

Oracle® Database

Release Notes

10g Release 2 (10.2) for Linux x86-64

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This document contains important information that was not included in the platform-specific or product-specific documentation for this release. This document supplements *Oracle Database Readme* and may be updated after it is released. To check for updates to this document and to view other Oracle documentation, refer to the Documentation section on the Oracle Technology Network (OTN) Web site:

<http://www.oracle.com/technology/documentation/>

For additional information about this release, refer to the readme files located in the `$ORACLE_HOME/relnotes` directory.

Note: The Database Quick Installation Guides are no longer available in printed format. These documents are available with the media in the same location as the software and on Oracle Technology Network.

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This document contains the following topics:

- [Certification Information](#)
- [Unsupported Products](#)
- [Preinstallation Requirements](#)
- [Installation, Configuration, and Upgrade Issues](#)
- [Other Known Issues](#)
- [Documentation Corrections and Additions](#)
- [Documentation Accessibility](#)

1 Certification Information

The latest certification information for Oracle Database 10g release 2 (10.2) is available on *OracleMetaLink* at:

<http://metalink.oracle.com>

Linux Certification

Starting with Oracle Database 10g release 2, the following operating systems are supported in addition to the list documented in *Oracle Database Installation Guide for Linux x86-64*:

- Asianux 2.0
- Asianux 3.0
- Oracle Enterprise Linux 5/Oracle VM
- Red Hat Enterprise Linux 5/Oracle VM
- SUSE Linux Enterprise Server 10

Refer to "[Documentation Corrections and Additions](#)" section for the list of packages for Oracle Database 10g release 2.

Pro*COBOL Certification

Starting with Oracle Database 10g Release 2 (10.2.0.3), Pro*COBOL is certified on SUSE Linux Enterprise Server 9 with Micro Focus Server Express 5.0

Starting with Oracle Database 10g release 2 (10.2.0.4), Pro*COBOL is certified on Red Hat Enterprise Linux 5.0 and Oracle Enterprise Linux 5.0 with Micro Focus Server Express 5.0 WP4.

2 Unsupported Products

The following products are not supported with Oracle Database 10g release 2 (10.2):

- Grid Control Support
Oracle Database 10g release 2 (10.2) can be managed as a target by Grid Control 10.1.0.4. However, Oracle Database 10g release 2 is not supported by Grid Control 10.1.0.4 as a repository.
- Oracle Procedural Gateway for APPC
- Oracle Procedural Gateway for WebSphere MQ
- Oracle ODBC driver

3 Preinstallation Requirements

You must review the following sections before installing Oracle Database 10g release 2:

Note: When installing SUSE Linux Enterprise Server 10, if you choose Oracle Server Base and C/C++ Compiler and Tools options in the Software Selection and System Tasks window, then the following prerequisites are automatically available in the operating system.

- [Install libaio Before Installing or Upgrading](#)
- [Install oracleasm-support to use ASMLib](#)

- [Install binutils on Oracle Enterprise Linux 4.0 and Red Hat Enterprise Linux 4.0](#)
- [Install libxm Before Installing Oracle Lite](#)
- [Configuring Kernel Parameters](#)
- [Oracle HTTP Server on Oracle Enterprise Linux 4.0 and Red Hat Enterprise Linux 4.0](#)
- [Oracle HTTP Server on Oracle Enterprise Linux 5.0 and Red Hat Enterprise Linux 5.0](#)

3.1 Install libaio Before Installing or Upgrading

Before upgrading to or installing Oracle Database 10g release 2, install the `libaio` package on Oracle Enterprise Linux 4.0 and Red Hat Enterprise Linux 4.0.

3.2 Install oracleasm-support to use ASMLib

Install `oracleasm-support` package version 2.0.0.1 or higher to use ASMLib on Oracle Enterprise Linux 4.0, Red Hat Enterprise Linux 4.0 Advanced Server, or SUSE Linux Enterprise Server 9. At the time of this publication, the ASMLib user space tools and kernel module packages are not yet available for SUSE Linux Enterprise Server 10.

3.3 Install binutils on Oracle Enterprise Linux 4.0 and Red Hat Enterprise Linux 4.0

Before installing Oracle Database 10g release 2 on Oracle Enterprise Linux 4.0 and Red Hat Enterprise Linux 4.0 Update 1, install the following package:

```
binutils-2.15.92.0.2-13.0.0.0.2.x86_64
```

This package can be downloaded from the following link:

http://oss.oracle.com/projects/compat-oracle/dist/files/RedHat/binutils-2.15.92.0.2-13.0.0.0.2.x86_64.rpm

This issue is tracked with Oracle bug 4619031.

3.4 Install libxm Before Installing Oracle Lite

Before installing Oracle Lite, ensure that the following package is installed:

```
libxml2-2.5.10-7.i386.rpm
```

3.5 Configuring Kernel Parameters

After updating the values of kernel parameters in the `/etc/sysctl.conf` file, ensure that you either reboot the computer or run the `sysctl -p` command to make the changes of the `/etc/sysctl.conf` file available in the active kernel memory.

On SUSE Linux Enterprise Server 9.0, ensure that you set the following kernel parameter:

```
disable_cap_mlock = 1
```

On SUSE Linux Enterprise Server 10, ensure that you set the `hugetlb_shm_group` kernel parameter to the gid of the group used as the `dba` group. For example, on a system using a group named `dba` with the following entry in the `/etc/group` file:

```
dba:::104:oracle
```

On SUSE Linux Enterprise Server 10, ensure that you set the `hugetlb_shm_group` kernel parameter to the GID of the group used as the `dba` group. For example, on a system using a group named `dba` with the `dba:::104:oracle` entry in the `/etc/group` file, the `hugetlb_shm_group` kernel parameter should be set to the following value:

```
hugetlb_shm_group = 104
```

3.6 Oracle HTTP Server on Oracle Enterprise Linux 4.0 and Red Hat Enterprise Linux 4.0

If you intend to use Oracle HTTP server, which is included in Companion CD of Oracle Database 10g Release 2 (10.2) Media pack, refer to the *MetaLink* note 317085.1 for more information on using Oracle HTTP server on Oracle Enterprise Linux 4.0 and Red Hat Enterprise Linux 4.0.

3.7 Oracle HTTP Server on Oracle Enterprise Linux 5.0 and Red Hat Enterprise Linux 5.0

If you intend to use Oracle HTTP server, which is included in Companion CD of Oracle Database 10g Release 2 (10.2) Media pack, refer to the *MetaLink* note 317085.1 for more information on using Oracle HTTP server on Oracle Enterprise Linux 5.0 and Red Hat Enterprise Linux 5.0.

Legacy entry points required by this version of Apache (`libdb.so.2`) are moved to `gdbm-1.8.0-26.2.1.i386`. You must create a symlink using the following command:

```
$ ln -s /usr/lib/libgdbm.so.2.0.0 /usr/lib/libdb.so.2
```

4 Installation, Configuration, and Upgrade Issues

Review the following sections for information about issues that affect Oracle Database installation, configuration, and upgrade:

- [Latest Upgrade Information](#)
- [Upgrading Oracle Real Application Clusters Release 9.2](#)
- [Oracle Universal Installer Operating System Prerequisite Checks](#)
- [Installing Oracle Clusterware](#)
- [Installing Enterprise Security Manager](#)
- [Upgrading Oracle Clusterware 10.1.x to Oracle Clusterware 10.2](#)
- [extjob Executable Required Directory Permissions](#)
- [Modifying a Virtual IP Address Node Application](#)
- [Raw Devices on Oracle Enterprise Linux and Red Hat Enterprise Linux](#)

- [Oracle Clusterware Daemon fails on Computer Restart](#)
- [Error When Installing Oracle Database 10g on Asianux Server 3](#)
- [Configuring Storage Devices for Oracle Clusterware on 2.6 Kernel Distributions](#)
- [Installing Oracle Database Client into an Existing Oracle Home](#)
- [Database Installation Types](#)

4.1 Latest Upgrade Information

For late-breaking updates and best practices about preupgrades, postupgrades, compatibility, and interoperability discussions refer to note 466181.1 on *OracleMetaLink* (<https://metalink.oracle.com/>) that links to "10g Upgrade Companion" Page.

4.2 Upgrading Oracle Real Application Clusters Release 9.2

If you are upgrading a 9.2 RAC environment to Oracle Database 10g release 2 on Red Hat Linux 3.0, then you must apply a patch to GLIBC before proceeding with the Oracle Clusterware installation. Follow the instructions documented in *OracleMetaLink* note 284535.1.

This issue is tracked with Oracle bug 3006854.

4.3 Oracle Universal Installer Operating System Prerequisite Checks

If you are installing Oracle Database 10g on Oracle Enterprise Linux 5.0, Red Hat Enterprise Linux 5.0, or SUSE Linux Enterprise Server 10, the current version of Oracle Universal Installer does not recognize these operating systems as supported operating systems and does not perform the installation.

Workaround #1 (recommended): Run the Oracle Universal Installer using the `ignoreSysPrereqs` flag which causes the installer to skip the operating system check and continue with the installation:

```
./runinstaller -ignoreSysPrereqs
```

As a side effect, the installer also skips other checks during the installation.

Workaround #2: On Oracle Enterprise Linux 5.0 and Red Hat Enterprise Linux 5.0, the installation passes the operating system prerequisite checks if you change each 5 to 4 in the `/etc/redhat-release` file. Ensure that you replace the original values in the `/etc/redhat-release` file after the Oracle installation is complete.

Original Value	Changed Value
Enterprise Linux Enterprise Linux server release 5 (On Oracle Enterprise Linux 5.0)	Enterprise Release Enterprise Linux server release 4
Red Hat Enterprise Linux server release 5 (On Red Hat Enterprise Linux 5.0)	Red Hat Enterprise Linux server release 4

On SUSE Linux Enterprise Server 10, the installation will pass the operating system prerequisite checks if you change each 10 to 9 in the `/etc/SuSE-release` file. Ensure that you replace the original values in the `/etc/SuSE-release` file after the Oracle installation is complete.

Original Value	Changed Value
SUSE Linux Enterprise Server 10 (x86_64)	SUSE Linux Enterprise Server 9 (x86_64)
VERSION = 10	VERSION = 9

This workaround causes the installer to consider the system to be running earlier version of the operating system and the operating system check passes. The changes to the release file should be reverted after the installation of all Oracle software is complete. The changes to the release file could impact the ability of other tools to be properly installed on the operating system.

4.4 Installing Oracle Clusterware

Near the end of the installation of Oracle Clusterware, Oracle Universal Installer prompts for the `$CRS_HOME/root.sh` script to be run on all of the nodes in the cluster. When the `root.sh` script is run on the last node in the cluster, the script calls the VIPCA utility, which fails on Oracle Enterprise Linux 5.0, Red Hat Enterprise Linux 5.0, and SUSE Linux Enterprise Linux 10. Refer to the "[SRVCTL and VIPCA Utilities Set the LD_ASSUME_KERNEL Parameter](#)" section for more details.

Workaround: Before running the `root.sh` script on the last node in the cluster, alter the `$CRS_HOME/bin/vipca` script commenting out lines 119 through 123:

```

arch='uname -m'
#   if [ "$arch" = "i686" -o "$arch" = "ia64" -o "$arch" = "x86_64" ]
#       then
#           LD_ASSUME_KERNEL=2.4.19
#           export LD_ASSUME_KERNEL
#       fi

```

With the lines commented out, `root.sh` should be able to call VIPCA successfully. Ensure that you do not comment out line 118, which sets the `arch` variable as that is needed by the `root.sh` script.

4.5 Installing Enterprise Security Manager

To install Oracle Security Manager, install Oracle Client and then select the Administrator installation type.

4.6 Upgrading Oracle Clusterware 10.1.x to Oracle Clusterware 10.2

When upgrading from 10.1.x to 10.2, Oracle Clusterware will not start if the host name directory under the `/etc/oracle/scls_scr` directory includes the domain name. The following error message is displayed when you run the `rootupgrade.sh` script.

```

A file or directory in the path name does not exist.
/etc/init.cssd[509]: /etc/oracle/scls_scr/host_name/root/cssrun: 0403-005
Cannot create the specified file.

```

Workaround: Move the `/etc/oracle/scls_scr/hostname.domain_name` directory to `/etc/oracle/scls_scr/hostname` and rerun the `rootupgrade.sh` script.

This issue is tracked with Oracle bug 4472284.

4.7 extjob Executable Required Directory Permissions

To enable the `extjob` executable to locate required libraries, the `$ORACLE_HOME/lib` directory and all of its parent directories must have execute permissions for `group` and `other`.

4.8 Modifying a Virtual IP Address Node Application

Use the `srvctl modify nodeapps` command to modify the name, IP address, or netmask of an existing virtual IP address (VIP) resource. Use the `-A` argument to include the existing interfaces for the VIP:

```
srvctl modify nodeapps -n mynode1 -A 100.200.300.40/255.255.255.0/eth0
```

This issue is tracked with Oracle bug 4500688.

4.9 Raw Devices on Oracle Enterprise Linux and Red Hat Enterprise Linux

Verify that an appropriate raw devices utility (`util-linux`) rpm is installed for the update of the operating systems. For example, on Oracle Enterprise Linux 4.0 and Red Hat Enterprise Linux 4.0 (update 5),

`util-linux-2.12a-16.EL4.23.x86_64` or later rpm should be installed. On Oracle Enterprise Linux 5.0 and Red Hat Enterprise Linux 5.0, `util-linux-2.13-0.44.EL5.x86_64` or later rpm should be installed.

When you restart an Oracle Enterprise Linux 4.0, Oracle Enterprise Linux 5.0, Red Hat Enterprise Linux 4.0, or Red Hat Enterprise Linux 5.0 system, raw devices revert to their original owners and permissions by default. If you are using raw devices with this operating system for your Oracle files, for example, for ASM storage or Oracle Clusterware files, you need to override this default behavior. To do this, add an entry to the `/etc/rc.d/rc.local` file for each raw device containing the `chmod` and `chown` commands required to reset them to the required values.

As an example, here are sample entries in a `/etc/rc.d/rc.local` file that control the restart behavior of raw devices for two ASM disk files (`/dev/raw/raw6` and `/dev/raw/raw7`), two Oracle Cluster Registry files (`/dev/raw/raw1` and `/dev/raw/raw2`), and three Oracle Clusterware voting disks (`/dev/raw/raw3`, `/dev/raw/raw4`, and `/dev/raw/raw5`):

```
# ASM
chown oracle:dba /dev/raw/raw6
chown oracle:dba /dev/raw/raw7
chmod 660 /dev/raw/raw6
chmod 660 /dev/raw/raw7
# OCR
chown root:oinstall /dev/raw/raw1
chown root:oinstall /dev/raw/raw2
chmod 660 /dev/raw/raw1
```

```
chmod 660 /dev/raw/raw2
# Voting Disks
chown oracle:oinstall /dev/raw/raw3
chown oracle:oinstall /dev/raw/raw4
chown oracle:oinstall /dev/raw/raw5
chmod 644 /dev/raw/raw3
chmod 644 /dev/raw/raw4
chmod 644 /dev/raw/raw5
```

4.10 Oracle Clusterware Daemon fails on Computer Restart

If different user IDs are used for installing Oracle Database 10g and Oracle Clusterware, then restarting the system results in OCR errors. Refer to the *OracleMetaLink* note 551478.1 for more information.

Workaround: Oracle recommends that you apply patch set 10.2.0.3 or higher to Oracle Clusterware install before patching Oracle Database.

This issue is tracked with the Oracle bug 4748946.

4.11 Error When Installing Oracle Database 10g on Asianux Server 3

When installing Oracle Database 10g on Asianux Server 3, the Product Specific Prerequisite Checks screen reports that the operating system requirement checks fail.

Workaround: Change the contents of `/etc/asianux-release` from Asianux Server 3 (Quartet) to Asianux release 3 (Quartet).

This issue is tracked with the Oracle bug 6457598.

4.12 Configuring Storage Devices for Oracle Clusterware on 2.6 Kernel Distributions

This section is for database and system administrators who intend to install or migrate to Oracle10g Release 2 (10.2.0) RAC on Red Hat Enterprise Linux 5 (RHEL5) or Oracle Enterprise Linux 5 (OEL5), and who need to configure raw devices for Oracle RAC and Oracle Clusterware. The Linux 2.6 kernel with these distributions requires additional configuration steps. The section contains the following topics:

- [Overview of Device Naming Persistence Changes](#)
- [Configuring Raw Devices for Clusterware on Red Hat and Oracle Enterprise Linux 5](#)
- [Relocate Oracle Clusterware Files from Raw to Block Devices](#)

4.12.1 Overview of Device Naming Persistence Changes

With the Linux 2.6 kernel, support for raw devices is deprecated. The preferred storage access is direct input/output to block devices using `O_DIRECT`. As a result of this change, the RHEL4 and OEL4 file `/etc/sysconfig/rawdevice` and the RHEL5 and OEL5 file `/etc/udev/rules.d/60-raw.rules` are deprecated. For details, refer to the Linux documentation for your 2.6 kernel.

The 2.4 kernel device file naming scheme `devlabel` maintained persistent device file names between server restarts. By default, the 2.6 kernel device file naming scheme `udev` dynamically creates device file names when the server is

started, and assigns ownership of them to `root`. If `udev` applies default settings, then it changes device file names and owners for voting disks or Oracle Cluster Registry partitions, corrupting them when the server is restarted. For example, a voting disk on a device named `/dev/sdd` owned by the user `crs` may be on a device named `/dev/sdf` owned by `root` after restarting the server.

To prevent corruption, you need to create a custom rules file. When `udev` is started, it sequentially carries out rules (configuration directives) defined in rule files. These files are in the path `/etc/udev/rules.d/`. Rules files are read in lexical order. For example, rules in file `10-wacom.rules` are parsed and carried out before rules in rule file `90-ib.rules`. Where rules files describe the same devices, on Asianux, Red Hat, and Oracle Enterprise Linux, the **last** file read is the one that is applied. (On SUSE 2.6 kernels, it is the first file read).

4.12.2 Configuring Raw Devices for Clusterware on Red Hat and Oracle Enterprise Linux 5

This section contains the following topics:

- [Configure SCSI_ID to Return Unique Device Identifiers](#)
- [Configure Udev for Persistent Naming of Oracle Clusterware Devices](#)
- [Bind Raw Devices Using Udev](#)
- [Verify Persistent Oracle Clusterware Storage Devices](#)

Configure SCSI_ID to Return Unique Device Identifiers

Before you can configure `udev` to name devices, you must first configure `scsi_id` to return device identifiers, and then ensure that these devices are visible and accessible on all cluster nodes. To do this, complete the following task:

1. Modify the `/etc/scsi_id.config` file by adding or replacing the 'option=-b' parameter/value pair (if it exists) with 'option=-g'. For example:

```
# cd /etc
# cp scsi_id.config scsi_id.config.orig
# grep -v ^# /etc/scsi_id.config
vendor="ATA",options=-p 0x80
options=-g
```

2. Run the command `fdisk (/sbin/fdisk)` to ensure that Clusterware devices are visible. For example:

```
# /sbin/fdisk -l /dev/sdb1 /dev/sde1

Disk /dev/sdb1: 261 MB, 261890048 bytes
9 heads, 56 sectors/track, 1014 cylinders
Units = cylinders of 504 * 512 = 258048 bytes

Disk /dev/sdb1 doesn't contain a valid partition table

Disk /dev/sde1: 52 MB, 52403200 bytes
2 heads, 50 sectors/track, 1023 cylinders
Units = cylinders of 100 * 512 = 51200 bytes

Disk /dev/sde1 doesn't contain a valid partition table
```

In some cases, to see newly provisioned or modified) devices on shared storage, you may need to update cluster node operating systems. Do this either by restarting the nodes, or by using commands such as `/sbin/partprobe device`, or `sfdisk -r device`. Resolve any issues preventing cluster nodes from correctly seeing or accessing storage devices you intend to use for Clusterware files before proceeding.

Note: At this point, cluster nodes may refer to the devices using different device file names. This is expected.

3. Run the command `scsi_id (/sbin/scsi_id)` on storage devices from one cluster node to obtain their unique device identifiers. When running the `scsi_id` command with the `-s` argument, the device path and name passed should be that relative to the `sysfs` directory `/sys` (for example, `/block/device`) when referring to `/sys/block/device`. For example:

```
# /sbin/scsi_id -g -s /block/sdb/sdb1
360a98000686f6959684a453333524174

# /sbin/scsi_id -g -s /block/sde/sde1
360a98000686f6959684a453333524179
```

Record the unique SCSI identifiers of Clusterware devices, so you can provide them when required in the following section, [Configure Udev for Persistent Naming of Oracle Clusterware Devices](#).

Note: The command `scsi_id` should return the same device identifier value for a given device, regardless of which node the command is run from.

Configure Udev for Persistent Naming of Oracle Clusterware Devices

Configure persistent user-defined naming of Oracle Clusterware device file names in a udev rules file. This step is optional, but recommended.

The default rule files affecting storage devices are rule files 50 and 51. So create a custom rules file using the format `[number]-[name][.rules]` with a number value greater than 51 to ensure that the device settings you provide are the ones applied. For example:

```
55-oracle-naming.rules
```

To do this, complete the following tasks:

1. Create a custom udev device naming rule file. For example:

```
# touch /etc/udev/rules.d/55-oracle-naming.rules
```

2. Using the a text editor such as `vi`, add to the custom device naming rule file the device-matching rules for the storage devices you intend to use with Oracle Clusterware, matching them to the unique SCSI identifiers you determined in the preceding section. For example:

```
# Configure persistent, user-defined Oracle Clusterware device file names
KERNEL=="sd*", BUS=="scsi", PROGRAM="/sbin/scsi_id",
RESULT=="360a98000686f6959684a453333524174", NAME="ocr1", OWNER="root",
GROUP="oinstall", MODE="0640"
```

```
KERNEL=="sd*", BUS=="scsi", PROGRAM=="/sbin/scsi_id",
RESULT=="360a98000686f6959684a453333524179", NAME="vote1",
OWNER="oracle", GROUP="oinstall", MODE="0640"
```

For each rule, if all specified keys (KERNEL, BUS, PROGRAM, RESULT) are matched, then the rule is applied and the specified assignments (NAME, OWNER, GROUP, MODE) are assigned to the device file name. However, if one or more keys are unmatched, then the rule is completely ignored and the default (arbitrary) kernel-assigned device file names are assigned to devices.

Note: In the example rules files shown, Oracle Clusterware devices are created with oraInventory group (oinstall). Oracle recommends that you do this to ensure that you can run Cluster Verification Utility during installation.

3. Run the command `udevtest (/sbin/udevtest)` to test the udev rules configuration you have created. The output should indicate that the block devices are available and the rules are applied as expected. For example:

```
# udevtest /block/sdb/sdb1
main: looking at device '/block/sdb/sdb1' from subsystem 'block'
udev_rules_get_name: add symlink
'disk/by-id/scsi-360a98000686f6959684a453333524174-part1'
udev_rules_get_name: add symlink
'disk/by-path/ip-192.168.1.1:3260-iscsi-iqn.1992-08.com.netapp:sn.887085-
part1'
udev_node_mknod: preserve file '/dev/.tmp-8-17', because it has correct
dev_t
run_program: '/lib/udev/vol_id --export /dev/.tmp-8-17'
run_program: '/lib/udev/vol_id' returned with status 4
run_program: '/sbin/scsi_id'
run_program: '/sbin/scsi_id' (stdout) '360a98000686f6959684a453333524174'
run_program: '/sbin/scsi_id' returned with status 0
udev_rules_get_name: rule applied, 'sdb1' becomes 'ocr1'
udev_device_event: device '/block/sdb/sdb1' validate currently present
symlinks
udev_node_add: creating device node '/dev/ocr1', major = '8', minor =
'17',
mode = '0640', uid = '0', gid = '500'
udev_node_add: creating symlink
'/dev/disk/by-id/scsi-360a98000686f6959684a453333524174-part1' to
'../../ocr1'
udev_node_add: creating symlink
'/dev/disk/by-path/ip-192.168.1.1:3260-iscsi-iqn.1992-08.com.netapp:sn.84
187085
-part1' to '../../ocr1'
main: run: 'socket:/org/kernel/udev/monitor'
main: run: '/lib/udev/udev_run_devd'
main: run: 'socket:/org/freedesktop/hal/udev_event'
main: run: '/sbin/pam_console_apply /dev/ocr1
/dev/disk/by-id/scsi-360a98000686f6959684a453333524174-part1
/dev/disk/by-path/ip-192.168.1.1:3260-iscsi-iqn.1992-08.com.netapp:sn.841
87085-
part1'
```

In the example output, note that applying the rules renames OCR device `/dev/sdb1` to `/dev/ocr1`.

- Restart the udev service by running the command `start_udev (/sbin/start_udev)`. Restarting udev applies the udev rules to the devices, including the device file rules you have created. Use the command `ls -l` command to ensure that the rules file has applied the new device names the rules file has applied. For example:

```
# start_udev

# ls -l /dev | grep -e 'ocr1\|vote1'
brw-r----- 1 root    oinstall 8, 17 Oct 29 15:31 ocr1
brw-rw---- 1 oracle  oinstall 8, 65 Oct 29 15:31 vote1
```

Bind Raw Devices Using Udev

- If the file `/etc/udev/rules.d/60-raw.rules` does not exist, then create it. If it does exist, then create a rules file for raw devices used with Oracle installations. For example:

```
# touch /etc/udev/rules.d/60-raw.rules
```

or

```
# touch /etc/udev/rules.d/61-oracleraw.rules
```

- Add the udev raw binding rules to the raw devices rules file you created. For example:

```
vi /etc/udev/rules.d/61-oracleraw.rules
# Raw bind to Oracle Clusterware devices
ACTION=="add", KERNEL=="sd*", PROGRAM=="/sbin/scsi_id",
  RESULT=="360a98000686f6959684a453333524174", RUN+="/bin/raw
/dev/raw/raw1 %N"
ACTION=="add", KERNEL=="sd*", PROGRAM=="/sbin/scsi_id",
  RESULT=="360a98000686f6959684a453333524179", RUN+="/bin/raw
/dev/raw/raw2 %N"
t 29 15:31 vote1
```

- Create a udev raw permissions file `/etc/udev/rules.d/65-raw-permissions.rules`. For example:

```
# touch /etc/udev/rules.d/65-raw-permissions.rules
```

- Using a text editor, add the udev raw permission rules to the file `/etc/udev/rules.d/65-raw-permissions.rules`. For example:

```
# Set permissions of raw bindings to Oracle Clusterware devices
KERNEL=="raw1", OWNER="root", GROUP="oinstall", MODE="640"
KERNEL=="raw2", OWNER="oracle", GROUP="oinstall", MODE="640"
```

- Test the udev rules by running the `udevtest` command (`/sbin/udevtest`) again to ensure that the rules are applied, and that they create proper permissions for Oracle Clusterware devices. For example:

```
# udevtest /block/sdb/sdb1
main: looking at device '/block/sdb/sdb1' from subsystem 'block'
udev_rules_get_name: add symlink 'disk/by-id/scsi-360a98000686f69
59684a453333524174-part1'
udev_rules_get_name: add symlink 'disk/by-path/ip-192.168.1.1:3260
-iscsi-iqn.1992-08.com.netapp:sn.84187085-part1'
udev_node_mknod: preserve file '/dev/.tmp-8-17', because it has
correct dev_t
run_program: '/lib/udev/vol_id --export /dev/.tmp-8-17'
```

```

run_program: '/lib/udev/vol_id' returned with status 4
run_program: '/sbin/scsi_id'
run_program: '/sbin/scsi_id' (stdout) '360a98000686f6959684a45333
3524174'
run_program: '/sbin/scsi_id' returned with status 0
udev_rules_get_name: rule applied, 'sdb1' becomes 'ocr1'
udev_device_event: device '/block/sdb/sdb1' validate currently
present symlinks
udev_node_add: creating device node '/dev/ocr1', major = '8',
minor = '17', mode = '0640', uid = '0', gid = '500'
udev_node_add: creating symlink '/dev/disk/by-id/scsi-360a9800068
6f6959684a453333524174-part1' to '.././ocr1'
udev_node_add: creating symlink '/dev/disk/by-path/ip-192.168.1.1
:3260-iscsi-iqn.1992-08.com.netapp:sn.84187085-part1' to '.././ocr1'
main: run: 'socket:/org/kernel/udev/monitor'
main: run: '/lib/udev/udev_run_devd'
main: run: 'socket:/org/freedesktop/hal/udev_event'
main: run: '/sbin/pam_console_apply /dev/ocr1 /dev/disk/by-id/scsi-36
0a98000686f6959684a453333524174-part1 /dev/disk/by-path/ip-192.168.1.
1:3260-iscsi-iqn.1992-08.com.netapp:sn.84187085-part1'
main: run: '/bin/raw /dev/raw/raw1 /dev/.tmp-8-17'

```

6. Restart udev to implement the rules you have created and tested. For example:

```
# start_udev
```

Verify Persistent Oracle Clusterware Storage Devices

1. Use the `fdisk` command to check device naming. For example:

```

# fdisk -l /dev/ocr1 /dev/vote1

Disk /dev/ocr1: 261 MB, 261890048 bytes
9 heads, 56 sectors/track, 1014 cylinders
Units = cylinders of 504 * 512 = 258048 bytes

Disk /dev/ocr1 doesn't contain a valid partition table

Disk /dev/vote1: 52 MB, 52403200 bytes
2 heads, 50 sectors/track, 1023 cylinders
Units = cylinders of 100 * 512 = 51200 bytes

Disk /dev/vote1 doesn't contain a valid partition table

```

2. Use the `ls` command to check device ownership. For example:

```

# ls -l /dev | grep -ie 'ocr|vote'
brw-r----- 1 root dba 8, 17 Oct 29 15:31 ocr1
brw-rw---- 1 oracle dba 8, 65 Oct 29 15:31 vote1

```

3. Use the `udevinfo` command to confirm unique SCSI device identifier mappings. For example:

```

# udevinfo -q all -n /dev/ocr1
P: /block/sdb/sdb1
N: ocr1
S: disk/by-id/scsi-360a98000686f6959684a453333524174-part1
S:
disk/by-path/ip-192.168.1.1:3260-iscsi-iqn.1992-08.com.netapp:sn.87085-pa

```

```
rt1
E: ID_VENDOR=NETAPP
E: ID_MODEL=LUN
E: ID_REVISION=0.2
E: ID_SERIAL=360a98000686f6959684a453333524174
E: ID_TYPE=disk
E: ID_BUS=scsi
E: ID_PATH=ip-192.168.1.1:3260-iscsi-iqn.1992-08.com.netapp:sn.84187085
```

4. Use the `raw` and `ls` commands to confirm raw devices are bound. For example:

```
# raw -qa
/dev/raw/raw1: bound to major 8, minor 17
/dev/raw/raw2: bound to major 8, minor 65

# ls -l /dev/raw/raw*
crw-r----- 1 root  oinstall 162, 11 Oct 30 12:54 /dev/raw/raw1
crw-r----- 1 oracle oinstall 162, 21 Oct 30 14:26 /dev/raw/raw2
```

After you have completed configuring and checking raw storage devices, you can proceed to install Oracle Clusterware and Oracle Real Application Clusters.

4.12.3 Relocate Oracle Clusterware Files from Raw to Block Devices

Oracle recommends that you move Oracle Clusterware files from raw devices to block devices.

Tip: *Oracle Database 2 Day + Real Application Clusters Guide* for more information about relocating voting disks and Oracle Cluster Registry files.

4.13 Installing Oracle Database Client into an Existing Oracle Home

Oracle Database Client can be installed in the same Oracle Database home if both products are at the same release level. For example, you can install Oracle Database Client 10g Release 2 (10.2) into an existing Oracle Database 10g Release 2 (10.2) home. If you apply a patch set before installing the client, then you must apply the patch set again.

4.14 Database Installation Types

If you perform a Custom installation, then ensure that you install only the components covered by your license. You can not install Standard Edition using Custom installation.

5 Other Known Issues

The following sections contain information about issues related to Oracle Database 10g and associated products:

- [Building Pro*C Applications if PostgreSQL is Installed](#)
- [Encoding Information Not Present in Translated Help Files](#)
- [Oracle Clusterware Files Issues](#)
- [Cluster Verification Utility](#)

- Removing Metrics for Wait Classes Removes Them Permanently
- Support for 64-Bit JDBC
- Patch for Oracle Clusterware Configuration with Voting Disk on Network Attached Storage
- SRVCTL and VIPCA Utilities Set the LD_ASSUME_KERNEL Parameter
- Mapping of 127.0.0.2 to the Local Hostname
- Error While Loading Shared Library When selinux is Enabled on Oracle Enterprise Linux 5.0 and Red Hat Enterprise Linux 5.0
- MAX_IDLE_BLOCKER_TIME Does Not Work in Oracle RAC Environment
- Database Control Does not Display the Listener Details

5.1 Building Pro*C Applications if PostgreSQL is Installed

If the `postgresql-devel` package is installed on the system, then you must add the following directory to the beginning of the `sys_include` parameter in the `$ORACLE_HOME/precomp/admin/pcscfg.cfg` file before building Pro*C applications:

```
$ORACLE_HOME/precomp/public
```

If you do not make this change, then you may encounter errors similar to the following when linking the applications:

```
/tmp/ccbXd7v6.o(.text+0xc0): In function 'drop_tables':
: undefined reference to 'sqlca'
```

This issue is tracked with Oracle bug 3933309.

5.2 Encoding Information Not Present in Translated Help Files

If the system uses a European language, you might see corrupted characters in Table of Contents of database tools, such as Database Configuration Assistant.

This issue is tracked with Oracle bug 3957096.

Workaround: If the system uses a European language, do not use the `.UTF-8` locale. For example, if the system uses German, set the `LANG` and `LC_ALL` environment variables to `de_DE` instead of `de_DE.UTF-8`.

5.3 Oracle Clusterware Files Issues

The following note applies if you are using Oracle Enterprise Linux 4.0, Oracle Enterprise Linux 5.0, Red Hat Enterprise Linux 4.0, Red Hat Enterprise Linux 5.0, or SUSE Linux Enterprise Server 10 and using raw devices to store the Oracle Cluster Registry (OCR) and the voting disk for Oracle Clusterware, or using raw devices for Automatic Storage Management (ASM) database files. For each raw device used for the purposes listed, you must add two entries in the `/etc/rc.d/rc.local` file on Oracle Enterprise Linux 4.0, Oracle Enterprise Linux 5.0, Red Hat Enterprise Linux 4.0, and Red Hat Enterprise Linux 5.0, or the `/etc/init.d/after.local` file on SUSE Linux Enterprise Server 10 after running the `root.sh` script following the installation of Oracle Clusterware.

For each OCR file, the entries should look as follows, where `oinstall` is the Oracle install group and `/dev/raw/rawn` is an individual device file:

```
chown root:oinstall /dev/raw/rawn
chmod 660 /dev/raw/rawnmar
```

For each voting disk file, the entries should look as follows, where `oracle` is the Oracle user, `oinstall` is the Oracle install group, and `/dev/raw/rawn` is an individual device file:

```
chown oracle:oinstall /dev/raw/rawn
chmod 644 /dev/raw/rawnmar
```

For each ASM file, the entries should look as follows, where `oracle` is the Oracle user, `oinstall` is the Oracle install group, and `/dev/raw/rawn` is an individual device file:

```
chown oracle:oinstall /dev/raw/rawn
chmod 660 /dev/raw/rawnmar
```

5.4 Cluster Verification Utility

This section lists the issues with Cluster Verification Utility on Oracle Enterprise Linux 4.0, Oracle Enterprise Linux 5.0, Red Hat Enterprise Linux 4.0, Red Hat Enterprise Linux 5.0, and SUSE Linux Enterprise Server 9 and 10:

- Cluster Verification Utility (CVU) does not support shared checks for raw disks used for Oracle Cluster File System version 2 on Oracle Enterprise Linux 4.0, Oracle Enterprise Linux 5.0, Red Hat Enterprise Linux 4.0, Red Hat Enterprise Linux 5.0, and SUSE Linux Enterprise Server 9 and 10.
- Cluster Verification Utility (CVU) does not detect SMP-Kernel rpms for the hosts and displays the "Kernel check failed" message. In verbose mode, the status for kernel is displayed as "missing".

This issue is tracked with Oracle bug 4685951.

- The preinstallation stage verification checks for Oracle Clusterware and Oracle Real Applications Clusters and reports missing packages. Ignore the following missing packages and continue with the installation:

```
compat-gcc-7.3-2.96.128
compat-gcc-c++-7.3-2.96.128
compat-libstdc++-7.3-2.96.128
compat-libstdc++-devel-7.3-2.96.128
```

5.5 Removing Metrics for Wait Classes Removes Them Permanently

Do not remove the key values for the wait class metrics. Doing so removes them permanently and currently there is no easy way to recover them.

This issue is tracked with Oracle bug 4602952.

5.6 Support for 64-Bit JDBC

For Oracle Database 10g release 2 on Linux x86-64, 64-bit JDBC (using JDK 5) is supported.

5.7 Patch for Oracle Clusterware Configuration with Voting Disk on Network Attached Storage

To resolve Oracle Clusterware configuration issue when voting disk is on Network Attached Storage, you need to apply the patch tracked through Oracle bug 4697432.

5.8 SRVCTL and VIPCA Utilities Set the LD_ASSUME_KERNEL Parameter

The SRVCTL and VIPCA utilities shipped with Oracle Database 10g release 2 and Oracle Clusterware software set the environmental variable LD_ASSUME_KERNEL. On SUSE Linux Enterprise Server 10, because the older Linux threads API has been removed from GLIBC, setting this parameter causes the SRVCTL and VIPCA utilities to exit with the following error:

```
/opt/oracle/crs/jdk/jre/bin/java:
error while loading shared libraries:
libpthread.so.0: cannot open shared object file:
No such file or directory
```

Workaround: Comment out the lines that set the LD_ASSUME_KERNEL variable from the VIPCA and SRVCTL utilities. For the VIPCA utility alter the \$CRS_HOME/bin/vipca script commenting out lines 119 through 123 as follows:

```
        arch='uname -m'
#       if [ "$arch" = "i686" -o "$arch" = "ia64" -o "$arch" = "x86_64" ]
#       then
#           LD_ASSUME_KERNEL=2.4.19
#           export LD_ASSUME_KERNEL
#       fi
```

With the lines commented out, root.sh should be able to call VIPCA successfully. Ensure that you do not to comment out line 118 which sets the arch variable as that is needed by the script.

For the SRVCTL utility alter the \$CRS_HOME/bin/srvctl and the \$ORACLE_HOME/bin/srvctl scripts commenting out lines 173 and 174 as follows:

```
#Remove this workaround when the bug 3937317 is fixed
#LD_ASSUME_KERNEL=2.4.19
#export LD_ASSUME_KERNEL
```

5.9 Mapping of 127.0.0.2 to the Local Hostname

By default, the hostname of a machine is mapped to the IP address 127.0.0.2 through an entry in the /etc/hosts similar to the following on SUSE Linux Enterprise Server 10:

```
127.0.0.2      test test.example.com
```

YaST does this to provide compatibility with earlier versions of the applications that had problems running on desktops with dynamically assigned hostnames from DHCP. This mapping may cause certain Oracle networking libraries to encounter errors when they attempt to resolve the hostname of the machine. To avoid these problems, the entry should be removed from the /etc/hosts file.

Note that several network related YaST utilities may add this entry back to the file.

5.10 Error While Loading Shared Library When selinux is Enabled on Oracle Enterprise Linux 5.0 and Red Hat Enterprise Linux 5.0

Oracle Call Interface (OCI) program calls fail with `selinux` enabled on Oracle Enterprise Linux 5.0 and Red Hat Enterprise Linux 5.0.

Workaround: Disable `selinux` on the system.

This issue is tracked with Oracle bug 6079461.

5.11 MAX_IDLE_BLOCKER_TIME Does Not Work in Oracle RAC Environment

Setting a value for `MAX_IDLE_BLOCKER_TIME` feature of Resource manager does not work as expected in Oracle RAC environment.

Workaround: Set a value for `MAX_IDLE_TIME` instead of setting a value for `MAX_IDLE_BLOCKER_TIME`.

This issue is tracked with Oracle bug 6114355.

5.12 Database Control Does not Display the Listener Details

When you connect to the database using Database Control, the page does not display the listener details.

Workaround: After installing Oracle Database 10g release 2, you must shutdown the Database Control with the command `emctl stop dbconsole`. Modify the `targets.xml` file located in `$ORACLE_HOME/hostname_SID/sysman/emd` directory so that the value of the `machinename` field is the same for listener and database. Restart Database Control with the command `emctl start dbconsole` to display the listener details.

This issue is tracked with Oracle bug 6743916.

6 Documentation Corrections and Additions

This section lists the following corrections to the installation guides for Linux x86-64.

- Chapter 2, "Preinstallation Requirements" of *Oracle Database Installation Guide for Linux x86-64* states incorrect physical RAM value. At least 1 GB RAM is required to install Oracle Database 10g.
- In the "Software Requirements" section of quick installation guides and Chapter 2 of installation guides, the following (or later versions) are the list of packages for Asianux 2.0, Oracle Enterprise Linux 4.0 and Red Hat Enterprise Linux 4.0:

```
binutils-2.15.92.0.2-10.EL4
compat-db-4.1.25-9
compat-libstdc++-33-3.2.3-47.3
compat-libstdc++-33-3.2.3-47.3 (i386)
compat-libstdc++-296.i386
control-center-2.8.0-12
```

```
gcc-3.4.3-22.1
gcc-c++-3.4.3-22.1
glibc-2.3.4-2
glibc-2.3.4-2(i386)
glibc-common-2.3.4-2
glibc-devel-2.3.4-2
glibc-devel-2.3.4-2(i386)
gnome-libs-1.4.1.2.90-44.1
libaio-0.3.96-3
libgcc-3.4.3-9.EL4
libstdc++-3.4.3-9.EL4
libstdc++-devel-3.4.3-9.EL4
make-3.80-5
pdksh-5.2.14-30
sysstat-5.0.5-1
```

- The following (or later version) are the list of packages for Asianux 3.0, Oracle Enterprise Linux 5.0 and Red Hat Enterprise Linux 5.0:

```
binutils-2.17.50.0.6-2.e15
compat-db-4.1.25-9
compat-libstdc++-33-3.2.3-61
compat-libstdc++-33-3.2.3-61(i386)
compat-libstdc++-296(i386)
control-center-2.16.0-14.e15
gcc-4.1.1-52.e15
gcc-c++-4.1.1-52.e15
glibc-2.5-12
glibc-2.3.4-2(i386)
glibc-common-2.5-12
glibc-devel-2.5-12
glibc-devel-2.5-12(i386)
glibc-headers-2.5-12
gnome-libs-1.4.1.2.90-44.1
libgcc-4.1.1-52.e15(i386)
libaio-0.3.96-3
libgcc-4.1.1-52.e15(x86_64)
libstdc++-3.4.3-9.EL4
libstdc++-devel-3.4.3-22.1
libgomp-4.1.1-52.EL5
make-3.81-1.1
pdksh-5.2.14-30
sysstat-7.0.0-3.e15.x86_64.rpm
```

- The following (or later version) are the list of packages for SUSE Linux Enterprise Server 10

```
binutils-2.16.91.0.5
compat-libstdc++-5.0.7-22.2
gcc-4.1.0
gcc-c++-4.1.0
glibc-2.4-31.2
glibc-32bit-2.4-31.2 (32 bit)
glibc-devel-2.4
glibc-devel-32bit-2.4 (32 bit)
libaio-0.3.104
libaio-32bit-0.3.104 (32 bit)
libaio-devel-0.3.104
libelf-0.8.5
libgcc-4.1.0
```

```
libstdc++-4.1.0
libstdc++-devel-4.1.0
make-3.80
sysstat-6.0.2
```

- In *Oracle Database Oracle Clusterware and Oracle Real Application Clusters Installation Guide*, Chapter 2, "Preinstallation," in the section "Oracle Clusterware Home Directory," it incorrectly lists the path `/u01/app/oracle/product/crs` as a possible Oracle Clusterware home (or CRS home) path. This is incorrect. A default Oracle base path is `/u01/app/oracle`, and the Oracle Clusterware home must never be a subdirectory of the Oracle base directory.

A possible CRS home directory is in a path outside of the Oracle base directory. For example, if the Oracle base directory is `u01/app/oracle`, then the CRS home can be an option similar to one of the following:

```
u01/crs/
/u01/crs/oracle/product/10/crs
/crs/home
```

This issue is tracked with Oracle bug 5843155.

- The following text of the section 2.6.1, "IP Address Requirements," in Chapter 2, "Pre-Installation Tasks," of *Oracle Database Oracle Clusterware and Oracle Real Application Clusters Installation Guide* states that the virtual IP address (VIP) should respond to a `ping` command:

During installation, OUI uses the `ping` command to ensure that the VIP is reachable.

The preceding statement is incorrect. Before installation, the VIP address should be configured in DHCP or `/etc/hosts`, or both, but it must not be assigned to a server that can respond to a `ping` command.

This issue is tracked with Oracle bug 6017001.

- Appendix H, "Database Limits" of *Oracle Database Administrator's Reference for UNIX-Based Operating Systems* states the incorrect maximum value (63) for the `MAXINSTANCES` variable. The correct maximum limit for the variable is 1055.
- In the "NFS Mount Options" section of Appendix C, "Using NAS Devices" in *Oracle Database Installation Guide 10g Release 2 (10.2) for Linux x86-64* the table should also contain the following entry:

Option	Description
<code>directio</code>	Disable attribute caching. Note: If the systems supports <code>directio</code> , use this option instead of <code>noac</code> to reliably disable caching.

- Chapter 2, "Oracle Database Preinstallation Requirements" of *Oracle Database Installation Guide for Linux x86-64* states the incorrect value for `shmmax` parameter. The correct limit for the kernel is minimum of the following values:
 - Half the size of the memory

- 4GB - 1 byte

Note: The minimum value required for `shmmx` is 0.5 GB. However, Oracle recommends that you set the value of `shmmx` to 2.0 GB for optimum performance of the system.

- Oracle Clusterware for 10.2.0.4 on Red Hat Enterprise Linux ,SUSE Linux Enterprise Server and Oracle Enterprise Linux now uses the Oracle Clusterware Process Monitor Daemon (`oproc`) to monitor the system state of the cluster nodes.

See Also: *Oracle Database Oracle Clusterware and Oracle Real Application Clusters Administration and Deployment Guide* for more information on Oracle Clusterware Process Monitor Daemon.

- The "DB_BLOCK_SIZE Initialization Parameter" section in chapter 1 of the Oracle Database Administrator's Reference guide for UNIX-Based Operating Systems, lists the incorrect value of `DB_BLOCK_SIZE` parameter. The maximum value to which you can set the `DB_BLOCK_SIZE` is 16 KB on Linux x86. It is 32 KB on all other UNIX platforms.
- In Oracle documentation, Oracle inventory group is represented as `oinstall`. However, it is not mandatory to use the same name, you can enter a different name for the group.

6.1 Additional Kernel parameters

The following Kernel parameters should be added to Chapter 2, "Oracle Database Preinstallation Requirements" of *Oracle Database Installation Guide for Linux x86-64*:

The table listing the recommended values for the kernel parameters in the section should contain the following rows:

Parameter	Minimum Value	File
<code>tcp_wmem</code>	262144	<code>/proc/sys/net/ipv4/tcp_wmem</code>
<code>tcp_rmem</code>	4194304	<code>/proc/sys/net/ipv4/tcp_rmem</code>

The table listing the commands to display the values of the kernel parameters in the section should contain the following rows:

Parameter	Command
<code>tcp_wmem</code>	<code># /sbin/sysctl -a grep tcp_wmem</code>
<code>tcp_rmem</code>	<code># /sbin/sysctl -a grep tcp_rmem</code>

The list of parameters and their values in the `/etc/sysctl.conf` file should also contain the following entries:

```
net.ipv4.tcp_wmem = 262144 262144 262144
```

6.2 Oracle RAC and the Hangcheck_reboot Parameter on Linux 2.6 Kernels

As initially released, information about the `hangcheck_reboot` parameter is missing from Section 2.16, "Checking the Configuration of the Hangcheck-timer Module" of Chapter 2, "Pre-Installation Tasks" in *Oracle Database Oracle Clusterware and Oracle Real Application Clusters Installation Guide for Linux*.

The `hangcheck_reboot` parameter indicates to the `hangcheck-timer` whether it should restart the node. The `hangcheck-timer` restarts the node if the kernel fails to respond within the time determined by the sum of the `hangcheck_tick` and `hangcheck_margin` parameter values, and the `hangcheck_tick` parameter value is greater than or equal to 1. If the `hangcheck_reboot` parameter is set to zero (0), then the `hangcheck-timer` will not restart the node.

By default, on 2.4 Linux kernels, the value of `hangcheck_reboot` is 1. However, on 2.6 kernels, the default value is 0. In an Oracle RAC environment, you must set the `hangcheck_reboot` parameter to 1.

Set `hangcheck_reboot=1` while loading the `hangcheck-timer` module. If you find that the cluster produces false node evictions, then increase the `hangcheck_margin` parameter value, and retest the cluster.

6.3 Configuring Oracle Clusterware Process Monitor Daemon

The 10.2.0.4 patch release for Oracle Clusterware on Linux includes the Oracle Clusterware Process Monitor Daemon (`oproc`). It is started automatically by Oracle Clusterware to detect system hangs. When it detects a system hang, it restarts the hung node.

Review the following configuration information if you have installed the 10.2.0.4 patch set.

Oracle has found wide variations in scheduling latencies observed across operating systems and versions of operating systems. Because of these scheduling latencies, the default values for `oproc` can be overly sensitive, particularly under heavy system load, resulting in unnecessary `oproc`-initiated restarts (false restarts).

Oracle recommends that you address scheduling latencies with your operating system vendor to reduce or eliminate them as much as possible, as they can cause other problems.

To overcome these scheduling latencies, Oracle recommends that you set the Oracle Clusterware parameter `diagwait` to the value 13. This setting increases the time for failed nodes to flush final trace files, which helps to debug the cause of a node failure. You must shut down the cluster to change the `diagwait` setting. However, if you prefer, you can use the default timing threshold for `diagwait`. In that case, you do not need to perform the procedure documented here.

If you require more aggressive failover times to meet more stringent service level requirements, then you should open a service request with Oracle Support to receive advice about how to tune for lower failover settings.

Note: Changing the `diagwait` parameter requires a clusterwide shutdown. Oracle recommends that you change the `diagwait` setting either immediately after the initial installation, or during a scheduled outage.

See Also: *Oracle Database Oracle Clusterware and Oracle Real Application Clusters Administration and Deployment Guide* for more information

To change the `diagwait` setting:

1. Log in as root, and run the following command on all nodes, where `CRS_home` is the home directory of the Oracle Clusterware installation:

```
# CRS_home/bin/crsctl stop crs
```

2. Enter the following command, where `CRS_home` is the Oracle Clusterware home:

```
# CRS_home/bin/oprocd stop
```

Repeat this command on all nodes.

3. From one node of the cluster, change the value of the `diagwait` parameter to 13 seconds by issuing the following command as root:

```
# CRS_home/bin/crsctl set css diagwait 13 -force
```

4. Restart the Oracle Clusterware by running the following command on all nodes:

```
# CRS_home/bin/crsctl start crs
```

5. Run the following command to ensure that Oracle Clusterware is functioning properly:

```
# CRS_home/bin/crsctl check crs
```

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