Adaptec Customer Support

If you have questions about installing or using your Adaptec product, check this document first—you will find answers to most of your questions here. If you need further assistance, use the support options listed below.

Technical Support Identification (TSID) Number

- Before contacting Technical Support, you need your unique 12-digit TSID number. The TSID number identifies your product and support status.
- The TSID number is included on a white, bar-coded label, like the example below:

```
+---------------------------+
| THIS TSID NUMBER WILL      |
| BE REQUIRED WHEN          |
| CONTACTING TECHNICAL      |
| SUPPORT                   |
+---------------------------+
| TSID: PTNNNNYYYYWW        |
| (1) PRODUCT PN: PPPPPPPP|
|                          |
| (2) PRODUCT SN: XXXXXXXX|
+---------------------------+
```

- Affix a copy of the TSID label to the CD jacket so that you don’t lose it.

Support Options

- Search the Adaptec Support Knowledgebase (ASK) at ask.adaptec.com for articles, troubleshooting tips, and frequently asked questions for your product.
- For support via Email, submit your question to Adaptec’s Technical Support Specialists at ask.adaptec.com.

North America

- For information about Adaptec’s support options, call +1 408-957-2550, 24 hours per day, 7 days per week. To speak with a Technical Support Specialist,
  - For Hardware products call +1 408-934-7274, Monday to Friday, 3:00 A.M. to 5:00 P.M., Pacific Time.
  - For RAID and Fibre Channel products call +1 321-207-2000, Monday to Friday, 3:00 A.M. to 5:00 P.M., Pacific Time.

To expedite your service, have your computer in front of you.

- To order Adaptec products, including accessories and cables, call +1 408-957-7274. Or, you can order cables online at www.adaptec.com/buy-cables.
Europe


- **German:** To speak with a Technical Support Specialist, call +49 89 43 66 55 22, Monday to Friday, 9:00 to 17:00, CET. For support via e-mail, submit your question to Adaptec’s Technical Support Specialists at ask-de.adaptec.com.

- **French:** To speak with a Technical Support Specialist, call +49 89 43 66 55 33, Monday to Friday, 9:00 to 17:00, CET. For support via e-mail, submit your question to Adaptec’s Technical Support Specialists at ask-fr.adaptec.com.

- **English:** To speak with a Technical Support Specialist, call +49 89 43 66 55 44, Monday to Friday, 9:00 to 17:00, GMT. For support via e-mail, submit your question to Adaptec’s Technical Support Specialists at ask.adaptec.com.

- You can order Adaptec cables online at www.adaptec.com/buy-cables.

Japan

- Visit our Web site at www.adaptec.co.jp.

- To speak with a Technical Support Specialist, call +81 3 5308 6120 Monday–Friday, 9:00 A.M. to 12:00 P.M and 1:00 P.M. to 6:00 P.M.
Limited 3-Year Hardware Warranty

1. Adaptec, Inc. ("Adaptec") warrants to the purchaser of this product that it will be free from defects in material and workmanship for a period of three (3) years from the date of purchase. If the product should become defective within the warranty period, Adaptec, at its option, will repair or replace the product, or refund the purchaser's purchase price for the product, provided it is delivered at the purchaser's expense to an authorized Adaptec service facility or to Adaptec.

2. Repair or replacement parts or products will be furnished on an exchange basis and will either be new or reconditioned. All replaced parts or products shall become the property of Adaptec. This warranty shall not apply if the product has been damaged by accident, misuse, abuse or as a result of unauthorized service or parts.

3. Warranty service is available to the purchaser by delivering the product during the warranty period to an authorized Adaptec service facility or to Adaptec and providing proof of purchase price and date. The purchaser shall bear all shipping, packing and insurance costs and all other costs, excluding labor and parts, necessary to effectuate repair, replacement or refund under this warranty.

4. For more information on how to obtain warranty service, write or telephone Adaptec at 691 South Milpitas Boulevard, Milpitas, CA 95035, (800) 959-7274.

5. THIS LIMITED WARRANTY DOES NOT EXTEND TO ANY PRODUCT WHICH HAS BEEN DAMAGED AS A RESULT OF ACCIDENT, MISUSE, ABUSE, OR AS A RESULT OF UNAUTHORIZED SERVICE OR PARTS.

6. THIS WARRANTY IS IN LIEU OF ALL OTHER EXPRESS WARRANTIES WHICH NOW OR HEREAFTER MIGHT OTHERWISE ARISE RESPECT TO THIS PRODUCT. IMPLIED WARRANTIES, INCLUDING THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT SHALL (A) HAVE NO GREATER DURATION THAN 3 YEARS FROM THE DATE OF PURCHASE, (B) TERMINATE AUTOMATICALLY AT THE EXPIRATION OF SUCH PERIOD AND (C) TO THE EXTENT PERMITTED BY LAW BE EXCLUDED. IN THE EVENT THIS PRODUCT BECOMES DEFECTIVE DURING THE WARRANTY PERIOD, THE PURCHASER'S EXCLUSIVE REMEDY SHALL BE REPAIR, REPLACEMENT OR REFUND AS PROVIDED ABOVE. INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION LOSS OF DATA, ARISING FROM BREACH OF ANY EXPRESS OR IMPLIED WARRANTY ARE NOT THE RESPONSIBILITY OF ADAPTEC AND, TO THE EXTENT PERMITTED BY LAW, ARE HEREBY EXCLUDED BOTH FOR PROPERTY DAMAGE, AND TO THE EXTENT NOT UNCONSCIONABLE, FOR PERSONAL INJURY DAMAGE.

7. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR CONSUMER PRODUCTS, AND SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION OR EXCLUSIONS MAY NOT APPLY TO YOU.

8. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.
Regulatory Compliance Statements

Federal Communications Commission Radio Frequency Interference Statement

WARNING: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. However, if this equipment does cause interference to radio or television equipment reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.
- Use a shielded and properly grounded I/O cable and power cable to ensure compliance of this unit to the specified limits of the rules.

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

European Union Compliance Statement

This Information Technology Equipment has been tested and found to comply with EMC Directive 89/336/EEC, as amended by 92/31/EEC and 93/68/EEC, in accordance with:

- EN55024 (1998) Immunity:
  - EN61000-4-2 (1998) Electrostatic discharge: ±4 kV contact, ±8 kV air
  - EN61000-4-3 (1998) Radiated immunity
  - EN61000-4-4 (1995) Electrical fast transients/burst: ±1 kV AC, ±0.5 kV 1/O
  - EN61000-4-5 (1995) Surges ±1 kV differential mode, ±2 kV common mode
  - EN61000-4-6 (1996) Conducted immunity: 3 V
  - EN61000-4-11 (1994) Supply dips and variation: 30% and 100%

In addition, all equipment requiring U.L. listing has been found to comply with EMC Directive 73/23/EEC as amended by 93/68/EEC in accordance with EN60950 with amendments A1, A2, A3, A4, A11.

Australian/New Zealand Compliance Statement

This device has been tested and found to comply with the limits for a Class B digital device, pursuant to the Australian/New Zealand standard AS/NZS 3548 set out by the Spectrum Management Agency.

Adaptec, Inc. 

FOR HOME OR OFFICE USE

Tested to Comply
With FCC Standards
Canadian Compliance Statement
This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.
Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Japanese Compliance (Voluntary Control Council Initiative)
This equipment complies to class B Information Technology equipment based on VCCI (Voluntary Control Council for Interface). This equipment is designed for home use but it may causes radio frequency interference problem if used too near to a television or radio. Please handle it correctly per this documentation.
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Kit Contents

Your controller kit includes:

- Adaptec RAID controller. For controller illustrations, see Appendix G.
- Installation CD
- The cables supplied depend on the controller model:

<table>
<thead>
<tr>
<th>Adaptec Model</th>
<th>Cables Supplied</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020ZCR/2020SA</td>
<td>None</td>
</tr>
<tr>
<td>2025ZCR/2025SA</td>
<td>None</td>
</tr>
<tr>
<td>2120S/2200S/2130SLP/2230SLP</td>
<td>1 internal LVD SCSI cable¹</td>
</tr>
<tr>
<td>2410SA</td>
<td>4 SATA cables</td>
</tr>
<tr>
<td>2810SA</td>
<td>8 SATA cables</td>
</tr>
<tr>
<td>21610SA</td>
<td>16 SATA cables</td>
</tr>
</tbody>
</table>

1. Features a multimode terminator. All these SCSI RAID controllers support multimode termination.

- Low-profile bracket (for low-profile controllers only - to determine the form factor of your controller, see Controller Features on page 1-5).
- Warranty card
- Quick Installation Guide
Overview of the Installation Process

This section provides an overview of how to install and configure the Adaptec RAID controller:

1. Install and configure the controller and hard drives, as described in Chapter 2, *Installing the Controller and Drives*.

2. Your next steps depend on your system:
   - **In a system without an operating system (fresh install)...**
     - a. Build the bootable array, as described in *Creating a Bootable RAID 5 Array* on page 2-5.
     - b. Install the controller driver at the beginning of the operating system installation, as described in Chapter 3.
     - c. Install Adaptec Storage Manager as described in Chapter 4.
     - d. View, manage, and build additional arrays, as needed, using Adaptec Storage Manager. For an overview, see Chapter 5. For details, refer to the Adaptec Storage Manager online Help.
   - **In an existing system that already has an operating system...**
     - a. Install the controller driver.
     - b. Install Adaptec Storage Manager as described in Chapter 4.
     - c. Build the array using Adaptec Storage Manager. View, manage, and build additional arrays, as needed, using Storage Manager. For an overview, see Chapter 5. For details, refer to the Storage Manager online Help.

3. Register online at register.adaptec.com to receive important information about your controller.

System Requirements and Compatibility

This section summarizes the following system requirements:

- Drive Requirements
- Hardware Requirements
- Operating System Compatibility
Drive Requirements

You need to have enough drives available for the RAID array level you want to build. For details, see Appendix E, About RAID.

\[\text{Note: Arrays work best when all array members (drives) are identical.}\]

Hardware Requirements

The following list summarizes the hardware requirements:

\[\text{■ Intel Pentium, or equivalent, processor}\]
\[\text{■ A motherboard that meets the following compatibility requirements:}\]
\[\quad \text{– Complies with the PCI Local Bus Specification, Revision 2.2 and higher.}\]
\[\quad \text{– Supports multifunction devices where one of the devices is a PCI bridge.}\]
\[\quad \text{– Provides large memory-mapped address ranges.}\]
\[\quad \text{Refer to the Readme file on the Adaptec installation CD for additional motherboard compatibility information.}\]
\[\text{■ At least 128 MB of RAM}\]
\[\text{■ An available 32- or 64-bit PCI slot}\]
\[\text{■ An available 32- or 64-bit PCI or PCI-X slot (For Adaptec 2020ZCR, 2130SLP, and 2230SLP controllers only)}\]
\[\text{■ 20 MB of free drive space}\]
\[\text{■ 16-bit SVGA color monitor with a resolution of at least 800 x 600}\]
\[\text{■ CD-ROM drive (that is not part of the RAID you are installing)}\]

Operating System Compatibility

The following operating systems are supported:

\[\text{■ Windows 2000—Server, Advanced Server, Professional}\]
\[\text{■ Windows 2003 Server—Standard and Advanced}\]
\[\text{■ Windows XP—Home Edition and Pro}\]
\[\text{■ Red Hat Linux—Professional, Enterprise, and Advanced Server}\]
**Introduction**

- **SuSE Linux**—Personal, Professional, and Enterprise

  ![Note: For the latest on Adaptec’s support of Linux, or to download driver sources, visit www.adaptec.com.]

- **SCO**—
  - UnixWare 7.1.x/OpenUNIX 8 (Base and Business Editions)
  - OpenServer 5.06 and 5.07
- **Novell**—NetWare 6.x

**Controller Features**

This section contains the following subsections:

- **Features Overview**
- **SATA RAID Controller Features Summary**
- **SCSI RAID Controller Features Summary**
- **Advanced RAID Features**

**Features Overview**

Adaptec RAID controllers offer the following features:

- Supports **PCI Local Bus Specification**, Revision 2.2. Some models also support the **PCI-X Addendum**, Revision 1.0a. See pages 1-6 and 1-7.
- 64-bit, 66-MHz PCI interface compatible with 32-bit/33-MHz PCI slots.
- At least 64 MB of on-board RAM. Some controllers are available with more RAM.
- Operating system independent configuration and RAID creation using the Adaptec RAID Configuration (ARC) utility.
- Flash ROM for easy updates of controller firmware, BIOS, and ARC. For details on updating the flash, see Appendix C.
- Centralized management across all Adaptec host-based RAID products using Adaptec Storage Manager™. In addition to local console access, Adaptec Storage Manager provides remote configuration and management of RAID subsystems through password-protected Web access.
Introduction

- Event logging and broadcasting, including messaging for alphanumeric pagers.
- *All except Adaptec 2020SA/2020ZCR*—Optional battery backup module available. For details, see page 1-9.

**SATA RAID Controller Features Summary**

The following tables summarizes the features of the Adaptec SATA RAID controllers

<table>
<thead>
<tr>
<th></th>
<th>Adaptec 2020SA</th>
<th>Adaptec 2025SA</th>
<th>Adaptec 2410SA</th>
<th>Adaptec 2810SA/Adaptec 21610SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form factor</td>
<td>Low-profile</td>
<td>ZCR SO-DIMM</td>
<td>Low-profile</td>
<td>Full-height</td>
</tr>
<tr>
<td>PCI compatibility</td>
<td>PCI only</td>
<td>PCI only</td>
<td>PCI only</td>
<td>PCI only</td>
</tr>
<tr>
<td>PCI bus width (max)</td>
<td>64-bit</td>
<td>64-bit</td>
<td>64-bit</td>
<td>64-bit</td>
</tr>
<tr>
<td>PCI bus speed (max)</td>
<td>66 MHz</td>
<td>66 MHz</td>
<td>66 MHz</td>
<td>66 MHz</td>
</tr>
<tr>
<td>Cache, standard</td>
<td>64 MB</td>
<td>64 MB</td>
<td>64 MB</td>
<td>64 MB</td>
</tr>
<tr>
<td>Ports</td>
<td>None</td>
<td>None</td>
<td>4</td>
<td>8 / 16</td>
</tr>
<tr>
<td>Drives per port</td>
<td>N/A</td>
<td>N/A</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total drives</td>
<td>16</td>
<td>16</td>
<td>4</td>
<td>8 / 16</td>
</tr>
<tr>
<td>Connectors, internal</td>
<td>None</td>
<td>None</td>
<td>4</td>
<td>8 / 16</td>
</tr>
<tr>
<td>Cables supplied</td>
<td>None</td>
<td>None</td>
<td>4</td>
<td>8 / 16</td>
</tr>
<tr>
<td>RAID levels</td>
<td>0, 1, 5, 10, 50</td>
<td>0, 1, 5, 10, 50</td>
<td>0, 1, 5, 10</td>
<td>0, 1, 5, 10, 50</td>
</tr>
<tr>
<td>Simple volume</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Spanned volume</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Hotspares</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Automatic failover</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Audible alarm</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Battery module option</td>
<td>Not available</td>
<td>Not available</td>
<td>Not available</td>
<td>ABM-300</td>
</tr>
</tbody>
</table>

1. Battery sold separately.
# SCSI RAID Controller Features Summary

The following tables summarizes the features of the Adaptec SCSI RAID controllers. For more on SCSI, see Appendix F, *About SCSI*.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Adaptec 2020ZCR</th>
<th>Adaptec 2025ZCR</th>
<th>Adaptec 2120S</th>
<th>Adaptec 2200S</th>
<th>Adaptec 2130SLP/2230SLP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form factor</td>
<td>Low-profile</td>
<td>ZCR SO-DIMM</td>
<td>Low-profile</td>
<td>Low-profile</td>
<td>Low-profile</td>
</tr>
<tr>
<td>PCI compatibility</td>
<td>PCI/PCI-X</td>
<td>PCI/PCI-X</td>
<td>PCI only</td>
<td>PCI only</td>
<td>PCI/PCI-X</td>
</tr>
<tr>
<td>PCI bus width (max)</td>
<td>64-bit</td>
<td>64-bit</td>
<td>64-bit</td>
<td>64-bit</td>
<td>64-bit</td>
</tr>
<tr>
<td>PCI bus speed (max)</td>
<td>133 MHz</td>
<td>133 MHz</td>
<td>66 MHz</td>
<td>66 MHz</td>
<td>133 MHz</td>
</tr>
<tr>
<td>Cache, standard</td>
<td>64 MB</td>
<td>64 MB</td>
<td>64 MB</td>
<td>64 MB</td>
<td>128 MB/256 MB</td>
</tr>
<tr>
<td>Channels</td>
<td>None</td>
<td>None</td>
<td>1</td>
<td>2</td>
<td>1/2</td>
</tr>
<tr>
<td>Devices per channel(^1)</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Total devices</td>
<td>30</td>
<td>30</td>
<td>15</td>
<td>30</td>
<td>15/30</td>
</tr>
<tr>
<td>Connectors, internal(^2)</td>
<td>None</td>
<td>None</td>
<td>1</td>
<td>2</td>
<td>1/2</td>
</tr>
<tr>
<td>Connectors, external(^3)</td>
<td>None</td>
<td>None</td>
<td>1</td>
<td>2</td>
<td>1/2</td>
</tr>
<tr>
<td>Cables supplied</td>
<td>None</td>
<td>None</td>
<td>1 internal</td>
<td>1 internal</td>
<td>1 internal</td>
</tr>
<tr>
<td>RAID levels</td>
<td>0, 1, 5, 10, 50</td>
<td>0, 1, 5, 10, 50</td>
<td>0, 1, 5, 10, 50</td>
<td>0, 1, 5, 10, 50</td>
<td>0, 1, 5, 10, 50</td>
</tr>
<tr>
<td>Simple volume</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Spanned volume</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Hotspares</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Automatic failover</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Audible alarm</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Battery module option(^4)</td>
<td>Not available</td>
<td>Not available</td>
<td>ABM-300</td>
<td>ABM-300</td>
<td>ABM-400</td>
</tr>
</tbody>
</table>

\(^1\) Each channel supports up to 15 devices.

\(^2\) Connectors: 1 internal, 1 external.

\(^3\) Connectors: 1 internal, 1 external.

\(^4\) Battery module options: ABM-300, ABM-400.
Introduction

1. Includes Ultra320 through Ultra2 hard drives and other devices, including CD and tape drives.
2. High density
3. Very High Density Connector Interface (VHDCI)
4. Battery sold separately.

Advanced RAID Features

Adaptec RAID controllers support the following advanced features:

- Optimized Disk Utilization—Allows you to use the full capacity of all your drives, even if drive sizes vary.
- SATA/SCSI Disk Hot Plug—Allows you to add and remove disks without shutting down your system.
- Online Capacity Expansion
- Array Level Migration
- Drive Enclosures – SCSI only
- Hotspares
- Audible Alarm
- Automatic Failover
- Adaptec Battery Backup Module

Online Capacity Expansion

These Adaptec RAID controllers support Online Capacity Expansion (OCE) of existing arrays for all operating systems. With OCE, you can add new members to increase the capacity of an array without losing any data. For details, refer to the Adaptec Storage Manager online Help.

Windows OCE allows you to use the additional capacity without restarting the system. For details, refer to your Windows documentation.
Array Level Migration

Adaptec RAID controllers support migration from one array type to another (provided your controller supports the new array type). The migration possibilities are:

<table>
<thead>
<tr>
<th>Current Array Type</th>
<th>New Array Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAID 0</td>
<td>RAID 5 or 10</td>
</tr>
<tr>
<td>RAID 1</td>
<td>RAID 0 or 5 or 10</td>
</tr>
<tr>
<td>RAID 5</td>
<td>RAID 0 or 10</td>
</tr>
<tr>
<td>RAID 10</td>
<td>RAID 0 or 5</td>
</tr>
</tbody>
</table>

For details on how to migrate from one array type to another, refer to the Adaptec Storage Manager online Help.

Drive Enclosures – *SCSI only*

Adaptec SCSI RAID controllers support drive enclosures that include SAF-TE enclosure management hardware per the SAF-TE specification.

Hotspares

Adaptec RAID controllers support hotspares—drives that are reserved to replace a failing drive in a redundant array. If a drive fails, the hotspare will replace it and the arrays is automatically rebuilt.

Adaptec RAID controllers support two types of hotspares:

- **Global**—Protects every array that the drive has enough available capacity to protect.
- **Dedicated**—Protects only the array that it has been assigned to protect.
Introduction

Audible Alarm
Adaptec RAID controllers are equipped with an audible alarm that alerts you to situations that affect safety of your data. This section discusses the following topics:

- **Sounding the Alarm**
- **Silencing the Alarm**

For additional details on how to control the alarm, see page A-11 and the Adaptec Storage Manager online Help.

Sounding the Alarm
The alarm sounds under the following circumstances:

- When the controller is running, the alarm sounds when a drive fails. For example, if a drive becomes unplugged, the alarm sounds.
- When restarting the system, the alarm sounds if an array is degraded. For example, if a drive is missing from a three-drive RAID 5, the alarm sounds.
- If an array can’t be configured, the alarm sounds. For example, if a drive is missing from a RAID 0, or if two drives are missing from a RAID-5, the alarm sounds.

Silencing the Alarm
The alarm continues to sound until one of the following actions is taken:

- The array with the failed member is deleted.
- If the array is redundant, a rebuild begins.
- The alarm is silenced using SATASelect or SCISISelect. For details, see the Alarm Control option on page A-11 or Adaptec Storage Manager online Help.

Automatic Failover
Adaptec RAID controllers can automatically rebuild an array when a failed drive is replaced with a new drive. This feature applies only to redundant arrays in SES- or SAF-TE-enabled drive enclosures. See page A-10 for details.
Adaptec Battery Backup Module
Some Adaptec RAID controllers accept an optional Adaptec battery backup module.

\textbf{Notes:}
\begin{itemize}
  \item To see if the controller is available with battery modules, see \textit{Controller Features} on page 1-5.
  \item To see the battery module connector location for your controller, see Appendix G.
  \item To purchase a battery module, visit www.adaptec.com.
\end{itemize}

About the Documentation
The documentation set for the Adaptec RAID controllers includes:

\begin{itemize}
  \item \textbf{Quick Installation Guide}—Printed guide that provides summarized instructions on how to install and create a bootable array.
  \item \textbf{Readme text file}—Contains additional technical information about device compatibility, operating system support, and drivers. (For location, see table below.)
  \item \textbf{Installation and User’s Guide} (this book)—PDF file on the installation CD with complete information to install and configure your Adaptec RAID controller and attached devices.
  \item \textbf{Command Line Interface Reference Guide}—PDF file on the installation CD containing an in-depth description of the commands available in the CLI. (For location, see table below.)
  \item \textbf{Online Help}—Adaptec Storage Manager includes an embedded online Help system that provides details on how to create and manage RAIDs.
\end{itemize}
The locations for the PDF files and Readme file are listed below:

<table>
<thead>
<tr>
<th>Document</th>
<th>CD Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Readme</td>
<td>/books/RAID Install Gd ... pdf</td>
</tr>
<tr>
<td>Installation and User’s Guide</td>
<td>/books/RAID SW Ref ... .pdf</td>
</tr>
<tr>
<td>Command Line Interface Reference Guide</td>
<td>/books/RAID SW Ref ... .pdf</td>
</tr>
</tbody>
</table>

To view the PDF documents, you need Acrobat Reader or Viewer installed on your computer. For details, see Installing the Adobe Acrobat Reader on page 1-14.

For details on using the installation CD, see Using the Adaptec Installation CD on page 1-12.

**Using the Adaptec Installation CD**

The Adaptec RAID Installation CD contains software, device drivers, and documentation. You can use the CD the following ways:

- **Booting from the CD with No Operating System**
- **Using the CD Autorun in Windows**
- **Browsing the CD**

**Booting from the CD with No Operating System**

The Adaptec installation CD is bootable. You can use it to start a computer that has no operating system and configure an array (provided your computer is set up to recognize bootable CDs).

⚠️ **Note:** Verify that your computer supports bootable CDs by entering system Setup and checking the settings.
Using the CD Autorun in Windows

To use the Autorun executable, `autorun.exe`, start Windows and insert the Adaptec installation CD. Your computer automatically reads the CD if it is set up to do so.

Note: If your computer does not automatically read the CD, you can prompt it to read the CD by clicking on `autorun.exe` from the root directory.

The CD presents the following options:

- **Install Adaptec Storage Manager**—Installs the management software. For details, see Chapter 4.
- **Install Adobe Acrobat Reader**—Installs Adobe Acrobat Reader for Windows to let you view the Adaptec documentation in PDF format. Versions of Acrobat Reader for other platforms are also included, see Installing the Adobe Acrobat Reader on page 1-14.
- **View Release Notes**—Displays the Readme file containing the latest information for Adaptec RAID products and software.
- **View Documentation**—Provides quick access to the PDF files listed in the table on page 1-12.
- **Create Driver Diskette**—Allows you to create a driver disk for any supported operating system.

Browsing the CD

If your installation process requires you to directly access files on the Adaptec installation CD, you can save time by limiting your browsing to the following files and folders, available at the root level:

- **Autorun executable**—In Windows, click on `autorun.exe` if your computer does not automatically execute it when you insert the CD in the drive.
- **Readme text file**—Contains additional technical information about device compatibility, operating system support, and drivers.
- **DOCS folder**—Contains the user documentation PDF files.
- **PACKAGES folder (and subfolders)**—Contains the management software and device drivers.
Introduction

- **SOURCES folder (and subfolders)**—Contains driver source files and other components developed under the GNU General Public License (GPL) agreement.

**Installing the Adobe Acrobat Reader**

Both Adobe Acrobat Reader and Viewer are provided on the Adaptec installation CD. These applications allow you to view the PDF files on the Adaptec installation CD. Acrobat Reader is also available from Adobe as a free download. For details, visit [www.adobe.com](http://www.adobe.com).

How you use Reader or Viewer depends on your operating system, as described below:

- **Windows**—To install Acrobat Reader, choose the appropriate option. If Autorun is disabled, click **Autorun** on the root to enter.

- **Linux**—Acrobat Reader is located on the Adaptec installation CD at `mount-point/packages/Linux/RedHat/apps/adobe`. Be sure to use the full path when viewing this location. If the path gets truncated, you may not see the correct location.

- **UNIX**—Use Acrobat Viewer because Reader is not available for all operating systems. Your system must have Java Runtime Environment 1.1.7B from April 11, 2000 or later. The Viewer is located on the installation CD at `mount-point/Acrobat_Reader`.

  **Note:** To download Java Virtual Machine (JVM), visit [java.sun.com](http://java.sun.com).

- **NetWare**—Acrobat Reader and Viewer are not available for this operating system or any DOS environment. You need to use a computer that supports Acrobat Reader or Acrobat Viewer.
Software Tools Overview

The Adaptec RAID controller includes the following tools to configure and manage your storage devices:

- **Adaptec Storage Manager**—Storage management application with a graphical user interface. Used to create, configure, and manage arrays. For details, see Chapters 4 and 5.

- **Adaptec RAID Configuration (ARC) Utility**—BIOS-based utility that contains the following components:
  - **Array Configuration Utility (ACU)**—Storage management utility. Used to create, configure, and manage arrays. Also available as a DOS-based executable (see below). For details, see Appendix A.
  - **SATASelect and SCSISelect**—Device management utility. Used to verify the hardware configuration of the controller and the drives. For details, see page A-9.
  - **Disk Utilities**—Drive management utility. Used to format and verify drives. For details, see page A-14.

- **Array Configuration Utility (ACU) for DOS**—DOS utility. Used to create, configure, and manage arrays. Also available as part of the ARC utility (see above). For details, see Appendix B.

- **Adaptec Flash Utility (AFU)**—DOS utility. Used to update, save, or verify the controller firmware, BIOS, and ARC versions. For details, see Appendix C.

- **Command Line Interface (CLI)**—Allows you to automate array creation or testing in a production environment using scripts. For details, see Appendix D.

Safety Information

To ensure your personal safety, as well as the safety of your equipment:

- Keep your work area and the computer clean and clear of debris.
- Before opening the system cabinet, unplug the power cord.
Electrostatic Discharge

Electrostatic Discharge (ESD) is a natural by-product of human activity. ESD is produced by materials that accumulate and retain electrical charges which are transferred to people or other objects upon contact.

**Caution:** ESD can damage electronic components when they are improperly handled and can result in total or intermittent failures. Always follow ESD-prevention procedures when removing and replacing components.

To prevent ESD damage:

- Use an ESD wrist or ankle strap and ensure that it makes skin contact. Connect the equipment end of the strap to an unpainted metal surface on the chassis. If a wrist strap is not available, ground yourself by touching the metal chassis before handling the controller or any other part of the computer.

- Avoid touching the controller against your clothing. The wrist strap protects components from ESD voltages present on the body only. ESD voltages on clothing can still cause damage.

- Handle your controller by its bracket or edges only. Avoid touching the printed circuit board or the connectors.

- When you need to put your controller down, use an antistatic surface such as the bag supplied in your kit.

- If you plan to return the controller to Adaptec, put it back in its antistatic bag immediately.
Installing the Controller and Drives

In this Chapter...

SATA Drives and Cables
SCSI Drives and Cables
Installing the Controller and Drives
Determining the Boot Controller
Creating a Bootable RAID 5 Array
Installing the Controller and Drives

SATA Drives and Cables

To install an Adaptec SATA RAID controller and drives, you need equal numbers of each of the following:

■ Serial ATA hard drives
■ Serial ATA cables (supplied in this kit)

Configuration of Serial ATA drives is simple for the following reasons:

■ There are no jumpers or switches to set on SATA controllers or hard drives.
■ Cable connectors are identical, so you don’t need to worry about which end to attach to the controller and which end to the drive.
■ All connectors are keyed so that you can insert them in only one direction.
■ Adaptec 2020SA/2025SA only—When connecting SATA cables to the motherboard connectors, make sure that you use the Zero Channel RAID (ZCR) enabled connectors. For details, refer to the motherboard documentation.

SCSI Drives and Cables

Adaptec recommends using only the latest Ultra320 hard drives in arrays and only high-quality Ultra320-rated cables with multimode terminators for all drives that share a channel with Ultra320 drives.

Notes:

■ For additional considerations related to installing SCSI drives, see Appendix F, About SCSI.
■ Use only good quality cables. Poor quality cables may degrade system reliability. Avoid cables not rated for Ultra320 operation.
■ To buy cables, visit www.adaptec.com.
■ Use device adapters as needed to connect any SE drives.
■ Do not attach a cable to the controller unless the other end of the cable is attached to at least one drive. Doing so would cause unstable operation.
Installing the Controller and Drives

To install Adaptec RAID controller and drives:

1. If you have a low-profile controller and a low-profile computer cabinet, replace the original full-height bracket with the low-profile bracket supplied in Adaptec RAID controller kit. To verify the form factor of your controller model, see Controller Features on page 1-5.

2. Turn off your computer.

3. Ground yourself by touching the system chassis.

4. Unplug the power cord.

5. Open the system cabinet.

6. Select an available PCI 2.2 or higher compliant slot as follows:
   - **Adaptec 2020SA (PCI)/2020ZCR (PCI-X)/2025SA (PCI)/2025ZCR (PCI-X)**—Use only a 3.3-V, ZCR-enabled slot.
     - The PCI-X ZCR controllers are backwards compatible and can be used in PCI slots.
     - Most ZCR controllers have a unique design that plugs into a special SO-DIMM socket provided on specific motherboards. Refer to your motherboard documentation for more information on ZCR support.
   - **Adaptec 2130SLP/2230SLP**—Use only a 3.3-V slot. These controllers can plug into either PCI or PCI-X slots.
   - **All other adapters**—Use any slot that is PCI Local Bus Specification 2.2 or higher compliant.

   **Note:** You’ll get better performance if you use a 64-bit slot.

7. Remove the cover from the PCI slot.
Installing the Controller and Drives

8 Install the controller in the PCI slot and secure the controller bracket to the chassis.

For Adaptec 2020SA/2020ZCR/2025SA/2025ZCR—Insert these controllers in the supported ZCR enabled slot on the motherboard and gently press down until they click into place. They may also be secured using other means available from the system manufacturer. See your motherboard documentation for more information on your supported ZCR enabled slot.

9 Connect the computer’s disk activity LED cable to the appropriate connector on the controller. See Appendix G for the location of this connector for your controller.

Ensure that the positive lead of the LED cable, usually a red wire or a wire marked with a red stripe, is attached to pin 1 and the negative lead, usually a black wire, is attached to pin 2.

10 Install and connect any internal drives using the appropriate cable.

Note: If you are building a RAID 5 as described in Creating a Bootable RAID 5 Array on page 2-5, you must install at least three drives.

11 Close the computer cabinet.

12 SCSI controllers only—Connect any external cables and drives to the Adaptec SCSI RAID controller.

Determining the Boot Controller

Note: If your system will contain two or more bootable controllers, read this section. Otherwise, skip this section.

The Adaptec RAID controller supports bootable drives and arrays. The default setting of the controller and system Setup usually allows you to install and boot from either a hard drive connected to the motherboard, or from a drive or array connected to the controller.
Installing the Controller and Drives

If you already have an operating system installed on a hard drive connected to the motherboard and you want to boot a second operating system from the RAID controller:

1. Enter the system Setup.
2. Navigate to the hard drive boot sequence.
3. Move the boot controller to the top of the list.

Creating a Bootable RAID 5 Array

Note: If you want to install an operating system on a drive or array connected to your Adaptec RAID controller, read this section. Otherwise, skip to installing the driver in your existing operating system, as described in Chapter 3.

This section describes how to create a bootable RAID 5 array with at least three drives.

The following methods are described. Choose the method you prefer:

- Using the Adaptec RAID Configuration (ARC) Utility—Use this method if you prefer a text-based approach.
- Using the Adaptec Installation CD—Use this method if you prefer a graphical interface-based approach.

Why build a RAID 5?
This array level is supported by your controller. It provides a versatile combination of performance and redundancy on a minimum of three drives. Because RAID 5 uses parity, it is the safest, and most recoverable, of all RAID levels.

What if I prefer a different array level?
That’s no problem. Once you build your array and install your operating system, you can change array levels (see Array Level Migration on page 1-9) or expand the capacity of the array (see Online Capacity Expansion on page 1-8) to suit your needs.
Installing the Controller and Drives

Using the Adaptec RAID Configuration (ARC) Utility

To build a bootable RAID 5 array using ARC:

1. Install the controller and drives, as described in *Installing the Controller and Drives* on page 2-3.

   **Note:** For a RAID 5, you need at least 3 drives.

2. Turn on the computer, then press **Ctrl-A** to enter the ARC utility.
   The first screen shows all installed Adaptec RAID controllers.

3. If more than one Adaptec RAID controller is installed, highlight the boot controller, then press **Enter**.

4. To select the ACU utility, press **Enter**.
   The ACU screen appears.

5. Using the arrow keys, highlight **Initialize Drives**, then press **Enter**.

6. Press **Insert** to highlight the drives you want to initialize, then press **Enter** to start the initialization process.

7. Using the arrow keys, highlight at least three drives to be used for the array and press **Insert** for each highlighted drive.
   The utility displays the selected drives.

8. Press **Enter**.
   A red warning box appears—this is normal.

9. Press **Y**, then **Enter**.
   The selected drives are initialized, then the ACU screen is displayed.

10. Using the arrow keys, highlight **Create Array**, then press **Enter**.

11. Using the arrow keys as in Step 7, highlight at least three drives to be used in the array and press **Insert** for each highlighted drive.

12. Press **Enter**.
13 On the next screen, respond as follows:

<table>
<thead>
<tr>
<th>Property Line Displayed</th>
<th>Entry or Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Array Type</td>
<td>Select RAID 5, then press Enter</td>
</tr>
<tr>
<td>Array Label</td>
<td>Type a name, then press Enter</td>
</tr>
<tr>
<td>Array Size</td>
<td>Press Enter, then press Enter again to use the default granularity of GB.</td>
</tr>
<tr>
<td>Stripe Size</td>
<td>Press Enter</td>
</tr>
<tr>
<td>Read Caching</td>
<td>Press Enter</td>
</tr>
<tr>
<td>Write Caching</td>
<td>Press Enter</td>
</tr>
<tr>
<td>Create RAID via</td>
<td>Press Enter</td>
</tr>
<tr>
<td>[Done]</td>
<td>Press Enter</td>
</tr>
</tbody>
</table>

A Creating Array window appears.

14 Press Enter to continue with the array configuration.

**Note:** You can start using the array immediately. However, performance is reduced until the build process is complete.

15 Press Esc until the Exit Utility window appears.
16 Highlight Yes, then press Enter.

The system restarts.

17 Install the driver as described in Chapter 3.

**Using the Adaptec Installation CD**

**Note:** SCSI only—You cannot create the RAID using a CD drive connected to the RAID controller.

To build a bootable RAID 5 array using the Adaptec installation CD:

1 Install the controller and drives, as described in *Installing the Controller and Drives* on page 2-3.
2 Start or restart the computer.
Insert the Adaptec installation CD.

**Note:** If the installation CD does not start automatically, you may need to enter system Setup and enable booting from the CD. For details, refer to your computer’s documentation.

Select the appropriate language on the Language screen, then press Enter. Read the information on the Licenses screen, then press Enter again. The Adaptec installation CD main menu is displayed.

Select Launch Configuration Utility. The system launches Adaptec Storage Manager. The Adaptec Storage Manager screen appears.

Click Create.

In the configuration wizard, select Custom.

Click the RAID 5 button, then click Next.

Click at least three drives to be used in your array. Each drive you select is marked with a check.

Click Next.

Type the name you want to assign to the RAID 5 you are creating, then click Apply.

The system creates the array. The display refreshes to show the newly-created RAID 5 on the right side of the display. You may use the array immediately. However, if you want to make the array bootable you must allow the array to finish building before restarting the system.
Installing the Controller and Drives

12 When you are ready to continue, close all windows. The Main Menu is active.

13 Click Reboot to restart your system.

14 Remove the Adaptec installation CD.

15 If you want to make the array bootable, do so now. For details, see page A-5.
Installing the Driver

In this Chapter...

- Overview of the Driver Installation Process 3-2
- Creating the Driver Disk 3-2
- Installing the Windows Driver 3-3
- Installing the Linux Module 3-5
- Installing the Unix Driver 3-6
- Installing the NetWare Driver 3-9
Overview of the Driver Installation Process

Adaptec recommends the following driver installation procedure:

1. Create a driver disk. See Creating the Driver Disk on page 3-2 for details.

2. Identify the appropriate installation procedure for your computer.
   
   You need to know the operating system and whether you are installing the driver while also installing the operating system, or installing the drive onto a system that already has the operating system installed.

3. Familiarize yourself with the supported RAID types. You will need to select a RAID type during your driver installation. See Appendix E for details.

   Note: If you don’t like your initial RAID level selection, you can change it later using Array Level Migration. For details, see page 1-9 and the Adaptec Storage Manager online Help for details.

4. Read and understand the entire installation procedure.

5. Proceed with the installation.

Creating the Driver Disk

Note: If you are adding the controller to a Linux system that was already installed, you do not need to create a driver disk; skip this section.

Before installing the driver, create the driver disk:

1. Set your system BIOS so that your computer boots from the CD-ROM drive.

2. Insert the Adaptec installation CD and turn on the computer.

3. Respond to the on-screen instructions as necessary to get to the Adaptec Start Menu.
Installing the Driver

4 Click Create Driver Disk, then select the appropriate operating system.

5 If you selected Linux, you must also select the architecture:
   – i386—for Intel 386 or 486 computers
   – i586—for Pentium I or II computers
   – i686—for Pentium III, IV, or AMD K-6 computers
   – Athlon—for AMD Athlon computers

6 Select the appropriate floppy drive letter, then choose the appropriate format. You need a full format only if the disk has never been formatted or may have bad sectors.

7 Insert a floppy disk, then click OK. The system creates the driver disk.

8 Remove and label the driver disk.

Now that you have created your driver disk, identify the appropriate driver installation procedure and proceed with the installation.

Installing the Windows Driver

This section contains the following procedures:

- Installing the Driver When You Install Windows
- Installing the Driver in an Existing Windows System

Installing the Driver When You Install Windows

To install the driver while also installing the Windows operating system, follow these steps:

1 Install and configure the controller and hard drives, as described in page 2-3.

2 Create the bootable array, as described on page 2-5.

3 Create the driver disk, as described on page 3-2. When finished, remove the driver disk.

4 Insert the Windows setup CD and restart the computer to begin the Windows installation.
5 When prompted to install a third-party driver, press F6.

⚠️ Note: When F6 is active, a prompt appears at the bottom of the screen for only 5 seconds. If you miss your chance to press F6, restart the computer.

6 Insert the driver floppy disk and wait until prompted to install a driver. Press S to specify that the driver is on the floppy disk, then press Enter. The computer reads the disk.

7 When the Adaptec driver is found, press Enter. Respond to the on-screen instructions to complete the installation.

### Installing the Driver in an Existing Windows System

To install the driver in an existing operating system:

1 Install and configure the controller and hard drives, as described in Chapter 2.

2 Create the driver disk, as described on page 3-2. When finished, remove the driver disk.

3 Start Windows. Windows launches the Found New Hardware Wizard, which searches for the driver.

4 Insert the driver floppy disk, select the floppy drive as the source, then click Next.

5 Click Next in the two subsequent windows and follow the on-screen instructions to complete the driver installation.

6 Remove the driver disk and restart the computer.
Installing the Linux Module

This section contains the following procedures:

- Installing the Module When You Install Red Hat
- Installing the Module in an Existing Linux System

Notes:

- SuSE Linux only—The controller is not supported as a bootable controller. In other words, you can only use Installing the Module in an Existing Linux System on page 3-6.
- For the most up-to-date information on Adaptec’s support of Linux, visit www.adaptec.com.

Installing the Module When You Install Red Hat

To install the module with the operating system during a fresh install:

1. Install and configure the controller and hard drives, as described in page 2-3.
2. Create the bootable array, as described on page 2-5.
3. Create the driver disk, as described on page 3-2. When finished, remove the driver disk.
4. Insert the first Red Hat installation CD and restart the computer to begin the operating system installation.
5. Restart the computer.
6. When the Red Hat Welcome screen appears, type **expert** at the **Boot:** prompt.
7. When prompted, insert the driver disk, then select **OK**.
8. Follow the prompts to set up your preferred environment.
9. If you are installing other third-party devices, proceed with the installation of those devices. Otherwise, select **Done**.
10. Proceed with the Linux installation according to the Red Hat instructions.
Installing the Module in an Existing Linux System

To install the module in an existing Red Hat or SuSE Linux system:

1. Insert and mount the Adaptec installation CD.
2. Install the module RPM by typing:
   ```
   rpm -Uvh mount-point/linux/arc/driver/aac1.1.4-2322.rpm
   ```
3. Run `fdisk`, `mkfs`, and create mount points for any new drives.

Installing the Unix Driver

This section discusses the following systems:

- **OpenServer**
- **UnixWare and OpenUNIX**

**OpenServer**

This section contains procedures for installing the driver in OpenServer systems.

**Installing the Driver When You Install OpenServer**

To install the driver with the operating system during a fresh install:

1. Install and configure the controller and hard drives, as described in page 2-3.

2. Create the bootable array, as described on page 2-5.

3. Create the driver disk, as described on page 3-2. When finished, remove the driver disk.

4. Insert the OpenServer installation CD and restart the computer. The system starts loading from the CD and displays a `Boot:` prompt.

5. When you see the `Boot:` prompt, insert the driver disk and type `defbootstr link=aacraid`.

6. Follow the OpenServer instructions to complete the installation.

7. When the installation is complete, remove the driver disk and restart the computer.

8. Insert and mount the Adaptec installation CD.
Installing the Driver

9 To enable RAID management software and utilities, type the following commands:
   `cd mount-point/openserv/arc/driver/aacraid/reloc/tmp/aacraid/scripts`
   `cp ./aacaifd /usr/sbin`
   `cp ./S98aacaifd /etc/rc2.d`
   `chmod 755 /usr/sbin/aacaifd /etc/rc.d/S98aacaifd`

Installing the Driver in an Existing OpenServer System

To install the driver in an existing operating system:

1 Install and configure your Adaptec RAID controller and hard drives, as described in Chapter 2.

2 Create the driver disk, as described on page 3-2. When finished, remove the driver disk.

3 Boot the server.

4 Insert the driver floppy disk.

5 To run the `installpkg` utility, open a terminal window and type the `installpkg` command.
   OpenServer reads the disk and performs the installation.

6 Rebuild the kernel.

7 Install the new kernel by typing `y` when prompted to make it the default kernel.

8 Restart the computer.

9 Add devices created on the RAID controller to the operating system. For details, refer to your OpenServer documentation.

10 Insert and mount the Adaptec installation CD.

11 To enable RAID management software and utilities, type the following commands:
    `cd mount-point/openserv/arc/driver/aacraid/reloc/tmp/aacraid/scripts`
    `cp ./aacaifd /usr/sbin`
    `cp ./S98aacaifd /etc/rc2.d`
    `chmod 755 /usr/sbin/aacaifd /etc/rc.d/S98aacaifd`
Installing the Driver

UnixWare and OpenUNIX

This section contains the following procedures:

- Installing the Driver When You Install UnixWare or OpenUNIX
- Installing the Driver in an Existing UnixWare or OpenUNIX System

⚠️ Note: Although the driver disk you create for UnixWare and OpenUNIX differ, the installation procedures for these operating systems are the same.

Installing the Driver When You Install UnixWare or OpenUNIX

To install the driver with the operating system during a fresh install:

1. Install and configure the controller and hard drives, as described in page 2-3.
2. Create the bootable array, as described on page 2-5.
3. Create the driver disk, as described on page 3-2. When finished, remove the driver disk.
4. Insert the Unix installation CD and start the operating system installation.
5. When you see the prompt, Choose One, insert the driver disk, select Install HBA diskette, and then press F10.
   The computer loads the driver from the driver disk, then the HBA screen is displayed.
7. Complete the installation as appropriate.
8. When the installation is finished, remove the driver disk and restart the computer.

Installing the Driver in an Existing UnixWare or OpenUNIX System

To install the driver in an existing operating system:

1. Shut down the computer. Install and configure the controller and hard drives, as described in Chapter 2.
2. Create the driver disk, as described on page 3-2. When finished, remove the driver disk.
Installing the Driver

3  Turn on the computer, then insert the driver disk.
4  To run the pkgadd utility, type pkgadd -d diskette1 and then press Enter. UNIX reads the disk and package information.
5  Press Enter.
6  Restart the computer. The system rebuilds the kernel automatically.
7  Add devices created on the RAID controller to the operating system. For details, refer to your OpenServer documentation.

Installing the NetWare Driver

This section contains the following procedures:

- Installing the Driver When You Install NetWare on page 3-9
- Installing the Driver in an Existing NetWare System on page 3-10
- Loading NetWare Drivers During Server Restart on page 3-11

Installing the Driver When You Install NetWare

To install the driver with the operating system during a fresh install:

1  Install and configure the controller and hard drives, as described in page 2-3.
2  Create the bootable array, as described on page 2-5.
3  Create the driver disk, as described on page 3-2. When finished, remove the driver disk.
4  Restart the computer, then press Ctrl+A when prompted to access the ARC utility. Use ARC to create the RAID. For details, see Using the Adaptec RAID Configuration (ARC) Utility on page 2-6.
5  Install and configure a secondary controller, if any.
6  Create the driver disk, as described on page 3-2. When finished, remove the driver disk.
7  Install the operating system according to the NetWare documentation. Verify that you have the aacraid.ham and aacraid.ddi files available on the driver disk created at the beginning of this chapter.
Installing the Driver

8 When the Device Types screen appears, check the Storage adapters list and select Modify to add another driver.

9 Select Storage adapters, then press Enter.
   All recognized controllers are displayed.

10 If AACRAID is detected, delete it.

11 Press Insert to add another driver. The available drivers are displayed.

12 Insert the driver floppy disk.

13 Press the Enter key to scan the floppy drive.
   Once the driver is selected, the parameter screen is displayed.

14 Verify the loaded drivers. From the lower window menu, select Continue, then press Enter.

   Note: If the driver installation process fails, the server console is displayed so you can see the cause of the failure.

Now that you have installed the drivers, refer to your NetWare documentation to modify disk partitions, apply hot fixes, or perform volume maintenance. Also see Loading NetWare Drivers During Server Restart on page 3-11 for a summary of array management options in NetWare.

Installing the Driver in an Existing NetWare System

To install the driver in an existing operating system:

1 Upgrade your NetWare server to the minimum patch level specified by Novell.

2 Make a backup copy of the driver.

3 Create the driver disk, as described on page 3-2. When finished, remove the driver disk.

4 Shutdown the server.

5 Install and configure the Adaptec RAID controller as a secondary controller, as described in Chapter 2.

6 Start the server.
Installing the Driver

7 At the NetWare server console prompt, type `load nwconfig.nlm` and press Enter.
8 Select Driver Options and press Enter.
9 Select Configure disk and storage device drivers and press Enter.
10 Select Select an additional driver and press Enter.
11 Insert the driver floppy disk, then press the Insert key.
   All available drivers are displayed.
12 Press the Insert key again to access additional drivers.
13 Press Enter to scan for the drivers.
14 Select Adaptec AdvancedRAID Controller and press Enter.
   The aacraid parameters screen is displayed.
15 Select Select/Modify driver Parameters and press Enter.
16 Select Save parameters and load driver.
17 When prompted to select an additional driver, select No.
18 Press Esc to exit the Nwconfig utility.
19 Create any arrays using the ARC utility (see Using the ACU on page A-2) or remotely using Adaptec Storage Manager (refer the online Help). Alternatively, you can create arrays using the Command Line Interface (CLI). Refer to the Adaptec Command Line Interface Reference Guide.

Now that you have installed the drivers, refer to your NetWare documentation to modify disk partitions, apply hot fixes, or perform volume maintenance. See also Loading NetWare Drivers During Server Restart.

Loading NetWare Drivers During Server Restart

To automatically load the aacraid.ham driver during server restart, the startup.net file (usually located in your server’s startup directory) must contain a load command line that specifies the location of the driver and any appropriate command line options.
The syntax to load the driver is:

```
load [pathname]aacraid.ham slot=number [options]
```

For example, the command to load the driver from the `c:\nwserver` directory, with the `verbose` option ON is:

```
load c:\nwserver\aacraid.ham slot=2 verbose=y
```

**Notes:**

- Command line options are *not* case sensitive.
- Placing commas between command line options is optional.

To modify the `startup.ncf` file:

1. At the server console prompt, type `load nwconfig` and press **Enter**.
2. Select the **NCF File Options** menu, then press **Enter**.
3. Select the **Modify Startup.ncf** option, then press **Enter**.
4. Make the necessary changes. When you are done, press **Esc**.

**Note:** You can also use your DOS text editor to modify the `startup.ncf` file, it resides on the DOS partition.

For additional information on the `startup.ncf` file, refer to your NetWare documentation.
Installing and Starting Adaptec Storage Manager

In this Chapter...

- Installing Adaptec Storage Manager on Windows
- Installing Adaptec Storage Manager on Linux
- Installing Adaptec Storage Manager on OpenServer
- Installing Adaptec Storage Manager on UnixWare/OpenUNIX
- Installing Adaptec Storage Manager on NetWare
- Starting Adaptec Storage Manager
- Logging into Remote Systems

After you have installed your Adaptec RAID controller and driver, you are ready to install and use Adaptec Storage Manager—a user-friendly graphical user interface that makes it easy for you to create and manage arrays without having to restart the computer and use the BIOS utility.

**Note:** You need administrator or root privileges to install Adaptec Storage Manager. For details on verifying privileges, refer to your operating system documentation.
Installing Adaptec Storage Manager on Windows

Cache Manager supports up to 16 Adaptec RAID controllers.

To install Adaptec Storage Manager:

1. Insert the Adaptec installation CD and wait for the Autorun executable to start the installation. If this does not occur, browse the CD and click Autorun.

2. When the installation wizard starts, follow the instructions on the screen to complete the installation.

Note: When prompted to install SNMP (Simple Network Management Protocol), accept the default (do not install) unless you have a specific requirement for Adaptec Storage Manager to work with SNMP gets and traps.
Installing and Starting Adaptec Storage Manager

Installing Adaptec Storage Manager on Linux

Notes:

■ With Linux, Adaptec Storage Manager supports up to 12 Adaptec RAID controllers.

■ Adaptec Storage Manager includes the Java Runtime Environment (JRE).

■ If a previous version of Adaptec Storage Manager is installed, you must remove it before upgrading. Any customization files you created when you used the previous version are saved and used in the upgrade. To remove Adaptec Storage Manager, type the `rpm --erase StorMan` command.

■ For the latest on Adaptec’s support of Linux, visit www.adaptec.com.

To install Adaptec Storage Manager:

1 Insert the Adaptec installation CD.

2 Mount the Adaptec installation CD:
   
   for Red Hat
   mount /dev/cdrom /mnt/cdrom
   
   for SuSE
   mount /dev/cdrom /media/cdrom

3 Change to the cdrom directory:

   for Red Hat
   cd /mnt/cdrom/linux/manager
   
   for SuSE
   cd /media/cdrom/linux/manager

4 Extract the RPM package and install it:

   `rpm --install ./StorMan*.rpm`

5 Unmount the Adaptec installation CD:

   for Red Hat
   umount /mnt/cdrom
   
   for SuSE
   umount /media/cdrom
Installing Adaptec Storage Manager on OpenServer

Notes:

- With OpenServer, Adaptec Storage Manager supports up to 12 Adaptec RAID controllers.
- You need either the Java Development Kit (JDK) for SCO or the Java Runtime Environment (JRE) for SCO, version 1.3.1. To download these, visit www.thescogroup.com.
- OpenServer 5.06 only—Requires the following packages: urwfonts and package set OSR-compatible Version 8.0.1 or higher, both available on the maintenance CD; OSS643A for socket driver supplement from the www.thescogroup.com. Release Supplement 5.06a is helpful but not required.
- If a previous version of Adaptec Storage Manager is installed, you must remove it before upgrading. Any customization files you created when you used the previous version are saved and used in the upgrade. To remove Adaptec Storage Manager, type pkgrm RaidMan.

To install Adaptec Storage Manager:

1. Insert the Adaptec installation CD.

2. Mount the Adaptec installation CD:
   ```
   mount -r -f HS,lower /dev/cd0 /mnt
   ```

3. Install using pkgadd:
   ```
   pkgadd -a /mnt/openserv/manager/RaidMan.adm -d /mnt/
           openserv/manager/RaidMan.ds
   ```

4. Follow the instructions on the screen to complete the installation. When the installation is complete, change to the root directory:
   ```
   cd /
   ```

5. Unmount the CD-ROM drive:
   ```
   umount /mnt
   ```
Installing and Starting Adaptec Storage Manager

6 To start RAID Agent, type the following case-sensitive command:

    sh /opt/RaidMan/RaidAgnt.sh

When successful, a copyright message is displayed in the terminal window.

If you want RAID Agent to run at startup all the time, add the following line to the `/etc/inittab` and `/etc/conf/init.d/kernel` files:


Installing Adaptec Storage Manager on UnixWare/OpenUNIX

Notes:

- With UnixWare and OpenUNIX, Adaptec Storage Manager supports up to 12 Adaptec RAID controllers.
- You need root privileges to install Adaptec Storage Manager.
- You need either the Java Development Kit (JDK) for SCO or the Java Runtime Environment (JRE) for SCO, version 1.3.1. To download these, visit www.thescogroup.com.
- If a previous version of Adaptec Storage Manager is installed, you must remove it before upgrading. Any customization files you may have created when you used the previous version are saved and used in the upgrade. To remove Adaptec Storage Manager, type the `pkgrm RaidMan` command.

To install Adaptec Storage Manager:

1 Insert the Adaptec installation CD.

2 Mount the Adaptec installation CD:

    mount -r -F cdfs /dev/cdrom/cdromdevicefile /mnt

where `cdromdevicefile` is the device file, for example, `c0b0t010`, for the CD-ROM block device. To determine the actual filename, look in the `/dev/cdrom` directory.
Installing and Starting Adaptec Storage Manager

3 Use pkgadd to install Adaptec Storage Manager:
   pkgadd -d /mnt/unixware/manager/RaidMan.ds

4 Follow the instructions on the screen to complete the installation.

5 Unmount the CD-ROM drive:
   umount /mnt

6 UnixWare Only—To start RAID Agent, type the following case-sensitive command:
   sh /opt/RaidMan/RaidAgnt.sh
   When successful, a copyright message is displayed in the terminal window.
   If you want RAID Agent to run at startup all the time, add the following line to the /etc/inittab and /etc/conf/init.d/kernel files:

Installing Adaptec Storage Manager on NetWare

Notes:
- With NetWare, Adaptec Storage Manager supports up to 16 Adaptec RAID controllers.
- You need the latest Support Pack for your operating system so you can run the supported Java Virtual Machine (JVM).
- You need JVM version 1.3 or later. To check your JVM version, load JVM, type JAVA -VERSION.
- For the latest updates from Novell, visit www.novell.com.

To install Adaptec Storage Manager:
1 Insert the Adaptec installation CD.
2 From the command prompt, type load cdrom and press Enter.
Installing and Starting Adaptec Storage Manager

3 From the command prompt, type:

```
xx_yy_zz:\netware\manager\install
```

where xx is the product CD, yy is the version number, and zz is the release number. For example:

```
adptcd_v2_01
```

The installation program starts.

4 Follow the instructions on the screen to complete the installation.

Starting Adaptec Storage Manager

⚠️ **Note:** You need root privileges to run Adaptec Storage Manager.

To start Adaptec Storage Manager, use the following procedures for your operating system.

**Windows Operating Systems**

1 To run Adaptec Storage Manager as a standalone application, click **Start > Programs > Adaptec Storage Manager**. To run Adaptec Storage Manager in a browser, open the browser, then type in the IP address, colon (:), and 34572 as the port number.

2 First the application flash screen will appear briefly, and then the Adaptec Storage Manager window will open with a log in dialog box superimposed. Enter a valid user name and password for a user on the system, and click **Connect**.
Notes: Your Adaptec Storage Manager permissions will vary according to your OS permissions:

- Administrator: The Administrator log in allows you to view and modify the RAID configuration. You can create and delete logical drives, verify logical drives, perform migrations, and add and remove hot-spare drives. To access the Adaptec Storage Manager with administrative privileges, enter a valid user name and password for the Administrator or an Administrative User on the system.

  The Administrative User is any member of the local Administrators group, which can (in a Domain configuration) include Domain Administrators.

- User: The User log in allows you to view the RAID configuration, verify logical drives, and add and remove hotspares. You cannot create or delete logical drives or perform migrations. To log in as User, use your normal network user name and password.

- Guest: The Guest log in allows you to view the RAID configuration only. You cannot change or modify and information. To log in as Guest, simply click Cancel when the Adaptec Storage Manager “Log in” window opens.
Installing and Starting Adaptec Storage Manager

Linux Operating Systems

1  Change to the Adaptec Storage Manager installation directory by typing:
   
   cd /usr/StorMan.

2  Type the following command and press Enter:
   
   sh StorMan.sh

3  First the application flash screen will appear briefly, and then the Adaptec Storage Manager window will open with a log in dialog box superimposed. Enter a valid user name and password for a user on the system, and click Connect.

   Notes: Your Adaptec Storage Manager permissions will vary according to your OS permissions:

   ■ Administrator: The Administrator log in allows you to view and modify the RAID configuration. You can create and delete logical drives, verify logical drives, perform migrations, and add and remove hot-spare drives. To access the Adaptec Storage Manager with administrative privileges, enter root for the user name and enter the root password.

   ■ User: The User log in allows you to view the RAID configuration, verify logical drives, and add and remove hotspares. You cannot create or delete logical drives or perform migrations. To log in as User, use your normal network user name and password.

   ■ Guest: The Guest log in allows you to view the RAID configuration only. You cannot change or modify and information. To log in as Guest, simply click Cancel when the Adaptec Storage Manager “Log in” window opens.
Installing and Starting Adaptec Storage Manager

OpenServer UnixWare and OpenUNIX Operating Systems

1  Change to the Adaptec Storage Manager installation directory by typing:
   
   cd /opt/RaidMan.

2  Type the following command and press Enter:
   
   sh RaidMan.sh

NetWare Operating System

To start Adaptec Storage Manager on the NetWare operating system, type the LOAD RAIDMAN command.

Logging into Remote Systems

To log into a remote system:

1  Click Remote > Add Remote System.
   
   Adaptec Storage Manager displays the login screen, as shown below.

   ![Add remote system dialog box]

   Note: The remote system must be running the Adaptec Storage Manager.

   Host name or TCP/IP address: 192.168.10.26
   System startup port number: 34571
   User name: admin
   Password: ********

   Save user name/password

   * Required fields if security is enabled on the Adaptec Storage Manager agent.

2  Type the IP address.
   
   The default System startup port number, 34571, is supplied for you.
Installing and Starting Adaptec Storage Manager

3  For Username, type admin
4  For Password, type adaptec

Note: The username and password are case sensitive.

Once you are logged in for the first time, you can add new accounts and change account passwords. For details, refer to the online Help.
Understanding Adaptec Storage Manager

In this Chapter...

Introduction 5-1
Overview 5-2
Changing How Drives are Displayed 5-4
Collapsed and Expanded Views 5-4
Component Views 5-5

Introduction

This chapter provides an overview of Adaptec Storage Manager, the user-friendly graphical user interface that you use to easily create and manage arrays. For more details on using Adaptec Storage Manager to set up and manage arrays, refer to the online Help.

Features

You can use Adaptec Storage Manager to:

■ Create and delete arrays
■ Verify arrays
■ Migrate arrays
■ Add and remove hotspares
Understanding Adaptec Storage Manager

- Change RAID level
- View the RAID configuration
- View information about managed systems and subsystems such as arrays, logical drives, hot-spare drives, physical drives
- Notify systems of all events occurring on the local system
- Increase logical device size
- Manage scheduled tasks such as Verify or Migrate
- Add or remove a remote system
- Configure, administer, and monitor controllers that are installed locally or remotely in your servers or external storage
- Fine tune controller settings for optimal performance

**Note:** Some of these features may not be available on your system. Check with your vendor, product documentation, or online Help for supported features.

**Overview**

Adaptec Storage Manager provides an expandable tree view of the systems and controllers you are managing. You can perform most configuration and management tasks by selecting a controller from the tree and working with related objects. The figure below shows how Adaptec Storage Manager displays information about Physical and Logical devices.
Understanding Adaptec Storage Manager

Using the buttons in the Physical devices and Logical devices views, you can:

- Change how drives are displayed.
- Collapse and expand a view.
- Identify components of a logical device.
- Create and delete hotspares.

Physical Devices View

This view displays information about the drives, enclosures, and other physical devices attached to the controller. The devices are organized numerically. The display for each channel or port includes information on maximum speed, the number of the channels on the controller, and the number of devices attached to the controller.

Indicators, next to the controller name, report status of the fan and temperature modules on SAF-TE (enclosure management) devices and other devices that monitor these conditions. The indicator colors are:

- Blue—Normal
- Yellow—Warning
- Red—Error
- Gray—Not applicable to the devices.

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

Logical Devices View

This view displays information about the logical devices created using the physical devices, including the number of logical devices, the RAID level of each device, and whether a logical device is protected by a hotspare.

You can create and delete logical devices in the Logical devices view by selecting the Create option and using the Create wizard.
Changing How Drives are Displayed

You can choose how information is displayed in the Physical devices view by clicking one of the following buttons in the Logical devices view.

Displays physical device information in text format. This is the default view.

Displays physical device information in full size capacity format. A full-length bar is displayed for each drive, regardless of capacity. A small segment on each drive is reserved for the RAID signature; this area is indicated by a gray cap at the end of each bar.

Note: A drive shaded in light blue is not part of any disk group.

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

Collapsed and Expanded Views

You can display a collapsed or expanded view of the system configuration. Initially, Adaptec Storage Manager displays a collapsed textual view of the configuration information in both the Logical devices and Physical devices views.

In the Logical devices view...

Click to expand and collapse information about disk groups and logical devices. The expanded display shows the following information about each logical device:

- Disk group name and capacity (if available)
- Logical device size
- Logical device state
- Build progress

In the Physical devices view...

Click to expand and collapse information about physical drives. The expanded display shows the following information about each drive:

- Capacity of the drive
- Drive ID
- Drive state
Component Views

When you click a physical or logical device in the device views, the related components are highlighted in the other view.

- When you click a logical device in the Logical devices view, the physical drives that make up the logical device are highlighted in the Physical devices view, and vice-versa.

- When you click a hotspare, the logical devices protected by that spare are highlighted.

- In the graphical views, if the logical device uses only part of the available storage, only those segments are highlighted (in dark blue).
Adaptec RAID
Configuration Utility (ARC)

In this Appendix...

Overview
Using the ACU
Using SATASelect and SCSISelect
Using the Disk Utilities
Viewing the Event Log

Overview
The Adaptec RAID Configuration (ARC) utility is part of the controller BIOS. The utility includes:

- **Array Configuration Utility (ACU)**—Used to create, configure, and manage arrays, and make arrays bootable. Also used to initialize and rescan drives. (Also available as a stand-alone DOS utility as described in Appendix B, *ACU for DOS*.)

- **SATASelect and SCSISelect**—Used to change device and controller settings.

- **Disk Utilities**—Used to format or verify media.

To run the ARC utility, press **Ctrl+A** when prompted by the following message during system startup:

Press <Ctrl><A> for Adaptec RAID Configuration Utility
Adaptec RAID Configuration Utility (ARC)

The Adaptec RAID Controller menu presents the following options:

- Array Configuration Utility
- SATASelect and SCISISelect Utilities
- Disk Utilities

To select a menu option in ARC, browse with the arrow keys, then press Enter. Sometimes, selecting an option displays another menu; to return to the previous menu at any time, press Esc.

The following sections discuss each of these menu options.

Using the ACU

The Array Configuration Utility (ACU) allows you to perform the following tasks:

- Creating Arrays
- Managing Arrays
- Initializing Drives
- Rescanning Drives

Creating Arrays

To create an array:

1. For systems with RAID enclosures—Power up any enclosures.

   **Note:** The ACU may not find disks or enclosures that were powered up after system power-up. Therefore, power up enclosures prior to powering up the computer.

2. Shut down and restart the computer.

   **Note:** After you install a controller in a system and start it for the first time, the BIOS may display a configuration that does not match your system’s configuration. This is normal. Proceed with array creation.

3. Press Ctrl+A when prompted to access the ARC utility.
4. From the ARC menu, select **Array Configuration Utility**.

5. From the ACU menu, select **Create Array**.

6. Browse with the arrow keys to select a channel.

7. Select the disks for the new array, then press **Insert**. To deselect a disk, highlight the disk, then press **Delete**.

   ACU displays the largest usable space available for each disk. You can use available space from multiple disks for the new array.

   **Note:** Disks containing MS-DOS partitions, disks with no usable space, or disks that are not initialized appear dimmed and cannot be used in a new array. For information on how to initialize a drive, see page A-7.

8. When you are finished selecting disks, press **Enter**.

   The Array Properties menu is displayed.

**Assigning Array Properties**

**Note:** The ACU can be used to assign array properties only prior to building the array. After the array is built, you need to use Adaptec Storage Manager to assign properties.

To assign properties to the new array:

1. In the Array Properties menu, select an array type, then press **Enter**.

   The display shows only the array types available for the number of drives selected. The supported array types (RAID levels) for your controller are listed in *Controller Features on page 1-5*.

   The maximum number of drives allowed and minimum number of drives required depends on the RAID level. For details, see *Appendix E, About RAID*.

2. Type an optional label for the array, then press **Enter**.
3 Enter the desired array size.

The maximum array size available based on the partitions you selected is displayed automatically. If you want to designate a different array size, type the desired array size and select MB (megabytes), GB (gigabytes), or TB (terabytes) from the drop-down list. If the available space from the selected partitions is greater than the size you specify, the remaining space is available for use in other arrays.

4 Select the desired stripe size.

The allowable stripe sizes are 16, 32, 64, 128, 256 KB (the default), 512 and 1024. The default stripe size provides the best overall performance in most network environments.

5 Specify whether you want to enable read and write caching for the array.

---

**Caution:** When caching is Enabled, there is a potential for data loss or corruption during a power failure.

---

Caching should usually be enabled to optimize performance, unless your data is highly sensitive, or unless your application performs completely random reads, which is unlikely.

6 When you are finished, select **Done**.

The array build starts.

**Managing Arrays**

With the Manage Arrays option, you can perform the following tasks:

- Viewing Array Properties
- Making an Array Bootable
- Deleting Arrays
- Managing Failover Drive Assignments
Adaptec RAID Configuration Utility (ARC)

Viewing Array Properties

To view the properties of an existing array:

1. From the ACU main menu, select Manage Arrays.

2. From the List of Arrays dialog box, select the array you want to view, then press Enter.

To view properties related to the array’s physical disks:

- RAID 0, 1, 5 (Single-Level Arrays)—View the Array Properties dialog box.
- RAID 10, 50 (Dual-Level Arrays)—Highlight the array member you want to view, then press Enter to display the second level. Press Enter again to display the physical disks associated with the array.

Note: Failed drives are displayed in a different text color.

3. Press Esc to return to the previous menu.

Making an Array Bootable

Notes:

- If the controller is not a boot device, you can disable its runtime BIOS. (For details, see the table on page A-10.) When the BIOS is disabled, it does not occupy any of the expansion ROM region of the system’s memory map. In a system with several expansion ROMs, disabling the BIOS may be helpful.

- The controller always uses the lowest numbered array as its bootable array. If you delete Array 00, the next lowest numbered array becomes the bootable array.

- You cannot make a non-00 array bootable while the array is in a build/verify or rebuild process.

- You may need to change the system BIOS to modify the boot order. For more information, refer to the system documentation.
Adaptec RAID Configuration Utility (ARC)

You can make an array bootable so that the system boots from the array instead of from a stand-alone (single) disk. To make an array bootable:

1. From the ACU main menu, select **Manage Arrays**.
2. Select the array you want to make bootable, then press **Ctrl+B**. This changes the selected array’s number to 00, making it the controller’s boot array.
3. Restart the computer.

### Deleting Arrays

**Caution:** When you delete an array, you delete all the data from the array. Before proceeding, back up any data.

To delete an existing array:

1. From the ACU main menu, select **Manage Arrays**.
2. Select the array you want to delete, then press **Delete**.
3. In the Array Properties dialog box, press **Delete** again, then press **Enter**. The following message is displayed:
   
   Warning!! Deleting will erase all data from the array.
   Do you still want to continue? (Yes/No):

4. Select **Yes** to delete the array, or **No** to return to the previous menu. At the Array Properties dialog box, select **Delete** again, then press **Enter**.
5. Press **Esc** to return to the previous menu.

### Managing Failover Drive Assignments

To assign a hotspare to an array:

1. Select **Manage Arrays** from the main menu.
2. From the List of Arrays dialog box, select the array to which you want to assign a hotspare, then press **Ctrl+S**. The Hotspare Management for Array dialog box is displayed, which shows the drives that can be assigned as hotspares.
3 Select a drive, then press Insert to assign the drive as a hotspare. The specified drive is displayed in the Assigned Hotspares drives list.

4 Press Enter to save the hotspare assignment.

5 If you are finished managing hotspares, press Y (for yes) when prompted to return to the main menu.

To remove an assigned hotspare from an array:

1 Select Manage Arrays from the main menu.

2 From the List of Arrays dialog box, select the array from which you want to remove the assigned hotspare, then press Ctrl+S. The Hotspare Management for Array dialog box is displayed, which shows drives that can be assigned as hotspares and drives that are already assigned as hotspares.

3 From the Assigned Hotspares drives list, select the drive to be removed, then press Delete. The specified drive is displayed in the Select Hotspares drives list.

4 Press Enter to save the removed hotspare assignment.

5 If you are finished managing hotspares, press Y (for yes) when prompted to return to the main menu.

Initializing Drives

If a correctly installed disk does not appear in the disk selection list for creating a new array, or it appears grayed out, you need to initialize it.

⚠️ Caution:

- During initialization, all data is deleted from the disk. Before proceeding, back up any data.
- If the drive is already used in an array, initialization may make the array unusable.
- Do not initialize a disk that is part of a boot array. The boot array is the lowest numbered array (normally 00) in the List of Arrays dialog box. For information on determining which disks are associated with a particular array, see Viewing Array Properties on page A-5.
Adaptec RAID Configuration Utility (ARC)

To initialize drives:
1. Restart the computer, then press Ctrl+A when prompted to access the ARC utility.
2. From the ARC menu, select Array Configuration Utility.
4. Browse with the arrow keys to select a channel.
5. Browse with the arrow keys to highlight the disk you want to initialize, then press Insert.
6. Repeat Step 5 until all the drives to be initialized are selected.
7. Press Enter.
8. Read the warning message, ensure that you have selected the correct drives to initialize, and then press Y to continue.

Rescanning Drives
To rescan the drives connected to the controller:
1. Restart the computer, then press Ctrl+A when prompted to access the ARC utility.
2. From the ARC menu, select Array Configuration Utility.
3. Select Rescan Drives.
Using SATASelect and SCSISelect

The SATASelect and SCSISelect utilities allow you to change controller and device settings without opening the computer cabinet or handling the controller. To access these utilities:

1. Restart the computer, then press Ctrl+A when prompted to access the ARC utility.
2. If multiple controllers are installed, select the controller you want to configure, then press Enter.
3. From the ARC menu, select SATASelect Utility or SCSISelect Utility.

The available options are listed in the table below.

<table>
<thead>
<tr>
<th>This section</th>
<th>Applies to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller Configuration Options</td>
<td>All controllers</td>
</tr>
<tr>
<td>SATA Configuration Options</td>
<td>SATA controllers</td>
</tr>
<tr>
<td>SCSI Configuration Options</td>
<td>SCSI controllers</td>
</tr>
</tbody>
</table>

These options are discussed in the sections that follow.

To select a menu option, browse with the arrow keys to the option, then press Enter. In some cases, selecting an option displays another menu. You can return to the previous menu at any time by pressing Esc.

To restore the original default values, return to Configure/View Host Adapter Settings, then press F6.

4. To exit the utility, press Esc until a message prompts you to exit. (If you changed any host adapter settings, you are prompted to save the changes before you exit.) Choose Yes to exit and restart the computer. Any changes you made take effect after restart.
Controller Configuration Options

The Controller Configuration options are described in the table below.

<table>
<thead>
<tr>
<th>Option</th>
<th>Default</th>
<th>Models Affected</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drives Write Cache</td>
<td>Drive’s Default</td>
<td>All</td>
<td>When Enabled, write cache is enabled, providing maximum drive performance. When Disabled, no write cache is used on the drive. By default, the drive’s setting is used. Caution—When Enabled, there is a slight possibility (less than with controller cache) of data loss or corruption during a power failure.</td>
</tr>
<tr>
<td>Runtime BIOS</td>
<td>Enabled</td>
<td>All</td>
<td>When Enabled, the controller BIOS allows the controller to act as a bootable device. Disabling the BIOS allows another suitable controller to act as the boot device.</td>
</tr>
<tr>
<td>Automatic Failover</td>
<td>Enabled</td>
<td>All</td>
<td>When Enabled, the controller automatically rebuilds an array when the failed drive is replaced. When disabled, the array must be rebuilt manually.</td>
</tr>
<tr>
<td>Array Background Consistency Check</td>
<td>Disabled</td>
<td>All</td>
<td>When Enabled, the controller constantly performs a verification on a redundant array to data integrity. In the case of RAID 1 or 10, consistency checks assure that the data between like blocks match. In the case of a RAID 5 or a RAID 0, consistency checks assure that data in the stripe and the calculated parity for the stripe match. Consistency checking processes reduce performance. For a RAID 5 or a RAID 50, the performance reduction is significant.</td>
</tr>
<tr>
<td>BBS Support</td>
<td>Enabled</td>
<td>See note 1</td>
<td>When Enabled in systems that support BBS, controller is presented as a bootable device in the host system’s BIOS for boot device selection.</td>
</tr>
</tbody>
</table>
**Adaptec RAID Configuration Utility (ARC)**

<table>
<thead>
<tr>
<th>Option</th>
<th>Default</th>
<th>Models Affected</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Array-based BBS Support</td>
<td>Disabled</td>
<td>All</td>
<td>When <em>Enabled</em> in systems that support BBS, the controller presents attached bootable devices up to the host system’s BIOS for boot device selection. This is relevant for logical arrays.</td>
</tr>
<tr>
<td>Physical Drives Display during POST</td>
<td>Disabled</td>
<td>All</td>
<td>When <em>Enabled</em>, attached physical devices are displayed during system POST. Displaying the devices adds a few seconds to the overall POST time.</td>
</tr>
<tr>
<td>CD-ROM Boot Support</td>
<td>Enabled</td>
<td>SCSI only</td>
<td>When <em>Enabled</em>, the system can be booted from a bootable CD.</td>
</tr>
<tr>
<td>Removable Media Devices Support</td>
<td>Enabled</td>
<td>SCSI only</td>
<td>When <em>Enabled</em>, removable media devices, such as CD drives and Zip drives, are supported.</td>
</tr>
<tr>
<td>Alarm Control</td>
<td>Enabled</td>
<td>See note 2</td>
<td>When <em>Enabled</em>, the alarm sounds.</td>
</tr>
</tbody>
</table>

1. BBS systems containing SCSI controllers only.
2. Adaptec 2120S/2130SLP/2200S/2230SLP

---

**Note:**
- BBS systems containing SCSI controllers only.
- Adaptec 2120S/2130SLP/2200S/2230SLP
SATA Configuration Options

The SATA Configuration options are described in the table below.

<table>
<thead>
<tr>
<th>Option</th>
<th>Default</th>
<th>Models Affected</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write Cache</td>
<td>Yes</td>
<td>All SATA controllers</td>
<td>When Enabled, write cache is enabled, providing maximum performance. Caution—When Enabled, there is a potential for data loss or corruption during a power failure.</td>
</tr>
</tbody>
</table>

SCSI Configuration Options

To access the SCSI Device Configuration options, select SCSI Configuration.

SCSI Channel Interface Definitions

The SCSI Channel Interface Definitions are described in the table below.

<table>
<thead>
<tr>
<th>Option</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller SCSI Channel ID</td>
<td>7</td>
<td>Sets the controller’s SCSI ID. Adaptec recommends that you leave the controller set to the default, which gives it the highest priority on the SCSI channel.</td>
</tr>
<tr>
<td>SCSI Parity Checking</td>
<td>Enabled</td>
<td>Determines whether the controller verifies the accuracy of data transfer on the SCSI channel. You should disable SCSI Parity Checking on the controller and all SCSI devices if any SCSI device supported by the controller does not support SCSI parity; otherwise, retain the default. Most SCSI devices do support SCSI parity. If you are not sure whether a device supports SCSI parity, consult the documentation for the device.</td>
</tr>
<tr>
<td>Controller SCSI Channel Termination</td>
<td>Auto Mode</td>
<td>Sets termination on the controller. Adaptec recommends that you retain the default setting.</td>
</tr>
</tbody>
</table>
SCSI Device Configuration Options

The SCSI device settings allow you to configure certain parameters for each device on the SCSI channel. To configure settings for a specific device, you must know the SCSI ID assigned to that device. If you are not sure of the SCSI ID, see Using the Disk Utilities on page A-14.

To access the SCSI Device Configuration options, select SCSI Configuration, then select Additional Options. The SCSI Device Configuration options are described in the table below.

⚠️ Note: For maximum performance, Adaptec recommends that you retain the default settings.

### SCSI Device Configuration Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Transfer Rate</td>
<td>N/A</td>
<td>Determines the maximum data transfer rate that the SCSI channel supports. The maximum effective data transfer rate is doubled when Initiate Wide Negotiation is set to Yes and 16-bit devices are attached. (Initiate Wide Negotiation has no effect with 8-bit devices.)</td>
</tr>
<tr>
<td>Enable Disconnection</td>
<td>Yes</td>
<td>Determines whether the SCSI channel allows the SCSI device to disconnect from the SCSI channel (sometimes called Disconnect/Reconnect or Reselection).</td>
</tr>
<tr>
<td>Initiate Wide Negotiation</td>
<td>Yes</td>
<td>Determines whether the SCSI channel attempts 16-bit data transfer instead of 8-bit data transfer. The effective data transfer rate is doubled when 16-bit data transfer is used.</td>
</tr>
<tr>
<td>QAS</td>
<td>No¹</td>
<td>Determines whether QAS (Quick Arbitration and Selection) is used to eliminate overhead and speed up data transfers on the SCSI bus.</td>
</tr>
<tr>
<td>Packetized</td>
<td>Yes</td>
<td>Determines whether SCSI packetization (encapsulation) is used to reduce overhead and speed data transfer. The packetized SCSI protocol provides a method for transferring command and status information at the maximum rate.</td>
</tr>
</tbody>
</table>

¹. Adaptec recommends that you not enable QAS if you are using an enclosure that contains Ultra320 expander ICs.
Using the Disk Utilities

The disk utilities allow you to low-level format or verify the media of the hard drives. To access the disk utilities:

1 Restart the computer, then press Ctrl+A when prompted to access the ARC utility.

2 If multiple controllers are installed, select the controller you want to configure, then press Enter.

3 From the ARC menu, select Disk Utilities.

4 Select the desired disk, then press Enter.

You are offered the following options:

- **Format Disk**—The functionality depends on the controller type, as described below:
  - **SATA Controllers**—Simulates a format of the hard drive by removing the file system and writing zeros to the entire disk.
  - **SCSI Controllers**—Performs a low-level format.

Most drives are formatted at the factory and do not need to be formatted again.

**Caution:** During formatting, all data is destroyed. Before proceeding, back up any data.

- **Verify Disk Media**—Scans the media of a drive for defects. Any errors found are corrected.
**Viewing the Event Log**

The BIOS-based event log stores all firmware events (configuration changes, array creation, boot activity, and so on).

The event log has a fixed size. Once full, old events are deleted as new events are stored. Also, the log is cleared after each system restart.

To access the event log:

1. Restart the computer, then press Ctrl+A when prompted to access the ARC utility.
2. If multiple controllers are installed, select the controller you want to configure, then press Enter.
3. From the ARC menu, press Ctrl+P. The Controller Service Menu appears.
4. Select **Controller Log Information**, then press Enter. The current log is displayed.
ACU for DOS

In this Appendix...

Introduction B-1
Creating the ACU Utility Disk B-1
Running the ACU Interactively B-2
Running the ACU Using Scripts B-3

Introduction

The Array Configuration Utility (ACU) allows you to create, configure, and manage arrays.

Creating the ACU Utility Disk

The DOS version of this utility runs from a floppy disk that you need to create using the following procedure:

1. To find the ACU executable, acu.exe, browse to the folder on the Adaptec installation CD that relates to your controller model.

<table>
<thead>
<tr>
<th>Adaptec Model</th>
<th>Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020ZCR</td>
<td>packages/firmware/adp2020ZCR</td>
</tr>
<tr>
<td>2020SA</td>
<td>packages/firmware/adp2020SA</td>
</tr>
<tr>
<td>2025ZCR</td>
<td>packages/firmware/adp2025ZCR</td>
</tr>
<tr>
<td>2025SA</td>
<td>packages/firmware/adp2025SA</td>
</tr>
<tr>
<td>2130SLP</td>
<td>packages/firmware/adp2130SLP</td>
</tr>
<tr>
<td>2120S</td>
<td>packages/firmware/adp2120S</td>
</tr>
<tr>
<td>21610SA</td>
<td>packages/firmware/adp21610SA</td>
</tr>
</tbody>
</table>
**Running the ACU Interactively**

To run the ACU interactively:

1. Insert the ACU utility disk you created in *Creating the ACU Utility Disk*.

2. Start or restart your computer.
   - The computer boots to the DOS command line.

3. Type `ACU` on the command line, then press `Enter`.

Select ACU options as needed using the arrow keys and the Tab key navigate through the menus and the Enter key to select from the following tasks:

- **Creating Arrays**
- **Managing Arrays**
- **Initializing Drives**
- **Rescanning Drives**

**Note:** To return to the previous menu at any time, press `Esc`.

For details on using the ACU interactively, see *Using the ACU* on page A-2.
Running the ACU Using Scripts

To use the ACU scripting features, use the `ACU` command, specify a script file (see Creating the Script File Manually on page B-5), and specify one (but not both) of the required switches listed in the table below. You may also add one or both of the optional switches listed in the table.

**Note:** Command line syntax is *not* case sensitive.

<table>
<thead>
<tr>
<th>Switch</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>/P &lt;file&gt;</code></td>
<td>Required</td>
<td><strong>Playback Mode</strong>—In this mode, the ACU reads the contents of the specified script file and creates arrays and configures channel settings based on the keywords defined in the script. For more details, see Playback Mode on page B-4. Note: The ACU exits with an error if you do not include either the <code>/P</code> or the <code>/R</code> switch (but not both).</td>
</tr>
<tr>
<td><code>/R &lt;file&gt;</code></td>
<td>Required</td>
<td><strong>Record Mode</strong>—The ACU writes a controller’s existing array configuration to a specified script file, enabling you to create the same configuration by running the ACU in playback mode (<code>/p</code> switch) with the resulting script. For more details, see Record Mode on page B-4. Note: The ACU exits with an error if you do not include either the <code>/P</code> or the <code>/R</code> switch (but not both).</td>
</tr>
<tr>
<td><code>/L &lt;file&gt;</code></td>
<td>Optional</td>
<td><strong>Optional Log Filename Switch</strong>—If you include this switch, the ACU records its activity and any errors it encounters in the log file. If you do not include this switch, the ACU displays any status and errors on the screen. The file is a standard MS-DOS file, which can include a drive, directory, filename, and extension. Only the filename and extension (.LOG) are required. If no drive or directory is specified, the file is placed in the location of the ACU executable.</td>
</tr>
<tr>
<td><code>/C &lt;number&gt;</code></td>
<td>Optional</td>
<td><strong>Optional Controller Number Switch</strong>—In systems with more than one controller, this switch specifies which controller to change, where <code>&lt;number&gt;</code> is the controller number. The default controller number is 0. Note: The number assigned to a particular controller depends on the controller’s physical PCI slot and the order in which your system scans its PCI slots.</td>
</tr>
</tbody>
</table>
Playback Mode

In this mode, the ACU reads the contents of the specified script file and creates arrays based on the keywords specified in the script.

The syntax is `ACU /P <file>` where `file` is the parameter specifying name of the script file. The `file` parameter can include a drive, directory, filename, and extension. If no drive or directory is specified, the file is placed in the location of the ACU executable.

⚠️ Note: The script file syntax allows only a single hotspare to be assigned to any given array. Therefore, when recording a RAID 10, the ACU cannot map hotspares assigned to the individual mirror sets in the resulting script file. Instead, the ACU creates a single `HotspareDrives` list for all hotspares assigned to the RAID 10. For details, see the Method Keyword on page B-9.

Record Mode

There are two methods available for creating a script file:

- Use Record Mode.
- Create the script manually. (See page B-5.)

Regardless of which method you use to create the script, you need to use `Playback Mode (/P)` to use the script.

In Record Mode, the ACU writes a controller’s existing array configuration to a specified script file, enabling you to create the same configuration by running the ACU in Playback Mode (`/P` switch) with the resulting script.

The syntax is `ACU /R <file>` where `file` is the parameter specifying name of the script file. The `file` parameter can include a drive, directory, filename, and extension, but only the filename and extension are required. If no drive or directory is specified, the file is placed in the location of the ACU executable.
Notes:

■ Record Mode can be used to record only one controller at a time. Therefore, if you want to record multiple controllers, record them separately using separate script files.

■ Because the ACU supports only a subset of array types available, it cannot record all the possible array configurations. If the ACU encounters an array that it cannot create, it displays a warning (or records the warning in the log file, if the /L switch is used) and does not record any keywords for that array in its script file.

■ When recording an array, the ACU always uses the default Wait setting (equivalent to Wait=Yes) unless you edit the script file and include Wait=No in the array’s definition block. For details, see the Wait Keyword on page B-11

Creating the Script File Manually

Script files contain the following structures, or blocks:

■ **Array Definition Block Keywords**

■ **Channel Definition Block Keywords – SCSI only** (optional)

The rules for syntax are as follows:

■ Each keyword must start its own line.

■ The syntax is not case sensitive.

Comments

To enter a comment in the script file, start with a pound character (#). You can start anywhere on a line. For a sample script that includes comments, see Example – Running the ACU with a Script on page B-14.
Array Definition Block Keywords

The array definition block always begins with the keyword **Array** and ends with the keyword **End**. The other required array definition keywords are **Drives** and **Type**. The array definition keywords are listed in the table below alphabetically.

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Required?</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Array</td>
<td>Yes</td>
<td>None</td>
<td>Indicates the start of an array definition block. See page B-7.</td>
</tr>
<tr>
<td>Drives</td>
<td>Yes</td>
<td>None</td>
<td>Specifies the devices used in creating the array. See page B-7.</td>
</tr>
<tr>
<td>End</td>
<td>Yes</td>
<td>None</td>
<td>Indicates the end of an array definition block. See page B-7 for details.</td>
</tr>
<tr>
<td>HotspareDrives</td>
<td>No</td>
<td>None</td>
<td>Specifies the hotspares to assign to the array. See page B-8.</td>
</tr>
<tr>
<td>InitializeAll</td>
<td>No</td>
<td>No</td>
<td>Indicates whether to initialize all the drives connected to the controller. See page B-8.</td>
</tr>
<tr>
<td>Method</td>
<td>Yes</td>
<td>Build</td>
<td>Indicates the method (Build/Verify, Clear, or Quick Init) to use when creating a redundant array (see page B-9).</td>
</tr>
<tr>
<td>ReadCache</td>
<td>No</td>
<td>Yes</td>
<td>Indicates whether read caching is enabled for this array (see page B-10).</td>
</tr>
<tr>
<td>Size</td>
<td>No</td>
<td>Maximum</td>
<td>Specifies the size of the array (see page B-10).</td>
</tr>
<tr>
<td>StripeSize</td>
<td>No</td>
<td>64</td>
<td>Specifies the size of contiguous I/O, in bytes (see page B-10).</td>
</tr>
<tr>
<td>Type</td>
<td>Yes</td>
<td>None</td>
<td>Indicates the type of array to create (see page B-9).</td>
</tr>
<tr>
<td>Wait</td>
<td>No</td>
<td>Yes</td>
<td>Indicates whether the ACU should wait for the new array’s build/verify or clear to complete before continuing (see page B-11).</td>
</tr>
<tr>
<td>WriteCache</td>
<td>No</td>
<td>Yes</td>
<td>Indicates whether write caching is enabled for this array (see page B-11).</td>
</tr>
</tbody>
</table>
The keywords are described in detail in the sections that follow.

Array Keyword
Array is a required keyword, indicating the start of an array definition block. The syntax is Array=<label>, where label is an optional alphanumeric string.

Examples
Array
Array=MyData

Drives Keyword
Drives is a required keyword, specifying the devices to use in creating the array. There is no default value.

A drive is identified by its channel number, ID (target), and LUN, separated by colons; for example, 0:0:0 or 0:1:0. Separate multiple drive identifiers with commas.

Prior to creating any new arrays, the ACU initializes any drives specified by the Drives keyword. If a drive is specified in more than one array definition block in a script, it is initialized only once.

Caution: Any drive specified within the script file is initialized, which destroys any data on that drive.

Examples
Drives=0:0:0
Drives=0:0:0,0:1:0,0:2:0

End Keyword
End is a required keyword, indicating the end of the block.

Example
End
HotspareDrives Keyword

HotspareDrives is an optional keyword, specifying the hotspares to assign to the array. The syntax for listing hotspares is the same as the Drives Keyword on page B-7. If HotspareDrives is not specified, no hotspares are assigned to the array.

Notes:

- **HotspareDrives** creates only dedicated hotspares. If the same drive is assigned to protect multiple arrays, only the last array that drive is assigned to is protected.
- **HotspareDrives** does not verify that the available space on the specified hotspares is sufficient to serve as failover for the array.
- When assigning hotspares to a multilevel array, **HotspareDrives** assigns all the hotspares in the list to all arrays within the multilevel array.

Example

HotspareDrives=0:0:0,0:1:0

InitializeAll Keyword

If you want the ACU to initialize all drives connected to the controller and delete any existing arrays before any new arrays are created, even those that are not specified in any Drives keyword definition, specify InitializeAll=yes. Otherwise, the ACU initializes only those drives specified by the Drives keyword.

Caution: Initializing a drive automatically deletes any existing arrays with that drive as their member.
ACU for DOS

Notes:

■ InitializeAll is a global keyword that you need to specify only once.
■ InitializeAll is always performed prior to array creation regardless of its position in the script.
■ If both InitializeAll=Yes and InitializeAll=No are specified in the same script file, InitializeAll=Yes is always the overriding value.
■ If an array is deleted during a build/verify process, the process is automatically terminated.

Possible values are as follows:

■ Yes—Initialize all drives.
■ No (the default)—Do not initialize all drives; only those drives specified with the Drives keyword are initialized.

Examples

Type=Volume
Type=RAID1

Method Keyword

Method is an optional keyword, indicating which method to use when creating a redundant (RAID 1, 5, and 10) array. Possible values are:

■ Build (the default)—Perform a build/verify process on the array. Takes longer than Clear, but allows you to begin using the array immediately.
■ Clear—Clear the array. Faster than a build/verify process, but you have to wait for the operation to be completed before you can begin using the array.
■ Quick Init—Makes the array available immediately, but does not accomplish a build/verify. Parity and mirror information is created as data is written to the drive (called full-stripe write mode), which reduces overall array performance. Maximum performance is achieved by starting and completing a build/verify.

Example

Method=Build
ReadCache Keyword

ReadCache indicates whether the array uses read caching.

Possible values are:

- **Yes** (the default)—Enable read caching.
- **No**—Disable read caching.

**Example**

ReadCache=Yes

Size Keyword

The **Size** keyword specifies the size of the array. Specify **Maximum** (the default) to create an array using the maximum available space, based on the array type and drives selected. Otherwise, specify the size as an integer or a decimal number, followed by the unit keyword MB (megabytes), GB (gigabytes), or TB (terabytes).

**Note:** A unit keyword is required with a numeric size value. If no unit keyword is specified, the ACU exits with an error.

**Examples**

Size=2.5GB  
Size=300MB  
Size=Maximum

StripeSize Keyword

**Note:** This keyword does not support RAID 50 arrays because RAID 50 arrays support only a stripe size of 64 KB.

The **StripeSize** keyword specifies the stripe size (in MB) written to each member of a striped (RAID 0, RAID 5, RAID 10) array.

The possible values for **StripeSize** are 16, 32, 64, 128, 256 KB (the default), 512 and 1024.

**Example**

StripeSize=256
**Type Keyword**

Type is a required keyword, indicating the array type. There is no default value. The Type keyword values are:

- **Volume**
- **RAID5**
- **RAID0**
- **RAID10**
- **RAID1**
- **RAID50**

**Note:** For information about which array types your controller supports, see *Controller Features on page 1-5*.

**Wait Keyword**

Wait is an optional keyword that you can use to tell the ACU to allow the ACU to continue while the build/verify or clear completes in the background; specify `wait=no`. Otherwise, the ACU waits by default.

**Note:** If the host is powered off before the build/verify or clear process completes and is then restarted, the process resumes without any user intervention.

**Examples**

- `Wait=Yes`
- `Wait=No`

**WriteCache Keyword**

The WriteCache keyword indicates whether write caching is used for this array if write caching is supported for the system. Possible values are as follows:

- **Yes** (the default)—Enable the write cache.
- **No**—Disable the write cache.

**Note:** Setting an array’s WriteCache keyword to Yes might result in data loss or corruption during a power failure.

**Example**

- `WriteCache=Yes`
Channel Definition Block Keywords – SCSI only

The channel definition block is optional. If used, it always begins with the keyword Channel and ends with the keyword End. The channel definition block keywords are listed in the table below.

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel</td>
<td>Used to identify the channel.</td>
</tr>
<tr>
<td>End</td>
<td>Indicates the end of a channel definition block.</td>
</tr>
<tr>
<td>ControllerID</td>
<td>Changes the SCSI ID of the controller.</td>
</tr>
</tbody>
</table>

**Channel Keyword**

Channel is an optional keyword that begins a channel definition block and specifies the channel number to which the channel keywords apply. Channels are numbered from zero to the maximum number of channels on the controller minus one.

You can include multiple channel definition blocks within a script file, each beginning with a Channel keyword and value. For example:

**Example**

Channel=0

**ControllerID Keyword**

ControllerID is an optional keyword to change the SCSI ID of the controller. Normally, the SCSI controller is assigned SCSI ID 7 on each of its channels. You can specify any ID value between 0 and 7.

**Caution:** Do not change the SCSI ID of the controller unless directed to do so by Adaptec Technical Support.

**Example**

ControllerID=7

**End Keyword**

End is a required keyword, indicating the end of the block.

**Example**

End
ACU Error Codes
When the ACU detects an error, it reports the error and exits immediately. If a log file is specified, the ACU writes the error code to the log file. Otherwise, it displays the error code on the screen.

The possible error messages returned by the ACU are listed in the table below.

**ACU Error Codes**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td><strong>ACU ran without changes</strong>—The ACU exited with no errors (success) and no report is required.</td>
</tr>
<tr>
<td>1</td>
<td><strong>No controller found</strong>—The ACU did not detect any controllers in the system.</td>
</tr>
<tr>
<td>2</td>
<td><strong>Syntax or logical error in the script file</strong>—The ACU encountered an invalid command or keyword in the specified script file.</td>
</tr>
<tr>
<td>3</td>
<td><strong>Unable to open file</strong>—The ACU was unable to open the specified script or log file.</td>
</tr>
<tr>
<td>4</td>
<td><strong>Error in the command line parameters</strong>—You passed an invalid command-line switch to the ACU. (See <em>Running the ACU Using Scripts on page B-3</em> for the list of valid command-line switches.)</td>
</tr>
<tr>
<td>5</td>
<td><strong>Unable to read system configuration</strong>—The ACU was unable to get the configuration information from the specified controller.</td>
</tr>
<tr>
<td>6</td>
<td><strong>No drives detected</strong>—The ACU did not detect any devices attached to the selected controller.</td>
</tr>
<tr>
<td>7</td>
<td><strong>Specified drive not found in system</strong>—The device you specified does not exist on the selected controller.</td>
</tr>
<tr>
<td>8</td>
<td><strong>Specified array size too small</strong>—You specified an array size that is smaller than the minimum size allowed for this array.</td>
</tr>
<tr>
<td>9</td>
<td><strong>Specified array size too big</strong>—You specified an array size that is larger than the maximum size allowed for this array.</td>
</tr>
<tr>
<td>10</td>
<td><strong>Number of drives do not match the array type</strong>—The number of drives you selected is invalid for the type of array specified.</td>
</tr>
<tr>
<td>11</td>
<td><strong>Unable to initialize drive</strong>—The ACU was unable to initialize one or more devices.</td>
</tr>
<tr>
<td>12</td>
<td><strong>Error occurred while creating array</strong>—The ACU encountered an error creating an array.</td>
</tr>
<tr>
<td>13</td>
<td><strong>Too many spare drives assigned</strong>—You attempted to assign more than the maximum number of hotspares allowed for the specified array.</td>
</tr>
</tbody>
</table>
Example – Running the ACU with a Script

The following MS-DOS command invokes the ACU and creates arrays on controller 1 based on the array keywords defined in the script file A:\RAID.ACU. It also configures Channel 0 and saves a log of the operation in the log file C:\RAID.LOG.

A:\> ACU /P A:\RAID.ACU /L C:\RAID.LOG /C1

The following sample script file is a sample RAID.ACU script as referred to in the previous ACU command. This script creates the following arrays—a 500 MB, single-disk volume and a 2-GB, two-drive RAID 1 with a hotspare:

```
# Script to create volume, mirror, and RAID 5 arrays
# Create a 500MB volume labeled 'MySystem'
Array=MySystem
Type=Volume
Size=500MB
Drives=0:0:0
End

# Create a 2GB mirror labeled 'MyMirror'
Array=MyMirror
Type=RAID1
Size=2GB
# Use drives 1 and 2
Drives=0:1:0,0:2:0
# Disable write cache
WriteCache=No
# Assign 1 spare drive
HotspareDrives=0:3:0
End
```

ACU Error Codes "Continued"

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td><strong>Insufficient memory to run the application</strong>—There is not enough memory to run the ACU.</td>
</tr>
<tr>
<td>15</td>
<td><strong>Incorrect controller number</strong>—The controller number you specified is invalid or out-of-range.</td>
</tr>
<tr>
<td>16</td>
<td><strong>Controller not responding</strong>—The controller has stopped responding to the ACU.</td>
</tr>
<tr>
<td>17</td>
<td><strong>Build/Verify/Clear failed</strong>—The build/verify or clear operation for one or more arrays has failed.</td>
</tr>
<tr>
<td>100</td>
<td><strong>You ran ACU and made changes</strong>—The ACU exited with no errors (success) and you must restart the computer.</td>
</tr>
</tbody>
</table>
The following sample script file creates a maximum-size three-drive RAID 5.

```plaintext
# Create a maximum size RAID 5 labeled 'MyData'
Array=MyData
Type=RAID5
Size=Maximum
# Use the maximum stripe size
StripeSize=64
# Clear the array (don’t build/verify it)
Method=Clear
# Don’t wait for clear to complete
Wait=No
# Use drives 0, 1, 2
Drives=0:0:0, 0:1:0, 0:2:0
End
```
Adaptec Flash Utility (AFU)

In this Appendix...

Introduction C-1
Creating the Firmware Floppy Disks C-3
Running the AFU from the GUI C-4
Running the AFU from the Command Line C-5

Introduction

The Adaptec Flash Utility (AFU) is a DOS utility used to update, save, or verify the RAID controller’s firmware BIOS, and NVRAM.

⚠️ Caution: The AFU is easy to use and contains safeguards to prevent you from accidentally damaging the controller’s flash contents. Still, you must be careful to use the AFU correctly; otherwise, you could render the controller inoperable.

⚠️ Note: If you are updating multiple controllers in the same system, update the boot controller’s flash first, restart the computer, and then update the flash for remaining controllers.
The AFU is used to:

- **Update**—Updates all the flash components on a controller with the flash image data from a User Flash Image (UFI) file. The AFU updates the controller’s flash by reading UFI files and writing them to the controller’s flash components.

  
  \begin{itemize}
  \item **Note:** The UFI includes the controller’s type, thereby ensuring that the AFU uses the correct file.
  \end{itemize}

- **Save**—Reads the contents of a controller’s flash components and saves the data to a UFI file. This allows you to later restore a controller’s flash to its previous contents should the need arise.

- **Verify**—Reads the contents of a controller’s flash components and compares it to the contents of the specified UFI file.

- **Version**—Displays version information about a controller’s flash components.

- **List**—Lists all supported controllers detected in your system.

**System Requirements**

The requirements for AFU are as follows:

- MS–DOS version 5.0 or later. It cannot run from a DOS command prompt window under any version of Windows.

- At least 8 MB of extended memory.

  \begin{itemize}
  \item **Note:** You cannot create the bootable floppy using Windows 2000.
  \end{itemize}

**Compatibility**

The AFU has the following compatibility issues:

- Supports **HIMEM.SYS**; compatible with other DOS drivers running under **HIMEM.SYS** (for example, **SMARTDRV.SYS** and **SETVER.SYS**).

- **Does not support** DOS extenders installed in memory, such as **EMM386.SYS** and **DOS4GW**.
Creating the Firmware Floppy Disks

Controller firmware is available two ways:

■ **From the Adaptec installation CD**—The CD includes the AFU executable, AFU.exe, the corresponding documentation, and a separate flash image. The flash image may be comprised of multiple UFI files.

You can locate the necessary files on the Adaptec installation CD at the locations listed below.

<table>
<thead>
<tr>
<th>Adaptec Model</th>
<th>Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020ZCR</td>
<td>/packages/firmware/adp2020ZCR</td>
</tr>
<tr>
<td>2020SA</td>
<td>/packages/firmware/adp2020ZCR</td>
</tr>
<tr>
<td>2025ZCR</td>
<td>/packages/firmware/adp2025ZCR</td>
</tr>
<tr>
<td>2025SA</td>
<td>/packages/firmware/adp2025SA</td>
</tr>
<tr>
<td>2130SLP</td>
<td>/packages/firmware/adp2130SLP</td>
</tr>
<tr>
<td>2120S</td>
<td>/packages/firmware/adp2120S</td>
</tr>
<tr>
<td>21610SA</td>
<td>/packages/firmware/adp21610SA</td>
</tr>
<tr>
<td>2230SLP</td>
<td>/packages/firmware/adp2230SLP</td>
</tr>
<tr>
<td>2200S</td>
<td>/packages/firmware/adp2200S</td>
</tr>
<tr>
<td>2410SA</td>
<td>/packages/firmware/adp2410SA</td>
</tr>
<tr>
<td>2810SA</td>
<td>/packages/firmware/adp2810SA</td>
</tr>
</tbody>
</table>

■ **From the Adaptec Web site**—When you download a new firmware file, you usually get the most recent version of AFU.

To create a controller firmware kit on floppy disks:

**Note:** You cannot create the bootable floppy using Windows 2000.

1. Create a bootable MS–DOS floppy disk and copy the following files to this disk:
   - AFU.exe
   - AAxxx01.ufi

where **xxx** is the model number of your controller.
2 Create additional bootable MS-DOS floppy disks and copy each additional AAXX0x.ufi files to a separate disk. (Some controllers have two UFI files; some have four.)

3 Start the AFU as described in Running the AFU from the GUI on page C-4 and follow the prompts.

Running the AFU from the GUI

The easy way to run the AFU is to use its Graphical User Interface (GUI). If you prefer to run the AFU from the command line, see page C-5.

To access the AFU:

1 Create the firmware floppy disks, as described in Creating the Firmware Floppy Disks on page C-3.

2 Shut down your operating system and reboot to DOS from a bootable MS-DOS floppy disk or from a DOS partition on a bootable drive. (You can use the drive connected to the controller you are updating.)

Note: When updating the controller flash, I/O is not possible. Before you can use the controller again, complete the flash operation and restart the computer.

3 At the DOS command prompt (typically A:\>), type AFU with no arguments.

   The AFU’s main menu is displayed.

4 Choose Select Controllers and select the Adaptec RAID controllers to be flashed.

5 Choose Select an Operation.

6 Choose any available AFU function and follow the on-screen instructions.
Running the AFU from the Command Line

At the DOS command prompt (typically A:\>, type AFU followed by a command and any switches. The AFU processes the command, prompts you to insert additional floppy disks as needed, exits, and reports success or an error message code.

Command Summary
This section describes each AFU command (in alphabetical order).

HELP
The HELP command displays a summary of AFU functions and command switches.

Examples
The following are examples of command syntax that will work to get help:

A:\> AFU HELP
A:\> AFU /?

LIST
The LIST command displays the AFU-supported controllers installed on your computer. Use this command to see which controllers are installed, or to identify the ID numbers assigned to each physical controller.

You do not have to restart the computer after completing this command.

Example
The following example shows a typical system response to a LIST command.

A:\> AFU LIST
Adaptec Flash Utility V4.0-0 B5749
(c)Adaptec Inc. 1999-2002. All Rights Reserved.
Controllers Detected and Recognized:
Controller #0 (03:05:00) Adaptec 2410
SAVE

The SAVE command saves the contents of a controller’s flash in a UFI file. The name of the UFI file is based on the controller type and cannot be changed.

You must restart the computer following a SAVE command.

Command Syntax

The command syntax for the SAVE command is as follows:

```
AFU SAVE [/C<Controller ID>] [/D <UFI File Path>]
```

Command Switches

The following switches are available:

- **/C <Controller ID>** is one or more controller IDs representing the set of controllers on which to perform the specified command. The default is 0, which means that if the computer has multiple controllers, the AFU defaults to controller 0 unless you specify otherwise.

  You can specify a single controller ID, for example:

  `/C 0`

  multiple IDs separated by commas, for example:

  `/C 0,2`

  or ALL to indicate all controllers.

  **Note:** If you are using multiple controllers, you must specify the controller you want by using the `/C` switch; otherwise, the AFU displays an error message and exits.

- **/D <UFI File Path>** specifies the path (drive and directory) where the UFI files are located. If you do not specify the `/D` switch, the AFU looks for, or creates, its UFI files in the default location.

  **Note:** You cannot specify the name of a UFI file, only its path. UFI filenames are predefined, based on the controller type.
Adaptec Flash Utility (AFU)

Examples

In the following example, the AFU saves flash contents from controller 0 to a UFI file in the current default drive and directory:

A:\> AFU SAVE /C 0

In the following example, the AFU saves flash contents from Controller 1 to a UFI file in C:\UFI_FILES.

A:\> AFU SAVE /C 1 /D C:\UFI_FILES

UPDATE

The UPDATE command updates a controller’s flash components from the flash image data in a UFI file. You can use the UPDATE command to update a single controller’s flash components or to update multiple controllers on your computer.

You must restart the computer following an UPDATE command.

Command Syntax

The command syntax for the UPDATE command is as follows:

AFU UPDATE [/C<Controller ID>] [/D <UFI File Path>]

Command Switches

For details on the /C and /D switches, see the SAVE command on page C-6.

Example

The following example shows a typical system response after an update has been performed.

A:\> AFU UPDATE /C 0
Adaptec Flash Utility V4.0-0 B5749
(c)Adaptec Inc. 1999-2002. All Rights Reserved.
Updating Controller 0 (Adaptec 2410)
Reading flash image file (Build 5749)
AFU is about to update firmware on controllers Adaptec 2410
***PLEASE DO NOT REBOOT THE SYSTEM DURING THE UPDATE***
This might take a few minutes.
Writing Adaptec 2410 (4MB) Flash Image to controller 0...OK.
Verifying...OK
Please restart the computer to allow firmware changes to take effect.
Adaptec Flash Utility (AFU)

VERIFY

The VERIFY command compares the contents of each of the flash components on a controller to the corresponding image in a UFI file and indicates whether they match. Use this command to determine whether a controller’s flash components are up-to-date when compared to a specific UFI file.

After using the VERIFY command, you must restart the computer.

Command Syntax

The command syntax for the VERIFY command is as follows:

```
AFU VERIFY [/C<Controller ID>] [/D <UFI File Path>]
```

Command Switches

For details on the /C and /D switches, see the SAVE command on page C-6.

Example

The following example shows a typical system response after a verify command has been performed.

```
A:\> AFU VERIFY /C 0
Adaptec Flash Utility V4.0-0 B5749
(c)Adaptec Inc. 1999–2002. All Rights Reserved.
Reading flash image file (Build 5748)
Controller #0: Adaptec 2410
ROM: Checksum: 797B [VALID] (Build 5748)
File: Checksum: 797B [VALID] (Build 5748)
   Image Compares Correctly
```

VERSION

The VERSION command displays version information about the flash components on a controller.

After using the VERSION command, you must restart the computer.

Command Syntax

The command syntax for the VERSION command is as follows:

```
AFU VERSION [/C<Controller ID>]
```

Command Switches

For details on the /C switch, see the SAVE command on page C-6.
Adaptec Flash Utility (AFU)

Example

The following example displays version information about all supported controllers.

```
A:\> AFU VERSION /C 0
Adaptec Flash Utility V4.0-0 B5749
(c)Adaptec Inc. 1999–2002. All Rights Reserved.
Version Information for Controller #0 (Adaptec 2410)
A:\> AFU VERSION /C ALL
```

AFU Command Line – Step-by-Step

This section provides step-by-step instructions for updating your the flash.

To update the flash using the AFU command line:

1. Create the firmware floppy disks, as described in Creating the Firmware Floppy Disks on page C-3.
2. Shut down the computer.
3. Insert the bootable disk that contains the AFU utility.
4. Turn on the computer.
5. Enter the system setup utility and verify that your computer is set up to boot from the bootable disk.
6. If you have multiple controllers only—at the DOS prompt, type afu list and press Enter.

   This command displays the Adaptec RAID controllers in your system. Note the controller number for the controller you want to update; you may need it in Step 7 to perform the update.

7. You can update the flash using any of the following alternatives:

   a. Updating the Flash on a Single Controller—To flash the firmware on a single controller, type:

      ```
      afu update /C <controller_number>
      ```

      Where `<controller_number>` is the number of the controller whose firmware you are updating. For example, to upgrade Controller 0, type:

      ```
      afu update /C 0
      ```
b Updating the Flash on Multiple Controllers—To flash the firmware on multiple controllers, type:

```
afu update /C <controller_number_a>,<controller_number_b>
```

Where `<controller_number_a>` and `<controller_number_b>` is the number of one of the Adaptec RAID controllers whose firmware you are updating.

To upgrade controllers 0, 2, and 3 for example, type:

```
afu update /C 0, 2, 3
```

c Updating the Flash on All Controllers Simultaneously—To flash the firmware on all controllers, type:

```
afu update /C all
```

⚠️ **Note:** The UFI file identifies the appropriate controllers, so you do not have to worry about flashing the wrong controller.

8 The AFU prompts you to put in the first firmware disk.

When it detects that the disk is in the drive, the AFU reads the part of the firmware image contained on the first disk.

9 When prompted, remove the first firmware disk and insert the second firmware disk.

10 If necessary, repeat Step 9 until the process is complete.
Command Line Interface

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Controller Commands D-25
Disk Commands D-28
Logfile Commands D-32
Task Commands D-32
Enclosure Commands D-34
Using Automated Command Scripts D-38
Introduction

The Command Line Interface (CLI) allows you to configure and manage controller components. The CLI contains most of the functionality offered by Adaptec Storage Manager, plus some additional functionality not offered by Adaptec Storage Manager.

CLI commands allow you to automate testing or array creation in a production environment using Windows command scripts and Linux and Unix shell scripts.

This appendix describes briefly some of the commands available in the CLI. For a full description of all the CLI commands, refer to the Command Line Interface Reference Guide.

Terminology

This section discusses terminology used in this Appendix.

Adaptec 2410SA/2810SA Controllers Only

In the device ID format C:ID:L:

- C represents Channel, which is always zero.
- ID represents Port ID, or Port number, on the SATA RAID controller. This is the only value that is used.
- L represents LUN, which is always zero.

⚠️ Note: Only the value for Port ID is used.

Adaptec 21610SA Controllers Only

In the device ID format C:ID:L:

- C represents Channel.
- ID represents Port ID. (For mapping, see below.)
- L represents LUN, which is always zero.

Your Serial ATA adapter maps Port IDs as follows:

- Controller ports 0 through 7 are mapped to IDs 0 through 7 on Channel 0
- Controller ports 8 through 15 are mapped to IDs 0 through 7 on Channel 1
For example, port 5 is 0:5:0; port 12 is 1:4:0.

**All Controllers**
The following terms are used in discussing the CLI:

- **Array, container**—A logical disk created from available space and made up of one or more partitions on one or more physical disks.

- **Stripe, chunk**—Contiguous set of data distributed across all the disks in an array. A striped array distributes data evenly across all members in equal-sized sections called *stripes*.

- **Free or available space**—Space on an initialized disk that is not in use.

- **Partition**—Contiguous area of a physical drive that makes up some or all of an array.

- **Hotspare, failover disk**—A hard drive, an array member, that is not used in day-to-day data storage, but is instead reserved for use as a replacement for one of the other drives in the array in the event of a failure.

Additional RAID terms are defined in the *Glossary*. 
Accessing the CLI

The method you use to access the CLI depends on the operating system, as described below.

Accessing the CLI in MS-DOS

To access the CLI from the MS-DOS prompt, move to the directory containing the afacli executable, then type `afacli`.

Accessing the CLI in Windows

To access the CLI in Windows:

1. Click the **Start** button.
2. Click **Programs**.
3. Browse to **Adaptec Storage Manager**.
   - The Adaptec program group is displayed.
4. Click **CLI**.

   **Note:** In Windows, when the CLI executes a background command, it displays status information in the title bar of a DOS command prompt window. The status information includes a percentage indicating a level of completion.

Accessing the CLI in Unix

To access the CLI in Unix, display a window and type `aaccli` in any directory. When the system displays the CLI> prompt, you can use CLI commands. The status information appears at the bottom of the CLI window.

For the commands to work in any directory, the path in the startup file (`.login` or `.cshrc`) must include the directory where the software is installed. Refer to your operating system documentation for information on setting up directory paths in the `.login` and `.cshrc` files.
From the NetWare server console

To access the CLI from the NetWare server console, type aaccli at the prompt. When the system displays the CLI> prompt, which indicates that you can now use CLI commands.

Using the CLI

This section contains some examples of using CLI commands to perform common tasks.

Opening and Closing a Controller

To prepare a controller to receive a CLI command, you first need to open the controller. You may open only one controller at any time.

To open controller AAC0 and prepare it to receive more CLI commands, type:

```
CLI> open AAC0
```

The prompt changes to reflect the open controller, as shown in the next example. When you have finished with the controller, close it by typing:

```
AAC0> close
```

Displaying Information about Your Disks

Before creating any array, use the disk show space command to display information about your disks.

⚠️ Note: Before you can create arrays, you need to initialize the member drives.

In the following example, the Usage column indicates Free for each disk, which means that the space on each disk consists of available space.

```
AAC0> disk show space
Executing: disk show space
Scsi C:ID:L Usage Size
----------------- ----------
0:01:0 Free 64.0KB:8.47GB
0:02:0 Free 64.0KB:8.47GB
0:03:0 Free 64.0KB:8.47GB
0:04:0 Free 64.0KB:8.47GB
```
Displaying Information about Your Array

After creating an array, use the container list command to display information about the array. In the following example, the Num Label column indicates the array ID 0 and the array label Venus. The Type column indicates a volume set. The Total Size column indicates that the array is 100 MB.

AAC0> container list
Executing: container list

<table>
<thead>
<tr>
<th>Num</th>
<th>Total Oth Stripe</th>
<th>Scsi</th>
<th>Partition</th>
</tr>
</thead>
<tbody>
<tr>
<td>--</td>
<td>------</td>
<td></td>
<td>----------</td>
</tr>
<tr>
<td>0</td>
<td>Venus</td>
<td>None</td>
<td>0:01:0 64.0KB: 100MB</td>
</tr>
</tbody>
</table>

Creating a Volume Set

To create a volume set, use the container create volume command. In the following example, Volume 0 is created on device 0:01:0 from 100 MB (megabytes) of available space. The array’s cache is enabled, and the label is Venus.

AAC0> container create volume /cache=TRUE /label=Venus ((0,01,0), 100M)
Executing: container create volume /cache=TRUE /label="Venus" ((CHANNEL=0,ID=1,LUN=0),104,857,600)
container 0 created

Creating a RAID 0

When creating a RAID 0, you need to determine the stripe size that is most suitable for your environment. The stripe_size attribute indicates the number of bytes in a stripe, the amount of data written to a partition before the I/O data stream switches to the next partition in the array.

The stripe size can be 16, 32, 64, 128, 256, 512 and 1024; the default is 256 KB. Note that you can change the stripe size later using the container reconfigure command.

To create a RAID 0, use the container create stripe command. In the following example, the Array 0 is created on device 0:01:0 from 100 MB of available space. The array’s cache is enabled, and the label is Mars.

AAC0> container create stripe /cache=TRUE /label=Mars ((0,01,0), 100M)
Executing: container create stripe /cache=TRUE /label="Mars" ((CHANNEL=0,ID=1,LUN=0),104,857,600)
container 0 created
Creating a RAID 1

To create a RAID 1, use the `container create new_mirror` command. In the following example, a RAID 1 is created on devices 0:02:0 and 0:03:0 using 100 MB of available space from each device.

```
AAC0> container create new_mirror ((0,2,0), 100M) (0,3,0)
Executing: container create new_mirror ((CHANNEL=0,ID=2,LUN=0),104,857,600 ) (CHANNEL=0,ID=3,LUN=0)
```

Creating a RAID 5

When you create a RAID 5, you use a form of redundancy called parity. When you set up parity, the parity stripes are initialized, by default, using a scrub switch (`/scrub=TRUE`). Parity is set up in the background, and the disks are available immediately.

Linux/UNIX only: The `/scrub` switch is not available in Linux. For Linux, the RAID 5 is always created by building.

The stripe size can be 16, 32, 64, 128, 256, 512 and 1024; the default is 256 KB. Note that you can change the stripe size later using the `container reconfigure` command.

To create a RAID 5, use the `container create raid5` command. In the following example, a RAID 5 is created on devices 0:01:0, 0:02:0, and 0:03:0 using 100 MB of available space from each device:

```
AAC0> container create raid5 /stripe_size=64K ((0,1,0), 100M) (0,2,0) (0,3,0)
Executing: container create raid5 /stripe_size=65,536 ((CHANNEL=0,ID=1,LUN=0),104,857,600) (CHANNEL=0,ID=2,LUN=0) (CHANNEL=0,ID=3,LUN=0)
```

Deleting an Array

To delete an array, use the `container delete` command. In the following example, Array 0 is deleted.

```
AAC0> container delete 0
Executing: container delete 0
```

After running the `container delete` command, use the `container list` command to verify that the array was deleted. In the following example, no arrays are found on the controller.

```
AAC0> container list
Executing: container list
No containers found.
```
Managing Failover Options and Hotspares

To assign one or more hotspares to a single array, use the `container set failover` command. To assign one or more spare disks for all arrays, use the `container set global_failover` command. These commands allow you to add hotspares to an array prior to a drive failure so that the array contains the resources it needs to survive a failure.

Alternatively, you can use the automatic failover commands that allow you to remove a failed drive and add a hotspare in its place. The controller automatically assigns the new hotspare to replace the failed drive without your having to first assign it using the `container set failover` or `container set global_failover` commands.

⚠️ **Note:** Automatic failover works only with disks that reside in an SAF-TE- or SES-enabled enclosure.

⚠️ **Caution:** During hotspare assignment, all data is deleted from the hotspare.

The following failover topics are discussed:
- *Displaying the Controller’s Automatic Failover Status*
- *Enabling Automatic Failover*

**Displaying the Controller’s Automatic Failover Status**

To display a controller’s automatic failover status, use the `controller show automatic_failover` command. In the following example, automatic failover is DISABLED:

```
AAC0> controller show automatic_failover
Executing: controller show automatic_failover
Automatic failover DISABLED
```
Enabling Automatic Failover

To enable automatic failover, use the `controller set automatic_failover` command with the `/failover` switch, as in the following example:

```
AAC0> controller set automatic_failover
/failover_enabled=TRUE
 Executing: controller set automatic_failover
/failover_enabled=TRUE
```

After running the `controller set automatic_failover` command, use the `controller show automatic_failover` command to verify that automatic failover has been enabled. If necessary, you can now replace a failed disk with a replacement disk.

Displaying Controller Information

Controllers exhibit a number of attributes that you can display or manage using the following CLI commands:

- **Controller List**
- **Controller Details**

**Controller List**

The `controller list` attributes are defined as follows:

- **Adapter Name**—Name
- **Adapter Type**—Product name
- **Controller Availability**—Access mode

**Example**

Before opening a controller, you may want to use the `controller list` command to display all controllers. In the following example, the **Adapter Name** column indicates that AAC0 is the name of the controller installed on the computer. The example also indicates the controller’s path (`\\`).

```
CLI> controller list
 Executing: controller list

 Adapter Name  Adapter Type  Availability
-----------  --------------  -------------
\\\AAC0  Adaptec xxxxx  read/write
```
Controller Details

The controller details attributes are defined as follows:

- **Controller Name**—Name
- **Controller Type**—Product name
- **Controller Availability**—Access mode
- **Controller Remote Computer**—Name of the remote computer on which an open controller resides
- **Controller Serial Number**—Last six hexadecimal characters of the serial number
- **Controller CPU Type**—CPU
- **Number of Channels**—Number of channels
- **Number of Devices Per Channel**—Maximum number of devices, not including the host controller
- **Controller CPU Speed**—Clock speed (in MHz)
- **Controller Memory**—Total amount of available memory for applications and data

**Example**

AAC0> controller details
Executing: controller details
Controller Information
----------------------
Remote Computer: .
Device Name: AAC0
Controller Type: Adaptec xxxxxx
Access Mode: READ-WRITE
Controller Serial Number: Last Six Digits = 8A277A
Number of Buses: 2
Devices per Bus: 15
Controller CPU: i960
Controller CPU Speed: 100 Mhz
Controller Memory: 64 Mbytes
Battery State: Not Present
Component Revisions
----------------------
CLI: 3.0-0 (Build #5478)
API: 3.0-0 (Build #5478)
Miniport Driver: 3.0-0 (Build #5478)
Controller Software: 3.0-0 (Build #5478)
Controller BIOS: 3.0-0 (Build #5478)
Controller Firmware: (Build #5478)
Controller Hardware: 3.3
Displaying Disk Information

The CLI allows you to monitor or manage disk attributes, prepare a disk for use by a controller, and detect defects using the following commands:

- **Disk List**
- **Disk Show Defects**
- **Disk Verify**

Disk List

The disk list attributes are defined as follows:

- **Device ID**—An ID number assigned to each device attached to a channel
- **Device Type**—Reports whether the device is a disk, printer, scanner, and so on
- **Removable Media**—Reports whether the media is removable (floppy disk or CD-ROM, for example)
- **Vendor ID**—Name of a device vendor
- **Product ID**—Device model number
- **Revision Number**—Device revision number
- **Number of Blocks**—Total number of disk block available on a device
- **Bytes per Block**—Number of bytes for each block
- **Disk Usage**—Either MS-DOS, Initialized, Not Initialized, Offline, or Unknown
- **Shared Channel**—N/A

Example

AAC0> disk list
Executing: disk list
C:ID:L Device Type Blocks Bytes/Block Usage Shared
-------- ----------- ----------- ----------- -------
0:01:0 Disk 17783240 512 Initialized NO
0:02:0 Disk 17783240 512 Initialized NO
**Command Line Interface**

**Disk Show Defects**

The `disk show defects` command shows the following types on information:

- Total number and location of primary defects (defects that originate during manufacturing)
- Total number and location of grown defects (defects that originate after manufacturing)

**Example**

In the example below, the drive contains five primary defects and no grown defects:

```
AAC0> disk show defects /full=true (0,1,0)
Executing: disk show defects /full=TRUE (CHANNEL=0,ID=1,LUN=0)
Number of PRIMARY defects on drive: 5
Defect 1 at cylinder 229, head 7, sector 203
Defect 2 at cylinder 575, head 0, sector 55
Defect 3 at cylinder 578, head 0, sector 238
Defect 4 at cylinder 579, head 0, sector 74
Number of GROWN defects on drive: 0
```

**Disk Verify**

The `disk verify` command shows the following types on information:

- Total number and location of primary defects (defects that originate during manufacturing)
- Total number and location of grown defects (defects that originate after manufacturing)

**Displaying Array Information**

The CLI allows you to display and manage array attributes using the following commands:

- **Container List**
- **Container Show Cache**

**Container List**

The `container list` attributes are defined as follows:

- Drive Letter—Letter associated with an array. Not automatically assigned when you create an array.
Command Line Interface

- **Root Special File** (Unix/Linux only)—File associated with the array and created by the OS after array creation. Appears in the Num Label column.
- **Array Number**—ID of an array (0 to 63).
- **Array Label**—Name assigned to an array. Not automatically assigned. Appears in the Num Label column.
- **Array Type**—Defines an array as a volume, RAID 0, RAID 1, etc., or a reconfigured array.
- **Creation Date**—Month, day, and year the array was created.
- **Creation Time**—Hour, minute, and second the array was created.
- **Total Size**—Number of bytes in an array. The size of an array is the size of the available space when the array was created, reconfigured, or extended.
- **Stripe Size**—Number of bytes in a stripe (amount of data written to a partition before the I/O data stream switches to the next partition/array).
- **Read Only**—Reports whether an array is read-only accessible. An array can be set to read-only if not in use by an application.
- **Read/write**—Reports whether an array is read-write accessible.
- **Lock**—Reports whether an array is locked into volatile memory space on the currently open controller.
- **Resident File System**—Type of file system, if any, that resides on an array. Appears in the Usage column.
- **Multipartition Container**—That a file system resides on a multipartition array. Appears in the Usage column.
- **UNIX opened**—There is a mounted file system on the array.
- **Unknown File System**—There is an unknown file system on the array.
- **Unmapped Containers**—The array is unusable and cannot be mounted.
- **Phantom Container**—The RAID controller software cannot configure the array or the array is offline.
- **Valid Container**—The OS recognized the array and there has been a query (such as mount, fdisk, read, or write) on the array.
Command Line Interface

- Mirror Set Create—Creation of a RAID 1 (mirror).
- Mirror Set Normal—The RAID 1 is in the normal state.
- Reconfiguration Copy Container—An array is being used as a copy (hidden) array (Copy).
- Reconfiguration Destination Container—An array is being used as a destination (hidden) array (Dest).
- Reconfiguration RAID 5 Set—An array is being used as a RAID 5 (hidden array).
- Reconfiguration Source Container—An array is being used as a source (hidden) array.
- Reconfiguration Temporary Container—An array is being used as a temporary (or hidden) array (Temp).
- RAID 5 Set Unprotected—Creation of a RAID 5 (Unprot).

Example
AAC0> container list
Executing: container list
<table>
<thead>
<tr>
<th>Total</th>
<th>Oth</th>
<th>Stripe</th>
<th>Scsi</th>
<th>Partition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Volume</td>
<td>30MB</td>
<td>None</td>
<td>0:01:0</td>
</tr>
</tbody>
</table>

Container Show Cache

The container show cache attributes are defined as follows:

- Global Container Read Cache Size—Number of blocks dedicated to the read cache.
- Global Container Write Cache Size—Number of blocks dedicated to the write cache.
- Read Cache Setting—Reports whether the read cache is enabled.

Example
AAC0> container show cache 0
Executing: container show cache 0
Global container Read Cache Size : 5345280
Global container Write Cache Size : 63332352
Read Cache Setting : ENABLE
Write Cache Setting : ENABLE
Write Cache Status : Active, cache enabled
CLI Command Dictionary

This section contains a command reference for the following command groupings:

- General Control Commands
- Container (Array) Commands
- Controller Commands
- Disk Commands
- Logfile Commands
- Task Commands
- Enclosure Commands

General Control Commands

close
  Closes the currently opened controller.

exit
  Closes the opened controller and exits the CLI.

help [/full] [{command}]
  Invokes general or topical help.
  
  **Parameters**
  
  `{command}`—If a command has more subcommands, help lists the subcommands and their functions. If a complete command is used, such as container list, the help displays all possible switches.
  
  **Switches**
  
  `/full`—Displays all relevant commands along with the command format and all command switches.

history_size {buffer_size}
  **Linux/Unix only**—Sets the size of the history buffer.
  
  **Parameters**
  
  `{buffer_size}`—Size of the command history buffer. The default is 200.
Command Line Interface

open [/readonly={boolean}] [/domain={string}] {name}

Opens a controller, a prerequisite for any controller command to be used on that controller.

Parameters
{name}—Computer name and the controller to open.

Switches
/readonly—If TRUE, the controller is opened for read-only access. (The default is FALSE.) If you open a controller with read-only access, you can use only those commands that do not change the controller configuration.
/domain (Windows only)—Local or trusted domain in which the host system resides. The default is the local domain.

reset_window

Linux/Unix only—Resets the window.

Container (Array) Commands

Before working with arrays, you must have previously opened the controller. In addition, you must have initialized your disks to prepare for array operations.

Use the Container commands to display, create, and manage arrays.

container add_level {container}

Creates a multilevel volume array which contains the array as its only element.

Parameters
{container}—ID number of the array to convert to a multilevel volume.

container clear [/always={boolean}] [/wait={boolean}] {container}

Clears the array.

Parameters
{container}—ID number of the array to clear.
Command Line Interface

Switches
/always—Specifies whether to clear the array even if it has data on it. The default is FALSE, meaning that the command clears the array only if it has no data on it. All user files must be closed; the /always switch cannot override this restriction.

/wait—If FALSE (the default), the operation is performed in the background and the command prompt is returned immediately. If TRUE, the operation is performed immediately and the command prompt is returned only when done.

container create mirror [/wait={boolean}]
[/io_delay={integer}] {container} {device_ID}

Creates a RAID 1 from a single entry volume.

Parameters
{container}—ID number of the array on which to create a RAID 1 (mirror).
{device_ID}—ID for the device whose available space to use for mirroring the volume is specified by the {container} parameter.

Switches
/wait—If FALSE (the default), the operation is performed in the background and the command prompt is returned immediately. If TRUE, the operation is performed immediately and the command prompt is returned only when done.
/io_delay—Number of milliseconds between each I/O used for the RAID 1 creation.

container create mmirror [/io_delay={integer}]
[/wait={boolean}] {container} {device_ID} [{device_ID}...]

Creates a multilevel array of RAID 1 arrays from a multilevel array of single entry volumes.

Parameters
{container}—ID number of the array whose underlying volumes the command converts to RAID 1 arrays.
{device_ID}—ID for the device whose available space to be used to create the multilevel array of RAID 1 arrays.
Command Line Interface

Switches
/io_delay—Number of milliseconds between each I/O used for the RAID 1 create.
/wait— If FALSE (the default), the operation is performed in the background and the command prompt is returned immediately. If TRUE, the operation is performed immediately and the command prompt is returned only when done.

container create mstripe [/stripe_size={integer}] [/label={string}] {container} [{container}...]
Creates a multilevel RAID 0 (stripe).

Parameters
{container}—ID number of the array from which to create the multilevel RAID 0.

Switches
/stripe_size—Stripe size for the RAID 0 array.
/label—Label for the RAID 0 array.

container create mvolume {container} [{container}...]
Creates a multilevel volume.

Parameters
{container}—ID number of the array from which to create the multilevel volume.

carrier create new_mirror [/cache={boolean}] [/clear={boolean}] [/label={string}] [/quick_init={boolean}] [/scrub={boolean}] [/wait={boolean}] {free_space} [{device_ID}...]
Creates a RAID 1 (mirror) from two available spaces.

Note: For details, see container create raid5 below.
container create raid5 [/cache={boolean}]
    [/stripe_size={integer}] [/clear={boolean}]
    [/label={string}] [/quick_init={boolean}]
    [/scrub={boolean}] [/wait={boolean}] {free_space}
    [{device_ID}...]

Creates a RAID 5.

Parameters

{free_space}—Drive and its associated available space used to create the array.

{device_ID}—One or more devices whose available space to be used to create the array.

Switches

/cache—Specifies whether to enable the array’s cache.

/stripe_size—Stripe size for the RAID 5 array.

/clear—Specifies whether to clear the entire array during initialization.

/label—Label to assign to the newly created array.

/quick_init—Specifies to use the Quick Init process, making the array available immediately.

/scrub—Specifies whether to set up the parity by building.

/wait—If FALSE (the default), the operation is performed in the background and the command prompt is returned immediately. If TRUE, the operation is performed immediately and the command prompt is returned only when done.

container create stripe [/cache={boolean}]
    [/stripe_size={integer}] [/label={string}]
    {free_space} [{device_ID}...]

Creates a RAID 0.

Parameters

{free_space}—Drive and its associated available space to be used to create the RAID 0.

{device_ID}—One or more devices.
Command Line Interface

Switches
/cache—Specifies whether to enable caching on the array.
/stripe_size—Stripe size for the RAID 0. The default is 64 KB.
/label—Label to assign to the new RAID 0.

container create volume [/cache={boolean}]
[/label={string}] {device_ID}, {free_space},
{device_ID}, [{free_space}...]
Creates a volume.

Parameters
{device_ID}—Drive and its associated available space to be used to create the volume.
{free_space}—Available space to be used to create the volume.
{device_ID}, {free_space}—Additional devices and associated available spaces.

Switches
/cache—Specifies whether to enable caching on the array.
/label—Label to assign to the new volume.

container delete [/always={boolean}]
[/unconditional={boolean}] {container}
Deletes the array.

Parameters
{container}—ID number of the array to delete.

Switches
/always—Specifies that the array be deleted if it has data a file system. (Cannot override open files.)
/unconditional—Specifies that the array be deleted even if it has a file system. (Overrides open files.)
**Command Line Interface**

```
container list [/all={boolean}] [/full={boolean}] [{container}]
```

Lists information about the arrays on the controller.

**Parameters**

- `{container}`—ID number of the array containing information to display.

**Switches**

- `/all`—Specifies whether to list all containers on the system.
- `/full`—Specifies whether to display detailed information.

```
container move {container1} {container2}
```

Moves the first array number specified to the second array number specified; in effect, to renumber an array.

**Parameters**

- `{container1}`—ID number of the array to renumber.
- `{container2}`—ID number to assign to the array specified in `{container1}`.

```
container promote {container}
```

Creates a multilevel volume from a RAID 0 or a single entry volume.

**Parameters**

- `{container}`—ID number of the array to promote to a multilevel array.

```
container readonly {container}
```

Sets the protection on the array to read-only access.

**Parameters**

- `{container}`—ID number of the array to set to read-only access.

```
container readwrite {container}
```

Sets the protection on an array to read-write access.
**Command Line Interface**

**Parameters**

{container}—ID number of the array to set to read-write access.

container reconfigure [/stripe_size={integer}] [/mirror={boolean}] [/partition_move={boolean}] [/partition_size={integer}] [/raid5={boolean}] [/raid10={boolean}] [/restart={boolean}] [/stripe={boolean}] [/volume={boolean}] [/wait={boolean}] {container} {device_ID}...

Changes the configuration of an array.

**Parameters**

{container}—ID number of the array to reconfigure.

{device_ID}—One or more devices.

**Switches**

/stripe_size—Stripe size of the array.

/mirror—Reconfigure the array as a RAID 1.

/partition_move—Specifies that the array will move partitions instead of add extra space.

/partition_size—Size of a partition.

/raid5—Reconfigure the array as a RAID 5.

/raid10—Reconfigure the array as a RAID 10 (stripe of mirrors).

/restart—Restart reconfiguring the array.

/stripe—Reconfigure the array as a RAID 1.

/volume—Reconfigure the array as a volume.

/wait—If FALSE (the default), the operation is performed in the background and the command prompt is returned immediately. If TRUE, the operation is performed immediately and the command prompt is returned only when done.

container remove failover {container} {device_ID} {device_ID}...

Removes one or more failover disks.
Command Line Interface

Parameters
{container}—ID number of the array whose assigned failover disk is to be removed.
{device_ID}—ID for the device to remove as a failover disks.

container remove global_failover {device_ID}
[{device_ID}...]
Removes a global failover assignment.

Parameters
{device_ID}—ID for the device to remove as a failover disk.

container restore RAID5 {container}
Tries to restore a RAID 5 that has a number of dead partitions as members.

Parameters
{container}—ID number of the RAID 5 to restore.

container scrub [/io_delay={integer}]
[/no_repair={boolean}] [/wait={boolean}] {container}
Checks and repairs the consistency of a redundant array.

Parameters
{container}—ID number of the redundant array to build.

Switches
/io_delay—Number of milliseconds the controller waits between I/Os when building the array.
/no_repair—Specifies whether the build operation be performed without repairing the error.
/wait—If FALSE (the default), the operation is performed in the background and the command prompt is returned immediately. If TRUE, the operation is performed immediately and the command prompt is returned only when done.
Command Line Interface

container set cache [/read_cache_enable={boolean}] [/unprotected={boolean}] [/write_cache_enable={boolean}] {container}

Sets cache parameters for a specific array. Useful only if a native OS’s file system resides on the array.

Parameters
{container}—ID number of the array on which to set cache parameters.

Switches
/read_cache_enable—Specifies whether to enable the read-ahead cache.
/unprotected—Specifies whether to set the container's NVRAM write-back cache to disable, enable when protected, or enable always. Use this switch in conjunction with the /write_cache_enable switch.
/write_cache_enable—Specifies whether to set the container's NVRAM write-back cache to disable, enable when protected, or enable always. Use this switch in conjunction with the /unprotected switch.

container set failover {container} {device_ID} [{device_ID}...]

Assigns an automatic failover disk for a single array.

Parameters
{container}—ID number of the array on which to assign an automatic failover disks.
{device_ID}—ID for the device to assign as a failover disk.

container set global_failover {device_ID} [{device_ID}...]

Assigns an automatic failover disk for all arrays.

Parameters
{device_ID}—ID for the device to assign as a failover disk.

container set io_delay {container} {integer}

Sets the I/O delay (in milliseconds).
Command Line Interface

**Parameters**

container set label {container} {label}
Assigns a new label to the array.

**Parameters**

{container}—ID number of the array to which to assign a label.
{label}—Specifies the label to assign.

container show cache {container}
Displays caching parameters for an array.

**Parameters**

{container}—ID number of the array whose associated cache parameters to display.

container show failover [{container}]
Displays an array’s assigned failover disks.

**Parameters**

{container}—ID number of the array whose assigned failover disks to display.

container unmirror {container}
Changes the RAID 1 (mirror) to a volume and frees the redundant space.

**Parameters**

{container}—ID number of the RAID 1 to unmirror.

**Controller Commands**

Use the Controller commands to display the status of a variety of controller attributes and to perform such tasks as pausing or resuming I/O, and enabling or disabling automatic failover.
controller details

Shows details about the open controller and software.

ccontroller firmware compare [/C{controller}]

[controller]... [/D{UFI_file_path}]

Compares the contents of each of the flash components on a
ccontroller to the corresponding image in User Flash Image (UFI)
files and indicates whether they match.

Switches
/C{controller}—ID representing the set of controllers on
which to perform the firmware comparison.
/D{UFI_file_path}—Location of the UFI files.

ccontroller firmware save [/C{controller}]

[controller]... [/D{UFI_file_path}]

Saves the contents of a controller’s flash in User Flash Image
(UFI) files.

Switches
/C{controller}—ID representing the set of controllers on
which to perform the firmware comparison.
/D{UFI_file_path}—Location of the UFI files.

Note: This command is not supported in Linux.

ccontroller firmware update [/C{controller}]

[controller]... [/D{UFI_file_path}]

Updates a controller’s flash components from the flash image
data in a pair of User Flash Image (UFI) files.

Switches
/C{controller}—ID representing the set of controllers on
which to perform the firmware comparison.
/D{UFI_file_path}—Path where the pair of UFI files are
located.
controller list [/domain={string}] [{string}]

Lists all controllers or displays information about the currently opened controller.

Parameters
{name}—Computer name from which to display all controllers or specific information about the open controller.

Switches
/domain (Windows only)—Specifies the domain in which the host to be searched resides.

ccontroller pause_io [{integer}]

Windows only—Pauses all I/O activity on the open controller to allow online manipulation of hardware.

Parameters
{integer}—Time in seconds to cause the controller to wait before resuming I/O.

ccontroller rescan

Rescans the channels and updates all underlying structures.

ccontroller reset_channel {integer}

Resets a specific channel on the open controller.

Parameters
{integer}—Channel on which to reset this channel.

ccontroller resume_io

Performs rescan operation, then resumes I/O after pause_io.

ccontroller set automatic_failover [/failover_enabled={boolean}]

Turns on or off automatic failover for the controller.

Switches
/failover_enabled—Specifies whether to turn on or off automatic failover on the controller. Specify 1 to enable, 0 to disable. The default is 0.
Command Line Interface

controller set container_verify [/verify_enabled={boolean}]
   Turns the container verify task on or off.
   **Switches**
   /verify_enabled—Specifies whether to turn on or off the container verify feature. The default is TRUE, which means the command turns on the container verify feature.

controller show automatic_failover
   Displays the automatic failover status (enabled or disabled) for the controller.

controller show channels
   Displays all of the channels on the controller with the characteristics of each channel.

controller show container_verify
   Displays the status of the container verify status.

Disk Commands

Use the disk commands to manage disks connected to a RAID controller. The CLI allows you to monitor disk characteristics and parameters, prepare a disk for use, and detect defects.

disk blink {device_ID} {integer}
   Causes the disk access light to blink.
   **Parameters**
   {device_ID}—ID number of the device to blink.
   {integer}—Number of seconds for the disk to blink. A value of zero stops the blinking.

disk initialize [/always={boolean}] [/unconditional={boolean}] {device_ID}
   Initializes a disk on the currently opened controller.
   **Parameters**
   {device_ID}—ID number of the device to initialize,
Command Line Interface

Switches
/always—Specifies whether to initialize the disk even if the disk has existing data. (Cannot override open files.) The default is FALSE.

/unconditional—Specifies whether to initialize the disk even if arrays on the disk have open files. The default is FALSE.

disk list [/all={boolean}] [/full={boolean}] [{device_ID}]
Lists the disks available on the controller.

Parameters
{device_ID}—ID number of the device to display information.

Switches
/all—List of all devices on the controller.
/full—Detailed information for devices. The default is FALSE.

disk remove dead_partitions {device_ID}
Removes all failed partitions from a disk.

Parameters
{device_ID}—ID number of the device from which to remove failed partitions.

disk set default {device_ID}
Sets the default ID for use in CLI commands.

Parameters
{device_ID}—ID number of the device.

disk set smart [/all={boolean}] [/clear={boolean}]
[/enable_exceptions={boolean}] [/logerr={boolean}]
[/perf={boolean}] [/report_count={boolean}]
[{device_ID}]
Changes a disk’s Self-Monitoring, Analysis and Reporting Technology (SMART) configuration.

Parameters
{device_ID}—ID number of the device on which to change SMART configurations.
Switches

/all—Specifies whether to enable SMART configurations for all disks.

/clear—Clears the SMART error counts for the disk.

/enable_exceptions—Specifies whether to enable SMART exception reporting.

/logerr—If FALSE (the default), logging of SMART exception reports is disabled. If TRUE, logging of SMART exception reports is enabled.

/perf—If FALSE (the default), reporting of exceptions according to the MRIE mode is disabled. If TRUE, reporting of exceptions according to the MRIE mode is enabled.

/report_count—Number of times an exception can be reported. A value of zero indicates no limit.

disk show default

Displays the current default for the device ID.

disk show defects [/full={boolean}] {device_ID}

Shows the number of defects and the defect list for a specific drive.

Parameters

{device_ID}—ID number of the device.

Switches

/full—Specifies whether to display the defect count and defects.

disk show partition

Displays all partitions on the disks attached to the currently opened controller.

disk show smart [/all={boolean}] [/full={boolean}]

[/view_changeable={boolean}] {device_ID}

Displays Self-Monitoring, Analysis and Reporting Technology (SMART) configuration information for one or all disks.
Command Line Interface

**Parameters**

=device_ID—ID number of the device for which to display SMART information.

**Switches**

=all—Specifies whether to display SMART configurations for all disks.

/full—Specifies whether to display detailed SMART configuration information for one or all disks.

/view_changeable—Specifies whether to display the configuration information that can be set on a SMART disk.

disk show space [/all={boolean}] {{device_ID}}

Displays space usage information.

**Parameters**

=device_ID—ID number of the device for which to display space usage information.

**Switches**

=all—Specifies whether to display all space usage.

disk verify [/repair={boolean}] [/wait={boolean}] {device_ID}

Verifies all blocks on a device and, optionally, repairs any bad blocks.

**Parameters**

=device_ID—ID number of the device to verify.

**Switches**

=repair—If FALSE (the default), the command only reports failures. If TRUE, bad blocks are automatically repaired, if possible.

=wait—If FALSE (the default), the operation is performed in the background and the command prompt is returned immediately. If TRUE, the operation is performed immediately and the command prompt is returned only when done.
Command Line Interface

disk zero [/repair={boolean}] [/wait={boolean}] {device_ID}

Clears an entire disk (by writing zeros). All data is erased and cannot be recovered.

Parameters
{device_ID}—ID number of the device to clear.

Switches
/repair—If FALSE (the default), the command only reports failures. If TRUE, bad blocks are automatically repaired, if possible.
/wait—If FALSE (the default), the operation is performed in the background and the command prompt is returned immediately. If TRUE, the operation is performed immediately and the command prompt is returned only when done.

Logfile Commands

logfile end

Enters logging of all output and closes the log file.

logfile start [/append={boolean}] {file}

Begins logging of all CLI command line activity to a file.

Parameters
{file}—Name of log file.

Switches
/append—Specifies whether to append all CLI command line activity to an existing output file if one exists.

Task Commands

Use the CLI commands to display and manage tasks. A task is an operation that occurs only on the controller, asynchronous to all other operations. Examples of tasks are clearing a disk and creating a RAID 1. Once a task is running on the controller, the CLI allows you to display, stop, suspend, and resume the task.
Command Line Interface

**task list [/all={boolean}] [{integer}]**

Lists the tasks running on the controller.

**Parameters**

{integer}—Task ID.

**Switches**

/all—Specifies whether to list all currently running tasks.

**task resume [/all={boolean}] {integer}**

Resumes a task that was suspended or all of the tasks that were suspended.

**Parameters**

{integer}—Task ID for the task to resume.

**Switches**

/all—Specifies whether to resume all suspended tasks.

**task stop [/all={boolean}] [{integer}]**

Stops one or all tasks on the controller.

**Parameters**

{integer}—Task ID for the task to stop.

**Switches**

/all—Specifies whether to stop all suspended tasks.

**task suspend [/all={boolean}] [{integer}]**

Suspends one or all tasks running on the controller.

**Parameters**

{integer}—Task ID for the task to suspend.

**Switches**

/all—Specifies whether to suspend all running tasks.
Enclosure Commands

Note: You can use the enclosure commands only with enclosures that support Version 1.0 of the SAF-TE specification.

enclosure activate slot {enclosure} {slot}
Activates a device in a slot in the SAF-TE enclosure.

Parameters
{enclosure}—ID number of the enclosure management device on which to activate a device.
{slot}—Unit number of the slot.

closure identify slot [/stop={boolean}] {enclosure} {slot}
Identifies a device in the enclosure.

Parameters
{enclosure}—ID number of the enclosure management device on which to identify a slot.
{slot}—Unit number of the slot.

Switches
/stop—Specifies whether to stop identifying the slot.

closure list [/all={boolean}] [/full={boolean}] [{enclosure}]
Lists components for one or all enclosure devices.

Parameters
{enclosure}—ID number of the enclosure management device whose associated components to display.

Switches
/all—Lists all enclosures on the system.
/full—Displays detailed component information.

closure prepare slot {enclosure} {slot}
Prepares a device in a slot for insertion or removal.
Command Line Interface

enclosure set alarm [/on={boolean}] {enclosure}

Turns the audible alarm on or off.

Parameters
{enclosure}—ID number of the enclosure management device whose audible alarm to set.

Switches
/on—Specifies whether to turn the audible alarm on or off.

enclosure set fan [/off={boolean}] {enclosure} {fan} [{speed}]

Sets the speed of a specific fan.

Parameters
{enclosure}—ID number of the enclosure management device on which to set the speed of a fan.
{fan}—Unit number of the fan.
{speed}—Speed at which to set the fan.

Switches
/off—Specifies whether to turn off the fan.

enclosure set interval {second}

Sets the monitor reporting interval (in seconds).

Parameters
{second}—Number of seconds for the monitor reporting interval.

enclosure set power [/off={boolean}] {enclosure} {powersupply}

Turns on or off a specific power supply.
Command Line Interface

Parameters
{enclosure}—ID number of the enclosure management device.
{powersupply}—Unit number of the power supply.

Switches
/off—Specifies whether to turn on or off the power supply of the unit number.

enclosure set scsiid {enclosure} {slot} {device_ID}
Sets the ID number of the device slot.

Parameters
{enclosure}—ID number of the enclosure management device.
{slot}—Unit number of the device slot to assign a channel number.
{device_ID}—ID number of the device.

enclosure set temperature {enclosure} {degree}
Sets the temperature threshold.

Parameters
{enclosure}—ID number of the enclosure management device on which to set a temperature threshold.
{degree}—Temperature (in degrees Fahrenheit from 0 to 255).

enclosure show fan [{enclosure}] [{fan}]
Displays the status of a specific fan.

Parameters
{enclosure}—ID number of the enclosure management device for which to display fan status.
{fan}—Unit number of the fan.

enclosure show power [{enclosure}] [{powersupply}]
Displays the status of one or more power supplies.
Command Line Interface

Parameters
{enclosure}—ID number of the enclosure management device for which to display power supply status.
{powersupply}—Unit number of the power supply.

enclosure show slot [{enclosure}] [{slot}]
Displays the status of a specific device slot on a specific enclosure.

Parameters
{enclosure}—ID number of the enclosure management device for which to display device slot status.
{slot}—Unit number of the device slot whose status to display.

closure show status [{enclosure}]
Displays general status of a specific enclosure.

Parameters
{enclosure}—ID number of the enclosure management device for which to display status.

closure show temperature [{enclosure}] [{sensor}]
Displays temperature status of a specific enclosure.

Parameters
{enclosure}—ID number of the enclosure management device for which to temperature status.
{sensor}—Unit number of the temperature sensor whose status to display.
Using Automated Command Scripts

To execute a CLI command script, type the at sign (@), followed by the filename that contains the CLI commands, for example:

AAC0>@commandscript.txt

In a CLI command script text file, each line ends with a line feed inserted by pressing Enter.

Example

open AAC0
controller details
close AAC0
exit

The above CLI command script:

1. Opens controller AAC0 by invoking the CLI command open.
2. Invokes controller details.
3. Closes controller AAC0 by invoking the CLI command close.
4. Exits the script.
About RAID

A RAID (Redundant Array of Independent Disks) provides better performance and reliability from combinations of drives than is possible with the same total storage space without RAID.

This Appendix describes the various RAID levels supported by Adaptec RAID controllers.

The table below shows the number of drives needed and supported for your controller according to RAID level.

<table>
<thead>
<tr>
<th>Array Type</th>
<th>Maximum Drives Supported / Minimum Drives Required for Adaptec Controller Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAID 0</td>
<td>4 / 2 8 / 2 15 / 2 16 / 2 16 / 2 30 / 2</td>
</tr>
<tr>
<td>RAID 1</td>
<td>2 / 2 2 / 2 2 / 2 2 / 2 2 / 2 2 / 2</td>
</tr>
<tr>
<td>RAID 5</td>
<td>4 / 3 8 / 3 15 / 3 16 / 3 16 / 3 16 / 3</td>
</tr>
<tr>
<td>RAID 10</td>
<td>4 / 4 8 / 4 14 / 4 16 / 4 16 / 4 30 / 4</td>
</tr>
<tr>
<td>RAID 50</td>
<td>N/A 8 / 6 15 / 6 16 / 6 16 / 6 30 / 6</td>
</tr>
</tbody>
</table>

⚠️ **Note:** Select RAID drives of equal capacity and performance. Otherwise, the RAID tends to be limited in capacity and performance to that of the smallest and slowest drive.

Simple Volume

A simple volume consists of a single drive.
**About RAID**

**Spanned Volume**

A spanned volume is created by joining, or concatenating, two or more drives. The drives do not have to be of equal capacity and are connected end-to-end. A spanned volume offers no redundancy and no performance advantage over a single drive.

**RAID 0**

A RAID 0 is created by striping data across two or more drives. This striping scheme creates no redundancy to protect the data. However, because the drives share load equally, RAID 0 provides the best read and write performance of any RAID type.

An example of a RAID 0 array is shown below.

![RAID 0 Diagram](image)

**RAID 1**

A RAID 1 array is created by copying, or mirroring, all data from one drive onto a second drive. This mirroring provides redundancy, ensuring that if one drive fails no data is lost. Redundancy also means that only half of the total capacity is available.
RAID 1 offers no write performance advantage over a simple volume configuration. However, because the drives share read load equally, RAID 1 provides improved read performance. An example of a RAID 1 array is shown below.

**RAID 5**

This RAID type requires at least three drives. Like RAID 0, data is striped across the drives. However, in RAID 5, parity is stored separately from data, and occupies the equivalent of one drive. The controller generates parity every time data is written to the array, and it is distributed in stripes across all the drives.

In the event of a drive failure, the contents of the failed drive can be rebuilt from the data and parity on the remaining drives.
Using parity minimizes the storage cost of redundancy. Because only one drive is used to store parity, a three-drive array, which is the worst case, uses only one-third of the total capacity for redundancy. In larger arrays, the storage cost of redundancy decreases proportionately.

RAID 5 write performance is limited by the need to generate parity data for every write. Read performance is good because the load is spread equally across all the drives.

**RAID 10**

This dual-level RAID type is created by using two or more equal-sized RAID 1 arrays to create a RAID 0. Both read and write performance are improved due to array striping. However, the performance improvement costs additional storage space due to the mirroring of the arrays.
About RAID

RAID 50

This dual-level RAID type is created by using two or more equal-sized RAID 5 arrays to create a RAID 0. The top level RAID 0 shares the load among the second-level RAID 5s, improving both read and write performance. Parity, used in the second level RAID 5s, provides efficient redundancy.

Note: Adaptec 2410SA does not support RAID 50.
About SCSI

In this Appendix...

- **SCSI Device Support**
- **Setting SCSI IDs**
- **Changing SCSI Termination on the Controller**
- **Enabling CD Drive Support**
- **Mixing SE Devices with LVD Devices**

## SCSI Device Support

The SCSI RAID controller is designed to work with Ultra320 SCSI hard drives. Although the controller also works with Ultra2 or higher SCSI drives and peripherals, performance is reduced. Adaptec does not recommend using SCSI devices older than Ultra2.

<table>
<thead>
<tr>
<th>Operating Systems</th>
<th>Devices Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>Ultra2 and faster SCSI drives</td>
</tr>
<tr>
<td>All except Linux</td>
<td>Tape, CD-ROM, CD-RW, and magneto-optical drives and jukeboxes.</td>
</tr>
</tbody>
</table>

⚠️ **Caution**: HVD devices are not supported and will damage your controller.
About SCSI

See *Mixing SE Devices with LVD Devices* on page F-3 for more details.

**Setting SCSI IDs**

For each controller channel, the SCSI IDs of the devices must be unique numbers between 0 and 15. The controller, itself a SCSI device, is usually set to ID 7 by default. SE drives usually support IDs between 0 and 6.

SCSI enclosures that use SCSI drives with 80-pin SCA connectors typically assign the drive ID automatically when the drive is inserted. You don’t need to set device IDs with such enclosures unless your enclosure requires it. For details, refer to the enclosure User’s Guide.

The RAID controller ID can be changed to any ID from 0 through 7 using the ARC utility.

**Note:** Do not change the controller ID unless the change is absolutely necessary.

**Changing SCSI Termination on the Controller**

The default termination for the controller is *Auto Mode* and you will probably never need to change this setting. However, if you do need to change the termination, you can use the SCSelect Controller SCSI Channel Termination option to change the setting to *Disabled*. For details, see page A-12.

All these SCSI controllers support multimode SCSI termination.

**Enabling CD Drive Support**

**Note:** Adaptec SCSI RAID controllers do not support CD drives in Linux systems.

If you attached a CD drive to the controller, you need to configure the controller BIOS as follows to make the CD drive work:

1. While the system is starting, press **Ctrl-A** when the controller displays its message on the screen.
About SCSI

2 Select SCSISelect Utility, then select Controller Configuration.
3 Using the arrow keys, enable CD-ROM Boot Support and Removable Media Devices Support.
4 Press Esc until the Reboot window appears.
5 Restart the computer.

Mixing SE Devices with LVD Devices
If you are mixing SE devices with LVD devices:

■ Ensure proper termination by using a cable (like the one in the kit) with a built-in multimode terminator and appropriate device adapters.
■ Disable device termination on all SE devices.
■ Put LVD and SE devices on separate channels for best performance.

⚠️ Note: If SE and Ultra320 devices are used together on the same channel, the performance of the Ultra320 devices is reduced to SE performance levels.
Controller Illustrations

This Appendix shows the Adaptec RAID controllers.

Adaptec 2020SA/2020ZCR Component Layout
Controller Illustrations

Adaptec 2025SA/2025ZCR Component Layout

Adaptec SCSI RAID 2120S Component Layout
Controller Illustrations

Adaptec SCSI RAID 2130SLP Component Layout

- Internal high-density SCSI connector
- Battery connector
- External VHDCI SCSI connector
- Low-profile bracket
- PCI-X connector

Adaptec SCSI RAID 2200S Component Layout

- Internal high-density SCSI connectors
- Battery connector
- External VHDCI SCSI connectors
- PCI connector
- Low-profile bracket
Controller Illustrations

Adaptec SCSI RAID 2230SLP Component Layout

- Internal high-density SCSI connectors
- Battery connector
- External VHDCI SCSI connectors
- Low-profile bracket
- PCI-X connector

Adaptec SCSI RAID 2230SLP Component Layout
Controller Illustrations

Adaptec SATA RAID 2410SA Component Layout

Adaptec SATA RAID 2410SA Port Numbers
Controller Illustrations

Adaptec SATA RAID 2810SA Component Layout

Adaptec SATA RAID 2810SA Port Numbers
Controller Illustrations

Adaptec SATA RAID 21610SA Component Layout

Adaptec SATA RAID 21610SA Port Numbers
Specifications

Environmental Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature without battery module</td>
<td>0 °C to 50 °C</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>10% to 90%, noncondensing</td>
</tr>
<tr>
<td>Altitude</td>
<td>up to 3,000 meters</td>
</tr>
</tbody>
</table>

⚠️ **Note:** Forced airflow is recommended, but not required.

DC Power Requirements

<table>
<thead>
<tr>
<th>Specification</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ripple and noise</td>
<td>50 mV peak-to-peak (max)</td>
</tr>
<tr>
<td>DC Voltage</td>
<td>5 V ± 0.5 V</td>
</tr>
</tbody>
</table>

Current Requirements

<table>
<thead>
<tr>
<th>Adaptec Model</th>
<th>Maximum Current (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020SA/2020ZCR/2025SA/2025ZCR</td>
<td>1.5 A @ 3.3 VDC; 0.75 A @ 5 VDC</td>
</tr>
<tr>
<td>2120S</td>
<td>2.50 A</td>
</tr>
<tr>
<td>2130SLP/2230SLP</td>
<td>2.5 A @ 3.3 VDC; 2 A @ 5 VDC</td>
</tr>
<tr>
<td>2200S</td>
<td>2.72 A</td>
</tr>
<tr>
<td>2410SA</td>
<td>1 A</td>
</tr>
<tr>
<td>2810SA</td>
<td>2.1 A @ 5 VDC</td>
</tr>
<tr>
<td>21610SA</td>
<td>3.5 A @ 5 VDC</td>
</tr>
</tbody>
</table>
A

activity
See task.

ACU
Array Configuration Utility. Used to create, configure, and manage arrays from the controller’s BIOS or MS-DOS.

array
A logical disk created from available space and made up of one or more partitions on one or more physical disks. Arrays are typically used to provide data redundancy or enhanced I/O performance. See also container, volume, spanned volume, and RAID signature.

Also known as a container.

array initialization
See initialize.

available space/partition
Unused space on an initialized disk from which logical devices (arrays) are created. When an array is deleted, the space that it used is returned to the available space pool.

B

background consistency check
Consistency check performed as a background process. See also consistency check command.

bad partition
Partition that is in an unknown state.
**bootable array**
Array configured as the boot device.

**build**
Background initialization of a redundant array. The array is accessible throughout. RAID 1 copies the contents of the primary drive to a secondary drive. See also *clear*.

**bus**
See *channel*.

**C**

**cache**
Fast-access memory on the controller that serves as intermediate storage for data that is read from, or written to, drives.

**capacity**
Total usable space available in megabytes or gigabytes.

**channel**
Any path, or *bus*, used for the transfer of data between storage devices and a RAID controller.

**chunk**
See *stripe*.

**clear**
Foreground initialization of a fault-tolerant array. A *clear* operation zeros all blocks of the array. The array is not accessible until the clear task is complete.

**concatenation**
Joining of physical or logical drives in sequential order.
**consistency check command**

The controller continuously performs a verification on a redundant array to data integrity. In the case of RAID 1 or 10, consistency checks assure that the data between like blocks match. In the case of a RAID 5, consistency checks assure that data in the stripe and the calculated parity for the stripe match.

**container**

See array.

**D**

**dead partition**

See failed.

**degraded**

A redundant (for example, a RAID 1) array in which one or more members have failed. The data is intact but redundancy has been compromised. Any further failure would cause the array to fail and result in data loss.

**dirty data**

Data that has been written to a cache, but which has not been “flushed” out to its final destination.

**disk**

A nonremovable platter in a hard drive, or removable media used in a CD drive, floppy disk drive, or Zip drive. See also disk ID, drive, and hard disk, hard drive.

**disk ID**

Unique disk identifier that consists of the channel number, ID, and LUN (channel:ID:LUN), for example, 1:04:0. See also channel.

**drive**

Device used for storing data. May contain one or more removable or nonremovable, writable or read only media. See also hard disk, hard drive.
drive LED
Indicator light that illuminates during read or write operations.

event
Notification or alert from the system, indicating that a change has occurred.

event log
File used to maintain information about prior controller activities or errors.

event notification
Process for transmitting events.

failed
State of a non-redundant array that has suffered a single drive failure, or a redundant array that has suffered multiple drive failures. A failed array is inaccessible and data is lost.

failed partition
A partition that is no longer usable by an array because it is either logically bad and therefore no longer needed, or physically damaged.

failover drive
See hotspare.

fault-tolerant array
Refers to an array that can continue to function after a disk drive failure without loss of data. See also redundant.

foreign disk
Disk that has previously been initialized on another Adaptec RAID controller. The RAID signature on the disk allows the RAID controller to identify whether or not the disk was initialized on the controller it is currently connected to.
free space/partition
See available space/partition.

hard disk, hard drive
Basic unit of nonvolatile, nonremovable, magnetic storage media. See also drive.

hot swap
To remove a component from a system and install a new component while the power is on and the system is running.

hotspare
A hard drive, an array member, that is not used in day-to-day data storage but, instead, is reserved for use as a replacement for one of the other drives in the array in the event of a failure.

impacted
An impacted array is one which has been created, but for some reason the initial build operation did not complete. All member drives are present and operational, and all data written to the array is protected. To optimize the array, run a Verify with Fix task.

initialize
Process of preparing a disk for use by the controller. When a disk is initialized, the controller records the RAID signature on the disk.

initialized array
An array that is ready for data reads and writes. Arrays can be initialized by build or clear.
L

legacy disk
Disk that contained a valid partition table when connected to the controller. The controller manages the disk as a legacy disk array where there is a one-to-one logical-to-physical mapping of array to disk.

logical device
Volume comprised of space from one or more physical drives and presented to the operating system as if it were a single storage unit.

low-level format
Process performed by the drive firmware that completely removes the file system from the disk.

M

migration
See reconfiguration.

mirrored array/mirroring
See RAID 1 on page E-2.

monitoring
Process of receiving, displaying, and logging system events.

multipartition array
Array with multiple operating systems or MS-DOS partitions.

O

offline array
Array that can no longer be accessed.

optimal
The state of an array when it is fully operational. For redundant arrays, the entire array is protected.
Glossary

P

partition
Contiguous area of a physical drive that makes up some or all of an array. When an array is created, space is automatically converted into partitions.

phantom object
Object that represents a component that cannot be configured by the controller management software; for example, a missing drive.

Q

quick init
An array initialized using the Quick Init option is available immediately, with no on-going background controller activity. All data written to an array that has been quick initialized is protected.

R

RAID
Redundant Array of Independent Disks (alternative definition Redundant Array of Inexpensive Disks).

RAID signature
The area on each disk reserved for use by the RAID controller.

RAID volume
Concatenates two or more arrays of the same type.

rebuild
Background regeneration of redundant data on a RAID 1.

reconfiguration
Process of expanding an array or migrating an array from one RAID type to another; changing the stripe size of a RAID 0, or moving a logical device’s partitions to other disks.
redundant

The ability of an array to maintain operability when one or more hardware failures occur. RAID 1 is an example of a redundant array. In the event of a drive failure, redundant arrays can be restored to normal operation by replacing the failed drive and rebuilding the array.

rescan

Process of updating the current screen to show all currently available resources.

segment

Disk drive or portion of a disk drive used to create a logical device. A disk can include RAID segments and available segments. A RAID segment is part of a logical device; it can be used by only one logical device at a time. Available segments can be used to define a new logical device. If the disk is not part of any logical device, the entire disk is an available segment.

Serial ATA (SATA)

A successor to ATA that uses a serial, instead of parallel, interface.

simple volume

A volume made up of disk space from a single disk. It can consist of a single region on a disk or concatenated, multiple regions of the same disk.

single-level array

Array created from one or more partitions. See also volume, spanned volume, RAID signature, and RAID 1 on page E-2.

spanned volume

A simple volume that spans two or more drives.

spare

See hotspare.
## Glossary

### stripe
Contiguous set of data distributed across all the disks in an array. A striped array distributes data evenly across all members in equal-sized sections called *stripes*.

### stripe size
The amount of data in each section of a striped array.

### striped array
See *RAID signature* and *RAID 5 on page E-3*.

### task
An operation that occurs only on the RAID controller, asynchronous to all other operations; for example, initializing a disk or verifying an array. Some tasks can take an extended period of time, particularly if the RAID controller is also performing intensive data I/O while the task is running.

### verify
See *consistency check command*.

### volume
See *simple volume, spanned volume*.