



LifeKeeper for Windows

LifeKeeper DB2 Recovery Kit Administration Guide

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LifeKeeper DB2 Recovery Kit Administration Guide

The LifeKeeper DB2 Recovery Kit provides fault resilient protection for DB2 version 9 Workgroup Server Edition and Enterprise Server Edition (single partition) database instances.

Document Contents

This guide explains the following topics:

- [DB2 Recovery Kit Overview](#). Describes the services protected by the recovery kit, along with a brief example and feature list.
- [DB2 Recovery Kit Requirements](#). Before you can install and set up the recovery software, your server must meet these hardware and software requirements.
- [Configuration Considerations](#). To ensure that your LifeKeeper configuration provides the protection and flexibility you require, you need to be aware of the configuration rules. You must understand your network configuration, interface selection, and the DB2 configuration tasks. This section also includes configuration examples.
- [Sample Configurations](#). This section provides diagrams and descriptions of two different configurations using both Workgroup Server Edition and Enterprise Server Edition (single partition).
- [Installing and Configuring DB2 with LifeKeeper](#). Follow the pre-installation checklist and the special procedures to set up your servers for LifeKeeper DB2 protection.
- [DB2 Resource Configuration Tasks](#). This section describes how to create, extend, unextend and delete your DB2 resource hierarchies. Tasks that are essentially the same across all recovery kits are described in the *Online Product Manual*.
- [DB2 Hierarchy Administration](#). This section provides recommendations for ongoing management of your DB2 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 for Windows, is available online at:

www.steeleye.com/support/documentation

Recovery Kit Requirements

Before installing and configuring the LifeKeeper DB2 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 DB2 with replicated volumes rather than shared storage, you should install the SteelEye Data Replication software on each server.
- **IBM Software** - IBM DB2 Workgroup Server Edition or IBM DB2 Enterprise Server Edition (single partition) version 9 or later.
- **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 virtual 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 DB2 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 DB2 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 DB2 Recovery Kit license key must be installed in order to protect a DB2 resource using LifeKeeper.

Kit Removal

To remove the LifeKeeper DB2 Recovery Kit software, choose the **LifeKeeper DB2 Recovery Kit v6** in the Add/Remove programs applet in the control panel.

CAUTION: Be sure there are no DB2 instances or resources in service when the kit is removed. Once the kit is removed these resources will be unusable. All DB2 hierarchies should be deleted before the kit is removed.

DB2 Recovery Kit Overview

The DB2 product family includes several editions of the relational database management system. The LifeKeeper DB2 Recovery Kit provides protection for both DB2 Workgroup Server Edition and DB2 Enterprise Server Edition (single partition) instances. Both are standard relational database management systems.

The LifeKeeper GUI allows you to easily create a DB2 resource hierarchy. LifeKeeper can then protect all of the disk resources used by the DB2 Server instance, as well as the virtual IP address resources used to access the database. The LifeKeeper DB2 Recovery Kit will monitor and protect the following services:

DB2 Workgroup Server Edition:

DB2 Service(Required)

DB2 Instance Service

(i.e. <DB2 Instance Name>)

Optional Services

DB2 Governor

DB2 License Server

DB2 Management Service

DB2 Remote Command Server

DB2 Security Server

DB2 Database Administrator Service

DB2 Enterprise Server Edition:

DB2 Service(Required)

DB2 Instance Service

(i.e. <DB2 Instance Name>-<Node Number>)

Optional Services

DB2 Governor

DB2 License Server

DB2 Management Service

DB2 Remote Command Server

DB2 Security Server

DB2 Database Administrator Service

The DB2 Copy must be located on the local system drive. 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 virtual IP address resources to a backup server. Once LifeKeeper switches all dependent resources to the backup server, it starts DB2 and any protected optional services.

Configuration Considerations

DB2 Workgroup Server Edition and DB2 Enterprise Server Edition (single partition)

The following should be considered before operating the LifeKeeper DB2 Recovery Kit in the DB2 Workgroup Server Edition or DB2 Enterprise Edition (single partition) environments.

Follow these recommendations for all DB2 configurations:

- DB2 instance names should contain alphanumeric characters only.
- DB2 clients should be configured to connect to the database via a virtual IP address that is protected by LifeKeeper.
- The `%windir%\system32\drivers\etc\services` file for each server in your configuration protecting a DB2 resource hierarchy must have identical service entries for the protected instance.

File Locations

LifeKeeper requires the location of the DB2 Copy to be on the local system drive. The associated databases, tablespaces, and resources are stored on shared or replicated volumes. During creation of the DB2 resource hierarchy, the DB2 instance is created as the parent resource while the volumes containing the actual databases, and database logs are configured as dependent resources. Consequently, if **after** the creation of your DB2 hierarchy you decide to create a database on a volume that is not protected by LifeKeeper, you will need to create a resource hierarchy for that volume and make it a dependency of your DB2 instance resource hierarchy.

Additional Considerations for DB2 Enterprise Server Edition (single partition)

The node (partition) to protect is determined by examining the following file:

```
<db2copy dir>\<instance dir>\db2nodes.cfg
```

To ensure proper operation of the LifeKeeper DB2 Recovery Kit in the Enterprise Server Edition Environment, LifeKeeper requires the following:

- Ensure that the hostname value in your `db2nodes.cfg` file is the same as the value returned from issuing the **hostname** command. For example, the `db2nodes.cfg` file contains:


```
0 SERVER1 SERVER1 0
```
- Your `%windir%\system32\drivers\etc\hosts` file should meet the following requirements:
 - the hostname value must be the same as the hostname value in your `db2nodes.cfg` file.
 - it should contain both the local hostname and the fully qualified hostname for each server entry included in the file, for example:


```
127.0.0.1 localhost
9.21.55.53 server1.sc.steeleye.com SERVER1
```

Client Access to DB2 Database

Since LifeKeeper supports TCP/IP and NetBIOS protocols, at least one of these protocols must be installed and configured on the client systems.

Usage of Protected IP Address in DB2 Hierarchy

A LifeKeeper protected IP address (switchable IP address) provides transparent connectivity to clients of the protected DB2 resource after failover occurs. However, in a WAN environment, depending upon subnet configuration, it may not be possible to protect an IP address. Use the following guidelines to help you determine whether to use a switchable IP address in the DB2 hierarchy.

All LifeKeeper servers in one IP subnet:

When LifeKeeper servers are running in the same IP subnet, a switchable IP address provides for client connectivity after the failover. This means that the client application/system does not have to be reconfigured to access the DB2 database. For this environment, it is best to use the switchable IP address through a static entry in DNS.

LifeKeeper servers in different IP subnets:

LifeKeeper cannot protect an IP address for the DB2 resource if the LifeKeeper servers are in different IP subnets. However, transparent client connectivity can be achieved through necessary updates in DNS entries for the servers, which can be accomplished using a LifeKeeper DNS resource. The DNS Recovery Kit, included with the LifeKeeper for Windows core product, allows you to create a DNS resource protecting a *record* and *PTR record* (if exists) of the primary server or an alias name. For further information on LifeKeeper DNS Recovery Kit, refer to the LifeKeeper *Planning and Installation Guide* and the LifeKeeper *Online Help* included with the LifeKeeper core product.

DB2 Exclusive Use of Volumes

LifeKeeper operations such as failover, which remove a volume resource from service, can fail if a remote user is accessing one of the volumes over the network or if a local process has done an open for write access on the volume. To avoid these potential causes for failures, it is recommended that you unshare DB2 volumes when you create them and that you reserve those volumes for exclusive use by DB2.

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 or replicated volume.

You can minimize the potential for restore failures by installing the DB2 software on local drives. You must, however, put the DB2 database (including all DB2 data, log, and trace files) on shared or replicated volumes for LifeKeeper protection.

Reducing Failover Time

A recovery is what takes place after DB2 is terminated abruptly, as with a system crash. Following are tips that will significantly reduce the amount of time it takes for DB2 to recover from a failure:

- Limit the log records that DB2 will process. You can accomplish this by properly configuring the **SOFTMAX** and **LOGFILSZ** configuration parameters. You should use log files with a size of 4MB (1000 4KB pages) and keep the amount of active log space at 25% of the size of one log file (1MB):

```
db2 UPDATE DB CFG FOR <dbname> USING SOFTMAX nn
db2 UPDATE DB CFG FOR <dbname> USING LOGFILSZ nn
```

- Ensure that there is a sufficient number of page cleaners to accommodate your work load:

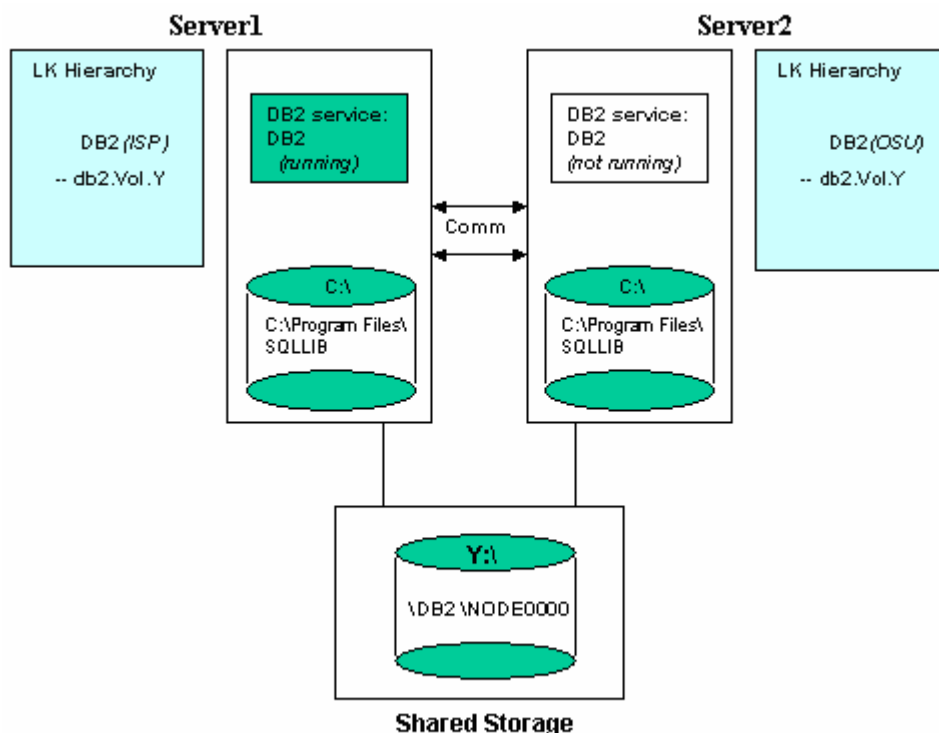
```
db2 UPDATE DB CFG FOR <dbname> USING NUM_IOCLEANERS nn
```

Sample Configurations

A few examples of LifeKeeper clusters with DB2 resources are provided below. These illustrate the locations of files and services, in addition to showing the associated LifeKeeper hierarchies in the blue boxes.

Configuration 1: DB2 WSE or EE (single partition) with One Instance

Configuration 1 shows a DB2 instance, DB2, protected on Server1 (the DB2 resource hierarchy is in service (ISP)). This resource is out of service (OSU) on Server2. Server2 will assume the DB2 resources when a failure occurs.

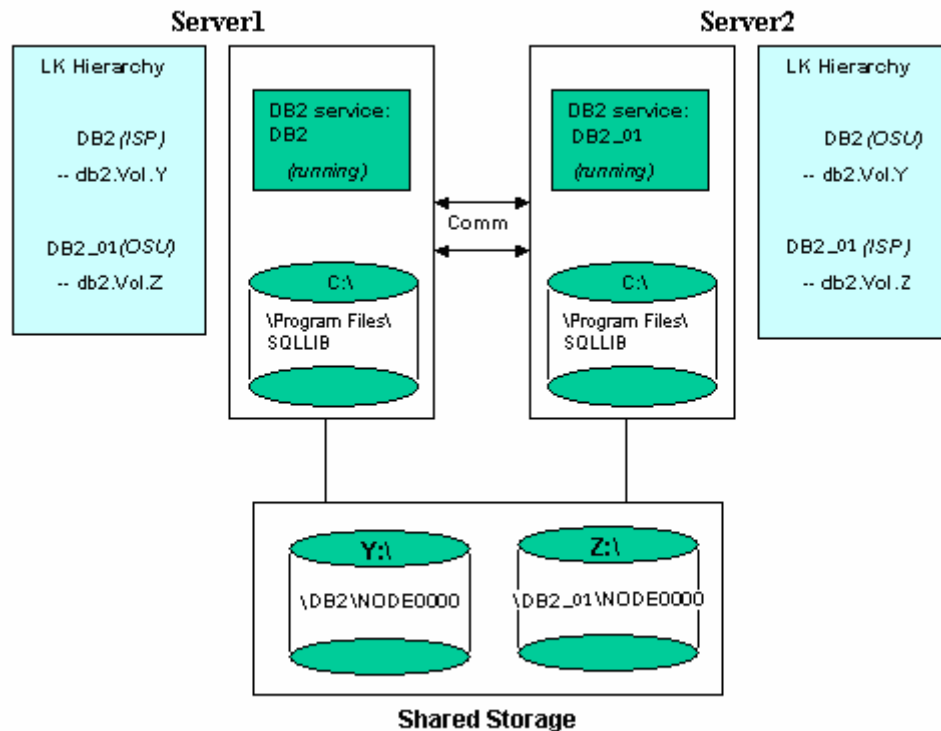


Configuration Notes:

- Server1 is running the service DB2 for the DB2 instance. The service exists on Server2, but is not running since the resource is not in service there.
- Shared or Replicated volume Y houses the database (DB2\NODE0000)
- Upon failover of DB2, the DB2 service will be started on Server2.

Configuration 2: DB2 ESE with Two Instances

Configuration 2 shows the DB2 instance, DB2, protected on Server1 and another DB2 instance, DB2_01, protected on Server2. DB2 is in service (ISP) on Server1 and out of service (OSU) on Server2. The opposite is true for DB2_01. Each server will assume the other's resources when a failure occurs.



Configuration Notes:

- Server 1 is running the service DB2; Server 2 is running the service DB2_01.
- Shared or Replicated volume Y houses the database for DB2 (DB2\NODE0000)
- Shared or Replicated volume Z houses the database for DB2_01 (DB2_01\NODE0000)
- Note that upon failure of DB2, the DB2 instance will be started on Server 2 during failover.

Installing and Configuring DB2 with LifeKeeper

Proper operation of the LifeKeeper DB2 Recovery Kit depends upon the 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 DB2 in a LifeKeeper environment.

Setup Checklist

The installation and setup sequence should be performed in the following order. 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 DB2 use.
2. Set up and test your network.
3. Install and configure the LifeKeeper Core, IP Recovery Kit, and DB2 Recovery Kit on each server.
4. Install SteelEye Data Replication if using replication to replicate DB2 data and executables between the local volumes on the servers within the cluster.
5. Create volume and IP resource hierarchies.
6. Install IBM DB2 software on each server.
7. Create the DB2 Database 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 DB2 Database**. 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 DB2 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 DB2 instance 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 DB2 hierarchy.

Note: If you create the IP resource *after* creating the DB2 hierarchy, then you must stop and re-start the DB2 instance in order for DB2 to recognize the IP resource.

Install the IBM DB2 software

1. In LifeKeeper, bring the *shared/replicated* volume resource hierarchy in service on the **backup** server.
2. **On the backup server**, install the IBM DB2 software using the following guidelines:
 - Choose to install to the local system volume and place the data files on the *shared/replicated* volume.
3. When installation is complete, check the Control Panel->Service to ensure that the instance started properly on the **backup** server. Stop all DB2 Services for the DB2 Copy on the **backup** server.
4. In LifeKeeper, bring the *shared/replicated* volume resource hierarchy in service on the **primary** server.
5. Install the IBM DB2 software on the **primary** server EXACTLY as you did on the **backup** server (DB2 Copy local and data files on the *shared/replicated* volume).
6. When installation is complete, use check the Control Panel->Service to ensure that the instance started properly on the **primary** server.

Post-Installation Configuration

For all configurations, check the registry values for the DB2 Copy and instance and ensure that all path entries correctly point to the shared volume that the DB2 Copy was installed to.

Active/Active Configurations

When running more than one DB2 instance on a cluster server, once the installation is complete on both nodes you can complete the following DB2 configuration tasks.

1. On both servers verify the DB2 Administrative Service is created and installed on a local volume. If not, then on both servers drop and then re-create it on a local volume.
2. If you choose, create the Tools Database on a local volume on both servers.

Catalog Database on the Secondary Server(s)

When the database is created on the primary server, it must be properly cataloged on all secondary server(s) before proper fail over can occur. To catalog the database, bring the DB2 resource hierarchy in-service on the secondary server. Using the db2 command line interface, enter the following catalog command:

```
db2 catalog database <database> as <database alias> on <database drive>
```

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 DB2 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 DB2 Hierarchy

After you complete the setup and installation tasks, you are ready to use LifeKeeper to **create** and **extend** a DB2 hierarchy. See the next section for details on configuring DB2 resource hierarchies.

Resource Configuration Tasks

The following four tasks are described in this guide as they are unique to a DB2 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 IBM DB2 Resource Configuration](#). Allows users to modify the list of optional IBM DB2 Services that are protected under the DB2 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 a DB2 Hierarchy

After you have completed the necessary setup tasks, use the following steps to define the DB2 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 *IBM DB2 Database* 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	<p>Choose either intelligent or automatic. This dictates how the DB2 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.</p> <p>Note: The switchback strategy must match that of the dependencies (IP and volume resource to be used by the DB2 resource) or else the create will fail.</p>
Server	Select the server on which you want to create the hierarchy.

DB2 Copy	Select a DB2 Copy Name for the installation that the instance for LifeKeeper protection is associated with.
DB2 Instance	Select a DB2 instance for LifeKeeper protection. LifeKeeper will use the instance name for the tag name of the DB2 resource by default. Note: LifeKeeper will read the database manager for this instance and create the associated volume resource.
DB2 Node	Select the Node Number for the DB2 instance partition. Note: This screen only appears for DB2 Enterprise Server Edition instances.
DB2 Optional Services	Select “none” or a list of DB2 optional services to be protected.
IP Address	Select an IP address to protect with this instance. Choose “None” if you are not using an IP address.
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 in the range 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 in the range 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 DB2 resource means that if the DB2 services for this instance stop running, LifeKeeper will attempt to restart them on this system prior to failover to the backup system.

- After you click **Create**, the *Create Resource Wizard* will create your DB2 resource. LifeKeeper will validate the data entered. If LifeKeeper detects a problem, an error message will appear in the information box.
- Another information box will appear indicating that you have successfully created a DB2 resource hierarchy, and you must Extend that hierarchy to another server in your cluster in order to achieve failover protection. Click **Next**.

- After you click **Continue**, LifeKeeper will launch the *Pre-Extend Wizard*. Refer to Step 2 under Extending a DB2 Resource Hierarchy (below) for details on how to extend your resource hierarchy to another server.

Extending a DB2 Hierarchy

Before extending a hierarchy that contains a DB2 resource, complete the following tasks on the system to which you are extending:

- Ensure that the DB2 software is installed on the local volume on the system to be extended (backup server).
- Ensure that there is an identically named DB2 instance on the backup server.

To Extend a DB2 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.

- 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**.
- 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 DB2 resource is currently in service.
Tag to Extend	Select the DB2 resource you wish to extend.
Target Server	Enter or select the server you are extending <i>to</i> .
Switchback Type	This dictates how the DB2 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 DB2 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 one or more information boxes showing the Resource Tags to be extended, which cannot be edited. Click **Extend**.
5. Select "Yes" to enable Local Recovery for the DB2 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 DB2 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 DB2 resource. It cannot be the server where the DB2 resource is currently in service. (This field 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 DB2 hierarchy to unextend and click **Next**. (This field 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 DB2 resource hierarchy you have chosen to unextend. Click **Unextend**.
5. Another information box appears confirming that the DB2 resource was unextended successfully. Click **Done** to exit the Unextend Resource Hierarchy menu selection.

Deleting a DB2 Hierarchy

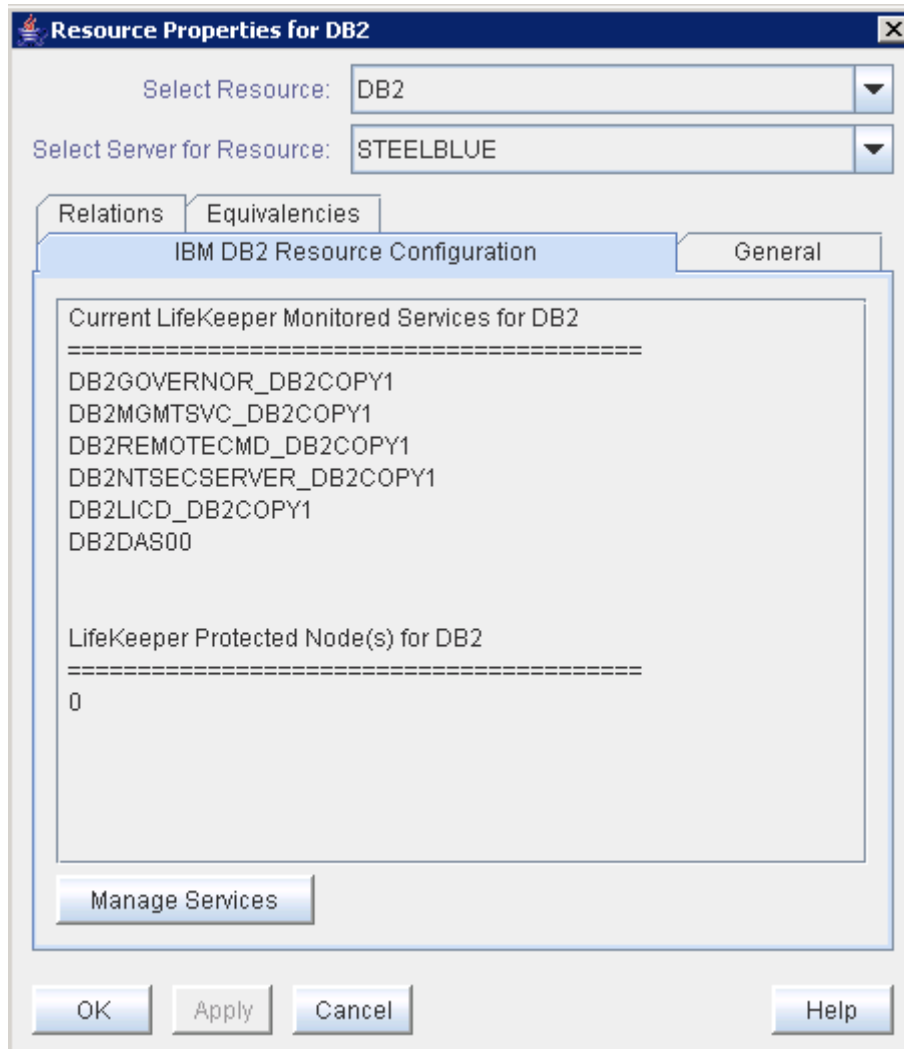
Before deleting a DB2 hierarchy or instance, make sure that the hierarchy is active (green) on its primary server. You may also wish to remove the dependencies before deleting the hierarchy; otherwise, the dependencies will be deleted also.

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 DB2 resource hierarchy and click **Next**. (This field 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 field 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 DB2 resource was deleted successfully.
6. Click **Done** to exit.

Manage IBM DB2 Resource Configuration

To administer a protected IBM DB2 resource from the LifeKeeper GUI, right-click on the IBM DB2 resource (on the right hand side of the LifeKeeper GUI) and select **properties**, then select the **IBM DB2 Resource Configuration** tab. Use the **IBM DB2 Resource Configuration** page to view or change information about your DB2 resource.



Manage Services

This menu allows users to modify the list of optional IBM DB2 Services that are protected under the resource hierarchy. LifeKeeper will monitor all protected optional services.

Select Action:

- *Add Service* - Add an additional IBM DB2 server to the protected configuration. LifeKeeper will start monitoring new IBM DB2 service
- *Delete Service* - Remove a service from the protected configuration.

Field	Tips
Service Name	Enter the service name for the IBM DB2 service to <i>Add</i> or <i>Delete</i> from the protected configuration.
Update Cluster?	Select <i>Yes</i> to update all systems in this cluster. Otherwise, select <i>No</i> to only update the current system. If you choose <i>No</i> , you must manually add the IBM DB2 service to the backup servers.

LifeKeeper Protected Node(s) for DB2 displays the list of protected nodes for DB2 instance partitions. This only applies to DB2 Enterprise Server Edition instances.

Testing Your Resource Hierarchy

You can test your DB2 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.

After the switchover, test the database by making a client connection to the backup server and verifying that the data is accessible on 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.

DB2 Hierarchy Administration

Follow these guidelines for administering your DB2 hierarchy:

Access via protected communications paths.

To ensure that users can access the DB2, regardless of the physical system on which it is running, all remote access of the database should be done through the protected Named Pipe or IP addresses, which are part of the DB2 hierarchy. LifeKeeper automatically makes protected communication paths available on the backup server in case of a switchover.

Reserve volumes for exclusive DB2 use.

Reserve volumes containing the DB2 database files for use exclusively by DB2. They should not be shared for users to access via LAN Manager and should not be accessed by any other local applications.

Start and Stop DB2 Through LifeKeeper.

Although much of your administration of DB2 databases is done through the DB2 tools, use the LifeKeeper Out of Service function to stop DB2 and use the In Service function to start DB2. When LifeKeeper stops and starts the DB2, it maintains a consistent view of the server on all nodes in the configuration.

Client Reconnect after Failover

When the database manager becomes inoperable on the primary system, the service fails over to a previously defined backup system. The database service on the backup system becomes available immediately after the dependent resources fail over and the database manager is brought into service. Previously connected DB2 clients are disconnected and must reconnect to the functioning server. Any uncommitted DB2 statements are rolled back and should be re-entered.

Adding DB2 Volumes

As your environment grows, you may need to add new DB2 volumes. You should perform the following tasks to add new volumes to the LifeKeeper hierarchy before administering the DB2 database:

1. Use the Create Volume Resource function to create the volume resource.
2. Use LifeKeeper's In Service function to bring the new volume resource into service on the server where the DB2 hierarchy is in service.
3. Create a dependency between the DB2 resource and the new volume resource. (Right click on the DB2 resource instance and select **Create Dependency**.)

TroubleShooting

DB2 Databases not available after failover

After installing the IBM DB2 Software on the secondary server, any databases created on the primary must be cataloged on the secondary server. To catalog the database, bring the DB2 resource hierarchy in-service on the secondary server. Using the db2 command line interface, enter the following catalog command:

```
db2 catalog database <database> as <database alias> on  
<database drive>
```

Example: db2 catalog database sample as sample on J:

The catalog command can also be performed using the Graphical Interface for DB2 Control Center.

Appendix: Applying a DB2 Fixpack

Starting with the DB2 hierarchy in-service (ISP) on the primary server:

1. Take the DB2 resource out-of-service , leaving the volume resource(s) ISP.
2. Apply the DB2 fixpack to the primary server.
3. Bring the DB2 hierarchy in-service on the secondary server.
4. Take the DB2 resource out-of-service, leaving the volume resource(s) ISP.
5. Apply the fixpack to the secondary server.
6. Reboot the primary server.
7. Bring the DB2 hierarchy in-service on the primary server.
8. Reboot the secondary server.