Migrating an HP Serviceguard for Linux Oracle Toolkit to Red Hat Cluster Suite for Red Hat Enterprise Linux 5

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Executive Summary

This white paper is one of a series that describes a procedure to migrate an HP Serviceguard for Linux (SGLX) cluster to a Red Hat Cluster Suite (RHCS) cluster. The white paper "Migrating an HP Serviceguard for Linux Cluster to Red Hat Cluster Suite for Red Hat Enterprise Linux 5", available at docs.hp.com -> High Availability -> Serviceguard for Linux, describes the basics of transitioning an SGLX cluster and a user written toolkit. This whitepaper covers transitioning from an SGLX Oracle Toolkit to an RHCS Oracle resource.

It is assumed that there is an existing SGLX cluster running at least one instance of an Oracle Toolkit package. The conversion can be done in 3 steps: gathering information for the conversion process (for both the cluster and the toolkit), completing basic cluster migration based on the earlier white paper, and finally, completing the Oracle Toolkit migration. A step-by-step process describes how to use the configuration information from an Oracle Toolkit package on an existing SGLX cluster to quickly create an RHCS service (a collection of resources) with similar functionality.

Introduction

The white paper "Migrating an HP Serviceguard for Linux Cluster to Red Hat Cluster Suite for Red Hat Enterprise Linux 5", henceforth referred to as the Cluster Migration white paper, describes the process for taking an existing SGLX cluster and, using information extracted from that cluster configuration, creating a Red Hat Cluster Suite cluster with characteristics that are familiar to an HP Serviceguard for Linux user. That white paper also describes the process to take information related to a user-created Serviceguard package and create a similar RHCS service.

A toolkit is really a package template for a specific application. This white paper leverages the process described in the Cluster Migration white paper to extract information used by the Oracle Toolkit and uses that information to create a series of resources, including an Oracle 10g Failover Instance resource, to create the RHCS service. This process is described for both the Legacy and Modular type of packages created using the Serviceguard Oracle Toolkit. The Serviceguard package configuration worksheet, first introduced in the Cluster Migration white paper, is used in this process. A blank copy of the worksheet, with added Oracle Toolkit parameters, is included in the Appendix section of this white paper.

The following table shows the support for the different Oracle releases in the SGLX Oracle Toolkit and in the RHCS Oracle 10g Failover Instance Resource Agent (RA) as of the writing of this whitepaper.

S.No	Oracle Release	Support in SGLX Oracle Toolkit	Support in RHCS Oracle RA
1	Oracle 10gR2	√	√
2	Oracle 11gR1	√	×
3	Oracle 10.2.0.4 ASM	√	×
4	Oracle 11.0.6 ASM	√	×
5	Oracle 10g IAS	×	√

The Serviceguard Oracle Toolkit has the following features that are not part of the RHCS Oracle10g Failover Instance RA (RHCS Oracle RA):

- In the SGLX Oracle Toolkit, the user can choose either "shutdown abort" or "`shutdown immediate`" in case of user initiated shutdown. But in the RHCS Oracle RA, it is always "`shutdown abort`".

- In the SGLX Oracle Toolkit, the user can set up the package to issue a "`shutdown abort`" before the startup of the database instance in order to clean up the stale shared memory or semaphores. RHCS does not have this feature.

- In the SGLX Oracle Toolkit, the listener name is taken from the user and is used for starting, stopping and monitoring the listener. In the RHCS Oracle RA, the default listener name is always used.

- The SGLX Oracle Toolkit scripts can start, stop, and monitor a password protected listener. RHCS Oracle RA does not use the listener password. So if the listener is password protected, the RHCS Oracle RA cannot stop the listener gracefully and instead kills the listener.

- The SGLX Oracle Toolkit includes support for Oracle 11gR1 and Oracle ASM on Oracle 10gR2 and Oracle 11gR1. The RHCS Oracle RA does not include support of Oracle 11gR1 or Oracle ASM yet.

- In the SGLX Oracle Toolkit, the user can skip the listener start/stop process as a part of database start/stop process. Listener monitoring is also optional. The RHCS Oracle RA requires a start/stop/monitor of the listener as a part of database start/stop/monitor.

- During database startup, Oracle, by default, loads the instance parameter file `init${SID_NAME}.ora` or the Server Parameter File `spfile${SID_NAME}.ora` from ${ORACLE_HOME}/dbs. In the SGLX Oracle Toolkit, the `PFILE` parameter is used to override the default parameter file location or name. In the RHCS Oracle RA, this cannot be overridden and the database always loads the default instance parameter file or Server parameter file.

- In the SGLX Oracle Toolkit, the `TIME_OUT` parameter is used to define the time period, in seconds, that this toolkit waits for a completion of a normal shutdown before initiating a forceful halt of the application. The default value of this parameter is 30 seconds but users can specify a different value. In the RHCS Oracle RA, this parameter is not configurable and is set to a value of 90 seconds.

- In the SGLX Oracle Toolkit, the `MONITOR_INTERVAL` parameter is used to define the time interval, in seconds, the monitoring script will wait between checks to make sure that the Oracle instance is running. The default value of this parameter is 30 seconds. In the RHCS Oracle RA, the environment variable `OCF_CHECK_LEVEL` is used to define the monitoring time interval. The `OCF_CHECK_LEVEL` can be set to 0, 10, or 20. For the different `OCF_CHECK_LEVEL` values of 0, 10, or 20, the corresponding monitoring interval is 10 seconds, 5 minutes, or 10 minutes.

- In the SGLX Oracle toolkit, the `MAINTENANCE_FLAG` parameter is used to bring the SGLX Oracle Toolkit into maintenance mode. Setting this parameter to "*yes*" enables the maintenance feature in the toolkit. The Oracle Toolkit will look for a file *oracle.debug* in the package directory. If the file exists and if the maintenance feature is enabled, then monitoring is paused. The database instance may be brought down for maintenance and package will not be failed over to the adoptive node. There is no similar feature in the RHCS Oracle RA.

There are a number of other differences between the SGLX Oracle Toolkit and the RHCS Oracle RA. These differences are relatively minor and are described in "The SGLX Oracle Toolkit" section.

Red Hat Cluster Suite delivered with Red Hat Enterprise Linux Advanced Platform 5.3 is used as the basis for this white paper. The information in this white paper is not expected to change significantly for later versions of Red Hat 5.

Audience

This document is targeted for users of HP SGLX on RHEL5 who wish to migrate to Red Hat Cluster Suite on RHEL5.

It is assumed that the reader has an understanding of HP SGLX, HP SGLX Oracle Toolkit, and RHCS and has read "Migrating an HP Serviceguard for Linux Cluster to Red Hat Cluster Suite for Red Hat Enterprise Linux 5". Details in that white paper and the Red Hat documentation are not necessarily repeated here. For more information on each solution,
see http://www.hp.com/go/sglx, http://docs.hp.com -> High Availability
and http://www.redhat.com/docs/manuals/csgfs.

The SGLX Oracle Toolkit

The Serviceguard for Linux Oracle Toolkit is a separate set of shell scripts that allows users to configure a Serviceguard package to monitor an Oracle database server. The toolkit consists of a 'rpm' file which, after installation and configuration, enables a Serviceguard for Linux package to provide high availability for an Oracle database server application and configures listener to monitor the database instance. It works as a subsystem under the SGLX core software to provide functions for starting, stopping, and monitoring the Oracle server and the listener in a cluster environment. The sample SGLX Oracle Toolkit scripts that are included in this white paper are from the Oracle Toolkit version A.05.00. Except for the new features, this version is very similar to older versions. The differences will have little effect on the migration process.

Special Features

In addition to the differences noted earlier, Serviceguard for Linux Oracle Toolkit A.05.00 has the following unique features:

- The SGLX Oracle Toolkit supports a new feature to perform a clean up before starting the database. The parameter `CLEANUP_BEFORE_STARTUP` set in the toolkit configuration file indicates whether "shutdown abort" needs to be executed before the startup of the Oracle/ASM instance. The 'shutdown abort' procedure ensures the clean up of shared memory and semaphores. This parameter can be set to `yes` or `no (the default)`.

- The `USER_SHUTDOWN_MODE` parameter specifies the instance shutdown mode when a shutdown is initiated by the user instead of a failure of a service. This parameter can be set to either `abort` (the default) or `immediate`. If the value `abort` is specified, the instance is shutdown using the abort option. If the value `immediate` is specified, the instance is shutdown using the immediate option.

- The A.05.00 release supports Oracle 10.2.0.4 and Oracle 11.0.6 ASM (certain Oracle patches are required).

The "Introduction" has the description of a few key differences between the SGLX Oracle toolkit and the implementation of the RHCS Oracle RA. The following features are different between the SG Oracle Toolkit and the RHCS Oracle RA. These differences are expected to have little or no impact in most environments.

- In the SGLX Oracle Toolkit, the listener is started first and followed by the database, while the reverse is true in the RHCS Oracle RA.

- In the SGLX Oracle Toolkit, the listener and database are monitored in different services. However, in the RHCS Oracle RA, the listener and database are monitored in the same service.

- In the SGLX Oracle Toolkit, the `MONITOR_PROCESSES` parameter is used to list all processes for a specific Oracle instance that must be running for that instance (and therefore the package) to be up and running. Users can add more instance processes that are to be monitored, to this parameter. In the RHCS Oracle RA, the user can customize the list of processes that are monitored, but those processes must be of the form `ora_${procname}_${ORACLE_SID}`

- In the SGLX Oracle Toolkit and the RHCS Oracle RA, the services are started by the root user. Oracle requires the user to be ORACLE_ADMIN for database and listener administration.

Hence, the services spawn a new shell to switch user from root to ORACLE_ADMIN for database and listener administration.

In the SGLX Oracle Toolkit, the `PARENT_ENVIRONMENT` parameter is used to define whether the Oracle user's shell should be invoked as a new shell or as a sub shell that inherits the variables set in the parent shell. In the RHCS Oracle RA, the new shell that is spawned to switch user from root to ORACLE_ADMIN to do database and listener administration is invoked as a sub-shell of the parent shell and inherits the variables set in the parent shell.

The RHCS Oracle RA has the following features that are not part of the Serviceguard Oracle Toolkit

- In the SGLX Oracle Toolkit, on service failure, the database is never restarted on the same node, but it can be restarted on the same node in the RHCS Oracle RA.

- In the SGLX Oracle Toolkit, *iSQLPlus* and *dbconsole* are not started as a part of database startup. In the RHCS Oracle RA, *iSQLPlus* and *dbconsole* are also started as a part of the database start up. If the dbconsole or iSQLPlus start fails, service start also fails.

- In the SGLX Oracle Toolkit, the Oracle Enterprise Manager (OEM) is not monitored as a part of database monitor. In the RHCS Oracle RA, OEM is also monitored as a part of database monitor.

Before migrating to RHCS, it is recommended to backup the most recent copy of the application data. This is to protect against data loss in the event of an operator error during the migration. Use any RHEL5 supported backup software to backup the data.

Gathering Serviceguard parameters

The Serviceguard cluster parameters need to be saved. They are translated to the equivalent RHCS parameters so that the users can have similar functionality. The most important step in the migration is saving the Serviceguard parameters in the Package migration template. Part of this process must be completed while the SGLX cluster is still available. The cluster does not need to be up during this part of the process but certain cluster commands do need to be able to run.

Gathering cluster parameters

The first step is to gather the cluster information, including the names of the packages that are configured in the cluster. Run the following command, on any one of the Serviceguard cluster nodes, to collect this information.

```
#cmviewcl –v > cluster.info
```

Following is an example output of this command, where an Oracle Toolkit package is configured. The package "`orapkg`" is an Oracle Toolkit package.

```
CLUSTER        STATUS
oracl          up

  NODE           STATUS       STATE
  drama          up           running

    Quorum_Server_Status:
    NAME           STATUS       STATE
    linuxlp64      up           running
```

```
    Network_Parameters:
    INTERFACE    STATUS           NAME
    PRIMARY      up               eth2

    PACKAGE        STATUS        STATE         AUTO_RUN     NODE
    orapkg         up            running       enabled      drama

      Policy_Parameters:
      POLICY_NAME     CONFIGURED_VALUE
      Failover        configured_node
      Failback        manual

      Script_Parameters:
      ITEM       STATUS   MAX_RESTARTS  RESTARTS NAME
      Service    up       0             0        oracle_service
      Service    up       0             0        oracle_listener_service

      Node_Switching_Parameters:
      NODE_TYPE    STATUS       SWITCHING    NAME
      Primary      up           enabled      drama (current)
      Alternate    up           disabled     poetry

  NODE           STATUS       STATE
  poetry         up           running

    Quorum_Server_Status:
    NAME           STATUS       STATE
    linuxlp64      up           running

    Network_Parameters:
    INTERFACE    STATUS           NAME
    PRIMARY      up               eth2
```

Gathering Serviceguard Oracle Toolkit parameters

The next step is gathering the SGLX Oracle Toolkit parameters.

The toolkit configuration information can be obtained using **one** of the following methods

- ✓ Toolkit configuration file (`haoracle.conf`), residing in the toolkit configuration directory, specified in the package configuration file
- ✓ Package configuration file (Only for Modular packages)
- ✓ Executing the `cmgetpkgenv <pkgname>` command (Only for Modular packages)

Toolkit Configuration file (Modular and Legacy packages)

File location in the SGLX Oracle Toolkit Legacy Packages:

In case of Legacy packages, the toolkit configuration information can be obtained from the file `haoracle.conf` residing in the package directory. This is in the same location as that of the Toolkit Interface Script (`toolkit.sh`). In the package control script, the user specifies this location as a value for the `SERVICE_CMD` and also in the customer_defined_run_cmds and customer_defined_halt_cmds functions.

Following is an example of the sections in the package control scripts where the user defines the package directory. In the case of Legacy packages, in this example, the `haoracle.conf` file is in `/usr/local/cmcluster/pkg/oracletoolkitleg` directory.

```
SERVICE_NAME[0]=orasvc
```

```
SERVICE_CMD[0]="/usr/local/cmcluster/pkg/oracletoolkitleg/toolkit.sh monitor"
SERVICE_RESTART[0]=""

SERVICE_NAME[1]=oralsnrsvc
SERVICE_CMD[1]="/usr/local/cmcluster/pkg/oracletoolkitleg/toolkit.sh
monitor_listener"
SERVICE_RESTART[1]=""

# Setting the log file
log_file=${SG_SCRIPT_LOG_FILE:-$0.log}

# START OF CUSTOMER DEFINED FUNCTIONS

# This function is a place holder for customer define functions.
# You should define all actions you want to happen here, before the service is
# started.  You can create as many functions as you need.
#
function customer_defined_run_cmds
{
# ADD customer defined run commands.
    : # do nothing instruction, because a function must contain some command.
        /usr/local/cmcluster/pkg/oracletoolkitleg/toolkit.sh start

    test_return 51
}

# This function is a place holder for customer define functions.
# You should define all actions you want to happen here, after the service is
# halted.
#
function customer_defined_halt_cmds
{
# ADD customer defined halt commands.
    : # do nothing instruction, because a function must contain some command.
        /usr/local/cmcluster/pkg/oracletoolkitleg/toolkit.sh stop

    test_return 52
}
```

File location in the SGLX Oracle Toolkit Modular Packages:

In the SGLX Oracle Toolkit Modular package, the toolkit configuration file (`haoracle.conf`) is generated in the toolkit configuration directory defined in the package configuration file. The toolkit configuration file has all the required Oracle Toolkit parameters.

Following is an example of how the toolkit configuration directory is defined in the package configuration file in the SGLX Oracle Toolkit Modular package configuration file.

```
#    Define toolkit configuration directory
#
#    This directory is synonymous to the package directory and holds
#    the toolkit configuration file. This parameter directs
#    cmapplyconf to generate the haoracle.conf file under this
#    directory. To put toolkit into maintenance mode, create oracle.debug
#    file under this directory.
#
# Legal values for TKIT_DIR: <Any String>

TKIT_DIR                /usr/local/cmcluster/pkg/oracletoolkitmod
```

The `haoracle.conf` file contains the same Oracle Toolkit parameters for both the Legacy and Modular packages. Following is an example of the toolkit configuration file (`haoracle.conf`).

```
INSTANCE_TYPE=database
ORACLE_HOME=/home/oracle/oracle10gr2/OracleHome
ORACLE_ADMIN=oracle
SID_NAME=oradb
ASM=no
declare -a ASM_DISKGROUP
declare -a ASM_VOLUME_GROUP
declare -a ASM_PV
ASM_HOME=
ASM_USER=oracle
ASM_SID=
LISTENER=yes
LISTENER_NAME=LISTENER
LISTENER_PASS=listener
PFILE=${ORACLE_HOME}/dbs/init${SID_NAME}.ora
declare -a MONITOR_PROCESSES
MONITOR_PROCESSES[0]=ora_pmon_${SID_NAME}
MONITOR_PROCESSES[1]=ora_dbw0_${SID_NAME}
MONITOR_PROCESSES[2]=ora_ckpt_${SID_NAME}
MONITOR_PROCESSES[3]=ora_smon_${SID_NAME}
MONITOR_PROCESSES[4]=ora_lgwr_${SID_NAME}
MONITOR_PROCESSES[5]=ora_reco_${SID_NAME}
MAINTENANCE_FLAG=yes
MONITOR_INTERVAL=30
TIME_OUT=30
PARENT_ENVIRONMENT=no
CLEANUP_BEFORE_STARTUP=no
USER_SHUTDOWN_MODE=abort
KILL_ASM_FOREGROUNDS=yes
```

Package configuration file (Only for Modular packages)

In the SGLX Oracle Toolkit Modular package, the package configuration file also has the Oracle Toolkit parameters. To get the current package configuration file execute the following command.

 # cmgetconf -p <pkg_name> > orapkg.info

For this example:

 # cmgetconf -p orapkg **> orapkg.info**

Following is an example output. Only the sections that have Oracle Toolkit parameters are included here for ease of reading. The other sections in the Oracle Toolkit Modular package configuration file that have the common SGLX parameters are not included in this example. The common SGLX parameters are described in the Cluster Migration white paper.

```
TKIT_DIR                /usr/local/cmcluster/pkg/oracletoolkitmod
INSTANCE_TYPE           database
ORACLE_HOME             /home/oracle/oracle10gr2/OracleHome
ORACLE_ADMIN            oracle
SID_NAME                oradb
ASM                     no
#ASM_DISKGROUP
#ASM_VOLUME_GROUP
#ASM_PV
#ASM_HOME
ASM_USER                oracle
#ASM_SID
LISTENER                yes
LISTENER_NAME           LISTENER
LISTENER_PASS           listener
PFILE                   ${ORACLE_HOME}/dbs/init${SID_NAME}.ora
```

```
MONITOR_PROCESSES       ora_pmon_${SID_NAME}
MONITOR_PROCESSES       ora_dbw0_${SID_NAME}
MONITOR_PROCESSES       ora_ckpt_${SID_NAME}
MONITOR_PROCESSES       ora_smon_${SID_NAME}
MONITOR_PROCESSES       ora_lgwr_${SID_NAME}
MONITOR_PROCESSES       ora_reco_${SID_NAME}
MAINTENANCE_FLAG        yes
MONITOR_INTERVAL        30
TIME_OUT                30
PARENT_ENVIRONMENT      no
CLEANUP_BEFORE_STARTUP  no
USER_SHUTDOWN_MODE      abort
KILL_ASM_FOREGROUNDS    yes
```

Executing the cmgetpkgenv <pkgname> command (Only for Modular packages)

In the SGLX Oracle Toolkit Modular package, all the parameters are stored in the CDB. Run the following command to view this information.

 # cmgetpkgenv <pkg_name> > orapkg.info

For this example

 # cmgetpkgenv orapkg **> orapkg.info**

Following is an example output with an Oracle Toolkit package configured. The package "orapkg" is an Oracle Toolkit package. Note that the parameter name may have prefixes in this case.

```
SG_PACKAGE_NAME="orapkg"
SG_PACKAGE_DESCRIPTION="Serviceguard Package"
SG_MODULE_NAME[0]="sg/basic"
SG_MODULE_VERSION[0]="1"
SG_MODULE_NAME[1]="sg/failover"
SG_MODULE_VERSION[1]="1"
SG_MODULE_NAME[2]="sg/priority"
SG_MODULE_VERSION[2]="1"
SG_MODULE_NAME[3]="sg/volume_group"
SG_MODULE_VERSION[3]="1"
SG_MODULE_NAME[4]="sg/filesystem"
SG_MODULE_VERSION[4]="1"
SG_MODULE_NAME[5]="sg/service"
SG_MODULE_VERSION[5]="1"
SG_MODULE_NAME[6]="tkit/oracle/oracle"
SG_MODULE_VERSION[6]="1"
SG_PACKAGE_TYPE="failover"
SG_NODE_NAME[0]="drama"
SG_NODE_NAME[1]="poetry"
SG_AUTO_RUN="yes"
SG_NODE_FAIL_FAST_ENABLED="no"
SG_RUN_SCRIPT_TIMEOUT="no_timeout"
SG_HALT_SCRIPT_TIMEOUT="no_timeout"
SG_SUCCESSOR_HALT_TIMEOUT="no_timeout"
SG_SCRIPT_LOG_FILE="/usr/local/cmcluster/run/log/orapkg.log"
SG_OPERATION_SEQUENCE[0]="$SGCONF/scripts/sg/volume_group.sh"
SG_OPERATION_SEQUENCE[1]="$SGCONF/scripts/sg/filesystem.sh"
SG_OPERATION_SEQUENCE[2]="$SGCONF/scripts/tkit/oracle/tkit_module.sh"
SG_OPERATION_SEQUENCE[3]="$SGCONF/scripts/sg/service.sh"
SG_FAILOVER_POLICY="configured_node"
SG_FAILBACK_POLICY="manual"
SG_PRIORITY="no_priority"
SG_VGCHANGE_CMD="vgchange -a y"
SG_VG[0]="vgora"
SG_CONCURRENT_FSCK_OPERATIONS="1"
```

```
SG_CONCURRENT_MOUNT_AND_UMOUNT_OPERATIONS="1"
SG_FS_MOUNT_RETRY_COUNT="0"
SG_FS_UMOUNT_RETRY_COUNT="1"
SG_FS_NAME[0]="/dev/vgora/lvora"
SG_FS_DIRECTORY[0]="/home/oracle/mntpt"
SG_FS_TYPE[0]="ext3"
SG_FS_MOUNT_OPT[0]="-o rw"
SG_FS_UMOUNT_OPT[0]=""
SG_FS_FSCK_OPT[0]=""
SG_SERVICE_NAME[0]="oracle_service"
SG_SERVICE_CMD[0]="$SGCONF/scripts/tkit/oracle/tkit_module.sh oracle_monitor"
SG_SERVICE_RESTART[0]="none"
SG_SERVICE_FAIL_FAST_ENABLED[0]="no"
SG_SERVICE_HALT_TIMEOUT[0]="300"
SG_SERVICE_NAME[1]="oracle_listener_service"
SG_SERVICE_CMD[1]="$SGCONF/scripts/tkit/oracle/tkit_module.sh
oracle_monitor_listener"
SG_SERVICE_RESTART[1]="none"
SG_SERVICE_FAIL_FAST_ENABLED[1]="no"
SG_SERVICE_HALT_TIMEOUT[1]="300"
ORACLE_TKIT_DIR="/usr/local/cmcluster/pkg/oracletoolkitmod"
ORACLE_INSTANCE_TYPE="database"
ORACLE_ORACLE_HOME="/home/oracle/oracle10gr2/OracleHome"
ORACLE_ORACLE_ADMIN="oracle"
ORACLE_SID_NAME="oradb"
ORACLE_ASM="no"
ORACLE_ASM_USER="oracle"
ORACLE_LISTENER="yes"
ORACLE_LISTENER_NAME="LISTENER"
ORACLE_LISTENER_PASS="listener"
ORACLE_PFILE="${ORACLE_HOME}/dbs/init${SID_NAME}.ora"
ORACLE_MONITOR_PROCESSES[0]="ora_pmon_${SID_NAME}"
ORACLE_MONITOR_PROCESSES[1]="ora_dbw0_${SID_NAME}"
ORACLE_MONITOR_PROCESSES[2]="ora_ckpt_${SID_NAME}"
ORACLE_MONITOR_PROCESSES[3]="ora_smon_${SID_NAME}"
ORACLE_MONITOR_PROCESSES[4]="ora_lgwr_${SID_NAME}"
ORACLE_MONITOR_PROCESSES[5]="ora_reco_${SID_NAME}"
ORACLE_MAINTENANCE_FLAG="yes"
ORACLE_MONITOR_INTERVAL="30"
ORACLE_TIME_OUT="30"
ORACLE_PARENT_ENVIRONMENT="no"
ORACLE_CLEANUP_BEFORE_STARTUP="no"
ORACLE_USER_SHUTDOWN_MODE="abort"
ORACLE_KILL_ASM_FOREGROUNDS="yes"
```

Saving Serviceguard Oracle Toolkit parameters

The Serviceguard parameters, such as IP addresses, Volume Groups, or File Systems are common to most toolkits. These parameters are saved in the Serviceguard package configuration worksheet. A blank copy of the worksheet, with added Oracle Toolkit parameters, is included in the Appendix section of this white paper.

The unique SGLX Oracle Toolkit parameters and other configuration information need to be saved. The SGLX Oracle Toolkit parameters, collected using one of the methods mentioned in the earlier section, are stored in the following SGLX Oracle Toolkit parameter template.

SGLX Oracle Toolkit package configuration parameters	RHCS service and resource configuration parameters
ORACLE_HOME /home/oracle/oracle10gr2/OracleHome ORACLE_ADMIN _____oracle_____ SID_NAME _____oradb_____	Oracle application home directory _/home/oracle/oracle10gr2/OracleHome Oracle user name ___oracle_____ Instance name (SID) of Oracle instance __oradb
	The resource agent is also customized with the following values ORACLE_SID - oradb ORACLE_HOME - /home/oracle/oracle10gr2/OracleHome ORACLE_USER - oracle
MONITOR_PROCESSES[0]=ora_pmon_${SID_NAME} MONITOR_PROCESSES[1]=ora_dbw0_${SID_NAME} MONITOR_PROCESSES[2]=ora_ckpt_${SID_NAME} MONITOR_PROCESSES[3]=ora_smon_${SID_NAME} MONITOR_PROCESSES[4]=ora_lgwr_${SID_NAME} MONITOR_PROCESSES[5]=ora_reco_${SID_NAME}	DB_PROCNAMES=pmon smon dbw0 lgwr ckpt reco

Migrating Common SGLX Package Parameters to RAs

There are a number of functions that are common to most Serviceguard for Linux packages. These include the IP addresses, Volume groups, and file systems. In an RHCS cluster these are managed by a number of resource agents.

Volume groups

Volume groups are treated one of two ways. If SCSI-3 PR fencing is used, the volume groups are converted to CLVM type volumes. The process for this is described in the Cluster Migration white paper and is repeated here. Once converted, these volume groups are managed by CLVMD, are activated at system start. Therefore no volume group is controlled by a resource agent. For other fencing methods, traditional volume groups are used as they are in the Oracle Toolkit and therefore a LVM RA is used.

SCSI-3 PR fencing

To convert the volume groups to CLVM, edit the `/etc/lvm/lvm.conf` file to set the parameter `locking_type` to 3. To convert the non-clustered Serviceguard volume group vgora to a clustered volume group run the command **`vgchange -c y vgora.`**

Following is an example of the commands execution.

1. Open the file `/etc/lvm/lvm.conf` in the vi editor. Edit the `locking_type` and set it to 3. Following is a section of the `lvm.conf` file, where `locking_type` is set.

```
 # Type of locking to use. Defaults to local file-based locking
(1).
 # Turn locking off by setting to 0 (dangerous: risks metadata
corruption
 # if LVM2 commands get run concurrently).
 # Type 2 uses the external shared library locking_library.
 # Type 3 uses built-in clustered locking.
 locking_type = 3
```

2. Run the command `vgchange –c y vgora` in the same node where the `lvm.conf` is edited. Following is an example output of this command.

```
# vgchange -c y vgora
Volume group "vgora" successfully changed
```

3. Execute `vgdisplay vgora` to verify whether the conversion has happened properly. Following is an example output of this command.

```
# vgdisplay vgora
--- Volume group ---
  VG Name               vgora
  System ID
  Format                lvm2
  Metadata Areas        1
  Metadata Sequence No  544
  VG Access             read/write
  VG Status             resizable
  Clustered             yes
  Shared                no
```

```
MAX LV                0
Cur LV                1
Open LV               0
Max PV                0
Cur PV                1
Act PV                1
VG Size               10.00 GB
PE Size               4.00 MB
Total PE              2559
Alloc PE / Size       2509 / 9.80 GB
Free  PE / Size       50 / 200.00 MB
VG UUID               bJlnP8-OOce-HH9p-JR4b-N3Ca-Np44-6jYekU
```

Other fencing methods

The *vg* parameter in the package configuration file specifies an LVM volume group on which a file system needs to be mounted. Multiple *vgs* can be defined for a package.

Create a separate LVM resource for every *vg* entry in the package configuration. The example of the LVM RA setup is shown in the XML in the "Setting up the RHCS Oracle service" section.

File systems

At start time, a Serviceguard package activates one or more logical volumes (associated with the file systems) and then mounts the file system. At halt time, the package un-mounts the file systems. In the case of Legacy packages, the package control script contains the necessary file system commands to complete the mount, un-mount, and fsck operations.

In Serviceguard, the `fs_name` parameter, in conjunction with `fs_directory`, `fs_type`, `fs_mount_opt`, `fs_umount_opt`, and `fs_fsck_opt` parameters, specifies a file system that is to be mounted by the package. The `fs_name` (parameter *LV* in Legacy packages) specifies the block device file for a logical volume and the parameter `fs_directory` is the root of the file system specified by `fs_name`.

In case of Modular packages, the file system information is specified as follows in the package configuration file.

```
fs_name                 /dev/vgora/lvora
fs_directory            /home/oracle/mntpt
fs_type                 ext3
fs_mount_opt            "-o rw"
fs_umount_opt           ""
fs_fsck_opt             ""
```

In case of Legacy packages, the file system information is specified as follows in the package control script.

```
LV[0]=/dev/vgora/lvora; FS[0]=/home/oracle/mntpt; FS_TYPE[0]="ext3";
FS_MOUNT_OPT[0]="-o rw"
FS_UMOUNT_OPT[0]=""; FS_FSCK_OPT[0]=""
```

In RHCS, file systems are treated one of two ways.

- If SCSI-3 PR fencing is not used, the underlying volume groups are LVM resources. The LVM resources configured in the "Volume group" migration step use lvm tags and thereby ensure VG exclusive activation. Create a separate file system resource for every fs entry in the package configuration.

- If SCSI-3 PR fencing is used, the underlying volume groups are CLVM type volumes. Create a separate file system resource for every fs entry in the package configuration. This approach is simple, but it does not ensure VG exclusive activation. If the user wants the cluster to ensure the protection to data integrity provided by VG exclusive, the file system has to be converted to a cluster file system (GFS) and then create a separate GFS file system resource for every fs entry in the package configuration.

In RHCS, the SGLX parameters translate to the `mountpoint`, `device`, `fstype`, and `options` parameter of the file system resource agent as shown in the following table

SGLX Modular	**SGLX Legacy**	**Description**	**RHCS**
fs_name	LV[x]	Logical volume	device
fs_directory	FS[x]	Mount point directory	mountpoint
fs_type	FS_TYPE[x]	File system type (e.g. ext3)	fstype
fs_mount_opt	FS_MOUNT_OPT[x]	Option used for mounting	options
fs_umount_opt	FS_UMOUNT_OPT[x]	Options used for unmounting	N/A

Following are a few recommendations to keep in mind while migrating Serviceguard packages to RHCS:

- For every *fs_name entry* in the Serviceguard package, a corresponding RHCS file system resource needs to be created. Ensure that resources are defined in the `/etc/cluster/cluster.conf` file in the order in which the *fs_name* parameters are defined in the Serviceguard package configuration file.

- Set the *force_fsck* option for the Red Hat file system resource so that a file system check is done on the file system before mounting it.

- Use *force_unmount* option in conjunction with *self_fence* so that if the umount fails the node will be reset.

The example of the File System RA setup is shown in the XML in the "Setting up the RHCS Oracle service" section.

NOTE: While many packages and toolkits would have a failover IP address that would require an IP RA, this is not required for the SGLX Oracle Toolkit packages.

Oracle Resource Agent Migration Procedure

This section covers the details that are unique to Oracle Toolkit package in the migration process. A step-by-step procedure is described for an Oracle Toolkit package. Any differences related to Legacy or Modular packages are described.

Oracle Toolkit migration planning

In this step, the required RHCS resources are determined. The Serviceguard Package migration worksheet is filled with values from the Serviceguard Cluster configuration files.

Following are the package configuration parameters of the Oracle Toolkit Modular package.

```
package_name                        orapkg
package_description                 "Serviceguard Package"
module_name                         sg/basic
module_version                      1
module_name                         sg/failover
module_version                      1
module_name                         sg/priority
module_version                      1
module_name                         sg/volume_group
module_version                      1
module_name                         sg/filesystem
module_version                      1
module_name                         sg/service
module_version                      1
module_name                         tkit/oracle/oracle
module_version                      1
package_type                        failover
node_name                           drama
node_name                           poetry
auto_run                            yes
node_fail_fast_enabled              no
halt_script_timeout                 no_timeout
successor_halt_timeout              no_timeout
operation_sequence                  $SGCONF/scripts/sg/volume_group.sh
operation_sequence                  $SGCONF/scripts/sg/filesystem.sh
operation_sequence                  $SGCONF/scripts/tkit/oracle/tkit_module.sh
operation_sequence                  $SGCONF/scripts/sg/service.sh
#log_level
failover_policy                     configured_node
failback_policy                     manual
priority                            no_priority

vgchange_cmd                        "vgchange -a y"
vg                                   vgora

concurrent_fsck_operations                1
concurrent_mount_and_umount_operations    1
fs_mount_retry_count                      0
fs_umount_retry_count                     1
fs_name                             /dev/vgora/lvora
fs_directory                        /home/oracle/mntpt
fs_type                              ext3
fs_mount_opt                        "-o rw"
fs_umount_opt                       ""
fs_fsck_opt                         ""

service_name                        oracle_service
service_cmd                         "$SGCONF/scripts/tkit/oracle/tkit_module.sh
oracle_monitor"
service_restart                     none
```

```
service_fail_fast_enabled       no
service_halt_timeout            300

service_name                    oracle_listener_service
service_cmd                     "$SGCONF/scripts/tkit/oracle/tkit_module.sh
oracle_monitor_listener"
service_restart                 none
service_fail_fast_enabled       no
service_halt_timeout            300
```

Following are the package configuration parameters of the Oracle Toolkit Legacy package.

```
PACKAGE_NAME                    orapkgleg
PACKAGE_TYPE                    FAILOVER
NODE_NAME                       drama
NODE_NAME                       poetry
AUTO_RUN                        YES
NODE_FAIL_FAST_ENABLED          NO
RUN_SCRIPT                /usr/local/cmcluster/pkg/oracletoolkitleg/orapkgleg.sh
HALT_SCRIPT               /usr/local/cmcluster/pkg/oracletoolkitleg/orapkgleg.sh
RUN_SCRIPT_TIMEOUT              NO_TIMEOUT
HALT_SCRIPT_TIMEOUT             NO_TIMEOUT
SUCCESSOR_HALT_TIMEOUT          NO_TIMEOUT
SCRIPT_LOG_FILE                 /usr/local/cmcluster/run/log/orapkgleg.log
FAILOVER_POLICY                 CONFIGURED_NODE
FAILBACK_POLICY                 MANUAL
PRIORITY                        NO_PRIORITY

SERVICE_NAME                    orasvc
SERVICE_FAIL_FAST_ENABLED       no
SERVICE_HALT_TIMEOUT            300

SERVICE_NAME                    oralsnrsvc
SERVICE_FAIL_FAST_ENABLED       no
SERVICE_HALT_TIMEOUT            300
```

Following are the package control script parameters of the Oracle Toolkit Legacy package.

```
VG[0]=vgora
LV[0]=/dev/vgora/lvora; FS[0]=/home/oracle/mntpt; FS_TYPE[0]="ext3";
FS_MOUNT_OPT[0]="-o rw"
FS_UMOUNT_OPT[0]=""; FS_FSCK_OPT[0]=""

SERVICE_NAME[0]=orasvc
SERVICE_CMD[0]="/usr/local/cmcluster/pkg/oracletoolkitleg/toolkit.sh monitor"
SERVICE_RESTART[0]=""

SERVICE_NAME[1]=oralsnrsvc
SERVICE_CMD[1]="/usr/local/cmcluster/pkg/oracletoolkitleg/toolkit.sh
monitor_listener"
SERVICE_RESTART[1]=""

function customer_defined_run_cmds
{
# ADD customer defined run commands.
    : # do nothing instruction, because a function must contain some command.
        /usr/local/cmcluster/pkg/oracletoolkitleg/toolkit.sh start

    test_return 51
}
```

```
# This function is a place holder for customer define functions.
# You should define all actions you want to happen here, after the service is
# halted.
#
function customer_defined_halt_cmds
{
# ADD customer defined halt commands.
    : # do nothing instruction, because a function must contain some command.
        /usr/local/cmcluster/pkg/oracletoolkitleg/toolkit.sh stop

    test_return 52
}
```

The table below illustrates how this information is used to populate the Serviceguard package configuration worksheet.

SGLX package configuration parameters	RHCS service and resource configuration parameters
Package Name __orapkg____ Node_name _____drama____ Node_name _____poetry____ Failover_policy _configured_node__ Failback_policy _____MANUAL____ Auto_run _____YES____ Node_fast_fail _____NO_____ **Package dependency** dependency_name ___NOT_USED___ dependency_condition ___NOT USED____ dependency_location ____ NOT USED ____ **Logical Volumes and File Systems** fs_name _ /dev/vgora/lvora__ fs_directory _ /home/oracle/mntpt____ fs_mount_opt __ -o rw_____ fs_umount_opt ___""_____ fs_fsck_opt ___""_____ fs_type ___ex3_____	**Service configuration** Service name ____Oraclesvc_____ Failover Domain ____Oracledom____ Service Resources List ____Oraclevg____ ____Oraclefs ____ ____Oracledb_____ Recovery policy (Restart, relocate, disable) _____ Auto start service _____YES_____ Run exclusive _____NO_____ Hard recovery _____NO_____ Depend _____NOT USED ____ Depend mode _____NOT USED ____ **Managed Resources/Failover Domain configuration** Domain name _____Oracledom____ Member node ____drama__ Member node ___poetry__ Restrict failover _____Yes_____ Prioritized list ___drama, poetry_____ **Resources/File system** Name ____Oraclefs_____ File system type ___ext3_____ Mount point ____/home/oracle/mntpt__ Device __/dev/vgora/lvora___ Options _____rw_____ File System ID _____""_____ Force unmount ____YES_____

Reboot if unmount fails _____NO_____
Check file system before mounting __*YES*_____

Network information
IP ___ *Not used*___
Subnet ___ *Not used*_____
Monitored_Subnet ___*Not used*_____
Monitored_subnet_access ____Not used___

Resources/IP address
IP address ____Not Used_____
Monitor Link ____Not Used_____

LVM volume groups
VG _____*vgora*_____

Resource/LVM
Name _____Oraclevg_____
Volume group name
_____vgora_____
Logical volume name
_____lvora_____

Service configuration

```
service_name
oracle_service
service_cmd
"$SGCONF/scripts/tkit/oracle/tkit
_module.sh oracle_monitor"
service_restart
none
service_fail_fast_enabled
no
service_halt_timeout
300
service_name
oracle_listener_service
service_cmd
"$SGCONF/scripts/tkit/oracle/tkit
_module.sh
oracle_monitor_listener"
service_restart
none
service_fail_fast_enabled
no
service_halt_timeout
300
```

Non-Serviceguard environment variable
Not used

External script
Not used

Script Resource
Not used

Priority _____
#Weight Name _____
#Weight Value _____
#STORAGE_GROUP _____
#USER_NAME _____
#USER_HOST _____
#USER_ROLE _____

Oracle Toolkit variables ORACLE_HOME /home/oracle/oracle10gr2/OracleHome ORACLE_ADMIN _____oracle_____ SID_NAME _____oradb_____	**Resource Oracle10g Failover Instance** Oracle application home directory _/home/oracle/oracle10gr2/OracleHome Oracle user name ___oracle_____ Instance name (SID) of Oracle instance __oradb The resource agent is also customized with the following values ORACLE_SID - oradb ORACLE_HOME - /home/oracle/oracle10gr2/OracleHome ORACLE_USER - oracle
MONITOR_PROCESSES[0]=ora_pmon_${SID_NAME} MONITOR_PROCESSES[1]=ora_dbw0_${SID_NAME} MONITOR_PROCESSES[2]=ora_ckpt_${SID_NAME} MONITOR_PROCESSES[3]=ora_smon_${SID_NAME} MONITOR_PROCESSES[4]=ora_lgwr_${SID_NAME} MONITOR_PROCESSES[5]=ora_reco_${SID_NAME}	DB_PROCNAMES=pmon smon dbw0 lgwr ckpt reco

Migration phase

During this phase, the RHCS cluster is configured and the RHCS resources are setup using the Package configuration worksheet. The actual migration is done in the following steps

1. Customizing the Oracle Resource Agent
2. Setting up the cluster, quorum rule, fencing, failover domain, and resources
3. Setting up the RHCS Oracle service
4. Starting the RHCS Oracle service

Customizing the Oracle Resource Agent

The RHCS Oracle RA residing in /usr/share/cluster/oracledb.sh needs to be customized to match the specific Oracle installation.

- Set the ORACLE_USER variable to the value of ORACLE_ADMIN from the saved SG Oracle Toolkit parameter values
- Set the ORACLE_HOME variable to the value of ORACLE_HOME from the saved SG Oracle Toolkit parameter values
- Set the ORACLE_SID variable to the value of SID_NAME from the saved SG Oracle Toolkit parameter values
- The LOCKFILE declaration needs to be commented out. The SGLX Oracle Toolkit does not support 10g-ias and hence this parameter is not required.
- The ORACLE_TYPE variable needs to be set to 10g.
  Note: RedHat RA does not yet support Oracle 11g or Oracle ASM.
- The ORACLE_HOSTNAME (optional) variable needs to be left empty. The SGLX Oracle Toolkit does not support virtual host name and hence this parameter is not required.

- DB_PROCNAMES variable needs to be set to the process names to be monitored.

Setting up the cluster, quorum rule, fencing, failover domain, and resources

Set up the RHCS cluster, quorum rule, and fencing. For information on setting up the cluster, quorum rule, and fencing, see the "Migrating an HP Serviceguard for Linux Cluster to Red Hat Cluster Suite for Red Hat Enterprise Linux 5".

The failover domains required for the migration of the Serviceguard package orapkg are setup. For information on the list of domains and the properties, see the package configuration worksheet prepared during the planning phase. Additional failover domains will be required if SCSI-3 PR fencing with automatic reset is setup.

From the package configuration worksheet, Oracledom is identified as the failover domain for the package orapkg and is of type "restricted, ordered". The domain members are drama and poetry. Use the RHCS configuration utility to create the Oracledom domains.

Setup the LVM, File system and Oracle 10g Failover Instance resources as required for the migration of the Serviceguard package orapkg. For information on the resource configuration details, see the package configuration worksheet prepared during the planning phase.

Setting up the RHCS Oracle service

The next step in the migration is setting up the RHCS Oracle cluster service, Oraclesvc. For information on the service, its failover domain, and child resources see the package configuration worksheet prepared during the planning phase.

After the configuration of the cluster, quorum rule, fencing, failover domains, the resources, and the service for Oracle verify that the required XML definitions are present in the /etc/cluster/cluster.conf file.

Following is an example of the RHCS /etc/cluster/cluster.conf with Oracle service setup. SCSI-3 PR fencing with automatic reset is also set up.

```
<?xml version="1.0"?>
<cluster alias="clust" config_version="84" name="clust">
        <fence_daemon clean_start="0" post_fail_delay="0" post_join_delay="3"/>
        <clusternodes>
                <clusternode name="poetry.ind.hp.com" nodeid="1" votes="1">
                        <fence>
                                <method name="1">
                                        <device name="SCSI_fence"
node="poetry.ind.hp.com"/>
                                </method>
                        </fence>
                </clusternode>
                <clusternode name="drama.ind.hp.com" nodeid="2" votes="1">
                        <fence>
                                <method name="1">
                                        <device name="SCSI_fence"
node="drama.ind.hp.com"/>
                                </method>
                        </fence>
                </clusternode>
        </clusternodes>
        <cman expected_votes="1" two_node="1"/>
        <fencedevices>
```

```
                <fencedevice agent="fence_scsi" name="SCSI_fence"/>
        </fencedevices>
        <rm>
                <failoverdomains>
                        <failoverdomain name="Oracledom" nofailback="0"
ordered="1" restricted="1">
                                <failoverdomainnode name="poetry.ind.hp.com"
priority="1"/>
                                <failoverdomainnode name="drama.ind.hp.com"
priority="1"/>
                        </failoverdomain>
                        <failoverdomain name="poetrydom" nofailback="0"
ordered="0" restricted="1">
                                <failoverdomainnode name="poetry.ind.hp.com"
priority="1"/>
                        </failoverdomain>
                        <failoverdomain name="dramadom" nofailback="0"
ordered="0" restricted="1">
                                <failoverdomainnode name="drama.ind.hp.com"
priority="1"/>
                        </failoverdomain>
                </failoverdomains>
                <resources>
                        <fs device="/dev/vgora/lvora" force_fsck="1"
force_unmount="1" fsid="45727" fstype="ext3" mountpoint="/home/oracle/mntpt"
name="Oraclefs" options="rw" self_fence="1"/>
                        <script file="/home/oracle/watchdog.sh"
name="watchdog_script"/>
                        <oracledb home="/home/oracle/oracle10gr2/OracleHome"
name="oradb" type="10g" user="oracle"/>
                </resources>
                <service autostart="0" domain="poetrydom" exclusive="0"
max_restarts="0" name="wdtcsrv-node1" recovery="restart" restart_expire_time="0">
                        <script ref="watchdog_script"/>
                </service>
                <service autostart="0" domain="dramadom" exclusive="0"
max_restarts="0" name="wdtcsrv-node2" recovery="restart" restart_expire_time="0">
                        <script ref="watchdog_script"/>
                </service>
                <service autostart="1" domain="Oracledom" exclusive="0"
name="Oraclesvc" recovery="relocate">
                        <fs ref="Oraclefs">
                                <oracledb ref="oradb"/>
                        </fs>
                </service>
        </rm>
        <quorumd interval="2" label="qdisk_orcl" min_score="1" tko="5" votes="1">
                <heuristic interval="2" program="/home/oracle/checkpvtlink.sh
eth1" score="1"/>
        </quorumd>
        <totem consensus="4800" join="60" token="20000"
token_retransmits_before_loss_const="20"/>
</cluster>
```

Note that the LVM line is not used in this example as the volume group has been converted to CLVM type volume. Additional failover domains are configured as SCSI3-PR fencing with automatic reset is setup.

Following is another example of the RHCS /etc/cluster/cluster.conf with Oracle service setup. HP iLO fencing, instead of SCSI-3 PR fencing, is used in this example.

```
<?xml version="1.0"?>
<cluster alias="clust" config_version="81" name="clust">
        <fence_daemon clean_start="0" post_fail_delay="0" post_join_delay="3"/>
        <clusternodes>
                <clusternode name="poetry.ind.hp.com" nodeid="1" votes="1">
                        <fence>
                                <method name="1">
                                        <device name="poetryiLO"/>
                                </method>
                        </fence>
                </clusternode>
                <clusternode name="drama.ind.hp.com" nodeid="2" votes="1">
                        <fence>
                                <method name="1">
                                        <device name="dramaiLO"/>
                                </method>
                        </fence>
                </clusternode>
        </clusternodes>
        <cman expected_votes="1" two_node="1"/>
        <fencedevices>
                <fencedevice agent="fence_ilo" hostname="poetry-c.ind.hp.com"
login="root" name="poetryiLO" passwd="lvmtest"/>
                <fencedevice agent="fence_ilo" hostname="drama-c.ind.hp.com"
login="root" name="dramaiLO" passwd="lvmtest"/>
        </fencedevices>
        <rm>
                <failoverdomains>
                        <failoverdomain name="Oracledom" nofailback="0"
ordered="1" restricted="1">
                                <failoverdomainnode name="poetry.ind.hp.com"
priority="1"/>
                                <failoverdomainnode name="drama.ind.hp.com"
priority="1"/>
                        </failoverdomain>
                </failoverdomains>
                <resources>
                        <lvm lv_name="lvora" name="Oraclevg" vg_name="vgora"/>
                        <fs device="/dev/vgora/lvora" force_fsck="1"
force_unmount="1" fsid="45727" fstype="ext3" mountpoint="/home/oracle/mntpt"
name="Oraclefs" options="rw" self_fence="1"/>
                        <oracledb home="/home/oracle/oracle10gr2/OracleHome"
name="oradb" type="10g" user="oracle"/>
                </resources>
                <service autostart="1" domain="Oracledom" exclusive="0"
name="Oraclesvc" recovery="relocate">
                        <lvm ref="Oraclevg">
                                <fs ref="Oraclefs">
                                        <oracledb ref="oradb"/>
                                </fs>
                        </lvm>
                </service>
        </rm>
        <quorumd interval="2" label="qdisk_orcl" min_score="1" tko="5" votes="1">
                <heuristic interval="2" program="/home/oracle/checkpvtlink.sh
eth1" score="1"/>
        </quorumd>
        <totem consensus="4800" join="60" token="20000"
token_retransmits_before_loss_const="20"/>
</cluster>
```

Note that the filesystem is not converted to a cluster filesystem in this example. If the user converts the file system to GFS, then the fs line will be replaced with clusterfs.

Starting the RHCS Oracle service

Enable the startup of services `cman`, `clvmd`, `qdiskd, scsi_reserve,` and `rgmanager` at system boot time, by executing the chkconfig command.

Following is an example of the command execution.

```
# chkconfig cman on
# chkconfig clvmd on
# chkconfig qdiskd on
# chkconfig scsi_reserve on
# chkconfig rgmanager on
```

If the cluster is setup using SCSI-3 PR fencing with automatic reset, disable the startup of service watchdogd at system boot time, by executing the chkconfig command.

Following is an example of the command execution.

```
# chkconfig watchdogd off
```

Start the following cluster services:

```
# service cman start
# service clvmd start
# service qdiskd start
# service scsi_reserve start
# service rgmanager start
```

Enable the watchdog controller cluster services, `wdtcsrv-node1` on `node1` and `wdtcsrv-node2` on `node2`.

```
On node1 execute the command as follows:
$> clusvcadm -e wdtcsrv-node1

On node2 execute the command as follows:
$> clusvcadm -e wdtcsrv-node2
```

Enable the Oracle service, Oraclesvc, on node1 *or* node2.

```
On node1 or node2 execute the following command:
# clusvcadm -e Oraclesvc
```

Using the command *`clustat`* verify that the services, `Oraclesvc` and `wdtcsrv-node1,` are up on `node1 or node2` and service `wdtcsrv-node2` is up on `node2.`

Following is an example output of the `clustat` command.

```
# clustat
Cluster Status for clust @ Wed May 20 14:52:02 2009
Member Status: Quorate

 Member Name                 ID   Status
 ------ ----                ---- ------
 poetry.ind.hp.com             1 Online, Local, rgmanager
 drama.ind.hp.com              2 Online, rgmanager

 Service Name                  Owner (Last)                  State
 ------- ----                  ----- ------                  -----
```

```
service:Oraclesvc          poetry.ind.hp.com          started
service:wdtcsrv-node1      poetry.ind.hp.com          started
service:wdtcsrv-node2      drama.ind.hp.com           started
```

Terms

CDB
: Cluster Database

CMAN
: The Cluster Manager is responsible managing the cluster quorum and keeps track of the cluster membership

CLVM
: Cluster Logical Volume Manager

GFS
: Global File System

HA
: High Availability

Legacy package
: Package Configuration style exclusively used in HP Serviceguard A.11.16 and earlier and support through A.11.19. The package configuration information is included in both the package ASCII file and the package control script.

LVM
: Logical volume management

Modular package
: Single package configuration file, introduced in Serviceguard A.11.18. The package configuration information is included in only the package configuration (ASCII) file, whereas in pre-11.18 packages configuration information is in both the package ASCII file and the package control script.

OEM
: Oracle Enterprise Manager

RA
: Resource Agent

RHCS
: The Red Hat Cluster Suite is an integrated set of software components that can be deployed to suite your needs for performance, high-availability, load balancing, scalability, file sharing, and economy.

RHEL5
: Red Hat Enterprise Linux 5

SGLX
: HP Serviceguard on Linux

XML
: The Extensible Markup Language is a general-purpose specification for creating custom markup languages.

For More Information

- HP Serviceguard for Linux product documentation at http://docs.hp.com
- Red Hat Cluster Suite for RHEL5 configuration guide at http://www.redhat.com/docs/manuals/csgfs
- HP Serviceguard for Linux certification matrix showing servers, storage, and software versions supported: http://www.hp.com/info/sglx

Appendix

Serviceguard package configuration worksheet with Oracle Toolkit parameters

SGLX package configuration	RHCS service, resource, and failover domain configuration
Package Name _____ Node_name _____ Node_name _____ Failover_policy _____ Failback_policy _____ Auto_run _____ Node_fast_fail _____ **Package dependency** dependency_name _____ dependency_condition _____ dependency_location _____ **Logical Volumes and File Systems** fs_name _____ fs_directory _____ fs_mount_opt _____ fs_umount_opt _____ fs_fsck_opt _____ fs_type _____ **Network information** IP _____ Subnet _____ Monitored_Subnet _____ Monitored_subnet_access _____	**Service configuration** Service name _____ Failover Domain _____ Service Resources List _____ _____ _____ Recovery policy (Restart, relocate, disable) _____ Auto start service _____ Run exclusive _____ Hard recovery _____ Depend _____ Depend mode _____ **Managed Resources/Failover Domain configuration** Domain name _____ Member node _____ Member node _____ Restrict failover _____ Prioritized list _____ **Resources/File system** Name _____ File system type _____ Mount point _____ Device _____ Options _____ File System ID _____ Force unmount _____ Reboot if unmount fails _____ Check file system before mounting _____ **Resources/IP address** IP address _____ Monitor Link _____

LVM volume groups
VG _____

Service configuration
Service_Name _____
Command _____
Restart _____
Fast_fail_enabled _____

Non-Serviceguard environment variable
_____
_____
_____
_____

External script
External script file _____

Priority _____
#Weight Name _____
#Weight Value _____
#STORAGE_GROUP _____
#USER_NAME _____
#USER_HOST _____
#USER_ROLE _____

Oracle Toolkit Parameters
ORACLE_HOME _____
ORACLE_ADMIN _____
SID_NAME _____

MONITOR_PROCESSES[0]=
MONITOR_PROCESSES[1]=
MONITOR_PROCESSES[2]=
MONITOR_PROCESSES[3]=
MONITOR_PROCESSES[4]=
MONITOR_PROCESSES[5]=

Resource/LVM
Name _____
Volume group name
_____
Logical volume name
_____

Script Resource
Name of script _____

Resource Oracle10g Failover Instance
Oracle application home directory _____
Oracle user name _____
Instance name (SID) of Oracle instance _____

The resource agent is customized with the following values
ORACLE_SID -
ORACLE_HOME -
ORACLE_USER -
DB_PROCNAMES

5900-0325, June 2009