

Cluster Server Agent for Oracle GoldenGate Installation and Configuration Guide

AIX, Linux, Solaris

8.0.2

Veritas InfoScale™ Availability Agents

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https://sort.veritas.com/data/support/SORT_Data_Sheet.pdf

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Introducing the agent for Oracle GoldenGate

This chapter includes the following topics:

- [About the agent for Oracle GoldenGate](#)
- [Supported software](#)
- [Typical Oracle GoldenGate setup in a Cluster Server cluster](#)
- [Oracle GoldenGate agent functions](#)

About the agent for Oracle GoldenGate

The Cluster Server agent for Oracle GoldenGate provides failover and recovery support for Oracle databases that are protected by the Oracle GoldenGate replication feature in a VCS global cluster.

The agent supports an active-passive bi-directional configuration in which Oracle GoldenGate replicates data from an active primary database to a full replica database on a live standby system. The standby system is ready for a fail over during planned and unplanned outages.

The agent also provides support for Oracle databases that are protected by the Oracle GoldenGate replication feature in a single node cluster. The agent supports unidirectional configurations in which Oracle GoldenGate replicates data from an active primary database to a full replica database on the same system. The agent supports multiple PDBs. The agent does not provide failover and recovery support in a single node cluster configuration.

The agent also supports Oracle PDBs on Red Hat Enterprise Linux (RHEL) platforms.

Considerations to be made for GoldenGate configurations with this agent:

- The agent does not support HA for the Replicat process. If Replicat is configured on multiple systems in a cluster, GoldenGate might duplicate the records in the database.
- The agent requires the trail files that are used for GoldenGate replication to be located on the shared disk.
- The agent does not support the default configuration for Oracle 12c when GoldenGate is installed on the shared disk.

Supported software

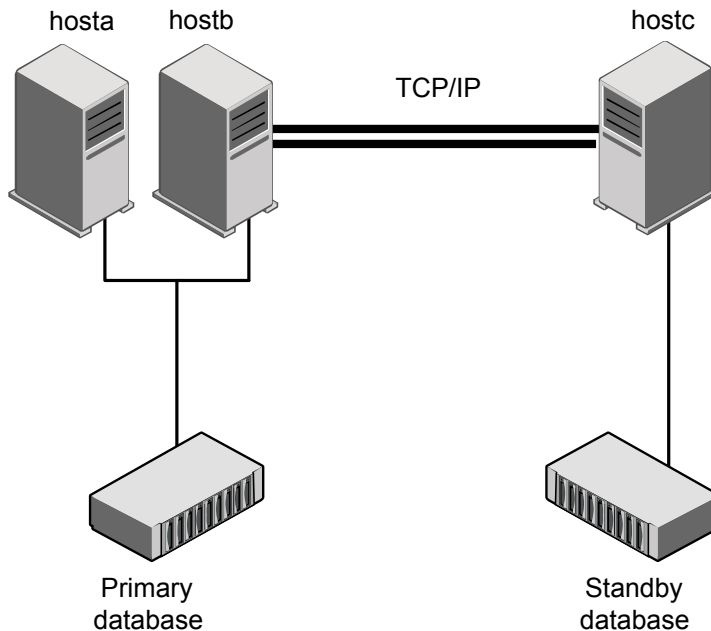
For information on the software versions that the InfoScale (VCS) agent for GoldenGate supports, see the Veritas Services and Operations Readiness Tools (SORT) site:

<https://sort.veritas.com/agents>

Typical Oracle GoldenGate setup in a Cluster Server cluster

Figure 1-1 displays a typical cluster setup in a GoldenGate environment.

Figure 1-1 Typical clustering setup for the agent



Clustering in a GoldenGate environment typically consists of the following hardware infrastructure:

- The primary database instance (db1) sends change records data across a TCP/IP link to a live standby database instance (db2) using Oracle GoldenGate. A local cluster protects the primary database and makes it highly available.
- The live standby database instance applies the redo information to a physical copy of the primary database using Oracle GoldenGate Replicat.
- The primary and live standby sites must be connected through a single TCP/IP network connection. This link can be shared with VCS global clusters for heartbeat communication.
- Network heartbeating between the two data centers to determine their health; this network heartbeating could be TCP/IP.

Oracle GoldenGate agent functions

The Oracle GoldenGate agent monitors and manages the state of replicated Oracle Database that runs on Cluster Server nodes. Agent functions bring resources online, take them offline, and perform different monitoring actions.

online	<p>The agent starts the specified Extract and data pump, if configured.</p> <p>The agent runs the following Oracle GoldenGate command to start the Extract:</p> <pre>START EXTRACT EXTRACT</pre> <p>See “About the agent's online function” on page 10.</p>
offline	<p>Removes the lock file that was created for the resource by the online function.</p> <p>The agent does not run any Oracle GoldenGate commands because taking the resource offline is not indicative of the intention to stop Extract.</p> <p>Note: The offline function stops the GoldenGate replication. Transactions that take place in the Oracle database after the GoldenGate resource is offline might cause data loss.</p>
monitor	<p>Verifies the status of the Extract and takes the following action:</p> <ul style="list-style-type: none"> ■ If the Extract status is RUNNING, the monitor function reports the status of the resource as online. ■ If the Extract status is STOPPED, the monitor function reports the status of the resource as offline. ■ If the Extract status is ABENDED, the monitor function reports the status of the resource as offline and reports a warning that the Extract is in the ABENDED state.
open	<p>The agent verifies the status of the Extract.</p> <p>The agent does not verify the Extract status if the agent was started after running the following command:</p> <pre>hastop<-all -local> -force</pre>
clean	<p>Determines if it is safe to fault the resource when the online function fails or times out.</p>
action/StartExtract	<p>Starts the specified Extract and data pump, if configured, with the following command:</p> <pre>START EXTRACT EXTRACT.</pre>
action/StopExtract	<p>Runs internally during a planned switchover operation.</p> <p>This action function stops the specified Extract and data pump, if configured, with the following command:</p> <pre>STOP EXTRACT EXTRACT.</pre>
action/StartReplicat	<p>Runs internally during a planned switchover operation.</p> <p>This action function starts the specified Replicat with the following command:</p> <pre>START REPLICAT REPLICAT.</pre> <p>Note: For a single node cluster configuration, this action function starts remote Replicat.</p>

action/StopReplicat	<p>Stops the specified Replicat with the following command:</p> <pre>STOP REPLICAT REPLICAT.</pre> <p>Note: For a single node cluster configuration, this action function stops remote Replicat.</p>
action/GGStatus	<p>Displays the status of the Extract, Replicat, Oracle database, and data pump, if configured.</p>
action /GetExtractLag	<p>Runs internally for calculating the RPO.</p> <p>This action function uses the following command to get the lag of the specified Extract and data pump, if configured</p> <pre>LAG EXTRACT EXTRACT.</pre>
action/GetCurrentRPO	<p>Fetches the current point-in-time RPO in terms of lag of the Extract, Replicat, and data pump, if configured. Invoke this action function on the DR system.</p> <p>Note: The agent does not store the computed RPO; make a note of the RPO for future reference.</p> <p>This action function is not applicable for a single node cluster configuration.</p>

About the agent's online function

The agent checks whether the Oracle GoldenGate Manager process is running and if it is not, the agent attempts to start the process.

For a GCO cluster configuration

The agent also checks the status of the Extract that is configured in the GoldenGate resource and takes the following actions:

- If the state of the Extract is RUNNING, the agent comes online directly.
 - If the state of the Extract is STOPPED and the state of the Replicat is neither STOPPED nor ABENDED, the agent verifies that the state of the remote cluster is RUNNING. The agent then attempts to switch roles in the following manner:
 - If the state of the both the Extract and the Replicat is STOPPED, the agent checks the state of the remote Replicat. If the state of the remote Replicat is RUNNING, the agent performs a local failover operation. The agent starts the local Extract and data pump, if configured.
1. The agent calls the StopExtract action function on the remote cluster to stop the Extract from capturing logs on the remote database. The StopExtract function first verifies that there is no lag in the Extract and data pump, if configured, and then stops the Extract and data pump.

2. The agent verifies that there are no more records that the Replicat needs to process. The agent then stops the local Replicat.
3. The agent alters the local Extract on the local database, in order to begin capturing logs on the local database. The agent then starts the local Extract and data pump, if configured.
4. The agent calls the StartReplicat action function on the remote cluster. The Replicat starts on the remote database, and the Replicat accepts the changes that are captured from the Extract.

If the remote cluster state is not RUNNING, the agent considers it as a disaster to the primary database.

If the value of the AutoTakeover attribute is 0, the agent does not take any action.

If the value of the AutoTakeover attribute is 1, the agent performs the following steps to convert the local database to primary.

1. The agent verifies that there are no more records that the local Replicat needs to process. The agent then stops the local Replicat.
2. The agent alters the local Extract on the local database, in order to begin capturing logs on the local database. The agent then starts the local Extract. The local Extract then captures all the changes on the database during a disaster. These changes are applied on the failed primary when the primary comes back online.

After the direction of replication is successfully switched, the agent marks the status of the Oracle GoldenGate resource as online.

For a single node cluster configuration

The agent checks the status of the Extract that is configured in the GoldenGate resource and takes the following actions:

- If the state of the Extract is RUNNING, the agent comes online directly.
- If the state of the Extract is STOPPED, the agent starts the local Extract and attempts to start the remote Replicat.

Installing and removing the agent for Oracle GoldenGate

This chapter includes the following topics:

- [Before you install the agent for Oracle GoldenGate](#)
- [Installing the agent for Oracle GoldenGate](#)
- [Installing the agent IPS package on Oracle Solaris 11 systems](#)
- [Removing the agent for Oracle GoldenGate](#)
- [Upgrading the agent for Oracle GoldenGate](#)

Before you install the agent for Oracle GoldenGate

Before you install the agent for Oracle GoldenGate, ensure that the following prerequisites are met:

- Before you install the Cluster Server agent for Oracle GoldenGate, ensure that you install and configure the VCS on all nodes in the cluster..
- Install Oracle GoldenGate and set up Oracle GoldenGate replication between the Oracle databases and set up the required hardware infrastructure.
See [“Typical Oracle GoldenGate setup in a Cluster Server cluster”](#) on page 7.
- The agent for Oracle GoldenGate requires the GoldenGate Manager process to be running on the primary and live standby databases.

Installing the agent for Oracle GoldenGate

You must install the Oracle GoldenGate agent on each node in the cluster. In global cluster environments, install the agent on each node in each cluster.

To install the agent in a VCS environment

- 1 Download the Agent Pack from the Veritas Services and Operations Readiness Tools (SORT) site: <https://sort.veritas.com/agents>.
- 2 Log in as a superuser.
- 3 Install the package.

```
AIX      # installp -ac -d VRTSvcsogg.rte.bff VRTSvcsogg.rte

Linux    # rpm -ihv
          VRTSvcsogg-AgentVersion-Linux_GENERIC.noarch.rpm

Solaris  # pkgadd -d . VRTSvcsogg
```

Note: On successful installation of the agent, if VCS is running, the agent types definition is automatically added to the VCS configuration.

Installing the agent IPS package on Oracle Solaris 11 systems

To install the agent IPS package on an Oracle Solaris 11 system

- 1 Copy the `VRTSvcsogg.p5p` package from the `pkgs` directory to the system in the `/tmp/install` directory.
- 2 Disable the publishers that are not reachable as package install may fail, if any of the already added repositories are unreachable.

```
# pkg set-publisher --disable <publisher name>
```

where the publisher name is obtained using the `pkg publisher` command.

- 3 Add a file-based repository in the system.

```
# pkg set-publisher -g /tmp/install/VRTSvcsogg.p5p Veritas
```

- 4 Install the package.

```
# pkg install --accept VRTSvcsogg
```

- 5 Remove the publisher from the system.

```
# pkg unset-publisher Veritas
```

- 6 Enable the publishers that were disabled earlier.

```
# pkg set-publisher --enable <publisher name>
```

Removing the agent for Oracle GoldenGate

Before you attempt to remove the agent, make sure the application service group is not online.

You must remove the GoldenGate agent from each node in the cluster.

To uninstall the agent in a VCS environment

- ◆ To remove the agent, type the following command on each node. Answer prompts accordingly:

```
AIX          # installp -u VRTSvcsogg.rte
```

```
Linux        # rpm -e VRTSvcsogg
```

```
Solaris      # pkgrm VRTSvcsogg
```

Upgrading the agent for Oracle GoldenGate

You must upgrade the agent on each node in the cluster.

To upgrade the agent software

- 1 Save the VCS configuration and stop the VCS engine.

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

- 2 Stop the agent if it is running.

```
# haagent -stop GoldenGate -force -sys system
```

- 3 Verify the status of the agent and ensure that it is not running.

```
# haagent -display GoldenGate | grep Running
```

The command output resembles the following:

```
GoldenGate Running No
```

4 Upgrade the agent.

- For Linux, run the following command:

```
# rpm -Uvh VRTSvcsogg-AgentVersion-Linux_GENERIC.noarch.rpm
```

- For AIX and Solaris, do the following:

- Remove the agent from the node.
See [“Removing the agent for Oracle GoldenGate”](#) on page 14.
- Delete the file `/etc/VRTSvcs/conf/config/GoldenGateTypes.cf`.
- Install the latest version of the agent.
See [“Installing the agent for Oracle GoldenGate”](#) on page 13.
- If the agent types file was not added automatically on successful installation of the agent, add the agent types file.
To add the file, copy the file `GoldenGateTypes.cf` from the directory `/etc/VRTSvcs/conf/` to the `/etc/VRTSvcs/conf/config` directory.
- Repeat these four substeps that are mentioned earlier on each node.
- From a node in the cluster, edit your configuration file `/etc/VRTSvcs/conf/config/main.cf`.
Configure the new attributes, if applicable.
- Verify the configuration.

```
# hacf -verify config
```

5 Start the agent.

```
# haagent -start GoldenGate -sys system
```

6 Verify the status of the agent and ensure that it is running.

```
# haagent -display GoldenGate | grep Running
```

The command output resembles the following:

```
GoldenGate Running Yes
```

Configuring the agent for Oracle GoldenGate

This chapter includes the following topics:

- [Resource type definition and attributes for the GoldenGate agent](#)
- [Sample configuration for the GoldenGate agent](#)
- [Sample configuration for the GoldenGate agent for a single node cluster](#)
- [Sample configuration for the GoldenGate agent for Oracle PDBs](#)
- [Sample configuration for the GoldenGate agent for Oracle PDBs for a single node cluster](#)
- [Before you configure the agent for Oracle GoldenGate](#)
- [Configuring the VCS service group for GoldenGate](#)

Resource type definition and attributes for the GoldenGate agent

The resource type definition defines the agent in VCS.

The resource type definition for the GoldenGate agent is as follows:

```
type GoldenGate (
    static keylist SupportedActions = { StartExtract, StopExtract,
    StartReplicat, StopReplicat, GGStatus, GetExtractLag, GetCurrentRPO }
    static str ArgList[] = { LinkRes, GoldenGateHome, Extract, DataPump,
    Replicat, AutoTakeover, TLinkRes, TGoldenGateHome, TReplicat }
    str LinkRes
```



```

str GoldenGateHome = "/u01/app/oracle/product/gg"
str Extract
str DataPump
str Replicat
int AutoTakeover = 0
int ComputeDRSLA = 1
str TLinkRes
str TGoldenGateHome
str TReplicat
)

```

Review the description of the following agent attributes and assign values to the required attributes.

Table 3-1 Attributes for the Oracle GoldenGate agent

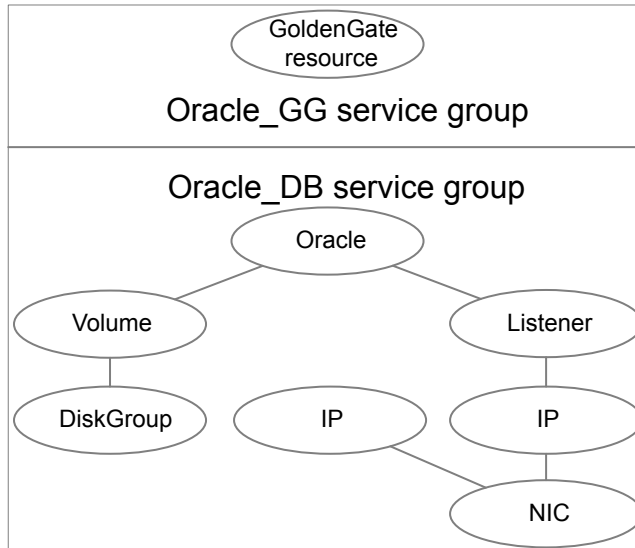
Attribute	Description
LinkRes	<p>Name of the Oracle resource that manages the replicated database instance.</p> <p>Type-dimension: string-scalar</p> <p>Example value: Oracle_res</p>
TLinkRes	<p>Name of the Oracle resource that manages the live standby replicated database instance.</p> <p>Type-dimension: string-scalar</p> <p>Example value: Oracle_res</p> <p>Note: This attribute is applicable for a single node cluster support.</p>
Extract	<p>Name of the Oracle GoldenGate Extract which captures changes in the database instance.</p> <p>Type-dimension: string-scalar</p> <p>Example value: PriEXT</p>
DataPump	<p>Name of the Oracle GoldenGate data pump.</p> <p>This is an optional attribute. Configure this attribute if data pump is configured in the Oracle GoldenGate replication configuration.</p> <p>Type-dimension: string-scalar</p> <p>Example value: PriDP</p>

Table 3-1 Attributes for the Oracle GoldenGate agent (*continued*)

Attribute	Description
Replicat	<p>Name of the Oracle GoldenGate Replicat which processes and applies the changes on the live standby database.</p> <p>Type-dimension: string-scalar</p> <p>Example value: StndbyREP</p> <p>Note: This attribute is not applicable for a single node cluster support.</p>
TReplicat	<p>Name of the Oracle GoldenGate Replicat process that is configured on the live standby database.</p> <p>Type-dimension: string-scalar</p> <p>Example value: TargetREP</p> <p>Note: This attribute is applicable for a single node cluster support.</p>
GoldenGateHome	<p>Location of the Oracle GoldenGate home directory.</p> <p>Type-dimension: string-scalar</p> <p>Default value: /u01/app/oracle/product/gg</p>
TGoldenGateHome	<p>Location of the Oracle GoldenGate home directory for the live standby database.</p> <p>Type-dimension: string-scalar</p> <p>Default value: ""</p> <p>Note: This attribute is applicable for a single node cluster support.</p>
AutoTakeover	<p>Indicates if the agent must bring the resource online on the live standby database when the primary database is not available.</p> <ul style="list-style-type: none"> ■ If the value of this attribute is set to 0, the agent does not bring the resource online on the live standby database when the primary database is not available. ■ If the value of this attribute is set to 1, the agent brings the resource online on the live standby database when the primary database is not available. <p>Type-dimension: integer-scalar</p> <p>Default value: 0</p> <p>Note: This attribute is not applicable for a single node cluster support.</p>
ComputeDRSLA	<p>Used to enable Recovery Point Objective (RPO) computation. This attribute cannot be edited.</p> <p>Type-dimension: integer-scalar</p> <p>Default value: 1</p>

Sample configuration for the GoldenGate agent

Figure 3-1 Sample dependency graph for a GCO cluster



The sample dependency graphs depict the resource types, resources, and resource dependencies within the service group. Cluster Server service group has a resource of type GoldenGate. A second service group contains all necessary resources to control the database instance. The Oracle_GG group depends on the Oracle_DB group, which is an online local hard group dependency.

Note the following variations to a standard Oracle database cluster configuration:

- The Oracle resource depends on the Listener resource. The listener process must be already active when the database instance is started.
- The IP and NIC resource in the database service group are optional. These resources are only necessary if a cluster on its own protects the primary database. For wide area or site failover, you can implement a transparent network client reconnect.
- If either the primary cluster or the remote cluster has more than one node, you must configure an IP resource for GoldenGate replication. If both the primary cluster and remote cluster have only a single node, configuring this IP resource is optional.
- The name of the GoldenGate resource must be the same in each global cluster configuration.

You can configure a resource of the GoldenGate type in the `main.cf` file.

Sample main.cf file for an Oracle GoldenGate agent configuration

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

cluster vcspri (
    UserNames = { admin = gJKcJEjGKfKKiSKeJH }
    Administrators = { admin }
    CounterInterval = 5
)

remoteclass vcsdr (
    ClusterAddress = "10.xxx.xx.xx"
)

heartbeat Icmp (
    ClusterList = { vcsdr }
    AYARetryLimit = 0
    Arguments @vcsdr = { "10.xxx.xx.xx" }
)

system orarep01 (
)

group ClusterService (
    SystemList = { orarep01 = 0 }
    AutoStartList = { orarep01 }
    OnlineRetryLimit = 3
    OnlineRetryInterval = 120
)

Application wac (
    StartProgram = "/opt/VRTSvcs/bin/wacstart"
    StopProgram = "/opt/VRTSvcs/bin/wacstop"
    MonitorProcesses = { "/opt/VRTSvcs/bin/wac" }
)

NIC csgnic (
    Device = eth0
)
```

```
wac requires csgnic

// resource dependency tree
//
// group ClusterService
// {
//   Application wac
//   {
//     NIC csgnic
//   }
// }

group db_OFFDG (
  SystemList = { orarep01 = 0 }
)

DiskGroup oradg (
  DiskGroup = oradg
)

Netlsnr LSNR_OFFDG (
  Owner = oracle
  Home = "/opt/oracle/app/oracle/product/11.2.0/Db_1"
  MonScript = "../bin/Netlsnr/LsnrTest.pl"
)

Mount oradb1 (
  MountPoint = "/oradb1"
  BlockDevice = "/dev/vx/dsk/oradg/oravol"
  FSType = vxfs
  FsckOpt = "-y"
)

Oracle OFFDG (
  Critical = 0
  Sid = OFFDG
  Owner = oracle
  Home = "/opt/oracle/app/oracle/product/11.2.0/Db_1"
  StartUpOpt = CUSTOM
  MonScript = "../bin/Oracle/SqlTest.pl"
)
```

```

    Volume oravol (
    DiskGroup = oradg
    Volume = oravol
    )

OFFDG requires oradb1
OFFDG requires LSNR_OFFDG
oradb1 requires oravol
oravol requires oradg

// resource dependency tree
//
// group db_OFFDG
// {
//   Oracle OFFDG
//   {
//     Netlsnr LSNR_OFFDG
//     Mount oradb1
//     {
//       Volume oravol
//       {
//         DiskGroup oradg
//       }
//     }
//   }
// }

group sw_OFFDG (
    SystemList = { orarep01 = 0 }
    ClusterList = { vcsPRI = 1, vcsDR = 0 }
    Authority = 1
    ClusterFailOverPolicy = Auto
)

GoldenGate O_goldengate (
    LinkRes = OFFDG
    GoldenGateHome = "/u01/app/oracle/product/GoldenGate"
    Extract = ext1
    DataPump = dpump1
    Replicat = repl
    AutoTakeover = 0
)
    
```

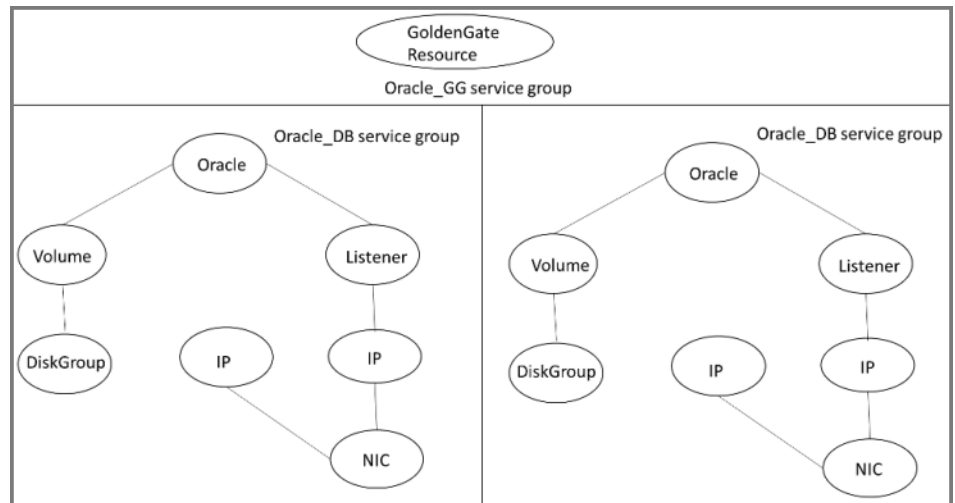
```
requires group db_OFFDG online local hard

// resource dependency tree
//
// group sw_OFFDG
// {
// GoldenGate O_goldengate
// }
```

Sample configuration for the GoldenGate agent for a single node cluster

The sample dependency graph depicts the resource types, resources, and resource dependencies within the service group. Oracle_GG service group has a resource of type GoldenGate. The Oracle_GG service groups contains all the necessary resources to control the primary and secondary database instances. The Oracle_GG group has an online-local-firm dependency on the primary database group and a online-local-soft dependency on the live standby database group.

Figure 3-2 Sample dependency graph for a single node cluster



Sample main.cf file for an Oracle GoldenGate agent configuration for a single node cluster

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

```

include "GoldenGateTypes.cf"

cluster vcspri (
UserNames = { admin = gJKcJEjGKfKKiSKeJH }
Administrators = { admin }
CounterInterval = 5
)

system orarep01 (
)

group db_OFFFDG1 (
SystemList = { orarep01 = 0 }
)

DiskGroup oradg (
DiskGroup = oradg
)

Netlsnr LSNR_OFFFDG1 (
Owner = oracle
Home = "/opt/oracle/app/oracle/product/11.2.0/Db_1"
MonScript = "../bin/Netlsnr/LsnrTest.pl"
)

Mount oradb1 (
MountPoint = "/oradb1"
BlockDevice = "/dev/vx/dsk/oradg/oravol"
FSType = vxfs
FsckOpt = "-y"
)

Oracle OFFFDG1 (
Sid = OFFFDG1
Owner = oracle
Home = "/u01/app/oracle/dbbase/dbhome"
StartUpOpt = STARTUP
DBName = OFFFDG1
)

Volume oravol (
DiskGroup = oradg

```



```

Volume = oravol
)

OFFDG1 requires oradb1
OFFDG1 requires LSNR_OFFDG1
oradb1 requires oravol
oravol requires oradg

group db_OFFDG2 (
SystemList = { orarep01 = 0 }
)

DiskGroup oradg2 (
DiskGroup = oradg2
)

Netlsnr LSNR_OFFDG2 (
Owner = oracle
Home = "/opt/oracle/app/oracle/product/11.2.0/Db_1"
MonScript = "../bin/Netlsnr/LsnrTest.pl"
)

Mount oradb2 (
MountPoint = "/oradb2"
BlockDevice = "/dev/vx/dsk/oradg2/oravol2"
FSType = vxfs
FsckOpt = "-y"
)

Oracle OFFDG2 (
Sid = OFFDG2
Owner = oracle
Home = "/u01/app/oracle/dbbase/dbhome"
StartUpOpt = STARTUP
DBName = OFFDG2
)

Volume oravol2 (
DiskGroup = oradg2
Volume = oravol2
)

```

```
OFFFDG2 requires oradb2
OFFFDG2 requires LSNR_OFFFDG2
Oradb2 requires oravol2
oravol2 requires oradg2

group sw_OFFFDG (
SystemList = { orarep01 = 0 }
)

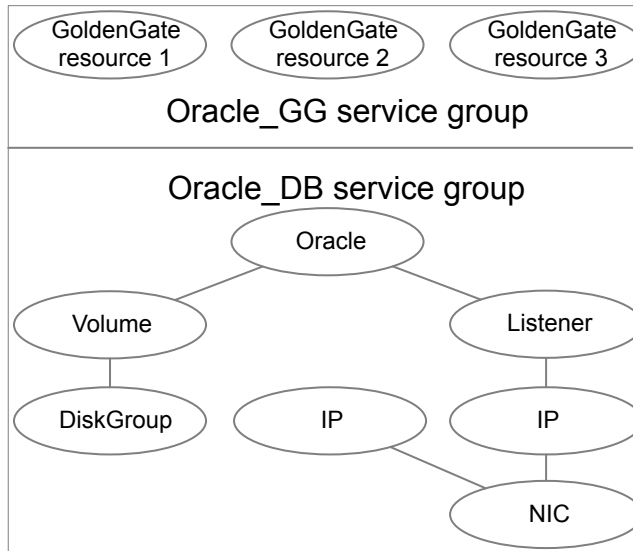
GoldenGate O_goldengate_1 (
LinkRes = OFFFDG1
GoldenGateHome = "/u01/app/oracle/product/GoldenGate1"
Extract = ext1
DataPump = dpump1
TReplicat = repl
TLinkRes = OFFFDG2
TGoldenGateHome = "/u01/app/oracle/product/GoldenGate2"
)

requires group db_OFFFDG1 online local firm
requires group db_OFFFDG2 online local soft
```

Sample configuration for the GoldenGate agent for Oracle PDBs

The sample dependency graph depicts an Oracle GoldenGate agent configuration that supports Oracle PDB. The agent requires that all the GoldenGate resources are in same service group and that separate Extract and Replicat values are configured for each PDB on both, the primary and the secondary clusters. The Oracle_GG group has an online-local-hard dependency on the Oracle_DB group.

Figure 3-3 Sample dependency graph for Oracle PDBs in a GCO cluster



Note: The GoldenGate agent does not support configurations with a single Extract and multiple DataPump or multiple Replicat values.

You can configure a resource of the GoldenGate type in the `main.cf` file.

Sample main.cf file for an Oracle GoldenGate agent configuration with Oracle PDB

```

include "types.cf"
include "OracleTypes.cf"
include "GoldenGateTypes.cf"

cluster vcspri (
    UserNames = { admin = gJKcJEjGKfKKiSKeJH }
    Administrators = { admin }
    CounterInterval = 5
)

remoteclass vcldr (
    ClusterAddress = "10.xxx.xx.xx"
)

heartbeat Icmp (
```

```

ClusterList = { vcsdr }
AYARetryLimit = 0
Arguments @vcsdr = { "10.xxx.xx.xx" }
)

system orarep01 (
)

group ClusterService (
    SystemList = { orarep01 = 0 }
    AutoStartList = { orarep01 }
    OnlineRetryLimit = 3
    OnlineRetryInterval = 120
)

Application wac (
    StartProgram = "/opt/VRTSvcs/bin/wacstart"
    StopProgram = "/opt/VRTSvcs/bin/wacstop"
    MonitorProcesses = { "/opt/VRTSvcs/bin/wac" }
)

NIC csgnic (
    Device = eth0
)

wac requires csgnic

group db_OFFDG (
    SystemList = { orarep01 = 0 }
)

DiskGroup oradg (
    DiskGroup = oradg
)

Netlsnr LSNR_OFFDG (
    Owner = oracle
    Home = "/opt/oracle/app/oracle/product/11.2.0/Db_1"
    MonScript = "./bin/Netlsnr/LsnrTest.pl"
)

Mount oradb1 (
    MountPoint = "/oradb1"

```

```

        BlockDevice = "/dev/vx/dsk/oradg/oravol"
        FSType = vxfs
        FsckOpt = "-y"
    )

    Oracle OFFDG (
        Sid = OFFDG
        Owner = oracle
        Home = "/u01/app/oracle/dbbase/dbhome"
        StartUpOpt = STARTUP
        DBName = OFFDG
    )

    Oracle OFFDGpdb2_res (
        Sid = OFFDG
        Owner = oracle
        Home = "/u01/app/oracle/dbbase/dbhome"
        StartUpOpt = STARTUP
        PDBName = OFFDGpdb2
    )

    Oracle OFFDGpdb1_res (
        Sid = OFFDG
        Owner = oracle
        Home = "/u01/app/oracle/dbbase/dbhome"
        StartUpOpt = STARTUP
        PDBName = OFFDGpdb1
    )

    Volume oravol (
        DiskGroup = oradg
        Volume = oravol
    )

    OFFDG requires oradb1
    OFFDG requires LSNR_OFFDG
    oradb1 requires oravol
    oravol requires oradg
    OFFDGpdb1_res requires OFFDG
    OFFDGpdb2_res requires OFFDG

    group sw_OFFDG (
        SystemList = { orarep01 = 0 }
    )

```

Sample configuration for the GoldenGate agent for Oracle PDBs for a single node cluster

```

ClusterList = { vcspri = 1, vcsdr = 0 }
Authority = 1
ClusterFailOverPolicy = Auto
)

GoldenGate O_goldengate_1 (
  LinkRes = OFFDG
  GoldenGateHome = "/u01/app/oracle/product/GoldenGate"
  Extract = ext1
  DataPump = dpump1
  Replicat = repl
  AutoTakeover = 0
)

GoldenGate O_goldengate_2 (
  LinkRes = OFFDG
  GoldenGateHome = "/u01/app/oracle/product/GoldenGate"
  Extract = ext2
  DataPump = dpump2
  Replicat = rep2
  AutoTakeover = 0
)

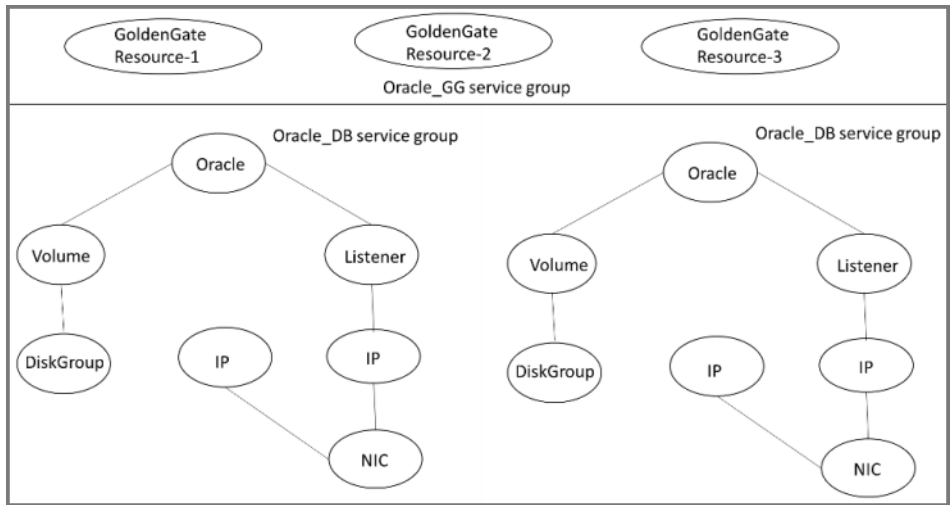
requires group db_OFFDG online local hard

```

Sample configuration for the GoldenGate agent for Oracle PDBs for a single node cluster

The sample dependency graph depicts an Oracle GoldenGate agent configuration that supports Oracle PDBs for a single node cluster. The agent requires that all the GoldenGate resources are in same service group and that separate Extract and Replicat values are configured for each PDB on the primary and the secondary databases. The Oracle_GG group has an online-local-firm dependency on the primary database group and a online-local-soft dependency on the live standby database group.

Figure 3-4 Sample dependency graph for Oracle PDBs in a single node cluster



Note: The GoldenGate agent does not support configurations with a single Extract and multiple DataPump or multiple Replicat values.

Sample main.cf file for an Oracle GoldenGate agent configuration for Oracle PDFs for a single node cluster

```

include "types.cf"
include "OracleTypes.cf"
include "GoldenGateTypes.cf"

cluster vcsPRI (
  UserNames = { admin = gJKcJEjGKfKKiSKeJH }
  Administrators = { admin }
  CounterInterval = 5
)

system orarep01 (
)

group db_OFFDG1 (
  SystemList = { orarep01 = 0 }
)

```

```

DiskGroup oradg (
DiskGroup = oradg
)

Netlsnr LSNR_OFFDG1 (
Owner = oracle
Home = "/opt/oracle/app/oracle/product/11.2.0/Db_1"
MonScript = "../bin/Netlsnr/LsnrTest.pl"
)

Mount oradb1 (
MountPoint = "/oradb1"
BlockDevice = "/dev/vx/dsk/oradg/oravol"
FSType = vxfs
FsckOpt = "-y"
)

Oracle OFFDG1 (
Sid = OFFDG1
Owner = oracle
Home = "/u01/app/oracle/dbbase/dbhome"
StartupOpt = STARTUP
DBName = OFFDG1
)

Oracle OFFDG1pdb2_res (
Sid = OFFDG1
Owner = oracle
Home = "/u01/app/oracle/dbbase/dbhome"
StartupOpt = STARTUP
PDBName = OFFDG1pdb2
)

Oracle OFFDG1pdb1_res (
Sid = OFFDG1
Owner = oracle
Home = "/u01/app/oracle/dbbase/dbhome"
StartupOpt = STARTUP
PDBName = OFFDG1pdb1
)

Volume oravol (
DiskGroup = oradg

```


Sample configuration for the GoldenGate agent for Oracle PDBs for a single node cluster

```

Volume = oravol
)

OFFDG1 requires oradb1
OFFDG1 requires LSNR_OFFDG1
oradb1 requires oravol
oravol requires oradg
OFFDG1pdb1_res requires OFFDG1
OFFDG1pdb2_res requires OFFDG1

group db_OFFDG2 (
SystemList = { orarep01 = 0 }
)

DiskGroup oradg2 (
DiskGroup = oradg2
)

Netlsnr LSNR_OFFDG2 (
Owner = oracle
Home = "/opt/oracle/app/oracle/product/11.2.0/Db_1"
MonScript = "../bin/Netlsnr/LsnrTest.pl"
)

Mount oradb2 (
MountPoint = "/oradb2"
BlockDevice = "/dev/vx/dsk/oradg2/oravol2"
FSType = vxfs
FsckOpt = "-y"
)

Oracle OFFDG2 (
Sid = OFFDG2
Owner = oracle
Home = "/u01/app/oracle/dbbase/dbhome"
StartupOpt = STARTUP
DBName = OFFDG2
)

Oracle OFFDG2pdb2_res (
Sid = OFFDG2
Owner = oracle

```

```

Home = "/u01/app/oracle/dbbase/dbhome"
StartUpOpt = STARTUP
PDBName = OFFDG2pdb2
)

Oracle OFFDG2pdb1_res (
Sid = OFFDG2
Owner = oracle
Home = "/u01/app/oracle/dbbase/dbhome"
StartUpOpt = STARTUP
PDBName = OFFDG2pdb1
)

Volume oravol2 (
DiskGroup = oradg2
Volume = oravol2
)

OFFDG2 requires oradb2
OFFDG2 requires LSNR_OFFDG2
Oradb2 requires oravol2
oravol2 requires oradg2
OFFDG2pdb1_res requires OFFDG2
OFFDG2pdb2_res requires OFFDG2

group sw_OFFDG (
SystemList = { orarep01 = 0 }
)

GoldenGate O_goldengate_1 (
LinkRes = OFFDG1
GoldenGateHome = "/u01/app/oracle/product/GoldenGate1"
Extract = ext1
DataPump = dpump1
TReplicat = repl1
TLinkRes = OFFDG2
TGoldenGateHome = "/u01/app/oracle/product/GoldenGate2"
)

GoldenGate O_goldengate_2 (
LinkRes = OFFDG1
GoldenGateHome = "/u01/app/oracle/product/GoldenGate1"
Extract = ext2

```

```
DataPump = dpump2
TReplicat = rep2
TLinkRes = OFFDG2
TGoldenGateHome = "/u01/app/oracle/product/GoldenGate2"
)

requires group db_OFFDG1 online local firm
requires group db_OFFDG2 online local soft
```

Before you configure the agent for Oracle GoldenGate

Before you configure the agent, review the following information:

- Verify the hardware setup for the agent.
- Make sure that the cluster has an effective heartbeat mechanism in place.
 - About cluster heartbeats: In a global cluster, VCS sends ICMP pings over the public network between the two sites for network heartbeating. To minimize the risk of split-brain, VCS sends ICMP pings to highly available IP addresses. VCS global clusters also notify the administrators when the sites cannot communicate.
 - About preventing split-brain: Split-brain occurs when all heartbeat links between the primary and secondary hosts are cut. In this situation, each side mistakenly assumes that the other side is down. You can minimize the effects of split-brain by ensuring that the cluster heartbeat links pass through a similar physical infrastructure as the replication links. When you ensure that both pass through the same infrastructure, if one breaks, so does the other.
- Verify that the clustering infrastructure is in place. If you plan to configure the agent in a global cluster, make sure the global service group for the application is configured.

Configuring the VCS service group for GoldenGate

You can configure the VCS service group for GoldenGate using any of the following methods:

- The Cluster Manager (Java console)
 See [“Configuring the VCS service group for GoldenGate using Cluster Manager \(Java console\)”](#) on page 36.

- The command-line
 See [“Configuring the VCS service group for GoldenGate using the CLI”](#)
 on page 36.

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

Complete the following procedure to configure a service group in a global cluster.

To configure the service group in a global cluster using Cluster Manager

- 1** Start Cluster Manager and log on to the cluster.
- 2** Add a resource of type GoldenGate at the bottom of the service group.
- 3** Configure the attributes of the GoldenGate resource.
- 4** If the service group is not configured as a global service group, configure the service group using the Global Group Configuration Wizard.
- 5** Repeat steps [2](#) through [4](#) for each service group in each cluster that uses replicated data.
- 6** The configuration must be identical on all cluster nodes, both primary and disaster recovery.

Note: You must not change the GoldenGate state of Extract and Replicat outside of a VCS setup. If the role reversal is done externally, the agent for Oracle GoldenGate detects a change in the replication state, but takes no action.

Configuring the VCS service group for GoldenGate using the CLI

Complete the following procedure to configure the service group for GoldenGate using the command line.

To configure the service group in a global cluster using the command-line

- 1** Configure the value of the LinkRes attribute. This attribute defines the name of the Oracle resource that manages the replicated database instance.

```
# hares -modify ogg_resource_name LinkRes oracle_resource_name
```

The Oracle resource must be online for the GoldenGate resource to come online.

- 2** You may skip this step if the location of the GoldenGate installation directory is `/u01/app/oracle/product/gg`. This location is the default value of the GoldenGateHome attribute.

Configure the value of the GoldenGateHome attribute. This attribute defines the location of the Oracle GoldenGate home directory.

```
# hares -modify ogg_resource_name GoldenGateHome
golden_gate_installation_dir
```

Configure this attribute only if the GoldenGate installation directory is not the same as the default value of the attribute.

- 3** Configure the value of the Extract attribute. This attribute defines the name of the local Extract that runs on the system and that the GoldenGate resource monitors.

```
# hares -modify ogg_resource_name Extract local_extract_name
```

- 4** You may skip this step if data pump is not configured.

Configure the value of the DataPump attribute, if data pump is configured. This attribute defines the name of the data pump that the GoldenGate resource monitors.

```
# hares -modify ogg_resource_name DataPump local_datapump_name
```

- 5** For a single node cluster configuration, skip this step and continue with the procedure from the next step onwards.

Configure the value of the Replicat attribute. This attribute defines the name of the Replicat that the GoldenGate resource monitors.

```
# hares -modify ogg_resource_name Replicat local_replicat_name
```

- 6** This step is applicable for single node cluster configuration only.

Configure the value of the TReplicat attribute. This attribute defines the name of the remote Replicat that the GoldenGate resource monitors.

```
# hares -modify ogg_resource_name TReplicat remote_replicat_name
```

- 7** This step is applicable for single node cluster configuration only.

Configure the value of the TLinkRes attribute. This attribute defines the name of the Oracle resource that manages the remote replicated database instance.

```
# hares -modify ogg_resource_name TLinkRes oracle_resource_name
```

- 8** This step is applicable for single node cluster configuration only.

Configure the value of the TGoldenGateHome attribute. This attribute defines the location of the Oracle GoldenGate home directory for the remote database.

```
# hares -modify ogg_resource_name TGoldenGateHome  
golden_gate_installation_dir
```

Managing and testing clustering support for Oracle GoldenGate

This chapter includes the following topics:

- [How VCS recovers from various disasters in an HA/DR setup with Oracle GoldenGate](#)
- [Testing the global service group migration](#)
- [Testing disaster recovery after host failure](#)

How VCS recovers from various disasters in an HA/DR setup with Oracle GoldenGate

When a site-wide global service group or system fault occurs, VCS failover behavior depends on the value of the ClusterFailOverPolicy attribute for the faulted global service group.

The following table lists the failure scenarios in a global cluster configuration and describes the behaviors of VCS and of the agent in response to each failure.

Table 4-1 Failure scenarios in a global cluster configuration with VCS agent for Oracle GoldenGate

Failure	Description and VCS response
Application failure	<p>Application cannot start successfully on any hosts at the primary site.</p> <p>VCS response at the secondary site:</p> <ul style="list-style-type: none"> ■ Causes global service group at the primary site to fault and displays an alert to indicate the fault. ■ Does the following based on the ClusterFailOverPolicy global service group attribute: <ul style="list-style-type: none"> ■ Auto or Connected—VCS automatically brings the faulted global group online at the secondary site. ■ Manual—No action. You must bring the global group online at the secondary site. <p>Agent response:</p> <p>The agent does the following:</p> <ul style="list-style-type: none"> ■ Verifies that all records are processed by Extract and data pump, if configured, in the remote cluster. The remote cluster is the original primary. ■ Stops Extract and data pump, if configured, in the remote cluster. ■ Verifies that local Replicat has processed all records. ■ Stops local Replicat process. ■ Starts local Extract and data pump, if configured.
Host failure	<p>All hosts at the primary site fail.</p> <p>VCS response at the secondary site:</p> <ul style="list-style-type: none"> ■ Displays an alert to indicate the primary cluster fault. ■ Does the following based on the ClusterFailOverPolicy global service group attribute: <ul style="list-style-type: none"> ■ Auto—VCS automatically brings the faulted global group online at the secondary site. ■ Manual or Connected—No action. You must bring the global group online at the secondary site. <p>Agent response:</p> <p>The agent does the following:</p> <ul style="list-style-type: none"> ■ Verifies that local Replicat has processed all records. ■ Agent stops local Replicat process. ■ Starts local Extract and data pump, if configured.

Table 4-1 Failure scenarios in a global cluster configuration with VCS agent for Oracle GoldenGate (*continued*)

Failure	Description and VCS response
Site failure	<p>All hosts and the storage at the primary site fail.</p> <p>VCS response at the secondary site:</p> <ul style="list-style-type: none"> ■ Displays an alert to indicate the cluster fault. ■ Does the following based on the ClusterFailOverPolicy global service group attribute: <ul style="list-style-type: none"> ■ Auto—VCS automatically brings the faulted global group online at the secondary site. ■ Manual or Connected—No action. You must bring the global group online at the secondary site. <p>Agent response:</p> <p>Based on the value of the AutoTakeover attribute, the agent does the following:</p> <ul style="list-style-type: none"> ■ 0-Agent takes no action and the online function exits. ■ 1-Verifies that local Replicat has processed all records. <ul style="list-style-type: none"> ■ Agent stops local Replicat process. ■ Starts local Extract and data pump, if configured.
Network failure	<p>The network connectivity and the replication link between the sites fail. VCS response at the secondary site:</p> <p>Agent response:</p> <p>Based on the value of the AutoTakeover attribute, the agent does the following:</p> <ul style="list-style-type: none"> ■ 0-Takes no action and the online function exits. ■ 1-Verifies that local Replicat has processed all records. <ul style="list-style-type: none"> ■ Stops local Replicat process. ■ Starts local Extract.

Table 4-1 Failure scenarios in a global cluster configuration with VCS agent for Oracle GoldenGate (*continued*)

Failure	Description and VCS response
Storage failure	<p>The array at the primary site fails.</p> <p>VCS response at the secondary site:</p> <ul style="list-style-type: none"> ■ Causes the global service group at the primary site to fault and displays an alert to indicate the fault. ■ Does the following based on the ClusterFailOverPolicy global service group attribute: <ul style="list-style-type: none"> ■ Auto or Connected—VCS automatically brings the faulted global service group online at the secondary site. ■ Manual—No action. You must bring the global group online at the secondary site. <p>Agent response:</p> <p>The agent does the following:</p> <ul style="list-style-type: none"> ■ Verifies that all records are processed by Extract and data pump, if configured, in the remote cluster, which is the original primary. ■ Stops Extract and data pump, if configured, in the remote cluster. ■ Verifies that local Replicat has processed all records. ■ Stops local Replicat process. ■ Starts local Extract and data pump, if configured.

Testing the global service group migration

After you configure the VCS agent for Oracle GoldenGate verify that the global service group can migrate to hosts across the sites.

To test the global service group migration in global cluster setup

- 1 Fail over the global service group from the primary site to the secondary site.

Perform the following steps:

- Switch the global service group from the primary site to any node in the secondary site.

```
hagrp -switch global_group -any -clus cluster_name
```

VCS brings the global service group online on a node at the secondary site.
- Verify that the original primary Extract and data pump, if configured, have processed all records and have stopped.
- Verify that on the secondary site Replicat has processed all records and the Extract and data pump, if configured, have started.

- 2 Fail back the global service group from the secondary site to the primary site.

Perform the following steps:

- Switch the global service group from the secondary site to the primary site.
`hagrp -switch global_group -any -clus cluster_name`
VCS brings the global service group online at the primary site.
- Verify that the Extract and data pump, if configured on the original secondary have processed all records and have stopped.
- Verify that on the original primary site, the Replicat has processed all records and the Extract and data pump, if configured have started.

Testing disaster recovery after host failure

To test disaster recovery for host failure in global cluster setup

- 1 Halt the hosts at the primary site.

The value of the ClusterFailOverPolicy attribute for the faulted global group determines the VCS failover behavior.

- Auto—VCS brings the faulted global service group online at the secondary site.
- Manual or Connected—You must bring the global service group online at the secondary site.

On a node in the secondary site, run the following command:

```
hagrp -online -force global_group -any
```

- 2 Verify that the global service group is online at the secondary site.

```
hagrp -state global_group
```

- 3 Verify that on secondary site Replicat has processed all records and the Extract and data pump, if configured, have started.