

# Oracle Linux 7

## Release Notes for Oracle Linux 7.9



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# Preface



## **WARNING:**

Oracle Linux 7 is now in Extended Support. See [Oracle Linux Extended Support](#) and [Oracle Open Source Support Policies](#) for more information.

Migrate applications and data to Oracle Linux 8 or Oracle Linux 9 as soon as possible.

[Oracle Linux 7: Release Notes for Oracle Linux 7.9](#) provides a summary of the new features and known issues in Oracle Linux 7.9. This document may be updated after it is released.

## 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.
<code>monospace</code>	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/>.

## 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

## System Requirements and Limitations



### WARNING:

Oracle Linux 7 is now in Extended Support. See [Oracle Linux Extended Support](#) and [Oracle Open Source Support Policies](#) for more information.

Migrate applications and data to Oracle Linux 8 or Oracle Linux 9 as soon as possible.

You can install Oracle Linux 7.9 on x86\_64 systems that have up to 2048 logical CPUs and 64 TB of memory. The theoretical upper limit is 5120 logical CPUs and 64 TB of memory; however, Oracle has not tested this specific configuration. A minimum of 2 logical CPUs and 1 GB of memory per logical CPU is recommended. Although the minimum disk space that is required for installation is 1GB, a minimum of 5 GB is recommended.

## File System, Storage, and Address Space Limitations

The following table describes the maximum file size and maximum file system size for the `btrfs`, `ext4`, and `xfs` file systems in Oracle Linux 7.9. File system limitations are affected by kernel versions and features, as well as the architecture of the system on which Oracle Linux is installed. The values that are depicted in the table are estimates, which are based on known variables that might affect the maximum theoretical value that can be achieved. Note that the theoretical values might be higher than those depicted here, while the actual achievable values might be lower than these values, depending on the hardware and kernel version that is used.

File System Type	Maximum File Size	Maximum File System Size
<code>btrfs</code>	8 EiB	8 EiB
<code>ext4</code>	16 TiB	1 EiB
<code>xfs</code>	8 EiB	8 EiB

The limits for the `ext4` file system that are described in the table are higher than the recommended limits and might prove unstable. If you are working with systems on which you intend to work toward using higher file system sizes or file sizes, it is recommended that you use either the `Btrfs` or `XFS` file system.

The maximum supported size for a bootable logical unit number (LUN) is 50 TB. GPT and UEFI support are required for LUNs that are larger than 2 TB.

The maximum size of the address space that is available to each process is 128 TB.

# 2

## Supported Architectures



### **WARNING:**

Oracle Linux 7 is now in Extended Support. See [Oracle Linux Extended Support](#) and [Oracle Open Source Support Policies](#) for more information.

Migrate applications and data to Oracle Linux 8 or Oracle Linux 9 as soon as possible.

The Oracle Linux 7.9 release is supported on the following platforms:

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

The 64-bit Arm (aarch64) platform is available with supported Unbreakable Enterprise Kernel (UEK) releases *only*, as documented in these release notes. For more details, see [Release-Specific Information for Oracle Linux 7.9 \(aarch64\)](#).

## Oracle Linux on Oracle Cloud Infrastructure

Oracle Linux images for Oracle Linux 7 are available for Oracle Cloud Infrastructure and can be installed on compute instances. Refer to these release notes in conjunction with the release notes that are available for Oracle Linux 7 images for more details. See the release notes for the image that you are using on the [Oracle Cloud Infrastructure Documentation](#) page.

For more information about Oracle Cloud Infrastructure, visit <https://docs.oracle.com/en/operating-systems/oracle-linux/oci/>.

# 3

## Shipped Kernels



### **WARNING:**

Oracle Linux 7 is now in Extended Support. See [Oracle Linux Extended Support](#) and [Oracle Open Source Support Policies](#) for more information.

Migrate applications and data to Oracle Linux 8 or Oracle Linux 9 as soon as possible.

Oracle Linux 7.9 for the x86\_64 platform ships with the following kernel packages:

**kernel-3.10.0-1160.el7**

Red Hat Compatible Kernel (RHCK)

**kernel-uek-5.4.17-2011.6.2.el7uek**

Unbreakable Enterprise Kernel Release 6 (UEK R6)

UEK R6 is the default kernel in this release. Note that if you are upgrading from a previous release, you are automatically subscribed to the UEK R6 Unbreakable Linux Network (ULN) channel or yum repository. See [General Upgrade Information](#) for more information.

Oracle Linux 7.9 is tested as a bundle, as shipped on the installation media image. When installed from the installation media image, the minimum kernel version that is supported is the kernel that is included in the image. Downgrading kernel packages is not supported, unless otherwise recommended by Oracle Support.

Previous UEK releases, such as UEK R5, can also be installed from the Oracle Linux yum server or ULN.

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

# 4

## New Features and Changes



### **WARNING:**

Oracle Linux 7 is now in Extended Support. See [Oracle Linux Extended Support](#) and [Oracle Open Source Support Policies](#) for more information.

Migrate applications and data to Oracle Linux 8 or Oracle Linux 9 as soon as possible.

The following new features and changes are included in Oracle Linux 7.9. These features generally apply to the x86\_64 and Arm (aarch64) platforms, unless otherwise specified. For information that applies specifically to the Arm platform, see [Release-Specific Information for Oracle Linux 7.9 \(aarch64\)](#).

For information about the new features and changes in the initial release of Oracle Linux 7, see [Oracle Linux 7: Release Notes for Oracle Linux 7](#).

## Red Hat Compatible Kernel

Oracle Linux 7.9 includes the following Red Hat Compatible Kernel (RHCK) features and changes.

### BTRFS Deprecated in RHCK

Starting with Oracle Linux 7.4, the Btrfs file system type is deprecated in RHCK. Note that the Btrfs file system is fully supported with UEK R4 and later UEK releases.

### EDAC Driver for Intel ICX Systems Added

The Error Detection and Correction (EDAC) driver has been added to Intel ICX systems in this release. This driver enables error detection on these systems, as well as reports any errors to the EDAC subsystem.

### Mellanox ConnectX-6 Dx Network Adapter Support Added

Oracle Linux 7.9 adds the PCI IDs of the Mellanox ConnectX-6 Dx network adapter to the `mlx5_core` driver. For systems that use this adapter, the `mlx5_core` driver is loaded automatically. Support for this feature was previously made available for UEK R6 and UEK R5U4, but was only available as a technology preview in earlier Oracle Linux releases.

## DIF/DIX (T10 P1) Support for Specified Hardware

SCSI T10 DIF/DIX is fully supported on hardware that has been qualified by the vendor, provided that the vendor also fully supports the particular host bus adapter (HBA) and storage

array configuration. Note that DIF/DIX is *not* supported on other configurations such as for use on a boot device or a virtualized guest.

**Note:**

Support for DIF/DIX is a technology preview for any HBAs and storage arrays that are not qualified and are not fully supported by the vendor. To determine whether DIF/DIX is supported by a particular hardware vendor, refer to that vendor's support information for the latest status.

## FreeRDP Updated to Version 2.1.1

The FreeRDP feature for the Remote Desktop Protocol (RDP) is updated from version 2.0.0 to version 2.1.1 in this release. This version of FreeRDP includes new RDP options for the current Microsoft Windows terminal server version. Several security issues are also fixed in FreeRDP 2.1.1.

## Pacemaker Updated to Version 1.1.23

The Pacemaker cluster resource manager is updated in this release to version 1.1.23. This version of Pacemaker provides numerous bug fixes over the previous version.

## Metrics for per-thread Available for Historical Analysis

Capability for optionally enabling logging of the per-thread and per-process performance metric values in the Performance Co-Pilot (PCP) is now included in the `pcp-zeroconf` package and the `pmieconf` utility. In previous releases, the per-process metric values were included in the `pcp-zeroconf` package and logged by `pmlogger`. Because some analysis situations also require per-thread values, per-thread metrics are now available for historical analysis. To enable this feature, use the following command:

```
sudo pmieconf -c enable zeroconf.all_threads
```

## SCAP Security Guide Now Correctly Disables Services


With this update, the SCAP Security Guide (SSG) profiles correctly disable and mask services that should not be started. This feature enhancement guarantees that disabled services are not inadvertently started as a dependency of another service. Prior to this change, SSG profiles, such as the U.S. Government Commercial Cloud Services (C2S) profile, only disabled the service. As a result, services that are disabled by an SSG profile cannot be started unless you unmask them first.

## Technology Preview

For RHCK, the following features are currently under technology preview.

Features that are currently under technology preview in UEK R6 are described in [Unbreakable Enterprise Kernel Release 6: Release Notes \(5.4.17-2011\)](#).

- **Systemd:** Importd features for container image imports and exports.

- **File Systems:**
    - Block and object storage layouts for parallel NFS (pNFS).
    - DAX (Direct Access) for direct persistent memory mapping from an application. This feature is under technical preview for the ext4 and XFS file systems.
    - OverlayFS remains in technical preview.
  - **Kernel:**
    - Extended Berkeley Packet Filter tool (eBPF) system call for tracing.
    - Heterogeneous memory management (HMM). A non-CPU device processor may read system memory using the unified system address space. To enable this feature, add `experimental_hmm=enable` to the kernel command line.
    - `kexec`. The `kexec` system call enables loading and booting into another kernel from the currently running kernel. Hardware initialization is not performed during a `kexec` boot, significantly reducing reboot time.
    - No-IOMMU mode virtual I/O feature.
-  **Note:**

This mode lacks the I/O management that is provided by an IOMMU and is not secure.
- Traffic Control (TC) Hardware offloading. This feature enables select network traffic processing to be executed directly in the hardware.
  - **Networking:**
    - Cisco VIC InfiniBand kernel driver, which provides similar functionality to RDMA on proprietary Cisco architectures.
    - Single-Root I/O virtualization (SR-IOV) in the `qlcnict` driver.
    - Cisco proprietary User Space Network Interface Controller in UCM servers provided in the `libusnic_verbs` driver.
    - The flower traffic control classifier, with off-loading support.
    - Trusted Network Connect. This feature enables you to verify an endpoint against existing network access policies before allowing network access.
  - **Storage:**
    - Multi-queue I/O scheduling for SCSI (`scsi-mq`). Note that this functionality is disabled by default. To enable the feature, add `scsi_mod.use_blk_mq=Y` to the RHCK kernel command line.
    - SCSI-MQ as a preview with the `qla2xxx` driver and `lpfc` devices.
    - Plug-in for the `libStorageMgmt` API used for storage array management. The `libStorageMgmt` API is now supported, but the plug-in is under technology preview.

## Compatibility

Oracle Linux maintains user space compatibility with Red Hat Enterprise Linux (RHEL), which is independent of the kernel version that underlies the operating system. Existing applications

in userspace continue to run unmodified on Unbreakable Enterprise Kernel Release 6 (UEK R6) and no re-certifications are required for RHEL certified applications.

To minimize the impact on interoperability during releases, the Oracle Linux team works closely with third-party vendors whose hardware and software have dependencies on kernel modules. The kernel ABI for UEK R6 will remain unchanged in all subsequent updates to the initial release. UEK R6 contains changes to the kernel ABI relative to UEK R5 that require recompilation of third-party kernel modules on the system. Before installing UEK R6, verify support status for the release with your application vendor.

# 5

## Known Issues



### **WARNING:**

Oracle Linux 7 is now in Extended Support. See [Oracle Linux Extended Support](#) and [Oracle Open Source Support Policies](#) for more information.

Migrate applications and data to Oracle Linux 8 or Oracle Linux 9 as soon as possible.

This chapter describes known issues in Oracle Linux 7.9. Note that some issues may apply to both the x86\_64 and Arm (aarch64) platforms. For known issues that impact the Arm (aarch64) platform only, see [Known Issues \(aarch64\)](#).

For any additional issues that are specific to the UEK R6, refer to [Unbreakable Enterprise Kernel Release 6: Release Notes \(5.4.17-2011\)](#).

## Installation and Upgrade Issues

You might encounter one or more of the following issues during an Oracle Linux 7.9 installation or upgrade.

### Installer kernel fails to boot on systems with a multipath-enabled NVMe controller

The Oracle Linux 7.9 installer may fail to boot on systems with a multipath-enabled Non-Volatile Memory Express (NVMe) controller.

To work around the issue, disable native multipath support at boot for the installation by setting the `nvme_core.multipath=N` kernel argument on the target system.

(Bug ID 31758304)

### Upgrade from ULN fails if the openscap-containers package is installed

Upgrading from Oracle Linux 7.8 to Oracle Linux 7.9 by installing packages from ULN fails if the `openscap-containers` package is already installed on the system that you are upgrading.

To avoid encountering this issue, remove the `openscap-containers` package prior to upgrading to Oracle Linux 7.9:

```
sudo yum -y remove openscap-containers
```

(Bug ID 30686371)



## Graphical installer allows users to edit kickstart settings



### Note:

The following issue applies to both x86\_64 and 64-bit Arm (aarch64) platforms.

When performing a graphical installation, where some installation options are already set by using a kickstart configuration file, you can still modify these settings by clicking the various fields during the installation and then editing the predefined content. These types of edits during the installation process require that you intentionally attempt to modify the setting, effectively enabling an interactive installation, where the options that are set in the kickstart configuration are not secured by any policy.

Note that these types of edits are not possible when performing a text installation. During a text installation, you can only modify those fields that have not already been defined in the kickstart configuration file.

(Bug ID 28642357)

## Graphical installer fails to produce error when unacceptable Kdump value is entered

There is a minor upstream usability error that applies to the graphical installer when configuring Kdump settings. In the situation where you attempt to configure a manual kdump memory reservation, and you then set the memory reservation value to an unacceptable value, the installer allows you to click `Done` and return to the `Installation Summary` screen without producing a warning or error message.

When you select an unacceptable value, the installer resets the value to the last-known acceptable value that was entered; or, the installer sets the default minimum value of 512 MB. Note that this information is not displayed in the `Installation Summary` screen. Because an incorrect value cannot be stored for this parameter, the installation succeeds even when incorrect information is entered.

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

(Bug IDs 31133351, 31182708)

## Graphical installer does not display the reserved memory that is manually set for Kdump

A minor usability error applies to the graphical installer when configuring Kdump settings. 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 settings for Kdump memory reservation of `auto` is adequate as the kernel will determine what size to use when it boots

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The default settings for Kdump memory reservation of `auto` is adequate as the kernel will determine what size to use when it boots

(Bug IDs 31133287 and 31182699)

## FCoE boot fails on HPE servers with HPE FlexFabric adapters

This issue is caused by a known limitation with the `bnx2x` and `bnx2fc` drivers and the Option Card Black Box - Active Health (OCBB) feature when the input-output memory management unit (IOMMU) is enabled. The issue occurs because the network adapter firmware attempts to access a memory area that is not assigned network devices when bringing the interface up or down, or when loading or unloading the driver. When this issue occurs, you must reboot the system.

As a workaround, you must specify `intel_iommu=off` in the kernel boot parameters.

(Bug ID 30102871)

## Information about installing on an iSCSI disk

When installing on an iSCSI disk, you must add the `rd.iscsi.ibft=1` parameter to the boot command line and then specify at least one MBR or GPT-formatted disk as an installation target. Otherwise, the installation fails with the following error message:

```
No valid boot loader target device found.
```

**Important:**

Any prior instruction advising you to use the `ip=ibft` is no longer valid, as this option is now fully deprecated.

(Bug IDs 22076589, 30155659)

## Information about installing on an HPE 3PAR TPVV

If you have not applied a Thin Persistence license to an HPE 3PAR storage array, the installation fails to create a file system on a thin provisioned virtual volume (TPVV). This license is required to support the low-level SCSI UNMAP command for storage reclamation. If you do not have a suitable license, the workaround is to use a fully provisioned virtual volume (FPVV) instead of a TPVV.

(Bug ID 22140852)

## Installation fails on Oracle Flash Accelerator F640 NVMe device

An installation fails if the target device is an Oracle Flash Accelerator F640 NVMe add-in card with two block devices. Although the card has two independent NVMe controllers and devices, they are assigned identical WWIDs. The multipath device mapper maps the two block devices to the same WWID, resulting in a bogus multipath configuration, which prevents the installation.

To work around this issue, disable multipath for the installation at boot time by using the installer boot argument `nopath`. After the installation completes, block list the NVMe block devices for the multipath configuration on the system by editing the `/etc/multipath.conf` file. Or, you can disable device mapper multipath altogether. See [Oracle Linux 7: Administrator's Guide](#) for more information about configuring multipath.

(Bug ID 27638939)

## Upgrade fails if open files limit is too low and rpm-plugin-systemd-inhibit is installed



### Note:

The following issue applies to both x86\_64 and 64-bit Arm (aarch64) platforms.

An upgrade from Oracle Linux 7.6 can fail if the log-in session open files limit is set too low and the system that is being upgraded includes multiple packages from many channels or repositories. This issue can be triggered if the `rpm-plugin-systemd-inhibit` package is installed and the session is configured for a maximum open file limit that is lower than 4096. The issue typically results in the `yum` command failing to update and produces error messages similar to the following:

```
Verifying : glib2-static-2.56.1-1.el7.i686
glib2-static-2.56.1-1.el7.i686 was supposed to be installed but is not!
```

To resolve this issue, set the open file limit to 4096 before running the `yum update` command, for example:

```
sudo ulimit -n 4096
sudo yum update -y
```

(Bug ID 28720235)

## 32-bit RDMA packages are installed when upgrading a system that has rdma-core installed

For upgrades prior to Oracle Linux 7.4, where the `rdma-core.noarch` package is installed, 32-bit versions of the packages, as well as many dependencies are also installed unnecessarily. This problem occurs because the original version of the package is obsoleted. Thus, during upgrade, the package is replaced with both the `rdma-core.i686` and `rdma-core.x86_64` versions of the package, along with any dependencies for those packages.

To work around the issue, run the `yum update` command with the `--exclude=*.i686` option, for example:

```
sudo yum update --exclude=*.i686
```

(Bug ID 28217831)

## Package Conflict: PackageKit.i686 and PackageKit.x86\_64

The `PackageKit.i686` package in the `ol7_x86_64_optional_latest` ULN channel conflicts with the `PackageKit.x86_64` package in the `ol7_x86_64_u6_base` channel. Attempting to install both packages results in a transaction check error similar to the following:

```
Transaction check error:
  file /usr/lib/python2.7/site-packages/packagekit/__init__.pyc from install
of PackageKit-version.el7.i686 conflicts with file from package
PackageKit-version.el7.x86_64
  file /usr/lib/python2.7/site-packages/packagekit/__init__.pyo from install
of PackageKit-version.el7.i686 conflicts with file from package
PackageKit-version.el7.x86_64
  file /usr/lib/python2.7/site-packages/packagekit/backend.pyc from install
of PackageKit-version.el7.i686 conflicts with file from package
PackageKit-version.el7.x86_64
  file /usr/lib/python2.7/site-packages/packagekit/backend.pyo from install
of PackageKit-version.el7.i686 conflicts with file from package
PackageKit-version.el7.x86_64
  file /usr/lib/python2.7/site-packages/packagekit/enums.pyc from install of
PackageKit-version.el7.i686 conflicts with file from package
PackageKit-version.el7.x86_64
  file /usr/lib/python2.7/site-packages/packagekit/enums.pyo from install of
PackageKit-version.el7.i686 conflicts with file from package
PackageKit-version.el7.x86_64
  file /usr/lib/python2.7/site-packages/packagekit/filter.pyc from install of
PackageKit-version.el7.i686 conflicts with file from package
PackageKit-version.el7.x86_64
  file /usr/lib/python2.7/site-packages/packagekit/filter.pyo from install of
PackageKit-version.el7.i686 conflicts with file from package
PackageKit-version.el7.x86_64
  file /usr/lib/python2.7/site-packages/packagekit/misc.pyc from install of
PackageKit-version.el7.i686 conflicts with file from package
PackageKit-version.el7.x86_64
  file /usr/lib/python2.7/site-packages/packagekit/misc.pyo from install of
PackageKit-version.el7.i686 conflicts with file from package
PackageKit-version.el7.x86_64
  file /usr/lib/python2.7/site-packages/packagekit/package.pyc from install
of PackageKit-version.el7.i686 conflicts with file from package
PackageKit-version.el7.x86_64
  file /usr/lib/python2.7/site-packages/packagekit/package.pyo from install
of PackageKit-version.el7.i686 conflicts with file from package
PackageKit-version.el7.x86_64
  file /usr/lib/python2.7/site-packages/packagekit/progress.pyc from install
of PackageKit-version.el7.i686 conflicts with file from package
PackageKit-version.el7.x86_64
  file /usr/lib/python2.7/site-packages/packagekit/progress.pyo from install
of PackageKit-version.el7.i686 conflicts with file from package
PackageKit-version.el7.x86_64
```

You may only install one of these packages on the same system at the same time. To avoid this conflict, exclude the `PackageKit.i686` package in your yum configuration. For more

information about how to exclude packages during an installation, see [Oracle Linux: Unbreakable Linux Network User's Guide for Oracle Linux 6 and Oracle Linux 7](#).

(Bug ID 24963661)

## Uninstalling libpcap can result in the removal of a large number of libvirt packages



### Note:

The following issue applies to both x86\_64 and 64-bit Arm (aarch64) platforms.

The `libpcap` package is updated to enable functionality for future technologies. If you install this package and then attempt to uninstall it, a large number of `libvirt` packages might also be uninstalled caused by dependency relationships. The `libvirt` package has a dependency on the `libvirt-daemon-driver-nwfilter` package and this package has a dependency on `libpcap`. Removing the `libpcap` package removes the entire `libvirt` family of packages.

(Bug ID 28582266)

## Database installation and operation fails if RemoveIPC=yes is configured for systemd

If the `RemoveIPC=yes` setting is configured for `systemd`, interprocess communication (IPC) is terminated for a non-system user's processes when that user logs out. This setting, which is intended for use on laptop systems, can cause software problems on servers. For example, if the user is a database software owner such as `oracle` for Oracle Database, this configuration can cause a database installation to fail or database services to crash.

By default, Oracle Linux 7.9 configures `RemoveIPC=no` in the `/etc/systemd/logind.conf` file to prevent `systemd` from terminating IPC. However, if you have touched this file before updating your system to Oracle Linux 7.9, the update installs the new version of the file as `/etc/systemd/logind.conf.rpmnew` and does not set `RemoveIPC=no` in the `/etc/systemd/logind.conf` file. To avoid database crashes, set `RemoveIPC=no` in the `/etc/systemd/logind.conf` file and then run the `systemctl reboot` command to reboot the system.

(Bug ID 22224874)

## Automatic Bug Reporting Tool



### Note:

The following information pertains to both x86\_64 and 64-bit Arm platforms.

The automated reporting daemons and features provided by the Red Hat Automatic Bug Reporting Tool (ABRT) are not supported with Oracle Linux

ABRT packages and associated files, such as `libreport`, are included in the distribution to satisfy package dependencies and can be used to generate local bug reports but the features to automatically upload these reports are not supported. For technical assistance, contact Oracle Support by using the My Oracle Support portal or by telephone.

## File Systems Issues

The following file systems issues are encountered when running Oracle Linux 7.9.

### XFS: No support for reflink feature in RHCK

If an XFS file system is created with support for the `reflink` feature with the UEK R5 kernel, you cannot mount the XFS file system with the RHCK kernel. The file system can only be mounted as read-only.

(Bug ID 30119906)

### XFS: No support for real-time devices in RHCK

If an XFS file system is created with support for `real-time` devices with the UEK R5 kernel, you cannot mount the XFS file system with the RHCK kernel.

(Bug ID 30115269)

## ACPI error messages displayed on Dell EMC PowerEdge Server during boot

When booting 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)
```

Note that this issue is encountered on both RHCK and UEK kernels.

The workaround for this issue is to disable the `acpi_power_meter` kernel module as follows:

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

After disabling the `acpi_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)

## grubby fatal error during kernel upgrade when /boot is on a BTRFS subvolume



### Note:

The following issue applies to both x86\_64 and 64-bit Arm (aarch64) platforms.

If `/boot` is hosted on a Btrfs subvolume, GRUB 2 is unable to correctly process the `initramfs` and `vmlinuz` path names. This problem occurs when you update or install a new kernel and then the `grubby` command attempts to update the GRUB 2 configuration. In the case where you have a fresh installation of Oracle Linux 7.9 and you upgrade the RHCK or UEK kernel, the following error is displayed:

```
grubby fatal error: unable to find a suitable template
```

After the kernel update, when the system is rebooted, it boots the old kernel.

The workaround for this problem is to use `grub2-mkconfig` to regenerate the `/etc/grub2/grub.cfg` file, or `/etc/grub2-efi.cfg` file on a UEFI booted system, immediately after the kernel has been installed or upgraded, for example:

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

Obtain a listing of the kernel menu entries in the generated configuration as follows:

```
grep -P "submenu|^menuentry" /boot/grub2/grub.cfg | cut -d '"' -f2
```

From the listing, select the kernel entry that you want to run as the default kernel and set this entry as the default by using the following command:

```
sudo grub2-set-default "menu entry title"
```

In the previous command, *menu entry title* is the title of the kernel entry that you identified in the listing.

You can use the `grub2-editenv list` command to check that the `saved_entry` has been updated with the selected kernel menu title.

Reboot the system and use `uname -a` to check that the correct kernel is now running.

(Bug ID 22750169)

## Hebrew LaTeX fonts



### Note:

The following information applies to both x86\_64 and 64-bit Arm (aarch64) platforms.

Installing the `tex-fonts-hebrew` package fails unless you first install all of the `texlive*` packages.

(Bug ID 19059949)

## InfiniBand CA port generates warnings if disabled

You might see the following warning messages if you use the `ibportstate disable` command to disable an InfiniBand CA or router port:

```
ibwarn: [2696] _do_madrpc: recv failed: Connection timed out
ibwarn: [2696] mad_rpc: _do_madrpc failed; dport (Lid 38)
ibportstate: iberror: failed: smp set portinfo failed
```

You can safely ignore these warnings.

(Bug ID 16248314)

## Kdump fails to start when lockdown is enabled

The `kdump` service fails to start if the kernel lockdown feature is enabled and either the `integrity` or `confidentiality` parameters have been set.

To work around this issue, append the `-s` option in `Kdump /usr/bin/kdumpctl` configuration file to include the `standard_kexec_args="-p"` argument. You must restart the `kdump` service for the changes to take effect.

(Bug ID 31724653)

## 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, remove the `"iommu=off"` command-line option from `KDUMP_COMMANDLINE_APPEND`, then restart the `kdump` service for the changes to take effect.

(Bug ID 31127379, 34034614, 34211826)

## KVM Issues

The following KVM issues may be encountered.

### Snapshots of KVM guests that use UEFI fail and are unsupported

#### Note:

The following issue applies to both x86\_64 and 64-bit Arm (aarch64) platforms.



You cannot create snapshots of KVM guests if they use UEFI. In older versions of QEMU and libvirt, the tools might allow you to create the snapshot without an error or warning, but the snapshot could be corrupted. More recent versions of these tools prevent snapshot creation by producing an error similar to the following:

```
virsh # snapshot-create-as OL7-seboot
```

```
error: Operation not supported: internal snapshots of a VM with pflash based
firmware are not supported
```

(Bug ID 26826800)

## KVM guests with LSI MegaRAID SAS ISCSI controller limited to 7 virtual disks

An Oracle Linux 7.9 KVM guest that is using the LSI MegaRAID SAS ISCSI controller is limited to 7 virtual disks. Although KVM guests can have up to 8 ISCSI virtual disks, the LSI MegaRAID SAS controller uses the first slot for the ISCSI Initiator, leaving just the 7 slots remaining for virtual disks.

The workaround for this issue is to use the `megasas` controller instead of the `lsi` controller when creating ISCSI virtual disks. For example, change `-device lsi` to `-device megasas`, as shown in following examples:

```
sudo /usr/bin/qemu-system-x86_64 -machine accel=kvm -m 8192 -smp 8 \
-drive file=/path/OracleLinux-7.6-x86_64.qcow2,format=qcow2,if=none,id=disk \
-device ide-hd,bus=ide.0,unit=0,drive=disk,bootindex=0 -device lsi,id=lsi0 \
-drive file=/path/disk1.img,format=raw,if=none,id=drive_image1 \
-device scsi-hd,id=image1,drive=drive_image1,bus=lsi0.0 \
...
```

```
sudo /usr/bin/qemu-system-x86_64 -machine accel=kvm -m 8192 -smp 8 \
-drive file=/path/OracleLinux-7.6-x86_64.qcow2,format=qcow2,if=none,id=disk \
-device ide-hd,bus=ide.0,unit=0,drive=disk,bootindex=0 -device megasas,id=lsi0 \
-drive file=/path/disk1.img,format=raw,if=none,id=drive_image1 \
-device scsi-hd,id=image1,drive=drive_image1,bus=lsi0.0 \
...
```

(Bug 27681238)

## Unable to create Oracle Linux 7 LXC containers on NFS



### Note:

The following issue applies to both x86\_64 and 64-bit Arm (aarch64) platforms.

Creating Oracle Linux 7 containers fails when the root file system (`/container`) is hosted on an NFS share. This problem occurs because the `iputils` package in Oracle Linux 7 is built to use the Linux file-extended attributes, `[xattr(7)] security capabilities(7)`. Because NFS does not support these file capabilities, the `iputils` package might not be installed into an NFS file system. For example, when attempting to create an Oracle Linux 7 container, the installation fails while installing the `iputils` package, producing the following error:

```
Error unpacking rpm package iputils-20121221-7.el7.x86_64
error: unpacking of archive failed on file /usr/bin/ping: cpio: cap_set_file
error: iputils-20121221-7.el7.x86_64: install failed
```

Similar issues are seen when attempting to install the `initscripts` and `systemd` packages while creating an Oracle Linux 7 container.

This issue occurs on both NFSv3 and NFSv4. Note that Oracle Linux 6 containers are not affected.

(Bug ID 25024258)

## Support for Oracle Linux 7 guests on Oracle VM and Xen

Oracle Linux 7 guests are supported for both hardware virtualization (HVM) and hardware virtualization, with paravirtual drivers (PVHVM) on Oracle VM Release 3. Oracle Linux 7 guests in a paravirtualized domain (PVM) on Oracle VM or other Xen-based hypervisors are not supported.

Oracle Linux 7 guests of any type are not supported on Oracle VM Release 2.

(Bug IDs 18712168, 18667813, 18266964)

## Network Issues

The following issues are related to network features and configuration.

### Device name change for Broadcom BCM573xx network driver (`bnxt_en`) may result in network configuration issues

An upstream change to the Broadcom BCM573xx network driver (`bnxt_en`) that was incorporated into UEK R6 results in a device name change for the second port on Broadcom network interfaces that use this driver. For example, a device that was previously identified as `eno3d1` is now identified as `eno3`. This fix was applied to improve device naming and also to address assumptions about port functionality on a device, such as in situations where the network device may belong to different functions. Consequently, this change can result in issues with network scripts when upgrading from a system that uses RHCK or UEK R5, or an earlier UEK release, to UEK R6.

If you configured a second port on the affected card during the installation, upon first boot or any subsequent boot after the installation with UEK R6, the system fails to initialize the second port, as a result of an incorrect configuration entry due to this name change. Note that the system is unaffected if you boot into RHCK.

Also, if you are upgrading from an earlier Oracle Linux release to Oracle Linux 7.9, and a second port on the affected card was previously configured, the system fails to initialize the second port, as earlier UEK and RHCK releases also use a different naming scheme.

To work around this issue, if you are performing a new installation and intend to use UEK R6 as your default kernel, use the Oracle Linux 7.9 UEK boot ISO to perform the installation. Alternatively, you can either boot into RHCK; or, you can update the network interface configuration file name and the interface name to ensure that it corresponds to the naming convention that is used by the driver in UEK R6.

(Bug IDs 31972637)

## Geneve network driver support not available in UEK releases earlier than UEK R5

The `ip` and `iproute` commands that are included in Oracle Linux 7.9 provide support for Geneve-capable devices. The module for this driver is included with RHCK, but it is not included in releases earlier than UEK R5.

As such, the commands that you use to set, add, or view Geneve devices are only functional when used with RHCK; or, if you are running UEK R5 or UEK R6, which is the default UEK release that is shipped with Oracle Linux 7.9.

(Bug ID 24652835)

## Network connection icon reports incorrect state for interfaces

The network connection icon might report that an active network interface is disconnected. This behavior is seen for the `root` user but not for other users. Command-line utilities such as `ip link` and `ifconfig` report the correct state.

(Bug ID 19060089)

## Power button defaults to ACPI Suspend mode

By default, the Oracle Linux 7 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 7 behaves the same way, do the following:

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

```
cat /etc/dconf/db/local.d/01-power

[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:

```
cat /etc/dconf/db/local.d/locks/01-power

/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)

## sosreport command issues warnings

Running the `sosreport` command in this release issues warnings similar to the following:

```
[plugin:networking] skipped command 'ip -s macsec show': required kernel
modules or services not present (kmods=[macsec] services=[]). Use
'--allow-system-changes' to enable collection.
[plugin:networking] skipped command 'ss -peaconmi': required kernel modules or
services not present
(kmods=[tcp_diag,udp_diag,inet_diag,unix_diag,netlink_diag,af_packet_diag]
services=[]). Use '--allow-system-changes' to enable collection.
```

These warnings are caused by a change in the `sos` package version, which now includes the `--allow-system-changes` option. The warning is advising you to specify this option whenever you run the `sosreport` command to ensure that all of the data is collected correctly and that no system information is omitted from the resulting `sosreport`.

**Note:**

When the `--allow-system-changes` option is specified, the command runs all of the subcommands, even those that are capable of changing the system, such as load kernel modules, and so on.

(Bug ID 30650012)

# 6

## Installation and Availability



### **WARNING:**

Oracle Linux 7 is now in Extended Support. See [Oracle Linux Extended Support](#) and [Oracle Open Source Support Policies](#) for more information.

Migrate applications and data to Oracle Linux 8 or Oracle Linux 9 as soon as possible.

You can download the full Oracle Linux 7.9 installation media image from the Oracle Software Delivery Cloud at <https://edelivery.oracle.com/>. Note that a smaller boot ISO is also available to perform a network-based installation.

For convenience, the three most recent Oracle Linux installation media images (for each release) are also available from the Oracle Linux yum server at <https://yum.oracle.com/oracle-linux-isos.html>.



### **Note:**

UEK R6 is the default boot kernel for Oracle Linux 7.9. To maintain your current boot kernel, follow the instructions in [General Upgrade Information](#).

For the Arm (aarch64) platform, see [Installation and Availability \(aarch64\)](#) for additional instructions.

You can also install a full Oracle Linux 7.9 media image for the x86\_64 platform on a compute instance on Oracle Cloud Infrastructure. To access the image, you must obtain an Oracle Cloud Infrastructure account. For more information, visit <https://www.oracle.com/index.html>.

In addition, the latest Oracle Linux 7.9 packages are available on the Unbreakable Linux Network (ULN) and the Oracle Linux yum server. To obtain the latest Oracle Linux 7.9 packages from ULN and install additional software for Oracle Linux 7.9, subscribe to the different channels on ULN by logging in to <https://linux.oracle.com> and then viewing the Channels option. To install additional software for Oracle Linux 7.9 from the Oracle Linux yum server, enable the required repositories within your yum configuration. To view the Oracle Linux yum repositories that are available for Oracle Linux 7.9, visit <https://yum.oracle.com/>.

Note that the Oracle Linux yum server does not provide equivalent repositories for some of the channels that are available on ULN. These channels provide non-open source packages.

**Note:**

When an Oracle Linux release RPM is updated, the default repositories may change. Oracle recommends that you review the output of the `yum repolist` command to ensure that only those repositories that are required for your configuration remain enabled.

To disable a repository, run use the `yum-config-manager --disable repository_label` command.

If you are installing an update on a system for which you have previously installed the Oracle-supported OFED packages, see [Upgrading Oracle-Supported OFED or RDMA Packages](#) for instructions on how to update these packages during an upgrade.

Oracle also makes the Oracle Linux 7.9 release available for 64-bit Arm (aarch64) platforms. See [Release-Specific Information for Oracle Linux 7.9 \(aarch64\)](#) for more information.

For developers who are making use of the Raspberry Pi hardware platform, Oracle provides an unsupported developer release image that includes the necessary firmware to boot this platform. You can download the image from the Oracle Technology Network. For more information about making use of the Raspberry Pi hardware platform, see [Install Oracle Linux on a Raspberry Pi](#).

## General Upgrade Information

For systems that are running UEK R4 or UEK R5 and are subscribed to the `ol7_x86_64_UEKR4` or `ol7_x86_64_UEKR5` channel on ULN, or the `ol7_x86_64_UEKR4` or `ol7_x86_64_UEKR5` repository on the Oracle Linux yum server, you can upgrade to Oracle Linux 7.9 and the latest UEK release as follows:

1. Upgrade all of the packages on the system, including the kernel packages.

```
sudo yum update
```

By default, the boot manager automatically enables the most recent kernel version so you do not need to change your GRUB configuration.

2. Reboot the system.

```
sudo systemctl reboot
```

**Important:**

Oracle Linux 7.9 updates many major subsystems. To ensure that your updated systems function correctly, reboot them after updating.

**Note:**

UEK R6 is the default boot kernel for Oracle Linux 7.9. If you want to maintain your system at its current UEK release, first run the `yum update` command and then disable the `ol7_UEKR6` repository by running the `yum-config-manager --disable ol7_UEKR6` command.

After upgrading to Oracle Linux 7.9, re-enable the repository for the UEK R5 release that you plan to continue run, as that repository is disabled during the upgrade process.

## Upgrading Oracle-Supported OFED or RDMA Packages

**Note:**

When upgrading Oracle-supported packages for the OFED or RDMA stack, the packages must match the specific UEK release that you are running, as per the following guidelines:

- UEK R4 uses the Oracle-supported OFED packages for UEK R4 (`ol7_x86_64_UEKR4_OFED`).
- UEK R5 uses the Oracle-supported RDMA packages for UEK R5 (`ol7_x86_64_UEKR5_RDMA`).
- UEK R6 uses the Oracle-supported RDMA packages for UEK R6 (`ol7_x86_64_UEKR6_RDMA`).

Additionally, you must disable all other OFED and RDMA channels that do not match your currently running UEK release.

Oracle Linux 7.9 provides UEK R6 as the default kernel. The Oracle-supported RDMA packages that are shipped with UEK R6 replace the previous OFED packages and use an updated package and channel-naming scheme. Oracle recommends using UEK R6 with Oracle Linux 7.9.

If you intend to install RDMA packages, see the [Unbreakable Enterprise Kernel Release 6: Release Notes \(5.4.17-2011\)](#).

## Upgrading a system with an existing UEK R6 installation

If you are upgrading your system from Oracle Linux 7.8 to Oracle Linux 7.9, and you are already using UEK R6 with the Oracle-supported RDMA packages, these packages are updated automatically during the upgrade process.

If your system is registered with ULN, ensure that it is subscribed to the `ol7_x86_64_UEKR6_RDMA`, `ol7_x86_64_UEKR6`, and `ol7_x86_64_latest` channels before upgrading.

If your system uses the Oracle Linux yum server, ensure that the `ol7_UEKR6_RDMA`, `ol7_UEKR6`, and `ol7_latest` repositories are enabled before upgrading.

## Upgrading a system with an existing UEK R5 installation to use UEK R6

If you are upgrading from a previous release to Oracle Linux 7.9 and you are using an existing UEK R5 release with the Oracle-supported RDMA packages, you can upgrade to UEK R6 and switch to the corresponding Oracle-supported UEK R6 RDMA packages. These packages are updated automatically during the upgrade process.

If the system is newly registered on ULN, the `ol7_x86_64_UEKR6` and `ol7_x86_64_latest` channels are subscribed to by default. However, ensure that you are also subscribed to the `ol7_x86_64_UEKR6_RDMA` channel prior to upgrading.

If the system uses the Oracle Linux yum server, the `ol7_UEKR6` and `ol7_latest` repositories are enabled by default. However, ensure that the `ol7_UEKR6_RDMA` repository is enabled prior to upgrading.

For instructions, see [Unbreakable Enterprise Kernel Release 6: Release Notes \(5.4.17-2011\)](#).

## Upgrading a system with an existing UEK R5 installation to continue to use UEK R5

If you are upgrading your system from a previous release and you are using UEK R5 with the Oracle-supported RDMA packages, *and* you intend to continue to use UEK R5, ensure that your system is subscribed to the correct channels or that the correct yum repositories are enabled before upgrading.

If you are using ULN, check that your system is registered before upgrading and then subscribe the system to the `ol7_x86_64_UEKR5_RDMA` and `ol7_x86_64_UEKR5` channels.

### **NOT\_SUPPORTED:**

By default, the `ol7_x86_64_UEKR6` and `ol7_x86_64_latest` channels are enabled when you register an Oracle Linux 7.9 system with ULN. Note that if the `ol7_x86_64_UEKR6` channel is enabled and you plan to continue to use UEK R5 with the Oracle-supported RDMA packages, you must disable this channel to continue.

If you are using the Oracle Linux yum server, check that the `ol7_UEKR5` and `ol7_UEKR5_RDMA` repositories are enabled. Then, use the `yum update` command to upgrade to Oracle Linux 7.9 with the compatible UEK R5 RDMA packages.

After the system is updated, ensure that other UEK and RDMA repositories are disabled.

If you do not have any RDMA packages installed, you can install the packages by following the installation instructions in the [Unbreakable Enterprise Kernel: Release Notes for Unbreakable Enterprise Kernel Release 5 Update 3 \(4.14.35-1902.300\)](#).

## Upgrading a system with an existing UEK R4 installation to use UEK R6

If you are upgrading your system from a release prior to Oracle Linux 7.9 and you are using UEK R4 with the Oracle-supported OFED packages, it is recommended that you upgrade to UEK R6 and switch to the corresponding Oracle-supported UEK R6 RDMA packages before upgrading your system.



Note that if the system is newly registered on ULN, you are subscribed to the `ol7_x86_64_UEKR6` and `ol7_x86_64_latest` channels by default. However, you will need to explicitly subscribe to the `ol7_x86_64_UEKR6_RDMA` channel.

Starting with Oracle Linux 7.9, if your system uses the Oracle Linux yum server, the `ol7_UEKR6` and `ol7_latest` repositories are enabled by default. However, ensure that the `ol7_UEKR6_RDMA` repository is enabled before upgrading.

Upgrading requires that you remove existing OFED packages prior to installing the compatible packages for UEK R6.

For instructions, see [Unbreakable Enterprise Kernel Release 6: Release Notes \(5.4.17-2011\)](#).

## Upgrading a system with an existing UEK R4 installation to continue to use UEK R4

If you are upgrading your system from a release prior to Oracle Linux 7.9 and you are using UEK R4 with the Oracle-supported OFED packages, *and* you intend to continue to use UEK R4, ensure that your system is subscribed to the correct channels or that the correct yum repositories are enabled before upgrading.

If you are using ULN, check that your system is registered before upgrading and then subscribe the system to the `ol7_x86_64_UEKR4_OFED` and `ol7_x86_64_UEKR4` channels.

### **NOT\_SUPPORTED:**

By default, the `ol7_x86_64_UEKR6` and `ol7_x86_64_latest` channels are enabled when you register an Oracle Linux 7.9 system with ULN. Note that if the `ol7_x86_64_UEKR6` channel is enabled, you must disable it to continue if you plan to continue to use UEK R4 with the Oracle-supported OFED packages.

If you are using the Oracle Linux yum server, check that the `ol7_UEKR4` and `ol7_UEKR4_OFED` repositories are enabled. Then, use the `yum update` command to upgrade to Oracle Linux 7.9 with the compatible UEK R4 OFED packages.

After the system is updated, ensure that the `ol7_UEKR6` and `ol7_UEKR6_RDMA` repositories are disabled. For more information, see [General Upgrade Information](#).

If you do not have any of the OFED packages installed, you can install the packages, per the installation instructions in the [Unbreakable Enterprise Kernel: Release Notes for Unbreakable Enterprise Kernel Release 4 Update 7 \(4.1.12-124\)](#)

# Release-Specific Information for Oracle Linux 7.9 (aarch64)



## **WARNING:**

Oracle Linux 7 is now in Extended Support. See [Oracle Linux Extended Support](#) and [Oracle Open Source Support Policies](#) for more information.

Migrate applications and data to Oracle Linux 8 or Oracle Linux 9 as soon as possible.

The following information pertains to the Oracle Linux 7.9 (aarch64) release.



## **Note:**

Some information in this chapter may also generally apply to the x86\_64 platform. Refer to the previous chapters of these release notes for general information that may apply to both the x86\_64 and 64-bit Arm (aarch64) platforms, as well as information that is specific to the x86\_64 platform.

## System Requirements and Limitations (aarch64)

System requirements and limitations for the 64-bit Arm (aarch64) architecture are under review. You can check whether your hardware is supported on Oracle Linux 7.9 (aarch64) by checking the Hardware Certification List at <https://linux.oracle.com/hardware-certifications>. Hardware is listed as it becomes available and is validated.

## File System, Storage, and Address Space Limitations

The following table describes the maximum file size and maximum file system size for the Btrfs, Ext4, and XFS file systems. File system limitations are affected by kernel versions and features, and by the architecture of the system on which Oracle Linux is installed. The values depicted here are estimates based on the known variables that might affect the maximum theoretical value that can be achieved. The theoretical values might be higher than those depicted here, and the actual achievable values might be lower than the values shown, depending on the hardware and the kernel version that is used.

File System Type	Maximum File Size	Maximum File System Size
btrfs	8 EiB	8 EiB
ext4	16 TiB	1 EiB
xfs	8 EiB	8 EiB

The limits for the `ext4` file system that are described here are higher than those recommended and might prove unstable. If you plan to work with systems where you are intend to work toward using higher file system sizes or file sizes, it is recommended that you use either the BTRFS or XFS file system.

The maximum supported size for a bootable logical unit number (LUN) is 50 TB. GPT and UEFI support are required for LUNs that are larger than 2 TB.

The maximum size of the address space that is available to each process is 128 TB.

## Shipped Kernel (aarch64)

Oracle Linux 7.9 ships with the following kernel package:

**kernel-uek-5.4.17-2011.6.2.el7uek**

Unbreakable Enterprise Kernel Release 6 (UEK R6), which is the default kernel.

The Oracle Linux release is tested as a bundle, as shipped on the installation media image. When installed from the installation media image, the minimum kernel version that is supported is the kernel that is included in the image. Downgrading kernel packages is not supported, unless recommended by Oracle Support.

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

## New Features (aarch64)



### Note:

Currently, there are no new features that apply just to the 64-bit Arm (aarch64) platform. Most of the new features in this release that are documented in the [New Features and Changes](#) chapter also apply to the 64-bit Arm (aarch64) platform.

## Known Issues (aarch64)

The following are the known issues for Oracle Linux 7.9 (aarch64). Some issues might also apply to the `x86_64` platform. See [Known Issues](#) for information about issues that apply to both the `x86_64` and Arm (aarch64) platforms.

For information about known issues that are specific to UEK R6, see [Unbreakable Enterprise Kernel Release 6: Release Notes \(5.4.17-2011\)](#).

## Support Limited to Text-Mode Environments and Server Software

Oracle Linux 7.9 (aarch64) is engineered and tested for server-related usage *only*. Although packages for desktop and productivity features are built and provided, testing of these packages is limited and support for graphical mode packages is not provided in this update. You can install any of these packages on your platform, but some of these applications might not work or could have issues that are not documented here.

Oracle does not provide support for these packages and any assistance is community-based. If you choose to run a desktop environment or any desktop applications, direct your questions

to the Oracle Linux for Arm community forum at <https://community.oracle.com/tech/apps-infra/categories/oracle-linux-for-arm>.

## Installation Issues (aarch64)

The following issues might be encountered during an Oracle Linux 7.9 (aarch64) installation.

### Installing the oracle-armtoolset-8 package sometimes fails

Running the `yum install oracle-armtoolset-8` command sometimes fails to install the package. This failure occurs at the following stage of the installation:

```
Installing : oracle-armtoolset-8-runtime-8.0-1.el7_6.aarch64 16/69
Error unpacking rpm package oracle-armtoolset-8-runtime-8.0-1.el7_6.aarch64
error: unpacking of archive failed on file
/opt/oracle/oracle-armtoolset-8/root/lib64: cpio: rename
Installing : oracle-armtoolset-8-libgo-8.2.0-6.el7_6.aarch64 17/69
error: oracle-armtoolset-8-runtime-8.0-1.el7_6.aarch64: install failed
Installing : oracle-armtoolset-8-libasan-8.2.0-6.el7_6.aarch64 18/69
```

Subsequent attempts to install the individual package also fail with the following output:

```
Failed:
oracle-armtoolset-8-runtime.aarch64 0:8.0-1.el7_6
```

If you encounter this issue, you can work around it by running the following commands, which remove and then reinstalls the `oracle-armtoolset-8` package:

```
sudo yum remove 'oracle-armtoolset-8*'
sudo yum remove policycoreutils-python
sudo rm -Rf /opt/oracle/oracle-armtoolset-8/
sudo yum install policycoreutils-python
sudo yum install 'oracle-armtoolset-8*'
```

(Bug ID 29672241)

### Kernel panic for QLogic cnic module on ThunderX2 during installation

The QLogic `cnic` driver module is unsupported on 64-bit Arm (aarch64) platforms. The Marvell ThunderX2 servers include hardware that can cause the `cnic` driver module to load, thus triggering a kernel panic.

To work around this issue, blocklist the `cnic` module at boot by modifying the boot option in the kernel command line for the installer. To prevent the module from installing or loading in the future, create the file `/etc/modprobe.d/cnic.conf` file and add the following lines:

```
blacklist cnic
install cnic /bin/true
```

(Bug IDs 27011806, 28109733)

### btrfs-convert operation results in a file system that cannot be mounted

You can use the `btrfs-convert` tool to convert an `ext4` file system to `btrfs`. However, if the tool attempts to convert a file system that has not been created with a sector block size that matches the system default page size (which is set to 64 KB for the aarch64 platform), the resulting file system cannot be mounted. Note that this issue can occur if the original `ext4` file system is not created by using the `-b 65536` option to specify a 64 KB block size.

(Bug ID 28200561)

## Manual execution of shim first-stage boot loader can fail in the UEFI shell

Manually loading shim binaries from the UEFI shell can fail in some scenarios, including the following cases, which are known to fail:

- `FS0:\EFI\redhat\shimaa64.efi`
- `FS0:\EFI\redhat\> shimaa64.efi`

`FS0:\> \EFI\redhat\shimaa64.efi` is known to work correctly.

This problem is limited to the manual execution of `shim` in the UEFI shell. Note that a standard installation is unaffected by this bug.

(Bug ID 27962691)

## Kdump tools fail to create a vmcore-dmesg.txt on systems that have multiple CPUs

On systems that have multiple CPUs, the Kdump crash dump tools fail to create a `vmcore-dmesg.txt` file, which is created with the `vmcore` file.

This issue might result in the following segmentation fault:

```
...
kdump: saving to /sysroot//var/crash/127.0.0.1-2018-05-22-12:34:45/
kdump: saving vmcore-dmesg.txt
/lib/kdump-lib-initramfs.sh: line 118: 459 Segmentation fault
$_dmesg_collector /proc/vmcore > ${_path}/vmcore-dmesg-incomplete.txt
kdump: saving vmcore-dmesg.txt failed
kdump: saving vmcore
Copying data                               : [100.0 %] \
eta: 0s
kdump: saving vmcore complete
```

The issue occurs because the log buffer that is dynamically allocated by the kernel (`vmcore-dmesg`) does not know how to access memory that is allocated in this way. This issue is typically triggered on systems with 64 or more CPUs, but has also been observed on a 32-core Ampere X-Gene 3 system.

As a workaround, you can retrieve the `dmesg` output manually by the running `crash` command against `vmcore` and then using the `dmesg` command in the crash shell.

(Bug IDs 28064675, 28670960)

## Segmentation fault when running bluedevil-wizard

The `bluedevil-wizard`, which is available in the `bluedevil` package, is unable to connect or locate Bluetooth devices and fails with a segmentation fault when run.

(Bug ID 27101618)

## dsktune command fails with an unsupported error message

The `dsktune` command, which is included with the 389 Directory Server base package (389-ds-base), fails with the following error:

```
ERROR: This system does not support CMPXCHG16B instruction (cpuflag cx16).  
nsslapd-enable-nunc-stans must be set to "off" on this system.  
In a future release of Directory Server this platform will NOT be  
supported.
```

```
ERROR : The above errors MUST be corrected before proceeding.
```

The message is notifying you that the system does not have support for `cx16`, which is a feature that is commonly available on the `x86_64` platform.

The `dsktune` command checks that a system meets requirements and can provide helpful information pertaining to configuration; however, it is not required to run the 389 Directory Server.

(Bug ID 26861135)

## Installation and Availability (aarch64)

The following installation and availability information applies specifically to the 64-bit Arm (aarch64) platform for the Oracle Linux 7.9 (aarch64) release. For general installation and availability information, as well as information that applies specifically to the `x86_64` platform, see [Installation and Availability](#).

Oracle Linux 7.9 (aarch64) is made available as an ISO image (`OracleLinux-R7-U9-Server-aarch64-dvd.iso`), which can be used for a standard installation on generic 64-bit Armv8 hardware. This ISO has been tested on Arm hardware and is engineered for use with Ampere™ eMAG™-based EVK platform and the Marvell ThunderX2® processor. For the latest hardware validated for Oracle Linux 7.9, refer to the Hardware Certification List at <https://linux.oracle.com/hardware-certifications>. Note that hardware is listed as it becomes available.

The Oracle Linux 7.9 (aarch64) ISO image is available from the Oracle Software Delivery Cloud at <https://edelivery.oracle.com/>.

You can also obtain the latest packages for Oracle Linux 7.9 (aarch64) from the Unbreakable Linux Network (ULN) and the Oracle Linux yum server. To install additional software for Oracle Linux 7.9 (aarch64), subscribe to the different channels on ULN or by enable the required repositories within your yum configuration. To explore the channels that are available on ULN, log in to <https://uln.oracle.com/> and view the Channels option. To view the Oracle Linux yum repositories that are available for Oracle Linux 7.9 (aarch64), visit <https://yum.oracle.com/oracle-linux-7.html>.



### Note:

The Oracle Linux yum server does not provide equivalent repositories for some channels that are available on ULN. These channels provide non-open source packages.

UEK R6 is the default boot kernel for fresh installations of Oracle Linux 7.9 (aarch64). For more information, see [Unbreakable Enterprise Kernel Release 6: Release Notes \(5.4.17-2011\)](#).

## Installing From the ISO Image

The installation process for Oracle Linux 7.9 (aarch64) does not differ substantially from the installation process on the x86\_64 platform. The same instructions and information that are provided in [Oracle Linux 7: Installation Guide](#) also apply to the 64-bit Arm (aarch64) platform.

The following is the recommended installation process:

1. Obtain the ISO image from the Oracle Technology Network (<https://www.oracle.com/linux/>).
2. Configure a network installation server to perform the installation.
3. Create a kickstart file to automate your installation.
4. Connect your target Arm hardware to the network and then configure the firmware to boot from the network or by performing a PXE boot.

Refer to your hardware documentation for instructions.

5. Boot the target hardware and wait for the installation to complete.

For more information about configuring a network installation server and using a kickstart file to boot the installer, see [Oracle Linux 7: Installation Guide](#).

The following exceptions and additional information might be required to complete the installation:

## Graphical Network-Based Installation

If you are performing a manual installation over the network and intend to use the remote graphical installer over VNC by setting the `inst.vnc` boot option, you must also set boot options to configure the network. Otherwise, the graphical installer fails to load and the installation reverts to text mode.

To ensure that the VNC server starts at boot, append the appropriate `ip` option to your kernel boot command. Typically, for a DHCP configuration, this option looks similar to the following:

```
ip=eth0:dhcp.
```

## Software Selection Groups

Note that the available Software Selection groups in the Arm installer may differ slightly from the groups that are available in the x86\_64 installer.

## Software Sources

Note that unlike the x86\_64 installer, there are no alternate Software Source repositories provided on this ISO.

# 8

## Package Changes from the Upstream Release



### **WARNING:**

Oracle Linux 7 is now in Extended Support. See [Oracle Linux Extended Support](#) and [Oracle Open Source Support Policies](#) for more information.

Migrate applications and data to Oracle Linux 8 or Oracle Linux 9 as soon as possible.

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 x86\_64 by Oracle

The following x86\_64 binary packages have been added by Oracle:

- `compat-libstdc++`
- `dtrace-utils`
- `dtrace-utils-devel`
- `dtrace-utils-testsuite`
- `inotify-tools`
- `kernel-uek`
- `kernel-uek-debug`
- `kernel-uek-debug-devel`
- `kernel-uek-devel`
- `kernel-uek-doc`
- `libdtrace-ctf`
- `libdtrace-ctf-devel`
- `libvirt-daemon-driver-lxc`
- `lxc`
- `lxc-devel`
- `lxc-libs`



- ocfs2-tools
- ocfs2-tools-devel
- oracleasm-support
- oracle-database-preinstall
- oraclelinux-release
- oraclelinux-release-el7
- oracle-logos
- reflink
- uname26
- yum-plugin-ulninfo

## Modified Binary Packages for x86\_64

The following x86\_64 binary packages from the upstream release have been modified:

- abrt
- abrt-addon-ccpp
- abrt-addon-kerneloops
- abrt-addon-pstoreoops
- abrt-addon-python
- abrt-addon-vmcore
- abrt-addon-xorg
- abrt-cli
- abrt-console-notification
- abrt-dbus
- abrt-desktop
- abrt-gui
- abrt-gui-libs
- abrt-java-connector
- abrt-libs
- abrt-python
- abrt-tui
- aide
- akonadi
- akonadi-mysql
- anaconda
- anaconda-core
- anaconda-gui

- anaconda-tui
- anaconda-user-help
- anaconda-widgets
- apr-util
- apr-util-devel
- autofs
- basesystem
- binutils
- binutils-devel
- blivet3-data
- bpftool
- btrfs-progs
- chrony
- cloud-init
- clufter-bin
- clufter-cli
- clufter-common
- clufter-lib-ccs
- clufter-lib-general
- clufter-lib-pcs
- cmirror
- cockpit
- cockpit-bridge
- cockpit-system
- cockpit-ws
- coreutils
- cpp
- crash
- cups-filters
- cups-filters-libs
- curl
- daxio
- dbus
- dbus-devel
- dbus-libs
- dbus-x11

- device-mapper
- device-mapper-event
- device-mapper-event-libs
- device-mapper-libs
- device-mapper-multipath
- device-mapper-multipath-libs
- dhclient
- dhcp
- dhcp-common
- dhcp-libs
- dracut
- dracut-config-generic
- dracut-config-rescue
- dracut-fips
- dracut-fips-aesni
- dracut-network
- efibootmgr
- firefox
- fuse
- fuse-devel
- fuse-libs
- fwupdate
- fwupdate-efi
- fwupdate-libs
- gcc
- gcc-c++
- gcc-gfortran
- gcc-gnat
- gcc-objc
- gcc-objc++
- gdb
- gdb-gdbserver
- glibc
- glibc-common
- glibc-devel
- glibc-headers

- glibc-utils
- gnome-system-log
- gperftools-libs
- grub2
- grub2-common
- grub2-efi-ia32
- grub2-efi-ia32-modules
- grub2-efi-x64
- grub2-efi-x64-modules
- grub2-pc
- grub2-pc-modules
- grub2-tools
- grub2-tools-extra
- grub2-tools-minimal
- grubby
- gstreamer
- gstreamer-tools
- httpd
- httpd-devel
- httpd-manual
- httpd-tools
- initial-setup
- initial-setup-gui
- initscripts
- ipa-client
- ipa-client-common
- ipa-common
- ipa-python-compat
- ipa-server
- ipa-server-common
- ipa-server-dns
- ipa-server-trust-ad
- 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
- java-11-openjdk
- java-11-openjdk-devel
- java-11-openjdk-headless
- java-1.7.0-openjdk
- java-1.7.0-openjdk-devel
- java-1.7.0-openjdk-headless
- kabi-yum-plugins
- kdepimlibs
- kdepimlibs-akonadi
- kdepimlibs-devel
- kdepimlibs-kxmlrpcclient
- kde-settings
- kde-settings-ksplash
- kde-settings-plasma
- kde-settings-pulseaudio
- kernel
- kernel-abi-whitelists
- kernel-debug
- kernel-debug-devel
- kernel-devel
- kernel-doc
- kernel-headers

- kernel-tools
- kernel-tools-libs
- kexec-tools
- kmod
- kmod-kvdo
- kmod-libs
- kmod-oracleasm
- kpartx
- ksc
- ksh
- libatomic
- libatomic-static
- libcurl
- libcurl-devel
- libdbi-dbd-mysql
- libdbi-dbd-pgsql
- libdbi-drivers
- libgcc
- libgfortran
- libgnat
- libgnat-devel
- libgomp
- libgudev1
- libgudev1-devel
- libguestfs
- libguestfs-inspect-icons
- libguestfs-java
- libguestfs-tools
- libguestfs-tools-c
- libguestfs-xfs
- libipa\_hbac
- libitm
- libitm-devel
- libobjc
- libpmem
- libpmemblk

- libpmemlog
- libpmemobj
- libpmempool
- libquadmath
- libquadmath-devel
- libreport
- libreport-anaconda
- libreport-cli
- libreport-filesystem
- libreport-gtk
- libreport-plugin-bugzilla
- libreport-plugin-mailx
- libreport-plugin-reportuploader
- libreport-plugin-ureport
- libreport-python
- libreport-rhel-anaconda-bugzilla
- libreport-web
- libreswan
- librpmem
- libssh2
- libsss\_autofs
- libsss\_certmap
- libsss\_idmap
- libsss\_nss\_idmap
- libsss\_simpleifp
- libsss\_sudo
- libstdc++
- libstdc++-devel
- libstdc++-docs
- libvirt
- libvirt-bash-completion
- libvirt-client
- libvirt-daemon
- libvirt-daemon-config-network
- libvirt-daemon-config-nwfilter
- libvirt-daemon-driver-interface

- libvirt-daemon-driver-lxc
- 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-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
- libvmem
- libvmmalloc
- libxml2
- libxml2-devel
- libxml2-python
- libxslt
- libxslt-devel
- linux-firmware
- lorax
- lvm2
- lvm2-cluster
- lvm2-libs
- lvm2-python-boom
- lvm2-python-libs
- lz4
- mdadm
- microcode\_ctl



- mkbootdisk
- mod\_session
- mod\_ssl
- mokutil
- mozjs52
- nfs-utils
- nscd
- nss-softokn
- nss-softokn-devel
- nss-softokn-freebl
- nss-softokn-freebl-devel
- ntp
- ntpdate
- opa-address-resolution
- opa-basic-tools
- opa-fastfabric
- opa-fm
- opa-libopamgt
- OpenIPMI
- OpenIPMI-libs
- OpenIPMI-modalias
- OpenIPMI-perl
- openscap
- openscap-containers
- openscap-python
- openscap-scanner
- openscap-utils
- openssh
- openssh-askpass
- openssh-cavs
- openssh-clients
- openssh-debuginfo
- openssh-keycat
- openssh-ldap
- openssh-server
- openssh-server-sysvinit

- openssl
- openssl-devel
- openssl-libs
- open-vm-tools
- open-vm-tools-desktop
- oscap-anaconda-addon
- osinfo-db
- os-prober
- PackageKit
- PackageKit-command-not-found
- PackageKit-glib
- PackageKit-gstreamer-plugin
- PackageKit-gtk3-module
- PackageKit-yum
- pam\_ssh\_agent\_auth
- parted
- pcs
- pcs-snmp
- perf
- perl-DBD-MySQL
- perl-Sys-Guestfs
- perl-XML-Parser
- plymouth
- plymouth-core-libs
- plymouth-graphics-libs
- plymouth-plugin-label
- plymouth-plugin-two-step
- plymouth-scripts
- plymouth-system-theme
- plymouth-theme-charge
- pmempool
- policycoreutils
- policycoreutils-devel
- policycoreutils-gui
- policycoreutils-newrole
- policycoreutils-python

- polycoreutils-sandbox
- polkit
- polkit-devel
- polkit-docs
- ppp
- pykickstart
- python
- python2-blivet3
- python2-ipaclient
- python2-ipalib
- python2-ipaserver
- python3
- python3-libs
- python-blivet
- python-clufter
- python-configshell
- python-devel
- python-jwt
- python-libguestfs
- python-libipa\_hbac
- python-libs
- python-libsss\_nss\_idmap
- python-msrestazure
- python-perf
- python-rtslib
- python-s3transfer
- python-sss
- python-sssdconfig
- python-sss-murmur
- qt3
- qt3-devel
- qt3-MySQL
- qt3-ODBC
- qt3-PostgreSQL
- qt-settings
- rear

- redhat-bookmarks
- redhat-indexhtml
- 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-release-server
- redhat-rpm-config
- redhat-upgrade-dracut
- redhat-upgrade-dracut-plymouth
- redhat-upgrade-tool
- redland
- redland-virtuoso
- rhn-check
- rhn-client-tools
- rhnlib
- rhnsd
- rhn-setup
- rhn-setup-gnome
- rpmdevtools
- rpmemd
- scap-security-guide
- scap-security-guide-doc
- scap-workbench
- seabios-bin
- seavgabios-bin
- selinux-policy
- selinux-policy-devel
- selinux-policy-minimum
- selinux-policy-mls
- selinux-policy-targeted
- setroubleshoot

- setroubleshoot-plugins
- setroubleshoot-server
- sg3\_utils
- sg3\_utils-libs
- shim-ia32
- shim-unsigned-ia32
- shim-unsigned-x64
- shim-x64
- sos
- sos-collector
- spice-streaming-agent
- sssd
- sssd-ad
- sssd-client
- sssd-common
- sssd-common-pac
- sssd-dbus
- sssd-ipa
- sssd-kcm
- sssd-krb5
- sssd-krb5-common
- sssd-ldap
- sssd-libwbclient
- sssd-polkit-rules
- sssd-proxy
- sssd-tools
- sssd-winbind-idmap
- system-config-date
- system-config-kickstart
- systemd
- systemd-devel
- systemd-libs
- systemd-python
- systemd-sysv
- tcpdump
- tog-pegasus

- tog-pegasus-libs
- unixODBC
- unixODBC-devel
- uom-lib
- vim
- vim-common
- vim-enhanced
- vim-filesystem
- vim-minimal
- vim-X11
- virt-install
- virt-manager
- virt-manager-common
- virt-p2v-maker
- virt-v2v
- wireshark
- wireshark-gnome
- xfsprogs
- xsane-common
- xsane-gimp
- xulrunner
- yum
- yum-plugin-aliases
- yum-plugin-changelog
- yum-plugin-ovl
- yum-plugin-tmprepo
- yum-plugin-verify
- yum-plugin-versionlock
- yum-rhn-plugin
- yum-utils

## Modified Optional Binary Packages for x86\_64

The following optional x86\_64 binary packages have been modified:

- libipa\_hbac-devel
- libsss\_certmap-devel
- libsss\_idmap-devel

- libsss\_nss\_idmap-devel
- libsss\_simpleifp-devel
- sg3\_utils-devel
- sssd-libwbclient-devel
- thunderbird

## Removed Binary Packages for x86\_64

The following x86\_64 binary packages from the upstream release have been removed:

- insights-client
- kpatch
- libreport-plugin-rhtsupport
- libreport-rhel
- openscap-containers
- python-rhsm
- python-rhsm-certificates
- python-syspurpose
- redhat-access-gui
- redhat-access-plugin-ipa
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-as-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-bn-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-de-DE
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-en-US
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-es-ES
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-fr-FR
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-gu-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-hi-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-it-IT
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ja-JP
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-kn-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ko-KR
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ml-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-mr-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-or-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-pa-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-pt-BR
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ru-RU

- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ta-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-te-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-zh-CN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-zh-TW
- redhat-logos
- redhat-release-eula
- redhat-support-lib-python
- redhat-support-tool
- rhsm-gtk
- subscription-manager
- subscription-manager-gui
- subscription-manager-initial-setup-addon
- subscription-manager-migration
- subscription-manager-migration-data
- subscription-manager-plugin-container
- subscription-manager-rhsm
- subscription-manager-rhsm-certificates
- virt-who

## Added Binary Packages by Oracle for aarch64

The following aarch64 binary packages have been added by Oracle:

- AAVMF
- dtrace-utils
- dtrace-utils-devel
- dtrace-utils-testsuite
- inotify-tools
- isl
- isl-devel
- ivshmem-tools
- kernel-uek
- kernel-uek-debug
- kernel-uek-debug-devel
- kernel-uek-devel
- kernel-uek-headers
- kernel-uek-tools
- kernel-uek-tools-libs



- `kernel-uek-tools-libs-devel`
- `libdtrace-ctf`
- `libdtrace-ctf-devel`
- `libzstd`
- `libzstd-devel`
- `lxc`
- `lxc-devel`
- `lxc-libs`
- `ocfs2-tools`
- `ocfs2-tools-devel`
- `oracle-armtoolset-1`
- `oracle-armtoolset-1-binutils`
- `oracle-armtoolset-1-binutils-devel`
- `oracle-armtoolset-1-build`
- `oracle-armtoolset-1-cpp`
- `oracle-armtoolset-1-gcc`
- `oracle-armtoolset-1-gcc-c++`
- `oracle-armtoolset-1-gcc-gdb-plugin`
- `oracle-armtoolset-1-gcc-gfortran`
- `oracle-armtoolset-1-gcc-gnat`
- `oracle-armtoolset-1-gcc-go`
- `oracle-armtoolset-1-gcc-objc`
- `oracle-armtoolset-1-gcc-objc++`
- `oracle-armtoolset-1-gcc-plugin-devel`
- `oracle-armtoolset-1-gdb`
- `oracle-armtoolset-1-gdb-doc`
- `oracle-armtoolset-1-gdb-gdbserver`
- `oracle-armtoolset-1-golang`
- `oracle-armtoolset-1-golang-bin`
- `oracle-armtoolset-1-golang-docs`
- `oracle-armtoolset-1-golang-misc`
- `oracle-armtoolset-1-golang-src`
- `oracle-armtoolset-1-golang-tests`
- `oracle-armtoolset-1-libasan`
- `oracle-armtoolset-1-libasan-static`
- `oracle-armtoolset-1-libatomic`

- `oracle-armtoolset-1-libatomic-static`
- `oracle-armtoolset-1-libgcc`
- `oracle-armtoolset-1-libgccjit`
- `oracle-armtoolset-1-libgccjit-devel`
- `oracle-armtoolset-1-libgfortran`
- `oracle-armtoolset-1-libgfortran-static`
- `oracle-armtoolset-1-libgnat`
- `oracle-armtoolset-1-libgnat-devel`
- `oracle-armtoolset-1-libgnat-static`
- `oracle-armtoolset-1-libgo`
- `oracle-armtoolset-1-libgo-devel`
- `oracle-armtoolset-1-libgomp`
- `oracle-armtoolset-1-libgo-static`
- `oracle-armtoolset-1-libitm`
- `oracle-armtoolset-1-libitm-devel`
- `oracle-armtoolset-1-libitm-static`
- `oracle-armtoolset-1-liblsan`
- `oracle-armtoolset-1-liblsan-static`
- `oracle-armtoolset-1-libobjc`
- `oracle-armtoolset-1-libstdc++`
- `oracle-armtoolset-1-libstdc++-devel`
- `oracle-armtoolset-1-libstdc++-static`
- `oracle-armtoolset-1-libtsan`
- `oracle-armtoolset-1-libtsan-static`
- `oracle-armtoolset-1-libubsan`
- `oracle-armtoolset-1-libubsan-static`
- `oracle-armtoolset-1-runtime`
- `oracle-armtoolset-1-toolchain`
- `oracle-logos`
- `perf`
- `python-perf`
- `qemu`
- `qemu-block-gluster`
- `qemu-block-iscsi`
- `qemu-block-rbd`
- `qemu-common`

- `qemu-img`
- `qemu-kvm`
- `qemu-kvm-core`
- `qemu-system-aarch64`
- `qemu-system-aarch64-core`
- `reflink`
- `uname26`
- `yum-plugin-ulninfo`
- `zstd`

## Modified Binary Packages

The following aarch64 binary packages from the upstream release have been modified:

- `abrt`
- `abrt-addon-ccpp`
- `abrt-addon-kerneloops`
- `abrt-addon-pstoreoops`
- `abrt-addon-python`
- `abrt-addon-vmcore`
- `abrt-addon-xorg`
- `abrt-cli`
- `abrt-console-notification`
- `abrt-dbus`
- `abrt-desktop`
- `abrt-gui`
- `abrt-gui-libs`
- `abrt-java-connector`
- `abrt-libs`
- `abrt-python`
- `abrt-tui`
- `aide`
- `akonadi`
- `akonadi-mysql`
- `anaconda`
- `anaconda-core`
- `anaconda-gui`
- `anaconda-tui`

- anaconda-widgets
- apr-util
- apr-util-devel
- autofs
- basesystem
- binutils
- binutils-devel
- bpftool
- btrfs-progs
- chrony
- cloud-init
- clufter-bin
- clufter-cli
- clufter-common
- clufter-lib-ccs
- clufter-lib-general
- clufter-lib-pcs
- cmirror
- cockpit
- cockpit-bridge
- cockpit-system
- cockpit-ws
- coreutils
- cpp
- crash
- cups-filters
- cups-filters-libs
- curl
- dbus
- dbus-devel
- dbus-libs
- dbus-x11
- device-mapper
- device-mapper-event
- device-mapper-event-libs
- device-mapper-libs

- device-mapper-multipath
- device-mapper-multipath-libs
- dhclient
- dhcp
- dhcp-common
- dhcp-libs
- dracut
- dracut-config-generic
- dracut-config-rescue
- dracut-fips
- dracut-fips-aesni
- dracut-network
- dtc
- efibootmgr
- firefox
- fuse
- fuse-devel
- fuse-libs
- fwupdate
- fwupdate-efi
- fwupdate-libs
- gcc
- gcc-c++
- gcc-gfortran
- gcc-gnat
- gcc-objc
- gcc-objc++
- gdb
- gdb-gdbserver
- glibc
- glibc-common
- glibc-devel
- glibc-headers
- glibc-utils
- gnome-system-log
- gperftools-libs

- grub2
- grub2-common
- grub2-efi-aa64
- grub2-efi-aa64-cdboot
- grub2-efi-aa64-modules
- grub2-tools
- grub2-tools-extra
- grub2-tools-minimal
- grubby
- gstreamer
- gstreamer-tools
- httpd
- httpd-devel
- httpd-manual
- httpd-tools
- initial-setup
- initial-setup-gui
- initscripts
- ipa-client
- ipa-client-common
- ipa-common
- ipa-python-compat
- ipa-server
- ipa-server-common
- ipa-server-dns
- ipa-server-trust-ad
- 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
- java-11-openjdk
- java-11-openjdk-devel
- java-11-openjdk-headless
- java-1.7.0-openjdk
- java-1.7.0-openjdk-devel
- java-1.7.0-openjdk-headless
- kdeplibs
- kdeplibs-akonadi
- kdeplibs-devel
- kdeplibs-kxmlrpcclient
- kde-settings
- kde-settings-ksplash
- kde-settings-plasma
- kde-settings-pulseaudio
- kernel
- kernel-abi-whitelists
- kernel-debug
- kernel-debug-devel
- kernel-devel
- kernel-doc
- kernel-headers
- kernel-tools
- kernel-tools-libs
- kexec-tools
- kmod
- kmod-kvdo
- kmod-libs
- kpartx

- ksc
- ksh
- libcurl
- libcurl-devel
- libdbi-dbd-mysql
- libdbi-dbd-pgsql
- libdbi-drivers
- libfdt
- libfdt-devel
- libgcc
- libgfortran
- libgnat
- libgnat-devel
- libgomp
- libgudev1
- libgudev1-devel
- libguestfs
- libguestfs-inspect-icons
- libguestfs-java
- libguestfs-tools
- libguestfs-tools-c
- libguestfs-xfstools
- libipa\_hbac
- libitm
- libitm-devel
- libobjc
- libreport
- libreport-anaconda
- libreport-cli
- libreport-filesystem
- libreport-gtk
- libreport-plugin-bugzilla
- libreport-plugin-mailx
- libreport-plugin-reportuploader
- libreport-plugin-ureport
- libreport-python



- `libreport-rhel-anaconda-bugzilla`
- `libreport-web`
- `libreswan`
- `libssh2`
- `libsss_autofs`
- `libsss_certmap`
- `libsss_idmap`
- `libsss_nss_idmap`
- `libsss_simpleifp`
- `libsss_sudo`
- `libstdc++`
- `libstdc++-devel`
- `libstdc++-docs`
- `libvirt`
- `libvirt-bash-completion`
- `libvirt-client`
- `libvirt-daemon`
- `libvirt-daemon-config-network`
- `libvirt-daemon-config-nwfilter`
- `libvirt-daemon-driver-interface`
- `libvirt-daemon-driver-lxc`
- `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-logical`
- `libvirt-daemon-driver-storage-mpath`
- `libvirt-daemon-driver-storage-rbd`
- `libvirt-daemon-driver-storage-scsi`
- `libvirt-daemon-kvm`

- libvirt-daemon-qemu
- libvirt-devel
- libvirt-docs
- libvirt-libs
- libxml2
- libxml2-devel
- libxml2-python
- libxslt
- libxslt-devel
- linux-firmware
- lorax
- lvm2
- lvm2-cluster
- lvm2-libs
- lvm2-python-boom
- lvm2-python-libs
- lz4
- mod\_session
- mod\_ssl
- mokutil
- mozjs52
- nfs-utils
- nscd
- nss-softokn
- nss-softokn-devel
- nss-softokn-freebl
- nss-softokn-freebl-devel
- ntp
- ntpdate
- OpenIPMI
- OpenIPMI-libs
- OpenIPMI-modalias
- OpenIPMI-perl
- openscap
- openscap-containers
- openscap-python

- openscap-scanner
- openscap-utils
- openssh
- openssh-askpass
- openssh-cavs
- openssh-clients
- openssh-debuginfo
- openssh-keycat
- openssh-ldap
- openssh-server
- openssh-server-sysvinit
- openssl
- openssl-devel
- openssl-libs
- oscap-anaconda-addon
- osinfo-db
- os-prober
- PackageKit
- PackageKit-command-not-found
- PackageKit-glib
- PackageKit-gstreamer-plugin
- PackageKit-gtk3-module
- PackageKit-yum
- pam\_ssh\_agent\_auth
- parted
- pcs
- pcs-snmp
- perf
- perl-DBD-MySQL
- perl-Sys-Guestfs
- perl-XML-Parser
- plymouth
- plymouth-core-libs
- plymouth-graphics-libs
- plymouth-plugin-label
- plymouth-plugin-two-step

- plymouth-scripts
- plymouth-system-theme
- plymouth-theme-charge
- policycoreutils
- policycoreutils-devel
- policycoreutils-gui
- policycoreutils-newrole
- policycoreutils-python
- policycoreutils-sandbox
- polkit
- polkit-devel
- polkit-docs
- ppp
- pykickstart
- python
- python2-ipaclient
- python2-ipalib
- python2-ipaserver
- python3
- python3-libs
- python-blivet
- python-clufter
- python-configshell
- python-devel
- python-jwt
- python-libguestfs
- python-libipa\_hbac
- python-libs
- python-libsss\_nss\_idmap
- python-msrestazure
- python-perf
- python-rtslib
- python-s3transfer
- python-sss
- python-sssdconfig
- python-sss-murmur

- qt3
- qt3-devel
- qt3-MySQL
- qt3-ODBC
- qt3-PostgreSQL
- qt-settings
- rear
- redhat-bookmarks
- redhat-indexhtml
- 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-release-server
- redhat-rpm-config
- redhat-upgrade-dracut
- redhat-upgrade-dracut-plymouth
- redhat-upgrade-tool
- redland
- redland-virtuoso
- rhn-check
- rhn-client-tools
- rhnlib
- rhnsd
- rhn-setup
- rhn-setup-gnome
- rpmdevtools
- scap-security-guide
- scap-security-guide-doc
- scap-workbench
- selinux-policy
- selinux-policy-devel

- selinux-policy-minimum
- selinux-policy-mls
- selinux-policy-targeted
- setroubleshoot
- setroubleshoot-plugins
- setroubleshoot-server
- sg3\_utils
- sg3\_utils-libs
- shim-aa64
- shim-unsigned-aa64
- sos
- sos-collector
- spice-streaming-agent
- sssd
- sssd-ad
- sssd-client
- sssd-common
- sssd-common-pac
- sssd-dbus
- sssd-ipa
- sssd-kcm
- sssd-krb5
- sssd-krb5-common
- sssd-ldap
- sssd-libwbclient
- sssd-polkit-rules
- sssd-proxy
- sssd-tools
- sssd-winbind-idmap
- system-config-date
- system-config-kickstart
- systemd
- systemd-devel
- systemd-libs
- systemd-python
- systemd-sysv

- tcpdump
- tog-pegasus
- tog-pegasus-libs
- unixODBC
- unixODBC-devel
- uom-lib
- vim
- vim-common
- vim-enhanced
- vim-filessystem
- vim-minimal
- vim-X11
- virt-install
- virt-manager
- virt-manager-common
- virt-p2v-maker
- virt-v2v
- wireshark
- wireshark-gnome
- xfsprogs
- xsane-common
- xsane-gimp
- xulrunner
- yum
- yum-plugin-aliases
- yum-plugin-changelog
- yum-plugin-ovl
- yum-plugin-tmprepo
- yum-plugin-verify
- yum-plugin-versionlock
- yum-rhn-plugin
- yum-utils

## Modified Optional Binary Packages for aarch64

The following optional aarch64 binary packages have been modified:

- libipa\_hbac-devel

- libsss\_certmap-devel
- libsss\_idmap-devel
- libsss\_nss\_idmap-devel
- libsss\_simpleifp-devel
- sg3\_utils-devel
- sssd-libwbclient-devel
- thunderbird

## Removed Binary Packages for aarch64

The following aarch64 binary packages from the upstream release have been removed:

- anaconda-user-help
- compat-dapl
- compat-exiv2-023
- compat-exiv2-026
- compat-gcc-34
- compat-gcc-44
- compat-glibc
- compat-libgfortran-41
- cpuid
- crash-ptdump-command
- hyperv-daemons
- infinipath-psm
- insights-client
- intel-cmt-cat
- ixpdimmm\_sw
- java-1.6.0-openjdk
- kabi-yum-plugins
- kpatch
- libinvm-cim
- libinvm-cli
- libinvm-i18n
- libpsm2
- libreport-plugin-rhtsupport
- libreport-rhel
- libsmbios
- mcelog



- memkind
- memtest86+
- microcode\_ctl
- mkbootdisk
- nvml
- opa-ff
- opa-fm
- openscap-containers
- openssl098e
- open-vm-tools
- oracleasm
- ovmf
- prelink
- python-rhsm
- python-rhsm-certificates
- python-syspurpose
- qemu-kvm
- redhat-access-gui
- redhat-access-plugin-ipa
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-as-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-bn-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-de-DE
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-en-US
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-es-ES
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-fr-FR
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-gu-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-hi-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-it-IT
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ja-JP
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-kn-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ko-KR
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ml-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-mr-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-or-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-pa-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-pt-BR

- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ru-RU
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ta-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-te-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-zh-CN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-zh-TW
- redhat-logos
- redhat-release-eula
- redhat-support-lib-python
- redhat-support-tool
- rhsm-gtk
- seabios
- sgabios
- subscription-manager
- subscription-manager-gui
- subscription-manager-initial-setup-addon
- subscription-manager-migration
- subscription-manager-migration-data
- subscription-manager-plugin-container
- subscription-manager-rhsm
- subscription-manager-rhsm-certificates
- syslinux
- tboot
- vdo
- virt-who
- x86info
- xorg-x11-drv-intel
- xorg-x11-drv-openchrome
- xorg-x11-drv-vesa
- xorg-x11-drv-vmmouse
- xorg-x11-drv-vmware

## 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 x86\_64 by Oracle

The following x86\_64 source packages have been added by Oracle:

- `compat-gcc-32`
- `dtrace-utils`
- `inotify-tools`
- `kernel-uek`
- `libdtrace-ctf`
- `lxc`
- `ocfs2-tools`
- `oracleasm-support`
- `oracle-database-preinstall-19c`
- `oraclelinux-release`
- `oraclelinux-release-el7`
- `oracle-logos`
- `reflink`
- `uname26`
- `yum-plugin-ulninfo`

## Modified Source Packages for x86\_64

The following x86\_64 source packages from the upstream release have been modified:

- `aide`
- `abrt`
- `abrt-java-connector`
- `akonadi`
- `anaconda`
- `anaconda-user-help`
- `apr-util`
- `autofs`
- `babel`
- `basesystem`
- `bcc`
- `binutils`
- `brlTTY`
- `btrfs-progs`
- `caribou`

- ceph-common
- chrony
- cloud-init
- clufter
- cockpit
- coreutils
- crash
- cups-filters
- curl
- custodia
- dbus
- dbus-glib
- dbusmenu-qt
- dbus-python
- deltarpm
- device-mapper-multipath
- device-mapper-persistent-data
- dhcp
- dracut
- efibootmgr
- file
- firefox
- firewalld
- fuse
- fuseiso
- fwupdate
- gcc
- gcc-libraries
- gdb
- gdbm
- glibc
- gnome-system-log
- gperftools
- grub2
- grubby
- gstreamer

- gstreamer1
- gstreamer1-plugins-bad-free
- gstreamer1-plugins-base
- gstreamer1-plugins-good
- gstreamer1-plugins-ugly-free
- gstreamer-plugins-bad-free
- gstreamer-plugins-base
- gstreamer-plugins-good
- hawkey
- httpd
- initial-setup
- initscripts
- ipa
- iscsi-initiator-utils
- java-11-openjdk
- java-1.7.0-openjdk
- javapackages-tools
- kabi-yum-plugins
- kdepimlibs
- kde-settings
- kernel
- kernel-uek
- kexec-tools
- keycloak-httpd-client-install
- kmod
- kmod-kvdo
- ksc
- kscreen
- ksh
- libblockdev
- libbytesize
- libdbi-drivers
- libguestfs
- libguestfs-winsupport
- libpwquality
- libreport

- librewan
- libssh2
- libtdb
- libtevent
- libvirt
- libvirt-cim
- libvirt-glib
- libvirt-java
- libvirt-python
- libvirt-snmpp
- libxml2
- libxslt
- linux-firmware
- lorax
- lvm2
- lz4
- microcode\_ctl
- mkbootdisk
- mozjs52
- nfs-utils
- nss-softoken
- ntp
- nvml
- opa-ff
- opa-fm
- OpenIPMI
- openscap
- openssh
- openssl
- openssl098e
- open-vm-tools
- oracleasm
- oscap-anaconda-addon
- osinfo-db
- osinfo-db-tools
- os-prober

- PackageKit
- parted
- pcp
- pcs
- pcsc-lite
- pcsc-lite-ccid
- perftest
- perl-DBD-MySQL
- perl-XML-Parser
- plymouth
- policycoreutils
- polkit
- polkit-kde
- polkit-pkla-compat
- polkit-qt
- ppp
- pyatspi
- pygobject3
- pykickstart
- python
- python3
- python3-setuptools
- python-adal
- python-augeas
- python-azure-sdk
- python-backports
- python-backports-ssl\_match\_hostname
- python-beaker
- python-blivet
- python-blivet3
- python-boto3
- python-cffi
- python-chardet
- python-cherrypy
- python-configobj
- python-configshell

- `python-coverage`
- `python-cpio`
- `python-cryptography`
- `python-cups`
- `python-dateutil`
- `python-decorator`
- `python-di`
- `python-dmidecode`
- `python-dns`
- `python-docs`
- `python-docutils`
- `python-enum34`
- `python-ethtool`
- `python-futures`
- `python-gssapi`
- `python-gudev`
- `python-hwdata`
- `python-idna`
- `python-iniparse`
- `python-inotify`
- `python-ipaddr`
- `python-ipaddress`
- `python-IPy`
- `python-isodate`
- `python-jinja2`
- `python-jsonpatch`
- `python-jsonpointer`
- `python-jwcrypto`
- `python-jwt`
- `python-kdcproxy`
- `python-kerberos`
- `python-kitchen`
- `python-kmod`
- `python-krbV`
- `python-ldap`
- `python-linux-procfs`



- `python-lxml`
- `python-mako`
- `python-markupsafe`
- `python-matplotlib`
- `python-meh`
- `python-memcached`
- `python-msrest`
- `python-msrestazure`
- `python-netaddr`
- `python-netifaces`
- `python-nose`
- `python-nss`
- `python-ntplib`
- `python-oauthlib`
- `python-paramiko`
- `python-paste`
- `python-pillow`
- `python-pip`
- `python-ply`
- `python-prettytable`
- `python-psycpg2`
- `python-pyasnl`
- `python-pyblock`
- `python-pycparser`
- `python-pycurl`
- `python-pyudev`
- `python-qrcode`
- `python-reportlab`
- `python-requests`
- `python-requests-oauthlib`
- `python-rpm-generators`
- `python-rpm-macros`
- `python-rtslib`
- `python-s3transfer`
- `python-schedutils`
- `python-setproctitle`

- `python-setuptools`
- `python-six`
- `python-slip`
- `python-smbc`
- `python-sqlalchemy`
- `python-subprocess32`
- `python-suds`
- `python-tempita`
- `python-urlgrabber`
- `python-urllib3`
- `python-urwid`
- `python-virtualenv`
- `python-wheel`
- `python-yubico`
- `qt3`
- `rear`
- `redhat-bookmarks`
- `redhat-indexhtml`
- `redhat-lsb`
- `redhat-release-server`
- `redhat-rpm-config`
- `redhat-upgrade-dracut`
- `redhat-upgrade-tool`
- `redland`
- `rhn-client-tools`
- `rhnlib`
- `rhnsd`
- `rpmdevtools`
- `scap-security-guide`
- `scap-workbench`
- `seabios`
- `selinux-policy`
- `setroubleshoot`
- `setroubleshoot-plugins`
- `sg3_utils`
- `shim`

- shim-signed
- sos
- sos-collector
- spice-streaming-agent
- sssd
- system-config-date
- system-config-date-docs
- system-config-kickstart
- systemd
- tcpdump
- tog-pegasus
- unixODBC
- uom-lib
- vim
- virt-manager
- volume\_key
- wireshark
- xfsprogs
- xsane
- xulrunner
- yum
- yum-langpacks
- yum-metadata-parser
- yum-plugin-ulninfo
- yum-rhn-plugin
- yum-utils

## Modified Optional Source Packages for x86\_64

The following optional x86\_64 source packages have been modified:

- gnu-efi
- jetty-artifact-remote-resources
- jetty-parent
- jetty-toolchain
- kmod-redhat-ixgbe
- libreoffice
- pesign

- publican
- sanlock
- thunderbird

## Removed Source Packages for x86\_64

The following x86\_64 source packages from the upstream release have been removed:

- dtc
- insights-client
- kpatch
- libcxl
- libehca
- libica
- libocxl
- librtas
- libservicelog
- libvdp
- libzfcphbaapi
- lsvpd
- opal-prd
- openssl-ibmca
- paflib
- powerpc-utils
- powerpc-utils-python
- ppc64-diag
- ppc64-utils
- python-rhsm
- qclib
- qemu-kvm-ma
- redhat-access-gui
- redhat-access-plugin-ipa
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-as-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-bn-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-de-DE
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-en-US
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-es-ES
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-fr-FR

- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-gu-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-hi-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-it-IT
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ja-JP
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-kn-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ko-KR
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ml-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-mr-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-or-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-pa-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-pt-BR
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ru-RU
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ta-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-te-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-zh-CN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-zh-TW
- redhat-logos
- redhat-release-eula
- redhat-support-lib-python
- redhat-support-tool
- s390utils
- servicelog
- SLOF
- subscription-manager
- subscription-manager-migration-data
- virt-who
- yaboot

## Added Source Packages for aarch64 by Oracle

The following aarch64 source packages have been added by Oracle:

- dtrace-utils
- inotify-tools
- kernel-uek
- libdtrace-ctf
- lxc
- ocfs2-tools

- oracle-database-preinstall
- oraclelinux-release
- oraclelinux-release-el7
- oracle-logos
- reflink
- uname26
- yum-plugin-ulninfo

## Modified Source Packages for aarch64

The following aarch64 source packages from the upstream release have been modified:

- aide
- abrt
- abrt-java-connector
- akonadi
- anaconda
- apr-util
- autofs
- babel
- basesystem
- bcc
- binutils
- brltty
- btrfs-progs
- caribou
- ceph-common
- chrony
- cloud-init
- clufter
- cockpit
- coreutils
- crash
- cups-filters
- curl
- custodia
- dbus
- dbus-glib

- dbusmenu-qt
- dbus-python
- deltarpm
- device-mapper-multipath
- device-mapper-persistent-data
- dhcp
- dracut
- dtc
- efibootmgr
- file
- firefox
- firewalld
- fuse
- fuseiso
- fwupdate
- gcc
- gcc-libraries
- gdb
- gdbm
- glibc
- gnome-system-log
- gperftools
- grub2
- grubby
- gstreamer
- gstreamer1
- gstreamer1-plugins-bad-free
- gstreamer1-plugins-base
- gstreamer1-plugins-good
- gstreamer1-plugins-ugly-free
- gstreamer-plugins-bad-free
- gstreamer-plugins-base
- gstreamer-plugins-good
- hawkey
- httpd
- initial-setup

- `initscripts`
- `ipa`
- `iscsi-initiator-utils`
- `java-11-openjdk`
- `java-1.7.0-openjdk`
- `javapackages-tools`
- `kdepimlibs`
- `kde-settings`
- `kernel`
- `kernel-uek`
- `kexec-tools`
- `keycloak-httpd-client-install`
- `kmod`
- `kmod-kvdo`
- `ksc`
- `kscreen`
- `ksh`
- `libblockdev`
- `libbytesize`
- `libdbi-drivers`
- `libguestfs`
- `libguestfs-winsupport`
- `libpwquality`
- `libreport`
- `libreswan`
- `libssh2`
- `libtdb`
- `libtevent`
- `libvirt`
- `libvirt-cim`
- `libvirt-glib`
- `libvirt-java`
- `libvirt-python`
- `libvirt-snmpp`
- `libxml2`
- `libxslt`



- linux-firmware
- lorax
- lvm2
- lz4
- mozjs52
- nfs-utils
- nss-softokn
- ntp
- OpenIPMI
- openscap
- openssh
- openssl
- oscap-anaconda-addon
- osinfo-db
- osinfo-db-tools
- os-prober
- PackageKit
- parted
- pcp
- pcs
- pcsc-lite
- pcsc-lite-ccid
- perftest
- perl-DBD-MySQL
- perl-XML-Parser
- plymouth
- policycoreutils
- polkit
- polkit-kde
- polkit-pkla-compat
- polkit-qt
- ppp
- pyatspi
- pygobject3
- pykickstart
- python

- python3
- python3-setuptools
- python-adal
- python-augeas
- python-azure-sdk
- python-backports
- python-backports-ssl\_match\_hostname
- python-beaker
- python-blivet
- python-blivet3
- python-boto3
- python-cffi
- python-chardet
- python-cherrypy
- python-configobj
- python-configshell
- python-coverage
- python-cpio
- python-cryptography
- python-cups
- python-dateutil
- python-decorator
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- python-dns
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- python-futures
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- python-inotify

- `python-ipaddr`
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- `python-markupsafe`
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- `python-meh`
- `python-memcached`
- `python-msrest`
- `python-msrestazure`
- `python-netaddr`
- `python-netifaces`
- `python-nose`
- `python-nss`
- `python-ntplib`
- `python-oauthlib`
- `python-paramiko`
- `python-paste`
- `python-pillow`
- `python-pip`
- `python-ply`
- `python-prettytable`

- python-psycpg2
- python-pyasnl
- python-pyblock
- python-pycparser
- python-pycurl
- python-pyudev
- python-qrcode
- python-reportlab
- python-requests
- python-requests-oauthlib
- python-rpm-generators
- python-rpm-macros
- python-rtslib
- python-s3transfer
- python-schedutils
- python-setproctitle
- python-setuptools
- python-six
- python-slip
- python-smbc
- python-sqlalchemy
- python-subprocess32
- python-suds
- python-tempita
- python-urlgrabber
- python-urllib3
- python-urwid
- python-virtualenv
- python-wheel
- python-yubico
- qt3
- rear
- redhat-bookmarks
- redhat-indexhtml
- redhat-lsb
- redhat-release-server

- redhat-rpm-config
- redhat-upgrade-dracut
- redhat-upgrade-tool
- redland
- rhn-client-tools
- rhnlib
- rhnsd
- rpmdevtools
- scap-security-guide
- scap-workbench
- selinux-policy
- setroubleshoot
- setroubleshoot-plugins
- sg3\_utils
- shim
- shim-signed
- sos
- sos-collector
- spice-streaming-agent
- sssd
- system-config-date
- system-config-date-docs
- system-config-kickstart
- systemd
- tcpdump
- tog-pegasus
- unixODBC
- uom-lib
- vim
- virt-manager
- volume\_key
- wireshark
- xfsprogs
- xsane
- xulrunner
- yum

- yum-langpacks
- yum-metadata-parser
- yum-plugin-ulninfo
- yum-rhn-plugin
- yum-utils

## Modified Optional Source Packages for aarch64

The following optional aarch64 source packages have been modified:

- gnu-efi
- jetty-artifact-remote-resources
- jetty-parent
- jetty-toolchain
- kmod-redhat-ixgbe
- libreoffice
- pesign
- publican
- sanlock
- thunderbird

## Removed Source Packages for aarch64

The following aarch64 source packages from the upstream release have been removed:

- anaconda-user-help
- biosdevname
- compat-dapl
- compat-exiv2-023
- compat-exiv2-026
- compat-gcc-34
- compat-gcc-44
- compat-glibc
- compat-libgfortran-41
- cpuid
- crash-ptdump-command
- genwqe-tools
- hyperv-daemons
- infinipath-psm
- insights-client

- intel-cmt-cat
- ixpdimm\_sw
- java-1.6.0-openjdk
- kabi-yum-plugins
- kernel
- kmod-kvdo
- kpatch
- ksc
- libcxl
- libehca
- libica
- libinvm-cim
- libinvm-cli
- libinvm-i18n
- libocxl
- libpsm2
- librtas
- libservicelog
- libsmbios
- libvpd
- libzfcphbaapi
- lsvpd
- mcelog
- memkind
- memtest86+
- microcode\_ctl
- mkbootdisk
- nbdkit
- nvml
- opa-ff
- opa-fm
- opal-prd
- openssl098e
- openssl-ibmca
- open-vm-tools
- oracleasm

- ovmf
- paflib
- pmdk-convert
- powerpc-utils
- powerpc-utils-python
- ppc64-diag
- ppc64-utils
- prelink
- python-rhsm
- qclib
- qemu-kvm
- qemu-kvm-ma
- redhat-access-gui
- redhat-access-plugin-ipa
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-as-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-bn-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-de-DE
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- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-hi-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-it-IT
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ja-JP
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-kn-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ko-KR
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ml-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-mr-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-or-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-pa-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-pt-BR
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ru-RU
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-ta-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-te-IN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-zh-CN
- Red\_Hat\_Enterprise\_Linux-Release\_Notes-7-zh-TW



- redhat-logos
- redhat-release-eula
- redhat-support-lib-python
- redhat-support-tool
- s390utils
- seabios
- servicelog
- sgabios
- SLOF
- subscription-manager
- subscription-manager-migration-data
- syslinux
- tboot
- tss2
- vdo
- virt-who
- x86info
- xorg-x11-drv-intel
- xorg-x11-drv-openchrome
- xorg-x11-drv-vesa
- xorg-x11-drv-vmmouse
- xorg-x11-drv-vmware
- yaboot