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# **Oracle® Linux 6**

## **Release Notes for Oracle Linux 6.10**

**ORACLE®**

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March 2021

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## Abstract

This document contains information about Oracle Linux 6.10. This document might be updated after it is released. To check for updates to this document, see [Oracle® Linux Documentation](#).

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This document is intended for users and administrators of Oracle Linux. It describes potential issues and the corresponding workarounds that you may encounter while using Oracle Linux. Oracle recommends that you read this document before installing or upgrading Oracle Linux.

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## Table of Contents

Preface .....	vii
1 New Features and Changes .....	1
1.1 ARPUPDATE option for ifcfg-* files .....	1
1.2 iptables-services Package Includes Support for /etc/sysctl.d .....	1
1.3 Red Hat Compatible Kernel Driver Updates .....	1
1.4 Retpoline Support Added to GCC .....	1
1.5 Shipped Kernels .....	2
1.6 Unbreakable Enterprise Kernel Release 2 .....	2
1.7 Unbreakable Enterprise Kernel Release 4 .....	2
1.8 Information About Feature Changes Introduced in Previous Oracle Linux 6 Updates .....	3
1.8.1 Ceph Support .....	3
1.8.2 OpenSCAP Support .....	3
1.8.3 Load Balancing and High Availability .....	3
1.8.4 Enhanced SSSD Support for Active Directory .....	3
1.8.5 Oracle Automatic Storage Management Enhancements .....	4
1.9 Removing RHCK From a System .....	4
1.10 Technology Preview Features .....	5
2 Fixed and Known Issues .....	7
2.1 Fixed Issues .....	8
2.1.1 Unable to boot after installation on systems that use Broadcom MegaRAID 9460 controller issue fixed .....	8
2.2 Known Issues .....	8
2.2.1 Kdump fails on Oracle Server X7-2L SAN boot installation .....	8
2.2.2 Installation on an Aura7 NVMe device fails .....	8
2.2.3 Requirement for installing Oracle Linux 6.10 with UEFI support .....	9
2.2.4 Installer does not display Network Devices screen when installing with iSCSI enabled .....	9
2.2.5 Kickstart installation fails on multipath device when the ignoredisk --only-use option is used .....	9
2.2.6 Btrfs file system issues on UEK .....	9
2.2.7 Btrfs: Unable to replay log after snapshot is deleted and parent directory fsynced .....	10
2.2.8 Btrfs: Empty symbolic link after fsync of parent directory .....	10
2.2.9 Btrfs: Incorrect directory entries after fsync log replay .....	10
2.2.10 Btrfs: File loss on log replay after renaming file and running fsync .....	10
2.2.11 Btrfs: Kernel oops when unmounting during a quota rescan or disable .....	10
2.2.12 Btrfs, ext4, and XFS: kernel panic when freeze and unfreeze operations are performed on multiple threads .....	10
2.2.13 mkfs.ext4 does not support the documented -f option .....	10
2.2.14 XFS: Kernel panic in the multi-block buffer logging code .....	11
2.2.15 OFED iSER target login fails from an initiator on Oracle Linux 6 .....	11
2.2.16 Kernel panic when booting into RHCK on a Btrfs root partition .....	11
2.2.17 DTrace Issues .....	11
2.2.18 Linux Containers Changes .....	11
2.2.19 avahi-daemon fails to start with UEK R2 .....	12
2.2.20 Console appears to hang when booting .....	12
2.2.21 Default reverse path filtering mode affects certain Oracle products .....	13
2.2.22 Error message following first reboot on an HP ProLiant server .....	13
2.2.23 ext4: Inline data feature not available for UEK .....	13
2.2.24 xfsprogs 3.2.0 user space tool not supported on RHCK .....	13
2.2.25 gcc-libraries package replaced .....	13

2.2.26 Intel TCO watchdog timer messages .....	14
2.2.27 Mellanox ConnectX driver support .....	14
2.2.28 Oracle VM 3.0 guests crash during Oracle Database installation .....	14
2.2.29 Oracle VM 3.3.1 32-bit guests panic on UEK R2 .....	14
2.2.30 Support for PV drivers in an HVM guest .....	14
2.2.31 RHCK panics when ext4 file system defragmented .....	14
2.2.32 Default sched_yield() settings for the Completely Fair Scheduler .....	14
2.2.33 Setting the serial console in an HV guest .....	15
2.2.34 Support for large memory 32-bit systems .....	15
2.2.35 Unable to register an Oracle Linux guest with ULN .....	15
2.2.36 Unable to register with ULN on first reboot after installing Oracle Linux 6 .....	15
2.2.37 Booting from SAN installation fails using multipath on Pure Storage FlashArray .....	15
<b>3 Upgrading to Oracle Linux 6.10 .....</b>	<b>17</b>
3.1 Supported Upgrade Paths .....	17
3.2 Obtaining Oracle Linux 6.10 Packages .....	17
3.2.1 About the Unbreakable Linux Network .....	18
3.2.2 About the Oracle Linux Yum Server .....	18
3.2.3 About Oracle Linux Installation Media .....	20
3.3 Upgrading the Unbreakable Enterprise Kernel .....	21
3.4 Applying the Update .....	22
<b>4 Oracle-Supported OFED Packages .....</b>	<b>23</b>
4.1 Installing or Upgrading Oracle-Supported OFED Packages for UEK R4 .....	23
4.2 Upgrading to Oracle Linux 6.10 with the Oracle-Supported OFED Packages for UEK R4 installed .....	23
<b>A Package Changes from the Upstream Release .....</b>	<b>25</b>
A.1 Changes to Binary Packages .....	25
A.1.1 Added Binary Packages by Oracle (i386) .....	25
A.1.2 Added Binary Packages by Oracle (x86_64) .....	26
A.1.3 Modified Binary Packages (i386) .....	27
A.1.4 Modified Binary Packages (x86_64) .....	36
A.1.5 Modified Optional Binary Packages (i386) .....	46
A.1.6 Modified Optional Binary Packages (x86_64) .....	51
A.1.7 Removed Binary Packages (i386) .....	56
A.1.8 Removed Binary Packages (x86_64) .....	56
A.2 Changes to Source Packages .....	57
A.2.1 Added Source Packages by Oracle .....	57
A.2.2 Modified Source Packages .....	58
A.2.3 Modified Optional Source Packages .....	61
A.2.4 Removed Source Packages .....	62

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information. Oracle recommends that you upgrade the software described by this documentation as soon as possible.

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## Preface

*Oracle® Linux 6: Release Notes for Oracle Linux 6.10* provides a summary of the new features, changes, and fixed and known issues in Oracle Linux 6.10.

## Audience

This document is written for system administrators who want to install or update Oracle Linux. It is assumed that readers have a general understanding of the Linux operating system.

## Document Organization

The document is organized as follows:

- [Chapter 1, New Features and Changes](#) contains a summary of the new features and changes in this release.
- [Chapter 2, Fixed and Known Issues](#) contains details of the fixed and known issues with the software.
- [Chapter 3, Upgrading to Oracle Linux 6.10](#) contains information about how to install updates on your system.

## Related Documents

The documentation for this product is available at:

[Oracle® Linux Documentation](#)

## 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.

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## Diversity and Inclusion

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# Chapter 1 New Features and Changes

## Table of Contents

1.1 ARPUPDATE option for ifcfg-* files .....	1
1.2 iptables-services Package Includes Support for /etc/sysctl.d .....	1
1.3 Red Hat Compatible Kernel Driver Updates .....	1
1.4 Retpoline Support Added to GCC .....	1
1.5 Shipped Kernels .....	2
1.6 Unbreakable Enterprise Kernel Release 2 .....	2
1.7 Unbreakable Enterprise Kernel Release 4 .....	2
1.8 Information About Feature Changes Introduced in Previous Oracle Linux 6 Updates .....	3
1.8.1 Ceph Support .....	3
1.8.2 OpenSCAP Support .....	3
1.8.3 Load Balancing and High Availability .....	3
1.8.4 Enhanced SSSD Support for Active Directory .....	3
1.8.5 Oracle Automatic Storage Management Enhancements .....	4
1.9 Removing RHCK From a System .....	4
1.10 Technology Preview Features .....	5

This chapter describes the new features and notable changes that are introduced by Oracle Linux 6.10.

### 1.1 ARPUPDATE option for ifcfg-\* files

In this update, the `ARPUPDATE` option for `ifconfig-*` files is introduced. By default, the value for this setting is `yes`. However, you can change the value to `no`, which enables you to disable updating of neighboring computers by using the Address Resolution Protocol (ARP) information about the current network interface controller.

### 1.2 iptables-services Package Includes Support for /etc/sysctl.d

The `init` scripts for the `iptables` and `ip6tables` services includes support for configuration files that are located in the `/etc/sysctl.d` directory, as well as `/etc/sysctl.conf`. This enhancement ensures that any user-provided files in `/etc/sysctl.d` are also correctly accounted for when the `iptables` service restarts.

### 1.3 Red Hat Compatible Kernel Driver Updates

The following Red Hat Compatible Kernel (RHCK) drivers have been updated in Oracle Linux 6.10:

- `bnxt_en` driver updated to version 1.5.0
- `lpfc` driver updated to version 11.0.1.6
- `qla2xxx` driver updated to version 8.07.00.26.06.8-k

### 1.4 Retpoline Support Added to GCC

Support for retpolines has been added to the GNU Compiler Collection (GCC) in this update. The kernel uses this technique to reduce the overhead of mitigating Spectre Variant 2 attacks, which is described in CVE-2017-5715.

## 1.5 Shipped Kernels

Oracle Linux 6.10 ships with the following kernel packages:

- Unbreakable Enterprise Kernel Release 4 ([kernel-uek-4.1.12-124.16.4.el6uek](#)) for x86-64
- Unbreakable Enterprise Kernel Release 2 ([kernel-uek-2.6.39-400.294.3.el6uek](#)) for i386
- Red Hat Compatible Kernel ([kernel-2.6.32-754.el6](#)) for i386 and x86-64

By default, both UEK and RHCK for the specific architecture (i386 or x86-64) are installed and the system boots the Unbreakable Enterprise Kernel release.

The ISO image for Oracle Linux 6.10 for i386 includes the Red Hat Compatible Kernel and Unbreakable Enterprise Kernel Release 2 but not Unbreakable Enterprise Kernel Release 4, which does not support i386.

The ISO image for Oracle Linux 6.10 for x86-64 includes the Red Hat Compatible Kernel and Unbreakable Enterprise Kernel Release 4 Update 7 but not Unbreakable Enterprise Kernel Release 2. You are still able to run Oracle Linux 6.10 using the latest UEK R3 version.

Note that the default I/O scheduler that is used for the UEK is `deadline`, while `cfq` is the default for RHCK.

To enable your system boot the Red Hat Compatible Kernel by default:

1. Edit the `/etc/grub.conf` file and change the value of the `default` parameter to indicate the Red Hat Compatible Kernel. Note that each entry for a bootable kernel in the file starts with a `title` definition. The entries are effectively numbered from `0` upwards, where `0` corresponds to the first entry in the file, `1` corresponds to the second entry, and so on. To view the GRUB man page, type the `info grub` command.
2. Edit the `/etc/sysconfig/kernel` file and change the setting for the default kernel package type from `DEFAULTKERNEL=kernel-uek` to `DEFAULTKERNEL=kernel`.

## 1.6 Unbreakable Enterprise Kernel Release 2

The Unbreakable Enterprise Kernel Release 2 (UEK R2) is based on the upstream kernel 3.0.36 stable source tree.

UEK supports a wide range of hardware and devices. In close cooperation with hardware and storage vendors, a number of device drivers have been updated by Oracle in the 2.6.39-400 kernel. For details, see the [Oracle Linux Unbreakable Enterprise Kernel Release 2 Quarterly Update 5 Release Notes](#).

## 1.7 Unbreakable Enterprise Kernel Release 4

Unbreakable Enterprise Kernel Release 4 Update 7 is based on the upstream kernel 4.1.12 stable source tree. For more information, see [Unbreakable Enterprise Kernel: Release Notes for Unbreakable Enterprise Kernel Release 4 Update 7](#).

A very large number of changes have taken place in mainline Linux between 3.0.x, on which UEK R2 is based, and 4.1.12, on which UEK R4 is based. For details about these changes, see the kernel change logs that the Linux Kernel Newbies maintain at <https://kernelnewbies.org/LinuxVersions>.

## 1.8 Information About Feature Changes Introduced in Previous Oracle Linux 6 Updates

Note the following information about feature changes introduced in a previous Oracle Linux 6 update.

### 1.8.1 Ceph Support

Although previous releases of Oracle Linux 6 provide some support for Ceph Storage Release 1.0, which is based on the Ceph Community Firefly release (v0.80), no support is provided on Oracle Linux 6 for the subsequent Ceph Storage Release 2.0, which is based on the Ceph Community Jewel release (v10.2.2).

From Oracle Linux 6.9 and onward, Ceph is no longer supported on Oracle Linux 6. Continued support for subsequent releases of Ceph is available on Oracle Linux 7.

### 1.8.2 OpenSCAP Support

The Open Security Content Automation Protocol (OpenSCAP) Guide package ([scap-security-guide](#)) provides guidance, baselines, and validation mechanisms for implementing security hardening of an Oracle Linux 6 system. OpenSCAP includes the `oscap` utility that you use to test the security compliance of a system and produce an online report that describes security policy requirements and how your system measures up to these requirements. OpenSCAP enables you to check system compliance, as required by your site security policy.

See [Oracle® Linux 6: Security Guide](#) for more information on OpenSCAP.

### 1.8.3 Load Balancing and High Availability

Oracle Linux 6 includes the Keepalived and HAProxy technologies for balancing access to network services while maintaining continuous access to those services.

Keepalived uses the IP Virtual Server (IPVS) kernel module to provide transport layer (Layer 4) load balancing, redirecting requests for network-based services to individual members of a server cluster. IPVS monitors the status of each server and uses the Virtual Router Redundancy Protocol (VRRP) to implement high availability.

HAProxy is an application layer (Layer 7) load balancing and high availability solution that you can use to implement a reverse proxy for HTTP and TCP-based Internet services.

See [Oracle® Linux 6: Administrator's Guide](#).

### 1.8.4 Enhanced SSSD Support for Active Directory

The System Security Services Daemon (SSSD) supports the following features when using Oracle Linux clients with Active Directory (AD):

- Dynamic updates to DNS.
- Group and user lookups of NetBIOS names.
- Site discovery of domain controllers.
- User and group resolution and user authentication for trusted domains within a single AD forest.

## 1.8.5 Oracle Automatic Storage Management Enhancements

The log format for Oracle `ASMLib` that is used to manage Oracle Automatic Storage Management (ASM) devices dedicated to Oracle Databases has been updated to include timestamps of the activities that are logged to `/var/log/oracleasm`.

The `oracleasm` command is improved for the `scandisks` operation so that it is able scan devices that are not directly available under `/dev`, but could be available within subdirectories within `/dev`. You can configure additional directories to be scanned during the `scandisks` operation by setting the `Directories to scan` option when using the interactive configuration tool, as shown in the following example:

```
# oracleasm configure -I
Configuring the Oracle ASM library driver.
...
The next two configuration options take substrings to match device names.
The substring "sd" (without the quotes), for example, matches "sda", "sdb",
etc. You may enter more than one substring pattern, separated by spaces.
The special string "none" (again, without the quotes) will clear the value.

Device order to scan for ASM disks []:
Devices to exclude from scanning []: dm
Directories to scan []: /dev/mapper/
Use device logical block size for ASM (y/n) [n]:
Writing Oracle ASM library driver configuration: done
```

## 1.9 Removing RHCK From a System

If you need to remove RHCK from a system, you can use the `kernel-transition` package to prepare the system for removing RHCK without removing dependent packages such as `bluez`, `fuse`, and `irqbalance` that might be needed for system operation. The `kernel-transition` package does not contain any files itself, but instead transfers the package dependencies from the `kernel` package to the `kernel-uek` package.



### Note

You must have subscribed the system to be transitioned to the `ol6_latest` channel on ULN.

Because the `xorg-x11-drv-nouveau` package requires `kernel-drm-nouveau` version 16, but `kernel-uek` provides `kernel-uek-drm-nouveau` version 12, removing the RHCK also removes `xorg-x11-drv-nouveau`. If you use this procedure on systems with Nvidia graphics hardware, the graphical interface will become low resolution and slow.

Transition a system from the Red Hat Compatible kernel to the Unbreakable Enterprise Kernel as follows:

1. Install the `kernel-transition` package on the system:

```
# yum install kernel-transition
```

This command changes the dependencies for important packages from the RHCK to UEK.

2. Remove RHCK:

```
# yum remove kernel
```

This command prompts you before removing remaining packages that depend on RHCK.



### Caution

When `yum` prompts you to remove a package, only remove packages that relate to the `kernel` package. If you are prompted to remove a package that your system requires, enter `n` to prevent the package being removed. You should also retain any other dependent packages.

Running the `yum update` command subsequently updates only UEK.

To reinstall RHCK, run the following command:

```
# yum install kernel
```

You can also use `kernel-transition` with a kickstart installation. Include the following lines in the `%packages` section to install the `kernel-uek` and `kernel-transition` packages, but not the `kernel` package:

```
-kernel
kernel-transition
```

If you create a customized installation ISO, you can replace the `kernel` package with the `kernel-transition` package so that dependency resolution pulls in `kernel-transition` instead of `kernel`. If `kernel-transition` is present on the installation media, it cannot be installed accidentally because it provides a kernel version that is lower than that of any RHCK.

## 1.10 Technology Preview Features

Technology Preview features are still under development but are made available for testing and evaluation purposes and to give the features wider exposure. These features are not supported under Oracle Linux support subscriptions and are not suitable for production use.

Features that are currently under technology preview when using UEK R4U7 are described in [Unbreakable Enterprise Kernel: Release Notes for Unbreakable Enterprise Kernel Release 4 Update 7](#).

Features that are currently under technology preview when using UEK R2QU5 are described in [Oracle Linux Release Notes for Unbreakable Enterprise Kernel Release 2 Quarterly Update 5](#).

The following technology preview features are currently not supported under Oracle Linux 6 and might not be functionally complete:

- Apache IPA identity management modules
- Cross Realm Kerberos Trust Functionality (relies on the Samba 4 client library)
- DIF/DIX support for SCSI
- `dm-era` is a device mapper target that records when blocks are written to a device and is typically intended for use by backup applications
- `fence_ipmilan` agent diagnostic pulse
- FS-Cache
- Kerberos v1.10 DIR cache storage type to handle TGTs for multiple KDCs
- Kernel Media support

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## Technology Preview Features

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- Linux Containers (LXC), except when using UEK R3 or UEK R4
- LVM API
- Mellanox SR-IOV Support
- System Information Gatherer and Reporter (SIGAR)
- Trusted Platform Module (TPM)
- QFQ queuing discipline
- System monitoring using SNMP for KVM hosts
- `trousers` and `tpm-tools` packages that support Trusted Platform Module (TPM) hardware
- vCPU hot unplug



### Note

FUSE is a supported feature in the UEK R2, UEK R3 and UEK R4 distributions.

LXC is a supported feature in the UEK R3 and UEK R4 distributions.

## Chapter 2 Fixed and Known Issues

### Table of Contents

2.1 Fixed Issues .....	8
2.1.1 Unable to boot after installation on systems that use Broadcom MegaRAID 9460 controller issue fixed .....	8
2.2 Known Issues .....	8
2.2.1 Kdump fails on Oracle Server X7-2L SAN boot installation .....	8
2.2.2 Installation on an Aura7 NVMe device fails .....	8
2.2.3 Requirement for installing Oracle Linux 6.10 with UEFI support .....	9
2.2.4 Installer does not display Network Devices screen when installing with iSCSI enabled .....	9
2.2.5 Kickstart installation fails on multipath device when the ignoredisk --only-use option is used .....	9
2.2.6 Btrfs file system issues on UEK .....	9
2.2.7 Btrfs: Unable to replay log after snapshot is deleted and parent directory fsynced .....	10
2.2.8 Btrfs: Empty symbolic link after fsync of parent directory .....	10
2.2.9 Btrfs: Incorrect directory entries after fsync log replay .....	10
2.2.10 Btrfs: File loss on log replay after renaming file and running fsync .....	10
2.2.11 Btrfs: Kernel oops when unmounting during a quota rescan or disable .....	10
2.2.12 Btrfs, ext4, and XFS: kernel panic when freeze and unfreeze operations are performed on multiple threads .....	10
2.2.13 mkfs.ext4 does not support the documented -f option .....	10
2.2.14 XFS: Kernel panic in the multi-block buffer logging code .....	11
2.2.15 OFED iSER target login fails from an initiator on Oracle Linux 6 .....	11
2.2.16 Kernel panic when booting into RHCK on a Btrfs root partition .....	11
2.2.17 DTrace Issues .....	11
2.2.18 Linux Containers Changes .....	11
2.2.19 avahi-daemon fails to start with UEK R2 .....	12
2.2.20 Console appears to hang when booting .....	12
2.2.21 Default reverse path filtering mode affects certain Oracle products .....	13
2.2.22 Error message following first reboot on an HP ProLiant server .....	13
2.2.23 ext4: Inline data feature not available for UEK .....	13
2.2.24 xfsprogs 3.2.0 user space tool not supported on RHCK .....	13
2.2.25 gcc-libraries package replaced .....	13
2.2.26 Intel TCO watchdog timer messages .....	14
2.2.27 Mellanox ConnectX driver support .....	14
2.2.28 Oracle VM 3.0 guests crash during Oracle Database installation .....	14
2.2.29 Oracle VM 3.3.1 32-bit guests panic on UEK R2 .....	14
2.2.30 Support for PV drivers in an HVM guest .....	14
2.2.31 RHCK panics when ext4 file system defragmented .....	14
2.2.32 Default sched_yield() settings for the Completely Fair Scheduler .....	14
2.2.33 Setting the serial console in an HV guest .....	15
2.2.34 Support for large memory 32-bit systems .....	15
2.2.35 Unable to register an Oracle Linux guest with ULN .....	15
2.2.36 Unable to register with ULN on first reboot after installing Oracle Linux 6 .....	15
2.2.37 Booting from SAN installation fails using multipath on Pure Storage FlashArray .....	15

This chapter describes the fixed and known issues for Oracle Linux 6.10.

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information. Oracle recommends that you upgrade the software described by this documentation as soon as possible.

## Fixed Issues

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### Important

Run the `yum update` command regularly to ensure that the latest bug fixes and security errata are installed on your system.

For details of the fixed and known issues in the Unbreakable Enterprise Kernel Release 4 Update 7 release, see [\*Unbreakable Enterprise Kernel: Release Notes for Unbreakable Enterprise Kernel Release 4 Update 7\*](#).

For details of the fixed and known issues with the Unbreakable Enterprise Kernel Release 2 Quarterly Update 5, see the [\*Oracle Linux Unbreakable Enterprise Kernel Release 2 Quarterly Update 5 Release Notes\*](#).

## 2.1 Fixed Issues

The following major issues are fixed in this update.

### 2.1.1 Unable to boot after installation on systems that use Broadcom MegaRAID 9460 controller issue fixed

An issue that caused some systems that use the updated Broadcom MegaRAID 9460 RAID controller, which depends on the `MegaRAID_SAS v7.x` driver, to not boot has been fixed.

This driver, which was unavailable on installation media for Oracle Linux 7 Update 4 (and earlier Oracle Linux 7 releases), and Oracle Linux 6 Update 9 (and earlier Oracle Linux 6 releases), is now provided on the installation media, starting with Oracle 7 Update 5 and Oracle Linux 6 Update 10.

(Bug ID 26426929)

## 2.2 Known Issues

The following are known issues in this update.

### 2.2.1 Kdump fails on Oracle Server X7-2L SAN boot installation

On fresh installations of Oracle Linux 6.10 using SAN boot, Kdump fails without generating a crash dump file, which results in a kernel panic.

This issue has been observed on the Oracle Server X7-2L with the Oracle Storage Dual-Port 32 Gb Fibre Channel PCIe Low Profile HBA (7115462) card installed.

To work around the issue, add the `pcie_aspm=off` option to the `/etc/sysconfig/kdump` file before booting the system.

(Bug ID 28132879)

### 2.2.2 Installation on an Aura7 NVMe device fails

Oracle Linux 6.10 installation fails if the target device is an Aura7 NVMe add-in card with two block devices. Although the card has two independent NVMe controllers and devices, they are assigned identical WWIDs. The version of GRUB in Oracle Linux 6.10 does not support this NVMe device.

(Bug ID 28152200)

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Oracle recommends that you upgrade the software described by this documentation as soon as possible.

Requirement for installing Oracle Linux 6.10 with UEFI support

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## 2.2.3 Requirement for installing Oracle Linux 6.10 with UEFI support

If your system supports UEFI boot mode, and you want to boot in this mode to install Oracle Linux 6.10, the target disk must use the GUID Partition Table (GPT), as some UEFI firmwares do not allow UEFI/MBR boot. (Bug ID 28213206)

## 2.2.4 Installer does not display Network Devices screen when installing with iSCSI enabled

If a system is configured to use iSCSI storage on a network interface within the BIOS or UEFI, the Oracle Linux installer does not provide an option to select the network device to use if the [URL](#) option is selected on the [Installation Method](#) screen.

Workarounds include the following:

- Disable iSCSI configuration in the BIOS or UEFI to cause the installer to display the [Network Devices](#) screen when viewing the [URL Setup](#) options.
- Make sure that the URL is accessible by using the same network device that is configured for iSCSI in the BIOS or UEFI, as this is the network interface that is used by default by the installer when the [Installation Method](#) is set to [URL](#).
- Perform a kickstart installation and specify that the [ksdevice](#) kernel boot parameter point to the correct network interface to use for the installation. The [Network Devices](#) screen is still not displayed in the installer, but a network interface that is not configured for iSCSI can be used to complete the installation. For more information, see [Oracle® Linux 6: Installation Guide](#).

(Bug ID 23273430)

## 2.2.5 Kickstart installation fails on multipath device when the [ignoredisk --only-use](#) option is used

A kickstart installation fails when the [ignoredisk --only-use](#) option is used to point to a multipath device. This problem occurs because multipath is not started by the time that the installer searches the multipath map to match the device.

Rather than use the [ignoredisk --only-use](#) option, specify which drives should *not* be used in the partitioning section by using the [ignoredisk --drives](#) option, as shown in the following example:

```
clearpart --all --initlabel
ignoredisk --drives=sda,sdb
part /boot --fstype=ext4 --size=500 --asprimary
  --ondisk=/dev/disk/by-id/scsi-3600144f0cab1f53e000058a15c870904
part / --fstype=ext4 --size=8192 --grow --maxsize=51200 --asprimary
  --ondisk=/dev/disk/by-id/scsi-3600144f0cab1f53e000058a15c870904
part swap --size=16384 --asprimary
  --ondisk=/dev/disk/by-id/scsi-3600144f0cab1f53e000058a15c870904
```

(Bug ID 25548146)

## 2.2.6 Btrfs file system issues on UEK

For a description of the known issues for Btrfs with Unbreakable Enterprise Kernel Release 4 Update 7, see [Unbreakable Enterprise Kernel: Release Notes for Unbreakable Enterprise Kernel Release 4 Update 7](#).

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Btrfs: Unable to replay log after snapshot is deleted and parent directory fsynced

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For a description of the known issues for Btrfs with Unbreakable Enterprise Kernel Release 2 Quarterly Update 5, see the [Oracle Linux Unbreakable Enterprise Kernel Release 2 Quarterly Update 5 Release Notes](#).

## 2.2.7 Btrfs: Unable to replay log after snapshot is deleted and parent directory fsynced

If a snapshot is deleted and the parent directory is `fsynced`, the log cannot be replayed during the next mount operation, which prevents the file system from mounting. This issue is solvable by wiping the log trees with the `btrfs-zero-log` tool, but this method is very inconvenient, as it results in the loss of any data and metadata that was `fsynced` before the parent directory was `fsynced`. (Bug ID 24424719)

## 2.2.8 Btrfs: Empty symbolic link after fsync of parent directory

If a symbolic link is created and then the parent directory is `fsynced`, a system crash or power outage results in an empty symbolic link when the file system is remounted. (Bug ID 23748445)

## 2.2.9 Btrfs: Incorrect directory entries after fsync log replay

If a directory or file is moved to a new parent directory, and the file system logs the new parent but does not explicitly log the old parent, when the log is replayed entries for the moved directory or file can appear in both the old and new parent directories. (Bug ID 23748405)

## 2.2.10 Btrfs: File loss on log replay after renaming file and running fsync

If a file is renamed and `fsynced` and a system crash or power outage occurs, when the log is replayed, the file is deleted. This issue occurs because the `last_unlink_trans` value is not captured in the log of the inode, which leaves the log without enough information to later replay the rename operation. (Bug ID 23725060)

## 2.2.11 Btrfs: Kernel oops when unmounting during a quota rescan or disable

Operations that trigger a quota rescan or those that disable the quota on a mounted file system cause a kernel oops message when attempting to unmount the file system. This behavior can cause the system to hang. (Bug ID 22377928)

## 2.2.12 Btrfs, ext4, and XFS: kernel panic when freeze and unfreeze operations are performed on multiple threads

Freeze and unfreeze operations that are performed across multiple threads on any supported file system can cause the system to hang and the kernel to panic. This problem is the result of a race condition that occurs when the unfreeze operation is triggered before it is actually frozen. The resulting unlock operation attempts a write operation on a non-existent lock resulting in the kernel panic. (Bug ID 25321899)

## 2.2.13 mkfs.ext4 does not support the documented -f option

The man page for `mkfs.ext4` describes an optional command line parameter, `-f`, to specify fragment size. However, this option was removed when support for creating `bigalloc` file systems was added. Attempts to create an `ext4` file system with the `mkfs.ext4` command in conjunction with this option may result in an error notifying the user of an invalid option. (Bug ID 25512202)

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XFS: Kernel panic in the multi-block buffer logging code

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## 2.2.14 XFS: Kernel panic in the multi-block buffer logging code

A bug for XFS that exists in the multi-block buffer logging code can cause a kernel panic at log push time. This problem is due to invalid regions being set in the buffer log format bitmap. (Bug ID 24400444)

## 2.2.15 OFED iSER target login fails from an initiator on Oracle Linux 6

An Oracle Linux 6 system with the `oracle-ofed-release` packages installed and an iSER (iSCSI Extensions for RDMA) target configured fails to log in to the iSER target as an initiator. On the Oracle Linux 6 initiator machine, the following behavior is typical:

```
# iscsiadadm -m node -T iqn.iser-target.t1 -p 10.196.100.134 --login
Logging in to [iface: default, target: iqn.iser-target.t1, portal:
10.196.100.134,3260] (multiple)
iscsiadm: Could not login to [iface: default, target: iqn.iser-target.t1,
portal: 10.196.100.134,3260].
iscsiadm: initiator reported error (8 - connection timed out)
iscsiadm: Could not log into all portals
```

This is expected behavior resulting from an errata fix for CVE-2016-4564 to protect against a write from an invalid context. (Bug ID 23615903)

## 2.2.16 Kernel panic when booting into RHCK on a Btrfs root partition

If the `root` partition is formatted by using Btrfs, the system is unable to boot into RHCK. This problem occurs because the features that are included in the version of Btrfs provided are not supported on older kernel versions. Note that Btrfs is included only as a technology preview for RHCK and is not fully supported on this kernel.

However, Btrfs is fully supported in production with the UEK release. Systems that boot into this kernel are unaffected by this particular issue.

When formatting file systems from the installation ISO, be aware that formatting the `root` partition with Btrfs makes it impossible to boot into the RHCK. Note that `btrfs` is the default file system for system disks when using the `boot-uek.iso`. If you are installing from this ISO and you intend to use the RHCK, you must change the default system disk layout in the installer. (Bug ID 23198167)

## 2.2.17 DTrace Issues

- Support for DTrace is available for UEK R4 only. To use DTrace, you must have both the `ol6_x86_64_UEKR4` and `ol6_x86_64_UEKR4_DTrace_userspace` channels enabled for ULN.
- Using `kill -9` to terminate `dtrace` can leave breakpoints outstanding in processes that are being traced, which might kill them at some point.
- The following compiler warning can be ignored for static probe definition arguments of type `string` (which is a D type, but not a C type):

```
provider_def.h:line#: warning: parameter names (without types) in function declaration
```

## 2.2.18 Linux Containers Changes

- The Linux Containers package (`lxci`) is available for the x86-64 architecture with UEK R3, but not the i386 architecture.

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## avahi-daemon fails to start with UEK R2

- The default location for a container's configuration has changed from `/etc/lxc/name` to `/container/name` in `lxc 0.8.0` onward.

To start a container that you created with a previous update of Oracle Linux, specify the `-f` option to `lxc-start`, for example:

```
# lxc-start -n ol6u3 -f /etc/lxc/ol6u3/config
```

Convert an existing container to use the new location as follows:

1. Move the container's configuration directory to `/container/name`.

```
# mv /etc/lxc/name /container
```

2. Edit the `/container/name/config` file and change the values of any `lxc.rootfs` and `lxc.mount` parameters to refer to `/container` instead of `/etc/lxc`.

For example, the `config` file might contain the following entries:

```
lxc.rootfs = /etc/lxc/example/rootfs
lxc.mount.entry=/lib /etc/lxc/example/rootfs/lib none ro,bind 0 0
lxc.mount.entry=/usr/lib /etc/lxc/example/rootfs/usr/lib none ro,bind 0 0
lxc.mount.entry=/lib64 /etc/lxc/example/rootfs/lib64 none ro,bind 0 0
lxc.mount.entry=/usr/lib64 /etc/lxc/example/rootfs/usr/lib64 none ro,bind 0 0
```

You would change these entries to the following:

```
lxc.rootfs = /container/example/rootfs
lxc.mount.entry=/lib /container/example/rootfs/lib none ro,bind 0 0
lxc.mount.entry=/usr/lib /container/example/rootfs/usr/lib none ro,bind 0 0
lxc.mount.entry=/lib64 /container/example/rootfs/lib64 none ro,bind 0 0
lxc.mount.entry=/usr/lib64 /container/example/rootfs/usr/lib64 none ro,bind 0 0
```

After converting the container, you do not need to specify the `-f` option with the `lxc-start` command. (Bug ID 15967411)

- Attempting to create an `lxc-oracle` container on a remote file system that is mounted by using NFSv4 fails. In addition, attempting to mount a remote file system by using NFSv4 from within an `lxc-oracle` container also fails. The workaround is to use NFSv3 instead. (Bug ID 16316266)

## 2.2.19 avahi-daemon fails to start with UEK R2

The `avahi-daemon` fails to start with UEK R2 and messages such as the following are logged:

```
avahi-daemon[PID]: SO_REUSEPORT failed: Protocol not available
avahi-daemon[PID]: Failed to create server: No suitable network protocol available
```

The workaround for this issue is to comment out the `disallow-other-stacks` entry in the `/etc/avahi/avahi-daemon.conf` file as follows:

```
#disallow-other-stacks=yes
```

(Bug ID 19712845)

## 2.2.20 Console appears to hang when booting

On some hardware, the console may appear to hang during the boot process after starting `udev`. However, the system boots properly and is accessible. A workaround for this problem is to add `nomodeset` as a kernel boot parameter in the `/etc/grub.conf` file. (Bug IDs 10094052, 13485328)

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Default reverse path filtering mode affects certain Oracle products

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## 2.2.21 Default reverse path filtering mode affects certain Oracle products

Oracle Linux 6 defaults to reverse path filtering in strict mode. Some Oracle products and network storage devices work more reliably with reverse path filtering in loose mode. To enable loose mode, run the following command

```
# sysctl net.ipv4.conf.iface.rp_filter=2
```

where *iface* is the network interface, for example, *eth1*.

The default setting for strict mode is 1. (Bug ID 10649976)

## 2.2.22 Error message following first reboot on an HP ProLiant server

You might see a message similar to the following during the first reboot of an HP ProLiant server:

```
[Firmware Bug]: the BIOS has corrupted hw-PMU resources (MSR 186 is 43003c)
```

This message can be safely ignored, as the functionality and performance of the operating system and the server are not affected.

## 2.2.23 ext4: Inline data feature not available for UEK

The inline data feature that allows the data for small files to be stored inside their inodes is not available in the UEK release. Also, the *-O inline\_data* option for the *mkfs.ext4* and *tune2fs* commands is not supported. (Bug ID 17210654)

## 2.2.24 xfsprogs 3.2.0 user space tool not supported on RHCK

The *xfsprogs* (3.2.0) user space tool introduced a new superblock format (v5) that includes a metadata checksum scheme. While this feature is supported in UEK R4, it is not currently supported on RHCK. If an *xfs* file system is created on a system that is running UEK R4, where cyclic redundancy checking (CRC) is enabled, *mkfs.xfs* generates the v5 superblock automatically and the file system can no longer be mounted on a system running RHCK. The following error is returned:

```
mount: wrong fs type, bad option, bad superblock on /dev/sdb1,
      missing codepage or helper program, or other error
      In some cases useful info is found in syslog - try
      dmesg | tail ..."
```

To check the superblock version number, run the following command:

```
# sudo xfs_db -r -c "sb" -c p /dev/sdb1 | grep versionnum
```

This command returns the hexadecimal value of *0xb4a5* for a file system formatted with a v5 superblock that requires CRC support in the kernel.

Do not try to mount a metadata CRC-enabled XFS file system on RHCK, as it does not support this functionality. (Bug ID 25489518)

## 2.2.25 gcc-libraries package replaced

The *gcc-libraries* package has been replaced by individual packages for *libatomic*, *libcilkrt*, and *libitm*. (Bug ID 19829494)

## 2.2.26 Intel TCO watchdog timer messages

Some server hardware does not support the Intel TCO watchdog driver. `dmesg` might display messages such as the following at boot time:

```
iTCO_vendor_support: vendor-support=0
iTCO_wdt: Intel TCO WatchDog Timer Driver v1.05
iTCO_wdt: failed to reset NO_REBOOT flag, reboot disabled by hardware
iTCO_wdt: No card detected
intel_rng: FWH not detected
```

To suppress this warning, disable the TCO watchdog timer driver by adding the following line to the `/etc/modprobe.d/blacklist-watchdog` file:

```
blacklist iTCO_wdt
```

## 2.2.27 Mellanox ConnectX driver support

The Mellanox ConnectX core, Ethernet, and InfiniBand drivers are supported on the x86-64 architecture only. Note that Mellanox InfiniBand is only supported with UEK. (Bug ID 16228063)

## 2.2.28 Oracle VM 3.0 guests crash during Oracle Database installation

PVHVM guests on Oracle VM 3.0 crash during Oracle Database installation if the value of the maximum memory (`maxmem`) parameter that is set for the guest is greater than the amount specified at boot time (`memory`). To avoid this issue, ensure that the values of the `maxmem` and `memory` parameters are the same. This issue has been resolved in Oracle VM 3.1.1. (Bug ID 13396734, 13970935)

## 2.2.29 Oracle VM 3.3.1 32-bit guests panic on UEK R2

A panic can occur in 32-bit guests with UEK R2 on Oracle VM 3.3.1. (Bug ID 20057995)

## 2.2.30 Support for PV drivers in an HVM guest

UEK provides support for PVHVM guests on Oracle VM. The default is to present only PV drivers when running in an HVM guest. To run `kernel-uek` fully hardware virtualized, including the drivers, add the parameter `xen_emul_unplug=never` to the boot parameters in `/etc/grub.conf`, for example:

```
kernel /vmlinuz-2.6.32-300.2.1.el6uek ro root=/dev/VolGroup00/LogVol00 xen_emul_unplug=never
```

Adding this parameter makes the kernel also present the emulated drivers as previously done, such as the `8139cp` network driver.

## 2.2.31 RHCK panics when ext4 file system defragmented

Under certain conditions, RHCK can panic if an `ext4` file system is defragmented. (Bug ID 21163148)

## 2.2.32 Default `sched_yield()` settings for the Completely Fair Scheduler

Note the following default `sched_yield()` settings for the UEK and RHCK kernels:

For UEK, the default setting is `kernel.sched_compat_yield=1`.

For RHCK, the default setting is `kernel.sched_compat_yield=0`.

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Setting the serial console in an HV guest

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## 2.2.33 Setting the serial console in an HV guest

To set the serial console in an HV guest, use following parameters in the guest:

- Add the following parameters to the kernel boot line in the `/etc/grub.conf` file:

```
console=tty0 console=ttyS0,57600n8
```

- Add the following line to the `/etc/securetty` file:

```
ttyS0
```

## 2.2.34 Support for large memory 32-bit systems

Oracle Linux releases prior to Oracle Linux 5 supplied a `hugemem` kernel to allow a system to address up to 64 GB of memory in 32-bit mode. The `hugemem` kernel is no longer available in Oracle Linux 5 and later releases.

UEK supports a maximum of 16 GB of memory for 32-bit kernels on bare metal and HVM systems, and 8 GB for fully PVM systems. Note that 32-bit PVM guest operating systems must be located in the first 128 GB of physical memory on the host.

RHCK has the same limitations, except that PVM systems can have up to 16 GB of memory. The 8 GB limitation for PVM on UEK was chosen for reasons of reliability.

A 32-bit system uses the PAE (physical address extension) memory feature to map physical memory beyond 4 GB into the 32-bit address space that is available to each process. A 64-bit system can address memory beyond 4 GB without requiring an extra layer of memory abstraction.

Oracle Linux on x86-64 includes 32-bit libraries, which allow applications that are built for both 64-bit and 32-bit Linux to run on the same system. This capability provides scalability to virtually unlimited memory sizes, while retaining the ability to run 32-bit applications. Oracle recommends this configuration for any system with more than 4 GB of memory. (Bug ID 16974301)

## 2.2.35 Unable to register an Oracle Linux guest with ULN

Registering an Oracle Linux guest that is running under Virtual Box with ULN might fail with a server communication error. The workaround is to run the following command as the `root` user on the guest:

```
# echo "uuid=`uuidgen -t`" >> /etc/sysconfig/rhn/up2date
```

You can then re-run the `uln_register` command. (Bug ID 14696776)

## 2.2.36 Unable to register with ULN on first reboot after installing Oracle Linux 6

Following the first reboot after installing Oracle Linux 6, you are prompted to register your system with ULN. If you did not configure your network during the installation, the registration process to ULN cannot succeed. To register your system, log in as the `root` user, configure the system's network manually, and run the `uln_register` command.

## 2.2.37 Booting from SAN installation fails using multipath on Pure Storage FlashArray

Some systems installed with Oracle Linux 6.10 and configured to use the UEK R4 kernel fail to boot if the boot disk is a multipath logical unit number (LUN) on a Pure Storage FlashArray. The system boots

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## Booting from SAN installation fails using multipath on Pure Storage FlashArray

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successfully if the LUN is exposed on a single path, or if the system is installed using Oracle Linux 6.8. Note that the system also boots successfully if it is configured to use RHCK.

This issue has been replicated by using a Pure Storage FlashArray FA-420 Pure Array and a QLogic QLE2562 HBA and is still currently under investigation. (Bug IDs 26732037, 27093062).

# Chapter 3 Upgrading to Oracle Linux 6.10

## Table of Contents

3.1 Supported Upgrade Paths .....	17
3.2 Obtaining Oracle Linux 6.10 Packages .....	17
3.2.1 About the Unbreakable Linux Network .....	18
3.2.2 About the Oracle Linux Yum Server .....	18
3.2.3 About Oracle Linux Installation Media .....	20
3.3 Upgrading the Unbreakable Enterprise Kernel .....	21
3.4 Applying the Update .....	22

This chapter describes how to upgrade your system to Oracle Linux 6.10.

### 3.1 Supported Upgrade Paths

On i386 systems, upgrading from Oracle Linux 6 GA or a previous update to Oracle Linux 6 is supported for the Unbreakable Enterprise Kernel Release 2 and the Red Hat Compatible Kernel. The Unbreakable Enterprise Kernel Release 4 is not supported on the i386 architecture.

On x86-64 systems, upgrading from a previous update to Oracle Linux 6 or from Oracle Linux 6 GA or is supported for the Unbreakable Enterprise Kernel Release 2, the Unbreakable Enterprise Kernel Release 3, the Unbreakable Enterprise Kernel Release 4, and the Red Hat Compatible Kernel.

Upgrading from a beta release is not supported.

In-place upgrading from a major version of Oracle Linux 5 or earlier is not supported. Although Anaconda provides an option to perform an upgrade, fresh installation is strongly recommended.

If you have an Oracle Linux 5.8 system, you can use new features in the Unbreakable Enterprise Kernel Release 2 without upgrading to Oracle Linux 6 as Oracle Linux 5.8 includes the Unbreakable Enterprise Kernel Release 2. You cannot use features from the Unbreakable Enterprise Kernel Release 4 as this kernel is not available for Oracle Linux 5.8.

### 3.2 Obtaining Oracle Linux 6.10 Packages

You can download Oracle Linux installation media from the Oracle Software Delivery Cloud at <https://edelivery.oracle.com/linux>.

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>.

The latest Oracle Linux 6.10 packages are also available on the Unbreakable Linux Network (ULN) and the Oracle Linux yum server.

To obtain the latest packages from ULN and install additional software for Oracle Linux 6.10, subscribe to the appropriate channels on ULN by logging into <https://linux.oracle.com> and then viewing the Channels option.

To install additional software for Oracle Linux 6.10 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 6.10, visit <https://yum.oracle.com/>.



#### Note

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.

### 3.2.1 About the Unbreakable Linux Network

You have the option of registering a system with Unbreakable Linux Network (ULN) when you install Oracle Linux 6 on a system. To register with ULN after an installation, use the [uln\\_register](#) command.

To obtain Oracle Linux updates from ULN, you must have an Oracle Linux support subscription. For more information, see <https://linux.oracle.com>.

From Oracle Linux 6.9 onward, ULN registration subscribes a server to the Oracle Linux 6 latest channel and either the UEK R2 latest channel ([ol6\\_i386\\_UEK\\_latest](#)) for i386 or the UEK R4 channel ([ol6\\_x86\\_64\\_UEK4](#)) for x86-64.

If you want to install UEK R4 on a ULN-registered x86-64 system that is currently running UEK R2, manually subscribe the system to the UEK R4 channel ([ol6\\_x86\\_64\\_UEK4](#)) and unsubscribe the server from the UEK R2 latest channel ([ol6\\_x86\\_64\\_UEK\\_latest](#)) before running [yum update](#).

ULN also provides channels for Oracle-specific software packages such as Oracle's [ASMLib](#) user-space package and the Oracle Instant Client. To enable access to these packages, log in to ULN and subscribe your system to the Oracle Software channel.

### 3.2.2 About the Oracle Linux Yum Server

Oracle provides all errata and updates for Oracle Linux through the Oracle Linux yum server, which includes updates to the base distribution, but does not include Oracle-specific software. You do not require an Oracle Linux support subscription to use this service. For more information on how to obtain updates from Oracle Linux yum server and how to update your [yum](#) configuration files for the latest Oracle Linux 6 release, see <https://yum.oracle.com>.

By default, all new installations of Oracle Linux 6.10 are automatically configured to use the Oracle Linux yum server. If you subsequently register the system with ULN, the Oracle Linux yum server is automatically disabled.

The Oracle Linux yum server provides a direct mapping of all of the Unbreakable Linux Network (ULN) channels that are available to the public without any specific support agreement. The repository labels used for each repository on the Oracle Linux yum server map directly onto the channel names on ULN. See [Oracle® Linux: Unbreakable Linux Network User's Guide for Oracle Linux 6 and Oracle Linux 7](#) for more information about the channel names and common suffixes used for channels and repositories.

Prior to January 2019, Oracle shipped a single yum repository configuration file for each Oracle Linux release. This configuration file is copied into [/etc/yum.repos.d/public-yum-ol6.repo](#) at installation, but can also be downloaded from the Oracle Linux yum server directly to obtain updates.

The original configuration file is deprecated in favor of modular repository files that are managed and updated automatically via yum in the form of RPM packages that are more targeted in scope. For example, core repository configuration files required for Oracle Linux 6 are available in the [oraclelinux-release-e16](#) package. This package includes all of the repository configuration required to install base

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## About the Oracle Linux Yum Server

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packages for the release, including packages from the `ol6_latest`, `ol6_addons` repositories and all of the supported repositories for UEK.

The modular yum repository configuration files released as packages that can be maintained via yum can help to simplify repository management and also ensure that your yum repository definitions are kept up to date automatically, whenever you update your system.

A list of all available RPM files to manage all of the possible yum repository configurations for your release can be obtained by running:

```
# yum list *release-el6*
```

To install the yum repository configuration for a particular set of software that you wish to use, use yum to install the corresponding package. For example, to install the yum repository configuration for the Oracle Linux Software Collection Library, run:

```
# yum install oracle-softwarecollection-release-el6
```

If your system is still configured to use the original single yum repository configuration file at `/etc/yum.repos.d/public-yum-ol6.repo`, you should update your system to transition to the current approach to handling yum repository configuration. To do this, ensure that your system is up to date and then run the `/usr/bin/ol_yum_configure.sh` script:

```
# yum update
# /usr/bin/ol_yum_configure.sh
```

The `/usr/bin/ol_yum_configure.sh` script checks the `/etc/yum.repos.d/public-yum-ol6.repo` file to determine which repositories are already enabled and installs the appropriate corresponding packages before renaming the original configuration file to `/etc/yum.repos.d/public-yum-ol6.repo.sav` to disable it in favor of the more recent modular repository configuration files.

If, for some reason, you manage to remove all configuration to access the Oracle Linux yum server repositories, you should create a temporary yum repository configuration file at `/etc/yum.repos.d/ol6-temp.repo` with the following as the minimum required content:

```
[ol6_latest]
name=Oracle Linux $releasever Latest ($basearch)
baseurl=https://yum.oracle.com/repo/OracleLinux/OL6/latest/$basearch/
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-oracle
gpgcheck=1
enabled=1
```

Then reinstall the `oraclelinux-release-el6` package to restore the default yum configuration:

```
# yum reinstall oraclelinux-release-el6
# rm /etc/yum.repos.d/ol6-temp.repo
```

For more information on manually setting up Oracle Linux yum server repository configuration files, see <https://yum.oracle.com/getting-started.html>.

You can enable or disable repositories in each repository configuration file by setting the value of the `enabled` directive to 1 or 0 for each repository listed in the file, as required. The preferred method of enabling or disabling repositories under Oracle Linux 6 is to use the `yum-config-manager` command provided in the `yum-utils` package.

If you want to install packages from the OFED repository for a system that is currently running UEK R3 (**x86-64 systems only**), enable the `ol6_ofed_UEK` yum repository. For example, run:

```
# yum-config-manager --enable ol6_ofed_UEK
```

If you want to install packages from the OFED repository for a system that is currently running UEK R4 (**x86-64 systems only**), enable the `ol6_UEKR4_OFED` yum repository. For example, run:

```
# yum-config-manager --enable ol6_UEKR4_OFED
```

### 3.2.3 About Oracle Linux Installation Media

The Oracle Linux 6.10 Media Pack contains the following ISO images:

- **Oracle Linux 6.10 for x86 (32 bit) or for x86\_64 (64 bit)**

This ISO image contains everything needed to boot a system and install Oracle Linux.

- **Oracle Linux 6.10 UEK Boot ISO image for x86 (32 bit) or for x86\_64 (64 bit)**

This is the boot ISO image for the Unbreakable Enterprise Kernel.

- **Oracle Linux 6.10 Boot ISO image for x86 (32 bit) or for x86\_64 (64 bit)**

This is the boot ISO image for the Red Hat Compatible Kernel.

- **Oracle Linux 6.10 Source DVD 1 and 2**

These ISO images contain the source code for the software packages in the release.

The full installation media for Oracle Linux 6.10 contains three distinct repository sources for the Unbreakable Enterprise Kernel Release 2, the Unbreakable Enterprise Kernel Release 4, and the Red Hat Compatible Kernel.

To configure `yum` to use both the Unbreakable Enterprise Kernel Release 2 and the Red Hat Compatible Kernel repositories from the full installation ISO image, create the file `/etc/yum.repos.d/Media.repo` containing entries similar to the following:

```
[ol6_base_media]
name=Oracle Linux 6.10 Base Media
baseurl=file:///media/ISOimage/Server
gpgkey=file:///media/ISOimage/RPM-GPG-KEY
gpgcheck=1
enabled=1

[ol6_uek_media]
name=Oracle Linux 6.10 UEK Media
baseurl=file:///media/ISOimage/UEK2
gpgkey=file:///media/ISOimage/RPM-GPG-KEY
gpgcheck=1
enabled=1
```

To configure `yum` to use both the Unbreakable Enterprise Kernel Release 4 (**x86-64 systems only**) and the Red Hat Compatible Kernel repositories from the full installation ISO image, create the file `/etc/yum.repos.d/Media.repo` containing entries similar to the following:

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Oracle recommends that you upgrade the software described by this documentation as soon as possible.

## Upgrading the Unbreakable Enterprise Kernel

---

```
[ol6_base_media]
name=Oracle Linux 6.10 Base Media
baseurl=file:///media/ISOimage/Server
gpgkey=file:///media/ISOimage/RPM-GPG-KEY
gpgcheck=1
enabled=1

[ol6_uekr4_media]
name=Oracle Linux 6.10 UEK Media
baseurl=file:///media/ISOimage/UEK4
gpgkey=file:///media/ISOimage/RPM-GPG-KEY
gpgcheck=1
enabled=1
```

Adjust the value of the `baseurl` and `gpgkey` parameters to match the mount point of the ISO image on your system. If you do not require one of the repositories, set the value of the corresponding `enabled` parameter to 0.

### 3.3 Upgrading the Unbreakable Enterprise Kernel

Oracle Linux 6.10 ships with the latest Unbreakable Enterprise Kernel Release 2 for i386 and Unbreakable Enterprise Kernel Release 4 for x86-64.

If you upgrade your system from the installation media, the following five upgrade scenarios are possible:

- If UEK R2 or UEK R4 is not currently installed on the system, only the latest Red Hat Compatible Kernel is installed. The UEK R2 or UEK R4 kernel is not installed.
- If UEK R2 is currently installed on an i386 system, the latest version of the UEK R2 kernel is installed.
- If UEK R2 is currently installed on an x86-64 system and you upgrade using the Oracle Linux 6.10 installation media for x86-64, which do not contain a UEK R2 repository, the latest version of UEK R2 is not installed.
- If UEK R3 is currently installed on an x86-64 system, and you upgrade using the Oracle Linux 6.10 installation media for x86-64, which do not contain a UEK R3 repository, the latest version of UEK R3 is not installed, the system continues to boot into the existing UEK R3 release.
- If UEK R4 is currently installed on an x86-64 system, the latest version of the UEK R4 kernel is installed.

The `yum` command uses whatever repositories you have configured on your system to upgrade the system. You can find the latest UEK R2 packages in the `ol6_i386_UEK_latest` and `ol6_x86_64_UEK_latest` repositories, the latest UEK R3 packages in the `ol6_UEKR3_latest` repository, and the latest UEK R4 packages in the `ol6_UEKR4` repository.

If you want to install the latest UEK R2 kernel on an i386 or x86-64 system, subscribe your system to the `ol6_i386_UEK_latest` or `ol6_x86_64_UEK_latest` channel on ULN, or enable the `ol6_UEK_latest` repository. For example:

```
# yum-config-manager --enable ol6_UEK_latest
```

If you want to update an x86-64 system to use the latest UEK R3 kernel, subscribe your system to the `ol6_x86_64_UEKR3_latest` channel on ULN, or enable the `ol6_UEKR3_latest` repository. For example:

```
# yum-config-manager --enable ol6_UEKR3_latest
```

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## Applying the Update

---

If you want to update an x86-64 system to use the latest UEK R4 kernel, subscribe your system to the `ol6_x86_64_UEK4` channel on ULN, or enable the `ol6_UEK4` repository. For example:

```
# yum-config-manager --enable ol6_UEK4
```

## 3.4 Applying the Update

When you have set up the ULN channels, yum repositories, or installation media repositories that the `yum` command should use, you can update all of the installed packages by running the following command:

```
# yum update
```

This command upgrades your system to Oracle Linux 6.10.

Use the following command to update a specific package:

```
# yum update package
```

For example, to update the Z-shell package (`zsh`), you would type:

```
# yum update zsh
```

For more information, see the `yum(8)` man page.

## Chapter 4 Oracle-Supported OFED Packages

### Table of Contents

4.1 Installing or Upgrading Oracle-Supported OFED Packages for UEK R4 .....	23
4.2 Upgrading to Oracle Linux 6.10 with the Oracle-Supported OFED Packages for UEK R4 installed ....	23

The following information describes additional steps specific to Oracle Linux 6.10 that may be required to install or upgrade the Oracle-supported OFED packages for UEK R4. This chapter also describes steps to upgrade an Oracle Linux system where the Oracle-supported OFED packages for UEK R4 are already installed.

### 4.1 Installing or Upgrading Oracle-Supported OFED Packages for UEK R4

For instructions on installing or upgrading OFED packages with UEK R4, see the most current version of the release notes for UEK R4 [Unbreakable Enterprise Kernel Documentation](#).

For example, if you are installing UEK R4U7, see [Unbreakable Enterprise Kernel: Release Notes for Unbreakable Enterprise Kernel Release 4 Update 7](#).

### 4.2 Upgrading to Oracle Linux 6.10 with the Oracle-Supported OFED Packages for UEK R4 installed

The following procedures describe how to upgrade an Oracle Linux 6 system to Oracle Linux 6.10 on a system where the Oracle-supported OFED packages for UEK R4 are already present.

#### Upgrading by using ULN

The following procedure describes how to use ULN to perform an upgrade.



##### Note

This procedure assumes that you have registered your system with ULN. See [Oracle® Linux: Unbreakable Linux Network User's Guide for Oracle Linux 6 and Oracle Linux 7](#).

1. Subscribe the system to the `ol6_x86_64_UEK4_OFED`, `ol6_x86_64_UEK4`, and `ol6_x86_64_latest` channels on ULN. By default, the `ol6_x86_64_UEK4` and `ol6_x86_64_latest` channels are enabled when you register an Oracle Linux 6 system with ULN.
2. Edit the `/etc/yum/pluginconf.d/rhnplugin.conf` file and add the following lines to the end of the file:

```
[ol6_x86_64_UEK4_OFED]
priority=20
```

3. Install the `yum-plugin-priorities` package from the `ol6_x86_64_latest` channel:

```
# yum install yum-plugin-priorities
```

## Upgrading by using the Oracle Linux Yum Server

---

4. Apply Oracle Linux 6.10 to the system:

```
# yum update
```

Any Oracle-supported OFED packages for UEK R4 that were already present are updated from the `ol6_x86_64_UEK4_OFED` channel. If you do not have any of the OFED packages installed, you can proceed to install the packages as described in the installation instructions provided in the Release Notes for the most current version of UEK R4 at [Unbreakable Enterprise Kernel Documentation](#).

For example, if installing for UEK R4U7, refer to [Unbreakable Enterprise Kernel: Release Notes for Unbreakable Enterprise Kernel Release 4 Update 7](#).

## Upgrading by using the Oracle Linux Yum Server

The following procedure describes how to perform an upgrade by using the Oracle Linux yum server.

1. If you updated the server from Oracle Linux 5 or the initial release of Oracle Linux 6, ensure that your system is up to date and that you have transitioned to use the modular yum repository configuration by installing the `oraclelinux-release-el6` package and running the `/usr/bin/ol_yum_configure.sh` script.

```
# yum install oraclelinux-release-el6
# /usr/bin/ol_yum_configure.sh
```

2. Enable the `ol6_latest`, `ol6_UEK4` and `ol6_UEK4_OFED` repositories. For example, run:

```
# yum-config-manager --enable ol6_latest ol6_UEK4 ol6_UEK4_OFED
```

3. Install the `yum-plugin-priorities` package from the `ol6_latest` repository:

```
# yum install yum-plugin-priorities
```

4. To apply Oracle Linux 6.10 to the system:

```
# yum update
```

Any Oracle-supported OFED packages for UEK R4 that were already present are updated from the `ol6_UEK4_OFED` repository on the Oracle Linux yum server. If you do not have any of the OFED packages installed, you can proceed to install the packages as described in the installation instructions that are provided in the release notes for the most current version of UEK R4 at [Unbreakable Enterprise Kernel Documentation](#).

For example, if you are installing UEK R4U7, see [Unbreakable Enterprise Kernel: Release Notes for Unbreakable Enterprise Kernel Release 4 Update 7](#).

# Appendix A Package Changes from the Upstream Release

## Table of Contents

A.1 Changes to Binary Packages .....	25
A.1.1 Added Binary Packages by Oracle (i386) .....	25
A.1.2 Added Binary Packages by Oracle (x86_64) .....	26
A.1.3 Modified Binary Packages (i386) .....	27
A.1.4 Modified Binary Packages (x86_64) .....	36
A.1.5 Modified Optional Binary Packages (i386) .....	46
A.1.6 Modified Optional Binary Packages (x86_64) .....	51
A.1.7 Removed Binary Packages (i386) .....	56
A.1.8 Removed Binary Packages (x86_64) .....	56
A.2 Changes to Source Packages .....	57
A.2.1 Added Source Packages by Oracle .....	57
A.2.2 Modified Source Packages .....	58
A.2.3 Modified Optional Source Packages .....	61
A.2.4 Removed Source Packages .....	62

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 added **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 (i386)

The following binary packages have been added by Oracle for the i386 platform:

- `kernel-uek`
- `kernel-uek-debug`
- `kernel-uek-debug-devel`
- `kernel-uek-devel`
- `kernel-uek-doc`
- `kernel-uek-firmware`
- `netxen-firmware`
- `ocfs2-tools`
- `ocfs2-tools-devel`
- `oracleasm-support`
- `oraclelinux-release`
- `oraclelinux-release-notes`

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#### Added Binary Packages by Oracle (x86\_64)

---

- `oracle-logos`
- `ql2600-firmware`
- `ql2700-firmware`
- `ql8300-firmware`
- `reflink`
- `yum-plugin-ulninfo`

### A.1.2 Added Binary Packages by Oracle (x86\_64)

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

- `dnotify-tools`
- `inotify-tools-devel`
- `kernel-uek`
- `kernel-uek-debug`
- `kernel-uek-debug-devel`
- `kernel-uek-devel`
- `kernel-uek-doc`
- `kernel-uek-firmware`
- `libdtrace-ctf`
- `libdtrace-ctf-devel`
- `linux-firmware`
- `lxc`
- `lxc-devel`
- `lxc-libs`
- `netxen-firmware`
- `ocfs2-tools`
- `ocfs2-tools-devel`
- `oracleasm-support`
- `oraclelinux-release`
- `oraclelinux-release-notes`
- `oracle-logos`

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---

#### Modified Binary Packages (i386)

- `oracle-database-server-12cR2-preinstall`
- `ql2600-firmware`
- `ql2700-firmware`
- `ql8300-firmware`
- `reflink`
- `uname26`
- `yum-plugin-ulninfo`

### A.1.3 Modified Binary Packages (i386)

The following binary packages from the upstream release have been modified for the i386 platform:

- `abrt`
- `abrt-addon-ccpp`
- `abrt-addon-kerneloops`
- `abrt-addon-python`
- `abrt-cli`
- `abrt-desktop`
- `abrt-gui`
- `abrt-libs`
- `abrt-python`
- `abrt-tui`
- `acpid`
- `anaconda`
- `autofs`
- `basesystem`
- `brltty`
- `clufter-bin`
- `clufter-cli`
- `clufter-common`
- `clufter-lib-ccs`
- `clufter-lib-general`

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## Modified Binary Packages (i386)

---

- [clutter-lib-pcs](#)
- [coreutils](#)
- [coreutils-libs](#)
- [cpp](#)
- [cpuspeed](#)
- [dbus](#)
- [dbus-devel](#)
- [dbus-libs](#)
- [dbus-x11](#)
- [device-mapper-multipath](#)
- [device-mapper-multipath-libs](#)
- [dhclient](#)
- [dhcp](#)
- [dhcp-common](#)
- [dracut](#)
- [dracut-fips](#)
- [dracut-kernel](#)
- [dracut-network](#)
- [e2fsprogs](#)
- [e2fsprogs-devel](#)
- [e2fsprogs-libs](#)
- [efax](#)
- [esc](#)
- [firstaidkit](#)
- [firstaidkit-engine](#)
- [firstaidkit-gui](#)
- [firstboot](#)
- [fuse](#)
- [fuse-devel](#)
- [fuse-libs](#)

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---

## Modified Binary Packages (i386)

---

- [gcc](#)
- [gcc-c++](#)
- [gcc-gfortran](#)
- [gcc-gnat](#)
- [gcc-java](#)
- [gcc-objc](#)
- [gcc-objc++](#)
- [gdm](#)
- [gdm-libs](#)
- [gdm-plugin-fingerprint](#)
- [gdm-plugin-smartcard](#)
- [gdm-user-switch-applet](#)
- [glibc](#)
- [glibc-common](#)
- [glibc-devel](#)
- [glibc-headers](#)
- [glibc-utils](#)
- [gnome-desktop](#)
- [gnome-desktop-devel](#)
- [grub](#)
- [grubby](#)
- [gstreamer](#)
- [gstreamer-devel](#)
- [gstreamer-tools](#)
- [httpd](#)
- [httpd-devel](#)
- [httpd-manual](#)
- [httpd-tools](#)
- [initscripts](#)
- [iproute](#)

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## Modified Binary Packages (i386)

---

- `iptables`
- `iptables-devel`
- `iptables-ipv6`
- `irqbalance`
- `java-1.7.0-openjdk`
- `java-1.7.0-openjdk-devel`
- `java-1.8.0-openjdk`
- `java-1.8.0-openjdk-devel`
- `java-1.8.0-openjdk-headless`
- `kabi-yum-plugins`
- `kdeadmin`
- `kdebase-workspace`
- `kdebase-workspace-akonadi`
- `kdebase-workspace-devel`
- `kdebase-workspace-libs`
- `kdebase-workspace-python-applet`
- `kdebase-workspace-wallpapers`
- `kdelibs`
- `kdelibs-common`
- `kdelibs-devel`
- `kde-settings`
- `kde-settings-kdm`
- `kde-settings-pulseaudio`
- `kdm`
- `keyutils`
- `keyutils-libs`
- `keyutils-libs-devel`
- `kpartx`
- `ksc`
- `ksysguardd`

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---

## Modified Binary Packages (i386)

---

- [libcom\\_err](#)
- [libcom\\_err-devel](#)
- [libgcc](#)
- [libgcj](#)
- [libgcj-devel](#)
- [libgcj-src](#)
- [libgfortran](#)
- [libgnat](#)
- [libgnat-devel](#)
- [libgomp](#)
- [libipa\\_hbac](#)
- [libobjc](#)
- [libreport](#)
- [libreport-cli](#)
- [libreport-compat](#)
- [libreport-filesystem](#)
- [libreport-gtk](#)
- [libreport-newt](#)
- [libreport-plugin-kerneloops](#)
- [libreport-plugin-logger](#)
- [libreport-plugin-mailx](#)
- [libreport-plugin-reportuploader](#)
- [libreport-plugin-ureport](#)
- [libreport-python](#)
- [libsmbclient](#)
- [libss](#)
- [libsss\\_idmap](#)
- [libstdc++](#)
- [libstdc++-devel](#)
- [luci](#)

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## Modified Binary Packages (i386)

---

- `microcode_ctl`
- `mkbootdisk`
- `mod_ssl`
- `module-init-tools`
- `net-snmp`
- `net-snmp-devel`
- `net-snmp-libs`
- `net-snmp-perl`
- `net-snmp-python`
- `net-snmp-utils`
- `nfs-utils`
- `nmap`
- `nscd`
- `nss`
- `nss-devel`
- `nss-sysinit`
- `nss-tools`
- `openmpi-1.10`
- `openmpi-1.10-devel`
- `openscap`
- `openscap-scanner`
- `openscap-utils`
- `openssl`
- `openssl-devel`
- `oracle-logos`
- `oxygen-cursor-themes`
- `PackageKit`
- `PackageKit-device-rebind`
- `PackageKit-glib`
- `PackageKit-gstreamer-plugin`

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## Modified Binary Packages (i386)

---

- [PackageKit-gtk-module](#)
- [PackageKit-yum](#)
- [PackageKit-yum-plugin](#)
- [pam](#)
- [pam-devel](#)
- [pcs](#)
- [pilot-link](#)
- [piranha](#)
- [plymouth](#)
- [plymouth-core-libs](#)
- [plymouth-gdm-hooks](#)
- [plymouth-graphics-libs](#)
- [plymouth-plugin-label](#)
- [plymouth-plugin-two-step](#)
- [plymouth-scripts](#)
- [plymouth-system-theme](#)
- [plymouth-theme-rings](#)
- [plymouth-utils](#)
- [python-clutter](#)
- [python-libipa\\_hbac](#)
- [python-sss](#)
- [python-sssdconfig](#)
- [python-sss-murmur](#)
- [python-urlgrabber](#)
- [python-virtinst](#)
- [ql2400-firmware](#)
- [ql2500-firmware](#)
- [ql2600-firmware](#)
- [ql2700-firmware](#)
- [ql8300-firmware](#)

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## Modified Binary Packages (i386)

---

- [qperf](#)
- [rear](#)
- [redhat-bookmarks](#)
- [redhat-indexhtml](#)
- [redhat-lsb](#)
- [redhat-lsb-compat](#)
- [redhat-lsb-core](#)
- [redhat-lsb-graphics](#)
- [redhat-lsb-printing](#)
- [redhat-release-server](#)
- [redhat-rpm-config](#)
- [rhn-check](#)
- [rhn-client-tools](#)
- [rhnlib](#)
- [rhnasd](#)
- [rhn-setup](#)
- [rhn-setup-gnome](#)
- [rpmdevtools](#)
- [rsyslog](#)
- [rsyslog-gnutls](#)
- [rsyslog-gssapi](#)
- [rsyslog-mysql](#)
- [rsyslog-pgsql](#)
- [rsyslog-repl](#)
- [samba](#)
- [samba-client](#)
- [samba-common](#)
- [samba-winbind](#)
- [samba-winbind-clients](#)
- [scap-security-guide](#)

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Oracle recommends that you upgrade the software described by this documentation as soon as possible.

---

## Modified Binary Packages (i386)

---

- `scap-workbench`
- `scsi-target-utils`
- `selinux-policy`
- `selinux-policy-doc`
- `selinux-policy-minimum`
- `selinux-policy-mls`
- `selinux-policy-targeted`
- `setroubleshoot`
- `setroubleshoot-plugins`
- `setroubleshoot-server`
- `sos`
- `sssd`
- `sssd-ad`
- `sssd-client`
- `sssd-common`
- `sssd-common-pac`
- `sssd-dbus`
- `sssd-ipa`
- `sssd-krb5`
- `sssd-krb5-common`
- `sssd-ldap`
- `sssd-proxy`
- `system-config-date`
- `system-config-date-docs`
- `system-config-kickstart`
- `system-config-network-tui`
- `system-config-services`
- `system-config-services-docs`
- `system-config-users-docs`
- `system-icon-theme`

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information.  
Oracle recommends that you upgrade the software described by this documentation as soon as possible.

#### Modified Binary Packages (x86\_64)

---

- `systemtap`
- `systemtap-client`
- `systemtap-devel`
- `systemtap-initscript`
- `systemtap-runtime`
- `systemtap-sdt-devel`
- `systemtap-server`
- `tog-pegasus`
- `tog-pegasus-libs`
- `trace-cmd`
- `wireshark`
- `wireshark-gnome`
- `xorg-x11-drivers`
- `xorg-x11-server-common`
- `xorg-x11-server-Xephyr`
- `xorg-x11-server-Xorg`
- `xsane`
- `xsane-common`
- `xsane-gimp`
- `yum`
- `yum-plugin-aliases`
- `yum-plugin-changelog`
- `yum-plugin-ovl`
- `yum-plugin-security`
- `yum-plugin-tmprepo`
- `yum-plugin-verify`
- `yum-plugin-versionlock`
- `yum-utils`

### A.1.4 Modified Binary Packages (x86\_64)

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

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information.

Oracle recommends that you upgrade the software described by this documentation as soon as possible.

---

## Modified Binary Packages (x86\_64)

---

- [abrt](#)
- [abrt-addon-ccpp](#)
- [abrt-addon-kerneloops](#)
- [abrt-addon-python](#)
- [abrt-cli](#)
- [abrt-desktop](#)
- [abrt-gui](#)
- [abrt-libs](#)
- [abrt-python](#)
- [abrt-tui](#)
- [acpid](#)
- [anaconda](#)
- [autofs](#)
- [basesystem](#)
- [brltty](#)
- [clufter-bin](#)
- [clufter-cli](#)
- [clufter-common](#)
- [clufter-lib-ccs](#)
- [clufter-lib-general](#)
- [clufter-lib-pcs](#)
- [coreutils](#)
- [coreutils-libs](#)
- [cpp](#)
- [cpuspeed](#)
- [dbus](#)
- [dbus-devel](#)
- [dbus-libs](#)
- [dbus-x11](#)
- [device-mapper-multipath](#)

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information.  
Oracle recommends that you upgrade the software described by this documentation as soon as possible.

## Modified Binary Packages (x86\_64)

---

- `device-mapper-multipath-libs`
- `dhclient`
- `dhcp`
- `dhcp-common`
- `dracut`
- `dracut-fips`
- `dracut-kernel`
- `dracut-network`
- `e2fsprogs`
- `e2fsprogs-devel`
- `e2fsprogs-libs`
- `efax`
- `esc`
- `firstaidkit`
- `firstaidkit-engine`
- `firstaidkit-gui`
- `firstboot`
- `fuse`
- `fuse-devel`
- `fuse-libs`
- `gcc`
- `gcc-c++`
- `gcc-gfortran`
- `gcc-gnat`
- `gcc-java`
- `gcc-objc`
- `gcc-objc++`
- `gdm`
- `gdm-libs`
- `gdm-plugin-fingerprint`

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information.

Oracle recommends that you upgrade the software described by this documentation as soon as possible.

---

## Modified Binary Packages (x86\_64)

---

- `gdm-plugin-smartcard`
- `gdm-user-switch-applet`
- `glibc`
- `glibc-common`
- `glibc-devel`
- `glibc-headers`
- `glibc-utils`
- `gnome-desktop`
- `gnome-desktop-devel`
- `grub`
- `grubby`
- `gstreamer`
- `gstreamer-devel`
- `gstreamer-tools`
- `httpd`
- `httpd-devel`
- `httpd-manual`
- `httpd-tools`
- `initscripts`
- `iproute`
- `iptables`
- `iptables-devel`
- `iptables-ipv6`
- `irqbalance`
- `java-1.7.0-openjdk`
- `java-1.7.0-openjdk-devel`
- `java-1.8.0-openjdk`
- `java-1.8.0-openjdk-devel`
- `java-1.8.0-openjdk-headless`
- `kabi-yum-plugins`

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information.  
Oracle recommends that you upgrade the software described by this documentation as soon as possible.

## Modified Binary Packages (x86\_64)

---

- `kdeadmin`
- `kdebase-workspace`
- `kdebase-workspace-akonadi`
- `kdebase-workspace-devel`
- `kdebase-workspace-libs`
- `kdebase-workspace-python-applet`
- `kdebase-workspace-wallpapers`
- `kdelibs`
- `kdelibs-common`
- `kdelibs-devel`
- `kde-settings`
- `kde-settings-kdm`
- `kde-settings-pulseaudio`
- `kdm`
- `keyutils`
- `keyutils-libs`
- `keyutils-libs-devel`
- `kpartx`
- `ksc`
- `ksysguardd`
- `libcom_err`
- `libcom_err-devel`
- `libgcc`
- `libgcj`
- `libgcj-devel`
- `libgcj-src`
- `libgfortran`
- `libgnat`
- `libgnat-devel`
- `libgomp`

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information.

Oracle recommends that you upgrade the software described by this documentation as soon as possible.

---

## Modified Binary Packages (x86\_64)

---

- [libipa\\_hbac](#)
- [libobjc](#)
- [libreport](#)
- [libreport-cli](#)
- [libreport-compat](#)
- [libreport-filesystem](#)
- [libreport-gtk](#)
- [libreport-newt](#)
- [libreport-plugin-kerneloops](#)
- [libreport-plugin-logger](#)
- [libreport-plugin-mailx](#)
- [libreport-plugin-reportuploader](#)
- [libreport-plugin-ureport](#)
- [libreport-python](#)
- [libsmbclient](#)
- [libss](#)
- [libssss\\_idmap](#)
- [libstdc++](#)
- [libstdc++-devel](#)
- [linux-firmware](#)
- [luci](#)
- [lxc](#)
- [lxc-devel](#)
- [lxc-libs](#)
- [microcode\\_ctl](#)
- [mkbootdisk](#)
- [mod\\_ssl](#)
- [module-init-tools](#)
- [net-snmp](#)
- [net-snmp-devel](#)

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information.  
Oracle recommends that you upgrade the software described by this documentation as soon as possible.

## Modified Binary Packages (x86\_64)

---

- `net-snmp-libs`
- `net-snmp-perl`
- `net-snmp-python`
- `net-snmp-utils`
- `nfs-utils`
- `nmap`
- `nsqd`
- `nss`
- `nss-devel`
- `nss-sysinit`
- `nss-tools`
- `openmpi-1.10`
- `openmpi-1.10-devel`
- `openscap`
- `openscap-scanner`
- `openscap-utils`
- `openssl`
- `openssl-devel`
- `oracle-logos`
- `oxygen-cursor-themes`
- `PackageKit`
- `PackageKit-device-rebind`
- `PackageKit-glib`
- `PackageKit-gstreamer-plugin`
- `PackageKit-gtk-module`
- `PackageKit-yum`
- `PackageKit-yum-plugin`
- `pam`
- `pam-devel`
- `pcs`

- `pilot-link`
- `piranha`
- `plymouth`
- `plymouth-core-libs`
- `plymouth-gdm-hooks`
- `plymouth-graphics-libs`
- `plymouth-plugin-label`
- `plymouth-plugin-two-step`
- `plymouth-scripts`
- `plymouth-system-theme`
- `plymouth-theme-rings`
- `plymouth-utils`
- `python-clufter`
- `python-libipa_hbac`
- `python-sss`
- `python-sssdconfig`
- `python-sss-murmur`
- `python-urlgrabber`
- `python-virtinst`
- `ql2400-firmware`
- `ql2500-firmware`
- `ql2600-firmware`
- `ql2700-firmware`
- `ql8300-firmware`
- `qperf`
- `rear`
- `redhat-bookmarks`
- `redhat-indexhtml`
- `redhat-lsb`
- `redhat-lsb-compat`

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information.  
Oracle recommends that you upgrade the software described by this documentation as soon as possible.

## Modified Binary Packages (x86\_64)

---

- `redhat-lsb-core`
- `redhat-lsb-graphics`
- `redhat-lsb-printing`
- `redhat-release-server`
- `redhat-rpm-config`
- `rhn-check`
- `rhn-client-tools`
- `rhnlib`
- `rhnasd`
- `rhn-setup`
- `rhn-setup-gnome`
- `rpmdevtools`
- `rsyslog`
- `rsyslog-gnutls`
- `rsyslog-gssapi`
- `rsyslog-mysql`
- `rsyslog-pgsql`
- `rsyslog-relp`
- `samba`
- `samba-client`
- `samba-common`
- `samba-winbind`
- `samba-winbind-clients`
- `scap-security-guide`
- `scap-workbench`
- `scsi-target-utils`
- `selinux-policy`
- `selinux-policy-doc`
- `selinux-policy-minimum`
- `selinux-policy-mls`

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information.

Oracle recommends that you upgrade the software described by this documentation as soon as possible.

---

## Modified Binary Packages (x86\_64)

---

- `selinux-policy-targeted`
- `setroubleshoot`
- `setroubleshoot-plugins`
- `setroubleshoot-server`
- `sos`
- `sssd`
- `sssd-ad`
- `sssd-client`
- `sssd-common`
- `sssd-common-pac`
- `sssd-dbus`
- `sssd-ipa`
- `sssd-krb5`
- `sssd-krb5-common`
- `sssd-ldap`
- `sssd-proxy`
- `system-config-date`
- `system-config-date-docs`
- `system-config-kickstart`
- `system-config-network-tui`
- `system-config-services`
- `system-config-services-docs`
- `system-config-users-docs`
- `system-icon-theme`
- `systemtap`
- `systemtap-client`
- `systemtap-devel`
- `systemtap-initscript`
- `systemtap-runtime`
- `systemtap-sdt-devel`

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information.  
Oracle recommends that you upgrade the software described by this documentation as soon as possible.

#### Modified Optional Binary Packages (i386)

---

- `systemtap-server`
- `tog-pegasus`
- `tog-pegasus-libs`
- `trace-cmd`
- `wireshark`
- `wireshark-gnome`
- `xfsdump`
- `xfsprogs`
- `xfsprogs-devel`
- `xfsprogs-qa-devel`
- `xorg-x11-drivers`
- `xorg-x11-server-common`
- `xorg-x11-server-Xephyr`
- `xorg-x11-server-Xorg`
- `xsane`
- `xsane-common`
- `xsane-gimp`
- `yum`
- `yum-plugin-aliases`
- `yum-plugin-changelog`
- `yum-plugin-ovl`
- `yum-plugin-security`
- `yum-plugin-tmprepo`
- `yum-plugin-verify`
- `yum-plugin-versionlock`
- `yum-utils`

### A.1.5 Modified Optional Binary Packages (i386)

The following optional binary packages have been modified for the i386 platform:

- `autocorr-af`

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information.

Oracle recommends that you upgrade the software described by this documentation as soon as possible.

---

## Modified Optional Binary Packages (i386)

---

- [autocorr-bg](#)
- [autocorr-ca](#)
- [autocorr-cs](#)
- [autocorr-da](#)
- [autocorr-de](#)
- [autocorr-en](#)
- [autocorr-es](#)
- [autocorr-fa](#)
- [autocorr-fi](#)
- [autocorr-fr](#)
- [autocorr-ga](#)
- [autocorr-hr](#)
- [autocorr-hu](#)
- [autocorr-is](#)
- [autocorr-it](#)
- [autocorr-ja](#)
- [autocorr-ko](#)
- [autocorr-lb](#)
- [autocorr-lt](#)
- [autocorr-mn](#)
- [autocorr-nl](#)
- [autocorr-pl](#)
- [autocorr-pt](#)
- [autocorr-ro](#)
- [autocorr-ru](#)
- [autocorr-sk](#)
- [autocorr-sl](#)
- [autocorr-sr](#)
- [autocorr-sv](#)
- [autocorr-tr](#)

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information.  
Oracle recommends that you upgrade the software described by this documentation as soon as possible.

## Modified Optional Binary Packages (i386)

---

- `autocorr-vi`
- `autocorr-zh`
- `libipa_hbac-devel`
- `libreoffice`
- `libreoffice-base`
- `libreoffice-bsh`
- `libreoffice-calc`
- `libreoffice-core`
- `libreoffice-draw`
- `libreoffice-emailmerge`
- `libreoffice-filters`
- `libreoffice-gdb-debug-support`
- `libreoffice-glade`
- `libreoffice-graphicfilter`
- `libreoffice-headless`
- `libreoffice-impress`
- `libreoffice-javafilter`
- `libreoffice-langpack-af`
- `libreoffice-langpack-ar`
- `libreoffice-langpack-as`
- `libreoffice-langpack-bg`
- `libreoffice-langpack-bn`
- `libreoffice-langpack-ca`
- `libreoffice-langpack-cs`
- `libreoffice-langpack-cy`
- `libreoffice-langpack-da`
- `libreoffice-langpack-de`
- `libreoffice-langpack-dz`
- `libreoffice-langpack-el`
- `libreoffice-langpack-en`

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information.

Oracle recommends that you upgrade the software described by this documentation as soon as possible.

---

## Modified Optional Binary Packages (i386)

---

- [libreoffice-langpack-es](#)
- [libreoffice-langpack-et](#)
- [libreoffice-langpack-eu](#)
- [libreoffice-langpack-fi](#)
- [libreoffice-langpack-fr](#)
- [libreoffice-langpack-ga](#)
- [libreoffice-langpack-gl](#)
- [libreoffice-langpack-gu](#)
- [libreoffice-langpack-he](#)
- [libreoffice-langpack-hi](#)
- [libreoffice-langpack-hr](#)
- [libreoffice-langpack-hu](#)
- [libreoffice-langpack-it](#)
- [libreoffice-langpack-ja](#)
- [libreoffice-langpack-kn](#)
- [libreoffice-langpack-ko](#)
- [libreoffice-langpack-lt](#)
- [libreoffice-langpack-mai](#)
- [libreoffice-langpack-ml](#)
- [libreoffice-langpack-mr](#)
- [libreoffice-langpack-ms](#)
- [libreoffice-langpack-nb](#)
- [libreoffice-langpack-nl](#)
- [libreoffice-langpack-nn](#)
- [libreoffice-langpack-nr](#)
- [libreoffice-langpack-nso](#)
- [libreoffice-langpack-or](#)
- [libreoffice-langpack-pa](#)
- [libreoffice-langpack-pl](#)
- [libreoffice-langpack-pt-BR](#)

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information.  
Oracle recommends that you upgrade the software described by this documentation as soon as possible.

## Modified Optional Binary Packages (i386)

---

- libreoffice-langpack-pt-PT
- libreoffice-langpack-ro
- libreoffice-langpack-ru
- libreoffice-langpack-sk
- libreoffice-langpack-sl
- libreoffice-langpack-sr
- libreoffice-langpack-ss
- libreoffice-langpack-st
- libreoffice-langpack-sv
- libreoffice-langpack-ta
- libreoffice-langpack-te
- libreoffice-langpack-th
- libreoffice-langpack-tn
- libreoffice-langpack-tr
- libreoffice-langpack-ts
- libreoffice-langpack-uk
- libreoffice-langpack-ur
- libreoffice-langpack-ve
- libreoffice-langpack-xh
- libreoffice-langpack-zh-Hans
- libreoffice-langpack-zh-Hant
- libreoffice-langpack-zu
- libreoffice-librelogo
- libreoffice-math
- libreoffice-nlpsolver
- libreoffice-officebean
- libreoffice-ogltrans
- libreoffice-opensymbol-fonts
- libreoffice-pdfimport
- libreoffice-presentation-minimizer

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information.

Oracle recommends that you upgrade the software described by this documentation as soon as possible.

---

#### Modified Optional Binary Packages (x86\_64)

- `libreoffice-pyuno`
- `libreoffice-report-builder`
- `libreoffice-rhino`
- `libreoffice-sdk`
- `libreoffice-sdk-doc`
- `libreoffice-ure`
- `libreoffice-wiki-publisher`
- `libreoffice-writer`
- `libreoffice-xsltfilter`
- `libsss_idmap-devel`
- `libsss_nss_idmap`
- `libsss_nss_idmap-devel`
- `libsss_simpleifp`
- `libsss_simpleifp-devel`
- `preupgrade-assistant`
- `preupgrade-assistant-tools`
- `preupgrade-assistant-ui`
- `python-libsss_nss_idmap`
- `sssd-tools`
- `thunderbird`

### A.1.6 Modified Optional Binary Packages (x86\_64)

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

- `autocorr-af`
- `autocorr-bg`
- `autocorr-ca`
- `autocorr-cs`
- `autocorr-da`
- `autocorr-de`
- `autocorr-en`

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information.  
Oracle recommends that you upgrade the software described by this documentation as soon as possible.

## Modified Optional Binary Packages (x86\_64)

---

- [autocorr-es](#)
- [autocorr-fa](#)
- [autocorr-fi](#)
- [autocorr-fr](#)
- [autocorr-ga](#)
- [autocorr-hr](#)
- [autocorr-hu](#)
- [autocorr-is](#)
- [autocorr-it](#)
- [autocorr-ja](#)
- [autocorr-ko](#)
- [autocorr-lb](#)
- [autocorr-lt](#)
- [autocorr-mn](#)
- [autocorr-nl](#)
- [autocorr-pl](#)
- [autocorr-pt](#)
- [autocorr-ro](#)
- [autocorr-ru](#)
- [autocorr-sk](#)
- [autocorr-sl](#)
- [autocorr-sr](#)
- [autocorr-sv](#)
- [autocorr-tr](#)
- [autocorr-vi](#)
- [autocorr-zh](#)
- [libipa\\_hbac-devel](#)
- [libreoffice](#)
- [libreoffice-base](#)
- [libreoffice-bsh](#)

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information.

Oracle recommends that you upgrade the software described by this documentation as soon as possible.

---

#### Modified Optional Binary Packages (x86\_64)

---

- libreoffice-calc
- libreoffice-core
- libreoffice-draw
- libreoffice-emailmerge
- libreoffice-filters
- libreoffice-gdb-debug-support
- libreoffice-glade
- libreoffice-graphicfilter
- libreoffice-headless
- libreoffice-impress
- libreoffice-javafilter
- libreoffice-langpack-af
- libreoffice-langpack-ar
- libreoffice-langpack-as
- libreoffice-langpack-bg
- libreoffice-langpack-bn
- libreoffice-langpack-ca
- libreoffice-langpack-cs
- libreoffice-langpack-cy
- libreoffice-langpack-da
- libreoffice-langpack-de
- libreoffice-langpack-dz
- libreoffice-langpack-el
- libreoffice-langpack-en
- libreoffice-langpack-es
- libreoffice-langpack-et
- libreoffice-langpack-eu
- libreoffice-langpack-fi
- libreoffice-langpack-fr
- libreoffice-langpack-ga

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information.  
Oracle recommends that you upgrade the software described by this documentation as soon as possible.

## Modified Optional Binary Packages (x86\_64)

---

- libreoffice-langpack-gl
- libreoffice-langpack-gu
- libreoffice-langpack-he
- libreoffice-langpack-hi
- libreoffice-langpack-hr
- libreoffice-langpack-hu
- libreoffice-langpack-it
- libreoffice-langpack-ja
- libreoffice-langpack-kn
- libreoffice-langpack-ko
- libreoffice-langpack-lt
- libreoffice-langpack-mai
- libreoffice-langpack-ml
- libreoffice-langpack-mr
- libreoffice-langpack-ms
- libreoffice-langpack-nb
- libreoffice-langpack-nl
- libreoffice-langpack-nn
- libreoffice-langpack-nr
- libreoffice-langpack-nso
- libreoffice-langpack-or
- libreoffice-langpack-pa
- libreoffice-langpack-pl
- libreoffice-langpack-pt-BR
- libreoffice-langpack-pt-PT
- libreoffice-langpack-ro
- libreoffice-langpack-ru
- libreoffice-langpack-sk
- libreoffice-langpack-sl
- libreoffice-langpack-sr

The software described in this documentation is either in Extended Support or Sustaining Support. See <https://www.oracle.com/us/support/library/enterprise-linux-support-policies-069172.pdf> for more information.

Oracle recommends that you upgrade the software described by this documentation as soon as possible.

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#### Modified Optional Binary Packages (x86\_64)

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- libreoffice-langpack-ss
- libreoffice-langpack-st
- libreoffice-langpack-sv
- libreoffice-langpack-ta
- libreoffice-langpack-te
- libreoffice-langpack-th
- libreoffice-langpack-tn
- libreoffice-langpack-tr
- libreoffice-langpack-ts
- libreoffice-langpack-uk
- libreoffice-langpack-ur
- libreoffice-langpack-ve
- libreoffice-langpack-xh
- libreoffice-langpack-zh-Hans
- libreoffice-langpack-zh-Hant
- libreoffice-langpack-zu
- libreoffice-librelogo
- libreoffice-math
- libreoffice-nlpsolver
- libreoffice-officebean
- libreoffice-ogltrans
- libreoffice-opensymbol-fonts
- libreoffice-pdfimport
- libreoffice-presentation-minimizer
- libreoffice-pyuno
- libreoffice-report-builder
- libreoffice-rhino
- libreoffice-sdk
- libreoffice-sdk-doc
- libreoffice-ure

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## Removed Binary Packages (i386)

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- `libreoffice-wiki-publisher`
- `libreoffice-writer`
- `libreoffice-xsltfilter`
- `libsss_idmap-devel`
- `libsss_nss_idmap`
- `libsss_nss_idmap-devel`
- `libsss_simpleifp`
- `libsss_simpleifp-devel`
- `preupgrade-assistant`
- `preupgrade-assistant-tools`
- `preupgrade-assistant-ui`
- `python-libsss_nss_idmap`
- `sssd-tools`
- `thunderbird`

### A.1.7 Removed Binary Packages (i386)

The following binary packages from the upstream release have been removed for the i386 platform:

- `insights-client`
- `python-rhsm`
- `redhat-access-insights`
- `redhat-logos`
- `redhat-support-lib-python`
- `redhat-support-tool`
- `subscription-manager`
- `subscription-manager-migration-data`
- `virt-who`

### A.1.8 Removed Binary Packages (x86\_64)

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

- `insights-client`
- `python-rhsm`

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## Changes to Source Packages

- `redhat-access-insights`
- `redhat-logos`
- `redhat-support-lib-python`
- `redhat-support-tool`
- `subscription-manager`
- `subscription-manager-migration-data`
- `virt-who`

## A.2 Changes to Source Packages

This section contains information about the removed, modified, and added **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:

- `inotify-tools`
- `kernel-uek`
- `libdtrace-ctf`
- `linux-firmware`
- `lxc`
- `netxen-firmware`
- `ocfs2-tools`
- `oracleasm-support`
- `oraclelinux-release`
- `oraclelinux-release-notes`
- `oracle-logos`
- `oracle-database-server-12cR2-preinstall`
- `ql2600-firmware`
- `ql2700-firmware`
- `ql8300-firmware`
- `reflink`
- `uname26`

---

## Modified Source Packages

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- [yum-plugin-ulninfo](#)

### A.2.2 Modified Source Packages

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

- [abrt](#)
- [acpid](#)
- [anaconda](#)
- [autofs](#)
- [basesystem](#)
- [brltty](#)
- [clufter](#)
- [coreutils](#)
- [cpuspeed](#)
- [dbus](#)
- [device-mapper-multipath](#)
- [dhcp](#)
- [dracut](#)
- [e2fsprogs](#)
- [efax](#)
- [esc](#)
- [firstaidkit](#)
- [firstboot](#)
- [fuse](#)
- [gcc](#)
- [gdm](#)
- [glibc](#)
- [gnome-desktop](#)
- [grub](#)
- [grubby](#)
- [gstreamer](#)

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## Modified Source Packages

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- `httpd`
- `initscripts`
- `iproute`
- `iptables`
- `irqbalance`
- `java-1.7.0-openjdk`
- `java-1.8.0-openjdk`
- `kabi-yum-plugins`
- `kdeadmin`
- `kdebase-workspace`
- `kdelibs`
- `kde-settings`
- `keyutils`
- `ksc`
- `libreport`
- `linux-firmware`
- `luci`
- `lxc`
- `microcode_ctl`
- `mkbootdisk`
- `module-init-tools`
- `net-snmp`
- `nfs-utils`
- `nmap`
- `nss`
- `openmpi`
- `openscap`
- `openssl`
- `oracle-logos`
- `PackageKit`

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## Modified Source Packages

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- [pam](#)
- [pcs](#)
- [pilot-link](#)
- [piranha](#)
- [plymouth](#)
- [python-urlgrabber](#)
- [python-virtinst](#)
- [ql2400-firmware](#)
- [ql2500-firmware](#)
- [ql2600-firmware](#)
- [ql2700-firmware](#)
- [ql8300-firmware](#)
- [qperf](#)
- [rear](#)
- [redhat-bookmarks](#)
- [redhat-indexhtml](#)
- [redhat-lsb](#)
- [redhat-release-server](#)
- [redhat-rpm-config](#)
- [rhn-client-tools](#)
- [rhnlib](#)
- [rhnasd](#)
- [rpmdevtools](#)
- [rsyslog](#)
- [samba](#)
- [scap-security-guide](#)
- [scap-workbench](#)
- [scsi-target-utils](#)
- [selinux-policy](#)
- [setroubleshoot](#)

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#### Modified Optional Source Packages

- `setroubleshoot-plugins`
- `sos`
- `sssd`
- `system-config-date`
- `system-config-date-docs`
- `system-config-kickstart`
- `system-config-network`
- `system-config-services`
- `system-config-services-docs`
- `system-config-users-docs`
- `system-icon-theme`
- `systemtap`
- `tg-pegasus`
- `trace-cmd`
- `wireshark`
- `xfsdump`
- `xfsprogs`
- `xorg-x11-drivers`
- `xorg-x11-server`
- `xsane`
- `yum`
- `yum-utils`

### A.2.3 Modified Optional Source Packages

The following optional source packages have been modified:

- `libreoffice`
- `publican`
- `sanlock`
- `thunderbird`
- `preupgrade-assistant-contents`

## Removed Source Packages

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- `preupgrade-assistant`

### A.2.4 Removed Source Packages

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

- `compat-gcc-295`
- `insights-client`
- `iprutils`
- `libehca`
- `libica`
- `librtas`
- `libservicelog`
- `libvpd`
- `lsvpd`
- `openssl-ibmca`
- `powerpc-utils`
- `ppc64-diag`
- `ppc64-utils`
- `python-rhsm`
- `redhat-access-insights`
- `redhat-logos`
- `redhat-support-lib-python`
- `redhat-support-tool`
- `s390utils`
- `servicelog`
- `subscription-manager`
- `subscription-manager-migration-data`
- `virt-who`
- `yaboot`