



**SIOS Protection Suite for Linux
Network Attached Storage Recovery Kit
v9.2.2**

March 2018

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Chapter 1: Introduction

NAS Recovery Kit Technical Documentation

The LifeKeeper for Linux Network Attached Storage Recovery Kit (hereafter referred to as the NAS Recovery Kit) provides fault resilience for Network File System (NFS) software in a LifeKeeper environment. The NAS Recovery Kit affords LifeKeeper users the opportunity to employ an exported NFS file system as the storage basis for LifeKeeper hierarchies.

Document Contents

This guide contains the following topics:

- [Documentation and References](#). Provides a list of LifeKeeper for Linux documentation and where to find them.
- [Requirements](#). A description of the hardware and software necessary to properly setup, install, and operate the NAS Recovery Kit. Refer to SIOS Protection Suite Installation Guide for specific instructions on how to install or remove LifeKeeper for Linux software. NAS Recovery Kit .
- [Overview](#). A description of the NAS Recovery Kit's features and functionality.
- [Configuring the LifeKeeper for Linux NAS Recovery Kit](#). A description of the procedures required to properly configure the NAS Recovery Kit.
- [LifeKeeper Configuration Tasks](#). A description of the tasks for creating and managing your NAS resource hierarchies using the LifeKeeper GUI.
- [Troubleshooting](#). A list of LifeKeeper for Linux error messages including a description for each.

Documentation and References

The following LifeKeeper product documentation is available from SIOS Technology Corp.:

- SPS for Linux Release Notes
- SPS for Linux Technical Documentation
- SIOS Protection Suite Installation Guide
- Optional Recovery Kit Documentation

This documentation, along with documentation associated with optional LifeKeeper Recovery Kits, is available on the SIOS Technology Corp. website at:

<http://docs.us.sios.com>

Chapter 2: Requirements

Your LifeKeeper configuration must meet the following requirements **prior** to the installation of the LifeKeeper for Linux NAS Recovery Kit. Please see SIOS Protection Suite Installation Guide for specific instructions regarding the configuration of your LifeKeeper hardware and software.

Hardware Requirements

- **Servers**-LifeKeeper for Linux supported servers configured in accordance with the requirements described in SIOS Protection Suite Installation Guide and SPS for Linux Release Notes.
- **IP Network Interface Cards**-Each server requires at least one Ethernet TCP/IP-supported network interface card. Remember, however, that a LifeKeeper cluster requires two communications paths; two separate LAN-based communication paths using dual independent sub-nets are recommended for heartbeats, and at least one of these should be configured as a private network. Using a combination of TCP and TTY heartbeats is also supported.

Software Requirements

- **TCP/IP software**-Each server in your LifeKeeper configuration requires TCP/IP software.
- **LifeKeeper Software**. It is imperative that you install the same version of the LifeKeeper for Linux software and apply the same versions of the LifeKeeper for Linux software patches to each server in your cluster.
- **LifeKeeper for Linux NAS Recovery Kit** - The NAS Recovery Kit is provided on the SPS Installation Image File (sps.img). It is packaged, installed and removed via the Red Hat Package Manager, rpm. The following rpm file is supplied on the SPS Installation Image File (sps.img):

steeleye-lkNAS

- **Linux software** - Each server in your cluster must have the **util-linux** package installed and configured prior to configuring LifeKeeper and the LifeKeeper NAS Recovery Kit. The NAS Recovery Kit requires version 2-9u or later of the **util-linux** package to assure proper functionality.

Please see SIOS Protection Suite Installation Guide for specific instructions on the installation and removal of the LifeKeeper for Linux software.

Chapter 3: Overview

LifeKeeper for Linux NAS Recovery Kit

The primary focus of the LifeKeeper for Linux NAS Recovery Kit is to offer LifeKeeper users an alternative storage method to shared storage and data replication.

The NAS Recovery Kit enables the creation of LifeKeeper resource hierarchies on LifeKeeper protected servers or clients that have imported (mounted) an exported Network File System (NFS) from either a Network Attached Storage device or an NFS server in the cluster. When a failure is detected on the node in the cluster where the exported file system is mounted, the NAS Recovery Kit initiates a fail over to the predetermined backup node.

Therefore, once the exported file system is mounted on a LifeKeeper server or client, it can be fully utilized as an additional storage basis for LifeKeeper hierarchies.

When you elect to use an exported file system as a storage medium, LifeKeeper does not require you to protect the server where the file system is exported. However, to achieve a greater degree of availability, users are encouraged to use the LifeKeeper for Linux NFS Server Recovery Kit to protect the server from failure where the file system is exported.

Resource hierarchies for the NAS Recovery Kit are created using the currently existing File System Recovery Kit available with the LifeKeeper Core product (**steeleye-1k** package).

While the NAS Recovery Kit delivers several advantages, the two most significant advantages are the elimination of the need for costly shared-storage devices and the capability to have multi-node cluster configurations.

NAS Recovery Kit Restrictions

- This version of the NAS Recovery Kit does not include support for a local recovery when access to the NAS device fails. When a failure is detected, the default action is to initiate a transfer of the hierarchy to a backup server. Depending on the makeup of the resource hierarchy, this action can result in hung processes. To avoid hung processes, the default action can be changed to halt the server and force a failover to a backup server. To change the default switchover behavior, alter the setting of **LKNASERROR** in the LifeKeeper defaults file. See the section **Configuring the NAS Recovery Kit** later in this document for more discussion on **LKNASERROR**.
- The NAS Recovery Kit does not provide protection for your Network Attached Storage device. The objective of this kit is to expand LifeKeeper storage options into the Network Attached Storage arena.
- The NAS Recovery Kit does not permit the NFS file system to be mounted more than once on different mount points. Attempts to create hierarchies when the file system is found in the */etc/fstab* file multiple times will fail.

NAS Recovery Kit Restrictions

- File systems to be protected by the NAS Recovery Kit should be mounted using the IP address rather than the host name (for example, 100.99.100.9/dir instead of server1/dir). This will avoid potential DNS or host file lookup problems. Mounting via host name will result in a “bad mount” being detected, after which LifeKeeper will unmount and re-mount the file system using the IP address. The unmount process could kill processes that are currently using the mount point.

Chapter 4: Configuring the LifeKeeper for Linux NAS Recovery Kit

This section describes the LifeKeeper for Linux NAS Recovery Kit configuration details. It also contains information you should consider before you start to configure and administer the NAS Recovery Kit. Please refer to SPS for Linux Technical Documentation for instructions on configuring LifeKeeper Core resource hierarchies.

Configuration Considerations

The following should be considered before operating the LifeKeeper for Linux NAS Recovery Kit:

1. Install the NAS Recovery Kit on the server(s) in your cluster configuration where you wish to mount your exported file systems and where you will extend your NAS resource hierarchy. You can export your file system from either a NFS server, which may be protected by LifeKeeper (this is the recommended configuration), or from a Network Attached Storage device.
2. To ensure proper execution of this kit, it is highly recommended that you mount your exported NFS file system using the server's IP address in place of the server name and that you perform your mount operation before you place your file system under LifeKeeper protection. Additionally, if you are mounting a file system that is currently protected by the LifeKeeper for Linux NFS Server Recovery Kit, we strongly suggest that the IP address used to create the NFS Server hierarchy be used to mount the file system on the LifeKeeper NAS server. Use the NFS mount option "**intr**" to ensure that LifeKeeper can interrupt operations being performed on the file system. Failure to use this option can result in a LifeKeeper failure.
3. To eliminate the possibility of split-brain related problems (i.e. more than one node in the cluster has a hierarchy In Service Protected (ISP)), we highly recommend that you establish one of the communication paths between nodes in the cluster on the same network used to access the exported file system. Failure to comply with this recommendation can result in multiple nodes bringing the hierarchy ISP (split-brain) when a communication path failure occurs. To recover from a split-brain scenario, take all but one of the ISP hierarchies out of service. This will ensure that only one node has access to the exported file system.
4. The built-in file system recovery kit used to build NAS hierarchies cannot detect and remove processes not protected by LifeKeeper that are using the mounted file system in a fail over condition. Therefore, it is highly recommended that only LifeKeeper protected processes use the NAS protected file system.
5. The LKNFSTIMEOUT tunable represents the timeout in seconds the NAS Recovery Kit will use when attempting to determine the status of a NFS mounted file system. The default value for this tunable is set to 2 minutes. The LKNFSSYSCALLTO tunable represents the timeout in seconds the NAS Recov-

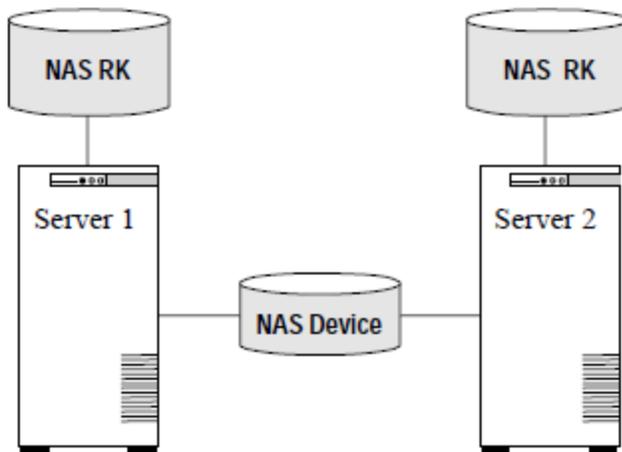
ery Kit will use for alarms to interrupt system calls when attempting to determine the status of a mount point. Use the formula below to determine the value for this tunable:

3 times your LKNFSSYSCALLTO value plus 5 should be less than the value of LKNFSTIMEOUT.

6. The LKNASERROR tunable controls the actions the NAS Recovery kit takes when access to the NAS device fails. The tunable has two values, **switch** and **halt**, with **switch** being the default. If the value is set to switch and access fails, the NAS Recovery Kit will initiate a transfer of the resource hierarchy to a backup server when the failure is detected. The attempt to transfer the resource hierarchy to the backup server can hang if any of the resources sitting above the NAS resource attempt to access anything on the NAS file system. To avoid this problem the tunable value can be set to **halt**, which will immediately halt the system when an access failure is detected. This action will force a failover of all resource hierarchies to the backup server.
7. STONITH devices or the Quorum/Witness package should be used so that a machine failure (all comm paths are down) does not result in a split brain where all the NAS resources are in service on all nodes in the cluster. This condition can lead to data corruption. More details on the Quorum/Witness package can be found in the SIOS Protection Suite Technical Documentation.

Configuration Examples

A few examples of what happens during a fail over using LifeKeeper for Linux NAS Recovery Kit are provided below.

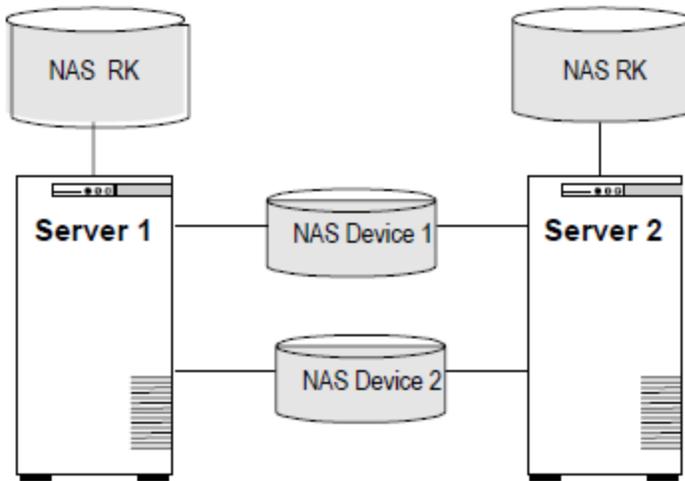


In this configuration, Server 1 is considered active because it is running the NAS Recovery Kit software and has imported (mounted) the file system from the NAS device. Server 2 does other processing. If Server 1 fails, Server 2 gains access to the file system and uses the LifeKeeper secondary hierarchy to make it available to clients.

Configuration Notes:

- The NAS software must be installed on both servers.
- The file system has been imported from a NAS device.
- Server 2 should not access files and directories on the NAS device while Server 1 is active.

Note:In an active/standby configuration, Server 2 might be running the NAS Recovery Kit, but does not have any other NAS resources under LifeKeeper protection.



An active/active configuration consists of two or more systems actively running the NAS Recovery Kit software and importing file systems from NAS device(s).

Configuration Notes:

- The NAS software must be installed on both servers.
- Initially, Server 1 imports a file system and Server 2 imports a different file system. In a switchover situation, one system can import both file systems.

Chapter 5: LifeKeeper Configuration Tasks

You can perform all LifeKeeper for Linux NAS Recovery Kit administrative tasks via the LifeKeeper Graphical User Interface (GUI). The LifeKeeper GUI provides a guided interface to configure, administer, and monitor NAS resources.

The following tasks are available for configuring the LifeKeeper for Linux NAS Recovery Kit:

- [Create a Resource Hierarchy](#) - Creates a NAS resource hierarchy.
- [Delete a Resource Hierarchy](#) - Deletes a NAS resource hierarchy.
- [Extend a Resource Hierarchy](#) - Extends a NAS resource hierarchy from the primary server to the backup server.
- [Unextend a Resource Hierarchy](#) - Unextends (removes) a NAS resource hierarchy from a single server in the LifeKeeper cluster.
- [Create Dependency](#) - Creates a child dependency between an existing resource hierarchy and another resource instance and propagates the dependency changes to all applicable servers in the cluster.
- [Delete Dependency](#) - Deletes a resource dependency and propagates the dependency changes to all applicable servers in the cluster.
- In Service - Activates a resource hierarchy.
- Out of Service - Deactivates a resource hierarchy.
- View/Edit Properties - View or edit the properties of a resource hierarchy.

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

1. From the toolbar, right - click on a global resource in the left pane of the status display.
2. Right - click on a resource instance in the right pane of the status display.

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

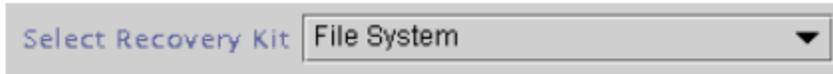
Creating a NAS Resource Hierarchy

Perform the following on your primary server:

1. Select **Edit** > **Server** > **Create Resource Hierarchy**.
2. The “**Select Recovery Kit**” dialog appears. Select the **File System** option from the drop down list.

Creating a NAS Resource Hierarchy

Simply put, a NAS Resource Hierarchy is a File System Hierarchy created using a NFS mounted file system.

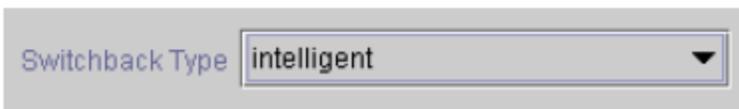


Select Recovery Kit File System

Click **Next** to continue.

CAUTION: If you click the **Cancel** button at any time during the sequence of creating your hierarchy, LifeKeeper will cancel the entire creation process.

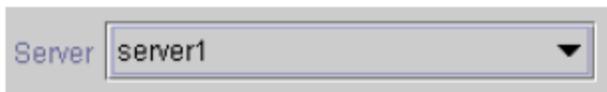
3. The “**Switchback Type**” dialog appears. The switchback type determines how the NAS resource will be switched back to the primary server when it becomes in-service (active) on the backup server following a failover. Switchback types are either *intelligent* or *automatic*. Intelligent switchback requires administrative intervention to switch the resource back to the primary server while automatic switchback occurs as soon as the primary server is back on line and reestablishes LifeKeeper communication paths.



Switchback Type intelligent

Click **Next** to continue.

4. The “**Server**” dialog appears. Select the name of the server where the NAS resource will be created (typically this is your primary server). All servers in your cluster are included in the drop down list box.



Server server1

Click **Next** to continue.

5. Select the **Mount Point** path to be protected by the NAS (File System) Resource Hierarchy. All “local” (i.e. file systems using shared storage) and NFS mounted file systems are listed. Select the NFS mounted file system from the drop down list box.



Mount Point /test

Click **Next** to continue.

- The **Root Tag** dialog is automatically populated with a unique name for the resource instance on the target server (i.e. the server selected above). You may accept the default or enter a unique tag consisting of letters, numbers and the following special characters: -, _, ., or /.



Click **Create Instance**.

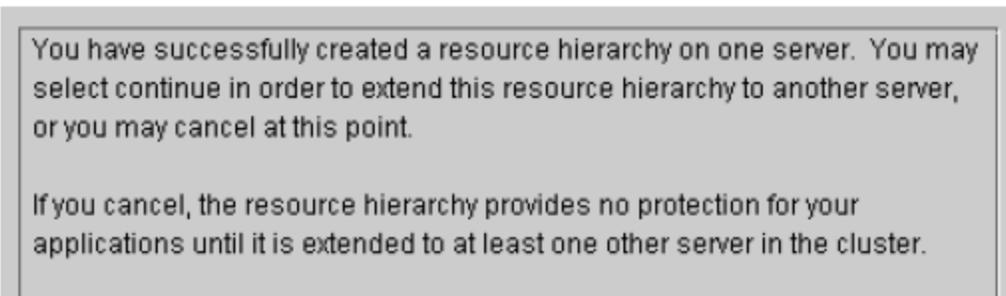
- An information box appears indicating the start of the hierarchy creation.

```

Creating gen/filesys resource...
07/27/2001 15:36:37 create: BEGIN creation of "device-nas20988" on
server "server1"
07/27/2001 15:36:37 create: END successful creation of
"device-nas20988" on server "server1"
07/27/2001 15:36:38 restore: BEGIN restore of "device-nas20988" on
server "server1"
07/27/2001 15:36:38 restore: END successful restore of
"device-nas20988" on server "server1"
Creating Resource Instance test-on-server1 with id /test on machine
"server1":
Resource test-on-server1 Successfully Created on machine "server1"
Creating Dependency test-on-server1-"device-nas20988" on machine
"server1":
Dependency test-on-server1-"device-nas20988" Successfully Created
on machine "server1"
Removing /etc/fstab entry
    
```

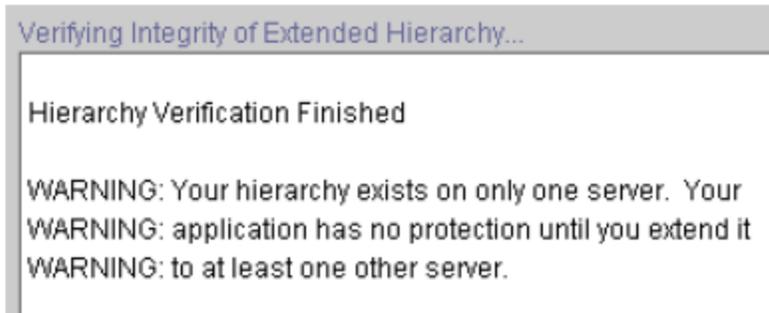
Click **Create** to continue.

- An information box appears announcing the successful creation of your NAS resource hierarchy. You must **Extend** the hierarchy to another server in your cluster in order to place it under LifeKeeper protection.



Click **Continue** to extend the resource.

Click **Cancel** if you wish to extend your resource at another time.



9. Click **Done** to exit the Create Resource Hierarchy menu selection.

Deleting a Resource Hierarchy

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

1. From the LifeKeeper GUI menu, select **Edit**, then **Resource**. From the drop down menu, select **Delete Resource Hierarchy**.
2. Select the name of the **Target Server** where you will be deleting your NAS resource hierarchy.

Note: If you selected the Delete Resource task by right-clicking from either the left pane on a global resource or the right pane on an individual resource instance, this dialog will not appear.

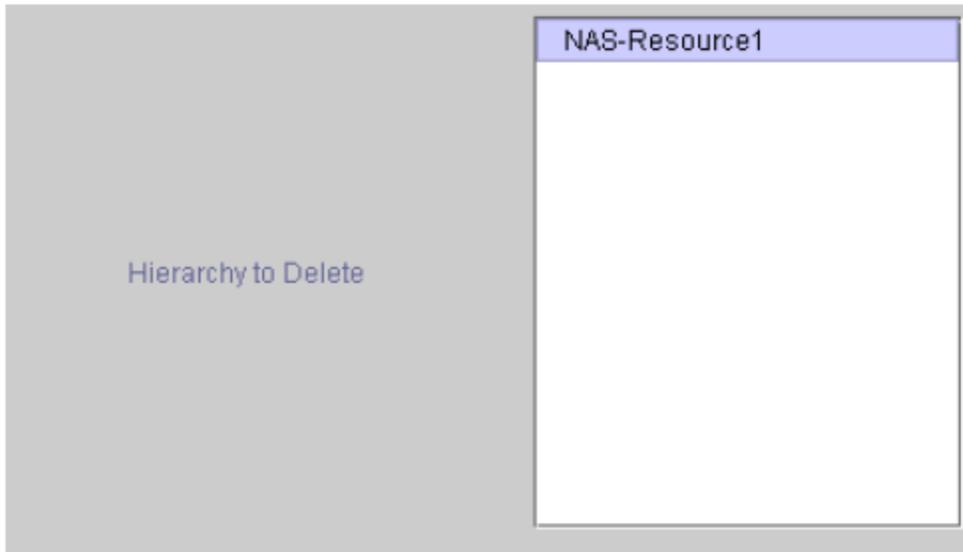


Click **Next** to continue.

3. Select the **Hierarchy to Delete**. Identify the resource hierarchy you wish to delete, and highlight it.

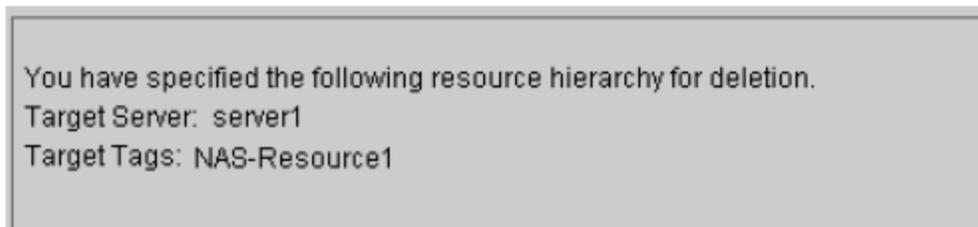
Note: If you selected the Delete Resource task by right-clicking from either the left pane on a global resource or the right pane on an individual resource instance, this dialog will not appear.

Deleting a Resource Hierarchy



Click **Next** to continue.

4. An information box appears confirming your selection of the target server and the hierarchy you have selected to delete.



Click **Delete** to continue.

5. An information box appears confirming that the NAS resource instance was deleted successfully.



6. Click **Done** to exit the Delete Resource Hierarchy menu selection.

Extending Your Hierarchy

After you have created a hierarchy, you should extend that hierarchy to another server in the cluster. There are three possible ways to extend your resource instance:

1. When you successfully create your NAS resource hierarchy you will have an opportunity to select **Continue** which will allow you to proceed with extending your resource hierarchy to your backup server.
2. Right-click on an unextended hierarchy in either the left or right pane on the LifeKeeper GUI.
3. Select the “**Extend Resource Hierarchy**” task from the LifeKeeper GUI by selecting **Edit, Resource, Extend Resource Hierarchy** from the drop down menu. This sequence of selections will launch the Extend Resource Hierarchy wizard. The **Accept Defaults** button that is available for the **Extend Resource Hierarchy** option is intended for the user who is familiar with the LifeKeeper Extend Resource Hierarchy defaults and wants to quickly extend a LifeKeeper resource hierarchy without being prompted for input or confirmation. Users who prefer to extend a LifeKeeper resource hierarchy using the interactive, step-by- step interface of the GUI dialogs should use the **Next** button.
 - a. The first dialog box to appear will ask you to select the **Template Server** where your NAS resource hierarchy is currently in service. Remember that the **Template Server** you select now and the **Tag to Extend** that you select in the next dialog box represent an in- service (activated) resource hierarchy. An error message will appear if you select a resource tag that is not in service on the template server you have selected. The drop down box in this dialog provides the names of all the servers in your cluster.

Note: If you are entering the Extend Resource Hierarchy task by continuing from the creation of a NAS resource hierarchy, this dialog box will not appear because the wizard

has already identified the template server in the create stage. This is also the case when you right-click on either the NAS resource icon in the left pane or right-click on the NAS resource box in the right pane of the GUI window and choose *Extend Resource Hierarchy*.

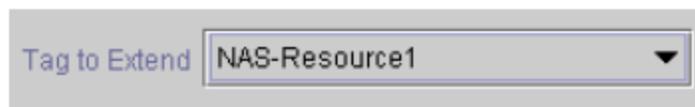


CAUTION: If you click the **Cancel** button at any time during the sequence of extending your hierarchy, LifeKeeper will cancel the extend hierarchy process. However, if you have already extended the resource to another server, that instance will continue to be in effect until you specifically unextend it.

Click **Next** to continue.

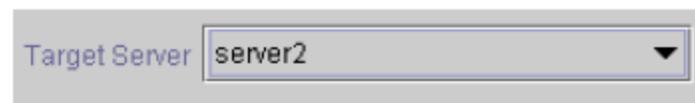
- b. Select the **Tag to Extend**. This is the name of the NAS instance you wish to extend from the template server to the target server. The wizard will list in the drop down box all of the resources that you have created on the template server.

Note: Once again, if you are entering the Extend Resource Hierarchy task immediately following the creation of a NAS hierarchy, this dialog box will not appear because the wizard has already identified the tag name of your resource in the create stage. This is also the case when you right-click on either the NAS resource icon in the left pane or on the NAS resource box in the right pane of the GUI window and choose *Extend Resource Hierarchy*.



Click **Next** to continue.

- c. Select the **Target Server** where you will extend your NAS resource hierarchy.



Click **Next** to continue.

- d. The **Switchback Type** dialog appears. The switchback type determines how the NAS resource will be switched back to the primary server when it becomes in service (active) on the backup server following a failover. Switchback types are either intelligent or automatic. Intelligent switchback requires administrative intervention to switch the resource

back to the primary server while automatic switchback occurs as soon as the primary server is back on line and reestablishes LifeKeeper communication paths.



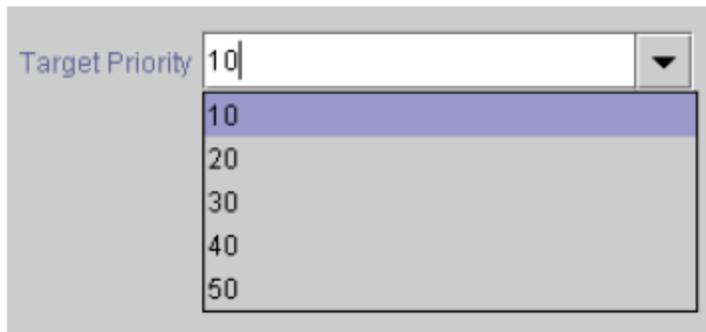
Click **Next** to continue.

- e. Select or enter a **Template Priority**. This is the priority for the NAS hierarchy on the server where it is currently in service. Any unused priority value from 1 to 999 is valid, where a lower number means a higher priority (1=highest). The extend process will reject any priority for this hierarchy that is already in use by another system. The default value is recommended.

Note: This selection will appear only for the initial extend of the hierarchy.

Click **Next** to continue.

- f. Select or enter the **Target Priority**. This is the priority for the new extended NAS hierarchy relative to equivalent hierarchies on other servers. Any unused priority value from 1 to 999 is valid, indicating a server's priority in the cascading failover sequence for the resource. A lower number means a higher priority (1=highest). Note that LifeKeeper assigns the number "1" to the server on which the hierarchy is created by default. The priorities need not be consecutive, but no two servers can have the same priority for a given resource.



Click **Next** to continue.

- g. An information box appears explaining that LifeKeeper has successfully checked your environment and that all requirements for extending this resource have been met. If there are requirements that have not been met, LifeKeeper will disable the **Next** button, and enable the **Back** button.

```
Executing the pre-extend script..
Checking existence of extend and canextend scripts
Building independent resource list
Checking extendability for NAS-Resource1
Pre Extend checks were successful
```

Click on the **Back** button to make changes to your resource extension.

Click **Cancel** to extend your resource another time.

Click **Next** to launch the Extend Resource Hierarchy configuration task.

Click **Finish** to confirm the successful extension of your NAS resource instance.

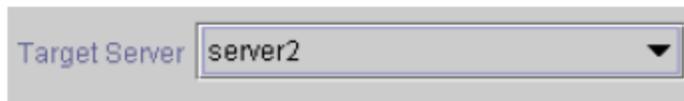
4. Click **Done** to exit the Extend Resources Hierarchy menu selection.

Note: Be sure to test the functionality of the new instance on *both* servers.

Unextending Your Hierarchy

1. From the LifeKeeper GUI menu, select **Edit, Resource, and Unextend Resource Hierarchy**.
2. Select the **Target Server** where you want to unextend the NAS resource. It cannot be the server where the resource is currently in service (active).

Note: If you selected the Unextend task by right-clicking from either the left pane on a global resource or the right pane on an individual resource instance, this dialog will not appear.



Click **Next** to continue.

3. Select the NAS **Hierarchy to Unextend**.

Note: If you selected the Unextend task by right-clicking from either the left pane on a global resource or the right pane on an individual resource instance, this dialog will not appear.

```
You have specified the following resource hierarchy for unextend.  
Target Server = server2  
Target Tag = NAS-Resource1
```

Click **Next** to continue.

4. An information box appears confirming the target server and the NAS resource hierarchy you have chosen to unextend.

```
You have specified the following resource hierarchy for unextend.  
Target Server = server2  
Target Tag = NAS-Resource1
```

Click **Unextend**.

5. Another information box appears confirming that the NAS resource was unextended successfully.
6. Click **Done** to exit the Unextend Resource Hierarchy menu selection.

Testing Your Resource Hierarchy

You can test your NAS resource hierarchy by initiating a manual switchover that will simulate a fail over of the resource instance from the primary server to the backup server.

Performing a Manual Switchover from the LifeKeeper GUI

You can initiate a manual switchover from the LifeKeeper GUI by selecting **Edit, Resource, and In Service**. For example, an in-service request executed on a backup server causes the NAS resource hierarchy to be placed in-service on the backup server and taken out-of-service on the primary 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 resource hierarchy is taken out-of-service without bringing it in-service on the other server.

Chapter 6: Troubleshooting

Symptom	Possible Cause
<p>LifeKeeper fail over operation fails with umount busy error.</p>	<p>The file system kit used to build NAS hierarchies cannot detect and remove processes not protected by LifeKeeper that are using the mounted file system in a fail over condition. Therefore, it is highly recommended that only LifeKeeper protected processes use the NAS protected file system. In the event of this failure, you must identify the processes using the file system and kill them. The fuser -m command can be used to determine the processes currently accessing the file system. Please see the fuser man pages for details on its use.</p>
<p>LifeKeeper does local recovery of file system mounted via server name.</p>	<p>If a file system protected by the NAS Recovery Kit was mounted via host name rather than IP address, then after creating the NAS resource, LifeKeeper logs a message similar to the following:</p> <pre data-bbox="506 940 1386 1108"> ... WARNING: Mon Aug 26 11:27:01 2002: LifeKeeper protected filesystem resource "tmp/mnt-on-tom.brown.com" (/tmp/mnt) is in service but not mounted ... Attempting Local Recovery of resource </pre> <p>LifeKeeper will re-mount the file system using the IP address at this point. However, if it encounters a problem, LifeKeeper will failover the NAS resource to the backup server (if it has been extended), or take the resource out of service (if the resource has not been extended).</p> <p>Suggested Action: If the local recovery is successful, no further action is needed. However, if the local recovery fails, you should:</p> <ol data-bbox="506 1381 1252 1524" style="list-style-type: none"> 1. Delete the NAS resource in LifeKeeper. 2. Re-mount the file system via IP address rather than host name. 3. Re-create the NAS resource.

Error Messages

This section provides a list of messages that you may encounter while creating and extending an SPS NAS resource hierarchy or removing and restoring a resource. Where appropriate, it provides an additional explanation of the cause of an error and necessary action to resolve the error condition.

Messages from other SPS components are also possible. In these cases, please refer to the Message Catalog (located on our Technical Documentation site under “Search for an Error Code”) which provides a listing of all error codes, including operational, administrative and GUI, that may be encountered while using SIOS Protection Suite for Linux and, where appropriate, provides additional explanation of the cause of the error code and necessary action to resolve the issue. This full listing may be searched for any error code received, or you may go directly to one of the individual Message Catalogs for the appropriate SPS component.

NAS Recovery Kit Error Messages

Error Number	Error Message
107001	Creation of NAS device with tag id <tag id> on server <LifeKeeper server name> failed.
107002	Error getting list of IP addresses for NFS server device <NFS server name> on server <LifeKeeper server name>.
107003	Error attempting to find active address to NFS server <NFS server name> on server <LifeKeeper server name>.
107004	Error in format of device ID <resource device>.
107005	Cannot bring NAS resource <tag id> in service on server <LifeKeeper server name>. Action: After correcting the problem, try bringing the resource in service manually.
107006	create: Device not specified.
107007	Null Device returned by getID on <LifeKeeper server name>.
107008	Cannot open /etc/mstab file on <LifeKeeper server name>.
107009	Illogical settings for NAS defaults on <LifeKeeper server name>. Using defaults of 120 for LKNFSTIMEOUT and 5 for LKNFSSYSCALLTO. Action: Reset NAS default values so that three times the value for LKNFSSYSCALLTO plus 5 is less than the value of LKNFSTIMEOUT.
107010	Error: detected conflict in expected tag name <tag id> on target machine <LifeKeeper server name>. Action: Delete the conflicting resource and re-extend the hierarchy.
107011	Error: mkdir of "/tmp/nas_mntpt.2915" on "mouse" failed: "permission denied".

Error Number	Error Message
107012	<p>Error: Exported file system <NFS exported file system name> cannot be accessed on <server name>.</p> <p>Possible causes:</p> <ul style="list-style-type: none"> - The LifeKeeper node is not in the exported system list on the NFS server, or, - The exported system list has contradictory entries that are not displayed by the showmount command. (i.e. if exported system list exports a file system to both the world and to specific systems, showmount will report only the specific systems). <p>Action: Fix the exported file system access problem and re- extend the hierarchy.</p>
107013	<p>Error: Mount authorization check for "172.25.113.25:/ export" on "fred" appears to be hung. Exiting.</p> <p>Action: Fix the access problem and re-extend the hierarchy.</p>

LifeKeeper GUI Related Errors

Error Number	Error Message
104901	<p>The mount point %s is mounted</p> <p>Action:Please specify a mount point that is not mounted.</p>
104902	<p>The mount point %s is not an absolute path</p> <p>Action:Please specify a mount point that begins with a slash.</p>
104903	<p>The mount point %s is not empty.</p> <p>Action:Please specify a mount point that does not exist or is empty.</p>