



# **LifeKeeper for Windows**

## LifeKeeper SAP Recovery Kit Administration Guide

**August 2006**

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# LifeKeeper SAP Recovery Kit Administration Guide

## Document Contents

The following topics can help you understand how to successfully define and administer your SAP hierarchy:

- [LifeKeeper SAP Recovery Kit Overview](#). Provides a general description of SAP in a LifeKeeper environment and discusses the SAP services that LifeKeeper can protect.
- [SAP Configuration Considerations](#). Provides sample configurations and tips for proper configuration of SAP with LifeKeeper.
- [Installing and Configuring SAP with LifeKeeper](#). Lists and describes the installation and configuration tasks required prior to creating your LifeKeeper resource hierarchies.
- [Resource Configuration Tasks](#). Explains the various functions you may perform on your SAP hierarchies: create, extend, unextend and delete.
- [SAP Hierarchy Administration](#). Provides important recommendations for ongoing administration of your SAP resource hierarchies.
- [Troubleshooting Tips](#). Offers suggestions for dealing with potential problems related to your SAP resources.

## LifeKeeper Documentation

The following documentation is associated with the LifeKeeper core:

- *Release Notes*
- *Online Product Manual*
- *Planning and Installation Guide*

This documentation, along with documentation associated with other LifeKeeper Recovery Kits and SteelEye Data Replication, is available online at:

[www.steeleye.com/support/documentation](http://www.steeleye.com/support/documentation)

## Recovery Kit Requirements

Before installing and configuring the LifeKeeper SAP Recovery Kit, be sure that your configuration meets the following requirements:

**Operating System software.** LifeKeeper supports the following versions of Windows operating systems:

- Windows 2000 Server Standard, Advanced, Data Center Editions
- Windows Server 2003 Standard, Enterprise, Data Center, Web Editions
- Windows Server 2003 R2 Editions

**LifeKeeper software.** You must install the same version of LifeKeeper software and any patches on each server. Please refer to the *Release Notes* for specific LifeKeeper requirements.

**LifeKeeper database recovery kit software.** In addition to the LifeKeeper SAP Recovery Kit, one of the following LifeKeeper database recovery kits is also required:

- LifeKeeper Oracle Recovery Kit version 5.3 or later.
- LifeKeeper Microsoft SQL Server Recovery Kit version 5.2 or later.

**SteelEye Data Replication software (optional).** If you plan to use SAP with replicated volumes rather than shared storage, you should install the SteelEye Data Replication for Windows software on each server.

**SAP Software.** The recovery kit supports SAP Web Application Server 6.40.

## Recovery Kit Installation

The LifeKeeper SAP Recovery Kit is available via ftp download. Installation is simple and quick, using InstallShield to provide a standard installation interface. For complete instructions on installing and removing LifeKeeper software, refer to the *LifeKeeper for Windows Planning and Installation Guide*.

Before installing the LifeKeeper SAP Recovery Kit, be sure you are familiar with the product prerequisites listed above, as well as the installation/configuration procedure outlined in the section [Installing and Configuring LifeKeeper with SAP](#).

### Kit Removal

To remove the LifeKeeper SAP Recovery Kit software, choose the **LifeKeeper SAP Recovery Kit v5.3** in the Add/Remove programs applet in the control panel.

## LifeKeeper SAP Recovery Kit Overview

The LifeKeeper SAP Recovery Kit provides a way to recover an SAP Central Instance (CI) and/or SAP Central Services Instance (SCS) from a failed server to a backup server. You can also extend the protection of the SAP Central Instance and/or SAP Central Services Instance to other servers. Using the LifeKeeper GUI you can easily create a complete resource hierarchy so that the recovery operation includes all the disk resources used by the SAP CI and/or SCS as well as the File Share and IP socket resources used to access the SAP system.

The LifeKeeper SAP Recovery Kit includes the ability to recover the SAP CI and/or SCS locally (local recovery) before trying to fail over the database instance to a standby server.

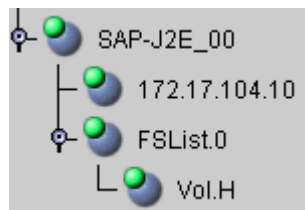
The LifeKeeper SAP Recovery Kit protects the SAP Message Server and Enqueue Service. Both services are included in the SAP Central Instance (CI) and/or SAP Central Service Instance (SCS).

The typical SAP resource hierarchy consists of the following resources:

- SAP
- Share communications resource (IP or DNS)
- File share hierarchy or hierarchy, which include Volume(s)

The SAP directories are stored on replicated or shared volumes. Upon detecting a failure, LifeKeeper switches the SAP CI and/or SCS, along with its associated file share and communication resources, to a backup server. The recovery can be completely transparent to the client. Once LifeKeeper switches all dependent resources to the backup server, it starts the SAP CI and/or SCS and the SAP OS Collector on that server.

The LifeKeeper GUI display shown below depicts a typical resource hierarchy. The SAP resource is the topmost resource in the hierarchy tree. It is responsible for starting and stopping the dependent resources (communication and file share resources) in the correct order.



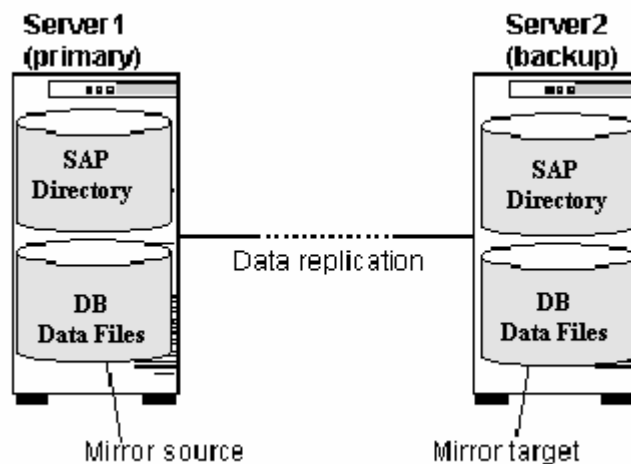
# SAP Configuration Considerations

## ABAP Configurations

The LifeKeeper SAP Recovery Kit supports the SAP CI and database running on the same server Active/Standby, the SAP CI running on the primary server and the database running on the backup server Active/Active, or the SAP CI and database running in separate clusters. Both replicated local storage and shared storage environments are supported.

## SAP with SteelEye Data Replication

In this configuration, SAP and the database data files are installed on local volumes on Server 1 and is replicated to local volumes on Server 2. The database software is can be installed on the local drive with the DB data file if SAP and the database will always run on the same server and will failover together, or installed on a separate local volume on each server. If on a separate local volume, the volume that contains the database software is not replicated.



### Configuration Notes:

#### Configuration #1

- Server1 is the primary server for the SAP CI and the backup for the DB, while Server2 is the primary for the DB and the backup server for the SAP CI.
- SAP and the database software is installed onto local volumes of Server1, then on Server2 using identical installation parameters. The database software is installed on a separate local volume. The volume on each server that contains the database software is not replicated.

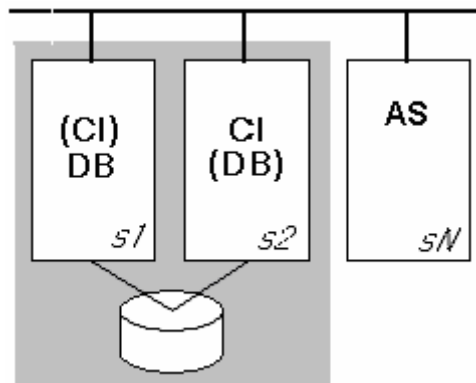
#### Configuration #2

- Server1 is the primary server for the SAP CI and the database, while Server2 is the backup server. A LifeKeeper dependency has been manually created between the SAP resource and the DB resource.

- SAP and the database software are installed onto the local volume of Server1, then on Server2 using identical installation parameters. The database software is either installed on the volume with the DB data file or on a separate local volume. If on a separate local volume, the volume on each server that contains the database software is not replicated.

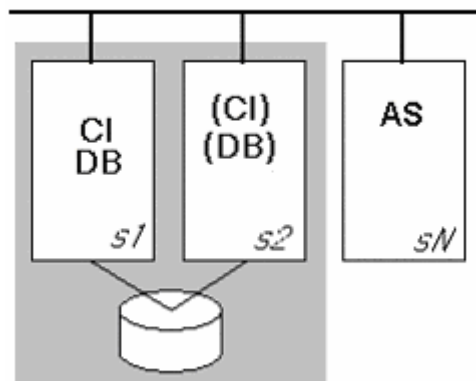
### SAP Shared Storage Configurations

In shared storage configurations, the database software is either installed on a local drive on the system or if SAP and the database will always run on the same server and will failover together the database software can also be installed to a LifeKeeper protected drive. The SAP software and files and the database data files are stored on shared storage volumes.



#### Configuration #1

- Server1 is the primary server for the SAP CI and the backup for the DB, while Server2 is the primary for the DB and the backup server for the SAP CI.
- SAP is installed on a shared storage volume and the database software is installed on a local volume of Server1, then on Server2 using identical installation parameters. The database data files are located on a shared storage volume.



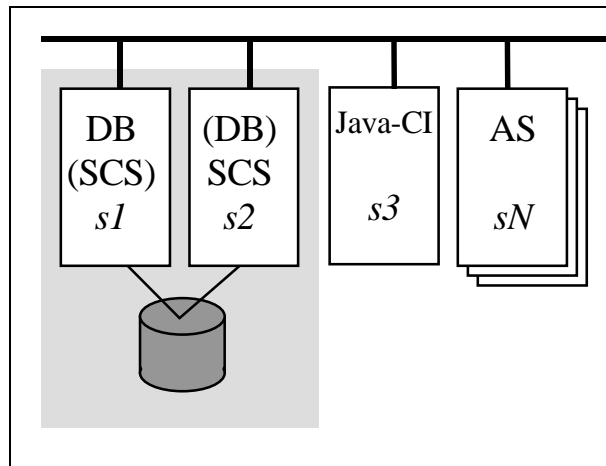
#### Configuration #2

- Server1 is the primary server for the SAP CI and the database, while Server2 is the backup server. A LifeKeeper dependency has been manually created between the SAP resource and the DB resource.
- SAP is installed on a shared storage volume and the database software is installed on a local volume of Server1 or on a shared storage volume, then on Server2 using identical installation parameters. The database data files are located on a shared storage volume

## Java Configurations

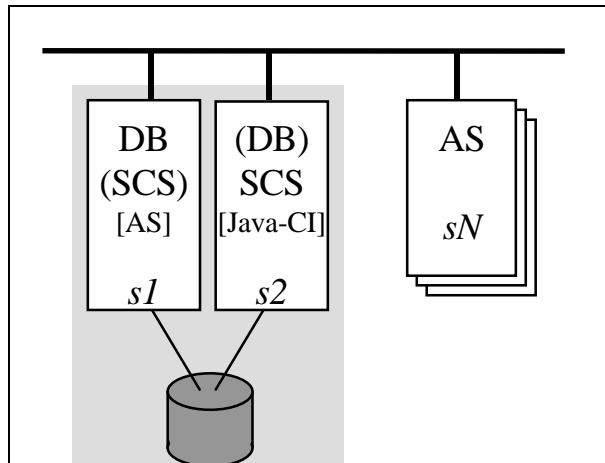
In ABAP+Java Add In configurations the LifeKeeper SAP Recovery Kit protects the ABAP Central Instance (CI) and the Java SAP Central Services (SCS) Instance. The Java CI is not protected and monitored as it is not a single point of failure.

In Java Only configurations the LifeKeeper SAP Recovery Kit protects the Java SCS.



### Configuration #1

- Server2 is the primary server for the SAP SCS and the backup for the DB, while Server1 is the primary for the DB and the backup server for the SAP SCS.
- The Java CI is installed outside of the cluster.
- SAP is installed on a shared storage volume and the database software is installed on a local volume of Server1, then on Server2 using identical installation parameters. The database data files are located on a shared storage volume.



**Configuration #2**

- Server2 is the primary server for the SAP SCS and the backup for the DB, while Server1 is the primary for the DB and the backup server for the SAP SCS.
- The Java CI and an application server (AS) is installed on the cluster system but are not LifeKeeper protected.
- SAP is installed on a shared storage volume and the database software is installed on a local volume of Server1, then on Server2 using identical installation parameters. The database data files are located on a shared storage volume.

# Installing and Configuring LifeKeeper with SAP

For the most efficient setup, perform the following tasks to install the SAP and database software first on the primary server, and then on the secondary server.

## Before Installing SAP

Before you install the SAP software, the servers and storage must be configured and LifeKeeper must be installed on each server in the cluster. By doing so, you can then install SAP onto a volume that is already LifeKeeper-protected. The database data files should also reside on a LifeKeeper protected drive.

Note: If SAP and the database will always run on the same server and will failover together the database software can also be installed to a LifeKeeper protected drive. Otherwise, the database software should be installed on a local drive that will not be protected by LifeKeeper.

### On the Primary Server

1. Use the Windows Disk Management tool to configure your disk resources and define the shared or replicated volumes that you want to use. (Be sure the volume size is adequate.)
2. It is recommended that you use Windows Explorer to unshare from the network all volumes to be used by the SAP and the database.
3. Configure your networking to support the LifeKeeper TCP/IP comm path(s) and the switchable IP address.\*
4. Install the LifeKeeper Core software on a local disk, followed by the LifeKeeper SAP Recovery Kit and the LifeKeeper database specific recovery kits.
5. When using SteelEye Data Replication, install the SteelEye Data Replication for Windows software to the local disk now. Refer to the *SteelEye Data Replication Administration Guide* for details.

\* Refer to the *Planning and Installation Guide* for detailed instructions.

### On the Backup Server

1. Bring up the backup server and use the Disk Management utility to assign the same drive letter to the shared/replicated volume as assigned on the primary server.
2. Install the LifeKeeper Core software on a local disk, followed by the LifeKeeper SAP Recovery Kit and the LifeKeeper database specific recovery kit.
3. When using SteelEye Data Replication, install the SteelEye Data Replication for Windows software now.

### On the Primary Server

Now that you have LifeKeeper installed on both servers, go back to the primary server and do the following:

1. When using SteelEye Data Replication, create your mirror on the volume which will contain the SAP directory and the database data files.

2. In LifeKeeper, create comm paths between the primary and backup servers.
3. In LifeKeeper, create your volume resource and communications resources (including either IP, or DNS) and extend them to the backup server.

## Installing SAP

Once you have installed LifeKeeper and configured the volume and communications resources, you are ready to install SAP to the protected volume(s).

**Important Note:** SAP must be installed using the Domain Installation. Local installation of SAP not supported.

### On the Primary Server

1. Install the database manually following the guidelines in the LifeKeeper database specific administration guide and the SAP Installation Guide. Install the SAP as documented in the SAP Installation Guide. Install SAP to the protected volume. Install the database software to a local drive that will not be LifeKeeper protected. The database data files must always reside on a protected drive.

When installing Java components use the sapinst option  
SAPINST\_USE\_HOSTNAME=<Virtual SCS Server> to override the hostname when installing the SCS. Similarly, override the hostname with the virtual database server name when installing the Java database install.

For Java Only installations, use the HA product catalog (product\_ha.catalog) from the DVD when installing the SAP components.

2. Stop all SAP and database services.

### On the Backup Server

1. In LifeKeeper, bring the protected volume in service on the backup server.

Remove or rename the SAP /usr/sap directory and rename the database directory or directories that contain the database data files. If this is a new installation, you can delete the data files.

**Note:** For Microsoft SQL Server, delete the database and the database user <sid>adm created by the SAP installation.

2. Install the database manually following the guidelines in the LifeKeeper database specific administration guide and the SAP Installation Guide. Install the SAP as documented in the SAP Installation Guide. Install SAP to the protected volume. Install the database software to a local drive that will not be LifeKeeper protected. The database data files must always reside on a protected drive. Use EXACTLY the same installation options as on the primary server (the drive letter, SID name and paths must be identical).

When installing Java components use the sapinst option  
SAPINST\_USE\_HOSTNAME=<Virtual SCS Server> to override the hostname when

installing the SCS. Similarly, override the hostname with the virtual database server name when installing the database install.

For Java Only installations, use the HA product catalog (product\_ha.catalog) from the DVD when installing the SAP components.

3. Stop all SAP and database services on the backup server.

## Configuring HA SAP

Using notepad:

1. For ABAP configurations, Edit  
`<Drive Letter>:\usr\sap<SID>\SYS\profile\DEFAULT.PFL:`
  - a. Set `rdisp/mshost=<Virtual SAP CI Server Name>`.
  - b. Set `rdisp/sna-gateway=<Virtual SAP CI Server Name>`.
  - c. Set `SAPDBHOST=<Virtual DB Server Name>`.
2. For both servers,  
Edit `<Drive Letter>:\usr\sap<SID>\SYS\profile<SID>_<Instance>_<server>:`
  - a. Set `SAPLOCALHOST=<Virtual SAP CI and/or SCS Server Name>`.
  - b. Set `SAPLOCALHOSTFULL=<Virtual SAP CI and/or SCS Server Name>`.
  - c. Set `SAPGLOBALHOST=<Virtual SAP CI and/or SCS Server Name>`.
3. For both servers,  
Edit `<Drive Letter>:\usr\sap<SID>\SYS\profile\START_<Instance>_<server>:`
  - a. Set `SAPLOCALHOST=<Virtual SAP CI and/or SCS Server Name>`.
  - b. Set `SAPLOCALHOSTFULL=<Virtual SAP CI and/or SCS Server Name>`.
  - c. Set `SAPGLOBALHOST=<Virtual SAP CI and/or SCS Server Name>`.

## ABAP+Java Addin Environments

On both servers, set the Windows Services entry for the Java SCS Instance to manual.

## HA Configuration steps in a SAP/Oracle Environment

Using notepad:

1. Edit `$ORACLE_HOME\network\admin\listener.ora:`
  - a. Change “`LISTENER=`” to “`<SID>=`”.

- b. Change “SID\_LIST\_LISTENER” to “SID\_LIST\_<SID>”.
  - c. Change the host parameter to be equal to the Virtual Server Name for the database host.
  - d. Create a separate TNSListener Service instance for the SID to be protected under LifeKeeper. The service should be created using the **lsnrctl Start <SID>** command. This will create service with the name Oracle<OraHome>TNSListener<SID>.
2. Edit \$ORACLE\_HOME\network\admin\tnsnames.ora
    - a. Change the host parameter to be equal to the Virtual Server Name for the database host.

## HA Configuration steps in a SAP/MS SQL Environment

1. On each system, login a <SID>adm and set the environment variable MSSQL\_SERVER to the DB virtual IP address.
2. On each system, set the registry entry  
HKEY\_LOCAL\_MACHINE\SOFTWARE\SAP\<SID>\Environment  
MSSQL\_SERVER to the DB virtual IP address.
4. Edit  
<Drive Letter>:\usr\sap\<SID>\SYS\profile\DEFAULT.PFL:
  - a. Set SAPDBHOST=<Virtual DB IP Address>.
  - b. Set dbs/mss/server=<Virtual DB IP Address>.

## Complete the Configuration

1. Bring the volume resource back in service on the primary server.
2. Start the database, then the SAP CI and/or SCS on the primary server.
3. Create the SAP hierarchy on the primary server and extend it to the backup server. See [Creating the SAP Hierarchy](#) for details.
4. [Test the new SAP hierarchy](#) by performing a manual failover.

## Resource Configuration Tasks

Once you have completed the setup tasks as described in the previous section, you are ready to create and extend your SAP resource hierarchies.

The following four tasks are described in this guide, as they are unique to a SAP resource instance and different for each Recovery Kit.

- **[Create a Resource Hierarchy](#)**. Creates an application resource hierarchy in your LifeKeeper cluster.
- **[Extend a Resource Hierarchy](#)**. Extends a resource hierarchy from the primary server to a backup server.
- **[Unextend a Resource Hierarchy](#)**. Unextends (removes) a resource hierarchy from a single server in the LifeKeeper cluster.
- **[Delete a Resource Hierarchy](#)**. Deletes a resource hierarchy from all servers in your LifeKeeper cluster.
- **[Manage SAP Resource Properties](#)**. Allows users to change the password for the SAP Administrative user.

The following tasks are described in the GUI Administrative Tasks section within the *LifeKeeper Online Product Manual*, because they are common tasks with steps that are identical across all recovery kits.

- **Create a Resource Dependency**. Creates a parent/child dependency between an existing resource and another resource instance and propagates the dependency changes to all applicable servers in the cluster.
- **Delete a Resource Dependency**. Deletes a resource dependency and propagates the dependency changes to all applicable servers in the cluster.
- **In Service**. Brings a resource hierarchy into service on a specific server.
- **Out of Service**. Takes a resource hierarchy out of service on a specific server.
- **View/Edit Properties**. View or edit the properties of a resource hierarchy on a specific server.

**Note:** Throughout the rest of this section, configuration tasks are performed using the **Edit** menu. You can also perform most of these tasks:

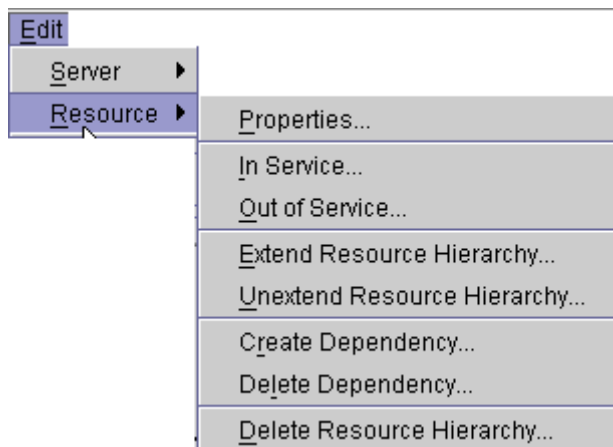
- from the toolbar
- by right clicking on a global resource in the left pane of the status display
- by right clicking on a resource instance in the right pane of the status display

Using the right-click method allows you to avoid entering information that is required when using the **Edit** menu.

### Creating a SAP Resource Hierarchy

After you have completed the necessary setup tasks, use the following steps to define the SAP Server hierarchy to protect your database(s).

1. From the LifeKeeper GUI menu, select **Edit**, then **Resource**. From the menu, select **Create Resource Hierarchy**.



The *Create Resource Wizard* dialog box will appear with a drop down list box displaying all recognized Recovery Kits installed within the cluster.

2. Select **SAP** and click **NEXT**.
3. You will be prompted to enter the following information. When the **Back** button is active in any of the dialog boxes, you can go back to the previous dialog box. This is helpful should you encounter an error requiring you to correct previously entered information. You may click **Cancel** at any time to cancel the entire creation process.

Field	Tips
Switchback Type	Choose either intelligent or automatic. This dictates how the SAP CI and/or SCS will be switched back to this server when the server comes back up after a failover. The switchback type can be changed later from the General tab of the Resource Properties dialog box. <b>Note:</b> The switchback strategy must match that of the IP and file share resources to be used by the SAP resource, or else the create will fail.
Select the SAP SID	Select the appropriate SAP SID for this hierarchy.
Select the SAP Instance ID	Select the ID on the Central Instance for this SID that you wish to place under LifeKeeper protection.
Select the IP child resource(s)	Select the LifeKeeper protected IP address(es) used to access that SAP CI and/or SCS.
Select the fileshare child resource(s)	Select the LifeKeeper protected file share(s) that protect the fileshares saploc and sapmnt.

Quick Check Interval	Enter the interval (in minutes) between basic checks of the resource's availability. This check verifies that the protected SAP services for this SID are still running. Different values can be specified for each system. The default value is 3 minutes. Value can be between 0 to 10080. Setting interval value to 0 will disable the quick check.
Local Recovery	Select <b>Yes</b> to enable Local Recovery for this resource. Local recovery for a SAP resource means that if any of the protected services fail, LifeKeeper will attempt to restart the affected service. If the restart is unsuccessful, then LifeKeeper will failover the service to the backup server.
SAP Tag Name	Enter a unique tag name, or you can accept the default tag name offered by LifeKeeper.

4. After you click **Create**, the *Create Resource Wizard* will create your SAP resource. LifeKeeper will validate the data entered. If LifeKeeper detects a problem, an error message will appear in the information box.
5. Another information box will appear indicating that you have successfully created a SAP resource hierarchy, and you must extend that hierarchy to another server in your cluster in order to achieve failover protection. Click **Next**.
6. After you click **Continue**, LifeKeeper will launch the *Pre-Extend Wizard*. Refer to Step 2 under *Extending an SAP Hierarchy* (below) for details on how to extend your resource hierarchy to another server.

## Extending a SAP Resource Hierarchy

This operation can be started from the **Edit** menu, or initiated automatically upon completing the **Create Resource Hierarchy** option, in which case you should refer to Step 2 below.

1. On the **Edit** menu, select **Resource**, then Extend Resource Hierarchy. The Pre-Extend Wizard appears. If you are unfamiliar with the Extend operation, click **Next**. If you are familiar with the LifeKeeper **Extend Resource Hierarchy** defaults and want to bypass the prompts for input/confirmation, click **Accept Defaults**.

2. The *Pre-Extend Wizard* will prompt you to enter the following information.  
**Note:** The first two fields appear only if you initiated the Extend from the **Edit** menu.

Field	Tips
Template Server	Enter the server where your SAP resource is currently in service.
Tag to Extend	Select the SAP resource you wish to extend.
Target Server	Enter or select the server you are extending <i>to</i> .
Switchback Type	This dictates how the SAP instance will be switched back to this server when it comes back into service after a failover to the backup server. You can choose either intelligent or automatic. The switchback type can be changed later, if desired, from the General tab of the Resource Properties dialog box. <b>Note:</b> Remember that the switchback strategy must match that of the dependent resources to be used by the SAP resource.
Template Priority	(This field appears only if you did NOT extend directly from the Create function.) Enter a number between 1 and 999 to specify the template server's priority in the cascading failover sequence for this resource. A lower number means a higher priority. LifeKeeper assigns the number "1" to the server on which the hierarchy was created. No two servers can have the same priority for a given resource.
Target Priority	Enter a number between 1 and 999 to specify the target server's priority in the cascading failover sequence for this resource. A lower number means a higher priority. LifeKeeper offers a default of 10 for the first server to which a hierarchy is extended.

3. After receiving the message that the pre-extend checks were successful, click **Next**.
4. Depending upon the hierarchy being extended, LifeKeeper will display a series of information box showing the Resource Tags to be extended, which cannot be edited. Click **Extend**.
5. Select "Yes" to enable Local Recovery for the SAP resource on the target server; otherwise choose "No".
6. After receiving the message "Hierarchy extend operations completed" click **Next Server** to extend the hierarchy to another server, or click **Finish** if there are no other extend operations to perform.
7. After receiving the message "Hierarchy Verification Finished", click **Done**.

## Unextending a SAP Resource Hierarchy

To remove a resource hierarchy from a single server in the LifeKeeper cluster, do the following:

1. On the **Edit** menu, select **Resource**, then **Unextend Resource Hierarchy**.
2. Select the **Target Server** where you want to unextend the SAP resource. It cannot be the server where the SAP resource is currently in service. (This dialog box will not appear if you selected the Unextend task by right clicking on a resource instance in the right pane.) Click **Next**.
3. Select the SAP hierarchy to unextend and click **Next**. (This dialog will not appear if you selected the Unextend task by right clicking on a resource instance in either pane).
4. An information box appears confirming the target server and the SAP resource hierarchy you have chosen to unextend. Click **Unextend**.
5. Another information box appears confirming that the SAP resource was unextended successfully. Click **Done** to exit the Unextend Resource Hierarchy menu selection.

## Deleting a SAP Resource Hierarchy

Before deleting a SAP hierarchy or instance, make sure that the hierarchy is active (green) on its primary server. You may also wish to remove the dependencies before deleting the hierarchy; otherwise, the dependencies will be deleted also.

Deleting a SAP hierarchy accomplishes the following:

- Stops the SAP CI and/or SCS.
- Deletes the SAP hierarchy and all dependencies.

### Notes:

- Make sure both servers are active when a delete is initiated for LifeKeeper to properly withdraw the databases from the backup server.
- If you want the dependant resource to remain under LifeKeeper protection, you should delete dependencies prior to deletion.

To delete a resource hierarchy from all the servers in your LifeKeeper environment, complete the following steps:

1. On the **Edit** menu, select **Resource**, then **Delete Resource Hierarchy**.
2. Select the **Target Server** where you will be deleting your SAP resource hierarchy and click **Next**. (This dialog will not appear if you selected the Delete Resource task by right clicking on a resource instance in either pane.)
3. Select the **Hierarchy to Delete**. (This dialog will not appear if you selected the Delete Resource task by right clicking on a resource instance in the left or right pane.) Click **Next**.
4. An information box appears confirming your selection of the target server and the hierarchy you have selected to delete. Click **Next**.
5. Another information box appears confirming that the SAP resource was deleted successfully.
6. Click **Done** to exit.

## Manage SAP Resource Properties

To view and manage a protected SAP Instance resource from the LifeKeeper GUI, right-click on the resource instance (on the right hand side of the LifeKeeper GUI) and select **properties**, then select the **Resource Settings** tab. Use the resource properties page to view or change information about the SAP Instance resource.

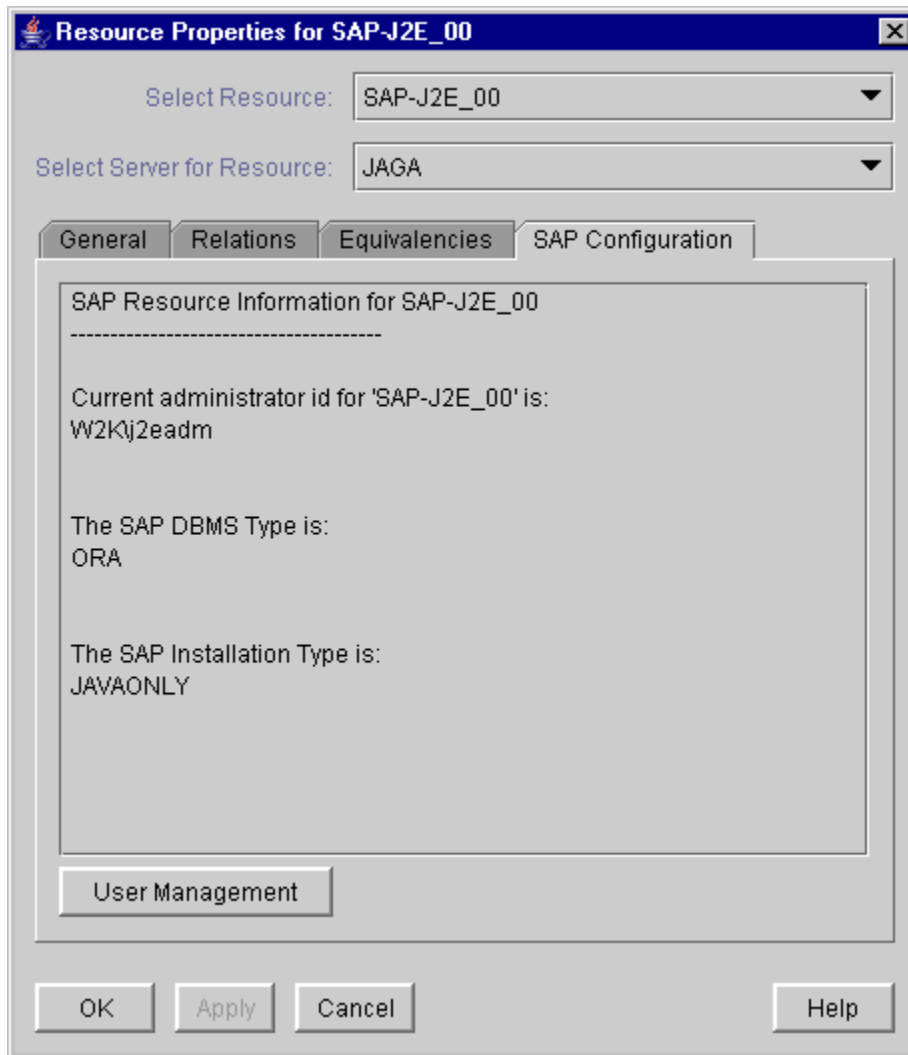


Figure 19 shows a typical SAP Instance resource property page that identifies the SAP Administrative User Name, the database type, and the SAP installation type. The SAP installation type is only shown if the SAP Instance resource is ISP. We may not be able to determine the installation type if the resource is in any other state. Also shown is a **User Management** button.

### User Management

This menu allows users to change the password for the SAP Administrative user. This is a Windows domain user and you can only change the password in LifeKeeper once it has been changed for the domain. LifeKeeper uses this user account to check to see if the database is running before attempting to start SAP. If it needs to be modified press the User Management button and select or enter the following:

User Management Action:

Field	Tips
Change Password	This is the only User Management action that is currently available. Select the <b>Next</b> button.
Enter Password	Enter the administrative password for the SAP Administrative user account being updated. Then, select the <b>Next</b> button.

## Testing Your Resource Hierarchy

You can test your SAP resource hierarchy by initiating a manual switchover. This will simulate a failover of a resource instance from the primary server to the backup server.

Selecting **Edit**, then **Resource**, then **In Service**. For example, an *In Service* request executed on a backup server causes the application hierarchy to be taken out of service on the primary server and placed in service on the backup server. At this point, the original backup server is now the primary server and original primary server has now become the backup server.

If you execute the *Out of Service* request, the application is taken out of service without bringing it in service on the other server, and the SAP CI and/or SCS and all SAP services are stopped.

## SAP Hierarchy Administration

Follow these guidelines for administering your SAP hierarchy:

- **Access via protected communication resources.** To ensure that users can access the SAP CI and/or SCS, regardless of the physical system on which it is running, all remote access of the database should be done through the protected IP addresses, which are part of the SAP hierarchy. LifeKeeper automatically makes protected communication resources available on the backup system in case of a switchover.

- **Reserve volumes for exclusive SAP and Database Management System use.** Reserve volumes containing the SAP directory and the database data file for use exclusively by SAP and the DBMS. They should not be accessed by any other local applications. This is because LifeKeeper operations that remove a volume resource from service, for example in a failover, can fail if a local process has done an open for write access on the volume.

Local processes that have read-only access to volumes do not prevent removal of a resource from service, but the read-only access may cause a restore to fail when you attempt to switch the resource back. Examples of processes with read-only access are the Performance Monitor, which periodically polls each volume, or any running process which is installed on the shared volume.

- **Start and Stop the SAP CI and/or SCS Through LifeKeeper.** Although much of your administration of the SAP CI and/or SCS is done through the SAP tools, use the LifeKeeper *Out of Service* function to stop the SAP CI and/or SCS and use the *In Service* function to start the SAP CI and/or SCS. When LifeKeeper stops and starts the SAP CI and/or SCS, it maintains a consistent view of the server on all nodes in the configuration.

## Troubleshooting Tips

This section is intended to provide suggestions for dealing with potential error messages related to your SAP resources.

### Create Hierarchy failed

**Suggestion:** Check the following:

- The file DEFAULT.PFL has been updated with the Virtual Server Name for the SAP CI and/or SCS host.

### Bring in Service failed

**Suggestion:** Check the following:

- The files START\_<Instance>\_<server> and <SID>\_<Instances>\_server has been updated with the Virtual Server Name for the SAP CI and/or SCS host for the parameters SAPLOCALHOST, SAPLOCALHOSTFULL, and SAPGLOBALHOST.
- The file DEFAULT.PFL has been updated with the Virtual Server Name for the database host for the parameter SAPDBHOST.

### Microsoft SQL Server 2005 SAP Database Inaccessible

After applying the recommended SAP Support Package Stacks, when the Microsoft SQL Server 2005 hierarchy is brought in-service on the backup server Microsoft SQL Server 2005 indicates that the SAP database is inaccessible.

**Suggestion:** Reboot the backup server.