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Oracle9i Real Application Clusters Real Application Clusters Guard I Configuration Guide
Release 2 (9.2.0.1.0) for UNIX Systems: AIX-Based Systems, Compaq Tru64 UNIX, HP 9000
Series HP-UX, and Sun Solaris
Part No. A95979-02

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- Did you find any errors?
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  Redwood Shores, CA 94065
  USA

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If you have problems with the software, please contact your local Oracle Support Services representa-
tive.
Preface

This guide describes how to configure Oracle9i Real Application Clusters Real Application Clusters Guard.

Audience

This guide is intended for database administrators or system administrators configuring Oracle9i Real Application Clusters Guard.
How This Guide Is Organized

This guide contains the following chapters and appendices:

- **Chapter 1, "Pre-installation"**
  This chapter describes the pre-installation tasks required for Oracle9i Real Application Clusters Guard.

- **Chapter 2, "Configuration Tasks"**
  This chapter describes how to install and configure Oracle9i Real Application Clusters Guard.

- **Chapter 3, "Post-Installation Tasks"**
  This chapter describes how to start Oracle9i Real Application Clusters Guard.

- **Chapter 4, "Upgrading to Oracle9i Real Application Clusters Guard I"**
  This chapter describes how to upgrade to Oracle9i Real Application Clusters Guard.

- **Appendix A, "Optimal Flexible Architecture"**
  This appendix provides information on the Oracle9i Real Application Clusters Guard directory structure.

- **Appendix B, "Configuration Files"**
  This appendix describes the Oracle9i Real Application Clusters Guard Packs configuration template files.
Typographic Conventions

The following table describes the typographic conventions used in this guide:

<table>
<thead>
<tr>
<th>Convention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>monospace</td>
<td>Monospace type indicates UNIX commands, directory names, usernames, path names, and filenames.</td>
</tr>
<tr>
<td>brackets [ ]</td>
<td>Words enclosed in brackets indicate key names (for example, Press [Return]). Note that brackets have a different meaning when used in command syntax.</td>
</tr>
<tr>
<td>italics</td>
<td>Italic type indicates a variable, including variable portions of filenames. It is also used for emphasis.</td>
</tr>
<tr>
<td>UPPERCASE</td>
<td>Uppercase letters indicate Structured Query Language (SQL) reserved words, initialization parameters, and environment variables.</td>
</tr>
</tbody>
</table>

Command Syntax

UNIX command syntax appears in monospace font and assumes the use of the Bourne shell. The "$" character at the beginning of UNIX command examples is the default UNIX command prompt. Do not enter it as part of the command.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>backslash \</td>
<td>A backslash indicates a command that is too long to fit on a single line. Enter the line as printed (with a backslash) or enter it as a single line without a backslash: <code>dd if=/dev/rdsk/c0t1d0s6 of=/dev/rst0 bs=10b \ count=10000</code></td>
</tr>
<tr>
<td>braces [ ]</td>
<td>Braces indicate required items: <code>.DEFINE {macro1}</code></td>
</tr>
<tr>
<td>brackets [ ]</td>
<td>brackets [ ]</td>
</tr>
<tr>
<td>brackets [ ]</td>
<td>Ellipses indicate an arbitrary number of similar items: <code>CHKVAL fieldname value1 value2 ... valueN</code></td>
</tr>
<tr>
<td>italics</td>
<td>Italic type indicates a variable. Substitute a value for the variable: <code>library_name</code></td>
</tr>
<tr>
<td>vertical line</td>
<td>A vertical line indicates a choice within braces or brackets: `SIZE filesize [K</td>
</tr>
</tbody>
</table>
Related Documentation

Refer to the following guides for more information about Oracle9i Real Application Clusters Guard:

- Oracle9i Real Application Clusters Concepts
- Oracle9i Real Application Clusters Guard Concepts and Administration Guide

Refer to the Oracle9i Installation Guide for UNIX Systems for information on installing Oracle9i Real Application Clusters.

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This chapter describes the pre-installation and configuration tasks required for Oracle9i Real Application Clusters Guard. It contains the following sections:

- Installation Overview
- System Installation Requirements
- Setting the Environment
Installation Overview

To install Oracle9i Real Application Clusters Guard, perform the following tasks:

1. **Check the prerequisites**: Ensure that the system meets the hardware, software, memory, and disk space requirements for Oracle9i Real Application Clusters Guard.
   
   **See Also**: See “System Installation Requirements” on page 1-3 for information about requirements.

2. **Set up the UNIX environment**: Ensure that the UNIX environment is set up correctly for Oracle9i Real Application Clusters Guard.
   
   **See Also**: See “Setting the Environment” on page 1-9 for information about setting up the UNIX environment.

3. **Set up the Oracle environment**: Ensure that a two-node cluster has been created and configured.
   
   **See Also**: See “Setting the Environment” on page 1-9 for information on setting up the Oracle environment.

4. **Configure Oracle9i Real Application Clusters Guard**: Use the provided setup utility (PFSSETUP) to configure Oracle9i Real Application Clusters Guard.
   
   **See Also**: See Chapter 2, “Configuration Tasks” for information about configuring Oracle9i Real Application Clusters Guard.

5. **Perform post-installation tasks**: Start Oracle9i Real Application Clusters Guard and ensure that it is correctly installed and configured.
   
   **See Also**: See Chapter 3, “Post-Installation Tasks” for information about post-installation tasks.
System Installation Requirements

Verify that the system meets the requirements described in the following sections before installing Oracle9i Real Application Clusters Guard:

- Restrictions
- Operating System Components
- Oracle Product Requirements
- Network Requirements

Restrictions

The following restrictions apply to Oracle9i Real Application Clusters Guard:

- Oracle9i Real Application Clusters Guard uses the physical host name, that is the output of the `hostname` command, interchangeably with cluster node names. Therefore, make sure that the cluster node name is the same as host name.

- Oracle9i Real Application Cluster Guard does not allow the host name (node name) to have any special characters such as hyphens, dashes, dots and so on. This also implies that the host name (node name) cannot have the domain name included in it. Make sure that the host name (node name) does not include any of the following characters:

  `/\:*<>|*%#!/@~!^&-()_`'`[]{};=,,`

- Oracle9i Real Application Cluster Guard is supported only on 2 cluster nodes.

- The Oracle9i Real Application Clusters database must be running in Primary/Secondary configuration.

**Note:** For information on how to run Oracle9i Real Application Clusters in Primary/Secondary configuration, refer to *Oracle9i Real Application Clusters Concepts*.

Operating System Components

The operating system dependent layer provides the services required for proper operation of Oracle9i Real Application Clusters. Oracle9i Real Application Clusters Guard also requires these components, but might require different versions from the...
Oracle 9i Real Application Clusters software. Table 1–1 shows the operating system software components required for Oracle 9i Real Application Clusters Guard.

**Table 1–1  Operating System Software Components**

<table>
<thead>
<tr>
<th>Software</th>
<th>Platform</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>Solaris</td>
<td>Solaris 8</td>
</tr>
<tr>
<td></td>
<td>HP</td>
<td>HP-UX 11.0</td>
</tr>
<tr>
<td></td>
<td>Tru64</td>
<td>Compaq Tru64 UNIX, Version 5.1</td>
</tr>
<tr>
<td></td>
<td>AIX</td>
<td>AIX Version 4.3.3 or higher</td>
</tr>
<tr>
<td>Operating System Patches</td>
<td>All</td>
<td>For information on Operating System patch requirements, refer to the <em>Oracle 9i Installation Guide for UNIX</em>, and the Oracle 9i Release Notes for your platform. For Solaris: If Sun Solaris patch update 5 or 6 is installed, then SUN patch 110662-06 is required. Starting with Sun Solaris patch update 7, this patch will no longer be required because the fix will be included with this release. Patch 110662-06: Starting with Sun Solaris patch 110662-03, a fix for KSH was introduced that made KSH UNIX98 compatible in its arithmetic constant handling (Sun bugid: 4286837). Since this fix causes incompatibilities for exiting scripts, a patch is available to back out the change (Sun bugid: 4473696). Obtain patch 110662-06 to fix this problem. For further information, please contact Sun support.</td>
</tr>
<tr>
<td>Cluster</td>
<td>Solaris</td>
<td>Sun Enterprise Cluster 3.0, Veritas Volume Manager Version 3.0.4</td>
</tr>
<tr>
<td></td>
<td>HP</td>
<td>MC/ServiceGuard 11.13 OPS Edition with patch PHSS_22876 or later</td>
</tr>
<tr>
<td></td>
<td>Tru64</td>
<td>Compaq TruCluster Software 5.1, with patches GB_G01313 and GB_G01314</td>
</tr>
<tr>
<td></td>
<td>AIX</td>
<td>HACMP/ES Version 4.4, or higher</td>
</tr>
</tbody>
</table>
Table 1–2 lists the commands required to determine the operating system patches for each platform.

**Table 1–2 Commands to Use to Determine Operating System Patches**

<table>
<thead>
<tr>
<th>Platform</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solaris</td>
<td>To determine which operating system patches are installed, enter the following command: &lt;br&gt; $ showrev -p</td>
</tr>
<tr>
<td>HP</td>
<td>To determine which operating system patches are installed, enter the following command: &lt;br&gt; $ swlist -l product</td>
</tr>
</tbody>
</table>
| Tru64    | To determine which operating system patches are installed, enter the following command: <br> $ dupatch  
 or  
 $ setld -i | more |
System Installation Requirements

Table 1–2  Commands to Use to Determine Operating System Patches

<table>
<thead>
<tr>
<th>Platform</th>
<th>Command</th>
</tr>
</thead>
</table>
| AIX      | To determine which operating system patches are installed, enter the following command:  
$ instfix -a  
To determine whether a specific patch is installed, enter the following command:  
$ instefix -ivk APAR_number  
To determine which operating system filesets are installed, enter the following command:  
$ lslpp -l  
To determine is a specific operating system fileset is installed, enter the following command:  
$ lslpp -l [fileset_name] |

Oracle Product Requirements

Table 1–3 lists the products that must be installed and running before you install Oracle9i Real Application Clusters Guard.

Table 1–3  Oracle Product Requirements for Oracle9i Real Application Clusters Guard

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle9i Enterprise Edition, Release 2 (9.2.x)</td>
<td>Provides the applications and files required to manage a database. All other Oracle9i Real Application Clusters components are installed on top of Oracle9i Enterprise Edition.</td>
</tr>
<tr>
<td>Oracle9i Real Application Clusters, 9.2.x</td>
<td>Provides the necessary Oracle9i Real Application Clusters services, scripts, initialization file, and data files.</td>
</tr>
<tr>
<td>Oracle Net, Release 2 (9.2.x)</td>
<td>Provides the networking software required for communicating between Oracle Servers. This software must be installed on both nodes.</td>
</tr>
<tr>
<td>SQL*Plus, Release 2 (9.2.x)</td>
<td>Oracle software required for accessing a database.</td>
</tr>
</tbody>
</table>

Note: The Oracle9i Real Application Clusters Guard files are installed as part of the Oracle9i Real Application Clusters installation. To install the Oracle9i Real Application Clusters Guard files, choose the Oracle9i Real Application Clusters option.
Network Requirements

You must pre-allocate two relocatable IP addresses, one for each Real Application Clusters Guard Pack, for use by client connections. These relocatable IP addresses are used as logical hosts, and Oracle9i Real Application Clusters Guard configures the availability of the relocatable IP address as required. For information on setting up relocatable IP addresses, refer to your system documentation.

Use the following parameters to specify the relocatable IP address in the Oracle9i Real Application Clusters Guard setup configuration file:

- PFS_IP_PACK_HOSTA
- PFS_IP_PACK_HOSTB

After you run the PFSSETUP utility, as described in Chapter 2, these relocatable IP addresses are associated with the public network adapter. If the Oracle9i Real Application Clusters Guard Pack is moved to another node, these relocatable IP addresses are also moved.

**Note:** The relocatable IP addresses specified using the PFS_IP_PACK_HOSTA and PFS_IP_PACK_HOSTB parameters must each have an entry in the /etc/hosts file.

For Sun Cluster 3.0, specify the public network adapter using the PFS_NET_IF_A and PFS_NET_IF_B configuration parameters. The public network adapter must already be part of a Network Adapter Failover (NAFO) group. Before installing Real Application Clusters Guard, create a NAFO group to host the relocatable IP address for a Real Application Clusters Guard Pack. Refer to the Sun Cluster 3.0 Installation Guide for more information on NAFO groups.

**See Also:** See Chapter 2 and the Oracle9i Real Application Clusters Guard Concepts and Administration Guide for more information on configuring the network.
System Installation Requirements

Implementation

Please note the following:

- On Sun Solaris, each Real Application Clusters Guard Pack is implemented as a resource group. For information on resource groups, refer to the Sun Cluster 3.0 documentation.

- For HP 9000 Series HP-UX systems, each Real Application Clusters Guard Pack is implemented as a package. For more information on packages, refer to Configuring OPS Clusters with Service Guard OPS Edition.

- For Compaq tru64 systems, each Real Application Clusters Guard Pack is implemented as a Application Resource. For more information on Application Resources, refer to Cluster High Available Applications and Cluster Administration.

- For IBM AIX HACM systems, each Real Application Clusters Guard Pack is implemented as a Application Monitor, refer to the IBM RedBook Exploring HACMP 4.4:Enhancing the capabilities of Cluster Multi-Processing.
Setting the Environment

This section describes how to set up the environment. It contains the following sections:

- Set Up Tasks to Perform as the root User
- Set Up Tasks to Perform as the oracle User

Set Up Tasks to Perform as the root User

As the root user, configure the system for Oracle9i Real Application Clusters Guard by setting the environment options described in Table 1–4.

<table>
<thead>
<tr>
<th>Environment Option</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIX group for oracle roles</td>
<td>A UNIX group is required for the OSDBA role. Ensure that you have an OSDBA group defined in the /etc/group file on all nodes of the cluster.</td>
</tr>
<tr>
<td>UNIX accounts</td>
<td>A UNIX account that is dedicated to installing and running Oracle9i Real Application Clusters Guard is needed. The account must be a member of the</td>
</tr>
<tr>
<td>Login shell</td>
<td>SYSDBA group. Create the UNIX account on all nodes of the cluster. This guide assumes the account is called oracle.</td>
</tr>
<tr>
<td>Login shell</td>
<td>The Korn shell must be the default shell for the oracle and root account that runs Oracle9i Real Application Clusters Guard. The Korn shell is</td>
</tr>
<tr>
<td>Login shell</td>
<td>the only shell supported with this release of Oracle9i Real Application Clusters Guard. To use the Korn shell: /bin/ksh</td>
</tr>
</tbody>
</table>
Set Up Tasks to Perform as the oracle User

Log in to the oracle account and perform the following tasks, if required:

1. Set environment variables.

   Table 1–5 lists required and optional environment variables to use for Oracle9i Real Application Clusters Guard.
### Table 1–5  Environment Variables

<table>
<thead>
<tr>
<th>Environment Variable</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB_NAME</td>
<td>Required</td>
<td>Specifies the value of the initialization parameter DB_NAME entered during the Oracle installation process or during database creation.</td>
</tr>
</tbody>
</table>
| ORACLE_BASE          | Optional    | Specifies the directory at the top of the Oracle software and administrative file structure. Not required, but recommended as part of an OFA-compliant configuration.  
Note: Do not set the ORACLE_BASE variable if you are not using an OFA-compliant configuration. |
| ORACLE_HOME          | Required    | Specifies the directory containing the Oracle software for a particular release. Ensure that the ORACLE_HOME environment variable specifies a directory that does not already contain any Oracle software. |
| ORACLE_SID           | Required    | Specifies the system identifier, or SID, for the Oracle Server instance. Because the SID is incorporated into many filenames, Oracle Corporation recommends restricting it to no more than four characters, to avoid filename problems on different systems. The SID for each instance in a Real Application Cluster database must be unique and should incorporate the name of the database it uses. |
| ORACLE_SERVICE       | Required    | Specifies a unique identifier for the Oracle9i Real Application Clusters Guard environment. This value is used to identify each Oracle9i Real Application Clusters Guard environment. You can set this variable to the same value as the DB_NAME environment variable. Use the ORACLE_SERVICE environment variable to distinguish between Oracle9i Real Application Clusters Guard environments. |
Table 1–5 Environment Variables (Cont.)

<table>
<thead>
<tr>
<th>Environment Variable</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORA_NLS33</td>
<td>Optional</td>
<td>Specifies the location of the global technology character set data. Required if the *.nib files are not in the default location, which is $ORACLE_HOME/ocommon/nls/admin/data.</td>
</tr>
<tr>
<td>NLS_LANG</td>
<td>Optional</td>
<td>Required if you creating a database that uses a character set other than US7ASCII.</td>
</tr>
<tr>
<td>PATH</td>
<td>Required</td>
<td>Specifies the search path for shell executables:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>■ For Sun Solaris, include the following directories: $ORACLE_HOME/bin, /usr/ccs/bin, /usr/bin, /etc, and /usr/local/bin if it exists</td>
</tr>
<tr>
<td></td>
<td></td>
<td>■ For HP-UX, include the following directories: $ORACLE_HOME/bin, /usr/ccs/bin, /usr/bin, /etc, /usr/bin/X11, and /usr/local/bin if it exists</td>
</tr>
<tr>
<td></td>
<td></td>
<td>■ For Tru64, include the following directories: $ORACLE_HOME/bin, /usr/bin, /etc, /usr/bin/X11, and /usr/local/bin if it exists</td>
</tr>
<tr>
<td></td>
<td></td>
<td>■ For AIX, include the following directories: $ORACLE_HOME/bin, /usr/bin, /etc, /usr/sbin, /usr/bin/X11, and /usr/local/bin if it exists</td>
</tr>
</tbody>
</table>
2. Check for user equivalence of the oracle account by performing a remote login (rlogin) to each node in the cluster, including the local node. If you are prompted for a password, the oracle account does not have user equivalence. Ensure that you give the same attributes to all the nodes in the cluster.

3. Make sure that you have a two node Oracle9i Real Application Clusters database running and tuned with the Oracle products as listed in Table 1–3 installed. The alert log contains entries showing whether the Oracle9i Real Application Clusters software is running.

See Also: For more information on environment variables, refer to the Oracle9i Administrator’s Reference for UNIX Systems.

Note: Make sure that the Real Applications Clusters database is running and performing as expected in a Primary/Secondary configuration.

Make sure that the database is properly tuned for runtime performance as well as instance recovery.

Refer to the Oracle9i Real Application Clusters Guard Concepts and Administration Guide for more information on possible configurations.
This chapter describes how to install and configure Oracle9i Real Application Clusters Guard. It contains the following sections:

- Installing Oracle9i Real Application Clusters Guard
- Installing the Oracle9i Real Application Clusters Guard Files
- Setting Up the Configuration File
- Running the Setup Utility (PFSSETUP)
- Oracle Net Services Configuration
Installing Oracle9i Real Application Clusters Guard

The following sections describe how to complete a new Oracle9i Real Application Clusters Guard installation:

- Installing the Oracle9i Real Application Clusters Guard Files
- Setting Up the Configuration File
- Running the Setup Utility (PFSSETUP)

Installing the Oracle9i Real Application Clusters Guard Files

Oracle9i Real Application Clusters Guard is included with the Oracle9i Real Application Clusters software. Oracle Universal Installer automatically installs Oracle9i Real Application Clusters Guard when you choose to install Oracle9i Real Application Clusters software. For complete instructions on how to install Oracle9i Real Application Clusters, refer to the Oracle9i Real Application Clusters Installation and Configuration Guide.

See Appendix A for more information about Oracle9i Real Application Clusters Guard files and directories.

The following table describes the contents of the most important directories:

<table>
<thead>
<tr>
<th>Directory</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>admin</td>
<td>SQL scripts</td>
</tr>
<tr>
<td>bin</td>
<td>Oracle9i Real Application Clusters Guard executables and utilities</td>
</tr>
<tr>
<td>doc</td>
<td>README file</td>
</tr>
<tr>
<td>lib</td>
<td>Library files</td>
</tr>
<tr>
<td>msg</td>
<td>Binary and text messages</td>
</tr>
<tr>
<td>setup</td>
<td>Oracle9i Real Application setup executable and configuration files, templates, and sample files</td>
</tr>
<tr>
<td>sys</td>
<td>Oracle9i Real Application Clusters Guard internal files</td>
</tr>
</tbody>
</table>

Note: The Oracle9i Real Application Clusters Guard software directory should exist on all nodes of the cluster where Oracle9i Real Application Clusters Guard runs.
Setting Up the Configuration File

The information in the Oracle9i Real Application Clusters Guard configuration file corresponds to a single Oracle9i Real Application Clusters database. If you intend to use Oracle9i Real Application Clusters Guard with multiple databases, you must create a separate configuration file for each database. The parameters in the Oracle9i Real Application Clusters Guard configuration file are used to create the Oracle9i Real Application Clusters Guard Packs and environment.

The $ORACLE_HOME/pfs/setup/conf/savsetup.dat file contains a template for the Oracle9i Real Application Clusters Guard configuration file.

To create a separate configuration file:

1. Change to the $ORACLE_HOME/pfs/setup/conf directory:
   
   $ cd $ORACLE_HOME/pfs/setup/conf

2. Copy the savsetup.dat file to SALES.conf, where SALES is the value of the $ORACLE_SERVICE variable. For example:

   $ cp savsetup.dat SALES.conf

3. Use a text editor to modify the Oracle9i Real Application Clusters Guard configuration file. You must set all of the parameters in the configuration file, except ORACLE_BASE. Set ORACLE_BASE only if you are using Oracle Flexible Architecture (OFA). If you are not using Oracle Flexible Architecture (OFA), comment out the ORACLE_BASE entry.

   You can use the default values in the configuration file if those values are acceptable.

   The Oracle9i Real Application Clusters configuration file is divided into six sections. Each section has been categorized based on the Oracle9i Real Application Clusters Guard parameters contained in that section. If you need to modify an Oracle9i Real Application Clusters Guard parameter, modify it using the Oracle9i Real Application Clusters Guard Setup utility (PFSSETUP). Depending on the parameter, different files and areas of the Oracle9i Real Application Clusters Guard environment are affected. Each section heading in the configuration file identifies the requirements for changing the parameters in that section. For example, changing the ORACLE_SERVICE parameter affects all of the Oracle9i Real Application Clusters Guard files, and therefore all files must be regenerated and redeployed using the Oracle9i Real Application Clusters Guard Setup utility.
Running the Setup Utility (PFSSETUP)

This section describes how to configure Oracle9i Real Application Clusters Guard using the Oracle9i Real Application Clusters Guard PFSSETUP utility. The PFSSETUP utility uses the Oracle9i Real Application Clusters Guard configuration file as described in "Setting Up the Configuration File" on page 2-3. The PFSSETUP utility automatically searches for the ORACLE_SERVICE.conf file.

To run the PFSSETUP utility:

1. Set the ORACLE_SERVICE and DB_NAME environment variables.
   The ORACLE_SERVICE environment variable specifies the Oracle9i Real Application Clusters Guard identifier. This identifier differentiates one Oracle9i

---

See Also: For more information on the configuration files, refer to Appendix B, "Configuration Files".

Note: Do not delete any parameters from the configuration file. All of the parameters are required for Oracle9i Real Application Clusters Guard to run.

For a detailed description of the the parameters in the Oracle9i Real Application Clusters Guard installation configuration parameter file, refer to the Oracle9i Real Application Clusters Guard Concepts and Administration Guide.

Running the Setup Utility (PFSSETUP)

Note: The PFSSETUP utility deploys the Oracle9i Real Application Clusters Guard files on both cluster nodes.

The following example shows the output as displayed on the Sun SPARC Solaris platform.

This example illustrates an initial configuration of Oracle9i Real Application Clusters Guard. For detailed information and more examples of Oracle9i Real Application Clusters Guard configurations, refer to the Oracle9i Real Application Clusters Guard Concepts and Administration Guide.
Running the Setup Utility (PFSSETUP)

Real Application Clusters Guard environment from another, and identifies the correct Oracle9i Real Application Clusters Guard configuration file. For example:

```
$ export ORACLE_SERVICE=SALES
$ export DB_NAME=SALES
```

2. Change to the `$ORACLE_HOME/pfs/setup` directory and run the PFSSETUP utility:

```
$ cd $ORACLE_HOME/pfs/setup
$ ./pfssetup
```

The PFSSETUP utility version information is displayed:

PFS_SETUP for Solaris: Version 9.2.0.1.0 on Mon Mar 19 10:35:53 PST 2002
(c) Copyright 2002 Oracle Corporation. All rights reserved.

3. Confirm the ORACLE_SERVICE and DB_NAME settings when prompted:

```
ORACLE_SERVICE is set to SALES
DB_NAME is set to SALES
Do you wish to continue? [Y/N] Y
```

4. Enter Y to continue or N to exit the PFSSETUP utility.

5. Check the values of environment variables displayed.

The Oracle9i Real Application Clusters Guard Setup main menu appears:

Choose the set of files from the following:
1) User definitions file
2) ORACLE Real Application Clusters Guard files
3) ORACLE network files
4) ORACLE instance files
5) ORACLE network and instance files
6) All the files
7) Quit

PFS_SETUP>

Options 1 to 5 in the preceding menu set up only the files specified in the option. For example, if you choose option 3, then only the ORACLE network files are set up.
6. To create all of the Oracle9i Real Application Clusters Guard setup files, enter option 6 at the prompt.

The following menu appears:

Choose an operation on the selected files:
1] Generate only
2] Deploy only
3] Generate and deploy
4] Deinstall
5] List the affected files
6] Return to Main Menu

PFS_SETUP>

7. To generate and deploy the setup files, enter option 3 at the prompt.

The list of affected files appears:

**Note:** The list of affected files might differ for each platform. The following example shows the list for Sun SPARC Solaris. The following list is the least number of files for Sun SPARC Solaris.

The list of affected files is

PFS_SALES.RUN
PFS_SALES.HALT
PFS_SALES.MONSTART
PFS_SALES.MONSTOP
PFS_SALES_User.def
PFS_SALES_System.def
listener.ora.ded.pfs
tnsnames.ora.ded.pfs
tnsnames.ora.ded.clnt.pfs
SALES_config1.ded.pfs
SALES_config2.ded.pfs
SALES_config.pfs
init_SALES1_hosta.ora
init_SALES2_hostb.ora

Do you wish to continue? [Y/N]
Note: For HP 9000 Series HP-UX systems, the list of files generated also includes:

- PFS_SALES_hosta.sh
- PFS_SALES_hostb.sh
- PFS_SALES_hosta.conf
- PFS_SALES_hostb.conf

8. Enter Y to continue.

The PFSSETUP utility generates and deploys the files to each node in the cluster.

When this process is complete, the menu shown in step 5 reappears.

9. Enter 6 to return to the main menu.

10. Enter 7 to exit.

Note: Do not start the Oracle9i Real Application Clusters Guard packs until you have created the Oracle9i Real Application Clusters database. For more information, refer to Chapter 3, "Post-Installation Tasks".
Oracle Net Services Configuration

A description of how to configure the Oracle network is beyond the scope of this guide and is covered in detail in the Oracle Net Services Administrator’s Guide and in Oracle9i Real Application Clusters Concepts. However, to configure a minimal network before exploring the features of Oracle9i Real Application Clusters Guard, verify that multiple copies of the tnsnames.ora, sqlnet.ora, and listener.ora files do not exist.

The PFSSETUP utility creates the required Oracle Net Services configuration files for the Oracle9i Real Application Clusters Guard environment, based on the information entered in the Oracle9i Real Application Clusters Guard configuration file. During the deployment phase, the Oracle9i Real Application Clusters Guard setup utility automatically copies the generated Oracle Net Services files (tnsnames.ora and listener.ora) appended with a descriptive name and a .pfs extension, into the $TNS_ADMIN directory. The path for the $TNS_ADMIN directory is specified in the Oracle9i Real Application Clusters Guard configuration file. The default setting for the TNS_ADMIN environment variable is $ORACLE_HOME/network/admin.

To avoid interfering with a currently running Oracle9i Real Application Clusters environment, the PFSSETUP utility does not automatically replace or install newly generated network files. Before you can use Oracle9i Real Application Clusters Guard, you must append the files generated by the PFSSETUP utility to the current Oracle Net Services configuration files. See Chapter 3 for more information on using the Oracle9i Real Application Clusters Guard files.

The following Oracle Net Services files are generated by the PFSSETUP utility:

<table>
<thead>
<tr>
<th>File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>listener.ora.ded.pfs</td>
<td>Dedicated server (IS_MTS parameter is set to false) configuration file for the listeners that identifies the Oracle9i Real Application Clusters Guard listener name and the service it is listening for</td>
</tr>
<tr>
<td>listener.ora.mts.pfs</td>
<td>Shared server (IS_MTS parameter is set to true) configuration file for the listeners that identifies the Oracle9i Real Application Clusters Guard listener name and the service it is listening for</td>
</tr>
<tr>
<td>tnsnames.ora.ded.pfs</td>
<td>Dedicated server (IS_MTS parameter is set to false) configuration file that contains net service names mapped to connect descriptors</td>
</tr>
</tbody>
</table>
Dedicated Sessions

This section provides information on dedicated sessions.

Net Services for Server

During the Oracle9i Real Application Clusters Guard setup, a listener.ora.ded.pfs file for the server nodes is created in the $TNS_ADMIN directory if the TNS_ADMIN environment variable is defined, or in the $ORACLE_HOME/network/admin directory if the TNS_ADMIN environment variable is not defined.

The following examples show sample listener configurations generated by the PFSSETUP utility.

Example 2–1 Sample Listener Configuration for Primary and Secondary Nodes

```
SALES_hosta_LSNR=
(DESCRIPTION= (ADDRESS=(PROTOCOL=TCP)(HOST=192.10.1.21) (PORT=2024) (QUEUESIZE=1024)))
STARTUP_WAIT_TIME_SALES_hosta_LSNR=0
CONNECT_TIMEOUT_SALES_hosta_LSNR=10
#TRACE_LEVEL_SALES_hosta_LSNR=SUPPORT

SALES_hostb_LSNR=
(DESCRIPTION= (ADDRESS=(PROTOCOL=TCP)(HOST=192.10.1.22) (PORT=2024) (QUEUESIZE=1024)))
STARTUP_WAIT_TIME_SALES_hostb_LSNR=0
CONNECT_TIMEOUT_SALES_hostb_LSNR=10
#TRACE_LEVEL_SALES_hostb_LSNR=SUPPORT
```
Example 2–2  Sample Listener Configuration for OEM for Primary and Secondary Nodes

SID_LIST_SALES_hosta_PRIVLSNR=
  (SID_LIST=
   (SID_DESC=(ORACLE_HOME=/u01/app/oracle/SALES/92)
    (SID_NAME=SALES1)))

SALES_hosta_PRIVLSNR=
  (DESCRIPTION= (ADDRESS=(PROTOCOL=TCP) (HOST=192.10.1.51) (PORT=2024) (QUEUE_SIZE=1024)))
STARTUP_WAIT_TIME_SALES_hosta_PRIVLSNR=0
CONNECT_TIMEOUT_SALES_hosta_PRIVLSNR=10
#TRACE_LEVEL_SALES_hosta_PRIVLSNR=SUPPORT

SID_LIST_SALES_hostb_PRIVLSNR=
  (SID_LIST=
   (SID_DESC=(ORACLE_HOME=/u01/app/oracle/SALES/92)
    (SID_NAME=SALES2)))

SALES_hostb_PRIVLSNR=
  (DESCRIPTION= (ADDRESS=(PROTOCOL=TCP) (HOST=192.10.1.52) (PORT=2024) (QUEUE_SIZE=1024)))
STARTUP_WAIT_TIME_SALES_hostb_PRIVLSNR=0
CONNECT_TIMEOUT_SALES_hostb_PRIVLSNR=10
#TRACE_LEVEL_SALES_hostb_PRIVLSNR=SUPPORT

Net Services for Clients

During the Oracle9i Real Application Clusters Guard setup, a tnsnames.ora.ded.clnt.pfs file for the client is created in the $TNS_ADMIN directory if the TNS_ADMIN environment variable is defined, or in the $ORACLE_HOME/network/admin directory if the TNS_ADMIN environment variable is not defined.

The following examples show sample service aliases in the client tnsnames.ora.ded.clnt file generated by the PFSSETUP utility.

Example 2–3  Net Service Name for Connections to Primary Instance

SALES_DED=
  (DESCRIPTION=
    (LOAD_BALANCE=OFF)
    (ADDRESS_LIST=
      (ADDRESS=(PROTOCOL=TCP) (HOST=192.10.1.21) (PORT=2024)))
      (ADDRESS=(PROTOCOL=TCP) (HOST=192.10.1.22) (PORT=2024)))
Example 2–4  Net Service Name for TAF BASIC Connections to Primary Instance

SALES_DED_BASIC=
  (DESCRIPTION=
   (LOAD_BALANCE=OFF)
   (FAILOVER=ON)
   (ADDRESS_LIST=
    (ADDRESS=(PROTOCOL=TCP)(HOST=192.10.1.21)(PORT=2024))
    (ADDRESS=(PROTOCOL=TCP)(HOST=192.10.1.22)(PORT=2024)))
  (CONNECT_DATA=
   (SERVICE_NAME=SALES.oracle.com)
   (SERVER=DEDICATED)
   (INSTANCE_ROLE=PRIMARY)
   (FAILOVER_MODE=
    (BACKUP=SALES_DED_BASIC_BACKUP)
    (TYPE=SELECT)
    (METHOD=BASIC)
    (RETRIES=180)
    (DELAY=5))
)

SALES_DED_BASIC_BACKUP=
  (DESCRIPTION=
   (LOAD_BALANCE=OFF)
   (FAILOVER=ON)
   (ADDRESS_LIST=
    (ADDRESS=(PROTOCOL=TCP)(HOST=192.10.1.21)(PORT=2024))
    (ADDRESS=(PROTOCOL=TCP)(HOST=192.10.1.22)(PORT=2024)))
  (CONNECT_DATA=
   (SERVICE_NAME=SALES.oracle.com)
   (SERVER=DEDICATED)
   (INSTANCE_ROLE=PRIMARY)
   (FAILOVER_MODE=
    (BACKUP=SALES_DED_BASIC)
    (TYPE=SELECT)
    (METHOD=BASIC)
    (RETRIES=180)
    (DELAY=5))
)
Example 2–5  Net Service Name for Dedicated TAF PRECONNECT Connections

SALES_DED_PRE=
  (DESCRIPTION=
   (LOAD_BALANCE=OFF)
   (FAILOVER=ON)
   (ADDRESS_LIST=
     (ADDRESS=(PROTOCOL=TCP)(HOST=192.10.1.21)(PORT=2024))
     (ADDRESS=(PROTOCOL=TCP)(HOST=192.10.1.22)(PORT=2024)))
   (CONNECT_DATA=
    (SERVICE_NAME=SALES.oracle.com)
    (SERVER=DEDICATED)
    (INSTANCE_ROLE=PRIMARY)
    (FAILOVER_MODE=
      (BACKUP=SALES_DED_PRE_SECONDARY)
      (TYPE=SELECT)
      (METHOD=PRECONNECT)
      (RETRIES=180)
      (DELAY=5) )))

SALES_DED_PRE_SECONDARY=
  (DESCRIPTION=
   (LOAD_BALANCE=OFF)
   (FAILOVER=ON)
   (ADDRESS_LIST= (ADDRESS=(PROTOCOL=TCP)(HOST=192.10.1.22)(PORT=2024))
     (ADDRESS=(PROTOCOL=TCP)(HOST=192.10.1.21)(PORT=2024)))
   (CONNECT_DATA=
    (SERVICE_NAME=SALES.oracle.com)
    (SERVER=DEDICATED)
    (INSTANCE_ROLE=SECONDARY)
    (FAILOVER_MODE=
      (BACKUP=SALES_DED_PRE)
      (TYPE=SELECT)
      (METHOD=PRECONNECT)
      (RETRIES=48)
      (DELAY=900) )
This chapter describes post-installation tasks. It contains the following sections:

- Post-Installation Tasks for the oracle User
- Post-Installation Tasks for the root User
- Starting Oracle9i Real Application Clusters Guard
- Troubleshooting

**Note:** To avoid interfering with a currently running Oracle9i Real Application Clusters environment, the PFSSETUP utility does not automatically replace or install newly generated network files. Before you can use Oracle9i Real Application Clusters Guard, you must append the files generated by the PFSSETUP utility to the current Net Services configuration files.
Post-Installation Tasks for the oracle User

Perform the following steps as the oracle user:

1. Log in as the Oracle software owner, typically, the oracle user.

2. Configure the server using the network configuration files generated by the PFSSETUP utility.

During the Oracle9i Real Application Clusters Guard setup, the following network configuration files are created:

<table>
<thead>
<tr>
<th>File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>listener.ora.ded.pfs</td>
<td>Dedicated server (IS_MTS parameter is set to false) configuration file for the listeners that identifies the Oracle9i Real Application Clusters Guard listener name and the service it is listening for</td>
</tr>
<tr>
<td>listener.ora.mts.pfs</td>
<td>Shared server (IS_MTS parameter is set to true) configuration file for the listeners that identifies the Oracle9i Real Application Clusters Guard listener name and the service it is listening for</td>
</tr>
<tr>
<td>tnsnames.ora.ded.pfs</td>
<td>Dedicated server (IS_MTS parameter is set to false) configuration file that contains net service names mapped to connect descriptors</td>
</tr>
<tr>
<td>tnsnames.ora.ded.clnt.pfs</td>
<td>Dedicated server client (IS_MTS parameter is set to false) configuration file that contains net service names mapped to connect descriptors</td>
</tr>
<tr>
<td>tnsnames.ora.mts.pfs</td>
<td>Shared server (IS_MTS parameter is set to true) configuration file that contains net service names mapped to connect descriptors</td>
</tr>
<tr>
<td>tnsnames.ora.mts.clnt.pfs</td>
<td>Shared server client (IS_MTS parameter is set to true) configuration file that contains net service names mapped to connect descriptors</td>
</tr>
</tbody>
</table>

The files in the preceeding table are created in the $TNS_ADMIN directory if the TNS_ADMIN environment variable is defined, or in the $ORACLE_HOME/network/admin directory if the TNS_ADMIN environment variable is not defined.

a. If network configuration files do not already exist, copy or rename the files to the correct suffix. For example:

   $ cd $TNS_ADMIN
$ ls
listener.ora.ded.pfs tnsnames.ora.ded.pfs tnsnames.ora.ded.clnt.pfs
$ cp listener.ora.ded.pfs listener.ora
$ cp tnsnames.ora.ded.pfs tnsnames.ora

b. Copy the client configuration file, tnsnames.ora.ded.clnt.pfs, to all of the client systems.

c. If network configuration files already exist, append the Oracle9i Real Application Clusters Guard entries to the existing network configuration files. Ensure that all entries in the network configuration files are unique.

3. Set up the Oracle instance parameter files for Oracle9i Real Application Clusters Guard.

During the Oracle9i Real Application Clusters Guard setup, the following parameter files are created:

<table>
<thead>
<tr>
<th>Filename</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>init_ORACLE_SERVICE_HOSTA.pfs</td>
<td>Sample initialization parameter file for host A.</td>
</tr>
<tr>
<td>init_ORACLE_SERVICE_HOSTB.pfs</td>
<td>Sample initialization parameter file for host B.</td>
</tr>
<tr>
<td>ORACLE_SERVICE_config.pfs</td>
<td>Common configuration parameter file containing recommended Oracle9i Real Application Clusters Guard initialization and configuration parameter settings. Parameters for this file should be set for both instances on host A and host B. This file contains two parameters, PFILE_HOSTA and PFILE_HOSTB. These parameters are set to indicate the location of the initialization parameter files for the two hosts. Ensure that these files exist or create a link from the files you want to use to the locations specified by these parameters.</td>
</tr>
<tr>
<td>ORACLE_SERVICE_config_HOSTA.mts.pfs</td>
<td>Host A configuration parameter file containing required Oracle9i Real Application Clusters Guard parameter settings for a system running shared server configuration.</td>
</tr>
<tr>
<td>ORACLE_SERVICE_config_HOSTA.ded.pfs</td>
<td>Host A configuration parameter file containing required Oracle9i Real Application Clusters Guard parameter settings for a system running dedicated server configuration.</td>
</tr>
</tbody>
</table>
### Table: Initialization Parameter Files

<table>
<thead>
<tr>
<th>Filename</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ORACLE_SERVICE_config_HOSTB.mts.pfs</code></td>
<td>Host B configuration parameter file containing required Oracle9i Real Application Clusters Guard parameter settings for a system running shared server configuration.</td>
</tr>
<tr>
<td><code>ORACLE_SERVICE_config_HOSTB.ded.pfs</code></td>
<td>Host B configuration parameter file containing required Oracle9i Real Application Clusters Guard parameter settings for a system running dedicated server configuration.</td>
</tr>
</tbody>
</table>

The files in the preceding table are created in the `$ORACLE_BASE/admin/$DB_NAME/pfile` directory for an OFA installation, or in the `$ORACLE_HOME/pfs/$DB_NAME/pfile` for a non OFA installation.

If you already have initialization parameter files set up for the Oracle9i Real Application Clusters database, you can use the IFILE parameter to include the initialization parameter files created by Oracle9i Real Application Clusters Guard.

The following example `initSALES1.ora` file shows a sample initialization parameter file for the first instance:

```ora
ifile=/u01/oracle/admin/SALES/pfile/initSALES.ora
rollback_segments=(rbs1_1, rbs1_2)
thread=1
cluster_database=true
instance_name=SALES1
```

The following example `initSALES2.ora` file shows a sample initialization parameter file for the second instance:

```ora
ifile=/u01/oracle/admin/SALES/pfile/initSALES.ora
rollback_segments=(rbs2_1, rbs2_2)
thread=2
cluster_database=true
instance_name=SALES2
```

The following example shows the contents of the `initSALES1.ora` file for the first instance after embedding the Oracle9i Real Application Clusters Guard parameter files within an existing parameter file. Make sure not to include multiple entries for the same initialization parameter. Because they are included in the embedded parameter files, the THREAD and CLUSTER_DATABASE parameters have been removed.
ifile=/u01/oracle/admin/SALES/pfile/initSALES.ora
ifile=/u01/oracle/admin/SALES/pfile/init_SALES_nodeA.ora
ifile=/u01/oracle/admin/SALES/pfile/SALES_config.pfs
ifile=/u01/oracle/admin/SALES/pfile/SALES_config_nodeA.ded.pfs
rollback_segments=(rbs1_1, rbs1_2)

The following example shows the contents of the initSALES2.ora file for the second instance after embedding the Oracle9i Real Application Clusters Guard parameter files within an existing parameter file. Make sure that you only have single entries for each initialization parameter. Because they are included in the embedded parameter files, the THREAD and CLUSTER_DATABASE parameters have been removed.

ifile=/u01/oracle/admin/SALES/pfile/initSALES.ora
ifile=/u01/oracle/admin/SALES/pfile/init_SALES_nodeB.ora
ifile=/u01/oracle/admin/SALES/pfile/SALES_config.pfs
ifile=/u01/oracle/admin/SALES/pfile/SALES_config_nodeB.ded.pfs
rollback_segments=(rbs2_1, rbs2_2)

For more information about these configuration files, refer to Appendix B.

4. Run the catpfs.sql script to create the required Oracle9i Real Application Clusters Guard objects in the database.

To run this script, you must have SYSDBA privileges. Run the script as follows:

a. Make sure that all user tables are available.

b. Change to the $ORACLE_HOME/pfs/admin directory:

   $ cd $ORACLE_HOME/pfs/admin

c. Use SQL*Plus to connect to the database as the SYS user and run the catpfs.sql script, where sys_password is the password (for example, CHANGE_ON_INSTALL):

   $ sqlplus 'SYS/sys_password AS SYSDBA'
   SQL> @catpfs.sql

The catpfs.sql script creates the following:

* Oracle9i Real Application Clusters Guard user

* CUSTOMER_QUERY package for Oracle Heartbeat Monitor

* ORAPING_CONFIG and ORAPING_HEARTBEAT tables for Oracle Heartbeat Monitor
Post-Installation Tasks for the oracle User

* PFSSORAPING_CONFIG and PFSSORAPING_HEARTBEAT views for Oracle Heartbeat Monitor

* PF_S_UP_ INSTANCE_NAME tables for the Oracle instance monitor

The following example shows output from the catpfs.sql script:

```
Enter the PFS software owner [Default: OPS$ORACLE]: ops$oracle

Dropping ops$oracle...
DROP USER ops$oracle CASCADE
ERROR at line 1:
ORA-01918: user 'OPS$ORACLE' does not exist

Creating ops$oracle...
User created.

Grant succeeded.

Below are the list of online tablespaces in this database. Decide which tablespace you wish to create the PFS tables and indexes. It is NOT recommended to use the system tablespace for storing PFS objects.

<table>
<thead>
<tr>
<th>TABLESPACE_NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>INDEX</td>
</tr>
<tr>
<td>TEMP</td>
</tr>
<tr>
<td>TOOLS</td>
</tr>
<tr>
<td>USERS</td>
</tr>
<tr>
<td>RBS</td>
</tr>
</tbody>
</table>

Specify ops$oracle user's default tablespace: users
User altered.

Specify ops$oracle user's temporary tablespace: temp
User altered.

Creating Customer Query Package...
Specify owner of the customer query table: scott
Specify customer query table: emp
```
Connected.

Grant succeeded.

Connected.

Creating synonym for the customer query table...
Specify synonym for customer query table:emp
DROP SYNONYM emp
  *
ERROR at line 1:
ORA-01434: private synonym to be dropped does not exist

Synonym created.

Creating CUSTOMER_QUERY package
Package created.

Package body created.

Creating tables and views for Oracle heartbeat monitor.
DROP PUBLIC SYNONYM pfs$oraping_config
  *
ERROR at line 1:
ORA-01432: public synonym to be dropped does not exist

DROP PUBLIC SYNONYM pfs$oraping_heartbeat
  *
ERROR at line 1:
ORA-01432: public synonym to be dropped does not exist

DROP PUBLIC SYNONYM oraping_heartbeat
  *
ERROR at line 1:
ORA-01432: public synonym to be dropped does not exist

DROP VIEW pfs$oraping_config
  *
ERROR at line 1:
ORA-00942: table or view does not exist

DROP VIEW pfs$oraping_heartbeat
  *
ERROR at line 1:
ORA-00942: table or view does not exist

DROP TABLE oraping_config
  *
ERROR at line 1:
ORA-00942: table or view does not exist

DROP TABLE oraping_heartbeat
  *
ERROR at line 1:
ORA-00942: table or view does not exist

Table created.
1 row created.
Commit complete.

Table created.
Table altered.
1 row created.
Commit complete.
View created.
View created.
Synonym created.
Synonym created.
Synonym created.
View created.
View created.
Creating tables and views for Oracle instance monitor.

Specify instance_name for instance on PFS_HOSTA: prod1
DROP TABLE pfs_up_prod1
  *
ERROR at line 1:
ORA-00942: table or view does not exist

Table created.
1 row created.

Specify instance_name for instance on PFS_HOSTB: prod2
DROP TABLE pfs_up_prod2
  *
ERROR at line 1:
ORA-00942: table or view does not exist

Table created.
1 row created.

NOTE:
catpfs complete. Please check catpfs.log for any errors.

5. To ensure that the Oracle9i Real Application Clusters database is functioning properly, shut down and start up all Oracle instances manually.

For example, enter the following commands where

`INIT.ORA parameter_file` is the name of the initialization file as defined by the PFILE variable in the `PFS ORACLE_SERVICE User.def` definition file.

```
$ sqlplus "/ as sysdba"
SQL> STARTUP pfile=INIT.ORA parameter_file
```

The definition file is located in the `$ORACLE_HOME/pfs/DB_NAME/include` directory for non-OFA compliant installations and in the

`$ORACLE_BASE/admin/DB_NAME/pfs/include` directory for OFA compliant installations.
Post-Installation Tasks for the root User

Perform the following steps as the root user:

---

**Note:** Perform the tasks described in "Post-Installation Tasks for the oracle User" on page 3-2 before starting the tasks described in this section.

---

1. To ensure that the oracle user’s environment is available to the root user, log in as the oracle user and enter the following command:

   $ su root

2. Set the ORACLE_SERVICE and DB_NAME environment variables to the appropriate values.

3. If you have created a database manually, ensure that the system configuration is reflected in the oratab file. The oratab file is located in the /var/opt/oracle directory for Solaris and in the /etc directory for AIX, HP, and Tru64.

   Add an entry for each server instance on the system using the following format:

   DB_NAME:ORACLE_HOME:N

   In this example N indicates that the database should not be started at reboot time. Always enter the N option so that Oracle9i Real Application Clusters Guard can control startup and shutdown of the database.

4. Change to the $ORACLE_HOME/pfs/setup directory and register the Oracle9i Real Application Clusters Guard Packs with the cluster by running the createpacks script

   Ensure that the DB_NAME, ORACLE_SERVICE, ORACLE_HOME, and if necessary, the ORACLE_BASE environment variables are set correctly before running the script.

   # cd $ORACLE_HOME/pfs/setup
   # ./createpacks
Starting Oracle9i Real Application Clusters Guard

The Oracle9i Real Application Clusters Guard software is controlled from the command line. To start Oracle9i Real Application Clusters Guard:

1. Log in as the root user.
2. Shut down all listeners associated with the Oracle9i Real Application Clusters Guard database on the cluster.
3. Ensure that the DB_NAME, ORACLE_SERVICE, ORACLE_HOME, and if necessary, the ORACLE_BASE environment variables are set correctly.
4. To enter Oracle9i Real Application Clusters Guard commands, enter the following command:
   ```
   # pfsctl
   ```
5. Start Oracle9i Real Application Clusters Guard from the PFSCTL prompt:
   ```
   PFSCON> pfsboot
   ```
6. Check the Oracle9i Real Application Clusters Guard packs log file for any errors:
   - For an OFA compliant installation, check the
     ```
     pfs_ORACLE_SERVICE_hostname.log
     ```
     file in the
     ```
     $ORACLE_BASE/admin/db_name/pfs/pfsdump
     ```
     directory.

**Note:** Run the createpacks script on only one of the nodes of the cluster.

**Note:** For HP 9000 Series HP-UX systems, you must shut down the cluster before running the createpacks script. To shut down the cluster, use the cmhaltcl command.

**Starting Oracle9i Real Application Clusters Guard**

The Oracle9i Real Application Clusters Guard software is controlled from the command line. To start Oracle9i Real Application Clusters Guard:

1. Log in as the root user.
2. Shut down all listeners associated with the Oracle9i Real Application Clusters Guard database on the cluster.
3. Ensure that the DB_NAME, ORACLE_SERVICE, ORACLE_HOME, and if necessary, the ORACLE_BASE environment variables are set correctly.
4. To enter Oracle9i Real Application Clusters Guard commands, enter the following command:
   ```
   # pfsctl
   ```
5. Start Oracle9i Real Application Clusters Guard from the PFSCTL prompt:
   ```
   PFSCON> pfsboot
   ```
6. Check the Oracle9i Real Application Clusters Guard packs log file for any errors:
   - For an OFA compliant installation, check the
     ```
     pfs_ORACLE_SERVICE_hostname.log
     ```
     file in the
     ```
     $ORACLE_BASE/admin/db_name/pfs/pfsdump
     ```
     directory.

**See Also:** Refer to the Oracle9i Real Application Clusters Guard Concepts and Administration Guide for information about the pfsctl script.
Troubleshooting

- For an non-OFA compliant installation, check the pfs_ORACLE_SERVICE_hostname.log file in the $ORACLE_HOME/pfs/db_name/log/ directory.

7. Check the Oracle Heartbeat Monitor logs for errors:
   - For an OFA installation, check the pfs_ORACLE_SERVICE_hostname_ping.log file in the $ORACLE_BASE/admin/db_name/pfs/pfsdump directory.
   - For an non-OFA installation, check the pfs_ORACLE_SERVICE_hostname_ping.log file in the $ORACLE_HOME/pfs/db_name/log directory.

Troubleshooting

The following notes may help you to troubleshoot problems with Oracle9i Real Application Clusters Guard:

- The PFSCTL status output "Both nodes are part of cluster" does not indicate that both nodes are up and running. One of the nodes might be down. Check the state of a node using the following commands:
  - For Sun Cluster 3.0:
    /usr/cluster/bin/scstat
  - For HP:
    /usr/sbin/cmviewcl
  - For Tru64:
    /usr/bin/caa_stat
  - For AIX:
    /usr/es/sbin/cluster/clstat

- The following parameters are not used by Oracle9i Real Application Clusters Guard in Sun Cluster 3.0, but must be specified for compatibility:
  - START_NET_TIMEOUT
  - STOP_NET_TIMEOUT
  - PFS_NET_IF_A *
Troubleshooting

- **PFS_NET_IF_B**
  *Specify the actual network interface adapter (that is, hme0) for PFS_NET_IF_A and PFS_NET_IF_B, not the NAFO group.*

- If you have problems with NAFO on Sun Solaris, note the following:
  - If no NAFO group exists, the system attempts to discover a network adapter on the subnet identified by the hostnames, and create single adapter NAFO groups.
  - If you want multiple net adapters as backups, get and use the adapter lists on the subnet identified by the hostnames, and read the "How to Configure Public Network Management (PNM)" chapter in the Sun Cluster 3.0 Installation Guide.
  - To check the status of the NAFO groups, enter the following command:
    
    ```
    $ /usr/cluster/bin/pnmstat -l
    ```
    
    The output might look similar to the following:
    
    ```
    group adapters status fo_time act_adp
    nafo0 hme0 OK NEVER hme0
    ```
    
    For further information on NAFO groups please refer to the Sun Cluster documentation or contact Sun support.

- If both the nodes of the cluster simultaneously fail, the Oracle Real Application Clusters Guard Packs start automatically when the nodes reboot. Enter the following command as the root user to stop the resources in the install environment:
  
  ```
  # cd $ORACLE_HOME/pfs/bin
  # pfsctl
  PFSCTL>pfshalt
  ```
Troubleshooting

The following Oracle9i Real Application Clusters Guard error might be displayed because of inconsistencies between SC2.2 and SC3.0:

Alert: could not generate file properly - Packs files

If it appears, remove all the files from the 
$ORACLE_HOME/pfs/setup/output/ORACLE_SERVICE/packs directory and reconfigure Oracle9i Real Application Clusters Guard.

When using the OFA architecture, ensure any user-specific configuration files for Real Application Clusters Guard are backed up and removed, so that they do not conflict with the new Real Application Clusters Guard files.

Note: This problem can occur any time all nodes are stopped without first stopping the Oracle9i Real Application Clusters Guard Packs using pfsctl. For example, if you perform a Sun Clusters shutdown, which stops all nodes cleanly, it does not run pfsctl and stop the packs. When you later boot a node, the Oracle9i Real Application Clusters Guard Pack is restarted automatically.
This chapter describes how to upgrade to this release of Oracle9i Real Application Clusters Guard. Specifically, this chapter describes:

- Upgrading from Oracle9i Real Application Clusters Guard Release 9.0.x
- Upgrading from Oracle9i Real Application Clusters Guard Release 9.0.1.x and Oracle Parallel Fail Safe 8.1.7.2
- Troubleshooting Tips

If an upgrade path is not described in this chapter then that upgrade path is not supported in this release.

**Note:** This release of Oracle9i Real Application Clusters Guard requires Sun Cluster 3.0 on Sun Solaris systems. If you need to upgrade the version of Sun Cluster, you must follow the instructions in this chapter.
Upgrading from Oracle9i Real Application Clusters Guard Release 9.0.x

This section describes how to upgrade to Oracle9i Real Application Clusters Guard Release 2 (9.2.0.1.0) if you currently use any of the following releases on Sun Cluster 2.2:

- Oracle9i Real Application Clusters Guard Release 9.0.1.0
- Oracle9i Real Application Clusters Guard Release 9.0.1.1
- Oracle9i Real Application Clusters Guard Release 9.0.1.2

Perform the following steps:

1. Back up all Oracle configuration files.
   
   Remember to back up files in the $ORACLE_HOME/network and $ORACLE_HOME/dbs directories. If you perform OFA compliant installations, also make backups as follows:
   
   a. Back up and remove all user-specific files by removing the following directories:
      
      $ORACLE_HOME/pfs
      $ORACLE_BASE/admin/DB_NAME/pfs
      $ORACLE_BASE/admin/DB_NAME/pfile
      $ORACLE_BASE/admin/DB_NAME/network
   
   b. Back up the Oracle Service configuration file as follows:
      
      $ cd $ORACLE_HOME/pfs/setup/conf
      $ cp $ORACLE_SERVICE.conf $ORACLE_SERVICE.conf.BACKUP92010

2. Use the pfsctl utility to stop the Oracle9i Real Application Clusters Guard software:
   
   a. Ensure that the following environment variables are set correctly:
      
      - ORACLE_SERVICE
      - PFS_HOME
      - DB_NAME
   
   b. Stop the Oracle9i Real Application Clusters Guard software:
      
      $ pfsctl
      PFSCTL> pfshalt
3. Use the PFSSETUP utility to delete the old Oracle9i Real Application Clusters Guard Pack files:
   a. Run the pfssetup utility:
      
      $ pfssetup
   
   b. Choose option 6 - All the files
   
   c. Choose option 4 - Deinstall
      Note that this step does not remove the software files.
   
   d. Log in as the root user.
   
   e. Run the deletepacks command to de-register the packs from the cluster framework:
      
      # cd $ORACLE_HOME/pfs/setup
      # ./deletepacks

4. Upgrade the cluster software from Sun Cluster 2.2 to Sun Cluster 3.0.
   Refer to the Sun Cluster 3.0 documentation for instructions on this procedure. For additional information, contact Sun support.

5. Test the Real Applications Clusters environment:
   a. Boot both nodes into cluster mode.
   b. Run Real Applications Clusters on both nodes.
      Make sure that Real Applications Clusters and associated databases operate correctly on Sun Cluster 3.0 independently of Oracle9i Real Application Clusters Guard before continuing.

6. Install Oracle9i Real Application Clusters Guard Release 2 (9.2.0.1.0) using the instructions in the “Installing the Oracle9i Real Application Clusters Guard Files” section in Chapter 2 of this guide.

7. Test the Real Application Clusters environment, again, by running Real Applications Clusters and testing that the database is operating correctly.

8. Configure Oracle9i Real Application Clusters Guard:
   a. Shut down both instances.
   b. Copy the savsetup.dat file to $ORACLE_SERVICE.conf:
      
      $ cd $ORACLE_HOME/pfs/setup/conf
      $ cp savsetup.dat $ORACLE_SERVICE.conf
c. Update the $ORACLE_SERVICE.conf file using the configuration information from the $ORACLE_SERVICE.conf.BACKUP92010 file you saved in step 1.

d. Run the pfssetup utility:
   $ pfssetup

e. Choose option 6 - All the files
f. Choose option 1 - Generate Only
g. Choose option 6 - All the files
h. Choose option 2 - Deploy Only
i. Log in as the root user.
j. Run the createpacks command to register the packs from the cluster framework:
   # cd $ORACLE_HOME/pfs/setup
   # ./createpacks

9. Complete the installation:
   a. Modify the appropriate database initialization (init.ora) files to include the required Real Application Clusters Guard parameters as described in Chapter 3.
   b. Update the Real Application Clusters Guard generated listener.ora and tnsnames.ora files as described in Chapter 3.
   c. Test the Real Application Clusters environment, again, by running Real Applications Clusters and testing that the database is operating correctly.
   d. Ensure that the following environment variables are set correctly:
      ■ ORACLE_SERVICE
      ■ PFS_HOME
      ■ DB_NAME
Start the Oracle9i Real Application Clusters Guard software:

```bash
$ pfsctl
PFSCTL> pfsboot
```

Check the `$ORACLE_HOME/pfs/setup/PFS_Setup.log` file for messages. Messages that begin with `ORA-` and `PFS-` might help you resolve any problems you encounter.

**Upgrading from Oracle9i Real Application Clusters Guard Release 9.0.1.x and Oracle Parallel Fail Safe 8.1.7.2**

This section describes how to upgrade to Oracle9i Real Application Clusters Guard Release 2 (9.2.0.1.0) if you currently use any of the following releases:

- Oracle9i Real Application Clusters Guard Release 9.0.1.3
- Oracle Parallel Fail Safe 8.1.7.2

Perform the following steps:

1. Back up all Oracle configuration files.
   
   Remember to back up files in the `$ORACLE_HOME/network` and `$ORACLE_HOME/dbs` directories. If you perform OFA compliant installations, also make backups as follows:

   a. Back up and remove all user-specific files by removing the following directories:

      ```
      $ORACLE_HOME/pfs
      $ORACLE_BASE/admin/DB_NAME/pfs
      $ORACLE_BASE/admin/DB_NAME/pfile
      $ORACLE_BASE/admin/DB_NAME/network
      ```

   b. Back up the Oracle Service configuration file as follows:

      ```
      $ cd $ORACLE_HOME/pfs/setup/conf
      $ cp $ORACLE_SERVICE.conf $ORACLE_SERVICE.conf.BACKUP92010
      ```

2. Use the `pfsctl` utility to stop the Oracle9i Real Application Clusters Guard or Oracle Parallel Fail Safe software:

   a. Ensure that the following environment variables are set correctly:

      ```
      ORACLE_SERVICE
      ```
- PFS_HOME
- DB_NAME

b. Stop the Oracle9i Real Application Clusters Guard software:
   
   `\$ pfsctl
   PFSCTL> pfshalt`

3. Use the `pfssetup` utility to delete the old Oracle9i Real Application Clusters Guard Pack files:
   
a. Run the `pfssetup` utility:
      
      `\$ pfssetup`

b. Choose option 6 - All the files

c. Choose option 4 - Deinstall
   
   Note that this step does not remove the software files.

d. Log in as the root user.

e. Run the `deletepacks` command to de-register the packs from the cluster framework:
   
   `# cd $ORACLE_HOME/pfs/setup
   # ./deletepacks`

4. Upgrade the Oracle Server to Oracle9i release 9.2.0.1. Following the instructions for migrating the Oracle Database in the Oracle9i Migration documentation. This step installs the Oracle9i Real Application Clusters Guard files.

5. Test the Real Applications Clusters environment:
   
a. Boot both nodes into cluster mode.

b. Run Real Applications Clusters on both nodes.
   
   Make sure that Real Applications Clusters and associated databases operate correctly independently of Oracle9i Real Application Clusters Guard before continuing.

6. Configure Oracle9i Real Application Clusters Guard:
   
a. Shut down both instances.
b. Copy the savsetup.dat file to $ORACLE_SERVICE.conf:

   $ cd $ORACLE_HOME/pfs/setup/conf
   $ cp savsetup.dat $ORACLE_SERVICE.conf

c. Update the $ORACLE_SERVICE.conf file using the configuration information from the $ORACLE_SERVICE.conf.BACKUP92010 file you saved in step one.

d. Run the pfssetup utility:

   $ pfssetup

e. Choose option 6 - All the files

f. Choose option 1 - Generate Only

g. Choose option 6 - All the files

h. Choose option 2 - Deploy Only

i. Log in as the root user.

j. Run the createpacks command to register the packs from the cluster framework:

   # cd $ORACLE_HOME/pfs/setup
   # ./createpacks

7. Complete the installation:

   a. Modify the appropriate database initialization (init.ora) files to include the required Real Application Clusters Guard parameters as described in Chapter 3.

   b. Update the Real Application Clusters Guard generated listener.ora and tnsnames.ora files as described in Chapter 3.

   c. Test the Real Application Clusters environment, again, by running Real Applications Clusters and testing that the database is operating correctly.

   d. Ensure that the following environment variables are set correctly:

       ■ ORACLE_SERVICE
       ■ PFS_HOME
       ■ DB_NAME
e. Start the Oracle9i Real Application Clusters Guard software:

   $ pfsctl
   PFSCTL> pfsboot

f. Check the $ORACLE_HOME/pfs/setup/PFS_Setup.log file for messages. Messages that begin with ORA- and PFS- might help you resolve any problems you encounter.

## Troubleshooting Tips

Consider the following points while troubleshooting an upgrade problem:

- The following message might appear if the $ORACLE_HOME/pfs/setup/output/$ORACLE_SERVICE/packs directory is not empty:

  Alert: could not generate file properly - Packs files

- When performing an OFA compliant installation, user-specific configuration files might conflict with the new Real Application Clusters Guard files. Back up and remove these file to ensure a sucessful upgrade.

- If the pfshalt or haltone commands fail while using the pfsctl utility, consider the following:
  - Check the associated Real Application Clusters Guard log files, Oracle log files, network log files, and system log files for errors.
  - Check the Real Application Clusters Guard Pack state using the scstat command. If a Real Application Clusters Guard is in a STOP_FAILED state, investigate and correct the error before clearing the STOP_FAILED state and restarting the pack.

The following conditions might put the Real Application Clusters Guard in a STOP_FAILED state:

- The Oracle instance cannot be stopped.
- The relocatable IP cannot be disabled.
- A timeout occurs.

After correcting the condition and clearing the STOP_FAILED state, run the the pfshalt or haltone command again. These commands ensure that the system clears any processes, shared memory segments or other resources.
For information on clearing the STOP_FAILED flag, refer to the section “Administering Data-Service Resources” in the Sun Cluster 3.0 U1 Data Services, Installation and Configuration Guide.
The Oracle9i Real Application Clusters Guard directory structure depends on the type of installation you perform when installing the software. This appendix contains the following sections:

- Introduction to Optimal Flexible Architecture
- OFA Compliant Installation
- Non-OFA Compliant Installation
Introduction to Optimal Flexible Architecture

Oracle Corporation recommends the Optimal Flexible Architecture (OFA) standard for Oracle installations. The OFA standard is a set of configuration guidelines for efficient and reliable Oracle databases that require little maintenance.

OFA provides the following benefits:

- Organizes large amounts of complicated software and data on disk to avoid device bottlenecks and poor performance
- Facilitates routine administrative tasks, such as software and data backup functions, which are often vulnerable to data corruption
- Eases switching among multiple Oracle databases
- Manages and administers database growth adequately
- Helps to eliminate fragmentation of free space in the data dictionary, isolate other fragmentation, and minimize resource contention

To switch to the OFA standard, you must modify the directory structure and relocate the database files.

See Also:

- See the Oracle operating-system specific documentation for more information about OFA.
- See the Oracle9i Administrator’s Guide for information about relocating your database files.
OFA Compliant Installation

If the ORACLE_BASE environment variable is set during installation, an OFA compliant installation is performed, and the PFS_HOME environment variable is set to $ORACLE_BASE/admin/db_name/pfs.

An OFA compliant installation of Oracle9i Real Application Clusters Guard results in a directory structure similar to the following:

```
$ORACLE_HOME
$ORACLE_HOME/pfs
$ORACLE_HOME/pfs/admin
$ORACLE_HOME/pfs/bin
$ORACLE_HOME/pfs/bin/oracle_up
$ORACLE_HOME/pfs/bin/oracle_ping
$ORACLE_HOME/pfs/bin/oracle_lsnr
$ORACLE_HOME/pfs/bin/oracle_role
$ORACLE_HOME/pfs/bin/pfs_watchdog
$ORACLE_HOME/pfs/demo
$ORACLE_HOME/pfs/doc
$ORACLE_HOME/pfs/lib
$ORACLE_HOME/pfs/lib/pfs_cluster
$ORACLE_HOME/pfs/lib/pfs_internal
$ORACLE_HOME/pfs/lib/pfs_oracle
$ORACLE_HOME/pfs/mesg
$ORACLE_HOME/pfs/setup
$ORACLE_HOME/pfs/setup/conf
$ORACLE_HOME/pfs/setup/template
$ORACLE_HOME/pfs/setup/template/include
$ORACLE_HOME/pfs/setup/template/network
$ORACLE_HOME/pfs/setup/template/packs
$ORACLE_HOME/pfs/setup/template/pfile
$ORACLE_HOME/pfs/setup/template/user
$ORACLE_HOME/pfs/setup/output
$ORACLE_HOME/pfs/setup/output/ORACLE_SERVICE
$ORACLE_HOME/pfs/setup/output/ORACLE_SERVICE/packs
$ORACLE_HOME/pfs/setup/output/ORACLE_SERVICE/include
$ORACLE_HOME/pfs/setup/output/ORACLE_SERVICE/network
$ORACLE_HOME/pfs/setup/output/ORACLE_SERVICE/pfile
$ORACLE_HOME/pfs/sys

$ORACLE_BASE/admin/
$ORACLE_BASE/admin/db_name
$ORACLE_BASE/admin/db_name/pfs
$ORACLE_BASE/admin/db_name/pfs/include
Non-OFA Compliant Installation

If the ORACLE_BASE environment variable is not set during installation, a non-OFA compliant installation is performed and the PFS_HOME environment variable is set to $ORACLE_HOME/pfs/db_name.

A non-OFA compliant installation of Oracle9i Real Application Clusters Guard results in a directory structure similar to the following:

$ORACLE_BASE/admin/db_name/pfs/packs
$ORACLE_BASE/admin/db_name/pfs/pfile
$ORACLE_BASE/admin/db_name/pfs/pfsdump
$ORACLE_BASE/admin/db_name/pfs/user
Non-OFA Compliant Installation

SCRACLE_HOME/pfs/db_name
SCRACLE_HOME/pfs/db_name/include
SCRACLE_HOME/pfs/db_name/log
SCRACLE_HOME/pfs/db_name/packs
SCRACLE_HOME/pfs/db_name/pfile
SCRACLE_HOME/pfs/db_name/user
Non-OFA Compliant Installation
This appendix contains information on the following configuration files:

- `init_ORACLE_SERVICE_HOSTNAME[A | B].ora`
- `ORACLE_SERVICE_config.pfs`
- `ORACLE_SERVICE_config_HOSTNAME[A | B].ded.pfs`
- `ORACLE_SERVICE_config_HOSTNAME[A | B].mts.pfs`
The `init_ORACLE_SERVICE_HOSTNAME[A|B].ora` file defines the following parameters for each instance:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSTANCE_NUMBER</td>
<td>Unique instance number. Maps the instance to one free list group for each database object created with the storage parameter FREELIST GROUPS. Oracle Corporation recommends setting the INSTANCE_NUMBER to the same value as the THREAD parameter.</td>
</tr>
<tr>
<td>THREAD</td>
<td>Unique thread number. Specifies the number of the redo thread used by the instance. You can specify any available redo thread number, but an instance cannot use the same thread number as another instance. Also, an instance cannot start when its redo thread is disabled. A value of zero causes an available, enabled public thread to be chosen. An instance cannot mount a database if the thread is used by another instance or if the thread is disabled.</td>
</tr>
<tr>
<td>INSTANCE_NAME</td>
<td>Unique instance name. Identifies the name of the instance and is used to uniquely identify a specific instance when multiple instances share common service names.</td>
</tr>
</tbody>
</table>

Example B–1 and Example B–2 show samples of the `init_ORACLE_SERVICE_HOSTNAME[A|B].ora` file that the PFSSETUP utility creates.

**Example B–1  `init_SALES_nodeA.ora`**

```
instance_number=1
thread=1
instance_name=SALES1
```

**Example B–2  `init_SALES_nodeB.ora`**

```
instance_number=2
thread=2
instance_name=SALES2
```
The ORACLE_SERVICE_config.pfs file contains the mandatory and recommended settings for selected initialization parameters for Oracle9i Real Application Clusters Guard. All instances must use the same ORACLE_SERVICE_config.pfs file.

Example B–3 shows a sample ORACLE_SERVICE_config.pfs file created by the PFSSETUP utility:

```
Example B–3 SALES_config.pfs
active_instance_count=1
compatible=9.0.0
db_block_checking=true
db_block_checksum=true
db_name=SALES
db_domain=WORLD
service_names=SALES.WORLD
max_dump_file_size=unlimited
os_authent_prefix=OPS$
cluster_database=true
remote_os_authent=true
timed_statistics=true
```

The following table describes the parameters in the preceeding example:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTIVE_INSTANCE_COUNT</td>
<td>Required</td>
<td>1</td>
<td>A value of 1 designates one instance in a two-instance cluster as the primary instance and the other instance as the secondary instance.</td>
</tr>
<tr>
<td>COMPATIBLE</td>
<td>Required</td>
<td>9.0.0</td>
<td>The Oracle server must maintain compatibility with Oracle server Release 2 (9.2.0.1.0).</td>
</tr>
</tbody>
</table>
The name specified must correspond with the name specified in the PFSSETUP utility file ($ORACLE_SERVICE.conf).

The database domain specified must correspond with the database domain specified in the PFSSETUP utility file ($ORACLE_SERVICE.conf).

A value of TRUE enables Oracle9i Real Application Clusters Guard.

The service name specified must correspond with the service name specified in the Oracle9i Real Application Clusters installation configuration file ($ORACLE_SERVICE.conf).

OPS$ is the prefix that Oracle uses to authenticate users attempting to connect to the server.

Remote clients are authenticated using OPS$.

Controls whether Oracle performs block checking for data blocks.

Determines whether the DBWn processes and the direct loader calculate a checksum and store it in the cache header of every data block when writing it to disk.

Specifies the time in seconds required during crash or instance recovery.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB_NAME</td>
<td>Required</td>
<td>SALES, for example</td>
<td>The name specified must correspond with the name specified in the PFSSETUP utility file ($ORACLE_SERVICE.conf).</td>
</tr>
<tr>
<td>DB_DOMAIN</td>
<td>Required</td>
<td>WORLD, for example</td>
<td>The database domain specified must correspond with the database domain specified in the PFSSETUP utility file ($ORACLE_SERVICE.conf).</td>
</tr>
<tr>
<td>CLUSTER_DATABASE</td>
<td>Required</td>
<td>TRUE</td>
<td>A value of TRUE enables Oracle9i Real Application Clusters Guard.</td>
</tr>
<tr>
<td>SERVICE_NAMES</td>
<td>Required</td>
<td>SALES.WORLD</td>
<td>The service name specified must correspond with the service name specified in the Oracle9i Real Application Clusters installation configuration file ($ORACLE_SERVICE.conf). You can provide multiple service names (using individual SERVICE_NAMES entries) so that different usage of an instance can be identified separately. Oracle9i Real Application Clusters Guard supports only one SERVICE_NAMES entry.</td>
</tr>
<tr>
<td>OS_AUTHENT_PREFIX</td>
<td>Required</td>
<td>OPS$</td>
<td>OPS$ is the prefix that Oracle uses to authenticate users attempting to connect to the server.</td>
</tr>
<tr>
<td>REMOTE_OS_AUTHENT</td>
<td>Required</td>
<td>TRUE</td>
<td>Remote clients are authenticated using OPS$.</td>
</tr>
<tr>
<td>DB_BLOCK_CHECKING</td>
<td>Recommended</td>
<td>TRUE</td>
<td>Controls whether Oracle performs block checking for data blocks.</td>
</tr>
<tr>
<td>DB_BLOCK_CHECKSUM</td>
<td>Recommended</td>
<td>TRUE</td>
<td>Determines whether the DBWn processes and the direct loader calculate a checksum and store it in the cache header of every data block when writing it to disk.</td>
</tr>
<tr>
<td>FAST_START_MTTR_TARGET</td>
<td>Recommended</td>
<td>System-specific, application specific</td>
<td>Specifies the time in seconds required during crash or instance recovery.</td>
</tr>
</tbody>
</table>
The ORACLE_SERVICE_config_HOSTNAME[A|B].mts.pfs files contain the shared servers network initialization parameters for Oracle9i Real Application Clusters Guard. These files are generated when the Oracle9i Real Application Clusters Guard installation configuration parameter IS_MTS is set to true.

Example B–6 and Example B–7 show samples of the ORACLE_SERVICE_config_HOSTNAME[A|B].mts.pfs file that the PFSSETUP utility creates.

Example B–6  SALES_config_nodea.mts.pfs
local_listener=listener_SALES_nodeA

Example B–7  SALES_config_nodeb.mts.pfs
local_listener=listener_SALES_nodeB

The LOCAL_LISTENER parameter is required. It specifies a network name that resolves to an address of a Oracle Net local listener. The address is specified in the tnsnames.ora file.

### Parameter Requirement Value Description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX_DUMP_FILE_SIZE</td>
<td>Recommended</td>
<td>UNLIMITED</td>
<td>Specifies the maximum size of trace files.</td>
</tr>
<tr>
<td>TIMED_STATISTICS</td>
<td>Recommended</td>
<td>TRUE</td>
<td>Specifies whether statistics related to time are collected.</td>
</tr>
</tbody>
</table>

ORACLE_SERVICE_config_HOSTNAME[A/B].mts.pfs

The ORACLE_SERVICE_config_HOSTNAME[A|B].mts.pfs files contain the dedicated network initialization parameters for Oracle9i Real Application Clusters Guard. These files are generated when the Oracle9i Real Application Clusters Guard configuration parameter IS_MTS is set to false, which is the default setting.

Example B–4 and Example B–5 show samples of the ORACLE_SERVICE_config_HOSTNAME[A|B].ded.pfs files that the PFSSETUP utility creates.

Example B–4  SALES_config_nodea.ded.pfs
local_listener=listener_SALES_nodeA

Example B–5  SALES_config_nodeb.ded.pfs
local_listener=listener_SALES_nodeB

The LOCAL_LISTENER parameter is required. It specifies a network name that resolves to an address of a Oracle Net local listener. The address is specified in the tnsnames.ora file.

### Parameter Requirement Value Description

<table>
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<tr>
<td>MAX_DUMP_FILE_SIZE</td>
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<td>UNLIMITED</td>
<td>Specifies the maximum size of trace files.</td>
</tr>
<tr>
<td>TIMED_STATISTICS</td>
<td>Recommended</td>
<td>TRUE</td>
<td>Specifies whether statistics related to time are collected.</td>
</tr>
</tbody>
</table>
Example B–6  sales_config_nodea.mts.pfs

dispatchers="(address=(protocol=tcp)(host=192.10.1.21)(lis=listener_sales)"

Example B–7  sales_config_nodeb.mts.pfs

dispatchers="(address=(protocol=tcp)(host=192.10.1.22)(lis=listener_sales)"

The lis=listener_sales setting enables an instance to register its instance information with remote listeners on the other nodes. The listener_sales value is resolved to a listener address list through a tnsnames.ora file.
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