoffice-langpack-ss
- libreoffice-langpack-st
- libreoffice-langpack-sv
- libreoffice-langpack-ta
- libreoffice-langpack-te
- libreoffice-langpack-th
- libreoffice-langpack-tn
- libreoffice-langpack-tr
- libreoffice-langpack-ts
- libreoffice-langpack-uk
- libreoffice-langpack-ve
- libreoffice-langpack-xh
- libreoffice-langpack-zh-Hans
- libreoffice-langpack-zh-Hant
- libreoffice-langpack-zu
- libreoffice-math
- libreoffice-ogltrans
- libreoffice-opensymbol-fonts
- libreoffice-pdfimport
- libreoffice-pyuno
- libreoffice-ure
- libreoffice-ure-common
- libreoffice-wiki-publisher
- libreoffice-writer
- libreoffice-x11
- libreoffice-xsltfilter
- libreport
- libreport-anaconda
- libreport-cli
- libreport-gtk
- libreport-newt
- libreport-plugin-bugzilla
- libreport-plugin-kerneloops
- libreport-plugin-logger



- libreport-plugin-mailx
- libreport-plugin-reportuploader
- libreport-plugin-ureport
- libreport-web
- libreswan
- libstdc++-devel
- libstdc++-docs
- libvirt
- libvirt-client
- libvirt-daemon
- libvirt-daemon-config-network
- libvirt-daemon-config-nwfilter
- libvirt-daemon-driver-interface
- libvirt-daemon-driver-network
- libvirt-daemon-driver-nodedev
- libvirt-daemon-driver-nwfilter
- libvirt-daemon-driver-qemu
- libvirt-daemon-driver-secret
- libvirt-daemon-driver-storage
- libvirt-daemon-driver-storage-core
- libvirt-daemon-driver-storage-disk
- libvirt-daemon-driver-storage-gluster
- libvirt-daemon-driver-storage-iscsi
- libvirt-daemon-driver-storage-iscsi-direct
- libvirt-daemon-driver-storage-logical
- libvirt-daemon-driver-storage-mpath
- libvirt-daemon-driver-storage-rbd
- libvirt-daemon-driver-storage-scsi
- libvirt-daemon-kvm
- libvirt-devel
- libvirt-docs
- libvirt-libs
- libvirt-lock-sanlock
- libvirt-nss
- libvirt-wireshark

- libxslt-devel
- llvm
- llvm-devel
- llvm-doc
- llvm-googletest
- llvm-libs
- llvm-static
- llvm-test
- llvm-toolset
- lorax
- lorax-composer
- lorax-lmc-novirt
- lorax-lmc-virt
- lorax-templates-generic
- lorax-templates-rhel
- lua-guestfs
- mecab-ipadic
- mecab-ipadic-EUCJP
- mod\_ldap
- mod\_proxy\_html
- mod\_session
- mod\_ssl
- mpich
- mpich-devel
- mpich-doc
- netavark
- net-snmp
- net-snmp-agent-libs
- net-snmp-devel
- net-snmp-perl
- net-snmp-utils
- netstandard-targeting-pack-2.1
- NetworkManager-cloud-setup
- nginx
- nginx-all-modules

- nginx-filesystem
- nginx-mod-devel
- nginx-mod-http-image-filter
- nginx-mod-http-perl
- nginx-mod-http-xslt-filter
- nginx-mod-mail
- nginx-mod-stream
- npm
- openchange
- openscap
- openscap-devel
- openscap-engine-sce
- openscap-python3
- openscap-scanner
- openscap-utils
- open-vm-tools
- open-vm-tools-desktop
- open-vm-tools-salt-minion
- open-vm-tools-sdmp
- osinfo-db
- pacemaker-cluster-libs
- pacemaker-libs
- pacemaker-schemas
- PackageKit
- PackageKit-command-not-found
- PackageKit-cron
- PackageKit-glib
- PackageKit-gstreamer-plugin
- PackageKit-gtk3-module
- pcp
- pcp-conf
- pcp-devel
- pcp-doc
- pcp-export-pcp2elasticsearch
- pcp-export-pcp2graphite

- pcp-export-pcp2influxdb
- pcp-export-pcp2json
- pcp-export-pcp2spark
- pcp-export-pcp2xml
- pcp-export-pcp2zabbix
- pcp-export-zabbix-agent
- pcp-gui
- pcp-import-collectl2pcp
- pcp-import-ganglia2pcp
- pcp-import-iostat2pcp
- pcp-import-mrtg2pcp
- pcp-import-sar2pcp
- pcp-libs
- pcp-libs-devel
- pcp-pmda-activemq
- pcp-pmda-apache
- pcp-pmda-bash
- pcp-pmda-bcc
- pcp-pmda-bind2
- pcp-pmda-bonding
- pcp-pmda-bpftrace
- pcp-pmda-cifs
- pcp-pmda-cisco
- pcp-pmda-dbping
- pcp-pmda-denki
- pcp-pmda-dm
- pcp-pmda-docker
- pcp-pmda-ds389
- pcp-pmda-ds389log
- pcp-pmda-elasticsearch
- pcp-pmda-gfs2
- pcp-pmda-gluster
- pcp-pmda-gpfs
- pcp-pmda-gpsd
- pcp-pmda-hacluster

- pcp-pmda-haproxy
- pcp-pmda-infiniband
- pcp-pmda-json
- pcp-pmda-libvirt
- pcp-pmda-lio
- pcp-pmda-lmsensors
- pcp-pmda-logger
- pcp-pmda-lustre
- pcp-pmda-lustrecomm
- pcp-pmda-mailq
- pcp-pmda-memcache
- pcp-pmda-mic
- pcp-pmda-mongodb
- pcp-pmda-mounts
- pcp-pmda-mssql
- pcp-pmda-mysql
- pcp-pmda-named
- pcp-pmda-netcheck
- pcp-pmda-netfilter
- pcp-pmda-news
- pcp-pmda-nfsclient
- pcp-pmda-nginx
- pcp-pmda-nvidia-gpu
- pcp-pmda-openmetrics
- pcp-pmda-openvswitch
- pcp-pmda-oracle
- pcp-pmda-pdns
- pcp-pmda-perfevent
- pcp-pmda-podman
- pcp-pmda-postfix
- pcp-pmda-postgresql
- pcp-pmda-rabbitmq
- pcp-pmda-redis
- pcp-pmda-roomtemp
- pcp-pmda-rsyslog

- pcp-pmda-samba
- pcp-pmda-sendmail
- pcp-pmda-shping
- pcp-pmda-slurm
- pcp-pmda-smart
- pcp-pmda-snmp
- pcp-pmda-sockets
- pcp-pmda-statsd
- pcp-pmda-summary
- pcp-pmda-systemd
- pcp-pmda-trace
- pcp-pmda-unbound
- pcp-pmda-weblog
- pcp-pmda-zimbra
- pcp-pmda-zswap
- pcp-selinux
- pcp-system-tools
- pcp-testsuite
- pcp-zeroconf
- perl-PCP-LogImport
- perl-PCP-LogSummary
- perl-PCP-MMV
- perl-PCP-PMDA
- perl-Sys-Guestfs
- perl-XML-Parser
- pesign
- platform-python
- platform-python-debug
- platform-python-devel
- plymouth
- plymouth-core-libs
- plymouth-graphics-libs
- plymouth-plugin-fade-throbber
- plymouth-plugin-label
- plymouth-plugin-script

- `plymouth-plugin-space-flares`
- `plymouth-plugin-throbgress`
- `plymouth-plugin-two-step`
- `plymouth-scripts`
- `plymouth-system-theme`
- `plymouth-theme-charge`
- `plymouth-theme-fade-in`
- `plymouth-theme-script`
- `plymouth-theme-solar`
- `plymouth-theme-spinfinity`
- `plymouth-theme-spinner`
- `podman`
- `podman-docker`
- `podman-remote`
- `podman-tests`
- `policycoreutils-gui`
- `policycoreutils-sandbox`
- `pykickstart`
- `python2`
- `python2-debug`
- `python2-devel`
- `python2-libs`
- `python2-test`
- `python2-tkinter`
- `python2-tools`
- `python3-abrt`
- `python3-abrt-addon`
- `python3-abrt-container-addon`
- `python3-abrt-doc`
- `python3-blivet`
- `python3-blockdev`
- `python3-clang`
- `python3-dnf-plugin-modulesync`
- `python3-dnf-plugin-spacewalk`
- `python3-idle`

- python3-idm-pki
- python3-ipaclient
- python3-ipalib
- python3-ipaserver
- python3-ipatests
- python3-kickstart
- python3-libguestfs
- python3-libreport
- python3-pcp
- python3-rhncfg
- python3-rhncfg-actions
- python3-rhncfg-client
- python3-rhncfg-management
- python3-rhn-check
- python3-rhn-client-tools
- python3-rhnlib
- python3-rhnpush
- python3-rhn-setup
- python3-rhn-setup-gnome
- python3-sanlock
- python3-spacewalk-backend-libs
- python3-spacewalk-oscapi
- python3-spacewalk-usix
- python3-test
- python3-tkinter
- rear
- redfish-finder
- redhat-lsb
- redhat-lsb-core
- redhat-lsb-cxx
- redhat-lsb-desktop
- redhat-lsb-languages
- redhat-lsb-printing
- redhat-lsb-submod-multimedia
- redhat-lsb-submod-security



- redhat-rpm-config
- rhel-system-roles
- rhncfg
- rhncfg-actions
- rhncfg-client
- rhncfg-management
- rhn-check
- rhn-client-tools
- rhn-custom-info
- rhnlib
- rhnpush
- rhnsd
- rhn-setup
- rhn-setup-gnome
- rpmdevtools
- ruby-libguestfs
- samba-vfs-iouring
- sank-reset
- sanlock
- scap-security-guide
- scap-security-guide-doc
- scap-workbench
- scl-utils
- scl-utils-build
- sendmail
- sendmail-cf
- sendmail-doc
- sendmail-milter
- setroubleshoot
- setroubleshoot-plugins
- setroubleshoot-server
- skopeo
- skopeo-tests
- sos-collector
- spacewalk-oscaps

- spacewalk-remote-utils
- spacewalk-usix
- spice-streaming-agent
- sssd-idp
- sysstat
- systemtap
- systemtap-client
- systemtap-devel
- systemtap-exporter
- systemtap-initscript
- systemtap-runtime
- systemtap-runtime-java
- systemtap-runtime-python3
- systemtap-runtime-virtguest
- systemtap-runtime-virthost
- systemtap-sdt-devel
- systemtap-server
- thunderbird
- tog-pegasus
- tog-pegasus-libs
- tuned-gtk
- tuned-profiles-postgresql
- tuned-utils
- tuned-utils-systemtap
- vim-common
- vim-enhanced
- vim-filesystem
- vim-X11
- virt-dib
- virt-install
- virt-manager
- virt-manager-common
- virt-p2v-maker
- WALinuxAgent
- WALinuxAgent-udev

- wget
- xdg-desktop-portal
- xsane
- xsane-common
- xsane-gimp
- zstd

## Removed BaseOS Binary Packages

The following binary packages from the BaseOS upstream release have been removed:

- dnf-plugin-subscription-manager
- grub2-ppc64le-modules
- kpatch
- kpatch-dnf
- NetworkManager-config-connectivity-redhat
- python3-cloud-what
- python3-subscription-manager-rhsm
- python3-syspurpose
- redhat-indexhtml
- redhat-logos
- redhat-logos-httpd
- redhat-release-eula
- rhsm-icons
- subscription-manager
- subscription-manager-cockpit
- subscription-manager-plugin-ostree
- subscription-manager-rhsm-certificates

## Removed AppStream Binary Packages

The following binary packages from the AppStream upstream release have been removed:

- ansible-collection-microsoft-sql
- ansible-collection-redhat-rhel\_mgmt
- coreos-installer
- coreos-installer-bootinfra
- coreos-installer-dracut

- insights-client
- libreport-plugin-rhtsupport
- libreport-rhel
- libreport-rhel-anaconda-bugzilla
- libreport-rhel-bugzilla
- redhat-backgrounds
- redhat-cloud-client-configuration
- redhat-logos-ipa
- redhat-support-lib-python
- redhat-support-tool
- rhc
- rhc-worker-playbook
- rhsm-gtk
- rt-tests
- spice-client-win-x64
- spice-client-win-x86
- spice-qxl-wddm-dod
- spice-vdagent-win-x64
- spice-vdagent-win-x86
- subscription-manager-initial-setup-addon
- subscription-manager-migration
- subscription-manager-migration-data
- toolbox
- toolbox-tests
- virtio-win
- virt-who

## Removed CodeReady Linux Builder Binary Packages

The following binary packages from the CodeReady Linux Builder upstream release have been removed:

- asio
- Cython
- Cython-debugsource
- galera-debuginfo
- galera-debugsource
- hivex-debuginfo

- hivex-debugsource
- Judy-debuginfo
- Judy-debugsource
- libiscsi-debuginfo
- libiscsi-debugsource
- libiscsi-utils-debuginfo
- libnbd-debuginfo
- libnbd-debugsource
- libserf-debuginfo
- libserf-debugsource
- libvirt-client-debuginfo
- libvirt-daemon-debuginfo
- libvirt-daemon-driver-interface-debuginfo
- libvirt-daemon-driver-network-debuginfo
- libvirt-daemon-driver-nodedev-debuginfo
- libvirt-daemon-driver-nwfilter-debuginfo
- libvirt-daemon-driver-secret-debuginfo
- libvirt-daemon-driver-storage-core-debuginfo
- libvirt-daemon-driver-storage-disk-debuginfo
- libvirt-daemon-driver-storage-iscsi-debuginfo
- libvirt-daemon-driver-storage-iscsi-direct-debuginfo
- libvirt-daemon-driver-storage-logical-debuginfo
- libvirt-daemon-driver-storage-mpath-debuginfo
- libvirt-daemon-driver-storage-scsi-debuginfo
- libvirt-dbus-debuginfo
- libvirt-dbus-debugsource
- libvirt-debuginfo
- libvirt-debugsource
- libvirt-libs-debuginfo
- libvirt-nss-debuginfo
- libvirt-python-debugsource
- libvirt-wireshark-debuginfo
- mariadb-backup-debuginfo
- mariadb-debuginfo
- mariadb-debugsource

- mariadb-embedded-debuginfo
- mariadb-gssapi-server-debuginfo
- mariadb-oggraph-engine-debuginfo
- mariadb-server-debuginfo
- mariadb-server-utils-debuginfo
- mariadb-test-debuginfo
- mod\_dav\_svn-debuginfo
- nbdfuse-debuginfo
- netcf-debuginfo
- netcf-debugsource
- netcf-libs-debuginfo
- ocaml-hivex-debuginfo
- ocaml-libguestfs-debuginfo
- ocaml-libnbd-debuginfo
- perl-hivex-debuginfo
- perl-Sys-Virt-debuginfo
- perl-Sys-Virt-debugsource
- pybind11
- pytest
- python39-Cython-debuginfo
- python3-hivex-debuginfo
- python3-libnbd-debuginfo
- python3-libvirt-debuginfo
- python3x-pyparsing
- python-atomicwrites
- python-attrs
- python-iniconfig
- python-more-itertools
- python-packaging
- python-pluggy
- python-py
- python-wcwidth
- ruby-hivex-debuginfo
- SLOF
- subversion-debuginfo

- subversion-debugsource
- subversion-devel-debuginfo
- subversion-gnome-debuginfo
- subversion-libs-debuginfo
- subversion-perl-debuginfo
- subversion-ruby-debuginfo
- subversion-tools-debuginfo
- utf8proc-debuginfo
- utf8proc-debugsource

## Changes to Source Packages

This section contains information about the removed, modified, and new **source** packages in this release. For information about the **binary** package changes, see [Changes to Binary Packages](#) .

### Added Source Packages for BaseOS by Oracle

The following source packages have been added to the BaseOS by Oracle:

- bcache-tools
- btrfs-progs
- dtrace
- kernel-uek
- ocfs2-tools
- oracle-indexhtml
- oraclelinux-release
- oraclelinux-release-el8
- oracle-logos

### Added Source Packages for AppStream by Oracle

The following source packages have been added to AppStream by Oracle:

- dtrace
- oracle-database-preinstall-21c
- python3-dnf-plugin-ulninfo

### Modified BaseOS Source Packages

The following source packages from the BaseOS upstream release have been modified:

- autoofs

- binutils
- biosdevname
- boom-boot
- chkconfig
- chrony
- cockpit
- coreutils
- dbus
- dbxtool
- dnf
- dnf-plugins-core
- dracut
- efibootmgr
- efi-rpm-macros
- expat
- firewalld
- fuse
- fwupd
- fwupdate
- gcc
- glibc
- grub2
- grubby
- iproute
- iptables
- iscsi-initiator-utils
- kexec-tools
- kmod
- kmod-kvdo
- kmod-redhat-oracleasm
- krb5
- ksc
- libdnf
- libkcapi
- libreport



- libxslt
- linux-firmware
- mcelog
- microcode\_ctl
- mokutil
- mozjs52
- mozjs60
- net-snmp
- NetworkManager
- nvmetcli
- opa-ff
- opa-fm
- OpenIPMI
- os-prober
- parted
- policycoreutils
- polkit
- procps-ng
- python3
- python-configshell
- python-rtplib
- redhat-release
- samba
- sanlock
- selinux-policy
- shim
- sos
- sssd
- systemd
- trace-cmd
- tuned
- unzip
- vim
- zstd

## Modified AppStream Source Packages

The following source packages from the AppStream upstream release have been modified:

- abrt
- abrt-java-connector
- anaconda
- anaconda-user-help
- ansible-pcp
- authd
- binutils
- buildah
- ceph
- clang
- cloud-init
- cockpit-appstream
- cockpit-composer
- cockpit-session-recording
- compat-libgfortran-48
- containernetworking-plugins
- containers-common
- crash
- cups-filters
- dbus
- dconf
- delve
- dnf-plugins-core
- dnf-plugin-spacewalk
- dotnet3.0
- dotnet3.1
- dotnet5.0
- dotnet6.0
- dotnet7.0
- eclipse
- eclipse-ecf
- eclipse-emf

- efi-rpm-macros
- eth-tools
- fapolicyd
- firefox
- firewalld
- frr
- gcc
- gcc-toolset-10-gcc
- gcc-toolset-11-binutils
- gcc-toolset-11-gcc
- gcc-toolset-11-gdb
- gcc-toolset-12-gdb
- gdb
- glibc
- gnome-boxes
- gnome-session
- gnome-themes-standard
- guile
- httpd
- icedtea-web
- initial-setup
- ipa
- Judy
- ksh
- leapp-repository
- libblockdev
- libguestfs
- libreoffice
- libreport
- libreswan
- libvirt
- libxslt
- llvm
- lorax
- lorax-templates-rhel

- mecab-ipadic
- mpich
- net-snmp
- NetworkManager
- nginx
- nodejs
- openchange
- openscap
- open-vm-tools
- osinfo-db
- pacemaker
- PackageKit
- pcp
- perl-XML-Parser
- pesign
- pki-core
- plymouth
- podman
- policycoreutils
- pykickstart
- python2
- python3
- python-blivet
- rear
- redfish-finder
- redhat-lsb
- redhat-rpm-config
- rhel-system-roles
- rhncfg
- rhn-client-tools
- rhn-custom-info
- rhnlib
- rhnpush
- rhnsd
- rpmdevtools

- samba
- sanlock
- sblim-cmpi-devel
- scap-security-guide
- scap-workbench
- sendmail
- setroubleshoot
- setroubleshoot-plugins
- skopeo
- sos-collector
- spacewalk-backend
- spacewalk-oscaps
- spacewalk-remote-utils
- spacewalk-usix
- spice-streaming-agent
- sssd
- sysstat
- systemtap
- thunderbird
- tog-pegasus
- trace-cmd
- tuned
- vim
- virt-manager
- virt-p2v
- WALinuxAgent
- wget
- xdg-desktop-portal
- xsane
- zstd

## Modified Source Packages for CodeReady Linux Builder by Oracle

The following binary packages to CodeReady Linux Builder by Oracle have been modified:

- anaconda
- ceph

- crash
- cups-filters
- dconf
- dotnet3.1
- dotnet5.0
- dotnet6.0
- dotnet7.0
- fwupd
- galera
- gcc
- gcc-toolset-10-gcc
- glibc
- guile
- iproute
- iscsi-initiator-utils
- Judy
- kmod
- libblockdev
- libdnf
- libguestfs
- libreoffice
- libvirt
- mariadb
- mozjs52
- mozjs60
- mpich
- NetworkManager
- OpenIPMI
- openscap
- PackageKit
- parted
- procps-ng
- samba
- sanlock
- sblim-cmpi-devel

- `sendmail`
- `sssd`
- `tog-pegasus`

## Removed BaseOS Source Packages

The following source packages from the BaseOS upstream release have been removed:

- `kpatch`
- `libica`
- `redhat-indexhtml`
- `redhat-logos`
- `subscription-manager`

## Removed AppStream Source Packages

The following source packages from the AppStream upstream release have been removed:

- `ansible-collection-microsoft-sql`
- `ansible-collection-redhat-rhel_mgmt`
- `coreos-installer`
- `insights-client`
- `libica`
- `redhat-cloud-client-configuration`
- `redhat-logos`
- `redhat-support-lib-python`
- `redhat-support-tool`
- `rhc`
- `rhc-worker-playbook`
- `rt-tests`
- `spice-client-win`
- `spice-qxl-wddm-dod`
- `spice-vdagent-win`
- `subscription-manager`
- `subscription-manager-migration-data`
- `toolbox`
- `virtio-win`
- `virt-who`