adaptec ®

Adaptec Storage Manager
User's Guide
For Direct Attached Storage

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● The TSID number is included on a white, bar-coded label, like this example:

```
THIS TSID NUMBER WILL     TSID: PTNNNNNNYYWW
BE REQUIRED WHEN          (1P) PRODUCT P/N: PPPPPPPPPPPPPPPPP
CONTACTING TECHNICAL      ‖‖‖‖‖‖ ‖‖‖ ‖‖‖‖‖ ‖‖‖ ‖‖‖ ‖‖‖‖
SUPPORT.                  (S) PRODUCT S/N: XXXXXXXXXXXXXX
                          ‖‖‖‖‖‖ ‖‖‖ ‖‖‖ ‖‖‖‖‖ ‖‖‖ ‖‖‖‖‖ ‖‖‖ ‖‖‖ ‖‖‖
```

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About This Guide

Adaptec® Storage Manager™ is a software application that helps you build a storage space using Adaptec RAID controllers, disk drives, and enclosures, and then manage your stored data, whether you have a single RAID controller installed in a server or a complex Storage Area Network (SAN) with multiple RAID controllers, servers, and enclosures.

This *User's Guide* describes how to install and use Adaptec Storage Manager to build and manage Adaptec *direct attached storage*—a RAID controller and disk drives which reside inside, or are directly attached to, the computer accessing them, similar to the basic configurations shown in these figures:

Server with Adaptec RAID controller and disk drives   System running Adaptec Storage Manager

Server with Adaptec RAID controller and disk drives   System running Adaptec Storage Manager   Network (SAN) Connection   Server with Adaptec RAID controller, running Adaptec Storage Manager   Storage enclosures with disk drives installed
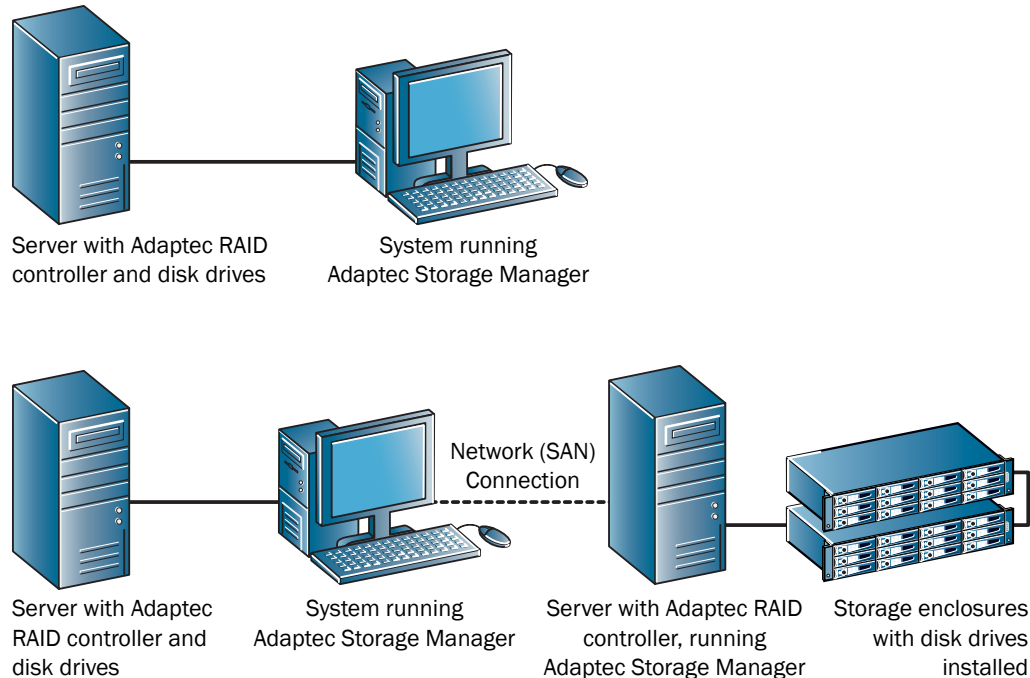
How This Guide is Organized

This *User's Guide* is divided into three sections:

● **Part I:** *Getting Started*—Follow the instructions in this section to install Adaptec Storage Manager and build your storage space. (For a definition of 'storage space' and other terms used in this *User's Guide*, see .)

● **Part II:** *Using Adaptec Storage Manager*—Once your storage space is built, refer to this section for help protecting, modifying, monitoring, and troubleshooting your storage space and its components.

● **Part III:** *Quick Reference*—Refer to this section for quick answers to common questions about Adaptec Storage Manager. A comparison of RAID levels is also included.

What You Need to Know Before You Begin

This *User's Guide* is written for advanced computer users who want to create a storage space for their data. Advanced knowledge of storage networks is not required, but you should be familiar with computer hardware, data storage, and DAS and Redundant Array of Independent Disks (RAID) technology.

If you are using Adaptec Storage Manager as part of a complex storage system, such as a SAN, you should be familiar with network administration terminology and tasks, have knowledge of Local Area Network (LAN) and SAN technology, and be familiar with the input/output (I/O) technology—such as Serial ATA (SATA) or Serial Attached SCSI (SAS)—that you are using on your network.

Note: Because this *User's Guide* covers multiple Adaptec RAID products, some of the features and functions described may not be available for your controller or enclosure.

Terminology Used in this Guide

Because this *User's Guide* provides information that can be used to manage multiple Adaptec RAID products in a variety of configurations from DAS to SAN, the generic term "storage space" is used to refer to the controller(s) and disk drives being managed with Adaptec Storage Manager.

For efficiency, the term "components" or "component" is used when referring generically to the physical and virtual parts of your storage space, such as systems, disk drives, controllers, and logical drives.

Many of the terms and concepts referred to in this *User's Guide* are known to computer users by multiple names. In this *User's Guide*, this terminology is used:

● Controller (also known as adapter, HBA, board, or card)

● Disk drive (also known as hard disk, hard drive, or hard disk drive)

● Logical drive (also known as logical device)

● System (also known as a server, workstation, or computer)

● Enclosure (also known as a JBOD, storage enclosure, or disk enclosure)

Note: For more terminology information, see the *Glossary* on page 173.

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Part I:
Getting Started

In this part:

Introduction to Adaptec Storage Manager

1

In this chapter...

This chapter describes Adaptec Storage Manager and the Adaptec Storage Manager Agent, explains the concept of a "storage space" and provides a checklist of getting-started tasks.

Getting Started Checklist

Part I of this *User's Guide* includes three special Getting Started chapters to help you install, start, and begin to use Adaptec Storage Manager.

- ✔ **Step 1:** Familiarize yourself with Adaptec Storage Manager and the Adaptec Storage Manager Agent (see the remainder of this chapter).

- ✔ **Step 2:** Install Adaptec Storage Manager on every system that will be part of your storage spaces (see page 18).

- ✔ **Step 3:** Build your storage space (see page 25).

About Adaptec Storage Manager

Adaptec Storage Manager is a software application that helps you build a storage space for your online data, using Adaptec RAID controllers, disk drives, and enclosures.

With Adaptec Storage Manager, you can group disk drives into logical drives and build in redundancy to protect your data and improve system performance. You can also use Adaptec Storage Manager to monitor and maintain all the controllers, enclosures, and disk drives in your storage space from a single location.

About the Adaptec Storage Manager Agent

When Adaptec Storage Manager is installed on a system, the *Adaptec Storage Manager Agent* is also installed automatically. The Agent is like a service that keeps your storage space running. It's designed to run in the background, without user intervention, and its job is to monitor and manage system health, event notifications, tasks schedules, and other on-going processes on that system. It sends notices when tasks are completed successfully, and sounds an alarm when errors or failures occur on that system.

The Agent uses less memory than the full application. If your storage space includes systems that won't be connected to monitors (and therefore won't require the user interface described in this *User's Guide*), you can choose to run the *Agent only* on those systems instead of the full application (see page 14). You may want to do this if system resources are limited, or if you want more system resources available for other tasks.

Note: *Linux or Unix users only*—If your storage space includes systems without X-Windows installed or running, you can run the Agent, even though you can't run the full Adaptec Storage Manager application.

You can manage and monitor systems running the Agent only by logging into them as remote systems (see page 31).
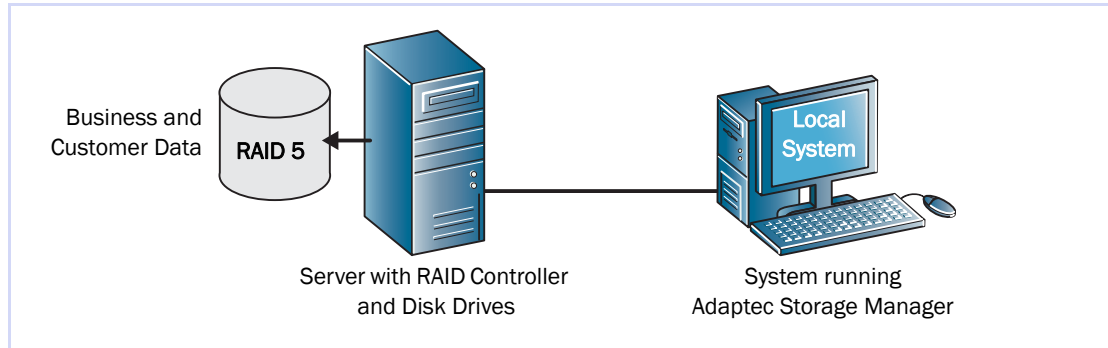
You can also customize the Agent settings to suit your storage space requirements.

Growing Your Storage Space with Adaptec Storage Manager

As your requirements change, Adaptec Storage Manager grows with your storage space as you add more controllers, more disk drives, more logical drives, and more data protection.
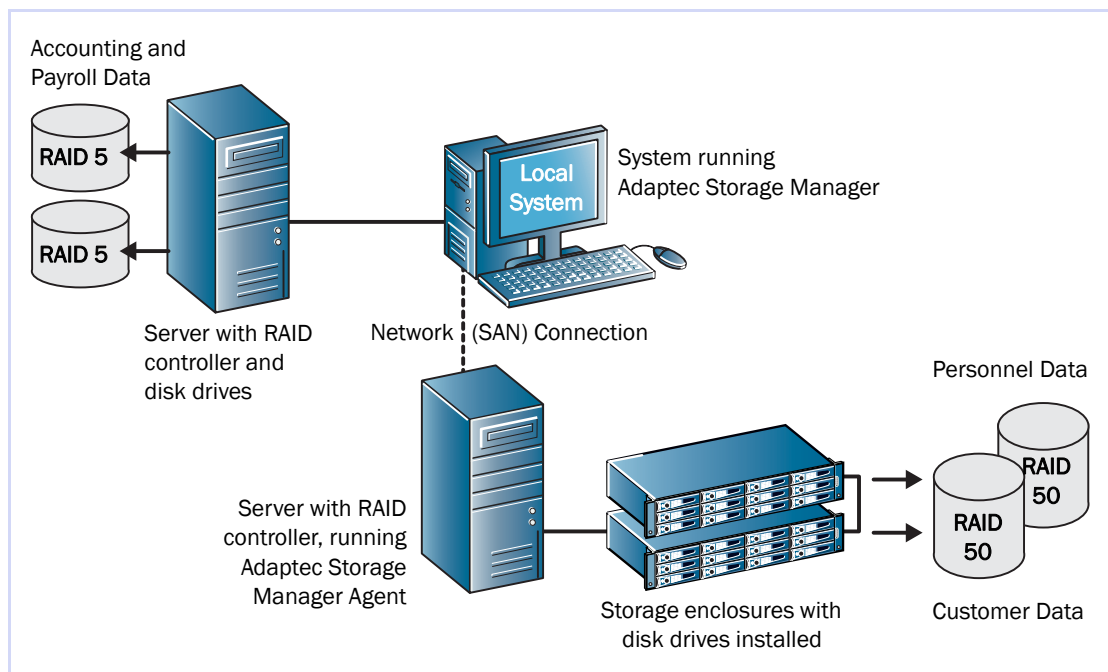
A Simple Storage Space

This example shows a simple storage space that might be appropriate in a home office or for a small business. This storage space includes one RAID controller and three disk drives installed in a server. For data protection, the disk drives have been used to build a RAID 5 logical drive.

Business and Customer Data
RAID 5

Local System

Server with RAID Controller and Disk Drives

System running Adaptec Storage Manager

An Advanced Storage Space

This example shows how you can grow your storage space to meet the expanding requirements of your business. On the first server, segments of space from each disk drive have been used to build two RAID 5 logical drives. A second server connected to two 12-disk-drive enclosures has been added. The additional storage space has been used to create two RAID 50 logical drives. The Administrator of this storage space can create and modify logical drives and monitor both controllers, disk drives, and enclosures from a single system, called the *local* system (see).

Accounting and Payroll Data
RAID 5
RAID 5

Local System

System running Adaptec Storage Manager

Server with RAID controller and disk drives

Network (SAN) Connection

Server with RAID controller, running Adaptec Storage Manager Agent

Storage enclosures with disk drives installed

Personnel Data
RAID 50
RAID 50
Customer Data

Continuing to Grow Your Storage Space

As your needs change, Adaptec Storage Manager will help you grow your storage space to include multiple controllers, storage enclosures, and disk drives in multiple locations.

In this example, multiple systems, servers, disk drives, and enclosures have been added to the storage space. The Administrator can create and modify logical drives and monitor all the controllers, enclosures, and disk drives in the storage space from the *local* system (see page 26).
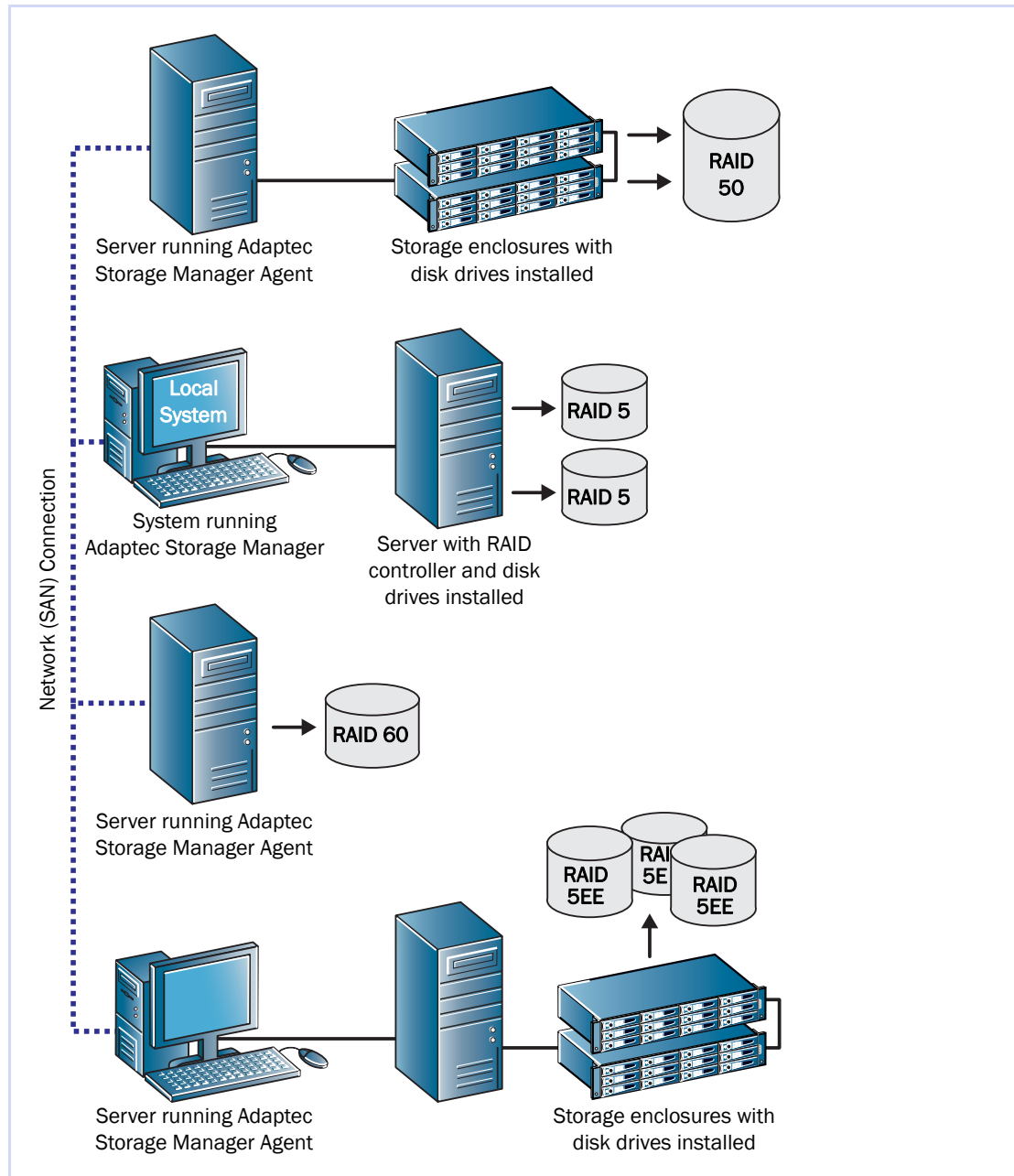
System Requirements

To install Adaptec Storage Manager and create a direct attached storage space, each system in your storage space must meet these requirements:

● PC-compatible computer with Intel Pentium 1.2 GHz processor, or equivalent

● At least 256 MB of RAM

● 80 MB of free disk drive space

● 256-color video mode

● CD-ROM drive or DVD-ROM drive

● One of these operating systems:

  ● Microsoft® Windows® Server 2008 (with SP2), Windows Server 2008 R2, Windows Server 2003 (Enterprise and Standard with SP1 or SP2), Windows Server 2003 R2, Windows 7, Windows Vista™ (with SP1 or SP2), Windows XP (with SP1, SP2, or SP3)

  ● Red Hat® Enterprise Linux 5.x, Red Hat Enterprise Linux 4.x

  ● SUSE Linux ES 11, SUSE Linux ES 10 SP3

    Note: For the latest on Adaptec's support of Linux or to download driver sources, visit the Support area of the Adaptec Web site at www.adaptec.com.

  ● SCO® OpenServer® 6.0 MP4

  ● UnixWare® 7.1.4

  ● Sun® Solaris™ 10, Solaris 10 x86 U7, Solaris 10 x64 U4

  ● VMware ESX Server 3.x with U1, U2, or U3, VMware ESX Server 4.0 (storage management must be done by command-line, BIOS utility, or remote GUI connection)

  ● FreeBSD 8.0, 7.2, 6.x

Note: Adaptec Storage Manager can also be used before an operating system is installed. See *Running Adaptec Storage Manager from the CD* on page 23 for more information.

Controller Support

The maximum number of controllers supported by Adaptec Storage Manager for each supported operating system is:

● **Windows**—Up to 16 Adaptec controllers

● **Linux**—Up to 16 Adaptec controllers

● **UnixWare**—Up to 16 Adaptec controllers

● **OpenServer**—Up to 16 Adaptec controllers

● **Solaris**—Up to 16 Adaptec controllers

● **FreeBSD**—Up to 16 Adaptec controllers

● **VMWare**—Up to 16 Adaptec controllers

Note: For the most recent operating system support information, visit www.adaptec.com.

Installing Adaptec Storage Manager

2

Adaptec Storage Manager must be installed on every system that will be part of your storage space. This chapter describes how to install Adaptec Storage Manager on different operating systems, and explains how to use Adaptec Storage Manager with a firewall.

Note: To use Adaptec Storage Manager to configure a RAID controller before you install your operating system, see *Running Adaptec Storage Manager from the CD* on page 23.

Installing on Windows

This section describes how to install Adaptec Storage Manager on systems running Windows. See *System Requirements* on page 17 for a list of supported operating systems.

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

If a previous version of Adaptec Storage Manager is installed on your system, you must remove it before beginning this installation. To uninstall Adaptec Storage Manager, use the Add/Remove Programs option in your Windows Control Panel.

Note: *Advanced users only*—To perform a silent installation, follow the instructions in Appendix A.

To install Adaptec Storage Manager:

1 Insert the Adaptec Storage Manager Installation CD.

The Installation wizard opens automatically. (If it doesn't open, browse to the CD in Windows Explorer, then click **Autorun**.)

2 Click **Next** to begin the installation, click **I accept…**, then click **Next**.

3 Select **GUI and Agent**. Then click **Next**.

4 Repeat these steps to install Adaptec Storage Manager on every Windows system that will be part of your storage space.

Installing on Linux

This section describes how to install Adaptec Storage Manager on systems running Linux. See *System Requirements* on page 17 for a list of supported operating systems.

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

Note: If a previous version of Adaptec Storage Manager is installed on your system, you must remove it before beginning this installation. Any customization files you created with the previous version are saved and used in the upgrade. To remove Adaptec Storage Manager, type the `rpm --erase StorMan` command.

To install Adaptec Storage Manager:

1 Insert the Adaptec Storage Manager Installation CD.

2 Mount the Adaptec Storage Manager Installation CD:

   For Red Hat `mount /dev/cdrom /mnt/cdrom`

   For SUSE   `mount /dev/cdrom /media/cdrom`

3 Change to the manager 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 Storage Manager Installation CD:

   For Red Hat `umount /mnt/cdrom`

   For SUSE   `umount /media/cdrom`

6 Repeat these Steps to install Adaptec Storage Manager on every Linux system that will be part of your storage space.

Installing on UnixWare or OpenServer

Note: If a previous version of Adaptec Storage Manager is installed on your system, you must remove it before beginning this installation. Any customization files you created with 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 Storage Manager Installation CD.

2 Mount the Adaptec Storage Manager Installation CD:

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

where `cdromdevicefile` is the device file name (for example, `c0b0t010` for a CD-ROM block device). To find the device file name, look in the /dev/cdrom directory.

3 Install Adaptec Storage Manager:

For UnixWare `pkgadd -d /mnt/unixware/manager/RaidMan.ds`

For OpenServer `pkgadd -d /mnt/openserv6/manager/RaidMan.ds`

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

5 Unmount the Adaptec Storage Manager Installation CD:

```
umount /mnt
```

Installing on Solaris

Note: If a previous version of Adaptec Storage Manager is installed on your system, you must remove it before beginning this installation. Any customization files you created with 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 Storage Manager Installation CD.

The CD mounts automatically. (If it doesn't, manually mount the CD using a command similar to the one shown below. Refer to your operating system documentation for detailed instructions.)

```
mount -F hsfs -o ro/dev/dsk/c1t0d0s2/mnt
```

2 Install Adaptec Storage Manager:

```
pkgadd -d/ <mount point>/solaris_x86/manager/StorMan.pkg
```

3 Follow the on-screen instructions to complete the installation.

4 Eject or unmount the Adaptec Storage Manager Installation CD. Refer to your operating system documentation for detailed instructions.

Installing on FreeBSD

To install Adaptec Storage Manager:

1 Insert the Adaptec Storage Manager Installation CD.

2 Mount the Adaptec Storage Manager Installation CD:

```
mount -F cd9660 -o ro /dev/acd0 /<mount point>
```

where `mount point` is the mount point of the CD-ROM.

3 Install Adaptec Storage Manager:

For FreeBSD for x86 (32-bit):

```
pkg_add /<mount point>/freebsd7/manager/StorMan-x86.pkg.tbz
```

For FreeBSD for amd64 (64-bit):

```
pkg_add /<mount point>/freebsd7_x86_64/manager/StorMan-amd64.pkg.tbz
```

where `mount point` is the CD-ROM mount point.

Note: The installation CD also includes packages for FreeBSD 6 and FreeBSD 8.

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

5 Unmount the Adaptec Storage Manager Installation CD:

```
umount /<mount point>
```

Installing on VMWare

To install Adaptec Storage Manager:

1 Mount the Adaptec Storage Manager Installation CD:

```
mount -r /dev/cdrom /mnt/cdrom
```

2 Change to the manager directory:

ESX Server 3.5: `cd /mnt/cdrom/linux/manager`

ESX Server 4.0: `cd /mnt/cdrom/linux_64/manager`

3 Extract the Linux Adaptec Storage Manager RPM package and install it:

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

Note: Ignore the note that says "Application can be started by typing /usr/StorMan/ StorMan.sh". The console has no graphical capability.

4 Use the command line utility (ARRCONF) included with your RAID controller to configure and manage your disk drives. For more information, refer to the *Command Line Interface User's Guide* on the Adaptec Storage Manager Installation CD.

5 To use Adaptec Storage Manager to connect remotely from another system, you must open a range of ports in the built-in firewall using this command:

```
esxcfg-firewall -o 34571:34581,tcp,in,"StorMan"
```

For more information, see .

Using Adaptec Storage Manager with a Firewall

If your system or network includes a firewall, you must unblock these ports:

- 8003 (TCP)
- 34580 (TCP)
- 34570 to 34579 (TCP)
- 34570 (UDP)
- 34577 to 34580 (UDP)

If you have installed the GUI and Agent on a system running Windows XP, you must also unblock the javaw process in the Windows firewall. Refer to your operating system documentation for instructions.

Running Adaptec Storage Manager from the CD

This section describes how to run Adaptec Storage Manager from the Adaptec RAID installation CD included in the kit, instead of as an installed application. When you run Adaptec Storage Manager from the CD, you are using *bootable-CD mode*.

When to Choose Bootable-CD Mode

Use Adaptec Storage Manager in bootable-CD mode if you want to install your operating system on a disk drive or logical drive associated with your controller. Bootable-CD mode lets you configure the controller before you install your operating system.

After you have configured the controller and installed the operating system, install and run Adaptec Storage Manager as an installed software application, as described earlier in this chapter.

Bootable-CD Mode Limitations

Running Adaptec Storage Manager from the CD is not an alternative to running it as an installed software application. Most of the features and functions described in this user's guide are not available when you are running Adaptec Storage Manager from the CD. Bootable-CD mode is only for configuring your controller before you install an operating system.

Getting Started in Bootable-CD Mode

This is a checklist of tasks to complete when you're building your storage space with Adaptec Storage Manager in bootable-CD mode.

- ✔ Install your Adaptec RAID controller.
- ✔ Run Adaptec Storage Manager (see the following section).
- ✔ Create logical drives (see page 34).

   For an introduction to the Adaptec Storage Manager window and its features, see page 43.

- ✔ Install your operating system (and controller device drivers, if appropriate).

✔ Install Adaptec Storage Manager as a software application, as described earlier in this chapter.

✔ Continue to build, customize, and manage your storage space as described in the rest of this user's guide.

Running Adaptec Storage Manager from the CD

Note: Before you begin, ensure that your system is set up to boot from a CD. Check the system BIOS to see if the CD drive is listed first in the boot order. For more information, refer to your system's documentation.

To run Adaptec Storage Manager in bootable-CD mode:

1 Insert the RAID installation CD into your CD drive, then restart your system.

2 When prompted, select the language you want, then press **Enter.**

3 Review the license information, then press **Enter.**

The main CD menu opens.

4 Click **Launch Configuration Utility.**

Adaptec Storage Manager opens.

5 In the tool bar, click **Create**.
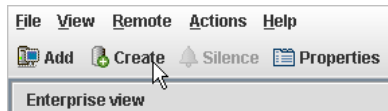
The Configuration wizard opens.
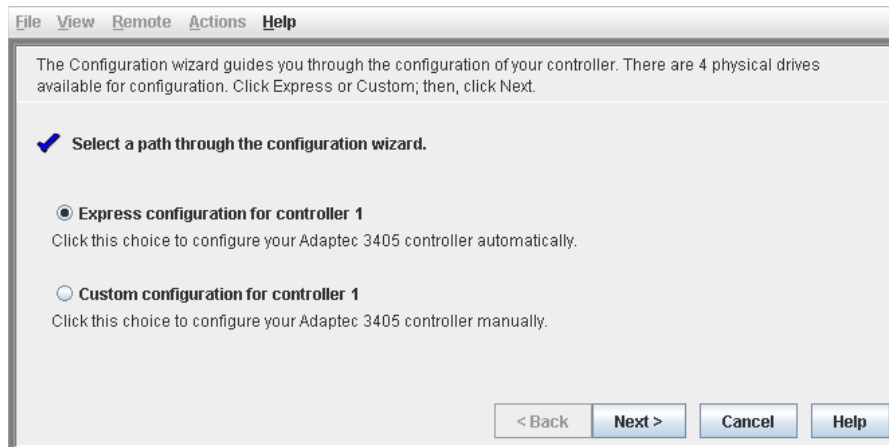
6 Continue with *Creating Logical Drives* on page 34.

Building Your Storage Space

3

In this chapter...

Follow the instructions in this chapter to start Adaptec Storage Manager, log in to each system in your storage space, and create logical drives. (For more information, see *Understanding Logical Drives* on page 59.)

Note: Before beginning the tasks in this chapter, ensure that Adaptec Storage Manager is installed on every system that will be part of your storage space.

Overview

To build your storage space, complete these steps as described in the rest of this chapter:

1   Choose at least one management system (see the next section).

2   Start and log in to Adaptec Storage Manager on the management system (see page 27).

3   Start Adaptec Storage Manager or the Agent on all other systems (see page 31).

4   Log in to all other systems from the management system (see page 32).

5   Create logical drives for all systems in your storage space (see page 34).

Choosing a Management System

You must designate at least one system as a 'management system', a system from which you will manage the direct attached storage on all systems in your storage space.

The management system can be any system on your LAN that has a monitor and can run the full Adaptec Storage Manager application.

'Local' or 'Remote'?

Whenever you're working in Adaptec Storage Manager, the system that you're working on is the *local* system. All other systems in your storage space are *remote* systems. 'Local' and 'remote' are relative terms, as shown in the following figure—when you are working on system A (local system), system B is a remote system; when you are working on system B (local system), system A is a remote system.

For the purposes of this chapter, the 'local system' is the management system.
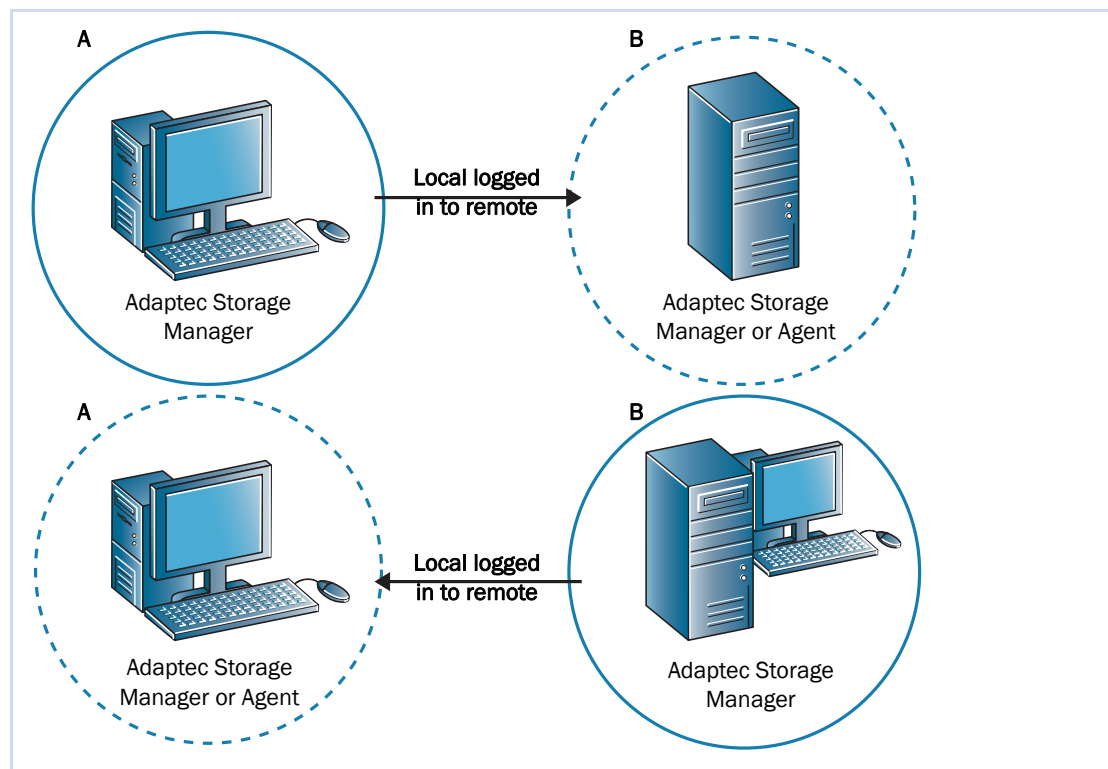
Starting and Logging In on the Local System

This section describes how to start and log in to the full Adaptec Storage Manager application. It also explains how Adaptec Storage Manager uses existing operating system permission levels to grant different amounts of access to your storage space.

Understanding Permission Levels

When you log in to Adaptec Storage Manager, your permission level is identical to your operating system permission level. For example, if you have Administrator permissions on your operating system, you also have Administrator permissions in Adaptec Storage Manager.

This section describes the three different permission levels.

Administrator Level

Logging in as an Administrator allows you full access to manage and modify the controllers, disk drives, and logical drives that are part of your storage space.

To log in as an Administrator:

- **Windows**—Enter a valid user name and password for the Administrator or 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.)

- **Linux**—Enter `root` for the user name and enter the root password.

- **UnixWare or OpenServer**—Enter `root` for the user name and enter the root password.

- **Solaris**—Enter `root` for the user name and enter the root password.

User Level

Logging in as a User partially restricts your access to the storage space, as described in this table.

Users can...	User's can't...
Rescan controllers	Create logical drives
Save activity logs	Modify logical drives
Verify disk drives (with and without fix)	Delete logical drives
Verify logical drives (with and without fix)	Delete hot spares
Identify disk drives and enclosures	Perform data migrations
Rebuild disk drives	
Create hot spares	
Access the same information as Guests (see the following section)	

To log in as a User, use your normal network user name and password.

Guest Level

Logging in as a Guest restricts your access to the storage space to "view-only".

You can see all local and remote systems and view their properties windows, view event logs, save configuration files and support archives, and browse the online Help.

You cannot make any changes to the storage space.

To log in as Guest, click **Cancel** on the Login window.

Starting and Logging In

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

To start Adaptec Storage Manager and log in on the local system, follow the instructions for your operating system:
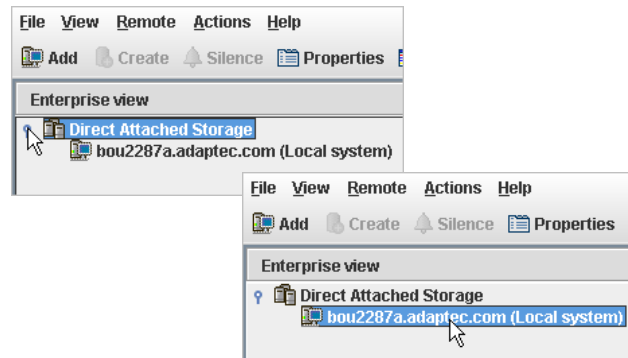
● For Windows, see the following section.

● For Linux, see page 29.

● For UnixWare or OpenServer, see page 29.

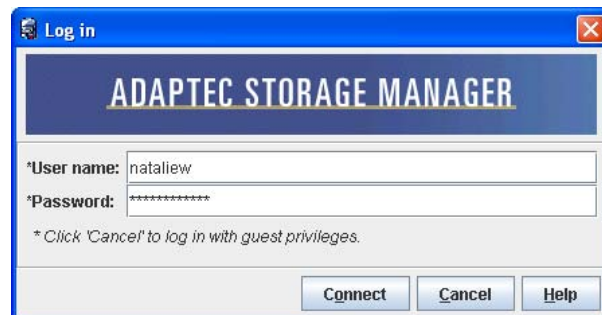● For Solaris, see page 29.

● For FreeBSD, see page 29.

Windows

1 From the Start menu, select **Programs** > **Adaptec Storage Manager** > **Adaptec Storage Manager**.

The main window opens.

2 In the Enterprise View, expand **Direct Attached Storage**, then select the local system.

The Log In window opens.

3 Enter your LAN user name and password, then click **Connect**. (See *Understanding Permission Levels* on page 27 for more information.)

4 If Adaptec Storage Manager detects a new controller on the local system, the New Hardware Detected window opens. Click **Register Now**, then follow the on-screen instructions to complete the registration.

5 Continue with *Enabling Statistics Logging in Adaptec Storage Manager* on page 30.

Linux

1 Type the following command to change to the Adaptec Storage Manager installation directory:

```
cd /usr/StorMan
```

2 Type the following command and press **Enter**:

```
sh StorMan.sh
```

3 When the Log In dialog box appears (see page 28), enter your LAN user name and password, then click **Connect**. (See *Understanding Permission Levels* on page 27 for more information.)

4 If Adaptec Storage Manager detects a new controller on the local system, the New Hardware Detected window opens. Click **Register Now,** then follow the on-screen instructions to complete the registration.

5 Continue with *Enabling Statistics Logging in Adaptec Storage Manager* on page 30.

UnixWare or OpenServer

1 Change to the directory where Adaptec Storage Manager is installed:

```
cd /opt/RaidMan
```

2 Launch the Adaptec Storage Manager script:

```
sh RaidMan.sh
```

3 If prompted, register the controllers on the local system.

4 Continue with *Enabling Statistics Logging in Adaptec Storage Manager* on page 30.

Solaris

To start Adaptec Storage Manager:

1 Change to the directory where Adaptec Storage Manager is installed:

```
cd /usr/StorMan
```

2 Launch the Adaptec Storage Manager script:

```
sh StorMan.sh
```

3 If prompted, register the controllers on the local system.

4 Continue with *Enabling Statistics Logging in Adaptec Storage Manager* on page 30.

FreeBSD

1 Change to the directory where Adaptec Storage Manager is installed:

```
cd /opt/StorMan
```

2 Launch the Adaptec Storage Manager script:

```
sh StorMan.sh
```

3 If prompted, register the controllers on the local system.

4 Continue with *Enabling Statistics Logging in Adaptec Storage Manager* on page 30.

Enabling Statistics Logging in Adaptec Storage Manager

When you log in for the first time, Adaptec Storage Manager prompts you to enable statistics logging on your system. Once you enable statistics logging, Adaptec Storage Manager periodically "calls home," and sends the data to Adaptec or another designated contact for analysis. (See *Logging Statistics for Remote Analysis* on page 119 for more information.)
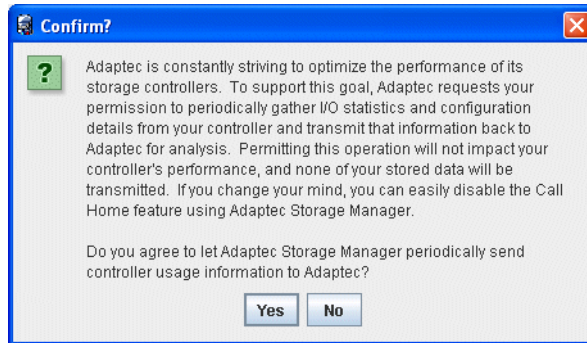
Click **Yes** to enable statistics logging. (If you change your mind, you can turn off statistics logging later.) The Advanced Statistics Manager window opens and you are prompted to enter your proxy server settings.
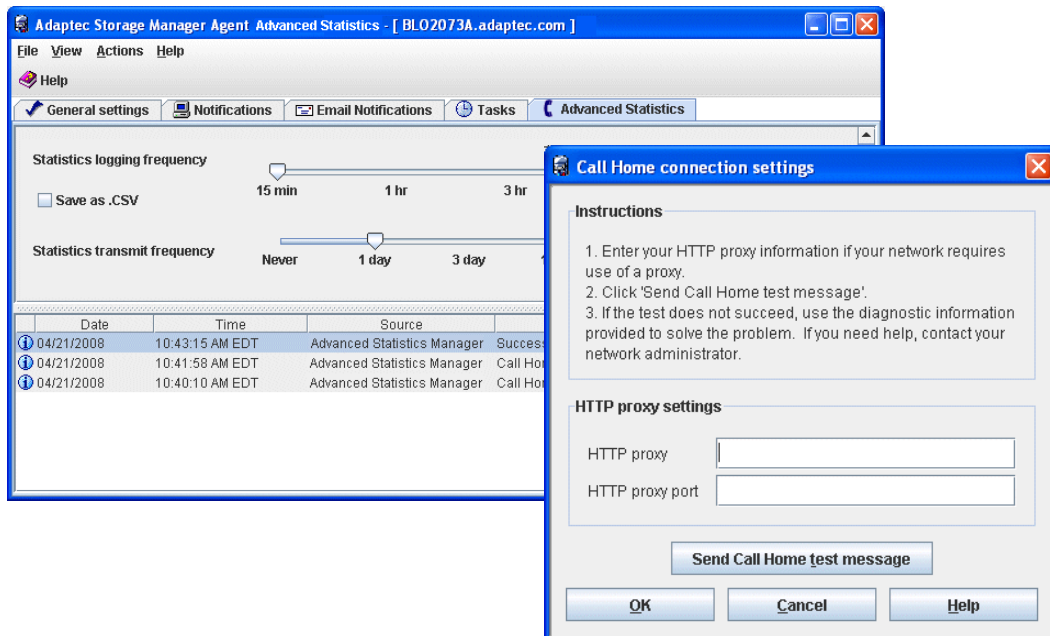
Enter your proxy server name and port number (if your network uses a proxy server), then click **Send Call Home test message**. A message appears indicating either that the test message was sent successfully or that the test failed. (Click **OK** to clear the message.)

Click **OK** to close the Call Home connection settings window. Then close the Advanced Statistics Manager window.

Continue with *Starting Adaptec Storage Manager on Remote Systems* on page 31.

Starting Adaptec Storage Manager on Remote Systems

The next step is to start Adaptec Storage Manager on all the remote systems in your storage space. (For more information about 'remote' systems, see page 26.)

You can run the full application on each system. Alternatively, if your storage space includes systems that aren't connected to monitors (and therefore won't require the user interface described in this *User's Guide*), you can run the *Agent only*. You may want to do this if system resources are limited, or if you want more system resources available for other tasks. (For more information, see *About the Adaptec Storage Manager Agent* on page 14.)

To start:

- The full application, see *Starting and Logging In on the Local System* on page 27.

- The Agent only, see page 31.

Starting the Full Application

To start the full Adaptec Storage Manager application, follow the instructions in *Starting and Logging In on the Local System* on page 27.

Starting the Agent Only

To start the Adaptec Storage Manager Agent only, follow the instructions for your operating system:

- For Windows, see the following section.

- For Linux or VMWare, see page 31.

- For UnixWare or OpenServer, see page 32.

- For Solaris, see page 32.

Windows

On systems running Windows, the Adaptec Storage Manager Agent starts automatically when the system is powered on.

To verify that the Agent is running:

1 Open the Windows **Control Panel**.

2 Double-click **Administrative Tools**, then double-click **Services**.

3 In the list of services, check that the Adaptec Storage Manager Agent is installed and running. If it's not, you can choose to restart it.

Linux or VMWare

On systems running Linux or VMWare, the Adaptec Storage Manager Agent starts automatically when the system is powered on.

To verify that the Agent is running:

1 Open a shell window.

2 Enter this command: `ps -ef | grep StorAgnt.sh`

If the Agent is running, it's listed as sh StorAgnt.sh.

UnixWare or OpenServer

To start the Agent, enter this command:

```
sh /opt/RaidMan/RaidAgnt.sh
```

When the Agent has started, a copyright message appears.

Note: To have the Agent run automatically at system start-up, add this line to the /etc/inittab and /etc/conf/init.d/kernel files: `nfra:12346:once:sh opt/RaidMan/RaidAgnt.sh`

Solaris

To start the Agent, enter this command:

```
svcadm enable ADPTstor_agent
```

Logging into Remote Systems from the Local System

Once Adaptec Storage Manager or the Adaptec Storage Manager Agent (see page 14) is running on all systems in your storage space, the next step is to log in to the remote systems from the local system.

Once you have logged in to a remote system, it automatically appears in the Enterprise View each time you start Adaptec Storage Manager on the local system. You can work with a remote system's controllers, disk drives, and logical drives as if they were part of your local system.

Note: Adaptec Storage Manager has a wizard to help you manage the remote systems in your storage space. The wizard simplifies the process of connecting to remote systems and adding them to the Enterprise View. For more information, see *Managing Remote Systems* on page 127.

To log in to a remote system:

1   In the Enterprise View, select either **Direct Attached Storage** or the **Local System**.

2   From the **Actions** menu, select **Add managed system**.
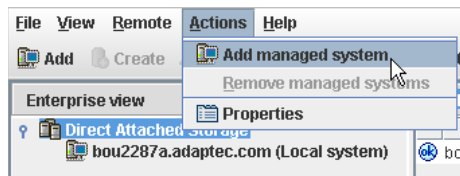
The Add Managed System window opens.
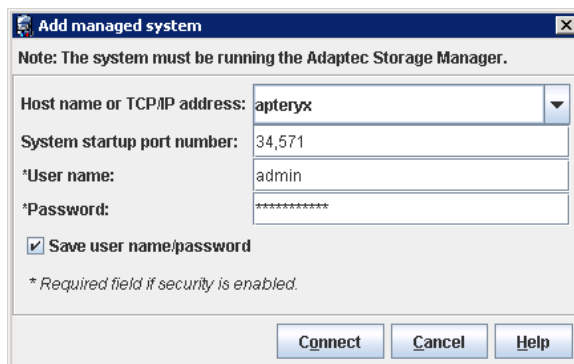
3 Enter the host name or TCP/IP address of the remote system. Or select a system from the drop-down list.

4 Enter the startup port number of the remote system. The default port number is 34571.

5 Click **Connect**.

Adaptec Storage Manager connects to the remote system and adds it to the list of managed systems in the Enterprise View.
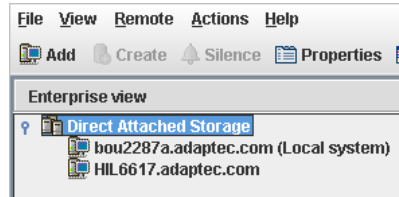
Note: You must log in to a remote system with the proper permission level to complete the tasks you wish to perform. See *Understanding Permission Levels* on page 27 for more information.

6 If Adaptec Storage Manager detects a new controller on the local system, the New Hardware Detected window opens. Click **Register Now,** then follow the on-screen instructions to complete the registration.

7 Continue with *Creating Logical Drives* on page 34.

Removing a Remote System

If you no longer want to monitor a remote system, you can remove it from the Enterprise View of Adaptec Storage Manager.

Removing a remote system does not take it off-line.

Note: Adaptec Storage Manager has a wizard to help you manage the remote systems in your storage space. The wizard simplifies the process of a removing remote systems from the Enterprise View. For more information, see *Managing Remote Systems* on page 127.

To remove a remote system:

1 In the menu bar of the main window, select **Remote**, select **Remove managed system**, then click the system you want to remove.

The Remove Managed System window opens.

2 If you want to continue receiving events from the remote system after it's been removed from the local system, select **Continue to receive events from the remote system** from the drop-down menu.

3 Click **OK**.

The remote system is removed from the Enterprise View of Adaptec Storage Manager.

Creating Logical Drives

Adaptec Storage Manager has a wizard to help you create (or *configure*) logical drives, and offers two configuration methods to choose from, depending on your needs:

- **Express configuration** (**basic**)—Automatically creates logical drives by grouping together same-sized physical drives, and assigns RAID levels based on the number of physical disk drives in the logical drive.

  Use the express method when you want to use all available disk drives in the most efficient manner. For instructions, see page 34.

- **Custom configuration** (**advanced**)—Helps you group disk drives, set RAID levels, determine logical drive size, and configure advanced settings manually.

  Use the custom method when you want to create specific logical drives with any or all available disk drives. For instructions, see page 37.

Note: Adaptec recommends that you *not* combine SAS and SATA disk drives within the same logical drive. Adaptec Storage Manager generates a warning if you try to create a logical drive using a combination of SAS and SATA disk drives.

Express Configuration: The Easy Way

When you use express configuration, Adaptec Storage Manager automatically creates logical drives by grouping together same-sized physical disk drives, and assigns RAID levels based on the number of physical disk drives in a logical drive:

- A logical drive with three or more physical disk drives is assigned RAID 5.

- A logical drive with two physical disk drives is assigned RAID 1.

- A logical drive with only a single physical disk drive becomes a simple volume, which does not offer redundancy.

Note: To create a logical drive with any other RAID level, you must use the custom method, as described on page 37. See *Selecting the Best RAID Level* on page 152 for more information about RAID levels.

By default, logical drive size is set by Adaptec Storage Manager and automatically maximizes the capacity of the disk drives. However, you can choose to specify a size for a logical drive, if required.

To build your storage space with the express method:

1 In the Enterprise View, select the system you want, then select the controller you want.

2 On the toolbar, click **Create**.
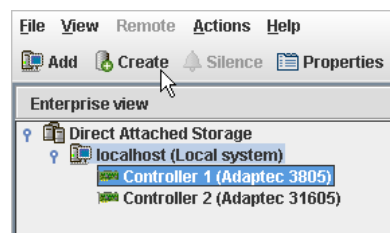
3 When the wizard opens, ensure that **Express configuration...** is selected, then click **Next**.

> The Configuration wizard guides you through the configuration of your controller. There are 8 physical drives available for configuration. Click Express or Custom; then, click Next.
>
> ✔ **Select a path through the configuration wizard.**
>
> ⦿ **Express configuration for controller 1**
> Click this choice to configure your Adaptec 3805 controller automatically.
>
> ○ **Custom configuration for controller 1**
> Click this choice to configure your Adaptec 3805 controller manually.
>
> [< Back] [Next >] [Cancel] [Help]

4 Review the information that is displayed.

> Configuration summary. Below is the configuration summary for the controller. To accept and save this configuration, click 'Apply.' To make changes, click the 'Modify' button.
>
> **Configuration summary**
>
> ➡ **Click 'Apply' to save your configuration changes.**
>
> | Logical device | Size | Initialization | Hot spare |
> | --- | --- | --- | --- |
> | RAID 5 | 101.458 GB | Build | Yes |
> | RAID 1 | 19.449 GB | Quick | Yes |
> | Simple volume | 9.684 GB | None | No |
>
> [Modify logical devices]
>
> [< Back] [Apply] [Cancel] [Help]

To exclude specific disk drives, specify a size for the logical drives, or to make other changes to the configuration, click **Modify logical devices**. See for more information.

Note: Some operating systems have size limitations for logical drives. Before you save the configuration, verify that the size of the logical drive is appropriate for your operating system.

5 Click **Apply**, then click **Yes**.

Adaptec Storage Manager builds the logical drive(s), indicated by a magnifying glass moving across the new logical drive icon in the Logical Devices View. The configuration is saved on the Adaptec controller and on the physical drives.

A magnifying glass means that a logical drive is being built.
It disappears once the logical drive has been created.

Note: To stop the creation of a new logical drive, right-click on the magnifying glass icon (shown in the figure above), then select **Stop current task**. You can also change the priority of the build task to High, Medium, or Low by selecting **Change background task priority** from the same right-click menu.
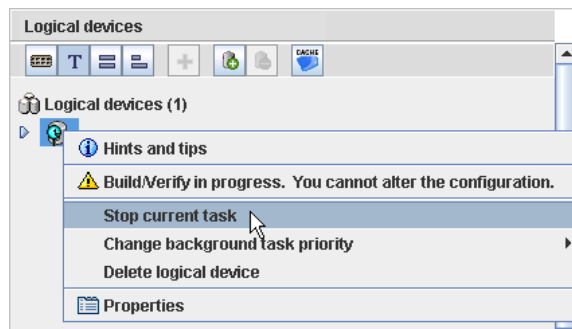
6 Repeat Steps 1 to 5 for each controller in your storage space, as required.

7 Continue with *Partitioning and Formatting Your Logical Drives* on page 36.

Partitioning and Formatting Your Logical Drives

The logical drives you create appear as physical disk drives on your operating system. You *must* partition and format these logical drives before you can use them to store data.

Note: Logical drives that have not been partitioned and formatted cannot be used to store data.

Refer to your operating system documentation for more information.

Including More Systems in Your Storage Space

Note: Adaptec Storage Manager must be installed on every system that will be part of your storage space.

If you have installed Adaptec RAID controllers on more than one system, to continue building your storage space:

● From each individual system, log in to Adaptec Storage Manager and repeat Steps 1 to 7 to continue building your storage space, *or*

● From your *local* system (the system you're working on), log in to all other systems in your storage space as *remote* systems (see page 26), then repeat Steps 1 to 7 to continue building your storage space.

The maximum number of supported RAID controllers varies depending on your operating system. See *Controller Support* on page 17 for more information.

To continue, see *Managing Your Storage Space* on page 41.

Custom Configuration (Advanced)

Custom configuration helps you build your storage space manually by stepping you through the process of creating logical drives, setting RAID levels, and configuring other settings.

To build your storage space with custom configuration:

1   In the Enterprise View, select the system you want, then select the controller you want.

Note how many available disk drives are connected to the controller; this information will be helpful as you create logical drives.

2   On the toolbar, click **Create**.
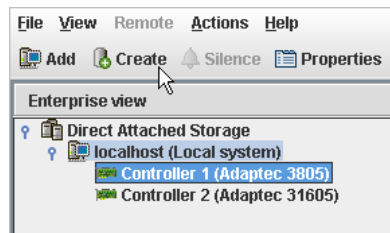
3   When the wizard opens, select **Custom configuration...**, then click **Next**.
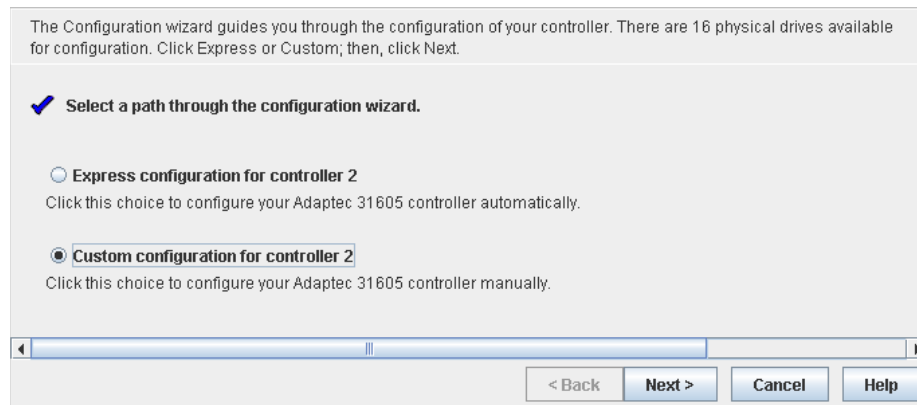
4 Select a RAID level.

The most common RAID levels are listed first; advanced RAID levels are available by clicking **Advanced settings**.
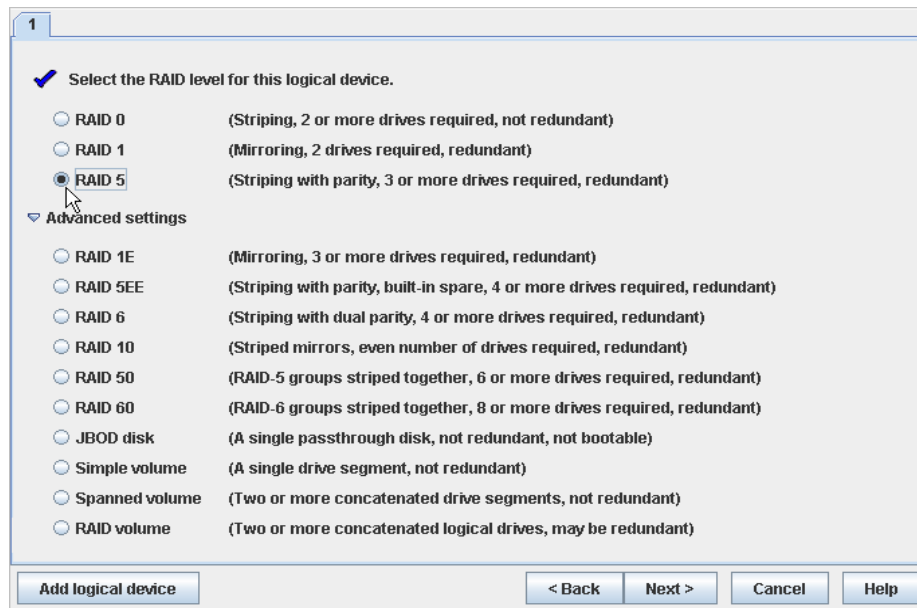
Note: To build a RAID Volume, see page 71. To build a JBOD disk, see page 73. See *Selecting the Best RAID Level* on page 152 for more information about RAID levels.

5 Click **Next**.

6 On the left side of the window, enter a name for the logical drive. Names can include any combination of letters and numbers, but cannot include spaces.

7 On the right side of the window, select the disk drives you want to use in the logical drive. Adaptec Storage Manager prompts you to select the correct number of disk drives.

Note: Adaptec recommends that you *not* combine SAS and SATA disk drives within the same logical drive. Adaptec Storage Manager generates a warning if you try to create a logical drive using a combination of SAS and SATA disk drives.
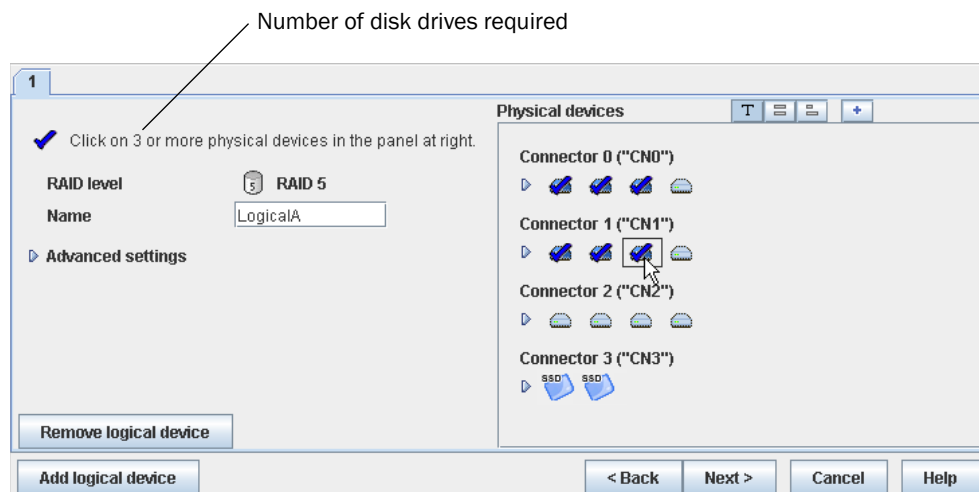
By default, Adaptec Storage Manager automatically sets the size of the logical drive and maximizes the capacity of the disk drives you select. (To set a custom size for the logical drive, see Step 9.)

8   *(Optional)* Create a global hot spare by clicking the **Create Global Hot Spare** button, then clicking on an available disk drive. (Alternatively, **Ctrl+click** an available disk drive.) Available disk drives are represented by light blue icons.

A plus sign (+) appears to indicate that the selected disk drive will be a hot spare. (To remove a hot-spare designation from a disk drive, **Ctrl+click** it.)
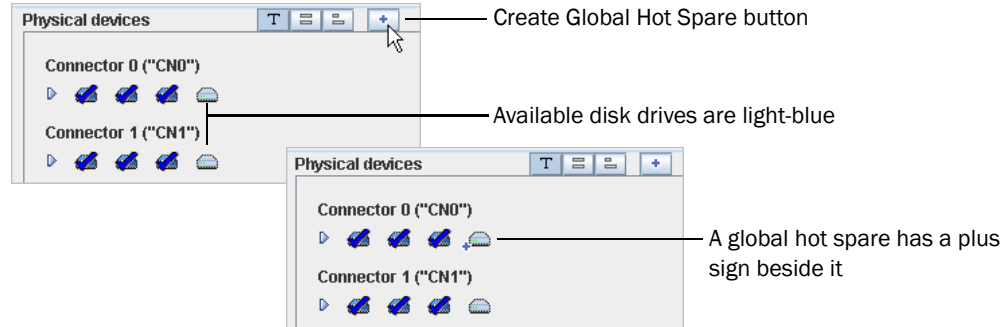
See *Creating and Managing Hot Spares* on page 54 for more information.

9   *(Optional)* To set a smaller logical drive size or modify other settings for this logical drive click **Advanced Settings**, then customize the settings as required. See *Fine-tuning Logical Drives* on page 63 for more information.
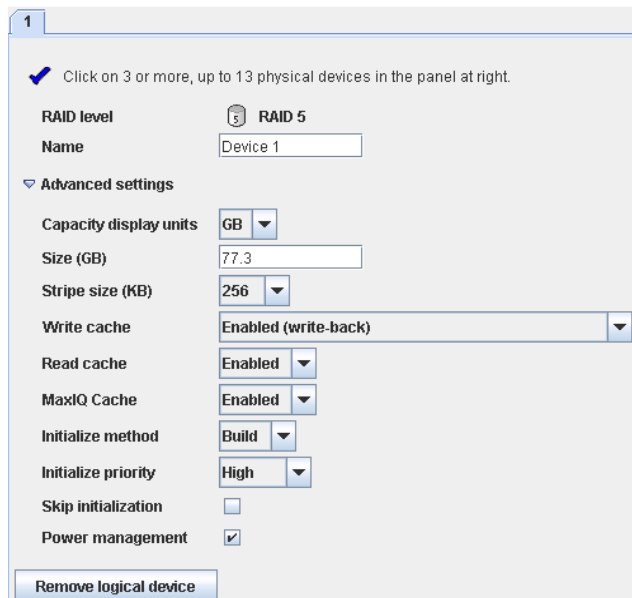
10 If you have no other available disk drives, skip to Step 12.

If you have available disk drives and want to create additional logical drives, click **Add logical device** to open a new tab in the wizard.

Tab for second logical drive

```
┌─────┬───────┐
│  1  │  New  │
├─────┴───────┴──────────────────────────────────────────────────────┐
│                                                                      │
│  ➡  Select the RAID level for this logical device.                  │
│                                                                      │
│      ○ RAID 0        (Striping, 2 or more drives required, not redundant) │
│      ○ RAID 1        (Mirroring, 2 drives required, redundant)       │
│      ○ RAID 5        (Striping with parity, 3 or more drives required, redundant) │
│   ▷ Advanced settings                                                │
│                                                                      │
│                                                                      │
├──────────────────────────────────────────────────────────────────────┤
│  Add logical device        │  < Back │ Next >  │ Cancel │ Help │      │
└──────────────────────────────────────────────────────────────────────┘
```
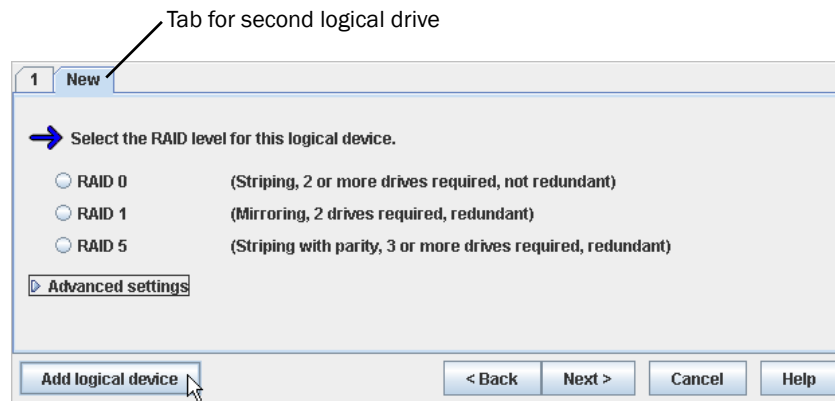
11 Repeat Steps 4 to 10 for each logical drive that you want to create on the controller.

12 Click **Next**, then review the logical drive settings.

This example shows two logical drives with RAID 5 are ready to be created.
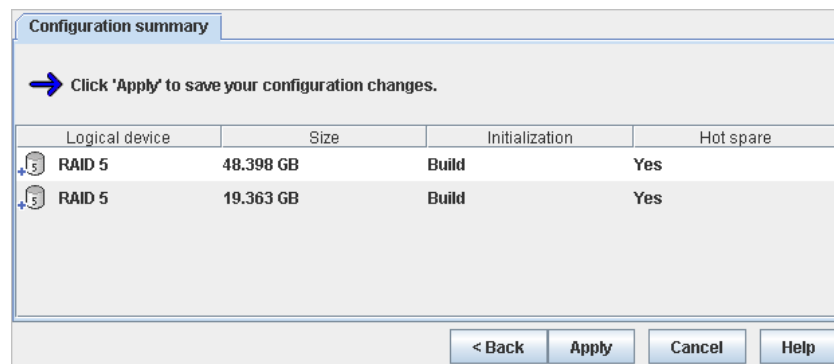
```
┌─ Configuration summary ───────────────────────────────────────────────┐
│                                                                        │
│  ➡  Click 'Apply' to save your configuration changes.                  │
│                                                                        │
│    Logical device  │    Size    │   Initialization   │   Hot spare     │
│    RAID 5          │  48.398 GB │   Build            │   Yes           │
│    RAID 5          │  19.363 GB │   Build            │   Yes           │
│                                                                        │
│                                    │ < Back │  Apply  │ Cancel │ Help │ │
└────────────────────────────────────────────────────────────────────────┘
```

To make changes, click **Back**.

Note: Some operating systems have size limitations for logical drives. Before continuing, verify that the size of the logical drive is appropriate for your operating system. For more information, refer to your operating system documentation.

13 Click **Apply**, then click **Yes**.

Adaptec Storage Manager builds the logical drive(s), indicated by a magnifying glass moving across the new logical drive icon in the Logical Devices View.

```
┌─ Logical devices ──────────────────┐
│  [⊞][T][≡][≡] [+] [🔒][🔓] [CACHE]  │
│  🗄 Logical devices (3)             │
│  ▷  🔍  ₊🔅  Ⓥ                       │
└────────────────────────────────────┘
```

A magnifying glass means that a logical drive is being built.
It disappears once the logical drive has been created.

The logical drive power timers window opens.

14 Set the power timers for the logical drive. The power timers control power usage by the logical device's disk drives. See *Maintaining an Energy-Efficient Storage Space* on page 75 for more information.
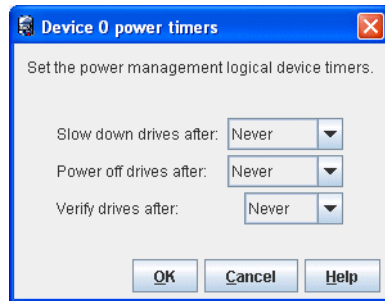
Note: Adaptec Storage Manager prompts you to set power timers for each logical drive you created in the wizard. If you did not enable power management for any logical drive, Adaptec Storage Manager does not display the power timers window.

15 Repeat Steps 1 to 14 for each controller in your storage space, as required.

16 Partition and format your logical drives. See page 36 for more information.

17 When you've finished building your storage space, continue with *Managing Your Storage Space* on page 41.

Managing Your Storage Space

Once your storage space is built, you can add systems, controllers, and disk drives to meet your changing needs, then create logical drives by repeating the steps in this chapter.

The next section of this *User's Guide, Part II: Monitoring and Modifying Your Storage Space*, introduces the features of Adaptec Storage Manager and describes how to protect, monitor, modify, and maintain your storage space.

To become familiar with the user interface of Adaptec Storage Manager, continue with *Exploring Adaptec Storage Manager* on page 43.

adaptec®

Part II:
Monitoring and Modifying Your Storage Space

In this part:

Exploring Adaptec Storage Manager

4

In this chapter...

Before you build your storage space, familiarize yourself with the main features of Adaptec Storage Manager and learn to navigate to the information you need.

Working in Adaptec Storage Manager

Adaptec Storage Manager provides multiple ways to work with its menus and windows.

Most menu options are available by:

- Selecting items from the menu bar.

- Clicking buttons on the tool bar.

- Right-clicking on components in the main window. (Only tasks and windows associated with a specific component are available on right-click menus.)

For simplicity, the tasks in this *User's Guide* are explained mainly using menu bar options.

About the Actions Menu

Most of the main tasks in Adaptec Storage Manager are available from the Actions menu on the menu bar. Options that appear on the Actions menu vary, depending on which type of component is selected in the main window. For instance, managed systems, disk drives, and hot spares each have specialized Actions menus.

For an overview of all Actions menu options, see *What options are on the Actions menu?* on page 164.

Overview of the Main Window

The main window of Adaptec Storage Manager has three main panels—left, right, and bottom—in addition to the other features shown in this figure.

The left panel always shows the Enterprise View; the bottom panel always shows the event log. Different information, or *views*, appear in the right panel depending on which component is selected in the Enterprise View. (In this example, a controller is selected in the Enterprise View, and the right panel displays the Physical Devices and Logical Devices Views.)
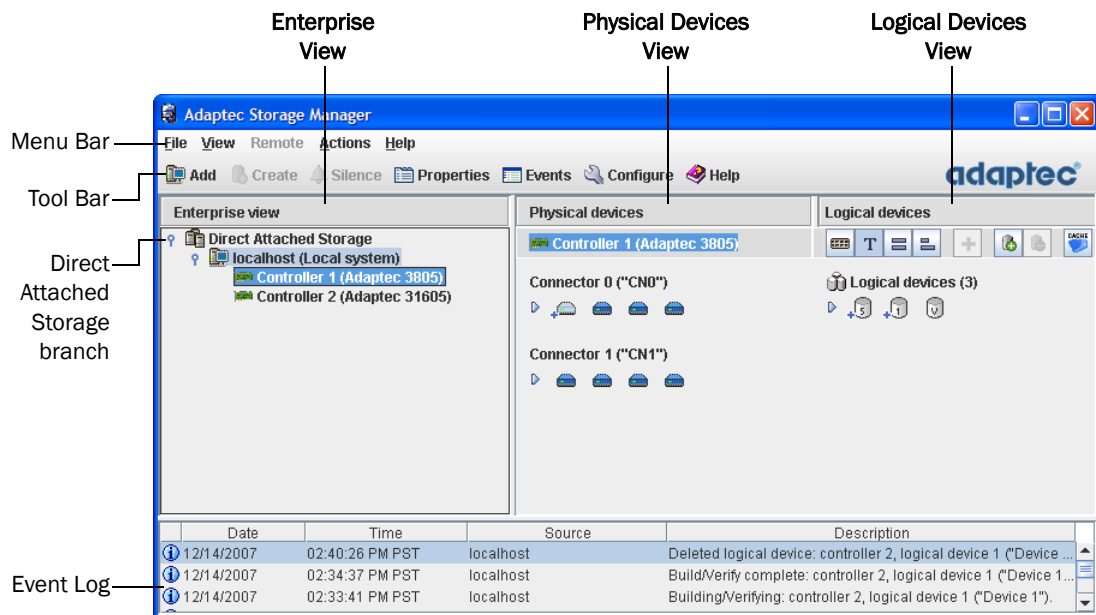
Resize the panels and scroll horizontally or vertically as required, to view more or less information.

The Enterprise View

The Enterprise View is an expandable tree with one main branch, the Direct Attached Storage branch, which displays automatically if you selected Direct Attached Storage when you installed Adaptec Storage Manager.

Under Direct Attached Storage, the Enterprise View lists the local system (the system you're working on) and any remote systems with direct attached storage that you have logged in to from the local system. (See *'Local' or 'Remote'?* on page 26 for more information.)

Expand a system in the Enterprise View to the see its controllers.

When you select a component in the Enterprise View, the controllers, disk drives, or logical drives ("devices") associated with it appear in the right-hand panel of the window, as shown in these figures.
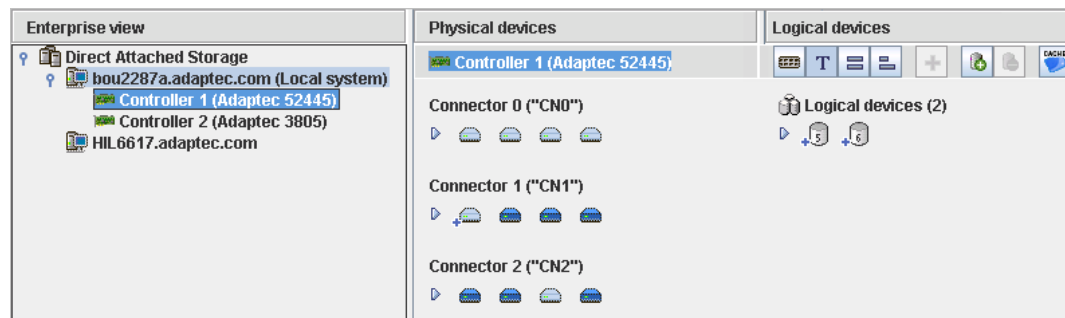
By selecting a controller in the Enterprise View...

...the disk drives (shown above) or enclosures and disk drives (shown below) connected to it and the logical drives created with those disk drives appear in the Physical and Logical Devices Views.
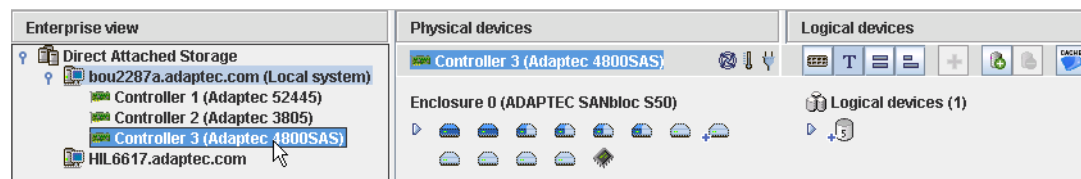
You can perform most tasks by selecting a controller in the Enterprise View and working with its associated devices in the Physical and Logical Devices Views.

What do the Enterprise View icons mean?

Icon	Description
	System with direct attached storage controller and directly attached disk drives or enclosures
	Enclosure
	Controller

The Physical Devices View

When you select a controller in the Enterprise View, information about the physical devices connected to that controller appear in the Physical Devices View. Disk drives designated as hot spares have plus signs (+) beside them.
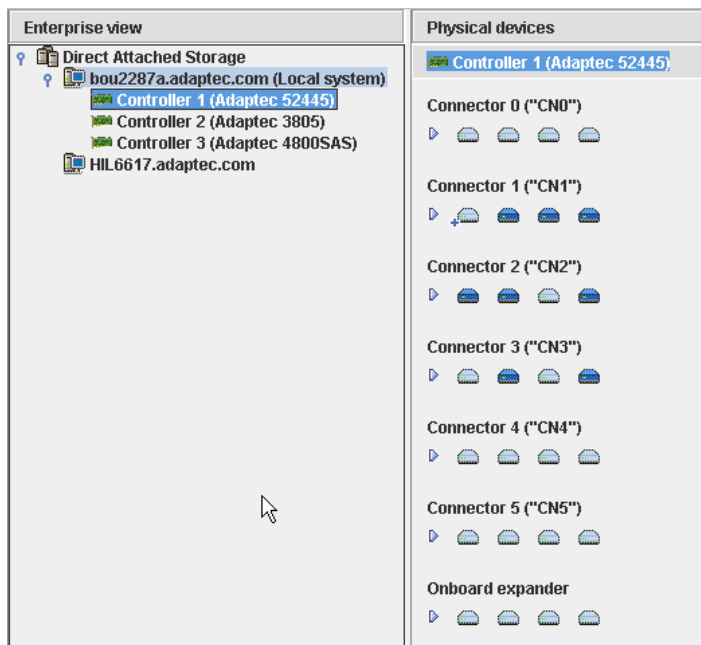
Controller 1...   ...has six connectors and one onboard expander, and is connected to 28 disk drives.

Hold your cursor over any disk drive to see its status, connector/ID number, and maximum speed. You can also click the arrow, shown at right, to see this same information. See *Revealing More Device Information* on page 49 to change how disk drives are represented.
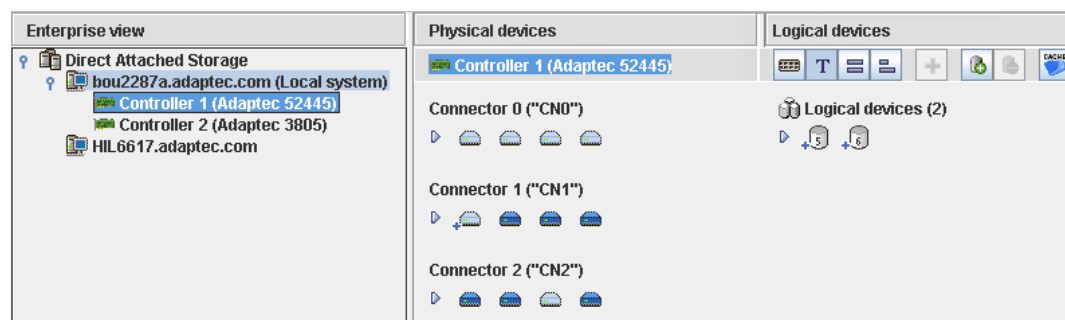
To view the logical drives associated with a particular disk drive, see *The Logical Devices View* on page 47.

What do the icons in the Physical Devices View mean?

Icon	Description
	Ready disk drive, not part of any logical drive
	Disk drive with some space allocated to a logical drive, and some space available
	Disk drive with no free space
	Failed disk drive
	Healthy global or dedicated hot spare protecting at least one logical drive (See *Creating and Managing Hot Spares* on page 54 for more information.)
	Hot spare with error (see page 55 for more information)
	Hot spare being built into logical drive after disk drive failure
	Hot spare built into logical drive after disk drive failure
	Ready Solid State Drive (SSD), not part of any logical drive or MaxIQ pool
	Solid State Drive assigned to MaxIQ pool
	Controller
	Enclosure Management Device (represents an enclosure connected to your controller)

The Logical Devices View

When you select a controller in the Enterprise View, information about the logical drives and arrays associated with that controller appear in the Logical Devices View. (A *logical drive* is a group of physical disk drives that your operating system recognizes as a single drive. For more information, see *Understanding Logical Drives* on page 59.)

Controller 1 is connected to...   ...28 disk drives (some not shown here)...   ...from which two logical drives have been created.

The RAID level of a logical drive is indicated by the number inside the logical drive's icon. For instance, the logical drive shown at right has RAID 1. Logical drives protected by hot spares have plus signs (+) beside them, as shown at right.

Hold your cursor over any logical drive to see its name, status, and size. You can also click the arrow, shown at right, to view this same information for all the logical drives at once.

Click on a logical drive to highlight the disk drives that comprise it in the Physical Devices View.

Five disk drives (plus one hot spare) comprise the selected RAID 6 logical drive.
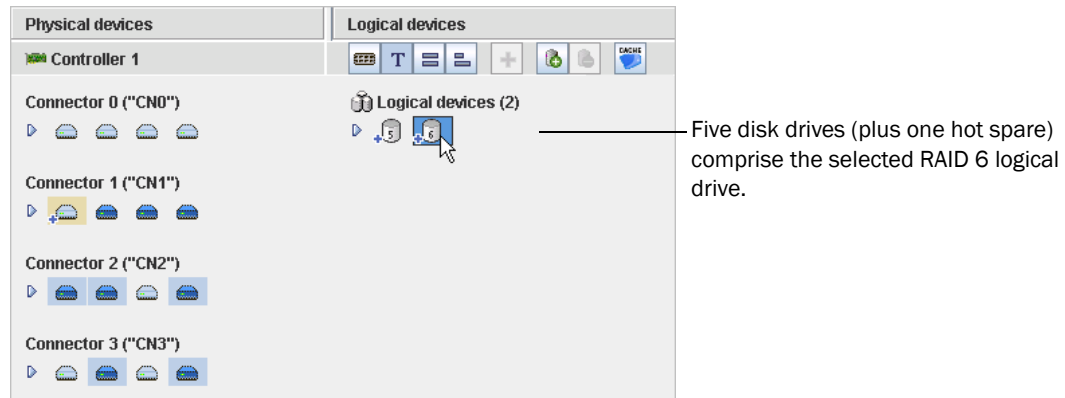
You can also click on any disk drive to see which (if any) logical drive it belongs to. A disk drive shaded in light blue is not part of any logical drive.

What do the icons in the Logical Devices View mean?

Icon	Description
	Logical drive
	Logical drive with healthy hot spare
	Logical drive being initialized
	Logical drive being modified
	Logical drive being rebuilt after disk drive failure

Revealing More Device Information

You can reveal more information about disk drives and logical drives by using the View buttons (circled below) to change what information displays.

Note: Not all views are available for all components.

Default View
(Text View)

Click the arrows to expand list and reveal basic information.

Click this button to see the size capacities of your disk drives. Disk drives or segments of disk drives that are included in logical devices are shaded brown.
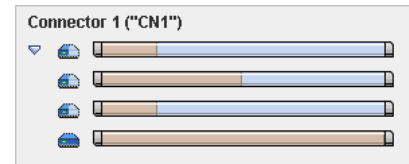
Click this button to see the size capacities of your disk drives relative to each other.
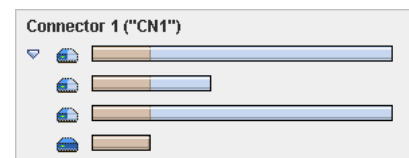
If your controller is connected to an enclosure, click this button to see all the disk drives in the enclosure.
Note: Not all enclosures are supported by Adaptec Storage Manager. Unsupported enclosures do not appear in Enclosure View.
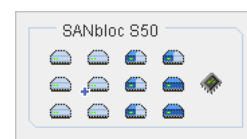
Checking System Status from the Main Window

Adaptec Storage Manager includes an event log for at-a-glance system status and activity information. The event log provides status information and messages about activity (or *events*) occurring in your storage space. Double-click any event to see more information in an easier-to-read format.

	Date	Time	Source	Description
ⓘ	12/18/2007	02:21:35 PM PST	bou2287a.adapte...	Build/Verify complete: controller 2, logical device 1 ("LogicalB2").
ⓘ	12/18/2007	02:21:29 PM PST	bou2287a.adapte...	Build/Verify complete: controller 2, logical device 0 ("LogicalB1").
ⓘ	12/18/2007	02:20:45 PM PST	bou2287a.adapte...	Building/Verifying: controller 2, logical device 1 ("LogicalB2").
ⓘ	12/18/2007	02:20:45 PM PST	bou2287a.adapte...	Building/Verifying: controller 2, logical device 0 ("LogicalB1").
ⓘ	12/18/2007	02:20:45 PM PST	bou2287a.adapte...	Added logical device: controller 2, logical device 1 ("LogicalB2"...

Warning- and Error-level icons, shown at right, appear next to components (such as systems and logical drives) affected by a failure or error, creating a trail, or *rapid fault isolation*, that helps you identify the source of a problem when it occurs. See *Identifying a Failed or Failing Component* on page 136 for more information.

Enclosure Warning

Disk Drive Error
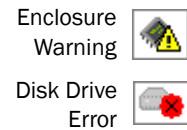
If your storage space includes a controller with a temperature sensor, or an enclosure with an enclosure management device, such as a SCSI Accessed Fault-Tolerant Enclosure (SAF-TE) processor, temperature, fan, and power module status is displayed by status icons in the Physical Device view, as shown in the next figure. These status icons change color to indicate status (see page 105).

Status Icons

Power Module Status

Temperature Status

Fan Status
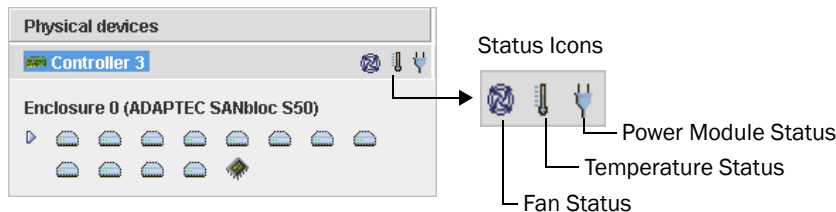
For more information, see *Monitoring Status and Activity* on page 102.

Note: By default, all Warning- and Error-level events activate an audible alarm. See *If your enclosure does not have an enclosure management device, the status icons appear but do not indicate status.* on page 105 for more information.

Getting Help

Adaptec Storage Manager online Help includes conceptual information, glossary definitions, and descriptions of on-screen menus and items, in addition to step-by-step instructions for completing tasks.

To open the online Help, click the **Help** button (shown at right). Alternatively, press the **F1** key, or in the menu bar select **Help**, then click **Search** or **Contents**.

Press the **Help** button in a dialog box or wizard for help with that specific dialog box, window, or procedure.

Additionally, you can find the most commonly asked-about information in *Quick Answers to Common Questions...* on page 161 of this *User's Guide*.

Logging Out of Adaptec Storage Manager

To log out of Adaptec Storage Manager:

1 In the Enterprise View, click on the local system.

2 In the menu bar, select **Actions**, then click **Log out**.
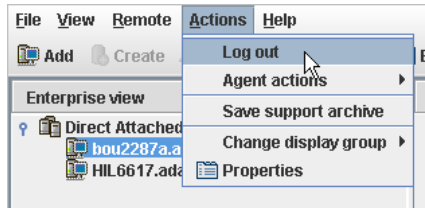
You are logged out of Adaptec Storage Manager.

Logging Back In

To log in to Adaptec Storage Manager:

1 In the Enterprise View, click on the local system.

2 In the menu bar, select **Actions**, then click **Log in**.

3 Enter your user name and password, then click **Connect**.

Uninstalling Adaptec Storage Manager

To uninstall Adaptec Storage Manager, follow the instructions for your operating system.

Uninstalling From Windows Systems

To uninstall Adaptec Storage Manager from a Windows system, use the Add or Remove Programs tool in the Control Panel. All Adaptec Storage Manager components are uninstalled.

Uninstalling From Linux Systems

To uninstall Adaptec Storage Manager from a Linux system, type this command:

```
rpm --erase StorMan
```

Adaptec Storage Manager is uninstalled.

Uninstalling From UnixWare or OpenServer Systems

To uninstall Adaptec Storage Manager from a UnixWare or OpenServer system, type this command:

```
pkgrm StorMan
```

Adaptec Storage Manager is uninstalled.

Uninstalling From Solaris Systems

To uninstall Adaptec Storage Manager from a Solaris system, type this command:

```
pkgrm StorMan
```

Adaptec Storage Manager is uninstalled.

Uninstalling From FreeBSD Systems

To uninstall Adaptec Storage Manager from a FreeBSD system, type this command:

```
pkg_delete Storman-x.x.x-x86 or pkg_delete Storman-x.x.x-amd64
```

where x.x.x is the package version.

Adaptec Storage Manager is uninstalled.

Uninstalling From VMWare Systems

To uninstall Adaptec Storage Manager from a VMWare system, type this command:

```
rpm --erase StorMan
```

Adaptec Storage Manager is uninstalled.

Protecting Your Data

5

In this chapter...

In addition to the standard (RAID 0, RAID 1, RAID 5, RAID 10, RAID 50) and enhanced (RAID 1E, RAID 5EE, RAID 6, RAID 60) RAID levels, controllers with the Adaptec Advanced Data Protection Suite include additional methods of protecting the data on your storage space.

This chapter describes how to use hot spares and copyback to protect your stored data.

Creating and Managing Hot Spares

A *hot spare* is a disk drive that automatically replaces any failed drive in a logical drive, and can subsequently be used to rebuild that logical drive. (For more information on recovering from a disk drive failure, see page 137.)

Hot Spare Limitations

● You can't create a hot spare for RAID 0 logical drives, simple volumes, or spanned volumes.

● You can't create a hot spare from a disk drive that is already part of a logical drive.

● You should select a disk drive that is at least as big as the largest disk drive it might replace.

● Adaptec recommends that you *not* designate a SAS hot spare for a logical drive comprising SATA disk drives, or a SATA hot spare for a logical drive comprising SAS disk drives.

Dedicated Spare or Global Spare?

A *global* hot spare is not assigned to a specific logical drive and will protect any logical drive on the controller (except RAID 0 logical drives). You can designate a global hot spare before or after you build logical drives on a controller; you can also designate a global hot spare while you're creating a logical drive. To designate a global hot spare, see page 54.

A *dedicated* hot spare is assigned to one or more specific logical drives and will only protect those logical drives. (A dedicated hot spare that has been assigned to protect more than one logical drive is called a *pool* spare.) You must create the logical drive before you can assign a dedicated hot spare. To assign a dedicated hot spare or pool hot spare, see page 55.

Designating a Global Hot Spare

This section describes how to designate a global hot spare before or after you build a logical drive.

Note: To designate a global hot spare while you're creating a logical drive, see Step 7 on page 38.

To designate a global hot spare:

1 In the Enterprise View, click the controller on which you want a global hot spare.

2 In the Physical Devices View, click the disk drive you want to designate as a hot spare. (See *Hot Spare Limitations* for help selecting a disk drive.)

3 Click the **Create global hot-spare drive** button.
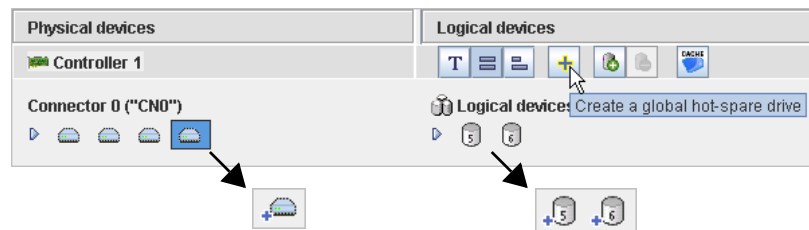
A plus sign appears beside the selected disk drive, indicating that it's designated as a hot spare. (A yellow plus sign indicates an error. See *What Do the Hot Spare Icons Mean?* on page 55 for help solving the problem.) A plus sign also appears beside each existing logical drive.

Any other logical drives created on the controller will automatically be protected by that global hot spare.

Assigning a Dedicated Hot Spare or Pool Hot Spare

A dedicated hot spare is assigned to one or more specific logical drives. (A dedicated hot spare that has been assigned to protect more than one logical drive is called a *pool* hot spare.)

Note: You must create the logical drive before you can assign a dedicated hot spare.

To assign a dedicated or pool hot spare:

1 In the Enterprise View, click the controller on which you want a dedicated hot spare.

2 In the Physical Devices View, click the disk drive you want to designate as a hot spare. (See *Hot Spare Limitations* on page 54 for help selecting a disk drive.)

3 In the menu bar, select **Actions**, then click **Create dedicated hot-spare drive for**, then click the name of the logical drive (in this example, Device 1).
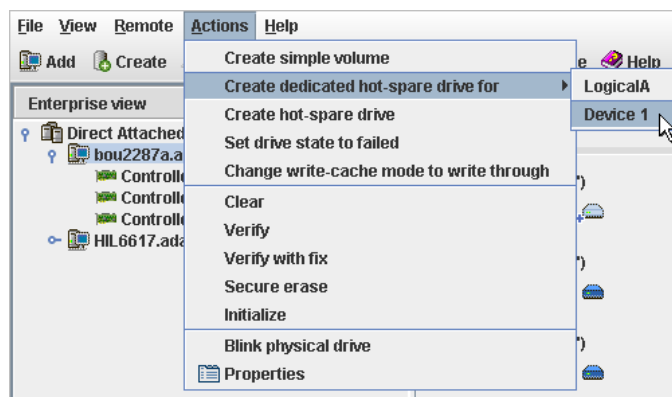
A plus sign appears beside the selected disk drive, indicating that it's designated as a dedicated hot spare. (A yellow plus sign indicates an error. See *What Do the Hot Spare Icons Mean?* on page 55 for help solving the problem.)

4 To use the same dedicated hot spare to protect another logical drive (create a pool hot spare), repeat Step 2 and Step 3.

What Do the Hot Spare Icons Mean?

Icon	Explanation	Action
	Healthy global or dedicated hot spare	No action required.
	Error on hot spare: ● Hot spare is not assigned to any logical drives	● Create at least one logical drive on the same controller
	● Hot spare is too small to protect the logical drive(s) it's assigned to	● Designate larger disk drive as hot spare
	● Global hot spare was designated before any logical drives were built	● Create at least one logical drive on the same controller
	Hot spare has been built into a logical drive after disk drive failure	Designate replacement or other available disk drive as new hot spare; remove 'hot spare' designation from disk drive (see *Removing or Deleting a Dedicated Hot Spare*)

Removing or Deleting a Dedicated Hot Spare

You can delete a dedicated hot spare or remove it from a logical drive. You may want to do this to:

- Make disk drive space available for another logical drive.

- Make a dedicated hot spare into a global hot spare.

- Remove the 'hot spare' designation from a disk drive that is no longer being used as a hot spare. (When a hot spare is built into a logical drive after a disk drive failure, it retains its 'hot spare' designation even though it can no longer protect the logical drives it's assigned to. See *Recovering from a Disk Drive Failure* on page 137 for more information.)

To remove or delete a dedicated hot spare:

1 In the Enterprise View, click the controller associated with the hot spare.

2 In the Physical Devices View, click the hot spare.

3 In the menu bar, select **Actions**, then click **Delete dedicated hot-spare drive**, or click **Remove dedicated hot-spare drive from**, then select the logical drive you want (in this example, Device 1).
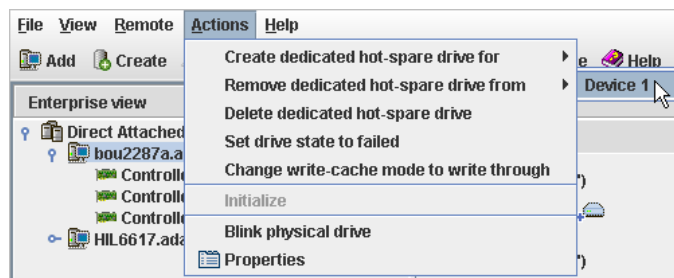
The hot spare is deleted or removed, and the disk drive becomes available for other uses in your storage space.

Deleting a Global Hot Spare

You can delete a global hot spare. You may want to do this to:

- Make disk drive space available for another logical drive.

- Make a global hot spare into a dedicated hot spare.

- Remove the 'hot spare' designation from a disk drive that is no longer being used as a hot spare. (When a hot spare is built into a logical drive after a disk drive failure, it retains its 'hot spare' designation even though it can no longer protect the logical drives it's assigned to. See *Recovering from a Disk Drive Failure* on page 137 for more information.)

To remove or delete a dedicated hot spare:

1 In the Enterprise View, click the controller associated with the hot spare.

2 In the Physical Devices View, click the hot spare.

3 In the menu bar, select **Actions**, then click **Delete hot-spare drive**.
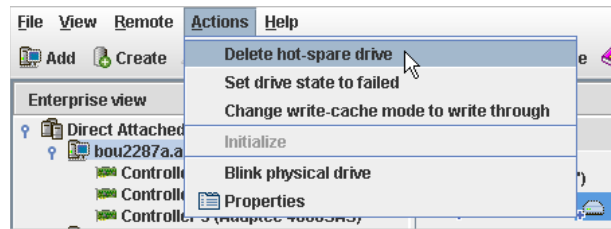
The hot spare is deleted and the disk drive becomes available for other uses in your storage space.

Enabling Copyback

When a logical drive is rebuilt using a hot spare (see page 137), data from the failed drive is transferred to the hot spare. When *copyback* is enabled, data is moved back to its original location once the controller detects that the failed drive has been replaced. Once the data is copied back, the hot spare becomes available again.

To enable or disable copyback, in the Enterprise View, right-click the controller, then click **Enable or Disable copy back mode**. (The copyback setting is a toggle switch.)

Modifying Your Direct Attached Storage

6

In this chapter...

This chapter explains how to create and modify logical drives, optimize logical drive performance, and use Adaptec Storage Manager's power management features to maintain an energy-efficient storage space.

Understanding Logical Drives

A logical drive is a group of physical disk drives that appears to your operating system as a single drive that can be used for storing data.

A logical drive can comprise one or more disk drives and can use part or all of each disk drive's capacity.

It is possible to include the same disk drive in two different logical drives by using just a portion of the space on the disk drive in each, as shown in the following figure.
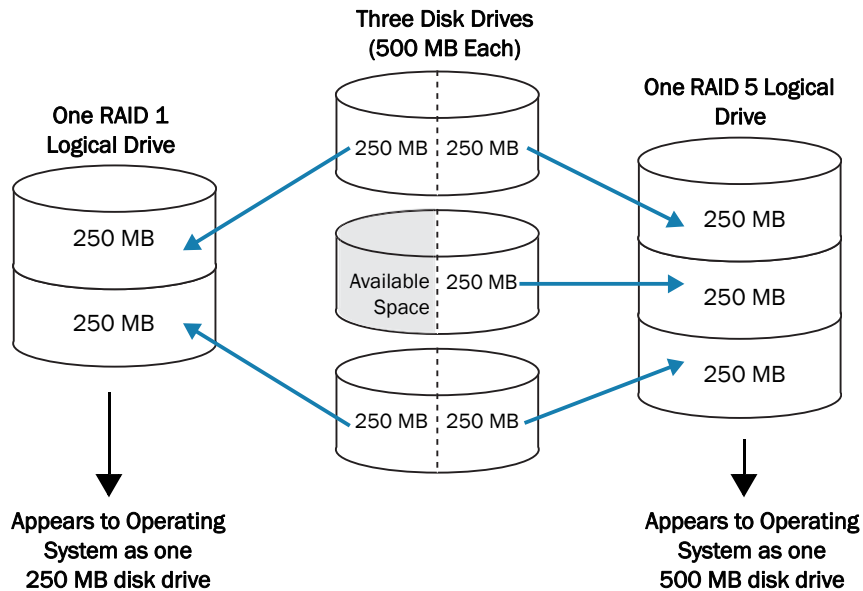
Disk drive space that has been assigned to a logical drive is called a *segment*. A segment can include all or just a portion of a disk drive's space. A disk drive with one segment is part of one logical drive, a disk drive with two segments is part of two logical drives, and so on. A segment can be part of only one logical drive. When a logical drive is deleted, the segments that comprised it revert to available space (or *free segments*).

A logical drive can include redundancy, depending on the RAID level assigned to it. (See *Selecting the Best RAID Level* on page 152 for more information.)

Once a logical drive has been created, you can change its RAID level or increase its capacity to meet changing requirements. You can also protect your logical drives by assigning one or more hot spares to them. (See page 54 for more information.)

Creating and Modifying Logical Drives

For basic instructions for creating logical drives, see *Building Your Storage Space* on page 25.

This section describes three additional scenarios for creating logical drives, and provides instructions for modifying a logical drive as it's being created.

● To create a new logical drive of a specified size, see the following section.

● To create a logical drive from different-sized disk drives, see page 61.

● To create a logical drive using available *segments* of disk drives, see page 62.

● To stop the creation of a new logical drive, see page 62.

● To change the priority of a new logical drive's creation, see page 62.

Creating a Logical Drive of a Specified Size

As described in Step 7 on page 38, Adaptec Storage Manager automatically sets the size of a new logical drive to maximize the capacity of the disk drives that it comprises. However, you can choose to set the size for a new logical drive. You may want to do this to maximize your available disk drive space, or allocate available space to more than one logical drive.

To set the size of a logical drive:

1   Complete Steps 1 through 7 in *Custom Configuration (Advanced)* on page 37.

2   Click **Advanced Settings**.

The maximum size of the logical drive appears in the Size (GB) box.

3   Enter the new size for the logical drive. The size you enter must be less than or equal to the maximum size.

4   Click **Next**.

5   Review the logical drive settings, click **Apply**, then click **Yes**.

Adaptec Storage Manager builds the logical drive. The configuration is saved in the Adaptec controller and in the physical drives.

If the disk drives you used to create this logical drive have available space left over, you can use them to create a new logical drive (see page 62), or to expand an existing logical drive (see page 69).

Including Different-sized Disk Drives in a Logical Drive

You can combine disk drives of different sizes in the same logical drive. If the logical drive includes redundancy, however, the size of each segment can be no larger than the size of the smallest disk drive. (See *Selecting the Best RAID Level* on page 152 for more information about redundancy.)

Note: Adaptec recommends that you *not* combine SAS and SATA disk drives within the same logical drive. Adaptec Storage Manager generates a warning if you try to create a logical drive using a combination of SAS and SATA disk drives.

To create a logical drive with disk drives of different sizes, follow the instructions in *Building Your Storage Space* on page 25.

When the logical drive is created, it appears similar to the example in the next figure, where a RAID 5 logical drive includes two disk drives of one size and two of another—the disk drive icons indicate that the two larger disk drives still have available space.

Disk drive icons show space still available
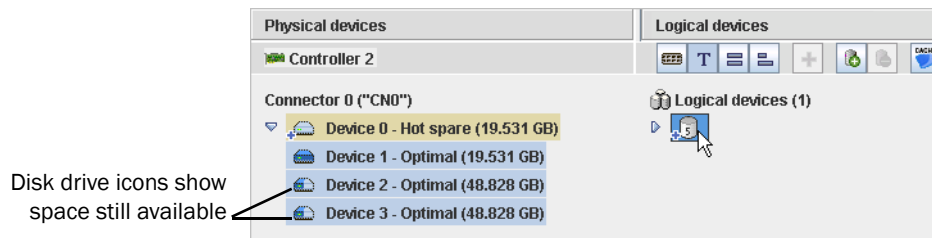
The Full Size Capacity View of the same RAID 5 logical drive shows that the larger disk drives still have available space (free segments, indicated in light-blue) that is not part of a logical drive. It also shows that the disk drive designated as a hot spare is large enough to replace any of the disk segments included in the logical drive.

Light-blue segments are not part of a logical drive and are still available for use.
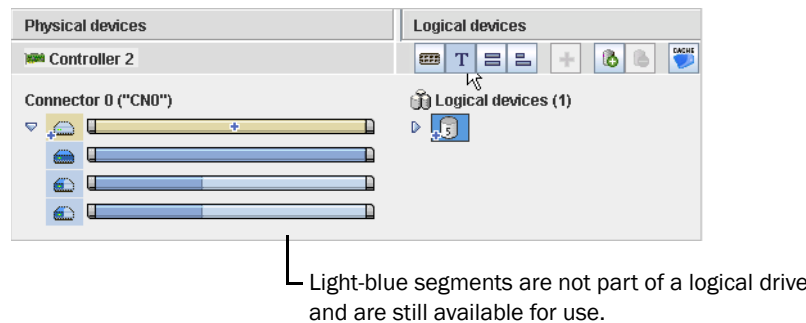
You can include a disk drive's available space in a new logical drive (see page 62), or add it to an existing logical drive (see page 69).

Creating a Logical Drive Using Available Segments

Free segments on a disk drive can be used to create a new logical drive. (Each segment can only be used in one logical drive at a time.)

To create a logical drive using free segments on disk drives:

1 Complete Steps 1 through 5 in *Custom Configuration (Advanced)* on page 37.

2 In the Physical Devices panel, select the disk drives and/or free disk drive segments you want to use in the logical drive.

Note: Adaptec recommends that you *not* combine SAS and SATA disk drives within the same logical drive. Adaptec Storage Manager generates a warning if you try to create a logical drive using a combination of SAS and SATA disk drives.

In this example, two free segments of larger disk drives are combined with smaller disk drives to create a RAID 5 logical drive.

Free segments of larger disk drives used in logical drive
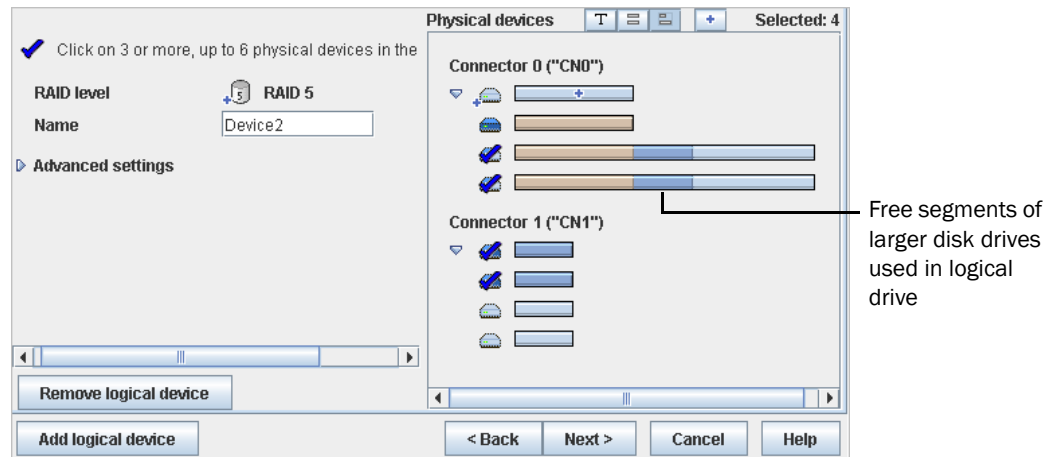
3 Click **Next**.

4 Review the logical drive settings.

5 Click **Apply**, then click **Yes**.

Adaptec Storage Manager builds the logical drive. The configuration is saved in the Adaptec controller and in the physical drives.

Stopping the Creation of a Logical Drive

To stop the creation of a new logical drive, right-click the magnifying glass icon (shown at right), then select **Stop current task**.

Changing the Priority of the Creation of a Logical Drive

To change the priority of the creation of a logical drive to High, Medium, or Low, right-click the magnifying glass icon, then select **Change background task priority**.

Note: To set the default priority for all tasks on the same controller, see *Setting a Controller's Default Task Priority* on page 93.

Fine-tuning Logical Drives

You can fine-tune a new or existing logical drive to meet your needs by changing its name or adjusting the Advanced settings described in this section. (Not all options are available for all controllers or all RAID levels.)

Renaming a Logical Drive

To change the name of a logical drive:

1   In the Enterprise View, click the controller associated with the logical drive.

2   In the Logical Devices View, click the logical drive.

3   In the menu bar, select **Actions**, then click **Change logical device name**.

4   Type the new name, then click **OK**.

     The logical drive is updated with its new name.

Adjusting a Logical Drive's Advanced Settings

Note: The default settings in Adaptec Storage Manager are optimal for most users and storage spaces. Only advanced users should change the settings described in this section.

To fine-tune a logical drive:

1   Open the list of Advanced settings.

     If you are creating a *new* logical drive, follow the instructions in Step 7 on page 38.

     If you are modifying an *existing* logical drive:

     a   In the Enterprise View, click the controller associated with the logical drive.

     b   In the Logical Devices View, click the logical drive.

     c   In the menu bar, select **Actions**, then click **Expand or change logical device** (shown in the figure in Step 3 on page 63.

     d   Click **Next**, then click **Advanced settings**.

2   Modify the available settings as required for your logical drive (not all options are available for all controllers or all RAID levels):

     • Logical drive size (see page 60)

     • Stripe size (see page 64)

     • Write cache (see page 64)

     • Read cache (see page 64)

     • Initialize priority (see page 65)

     • Initialize method (see page 65)

     • MaxIQ cache (see page 78)

3   Click **Next**.

4   To apply the changes immediately, click **Apply**.

To schedule the changes for later, click **Schedule**, then set the date and time. (For more information, see *Scheduling a Task* on page 81.)

Changing the Stripe Size

The *stripe size* is the amount of data (in KB) written to one partition before the controller moves to the next partition in a logical drive.

Stripe size options vary, depending on your controller. Normally, the default stripe size provides the best performance.

For RAID 6 and RAID 60 logical drives, the more disk drives there are in the logical drive, the fewer the stripe size options.

Changing the Write Cache Setting

The *write cache* setting determines when data is stored on a disk drive and when the controller communicates with the operating system.

- **Disabled** (**write-through**)—The controller sends (or *writes*) the data to a disk drive, then sends confirmation to the operating system that the data was received. Use this setting when performance is less important than data protection.

- **Enabled** (**write-back**)—The controller sends confirmation to the operating system that the data was received, then writes the data to a disk drive. Use this setting when performance is more important than data protection and you aren't using a battery-backup cache. *Enabled* is the default setting.

Note: (*RAID 10, 50, and 60 only*) All logical drives within a RAID 10/50/60 logical drive must have the same write cache setting—either all write-through or all write-back.

To quickly change the write cache setting:

1 Click the logical drive you want.

2 In the menu bar, select **Actions**, click **Configure write cache**, then select **Enabled** or **Disabled** as required.

 The write cache setting is changed.

Changing the Read Cache Setting

When *read caching* is enabled, the controller monitors the read access to a logical drive and, if it sees a pattern, pre-loads the cache with data that seems most likely to be read next, increasing performance.

- **Enabled**—The controller transfers data from the logical drive to its local cache in portions equal to the stripe size. Use this setting for the best performance when workloads are steady and sequential. *Enabled* is the default setting.

- **Disabled**—The controller transfers data from the logical drive to its local cache in portions equal to the system I/O request size. Use this setting for the best performance when workloads are random or the system I/O requests are smaller than the stripe size. (For more information about system I/O requests, refer to your operating system documentation.)

Note: To improve performance in read-intensive applications, use the MaxIQ™-compatible Solid State Drives (SSD) in your system as a global read cache pool. For more information, see *Configuring the MaxIQ Cache* on page 78.

To quickly change the read cache setting:

1   Click the logical drive you want.

2   In the menu bar, select **Actions**, click **Configure read cache**, then select **Enabled** or **Disabled** as required.

The read cache setting is changed.

Changing the Initialize Priority

The Initialize Priority setting determines the priority for the initialization of the logical drive. The default setting is *High*, which means that the logical drive is initialized as quickly as possible.

Changing the Initialize Method

The Initialize Method setting determines how a logical drive is *initialized* (prepared for reading and writing), and how long initialization will take. The settings are presented in order of slowest to fastest method.

- **Build**—(slowest) For RAID 1 logical drives, data is copied from the primary drive to the mirror drive; for RAID 5 logical drives, parity is computed and written. *Build* is the default setting for most logical drives (see *Quick* method below).

  Adaptec Storage Manager performs build initializations in the background; you can use the logical drive immediately.

- **Clear**—Every block in the logical drive is overwritten, removing all existing data. You can't use the logical drive until the initialization is complete.

- **Quick**—(fastest) The logical drive is made available immediately. *Quick* is the default setting for RAID 1, RAID 1EE, and RAID 10 logical drives.

Optimizing Logical Drive Performance

To ensure optimal performance of the logical drives in your storage space, you can select a *performance mode* to improve I/O throughput based on the needs of your application. (This feature is not supported on all controllers.) The following application-specific performance modes are supported by Adaptec Storage Manager.

Performance Mode	Performance Criteria	Best Performance
Dynamic (default)	● Automatically adjusts criteria based on controller usage, RAID level, and disk drive type	—
Online Transaction Process (OLTP)/ Database—a system that facilitates and manages transaction-oriented applications, such as data entry and retrieval applications.	● 100% Random ● 60%--80% Read ● 20%--40% Write ● 8Kb Blocks	SAS: ● R0 Sequential writes (all request sizes) ● R0 File server and Web server ● R5 Sequential writes (all request sizes) ● R5 Web server ● R6 Web server ● R10 Sequential writes ● R10 Web server SATA: ● R0 Sequential reads (all request sizes) ● R0 Sequential writes (all request sizes) ● R0 File/print server ● R5 Sequential writes (256Kb request size) ● R5 Random writes ● R6 Sequential writes (all request sizes) ● R10 Sequential writes (all request sizes) ● R10 Workstation:

To select a performance mode for the logical drives on a controller:

1 In the Enterprise View, select the controller you want.

2 In the menu bar, select **Actions**, click **Change performance mode**, then select an application type.
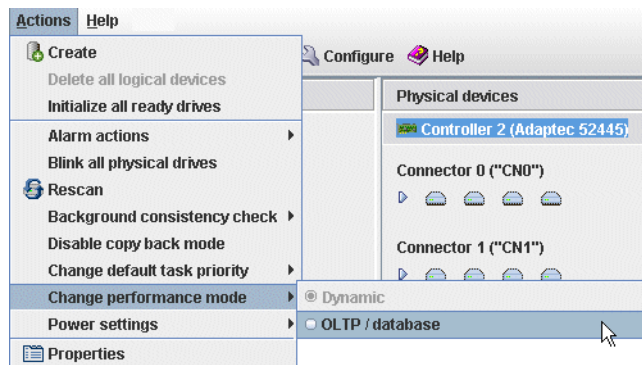
3 Shutdown Adaptec Storage Manager and reboot the system.

Note: You *must* reboot the system before the performance mode setting takes effect.

Verifying Logical Drives

To ensure that there are no data problems on your logical drives, it is important to *verify* them. When you verify a logical drive, Adaptec Storage Manager checks it for inconsistent or bad data and then fixes any problems. (You can also choose to verify a logical drive without fixing it.)

Logical drives without redundancy (for instance, RAID 0 logical drives) do not need to be verified.

In Adaptec Storage Manager, logical drive verification can occur in different ways, depending on your controller:

● **Automatic verification**—If your controller supports build initialization, Adaptec Storage Manager automatically verifies all new redundant logical drives. No manual verification is required.

   To see if your controller supports build initialization, right-click the controller in the Enterprise View and click **Properties**.

● **Manual verification**—If your controller doesn't support build initialization, a Warning-level event notice appears in the event log prompting you to verify a logical drive before you begin to use it. To verify a logical drive manually, see *Verifying and Fixing a Logical Drive* on page 67.

● **Background verification**—If your controller supports background consistency check, Adaptec Storage Manager continually and automatically checks your logical drives once they're in use.

   To see if your controller supports background consistency check, right-click the controller in the Enterprise View, then click **Properties**. To enable or disable background consistency check or to set the checking period, see page 68.

   Note: If your controller doesn't support background consistency check, Adaptec highly recommends that you verify your logical drives weekly, following the instructions in *Verifying and Fixing a Logical Drive* on page 67.

Verifying and Fixing a Logical Drive

Note: To verify a logical drive without fixing it, see page 68.

While Adaptec Storage Manager verifies and fixes a logical drive, you can't complete any other tasks on the controller. Because the verification can take a long time to complete, you may want to schedule it as a task to be completed overnight or on a weekend.

To verify and fix a logical drive:

1 Ensure that no activity is taking place on the controller associated with the logical drive you want to verify and fix.

2 In the Enterprise View, click the controller.

3 In the Logical Devices View, click the logical drive.

4 In the menu bar, select **Actions**, then click **Verify with fix**.

5 To begin the verification immediately, click **Yes**.

   To schedule the verification, click **Schedule**, then set the date and time. You can also choose to set the verification as a recurring task. (For more information on scheduling tasks, see page 81.)

Note: Don't power off the system while the verification is in progress. If you do, the verification will stop.

While the verification is in progress, the logical drive is shown as an animated icon (as shown at right) to indicate that the task is in progress.

When the verification is complete, an event notice is generated in the local system's event log (and broadcast to other systems, if you have event notification set up—see *Notifying Users by Event Log Message About Status and Activity* on page 106).

You can now continue working on the controller.

Verifying a Logical Drive (Without Fix)

Note: To verify *and fix* a logical drive, see page 67.

While Adaptec Storage Manager verifies a logical drive, you can't complete any other tasks on the controller associated with that logical drive. Because verification takes a long time to complete, you may want to schedule it as a task to be completed overnight or on a weekend.

To verify a logical drive:

1   Ensure that no activity is taking place on the controller associated with the logical drive you want to verify and fix.

2   In the Enterprise View, click the controller.

3   In the Logical Devices View, click the logical drive.

4   In the menu bar, select **Actions**, then click **Verify**.

5   To begin the verification immediately, click **Yes**.

To schedule the verification for later, click **Schedule**, set the date and time, then click **Apply**. You can also set the verification to recur. (For more information on scheduling tasks, see page 81.)

Note: Don't power off the system while the verification is in progress. If you do, the verification will stop.

While the verification is in progress, the logical drive is shown as an animated icon (as shown at right) to indicate that the task is in progress.

When the verification is complete, an event notice is generated in the local system's event log (and broadcast to other systems, if you have event notification set up—see *Notifying Users by Event Log Message About Status and Activity* on page 106).

You can now continue working on the controller.

Enabling/Disabling Background Consistency Check

If your controller supports background consistency check, Adaptec Storage Manager continually and automatically checks your logical drives once they're in use. (To see if your controller supports background consistency check, right-click the controller in the Enterprise View, then click **Properties**.)

To enable or disable background consistency check:

1   In the Enterprise View, click the controller.

2   In the menu bar, select **Actions**, then click **Enable (Disable) background consistency check**.

The controller is updated with the new setting.

Setting the Background Consistency Check Period

You can choose how often Adaptec Storage Manager checks for inconsistent or bad data on your logical drives and hot-spares.

To change the background consistency check period:

1   In the Enterprise view, select a controller.

2   Right-click **Background Consistency Check,** then select **Change period**.

The Change background consistency check period window opens.

3   Adjust the slider control from Very Slow (365 days) to Fast (10 days). Alternatively, in the New Period field, use the arrow keys to increase or decrease the setting.

4   Click **OK**.

Increasing the Capacity of a Logical Drive

You can add more disk drive space to a logical drive to increase its capacity (or *expand* it).

Note: The maximum size of a logical drive varies by controller. Refer to your controller's documentation for more information.

The expanded logical drive must have a capacity that's greater than or equal to the original logical drive.

To increase the capacity of a logical drive:

1   In the Enterprise View, click the controller associated with the logical drive.

2   In the Logical Devices View, click the logical drive.

3   In the menu bar, select **Actions**, then click **Expand or change logical device** (shown in the figure in).

A wizard opens to help you modify the logical drive.

4   Click **Next**.

5   Click on the disk drive(s) or disk drive segments you want to add to the logical drive.

Note: Adaptec recommends that you *not* combine SAS and SATA disk drives within the same logical drive. Adaptec Storage Manager generates a warning if you try to create a logical drive using a combination of SAS and SATA disk drives.

If you want to remove a specific disk drive or segment and replace it with another one (for instance, replace a smaller disk drive with a larger one), click on the disk drive you want to remove.

An X indicates that the selected disk drive will be removed from the logical drive, and you are prompted to select another disk drive (of greater or equal size) to replace it.
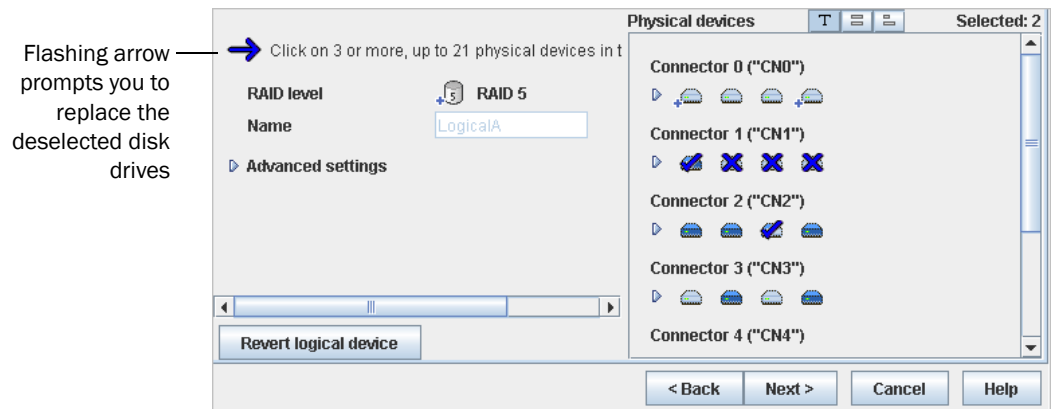
Flashing arrow prompts you to replace the deselected disk drives

6   Modify the Advanced Settings, if required. (See *Fine-tuning Logical Drives* on page 63.)

7   Click **Next**.

8   Review the new logical drive settings. To make changes, click **Back**.

   Note: Some operating systems have size limitations for logical drives. Before you save the configuration, verify that the size of the logical drive is appropriate for your operating system.

9   To update your logical drive immediately, click **Apply**, then click **Yes**.

   To schedule the changes for later, click **Schedule**, set the date and time, then click **Apply**. (For more information on scheduling tasks, see page 81.)

Extending a Partition on a Logical Drive

(Windows 2003, Windows XP, and Windows 2000 only) If you have expanded a logical drive, you can extend the partition on that logical drive to use the newly added space. Refer to your operating system instructions for more information.

Changing the RAID Level of a Logical Drive

As your requirements change, you can change the RAID level of your logical drives to suit your needs. You may want to do this to add redundancy to protect your data, or improve data availability for speedier access to your data. See *Selecting the Best RAID Level* on page 152 for more information.

Changing the RAID level normally requires one or more disk drives to be added to or removed from the logical drive. Adaptec Storage Manager won't allow you to continue unless you have the right number of disk drives available.

To change the RAID level of a logical drive:

1   In the Enterprise View, click the controller associated with the logical drive.

2   In the Logical Devices View, click the logical drive.

3   In the menu bar, select **Actions**, then click **Expand or change logical device** (see page 69).

   A wizard opens to help you change the RAID level.

4   Select a new RAID level, then click **Next**. Only valid options are offered.

5 In the Logical Devices panel, select the disk drives you want to use in the modified logical drive.

Note: Adaptec recommends that you *not* combine SAS and SATA disk drives within the same logical drive. Adaptec Storage Manager generates a warning if you try to create a logical drive using a combination of SAS and SATA disk drives.

Adaptec Storage Manager prompts you to select the correct number of disk drives.

If you want to remove a specific disk drive and replace it with another one (for instance, replace a smaller disk drive with a larger one), click on the disk drive you want to remove. An X indicates that the selected disk drive will be removed from the logical drive. (See the figure on page 70 for an example.)

6 Modify the Advanced Settings, if required. (See *Fine-tuning Logical Drives* on page 63.)

7 Click **Next**.

8 Review the new logical drive settings. To make changes, click **Back**.

Note: Some operating systems have size limitations for logical drives. Before you save the configuration, verify that the size of the logical drive is appropriate for your operating system.

9 To update your logical drive immediately, click **Apply**, then click **Yes**.

To schedule the changes for later, click **Schedule**, set the date and time, then click **Apply**. (For more information, see page 81.)

Deleting a Logical Drive

⚠️ **Caution:** When you delete a logical drive, you lose all data stored on that logical drive.

To delete a logical drive:

Ensure that you no longer need the data stored on the logical drive.

1 In the Enterprise View, click on the controller associated with the logical drive.

2 In the Logical Devices View, click the logical drive.

3 In the menu bar, select **Actions**, then click **Delete logical device**.

4 When prompted, click **Yes** to delete the device, or **No** to cancel the deletion.

If you click **Yes**, the logical drive is deleted. The disk drives or drive segments included in the logical drive become available, and can be used to create a new logical drive (see page 62), or to expand an existing logical drive (see page 69).

Creating a RAID Volume

A RAID Volume comprises two or more logical drives connected end-to-end. The logical drives in a RAID Volume:

● Must be built using disk drives connected to the same controller.

● Must have the same RAID level assigned.

● Must not be striped together.

● May have equal or different capacities.

To build a RAID Volume:

1 Create two or more logical drives that meet the requirements listed at the beginning of this section, and wait for them to build and initialize. For instructions, see *Express Configuration: The Easy Way* on page 34 or *Custom Configuration (Advanced)* on page 37.

This example shows two RAID 5 logical drives, which can be used to build a RAID volume.
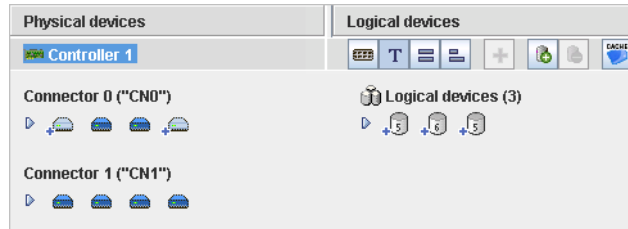
2 On the toolbar, click **Create**.

3 When the configuration wizard opens, select **Custom configuration...**, then click **Next**.

4 Click **Advanced settings**, select **RAID Volume**, then click **Next**.

5 In the Logical Devices panel, select the logical drives you want to use in the RAID Volume.

Adaptec Storage Manager prompts you to select the correct number of logical drives.
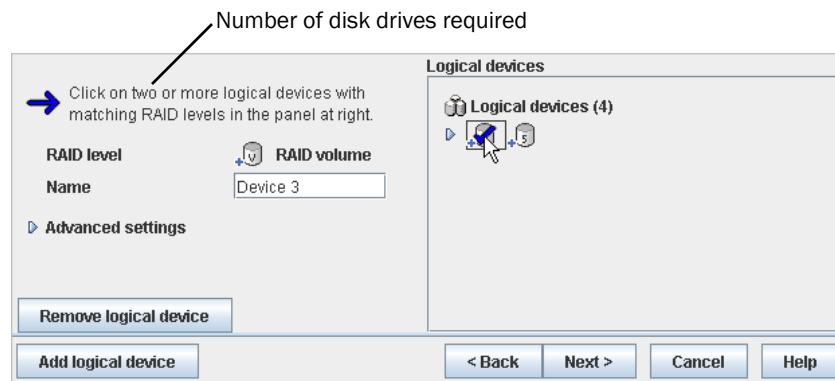
6 Modify the Advanced Settings, if required. (See *Fine-tuning Logical Drives* on page 63 for more information.)

7 Click **Next** to review the RAID Volume settings. To make changes, click **Back**.

This example shows one RAID Volume ready to be created.
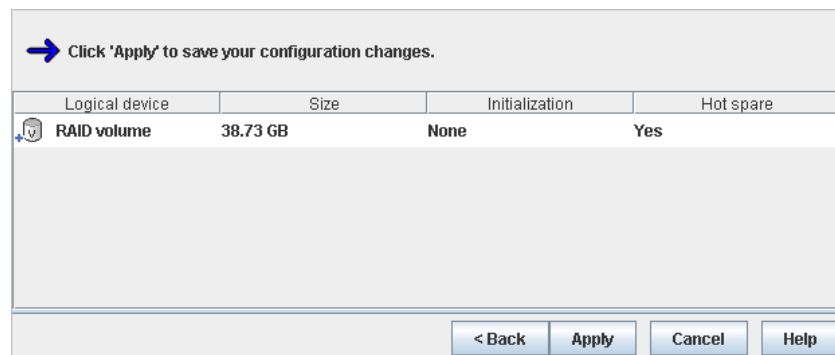
8 Click **Apply**, then click **Yes**.

Adaptec Storage Manager builds the RAID Volume. The configuration is saved on the Adaptec controller and on the physical drives. Adaptec Storage Manager replaces the individual logical drives with a single RAID Volume in the Logical Devices View.

RAID Volume replaces the two RAID 5 logical drives shown in Step 1
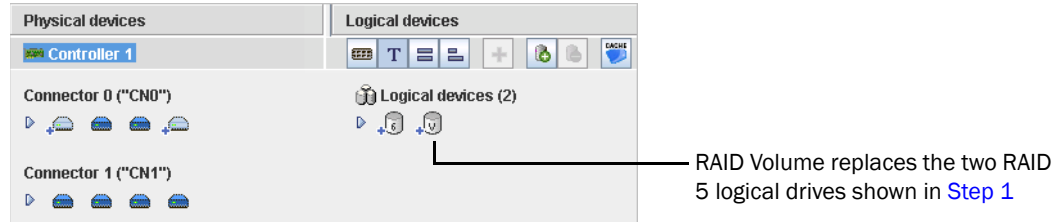
9 Partition and format your RAID Volume. See page 36 for more information.

Creating a JBOD Disk

You can create a JBOD disk from any Ready disk drive. A JBOD disk:

- Appears as a physical disk drive to the operating system.
- Is not redundant.
- Comprises all available disk space.
- Is not bootable (that is, you cannot boot the operating system from a JBOD).

To create a JBOD disk:

1 In the Physical Devices View, click a Ready disk drive.

2 In the menu bar, select **Actions**, then click **Create JBOD disk**.

Adaptec Storage Manager creates the JBOD disk.

Creating multiple JBOD Disks in the Wizard

To make it easier to create multiple JBODs, you can use the wizard.

To create multiple JBODs in the wizard:

1 On the toolbar, click **Create**.

2 When the configuration wizard opens, select **Custom configuration...**, then click **Next**.

3 Click **Advanced settings**, select **JBOD disk**, then click **Next**.

4   In the Physical Devices panel, select the drives you want to use to create the individual JBOD disks.
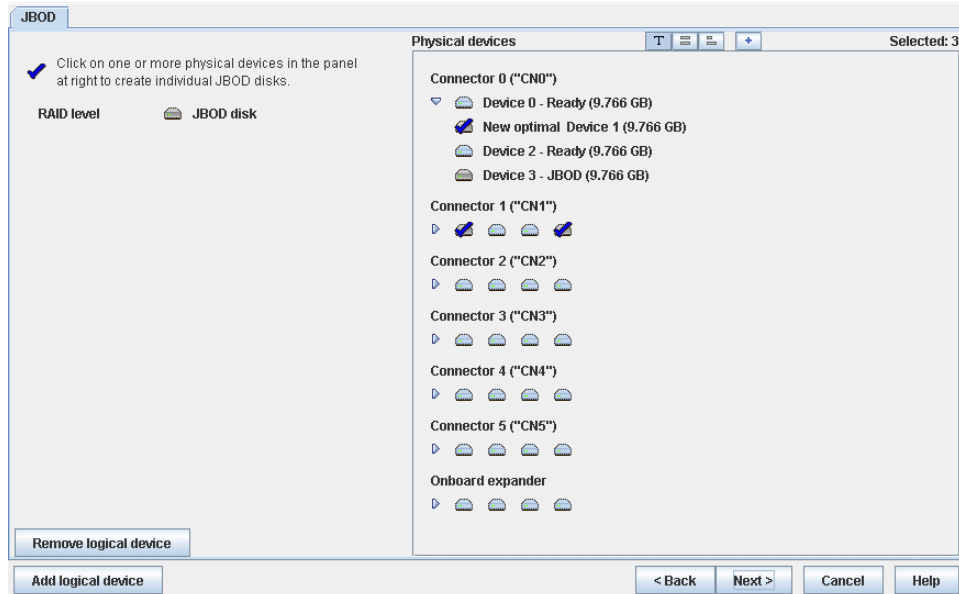
5   Click **Next** to review the JBOD disk settings. To make changes, click **Back**.

This example shows three JBOD disks ready to be created.
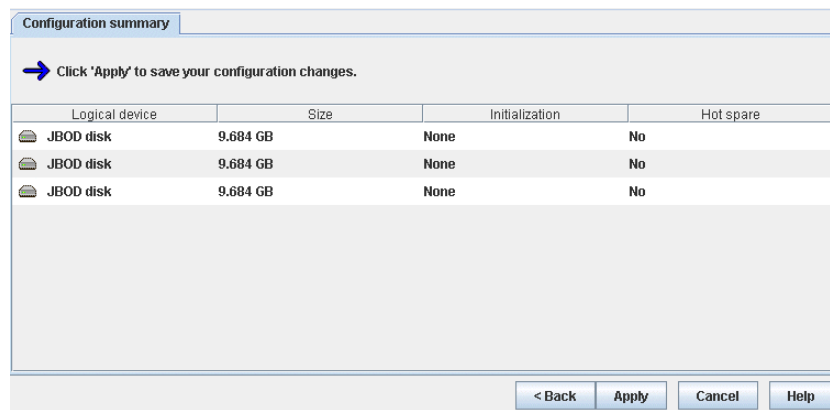
6   Click **Apply**, then click **Yes**.

Adaptec Storage Manager creates the JBOD disks.

Converting a JBOD Disk to a Simple Volume

You can convert a JBOD disk to a simple volume. Unlike a JBOD, a simple volume is a true logical device. It comprises a single physical disk and is not redundant.

To convert a JBOD to a simple volume:

1   In the Physical Devices View, select a JBOD disk.

2   In the menu bar, select **Actions**, then click **Create simple volume**.

Adaptec Storage Manager converts the JBOD to a simple volume and displays the logical drive in the Logical Devices View.

Deleting a JBOD Disk

⚠ **Caution:** When you delete a JBOD disk, you lose all data stored on that disk.

To delete a JBOD disk:

1   In the Physical Devices View, click the JBOD disk.

2   In the menu bar, select **Actions**, then click **Delete JBOD disk**.

The disk drive becomes available, and can be used to create a new JBOD, logical drive (see), or to expand an existing logical drive (see).

Maintaining an Energy-Efficient Storage Space

You can use power management in Adaptec Storage Manager to maintain an energy-efficient storage space. Power management of your storage space reduces cooling and electricity costs. It increases system stability due to lower heat dissipation. And it improves the quality of your work environment by reducing noise levels in your computer rooms and data centers.

This section describes how to configure power management for the logical drives and RAID controllers in your storage space. You can configure power management for an individual logical drive or for all logical drives on a controller.

●   To configure power management for a logical drive, see the following section.

●   To configure power management for a controller, see .

●   To disable power management on a logical drive, see .

●   To show devices under power management, see .

Note: Power management is not available on all controllers.To see if your controller supports power management, right-click the controller in the Enterprise View, then click **Properties**. The Power tab shows the power status of the device. (If the tab is not present, the device does not support power management.) You can check the power status in the Properties panel for controllers, logical drives, and physical drives. In the following example, a logical drive under power management is running at full power, indicating that its drives are operating at their peak spin rate.
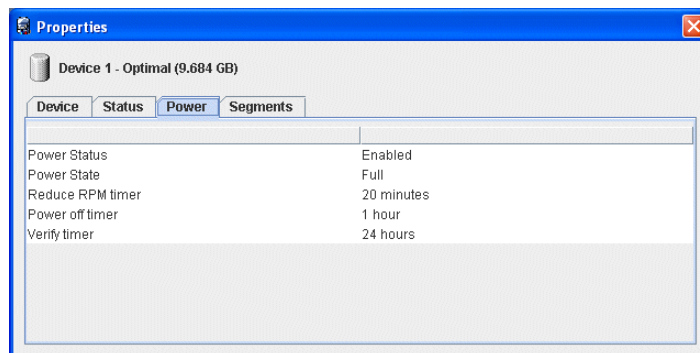
Configuring Power Management for a Logical Drive

This section describes how to configure power management for an existing logical drive. You can also configure power management when you create a logical drive in the wizard (see).

For each logical drive in your storage space, you can a set a timer to lower disk drive spin rate (RPM), turn disk drives off, and check an inactive drive to verify its health.

⚠ **Caution:** Adaptec does not recommend putting logical drives with common physical drives under power management (although it is supported). Putting such drives under power management may limit power savings in your storage space.

To configure power management for a logical drive:

1 In the Logical Devices View, select a logical drive.

2 In the menu bar, select **Actions**, click **Power settings**, then click **Set timers**.

The logical drive power timers window opens:

3 Select a value for each timer from the drop-down lists:

● **Slow down drives after**—Period of inactivity, from 3 minutes to 3 hours, after which the drives' spin rate is lowered. The default is Never.

Note: For disk drives that do not support slow operation, set this timer to Never.

● **Power off drives after**—Period of inactivity, from 3 minutes to 3 hours, after which the disk drives are turned off. The default is Never.

● **Verify drives after**—Period of inactivity, from 1 hour to 24 hours. after which an inactive drive (a drive that's already powered down) is restarted and checked to verify its health. Once the check is completed, the drive is powered down and returns to its inactive state. The default is Never.

4 Click **OK**.

Configuring Power Management for a Controller

The power management options for a controller affect all the logical drives on that controller. You can choose a "stay awake" period during which time the disk drives on the controller always spin at their peak rate. You can also set the spin-up limits for the controller—the maximum number of drives that the controller may spin up at the same time.

Note: The time you set for the stay awake period is relative to your local system time and time zone. To set the time zone for power management, you *must* use the controller BIOS utility. The time zone does not adjust automatically for daylight savings time. To compensate, you must adjust the stay awake period manually, either in the BIOS or with Adaptec Storage Manager. For more information, see the *Adaptec RAID Controller Installation and User's Guide*.

To set the stay awake period for disk drives:

1 In the Enterprise View, select a controller.

2 In the menu bar, select **Actions**, click **Power settings**, then click **Set stay awake settings**.

The Stay awake settings window opens:
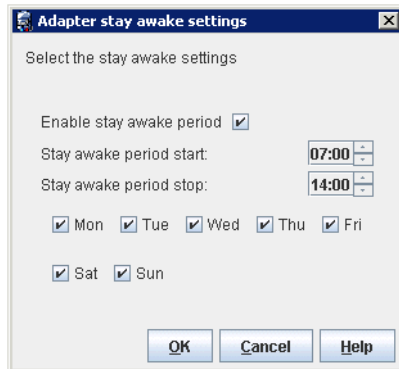
3 Select **Enable stay awake period**.

4 Enter the stay awake period start time and end time in 24-hour format; for example, 09:00 for 9AM, 14:00 for 2PM, and so on.

5 Select the days of the week to enforce the stay awake period. On days you do not select, the stay awake period is disabled and the spin rate is controlled by the power timer settings (see page 75).

6 Click **OK**.

To set the spin-up limits for disk drives:

1 In the Enterprise View, select a controller.

2 In the menu bar, select **Actions**, click **Power settings**, then click **Set spinup limits**.

The Adapter drive spinup limits window opens:
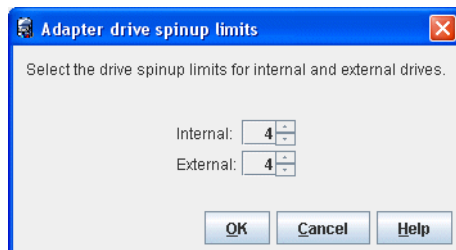
3 Enter the maximum number of internal disk drives that the controller may spin-up at the same time.

4 Enter the maximum number of external disk drives (drives in an enclosure, such as a JBOD) that the controller may spin-up at the same time.

5 Click **OK**.

Disabling Power Management for a Logical Drive

You can disable power management for a logical drive. For example, you may choose to disable power management for the drives on a high-volume server, or a logical drive that needs to be highly available.

To disable power management for a logical drive:

1   In the Logical Devices View, click the logical drive.

2   In the menu bar, select **Actions**, click **Power settings**, then click **Disable**.

The logical drive is updated with the new setting.

Re-Enabling Power Management for a Logical Drive

To re-enable the power management for a logical drive, repeat the steps in *Disabling Power Management for a Logical Drive* on page 77, selecting **Enable** during Step 2.

Showing Devices Under Power Management

You can highlight the physical and logical drives under power management in the Adaptec Storage Manager GUI. Logical drives are shown in green if power management is enabled. Physical drives are shown in green if they are powered down (off).

In the menu bar, select **View**, then click **Show Power Management**. Adaptec Storage Manager highlights the devices under power management in the Physical Devices View and Logical Devices View:

To stop showing devices under power management, select **View** on the menu bar, then click **Show Power Management** again.

Configuring the MaxIQ Cache

The MaxIQ cache is a global read cache pool. It uses the Solid State Drives (SSDs) in your system as fast cache memory for read-intensive operations.

You can configure the MaxIQ cache only if you have one or more MaxIQ-compatible Solid State Drives installed on the RAID controllers in your system.

Note: For MaxIQ caching applications, you can use any Solid State Drive on the compatibility list, including Adaptec MaxIQ SSDs and, with some controllers, select SSDs from other manufacturers. See www.adaptec.com/compatibility for a list of MaxIQ-compatible Solid State Drives.

Adaptec Storage Manager assigns all compatible SSDs to the MaxIQ cache pool, by default. Use the following procedures to add or remove SSDs, to configure the MaxIQ cache fetch rate, and to enable MaxIQ caching for a logical drive.

To check the status of the SSDs in the MaxIQ pool, including wear-level and longevity indicators, see *Working with Solid State Drives* on page 90. To check the MaxIQ cache statistics for a logical drive, see *Viewing Statistics* on page 123.

Note: Before you can enable MaxIQ caching for a logical drive, you must enable read caching; see page 64.

To configure the MaxIQ cache pool:

1 In the Logical Devices View, click the **Configure MaxIQ Cache Pool** button.

The Configure MaxIQ cache pool window opens.

2 Select one or more SSDs in the Available SSDs list, then click **SSD >** .
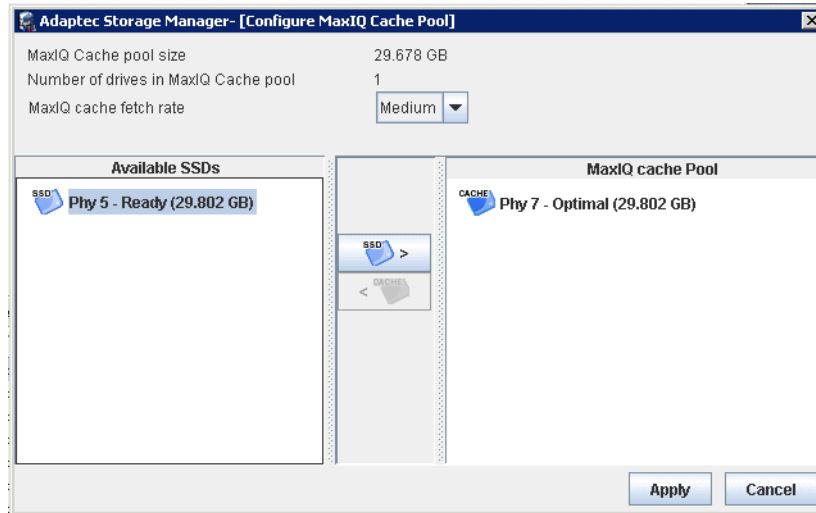
The SSD is added to the MaxIQ cache pool and the icon changes to indicate that it's part of the cache.

To remove an SSD from the cache, select one or more SSDs from the MaxIQ Cache Pool list, then click < **Cache**. The icon changes to indicate that the SSD is Ready.

3 Select the MaxIQ cache fetch rate from the drop-down list: Low, Medium, High. (The default is Medium.)

4 Click **Apply**.

The Configure MaxIQ cache pool window closes and the cache configuration is saved.

To enable/disable the MaxIQ cache for a logical drive:

1 In the Logical Devices View, select a logical drive.

2 In the menu bar, select **Actions**, click **Configure MaxIQ**, then select **Enable MaxIQ Caching** or **Disable MaxIQ Caching**.

Scheduling Recurring or Resource-Intensive Jobs

7

In this chapter...

Adaptec Storage Manager allows you to schedule some types of jobs (or *tasks*) to complete at convenient times. Additionally, you can schedule some tasks to recur at preset times.

A Task Manager utility helps you manage the tasks you schedule.

This chapter describes how to schedule, monitor, and manage tasks.

Scheduling a Task

If a task is lengthy and limits access to components on your storage space, you may want to set a date and time for the task to complete, instead of running the task while there is activity on your storage space.

If a task must be performed regularly, you can schedule it to recur at preset times.

You can schedule these Adaptec Storage Manager tasks:

● Expanding a logical drive

● Changing a logical drive's RAID level

● Modifying the stripe size of a logical drive

● Verifying a logical drive

● Verifying and fixing a logical drive

To schedule one of these tasks:

1 Complete each step of the task until you are prompted to click **Apply**. (*Don't* click **Apply**.)

Schedule button
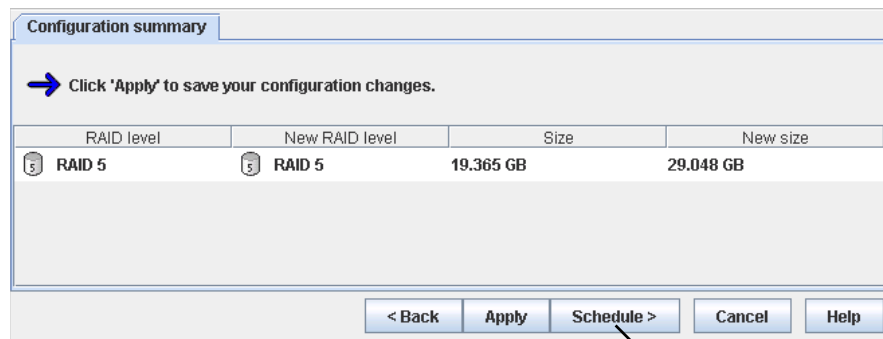
2 Click **Schedule**.

The schedule window opens. (The window you see may be different from the one shown in this example, depending on which type of task you are scheduling.)
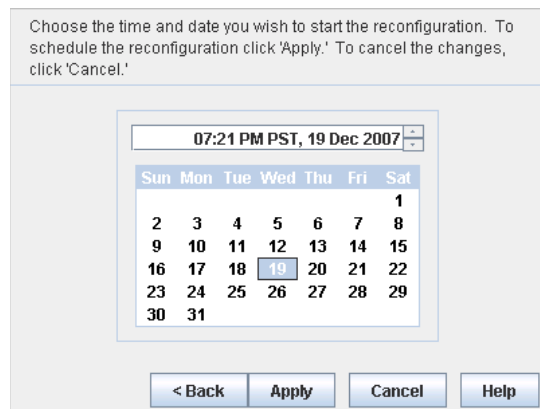
3   Set the date and time for the task.

> **Note:** Keep geography in mind—If you are scheduling tasks on remote systems located in other geographical areas, remember that the time you set for a scheduled task is *that system's* time, which may be different from local time. You will be prompted to select a new time if the one you've set occurs in the past on the remote system.

4   Set the recurrence frequency from the drop-down menu, if the option is available for this task and you want it to occur regularly. You can set a task to recur daily, weekly, or monthly.

5   Click **Apply**.

The task is saved in the Task Manager, and the scheduled task is added to the Task List. For more information about the Task Manager, see the following section.

Opening the Task Manager

You can use the Task Manager to monitor and modify the tasks you have scheduled. (To schedule a task, see page 81.)

Tasks are associated with systems. When you open the Task Manager, you see the scheduled tasks associated with that local or remote system only.

To open the Task Manager, in the tool bar, click **Configure**, point to the system, then click **Tasks**.
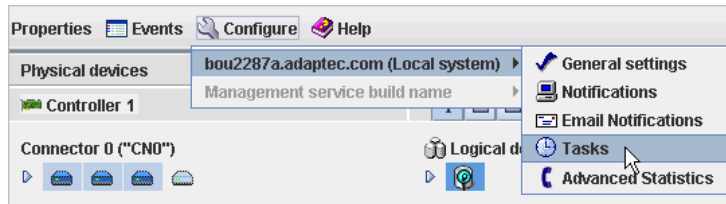
The Task Manager opens on the Tasks tab of a new window. The Tasks tab has two main panels, as shown in this figure. All scheduled tasks for the system appear in the task list; all events related to scheduled tasks on that system appear in the event log.:
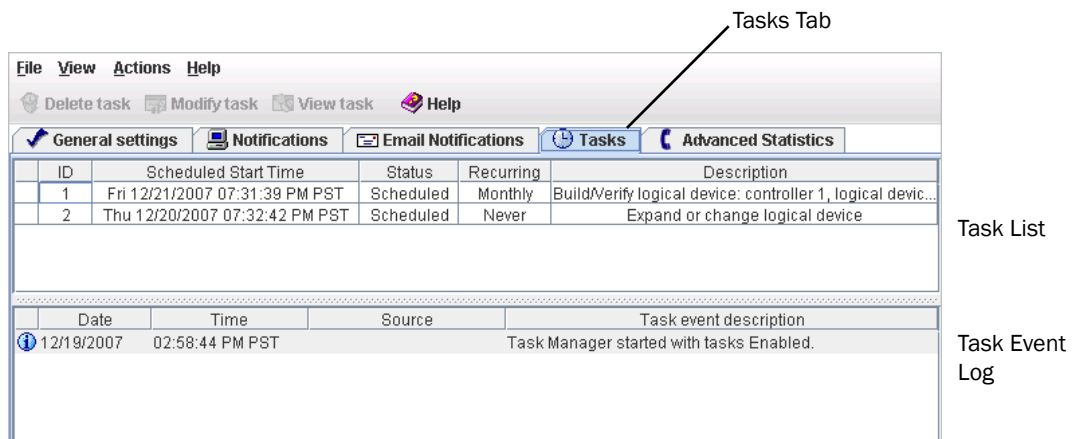
> **Note:** From the Tasks tab, you can access other utilities in this window, such as the Email Notification Manager (see page 111), by clicking their tabs.

Monitoring Tasks

Use the two main panels of the Task Manager—the task list and the task event log—to monitor your tasks.

Monitoring Upcoming Tasks in the Task List

The Task List displays all scheduled tasks in order of creation, and includes basic information about each task. Although you can't sort the tasks in any other order, you can reorganize the columns in the Task List by clicking and dragging the column heads.

The Status column of the Task List shows the current condition of each task:

● **Scheduled**—The task is scheduled to be completed at a future date and time.

● **Executed**—The task has been completed successfully.

● **Executed***—A recurring task has been completed once and will be repeated at the scheduled time.

● **Error**—The task has not been completed successfully. (For more information about an error, double-click the task in the Task List to open the Task Properties window.)

In the menu bar, click **View task** for additional detail about any task in the Task List.

Checking Past Tasks and Events in the Event Log

The Event Log displays detailed information about the Task Manager itself, such as when scheduled events were modified, deleted, or completed successfully.

By default, task events are listed in the order they occurred, with the most recent event first. To make it easier to find a specific event, click on the column heads to sort task events. You can also reorganize the columns by clicking and dragging the column heads.

The Event Log uses icons to show the status of past tasks:

Icon	Status	Explanation and Solution
(information icon)	Information	The task or event completed successfully. No action required.
(warning icon)	Warning	The task missed its start time. Reschedule the task to clear the error, as described in *Modifying a Task* on page 84.
(error icon)	Error	The task failed. Delete the task to clear the error. Schedule the task again, as described in *Scheduling a Task* on page 81.)

Double-click on an event to see basic information about the event in the Task Properties window. Click **Next** to see the next event in the list.
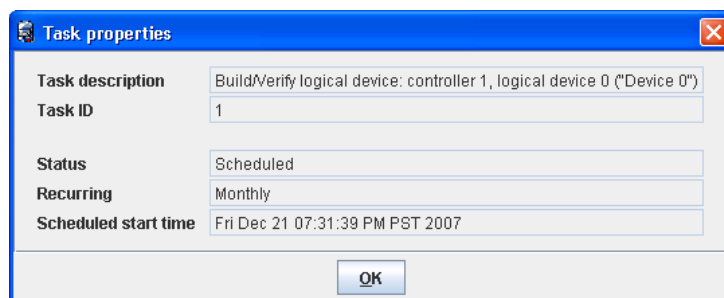
Modifying a Task

If your requirements change, you can reschedule a task to a different date or time. You can also modify the task description that appears in the Task List. Creating a custom task description makes it easier to find the task in the Task List.

To modify a scheduled task:

1 In the tool bar, click **Configure**, point to the system you want, then click **Tasks** (as shown on page 82).

2 In the Task Manager, select the task you want to change, then click **Modify task**.

3 In the Modify Task window, make the required changes, then click **OK**.

The task and Task List are updated with the new information.

What if a task misses its start time?

Tasks scheduled in Adaptec Storage Manager include an automatic 30-minute grace period following their start time, to accommodate temporary interruptions. For instance, if there's a brief power outage a task will run once normal conditions resume, if the interruption lasts no longer than 30 minutes past the scheduled start time.

If a task misses its start time, it must be rescheduled. For instructions, see *Modifying a Task*.

If a recurring task misses its start time, it is automatically rescheduled to run at the next scheduled interval.

Deleting a Task

If a scheduled task is no longer required, you can delete it from the Task Manager.

To delete a task:

1 In the tool bar, click **Configure**, point to the system associated with the task you want to delete, then click **Tasks** (as shown on page 82).

2 In the Task Manager, select the task you want to delete, then click **Delete task**.

3 Click **Yes** to confirm the deletion.

The task is deleted.

Disabling the Task Manager

The Task Manager is enabled by default. If you do not wish to schedule tasks on a selected system, you can disable it.

Note: If you disable the Task Manager, no scheduled tasks will run on that system. No other systems are affected.

To disable the Task Manager:

1 In the tool bar, click **Configure**, point to the system whose Task Manager you want to disable, then click **Tasks** (as shown on page 82).

2   In the menu bar, click **Actions**, then click **Disable Task Scheduler**.

The Task Manager is disabled. The Tasks tab (shown at right) shows the red 'disabled' icon.

Note: When the Task Manager is disabled, a brief three-tone alert sounds each time you open and log in to Adaptec Storage Manager. Scheduled tasks in the Task List will not run while the Task Manager is disabled.

Re-enabling the Task Manager

To re-enable the Task Manager, repeat the steps in *Disabling the Task Manager* on page 84, selecting **Enable Task Scheduler** during Step 2.

Scheduled tasks that have missed their start times must be rescheduled if you want them to run. See *Modifying a Task* on page 84 for instructions.

Scheduled tasks that did not miss their start time while the Task Manager was disabled will run as scheduled.

Maintaining Physical Devices

8

In this chapter...

This chapter describes how to manage the controllers, disk drives, solid state drives, and enclosures in your storage space.

Viewing Component Properties

Click on any component in the main window of Adaptec Storage Manager, then click the **Properties** button (shown at right) to view version numbers, status, model numbers, and other information about that component.

The properties listed vary, depending on which type of component you select. The examples below show the Disk Drive (left) and Logical Drive (right) Properties windows.
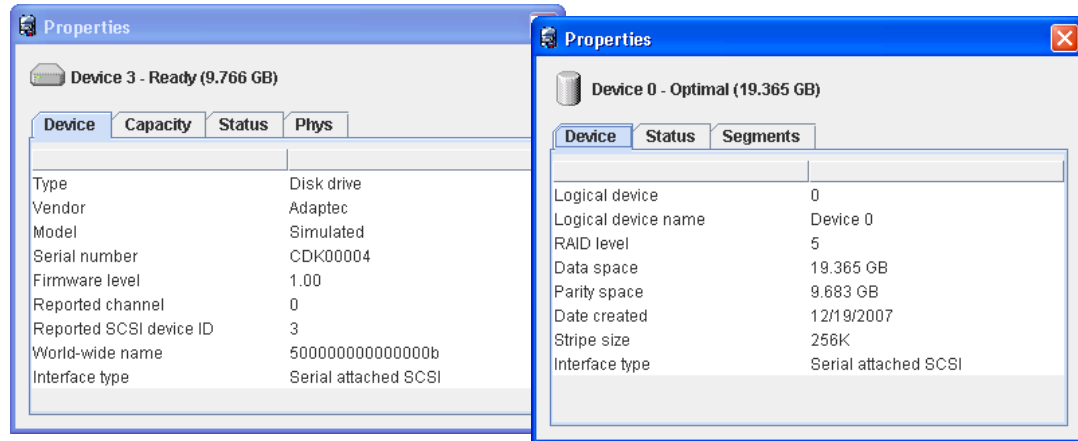
Blinking a Component

You can blink the LEDs on enclosures, or disk drives *inside* enclosures, to identify where they are physically located in your storage space. This table describes how to blink specific enclosures and disk drives.

To Blink...	Right-click...	
The disk drive		Disk Drive icon
All disk drives connected to that controller		Controller icon (in the Enterprise View or in the Physical Devices View)
The enclosure		Enclosure Management Device icon
All disk drives included in a logical drive		Logical Drive icon
All disk drives included in all the logical drives on a selected controller	Logical devices	Text—In the Logical Devices View of a controller with multiple logical drives
All disk drives connected to selected controller ports	Ports	Text—In the Physical Devices View of a controller with multiple ports
All disk drives connected to a selected controller channel	Channel	Text—In the Physical Devices View of a controller with multiple channels
All disk drives connected to a selected controller connector	Device	Text—In the Physical Devices View of a controller with multiple connectors

To blink a component:

1 In Adaptec Storage Manager, right-click the component, then click **Blink...**.

Note: If the component you select (for instance, a controller) doesn't support the blink function, the Blink... option won't appear in the menu.

The LEDs on the disk drives or enclosures begin to flash.

2 Click **OK** to stop blinking the component.

Working with Failed or Failing Disk Drives

This section describes how to use Adaptec Storage Manager to manage failed or failing disk drives in your storage space.

Replacing Disk Drives in a Logical Drive

You can replace one or more disk drives in a logical drive. You may want to do this to upgrade to larger disk drives, or to make disk drive size uniform across the logical drive.

⚠️ **Caution:** If another disk drive in the logical drive fails during rebuild (see page 140), you may lose data.

To replace a disk drive in a logical drive:

1   In the Physical Devices View, click the disk drive you want to replace.

2   Set the drive state to failed. (See page 88.)

3   Remove and replace the disk drive with one of equal or larger size.

4   Wait for the logical drive to rebuild. (See page 140.)

5   Repeat Steps 1 to 4 for all the disk drives you want to replace.

For help solving disk drive problems, see *Recovering from a Disk Drive Failure* on page 137.

Setting a Disk Drive to 'Failed'

Before you can remove a disk drive, you should set it to a failed state to protect your data.

⚠️ **Caution:** You may lose data or damage your disk drive if you remove a disk drive without first setting it to a failed state.

You can set a disk drive to a failed state if:

● The disk drive is not part of a logical drive, *or*

● The disk drive is part of a redundant, healthy logical drive

You can't set a disk drive to a failed state if doing so will take a logical drive offline.

To set a disk drive to a failed state:

1   In the Physical Devices View, click the disk drive.

2   In the menu bar, select **Actions**, then click **Set drive state to failed**.

3   Click **Yes** to set the drive status to failed.

4   Remove and replace the disk drive.

5   If the logical drive that the disk drive belongs to is failed, see *Recovering from a Disk Drive Failure* on page 137.

Initializing and Erasing Disk Drives

This section describes how to use Adaptec Storage Manager to erase data and metadata (including logical drive information) from the disk drives in your storage space.

Initializing Disk Drives

You can use Adaptec Storage Manager to initialize any disk drives that are in a Ready state, if required. You may want to do this to erase all existing data and metadata (including all logical drive information) before using the disk drive in a new logical device or as a hot spare.

⚠️ **Caution:** Do not initialize a disk drive that is part of a logical drive. Initializing a disk drive that's part of a logical drive may make the logical drive unusable. Back up all data from your disk drive before you initialize it.

To initialize a single disk drive:

1 In the Physical Devices view, click the disk drive you want to initialize.

2 In the menu bar, select **Actions**, then click **Initialize**.

3 Click **Yes** to initialize the disk drive.

The initialization begins.

To initialize *all* ready disk drives on a controller:

1 In the Enterprise View, click the controller whose disk drives you want to initialize.

2 In the menu bar, select **Actions**, then click **Initialize all ready drives**.

3 Click **Yes** to initialize the disk drives.

The initialization begins.

Clearing Disk Drives

You can use Adaptec Storage Manager to erase all existing data on any disk drives that are in the Ready state, if required. You can clear the drive, or clear the drive *securely* to completely destroy any data on the disk. Secure erase amounts to electronic "data shredding."

To clear a disk drive:

1 In the Physical Devices view, click the disk drive you want to clear.

2 In the menu bar, select **Actions**, then click **Clear**.

3 Click **Yes** to clear the disk drive.

To securely erase a disk drive:

1 In the Physical Devices view, click the disk drive you want to clear.

2 In the menu bar, select **Actions**, then click **Secure erase**.

3 Click **Yes** to securely erase the disk drive.

Working with Solid State Drives

You can use Adaptec Storage Manager to check the status of the SSDs in your system. You can use this information to verify the health of your SSDs and to predict drive failures.

For MaxIQ-compatible SSDs, Adaptec Storage Manager displays SMART statistics for the drive using Self-Monitoring, Analysis and Reporting Technology. It also displays wear-level and longevity indicators. For non-MaxIQ-compatible SSDs, Adaptec Storage Manager displays the same set of statistics *except* for longevity.

Note: For more on using MaxIQ in Adaptec Storage Manager, see *Configuring the MaxIQ Cache* on page 78 and *Logging Statistics for Remote Analysis* on page 119. For a list of MaxIQ-compatible Solid State Drives, see www.adaptec.com/compatibility.

To view the SMART statistics for a SSD, select the drive in the Physical Devices View, click the **Properties** button, then select the **Smart** tab. To view wear-level and longevity indicators for the SSD, select the **Status** tab.

SSD wear-level and longevity indicators
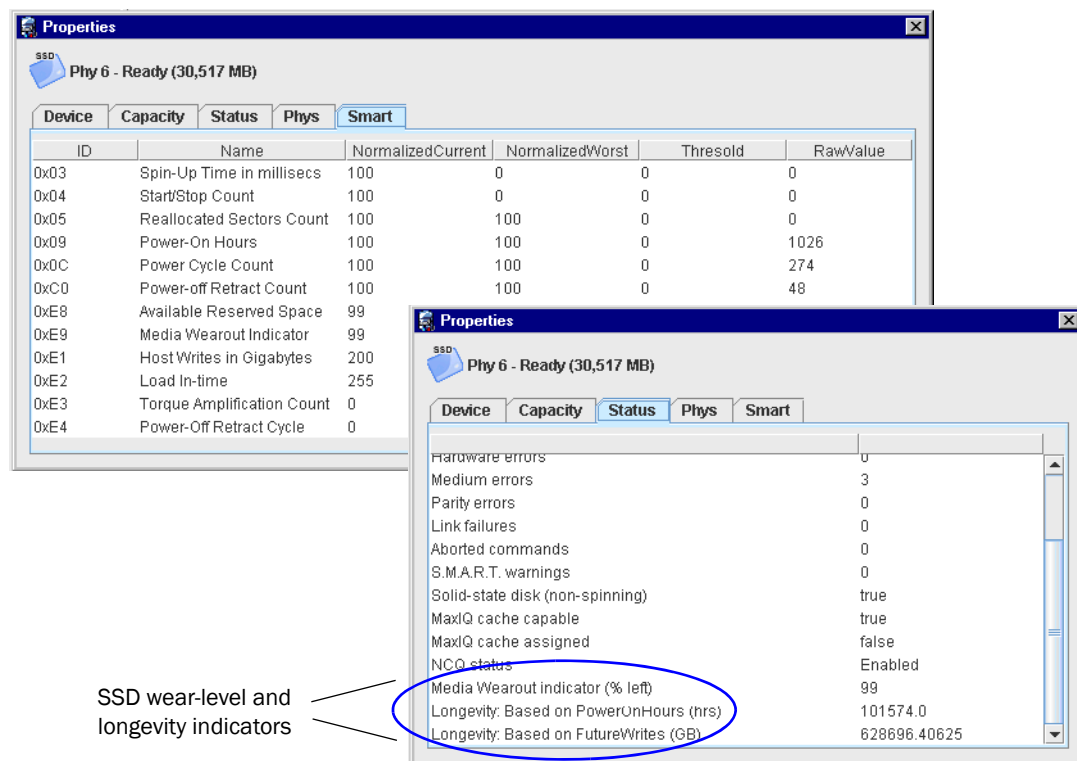
What do the SMART statistics and wear-level indicators mean?

Name	Description
Power-On Hours	Number of power-on hours over life of device.
Power Cycle Count	Number of power-cycle events over life of device.
Available Reserved Space	Number of remaining reserve blocks.
Reallocated Sector Count	Number of bad sectors.
Host Writes	Number of sectors written by the host (1 sector = 512 bytes); increases by 1 for every 65536 sectors written.

Name	Description
Media Wear-Out Indicator	% wear remaining, based on number of NAND media cycles. SSD will be marked as Failed if wear-level goes below threshold value.
Longevity: Power-on Hours	Predicted SSD longevity based on remaining number of power-on hours.
Longevity: Future Writes	Predicted SSD longevity based on remaining number of writes.

Working with Controllers

This section describes how to use Adaptec Storage Manager to manage the controllers that are part of your storage space:

● To register a new controller, see the following section.

● To test a controller alarm, see .

● To silence a controller alarm, see .

● To disable a controller alarm, see .

● To rescan a controller, see .

● To save your controller configuration, see .

● To set the controller's default task priority, see .

● To enable Native Command Queuing (NCQ) on a controller, see .

● To disable statistics logging on a controller, see .

Registering New Controllers

Each time you log in to Adaptec Storage Manager, it searches for new controllers in your storage space. If it detects a new controller, the New Hardware Detected window opens and prompts you to register it.

To stay informed about Adaptec products and special offers, register your controllers by clicking **Register Now** in the New Hardware Detected window.

Follow the on-screen instructions to complete the registration.

Testing a Controller Alarm

Note: Not all controllers have alarms. Refer to your controller's documentation for more information.

If you controller has an alarm, that alarm is enabled by default. To test a controller alarm to ensure that it's working:

1 Ensure that the speakers on your local system aren't muted.

2 In the Enterprise View, select the controller you want.

3 In the menu bar, click **Actions**, select **Alarm actions**, then click **Test alarm**.
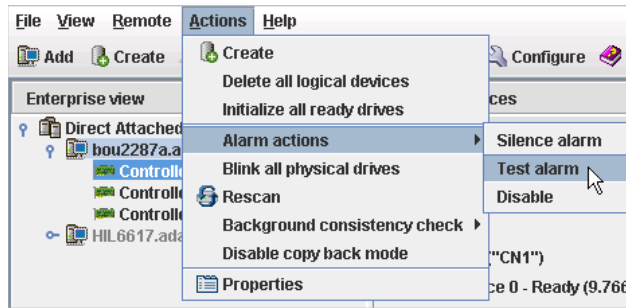
The alarm sounds.

4 To stop the test, click **OK**.

Silencing a Controller Alarm

You can silence the alarm on a controller while you fix the problem.

To silence the alarm, click the **Silence** button (shown at right) in the main Adaptec Storage Manager window.

Disabling a Controller Alarm

You can disable the alarm for a selected controller, if required.

⚠ **Caution:** If you disable the alarm, no audible signal will sound when an error occurs on the controller.

To disable a controller's alarm:

1 In the Enterprise View, select the controller you want.

2 In the menu bar, click **Actions**, select **Alarm Actions**, then click **Disable** (shown in the figure in Step 3 on page 92).

The alarm is disabled for that system.

Rescanning a Controller

After you connect a disk drive to or remove a 'Ready' (non-failed) disk drive from a controller, Adaptec Storage Manager may not recognize the change until it rescans the controller.

To rescan a controller:

1 In the Enterprise View, click the controller.

2 In the menu bar, select **Actions**, then click **Rescan**.

Adaptec Storage Manager scans all the channels or ports on the controller you selected.

When the scan is complete, a report appears.

3 Click **Done** after you have reviewed the scan report.

Saving Your Controller Configuration

If you require a record of your controller configurations, you can use Adaptec Storage Manager to create a text file with this information about all controllers on a selected system:

- Controllers
- Disk drives
- Disk drives used in logical drives
- Logical drives

To save a system's controller configurations:

1 In the Enterprise View, click the local or remote system.

2 In the menu bar, select **Actions**, then click **Save printable configuration**.

3 In the Save window, browse to the directory you want, then enter a file name for the report. (The default directory is the directory in which the Adaptec Storage Manager is installed. The default file name is RaidCfg.log.)

A text-file report is saved.

Setting a Controller's Default Task Priority

To set the default priority for all tasks running on the controller to High, Medium, or Low, right-click the controller in the Enterprise View, then select **Change default task priority**.

Note: This setting applies to new tasks. It does not affect currently running tasks.

Enabling Native Command Queuing on a Controller

Native Command Queuing, or NCQ, lets SATA disk drives arrange commands into the most efficient order for optimum performance.

To enable or disable NCQ for the drives on a controller:

1 In the Enterprise view, select a controller.

2 In the menu bar, select **Actions**, select **NCQ**, then click **Enable** or **Disable**.

Disabling Statistics Logging on a Controller

If you enabled statistics logging when you first logged in (see page 30), Adaptec Storage Manager gathers IO and usage statistics for all controllers on a system. If you prefer not to gather statistics for a controller, you can disable statistics logging on that controller.

To disable statistics logging on a controller:

1 In the Enterprise view, select a controller.

2 In the menu bar, select **Actions**, select **Advanced Statistics**, then click **Disable**.

Re-Enabling Statistics Logging

To re-enable statistics logging, repeat steps 1 and 2 in *Disabling Statistics Logging on a Controller*, selecting **Enable** in Step 2.

Resetting the Statistics Logs on a Controller

Adaptec Storage Manager adds statistics to the statistics log for a controller (cumulatively) until you reset the log.

To reset the statistics log for a controller:

1   In the Enterprise view, select a controller.

2   In the menu bar, select **Actions**, select **Advanced Statistics**, then click **Reset**.

Testing and Silencing System and Enclosure Alarms

Adaptec Storage Manager supports an audible alarm which is triggered on the local system when a Warning- or Error-level event (see page 104) occurs on any system in your storage space. Adaptec Storage Manager also supports audible alarms on enclosures.

This section describes how to work with the audible alarms in your storage space:

● For system alarms, see the next section.

● For enclosure alarms, see page 96.

Working with System Alarms

Warning- or Error-level events (see page 104) on a system trigger an audible alarm, a series of beeps which sound every five minutes until the event is resolved.

The alarm is enabled by default, but can be disabled on any system, if required. You can also change the frequency and duration of the alarm.

Note: A system alarm is not the same as a controller alarm. For controller alarm information, see *Working with Controllers* on page 91.

This section describes how to work with your systems' audible alarms.

Testing a System's Alarm

To test the audible alarm to ensure that it's working on your local system:

1   Ensure that the speakers on your local system aren't muted.

2   In the Enterprise View, click on your local system.

3   In the menu bar, click **Actions**, then select **Agent actions**.
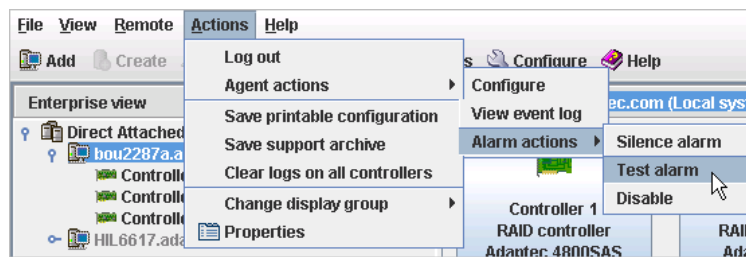
4   Select **Alarm actions**, then click **Test alarm**.

The alarm sounds.

5   To stop the test, click **OK**.

Silencing a System's Alarm

When a Warning- or Error-level event occurs, you can silence the alarm on your local system while you fix the problem.

To silence the alarm, click the **Silence** button (shown at right) in the main Adaptec Storage Manager window.

Alternatively, in the menu bar, click **Actions**, then select **Agent actions**. Select **Alarm actions**, then click **Test alarm**.

Changing a System's Alarm Settings

By default, an audible alarm sounds every five minutes (or 300 seconds) until silenced or until the event is resolved. You can change the frequency of the alarm, if required.

To change alarm settings on a system:

1 In the Enterprise View, select the system.

2 In the tool bar, click **Configure**, point to the system, then click **General Settings**.
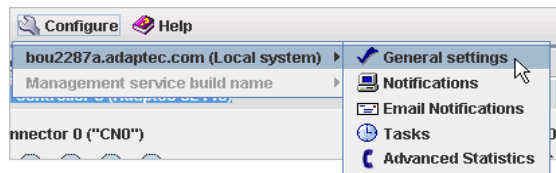
The Adaptec Storage Manager Agent General Settings window opens for the system you selected. The alarm settings are circled in the next figure.
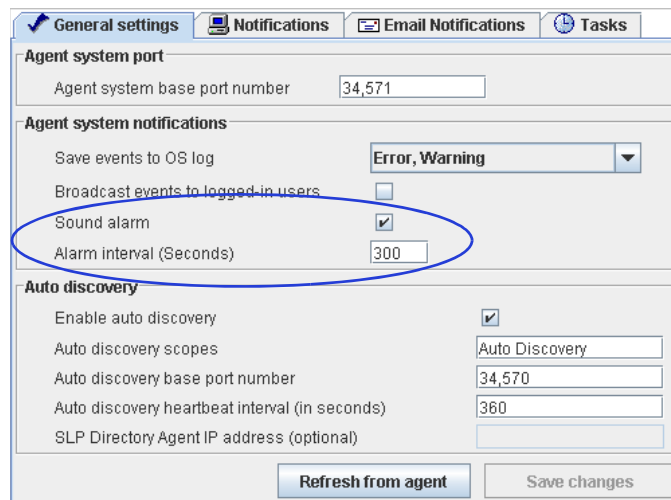
Note: You can access other utilities in this window, such as the Task Manager (see *Scheduling Recurring or Resource-Intensive Jobs* on page 80), by clicking their tabs.

3 Edit the alarm settings as required.

Note: You can disable an alarm in this window by deselecting **Sound alarm**. Alternatively, follow the instructions in *Disabling a System's Alarm* on page 96.

The changes take effect immediately.

Disabling a System's Alarm

You can disable the alarm for a selected system, if required.

⚠️ **Caution:** When the alarm is disabled, no audible signal sounds when a Warning- or Error-level event occurs on the system.

1 In the Enterprise View, select the system you want.

2 In the menu bar, click **Actions**, select **Agent Actions**, select **Alarm Actions**, then click **Disable**.
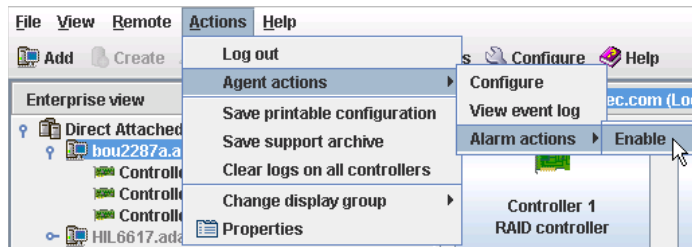
The alarm is disabled for that system.

To enable an alarm, repeat Steps 1 and 2, selecting the alarm action **Enable**.

Working with Enclosure Alarms

This section describes how to work with the alarms of the enclosures in your storage space.

Testing an Enclosure Alarm

If an enclosure has an alarm, follow these instructions to ensure that the alarm is working:

1 Ensure that the speakers on your local system aren't muted.

2 In the Enterprise View, select the controller that's connected to the enclosure you want.

3 In the Physical Devices View, right-click the enclosure icon (shown at right) of the enclosure that you want.

4 Select **Alarm actions**, then click **Test alarm**.

The alarm sounds.

5 To stop the test, click **OK**.

Silencing an Enclosure Alarm

You can silence the alarm on an enclosure while you fix the problem.

To silence the alarm, click the **Silence** button (shown at right) in the main Adaptec Storage Manager window.

Disabling an Enclosure Alarm

You can disable the alarm for a selected enclosure, if required.

⚠️ **Caution:** If you disable the alarm, no audible signal will sound when an error occurs on the enclosure.

To disable an enclosure's alarm:

1 In the Enterprise View, select the controller that's connected to the enclosure you want.

2 In the Physical Devices View, right-click the enclosure icon (shown at right) of the enclosure that you want.

3 Select **Alarm actions**, then click **Disable**.

The alarm is disabled for that system.

Updating the Controller BIOS and Firmware

Note: This task is recommended for advanced users only.

Adaptec Storage Manager provides a wizard to help you update the BIOS and firmware for the controllers in your storage space. The ROM Update wizard updates the BIOS and firmware for all controllers of the same type on local and remote systems. You can update one type of controller at a time.

Before You Begin

Before you begin, download the latest firmware images from the Adaptec Web site at www.adaptec.com. Image files typically come in sets of two or more and have a .ufi file extension.

Updating the Controller BIOS and Firmware

To update the controller firmware:

1 In the Enterprise View, right-click **Direct Attached Storage**, then click **Update controller images**.
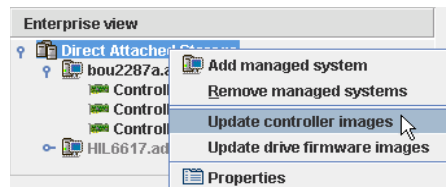
The ROM Update wizard opens.

2 Click **Next**.

3 Click **Add** to browse to the firmware image files you downloaded, select the files, then click **Open**.
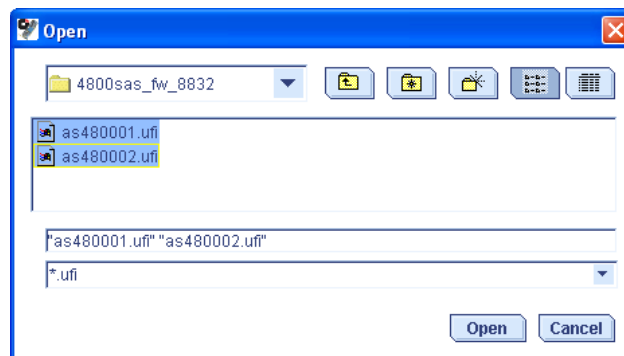
4 In the wizard, select the image files you want, then click **Next**.
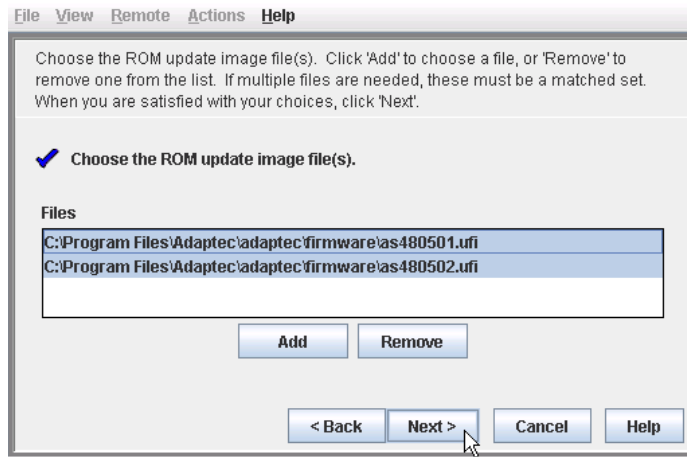
5 Select the controllers you want to update, then click **Next**.
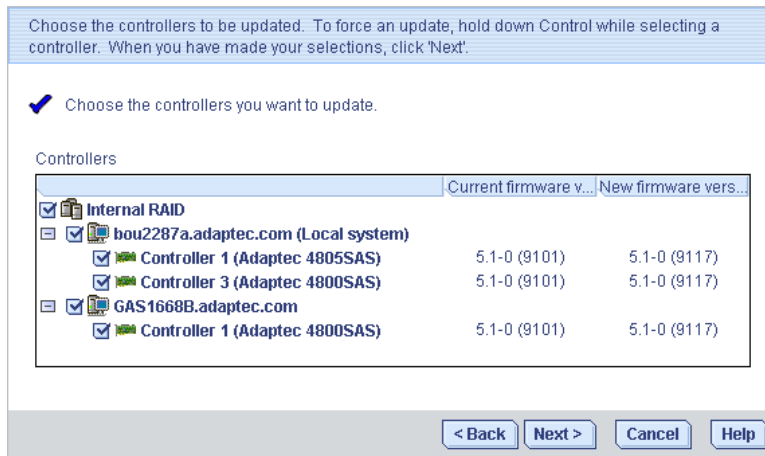
6 Review the update summary, then click **Apply**.

7 When prompted, click **Yes** to begin the update.

⚠ **Caution:** *Do not* power down the controller(s) during the update.

8 When the update is complete, click **OK**. Then, restart the server(s) to activate the new firmware images.

Updating the Disk Drive Firmware

Note: This task is recommended for advanced users only.

Adaptec Storage Manager provides a wizard to help you update the firmware for the disk drives in your storage space. The wizard updates the firmware for all disks of the same type on local and remote systems. You can update only one type of disk drive at a time.

Before You Begin

Before you begin, download the latest firmware images from your vendor's support site on the World Wide Web. The image file name and extension vary by manufacturer.

Updating the Disk Drive Firmware

To update the disk drive firmware:

1   In the Enterprise View, right-click **Direct Attached Storage**, then click **Update drive firmware images**.
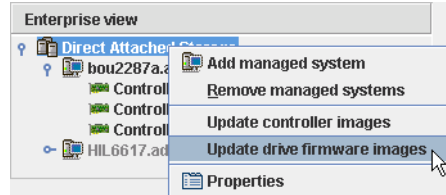
The Drive Firmware Update wizard opens.

2   Click **Next**.

3   Click **Add** to browse to the firmware image file you downloaded, select the file, then click **Open**.
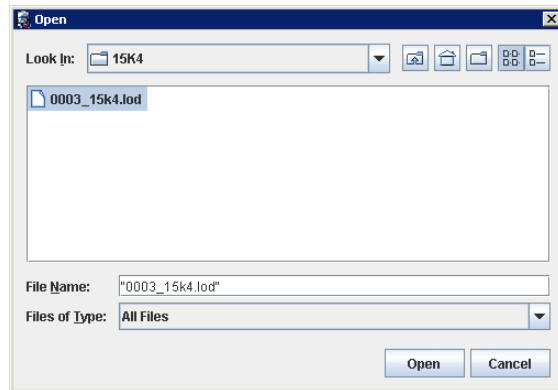
4 In the wizard, select the image file you want, choose the packet size (in bytes) from the drop-down list, then click **Next**.

> **Note:** For SATA drives, the packet size must be a multiple of 512.

5 Select the disk drives you want to update, then click **Next**.

> **Note:** For SAS drives with "Mode 6" support, select **Save Later** to use the new firmware once, during the current session, and to revert to the previous firmware the next time the drive is started.

6 Review the update summary, then click **Apply**.

7   When prompted, click **Yes** to begin the update.

⚠️ **Caution:** Do *not* power down the controller or remove the disk drives during the update.

8   When the update is complete, click **OK**.

Monitoring Status and Activity

9

In this chapter...

This chapter describes how Adaptec Storage Manager helps you monitor your storage space.

Monitoring Options

Adaptec Storage Manager provides many ways to monitor the status of your storage space:

- **Event Log**—The main window of Adaptec Storage Manager features an event log that provides at-a-glance status information about activity occurring in your storage space. (See the following section.)

- **Event Status Icons**—Three basic icons (information, warning, and error) appear in the event log and in the main Adaptec Storage Manager window to help you quickly identify problems. (See page 104.)

- **Enclosure Status Icons**—If your storage space includes an enclosure with an enclosure management device, three icons appear in the Physical Devices View to help you monitor temperature, fan, and power module status. (See page 105.)

- **Notifications**—You can set Adaptec Storage Manager to broadcast status notifications in your choice of format to help you monitor these activities on local and remote systems (see pages 106–117):

    - Progress of scheduled tasks, such as logical drive verifications.

    - Changes in the status of the physical components of your storage space, such as disk drives.

    - Changes to the local system, such as the expansion of a logical drive or the creation of a hot spare.

- **Statistics Logging**—You can set Adaptec Storage Manager to collect I/O and usage statistics for the RAID controllers in your system and periodically "call home" to send the data to Adaptec or other contacts for analysis. (See page 119.)

- **Properties Button**—You can check the status of any component in your storage space by using the Properties button. (See *Viewing Component Properties* on page 87.)

- **Audible Alarm**—A series of beeps sounds whenever a serious event occurs on your storage space. (See *Maintaining Physical Devices* on page 86.)

Checking Status from the Main Window

From your local system, you can see status information and messages about the activity (or *events*) occurring in your storage space by looking at the *event log* and status icons in the main window of Adaptec Storage Manager. (You can also view all events for a system in its operating system event log—see page 118.) You can also monitor any enclosure with an enclosure management device from the main window.

Viewing Activity and Status in the Event Log

The event log lists activity occurring in your storage space, with the most recent event listed at the top. Status is indicated by icons (see page 104) in the left-hand column, as shown in the figure on page 104.

Double-click any event to open the Configuration Event Detail window to see more information in an easier-to-read format. Use the up and down arrows to view previous or following events.
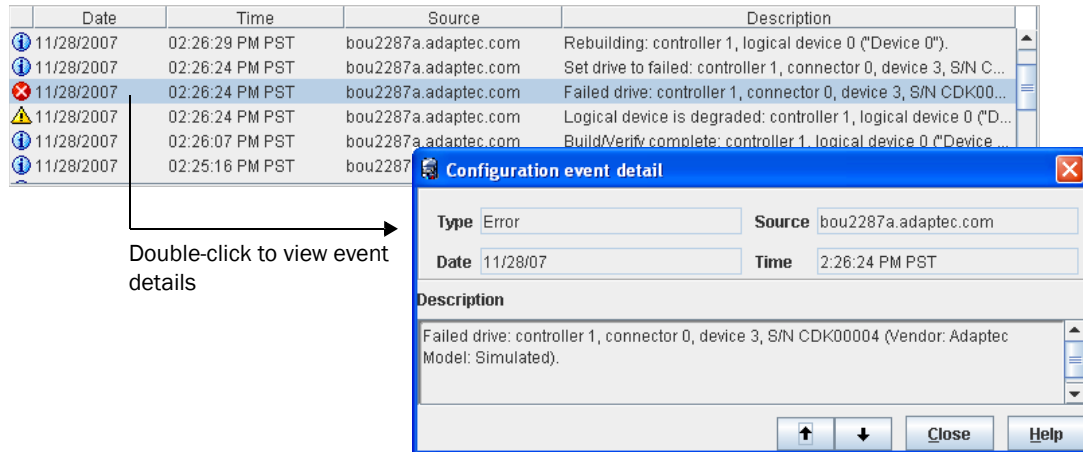
Double-click to view event details

To open a full-screen version of the complete event log, click the **Events** button on the tool bar.

To make it easier to find a specific event, click on the column heads to sort the events. (Sorting events by status icons helps you find specific Error- or Warning-level events quickly.) You can also move the columns of the event log, if required.

What Do the Event Status Icons Mean?

Adaptec Storage Manager indicates event status with icons. This table lists the three categories, or types, of events based on severity.

Icon	Status	Examples
ⓘ	Information	● The local system successfully connected to a remote system. ● A logical drive was created. ● A hot spare was deleted.
⚠	Warning	● A logical drive is in a degraded state. ● A disk drive is being rebuilt. ● A controller is not responding to an enclosure.
⊗	Error	● A controller has failed. ● A logical drive has failed. ● A hot spare has failed. ● An enclosure is overheating. ● Multiple fans or power supplies within an enclosure have failed. ● An enclosure is not responding.

Warning- and Error-level icons appear next to components (such as systems and logical drives) affected by a failure or error, creating a trail that helps you quickly identify the source of a problem. See *Identifying a Failed or Failing Component* on page 136 for more information.

Note: All Warning- and Error-level events also cause the audible alarm to sound. See page 105 for more information.

Clearing the Event Log

To clear all event logs belonging to all controllers in a selected system:

1 In the Enterprise View, click on the system you want.

2 On the menu bar, select **Actions**, then select **Clear logs on all controllers**.

3 Click **Yes** to clear the log.

Using Enclosure Icons to Monitor Enclosure Status

If your storage space includes an enclosure with an enclosure management device, such as a SCSI Accessed Fault-Tolerant Enclosure (SAF-TE) processor, Adaptec Storage Manager displays temperature, fan, and power module status in the Physical Device view, as shown in the next figure. The icons change color to indicate status, as described in the table below.
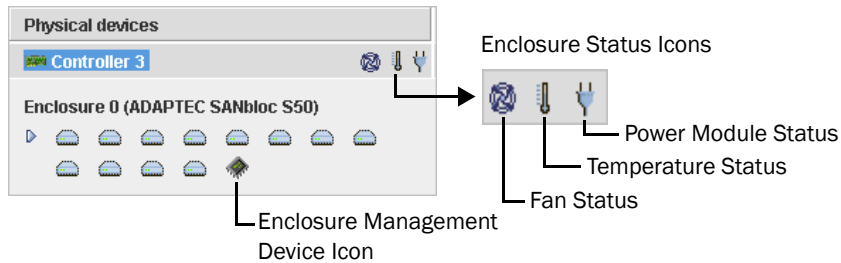
Icon	Status	Examples
	Normal	Fans are working properly.
	Warning	A fan has failed.
	Error	Multiple fans have failed.
	Normal	Enclosure temperature is normal.
	Warning	Enclosure temperature is higher than normal.
	Error	Enclosure is overheating.
	Normal	Power supplies are working normally.
	Warning	One power supply has failed.
	Error	Multiple power supplies have failed.

Note: If your enclosure does not have an enclosure management device, the status icons appear but *do not* indicate status.

Notifying Users by Event Log Message About Status and Activity

You can set up Adaptec Storage Manager to send messages to the event log of selected remote systems when activity, such as the creation of a logical drive or the failure of a disk drive, occurs on the local system. (For more information about event types, see page 104.)

Logged notifications can help you monitor activity on your entire storage space from a single local station, and are especially useful in storage spaces that include multiple systems running the Adaptec Storage Manager Agent only.

Logged notifications include status information and identify which system (or *source*) an event occurred on. For instance, in this example, the event log indicates that two logical drives were added to a system named 'gas1668b'.

	Date	Time	Source	Description
ⓘ	04/14/2006	11:01:44 AM PDT	GAS1668B.adaptec.com	Added logical device: controller 1, logical device 4 ("Logi...
ⓘ	04/14/2006	11:01:44 AM PDT	GAS1668B.adaptec.com	Added logical device: controller 1, logical device 3 ("Logi...
ⓘ	04/14/2006	11:01:41 AM PDT	GAS1668B.adaptec.com	Successfully applied the new configuration: controller 1.
❌	04/14/2006	10:53:48 AM PDT	bou2287c.adaptec.com	Could not clear the event logs for system bou2287c.ada...
❌	04/14/2006	10:53:32 AM PDT	GAS1668B.adaptec.com	Could not clear the event logs for system GAS1668B.ad...
ⓘ	04/14/2006	10:40:46 AM PDT	bou2287c.adaptec.com	Reconfiguration complete: controller 1, logical device 3 (...

Logged notifications are *not* sent to all systems in your storage space. In the Notifications Manager, you can specify which systems will send and receive logged notifications; then, you can add or delete systems as your storage space grows and changes.

Follow the instructions in this section to:

● Set up logged notifications (see the next section).

● Send a test notification (see page 108).

● Modify a system's information or remove a system (see page 109).

● Disable logged notifications (see page 110).

● Clear the notification event log (see page 110).

Setting up Logged Notifications

This section describes how to set up logged notifications for one system in your storage space. You must complete the tasks in this section for *each* individual system that you want to monitor with logged notifications.

To set up logged notifications for a system:

1 Note this information for each system that will *receive* event notifications about the selected system:

● Host name or TCP/IP address

● TCP/IP port number (or the default, 34571)

**2** In the Enterprise View, select the system you want.

3 On the tool bar, click **Configure**, point to the system, then click **Notifications**.
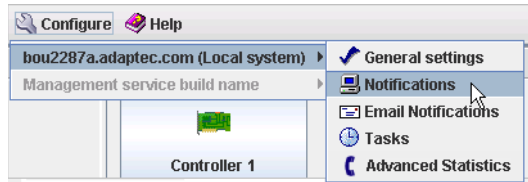
The Notifications Manager opens. The local system is automatically included in the list of systems receiving logged notifications. (By default, all local events are listed in the local event log.)

Notifications Manager on Notifications Tab
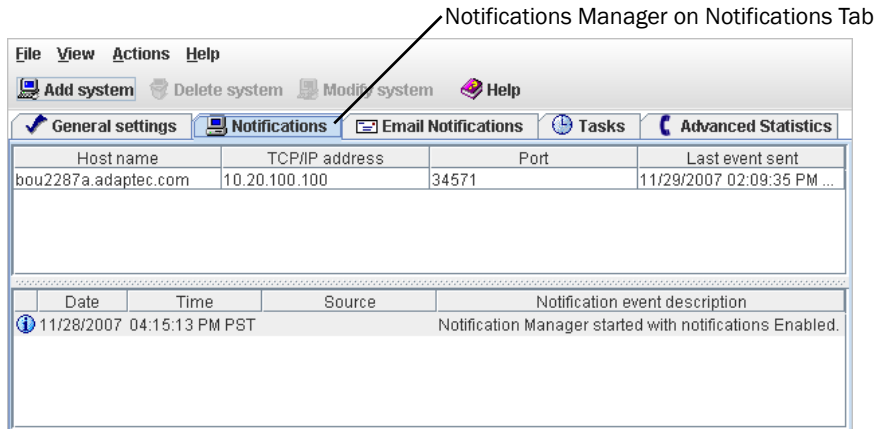
Note: You can access other features in this window, such as the Task Manager (see *Scheduling Recurring or Resource-Intensive Jobs* on page 80), by clicking their tabs.

4 In the tool bar, click **Add system**.

The Add System window opens.

5 Enter the host name or TCP/IP address of another system in your storage space that will receive event notifications generated by the local system. (If you are not using the default port number, 34571, enter the TCP/IP port.) Then, click **Add**.
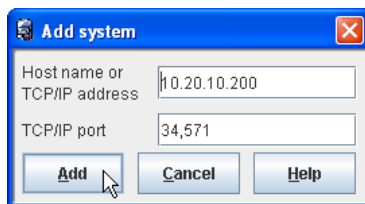
Repeat this step to add other systems to Notifications Manager.

6   When you're done, click **Cancel** to close the Add System window.

The systems you added appear in the Notifications Manager.

General settings	Notifications	Email Notifications	Tasks	Advanced Statistics
Host name	**TCP/IP address**	**Port**		**Last event sent**
bou2287a.adaptec.com	10.20.171.200	34571		11/29/2007 02:19:38 PM ...
10.20.10.200	10.20.10.200	34571		11/29/2007 02:21:21 PM ...
10.20.10.201	10.20.10.201	34571		11/29/2007 02:21:33 PM ...

7   Close the Notifications Manager when you're done.

8   Repeat the steps in this section for each system you want to monitor with logged notifications.

Sending a Test Event

To ensure that a system is receiving logged notifications, you can send a test event.

To send a test event:

1   In the Enterprise View, select the system you want.

2   On the tool bar, click **Configure**, point to the system, then click **Notifications**.

The Notifications Manager opens.

3   In the Notifications list, click on the system you want to send a test event to.

Note: You can only send a test event to one system at a time.

4   On the menu bar, select **Actions**, then click **Send test event**.

File	View	Actions	Help

Add sys   Add system   Modify system   Help
            Delete system
General   Modify system   Email Notifications | Tasks | Advanced Statistics

Hos	Send test event	address	Port	Last event sent
bou2287a.a			34571	11/29/2007 02:19:38 PM ...
10.20.10.20	Disable notifications		34571	11/29/2007 02:21:21 PM ...
10.20.10.20			34571	11/29/2007 02:21:33 PM ...
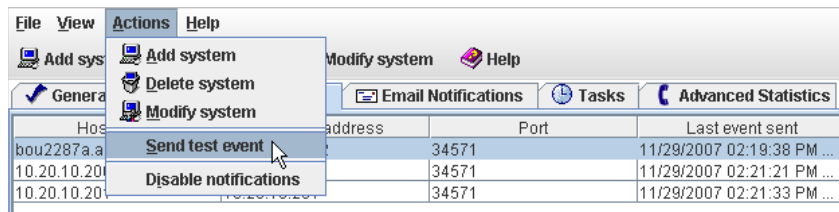
The test event is sent. A message appears indicating either that the test event was sent successfully or that the test failed. (Click **OK** to clear the message.)

If the test is successful, the receiving system beeps once, and its event log shows that a test event was received.

Date	Time	Source	Description
11/29/2007	02:30:41 PM PST	bou2287a.adaptec.com	This is a test event.
11/29/2007	12:56:56 PM PST	bou2287a.adaptec.com	Established a connection to 10.20.170.113 on port number 3...
11/29/2007	12:56:54 PM PST	HIL6617.adaptec.com	No controllers were found in this system.
11/15/2007	10:01:35 AM PST	HIL6617.adaptec.com	Adaptec Storage Manager started on TCP/IP port number 34,...

If the test fails:

a   Ensure that the receiving system is powered on and running Adaptec Storage Manager.

b   Open the receiving system's System Properties window (see Step 4 on page 109) and double-check the TCP/IP address and port number.

c   Try sending the test event again.

Modifying a System's Information or Remove a System

Follow the instructions in this section to specify a notification level for a system, or change the TCP/IP information or host name of a system.

Note: Does this system receive notifications from more than one system? Ensure you enter the updated information on all affected systems.

To modify system information:

1   In the Enterprise View, select the system you want.

2   On the tool bar, click **Configure**, point to the system, then click **Notifications**.

The Notifications Manager opens.

3   Select the system you want to modify.

4   In the System Properties window, enter the new information or select a new notification level in the Event Type drop-down menu, then click **OK**.
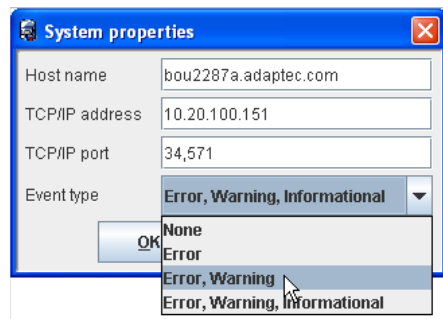
Or,

In the tool bar, click **Delete system**, then click **Yes** to confirm the deletion.

Modifications become effective immediately. If you have deleted a system but you still want to be notified about status and activity by logged notifications, ensure that there is at least one system on the Notifications list. (See page 106 to add a new system.)

Disabling Logged Notifications

Logged notifications are enabled by default. You can choose disable them on a selected system, if required.

Note: If you disable logged notifications, events will be generated for that system but not broadcast—not even to the local Event Log.

To disable logged notifications:

1   In the Enterprise View, select the system you want.

2   On the tool bar, click **Configure**, point to the system, then click **Notifications**.

The Notifications Manager opens.

3   On the menu bar, click **Actions**, then click **Disable notifications**. (See the illustration in Step 4 on page 108, if required.)

Event notifications are disabled. The Notifications tab (shown at right) shows the red 'disabled' icon.

Re-enabling Logged Notifications

To re-enable logged notifications, repeat steps 1 and 3 in *Disabling Logged Notifications*, selecting Enable Notifications during Step 3.

Clearing the Notifications Manager Log

The bottom panel of the Notifications Manager displays status information and messages about the Notification Manager itself, such as whether notifications were sent successfully or not. To make it easier to monitor recent events, you can clear the log on a selected system.

To clear the Notification Log:

1   In the Enterprise View, select the system you want.

2   On the tool bar, click **Configure**, point to the system, then click **Notifications**.

The Notifications Manager opens.

3   On the menu bar, click **File**, select **Clear the event log**, then click **Notifications**.
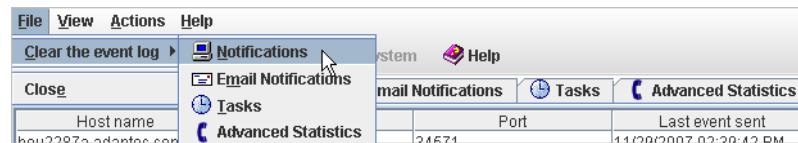
4   Click **Yes** to clear the log.

The log is cleared.

Notifying Users by Email About Status and Activity

You can set up Adaptec Storage Manager to send email messages (or *notifications*) to a selected email address when an event, such as the creation of a pool or the failure of a disk drive, occurs on a system. Email notifications can help you monitor activity on your entire storage space from any location, and are especially useful in storage spaces that include multiple systems running the Adaptec Storage Manager Agent only.

Only the users you specify receive email notifications. You can specify which types of events generate email messages (Error, Informational, Warning). You can also specify if you want to be notified instantly when an event occurs to ensure that urgent issues receive immediate attention from the right people. Alternatively, you can specify that you want events "coalesced" and receive only one email message for each event type.

Follow the instructions in this section to:

- Set up email notifications (see page 111).

- Send a test email (see page 113).

- Modify a recipient's information or remove a recipient (see page 114).

- Modify email settings (see page 114).

- Disable email notifications (see page 115).

Setting Up Email Notifications

This section describes how to set up email notifications for one system. If you want to monitor multiple systems by email, you must complete the tasks in this section for each one separately.

Before you begin, note this information:

- The address of your Simple Mail Transfer Protocol (SMTP) server (host name and domain, or TCP/IP address)

- The name and email address of the person who will receive email notifications

To set up email notifications:

1   In the Enterprise View, select the system you want.

2   In the Adaptec Storage Manager tool bar, click **Configure**, point to the system, then click **Email Notifications**.
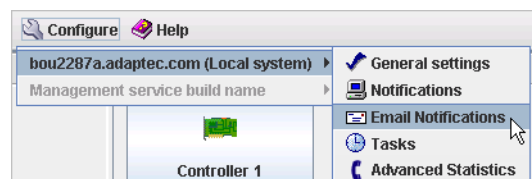
The Email Notifications Manager opens.
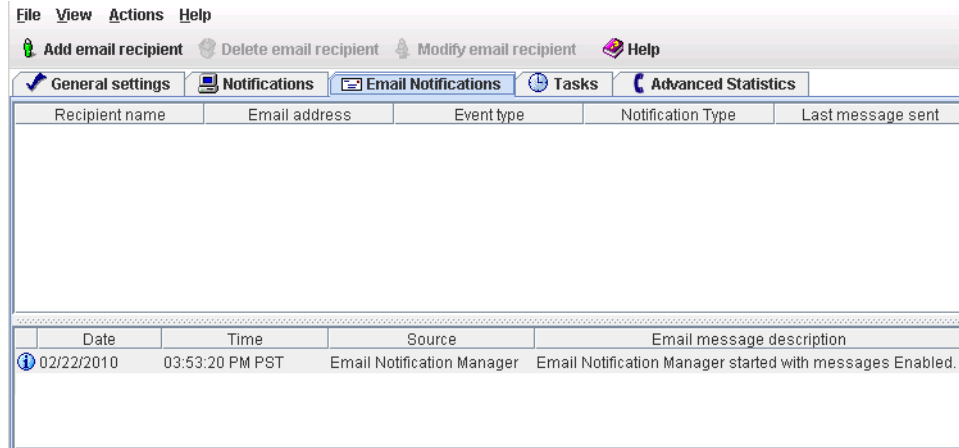
If you haven't previously set up email notifications, the SMTP Server Settings window also opens, as shown in the next Step. (If email notifications are already set up, the SMTP Server Settings window doesn't open. Skip to Step 5.)

3 Enter the address of your SMTP server and the server's port number (or use the default port). Then enter the "From" address to appear in email notifications. If an email recipient will be replying to email notifications, be sure that the "From" address belongs to a system that is actively monitored.

If authentication is enabled on your SMTP server (that is, the server requires authentication details before it will send messages to users), select **Use Secure Mail Server**, then enter the SMTP server user's login credentials in the space provided.
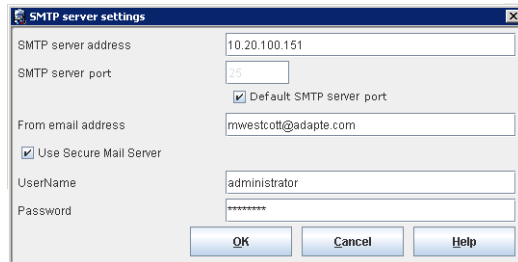
4 Click **OK** to save the settings.

5 In the Email Notifications Manager tool bar, click **Add email recipient**.

The Add Email Recipient window opens.

6 Enter the recipient's name and email address, select the level of events for which the recipient will receive an email, select the notification type—Instant or Coalesced—then click **Add**. (For more information on event levels, see .)

Note: With Coalesced notifications, you receive one email message for a group of events, not for each event individually. The minimum interval between email messages is one minute.

Repeat this Step to add other recipients to the Email Notifications Manager.

7 When you're done, click **Cancel** to close the Add Email Recipient window.

The email recipients you added appear in the Email Notifications Manager.

8 Repeat the steps in this section for each system you want to monitor with email notifications.

9 Close the Email Notifications Manager, then continue by sending test messages to all recipients, as described in the next section.

Sending a Test Message

To ensure that an email recipient is receiving event notifications, you can send them a test message.

To send a test message:

1 In the Enterprise View, select the system you want.

2 In the Adaptec Storage Manager tool bar, click **Configure**, point to the system, then click **Email Notifications**.

The Email Notifications Manager opens.

3 Click on the email address you want to send the test message to.

Note: You can only send a test message to one email address at a time.

4 On the menu bar, select **Actions**, then click **Send test message**.
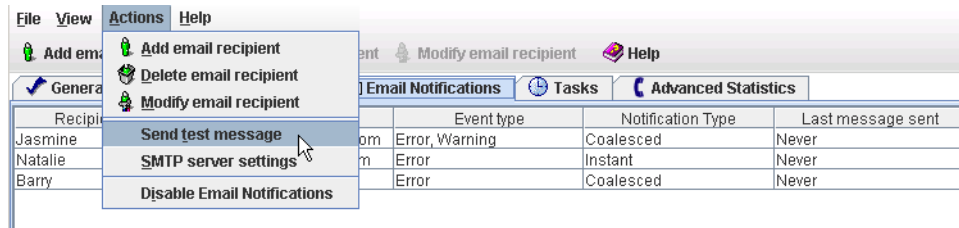
The test message is sent.

If the test is successful, the email recipient receives the test message. If the test fails:

a Ensure that the recipient's email address is correct. (See *Modifying a Recipient's Information or Removing a Recipient* on page 114 to modify the address.)

b Ensure that your SMTP server address is correct. (See *Modifying Email Settings* on page 114 to modify the address.)

c Try sending the test message again.

Modifying a Recipient's Information or Removing a Recipient

This section describes how to modify a recipient's email address, change the types of event notifications the recipient receives, or stop sending email notifications to a recipient from a selected system.

To modify a recipient's information:

1 In the Enterprise View, select the system you want.

2 In the Adaptec Storage Manager tool bar, click **Configure**, point to the system, then click **Email Notifications**.

The Email Notifications Manager opens.

3 Select the recipient you want, then click **Modify email recipient**. Change the information as required, then click **OK**.

Or,

Select the recipient you want, click **Delete email recipient**, then click **Yes** to confirm the deletion.

Modifications become effective immediately.

Modifying Email Settings

You can modify these email settings as your needs change:

● Address of your SMTP server

● 'From' address that will appear in email notifications

To modify email settings:

1 In the Enterprise View, select the system you want.

2 In the Adaptec Storage Manager tool bar, click **Configure**, point to the system, then click **Email Notifications**.

The Email Notifications Manager opens.

3 On the menu bar, select **Actions**, then click **SMTP server settings**.
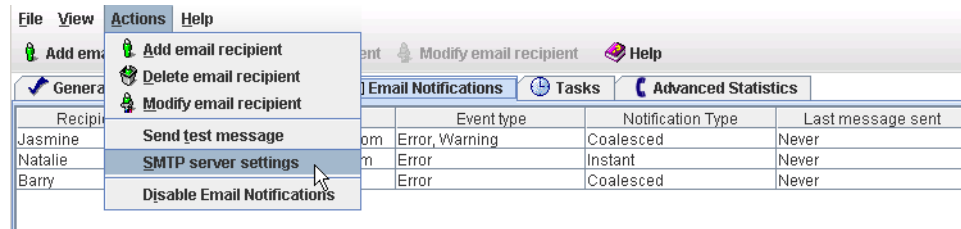
The SMTP Server Settings window opens.

4 Edit the SMTP server settings as required, then click **Add** to save the settings.

Disabling Email Notifications

Email notifications are enabled by default. You can choose disable them on a selected system, if required.

Note: If you disable email notifications, events will be generated but email messages won't be sent.

To disable email notifications on a selected system:

1 In the Enterprise View, select the system you want.

2 In the Adaptec Storage Manager tool bar, click **Configure**, point to the system, then click **Email Notifications**.

The Email Notifications Manager opens.

3 On the menu bar, click **Actions**, then click **Disable Email Notifications**.

Email notifications are disabled. The Email Notifications tab (shown at right) shows the red 'disabled' icon.

Re-enabling Email Notifications

To re-enable email notifications, repeat Steps 1 and 2 in *Disabling Email Notifications*, selecting Enable Notifications during Step 2.

Clearing the Email Notifications Log

The Email Notifications log displays status information and messages about the Email Notification Manager itself, such as whether email notifications were sent successfully or not. To make it easier to monitor recent events, you can clear the Email Notifications log on a selected system.

To clear the Email Notifications log:

1 In the Enterprise View, select the system you want.

2 On the tool bar, click **Configure**, point to the system, then click **Email Notifications**.

The Email Notifications Manager opens.

3 On the menu bar, click **File**, select **Clear the event log**, then click **Email Notifications**.
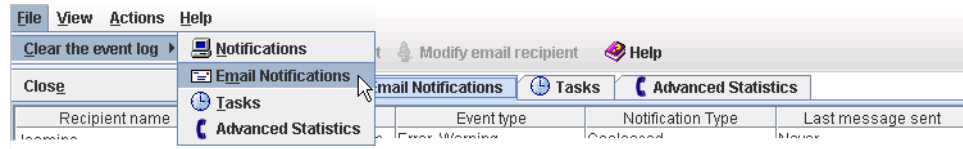
4 Click **Yes** to clear the log.

The log is cleared.

Notifying Users by SNMP Trap About Status and Activity

Note: Before attempting the tasks in this section, you should be familiar with SNMP traps concepts and technology.

If you are running Windows or Linux, you can use your operating system to monitor Simple Network Management Protocol (SNMP) traps in your storage space, such as disk drive failures and logical drive verifications. One system—typically the system where the GUI is installed—can receive SNMP trap notifications.

To configure SNMP support on:

● Windows, see the next section.

● Linux, see .

Setting Up SNMP Notifications on Windows

Note: Be sure your Windows installation includes SNMP support. By default, Windows 2000 and Windows XP do not install SNMP.

To install and configure SNMP support:

1 From your desktop, open the Windows **Computer Management** tool, then select **Services** from the tree.
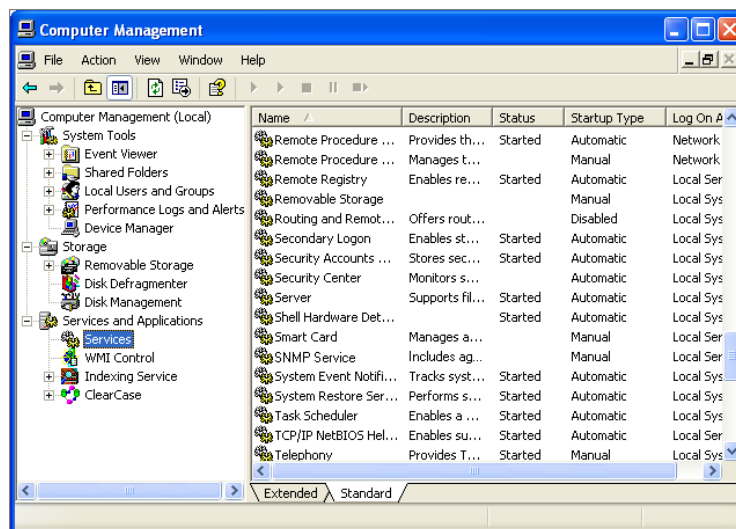
2 Double-click **SNMP Service**.

The SNMP Service Properties window opens.

3   Click the **Traps** tab, then enter the IP address of each system on which you want to enable traps.

4   Click **OK**.

5   Start the SNMP service.

Setting Up SNMP Notifications on Linux

For the Linux operating system, the Adaptec Storage Manager SNMP agent is a sub-agent that interfaces with the UCD-SNMP agentx architecture. UCD-SNMP is a third-party package for Linux; for information, documentation, and downloads, see www.net-snmp.org.

To configure SNMP support:

1   Install Adaptec Storage Manager (see page 20).

2   Add Adaptec OID information and agentx extension information to the snmp.conf.

3   Delete `/var/agentx/master` (socket file for agentx).

4   Start the snmpd daemon and agentx.

5   Start aus-snmp daemon.

Refer to your Linux documentation for information on configuring UCD-SNMP, agentx, and setting up traps.

Notifying *All* Users About Status and Activity

You can set Adaptec Storage Manager to send status alerts about a specified system to all users who are logged into your storage space. You might want to do this if your storage space isn't managed by a dedicated person, or if that particular system is off-site or not connected to a monitor. Event alerts signal everyone working on the storage space that a system requires technical assistance.

When you set Adaptec Storage Manager to broadcast event alerts, *all* logged-in users receive messages about *all* types of events. In Windows, these alerts appear as pop-up messages; in all other operating systems, these alerts appear as console messages.

When enabled, event alerts occur independent of event notifications (see page 106) and email notifications (see page 111).

To enable event alerts:

1   In the Enterprise View, select the system you want.

1   On the tool bar, click **Configure**, point to the system you want, then click **General Settings**.
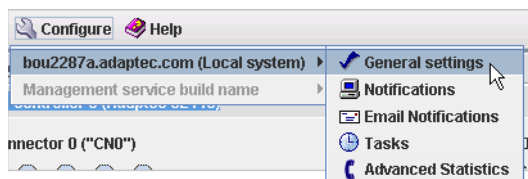
The Adaptec Storage Manager Agent General Settings window opens for that system. (See the figure on page 131.)

2 Select **Broadcast events to logged-in users**, then click **Save changes**.

3 Restart Adaptec Storage Manager to apply the change.

Changing an Operating System's Event Log Setting

In addition to the Adaptec Storage Manager event log, all Warning- and Error-level events on a system are recorded in its *operating system* event log. You can customize the level of events that are recorded, or you can disable operating system event logging.

To change or disable operating system event logging on a system:

1 In the Enterprise View, select the system.

2 In the tool bar, click **Configure**, point to the system, then click **General Settings**.
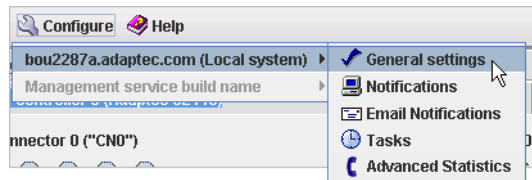
The Adaptec Storage Manager Agent General Settings window opens for the system you selected.
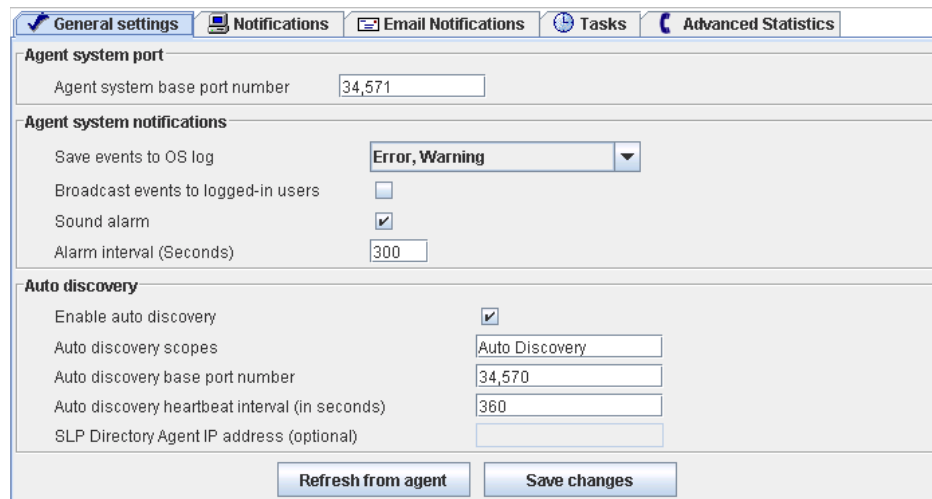
Note: You can access other utilities in this window, such as the Task Manager (see *Scheduling Recurring or Resource-Intensive Jobs* on page 80), by clicking their tabs.

3 In the Save events in OS log drop-down menu, select the type of event logging that you want, then click **Save changes**.

4 Restart Adaptec Storage Manager to apply the new setting.

Logging Statistics for Remote Analysis

You can use Adaptec Storage Manager to gather advanced usage statistics for the RAID controllers in your system, and to periodically send the data to Adaptec, or other designated contacts, for analysis. This feature is referred to as "call home".

The information gathered by Adaptec Storage Manager includes:

- Advanced IO and usage statistics for the controllers on your system, including MaxIQ cache statistics

    Note: If you prefer not to gather statistics for a controller, you can disable statistics logging. See *Disabling Statistics Logging on a Controller* on page 93.

- Controller configuration data, such as the number of logical drives, their RAID levels, and size

- Error log files

Note: Adaptec Storage Manager does not gather proprietary site information when logging statistics for remote analysis. In addition to logging I/O usage statistics, it gathers the same error log files and controller configuration data as the ASM support archive. For more information, see *Creating a Call Home Support Archive* on page 123 and *Creating a Support Archive File* on page 141.

Follow the instructions in this section to:

- Set up the statistics logging frequency, reporting interval, and contact information (see next section).

- Configure proxy server settings (see page 121).

- Send a test message (see page 121).

- Disable/Enable call home messages (see page 122).

- Clear the Advanced Statistics Manager event log (see page 122).

- Create a call home support archive (see page 123).

- View the statistics for a controller, hard drive, SSD, or logical drive (see page 123).

Setting Up Statistics Logging

This section describes how to set up advanced statistics logging, including the logging frequency, reporting interval, and contact information. The logging frequency is the rate at which I/O statistics are read from the controller. The reporting interval determines how often Adaptec Storage Manager sends the data to your contacts.

Note: Typically, you enable statistics logging the first time you log in to Adaptec Storage Manager. If you haven't enabled statistics logging, follow the instructions on page 122, then continue with the instructions below.

To set up statistics logging for a system:

1   In the Enterprise View, select the system you want.

2 On the tool bar, click **Configure**, point to the system, then click **Advanced Statistics**.
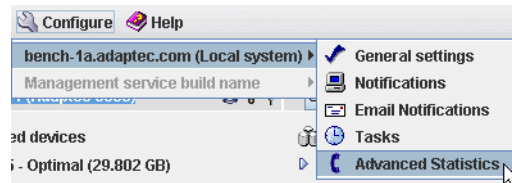
The Advanced Statistics Manager opens.

Advanced Statistics Manager on Advanced Statistics Tab
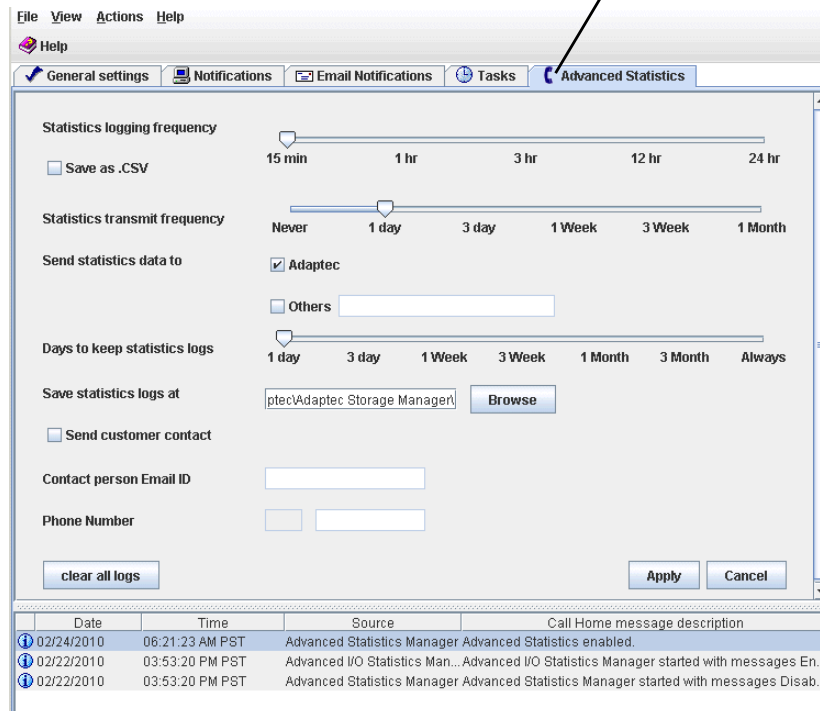
3 Adjust the Statistics logging frequency slider. (The default is 15 minutes.) Select **Save as .CSV** to save the statistics logs in both CSV and XML format; the default is XML only.

4 Adjust the Statistics transmission frequency slider. (The default is 1 day.)

5 In the Send statistics to field, select **Adaptec** and/or **Others**. If you select Others, enter the datacenter URL in the text box.

6 Adjust the Days to keep statistics logs slider. (The default is 1 day.)

7 Enter the storage location for the statistics logs or use the default location. Click **Browse** to select a location in your file system.

8 To send customer contact information along with the statistics logs, click **Send customer contact**, then enter the contact's email address and phone number.

9 Click **Apply**.

Note: To transmit the statistics immediately and to delete the statistics logs, click **Clear all logs**, then click **Yes** to confirm.

Configuring Proxy Server Settings

Adaptec Storage Manager uses the Internet to send statistics to your designated contacts. If your network uses a proxy server to access the Internet, you must provide your proxy server connection settings.

To configure your proxy server connection settings:

1   In the Enterprise View, select the system you want.

2   On the tool bar, click **Configure**, point to the system, then click **Advanced Statistics**.

   The Advanced Statistics Manager opens.

3   On the menu bar, select **Actions**, then click **Call Home connection settings**.

   The Call Home connection settings window opens.
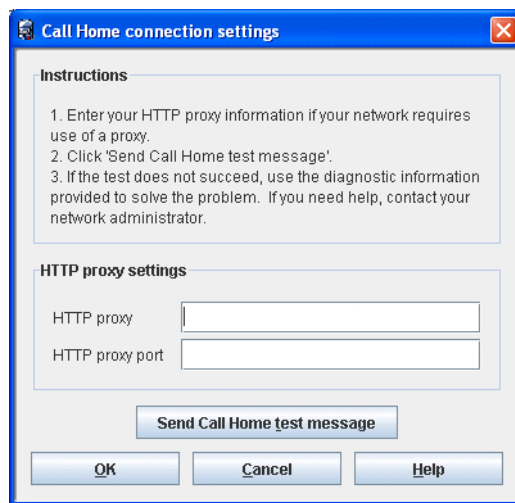
4   Enter your HTTP proxy server name and port number.

5   Click **OK**.

Sending a Test Message

To ensure that your contacts are receiving logged statistics, you can send a test message.

1   In the Enterprise View, select the system you want.

2   On the tool bar, click **Configure**, point to the system, then click **Advanced Statistics**.

   The Advanced Statistics Manager opens.

3   On the menu bar, select **Actions**, then click **Call Home connection settings**.

   The Call Home connection settings window opens.

4   Click **Send Call Home test message**. A message appears indicating either that the test message was sent successfully or that the test failed.

Click **OK** to clear the message, then click **Cancel** to close the Call Home connection settings window.

Note: If the test fails, try opening port 80. If the test continues to fail, your system administrator may need to add the Adaptec Storage Manager Agent to your proxy server's white list.

Disabling Call Home Messages

If you prefer not to send statistics to Adaptec or other contacts, you can disable call home messages. Adaptec Storage Manager will continue to collect statistics but will not send them to your contacts for analysis.

To disable call home messages on a system:

1 In the Enterprise View, select the system you want.

2 On the tool bar, click **Configure**, point to the system, then click **Advanced Statistics**.

The Advanced Statistics Manager opens.

3 On the menu bar, click **Actions**, then click **Disable Advanced Statistics**.

Call home messages are disabled. The Advanced Statistics tab (shown at right) shows the red 'disabled' icon.
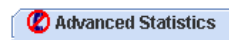
Re-Enabling Call Home Messages

To re-enable call home messages, repeat steps 1 and 2 in *Disabling Call Home Messages*, selecting **Enable Advanced Statistics** during Step 3.

Clearing the Advanced Statistics Manager Event Log

The bottom panel of the Advanced Statistics Manager displays status information and messages about the Advanced Statistics Manager itself, such as whether call home messages were sent successfully or not. To make it easier to monitor recent events, you can clear the log on a selected system.

To clear the Advanced Statistics Manager event log:

1 In the Enterprise View, select the system you want.

2 On the tool bar, click **Configure**, point to the system, then click **Advanced Statistics**.

The Advanced Statistics Manager opens.

3 On the menu bar, click **File**, select **Clear the event log**, then click **Advanced Statistics**.

4 Click **Yes** to clear the log.

The log is cleared.

Creating a Call Home Support Archive

You can create a Call Home Support Archive to gather IO and usage statistics without waiting for the polling and transmission cycle to complete. Information saved in the archive includes (but is not limited to) statistics logs, device logs, drive logs, event logs, error logs, controller logs, and MaxIQ logs. The default name of the archive file is CallHomeSupport.zip.

To create the call home support archive:

1   In the Enterprise View, select the local or remote system.

2   In the menu bar, select **Actions**, then click **Save call home support archive**.

3   Enter a name for the archive file or accept the default name, then click **Save**.

Viewing Statistics

Use the Statistics Viewer to view IO and usage statistics for the controllers, hard drives, SSDs, and logical drives in your system, including MaxIQ cache statistics. Click on the component in the main window of Adaptec Storage Manager, select **Actions**, then:

●   For hard drives, SSDs, or logical drives, click **View Statistics Data**

●   For controllers, select **Advanced Statistics**, then click **View Statistics Data**

The statistics listed vary, depending on which type of component you select. The example below shows the MaxIQ statistics for a logical drive, including cache hits and misses and a histogram of cache hit distribution.

Updating and Customizing Adaptec Storage Manager

10

In this chapter...

This chapter explains how to customize Adaptec Storage Manager as your requirements change and update it as new versions become available.

Updating Adaptec Storage Manager

When newer versions of Adaptec Storage Manager become available, you can update your storage space, if required.

Newer versions of Adaptec Storage Manager can be downloaded from the Adaptec Web site at www.adaptec.com.

If a newer version of Adaptec Storage Manager includes features that are incompatible with an earlier version and therefore isn't "downgradeable" after installation, you will be notified by Adaptec Storage Manager before the installation begins.

Note: If a previous version of Adaptec Storage Manager is installed on your system, you must remove it before installing a new version.

Adding Enhanced Features

As you grow your storage space, you can enhance data protection and improve performance by upgrading your Adaptec controller with extra features, then manage these enhanced features with Adaptec Storage Manager.

For the most up-to-date information about available upgrade features, refer to the Adaptec Web site at www.adaptec.com.

Locked features—features which are unavailable without a key— have a padlock icon beside them, as shown in the figure at right. If you select a locked feature, you are reminded that a key is required to unlock it.

To purchase a feature key (also known as a software license key), contact your Adaptec Reseller or refer to the Adaptec Web site at www.adaptec.com.

To unlock enhanced features with a feature key, see page 125.

Unlocking the Enhanced Features

To unlock enhanced features with a feature key:

1 In the Enterprise View, right-click the controller you want, then click **Add feature key**.

The Add Feature Key window opens.

2 Enter the feature key, then click **OK**.

3 Click **OK** to confirm.

The enhanced features are unlocked and are now ready for use.

Setting Preferences and Changing Views

Change display settings, and add or remove features from the Adaptec Storage Manager main window to make managing your IP SAN easier and more effective.

Note: The tasks described in this section are optional.

You can customize Adaptec Storage Manager by:

● Reorganizing the Enterprise view tree (see the next section).

● Selecting the standard unit of measure shown for disk drives (see page 127).

●   Excluding the tool bar or status bar from the main window, or turning off the Tool Tips (see page 127).

Reorganizing the Enterprise View

You can reorganize the Enterprise view tree to suit your needs.

You can set Adaptec Storage Manager to sort systems in the Enterprise View alphabetically or chronologically. (By default, systems are listed in alphabetical order.)

To reorganize the Enterprise View:

1   In the menu bar of the main window, select **File**, then click **Preferences**.

The User Preferences window opens.

2   Click the **Display options** tab.
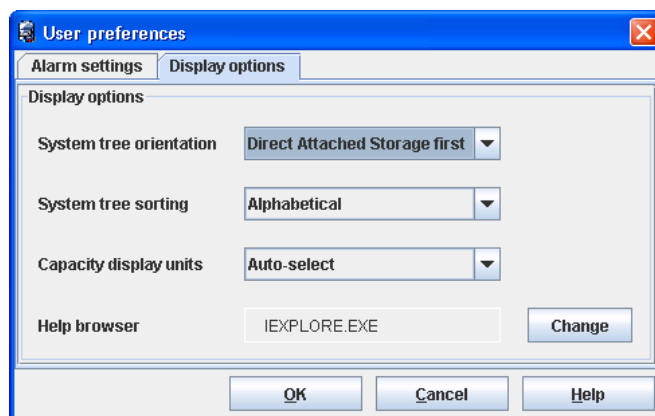
3   Change the **System tree sorting** or **System tree orientation** setting as required, then click **OK.**

Note: The local system always appears first when you sort objects alphabetically.

The changes are applied immediately.

Setting the Standard Unit of Measure

You can set Adaptec Storage Manager to show disk drive capacity in measures of megabytes (MB), gigabytes (GB), or terabytes (TB).

You can choose the Auto-select setting to allow Adaptec Storage Manager to show the most appropriate unit of measure based on disk drive size. This option allows different disk drives to be shown in different units of measure. By default, disk drives are shown in GB.

To change the standard unit of measure:

1 In the menu bar of the main window, select **File**, then click **Preferences**.

2 Click the **Display options** tab.

3 In the **Capacity display units** drop-down menu, select the option you want.
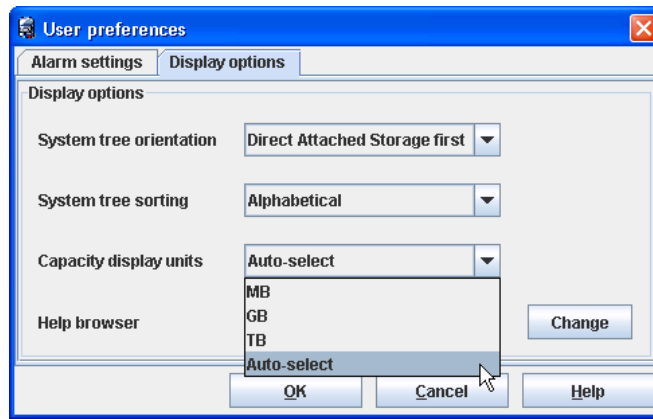
4 Click **OK**.

The change is applied immediately.

Changing the Main Window Appearance

You can choose to remove the tool bar and status bar from the main Adaptec Storage Manager window to save space on-screen. You can also choose to turn off the Tool Tips that automatically appear when you place your cursor over on-screen items.

To change the appearance of the main window, in the menu bar select View. The options in the View menu are toggle switches, which means they can be selected and deselected by clicking them.

Managing Remote Systems

Adaptec Storage Manager has a wizard to help you manage the remote systems in your storage space. The wizard simplifies the process of connecting to remote systems from the local system and adding them to the Enterprise View.

When you start Adaptec Storage Manager, an "auto-discovery" task runs in the background, continuously searching your network for systems running the Adaptec Storage Manager Agent. The wizard presents a list of discovered systems. You can select systems to add to the Enterprise View when you start Adaptec Storage Manager. You can also remove systems you no longer want to manage.

Adding and Removing Remote Systems in the Wizard

This section describes how to add or remove discovered systems in the Remote systems wizard. When you add systems, you can set up a group login to connect to all selected systems with a single user name and password. You can also add discovered systems to the Enterprise View without logging in.

To add or remove remote systems in the wizard:

1 In the Enterprise View, select **Direct Attached Storage**.

2 From the **Actions** menu, select **Manage Remote Systems**.

The wizard opens.

3 Select the discovered systems you want to add to the Enterprise View, then click **Add**. Click **Add All** to select all discovered systems.
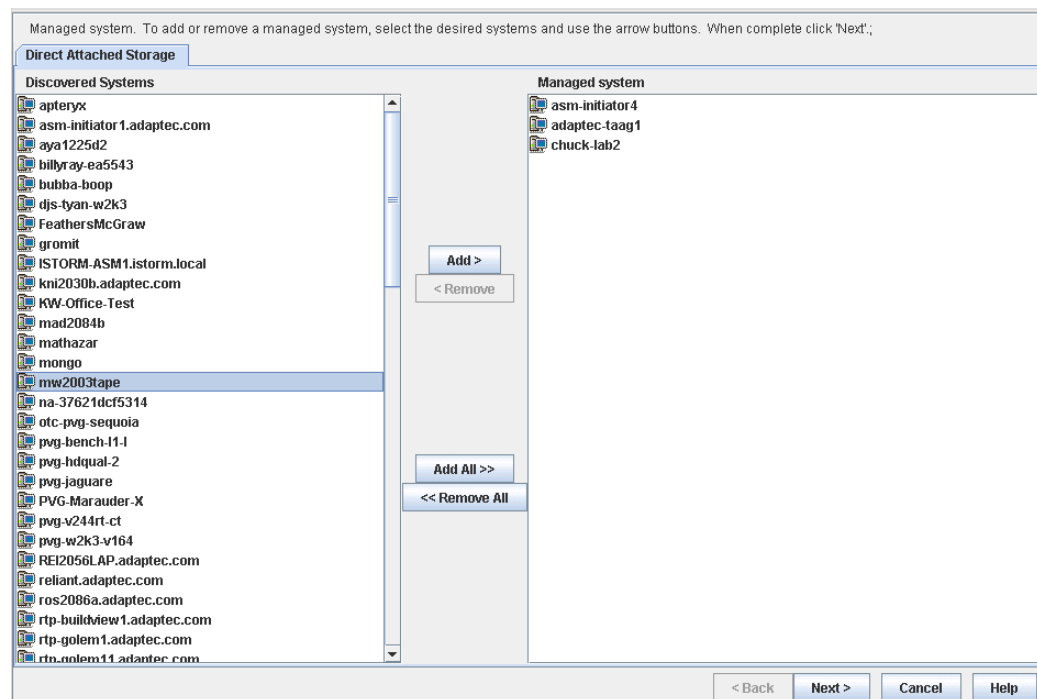
To remove a system from the Enterprise View that you no longer want to manage, select it from the Managed systems list, then click **Remove**. Click **Remove All** to remove all managed systems.

4 Click **Next**, review the Managed systems summary, then click **Apply**.
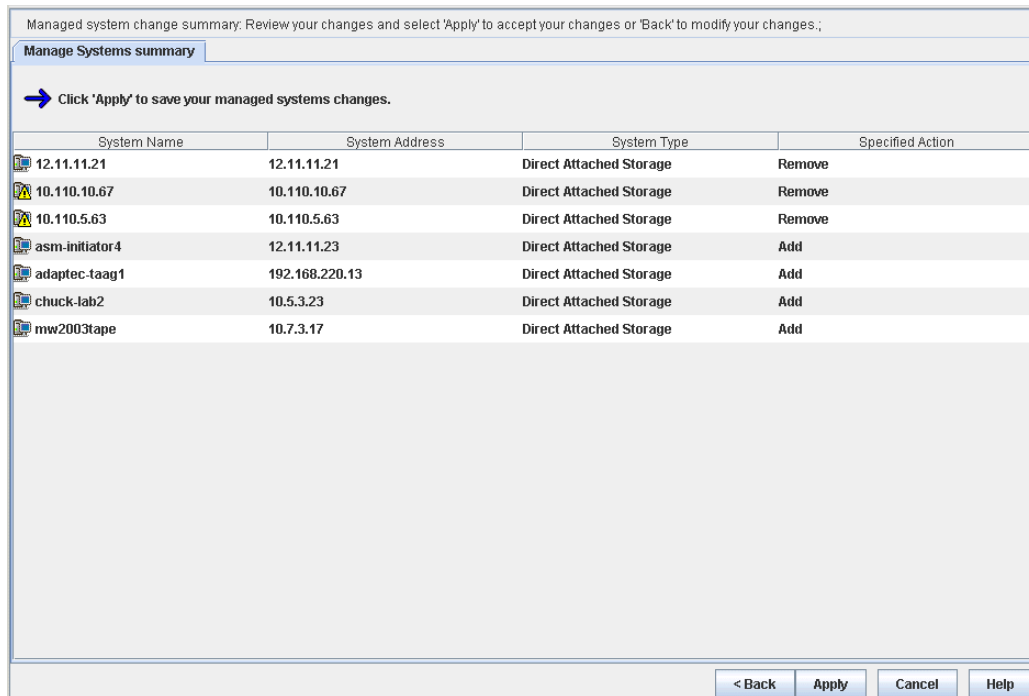
5 If you removed systems that you no longer want to manage, the Removing systems window opens. To continue receiving events from these systems, select **Continue to receive events from remote system(s)** from the drop-down list; otherwise, select **Do not continue to receive events from remote system**(s). Then, click **OK**.
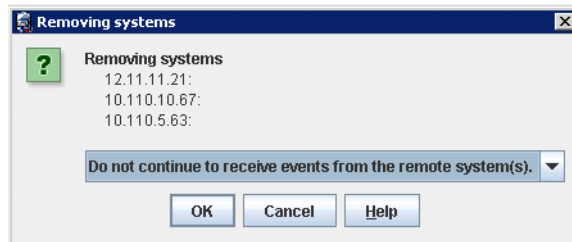
6 If you added systems, Adaptec Storage Manager prompts you to enter login credentials for the selected systems. In the Login to managed system window, enter a user name and password if security is enabled on the remote systems. Select **Login to all selected systems with this username and password** to use the same username/password combination for all selected systems. (You will be prompted to login to each remote system individually if you do not choose this option.) Select **Save username/password** to use the same login credentials each time you start Adaptec Storage Manager.
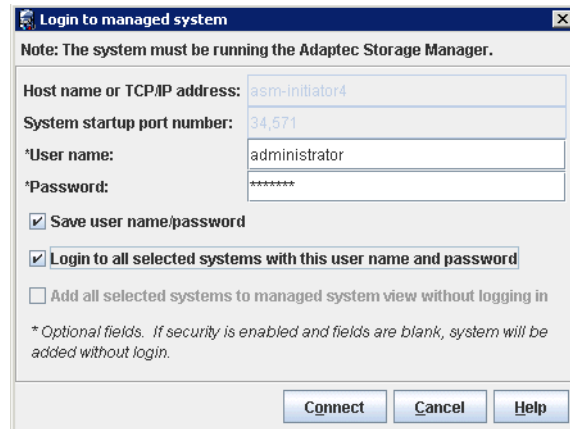
To add all selected systems to the Enterprise view without logging in, select **Add all selected systems to managed system view without logging in**. Choosing this option causes all other options to be grayed out.

7 Click **Connect**. The wizard closes and the selected systems are added to the Enterprise View.

Note: Adaptec Storage Manager adds all selected systems to the Enterprise view even if login fails on some systems. For those systems, try logging in again with different credentials.

Changing Auto-Discovery Settings

Auto-discovery, in Adaptec Storage Manager, is enabled by default. The auto-discovery task runs in the background each time Adaptec Storage Manager is started. You can disable auto-discovery if desired, and configure the auto-discovery settings described below.

To change auto-discovery settings on a system:

1 In the Enterprise View, select the local system.

2 In the tool bar, click **Configure**, point to the system, then click **General Settings**.
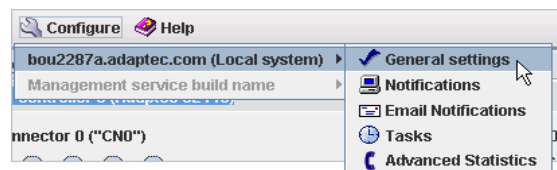
The Adaptec Storage Manager Agent General Settings window opens for the system you selected. The auto-discovery settings appear at the bottom:

3 To enable/disable auto-discovery, select **Enable auto-discovery.** (This option toggles between enabled and disabled.)

4 Update the auto-discovery settings, as required:

- In the **Auto discovery scopes** field, enter a comma-separated list of scopes. To be discovered by the auto-discovery task, the local system and remote system must have at least one scope in common. The default scope for an Adaptec Storage Manager Agent is Auto Discovery.

- In the **Auto discovery base port number** field, enter the port's TCP/IP address. You can use any port for auto-discovery. However, to use an existing SLP infrastructure, you must use port 427. The default port is 34570. If you change the port, you must restart the Adaptec Storage Manager Agent for the change to take effect.

- In the **Auto discovery heartbeat interval** field, enter the number of seconds between each auto-discovery check. This number determines how often Adaptec Storage Manager checks for changes in remote system resources. The default is 360 seconds.

- In the **SLP Directory Agent address** field, enter the TCP/IP address of the SLP Directory Agent. Applies only if you specified port 427 for an existing SLP infrastructure.

5 Click **Save Changes.**

Working with Display Groups

You can organize related local and remote systems into display groups within the Enterprise View to make monitoring and modifying your storage space faster, easier, and more efficient.

Once display groups are created, they're sorted alphabetically and appear in the Enterprise View below any systems that are not part of a display group.

A system can belong to only one display group at a time; you can't include the same system in multiple display groups.

Follow the instructions in this section to:

- Create display groups (see the next section).

- View display group properties (see page 133).

- Move a system from one group to another (see page 133).

- Rename a display group (page 134).

- Remove a system from a display group (page 134).

- Delete a display group (page 134).

Creating Display Groups

You can organize related local and remote systems into display groups to make managing your storage space easier and more effective.

Systems in a display group appear together in the Enterprise View under the group name.

To create a display group:

1   In the Enterprise View, right-click on a system that you want to add to a display group, select **Change display group**, then click **New group**.
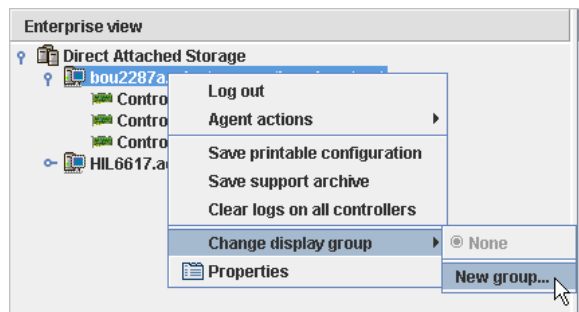
2   Enter a name for the new display group, then click **OK**.
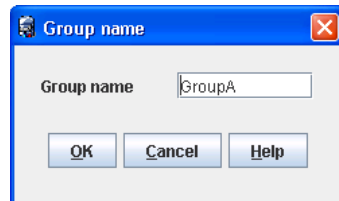
The display group is created and the system you selected in Step 1 is added to it.

3 To add another system to the display group, repeat right-click on that system in the Enterprise View, select **Change display group**, then click the display group name.
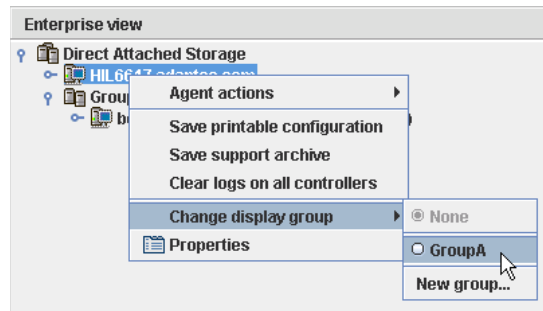
The system is added to the display group.

Note: A system can belong to only one display group at a time; you can't include the same system in multiple display groups.

Viewing Display Group Status

To quickly view the status of systems within a display group, you can open the display group Properties window.

In the Enterprise View, right-click on the display group, then click **Properties**. The Properties window opens for that display group, summarizing the status of the systems that belong to that group.
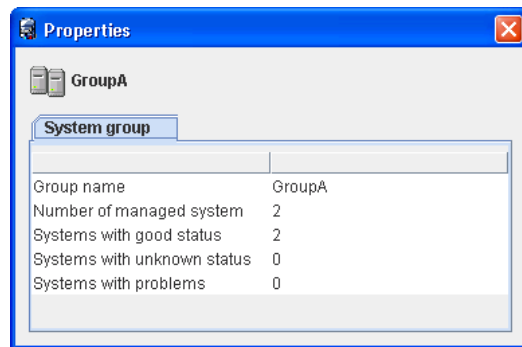
Moving a System from One Display Group to Another

To move a system from one display group to another:

1 In the Enterprise View, right-click the system you want to move.

2 Select **Change display group**, then click the name of the display group you want.

The system moves to its new display group.

Renaming a Display Group

You can make managing your storage space easier and more efficient by giving your display groups meaningful names. To rename a display group:

1 In the Enterprise View, right-click on the display group, then click **Rename display group**.

2 Enter a new name for the display group, then click **OK**.

The Enterprise View shows the new name of the display group.

Removing a System from a Display Group

To remove a system from a display group:

1 In the Enterprise View, right-click the system you want to remove.

2 Select **Change display group**, then click **None**.

The system is removed from the display group.

Note: Systems that are *not* part of display groups are listed at the top of the Enterprise View, above any display groups.

Deleting a Display Group

If required, you can delete a display group. When you delete the display group, the systems that belonged to it are listed at the top of the Enterprise View, above any remaining display groups.

To delete a display group:

1 In the Enterprise View, right-click on the display group.

2 Click **Delete display group**.

The display group is deleted and the systems that belonged to it are no longer grouped together in the Enterprise View.

Solving Problems

11

In this chapter...

General Troubleshooting Tips

If you experience problems installing or using Adaptec Storage Manager, follow these suggestions:

- Ensure that you are logged in to Adaptec Storage Manager at the permission level you need to perform the tasks you want. (See page 27 for more information.)

- Ensure that all managed systems are powered on and that you are logged in to any remote systems you want to manage. (See page 32 for more information.)

- Check all cable connections.

- Try uninstalling and reinstalling Adaptec Storage Manager.

Identifying a Failed or Failing Component

When your are notified of a Warning- or Error-level event, use Adaptec Storage Manager's rapid fault isolation feature to quickly identify the source of the problem.

For instance, in this example, a disk drive has failed. To find the failed disk drive, follow the yellow Error icons:

Stopping the Creation of a New Logical Drive

To stop the creation of a new logical drive, right-click on the magnifying glass icon, then select **Stop current task**. You can also change the priority of the build task to High, Medium, or Low by selecting **Change background task priority** from the same right-click menu.
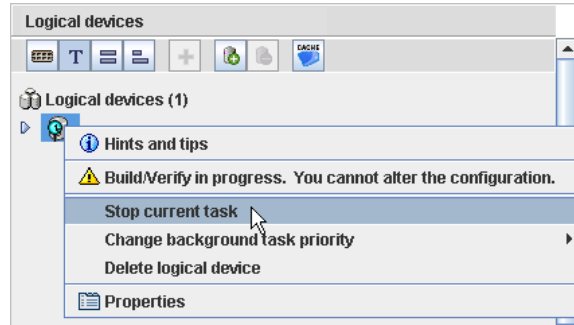
Recovering from a Disk Drive Failure

When a disk drive fails for any reason, it is represented in Adaptec Storage Manager with a red X, as shown at right.

This section explains how to recover when a disk drive fails:

● If the logical drive was protected by a hot spare (see the following section).

● If the logical drive was *not* protected by a hot spare (see page 138).

● If there is a disk drive failure in more than one logical drive simultaneously (see page 138).

● If it is a RAID 0 logical drive (see page 138).

● If multiple disk drives fail within the same logical drive (see page 139).

● If you want to force a logical drive with multiple drive failures back online (see page 140).

Failed Disk Drive Protected by a Hot Spare

When a logical drive is protected by a hot spare, if a disk drive in that logical drive fails the hot spare is automatically incorporated into the logical drive and takes over for the failed drive.

For instance, when a disk drive fails in the RAID 5 logical drive shown in the next example, the logical drive is automatically *rebuilt* (its data is reconstructed) using the hot spare in place of the failed drive. You can access the logical drive while it's rebuilding.

Hot spare takes over...

...Disk drive shows Failed status...

...and logical drive is rebuilt with hot spare.
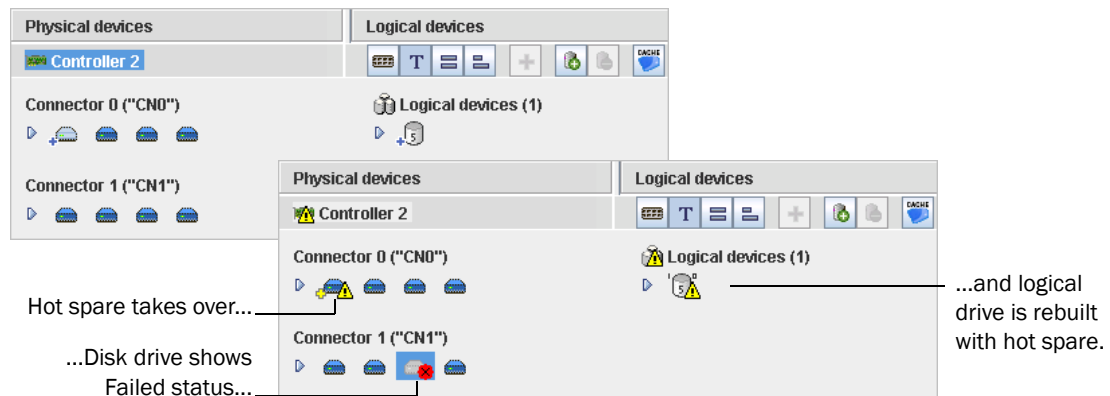
Note: A hot spare icon changes from light-blue to dark-blue when it becomes part of a logical drive.

To recover from the failure:

1   Remove and replace the failed disk drive (following manufacturer's instructions).

2   *If copyback is not enabled*—Remove the 'hot spare' designation from the original hot spare (the disk drive that was built into the logical drive). See page 56 for instructions. Then, designate a new hot spare to protect the logical drives on that controller.

If copyback is enabled—Data is automatically moved back to its original location once the controller detects that the failed drive has been replaced. No action is required. See *Enabling Copyback on page 57* for more information.

Failed Disk Drive *Not* Protected by a Hot Spare

When a logical drive is not protected by a hot spare, if a disk drive in that logical drive fails, remove and replace the failed disk drive. The controller detects the new disk drive and begins to rebuild the logical drive. You can access the logical drive while it's rebuilding.

For instance, when one of the disk drives fails in the RAID 1 logical drive shown in the next example, the logical drive is *not* automatically rebuilt. The failed disk drive must be removed and replaced before the logical drive can be rebuilt.
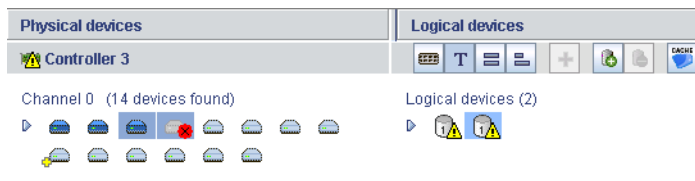
If the controller fails to rebuild the logical drive, check that the cables, disk drives, and controllers are properly installed and connected. Then, if necessary, follow the instructions in *Rebuilding Logical Drives on page 140*.

Failure in Multiple Logical Drives Simultaneously

If there's a disk drive failure in more than one logical drive at the same time (one failure per logical drive), and the logical drives have hot spares protecting them, the controller rebuilds the logical drives with these limitations:

●   A hot spare must be of equal or greater size than the failed disk drive it's replacing.

●   Failed disk drives are replaced with hot spares in the order in which they failed. (The logical drive that includes the disk drive that failed first is rebuilt first, assuming an appropriate hot spare is available—see the previous bullet.)

If there are more disk drive failures than hot spares, see *Failed Disk Drive Not Protected by a Hot Spare on page 138*.

If copyback is enabled, data is moved back to its original location once the controller detects that the failed drive has been replaced. See *Enabling Copyback on page 57* for more information.

Disk Drive Failure in a RAID 0 Logical Drive

Because RAID 0 volumes do not include redundancy, if a disk drive fails in a RAID 0 logical drive, the data can't be recovered.

Correct the cause of the failure or replace the failed disk drives. Then, restore your data (if available).

Multiple Disk Drive Failures in the Same Logical Drive
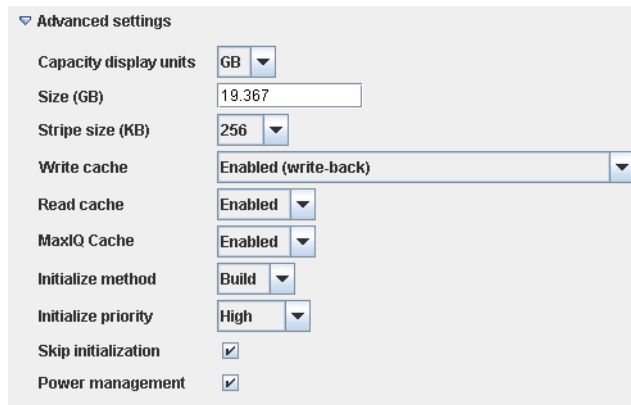
If multiple disk drives fail in the same logical drive, you *may* be able to recover the data by recreating the logical drive in the wizard *without* the initialization step. Omitting the initialization step reconstructs the logical drive metadata without modifying or destroying any other data on the disks.

Note: RAID 6 and RAID 60 logical drives support two simultaneous disk drive failures (see page 160). In some instances, RAID 10 and RAID 50 logical drives *may* survive multiple disk drive failures, depending on which disk drives fail. See *Selecting the Best RAID Level* on page 152 for more information.

> **Caution:** This procedure is not guaranteed to successfully recover your logical drive. The preferred and surest way to recover your data is to restore the failed logical drive from backup.

To recreate the logical drive after multiple drive failures:

1   Start the logical drive wizard, select **Custom**, then click **Next**.

2   Choose the same RAID level as the original logical drive, then click **Next**.

3   Select the same set of disk drives as the original logical drive.

4   Ensure that all **Advanced settings** are the same as the original logical drive, click **Skip initialization**, then click **Next**.

5   Click **Yes** to confirm that you do not want to initialize the logical drive.

6   Click **Apply**, then click **Yes**.

Adaptec Storage Manager begins building the logical drive.

7   Check the logical drive for data and file system integrity. If you still cannot access the data, initialize the *physical* drives (to erase the metadata), then rebuild the logical drive again without initialization, selecting the disk drives in a different *order* in Step 3. You may need to try several different "stripe orders" before you can recover the data.

Note: In the Properties panel, uninitialized logical drives have the status "created without initialization".

Forcing a Logical Drive with Multiple Drive Failures Back Online

If multiple disk drives fail in the same logical drive, you *may* be able to recover the data by forcing the logical drive back online. For instance, if two drives fail in a RAID 5, forcing it online may allow you to access the data, depending on which disk drives failed.

> **Caution:** This procedure is not guaranteed to successfully recover your logical drive. The preferred and surest way to recover your data is to restore the failed logical drive from backup. Before using this procedure, check all connectors (cables, power, and so on), then try restoring the logical drive by performing a bus rescan or restarting the server.

To force a logical drive online:

1 In the Logical Devices View, select the failed logical drive.

2 In the menu bar, select **Actions**, then click **Force online**.

3 Click **Yes** to confirm, then click **OK**.

4 If Adaptec Storage Manager successfully forces the logical drive online, check it for data and file system integrity. If some disks are still missing from the logical drive, reinsert or replace them and allow Adaptec Storage Manager to rebuild the logical drive. Then verify that drive status has returned to Optimal.

> **Note:** If the operation fails, follow the on-screen prompts to try the Advanced options for forcing the logical drive online. Only expert users should try the Advanced options.

Removing a Failed Disk Drive's Icon

Note: You can only complete this task on disk drives that are not included in any logical drive.

When a disk drive fails, it may still appear in Adaptec Storage Manager although it is no longer available. To see an accurate representation of your storage space and make it easier to monitor your disk drives, you can remove a failed disk drive from the Physical Devices View.

In the Physical Devices View, right-click the failed disk drive, then click **Remove failed drive**.

Rebuilding Logical Drives

A *hot-swap rebuild* occurs when a controller detects that a failed disk drive in a logical drive has been removed and then reinserted.

To start a hot-swap rebuild:

1 Following manufacturer's instructions, gently pull the failed disk drive from the server without fully removing it, then wait for it to spin down fully before continuing.

2 If there is nothing wrong with the disk drive, reinstall it, following manufacturer's instructions.

 If necessary, replace the failed disk drive with a new disk drive of equal or larger size.

3 The controller detects the reinserted (or new) disk drive and begins to rebuild the logical drive.

Solving Notification Problems

To test notifications on your storage space, you can send test events or emails to ensure that they're being received properly.

If your test event fails:

1   Ensure that the remote system is powered on and running Adaptec Storage Manager.

2   Open the remote system's System Properties window (see Step 4 on page 109) and double-check the TCP/IP address and port number.

3   Try sending the test event again.

If your test email fails:

1   Ensure that the recipient's email address is correct. (See *Modifying a Recipient's Information or Removing a Recipient* on page 114 to modify the address.)

2   Ensure that your SMTP server address is correct. (See *Modifying Email Settings* on page 114 to modify the address.)

3   Try sending the test message again.

Creating a Support Archive File

Your Adaptec Storage Manager service representative might ask you to create a configuration and status information archive file to help diagnose a problem with your system.

To create the archive file:

1   In the Enterprise View, click the local or remote system on which the problem is occurring.

2   In the menu bar, select **Actions**, then click **Save support archive**.

3   Enter a name for the archive file or accept the default name, then click **Save**.

Understanding Error and Warning Messages

This section provides detailed information about error and warning events that occur in Adaptec Storage Manager.

Warning Messages

Warning	Warning Message Text
ArrayCritical	Ready disk drives are still available
HotSpareTooSmall	The hot spare is too small to protect the specified array
HotSpareWontWork	At least one logical drive is not protected by the specified hot spare
InitLD	Hot spare is too small for use by at least one array
NoService	The specified logical drive was not initialized
SyncLD	Could not contact Adaptec Storage Manager Agent. Adaptec Storage Manager may not function correctly. Please start the Agent.

Error Messages

Error	Error Message Text
AbortTask	Could not stop the specified currently running task
AccessControl	Could not write the logical drive access control list
AddToDiskSet	Could not add drives to the specified diskset
AgentRemoved	Could not remove the specified Agent
ArrayInUse	Could not delete the specified array. One or more initiators are logged into a logical drive(s) contained within this array
ArraysInUse	Could not delete all of the specified arrays. One or more initiators are logged into a logical drive(s) contained within this array
BreakRemoteMirror	Could not break the specified remote mirror facet
CalibrateBatteryController	Could not recalibrate the specified battery
ChangeArraylName	Could not change the name of the specified array
ChangeBIOSMode	Could not change the BIOS-compatibility mapping
ChangeDiskSetName	Could not change the name of diskset
ChangeLogicalLun	Could not change the LUN of the specified logical drive

Error	Error Message Text
ChangeLogicalName	Could not change the name of the specified logical drive
ChangeNtpServer	Could not update the specified NTP server
ChangeTimeDate	Could not change the date and time
ChgAlarm	Could not change the alarm setting
ChgDataScrubRate	Could not change the background consistency check rate
ChgRebuildRate	Could not change the rebuild rate
ChgSCSIXferSpeed	Could not change the SCSI transfer speed
ChgStripeSize	Could not change the specified stripe size
ChgTaskPriority	Could not change task priority
ClearAdapterLogsFail	Could not clear the event logs for the specified system
ClearEnclosureLogsFail	Could not clear the event logs for specified enclosure
ClearHardDrive	Clear failed to start for the specified disk drive
CommFailure	You must re-establish communication with specified system
CommFailure1	Restart the Adaptec Storage Manager Agent to establish communication with the local system
ControllerRescan	Could not rescan for the specified controller
ControllerRestart	Could not restart the specified controller
ControllerShutDown	Could not shut down the specified controller
CreateDiskSet	Could not create the diskset
CreateLDError	There was an error creating specified logical drive
CreateSimpleVolume	Could not create a simple volume
DataScrub	Could not change the background consistency check mode
DDDAdInternal	Failed drive—Controller internal failure
DDDDeviceNotFound	Failed drive—Device not found
DDDDeviceNotReady	Failed drive—Specified device will not come ready
DDDDriveAddedToSystem	Failed drive—Specified disk drive added to server
DDDDriveNotBelong1	Failed drive—Specified disk drive does not belong
DDDDriveNotBelong2	Failed drive—Specified disk drive does not belong
DDDDriveNotFound	Failed drive—Specified disk drive not found
DDDDriveNotPartOfCluster	Failed drive—Specified disk drive is not part of the cluster

Error	Error Message Text
DDDHardwareError	Failed drive—Internal hardware error
DDDInternalHW	Failed drive—Internal hardware error
DDDIOSubSystem1	Failed drive—I/O subsystem error
DDDIOSubSystem2	Failed drive—I/O subsystem error
DDDIOSubSystem3	Failed drive—I/O subsystem error
DDDSCSI1	Failed drive—SCSI error
DDDSCSI2	Failed drive—SCSI error
DDDSCSI3	Failed drive—SCSI error
DDDSCSIBusParity	Failed drive—SCSI bus parity error
DDDSCSIBusTest	Failed drive—SCSI bus test error
DDDSCSIChanNotOperational	Failed drive—SCSI channel is not operational
DDDSCSIErrUnknown	Failed drive—Unknown SCSI error
DDDUnknownDriveFound	Failed drive—Unknown disk drive on controller
DDDUnknownDriveInCluster	Failed drive—Unknown disk drive in cluster
DDDUnknownSASError	Failed drive—Unknown SAS error
DDDUserAcceptedInitChange	Failed drive—User accepted
DDDUserMarked	Failed drive—User marked 'failed'
DDDUserMarkedFailed	Failed drive—User marked 'failed'
DeleteArray	Could not delete the specified array
DeleteArrays	Could not delete all of the specified arrays
DeleteDiskSet	Could not delete the diskset
DeleteHArray	Could not delete the specified spanned array
DeleteLogDrive	Could not delete the specified logical drive
DisCopyBackMode	Could not disable copy back mode
DisReadCache	Could not disable read cache
DisUnattendedMode	Could not disable unattended mode
DisWriteCache	Could not disable write cache
EnclosureRestart	Could not restart the specified enclosure
EnclosureShutDown	Could not shut down the specified enclosure

Error	Error Message Text
EnCopyBackMode	Could not enable copy back mode
EnReadCache	Could not enable read cache
EnUnattendedMode	Could not enable unattended mode
EnWriteCache	Could not enable write cache
EventNotSent	Could not send the event to the system
ExportedArray	Could not export the specified array
FactoryDefault	Could not restore the configuration to the factory-default settings
FailbackDiskSet	Could not move diskset
FailedAtPort	Adaptec Storage Manager failed to start at specified port number
FailedSelfTest	Specified self-test problem code was returned from specified controller, channel, SCSI ID, S/N
FailedSelfTestStart	One or more of the selected disk drives failed to execute the self-test. View the RaidErrA.log file on the Adaptec Storage Manager Agent for details
FailedToConnect	Failed to connect to specified host name at specified port number
FailedToReadNOT	Failed to read the notification list file
FailedToReadSEC	Failed to read the user accounts file
FailIncompatible	Failed to connect to the specified host name due to incompatible software versions
FailOver	Could not fail from the active device to the passive device
FailoverDiskSet	Could not move diskset
HostList	Could not write the host initiator list
HotSwap	Could not enable the automatic rebuild on replacement operation
ImageSelect	Could not change the firmware to the specified boot image
ImportConfig	Could not copy the configuration from the specified drives
ImportedArray	Could not import the specified array
IncreaseLogDrive	Could not increase the size of the specified logical drive
InitHardDrive	Could not initialize the specified disk drive
InitLogDrive	Could not initialize the specified logical drive
KillOtherController	Could not kill other controller
LDM	Could not start the specified logical drive reconfiguration
LogIn	The user could not be logged in

Error	Error Message Text
LogOut	The user could not be logged out
MaybeReadCache	Could not set read cache mode to 'enabled when protected by battery'
MaybeWriteCache	Could not set write cache mode to 'enabled when protected by battery'
MergeOwnNS	Could not copy the configuration from the non-shared logical drives
Rebuild	Could not set the drive to the specified rebuild state
RemoveAHS	Could not delete the dedicated hot spare drive
RemoveFromDiskSet	Could not remove drives from the specified diskset
RemoveHSP	Could not delete the specified hot spare drive
RemoveSHS	Could not delete the specified standby hot-spare drive
ReplaceDHS	Could not replace the specified failed drive
ScanDrives	Could not perform the bus rescan
SetArrayOnline	Could not send the Array Optimal command to the specified controller
SetChannelInitiatorId	Could not set the specified SCSI initiator ID
SetContDiskCachePolicy	Could not change the specified global drive cache policy
SetHostId	Could not set the specified controller name
SetITNexusLossTime	Could not change I_T nexus loss time
SetMergeGroup	Could not set the specified merge-group number
SetPartnerId	Could not set the specified partner controller name
SetSpareSet	Could not change the specified spare set attribute
SetToAHotSpare	Could not create a dedicated hot spare drive
SetToDefunct	Could not set the specified drive to failed
SetToEmpty	Could not remove the specified failed drive
SetToHotSpare	Could not create a hot-spare drive
SetToOnline	Could not set the specified failed drive to optimal
SetToSHotSpare	Could not create a standby hot-spare drive
SetWce	Could not change the write-cache mode
SyncArray	Could not start the array verify
SyncLogDrive	Could not start the logical drive verify
TargetInfo	Could not write the logical drive target information

Error	Error Message Text
Unblock	Could not unblock the specified logical drive
UnkillOtherController	Could not unkill other controller
UserAccounts	Could not write the target user account list
VerifyArray	Could not start the array verify
VerifyFixHardDrive	Verify with fix failed to start
VerifyHardDrive	Verify failed to start
VolumeInUse	Could not delete the specified logical drive. One or more initiators are logged into the logical drive.

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Part III: Appendices

In this part:

Completing a Silent Windows Installation

A

This appendix describes for advanced users how to complete a silent Windows installation of Adaptec Storage Manager instead of following the installation instructions provided in *Installing on Windows* on page 19. A silent installation uses command line parameters to complete an installation without messages or user interaction.

Note: If a previous version of Adaptec Storage Manager is installed on your system, you must remove it before beginning this installation. Use the Add or Remove Programs tool in the Control Panel.

Completing a Silent Installation

You will need the Adaptec Storage Manager Installation CD to complete this task.

To complete a silent installation:

1 Insert the CD into your CD drive.

2 Open a command prompt window and change to the CD directory.

3 Run the silent installation from the command line using one of these files, as appropriate: setup asm x64.exe or setup asm x86.exe. For example:

```
setup asm x86.exe /s /v" /qn <properties>"
```

where *<properties>* is one or more of the options listed in *Available Properties and Values* on page 151.

Separate properties with spaces; separate feature names for the ADDLOCAL property with commas (see examples on page 151).

Note: Synchronous Installation—To install Adaptec Storage Manager so that the .exe file does not close until the installation is complete, add the /w parameter to the .exe file and run the application with the start /WAIT command as shown in this example:

```
start /WAIT setup asm x64.exe /w /s /v" /qn <OPTIONS>"
```

You might want to do this for a batch file installation so that the setup will not return until the installation is finished.

After a minute or two, the silent installation should be complete and the Adaptec Storage Manager icon should be accessible. Continue with *Building Your Storage Space* on page 25.

Available Properties and Values

Property	Values
INSTALLDIR (Not required)	Specifies the installation path. If you are specifying the installation path, it must be set for a command line install, and must be enclosed in escaped quotation marks. For example: `INSTALLDIR=\"C:\Program Files\Adaptec\Adaptec Storage Manager\"` **Note:** If you do not explicitly set the installation path, the default path is `"C:\Program Files\Adaptec\Adaptec Storage Manager"`
ADDLOCAL (Required)	**Note:** Use commas to separate multiple values. ● **ALL**—Installs all of the following features. If you specify ALL, do not also specify any of the following values. ● **Agent**—Installs the Adaptec Storage Manager Direct Attached Storage Agent. If this feature is installed, your system will reboot if RAID controllers that use the filter driver are installed. If necessary, use the REBOOT property to suppress this. ● **ASMReadme**—Installs the Readme file in its Start menu shortcut. ● **CLITools**—Installs the Command Line Interface tool. ● **Console**—Installs the Adaptec Storage Manager GUI. ● **SNMPSupport**—Installs SNMP support for Adaptec Storage Manager. Requires the Agent feature to be installed. If you select the SNMPSupport feature, the Agent feature is automatically included, even if you don't specify it.
REBOOT (Not Required)	● **Force**—Forces a reboot at the end of the installation. ● **Suppress**—Suppresses a reboot unless files were in use and could not be overwritten during installation. ● **ReallySuppress**—Suppresses all reboots at the end of the installation. **NOTE:** A reboot is only forced by the Adaptec installer if you have installed the DSM or if any files can't be overwritten.

Example Command Line Installations

● To install all DAS options, which include the Console, Agent, Readme, and SNMP Support:

```
setup asm x86.exe /s /v"/qn ADDLOCAL=Console,Agent,,ASMReadme,SNMPSupport"
```

● To install just the Agent and suppress a reboot at the end of installation:

```
setup asm x86.exe /s /v"/qn ADDLOCAL=Agent REBOOT=ReallySupress"
```

● To install only the CLI Tools and suppress a reboot:

```
setup asm x86.exe /s /v"/qn ADDLOCAL=CLITools REBOOT=ReallySuppress"
```

● To install the GUI feature to a different installation path:

```
setup asm x86.exe /s /v"/qn ADDLOCAL=Console INSTALLDIR=\"C:\Adaptec Storage Manager\""
```

● To install and have setup wait until the install finishes before it closes:

```
start /WAIT setup asm x86.exe /w /s /v"/qn ADDLOCAL=Console,Agent REBOOT=ReallySupress"
```

Selecting the Best RAID Level

B

When you create logical drives in Adaptec Storage Manager, you can assign a RAID level to protect your data.

Each RAID level offers a unique combination of performance and redundancy. RAID levels also vary by the number of disk drives they support.

This chapter provides a comparison of all the RAID levels supported by Adaptec Storage Manager, and provides a basic overview of each to help you select the best level of protection for your storage system.

Comparing RAID Levels

Use this table to select the RAID levels that are most appropriate for the logical drives on your storage space, based on the number of available disk drives and your requirements for performance and reliability.

RAID Level	Redundancy	Disk Drive Usage	Read Performance	Write Performance	Built-in Hot Spare	Minimum Disk Drives
RAID 0	No	100%	★★★	★★★	No	2
RAID 1	Yes	50%	★★	★★	No	2
RAID 1E	Yes	50%	★★	★★	No	3
RAID 10	Yes	50%	★★	★★	No	4
RAID 5	Yes	67% – 94%	★★★	★	No	3
RAID 5EE	Yes	50% – 88%	★★★	★	Yes	4
RAID 50	Yes	67% – 94%	★★★	★	No	6
RAID 6	Yes	50% – 88%	★★	★	No	4
RAID 60	Yes	50% – 88%	★★	★	No	8
Spanned Volume	No	100%	★★★	★★★	No	2
RAID Volume	No	50% – 100%	★★★	★★★	No	4

Disk drive usage, read performance, and write performance depend on the number of drives in the logical drive. In general, the more drives, the better the performance.

More information about each RAID level is available beginning on .

Understanding Drive Segments

A *drive segment* is a disk drive or portion of a disk drive that is used to create a logical drive. A disk drive can include both *RAID segments* (segments that are part of a logical drive) and available segments. Each segment can be part of only one logical drive at a time. If a disk drive is not part of any logical drive, the entire disk is an available segment.

Non-redundant Logical Drives (RAID 0)

A logical drive with RAID 0 includes two or more disk drives and provides data *striping*, where data is distributed evenly across the disk drives in equal-sized sections. However, RAID 0 arrays do not maintain redundant data, so they offer *no data protection*.

Compared to an equal-sized group of independent disks, a RAID 0 array provides improved I/O performance.

Drive segment size is limited to the size of the smallest disk drive in the logical drive. For instance, a logical drive with two 250 GB disk drives and two 400 GB disk drives can create a RAID 0 drive segment of 250 GB, for a total of 1000 GB for the volume, as shown in this figure.
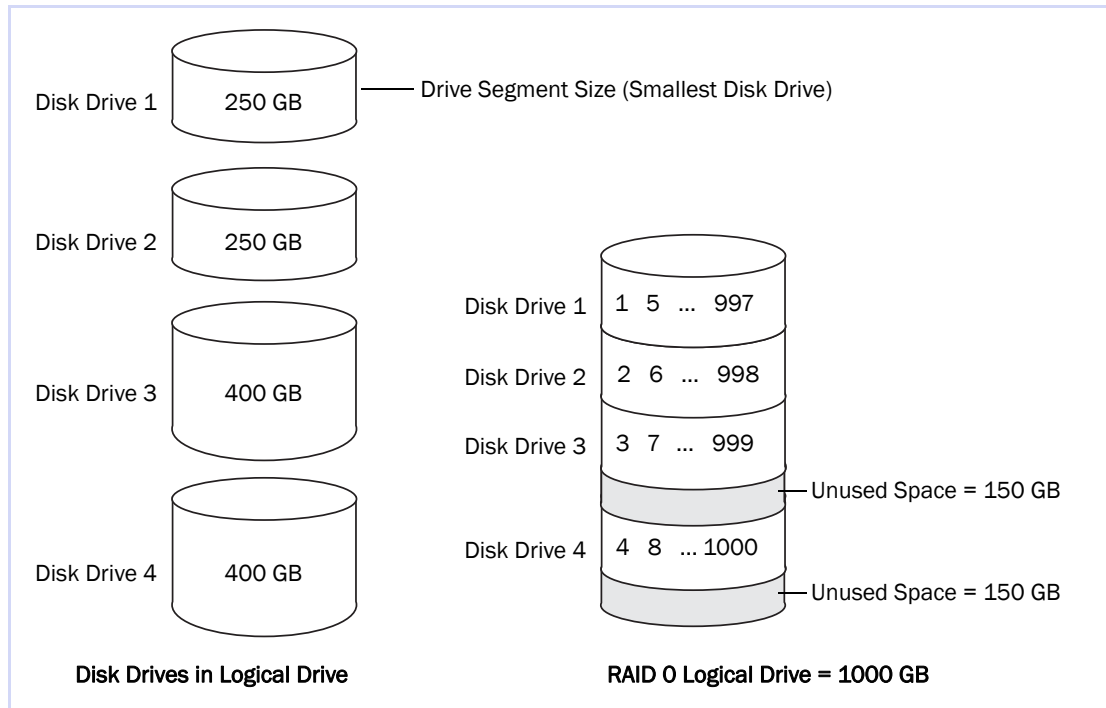
RAID 1 Logical Drives

A RAID 1 logical drive is built from two disk drives, where one disk drive is a *mirror* of the other (the same data is stored on each disk drive). Compared to independent disk drives, RAID 1 logical drives provide improved performance, with twice the read rate and an equal write rate of single disks. However, capacity is only 50 percent of independent disk drives.

If the RAID 1 logical drive is built from different-sized disk drives, drive segment size is the size of the smaller disk drive, as shown in this figure.

Drive Segment Size (Smallest Disk Drive)

Disk Drive 1   250 GB

Disk Drive 2   400 GB

Disk Drive 1   1 – 250

Disk Drive 2   1 – 250

Unused Space = 150 GB

Disk Drives in Logical Drive

RAID 1 Logical Drive = 250 GB
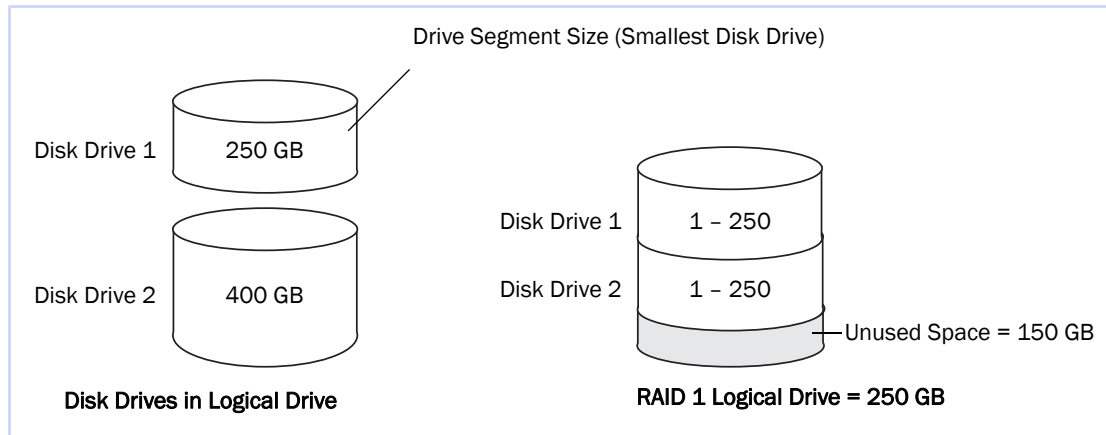
RAID 1 Enhanced Logical Drives

A RAID 1 Enhanced (RAID 1E) logical drive—also referred to as a *striped mirror*—is similar to a RAID 1 logical drive except that data is both mirrored *and* striped, and more disk drives can be included. A RAID 1E logical drive can be built from three or more disk drives.

In this figure, the large bold numbers represent the striped data, and the smaller, non-bold numbers represent the mirrored data stripes.

Disk Drive 1   400 GB

Disk Drive 2   400 GB

Disk Drive 3   400 GB

Disk Drive 1   **1** 3 **4** 6

Disk Drive 2   **2** 1 **5** 4

Disk Drive 3   **3** 2 **6** 5

Disk Drives in Logical Drive

RAID 1E Logical Drive = 600 GB
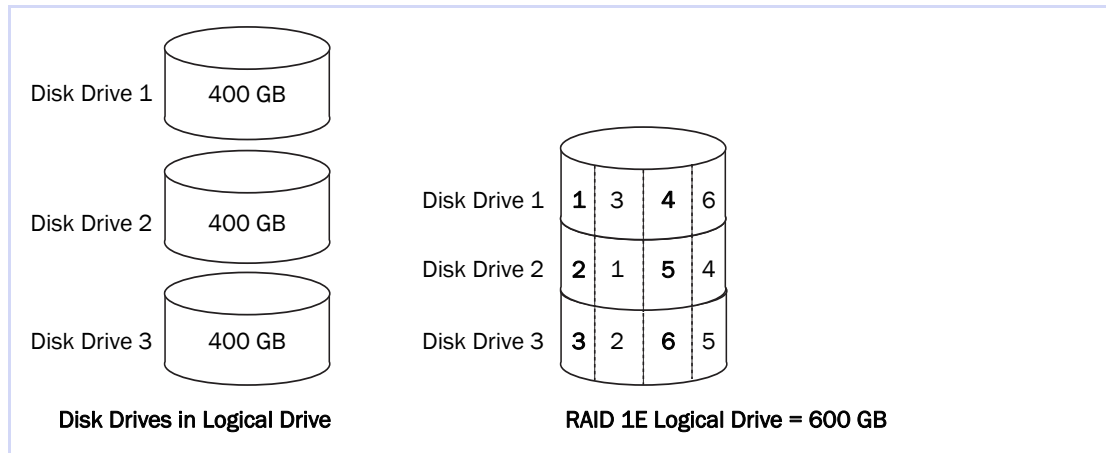
RAID 10 Logical Drives

A RAID 10 logical drive is built from two or more equal-sized RAID 1 logical drives. Data in a RAID 10 logical drive is both striped and mirrored. Mirroring provides data protection, and striping improves performance.

Drive segment size is limited to the size of the smallest disk drive in the logical drive. For instance, a logical drive with two 250 GB disk drives and two 400 GB disk drives can create two mirrored drive segments of 250 GB, for a total of 500 GB for the logical drive, as shown in this figure.
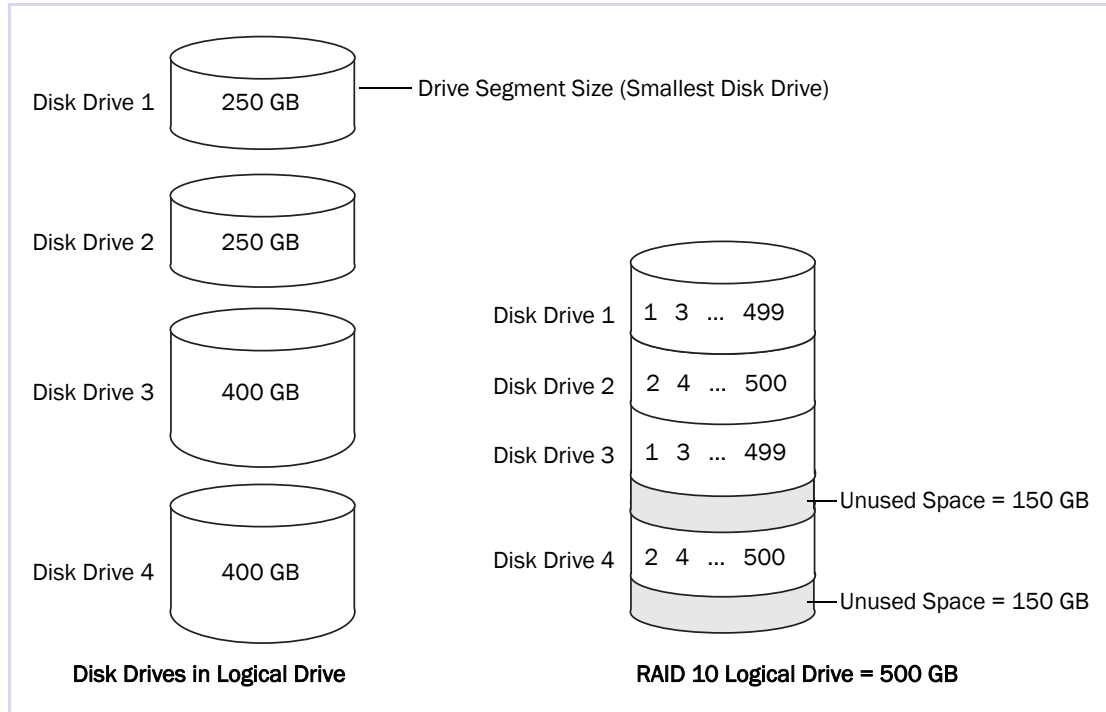
RAID 5 Logical Drives

A RAID 5 logical drive is built from a minimum of three disk drives, and uses data striping and *parity* data to provide redundancy. Parity data provides data protection, and striping improves performance.

Parity data is an error-correcting redundancy that's used to re-create data if a disk drive fails. In RAID 5 logical drives, parity data (represented by Ps in the next figure) is striped evenly across the disk drives with the stored data.

Drive segment size is limited to the size of the smallest disk drive in the logical drive. For instance, a logical drive with two 250 GB disk drives and two 400 GB disk drives can contain 750 GB of stored data and 250 GB of parity data, as shown in this figure.
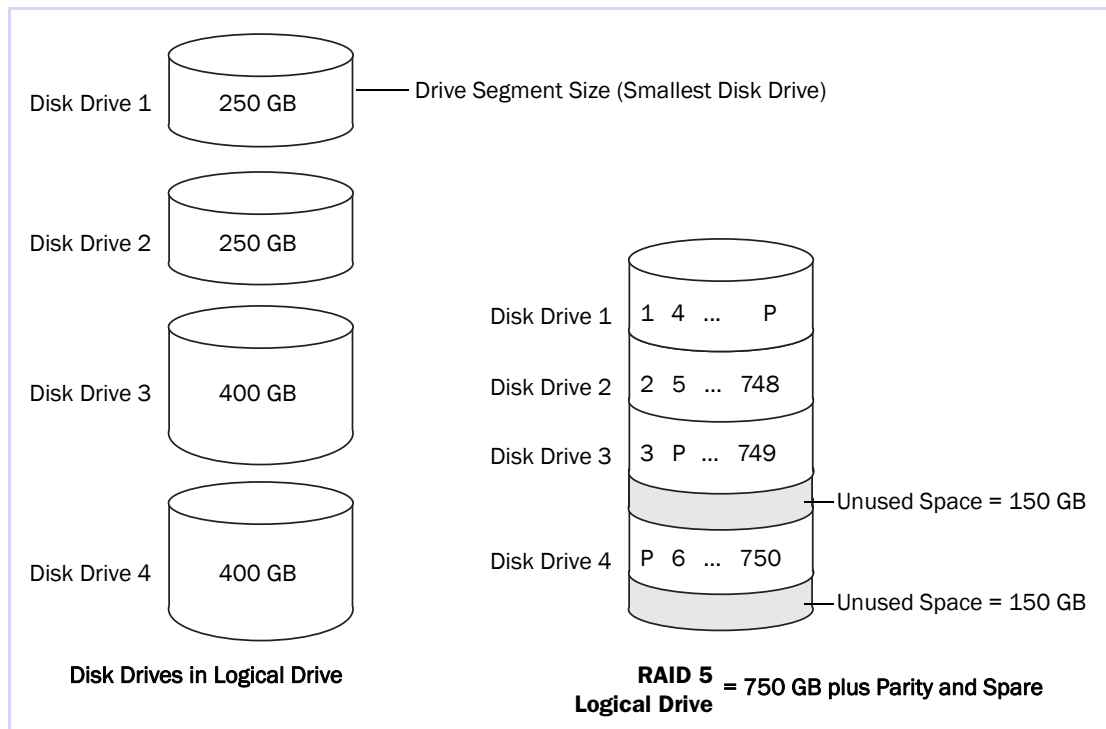
RAID 5EE Logical Drives

A RAID 5EE logical drive—also referred to as a *hot space*—is similar to a RAID 5 logical drive except that it includes a *distributed spare* drive and must be built from a minimum of four disk drives.

Unlike a hot spare (see), a distributed spare is striped evenly across the disk drives with the stored data and parity data, and can't be shared with other logical disk drives. A distributed spare improves the speed at which the logical drive is rebuilt following a disk drive failure.

A RAID 5EE logical drive protects your data and increases read and write speeds. However, capacity is reduced by two disk drives' worth of space, which is for parity data and spare data.

In this example, S represents the distributed spare, P represents the distributed parity data.

Disk Drive 1   250 GB — Drive Segment Size (Smallest Disk Drive)

Disk Drive 2   250 GB

Disk Drive 3   400 GB

Disk Drive 4   400 GB

Disk Drive 1 | 1 S ...   P
Disk Drive 2 | 2 P ... 449
Disk Drive 3 | S 3 ...   S
Unused Space = 150 GB
Disk Drive 4 | P 4 ... 500
Unused Space = 150 GB

Disk Drives in Logical Drive

RAID 5EE Logical Drive = 500 GB plus Parity and Spare
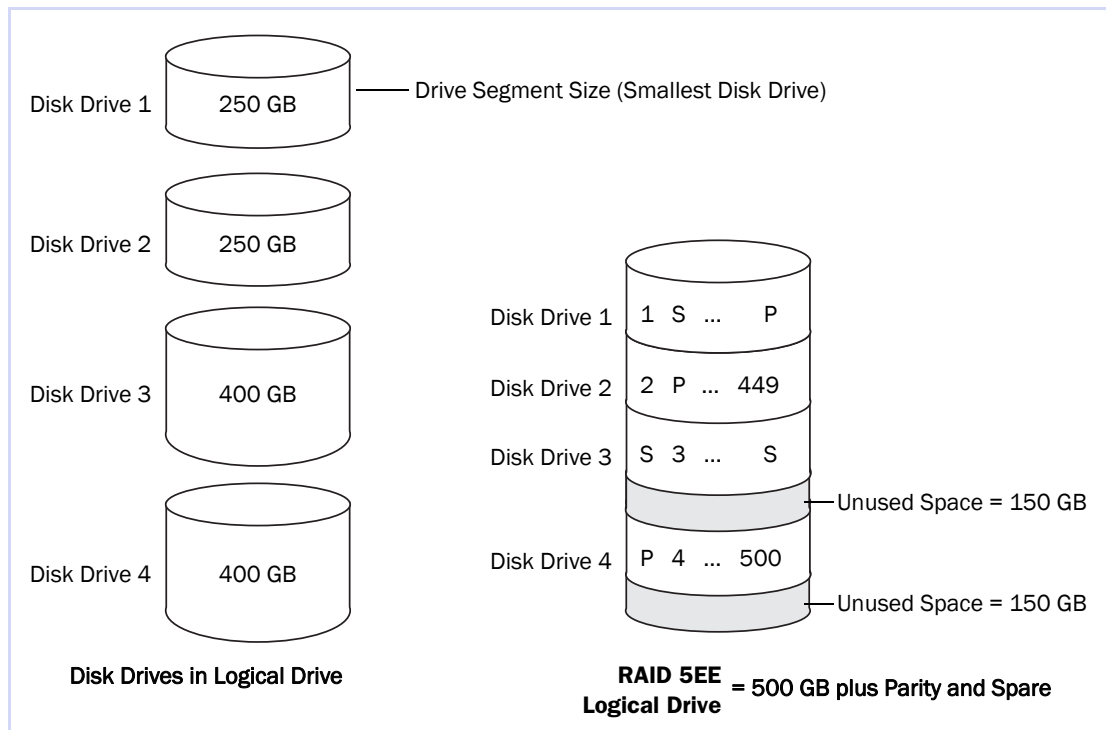
RAID 50 Logical Drives

A RAID 50 logical drive is built from at least six disk drives configured as two or more RAID 5 logical drives, and stripes stored data and parity data across all disk drives in both RAID 5 logical drives. (For more information, see *RAID 5 Logical Drives* on page 157.)

The parity data provides data protection, and striping improves performance. RAID 50 logical drives also provide high data transfer speeds.

Drive segment size is limited to the size of the smallest disk drive in the logical drive. For example, three 250 GB disk drives and three 400 GB disk drives comprise two equal-sized RAID 5 logical drives with 500 GB of stored data and 250 GB of parity data. The RAID 50 logical drive can therefore contain 1000 GB (2 x 500 GB) of stored data and 500 GB of parity data.
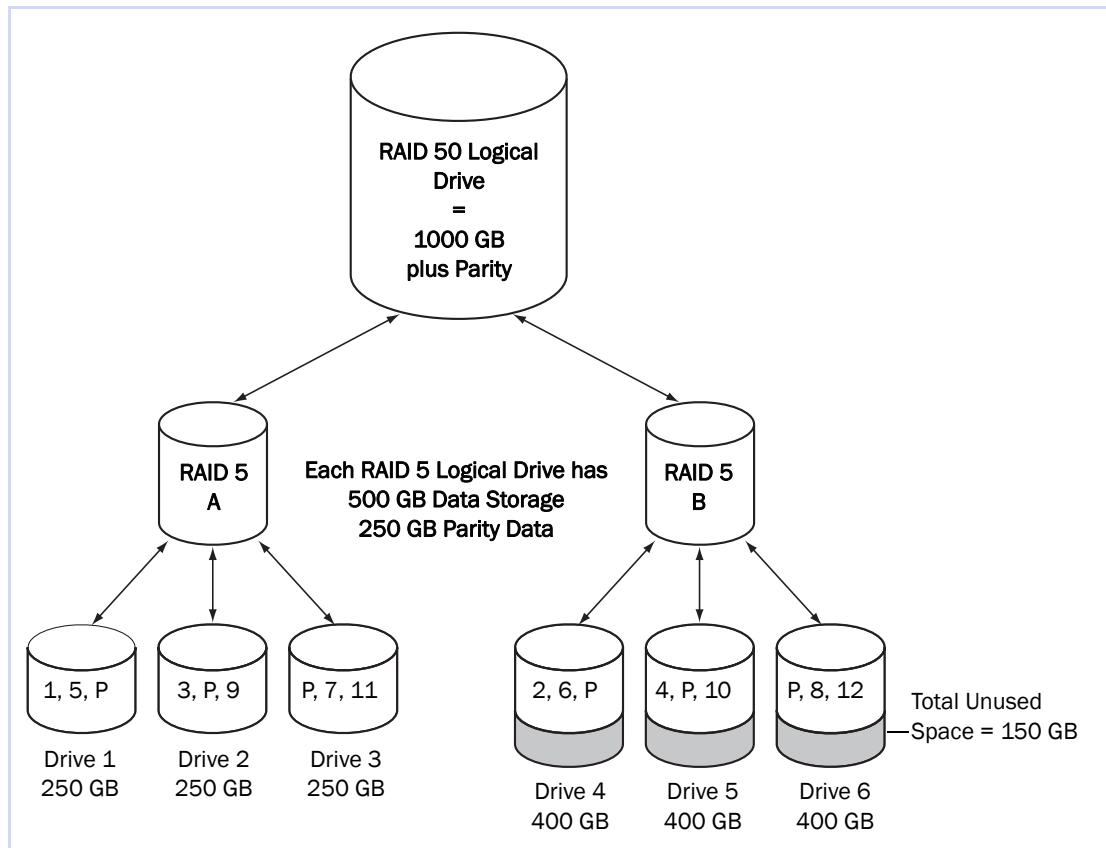
In this example, P represents the distributed parity data.

RAID 6 Logical Drives

A RAID 6 logical drive—also referred to as *dual drive failure protection*—is similar to a RAID 5 logical drive because it uses data striping and parity data to provide redundancy. However, RAID 6 logical drives include *two* independent sets of parity data instead of one. Both sets of parity data are striped separately across all disk drives in the logical drive.

RAID 6 logical drives provide extra protection for your data because they can recover from two simultaneous disk drive failures. However, the extra parity calculation slows performance (compared to RAID 5 logical drives).

RAID 6 logical drives must be built from at least four disk drives. Maximum stripe size depends on the number of disk drives in the logical drive.
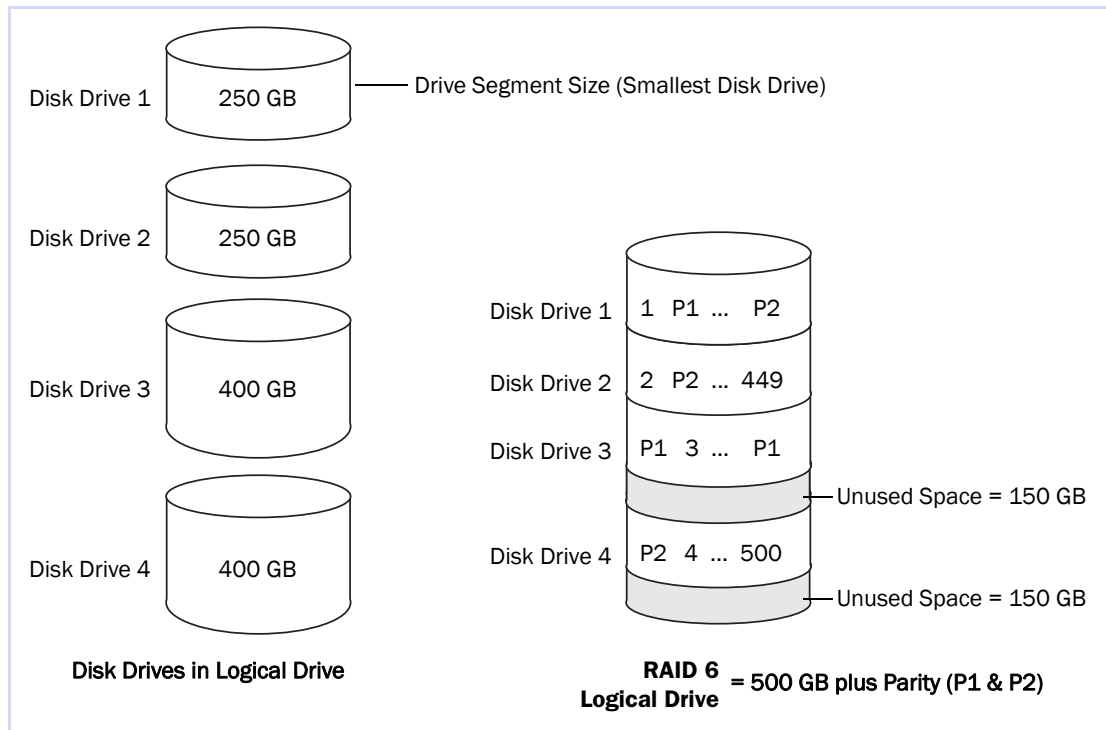
RAID 60 Logical Drives

Similar to a RAID 50 logical drive (see page 159), a RAID 60 logical drive—also referred to as *dual drive failure protection*— is built from at least eight disk drives configured as two or more RAID 6 logical drives, and stripes stored data and two sets of parity data across all disk drives in both RAID 6 logical drives.

Two sets of parity data provide enhanced data protection, and striping improves performance. RAID 60 logical drives also provide high data transfer speeds.

Quick Answers to Common Questions...

C

In this appendix...

This chapter provides quick references to frequently requested information about basic tasks, functions, and concepts in Adaptec Storage Manager.

Note: For troubleshooting tips, see *Solving Problems* on page 135.

How do I...?

Set up my storage space?

Follow the five steps in the *Getting Started Checklist* on page 14.

Create or add a new logical drive?

In the Enterprise View, right-click the controller you want, then click **Create logical device**.

Or, click either of the buttons shown at right.

See *Building Your Storage Space* on page 25.

Open the Configuration wizard?

In the Enterprise View, right-click the controller you want, then click **Create logical device**.

Or, click either of the buttons shown at right.

See *Building Your Storage Space* on page 25.

Turn off the alarm?

Click the **Silence** button, shown at right.

Or, from the menu bar, click **Actions**, select **Agent actions**, select **Alarm actions**, then click **Silence alarm**.

See *If your enclosure does not have an enclosure management device, the status icons appear but do not indicate status.* on page 105.

Add a new user to Adaptec Storage Manager?

Any user with a valid network user name and password can log into Adaptec Storage Manager.

See *Starting and Logging In on the Local System* on page 27 and *Understanding Permission Levels* on page 27.

Add a remote system?

Click the **Add** button, shown at right.

See *Logging into Remote Systems from the Local System* on page 32.

Prevent a user from changing my storage space?

See *Understanding Permission Levels* on page 27 for information on restricting access.

Check disk drive or logical drive status?

Hold your cursor over the disk drive or logical drive to reveal status information.

See also *Revealing More Device Information* on page 49.

Access a feature with a padlock icon beside it?

Enhanced features must be unlocked with a special feature key (sold separately).

See *Adding Enhanced Features* on page 125.

Log out of Adaptec Storage Manager?

In the Enterprise View, click on the local system. In the menu bar, select **Actions**, then click **Log out**.

See *Logging Out of Adaptec Storage Manager* on page 51.

Schedule a task?

Complete each step of the task until you are prompted to click **Apply**. (*Don't* click **Apply**.) Click **Schedule**.

Note: The Schedule button won't appear on tasks that can't be scheduled.

See *Scheduling a Task* on page 81.

Find the Task Manager?

In the tool bar, click **Configure**, point to the system you want, then click **Tasks**. See *Scheduling a Task* on page 81.
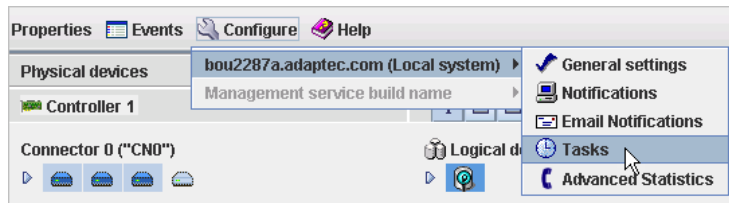
Find the Notification Manager?

In the tool bar, click **Configure**, point to the system you want, then click **Notifications**. See *Setting up Logged Notifications* on page 106.
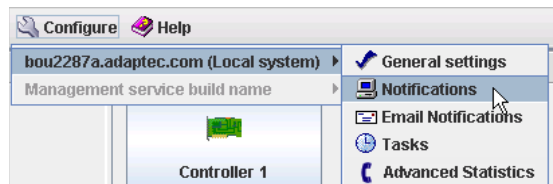
Find the Email Notification Manager?

In the tool bar, click **Configure**, point to the system you want, then click **Email Notifications**. See *Notifying Users by Email About Status and Activity* on page 111.
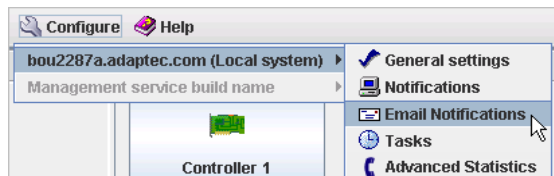
What's the difference between...?

Adaptec Storage Manager and the Agent?

Adaptec Storage Manager is the full software application, including the user interface (windows, menus) described in this *User's Guide*. It helps you build and maintain the logical drives, controllers, and disk drives that make up your storage space.

The Agent is like a service that keeps your storage space running. Its job is to monitor system health and manage event notifications, tasks schedules, and other on-going processes on each system in your storage space. The Agent can run independently of the full application.

See *About Adaptec Storage Manager* on page 14 for more information.

Event notifications, email notifications, and event alerts?

Event notifications (also called logged notifications) are messages about events on one system that are sent to the event log of another system in your storage space. (See page 106.)

Email notifications are email messages about events on a system in your storage space that are sent to specified users. (See page 111.)

Event alerts are pop-up messages or console messages about all types of events on a specific system, which are broadcast to all the users who are logged into your storage space. (See page 117.)

What options are on the Actions menu?

You can also access many Action menu options by right-clicking a component. For example, right-click on a system to access most of the options shown in *Local and remote systems* below. See *About the Actions Menu* on page 44 for more information.

Local and remote systems

In the Enterprise View, click on a system. In the menu bar, select **Actions** to view these options:
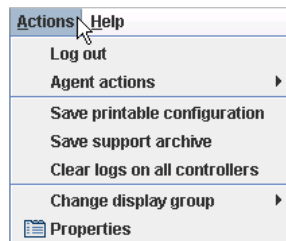
Then select **Action actions** to view these options:
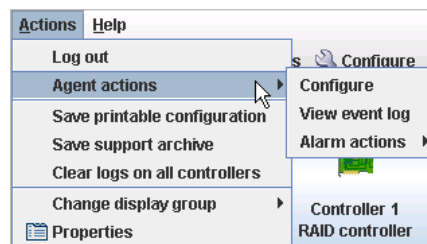
Controllers?

In the Enterprise View, click on a controller. In the menu bar, select **Actions** to view these options:
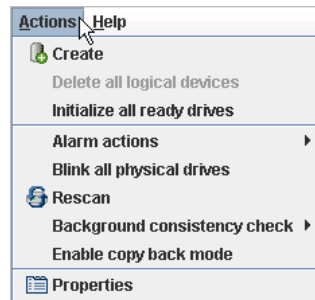
Then select **Alarm actions** to view these options:
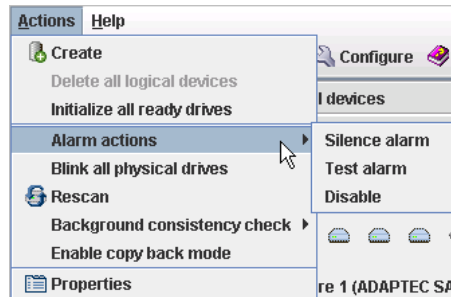
Disk drives?

In the Physical Devices View, click on a disk drive. In the menu bar, select **Actions** to view these options:
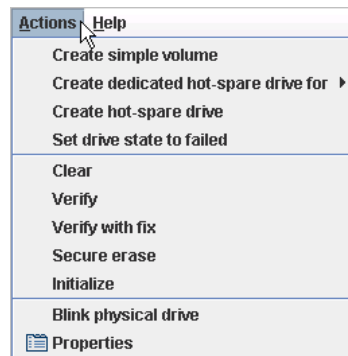
Enclosures?

In the Physical Devices View, click on an enclosure management device. In the menu bar, select **Actions** to view these options:
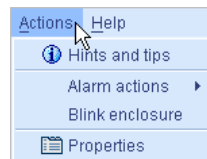
Logical drives?

In the Logical Devices View, click on a logical drive. In the menu bar, select **Actions** to view these options:
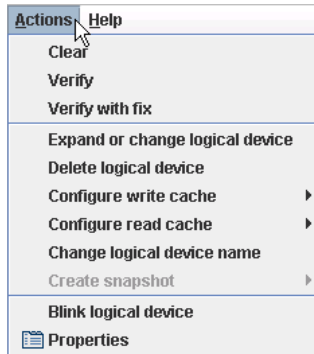
Direct Attached Storage?

In the Enterprise View, click **Direct Attached Storage**. In the menu bar, select **Actions** to view these options:
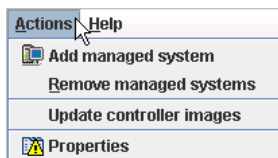
The Notification Manager?

In the tool bar, click **Configure**, point to the system you want, then click **Notifications**. In the menu bar, select **Actions** to view these options:
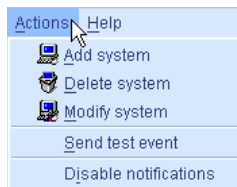
The Email Notification Manager?

In the tool bar, click **Configure**, point to the system you want, then click **Email Notifications**. In the menu bar, select **Actions** to view these options:
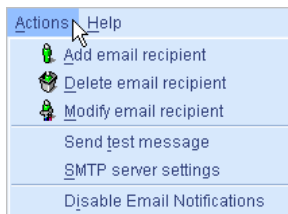
The Task Manager?

In the tool bar, click **Configure**, point to the system you want, then click **Tasks**. In the menu bar, select **Actions** to view these options:
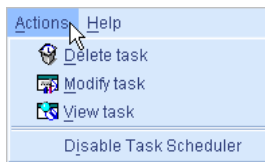
The Advanced Statistics Manager

In the tool bar, click **Configure**, point to the system you want, then click **Advanced Statistics**. In the menu bar, select **Actions** to view these options:
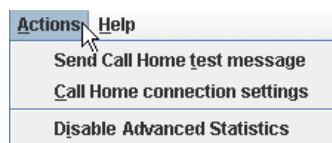
What tasks can be scheduled to run at a specified time?

You can schedule any of these tasks to run at a specified time:

● Changing a logical drive from one RAID level to another (see page 70).

● Expanding the size of a logical drive (see page 69).

● Modifying a logical drives settings (see page 63).

● Verifying a logical drive (see page 68) or verifying and fixing a logical drive (see page 67).

See *Scheduling a Task* on page 81 for more information.

Buttons and Icons At-a-Glance

D

This chapter provides quick references to the icons and buttons that appear in Adaptec Storage Manager.

Enterprise View Icons

Icon	Description
	System with direct attached storage controller and directly attached disk drives or enclosures
	Enclosure
	Controller

Icons in the Physical Devices View

Icon	Description
	Ready disk drive
	Disk drive with free space
	Disk drive with no free space
	Failed disk drive
	Healthy global or dedicated hot spare
	Hot spare with error (see page 55 for more information)
	Hot spare being built into logical drive after disk drive failure
	Hot spare built into logical drive after disk drive failure
	JBOD disk
	Ready Solid State Drive (SSD), not part of any logical drive or MaxIQ pool
	Solid State Drive assigned to MaxIQ pool
	Controller
	Enclosure Management Device
	Locked upgrade feature that can be activated with a feature key (see page 125 for more information)

Enclosure Status Icons

Icon	Description	Icon	Description
	Enclosure fan(s) — normal		Enclosure fan(s) — error
	Enclosure temperature — normal		Enclosure temperature — error
	Enclosure Power — normal		Enclosure Power — error
	Enclosure fan(s) — warning		

Enclosure temperature — warning

Enclosure Power — warning

Icons in the Logical Devices View

Icon	Description
	Logical drive
	Logical drive with healthy hot spare
	Logical drive being initialized
	Logical drive being modified
	Logical drive being rebuilt after disk drive failure
	Array with available space
	Array with no available space
	Locked upgrade feature that can be activated with a feature key (see page 125 for more information)

Buttons in the Main Window

Button	Click to...	More on...
Add	...add a remote system	...page 32
Create	...create a logical drive; open the Configuration wizard	...page 25
Silence	...silence the audible alarm	...page 94
Properties	...check status and other properties of a controller, disk drive, or other component	...page 87
Events	...view the full Event log	...page 103
Configure	....configure notification settings ...configure email notification settings ...check the status of scheduled tasks; monitor and modify scheduled tasks	...page 106 ...page 111 ...page 80
Help	...open the online Help	...page 50
T	...see a text description of your disk drives	...page 49
▤	...see the size capacities of your disk drives	...page 49
▤	...see the size capacities of your disk drives relative to each other	...page 49
➕	...create a global hot spare	...page 54
🗎	...create a logical drive	...page 25
🗎	...delete a logical drive	...page 71
CACHE	...configure MaxIQ cache pool	...page 78
▷ ▽	...expand and collapse additional information about disk drives and logical drives	...page 49
Logical devices	...access logical drive-specific functions, such as deleting	...page 87
Channel	...access channel-specific functions, such as rescanning	...page 87
Ports	...access port-specific functions, such as blinking	...page 87
Device	...access device-specific functions, such as initializing	...page 87

Buttons in the Notification Manager

Button	Click to...	More on...
Add system	...add a system that will receive notifications generated by the Notification Manager	...page 106
Modify system	...update a system's address, host name, or notification level	...page 109
Delete system	...remove a system from the Notification List	...page 109

Buttons in the Email Notification Manager

Button	Click to...	More on...
Add email recipient	...add the email address of a user who will receive notifications generated by the Email Notification Manager	...page 111
Modify email recipient	...update a recipient's email address or notification level	...page 114
Delete email recipient	...remove a recipient from the Email Notification List	...page 114

Buttons in the Task Manager

Button	Click to...	More on...
View task	...view the details of a scheduled task	...page 83
Modify task	...reschedule a task or change the description of the task in the Task List	...page 84
Delete task	...delete a task that is no longer required	...page 84

Glossary

A

Adaptec Storage Manager Agent

Runs in the background on your system, monitoring and managing event notifications, tasks schedules, and other on-going processes in your storage space. It requires no user intervention and includes no user interface.

available space

Space on a disk drive that is not being used by a logical drive. When a logical drive is deleted, its space becomes available. *See also* logical drive.

B

background consistency check

A controller function that continually and automatically verifies your logical drives once they're in use.

bootable-CD mode

A way of running Adaptec Storage Manager, where the application is not installed but is run directly from a CD.

C

cache

A temporary, fast storage area that holds data from a slower storage device for quick access. Cache storage is normally transparent to the accessing device.

channel

Any path used for the transfer of data and the control of information between disk drives and a RAID controller.

controller

A hardware device that interprets signals between a host and a disk drive. Also known as an adapter or card. *See also* I/O.

copyback

Adaptec RAID controller feature that allows data that has been moved to a hot spare to be returned to its original location once the controller detects that the failed drive has been replaced.

D

DAS
Direct-attached Storage. Data storage that is physically connected to a server. *See also* LAN, SAN.

drive segment
See segment.

dual drive failure protection
Another name for a RAID 6 or RAID 60 logical drive.

E

Email Notification Manager
A utility within Adaptec Storage Manager that emails event messages to selected recipients. *See also* email notifications, Notification Manager.

email notifications
Event messages about remote systems that are emailed to selected recipients.

event
Activity on your storage space, such as a disk drive failure or logical drive verification.

F

fault tolerance
The ability of a system to continue to perform its functions even when one or more disk drives have failed.

firmware
A combination of hardware and software; software written onto read-only memory (ROM).

format
See initialize.

G

GB
GigaByte. 1,024 MB. *See also* MB.

H

host
A system that's connected to a TCP/IP network. *See also* TCP/IP.

host bus adapter (HBA)
An adapter card that includes all of the I/O logic, software, and processing to manage the transfer of information between the host and the devices it's connected to.

hot space
A RAID 5EE logical drive. See page 158.

hot spare
A spare disk drive which will automatically replace a failed disk drive in a logical drive.

hot-swap
Remove and replace a failed disk drive in a logical drive without shutting down the server or disrupting activity on the logical drive.

I

Storage Manager Agent

Runs in the background on your system, monitoring and managing event notifications, tasks schedules, and other on-going processes in your storage space. It requires no user intervention and includes no user interface.

initialize

Prepare a disk drive for reading and writing.

I/O

Input/Output. Data entering into or being extracted from a system.

L

LAN

Local Area Network. A network of interconnected workstations sharing the resources of a single server, typically within the area of a small office building.

LED

Light-emitting Diode. An electronic device that lights up when powered.

local system

The computer (or *system*) that you're working on. In Adaptec Storage Manager, 'local' and 'remote' are relative terms. *See also* remote system.

logged events

Event messages about remote systems that appear in the event log of Adaptec Storage Manager. *See also* Notification Manager.

logical drive

One or more disk drives grouped together to appear as a single device to an operating system. Also known as a logical device or array.

M

managed system

A computer (or *system*) in a storage space that's being managed by Adaptec Storage Manager.

MB

MegaByte. Depending on context, 1,000,000 or 1,048,576 bytes. Also 1000 KB.

mirroring

Data protection that duplicates all data from one drive onto a second drive. *See also* RAID.

N

Notification Manager

A utility within Adaptec Storage Manager that broadcasts event messages to selected managed systems.

P

parity

A form of data protection used by some RAID levels to re-create the data of a failed disk drive in a logical drive. *See also* RAID.

partition

Divides the space of a disk drive into isolated sections.

port

A connection point to a controller, disk drive, expander, enclosure, or other device.

R

RAID

Redundant Array of Independent Disks. For more information on RAID and all supported RAID levels, see *Selecting the Best RAID Level* on page 152.

rapid fault isolation

The trail of yellow or red warning icons that leads from the high-level system view to the failed or failing component.

rebuild

Re-create a logical drive after a disk drive failure.

recurring task

A scheduled task, such as logical drive verification, that occurs on a regular basis. *See also* Task Manager, scheduled task.

redundancy

The capability of preventing data loss if a disk drive fails. *See also* mirroring, parity.

remote system

In Adaptec Storage Manager, all other systems in your storage space besides your local system are remote systems. 'Local' and 'remote' are relative terms. *See also* local system.

ROM Update wizard

A program that updates the BIOS and firmware codes on the controller. *See also* firmware.

S

SAN

Storage Area Network. A storage architecture that connects servers and disk drives across a network for enhanced reliability, scalability, and performance.

scheduled task

Activity, such as logical drive verification, that is set to be completed at a specified date and time. *See also* recurring task.

segment

Disk drive space that has been assigned to a logical drive. A segment can include all or just a portion of a disk drive's space.

SMTP

Simple Mail Transfer Protocol.

spare

See hot spare.

storage space

The controller(s) and disk drives being managed with Adaptec Storage Manager.

stripe size

Amount of data written to one partition before the controller moves to the next partition in a stripe set.

striped mirror
A RAID 1 Enhanced, or RAID 1E, logical drive. See page 155.

striping
A method of enhancing performance by spreading data evenly over multiple disk drives. Provides no data protection.

T

Task Manager
A utility in Adaptec Storage Manager that allows you to schedule a specific activity, such as expanding a logical drive, for a time that's convenient. *See also* scheduled task, recurring task.

TB
TeraByte. Approximately one million-million bytes, or 1024 GB.

TCP/IP
Transmission Control Protocol/Internet Protocol. A set of communication protocols used to connect hosts on the Internet.

V

verify
Check a logical drive for inconsistent or bad data. May also fix any data problems or parity errors.

Index

M

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