TotalStorage DS300 and DS400

IBM

Software Installation Guide

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Note: Before using this information and the product it supports, read the general information in Appendix C, "Notices," on page 39.

Contents

Chapter 1. Installing and running ServeRAID Manager

This chapter provides installation instructions for the IBM® ServeRAID™ Manager program and provides an overview of the software features and navigation tools. For detailed instructions for using the ServeRAID Manager program to manage the storage subsystem, see the online help.

System requirements

This section lists the system requirements for the management station and the client computer.

Management station system requirements

To install and run the ServeRAID Manager program on a management station, you need the following hardware and software:

- A computer with an Intel®-compatible 500 MHz processor (IA32, AMD32, or AMD64)
- 256 MB RAM
- 35 MB hard disk space
- Microsoft® Windows® Advanced Server 2003, Windows XP, or Windows 2000

Client computer system requirements

To install and run the ServeRAID Manager program on a client computer, you need the following hardware and software:

- A computer with an Intel-compatible 500 MHz processor (IA32, AMD32, or AMD64)
- 256 MB RAM
- 35 MB hard disk space
- 256 color video mode

On client computers, the ServeRAID Manager program is supported Microsoft Windows, Linux, Novell Netware, UnixWare, and OpenServer on operating systems.

Note: When installing the ServeRAID Manager program on client computers, see the operating-system-specific readme files on the IBM *ServeRAID Manager Application* CD for a list of operating systems that support ServeRAID Manager and other operating-system-specific information.

Installing the ServeRAID Manager and Management Station programs

This section provides instructions for installing the ServeRAID Manager and Management Station programs on systems running a Microsoft Windows operating system. To install the ServeRAID Manager program on a client computer running an operating system other than Windows, see the operating-system-specific readme files on the *IBM ServeRAID Manager Application* CD for installation instructions. To install the Management Station program on a client computer running an operating system other than Windows, see the operating-system-specific readme files on the IBM Support Web site for installation instructions.

Note: You must have administrator privileges to install the ServeRAID Manager and Management Station programs.

Installing the ServeRAID Manager program

To install the ServeRAID Manager program, complete the following steps:

1. Insert the installation CD and wait for the Autorun executable file to start the installation. If this does not occur, browse the CD and click **Autorun**.
2. When the installation wizard opens, click **Next**.
3. Read and accept the terms of the license agreement; then, click **Next**.
4. Click **Next** to accept the default installation setup. You can also use the menus to select the ServeRAID components that you want to install, and then click **Next**.
5. Click **Install**.

   The installation wizard installs the software. This might take a few minutes.
6. When the installation is completed, click **Finish**.

Installing the Management Station program

To install the Management Station program, complete the following steps:

1. Download the Management Station program executable file:
   a. Go to http://www.ibm.com/servers/storage/support/.
   b. Go to the page for your storage subsystem model and configuration.
   c. Follow the online instructions to download the program executable file (setup.exe).
2. Double-click **setup.exe** to start the installation wizard.
3. Read and accept the terms of the license agreement; then, click **Next**.
4. Create a user name and a password for the management station. This is the user name and password that you will use to log in to the management station. When completed, click **Next**.
5. Click **Install**. The installation wizard installs the software. This might take a few minutes.
6. When the installation is completed, click **Finish**.

Getting started

This section explains how to begin using the ServeRAID Manager program.

Running ServeRAID Manager

Note: You must have administrator privileges to run ServeRAID Manager.

To run ServeRAID Manager as a stand-alone application, click **Start → Programs → ServeRAID Manager → ServeRAID Manager**. The ServeRAID Manager window opens, as shown in Figure 1 on page 3.

The ServeRAID Manager window is divided into four panes:

- Enterprise view (1)
- Physical devices (2)
- Logical devices (3)
- Event monitoring (4)
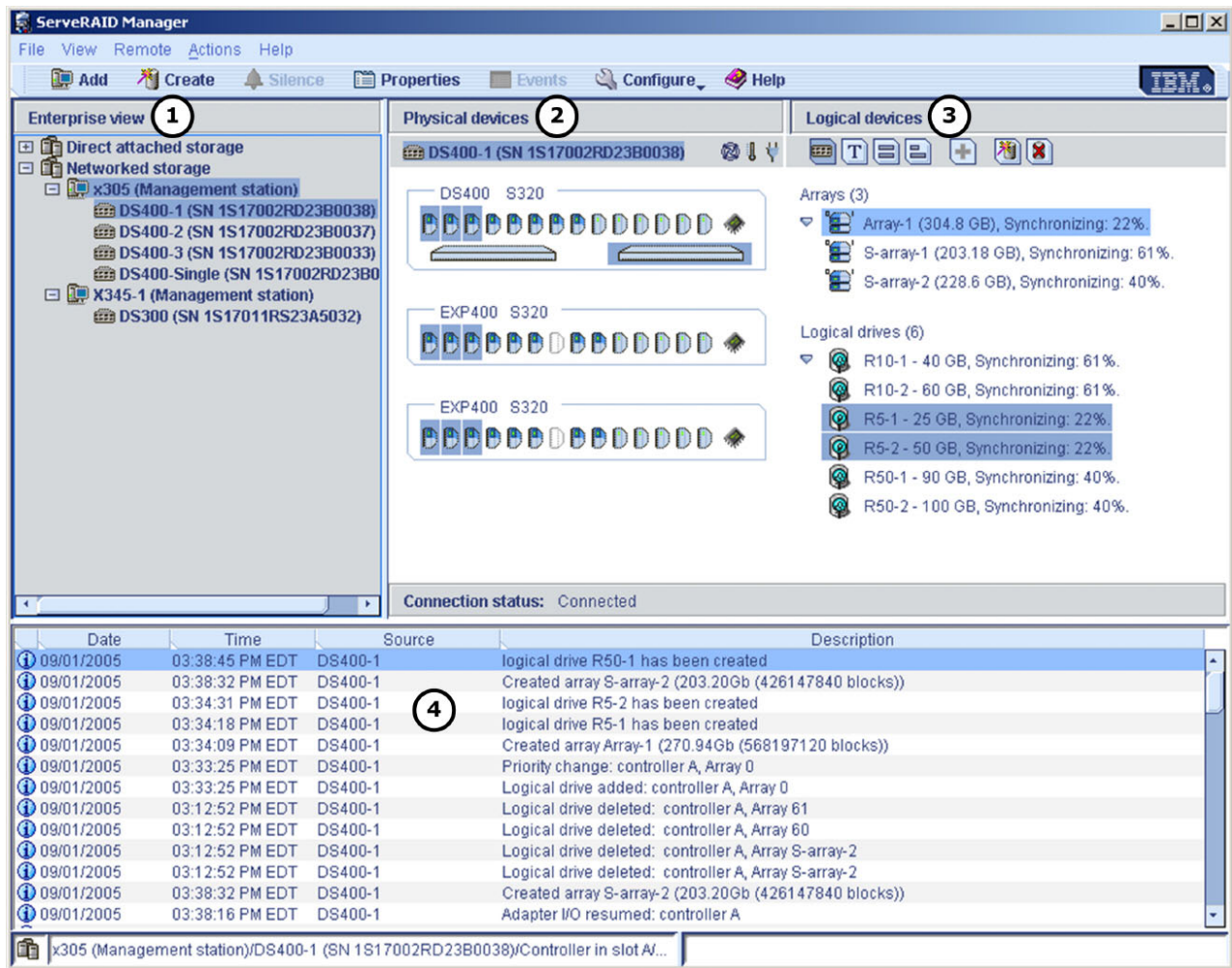
Figure 1. ServeRAID Manager window

For additional information about ServeRAID Manager features, see "Navigating ServeRAID Manager" on page 5.

Adding a management-station agent

The management-station agent is a monitoring agent for network-managed storage. After you add an agent to a management station, you can monitor and configure the attached storage enclosures from a ServeRAID Manager console.

When you log in for the first time, you must add and configure the management-station agent before you can set up network-managed storage, such as the IBM TotalStorage DS300 and DS400.

To add a management-station agent, complete the following steps:

1. In the "Enterprise view" pane, right-click the **Networked storage** icon and select **Add management station**, as shown in the following illustration. The "Add management station" window opens.
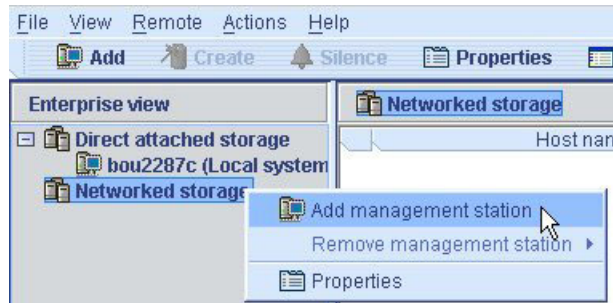
Figure 2. Adding a management station

2. In the **Type** field, select **Management station**.
3. Enter the host name or TCP/IP address of the management-station computer.
4. Enter the management-station user name and password created during the ServeRAID Manager installation. (See step 4 on page 2.)
5. Select **Save user name/password**.
6. Click **Connect**. The management-station agent is added.

Removing a management-station agent

To remove a management-station agent, complete the following steps:

1. In the "Enterprise view" pane, right-click **Networked storage**, and select **Remove management station**; then, select the management-station agent to be removed.
2. Click **Yes**.

   The management-station agent and all the network-managed storage devices that are associated with the management-station agent are removed.

Adding the storage subsystem to the management station

To add the storage subsystem to the management station, complete the following steps:

1. In the "Enterprise view" pane, right-click the management station in the **Networked storage** tree and select **Add agent**.
2. Type the host name or TCP/IP address for one of the storage subsystem management ports.
3. Enter the administrator password for the storage subsystem.

   Note: The administrator password is created when the storage subsystem is installed on the network. It is not the same as the management-station password.

4. Click **Add**.

   The storage subsystem is added to the management station in the **Networked storage** tree in the "Enterprise view" pane.

For more information about configuring the storage subsystem and building the network-managed storage, see the ServeRAID Manager help.

Navigating ServeRAID Manager

The "Enterprise view" pane (shown in Figure 3) contains an expandable tree that shows the systems and controllers that you are managing. The **Networked storage** tree lists management stations that have network-attached storage enclosures.
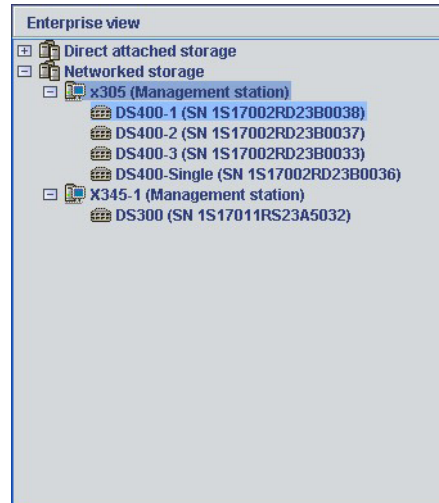
Figure 3. "Enterprise view" pane

You can perform most configuration and management tasks by selecting a controller or enclosure from the tree and working with related objects in the "Physical devices" and "Logical device" panes (shown in Figure 4).

Figure 4 shows how ServeRAID Manager displays the "Physical devices" and "Logical devices" panes, which show the physical devices and logical devices that are connected to the controller or enclosure.
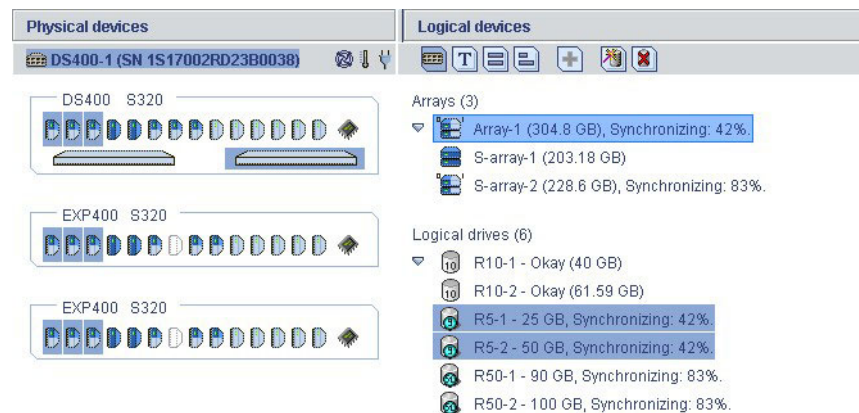
Figure 4. "Physical devices" and "Logical devices" panes

The "Physical devices" pane (on the left in Figure 4) displays information about the drives, enclosures, and other devices that are attached to the controller. The devices are grouped by the channel or port they are connected to and shown in

numerical order. The information for each channel or port includes the maximum speed capability, the number of the channel on the controller, and the number of devices that are attached to the controller.

The "Logical devices" pane (on the right in Figure 4 on page 5) displays information about the arrays and logical drives that are created using the physical devices. This information includes the number of arrays and logical drives, the RAID level of each device, and whether a logical drive is protected by a hot spare drive.

In the "Physical devices" and "Logical devices" panes, you can perform the following tasks:

- Collapse or expand a view to see more information about arrays, logical devices, and physical devices.
- Change how drives are displayed (see "Changing how drives are displayed" on page 8).
- Identify components of a logical device (see "Viewing related components" on page 8).

"Physical devices" pane

The "Physical devices" pane displays device information in enclosure view format or in text format.

Figure 5 shows the enclosure view format. Drives in the enclosure view format are shown in the physical slots that they occupy with the correct vertical or horizontal orientation. Empty slots are shown as drive outlines.
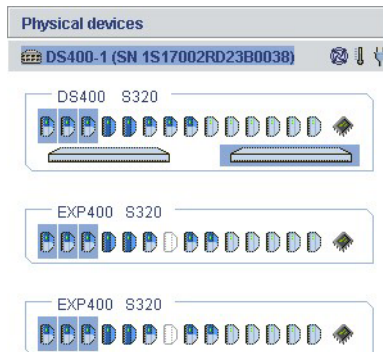
Figure 5. "Physical devices" pane showing the enclosure view format

Figure 6 shows physical device information displayed in text format. Drives in text format are shown by SCSI channel and SCSI ID.
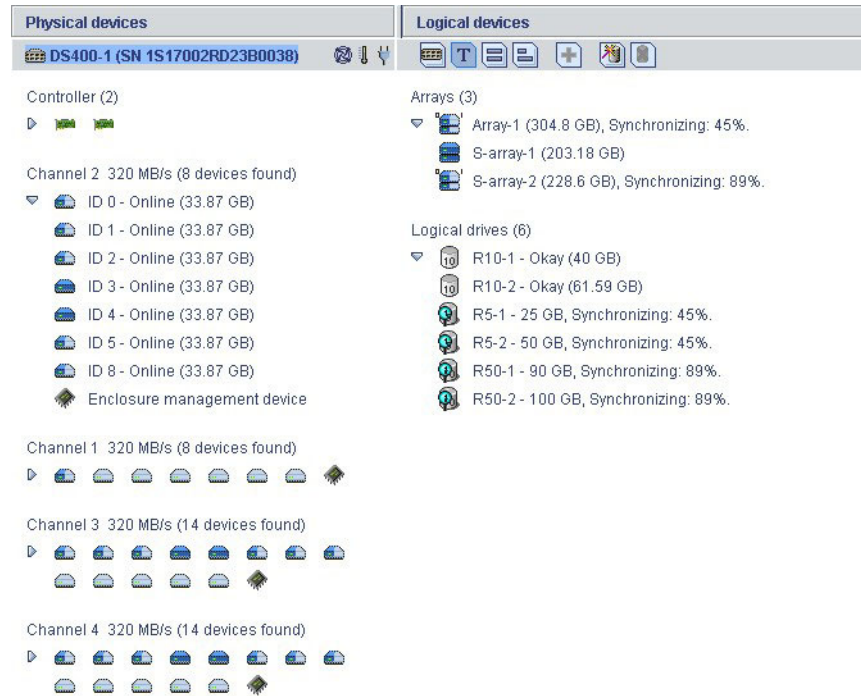
Figure 6. Displaying the physical and logical drives in text format

The indicator icons (   ) report the status of the fan and temperature modules on SAF-TE (enclosure management) devices and other devices that monitor these conditions.

The indicator colors are as follows:
- **Blue** — Normal
- **Yellow** — Warning
- **Red** — Error
- **Gray** — Not applicable to the devices

For example, the fan indicator changes to yellow when one fan fails; it changes to red when a second fan fails and cooling is no longer adequate.

"Logical devices" pane

The "Logical devices" pane displays information about the logical devices that were created using the physical devices, including the number of arrays and logical devices, the RAID level of each device, and whether a logical device is protected by a hot spare drive.

You can create and delete logical devices in the "Logical devices" pane by clicking **Create** and using the Create wizard.

Changing how drives are displayed

You can change how information is displayed in the "Physical devices" pane by clicking one of the following icons in the "Logical devices" pane.

Displays the enclosure view. This is the default view.

Displays physical device information in text format.

Displays physical device information in full-size capacity format. A full-length bar is displayed for each hard disk drive, regardless of capacity. A small segment on each hard disk is reserved for the RAID signature; this area is indicated by a gray cap at the end of each bar.
Note: A hard disk drive that is shaded in light blue is not part of any hard disk drive group.

Displays physical device information in relative-size capacity format. A full-length bar is displayed for the largest hard disk drive; proportionally shorter bars are displayed for other hard disk drives.

Viewing related components

When you click a physical or logical device in either device pane, the related components are highlighted.

For example, when you click an array, the associated logical drives are highlighted in the "Logical devices" pane and the physical drives that are members of the array are highlighted in the "Physical devices" pane, as shown in Figure 4 on page 5.

Selecting a global or dedicated hot spare highlights the logical drives that are protected by that hot spare. Figure 7 shows an example of the logical drives that are protected by a global hot spare.
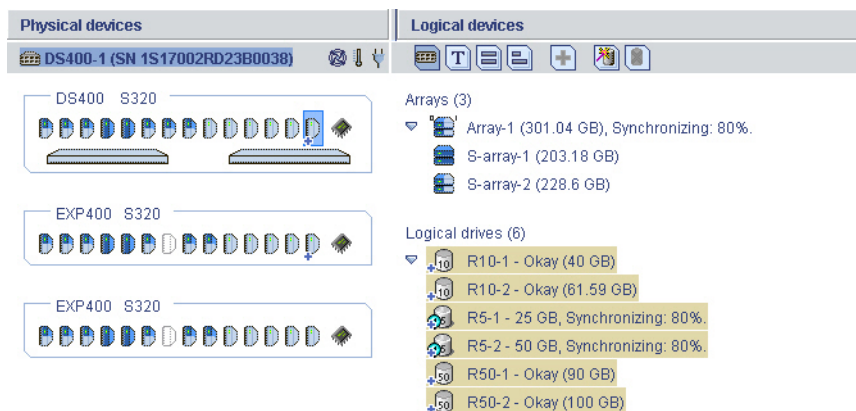
Figure 7. Displaying a global hot spare

Figure 8 shows an example of a dedicated hot spare.
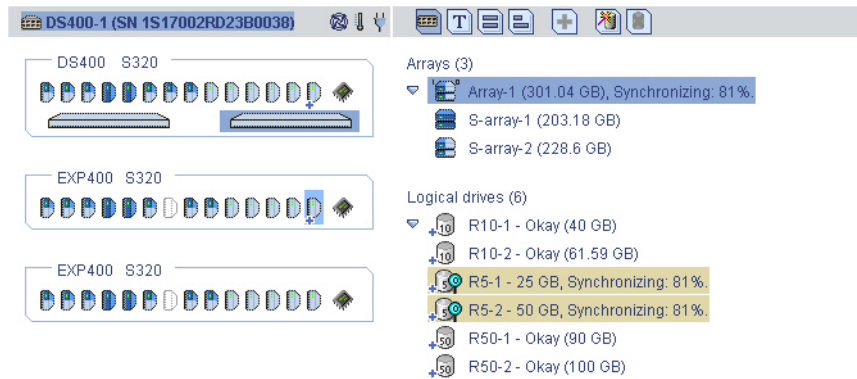
Figure 8. Displaying logical devices that are protected by a hot spare

Finding more information

For detailed instructions for using the ServeRAID Manager program to manage the storage subsystem, see the ServeRAID Manager help.

Chapter 2. Installing firmware

This chapter provides instructions for downloading and installing firmware on the storage subsystem.

Downloading firmware

To download a new firmware image, go to http://www.ibm.com/servers/storage/support/; then, go to the page for your storage subsystem model and configuration. Follow the online instructions to download the file.

Keep the default file name, and save the file to a system that is accessible by IBM ServeRAID Manager.

Updating the firmware

To update the firmware, complete the following steps:

1. In the "Enterprise view" pane, right-click the **Networked storage** icon and select **Update controller images**. The IBM ROM Update wizard starts.
2. Click **Next**. The ROM Update Image selection window opens.
3. Click **Add** and select the firmware update image file. Then, click **Next**.
4. Select the check box for the enclosure controllers that you want to update, and then click **Next**.

   Note: To force an update, hold down the Ctrl key while selecting the enclosure that is to be updated.
5. Review the update summary, and then click **Apply**.

   ServeRAID Manager applies the firmware update to the selected enclosure controllers. The progress meter shows the update status. When the update is completed, the progress meter automatically closes.
6. Restart the controller. (See "Restarting the controller.")

Restarting the controller

To restart the controller, complete the following steps:

1. In the "Enterprise view" pane, right-click the enclosure that you want to restart, and select **Restart enclosure**.
2. Click **Yes** to confirm that you want to restart the enclosure.

   Note: Restarting the enclosure can take up to 10 minutes; during this time, data on the controller will be unavailable.

Chapter 3. Configuring a new controller

This chapter provides detailed instructions for configuring a new or replacement controller as part of the storage subsystem.

Note: For detailed instructions for installing a RAID controller, see the *IBM TotalStorage DS300 and DS400 Hardware Installation and User's Guide*.

Getting started

To configure a new or replacement controller, complete the following steps:

1. **For a single-controller configuration only:** If you are installing a replacement controller, see the *Replacing a controller in a single-controller or dual-controller IBM TotalStorage DS300 or DS400 storage subsystem* document that comes with the replacement controller, for more detailed installation and setup instructions.

2. Turn on the storage subsystem and wait until the green controller ready LED is lit. For the location and a description of the LED, see the storage subsystem rear view section in Chapter 4 (for DS300) or Chapter 8 (for DS400) of the *Hardware Installation and User's Guide*.

3. From a management station, open a Telnet session to IP address 192.168.70.123.

4. Change to administrator mode by typing `administrator`, `admin`, or `ad` and pressing Enter.

5. When prompted for a password, enter `passw0rd` (all lowercase letters with a zero, not O, in passw0rd).

6. **For controller A only:** At the DS300 or DS400 prompt, enter `setup`.

7. Using the Setup wizard, change the storage subsystem default configuration settings as required for your network. The default settings are shown in Table 1 and Table 2.

Table 1. Controller A default configuration settings

Controller A settings	Default
Hostname	DS300 / DS400
Domain Name	ibm.com
Timezone [GMT]	GMT-5
New Administrator Password	passw0rd (all lowercase letters with a zero, not O, in passw0rd)
Default Gateway	0.0.0.0
DNS Servers	NO
User DHCP	NO
Management i/f IP Address	192.168.70.123
Management i/f IP Netmask	255.255.0.0
Management i/f Broadcast Address	192.168.255.255

Table 2. Controller B default configuration settings

Controller B settings	Default
Hostname	DS300 / DS400

Table 2. Controller B default configuration settings (continued)

Controller B settings	Default
Domain Name	ibm.com
Management i/f IP Address	192.168.70.124
Management i/f IP Netmask	255.255.0.0
Management i/f Broadcast Address	192.168.255.255

The Setup wizard gives you a series of prompts. You can type the answers to the prompts and use the three commands that are shown in the following table.

Command	Function
Abort	Quit the Setup wizard without making changes
Back	Go to the previous prompt
Help	Describe the current options

If a parameter has a default value, the prompt displays the value in square brackets ([ ]). Some parameters require an arbitrary string, in which case the commands **back** and **abort** cannot be used. In these cases, enclose the string in quotation marks ("").

Use the following information to assign values for the parameters:

hostname
>   Enter the name that you want to use for the system. Enter back to repeat this prompt.

domain name
>   Enter the domain to which the system belongs.

SAN name
>   Enter the Storage Area Network (SAN) to which the system belongs.

timezone
>   Enter the system time zone.

system date
>   Enter the system date in the format *hh:mm@dd/mm/yy.*

define administrator password
>   Define whether an administrator password is required. If a password is required, you are prompted for that password, which you must enter twice. Press Ctrl to leave the password unchanged. Press Enter twice to not require an administrator password.

define operator password
>   Define whether an operator password is required.

default gateway
>   Enter the name or IP address of a router to which packets are sent if their destinations do not have routes that are defined in the system. Enter no to clear the default gateway.

DNS servers
>   Enter the IP addresses of up to three systems that will act as DNS servers. Enter no to clear the list of DNS servers.

dhcp   Enter yes if a DHCP server will be used to discover the system network values. Enter no if a DHCP server will not be used.

If you enter yes, the wizard takes you to the **finish** parameter. If you enter no, the wizard continues to prompt you for information about the main Ethernet interface of the system.

IP address

Enter the IP address, in x.x.x.x format. You can also define the netmask by typing its width after the IP address.

Note: For the DS300 storage subsystem, the management interface must be in a separate network segment from your iSCSI ports.

netmask

Define the size of the netmask. Any of the common formats are accepted.

Note: If you entered the netmask as part of the IP address in the previous prompt, this parameter is skipped.

broadcast address

Enter the address to be used for broadcasts. Any of the common formats are accepted.

peer IP address

Enter the IP address for the peer controller, in x.x.x format.

Note: For the DS300 storage subsystem, the management interface must be in a separate network segment from your iSCSI ports.

peer netmask

Define the size of the netmask for the peer controller. Any of the common formats are accepted.

peer broadcast address

Enter the address to use by the peer controller for broadcasts. Any of the common formats are accepted.

finish Enter yes to apply the values that you have entered, or enter no to return to the first parameter and change the values that you have entered.

Completing the controller configuration

To finish the controller configuration by using ServeRAID Manager, complete the following steps:

1. Start ServeRAID Manager. (For more information, see "Running ServeRAID Manager" on page 2.)
2. Add the management-station agent. (For more information, see "Adding a management-station agent" on page 3.)
3. Add the enclosure to the management station. (For more information, see "Adding the storage subsystem to the management station" on page 4.)
4. Configure the storage subsystem using the Configuration wizard. (For detailed instructions, see the ServeRAID Manager help.)

Note: After the storage subsystem is configured, logical drives are displayed as physical drives to the initiator operating system. To set up the initiators, see the initiator documentation.

If you replaced a RAID controller and the existing arrays were associated with the RAID controller that you replaced, they are displayed as foreign arrays and can be imported. (For detailed instructions, see the ServeRAID Manager help.)

Chapter 4. Installing a DS300 or DS400 storage subsystem in a Windows cluster server environment

This chapter describes how to install a DS300 or DS400 storage subsystem in a Windows cluster server environment. Before you install the software, make sure that you have read the following information:

- *IBM TotalStorage DS300 and DS400 Hardware Installation and User's Guide*
- Chapter 1, "Installing and running ServeRAID Manager," on page 1

Important: Always check for a readme file on any installation media. A readme file contains important information that was not available when this document was written.

For the latest storage management software and readme files for your operating system, see http://www.ibm.com/servers/storage/support/.

Preinstallation tasks for an iSCSI (DS300) environment

The procedure for installing a DS300 storage subsystem in a cluster server environment includes the following tasks:

1. Installing the Microsoft iSCSI Software Initiator software
2. Installing the ServeRAID Manager software
3. Installing the Microsoft Cluster Server software

ISCSI configuration considerations

You can connect the DS300 storage subsystem to the cluster only by using a gigabit Ethernet switch. Figure 9 shows an iSCSI environment that uses multiple switches.
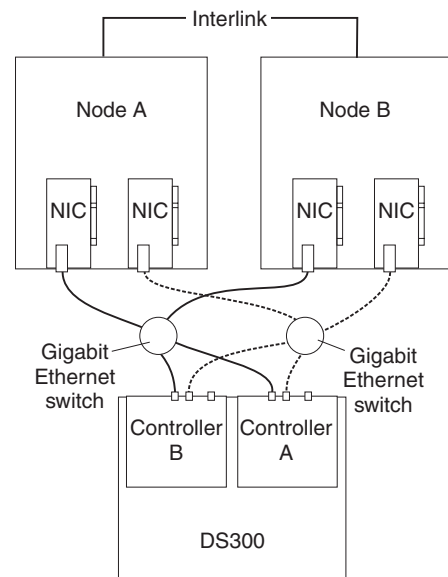

Figure 9. iSCSI cluster configuration

Before connecting the DS300 to the cluster, read the following Microsoft requirements for iSCSI cluster support. For more information about Microsoft iSCSI support, see http://www.microsoft.com/windowsserver2003/technologies/storage/iscsi/default.mspx

- The iSCSI traffic must be on a private network (not shared), for security and performance. Any "networking standard practice" method for achieving this end is acceptable and includes any of the following configurations:
  - Physically separate, dedicated iSCSI traffic network.
  - Physically shared network with the iSCSI traffic running on a private VLAN. The switch hardware must provide CoS (or QoS) guarantees for the private VLAN.
- If multiple clusters or systems are connected to the same iSCSI network, they must be segregated.
- The use of session authentication (CHAP minimum) is mandatory. This provides security and segregation.

Installing the Microsoft iSCSI Software Initiator

The Microsoft iSCSI Software Initiator is a device driver on the server that encapsulates SCSI commands and routes them through the server NIC and the IP network to the DS300 storage subsystem.

To download the iSCSI software initiator from the Microsoft Download Center, go to http://www.microsoft.com/windowsserver2003/technologies/storage/iscsi/default.mspx. For detailed information about installing and configuring the iSCSI software initiator, see the *Microsoft iSCSI Software Initiator Users Guide*, which is available from the Microsoft Download Center.

Preinstallation tasks for a Fibre Channel (DS400) environment

The procedure for installing a storage subsystem in a cluster server environment includes the following tasks:

1. Installing the Fibre Channel host adapters
2. Installing the multi-path I/O device specific module (MPIO DSM) software
3. Installing the ServeRAID Manager software
4. Installing the Microsoft Cluster Server software

Types of Fibre Channel configurations

You can connect the storage subsystem to the cluster node either directly or through Fibre Channel switches. Figure 10 on page 19 shows a typical directly attached configuration. Figure 11 on page 19 shows a typical Fibre Channel switch connection configuration. Both configurations are fully redundant.
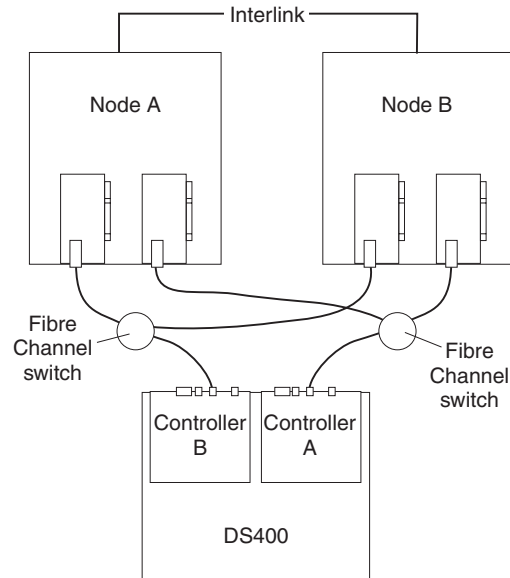
Figure 10. Fibre Channel directly attached cluster solution
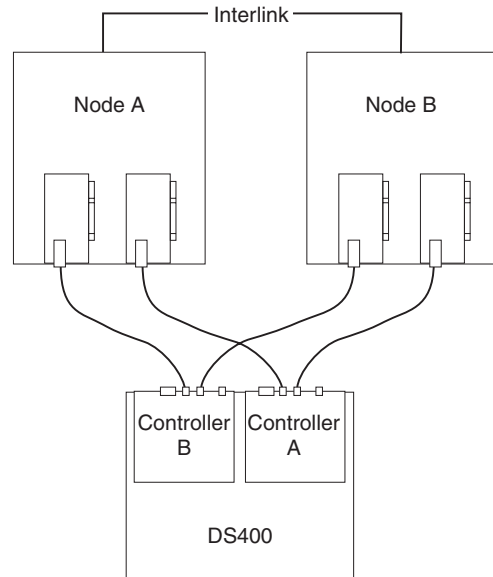
Figure 11. Fibre Channel switch cluster solution

Installing the Fibre Channel host adapters

To install the Fibre Channel host adapters, see the specific installation requirements and procedures in the documentation that comes with the host adapter. After you install the host adapter, install the correct host adapter device driver.

To use the dual path configuration, complete the following steps:

1. Install two host adapters in each node.
2. Connect two Fibre Channel cables from each node to the storage subsystem.
3. Install the multi-path I/O (MPIO) DSM software as described in "Installing the multi-path I/O DSM software" on page 20.

Installing the multi-path I/O DSM software

To install the MPIO DSM software on a host system that uses multiple connections to the external storage enclosure, complete the following steps:

1. To download the latest MPIO DSM, go to http://www.ibm.com/support/.
2. At a command prompt or using Windows, run the installation program.
3. After the software is installed, restart the host system.
4. To be sure that the software is installed correctly, on the desktop, right-click **My computer**, and click **Manage**. In the Computer Management window, a disk device is displayed as a Multi-Path Disk Device.

Installing a DS300 or DS400 storage subsystem in a cluster environment

The following procedures describe how to install the storage management software in a cluster environment.

Note: The storage management software consists of host bus adapter device drivers, iSCSI software initiator software, MPIO DSM software, and the ServeRAID Manager software.

Windows 2000

Note: Microsoft does not support an iSCSI cluster in a Windows 2000 operating-system environment.

Before you begin, make sure that the host bus adapters, device drivers, and MPIO DSM software are installed on each cluster node.

To install the storage management software and the cluster service software on a server running the Microsoft Windows 2000 operating system, complete the following steps:

1. Shut down node B. Turn on node A.
2. Install the ServeRAID Manager software on node A. For more information, see "Installing the ServeRAID Manager and Management Station programs" on page 1.
3. Use the ServeRAID Manager software to define and map the shared logical drives to the cluster nodes.

    Note: You might have to restart the first node of the cluster to see the logical drives (LUNs) that are added.
4. Format all shared logical drives as NT File System (NTFS), assign volume labels, and specify a drive letter for each.

    Important: You must assign a permanent (sticky) drive letter to each shared logical drive on both cluster nodes. The two nodes must have the same drive letter for each shared drive. If you do not assign permanent drive letters, Windows might assign different drive letters on the nodes.
5. Shut down node A. Start node B.
6. To make sure that the drive letters for the cluster configuration are defined correctly, complete the following steps:

    a. Click **Start → Programs → Administrative Tools → Computer Management**. The Computer Management window opens.

b. Click **Storage Disk Management**.

7. Make sure that the following conditions are met:
   - The same logical drives are displayed on each cluster node.
   - Each cluster node has the same number of partitions defined on the logical drives.
   - Drive letters are assigned to the configured logical drives.
   - The drive letters on the partitions are the same on both cluster nodes.

8. Shut down node B. Start node A.

9. Install the cluster server software. For more information, see "Installing the cluster server software" on page 22.

Windows Server 2003

To install the storage management software and the cluster services software on a server running the Microsoft Windows Server 2003 operating system, complete the following steps.

Notes:
- **For DS300 iSCSI configurations:** Before you begin, make sure that the Microsoft iSCSI Software Initiator software is installed on each cluster node. For more information, see "Installing the Microsoft iSCSI Software Initiator" on page 18.
- **For DS400 Fibre Channel configurations:** Before you begin, make sure that the host bus adapters, device drivers, and MPIO DSM software are installed on each cluster node.

1. Shut down node B. Turn on node A.

2. Install the ServeRAID Manager software on node A. For more information, see "Installing the ServeRAID Manager and Management Station programs" on page 1.

3. Use the ServeRAID Manager software to define and map the shared logical drives to the cluster nodes.

   Note: You might have to restart the first node of the cluster to see the logical drives (LUNs) that are added.

4. Format all shared logical drives as NT File System (NTFS), assign volume labels, and specify a drive letter for each.

   Important: You must assign a permanent (sticky) drive letter to each shared logical drive on both cluster nodes. The two nodes must have the same drive letter for each shared drive. If you do not assign permanent drive letters, Windows might assign different drive letters on the nodes.

5. Shut down node A. Turn on node B.

6. To be sure that the drive letters for the cluster configuration are defined correctly, complete the following steps:

   a. Click **Start → Programs → Administrative Tools → Computer Management**. The Computer Management window opens.

   b. Click **Storage Disk Management**.

7. Make sure that the following conditions are met:
   - The same logical drives are displayed on each cluster node.
   - Each cluster node has the same number of partitions defined on the logical drives.
   - Drive letters are assigned to the configured logical drives.

- The drive letters on the partitions are the same on both cluster nodes.

8. Shut down node B. Start node A.

9. Install the cluster server software. For more information, see "Installing the cluster server software."

Installing the cluster server software

The following sections describe how to install the cluster server software on Windows operating systems.

Windows 2000

Important: Do not perform this procedure unless you have installed the necessary storage management software components on both cluster nodes.

To install the cluster server software on node A and node B, complete the following steps:

1. Install the cluster server software on node A:

   a. See the Microsoft Cluster Server (MSCS) documentation for the correct procedure to install the cluster server software.

      Note: During installation, specify that you want to form a new cluster.

   b. After the system restarts, leave node A running.

2. Install the cluster server software on node B, as follows:

   a. See the MSCS documentation for the correct procedure to install the Cluster Server software.

      Note: During installation, specify that you want to join the existing cluster.

   b. After the system restarts, leave node B running.

3. After you install MSCS, reinstall Service Pack 4.

   Note: For more information about installing the service pack in a cluster environment, see the Microsoft Knowledge Base article Q174799.

4. Check the software installation as follows:

   a. On either node A or node B, click **Start → Programs → Administrative Tools → Cluster Administration**.

   b. In the **Cluster or Server Name** field, type either the name of the cluster or the name or IP address of one of the nodes.

      If the installation is successful, the computer names of both nodes are displayed in the left pane of the Cluster Administrator window. If both node names are not displayed in the left pane of the Cluster Administrator window, reinstall the cluster server software. If the problem remains, contact your IBM technical support representative.

   c. Make sure that the cluster disk groups can be moved between cluster nodes.

5.

Windows Server 2003

Important: Do not perform this procedure unless the necessary storage management software components are installed on all cluster nodes.

To install the cluster server software on cluster nodes, complete the following steps:

1. Install the cluster server software on the first node of the cluster. See the Microsoft Cluster Server (MSCS) documentation for the correct procedure to install the cluster server software.

   Note: During installation, specify that you want to form a new cluster.

2. In the Cluster Administrator window, make sure that all of the cluster disk groups can be varied online and offline with no problems.

3. Install the cluster server software on the second node of the cluster. See the MSCS documentation for the correct procedure to install the cluster server software.

   Note: During installation, specify that you want to join the existing cluster. Make sure that you add the cluster nodes one at a time.

4. If all node names are not displayed in the left pane of the Cluster Administrator window, reinstall the cluster server software. If the problem remains, contact your IBM technical support representative.

Upgrading from a previous version of the storage management software

Make sure that you are familiar with the steps that are required in a new installation before you continue with the following upgrade procedure.

Use one of the following two procedures:

- **Performing a scheduled upgrade:** A scheduled upgrade requires scheduling downtime on your cluster server to upgrade the controller firmware and storage management software. The services and resources that are offered by the cluster are not available during the upgrade. If you use this upgrade method, you must perform the upgrade during off-peak workload time.

   Note: The scheduled upgrade is the preferred procedure for upgrading a cluster server configuration.

- **Performing a rolling upgrade:** A rolling upgrade requires upgrading the storage management software first in one of the cluster nodes and then in each of the remaining cluster nodes, one cluster node a time, so that the services and resources that are offered by the cluster are always available.

Important: Do not upgrade the storage subsystem firmware until you have upgraded the storage management software on all cluster nodes and management stations.

Performing a scheduled upgrade

The following sections describe how to perform a scheduled upgrade on Windows operating systems.

Windows 2000

To perform a scheduled upgrade on computers that are running the Windows 2000 operating system, complete the following steps:

1. Click **Start → Programs → Administrative Tools → Services**. The Services window opens.
2. Shut down node B.
3. On node A, uninstall the components from the previous version of the storage management software in the following order (as applicable):
   a. MPIO DSM
   b. Microsoft iSCSI Software Initiator
   c. ServeRAID Manager
4. Make sure that the latest IBM host adapter device drivers are installed on node A. Go to http://www.ibm.com/servers/storage/support/ to download the latest device drivers.
5. Install the latest version of the storage management software on node A. For more information, see "Installing the ServeRAID Manager and Management Station programs" on page 1, "Installing the Microsoft iSCSI Software Initiator" on page 18, and "Installing the Fibre Channel host adapters" on page 19.
6. Shut down node A.
7. Restart node B.
8. On node B, uninstall the components from the previous version of the storage management software.
9. Make sure that the latest IBM host adapter device drivers are installed on node B. Go to http://www.ibm.com/servers/storage/support/ to download the latest device drivers.
10. Install the latest version of the storage management software on node B. For more information, see "Installing the ServeRAID Manager and Management Station programs" on page 1, "Installing the Microsoft iSCSI Software Initiator" on page 18, and "Installing the Fibre Channel host adapters" on page 19.
11. Shut down node B.
12. Start one node at a time and complete the following steps:
    a. Click **Start → Programs → Administrative Tools → Services**. The Services window opens.
    b. From the list of services, right-click the cluster server. Click **Automatic** to change the cluster server startup option.
    c. Start the cluster server service on node B.

Windows Server 2003

To perform a scheduled upgrade on computers that are running the Windows Server 2003 operating system, complete the following steps:

1. Before you install the storage management software, complete the following steps in each of the cluster nodes in the cluster:
   a. Click **Start → Programs → Administrative Tools → Services**. The Services window opens.
   b. From the list of services, right-click the cluster server. Then, click **Manual**.
   c. Stop the cluster server on all nodes in the cluster configuration.
2. On each cluster node, uninstall the components from the previous version of the storage management software in the following order (as applicable):
   a. MPIO DSM
   b. Microsoft iSCSI Software Initiator
   c. ServeRAID Manager

3. Make sure that the latest IBM host adapter device drivers are installed in each cluster node. Go to http://www.ibm.com/servers/storage/support/ to download the latest device drivers.

4. Install the latest version of the storage management software in each cluster node. For more information, see "Installing the ServeRAID Manager and Management Station programs" on page 1, "Installing the Microsoft iSCSI Software Initiator" on page 18, and "Installing the Fibre Channel host adapters" on page 19.

5. Start one node at a time and complete the following steps for each node:

   a. Click **Start → Programs → Administrative Tools → Services**. The Services window opens.

   b. From the list of services, right-click the cluster server. Click **Automatic** to change the cluster server startup option.

   c. Manually start the cluster server service.

6. Open Cluster Administrator windows and verify that the cluster groups can be brought online. If they cannot, contact your IBM service representative for support.

Performing a rolling upgrade

This section describes how to perform a rolling upgrade on Windows operating systems.

Important: If applications that do not support a rolling upgrade are installed in the cluster server environment, perform one of the following tasks:

- Put those applications offline before the upgrade; then, put them back online after the upgrade.
- Perform a scheduled upgrade. A scheduled upgrade requires scheduling downtime on your cluster server to upgrade the controller firmware and storage management software.

Windows 2000

To perform a rolling upgrade on computers that are running the Windows 2000 operating system, complete the following steps:

1. On node A, open the Cluster Administrator window.

2. Double-click the Active Groups folder in the right pane of the Cluster Administrator window.

3. Select each listed group and move it to node B.

4. Select note A. Then, click **File → Pause Node** to pause cluster service in node A.

5. On node A, uninstall the components from the previous version of the storage management software in the following order (as applicable):

   a. MPIO DSM

   b. Microsoft iSCSI Software Initiator

   c. ServeRAID Manager

6. Make sure that the latest IBM host adapter device drivers are installed on node A. Go to http://www.ibm.com/servers/storage/support/ to download the latest device drivers.

7. Install the latest version of the storage management software on node A. For more information, see "Installing the ServeRAID Manager and Management

Station programs" on page 1, "Installing the Microsoft iSCSI Software Initiator" on page 18, and "Installing the Fibre Channel host adapters" on page 19.

8. Start Cluster Administrator. Then, click **File → Resume Node** to resume cluster service in node A.

9. On node B, start Cluster Administrator.

10. Double-click the Active Groups folder in the right pane of the Cluster Administrator window.

11. Select each listed group and move it to node A.

12. Select node B. Then, click **File → Pause Node** to pause cluster service in node B.

13. From node B, uninstall the components from the previous version of the software.

14. Make sure that the latest IBM host adapter device drivers are installed on node B. Go to http://www.ibm.com/servers/storage/support/disk/ to download the latest device drivers.

15. Install the latest version of the storage management software on node B. For more information, see Chapter 1, "Installing and running ServeRAID Manager," on page 1.

16. Start Cluster Administrator. Then, click **File → Resume Node** to resume cluster service in node B.

Windows Server 2003

To perform a rolling upgrade on computers that are running the Windows Server 2003 operating system, complete the following steps:

1. On the first node of the cluster, open the Cluster Administrator window.

2. Double-click the Active Groups folder in the right pane of the Cluster Administrator window.

3. Select each of the active groups that are listed in the first cluster node and move them to other nodes in the cluster configuration. Make sure that the cluster groups can be brought online successfully.

4. Select the first node of the cluster in the Cluster Node Tree view and click **File → Pause Node** to pause cluster service in that node.

5. On node A, uninstall the components from the previous version of the storage management software in the following order (as applicable):

   a. MPIO DSM

   b. Microsoft iSCSI Software Initiator

   c. ServeRAID Manager

6. Make sure that the latest IBM host adapter device drivers are installed in each cluster node. Go to http://www.ibm.com/servers/storage/support/ to download the latest device drivers.

7. Install the latest version of the storage management software in the first cluster node. For more information, see "Installing the ServeRAID Manager and Management Station programs" on page 1, "Installing the Microsoft iSCSI Software Initiator" on page 18, and "Installing the Fibre Channel host adapters" on page 19.

8. In the Cluster Administrator window, select the first node of the cluster and click **File → Resume Node** to resume cluster services in the first cluster node.

9. Move all cluster groups that were active in the first cluster node back to it. Make sure that the cluster groups can be brought online in the first cluster node successfully.

10. Repeat steps 1 through 9 for each of the other nodes in the cluster configuration. Perform all steps for each cluster node, one cluster node at a time.

Upgrading from Windows 2000 Advanced Server to Windows Server 2003 in a cluster configuration

Note: Always perform a full system backup before you perform any upgrade procedure.

Important: If applications that do not support a rolling upgrade are installed in the cluster server environment, perform one of the following tasks:

- Put those applications offline before the upgrade; then, put them back online after the upgrade.
- Perform a scheduled upgrade. A scheduled upgrade requires scheduling downtime on your cluster server to upgrade the controller firmware and storage management software.

To upgrade from Windows 2000 Advanced Server to Windows Server 2003 Enterprise Edition, complete the following steps:

1. On node A, open the Cluster Administrator window.
2. Double-click the Active Groups folder in the right pane of the Cluster Administrator window.
3. Move all active cluster groups in node A to node B. Make sure that the cluster groups can be brought online successfully in node B.
4. Select node A. Click **File → Pause Node** to pause cluster service in node A.
5. Follow the instructions from Microsoft to upgrade node A from Windows 2000 Advanced Server to Windows Server 2003 Enterprise Edition.

   Note: During the upgrade, the existing cluster server installation is detected and clustering for Windows 2000 Advanced Server is installed. When the upgrade is complete, node A rejoins the cluster and remains paused.
6. Make sure that the latest IBM host adapter device drivers are installed on node A. Go to http://www.ibm.com/servers/storage/support/disk/ to download the latest device drivers.
7. Make sure that node A was successfully upgraded to Windows Server 2003 Enterprise Edition.
8. Install the latest version of the storage management software on node A. For more information, see "Installing the ServeRAID Manager and Management Station programs" on page 1, "Installing the Microsoft iSCSI Software Initiator" on page 18, and "Installing the Fibre Channel host adapters" on page 19.
9. In the Cluster Administrator window, select node A and click **File → Resume Node** to resume cluster service in node A.
10. Move the cluster groups that were active in node A back to node A.
11. On node B, open the Cluster Administrator window.
12. Double-click the Active Groups folder in the right pane of the Cluster Administrator window.
13. Make sure that all cluster groups failover to node A successfully.
14. Select node B. Click **File → Pause Node** to pause cluster service in node B.
15. Follow the instructions from Microsoft to upgrade node B from Windows 2000 Advanced Server to Windows Server 2003 Enterprise Edition.

   Note: During the upgrade, the existing cluster server installation is detected and clustering for Windows 2000 Advanced Server is installed. When the upgrade is complete, node B rejoins the cluster and remains paused.

16. Make sure that the latest IBM host adapter device drivers are installed on node A. Go to http://www.ibm.com/servers/storage/support/disk/ to download the latest device drivers.

17. Make sure that node B was successfully upgraded to Windows Server 2003 Enterprise Edition.

18. Install the latest version of the storage management software in node B. For more information, see "Installing the ServeRAID Manager and Management Station programs" on page 1, "Installing the Microsoft iSCSI Software Initiator" on page 18, and "Installing the Fibre Channel host adapters" on page 19.

19. In the Cluster Administrator window, select node B and click **File → Resume Node** to resume cluster service in node B.

20. In the Cluster Administrator window, move the cluster groups that were active in node B back to node B. Make sure that they can be brought online successfully.

21. If there are more than two nodes in a cluster, repeat step 11 on page 28 through step 20 for each of the remaining nodes in a cluster, one cluster node at a time.

Appendix A. Configuring an iSCSI software initiator for use with a DS300 storage subsystem

The following sections describe how to configure an iSCSI software initiator for use with a DS300 storage subsystem.

Updating the registry information for the host computer

If the DS300 storage subsystem configuration supports dual controllers, you must perform the following procedure on each host computer if the host computer is connected to one of the DS300 data ports, and is running the Microsoft Windows 2000 or Microsoft Windows 2003 operating system. You must perform this procedure *after* each time that you install or update the Microsoft iSCSI Software Initiator onto a host computer.

To update the registry information, complete the following steps:

1. Create an Emergency Repair diskette for the system, using the instructions in the operating-system online help.
2. Click **Start → Run**.
3. In the Run window, type `regedt32` and click **OK**.
4. In the Registry Editor window, double-click **HKEY_LOCAL_MACHINE** to expand the tree.
5. Expand the **SYSTEM** tree.
6. Expand the **ControlSet001** tree.
7. Expand the **Control** tree.
8. Expand the **Class** tree.
9. Double-click the Globally Unique Identifier (GUID) that contains the legacy information option of SCSI. An example of a GUID is {4D36E97B-E325-11CE-BFC1-08002BE10318}.
10. Select value **0000*x*** (where *x* is the Microsoft iSCSI Initiator device driver), and then click **Parameters**.
11. Change the value for the MAXRequestHoldTime from 60 to120:
    a. In the right pane, double-click **MaxRequestHoldTime**.
    b. In the String Editor window, change the value from hex 3C in hex 78.
    c. Click **OK**.
12. Close the Registry Editor window.

Microsoft iSCSI Software Initiator version 2.0 target configuration

During a failover event, the software initiator might attempt to reconnect to a target portal that is not accessible. Use the procedure in this section to make the necessary changes to the target portal to be sure that the software initiator is associated with the correct target portal.

To make sure that the initiator is associated with the correct target portal, complete the following steps:

1. On the desktop, double-click the **iSCSI Initiator** icon. The iSCSI Initiator Properties window opens.
2. Click the **Target Portals** tab and click **Add** to define a target portal. The Target Portals window opens.

3. Type the IP address of the target portal and then click **Advanced**. The Advanced Settings window opens.

4. Select the Local adapter, and then select the source IP address that is bound to the local adapter.

5. Click **OK** to finish adding the target portal information.

6. Click the **Available Targets** tab and click **Refresh** to make sure that the current valid targets are listed.

7. Select a target, and then click **Log On**.

8. Click **Advanced**.

9. Change the target portal to correspond to the same target portal that you specified in step 3.

10. Repeat step 2 on page 31 through step 9 for each target.

Note: To change the target portal after it is defined, you must log off the target and then log on again and redefine the target portal in the Advanced Settings window.

Appendix B. Using the FlashCopy Management Command Line Tool

This appendix provides detailed instructions for using the FlashCopy Management Command Line Tool.

Introduction

You can use the FlashCopy Management Command Line Tool to create and manage FlashCopy images of application databases.

You can back up an application database to a FlashCopy image and use it later as a rollback point in case of a problem with the application.

You can use the FlashCopy Management Command Line Tool to perform the following tasks:

- List Mini Snap Agents that are available on the IPSAN
- List available databases
- Create a FlashCopy image of the database
- Schedule a FlashCopy image of a database
- Roll back to a FlashCopy image
- Delete a FlashCopy image and its associated metadata
- Print usage information

FlashCopy Management Command Line Tool glossary

This section defines terms that are used in this appendix to describe the commands and options of the FlashCopy Management Command Line Tool.

agent A system on the network that is running at least one instance of a database server application that holds information on network storage volumes and disks.

appointment
An entry in the diary.

diary A scheduling service on the host that you can use to schedule jobs.

host The system on the network that runs the IBM ServeRAID Manager network storage management station.

initiator
A device that starts a SCSI transaction by issuing a command to another device (a target). Typically, a SCSI host is the initiator, but a target can also become an initiator.

instance
A specific occurrence of a database server application.

snapshot
A collection of data that represents the state of a network storage device at a specific point in time.

Command line syntax and output

The FlashCopy Management Command Line Tool uses this syntax:

`sstool host host_username host_password command [options]`

where:

- *host* is the name or IP address of the management service. A host can optionally have a specified port number. Otherwise, the FlashCopy Management Command Line Tool uses 8003 by default.

  For example:

  > samplehost:8000

  > 192.168.0.2:8000

  > 192.168.0.2

- *host_username* and *host_password* are the user name and password that are used to log in to a management station.
- *command [options]* describes the action that is to be performed by the FlashCopy Management Command Line Tool. A command can have options associated with it. (See "Commands.")

Return values

The following values can be returned:

- 0 - Success
- 1 - Invalid parameters
- 2 - Subsystem error

Output

The FlashCopy Management Command Line Tool prints results to a standard output in tabular comma-delimited format. The order and meaning of the column are specific to each command. For more information, see "Commands."

Note: In DOS and Windows, the FlashCopy Management Command Line Tool uses a forward slash (/) as an option prefix instead of a hyphen (-) or double hyphen (--).

Commands

This section describes the FlashCopy Management Command Line Tool commands and their options.

list_agents

Description: Returns a list of FlashCopy agents on the IPSAN (that is, a list of hosts with FlashCopy agents on them)

Command: list_agents

Options: None

list_server_instances

Description: Returns a list of server instances that are available on a FlashCopy agent.

Command: list_server_instances

Options:

-a	The name of the system on the network that runs storage volume/disk database servers
--d	The network domain
--au	The agent user login name
--ap	The agent user password
--app	The database server application type

list_instance_databases

Description: Returns a list of databases that are available on a server instance.

Command: list_instance_databases

Options:

-a	The name of the system on the network that runs storage volume/disk database servers
--d	The network domain
--au	The agent user login name
--ap	The agent user password
--app	The database server application type
-i	The server instance name (the name of the instance of the database server of a given application type that is running on the mini snap agent)
--iu	The instance user login name
--ip	The instance user password

take_snapshot

Description: Creates a FlashCopy image of the database.

Command: take_snapshot

Options:

-a	The name of the system on the network that runs storage volume/disk database servers
--d	The network domain
--au	The agent user login name
--ap	The agent user password
--app	The database server application type
-i	The server instance name (the name of the instance of the database server of a given application type running on the mini snap agent)
--iu	The instance user login name
--ip	The instance user password
--db	The database (the name of the database of a given instance that is running on the mini snap agent)

--ini	Initiator
--dbu	The database user login name
--dbp	The database user password
--NAME	The FlashCopy image name

schedule_snapshot

Description: Schedules creation of a FlashCopy image. The time pattern of the FlashCopy is defined using the scheduling options as shown in "Scheduling options".

Command: schedule_snapshot

Options:

-a	The name of the system on the network that runs storage volume/disk database servers
--d	The network domain
--au	The agent user login name
--ap	The agent user password
--app	The database server application type
-i	The server instance name (the name of the instance of the database server of a given application type that is running on the mini snap agent)
--iu	The instance user login name
--ip	The instance user password
--db	The database (the name of the database of a given instance that is running on the mini snap agent)
--ini	Initiator
--dbu	The database user login name
--dbp	The database user password
--NAME	The FlashCopy image name

Scheduling options:

Option	Value	Description
--MINUTE	0-59	The minute within the hour
--HOUR	0-23	The hour within the 24 hour period
--DAY	1-31	The day of the month
--WEEKDAY	0-6	The weekday
--MONTH	1-12	The month of the year
--YEAR	valid year	The year

In the scheduling options, *value* means that the task will run every unit of time. Values can also be given as a list of values, separated by commas. For example:

    --MINUTE 10,20,30

    --DAY 5,25

list_scheduled

Description: Returns a list of scheduled jobs on the management station.

Command: list_scheduled

Options: None

unschedule_snapshot

Description: Removes a scheduled job from the host diary.

Command: unschedule_snapshot

Options:

--NAME	The snapshot name

roll_back

Description: Rolls back the database to a specific FlashCopy image.

Command: roll_back

Options:

-a	The name of the system on the network that runs storage volume/disk database servers
--d	The network domain
--au	The agent user login name
--ap	The agent user password
--app	The database server application type
-i	The server instance name (the name of the instance of the database server of a given application type that is running on the mini snap agent)
--iu	The instance user login name
--ip	The instance user password
--db	The database (the name of the database of a given instance that is running on the mini snap agent)
--dbu	The database user login name
--dbp	The database user password
--NAME	The FlashCopy image name

delete_snapshot

Description: Deletes a FlashCopy image and its associated metadata.

Command: delete_snapshot

Options:

-a	The name of the system on the network that runs storage volume/disk database servers
--d	The network domain

--au	The agent user login name
--ap	The agent user password
--app	The database server application type
-i	The server instance name (the name of the instance of the database server of a given application type that is running on the mini snap agent)
--iu	The instance user login name
--ip	The instance user password
--db	Database (the name of the database of a given instance that is running on the mini snap agent)
--dbu	The database user login name
--dbp	The database user password
--NAME	The FlashCopy image name

list_snapshots

Description: Lists all FlashCopy images.

Command: list_snapshots

Options: None

help

Description: Prints this document to standard output.

Command: help

Options: None

Appendix C. Notices

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