

# Veritas™ High Availability Agent for SAP liveCache Installation and Configuration Guide

AIX, HP-UX, Linux, Solaris

5.0

# Veritas High Availability Agent for SAP liveCache Installation and Configuration Guide

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# Introducing the Veritas High Availability Agent for SAP liveCache

This chapter includes the following topics:

- [About the Veritas agent for SAP liveCache](#)
- [What's new in this agent](#)
- [Supported software](#)
- [About SAP liveCache server](#)
- [SAP liveCache agent functions](#)

## About the Veritas agent for SAP liveCache

The Veritas High Availability agents monitor specific resources within an enterprise application. They determine the status of resources and start or stop them according to external events.

The Veritas agent for SAP liveCache provides high availability for SAP liveCache Server in a cluster.

See the following Technical Support TechNote for the latest updates or software issues for this agent:

<http://seer.entsupport.symantec.com/docs/282004.htm>

## What's new in this agent

The enhancements in this release of SAP liveCache agent are as follows:

- Added support for RHEL 5.0 and SuSE 10.0
- Added support for Solaris 10 x64

## Supported software

The Veritas agent for SAP liveCache supports the following software versions:

Veritas Cluster Server	VCS 4.0, 4.1, 5.0
ACC Library	5.1.0.0 and later
Operating Systems	<ul style="list-style-type: none"><li>■ AIX 5.2 and 5.3 on pSeries</li><li>■ HP-UX 11i v2, 11i v3</li><li>■ Red Hat Enterprise Linux 4.0, 5.0, SUSE Linux 9.0, 10.0</li><li>■ Solaris 8, 9, 10 SPARC</li><li>■ Solaris 10 x64</li></ul>
SAP liveCache Server	7.5, 7.6, 7.7

## About SAP liveCache server

SAP liveCache is based on a memory-centric offshoot of the SAP DB technology that is shipped with SAP 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 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 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 `starttrfc` 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 `starttrfc` 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 processes are running.  
See “[Monitoring a SAP liveCache instance](#)” on page 26.
- If the SecondLevelMonitor attribute is greater than 0, the monitor function performs a more thorough check of the SAP liveCache instance. The utility `dbmccli` 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 `dbmccli`.
- 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).

# Installing, upgrading, and removing the agent for SAP liveCache

This chapter includes the following topics:

- [Before you install the Veritas agent for SAP liveCache](#)
- [Installing the ACC library](#)
- [Installing the agent in a VCS environment](#)
- [Removing the agent in a VCS environment](#)
- [Removing the ACC library](#)
- [Upgrading the agent in a VCS environment](#)

## Before you install the Veritas agent for SAP liveCache

You must install the Veritas agent for SAP liveCache on all the systems that will host a SAP liveCache service group.

Ensure that you meet the following prerequisites to install the agent for SAP liveCache.

For VCS, do the following:

- Install and configure Veritas Cluster Server.  
For more information on installing and configuring Veritas Cluster Server refer to, [Veritas Cluster Server Installation Guide](#)
- Remove any previous version of this agent.

To remove the agent,

See [“Removing the agent in a VCS environment”](#) on page 16.

- Install the latest version of ACC Library.

To install or update the ACC Library package, locate the library and related documentation on the agentpack disc.

See [“Installing the ACC library”](#) on page 14.

## About ACC Library

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

## 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 superuser.
- 2 Navigate to the pkgs directory (the pkgs directory on the CD).

AIX `cd_mount/aix/application/acc_library/vcs/version_library/pkgs`

HP-UX `cd_mount/hpux/generic/application/acc_library/vcs/version_library/pkgs`

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

Solaris `cd_mount/solaris/dist_arch/application/acc_library/vcs/version_library/pkgs`

where *dist\_arch* is sparc or sol\_x64.

- 3 Install the package. Enter **Yes** if asked to confirm overwriting of files in the existing package.

```
AIX          # installp -ac -d VRTSacclib.rte.bff VRTSacclib.rte
HP-UX       # swinstall -s `pwd` VRTSacclib
Linux       # rpm -i \
            VRTSacclib-VersionNumber-GA_GENERIC.noarch.rpm
Solaris     # pkgadd -d . VRTSacclib
```

- 4 For HP-UX, install the HP-UX patch PHCO\_29042 if it is not already installed.

## Installing the agent in a VCS environment

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

### To install the agent

- 1 Log in as superuser.
- 2 Navigate to the directory containing the package for the platform running in your environment.

```
AIX          cd_mount/aix/application/saplivercache_agent/
            vcs_version/version_agent/pkggs
HP-UX       cd_mount/hpux/generic/application/saplivercache_agent/
            vcs_version/version_agent/pkggs
Linux       cd_mount/linux/generic/
            application/saplivercache_agent/vcs_version/
            version_agent/rpms
Solaris     cd_mount/solaris/dist_arch/application/
            saplivercache_agent/vcs_version/version_agent/pkggs
```

Where *dist* is the Solaris distribution and *arch* is the Solaris processor architecture.

**3 Install the package.**

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

HP-UX    # swinstall -s 'pwd' VRTSsaplc

Linux    # rpm -ihv \
          VRTSsaplc-AgentVersion-GA_GENERIC.noarch.rpm

Solaris  # pkgadd -d . VRTSsaplc
```

## Removing the agent in a VCS environment

You must uninstall the agent for SAP liveCache 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 typing the following command from any node in the cluster:

```
# haconf -makerw
```

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

```
# hares -list Type=SAPLiveCache
```

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

```
# hatype -delete SAPLiveCache
```

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 typing 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 liveCache from each node in the cluster.

Execute the following command to uninstall the agent:

```
AIX                # installp -u VRTSsaplc.rte
HP-UX              # swremove VRTSsaplc
Linux              # rpm -e VRTSsaplc
Solaris            # pkgrm VRTSsaplc
```

## 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 VRTSacclib.rte
HP-UX              # swremove VRTSacclib
Linux              # rpm -e VRTSacclib
Solaris            # pkgrm VRTSacclib
```

## Upgrading the agent in a VCS environment

Perform the following steps to upgrade the agent with minimal disruption, in a VCS environment

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

```
# hagrps -freeze group -persistent
```

- 2 Stop the cluster services forcibly.

```
# hastop -all -force
```

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

```
# ps -ef |grep SAPLiveCache
```

- 4 Uninstall the agent package from all the nodes.

See [“Removing the agent in a VCS environment”](#) on page 16.

- 5 Install the new agent on all the nodes.

See [“Installing the agent in a VCS environment”](#) on page 15.

- 6 Copy the new SAPLiveCacheTypes.cf file from the agent's sample conf directory,

```
VCS 4.x          /etc/VRTSagents/ha/bin/SAPLiveCache
```

```
VCS 5.0          /etc/VRTSvcsvcs/conf/sample_SAPLiveCache
```

to the VCS conf directory `/etc/VRTSvcsvcs/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 Start the cluster services.

```
# hastart
```

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

```
# haagent -start SAPLiveCache -sys System
```

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

```
# hagrps -unfreeze group -persistent
```

# Preparing to configure the agent for SAP liveCache

This chapter includes the following topics:

- [About configuring the Veritas agent for SAP liveCache](#)
- [Importing the agent types files in a VCS environment](#)
- [SAP liveCache agent attributes](#)
- [Uniquely identifying SAP liveCache server instances](#)
- [Monitoring a SAP liveCache instance](#)
- [Executing a customized monitoring program](#)

## About configuring the Veritas agent for SAP liveCache

After installing the Veritas agent for SAP liveCache, you must import the agent type configuration file. After importing this file, you can create and configure a SAP liveCache resource. Before you configure a resource, review the attributes table that describes the resource type and its attributes.

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

See [“About sample configurations for the agent for SAP liveCache”](#) on page 39.

## Importing the agent types files in a VCS environment

To use the agent for SAP liveCache, you must import the agent types file into the cluster.

### To import the agent types file using the Veritas Cluster Server graphical user interface

- 1 Start the Veritas Cluster Manager 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:

VCS 4.x        /etc/VRTSvcs/conf/sample\_SAPLiveCache/SAPLiveCacheTypes.cf

VCS 5.0        /etc/VRTSagents/ha/conf/SAPLiveCache/SAPLiveCacheTypes.cf

- 4 Click **Import**.
- 5 Save the VCS configuration.

The SAP liveCache agent type is now imported to the VCS engine.

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

## SAP liveCache agent attributes

A SAP liveCache service is managed within a Veritas 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 3-1](#) lists the attributes that are required for configuring a SAP liveCache instance.

**Table 3-1** Required attributes

Required attributes	Description
APOHost	<p>Virtual hostname of the SAP APO application server in which liveCache is configured.</p> <p>Type and dimension: string-scalar</p> <p>Default: ""</p> <p>Example: sapsc1ci</p>
ClientId	<p>The production client ID in which the <i>RFCDest</i> and <i>RFCUserId</i> are configured for liveCache server. The liveCache server is started and stopped with this client ID.</p> <p>Type and dimension: integer-scalar</p> <p>Default: ""</p> <p>Example: 001</p>
DBMPassword	<p>Password for DBM user <i>DBMUserId</i>.</p> <ul style="list-style-type: none"> <li>■ store encrypted</li> <li>■ agent to do decryption appropriately</li> </ul> <p>Use <code>vcscrypt -agent</code> option to encrypt the password. If you are using VCS GUI to enter password no need to encrypt the password. VCS GUI will automatically encrypt password for you.</p> <p>Type and dimension: string-scalar</p> <p>Default: ""</p> <p>Example: jxpVmxMpkPlpMpnPo</p>
DBMUserId	<p>liveCache Database Manager Operator user name used in the "dbmcli" to connect to the liveCache database server.</p> <p>Type and dimension: string-scalar</p> <p>Example: control.</p> <p>Default: "control "</p>

**Table 3-1** Required attributes (*continued*)

Required attributes	Description
EnvFile	<p>Description: Environments file for <i>LCUser</i> to be sourced before starting/stopping the liveCache server. Symantec recommends keeping the environments file on shared disk for easy of maintenance.</p> <p>Type and dimension: string-scalar</p> <p>Example: /home/lc5adm/lcenv.csh</p> <p>Default: ""</p>
InstId	<p>The SAP system number or instance ID for the APO Application Server.</p> <p>Type and dimension: integer-scalar</p> <p>Example: 01</p> <p>Default: " "</p>
Language	<p>The language type used for starting and stopping liveCache server. Agent supports only English.</p> <p>Type and dimension: string-scalar</p> <p>Example: "EN"</p> <p>Default: "EN"</p>
LCHome	<p>Directory where the liveCache database software is installed. This directory is needed to get the dbmcli and x_server binaries.</p> <p>Type and dimension: string-scalar</p> <p>Example: "/sapdb/programs/bin"</p> <p>Default: ""</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>Example: LC5.</p> <p>Default: ""</p>

**Table 3-1** Required attributes (*continued*)

Required attributes	Description
LCUser	<p>Operating system user for liveCache server. This user is responsible for starting and stopping the liveCache server. It must always be set to a value. In general this user takes the form <i>LCName</i> adm.</p> <p>Type and dimension: string-scalar</p> <p>Example: lc5adm</p> <p>Default: ""</p>
MonitorProgram	<p>Full path and file name of an external, user-supplied monitor program. If specified, the monitor entry point will execute this file to perform an additional server state check. There are no restrictions for what actions the external monitor program performs to determine the state of a 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"> <li>■ 0 (server is online)</li> <li>■ 110 (server is online)</li> <li>■ 100 (server is offline)</li> <li>■ 1 (server is offline)</li> <li>■ 99 or any thing other than {0,1,110,100} (server state is unknown)</li> </ul> <p>Symantec recommends storing the external monitor program on the shared disk directory to ensure the file is always available on the online system. Arguments are supported.</p> <p>Type and dimension: string-scalar</p> <p>Example1: /sapdb/data/db/wrk/LC5/mymonitor.sh</p> <p>Example2: /sapdb/data/db/wrk/LC5/mymonitor.sh arg1 arg2</p> <p>Default: No default value</p>

**Table 3-1** Required attributes (*continued*)

Required attributes	Description
ResLogLevel	<p>String used to set the ResLogLevel of each instance of a resource. This attribute should not be confused with the VCS generic LogLevel Type attribute, which controls the VCS engine log level on a per agent type basis. 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.</p> <p>Valid values are:</p> <p>ERROR: Only Error level messages are logged.</p> <p>WARN: Above plus warning level messages are logged.</p> <p>INFO: Above plus informational level messages will be logged. This is the default log level.</p> <p>TRACE: Above plus trace level messages will be logged. This is very verbose and should only be used during diagnostic operations.</p> <p>Type and dimension: string-scalar</p> <p>Example: TRACE</p> <p>Default: INFO</p>
RFCDest	<p>RFC Destination configured for liveCache server start/stop. In general the destination will be in the form SID CLNT ClientId. Refer to SAP note 305634 and 452745 for more information.</p> <p>Type and dimension: string-scalar</p> <p>Example: SC1CLNT001</p> <p>Default: ""</p>
RFCHome	<p>The home directory for RFC SDK tool kit. <code>starttrfc</code> binary is used to start/stop the liveCache server with function modules RSLVCSTART/RSLVCSTOP. This RFC tool kit needs to be downloaded from SAP Service Market place <a href="http://service.sap.com/swdc">http://service.sap.com/swdc</a>. This directory must have executable permission for LCUser.</p> <p>Type and dimension: string-scalar</p> <p>Example: /sapdb/rfcsdk/bin</p> <p>Default: ""</p>

**Table 3-1** Required attributes (*continued*)

Required attributes	Description
RFCPassword	<p>The password for RFCUserId.</p> <ul style="list-style-type: none"> <li>■ store encrypted</li> <li>■ agent to do decryption appropriately</li> </ul> <p>Use vcsencrypt -agent option to encrypt the password. If you are using VCS GUI to enter password no need to encrypt the password. VCS GUI will automatically encrypt password for you.</p> <p>Type and dimension: string-scalar</p> <p>Example: akgIdkDgbGcgDgeGf</p> <p>Default: ""</p>
RFCUserId	<p>The RFC User configured for SAP liveCache Server to globally operate SAP liveCache Server.</p> <p>Type and dimension: string-scalar</p> <p>Example: LC5RFC</p> <p>Default: ""</p>
SecondLevelMonitor	<p>Used to enable second-level monitoring and specify how often it is run. Second-level monitoring is a deeper, more thorough state check of the configured SAP liveCache instance.</p> <p>The numeric value specifies how often that the second-level monitoring routines are run.</p> <ul style="list-style-type: none"> <li>■ 0 - never run the second-level monitoring routines.</li> <li>■ 1 - run it every monitor interval.</li> <li>■ 2- run the second-level monitoring routines every second monitor interval, and so on.</li> </ul> <p>Care should be taken while setting this attribute to large numbers. For example, if the MonitorInterval is set to 60 seconds, and the SecondLevelMonitor is set to 100, then the dbmccli command for this attribute would only get executed every 100 minutes, which may not be as often as intended. To provide maximum flexibility, the value set is not checked for an upper limit. Hence, you could cause the secondlevelmonitor command to run once a month, if that is what is desired.</p> <p>Type and dimension: integer-scalar</p> <p>Example: 1</p> <p>Default Value: 0</p>

## Uniquely identifying SAP liveCache 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 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 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.

## Monitoring a SAP liveCache 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 if *SecondLevelMonitor* attribute is set.

## 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.
- The process level check and database state check 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, Symantec recommends storing the file in a shared directory that is available on the online node.



# Configuring the service groups for SAP liveCache

This chapter includes the following topics:

- [Configuring service groups for SAP liveCache](#)

## Configuring service groups for SAP liveCache

Configuring the service groups for SAP liveCache server involves the following steps:

- [Installing the SAP liveCache server with database on first node](#)
- [Installing the SAP liveCache server software on second node](#)
- [Creating SAP liveCache RFC destination and RFC user](#)
- [Copying the lcluster file to SAP liveCache directory](#)
- [Creating SAP liveCache resource](#)

For more information on configuring the service groups for SAP liveCache server, refer to SAP note 803452.

### Installing the SAP liveCache server with database on first node

Install the liveCache server using SAP provided installation tool SAPIInst for the required SAP application.

Start the liveCache installation using `SAPINST_USE_HOSTNAME=VirtualHostName` and perform the following.

- Use the following command for starting the installation and proceed as per the instructions on the SAP installation GUI:

```
sapinst SAPINST_USE_HOSTNAME=VirtualHostName
```

- Perform all the post-installation steps described in the SAP liveCache installation guide.

## Installing the SAP liveCache server software on second node

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

Perform the following steps:

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

- Create SAP liveCache database administration group "sdba" on the system with same GID 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
```

- 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 Lc5"  
pgrp="sdba" groups="sapsys" shell="/bin/csh" lc5adm
```

- Start the liveCache software installation from the liveCache media with SDBINST.

- Setup the X server logon credentials for all SAP users, namely, LCName adm, control, superdba as described in SAP note 39439.

- Copy <LCName>from <indep\_data\_path>/config directory on first node to <indep\_data\_path>/config directory on the second node.

For example, `rcp -r /sapdb/data/config/LC5*  
vcsaix102:/sapdb/data/config`

Make sure that all the files are owned by user 'sdb' and group 'sdba'

- Create a work directory for liveCache server instance

```
<indep_data_path>/wrk/<LCName>
```

For example,

```
cd /sapdb/data/wrk  
mkdir LC5
```

- Create data and log directories for database. The path to the directories should be the same as of the first node.

For example,

```
cd /sapdb/LC5
```

```
mkdir sapdata
mkdir saplog
```

- Mount the data and log volumes on first node on to second node under data and log directories created.
- Start the liveCache server.

## Establishing communication between Application server and SAP liveCache server

Each database instance is assigned a logical server name. This logical server name should be used for communication with the database. It is therefore entered in XUSER. As the application instance does not recognize the database server as a local host when the connection is set up, communication via TCP/IP (x\_server) is selected. Hence, you need to create a global login for XUSER entries with virtual hostname on all the nodes. Refer to SAP note 39439 for more information on how to generate XUSER entries for different users.

---

**Note:** If you copy the environment for user *<LCName>* adm user from first node, the XUSER.62 file in the HOME directory of the owner, usually *<LCName>*adm, must also be moved and regenerated.

---

## Creating SAP liveCache RFC destination and RFC user

Follow the instructions on SAP notes 305634 and 452745 for creating liveCache RFC destination and RFC user.

Create global login for XUSER entries with virtual hostname on all the nodes. See SAP note 39439 for more information.

## Copying the lcluster file to SAP liveCache directory

SAP liveCache server is a cluster aware product. SAP liveCache server provides interfaces to integrate into high availability management system with all liveCache events. This interface is used to prevent the liveCache cluster resource from faulting and failing over for intentional offline of the liveCache system.

Review the information on intentional offline and implementation of the lcluster interface.

See [“Intentional offline”](#) on page 41.

See [“lcluster implementation for HA management system”](#) on page 42.

To use this feature, `lcluster` file must be present in directory `"sap"` under SAP liveCache database root directory. Typically under the directory `"/sapdb/LCName/db/sap"`.

Copy the sample `lcluster` file shipped with the agent to `"sap"` directory and set the permissions and owner of the file as follows:

- Login as superuser.
- Copy the file to `"sap"` directory.  
For VCS 4.1, use the following command

```
cd /opt/VRTSvcs/bin/SAPLiveCache
```

For VCS 5.0, use the following command

```
cd /opt/VRTSagents/ha/bin/SAPLiveCache
```

```
cp lcluster /sapdb/LCName/db/sap
```

- Change the owner of the file with the command.

```
cd /sapdb/LCName/db/sap  
chown sdb:sdba lcluster
```

- Change the permissions of the file with the command.

```
chmod 555 lcluster
```

## Creating SAP liveCache resource

Create SAP liveCache resource using VCS GUI. The following diagrams provide the sample configuration of VCS resource for SAP liveCache Server.

[Figure 4-1](#) shows the dependency graph for the configuration.

**Figure 4-1** Dependency graph for SAP liveCache

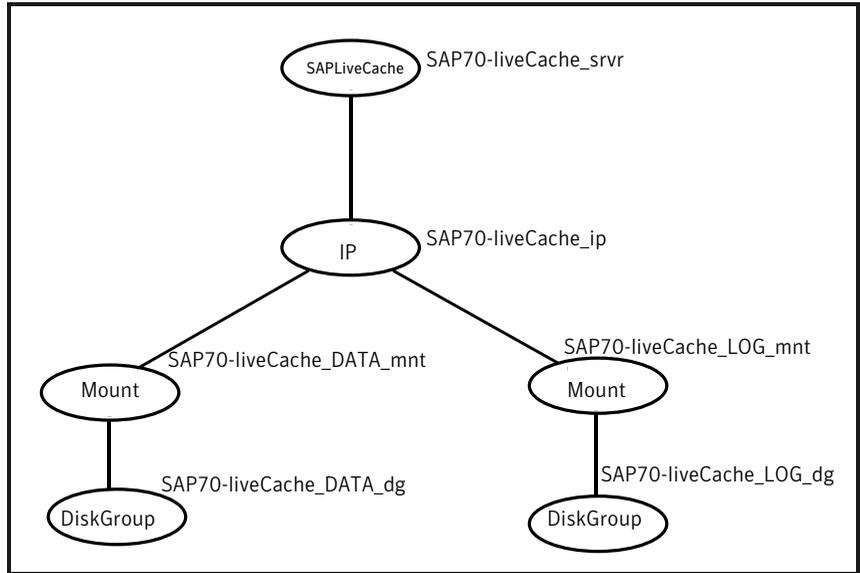


Table 4-1 shows the agent attributes for SAP liveCache.

**Table 4-1** Agent attributes for SAP liveCache

Attribute	Value
ResLogLevel	INFO
EnvFile	/home/lc3adm/.lcenv.csh
LCHome	/sapdb/programs/bin
LCUser	lc3adm
LCName	HOT
DBMUserId	control
DBMPassword	govSjsLshSukKuiQvmHmh
APOHost	saplc1ci
InstId	11
ClientId	001
RFCDest	LC1CLNT001

**Table 4-1** Agent attributes for SAP liveCache (*continued*)

Attribute	Value
RFCHome	/usr/sap/rfcsdk/bin
RFCUserId	LC3RFC
RFCPassword	FLTkrITILghk
Language	EN
SecondLevelMonitor	0
MonitorProgram	

# Troubleshooting the agent for SAP liveCache

This chapter includes the following topics:

- [Using correct software and operating system versions](#)
- [Meeting prerequisites](#)
- [Configuring SAP liveCache resources](#)
- [Starting the SAP liveCache instance outside a cluster](#)

## Using correct software and operating system versions

Ensure that no issues arise due to incorrect software and operating system versions. For the correct versions of operating system and software to be installed on the resource systems:

See [“Supported software”](#) on page 10.

## Meeting prerequisites

Before installing the agent for SAP liveCache, double check that you meet the prerequisites.

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

See [“Before you install the Veritas agent for SAP liveCache”](#) on page 13.

## Configuring SAP liveCache resources

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

## Starting the SAP liveCache instance outside a cluster

If you face problems while working with a resource, you must disable the resource within the cluster framework. A disabled resource is not under the control of the cluster framework, and so you can test the SAP liveCache instance independent of the cluster framework. Refer to the cluster documentation for information about disabling a resource.

You can then restart the SAP liveCache instance outside the cluster framework.

---

**Note:** Use the same parameters that the resource attributes define within the cluster framework while restarting the resource outside the cluster framework.

---

A sample procedure to start a SAP instance outside the cluster framework, is illustrated as follows.

### To restart the SAP liveCache server instance outside the framework

- 1 Log in as superuser.
- 2 Ensure that the SAP database is up and running. Refer to the relevant database documentation or consult your database administrator for more information.
- 3 Use the LCUser attribute to log in to the SAPliveCache server:

```
# su LCUser
$ USER=LCUser; LOGNAME=LCUser; HOME=/home/LCUser
$ export USER LOGNAME HOME
$ . EnvFile
```

For certain shell versions on AIX, LOGNAME is read-only.

**4** Start the SAP liveCache server instance:

```
$ Path_RFCSDK/bin/startRFC -3 -d RFCDest -h APOHost -s InstId
-c ClientId -u RFCserId -p RFCPassword -l Language
-F START_LIVECACHE_LVC -E IV_CON_NAME=LCA
```

**5** Ensure that the SAP liveCache instance is running successfully by running the grep command for LCName.

For example, for a SAP liveCache server instance LC5:

```
$ ps -ef | grep LC5
```

You must see the kernel processes running on the system for liveCache server.

If the SAP liveCache server instance is running outside the cluster framework, you can then attempt to restart the SAP liveCache server within the cluster framework by enabling the liveCache resource.



# Sample Configurations

This appendix includes the following topics:

- [About sample configurations for the agent for SAP liveCache](#)
- [Sample agent type definition for SAP liveCache](#)
- [Sample SAP liveCache resource configuration for VCS](#)
- [Intentional offline](#)
- [Iccluster implementation for HA management system](#)

## About sample configurations for the agent for SAP liveCache

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

## Sample agent type definition for SAP liveCache

Examples of agent type definition files follow.

VCS 4.1

```
type SAPLiveCache (  
    static str ArgList[] = { ResLogLevel, State, IState, EnvFile,  
        LCHome, LCUser, LCName, DBMUserId, DBMPassword, APOHost, InstID,  
        ClientID, RFCDest, RFCHome, RFCUserId, RFCPassword, Language,  
        SecondLevelMonitor, MonitorProgram }
```

```
    str ResLogLevel = INFO
    str EnvFile
    str LCHome
    str LCUser
    str LCName
    str DBMUserId = control
    str DBMPassword
    str APOHost
    int InstId
    int ClientId
    str RFCDest
    str RFCHome
    str RFCUserId
    str RFCPassword
    str Language = EN
    int SecondLevelMonitor = 0
    str MonitorProgram
)
```

## VCS 5.0

```
type SAPLiveCache (
    static str AgentDirectory =
"/opt/VRTSagents/ha/bin/SAPLiveCache"
    static str AgentFile = "/opt/VRTSvcs/bin/Script50Agent"

    static str ArgList[] = { ResLogLevel, State, IState, EnvFile,
LCHome, LCUser, LCName, DBMUserId, DBMPassword, APOHost, InstId,
ClientId, RFCDest, RFCHome, RFCUserId, RFCPassword, Language,
SecondLevelMonitor, MonitorProgram }
    str ResLogLevel = INFO
    str EnvFile
    str LCHome
    str LCUser
    str LCName
    str DBMUserId = control
    str DBMPassword
    str APOHost
    str InstId
    str ClientId
    str RFCDest
    str RFCHome
    str RFCUserId
    str RFCPassword
```

```
str Language = EN
int SecondLevelMonitor = 0
str MonitorProgram

)
```

## Sample SAP liveCache resource configuration for VCS

The sample resource configuration for VCS is as follows:

```
SAPLiveCache SAPLC5_liveCache (

ResLogLevel          = "INFO"
EnvFile              = "/home/lc5adm/lcenv.csh"
LCHome               = "/sapdb/programs/bin"
LCUser               = "lc5adm"
LCName               = "LC5"
DBMUserId             = "control"
DBMPassword           = "asfjfdsyuklf"
APOHost              = "sapsclci"
InstId                = 01
ClientId              = 001
RFCDest               = "SC1CLNT001"
RFCHome               = "/sapdb/rfcsdk/bin"
RFCUserId             = "LC5RFC"
RFCPassword           = "SaskDWlksa"
Language              = "EN"
SecondLevelMonitor   = 0
MonitorProgram        = ""

)
```

## Intentional offline

Intentional offline is needed to detect graceful shutdown of the SAP liveCache server with liveCache transaction LC10. SAP liveCache server has a mechanism to notify the high availability management system whenever the liveCache server is started or stopped gracefully with the help of lcluster. The lcluster script must be implemented if the HA management system needs to be notified for all graceful actions.

See ["lcluster implementation for HA management system"](#) on page 42.

All graceful starts of the liveCache server can be detected by the SAP liveCache agent without the help of the lcluster script. For defined MonitorInterval, monitor

entry point is run by the VCS HA management system for all the resources of type SAPliveCache. Hence, the agent can easily detect whenever SAP liveCache server is started gracefully with maximum time delay of MonitorInterval.

Generally, for all graceful stops of the SAP liveCache server, the agent faults the resource assuming unexpected offline. The Clean entry point will be called and if the resource is set to "critical", the service group will be failed-over to the other node in the cluster, which is not intended. Hence, to prevent this scenario, intentional offline has been implemented.

## lcluster implementation for HA management system

SAP recommends starting/stopping the liveCache server for APO with liveCache transaction LC10. The transaction LC10 calls SAP provided script `/sapdb/<LCName>/db/sap/lcinit` to start/stop the liveCache instance. The lcinit script can inform the high availability management system with the start/stop actions of the liveCache with the help of another script `/sapdb/LCName/db/sap/lcluster`, if implemented. Otherwise lcinit assumes that the liveCache is running in a non-HA environment. In case of SAP liveCache starts and stops in HA environments, lcinit calls lcluster with the following options:

starting req	lcinit begins to start the liveCache
starting ok	lcinit has started the liveCache successfully
starting error	start up of the liveCache failed
stopping req	lcinit begins to stop the liveCache
stopping ok	lcinit has stopped the liveCache successfully
stopping error	stop of the liveCache failed

This script must be implemented to prevent faulting of SAP liveCache server resource for intentional stop of liveCache server with transaction LC10.

This script is implemented such that whenever a liveCache is started/stopped out of the liveCache transaction LC10, the lcluster script, creates a tmp file with the name `symc_lcluster_LCName` under the liveCache working directory `/sapdb/data/wrk/LCName`.

Get the LCName from lcluster script full path name.

Following is a sample code for lcluster script.

```
bash-2.05b$ cat /sapdb/LC5/db/sap/lcluster
#!/opt/VRTSperl/bin/perl -w
```

```
use Fcntl;
use File::Path qw ( mkpath );
my $sClustMode = $ARGV[0];
my $sStatus = $ARGV[1];
my $sClustStatus = "$sClustMode $sStatus";
my ( $sFileName, $sSAP, $sDB, $sLCName ) = reverse $0 =~
m@([^\/]*)@g;
my $sWrkDir = "/sapdb/data/wrk/" . $sLCName ;
my $sClustFile = $sWrkDir . "/sync_lccluster_" . $sLCName ;
#-----
# Create work folder if needed..
#-----
if ( -d $sWrkDir ) {
    # Directory already exists.
}
elsif ( ! mkpath ( $sWrkDir, 0, 0700 ) ) {
    # Not able to create a directory.
    return 0;
}
if ( sysopen( CLUSTFILE, $sClustFile,
O_WRONLY|O_SYNC|O_CREAT|O_TRUNC, 0660 ) ) {
    print CLUSTFILE $sClustStatus;
}
else {
    # Not able to create the file.
}
close ( CLUSTFILE );
bash-2.05b$
```



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