Unbreakable Enterprise Kernel

Release Notes for Unbreakable Enterprise Kernel Release 2 Quarterly Update 3

Quarterly Update 3

ORACLE

Abstract

This document contains information on the Unbreakable Enterprise Kernel Release 2 Quarterly Update 3. This document may be updated after it is released. To check for updates to this document, and to view other related Oracle documentation, refer to:

Unbreakable Enterprise Kernel Documentation

This document is intended for users and administrators of Oracle Linux. It describes potential issues and the corresponding workarounds you may encounter while using the Unbreakable Enterprise Kernel Release 2 Quarterly Update 3 with Oracle Linux. Oracle recommends that you read this document before installing or upgrading Unbreakable Enterprise Kernel Release 2 Quarterly Update 3.

Document generated on: 2019-11-14 (revision: 303)

Table of Contents

Preface

Unbreakable Enterprise Kernel: Release Notes for Unbreakable Enterprise Kernel Release 2 Quarterly Update 3 provides a summary of the new features, changes, and known issues in the Unbreakable Enterprise Kernel Release 2 Quarterly Update 3.

Audience

This document is written for system administrators who want to use the Unbreakable Enterprise Kernel with Oracle Linux. It is assumed that readers have a general understanding of the Linux operating system.

Related Documents

The documentation for this product is available at:

Unbreakable Enterprise Kernel Documentation

Conventions

The following text conventions are used in this document:

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

Chapter 1 New Features and Changes

Table of Contents

The Unbreakable Enterprise Kernel Release 2 (UEK R2) is Oracle's second major release of its heavily tested and optimized operating system kernel for Oracle Linux 5 and Oracle Linux 6. It is based on the mainline Linux 3.0 version 3.0.36. It contains a large number of improvements and new features that have been incorporated into mainline Linux since the first version of the Unbreakable Enterprise Kernel, which was based on Linux 2.6.32. See the initial *Oracle Unbreakable Enterprise Kernel Release 2 Release Notes* (https://oss.oracle.com/ol6/docs/RELEASE-NOTES-UEK2-en.html) for a detailed description of these changes.

The 2.6.39-400 release is a quarterly driver update release which also includes bug and security fixes.

> **Note**
>
> The actual version number displayed by the kernel and on the RPM packages is 2.6.39. This was done to avoid potential breakage of certain low-level utilities of the Oracle Linux distribution (also known as the *plumbing*) that potentially cannot cope with the new 3.x version scheme. Regular Linux applications are usually not aware or affected by Linux kernel version numbers.

1.1 Notable Changes

- The code base has been aligned with mainline Linux 3.0.36.

- Support for the SGI UV 2 architecture has been added.

- Support for family 15H model 2 (Abu Dhabi) AMD processors has been added.

- NBD, the network block device driver has been updated and enabled (`CONFIG_BLK_DEV_NBD=m`).

- The following InfiniBand hardware is supported with the Unbreakable Enterprise Kernel:

  - Mellanox ConnectX-2 InfiniBand Host Channel Adapters

  - Sun InfiniBand QDR Host Channel Adapter PCIe #375-3696

- The QLogic iSCSI driver (`qla4xxx`) has been updated to support Open-iSCSI.

1.2 Xen Improvements

Several improvements have been incorporated into the Unbreakable Enterprise Kernel to support Xen usage:

- Numerous bug fixes and performance improvements.

- Added support for more than 128 GB in a PV guest.

- Xen Machine Check Exception (MCE) driver added (allows you to view MCE events that the Xen hypervisor receives).

- Xen Physical CPU (PCPU) driver added (allows management tools to online or offline physical CPUs in dom0).

- Xen Processor Aggregator Device (PAD) added (enables configuration and control of all processors on a platform).

1.3 Driver Updates

The Unbreakable Enterprise Kernel supports a wide range of hardware and devices. In close cooperation with hardware and storage vendors, several device drivers have been updated by Oracle.

1.3.1 Storage Adapter Drivers

Broadcom

- NetXtreme II iSCSI driver (`bnx2i`) updated to 2.7.4.1f.

- NetXtreme II Fibre Channel over Ethernet driver (`bnx2fc`) updated to 2.2.17.

Emulex

- Blade Engine 2 Open-iSCSI driver (`be2iscsi`) updated to 10.0.272.0o.

- Fibre Channel HBA driver (`lpfc`) updated to 8.3.5.86.2p.

Mellanox

- ConnectX core driver (`mlx4_core`) released at 1.0-ofed1.5.5 (x86_64 only). Handles low-level functions such as device initialization and firmware commands processing, and controls resource allocation so that the InfiniBand and Ethernet functions can share a device without interfering with each other.

- ConnectX Ethernet driver (`mlx4_en`) released at 1.5.4.24 (x86_64 only). Handles Ethernet-specific functions and plugs into the netdev mid-layer.

- ConnectX InfiniBand driver (`mlx4_ib`) released at 1.0-ofed1.5.5 (x86_64 only). Handles InfiniBand-specific functions.

QLogic

- Fibre Channel HBA driver (`qla2xxx`) updated to 8.04.00.11.39.0-k.

- iSCSI driver (`qla4xxx`) updated to 5.03.00.01.06.02-uek2. Now supports Open-iSCSI.

1.3.2 Network Adapter Drivers

Broadcom

- NetXtreme II network adapter driver (`bnx2`) updated to 2.2.3e.

- NetXtreme II 10Gbps network adapter driver (`bnx2x`) updated to 1.74.17.

- Converged Network Interface Card core driver (`cnic`) updated to 2.5.12e.

- Tigon3 Ethernet adapter driver (`tg3`) updated to 3.125g.

Emulex

- Blade Engine 2 10Gbps adapter driver (`be2net`) updated to 4.4.161.0o.

Intel

- PRO/1000 PCI-Express Gigabit network adapter driver (`e1000e`) updated to 2.1.4-NAPI.

- Gigabit Ethernet network adapter driver (`igb`) updated to 4.0.17.

- 10 Gigabit PCI-Express network adapter driver (`ixgbe`) updated to 3.11.33.

- 10 Gigabit Server Adapter virtual function driver (`ixgbevf`) updated to 2.6.2-NAPI. The kernel must support Single Root I/O Virtualization (SR-IOV).

QLogic

- NetXen Multiport 1/10 Gigabit Network adapter driver (`netxen_nic`) updated to 4.0.80.

- 1/10 GbE Converged/Intelligent Ethernet Adapter driver (`qlcnic`) updated to 5.1.27.35.

- QLE81xx network adapter driver (`qlge`) updated to v1.00.00.31.

1.3.3 Miscellaneous Drivers

Oracle

- Reliable Datagram Sockets driver (`rds`) updated to 4.1. RDS provides in-order, non-duplicated, highly-available, low-overhead, reliable delivery of datagrams between hundreds of thousands of non-connected endpoints.

1.4 Technology Preview

The following features included in the Unbreakable Enterprise Kernel Release 2 are still under development, but are made available for testing and evaluation purposes.

- **DRBD (Distributed Replicated Block Device)**

  A shared-nothing, synchronously replicated block device (*RAID1 over network*), designed to serve as a building block for high availability (HA) clusters. It requires a cluster manager (for example, pacemaker) for automatic failover.

- **Kernel module signing facility**

  Applies cryptographic signature checking to modules on module load, checking the signature against a ring of public keys compiled into the kernel. GPG is used to do the cryptographic work and determines the format of the signature and key data.

- **Linux Containers (lxc)**

  Based on the Linux Cgroups and name spaces functionality, containers allow you to safely and securely run multiple applications or instances of an operating system on a single host without risking them

interfering with each other. Containers are lightweight and resource-friendly, which saves both rack space and power. In order to get started with containers, you need to install the `lxc` package, which is included in the package repository of the Unbreakable Enterprise Kernel.

- **Transcendent memory**

  Transcendent Memory (tmem for short) provides a new approach for improving the utilization of physical memory in a virtualized environment by claiming underutilized memory in a system and making it available where it is most needed. From the perspective of an operating system, tmem is fast pseudo-RAM of indeterminate and varying size that is useful primarily when real RAM is in short supply. To learn more about this technology and its use cases, see the Transcendent Memory project page at https://oss.oracle.com/projects/tmem/.

1.5 Compatibility

Oracle Linux maintains user-space compatibility with Red Hat Enterprise Linux, which is independent of the kernel version running underneath the operating system. Existing applications will continue to run unmodified on the Unbreakable Enterprise Kernel Release 2 and no re-certifications are needed for RHEL certified applications.

The Oracle Linux team works closely with third-party hardware and software vendors to minimize impact on interoperability during releases but in order to introduce new drivers there are instances where changes must be made. In this release, there are changes to the kernel ABI which requires third-party kernel modules on the system be recompiled. Before installing this update, verify the support status of this release with your application vendor.

Chapter 2 Fixed and Known Issues

Table of Contents

This chapter describes the fixed and known issues for the Unbreakable Enterprise Kernel Release 2.

2.1 Fixed Issues

The following issues have been fixed in this update.

- The legacy DNS resolver now supports the sending of NFSv4 referrals (lists of NFS servers and exported NFS file systems) to Oracle Linux 6 clients. The user-space component in the `nfs-utils` package is distributed with Oracle Linux 6 Update 4. (Bug ID 14769650)

- A bug has been fixed that caused connections to hang when running SysBench benchmarks on MySQL with the thread pool enabled. (Bug ID 16363540)

2.2 Known Issues

This section describes known issues in this update.

ACPI

One some systems you might see ACPI-related error messages in `dmesg` similar to the following:

```
ACPI Error: [CDW1] Namespace lookup failure, AE_NOT_FOUND
        ACPI Error: Method parse/execution failed [_SB_._OSC||\||]
        ACPI Error: Field [CDW3] at 96 exceeds Buffer [NULL] size 64 (bits)]]>
```

These messages, which are not fatal, are caused by bugs in the BIOS. Contact your system vendor for a BIOS update. (Bug ID 13100702)

ASM

Calling the `oracleasm init` script, `/etc/init.d/oracleasm`, with the parameter `scandisks` can lead to error messages about missing devices similar to the following:

```
oracleasm-read-label: Unable to open device "device": No such file or directory
```

However, the device actually exists. You can ignore this error message, which is triggered by a timing issue. Only use the `init` script to start and stop the `oracleasm` service. All other options, such as scandisks, `listdisk`, and `createdisk`, are deprecated. For these and other administrative tasks, use `/usr/sbin/oracleasm` instead. (Bug ID 13639337)

bnx2x driver

When using the `bnx2x` driver in a bridge, disable Transparent Packet Aggregation (TPA) by including the statement `options bnx2x disable_tpa=1` in `/etc/modprobe.conf`. (Bug ID 14626070)

btrfs

- Running `btrfs filesystem balance` converts a non-RAID or concatenated file system setup to RAID-0 after adding a new device. (Bug ID 13715389)

- Converting an existing `ext2`, `ext3`, or `ext4` root file system to `btrfs` does not carry over the associated security contexts that are stored as part of a file's extended attributes. With SELinux enabled and set to enforcing mode, you might experience many permission denied errors after reboot, and the system might be unbootable. To avoid this problem, enforce automatic file system relabeling to run at bootup time. To trigger automatic relabeling, create an empty file named `.autorelabel` (for example, by using `touch`) in the file system's `root` directory before rebooting the system after the initial conversion. The presence of this file instruct SELinux to recreate the security attributes for all files on the file system. If you forget to do this and rebooting fails, either temporarily disable SELinux completely by adding `selinux=0` to the kernel boot parameters, or disable enforcing of the SELinux policy by adding `enforcing=0`. (Bug ID 13806043)

- A failing RAID1 disk might result in a kernel panic with the error kernel:

```
BTRFS error (device (null)) in btree_writepage_io_failed_hook:3662: \
        IO failure (Error occurred while writing out btree at offset).
```

(Bug ID 16262571)

- The `btrfs subvolume get-default` command lists all existing subvolumes instead of only the default subvolume. (Bug ID 13815433)

- The `btrfs filesystem defragment` command exits with an exit code of 20 even if it succeeds. (Bug ID 13714531)

- Commands such as `du` might show inconsistent results for file sizes in a `btrfs` file system when the number of bytes that is under delayed allocation is changing. (Bug ID 13096268)

- Btrfs has a limit of 237 hard links to a file. Attempting to create more than this number of links results in the error `Too many links`. (Bug ID 16278563)

CPU microcode update failures on PVM/PVHVM guests

When running Oracle Linux with UEK R2, you might see error messages in `dmesg` or `/var/log/messages` similar to this one:

```
microcode: CPU0 update to revision 0x6b failed.
```

You can ignore this warning. You do not need to upgrade the microcode for virtual CPUs as presented to the guest. (Bug ID 12576264, 13782843)

I/O scheduler

The Unbreakable Enterprise Kernel uses the `deadline` scheduler as the default I/O scheduler. For the Red Hat Compatible Kernel, the default I/O scheduler is the `cfq` scheduler.

libfprint

The following message might appear in `dmesg` or `/var/log/messages`:

```
WARNING! power/level is deprecated; use power/control instead.
```

The USB subsystem in UEK R2 deprecates the `power/level sysfs` attribute in favor of the `power/control` attribute. The `libfprint` fingerprinting library triggers this warning via `udev` rules that try to

use the old attribute first. You can safely ignore this warning. The setting of the appropriate power level still succeeds. (Bug ID 13523418)

Nouveau kernel driver is not compatible with NVIDIA graphics driver

After upgrading to UEK R2, the NVIDIA driver upgrade script does not correctly blacklist the Nouveau kernel driver. To blacklist the driver, append `rdblacklist=nouveau nouveau.modeset=0` to the kernel boot parameters in `/boot/grub/grub.conf`.

sched_yield() settings for CFS

For the Unbreakable Enterprise Kernel, `kernel.sched_compat_yield=1` is set by default. For the Red Hat Compatible Kernel, `kernel.sched_compat_yield=0` is used by default.

udev

A message similar to the following might be recorded in `dmesg` or `/var/log/messages` at boot time:

```
udevd (pid): /proc/pid/oom_adj is deprecated, please use /proc/pid/oom_score_adj instead.
```

The `udev` process uses the deprecated `oom_adj` kernel interface to prevent it from being killed if the system runs short of memory. You can safely ignore the message as the action still succeeds. To prevent the message from occurring, install the package `udev-147-2.42.el6.arch.rpm` or higher for Oracle Linux 6, or `udev-095-14.29.0.1.el5.arch.rpm` or higher for Oracle Linux 5. (Bug ID 13655071 and 13712009)

Virtualization

When booting UEK R2 as a 32-bit PVHVM guest, you can safely ignore the following kernel message:

```
register_vcpu_info failed:
        err=-38
```

(Bug ID 13713774)

Chapter 3 Installation and Availability

The Unbreakable Enterprise Kernel Release 2 can be installed on Oracle Linux 5 Update 8 or newer, as well as Oracle Linux 6 Update 2 or newer, both running either the Red Hat compatible kernel or a previous version of the Unbreakable Enterprise Kernel. If you are still running an older version of Oracle Linux, first update your system to the latest available update release.

The kernel images are available as binary RPM packages from dedicated channels on Oracle's Unbreakable Linux Network as well as the public yum repository. Four channels are available:

- Oracle Linux 5 (x86): `ol5_i386_UEK_latest`

- Oracle Linux 5 (x86_64): `ol5_x86_64_UEK_latest`

- Oracle Linux 6 (x86): `ol6_i386_UEK_latest`

- Oracle Linux 6 (x86_64): `ol6_x86_64_UEK_latest`

Existing Oracle Linux 5 or Oracle Linux 6 installations can be upgraded to UEK R2 by enabling the appropriate `UEK_latest` channel and running `yum update`. The channel is automatically enabled for freshly installed Oracle Linux 6 Update 3 systems that shipped with the 2.6.39-200 kernel version of UEK R2.

If you have questions regarding configuring or using `yum` to install updates, refer to *Oracle® Linux 6: Administrator's Guide* and to *Oracle® Linux: Unbreakable Linux Network User's Guide for Oracle Linux 6 and Oracle Linux 7*.

The kernel's source code is available via a public git source code repository at https://oss.oracle.com/git/?p=linux-uek-2.6.39.git.