Sun Cluster 3.1 Data Service for SAP liveCache

Adobe PostScript

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Contents

Preface

The Sun Cluster 3.1 Data Service for SAP liveCache contains procedures to install and configure Sun Cluster HA for SAP liveCache.

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

The instructions in this document assume knowledge of the Solaris™ operating environment and expertise with the volume manager software used with Sun Cluster.

UNIX Commands

This document contains information on commands specific to installing and configuring Sun Cluster data services. It might not contain information on basic UNIX® commands and procedures, such as shutting down the system, booting the system, and configuring devices. For that information, see one or more of the following:

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

Typographic Conventions

Typeface or Symbol	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your file. Use `ls -a` to list all files. `% You have mail.`
AaBbCc123	What you type, when contrasted with on-screen computer output	`% `**`su`** `Password:`
AaBbCc123	Book titles, new words or terms, words to be emphasized	Read Chapter 6 in the *User's Guide*. These are called *class* options. You *must* be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type `rm` *filename*.

Shell Prompts

Shell	Prompt
C shell	*machine_name*`%`
C shell superuser	*machine_name*`#`
Bourne shell and Korn shell	`$`
Bourne shell and Korn shell superuser	`#`

Related Documentation

Application	Title	Part Number
Installation	*Sun Cluster 3.1 Software Installation Guide*	816-3388
Hardware	*Sun Cluster 3.x Hardware Administration Manual*	817–0168
	Sun Cluster 3.x Hardware Administration Collection at `http://docs.sun.com/db/coll/1024.1/`	
API development	*Sun Cluster 3.1 Data Services Developer's Guide*	816-3385
Data Services	*Sun Cluster 3.1 Data Service Planning and Administration Guide*	817–1526
	Sun Cluster 3.1 Data Service for Oracle	817–1527
	Sun Cluster 3.1 Data Service for Sun ONE Web Server	817–1528
	Sun Cluster 3.1 Data Service for Sun ONE Directory Server	817–1529
	Sun Cluster 3.1 Data Service for Sun ONE Application Server	817–1530
	Sun Cluster 3.1 Data Service for Sun ONE Message Queue	817–1531
	Sun Cluster 3.1 Data Service for Apache	817–1532
	Sun Cluster 3.1 Data Service for Domain Name Service (DNS)	817–1533
	Sun Cluster 3.1 Data Service for Network File System (NFS)	817–1534
	Sun Cluster 3.1 Data Service for Oracle Parallel Server/Real Application Clusters	817–1535
	Sun Cluster 3.1 Data Service for SAP	817–1536
	Sun Cluster 3.1 Data Service for Sybase ASE	817–1537
	Sun Cluster 3.1 Data Service for Netbackup	817–1538
	Sun Cluster 3.1 Data Service for Siebel	817–1540
	Sun Cluster 3.1 Data Service for WebLogic Server	817–1541
	Sun Cluster 3.1 Data Service for BroadVision One-To-One Enterprise	817–1542
	Sun Cluster 3.1 Data Service for WebSphere MQ	817–1713

Application	Title	Part Number
	Sun Cluster 3.1 Data Service for WebSphere MQ Integrator	817–1714
	Sun Cluster 3.1 Data Service for Samba	817–1715
	Sun Cluster 3.1 Data Service for DHCP	817–1716
Administration	*Sun Cluster 3.1 System Administration Guide*	816-3384
Cluster concepts	*Sun Cluster 3.1 Concepts Guide*	816-3383
Error Messages	*Sun Cluster 3.1 Error Messages Guide*	816-3382
Man Pages	*Sun Cluster 3.1 Reference Manual*	816–5251
Release notes	*Sun Cluster 3.1 Data Service Release Notes*	817–1790
	Sun Cluster 3.1 Release Notes	816-5317
	Sun Cluster 3.1 Release Notes Supplement	816-3381

Sun Documentation Online

The `docs.sun.com`[SM] Web site enables you to access Sun technical documentation on the Web. You can browse the `docs.sun.com` archive or search for a specific book title or subject at `http://docs.sun.com`.

Help

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

- Your name and E-mail address (if available)
- Your company name, address, and phone number
- The model and serial numbers of your systems
- The release number of the operating environment (for example, Solaris 8)
- The release number of Sun Cluster (for example, Sun Cluster 3.0)

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

Command	Function
prtconf -v	Displays the size of the system memory and reports information about peripheral devices.
psrinfo -v	Displays information about processors.
showrev –p	Reports which patches are installed.
prtdiag -v	Displays system diagnostic information.
scinstall -pv	Displays Sun Cluster release and package version information.

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

Installing and Configuring Sun Cluster HA for SAP liveCache

This chapter contains the procedures on how to install and configure Sun Cluster HA for SAP liveCache.

This chapter contains the following procedures.

Sun Cluster HA for SAP liveCache Overview

Use the information in this section to understand how Sun Cluster HA for SAP liveCache makes liveCache highly available.

For conceptual information on failover and scalable services, see the *Sun Cluster 3.1 Concepts Guide*.

To eliminate a single point of failure in an SAP Advanced Planner & Optimizer (APO) System, Sun Cluster HA for SAP liveCache provides fault monitoring and automatic failover for liveCache and fault monitoring and automatic restart for SAP xserver. The following table lists the data services that best protect SAP Supply Chain Management (SCM) components in a Sun Cluster configuration. Figure 1–1 also illustrates the data services that best protect SAP SCM components in a Sun Cluster configuration.

TABLE 1–1 Protection of liveCache Components

liveCache Component	Protected by
SAP APO Central Instance	Sun Cluster HA for SAP The resource type is `SUNW.sap_ci_v2`. For more information on this data service, see *Sun Cluster 3.1 Data Service for SAP*.
SAP APO database	All highly available databases that are supported with Sun Cluster software and by SAP.
SAP APO Application Server	Sun Cluster HA for SAP The resource type is `SUNW.sap_as_v2`. For more information on this data service, see *Sun Cluster 3.1 Data Service for SAP*.
SAP liveCache AP xserver	Sun Cluster HA for SAP liveCache The resource type is `SUNW.sap_xserver`.
SAP liveCache database	Sun Cluster HA for SAP liveCache The resource type is `SUNW.sap_livecache`.
NFS file system	Sun Cluster HA for NFS The resource type is `SUNW.nfs`. For more information on this data service, see *Sun Cluster 3.1 Data Service for Network File System (NFS)*.
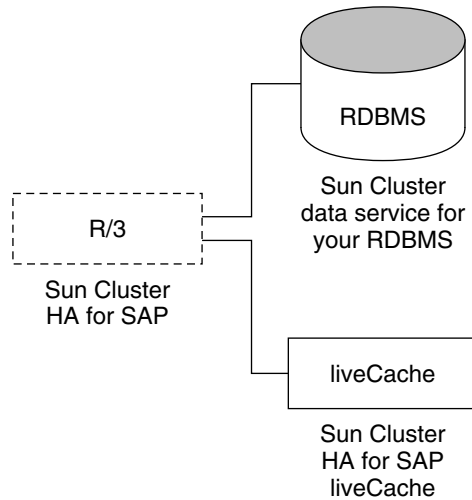
FIGURE 1–1 Protection of liveCache Components

Installing and Configuring Sun Cluster HA for SAP liveCache

Table 1–2 lists the tasks for installing and configuring Sun Cluster HA for SAP liveCache. Perform these tasks in the order that they are listed.

TABLE 1–2 Task Map: Installing and Configuring Sun Cluster HA for SAP liveCache

Task	For Instructions, Go To
Plan the Sun Cluster HA for SAP liveCache installation	Your SAP documentation. *Sun Cluster 3.1 Data Service for SAP*
Prepare the nodes and disks	"How to Prepare the Nodes" on page 17

TABLE 1–2 Task Map: Installing and Configuring Sun Cluster HA for SAP liveCache *(Continued)*

Task	For Instructions, Go To
Install and configure liveCache	"How to Install and Configure liveCache" on page 18 "How to Enable liveCache to Run in a Cluster" on page 19
Verify liveCache installation and configuration	"How to Verify the liveCache Installation and Configuration" on page 20
Install Sun Cluster HA for SAP liveCache packages	"How to Install the Sun Cluster HA for SAP liveCache Packages" on page 20
Register and configure Sun Cluster HA for SAP liveCache as a failover data service	"How to Register and Configure Sun Cluster HA for SAP liveCache" on page 23
Verify Sun Cluster HA for SAP liveCache installation and configuration	"Verifying the Sun Cluster HA for SAP liveCache Installation and Configuration" on page 27
Understand Sun Cluster HA for SAP liveCache Fault Monitors	"Understanding Sun Cluster HA for SAP liveCache Fault Monitors" on page 29

Planning the Sun Cluster HA for SAP liveCache Installation and Configuration

This section contains the information you need to plan your Sun Cluster HA for SAP liveCache installation and configuration.

Note – If you have not already done so, read your SAP documentation before you begin planning your Sun Cluster HA for SAP liveCache installation and configuration because your SAP documentation includes configuration restrictions and requirements that are not outlined in Sun Cluster documentation or dictated by Sun Cluster software.

Configuration Requirements

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

Use the requirements in this section to plan the installation and configuration of Sun Cluster HA for SAP liveCache. These requirements apply to Sun Cluster HA for SAP liveCache only. You must meet these requirements before you proceed with your Sun Cluster HA for SAP liveCache installation and configuration.

For requirements that apply to all data services, see *Sun Cluster 3.1 Data Service Planning and Administration Guide*.

- Use an SAP liveCache version 7.4 or higher.
- Configure SAP xserver so that SAP xserver starts on all nodes that the liveCache resource can failover to. To implement this configuration, ensure that the nodelist of the SAP xserver resource group and the liveCache resource group contain the same nodes. Also, the value of `desired_primaries` and `maximum_primaries` of the SAP xserver resource must be equal to the number of nodes listed in the `nodelist` parameter of the liveCache resource. For more information, see "How to Register and Configure Sun Cluster HA for SAP liveCache" on page 23.

Standard Data Service Configurations

Use the standard configurations in this section to plan the installation and configuration of Sun Cluster HA for SAP liveCache. Sun Cluster HA for SAP liveCache supports the standard configurations in this section. Sun Cluster HA for SAP liveCache might support additional configurations. However, you must contact your Sun service provider for information on additional configurations.

Figure 1–2 illustrates a four-node cluster with SAP APO Central Instance, APO application servers, a database, and liveCache. APO Central Instance, the database, and liveCache are configured as failover data services. APO application servers and SAP xserver can be configured as scalable or failover data services.
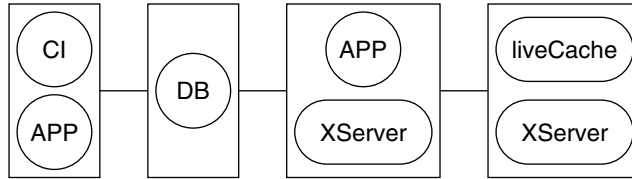
FIGURE 1–2 Four-Node Cluster

Configuration Considerations

Use the information in this section to plan the installation and configuration of Sun Cluster HA for SAP liveCache. The information in this section encourages you to think about the impact your decisions have on the installation and configuration of Sun Cluster HA for SAP liveCache.

- Install liveCache on its own global device group, separate from the global device group for the APO Oracle database and SAP R/3 software. This separate global device group for liveCache ensures that the liveCache resource can depend on the `HAStoragePlus` resource for liveCache only.

- If you want to run SAP xserver as any user other than user `root`, create that user on all nodes on which SAP xserver runs, and define this user in the `Xserver_User` extension property. SAP xserver starts and stops based on the user you identify in this extension property. The default for this extension property is user `root`.

- Configure SAP xserver as a failover resource unless you are running multiple liveCache instances that overlap.

Configuration Planning Questions

Use the questions in this section to plan the installation and configuration of Sun Cluster HA for SAP liveCache. Insert the answers to these questions into the data service worksheets in the *Sun Cluster Data Services 3.1 Release Notes*. See "Configuration Considerations" on page 16 for information that might apply to these questions.

- What resource groups will you use for network addresses and application resources and the dependencies between them?

- What is the logical hostname (for liveCache resource) for clients that will access the data service?

- Where will the system configuration files reside?

See *Sun Cluster 3.1 Data Service Planning and Administration Guide* for the advantages and disadvantages of placing the liveCache binaries on the local file system as opposed to the cluster file system.

Preparing the Nodes and Disks

This section contains the procedures you need to prepare the nodes and disks.

▼ How to Prepare the Nodes

Use this procedure to prepare for the installation and configuration of liveCache.

1. **Become superuser on all of the nodes.**

2. **Configure the `/etc/nsswitch.conf` file.**

   a. **On each node that can master the liveCache resource, include one of the following entries for `group`, `project`, an `passwd` database entries in the `/etc/nsswitch.conf` file.**

      database:
      database: files
      database: files [NOTFOUND=return] nis
      database: files [NOTFOUND=return] nisplus

   b. **On each node that can master the liveCache resource, ensure that `files` appears first for the `protocols` database entry in the `/etc/nsswitch.conf` file.**

      Example:

      ```
      protocols: files nis
      ```

   Sun Cluster HA for SAP liveCache uses the su - *user* command and the dbmcli command to start and stop liveCache.

   The network information name service might become unavailable when a cluster node's public network fails. Implementing the preceding changes to the /etc/nsswitch.conf file ensures that the su(1M) command and the dbmcli command do not refer to the NIS/NIS+ name services.

Installing and Configuring liveCache

This section contains the procedures you need to install and configure liveCache.

▼ How to Install and Configure liveCache

Use this procedure to install and configure liveCache.

1. **Install and configure SAP APO System.**

   See *Sun Cluster 3.1 Data Service for SAP* for the procedures on how to install and configure SAP APO System on Sun Cluster software.

2. **Install liveCache.**

   Note – Install liveCache by using the physical hostname if you have not already created the required logical host.

   For more information, see your SAP documentation.

3. **Create the `.XUSER.62` file for the SAP APO administrator user and the liveCache administrator user by using the following command.**

   ```
   # dbmcli -d LC-NAME -n logical-hostname -us user,passwd
   ```

`LC-NAME`	Uppercase name of liveCache database instance
`logical-hostname`	Logical hostname that is used with the liveCache resource

   ---

   ⚠ **Caution –** Neither SAP APO transaction LC10 nor Sun Cluster HA for SAP liveCache functions properly if you do not create this file correctly.

   ---

4. **Copy `/usr/spool/sql` from the node, on which you installed liveCache, to all the nodes that will run the liveCache resource. Ensure that the ownership of these files is the same on all node as it is on the node on which you installed liveCache.**

   Example:

   ```
   # tar cfB - /usr/spool/sql | rsh phys-schost-1 tar xfB -
   ```

▼ How to Enable liveCache to Run in a Cluster

During a standard SAP installation, liveCache is installed with a physical hostname. You must modify liveCache to use a logical hostname so that liveCache works in a Sun Cluster environment. Use this procedure to enable liveCache to run in a cluster.

1. **Create the failover resource group to hold the network and liveCache resource.**

   # **scrgadm -a -g** *livecache-resource-group* [**-h** *nodelist*]

2. **Verify that you added all the network resources you use to your name service database.**

3. **Add a network resource (logical hostname) to the failover resource group.**

scrgadm -a -L -g *livecache-resource-group*\ **-l** *lc-logical-hostname* [**-n** *netiflist*]

4. **Enable the failover resource group.**

   # **scswitch -Z -g** *livecache-resource-group*

5. **Log on to the node that hosts the liveCache resource group.**

6. **Start SAP xserver manually on the node that hosts the liveCache resource group.**

   # **su** - *lc-name***adm**
   # **x_server start**

   lc-name   Lowercase name of liveCache database instance

7. **Log on to SAP APO System by using your SAP GUI with user DDIC.**

8. **Go to transaction LC10 and change the liveCache host to the logical hostname you defined in Step 3.**

   liveCache host: *lc-logical-hostname*

Verifying the liveCache Installation and Configuration

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

▼ How to Verify the liveCache Installation and Configuration

Use this procedure to verify the liveCache installation and configuration. This procedure does not verify that your application is highly available because you have not installed your data service yet.

1. **Log on to SAP APO System by using your SAP GUI with user `DDIC`.**

2. **Go to transaction LC10.**

3. **Ensure that you can check the state of liveCache.**

4. **Ensure that the following `dbmcli` command work as user** *lc_name***adm.**

   ```
   # dbmcli -d LC_NAME -n logical-hostname db_state
   # dbmcli -d LC_NAME -n logical-hostname db_enum
   ```

Installing the Sun Cluster HA for SAP liveCache Packages

This section contains the procedure you need to install the Sun Cluster HA for SAP liveCache packages.

▼ How to Install the Sun Cluster HA for SAP liveCache Packages

Use this procedure to install the Sun Cluster HA for SAP liveCache packages. You need the Sun Cluster Agents CD-ROM to perform this procedure. This procedure assumes that you did not install the data service packages during your initial Sun Cluster installation.

1. **Load the Sun Cluster Agents CD-ROM into the CD-ROM drive.**

2. **Run the `scinstall` utility with no options.**
   This step starts the `scinstall` utility in interactive mode.

3. **Choose the Add Support for New Data Service to This Cluster Node menu option.**
   The `scinstall` utility prompts you for additional information.

4. **Provide the path to the Sun Cluster Agents CD-ROM.**

   The utility refers to the CD-ROM as the "data services cd."

5. **Specify the data service to install.**

   The `scinstall` utility lists the data service that you selected and asks you to confirm your choice.

6. **Exit the `scinstall` utility.**

7. **Unload the CD-ROM from the drive.**

Registering and Configuring the Sun Cluster HA for SAP liveCache

This section contains the procedures you need to configure Sun Cluster HA for SAP liveCache.

Sun Cluster HA for SAP liveCache Extension Properties

Use the extension properties in Table 1–3 and Table 1–4 to create your resources. Use the following command line to configure extension properties when you create your resource.

`scrgadm -x` *parameter=value*
Use the procedure in *Sun Cluster 3.1 Data Service for SAP* to configure the extension properties if you have already created your resources. You can update some extension properties dynamically. You can update others, however, only when you create or disable a resource. The Tunable fields in Table 1–3 and Table 1–4 indicate when you can update each property. See Appendix A for details on all Sun Cluster properties.

TABLE 1–3 Sun Cluster HA for SAP liveCache (`SUNW.sap_xserver`) Extension Properties

Name/Data Type	Description
`Confdir_List` (optional) String	The directory for liveCache software and instance directories. **Default:** `/sapdb` **Range:** None **Tunable:** At creation
`Monitor_retry_count`	Number of PMF restarts that are allowed for the fault monitor. **Default:** 4 **Tunable:** Any time
`Monitor_retry_ interval`	Time interval in minutes for fault monitor restarts. **Default:** 2 **Tunable:** Any time
`Probe_timeout`	Time-out value in seconds for the probes. **Default:** `120` **Tunable:** Any time
`Soft_Stop_Pct` (optional) Integer	Percentage of stop timeout that is used to stop SAP xserver by using the SAP utility `x_server stop` before `SIGKILL` is used to stop all SAP xserver processes. **Default:** `50` **Range:** 1-100 **Tunable:** When disabled
`Xserver_User` (optional) String	SAP xserver system administrator user name. **Default:** `root` **Range:** None **Tunable:** At creation

TABLE 1–4 Sun Cluster HA for SAP liveCache (`SUNW.sap_livecache`) Extension Properties

Name/Data Type	Description
`Confdir_list` (optional) String	The directory for liveCache software and the instance directory. **Default:** `/sapdb` **Range:** None **Tunable:** At creation
`Livecache_name` (required) String	Name of liveCache database instance. **Default:** None **Range:** None **Tunable:** At creation
`Monitor_retry_count`	Number of PMF restarts that are allowed for the fault monitor. **Default:** 4 **Tunable:** Any time
`Monitor_retry_interval`	Time interval in minutes for fault monitor restarts. **Default:** 2 **Tunable:** Any time
`Probe_timeout`	Time-out value in seconds for the probes. **Default:** 90 **Tunable:** Any time

▼ How to Register and Configure Sun Cluster HA for SAP liveCache

Use this procedure to configure Sun Cluster HA for SAP liveCache as a failover data service for the liveCache database and SAP xserver as a failover or scalable data service. This procedure assumes that you installed the data service packages. If you did not install the Sun Cluster HA for SAP liveCache packages as part of your initial Sun Cluster installation, go to "How to Install the Sun Cluster HA for SAP liveCache Packages" on page 20 to install the data service packages. Otherwise, use this procedure to configure the Sun Cluster HA for SAP liveCache.

Caution – Do not configure more than one SAP xserver resource on the same cluster because one SAP xserver serves multiple liveCache instances in the cluster. More than one SAP xserver resource that runs on the same cluster causes conflicts between the SAP xserver resources. These conflicts cause all SAP xserver resources to become unavailable. If you attempt to start the SAP xserver twice, you receive an error message that says Address already in use.

1. **Become superuser on one of the nodes in the cluster that will host the liveCache resource.**

2. **Copy the `lccluster` file to the same location as the `lcinit` file.**

   # **cp /opt/SUNWsclc/livecache/bin/lccluster** \
   /sapdb/*LC-NAME***/db/sap**

   LC-NAME   Uppercase name of liveCache database instance

3. **Edit the `lccluster` file to substitute values for `put-LC_NAME-here` and `put-Confdir_list-here`.**

   Note – The put-Confidir_list-here value exists only in the Sun Cluster 3.1 version.

   a. **Open the `lccluster` file.**

      # **vi /sapdb/***LC-NAME***/db/sap/lccluster** \LC_NAME="put-LC_NAME-here" \
      CONFDIR_LIST="put-Confdir_list-here"

      Note – The CONFDIR_LIST="put-Confdir_list-here entry exists only in the Sun Cluster 3.1 version.

   b. **Replace `put-LC_NAME-here` with the liveCache instance name. The liveCache instance name is the value you defined in the `Livecache_Name` extension property.**

      For an example, see Step c.

      LC_NAME="*liveCache-instance-name*"

   c. **Replace `put-Confdir_list-here` with the value of the `Confidir_list` extension property.**

> **Note –** This step is only for the Sun Cluster 3.1 version. Skip this step if you are running an earlier version of Sun Cluster.

```
CONFDIR_LIST="liveCache-software-directory"
```

Example:

If the liveCache instance name is `LC1` and the liveCache software directory is `/sapdb`, edit the `lccluster` script as follows.

```
LC_NAME="LC1"
CONFDIR_LIST="/sapdb" [Sun Cluster 3.1 version only]
```

4. **Add the HAStoragePlus resource to the liveCache resource group.**

```
# scrgadm -a -t SUNW.HAStoragePlus
# scrgadm -a -j livecache-storage-resource -g livecache-resource-group \
-t SUNW.HAStoragePlus -x filesystemmountpoints=mountpoint,... \
-x globaldevicepaths=livecache-device-group  -x affinityon=TRUE
```

> **Note –** AffinityOne must be set to TRUE and the local file system must reside on global disk groups to be failover.

For the procedure on how to set up an HAStoragePlus resource, see *Sun Cluster 3.1 Data Service Planning and Administration Guide*.

5. **Enable the liveCache storage resource.**

```
# scswitch -e -j livecache-storage-resource
```

6. **Register the resource type for liveCache database.**

```
# scrgadm -a -t SUNW.sap_livecache
```

7. **Register the resource type for SAP xserver.**

```
# scrgadm -a -t SUNW.sap_xserver
```

8. **Determine if you need to configure the SAP xserver as failover or scalable.**

Configure the SAP xserver as a failover resource unless you have multiple liveCache instances running that overlap.

- To configure the SAP xserver as a failover resource, complete Step 9.
- To configure the SAP xserver as a scalable resource, skip the following step, and complete Step 10.

9. **To create SAP xserver resource in the liveCache failover resource group, complete the following substeps.**

   a. **Create an SAP xserver resource.**

      ```
      # scrgadm -a -j xserver-resource\
      -g livecache-resource group -t SUNW.sap_xserver
      ```

   b. **Enable the failover SAP xserver resource.**

      ```
      # scswitch -e -j xserver-resource\
      ```

   See "Sun Cluster HA for SAP liveCache Extension Properties" on page 21 for a list of extension properties.

10. **To configure the SAP xserver as a scalable resource, complete the following substeps.**

    a. **Create a scalable resource group for SAP xserver. Configure SAP xserver to run on all the potential nodes that liveCache will run on.**

    Note – Configure SAP xserver so that SAP xserver starts on all nodes that the liveCache resources can fail over to. To implement this configuration, ensure that the *nodelist* parameter of the SAP xserver resource group contains all the nodes listed in the liveCache resource groups' *nodelist*. Also, the value of `desired_primaries` and `maximum_primaries` of the SAP xserver resource group must be equal to each other.

    ```
    # scrgadm -a -g xserver-resource-group \
    -y Maximum_primaries=value \
    -y Desired_primaries=value \
    -h nodelist
    ```

    b. **Create an SAP xserver resource in this scalable resource group.**

       ```
       # scrgadm -a -j xserver-resource\
        -g xserver-resource-group -t SUNW.sap_xserver
       ```

       See "Sun Cluster HA for SAP liveCache Extension Properties" on page 21 for a list of extension properties.

    c. **Enable the scalable resource group that now includes the SAP xserver resource.**

       ```
       # scswitch -Z -g xserver-resource-group
       ```

11. **If you registered the SAP xserver as a failover resource, then register the liveCache resource as follows.**

    ```
    # scrgadm -a -j livecache-resource -g livecache-resource-group \
    -t SUNW.sap_livecache -x livecache_name=LC-NAME \
    -y resource_dependencies=livecache-storage-resource,
    ```

xserver-resource

12. **If you registered the SAP xserver as a scalable resource, then register the liveCache resource as follows.**

    ```
    # scrgadm -a -j livecache-resource -g livecache-resource-group \
    -t SUNW.sap_livecache -x livecache_name=LC-NAME \
    -y resource_dependencies=livecache-storage-resource
    ```

13. **If you registered the SAP xserver as scalable, set up a resource group dependency between SAP xserver and liveCache.**

    ```
    # scrgadm -c -g livecache-resource-group \
    -y rg_dependencies=xserver-resource-group
    ```

14. **Enable the liveCache failover resource group.**

    ```
    # scswitch -Z -g livecache-resource-group
    ```

15. **Are you running an APO application server on a node that liveCache can fail over to?**

    - If no, this step completes this procedure.
    - If yes, proceed to Step 16.

16. **Is the scalable APO application server resource group already in an RGOffload resource's `rg_to_offload` list?**

    ```
    # scrgadm -pvv | grep -i rg_to_offload | grep value:
    ```

    - If yes, this step completes this procedure.
    - If no, consider adding an RGOffload resource in the liveCache resource group.

      This configuration enables you to automatically shut down the APO application server if the liveCache resource fails over to a node on which the APO application server was running.

      For the procedure on how to set up an RGOffload resource, see *Sun Cluster 3.1 Data Service Planning and Administration Guide*.

Verifying the Sun Cluster HA for SAP liveCache Installation and Configuration

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

▼ How to Verify the Sun Cluster HA for SAP liveCache Installation and Configuration

Use this procedure to verify that you installed and configured Sun Cluster HA for SAP liveCache correctly. You need the information in the following table to understand the various states of the liveCache database.

TABLE 1–5 States of the liveCache database

State	Description
OFFLINE	liveCache is not running.
COLD	liveCache is available for administrator tasks.
WARM	liveCache is online.
STOPPED INCORRECTLY	liveCache stopped incorrectly. This is also one of the interim states while liveCache starts or stops.
ERROR	Cannot determine the current state. This is also one of the interim states while liveCache starts or stops.
UNKNOWN	This is one of the interim states while liveCache starts or stops.

1. **Log on to the node that hosts the resource group that contains the liveCache resource, and verify that the fault monitor functionality works correctly.**

    a. **Terminate liveCache abnormally by stopping all liveCache processes.**

    Sun Cluster software restarts liveCache.

    If you do not see this behavior, you might not have correctly performed Step 2 and Step 3 in "How to Register and Configure Sun Cluster HA for SAP liveCache" on page 23.

    ```
    # ps -ef|grep sap|grep kernel
    # kill -9 livecache-processes
    ```

    b. **Terminate liveCache by using the Stop liveCache button in LC10 or by running the lcinit command.**

    Sun Cluster software does not restart liveCache. However, the liveCache resource status message reflects that liveCache stopped outside of Sun Cluster software through the use of the Stop liveCache button in LC10 or the lcinit command. The state of the liveCache resource is UNKNOWN. When the user successfully restarts liveCache by using the Start liveCache button in LC10 or the lcinit command, the Sun Cluster HA for SAP liveCache Fault Monitor updates the

resource state and status message to indicate that liveCache is running under the control of Sun Cluster software.

If you do not see this behavior, you might not have correctly performed Step 2 and Step 3 in "How to Register and Configure Sun Cluster HA for SAP liveCache" on page 23.

2. **Log on to SAP APO by using your SAP GUI with user `DDIC`, and verify that liveCache starts correctly by using transaction LC10.**

3. **As user root, switch the liveCache resource group to another node.**

   ```
   # scswitch -z -g livecache-resource-group -h node2
   ```

4. **Repeat Step 1 through Step 3 for each potential node on which the liveCache resource can run.**

5. **Log on to the nodes that host the SAP xserver resource, and verify that the fault monitor functionality works correctly.**

   Terminate SAP xserver abnormally by stopping all SAP xserver processes.

   ```
   # ps -ef|grep xserver
   # kill -9 xserver-process
   ```

Understanding Sun Cluster HA for SAP liveCache Fault Monitors

Use the information in this section to understand Sun Cluster HA for SAP liveCache Fault Monitors. This section describes the Sun Cluster HA for SAP liveCache Fault Monitors' probing algorithm or functionality, states the conditions, messages, and recovery actions associated with unsuccessful probing, and states the conditions and messages associated with successful probing.

Extension Properties

See "Sun Cluster HA for SAP liveCache Extension Properties" on page 21 for the extension properties that the Sun Cluster HA for SAP liveCache Fault Monitors use.

Monitor Check Method

A liveCache resource `Monitor_check` method checks whether SAP xserver is available on this node. If SAP xserver is not available on this node, this method returns an error and rejects the failover of liveCache to this node.

This method is needed to enforce the cross-resource group resource dependency between SAP xserver and liveCache.

Probing Algorithm and Functionality

Sun Cluster HA for SAP liveCache has a fault monitor for each resource type.

- "SAP xserver Fault Monitor" on page 30 (SUNW.sap_xserver)
- "liveCache Fault Monitor" on page 30 (SUNW.sap_livecache)

SAP xserver Fault Monitor

The SAP xserver parent process is under the control of process monitor pmfadm. If the parent process is stopped or killed, the process monitor contacts the SAP xserver Fault Monitor, and the SAP xserver Fault Monitor decides what action must be taken.

The SAP xserver Fault Monitor performs the following steps in a loop.

1. Sleeps for Thorough_probe_interval.

2. Uses the SAP utility dbmcli with db_enum to check SAP xserver availability.

   - If SAP xserver is unavailable, SAP xserver probe restarts or fails over the SAP xserver resource if it reaches the maximum number of restarts.

   - If any system error messages are logged in syslog during the checking process, the SAP xserver probe concludes that a partial failure has occurred. If the system error messages logged in syslog occur four times within the probe_interval, SAP xserver probe restarts SAP xserver.

liveCache Fault Monitor

The liveCache probe checks for the presence of the liveCache parent process, the state of the liveCache database, and whether the user intentionally stopped liveCache outside of Sun Cluster software. If a user used the Stop liveCache button in LC10 or the lcinit command to stop liveCache outside of Sun Cluster software, the liveCache probe concludes that the user intentionally stopped liveCache outside of Sun Cluster software.

If the user intentionally stopped liveCache outside of Sun Cluster software by using the Stop liveCache button in LC10 or the lcinit command, the Sun Cluster HA for SAP liveCache Fault Monitor updates the resource state and status message to reflect this action, but it does not restart liveCache. When the user successfully restarts liveCache outside of Sun Cluster software by using the Start liveCache button in LC10 or the lcinit command, the Sun Cluster HA for SAP liveCache Fault Monitor updates the resource state and status message to indicate that liveCache is running under the control of Sun Cluster software, and Sun Cluster HA for SAP liveCache Fault Monitor takes appropriate action if it detects liveCache is OFFLINE.

If liveCache database state reports that liveCache is not running or that the liveCache parent process terminated, the Sun Cluster HA for SAP liveCache Fault Monitor restarts or fails over liveCache.

The Sun Cluster HA for SAP liveCache Fault Monitor performs the following steps in a loop. If any step returns `liveCache is offline`, the liveCache probe restarts or fails over liveCache.

1. Sleeps for `Thorough_probe_interval`.
2. Uses the `dbmcli` utility with `db_state` to check the liveCache database state.
3. If liveCache is online, liveCache probe checks the liveCache parent process.

   - If the parent process terminates, liveCache probe returns `liveCache is offline`.
   - If the parent process is online, liveCache probe returns `OK`.

4. If liveCache is not online, liveCache probe determines if the user stopped liveCache outside of Sun Cluster software by using the `Stop liveCache` button in LC10 or the `lcinit` command.
5. If the user stopped liveCache outside of Sun Cluster software by using the `Stop liveCache` button in LC10 or the `lcinit` command, returns `OK`.
6. If the user did not stop liveCache outside of Sun Cluster software by using the `Stop liveCache` button in LC10 or the `lcinit` command, checks SAP xserver availability.

   - If SAP xserver is unavailable, returns `OK` because the probe cannot restart liveCache if SAP xserver is unavailable.
   - If SAP xserver is available, returns `liveCache is offline`.

7. If any errors are reported from system function calls, returns `system failure`.

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