

Veritas™ Cluster Server Agent for Oracle Installation and Configuration Guide

HP-UX 11i v3

5.2

Veritas Cluster Server Agent for Oracle Installation and Configuration Guide

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Introducing the Veritas Cluster Server agent for Oracle

This chapter includes the following topics:

- [About the Veritas Cluster Server agent for Oracle](#)
- [What's new in this release](#)
- [Supported software for VCS agent for Oracle](#)
- [How the agent makes Oracle highly available](#)
- [About Veritas Cluster Server agent for Oracle agent functions](#)
- [Typical Oracle configuration in a VCS cluster](#)
- [About setting up Oracle in a VCS cluster](#)

About the Veritas Cluster Server agent for Oracle

The Veritas Cluster Server agent for Oracle provides high availability for Oracle.

Veritas high availability agents do the following:

- Monitor specific resources within an enterprise application.
- Determine the status of these resources.
- Start or stop the resources according to external events.

The agents include resource type declarations and agent executables. The agent for Oracle monitors the Oracle and listener processes, brings them online, and takes them offline.

The agent package for Oracle contains the following agents that work together to make Oracle highly available:

- The Oracle agent monitors the Oracle database processes.
- The Netlsnr agent monitors the listener process.

About the agent for Oracle ASM

The Veritas Cluster Server agent suite for Oracle provides high availability agents for the Oracle 10g R2 or later databases that use Automatic Storage Management (ASM). The agents for Oracle ASM monitor the Oracle ASM instance and ASM disk groups.

The agent package for Oracle also contains the following agents for Oracle ASM:

- The ASMinst agent monitors the Oracle ASM instance.
- The ASMDG agent monitors the Oracle ASM disk groups.

What's new in this release

The Veritas Cluster Server agent for Oracle includes the following new or enhanced features:

- The agent provides high availability for the Oracle ASM instance and the disk groups on Oracle 10g R2 and later
The Veritas Cluster Server agent for Oracle has introduced two new agents to keep the Oracle ASM instance and ASM disk groups highly available.
See [“How the agent makes Oracle ASM instance highly available”](#) on page 14.
- The agent supports Oracle 11g.
- The agent detects intentional offline.
The Oracle agent has a new IntentionalOffline attribute with the default value as 1. If you enable Health check monitoring option, the agent detects graceful shutdown for Oracle 10g and later.
See [“Attribute definition for the Oracle agent”](#) on page 106.
- The agent supports CUSTOM as one of the start up options when you use Hot backup feature of Oracle.
See [“Failing over Oracle after a VCS node failure during hot backup”](#) on page 37.
- The agent supports a new action entry point pfile.vfd.

See [“Action entry point for VCS agent for Oracle”](#) on page 21.

- The agent also supports csh and tcsh shell when Health check monitoring is enabled.

Supported software for VCS agent for Oracle

The Veritas Cluster Server agent for Oracle 5.2 supports the following software versions in a Veritas Cluster Server (VCS) environment:

Oracle	Oracle9i, Oracle 10g R1, Oracle 10g R2, and Oracle 11g R1 (including 64-bit versions) Note: Veritas Cluster Server agent for Oracle supports the specified Oracle versions on HP-UX if Oracle supports that version on HP-UX. Refer to the <i>Veritas Cluster Server Release Notes</i> for more details.
VCS	VCS 5.0.1 on HP-UX
HP-UX	HP-UX 11i version 3.0 Refer to the <i>Veritas Cluster Server Release Notes</i> for more details.

Note: Within the cluster, all systems must use the same operating system version and patch level.

How the agent makes Oracle highly available

The Veritas Cluster Server agent for Oracle continuously monitors the Oracle database and listener processes to verify they function properly.

See [“About Veritas Cluster Server agent for Oracle agent functions”](#) on page 15.

The agent provides the following levels of application monitoring:

- **Primary or Basic monitoring**
 This mode has Process check and Health check monitoring options. With the default Process check option, the agent verifies that the Oracle and listener processes are present in the process table. Process check cannot detect whether processes are in a hung or stopped states.
 The Oracle agent provides functionality to detect whether the Oracle resource was intentionally taken offline. The agent detects graceful shutdown for Oracle 10g and later. When an administrator brings down Oracle gracefully, the agent does not trigger a resource fault even though Oracle is down. The value of the type-level attribute IntentionalOffline attribute and the value of the

MonitorOption attribute must be set to 1 to enable Oracle agent's intentional offline functionality.

For example, with the intentional offline functionality, the agent faults the Oracle resource if you run the `shutdown abort` command. The agent reports the Oracle resource as offline if you gracefully bring down Oracle using commands like `shutdown`, `shutdown immediate`, or `shutdown transactional`.

- Secondary or Detail monitoring

In this mode, the agent runs a perl script that executes commands against the database and listener to verify their status.

The agent detects application failure if the monitoring routine reports an improper function of the Oracle or listener processes. When this application failure occurs, the Oracle service group fails over to another node in the cluster. Thus the agent ensures high availability for the Oracle services and the database.

How the agent makes Oracle ASM instance highly available

Oracle 10g and later provides ASM feature to store and manage the Oracle data that includes data files, control files, and log files. These Oracle data files that are stored in ASM disk groups are called ASM files.

For ASM-managed databases, you must start an ASM instance before you start the database instance. The ASM instance mounts ASM disk groups and makes ASM files available to database instances.

ASM requires Cluster Synchronization Services to enable synchronization between an ASM instance and a database instance.

See Oracle documentation.

The Veritas Cluster Server agent for Oracle has the following agents to keep the Oracle ASM instance and ASM disk groups highly available:

- ASMInst agent

See [“ASMInst agent functions”](#) on page 24.

- ASMDG agent

See [“ASMDG agent functions”](#) on page 25.

The Veritas high availability agent for Oracle continuously monitors the ASM instance and ASM disk groups to verify they function properly.

About Veritas Cluster Server agent for Oracle agent functions

The functions an agent performs are called entry points. Review the functions for the following agents that are part of the Veritas Cluster Server agent suite for Oracle:

- Oracle agent functions
See [“Oracle agent functions”](#) on page 15.
- Netlsnr agent functions
See [“Netlsnr agent functions”](#) on page 23.
- ASMInst agent functions
See [“ASMInst agent functions”](#) on page 24.
- ASMDG agent functions
See [“ASMDG agent functions”](#) on page 25.

Oracle agent functions

The Oracle agent monitors the database processes.

[Table 1-1](#) lists the Oracle agent functions.

Table 1-1 Oracle agent functions

Agent operation	Description
Online	<p>Starts the Oracle database by using the following <code>svrmgr1</code> or <code>sqlplus</code> command:</p> <pre>startup force pfile=\$PFile</pre> <p>The default Startup option is <code>STARTUP_FORCE</code>. You can also configure the agent to start the database using different Startup options for Oracle.</p> <p>See “Startup and shutdown options for the Oracle agent” on page 16.</p>

Table 1-1 Oracle agent functions (continued)

Agent operation	Description
Offline	<p>Stops the Oracle database with the specified options by using the following <code>svrmgrl</code> or <code>sqlplus</code> command:</p> <pre>shutdown immediate</pre> <p>The default Shutdown option is IMMEDIATE. You can also configure the agent to stop the database using different Shutdown options for Oracle.</p> <p>See “Startup and shutdown options for the Oracle agent” on page 16.</p>
Monitor	<p>Verifies the status of the Oracle processes. The Oracle agent provides two levels of monitoring: basic and detail.</p> <p>See “Monitor options for the Oracle agent” on page 18.</p>
Clean	<p>Forcibly stops the Oracle database by using the following <code>svrmgrl</code> or <code>sqlplus</code> command:</p> <pre>shutdown abort</pre> <p>If the process does not respond to the <code>shutdown</code> command, then the agent does the following:</p> <ul style="list-style-type: none">■ Scans the process table for the processes that are associated with the configured instance■ Kills the processes that are associated with the configured instance
Info	<p>Provides the static and dynamic information about the state of the database.</p> <p>See “Info entry point for VCS agent for Oracle” on page 20.</p>
Action	<p>Performs the predefined actions on a resource.</p> <p>See “Action entry point for VCS agent for Oracle” on page 21.</p>

Startup and shutdown options for the Oracle agent

You can specify Startup and Shutdown options for the Oracle instances that are configured.

[Table 1-2](#) lists the startup options that the agent supports.

Table 1-2 Startup options

Option	Description
STARTUP_FORCE (Default)	<p>Runs the command <code>startup force</code> <code>pfile='location_of_pfile'</code> if the pfile is configured.</p> <p>If the pfile is not configured, the agent runs <code>startup force</code>. It picks up the default parameter files from their default locations.</p>
STARTUP	<p>Runs the command <code>startup pfile='location_of_pfile'</code> if the pfile is configured.</p> <p>If the pfile is not configured, the agent picks up the default parameter files from their default locations and runs <code>startup</code>.</p>
RESTRICTED	Starts the database in the RESTRICTED mode.
RECOVERDB	Performs a database recovery on instance startup.
CUSTOM	<p>Uses a predefined SQL script (<code>start_custom_\${SID}.sql</code>) and runs custom startup options. The script must be in the <code>/opt/VRTSagents/ha/bin/Oracle</code> directory and must have access to the Oracle Owner OS user. If the file is not present, the agent logs an error message.</p> <p>With a custom script, the agent takes the following action:</p> <pre> sqlplus /nolog <<! connect / as sysdba; @start_custom_\${SID}.sql exit; ! </pre>
SRVCTLSTART	<p>Uses the <code>srvctl</code> utility to start an instance of the database.</p> <p>For RAC clusters, you must manually set the default startup option as SRVCTLSTART.</p>

[Table 1-3](#) lists the shutdown options that the agent supports.

Table 1-3 Shutdown options

Option	Description
IMMEDIATE (Default)	Shuts down the Oracle instance by running <code>shutdown immediate</code> .
TRANSACTIONAL	Runs the <code>shutdown transactional</code> command. This option is valid only for the database versions that support this option.

Table 1-3 Shutdown options (continued)

Option	Description
CUSTOM	Uses a predefined SQL script (<code>shut_custom_\$\$SID.sql</code>) and runs custom shutdown options. The script must be in the <code>/opt/VRTSagents/ha/bin/Oracle</code> directory and must have access to the Oracle Owner OS user. If the file is not present, the agent shuts the agent down with the default option.
SRVCTLSTOP	Uses the <code>srvctl</code> utility to stop an instance of the database. For RAC clusters, you must manually set the default option as <code>SRVCTLSTOP</code> .

Monitor options for the Oracle agent

The Oracle agent provides two levels of monitoring: basic and detail. By default, the agent does a basic monitoring.

The basic monitoring mode has the following options:

- Process check
- Health check

The `MonitorOption` attribute of the Oracle resource determines whether the the agent must perform basic monitoring in Process check or Health check mode.

[Table 1-4](#) describes the basic monitoring options.

Table 1-4 Basic monitoring options

Option	Description
0 (Default)	Process check The agent scans the process table for the <code>ora_dbw</code> , <code>ora_smon</code> , <code>ora_pmon</code> , and <code>ora_lgwr</code> processes to verify that Oracle is running.
1	Health check (supported on Oracle 10g and later) The agent uses the Health Check APIs from Oracle to monitor the SGA and retrieve the information about the instance. If you want to use the Oracle agent's intentional offline functionality, you must enable Health check monitoring. See “How the agent makes Oracle highly available” on page 13.

Review the following considerations if you want to configure basic monitoring:

- Basic monitoring of Oracle processes is user-specific. As a result, an Oracle instance started under the context of another user cannot be detected as online. For example, if an Oracle instance is started under the user "oraVRT" and the agent is configured for a user "oracle", the agent will not detect the instance started by "oraVRT" as online.

This could lead to situations where issuing a command to online a resource on a node might online an already running instance on that node (or any other node).

So, Symantec recommends that instances started outside VCS control be configured with the correct Owner attribute corresponding to the OS user for that instance.

- Within a failover service group, when the administrator onlines an Oracle resource on a node and if the Oracle instance is online on any other node within a cluster, the instance would come up. However, the database does not get mounted. In such circumstances, this failure is detected only by health check monitoring option of basic monitoring or detail monitoring. Detail monitoring updates the database table after detecting a failure whereas health check monitoring does not.

If health check monitoring option of basic monitoring or detail monitoring is not configured, then such a conflict would go undetected.

In the detail monitoring mode, the agent performs a transaction on a test table in the database to ensure that Oracle functions properly. The agent uses this test table for internal purposes. Symantec recommends that you do not perform any other transaction on the test table. The DetailMonitor attribute of the Oracle resource determines whether the the agent must perform detail monitoring.

See [“How the agent handles Oracle error codes during detail monitoring”](#) on page 19.

See [“Setting up detail monitoring for VCS agent for Oracle”](#) on page 85.

How the agent handles Oracle error codes during detail monitoring

The Veritas Cluster Server agent for Oracle handles Oracle errors during detail monitoring. The agent classifies Oracle errors according to their severity and associates predefined actions with each error code.

The agent includes a reference file oraerror.dat, which lists Oracle errors and the action to be taken when the error is encountered.

The file stores information in the following format:

```
Oracle_error_string:action_to_be_taken
```

For example:

```
01035:WARN
01034:FAILOVER
```

Table 1-5 lists the predefined actions that the agent takes when an Oracle error is encountered.

Table 1-5 Predefined agent actions for Oracle errors

Action	Description
IGNORE	<p> Ignores the error.</p> <p>When the Veritas agent for Oracle encounters an error, the agent matches the error code in the oraerror.dat file. If the error does not have a matching error code in the file, then the agent ignores the error.</p>
UNKNOWN	<p>Marks the resource state as UNKNOWN and sends a notification if the Notifier resource is configured. See the <i>Veritas Cluster Server User's Guide</i> for more information about VCS notification.</p> <p>This action is typically associated with configuration errors or program interface errors.</p>
WARN	<p>Marks the resource state as ONLINE and sends a notification if the Notifier resource is configured.</p> <p>This action is typically associated with errors due to exceeded quota limits, session limits/restricted sessions so on.</p>
FAILOVER (Default)	<p>Marks the resource state as OFFLINE. This faults the service group by default, which fails over to the next available system.</p> <p>If the file oraerror.dat is not available, the agent assumes this default behavior for every Oracle error encountered.</p>
NOFAILOVER	<p>Freezes the service group temporarily and marks the resource state as OFFLINE. The agent also sends a notification if the Notifier resource is configured.</p> <p>This action is typically associated with the errors that are not system-specific. For example, if a database does not open from a node due to corrupt Oracle files, failing it over to another node does not help.</p>

Info entry point for VCS agent for Oracle

The Veritas Cluster Server agent for Oracle supports the Info entry point, which provides static and dynamic information about the state of the database.

To invoke the Info entry point, type the following command:

```
# hares -value resource ResourceInfo [system] \
  [-clus cluster | -localclus]
```

The entry point retrieves the following static information:

■ Version	■ InstanceNo	■ InstanceName
■ DatabaseName	■ HostName	■ StartupTime
■ Parallel	■ Thread	■ InstanceRole

The entry point retrieves the following dynamic information:

■ InstanceStatus	■ Logins	■ OpenMode
■ LogMode	■ ShutdownPending	■ DatabaseStatus
■ Shared Pool Percent free	■ Buffer Hits Percent	

You can add additional attributes by adding sql statements to the file /opt/VRTSagents/ha/bin/Oracle/resinfo.sql. For example:

```
select 'static:HostName:'||host_name from v$instance;
select 'dynamic:ShutdownPending:'||shutdown_pending from
v$instance;
```

The format of the selected record must be as follows:

```
attribute_type:userkey_name:userkey_value
```

The variable *attribute_type* can take the value static and/or dynamic.

Action entry point for VCS agent for Oracle

The Veritas Cluster Server agent for Oracle supports the Action entry point, which enables you to perform predefined actions on a resource.

To perform an action on a resource, type the following command:

```
# hares -action res token [-actionargs arg1 ...] \
  [-sys system] [-clus cluster]
```

You can also add custom actions for the agent.

For further information, refer to the *Veritas Cluster Server Agent Developer's Guide*.

See [Table 1-7](#) on page 22.

[Table 1-6](#) describes the agent's predefined actions.

Table 1-6 Predefined agent actions

Action	Description
VRTS_GetInstanceName	Retrieves the name of the configured instance. You can use this option for the Oracle and the Netlsnr resources.
VRTS_GetRunningServices	Retrieves the list of processes that the agent monitors. You can use this option for the Oracle and the Netlsnr resources.
DBRestrict	Changes the database session to enable the RESTRICTED mode.
DBUndoRestrict	Changes the database session to disable the RESTRICTED mode.
DBSuspend	Suspends a database.
DBResume	Resumes a suspended database.
DBTbspBackup	Backs up a tablespace; <code>actionargs</code> contains name of the tablespace to be backed up.

[Table 1-7](#) lists the virtual fire drill actions of the Veritas Cluster Server agent for Oracle lets you run infrastructure checks and fix specific errors.

Table 1-7 Predefined virtual fire drill actions

Virtual fire drill action	Description
getid (Oracle agent)	Verifies that the Oracle Owner exists on the node.
home.vfd (Oracle agent)	<p>Verifies the following:</p> <ul style="list-style-type: none"> ■ ORACLE_HOME is mounted on the node and corresponding entry is in the fstab. If the ORACLE_HOME is not mounted, the action entry point checks if any other resource has already mounted ORACLE_HOME. ■ Pfile is provided and it exists on the node. ■ Password file from \$ORACLE_HOME/dbs/orapw[SID] is present.

Table 1-7 Predefined virtual fire drill actions (*continued*)

Virtual fire drill action	Description
owner.vfd (Oracle agent)	Verifies the uid and gid of the Oracle Owner attribute. Checks if uid and gid of Owner attribute is the same on the node where the Oracle resource is currently ONLINE.
pfile.vfd (Oracle agent)	Checks for the presence of pfile or spfile on the local disk. If both pfile and spfile are not present, the agent function exits. If the Oracle resource is online in the cluster, the agent function logs a message that the spfile must be on the shared storage because the Oracle resource is online.
tnsadmin.vfd (Netlsnr agent)	Checks if listener.ora file is present. If listener.ora file, it checks if ORACLE_HOME is mounted and displays appropriate messages.

Netlsnr agent functions

The listener is a server process that listens to incoming client connection requests and manages traffic to the database. The Netlsnr agent brings the listener services online, monitors their status, and takes them offline.

[Table 1-8](#) lists the Netlsnr agent functions.

Table 1-8 Netlsnr agent functions

Agent operation	Description
Online	Starts the listener process by using the following command: <code>lsnrctl start \$LISTENER</code>
Offline	Stops the listener process by using the following command: <code>lsnrctl stop \$LISTENER</code> If the listener is configured with a password, the agent uses the password to stop the listener.

Table 1-8 Netlsnr agent functions (continued)

Agent operation	Description
Monitor	<p>Verifies the status of the listener process.</p> <p>The Netlsnr agent provides two levels of monitoring, basic and detail:</p> <ul style="list-style-type: none">■ In the basic monitoring mode, the agent scans the process table for the <code>tnslsnr</code> process to verify that the listener process is running.■ In the detail monitoring mode, the agent uses the <code>lsnrctl status \$LISTENER</code> command to verify the status of the Listener process. (Default)
Clean	Scans the process table for <code>tnslsnr \$Listener</code> and kills it.
Action	<p>Performs the predefined actions on a resource.</p> <p>See “Action entry point for VCS agent for Oracle” on page 21.</p>

ASMIInst agent functions

The ASMIInst agent monitors the processes of ASM instance.

[Table 1-9](#) lists the ASMIInst agent operations.

Table 1-9 ASMIInst agent operations

Agent operation	Description
Online	<p>Starts the Oracle ASM instance by using the following SQL command:</p> <pre>startup nomount</pre> <p>The Online operation starts the ASM instance without mounting any disk groups.</p>
Offline	<p>Stops the Oracle ASM instance by using the following SQL command:</p> <pre>shutdown immediate</pre>

Table 1-9 ASMIInst agent operations (*continued*)

Agent operation	Description
Monitor	<p>Verifies the status of the ASM instance.</p> <p>The ASMIInst agent monitors the ASM instance using the Health check monitoring method. If the Health check monitoring fails, the agent does Process check monitoring.</p> <p>The agent also checks if the ocssd.bin process is running. The agent returns offline for the following conditions:</p> <ul style="list-style-type: none"> ■ The process is not running. ■ The process is restarted. <p>Note: Make sure that the OCSSD process is running. The ASMIInst agent only monitors the OCSSD process. The agent does not start or stop the process.</p>
Clean	<p>Forcibly stops the Oracle ASM instance by using the following SQL command:</p> <pre>shutdown abort</pre> <p>If the process does not respond to the <code>shutdown</code> command, the agent kills the process using the <code>SIGTERM</code> or <code>SIGKILL</code> commands.</p>

ASMDG agent functions

The ASMDG agent mounts the ASM disk groups that the Oracle databases use, monitors the status, unmounts the ASM disk groups.

You must have specified the disk group names in the `DiskGroup` attribute of the ASMDG agent.

[Table 1-10](#) lists the ASMDG agent operations.

Table 1-10 ASMIInst agent operations

Agent operation	Description
Online	<p>Mounts the specified Oracle ASM disk groups to an ASM instance by using the following SQL command:</p> <pre>alter diskgroup dg_name1, dg_name2 mount</pre>

Table 1-10 ASMInst agent operations (continued)

Agent operation	Description
Offline	<p>Unmounts the specified Oracle ASM disk groups from an ASM instance by using the following SQL command:</p> <pre>alter diskgroup dg_name1, dg_name2 dismount</pre> <p>Note: The following Oracle message appears in the VCS log when an ASM instance with no ASM disk groups mounted is shut down:</p> <p>ORA-15100: invalid or missing diskgroup name</p>
Monitor	<p>Verifies the status of the specified ASM disk groups.</p> <p>The disk groups can be in one of the following states:</p> <ul style="list-style-type: none">■ mounted■ dismounted■ unknown■ broken■ connected <p>If multiple ASM disk groups are configured for a resource, then the ASMDG agent returns the resource state considering the status of all the specified ASM disk groups.</p>
Clean	<p>Forcibly unmounts the Oracle ASM disk groups by using the following SQL command:</p> <pre>alter diskgroup dg_name1, dg_name2 dismount force</pre>

Typical Oracle configuration in a VCS cluster

A typical Oracle configuration in a VCS cluster has the following characteristics:

- VCS is configured in a two-node cluster.
- The Oracle data is installed on shared storage.
- The Oracle binaries are installed locally on both nodes or on shared disks.

If you use Oracle ASM feature, then the characteristics are as follows:

 - The Oracle binaries are installed locally on both the nodes.
 - The database files are installed on the ASM disk groups.

Review the typical cluster setup illustration for ASM-managed database. See [Figure 1-2](#) on page 27.
- The Veritas Cluster Server agent for Oracle is installed on both nodes.

For ASM, ASMIInst and ASMDG agents are installed on both nodes.

Figure 1-1 depicts a configuration where Oracle binaries and data are installed completely on shared disks.

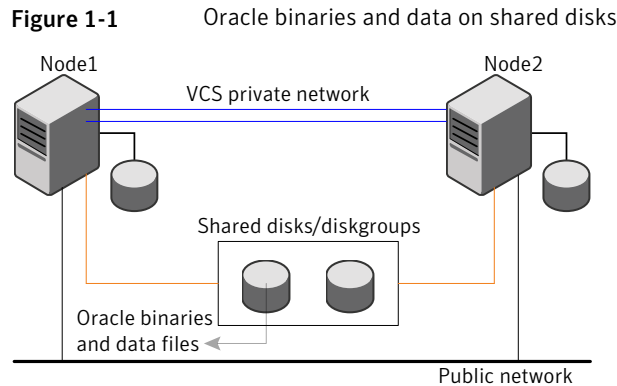
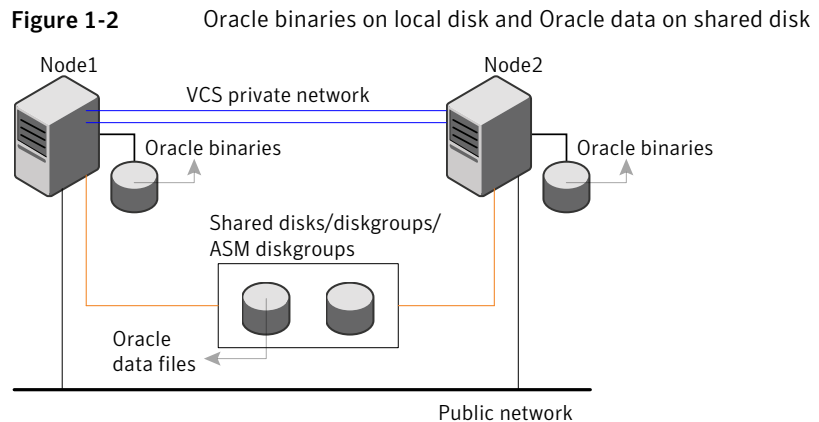


Figure 1-2 depicts a configuration where Oracle binaries are installed locally on each node and Oracle data is installed on shared disks.



About setting up Oracle in a VCS cluster

Tasks involved in setting up Oracle in a VCS environment include:

- Setting up a VCS cluster
Refer to *Veritas Cluster Server Installation Guide* for more information on installing and configuring VCS.
- Installing and configuring Oracle

See [“About installing Oracle in a VCS environment”](#) on page 29.

- Installing the Veritas Cluster Server agent for Oracle
See [“Before you install or upgrade the agent for Oracle”](#) on page 53.
- Configuring VCS service groups for Oracle
See [“About configuring a service group for Oracle”](#) on page 59.

Installing and configuring Oracle

This chapter includes the following topics:

- [About installing Oracle in a VCS environment](#)
- [Before you install Oracle in a VCS environment](#)
- [About VCS requirements for installing Oracle](#)
- [About Oracle installation tasks for VCS](#)
- [Installing Oracle binaries in a VCS environment](#)
- [Configuring the Oracle ASM in a VCS environment](#)
- [Configuring the Oracle database in a VCS environment](#)
- [Setting MLOCK privilege for Oracle DBA user](#)
- [Copying the \\$ORACLE_BASE/admin/SID directory](#)
- [Copying the Oracle ASM initialization parameter file](#)
- [Verifying access to the Oracle database](#)

About installing Oracle in a VCS environment

The strategy for installing Oracle into a VCS cluster is aimed at ensuring that installations on all nodes in the cluster are uniform.

See the Oracle documentation on HP-UX.

You can install Oracle in the following ways in a VCS environment:

\$ORACLE_HOME on the shared disk	Oracle binaries and Oracle data are installed on shared disks.
\$ORACLE_HOME on the local disk	Oracle binaries are installed locally on each node and Oracle data is installed on shared disks.

Note: To use ASM for Oracle database storage, you must install \$ORACLE_HOME on the local disks of all nodes in the cluster.

See [“About Oracle installation tasks for VCS”](#) on page 38.

Note that Oracle data includes the datafiles, control files, redo log files, and archive log files.

When installing Oracle, ensure that the login_id, id_name, group_id, and group_name for the Oracle owner is the same on all the nodes. The user oracle and the group dba must be local and not Network Information Service (NIS and NIS+) users.

Before you install Oracle in a VCS environment

Make sure you meet the following prerequisites:

- Verify that VCS is installed on all nodes in the cluster.
- Verify that all nodes in the cluster have adequate resources to run Oracle and VCS.
- Verify that the network supports the TCP/IP protocol.
- Make sure that you meet the VCS requirements to install Oracle.
See [“About VCS requirements for installing Oracle”](#) on page 30.

About VCS requirements for installing Oracle

Make sure you meet the following requirements to install Oracle in a VCS cluster:

Kernel parameter configuration

Each node on which you want to install Oracle must meet the following Oracle configuration requirements:

- Disk partitions
- Shared memory
- Swap size
- Semaphores
- File handles

See Oracle documentation for the corresponding operating system for specific requirement details.

Location of the \$ORACLE_HOME

Depending on your environment, you can place the Oracle home directory (\$ORACLE_HOME) in one of the following ways:

- Locally on each server's disk
- On the shared storage.

If you want to use Oracle ASM, then you must place the Oracle home directory only on the local disks of each node.

Review the advantages of each approach to make a decision.

See [“Location of the \\$ORACLE_HOME”](#) on page 35.

Configurations with multiple Oracle instances (SIDs)

You can have multiple Oracle instances that are defined in a single cluster configuration. In such cases, the parameter file for each instance must be accessible on all the nodes in the service group's SystemList attribute.

Note: If you installed multiple versions of Oracle on the same system, make sure that the SIDs are unique.

Location of Oracle database tablespaces

If you plan to create the tablespaces using regular (UFS or VxFS) files, the file systems that contain these files must be located on shared disks. Create the same file system mount points on each node.

If you use raw devices on shared disks for Oracle tablespaces, you must meet the following requirements:

- The ownership must be Oracle dba user.
- The permissions or access mode must be 660 on the raw devices that store the Oracle data.

For example, if you use Veritas Volume Manager, type:

```
# vxedit -g diskgroup_name set group=dba \
user=oracle mode=660 volume_name
```

Note: The user `oracle` and the group `dba` must be local and not Network Information Service (NIS and NIS+) users

Transparent listener failover

You can enable Oracle Server clients to reconnect after a node switch without reconfiguring. For such reconnections you must include at least one IP resource in the service group for the Oracle resource. The hostname mapping the IP address of this resource must be used for the Host field in the file `$TNS_ADMIN/listener.ora`.

If you use the TCP/IP protocol for Oracle client/server communication, verify that the file `/etc/services` contains the service name of the Oracle Net Service. You must verify this file on each node that is defined in the service group's SystemList attribute.

Listener authentication in VCS environment

The Netlsnr agent supports OS authentication as well as password authentication for the listener process. If you use Oracle 10g or later, Symantec recommends you to configure OS authentication. If you want to configure a listener password, make sure that you configure the password correctly. A misconfigured password can cause the listener to fault.

See [“Encrypting Oracle database user and listener passwords”](#) on page 83.

Refer to the Oracle documentation for details on configuring the listener authentication.

Long pathname limitation for \$ORACLE_HOME	<p>The HP-UX process table limits process pathnames to 79 characters.</p> <p>The full pathname of processes in \$ORACLE_HOME can possibly have 80 characters or more. In this case, you can create a soft link to the \$ORACLE_HOME directory. You can then use the soft link in place of the long filename in the Home attribute in the main.cf file.</p> <p>Review the instructions to replace the long pathnames for \$ORACLE_HOME in the agent attributes.</p> <p>See “Replacing the long pathnames for \$ORACLE_HOME in the agent attributes” on page 36.</p>
Oracle NLS information	<p>You can define the NLS information in one of the following ways:</p> <ul style="list-style-type: none"> ■ Define the appropriate parameters in the Oracle parameter file. ■ Define the appropriate environment variables in the EnvFile attribute for the agents. <p>See “About the resource type and attribute definitions” on page 105.</p> <p>Defining the parameters in the Oracle parameters file affects NLS settings for the Oracle server. Defining the environment variables affects the NLS input and output of client utilities.</p>

Hot backup of Oracle
database in VCS environment

The hot backup of Oracle database is enabled by default in VCS environment.

A node can fail during a hot backup of an Oracle database. During such failures, VCS can fail over to another node only if the following requirements are met:

- The AutoEndBkup attribute value must be set to 1, which is the default.
See [“Attribute definition for the Netlsnr agent”](#) on page 111.
- The Startup option of Oracle agent must be STARTUP, STARTUP_FORCE, or CUSTOM.
See [“Startup and shutdown options for the Oracle agent”](#) on page 16.

If you do not meet VCS requirements, you must manually end the hot backup and then fail over Oracle to another node.

See [“Failing over Oracle after a VCS node failure during hot backup”](#) on page 37.

Note: If you set the AutoEndBkup attribute value to 0, then to avoid unexpected VCS behavior you must set the DetailMonitor attribute value to 1.

See [“Setting up detail monitoring for VCS agent for Oracle”](#) on page 85.

Storage devices for Oracle ASM configurations in VCS

You can choose one of the following storage devices for Oracle ASM:

- ASM disks as raw disks
If you use raw disks, then make sure that the disks have the persistent permissions that are specified for ASM \$ORACLE_HOME.
- ASM disks as Veritas Volume Manager volumes
If you use VxVM volumes, then make sure that the disks have persistent permissions across reboots. The permissions must be the same as that of ASM \$ORACLE_HOME.
See Veritas Volume Manager documentation.
- ASM disks as Veritas Cluster Volume Manager volumes
If you use CVM volumes, then make sure that the disks have persistent permissions across reboots. The permissions must be the same as that of ASM \$ORACLE_HOME.
See Veritas Volume Manager documentation.

If you want to configure mirroring for ASM disks that use VxVM or CVM volumes, then you must configure VxVM mirroring and not configure ASM mirroring.

See [“Sample Oracle ASM configurations”](#) on page 138.

Location of the \$ORACLE_HOME

You can place the Oracle home directory (\$ORACLE_HOME), which contains the Oracle binaries and configuration files, locally on each server’s disk. Alternatively, you can place the Oracle home directory on the shared storage. The correct location for Oracle binaries depends on your environment. The following points discuss the advantages of each approach.

`$ORACLE_HOME` directory
on shared disks

You can install the Oracle Database Server (`$ORACLE_HOME`) on shared disks. Each node in the cluster must have the same mount point directory for the shared file system. Placing the Oracle binaries on shared storage simplifies setting up a given node in a cluster to run an instance. Each database service group is self-contained. An instance can be moved to a new node in the cluster that shares the storage.

For example, in a cluster with four nodes, you can have three database instances or service groups, each at a different Oracle version. If the Oracle binaries are placed on shared storage, three copies of Oracle, that is, one per version are required on shared storage. By contrast, placing the Oracle binaries on local storage, would require as many as 12 copies of the binaries (three versions on four nodes).

The disadvantage of this approach is that a rolling upgrade of Oracle binaries on shared storage is not possible.

`$ORACLE_HOME` directory
on local disks

You can install the Oracle Database Server (`$ORACLE_HOME`) on the local disk. The advantage is that you can upgrade the Oracle database binaries on an offline node while the database server runs on another node. The database server can later be switched to the upgraded node (provided the database is compatible), permitting a minimum amount of downtime.

The disadvantage of this approach is that with a large number of nodes, it becomes difficult to maintain the various Oracle installations.

If you want to use Oracle ASM, then you must place the Oracle home directory only on the local disks of each node. You can install Oracle ASM on the same Oracle home as Oracle Database, or you can install Oracle ASM on a different Oracle home directory.

See Oracle documentation.

Replacing the long pathnames for `$ORACLE_HOME` in the agent attributes

You must create the soft link for `$ORACLE_HOME` on each of the nodes in the cluster, and then modify the values for the agent attributes.

To replace the long pathnames

- 1 Create a soft link to the long pathname for \$ORACLE_HOME. For example:

```
# ln -s /opt/apps/oracle/home/directory/is/longer/than\  
/eighty/characters/oracle /opt/link_to_longpath
```

- 2 In the file /etc/VRTSvcs/conf/config/main.cf, modify the Home and the Pfile attributes for the Oracle and the Netlsnr resource types.

For ASM, also modify these attributes for the ASMInst and the ASMDG resource types.

See [“About the sample configurations for Oracle enterprise agent”](#) on page 119.

For example:

```
Home = "/opt/link_to_longpath"  
Pfile = "/opt/link_to_longpath/dbs/initVRT.ora"
```

Failing over Oracle after a VCS node failure during hot backup

If a node fails during a hot backup, VCS can succeed with a node failover only if you meet VCS requirements for Oracle hot backup.

See [“About VCS requirements for installing Oracle”](#) on page 30.

If you do not meet VCS requirements, the agent cannot open the database in the backup mode on the failover node. Therefore, VCS cannot online the Oracle group on the failover node. You may encounter the following Oracle errors in this situation:

```
$ ORA-1110 "data file %s: '%s'"
```

or

```
$ ORA-1113 "file %s needs media recovery"
```

In such cases, you must manually end the hot backup and then fail over Oracle to another node.

To manually fail over Oracle after a node failure that occurs during hot backup

- 1** Take the datafiles in the database out of the backup mode.
Refer to the Oracle documentation for instructions on how to change the state of the database files.
- 2** Shut down the database.
- 3** Bring the Oracle service group online on the failover node.
The agent can now start the Oracle instance, mount the database, and open the datafiles.

About Oracle installation tasks for VCS

Tasks to complete Oracle installation in a VCS cluster depend on whether you want the \$ORACLE_HOME on shared disk or local disk.

See [“Installation tasks for \\$ORACLE_HOME on shared disks”](#) on page 39.

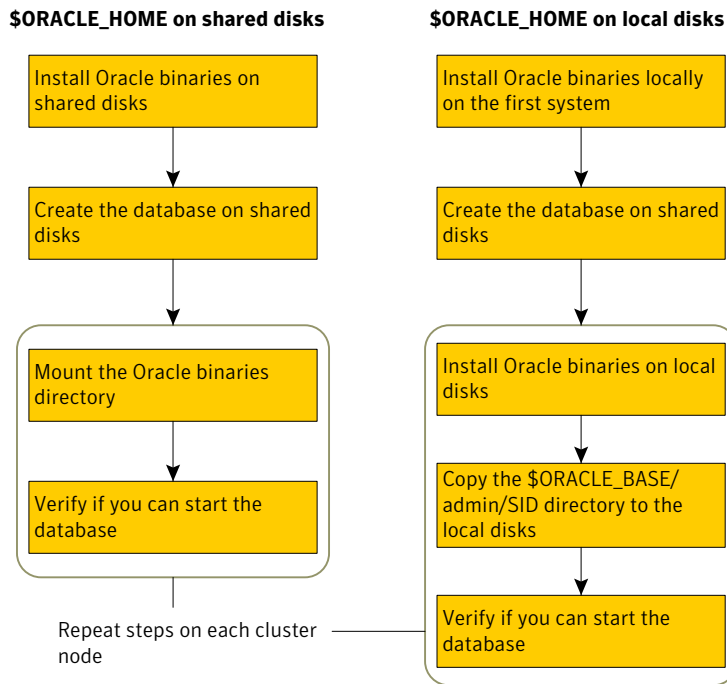
See [“Installation tasks for \\$ORACLE_HOME on local disks”](#) on page 40.

For ASM, you must install \$ORACLE_HOME on local disks and configure the Oracle ASM.

See [“Installation tasks for Oracle using ASM”](#) on page 40.

[Figure 2-1](#) illustrates the flow of the installation when the \$ORACLE_HOME is on shared disk and on local disk.

Figure 2-1 Comparison of the installation flow



Installation tasks for \$ORACLE_HOME on shared disks

The methodology is to install the Oracle binaries and to create the Oracle database on shared disks during the first installation. Mount the Oracle binaries directory and verify that the database can be started from all nodes.

The tasks to install Oracle such that \$ORACLE_HOME is on shared disks are as follows:

- | | |
|--|---|
| From any node in the cluster, install Oracle binaries on shared disks. | See “Installing Oracle binaries in a VCS environment” on page 42. |
| Disable the Oracle clustering daemon for Oracle 10g and later. | See “Disabling the clustering daemon for Oracle 10g or later” on page 45. |
| From the node where you installed Oracle, create the database on shared disks. | See “Configuring the Oracle database in a VCS environment” on page 47. |
| Set the MLOCK privileges for DBA user to prevent ASYNCH_IO errors. | See “Setting MLOCK privilege for Oracle DBA user” on page 49. |

From each node that would be a part of the Oracle cluster, verify access to the database on shared disks. See [“Verifying access to the Oracle database”](#) on page 50.

Installation tasks for \$ORACLE_HOME on local disks

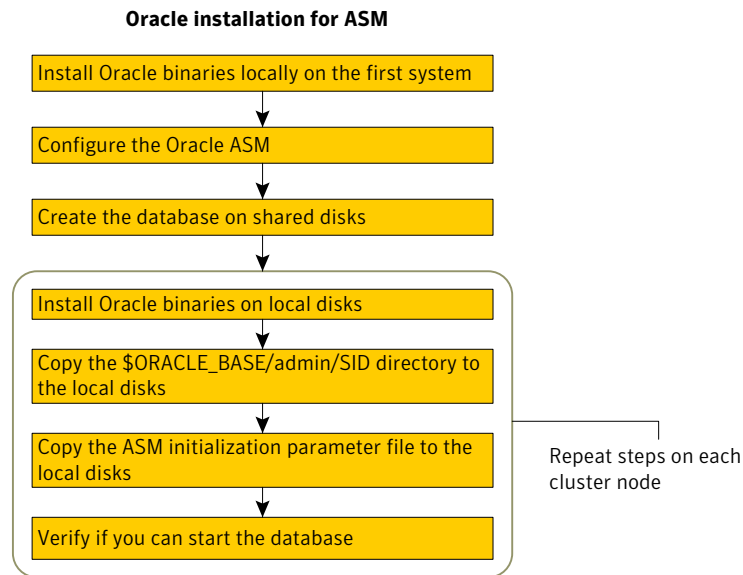
The methodology is to install the Oracle binaries on the local disk and to create the Oracle database on shared disks during the first installation. Then, install the Oracle binaries on local disks of other nodes. This methodology ensures that all Oracle installations are identical and access the database from the same location on the shared disk.

The tasks to install Oracle such that \$ORACLE_HOME is on local disks are as follows:

- | | |
|--|---|
| On the first node in the cluster, install Oracle binaries on the local disk. | See “Installing Oracle binaries in a VCS environment” on page 42. |
| From the first node where you installed Oracle, create the database on shared disks. | See “Configuring the Oracle database in a VCS environment” on page 47. |
| Set the MLOCK privileges for DBA user to prevent ASYNCH_IO errors. | See “Setting MLOCK privilege for Oracle DBA user” on page 49. |
| On each node in the cluster, perform the following tasks: | See “Installing Oracle binaries in a VCS environment” on page 42. |
| <ul style="list-style-type: none"> ■ Install Oracle binaries on the local disk. ■ Copy the \$ORACLE_BASE/admin/SID directory to the local disk. ■ Verify if you can start the database. | <p>See “Copying the \$ORACLE_BASE/admin/SID directory” on page 50.</p> <p>See “Verifying access to the Oracle database” on page 50.</p> |

Installation tasks for Oracle using ASM

[Figure 2-2](#) illustrates the flow of the installation when you want to use ASM for the Oracle database.

Figure 2-2 Installation flow for Oracle ASM

The methodology is to perform the following:

- Install the Oracle binaries on the local disk, configure the ASM, and to create the Oracle database on ASM disk groups during the first installation.
- Then, install the Oracle binaries on local disks of other nodes.

This methodology ensures that all Oracle installations are identical and access the database from the same location.

The tasks to install Oracle such that `$ORACLE_HOME` is on local disks are as follows:

On the first node in the cluster, install Oracle binaries on the local disk.	See “Installing Oracle binaries in a VCS environment” on page 42.
Enable the Oracle clustering daemon for Oracle 10g and later.	See “Enabling the clustering daemon for ASM-managed database” on page 47.
From the first node where you installed Oracle, create the database on shared disks.	See “Configuring the Oracle database in a VCS environment” on page 47.
Set the MLOCK privileges for DBA user to prevent ASYNCH_IO errors.	See “Setting MLOCK privilege for Oracle DBA user” on page 49.

On each node in the cluster, perform the following tasks:

- Install Oracle binaries on the local disk.
- Copy the \$ORACLE_BASE/admin/SID directory to the local disk.
- Copy the ASM initialization parameter file to the local disk.
- Verify if you can start the database.

See [“Installing Oracle binaries in a VCS environment”](#) on page 42.

See [“Copying the \\$ORACLE_BASE/admin/SID directory”](#) on page 50.

See [“Copying the Oracle ASM initialization parameter file”](#) on page 50.

See [“Verifying access to the Oracle database”](#) on page 50.

Installing Oracle binaries in a VCS environment

Install a version of Oracle that the Veritas Cluster Server agent for Oracle supports.

Note: If you want to use Oracle ASM feature, do not disable the Cluster Synchronization Services.

To install Oracle9i for VCS

- 1 Insert the Oracle CD.
- 2 Set the *DISPLAY* variable, mount the CD drive, and run the Oracle installer as Oracle User.

```
# /mnt/cdrom/runInstaller
```

- 3 Read the Welcome screen and click **Next**.
- 4 If you perform the Oracle installation for the first time, the Inventory Location dialog box is displayed. Specify the location of your base directory and click **OK**.
 - If you plan the \$ORACLE_HOME to be on local disks in your installation, specify a location on the local disk.
 - If you plan the \$ORACLE_HOME to be on shared disks in your installation, specify a location on the shared disk.
- 5 On the UNIX Group Name dialog box, enter the name of a UNIX group that has permissions to update the Oracle software and click **Next**.
- 6 The Oracle installer displays a message asking you to run the script `/tmp/orainstRoot.sh`. Run the script and click **Continue** to return to the Oracle installer.

- 7 On the File Locations dialog box, enter or select a name and a path for the Oracle Home and click **Next**.
- 8 On the Available Products dialog box, select the **Oracle9i Database** option and click **Next**.
- 9 On the Installation Types dialog box, select your installation type and click **Next**.
- 10 On the Database Configuration dialog box, select the **Software Only** option and click **Next**.
- 11 On the Summary dialog box, review your selections. Click **Back** to make changes. Otherwise click **Install**.
- 12 Click **Next** after the installation is complete.
- 13 On the End of Installation dialog box, click **Exit**.
- 14 Proceed to configure the database on shared disks.

See [“Configuring the Oracle database in a VCS environment”](#) on page 47.

To install Oracle 10g for VCS

- 1 Insert the Oracle CD.
- 2 Set the *DISPLAY* variable, mount the CD drive, and run the Oracle installer as Oracle User.


```
# /mnt/cdrom/runInstaller
```
- 3 Read the Welcome screen and click **Next**.
- 4 If you perform the Oracle installation for the first time, the Inventory Location dialog box is displayed. Specify the location of your base directory and click **OK**. Do one of the following:
 - If you plan the \$ORACLE_HOME to be on local disks in your installation, specify a location on the local disk.
 - If you plan the \$ORACLE_HOME to be on shared disks in your installation, specify a location on the shared disk.
- 5 The Oracle installer displays a message asking you to run the script `/tmp/orainstRoot.sh`. Run the script and click **Continue** to return to the Oracle installer.
- 6 In the File Locations dialog box, enter or select a name and a path for the Oracle Home and click **Next**.
- 7 In the Installation Types dialog box, select your installation type and click **Next**.

- 8 In the Select Database Configuration dialog box, select the **Do not create a starter database** option and click **Next**.
- 9 In the Summary dialog box, review your selections. Click **Back** to make changes. Otherwise click **Install**.
- 10 Click **Next** after the installation is complete.
- 11 In the End of Installation dialog box, click **Exit**.
- 12 Disable the Oracle clustering daemon.
See [“Disabling the clustering daemon for Oracle 10g or later”](#) on page 45.
If you want to use ASM, skip this step and proceed to configuring the Oracle ASM.
See [“Configuring the Oracle ASM in a VCS environment”](#) on page 46.
- 13 Proceed to configure the database on shared disks.
See [“Configuring the Oracle database in a VCS environment”](#) on page 47.

To install Oracle 11g for VCS

- 1 Insert the Oracle CD.
- 2 Set the *DISPLAY* variable, mount the CD drive, and run the Oracle installer as Oracle User.


```
# /mnt/cdrom/runInstaller
```
- 3 In the Select Installation Method dialog box, choose the **Advanced Installation** method and click **Next**.
- 4 If you perform the Oracle installation for the first time, the Specify Inventory directory and credentials dialog box is displayed. Specify the location of your inventory directory and click **Next**. Do one of the following:
 - If you plan the \$ORACLE_HOME to be on local disks in your installation, specify a location on the local disk.
 - If you plan the \$ORACLE_HOME to be on shared disks in your installation, specify a location on the shared disk.
- 5 Follow the wizard instructions and select other options
- 6 In the Create Database dialog box, choose **Install database Software only**.
- 7 In the Summary dialog box, review your selections. Click **Back** to make changes. Otherwise click **Install**.

- 8 During the installation, the Oracle installer displays a message asking you to run some configuration scripts. Run the scripts and click **OK** to return to the Oracle installer.
- 9 Click **Next** after the installation is complete.
- 10 In the End of Installation dialog box, click **Exit**.
- 11 Disable the Oracle clustering daemon.
See [“Disabling the clustering daemon for Oracle 10g or later”](#) on page 45.
If you want to use ASM, skip this step and proceed to configuring the Oracle ASM.
See [“Configuring the Oracle ASM in a VCS environment”](#) on page 46.
- 12 Proceed to configure the database on shared disks.
See [“Configuring the Oracle database in a VCS environment”](#) on page 47.

Disabling the clustering daemon for Oracle 10g or later

If you installed Oracle binaries for Oracle versions 10g or later on shared disks, you must disable the Oracle clustering daemon.

Warning: If you want to use ASM feature, then do not disable the Oracle clustering daemon.

Oracle versions 10g and later provide a clustering daemon called Oracle Cluster Synchronization Service Daemon (CSSD). If the Oracle binary files are on a shared storage, the `init` command to start the daemon may result in an error. Because a VCS cluster for Oracle does not require this daemon, Symantec recommends you to disable the daemon.

To disable the daemon on HP-UX

- ◆ Remove the following line from the `/etc/inittab` file on the node from where you ran the Oracle installation wizard:

```
hl:23:respawn:/etc/init.d/init.cssd run >/dev/null 2>&1 >  
</dev/null
```

Configuring the Oracle ASM in a VCS environment

If you want to use ASM feature of Oracle 10g or later, then configure the Oracle ASM using the Database Configuration Assistant. You need to configure the ASM only once, from the node on which you installed Oracle first.

Review the procedure to configure ASM for Oracle database.

To configure ASM for the Oracle 10g or Oracle 11g database

- 1 Set the *DISPLAY* variable and start the Oracle Database Configuration Assistant as Oracle User.

```
# dbca
```

- 2 Read the Welcome screen, click **Next**.
- 3 In the Operations dialog box, select the **Configure Automatic Storage Management** option and click **Next**.
- 4 In the Database Templates dialog box, select a template to create the database and click **Next**.
- 5 In the Database Identification dialog box, enter or select a unique name and SID for the global database and click **Next**.
- 6 Follow the wizard instructions and select other options.
- 7 In the Storage Options dialog box, select the **Automatic Storage Option** and click **Next**.
- 8 Review the warning message and click **OK**. Make sure that the Oracle clustering daemon is running.
See [“Enabling the clustering daemon for ASM-managed database”](#) on page 47.
- 9 In the Create ASM Instance dialog box, specify the ASM SYS user password and click **Next**.
- 10 Click **OK** in the message box that appears.
- 11 In the ASM Disk Groups dialog box, choose to create a new disk group or add disks to an existing disk group.
- 12 In the Change Disk Discovery Path dialog box, enter the path name.
Depending on the disk device you want to use for ASM, enter the disk discovery path.

- 13 In the Create Disk Group dialog box, do the following:

- Choose one of the Redundancy options.

- In the Select Member Disks area, choose the **Show Candidates** option.
 - Select the disks against the **Disk Path** from the list to create the ASM disk group.
 - Click **OK**.
- 14 Follow the wizard instructions and complete configuring the Oracle ASM.

Enabling the clustering daemon for ASM-managed database

If your database is ASM-managed, then you must make sure that the Oracle clustering daemon is enabled in each node of the cluster. If the CSSD is not enabled, perform the following procedure.

To enable the clustering daemon for ASM-managed database

- 1 Log in as superuser.
- 2 Run the following command to configure and start the clustering daemon.

```
# $ORACLE_HOME/bin/localconfig add
```
- 3 Make sure the node has only one Oracle CSSD process running.

Configuring the Oracle database in a VCS environment

Configure an Oracle database on shared disks using the Database Configuration Assistant. You need to configure the database only once, from the node on which you installed Oracle first.

If you configured ASM for Oracle database storage, configure the Oracle database on ASM disk groups.

To configure the Oracle9i database

- 1 Set the *DISPLAY* variable and start the Oracle Database Configuration Assistant as Oracle User.

```
# dbca
```
- 2 Read the Welcome screen, click **Next**.
- 3 On the Operations dialog box, select the **Create a database** option and click **Next**.
- 4 On the Database Templates dialog box, select a template to create the database and click **Next**.

- 5 On the Database Identification dialog box, enter or select a unique name and SID for the global database and click **Next**.
- 6 On the Database Connection Options dialog box, select the **Dedicated Server Mode** or the **Shared Server Mode** and click **Next**.
- 7 On the Initialization Parameters dialog box, specify the locations of the archive logs and the initialization parameter files:
 - If you want to enable archive logs for the database, click the **Archive** tab and select the **Archive Log Mode** check box. In the Archive Log Destination(s) list, enter a path on the shared disk to ensure that the Archive Log is created on the shared disk.
 - Click the **File Locations** tab.
 - If installing Oracle locally on all systems, make sure that the initialization parameter file and the trace file directories are on the local disk.
 - Modify other parameters, if desired.
 - Click **Next**.
- 8 On the Database Storage dialog box, specify the locations of the Control, Data, and Redo log files:
 - In the left pane, expand the **Storage** folder by clicking the + next to it.
 - Click **Controlfile** and click the **General** tab in the right pane.
 - In the **File Directory** field, enter a path on the shared disk for each control file.
 - Expand the **Datafiles** folder by clicking the + next to it.
 - Select the datafile in the left pane and click the **General** tab in the right pane. In the **Name** field, enter a path on the shared disk for each datafile.
 - Expand the **Redo Log Groups** folder by clicking the + next to it.
 - Select the Redo Log file in the left pane. In the **File Directory** field in the right pane, enter the path of a directory on the shared disk for each Redo Log file. Specify file sizes for the Redo Log files, if desired.
 - Click **Next**.
- 9 On the Creation Options dialog box, select the **Create Database** check box and click **Finish**.
- 10 On the Summary dialog box, review your selections and click **OK**.

To configure the Oracle 10g or Oracle 11g database

- 1 Set the *DISPLAY* variable and start the Oracle Database Configuration Assistant as Oracle User.

dbca
- 2 Read the Welcome screen, click **Next**.
- 3 In the Operations dialog box, select the **Create a database** option and click **Next**.
- 4 In the Database Templates dialog box, select a template to create the database and click **Next**.
- 5 In the Database Identification dialog box, enter or select a unique name and SID for the global database and click **Next**.
- 6 Follow the wizard instructions and select other options.
- 7 In the Storage Options dialog box, select the **File System** or **Raw Devices** option and click **Next**.

If you configured ASM, select **Automatic Storage Option (ASM)** and click **Next**.
- 8 If you configured ASM, in the ASM Disk Groups dialog box, select the ASM disk group for the Oracle database storage and click **Next**.
- 9 In the Database File Locations dialog box, specify a location on the shared disk for the database files to be created and click **Next**.

If you configured ASM, choose **Use Oracle-Managed Files**, specify the database area, and click **Next**.
- 10 In the Recovery Configuration dialog box, specify the **Flash Recovery Area** on the shared disk and click **Next**.

If you configured ASM, specify the appropriate **Flash Recovery Area** location and click **Next**.
- 11 If you use Oracle 11g, in the Security Settings dialog box, choose the recommended security setting. Choose the **Keep the enhanced 11g default security settings** option and click **Next**.
- 12 Follow the wizard instructions and complete creating the database.

Setting MLOCK privilege for Oracle DBA user

To prevent ASYNCH_IO errors from occurring during select and update queries on the Oracle database, set the MLOCK privilege for the dba user.

To set MLOCK privilege for DBA user

- 1 Give the MLOCK privilege to the dba group:

```
# setprivgrp dba MLOCK
```

- 2 Create the /etc/privgroup file and add the line:

```
dba MLOCK
```

- 3 Verify the availability of MLOCK privilege for the dba group:

```
# /usr/bin/getprivgrp dba
```

Copying the \$ORACLE_BASE/admin/SID directory

Follow the instruction on each node in the cluster, only if the \$ORACLE_HOME is on local disks.

To copy the \$ORACLE_BASE/admin/SID directory

- ◆ Copy the directory \$ORACLE_BASE/admin/*SID* from the shared disk to the local disk.

The variable *SID* represents the database instance.

Refer to Oracle's documentation on OFA Structure for more information.

Copying the Oracle ASM initialization parameter file

If your Oracle is ASM-managed, then perform the procedure on each node in the cluster.

To copy the ASM initialization parameter file

- ◆ Copy the init*SID*.ora file from the \$ORACLE_HOME/dbs directory on the node where you first installed Oracle ASM to the local node.

where *SID* is the ASM instance identifier.

Verifying access to the Oracle database

You can verify access to the database by running an SQL query. Depending on the location of your \$ORACLE_HOME, perform one of the following procedures.

Upon completion, the Oracle database is started from the node in the cluster that you last performed this procedure.

To verify access to the Oracle database

- ◆ Depending on the location of your \$ORACLE_HOME, perform one of the following procedures:

For \$ORACLE_HOME on shared disks, start the Oracle database.

Verify that you can access the shared database from each node. Perform the steps from each node that would be a part of the Oracle cluster.

To start the Oracle database (for \$ORACLE_HOME on shared disks)

- 1 If the Oracle binaries are mounted on any other node, unmount it.
- 2 If the data files on shared disk are mounted on any node, unmount it.
- 3 Mount the Oracle binaries and data files.
- 4 Start the database.

For \$ORACLE_HOME on local disks, start the Oracle database.

Verify that you can access the database individually on each node that would be a part of the Oracle cluster.

To start the Oracle database (for \$ORACLE_HOME on local disks)

- 1 Make sure you have installed Oracle binaries on the node.
- 2 If the data files on shared disk are mounted on any node, unmount it.
- 3 Mount the data files.
- 4 Start the database.

For ASM, the \$ORACLE_HOME is on local disks and the database is configured on ASM disk groups.

Start the ASM-managed Oracle database.

Verify that you can access the database individually on each node that would be a part of the Oracle cluster.

To start the Oracle database (for \$ORACLE_HOME on local disks)

- 1 Make sure you have installed Oracle binaries on the node.
- 2 If you use VxVM disks as ASM disks, do the following:
 - If the ASM disk groups are mounted on any node, do the following:
 - Unmount the ASM disk groups from the ASM instance.
 - Stop the ASM instance.
 - Stop the VxVM volumes.
 - Deport the VxVM disk groups.
 - Import the VxVM disk groups on this node and start the volumes.
 - Start the ASM instance.
 - Mount the ASM disk groups.
- 3 If you use CVM volumes for ASM, do the following:
 - Unmount the ASM disk group from the ASM instance on the node where the disk group is mounted.
 - Mount the ASM disk groups on the other node.
- 4 If you use raw disks as ASM disks, do the following:
 - If the ASM disk groups are mounted on any node, unmount it.
 - If the ASM instance is not running on this node, then start the ASM instance.
 - Mount the ASM disk groups.
- 5 Start the database.

Installing and removing the agent for Oracle

This chapter includes the following topics:

- [Before you install or upgrade the agent for Oracle](#)
- [Installing the VCS agent for Oracle software](#)
- [Upgrading the VCS agent for Oracle](#)
- [Disabling the Veritas Cluster Server agent for Oracle](#)
- [Removing the Veritas Cluster Server agent for Oracle](#)

Before you install or upgrade the agent for Oracle

Meet the following prerequisites to install or upgrade the Veritas Cluster Server agent for Oracle:

- Make sure that VCS is installed in the cluster.
Symantec recommends installing the VCS graphical user interface. Refer to the *Veritas Cluster Server Installation Guide*.
- Verify that the Oracle Server for HP-UX and the add-on Listener are installed and configured.
See Oracle documentation.
See [“About installing Oracle in a VCS environment”](#) on page 29.

Installing the VCS agent for Oracle software

You can install the Veritas Cluster Server agent for Oracle from the product disc. You must install the Oracle enterprise agent on all nodes that will host the Oracle service group.

To access the VCS enterprise agent software on the disc, you must mount the disc.

To install the agent on an HP-UX 11i v3 node

- 1 Insert the disc in the drive that is installed on your local system.
- 2 Log in as superuser.
- 3 Set the display permission on your workstation:

```
# xhost +myws
```

- 4 Configure the shell environment variable DISPLAY on your workstation to enable you to use the SD-UX graphical interface.

For example, if your workstation has the name "myws," type:

- For Bourne or Korn shell (sh or ksh):

```
# DISPLAY=myws:0.0
# export DISPLAY
```

- For C shell (csh or tcsh):

```
# setenv DISPLAY myws:0.0
```

- 5 Determine the block device file for the disc drive.

```
# ioscan -fnC disk
```

Make a note of the device file as it applies to your node.

- 6 Create a directory in which to mount the software disc and mount the disc using the appropriate drive name. For example:

```
# mkdir -p /cdrom
# mount /dev/dsk/c0t0d0 /cdrom
```

- 7 Verify that the disk is mounted.

```
# mount
```

- 8 Type the following commands to install the agent and the service group configuration wizard respectively:

```
# swinstall -s /cdrom/depot VRTSvcsor
# swinstall -s /cdrom/depot VRTScsow
```

These depots include the following:

- VRTSvcsor—the agent binaries for Oracle, Netlsnr, ASMinst, and ASMDG agents
- VRTScsow—the agent configuration wizard

- 9 Copy the Oracle types configuration file into place:

```
# cp /etc/VRTSagents/ha/conf/Oracle/OracleTypes.cf \
/etc/VRTSvcs/conf/config/OracleTypes.cf
```

If you want to configure the ASM agents, do the following:

```
# cp /etc/VRTSagents/ha/conf/OracleASM/OracleASMTypes.cf \
/etc/VRTSvcs/conf/config/OracleASMTypes.cf
```

- 10 Repeat step 1 through step 9 on each node that will become part of the Oracle service group.

Upgrading the VCS agent for Oracle

Before you upgrade the agent, make sure you meet the prerequisites to upgrade the Veritas Cluster Server agent for Oracle.

See [“Before you install or upgrade the agent for Oracle”](#) on page 53.

See [“Supported software for VCS agent for Oracle”](#) on page 13.

[Table 3-1](#) lists the supported upgrade paths for the Veritas Cluster Server agent for Oracle in a VCS 5.0.1 HP-UX 11i v3 cluster.

Table 3-1 Supported upgrade paths

From VCS	HP-UX	To VCS	HP-UX
VCS 4.1	HP-UX 11i v2	VCS 5.0.1	HP-UX 11i v3
VCS 5.0	HP-UX 11i v2	VCS 5.0.1	HP-UX 11i v3
VCS 5.0	HP-UX 11i v3	VCS 5.0.1	HP-UX 11i v3

See [“Upgrading VCS agent 4.1 or 5.0 for Oracle”](#) on page 56.

Upgrading VCS agent 4.1 or 5.0 for Oracle

Perform the following steps in each node of the VCS cluster.

To upgrade VCS agent for Oracle to version 5.2

- 1 Stop VCS locally.

```
# hastop -local -force
```

- 2 Remove the earlier version of the VCS enterprise agent for Oracle.

```
# swremove VRTSvcsor  
# swremove VRTScsocw
```

- 3 Install the VCS enterprise agent 5.2 for Oracle.

See [“Installing the VCS agent for Oracle software”](#) on page 54.

- 4 Make sure that you have copied the OracleTypes.cf file from the /etc/VRTSagents/ha/conf/Oracle directory to /etc/VRTSvcs/conf/config directory.

Make sure to update the newly copied OracleTypes.cf file with all the type-level changes that you had made to the older OracleTypes.cf file.

For example, if you had changed the value of the MonitorInterval attribute from the default 60 to 120 seconds, the OracleTypes.cf file gets updated. You must apply these type-level changes manually to the newly copied OracleTypes.cf file.

- 5 For Oracle 10g or later, if you use ASM for database storage, then make sure that you have copied the file OracleASMTypes.cf from the directory /etc/VRTSagents/ha/conf/OracleASM to /etc/VRTSvcs/conf/config directory.
- 6 Restart the VCS engine.

```
# hstart
```

Disabling the Veritas Cluster Server agent for Oracle

To disable the Veritas Cluster Server agent for Oracle, you must change the Oracle service group to an OFFLINE state. You can stop the application completely or switch the agent to another system.

To disable the agent

- 1 To remove a system from the service group's SystemList, check if the service group is online:

```
# hagrps -state service_group -sys system_name
```

- 2 If the service group is online, take it offline. Use one of the following commands:

- To take the service group offline on one node and online it on another node, you can use the -switch option:

```
# hagrps -switch service_group -to system_name
```

- To take the service group offline without bringing it online on any other node in the cluster, enter:

```
# hagrps -offline service_group -sys system_name
```

- 3 Stop the agent on the node:

```
# haagent -stop Oracle -sys system_name
```

- 4 When you get the message "Please look for messages in the log file," check the file /var/VRTSvcs/log/engine_A.log for a message confirming the agent has stopped.

You can also use the `ps` command to confirm the agent is stopped.

- 5 You can now remove the service group, the resource type, or both from the VCS configuration after disabling the agent on all nodes.

See the *Veritas Cluster Server User's Guide* for more information.

Removing the Veritas Cluster Server agent for Oracle

Make sure you disabled the agent on all nodes before you remove the service group, the resource type, or both from the VCS configuration.

Removing the agent involves removing the agent configuration wizard and the agent files from each system. Perform the procedure to remove the agents on each node in the cluster.

To remove the agent on a node

- 1** Remove the agent configuration wizard.

```
# swremove VRTScsow
```

- 2** Remove the agent. Answer prompts accordingly.

```
# swremove VRTSvcso
```

Configuring VCS service groups for Oracle

This chapter includes the following topics:

- [About configuring a service group for Oracle](#)
- [Configuring Oracle instances in VCS](#)
- [Before you configure the VCS service group for Oracle](#)
- [Configuring the VCS service group for Oracle](#)
- [Setting up detail monitoring for VCS agent for Oracle](#)

About configuring a service group for Oracle

Configuring the Oracle service group involves creating the Oracle service group, its resources, and defining attribute values for the configured resources. You must have administrator privileges to create and configure a service group.

You can configure a VCS service group for Oracle using one of the following:

- The agent configuration wizard
- The Cluster Manager (Java console)
- Veritas Cluster Server Management Console
- The command-line

See [“Configuring the VCS service group for Oracle”](#) on page 69.

Note: If you use Oracle ASM feature, you must also configure ASMInst resources and ASMDG resources to keep the ASM instance highly available. You must use the command-line to configure these resources.

Configuring Oracle instances in VCS

You can set up Oracle in different ways in a VCS environment. Configuring Oracle for VCS involves configuring the Oracle files listener.ora and tnsnames.ora as per VCS requirements.

You can set up the following different Oracle configurations in a VCS environment for high availability:

Single Oracle instance configuration	See “Configuring a single Oracle instance in VCS” on page 60.
Multiple Oracle instances (single listener) configuration	See “Configuring multiple Oracle instances (single listener) in VCS” on page 62.
Multiple Oracle instances (multiple listeners) configuration	See “Configuring multiple Oracle instances (multiple listeners) in VCS” on page 63.
Configuration with shared server support	See “Configuring an Oracle instance with shared server support in VCS” on page 65.

See [“Best practices for multiple Oracle instance configurations in a VCS environment”](#) on page 151.

Configuring a single Oracle instance in VCS

Review the resource dependency graph and sample configuration of service groups involving a single Oracle instance.

See [“Sample single Oracle instance configuration”](#) on page 120.

To configure an Oracle instance in VCS

- 1 Review the Oracle and Netlsnr resource types and their attribute definitions. See [“About the resource type and attribute definitions”](#) on page 105.

- 2 Configure the Oracle file tnsnames.ora as per VCS requirements. The changes required in the file depends on your Oracle configuration.

For clients to connect to the failover instance, in the file tnsnames.ora located at \$TNS_ADMIN, change the host name for all TCP protocol address databases to the virtual IP address for the service group.

The following example assumes that the host name for the database is set to oraprod, which represents the virtual IP address for the service group.

```
prod =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP) (HOST = oraprod) (PORT = 1521))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = prod)
    )
  )
```

- 3 Configure the Oracle file listener.ora as per VCS requirements. The changes required in the file depends on your Oracle configuration.

In the file listener.ora located at \$TNS_ADMIN, edit the "Host=" line in the ADDRESS_LIST section and add the name of the high availability address for the service group, in this case, oraprod.

```
LISTENER_PROD =
  (DESCRIPTION_LIST =
    (DESCRIPTION =
      (ADDRESS_LIST =
        (ADDRESS = (PROTOCOL = TCP) (HOST = oraprod) (PORT = 1521))
      )
    )
  )
```

- 4 Create the VCS service groups for Oracle.

See [“Configuring the VCS service group for Oracle”](#) on page 69.

- 5 Bring the Oracle service group online.

See [“Bringing the service group online”](#) on page 91.

Configuring multiple Oracle instances (single listener) in VCS

Review the resource dependency graph and sample configuration of a service group involving multiple Oracle instances.

See [“Sample multiple Oracle instances \(single listener\) configuration”](#) on page 123.

To configure multiple Oracle instances (single listener)

- 1 Review the Oracle and Netlsnr resource types and their attribute definitions.
 See [“About the resource type and attribute definitions”](#) on page 105.
- 2 Configure the Oracle file tnsnames.ora as per VCS requirements. The changes required in the file depends on your Oracle configuration.

For clients to connect to the failover instance, in the file tnsnames.ora located at \$TNS_ADMIN, change the host name for all TCP protocol address databases to the virtual IP address for the service group.

The following example assumes that the host name for the database is set to oraprod, which represents the virtual IP address for the service group.

```
prod =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP) (HOST = oraprod) (PORT = 1521))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = prod)
    )
  )
mktg =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP) (HOST = oramktg) (PORT = 1522))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = mktg)
    )
  )
```

- 3 Configure the Oracle file listener.ora as per VCS requirements. The changes required in the file depends on your Oracle configuration.

In the file listener.ora located at \$TNS_ADMIN, edit the "Host=" line in the ADDRESS_LIST section and add the name of the high availability address for the service group, in this case, oraprod.

```
LISTENER_ORACLE =  
(DESCRIPTION_LIST =  
(DESCRIPTION =  
(ADDRESS_LIST =  
(ADDRESS = (PROTOCOL = TCP) (HOST = oraprod) (PORT = 1521))  
(ADDRESS = (PROTOCOL = TCP) (HOST = oramktg) (PORT = 1522))  
)  
)
```

- 4 Create the Oracle and Listener service groups using Cluster Manager (Java Console.) You can also use the command-line to create the service group.

See [“Configuring the VCS service group for Oracle”](#) on page 69.

- 5 Bring the Oracle service group online.

See [“Bringing the service group online”](#) on page 91.

Configuring multiple Oracle instances (multiple listeners) in VCS

Review the resource dependency graph and sample configuration of a service group involving multiple Oracle instance.

See [“Sample multiple instance \(multiple listeners\) configuration”](#) on page 130.

To configure multiple Oracle instances (multiple listeners)

- 1 Review the Oracle and Netlsnr resource types and their attribute definitions. See [“About the resource type and attribute definitions”](#) on page 105.
- 2 Configure the Oracle file tnsnames.ora as per VCS requirements. The changes required in the file depends on your Oracle configuration.

For clients to connect to the failover instance, in the file tnsnames.ora located at \$TNS_ADMIN, change the host name for all TCP protocol address databases to the virtual IP address for the service group.

```
prod =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP) (HOST = oraprod) (PORT = 1521))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = prod)
    )
  )
mktg =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP) (HOST = oramktg) (PORT = 1522))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = mktg)
    )
  )
```


- 3 Configure the Oracle file listener.ora as per VCS requirements. The changes required in the file depends on your Oracle configuration.

In the file listener.ora, create independent configurations for each listener.

```
LISTENER_PROD =  
  (DESCRIPTION_LIST =  
    (DESCRIPTION =  
      (ADDRESS_LIST =  
        (ADDRESS = (PROTOCOL = TCP) (HOST = oraprod) (PORT = 1521))  
      )  
    )  
  )  
  
LISTENER_MKTG =  
  (DESCRIPTION_LIST =  
    (DESCRIPTION =  
      (ADDRESS_LIST =  
        (ADDRESS = (PROTOCOL = TCP) (HOST = oramktg) (PORT = 1522))  
      )  
    )  
  )
```

- 4 Create the VCS service groups for Oracle.

See [“Configuring the VCS service group for Oracle”](#) on page 69.

- 5 Bring the Oracle service group online.

See [“Bringing the service group online”](#) on page 91.

Configuring an Oracle instance with shared server support in VCS

Review the resource dependency graph and sample configuration.

See [“Sample Oracle configuration with shared server support”](#) on page 135.

To configure Oracle with shared server support

- 1 Review the Oracle and Netlsnr resource types and their attribute definitions. See [“About the resource type and attribute definitions”](#) on page 105.
- 2 Configure the Oracle file tnsnames.ora as per VCS requirements. The changes required in the file depends on your Oracle configuration.

For clients to connect to the failover instance, in the file tnsnames.ora located at \$TNS_ADMIN, change the host name for all TCP protocol address databases to the virtual IP address for the service group.

The following example assumes that the host name for the database is set to oraprod, which represents the virtual IP address for the service group.

```
prod =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP) (HOST = oraprod) (PORT = 1521))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = prod)
    )
  )
```

- 3 Configure the Oracle file listener.ora as per VCS requirements. The changes required in the file depends on your Oracle configuration.

In the file listener.ora located at \$TNS_ADMIN, edit the "Host=" line in the ADDRESS_LIST section and add the name of the high availability address for the service group, in this case, oraprod.

```
LISTENER_PROD =
  (DESCRIPTION_LIST =
    (DESCRIPTION =
      (ADDRESS_LIST =
        (ADDRESS = (PROTOCOL = TCP) (HOST = oraprod) (PORT = 1522))
      )
    )
  )
```

- 4 In the initialization parameter file, for the dispatchers parameter, set the host name for all TCP protocol address dispatchers to the virtual IP address for the service group.

In the following example, the host name for the dispatcher is set to oraprod.

```
dispatchers =
  "(ADDRESS = (PROTOCOL = TCP) (HOST = oraprod))
  (MUL=ON) (TICK=15) (POOL=true) "
```

- 5 In the initialization parameter file, set the LOCAL_LISTENER attribute to a listener alias, so that the Oracle PMON process registers information with the listener.

```
local_listener=listener_alias
```

This listener alias gets appended by the default domain set in the file sqlnet.ora.

- 6 In the file tnsnames.ora, create an entry for the listener alias to resolve the address information. In the address parameter, set the host name to the virtual IP address for the service group, without the CONNECT_DATA portion of the connect descriptor.

In the following example, the listener *listener_alias* uses TCP/IP port 1521 and the virtual IP address for the service group is oraprod.

```
listener_alias=
  (address = (PROTOCOL = TCP) (HOST = oraprod)
  (PORT= 1521))
```

- 7 Create the VCS service groups for Oracle.
 See [“Configuring the VCS service group for Oracle”](#) on page 69.
- 8 Bring the Oracle service group online.
 See [“Bringing the service group online”](#) on page 91.

Before you configure the VCS service group for Oracle

Before you configure the Oracle service group, you must:

- Verify that VCS is installed and configured on all nodes in the cluster where you will configure the service group.
 Refer to the *Veritas Cluster Server Installation Guide* for more information.

- Verify that Oracle is installed and configured identically on all nodes in the cluster.
See [“About installing Oracle in a VCS environment”](#) on page 29.
- Verify that the Veritas Cluster Server agent for Oracle is installed on all nodes in the cluster.
If the Oracle database is ASM-managed, verify that the ASM agent binaries are also installed.
See [“Before you install or upgrade the agent for Oracle”](#) on page 53.
- Verify that the type definition for Veritas Cluster Server agent for Oracle is imported into the VCS engine.
See [“Importing the type definition files for Veritas Cluster Server agent for Oracle”](#) on page 68.
- If the Oracle database is ASM-managed, make sure that the Oracle clustering daemon is enabled. Else, the OCSSD daemon must be disabled.

Importing the type definition files for Veritas Cluster Server agent for Oracle

Before configuring the Veritas Cluster Server agent for Oracle, you must import the OracleTypes.cf file to the VCS engine.

If you want to configure the ASM agents, you must import the OracleASMTypes.cf file. Import the OracleASMTypes.cf file using the command-line.

To import using the Cluster Manager

- 1 Start Cluster Manager and log on to the cluster.
- 2 From the Cluster Explorer’s **File** menu, choose **Import Types**.
- 3 In the Import Types dialog box, select the `/etc/VRTSvcs/conf/config/OracleTypes.cf` file.
- 4 Click **Import**.
- 5 Save the configuration.

To import using the command line

- 1 Log in to sysa as superuser.
- 2 Ensure that all changes to the existing configuration have been saved and that further changes are prevented while you modify main.cf:

```
# haconf -dump -makero
```

- 3 To ensure that VCS is not running while you edit main.cf, stop the VCS engine on all nodes and leave the resources available:

```
# hastop -all -force
```

- 4 Make a backup copy of the main.cf file:

```
# cd /etc/VRTSvcs/conf/config
# cp main.cf main.cf.orig
```

- 5 Edit the main.cf file to include the OracleTypes.cf file:

```
include "OracleTypes.cf"
```

If you want to configure the ASM agents, you must also include the OracleASMTTypes.cf file:

```
include "OracleASMTTypes.cf"
```

Configuring the VCS service group for Oracle

You can configure Oracle in a VCS environment in one of the ways that VCS supports.

See [“Configuring Oracle instances in VCS”](#) on page 60.

You can configure VCS agent for Oracle using one of the following:

The agent configuration wizard	See “Configuring the VCS service group for Oracle using the agent configuration wizard” on page 70. Note: You can use the wizard to configure the service group for Oracle in VCS environment. Use the Cluster Manager or the command-line for SF HA environments.
The Cluster Manager (Java console)	See “Configuring the VCS service group for Oracle using Cluster Manager (Java console)” on page 79.
Veritas Cluster Server Management Console	Refer to the <i>Veritas Cluster Server Management Console Implementation Guide</i> for more details.
The command-line	See “Configuring the VCS service group for Oracle using the command-line” on page 81.

Review the following to configure the service group:

- Sample configuration files and resource dependency graphs of the Oracle service group.
 See [“About the sample configurations for Oracle enterprise agent”](#) on page 119.
- Resource type and the attribute definitions of the Oracle and Netlsnr agents. For ASM, resource type and the attribute definitions of the ASMinst and ASMDG agents.
 See [“About the resource type and attribute definitions”](#) on page 105.

Configuring the VCS service group for Oracle using the agent configuration wizard

VCS provides an agent configuration wizard that guides you through the process of configuring the agent in a VCS environment. The wizard creates and modifies Oracle service groups. You can also modify an existing service group.

See [“Modifying the service group configuration”](#) on page 93.

Make sure that you meet the following requirements:

- The Oracle instances and listeners to be configured must be running. All listeners to be configured must listen to the same virtual IP address.

Note: For the default listener, the configuration wizard requires the listener parameter file, listener.ora, to reside in \$ORACLE_HOME/network/admin. No such condition applies for non-default listeners.

- The Oracle files (control, data, redo-log, and archive files) must be on shared disks.
- The IP addresses and host names specified in the files listener.ora and tnsnames.ora must be the same.
- If detail monitoring is to be used for a database instance, the table used for detail monitoring must be set up, with user and password assigned.
 See [“Setting up detail monitoring for VCS agent for Oracle”](#) on page 85.

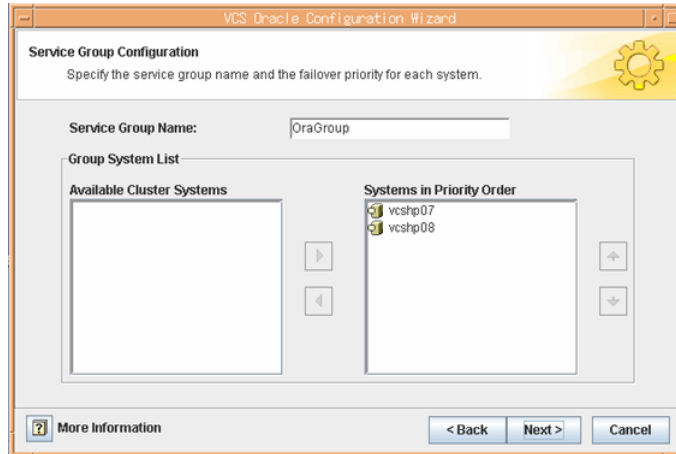
To configure the service group using the agent configuration wizard

- 1 Set the *DISPLAY* variable, start the VCS Oracle configuration wizard as root.

```
# hawizard oracle
```

- 2 Read the information on the Welcome screen and click **Next**.
- 3 In the Wizard Options dialog box, select the **Create Oracle Service Group** option and click **Next**.

- 4 In the Service Group Configuration dialog box, specify information about the service group.

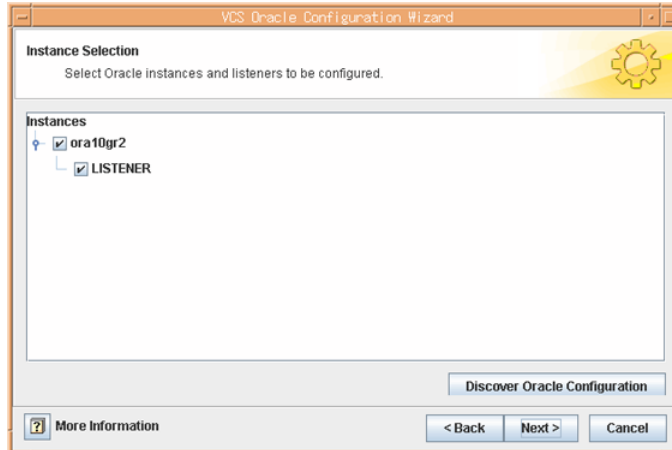


Specify the following information:

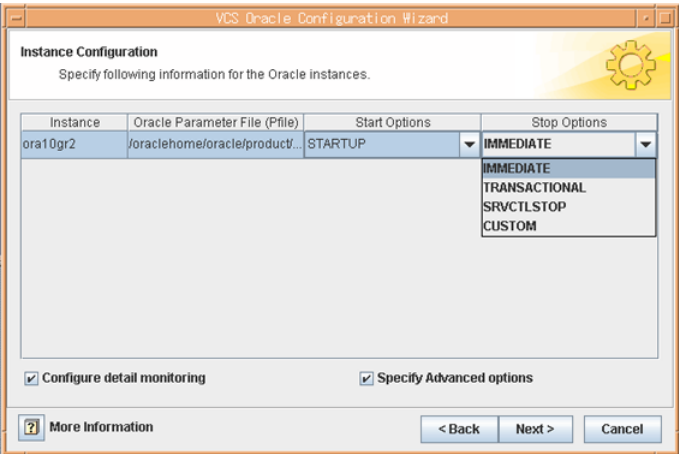
- | | |
|----------------------------------|---|
| Service Group Name | Enter a name for the Oracle service group. |
| Available Cluster Systems | Select the systems on which to configure the service group and click the right-arrow icon to move the systems to the service group's system list. |
| Systems in Priority Order | <ul style="list-style-type: none"> ■ To remove a system from the service group's system list, select the system in the Systems in Priority Order box and click the left arrow icon. ■ To change a system's priority in the service group's system list, select the system in the Systems in Priority Order box and click the buttons with the up and down arrow icons. The system at the top of the list has the highest priority while the system at the bottom of the list has the lowest priority. |

- 5 Click **Next**.

- 6 In the Instance Selection dialog box, select the Oracle instances to be configured along with their listeners. Click **Discover Oracle Configuration**, if required.



- 7
- In the Instance Configuration dialog box, specify information for all selected instances.



Specify the following information for the Oracle instances that you selected:

- Oracle Parameter File (Pfile)

Verify the location of the Oracle Parameter File.
- Start Options

Choose the Start options, if desired. Default is STARTUP_FORCE.

See [“Startup and shutdown options for the Oracle agent”](#) on page 16.
- Stop Options

Choose the Stop options, if desired. Default is IMMEDIATE.

See [“Startup and shutdown options for the Oracle agent”](#) on page 16.
- Configure detail monitoring

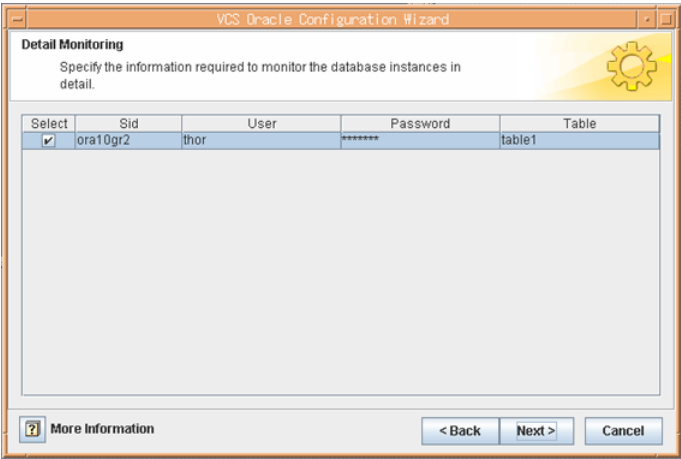
Select the check box if you want to monitor the database in detail.

See [“Monitor options for the Oracle agent”](#) on page 18.
- Specify Advanced Options

Select the check box to enter advanced configuration information for the database instances.

- 8
- Click **Next**.

- 9
- If you chose to monitor the database in detail, the Detail Monitoring dialog box is displayed.



Specify the following information for the database instances that you want the agent to monitor in detail and click **Next**:

- Select

Select the check box corresponding to the database to be monitored in detail.
- User

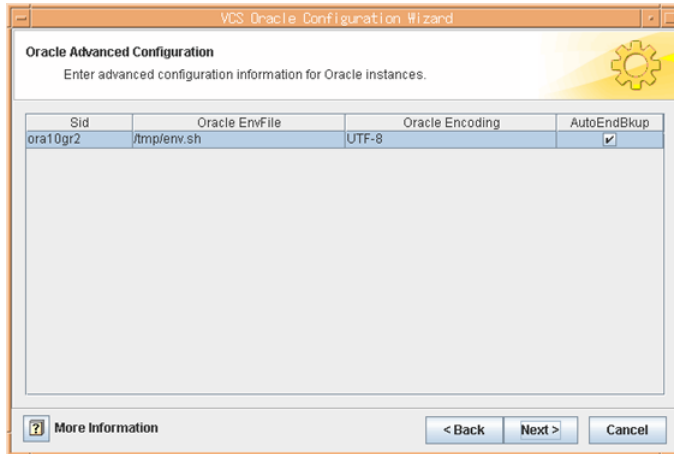
Enter a valid user name for the database.
- Password

Enter a valid password for the database user.

Do not encrypt passwords when entering them through the Agent Configuration Wizard; the wizard takes care of encrypting passwords.
- Table

Enter the name of a table that will be queried to validate the status of the database.

- 10** If you chose to specify advanced options, the Oracle Advanced Configuration dialog box is displayed.



Specify the following information for the Oracle instances and click **Next**:

Oracle EnvFile Enter the location of the Oracle Envfile.

Oracle Encoding Enter the encoding.

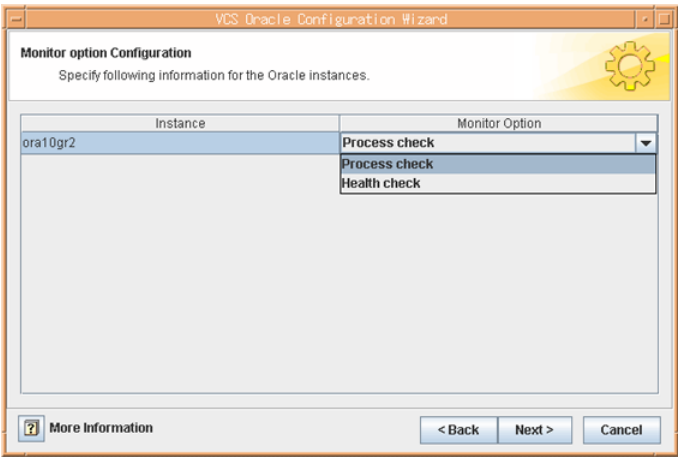
AutoEndBkup Select the check box, if desired.

See [“Failing over Oracle after a VCS node failure during hot backup”](#) on page 37.

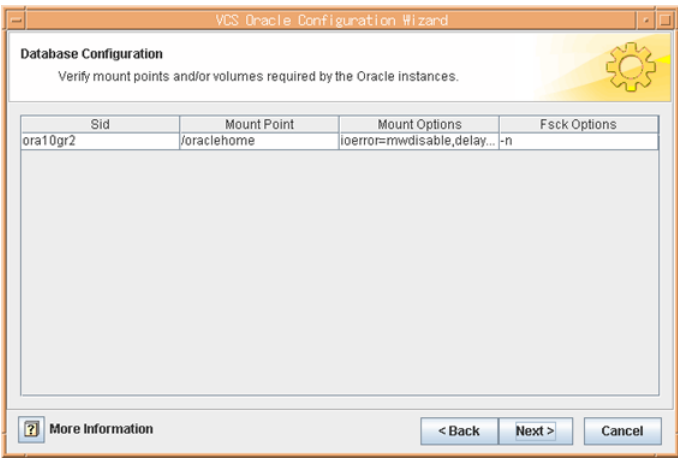
- 11 In the Monitor option Configuration dialog box, specify the monitor option for the Oracle instances, and click **Next**.

The default monitor option is **Process check**.

See “[Monitor options for the Oracle agent](#)” on page 18.



- 12 In the Database Configuration dialog box, verify the mount points required by each database, specify the Mount and Fscsk options, and click **Next**.



- 13** In the Listener Configuration dialog box, configure the listeners for the databases.

VCS Oracle Configuration Wizard

Listener Configuration
 Configure the network details for the listeners.

Address 10 . 216 . 175 . 11

Netmask 255 . 255 . 248 . 0

System	Device
vcshp07	lan0
vcshp08	lan0

☒ Enable detail monitoring ☒ Specify Advanced options

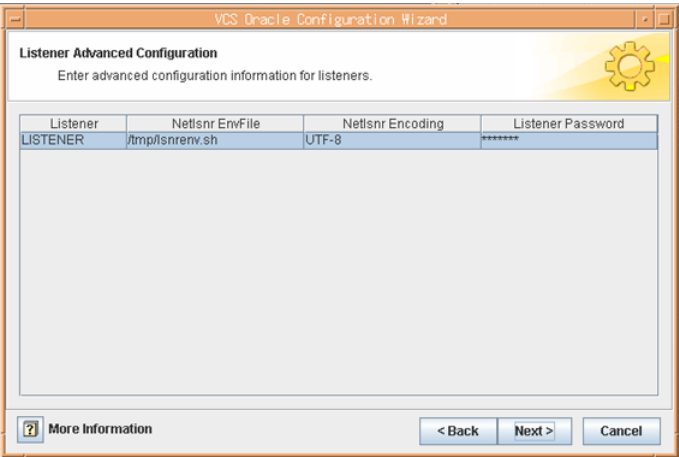
? More Information < Back Next > Cancel

Specify the following information for the listeners:

Address	Verify the virtual IP address.
Netmask	Verify the Netmask.
Device	For each system, select a device.
Enable detail monitoring	Select the check box to enable detail monitoring.
Specify Advanced Options	Select the check box to enter advanced configuration information for the listeners.

- 14** Click **Next**.

15 If you chose to specify advanced options for the listeners, the Listener Advanced Configuration dialog box is displayed.



Specify the following information for each listener and click **Next**:

- Netlsnr EnvFile

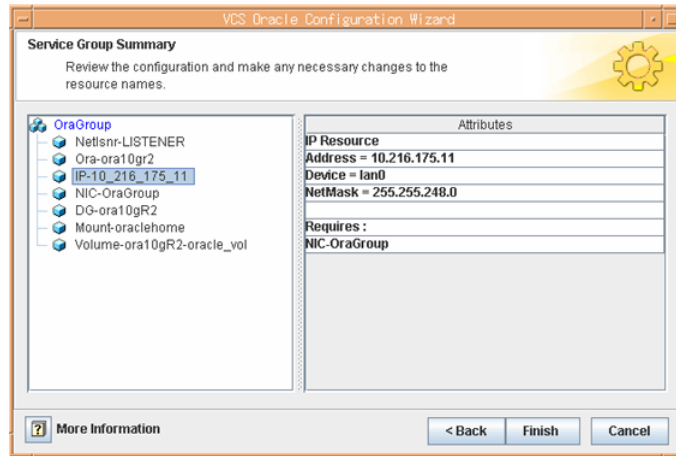
Enter the path of the listener Envfile.
- Netlsnr Encoding

Enter the encoding.
- Listener Password

Enter a valid password for the listener.

Do not encrypt passwords when entering them through the agent configuration wizard; the wizard takes care of encrypting passwords.

16 In the Service Group Summary dialog, review your configuration.



Click on a resource to view its attributes and their configured values in the Attributes box.

- Change names of resources, if desired; the wizard assigns unique names to resources based on their respective name rules.

To edit a resource name, select the resource name and click on it, press Enter after editing each attribute.

- Review your configuration and click **Finish**.

The wizard starts running commands to create the Oracle service group. Various messages indicate the status of these commands.

- 17 In the Completing the Oracle Configuration wizard dialog box, select the **Bring the service group online** check box to bring the service group online on the local system.

- 18 Click **Close**.

The Oracle service group is created in your cluster.

Configuring the VCS service group for Oracle using Cluster Manager (Java console)

A template for the Oracle resource groups is automatically installed when you install the Oracle enterprise agent. Using the VCS Cluster Manager, you can view the template, which displays the Oracle service group, its resources and their attributes. You can dynamically modify the attribute values as necessary for your configuration.

Configuration tasks involve:

- Creating a new service group
- Editing the resource attributes

To create a new service group

- 1 Make sure that the Oracle type definition file `OracleTypes.cf` is imported in your configuration.
- 2 Launch the Cluster Configuration wizard. Do one of the following:
 - From the Cluster Explorer menu, select **Tools > Configuration Wizard**.
 - If no service groups exist on the system, **Cluster Explorer** prompts you to launch the **Cluster Configuration wizard**. Click **Yes** when prompted.The Loading Templates Information window appears, and launches the wizard.
- 3 Read the information on the Welcome screen and click **Next**.
- 4 Specify the name of the service group and the target systems on which it is to be configured.
 - Enter the name of the service group.
 - On the **Available Systems** box, select the systems on which to configure the service group.
 - Click the right arrow to move the selected systems to the **Systems for Service Group** box. To remove a system from the box, select the system and click the left arrow.
 - Indicate the order in which the systems will fail over (priority). System priority is numbered sequentially, with 1 denoting the system that starts first following a failover.
 - Click **Next**.
- 5 In the Would you like to use a template to configure the service group? dialog box, click **Next**.
- 6 In the Select a template to configure the service group dialog box, select the OracleGroup template on which to base the service group.

If applicable, a window opens notifying you that names of some resources within the new service group are already in use. This window also includes a list of alternative names. You can select an alternative name, or modify the name. Click **Next** after resolving the name clashes.

- 7 Click **Next** to create the service group based on the selected template.
 A window opens indicating that commands are being sent to add the group, its resources, and the attributes and dependencies specified in the template.
 A progress indicator displays the percentage of the commands fired.
 The actual commands are displayed at the top of the indicator.
- 8 Click **Next** when prompted that the service group has been successfully created.
 A window opens listing the service group's resources and their associated attributes.
- 9 Click **Finish** to accept the default values and complete the configuration.
 You can modify the default values of the resources according to your specific configuration requirements, as instructed in the following section.

To edit the resource attributes

- 1 Select the resource from the list on the left pane.
 The resource's attributes appear in the right pane.
- 2 Select the attribute to be modified.
 See [“About the resource type and attribute definitions”](#) on page 105.
- 3 Click the edit icon in the **Edit** column.
- 4 In the Edit Attribute dialog box, enter the attribute values. To modify the scope of the attribute, click the option buttons for **Global** or **Local**.
- 5 Click **OK**.
- 6 Repeat the procedure for each resource and its attributes and click **Finish**.
 Edit the attributes for all the resources according to your configuration.
- 7 Follow the wizard instructions to complete the configuration.
- 8 Click **Finish** to quit the wizard.

Configuring the VCS service group for Oracle using the command-line

The Veritas Cluster Server agent for Oracle comes with a sample configuration file that can be used as reference to directly modify your present configuration file. When you use this method, you must stop and restart VCS to implement the configuration.

The Veritas Cluster Server agent for Oracle also includes sample configuration files for ASM configurations in a VCS environment.

See [“About the sample configurations for Oracle enterprise agent”](#) on page 119.

To configure the service group using the sample configuration file

- 1 Log in to sysa as superuser.
- 2 Ensure that all changes to the existing configuration have been saved and that further changes are prevented while you modify main.cf:

```
# haconf -dump -makero
```

- 3 To ensure that VCS is not running while you edit main.cf, issue the following command to stop the VCS engine on all systems and leave the resources available:

```
# hstop -all -force
```

- 4 Make a backup copy of the main.cf file:

```
# cd /etc/VRTSvcs/conf/config
# cp main.cf main.cf.orig
```

- 5 Edit the main.cf file.

You can use the file /etc/VRTSagents/ha/conf/Oracle/sample_main.cf for reference.

For ASM, you can refer to the examples shown in the file /etc/VRTSagents/ha/conf/OracleASM/sample_main.cf.asm.

Do the following:

- Create the Oracle and Netlsnr resources.
For ASM instances and disk groups, create the ASMinst and ASMDG resources.
- Edit the default attributes to match the parameters in your configuration.
See [“About the resource type and attribute definitions”](#) on page 105.
- Assign dependencies to the newly created resources.
See [“About the sample configurations for Oracle enterprise agent”](#) on page 119.
See the *Veritas Cluster Server User’s Guide* for more information on assigning dependencies.

- 6 Save and close the file.
- 7 Verify the syntax of the file /etc/VRTSvcs/conf/config/main.cf:

```
# cd /etc/VRTSvcs/conf/config/
# hacf -verify .
```

- 8 Start the VCS engine:

```
# hstart
```

- 9 Verify that all Oracle service group resources are brought online:

```
# hagr -state
```

- 10 Take the service group offline and verify that all resources are stopped:

```
# hagr -offline service_group -sys system_name  
# hagr -state
```

- 11 Bring the service group online again and verify that all resources are available:

```
# hagr -online service_group -sys system_name  
# hagr -state
```

- 12 Start the VCS engine on sysb:

```
# hstart
```

- 13 Switch the Oracle service group to sysb:

```
# hagr -switch service_group -to sysb
```

- 14 Verify that all Oracle service group resources are brought online on sysb:

```
# hagr -state
```

- 15 On all the nodes, look at the following log files for any errors or status:

```
/var/VRTSvcs/log/engine_A.log  
/var/VRTSvcs/log/Oracle_A.log  
/var/VRTSvcs/log/Netlsnr_A.log  
  
/var/VRTSvcs/log/ASMinst_A.log/  
var/VRTSvcs/log/ASMDG_A.log
```

Encrypting Oracle database user and listener passwords

VCS provides a utility to encrypt database user passwords and listener passwords. You must encrypt the Pword attribute in the Oracle agent and the LsnrPwd attribute in the Netlsnr agent before you configure these attributes.

The `vsencrypt` utility also allows you to encrypt the agent passwords using a security key.

See *Veritas Cluster Server User's Guide* for more information.

Note:

You need not encrypt passwords if you use the VCS Cluster Manager (Java Console) to configure attributes.

Also, you need not encrypt passwords if you use the configuration wizard.

The user passwords that are used for detail monitoring of the Oracle database are encrypted. The listener password that is considered for querying the status of the listener and stopping the listener is also encrypted.

Oracle provides the option of storing the listener password in the `listener.ora` file, in both clear text and encrypted formats. Irrespective of the format in which the password is stored in Oracle, you must encrypt the password using the `vsencrypt` utility before you configure the `LsnrPwd` attribute.

If you encrypted the listener password using the Oracle `lsnrctl` utility, make sure that you pass the encrypted password to the `vsencrypt` utility.

For example, if the password after you encrypt using the Oracle `lsnrctl` utility is as follows:

```
PASSWORDS_LISTENER = 652C5971EE3A8DF9
```

You must pass the Oracle-encrypted password to the `vsencrypt` utility. For example:

```
# vsencrypt -agent 652C5971EE3A8DF9
```

The `vsencrypt` utility displays the encrypted password. For example:
`ciiIhiEkfIhiLijIdkHkhIfkDikKgklil`

To encrypt passwords

- 1 From the path `$VCS_HOME/bin/`, run the `vsencrypt` utility.

- Type the following command:

```
# vsencrypt -agent
```

- Enter the password and confirm it by entering it again. Press Enter.

```
# Enter New Password:
# Enter Again:
```

- 2 Review as the utility encrypts the password and displays the encrypted password.
- 3 Enter this encrypted password as the value for the attribute.
- 4 Copy the encrypted password for future reference.

Setting up detail monitoring for VCS agent for Oracle

The Veritas Cluster Server agent for Oracle provides two levels of application monitoring: primary (basic monitoring) and secondary (detail monitoring).

- In the basic monitoring mode, the agent monitors the Oracle processes to verify that they are continuously active.

Note: The agent for Oracle ASM does only basic monitoring for ASM instances.

- In the detail monitoring mode, the agent executes the script defined in the attribute MonScript of the Oracle and the Netlsnr resources. If the script successfully executes, the agent considers the resource available. You can customize the default script according to your configuration.

See [“Monitor options for the Oracle agent”](#) on page 18.

You can use the agent’s detail monitoring capability to monitor the status of a database and listener and increase the confidence in their availability. Before setting up detail monitoring, you must have the agent running satisfactorily at the basic level of monitoring.

Note: Disable detail monitoring before undertaking any database maintenance that involves disabling database access to external users.

Setting up detail monitoring for Oracle

Detail monitoring for an Oracle resource verifies whether a database is ready for transactions by performing an update transaction against a table within the database. The update action is taken by the two scripts, `SqlTest.pl` and `SimpleTest.pl`, provided with the Veritas Cluster Server agent for Oracle. The scripts are available under the directory `/opt/VRTSagents/ha/bin/Oracle/`. Both scripts update the timestamp to monitor the database.

The `SqlTest.pl` script checks whether the database is open before updating the timestamp. If the database is found to be in restricted mode, quiesced mode, or suspended mode, the monitor returns success. In such a case, only basic monitoring occurs. The `SimpleTest.pl` script does not perform database checks but only issues update statements against the table.

Before enabling detail monitoring for Oracle, you must create a test table (with a timestamp) in the Oracle database. The agent uses this test table for internal purposes. Symantec recommends that you do not perform any other transaction on the test table. The detail monitor script, `MonScript`, must exist and have execute permission for root. You can use a custom monitor script, or the scripts provided with the agent. In the monitor script, the return code 100 indicates failure. Return codes from 101 to 110 indicate success.

The example to set up detail monitoring, based on the use of the supplied script, shows how to create and test a table for use by detail monitoring, and how to enable detail monitoring.

To set up detail monitoring for Oracle

- 1 Make the VCS configuration writable:

```
haconf -makerw
```

- 2 Freeze the service group to avoid automated actions by VCS caused by an incomplete reconfiguration:

```
hagrp -freeze service_group
```

- 3 Log on as an Oracle user.

```
su - <Owner>
```

- 4 Set the environment variables for `ORACLE_HOME` and `ORACLE_SID`.

```
export ORACLE_HOME=<Home>
export ORACLE_SID=<Sid>
```

- 5 Start the `svrmgrl` or `sqlplus` utility to set up a database table:

```
$ORACLE_HOME/bin/svrmgrl
```

or

```
$ORACLE_HOME/bin/sqlplus /nolog
```

- 6 As the database administrator, issue the following statements at the `svrmgr1` or `sqlplus` prompt to create the test table:

```
connect / as sysdba

create user <User>
identified by <Pword>
default tablespace USERS

temporary tablespace TEMP
quota 100K on USERS;

grant create session to <User>;

create table <User>.<Table> ( timestamp );
insert into <User>.<Table> (timestamp) values (SYSDATE);
```

- 7 To test the database table for use, do the following:

```
disconnect
connect <User>/<Pword>
update <User>.<Table> set ( timestamp ) = SYSDATE;

select TO_CHAR(timestamp, 'MON DD, YYYY HH:MI:SS AM')
from <User>.<Table>;
exit
```

- 8 Enable the detail monitoring for the Oracle resource using the following VCS commands:

```
hares -modify OracleResource User User
hares -modify OracleResource Pword Pword
hares -modify OracleResource Table Table
hares -modify OracleResource MonScript "./bin/Oracle/SqlTest.pl"
hares -modify OracleResource DetailMonitor 1

haconf -dump -makero

hagrp -unfreeze service_group
```

You can also use Cluster Manager (Java Console) to set these attributes.

Enabling and disabling detail monitoring for Oracle resource

Review the instructions to enable or disable detail monitoring.

To enable detail monitoring

- ◆ Set the DetailMonitor attribute to 1.

```
hares -modify OracleResource DetailMonitor 1
```

To disable detail monitoring

- ◆ Set the DetailMonitor attribute to 0.

```
hares -modify OracleResource DetailMonitor 0
```

Setting up detail monitoring for Netlsnr

For Netlsnr agent, the detail monitoring is enabled by default to monitor the listener process.

You can disable detail monitoring by setting the value of the attribute MonScript to an empty string.

You can enable detail monitoring for Netlsnr by specifying a value for the MonScript attribute. The example to set up detail monitoring uses the supplied monitor script for Netlsnr, /opt/VRTSagents/ha/bin/Netlsnr/LsnrTest.pl. The detail monitoring script for the Netlsnr resource uses the Listener command `lsnrctl status $Listener` to test the Listener process.

To disable detail monitoring for Netlsnr

- ◆ Disable detail monitoring by setting the MonScript attribute to an empty string:

```
haconf -makerw
hagrp -freeze service_group
hares -modify SqlResource MonScript ""
haconf -dump -makero
hagrp -unfreeze
```


To set up detail monitoring for Netlsnr

- 1 Make the VCS configuration writable:

```
haconf -makerw
```

- 2 Freeze the service group to avoid automated actions by VCS caused by an incomplete reconfiguration:

```
hagrp -freeze service_group
```

- 3 Enable detail monitoring by entering the following commands:

```
hares -modify LsnrResource MonScript "./bin/Netlsnr/LsnrTest.pl"
```

```
haconf -dump -makero
```

```
hagrp -unfreeze service_group
```


Administering VCS service groups for Oracle

This chapter includes the following topics:

- [About administering VCS service groups](#)
- [Bringing the service group online](#)
- [Taking the service group offline](#)
- [Switching the service group](#)
- [Modifying the service group configuration](#)

About administering VCS service groups

You can administer service groups in Cluster Server using Veritas Cluster Server Management Console, the Cluster Manager, or the command-line. Review the procedures to administer the service groups using the Cluster Manager.

See *Veritas Cluster Server User's Guide*.

Bringing the service group online

Perform the following steps to bring the service group online.

To bring a service group online

- 1 In the Cluster Explorer configuration tree, select the newly created service group.
- 2 Right-click the service group name, and select **Enable Resources** to enable all resources in the service group.

- 3 Right-click the service group name, and select the systems on which to enable the service group (Right-click>Enable>*system_name* or Right-click>Enable>All).
- 4 Save your configuration (File>Close Configuration).
- 5 Right-click the service group and select to online the service group on the system (Right-click>Online>*system_name*).

Taking the service group offline

Perform the following steps to take the service group offline.

To take a service group offline

- 1 In the **Service Groups** tab of the Cluster Explorer configuration tree, right-click the service group.

or

Select the cluster in the Cluster Explorer configuration tree, select the **Service Groups** tab, and right-click the service group icon in the view panel.
- 2 Choose **Offline**, and choose the appropriate system from the pop-up menu (Right-click>Offline>*system_name*).

Switching the service group

The process of switching a service group involves taking it offline on its current system and bringing it online on another system.

To switch a service group

- 1 In the **Service Groups** tab of the Cluster Explorer configuration tree, right-click the service group.

or

Select the cluster in the Cluster Explorer configuration tree, select the **Service Groups** tab, and right-click the service group icon in the view panel.
- 2 Choose **Switch To**, and choose the appropriate system from the pop-up menu (Right-click>Switch To>*system_name*).

Modifying the service group configuration

You can dynamically configure the Veritas Cluster Server agent for Oracle in several ways. You can use the following to configure the Veritas Cluster Server agent for Oracle:

- Configuration wizard
- Command-line interface
- Cluster Manager Java Console
- Veritas Cluster Server Management Console

Refer to the *Veritas Cluster Server User's Guide* for more information.

To modify an Oracle service group using the cluster configuration wizard

- 1 Start the Oracle Configuration wizard.

```
# hawizard oracle
```

- 2 Read the information on the Welcome screen and click **Next**.
- 3 On the Wizard Options dialog box, select the **Modify service group** option, select the service group to be modified, and click **Next**.
- 4 Follow the wizard instructions and make modifications as per your configuration.

See [“Configuring the VCS service group for Oracle using the agent configuration wizard”](#) on page 70.

Troubleshooting Veritas Cluster Server agent for Oracle

This chapter includes the following topics:

- [About troubleshooting Veritas Cluster Server agent for Oracle](#)
- [Error messages common to the Oracle and Netlsnr agents](#)
- [Error messages specific to the Oracle agent](#)
- [Error messages specific to the Netlsnr agent](#)
- [Error messages specific to the ASMInst agent](#)
- [Error messages specific to the ASMDG agent](#)
- [Troubleshooting issues specific to Oracle in a VCS environment](#)

About troubleshooting Veritas Cluster Server agent for Oracle

Review the information on the error logs that you must access:

- To check the Oracle installation error log, you must access:

`$ORACLE_BASE/oraInventory/logs/installActionsdate_time.log`

This file contains the errors that occurred during installation. It clarifies the nature of the error and at exactly which point it occurred during the

installation. If there are any installation problems, you must send this file to Tech Support for debugging the issue.

- To check the Veritas log file, you must access:

```
/var/VRTSvcs/log/engine_A.log
/var/VRTSvcs/log/Oracle_A.log
/var/VRTSvcs/log/Netlsnr_A.log

/var/VRTSvcs/log/ASMinst_A.log
/var/VRTSvcs/log/ASMDG_A.log
```

These files contain all the actions that the VCS engine and other agents for Oracle perform.

Review the description of the error messages for the following agents and the possible solutions:

- Oracle agent
- Netlsnr agent
- ASMinst agent
- ASMDG agent

Error messages common to the Oracle and Netlsnr agents

Table 6-1 lists the Veritas Cluster Server agent for Oracle error messages with the description and a recommended solution, if available.

Table 6-1 Veritas Cluster Server agent for Oracle error messages

Message	Description and solution
No ORACLE_HOME specified	<p>The Home attribute in the Oracle or Netlsnr type has not been set.</p> <p>Solution: Set the Home attribute value to the correct full path name of the Oracle home.</p>
Oracle home directory %s does not exist	<p>The string that is specified for the Home attribute in the Oracle or Netlsnr type is incorrect.</p> <p>Solution: Set the Home attribute value to the correct full path name of the Oracle home.</p>

Table 6-1 Veritas Cluster Server agent for Oracle error messages (*continued*)

Message	Description and solution
File %s is not a valid text file	<p>The file that the EnvFile attribute specifies for sourcing the environment variables is not present, not readable, or is not a text file.</p> <p>Solution: Set the EnvFile attribute value to the correct full path name. Ensure that the file format is valid.</p>
VCSAgExec returned failure when trying to execute in-depth test	<p>Internal error.</p> <p>Solution: Contact Technical Support for further assistance.</p>
Unable to open pipe from %s	<p>Internal error.</p> <p>Solution: Contact Technical Support for further assistance.</p>
Process %s restarted	<p>Warning message to indicate that the PID for the Oracle process that is specified is different than the one registered by the previous monitor cycle.</p>
Monitor procedure %s returned %s	<p>MonScript failed to execute correctly.</p> <p>Solution: Debug MonScript to assess the exact cause of failure.</p>
Monitor procedure %s did not exit, return value is %s	<p>Internal error while executing MonScript.</p> <p>Solution: Contact Technical Support for further assistance.</p>
No owner for Oracle executables was specified	<p>The Owner attribute in the Oracle type has not been set.</p> <p>Solution: Set the Owner attribute value to the correct owner of the database binaries.</p>
Invalid owner %s for Oracle executables was specified	<p>The Operating System user that the Owner attribute specifies is invalid.</p> <p>Solution: Set the Owner attribute value to the correct owner of the database binaries.</p>
Access to Monscrip %s denied. Detail Monitoring will not be enabled!! Please specify a valid file.	<p>The file that the MonScript attribute specifies is not accessible or not found.</p> <p>Solution: Make sure that the file name indicates a valid and accessible file.</p>

Table 6-1 Veritas Cluster Server agent for Oracle error messages (continued)

Message	Description and solution
Encountered errors while decrypting password!	<p>The agent cannot decrypt the password you specified.</p> <p>Solution: Use vcsencrypt utility to create a new encrypted password and supply the password.</p>

Error messages specific to the Oracle agent

Table 6-2 lists the error messages for the VCS agent for Oracle with the description and a recommended solution, if available.

Table 6-2 Oracle agent error messages

Message	Description and solution
No SID specified	<p>The Sid attribute in the Oracle type has not been set.</p> <p>Solution: Set the Sid attribute value to the correct database instance.</p>
sqlplus/svrmgrl not found in %s/bin	<p>The client utilities svrmgrl or sqlplus are not found in the \$ORACLE_HOME/bin directory.</p> <p>Solution: Verify that the Oracle home has been correctly specified and that these executables are present.</p>
srvctl not found in %s/bin	<p>The client utility srvctl is not found in the \$ORACLE_HOME/bin directory.</p> <p>Solution: Verify that the Oracle home has been correctly specified and that this executable is present.</p>
Oracle %s failed to stop	<p>Warning message to indicate that the following commands were not successful in closing the Oracle instance in the clean or offline entry point:</p> <ul style="list-style-type: none">■ Shutdown immediate■ Shutdown abort

Table 6-2 Oracle agent error messages (*continued*)

Message	Description and solution
Oracle database %s not running	<p>Warning message to indicate that the database instance was not running even before the clean or offline entry points were executed.</p> <p>Solution: No action required.</p>
Oracle (%s) kill TERM %s	<p>Warning message to indicate that the Oracle processes would be signaled with SIGTERM.</p> <p>Solution: No action required.</p>
Oracle (%s) kill KILL %s	<p>Warning message to indicate that the Oracle processes would be signaled with SIGKILL.</p> <p>Solution: No action required.</p>
Database in QUIESCING/QUIESCED mode	<p>Warning message to indicate that database is in QUIESCING or QUIESCED mode.</p>
Database in RESTRICTED mode	<p>Warning message to indicate that database is in RESTRICTED mode.</p>
Database in SUSPENDED state	<p>Warning message to indicate that database is in SUSPENDED state.</p>
Resource %s - monitor procedure did not complete within the expected time.	<p>Refer to Oracle's alert log for more information.</p> <p>When a monitor times out as many times as the value specified, the corresponding resource is brought down by calling the clean entry point. The resource is then marked FAULTED, or it is restarted, depending on the RestartLimit attribute value.</p> <p>Solution: Set the FaultOnMonitorTimeouts attribute value to 0 so that the monitor failures are not considered indicative of a resource fault.</p> <p>Another possible reason could be that automatic archiving was not enabled while setting up the database.</p> <p>Solution: Archive the database manually. If automatic archival is enabled, set the LOG_ARCHIVE_START parameter value in the file init.ora to TRUE.</p>

Table 6-2 Oracle agent error messages (*continued*)

Message	Description and solution
Custom script /opt/VRTSagents/ha/bin/Oracle/start_custom_%.sql does not exist. Will not be able to start the database.	<p>The agent could not find the custom script at the specified location to start the database.</p> <p>Solution: Make sure the custom file exists at the specified location and has valid permissions.</p>
Custom script /opt/VRTSagents/ha/bin/Oracle/shut_custom_%.sql does not exist. Using default shutdown option.	<p>The agent could not find the custom script at the specified location to stop the database.</p> <p>Solution: Make sure the custom file exists and the specified location and has valid permissions.</p>
oraerror.dat did not have records that could be parsed	<p>The file oraerror.dat is not present or has records in an unsupported format.</p> <p>Solution: Make sure the file exists and has data in the supported format.</p>
Incorrect Monitor Option	<p>The MonitorOption value is less than 0 or greater than 1.</p> <p>Solution: Set the MonitorOption attribute value to 0 or 1.</p>
MonitorOption value not applicable for this Oracle Version	<p>The health check monitoring option is selected when Oracle version is not Oracle 10g or later.</p> <p>Solution: Set the MonitorOption value to 0 to select the process check monitoring option.</p>
VCSAgExec returned failure when trying to execute health check monitor test	<p>Internal error.</p> <p>Solution: Contact Technical Support for further assistance.</p>
VCSAgExec returned failure while trying to find Oracle version	<p>Internal error.</p> <p>Solution: Contact Technical Support for further assistance.</p>
One or more of the attributes User:Pword:Table:MonScript are not set correctly. Detail monitoring will not be enabled!! Unset the DetailMonitor attribute if you want to disable DetailMonitoring.	<p>Detail Monitoring has been enabled but the necessary attributes for detail monitoring have not been set correctly.</p> <p>Solution: Set the values of the required attributes for detail monitoring correctly or set DetailMonitor attribute value to 0 to disable detail monitoring.</p>

Error messages specific to the Netlsnr agent

[Table 6-3](#) lists the Netlsnr agent error messages with the description and a recommended solution, if available.

Table 6-3 Netlsnr agent error messages

Message	Description and solution
Cannot open process directory.	The agent could not process the /proc entries in the particular monitor cycle. Solution: No action required.
Listener process %s not running	Warning message to indicate that the Listener process was not running even before the clean or offline entry points were executed. Solution: No action required.
Listener %s kill TERM %s	Warning message to indicate that the Listener process would be signaled with SIGTERM. Solution: No action required.
Listener %s kill KILL %s	Warning message to indicate that the Listener process would be signaled with SIGKILL. Solution: No action required.
lsnrctl not found in %s/bin	The client utility lsnrctl is not found in the \$ORACLE_HOME/bin directory. Solution: Verify that the Oracle home has been correctly specified and that this executable is present.
lsnrctl operation timed out	The tnslnsr process does not respond. Solution: Verify the underlying network protocol.

Error messages specific to the ASMinst agent

[Table 6-4](#) lists the ASMinst agent error messages with the description and a recommended solution, if available.

Table 6-4 ASMIInst agent error messages

Message	Description and solution
Attribute Home cannot have multiple tokens.	<p>The Home attribute of the ASMIInst agent has multiple tokens.</p> <p>Solution: Correct the value of the Home attribute.</p>
Cluster Synchronization Service process is not running.	<p>The Oracle CSSD process is not running.</p> <p>Solution: Enable the CSSD process.</p> <p>See “Enabling the clustering daemon for ASM-managed database” on page 47.</p>
Cluster Synchronization Service died or is restarted.	<p>The Oracle CSSD process has died.</p> <p>Solution: Enable the CSSD process.</p> <p>See “Enabling the clustering daemon for ASM-managed database” on page 47.</p>

Error messages specific to the ASMDG agent

[Table 6-5](#) lists the ASMIInst agent error messages with the description and a recommended solution, if available.

Table 6-5 ASMDG agent error messages

Message	Description and solution
No ASM Diskgroup name specified, or is null.	<p>The DiskGroups attribute value for ASMDG agent is not specified.</p> <p>Solution: Specify the value of the Diskgroup attribute.</p>
Agent unable to identify state of the ASMDG resource. The asm_diskstring parameter is not set correctly in the ASM initialization parameter file.	<p>The ASM initialization parameter file does not have the correct value for ASM instance to search the ASM disk groups.</p> <p>Solution: Specify the correct value for the asm_diskstring parameter in the ASM initialization parameter file.</p>
Agent unable to identify state of the resource.	<p>The ASMDG agent cannot identify the state of the resource.</p> <p>Solution: Contact Technical Support for further assistance.</p>

Troubleshooting issues specific to Oracle in a VCS environment

Table 6-6 lists any Oracle issues that you may encounter in a VCS environment.

Table 6-6 Oracle common issue

Message	Description and solution
ORA-15097: Cannot SHUTDOWN ASM instance with connected RDBMS instance.	<p>This message appears for ASM-managed database if you try to offline the Oracle service group within 2-3 minutes after you brought the service group online.</p> <p>Refer to Oracle bug 5045309 for more information.</p>

Resource type definitions

This appendix includes the following topics:

- [About the resource type and attribute definitions](#)
- [Resource type definition for the Oracle agent](#)
- [Resource type definition for the Netlsnr agent](#)
- [Resource type definition for the ASMInst agent](#)
- [Resource type definition for the ASMDG agent](#)

About the resource type and attribute definitions

The resource type represents the VCS configuration definition of the agent and specifies how the agent is defined in the configuration file main.cf. The Attribute Definitions explain the attributes associated with the agent. The Required attributes explain the attributes that must be configured for the agent to function properly.

Resource type definition for the Oracle agent

The Oracle agent of the Veritas Cluster Server agent for Oracle is represented by the Oracle resource type in VCS.

```
type Oracle (  
  
    static str AgentDirectory = "/opt/VRTSagents/ha/bin/Oracle"  
  
    static keylist SupportedActions = { VRTS_GetInstanceName,  
                                        VRTS_GetRunningServices, DBRestrict, DBUndoRestrict,  
                                        DBResume, DBSuspend, DBTbspBackup,  
                                        "home.vfd", "owner.vfd", "getid", "pfile.vfd" }
```

```
static str ArgList[] = { Sid, Owner, Home, Pfile, StartUpOpt,
    ShutDownOpt, EnvFile, AutoEndBkup, DetailMonitor,
    User, Pword, Table, MonScript, AgentDebug, Encoding,
    MonitorOption }

str Sid
str Owner
str Home
str Pfile
str StartUpOpt = STARTUP_FORCE
str ShutDownOpt = IMMEDIATE
str EnvFile
boolean AutoEndBkup = 1
int DetailMonitor = 0
str MonScript = "./bin/Oracle/SqlTest.pl"
str User
str Pword
str Table
boolean AgentDebug = 0
str Encoding
int MonitorOption = 0
static int IntentionalOffline = 1

)
```

Attribute definition for the Oracle agent

Review the description of the Oracle agent attributes. The agent attributes are classified as required, optional, and internal.

[Table A-1](#) lists the required attributes. You must assign values to the required attributes.

Table A-1 Required attributes for Oracle agent

Required attributes	Type and dimension	Definition
Sid	string-scalar	The variable \$ORACLE_SID that represents the Oracle instance. The Sid is considered case-sensitive by the Oracle agent and by the Oracle database server.
Owner	string-scalar	The Oracle user, as the defined owner of executables and database files in /etc/passwd.

Table A-1 Required attributes for Oracle agent (*continued*)

Required attributes	Type and dimension	Definition
Home	string-scalar	The \$ORACLE_HOME path to Oracle binaries and configuration files. For example, you could specify the path as /opt/ora_home. Note: Do not append a slash (/) at the end of the path.

[Table A-2](#) lists the optional attributes for Oracle agent. You can configure the optional attributes if necessary.

Table A-2 Optional attributes for Oracle agent

Optional Attributes	Type and Dimension	Definition
StartUpOpt	string-scalar	Startup options for the Oracle instance. This attribute can take the following values: <ul style="list-style-type: none">■ STARTUP■ STARTUP_FORCE■ RESTRICTED■ RECOVERDB■ SRVCTLSTART■ CUSTOM Default is STARTUP_FORCE. See “Startup and shutdown options for the Oracle agent” on page 16.
ShutDownOpt	string-scalar	Shut down options for the Oracle instance. This attribute can take the following values: <ul style="list-style-type: none">■ IMMEDIATE■ TRANSACTIONAL■ SRVCTLSTOP■ CUSTOM Default is IMMEDIATE. See “Startup and shutdown options for the Oracle agent” on page 16.

Table A-2 Optional attributes for Oracle agent (*continued*)

Optional Attributes	Type and Dimension	Definition
EnvFile	string-scalar	<p>The full path name of the file that is sourced by the entry point scripts. This file contains the environment variables set by the user for the Oracle database server environment such as LD_LIBRARY_PATH, NLS_DATE_FORMAT, and so on.</p> <p>The syntax for the contents of the file depends on the login shell of Owner. File must be readable by Owner. The file must not contain any prompts for user input.</p>
Pfile	string-scalar	<p>The name of the initialization parameter file with the complete path of the startup profile.</p> <p>You can also use the server parameter file. Create a one-line text initialization parameter file that contains only the SPFILE parameter. See the Oracle documentation for more information.</p> <p>See “Using the SPFILE in a VCS cluster” on page 154.</p>
AutoEndBkup	integer-scalar	<p>Setting the AutoEndBkup attribute to a non-zero value takes the datafiles in the database out of the backup mode, during Online.</p> <p>Default = 1</p> <p>See “Failing over Oracle after a VCS node failure during hot backup” on page 37.</p>
MonitorOption	integer-scalar	<p>Monitor options for the Oracle instance. This attribute can take values 0 or 1.</p> <ul style="list-style-type: none"> ■ 0 - Process check monitoring (recommended) ■ 1 - Health check monitoring <p>You must the set the value of this attribute as 1 to use the intentional offline functionality of the agent.</p> <p>Default = 0</p> <p>See “Monitor options for the Oracle agent” on page 18.</p>

Table A-2 Optional attributes for Oracle agent (*continued*)

Optional Attributes	Type and Dimension	Definition
DetailMonitor	integer-scalar	<p>Setting this flag to a non-zero enables detail monitoring for Oracle. The value indicates the number of monitor cycles after which the agent will monitor Oracle in detail. For example, the value 5 indicates that the agent will monitor Oracle in detail every five monitor intervals.</p> <p>Note: If you set the AutoEndBkup attribute value to 0, then you must set the DetailMonitor attribute value to 1.</p> <p>Default = 0</p>
MonScript	string-scalar	<p>Pathname to the script provided for detail monitoring. The default (basic monitoring) is to monitor the database PIDs only.</p> <p>Note: Detail monitoring is disabled if the value of the attribute MonScript is invalid or is set to an empty string.</p> <p>The pathname to the supplied detail monitor script is /opt/VRTSagents/ha/bin/Oracle/SqlTest.pl.</p> <p>MonScript also accepts a pathname relative to /opt/VRTSagents/ha. A relative pathname should start with "./", as in the path ./bin/Oracle/SqlTest.pl.</p>
User	string-scalar	Internal database user. Connects to the database for detail monitoring.
Pword	string-scalar	<p>Encrypted password for internal database-user authentication.</p> <p>Encrypt passwords only when entering them using the command-line. Passwords must be encrypted using the VCS Encrypt utility.</p> <p>See “Encrypting Oracle database user and listener passwords” on page 83.</p>
Table	string-scalar	Table for update by User/Pword.

Table A-2 Optional attributes for Oracle agent (*continued*)

Optional Attributes	Type and Dimension	Definition
Encoding	string-scalar	Specifies operating system encoding that corresponds to Oracle encoding for the displayed Oracle output. Default is "".
IntentionalOffline	static-int	Defines how VCS reacts when Oracle is intentionally stopped outside of VCS control. If you stop Oracle out of VCS control, the agent behavior is as follows: <ul style="list-style-type: none"> ■ 0—the Oracle agent registers a fault and initiates the failover of the service group. ■ 1—the Oracle agent takes the Oracle resource offline when Health check monitoring is enabled. <p>If Health check monitoring is not enabled, the agent registers a fault and initiates the failover of the service group.</p> <p>Note: If you want to use the intentional offline functionality of the agent, you must set the value of the MonitorOption attribute as 1 to enable Health check monitoring.</p> <p>Default = 1</p> <p>See <i>Veritas Cluster Server User's Guide</i>.</p>
AgentDebug	boolean-scalar	Additional debug messages are logged when this flag is set. Default = 0

[Table A-3](#) lists the internal attribute for Oracle agent. This attribute is for internal use only. Symantec recommends not to modify the value of this attribute.

Table A-3 Internal attributes for Oracle agent

Optional Attributes	Type and Dimension	Definition
AgentDirectory	static-string	Specifies the location of binaries, scripts, and other files related to the Oracle agent. Default is /opt/VRTSagents/ha/bin/Oracle.

Resource type definition for the Netlsnr agent

The Netlsnr agent of the Veritas Cluster Server agent for Oracle is represented by the Netlsnr resource type in VCS.

```
type Netlsnr (

    static str AgentDirectory = "/opt/VRTSagents/ha/bin/Netlsnr"

    static keylist SupportedActions = { VRTS_GetInstanceName,
        VRTS_GetRunningServices, "tnsadmin.vfd" }
    static str ArgList[] = { Owner, Home, TnsAdmin, Listener,
        EnvFile, MonScript, LsnrPwd, AgentDebug, Encoding }
    str Owner
    str Home
    str TnsAdmin
    str Listener
    str EnvFile
    str MonScript = "./bin/Netlsnr/LsnrTest.pl"
    str LsnrPwd
    boolean AgentDebug = 0
    str Encoding
    static int IntentionalOffline = 0

)
```

Attribute definition for the Netlsnr agent

Review the description of the Netlsnr agent attributes. The agent attributes are classified as required, optional, and internal.

[Table A-4](#) lists the required attributes for Netlsnr agent. You must assign values to the required attributes.

Table A-4 Required attributes for Netlsnr agent

Required attributes	Type and dimension	Definition
Owner	string-scalar	Oracle user, as the defined owner of executables and database files in /etc/passwd.
Home	string-scalar	The \$ORACLE_HOME path to Oracle binaries and configuration files. For example, you could specify the path as /opt/ora_home. Do not append a slash (/) at the end of the path.

[Table A-5](#) lists the optional attributes for Netlsnr agent. You can configure the optional attributes if necessary.

Table A-5 Optional attributes for Netlsnr agent

Optional attributes	Type and dimension	Definition
TnsAdmin	string-scalar	The \$TNS_ADMIN path to directory in which the Listener configuration file resides (listener.ora). Default is /var/opt/oracle.
Listener	string-scalar	Name of Listener. The name for Listener is considered case-insensitive by the Netlsnr agent and the Oracle database server. Default is LISTENER.
LsnrPwd	string-scalar	The VCS encrypted password used to stop and monitor the listener. This password is set in the Listener configuration file. Encrypt passwords only when entering them using the command-line. Passwords must be encrypted using the VCS Encrypt utility. See “Encrypting Oracle database user and listener passwords” on page 83.
EnvFile	string-scalar	Specifies the full path name of the file that is sourced by the entry point scripts. This file contains the environment variables set by the user for the Oracle listener environment such as LD_LIBRARY_PATH and so on. The syntax for the contents of the file depends on the login shell of Owner. This file must be readable by Owner. The file must not contain any prompts for user input.

Table A-5 Optional attributes for Netlsnr agent (*continued*)

Optional attributes	Type and dimension	Definition
MonScript	string-scalar	<p>Pathname to the script provided for detail monitoring. By default, the detail monitoring is enabled to monitor the listener process.</p> <p>Note: If the value of the attribute MonScript is set to an empty string, the agent disables detail monitoring.</p> <p>The pathname to the supplied detail monitoring script is /opt/VRTSagents/ha/bin/Netlsnr/LsnrTest.pl.</p> <p>MonScript also accepts a pathname relative to /opt/VRTSagents/ha. A relative pathname should start with "./", as in the path ./bin/Netlsnr/LsnrTest.pl.</p>
Encoding	string-scalar	<p>Specifies operating system encoding that corresponds to Oracle encoding for the displayed Oracle output.</p> <p>Default is "".</p>
IntentionalOffline	static-int	<p>For future use.</p> <p>Do not change the value of this attribute.</p> <p>Default = 0</p>
AgentDebug	boolean	<p>Additional debug messages are logged when this flag is set.</p> <p>Default = 0</p>

[Table A-6](#) lists the internal attribute for Netlsnr agent. This attribute is for internal use only. Symantec recommends not to modify the value of this attribute.

Table A-6 Internal attributes for Netlsnr agent

Optional Attributes	Type and Dimension	Definition
AgentDirectory	static-string	<p>Specifies the location of binaries, scripts, and other files related to the Netlsnr agent.</p> <p>Default is /opt/VRTSagents/ha/bin/Netlsnr.</p>

Resource type definition for the ASMinst agent

The ASMinst agent of the Veritas Cluster Server agent for Oracle is represented by the ASMinst resource type in VCS.

```
type ASMinst (  
    static str AgentDirectory = "/opt/VRTSagents/ha/bin/ASMinst"  
    static str ArgList[] = { Sid, Owner, Home, Pfile,  
        EnvFile, Encoding }  
    str Sid  
    str Owner  
    str Home  
    str Pfile  
    str EnvFile  
    str Encoding  
)
```

Attribute definition for the ASMinst agent

Review the description of the ASMinst agent attributes. The agent attributes are classified as required, optional, and internal.

[Table A-7](#) lists the required attributes. You must assign values to the required attributes.

Table A-7 Required attributes for ASMinst agent

Required attributes	Type and dimension	Definition
Sid	string-scalar	The variable \$ORACLE_SID that represents the ASM instance. The Sid is considered case-sensitive by the ASMinst agent.
Owner	string-scalar	The Oracle user, as the defined owner of \$ORACLE_HOME of ASM instance and in /etc/passwd.
Home	string-scalar	The \$ORACLE_HOME path to Oracle ASM binaries and configuration files. For example, you could specify the path as /opt/ora_home. Note: Do not append a slash (/) at the end of the path.

[Table A-8](#) lists the optional attributes for ASMinst agent. You can configure the optional attributes if necessary.

Table A-8 Optional attributes for ASMinst agent

Optional Attributes	Type and Dimension	Definition
EnvFile	string-scalar	<p>The full path name of the file that is sourced by the entry point scripts. This file contains the environment variables set by the user for the Oracle database server environment such as LD_LIBRARY_PATH, NLS_DATE_FORMAT, and so on.</p> <p>The syntax for the contents of the file depends on the login shell of Owner. File must be readable by Owner. The file must not contain any prompts for user input.</p>
Pfile	string-scalar	<p>The name of the initialization parameter file of ASM instance with the complete path of the startup profile.</p> <p>You can also use the server parameter file. Create a one-line text initialization parameter file that contains only the SPFILE parameter. See the Oracle documentation for more information.</p> <p>See “Using the SPFILE in a VCS cluster” on page 154.</p>
Encoding	string-scalar	<p>Specifies operating system encoding that corresponds to Oracle encoding for the displayed Oracle output. Default is "".</p>

[Table A-9](#) lists the internal attribute for ASMinst agent. This attribute is for internal use only. Symantec recommends not to modify the value of this attribute.

Table A-9 Internal attributes for ASMInst agent

Optional Attributes	Type and Dimension	Definition
AgentDirectory	static-string	Specifies the location of binaries, scripts, and other files related to the ASMInst agent. Default is /opt/VRTSagents/ha/bin/ASMInst.

Resource type definition for the ASMDG agent

The ASMDG agent of the Veritas Cluster Server agent for Oracle is represented by the ASMDG resource type in VCS.

```
type ASMDG (  
    static str AgentDirectory = "/opt/VRTSagents/ha/bin/ASMDG"  
    static str ArgList[] = { Sid, Owner, Home, DiskGroups,  
    EnvFile, Encoding }  
    str Sid  
    str Owner  
    str Home  
    keylist DiskGroups  
    str EnvFile  
    str Encoding  
)
```

Attribute definition for the ASMDG agent

Review the description of the ASMDG agent attributes. The agent attributes are classified as required, optional, and internal.

Table A-10 lists the required attributes. You must assign values to the required attributes.

Table A-10 Required attributes for ASMDG agent

Required attributes	Type and dimension	Definition
DiskGroups	keylist	The ASM disk groups, where you store the Oracle database files.

Table A-10 Required attributes for ASMDG agent (*continued*)

Required attributes	Type and dimension	Definition
Sid	string-scalar	The variable \$ORACLE_SID that represents the ASM instance. The Sid is considered case-sensitive by the ASMInst agent.
Owner	string-scalar	The Oracle user, as the defined owner of \$ORACLE_HOME of ASM instance and in /etc/passwd.
Home	string-scalar	The \$ORACLE_HOME path to Oracle ASM binaries and configuration files. For example, you could specify the path as /opt/ora_home. Note: Do not append a slash (/) at the end of the path.

[Table A-11](#) lists the optional attributes for ASMDG agent. You can configure the optional attributes if necessary.

Table A-11 Optional attributes for ASMDG agent

Optional Attributes	Type and Dimension	Definition
EnvFile	string-scalar	The full path name of the file that is sourced by the entry point scripts. This file contains the environment variables set by the user for the Oracle database server environment such as LD_LIBRARY_PATH, NLS_DATE_FORMAT, and so on. The syntax for the contents of the file depends on the login shell of Owner. File must be readable by Owner. The file must not contain any prompts for user input.
Encoding	string-scalar	Specifies operating system encoding that corresponds to Oracle encoding for the displayed Oracle output. Default is "".

Table A-12 lists the internal attribute for ASMDG agent. This attribute is for internal use only. Symantec recommends not to modify the value of this attribute.

Table A-12 Internal attributes for ASMDG agent

Optional Attributes	Type and Dimension	Definition
AgentDirectory	static-string	Specifies the location of binaries, scripts, and other files related to the ASMDG agent. Default is /opt/VRTSagents/ha/bin/ASMDG.

Sample configurations

This appendix includes the following topics:

- [About the sample configurations for Oracle enterprise agent](#)
- [Sample single Oracle instance configuration](#)
- [Sample multiple Oracle instances \(single listener\) configuration](#)
- [Sample multiple instance \(multiple listeners\) configuration](#)
- [Sample Oracle configuration with shared server support](#)
- [Sample Oracle ASM configurations](#)

About the sample configurations for Oracle enterprise agent

The sample configuration include descriptions for typical service groups that are configured to monitor the state of Oracle in a VCS cluster.

See [“Configuring Oracle instances in VCS”](#) on page 60.

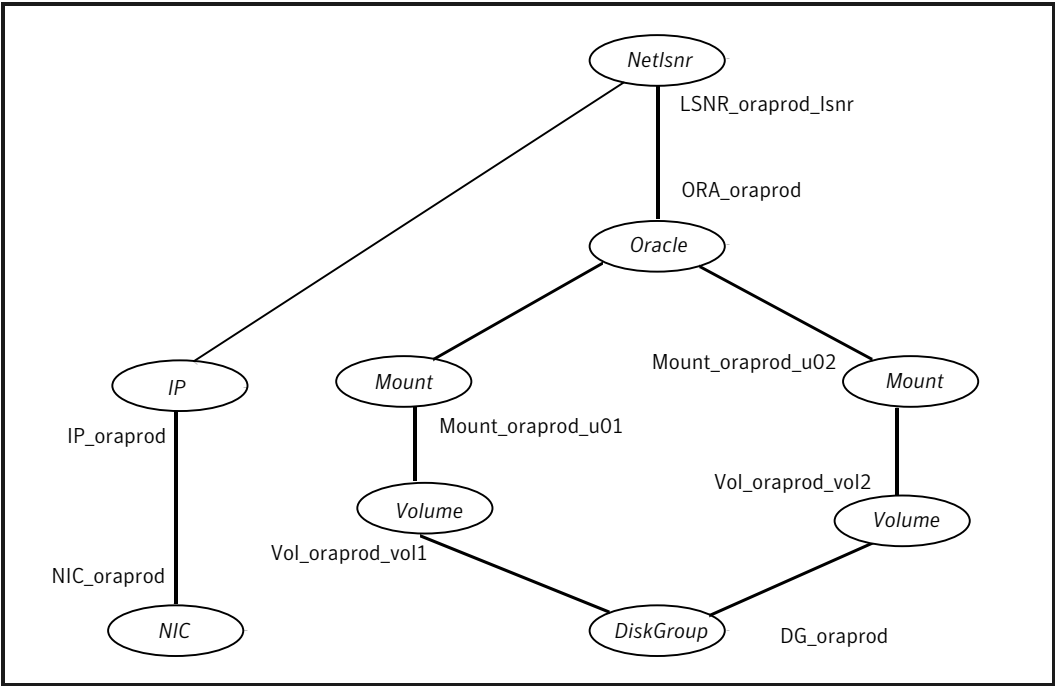
The sample dependency graphs depict the resource types, resources, and resource dependencies within the service group. The sample configuration file (main.cf) is also included for your reference.

Review these dependencies carefully before configuring the agent. For more information about VCS resource types, see the *Veritas Cluster Server Bundled Agents Reference Guide*.

Sample single Oracle instance configuration

Figure B-1 describes a typical service group configured to monitor the state of an Oracle instance in a VCS cluster.

Figure B-1 Dependency graph for single Oracle instance



The shared disk groups and volumes in the cluster are configured as resources of type `DiskGroup` and `Volume` respectively. The volumes are mounted using the `Mount` agent. The virtual IP address for the service group is configured using the `IP` and `NIC` resource types. The Oracle server can be started after each of these resources is brought online.

If your configuration does not use Veritas Volume Manager, use the `DiskReservation` resource type to configure shared storage instead of the `DiskGroup` and `Volume` resource types.

Sample VCS configuration file for single Oracle instance

Review the sample configuration with a resource of type `Oracle` that is configured as follows in `main.cf` file.


```
include "types.cf"
include "OracleTypes.cf"

cluster vcs (
)

system vcshp1 (
)

system vcshp2 (
)

group ORA_PROD_Group (
    SystemList = { vcshp1 = 0, vcshp2 = 1 }
    AutoStartList = { vcshp1 }
)

DiskGroup DG_oraprod (
    DiskGroup = ora_prod_dg
    StartVolumes = 0
    StopVolumes = 0
)

IP IP_oraprod (
    Device = lan0
    Address = "192.168.1.22"
)

Mount Mount_oraprod_u01 (
    MountPoint = "/prod/u01"
    BlockDevice = "/dev/vx/dsk/ora_prod_dg/u01-vol"
    FSType = vxfs
    FsckOpt = "-n"
)

Mount Mount_oraprod_u02 (
    MountPoint = "/prod/u02"
    BlockDevice = "/dev/vx/dsk/ora_prod_dg/u02-vol"
    FSType = vxfs
    FsckOpt = "-n"
)
```

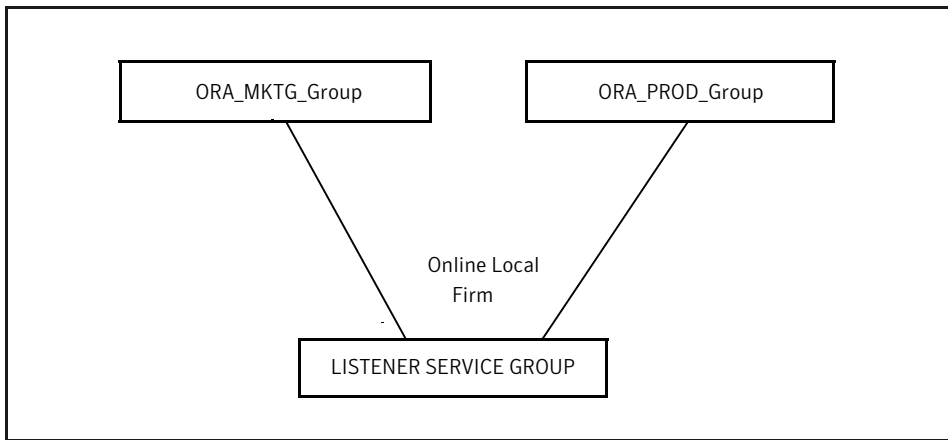
```
NIC NIC_oraprod (  
    Device = lan0  
)  
  
Netlsnr LSNR_oraprod_lsnr (  
    Owner = oraprod  
  
    Home = "/orahome/Oracle"  
    TnsAdmin = "/orahome/Oracle/network/admin"  
    Listener = LISTENER_PROD  
    MonScript = "./bin/Netlsnr/LsnrTest.pl"  
    LsnrPwd = cqfOdoOolOo  
)  
  
Oracle ORA_oraprod (  
    Sid = PROD  
    Owner = oraprod  
  
    Home = "/orahome/Oracle"  
    EnvFile = "/tmp/env.sh"  
    DetailMonitor = 1  
    MonScript = "./bin/Oracle/SqlTest.pl"  
    User = thor  
    Pword = hvlTptWvj  
    Table = thor  
    MonitorOption = 0  
)  
  
Volume Vol_oraprod_vol1 (  
    Volume = u01-vol  
    DiskGroup = ora_prod_dg  
)  
  
Volume Vol_oraprod_vol2 (  
    Volume = u02-vol  
    DiskGroup = ora_prod_dg  
)  
  
IP_oraprod requires NIC_oraprod  
LSNR_oraprod_lsnr requires IP_oraprod  
LSNR_oraprod_lsnr requires ORA_oraprod
```

```
Mount_oraprod_u01 requires Vol_oraprod_vol1
Mount_oraprod_u02 requires Vol_oraprod_vol2
ORA_oraprod requires Mount_oraprod_u01
ORA_oraprod requires Mount_oraprod_u02
Vol_oraprod_vol1 requires DG_oraprod
Vol_oraprod_vol2 requires DG_oraprod
```

Sample multiple Oracle instances (single listener) configuration

Figure B-2 describes a typical VCS configuration to monitor two Oracle instances sharing a listener. This configuration has a service group for each Oracle instance. The Listener too is configured in a separate service group.

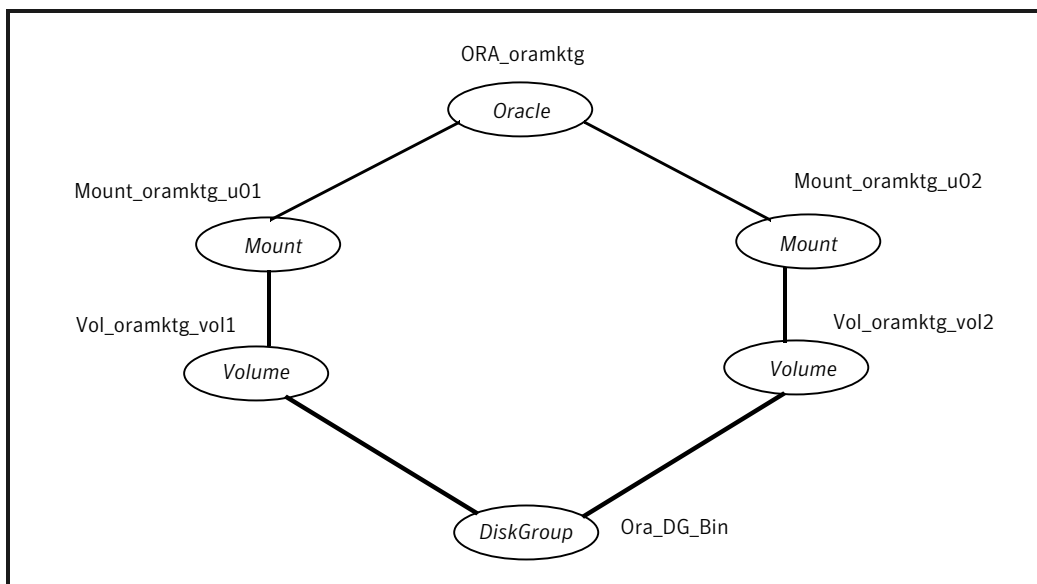
Figure B-2 Two Oracle instances sharing a listener



The Oracle service groups are made dependent on the Listener service group using an Online Local Firm dependency.

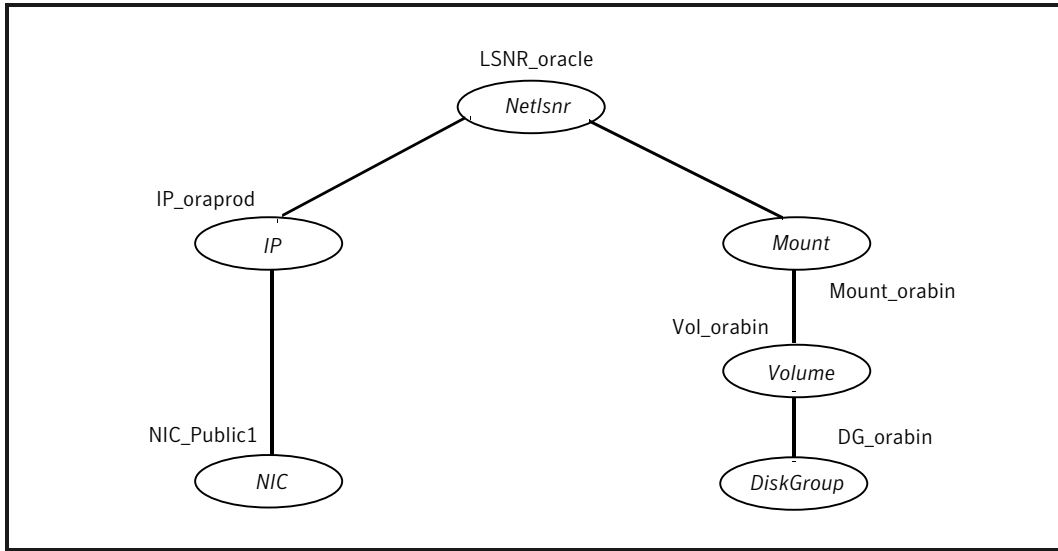
Figure B-3 shows the dependency graph for one of the Oracle instances in the VCS configuration. In the Oracle service group, the shared disk groups and volumes in the cluster are configured as resources of type DiskGroup and Volume respectively. The volumes are mounted using the Mount agent.

Figure B-3 Dependency graph for one of the Oracle instances



[Figure B-4](#) shows the dependency graph for the listener that the two Oracle instances share in the VCS configuration. In the Listener service group, the virtual IP address is configured using the IP and NIC resource types. The Listener can be started after the IP and NIC resources are brought online.

Figure B-4 Dependency graph for the single listener



The Oracle server can be started after the Listener service group and the resources in the Oracle service group are brought online.

If your configuration does not use Veritas Volume Manager, use the DiskReservation resource type to configure shared storage instead of the DiskGroup and Volume resource types.

Note: In this case, make sure you have modified all proper system files, such as `/etc/system`, `/etc/passwd`, `/etc/group`, and `/etc/shadow` to support multiple databases. Pay particular attention to system requirements like physical memory and shared memory segment availability. Also ensure a single system is capable of sustaining a multiple instance load in the event of a server failure and extended operation on the backup server.

Sample VCS configuration file for multiple Oracle instances (single listener)

Review the sample configuration file for multiple Oracle instances.

```
include "types.cf"
include "OracleTypes.cf"
```

```

cluster vcs (
)

system vcshp1 (
)

system vcshp2 (
)

group ORA_MKTG_Group (
    SystemList = { vcshp1 = 0, vcshp2 = 1 }
    AutoStartList = { vcshp1 }
)

DiskGroup DG_oramktg (
    DiskGroup = ora_mktg_dg
    StartVolumes = 0
    StopVolumes = 0
)

Mount Mount_oramktg_u01 (
    MountPoint = "/mktg/u01"
    BlockDevice = "/dev/vx/dsk/ora_mktg_dg/u01-vol"
    FSType = vxfs
    FsckOpt = "-n"
)

Mount Mount_oramktg_u02 (
    MountPoint = "/mktg/u02"
    BlockDevice = "/dev/vx/dsk/ora_mktg_dg/u02-vol"
    FSType = vxfs
    FsckOpt = "-n"
)

Oracle ORA_oramktg (
    Sid = MKTG
    Owner = oramktg

    Home = "/orahome/Oracle"
    EnvFile = "/tmp/env.sh"
    DetailMonitor = 1
    MonScript = "./bin/Oracle/SqlTest.pl"

```

```
User = thor
Pword = hvlTptWvj
Table = thor
MonitorOption = 0
)

Volume Vol_oramktg_vol1 (
    Volume = u01-vol
    DiskGroup = ora_mktg_dg
)

Volume Vol_oramktg_vol2 (
    Volume = u02-vol
    DiskGroup = ora_mktg_dg
)

requires group Common_Service online firm
Mount_oramktg_u01 requires Vol_oramktg_vol1
Mount_oramktg_u02 requires Vol_oramktg_vol2
ORA_oramktg requires Mount_oramktg_u01
ORA_oramktg requires Mount_oramktg_u02
Vol_oramktg_vol1 requires DG_oramktg
Vol_oramktg_vol2 requires DG_oramktg

group ORA_PROD_Group (

    SystemList = { vcshp1 = 0, vcshp2 = 1 }
    AutoStartList = { vcshp1 }

)

DiskGroup DG_oraprod (
    DiskGroup = ora_prod_dg
    StartVolumes = 0
    StopVolumes = 0
)

Mount Mount_oraprod_u01 (
    MountPoint = "/prod/u01"
    BlockDevice = "/dev/vx/dsk/ora_prod_dg/u01-vol"
    FSType = vxfs
    FsckOpt = "-n"
)
```

```
Mount Mount_oraprod_u02 (  
    MountPoint = "/prod/u02"  
    BlockDevice = "/dev/vx/dsk/ora_prod_dg/u02-vol"  
    FSType = vxfs  
    FsckOpt = "-n"  
)  
  
Oracle ORA_oraprod (  
    Sid = PROD  
    Owner = oraprod  
    Home = "/orahome/Oracle"  
  
    EnvFile = "/tmp/env.sh"  
    DetailMonitor = 1  
    MonScript = "./bin/Oracle/SqlTest.pl"  
    User = thor  
    Pword = hvlTptWvj  
    Table = thor  
    MonitorOption = 0  
)  
  
Volume Vol_oraprod_vol1 (  
    Volume = u01-vol  
    DiskGroup = ora_prod_dg  
)  
  
Volume Vol_oraprod_vol2 (  
    Volume = u02-vol  
    DiskGroup = ora_prod_dg  
)  
  
requires group Common_Service online firm  
Mount_oraprod_u01 requires Vol_oraprod_vol1  
Mount_oraprod_u02 requires Vol_oraprod_vol2  
ORA_oraprod requires Mount_oraprod_u01  
ORA_oraprod requires Mount_oraprod_u02  
Vol_oraprod_vol1 requires DG_oraprod  
Vol_oraprod_vol2 requires DG_oraprod  
  
group Common_Service (  

```



```
SystemList = { vcshp1 = 0, vcshp2 = 1 }
AutoStartList = { vcshp1 }

)

DiskGroup DG_orabin (
    DiskGroup = ora_bin_dg
    StartVolumes = 0
    StopVolumes = 0
)

IP IP_oraprod (
    Device = lan0

    Address = "192.168.1.22"
)

Mount Mount_orabin (
    MountPoint = "/orahome/Oracle"
    BlockDevice = "/dev/vx/dsk/ora_bin_dg/u01-vol"
    FSType = vxfs
    FsckOpt = "-n"
)

NIC NIC_Public1 (
    Device = lan0
)

Netlsnr LSNR_oracle (
    Owner = oracle

    Home = "/orahome/Oracle"
    TnsAdmin = "/orahome/Oracle/network/admin"
    Listener = LISTENER_ORACLE
    MonScript = "../bin/Netlsnr/LsnrTest.pl"
)

Volume Vol_orabin (
    Volume = u01-vol
    DiskGroup = ora_bin_dg
)
```

```
IP_oraprod requires NIC_Public1
LSNR_oracle requires IP_oraprod
LSNR_oracle requires Mount_orabin
Mount_orabin requires Vol_orabin
Vol_orabin requires DG_orabin
```

Sample multiple instance (multiple listeners) configuration

This configuration has several single-instance configurations. Each Oracle instance is configured in a separate service group. The resource dependencies are similar to the single Oracle instance configuration.

See [“Sample single Oracle instance configuration”](#) on page 120.

Sample VCS configuration file for multiple Oracle instances (multiple listeners)

Review the sample configuration file for the multiple Oracle instances that have multiple listeners.

```
include "types.cf"
include "OracleTypes.cf"

cluster vcs (
)

system vcshp1 (
)

system vcshp2 (
)

group ORA_MKTG_Group (

    SystemList = { vcshp1 = 0, vcshp2 = 1 }
    AutoStartList = { vcshp1 }

)

DiskGroup DG_oramktg (
```

```
DiskGroup = ora_mktg_dg
StartVolumes = 0
StopVolumes = 0
)

IP IP_oramktg (

    Device = lan0

    Address = "192.168.1.22"

)

Mount Mount_oramktg_u01 (
    MountPoint = "/mktg/u01"
    BlockDevice = "/dev/vx/dsk/ora_mktg_dg/u01-vol"
    FSType = vxfs
    FsckOpt = "-n"
)

Mount Mount_oramktg_u02 (
    MountPoint = "/mktg/u02"
    BlockDevice = "/dev/vx/dsk/ora_mktg_dg/u02-vol"
    FSType = vxfs
    FsckOpt = "-n"
)

Netlsnr LSNR_oramktg_lsnr (
    Owner = oramktg

    Home = "/mktg/u01/oracle/product/8.1.5"
    TnsAdmin = "/mktg/u01/oracle/network/admin"

    Home = "/orahome/Oracle"
    TnsAdmin = "/orahome/Oracle/network/admin"
    Listener = LISTENER_MKTG
    MonScript = "../bin/Netlsnr/LsnrTest.pl"
    LsnrPwd = cqfOdoOolOo
)

Oracle ORA_oramktg (
    Sid = MKTG
    Owner = oramktg
    Home = "/orahome/Oracle"
```

Sample multiple instance (multiple listeners) configuration

```

        Home = "/mktg/u01/oracle/product/8.1.5"
        Pfile = "/mktg/u01/oracle/admin/pfile/initMKTG.ora"

        EnvFile = "/tmp/env.sh"
        DetailMonitor = 1
        MonScript = "./bin/Oracle/SqlTest.pl"
        User = thor
        Pword = hvlTptWvj
        Table = thor
        MonitorOption = 0
    )

    Proxy NICProxy_oramktg (
        TargetResName = NIC_Public1
    )

    Volume Vol_oramktg_vol1 (
        Volume = u01-vol
        DiskGroup = ora_mktg_dg
    )

    Volume Vol_oramktg_vol2 (
        Volume = u02-vol
        DiskGroup = ora_mktg_dg
    )

    IP_oramktg requires NICProxy_oramktg
    LSNR_oramktg_lsnr requires IP_oramktg
    LSNR_oramktg_lsnr requires ORA_oramktg
    Mount_oramktg_u01 requires Vol_oramktg_vol1
    Mount_oramktg_u02 requires Vol_oramktg_vol2
    ORA_oramktg requires Mount_oramktg_u01
    ORA_oramktg requires Mount_oramktg_u02
    Vol_oramktg_vol1 requires DG_oramktg
    Vol_oramktg_vol2 requires DG_oramktg

    group ORA_PROD_Group (

        SystemList = { vcshp1 = 0, vcshp2 = 1 }
        AutoStartList = { vcshp1 }

    )

    DiskGroup DG_oraprod (

```

```
DiskGroup = ora_prod_dg
StartVolumes = 0
StopVolumes = 0
)

IP IP_oraprod (
    Device = lan0
    Address = "192.168.1.21"
)

Mount Mount_oraprod_u01 (
    MountPoint = "/prod/u01"
    BlockDevice = "/dev/vx/dsk/ora_prod_dg/u01-vol"
    FSType = vxfs
    FsckOpt = "-n"
)

Mount Mount_oraprod_u02 (
    MountPoint = "/prod/u02"
    BlockDevice = "/dev/vx/dsk/ora_prod_dg/u02-vol"
    FSType = vxfs
    FsckOpt = "-n"
)

Netlsnr LSNR_oraprod_lsnr (
    Owner = oraprod

    Home = "/orahome/Oracle"
    TnsAdmin = "/orahome/Oracle/network/admin"
    Listener = LISTENER_PROD
    MonScript = "./bin/Netlsnr/LsnrTest.pl"
    LsnrPwd = cqfOdoOolOo
)

Oracle ORA_oraprod (
    Sid = PROD
    Owner = oraprod
    Home = "/orahome/Oracle"

    EnvFile = "/tmp/env.sh"
    DetailMonitor = 1
    MonScript = "./bin/Oracle/SqlTest.pl"
```

```

        User = thor
        Pword = hv1TptWvj
        Table = thor
        MonitorOption = 0
    )

    Proxy NICProxy_oraprod (
        TargetResName = NIC_Public1
    )

    Volume Vol_oraprod_vol1 (
        Volume = u01-vol
        DiskGroup = ora_prod_dg
    )

    Volume Vol_oraprod_vol2 (
        Volume = u02-vol
        DiskGroup = ora_prod_dg
    )

    IP_oraprod requires NICProxy_oraprod
    LSNR_oraprod_lsnr requires IP_oraprod
    LSNR_oraprod_lsnr requires ORA_oraprod
    Mount_oraprod_u01 requires Vol_oraprod_vol1
    Mount_oraprod_u02 requires Vol_oraprod_vol2
    ORA_oraprod requires Mount_oraprod_u01
    ORA_oraprod requires Mount_oraprod_u02
    Vol_oraprod_vol1 requires DG_oraprod
    Vol_oraprod_vol2 requires DG_oraprod

group Parallel_Service (

    SystemList = { vcshp1 = 0, vcshp2 = 1 }

    Parallel = 1

    AutoStartList = { vcshp1 }
)

NIC NIC_Public1 (

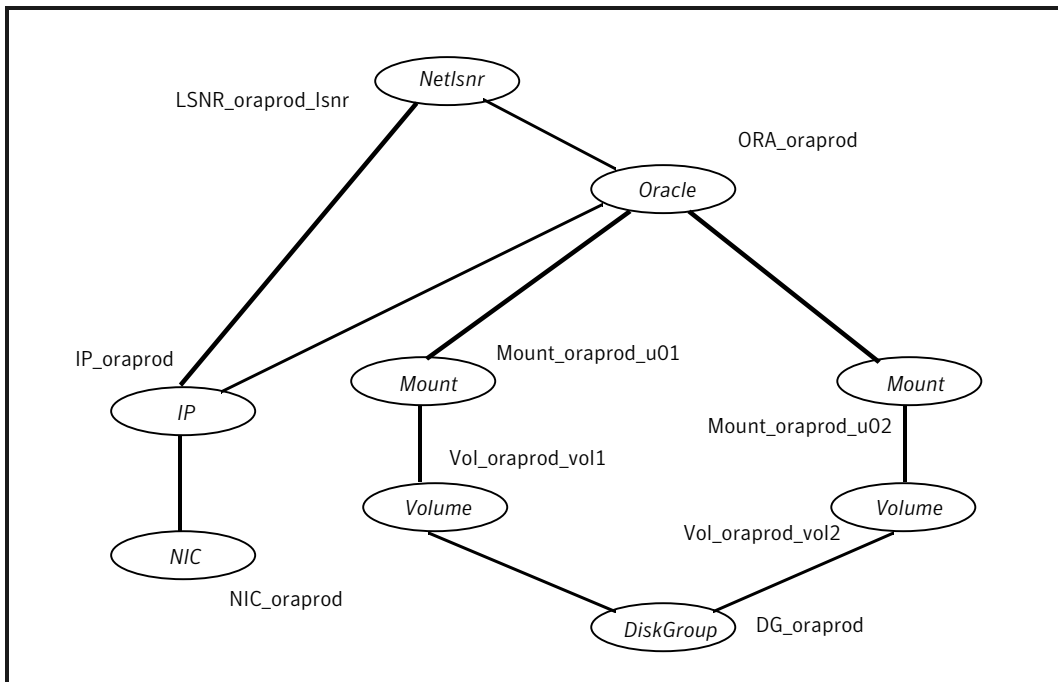
    Device = lan0

```

Sample Oracle configuration with shared server support

Figure B-5 describes a typical service group configured to monitor Oracle with shared server support.

Figure B-5 Dependency for Oracle configured with shared server support



The shared disk groups and volumes in the cluster are configured as resources of type DiskGroup and Volume respectively. The volumes are mounted using the Mount agent. The virtual IP address for the service group is configured using the IP and NIC resource types. The Oracle server can be started after each of these resources is brought online.

If your configuration does not use Veritas Volume Manager, use the DiskReservation resource type to configure shared storage instead of the DiskGroup and Volume resource types.

Sample VCS configuration file for Oracle instance configured with shared server support

Review the configuration file for an Oracle instance that is configured with shared server support.

```
include "types.cf"
include "OracleTypes.cf"

cluster vcs (
)

system vcshp1 (
)

system vcshp2 (
)

group ORA_PROD_Group (

    SystemList = { vcshp1 = 0, vcshp2 = 1 }
    AutoStartList = { vcshp1 }

)

DiskGroup DG_oraprod (
    DiskGroup = ora_prod_dg
    StartVolumes = 0
    StopVolumes = 0
)

IP IP_oraprod (

    Device = lan0

    Address = "192.168.1.22"
)

Mount Mount_oraprod_u01 (
    MountPoint = "/prod/u01"
    BlockDevice = "/dev/vx/dsk/ora_prod_dg/u01-vol"
    FSType = vxfs
    FsckOpt = "-n"
)
```



```
Mount Mount_oraprod_u02 (  
    MountPoint = "/prod/u02"  
    BlockDevice = "/dev/vx/dsk/ora_prod_dg/u02-vol"  
    FSType = vxfs  
    FsckOpt = "-n"  
)  
  
NIC NIC_ORAPROD (  
    Device = lan0  
)  
  
Netlsnr LSNR_oraprod_lsnr (  
    Owner = oraprod  
  
    Home = "/orahome/Oracle"  
    TnsAdmin = "/orahome/Oracle/network/admin"  
  
    Listener = LISTENER_PROD  
    MonScript = "../bin/Netlsnr/LsnrTest.pl"  
    LsnrPwd = cqfOdoOolOo  
)  
  
Oracle ORA_oraprod (  
    Sid = PROD  
    Owner = oraprod  
    Home = "/orahome/Oracle"  
  
    EnvFile = "/tmp/env.sh"  
    DetailMonitor = 1  
    MonScript = "../bin/Oracle/SqlTest.pl"  
    User = thor  
    Pword = hvlTptWvj  
    Table = thor  
    MonitorOption = 0  
)  
  
Volume Vol_oraprod_vol1 (  
    Volume = u01-vol  
    DiskGroup = ora_prod_dg  
)  
  
Volume Vol_oraprod_vol2 (  
    Volume = u02-vol
```

```
DiskGroup = ora_prod_dg
)

IP_oraprod requires NIC_ORAPROD
LSNR_oraprod_lsnr requires IP_oraprod
Mount_oraprod_u01 requires Vol_oraprod_vol1
Mount_oraprod_u02 requires Vol_oraprod_vol2
ORA_oraprod requires IP_oraprod
ORA_oraprod requires Mount_oraprod_u01
ORA_oraprod requires Mount_oraprod_u02
Vol_oraprod_vol1 requires DG_oraprod
Vol_oraprod_vol2 requires DG_oraprod
```

Sample Oracle ASM configurations

Review the dependency graphs for the service group configured to monitor the state of an Oracle instance that is ASM-managed in a VCS cluster. You can have the following Oracle ASM configurations in a VCS environment:

- ASM disks as raw disks
- ASM disks as Veritas Volume Manager volumes
- ASM disks as Veritas Cluster Volume Manager volumes

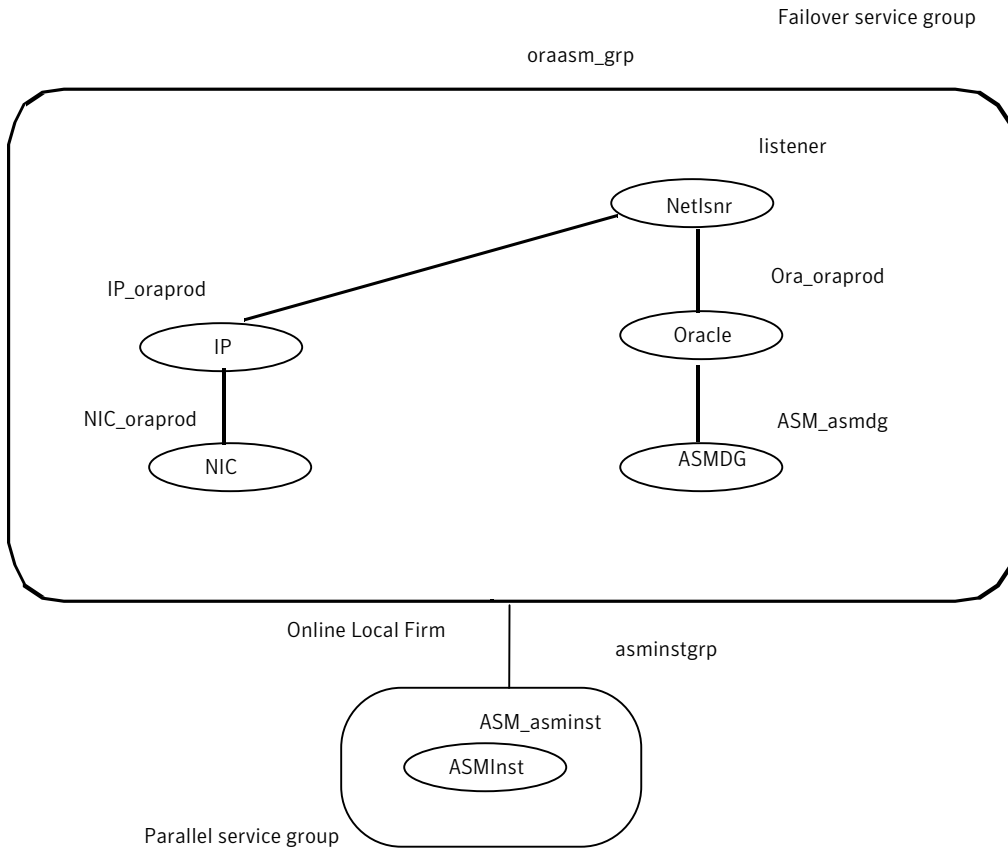
Sample configuration for ASM disks as raw disks

If you use raw devices as ASM disks, you can configure your service group in the following way:

- Oracle and ASMDG resources as parent failover service groups, and ASMInst resource as parallel service group
- The service groups are made dependent using an Online Local Firm dependency.

[Figure B-6](#) describes a typical service group with ASMInst resource as a parallel service group.

Figure B-6 Dependency graph with ASMInst resource as a parallel service group



The Oracle ASM instance and ASM disk groups in the cluster are configured as resources of type ASMInst and ASMDG respectively. The ASMInst agent is configured as parallel service group, asminstgrp.

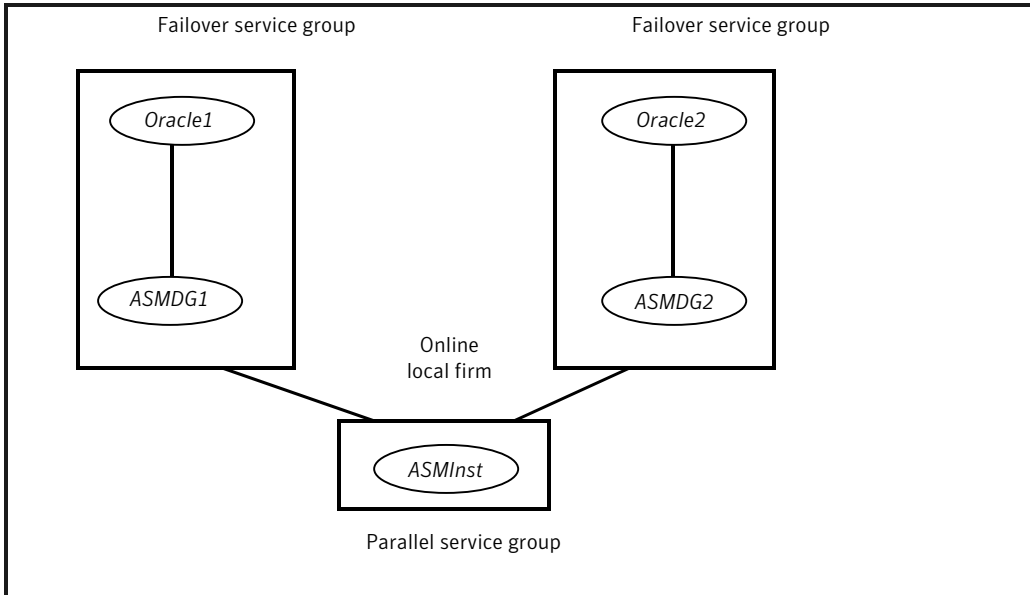
The virtual IP address for the service group is configured using the IP and NIC resource types. The Oracle and ASMDG resources are configured as failover service group, oraasm_grp. The Oracle server can be started after each of these resources is brought online.

The oraasm_grp is made dependent on the asminstgrp using an Online Local Firm dependency.

[Figure B-7](#) describes a typical service group with multiple Oracle instances sharing an ASMInst resource that is configured as a parallel service group.

Figure B-7

Dependency graph for Oracle ASM with multiple Oracle instances on a node



If you have multiple Oracle instances, a failover service group is configured for each Oracle instance. The Oracle service groups share a single ASM instance that is configured as a parallel service group. The Oracle service groups are made dependent on the ASMIInst service group using an Online Local Firm dependency. However, each database must use exclusive ASM disk groups, so that the Veritas Cluster Server agent for Oracle can fail over the disk group.

Sample VCS configuration file for ASM-managed Oracle instance

Review the sample configuration for an Oracle instance that is ASM-managed. The sample file has the ASMIInst resource as part of a parallel service group.

```
include "types.cf"
include "OracleTypes.cf"
include "OracleASMTypes.cf"

cluster vcs (
)

system symnode01 (
```

```
)

system symnode02 (
)

group asminstgrp (
    SystemList = { symnode01 = 0, symnode02 = 1 }
    Parallel = 1
)

ASMinst ASM_asminst (
    Sid = "+ASM"
    Owner = "oraprod"
    Home = "/orahome/Oracle"
)
group oraasm_grp (
    SystemList = { symnode01 = 0, symnode02 = 1 }
    AutoStartList = { symnode01 }
)

ASMDG ASM-asmdg (
    Sid = "+ASM"
    Owner = "oracle"
    Home = "/orahome/Oracle"
    DiskGroups = { asmhighdg }
)

IP IP_oraprod (
    Device = lan0

    Address = "192.168.1.22"
    NetMask = "255.255.240.0"
)

NIC NIC_oraprod (
    Device = lan0
)

Netlsnr LSNR_oraprod_lsnr (
    Owner = "oraprod"
    Home = "/orahome/Oracle"
```

```

        TnsAdmin = "/orahome/Oracle/network/admin"
        Listener = LISTENER_PROD
        MonScript = "./bin/Netlsnr/LsnrTest.pl"
    )

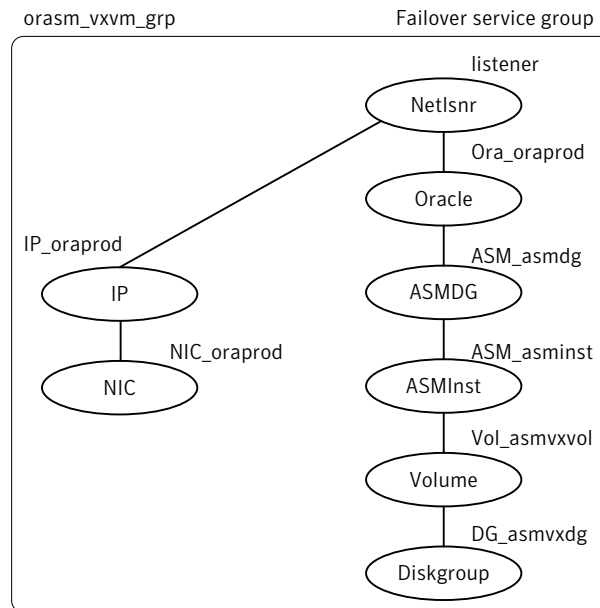
    Oracle ORA_oraprod (
        Sid = PROD
        Owner = "oraprod"
        Home = "/orahome/Oracle"
        EnvFile = "/tmp/env.sh"
        DetailMonitor = 1
        MonScript = "./bin/Oracle/SqlTest.pl"
        User = thor
        Pword = hvlTptWvj
        Table = thor
        MonitorOption = 0
    )

    requires group asminstgrp online local firm
    IP_oraprod requires NIC_oraprod
    LSNR_oraprod_lsnr requires IP_oraprod
    LSNR_oraprod_lsnr requires ORA_oraprod
    ORA_oraprod requires ASM_asmdg

```

Sample configuration for ASM disks as VxVM volumes

[Figure B-8](#) describes a typical service group with VxVM disks chosen for Oracle ASM.

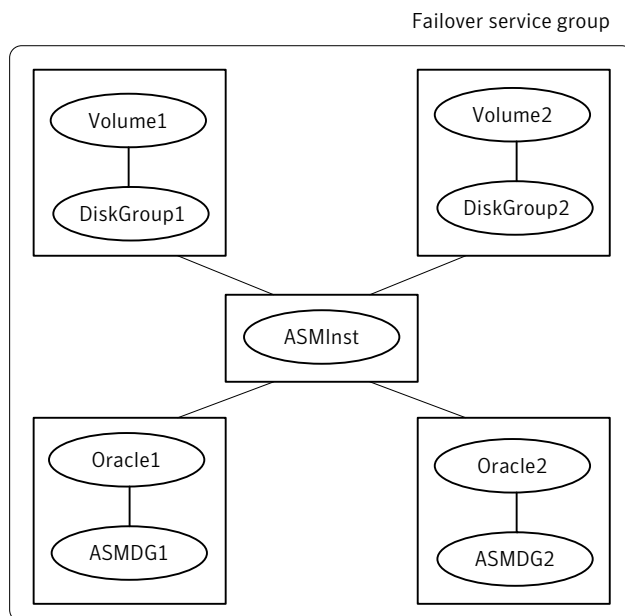
Figure B-8 Dependency graph for ASM on VxVM disks

This configuration has a single failover service group. The Oracle ASM instance and ASM disk groups in the cluster are configured as resources of type **ASMInst** and **ASMDG** respectively.

The VxVM disk groups and volumes in the cluster are configured as resources of type **DiskGroup** and **Volume** respectively. The virtual IP address for the service group is configured using the **IP** and **NIC** resource types. The Oracle server can be started after each of these resources is brought online.

[Figure B-9](#) describes a typical service group with multiple Oracle instances sharing the **ASMInst** resource that is part of a single failover service group.

Figure B-9 Dependency graph for Oracle ASM with multiple Oracle instances on a node



Sample VCS configuration file for ASM disks as VxVM disks

Review the sample configuration for an Oracle instance that is ASM-managed.

```

include "types.cf"
include "OracleTypes.cf"
include "OracleASMTypes.cf"

cluster vcs (
)

system symnode01 (
)

system symnode02 (
)

group orasm_vxvm_grp (
    SystemList = { symnode01 = 0, symnode02 = 1 }
    AutoStartList = { symnode01 }
)

```



```
ASMDG ASM-asmdg (
    Sid = "+ASM"
    Owner = oracle
    Home = "/orahome/Oracle"
    DiskGroups = { asmhighdg }
)

ASMinst ASM_asminst (
    Sid = "+ASM"
    Owner = oraprod
    Home = "/orahome/Oracle"
)

DiskGroup DG_asmvxdg (
    DiskGroup = asmvxdg
)

IP IP_oraprod (
    Device = lan0

    Address = "192.168.1.22"
    NetMask = "255.255.240.0"
)

NIC NIC_oraprod (
    Device = lan0
)

Netlsnr LSNR_oraprod_lsnr (
    Owner = oraprod
    Home = "/orahome/Oracle"
    TnsAdmin = "/orahome/Oracle/network/admin"
    Listener = LISTENER_PROD
    MonScript = "./bin/Netlsnr/LsnrTest.pl"
    LsnrPwd = cqfOdoOolOo
    AgentDebug = 1
)

Oracle ORA_oraprod (
    Sid = PROD
```

```

Owner = oraprod
Home = "/orahome/Oracle"
EnvFile = "/tmp/env.sh"
DetailMonitor = 1
MonScript = "./bin/Oracle/SqlTest.pl"
User = thor
Pword = hvlTptWvj
Table = thor
MonitorOption = 0
AgentDebug = 1
)

Volume Vol_asmvxxvol (
    Volume = asmvxxvol
    DiskGroup = asmvxdg
)

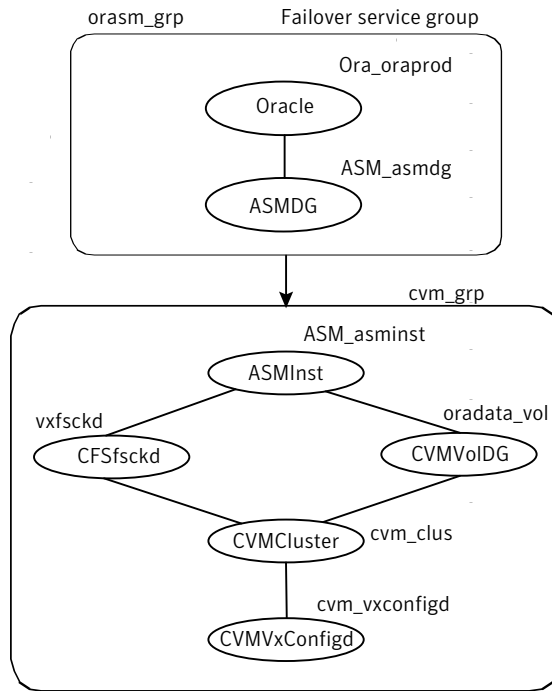
ASM_asminst requires VOL_asmvxxvol
ASM_asmdg requires ASM_asminst
IP_oraprod requires NIC_oraprod
LSNR_oraprod_lsnr requires IP_oraprod
LSNR_oraprod_lsnr requires ORA_oraprod
ORA_oraprod requires ASM_asmdg
VOL_asmvxxvol requires DG_asmvxdg

```

Sample configuration for ASM disks as CVM volumes

[Figure B-10](#) describes a typical service group with CVM volumes chosen for Oracle ASM.

Figure B-10 Dependency graph for ASM on CVM volumes

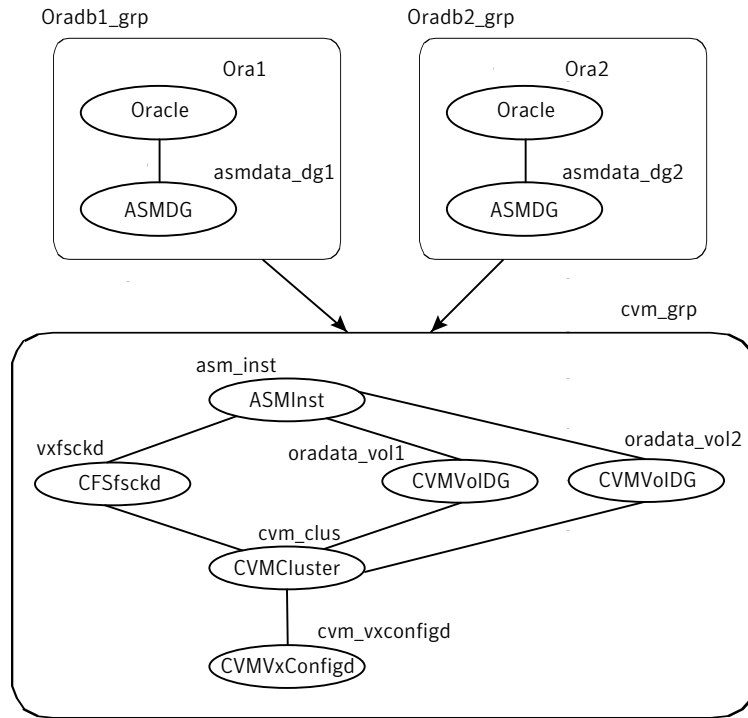


This configuration has two service groups. The Oracle and ASMDG resources are part of the parent failover service group oraasm_grp. The ASMInst resource belongs to the CVM service group cvm_grp, which is a parallel service group. The service groups are linked with online local firm dependency.

After the CVM volume where the database resides comes online, the ASMDG agent mounts the ASM disk group that the database requires. The virtual IP address for the service group is configured using the IP and NIC resource types. The Oracle server can be started after each of these resources come online.

[Figure B-11](#) describes a typical service group with multiple Oracle instances which share the ASMInst resource that is part of a CVM parallel service group.

Figure B-11 Dependency graph for Oracle ASM with multiple Oracle instances on a node



If you have multiple Oracle instances, a failover service group is configured for each Oracle instance. The Oracle service groups share a single ASM instance that is configured as part of the CVM parallel service group. The Oracle service groups are made dependent on the CVM service group using an Online Local Firm dependency. However, each database must use exclusive ASM disk groups, so that the Veritas Cluster Server agent for Oracle can fail over the disk group.

Sample VCS configuration file for ASM that uses CVM volumes

Review the sample configuration for an Oracle instance that uses CVM volumes for ASM.

```

include "types.cf"
include "CFSTypes.cf"
include "CVMTypes.cf"
include "OracleTypes.cf"
include "OracleASMTypes.cf"

```

```
cluster vcsclus_asm (
  UserNames = { admin = abcdef }
  Administrator = { admin }
  HacliUserLevel = COMMANDROOT
)

system symnode01 (
)

system symnode02 (
)

group cvm (
  SystemList = { symnode01 = 0, symnode02 = 1 }
  AutoFailOver = 0
  Parallel = 1
  AutoStartList = { symnode01, symnode02 }
)

CFSfsckd vxfsckd (
)

CVMCluster cvm_clus (
  CVMClustName = vcsclus_asm
  CVMNodeId = { symnode01 = 0, symnode02 = 1 }
  CVMTransport = gab
  CVMTimeout = 200
)

CVMVolDg oradata_vol (
  CVMDiskGroup = ora_dg
  CVMVolume = { oradatavol }
  CVMActivation = sw
)

CVMVxconfigd cvm_vxconfigd (
  Critical = 0
  CVMVxconfigdArgs = { syslog }
)

ASMInst ASM_asminst (
  Sid = "+ASM"
```

```
    Owner = oracle
    Home = "/orahome/Oracle"
)

ASM_asminst requires vxfscd
ASM_asminst requires oradata_vol
oradata_vol requires cvm_clus
vxfscd requires cvm_clus
cvm_clus requires cvm_vxconfigd

group oraasm_grp (
    SystemList = { symnode01 = 0, symnode02 = 1 }
    AutoFailOver = 1
    AutoStartList = { symnode01, symnode02 }
)

ASMDG ASM_asmdg (
    Sid = "+ASM"
    Owner = oracle
    Home = "/orahome/Oracle"
    DiskGroups = { ASM_DG }
)

Oracle Ora_oraprod (
    Owner = oracle
    Sid = vrts
    Home = "/orahome/Oracle"
)

requires group cvm_grp online local firm
Ora_oraprod requires ASM_asmdg
```

Best practices

This appendix includes the following topics:

- [Best practices for multiple Oracle instance configurations in a VCS environment](#)

Best practices for multiple Oracle instance configurations in a VCS environment

Review some of the best practices for using multiple Oracle instances in a VCS environment:

- For each SID to be configured, create UNIX accounts with DBA privileges.
- Make sure that each Oracle instance has a separate disk group and is configured as a separate service group.
- Define the system parameters such that the allocation of semaphore and shared memory is appropriate on all systems.
- Use a dedicated set of binaries for each Oracle instance, even if each instance uses the same Oracle version.
- If your configuration uses the same Oracle version for all instances, install a version on the root disk or preferably on a secondary disk. Locate the pfiles in the default location and define several listener processes to ensure clean failover.
- If your configuration has different versions of Oracle, create a separate \$ORACLE_HOME for each Oracle version.
- Follow the Optimal Flexible Architecture (OFA) standard (/uwx/<SID>). In cluster configurations, you could adapt the standard to make it more application-specific. For example, /app/uwx/<SID>.
- Listeners accompanying different versions of Oracle may not be backward-compatible. So, if you want to create a single listener.ora file, you

must verify that the listener supports the other versions of Oracle in the cluster. You must also create a separate Envfile for each version of Oracle.

- Make sure that each listener listens to a different virtual address. Also, assign different names to listeners and make sure that they do not listen to the same port.
- The pfiles must be coordinated between systems. For the same instance of a database, ensure that the pfiles referenced are identical across the nodes.

Using the SPFILE in a VCS cluster for Oracle

This appendix includes the following topics:

- [About the Oracle initialization parameter files](#)
- [Starting an Oracle instance](#)
- [Using the SPFILE in a VCS cluster](#)

About the Oracle initialization parameter files

Oracle versions earlier than Oracle9i used an initialization file `initSID.ora`, a text file, to start database instances. Changes that were applied to instance parameters during a database session were not saved to the file. You had to manually apply them to the initialization file.

Oracle9i introduced the SPFILE, which is a binary file stored on the database server. With this feature, changes to the instance parameters can be set to be persistent across all startup and shutdown procedures.

Starting an Oracle instance

For versions above Oracle9i, you can start an Oracle instance in the following ways:

- Using the default SPFILE `spfileSID.ora`
- Using the default `init.ora` file `initSID.ora`
- By specifying an initialization file `init.ora`
- By specifying an SPFILE in the initialization file `init.ora`

When you run the `startup` command without a PFILE clause, Oracle reads the initialization parameters from the SPFILE. On HP-UX platforms, the default location for the SPFILE or PFILE is `$ORACLE_HOME/dbs`.

Oracle locates the initialization parameter file by examining file names in the following order:

- `SPFILESID.ora`
- `SPFILE.ora`
- `initSID.ora`

Using the SPFILE in a VCS cluster

When using the Veritas Cluster Server agent for Oracle, you can start a database instance by specifying a PFILE. If you do not specify the PFILE, the database instance starts up using the default SPFILE.

The agent attribute `Pfile` must specify the location of the PFILE. If your configuration uses the SPFILE, the contents of the PFILE must specify the location of the SPFILE, which must be created from the PFILE.

Note: If you want the SPFILE's session parameter changes be persistent across an instance failover, then Symantec recommends you to save the SPFILE on shared storage.

To create the SPFILE from a PFILE

- ◆ The SPFILE must be created from the PFILE. You must have the `sysdba` or the `sysoper` system privileges to create an SPFILE.

You can run the following command to create the SPFILE:

```
CREATE SPFILE [= spfile_name] FROM PFILE [= pfile_name ];
```

If you do not specify the complete path for the SPFILE, this command creates an SPFILE at the default location (`$ORACLE_HOME/dbs` on HP-UX).

To specify the SPFILE location in the PFILE

- ◆ To specify the location of the SPFILE in a PFILE, create a PFILE and specify the following entry in the PFILE:

```
SPFILE = spfile_location
```

The variable *spfile_location* represents the complete path of the SPFILE. For example:

```
SPFILE = /database/startup/spfileoral.ora
```

In this case, to start the database use the following command:

```
startup pfile=location_of_pfile
```


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