

# Oracle® Linux 7

## Release Notes for Oracle Linux 7.6 (aarch64)

**ORACLE®**

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## Preface

[Oracle® Linux 7: Release Notes for Oracle Linux 7.6 \(aarch64\)](#) provides a summary of the new features and known issues in Oracle Linux 7.6 (aarch64). This document may be updated after it is released.

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## Audience

This document is intended for users and administrators of Oracle Linux 7. It describes potential issues and the corresponding workarounds you may encounter while using Oracle Linux 7. Oracle recommends that you read this document before installing Oracle Linux 7. It is assumed that readers have a general understanding of the Linux operating system.

## Related Documents

The latest version of this document and other documentation for this product are available at:

[Oracle® Linux 7 Documentation](#)

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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. |

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insensitive. While doing so, 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 an ongoing, long-term process.

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# Chapter 1 System Requirements and Limits

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1.1 File System, Storage, and Address Space Limitations ..... 1

System requirements and limitations for 64-bit Arm architecture are under review. You can check whether your hardware is supported on Oracle Linux 7 by checking the Hardware Certification List at <https://linux.oracle.com/hardware-certifications>. Hardware is listed as it becomes available and is validated.

## 1.1 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 that are recommended and might prove unstable. If you plan to work with systems where you are intend to work towards 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.





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## Chapter 2 Shipped Kernels

Oracle Linux 7.6 (aarch64) ships with the following kernel packages:

`kernel-uek-4.14.35-1818.3.3.el7uek` Unbreakable Enterprise Kernel Release 5 (UEK R5), which is the default kernel.

Oracle Linux 7.6 (aarch64) is only shipped with Unbreakable Enterprise Kernel Release 5 and only this kernel is supported at this time.

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 supported is the one 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>.

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## Chapter 3 New Features and Changes

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This section describes new features and changes in Oracle Linux 7.6 (aarch64). For details about the new features and changes in the initial release of Oracle Linux 7, see [Oracle® Linux 7: Release Notes for Oracle Linux 7](#). Note that Arm architecture platforms started to be supported on Oracle Linux 7, with the [Oracle Linux 7.5 \(aarch64\)](#) release. The changes described here are subsequent to the changes described in the release notes that are provided for that initial release.

### 3.1 Clustering

The following clustering features, bug fixes, and enhancements are included in this update. See [Oracle® Linux 7: Administrator's Guide](#) for more information about clustering technology and support limitations.

- **Pacemaker now supports path, mount, and timer systemd unit files.** Although previous releases of Pacemaker supported `service` and `socket` systemd unit file, alternative units would fail. Pacemaker can now manage `path`, `mount` and `timer` systemd units, as well.
- **Pacemaker LVM resource agent updates.** New functionality and updates have been applied to the LVM resource agents for better management of shared storage across hosts. Most notably, the new `LVM-activate` resource agent assists with the handling of LVM management throughout the cluster and can be configured to work either with `clvmd` or `lvmlockd`, depending on your implementation.

Options available through the new `LVM-activate` resource agent include:

- `tagging`, equivalent to the `tagging` provided with the existing `lvm` resource agent;
- `clvmd`, equivalent to using `clvmd` with the existing `lvm` resource agent;
- `system ID`, a new option for using the system ID for volume group failover as an alternative to using `tagging`; and
- `lvmlockd`, a new option to use `lvmlockd` and `dln` for volume group sharing as an alternative to using `clvmd`.

The existing `lvm` resource agent has also been patched to accept the `volume_group_check_only` parameter. This parameter can be set to limit monitoring to only volume groups, to avoid timeouts on tagged volumes. This parameter must only be used with the `lvm` resource agent when you are experiencing timeout issues. Do not use this parameter with the `LVM-activate` resource agent.

### 3.2 MySQL Community Packages

The MySQL Community 8.0.11 packages are available for Arm on the Unbreakable Linux Network (ULN) and the Oracle Linux yum server.

You can install MySQL Community packages directly from ULN or the Oracle Linux yum server by enabling the appropriate channel or repository. For example, you would enable the `ol7_MySQL80` repository on the Oracle Linux yum server to install the MySQL Community 8.0 packages as follows:

```
# yum-config-manager --enable ol7_MySQL80
```

To enable the channel on ULN, use the ULN web interface to subscribe the system to the appropriate channel:

1. Log in to <https://linux.oracle.com> with your ULN user name and password.
2. On the Systems tab, click the link named for the system in the list of registered machines.
3. On the System Details page, click **Manage Subscriptions**.
4. On the System Summary page, select each required channel from the list of available channels and click the right arrow to move the channel to the list of subscribed channels.

Subscribe the system to the `ol7_aarch64_MySQL80_community` channel.

5. Click **Save Subscriptions**.



#### Note

Arm support is limited to MySQL Community 8.0.11. Channels for prior MySQL Community releases are not available for aarch64.

## 3.3 DTrace

DTrace has been enabled for Arm platforms and ports of the DTrace code are available in UEK R5. Refer to [Unbreakable Enterprise Kernel: Release Notes for Unbreakable Enterprise Kernel Release 5](#) for more information.

The DTrace user space code in the `dtrace-utils` package has also all been ported to run on 64-bit Arm platforms to fully enable DTrace for Oracle Linux 7.6 (aarch64)

## 3.4 Developer Toolchain

The Oracle Linux 7.6 (aarch64) release includes a toolchain that provides a solid developer toolset to build code for 64-bit Arm platforms and to compile modules against the provided kernel. This includes the version 7.3 of the `gcc` compiler that is used to build the aarch64 version of UEK R5.

Developer tools are released as a software collection that can be found in the `/addons/Oscl` directory repository on the provided ISO. You can install the `oracle-armtoolset-1` software collection using the `yum` command:

```
# yum install scl-utils oracle-armtoolset-1
```

When the `oracle-armtoolset-1` software collection is installed, you can enable it by running the following command:

```
# scl enable oracle-armtoolset-1 bash
```

The `oracle-armtoolset-1` software collection is released as an addition to the Software Collection Library for Oracle Linux and is only available on aarch64 platforms.

**Note**

The `oracle-armtoolset-1` software collection is required if you need to build kernel modules from source.

## 3.5 Networking

The following networking features, bug fixes, and enhancements are included in this update:

- **IFDOWN\_ON\_SHUTDOWN option available in `/etc/sysconfig/network`.** A new option for use when configuring networking in `/etc/sysconfig/network` is available. You can set the `IFDOWN_ON_SHUTDOWN` option to `no` or to `false` to prevent all network interfaces from being taken down when the system is shut down. If this parameter is set to the default value of `true`, network interfaces are taken down during system shut down.

This option can be useful in preventing mount points that use networked-based file systems, such as NFS, from becoming stale if the network is stopped before the file system is cleanly unmounted.

- **More detail in `network-scripts` error messages for the bonding driver.** Error messages that are related to the failure of bonding driver installation have been made more verbose when using `/etc/sysconfig/network-scripts` to manage an interface.

## 3.6 Virtualization

The following virtualization features, bug fixes, and enhancements are included in this update:

- **QEMU guest agent diagnostics enhanced.** New QEMU guest agent commands have been added to improve diagnostic capabilities in line with Virtual Desktop and Server Management daemon requirements. These include the addition of the commands: `qemu-get-host-name`, `qemu-get-users`, `qemu-get-osinfo`, and `qemu-get-timezone`.

## 3.7 Technology Preview

Features that are currently under technology preview when using UEK R5 are described in [Unbreakable Enterprise Kernel: Release Notes for Unbreakable Enterprise Kernel Release 5](#).

This section specifies items specific to the Arm architecture and Oracle Linux 7.6 (aarch64) that are not supported but which may be made available under technology preview.

Oracle makes available an Oracle Linux 7.6 (aarch64) disk image for use on Raspberry Pi™ 3 Model B+ hardware. This disk image is available as a technology preview for developer use *only* and Oracle does not provide support for the disk image or the hardware. Oracle recommends that developers assist each other on the Oracle Linux for Arm community forum at [https://community.oracle.com/community/technology\\_network\\_community/server\\_%26\\_storage\\_systems/linux/oracle-linux-for-arm](https://community.oracle.com/community/technology_network_community/server_%26_storage_systems/linux/oracle-linux-for-arm)

Linux Containers (LXC) are available as a technology preview and functionality may be limited.



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# Chapter 4 Fixed Issues

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This chapter describes issues that are fixed in Oracle Linux 7.6 (aarch64).

Note that additional issues specific to the kernel that you are using might also be resolved. If you are using the default UEK R5, see [Unbreakable Enterprise Kernel: Release Notes for Unbreakable Enterprise Kernel Release 5](#). If you are using an alternate UEK release or update, please refer to the appropriate release notes for this kernel version, available at [Unbreakable Enterprise Kernel Documentation](#).

### 4.1 Kdump Vmcore Save Service fixed to resolve start issue on aarch64 platforms

Various issues that caused the Kdump Vmcore Save Service to fail when it was started on Arm systems have been resolved. (Bug ID 27995626)

### 4.2 OpenSSL packages updated to fix security issues, including CVE-2018-0739

Security fixes were applied to the OpenSSL packages that are shipped with Oracle Linux 7 and are included in this update release. These include a fix for CVE-2018-0739. (Bug ID 28584683)





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This chapter describes the known issues for Oracle Linux 7.6 (aarch64).

Note that additional issues specific to the kernel that you are using might also be present. Please see [Unbreakable Enterprise Kernel: Release Notes for Unbreakable Enterprise Kernel Release 5](#) available as part of the [Unbreakable Enterprise Kernel Documentation](#), for issues specific to the kernel.

## 5.1 Support limited to text-mode environments and server software

Oracle Linux 7.6 (aarch64) is engineered and tested for server-related usage only. Although packages for desktop and productivity features are built and provided, the testing of these packages is limited and support for graphical mode packages is not provided in this release. You can install any of these packages on your platform, but it is possible that some of these applications may not work or may 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, you should direct any questions to the Oracle Linux for Arm community forum at [https://community.oracle.com/community/technology\\_network\\_community/server\\_%26\\_storage\\_systems/linux/oracle-linux-for-arm](https://community.oracle.com/community/technology_network_community/server_%26_storage_systems/linux/oracle-linux-for-arm).

## 5.2 Installation Issues

The following issues might be encountered during installation.

## 5.2.1 Alternate installation options

When performing a text based installation, the installer detects the video controller and offers a graphical installation on the system video console by default. The boot menu may not offer options to perform text-based or VNC-based installation.

To perform a text-based installation, you must specify the `inst.text` option on the boot command line. If you intend to perform a remote graphical installation over VNC, you must use the `inst.vnc` option, as well as specify boot options to configure the network. Typically `ip=dhcp` is used for this purpose.

For more information about boot options, see [Oracle® Linux 7: Installation Guide](#). (Bug ID 27581120)

## 5.2.2 Graphical installer allows users to edit kickstart settings

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

Note that this type of change is not possible when performing a text installation. During a text installation, the user can only modify fields that have not already been defined in the kickstart configuration file. (Bug ID 28642357)

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

The QLogic `cnic` driver module is unsupported for 64-bit Arm platforms. The Cavium ThunderX2 servers include hardware that can cause the `cnic` driver module to load, triggering a kernel panic.

To work around the issue, blacklist the `cnic` module at boot by using the `module_blacklist=cnic` 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` and ensure that it contains the following lines:

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

(Bug IDs 27011806, 28109733)

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

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 may also be uninstalled due to dependency relationships. The `libvirt` package has a dependency on the `libvirt-daemon-driver-nwfiler` package, and this package has a dependency on `libpcap`. Removing `libpcap` removes the entire `libvirt` family of packages. (Bug ID 28582266)

## 5.2.5 Remove fence-agents-azure-arm-4.0.11-86.el7\_5.3.aarch64 package before upgrade from Oracle Linux 7.5 (aarch64)

When upgrading from Oracle Linux 7.5 (aarch64) to Oracle Linux 7.6 (aarch64), the following package conflict is encountered while installing packages from the `ol7_latest` channel:

```
Transaction check error:
file /usr/share/fence/azure_fence.py conflicts between attempted installs
of fence-agents-azure-arm-4.0.11-86.el7_5.3.aarch64 and
```

```
fence-agents-common-4.2.1-11.el7.aarch64
```

The workaround for this issue is to remove the `fence-agents-azure-arm-4.0.11-86.el7_5.3.aarch64` package before upgrading from Oracle Linux 7.5 (aarch64).



#### Note

The older package (`fence-agents-azure-arm-4.0.11-86.el7_5.3.aarch64`) will be removed from yum and ULN in the next update.

Bug ID (28888799)

## 5.2.6 Remove libvirt-autonuma-config-hook and other associated packages before upgrade from Oracle Linux 7.5 (aarch64)

The `libvirt-autonuma-config-hook`, `virt-v2v` and `virt-p2v-maker` packages were distributed with the initial release of Oracle Linux 7.5 (aarch64). These packages are not required and can cause some dependency problems if they are installed when you attempt to upgrade to Oracle Linux 7.6 (aarch64).

If any of these packages are installed on your system, remove them as follows prior to an upgrade:

```
# yum remove libvirt-autonuma-config-hook virt-v2v virt-p2v-maker
```

(Bug ID 28681615, 28807367)

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

Upgrade from Oracle Linux 7.5 can fail if the login session open files limit is set too low and the system that is being upgraded includes many packages from many channels or repositories. The issue can be triggered if the `rpm-plugin-systemd-inhibit` package is installed and the session is configured for a maximum open file limit below 4096. This issue typically results in yum failing to update and error messages similar to:

```
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 `yum update`:

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

(Bug ID 28720235)

## 5.3 File System Bugs

The following file systems related issues pertain to Oracle Linux 7.6 (aarch64).

### 5.3.1 btrfs: Convert operation results in a file system that cannot be mounted

The `btrfs-convert` tool can be used 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 aarch64, the resulting file system cannot be mounted. This issue may 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)

## 5.4 Automatic Bug Reporting Tool

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.

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

Manually loading shim binaries from the UEFI shell may fail in some scenarios. The following cases are known to fail:

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

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

A standard installation is unaffected by this bug and the problem is limited to the manual execution of [shim](#) in the UEFI shell. (Bug ID 27962691)

## 5.6 Kdump tools fail to create vmcore-dmesg.txt on systems with many CPUs

On systems with many CPUs, the crash dump tools that are included with Kdump, fail to create the [vmcore-dmesg.txt](#) file, which is created with the [vmcore](#) file. This may result in a 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
```

This issue is the result of a log buffer that is dynamically allocated by the kernel. [vmcore-dmesg](#) does not know how to access memory allocated in this way. The 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.

The dmesg output can be retrieved manually by running [crash](#) against the vmcore and using the [dmesg](#) command once in the crash shell. (Bug ID 28064675, 28670960)

## 5.7 Snapshots of KVM guests using UEFI fail and are unsupported

You cannot do 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 with 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)

## 5.8 Virtual machine with copied disk fails to boot

Attempting to start a virtual machine that has been created to use a copied virtual machine hard disk can fail with the messages:

```
Section 0 has negative size
Failed to load image: Unsupported
start_image() returned Unsupported
Error: Image at 002384AD000 start failed: Unsupported
Unloading driver at 0x002384AD000
```

The boot loader drops back into the UEFI Interactive Shell after it fails.

The issue is caused by a problem with the default EFI boot option that is used by the aarch64 virtual machine firmware when it attempts to boot the disk.

To work around the issue, when the virtual machine drops to the UEFI shell after it fails to boot, you can enter the following to manually load the appropriate shim binary:

```
Shell> FS0:\EFI\BOOT\fbaa64.efi
```

This is a one-time requirement and future reboots of the same virtual machine do not require manual intervention. (Bug ID 27972230)

## 5.9 Error with PXE-based installation of a UEFI virtual machine

An error appears when performing an operating system installation on a UEFI based virtual machine using PXE boot where there is no ramfb device present. Typically, the error may appear as:

```
Error: Image at 0023F1EB000 start failed: Not Found
```

The error does not prevent installation and is reported as debugging output. The error does not appear in earlier versions of the package, where support for the QemuRamfbDxe driver was not present. The error message can be ignored. (Bug ID 28868674)

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

If `/boot` is hosted on a btrfs subvolume, GRUB 2 is unable to correctly process the `initramfs` and `vmlinuz` pathnames. This problem occurs when you update or install a new kernel and `grubby` attempts to update the GRUB 2 configuration. In the case where you are running a fresh installation of Oracle Linux 7.6 and you upgrade the UEK kernel, the following error is displayed:

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

When the system is rebooted after the kernel update, the system boots to 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:

```
# 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:

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

where for *menu entry title*, you substitute with 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 and use `uname -a` to check that the correct kernel is now running.

(Bug ID 22750169)

## 5.11 Hebrew LaTeX fonts

Installing the `tex-fonts-hebrew` package fails unless you first install all `texlive*` packages. (Bug ID 19059949)

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

The creation of 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 releases, (Updates 4 and 5) is built to use the Linux file extended attributes `[xattr(7)] security capabilities(7)`. Because the NFS protocol does not support these file capabilities, the `iputils` package might not be installed into an NFS files system. For example, when attempting to create an Oracle Linux 7.4 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 7.3 container.

This issue occurs on both NFSv3 and NFSv4.

Oracle Linux 6 containers are not affected. LXC is available as a technology preview in this release and some functionality may not work correctly. (Bug ID 25024258)

## 5.13 Segmentation fault when running bluedevil-wizard

The `bluedevil-wizard`, available in the `bluedevil` package, is unable to connect or locate bluetooth devices and fails with a segmentation fault when it is run. (Bug ID 27101618)

## 5.14 dsktune command fails with an unsupported error message

The `dsktune` command that is included with the 389 Directory Server base package, `389-ds-base`, fails with an error message notifying you that the system does not have support for `cx16`, a feature commonly available on x86 platforms:

```
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 `dsktune` command checks that a system meets requirements and can provide information that helps with the configuration, but is not required to run the 389 Directory Server. (Bug ID 26861135)

## 5.15 dmstats report output does not return any data

The `dmstats report` command does not recognize any of the device mapper targets that are present on a system and returns no output when it is run. The issue is a regression in the upstream package and can be resolved by downgrading the `device-mapper` packages, if required. (Bug ID 28642757)





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# Chapter 6 Installation and Availability

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You can download a full Oracle Linux 7.6 (aarch64) installation media image from the Oracle Software Delivery Cloud at <https://edelivery.oracle.com/linux>. You can also obtain the latest Oracle Linux 7 packages from the Unbreakable Linux Network (ULN) and the Oracle Linux yum server.

Oracle Linux 7.6 (aarch64) is made available in two forms:

- [rpi3-ol7.6-image.img.xz](#): A disk image that can be installed onto an SD Card and used on a Raspberry Pi 3 Model B or Raspberry Pi 3 Model B+ single-board computer. This image includes the necessary firmware to boot the Raspberry Pi 3 directly into Oracle Linux 7. This image is made available for developers who may not have access to alternate Arm hardware.



### Note

The disk image for the Raspberry Pi is available as a technology preview for developer use only. Oracle does not provide support for Oracle Linux on Raspberry Pi systems. Oracle recommends that developers assist each other on the Oracle Linux for Arm community forum at [https://community.oracle.com/community/technology\\_network\\_community/server\\_%26\\_storage\\_systems/linux/oracle-linux-for-arm](https://community.oracle.com/community/technology_network_community/server_%26_storage_systems/linux/oracle-linux-for-arm)

- [OracleLinux-R7-U6-Server-aarch64-dvd.iso](#): An ISO image that 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 Cavium ThunderX2® processor. For the latest hardware validated for Oracle Linux 7.6 (aarch64) please refer to the Hardware Certification List at <https://linux.oracle.com/hardware-certifications>. Hardware is listed as it becomes available.

This ISO image can be loaded from local media, such as DVD-ROM or USB flash drive, or can be used to perform a network-based kickstart installation via PXE. If you perform a network-based installation and you wish to access the graphical interface for the installer, you must change kernel boot parameters to enable VNC and to set the network address at boot.

You can install additional software for Oracle Linux 7 by subscribing to the different channels on ULN or by enabling the required repositories within your yum configuration. To explore the channels that are available to you 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, 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 R5 is the default boot kernel for fresh installations of Oracle Linux 7.6 (aarch64). UEK R5 is the only supported kernel that is available for the aarch64 platform. For more information, see [Unbreakable Enterprise Kernel: Release Notes for Unbreakable Enterprise Kernel Release 5](#)

## 6.1 Installation of ISO

The process to install Oracle Linux 7.6 (aarch64) does not differ substantially from the installation process for Oracle Linux 7.6 on an x86 platform. The instructions and information that are provided in [Oracle® Linux 7: Installation Guide](#).

The recommended installation process is as follows:

1. Obtain the ISO image from the Oracle Technology Network (<https://www.oracle.com/linux/products.html>)
2. Configure a Network Installation Server to perform the installation. See [Oracle® Linux 7: Installation Guide](#) for more information.
3. Create a kickstart file to automate your installation. See [Oracle® Linux 7: Installation Guide](#) for more information on the contents of this file and how to use it when booting the installer.
4. Connect your target Arm hardware to the network and configure the firmware to network boot or to boot from PXE. Refer to your hardware documentation for instructions.
5. Boot the target hardware and wait for the installation to complete.

Exceptions and additional information that may be required to complete the installation are provided in this section.

### 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 the boot options to configure the network, or 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 may look similar to the following: `ip=eth0:dhcp`.

### Software Selection Groups

Note that the available Software Selection Groups in the installer may differ slightly from the groups available in the x86 installer.

### Software Sources

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

## 6.2 Installation of Raspberry Pi™ 3 Image



#### Note

The disk image for the Raspberry Pi is available as a technology preview for developer use only. Oracle does not provide support for Oracle Linux on Raspberry Pi systems. Oracle recommends that developers assist each other on the Oracle Linux for Arm community forum at [https://community.oracle.com/community/technology\\_network\\_community/server\\_%26\\_storage\\_systems/linux/oracle-linux-for-arm](https://community.oracle.com/community/technology_network_community/server_%26_storage_systems/linux/oracle-linux-for-arm)

Oracle provides an installation image of Oracle Linux 7.6 (aarch64) that is specifically designed to run on Raspberry Pi 3 Model B or Raspberry Pi 3 Model B+ hardware. The provided installation image is a default

installation of Oracle Linux 7.6 (aarch64) into a raw disk image that can be cloned block-by-block to an SD Card for immediate boot. The default file system used in the image is btrfs. Raspberry Pi is a trademark of the Raspberry Pi Foundation. More information about installing a Linux image onto the Raspberry Pi is available at:

<https://www.raspberrypi.org/documentation/installation/installing-images/linux.md>

In summary, the recommended installation process is as follows:

1. Obtain the Raspberry Pi 3 disk image from the Oracle Technology Network (<https://www.oracle.com/linux/products.html>). You should unzip the disk image once you have downloaded it.
2. On an existing Oracle Linux system, insert the SD Card into an SD Card reader connected to the system. The image is 5 GB in size, so your SD Card must have the capacity to store this image at minimum. An 8 GB SD Card is the recommended minimum.
3. Identify the device name for the SD Card. You can use this using the output from `dmesg` when you connect the device, using the `lsblk` or by using `fdisk -l` to list device names and device information.
4. Use the `dd` command to perform a block copy of the image file to the SD Card device. For example:

```
# dd if=/path/to/img of=/dev/mmcblk0 bs=4M
```

Replace `/path/to/img` with the relative path to the image file, and replace `/dev/mmcblk0` with the device name for the SD Card. This operation is destructive and will overwrite any data on the device that you have specified. Ensure that you have specified the correct device name. The operation may take some time to complete.

5. When the operation is complete, eject the SD Card from the reader, insert it into the SD Card reader on the Raspberry Pi and boot into Oracle Linux 7.
6. Log into the image as the **root** user with the password **oracle**. Change the password immediately after you login.

If your SD Card is larger than the image (5 GB) you can grow the partition size to maximize disk usage. You can do this by running the following commands after installation is complete and once you have logged into the system on the Raspberry Pi:

```
# growpart /dev/mmcblk0 4  
# btrfs filesystem resize max /
```



### Tip

If you require a graphical user interface, the XFCE desktop environment available in the `ol7_developer_EPEL` yum repository is usable and may be more suitable for devices with limited resources, such as the Raspberry Pi.



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# Appendix A Package Changes from the Upstream Release

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

## A.1 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 [Section A.2, “Changes to Source Packages”](#).

### A.1.1 Added Binary Packages by Oracle

The following binary packages have been added by Oracle:

- `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`
- `oraclelinux-release`
- `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`

### A.1.2 Modified Binary Packages

The following 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`
- `akonadi`
- `akonadi-mysql`
- `anaconda`
- `anaconda-core`
- `anaconda-gui`
- `anaconda-tui`
- `anaconda-widgets`
- `apr-util`
- `apr-util-devel`
- `autofs`
- `awscli`
- `basesystem`
- `binutils`
- `binutils-devel`
- `cloud-init`
- `clufteer-bin`
- `clufteer-cli`
- `clufteer-common`
- `clufteer-lib-ccs`

- `clufteer-lib-general`
- `clufteer-lib-pcs`
- `cockpit`
- `cockpit-bridge`
- `cockpit-system`
- `cockpit-ws`
- `coreutils`
- `cpp`
- `cups-filters`
- `cups-filters-libs`
- `dbus`
- `dbus-devel`
- `dbus-libs`
- `dbus-x11`
- `dhclient`
- `dhcp`
- `dhcp-common`
- `dhcp-libs`
- `dln`
- `dln-devel`
- `dln-lib`
- `dnssec-trigger`
- `dracut`
- `dracut-config-generic`
- `dracut-config-rescue`
- `dracut-fips`
- `dracut-fips-aesni`
- `dracut-network`
- `dyninst`
- `fence-virt`

- `fence-virt`
- `fence-virt-libvirt`
- `fence-virt-multicast`
- `fence-virt-serial`
- `firefox`
- `fuse`
- `fuse-devel`
- `fuse-libs`
- `fwupdate`
- `fwupdate-efi`
- `fwupdate-libs`
- `gcc`
- `gcc-c++`
- `gcc-gfortran`
- `gcc-gnat`
- `gcc-objc`
- `gcc-objc++`
- `gfs2-utils`
- `gnome-boxes`
- `gnome-system-log`
- `gnutls`
- `gnutls-c++`
- `gnutls-dane`
- `gnutls-devel`
- `gnutls-utils`
- `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`
- `gststreamer`
- `gststreamer-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`
- `iproute`
- `iproute-tc`
- `irqbalance`
- `iscsi-initiator-utils`
- `iscsi-initiator-utils-iscsiuio`
- `java-atk-wrapper`
- `java-11-openjdk`
- `java-11-openjdk-devel`

- `java-11-openjdk-headless`
- `junit`
- `kdepimlibs`
- `kdepimlibs-akonadi`
- `kdepimlibs-devel`
- `kdepimlibs-kxmlrpcclient`
- `kde-settings`
- `kde-settings-ksplash`
- `kde-settings-plasma`
- `kde-settings-pulseaudio`
- `kexec-tools`
- `kmod`
- `kmod-libs`
- `ksh`
- `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-xfstools`

- 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
- libstdc++
- libstdc++-devel
- libstdc++-docs
- libxml2
- libxml2-devel
- libxml2-python
- libxslt
- libxslt-devel
- lorax
- lz4
- mod\_session
- mod\_ssl
- mokutil
- mozjs52

- `net-tools`
- `nfs-utils`
- `nss-softokn`
- `nss-softokn-devel`
- `nss-softokn-freebl`
- `nss-softokn-freebl-devel`
- `ntp`
- `ntpd`
- `ntpsync`
- `ocfs2-tools`
- `ocfs2-tools-devel`
- `OpenIPMI`
- `OpenIPMI-libs`
- `OpenIPMI-modalias`
- `OpenIPMI-perl`
- `openssl`
- `openssl-devel`
- `openssl-libs`
- `oracle-armtoolset`
- `oraclelinux-release`
- `oracle-logos`
- `oscap-anaconda-addon`
- `osinfo-db`
- `os-prober`
- `pacemaker`
- `pacemaker-cli`
- `pacemaker-cluster-libs`
- `pacemaker-cts`
- `pacemaker-doc`
- `pacemaker-libs`
- `pacemaker-libs-devel`

- `pacemaker-nagios-plugins-metadata`
- `pacemaker-remote`
- `PackageKit`
- `PackageKit-command-not-found`
- `PackageKit-glib`
- `PackageKit-gstreamer-plugin`
- `PackageKit-gtk3-module`
- `PackageKit-yum`
- `parted`
- `pcs`
- `pcs-snmp`
- `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`
- `python-blivet`
- `python-clufter`
- `python-configshell`
- `python-devel`
- `python-jwt`
- `python-libguestfs`
- `python-libs`
- `python-msrestazure`
- `python-rtslib`
- `python-s3transfer`
- `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`
- `rsyslog`
- `rsyslog-gnutls`
- `rsyslog-gssapi`
- `rsyslog-kafka`
- `rsyslog-mmjsonparse`
- `rsyslog-mysql`
- `rsyslog-pgsql`
- `rsyslog-relp`
- `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
- shim-aa64
- shim-unsigned-aa64
- sos
- sos-collector
- spice-server
- spice-streaming-agent
- system-config-date
- system-config-kickstart
- systemd
- systemd-devel
- systemd-libs
- systemd-python
- systemd-sysv
- tog-pegasus
- tog-pegasus-libs
- tpm2-abrmd
- tpm2-tools
- tpm2-tss
- tpm2-tss-devel
- uom-lib
- wireshark
- wireshark-gnome
- wpa\_supplicant

- `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`

### A.1.3 Modified Optional Binary Packages

The following optional binary packages have been modified:

- `cups-filters-devel`
- `java-11-openjdk-debug`
- `java-11-openjdk-demo`
- `java-11-openjdk-demo-debug`
- `java-11-openjdk-devel-debug`
- `java-11-openjdk-headless-debug`
- `java-11-openjdk-javadoc`
- `java-11-openjdk-javadoc-debug`
- `java-11-openjdk-javadoc-zip`
- `java-11-openjdk-javadoc-zip-debug`
- `java-11-openjdk-jmods`
- `java-11-openjdk-jmods-debug`
- `java-11-openjdk-src`
- `java-11-openjdk-src-debug`
- `parted-devel`
- `uboot-rpi3`

## A.1.4 New Binary Packages

The following binary packages are new for Update 6, relative to Update 5 of Oracle Linux 7:

- `bcc`
- `bolt`
- `fribidi`
- `google-noto-emoji-fonts`
- `java-11-openjdk`
- `java-11-openjdk-devel`
- `java-11-openjdk-headless`
- `libglvnd`
- `librdkafka`
- `mozjs52`
- `python-futures`
- `python-paramiko`
- `python-subprocess32`
- `sos-collector`
- `spice-streaming-agent`

## A.1.5 Removed Binary Packages

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

- `anaconda-user-help`
- `biosdevname`
- `compat-dapl`
- `compat-exiv2-023`
- `compat-gcc-34`
- `compat-gcc-44`
- `compat-glibc`
- `compat-libgfortran-41`
- `cpuid`
- `crash-ptdump-command`
- `hyperv-daemons`

- `infinipath-psm`
- `insights-client`
- `intel-cmt-cat`
- `ixpdimm_sw`
- `java-1.6.0-openjdk`
- `kabi-yum-plugins`
- `kernel`
- `kmod-kvdo`
- `kpatch`
- `ksc`
- `libinvm-cim`
- `libinvm-cli`
- `libinvm-il8n`
- `libpsm2`
- `libsmbios`
- `mcelog`
- `memkind`
- `memtest86+`
- `microcode_ctl`
- `mkbootdisk`
- `nbdkit`
- `nvml`
- `opa-ff`
- `opa-fm`
- `openssl098e`
- `open-vm-tools`
- `oracleasm`
- `prelink`
- `python-rhsm`
- `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-support-lib-python`
- `redhat-support-tool`
- `seabios`
- `sgabios`
- `subscription-manager`

- `subscription-manager-migration-data`
- `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`

## A.2 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 [Section A.1, “Changes to Binary Packages”](#).

### A.2.1 Added Source Packages by Oracle

The following source packages have been added by Oracle:

- `dtrace-utils`
- `inotify-tools`
- `isl`
- `kernel-uek`
- `libdtrace-ctf`
- `lxc`
- `ocfs2-tools`
- `oracle-armtoolset-1`
- `oracle-armtoolset-1-binutils`
- `oracle-armtoolset-1-gcc`
- `oracle-armtoolset-1-gdb`
- `oracle-armtoolset-1-golang`
- `oraclelinux-release`
- `oracle-logos`



- `qemu`
- `reflink`
- `uname26`
- `yum-plugin-ulninfo`
- `zstd`

### A.2.2 Modified Source Packages

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

- `abrt`
- `abrt-java-connector`
- `akonadi`
- `anaconda`
- `apr-util`
- `autofs`
- `awscli`
- `basesystem`
- `binutils`
- `cloud-init`
- `clufter`
- `cockpit`
- `coreutils`
- `cups-filters`
- `dbus`
- `dhcp`
- `dln`
- `dnssec-trigger`
- `dracut`
- `dyninst`
- `fence-virt`
- `firefox`
- `fuse`

- fwupdate
- gcc
- gfs2-utils
- glibc
- gnome-boxes
- gnome-system-log
- gnutls
- gperftools
- grub2
- grubby
- gstreamer
- httpd
- initial-setup
- initscripts
- ipa
- iproute
- irqbalance
- iscsi-initiator-utils
- java
- java-11-openjdk
- java-atk-wrapper
- junit
- kdepimlibs
- kde-settings
- kexec-tools
- kmod
- ksh
- libdbi-drivers
- libguestfs
- libreport

- libreswan
- libxml2
- libxslt
- lorax
- lz4
- mozjs52
- net-tools
- nfs-utils
- nss-sofotkn
- ntp
- ocfs2-tools
- OpenIPMI
- openssl
- oraclelinux-release
- oracle-logos
- oscap-anaconda-addon
- osinfo-db
- os-prober
- pacemaker
- PackageKit
- parted
- pcs
- perl-DBD-MySQL
- perl-XML-Parser
- plymouth
- policycoreutils
- polkit
- ppp
- pykickstart
- python

- `python-blivet`
- `python-configshell`
- `python-jwt`
- `python-msrestazure`
- `python-rtslib`
- `python-s3transfer`
- `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`
- `rsyslog`
- `scap-security-guide`
- `scap-workbench`
- `selinux-policy`
- `setroubleshoot`
- `setroubleshoot-plugins`
- `shim`
- `shim-signed`
- `sos`
- `sos-collector`

- `spice`
- `spice-streaming-agent`
- `system-config-date`
- `system-config-kickstart`
- `systemd`
- `tog-pegasus`
- `tpm2-abrmd`
- `tpm2-tools`
- `tpm2-tss`
- `uom-lib`
- `wireshark`
- `wpa_supplicant`
- `xsane`
- `xulrunner`
- `yum`
- `yum-rhn-plugin`
- `yum-utils`

### A.2.3 Modified Optional Source Packages

The following optional source packages have been modified:

- `firmware-rpi3`
- `gnu-efi`
- `jetty-artifact-remote-resources`
- `jetty-parent`
- `jetty-toolchain`
- `libreoffice`
- `pesign`
- `publican`
- `sanlock`
- `thunderbird`
- `uboot-rpi3`

## A.2.4 New Source Packages

The following source packages are new for Update 6, relative to Update 5 of Oracle Linux 7:

- `bcc`
- `bolt`
- `compat-exiv2-023`
- `fribidi`
- `genwqe-tools`
- `google-noto-emoji-fonts`
- `java-11-openjdk`
- `libglvnd`
- `librdkafka`
- `mozjs52`
- `python-futures`
- `python-paramiko`
- `python-subprocess32`
- `sos-collector`
- `spice-streaming-agent`

## A.2.5 Removed Source Packages

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

- `anaconda-user-help`
- `biosdevname`
- `compat-dapl`
- `compat-gcc-34`
- `compat-gcc-44`
- `compat-glibc`
- `compat-libgfortran-41`
- `cpuid`
- `crash-ptdump-command`
- `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-il8n`
- `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
- paflib
- perl-gettext
- po4a
- 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
- 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-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`