Chapter 5
Running the Array Configuration Utility

This chapter provides instructions for using the Compaq Array Configuration Utility and describes methods to configure your controller quickly and easily. The Array Configuration Utility is located on the SmartStart and Support Software CD.

The utility uses a graphic interface to help you configure the Smart Array 3200 Controller. You can use it initially to configure a Smart Array 3200, to add additional disk drives to an existing configuration, or to reconfigure an array controller.

The Array Configuration Utility is compatible with the operating systems discussed in Chapter 6. It is an offline utility, except in servers running Windows NT; Windows NT users can run the utility while online. A second online utility for NetWare/intraNetWare users is also described in this chapter.

This chapter includes the following sections:

- Before You Begin
- Starting the Compaq Array Configuration Utility
- Configuration Wizards
- Online Help
- Configuration Procedures
- Array Configuration Utility screens
- Errors and Warnings
- NetWare/intraNetWare Online Configuration Utility

The Array Configuration Utility:

- Uses easy-to-understand graphics to illustrate controller configuration
- Describes various configuration errors
- Uses wizards that guide you through the configuration process
- Suggests optimal configuration and fault tolerance for unconfigured controllers

Before You Begin

During a first-time installation and configuration of the Smart Array 3200, complete the following:

1. Update the system ROM with System ROMPaq.
2. Install the Smart Array 3200 Controller board.
3. Run Option ROMPaq to update the controller firmware, option ROM, and drive firmware.
4. Run the System Configuration Utility to verify the controller order settings.
5. Determine which fault tolerance method and array configuration you want to use.

Starting the Array Configuration Utility

You can access and start version 2.1 of the Array Configuration Utility either online or by using the SmartStart and Support Software CD.

Accessing Online

If the server you are configuring is running Windows NT, you can install and run the configuration utility online.

When you install the Compaq Software Support Diskette for Microsoft Windows NT (NT SSD), the diskette prompts you to insert the Array Configuration Utility diskette to install the utility. A program icon is created automatically. Select the icon to run the Array Configuration Utility. The Windows NT online Array Configuration Utility requires that at least one logical drive was configured previously while offline.

NOTE: See the section "NetWare/intraNetWare Online Configuration Utility" in this chapter for information on accessing and using this online utility. The NetWare/intraNetWare utility uses a text interface. If you prefer to use the graphic interface, select one of the methods explained in the following sections to use the Compaq Array Configuration Utility offline.

SmartStart and Support Software CD

To run the Array Configuration Utility from the SmartStart and Support Software CD:

1. Insert the SmartStart and Support Software CD in the CD drive and power up the server. A menu is displayed.
2. Select Configure Hardware from the menu, then select the Array Configuration Utility.
3. After completing the configuration, remove the CD and restart the server.

Configuration Wizards

When you start the Array Configuration Utility, the software checks the configuration of each Smart Array 3200 Controller board and its drive arrays. If the arrays are unconfigured *or* if the configuration is less than optimal, the configuration wizard guides you through the configuration process. The configuration wizard recognizes the following conditions:

- *Unconfigured controller* - When the Array Configuration Utility detects an unconfigured controller, the configuration wizard leads you through the controller configuration process.
- *Unused physical drives* - When the Array Configuration Utility detects unused physical drives, the configuration wizard provides an easy way to add them to an array. The "capacity expansion" capability of the Smart Array 3200 allows the Array Configuration Utility to add new physical drives to an existing array without destroying data on the existing logical drives.
- *Unused space on an array* - If the Array Configuration Utility detects unused capacity in an array, the configuration wizard leads you through the process of configuring the space into one or more logical drives.

Getting Help

Press the **F1** key or click the Help button to activate context-sensitive, online help for each screen. A status bar at the bottom of the screen also displays help messages describing the current selection.

Configuration Procedures

Creating a New Array

If you are configuring a new array, the configuration wizard leads you through the process. To bypass the wizard, use the following procedures to create your array.

Creating a New Array—Procedure

There are three general steps for creating a new array:

1. Choose a controller for the array.
2. Group physical drives of the same size into an array.
3. Divide the array into one or more logical drives.

Creating a New Array—Example

For this example, use the following assumptions:

- Four 4.3-GB drives and two 9.1-GB drives are connected to the Smart Array 3200.
- There will be two arrays. Array A consists of three 4.3-GB drives with the fourth 4.3-GB drive used as a spare. Array B is the two 9.1-GB drives.
- The fault tolerance method for all logical drives on Array A is RAID 5, Distributed Data Guarding. The fault tolerance method for all logical drives on Array B is RAID 1, Drive Mirroring.

Choose a controller for the array

1. In the Array Configuration Utility Main Configuration Screen, select the Controller Select box. You can also select Controller/Select... from the main menu.
2. Select one of the listed controllers.

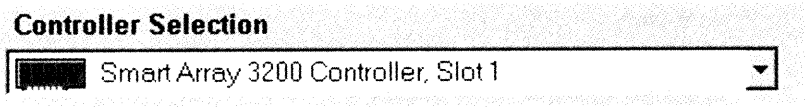

Figure 5-1. Controller Select list

3. Click the Controller Settings button shown in Figure 5-2.

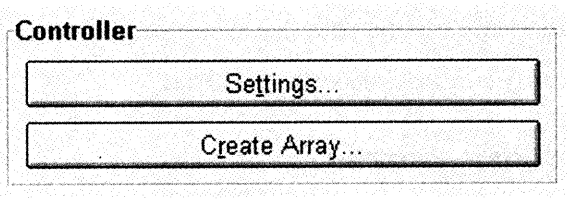

Figure 5-2. Controller buttons

The controller settings screen is displayed, as shown in Figure 5-3.

4. Select the correct operating system on the controller settings screen.

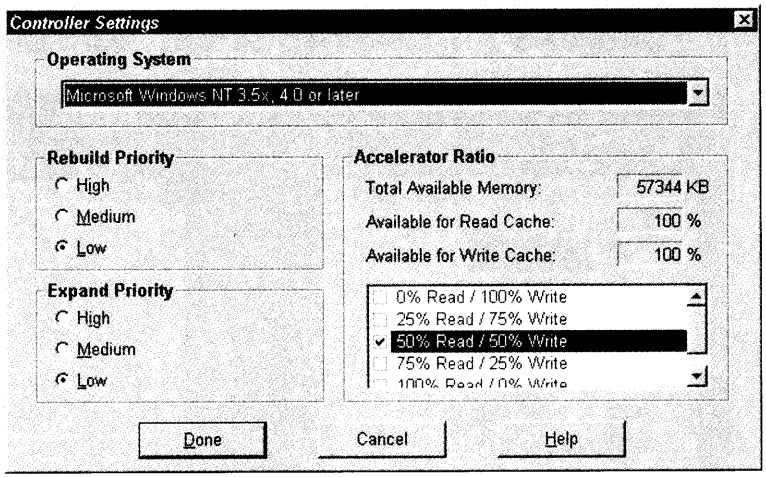

Figure 5-3. Controller Settings screen

Group physical drives of the same size into an array

5. Click the Create Array button. The Create Array screen is displayed.

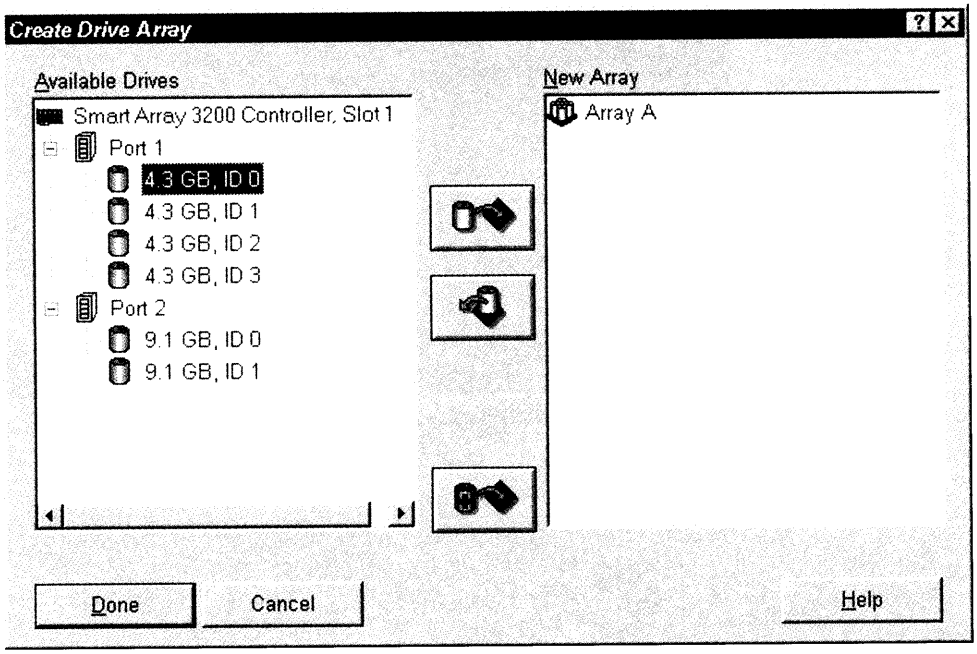

Figure 5-4. Create Array screen

NOTE: Always group physical drives of the same size. If you mix drive sizes, the capacity of the larger drives is wasted.

6. Select the three drives you want to make up the array from the drives on the left. For this example, select the following drives:
   Port 1:SCSI ID 0
   Port 1:SCSI ID 1
   Port 1:SCSI ID 2
   Click the Assign Drive(s) to Array button.

NOTE: Given the reliability of a particular generation of hard drive technology, the probability of an array experiencing a drive failure increases with the number of drives in an array. Compaq recommends the number of drives in an array be limited to 15.

7. Select the drive at Port 1:SCSI ID 3 and click the Assign Spare to Array button *update as advised*. The right side of the Create Array screen should look similar to the following figure.

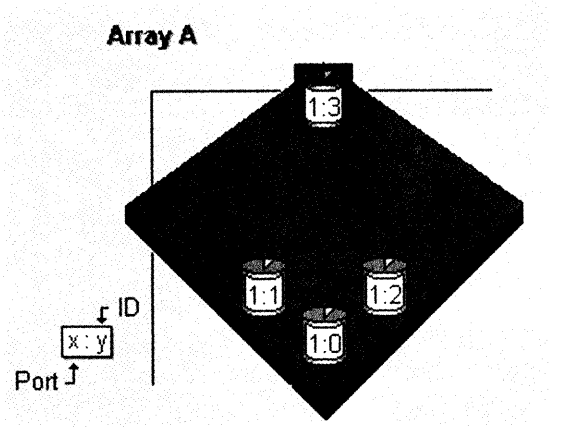

Figure 5-5. Example Array A

NOTE: The same spare drive may be assigned to multiple arrays. However, spare drives should have the same or greater capacity as the drives in the array.

8. Click the Done button to return to the Main Configuration screen. The Logical Configuration View area should look similar to Figure 5-6.

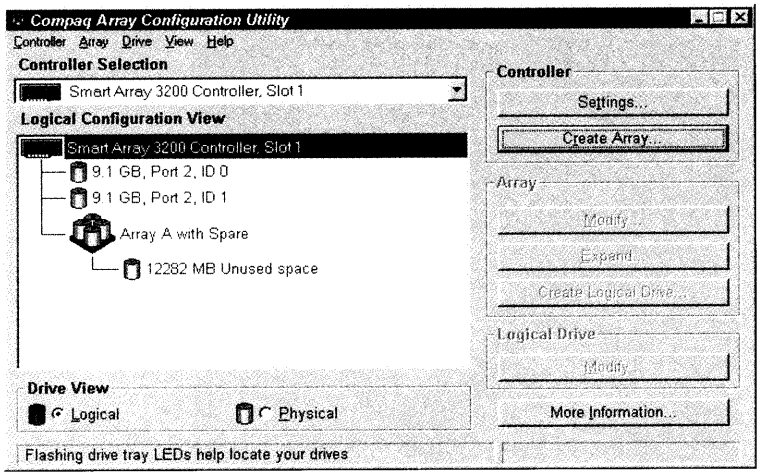

Figure 5-6. Example array - Logical Configuration View with one array

9. Select the controller, then click the Create Array button to create Array B.

10. Assign both 9.1-GB drives to the array. Click the Done button.

NOTE: In this example, each array was created using drives from the same SCSI Port. You can achieve better performance by selecting drives from both ports for an array, assuming you installed the correct drives in both ports before you ran the Array Configuration Utility.

Create logical drives across the physical drives in the array

When creating a logical drive, you can select a fault tolerance (RAID level) option and provide information regarding the drive size and array accelerator.

1. Select Array A or the Unused Space icon under Array A in the Logical Configuration View.
2. Click the Create Logical Drive button. A screen similar to the following figure is displayed.

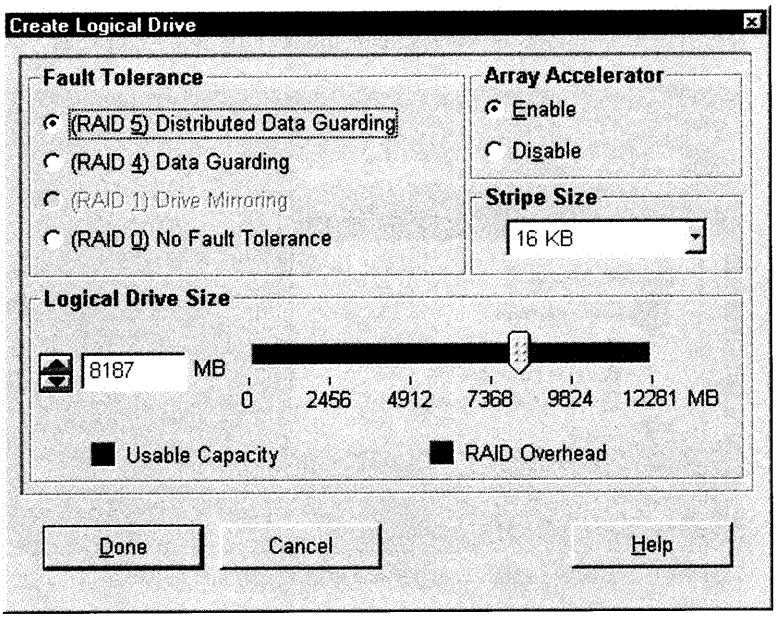

Figure 5-7. Create Logical Drive screen

3. In the upper-left area of this screen, click the Distributed Data Guarding (RAID 5) button.
4. Click the Array Accelerator Enable button.
5. Stripe Size can be left at the default for the selected RAID level, or set to another value. See the section titled "Create Logical Drive Screen" for a detailed description.

6. The Logical Drive Size area includes a graphical representation of the storage capacity available. To create a single logical drive across this array, accept the default values. See the section titled "Create Logical Drive Screen" for a detailed description of this screen.
7. Click the Done button.
8. Select Array B or the Unused Space icon under Array B in the Logical Configuration View.
9. Repeat steps 12 through 16 to create a single logical drive on Array B, this time selecting RAID 1 fault tolerance.
10. The Configuration View screen should look like Figure 5-8.

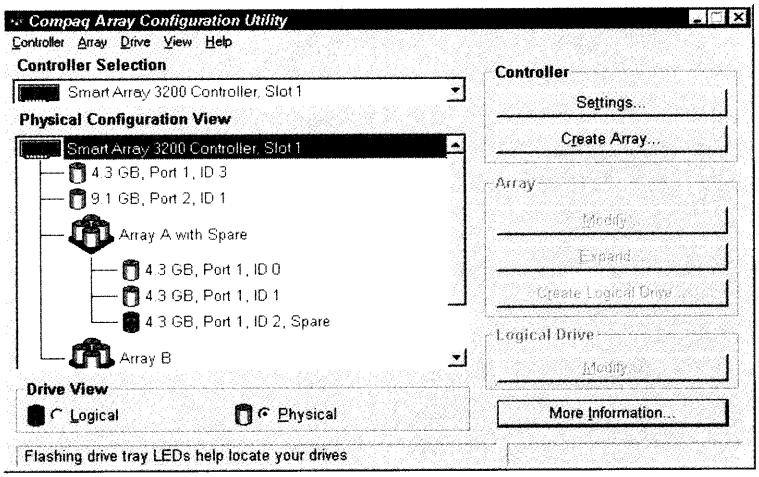

Figure 5-8. Example array - Configuration View screen with two arrays

NOTE: Given the reliability of a particular generation of hard drive technology, the probability of an array experiencing a drive failure increases with the number of drives in an array. Compaq recommends the number of drives in an array be limited to 15.

Capacity Expansion

Capacity expansion involves adding storage capacity to an array that has already been configured. If an existing array is nearly full of data, you can expand the capacity without disturbing the existing data. The Smart Array 3200 capacity expansion feature allows the addition of a new physical drive(s) to the array.

When you run the Array Configuration Utility, the program checks the drive hardware and configuration. If the Array Configuration Utility discovers a physical drive that is not being used, the configuration wizard leads you through the steps for adding the drive.

NOTE: You cannot use the Capacity Expansion feature if the disk controller is configured for use with the Recovery Server option. In order to expand an array when the controller is configured for the Recovery Server option:

1. Use the System Configuration Utility to turn off the Recovery Server feature.
2. Enter the Array Configuration Utility and use the capacity expansion feature.
3. After the expansion is complete, use the System Configuration Utility to enable the Recovery Server feature.

Capacity Expansion Procedure

To bypass the configuration wizard, follow these steps to expand your array:

1. Install the new physical drive(s).
2. Assign the new physical drive(s) to an existing array. Existing logical drive(s) will expand automatically across the physical drives, including the newly added one(s).
3. Create a new logical drive to use the extra space on the expanded array.

Capacity Expansion Example

For this example, assume a configuration similar to the previous example, except that the fourth 4.3-GB drive was added later. Expand Array A to include the fourth drive. This scenario is represented in the following figure with a single 4.3-GB drive unassigned.

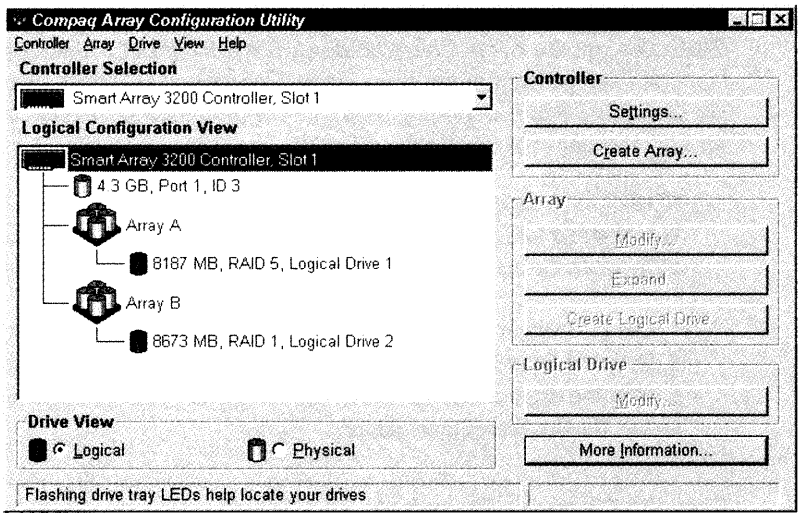

Figure 5-9. Array expansion example - Configuration View screen

To expand the capacity of Array A and create Logical Drive 2:

1. Select Array A.
2. Click the Expand button.
3. Select the unassigned 4.3-GB drive.
4. Click Assign Drive(s) to Array button.

5. Click the Next button at the bottom of the screen. A screen similar to the following figure is displayed.

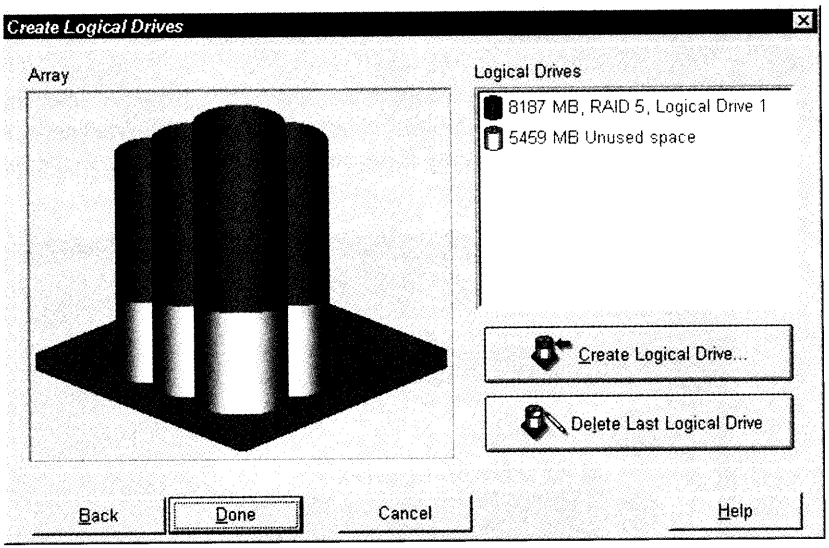

Figure 5-10. Expansion Wizards - Logical Drive screen

6. Click the Create Logical Drive button.
7. Set the fault tolerance, stripe size, array accelerator, and size for Logical Drive 2.
8. Click the Next button.
9. Click the Done button.
10. At the main screen, select Controller, Save. This saves the new settings for Logical Drive 2 and starts the capacity expansion process.

NOTE: Logical Drive 2 will not be accessible until the capacity expansion process has completed on Logical Drive 1.

CAUTION: In case of power loss, capacity expansion process information is temporarily stored in the Array Accelerator memory. To prevent the loss of data in the expanding logical drive do not interchange Smart Array 3200 or Array Accelerator boards during a capacity expansion process.

Array Configuration Utility Screens

Main Configuration Screen

The Main Configuration screen is the first screen displayed after the configuration wizard is finished. Some areas are highlighted and some appear gray. You cannot select gray areas until you select an item in the list box providing that option.

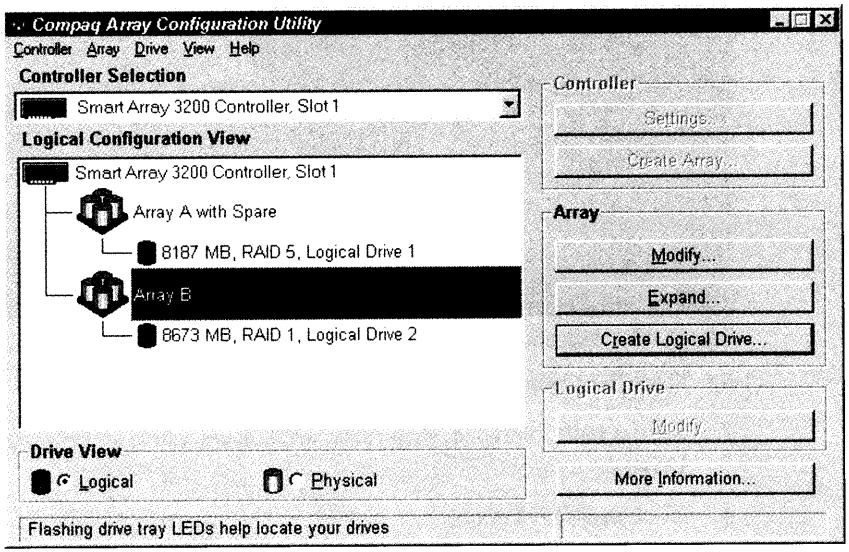

Figure 5-11. Main Configuration screen

Main Configuration Screen Contents

Menu Bar

The menu bar contains the following pull-down menus:

- Controller - Use to select a controller, save a configuration, create an array, and exit the program.
- Array - Use to delete, change, or expand the capacity of an array and to create logical drives.
- Drive - Use to delete or change logical drives, assign physical drives to arrays, and create online spares.
- View - Use to switch between the Physical Drive View or the Logical Drive View in the list box.
- Help - Use to access online help.

Controller Selection Box

The Controller Selection box is located in the top left corner of the Main Configuration screen. Select this to see a list of the controllers installed in the system. You can select a controller to view or configure. The highlighted controller is shown in detail in the View Configuration list box.

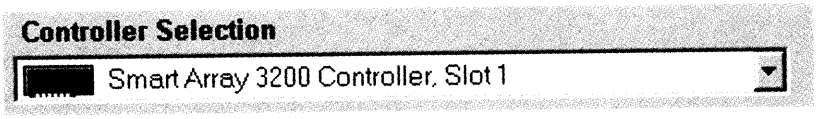

Figure 5-12. Controller Selection box

Physical/Logical Configuration View List

The Physical/Logical Configuration View list shows all the drives and arrays configured for the selected controller. The name of the controller and the slot in which it is installed are displayed next to each controller icon.

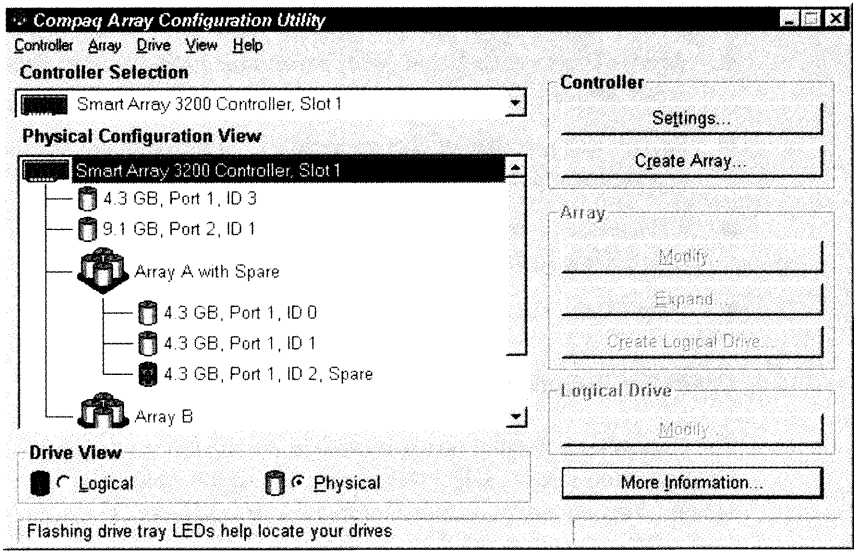

Figure 5-13. Configuration View list

For each controller, the drive arrays, logical drives, and physical drives configured for that controller are listed. Use the Drive View options, located below the Configuration View list to select the Physical or Logical view.

Figure 5-13 shows the physical view of a Smart Array 3200 Controller in slot 3. Listed below the controller are two unassigned drives: one 9.1-GB drive and one 4.3-GB drive. This controller has two drive arrays, Array A and Array B, along with a number of drives within each array. Array A has an online spare.

NOTE: When viewing the configuration list box, selecting an item—a controller, array, logical drive, or physical drive—will cause the drive tray LEDs to blink. Use this feature to identify a specific physical drive or to identify the external drives attached to a controller.

More Information Button

The More Information button, shown in Figure 5-14, is located at the bottom right side of the screen. Click this button to display a list of all the controller, drive, and array configuration details available for the selected items.

Drive View Box

This box, shown in Figure 5-14, is located at the bottom left of the screen. Use the Drive View box to select a logical or physical representation in the View Configuration list box.

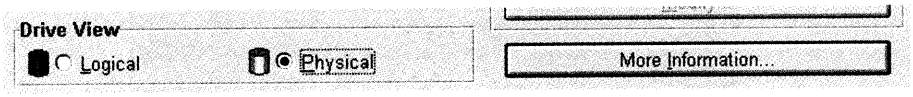

Figure 5-14. Drive View options and More Information button

Controller Buttons

The top right corner of the screen contains the Controller box, which becomes active after you select a controller in the Controller Select box.

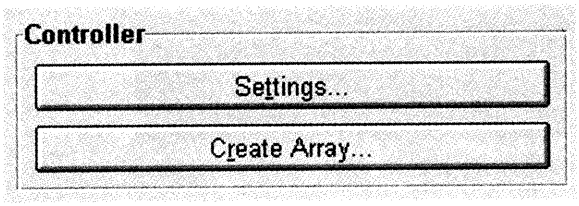

Figure 5-15. Controller box

Click the Settings button to display the Controller Settings screen (see the section titled "Controller Settings Screen" later in this chapter). Click the Create Array button to display the Create Array screen (see the section titled "Create Array Screen" later in this chapter).

Array Buttons

The Array box is located on the right side of the screen, under the Controller box. It becomes active after you select an array in the View Configuration list box.

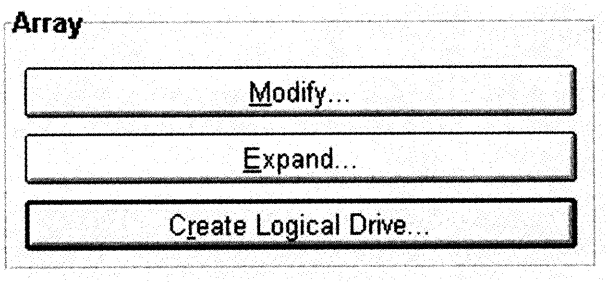

Figure 5-16. Array buttons

Logical Drive Buttons

This box is located on the right side under the Array box. It becomes active after you select a logical drive in the Configuration View list box.

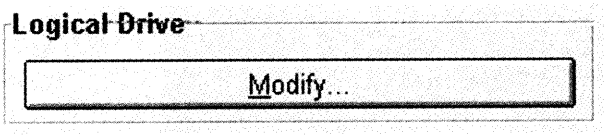

Figure 5-17. Logical Drive buttons

Controller Settings Screen

Use the Controller Settings screen to select the operating system and set the Rebuild Priority, Expand Priority, and Accelerator Ratio. Rebuild and Expand priority settings will not affect an idle system, but they will affect performance on a busy system.

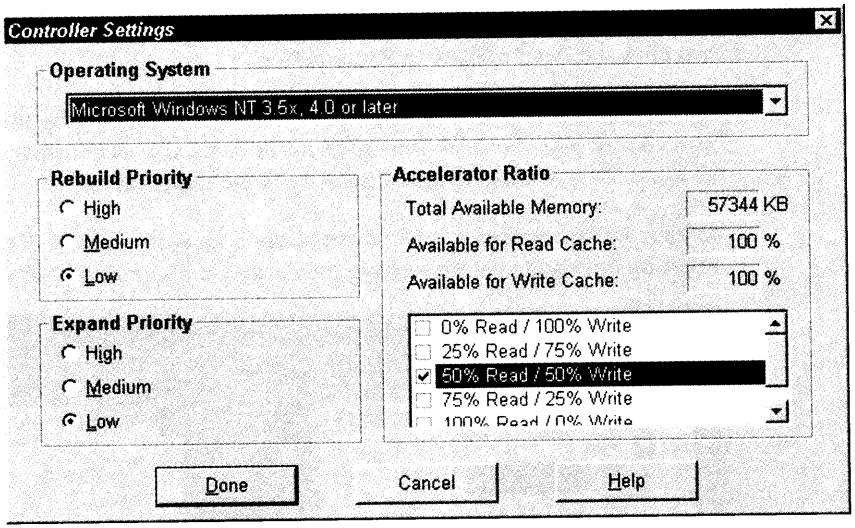

Figure 5-18. Controller Settings screen

The Rebuild Priority affects the amount of time the controller spends rebuilding data after a failed drive has been replaced. Select High if rebuilding data should take precedence over handling requests from the operating system. Select Low if the controller should rebuild data only when it is idle.

The Expand Priority affects when the controller moves data after you have chosen to expand the capacity of an array. Select High if expanding the array capacity should take precedence over handling requests from the operating system. Select Low if the controller should expand the array capacity only when it is idle.

The Accelerator Ratio determines the amount of memory allocated to the read and write caches. Some applications may perform better with a larger write cache; others may perform better with a larger read cache.

Create Array Screen

In this screen, all available drives attached to the selected controller are listed in the Port columns. The rows in the columns correspond to the SCSI ID of the drives.

To create an array, select the drives to be part of the array, then click the Assign Drive to Array button. To assign a spare, select the drive to be the spare and then click the Assign Spare to Array button.

Always group physical drives of the same size. If you mix drive sizes, the Smart Array 3200 treats all the drives as the same size as the smallest drive in the array. This results in wasted capacity in the larger drives.

To increase performance, select drives from both ports and install the correct drives on both ports before running the Array Configuration Utility.

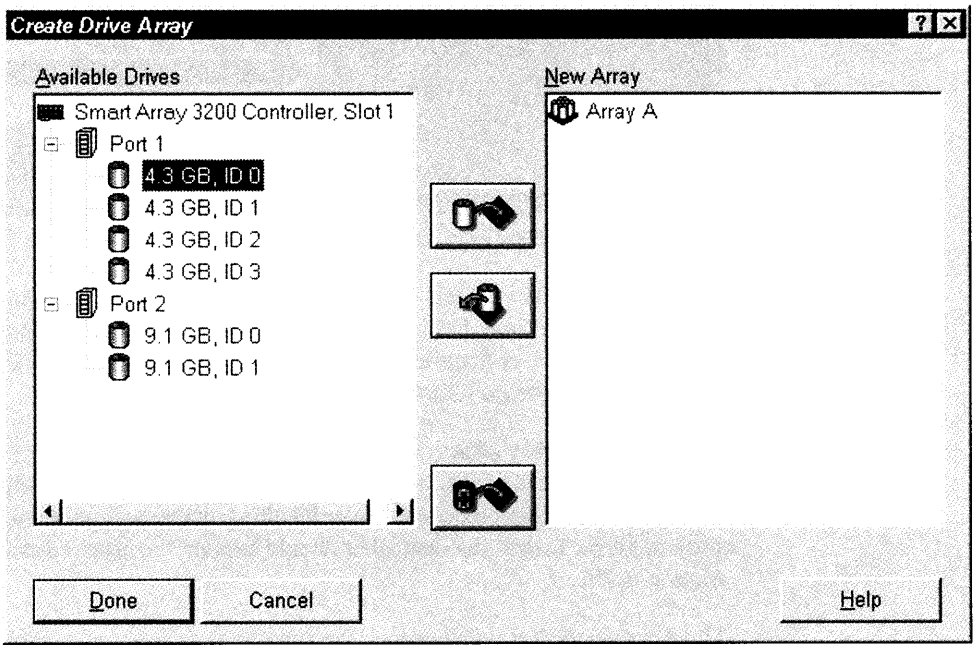

Figure 5-19. Create Array screen

Create Logical Drive Screen

In this screen, you can select the fault tolerance method, enable the array accelerator, and set the logical drive size.

NOTE: Given the reliability of a particular generation of hard drive technology, the probability of an array experiencing a drive failure increases with the number of drives in an array. Compaq recommends the number of drives in an array be limited to 15.

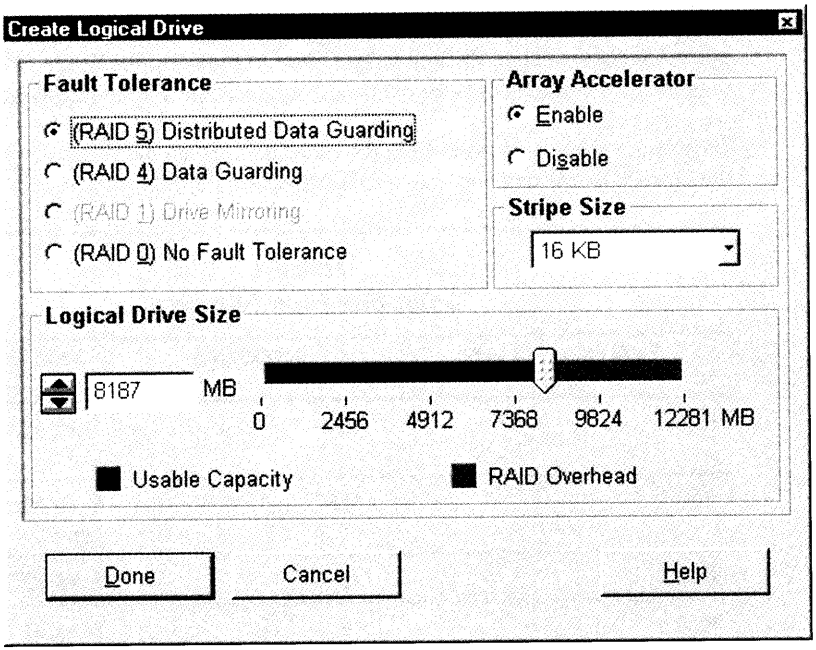

Figure 5-20. Create Logical Drive screen

The Logical Drive Size area shows a scale marked with the amount of drive capacity available for a logical drive. The utility does not allow you to create a logical drive larger than the maximum supported by the operating system.

The left side of the Logical Drive Size scale indicates the amount of space available for data. The right side of the scale indicates the amount of space required for storing parity or mirrored information, depending on the fault tolerance method. The red (right) band is only needed for RAID 1, RAID 4, or RAID 5.

This screen first displays the maximum size logical drive that can be created for your drive array. You can reduce this amount if you want to create more than one logical drive on the array. To reduce the size, type the number in or drag the pointer to the left. Fine-tune the size with the arrow buttons to the left of the scale.

Stripe Size

Stripe size refers to the amount of data stored on each physical drive in one stripe of a logical drive. Each RAID level has a default value (Table 5-1) plus a range of supported sizes. The default values were determined to provide optimum performance for that RAID level in many applications. However, your application may benefit from setting the stripe size to a different value.

To select a stripe size other than the default, click on the down arrow next to the current stripe size and select from those available.

Table 5-1
Stripe Size Fault Tolerance

Fault Tolerance Level	Default (KB)	Valid Stripe Sizes (KB)
Raid 0	128	8, 16, 32, 64, **128**, 256
RAID 1	128	8, 16, 32, 64, **128**, 256
RAID 4	16	8, **16**, 32, 64*
RAID 5	16	8, **16**, 32, 64*

*RAID 4 and 5 do not support stripe sizes larger than 64KB per drive.

Existing Configurations

To change the stripe size on an existing configuration, select "Modify Logical Drive." Use "Modify/Expand Array" if physical drives will be added at the same time stripe size is changed. Refer to Table 5-1 for the range of supported sizes. This can only be done if the Array Accelerator is enabled and the cache memory is large enough to store data during the transition. See "Distributing Data and Data Striping" Appendix D for a more detailed explanation.

IMPORTANT: In some cases, when the stripe-size is increased, the number of sectors required on each physical drive will also be increased. However, an error message will be displayed and stripe-size not changed. In this case the data must be backed up and the volume reconfigured as a new logical drive with the new stripe-size. See the Chapter 2.

Error and Warning Messages

When you start the Array Configuration Utility, the software checks each controller to detect errors in its configuration. If a problem is found, the Array Configuration Utility displays an error or warning message that describes the problem. Error and warning messages include instructions to correct configurations. If a warning message indicates "Internal Error Has Occurred" and cites an error code number, the problem requires assistance from Compaq technical support. See the "About This Guide" section at the beginning of this book for technical support phone numbers.

NetWare/intraNetWare Online Array Configuration Utility (CPQONLIN)

The NetWare Online Array Configuration Utility, also called CPQONLIN, is an NLM for configuring your drive arrays without shutting down your server. CPQONLIN also provides information about the status of drives attached to the Smart Array 3200. It indicates drive failure, expansion, or waiting for expansion or rebuild (queued). Before loading *CPQONLIN.NLM*, you must load the appropriate device drivers—*CPQARRAY.HAM*. *CPQONLIN.NLM* is located in the ONLINE directory of Novell SSD Disk 1. See driver installation information in the NetWare/intraNetware section of Chapter 6.

Auto-configuration

If no logical drives are configured, a CPQONLIN auto-configuration wizard (Figure 5-21) appears and prompts you select fault tolerance information. CPQONLIN then configures arrays optimally for the selected fault tolerance.

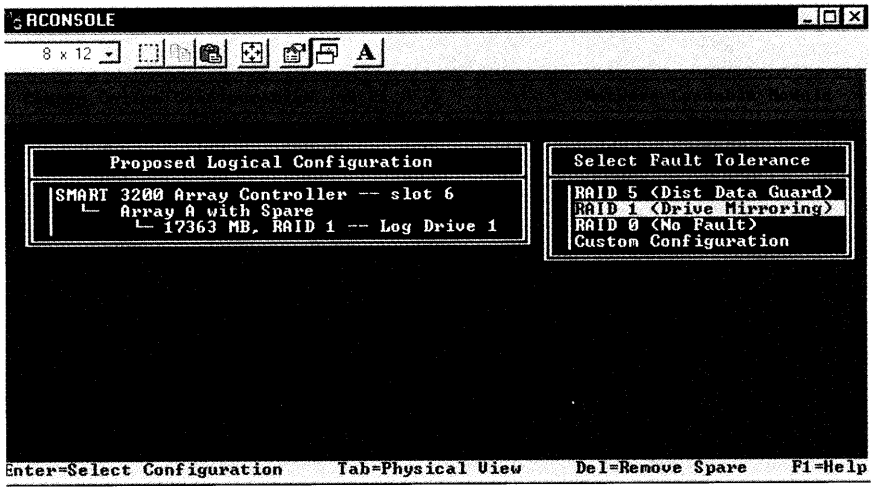

Figure 5-21. Auto-configuration wizard configures logical drives for RAID 1

Custom Configuration

Custom configuration allows you to create arrays and to assign fault tolerance to one array at a time. To custom configure an array, make selections from the Main Configuration View screen. Highlight the controller, array, or logical drive you want to configure. Make a selection from the Options menu located on the right side of the screeen. Figure 5-22 shows the controller highlighted on the left side of the screen and Controller Options on the right side of the screen.

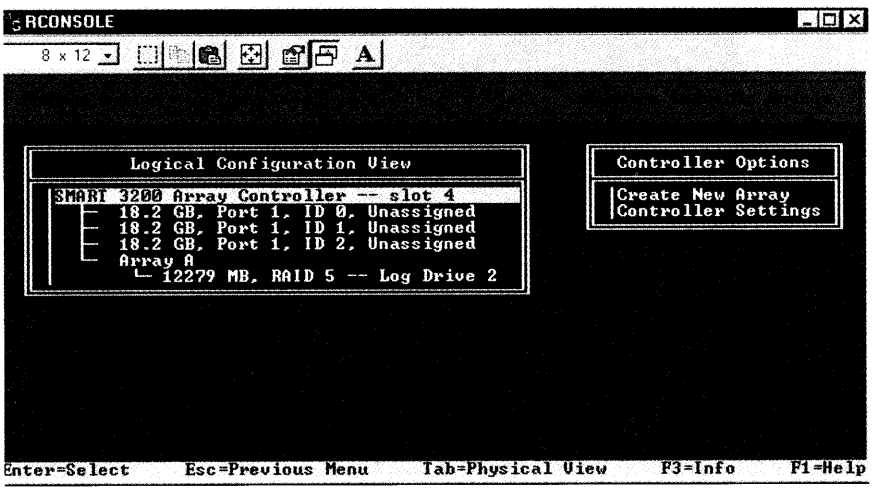

Figure 5-22. Main Configuration View screen

Use online help for instructions to complete configurations. The following sections discuss CPQONLIN functions.

Drive Rebuild, Expand Priority, and Accelerator Ratio

To set the drive rebuild priority, expand priority, or accelerator ratio for a controller, highlight the controller at the Main Configuration View screen and select the Controller Settings option listed below Controller Options. The Controller Settings screen appears (Figure 5-23).

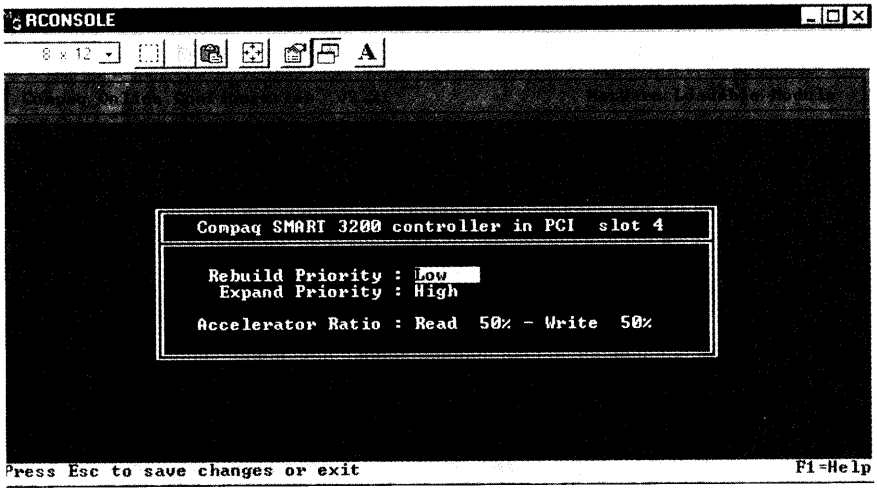

Figure 5-23. Controller Settings screen

Drive Rebuild

Drive rebuild occurs after a physical drive fails and is replaced. Only logical drives configured for fault tolerance (RAID 1, RAID 4, or RAID 5) on the array with the failed physical drive will rebuild.

Priority Settings

To set the drive rebuild priority, highlight the Smart Array 3200 controller and select the Controller Settings. If you choose low priority for drive rebuilding (the default), rebuild takes place only when the Smart Array 3200 is not busy handling normal I/O requests. Low priority has minimal effect on normal I/O operations. With high priority, drive rebuilding occurs faster, at the expense of normal I/O operations. Choosing high priority for drive rebuilding protects an array better, but the array is vulnerable to additional drive failures while a drive is being rebuilt.

Accelerator Ratio

The Smart Array 3200 has an onboard cache, called an Array Accelerator, that performs both write-posting and read-ahead caching. The setting in CPQONLIN determines the amount of memory allocated to the read and write caches. For example, if the Accelerator Ratio is set to Read 75% - Write 25%, then 75% of Array Accelerator cache is dedicated to read-ahead cache and 25% is dedicated to the write-posting cache. This option can be modified from the Controller Settings menu when the Array Accelerator is installed.

Expand an Array

During an expand, performance may be slightly degraded. In most cases, however, any potential degradation is offset by the addition of physical drives. Some tips for expanding are:

- Perform the expand process during periods of low server use. If you must expand during peak periods, the Array Configuration Utility for NetWare allows you to set the priority of the expand. Setting the priority to LOW will affect performance the least, but it will take longer for the new space to become available.
- When expanding, you must add drives of at least the same capacity as the smallest drive in the array. Adding larger drives wastes space because only the space that is equal to the smallest drive size can be used.

Add or Configure Spare Drives

When adding a spare drive to another array, you must have an unassigned drive or a drive assigned as a spare. You can assign a single spare to as many arrays as you want, or assign separate spares. When you select Assign Spare Drive, only drives that qualify will appear (for example, only those spares that are large enough will appear). If drives that you expect to see do not appear, switch to the physical drive view (**TAB** key) and check the size of the drives. The spare must be as large as the smallest drive in the array.

Failed Drives or Interim Recovery Mode

If a drive fails and you have hardware fault tolerance enabled, operation will continue. Replace the drive as soon as possible. Select a logical drive and press **F3** to monitor the status of drive recovery (Figure 5-24).

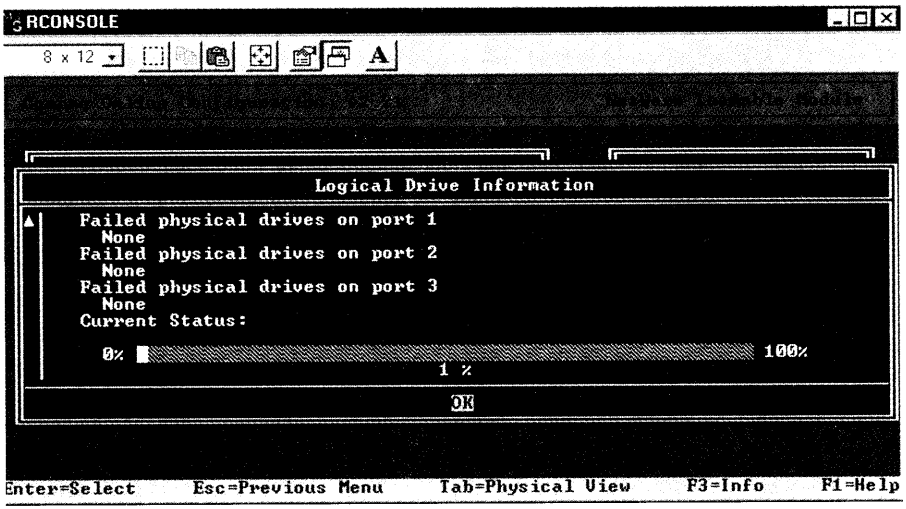

Figure 5-24. Rebuilding logical drive

- Interim Recovery: The logical drive is operating, but a failed drive has not been replaced. Replace drive as soon as possible.
- Ready for Recovery: The logical drives are queued for recovery. This status is displayed when another logical drive is already rebuilding or expanding.
- Rebuilding: The array is operating and rebuilding a replacement drive or an online spare, if one was assigned.
- Logical Drive Failed: If you have one or more logical drives that are not protected by fault tolerance in an array, the data on these logical drives will be lost. The Array Configuration Utility shows the logical drives as FAILED. After drive replacement, any fault-tolerant logical drives rebuild. The logical drives that were not protected (FAILED) become available for data (the devices are reactivated automatically). If you have a backup of the data, restore the data now.

If you do not replace the failed drive, the only option using the Array Configuration Utility is to delete logical drives. Do NOT delete logical drives that contain valid data. Doing so results in lost data.

NOTE: A failed status can occur on drives protected by fault tolerance if two or more physical drives fail concurrently.

Some status indicators are available without pressing **F3**. For example, on the Main menu, the FAILED status will appear next to the logical drive that has failed. EXPANDING and REBUILDING will appear next to the array in which the activity is occurring.

Handling Disk Drive Failures

If you configured your Smart Array 3200 with hardware fault tolerance, complete the following steps after a disk drive failure.

1. Determine which physical drive failed. On hot-pluggable drives in a ProLiant server or storage system, this is indicated by an amber Drive Failure LED on each drive tray.
2. If the unit containing the failed drive does not support hot-pluggable drives, perform a normal system shutdown.
3. Remove the failed drive and replace it with a drive that is of the same capacity. For hot-pluggable drives, after you secure the drive in the bay, the LEDs on the drive each light once in an alternating pattern to indicate that the connection was successful. The Online LED blinks, indicating that the controller recognized the drive replacement and began the recovery process.
4. Power on the server, if applicable.
5. The Smart Array 3200 firmware reconstructs the information on the new drive based on information from the remaining physical drives in the logical drive. While reconstructing the data on hot-pluggable drives, the Online LED blinks. When drive rebuild is complete, the Online LED is illuminated.
6. NetWare/intraNetWare cannot detect a single physical drive failure when using hardware-based fault tolerance; intraNetWare determines that the data is still valid and accessible during the rebuilding process.

Optimizing Array Controller Performance

To improve system performance, keep these tips in mind before creating intraNetWare volumes or partitions:

- If you selected a fault tolerance option, such as mirroring or distributed data guarding, when using the Compaq System Configuration Utility, do not select mirroring while using *INSTALL.NLM*. The fault tolerance capabilities of the Smart Array 3200 provide performance improvements and automatic data recovery features.
- Novell recommends that you create volumes with a 64-KB block size and that you use the Block Sub-Allocation feature of intraNetWare. Using a large block size decreases the amount of RAM required to mount the volume, while Block Sub-Allocation allows intraNetWare to allocate disk space more efficiently.
- Use of linear memory provides the best performance in the intraNetWare environment. When you use the Compaq System Configuration Utility to configure your server with intraNetWare, the memory options default so that linear memory is used. To verify the setting, run the Compaq System Configuration Utility and view the Compaq Memory settings. Make sure that a linear option has been selected under the Base Memory option.

Using the Compaq Drive Array Optimization Utility (CPQDAOPT)

Compaq recommends that you use the Compaq Drive Array Optimization Utility (*CPQDAOPT.NLM*) to optimize the drive arrays before creating partitions. CPQDAOPT assists you in optimizing performance and can increase drive array performance by 20 to 40 percent. CPQDAOPT provides a formula specific to your configuration. Use this information as you create a partition using *INSTALL.NLM*. If you installed NetWare using SmartStart, it is not necessary to run this utility.

Using CPQDAOPT on NetWare 3.12 Servers

NOTE: Back up existing data before applying new settings to data volumes.

1. Start your NetWare server.
2. Copy the *CLIB.NLM* and *STREAMS.NLM* files from the NetWare Installation CD-ROM (D:\ NETWARE.312_____\C where the line represents eight underscores) to the server's DOS partition before you begin installation.

   NOTE: *CLIB.NLM* must be v3.11c or later.

3. Be sure that you load *CPQARRAY.HAM*.
4. When the Create NetWare Partition option appears during a new NetWare 3.12 installation, use the **Alt+Esc** key sequence to change to the console prompt and load CLIB:

   ```
   Load clib.nlm
   ```

5. Load *CPQDAOPT.NLM* from Novell SSD Disk 4:

   ```
   Load A:\drv_arry\cpqdaopt
   ```

6. CPQDAOPT displays the registered disk devices it has located. Select the device where you will create a partition by using the cursor keys. Press **Enter**.

   CPQDAOPT determines if it is possible to optimize the alignment of data on the selected device. If so, it provides a formula to determine the size of the Hot Fix Redirection Area you should select when creating this partition. Note the formula: even, odd, and so on.

7. In some cases, it may not be possible to align the data on the partition optimally by sizing the Hot Fix Redirection Area alone. CPQDAOPT may instruct you to create a small DOS partition on the device. If so:
   a. Exit NetWare before creating the partition.
   b. Use the DOS FDISK utility to create the smallest DOS partition allowed.
   c. Start the server and load *CPQDAOPT.NLM* again.
8. If there are no existing partitions, load the NetWare installation utility and select the option to create disk partitions.

9. Use the formula recommended by CPQDAOPT to determine the number of Hot Fix Redirection Blocks for the partition installed on the selected device. Make sure that the number of blocks is the same as described by the formula. For example, if the formula was "even," any even number will work.

10. After the volume is optimized, copy the *CPQDAOPT.NLM* to the server's SYSTEM partition so that it is easily accessible for future optimizations. In the following example, F: is mapped to the server's SYSTEM partition. From a client logged into the server, type:

```
copy A:\drv_arry\cpqdaopt.nlm  f:\system\cpqdaopt.nlm
```

If you have already created a partition on a device, use CPQDAOPT to determine if the data is optimally aligned.

A warning about changing the cache buffer size on your server may appear. In some cases, increasing the size of the cache buffers on a NetWare/intraNetWare server may slow I/O performance. If you must enlarge the cache buffer size and this takes the partition out of optimal alignment, or if CPQDAOPT indicates the existing partition on a device is not optimally aligned, you can still configure the partition optimally:

1. Back up the data on your server to avoid data loss.

2. Use *INSTALL.NLM* Disk Options, Partition Tables, and Change Hot Fix Option to change the size of the Hot Fix Redirection Area using the formula provided by CPQDAOPT.

3. Create your volume(s).

4. Restore your data.