



# Sun Cluster Data Service for Oracle Application Server Guide for Solaris OS



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# Preface

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*Sun Cluster Data Service for Oracle Application Server Guide for Solaris OS* explains how to install and configure Sun™ Cluster HA for Oracle Application Server on both SPARC® based systems and x86 based systems.

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**Note** – This Sun Cluster release supports systems that use the SPARC™ and x86 families of processor architectures: UltraSPARC, SPARC64, and AMD64. In this document, the label x86 refers to systems that use the AMD64 family of processor architectures.

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This document is intended for system administrators with extensive knowledge of Sun software and hardware. Do not use this document as a planning or presales guide. Before reading this document, you should have already determined your system requirements and purchased the appropriate equipment and software.

The instructions in this book assume knowledge of the Solaris™ Operating System (Solaris OS) and expertise with the volume-manager software that is used with Sun Cluster software.

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**Note** – Sun Cluster software runs on two platforms, SPARC and x86. The information in this document pertains to both platforms unless otherwise specified in a special chapter, section, note, bulleted item, figure, table, or example.

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## Using UNIX Commands

This document contains information about commands that are specific to installing and configuring Sun Cluster data services. The document does *not* contain comprehensive information about basic UNIX® commands and procedures, such as shutting down the system, booting the system, and configuring devices. Information about basic UNIX commands and procedures is available from the following sources:

- Online documentation for the Solaris Operating System
- Solaris Operating System man pages
- Other software documentation that you received with your system

## Typographic Conventions

The following table describes the typographic conventions that are used in this book.

TABLE P-1 Typographic Conventions

Typeface	Meaning	Example
AaBbCc123	The names of commands, files, and directories, and onscreen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. <code>machine_name% you have mail.</code>
<b>AaBbCc123</b>	What you type, contrasted with onscreen computer output	<code>machine_name% su</code> Password:
<i>aabbcc123</i>	Placeholder: replace with a real name or value	The command to remove a file is <i>rm filename</i> .
<i>AaBbCc123</i>	Book titles, new terms, and terms to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . <i>A cache</i> is a copy that is stored locally. Do <i>not</i> save the file. <b>Note:</b> Some emphasized items appear bold online.

## Shell Prompts in Command Examples

The following table shows the default UNIX system prompt and superuser prompt for the C shell, Bourne shell, and Korn shell.

TABLE P-2 Shell Prompts

Shell	Prompt
C shell	<code>machine_name%</code>
C shell for superuser	<code>machine_name#</code>
Bourne shell and Korn shell	<code>\$</code>
Bourne shell and Korn shell for superuser	<code>#</code>

## Related Documentation

Information about related Sun Cluster topics is available in the documentation that is listed in the following table. All Sun Cluster documentation is available at <http://docs.sun.com>.

Topic	Documentation
Data service administration	<i>Sun Cluster Data Services Planning and Administration Guide for Solaris OS</i> Individual data service guides
Concepts	<i>Sun Cluster Concepts Guide for Solaris OS</i>
Overview	<i>Sun Cluster Overview for Solaris OS</i>
Software installation	<i>Sun Cluster Software Installation Guide for Solaris OS</i>
System administration	<i>Sun Cluster System Administration Guide for Solaris OS</i>
Hardware administration	<i>Sun Cluster 3.1 - 3.2 Hardware Administration Manual for Solaris OS</i> Individual hardware administration guides
Data service development	<i>Sun Cluster Data Services Developer's Guide for Solaris OS</i>
Error messages	<i>Sun Cluster Error Messages Guide for Solaris OS</i>
Command and function reference	<i>Sun Cluster Reference Manual for Solaris OS</i>

For a complete list of Sun Cluster documentation, see the release notes for your release of Sun Cluster at <http://docs.sun.com>.

## Related Third-Party Web Site References

Third-party URLs that are referenced in this document provide additional related information.

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## Documentation, Support, and Training

The Sun web site provides information about the following additional resources:

- [Documentation](http://www.sun.com/documentation/) (<http://www.sun.com/documentation/>)
- [Support](http://www.sun.com/support/) (<http://www.sun.com/support/>)
- [Training](http://www.sun.com/training/) (<http://www.sun.com/training/>)

## Getting Help

If you have problems installing or using Sun Cluster, contact your service provider and provide the following information:

- Your name and email address (if available)
- Your company name, address, and phone number
- The model number and serial number of your systems
- The release number of the Solaris Operating System (for example, Solaris 10)
- The release number of Sun Cluster (for example, Sun Cluster 3.2)

Use the following commands to gather information about each node on your system for your service provider.

Command	Function
<code>prtconf -v</code>	Displays the size of the system memory and reports information about peripheral devices
<code>psrinfo -v</code>	Displays information about processors
<code>showrev -p</code>	Reports which patches are installed
<code>prtdiag -v</code>	Displays system diagnostic information
<code>/usr/cluster/bin/clnode show-rev</code>	Displays Sun Cluster release and package version information

Also have available the contents of the `/var/adm/messages` file.



# Installing and Configuring Sun Cluster HA for Oracle Application Server

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This chapter explains how to install and configure Sun Cluster HA for Oracle Application Server.

This chapter contains the following sections.

- “Sun Cluster HA for Oracle Application Server Overview” on page 9
- “Overview of Installing and Configuring Sun Cluster HA for Oracle Application Server” on page 10
- “Planning the Sun Cluster HA for Oracle Application Server Installation and Configuration” on page 11
- “Installing and Configuring Oracle Application Server” on page 13
- “Verifying the Installation and Configuration of Oracle Application Server” on page 22
- “Installing the Sun Cluster HA for Oracle Application Server Packages” on page 29
- “Registering and Configuring Sun Cluster HA for Oracle Application Server” on page 31
- “Verifying the Sun Cluster HA for Oracle Application Server Installation and Configuration” on page 34
- “Upgrading Sun Cluster HA for Oracle Application Server” on page 34
- “Understanding the Sun Cluster HA for Oracle Application Server Fault Monitor” on page 36
- “Debug Sun Cluster HA for Oracle Application Server” on page 38

## Sun Cluster HA for Oracle Application Server Overview

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**Note** – Throughout this document a non-global zone may be referred to as a zone. A global zone will always be referred to as a global zone.

---

The Sun Cluster HA for Oracle Application Server data service provides a mechanism for the orderly startup and shutdown, fault monitoring, and automatic failover of the Oracle Application Server Infrastructure, referred to as the infrastructure.

The infrastructure provides centralized product metadata, security and management services, configuration information, and data repositories for middle tier installations.

**Table 1** lists the Oracle Application Server Middle-Tier, Infrastructure Tier and Database Tier Services.

**TABLE 1** Oracle Application Server Services

Middle Tier	Infrastructure Tier	Database Tier
Oracle HTTP Server (OHS)	Oracle HTTP Server (OHS)	Metadata Repository
J2EE Server (OC4J)	J2EE Server (OC4J)	
	LDAP Server (OID)	
	Enterprise Manager (EM)	

To fully protect the infrastructure tier and database tier, you must deploy the following data services:

- Sun Cluster HA for Oracle Application Server, to provide high availability for the infrastructure components.
- Sun Cluster HA for Oracle, to provide high availability for the Oracle Database.

## Overview of Installing and Configuring Sun Cluster HA for Oracle Application Server

The following table summarizes the tasks for installing and configuring Sun Cluster HA for Oracle Application Server and provides cross-references to detailed instructions for performing these tasks. Perform the tasks in the order that they are listed in the table.

**TABLE 2** Tasks for Installing and Configuring Sun Cluster HA for Oracle Application Server

Task	Instructions
Plan the installation	<a href="#">“Planning the Sun Cluster HA for Oracle Application Server Installation and Configuration” on page 11</a>
Install and configure the Oracle Application Server software	<a href="#">“How to Install and Configure Oracle Application Server” on page 13</a>
Verify the installation and configuration	<a href="#">“How to Verify the Installation and Configuration of Oracle Application Server” on page 22</a>

**TABLE 2** Tasks for Installing and Configuring Sun Cluster HA for Oracle Application Server  
 (Continued)

Task	Instructions
Install Sun Cluster HA for Oracle Application Server packages	<a href="#">“How to Install the Sun Cluster HA for Oracle Application Server Packages” on page 29</a>
Register and configure Sun Cluster HA for Oracle Application Server resources	<a href="#">“How to Register and Configure Sun Cluster HA for Oracle Application Server” on page 31</a>
Verify the Sun Cluster HA for Oracle Application Server installation and configuration	<a href="#">“How to Verify the Sun Cluster HA for Oracle Application Server Installation and Configuration” on page 34</a>
Upgrade the Sun Cluster HA for Oracle Application Server data service	<a href="#">“How to Upgrade to the New Version of Sun Cluster HA for Oracle Application Server” on page 35</a>
Tune the Sun Cluster HA for Oracle Application Server fault monitor	<a href="#">“Understanding the Sun Cluster HA for Oracle Application Server Fault Monitor” on page 36</a>
Debug Sun Cluster HA for Oracle Application Server	<a href="#">“How to turn on debug for Sun Cluster HA for Oracle Application Server” on page 38</a>

## Planning the Sun Cluster HA for Oracle Application Server Installation and Configuration

This section contains the information you need to plan your Sun Cluster HA for Oracle Application Server installation and configuration.

### Configuration Restrictions

The configuration restrictions in the subsections that follow apply only to Sun Cluster HA for Oracle Application Server.



**Caution** – Your data service configuration might not be supported if you do not observe these restrictions.

#### Restriction for the supported configurations of Sun Cluster HA for Oracle Application Server

The Sun Cluster HA for Oracle Application Server data service can only be configured as a failover service.

Single or multiple instances of Oracle Application Server can be deployed in the cluster.

Oracle Application Server can be deployed in the global zone or non-global zone.

The Sun Cluster HA for Oracle Application Server data service supports different versions of Oracle Application Server. Before proceeding with the installation of Oracle Application Server you must check that the Sun Cluster HA for Oracle Application Server data service has been verified against the version you will be installing.

## **Restriction for the location of Oracle Application Server files**

The Oracle Application Server files are the data files that are stored in the Oracle home directory and Oracle database directory, which are created when you install Oracle Application Server using the Oracle Universal Installer.

Within this document references will be made to the Oracle Application Server files which implies all of the contents of the Oracle home directory and Oracle database directory.

The Oracle Application Server files must be placed on shared storage as either a cluster file system or a highly available local file system.

## **Configuration Requirements**

The configuration requirements in this section apply only to Sun Cluster HA for Oracle Application Server.



**Caution** – If your data service configuration does not conform to these requirements, the data service configuration might not be supported.

---

## **Determine which Solaris zone Oracle Application Server will use**

Solaris zones provides a means of creating virtualized operating system environments within an instance of the Solaris 10 OS. Solaris zones allow one or more applications to run in isolation from other activity on your system. For complete information about installing and configuring a Solaris Container, refer to *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*.

You must determine which Solaris zone Oracle Application Server will use. Oracle Application Server can run within a global zone or non-global zone configuration.

# Installing and Configuring Oracle Application Server

This section contains the procedures you need to install and configure Oracle Application Server.

## ▼ How to Install and Configure Oracle Application Server

This section contains the procedures you need to install and configure Oracle Application Server.

- 1 On a cluster member, become superuser or assume a role that provides `solaris.cluster.modify RBAC authorization`.**
- 2 Determine which Solaris zone to use.**

Refer to [“Determine which Solaris zone Oracle Application Server will use” on page 12](#) for more information.
- 3 If a zone will be used, create the zone.**

Refer to *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones* for complete information about installing and configuring a zone.
- 4 If a zone is being used, ensure the zone is booted.**

Repeat this step on all nodes of the cluster if a zone is being used.

Boot the zone if it is not running.

```
# zoneadm list -v
# zoneadm -z zonename boot
```
- 5 Create a cluster file system or highly available local file system for the Oracle Application Server files.**

Refer to *Sun Cluster Software Installation Guide for Solaris OS* for information about creating a cluster file system and to *Sun Cluster Data Services Planning and Administration Guide for Solaris OS* for information about creating a highly available local file system.
- 6 Stop the cluster and reboot each node in non cluster mode.**

**Note** – Currently Oracle Application Server does not support the infrastructure installation on a hardware cluster. So for the duration of the install and post install configuration, Sun Cluster must be stopped.

Your data service configuration might not be supported if you do not adhere to these requirements.

---

If a cluster file system was created, then you must temporarily remove the `global` mount option from `/etc/vfstab`, as you will manually mount the cluster file system as a local file system after you have stopped the cluster.

```
# cluster shutdown -y -g0
ok boot -x
```

## 7 Mount the cluster file system (as a local file system) or the highly available local file system.

Perform this step from the global zone on one node of the cluster.

### a. If a non ZFS highly available local file system is being used for Oracle Application Server.

Ensure the node has ownership of the disk set or disk group.

For Solaris Volume Manager.

```
# metaset -s disk-set -t -C take
```

For Veritas Volume Manager.

```
# vxdg -C import disk-group
# vxdg -g disk-group startall
```

### i. If the global zone is being used for Oracle Application Server.

```
# mount highly-available-local-file-system
```

### ii. If a zone is being used for Oracle Application Server.

Create the mount point on all zones of the cluster that are being used for Oracle Application Server.

```
# zlogin zonename mkdir highly-available-local-file-system
```

Mount the highly available local file system on one of the zones being used.

```
# mount -F lofs highly-available-local-file-system \  
> /zonepath/root/highly-available-local-file-system
```

**b. If a ZFS highly available local file system is being used for Oracle Application Server.****i. If the global zone is being used for Oracle Application Server.**

```
# zpool import -R / HAZpool
```

**ii. If a zone is being used for Oracle Application Server.**

```
# zpool export -f HAZpool
# zpool import -R /zonepath/root HAZpool
```

**8 Plumb the Oracle Application Server logical hostname.**

Perform this step from the global zone on one node of the cluster.

**a. If the global zone is being used for Oracle Application Server.**

```
# ifconfig interface addif logical-hostname up
```

**b. If a zone is being used for Oracle Application Server.**

```
# ifconfig interface addif logical-hostname up zone zonename
```

**9 Install the Oracle 9i Application Server Infrastructure.**

Perform this step from the global zone or zone on one node of the cluster, if you are installing Oracle 9iAS Application Server Infrastructure for version 9.0.2 or version 9.0.3.

---

**Note** – Refer to [Step 10](#) if you are installing the Oracle Application Server 10g Infrastructure version 9.0.4 or version 10.

---

Refer to *Oracle Application Server, Quick Installation Guide* for complete installation information.

**a. Enable logical host interpositioning.**

Perform this step on all cluster nodes where Oracle 9iAS Application Server infrastructure will run.

To provide logical host interpositioning for Oracle 9iAS Application Server infrastructure you must create a symbolic link from

```
/usr/lib/secure/libschost.so.1 to /usr/cluster/lib/libschost.so.1
```

On all cluster nodes where Oracle 9iAS Application Server infrastructure will run.

```
# cp /usr/cluster/lib/libschost.so.1 /usr/lib/libschost.so.1
# cd /usr/lib/secure
# ln -s /usr/lib/libschost.so.1 libschost.so.1
```

**b. Execute `runInstaller`.**

You must specify the short logical hostname for Oracle 9iAS Application Server infrastructure and not the fully qualify name.

```
# su - oracle-application-server-userid
$ LD_PRELOAD_32=libscho.st.so.1
$ SC_LHOSTNAME=logical-hostname
$ export LD_PRELOAD_32 SC_LHOSTNAME
```

Test that the short logical hostname is returned.

```
$ uname -n
```

If the short logical hostname is returned, you can proceed with the installation.

```
$ cd oracle-application-server-install-directory
$ ./runInstaller
```

Follow the Oracle Universal Installer screens as required.

When prompted for the Oracle home directory you must enter a destination directory that resides on the cluster file system or highly available local file system. If the destination directory does not exist, Oracle Universal Installer creates it.

After installing the software you will be prompted to execute `$ORACLE_HOME/root.sh` before the Oracle Universal Installer continues with the configuration assistants.

---

**Note** – Before you execute `$ORACLE_HOME/root.sh` you must perform [Step c](#).

---

**c. Pre-task before executing `$ORACLE_HOME/root.sh` from `./runInstaller`.**

Before executing `$ORACLE_HOME/root.sh`, you must complete the following in another window, as some configuration assistants require that `LD_PRELOAD_32` and `SC_LHOSTNAME` are set.

```
$ cd $ORACLE_HOME/Apache/Apache/bin
$ vi apachectl
```

Add the following three lines to the `CONFIGURATION` section in `apachectl` just before the `PIDFILE=`. You must specify the short logical hostname for `SC_LHOSTNAME`.

```
LD_PRELOAD_32=libscho.st.so.1
SC_LHOSTNAME=logical-hostname
export LD_PRELOAD_32 SC_LHOSTNAME
```

**d. As root execute `$ORACLE_HOME/root.sh`.**

After amending `apachectl`, you can execute `$ORACLE_HOME/root.sh` as root and continue with the Oracle Universal Installer.



**e. As root, copy /var/tmp/oracle/\*tab to the other cluster nodes.**

After the install is complete, you must copy the emtab and oratab files from /var/opt/oracle to the other cluster nodes or zones.

If other Oracle databases have been defined on other cluster nodes or zones, instead of copying emtab and oratab to /var/opt/oracle on the other cluster nodes or zones, you must *add* the Oracle Application Server database entries to emtab and oratab in /var/opt/oracle on the other cluster nodes or zones.

```
other-node# mkdir -p /var/opt/oracle
other-node# rcp install-node:/var/opt/oracle/*tab /var/opt/oracle
```

**f. Install the Oracle 9.0.2.3 Core Patchset.**

Complete any prerequisites before installing the Oracle 9.0.2.3 Core Patchset, refer to Oracle Metalink Note: 243561.1 for more information.

When installing the Oracle 9.0.2.3 Core Patchset, follow the Oracle Universal Installer screens as required.

After installing the software, you will be prompted to execute \$ORACLE\_HOME/root.sh before the Oracle Universal Installer will continue with the configuration assistants.

---

**Note** – Before you execute \$ORACLE\_HOME/root.sh you must perform [Step g](#).

---

**g. Pre-task before executing \$ORACLE\_HOME/root.sh from Oracle 9.0.2.3 Core Patchset.**

Before executing \$ORACLE\_HOME/root.sh, you must complete the following in another window, as some configuration assistants require that LD\_LIBRARY\_PATH, LD\_PRELOAD\_32 and SC\_LHOSTNAME are set.

Edit \$ORACLE\_HOME/opmn/conf/opmn.xml and include entries for LD\_LIBRARY\_PATH, LD\_PRELOAD\_32, and SC\_LHOSTNAME in the environment section for OC4J\_DAS, home, OC4J\_Demos, and CUSTOM.

---

**Note** – LD\_LIBRARY\_PATH should contain the fully qualified \$ORACLE\_HOME/lib value.

DISPLAY should contain the short logical hostname.

SC\_LHOSTNAME should contain the fully qualified logical hostname.

---

The following shows a sample \$ORACLE\_HOME/opmn/conf/opmn.xml after it has been modified.

```
# su - oracle-application-server-userid
$ cd $ORACLE_HOME/opmn/conf
$ cat opmn.xml
<ias-instance xmlns="http://www.oracle.com/ias-instance">
```

```

<notification-server>
  <port local="6100" remote="6200" request="6003"/>
  <log-file path="/global/ora9ias/infra/opmn/logs/ons.log" level="3"/>
</notification-server>
<process-manager>
  <ohs gid="HTTP Server" maxRetry="3">
    <start-mode mode="ssl"/>
  </ohs>
  <oc4j maxRetry="3" instanceName="home" numProcs="1">
    <config-file path="/global/ora9ias/infra/j2ee/home/config/server.xml"/>
    <oc4j-option value="-properties"/>
    <port ajp="3000-3100" jms="3201-3300" rmi="3101-3200"/>
    <environment>
      <prop name="DISPLAY" value="ora9ias:0.0"/>
      <prop name="LD_LIBRARY_PATH" value="/global/ora9ias/infra/lib"/>
      <prop name="SC_LHOSTNAME" value="ora9ias.com"/>
      <prop name="LD_PRELOAD_32" value="libscho.st.so.1"/>
    </environment>
  </oc4j>
  <oc4j maxRetry="3" instanceName="OC4J_DAS" gid="OC4J_DAS" numProcs="1">
    <config-file path="/global/ora9ias/infra/j2ee/OC4J_DAS/config/server.xml"/>
    <java-option value="-server -Xincgc -Xnoclassgc -Xmx256m"/>
    <oc4j-option value="-properties"/>
    <port ajp="3001-3100" jms="3201-3300" rmi="3101-3200"/>
    <environment>
      <prop name="DISPLAY" value="ora9ias:0.0"/>
      <prop name="LD_LIBRARY_PATH" value="/global/ora9ias/infra/lib"/>
      <prop name="SC_LHOSTNAME" value="ora9ias.com"/>
      <prop name="LD_PRELOAD_32" value="libscho.st.so.1"/>
    </environment>
  </oc4j>
  <oc4j maxRetry="3" instanceName="OC4J_Demos" gid="OC4J_Demos" numProcs="1">
    <config-file path="/global/ora9ias/infra/j2ee/OC4J_Demos/config/server.xml"/>
    <java-option value="-Xmx512M"/>
    <oc4j-option value="-userThreads -properties"/>
    <port ajp="3001-3100" jms="3201-3300" rmi="3101-3200"/>
    <environment>
      <prop name="%LIB_PATH_ENV%" value="%LIB_PATH_VALUE"/>
      <prop name="DISPLAY" value="ora9ias:0.0"/>
      <prop name="LD_LIBRARY_PATH" value="/global/ora9ias/infra/lib"/>
      <prop name="SC_LHOSTNAME" value="ora9ias.com"/>
      <prop name="LD_PRELOAD_32" value="libscho.st.so.1"/>
    </environment>
  </oc4j>
  <custom gid="dcm-daemon" numProcs="1" noGidWildcard="true">
    <start path="/global/ora9ias/infra/dcm/bin/dcmctl daemon -logdir
/global/ora9ias/infra/dcm/logs/daemon_logs"/>
    <stop path="/global/ora9ias/infra/dcm/bin/dcmctl shutdowndaemon"/>

```

```

<environment>
  <prop name="DISPLAY" value="ora9ias:0.0"/>
  <prop name="LD_LIBRARY_PATH" value="/global/ora9ias/infra/lib"/>
  <prop name="SC_LHOSTNAME" value="ora9ias.com"/>
  <prop name="LD_PRELOAD_32" value="libscho.st.so.1"/>
</environment>
</custom>
<log-file path="/global/ora9ias/infra/opmn/logs/ipm.log" level="3"/>
</process-manager>
</ias-instance>

```

**h. As root execute \$ORACLE\_HOME/root.sh**

After amending `opmn.xml`, you can execute `$ORACLE_HOME/root.sh` as root and continue with the Oracle Universal Installer.

**10 Install the Oracle Application Server 10g Infrastructure.**

Perform this step within the global zone or non-global zone as required, if you are installing Oracle Application Server 10g infrastructure version 9.0.4 or version 10.

---

**Note** – Refer to [Step 9](#) if you are installing the Oracle 9iAS Application Server infrastructure version 9.0.2 or version 9.0.3.

---

Refer to *Oracle Application Server, Quick Installation Guide* for complete installation information.

**a. Execute `runInstaller`.**

```

# su - oracle-application-server-userid
$ cd oracle-application-server-install-directory
$ ./runInstaller

```

Follow the Oracle Universal Installer screens as required

When prompted for the Oracle home directory you must enter a destination directory that resides on the cluster file system or highly available local file system. If the destination directory does not exist, Oracle Universal Installer creates it.

When prompted with the Configuration Options screen, you must select High Availability and Replication and provide the fully qualified logical hostname when requested to do so.

**b. As root, copy `/var/tmp/oracle/oratab` to the other cluster nodes or zones.**

After the install is complete, you must copy the `oratab` file from `/var/opt/oracle` to the other cluster nodes or zones.

If other Oracle databases have been defined on other cluster nodes or zones, instead of copying `oratab` to `/var/opt/oracle` on the other cluster nodes or zones, you must *add* the Oracle Application Server database entries to `oratab` in `/var/opt/oracle` on the other cluster nodes or zones.

```
other-node# mkdir -p /var/opt/oracle
other-node# rcp install-node:/var/opt/oracle/oratab /var/opt/oracle
```

## 11 (Optional) Installing the Middle Tier on the same cluster nodes as the Infrastructure.

The middle tier may be installed on multiple active nodes to achieve high availability. Typically the middle tier and infrastructure are installed on separate nodes. However, you may wish to install the middle tier on the same cluster nodes as the infrastructure. This can be done by installing the middle tier on local disks on each cluster node.

However, whenever the middle tier and infrastructure share a cluster node, two `/var/opt/oracle` directories must be maintained.

One for the infrastructure where `oraInst.loc` points to the infrastructure `oraInventory` directory on shared disk.

Another for the middle tier instance installed on local disk on each cluster node where `oraInst.loc` points to another `oraInventory` directory on local disk of that node.

These separate directories are needed for applying patches and performing other upgrades or maintenance tasks.

If installing the middle tier on the same cluster nodes as the infrastructure you must copy the infrastructure `/var/opt/oracle` to another location. This then allows you to apply patches or upgrades to the infrastructure or middle tiers, by reinstating the corresponding original copy of `/var/opt/oracle`.

Save `/var/opt/oracle` on each cluster node where the middle tier and infrastructure are installed together.

```
# cp -rp /var/opt/oracle /var/opt/oracle_infra
```

If you have copied `/var/opt/oracle` you will need to supply the new infrastructure directory when you register the Sun Cluster HA for Oracle Application Server data service.

## 12 Stop the Oracle 9iAS Application Server or Oracle Application Server 10g Infrastructure.

Perform this step from the global zone or zone where you installed Oracle 9iAS Application Server Infrastructure or Oracle Application Server 10g Infrastructure.

---

**Note** – This step assumes that you have completed the infrastructure install and have included `ORACLE_HOME` and `ORACLE_SID` within the profile for the *oracle-application-server-userid*.

---

For Oracle 9iAS Application Server Infrastructure

```
# su - oracle-application-server-userid
$ $ORACLE_HOME/bin/emctl stop
$ $ORACLE_HOME/opmn/bin/opmnctl stopall
$ $ORACLE_HOME/bin/oidctl server=oidldapd configset=0 instance=1 stop
$ $ORACLE_HOME/bin/oidmon stop
```

For Oracle Application Server 10g Infrastructure

```
# su - oracle-application-server-userid
$ $ORACLE_HOME/bin/emctl stop iasconsole
$ $ORACLE_HOME/opmn/bin/opmnctl stopall
```

### 13 Stop the Oracle Database and Listener.

Perform this step from the global zone or zone where you installed Oracle 9iAS Application Server Infrastructure or Oracle Application Server 10g Infrastructure.

```
# su - oracle-application-server-userid
$ $ORACLE_HOME/bin/lsnrctl stop
$ $ORACLE_HOME/bin/sqlplus "/ as sysdba"
SQL> shutdown immediate
SQL> quit
$ exit
```

### 14 Unmount the cluster file system or highly available local file system.

Perform this step from the global zone on the node where you installed the Oracle 9iAS Application Server Infrastructure or Oracle Application Server 10g Infrastructure.

#### a. If a non ZFS highly available local file system is being used for the Oracle Application Server.

##### i. If the global zone is being used for Oracle Application Server.

```
# umount oracle-application-server-highly-available-local-file-system
```

##### ii. If a zone is being used for Oracle Application Server.

```
# umount /zonepath/root/oracle-application-server-highly-available-local-file-system
```

#### b. If a ZFS highly available local file system is being used for Oracle Application Server.

```
# zpool export -f HAZpool
```

### 15 Unplumb the Oracle Application Server logical hostname.

```
# ifconfig interface removeif logical-hostname
```

**16 Reboot each node in cluster mode to start the cluster.**

If a cluster file system was created and you temporarily removed the `global mount` option from `/etc/vfstab`, you must reinstate the `global mount` option before you reboot each node to start the cluster.

```
# reboot
```

## Verifying the Installation and Configuration of Oracle Application Server

This section contains the procedure you need to verify the installation and configuration.

### ▼ How to Verify the Installation and Configuration of Oracle Application Server

This procedure does not verify that your application is highly available because you have not yet installed your data service.

Perform this procedure on one node or zone of the cluster unless a specific step indicates otherwise.

---

**Note** – This procedure assumes that you have completed the infrastructure install and have included `ORACLE_HOME` and `ORACLE_SID` within the profile for the `oracle-application-server-userid`.

---

**1 On a cluster member, become superuser or assume a role that provides `solaris.cluster.modify RBAC authorization`.****2 If a zone is being used for Oracle Application Server, ensure the zone is booted.**

Repeat this step on all nodes on the cluster if a zone is being used.

Boot the zone if it is not running.

```
# zoneadm list -v
# zoneadm -z zonename boot
```

**3 Mount the highly available local file system.**

Perform this step from the global zone on one node of the cluster.

**a. If a non ZFS highly available local file system is being used for the Oracle Application Server files.**

Ensure the node has ownership of the disk set or disk group.

For Solaris Volume Manager.

```
# metaset -s disk-set -t
```

For Veritas Volume Manager.

```
# vxdg -C import disk-group
# vxdg -g disk-group startall
```

**i. If the global zone is being used for Oracle Application Server.**

```
# mount highly-available-local-file-system
```

**ii. If a zone is being used for Oracle Application Server.**

Mount the highly available local file system on one of the zones being used .

```
# mount -F lofs highly-available-local-file-system \
> /zonepath/root/highly-available-local-file-system
```

**b. If a ZFS highly available file system is being used for Oracle Application Server.**

**i. If the global zone is being used for Oracle Application Server.**

```
# zpool import -R / HAZpool
```

**ii. If a zone is being used for Oracle Application Server.**

```
# zpool import -R /zonepath/root HAZpool
```

**4 Plumb the Oracle Application Server logical hostname.**

**a. If the global zone is being used for Oracle Application Server.**

```
# ifconfig interface addif logical-hostname up
```

**b. If a zone is being used for Oracle Application Server.**

```
# ifconfig interface addif logical-hostname up zone zonename
```

**5 Login to the zone, if a zone is being used.**

```
# zlogin zonename
```

**6 Start the Oracle Database and Listener**

```
# su - oracle-application-server-userid
$ $ORACLE_HOME/bin/lsnrctl start
$ $ORACLE_HOME/bin/sqlplus "/ as sysdba"
SQL> startup
SQL> quit
$ exit
```

## 7 Start the Oracle Application Server Infrastructure.

For Oracle Application Server 9iAS Infrastructure

```
# su - oracle-application-server-userid
$ $ORACLE_HOME/bin/oidmon start
$ $ORACLE_HOME/bin/oidctl server=oidldapd configset=0 instance=1 start
$ $ORACLE_HOME/opmn/bin/opmnctl startall
$ $ORACLE_HOME/bin/emctl start
$ $ORACLE_HOME/bin/lsnrctl start
$ exit
```

For Oracle Application Server 10g AS Infrastructure

```
# su - oracle-application-server-userid
$ $ORACLE_HOME/opmn/bin/opmnctl startall
$ $ORACLE_HOME/bin/emctl start iasconsole
$ exit
```

## 8 Verify the Oracle 9iAS Infrastructure.

```
# su - oracle-application-server-userid
$ $ORACLE_HOME/bin/emctl status
EMD is up and running : 200 OK
$ $ORACLE_HOME/dcm/bin/dcmctl getstate -v
```

Current State for Instance:iasdb1.psemea14.uk.sun.com

	Component	Type	Up Status	In Sync Status
1	HTTP Server	ohs	Up	True
2	OC4J_DAS	oc4j	Up	True
3	OC4J_Demos	oc4j	Down	True
4	home	oc4j	Down	True

```
$ exit
```

## 9 Verifying the Oracle Application Server 10g Infrastructure.

```
# su - oracle-application-server-userid
$ $ORACLE_HOME/bin/emctl status iasconsole
TZ set to GB
```

Oracle Enterprise Manager 10g Application Server Control Release 10.1.2.0.2  
 Copyright (c) 1996, 2005 Oracle Corporation. All rights reserved.  
<http://oas10g.uk.sun.com:1156/emd/console/aboutApplication>  
 Oracle Enterprise Manager 10g Application Server Control is running.

```
-----
Logs are generated in directory /ZFSoracle/oraInfra/sysman/log
$ $ORACLE_HOME/opmn/bin/opmnctl status
```

Processes in Instance: IAS.oas10g.uk.sun.com



```

-----+-----+-----+-----
ias-component | process-type | pid | status
-----+-----+-----+-----
LogLoader    | logloaderd   | N/A | Down
dcm-daemon   | dcm-daemon   | 6135 | Alive
DSA          | DSA          | N/A | Down
OC4J         | OC4J_SECURITY | 4781 | Alive
HTTP_Server  | HTTP_Server  | 4546 | Alive
OID          | OID          | 4558 | Alive

```

```
$ exit
```

## 10 Stop the Oracle 9iAS Application Server or Oracle Application Server 10g Infrastructure.

Perform this step from the global zone or zone where you installed Oracle 9iAS Application Server Infrastructure or Oracle Application Server 10g Infrastructure.

For Oracle 9iAS Application Server Infrastructure.

```

# su - oracle-application-server-userid
$ $ORACLE_HOME/bin/emctl stop
$ $ORACLE_HOME/opmn/bin/opmnctl stopall
$ $ORACLE_HOME/bin/oidctl server=oidldapd configset=0 instance=1 stop
$ $ORACLE_HOME/bin/oidmon stop

```

For Oracle Application Server 10g Infrastructure.

```

# su - oracle-application-server-userid
$ $ORACLE_HOME/bin/emctl stop iasconsole
$ $ORACLE_HOME/opmn/bin/opmnctl stopall

```

## 11 Stop the Oracle Database and Listener.

Perform this step from the global zone or zone where you installed Oracle 9iAS Application Server Infrastructure or Oracle Application Server 10g Infrastructure.

```

# su - oracle-application-server-userid
$ $ORACLE_HOME/bin/lsnrctl stop
$ $ORACLE_HOME/bin/sqlplus "/ as sysdba"
SQL> shutdown immediate
SQL> quit

```

## 12 Logout from the zone, if a zone is being used.

```
# exit
```

**13 Unmount the highly available local file system.**

Perform this step in the global zone only.

**a. If a non ZFS highly available local file system is being used for Oracle Application Server.****i. If the global zone is being used for Oracle Application Server.**

```
# umount oracle-application-server-highly-available-local-file-system
```

**ii. If a zone is being used for Oracle Application Server.**

Unmount the highly available local file system from the zone.

```
# umount /zonepath/root/oracle-application-server-highly-available-local-file-system
```

**b. If a ZFS highly available file system is being used for Oracle Application Server.**

```
# zpool export -f HAZpool
```

**14 Unplumb the Infrastructure logical IP address.**

```
# ifconfig interface removeif logical-hostname
```

**15 Relocate the shared storage to another node and mount the highly available local file system.**

Perform this step on another node of the cluster.

**a. If a non ZFS highly available local file system is being used for the Oracle Application Server files.**

Ensure the node has ownership of the disk set or disk group.

For Solaris Volume Manager.

```
# metaset -s disk-set -t
```

For Veritas Volume Manager.

```
# vxdg -C import disk-group
```

```
# vxdg -g disk-group startall
```

**i. If the global zone is being used for Oracle Application Server.**

```
# mount highly-available-local-file-system
```

**ii. If a zone is being used for Oracle Application Server.**

Mount the highly available local file system on one of the zones being used .

```
# mount -F lofs highly-available-local-file-system \  
> /zonepath/root/highly-available-local-file-system
```

**b. If a ZFS highly available file system is being used for Oracle Application Server.****i. If the global zone is being used for Oracle Application Server.**

```
# zpool import -R / HAZpool
```

**ii. If a zone is being used for Oracle Application Server.**

```
# zpool import -R /zonepath/root HAZpool
```

**16 Plumb the Oracle Application Server logical hostname.**

Perform this step on another node of the cluster.

**a. If the global zone is being used for Oracle Application Server.**

```
# ifconfig interface addif logical-hostname up
```

**b. If a zone is being used for Oracle Application Server.**

```
# ifconfig interface addif logical-hostname up zone zonename
```

**17 Login to the zone, if a zone is being used.**

```
# zlogin zonename
```

**18 Start the Oracle Database and Listener**

```
# su - oracle-application-server-userid
$ $ORACLE_HOME/bin/lsnrctl start
$ $ORACLE_HOME/bin/sqlplus "/ as sysdba"
SQL> startup
SQL> quit
```

**19 Start the Oracle Application Server Infrastructure.**

For Oracle 9iAS Application Server Infrastructure.

```
# su - oracle-application-server-userid
$ $ORACLE_HOME/bin/oidmon start
$ $ORACLE_HOME/bin/oidctl server=oidldapd configset=0 instance=1 start
$ $ORACLE_HOME/opmn/bin/opmnctl startall
$ $ORACLE_HOME/bin/emctl start
$ exit
```

For Oracle Application Server 10g AS Infrastructure.

```
# su - oracle-application-server-userid
$ $ORACLE_HOME/opmn/bin/opmnctl startall
$ $ORACLE_HOME/bin/emctl start iasconsole
$ exit
```

## 20 Verify the Oracle Application Server 9i Infrastructure.

```
# su - oracle-application-server-userid
$ $ORACLE_HOME/bin/emctl status
EMD is up and running : 200 OK
$ $ORACLE_HOME/dcm/bin/dcmctl getstate -v
```

Current State for Instance:iasdb1.psemea14.uk.sun.com

Component	Type	Up Status	In Sync Status
1 HTTP Server	ohs	Up	True
2 OC4J_DAS	oc4j	Up	True
3 OC4J_Demos	oc4j	Down	True
4 home	oc4j	Down	True

```
$ exit
```

## 21 Verifying the Oracle Application Server 10g Infrastructure

```
# su - oracle-application-server-userid
$ $ORACLE_HOME/bin/emctl status iasconsole
TZ set to GB
```

Oracle Enterprise Manager 10g Application Server Control Release 10.1.2.0.2  
 Copyright (c) 1996, 2005 Oracle Corporation. All rights reserved.  
<http://oas10g.uk.sun.com:1156/emd/console/aboutApplication>  
 Oracle Enterprise Manager 10g Application Server Control is running.

-----  
 Logs are generated in directory /ZFSoracle/oraInfra/sysman/log  
 \$ \$ORACLE\_HOME/opmn/bin/opmnctl status

Processes in Instance: IAS.oas10g.uk.sun.com

ias-component	process-type	pid	status
LogLoader	logloaderd	N/A	Down
dcm-daemon	dcm-daemon	6135	Alive
DSA	DSA	N/A	Down
OC4J	OC4J_SECURITY	4781	Alive
HTTP_Server	HTTP_Server	4546	Alive
OID	OID	4558	Alive

```
$ exit
```

## 22 Logout from the zone, if a zone is being used.

```
# exit
```

**23 Unmount the highly available local file system.**

Perform this step in the global zone only.

**a. If a non ZFS highly available local file system is being used for Oracle Application Server.****i. If the global zone is being used for Oracle Application Server.**

```
# umount oracle-application-server-highly-available-local-file-system
```

**ii. If a zone is being used for Oracle Application Server.**

Unmount the highly available local file system from the zone.

```
# umount /zonepath/root/oracle-application-server-highly-available-local-file-system
```

**b. If a ZFS highly available file system is being used for Oracle Application Server.**

```
# zpool export -f HAZpool
```

**24 Unplumb the Oracle Application Server logical hostname.**

```
# ifconfig interface removeif logical hostname
```

## Installing the Sun Cluster HA for Oracle Application Server Packages

If you did not install the Sun Cluster HA for Oracle Application Server packages during your initial Sun Cluster installation, perform this procedure to install the packages. To install the packages, use the Sun Java™ Enterprise System Installation Wizard.

### ▼ How to Install the Sun Cluster HA for Oracle Application Server Packages

Perform this procedure on each cluster node where you are installing the Sun Cluster HA for Oracle Application Server packages.

You can run the Sun Java Enterprise System Installation Wizard with a command-line interface (CLI) or with a graphical user interface (GUI). The content and sequence of instructions in the CLI and the GUI are similar.

---

**Note** – Even if you plan to configure this data service to run in non-global zones, install the packages for this data service in the global zone. The packages are propagated to any existing non-global zones and to any non-global zones that are created after you install the packages.

---

**Before You Begin** Ensure that you have the Sun Java Availability Suite DVD-ROM.

If you intend to run the Sun Java Enterprise System Installation Wizard with a GUI, ensure that your DISPLAY environment variable is set.

**1 On the cluster node where you are installing the data service packages, become superuser.**

**2 Load the Sun Java Availability Suite DVD-ROM into the DVD-ROM drive.**

If the Volume Management daemon vold(1M) is running and configured to manage DVD-ROM devices, the daemon automatically mounts the DVD-ROM on the /cdrom directory.

**3 Change to the Sun Java Enterprise System Installation Wizard directory of the DVD-ROM.**

- **If you are installing the data service packages on the SPARC® platform, type the following command:**

```
# cd /cdrom/cdrom0/Solaris_sparc
```

- **If you are installing the data service packages on the x86 platform, type the following command:**

```
# cd /cdrom/cdrom0/Solaris_x86
```

**4 Start the Sun Java Enterprise System Installation Wizard.**

```
# ./installer
```

**5 When you are prompted, accept the license agreement.**

If any Sun Java Enterprise System components are installed, you are prompted to select whether to upgrade the components or install new software.

**6 From the list of Sun Cluster agents under Availability Services, select the data service for Oracle Application Server.**

**7 If you require support for languages other than English, select the option to install multilingual packages.**

English language support is always installed.

**8 When prompted whether to configure the data service now or later, choose Configure Later.**

Choose Configure Later to perform the configuration after the installation.

**9 Follow the instructions on the screen to install the data service packages on the node.**

The Sun Java Enterprise System Installation Wizard displays the status of the installation. When the installation is complete, the wizard displays an installation summary and the installation logs.

- 10 **(GUI only) If you do not want to register the product and receive product updates, deselect the Product Registration option.**

The Product Registration option is not available with the CLI. If you are running the Sun Java Enterprise System Installation Wizard with the CLI, omit this step
- 11 **Exit the Sun Java Enterprise System Installation Wizard.**
- 12 **Unload the Sun Java Availability Suite DVD-ROM from the DVD-ROM drive.**
  - a. **To ensure that the DVD-ROM is not being used, change to a directory that does *not* reside on the DVD-ROM.**
  - b. **Eject the DVD-ROM.**

```
# eject cdrom
```

**Next Steps** See “[Registering and Configuring Sun Cluster HA for Oracle Application Server](#)” on page 31 to register Sun Cluster HA for Oracle Application Server and to configure the cluster for the data service.

## Registering and Configuring Sun Cluster HA for Oracle Application Server

This section contains the procedures you need to configure Sun Cluster HA for Oracle Application Server.

Some procedures within this section require you to use certain Sun Cluster commands. Refer to the relevant Sun Cluster command man page for more information about these command and their parameters.

The Sun Cluster HA for Oracle Application Server data service

### ▼ **How to Register and Configure Sun Cluster HA for Oracle Application Server**

Perform this procedure on one node of the cluster only.

This procedure assumes that you installed the data service packages during your initial Sun Cluster installation.

If you did not install the Sun Cluster HA for Oracle Application Server packages as part of your initial Sun Cluster installation, go to “[How to Install the Sun Cluster HA for Oracle Application Server Packages](#)” on page 29.

**1 On a cluster member, become superuser or assume a role that provides solaris.cluster.modify RBAC authorization.**

**2 Register the following resource types.**

```
# clresourcetype register SUNW.HAStoragePlus
# clresourcetype register SUNW.gds
```

**3 Create a failover resource group for Oracle Application Server.**

```
# clresourcegroup create -n nodelist oracle-application-server-resource-group
```

**4 Create a resource for the Oracle Application Server Logical Hostname.**

```
# clreslogicalhostname create -g oracle-application-server-resource-group \
> -h logical-hostname \
> logical-hostname-resource
```

**5 Create a resource for the Oracle Application Server Disk Storage.**

**a. If a ZFS highly available local file system is being used.**

```
# clresource create -g oracle-application-server-resource-group \
> -t SUNW.HAStoragePlus \
> -p Zpool=oracle-application-zspool \
> oracle-application-server-hastorage-resource
```

**b. If a cluster file system or a non ZFS highly available local file system is being used.**

```
# clresource create -g oracle-application-server-resource-group \
> -t SUNW.HAStoragePlus \
> -p FilesystemMountPoints=oracle-application-filesystem-mountpoint \
> oracle-application-server-hastorage-resource
```

**6 Enable the Resource Group.**

```
# clresourcegroup enable -M oracle-application-server-resource-group
```

**7 Create and register a resource for the Oracle Database and Listener.**

For complete information about creating and registering a cluster resource for the Oracle Database and Listener, refer to *Sun Cluster Data Service for Oracle Guide for Solaris OS*.

**8 Create and register resources for the Oracle 9iAS Infrastructure.**

To create and register resources for Oracle Application Server 10g Infrastructure, refer to [Step 10](#)



Edit `/opt/SUNWsc9ias/util/9ias_config` and follow the comments within that file. After you have edited `9ias_config`, you must register the resource.

```
# cd /opt/SUNWsc9ias/util
# vi 9ias_config
# ./9ias_register
```

## 9 Enable the Oracle 9iAS Infrastructure resources.

```
# clresource enable -g oracle-application-resource-group +
```

## 10 Create and register resources for the Oracle Application Server 10g Infrastructure.

Edit `/opt/SUNWsc9ias/util/10gas_config` and follow the comments within that file. After you have edited `10gas_config`, you must register the resource.

```
# cd /opt/SUNWsc9ias/util
# vi 10gas_config
# ./10gas_register
```

The following listing has been taken from the deployment example, [Step 4](#), which can be found in [Appendix A, “Deployment Example: Installing Oracle Application Server in Zones”](#) and shows `/opt/SUNWsc9ias/util/10gas_config` that has been edited to configure a cluster resource for Oracle Application Server 10g Infrastructure.

```
Vigor5# cat > /opt/SUNWsc9ias/util/10gas_config <<-EOF
RG=oas10g-rg
RS_OPMN=oas10g-opmn
RS_EM=oas10g-em
```

```
ORACLE_HOME=/ZFSoracle/oraInfra
ORACLE_SID=orcl
OIAS_LHOST=oas10g
OIAS_USER=oracle
OIAS_ADMIN=dummy
OIAS_INFRA=/var/opt/oracle
OIAS_FQDN=dummy
OIAS_OPMN=all
```

```
RS_LH=oas10g-lh
RS_HAS=oas10g-ZFShas
RS_ORACLE=oas10g-ora
RS_ORALSR=oas10g-lsr
EOF
```

```
Vigor5# /opt/SUNWsc9ias/util/10gas_register
```

## 11 Enable the Oracle Application Server 10g Infrastructure resources.

```
# clresource enable -g oracle-application-server-resource-group +
```

The following listing has been taken from the deployment example, [Step 4](#), which can be found in [Appendix A](#), “Deployment Example: Installing Oracle Application Server in Zones”.

```
Vigor5# clresource enable -g oas10g-rg +
```

## Verifying the Sun Cluster HA for Oracle Application Server Installation and Configuration

This section contains the procedure you need to verify that you installed and configured your data service correctly.

### ▼ How to Verify the Sun Cluster HA for Oracle Application Server Installation and Configuration

- 1 On a cluster member, become superuser or assume a role that provides `solaris.cluster.modify RBAC authorization`.
- 2 Ensure all the Oracle Application Server resources are online.  

```
# cluster status
```

Enable any Oracle Application Server resources that are not online.  

```
# clresource enable oracle-application-server-resource
```
- 3 Switch the Oracle Application Server resource group to another cluster node or node:zone.  

```
# clresourcegroup switch -n node[:zone] oracle-application-server-resource-group
```

## Upgrading Sun Cluster HA for Oracle Application Server

Upgrade the Sun Cluster HA for Oracle Application Server data service if the following conditions apply:

- You are upgrading from an earlier version of the Sun Cluster HA for Oracle Application Server data service.
- You need to use the new features of this data service.

## ▼ How to Upgrade to the New Version of Sun Cluster HA for Oracle Application Server

Perform steps 1, 2, 3, 6 and 7 if you have an existing Sun Cluster HA for Oracle Application Server deployment and wish to upgrade to the new version. Complete all steps if you need to use the new features of this data service.

---

**Note** – If you intend to run all steps, you should consider if your current Oracle Application Server resources have been modified to have specific timeout values that suit your deployment. If timeout values were previously adjusted you should reapply those timeout values to your new Oracle Application Server resources.

---

- 1 On a cluster member, become superuser or assume a role that provides `solaris.cluster.modify` RBAC authorization.**
- 2 Disable the Oracle Application Server resources.**  
`# clresource disable oracle-application-server-resource`
- 3 Install the new version of Sun Cluster HA for Oracle Application Server to each cluster.**  
Refer to [“How to Install the Sun Cluster HA for Oracle Application Server Packages”](#) on page 29 for more information.
- 4 Delete the Oracle Application Server resources, if you want to use new features that have been introduced in the new version of Sun Cluster HA for Oracle Application Server.**  
`# clresource delete oracle-application-server-resource`
- 5 Reregister the Oracle Application Server resources, if you want to use new features that have been introduced in the new version of Sun Cluster HA for Oracle Application Server.**  
Refer to [“How to Register and Configure Sun Cluster HA for Oracle Application Server”](#) on page 31 for more information.
- 6 Upgrading from Oracle 9iAS Application Server.**  
If you are upgrading from Oracle 9iAS Application Server version 9.0.2 or 9.0.3, you will need to perform these additional tasks.

**Note** – You must repeat the steps below as the logical host interpositioning filename and variable names have changed. You will be changing the following:

LHOSTNAME to SC\_LHOSTNAME.

libloghost\_32.so.1 to libschohost.so.1.

---

The following steps to be repeated are from [Step 9](#) in “How to Install and Configure Oracle Application Server” on page 13.

**a. Enable logical host interpositioning by repeating [Step a](#).**

Complete all of [Step a](#).

**b. Edit `$ORACLE_HOME/Apache/Apache/bin/apachectl` by repeating [Step c](#).**

Within [Step c](#), you must modify your existing `$ORACLE_HOME/Apache/Apache/bin/apachectl`.

There is no requirement to run `$ORACLE_HOME/root.sh`.

**c. Edit `$ORACLE_HOME/opmn/conf/opmn.xml` by repeating [Step g](#).**

Within [Step g](#), you must modify your existing `$ORACLE_HOME/opmn/conf/opmn.xml`.

There is no requirement to run `$ORACLE_HOME/root.sh`.

**7 Enable the Oracle Application Server resources**

If you have only performed steps 1, 2 and 3 you will need to re-enable the Oracle Application Server resources.

```
# clresource enable oracle-application-server-resource
```

## Understanding the Sun Cluster HA for Oracle Application Server Fault Monitor

This section describes the Sun Cluster HA for Oracle Application Server fault monitor probing algorithm or functionality, states the conditions, and recovery actions associated with unsuccessful probing.

For conceptual information on fault monitors, see the *Sun Cluster Concepts Guide*.

## Resource Properties

The Sun Cluster HA for Oracle Application Server fault monitor uses the same resource properties as resource type `SUNW.gds`. Refer to the `SUNW.gds(5)` man page for a complete list of resource properties used.

## Probing Algorithm and Functionality

The Sun Cluster HA for Oracle Application Server fault monitor is controlled by the extension properties that control the probing frequency. The default values of these properties determine the preset behavior of the fault monitor. The preset behavior should be suitable for most Sun Cluster installations. Therefore, you should tune the Sun Cluster HA for Oracle Application Server fault monitor *only* if you need to modify this preset behavior.

- Setting the interval between fault monitor probes (`Thorough_probe_interval`)
- Setting the timeout for fault monitor probes (`Probe_timeout`)
- Setting the number of times the fault monitor attempts to restart the resource (`Retry_count`)

The Sun Cluster HA for Oracle Application Server fault monitor checks the broker and other components within an infinite loop. During each cycle the fault monitor will check the relevant component and report either a failure or success.

If the fault monitor is successful it returns to its infinite loop and continues the next cycle of probing and sleeping.

If the fault monitor reports a failure a request is made to the cluster to restart the resource. If the fault monitor reports another failure another request is made to the cluster to restart the resource. This behavior will continue whenever the fault monitor reports a failure.

If successive restarts exceed the `Retry_count` within the `Thorough_probe_interval` a request to failover the resource group onto a different node or zone is made.

## Operations of the Oracle 9iAS Application Server Probe

The Oracle 9iAS Application Server probe checks the following:

- Test whether the `OIDMON` process is running. If this fails, then the probe will restart the `OIDMON` resource.
- Test whether the directory service is available by running `$ORACLE_HOME/bin/ldapsearch`. If this fails, then the probe will issue a half failure as usually the Oracle Internet Directory Monitor `OIDMON` process will restart the Oracle Internet Directory Process `OIDLDAP`. If at the next probe cycle the test fails again then another half failure is issued. If two half failures are issued by successive probes, then the probe will restart the `OIDLDAP` resource.

- Test whether each managed OPMN component reported by `$ORACLE_HOME/dcm/bin/dcmctl getsstate -v` is Up. If this fails, then the probe will try to restart the OPMN component. However, in reality the OPMN process is responsible for restarting these components. If the OPMN probe tries to restart the OPMN component and the OPMN process has already tried to start the OPMN component then the duplicate restart will simply be ignored.

## Operations of the Oracle Application Server 10g Probe

The Oracle Application Server 10g probe checks the following:

- Test whether OPMN is working by `$ORACLE_HOME/opmn/bin/opmnctl status`. If this fails, then the probe will report an error and request a restart.
- Test whether the EM status is EMD is up and running. If this fails, then the probe will restart the EM resource.

# Debug Sun Cluster HA for Oracle Application Server

## ▼ How to turn on debug for Sun Cluster HA for Oracle Application Server

Sun Cluster HA for Oracle Application Server can be used by multiple Oracle Application Server instances. It is possible to turn debug on for all Oracle Application Server instances or a particular Oracle Application Server instance.

`/opt/SUNWsc9ias/etc/config` allows you to turn on debug for all Oracle Application Server instances or for a specific Oracle Application Server instance on a particular node or zone within the cluster. If you require debug to be turned on for Sun Cluster HA for Oracle Application Server across the whole cluster, repeat this step on all nodes within the cluster.

- 1 **Edit** `/etc/syslog.conf` and change `daemon.notice` to `daemon.debug`.

```
# grep daemon /etc/syslog.conf
*.err;kern.debug;daemon.notice;mail.crit      /var/adm/messages
*.alert;kern.err;daemon.err                  operator
#
```

Change the `daemon.notice` to `daemon.debug` and restart `syslogd`. Note that the output below, from `grep daemon /etc/syslog.conf`, shows that `daemon.debug` has been set.

```
# grep daemon /etc/syslog.conf
*.err;kern.debug;daemon.debug;mail.crit      /var/adm/messages
*.alert;kern.err;daemon.err                  operator
```

Restart the syslog daemon.

**a. If running Solaris 9**

```
# pkill -1 syslogd
```

**b. If running Solaris 10**

```
# svcadm disable system-log
```

```
# svcadm enable system-log
```

**2 Edit /opt/SUNWsc9ias/etc/config.**

Perform this step for each component that requires debug output, on each node of Sun Cluster as required.

Edit /opt/SUNWsc9ias/etc/config and change DEBUG= to DEBUG=ALL or DEBUG=sun-cluster-resource.

```
# cat /opt/SUNWsc9ias/etc/config
#
# Copyright 2006 Sun Microsystems, Inc. All rights reserved.
# Use is subject to license terms.
#
# ident "@(#)config 1.1 06/03/03 SMI"
#
# Usage:
#     DEBUG=<RESOURCE_NAME> or ALL
#
DEBUG=ALL
```

---

**Note** – To turn off debug, reverse the steps above.

---





# Deployment Example: Installing Oracle Application Server in Zones

---

This appendix presents a complete example of how to install and configure a Oracle Application Server in zones. It presents a single node cluster configuration. If you need to install the application in any other configuration, refer to the general-purpose procedures presented elsewhere in this manual.

## Target Cluster Configuration

This example uses a single node cluster with the following node and zone names:

- Vigor5      The physical node, which owns the file system.
- Vigor5:z1    A whole root zone named z1.
- Vigor5:z2    A whole root zone named z2.

## Software Configuration

This deployment example uses the following software products and versions:

- Solaris 10 6/06 software for SPARC or x86 platforms
- Sun Cluster 3.2 core software
- Sun Cluster HA for Oracle data service
- Sun Cluster HA for Oracle Application Server data service
- Oracle Application Server 10g version 10.1.2 for Solaris x86-64

This example assumes that you have already installed and established your cluster. It illustrates the installation and configuration of the data service application only.

## Assumptions

The instructions in this example were developed with the following assumptions:

- **Shell environment:** All commands and the environment setup in this example are for the Korn shell environment. If you use a different shell, replace any Korn shell-specific information or instructions with the appropriate information for your preferred shell environment.
- **User login:** Unless otherwise specified, perform all procedures as superuser or assume a role that provides `solaris.cluster.admin`, `solaris.cluster.modify`, and `solaris.cluster.read` RBAC authorization.

## Installing Oracle Application Server in Zones

---

**Note** – This deployment example is designed for a single node cluster. It is provided simply as a concise guide to help you if you need to refer to an installation and configuration of Oracle Application Server.

This deployment example is *not* meant to be a precise guide to install and configure Oracle Application Server.

If you need to install Oracle Application Server in any other configuration, refer to the general purpose procedures elsewhere in this manual.

---

The instructions with this deployment example assume that you are using the Oracle Application Server 10g version 10.1.2 for Solaris x86–64 platform and will configure Oracle Application Server on a ZFS highly available local file system.

The tasks you must perform to install and configure Oracle Application Server in the zones are as follows:

- “[Example: Prepare the Cluster for Oracle Application Server](#)” on page 43
- “[Example: Configure zones z1 and z2 for Oracle Application Server](#)” on page 43
- “[Example: Install Oracle Application Server in the zones](#)” on page 45
- “[Example: Verify Oracle Application Server](#)” on page 47
- “[Example: Configure Cluster Resources for Oracle Application Server](#)” on page 50
- “[Example: Enable the Oracle Application Server Software to Run in the Cluster](#)” on page 50
- “[Example: Verify the Sun Cluster HA for Oracle Application Server Resource Group](#)” on page 51

## ▼ Example: Prepare the Cluster for Oracle Application Server

Perform all steps within this example in the global zone.

- 1 **Install and configure the cluster as instructed in *Sun Cluster Software Installation Guide for Solaris OS*.**

Install the following cluster software components.

- Sun Cluster core software
- Sun Cluster HA for Oracle data service
- Sun Cluster HA for Oracle Application Server data service

- 2 **Install and configure a Zettabyte file system.**

Create a ZFS pool.

---

**Note** – The following `zpool` definition represents a very basic configuration for deployment on a single node cluster.

You should *not* consider this example for use within a productive deployment, instead it is a very basic configuration for testing or development purposes only.

---

```
Vigor5# zpool create -m /ZFSoracle HAZpool4 c1t6d0
```

- 3 **Add the Oracle Application Server logical hostname to `/etc/hosts` and `/etc/inet/ipnodes`.**

```
Vigor5# cat >> /etc/hosts <<-EOF
192.168.1.153    oas10g.uk.sun.com oas10g
EOF
Vigor5# cat >> /etc/inet/ipnodes <<-EOF
192.168.1.153    oas10g.uk.sun.com oas10g
EOF
```

## ▼ Example: Configure zones `z1` and `z2` for Oracle Application Server

- 1 **On local storage create a directory for the non-global zones root path.**

```
Vigor5# mkdir /zones
```

- 2 Create a temporary file for the whole root zones, for example /tmp/z1 and /tmp/z2, and include the following entries:**

```
Vigor5# cat > /tmp/z1 <<-EOF
create -b
set zonepath=/zones/z1
EOF
Vigor5# cat > /tmp/z2 <<-EOF
create -b
set zonepath=/zones/z2
EOF
```

- 3 Configure the non-global zones, using the files you created.**

```
Vigor5# zonecfg -z z1 -f /tmp/z1
Vigor5# zonecfg -z z2 -f /tmp/z2
```

- 4 Install the zones.**

Open two windows and issue the following command in each window.

```
Vigor5# zoneadm -z z1 install
Vigor5# zoneadm -z z2 install
```

- 5 Boot the zones.**

```
Vigor5# zoneadm -z z1 boot
Vigor5# zoneadm -z z2 boot
```

- 6 Log in to the zones and complete the zone system identification.**

```
Vigor5# zlogin -C z1
Vigor5# zlogin -C z2
```

- 7 Close the terminal window and disconnect from the zone consoles.**

After you have completed the zone system identification, disconnect from the window your previously opened.

```
Vigo5# ~.
```

- 8 Import the ZFS pool into zone z1.**

Perform this step in the global zone only.

```
Vigor5# zpool export -f HAZpool4
Vigor5# zpool import -R /zones/z1/root HAZpool4
```

- 9 Add the Oracle Application Server logical hostname to /etc/hosts in the zones.**

```
Vigor5# zlogin z1
# cat >> /etc/hosts <<-EOF
192.168.1.153 oas10g.uk.sun.com oas10g
EOF
```

```
# exit
Vigor5# zlogin z2
# cat >> /etc/hosts <<-EOF
192.168.1.153    oas10g.uk.sun.com oas10g
EOF
# exit
```

## 10 Create the Oracle Application Server userid in the zones.

Perform this step from the global zone .

```
Vigor5# zlogin z1
# mkdir -p /ZFSoracle/oraInfra
# groupadd -g 3000 dba
# useradd -u 4000 -g 3000 -d /ZFSoracle/oraInfra -s /usr/bin/ksh oracle
# exit
Vigor5# zlogin z2
# groupadd -g 3000 dba
# useradd -u 4000 -g 3000 -d /ZFSoracle/oraInfra -s /usr/bin/ksh oracle
# exit
```

## 11 Setup file permissions in the ZFS pool.

Perform this step in zone z1 only.

```
Vigor5# zlogin z1
# chown -R oracle:dba /ZFSoracle
# exit
```

## 12 Plumb the Oracle Application Server logical hostname in zone z1.

Perform this step in the global zone.

```
Vigor5# ifconfig e1000g0 addif oas10g up zone z1
```

# ▼ Example: Install Oracle Application Server in the zones



**Caution** – The steps within this procedure are *not* precise steps to install Oracle Application Server. Refer to the relevant Oracle Application Server documentation for complete information.

## 1 Mount the Oracle Application Server software in the zones.

Perform this step in the global zone only.

In this example, the Oracle Application Server software has been copied to node Vigor5 into directory `/export/software/oracle/oasv1012`.

```
Vigor5# zlogin z1 mkdir -p /var/tmp/software
Vigor5# mount -F lofs /export/software /zones/z1/root/var/tmp/software
```

## 2 Install the Oracle Application Server software in zone z1.

Perform this step from the global zone for zone z1.

---

**Note** – The values specified here were those used by this deployment example. You should specify values that are relevant to your installation.

---

While navigating through the Oracle Universal Installer specify the following:

- Enter `/ZFSoracle/oraInventory` for the inventory directory.
- Enter `OH_INFRA` as the name for the installation.
- Enter `/ZFSoracle/oraInfra` for the Oracle home directory.
- Select Oracle Application Server Infrastructure 10g 10.1.2.0.2.
- Select High Availability and Replication.
- Select Virtual host.
- Select Custom Namespace.
- Enter `dc=uk,dc=sun,dc=com` for the namespace.
- Enter `oas10g.uk.sun.com` for the virtual host.
- Enter `orcl.uk.sun.com` global database name.

```
Vigor5# /usr/openwin/bin/xhost +
Vigor5# zlogin z1
# su - oracle
$ DISPLAY=192.168.1.5:0.0
$ TMP=/tmp
$ export DISPLAY TMP
$ cd /var/tmp/software/oracle/oasv1012/cd1
$ ./runInstaller
```

## 3 Setup the Oracle Application Server userid .profile.

Perform this step after you have completed the installation of the Oracle Application Server software in zone z1 as user oracle.

```
$ cat >> .profile <<-EOF
ORACLE_HOME=/ZFSoracle/oraInfra
ORACLE_SID=orcl
export ORACLE_HOME ORACLE_SID
EOF
$ exit
# exit
```

**4 Copy /var/opt/oracle from zone z1 to z2.**

Perform this step in the global zone only.

```
Vigor5# cp -rp /zones/z1/root/var/opt/oracle /zones/z2/root/var/opt/oracle
```

**▼ Example: Verify Oracle Application Server****1 Verify the Oracle Application Server 10g Infrastructure.**

```
Vigor5# zlogin z1
# su - oracle
$ $ORACLE_HOME/bin/emctl status iasconsole
TZ set to GB
```

```
Oracle Enterprise Manager 10g Application Server Control Release 10.1.2.0.2
Copyright (c) 1996, 2005 Oracle Corporation. All rights reserved.
http://oas10g.uk.sun.com:1156/emd/console/aboutApplication
Oracle Enterprise Manager 10g Application Server Control is running.
```

```
-----
Logs are generated in directory /ZFSoracle/oraInfra/sysman/log
$ $ORACLE_HOME/opmn/bin/opmnctl status
```

```
Processes in Instance: IAS.oas10g.uk.sun.com
```

```
-----+-----+-----+-----
ias-component      | process-type      | pid | status
-----+-----+-----+-----
LogLoader          | logloaderd        | N/A | Down
dcm-daemon         | dcm-daemon        | 6135 | Alive
DSA                | DSA               | N/A | Down
OC4J               | OC4J_SECURITY     | 4781 | Alive
HTTP_Server        | HTTP_Server       | 4546 | Alive
OID                | OID               | 4558 | Alive
```

**2 Stop the 10g Infrastructure.**

Perform this step as user oracle in zone z1.

```
$ $ORACLE_HOME/bin/emctl stop iasconsole
$ $ORACLE_HOME/opmn/bin/opmnctl stopall
```

**3 Stop the Oracle Database and Listener.**

Perform this step as user oracle in zone z1.

```
$ $ORACLE_HOME/bin/lsnrctl stop
$ $ORACLE_HOME/bin/sqlplus "/ as sysdba"
SQL> shutdown immediate
SQL> quit
$ exit
```

**4 Relocate the Oracle Application Server logical hostname to zone z2.**

Perform this step as user root in the global zone .

```
Vigor5# ifconfig e1000g0 removeif oas10g
Vigor5# ifconfig e1000g0 addif oas10g up zone z2
```

**5 Relocate the ZFS pool to zone z2.**

Perform this step as user root in the global zone .

```
Vigor5# zpool export -f HAZpool4
Vigor5# zpool import -R /zones/z2/root HAZpool4
```

**6 Start the Oracle Database and Listener in zone z2.**

```
Vigor5# zlogin z2
# su - oracle-application-server-userid
$ $ORACLE_HOME/bin/lsnrctl start
$ $ORACLE_HOME/bin/sqlplus "/" as sysdba"
SQL> startup
SQL> quit
```

**7 Start the Oracle Application Server Infrastructure in zone z2.**

Perform this step as user oracle in zone z2.

```
$ $ORACLE_HOME/opmn/bin/opmnctl startall
$ $ORACLE_HOME/bin/emctl start iasconsole
```

**8 Verify the Oracle Application Server 10g Infrastructure.**

Perform this step as user oracle in zone z2.

```
$ $ORACLE_HOME/bin/emctl status iasconsole
TZ set to GB
```

```
Oracle Enterprise Manager 10g Application Server Control Release 10.1.2.0.2
Copyright (c) 1996, 2005 Oracle Corporation. All rights reserved.
http://oas10g.uk.sun.com:1156/emd/console/aboutApplication
Oracle Enterprise Manager 10g Application Server Control is running.
```

```
-----
Logs are generated in directory /ZFSoracle/oraInfra/sysman/log
$ $ORACLE_HOME/opmn/bin/opmnctl status
```

```
Processes in Instance: IAS.oas10g.uk.sun.com
```

```
-----+-----+-----+-----
ias-component | process-type | pid | status
-----+-----+-----+-----
LogLoader    | logloaderd   | N/A | Down
dcm-daemon   | dcm-daemon   | 14170 | Alive
DSA          | DSA          | N/A | Down
OC4J         | OC4J_SECURITY | 14054 | Alive
```



HTTP_Server	HTTP_Server	14012	Alive
OID	OID	14017	Alive

## 9 Setup Oracle Database Permissions.

Perform this step as user oracle in zone z2.

```
$ $ORACLE_HOME/bin/sqlplus "/ as sysdba"
SQL> grant connect, resource to homer identified by springfield;
SQL> alter user homer default tablespace system quota 1m on system;
SQL> grant select on v_$sysstat to homer;
SQL> grant select on v_$archive_dest to homer;
SQL> grant create session to homer;
SQL> grant create table to homer;
SQL> exit;
$ chmod 6751 $ORACLE_HOME/bin/oracle
```

## 10 Stop the Oracle Application Server 10g Infrastructure.

Perform this step as user oracle in zone z2.

```
$ $ORACLE_HOME/bin/emctl stop iasconsole
$ $ORACLE_HOME/opmn/bin/opmnctl stopall
```

## 11 Stop the Oracle Database and Listener.

Perform this step as user oracle in zone z2.

```
$ $ORACLE_HOME/bin/lsnrctl stop
$ $ORACLE_HOME/bin/sqlplus "/ as sysdba"
SQL> shutdown immediate
SQL> quit
$ exit
# exit
```

## 12 Unplumb the Infrastructure logical IP address .

Perform this step as user root in the global zone .

```
Vigor5# ifconfig e1000g0 removeif oas10g
```

## 13 Export the ZFS pool.

Perform this step as user root in the global zone .

```
Vigor5# zpool export -f HAZpool4
```

## ▼ Example: Configure Cluster Resources for Oracle Application Server

Perform all steps within this example in the global zone.

### 1 Register the required resource types.

```
Vigor5# clresourcetype register SUNW.HASStoragePlus
Vigor5# clresourcetype register SUNW.gds
Vigor5# clresourcetype register SUNW.oracle_server
Vigor5# clresourcetype register SUNW.oracle_listener
```

### 2 Create the resource group.

```
Vigor5# clresourcegroup create -n Vigor5:z1,Vigor5:z2 oas10g-rg
```

### 3 Create the logical hosts.

```
Vigor5# clreslogicalhostname create -g oas10g-rg -h oas10g oas10g-lh
```

### 4 Create the HASStoragePlus resource in the wmq1-rg resource group.

```
Vigor5# clresource create -g oas10g-rg -t SUNW.HASStoragePlus \
> -p Zpools=HAZpool4 oas10g-ZFShas
```

### 5 Enable the resource group.

```
Vigor5# clresourcegroup online -M oas10g-rg
```

## ▼ Example: Enable the Oracle Application Server Software to Run in the Cluster

Perform all steps within this example in the global zone.

### 1 Create the Oracle Database cluster resource.

The Oracle permissions were previously setup in [Step 9](#) from “[Example: Verify Oracle Application Server](#)” on page 47.

```
Vigor5# clresource create -g oas10g-rg -t SUNW.oracle_server \
-p Connect_string=homer/springfield \
-p ORACLE_SID=orcl \
-p ORACLE_HOME=/ZFSoracle/oraInfra \
-p Alert_log_file=/ZFSoracle/oraInfra/admin/orcl/bdump/alert_orcl.log \
-p Restart_type=RESOURCE_GROUP_RESTART \
-p Resource_dependencies=oas10g-ZFShas \
oas10g-ora
```

**2 Create the Oracle Listener cluster resource.**

```
Vigor5# clresource create -g oas10g-rg -t SUNW.oracle_listener \
-p LISTENER_NAME=listener \
-p ORACLE_HOME=/ZFSoracle/oraInfra \
-p Resource_dependencies=oas10g-ZFShas \
oas10g-lsr
```

**3 Enable the Oracle Database and Listener cluster resources.**

```
Vigor5# clresource enable -g oas10g-rg +
```

**4 Create and enable the Oracle Application Server cluster resource.**

```
Vigor5# cat > /opt/SUNWsc9ias/util/10gas_config <<-EOF
RG=oas10g-rg
RS_OPMN=oas10g-opmn
RS_EM=oas10g-em

ORACLE_HOME=/ZFSoracle/oraInfra
ORACLE_SID=orcl
OIAS_LHOST=oas10g
OIAS_USER=oracle
OIAS_ADMIN=dummy
OIAS_INFRA=/var/opt/oracle
OIAS_FQDN=dummy
OIAS_OPMN=all

RS_LH=oas10g-lh
RS_HAS=oas10g-ZFShas
RS_ORACLE=oas10g-ora
RS_ORALSR=oas10g-lsr
EOF
Vigor5# /opt/SUNWsc9ias/util/10gas_register
Vigor5# clresource enable -g oas10g-rg +
```

## ▼ Example: Verify the Sun Cluster HA for Oracle Application Server Resource Group

Perform this step in the global zone.

- Switch the Oracle Application Server resource group between the two zones.

```
Vigor5# for node in Vigor5:z2 Vigor5:z1
do
    clrg switch -n $node oas10g-rg
```

```
clrg status oas10g-rg  
done
```

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---

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