VERITAS Cluster Server
Enterprise Agent 4.1
for Oracle

Installation and Configuration Guide

Solaris

N15371F

March 2005
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# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preface</td>
<td>vii</td>
</tr>
<tr>
<td>How This Guide is Organized</td>
<td>vii</td>
</tr>
<tr>
<td>VERITAS Cluster Server Documentation</td>
<td>viii</td>
</tr>
<tr>
<td>Conventions</td>
<td>ix</td>
</tr>
<tr>
<td>Getting Help</td>
<td>ix</td>
</tr>
<tr>
<td>Documentation Feedback</td>
<td>x</td>
</tr>
<tr>
<td><strong>Chapter 1. Introduction</strong></td>
<td>1</td>
</tr>
<tr>
<td>About the VCS Enterprise Agent for Oracle</td>
<td>1</td>
</tr>
<tr>
<td>Oracle Agent</td>
<td>2</td>
</tr>
<tr>
<td>Netlsnr Agent</td>
<td>3</td>
</tr>
<tr>
<td>Additional Information About the Agent</td>
<td>4</td>
</tr>
<tr>
<td>Startup and Shutdown Options</td>
<td>4</td>
</tr>
<tr>
<td>Handling Oracle Error Codes During Detail Monitoring</td>
<td>6</td>
</tr>
<tr>
<td>Handling Attribute of Type Password</td>
<td>7</td>
</tr>
<tr>
<td>Info Entry Point</td>
<td>7</td>
</tr>
<tr>
<td>Action Entry Point</td>
<td>8</td>
</tr>
<tr>
<td>New Features and Updates</td>
<td>9</td>
</tr>
<tr>
<td>Monitoring Oracle Instances Running in Solaris 10 Zones</td>
<td>9</td>
</tr>
<tr>
<td>Supported Software</td>
<td>9</td>
</tr>
<tr>
<td>How the Agent Makes Oracle Highly Available</td>
<td>10</td>
</tr>
<tr>
<td>Typical Oracle Configuration in a VCS Cluster</td>
<td>11</td>
</tr>
<tr>
<td>Setting Up an Oracle Cluster</td>
<td>12</td>
</tr>
</tbody>
</table>
# Chapter 2. Installing and Configuring Oracle

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prerequisites</td>
<td>13</td>
</tr>
<tr>
<td>Points to Note Before Installing Oracle</td>
<td></td>
</tr>
<tr>
<td>Location of the $ORACLE_HOME</td>
<td>14</td>
</tr>
<tr>
<td>Multiple Oracle Instances (SIDs)</td>
<td>15</td>
</tr>
<tr>
<td>Location of Database Tablespaces</td>
<td>15</td>
</tr>
<tr>
<td>Configuring the Location of Core Files</td>
<td>15</td>
</tr>
<tr>
<td>Transparent Listener Failover</td>
<td>15</td>
</tr>
<tr>
<td>Long Pathname Limitation for $ORACLE_HOME</td>
<td>16</td>
</tr>
<tr>
<td>Defining NLS Information</td>
<td>16</td>
</tr>
<tr>
<td>Hot Backup of Oracle Database and VCS</td>
<td>16</td>
</tr>
<tr>
<td>Installing Oracle</td>
<td>18</td>
</tr>
<tr>
<td>Overview of Tasks</td>
<td>19</td>
</tr>
<tr>
<td>Installing Oracle Binaries</td>
<td>21</td>
</tr>
<tr>
<td>Configuring the Database</td>
<td>25</td>
</tr>
<tr>
<td>Copying the $ORACLE_BASE/admin/SID Directory</td>
<td>30</td>
</tr>
<tr>
<td>Starting the Database</td>
<td>30</td>
</tr>
</tbody>
</table>

# Chapter 3. Installing the Oracle Agent

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installing the Agent Software</td>
<td>31</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>31</td>
</tr>
<tr>
<td>Installation Instructions</td>
<td>32</td>
</tr>
<tr>
<td>Upgrading the Agent</td>
<td>34</td>
</tr>
</tbody>
</table>

# Chapter 4. Configuring the Agent

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prerequisites</td>
<td>37</td>
</tr>
<tr>
<td>Oracle Configurations in VCS</td>
<td>38</td>
</tr>
<tr>
<td>Single Oracle Instance Configuration</td>
<td>38</td>
</tr>
<tr>
<td>Multiple Oracle Instance (Single Listener) Configuration</td>
<td>39</td>
</tr>
<tr>
<td>Multiple Oracle Instances (Multiple Listeners) Configuration</td>
<td>40</td>
</tr>
<tr>
<td>Configuration With Shared Server Support</td>
<td>42</td>
</tr>
</tbody>
</table>
Configuring the Agent Using the Agent Configuration Wizard .......................... 44
Prerequisites ................................................................................. 44
Instructions .................................................................................. 46
Configuring the Agent Using Cluster Manager (Java Console) ................... 55
Creating a New Service Group ......................................................... 55
Editing Resource attributes .......................................................... 57
Configuring the Agent Using the Command-line .................................... 58
Encrypting Passwords ..................................................................... 60
Additional Considerations with Basic Monitoring ................................. 61
Setting Up Detail Monitoring .......................................................... 61
Setting Up Detail Monitoring for Oracle ........................................... 62
Enabling and Disabling Detail Monitoring for Oracle ............................. 64
Setting Up Detail Monitoring for Netlsnr .......................................... 64

Chapter 5. Administering the Oracle Service Group ................................. 65
Bringing the Service Group Online ................................................... 65
Switching the Service Group ........................................................... 66
Taking the Service Group Offline ..................................................... 66
Disabling the Agent ........................................................................ 67
Modifying the Agent Configuration .................................................. 68
Removing the Agent ....................................................................... 68

Chapter 6. Troubleshooting ............................................................... 69
Error Messages Common to the Oracle and Netlsnr Agents .................. 69
Error Messages Specific to the Oracle Agent .................................... 71
Error Messages Specific to the Netlsnr Agent .................................... 73
Appendix A. Resource Type Definitions ................................................. 75
  Oracle Resource Type ........................................................................... 75
  Attribute Definitions ............................................................................ 76
  Netlsnr Resource Type .......................................................................... 79
  Attribute Definitions ............................................................................ 79

Appendix B. Sample Configurations ....................................................... 83
  Single Oracle Instance Configuration .................................................. 84
  Oracle Instance Configured in Solaris Zones ......................................... 87
  Multiple Oracle Instances (Single Listener) Configuration ...................... 90
  Oracle Instances Configured In Solaris Zones ....................................... 95
  Multiple Instance (Multiple Listeners) Configuration ............................. 100
  Oracle Configuration With Shared Server Support ................................. 105
  Oracle Instance Configured in Solaris Zones ....................................... 108

Appendix C. Best Practices for Multiple Oracle Instance Configurations ...... 111

Appendix D. Using the SPFILE in an Oracle Cluster ............................... 113
  Starting an Oracle Instance ............................................................... 113
  Using the SPFILE in a VCS Cluster .................................................... 114
  Specifying the SPFILE Location in the PFILE ...................................... 114
  Creating the SPFILE from a PFILE ..................................................... 114

Index ........................................................................................................ 115
Preface

This book describes how to install and configure the VERITAS Cluster Server (VCS) Enterprise Agent 4.1 for Oracle.

If this document is dated more than six months prior to the date you are installing your enterprise agent, contact VERITAS Technical Support to confirm you have the latest supported versions of the application and operating system.

How This Guide is Organized

Chapter 1. “Introduction” on page 1 presents a brief introduction of the VCS enterprise agent for Oracle.


Chapter 3. “Installing the Oracle Agent” on page 31 describes how to install VCS enterprise agent for Oracle in a VCS cluster.

Chapter 4. “Configuring the Agent” on page 37 describes how to configure an Oracle service group in a VCS cluster.

Chapter 5. “Administering the Oracle Service Group” on page 65 describes the administrative tasks you can perform on an Oracle service group.

Chapter 6. “Troubleshooting” on page 69 lists the error messages associated with the VCS enterprise agent for Oracle. If applicable, a recommended solution is also provided.

Appendix A. “Resource Type Definitions” on page 75 lists the resource type definitions and attribute definitions for the VCS enterprise agent for Oracle.

Appendix B. “Sample Configurations” on page 83 provides sample configurations for the Oracle service group.

Appendix C. “Best Practices for Multiple Oracle Instance Configurations” on page 111 lists some best practices for using the VCS enterprise agent for Oracle.

Appendix D. “Using the SPFILE in an Oracle Cluster” on page 113 describes how to use the SPFILE in an Oracle cluster.
The following documents, along with the online help and the Release Notes, comprise the VCS documentation for this release:

<table>
<thead>
<tr>
<th>Title</th>
<th>File Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>VERITAS Cluster Server Installation Guide</td>
<td>vcs_install.pdf</td>
</tr>
<tr>
<td>VERITAS Cluster Server Agent Developer’s Guide</td>
<td>vcs_agent_dev.pdf</td>
</tr>
</tbody>
</table>

See the Release Notes for a complete list of documents, including VCS enterprise agent guides.
Conventions

<table>
<thead>
<tr>
<th>Convention</th>
<th>Usage</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>monospace</td>
<td>Used for path names, commands, output, directory and file names, functions, and parameters.</td>
<td>Read tunables from the /etc/vx/tunefstab file. See the ls(1) manual page for more information.</td>
</tr>
<tr>
<td>monospace</td>
<td>Indicates user input.</td>
<td>#ls pubs</td>
</tr>
<tr>
<td>(bold)</td>
<td>Identifies book titles, new terms, emphasized text, and variables replaced with a name or value.</td>
<td>See the User’s Guide for details. The variable system_name indicates the system on which to enter the command.</td>
</tr>
<tr>
<td>italic</td>
<td>Depicts GUI objects, such as fields, list boxes, menu selections, etc. Also depicts GUI commands.</td>
<td>Enter your password in the Password field. Press Return.</td>
</tr>
<tr>
<td>bold</td>
<td>Indicates hypertext links.</td>
<td>See “Getting Help” on page ix.</td>
</tr>
<tr>
<td>#</td>
<td>Unix superuser prompt (all shells).</td>
<td>#cp /pubs/4.1/user_book/release_mgnt/4.1/archive</td>
</tr>
</tbody>
</table>

Getting Help

For technical assistance, visit http://support.veritas.com and select phone or email support. This site also provides access to resources such as TechNotes, product alerts, software downloads, hardware compatibility lists, and our customer email notification service. Use the Knowledge Base Search feature to access additional product information, including current and past releases of VERITAS documentation.

Diagnostic tools are also available to assist in troubleshooting problems associated with the product. These tools are available on disc or can be downloaded from the VERITAS FTP site. See the README.VRTSspt file in the /support directory for details.

Additional Resources

For license information, software updates and sales contacts, visit https://my.veritas.com/productcenter/ContactVeritas.jsp. For information on purchasing product documentation, visit http://webstore.veritas.com.
Documentation Feedback

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VCS enterprise agents monitor specific resources within an enterprise application, determine the status of these resources, and start or stop them according to external events. The VCS enterprise agent for Oracle provides high availability for Oracle in a VCS cluster.

About the VCS Enterprise Agent for Oracle

The VCS enterprise agent for Oracle monitors the Oracle and listener processes, brings them online, and takes them offline.

The package contains two VCS agents:

◆ The Oracle agent, which monitors the Oracle database processes.
◆ The Netlsnr agent, which monitors the listener process.

The agents include VCS type declarations and agent executables, and are represented with the Oracle and Netlsnr resource types, respectively. Both agents work together to make Oracle highly available in a VCS cluster.
Oracle Agent

The Oracle agent monitors the database processes. Specific agent operations include:

- **Online**—Starts the Oracle database by using the following `svrmgrl` or `sqlplus` command:

  ```
  startup pfile=$PFile force
  ```

  You can also configure the agent to start the database using different Startup options for Oracle. See “Startup Options” on page 4 for more information about these options.

- **Offline**—Stops the Oracle database with the specified options by using the following `svrmgrl` or `sqlplus` command:

  ```
  shutdown immediate
  ```

  You can also configure the agent to stop the database using different Shutdown options for Oracle. See “Shutdown Options” on page 5 for more information about these options.

- **Monitor**—The Oracle agent provides two levels of monitoring: basic and detail. In the basic monitoring mode, the agent scans the process table for the ora_dbw, ora_smon, ora_pmon, and ora_lgwr processes to verify Oracle is running. In the detail monitoring mode, the agent performs a transaction on a test table in the database to ensure that Oracle is functioning properly.

- **Clean**—Forcibly stops the Oracle database by using the following `svrmgrl` or `sqlplus` command:

  ```
  shutdown abort
  ```

  If the process does not respond to the `shutdown` command, the agent scans the process table for processes associated with the configured instance and kills them.

- **Info**—Provides static and dynamic information about the state of the database. See “Info Entry Point” on page 7 for more information.

- **Action**—Performs predefined actions on a resource. See “Action Entry Point” on page 8 for more information.
Netlsnr Agent

The Netlsnr agent monitors the listener process. The agent controls the listener for the database. 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. Specific agent operations include:

- **Online**—Starts the listener process by using the following command:
  
  ```
  lsnrctl start $LISTENER
  ```

- **Offline**—Stops the listener process by using the following command:

  ```
  lsnrctl stop $LISTENER
  ```

  If the listener is configured with a password, the agent uses the password to stop the listener.

- **Monitor**—The Netlsnr agent provides two levels of monitoring: *basic* and *detail*. In the basic monitoring mode, the agent scans the process table for the tns1snr process to verify the listener process is running. In the detail monitoring mode, the agent uses the command `lsnrctl status $LISTENER` to verify the status of the Listener process.

- **Clean**—Scans the process table for `tns1snr $Listener` and kills it.

- **Action**—Performs predefined actions on a resource. See “Action Entry Point” on page 8 for more information.
Additional Information About the Agent

Startup and Shutdown Options

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

Startup Options

The agent supports the following startup options:

<table>
<thead>
<tr>
<th>Startup Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>STARTUP (Default)</td>
<td>Runs <code>startup pfile='location_of_pfile' force</code> if the pfile is configured. If the pfile is not configured, the agent runs <code>startup force</code>. It picks up the default parameter files from their default locations.</td>
</tr>
<tr>
<td>RESTRICTED</td>
<td>Starts the database in the RESTRICTED mode.</td>
</tr>
<tr>
<td>RECOVERDB</td>
<td>Performs a database recovery on instance startup.</td>
</tr>
</tbody>
</table>
| CUSTOM | Uses a predefined SQL script (`start_custom_$SID.sql`) and runs custom startup options. The script must be in the `$VCS_HOME/bin/Oracle` directory and must have access to the Oracle Owner OS user. If the file is not present, the agent logs an error message. With a custom script, the agent takes the following action:  
```sql
sqlplus /nolog <<!
connect / as sysdba;
@start_custom_$SID.sql
exit;
!```
| SRVCTLSTART | Uses the `srvctl` utility to start an instance of the database. Use this option for RAC clusters for Oracle9i R2 and later. |
## Shutdown Options

The agent supports the following shutdown options:

<table>
<thead>
<tr>
<th>Shutdown Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMMEDIATE (Default)</td>
<td>Shuts down the Oracle instance by running <code>shutdown immediate</code>.</td>
</tr>
<tr>
<td>SRVCTLSTOP</td>
<td>Sets up <code>srvctl</code> as the client tool and uses <code>srvctl</code> syntax to shut down the instance. This option is valid only for RAC instances in versions 9.2.0 and above.</td>
</tr>
<tr>
<td>TRANSACTIONAL</td>
<td>Runs the <code>shutdown transactional</code> command. This option is valid only for databases that support this option.</td>
</tr>
<tr>
<td>CUSTOM</td>
<td>Uses a predefined SQL script (<code>shut_custom_$SID.sql</code>) and runs custom shutdown options. The script must be in the <code>$VCS_HOME/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.</td>
</tr>
<tr>
<td>SRVCTLSTOP</td>
<td>Uses the <code>srvctl</code> utility to stop an instance of the database. Use this option for RAC clusters for Oracle9i R2 and later.</td>
</tr>
</tbody>
</table>
Handling Oracle Error Codes During Detail Monitoring

The VCS enterprise agent for Oracle comes with enhanced handling of 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 called `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

The agent supports the following actions:

<table>
<thead>
<tr>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IGNORE</td>
<td>Ignores the error.</td>
</tr>
<tr>
<td>UNKNOWN</td>
<td>Marks the resource state as UNKNOWN and sends a notification if the Notifier resource is configured. See the VERITAS Cluster Server User’s Guide for more information about VCS notification. This action is typically associated with configuration errors or program interface errors.</td>
</tr>
<tr>
<td>WARN</td>
<td>Marks the resource state as ONLINE and sends a notification if the Notifier resource is configured. This action is typically associated with errors due to exceeded quota limits, session limits/restricted sessions so on.</td>
</tr>
<tr>
<td>FAILOVER</td>
<td>Marks the resource state as OFFLINE. This faults the service group, which fails over to the next available system. This is agent’s default behavior. If the file <code>oraerror.dat</code> is not available, the agent assumes this default behavior for every Oracle error encountered.</td>
</tr>
<tr>
<td>NOFAILOVER</td>
<td>Freezes the service group temporarily and marks the resource state as OFFLINE. The agent also sends a notification if the Notifier resource is configured. This action is typically associated with 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 will not help.</td>
</tr>
</tbody>
</table>
Handling Attribute of Type Password

User passwords used for detail monitoring of the Oracle database are no longer ‘clear-text’. The Oracle agent supports encryption of user passwords. See “Encrypting Passwords” on page 60 for further information.

Configuring ‘listener’ passwords is introduced in the Netlsnr agent. This password is considered for querying the status of the listener and stopping the listener. This password is also encrypted. See “Encrypting Passwords” on page 60 for further information.

Info Entry Point

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

The entry point retrieves the following static information:

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

The entry point retrieves the following dynamic information:

- InstanceStatus
- LogMode
- TotalDBfileSize
- Buffer Hits Percent
- Logins
- ShutdownPending
- FreeDBfileSize
- OpenMode
- DatabaseStatus
- Shared Pool Percent free

You can add additional attributes by adding sql statements to the file $VCS_HOME/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.
Additional Information About the Agent

**Action Entry Point**

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

The agent supports the following actions:

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

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

<table>
<thead>
<tr>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VRTS_GetInstanceName</td>
<td>Retrieves the name of the configured instance. You can use this option for the Oracle and the Netlsnr resources.</td>
</tr>
<tr>
<td>VRTS_GetRunningServices</td>
<td>Retrieves the list of processes monitored by the agent. You can use this option for the Oracle and the Netlsnr resources.</td>
</tr>
<tr>
<td>DBRestrict</td>
<td>Changes the database session to enable the RESTRICTED mode.</td>
</tr>
<tr>
<td>DBUndoRestrict</td>
<td>Changes the database session to disable the RESTRICTED mode.</td>
</tr>
<tr>
<td>DBSuspend</td>
<td>Suspends a database. This option is available for Oracle versions 8i and above.</td>
</tr>
<tr>
<td>DBResume</td>
<td>Resumes a suspended database. This option is available for Oracle versions 8i and above.</td>
</tr>
<tr>
<td>DBTbspBackup</td>
<td>Backs up a tablespace; <code>actionargs</code> contains name of the tablespace to be backed up.</td>
</tr>
</tbody>
</table>

You can also add custom actions for the agent. For further information, refer to the *VERITAS Cluster Server Agent Developer’s Guide*. 
New Features and Updates

This section describes the new features and updates introduced in this version of the agent.

Monitoring Oracle Instances Running in Solaris 10 Zones

Solaris 10 provides a means of virtualizing operating system services, allowing one or more processes to run in isolation from other activity on the system. Such a "sandbox" is called a “non-global zone.” Each zone can provide a rich and customized set of services. There is also a "global zone" and processes running in this zone have the same set of privileges available on a Solaris system today.

VCS provides high availability to applications running in non-global zones by extending the failover capability to zones. VCS is installed in a global zone and all VCS agents and engine components run in the global zone. For applications running within non-global zones, agents run entry points inside the zones. If a zone configured under VCS control faults, VCS fails over the entire service group containing the zone.

The VCS enterprise agent for Oracle is zone-aware and can monitor Oracle instances running in non-global zones.

Supported Software

- Oracle 8.0.x, Oracle 8.1.x, Oracle9i, and Oracle 10g, including 64-bit versions
- VCS 4.1 on Solaris
- Solaris 8, 9, and 10 (32-bit and 64-bit) operating systems

For each platform, VERITAS recommends applying the latest Solaris operating system patches available from Sun. See http://sunsolve.Sun.com

Note: Within the cluster, all systems must use the same operating system version and patch level.
How the Agent Makes Oracle Highly Available

The VCS enterprise agent for Oracle continuously monitors the Oracle and listener processes to verify they are functioning properly. The agent provides two levels of application monitoring:

- **Primary or Basic Monitoring**
  In the Basic monitoring mode, the agent verifies that the Oracle and listener processes are present in the process table.

  **Note** Basic monitoring cannot detect whether processes are in a hung or stopped states.

- **Secondary or Detail Monitoring**
  In the Detail monitoring 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 that the Oracle or listener processes are not functioning properly. When this occurs, the Oracle service group fails over to another node in the cluster, thus ensuring high availability for the Oracle services and the database.
Typical Oracle Configuration in a VCS Cluster

In a typical configuration, VCS is configured in a two-system cluster (System 1 and System 2). The data to be used by Oracle is installed on shared storage. The Oracle binaries can be installed locally on both nodes or on shared disks. The Oracle enterprise agent is installed on both systems.

In the configuration depicted in the illustration below, Oracle binaries and data are installed completely on shared disks.
Setting Up an Oracle Cluster

In the configuration depicted in the illustration below, Oracle binaries are installed locally on each node and Oracle data is installed on shared disks.

![Oracle Cluster Diagram]

Setting Up an Oracle Cluster

Setting up an Oracle cluster in a VCS environment involves the following tasks. Each task is described in detail in subsequent chapters.

| Setting up a VCS cluster (described in the VCS Installation Guide) |
| "Installing and Configuring Oracle" on page 13 |
| "Installing the Oracle Agent" on page 31 |
| "Configuring the Agent" on page 37 |
Installing and Configuring Oracle

This chapter describes how to install and configure Oracle and its components in a VCS cluster. The chapter also lists the prerequisites for installing Oracle. For more information on installing Oracle, refer to the Oracle documentation on Solaris.

Prerequisites

✔ Verify that all systems in the cluster have adequate resources to run Oracle and VCS.
✔ Verify that the network supports the TCP/IP protocol.
Points to Note Before Installing Oracle

The following sections discuss some important tasks that need to be noted before you install Oracle in a VCS cluster on Solaris.

Location of the $ORACLE_HOME

You can install 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

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

For example, in a four-system cluster, it is possible to have three database instances, or service groups, each at a different version of Oracle. 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 binaries on local storage, would require as many as 12 copies of the binaries (three versions on four systems).

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

$ORACLE_HOME Directory on the Local Disk

Installing $ORACLE_HOME on the local disk has the advantage of allowing an upgrade of the Oracle database server running on an offline system while the database server runs on another system. The database server can later be switched to the upgraded system (provided the database is compatible), permitting a minimum amount of downtime.

The disadvantage of this approach is that with a large number of systems, it becomes difficult to maintain the various Oracle installations.
Multiple Oracle Instances (SIDs)

If multiple Oracle instances are defined in a single cluster configuration, the startup profile for each instance must be accessible on all systems listed in the service group’s SystemList attribute.

Location of Database Tablespaces

If the tablespaces are created using regular (UFS or VxFS) files, the file systems containing these files must be located on shared disks. Create the same file system mount points on each system.

If you are using raw devices on shared disks for Oracle tablespaces, change the ownership to Oracle dba user and the permissions, or access mode, to 660 on the raw devices storing the Oracle data.

For example, if you are using 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.

Configuring the Location of Core Files

The VCS agent framework sets the current directory to /opt/VRTSvcs/bin/Oracle before running Oracle agent scripts or programs that execute the Oracle binaries. Since Oracle binaries, which run as the user oracle, do not have permission to write to /opt/VRTSvcs/bin/Oracle, any “core” files they generate will be lost. We recommend you use the coreadm (1M) command available on Solaris to specify the name and location of core files produced by processes that terminate abnormally.

Transparent Listener Failover

To enable Oracle Server clients to reconnect after a system switch without reconfiguring, 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 are using the TCP/IP protocol for Oracle client/server communication, verify that the file /etc/services on each system defined in the service group’s SystemList attribute contains entries for the service name of the Oracle Net Service.
Points to Note Before Installing Oracle

Long Pathname Limitation for $ORACLE_HOME

The Solaris process table limits process pathnames to 79 characters. 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 and use it in place of the long filename in the Home attribute in the main.cf file. You must create the link on each of the systems in the cluster.

1. Create a soft link to the long pathname. 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 Pfile attributes for both the Oracle resource type and the Netlsnr resource type (refer to the Sample Configuration in “Sample Configurations” on page 83).

   For example:

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

Defining NLS Information

You can define NLS information by defining the appropriate parameters in the Oracle parameter file or by defining the appropriate environment variables in the EnvFile. See the description of the EnvFile attribute in “Resource Type Definitions” on page 75.

Defining parameters in the Oracle parameters file affects NLS settings for the Oracle server. Defining environment variables affects the NLS input and output of client utilities.

Hot Backup of Oracle Database and VCS

If a cluster node fails while running a hot backup of an Oracle database, the failover to another node can succeed only if the Oracle resource attribute, AutoEndBkup, is set to a non-zero value. See “Resource Type Definitions” on page 75 for more information about the Oracle agent attributes.

Otherwise, the database in the backup mode on the failover system cannot be opened and VCS cannot online the Oracle resource group.

The following errors are displayed to indicate this condition:

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

or

```bash
$ ORA-1113 "file %s needs media recovery"
```
Before VCS can online the Oracle resource group on the failover system, you must take the datafiles in the database out of the backup mode and shut down the database so that it can be reopened. Refer to the Oracle documentation for instructions on how to change the state of the database files.
Installing Oracle

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

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

- **$ORACLE_HOME on the shared disk.** Oracle binaries and data, including the datafiles, control files, redo log files, archive log files, and the spfile are installed on shared disks.

- **$ORACLE_HOME on the disk.** Oracle binaries are installed on each node and the data, including the datafiles, control files, redo log files, archive log files, and the spfile, is installed on shared disks.

**Note** 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.
Overview of Tasks

This section provides an overview of tasks required to install Oracle in a VCS cluster. These tasks are described in detail in following sections.

$ORACLE_HOME on Shared Disks

Installing Oracle such that the $ORACLE_HOME is on shared disks involves the following tasks.

- Mounting the Oracle binaries directory
  - "Starting the Database" on page 30
  - Repeat steps on every cluster node.
- Creating the database on shared disks
  - "Configuring the Database" on page 25
- Installing Oracle binaries on shared disks
  - (See "Installing Oracle Binaries" on page 21)

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.
Installing Oracle such that the $ORACLE_HOME is on local disks involves the following tasks.

- Installing Oracle binaries locally on the first system (See “Installing Oracle Binaries” on page 21)
- Creating the database on shared disks (See “Configuring the Database” on page 25)
- Installing Oracle binaries on the local disks (See “Installing Oracle Binaries” on page 21)
- Copying the $ORACLE_BASE/admin/SID directory to the local disks (See “Installing Oracle Binaries” on page 21)
- “Starting the Database” on page 30

Repeat steps on every cluster node.

The methodology is to install the Oracle binaries and to create the Oracle database on shared disks during the first installation. This ensures that all Oracle installations are identical and access the database from the same location on the shared disk.
Installing Oracle Binaries

This section describes how to install Oracle9i for VCS. Note that the screens and options presented by installers for other Oracle versions may differ.

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 this is the first Oracle installation, the Inventory Location dialog box is displayed. Specify the location of your base directory and click OK.

If in your installation, the `$ORACLE_HOME` will be on local disks, specify a location on the local disk.

If the `$ORACLE_HOME` will be on shared disks, specify a location on the shared disk.
5. On the UNIX Group Name dialog box, enter the name of a UNIX group that will have 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 the next section to configure the database on shared disks.

**Additional Considerations For Installing Oracle 10g on Shared Disks**

Oracle 10g provides 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 deamon may result in an error. Because a VCS cluster for Oracle does not require this daemon, VERITAS recommends you to disable the daemon by performing the following steps:

**On Solaris 9 and below**

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

```
# h1:23:respawn:/etc/init.d/init.cssd run >/dev/null 2>&1 ></dev/null
```

**On Solaris 10**

Perform the following steps on the system from where you ran the Oracle installation wizard:

1. Find out the Fault Management Resource Identifier (FMRI) for the cssd daemon. Type the following from the command prompt:

   ```
   # svcs | grep cssd
   ``
   
   The FMRI for the cssd deamon is displayed.

2. Modify the Service Configuration Repository such that the SVC does not control the daemon. Type the following from the command prompt:

   ```
   # svccfg delete -f <FMRI>
   ``
   
   where **FMRI** is the cssd FMRI obtained in step 1.
Configuring the Database

This section instructs you on how to configure an Oracle9i 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.

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.
Installing Oracle

4. On the **Database Templates** dialog box, select a template to create the database and click **Next**.

![Database Templates Dialog Box](image1)

5. On the **Database Identification** dialog box, enter or select a unique name and SID for the global database and click **Next**.

![Database Identification Dialog Box](image2)
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. This ensures that the Archive Log will be 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.

   a. In the left pane, expand the Storage folder by clicking the + next to it.

   b. Click **Controlfile** and click the **General** tab in the right pane.

   ![Database Configuration Assistant, Step 6 of 7: Database Storage](image)

   c. In the **File Directory** field, enter a path on the shared disk for each control file.

   d. Expand the **Datafiles** folder by clicking the + next to it.

   e. 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.

   f. Expand the **Redo Log Groups** folder by clicking the + next to it.

   g. 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.

   h. Click **Next**.
9. On the **Creation Options** dialog box, select the **Create Database** check box and click **Finish**.

![Database Configuration Assistant, Step 7 of 7: Creation Options](image)

10. On the **Summary** dialog box, review your selections and click **OK**.

**Note** You need to configure and test if the database is accessible on other nodes. If your $ORACLE_HOME is on shared disks, mount the Oracle binaries on each node individually, and start the database (see “Starting the Database” on page 30). If your $ORACLE_HOME is on local disks, install Oracle locally on other systems (see “Installing Oracle Binaries” on page 21) and start the database on each system, individually (see “Starting the Database” on page 30).

### Copying the $ORACLE_BASE/admin/SID Directory

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

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 OFA Structure for more information.

### Starting the Database

Mount the database directory and start the database on each node. You can verify access to the database by running an SQL query.
Installing the Oracle Agent

This chapter describes how to install the Oracle agent in a VCS cluster. If you have an earlier version of the agent installed, refer to “Upgrading the Agent” on page 34.

Installing the Agent Software

The VCS enterprise agent for Oracle is installed from the CD. You must install the Oracle Enterprise Agent on all systems that will host the Oracle service group.

Prerequisites

✔ Make sure that VCS is installed in the cluster.
✔ If a previous version of the agent is installed, uninstall it.
✔ Install and configure the Oracle Server for Solaris and the add-on Listener. For more information, see the Oracle documentation.
Installation Instructions

Install the Oracle enterprise agent on each node in the cluster.

▼ To install the agent

1. Log in as root.

2. Create a temporary directory for installation:
   ```bash
   # mkdir /tmp/install
   ...
   ```

3. Insert the disc into a drive connected to your system.
   - If you are running Solaris volume-management software, the software automatically mounts the disc as `/cdrom/cdrom0`. Type the following command to go to the location:
     ```bash
     # cd /cdrom/cdrom0
     ```
   - If you are not running Solaris volume-management software, you must mount the disc manually. For example:
     ```bash
     # mount -F hsfs -o ro /dev/dsk/c0t6d0s2 /cdrom
     ```
     Where, in this example, `/dev/dsk/c0t6d0s2` is the default for the CD drive. Once the disc is mounted, type the following commands to go to the location:
     ```bash
     # cd /cdrom
     ```

4. Copy the compressed package files from the software disc to the temporary directory:
   ```bash
   # cp -r oracle_agent/pkgs/* /tmp/install
   ```

5. Go to the temporary directory and unzip the compressed package file:
   ```bash
   # cd /tmp/install
   # gunzip VRTS*.gz
   ```

6. Extract the compressed files from the tar files:
   ```bash
   # tar -xvf VRTSvcsor.tar
   # tar -xvf VRTScsocw.tar
   ```
7. Install the package:
   # pkgadd -d VRTSvcsor
   # pkgadd -d VRTScsocw

▼ To install the Japanese language pack

1. After installing the agent, insert the “Language” disc into a drive connected to the system. See step 3 on page 32 for instructions on mounting the disc.

2. Copy the compressed package files from the software disc to the temporary directory:
   # cp -r ja/oracle_agent/pkgs/* /tmp/install

3. Go to the temporary directory and unzip the compressed package file:
   # cd /tmp/install
   # gunzip VRTSjacso.tar.gz

4. Extract the compressed file from the tar file:
   # tar -xvf VRTSjacso.tar

5. Install the Japanese package:
   # pkgadd -d VRTSjacso
Upgrading the Agent

This section describes how to upgrade from the VCS enterprise agent 3.5 and 4.0 for Oracle in a VCS cluster.

▼ To upgrade VCS enterprise agent 3.5 for Oracle

1. Save the VCS configuration and stop the VCS engine.
   
   ```
   # haconf -dump -makero
   # hastop -all -force
   ```

2. Follow step a through step c on all systems on which the Oracle agent was installed.

   a. Remove the Oracle agent.
      
      ```
      # pkgrm VRTSvcsor
      ```

   b. Delete the file `/etc/VRTSvcs/conf/config/OracleTypes.cf`.

   c. Install the VCS enterprise agent 4.1 for Oracle. See “Installing the Agent Software” on page 31 for instructions.

3. Copy the file `OracleTypes.cf` from the directory `/etc/VRTSvcs/conf/` to the `/etc/VRTSvcs/conf/config` directory.

4. From a node in the cluster, edit your configuration file `/etc/VRTSvcs/conf/config/main.cf`.

   Replace all resources of type Sqlnet with resources of type Netlsnr.

   See Appendix A for information about the attributes in this version of the Oracle agent.

5. Verify the configuration
   
   ```
   # hacf -verify config
   ```

6. Start VCS on local node first.

7. Start VCS on other nodes.
To upgrade VCS enterprise agent 4.0 for Oracle

There are no configuration changes between versions 4.0 and 4.1 of the VCS enterprise agent for Oracle. So you need not make any changes to the type definition files.

On each node of the VCS cluster, perform the following steps.

1. Stop VCS locally.
   
   # hastop - -force

2. Remove the VCS enterprise agent 4.0 for Oracle.
   
   # pkgrm VRTSvcsor

3. Install the VCS enterprise agent 4.1 for Oracle. See “Installing the Agent Software” on page 31 for instructions.

4. Restart the VCS engine.
   
   # hastart
Configuring the Agent

Configuring the Oracle enterprise agent involves creating the Oracle service group, its resources, and defining attribute values for the configured resources. VCS provides several ways to configure an enterprise agent, including the agent configuration wizard, Cluster Manager (Java Console), and the command-line.

You must have administrator privileges to create and configure a service group.

Before configuring the agent, review the supported Oracle configurations, described under “Oracle Configurations in VCS” on page 38. Review the Oracle resource type and the attribute definitions of the Oracle agents, described in “Resource Type Definitions” on page 75. For sample configuration files of the Oracle service group, see “Sample Configurations” on page 83.

Prerequisites

✔ Install and configure Oracle identically on all cluster systems. (For more information, see “Installing and Configuring Oracle” on page 13.)

✔ Verify that the Oracle agent is installed on all cluster systems. (For more information, see “Installing the Oracle Agent” on page 31.)

✔ Make sure the Oracle services are not started on reboot by the init script.
Oracle Configurations in VCS

You can set up Oracle in different ways in a VCS environment.

Single Oracle Instance Configuration

This section describes how to configure a single Oracle instance in a VCS environment for high availability. For resource dependency graph and sample configuration of service groups involving a single Oracle instance, see “Single Oracle Instance Configuration” on page 84.

▼ To configure an Oracle instance in VCS

1. Review the Oracle and Netlsnr resource types and their attribute definitions, described in “Resource Type Definitions” on page 75.

2. Configure Oracle for VCS. This involves configuring the Oracle files listener.ora and tnsnames.ora as per VCS requirements. This section describes the changes required in these files, depending on your Oracle configuration.

   a. 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.

      In the following example, assuming 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)
      )
      )
      ```

   b. Perform additional configuration tasks specific to the listener 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 =
      ```
Oracle Configurations in VCS

3. Create the Oracle service groups using the Agent Configuration wizard, Cluster Manager (Java Console,) or the command-line. For information on using the wizard, see “Configuring the Agent Using the Agent Configuration Wizard” on page 44. For information on using Cluster Manager (Java Console), see “Configuring the Agent Using Cluster Manager (Java Console)” on page 55.

4. Bring the Oracle service group online. See “Bringing the Service Group Online” on page 65 for instructions.

Multiple Oracle Instance (Single Listener) Configuration

This section describes how to configure multiple Oracle instances with a single listener in a VCS environment for high availability. For resource dependency graph and sample configuration of a service group involving multiple Oracle instances, see “Multiple Oracle Instances (Single Listener) Configuration” on page 90.

To configure multiple Oracle instances (single listener)

1. Review the Oracle and Netlsnr resource types and their attribute definitions, described in “Resource Type Definitions” on page 75.

2. Configure Oracle for VCS. This involves configuring the Oracle files listener.ora and tnsnames.ora as per VCS requirements. This section describes the changes required in these files, depending on your Oracle configuration.

   a. 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.

   In the following example, assuming 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)
   )
   ```
b. Perform additional configuration tasks specific to the listener 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.

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

3. Create the Oracle and Listener service groups using Cluster Manager (Java Console.) See “Configuring the Agent Using Cluster Manager (Java Console)” on page 55 for instructions. You can also use the command-line to create the service group.

4. Bring the Oracle service group online. See “Bringing the Service Group Online” on page 65 for instructions.

**Multiple Oracle Instances (Multiple Listeners) Configuration**

This section describes how to configure multiple Oracle instances with multiple listeners in VCS environment for high availability. For resource dependency graph and sample configuration of a service group involving multiple Oracle instance, see “Multiple Instance (Multiple Listeners) Configuration” on page 100.

▼ **To configure multiple Oracle instances (multiple listeners)**

1. Review the Oracle and Netlsnr resource types and their attribute definitions, described in “Resource Type Definitions” on page 75.

2. Configure Oracle for VCS. This involves configuring the Oracle files `listener.ora` and `tnsnames.ora` as per VCS requirements. This section describes the changes required in these files, depending on your Oracle configuration.

a. 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.

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

```
Oracle Configurations in VCS

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

b. 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))
      )
    )
  )
)
```

3. Create the Oracle service groups using the Agent Configuration wizard, Cluster Manager (Java Console,) or the command-line. For information on using the wizard, see “Configuring the Agent Using the Agent Configuration Wizard” on page 44. For information on using Cluster Manager (Java Console), see “Configuring the Agent Using Cluster Manager (Java Console)” on page 55.

4. Bring the Oracle service group online. See “Bringing the Service Group Online” on page 65 for instructions.
Configuration With Shared Server Support

This section describes how to configure Oracle instance having shared server support in a VCS environment for high availability. For resource dependency graph and sample configuration, see “Oracle Configuration With Shared Server Support” on page 105.

To configure Oracle with shared server support

1. Review the Oracle and Netlsnr resource types and their attribute definitions, described in “Resource Type Definitions” on page 75.

2. Configure Oracle for VCS. This involves configuring the Oracle files listener.ora and tnsnames.ora as per VCS requirements. This section describes the changes required in these files, depending on your Oracle configuration.

a. 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.

In the following example, assuming 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)
    )
  )
```

b. Perform additional configuration tasks specific to the listener 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))
      )
    )
  )
```
3. In the initialization parameter file, for the mts_dispatchers (called dispatchers in Oracle9i versions and above) parameter, set the host name for all TCP protocol address dispatchers to the virtual IP address for the service group.

In the following example from an Oracle 8i configuration, the host name for the dispatcher is set to oraprod.

```plaintext
mts_dispatchers =
  *(ADDRESS = (PROTOCOL = TCP)(HOST = oraprod))
  (MUL=ON) (TICK=15) (POOL=true)
```

In the following example from an Oracle9i configuration, the host name for the dispatcher is set to oraprod.

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

4. 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.

```plaintext
_listener=listener_alias
```

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

5. 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.

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

6. Create the Oracle service groups using the Agent Configuration wizard, Cluster Manager (Java Console,) or the command-line. For information on using Cluster Manager (Java Console), see “Configuring the Agent Using Cluster Manager (Java Console)” on page 55.

7. Bring the Oracle service group online. See “Bringing the Service Group Online” on page 65 for instructions.
Configuring the Agent Using the Agent Configuration Wizard

VCS provides an Agent Configuration wizard that guides you through the process of configuring the agent. The wizard creates and modifies Oracle service groups.

This section describes the steps required to create a new Oracle service group using the wizard. To modify an existing service group, see “Modifying the Agent Configuration” on page 68.

Before configuring the Oracle agent, review the resource type and the attribute definitions of the Oracle and Netlsnr agents, described in “Resource Type Definitions” on page 75. For sample configuration files and resource dependency graphs of the Oracle service group, see “Sample Configurations” on page 83.

Prerequisites

✔ Make sure that the Oracle instances and listeners to be configured, whether running in global or non-global zones, are 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.

✔ If you are configuring a service group for an Oracle instance running in a non-global zone, make sure the zone is created on all the systems that will be part of the service group.

✔ 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.

✔ Make sure the Oracle type definition is imported to the VCS engine. See “Importing the OracleTypes.cf File” on page 45 for instructions.
Importing the OracleTypes.cf File
Before configuring the Oracle agent, you must import the OracleTypes.cf file to the VCS engine.

▼ 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 file /etc/VRTSvcs/conf/OracleTypes.cf
4. Click Import.
5. Save the configuration.

▼ To import using the command line
1. Log in to sysa as root.
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:
   # 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. Copy the Oracle types configuration file into place:
   # cp /etc/VRTSvcs/conf/OracleTypes.cf /etc/VRTSvcs/conf/config/OracleTypes.cf
6. Edit the main.cf file to include the OracleTypes.cf file:
   include "OracleTypes.cf"
Instructions

1. Set the DISPLAY variable, start the Oracle configuration wizard as root.
   
   ```
   # hawizard oracle
   ```

2. Read the information on the Welcome screen and click Next.

3. On the Wizard Options dialog box, select the Create Oracle Service Group option and click Next.

4. On the Service Group Configuration dialog box, specify information about the service group.
Configuring the Agent Using the Agent Configuration Wizard

a. Enter a name for the Oracle service group.

b. In the Available Cluster Systems box, 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.

To remove a system from the service group’s system list, select the system in the Systems in Priority Order box and click the button with the left arrow icon.

c. 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.

d. Click Next.

5. On the Instance Selection dialog box, select the Oracle instances to be configured along with their listeners. Click Discover Oracle Configuration, if required.

The wizard displays the instances, along with the name of the non-global zone where the instance is running. However, the zone name is not displayed for an instance running in a global zone.

Select the instances and click Next.

**Note** If you select multiple instances, make sure they are running in the same zone.
Configuring the Agent Using the Agent Configuration Wizard

6. On the **Instance Configuration** dialog box, specify information for all selected instances.

   ![Image of Instance Configuration dialog box]

   a. Verify the location of the Oracle Parameter File.
   
   In **step 5** on page 47, if you selected an instance running in a non-global zone, make sure the specified location is in the context of the zone where the instance is running.

   b. Choose Start and Stop options, if desired.

   c. Select the **Enable detail monitoring** and **Specify Advanced options** check boxes, if desired.

   d. Click **Next**.
7. If you chose to monitor the database in detail, the **Detail Monitoring** dialog box is displayed.

![Detail Monitoring Dialog Box]

- a. In the **Select** column, select the check box corresponding to the database to be monitored in detail.

- b. Enter a valid user name for the database.

- c. Enter a valid password for the database user.

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

- d. In the **Table** column, enter the name of a table that will be queried to validate the status of the database.

- e. Click **Next**.
8. If you chose to specify advanced options, the **Oracle Advanced Configuration** dialog box is displayed.

![Oracle Advanced Configuration dialog box](image)

**a.** Enter the location of the Oracle Envfile and the encoding and select the **AutoEndBkup** check box, if desired.

In step 5 on page 47, if you selected an instance running in a non-global zone, make sure the specified location is in the context of the zone where the instance is running.

**b.** Click Next.

9. On the **Database Configuration** dialog box, verify the mount points required by each database, specify the Mount and Fsck options, and click **Next**.

![Database Configuration dialog box](image)
10. On the **Listener Configuration** dialog box, configure the listeners for the databases.

   ![Listener Configuration Dialog Box](image)

   a. Verify the virtual IP address and Netmask.

   b. For each system, select a device.

   c. Select the **Enable detail monitoring** and **Specify Advanced options**, if desired.

   d. Click Next.
11. If you chose to specify advanced options for the listeners, the **Listener Advanced Configuration** dialog box is displayed.

For each listener, enter the path of the Envfile and encoding, if desired. Enter a valid password for the listener. In step 5 on page 47, if you selected a listener running in a non-global zone, make sure the specified location is in the context of the zone where the listener is running.

Click **Next**.

**Note** Do not encrypt passwords when entering them through the Agent Configuration Wizard; the wizard takes care of encrypting passwords.
12. On the **Service Group Summary** dialog, review your configuration.

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

- **a.** 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.

- **b.** 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.
13. On 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.

Click Close.

The Oracle service group is created in your cluster.
Configuring the Agent 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.

To use the Oracle template, import the OracleTypes.cf file to the VCS engine by using Cluster Manager. See “Importing the OracleTypes.cf File” on page 45 for instructions.

**Note** Using the Java Console, you cannot configure a service group for an Oracle instance running in Solaris non-global zones. Use the configuration wizard to configure such service groups. See “Configuring the Agent Using the Agent Configuration Wizard” on page 44 for instructions.

Creating a New Service Group

1. Make sure the Oracle type definition file OracleTypes.cf is imported in your configuration.

2. Launch the Cluster Configuration wizard using any of the following two ways:
   - 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.
d. 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.

e. Click Next.

5. On the Would you like to use a template to configure the service group? dialog box, click Next.

6. On 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.

9. A window opens listing the service group’s resources and their associated attributes. 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.
Configuring the Agent Using Cluster Manager (Java Console)

**Editing Resource attributes**

Configure the Oracle service group by editing attributes of resources in the service group.

1. Select the resource from the list on the left pane. Its attributes appear in the right pane.

2. Select the attribute to be modified.

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. Click **Finish** to quit the wizard.
Configuring the Agent Using the Command-line

The VCS enterprise 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.

Follow the instructions below to configure the agent using the sample configuration file:

1. Log in to sysa as root.

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:
   
   ```
   # 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. Copy the Oracle types configuration file into place:
   
   ```
   # cp /etc/VRTSvcs/conf/OracleTypes.cf /etc/VRTSvcs/conf/config/OracleTypes.cf
   ```

6. Edit the main.cf file. The file /etc/VRTSvcs/conf/sample_oracle/main.cf can be used for reference:
   
   a. Add an “include” line for the OracleTypes.cf file:
      
      ```
      include "OracleTypes.cf"
      ```

   b. Create the Oracle and Netlsnr resources. You can refer to the examples shown in the file /etc/VRTSvcs/conf/sample_oracle/main.cf.

   c. Edit the default attributes to match the parameters in your configuration. See “Resource Type Definitions” on page 75 for more information about the agent attributes.

   d. Assign dependencies to the newly created resources. Refer to the sample file /etc/VRTSvcs/conf/sample_oracle/main.cf and the sample dependency graphs in “Sample Configurations” on page 83. (See the VERITAS Cluster Server User’s Guide for more information on assigning dependencies.)
7. Save and close the file.

8. Verify the syntax of the file /etc/VRTSvcs/conf/config/main.cf:
   ```
   # cd /etc/VRTSvcs/conf/config/
   # hacf -verify .
   ```

9. Start the VCS engine:
   ```
   # hastart
   ```

10. Verify that all Oracle service group resources are brought online:
    ```
        # hagrp -state
    ```

11. Take the service group offline and verify that all resources are stopped:
    ```
        # hagrp -offline service_group -sys system_name
        # hagrp -state
    ```

12. Bring the service group online again and verify that all resources are available:
    ```
        # hagrp -online service_group -sys system_name
        # hagrp -state
    ```

13. Start the VCS engine on sysb:
    ```
        # hastart
    ```

14. Switch the Oracle service group to sysb:
    ```
        # hagrp -switch service_group -to sysb
    ```

15. Verify that all Oracle service group resources are brought online on sysb:
    ```
        # hagrp -state
    ```

16. On all the systems, 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
    ```
Encrypting Passwords

VCS provides a utility to encrypt database user passwords and listener passwords. Encrypt the Pword attribute in the Oracle agent and the LsnrPwd attribute in the Netlsnr agent before configuring these attributes.

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 vcsencrypt utility before configuring the LsnrPwd attribute. This password, when decrypted should be of the same format as stored in the listener.ora file.

Note You need not encrypt passwords when using the configuration wizard or the VCS Cluster Manager (Java Console) to configure attributes.

1. From the path $VCS_HOME/bin/, run the vcsencrypt utility.
   a. Type the following command:
      
      # vcsencrypt -agent
   
      b. The utility prompts you to enter the password twice. Enter the password and press Return.
      
      # Enter New Password:
      # Enter Again:

2. The utility encrypts the password and displays the encrypted password.

3. Enter this encrypted password as the value for the attribute.
   Copy the encrypted password for future reference.
Additional Considerations with 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 system might online an already running instance on that system (or any other system).

◆ within a failover service group, when the administrator online an Oracle resource on a system and if the Oracle instance is online on any other system within a cluster, the instance would come up. However, the database does not get mounted. In such circumstances, this failure is detected only by in-depth monitoring. If in-depth monitoring is not configured, then such a conflict would go undetected.

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

Setting Up Detail Monitoring

The VCS enterprise 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.

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

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 VCS enterprise agent for Oracle. The scripts are available under the directory /opt/VRTSvcs/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 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 following example, 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.

1. Make the VCS configuration writable:
   ```bash
   haconf -makerw
   ```

2. Freeze the service group to avoid automated actions by VCS caused by an incomplete reconfiguration:
   ```bash
   hagrp -freeze service_group
   ```

3. Log on as an Oracle user.
   ```bash
   su - <Owner>
   ```

4. Set the environment variables for ORACLE_HOME and ORACLE_SID.
   ```bash
   export ORACLE_HOME=<Home>
   export ORACLE_SID=<Sid>
   ```

5. Start the svrmgr1 or sqlplus utility to set up a database table:
   ```bash
   $ORACLE_HOME/bin/svrmgr1
   or
   $ORACLE_HOME/bin/sqlplus /nolog
   ```
6. As the database administrator, issue the following statements at the `svrmgrl` or `sqlplus` prompt to create the test table:

   ```sql
   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> ( tstamp date );
   insert into <User>.<Table> (tstamp) values (SYSDATE);
   ```

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

   ```sql
   disconnect
   connect <User>/<Pword>
   update <User>.<Table> set ( tstamp ) = SYSDATE;
   select TO_CHAR(tstamp, 'MON DD, YYYY HH:MI:SS AM')
   from <User>.<Table>;
   exit
   ```

8. Detail monitoring for the Oracle resource can be enabled by 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
   ```

   **Note** You can also use Cluster Manager (Java Console) to set these attributes.
Enabling and Disabling Detail Monitoring for Oracle

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

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

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
   ```

4. 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
   ```
Administering the Oracle Service Group

This chapter describes some administrative tasks you can perform on the Oracle service group, including bringing the service group online, taking it offline, switching it, and modifying the service group configuration. The chapter also describes how to disable the agent and to remove it.

Bringing the 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. This enables 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).
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.

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).

Taking the 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).
Disabling the Agent

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

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

   `hagrp -state service_group -sys system_name`

2. If the service group is online, take it offline. Use one of the following commands:
   a. To take the service group offline on one system and online it on another system, you can use the -switch option:

      `hagrp -switch service_group -to system_name`
   b. To take the service group offline without bringing it online on any other system in the cluster, enter:

      `hagrp -offline service_group -sys system_name`

3. Stop the agent on the system by entering:

   `haagent -stop Oracle -sys system_name`

   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.

You can now remove the service group, the resource type, or both from the VCS configuration. See the chapter on reconfiguring VCS from the command line in the _VERITAS Cluster Server User’s Guide_ for more information.
Modifying the Agent Configuration

You can dynamically configure the VCS enterprise agent for Oracle in several ways, including the configuration wizard, the command-line interface, Cluster Manager Java Console, and the Web Console.

This section describes the process using the cluster configuration wizard.

1. Start the Oracle Configuration wizard.
   
   ```bash
   # 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 Agent Using the Agent Configuration Wizard” on page 44 for more information about the configuration wizard.

Removing the Agent

Removing the agent involves removing the agent configuration wizard and the agent files from each system.

1. Remove the agent configuration wizard.
   
   ```bash
   # pkg rm VRTScsocw
   ```

2. Remove the agent. Answer prompts accordingly.
   
   ```bash
   # pkg rm VRTSvcsor
   ```
This chapter lists error messages associated with the VCS enterprise agent. Messages include the description and a recommended solution, if available.

## Error Messages Common to the Oracle and Netlsnr Agents

<table>
<thead>
<tr>
<th>Message</th>
<th>Description and Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>No ORACLE_HOME specified</td>
<td>The Home attribute in the Oracle or Netlsnr type has not been set.</td>
</tr>
<tr>
<td></td>
<td><strong>Solution:</strong> Set the Home attribute to the correct full path name of the Oracle home.</td>
</tr>
<tr>
<td>Oracle home directory %s does not exist</td>
<td>The string specified for the Home attribute in the Oracle or Netlsnr type is incorrect.</td>
</tr>
<tr>
<td></td>
<td><strong>Solution:</strong> Set the Home attribute to the correct full path name of the Oracle home.</td>
</tr>
<tr>
<td>File %s is not a valid text file</td>
<td>The file specified by the EnvFile attribute for sourcing the environment variables is not present, not readable, or is not a text file.</td>
</tr>
<tr>
<td></td>
<td><strong>Solution:</strong> Set the EnvFile attribute to the correct full path name. Ensure that the file format is valid.</td>
</tr>
<tr>
<td>VCSAgExec returned failure when trying to execute in-depth test</td>
<td>Internal error.</td>
</tr>
<tr>
<td></td>
<td><strong>Solution:</strong> Contact Technical Support for further assistance.</td>
</tr>
<tr>
<td>Unable to open pipe from %s</td>
<td>Internal error.</td>
</tr>
<tr>
<td></td>
<td><strong>Solution:</strong> Contact Technical Support for further assistance.</td>
</tr>
</tbody>
</table>
## Error Messages Common to the Oracle and Netlsnr Agents

<table>
<thead>
<tr>
<th>Message</th>
<th>Description and Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process %s restarted</td>
<td>Warning message to indicate that the PID for the Oracle process specified is different than the one registered by the previous monitor cycle.</td>
</tr>
</tbody>
</table>
| Execution of script returned %s | The detailed monitoring script returns the output specified in the message when the status is offline or unknown.  
**Solution:** Take corrective action for the error that has occurred. |
| Monitor procedure %s returned %s | MonScript failed to execute correctly.  
**Solution:** Debug MonScript to assess the exact cause of failure. |
| Monitor procedure %s did not exit, return value is %s | Internal error while executing MonScript.  
**Solution:** Contact Technical Support for further assistance. |
| Source file for environment variables %s is not a valid text file | The file specified by the EnvFile attribute for sourcing the environment variables is not present, not readable, or is not a text file. Occurs in MonScript file.  
**Solution:** Set the EnvFile attribute to the correct full path name. Ensure that the file format is valid. |
| No owner for Oracle executables was specified | The Owner attribute in the Oracle type has not been set.  
**Solution:** Set the Owner attribute to the correct owner of the database binaries. |
| Invalid owner %s for Oracle executables was specified | The OS user specified by the Owner attribute is invalid.  
**Solution:** Set the Owner attribute to the correct owner of the database binaries. |
## Error Messages Specific to the Oracle Agent

<table>
<thead>
<tr>
<th>Message</th>
<th>Description and Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>No SID specified</td>
<td>The Sid attribute in the Oracle type has not been set. <strong>Solution:</strong> Set the Sid attribute to the correct database instance.</td>
</tr>
<tr>
<td>No initialization parameter file specified for startup</td>
<td>The Pfile attribute in the Oracle type has not been set. <strong>Solution:</strong> Set the Pfile attribute to the correct full path name corresponding to the instance specified by Sid attribute.</td>
</tr>
<tr>
<td><code>svrmgrl/sqlplus</code> not found in <code>%s/bin</code></td>
<td>The client utilities <code>svrmgrl</code> or <code>sqlplus</code> are not found in the <code>$ORACLE_HOME/bin</code> directory. <strong>Solution:</strong> Verify that the Oracle home has been correctly specified and that these executables are present.</td>
</tr>
<tr>
<td>Oracle database is in backup mode</td>
<td>Warning message to indicate that the database is in backup mode. <strong>Solution:</strong> If the AutoEndBkup attribute is set then the database files that are being backed up will be taken out of backup mode and the database will be opened.</td>
</tr>
<tr>
<td>Oracle <code>%s</code> failed to stop</td>
<td>Warning message to indicate that Shutdown immediate or Shutdown abort commands were not successful in closing the Oracle instance, in the clean or offline entry point.</td>
</tr>
<tr>
<td>Oracle instance <code>%s</code> not running</td>
<td>Warning message to indicate that the database instance was not running even before the clean or offline entry points were executed. <strong>Solution:</strong> No action required.</td>
</tr>
<tr>
<td>Oracle (%s) kill TERM <code>%s</code></td>
<td>Warning message to indicate that the Oracle processes would be signaled with SIGTERM. <strong>Solution:</strong> No action required.</td>
</tr>
<tr>
<td>Oracle (%s) kill KILL <code>%s</code></td>
<td>Warning message to indicate that the Oracle processes would be signaled with SIGKILL. <strong>Solution:</strong> No action required.</td>
</tr>
<tr>
<td>Message</td>
<td>Description and Solution</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Oracle (%s) failed to stop even after SIGKILL</td>
<td>Oracle processes could not be terminated even with SIGKILL.</td>
</tr>
<tr>
<td></td>
<td><strong>Solution:</strong> Contact your Oracle Administrator for assistance.</td>
</tr>
<tr>
<td>Oracle (%s) attempting cleanup of Oracle IPC resources</td>
<td>Warning message to indicate that the IPC resources are being cleaned.</td>
</tr>
<tr>
<td>Database in QUIESCING/QUIESCED mode</td>
<td>Warning message to indicate that database is in QUIESCING or QUIESCED mode.</td>
</tr>
<tr>
<td>Database in RESTRICTED mode</td>
<td>Warning message to indicate that database is in RESTRICTED mode.</td>
</tr>
<tr>
<td>Database in SUSPENDED state</td>
<td>Warning message to indicate that database is in SUSPENDED state.</td>
</tr>
<tr>
<td>Resource %s - monitor procedure did not complete within the expected time.</td>
<td>Refer to Oracle’s alert log for more information. One possible reason could be that automatic archiving was not enabled while setting up the database.</td>
</tr>
<tr>
<td></td>
<td><strong>Solution:</strong> Archive the database manually. If automatic archival is enabled, set the LOG_ARCHIVE_START parameter in the file init.ora to TRUE.</td>
</tr>
<tr>
<td>Custom script $VCS_HOME/bin/Oracle/start_custom_%s.sql does not exist.</td>
<td>The agent could not find the custom script at the specified location to start the database.</td>
</tr>
<tr>
<td></td>
<td><strong>Solution:</strong> Make sure the custom file exists at the specified location and has valid permissions.</td>
</tr>
<tr>
<td>Custom script $VCS_HOME/bin/Oracle/shut_custom_%s.sql does not exist.</td>
<td>The agent could not find the custom script at the specified location to stop the database.</td>
</tr>
<tr>
<td></td>
<td><strong>Solution:</strong> Make sure the custom file exists at the specified location and has valid permissions.</td>
</tr>
<tr>
<td>oraerror.dat did not have records that could be parsed</td>
<td>The file oraerror.dat is not present or has records in an unsupported format.</td>
</tr>
<tr>
<td></td>
<td><strong>Solution:</strong> Make sure the file exists and has data in the supported format.</td>
</tr>
</tbody>
</table>
## Error Messages Specific to the NetSnhr Agent

<table>
<thead>
<tr>
<th>Message</th>
<th>Description and Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot open process directory.</td>
<td>The agent could not process the /proc entries in the particular monitor cycle. <strong>Solution:</strong> No action required.</td>
</tr>
<tr>
<td>Listener process %s not running</td>
<td>Warning message to indicate that the Listener process was not running even before the clean or offline entry points were executed. <strong>Solution:</strong> No action required.</td>
</tr>
<tr>
<td>Listener %s kill TERM %s</td>
<td>Warning message to indicate that the Listener process would be signaled with SIGTERM. <strong>Solution:</strong> No action required.</td>
</tr>
<tr>
<td>Listener %s kill KILL %s</td>
<td>Warning message to indicate that the Listener process would be signaled with SIGKILL. <strong>Solution:</strong> No action required.</td>
</tr>
<tr>
<td>Listener %s failed to stop even after SIGKILL</td>
<td>Listener process could not be terminated even with SIGKILL. <strong>Solution:</strong> Contact your Oracle Administrator for assistance.</td>
</tr>
<tr>
<td>lsnrctl not found in %s/bin</td>
<td>The client utility lsnrctl is not found in the $ORACLE_HOME/bin directory. <strong>Solution:</strong> Verify that the Oracle home has been correctly specified and that this executable is present.</td>
</tr>
<tr>
<td>lsnrctl operation timed out</td>
<td>The tnslsnr process is not responding. <strong>Solution:</strong> Verify the underlying network protocol.</td>
</tr>
</tbody>
</table>
Resource Type Definitions

This appendix lists the resource type definitions and attribute definitions of the Oracle and Netlsnr agents.

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 table explains the attributes associated with the agent. The Required attributes table lists the attributes that must be configured for the agent to function properly.

Oracle Resource Type

type Oracle {
    static str ContainerType = Zone
    static keylist SupportedActions = { VRTS_GetInstanceName,
        VRTS_GetRunningServices, DBRestrict, DBUndoRestrict, DBResume,
        DBSuspend, DBTbspBackup }
    static str ArgList[] = { Sid, Owner, Home, Pfile, StartUpOpt,
        ShutDownOpt, EnvFile, AutoEndBkup, DetailMonitor, User, Pword,
        Table, MonScript, AgentDebug, Encoding }
    str Sid
    str Owner
    str Home
    str Pfile
    str StartUpOpt = STARTUP
    str ShutDownOpt = IMMEDIATE
    str EnvFile
    boolean AutoEndBkup = 1
    int DetailMonitor
    str MonScript = "./bin/Oracle/SqlTest.pl"
    str User
    str Pword
    str Table
    boolean AgentDebug = 0
    str Encoding
    str ContainerName
}
### Attribute Definitions

<table>
<thead>
<tr>
<th>Required Attributes</th>
<th>Type and Dimension</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sid</td>
<td>string-scalar</td>
<td>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.</td>
</tr>
<tr>
<td>Owner</td>
<td>string-scalar</td>
<td>The Oracle user, as the defined owner of executables and database files in /etc/passwd.</td>
</tr>
<tr>
<td>Home</td>
<td>string-scalar</td>
<td>The $ORACLE_HOME path to Oracle binaries and configuration files. For example, you could specify the path as /opt/ora_home. <strong>Note</strong> Do not append a slash (/) at the end of the path.</td>
</tr>
<tr>
<td>Optional Attributes</td>
<td>Type and Dimension</td>
<td>Definition</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------------</td>
<td>------------</td>
</tr>
<tr>
<td>ContainerType</td>
<td>string-scalar</td>
<td>Setting this attribute to “Zone” indicates that the Oracle agent monitors Oracle instances running in Solaris 10 zones. Leaving this attribute blank indicates it does not.</td>
</tr>
</tbody>
</table>
| StartUpOpt          | string-scalar      | Startup options for the Oracle instance. This attribute can take the following values:  
  - STARTUP  
  - RESTRICTED  
  - RECOVERDB  
  - SRVCTLSTART  
  - CUSTOM  
  Default is STARTUP. |
| ShutDownOpt         | string-scalar      | Shut down options for the Oracle instance. This attribute can take the following values:  
  - IMMEDIATE  
  - TRANSACTIONAL  
  - SRVCTLSTOP  
  - CUSTOM  
  Default is IMMEDIATE. |
| 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. |
| Pfile               | string-scalar      | The name of the initialization parameter file with the complete path of the startup profile.  
  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. |
| AutoEndBkup         | integer-scalar     | Setting the AutoEndBkup attribute to a non-zero value takes the datafiles in the database out of the backup mode, during Online.  
  Default = 1 |
<table>
<thead>
<tr>
<th>Optional Attributes</th>
<th>Type and Dimension</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DetailMonitor</td>
<td>integer-scalar</td>
<td>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. Default = 0</td>
</tr>
<tr>
<td>MonScript</td>
<td>string-scalar</td>
<td>Pathname to the script provided for detail monitoring. The default (basic monitoring) is to monitor the database PIDs only. The pathname to the supplied detail monitor script is /opt/VRTSvcs/bin/Oracle/SqlTest.pl. MonScript also accepts a pathname relative to $VCS_HOME. A relative pathname should start with “./”, as in the path ./bin/Oracle/SqlTest.pl.</td>
</tr>
<tr>
<td>User</td>
<td>string-scalar</td>
<td>Internal database user. Connects to the database for detail monitoring.</td>
</tr>
<tr>
<td>Pword</td>
<td>string-scalar</td>
<td>Encrypted password for internal database-user authentication. Encrypt passwords only when entering them using the command-line. Passwords must be encrypted using the VCS Encrypt utility, described on “Encrypting Passwords” on page 60.</td>
</tr>
<tr>
<td>Table</td>
<td>string-scalar</td>
<td>Table for update by User/Pword.</td>
</tr>
<tr>
<td>Encoding</td>
<td>string-scalar</td>
<td>Specifies operating system encoding that corresponds to Oracle encoding for the displayed Oracle output. For example, if Oracle output is in “JAPANESE_JAPAN.JA16EUC,” then &quot;eucJP&quot; is the Solaris value for Encoding. Refer to Oracle and Solaris documentation for respective encoding values. The default is “”.</td>
</tr>
<tr>
<td>AgentDebug</td>
<td>boolean-scalar</td>
<td>Additional debug messages are logged when this flag is set. Default = 0</td>
</tr>
<tr>
<td>ContainerName</td>
<td>string-scalar</td>
<td>Specifies the name of the zone where the Oracle instance to be monitored is running.</td>
</tr>
</tbody>
</table>
Netlsnr Resource Type

type Netlsnr {
    static str ContainerType = Zone
    static keylist SupportedActions = { VRTS_GetInstanceName, VRTS_GetRunningServices }
    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
    str ContainerName
}

Attribute Definitions

<table>
<thead>
<tr>
<th>Required Attributes</th>
<th>Type and Dimension</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>string-scalar</td>
<td>Oracle user, as the defined owner of executables and database files in /etc/passwd.</td>
</tr>
<tr>
<td>Home</td>
<td>string-scalar</td>
<td>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.</td>
</tr>
<tr>
<td>TnsAdmin</td>
<td>string-scalar</td>
<td>The $TNS_ADMIN path to directory in which the Listener configuration file resides (listener.ora). The default is /var/opt/oracle.</td>
</tr>
<tr>
<td>Listener</td>
<td>string-scalar</td>
<td>Name of Listener. The default is LISTENER. The name for Listener is considered case-insensitive by the Netlsnr agent and the Oracle database server.</td>
</tr>
</tbody>
</table>
### Netlsnr Resource Type

<table>
<thead>
<tr>
<th>Required Attributes</th>
<th>Type and Dimension</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>LsnrPwd</td>
<td>string-scalar</td>
<td>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, described on “Encrypting Passwords” on page 60.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Optional Attributes</th>
<th>Type and Dimension</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ContainerType</td>
<td>string-scalar</td>
<td>Setting this attribute to “Zone” indicates that the Netlsnr agent monitors the listener process running in Solaris 10 zones. Leaving this attribute blank indicates it does not.</td>
</tr>
<tr>
<td>EnvFile</td>
<td>string-scalar</td>
<td>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 readable by Owner. The file must not contain any prompts for user input.</td>
</tr>
<tr>
<td>MonScript</td>
<td>string-scalar</td>
<td>Pathname to the script provided for detail monitoring. The default (basic monitoring) is to monitor the listener process only. The pathname to the supplied detail monitoring script is $VCS_HOME/bin/Netlsnr/LsnrTest.pl. MonScript also accepts a pathname relative to $VCS_HOME. A relative pathname should start with &quot;/&quot;, as in the path ./bin/Netlsnr/LsnrTest.pl.</td>
</tr>
<tr>
<td>Encoding</td>
<td>string-scalar</td>
<td>Specifies operating system encoding that corresponds to Oracle encoding for the displayed Oracle output. For example, if Oracle output is in “JAPANESE_JAPAN JA16EUC,” then “eucJP” is the Solaris value for Encoding. Refer to Oracle and Solaris documentation for respective encoding values. The default is “”.</td>
</tr>
<tr>
<td>AgentDebug</td>
<td>boolean</td>
<td>Additional debug messages are logged when this flag is set. Default = 0</td>
</tr>
</tbody>
</table>
### Netlsnr Resource Type

<table>
<thead>
<tr>
<th>Optional Attributes</th>
<th>Type and Dimension</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ContainerName</td>
<td>string-scalar</td>
<td>Specifies the name of the zone where the listener process to be monitored is running.</td>
</tr>
</tbody>
</table>

**Note** Detail Monitoring is disabled if the value of the attribute MonScript is invalid or is set to an empty string.
Netlnsr Resource Type
Sample Configurations

This appendix describes typical service groups configured to monitor the state of Oracle in a VCS cluster. 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.

The appendix describes the following configurations

◆ “Single Oracle Instance Configuration” on page 84
◆ “Multiple Oracle Instances (Single Listener) Configuration” on page 90
◆ “Multiple Instance (Multiple Listeners) Configuration” on page 100
◆ “Oracle Configuration With Shared Server Support” on page 105
Single Oracle Instance Configuration

The following example describes a typical service group configured to monitor the state of an Oracle instance in a VCS cluster. For Oracle instances configured in Solaris zones, see “Oracle Instance Configured in Solaris Zones” on page 87.

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 Configuration

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

cluster vcs {
}

system vcssun48 {
}
```
system vcssun49 {
}

group ORA_PROD_Group {
  SystemList = { vcssun48 = 0, vcssun49 = 1 }
  AutoStartList = { vcssun48 }
}

DiskGroup DG_oraprod {
  DiskGroup = ora_prod_dg
  StartVolumes = 0
  StopVolumes = 0
}

IP IP_oraprod {
  Device = hme0
  Address = "10.212.102.13"
}

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 = hme0
}

Netlsnr LSNR_oraprod_lsnr {
  Owner = oraprod
  Home = "/prod/u01/oracle/product/8.1.5"
  TnsAdmin = "/prod/u01/oracle/network/admin"
  Listener = LISTENER_PROD
  MonScript = "./bin/Netlsnr/LsnrTest.pl"
}
Single Oracle Instance Configuration

Oracle ORA_oraprod {
  Sid = PROD
  Owner = oraprod
  Home = "/prod/u01/oracle/product/8.1.5"
  Pfile = "/prod/u01/oracle/admin/pfile/initPROD.ora"
  EnvFile = "/tmp/env.sh"
  DetailMonitor = 1
  MonScript = "./bin/Oracle/SqlTest.pl"
  User = thor
  Pword = hv1TptWvj
  Table = thor
}

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 DQ_oraprod
Vol_oraprod_vol2 requires DQ_oraprod
Oracle Instance Configured in Solaris Zones

The following examples describe a typical service group configured to monitor the state of an Oracle instance configured in a Solaris zone.

Zone Root on Local Disk

If the root file system of a zone is on the local disk of each node, the file system is mounted when the system is booted. Hence, the service group does not need to have separate DiskGroup and Volume resources for the zone.

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 Solaris zone is monitored through a zone resource, which is dependent on the Mount and NIC resources. 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 Configuration

A resource of type Zone may be configured as follows in the main.cf:

```plaintext
Zone ORA_zone {
    ZoneName = z-ora
}
```

Along with this resource addition, the service group configuration would also change to have the NIC and Mount resources to depend on the Zone resource.

Zone Root on Shared Disk

If the root file system of a zone is on a shared disk, the file system should be mounted by VCS. Hence, separate DiskGroup and Volume resources are required for the zone.

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 Solaris zone is monitored through a zone resource, which is dependent on the Mount and NIC resources. 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 Configuration

A resource of type Zone may be configured as follows in the main.cf:

```
Zone ORA_zone {
    ZoneName = z-ora
}
```

Along with this resource addition, the service group configuration would also change to have the NIC and Mount resources to depend on the Zone resource.
Multiple Oracle Instances (Single Listener) Configuration

The following example 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. For Oracle instances configured in Solaris zones, see “Oracle Instances Configured In Solaris Zones” on page 95.

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

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.
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.

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 Configuration**

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

cluster vcs {
}

system vcssun48 {
}

system vcssun49 {
```
Multiple Oracle Instances (Single Listener) Configuration

```plaintext
group ORA_MKTG_Group {
    SystemList = { vcssun48 = 0, vcssun49 = 1 }
    AutoStartList = { vcssun48 }
}

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/u01/oracle/product/8.1.5"
    Pfile = "/orahome/u01/oracle/admin/pfile/initMKTG.ora"
    EnvFile = "/tmp/env.sh"
    DetailMonitor = 1
    MonScript = "/bin/Oracle/SqlTest.pl"
    User = thor
    Pword = hv1TptWvj
    Table = thor
}

Volume Vol_oramktg_vol1 {
    Volume = u01-vol
    DiskGroup = ora_mktg_dg
}

Volume Vol_oramktg_vol2 {
    Volume = u02-vol
    DiskGroup = ora_mktg_dg
}
```

Multiple Oracle Instances (Single Listener) Configuration

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 = { vcssun48 = 0, vcssun49 = 1 }  
  AutoStartList = { vcssun48 }  
}

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/u01/oracle/product/8.1.5"
  Pfile = "/orahome/u01/oracle/admin/pfile/initPROD.ora"
  EnvFile = "/tmp/env.sh"
  DetailMonitor = 1
  MonScript = "/usr/bin/Oracle/SqlTest.pl"
  User = thor
  Pword = hvlTptWvj
  Table = thor
}
Multiple Oracle Instances (Single Listener) Configuration

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 = { vcssun48 = 0, vcssun49 = 1 }
  AutoStartList = { vcssun48 }
}

DiskGroup DG_orabin {
  DiskGroup = ora_bin_dg
  StartVolumes = 0
  StopVolumes = 0
}

IP IP_oraprod {
  Device = hme0
  Address = "10.212.102.13"
}

Mount Mount_orabin {
  MountPoint = "/orahome/u01"
  BlockDevice = "/dev/vx/dsk/ora_bin_dg/u01-vol"
  FSType = vxfs
  FsckOpt = "-n"
}

NIC NIC_Public1 {
  Device = hme0
}
Multiple Oracle Instances (Single Listener) Configuration

Netlsnr LSNR_oracle (  
Owner = oracle  
Home = "*/orahome/u01/oracle/product/8.1.5*"  
TnsAdmin = "*/orahome/u01/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

Oracle Instances Configured In Solaris Zones

The following examples describe a typical service group configured to monitor the state of a multiple Oracle instance configured in a Solaris zone.

The Oracle service groups are made dependent on the Listener service group using an Online Local Firm dependency.
Multiple Oracle Instances (Single Listener) Configuration

**Zone Root on Local Disk**

If the root file system of a zone is on the local disk of each node, the file system is mounted when the system is booted. Hence, the service group does not need to have separate DiskGroup and Volume resources for the zone.

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. The Solaris zone is monitored through a zone resource, which is dependent on the Mount and NIC resources.

![Diagram of Zone Root on Local Disk](image)

In the Listener service group, the Listener resource is dependent on the zone resource. The Listener can be started after the zone resource is brought online.

![Diagram of Listener Service Group](image)

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 Configuration**

A resource of type Zone may be configured as follows in the main.cf:

```plaintext
Zone ORA_zone {
    ZoneName = z-ora
}
```

Along with this resource addition, the service group configuration would also change to have the NIC and Mount resources to depend on the Zone resource.
**Zone Root on Shared Disk**

If the root file system of a zone is on a shared disk, the file system should be mounted by VCS. Hence, separate DiskGroup and Volume resources are required for the zone.

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. The Solaris zone is monitored through a zone resource, which is dependent on the Mount and NIC resources.

In the Listener service group, the Listener resource is dependent on the zone resource. The Listener can be started after the zone resource is brought online.

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 Configuration**

A resource of type Zone may be configured as follows in the main.cf:

```plaintext
Zone ORA_zone {
    ZoneName = z-ora
}
```

Along with this resource addition, the service group configuration would also change to have the NIC and Mount resources to depend on the Zone resource.
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 those described in the “Single Oracle Instance Configuration” on page 84.

Sample Configuration File

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

cluster vcs {
}

system vcssun48 {
}

system vcssun49 {
}

group ORA_MKTG_Group {
    SystemList = { vcssun48 = 0, vcssun49 = 1 }
    AutoStartList = { vcssun48 }
}

DiskGroup DG_oramktg {
    DiskGroup = ora_mktg_dg
    StartVolumes = 0
    StopVolumes = 0
}

IP IP_oramktg {
    Device = hme0
    Address = "10.212.102.14"
}

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"
    Listener = LISTENER_MKTG
    MonScript = "./bin/Netlsnr/LsnrTest.pl"
}

Oracle ORA_oramktg {
    Sid = MKTG
    Owner = oramktg
    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 = hv1TptWvj
    Table = thor
}

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
}
Multiple Instance (Multiple Listeners) Configuration

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 = { vcssun48 = 0, vcssun49 = 1 }
  AutoStartList = { vcssun48 }
}

DiskGroup DG_oraprod {
  DiskGroup = ora_prod_dg
  StartVolumes = 0
  StopVolumes = 0
}

IP IP_oraprod {
  Device = hme0
  Address = "10.212.102.13"
}

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"
}
Multiple Instance (Multiple Listeners) Configuration

Netlsnr LSNR_oraprod_lsnr (
    Owner = oraprod
    Home = "/prod/u01/oracle/product/8.1.5"
    TnsAdmin = "/prod/u01/oracle/network/admin"
    Listener = LISTENER_PROD
    MonScript = "/bin/Netlsnr/LsnrTest.pl"
)

Oracle ORA_oraprod (
    Sid = PROD
    Owner = oraprod
    Home = "/prod/u01/oracle/product/8.1.5"
    Pfile = "/prod/u01/oracle/admin/pfile/initPROD.ora"
    EnvFile = "/tmp/env.sh"
    DetailMonitor = 1
    MonScript = "/bin/Oracle/SqlTest.pl"
    User = thor
    Pword = hv1TptWvj
    Table = thor
)

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
Multiple Instance (Multiple Listeners) Configuration

```plaintext
group Parallel_Service {
    SystemList = { vcssun48 = 0, vcssun49 = 1 }
    Parallel = 1
    AutoStartList = { vcssun48, vcssun49 }
}

NIC NIC_Public1 {
    Device = hme0
}
```
Oracle Configuration With Shared Server Support

The following example describes a typical service group configured to monitor Oracle with shared server support. For Oracle instances configured in Solaris zones, see “Oracle Instance Configured in Solaris Zones” on page 108.

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 Configuration File

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

cluster vcs {
}

system vcssun48 {
}
```
Oracle Configuration With Shared Server Support

```
system vcssun49 {
}

group ORA_PROD_Group {
    SystemList = { vcssun48 = 0, vcssun49 = 1 }
    AutoStartList = { vcssun48 }
}

DiskGroup DG_oraprod {
    DiskGroup = ora_prod_dg
    StartVolumes = 0
    StopVolumes = 0
}

IP IP_oraprod {
    Device = hme0
    Address = "10.212.102.13"
}

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 = hme0
}

Netlsnr LSNR_oraprod_lsnr {
    Owner = oraprod
    Home = "/prod/u01/oracle/product/8.1.5"
    TnsAdmin = "/prod/u01/oracle/network/admin"
    Listener = LISTENER_PROD
    MonScript = "/bin/Netlsnr/LsnrTest.pl"
}

Oracle ORA_oraprod {
```
Sid = PROD
Owner = oraprod
Home = "/prod/u01/oracle/product/8.1.5"
Pfile = "/prod/u01/oracle/admin/pfile/initPROD.ora"
EnvFile = "/tmp/env.sh"
DetailMonitor = 1
MonScript = "./bin/Oracle/SqlTest.pl"
User = thor
Pword = hvlTptWvj
Table = thor

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
Oracle Instance Configured in Solaris Zones

The following examples describe a typical service group configured to monitor Oracle with shared server support configured in a Solaris zone.

Zone Root on Local Disk

If the root file system of a zone is on the local disk of each node, the file system is mounted when the system is booted. Hence, the service group does not need to have separate DiskGroup and Volume resources for the zone.

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 Solaris zone is monitored through a zone resource, which is dependent on the Mount and NIC resources. 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 Configuration

A resource of type Zone may be configured as follows in the main.cf:

```
Zone ORA_zone {
```
ZoneName = z-ora
)

Along with this resource addition, the service group configuration would also change to have the NIC and Mount resources to depend on the Zone resource.

**Zone Root on Shared Disk**

If the root file system of a zone is on a shared disk, the file system should be mounted by VCS. Hence, separate DiskGroup and Volume resources are required for the zone.

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 Solaris zone is monitored through a zone resource, which is dependent on the Mount and NIC resources. 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 Configuration**

A resource of type Zone may be configured as follows in the main.cf:

```plaintext
Zone ORA_zone {
    ZoneName = z-ora
}
```
Along with this resource addition, the service group configuration would also change to have the NIC and Mount resources to depend on the Zone resource.
Best Practices for Multiple Oracle Instance Configurations

This appendix lists some Best Practices for VCS 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 several 8.1.x instances and just one listener, set up a parallel service group.
◆ If your configuration has different versions of Oracle, create a separate $ORACLE_HOME for each Oracle version.
◆ Follow the Optimal Flexible Architecture (OFA) standard (/uxx/<SID>). In cluster configurations, you could adapt the standard to make it more application-specific. For example, /app/uxx/<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.
◆ If you create a single user named oracle and define the variables required by Oracle, you must redefine at minimum the $ORACLE_HOME and $ORACLE_SID variables every time you want to invoke `svrmgrl`.

◆ The pfiles must be co-ordinated between systems. For the same instance of a database, ensure that the pfiles referenced are identical across the nodes.
Using the SPFILE in an Oracle Cluster

Oracle versions prior to Oracle9i used an initialization file initSID.ora, a text file, to start database instances. Changes 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 UNIX 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 Oracle enterprise agent, 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** VERITAS recommends that the SPFILE be located on shared storage, preferably at the same location as that of the database control files.

**Specifying the SPFILE Location in the PFILE**

To specify the location of the SPFILE in a PFILE, create 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/spfileora1.ora
```

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

```
startup pfile=location_of_pfile
```

**Creating 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 commands creates an SPFILE at the default location (`$ORACLE_HOME/dbs` on UNIX).
# Index

## Symbols
- `$ORACLE_HOME`
  - limitation for 16
  - location 14
  - on local disk 14
  - on shared disk 14

## A
- Agent operations
  - Netlsnr agent 3
  - Oracle agent 2
- Attribute definitions
  - Netlsnr agent 79
  - Oracle agent 76
- Attributes
  - editing 57
  - modifying 57

## C
- Cluster Manager 55
- Configuration
  - modifying 68
  - typical setup 11
- Configuration files 83
- Configuration wizard 44
- Core files, location of 15
- cssd daemon 24
- cssd daemon, disabling
  - on Solaris 10 24
  - on Solaris 9 and below 24

## D
- Database tablespaces 15
- Detail Monitoring
  - about 61
  - disabling for Netlsnr 64
  - disabling for Oracle 64
  - enabling for Netlsnr 64
  - enabling for Oracle 64
  - setting up 61

## E
- Editing attributes 57
- Encrypting passwords 60
- Enterprise agent
  - about 1
  - configuring using Cluster Manager 55
  - configuring using command-line 58
  - configuring using wizard 44
  - disabling 67
  - error messages 69
  - installing 31
  - modifying configuration 68
  - removing 68
  - troubleshooting 69
  - typical setup 11
  - upgrading 34
- Error messages 69

## F
- Failover 10

## H
- Hot backup 16

## M
- Message log 69
- Monitoring options 10

## N
- Netlsnr agent
  - attribute definitions 79
  - operations 3
  - resource type 79
- Netlsnr agent attributes
  - AgentDebug 80
  - ContainerName 81
  - Encoding 80
  - EnvFile 80
  - Home 79
  - Listener 79
Oracle configuration
  multiple instances (multiple listeners) 40
  multiple instances (single listener) 90
  single instance 84
Oracle database, hot backup 16

Passwords, encrypting 60

Removing agent 65
Resource attributes, editing 57
Resource type
  Netlsnr 79
  Oracle 75

Sample configuration files 83
Sample Oracle Configuration 11
Service group
  bringing online 65
  switching 66
  taking offline 66
Shutdown options 5
Solaris 10 zones 9
SPFILE
  creating 114
  location of 114
  using in VCS 113
Startup options 4
Switching service group 66

Technical assistance ix
Troubleshooting 69

vcsencrypt utility 60

Wizard 44

Zones, with Solaris 10 9