

Preserving Your Oracle Database
10g Environment when
Upgrading from Red Hat
Enterprise Linux 2.1 AS to Red
Hat Enterprise Linux 3

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OVERVIEW

When you perform a clean install of Red Hat Enterprise Linux 3 (RHEL3) on a system that has Oracle Database 10g installed on Red Hat Enterprise Linux 2.1 AS (RHAS2.1), you must preserve the Oracle Database 10g environment. This white paper explains how.

INTRODUCTION

When you upgrade from RHAS2.1 to RHEL3, Red Hat strongly recommends that you do a full application and data backup, followed by a fresh install of RHEL3 over the previous version. This procedure is described in *Migrating to Red Hat Enterprise Linux – Benefits and Guidelines* at:

<http://www.redhat.com/whitepapers/rhel/RHEL3MigrationWPSO.pdf>

Oracle directories are usually not located in system directories, so they will not be overwritten by a clean install. However, the install will overwrite all files in system directories such as /, /boot, /etc, /var, /home, and /usr. If you have installed any Oracle directories, such as the Oracle base directories, Oracle inventory directory, Oracle home, or Cluster Ready Services (CRS) home directories, in system directories, you must fully back them up before you perform the upgrade. After the upgrade, restore these directories to their original locations.

You must preserve certain configuration files to ensure correct Oracle operation after the RHEL3 install. Some of these files were created or modified when you did the pre-installation tasks described in *Oracle Database Installation Guide: 10g Release 1 (10.1) for UNIX Systems: AIX-Based Systems, hp HP-UX, hp Tru64 UNIX, Linux, and Solaris Operating System (SPARC) Part No. B10811-02*. Other files were created by Oracle Universal Installer during the Oracle Database 10g installation. This document describes how to save and restore those files.

It is likely that, as an administrator, you will need to preserve other configuration files and user files. This document only addresses files specifically related to Oracle Database 10g.

If you have extra disk space of sufficient size, you can install RHEL3 on a different drive or on different partitions on the same drive, so that the RHAS2.1 configuration files are still available after the RHEL3 installation. If you can do that, you do not need to save the configuration files before the RHEL3 installation.

UPGRADE PROCEDURE

Follow these steps:

1. Shut down Oracle
2. Save critical files
3. Back up your system directories
4. Back up Oracle directories
5. Perform a clean install of RHEL3
6. Re-create the Oracle environment
7. Restart Oracle

1. Shut Down Oracle

If you are running a single-instance Oracle database, shut down the database and the Automatic Storage Management (ASM) instance with normal or immediate priority. For example:

```
$ sqlplus /nolog
SQL> CONNECT SYS/sys_password as SYSDBA
SQL> SHUTDOWN NORMAL
```

Stop the listener by typing:

```
$ $ORACLE_HOME/bin/lsnrctl stop listenername
```

and shut down any other processes running in the Oracle home directories.

On Oracle Real Application Clusters (RAC), perform the upgrade to RHEL3 on all nodes at the same time. On each node, shut down Oracle CRS resource applications in the following order:

1. RAC databases
2. ASM instances
3. All listeners
4. Node applications, such as Virtual Internet Protocol (VIP) and Oracle Notification System (ONS)

5. The CRS stack

The `srvctl stop` syntax for shutting down RAC, ASM, and node applications is described in the appendix “Server Control (SRVCTL) Reference” in *Oracle® Real Application Clusters Administrator's Guide 10g Release 1 (10.1)* Part No. B10765-02. Also see the chapter “Pre-Installation Tasks for Installing RAC on Linux-Based Systems” in *Oracle Real Application Clusters Installation and Configuration Guide 10g Release 1 (10.1.0.2.0) for AIX-Based Systems, hp HP-UX PA-RISC (64-bit), hp Tru64 UNIX, Linux, Solaris Operating System (SPARC 64-bit), and Windows Platforms* Part No. B10766-04.

Stop all listeners on each system in the cluster by typing:

```
$ $ORACLE_HOME/bin/lsnrctl stop listenername
```

Shut down CRS on each node by typing:

```
# /etc/init.d/init.crs stop
```

Then disable CRS by typing:

```
# /etc/init.d/init.crs disable
```

on each node. This step prevents the cluster software from starting automatically when you restore the file `/etc/inittab`.

2. Save Critical Files

As user `root`, change directory to `/`. Using the `tar` command, create a compressed archive of `/etc`, the home directory of the user who installed Oracle, and all Oracle-specific files and directories. For example:

```
# cd /
# tar -cvjf oracle-bak.tar.bz2 etc home/oracle
opt/ORCLfmap opt/oracle usr/local/bin/oraenv
usr/local/bin/dbhome usr/local/bin/coraenv
var/spool/cron/oracle
```

Substitute the actual path of the home directory of the user who installed Oracle, if it is not `/home/oracle`. If you do not store important files in that directory, you can omit it from the archive.

The file `/var/spool/cron/oracle` is a `crontab` file that might not exist on your system. If you did not install any optional Oracle components, such as Automatic Storage Management (ASM), `/opt/oracle/` might not exist on your system.

Copy `oracle-bak.tar.bz2` either to removable media or to a location that will not be overwritten, such as an NFS file system. As a precaution, you might want to verify the archive at this time, to ensure you have all the files you need. The command to list the contents of the archive is:

```
# tar -tvjf oracle-bak.tar.bz2
```

The `-j` option causes `tar` to use `bzip2` compression and results in a smaller archive. If you prefer to have an even smaller archive, you can back up a subset of the files. Not all files in `/etc` are required to restore your Oracle environment. Review the *Re-Create the Oracle Environment* section of this document to determine the minimum set of files and directories that you must restore.

This document describes files required to restore the Oracle environment. As administrator, you might need to preserve other system configuration files, such as `/etc/hosts`, `/etc/fstab`, and `/etc/X11/XF86Config`. You might also find it useful to save the output of the following commands, in case you need to recover your system:

```
$ /bin/rpm -qa
# /sbin/fdisk -l
$ /sbin/lsmmod
$ /sbin/sysctl -a
$ /sbin/ifconfig -a
$ /sbin/chkconfig --list
# /usr/bin/raw -qa
```

3. Back Up System Directories

Perform a backup of the system directories, including `/`, `/bin`, `/boot`, `/dev`, `/etc`, `/mnt`, `/lib`, `/root`, `/sbin`, `/usr`, and `/var`. This is necessary in case you need to restore your RHAS2.1 installation for some reason. If you store important files in `/misc`, `/opt`, or other directories, back them up too. Do not back up `/proc`, as it is pseudo-filesystem.

4. Back Up the Oracle Directories

If you have installed the Oracle base directories, Oracle inventory directory, Oracle home, or CRS home in system directories, you must back them up because they will be overwritten by the RHEL3 installation. As a precaution, you should back up these directories even if they are not in system directories.

5. Perform a Clean Install of RHEL 3.0

Install RHEL3 as described in *Red Hat Enterprise Linux 3: Installation Guide for x86, Itanium, AMD64, and Intel Extended Memory 64 Technology (Intel EM64T)*. On Oracle Real Application Clusters (RAC), perform the upgrade to RHEL3 on all nodes at the same time.

Apply all recommended patches to RHEL3. If you plan to run RAC, you must apply Update 2 (Q2 2004) or a later update. For information about RHEL3 updates, see:

<https://www.redhat.com/security/notes>

Apply any kernel customizations required at your site and reboot, if necessary.

If you need to use the Oracle VLM option to create a very large buffer cache or to use the hugetlb feature of the RHEL3 kernel, see the January, 2004 article *Upgrading from Red Hat Enterprise Linux 2.1 AS To Red Hat Enterprise Linux 3* at:

<http://www.oracle.com/technology/pub/articles/index.html>

and Oracle *MetaLink* document 262004.1, *Configuring RHEL 3 and Oracle 9iR2 with Hugetlb and Remap_file_pages*. (The latter article applies to Oracle Database 10g as well as Oracle9iR2.)

If necessary, re-configure raw partitions, as described in the “Pre-installation Tasks” chapter of *Oracle Database Installation Guide*.

If necessary, install and configure the ASM library driver software, as described in the “Pre-Installation Tasks” chapter of *Oracle Database Installation Guide*.

Also see the article *Installing Oracle ASMLib* at:

<http://www.oracle.com/technology/tech/linux/asmlib/install.html>

If you are using RAC, load the hangcheck timer:

```
# /sbin/insmod hangcheck-timer hangcheck_tick=30
hangcheck_margin=180
```

Install any custom software required at your site.

6. Re-Create the Oracle Environment

Now restore the files you saved in your tar archive. Do not extract the archive while your current directory is the root directory, or you will overwrite RHEL3 system files. Instead, copy oracle-bak.tar.bz2 to a convenient directory on your system, such as a user’s home directory. Then become root and extract the archive into that directory. For example:

```
$ cd $HOME/tar_dir
$ su
# tar -xvjf oracle-bak.tar.bz2
```

You can copy most of the files directly from the extracted archive to the RHEL3 directories. You should inspect and merge some files, however, rather than copying them directly, because of differences between the default RHAS2.1 and RHEL3 files. Before merging files, review the Linux sections of the “Pre-Installation Tasks” chapter in *Oracle Database Installation Guide: 10g Release 1 (10.1) for UNIX Systems: AIX-Based Systems, hp HP-UX, hp Tru64 UNIX, Linux, and Solaris Operating System (SPARC)* Part No. B10811-02.

a. Files to Copy Directly

As root, verify that your umask is 022 and set it if it is not.

```
# umask
# umask 022
```

Copy the following files and directories and contents of directories from the expanded RHAS2.1 archive to the system directories, creating intermediate directories as necessary. Some of these files might not be present if you did not install certain Oracle features, such as RAC, on RHAS2.1.

```
/etc/init.d/init.crs
/etc/init.d/init.crsd
/etc/init.d/init.cssd
/etc/init.d/init.evmd
/etc/ocfs.conf
/etc/oracle/ocr.loc
/etc/oracle/scls_scr/hostname/*
/etc/oraInst.loc
/etc/oratab
/etc/rc/rc.local
/etc/pam.d/login
/etc/security/limits.conf
/home/oracle (or home directory of user who installed Oracle)
/usr/local/bin/oraenv
/usr/local/bin/dbhome
/usr/local/bin/coraenv
/opt/oracle
/opt/ORCL.fmap
```

Verify that the files you copied into /etc/init.d, /usr/local/bin /opt/ORCL.fmap/*/bin and /opt/ORCL.fmap/*/etc all have the execute (x) bit set. For example:

```
# cd /etc/init.d
# ls -l init.cssd
-r-xr-xr-x 1 root root 16910 Jul 26 15:26 init.cssd
```

When copying the contents of a directory, remember to copy files and directories with names that begin with `.`, such as `.ssh.` and `.profile.` Use the following command to list them:

```
ls -a
```

b. Symbolic Links

The `rc.2`, `rc.3`, and `rc.5` subdirectories of `/etc/rc.d` contain symbolic links to files under `/etc/init.d`. Oracle Universal Installer created some of the files and links in your extracted RHAS2.1 archive. For example, the installer might have created a file called `init.crs` under `/etc/init.d`, with symbolic links named `K96init.crs` and `S96init.crs` in the subdirectories of `/etc/rc.d`. In addition to copying the files to `/etc/init.d`, you must copy these links so that certain Oracle processes can be started and shut down cleanly on system startup and shutdown. By default, the `cp` command copies the files that the links point to, not the links themselves. To copy the links, use the `--no-dereference` option with the `cp` command. For example (using `bash`):

```
# for DIR in rc2.d rc3.d rc5.d; do
> cd $HOME/tar_dir/rc.d/$DIR
> cp --no-dereference *init.crs /etc/rc.d/$DIR
> done
```

If you did not install RAC on your RHAS2.1 system, you would replace `*init.crs` with `*init.cssd` in the command line to copy the links. If you have other Oracle-related links to files in `init.d`, you would copy them in the same manner.

c. Files to Merge

The following files have changed between RHAS2.1 and RHEL3:

```
/etc/csh.*
/etc/profile
/etc/group
/etc/passwd
/etc/inittab*
```

Use the `diff` command to compare the two versions. For example:

```
$ diff $HOME/tar_dir/etc/inittab /etc/inittab
```

If you want to use the RHEL3 version of a file, first back up the RHEL3 file, then locate the Oracle-specific lines in the RHAS2.1 file and cut and paste those lines into the RHEL3 file, using a text editor such as `vi`.

Instead of modifying `/etc/group` and `/etc/passwd` directly, you might find it easier to simply use the `groupadd` and `useradd` commands as described in the “Pre-Installation Tasks” chapter of the *Oracle Database Installation Guide*. Set

the same user and group ID values as in the RHAS2.1 files. Be sure to set a password for the user who installed Oracle.

Oracle Universal Installer creates copies of `/etc/inittab`, such as `inittab.cssd`. Recreate these by copying the RHEL3 version of `/etc/inittab`, then cutting and pasting the Oracle-related changes.

As a precaution, do not add the Oracle-related lines to `/etc/inittab` until you are ready to restart Oracle. Instead, make a copy of the RHEL3 version of `/etc/inittab` called `/etc/new_inittab` and add the Oracle-related lines to that file.

d. Kernel Limits

Some default kernel limits changed between RHAS2.1 and RHEL3. For best results, do not copy the RHAS2.1 `sysctl.conf` file into `/etc`. Instead, set kernel limits as described under “Configuring Kernel Parameters on Linux” in the *Oracle Database Installation Guide*. To learn how to set a value for the new RHEL3 limit `hugetlb_pool`, refer to the January, 2004 article *Upgrading from Red Hat Enterprise Linux 2.1 AS To Red Hat Enterprise Linux 3* at:

<http://www.oracle.com/technology/pub/articles/index.html>

That document also explains how to use the Oracle VLM option to create a very large buffer cache.

7. Restart Oracle

If you want to take advantage of the asynchronous I/O capability of the RHEL3 kernel, relink Oracle by using the following command line, as the user who installed Oracle:

```
$ cd $ORACLE_HOME/rdbms/lib && make PL_ORALIBS=-laio  
-f ins_rdms.mk async_on
```

For more information, see OracleMetaLink document 225751.1, *Frequently Asked Questions (FAQ) Asynchronous I/O (aio) on Red Hat Advanced Server Version 2.1 – 3.0*.

If you do not need asynchronous I/O, you do not need to relink Oracle.

Now rename `/etc/new_inittab` to `/etc/inittab` by typing:

```
# sync; sync; sync; mv /etc/new_inittab /etc/inittab
```

On RAC configurations, reboot one node at a time. Verify that each node has started correctly before starting the next node. For more information, see *Oracle Real Application Clusters Installation and Configuration Guide 10g Release 1 (10.1.0.2.0) for AIX-Based Systems, hp HP-UX PA-RISC (64-bit), hp Tru64 UNIX, Linux, Solaris Operating System (SPARC 64-bit), and Windows*

Platforms Part No. B10766-04. If configuration errors cause a node to go into a reboot loop, boot to single-user mode, as described in *Red Hat Enterprise Linux 3: Installation Guide for x86, Itanium, AMD64, and Intel Extended Memory 64 Technology (Intel EM64T)*, edit the configuration files, and reboot.

For a single instance installation, you do not need to reboot to start Oracle. Start the listener:

```
$ $ORACLE_HOME/bin/lsnrctl start
```

Verify the Enterprise Manager configuration by typing:

```
$ srvctl config database -d db
```

If you are using ASM, start the ASM instance. Use SQL*Plus to login to the database instance as the SYS user with SYSDBA privileges:

```
$ sqlplus /NOLOG
SQL> CONNECT SYS/PASSWORD AS SYSDBA
```

Start up the database:

```
SQL> STARTUP
```

CONCLUSION

By following the steps described in this white paper, you can preserve the Oracle Database 10g release 1 (10.1) environment when you perform a clean install of RHEL3 onto a system where you previously installed Oracle Database 10g on RHAS2.1.



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Author: Ellen Desmond

Contributing Authors: Mark Bauer, Peter Knaggs, Jeffrey Levinger, Richard Long, Van Okamura, Sally Piao, Daljeet Singh, Janelle Simmons, Khethavath Singh, Helen Slattery, Chris Trevino, Tak Fung Wang, and Gary Young

Oracle Corporation
World Headquarters
500 Oracle Parkway
Redwood Shores, CA 94065
U.S.A.

Worldwide Inquiries:
Phone: +1.650.506.7000
Fax: +1.650.506.7200
www.oracle.com

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