

IBM Netfinity®  
High-Availability Cluster Solutions  
Using the IBM ServeRAID™ -3H and IBM ServeRAID-3HB  
Ultra2 SCSI Controllers

**Installation and User's Guide**





IBM Netfinity®

High-Availability Cluster Solutions

Using the IBM ServeRAID™ -3H and IBM ServeRAID-3HB  
Ultra2 SCSI Controllers

## **Installation and User's Guide**

**Note**

Before using this information and the product it supports, be sure to read the general information under Appendix A, "Notices" on page 44.

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## About This Book

This book provides information and instructions for setting up a high-availability clustering solution using the IBM® Netfinity® ServeRAID™ -3H Ultra2 SCSI Controller and the ServeRAID-3HB Ultra2 SCSI Controller, herein called the ServeRAID controller.

**Note:** The ServeRAID-3L Ultra2 SCSI Controller does not support clustering.

This book is intended for experienced users who will be involved with setting up clustering and high-availability solutions for their computer installations with Windows NT 4.0 and Novell IntranetWare 4.11.

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## How This Book Is Organized

Chapter 1, "Introduction to IBM High-Availability Cluster Solutions," provides an overview of high-availability cluster solutions.

Chapter 2, "Preparing to Install or Modify a High-Availability Cluster Solution," provides the information you need to know before you start the installation and setup of a high-availability cluster solution or upgrade an existing one. It provides definitions of important terms used in this manual and some considerations you need to be familiar with for the ServeRAID controller.

Chapter 3, "Removing a quorum arbitration cable and upgrading an existing High-Availability Cluster Solution," provides the information you need to know to remove a quorum arbitration cable and upgrade an existing high availability cluster solution.

Chapter 4, "Installing the ServeRAID Controller for the High-Availability Cluster Solution Using Windows NT 4.0," provides the information you need to configure the ServeRAID controllers in the two servers used in the high-availability cluster solution. It includes information to define all shared and nonshared logical drives and set merge IDs, along with instructions for setting up a high-availability cluster solution using Windows NT.

Chapter 5, "Installing the ServeRAID Controller for the High-Availability Cluster Solution Using Vinca and Novell IntranetWare," provides the information you need to configure the ServeRAID controllers in the two servers used in the high-availability cluster solution. It includes information to define all shared and nonshared logical drives and set merge IDs, and directs you to information you can use to set up a high-availability cluster solution with Novell IntranetWare.

Chapter 6, "Monitoring and Updating a High-Availability Cluster Solution Using the ServeRAID Manager Program," provides information about how to use the ServeRAID Manager program to determine the availability of logical drives in a cluster. It also includes procedures to use if you add or remove a hard disk drive in your high-availability cluster solution, or to uninstall your high-availability cluster solution.

Chapter 7, "Monitoring and Updating a High-Availability Cluster Solution With the ServeRAID Administration and Monitoring Utility," provides information about how to use the ServeRAID Administration and Monitoring Utility to determine the availability of logical drives in a cluster. It also includes procedures to use if you add or remove a hard disk drive in your high-availability cluster solution, or to uninstall your high-availability cluster solution.

Chapter 8, "Troubleshooting a High-Availability Cluster," provides information on how to recover from some potential problems, such as a defective ServeRAID controller or a defective hard disk drive in a logical drive.

Appendix A, "Notices," includes legal notices and trademarks.

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## Related Publications

During the installation of the High-Availability Cluster Solution, you might need to refer to one or more of the following manuals:

- The *IBM Shared Disk Clustering Hardware Reference* provides general information about planning and configuring a shared-disk cluster using IBM Netfinity and PC Server products. It contains illustrations, descriptions, and parts listings for various high-availability, shared-disk cluster examples. This publication is currently available on the World Wide Web at:

<http://www.pc.ibm.com/support>

When you are on the IBM Web page, do the following:

1. Select **Server Brand**
  2. Select **Clustering**
  3. Select **Online Pubs**
  4. Select **User's Guides**
  5. Search through the list of books to find the one you need.
- The *IBM ServeRAID-3H, ServeRAID-3HB, and ServeRAID-3L Ultra2 SCSI Controller Installation and User's Guide* provides instructions for the installation of the ServeRAID controller, as well as instructions on how to use and maintain RAID configurations.

For more information about these publications, call 1 800 879-2755 in the United States and Puerto Rico, or call 1 800 426-4968 in Canada. In all other countries, contact your IBM reseller or marketing representative.



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## Chapter 1. Introduction to IBM High-Availability Cluster Solutions

A *cluster* is a type of parallel or distributed system that consists of interconnected computers used as a single, unified computing resource. In other words, a group of computers linked together in such a way that they share and manage a set of resources that can support a number of users at the same time.

This *high-availability clustering solution* is based on a two-node cluster, where both nodes, or servers, can access the same storage devices, but only one server at a time controls the storage devices shared by both servers. If one server fails, the remaining server automatically assumes control of the resources that the failed server was using, while still controlling its own resources at the same time. The failed server can then be repaired offline without the loss of time or work efficiency, because access to that server's data and applications is still available.

When the failed server is operational again, it can be placed back into the cluster, the resources are reallocated between the two servers and the cluster can then resume normal operations.

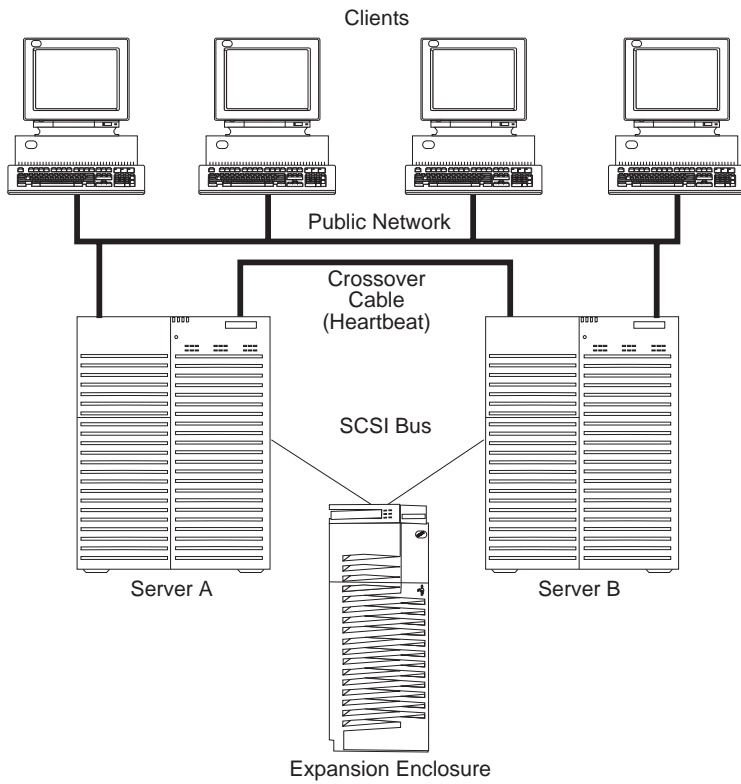
An *adapter* is software that enables different software components or products to interact with one another. A *controller* is a device that coordinates and controls the operation of one or more input and output devices, such as workstations, and synchronizes the operation of such devices with the operation of a system as a whole.

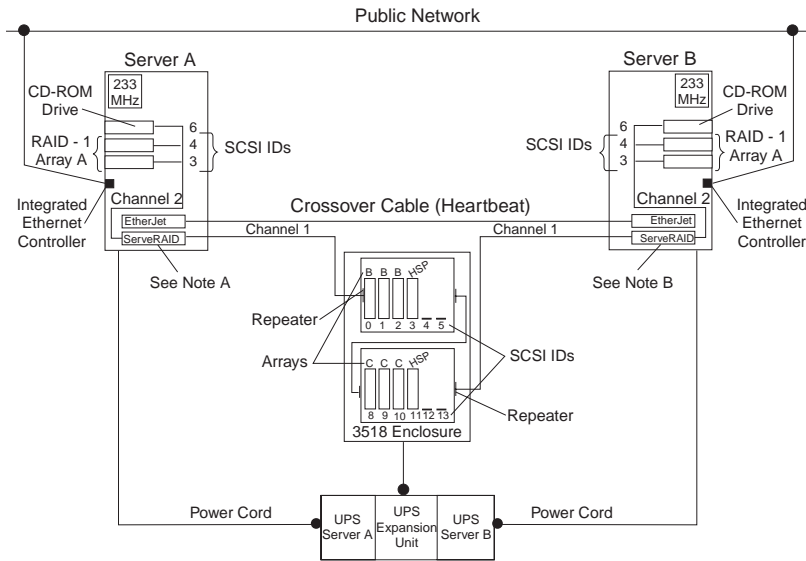
IBM high-availability cluster solutions, as discussed in this manual, use the IBM ServeRAID-3H Ultra2 SCSI Controller or IBM ServeRAID-3HB Ultra2 SCSI Controller (ServeRAID-3L Ultra2 SCSI controllers do not support clustering), and the term ServeRAID Controller will be used throughout to mean adapter or controller. Whether you have one or the other, you can use the information in this book to help you successfully set up a clustering solution to meet your requirements. IBM high-availability cluster solutions also use IBM expansion enclosures, such as the IBM Enterprise Expansion Enclosure (Model 3518), the IBM PC Server 3519 Rack Expansion Enclosure, the IBM Netfinity EXP10 Rack Expansion Enclosure, or the IBM Netfinity EXP15 Rack Expansion Enclosure.

IBM high-availability cluster solutions can be installed using one of the following:

- Microsoft Cluster Server, which is part of Windows NT Server Enterprise Edition
- Vinca High Availability for Novell IntranetWare, which is part of the IBM Netfinity Cluster Pack by Vinca

The following figures show an example of a simple high-availability clustering solution. The first figure shows a high-level view of a cluster, while the second figure shows more of a detailed view of a cluster.





**Note A: Server A**

- Shared Channel 1 - SCSI ID 6
- Nonshared Channel 2 - SCSI ID 7
- Nonshared Channel 3 - SCSI ID 7
- Shared Channel 3 - SCSI ID 6 (Heartbeat Cable)\*

**Note B: Server B**

- Shared Channel 1 - SCSI ID 7
- Nonshared Channel 2 - SCSI ID 7
- Shared Channel 3 - SCSI ID 7 (Heartbeat Cable)\*

\* Note: If you are using a ServeRAID-II adapter with a quorum drive, then you need to use a shared channel 3 heartbeat cable in your configuration.

The solution you use for your installation depends on your own specific requirements. For more information about requirements and types of installations, refer to the *IBM Shared Disk Clustering Hardware Reference*. This publication can be found on the World Wide Web site at:

<http://www.pc.ibm.com/us/support>

When you are at the IBM Web site,

1. Select **Server Brand**
2. Select **Clustering**
3. Select **Online Pubs**
4. Select **User's Guides**
5. Search through the list of books to find the one you need.

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## Chapter 2. Preparing to Install or Modify a High-Availability Cluster Solution

**Note:** If you are going to upgrade an existing High-Availability Cluster Solution by removing the quorum arbitration cable and are already familiar with the concepts of a cluster, go to Chapter 3, “Removing a quorum arbitration cable and upgrading an existing High-Availability Cluster Solution” on page 7. If you are setting up your first High-Availability Cluster Solution, continue reading this section.

Before you begin installing and setting up a high-availability cluster solution, it is important to familiarize yourself with the following terms and definitions that are used in this manual, as well as some considerations concerning the ServeRAID Controller.

**Note:** The following terms and definitions are for the Microsoft Cluster Solution using Windows NT. For similar terms and definitions for the Novell IntranetWare Cluster Solution using Novell NetWare, refer to the *Vinca High Availability for NetWare manual* and the *IBM ServeRAID-3H, ServeRAID-3HB, and ServeRAID-3L Ultra2 SCSI Controller Installation and User's Guide*.

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### Terms and Definitions

The following terms will be used in this manual.

**Failback:** This is a special case of failover and is the process of moving back some or all groups of resources to the preferred owner after a failover has occurred. The *preferred owner* is the server in the cluster on which you prefer each group of resources to run. If the preferred owner fails, its resources are transferred to the other server. When the preferred owner is repaired and comes back online, and *allow failback* is enabled in the Microsoft Cluster Administration Program, the resources are automatically transferred back to that server.

**Failover:** This is the process of relocating the cluster resources from a failed server to the surviving server. The detection of a failure is made by the resource-monitor program responsible for the resource. If a resource failure occurs, the resource-monitor program notifies the Cluster Service, which triggers the actions defined in the failover policy for that resource. A failover can occur automatically, such as when an application or a server fails, or it can occur manually, such as when a system administrator moves all applications onto one server and then brings the other server down for scheduled maintenance.

Failover generally consists of three components:

- Failure detection
- Resource relocation
- Application restart

For more information about failover, refer to the *IBM ServeRAID-3H, ServeRAID-3HB, and ServeRAID-3L Ultra2 SCSI Controller Installation and User's Guide*.

**Resource Group:** Dependent resources that are grouped together. Some resources need other resources to run successfully and are known as *resource dependencies*. When one resource is listed as a dependency for another resource, the two resources must be placed in the same group. If all resources are ultimately dependent on one resource (for example, one physical disk resource), all resources must be in the same group. It is possible that all resources in a cluster will need to be in one group.

Also, any cluster operation performed on a group is performed on all resources that are present within that group. For example, if a resource needs to be moved from Server A to Server B, all the resources defined in the group that the resource is in will be moved.

**SCSI Heartbeat Connection:** This is a small computer system interface (SCSI) cable connection that joins two IBM ServeRAID controllers, one in each server, together.

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## ServeRAID Considerations

It is important to understand the following ServeRAID controller considerations before you set up your high-availability cluster solution.

**Note:** The following ServeRAID considerations are for the Microsoft Cluster Solution using Windows NT. For similar considerations for the Novell IntranetWare Cluster Solution, refer to the *Vinca High Availability for NetWare* manual and the *IBM ServeRAID-3H, ServeRAID-3HB, and ServeRAID-3L Ultra2 SCSI Controller Installation and User's Guide*.

- The ServeRAID controller does not allow the failover of RAID level-5 logical drives that are in a critical state; that is, a drive in a RAID level-5 array has failed. For this reason, do not use RAID level-5 for the quorum disk. The quorum drive must be configured as a RAID 1 logical drive.

**Note:** You should define hot-spare drives (HSP) in your array to minimize the time that logical drives remain in critical state.

- Every logical drive that is shared by the two servers *must* have its cache policy set to write-through mode to ensure data integrity is maintained. Logical drives that are not shared between the two servers can be configured for write-back mode for improved performance. For more information about write policy, refer to the *IBM Netfinity ServeRAID-3H, ServeRAID-3HB, and ServeRAID-3L Ultra2 SCSI Controller Installation and User's Guide*.
- The SCSI-2 Fast/Wide Enhanced Repeater Card is required for configurations using the IBM Enterprise Expansion Enclosure (Model 3518) or the IBM Model 3519 Rack Expansion Enclosure. The previous version of the SCSI-2 Fast/Wide Repeater is not supported in these configurations. For information on the latest version of the SCSI Fast/Wide Enhanced Repeater Card, contact your IBM remarketer or dealer.
- Each ServeRAID controller must have a unique Controller Host ID assigned.
- Do not attempt to change the Controller Host ID on both ServeRAID controllers in a pair at the exact same time. Doing so can cause a problem, such as a server *lock-up*.
- Each ServeRAID controller, and controller pair, must have a different SCSI Channel Initiator ID assigned to the shared channels. For example, one server, Server A, could be set to ID 6, and the other server, Server B could be set to ID 7. This will be described during the setup instructions.
- The stripe unit size of each ServeRAID controller in a pair must be set to the same value (8 KB, 16 KB, 32 KB, or 64 KB).
- The SCSI channels in a controller pair must be cabled so that the same channels are shared between controllers.
- All disks that will be shared must be connected to the shared channels. This includes hot-spare (HSP) drives, as well as data drives.
- Only one logical drive must be created for each physical array because only one server at a time can own a physical drive. For example, only logical drives A0, B0, C0, and so on, are supported, not A1, B1, and so on.

- Merge ID numbers in the range 1–8 must be assigned to each logical drive that will be shared. Merge ID numbers in the range 200–215, where the last two numbers are the SCSI Channel initiator of a shared channel, must be assigned to the nonshared logical drives.
- If you are starting (booting) the operating system from a shared controller, define the first logical drive as the startup drive and assign a nonshared Merge ID, for example, 206 for Server A.
- Do not connect nondisk devices, such as tape drives, to shared channels. They will be accessible to both servers and conflicts can arise.
- Hot-spare drives are not shared between the controllers in a pair. Each ServeRAID controller must have a hot-spare drive defined if hot-spare protection is desired, no matter which server is controlling a logical drive. All hot-spare drives must be connected to shared channels so that, if the hot-spare drive is used to replace a failed shared disk, the disk can be accessed from either server if a failover occurs later.
- RAID level-0 and RAID level-1 logical drives can failover in normal or critical state. RAID level-5 logical drives cannot failover in critical state. Use hot-spare drives to minimize the time that logical drives are in critical state and exposed to a second disk or system failure.
- The total number of logical drives per controller is eight before or after a failover. A failover will not complete if this number is exceeded.
- Logical drives that are currently undergoing Logical Drive Migration (LDM) operations, will not be allowed to failover. However, all other drives will be able to failover if necessary.
- Drives that are configured by one controller in the pair must appear as Ready drives to the other controller in the pair. The same must also be true in reverse. Be sure to verify this consideration when drives are added after the nodes are started. Restart the servers, or scan for new devices, or set the drives to Ready state using the RAID Administration and Monitoring Utility after adding new drives to a server.
- All shared drives must be part of a logical disk or defined as a hot spare to one or the other servers. All other drives should be removed from the shared disk enclosure to ensure proper operation.
- If a failover occurs while a critical RAID level-1 logical drive is rebuilding to a spare disk, the rebuild automatically starts a few seconds after the failover is completed.
- The cluster support software will initiate a synchronization of RAID level-1 and RAID level-5 logical drives immediately after a failover. If a drive fails before this synchronization is complete, logical drive access is placed in the blocked state.
- When a logical drive spans across multiple channels and a failure within the drive subsystem occurs that is unique to a channel (for example, a disconnected cable), the entire physical array will be identified as unsuccessful even though access from the surviving server can occur. Therefore, you might want to consider, if you have small arrays, not spanning across multiple channels.

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## Chapter 3. Removing a quorum arbitration cable and upgrading an existing High-Availability Cluster Solution

**Note:** This procedure is for IBM ServeRAID-3H and IBM ServeRAID-3HB Ultra2 SCSI Controllers only.

If you already have an existing High-Availability Cluster Solution set up and running using a quorum arbitration cable (SCSI Heartbeat Cable), and you want to remove it from your cluster to free a SCSI channel for future use with more storage devices, do the following:

**Note:** Before starting this procedure, you need to obtain the new software for the IBM ServeRAID controllers. If you need to update any RAID software, you must update all RAID software at the same time to ensure compatibility with all of the levels of software. This includes:

- BIOS/Firmware
- Device Drivers
- ServeRAID Manager
- ServeRAID Configuration Program
- Administration and Monitoring Utility
- Command Line Programs

The software is available on the IBM web page at:

<http://www.pc.ibm.com/support>

When you are on the IBM Web page, do the following:

1. Select **Server Brand**
2. Select **Clustering**
3. Select **Online Pubs**
4. Select **Software**
5. Search through the software for the ServeRAID software you need.

1. Shutdown both servers in the cluster.
2. Remove the Quorum Arbitration Cable (SCSI heartbeat cable) on channel 3 of both servers.
3. Install the new BIOS/Firmware using the *IBM ServeRAID Configuration and Management CD* or the software that you downloaded from the IBM web page.

**Note:** The sequence in which you install the BIOS/Firmware on the servers does not matter since you will not start up in the operating system. You should start up to either the CD-ROM or the diskette.

4. Restart both servers.
5. Use the setup program in the Clustering Software to update the ServeRAID clustering software on both servers.
6. Update the ServeRAID device drivers on both servers using the *IBM ServeRAID Device Driver Diskette*.

**Note:** You do not have to remove the previous device driver before installing the new device driver.

7. Shutdown both servers; then, remove any diskettes from the diskette drive and turn on both servers.
8. To upgrade the Cluster Software, go to "Upgrading MSCS on ServeRAID Servers" on page 20.

Once you have removed the quorum arbitration cable, you can now use that SCSI channel to add more hard disk drivers. For information on how to add a hard disk drive to a cluster, go to “Adding Hard Disk Drives to a Cluster” on page 30.



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## Chapter 4. Installing the ServeRAID Controller for the High-Availability Cluster Solution Using Windows NT 4.0

To install a high-availability cluster solution, you must first configure the ServeRAID controller, define logical drives, and set up merge IDs. To do this, perform the following procedure.

### Important

Before beginning this procedure, read the following information.

- Read "ServeRAID Considerations" on page 5.
- Use the following CD-ROM and diskettes, together as a set, with the high-availability cluster solution:
  - *IBM ServeRAID Configuration and Management CD*
  - *IBM ServeRAID Device Drivers Diskette*

When you update any RAID software, you must update all RAID software at the same time to ensure compatibility with all of the levels of the software. This includes:

- BIOS/Firmware
- Device Drivers
- ServeRAID Manager
- ServeRAID Configuration Program
- Administration and Monitoring Utility
- Command Line Programs

Ensure that the ServeRAID controllers have the latest BIOS/Firmware installed. You must have Version 3.5, or higher, as a minimum. If you are using Microsoft Cluster Server, be sure that you use a version that has been certified by Microsoft as noted on the following Web site. Refer to this Web site to download the latest level:

[www.pc.ibm.com/support](http://www.pc.ibm.com/support)

When you are on the IBM Web page, do the following:

1. Select **Server Brand**
2. Select **Clustering**
3. Select **Online Pubs**
4. Select **Software**
5. Search through the software for the ServeRAID software you need.

For instructions on how to determine the versions of the BIOS/Firmware on your ServeRAID controller, refer to the documentation that was included with your server or your controller.

**Note:** If you are using the latest version of the *IBM ServeRAID Configuration and Management CD*, the BIOS/Firmware will be automatically verified when you start the server with the CD in the CD-ROM drive. If it needs to be updated, you will be prompted to do so.

---

## Preparing the Servers

Before you configure Server A and Server B, do the following:

1. If necessary, perform any operating system shutdown procedure on the two servers, Server A and Server B, you are going to use in the cluster, and then turn off the servers.
2. If you have not done so, connect any shared external drive enclosures between both servers; then, turn on the enclosures.

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## Configuring Server A

**Note:** For complete information on using the ServeRAID Configuration Program, refer to the *IBM ServeRAID-3H, ServeRAID-3HB, and ServeRAID-3L Ultra2 SCSI Controller Installation and User's Guide*.

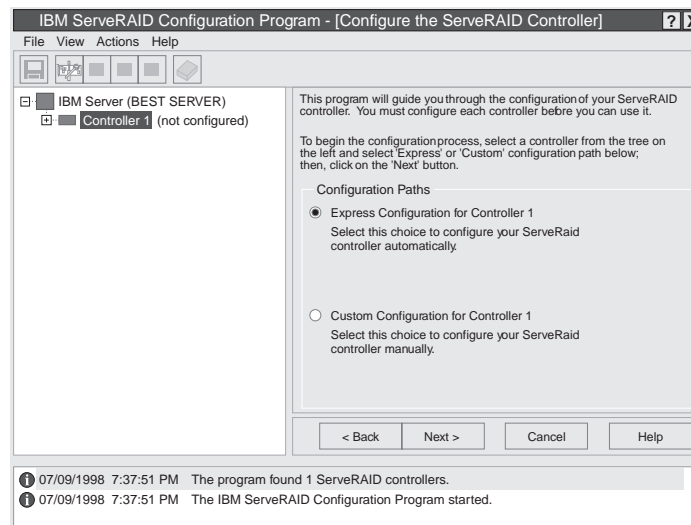
To configure Server A, do the following:

**Important**

If you already have logical drives defined that you wish to keep, go to step 6 on page 11. The steps prior to step 6 will cause loss of data by deleting all logical drives already defined.

1. Start Server A using the *IBM ServeRAID Configuration and Management CD* (or the configuration CD-ROM that was included with your server). At this time, leave Server B turned off.

A screen similar to the following appears:



2. Click **Cancel**.

### Important

The ServeRAID controller should be initialized only one time when the controller is first installed. Initializing the controller removes all configuration information from NVRAM. This information includes the SCSI IDs, the cluster and the cluster partner name, and the array information. This point is especially important if the Windows NT system boot drive is attached to the IBM ServeRAID controller. If the initialization occurs after the boot drive array has been created, this array information will be removed and the server will not be able to start up into Windows NT.

- Using the right mouse button, click the ServeRAID controller in the Main Tree that you are configuring, and a pop-up list appears.
- Click **Restore to Factory Defaults**  
If a confirmation window appears, click **Yes**.
- When complete, a message appears at the bottom of the screen indicating the initialization was successful.  
**Note:** Do not attempt to change the SCSI Channel Initiator ID on both ServeRAID controllers in a pair at the exact same time. Doing so can cause a problem, such as a server *lock-up*.
- Using the right mouse button, click the ServeRAID controller in the Main Tree that you are configuring, and the pop-up list appears.
- Click **Configure for Clustering**.
- A window appears. Fill in the following information:

### Important

Keep the following in mind:

- If your configuration will contain multiple ServeRAID controller pairs, each Controller Host ID must be unique.
- The name of the Controller Host ID and the Cluster Partner Host ID are case-sensitive.
- Servers cannot have the same SCSI Channel Initiator IDs.

- Controller Host ID - Enter a name to identify the first controller, for example, Server A.
  - Cluster Partner Host ID - Enter a name that you will use to identify the second controller, for example, Server B.
  - SCSI Channel Initiator IDs - The system presets these seven (7). Change it to six (6).
- Record the Controller Host ID and Cluster Partner Host ID. Be sure to record the SCSI Controller Host IDs and Cluster Partner Host IDs in a safe place.
  - Click **OK**.

### Notes:

- When creating logical drives, be aware of the following way in which the information is displayed on the ServeRAID configuration program screens. **You should create only one logical drive for each array when defining shared logical drives for use in a cluster.**

When logical drives are created, they appear on the screen in the order they are created. For ease of understanding, create an array and then all logical drives for that array *before* you create another array. If they are created in that order, they will appear on the screen as shown in the first figure. (\*\*\*\*\* is other information that will appear on the screen, such as RAID level, Write Policy, and so on, but is not needed for this explanation).

```

A ***** A0 ***** ***** ***** ***** *****
B ***** B0 ***** ***** ***** ***** *****
C ***** C0 ***** ***** ***** ***** *****

```

If logical drives are created out of order, meaning you do not follow the order mentioned above, they are listed on the screen out of order, which might cause some confusion. For example, say you created two arrays, Array A and Array B, but did not define any logical drives at that time. Then, afterwards, you go back and create a logical drive on Array B. That logical drive will then appear in the first line of the logical drive box. Now, if you go back and create another logical drive on Array A, that logical drive will show up on the second line of the logical drive box, as shown in the second figure.

```

A ***** B0 ***** ***** ***** ***** *****
B ***** A0 ***** ***** ***** ***** *****

```

- b. Hot-spare/standby hot-spare (HSP/SHS) devices must be defined only on a shared channel, and each controller must have its own HSP/SHS device defined. This means that the same HSP/SHS device must not be defined on both controllers in the pair.

11. Create RAID arrays and logical drives on Server A as follows:

- a. Click the ServeRAID controller that you want to configure in the Main Tree.
- b. Click the **Custom Configuration** radio button.
- c. Click the **Next** button.

**Notes:**

- 1) You must have two or more drives for RAID level 1 and three or more drives for RAID level 5 within the same array.
  - 2) In the Windows NT environment, you must create at least one logical drive, the quorum drive, as RAID level 1 to store the quorum resource information. This drive can be used to store customer programs and data.
- d. Using the right mouse button, click the drive or SCSI Channel icons in the Main Tree to select the drives that you want to add to your arrays, delete from your arrays, or define as hot-spare drives; then, select a choice from the pop-up list.

or

Drag the drive or SCSI Channel icon from the Main Tree and drop it on the Array or Hot-Spare Drive icon in the Main Panel on the right. If you change your mind, you can drag the icons back to the Main Tree to remove them from the configuration.

- e. After you select the data drives for your arrays and define your hot-spare drives, click the **Next** button.

If you change your mind, you can:

- Remove a specific drive from a newly defined array or delete an entire newly defined array. To do this, click the **Back** button, use the right mouse button to click the specific drive or Array icon in the Main Panel on the right, and then select **Remove from New Array** or **Delete New Array**.
  - Remove a specific hot-spare drive or all newly defined hot-spare drives. To do this, click the **Back** button, use the right mouse button to click the Hot-Spare Drive icon in the Main Panel on the right, and then select **Remove New Hot-Spare Drive** or **Remove All New Hot-Spare Drives**.
- f. Select a RAID level for the logical drive from the RAID pull-down menu in the Main Panel. (Refer to the ServeRAID documentation for descriptions of the supported levels.)

g. Move the sliding bar in the Main Panel from right to left to allow data and parity space for the logical drive.

**Note:** Typically, the first logical drive defined on the first ServeRAID controller found by system BIOS/Firmware during startup will be your startup (boot) drive.

h. Click the **Next** button.

i. Review the information that appears on the Configuration Summary screen.

**Note:** To change the configuration, click the **Modify** icon button.

j. Click the **Apply** button to accept and save the configuration.

**Note:** For Microsoft Windows NT clusters, you should define all shared logical drives on Server A.

Then, continue with step 12.

12. After creating the arrays and logical drives, you must assign a merge ID to the shared drives. To set the merge IDs, do the following:

**Note:** Shared and nonshared merge ID considerations:

- Shared logical drives must have unique merge IDs.
- Valid merge IDs for nonshared logical drives are in the range 200–215. An example would be to set all nonshared drives on Server A to Merge ID 206 and all nonshared drives on Server B to Merge ID 207.
- The merge ID must be unique for each shared logical drive that will be shared by the controller pair. For example, if you have a logical drive with a merge ID of 1 on Server A, you cannot assign the same merge ID to a logical drive on Server B. Valid IDs for shared logical drives are in the range 1–8.

13. Using the right mouse button, click the ServeRAID controller in the Main Tree that contains the logical drives and a pop-up list appears.

14. Click **Configure for Clustering**.

15. A window appears.

16. Click the **Shared** checkbox for the logical drives that will be shared between the two ServeRAID controllers.

17. Set the Merge ID. You can change the Merge Group value, but use the default provided.

18. Click **OK**.

19. Exit the Configuration Program by either clicking the box with the X in the upper right corner, or by clicking **File**, and then **Exit**.

20. Shut down Server A.

21. Restart the server.

---

## Configuring Server B

To configure Server B, do the following:

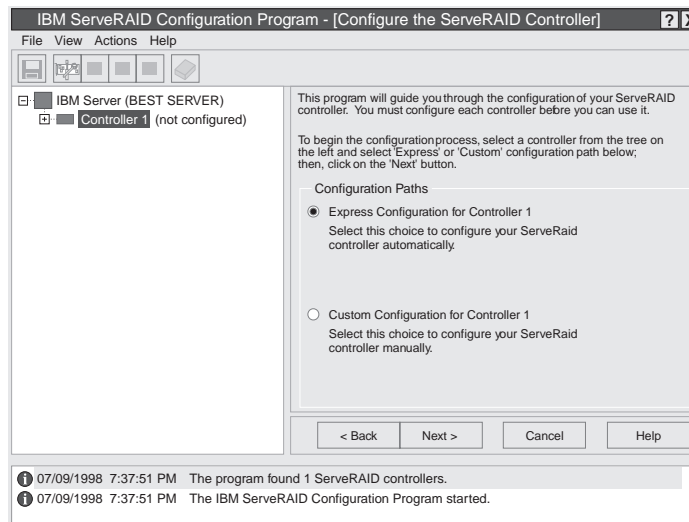
**Note:** For complete information on using the ServeRAID Configuration Program, refer to the *IBM ServeRAID-3H, ServeRAID-3HB, and ServeRAID-3L Ultra2 SCSI Controller Installation and User's Guide*.

### Important

If you already have logical drives defined that you wish to keep, go to step 6 on page 14. The steps prior to step 6 will cause loss of data by deleting all logical drives already defined.

1. Start Server B using the *IBM ServeRAID Configuration CD-ROM* (or the configuration CD-ROM that was included with your server).

A screen similar to the following appears:



2. Click **Cancel**.

### Important

The ServeRAID controller should be initialized only one time when the controller is first installed. Initializing the controller removes all configuration information from NVRAM. This information includes the SCSI IDs, the cluster and the cluster partner name, and the array information. This point is especially important if the Windows NT system boot drive is attached to the IBM ServeRAID controller. If the initialization occurs after the boot drive array has been created, this array information will be removed and the server will not be able to start up into Windows NT.

3. Using the right mouse button, click the ServeRAID controller in the Main Tree that you are configuring and a pop-up list appears.
4. Click **Restore to Factory Defaults**  
If a confirmation window appears, click **Yes**.
5. When complete, a message appears at the bottom of the screen indicating the initialization was successful.  
**Note:** Do not attempt to change the Controller Host ID on both ServeRAID 3 controllers in a pair at the exact same time. Doing so can cause a problem, such as a server *lock-up*.
6. Using the right mouse button, click the ServeRAID controller in the Main Tree that you are configuring, and the pop-up list appears.
7. Click **Configure for Clustering**.
8. A window appears. Fill in the following information:

### Important

Keep the following in mind:

- If your configuration will contain multiple ServeRAID controller pairs each Controller Host ID must be unique.
- The name of the Controller Host ID and the Cluster Partner Host ID are case-sensitive.
- Servers cannot have the same SCSI Controller Initiator IDs.

- Controller Host ID - Enter the name you chose in step 8 on page 11 to identify the second controller. This is the same name as the Cluster Partner Host ID you set up for the first controller, in this case, Server B.
- Cluster Partner Host ID - Enter the name you chose in step 8 on page 11 to identify the first controller. This is the same name as the Controller Host ID you set up for the first controller, in this case, Server A.
- SCSI Controller Initiator IDs - The system presets these to seven (7). Leave this set to seven (7).

9. Record the Controller Host ID and Cluster Partner Host ID. Be sure to record the Controller Host IDs and Cluster Partner Host IDs in a safe place.

10. Click **OK**.

---

## Installing the Microsoft Cluster Software

To install the Microsoft Cluster Software, do the following procedure.

You have now completed the configuration for your ServeRAID controllers and hard disk drives, which are the initial installation steps for a high-availability cluster solution.

To install a high-availability cluster solution using Windows NT, complete the following procedure.

### Important

Before beginning the procedure, read the following information.

- Read Chapter 2, "Preparing to Install or Modify a High-Availability Cluster Solution" on page 4, which contains important information on ServeRAID considerations.
- Read the steps in this chapter for configuring Server A and Server B for the high-availability cluster solution.
- Ensure that you are using the *IBM ServeRAID Device Drivers Diskette, Version 3.50*, or higher, during the installation of the Microsoft Windows NT Server Enterprise Edition.

a. Install Microsoft Windows NT Server Enterprise Edition with the update to Service Pack 3, or higher, on both servers, but do not install the Microsoft Cluster Server (MSCS) software. When the system prompts you, deselect the option to install MSCS. It will be installed later in this procedure.

For information on installing Windows NT Server Enterprise Edition, refer to the documentation that is included with it. When you are finished, return here and continue with this procedure.

b. Format all shared logical drives and assign drive letters to them by doing the following:

**Important**

Before using the IPSHAHTO.EXE program:

- Use the ServeRAID Manager program or the Administration and Monitoring Utility to scan for new devices.
- Check to see if all synchronization of RAID level-5 logical drives is completed. To check if any synchronization is running, use the ServeRAID Administration and Monitoring Utility. If arrays are currently being synchronized, a pop-up window appears showing the progress of the synchronization.

- 1) On Server A, run the utility IPSHAHTO.EXE from the ServeRAID Windows NT Cluster Solutions Diskette by typing the following command from a Windows NT command line or from the Add/Remove Programs control panel:

```
a:\support\ipshahto
```

This utility will make all the shared logical drives available for access by Server A.

**Note:** It is helpful if part of the volume label that you assign contains the drive letter that is assigned to a drive, such as drive E.

- 2) Using the Windows NT Disk Administrator, format all shared logical drives as NTFS (NT File System), assign volume labels, and specify drive letters to each.
- 3) On Server B, run the same utility, IPSHAHTO.EXE, to make all shared logical drives available for access by Server B.  
**Note:** The volume label is used as a guide to make sure the same letters are assigned on Server B as were assigned on Server A.
- 4) Using the Windows NT Disk Administrator, assign the same drive letters that you assigned to each drive on Server A.
- 5) Run IPSHAHTO.EXE from Server A again to regain control of all shared logical drives to that server.

- c. Install the Microsoft Cluster Server (MSCS) software.

**Note:** The directory name and path where the MSCS software is installed must be the same on both servers.

To start the installation, do the following:

**Important**

You must use the *localquorum* option when installing the Microsoft Cluster Server (MSCS) software with ServeRAID.

- 1) Insert the *Windows NT Server Enterprise Edition Component CD-ROM* into the CD-ROM drive on Server A and issue the following command, either from a command line or from Add/Remove Programs in the Control panel:

**Note:** The parameter, *localquorum*, must be typed in lowercase.

```
\MSCS\CLUSTER\I386\SETUP /localquorum
```

- 2) Install the Microsoft Cluster Server software following the instructions in the documentation that is included with the MSCS software.

Server A will restart when the installation is completed.

- d. To make Server B *join* the cluster, do the following:



**Note:** The directory name and path where the MSCS software is installed must be the same on both servers.

- 1) Insert the *Windows NT Server Enterprise Edition Component CD-ROM* into the CD-ROM drive on Server B and issue the following command, either from a command line or from Add/Remove Programs in the Control panel:

```
\MSCS\CLUSTER\I386\SETUP
```

- 2) Install the Microsoft Cluster Server software following the instructions in the documentation that is included with the MSCS software to have Server B join the newly created high-availability cluster solution.

Server B will restart when the installation is completed.

- e. Make Server A the preferred owner of the cluster group by doing the following:

- 1) Run the Cluster Administrator program that is included with the MSCS software. Refer to the documentation that is included with the MSCS software for instructions.
- 2) Select the **Cluster Group**.
- 3) Display its properties window by selecting **File**; then, by selecting **Properties**.
- 4) Click **Modify** next to the Preferred Owner text box.
- 5) Select **Server A** and move it to the right side, into the Preferred Owners panel.
- 6) Click **OK**.

Server A appears in the Preferred Owner text box.

- 7) Make sure that the cluster group has failover enabled. For instructions on how to do this, refer to the documentation that is included with the Microsoft Cluster Services package.
- 8) Close the connection to the cluster and open it again to ensure that the connection is through Server A.

- f. Install the IBM ServeRAID Windows NT Cluster Solution utility by doing the following:

- 1) From Server A, run the SETUP.EXE program from the ServeRAID Windows NT Cluster Solution Diskette and follow the instructions that appear on the screen.
- 2) When complete, repeat the procedure from Server B.

Upon completion of the installation of the utility on both servers, all shared ServeRAID groups and disk resources will be automatically created by the IBM Cluster Solution setup program and then brought ONLINE. Server A will be the current owner of these groups.

- g. Move the quorum resource from *localquorum* to a ServeRAID disk resource by doing the following:

- 1) From the Cluster Administrator, click the cluster name with the left mouse button to select the cluster you are using.
- 2) Click the right mouse button to open the cluster.
- 3) Select **Properties**; then, select the **Quorum tab**.
- 4) In the **Quorum Resource** field, select a ServeRAID shared disk and click **OK**.

Refer to the *Microsoft Cluster Solution Administrator's Guide* for more information.

You will need to ensure that the same server (for example, Server A) owns the ServeRAID disk resources and the localquorum resource and that the quorum resource is moved to a RAID level-1 logical drive.

Shared disk resources can now be moved manually using the Microsoft Cluster Administrator utility or automatically during failover.

---

## Special Installation Instructions

**Note:** Only perform this procedure if you are using Service Pack 3. Do not perform this procedure if you are using Service Pack 4 or later.

You must update the Microsoft Cluster Solution software supplied by Microsoft for each cluster server. To obtain and install this update, do the following:

1. Download the file CLUSFIXI.EXE currently at the following Web site:  
*ftp://ftp.microsoft.com/bussys/winnt/winnt-public/fixes/usa/nt40/hotfixes-postSP3/roll-up/CLUSTER/*
2. Copy CLUSFIXI.EXE file to the boot hard disk drive on each cluster server.
3. Run CLUSFIXI.EXE on Server A. This will automatically update Server A and restart (reboot) the system.
4. Allow Server A to rejoin the cluster and be reported in the MSCS cluster administrator as *up* and all resources are *online*.
5. Run CLUSFIXI.EXE on Server B. This will automatically update Server B and restart (reboot) the system. Allow Server B to rejoin the cluster and be reported in the MSCS cluster administrator as *up* and all resources are *online*.
6. You have completed the steps necessary for installing the MSCS update.

---

## Creating a ServeRAID Disk Resource on a ServeRAID Server with MSCS

You can use a ServeRAID logical disk that has not already been designated as a cluster resource, or you can create a new array and logical disk on Server A, using the ServeRAID Configuration Program or the ServeRAID Administration and Monitoring Utility. For more information about creating new arrays and logical disks, refer to the *IBM ServeRAID 3H, ServeRAID-3HB, and ServeRAID-3L Ultra2 SCSI Controllers Installation and User's Guide*.

**Note:** Be sure to assign a shared merge ID to the new shared logical disk drive.

Before creating the ServeRAID logical disk cluster resource, assign a sticky drive letter to the shared logical disk drive on both servers using the Windows NT Disk Administrator Program by following the next procedure. (Use the IPSHAHTO.EXE utility to move the logical drive to the other server so an identical drive letter can be assigned.)

1. On Server A, use the Windows NT Disk Administrator Program to assign a previously unused drive letter to the new logical disk. For information on how to assign sticky drive letters, see the MSCS documentation.
2. On Server B, use the ServeRAID Administration Monitoring Facility to scan for new devices.
3. Run the IPSHAHTO.EXE utility on Server B to move the newly defined logical disk drive to Server B.
4. Using the Windows NT Disk Administrator Program on Server B, assign the same sticky drive letter.

Perform this operation on the cluster server that currently owns the shared logical disk drive. The cluster server that owns the logical disk drives is the server on which you last ran the IPSHAHTO.EXE program.

1. On the system that owns the logical disk drive, run the Cluster Administration Utility program and make this server the preferred owner of **Cluster Group**.

2. Using the Cluster Administration Utility program, close the connection to the MSCS cluster and then reopen the connection. This ensures that your connection to the cluster is using the cluster server that owns the shared logical disk drive.
3. To create the ServeRAID disk resource in an existing group, ensure that the cluster server that owns the shared logical disk drive is the owner of that group. If the cluster server is not the owner of the group, use **Move Group** to make this cluster server the owner of the group where you will create the ServeRAID disk resource. Then, create the ServeRAID disk resource.
4. Bring the new ServeRAID disk group ONLINE.
5. If you create a new ServeRAID group. The cluster server that owns the shared logical disk drive will be the owner of this group by default.
6. Create a ServeRAID disk resource as part of the new group.
7. Bring the ServeRAID disk group ONLINE.

#### Important

When adding logical drives to an already existing configuration after you assign them as disk resources from within Cluster Administrator you must restart your computer. This restart will ensure that the MSCS software properly initializes the new drives.

---

## Deleting and Later Recreating a ServeRAID Logical Disk Resource

This section describes how to delete and, later, recreate a ServeRAID logical disk resource without deleting a ServeRAID logical drive.

To delete a resource or resource group:

1. If the resource or resource group is not currently owned by the cluster server from which you will delete the group, move the resource or resource group to that cluster server.
2. To delete the resource, run the Cluster Administration Utility program from the cluster server that currently owns the resource or resource group.

**Note:** You can also run the Cluster Administration Utility program from a remote administration system.

Use the normal MSCS procedure for deleting a resource or a group. Refer to the documentation that is included with the MSCS package for instructions.

3. When the ServeRAID resource is deleted, shut down and restart the cluster server from which the resource was deleted.

**Note:** Restarting one cluster server will **not** bring down the entire cluster.

To create a resource:

1. If the group that will own the resource you are creating is not currently owned by the cluster server on which you want to create the resource, move the group to the cluster server.
2. To create the resource, run the Cluster Administration Utility program from the cluster server that currently owns the resource group.

Create a new ServeRAID logical disk using the normal MSCS procedure for creating cluster resources. Refer to the documentation that is included with the MSCS package for instructions.

---

## Uninstalling MSCS on ServeRAID Servers

**Note:** *Do not* use the uninstall procedure if you are upgrading MSCS on ServeRAID servers. To upgrade MSCS on ServeRAID servers, use “Upgrading MSCS on ServeRAID Servers” on page 20.

To uninstall MSCS on ServeRAID servers, you must perform the following procedure on all servers in your cluster:

1. Select one of the cluster servers to uninstall MSCS from.
2. Stop the cluster services. To do this, select the **Services** icon in the Windows NT control panel. Highlight the **Cluster Service** entry and then select the **Stop** button. For more information, refer to the documentation that is included with the cluster services.
3. Select the Start button, and then select **Control Panel** from the **Settings** menu.
4. Double-click **Add/Remove Programs**.
5. Select **Microsoft Cluster Service** from the list of installed components and then select **Add/Remove**.  
**Note:** Ignore the warnings regarding the removal of IBM ServeRAID Logical Disks.
6. Follow the on-screen prompts by selecting **OK** or **Yes**.
7. Restart the system when prompted to complete uninstallation on MSCS.
8. Select the Start button, and then select **Control Panel** from the **Settings** menu.
9. Double-click **Add/Remove Programs**.
10. Select **IBM ServeRAID Windows NT Cluster Solution** from the list of installed components and then select **Add/Remove**.  
You can also remove the IBM ServeRAID Windows NT Cluster Solution by running the IBM ServeRAID NT Cluster Solution setup program and selecting the uninstall option.
11. Repeat step 1 to step 10 for the other server in the cluster.

---

## Upgrading MSCS on ServeRAID Servers

**Note:** If you are upgrading your RAID software after downloading it from the IBM web page, then perform this procedure. If you are installing your software using the *IBM ServeRAID Configuration and Management CD*, refer to the *IBM ServeRAID-3H, ServeRAID-3HB, and ServeRAID-3L Ultra2 SCSI Controllers Installation and User's Guide* for instructions.

This upgrade procedure allows the cluster to remain online at all times. To upgrade the cluster, perform the following steps on one server at a time. When all of the steps are completed for Server A and both servers are reported in the MSCS cluster administrator as *up* and all resources are *online*, repeat the steps for Server B.

**Note:** These instructions should be used on a cluster running Microsoft Cluster Server (MSCS) Release 1.00 and IBM ServeRAID Cluster Solution

## Upgrading the IBM ServeRAID Administration and Monitoring Program

To upgrade the IBM ServeRAID Administration and Monitoring program, do the following:

Run SETUP.EXE program from the IBM ServeRAID Administration and Monitoring diskette and follow the instructions that appear on the screen.

## Upgrading the IBM ServeRAID Microsoft Windows NT Cluster Solution

To upgrade the IBM ServeRAID Microsoft Windows NT Cluster Solution, do the following:

1. Select the Start button, and then select **Control Panel** from the **Settings** menu.
2. Double-click **Services**.
3. Select **Microsoft Cluster Service** from the list of installed components and then select **Stop**.
4. Run SETUP.EXE program from *IBM ServeRAID Windows NT Cluster Solution* diskette and follow the instructions that appear on the screen.
5. Repeat this procedure for the other server in the cluster.

To upgrade the ServeRAID device drivers, BIOS/Firmware, and other software, refer to the *IBM ServeRAID-3H, ServeRAID-3HB, and ServeRAID-3L Ultra2 SCSI Controllers Installation and User's Guide* for instructions.

---

## Chapter 5. Installing the ServeRAID Controller for the High-Availability Cluster Solution Using Vinca and Novell IntranetWare

To install a high-availability cluster solution, you must first configure the ServeRAID controller, define logical drives, and set up merge IDs. To do this, perform the following procedure.

### Important

Before beginning this procedure, read the following information.

- Read "ServeRAID Considerations" on page 5.
- Use the following CD-ROM and diskettes, together as a set, with the high-availability cluster solution:
  - *IBM ServeRAID Configuration and Management CD*
  - *IBM ServeRAID Device Drivers Diskette*
- Ensure that the ServeRAID controllers have the latest BIOS/Firmware installed.

When you update any RAID software, you must update all RAID software at the same time to ensure compatibility with all of the levels of the software. This includes:

- BIOS/Firmware
- Device Drivers
- ServeRAID Manager
- ServeRAID Configuration Program
- Administration and Monitoring Utility
- Command Line Programs

You must have Version 3.50 or higher, as a minimum.

Refer to the following Web site to download the latest level:

[www.pc.ibm.com/support](http://www.pc.ibm.com/support)

When you are on the IBM Web page, do the following:

1. Select **Server Brand**
2. Select **Clustering**
3. Select **Online Pubs**
4. Select **Software**
5. Search through the software for the ServeRAID software you need.

For instructions on how to determine the versions of the BIOS/Firmware on your ServeRAID controller, refer to the documentation that was included with your server or your controller.

**Note:** If you are using the latest version of the *IBM ServeRAID Configuration and Management CD*, the BIOS/Firmware will be automatically verified when you start the server with the CD in the CD-ROM drive. If it needs to be updated, you will be prompted to do so.

---

## Preparing the Servers

Before you configure Server A and Server B, do the following:

1. If necessary, perform any operating system shutdown procedure on the two servers, Server A and Server B, you are going to use in the cluster, and then turn off the servers.
2. If you have not done so, connect any shared external drive enclosures between both servers; then, turn on the enclosures.

---

## Configuring Server A

**Note:** For complete information on using the ServeRAID Configuration Program, refer to the *IBM ServeRAID-3H, ServeRAID-3HB, and ServeRAID-3L Ultra2 SCSI Controller Installation and User's Guide*.

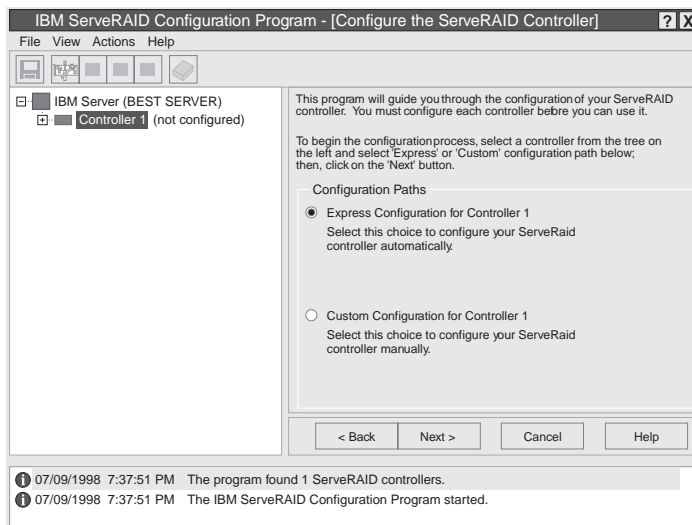
To configure Server A, do the following:

### Important

If you already have logical drives defined that you wish to keep, go to step 6 on page 24. The steps prior to step 6 will cause loss of data by deleting all logical drives already defined.

1. Start Server A using the *IBM ServeRAID Configuration and Management CD* (or the configuration CD-ROM that was included with your server). controller time, leave Server B turned off.

A screen similar to the following appears:



2. Click **Cancel**.

### Important

The ServeRAID controller should be initialized only one time when the controller is first installed. Initializing the controller removes all configuration information from NVRAM. This information includes the SCSI IDs, the cluster and the cluster partner name, and the array information.

3. Using the right mouse button, click the ServeRAID controller in the Main Tree that you are configuring, and a pop-up list appears.

4. Click **Restore to Factory Defaults**

If a confirmation window appears, click **Yes**.

5. When complete, a message appears at the bottom of the screen indicating the initialization was successful.

**Note:** Do not attempt to change the SCSI Channel Initiator ID on both ServeRAID controllers in a pair at the exact same time. Doing so can cause a problem, such as a server *lock-up*.

6. Using the right mouse button, click the ServeRAID controller in the Main Tree that you are configuring, and the pop-up list appears.

7. Click **Configure for Clustering**.

8. A window appears. Fill in the following information:

**Important**

Keep the following in mind:

- If your configuration will contain multiple ServeRAID controller pairs, each Controller Host ID must be unique.
- The name of the Controller Host ID and Cluster Partner Host ID are case-sensitive.
- Servers cannot have the same SCSI Channel Initiator ID

- Controller Host ID - Enter a name to identify the first controller, for example, Server A.
- Cluster Partner Host ID - Enter a name that you will use to identify the second controller, for example, Server B.
- SCSI Channel Initiator IDs - The system presets these seven (7). Change it to six (6).

9. Record the Controller Host ID and Cluster Partner Host ID. Be sure to record the SCSI Controller Host IDs and Cluster Partner Host IDs in a safe place.

10. Click **OK**.

**Notes:**

a. When creating logical drives, be aware of the following way in which the information is displayed on the ServeRAID configuration program screens. **You should create only one logical drive for each array when defining shared logical drives for use in a cluster.**

When logical drives are created, they appear on the screen in the order they are created. For ease of understanding, create an array and then all logical drives for that array *before* you create another array. If they are created in that order, they will appear on the screen as shown in the first figure. (\*\*\*\*\* is other information that will appear on the screen, such as RAID level, Write Policy, and so on, but is not needed for this explanation).

```
A ***** A0 ***** ***** ***** ***** *****
B ***** B0 ***** ***** ***** ***** *****
C ***** C0 ***** ***** ***** ***** *****
```

If logical drives are created out of order, meaning you do not follow the order mentioned above, they are listed on the screen out of order, which might cause some confusion. For example, say you created two arrays, Array A and Array B, but did not define any logical drives at that time. Then, afterwards, you go back and create a logical drive on Array B. That logical drive will then appear in the first line of the logical drive box. Now, if you go back and create another logical drive on Array A, that logical drive will show up on the second line of the logical drive box, as shown in the second figure.

```
A ***** B0 ***** ***** ***** ***** *****
B ***** A0 ***** ***** ***** ***** *****
```



- b. Hot-spare/standby hot-spare (HSP/SHS) devices must be defined only on a shared channel, and each controller must have its own HSP/SHS device defined. This means that the same HSP/SHS device must not be defined on both controllers in a pair.
11. Create RAID arrays and logical drives on Server A as follows:
- Click the ServeRAID controller that you want to configure in the Main Tree.
  - Click the **Custom Configuration** radio button.
  - Click the **Next** button.  
**Note:** You must have two or more drives for RAID level 1 and three or more drives for RAID level 5 within the same array.
  - Using the right mouse button, click the drive or SCSI Channel icons in the Main Tree to select the drives that you want to add to your arrays, delete from your arrays, or define as hot-spare drives; then, select a choice from the pop-up list.  
or  
Drag the drive or SCSI Channel icon from the Main Tree and drop it on the Array or Hot-Spare Drive icon in the Main Panel on the right. If you change your mind, you can drag the icons back to the Main Tree to remove them from the configuration.
  - After you select the data drives for your arrays and define your hot-spare drives, click the **Next** button.  
If you change your mind, you can:
    - Remove a specific drive from a newly defined array or delete an entire newly defined array. To do this, click the **Back** button, use the right mouse button to click the specific drive or Array icon in the Main Panel on the right, and then select **Remove from New Array** or **Delete New Array**.
    - Remove a specific hot-spare drive or all newly defined hot-spare drives. To do this, click the **Back** button, use the right mouse button to click the Hot-Spare Drive icon in the Main Panel on the right, and then select **Remove New Hot-Spare Drive** or **Remove All New Hot-Spare Drives**.
  - Select a RAID level for the logical drive from the RAID pull-down menu in the Main Panel. (Refer to the ServeRAID documentation for descriptions of the supported levels.)
  - Move the sliding bar in the Main Panel from right to left to allot data and parity space for the logical drive.  
**Notes:**
    - Some operating systems have size limitations for logical drives. Before you save the configuration, you might want to verify that the size of the logical drive is appropriate for your operating system. See your operating-system documentation for more detailed information.
    - Typically, the first logical drive defined on the first ServeRAID controller found by system BIOS/Firmware during startup will be your startup (boot) drive.
  - Click the **Next** button.
  - Review the information that appears on the Configuration Summary screen.  
**Note:** To change the configuration, click **Modify** button.
  - Click the **Apply** button to accept and save the configuration. Then, continue with step 12.
12. After creating the arrays and logical drives, you must assign a merge ID to the shared drives. To set the merge IDs, do the following:

**Note:** Shared and nonshared merge ID considerations:

- Shared logical drives must have unique merge IDs.
- Valid merge IDs for nonshared logical drives are in the range 200–215. An example would be to set all nonshared drives on Server A to Merge ID 206 and all nonshared drives on server B to Merge ID 207.
- The merge ID must be unique for each shared logical drive that will be shared by the controller. For example, if you have a logical drive with a Merge ID of 1 on Server A, you cannot assign the same Merge ID to a logical drive on Server B. Valid IDs for shared logical drives are in the range 1–8.

13. Using the right mouse button, click the ServeRAID controller in the Main Tree that contains the logical drives and a pop-up list appears.
14. Click **Configure for Clustering**.
15. A window appears.
16. Click the **Shared** checkbox for the logical drives that will be shared between the two ServeRAID controllers.
17. Set the merge ID. You can change the merge group value, but use the default provided.
18. Click **OK**.
19. Exit the Configuration Program by either clicking the box with the X in the upper right corner, or by clicking **File**, and then **Exit**.
20. Shut down Server A.
21. Restart Server A.

---

## Configuring Server B

To configure Server B, do the following:

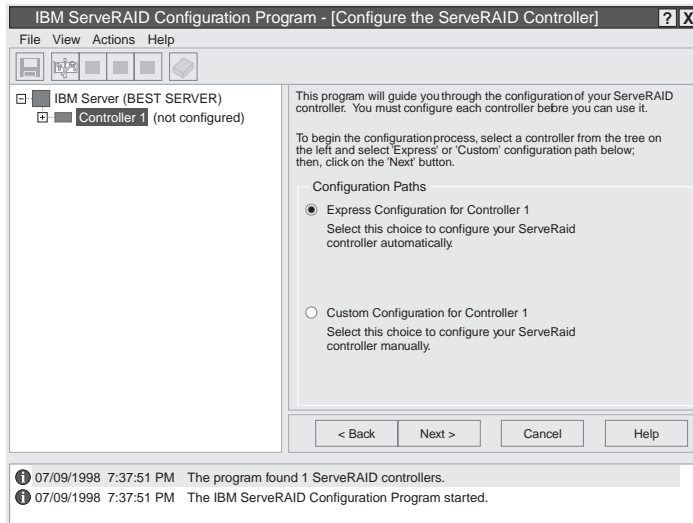
**Note:** For complete information on using the ServeRAID Configuration Program, refer to the *IBM ServeRAID-3H and ServeRAID-3L Ultra2 SCSI Controller Installation and User's Guide*.

**Important**

If you already have logical drives defined that you wish to keep, go to step 6 on page 27. The steps prior to step 6 will cause loss of data by deleting all logical drives already defined.

1. Start Server B using the *IBM ServeRAID Configuration CD-ROM* (or the configuration CD-ROM that was included with your server). At this time, leave server A turned off.

A screen similar to the following appears:



2. Click **Cancel**.

**Important**

The ServeRAID controller should be initialized only one time when the controller is first installed. Initializing the controller removes all configuration information from NVRAM. This information includes the SCSI IDs, the cluster and the cluster partner name, and the array information.

3. Using the right mouse button, click the ServeRAID controller in the Main Tree that you are configuring and a pop-up list appears.
4. Click **Restore to Factory Defaults**  
If a confirmation window appears, click **Yes**.
5. When complete, a message appears at the bottom of the screen indicating the initialization was successful.  
**Note:** Do not attempt to change the Controller Host ID on both ServeRAID 3 controllers in a pair at the exact same time. Doing so can cause a problem, such as a server *lock-up*.
6. Using the right mouse button, click the ServeRAID controller in the Main Tree that you are configuring, and the pop-up list appears.
7. Click **Configure for Clustering**.
8. A window appears. Fill in the following information:

**Important**

Keep the following in mind:

- If your configuration will contain multiple ServeRAID controller pairs each Controller Host ID must be unique.
  - The name of the Controller Host ID and the Cluster Partner Host ID are case-sensitive.
  - Servers cannot have the same SCSI Channel Initiator IDs.
- Controller Host ID - Enter the name you chose in step 8 on page 24 to identify the second controller. This is the same name as the Cluster Partner Host ID you set up for the first controller, in this case, Server B.

- Cluster Partner Host ID - Enter the name you chose in step 8 on page 24 to identify the first controller. This is the same name as the Controller Host ID you set up for the first controller, in this case, Server A.
- SCSI Controller Initiator IDs - The system presets these to seven (7). Leave this set to seven (7).

9. Record the Controller Host ID and Cluster Partner Host ID. Be sure to record the Controller Host IDs and Cluster Partner Host IDs in a safe place for future reference.

10. Click **OK**.

11. If you are using Vinca and Novell IntranetWare, continue with the following procedure.

You have now completed the configuration of your ServeRAID controllers and hard disk drives, which are the initial installation steps for a high-availability cluster solution. Depending on your operating system, continue with the following:

- Install Novell NetWare on your servers. For information, refer to the documentation that comes with your Novell NetWare software package.
- Install the Vinca IntranetWare software on your servers. For information, refer to the documentation that comes with *Vinca High Availability for NetWare and IBM ServeRAID II SCSI Controller*.

---

## Chapter 6. Monitoring and Updating a High-Availability Cluster Solution Using the ServeRAID Manager Program

### Important

If you are using Windows NT, perform these instructions. If you are using NetWare, then you need to use the IBM Administration and Monitoring program. Go to Chapter 7, "Monitoring and Updating a High-Availability Cluster Solution With the ServeRAID Administration and Monitoring Utility" on page 32 for instructions.

You can use the ServeRAID Manager program to check the availability of a hard disk drive on another server or to add or remove a hard disk drive to the cluster.

There are two selections for high-availability functions supported by the Administration and Monitoring Utility.

- View Shared Drives
- Configure the Controller for Clustering

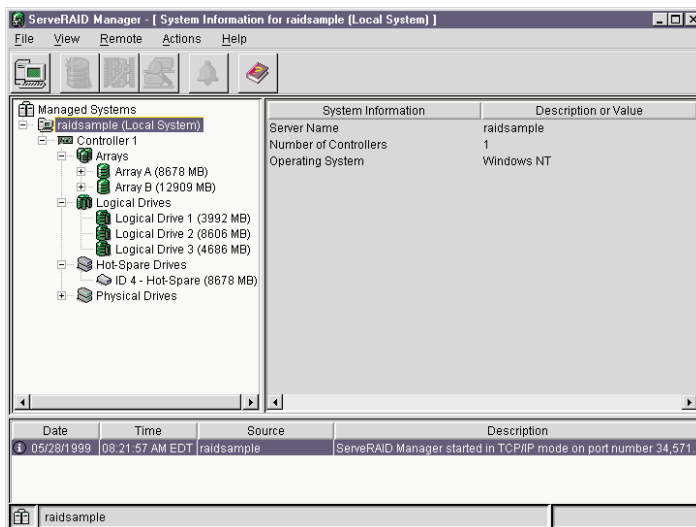
---

### Checking the Availability of a Drive

**Note:** Make sure the ServeRAID Manager program is installed on your server. If you need to install it, refer to the *IBM ServeRAID-3H, ServeRAID-3HB, and ServeRAID3L Ultra2 SCSI Controllers Installation and User's Guide* for instructions.

To check the availability of a hard disk drive on another server, do the following:

1. Right-click on the controller from the Main Tree that you want to configure.



2. Select **View Shared Drives**
3. Check **Enable View Shared Drives**.
4. Select the channel, which the hard disk drive you want to check, is connected to.

**Note:** This procedure can determine only if Online Devices are available.

5. Select the SCSI ID of the hard disk drive, which you are checking, is connected to a shared channel.

Click **OK**. If the hard disk drive is available for use, it will appear as Ready on the Main Tree. If the hard disk drive is not available for use, meaning that it is owned by the other server, it will appear as Reserved on the Main Tree.

All of the other hard disk drives owned by the other server also will appear as Reserved at this time.

**Note:** Hot-spare drives owned by the other server will not display as Reserved. Take care to ensure other servers hot-spare drives are not used inadvertently by both servers.

---

## Adding Hard Disk Drives to a Cluster

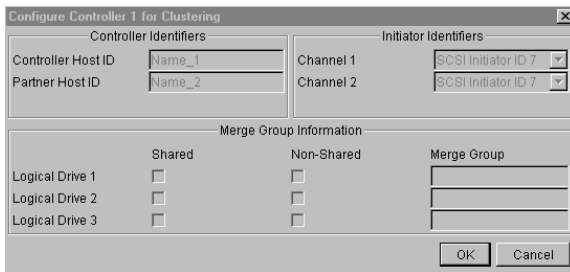
If you add hard disk drives to a cluster, do the following:

1. Install the hard disk drives in the server or shared expansion enclosure. For information, refer to the documentation that is included with the hard disk drive and the server.
2. Configure and set up the hard disk drives for the ServeRAID controller. Refer to the *IBM ServeRAID-3H, ServeRAID-3HB, and ServeRAID-3L Ultra2 SCSI Controllers Installation and User's Guide* for instructions.

**Note:** If the drives will be shared, define only one logical drive per array.

3. Right-click on the controller you are using for the cluster.
4. Click on **Configure for Clustering**.

A screen similar to the following appears:



5. Select shared or nonshared for the logical drive you have just defined.
6. Select the merge group number you want to use for the drive you just defined.
7. Click **OK** when you are finished for the changes to take effect.

**Attention:** Drives that are configured by one controller in the pair must appear as Ready drives to the other controller in the pair. The same must also be true in reverse. Be sure to verify this consideration when drives are added after the servers are started. Restart the servers, or scan for new devices, or set the drives to RDY state using the RAID Administration and Monitoring Utility after adding new drives to a server. For more information, see "ServeRAID Considerations" on page 5.

8. Continue with "Creating a ServeRAID Disk Resource on a ServeRAID Server with MSCS" on page 18.

---

## Viewing Merge Group Numbers and Other Cluster Information

To view the merge group numbers and other cluster information, do the following:

1. Right-click on the controller you are using for the cluster.
2. Click on **Configure for Clustering**.

A screen similar to the following appears:

Controller Identifiers		Initiator Identifiers	
Controller Host ID	Name_1	Channel 1	SCSI Initiator ID 7
Partner Host ID	Name_2	Channel 2	SCSI Initiator ID 7

Merge Group Information			
Logical Drive	Shared	Non-Shared	Merge Group
Logical Drive 1	<input type="checkbox"/>	<input type="checkbox"/>	
Logical Drive 2	<input type="checkbox"/>	<input type="checkbox"/>	
Logical Drive 3	<input type="checkbox"/>	<input type="checkbox"/>	

In this case, this screen will be for viewing only. Information can be read, but not accessed.

---

## Chapter 7. Monitoring and Updating a High-Availability Cluster Solution With the ServeRAID Administration and Monitoring Utility

### Important

If you are using NetWare, perform these instructions. If you are using Windows NT, than you should use the ServeRAID Manager program. Go to Chapter 6, "Monitoring and Updating a High-Availability Cluster Solution Using the ServeRAID Manager Program" on page 29 for instructions.

You can use the ServeRAID Administration and Monitoring Utility to check the availability of a hard disk drive on another server or to add or remove a hard disk drive to the cluster.

There are two selections for high-availability functions supported by the Administration and Monitoring Utility.


- View Shared Devices
- Manage Merge Groups

---

### Checking the Availability of a Drive

**Note:** Make sure the ServeRAID Administration and Monitoring Utility is installed on your server. If you need to install it, refer to the *IBM ServeRAID-3H, ServeRAID-3HB, and ServeRAID-3L Ultra2 SCSI Controllers Installation and User's Guide* for instructions.

To check the availability of a hard disk drive on another server, do the following:

1. From the Administration and Monitoring Utility screen, click the  icon on the toolbar or select **High Availability** from the **Advanced** pull-down menu, and then select **View Shared Devices**.
2. Click the box to **Enable View Shared Devices**.
3. Select the channel, in which the hard disk drive you want to check, is connected to.

**Note:** This procedure can determine only if ONL Devices are available.

4. Select the SCSI ID of the hard disk drive, which you are checking, is connected to a shared channel.

Click **Refresh Now**. If the hard disk drive is available for use, it will appear as RDY (Ready) on the Administration and Monitoring Utility screen. If the hard disk drive is not available for use, meaning that it is owned by the other server, it will appear as RSV (Reserved) on the Administration and Monitoring Utility screen.

All of the other hard disk drives owned by the other server also will appear as RSV at this time.

**Note:** Hot-spare drives owned by the other server will not display as RSV. Take care to ensure other servers hot-spare drives are not used inadvertently by both servers.



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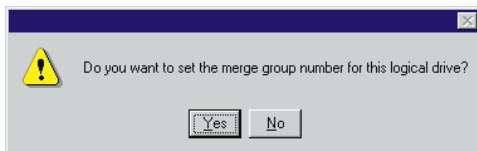
## Adding Hard Disk Drives to a Cluster

If you add hard disk drives to a cluster, do the following:

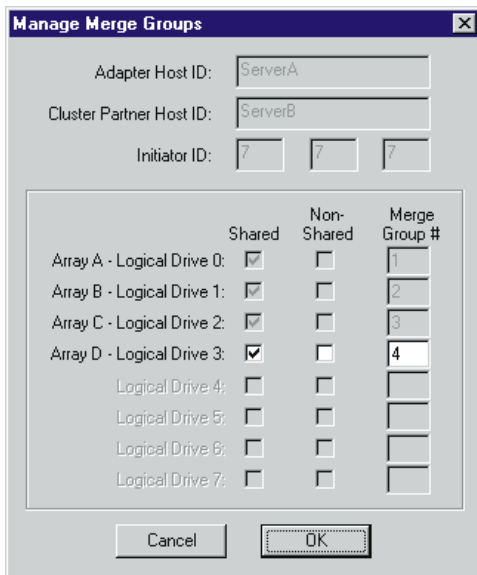
1. Install the hard disk drives in the server or shared expansion enclosure. For information, refer to the documentation that is included with the hard disk drive and the server.
2. Configure and set up the hard disk drives for the ServeRAID controller. Refer to the *IBM ServeRAID-3H, ServeRAID-3HB, and ServeRAID-3L Ultra2 SCSI Controllers User's Guide* for instructions.

**Note:** If the drives will be shared, define only one logical drive per array.

3. After creating a logical drive, a screen similar to the following appears.



Select **Yes** and a screen similar to the following appears.




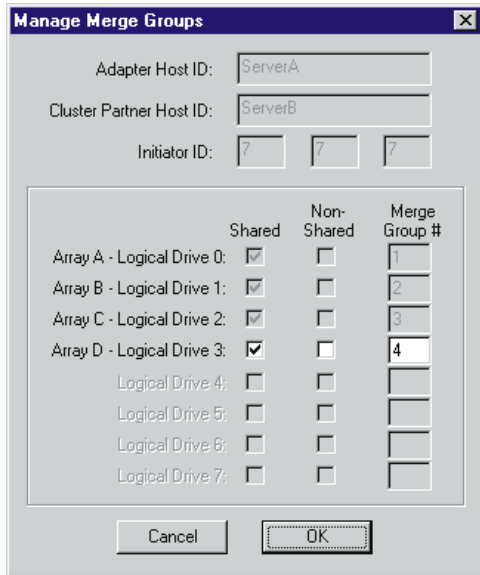
4. Select shared or nonshared for the logical drive you have just defined.
5. Select the merge group number you want to use for the drive you just defined.
6. Click **OK** when you are finished for the changes to take effect.

**Note:** Depending on the operating system, additional steps such as assigning drive letters, partitioning, formatting, and creating cluster resources will be required to use the new logical drive to store programs and data. For information, see "Creating a ServeRAID Disk Resource on a ServeRAID Server with MSCS" on page 18.

**Attention:** Drives that are configured by one controller in the pair must appear as Ready drives to the other controller in the pair. The same must also be true in reverse. Be sure to verify this consideration when drives are added after the servers are started. Restart the servers, or scan for new devices, or set the drives to Ready state using the RAID Administration and Monitoring Utility after adding new drives to a server. For more information, see "ServeRAID Considerations" on page 5.

## Viewing Merge Group Numbers and Other Cluster Information

To view the merge group numbers and other cluster information, click the  icon on the toolbar or select **High Availability** from the **Advanced** pull-down menu, and then select **Manage Merge Groups**. A screen similar to the following appears.



	Shared	Non-Shared	Merge Group #
Array A - Logical Drive 0:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
Array B - Logical Drive 1:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2
Array C - Logical Drive 2:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	3
Array D - Logical Drive 3:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	4
Logical Drive 4:	<input type="checkbox"/>	<input type="checkbox"/>	
Logical Drive 5:	<input type="checkbox"/>	<input type="checkbox"/>	
Logical Drive 6:	<input type="checkbox"/>	<input type="checkbox"/>	
Logical Drive 7:	<input type="checkbox"/>	<input type="checkbox"/>	

In this case, this screen will be for viewing only. Information can be read, but not accessed.

---

## Chapter 8. Troubleshooting a High-Availability Cluster

There is the possibility that one of the servers, one of the ServeRAID controllers, or one of the hard disk drives in a cluster will fail. If this occurs, there are steps you can take to recover from the problem.

In this chapter, you will find actions you can take to help recover from these potential problems. If you still have problems after following these procedures, contact your IBM service representative for further information. Also, you can find hints and tips to help you solve problems on the Web site at:

<http://www.pc.ibm.com/support>

When you are on the IBM Web page, do the following:

1. Select **Server Brand**
2. Select **Clustering**
3. Select **Hints and Tips**
4. Search through the list to find the one you need.

---

### Recovering from a Hard Disk Drive Failure

Use the following procedure to recover from a hard disk drive failure:

A hard disk drive will fail, or go defunct (DDD), whenever there is a loss of communication between the controller and the hard disk drive. This can be caused by any of the following:

- An improperly connected cable, hard disk drive, or controller
- A loss of power to a drive
- A defective cable, backplane, hard disk drive or controller

In all cases, the communication problem needs to be resolved and then a Rebuild operation is required to reconstruct the data for the device in its respective disk array. The ServeRAID controllers can reconstruct RAID level-1 and RAID level-5 logical drives, but they cannot reconstruct data stored in RAID level-0 logical drives.

To prevent data integrity problems, the ServeRAID controllers set the RAID level-0 logical drives to Blocked during a Rebuild operation. After the Rebuild operation completes, you can unblock the RAID level-0 logical drives, and access them once again. But remember, the logical drive might contain damaged data.

### Steps for recovering from defunct (DDD) drives

If the defunct drives are not part of an array, contact your IBM service representative.

If the defunct drives are part of an array, do the following:

- If more than one hard disk drive is defunct in an array, contact your IBM service representative.
- If a rebuild is in progress, wait until the rebuild is complete.
- If a rebuild is not in progress and only one hard disk drive in the array is defunct, do the following:
  1. Verify the cables, hard disk drives, and controllers are installed properly.

2. Attempt to rebuild the defunct (DDD) hard disk drive by performing a hot-swap rebuild. Refer to “Rebuilding a hot-swap drive” on page 36 for instructions.
3. If the rebuild fails, contact your IBM service representative.

## Rebuilding a hot-swap drive

A Hot-Swap Rebuild refers to a rebuild operation that is started by the ServeRAID controller when it detects that a drive, which is part of an array and in the defunct (DDD) state, has been removed and reinserted on the SCSI cable or backplane. The reinsertion of the hard disk drive, whether it is the same drive or a new drive, will trigger the ServeRAID controller to start the rebuild. During the rebuild, the drive being rebuilt appears in the Rebuild (RBL) state and the logical drive remains as Critical (CRT) until the hard disk drive has completed a successful rebuild.

On IBM servers, when a Hot-Spare drive is available, the data rebuild operation will begin automatically without the requirement to replace the failed drive.

### Steps to start a hot-swap rebuild

To start a hot-swap rebuild, do the following:

1. Gently, remove the hard disk drive from the server, using the handle of the hot-swap tray, but do not remove the drive completely. If necessary, refer to the documentation that came with your server on how to remove a hard disk drive.
2. Wait 20 seconds to allow the disk drive to completely spin down.

**Note:** When power is removed from a hot-swap drive, the drive immediately parks the heads, locks the actuator in the “landing zone,” and begins spinning down. However, the spinning down of the disk may require up to 20 seconds after power is removed. Do not move the drive while it is spinning down. Moving the drive while it is spinning down may damage the drive.

3. Gently reinstall the hard disk drive into the server. Make sure it is completely installed in the backplane connector.

---

## Recovering From a Failed Server

When replacing a failed server in a high-availability configuration, you might not need to replace the ServeRAID controller. However, if you replace your ServeRAID controller, you must reconfigure the controller after you have installed your new server.

### Important

The following procedure requires specific configuration settings for the ServeRAID controller. If the server and controller that are being replaced are functional, you can obtain these settings from the controller. However, if the controller or the server is not functional, you will need a record of these settings, such as one that was created when the controller was previously configured. If you are replacing your ServeRAID controller with your server, you **must** have correct configuration information to complete this procedure.

Use the following procedure to recover from a failed server:

1. Remove the failed server from your high-availability configuration.
2. Remove all hard disk drives from the disk drive array in the failed server.

As you remove your hard disk drives, be sure to note the bay in which each drive was installed. If you are replacing your failed server with an identical server you can reinstall the drives in an identical configuration and get your server up and running quickly.

3. If the ServeRAID controller is functional, remove it from the failed server.

As you remove the controller from the failed server, be sure to:

- Note which SCSI cables are connected to the SCSI channel connectors on the controller.
- Note which PCI slot has the controller installed.

If you are replacing your failed server with an identical server, you can reinstall the ServeRAID controller in an identical configuration and get your server up and running quickly.

4. Install the hard disk drives in the new server.

For information on how to install a hard disk drive, see the documentation that comes with your server. If you are replacing the failed server with an identical server, install each hard disk drive in the same bay as the one it was removed from in the failed server.

5. To determine your next step, read and do one of the following:

- If the ServeRAID controller in the failed server is functional, do the following:
  - a. Install the controller in the new server.
  - b. Reinstall the cables as they were in the failed server.
  - c. Restart the server.
- If the ServeRAID controller in the failed server is not functional, or you are not sure, continue with “Recovering from a Failed ServeRAID Controller.”

---

## Recovering from a Failed ServeRAID Controller

The following configuration information is required to configure your new ServeRAID controller:

- SCSI Channel Initiator IDs
- Controller Host ID
- Cluster Partner Host ID
- Stripe Unit Size
- Unattended Mode

If the ServeRAID controller you are replacing *is* functional, you can obtain the SCSI bus initiator\_IDs, the controller host\_ID, the cluster partner host\_ID, the stripe size, and the unattended mode by starting your server with the *IBM ServeRAID Configuration and Management CD*. Then, refer to *IBM ServeRAID-3H, ServeRAID-3HB, and ServeRAID-3L Ultra2 SCSI Controllers Installation and User's Guide* for information on locating this information.

If the ServeRAID controller is *not* functional, you will need to refer to a record of the settings that was made when the controller was previously configured. If you do not have a record of the configuration information, the following hints **might** help you to assign the proper values.

### Obtaining the current SCSI Channel Initiator IDs

Read the following information to determine the current SCSI Channel Initiator ID, do the following:

The SCSI Channel Initiator IDs for a nonshared SCSI channel are set to 7 by default. For shared SCSI channels, the IDs will usually be 7 or 6 and must be different from the SCSI Channel Initiator IDs for the corresponding SCSI channels of the cluster partner controller. Therefore, if you can obtain the SCSI

Channel Initiator IDs for the corresponding cluster partner system, you can infer the correct SCSI Channel Initiator IDs for this system. For example, if the cluster partner system-shared SCSI bus initiator\_IDs were set to 7, usually the controller you are replacing would need to have its IDs set to 6.

To obtain the SCSI Channel Initiator IDs from the corresponding cluster partner controller, do the following:

1. Start the cluster partner system with the *IBM ServeRAID Configuration and Management CD*
2. Select the controller you are setting up the cluster on.
3. Select the **Configure for Clustering** icon from the tool bar.
4. Note the settings in the fields.

## Obtaining the current Controller Host ID and Cluster Partner Host ID

Read the following information to determine the current Controller Host ID and Cluster Partner Host ID:

The proper settings for the Controller Host ID and Cluster Partner Host ID of the controller being replaced can also be determined by reading the settings from the cluster partner system.

To determine the current settings for the Controller Host ID and the Cluster Partner Host ID, do the following:

1. Start the cluster partner system with the *IBM ServeRAID Configuration and Management CD*
2. Select the controller you are setting up the cluster on.
3. Select the **Configure for Clustering** icon from the tool bar.
4. Note the settings in the fields.

## Obtaining the current Stripe Unit Size

The Stripe Unit Size is required to be same on both controllers in a High Availability cluster.

To obtain the current Stripe Unit Size, do the following:

1. Start the cluster partner system with the *IBM ServeRAID Configuration and Management CD*
2. Select the controller you are setting up the cluster on.
3. Look for the setting for the Stripe Unit Size in the Main Panel to the right of the Main Tree.

## Status of the Unattended Mode

This setting is configured automatically as Enabled when a controller is set up for clustering.

## Replacing a ServeRAID adapter

Use the following procedure to replace a failed ServeRAID controller from your high-availability configuration.

### Important

Before you begin this procedure, it is important to ensure that you have the current level of all the ServeRAID software and the latest BIOS/Firmware level on your server.

The latest software and BIOS/Firmware is available from the IBM Web site at:

<http://www.pc.ibm.com/support>

When you have connected to the web page, do the following:

1. Select **Server Brand**
2. Select **Clustering**
3. Select **Software**
4. Search through the list to find the latest releases.

To replace the ServeRAID controller, do the following:

1. Remove the failing ServeRAID controller.

For instructions on how to remove the ServeRAID controller, see the *IBM ServeRAID-3H and ServeRAID-3L Ultra2 SCSI Controller Installation and User's Guide*. Before you remove the controller, be sure to:

- a. Turn off the server.
- b. Note which SCSI cables are connected to the SCSI channel connectors on the controller.
- c. Note which PCI slot has the controller installed.

2. Install the new ServeRAID controller.

For instructions on how to install the ServeRAID controller, see the *IBM ServeRAID-3H, ServeRAID-3HG, and ServeRAID-3L Ultra2 SCSI Controllers Installation and User's Guide*. Be sure to install the controller to the same PCI slot from which you removed the failed ServeRAID controller.

### Important

Do **not** reconnect the SCSI channel cables to the controller at this time.

3. Start the system from the *IBM ServeRAID Configuration and Management CD* Version 3.50, or higher.
4. Initialize the controller configuration.

To initialize the controller:

- a. Right click on the new controller in the Main Tree.
- b. Select **Restore to Factory Defaults**.

5. Update the configuration parameters.

To update the configuration parameters:

- a. Start the system from the *IBM ServeRAID Configuration and Management CD* Version 3.50, or higher.
- b. Right click on the new controller in the Main Tree.
- c. Select **Configure for Clustering** from the menu.

d. Using the settings that were assigned to the ServeRAID controller you are replacing, select and configure each of the following parameters:

- SCSI Channel Initiator IDs
- Controller Host ID
- Cluster Partner Host ID

The new controller's Stripe Unit Size defaults to 8K. If you need to change that, then:

- 1) Right click on the new controller in the Main Tree.
- 2) Select **Change the Stripe Unit Size**.
- 3) Select the Stripe Unit Size that you need for your installation.

6. Shut down and turn off the server.

7. Reconnect the SCSI channel cables to the controller.

**Note:** Be sure to connect the cables to the correct SCSI channels as noted in step 1 on page 39.

**Important**

If the ServeRAID controller being replaced *is* the controller that attaches to the server startup disk array, other nonshared disk arrays, or shared arrays which have not failed over to the other server, continue with the following steps; otherwise, restart the system normally.

8. If the controller that was replaced attaches the operating system startup disk array for the system, or if other nonshared disk arrays are attached to this controller, then perform the following procedures.

- a. Start the system using the *IBM ServeRAID Configuration and Management CD* Version 3.50, or higher,
- b. Right click on the controller you are working on.
- c. Select **Merge or Unmerge Logical Drive** from the menu.
- d. Select **Merge or Unmerge Own Non-Shared Logical Drives**.
- e. **Select the Merge Group ID for the logical drive,**

2XX

**where xx is the shared SCSI Channel Initiator ID. The Merge Group ID value is typically 206 or 207.**

**f. If the adapter you are replacing is the startup adapter, the system now will be able to startup the operating system properly.**

9. If the shared disk arrays were not merged automatically to the partner system, perform the following procedure:

- a. Start the system using the *IBM ServeRAID Configuration and Management CD* Version 3.50, or higher,
- b. Right click on the controller you are working on.
- c. Select **Merge or Unmerge Logical Drive** from the menu.
- d. Select **Merge Own Shared Logical Drive** for a shared array (Merge Group IDs in the range 1–8) that has not failed over to the cluster partner system (for example, RAID level-5 arrays in critical or degraded state) to restore the configuration of these shared arrays.

Repeat this process for each shared array.



### Important

The *IBM ServeRAID Configuration and Management CD* **must not** be used to perform failover and failback to merge or unmerge drives belonging to the other server. Failover and failback to merge or unmerge drives belonging to the other server is normally handled by the operating system software and cluster support software.

10. Restart your server.

---

## Troubleshooting ServeRAID Subsystems in a Cluster Environment

Following is a series of common problems and solutions that can help you troubleshoot your high-availability solution.

**Problem: ServeRAID Administration Utility program shows physical devices as DDD state.**

**Action:**

1. Enable the shared disk display function to allow disks that have been moved or have failed over to the other server in the cluster to be displayed as RSV state instead of DDD (defunct) state.

**Note:** It is normal for disks that have been moved or have failed over to be displayed in the DDD state if the shared disk display feature has not been enabled. In this case the disks shown in the DDD state are not really defective.

2. Check RAID level-1 and RAID level-5 arrays to make sure they are not in critical state. If they are in critical state, replace the failed disk and perform a rebuild operation.

**Problem: ServeRAID shared logical drives do not failover properly.**

**Action:**

1. Ensure that the resource type of each ServeRAID controller shared disk resource is *IBM ServeRAID logical disk*.

If the resource type is shown as *physical disk*, the localquorum option was not specified properly when MSCS was installed.

To correct this problem, you must reinstall a high-availability cluster solution using Microsoft Windows NT. Refer to Chapter 4, "Installing the ServeRAID Controller for the High-Availability Cluster Solution Using Windows NT 4.0" on page 9 for instructions.

2. Ensure that shared SCSI buses on the ServeRAID controller pair are connected in a way that corresponding SCSI channels are connected. For example, SCSI channel 1 on the controller in the first cluster server is connected to SCSI channel 1 on the controller in the second cluster server, channel 2 is connected to channel 2, and so forth.
3. Ensure that physical SCSI disks that contain logical drives are all connected to shared SCSI channels.
4. Ensure that there are no more than eight shared logical disk drives defined per pair of ServeRAID controllers for use in your cluster.
5. If you are using a ServeRAID 2 with a quorum drive, then with Windows NT Server clusters, ensure that SCSI channel 3 of the pair that attaches to the ServeRAID logical drive that has been designated as the Windows NT Cluster Quorum Resource is used for arbitration. Also, ensure that it is connected from the first cluster server to SCSI channel 3 in the second cluster server and that there are no SCSI devices connected to that channel.

If you are using a ServeRAID 2 with a quorum drive, then the SCSI heartbeat connection *must* be connected to the third channel of the ServeRAID controller pair that has the quorum drive connected to it. No disks can be installed on this heartbeat channel. If you choose to move the quorum drive to another ServeRAID controller, ID level 5, you must also move the SCSI heartbeat cable on both servers to the new quorum ServeRAID controller pair. For more information, see "ServeRAID Considerations" on page 5.

6. Make sure each shared logical drive has a Merge ID assigned. Merge IDs **must** be in the range 1–8.
7. Make sure each ServeRAID controller has been assigned a unique controller host ID and that each ServeRAID controller has its cluster partner host ID assigned properly to correspond to the ServeRAID controller in the other cluster server that is attached to the shared SCSI buses.

8. Check for loose shared SCSI bus cables.
9. Ensure that SCSI repeater cards in Model 3518 or 3519 disk expansion enclosures are at the latest revision level.
10. Ensure that physical disks that are expected to be moved or failover show up as Ready (RDY) or Reserved (RSV) state on the server that is attempting to take over control of these disks.

**Problem: RAID level 5 logical disks cannot be accessed by the operating system after a failover.**

**Action:** Use the ServeRAID Administration Utility program to check the state of the logical disk drive to ensure that it is not blocked. Using the utility program, select the logical disk drive and look for Blocked state **Yes**. If the logical disk drive is blocked, make sure all physical disks that are part of the logical drive are in the ONL state. If all physical disks are not in the ONL state, a disk might have gone bad during a failover or during the resynchronization process after a failover. Data integrity cannot be guaranteed in this case and the array has been blocked to prevent the possibility of incorrect data being read from the logical drive.

Reinitialize and synchronize the logical drive and restore the data from a backup source. Depending on the type of data contained on the logical drive and the availability of a recent backup copy, you can unblock the drive and continue normal operation or replace/rebuild one or more DDD disks. However, if you do not reinitialize, synchronize, and restore the drive, be aware that some data on the disk drive could be lost or corrupted.

**Problem: If one of the cluster servers fails and the surviving server takes over the cluster resources, occasionally one or more of the IP address resources will stay in the ONL pending state for several minutes after moving over to the surviving server. After this, the resource will go to the failed state and the following error message will be displayed in the surviving server system log (as viewed with the Event Viewer).**

For Example: Windows NT Event Log Message:

Date: ???	Event ID: 1069
Time: ???	Source: ClusSvc
User: N/A	Type: Error
Computer: ???	Category: (4)

Description:

Cluster resource 'ip address resource name' failed

**Action:** Do the following:

1. Using the right mouse button, click the IP resource in the Cluster Administrator.
2. Select **Properties** from the **General** tab.
3. Check the box labeled Run this resource in a separate Resource Monitor

A message appears stating that the resource must be restarted for the change to take effect.

**Problem: After one of the cluster servers has been shutdown normally and the surviving server takes over the cluster resources, occasionally one or more of the IBM ServeRAID logical disk resources will stay in the *online pending* state for several minutes, after moving over to the surviving server (when viewed with the Cluster Administrator). After this, the resource will go to the 'failed state'. and the following error message will be displayed in the surviving server system log (as viewed with the Event Viewer).**

For Example: Windows NT Event Log Message:

Date: ???	Event ID: 1069
Time: ???	Source: ClusSvc
User: N/A	Type: Error
Computer: ???	Category: (4)

Description:

Cluster resource 'IBM ServeRAID Logical Disk name' failed.

**Action:** No action is necessary to bring the resource online after the failover. MSCS will successfully reattempt to bring this resource online on the surviving server within about four minutes.

**Problem: You cannot reinstall the ServeRAID Windows NT Cluster Solution. If a previous version of IBM ServeRAID Cluster Solution has been uninstalled, when attempting to reinstall the IBM ServeRAID Windows NT Cluster solution, a message incorrectly appears prompting you to perform an upgrade.**

**Action:** You must delete *C3E76E53-F841-11D0-BFA1-08005AB8ED05* registry key. To delete the registry key, do the following:

1. Select RUN
2. Type: REGEDIT and click OK. The Registry Editor screen appears.
3. Select HKEY\_CLASSES\_ROOT\CLSID and delete *C3E76E53-F841-11D0-BFA1-08005AB8ED05*
4. Reinstall the ServeRAID Windows NT Cluster Solution. Refer to Chapter 4, "Installing the ServeRAID Controller for the High-Availability Cluster Solution Using Windows NT 4.0" on page 9 for instructions.

**Problem:** The following error message is displayed when running the IPSHAHTO program on a server warning message is: *"Warning: CONFIG\_SYNC with 0xA0 command FAILED on Controller #"* and one or more HSP/SHS devices are defined on controller pairs or READY (RDY) devices are not part of any logical array configuration on a controller pair in a cluster.

**Action:** If all shared disk resources moved successfully when running the IPSHAHTO program, it is safe to ignore the error message and no further action is required.

If shared disk resources fail to move when running the IPSHAHTO program, perform a low-level format on all HSP/SHS and RDY devices that are not part of any logical array configuration on a controller pair in a cluster. Refer to the instructions on low-level formatting HSP/SHS drives in *IBM ServeRAID-3H, ServeRAID-3HB, and ServeRAID-3L Ultra2 SCSI Controllers Installation and User's Guide* for further details.

**Problem:** Array identifiers and logical drive numbers might change during a failover condition.

**Action:** By design, the array identifiers and logical drive numbers may change during a failover condition. Consistency between the merge identifiers and Windows NT sticky drive letters is maintained, while the ordering process during a failover condition is controlled by the Microsoft Cluster Management Software and the available array identifiers on the surviving server.

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