LifeKeeper for Windows

LifeKeeper Microsoft SQL Server Recovery Kit Administration Guide

March 2007

The product described in this book is a licensed product of SteelEye™ Technology, Inc.

SteelEye Technology and LifeKeeper are registered trademarks and SteelEye is a trademark of SteelEye Technology, Inc.

Microsoft, SQL Server, Windows 2000, and Windows 2003 are trademarks or registered trademarks of Microsoft in the U.S. and other countries.

Other brand and product names used herein are for identification purposes only and may be trademarks of their respective companies.

It is the policy of SteelEye Technology, Inc. to improve products as new technology, components, software, and firmware become available. SteelEye Technology, Inc., therefore, reserves the right to change specifications without prior notice.

To maintain the quality of our publications, we need your comments on the accuracy, clarity, organization, and value of this book.

Address correspondence to:

ip@steeleye.com

Table of Contents

LifeKeeper Microsoft SQL Server Recovery Kit Administration Guide

The LifeKeeper® Microsoft SQL Server Recovery Kit provides fault resilience for Microsoft SQL 2000 (8.0) and Microsoft SQL 2005 (9.0) in a LifeKeeper environment.

Document Contents

This guide provides the following information topics:

- **SQL Server Recovery Kit Overview.** This section provides a general overview of the product and the LifeKeeper environment.
- **SQL Server Configuration Considerations.** This section describes basic configuration concepts that are important to a successful installation of Microsoft SQL Server with LifeKeeper.
- **Installing and Configuring SQL Server with LifeKeeper.** Follow the pre-installation checklist and the special procedures to set up your servers for SQL Server.
- **SQL Resource Configuration Tasks.** After you have completed the necessary setup tasks, use the steps in this section to create, extend and manage the SQL hierarchy.
- **Hierarchy Administration.** This section describes how set up and administer a single database instance, add system dependencies, and understand manual switchover.

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 for Windows, is available online at:

www.steeleye.com/support/documentation

Recovery Kit Requirements

Before installing and configuring the LifeKeeper Microsoft SQL Server 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 for Windows on *all* servers in the cluster.
- **SteelEye Data Replication for Windows (optional).** If you plan to use Microsoft SQL Server with replicated volumes rather than shared storage, you should install the SteelEye Data Replication software on each server.
- **Microsoft SQL Server RDBMS software.** The kit is compatible with Microsoft SQL 2000 (8.0) and Microsoft SQL 2005 (9.0). However, the same version of Microsoft SQL Server must be installed on all systems in the cluster.
- **Communications protocol**. TCP/IP is strongly recommended by Microsoft for use in a clustered environment. Although LifeKeeper supports LAN Manager, this document will assume you are using TCP/IP, and will refer to switchable IP resources (rather than LAN Manager resources) in its configuration instructions.

Consult your LifeKeeper sales representative for release and ordering information.

Recovery Kit Installation

The LifeKeeper Microsoft SQL Server Recovery Kit is distributed via ftp download. Installation is simple and quick, using InstallShield to provide a standard installation interface. For complete LifeKeeper installation instructions, refer to the *Planning and Installation Guide*.

Before installing the LifeKeeper Microsoft SQL Server Recovery Kit software, be sure you are familiar with the product prerequisites listed above, as well as the installation procedure outlined in the Setup Checklist. A LifeKeeper Microsoft SQL Server Recovery Kit license key must be installed in order to protect a SQL resource using LifeKeeper.

Kit Removal

To remove the LifeKeeper Microsoft SQL Server Recovery Kit software, choose **LifeKeeper Microsoft SQL Server Recovery Kit for LifeKeeper v6** in the Add/Remove programs applet in the control panel.

CAUTION: Be sure there are no SQL instances or resources in service when the kit is removed. Once the kit is removed these resources will be unusable. All SQL hierarchies should be deleted before the kit is removed.

SQL Server Recovery Kit Overview

The LifeKeeper Microsoft SQL Server Recovery Kit software lets you tie the data integrity of Microsoft SQL-based databases to the increased availability provided by LifeKeeper for Windows.

The LifeKeeper GUI allows you to easily create a SQL resource hierarchy. LifeKeeper can then protect all of the disk resources used by the SQL Server instance, as well as the IP socket resources used to access the database. The LifeKeeper Microsoft SQL Server Recovery Kit will monitor and protect the following services:

SQL 2000:

Core/Standard SQL Services (Required)	**Optional Services**
SQL Server (MSSQLSERVER)	SQL Server Agent
	Distributed Transaction Coordinator
	Microsoft Search

SQL 2005:

Core/Standard SQL Services (Required)	**Optional Services**
SQL Server (MSSQLSERVER)	SQL Server Agent
	SQL Server Analysis Services
	SQL Server FullText Search
	SQL Server Reporting Services
	SQL Server Browser

All data files are stored on shared or replicated volumes. Thus, upon detecting a failure, LifeKeeper switches the database, along with its associated volumes and IP socket resources to a backup server. Once LifeKeeper switches all dependent resources to the backup server, it starts the Microsoft SQL service and any protected optional services.

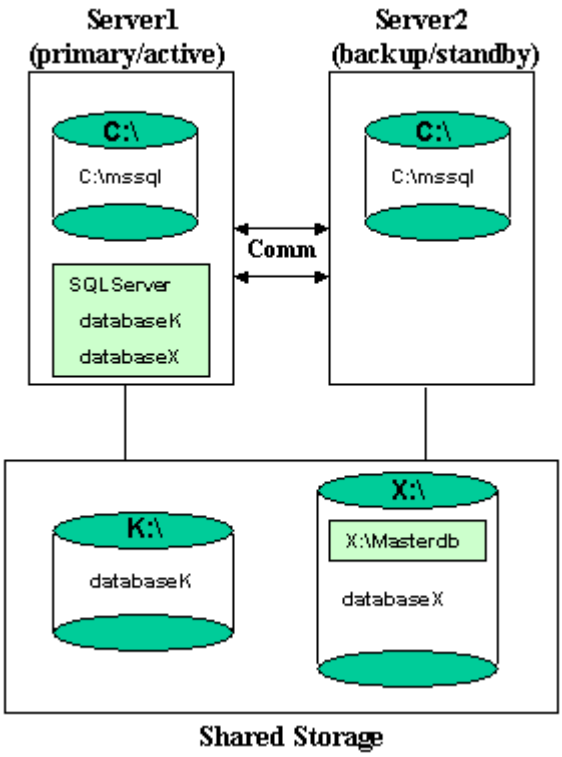
SQL Server Configuration Considerations

Before you install and configure your clusters, it is important to understand the concepts of Active/Standby configurations, and how multiple instances can be setup in a SQL configuration.

SQL Configuration

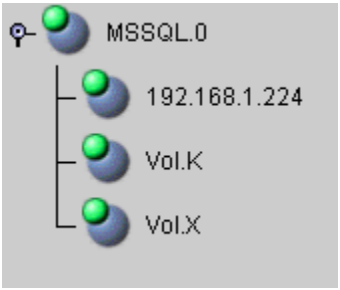
A configuration is **Active/Standby** when there is only one master database for each SQL Server, and it is located on a shared or replicated volume. The services run on only one system at a time. The servers are assigned priorities within LifeKeeper which determine the order of failover for a particular hierarchy.

The figure below depicts a single SQL instance installed on a pair of servers. The instance contains two databases, *databaseK* and *databaseX* residing on separate volumes. Note that there is a single master database which resides on shared volume *X*.



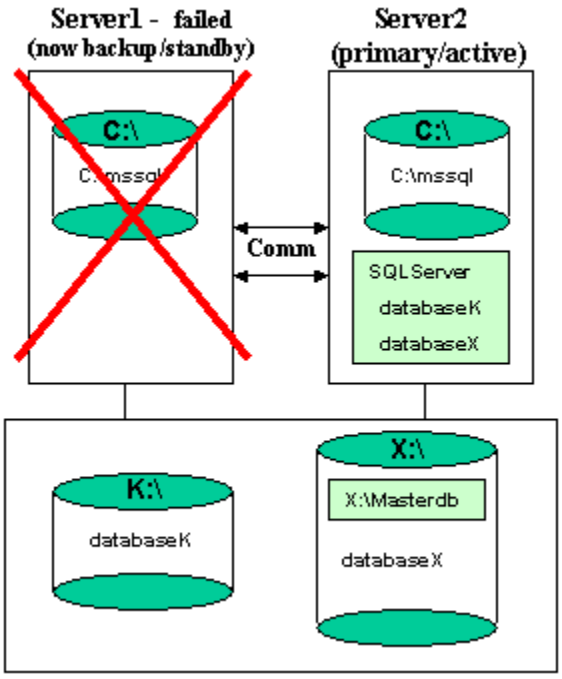
When you create the SQL hierarchy within LifeKeeper, you are asked to specify the SQL instance to be protected, and the IP resource that will be used to connect to the database. LifeKeeper then reads the configuration data for that instance and pulls the associated volumes into the hierarchy.

Once the hierarchy is created, it will appear as follows in the LifeKeeper GUI.



Failover

In the event of failure, LifeKeeper brings the SQL Server hierarchy In Service on the backup Server. SQL Server is started on the backup server and it takes over protection of all defined databases as depicted in the figure below.

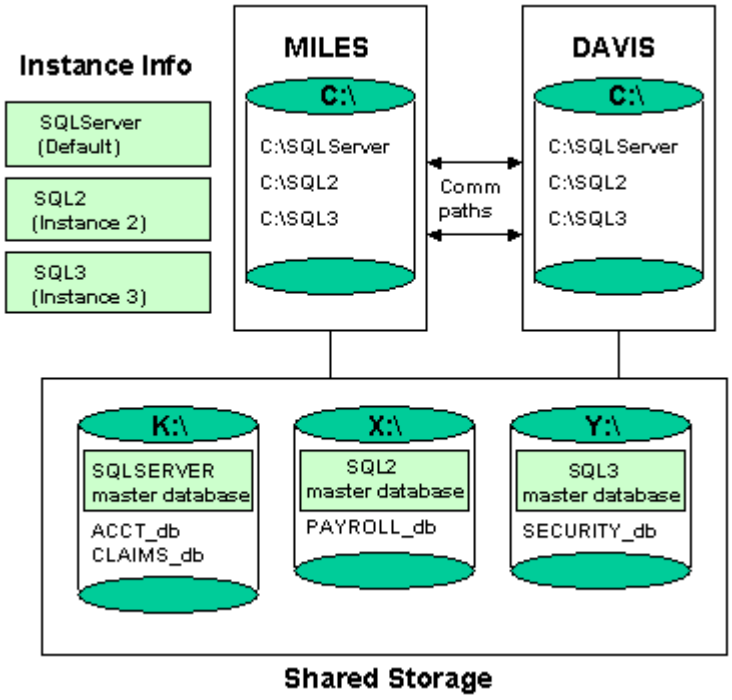


Multiple SQL Instances

SQL Server can be installed multiple times, which creates multiple SQL **instances**. LifeKeeper can protect multiple instances of SQL Server. LifeKeeper identifies each instance by the unique name given during SQL installation.

One SQL instance may contain multiple SQL databases. Each instance is protected in a single LifeKeeper hierarchy. Thus, if the SQL instance contains two databases, the corresponding LifeKeeper hierarchy will protect two databases (along with the associated IP and volume resources).

The figure below depicts three SQL instances: SQLServer (the default instance), SQL2, and SQL3. These are installed on a pair of servers, MILES and DAVIS.



Notes:

- The databases are located on three different shared storage volumes, K, X, and Y. Note that the default instance contains two databases, and the other two instances contain one database each.
- Each server can be the primary and backup server for multiple instances.
- It would be possible for MILES to be the primary server for the default instance, and DAVIS to be the primary server for the SQL2 and SQL3 instance.

Installing and Configuring SQL Server with LifeKeeper

Proper operation of the LifeKeeper Microsoft SQL Server Recovery Kit depends upon correct setup of the hardware and software.

Before continuing, please preview the Hierarchy Administration section of this guide. This section provides general guidelines, configuration details, and troubleshooting hints to help you administer Microsoft SQL Server in a LifeKeeper environment.

Setup Checklist

The installation and setup sequence should be performed in the following sequence. More detailed instructions for each of these steps are provided in the sections to follow. See the *Planning and Installation Guide* for additional details on the first three steps.

1. Set up your shared or replicated storage to reserve protected volumes for exclusive Microsoft SQL Server use.
2. Set up and test your network.
3. Install and configure the LifeKeeper Core, IP Recovery Kit, and Microsoft SQL Server Recovery Kit on each server.
4. Install SteelEye Data Replication if using replication to replicate SQL data between the local volumes on the servers within the cluster.
5. Create volume and IP resource hierarchies.
6. Install Microsoft SQL Server software on each server.
7. Create the SQL Server resource hierarchy.

Setup Tasks

During setup, first configure the primary server, then a backup server, and finally, any further servers you wish to include in the cluster.

Set up shared/replicated storage.

Follow these steps to ensure the correct configuration.

1. Use the Windows Disk Management tool to configure your shared or replicated disk resources and **define the volumes that you want to use**. It is required that databases with different primary servers be placed on different volumes.
2. Use Windows Explorer to **unshare from the network all volumes to be used by the SQL Services**. A LifeKeeper-protected volume may fail to switchover if another application or process is using it.

Set up and test your network.

Ensure your network is configured and working correctly before installing LifeKeeper, since the communications paths and LifeKeeper GUI depend upon the network.

Install and Configure LifeKeeper Core and Recovery Kits

Install the LifeKeeper Core, which includes the Volume and IP Recovery Kits, LifeKeeper Microsoft SQL Server Recovery Kit, and SteelEye Data Replication (if needed) on each server in the cluster. You must have the same version of LifeKeeper on all servers and required license keys installed.

Create volume and IP resource hierarchies

1. For each shared or replicated volume you plan to use, create a volume hierarchy to protect the volume, and ensure the volume hierarchy is In Service on the primary server.
2. Create your LifeKeeper IP resource hierarchies on the primary server, and extend them to the backup server. See the *Online Product Manual* for details on creating IP resource hierarchies. Note that LifeKeeper-protected IP addresses must have a corresponding DNS entry. If absent, then on startup the SQL Server may not bind to the protected IP address.

   The IP resources must be defined, and should not be part of another hierarchy when you to create your SQL hierarchy.

Note: If you create the IP resource *after* creating the SQL hierarchy, then you must stop and re-start the SQL service in order for SQL to recognize the IP resource.

Install Microsoft SQL Server software.

1. In LifeKeeper, bring the *shared/replicated* volume resource hierarchy In Service on the **backup** server.
2. **On the backup server**, install Microsoft SQL Server using the following guidelines:

   SQL 2000:

   - In the *Computer Name* dialog, choose Local Computer.
   - In the *Setup Type* dialog, under Destination Folder specify a folder on the local disk for *Program Files* and a *shared* or *replicated* volume (protected by LifeKeeper) for *Data Files*.
   - In the *Authentication Mode* dialog, select “Mixed Mode”, and enter a non-blank password for the SA account. The passwords **MUST** be the same on all servers in the cluster.

   SQL 2005:

   - In the *Components to Install* dialog, select the components for your installation. Click on the **Advanced** button to go to the *Feature Selection* dialog. On the *Feature Selection* page, change the installation path for the *Data Files* under *Database Services* to the *shared* or *replicated* volume (protected by LifeKeeper).
   - In the *Authentication Mode* dialog, select “Mixed Mode”, and enter a non-blank password for the SA account. The passwords **MUST** be the same on all servers in the cluster.

3. When installation is complete, use Microsoft SQL Enterprise Manager (SQL 2000) or Microsoft SQL Server Configuration Manager (SQL 2005) to verify that SQL Server can start properly on the **backup** server. Stop all Microsoft SQL Services on the **backup** server.
4. In LifeKeeper, bring the *shared/replicated* volume resource hierarchy In Service on the **primary** server.

5. **On the primary server**, open Explorer and access the drive associated with the *shared/replicated* volume.
6. Delete the directory where you previously installed the SQL data files. (You will re-install them in the next step).
7. Install Microsoft SQL Server on the **primary** server EXACTLY as you did on the **backup** server (program files on the local disk and data files on the *shared/replicated* volume).
8. When installation is complete, use Microsoft SQL Enterprise Manager (SQL 2000) or Microsoft SQL Server Configuration Manager (SQL 2005) to verify that SQL Server can start properly on the **primary** server.

Additional Setup Tasks for Extended Configurations

If your configuration uses a shared storage device or you are using SteelEye Data Replication, you may choose a configuration that will be extended to a third (or more) server(s).

1. Configure two systems per the steps given above.
2. Switch your protected volumes to the third server.
3. Install the Microsoft SQL Server software on the local drive, and the master database on the same *shared/replicated* volume as used by the other servers. This will permit you to extend the hierarchy and utilize LifeKeeper's cascading feature.

Create your SQL Server Hierarchy

After you complete the setup and installation tasks, you are ready to use LifeKeeper to **create** and **extend** a SQL Server hierarchy. See the next section for details on configuring SQL Server resource hierarchies.

Resource Configuration Tasks

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

The following five tasks are described in this guide, as they are unique to a SQL 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 SQL Server Configuration.** Allows administrative actions to be performed on your SQL resource hierarchy such as changing the SQL user and password associated with the SQL resource hierarchy.

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 the SQL Hierarchy

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

1. From the LifeKeeper GUI menu, select **Edit**, then **Server**. 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 *MS SQL Server* 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 SQL instance 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. **Note:** The switchback strategy must match that of the IP and volume resource to be used by the SQL resource, or else the create will fail.
Server	Select the Server on which you want to create the hierarchy.

Select Microsoft SQL Server Instance	Select the instance of Microsoft SQL Server you wish to place under LifeKeeper protection. LifeKeeper will read the configuration data for this instance and pull the associated volumes into the hierarchy.
Enter Microsoft SQL Administrative User Name	Enter the administrative user name that is used for Microsoft SQL on this server. This user account must include SA permissions to the master database.
Enter Password	Enter the administrative password for the user account just entered.
Select Optional Services for Protection	Select optional SQL services to be protected in this hierarchy. The list includes only those services eligible for LifeKeeper protection.
Protected IP Address	Select an IP address to protect with this instance. IP Address is not required if only named pipes are used (though this is NOT recommended). **Note**: The IP address you select should not already be extended to another server. If you select an IP address that is already extended, the create process will fail in a later step.
Named Pipe Alias	Optional, but not recommended. If you intend to use Named Pipes (LAN Manager), select an alias name for the named pipe connection. Leave this blank if you choose not to use Named Pipes. **Note**: The LAN Manager resource you select should not already be extended to another server. If you select a LAN Manager resource that is already extended, the create process will fail in a later step.
Microsoft SQL Server Tag	Enter a unique tag name, or you can accept the default tag name offered by LifeKeeper.
Quick Check Interval	Enter the interval (in minutes) between basic checks of the resource's availability. 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.
Deep Check Interval	Enter the interval (in minutes) between extensive checks of the resource's availability. This program utilizes Quickcheck for its Deepcheck implementation. Different values can be specified for each system. The default value is 5 minutes. Value can be between 0 to 10080. Setting interval value to 0 will disable the Deep Check.
Local Recovery	Select **Yes** to enable Local Recovery for this

	resource. Local recovery for a SQL resource means that if there is 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.

4. After you click **Create**, the *Create Resource Wizard* will create your SQL 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 SQL 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 a SQL Resource Hierarchy (below) for details on how to extend your resource hierarchy to another server.

Extending a SQL Hierarchy

This operation can be started from the **Edit** menu, or initiated automatically upon completing the **Create Resource Hierarch**y 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 SQL resource is currently in service.
Tag to Extend	Select the SQL resource you wish to extend.
Target Server	Enter or select the server you are extending *to*.
Switchback Type	This dictates how the SQL 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. **Note:** Remember that the switchback strategy must match that of the dependent resources to be used by the SQL 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 SQL 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 an SQL 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 SQL resource. It cannot be the server where the SQL 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 SQL 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 SQL resource hierarchy you have chosen to unextend. Click **Unextend**.
5. Another information box appears confirming that the SQL resource was unextended successfully. Click **Done** to exit the Unextend Resource Hierarchy menu selection.

Deleting a SQL Hierarchy

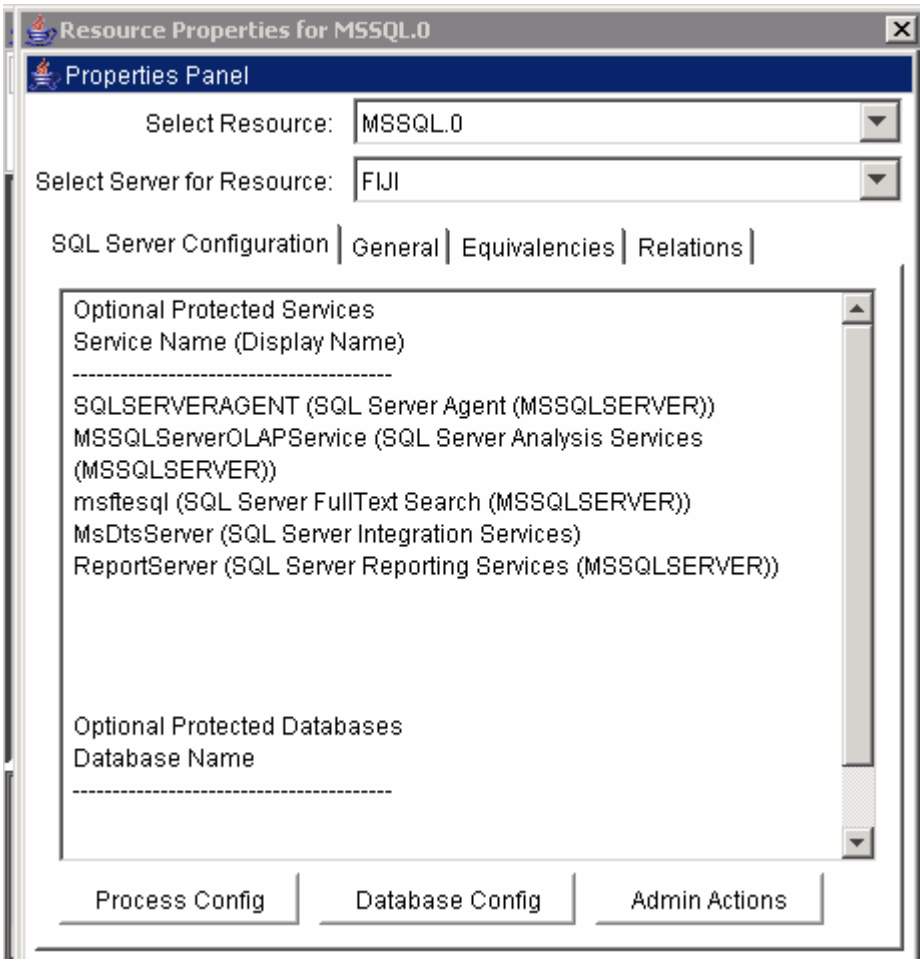
Before deleting a SQL hierarchy or instance, make sure that the hierarchy is active (green) on its primary server. You may also wish to remove the dependencies before deleting the hierarchy; otherwise, the dependencies will be deleted also.

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 SQL 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 SQL resource was deleted successfully.
6. Click **Done** to exit.

Manage SQL Server Configuration

To administer a protected SQL Server resource from the LifeKeeper GUI, right-click on the SQL Server resource (on the right hand side of the LifeKeeper GUI) and select **properties**, then select the **SQL Server Configuration** tab. Use the **SQL Server Configuration** page to view or change information about your SQL resource.



Process Config

This menu allows users to modify the list of optional SQL Processes that are protected under the resource hierarchy. LifeKeeper will monitor all protected optional services. See Monitoring Your SQL Hierarchy

Select Action:

- *Add Process* - Add an additional process to the protected configuration. LifeKeeper will start monitoring new SQL service
- *Delete Process* - Remove a process from the protected configuration. The remove

Field	Tips
Service Name	Enter the service name for the process to *Add* or *Delete* from the protected configuration.
Update All Systems	Select *Yes* to update all systems in this cluster. Otherwise, select *No* to only update the current system. If you choose *No*, you must manually add the process to the backup servers.

Database Config

This menu allows users to modify the list of optional SQL Databases that are protected under the resource hierarchy. LifeKeeper will monitor all protected optional SQL Databases by performing a SQL query to test the connection to the database. See Monitoring Your SQL Hierarchy.

Select Action:

- *Add Database* - Add an additional database to the protected configuration. **Note:** The option is available only on the server where the SQL resource is active (In Service).
- *Delete Database* - Remove a database from the protected configuration.

Field	Tips
Enter Database Name	Enter the database name for the process to *Add* or *Delete* from the protected configuration.
Update All Systems	Select *Yes* to update all systems in this cluster. Otherwise, select *No* to only update the current system. If you choose *No*, you must manually add the process to the backup servers.

Admin Actions

This menu allows users to manage the SQL administrator user used during LifeKeeper operations or resolve ID conflicts between the primary and backup servers encountered during the *extend* operation.

Select Administrative Action:

- *Manage User* - Display or update the current user name used by the protected resource hierarchy.
- *ID Conflict Resolution (SQL 2005 only)* - Resolves Microsoft SQL ID mismatches encountered during *extend* of a SQL resource hierarchy. **Note:** This action will make registry modifications to your SQL configuration on the backup server to match the primary server. This will allow the *extend* operation of the SQL resource to the backup server.

Manage User

Select Management Action:

- *Show Current User* - Display the current user name used by the protected resource hierarchy.
- *Change Password* - Update the user password for the current user associated with the protected resource hierarchy.
- *Change User and Password* - Update both the user and password to be used during LifeKeeper operations to administer and monitor the SQL instance. The user must have sqladmin privileges for all databases under protection.

Note: The SQL instance must be running to change the user and/or password.

Field	Tips
Enter User Name	Enter the administrative user name. This user account must include SA permissions to all databases under LifeKeeper protection.
Enter Password	Enter the administrative password for the user account being updated.

ID Conflict Resolution (SQL 2005 only)

Field	Tips
Select Service Type	Choose the service to repair the registry to allow LifeKeeper protection. Choose *Sql* if only the IDs for the SQL Server service differ on the primary and backup servers. Choose *Olap* if only the IDs for the SQL OLAP Service differ on the primary and backup servers. Choose *Rs* if only the IDs for the SQL Reporting Service differ on the primary and backup servers. Choose *All* to update the *Sql* , *Rs*, and *Olap* services simultaneously.
Select Template Server	Choose the template (primary) server for the resource that needs to be repaired. The template server must have the resource in the in-service protected (ISP) state.
Select Target Server	Choose the target (backup) server for the resource to be repaired. The target server must not have the resource in the in-service protected (ISP) state.
Confirmation	Verify information is correct entered from above. Select **Continue** to perform the action, **Back** to change information, or **Cancel** to cancel the action.

Testing Your Resource Hierarchy

You can test your SQL 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.

Hierarchy Administration

Follow these guidelines when administering your SQL Server:

Access via protected communication paths.

All remote access of the service should be done through the hierarchy's protected IP addresses. This will ensure that users can access the SQL service regardless of which server it is currently running on.

Use resource name for remote access.

Unless the application is cluster-aware, when using Microsoft SQL Enterprise Manager to administer the service, you should register it by the switchable resource name (the name by which users access the server using TCP/IP address). This gives you a continuous monitor of the viability of this path.

If you register the SQL Server by the system name, you can also monitor the system.

Reserve volumes for exclusive SQL use.

The volumes containing the protected SQL files should be reserved for use by SQL exclusively.

A LifeKeeper protected volume may fail to switchover if it is accessed by an application, process, or remote user.

Start and stop SQL Server only through LifeKeeper.

Although much of your administration of the Microsoft SQL Server is done through the Microsoft SQL Enterprise Manager, you derive two distinct benefits from bringing the Microsoft SQL Server in service and out of service using the LifeKeeper administration options:

- **Consistent view**. When LifeKeeper stops and starts Microsoft SQL Server, it maintains a consistent view of the server on all nodes in the configuration.
- **Configuration details saved.** If you change your Microsoft SQL Server configuration, you can stop and start the server through LifeKeeper or perform a manual switchover and LifeKeeper automatically replicates the configuration changes on the paired node.
  Note: If you do not use these options to replicate new configuration information on the paired server, the backup server will use old configuration information in a failover situation.
- **Protected** Microsoft SQL services should be set to **Manual** startup mode through the Control Panel "Services" tool.

Understand manual switchover limitations.

Any manual action requires that all users be logged off of the SQL Server resources.

Local processes that have read-only access to volumes do not prevent removal of a resource from service but may cause a restore to fail when you try to switch back. Examples might be the Performance Monitor, which periodically polls each volume, or any running process which is installed on the shared or replicated volume. You can minimize your potential for this type of restore failure by installing the Microsoft SQL Server on local drives and putting only the database on shared or replicated volumes.

Running Microsoft SQL Management Tools

Open the Microsoft SQL Enterprise Manager (SQL 2000) or Microsoft SQL Server Configuration Manager (SQL 2005) only when needed, and do not run it constantly.

If the Microsoft SQL Enterprise Manager (SQL 2000) or Microsoft SQL Server Configuration Manager (SQL 2005) is open and active at the database level, it may prevent the SQL hierarchy from coming into service properly and the failover will not complete successfully. If this occurs, close the Microsoft SQL Enterprise Manager (SQL 2000) or Microsoft SQL Server Configuration Manager (SQL 2005) and manually bring the SQL resource into service.

Monitoring Your SQL Hierarchy

For every SQL resource, LifeKeeper monitors the Microsoft SQL Server service and any optional services selected during the creation of the SQL hierarchy or added at a later time. Should any of these services stop, the monitoring process associated with the SQL resource will detect this and attempt to restart the service on the local server, if Local Recovery is enabled. If Local Recovery is disabled, the resource will fail over to the backup server.

LifeKeeper will also perform a SQL query to test the connection to all protected SQL databases. If the SQL query fails to the master database, the monitoring process associated with the SQL resource will detect this and attempt to restart the services, if Local Recovery is enabled. If Local Recovery is disabled, the resource will fail over to the backup server. For other protected databases added after creation of the SQL hierarchy, an error will be logged to the Application Event log.

Adding Microsoft SQL Server Volumes

As your environment grows, you may need to add new Microsoft SQL Server databases on new shared or replicated volumes. You should perform the following tasks to add the new volumes to the LifeKeeper hierarchy *before* administering the new databases within Microsoft SQL Server:

To add a new volume resource to an existing SQL Server hierarchy:

1. **Create the resource.** On the server where the SQL Server hierarchy is in service, create and extend the volume resource with the same priority order as that of the SQL hierarchy.
2. **Create dependency.** Right click on the SQL Server resource, and then select **Create Dependency** from the pop-up menu. For **Child Resource Tag**, select the new Volume resource.

When you have completed these LifeKeeper tasks, you can perform the administration tasks to add the SQL Server database. Adding new databases to volumes that are already part of the resource hierarchy requires no LifeKeeper specific administration.

Recovering from Databases in *"Suspect"* State after a Switchover

A database which gets marked as *suspect* may be caused by starting Microsoft SQL Server when the volume(s) on which it resides is unavailable to this system. When LifeKeeper is used to

protect SQL databases, the starting and stopping of SQL should be performed only as a function of bringing hierarchies in or out of service. In those situations where a database has been marked *suspect* and it is known that the database is fine, perform the following steps to correct the problem.

For those databases which are *suspect* on a primary/secondary server:

1. Make sure that the volume(s) where the database resides is actively (green) being protected by this server.
2. Use **sp_resetstatus** to change the state of the database. Execute the following commands from a query window to reset the status of the suspect database:
   - While in master database, execute **sp_configure 'allow updates', 1**
   - Reconfigure with override
   - **Sp_resetstatus 'dbname'**
   - **Sp_configure 'allow updates', 0**
   - Reconfigure with override
3. Stop Microsoft SQL Server.
4. Start Microsoft SQL Server.

Pausing Microsoft SQL Server (MSSQLServer)

It is possible for the SQL Administrator to manually put Microsoft SQL Server into a PAUSED state whereby existing connections to the Microsoft SQL Server can continue processing, but no new connections are allowed. In this case, LifeKeeper detects that the MSSQLServer service is not RUNNING, but will NOT attempt to restart the service locally or fail the SQL hierarchy to the backup server. Neither option is the appropriate action, so monitoring of the SQL resource is essentially forfeited when Microsoft SQL Server is in the PAUSED state.

Because manual intervention was required to put Microsoft SQL Server into this state, the SQL administrator must manually move SQL Server out of this state. Once out of the PAUSED state, LifeKeeper can resume monitoring the SQL resource as outlined above.

Configuring SQL Server to Connect Using the Switchable IP Address

To connect to Microsoft SQL Server via an IP address, such as the LifeKeeper switchable IP address, you must make the following changes in SQL and in the client configuration:

1. Configure Microsoft SQL Server to use TCP/IP sockets network protocol in addition to named pipes (which is the default).
   a. Make this change in SQL Setup under Change Network Support.
   b. After selecting TCP/IP sockets, stop and restart the SQL Server service.
2. In the client configuration utility for SQL, do one of the following:
   a. Make TCP/IP sockets the default network protocol (recommended), OR
   b. Add a server in the Advanced window which specifies the IP address for the server name and uses TCP/IP sockets for the network library.

Notes:

- Without these changes, the user receives an error indicating Microsoft SQL Server is not available or does not exist when trying to connect using the switchable IP address.
- Switchable IP addresses should be created prior to the SQL hierarchy creation. This is because SQL binds to known IP addresses when the SQL Server service starts. SQL is unable to make a client connection to an IP address that is defined after SQL Server service has started.

Maintaining SQL Server Login/Passwords

During the creation of a LifeKeeper SQL resource, the user must enter a SQL administrative username and password for that instance of Microsoft SQL Server. Should the password of this username change at some point in the future, the SQL resource must be updated on all systems in the cluster with this new password. Failure to do so will leave the SQL resource and the information in the SQL security database out of sync and will prevent the SQL resource from coming in and out of service properly.

The SQL administrative username and password associated with the LifeKeeper SQL resource can be changed using the **SQL Server Configuration** tab in the LifeKeeper GUI. To administer a protected SQL Server resource from the LifeKeeper GUI, right-click on the SQL Server resource (on the right hand side of the LifeKeeper GUI) and select **properties**, then select the **SQL Server Configuration** tab. Click the **Admin Actions** button and select *Manage User* on the **SQL Server Configuration** page to view or change information about your SQL resource.

See the section **Manage SQL Server Configuration** for more details on the **SQL Server Configuration** page.

Troubleshooting

Extend of a SQL resource fails (SQL 2005 only)

Symptom:

The Extend of a Microsoft SQL resource will fail if the primary and backup configurations are different (i.e. Microsoft SQL ID mismatch). Below is an example of the error message displayed in the LifeKeeper GUI during the canextend operation:

```
Process: canextend.ksh(1292)
*ERROR* (No. 14003) The target value for Database file location does not
match the template value (target=-
DQ:\SQLDEFAULT\MSSQL.1\MSSQL\DATA\MASTER.MDF,template=DQ:\SQLDEFAULT\MSSQL.4
\MSSQL\DATA\MASTER.MDF)
Process: canextend.ksh(1572)
*ERROR* (No. 14003) The target value for Temp DB location does not match the
template value (target=-EQ:\SQLDEFAULT\MSSQL.1\MSSQL\LOG\ERRORLOG,template=-
EQ:\SQLDEFAULT\MSSQL.4\MSSQL\LOG\ERRORLOG)
Process: canextend.ksh(1156)
*ERROR* (No. 14003) The target value for Log file location does not match
the template value (target=-
LQ:\SQLDEFAULT\MSSQL.1\MSSQL\DATA\MASTLOG.LDF,template=-
LQ:\SQLDEFAULT\MSSQL.4\MSSQL\DATA\MASTLOG.LDF)
Error - extmgr (HAWK, MSSQL.0, MSSQL.0, OSPREY) - canextend failed
```

Suggested Actions:

Use the *ID Conflict Resolution* option to resolve Microsoft SQL ID mismatches between the primary and backup servers. In the LifeKeeper GUI, right-click on the SQL Server resource (on the right hand side of the LifeKeeper GUI) and select **properties**, then select the **SQL Server Configuration** tab. Click the **Admin Actions** button and select *ID Conflict Resolution* on the **SQL Server Configuration** page.

See the section **Manage SQL Server Configuration** for more details on the SQL Server Configuration page.

SQLAgent service fails to start sometimes for named instances.

Symptom:

On named instances of Microsoft SQL Server where LifeKeeper is protecting the SQLAgent service, when the resource is originally brought in service, a SQL problem prevents this service from starting and forces a MAXWAIT situation (300 second delay) before the SQL gives up trying to start the SQLAgent service.

This message indicates that the INFO field of the SQL resource has become corrupted. You must delete and re-create the SQL resource. Note that you should remove any IP and volume dependencies prior to deleting the resource. Upon creating the new SQL resource, LifeKeeper will re-create the dependencies.

If the Microsoft SQL Server service is already started on the system where the SQLAgent service is trying to start, you'll likely see this scenario.

If the SQLAgent service and the Microsoft SQL Server service are both started when the SQL hierarchy creation occurs, you will not see this issue.

Suggested Actions:

Stopping and starting the Microsoft SQL Server service usually clears up the problem and the SQL Agent service then starts. However, stopping the SQL Server service is not a good option.

Both the MSSQLServer and the SQLServerAgent service should start up properly using the Local System Account on the default instance or a named instance. They will both start up using a Domain Administrator account, provided you have added that Domain Admin account to the Local Administrator Group on each system.

Connecting ODBC clients to Named Instances of SQL Server

Symptom:

After creating an ODBC connection to your LifeKeeper cluster via the protected IP address, the connection fails after switching the SQL resource to the backup server.

Suggested Action:

1. Take each instance out of service and bring it back into service on the PRIMARY. Examine the application event log to determine which IP:PORT that particular SQL Server instance is listening on.

2. Bring each hierarchy In Service on the SECONDARY server and note the IP:PORT each SQL instance is listening on.

3. To insure your clients can connect via ODBC to either server, make sure the PORT each instance is listening on is the same on both the PRIMARY and SECONDARY servers.

4. To do this, use the Microsoft SQL Server Network Utility. Select the SQL instance (it must be running on that machine), highlight the TCPIP protocol and look at the properties to determine the current default port it is listening on.

5. Change this value so the default PORT is the same on both systems for this instance.

6. Create your ODBC connections for each instance using the protected IPs:PORTs you just set up in step 5.

Appendix: Installing Software Updates in a LifeKeeper Environment

SQL Server Software Update Procedure

Microsoft SQL Server software updates should be applied where the Microsoft SQL Server resource is active. Use the following procedure to install Microsoft SQL Server software updates:

On the Primary:

1. Change directory to the $LKROOT\bin directory on the primary server and, from a command prompt, run the command **lkstop.exe –f**. This will stop the LifeKeeper service on the primary server, but leave LifeKeeper protected resources active on the primary server.
2. If using replicated volume(s), **pause** the mirror(s) using the LifeKeeper GUI or the SteelEye Data Replication GUI.
3. Install Microsoft SQL Server software updates on the **primary** server where Microsoft SQL Server is active. **Note**: Microsoft SQL services may be stopped during the installation of some Microsoft SQL software updates.
4. Verify that the **primary** server switchback type is "Do Not Switchover Resources". Reboot the primary server, if required. If reboot is not required, manually restart the LifeKeeper services on the **primary** server using the Services MMC snap in.
5. Once the Microsoft SQL Server resource is active on the **primary** server, verify SQL is working correctly before applying the updates to the backup server.
6. If using replicated volume(s), **continue** the mirror(s) using the LifeKeeper GUI or the SteelEye Data Replication GUI. A partial resync will occur to the backup server. Wait until the replicated volume(s) is in the “Mirroring” state before applying the updates to the backup server.

   Note: It is recommended that you perform a backup of your SQL data before upgrading the backup server.
7. Shutdown the **primary** server.

On the Backup:

8. Perform a manual in-service of the SQL resource on the **backup** server. **Note:** If using LifeKeeper with SteelEye Data Replication (SDR), mirror(s) must be in the “Mirroring” state prior to performing the manual in-service.
9. Once Microsoft SQL resource is active on the **backup** server, change directory to the $LKROOT\bin directory on the **backup** server and, from a command prompt, run the command **lkstop.exe –f**. This will stop the LifeKeeper service on the **backup** server, but leave LifeKeeper protected resources active on the **backup** server.
10. If using replicated volume(s), **pause** the mirror(s) using the LifeKeeper GUI or the SteelEye Data Replication GUI.
11. Install Microsoft SQL software updates on the **backup** server where Microsoft SQL Server is active. **Note**: Microsoft SQL services may be stopped during the installation of some Microsoft SQL software updates.

12. Verify that the **backup** server switchback type is "Do Not Switchover Resources". Reboot the backup server, if required. If reboot is not required, manually restart the LifeKeeper services on the **backup** server using the Services MMC snap in.
13. Once the Microsoft SQL Server resource is active on the **backup** server, verify SQL is working correctly before restarting the primary server.
14. Restart the **primary** server.
15. If using replicated volume(s), **continue** the mirror(s) using the LifeKeeper GUI or the SteelEye Data Replication GUI. A partial resync will occur to the primary server. Wait until the replicated volume(s) is in the “Mirroring” state before bringing the SQL resource in-service on the primary server.
16. The Microsoft SQL resource can be brought back in-service on the original **primary** at some scheduled time by performing a manual in-service. **Note:** If using LifeKeeper with SteelEye Data Replication (SDR), the mirror(s) must be in the “Mirroring” state prior to performing a manual in-service.