

Cluster Server Agent for SAP HotStandby Installation and Configuration Guide

AIX, Linux

8.0

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Introducing the agent for SAP HotStandby

This chapter includes the following topics:

- [About the Cluster Server agent for SAP HotStandby](#)
- [Supported software](#)
- [How the agent makes SAP HotStandby highly available](#)
- [Agent functions](#)
- [Typical SAP liveCache HotStandby configuration in a VCS cluster](#)
- [Setting up SAP HotStandby in a VCS cluster](#)

About the Cluster Server agent for SAP HotStandby

Cluster Server (VCS) agents monitor specific resources within an enterprise application. They determine the status of resources and start or stop them according to external events.

The Cluster Server agent for SAP HotStandby provides high availability for SAP liveCache Server in HotStandby mode in a cluster.

The agent supports the following configurations:

- A single storage volume that contains one or more SAP data volumes.
- Multiple storage volumes, where each storage volume contains only one SAP data volume.

Note: The agent for SAP Hotstandby assumes that all the SAP data volumes that reside on all the storage volumes are contained in a single diskgroup.

For the latest updates or software issues for this agent, see the *Cluster Server Agent Pack Release Notes*.

Supported software

For information on the software versions that the Cluster Server agent for SAP HotStandby supports, see the Veritas Services and Operations Readiness Tools (SORT) site: <https://sort.veritas.com/agents>.

How the agent makes SAP HotStandby highly available

The Cluster Server agent for SAP HotStandby continuously monitors the SAP liveCache server processes to verify that they function properly.

The agent provides the following levels of application monitoring:

- **Primary or Basic monitoring**
This mode has Process check and Health check monitoring options. With the default Process check option, the agent verifies that the SAP liveCache server processes are present in the process table. Process check cannot detect whether processes are in the hung or stopped states.
- **Secondary or Detail monitoring**
In this mode, the agent runs a utility to verify the status of the SAP liveCache server. The agent detects application failure if the monitoring routine reports an improper function of the SAP liveCache server processes. When this application failure occurs, the SAP liveCache server service group fails over to another node in the cluster.
Thus, the agent ensures high availability for SAP liveCache servers.

Agent functions

The agent consists of resource type declarations and agent executables. The agent executables are organized into online, offline, monitor, and clean functions.

Online

The online function performs the following tasks:

- Performs a preliminary check to ensure that the SAP liveCache instance is not online on the specified node in the cluster.
- Forcibly removes any SAP liveCache processes that remain because of an unclean shutdown.
- Removes all the IPC resources for the SAP liveCache Instance based on /sapdb/data/ipc (SAP standard) directory.
- Starts the SAP liveCache client x_server on the system.
- Starts the SAP liveCache instance using the dbmcli program.
- Ensures that the SAP liveCache instance is initialized successfully.

Offline

The offline function performs the following tasks:

- Performs a preliminary check to ensure that the SAP liveCache instance is not already offline on the specified node in the cluster.
- Stops the SAP liveCache instance using the dbmcli program.
- Removes all the IPC resources for the SAP liveCache instance based on /sapdb/data/ipc (SAP standard) directory, if exists.
- Ensures that the liveCache instance is stopped successfully.

Monitor

The monitor function monitors the state of the SAP liveCache instance on all nodes in the cluster. The function performs the following tasks:

- Scans the process table to verify the SAP liveCache instance kernel processes are running.
- If the SecondLevelMonitor attribute is greater than 0, the monitor function performs a more thorough check of the SAP liveCache instance. The utility dbmcli used to perform this second level check.
- Executes a custom monitor utility that the MonitorProgram attribute specifies.

Clean

The clean function performs the following tasks:

- Attempts to gracefully shutdown the SAP liveCache server with dbmcli.
- Waits for 10 seconds for the SAP liveCache instance to shut down successfully.

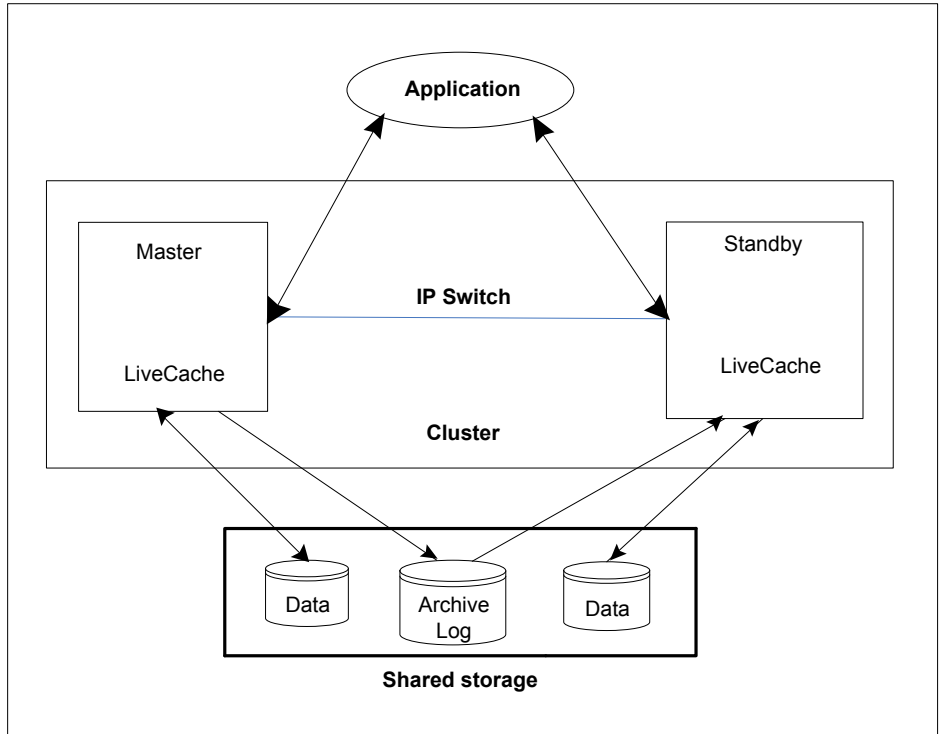
- Ensures that no relevant SAP liveCache server processes are running. If any processes remain, the function kills the remaining processes using a SIGKILL signal.
- Removes all IPC resources for SAP liveCache instance based on the directory /sapdb/data/ipc (SAP Standard).

Typical SAP liveCache HotStandby configuration in a VCS cluster

A typical SAP liveCache HotStandby configuration in a Cluster Server cluster has the following characteristics:

- VCS is installed and configured in a two-node cluster.
- Separate SAP liveCache DATA volume(s) and shared LOG volume(s) are created on shared disk.
- The SAP HotStandby binaries are installed locally on both nodes or on shared disks.
- The Cluster Server agent for SAP HotStandby is installed on both the nodes.

Figure 1-1 depicts a configuration where SAP liveCache HotStandby instance binaries are installed locally on each node and Data and Log volumes are installed on shared disks.



Setting up SAP HotStandby in a VCS cluster

Perform the following tasks to set up SAP HotStandby in a cluster:

1. Set up a VCS cluster.
2. Install and configure SAP HotStandby for high availability.
3. Install the Cluster Server agent for SAP HotStandby.
 See [“Installing the agent in a VCS environment”](#) on page 40.
4. Configure the service groups for SAP HotStandby.
 See [“About configuring service groups for SAP HotStandby”](#) on page 51.

Installing and configuring SAP HotStandby for high availability

This chapter includes the following topics:

- [About SAP liveCache server](#)
- [Uniquely identifying SAP HotStandby server instances](#)
- [Monitoring an SAP liveCache HotStandby instance](#)
- [About configuring SAP HotStandby for high availability](#)
- [Configuring SAP liveCache HotStandBy Server for cluster support](#)

About SAP liveCache server

SAP liveCache is based on a memory-centric offshoot of the SAP DB technology that is shipped with SAP Advanced Planning and Optimization (APO) since Release 2.0. For the most resource-intensive planning questions, SAP APO pushes performance-critical application logic to SAP liveCache. The data that is required for those processes is also pushed to SAP liveCache, where it is kept persistent. The persistence of both data and application logic is beneficial as it allows different processes to work on the same data and avoids bottlenecks by following the paradigm "run the logic where the data is".

SAP liveCache - technology

SAP liveCache technology is an object-based enhancement of the MaxDB database system. MaxDB is a relational database system that was developed for Online

Transaction Processing (OLTP). OLTP (MaxDB) and SAP liveCache database systems are variations of the same database system.

SAP liveCache was developed to manage complex objects, for example, in logistical solutions, such as SAP Supply Chain Management (SCM)/APO. In such solutions, large volumes of data must be permanently available and modifiable. You can use SAP liveCache technology to represent data structures and data flows, such as networks and relationships more easily and effectively. In SAP liveCache database, all data which must be accessible to the database system is located in the main memory. SAP liveCache database instances can only be used within SAP systems.

SAP liveCache - HotStandby

An SAP liveCache HotStandby system consists of a master and one or more standby instances, which can be located on different computers. The master and standby instances each have their own kernel, cache, a separate liveCache X Server, DBM Server, and so on.

The computers on which the database instances are located constitute a cluster. The computers within a cluster communicate with each other with the help of their internal IP addresses. Externally, the hot standby system behaves like a single database instance.

To access the hot standby system externally, you need the following information:

- Name of the database instance
- Virtual server name (identifies the computer that currently has the role of master instance)

If the master instance fails, the virtual service name transfers to the computer with the standby instance, which assumes the master role.

The data and log areas of all instances are located in a storage system.

As a precaution for the event of hardware failure, we recommend that you mirror the data and log areas in the storage system.

Master and standby instances use the same log area; however, standby instances only have read access.

Master and standby instances each have separate data areas that are independent of each other.

Uniquely identifying SAP HotStandby server instances

You can virtualize a SAP liveCache instance using a cluster. Using shared disk and virtual IP addresses, you can manage a large set of SAP liveCache HotStandby instances in a single cluster.

For multiple instances running concurrently on a single node, the agent must be able to uniquely identify each SAP liveCache HotStandby instance on a single host system.

Each instance has a unique instance name.

The instance names may follow the conventional naming conventions as follows:

- Instance name should contain only three alphanumeric uppercase characters.
- Instance name should start with alphabet always.
- Instance name should be unique on the cluster.

Note that the LCName attribute forms a unique identifier that can identify the processes running for a particular SAP liveCache server instance.

Some examples are HOT, LC1, and so on.

InstName	InstType
DVEBMGS00	SAP Application Server - ABAP (Primary)
D01	SAP Application Server - ABAP (Additional)
ASCS02	SAP Central Services - ABAP
J03	SAP Application Server - Java
SCS04	SAP Central Services - Java
ERS05	SAP Enqueue Replication Server
SMDA97	Solution Manager Diagnostics Agent

Monitoring an SAP liveCache HotStandby instance

The monitor operation performs process level check to ensure the proper functioning of an SAP liveCache instance. The monitor operation checks for the processes from the process table which contains "*kernel LCName*" in their name.

It also checks the database state with "*dbmccli*" utility.

About configuring SAP HotStandby for high availability

The guidelines for configuring SAP HotStandby for high availability are as follows:

- In a service group, keep the single point of failure as minimal as possible and watch the application startup time.
- Assign a virtual hostname to the component within the switchover environment. Because the physical hostname changes with the switchover, this is a must-have requirement.
- Based on the expected failover time, configure the reconnection parameters for all software components and enable its automatic reconnection.

Configuring SAP liveCache HotStandBy Server for cluster support

Configuring the SAP liveCache HotStandBy server for cluster support involves,

- [Creating file systems for liveCache LOG and DATA](#)
- [Installing the liveCache server with database on first node](#)
- [Installing the liveCache server software on second node](#)
- [Configuring the storage library for HotStandby setup](#)
- [Configuring the HotStandby system](#)

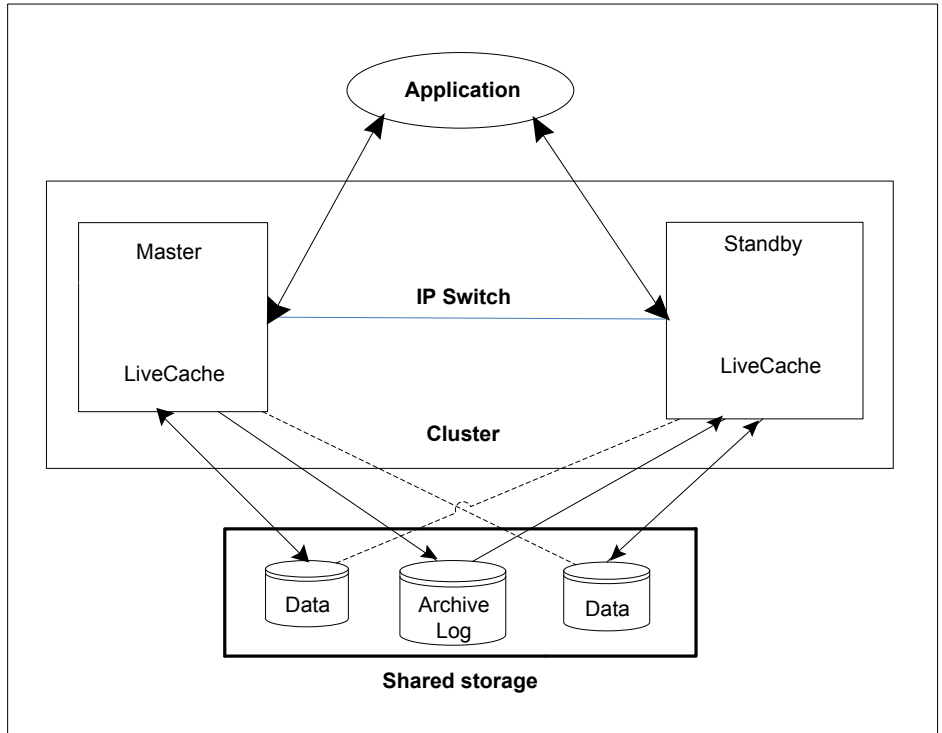
Creating file systems for liveCache LOG and DATA

SAP liveCache in HotStandby mode requires special file systems to be created.

The LOG volume should be shared between Standby systems having read-write access from Master system and read-only access from Standby system to protect from unauthorized writes to the LOG area from Standby system. Use Veritas Cluster Volume Manager (CVM) and Cluster File System (CFS) for LOG volume to achieve these requirements.

The Master and Standby systems have separate DATA areas that are independent of each other. All the disks in the DATA volumes (for Master and Standby) are visible to all the systems where SAP liveCache in HotStandby mode is configured. This is needed to take snapshots from the Master DATA volumes by Standby system for Standby operation.

Figure 2-1 depicts a configuration where SAP liveCache HotStandby instance binaries are installed locally on each node, Data and Log volumes are installed on shared disks, and Data volumes are visible to all the systems



Note: Currently, Veritas supports only two systems to configure for SAP liveCache in the HotStandby mode.

The following procedures describe how to create LOG, Mirror LOG, and DATA file systems for SAP liveCache in the HotStandby mode. In these examples, the names of directories are based on the SAP standards for liveCache Server.

To create a LOG file system for SAP liveCache server

- 1** Create a shared diskgroup. This diskgroup should be enabled for auto import after the system restarts.

Example: `vxchg -s init lchotlog_dg lchotlog_dg01=hdisk10`

- 2** Create a volume in the diskgroup.

Example: `vxassist -g lchotlog_dg make lchotlog_vol 2g`

3 Create a file system on top of the volume.

Example: `mkfs -V vxfs /dev/vx/rdisk/lchotlog_dg/lchotlog_vol`

4 Mount the volume for LOG area on Master.

Example: `mount -V vxfs -o cluster,rw,crw\
/dev/vx/dsk/lchotlog_dg/lchotlog_vol /sapdb/HOT/saplog`

5 Mount the volume for LOG area on Standby.

Example: `mount -V vxfs -o cluster,ro,crw\
/dev/vx/dsk/lchotlog_dg/lchotlog_vol /sapdb/HOT/saplog`

To create a Mirror LOG file system for SAP liveCache server

1 Create a volume in the disk group.

Use the same disk group in which you created the LOG volume using the procedure "[To create a LOG file system for SAP liveCache server](#)".

Example: `vxassist -g lchotlog_dg make mirrorlog_vol 2g`

2 Create a file system on top of the volume.

Example: `mkfs -V vxfs /dev/vx/rdisk/lchotlog_dg/mirrorlog_vol`

3 Mount the volume for LOG area on Master.

Example: `mount -V vxfs -o cluster,rw,crw\
/dev/vx/dsk/lchotlog_dg/mirrorlog_vol /sapdb/HOT/mirrlog`

4 Mount the volume for LOG area on Standby.

Example: `mount -V vxfs -o cluster,ro,crw\
/dev/vx/dsk/lchotlog_dg/mirrorlog_vol /sapdb/HOT/mirrlog`

To create a DATA file system for master

1 Create a diskgroup on Master for DATA volume.

Example: `vxdg init hotmaster_dg hotmaster_dg01=hdisk11\
hotmaster_dg02=hdisk12`

2 Create volume[s] on the diskgroup.

Example:

```
vxassist -g hotmaster_dg make hotmaster_vol1 2g\ logtype=dco
drl=off dcoversion=20 regionsz=128 init=active
vxassist -g hotmaster_dg make hotmaster_vol2 2g logtype=dco\
drl=off dcoversion=20 regionsz=128 init=active
```


3 Create file systems on the volumes.

Example:

```
mkfs -V vxfs /dev/vx/rdisk/hotmaster_dg/hotmaster_vol1
mkfs -V vxfs /dev/vx/rdisk/hotmaster_dg/hotmaster_vol2
```

4 Mount the volumes on the master node.

Example:

```
mount -V vxfs /dev/vx/dsk/hotmaster_dg/hotmaster_vol1\
/sapdb/HOT/sapdata1
mount -V vxfs /dev/vx/dsk/hotmaster_dg/hotmaster_vol2\
/sapdb/HOT/sapdata2
```

To create a DATA file system for standby

1 Create a diskgroup on Standby for DATA volumes.

Example: `vxvg init hotstandby_dg hotstandby_dg01=hdisk13\
hotstandby_dg02=hdisk14`

2 Create volume[s] on the diskgroup.

The volumes on the Standby node should have the same size as that of the Master node. The number of volumes on the Standby node should be equal to the number of volumes on the Master node.

Example:

```
vxassist -g hotstandby_dg make hotstandby_vol1 2g\ logtype=dco
drl=off dconversion=20 regionsz=128 init=active
vxassist -g hotstandby_dg make hotstandby_vol2 2g logtype=dco\
drl=off dconversion=20 regionsz=128 init=active
```

3 Create file system on Standby DATA volumes.

Example:

```
mkfs -V vxfs /dev/vx/dsk/hotstandby_dg/hotstandby_vol1  
mkfs -V vxfs /dev/vx/dsk/hotstandby_dg/hotstandby_vol2
```

4 Mount the volumes on the Standby system.

Example:

```
mount -V vxfs\  
/dev/vx/dsk/hotstandby_dg/hotstandby_vol1 /sapdb/HOT/sapdata1\  
mount -V vxfs /dev/vx/dsk/hotstandby_dg/hotstandby_vol2\  
/sapdb/HOT/sapdata2
```

Note: If the mount is locked, ensure that you unlock it; Veritas does not support mount locking for SAP HotStandby configured disks.

Installing the liveCache server with database on first node

Install the liveCache server using SAP provided installation tool SAPInst. Start the liveCache installation using `SAPINST_USE_HOSTNAME=VirtualHostName`.

To install the liveCache server software on the first node

1 Use the following command to start the installation:

```
sapinst SAPINST_USE_HOSTNAME=VirtualHostName
```

and proceed as per the instructions on the SAP installation GUI.

2 Perform all the post-installation steps described in the SAP liveCache installation guide. See the SAP web-site for details.

Installing the liveCache server software on second node

Install the liveCache server software on the second node with the same liveCache name used while installing on the first node.

To install the liveCache server software on the second node

- 1 Create SAP liveCache database administration group "sdba" on the system with same GID as of first node.
- 2 Create SAP liveCache database software owner "sdb" user on the system with logon permission disabled with same UID as of first node.

For example, on AIX: `/usr/bin/mkuser gecos="Database Software Owner" \`
`pgrp="sdba" sdb`

`/usr/bin/chuser rlogin=false login=false account_locked=true sdb`

Set the password of "sdb" user to be the same as that on the first node.

- 3 Create SAP liveCache user "*LCName* adm" user with same permissions as on first node and with same UID as of first node.

For example, on AIX: `/usr/bin/mkuser gecos="Owner of Database`
`Instance HOT" \ pgrp="sdba" groups="sapsys" shell="/bin/csh" hotadm`

Set the password for *LCName* adm same as on the first node.

- 4 Start the liveCache software installation from the liveCache media with SDBINST tool.
- 5 Set up the X server logon credentials for all SAP users: *LCName* adm, control, superdba as described in SAP note 39439.
- 6 Start the X server on the Standby node.
- 7 Create dummy files with same names as on liveCache Master Server node for DATA Volumes.

Examples:

```
#touch /sapdb/HOT/sapdata1/DISKD0001
#touch /sapdb/HOT/sapdata2/DISKD0002
```

Configuring the storage library for HotStandby setup

SAP liveCache in HotStandby mode needs specific memory management system requirements to handle the standby systems.

The data and log areas of the master and standby instances are in a memory management system.

The memory management system requirements are as follows:

- All instances can access the log area simultaneously.

Ideally, a memory management system should offer two different authorizations for access to the log area, which are read-only and read-write.

- Every data volume of each database instance involved has its own physical memory area in the memory management system. To avoid collisions of I/O accesses, separate hard disks are recommended in the memory management system.

The data volumes of each instance have the same access path on their respective computers;. Alternatively, a corresponding symbolic link can be set up.

Consistent copies of data volumes can be created which after the split can be read and written to independently of one another. While a copy is being created, the master instance can continue to write to its data volume so that downtimes are minimal. After the split, the data volumes of the master and standby instances are completely independent of each other.

- Fast copying of data within the memory management system.
When standby instances are initialized or if an error occurs, large amounts of data may have to be copied.
- Fast transmission of data between the memory management system and the computers on which the database instances are located.

Veritas implemented storage library (libsymchss.so) to meet these memory management system requirements and supports the creation of a hot standby system for liveCache server. This library is shipped as part of the agent package.

Note: Ensure that the agent is installed before copying the following files at their respective locations. See [“Installing the agent in a VCS environment”](#) on page 40.

A sample configuration file (`RTEHSS_LCName_Config.cf`) that must be configured by the customers is shipped along with the agent package.

The utility `runvxcmd` is used by storage library to run Veritas Volume Manager/File system commands with non-root user ("sdb") from the library. This utility is shipped with the agent package.

The Storage library (`libsymchss.so`), storage library utility (`runvxcmd`), and sample configuration file (`RTEHSS_LCName_Config.cf`) can be found in the following the directory: `/etc/VRTSagents/ha/conf/SAPHotStandby/`

All these files need to be copied into specific directories and permissions need to be set appropriately.

See [“HotStandby Storage library configuration \(libsymchss.so\)”](#) on page 21.

See [“HotStandby Storage library utility configuration \(runvxcmd\)”](#) on page 21.

See [“HotStandby Storage configuration file setup \(RTEHSS_LCName_Config.cf\)”](#) on page 22.

HotStandby Storage library configuration (libsymchss.so)

The storage library must be copied on all the Standby systems.

To copy the storage library configuration

- 1 Login as superuser.
- 2 Copy the file `libsymchss.so` from the `/etc/VRTSagents/ha/conf/SAPHotStandby` directory to the following SAP liveCache directory:

AIX: `InstRoot/lib/lib64`

Linux: `InstRoot/lib`

Example:

```
cp /etc/VRTSagents/ha/conf/SAPHotStandby/libsymchss.so \  
/sapdb/HOT/db/lib
```

AIX:

```
cp /etc/VRTSagents/ha/conf/SAPHotStandby/libsymchss.so \  
/sapdb/HOT/db/lib/lib64
```

Linux:

```
cp /etc/VRTSagents/ha/conf/SAPHotStandby/libsymchss.so \  
/sapdb/HOT/db/lib
```

- 3 Change the owner of the file to "sdb" with the following command:

AIX:

```
chown sdb:sdba /sapdb/HOT/db/lib/libsymchss.so
```

Linux:

```
chown sdb:sdba /sapdb/HOT/db/lib/libsymchss.so
```

HotStandby Storage library utility configuration (runvxcmd)

The storage library utility must be copied on all the Standby systems under the directory `/sapdb/symantec/bin`.

To copy the storage library utility

- 1 Log in as superuser.
- 2 Copy the storage library utility runvxcmd from the directory /etc/VRTSagents/ha/conf/SAPHotStandby.

Example:

```
cp /etc/VRTSagents/ha/conf/SAPHotStandby/runvxcmd \  
/sapdb/symantec/bin
```

- 3 Make sure that the owner of the file has the privileges of superuser 'root'.
- 4 Change the permissions of the file to have set bit set.

```
chmod +srx /sapdb/symantec/bin/runvxcmd
```

```
# ls -l /sapdb/symantec/bin/runvxcmd
```

```
-r-sr-sr-x    1 root      system      275245 Jun 24 14:09  
/sapdb/symantec/bin/runvxcmd
```

**HotStandby Storage configuration file setup
(RTEHSS_LCName_Config.cf)**

The file can exist either on shared storage or locally on all nodes under the directory /sapdb/symantec/conf.

To set up the HotStandby Storage configuration file

- 1 Login as superuser.
- 2 Copy the sample configuration file `RTEHSS_HOT_Config.cf` from the directory `/etc/VRTSagents/ha/conf/SAPHotStandby` to `/sapdb/symantec/conf`.

Example:

```
cp /etc/VRTSagents/ha/conf/SAPHotStandby/RTEHSS_HOT_Config.cf \
/sapdb/symantec/conf/RTEHSS_LCName_Config.cf
```

3 Change the permissions of the file to be owned by "sdb" with read-write access.

Example:

```
chown -R sdb:sdba /sapdb/symantec/conf/RTEHSS_LCName_Config.cf
chmod 660 /sapdb/symantec/conf/RTEHSS_LCName_Config.cf
```

The `RTEHSS_LCName_Config.cf` file can be tailored using the hints given as follows:

<code>vrtsclidir</code>	<p>directory for Command Line Interface (CLI) for VxVM and VxFS.</p> <p>Default: <code>/usr/sbin</code></p>
<code>fstype</code>	<p>File system type used for LOG and DATA volumes. Only vxfs is supported.</p> <p>Example: vxfs</p>
<code>LCLogDgName</code>	<p>Shared LOG disk group name created by VxVM for SAP liveCache LOG area.</p> <p>Example: <code>LCLogDgName=lchotlog_dg</code></p>
<code>LCLogVolName</code>	<p>VxVM Volume name for the LOG area created on the shared disk.</p> <p>Example: <code>LCLogVolName=lchotlog_vol</code></p>
<code>LCMirLogVolName</code>	<p>VxVM Volume name for the Mirror LOG area created on the shared disk.</p> <p>This tag must be provided in the <code>/sapdb/symantec/conf/RTEHSS_LCName_Config.cf</code> on both the nodes.</p> <p>Example: <code>LCMirLogVolName=mirrorlog_vol</code></p> <p>Note: In the <code>RTEHSS_LCName_Config.cf</code> file, the <code>LCLogVolName</code> entry must always appear before the <code>LCMirLogVolName</code> entry.</p>
<code>MLCDataDgName</code>	<p>Master SAP liveCache Server DATA disk group name created by VxVM for Master DATA area.</p> <p>Example: <code>MLCDataDgName=hotmaster_dg</code></p>

MLCDataVolName Master SAP liveCache server Volume name[s] for DATA area.

Example: `MLCDataVolName=hotmaster_vol1`

If you have multiple DATA volumes, you must enter each of them in new line with the same key `MLCDataVolName`.

Example:

`MLCDataVolName=hotmaster_vol1`

`MLCDataVolName=hotmaster_vol2`

SLCDataDgName Standby SAP liveCache server DATA disk group name created by VxVM for Standby DATA area.

Example:

`SLCDataDgName=hotstandby_dg`

SLCDataVolName Standby SAP liveCache serve Volume name[s] for DATA area.

Example: `SLCDataVolName=hotstandby_vol1`

If you have multiple DATA volumes you must enter each of them in newline with the same key `SLCDataDgName`.

Example:

`SLCDataVolName=hotstandby_vol1`

`SLCDataVolName=hotstandby_vol2`

MVCSDataSGName SAP liveCache Master data service group name in VCS.

Example: `MVCSDataSGName=SAP-HOTMasterData`

SVCSDDataSGName SAP liveCache Standby data service group name in VCS.

Example: `SVCSDDataSGName=SAP-HOTStandbyData`

HSS_NODE_00X [X e {1, 2}] Name of each node for SAP liveCache server. Get the name with 'uname -n' on AIX or Linux hosts.

Example:

`HSS_NODE_001=sysA`

`HSS_NODE_002=sysB`

If you have multiple volumes for DATA area of liveCache server, you must list all the volumes in a consistent manner for both Master and Standby nodes. The DATA snapshot copy is taken from the Master to the Standby node in the corresponding order.

For example, for a Master and Standby systems with two volumes for DATA area, list the volumes as follows:

For Master system	MLCDataVolName=vol1
	MLCDataVolName=vol2
For Standby system	SLCDataVolName=vol3
	SLCDataVolName=vol4

The snapshot copy is taken for vol3 from vol1 (vol1to vol3) and for vol4 from vol2 (vol2 to vol4) and vice versa.

Exercise caution while configuring all the DATA volumes for Master and Standby.

Configuring the HotStandby system

HotStandby System (HSS) configuration involves the following steps:

- Setting the Master HSS Configuration
- Adding the Standby instance
- Activating the Standby Instance
- Removing Standby Instance

Review the description for the most recent commands for the hot standby system.

http://help.sap.com/saphelp_banking70/helpdata/en/44/ea567cb9e32951e10000000a11466f/frameset.htm

Setting the master HSS configuration

Execute the HSS integration commands on the master database.

Set up the master database as a hot standby instance. Use the following dbmcli commands.

```
$ dbmcli -n vcsaix101 -d db_name -u dbm-user,password
$ dbmcli on vcsaix101: db_name > db_offline
$ dbmcli on vcsaix101: db_name > param_directput
  EnableMultipleServerTaskUKT YES
$ dbmcli on vcsaix101: dbname > param_checkall
$ dbmcli on vcsaix101: dbname > hss_enable lib=libsymchss\
node=<official node>
$ dbmcli on vcsaix101: dbname > db_online
```

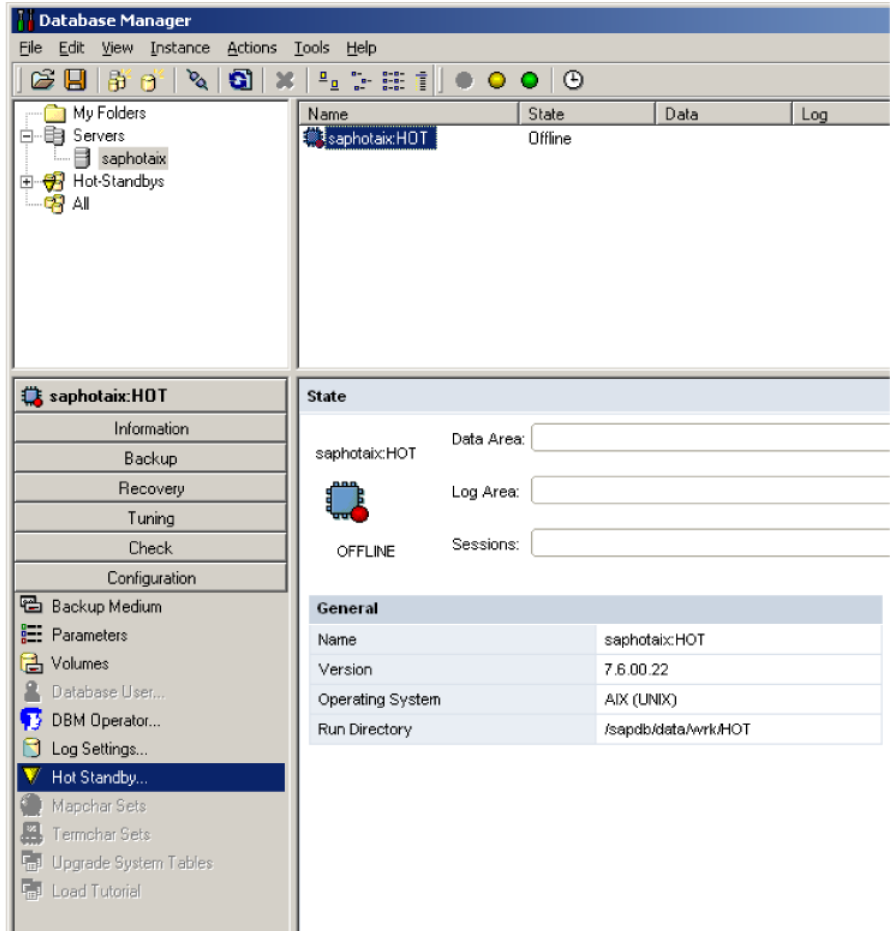
The parameter `EnableMultipleServerTaskUKT=YES` allows rapid log redo in the standby instance. The application uses this node name as the official node. It is identical to the virtual host name for SAP liveCache in VCS.

For DBMGUI register, the database instance uses the official node.

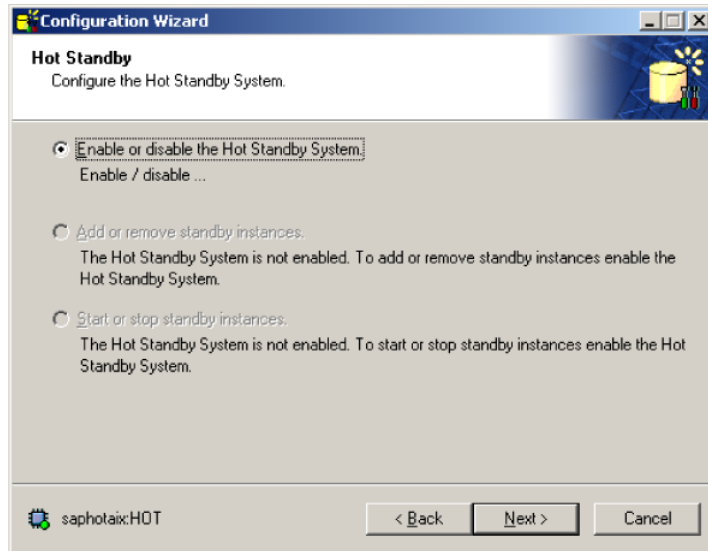
You can set up the master database as a hot standby instance using the Configuration Wizard of DBMGUI as follows.

To set up the master database as a hot standby instance

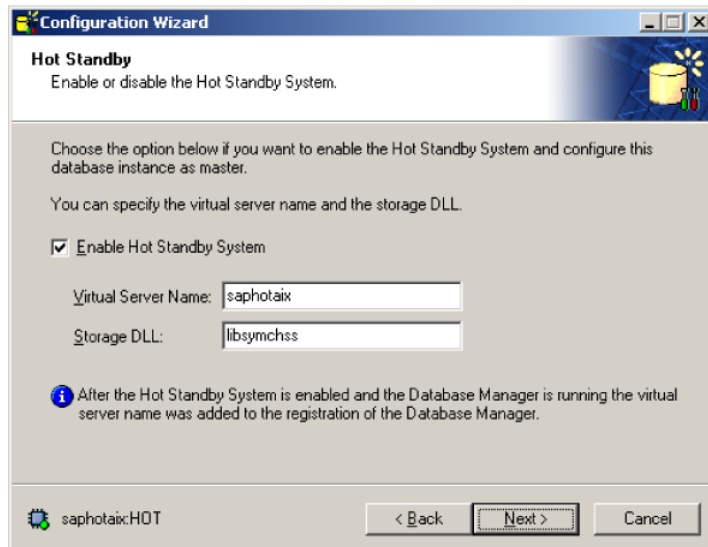
- 1 In the main screen of the DBMGUI, click **Configuration** and then double-click **HotStandby**. The Configuration Wizard opens.



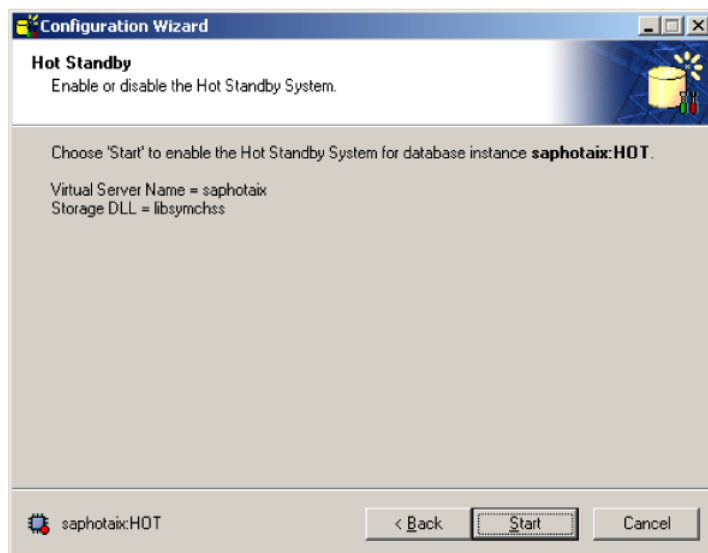
- 2 Select the Enable or disable the Hot Standby System option and click **Next**.



- 3 Select **Enable Hot Standby System**.
- 4 Specify the following:
- Official Node name.
 - Name of the SYMC runtime lib for SAP liveCache HotStandby, which is libsymchss.so.



5 Click **Next**.



6 Click **Start** to confirm the settings and enable the Hot Standby system.

7 Click **Close** to close the Configuration Wizard.

Adding the standby instance

Before you add any standby instance, make sure that X Server is running on the Standby system. Make sure that the liveCache server on the Master node is in the online state.

The dbmcli-command `hss_addstandby` makes a new instance known to the hot standby environment.

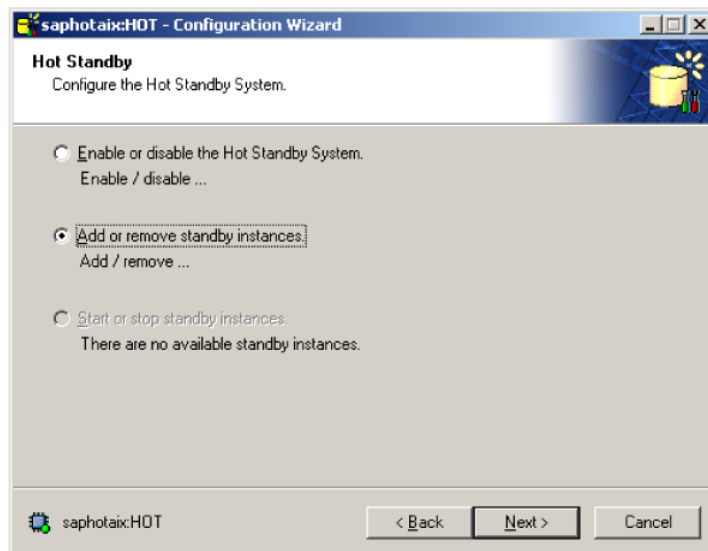
```
$ dbmcli -n vcsaix101 -d db_name -u dbm-user,password
$ dbmcli on vcsaix101: db_name > hss_addstandby vcsaix102\
login=hotadm,password
```

The command `hss_addstandby` needs the permission to create an instance on the second node. Provide the user and password of the operating system user of the SAP liveCache software.

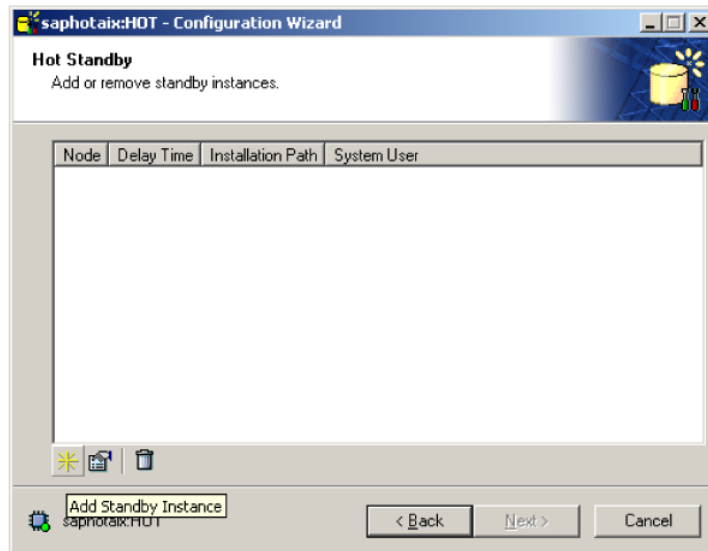
You can add the standby instance using the Configuration Wizard of the DBMGUI as follows:

To add the standby instance

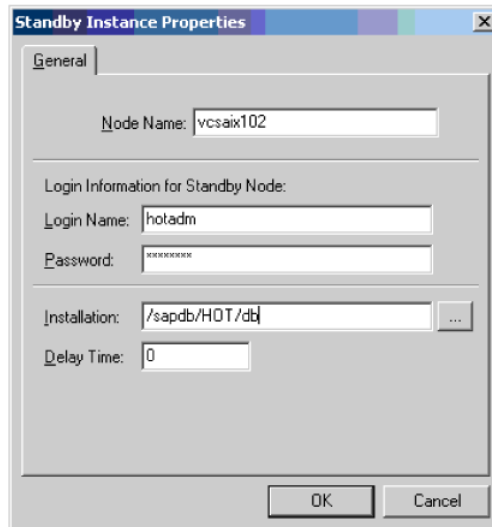
- 1 In the main screen of the DBMGUI, click **Configuration** and then double-click **HotStandby**. The Configuration Wizard opens.
- 2 Select the **Add or Remove standby instances** option and click **Next**.



- 3 The displayed table is empty because no standby instances have been added to the system. Click the "Asterisk" icon to add a new standby instance.



- 4 In the Standby Instance Properties screen, specify the following:
- Node name of the server in which to install the standby instance.
 - Login name and password of the user.
 - Dependent program path on the Standby server.



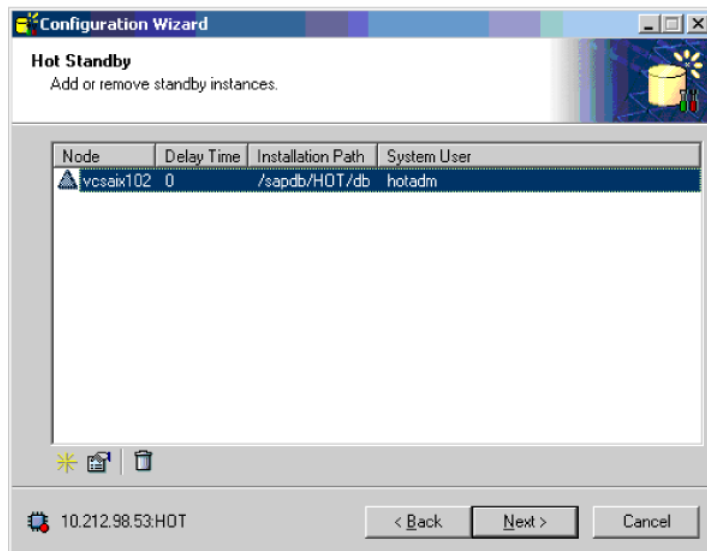
The 'Standby Instance Properties' dialog box is shown with the 'General' tab selected. It contains the following fields:

- Node Name:** vcsaix102
- Login Information for Standby Node:**
 - Login Name:** hotadm
 - Password:** [REDACTED]
- Installation:** /sapdb/HOT/db
- Delay Time:** 0

At the bottom are 'OK' and 'Cancel' buttons.

- 5 Click **OK** to confirm the settings.

The table now shows the added instance.



The 'Configuration Wizard' window shows the 'Hot Standby' step with the instruction 'Add or remove standby instances.' Below this is a table listing the configured instance:

Node	Delay Time	Installation Path	System User
vcsaix102	0	/sapdb/HOT/db	hotadm

At the bottom, there are icons for adding, editing, and deleting instances, a status bar showing '10.212.98.53:H0T', and '< Back', 'Next >', and 'Cancel' buttons.

- 6 Click **Next**.
- 7 Click **Start** to confirm the settings.

Activating the standby instance

Use the *official node* as the server name for communicating to the master and standby instances. A single dbmcli-command activates the standby instance. Make sure that the standby instance is offline.

Note: When the db_standby command is being executed, VCS should be running and SAPHotStandBy and the related resources must be configured with VCS and monitored by VCS.

```
$ dbmcli -n <official node> -d db_name -u dbm-user, password
$ dbmcli on <official node>: dbname > hss_execute vcsaix102 db_offline
$ dbmcli on <official node>: dbname > db_standby vcsaix102
```

With db_standby, the standby instance checks if the current data volumes fit to the log.

If yes, it starts with the redo of the log and returns OK.

If not, it starts an Init Standby. The Init Standby starts the snapshot tasks which creates snapshot of the data volumes of the master to the standby. This step runs synchronously.

The db_standby sets the standby instance into mode Standby when the Init Standby returns OK.

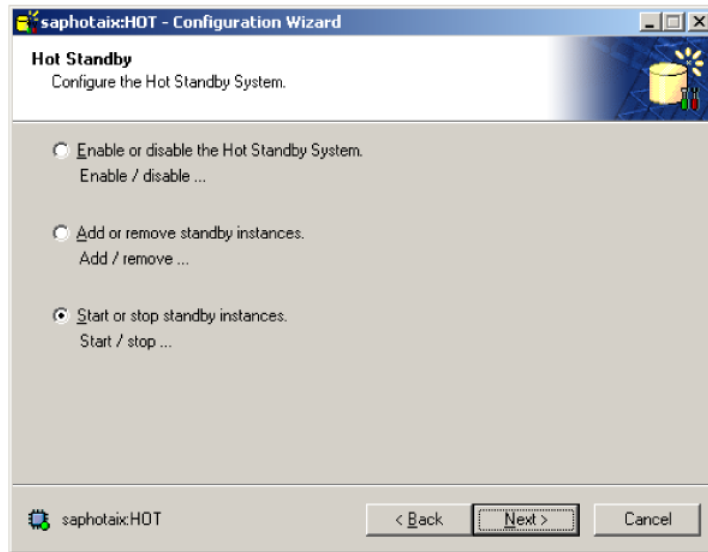
The Configuration Wizard provides the same functionality as the dbmcli command db_standby.

Activate the Standby instance using the following procedure:

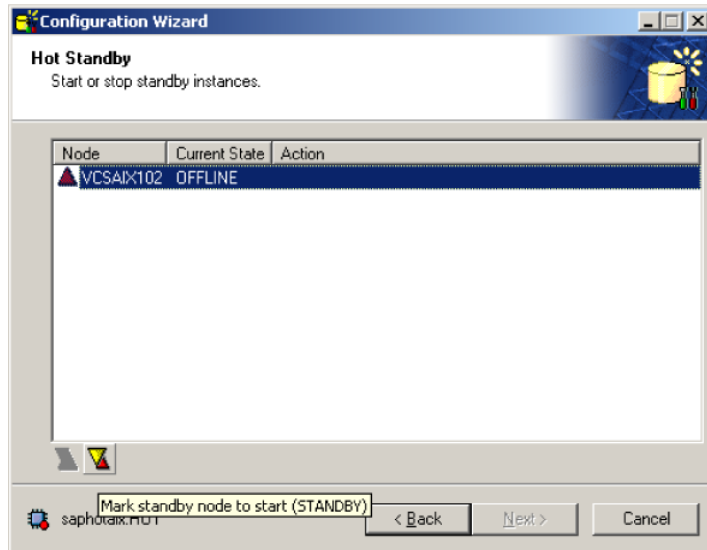
Note: You must start the standby instances after each restart of the master. The start of the master doesn't automatically synchronize the standby instances. If you start the master instance with the agent for SAP HotStandby and if 'StandbyList' of the resource is defined, the agent starts the standby instances after the master comes up.

To activate the standby instance

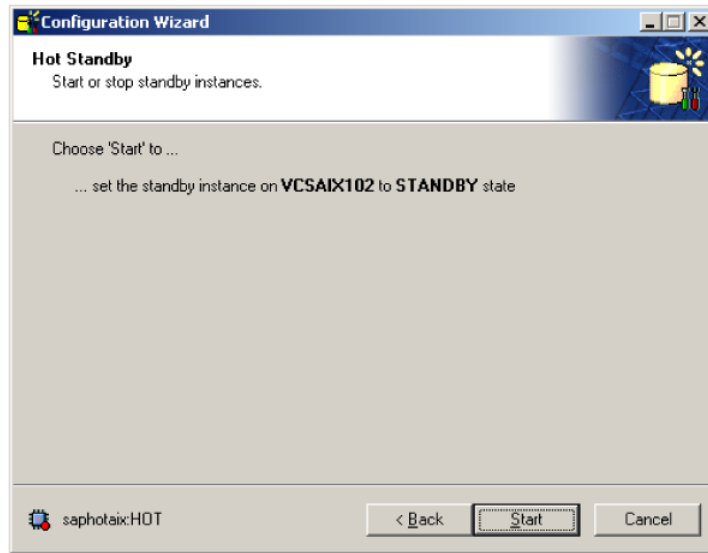
- 1 In the main screen of the DBMGUI, click **Configuration** and then double-click **HotStandby**. The Configuration Wizard opens.
- 2 Select the **Start or stop standby instance** option and click **Next**.



- 3 In the next screen, a table is displayed with all known standby instances and their state. Select the instance and click the highlighted icon that is shown in the following figure, to start or stop the instance.



- 4 Click **Start** to confirm the settings.



The main screen of DBMGUI shows information about the master and standby instances.

Removing the standby instance

The dbmcli command `hss_removestandby` removes an instance from the hot standby system. It clears all information about the standby instance from the current master.

```
$ dbmcli -n vcsaix101 -d db_name -u dbm-user, password
$ dbmcli on vcsaix101: db_name > hss_removestandby vcsaix102
```

You can also remove a standby instance using the Configuration Wizard of DBMGUI. The steps to remove a standby instance are as follows:

To remove the standby instance

- 1 In the main screen of the DBMGUI, click **Configuration** and then double-click **HotStandby**. The Configuration Wizard opens.
- 2 Select the **Add or Remove standby instance** option and click **Next**.
- 3 Select the instance and click the Trash can icon to delete the instance.
- 4 Click **Next**.

Installing, upgrading, and removing the agent for SAP HotStandby

This chapter includes the following topics:

- [Before you install the Cluster Server agent for SAP HotStandby](#)
- [About the ACC library](#)
- [Installing the ACC library](#)
- [Installing the agent in a VCS environment](#)
- [Uninstalling the agent in a VCS environment](#)
- [Removing the ACC library](#)
- [Upgrading the agent in a VCS environment](#)

Before you install the Cluster Server agent for SAP HotStandby

You must install the Cluster Server agent for SAP HotStandby on all the systems that will host SAP liveCache HotStandby service groups.

Before you install the agent for SAP HotStandby, ensure that the following prerequisites are met.

- Install and configure Cluster Server.
For more information on installing and configuring Cluster Server, refer to the Cluster Server installation and configuration guides.

- Remove any previous version of this agent.
To remove the agent,
See “[Uninstalling the agent in a VCS environment](#)” on page 41.
- Install the latest version of ACC Library.
To install or update the ACC Library package, locate the library and related documentation in the Agent Pack tarball.
See “[About the ACC library](#)” on page 39.

About the ACC library

The operations of a Cluster Server agent depend on a set of Perl modules known as the ACC library. The library must be installed on each system in the cluster that runs the agent. The ACC library contains common, reusable functions that perform tasks, such as process identification, logging, and system calls.

Instructions to install or remove the ACC library on a single system in the cluster are given in the following sections. The instructions assume that the ACCLib tar file has already been extracted.

Note: The LogDbg attribute should be used to enable debug logs for the ACCLib-based agents when the ACCLib version is 6.2.0.0 or later and VCS version is 6.2 or later.

Installing the ACC library

Install the ACC library on each system in the cluster that runs an agent that depends on the ACC library.

To install the ACC library

- 1 Log in as a superuser.
- 2 Download ACC Library.

You can download either the complete Agent Pack tar file or the individual ACCLib tar file from the Veritas Services and Operations Readiness Tools (SORT) site (<https://sort.veritas.com/agents>).

- 3 If you downloaded the complete Agent Pack tar file, navigate to the directory containing the package for the platform running in your environment.

AIX `cd1/aix/vcs/application/acc_library/version_library/pkggs`

Linux `cd1/linux/generic/vcs/application/acc_library/version_library/rpms`

- 4 If you downloaded the individual ACCLib tar file, navigate to the pkgs directory (for AIX and Solaris), or rpms directory (for Linux).
- 5 Install the package. Enter **Yes**, if asked to confirm overwriting of files in the existing package.

```
AIX          # installp -ac -d VRTSacclib.bff VRTSacclib

Linux        # rpm -i \
              VRTSacclib-VersionNumber-GA_GENERIC.noarch.rpm
```

Note: The LogDbg attribute should be used to enable debug logs for the ACCLib-based agents when the ACCLib version is 6.2.0.0 or later and VCS version is 6.2 or later.

Installing the agent in a VCS environment

Install the agent for SAP HotStandby on each node in the cluster.

To install the agent in a VCS environment

- 1 Download the agent from the Veritas Services and Operations Readiness Tools (SORT) site: <https://sort.veritas.com/agents>.

You can download either the complete Agent Pack tar file or an individual agent tar file.

- 2 Uncompress the file to a temporary location, say /tmp.
- 3 If you downloaded the complete Agent Pack tar file, navigate to the directory containing the package for the platform running in your environment.

```
AIX          cd1/aix/vcs/application/saphotstandby_agent/
              vcs_version/version_agent/pkgs

Linux        cd1/linux/generic/vcs/application/saphotstandby_agent/
              vcs_version/version_agent/rpms
```

If you downloaded the individual agent tar file, navigate to the pkgs directory (for AIX and Solaris), or rpms directory (for Linux).

4 Log in as a superuser.

5 Install the package.

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

Linux        # rpm -ihv \
              VRTSsaphs-AgentVersion-GA_GENERIC.noarch.rpm
```

After installing the agent package, you must import the agent type configuration file.

See [“Importing the agent types files in a VCS environment”](#) on page 44.

Uninstalling the agent in a VCS environment

You must uninstall the agent for SAP HotStandby from a cluster while the cluster is active.

To uninstall the agent in a VCS environment

1 Log in as a superuser.

2 Set the cluster configuration mode to read/write by running the following command from any node in the cluster:

```
# haconf -makerw
```

3 Remove all SAP liveCache HotStandby resources from the cluster. Run the following command to verify that all resources have been removed:

```
# hares -list Type=SAPHotStandby
```

4 Remove the agent type from the cluster configuration by running the following command from any node in the cluster:

```
# hatype -delete SAPHotStandby
```

Removing the agent's type file from the cluster removes the include statement for the agent from the `main.cf` file, but the agent's type file is not removed from the cluster configuration directory. You can remove the agent's type file later from the cluster configuration directory.

- 5 Save these changes. Then set the cluster configuration mode to read-only by running the following command from any node in the cluster:

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

- 6 Use the platform's native software management program to remove the agent for SAP HotStandby from each node in the cluster.

Run the following command to uninstall the agent:

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

```
Linux        # rpm -e VRTSsaphs
```

Removing the ACC library

Perform the following steps to remove the ACC library.

To remove the ACC library

- 1 Ensure that all agents that use ACC library are removed.
- 2 Run the following command to remove the ACC library package:

```
AIX          # installp -u VRTSaccclib
```

```
Linux        # rpm -e VRTSaccclib
```

Upgrading the agent in a VCS environment

To upgrade the agent in a VCS environment

- 1 Persistently freeze the service groups that host the application.

```
# hagrps -freeze GroupName -persistent
```

- 2 Stop the cluster services forcibly.

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

- 3 Ensure that the agent operations are stopped on all the nodes.

```
# ps -ef | grep SAPHotStandby
```

- 4 Uninstall the agent package from all the nodes. Use the platform's native software management program to remove the agent for SAP HotStandby from each node in the cluster.

Execute the following command to uninstall the agent:

AIX	<code># installp -u VRTSsaphs.rte</code>
Linux	<code># rpm -e VRTSsaphs</code>

- 5 Install the new agent on all the nodes.

See [“Installing the agent in a VCS environment”](#) on page 40.

- 6 Copy the new SAPHotStandbyTypes.cf file from the agent's conf directory, /etc/VRTSagents/ha/conf/SAPHotStandby/ SAPHotStandbyTypes.cf, to the VCS conf directory /etc/VRTSvcsc/conf/config.
- 7 Check for the changes in the resource values required, if any, due to the new agent types file.

Note: To note the list of changed attributes, compare the new type definition file with the old type definition file.

- 8 Copy the storage library utility (runvxcmd) and the storage library configuration (libsymchss.so) to all the standby systems. See [“HotStandby Storage library configuration \(libsymchss.so\)”](#) on page 21. See [“HotStandby Storage library utility configuration \(runvxcmd\)”](#) on page 21.
- 9 Start the cluster services.

```
# hstart
```

- 10 Start the agent on all nodes, if not started.

```
# haagent -start SAPHotStandby -sys SystemName
```

- 11 Unfreeze the service groups once all the resources come to an online steady state.

```
# hagr -unfreeze GroupName -persistent
```

Configuring the agent for SAP HotStandby

This chapter includes the following topics:

- [About configuring the Cluster Server agent for SAP HotStandby](#)
- [Importing the agent types files in a VCS environment](#)
- [SAP HotStandby agent attributes](#)
- [Executing a customized monitoring program](#)

About configuring the Cluster Server agent for SAP HotStandby

After installing the Cluster Server agent for SAP HotStandby, you must import the agent type configuration file. After importing this file, review the attributes table that describes the resource type and its attributes, and then create and configure SAP liveCache HotStandby resources.

To view the sample agent type definition and service groups configuration:

See [“About sample configurations for the agents for SAP HotStandby”](#) on page 72.

Importing the agent types files in a VCS environment

To use the agent for SAP HotStandby, you must import the agent types file into the cluster. You can import the agent types file using the VCS graphical user interface or using the command line interface.

To import the agent types file using the VCS Java GUI

- 1** Start the Cluster Manager (Java Console) and connect to the cluster on which the agent is installed.
- 2** Click **File > Import Types**.
- 3** In the **Import Types** dialog box, select the following file:

`/etc/VRTSagents/ha/conf/SAPHotStandby/SAPHotStandbyTypes.cf`
- 4** Click **Import**.
- 5** Save the VCS configuration.

You can now create SAP liveCache HotStandby resources. For additional information about using the VCS GUI, refer to the *Cluster Server Administrator's Guide*.

SAP HotStandby agent attributes

A SAP HotStandby service is managed within a Cluster Server (VCS) environment. VCS uses software agents to control software services within a VCS cluster. To allow VCS to monitor and control the liveCache service in HotStandby mode effectively, the service is managed with the agent.

VCS deploys agents to manage all components or resources of the same type. For example, a single mount agent is responsible for managing all mounted file systems that are under VCS control.

The agent attributes define the details that are passed from the VCS engine to the agent to uniquely identify the specific resource component that is to be managed.

[Table 4-1](#) lists the attributes required for configuring a SAP HotStandby instance.

Table 4-1 Required attributes

Attribute name	Definition
ResLogLevel	<p>Controls the agent's logging detail for a specific instance of a resource. The ResLogLevel attribute controls the amount of ACCLib VCS agent framework based logging that is written to the VCS log file on a per resource-instance basis. This attribute is different from the VCS generic LogLevel type attribute, which controls the VCS engine log level on a per agent-type basis.</p> <p>Values are:</p> <p>ERROR: Logs error messages.</p> <p>WARN: Logs error and warning messages.</p> <p>INFO: Logs error, warning, and informational messages.</p> <p>TRACE: Logs error, warning, informational, and trace messages.</p> <p>Trace logging is verbose. Use for initial configuration or troubleshooting only.</p> <p>Type and dimension: string-scalar</p> <p>Default Value: "INFO"</p> <p>Example: "TRACE"</p>
EnvFile	<p>Environments file for <i>LCUser</i> to be sourced before starting/stopping the liveCache server. Veritas recommends keeping the environments file on shared disk for ease of maintenance.</p> <p>Type and dimension: string-scalar</p> <p>Default Value: No default value</p> <p>Example: /home/hotadm/lcenv.csh</p>
LCHome	<p>Directory in which the liveCache database software is installed. This directory is needed to find the dbmcli and x_server binaries.</p> <p>Type and dimension: string-scalar</p> <p>Default Value: No default value</p> <p>Example: "/sapdb/programs/bin"</p>
LCHost	<p>Virtual hostname of the SAP liveCache server. This attribute should be set to same value for both MASTER and STANDBY instances for a given liveCache server.</p> <p>Type and dimension: string-scalar</p> <p>Default Value: No default value</p> <p>Example: saphotaix</p>

Table 4-1 Required attributes (*continued*)

Attribute name	Definition
LCUser	<p>Operating system user for liveCache server. This user is responsible for starting and stopping the liveCache server. In general, this user takes the form <i>LCName</i> adm.</p> <p>Type and dimension: string-scalar</p> <p>Default Value: No default value</p> <p>Example: hotadm</p>
LCName	<p>Name of the liveCache instance consisting of three alphanumeric characters. Also called liveCache SID. Only upper case letters are allowed and the first letter must be a character. This attribute is needed to uniquely identify the processes of the live Cache server. Also needed by "dbmcli" utility to find the status of the liveCache server.</p> <p>Type and dimension: string-scalar</p> <p>Default Value: No default value</p> <p>Example: HOT</p>
DBMUserId	<p>The DBMUserId used in the "dbmcli" utility to connect to the liveCache database server.</p> <p>Type and dimension: string-scalar</p> <p>Default Value: "control "</p> <p>Example: control</p>
DBMPassword	<p>Password for the user <i>DBMUserId</i>.</p> <ul style="list-style-type: none">■ store encrypted■ agent to do decryption appropriately <p>Use vcsencrypt -agent option to encrypt the password.</p> <p>If you use the VCS GUI to enter the password, VCS GUI automatically encrypts the password for you.</p> <p>Type and dimension: string-scalar</p> <p>Default Value: No default value</p> <p>Example: jxpVmxMpkPlpMpnPo</p>

Table 4-1 Required attributes (*continued*)

Attribute name	Definition
DBAUserId	<p>The DBAUserId used in the "dbmcli" utility to connect to the liveCache database server and query for list of standby system.</p> <p>Type and dimension: string-scalar</p> <p>Default Value: "superdba"</p> <p>Example: superdba</p>
DBAPassword	<p>Password for the user DBAUserId.</p> <ul style="list-style-type: none"> ■ store encrypted ■ agent to do decryption appropriately <p>Use vcsencrypt -agent option to encrypt the password. If you use the VCS GUI to enter the password, there is no need to encrypt the password. VCS GUI automatically encrypts the password.</p> <p>Type and dimension: string-scalar</p> <p>Default Value: No default value</p> <p>Example: jxpVmxMpkPlpMpnPo</p>
StandbyList	<p>List of hot standby systems, including master server, on which SAP liveCache Standby server is configured.</p> <p>Type and dimension: string-vector</p> <p>Default Value: No default value</p> <p>Example: {vcsaix101, vcsaix102}</p>
StandbyRole	<p>The role of the liveCache server for which SAP HotStandby resource is configured. This attribute takes the value of either MASTER or STANDBY.</p> <p>Type and dimension: string-scalar</p> <p>Default Value: MASTER</p> <p>Example: STANDBY</p>
MasterResName	<p>VCS resource name for liveCache Master server. This attribute needs to be configured for only liveCache Standby server resource.</p> <p>Type and dimension: string-scalar</p> <p>Default Value: No default value</p> <p>Example: SAPHOTMaster-srvr</p>

Table 4-1 Required attributes (*continued*)

Attribute name	Definition
MonitorProgram	<p>Full path and file name of an external, user-supplied monitor program. If specified, the monitor entry point executes this file to perform an additional server state check. There are no restrictions on the actions the external monitor program performs to determine the state of an SAP liveCache server. The only constraint is that the external monitor program must return one of the following integer values:</p> <ul style="list-style-type: none"> ■ 0 (server is online) ■ 110 (server is online) ■ 00 (server is offline) ■ 1 (server is offline) ■ 99 or any thing other than{0,1,110,100}(server state is unknown) <p>Veritas recommends storing the external monitor program on the shared disk directory to ensure that the file is always available on the online system. Arguments are supported.</p> <p>Type and dimension: string-scalar</p> <p>Default Value: No default value</p> <p>Example1:</p> <p>/sapdb/data/wrk/HOT/mymonitor.sh</p> <p>Example2:</p> <p>/sapdb/data/wrk/HOT/mymonitor.sh arg1 arg2</p>

Executing a customized monitoring program

The monitor function can execute a customized monitoring utility to perform an additional SAP liveCache server state check.

The monitor function executes the utility specified in the MonitorProgram attribute if the following conditions are satisfied:

- The specified utility is a valid executable file and LCUser has executable permissions.
- The regular monitor indicates that the SAP liveCache Server instance is online.

The monitor function interprets the utility exit code as follows:

110 or 0	SAP liveCache server instance is online
100 or 1	SAP liveCache server instance is offline

99 SAP liveCache server instance is unknown

Any other value SAP liveCache server instance is unknown

To ensure that the customized utility is always available to the agent, Veritas recommends storing the file in a shared directory that is available on an online node.

Configuring the service groups for SAP HotStandby using the CLI

This chapter includes the following topics:

- [About configuring service groups for SAP HotStandby](#)
- [Before configuring the service groups for SAP HotStandby](#)
- [Configuring service groups for SAP HotStandby](#)

About configuring service groups for SAP HotStandby

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

You can configure the service groups using one of the following:

- The Cluster Manager (Java console)
- Veritas Infoscale Operations Manager
- The command line

Before configuring the service groups for SAP HotStandby

Before you configure the SAP liveCache HotStandby service group, you must:

- Verify that the Cluster Server components are installed and configured on all nodes in the cluster where you will configure the service group.
For more information on installing the components, refer to the *Installation Guide*.
- Verify that SAP HotStandby is installed and configured identically on all nodes in the cluster.
See [“About configuring SAP HotStandby for high availability ”](#) on page 14.
- Verify that the Cluster Server agent for SAP HotStandby is installed on all nodes in the cluster.
See [“Installing the agent in a VCS environment”](#) on page 40.

Configuring service groups for SAP HotStandby

Configuring the service groups for SAP liveCache server in HotStandby mode involves, creating VCS service groups for SAP liveCache HotStandby.

Creating VCS service groups for SAP liveCache HotStandby

Creating VCS service groups for SAP liveCache HotStandby involves procedures as described in the following paragraphs.

SG 1: Service group for liveCache LOG (Parallel service group)

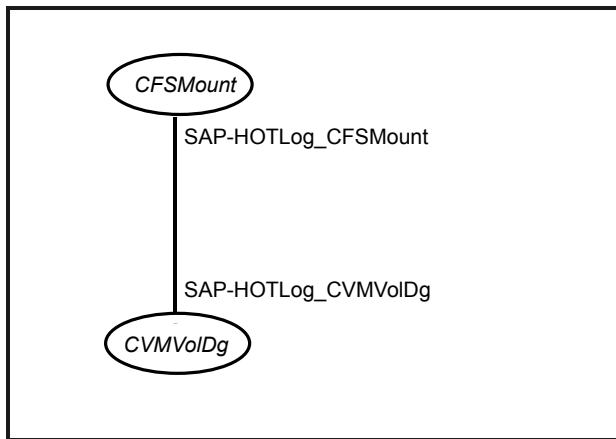
In this service group the Shared Log volumes are clustered for SAP liveCache server. This service group requires one resource for the shared log volume startup of type CVMVolDg and another resource for mounting the shared volume of type CFSMount. The CFSMount resource depends on the CVMVolDg resource.

Note: The AutoRestart attribute for this service group should be enabled.

Note: The Mount resources and the DiskGroup resource for an SAP Log Volume are managed by VCS and also by the `libsymchss.so` library. If you configure these resources as critical and if they are faulted, VCS may take the SAP service group offline and thereby interfere with the working of `libsymchss.so`. To avoid such a situation, set the Critical attribute of the Mount resources and the DiskGroup resource that are created for an SAP Log Volume to 0 (zero).

Figure 5-1 shows a sample service group.

Figure 5-1 Service group for SAP liveCache LOG (Parallel service group)



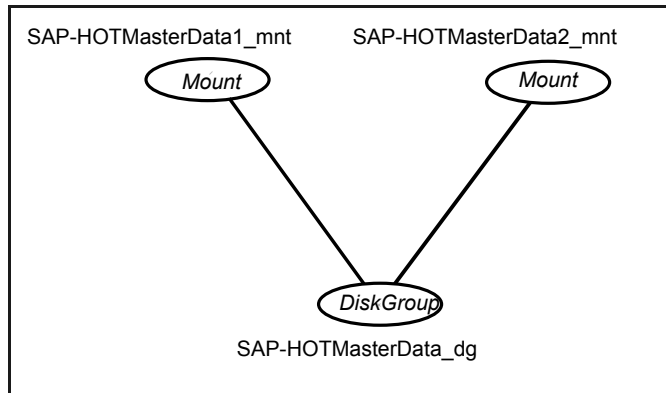
SG 2: Service group for liveCache master DATA (Parallel single node group)

Create a service group for liveCache Master DATA volumes. This service group contains one resource for importing the Disk Group of type DiskGroup and one or more resources for mounting the DATA volumes of type Mount for liveCache Master server data. All the mount resources depend on the disk group resource.

Note: The AutoRestart attribute for this service group should be enabled.

Figure 5-2 shows a sample service group for liveCache Master server data.

Figure 5-2 Sample service group for liveCache master server data



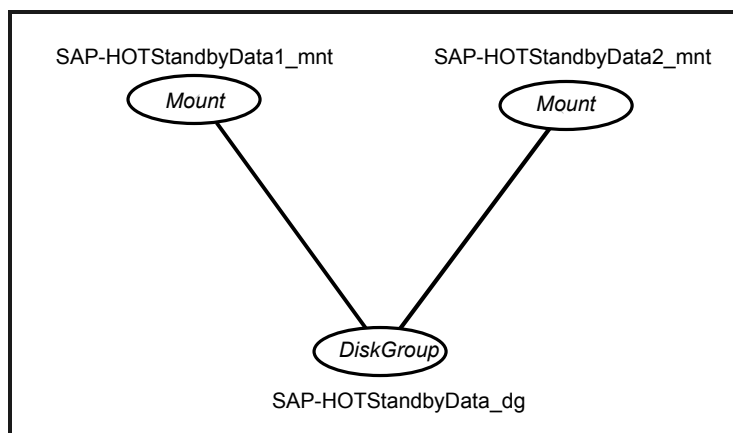
SG 3: Service group for liveCache standby DATA (Parallel single node group)

Create a Service Group for liveCache Standby DATA volumes. This service group contains one resource for importing the Disk Group of type DiskGroup and one or more resources for mounting the DATA volumes of type Mount for liveCache Standby server data. All the mount resources depend on the disk group resource.

Note: The AutoRestart attribute for this service group should be enabled.

Figure 5-3 shows a sample service group for liveCache Standby server data.

Figure 5-3 Sample service group for liveCache standby server data



The number of Mount resources in Standby data service group are always equal to the number of Mount resources in the Master data service group.

Note: You may notice that Standby data service group faults when liveCache Standby needs to copy data from the Master while starting up. When the copy is made, the Standby data service group comes online again. This is the expected behavior.

SG 4: Service group for liveCache master server (Failover service group)

Create a service group for liveCache Master server. This service group contains one resource for liveCache virtual IP of type IP and another resource for SAP liveCache HotStandby server of type SAPHotStandby. The liveCache HotStandby resource depends on the IP resource.

Figure 5-4 shows a sample service group for SAP liveCache HotStandby resource for Master.

Figure 5-4 Sample service group for liveCache HotStandby resource for master server

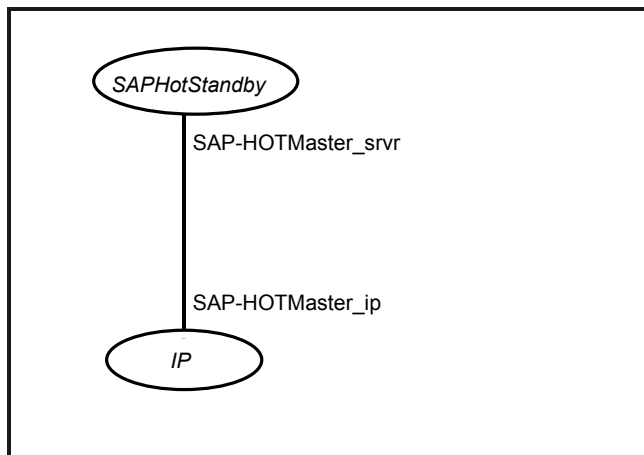


Table 5-1 shows a sample resource configuration for SAP liveCache HotStandby Master.

Table 5-1 Sample resource configuration for SAP liveCache HotStandby Master

Attribute	Value
ResLogLevel	INFO
EnvFile	/home/hotadm/.lcenv.csh
LCHome	/sapdb/programs/bin
LCHost	saphotaix
LCUser	hotadm
LCName	HOT
DBMUserId	control
DBMPassword	govSjsLshSukKuiQvmHmh
DBAUserId	superdba
DBAPassword	FLTkrITILghk
StandbyList	sysA, sysB
StandbyRole	MASTER
MasterResName	
MonitorProgram	

Note: The attribute StandbyRole set to 'MASTER' for the liveCache Master resource is important in identifying the role of the resource in HotStandby environment.

SG 5: Service group for liveCache standby server (Failover service group)

Create a service group for liveCache Standby server. This service group contains only one resource for SAP liveCache HotStandby server of type SAPHotStandby.

Figure 5-5 shows a sample service group for SAP liveCache HotStandby resource for Standby.

Figure 5-5 Sample service group for liveCache HotStandby resource for standby server

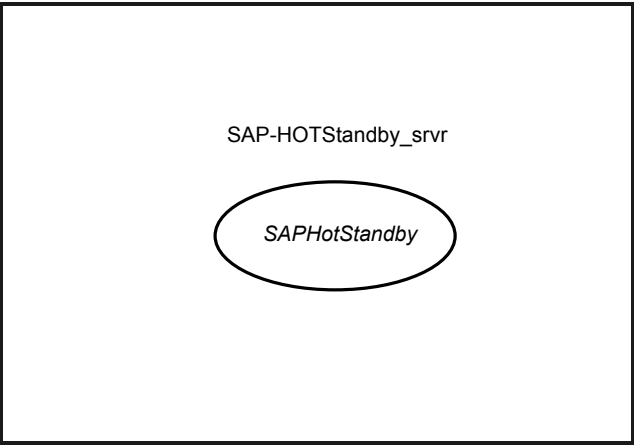


Table 5-2 shows a sample resource configuration for SAP liveCache Standby resource.

Note: The attribute StandbyRole set to 'STANDBY' for the liveCache Standby resource is important in identifying the role of the resource in HotStandby environment.

The OnlineTimeout attribute for the Standby resource should be set to a value such that resource is not timed out during online of standby resource when standby initiates INIT STANDBY (takes a snapshot of liveCache data from Master).

The ToleranceLimit attribute for the standby resource should be set to a value such that the master resource gets sufficient time to come online before the online operation for the standby resource is executed.

For example:

```
#hares -override <standby_resource> ToleranceLimit
# hares -modify <standby_resource> ToleranceLimit 2
```

This introduces delay of 3 monitor cycles so that master resource gets sufficient time to come online before the online operation for the standby resource is executed.

Table 5-2 Sample resource configuration for liveCache Standby server

Attribute	Value
ResLogLevel	INFO

Table 5-2 Sample resource configuration for liveCache Standby server
(continued)

Attribute	Value
EnvFile	/home/hotadm/.lcenv.csh
LCHome	/sapdb/programs/bin
LCHost	saphotaix
LCUser	hotadm
LCName	HOT
DBMUserId	control
DBMPassword	govSjsLshSukKuiQvmHmh
DBAUserId	superdba
DBAPassword	FLTkrITILghk
StandbyList	sysA, sysB
StandbyRole	STANDBY
MasterResName	SAP-HOTMaster_svr
MonitorProgram	

SG 6: service group for liveCache data RemoteGroup (Parallel service group)

This service group is needed to achieve the SG dependency between liveCache Master/Standby service group and Master/Standby Data service groups. This service group consists of one resource of type RemoteGroup.

Figure 5-6 shows a sample service group configuration for liveCache RemoteGroup.

Figure 5-6 Sample service group configuration for liveCache RemoteGroup

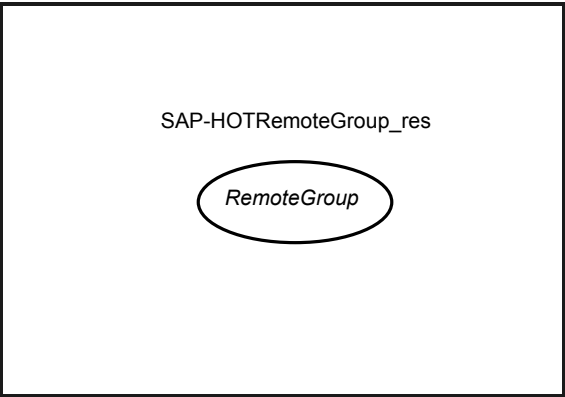


Table 5-3 shows the attribute configuration for the RemoteGroup resource.

Table 5-3 Attribute configuration for the RemoteGroup resource

Attribute	Value
IPAddress	vcsaix101 vcsaix101 vcsaix102 vcsaix102
Port	63036
UserName	admin
Password	password
GroupName	vcsaix101 SAP-HOTMasterData vcsaix102 SAP-HOTStandbyData
VCSSysName	vcsaix101 vcsaix101 vcsaix102 vcsaix102
ControlMode	OnlineOnly
OfflineWaitTime	0

Note: The RemoteGroup resource needs some of the attributes to be localized. (For example: GroupName, VCSSysName, etc.)

Adjust the timings for the RemoteGroup resource based on the time it takes for snapshot for the Standby data.

The attributes to be considered are as follows:

- OnlineWaitLimit
- OnlineRetryLimit
- MonitorInterval
- OfflineWaitTime
- ToleranceLimit

Configuring preonline trigger for liveCache Master(SG4) and Standby(SG5) server service groups

In a clustered environment, the SAP liveCache administrator installs liveCache Master and Standby systems for liveCache Hot Standby configuration. The behavior of these two servers has the following requisites:

- When a liveCache Master server fails, the server must failover to a node where the Standby server is online. After the Master server takes over, the Standby has to failover to another node in the cluster.
- When a liveCache Standby server fails, the instance must failover to such a node in the cluster where the liveCache Master instance is NOT online.

To manage the failover sequences between liveCache Master and Standby servers as described, the preonline trigger is implemented.

The SAPHotStandby pre-online script performs the following tasks:

- If the service group for which the SAPHotStandby pre-online script is running does not have liveCache MASTER or STANDBY server resource, the script returns the control to VCS preonline script.
- If the service group has liveCache MASTER or STANDBY resource, the script determines the node on which online operation can be performed. This script also ensures that the online operation does not execute VCS pre-online script again.

A sample pre-online script is shipped with the agent package and can be found in the `/etc/VRTSagents/ha/conf/SAPHotStandby` directory after the agent is installed.

To accomplish this failover behavior, the pre-online trigger must be configured as follows:

To configure the pre-online trigger

- 1 For the service groups (both MASTER and STANDBY), set the pre-online flag to true.

```
hagrp -modify service_group PreOnline 1
```

Example:

```
hagrp -modify SAP-HOTMaster PreOnline 1
hagrp -modify SAP-HOTStandby PreOnline 1
```

The following steps must be performed on all the systems where SAP liveCache HotStandby agent is installed.

- 2** Go to the `$VCS_HOME/bin/triggers` directory.
- 3** In the pre-online file, add the following lines to integrate the call to the SAPHotStandby pre-online trigger, in the main trigger script:

If you do not find the pre-online file, proceed to step 4.

```
eval 'exec /opt/VRTSperl/bin/perl -Sw $0 ${1+"$@"}'
if 0;
use strict;
use vars;
my $vcs_home = $ENV{"VCS_HOME"};
if (!defined ($vcs_home)) {
$vcs_home="/opt/VRTSvcs";
}
use ag_i18n_inc;
VCSAG_SET_ENVS();
if (!defined $ARGV[0]) {
VCSAG_LOG_MSG ("W", "Failed to continue; undefined system name",
15028);
exit;
}
elsif (!defined $ARGV[1]) {
VCSAG_LOG_MSG ("W", "Failed to continue; undefined group name",
15031);
exit;
}
# Add the SAPHotStandby Trigger Call here....
#-----
# Define variables for SAPHotStandby preonline trigger ..
#-----
my $sCmd = '/opt/VRTSagents/ha/bin/SAPHotStandby/preonline';
my $sResLogLevel = 'INFO'; # Define logging
level..
my @lsCmdArgs = ( @ARGV, $sResLogLevel ); # Insert logging
level..
my $sArgs = join ( ' ', @lsCmdArgs );
my $iExitCode = undef;
```

```
#-----
# Pass control to preonline, if it exists..
#-----
if ( -x $sCmd ) {
    VCSAG_LOG_MSG ("I", "Preonline Cmd [$sCmd] Args [$sArgs]",
15031);
    system ( $sCmd, @lsCmdArgs );
    #-----
    # Exit if we were successful..
    #-----
    exit $iExitCode unless ( $iExitCode = $? >> 8 );
}
# give control back to HAD.
if (defined $ARGV[3]) {
    system("$vcs_home/bin/hagrp -online -nopre $ARGV[1] -sys
$ARGV[0] -checkpartial $ARGV[3]");
    exit;
}
system("$vcs_home/bin/hagrp -online -nopre $ARGV[1] -sys
$ARGV[0]");
exit;
```

- 4 If the VCS preonline trigger script is not present, you can do the following:
 - Pick the sample preonline script present in this directory:
`/etc/VRTSagents/ha/conf/SAPHotStandby`
 - Copy this file in the `$VCS_HOME/bin/triggers` directory.
 - Ensure that the file is an executable, and the root user can access it.
- 5 Create a symlink for the preonline script to the monitor script by running these commands:

```
# cd /opt/VRTSagents/ha/bin/SAPHotStandby
# ln -s /opt/VRTSagents/ha/bin/SAPHotStandby/monitor preonline
```

The preonline script is now configured to facilitate liveCache HotStandby behavior.

To configure the logging level used in the preonline script, you can set the `ResLogLevel` attribute in the preonline wrapper to 'TRACE'. You can then view the logs in the VCS engine log, `/var/VRTSvcs/log/engine_A.log`.

Configuring service group dependencies between different liveCache service groups

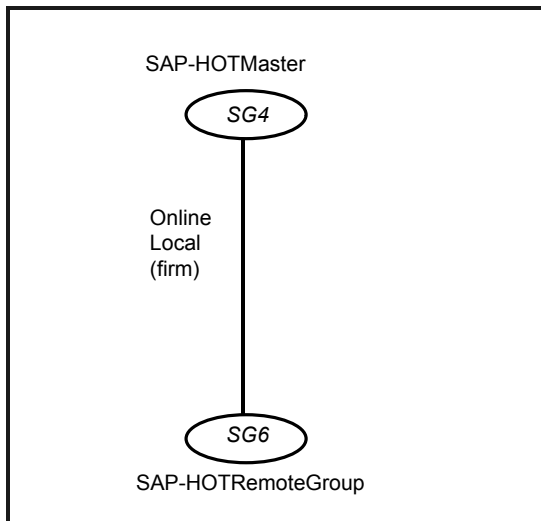
In addition to creating all these service groups and configuring preonline trigger for the liveCache, it is necessary to have proper dependencies among these service groups for proper functioning of liveCache.

Following are the recommended service group dependencies between different service groups for liveCache.

The service group for SAP liveCache Master should depend locally on Service Group for liveCache RemoteGroup (SG4 -> SG6). (online - local - firm).

Figure 5-7 shows a sample service group dependency for SAP liveCache Master and RemoteGroup.

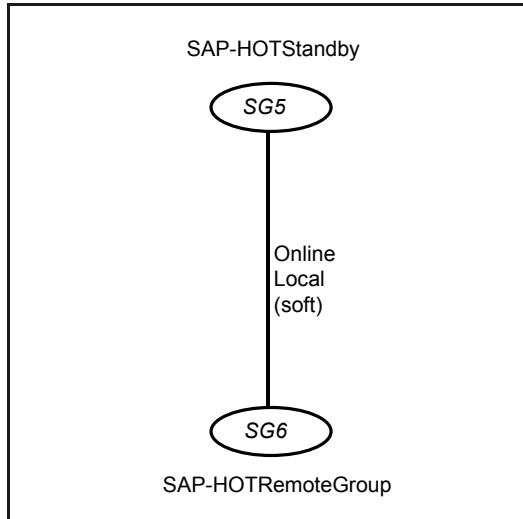
Figure 5-7 Sample service group dependency for SAP liveCache master and RemoteGroup



The service group for SAP liveCache Standby should depend locally on service group for liveCache RemoteGroup (SG5 -> SG6). (online - local - soft).

Figure 5-8 shows a sample service group dependency for SAP liveCache Standby and RemoteGroup.

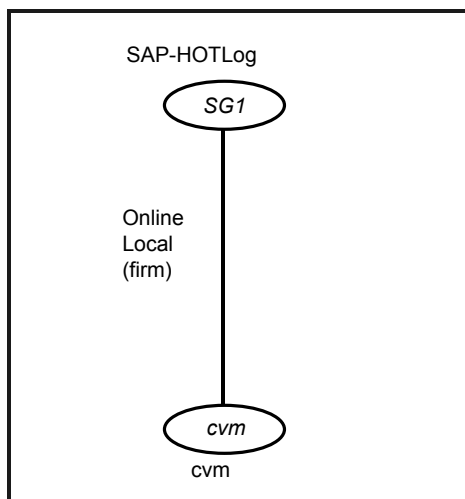
Figure 5-8 Sample service group dependency for SAP liveCache standby and RemoteGroup



The Service Group for SAP liveCache LOG should depend on the service group for "cvm" cluster (SG1 -> cvm). (online - local - firm).

[Figure 5-9](#) shows a sample service group dependency for SAP liveCache LOG and cvm.

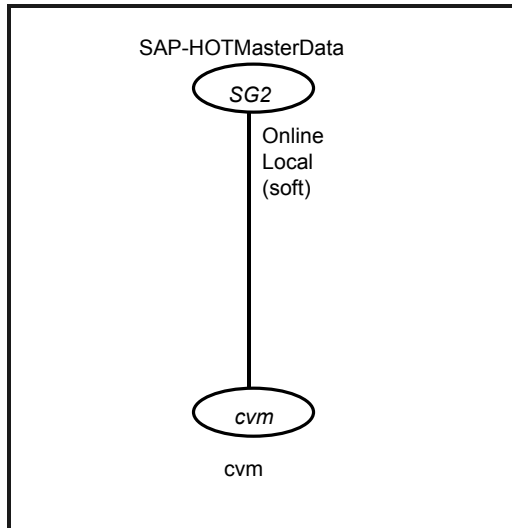
Figure 5-9 Sample service group for dependency for SAP liveCache LOG and cvm



The Service Group for SAP liveCache Master Data should depend on the service group for "cvm" cluster (SG2 -> cvm). (online - local - soft).

Figure 5-10 shows a sample service group dependency for SAP liveCache Master Data and cvm.

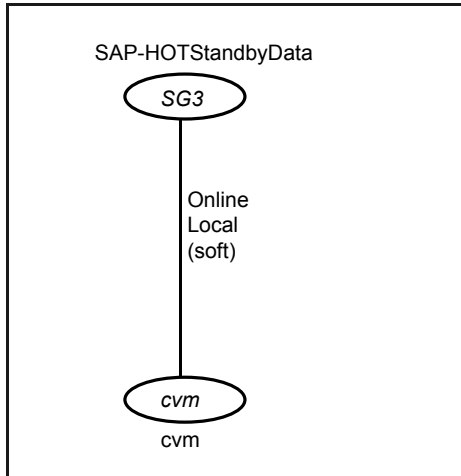
Figure 5-10 sample service group dependency for SAP liveCache master data and cvm



The Service Group for SAP liveCache Standby Data should depend on the service group for "cvm" cluster (SG3 -> cvm). (online - local - soft).

Figure 5-11 shows a sample service group dependency for SAP liveCache Standby Data and cvm.

Figure 5-11 Sample service group dependency for SAP liveCache standby data and cvm



Manually recovering the snapshot from master when snapshot for standby fails

The procedure to recover the snapshot volumes from Master when a snapshot for Standby server fails is described as follows. All these commands must be run on the liveCache server Master node. See the *Storage Foundation Administrator's Guide* for more information on these commands.

The following assumptions are made in this example:

- The diskgroup name for liveCache Master Data is hotmaster_dg and it has two volumes configured for Data with the names hotmaster_vol1 and hotmaster_vol2.
- The diskgroup name for liveCache Standby Data is hotstandby_dg and it has two volumes configured for Data with names hotstandby_vol1 and hotstandby_vol2.

Run the following commands to recover the Standby diskgroup based on the state of the snapshot.

```

vxdg import hotstandby_dg
vxdg join hotstandby_dg hotmaster_dg
vxrecover -g hotmaster_dg -m hotstandby_vol1 hotstandby_vol2
vxvol -g hotmaster_dg start hotstandby_vol1 hotstandby_vol2
vxsnap -g hotmaster_dg addmir hotmaster_vol1 mirvol=hotstandby_vol1
vxsnap -g hotmaster_dg addmir hotmaster_vol2 mirvol=hotstandby_vol2
vxsnap -g hotmaster_dg snapwait hotmaster_vol1
  
```

```
mirvol=hotstandby_vol1
vxsnap -g hotmaster_dg snapwait hotmaster_vol2
mirvol=hotstandby_vol2
vxsnap -g hotmaster_dg make
source=hotmaster_vol1/snapvol=hotstandby_vol1 source=hotmaster_vol2/
snapvol=hotstandby_vol2
vxsnap -g hotmaster_dg dis hotstandby_vol1
vxsnap -g hotmaster_dg dis hotstandby_vol2
vxdg split hotmaster_dg hotstandby_dg hotstandby_vol1
hotstandby_vol2
vxdg deport hotstandby_dg
```

Note: All these commands need to be exercised with caution.

The Standby diskgroup on Master node is recovered. Import the Standby diskgroup on the Standby node with the following commands:

```
vxdg import hotstandby_dg
vxrecover -g hotstandby_dg -m hotstandby_vol1 hotstandby_vol2
vxvol -g hotstandby_dg start hotstandby_vol1 hotstandby_vol2
fsck -V vxfs /dev/vx/dsk/hotstandby_dg/hotstandby_vol1
fsck -V vxfs /dev/vx/dsk/hotstandby_dg/hotstandby_vol2
mount -V vxfs /dev/vx/dsk/hotstandby_dg/hotstandby_vol1
/sapdb/HOT/sapdata1
mount -V vxfs /dev/vx/dsk/hotstandby_dg/hotstandby_vol2
/sapdb/HOT/sapdata2
```

Troubleshooting the agent for SAP HotStandby

This chapter includes the following topics:

- [Using the correct software and operating system versions](#)
- [Meeting prerequisites](#)
- [Configuring SAP liveCache HotStandby resources](#)
- [Reviewing error log files](#)

Using the correct software and operating system versions

Ensure that you use correct software and operating system versions.

For information on the software versions that the agent for SAP HotStandby supports, see the Veritas Services and Operations Readiness Tools (SORT) site: <https://sort.veritas.com/agents>.

Meeting prerequisites

Before installing the agent for SAP HotStandby, ensure that the following prerequisites are met.

For example, you must install the ACC library on VCS before installing the agent for SAP HotStandby.

See [“Before you install the Cluster Server agent for SAP HotStandby”](#) on page 38.

Configuring SAP liveCache HotStandby resources

Before using SAP liveCache HotStandby resources, ensure that you configure the resources properly. For a list of attributes used to configure all SAP liveCache HotStandby resources, refer to the agent attributes.

On the RHEL 7 and SLES 12 platforms, the SAPHotStandBy processes run in the user context in certain conditions. You can make them run in the system context as follows:

- When the db_standby command is executed, the SAPHotStandBy processes on the standby node start in user.slice (the user context). Thereafter, when the master instance is failed over or switched over to a standby node, the processes will continue to run in the user context. If you want the SAPHotStandBy processes to run in system.slice (the system context), you must restart the master instance.
- If the vserver processes are started in the user context, the SAPHotStandBy processes also start in the user context. To overcome this limitation, stop the vserver processes manually and start the SAPHotStandBy instances through VCS.

Reviewing error log files

If you face problems while using SAP liveCache HotStandby or the agent for SAP HotStandby, use the log files described in this section to investigate the problems.

Using SAP liveCache HotStandby log files

If a SAP liveCache HotStandby server is facing problems, you can access the server log files to further diagnose the problem. The SAP liveCache log files are located in the /sapdb/data/wrk/<LCName> directory.

Reviewing cluster log files

In case of problems while using the agent for SAP HotStandby, you can access the engine log file for more information about a particular resource. The engine log file is located at /var/VRTSvcs/log/engine_A.log.

Additionally, you can also refer to the latest SAPHotStandby agent log files located at /var/VRTSvcs/log/SAPHotStandby_A.log

Note: Include both these log files while addressing the problem to Veritas support team.

Using trace level logging

The ResLogLevel attribute controls the level of logging that is written in a cluster log file for each SAP liveCache HotStandby resource. You can set this attribute to TRACE, which enables very detailed and verbose logging.

If you set ResLogLevel to TRACE, a very high volume of messages are produced. Veritas recommends that you localize the ResLogLevel attribute for a particular resource.

Note: Starting with version 5.1.1.0 of the ACC library, the TRACE level logs for any ACCLib based agent are generated locally at the location
`/var/VRTSvcS/log/Agent_A.log`.

Warning: You may consider temporarily increasing the timeout values for SAPHotStandby for debugging purposes. After the debugging process is complete, you can revert back to the original timeout values.

The LogDbg attribute should be used to enable the debug logs for the ACCLib-based agents when the ACCLIB version is 6.2.0.0 or later and the VCS version is 6.2 or later.

To localize ResLogLevel attribute for a resource

1 Identify the resource for which you want to enable detailed logging.

2 Localize the ResLogLevel attribute for the identified resource:

```
# hares -local Resource_Name ResLogLevel
```

3 Set the ResLogLevel attribute to TRACE for the identified resource:

```
# hares -modify Resource_Name ResLogLevel TRACE -sys SysA
```

4 Note the time before you begin to operate the identified resource.

5 Test the identified resource. The function reproduces the problem that you are attempting to diagnose.

6 Note the time when the problem is reproduced.

7 Set the ResLogLevel attribute back to INFO for the identified resource:

```
# hares -modify Resource_Name ResLogLevel INFO -sys SysA
```

8 Save the configuration changes.

```
# haconf -dump
```

9 Review the contents of the log file.

Use the time noted in the previous steps to diagnose the problem.

You can also contact Veritas support for more help.

To enable debug logs for all resources of type SAPHotStandby

Enable the debug log.

```
# hatype -modify SAPHotStandby LogDbg DBG_5
```

To override the LogDbg attribute at resource level

Override the LogDbg attribute at the resource level and enable the debug logs for the specific resource.

```
# hares -override SAPHotStandby LogDbg
# hares -modify SAPHotStandby LogDbg DBG_5
```

Sample Configurations

This appendix includes the following topics:

- [About sample configurations for the agents for SAP HotStandby](#)
- [Sample agent type definition for SAP HotStandby](#)
- [Sample SAP HotStandby resource configuration for VCS](#)
- [Sample RTEHSS_LCName_Config.cf](#)

About sample configurations for the agents for SAP HotStandby

The sample configuration graphically depicts the resource types, resources, and resource dependencies within the service group. Review these dependencies carefully before configuring the agents for SAP HotStandby. For more information about these resource types, refer to the *Cluster Server Bundled Agents Reference Guide*.

Sample agent type definition for SAP HotStandby

The sample agent type definition for SAP HotStandby is as follows:

```
type SAPHotStandby (
    static str AgentDirectory =
        "/opt/VRTSagents/ha/bin/SAPHotStandby"
    static str AgentFile = "/opt/VRTSvcs/bin/ScriptAgent"
    static int MonitorTimeout = 90
    static int OnlineTimeout = 900
    static int OnlineWaitLimit = 0
    static il8nstr ArgList[] = { ResLogLevel, State, IState,
```



```
EnvFile, LCHome, LCHost, LCUser, LCName, DBMUserId, DBMPassword,  
DBAUserId, DBAPassword, StandbyList, StandbyRole, MasterResName,  
MonitorProgram }  
str ResLogLevel = INFO  
str EnvFile  
str LCHome  
str LCHost  
str LCUser  
str LCName  
str DBMUserId = control  
str DBMPassword  
str DBAUserId = superdba  
str DBAPassword  
str StandbyList[]  
str StandbyRole = MASTER  
str MasterResName  
str MonitorProgram  
)
```

Sample SAP HotStandby resource configuration for VCS

A sample SAP HotStandby resource configuration is as follows:

```
include "types.cf"  
include "CFSTypes.cf"  
include "CVMTypes.cf"  
include "SAPHotStandbyTypes.cf"  
  
cluster accaix1 (  
    UserNames = { admin = dqrJqlQnrMrrPzrLqo }  
    Administrators = { admin }  
    HacliUserLevel = COMMANDROOT  
)  
  
system sysA (  
    )  
  
    system sysB (  
        )  
  
group SAP-HOTLog (  
    )
```

```
SystemList = { sysA = 0, sysB = 1 }
Parallel = 1
AutoStartList = { sysA, sysB }
)

CFSMount SAP-HOTLog_CFSMount (
    Critical = 0
    MountPoint = "/sapdb/HOT/saplog"
    BlockDevice = "/dev/vx/dsk/lchotlog_dg/lchotlog_vol"
    MountOpt = "crw,ro"
)

CVMVolDg SAP-HOTLog_CVMVolDg (
    Critical = 0
    CVMDiskGroup = lchotlog_dg
    CVMVolume = { lchotlog_vol }
    CVMActivation = sw
)

requires group cvm online local firm
SAP-HOTLog_CFSMount requires SAP-HOTLog_CVMVolDg

// resource dependency tree
//
// group SAP-HOTLog
// {
//   CFSMount SAP-HOTLog_CFSMount
//   {
//     CVMVolDg SAP-HOTLog_CVMVolDg
//   }
// }

group SAP-HOTMaster (
    SystemList = { sysAsysA = 0, sysB = 1 }
    AutoStartList = { sysA, sysB }
    PreOnline = 1
)

IP SAP-HOTMaster_ip (
    Device = en0
    Address = "10.10.10.10"
    NetMask = "255.255.254.0"
```

```
)

SAPHotStandby SAP-HOTMaster_srvr (
    EnvFile = "/home/hotadm/.lcenv.csh"
    LCHome = "/sapdb/programs/bin"
    LCHost = saphotaix
    LCUser = hotadm
    LCName = HOT
    DBMPassword = govSjsLshSukKuiQvmHmh
    DBAPassword = FTLrITiLG1HLiLJlK
    StandbyList = { sysA, sysB }
)

requires group SAP-HOTRemoteGroup online local firm
SAP-HOTMaster_srvr requires SAP-HOTMaster_ip

// resource dependency tree
//
// group SAP-HOTMaster
// {
//   SAPHotStandby SAP-HOTMaster_srvr
//   {
//     IP SAP-HOTMaster_ip
//   }
// }

group SAP-HOTMasterData (
    SystemList = { sysA = 0 }
    Parallel = 1
    AutoStartList = { sysA }
)

DiskGroup SAP-HOTMasterData_dg (
    Critical = 0
    DiskGroup = hotmaster_dg
)

Mount SAP-HOTMasterData1_mnt (
    Critical = 0
    MountPoint = "/sapdb/HOT/sapdata1"
    BlockDevice = "/dev/vx/dsk/hotmaster_dg/hotmaster_voll"
    FSType = vxfs
    FsckOpt = "-y"
)
```

```
Mount SAP-HOTMasterData2_mnt (
    Critical = 0
    MountPoint = "/sapdb/HOT/sapdata2"
    BlockDevice = "/dev/vx/dsk/hotmaster_dg/hotmaster_vol2"
    FSType = vxfs
    FsckOpt = "-y"
)

requires group cvm online local soft
SAP-HOTMasterData1_mnt requires SAP-HOTMasterData_dg
SAP-HOTMasterData2_mnt requires SAP-HOTMasterData_dg

// resource dependency tree
//
// group SAP-HOTMasterData
// {
// Mount SAP-HOTMasterData1_mnt
//     {
//         DiskGroup SAP-HOTMasterData_dg
//     }
// Mount SAP-HOTMasterData2_mnt
//     {
//         DiskGroup SAP-HOTMasterData_dg
//     }
// }

group SAP-HOTRemoteGroup (
    SystemList = { sysA = 0, sysB = 1 }
    Parallel = 1
    AutoStartList = { sysA, sysB }
)

RemoteGroup SAP-HOTRemoteGroup_res (
    Critical = 0
    IPAddress @sysA = sysA
    IPAddress @sysB = sysB
    Port = 63036
    Username = admin
    Password = password
    GroupName @sysA = SAP-HOTMasterData
    GroupName @sysB = SAP-HOTStandbyData
```

```

        VCSSysName @sysA = sysA
        VCSSysName @sysB = sysB
        ControlMode = OnlineOnly
    )

// resource dependency tree
//
// group SAP-HOTRemoteGroup
// {
// RemoteGroup SAP-HOTRemoteGroup_res
// }

group SAP-HOTStandby (
    SystemList = { sysA = 0, sysB = 1 }
    AutoStartList = { sysA, sysB }
    PreOnline = 1
)

SAPHotStandby SAP-HOTStandby_svr (
    EnvFile = "/home/hotadm/.lcenv.csh"
    LCHome = "/sapdb/programs/bin"
    LCHost = saphotaix
    LCUser = hotadm
    LCName = HOT
    DBMPassword = BJQnENgNCnPFfPDlQHcHC
    DBAPassword = FTLrITiLG1HLiLJlK
    StandbyList = { sysA, sysB }
    StandbyRole = STANDBY
    MasterResName = SAP-HOTMaster_svr
)

requires group SAP-HOTRemoteGroup online local soft

// resource dependency tree
//
// group SAP-HOTStandby
// {
// SAPHotStandby SAP-HOTStandby_svr
// }

group SAP-HOTStandbyData (

```

```
SystemList = { sysB = 0 }
Parallel = 1
AutoStartList = { sysB }
)

DiskGroup SAP-HOTStandbyData_dg (
    Critical = 0
    DiskGroup = hotstandby_dg
)

Mount SAP-HOTStandbyData1_mnt (
    Critical = 0
    MountPoint = "/sapdb/HOT/sapdata1"
    BlockDevice = "/dev/vx/dsk/hotstandby_dg/hotstandby_vol1"
    FSType = vxfs
    FsckOpt = "-y"
)

Mount SAP-HOTStandbyData2_mnt (
    Critical = 0
    MountPoint = "/sapdb/HOT/sapdata2"
    BlockDevice = "/dev/vx/dsk/hotstandby_dg/hotstandby_vol2"
    FSType = vxfs
    FsckOpt = "-y"
)

requires group cvm online local soft
SAP-HOTStandbyData1_mnt requires SAP-HOTStandbyData_dg
SAP-HOTStandbyData2_mnt requires SAP-HOTStandbyData_dg

// resource dependency tree
//
// group SAP-HOTStandbyData
// {
//   Mount SAP-HOTStandbyData1_mnt
//   {
//     DiskGroup SAP-HOTStandbyData_dg
//   }
//   Mount SAP-HOTStandbyData2_mnt
//   {
//     DiskGroup SAP-HOTStandbyData_dg
//   }
// }
```

```
// }

group cvm (
    SystemList = { sysA = 0, sysB = 1 }
    AutoFailOver = 0
    Parallel = 1
    AutoStartList = { sysA, sysB }
)

CFSfsckd vxfsckd (
)

CVMCluster cvm_clus (
    CVMClustName = aixvcs50
    CVMNodeId = { sysA = 0, sysB = 1 }
    CVMTransport = gab
    CVMTimeout = 200
)

CVMVxconfigd cvm_vxconfigd (
    CVMVxconfigdArgs = { syslog }
)

vxfsckd requires cvm_clus
cvm_clus requires cvm_vxconfigd

// resource dependency tree
//
// group cvm
// {
//     CFSfsckd vxfsckd
//     {
//         CVMCluster cvm_clus
//         {
//             CVMVxconfigd cvm_vxconfigd
//         }
//     }
// }
```

A sample SAP HotStandby resource configuration with Mirror Log File System is as follows:

```
include "types.cf"
include "CFSTypes.cf"
include "CRSResource.cf"
include "CSSD.cf"
include "CVMTypes.cf"
include "MultiPrivNIC.cf"
include "PrivNIC.cf"
include "SAPHotStandbyTypes.cf"

cluster SAP_HOT (
    UserNames = { admin = bIJbIDiFJeJJhRjdIG }
    Administrators = { admin }
    HacliUserLevel = COMMANDROOT
)

system saplc-vm1 (
)

system saplc-vm2 (
)

group SAP-HOTMasterData_sg (
    SystemList = { saplc-vm1 = 0 }
    Parallel = 1
    ClusterFailOverPolicy = Auto
)

DiskGroup SAP-HOTMasterData_dg (
    Critical = 0
    DiskGroup = hotmaster_dg
)

Mount SAP-HOTMasterData1_mnt (
    Critical = 0
    MountPoint = "/sapdb/HOT/sapdata1"
    BlockDevice = "/dev/vx/dsk/hotmaster_dg/hotmaster_vol1"
    FSType = vxfs
    FsckOpt = "-y"
    VxFSMountLock = 0
)

Mount SAP-HOTMasterData2_mnt (
    Critical = 0
```



```
MountPoint = "/sapdb/HOT/sapdata2"
BlockDevice = "/dev/vx/dsk/hotmaster_dg/hotmaster_vol2"
FSType = vxfs
FsckOpt = "-y"
VxFSMountLock = 0
)

requires group cvm online local soft
SAP-HOTMasterData1_mnt requires SAP-HOTMasterData_dg

// resource dependency tree
//
//      group SAP-HOTMasterData_sg
//      {
//      Mount SAP-HOTMasterData1_mnt
//      {
//      DiskGroup SAP-HOTMasterData_dg
//      }
//      Mount SAP-HOTMasterData2_mnt
//      }

group SAP-HOTMaster_srvr_sg (
    SystemList = { saplc-vm1 = 0, saplc-vm2 = 1 }
    ClusterFailOverPolicy = Auto
    PreOnline = 1
)

IP SAP-HOTMaster_ip (
    Device = eth0
    Address = "10.209.141.197"
    NetMask = "255.255.252.0"
)

NIC SAP-HOTMaster_nic (
    Device = eth0
)

SAPHotStandby SAP-HOTMaster_srvr (
    ResLogLevel = TRACE
    EnvFile = "/home/hotadm/.lcnenv.csh"
    LCHome = "/sapdb/programs/bin"
```

```
LCHost = saphot
LCUser = hotadm
LCName = HOT
DBMPassword = BPHnEPeHChDHeHFhG
DBAPassword = iwoUlwLojOkoLomOn
StandbyList = { saplc-vm1, saplc-vm2 }
)

requires group SAP-HOTRemoteGroup online local soft
SAP-HOTMaster_ip requires SAP-HOTMaster_nic
SAP-HOTMaster_srvr requires SAP-HOTMaster_ip

// resource dependency tree
//
//      group SAP-HOTMaster_srvr_sg
//      {
//      SAPHotStandby SAP-HOTMaster_srvr
//      {
//      IP SAP-HOTMaster_ip
//      {
//      NIC SAP-HOTMaster_nic
//      }
//      }
//      }
//      }

group SAP-HOTRemoteGroup (
    SystemList = { saplc-vm1 = 0, saplc-vm2 = 1 }
    Parallel = 1
    OnlineRetryLimit = 3
    OnlineRetryInterval = 3
    AutoRestart = 2
)

RemoteGroup SAP-HOTRemoteGroup_res (
    IPAddress @saplc-vm1 = "10.209.141.195"
    IPAddress @saplc-vm2 = "10.209.141.196"
    Username @saplc-vm1 = admin
    Username @saplc-vm2 = admin
    Password @saplc-vm1 = IWlUJWlWLwPUxWkUM
    Password @saplc-vm2 = cqC0dqFqfQj0RqeOg
    GroupName @saplc-vm1 = SAP-HOTMasterData_sg
```

```

        GroupName @saplc-vm2 = SAP-HOTStandbyData_sg
        VCSSysName @saplc-vm1 = saplc-vm1
        VCSSysName @saplc-vm2 = saplc-vm2
        ControlMode = OnlineOnly
    )

// resource dependency tree
//
//      group SAP-HOTRemoteGroup
//      {
//      RemoteGroup SAP-HOTRemoteGroup_res
//      }

group SAP-HOTStandbyData_sg (
    SystemList = { saplc-vm2 = 0 }
    Parallel = 1
    ClusterFailOverPolicy = Auto
    AutoRestart = 2
)

DiskGroup SAP-HOTStandbyData_dg (
    Critical = 0
    DiskGroup = hotstandby_dg
)

Mount SAP-HOTStandbyData1_mnt (
    Critical = 0
    MountPoint = "/sapdb/HOT/sapdata1"
    BlockDevice = "/dev/vx/dsk/hotstandby_dg/hotstandby_vol1"
    FSType = vxfs
    FsckOpt = "-y"
    VxFSMountLock = 0
)

Mount SAP-HOTStandbyData2_mnt (
    Critical = 0
    MountPoint = "/sapdb/HOT/sapdata2"
    BlockDevice = "/dev/vx/dsk/hotstandby_dg/hotstandby_vol2"
    FSType = vxfs
    FsckOpt = "-y"

```

```
VxFSMountLock = 0
)

requires group cvm online local soft
SAP-HOTStandbyData1_mnt requires SAP-HOTStandbyData_dg
SAP-HOTStandbyData2_mnt requires SAP-HOTStandbyData_dg

// resource dependency tree
//
//      group SAP-HOTStandbyData_sg
//      {
//      Mount SAP-HOTStandbyData1_mnt
//      {
//      DiskGroup SAP-HOTStandbyData_dg
//      }
//      Mount SAP-HOTStandbyData2_mnt
//      {
//      DiskGroup SAP-HOTStandbyData_dg
//      }
//      }

group SAP-HOTStandby_svr (
    SystemList = { saplc-vm1 = 0, saplc-vm2 = 1 }
    ClusterFailOverPolicy = Auto
    PreOnline = 1
    OnlineRetryLimit = 2
)

SAPHotStandby SAP-HOTStandby_svr (
    ResLogLevel = TRACE
    EnvFile = "/home/hotadm/.lcenv.csh"
    LCHome = "/sapdb/programs/bin"
    LCHost = saphot
    LCUser = hotadm
    LCName = HOT
    DBMPassword = BPHnEPeHChDHeHFhG
    DBAPassword = iwoUlwLojOkoLomOn
    StandbyList = { saplc-vm1, saplc-vm2 }
    StandbyRole = STANDBY
    MasterResName = SAP-HOTMaster_svr
    ToleranceLimit = 2
```

```
)

requires group SAP-HOTRemoteGroup online local soft

// resource dependency tree
//
//      group SAP-HOTStandby_srvr
//      {
//      SAPHotStandby SAP-HOTStandby_srvr
//      }

group SAP_LogVol_SG (
    SystemList = { saplc-vm1 = 0, saplc-vm2 = 1 }
    Parallel = 1
    OnlineRetryLimit = 3
)

CFSMount HOT_Mirror_Mnt_Res_ (
    Critical = 0
    MountPoint = "/sapdb/HOT/mirrlog"
    BlockDevice = "/dev/vx/dsk/lchotlog_dg/mirrorlog_vol"
    MountOpt = "cluster,crw,ro"
)

CFSMount HOT_Mnt_Res (
    Critical = 0
    MountPoint = "/sapdb/HOT/saplog"
    BlockDevice = "/dev/vx/dsk/lchotlog_dg/lchotlog_vol"
    MountOpt = "cluster,crw,ro"
)

CVMVolDg HOT_DG_Res (
    Critical = 0
    CVMDiskGroup = lchotlog_dg
    CVMVolume = { lchotlog_vol, "mirrorlog_vol " }
    CVMActivation = sw
)

requires group cvm online local firm
HOT_Mirror_Mnt_Res_ requires HOT_DG_Res
HOT_Mnt_Res requires HOT_DG_Res
```

```
// resource dependency tree
//
//      group SAP_LogVol_SG
//      {
//      CFSMount HOT_Mirror_Mnt_Res_
//      {
//      CVMVolDg HOT_DG_Res
//      }
//      CFSMount HOT_Mnt_Res
//      {
//      CVMVolDg HOT_DG_Res
//      }
//      }

group cvm (
    SystemList = { saplc-vm1 = 0, saplc-vm2 = 1 }
    AutoFailOver = 0
    Parallel = 1
    AutoStartList = { saplc-vm1, saplc-vm2 }
)

CFSfsckd vxfsckd (
)

CVMCluster cvm_clus (
    CVMClustName = SAP_HOT
    CVMNodeId = { saplc-vm1 = 0, saplc-vm2 = 1 }
    CVMTransport = gab
    CVMTimeout = 200
)

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

ProcessOnOnly vxattachd (
    Critical = 0
    PathName = "/bin/sh"
    Arguments = "- /usr/lib/vxvm/bin/vxattachd root"
```

```

RestartLimit = 3
)

cvm_clus requires cvm_vxconfigd
vxfsckd requires cvm_clus

// resource dependency tree
//
//      group cvm
//      {
//      ProcessOnOnly vxattachd
//      CFSfsckd vxfsckd
//      {
//      CVMCluster cvm_clus
//      {
//      CVMVxconfigd cvm_vxconfigd
//      }
//      }
//      }
//      }

```

Sample RTEHSS_LCName_Config.cf

A sample configuration for SAP liveCache is as follows:

```

#cat /sapdb/symantec/conf/RTEHSS_HOT_Config.cf
#----- RTEHSS_HOT_Config.cf -----
# SAP liveCache
# RunTimeEnvironment HotStandbyStorage configuration file
#-----
# Directory for all vxvm commands needed for split mirror.
vrtscldir=/usr/sbin
# File system type: vxfs. Only these types are supported.
fstype=vxfs
# Disk group and volume name for liveCache log volume.
LCLogDgName=lchotlog_dg
LCLogVolName=lchotlog_vol
# Master liveCache Server
## Disk group name and volume name for master data volume.
MLCDataDgName=hotmaster_dg
MLCDataVolName=hotmaster_vol1
MLCDataVolName=hotmaster_vol2

```

```
# 1st Standby liveCache Server

## Disk group and volume name for 1st hot standby data volume.
SLCDataDgName=hotstandby_dg
SLCDataVolName=hotstandby_vol1
SLCDataVolName=hotstandby_vol2
## VCS ServiceGroup name for Data diskgroup and volume[s].
ServiceGroup names are case-sensitive.
MVCSDataSGName=SAP-HOTMasterData
SVCSDataSGName=SAP-HOTStandbyData
# List of all nodes in the hot standby setup for liveCache.
(HSS_NODE_00X)
HSS_NODE_001=sysA
HSS_NODE_002=sysB
```


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