maxView Storage Manager User's Guide

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Revision History

Issue	Issue Date	Details of Change
1.04	November 22, 2013	Adaptec maxView Storage Manager Version 1.04

Contents

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Adaptec by PMC Product Support

If you have questions about installing or using your Adaptec by PMC product, check this document first—you will find answers to most of your questions. If you need further assistance, use the support options listed below. To expedite your service, have your computer in front of you.

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

- It's recommended that you register your product so that you have easy access to your TSID when contacting product support.

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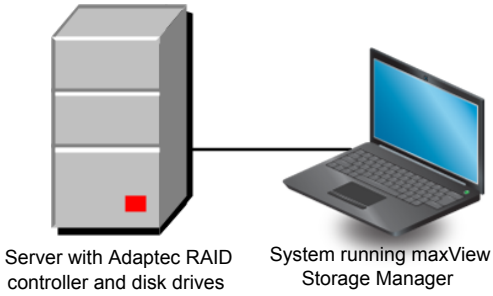
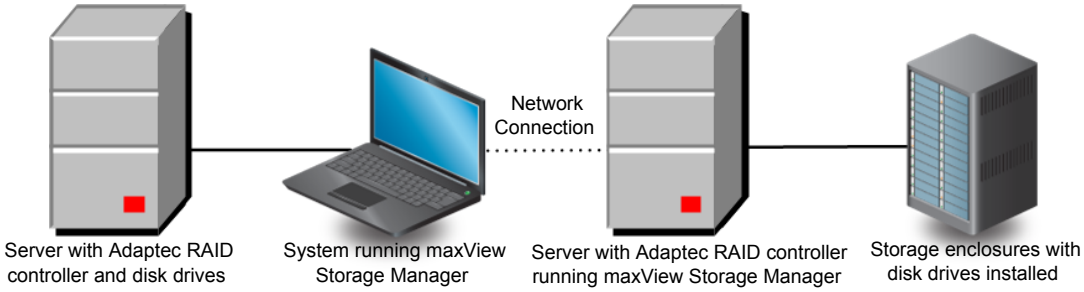
1 About this Guide

Adaptec maxView Storage Manager™ is a browser-based 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 multiple RAID controllers, servers, and enclosures.

This guide describes how to install and use Adaptec maxView Storage Manager (called simply maxView Storage Manager in the remainder of this guide) to build and manage *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 the figures below:





What You Need to Know Before You Begin

This guide is written for data storage and IT professionals who want to create a storage space for their online data. You should be familiar with computer hardware, operating system administration, and Redundant Array of Independent Disks (RAID) technology.

If you are using maxView Storage Manager as part of a complex storage system, with multiple servers, enclosures and RAID controllers, you should be familiar with network administration, have knowledge of Local Area Networks (knowledge of storage area networks (SANs) is not required), and be familiar with the input/output (I/O) technology of the storage devices on your network, such as Serial ATA (SATA) or Serial Attached SCSI (SAS).

> **Note:** Because this 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 guide provides information that can be used to manage multiple Adaptec RAID products in a variety of configurations, the generic term “storage space” is used to refer to the controller(s), disk drives, and systems being managed with maxView Storage Manager.

For efficiency, the term “component” or “components” 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 guide are known to computer users by multiple names. In this guide, this terminology is used:

- Controller (also known as adapter, board, or I/O card)
- Disk drive (also known as hard disk, hard drive, or hard disk drive)
- Solid State Drive (also known as SSD or non-rotating storage media)
- Logical drive (also known as logical device or array)
- System (also known as a server, workstation, or computer)
- Enclosure (also known as a storage enclosure or disk enclosure)

How to Find More Information

You can find more information about your Adaptec RAID controller, management software, and utilities by referring to these documents, available in the Documentation section of the Adaptec Web site at *start.adaptec.com*:

- *Readme.txt*—Includes product information and known issues.
- *Adaptec RAID Controllers Installation and User's Guide*—Provides complete information on how to install and configure your Adaptec RAID controller and attach devices.
- *Adaptec RAID Controllers Command Line Utility User's Guide*—Describes how to use ARCCONF, the Adaptec RAID Controller Configuration command line utility, to perform basic storage management tasks.

2 Introduction to maxView Storage Manager

This section introduces the maxView Storage Manager software, explains the concept of a "storage space," and provides a checklist of getting-started tasks.

Getting Started

The first part of this guide provides the information you need to install, start, and begin to use maxView Storage Manager. Follow these general steps:

Step 1: Familiarize yourself with the software components of maxView Storage Manager, review the system requirements, and study the configuration examples that illustrate how to build and grow your storage space (described in the remainder of this chapter).

Step 2: Install maxView Storage Manager on every system that will be part of your storage space (see *Installing maxView Storage Manager* on page 22).

Step 3: Start maxView Storage Manager and explore its graphical user interface (see *Exploring maxView Storage Manager* on page 30).

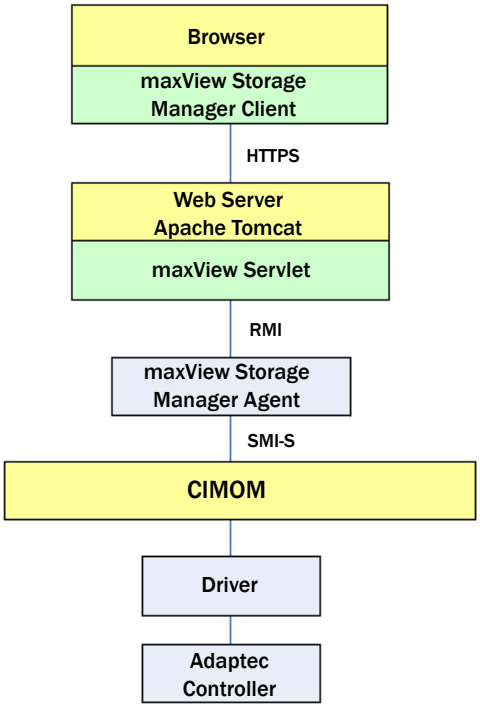
Step 4: Build your storage space (see *Building Your Storage Space* on page 38).

About maxView Storage Manager

maxView Storage Manager is a browser-based software application that helps you build a storage space for your data, using Adaptec RAID controllers, disk drives, Solid State Drives (SSDs), and enclosures.

With maxView 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 maxView Storage Manager to monitor and maintain all the controllers, enclosures, and disk drives in your storage space from a single location.

The maxView Storage Manager GUI (or *graphical user interface*) runs on most contemporary Web browsers (for a list of supported browsers, see *Browser Support* on page 19). A software stack comprising a Web server, Agent, and CIMOM server allows maxView Storage Manager to communicate with your RAID controller and coordinate activity in your storage space.



About the maxView Storage Manager Agent

When maxView Storage Manager is installed on a system, the *maxView Storage Manager Agent* is also installed automatically. The Agent is designed to run in the background, without user intervention. Its job is to monitor system health, manage event notifications, task schedules, and other on-going processes on a system. It sends notices when tasks are completed successfully, and notifies you when errors or failures occur on that system.

If your storage space includes systems that won't be connected to monitors (and therefore won't require the graphical user interface), you can choose to run the *Agent only* on those systems instead of the full application.

You can manage and monitor systems running the Agent only by logging into them as remote systems (see *Starting maxView Storage Manager on Remote Systems* on page 39).

About the maxView Storage Manager Web Server

The maxView Storage Manager Web Server is an instance of the open-source Apache Tomcat servlet container. It runs the maxView Storage Manager Web application, and serves static and dynamic content to the maxView Storage Manager GUI. The maxView Web Server is installed automatically with maxView Storage Manager and the maxView Storage Manager Agent.

About the maxView Storage Manager CIM Server

The maxView Storage Manager CIM Server is an instance of the open-source Pegasus CIM Object Manager, or CIMOM. In maxView Storage Manager, the CIM Server manages the SMI-S hardware provider and notification provider, which monitor the RAID controllers in your system and notify the maxView Storage Manager Agent. The standards-based SMI-S provider enables your Adaptec RAID controller to be managed with any standard CIM client. (For more information, contact your Adaptec support representative.) The maxView Storage Manager CIM Server is installed automatically with maxView Storage Manager and the maxView Storage Manager Agent.

System Requirements

To install maxView Storage Manager, each system in your storage space must meet these requirements:

- PC-compatible computer with Intel Pentium processor, or equivalent
- At least 4 GB of RAM
- 350 MB of free disk drive space
- 256-color video mode
- One of these operating systems:
  - Microsoft® Windows® Server 2012 (64-bit), Windows Server 2008 (32-bit and 64-bit), Windows Server 2008 R2 (64-bit), Windows SBS 2011, Windows Storage Server 2008 R2, Windows Storage Server 2011, Windows 7 and Windows 8 (32-bit and 64-bit)
  - Red Hat® Enterprise Linux 6.4, 5.9 (32-bit and 64-bit)
  - SuSE Linux Enterprise Server 11, 10 (32-bit and 64-bit)
  - Debian Linux 7 (32-bit and 64-bit)
  - Ubuntu Linux 12, 11, 10 (32-bit and 64-bit)
  - Fedora Linux 19, 18 (32-bit and 64-bit)
  - CentOS 6.4, 5.9 (32-bit and 64-bit)
  - Solaris 10, Solaris 11 Express (32-bit and 64-bit)
  - VMware ESXi 5.1, VMware ESX 4.1 Classic

For the latest on operating system version support check the Readme, available in the Documentation section of the Adaptec Web Site at *http://start.adaptec.com*.

> **Note:** maxView Storage Manager can also be used *before* an operating system is installed. See *Running maxView Storage Manager from a Bootable USB Image* on page 27 for more information.

Browser Support

To run the maxView Storage Manager GUI, each system in your storage space must be running one of these Web browsers:

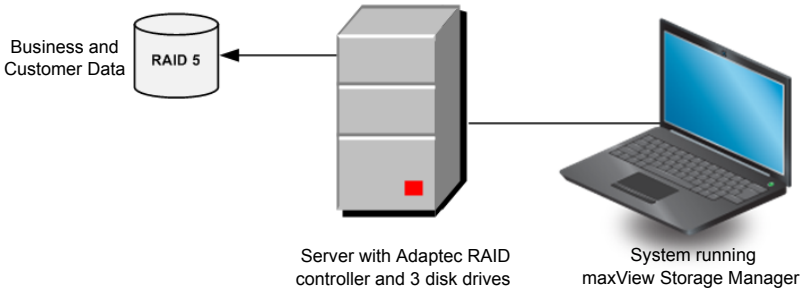
- Microsoft® Internet Explorer® 8, 9, 10 or newer
- Google® Chrome™ 15.0, or newer
- Mozilla Firefox® 8, 9, 10, or newer

Typical Storage Space Configurations

The following examples show typical storage spaces that you can build with maxView Storage Manager. You can grow your storage space as your requirements change by adding more systems, controllers, disk drives, and enclosures, and by adding redundant logical drives for protection against data loss.

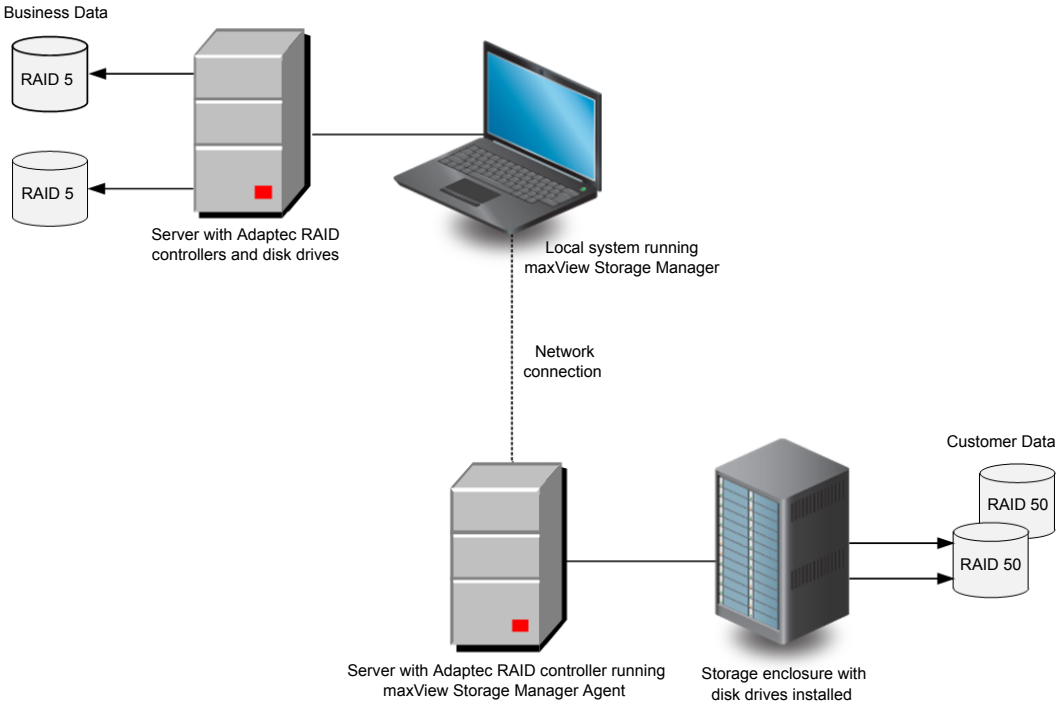
A Simple Storage Space

This example shows a simple storage space that might be appropriate 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.



An Advanced Storage Space

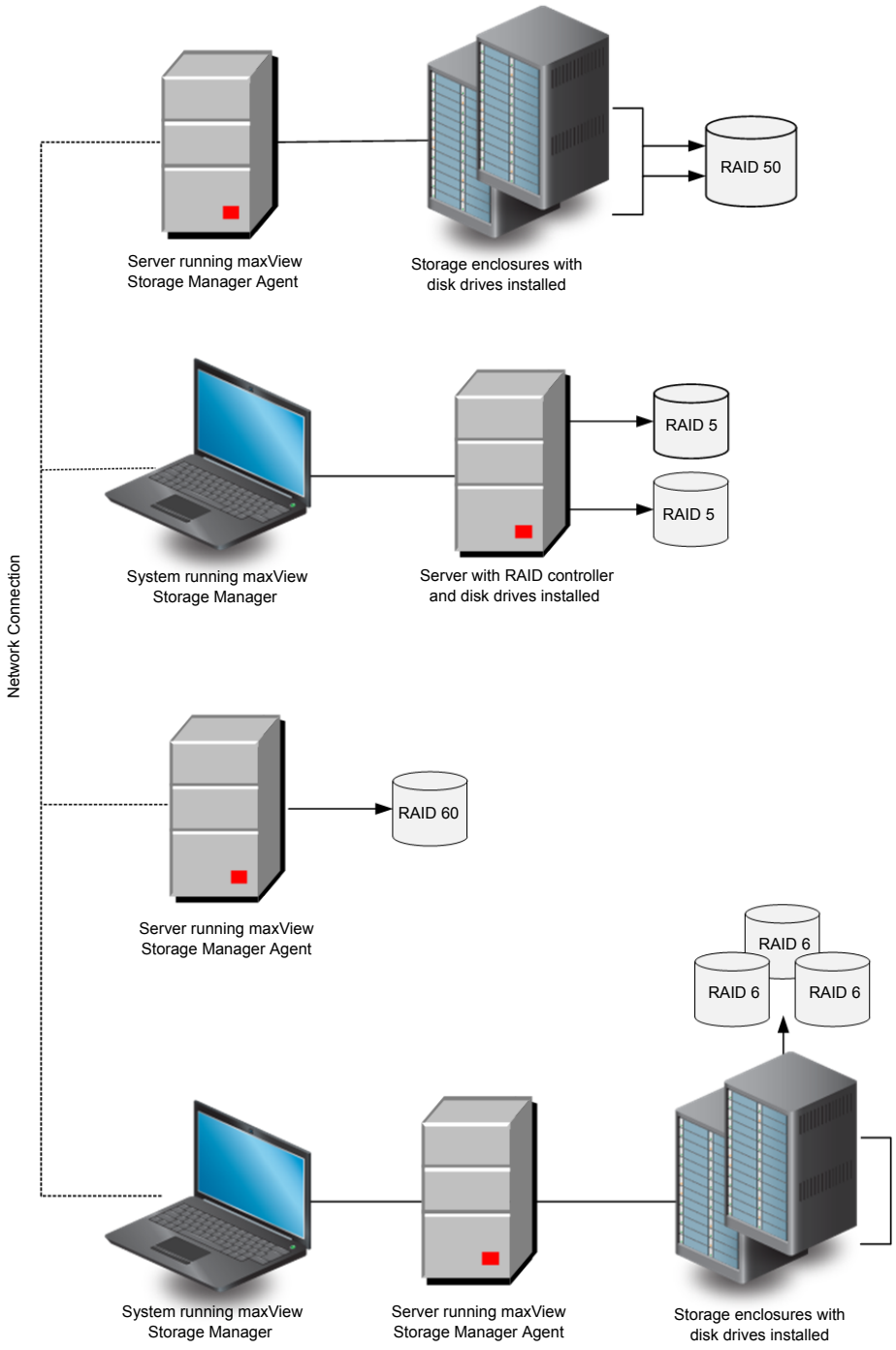
This example shows how you can grow your storage space as the requirements of your application change. On the first server, segments from each disk drive have been used to build two RAID 5 logical drives. A second server connected to two 12-disk enclosures has been added. The additional storage space 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 running the maxView Storage Manager GUI.



Continuing to Grow Your Storage Space

For more advanced applications, such as high-volume transaction processing in "cloud" or data center environments, maxView Storage Manager helps 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 any system running the maxView Storage Manager GUI.



3 Installing maxView Storage Manager

This section describes how to install and uninstall maxView Storage Manager on different operating systems. It also describes how to run maxView Storage Manager from a *bootable USB image*, before the application is installed on an operating system.

> **Note:** To perform a silent installation without messages or user interaction, follow the instructions in *Silent Installation on Windows and Linux* on page 131.

Before You Begin the Installation

Complete the following steps before you begin the installation.

Gather Installation Information

Prepare the following information:

- Administrator account user name and password for your operating system.
- CIM Server port number. The default port is recommended (5988). If you want to use a different port, select any one between 65500 and 65535 and it will be assigned as the CIM Server http port for maxView Storage Manager installation. (The selected port must be free at installation time.) The installation will verify the availability of this port. There is no guarantee that any port number besides the default will work in the future as any other application can claim this port. For more information on the CIM Server, see*About the maxView Storage Manager CIM Server* on page 18.
- maxView Web Server port number. The default port is recommended (8443). If the default port is not available, another port number will be automatically assigned. For more information on the Web Server, see *About the maxView Storage Manager Web Server* on page 18.

  > **Note:** If a previous version of maxView Storage Manager is installed on your system, you must remove it before beginning a new installation. See *Uninstalling maxView Storage Manager* on page 28 for details.

Download the Installation Packages

Complete these steps to download the installation package for your operating system(s) from the Adaptec Web site:

1. Open a browser window, then type start.adaptec.com in the address bar.
2. Select your RAID controller family (Series 7, Series 8, and so on) and controller model.
3. Select **Storage Manager Downloads**, then select the appropriate installer package from the list; for instance, maxView Storage Manager for Windows x64 or maxView Storage Manager for Linux.
4. Click **Download Now** and accept the license agreement.
5. When the download completes, extract the contents of the installer archive file to a temporary location. If the archive includes installers for multiple operating system versions (VMware, for instance), each installer is stored in a separate folder, including one each for 32-bit and 64-bit operating systems.

   > **Note:** If you are installing maxView Storage Manager on a different machine–for instance, you downloaded the Linux installer onto a Windows machine–copy the installer from the download location to a temporary location on the target machine. Use whatever method you prefer to copy the file: USB flash drive; network transfer; Telnet/SSH; whatever is most convenient.

6. Continue with the installation instructions for your operating system.

Installing on Windows

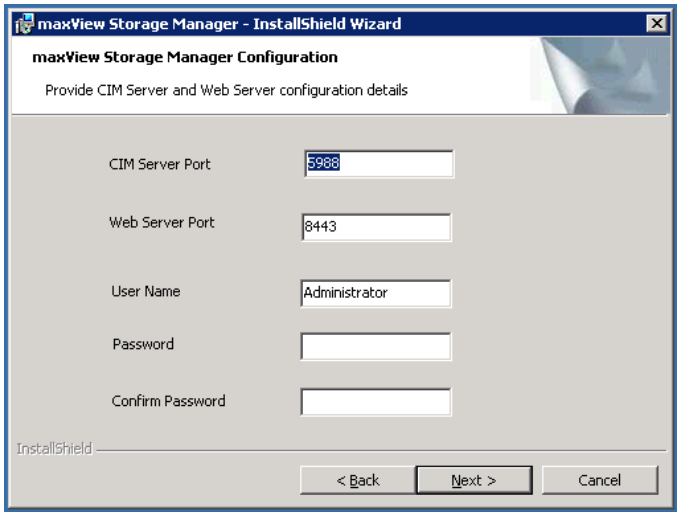
This section describes how to install maxView Storage Manager on Windows systems.

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

1. Open Windows Explorer or My Computer, then change to the directory where the Windows setup program is located (see *Download the Installation Packages* on page 22 for details).
2. Double-click the setup program for your operating system version:

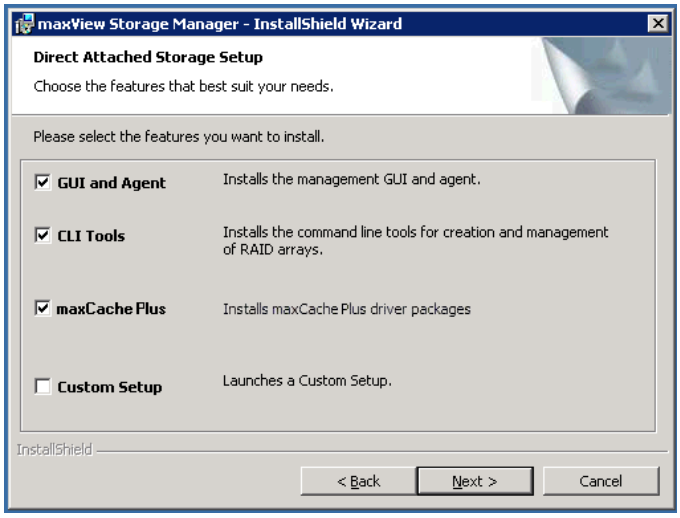
Options	Description
Windows 64-bit	setup_asm_x64.exe
Windows 32-bit	setup_asm_x86.exe

   The Installation wizard opens.
3. Click **Next** to begin the installation, click **I accept...**, then click **Next**.
4. Add the following configuration settings:
   a) CIM Server Port: 5988.
   b) Web Server Port: 8443.
   c) User Name default: Administrator
   d) Operating system password.



5. Click **OK** on the password verification window and on the CIM Server and Web Server port number verification window.
6. In the Features screen, ensure that **GUI and Agent** is selected. Optionally, select **CLI Tools** and **maxCache Plus**. Then click **Next**.

Note: maxCache Plus is supported on qualifying Adaptec Series Q controllers only (see the Readme for a complete list). For other controllers, the maxCache Plus option is grayed out.



7. Click **Install** to begin the installation.
8. Repeat these steps to install maxView Storage Manager on every Windows system that will be part of your storage space.

When the installation is complete you receive a confirmation message and the maxView Storage Manager icon is placed on your desktop.

Installing on Red Hat, Cent OS, SuSE, or Fedora Linux

This section describes how to install maxView Storage Manager on systems running Red Hat Linux, Cent OS, SuSE Linux, or Fedora Linux. For information about installing maxView Storage Manager on Debian and Ubuntu Linux, see the next section. For a list of supported Linux operating systems, see *System Requirements* on page 19.

1. Open a shell window, then change to the directory where the Linux installer package is located (see *Download the Installation Packages* on page 22 for details).
2. To install maxView Storage Manager with maxCache Plus support, run the maxCache Plus installation script, install.sh; otherwise skip to Step *3* on page 24.

   chmod +x install.sh
   ./install.sh

   If the installer detects a qualifying Adaptec Series Q controller and one of the supported Linux operating systems, it installs the maxCache Plus driver software, then it continues with the maxView Storage Manager installation. (See the Readme for a complete list of controllers and operating systems that support maxCache Plus.)
3. To install maxView Storage Manager without maxCache Plus support, run the . bin file for your operating system version:

Options	Description
Linux 64-bit	./StorMan-1.02.x86_64.bin
Linux 32-bit	./StorMan-1.02.i386.bin

4. When prompted for configuration details, enter the following:
   Enter your username [default: root]
   Enter your operating system password

Enter the CIM Server HTTP Port: [default:5988]

When the installation completes a confirmation message is displayed and the maxView Storage Manager icon is placed on your desktop.

5. Repeat these steps to install maxView Storage Manager on every Linux system that will be part of your storage space.

Installing on Debian or Ubuntu Linux

This section describes how to install maxView Storage Manager on systems running Debian or Ubuntu Linux. For a list of supported Linux operating systems, see *System Requirements* on page 19.

1. Open a shell window, then change to the directory where the Linux installer package is located (see *Download the Installation Packages* on page 22 for details).
2. Install the .deb package for your operating system version (xxxxx=build number).

Options	Description
Linux 64-bit	dpkg -i StorMan-1.02-XXXXX_amd64.deb
Linux 32-bit	dpkg -i StorMan-1.02-XXXXX_i386.deb

Enter your username [default: root].

Enter your password.

Enter the CIM Server HTTP Port: [default:5988].

3. Repeat these steps to install maxView Storage Manager on every Debian and Ubuntu Linux system that will be part of your storage space.

When the installation is complete you receive a confirmation message and the maxView Storage Manager icon is placed on your desktop.

Installing on Solaris

This section describes how to install maxView Storage Manager on systems running Solaris.

1. On the Solaris machine, change to the directory where the Solaris installer package is located (see *Download the Installation Packages* on page 22 for details).
2. Install maxView Storage Manager:
   pkgadd -d StorMan.pkg
3. At the prompt to continue, select y, then press Enter.
4. Enter the following configuration details:
   Enter your username [default: root].
   Enter your operating system password.
   Enter the CIM Server HTTP Port: [default:5988].
5. Repeat these steps to install maxView Storage Manager on every Solaris system that will be part of your storage space.

When the installation is complete you receive a confirmation message and the maxView Storage Manager icon is placed on your desktop.

Installing on VMware ESX 4.1

Use the following procedure to install the .vib files for a VMware ESX 4.1 system. Perform the installation from an ESX 4.1 console or from a remote system running a Telnet/SSH client.

1. Copy the following files from the installer download location to your local ESX 4.1 /tmp directory (see *Download the Installation Packages* on page 22 for details):
   - vmware-esx-provider-arcconf.vib

- vmware-esx-provider-arcsmis.vib

The arcconf.vib is for command line communication.

The arcsmis.vib is for remote management communication.

2. Stop operations.
   /etc/init.d/sfcbd-watchdog stop
3. Check for an existing installation of arcconf.
   esxupdate --vib-view query | grep arcconf
4. Remove the existing installation of arcconf.
   esxupdate -b < arcconf module name > --maintenancemode remove
   When the package is removed, you receive the message "The update completed successfully, but the system needs to be rebooted for the changes to be effective".
5. Check for an existing installation of arcsmis.
   esxupdate --vib-view query | grep arcsmis
6. Remove the existing installation of arcsmis.
   esxupdate -b < arcsmis module name > --maintenancemode remove
   When the package is removed, you receive the message "The update completed successfully, but the system needs to be rebooted for the changes to be effective."
7. Reboot the system.
8. Stop operations.
   /etc/init.d/./sfcbd-watchdog stop
9. Install the arcconf package.
   esxupdate -b /tmp/vmware-esx-provider-arcconf.vib --nodeps --nosigcheck --maintenancemode update
   When the package is installed, you receive the message "The update completed successfully, but the system needs to be rebooted for the changes to be effective."
10. Install the arcsmis package.
    esxupdate -b /tmp/vmware-esx-provider-arcsmis.vib --nodeps --nosigcheck --maintenancemode update
    When the package is installed, you receive the message "The update completed successfully, but the system needs to be rebooted for the changes to be effective."
11. Reboot the system.
12. Continue with *Installing on a VMware Guest OS* on page 27.

Installing on VMware ESXi 5.x

Use the following procedure to install the .vib files for a VMware ESXi 5.x system. Perform the installation from a remote system running a Telnet/SSH client. Use a terminal emulator to access the ESXi 5.x server remotely.

1. Copy the following files from the installer download location to your local ESXi 5.x /tmp directory (see *Download the Installation Packages* on page 22 for details):

   - vmware-esx-provider-arcconf.vib
   - vmware-esx-provider-arcsmis.vib

   The arcconf.vib is for command line communication.

   The arcsmis.vib is for remote management communication.

2. Stop operations.
   /etc/init.d/sfcbd-watchdog stop
3. Check for existing installation of arcconf.
   esxcli software vib list | grep arcconf
4. Remove the existing arcconf package.
   esxcli software vib remove -n arcconf

When the package is removed, you receive the message "Reboot Required: false."

5. Check for an existing installation of arcsmis.
   esxcli software vib list | grep arcsmis
6. Remove the existing arcsmis package.
   esxcli software vib remove -n arcsmis
   When the package is removed, you receive the message "Reboot Required: false."
7. Set the acceptance level if this is the first installation of arcconf and arcsmis:
   esxcli software acceptance set –-level=CommunitySupported
8. Install the arcconf package.
   esxcli software vib install --maintenance-mode --no-sig-check -v /tmp/vmware-esx-provider-arcconf.vib
   When the package is installed, you receive the message "Reboot Required: false."
9. Install the arcsmis package.
   esxcli software vib install --maintenance-mode --no-sig-check -v /tmp/vmware-esx-provider-arcsmis.vib
   When the package is installed, you receive the message "Reboot Required: false."
10. Reboot the system.
11. Continue with *Installing on a VMware Guest OS* on page 27.

Installing on a VMware Guest OS

This section describes how to install maxView Storage Manager on a VMware guest operating system.

1. On the VMware guest OS, change to the directory where the Guest OS installer package is located (see *Download the Installation Packages* on page 22 for details).
2. Type one of the following commands, depending on the operating system:

Options	Description
Linux 32-bit	./StorMan-1.02.esx32.bin
Linux 64-bit	./StorMan-1.02.esx86_64.bin
Windows 32-bit	setup_asm_esx_x86.exe
Windows 64-bit	setup_asm_esx_x64.exe

Running maxView Storage Manager from a Bootable USB Image

Running maxView Storage Manager from a *bootable USB image* allows you to configure your controller before you install the operating system. The procedure consists of three basic steps:

1. Download the bootable USB image from the Adaptec Web Site
2. Create an image on a USB flash drive

   Note: We recommend using LiveUSB Creator, available at *fedorahosted.org* (see Step *2* on page 28, below).
3. Boot from the USB flash drive, login to maxView Storage Manager and configure your controller

The bootable USB image is not a substitute for running maxView Storage Manager as an installed application. Many of the features and functions described in this guide are not available when you run maxView Storage Manager from a bootable USB image. Use the bootable USB image only to configure your controller before you install an operating system.

Note: Before you begin, ensure that your system is set up to boot from a USB drive. Check the system BIOS to see if the USB drive is included in the boot sequence. (For more information, see your system's documentation.) You will need a USB drive with at least 1GB of storage to complete this task. To run the bootable USB image, the target machine must have at least 4GB of memory.

To run maxView Storage Manager from a bootable USB image:

1. Download the bootable USB image from the Adatepec Web site:

a) Open a browser window, then type *start.adaptec.com* in the address bar.
b) Locate the bootable USB image on the Adaptec Start page.
c) Download the bootable USB image.
d) Extract the contents of the bootable image archive file to a temporary location.

   The archive contains one file: the maxView Storage Manager bootable iso image.

2. Create an image on the USB drive:
   a) Run the LiveUSB Creator utility setup program at *https://fedorahosted.org/releases/l/i/liveusb-creator/liveusb-creator- 3.11.8-setup.exe*.
   b) Start LiveUSB Creator from the Windows All Programs menu.
   c) In the Use Existing Live CD field, click **Browse**, then locate and select the maxView Storage Manager bootable iso image.
   d) In the Target Device field, select the USB flash drive (e:\, for instance).
   e) Click **Create Live USB**.
3. Insert the USB drive on the machine you want to configure.
   The Boot menu opens in a shell window.
4. Select **Launch maxView** from the menu.
   After a minute or so, the maxView Storage Manager login screen opens in a browser window.

   Note: If you prefer to configure the controller from the command line, select **Launch arcconf** from the Boot menu, then enter root, with no password, for the login credentials.
5. Enter root/root for the login credentials.
6. Continue with *Creating Logical Drives* on page 42.

Uninstalling maxView Storage Manager

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

Note: If a previous version of maxView Storage Manager is installed on your system, you must remove it before beginning a new installation.

Uninstalling from Windows

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

When the uninstall process is complete, you receive a confirmation message and the maxView icon is removed from your desktop.

Uninstalling from Red Hat, Cent OS, SuSE, or Fedora Linux

This section describes how to uninstall maxView Storage Manager from systems running Red Hat, Cent OS, SuSE, or Fedora Linux.

Type the command rpm -e StorMan

When the uninstall process is complete, you receive a confirmation message and the maxView icon is removed from your desktop.

Uninstalling from Debian or Ubuntu Linux

This section describes how to uninstall maxView Storage Manager from systems running Debian or Ubuntu Linux.

Type the command dpkg -r StorMan

When the uninstall process is complete, you receive a confirmation message and the maxView icon is removed from your desktop.

Uninstalling from Solaris

This section describes how to uninstall maxView Storage Manager from systems running Solaris.

1. Type the command pkgrm StorMan
2. At the prompt to remove the package select y, then press Enter.
3. At the confirmation prompt select y, then press Enter.

When the uninstall process is complete, you receive a confirmation message and the maxView icon is removed from your desktop.

Uninstalling from VMware ESX 4.1

Use the following procedure to remove maxView Storage Manager from a VMware ESX 4.1 system.

1. Log in with the user name: root
2. List the installed packages:
   esxupdate -—vib-view query | grep arcconf
   esxupdate –-vib-view query | grep arcsmis
3. Stop operations:
   /etc/init.d/./sfcbd-watchdog stop
4. Remove the arcconf package:
   esxcli software vib remove -n arcconf
5. Remove the arcsmis package:
   esxcli software vib remove -n arcsmis
6. Restart operations:
   /etc/init.d/./sfcbd-watchdog start

To verify that maxView Storage Manager was uninstalled, repeat step 2. If no results are shown, the software was uninstalled.

Uninstalling from VMware ESXi 5.x

Use the following procedure to remove maxView Storage Manager from a VMware ESXi 5.x system.

1. Log in with the user name: root
2. List the installed packages:
   esxcli software vib list | grep arcconf
   esxcli software vib list | grep arcsmis
3. Stop operations:
   /etc/init.d/./sfcbd-watchdog stop
4. Remove the arcconf package:
   esxcli software vib remove -n arcconf
5. Remove the arcsmis package:
   esxcli software vib remove -n arcsmis
6. Restart operations:
   /etc/init.d/./sfcbd-watchdog start

To verify that maxView Storage Manager was uninstalled, repeat step 2. If no results are shown, the software was uninstalled.

4 Exploring maxView Storage Manager

This section describes how to start and log into maxView Storage Manager, and familiarizes you with the main features of the graphical user interface. It also explains how to get help and log out of maxView Storage Manager when you are finished working with the application.

Starting maxView Storage Manager and Logging In

The procedure for starting and logging in to maxView Storage Manager is the same for all operating systems with a graphical desktop.

Note: You need Administrator or root privileges to run the maxView Storage Manager application.

1. On the desktop, double-click the maxView Storage Manager desktop icon.
   The login window opens in the default browser.

Note: If you do not have an icon for maxView Storage Manager on your desktop, open a browser window, type this URL in the address bar: *https://127.0.0.1:8443/maxview/manager/login.xhtml*, then press Return.

2. Enter Administrator account username and password from your operating system, then click **Login**.
   The maxView Storage Manager main window opens.

Working in maxView Storage Manager

Most options in maxView Storage Manager are available by:

- Selecting components in the Enterprise View
- Clicking icons on the *ribbon*, at the top of the main window
- Working with information in the *Storage Dashboard* and *Chart View*
- Checking status in the Event Log and Task Log

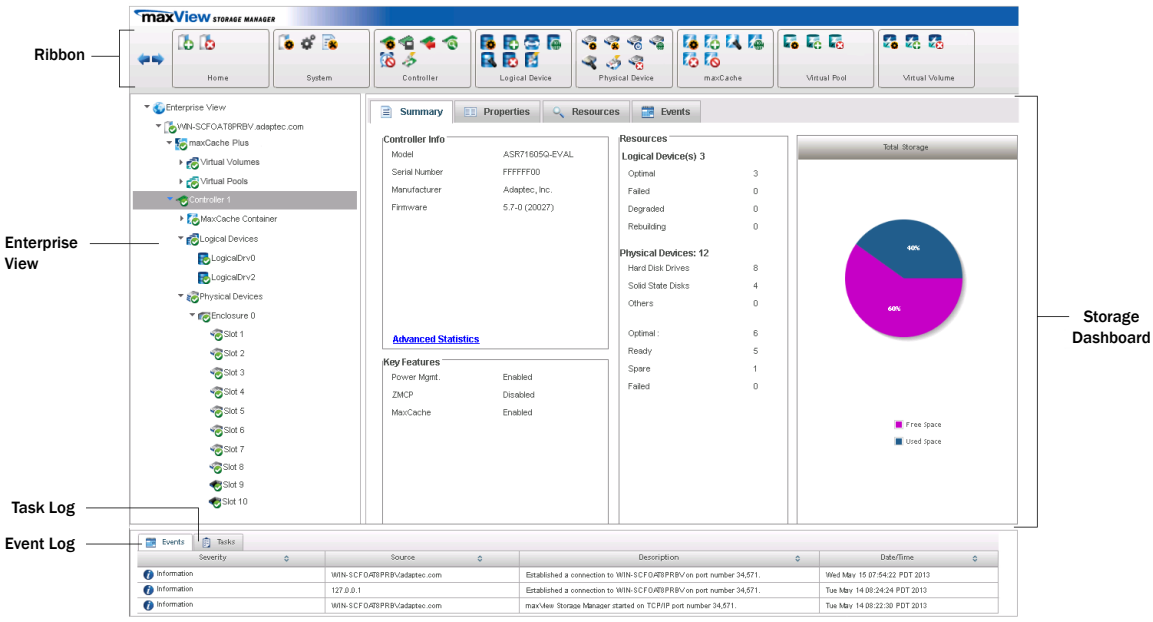
The following sections describe how to work with these features in the main window of maxView Storage Manager.

Overview of the Main Window

The main window of maxView Storage Manager has three main panels—left, right, and bottom—plus the ribbon, at the top of the window.

The left panel shows always the Enterprise View. The bottom panel shows the Event Log and Task Log. The right panel shows the Storage Dashboard and Chart View. Different information appears in the right panel depending on which component is selected in the Enterprise View.

In example below, a controller is selected in the Enterprise View, and the right panel displays the Storage Dashboard for the controller, with a chart view of its storage space.

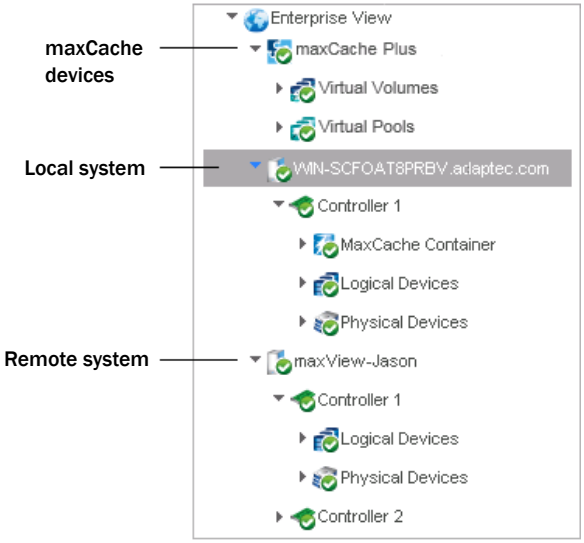


You can resize the panels and scroll horizontally or vertically as needed, to view more or less information.

The Enterprise View

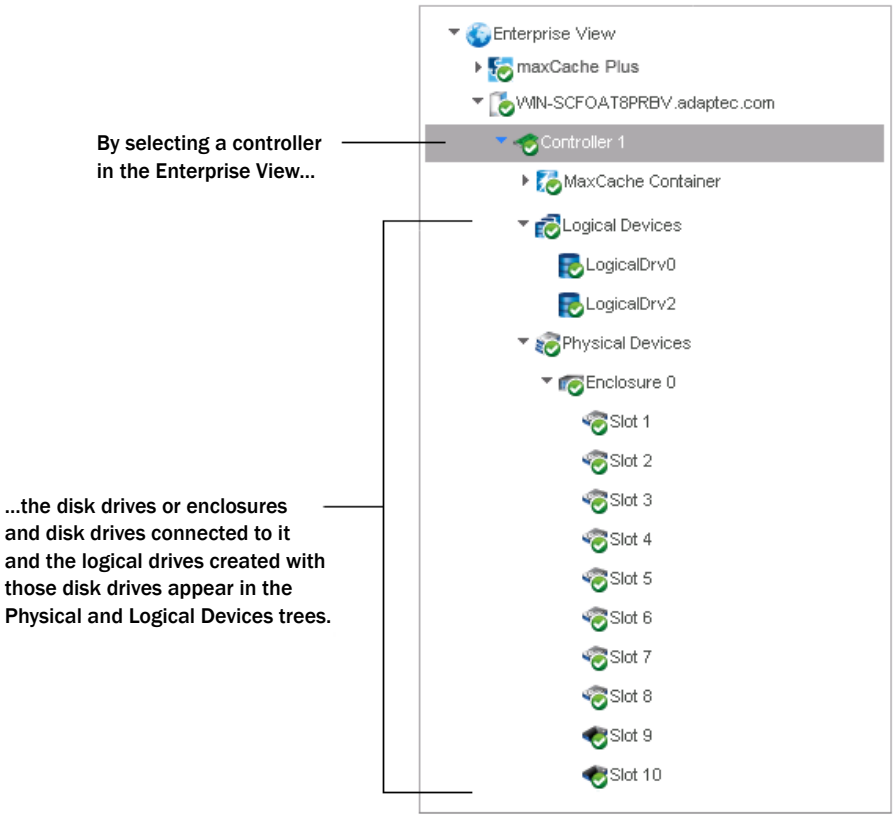
The Enterprise View is an expandable "tree" that shows the physical and logical components of your storage space. The Enterprise View lists the local system (the system you're working on) and any remote systems that you have logged in to from the local system. (See *'Local' or 'Remote'?* on page 38 for more information.) It also lists the *maxCache devices* in your system, including virtual volumes, virtual pools, and the maxCache Container.

> **Note:** maxCache is supported on Adaptec Series Q controllers only. See *Optimizing the Structure of Your Storage Space* on page 69 for more information about maxCache.



Expand a system in the Enterprise View to the see its controllers, logical drives ("devices"), physical drives, enclosures, and maxCache Container.

In the figure below, a controller is expanded in the Enterprise View, revealing the physical and logical devices associated with that controller.



You can perform most tasks in maxView Storage Manager by selecting a component in the Enterprise View, such as a controller or disk drive, then using the related commands on the *ribbon*, described next.

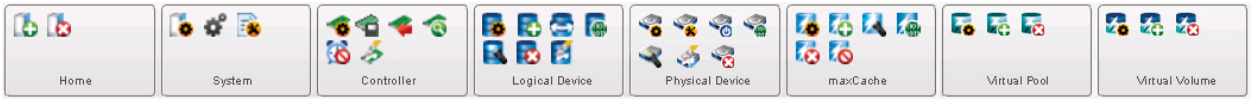
What do the Enterprise View Icons Mean?

Icon	Description
	System with controller and directly attached disk drives or enclosures
	Controller
	Enclosure
	Logical device

Icon	Description
	maxCache device (healthy)[1]
	Hard disk drive
	Solid State Drive (SSD)
	Connector or other physical device

The Ribbon

Most tasks in maxView Storage Manager are available from the *ribbon*, at the top of the main window. The ribbon replaces toolbars and menus in maxView Storage Manager to help you quickly find the commands you need to complete a task.



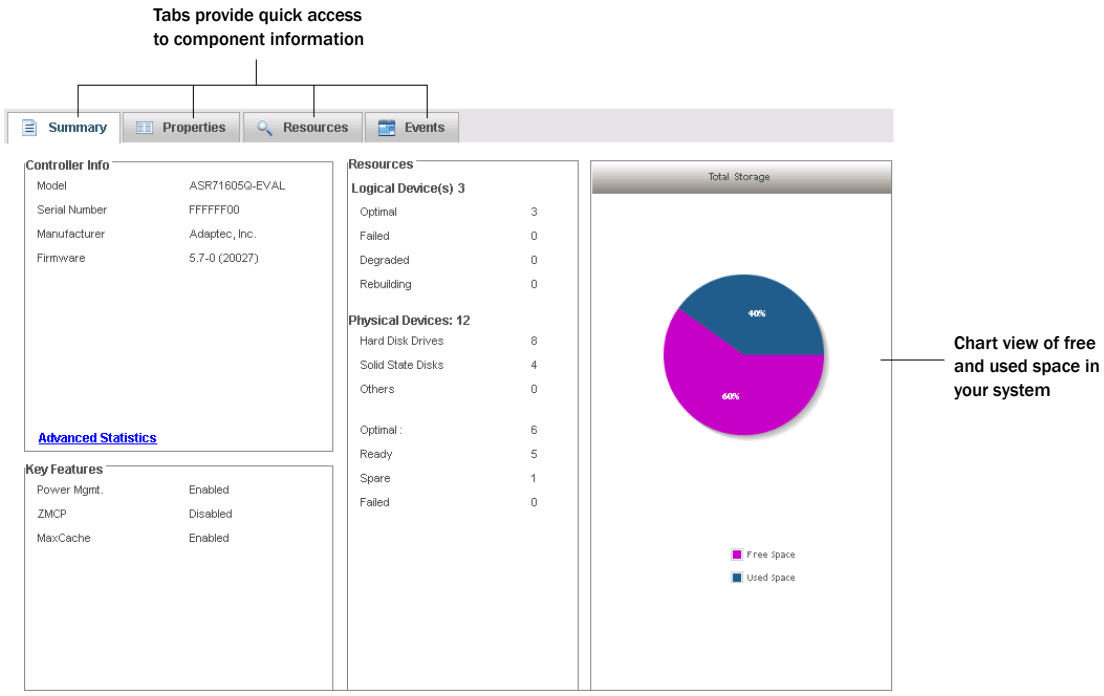
The ribbon is organized into groups, with related tasks for Systems, Controllers, Logical Devices, Physical Devices, and maxCache devices (maxCache Container, Virtual Pools, Virtual Volumes); the Home group (on the left) provides commands for working with remote systems (see *Managing Remote Systems* on page 122). Options available on the ribbon vary, depending on which type of component is selected in the Enterprise View. For instance, if you select a controller in the Enterprise View, the Create Logical Drive option is highlighted in the Logical Device group, in addition to options in the Controller group. If you select a disk drive or SSD in the Enterprise View, options in the Physical Device group are highlighted; and so on.

For a description of the icons on the ribbon, see *Icons At-a-Glance* on page 147.

The Storage Dashboard

When you select a component in the Enterprise View, maxView Storage Manager displays detailed information about that component on the *Storage Dashboard*. Occupying the largest portion of the main window in maxView Storage Manager, the Storage Dashboard provides status information, physical and logical device properties, resources, usage statistics, and reliability indicators for hard drives and SSDs. It also provides a chart view of free and used space in your system.

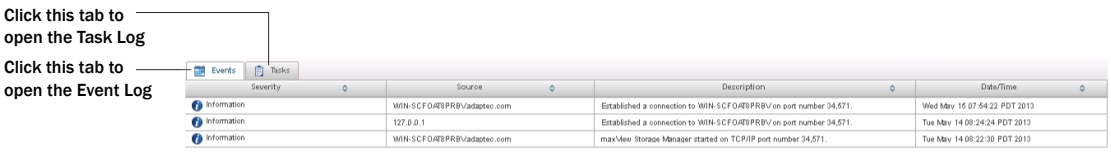
[1] A green checkmark in the Enterprise View means that the component is healthy with no problems or issues. For more information, see *Identifying a Failed or Failing Component* on page 127.



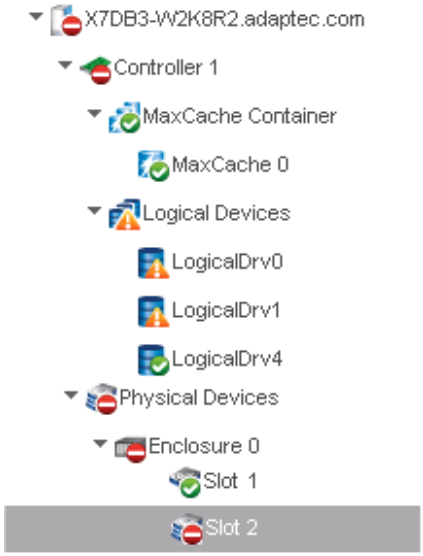
For more information about the types of information provided on the Storage Dashboard for each component in your storage space, see *Viewing Component Status in the Storage Dashboard* on page 105; also see *Revealing More Device Information* on page 35.

Checking System Status from the Main Window

maxView Storage Manager includes an Event Log and Task Log for at-a-glance status and activity information for all managed systems. The Event Log provides status information and messages about activity (or *events*) occurring in your storage space. The Task Log provides information about current or recurring processes in your storage space, such as the creation of a logical drive. Single-click any event or task to see more information in an easier-to-read format. For more information about the Event Log and Task Log, see *Viewing Activity Status in the Event Log* on page 104 and *Working with Scheduled Tasks* on page 85.



Warning- and Error-level icons appear next to components in the Enterprise View 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 127 for more information.



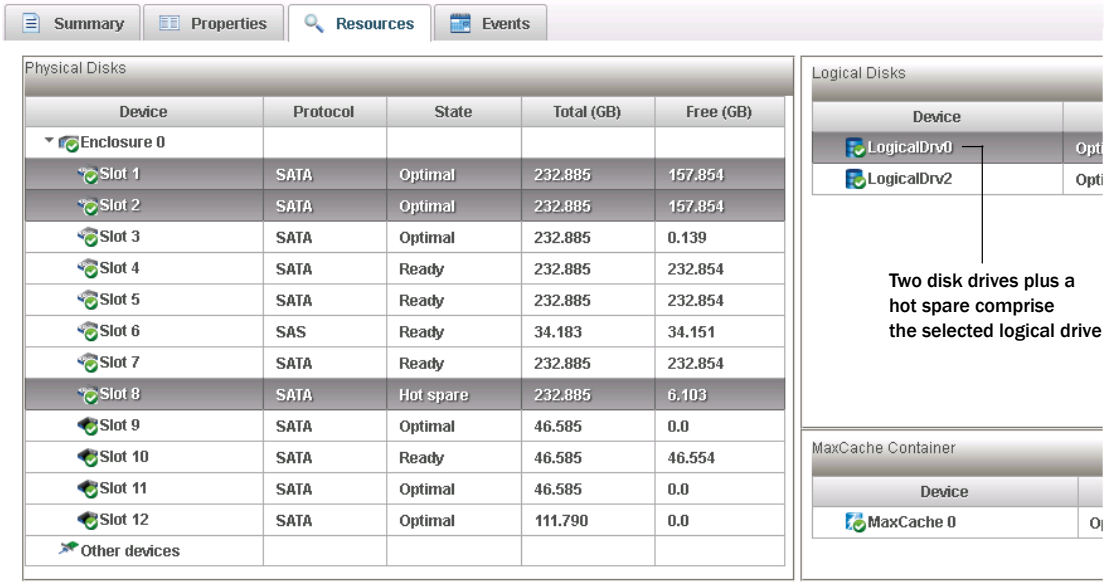
If your storage space includes a drive enclosure with a temperature sensor, temperature, fan, and power module status is displayed on the Storage Dashboard (see *Monitoring Enclosure Status* on page 107).

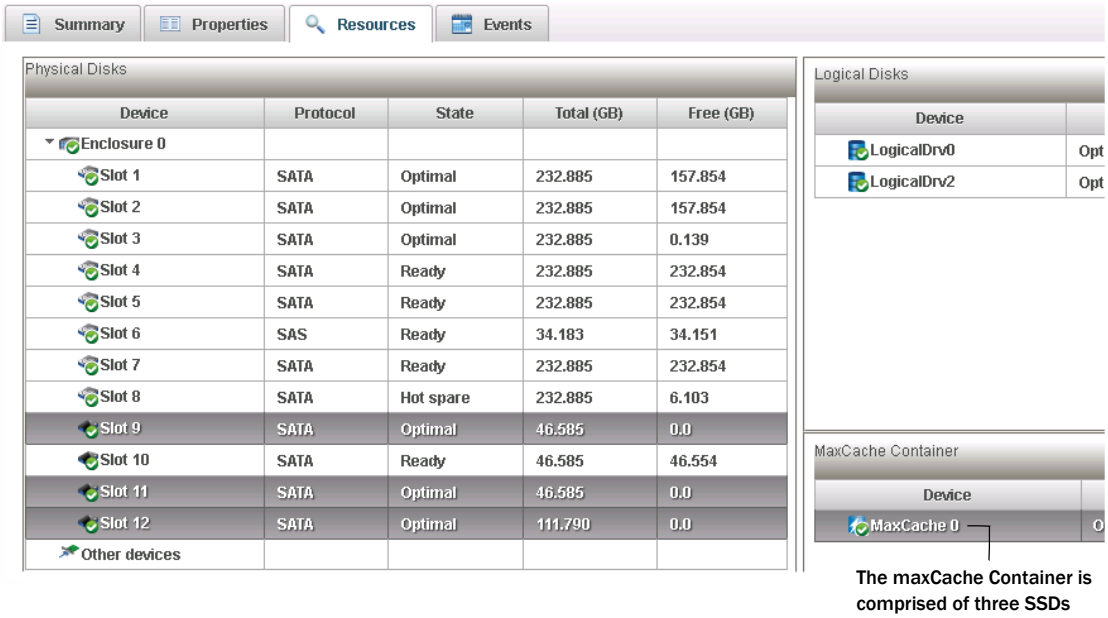
For more information about checking status from the main window, see *Monitoring Status and Activity* on page 103.

Revealing More Device Information

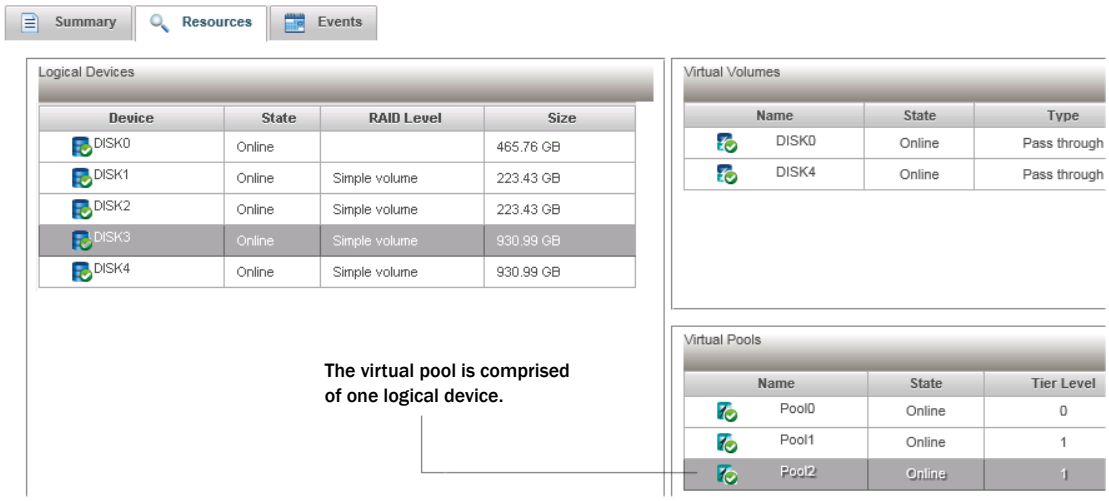
You can reveal more information about disk drive, logical drive, and maxCache device usage in your storage space with the Resources view on the Storage Dashboard.

To reveal disk drive usage by logical drive (and vice-versa), select a controller in the Enterprise View, then open the **Resources** tab on the Storage Dashboard. As shown in the figures below, you can click a logical drive to see its member disk drives or SSDs (including the maxCache Container); similarly, you can click a physical disk to see which (if any) logical drive it belongs to.





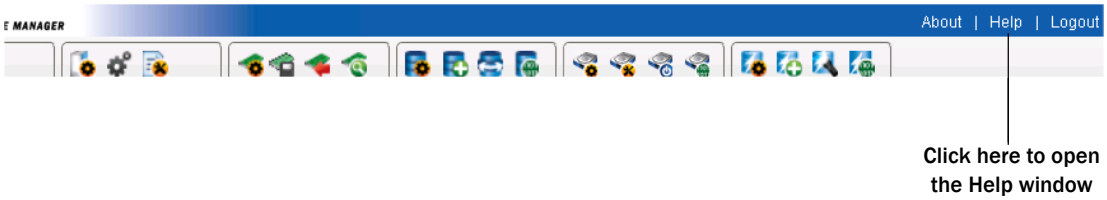
To reveal logical device usage for maxCache Plus virtual pools and virtual volumes, select the **maxCache Plus** node in the Enterprise view, then open the **Resources** tab on the Storage Dashboard. You can click a virtual pool to see its member logical drives, or a virtual volume to see its virtual pool members. (See *Optimizing the Structure of Your Storage Space* on page 69 for more about maxCache Plus.)



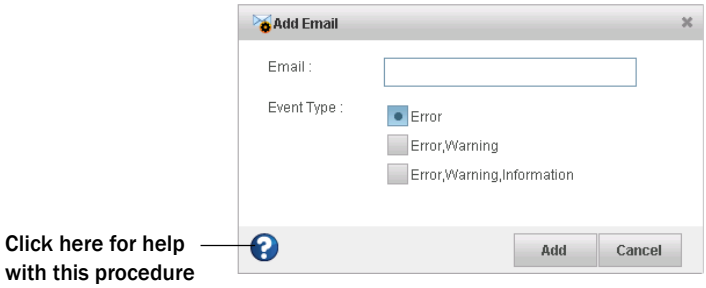
Getting Help

maxView Storage Manager provides online help that includes conceptual information, glossary definitions, and descriptions of on-screen items and dialog boxes, in addition to step-by-step instructions for completing tasks.

To open the online help, click the **Help** button at the upper-right corner of the main window:



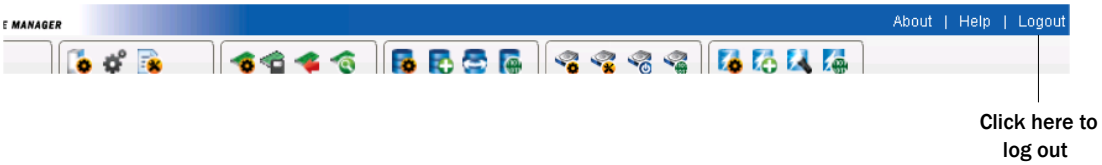
For help with a dialog box or wizard, click the question-mark icon, in the lower corner of the dialog box, for help with that specific procedure:



Logging Out of maxView Storage Manager

To log out of maxView Storage Manager:

1. In the Enterprise View, click on the local system.
2. Click the **Logout** button at the upper-right corner of the main window:



You are logged out of maxView Storage Manager and the main window is closed.

5 Building Your Storage Space

Follow the instructions in this section to choose a management system, log in to each system in your storage space, and create logical drives. (For more information, see *Understanding Logical Drives* on page 55.)

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

Overview

To build your storage space, complete these steps:

1. Choose at least one management system (see *Choosing a Management System* on page 38).
2. Start and log in to maxView Storage Manager on the management system (see *Starting maxView Storage Manager and Logging In* on page 30).
3. Start maxView Storage Manager or the Agent on all other systems (see *Starting maxView Storage Manager on Remote Systems* on page 39).
4. Log in to all other systems from the management system (see *Logging into Remote Systems from the Local System* on page 41).
5. Create logical drives for all systems in your storage space (see *Creating Logical Drives* on page 42).

As your storage requirements change, you can add systems, controllers, and disk drives, then modify the logical drives in your storage space by following the instructions in *Modifying Your Storage Space* on page 55.

Choosing a Management System

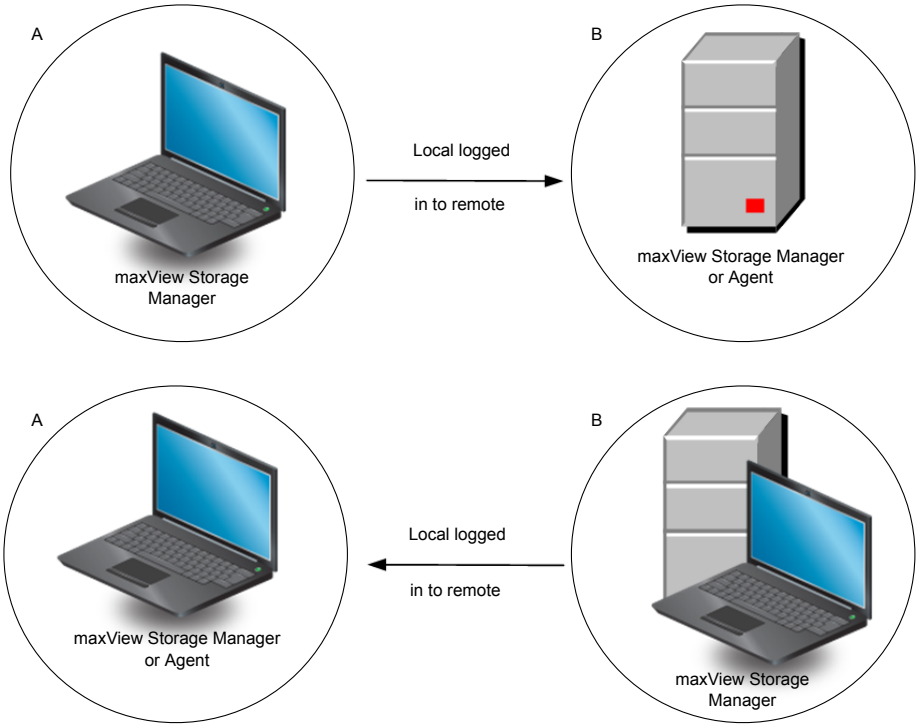
You must designate at least one system as a *management system*, a system from which you will manage the storage on all systems in your storage space.

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

‘Local’ or ‘Remote’?

Whenever you're working in maxView 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 guide, the ‘local system’ is the management system.



Logging in on the Local System

To log in on the local system, see *Starting maxView Storage Manager and Logging In* on page 30.

Starting maxView Storage Manager on Remote Systems

You can run the maxView Storage Manager application on the remote systems in your storage space (making those systems usable as 'management systems'). Alternatively, if your storage space includes systems that aren't connected to monitors or that you don't anticipate using as management systems (and therefore won't require the GUI, or graphical user interface), you can run the *Agent only* on those systems. (For more information, see *About the maxView Storage Manager Agent* on page 18.)

- To start the full maxView Storage Manager application on a remote system, follow the instructions in *Starting maxView Storage Manager and Logging In* on page 30.
- To start the Agent only on a remote system, follow the instructions in *Starting the Agent Only* on page 39.

Starting the Agent Only

To start the maxView Storage Manager Agent only on a remote system, follow the instructions for your operating system, as described in the sections below.

In an Agent Only configuration, you must ensure that the maxView Storage Manager CIM server and Web server are running on the remote system, and that you start the services in the proper order:

1. CIM server
2. Agent
3. Web server

In general, maxView Storage Manager services start automatically when the system is powered on. Use the procedures in this section to manually start and stop the services, as needed. For more information about the maxView Storage Manager Agent, CIM server, and Web server, see *About maxView Storage Manager* on page 17.

Windows

On Windows systems, the Agent and other maxView Storage Manager services start 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 maxView Storage Manager Agent is installed and running. Then verify that the maxView CIM server and maxView Web server are running. If not, you can choose to restart the services. Be sure to observe the proper startup order: CIM server, Agent, Web server.

Linux or VMware

On Linux systems and VMware Guest OSs, the Agent and other maxView Storage Manager services start automatically when the system is started. To manually start (or stop) the Agent on Linux, enter these commands:

1. Start the CIM server:

Options	Description
Start service	service stor_cimserver start
Stop service	service stor_cimserver stop
Check status	service stor_cimserver status

To start operations from the VMware console, use these commands:

Options	Description
Start service	Sfcbd-watchdog start
Stop service	Sfcbd-watchdog stop

2. Start the Agent:

Options	Description
Start service	service stor_agent start
Stop service	service stor_agent stop

3. Start the Web server:

Options	Description
Start service	service stor_tomcat start
Stop service	service stor_tomcat stop

Solaris

To start (or stop) the Agent on Solaris, enter these commands:

1. Start the CIM server:

Options	Description
Start service	svcadm enable stor_cimserver
Stop service	svcadm disable stor_cimserver
Check status	svcs -l stor_cimserver

2. Start the Agent:

Options	Description
Start service	svcadm enable ADPTstor_agent
Stop service	svcadm disable ADPTstor_agent

3. Start the Web server:

Options	Description
Start service	svcadm enable stor_tomcat
Stop service	svcadm disable stor_tomcat

Logging into Remote Systems from the Local System

Once maxView Storage Manager or the maxView Storage Manager Agent (see *About the maxView Storage Manager Agent* on page 18) is running on all systems in your storage space, you can log into the remote systems from the local system.

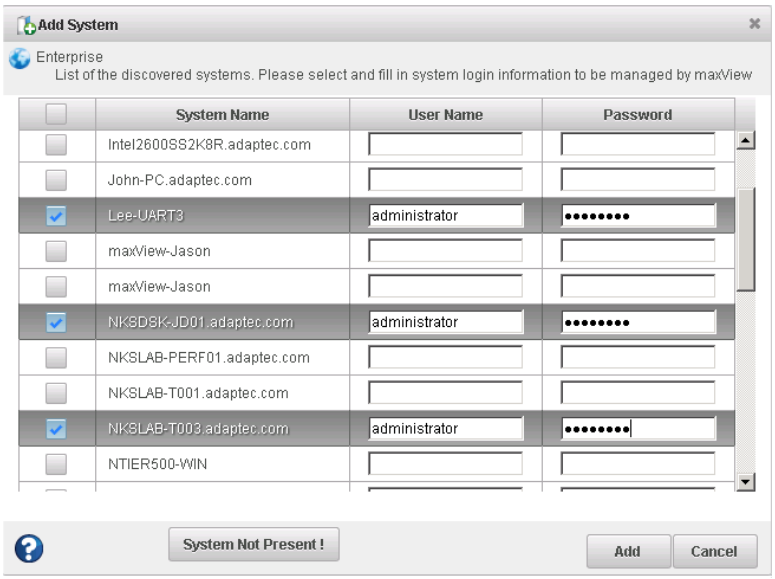
Once you have logged in to a remote system, it automatically appears in the Enterprise View each time you start maxView Storage Manager on the local system. You can work with a remote system's controllers, disk drives, and logical drives as if they were part of your local system.

To log in to a remote system:

1. On the ribbon, in the Home group, click **Add System**.

The Add System window opens, showing a list of "discovered" systems; that is, systems on your network that are running the maxView Storage Manager Agent.

2. Select the systems you want to add to the Enterprise View, then enter the systems' login credentials (username/password) in the space provided.



Note: You can add a system manually if you don't see the system in the list. For more information, see *Manually Adding a Remote System* on page 122.

3. Click **Add**.
   maxView Storage Manager connects to the remote system(s) and adds them to the list of managed systems in the Enterprise View.

For more information about working with remote systems, see *Managing Remote Systems* on page 122.

Creating Logical Drives

maxView Storage Manager has a wizard to help you create, or *configure*, the logical drives in your storage space. You can choose from two configuration methods, depending on your needs:

- Express configuration—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 *Express Configuration* on page 42.
- Custom configuration—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 and SSDs (Solid State Drives). For instructions, see *Custom Configuration* on page 44

  Note: We recommend that you do *not* combine SAS and SATA disk drives within the same logical drive. maxView Storage Manager displays a warning if you try to create a logical drive using a combination of SAS and SATA disk drives.

Express Configuration

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

- A logical drive with three or more physical drives is assigned RAID 5.
- A logical drive with two physical drives is assigned RAID 1.
- A logical drive with only a single physical drive becomes a simple volume, which does not offer redundancy.

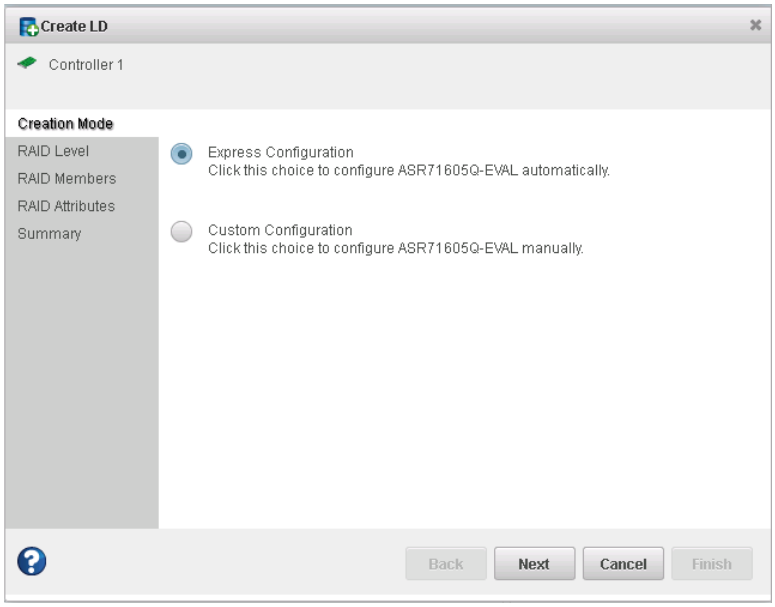
To create a logical drive with any other RAID level, you must use the custom method, as described on *Custom Configuration* on page 44. See *Selecting the Best RAID Level* on page 134 for more information about RAID levels.

With Express configuration, maxView Storage Manager uses all available disk drive space to maximize the capacity of the logical drives.

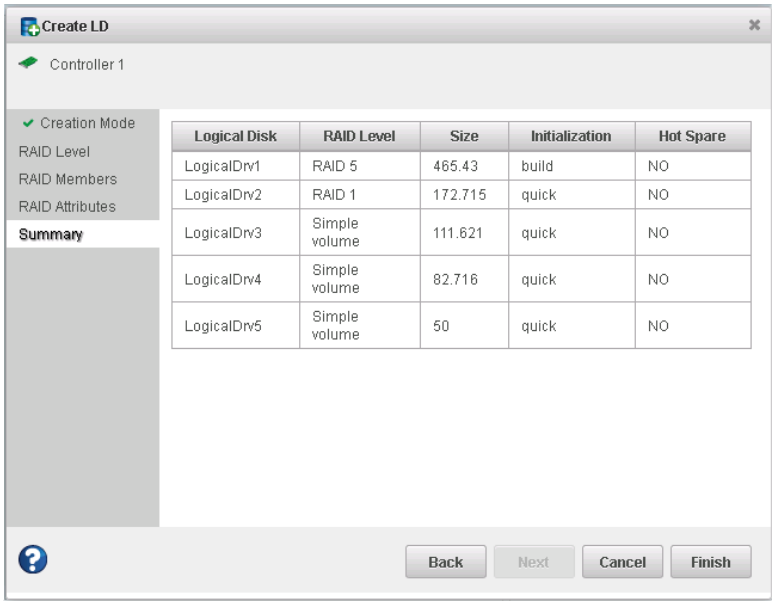
To build your storage space with the Express method:

1. In the Enterprise View, select a system, then select a controller on that system.
2. On the ribbon, in the Logical Device group, click **Create Logical Drive**.

3. When the wizard opens, ensure that **Express Configuration** is selected, then click **Next**.



4. Review the logical drive configuration summary.



Logical Disk	RAID Level	Size	Initialization	Hot Spare
LogicalDrv1	RAID 5	465.43	build	NO
LogicalDrv2	RAID 1	172.715	quick	NO
LogicalDrv3	Simple volume	111.621	quick	NO
LogicalDrv4	Simple volume	82.716	quick	NO
LogicalDrv5	Simple volume	50	quick	NO

5. Click **Finish**.
   maxView Storage Manager builds the logical drive(s). Use the Event Log and Task Log to track build progress.
6. Repeat Steps *2* on page 42-*5* on page 43 for each controller in your storage space.
7. Partition and format your logical drives. See *Partitioning and Formatting Your Logical Drives* on page 47.

Custom Configuration

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.

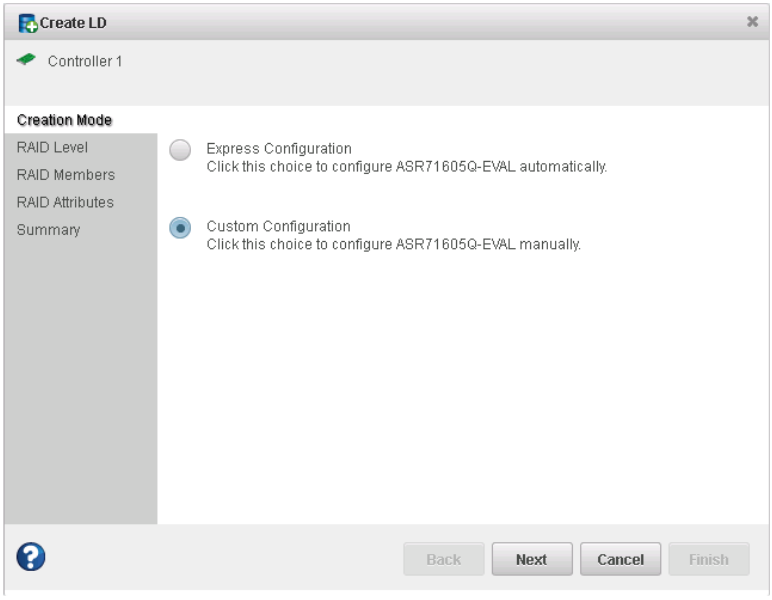
To build your storage space with the Custom configuration method:

1. In the Enterprise View, select a system, then select a controller on that system.

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

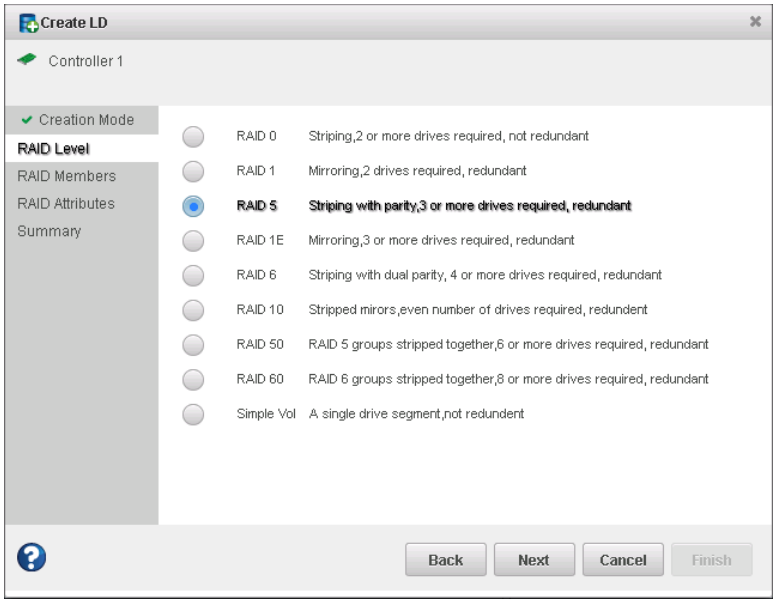
2. On the ribbon, in the Logical Device group, click **Create Logical Drive**.

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



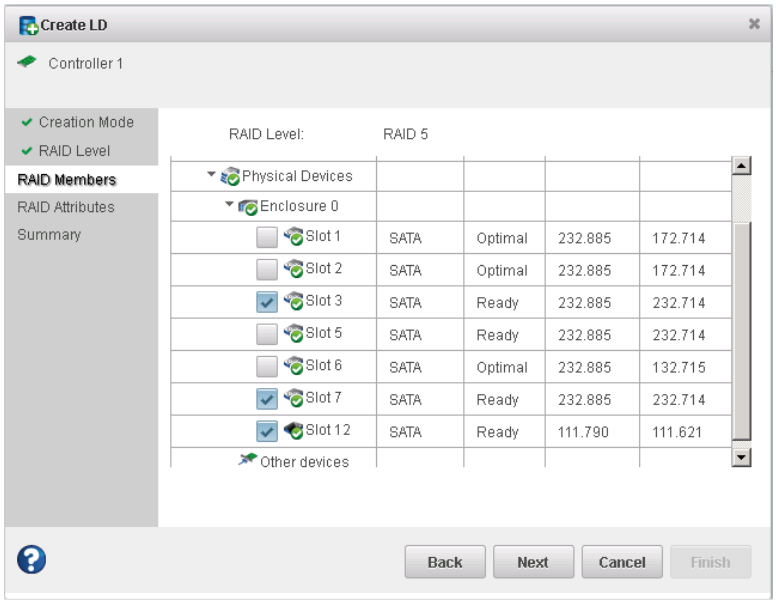
4. Select a RAID level, then click **Next**.

   Note: Not all RAID levels are supported by all controllers. For example, RAID 5EE and JBODs are supported on Adaptec Series 6 controllers only.



See *Selecting the Best RAID Level* on page 134 for more information about RAID levels.

5. Select the disk drives and SSDs (Solid State Drives) that you want to include in the logical drive. Be sure to select the right number of drives for the RAID level you selected.

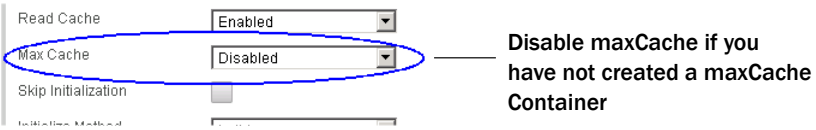


Note: maxView Storage Manager allows you to create *hybrid RAID* drives that maximize performance in logical drives that include SSDs. For more information about hybrid RAID, see *Creating a Hybrid RAID Logical Drive* on page 57.

6. Click **Next**.
7. (*Optional*) In the RAID Attributes panel, customize the logical drive settings. You can:
   - Enter a name for the logical drive. Names can include any combination of letters and numbers, but cannot include spaces.
   - Set a smaller logical drive size (by default, a new logical drive uses all available disk space).

- Change the stripe size—the amount of data written per disk in the logical drive. (The default stripe size usually provides the best performance.)
- Set the build method to Build, Clear, or Quick. The build method determines how a logical drive is initialized (prepared for reading and writing), and how long initialization will take.
- Set the build priority to: High, Medium, or Low.

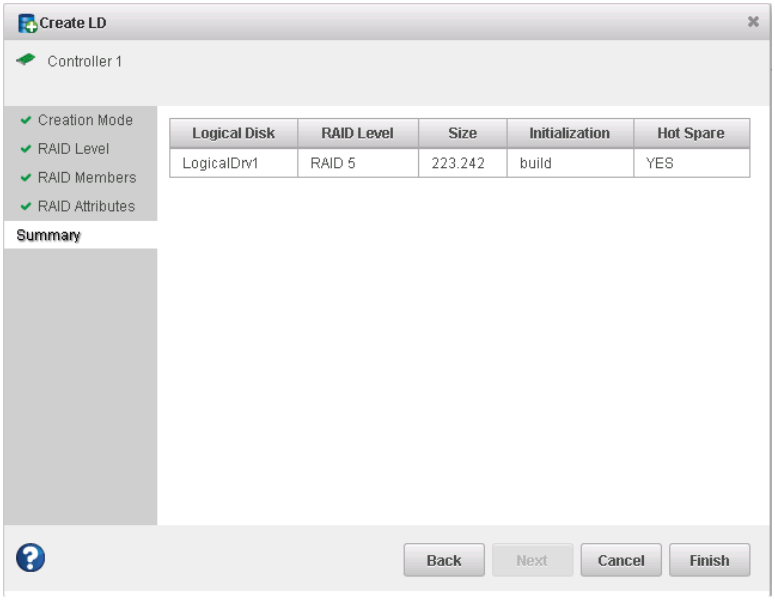
  Note: By default, maxCache read and write caching is enabled for a logical drive. Be sure to *disable* maxCache if you have not created a maxCache Container. (You can enable maxCache later, after you create the container.) For more information, see *Addding maxCache to Local Storage* on page 79.



See *Fine-tuning Logical Drives* on page 58 for details about customizing the settings in the RAID Attributes panel.

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

This example shows a RAID 5 logical drive ready to be created.



To make changes, click **Back**.

9. Click **Finish**.
maxView Storage Manager builds the logical drive. Use the Event Log and Task Log to track build progress.

10. If you have other disk drives or available disk space and want to create additional logical drives, repeat Steps *2* on page 44 to *9* on page 46 for each logical drive that you want to create on the controller.

11. Repeat Steps *1* on page 44 to *10* on page 46 for each controller in your storage space, as needed.

12. Partition and format your logical drives. See *Partitioning and Formatting Your Logical Drives* on page 47 for more information.

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.

Creating Logical Drives on Other Systems in Your Storage Space

If you installed maxView Storage Manager and Adaptec RAID controllers on more than one system, continue building your storage space as follows:

- From each individual system, log in to maxView Storage Manager and repeat the steps to perform an Express Configuration or Custom Configuration, *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 *Logging into Remote Systems from the Local System* on page 41), then repeat the steps to perform an Express Configuration or Custom Configuration, *or*
- From your local system, create a *server template file* and deploy the configuration to the remote systems in your storage space (see *Deploying Servers* on page 120).

6 Protecting Your Data

In addition to the standard (RAID 0, RAID 1, RAID 5, RAID 10, RAID 50) and enhanced (RAID 1E, 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 section describes how to use hot spares, failover, and copyback to protect your data.

Creating and Managing Hot Spares

A *hot spare* is a disk drive or SSD (Solid State Drive) that automatically replaces any failed drive in a logical drive, and can subsequently be used to rebuild that logical drive. (For more information, see *Recovering from a Disk Drive Failure* on page 128.)

Hot Spare Limitations

- You cannot protect a RAID 0 logical drive or simple volume with a hot spare; hot spares protect only redundant logical drives.
- You cannot 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.
- We recommend that you do *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.

Global Spare or Dedicated Spare?

A *global* hot spare is not assigned to a specific logical drive; it will protect any redundant logical drive on the controller. (RAID 0 logical drives and simple volumes are non-redundant and are not protected by hot spares.) You can designate a global hot spare before or after you build logical drives on a controller. To designate a global hot spare, see *Designating a Global Hot Spare* on page 48.

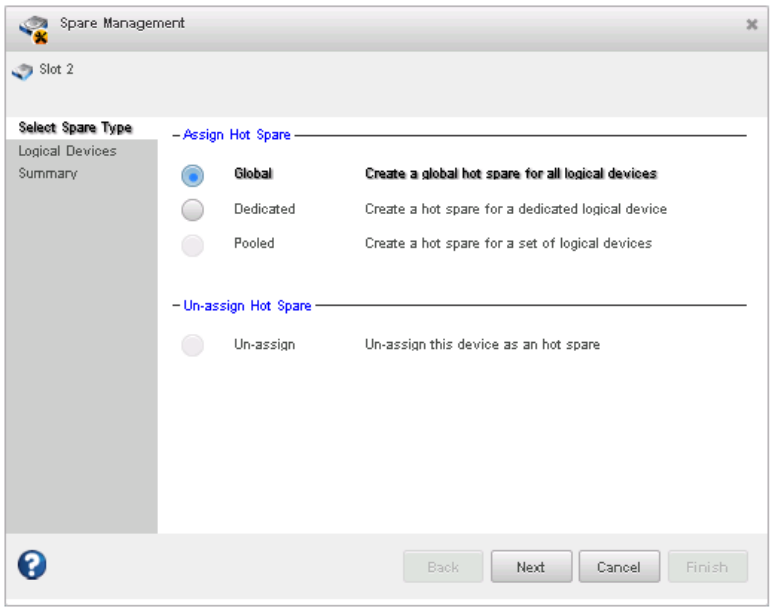
A *dedicated* hot spare is assigned to one or more specific logical drives and will only protect those logical drives. A dedicated hot spare that is assigned to protect more than one logical drive is called a *pool* spare. You must create the logical drive before you can assign a dedicated hot spare to protect it. To assign a dedicated hot spare or pool hot spare, see *Assigning a Dedicated Hot Spare or Pool Hot Spare* on page 49.

Designating a Global Hot Spare

To designate a global hot spare before or after you build a logical drive:

1. In the Enterprise View, select a controller then, in the Physical Devices tree, select the disk drive or SSD that you want to designate as a hot spare. (See *Hot Spare Limitations* on page 48 for help selecting a disk drive.)
2. On the ribbon, in the Physical Device group, click **Spare Management**.

   The Spare Management wizard opens.
3. Select **Global**, then click **Next**.



4. Review the summary of protected logical drives, then click **Finish**.

   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 specific logical drive. A dedicated hot spare assigned to protect more than one logical drive is called a *pool* hot spare.

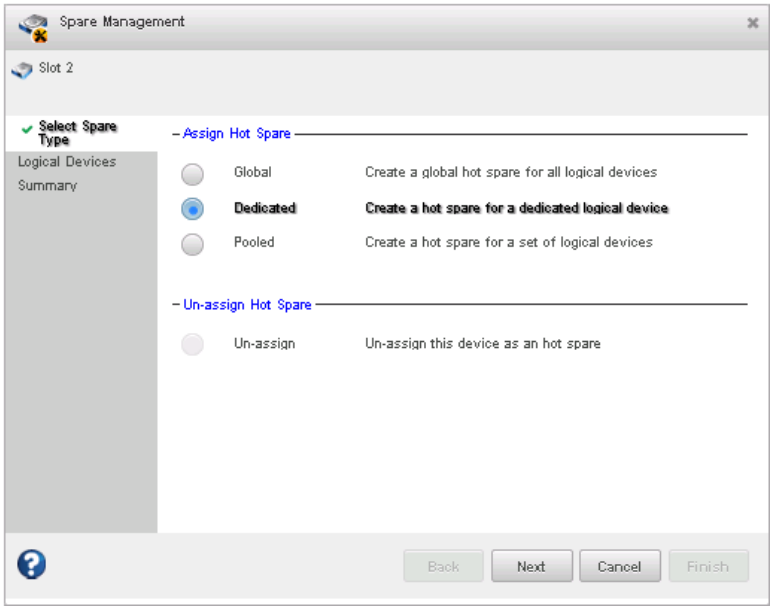
> **Note:** You must create the logical drive before you can assign a dedicated hot spare to protect it.

To assign a dedicated spare or pool hot spare:

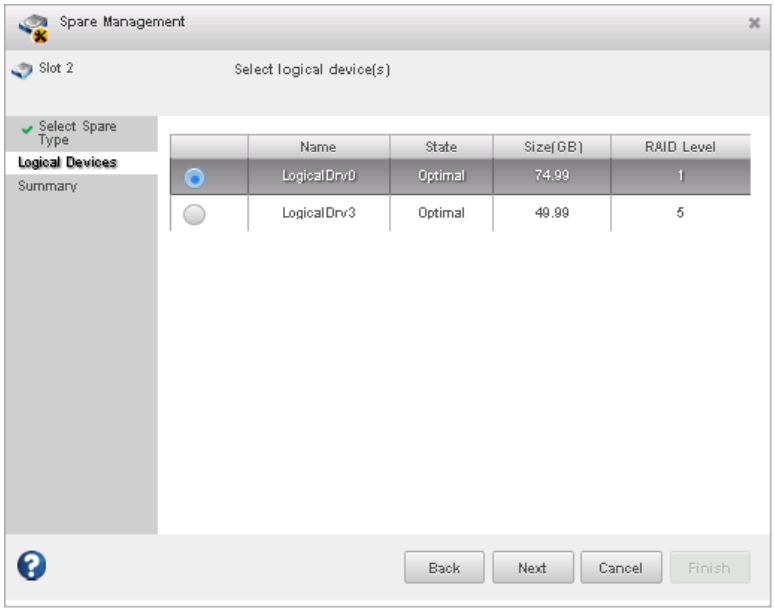
1. In the Enterprise View, select a controller then, in the Physical Devices tree, select the disk drive or SSD you want to designate as a hot spare. (See *Hot Spare Limitations* on page 48 for help selecting a disk drive.)
2. On the ribbon, in the Physical Device group, click **Spare Management**.

   The Spare Management wizard opens.

3. Select **Dedicated** or **Pooled**, as needed, then click **Next**.



4. Select the logical drive(s) that you want protected by the dedicated spare, then click **Next**.



5. Review the summary of protected logical drives, then click **Finish**.

Deleting a Global Hot Spare

You may want to delete a global hot spare 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 128.

To delete a global hot spare:

1. In the Enterprise View, select a controller then, in the Physical Devices tree, select a hot spare drive.
2. On the ribbon, in the Physical Device group, click **Spare Management**.

The Spare Management wizard opens.

3. Click **Un-assign**, then click **Next**.
4. Review the summary of affected logical drives, then click **Finish**.
The hot spare is deleted and the drive becomes available for other uses in your storage space.

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.

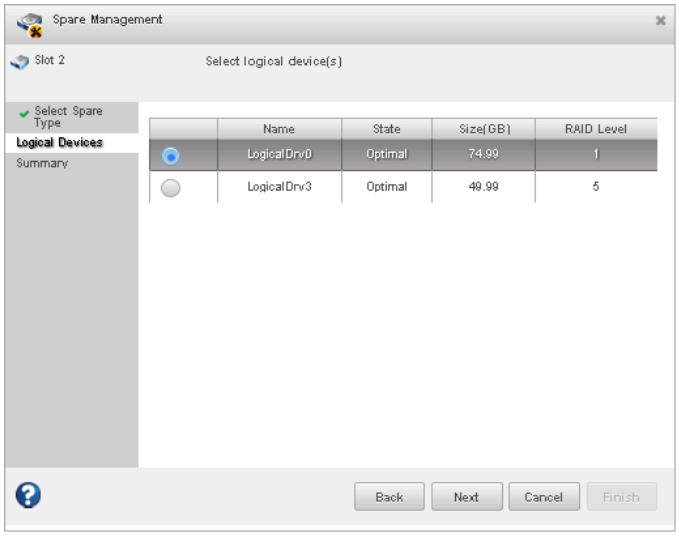
> **Note:** When a hot spare is built into a logical drive after a disk drive failure, it retains its 'hot spare' designation even though it can no longer protect the logical drives it's assigned to. See *Recovering from a Disk Drive Failure* on page 128 for more information.

To remove or delete a dedicated hot spare:

1. In the Enterprise View, select a controller then, in the Physical Devices tree, select a dedicated hot spare.
2. On the ribbon, in the Physical Device group, click **Spare Management**.

The Spare Management wizard opens.

3. Click **Un-assign**, then click **Next**.
4. Select the logical drive(s) from which to remove the dedicated spare, then click **Next.**



5. Review the summary of affected logical drive(s), then click **Finish**.
   If the spare protects only one logical drive, it is deleted and the drive becomes available for other uses in your storage space. If the spare protects more than one logical drive (a *pool* spare), it is removed from the selected logical drive(s) but continues to protect the other logical drives to which it is assigned.

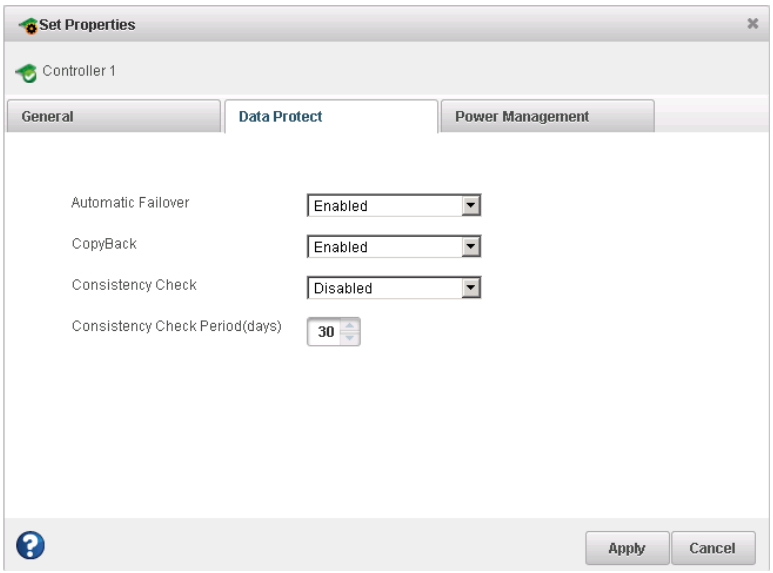
Enabling Copyback

When a logical drive is rebuilt using a hot spare (see *Failed Disk Drive Protected by a Hot Spare* on page 128), 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:

1. In the Enterprise View, select a controller.
2. On the ribbon, in the Controller group, click **Set Properties**.

   The Set Properties window opens.
3. Click the **Data Protect** tab.
4. In the Copyback drop-down list, select Enabled or Disabled , then click **Apply**.



Enabling Automatic Failover

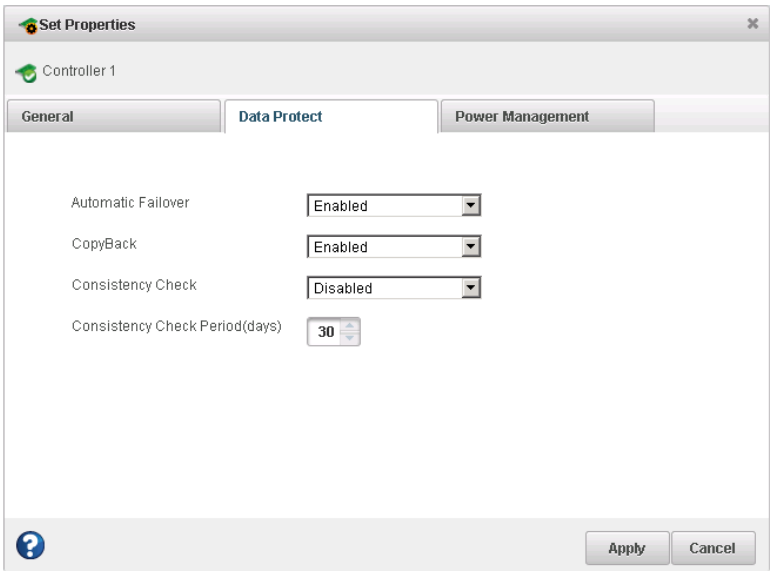
This function controls the rebuilding of a logical drive when a failed drive is replaced. When *failover* is enabled, the controller automatically rebuilds a logical drive when a failed disk drive is replaced. When failover is disabled, the logical drive must be rebuilt manually (for more information, see *Rebuilding Logical Drives* on page 130). Failover applies to redundant logical drives only (see *Selecting the Best RAID Level* on page 134).

To enable or disable failover:

1. In the Enterprise View, select a controller.
2. On the ribbon, in the Controller group, click **Set Properties**.

The Set Properties window opens.

3. Click the **Data Protect** tab.
4. In the Failover drop-down list, select Enabled or Disabled , then click **Apply**.


Set Properties
Controller 1
General
Data Protect
Power Management
Automatic Failover
Enabled
CopyBack
Enabled
Consistency Check
Disabled
Consistency Check Period(days)
30
Apply
Cancel

7 Modifying Your Storage Space

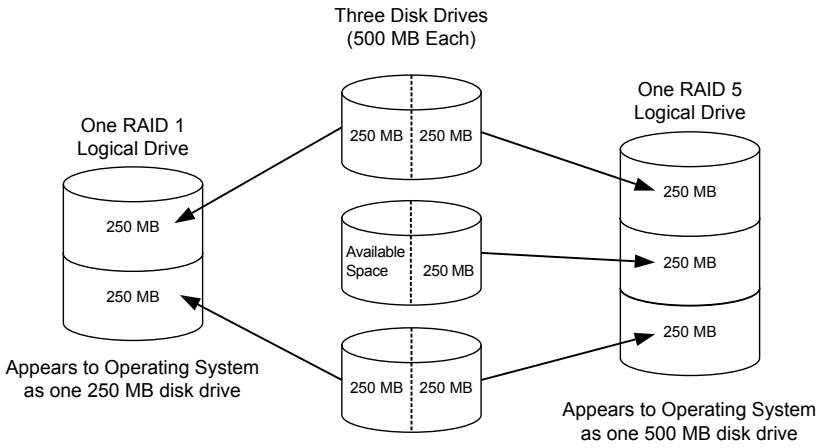
This section provides additional scenarios for creating and modifying logical drives. It explains how to create *hybrid RAID* drives; optimize logical drive performance; and use maxView Storage Manager's power management features to create an energy-efficient storage space.

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 or SSDs, and can use part or all of each disk drive's capacity.

You can 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. 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 its RAID level. (See *Selecting the Best RAID Level* on page 134 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 *Creating and Managing Hot Spares* on page 48 for more information.)

Creating and Modifying Logical Drives

For basic instructions for creating logical drives, see *Building Your Storage Space* on page 38.

This section describes three additional scenarios for creating logical drives:

- To create a logical drive from different-sized disk drives, see *Including Different-sized Disk Drives in a Logical Drive* on page 56.
- To create a logical drive using available *segments* of disk drives, see *Creating a Logical Drive Using Available Segments* on page 57.

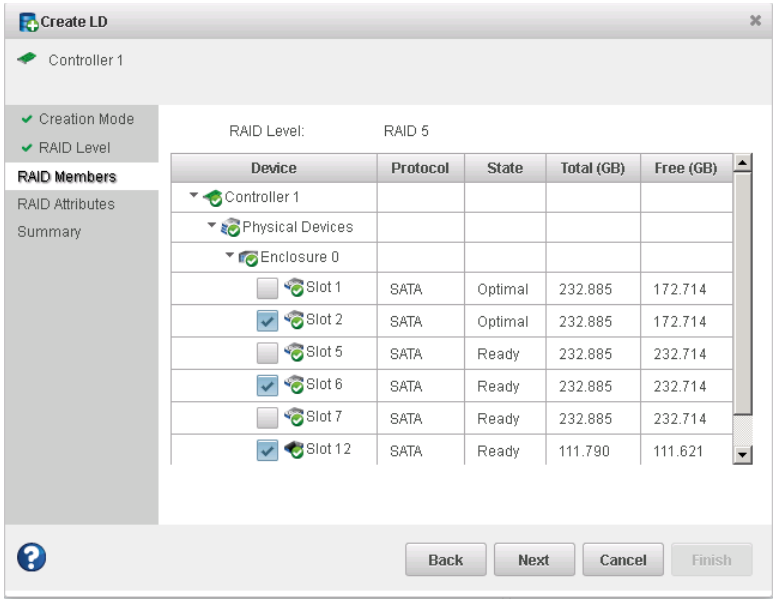
- To create a *hybrid RAID* logical drive using a combination of hard disk drives and SSDs, see *Creating a Hybrid RAID Logical Drive* on page 57.

Including Different-sized Disk Drives in a Logical Drive

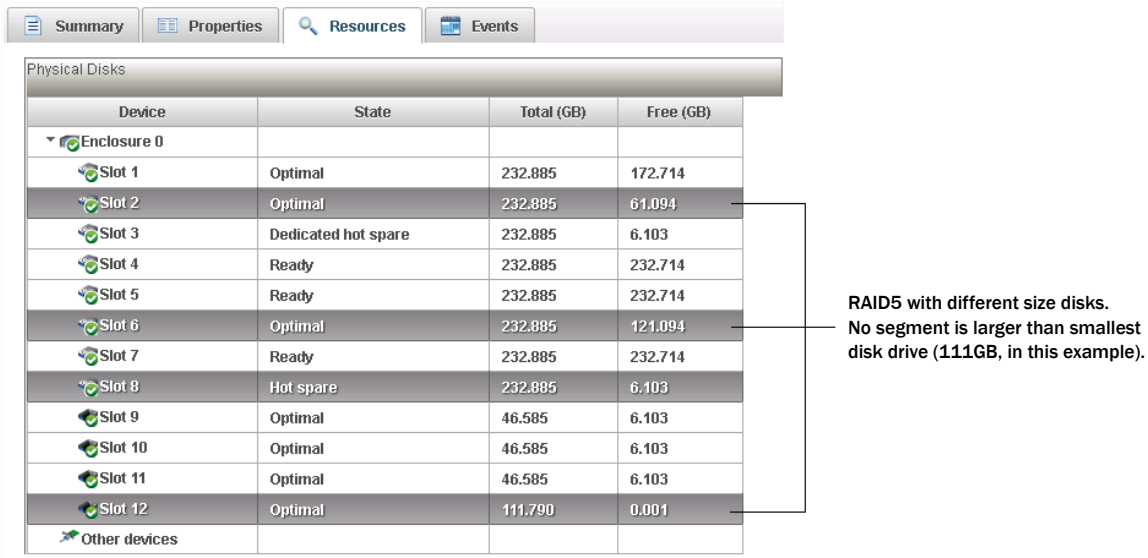
You can combine disk drives of different sizes in the same logical drive. If the logical drive includes redundancy, however, the size of each segment can be no larger than the size of the smallest disk drive. (See *Selecting the Best RAID Level* on page 134 for more information about redundancy.)

> **Note:** We recommend that you do *not* combine SAS and SATA disk drives within the same logical drive. maxView Storage Manager displays 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 *Custom Configuration* on page 44. When the wizard displays the RAID Members panel, select different size drives, as shown in the figure below, then complete the wizard.



When the logical drive is created, check its resources on the Storage Dashboard: it should appear similar to the next figure, where a RAID 5 logical drive includes two disk drives of one size and one of another.



You can include a disk drive's available space in a new logical drive (see *Creating a Logical Drive Using Available Segments* on page 57), or add it to an existing logical drive (see *Increasing the Capacity of a Logical Drive* on page 63).

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 be used in only one logical drive at a time.)

To create a logical drive using free segments on disk drives, follow the instructions in *Custom Configuration* on page 44. When the wizard displays the RAID Members panel, select the disk drives and/or free disk drive segments you want to use in the logical drive, then complete the wizard.

Creating a Hybrid RAID Logical Drive

You can combine hard drives and Solid State Drives (SSDs) in a RAID 1 or RAID 10 logical drive to create a *hybrid RAID* drive. Hybrid RAID leverages the performance benefits of the SSDs in your system by sending read operations to the SSD first; typically, the fastest I/O path.

For a hybrid RAID 1, you must select exactly one HDD and one SSD. For a hybrid RAID 10 you must select an equal number of SSDs and HDDs.

You can use any SSD (or available segment) when creating or modifying a hybrid RAID drive.

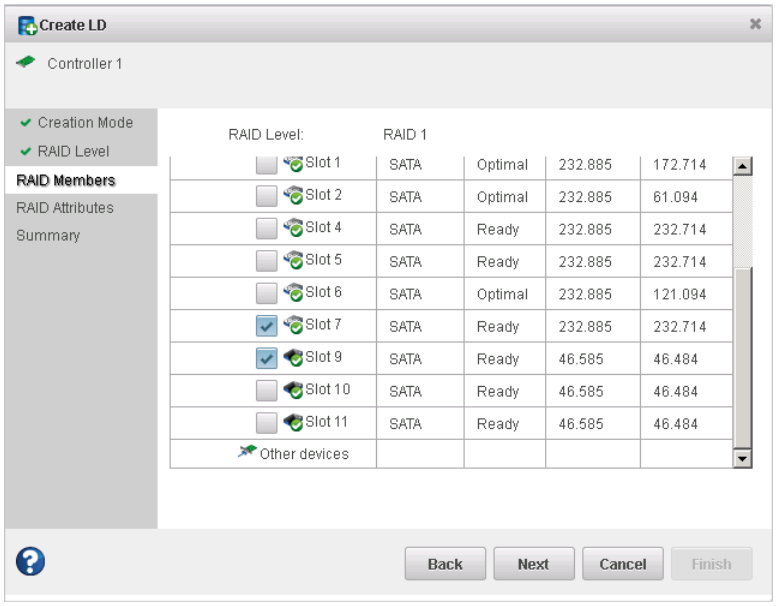
To create a hybrid RAID drive:

1. In the Enterprise View, select a system, then select a controller on that system.

   Note the number and location of SSDs in your system; for instance, SSD 1 in Slot 1 on Enclosure 1, SSD 2 in Slot 3 on Enclosure 1, and so on. This information will be helpful as you create the hybrid RAID drive in the wizard.

2. On the ribbon, in the Logical Device group, click **Create Logical Drive**.

3. When the wizard opens, select **Custom Configuration**, then click **Next**.
4. In the RAID Level panel, select RAID 1 or RAID 10, then click **Next**.
5. Select the hard drives and SSDs that you want to use in the hybrid RAID drive.



For a RAID 10, be sure to select an even number of SSDs and HDDs!

6. Click **Next**, then customize the RAID Attributes, as needed. See *Fine-tuning Logical Drives* on page 58 for more information.
7. Click **Next**, review the logical drive settings, then click **Finish**.

   maxView Storage Manager begins to build the hybrid RAID drive. Use the Event Log and Task Log to track build progress.

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 property settings described in this section.

Renaming a Logical Drive

To change the name of a logical drive:

1. In the Enterprise View, select a controller, then select the logical drive you want to rename.
2. On the ribbon, in the Logical Device group, click **Set Properties**.

The Set Properties window opens.

3. In the Logical Device Name field, type the new name, then click **OK**.
   maxView Storage Manager updates the logical drive name and displays the new name in the Enterprise View.

Changing the Read Cache Setting

When *read caching* is enabled, the controller monitors 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, thereby improving performance. You can set the Read Cache to:

- 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.

  Note: For additional performance gains in read-intensive applications, you can also use maxCache read caching. For more information, see *Changing maxCache Settings for a Logical Drive* on page 80.

To quickly change the read cache setting:

1. In the Enterprise View, select a controller, then select a logical drive on that controller.
2. On the ribbon, in the Logical Device group, click **Set Properties**.

   The Set Properties window opens.

3. In the Read Cache drop-down list, select Enabled or Disabled, as needed.
4. Click **OK**.

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. You can set the Write Cache to:

- 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 or zero-maintenance cache protection module. *Enabled* is the default setting.
- Enabled (write-back) when protected by battery/ZMM—Similar to Enabled (write-back), but used when the controller is protected by a zero-maintenance cache protection module. For more information about zero-maintenance cache protection, see the *Adaptec RAID Controller Installation and User's Guide*.

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

To quickly change the write cache setting:

1. In the Enterprise View, select a controller, then select a logical drive on that controller.
2. On the ribbon, in the Logical Device group, click **Set Properties**.

The Set Properties window opens.

3. In the Write Cache drop-down list, select Enabled, Enabled when protected by battery/ZMM, or Disabled, as needed.
4. Click **OK**.

Changing the Stripe Size

The *stripe size* is the amount of data (in KB) written to one disk drive, before moving to the next disk drive in the logical device. Stripe size options vary, depending on your controller and RAID level. For example, in a RAID 6 or RAID 60 logical drive, the more disk drives included in the logical drive, the fewer stripe size options are available. Normally, the default stripe size provides the best performance.

You can change the stripe size of an existing logical drive when you expand or migrate the logical drive. For more information, see *Increasing the Capacity of a Logical Drive* on page 63 and *Changing the RAID Level of a Logical Drive* on page 64.

Changing the Initialize Method

The initialize, or *build*, method determines how a logical drive is prepared for reading and writing and how long initialization will take.

You can choose one of the initialization methods below when you create a new logical drive with the Custom Configuration wizard. (The methods are presented in order of slowest to fastest.) You can change the initialization method of an existing logical drive only when you expand the logical drive (see *Increasing the Capacity of a Logical Drive* on page 63).

- **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. maxView Storage Manager performs Build initializations in the background; you can use the logical drive immediately. Build is the default setting for most logical drives
- **Clear**—Every block in the logical drive is overwritten with zeros, removing all existing data. You cannot 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. It is recommended for use only with new drives.
- **Skip Initialization**—Reconstructs the logical drive meta-data without modifying or destroying other data on the disks. Useful for recovering data when multiple drives fail in the same logical drive. For more information, see *Multiple Disk Drive Failures in the Same Logical Drive* on page 129.

Optimizing Logical Drive Performance

To ensure optimal performance of the logical drives in your storage space, you can select an application-specific *performance mode* to improve I/O throughput based on the needs of your application. The following performance modes are supported by maxView 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 or 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

Performance Mode	Performance Criteria	Best Performance
		R5 Sequential writes (256Kb request size) R5 Random writes R6 Sequential writes (all request sizes) R10 Sequential writes (all request sizes) R10 Workstation
Big Block Bypass	Bypasses DRAM write cache based on I/O write size Adjusts stripe size flush for simple volumes to 128K minimum	Optimizes performance for Web servers, file servers, and databases

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

1. In the Enterprise View, select a controller, then select a logical drive on that controller.
2. On the ribbon, in the Logical Device group, click **Set Properties**.

   The Set Properties window opens.
3. In the Performance Mode drop-down list, select the application type: Dynamic, OLTP, or Big Block Bypass.
4. Click **OK**.
5. Shutdown maxView Storage Manager and reboot the system.

   Note: You *must* reboot the system for the performance mode setting to take 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, maxView 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 maxView Storage Manager, logical drive verification can occur in different ways, depending on your controller:

- Automatic verification—If your controller supports Build initialization, maxView Storage Manager automatically verifies all new redundant logical drives. No manual verification is required.
  To see if your controller supports Build initialization, select the controller in the Enterprise View then, on the Storage Dashboard, 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 62.
- Background verification—If your controller supports background consistency check, maxView Storage Manager continually and automatically checks your logical drives once they're in use.

To see if your controller supports background consistency check, select the controller in the Enterprise View then, on the Storage Dashboard, click **Properties**. To enable or disable background consistency check or to set the checking period, see *Enabling/Disabling Background Consistency Check* on page 62.

If your controller doesn't support background consistency check, we highly recommend that you verify your logical drives weekly, following the instructions in *Verifying and Fixing a Logical Drive* on page 62.

Verifying and Fixing a Logical Drive

While maxView 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.

> **Note:** You can also choose to verify the logical drive without fixing inconsistent or bad data.

To verify and fix a logical drive:

1. Ensure that no activity is taking place on the controller for the logical drive.
2. In the Enterprise View, select the logical drive.
3. On the ribbon, in the Logical Device group, click **Verify**.

The Verify Logical Device window opens.

4. To verify the logical drive without fixing bad data, click **Verify** (default). To repair inconsistent or bad data during verification, click **Verify with fix**.

5. To verify the logical drive now (immediately), click **Verify**.

   To verify the logical drive later, click **Schedule**, then set the time and date to perform the verification. You can also set up the verification as a recurring task. (For more information, see *Working with Scheduled Tasks* on page 85.)

   > **Caution:** Do not power off the system while the verification is in progress. If you do, the verification will stop.

   When the verification is complete, an event notice is generated in the local system's event log, at which time you can continue working with the controller.

Enabling/Disabling Background Consistency Check

If your controller supports background consistency check, maxView Storage Manager continually and automatically checks your logical drives for bad or inconsistent data once they're in use. (To see if your controller supports background consistency check, select the controller in the Enterprise View then, on the Storage Dashboard, click **Properties**.)

To enable or disable background consistency check:

1. In the Enterprise View, select a controller.
2. On the ribbon, in the Controller group, click **Set Properties**.

The Set Properties window opens.

3. Click the **Data Protect** tab.
4. In Consistency Check drop-down list, select Enabled or Disabled.
5. Enter the Consistency Check Period period, in days.
6. Click **Apply**.

Increasing the Capacity of a Logical Drive

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

> **Note:** Some operating systems have size limitations for logical drives. Refer to your operating system documentation to see if size limits apply.

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

To increase the capacity of a logical drive:

1. In the Enterprise View, select a controller, then select the logical drive you want to expand.
2. On the ribbon, in the Logical Device group, click **Expand/Migrate**.

A wizard opens to help you modify the logical drive.

3. Click **Next**.
4. Select the disk drive(s), drive segments, or SSDs you want to add to the logical drive.

   If you want to remove a specific disk drive or segment and replace it with another one (for instance, to replace a smaller disk drive with a larger one), deselect the disk drive you want to remove, then select another disk drive of greater or equal capacity to replace it.

   > **Note:** We recommend that you do *not* combine SAS and SATA disk drives within the same logical drive. maxView Storage Manager displays a warning message if you try to create a logical drive using a combination of SAS and SATA disk drives.

5. Click **Next**.
6. Enter the size of the logical drive in the space provided (in gigabytes). It must be greater than or equal to the current size.
7. Select a new stripe size from the drop-down list, if required.

   > **Note:** The default stripe size usually provides the best performance.

8. Click **Next**.
9. Review the logical drive settings. To make changes, click **Back**.
10. Click **Finish**.

The logical drive is expanded and its capacity increased to the new size.

Changing the RAID Level of a Logical Drive

If your storage needs or application requirements change, you can change, or *migrate*, the RAID level of your logical drives to another, more suitable, RAID level. You may want to change the RAID level to add redundancy, further protect your data, or to improve data availability for speedier access. See *Selecting the Best RAID Level* on page 134 for more information.

Changing the RAID level normally requires one or more disk drives to be added to or removed from the logical drive. maxView Storage Manager will not let you change the RAID level unless the right number of drives are available.

The following RAID level migrations are supported:

- RAID 0 to RAID 5
- RAID 0 to RAID 10
- RAID 5 to RAID 6
- RAID 6 to RAID 5
- RAID 10 to RAID 5
- RAID 5 to RAID 10
- RAID 1 to RAID 5
- SIMPLE VOLUME to RAID 1
- RAID 1 to SIMPLE VOLUME

To change the RAID level of a logical drive:

1. In the Enterprise View, select a controller, then select the logical drive that you want to migrate.
2. On the ribbon, in the Logical Device group, click **Expand/Migrate**.

A wizard opens to help you modify the logical drive.

3. Select a new RAID level, then click **Next**. Only valid RAID level options are offered.
4. In the RAID Members panel, select the disk drive(s), drive segments, or SSDs that you want to add to the logical drive.

   If you want to remove a specific disk drive or segment and replace it with another one (for instance, to replace a smaller disk drive with a larger one), deselect the disk drive you want to remove, then select another disk drive of greater or equal size to replace it.

   > **Note:** We recommend that you do *not* combine SAS and SATA disk drives within the same logical drive. maxView Storage Manager displays a warning message if you try to create a logical drive using a combination of SAS and SATA disk drives.

5. Enter the size of the logical drive in the space provided (in gigabytes). It must be greater than or equal to the current size.

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

6. Select a new stripe size from the drop-down list, if required.

   > **Note:** The default stripe size usually provides the best performance.

7. Click **Next**.

8. Review the logical drive settings. To make changes, click **Back**.
9. Click **Finish**.
   The logical drive is reconfigured with the selected disks and migrates to the new RAID level.

Erasing a Logical Drive

You can use maxView Storage Manager to erase the data on any logical drives that are in the Optimal state. The logical drive remains in the Enterprise View and ready to store new data.

Caution: When you erase a logical drive, you lose all data on that drive.

To erase a logical drive:

1. In the Enterprise View, select a controller, then select the logical drive you want to erase.
2. On the ribbon, in the Logical Device group, click **Erase**.

   The Erase Logical Device window opens.
3. Click **Erase** to erase the logical drive; click **Cancel** to cancel the action.

Deleting a Logical Drive

When you delete a logical drive, it is removed from the Enterprise View and the disk drives or segments in the logical drive become available to use in a new logical drive (see *Creating a Logical Drive Using Available Segments* on page 57), or to expand an existing logical drive (see *Increasing the Capacity of a Logical Drive* on page 63).

Caution: When you delete a logical drive, you lose all data stored on that logical drive. Be sure that you no longer need the data on the logical drive before you delete it.

To delete a logical drive:

1. In the Enterprise View, select a controller, then select the logical drive you want to delete.
2. On the ribbon, in the Logical Device group, click **Delete**.

3. When prompted, click **Delete** to delete the logical drive; click **Cancel** to cancel the action.

Maintaining an Energy-Efficient Storage Space

You can use power management in maxView 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 *Setting Power Management Options for a Logical Drive* on page 66.
- To configure power management for a controller, see *Setting Power Management Options for a Controller* on page 67.
- To disable power management on a logical drive, see *Disabling Power Management for a Logical Drive* on page 68.

Note: To see if your controller supports power management, select the controller in the Enterprise View then, on the Storage Dashboard, click the **Properties** tab. If the Key Features section includes 'Intelligent Power Management', the controller supports the power management features. You can check for power management support on the Storage Dashboard for controllers, logical drives, and physical drives.

Setting Power Management Options for a Logical Drive

This section describes how to set the power management options for an existing logical drive. You can also set the power management options when you create a logical drive in the wizard (see *Custom Configuration* on page 44).

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

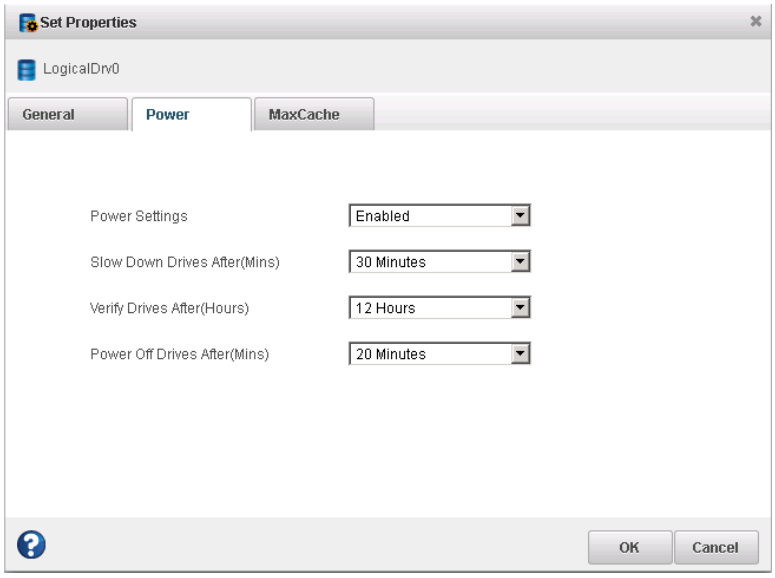
Note: We do not recommend enabling power management for logical drives with shared physical drives; that is, logical drives that include segments of the same physical drives. Placing logical drives with these characteristics under power management may limit the power savings benefit in your storage space.

To set the power management options for a logical drive:

1. In the Enterprise View, select a controller, then select a logical drive.
2. On the ribbon, in the Logical Device group, click **Set Properties**.

The Set Properties window opens.

3. Click the **Power** tab.
4. In the Power Settings drop-down list, select Enabled.
5. 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.

- 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 complete, the drive is powered down and returns to an inactive state. The default is 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.

6. Click **OK**.

Setting Power Management Options for a Controller

The power management options for a controller affect all logical drives on that controller. The main setting is the "stay awake" period: the time during which disk drives on the controller always spin at their peak rate.

Note: 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 maxView Storage Manager. For more information, see the *Adaptec RAID Controller Installation and User's Guide*.

To set the stay awake period for the disk drives on a controller:

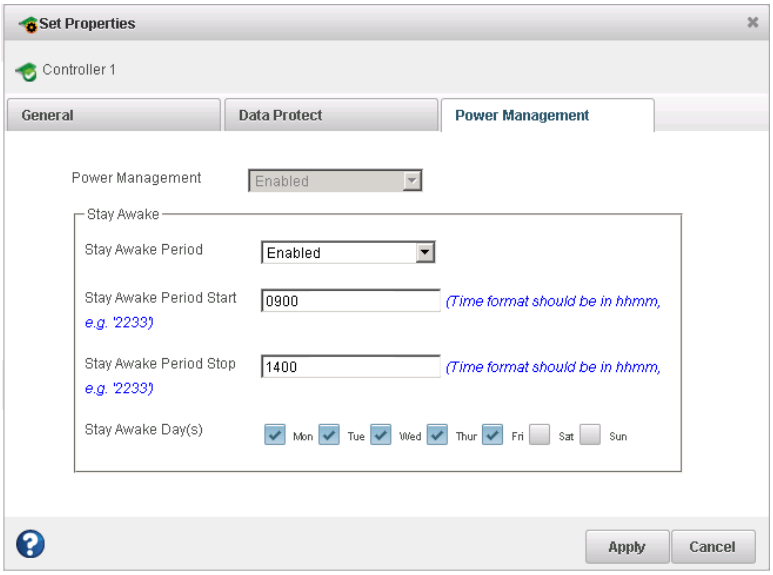
1. In the Enterprise View, select a controller.
2. On the ribbon, in the Controller group, click **Set Properties**.

The Set Properties window opens.

3. Click the **Power Management** tab.
4. In the Stay Awake Period drop-down list, select Enabled.

   Note: This field is set to Enabled and grayed out if you enabled power management when you created the logical drive.

5. Enter the stay awake period start time and end time in 24-hour, *hhmm*, format; for example, 0900 for 9AM, 1400 for 2PM, and so on.



6. Select the days of the week to enforce the stay awake period. On days that you do not select, the stay awake period is disabled and the spin rate is controlled by the logical drive's power timer settings (see *Setting Power Management Options for a Logical Drive* on page 66).
7. Click **Apply**.

Disabling Power Management for a Logical Drive

You can disable power management for a logical drive. 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 Enterprise View, select a controller, then select a logical drive on that controller.
2. On the ribbon, in the Logical Device group, click **Set Properties**.

   The Set Properties window opens.

3. Click the **Power** tab.
4. In the Power Settings drop-down list, select Disabled.
5. Click **OK**.

8 Optimizing the Structure of Your Storage Space

This section explains how to use Adaptec maxCache™ and maxCache Plus™ to optimize the structure of your server storage. It describes how to organize storage resources to leverage the performance capabilities of the Solid State Drives and other fast storage media in your system; create virtual pools of media with similar performance characteristics; and provision tiered volumes comprised of pools with different tier levels.

> **Note:** maxCache is supported on Adaptec Series Q controllers. maxCache Plus is supported on qualifying Adaptec Series Q controllers only (see the Readme for a complete list). Once a qualifying Series Q controller is detected in your system, you can use maxCache Plus to organize storage on any other Adaptec controller. For more information about Adaptec maxCache technology, visit the Adaptec Web site at *www.adpatec.com*. For information about the maxCache Plus command line utility, see *Using the maxConf Command Line Utility* on page 142.

Adding Caching and Tiering to Your Storage Space

maxCache and maxCache Plus use advanced caching and tiering technology to accelerate application performance.

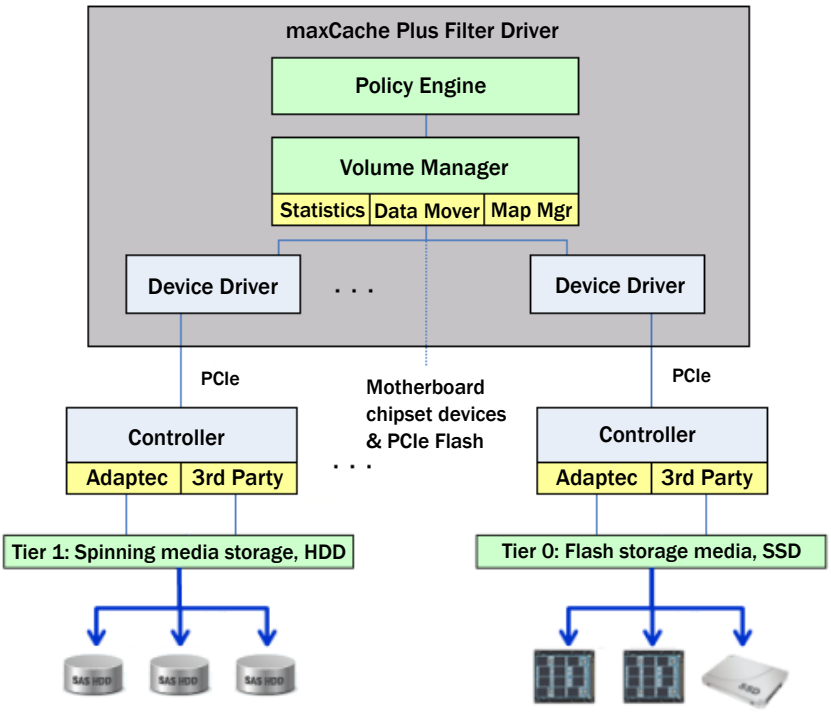
For caching applications, maxCache uses the Solid State Drives (SSDs) in your system as fast cache memory. maxCache supports both read and redundant-write caching, and provides performance benefits for both read and write operations in I/O-intensive applications with mixed workloads.

For tiering applications, maxCache provides virtualized pools of storage using all of the storage resources in your system. It allows you to organize media into virtual pools with similar performance characteristics, and provision volumes comprised of pools with different tier levels. Higher level tiers, comprised typically of SSDs or other fast media (PCIe flash, for instance) store frequently used "hot" data; while lower level tiers, comprised typically of rotating media, such as SAS or SATA hard disk drives, store static or less frequently accessed data.

About maxCache Plus

Tiering, in maxCache Plus, is implemented as an operating-system level *filter driver*. The filter driver consists of two main parts: Volume Manager and Policy Engine.

- **Volume Manager** manages I/O to and from the tiered volume and routes the I/O to the correct tier group. It maintains a tier value mapping table in persistent storage for all the tiered sources. It also gathers I/O statistics and routes it to the Policy Engine.
- **Policy Engine** decides where to place the managed data. It analyzes statistical information about data access frequency and divides the data into "cold" and "hot" queues. Cold data is stored on the slowest media, typically SAS or SATA hard disk drives. Hot data is stored on the fastest media, such as an SSD, for rapid retrieval. The Policy Engine continuously analyzes entries in the hot and cold queues and updates the data location based on use patterns.

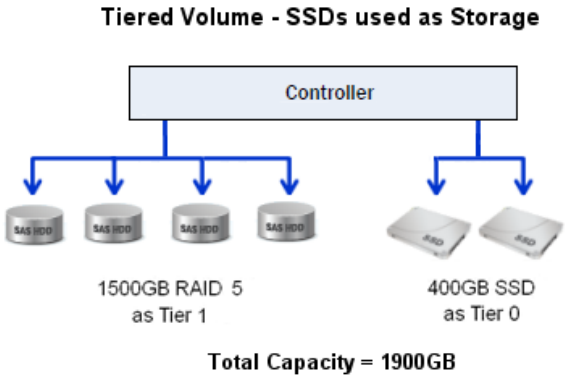


Tiers, Virtual Pools, and Virtual Volumes

In maxCache Plus, a *tier* is a collection of storage media with distinct performance characteristics (RAID 5, RAID 10, SSD, SAS hard disk drive, etc). A *virtual pool* is a grouping of storage devices with similar performance characteristics. Each pool has a *tier level* based on the performance characteristics of the underlying media. Tier 0 is reserved for the highest performing media, such as an SSD pool; a RAID 5 pool, comprised of SAS hard drives, might be assigned to Tier level 1.

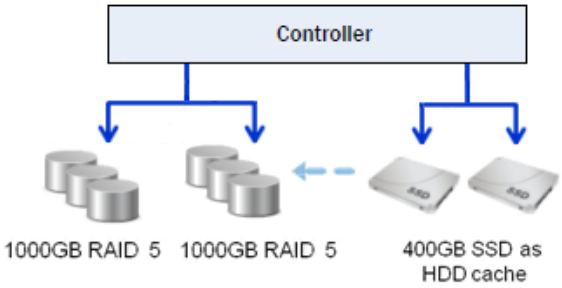
You can provision *virtual volumes* comprised of pools with different tier levels and create *cached volumes*, as described below. A virtual volume is exposed to the operating system by the maxCache Filter Driver. By default, the Filter Driver detects all underlying storage (logical drives, raw devices) and exposes the discovered resources to the OS as *pass-through* volumes.

- **Tiered Volume**—Volume comprised of two pools with different tier levels. The uppermost tier is used to store the hot data. Its maximum capacity equals the combined capacity of each pool.



- **Cached Volume**—Volume comprised of two pools with different tier levels. The uppermost tier is used as the caching media. Cache types include Write-Through and Write-Back. Its maximum capacity equals the capacity of the lower level tier.

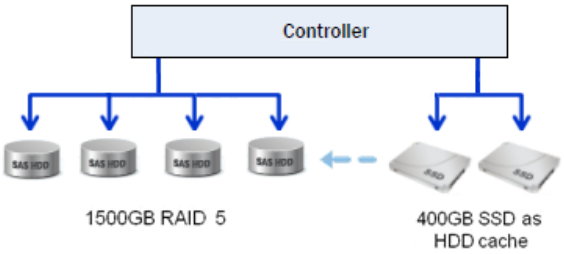
Cached Volume - SSDs used as HDD cache



Total Capacity = 2TB

- **Cached Logical Drive**—Volume comprised of an existing logical drive and a pool with better performance characteristics than the logical drive. Pool devices are used as the caching media. Cache type includes Write-Through only. Its maximum capacity equals the logical drive capacity.

Cached-LD Volume - SSDs used as HDD cache



Total Capacity = 1500GB

- **Pass-Through**—Volume comprised of discovered storage (logical drives, raw devices) and exposed to the OS. Created by default for all underlying storage resources.

maxCache vs. maxCache Plus

maxCache and maxCache Plus both support SSD read and write caching. Tiering, however, is supported by maxCache Plus only. Whereas maxCache is limited to the resources connected to a single Adaptec Series Q controller, maxCache Plus utilizes the resources on all of your Adaptec controllers (Series 6/7/8, Q, non-Q), select 3rd party controllers or HBAs, motherboard chipset storage, and PCIe devices, such as PCIe flash.

> **Note:** For supported third-party controllers and storage devices, contact Adaptec Support.

For local storage connected directly to your Adaptec controller, maxCache uses a reserved logical drive comprised of SSDs only to support read and write caching for *all* logical drives on that controller. This logical drive is called the *maxCache Container* (see *Addding maxCache to Local Storage* on page 79 for more). By contrast, maxCache Plus uses a virtual pool of SSDs (or other fast media) to support read and write caching on a designated logical drive or virtual volume, anywhere in your storage space.

Note: You cannot use an SSD concurrently in a maxCache Container and maxCache Plus virtual volume. When you create a maxCache Container, the member SSDs are hidden from the maxCache Plus filter driver.

Finally, due to its implementation as a filter driver and ability to use storage resources across your system, maxCache Plus typically offers improved throughput, lower latency, and greater scalability than maxCache.

Creating and Managing Virtual Pools

This section describes how to create a virtual pool from available storage, modify pool properties, and delete a virtual pool.

Creating a Virtual Pool

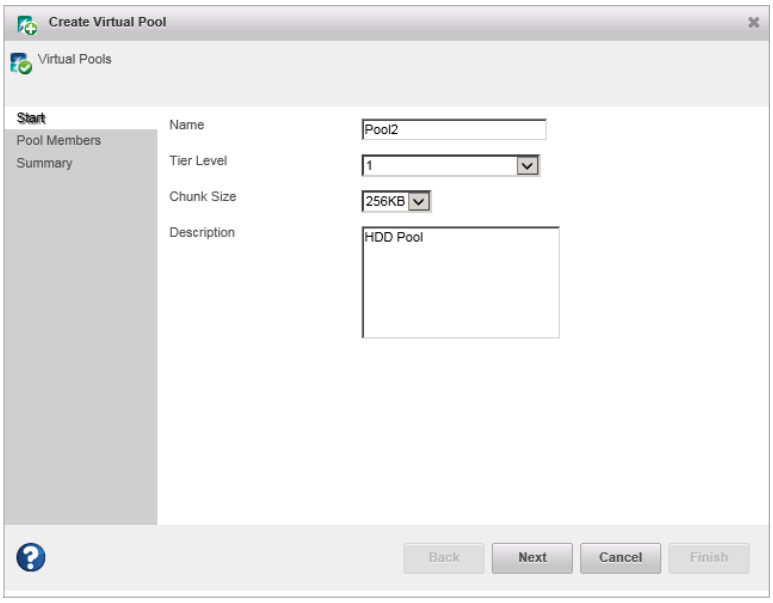
When you create a virtual pool, you choose the pool members from the logical devices in your storage space, then assign the pool to a tier level. Tier 0 is reserved for your fast media, such as an SSD pool.

To create a virtual pool:

1. In the Enterprise View, open the maxCache Plus tree, then select the Virtual Pools tree node.
2. On the ribbon, in the Virtual Pool group, click **Create Virtual Pool**.

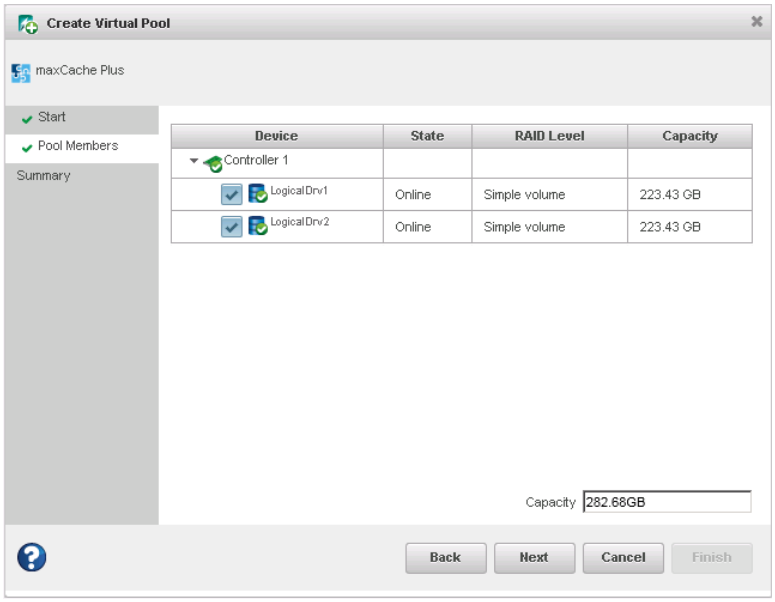
The Create Virtual Pool wizard opens.

3. Enter the pool name (up to 31 characters), tier level, chunk size (64KB, 256KB, 1MB, or 4MB), and pool description (up to 63 characters), then click **Next**.



4. Select the logical drive(s) you want to add to the pool, then adjust the pool capacity.

   Note: By default, the pool capacity equals the total capacity of the pool members.



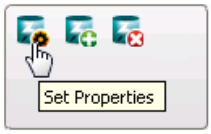
5. Click **Next**, review the pool settings, then click **Finish**.

Modifying a Virtual Pool

You can modify the properties of an existing virtual pool to change its name, description, or tier level. You can change a pool's tier level only if it is not part of a virtual volume.

To modify virtual pool properties:

1. In the Enterprise View, open the maxCache Plus tree then, in the Virtual Pools tree, select a virtual pool.
2. On the ribbon, in the Virtual Pool group, click **Set Properties**.



The Set Properties window opens.

3. Change the pool name (up to 31 characters), pool description (up to 63 characters), or tier level, as needed.

   Note: If the pool is part of a virtual volume, the tier level is read-only.

4. Click **OK**.

Deleting a Virtual Pool

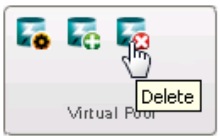
When you delete a virtual pool, all data in the pool is destroyed and the underlying media becomes available for use in other storage applications.

Caution: Ensure that volumes with the deleted pool as a member are inactive; otherwise you may lose data.

To delete a virtual pool:

1. In the Enterprise View, open the maxCache Plus tree then, in the Virtual Pools tree, select a virtual pool.

2. On the ribbon, in the Virtual Pool group, click **Delete**.



3. When prompted, click **Delete** to delete the virtual pool. Click **Cancel** to cancel the action.

Creating and Managing Virtual Volumes

This section describes how to create a tiered or cached virtual volume, modify volume properties, and delete a virtual volume.

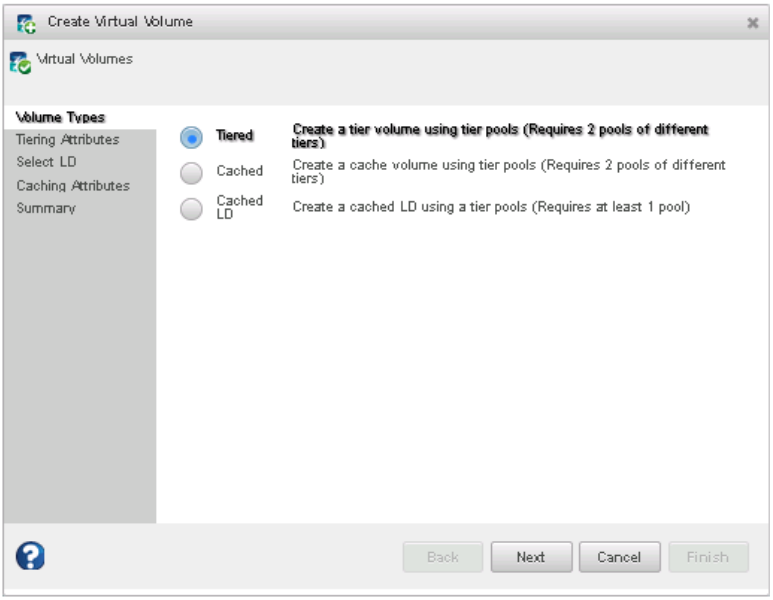
Creating a Tiered Volume

When you create a Tiered Volume, you choose two pools with different tier levels: a fast "up-tier" pool, and a slower "down-tier" pool. Optionally, you can specify the tier level size. You can also "tune" the volume by specifying the fetch and flush rate.

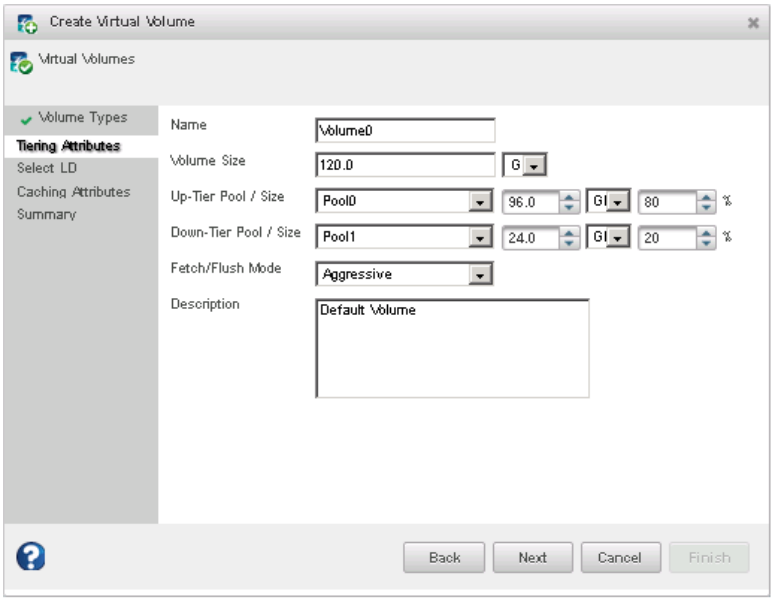
To create a Tiered Volume:

1. In the Enterprise View, open the maxCache Plus tree, then select the Virtual Volumes tree node.
2. On the ribbon, in the Virtual Volume group, click **Create Virtual Volume**.

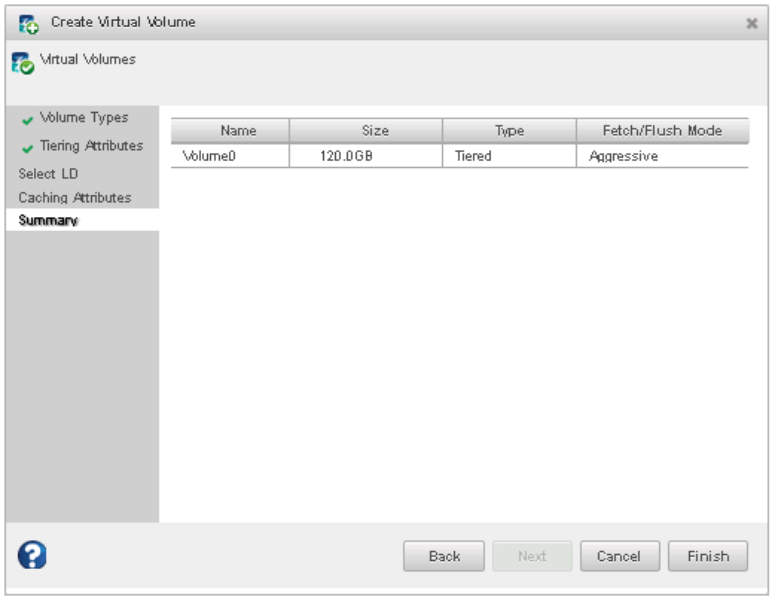
3. When the wizard opens, ensure that **Tiered** is selected (the default), then click **Next**.



4. In the Tiering Attributes panel, select the up-tier pool and down-tier pool from the drop-down lists.



5. Customize the volume settings. You can:
   - Enter a name for the volume (up to 31 characters) and the volume description (up to 63 characters). Names can include any combination of letters and numbers, but cannot include spaces.
   - Adjust the volume size. By default, the volume size equals the total size of the up-tier pool and down-tier pool.
   - Adjust the size of each tier level by clicking on either the size or percent spinners. The total size remains the same.
   - Adjust the volume's fetch and flush rate. Valid values are: Aggressive, Moderate, Low
6. Click **Next**, review the volume settings, then click **Finish**.



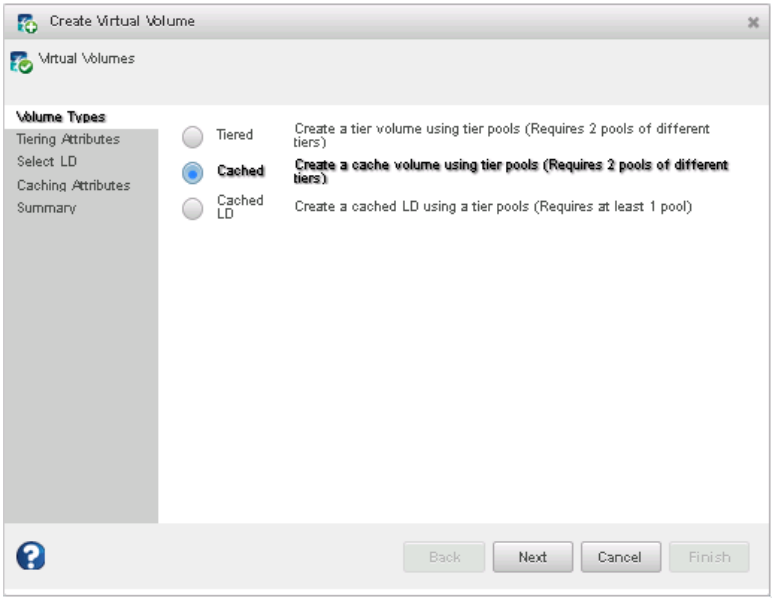
Creating a Cached Volume or Cached LD Volume

When you create a Cached Volume, you choose two pools with different tier levels. The upper-level (fast) pool is used for caching. When you create a Cached LD Volume, you choose an existing logical drive as the primary storage device, then you select the cache pool. Optionally, you can specify the size of the cache pool. You can also "tune" the volume by specifying its fetch and flush rate.

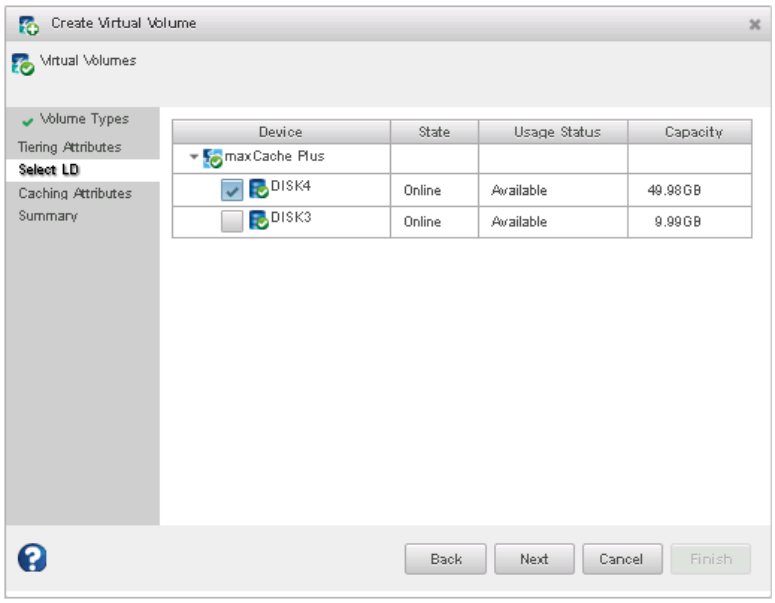
To create a Cached Volume or Cached LD Volume:

1. In the Enterprise View, open the maxCache Plus tree, then select the Virtual Volumes tree node.
2. On the ribbon, in the Virtual Volume group, click **Create Virtual Volume**.

3. When the wizard opens, click **Cached** or **Cached LD**, then click **Next**.

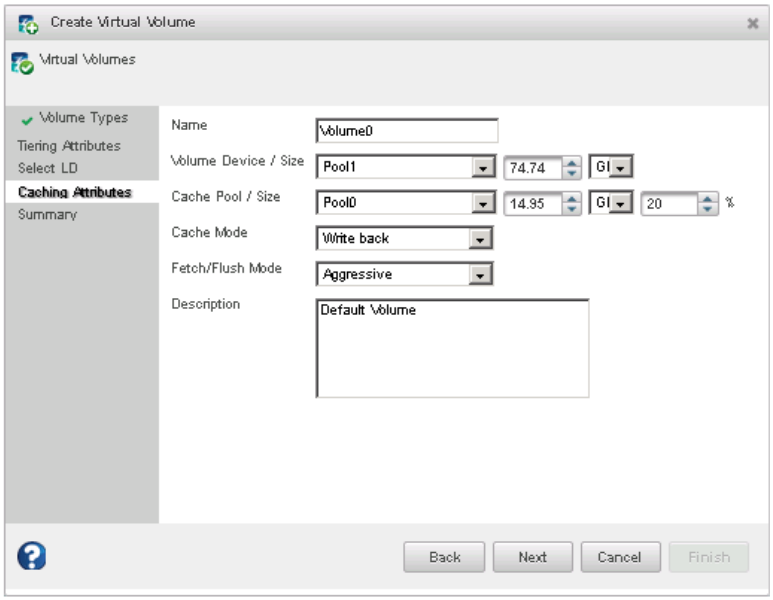


4. (*Cached LD Volume only*) For a Cached LD Volume, select the logical drive you want to use as the primary storage device, then click **Next**. You can select only *one* logical drive.



5. In the Caching Attributes panel, select the lower-level pool from the Volume Device drop-down list, then select the cache (upper-level) pool.

   Note: For a Cached LD Volume, the Volume Device/Size field is read-only. The volume device is fixed, based on your selection in Step *4* on page 76.

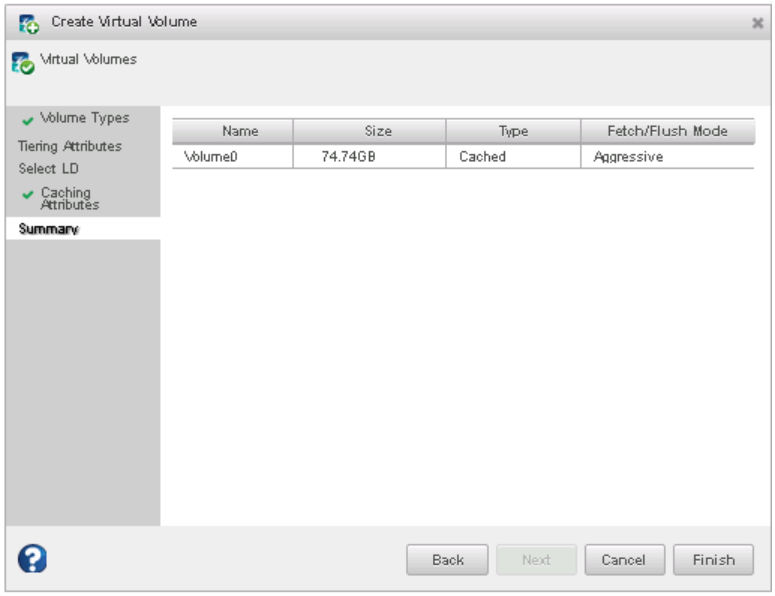


6. Customize the volume settings. You can:
   - Enter a name for the volume (up to 31 characters). Names can include any combination of letters and numbers, but cannot include spaces. The default is VD*n* (VD0, VD1, and so on).
   - (*Cached Volume only*) Adjust the volume size. By default, the volume size equals the size of the lower-level pool.

     Note: For a Cached LD Volume, the volume size is fixed, based on your selection in Step *4* on page 76.

- Adjust the size of the cache pool by clicking on either the size or percent spinners. By default, the capacity of the cache pool is set to 20% of the capacity of the lower-level pool.
- Select the cache mode:
  - **Write-Back** (*Cached Volume only*): uses the cache for fast retrieval and updates lower-level storage at the same time.
  - **Write-Through:** uses cache for the "freshest" data and updates lower-level storage at a later time.
- Adjust the volume's fetch and flush rate. Valid values are: Aggressive, Moderate, Low

7. Click **Next**, review the volume settings, then click **Finish**.

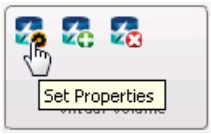


Modifying a Virtual Volume

Use this option to modify the properties of an existing virtual volume. You can change the volume name or description, or adjust the fetch and flush rate.

To modify virtual volume properties:

1. In the Enterprise View, open the maxCache Plus tree then, in the Virtual Volumes tree, select a virtual volume.
2. On the ribbon, in the Virtual Volume group, click **Set Properties**.



The Set Properties window opens.

3. Change the volume name (up to 31 characters) or description (up to 63 characters), as needed.
4. From the Tunning Setting drop-down, adjust the volume's fetch and flush rate. Valid values are: Aggressive, Moderate, Low.
5. Click **OK**.

Deleting a Virtual Volume

When you delete a virtual volume, all data in the volume is destroyed.
To delete a virtual volume:

1. In the Enterprise View, open the maxCache Plus tree then, in the Virtual Volumes tree, select a virtual volume.
2. On the ribbon, in the Virtual Volume group, click **Delete**.

3. When prompted, click **Delete** to delete the virtual volume. Click **Cancel** to cancel the action.

Addding maxCache to Local Storage

For storage connected directly to your Adaptec Series Q controller, maxCache uses a reserved logical drive comprised of SSDs only, called the *maxCache Container*, for fast read and write caching. maxCache can be applied independently on a per controller or per logical drive basis. By default, maxCache is enabled for new logical drives (see *Creating Logical Drives* on page 42).

With maxCache read caching enabled, the system copies frequently read "hot" data to the maxCache Container for faster retrieval. With maxCache write caching enabled, the maxCache Container is populated with certain "hot" blocks from the logical drives on the controller. All writes to these hot blocks go directly to the maxCache Container. The data remains on the maxCache Container until it is full or some other "hotter" data replaces it.

Use the procedures in the following sections to create, modify, and maintain the maxCache Container, and to enable and disable maxCache for the logical drives in your storage space.

> **Note:** Adaptec Series 6Q controllers support maxCache read caching only and do not use the maxCache Container. For more information, see *Using maxCache with Adaptec Series 6Q Controllers* on page 83.

Creating a maxCache Container

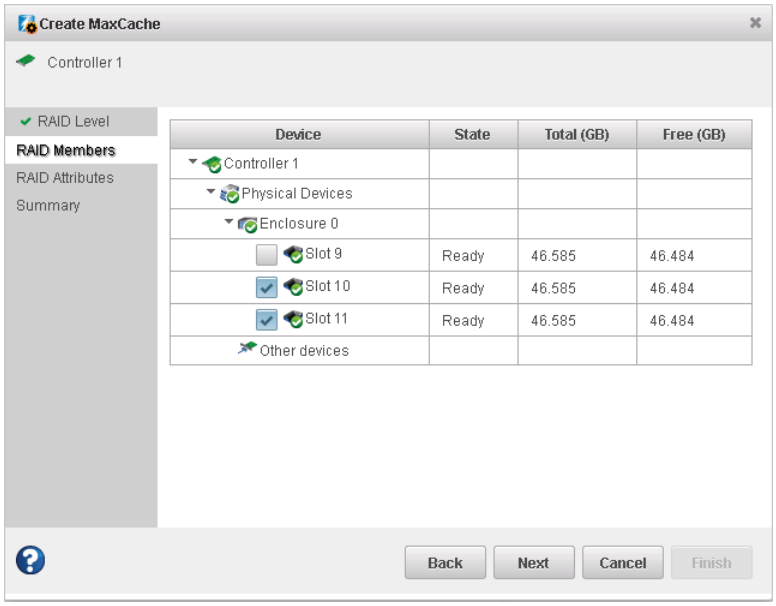
To create a maxCache Container:

1. In the Enterprise View, select a system, then select a controller on that system.
2. On the ribbon, in the maxCache group, click **Create maxCache**.

3. When the wizard opens, select a RAID level for the container, then click **Next**.

   See *Selecting the Best RAID Level* on page 134 for more information about RAID levels.

4. Select the SSDs that you want to include in the maxCache Container. Be sure to select the right number of SSDs for the RAID level you selected.



5. Click **Next**.
6. (*Optional*) In the RAID Attributes panel, customize the settings for the maxCache Container. You can:
   - Enter a name for the maxCache Container. Names can include any combination of letters and numbers, but cannot include spaces.
   - Set a smaller logical drive size. (By default, the maxCache Container uses all available drive space.)
   - Set the build method to: Build, Clear, or Quick.
   - Set the build priority to: High, Medium, or Low.

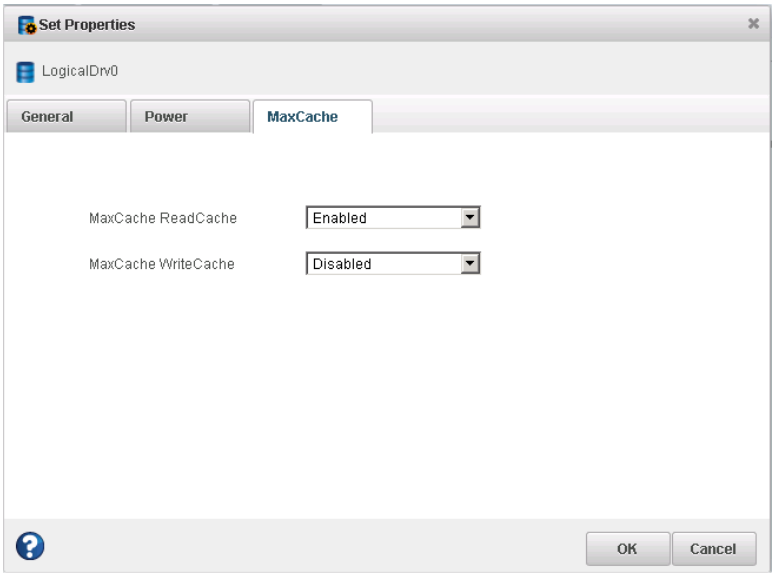
   See *Fine-tuning Logical Drives* on page 58 for details about customizing the settings in the RAID Attributes panel.
7. Click **Next**, then review the logical drive settings. To make changes, click **Back**.
8. Click **Finish**.
   maxView Storage Manager builds the maxCache Container. Use the Event Log and Task Log to track build progress.

Changing maxCache Settings for a Logical Drive

You can enable or disable maxCache read and write caching for each logical drive in your storage space:

1. In the Enterprise View, select a controller, then select a logical drive on that controller.
2. On the ribbon, in the Logical Device group, click **Set Properties**.

3. When the Set Properties window opens, click the **maxCache** tab.



4. In the drop-down lists:
   - For maxCache Read Cache, select Enabled or Disabled, as needed.
   - For maxCache Write Cache, select Enabled or Disabled, as needed.
5. Click **OK**.

Changing maxCache Settings for a Controller

You can disable maxCache *write caching* for all logical drives on a controller. Because write caching sends in-coming data to the maxCache Container first, before moving it to the logical devices on your controller, you may want to disable write caching to reduce the possibility of data loss in the event of a power outage, system failure, or dirty shutdown.

> **Note:** To re-enable maxCache write caching in your storage space, you must change the maxCache settings for each logical drive individually; see *Changing maxCache Settings for a Logical Drive* on page 80.

To disable maxCache write caching for a controller:

1. In the Enterprise View, select a controller, then select the maxCache Container on that controller.
2. On the ribbon, in the maxCache group, click **Disable Write Cache**.

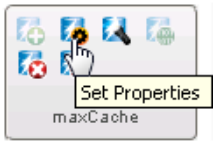
3. Click **OK**.

Setting the maxCache Flush and Fetch Rate

Once the maxCache Container is built, you can set its Flush and Fetch rate to optimize the read cache performance.

To set the maxCache Container Flush and Fetch rate:

1. In the Enterprise View, select a controller, then select the maxCache Container for that controller.
2. On the ribbon, in the maxCache group, click **Set Properties**.



The Set Properties window opens.

3. In the drop-down list, set the Flush and Fetch rate to: Slow, Medium, or High. The default is Medium.

   Note: The lower the rate, the longer data is kept on the maxCache Container before it is flushed from the cache.

4. Click **OK**.

Verifying and Fixing the maxCache Container

If maxCache is enabled for a controller, you cannot complete any other tasks on that controller while maxView Storage Manager verifies and fixes the maxCache Container. Optionally, you can choose to verify the maxCache Container without fixing inconsistent or bad data, or run a *coherency check* to compare valid pages of the maxCache Container with their corresponding logical drive storage.

To verify and fix the maxCache Container:

1. Ensure that no activity is taking place on the controller for the maxCache Container.
2. In the Enterprise View, select the maxCache Container you want to verify and fix.
3. On the ribbon, in the maxCache group, click **Verify**.

The Verify maxCache window opens.

4. Choose a verification option:

Options	Description
To repair inconsistent or bad data during verification	...click **Verify with fix**.
To verify the maxCache Container without fixing bad data	...click **Verify**.
To perform a coherency check on the maxCache meta-data	...click **Coherency Check**, then select Once or Always from the drop-down list.

5. Click **OK**.

   Caution: Do not power off the system while the verification is in progress. If you do, the verification will stop.

   When the verification is complete, an event notice is generated in the system's event log, at which time you can continue working with the controller.

Deleting the maxCache Container

When you delete the maxCache Container, the component SSDs become available and can be used to create a new logical drive, hot spare, or new maxCache Container.

Caution: Ensure that no activity is taking place on the controller for the maxCache Container; otherwise you may lose data.

To delete the maxCache Container:

1. In the Enterprise View, select a controller, then select the maxCache Container.
2. On the ribbon, in the maxCache group, click **Delete**.

3. When prompted, click **Delete** to delete the maxCache Container; click **Cancel** to cancel the action.

Using maxCache with Adaptec Series 6Q Controllers

Adaptec Series 6Q controllers support maxCache read caching only. On a Series 6Q controller with maxCache read caching enabled, the system copies frequently read "hot" data to an SSD cache pool, called the *maxCache device*. Unlike the maxCache Container, used for Adaptec Series 7Q, Series 8Q, and newer controllers, the maxCache device is simply a collection of SSDs used as fast read memory; it is not a logical device and is not displayed in the Enterprise view.

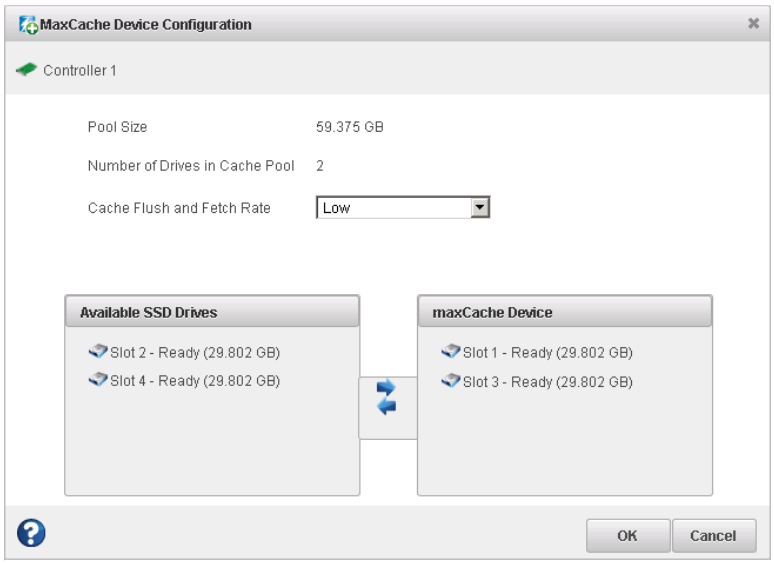
Use the following procedure to configure the maxCache device and to set its cache Flush and Fetch Rate. By default, maxCache read caching is enabled for a logical drive. To disable maxCache read caching, see *Changing maxCache Settings for a Logical Drive* on page 80.

To configure the maxCache device:

1. In the Enterprise View, select a system, then select an Adaptec Series 6Q controller on that system.
2. On the ribbon, in the maxCache group, click **Create maxCache**.

The maxCache Device Configuration window opens.

3. Select one or more SSDs in the Available SSD Drives list, then click **right arrow**.



To remove a SSD from the cache, select one or more SSDs in the maxCache Device list, then click **left arrow**.

4. Select the maxCache flush and fetch rate from the drop-down list: Low, Medium, High. (The default is Medium.)
5. Click **OK**.
   maxView Storage Manager builds the maxCache Device. Use the Event Log and Task Log to track build progress.

9 Working with Scheduled Tasks

maxView Storage Manager allows you to schedule some tasks to start at convenient times. Additionally, you can schedule some tasks to recur at preset times.

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

Scheduling a Task

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

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

You can schedule these tasks in maxView Storage Manager:

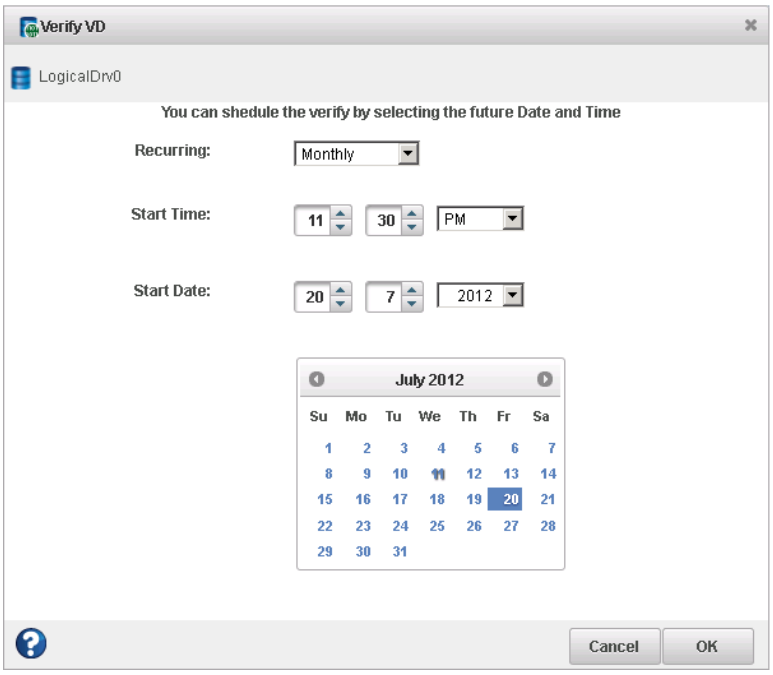
- Expanding a logical drive
- Changing a logical drive's RAID level
- Modifying the stripe size of a logical drive (as part of an expansion or migration)
- Verifying a logical drive
- Verifying and fixing a logical drive

To schedule one of these tasks:

1. Complete each step of the task until you are prompted to finish the task or schedule the task. (The actual label on the "finish" button varies, depending on the task type.) *Do not click finish!*

2. Click **Schedule**.
   The schedule window opens.

   Note: The schedule window is the same for all tasks, except for the title text on the title bar.



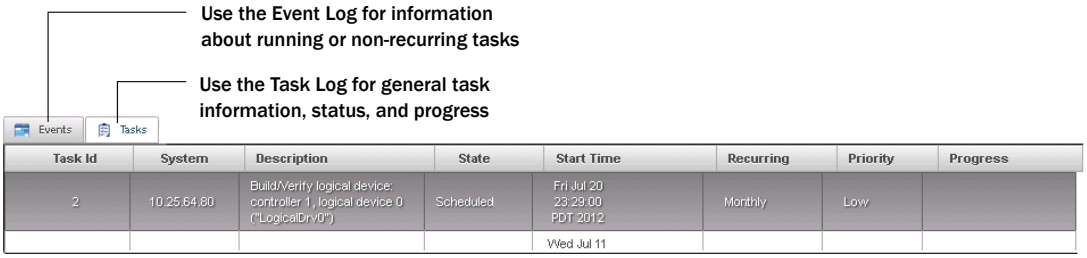
3. Set the time and date for the task to start. You can pick the date from the calendar or use the controls in the Start Date field to enter it directly. By default, the task starts "today".

   Note: If you are scheduling a task on a remote system located in another geographical area, remember that the time you set for the task is *that system's* time, which may be different from the 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 **OK**.
   The task is saved and the scheduled task is added to the Task Log.

Monitoring Tasks

You can use the Task Log and Event Log—at the bottom of the maxView Storage Manager main window—to monitor your tasks. The information in each log is complementary, and helps you manage the scheduled and non-scheduled tasks in your system.



The Task Log displays all scheduled tasks in order of creation, and includes basic information about each task, and progress of running tasks. The Status column shows the current condition of each task:

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

- **Running**—The task is running and currently in progress.
- **Error**—The task did not complete successfully. (For more information about an error, double-click the task in the Task Log to open the Task Log Detail window; see *Viewing Task Status in the Task Log* on page 105.)

The Event Log displays additional information about tasks, such as when a scheduled task is modified or deleted, or when a task did not complete successfully.

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

Icon	Status	Explanation and Solution
	Information	The task completed successfully. No action required.
	Warning	The task missed its start time. Reschedule the task to clear the error, as described in *Modifying a Task* on page 87.
	Error	The task failed. Delete the task to clear the error. Schedule the task again, as described in *Scheduling a Task* on page 85.

What if a Task Misses its Start Time?

Tasks scheduled in maxView 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* on page 87.

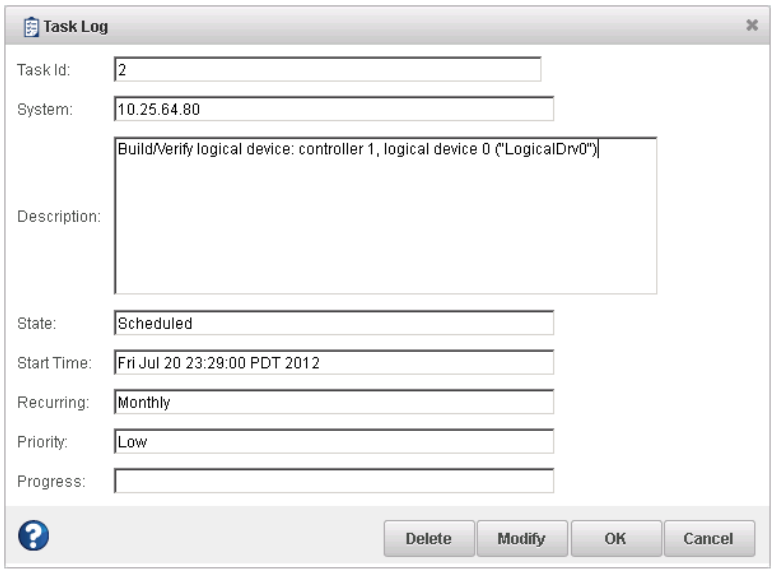
If a recurring task misses its start time, it is automatically rescheduled to run at the next scheduled interval.

Modifying a Task

If the requirements for a scheduled task change, you can use maxView Storage Manager to modify the task. You can reschedule a task for a different date or time; change it from recurring to non-recurring; and modify the task description that appears in the Task Log. Creating a custom task description makes it easier to find the task in the task list.

To modify a scheduled task:

1. In the Task Log, single-click the task you want to modify.
2. When the Task Log Detail window opens, click **Modify**.



3. When the Modify Task window opens, make the required changes, then click **OK**.
   The task changes are saved and its entry in the Task Log is updated.

Deleting a Task

If a scheduled task is no longer needed, you can delete it from the system.
To delete a task:

1. In the Task Log, single-click the task you want to delete.
2. When the Task Log Detail window opens, click **Delete**.
3. Click **Yes** to confirm the deletion.
   The task is deleted and its entry is removed from the Task Log.

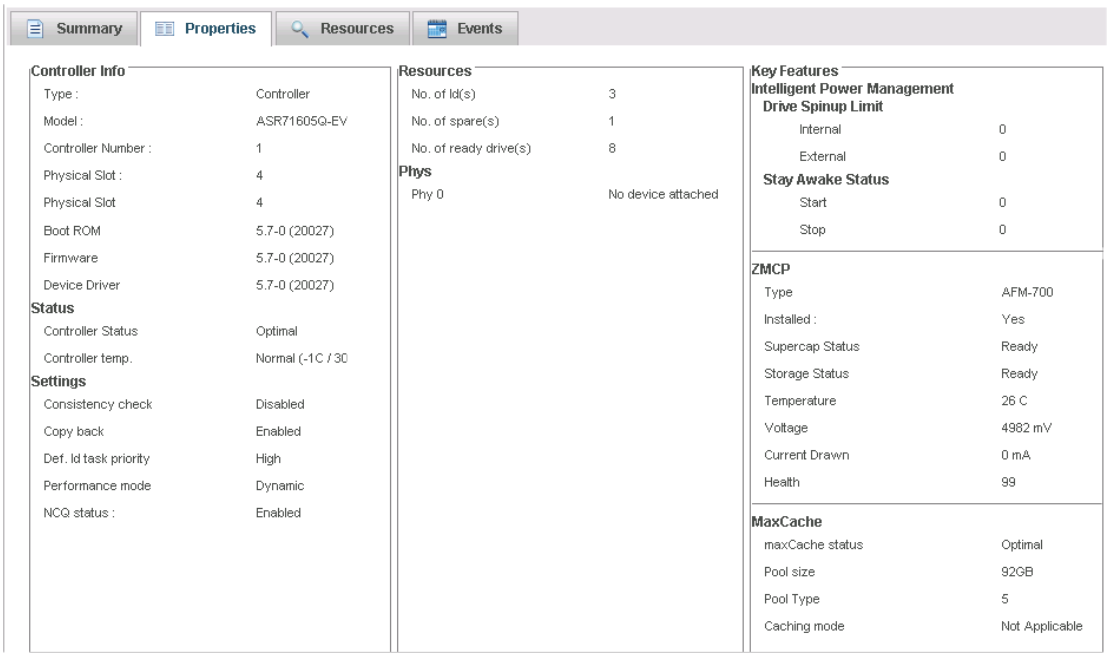
10 Maintaining Physical Devices

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

Viewing Device Properties

Click on any physical device in the Enterprise View then, on the Storage Dashboard, click the **Properties** tab to view version numbers, status, model numbers, features, and other information about the device.

The properties listed vary, depending on which type of device you select. The figure below shows the properties for a controller. For more information about using the Storage Dashboard to monitor the components in your storage space, see *Viewing Component Status in the Storage Dashboard* on page 105.



Locating Drives in Your Storage Space

You can blink the LEDs on disk drives and SSDs to identify where they are physically located in your storage space. This table describes how to locate specific devices.

To Locate...	Select...
A disk drive	Disk Drive icon: 
All disk drives included in a logical drive	Logical Drive icon: 
All SSDs in the maxCache Container	maxCache Container icon:

To Locate...	Select...

Locating a Disk Drive

To locate a (single) disk drive:

1. In the Enterprise View, select a controller then, in the Physical Devices tree, select a disk drive.
2. On the ribbon, in the Physical Device group, click **Locate**.

The Locate PD window opens.

3. Click the **Locate** button (on the Locate PD window).
   The LED on the disk drive begins to blink.
4. Click **Stop** to stop blinking the drive.

5. Click **Cancel** to close the Locate PD window.

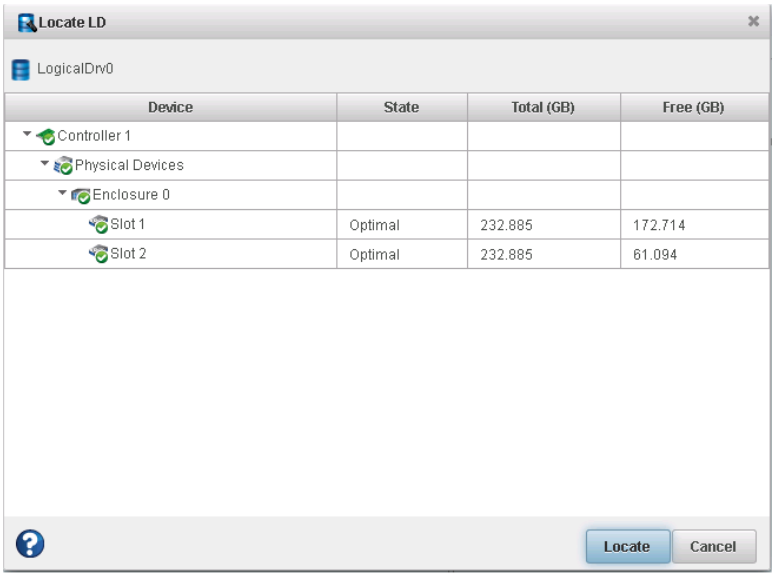
Locating Physical Disks in a Logical Drive

To locate all physical disks in a logical drive:

1. In the Enterprise View, select a controller then, in the Logical Devices tree, select a logical drive.
2. On the ribbon, in the Logical Device group, click **Locate**.

The Locate LD window opens and displays a list of the physical disks associated with the logical drive.

3. Click the **Locate** button (on the Locate LD window).



The LEDs on the disk drives begin to flash.

4. Click **Stop** to stop blinking the drives.
5. Click **Cancel** to close the Locate LD window.

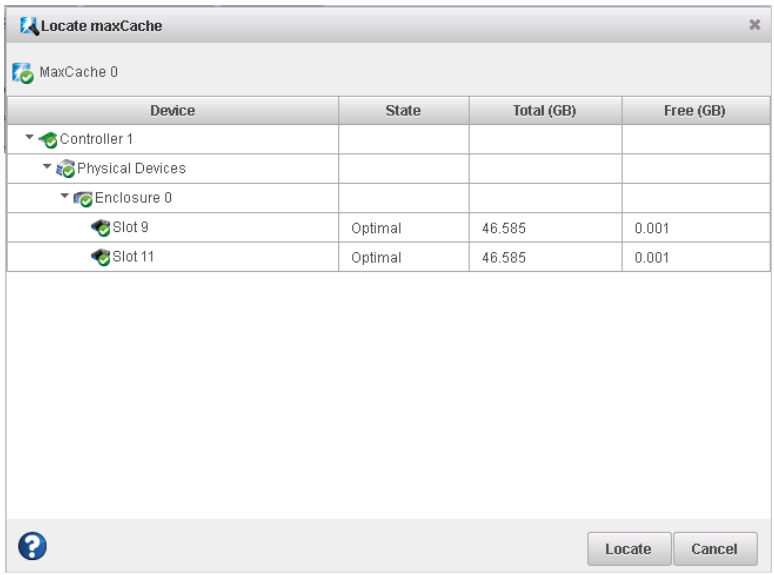
Locating SSDs in the maxCache Container

To locate all Solid State Drives (SSDs) in the maxCache Container:

1. In the Enterprise View, select a controller then, in the maxCache Container tree, select the maxCache Container on that controller.
2. On the ribbon, in the maxCache group, click **Locate**.

The Locate maxCache window opens, displaying a list of the SSDs comprising the maxCache Container.

3. Click the **Locate** button (on the Locate maxCache window).



The LEDs on the SSDs begin to flash.

4. Click **Stop** to stop blinking the SSDs.
5. Click **Cancel** to close the Locate maxCache window.

Working with Failed or Failing Disk Drives

This section describes how to use maxView 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 replace a drive 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 *Rebuilding Logical Drives* on page 130), you may lose data. For help solving disk drive problems, see *Recovering from a Disk Drive Failure* on page 128.

To replace a disk drive in a logical drive:

1. In the Physical Devices tree in the Enterprise View, find the disk drive you want to replace; note its size and location (for instance Slot 1 in Enclosure 0).
2. Set the drive state to failed. (See *Setting a Disk Drive to 'Failed'* on page 92.)
3. Remove and replace the disk drive with one of equal or greater size.
4. Wait for the logical drive to rebuild. (See *Rebuilding Logical Drives* on page 130.)
5. Repeat these steps for each disk drive you want to replace.

Setting a Disk Drive to 'Failed'

Before you can remove a disk drive, you should set it to the Failed state to protect your data. To fail a disk drive (or SSD), use the Force Offline option for physical devices.

You can set a disk drive to the 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

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

To set a disk drive to Failed:

1. In the Enterprise View, select a controller then, in the Physical Devices tree, select the drive you want to set to Failed.
2. On the ribbon, in the Physical Devices group, click **Force Offline**.

The Force Offline window opens.

3. Click **Force**.

The drive is taken offline and set to the Failed state.

> **Note:** If the drive is part of a healthy logical drive, the drive is degraded and a warning message is displayed in the Event Log.

Initializing, Uninitializing, and Erasing Disk Drives

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

Initializing Disk Drives

You can use maxView Storage Manager to initialize any disk drive (or SSD) in the Ready state. You may want to do this to erase all existing data and meta-data 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. Be sure to back up all data from your disk drive before you initialize it.

To initialize a disk drive:

1. In the Enterprise View, select a controller then, in Physical Devices tree, select the disk drive you want to initialize.
2. On the ribbon, in the Physical Device group, click **Initialize**.

The Init/Uninit Physical Device window opens.

3. Click the **Initialize Physical Device** button, then click **OK**.

maxView Storage Manager begins the initialization.

4. When prompted, click **OK** to close the Init/Uninit Physical Device window.

Erasing Disk Drives

You can use maxView Storage Manager to *securely* erase existing data on any disk drives or SSDs that are in the Ready state. Secure erase completely destroys the data on the drive; the data is completely and irretrievably eradicated. Secure erase performs three distinct writing passes to the disk drive being erased—it does not just write zeros.

To securely erase a disk drive or SSD:

1. In the Enterprise View, select a controller then, in the Physical Devices tree, select the drive you want to erase.
2. On the ribbon, in the Physical Device group, click **Secure Erase**.

The Secure Erase Physical Device window opens.

3. Click **Erase** to erase the disk drive; click **Cancel** to cancel the action.

Unnitializing Disk Drives

You can use maxView Storage Manager to uninitialize any disk drive (or SSD) in the Ready or Raw state. (In other words, the drive is not part of any logical device.) Uninitializing a disk drive clears Adaptec meta-data and reserved space from the drive and removes any OS partitions; existing data on the drive is destroyed.

> **Note:** Uninitialized drives change from their current state to the Raw state. Raw drives are compatible with any Host Bus Adapter (HBA), including Adaptec RAID controllers operating in Auto-Volume or HBA mode, and can be exchanged with drives on the motherboard's SATA interface. For more information about Raw devices and controller modes, see the *Adaptec RAID Controllers Installation and User's Guide*.

To uninitialize a disk drive:

1. In the Enterprise View, select a controller then, in Physical Devices tree, select the disk drive you want to uninitialize.
2. On the ribbon, in the Physical Device group, click **Initialize**.

The Init/Uninit Physical Device window opens.

3. Click the **Uninitialize Physical Device** button, then click **OK**.

maxView Storage Manager uninitializes the device

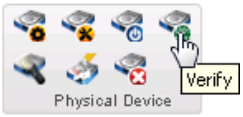
4. When prompted, click **OK** to close the Init/Uninit Physical Device window.

Verifying and Fixing a Disk Drive

When you verify a physical drive (HDD or SSD), maxView Storage Manager checks it for inconsistent or bad data and then fixes any problems it finds. (You can also choose to verify a physical drive without fixing it.) While maxView Storage Manager verifies and fixes a physical drive, you can't complete any other tasks on that drive. You can verify any drive in the Ready state.

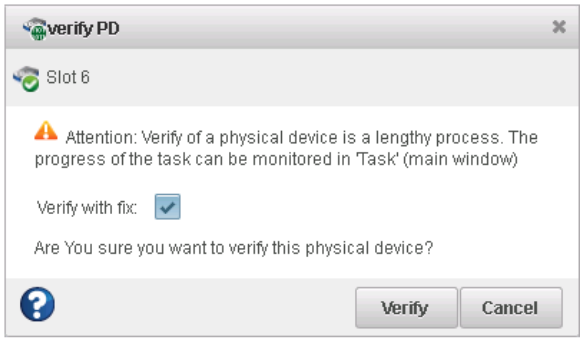
To verify and fix a physical drive:

1. In the Enterprise View, select a controller, then select a physical drive on that controller.
2. On the ribbon, in the Physical Device group, click **Verify**.



The Verify Physical Device window opens.

3. To repair inconsistent or bad data during verification, click **Verify with fix**. To verify the physical drive without fixing bad data, leave the checkbox blank.



4. Click **Verify**.

   Caution: Do not power off the system while the verification is in progress. If you do, the verification will stop.

   When the verification is complete, an event notice is generated in the event log, at which time you can continue working with the drive.

Changing a Disk Drive's Write Cache Setting

Note: This task is for advanced users only.

By default, disk drive write caching is disabled in maxView Storage Manager. You can enable write caching on a disk drive to improve performance. However, if the system experiences a power, device, or system failure, or cannot be shut down properly, there is a possibility of data loss or file-system corruption.

Caution: With disk drive write caching enabled, you may lose data if a power outage or other system failure occurs.

1. In the Enterprise View, select a controller then, in the Physical Devices tree, select a disk drive.
2. On the ribbon, in the Physical Device group, click **Set Properties**.

The Set Properties window opens.

3. In the Write-back Cache drop-down list, select Enabled or Disabled.
4. Click **OK**.

Working with Controllers

This section describes how to use maxView Storage Manager to manage the controllers in your storage space:

- To silence a controller alarm, see *Silencing a Controller Alarm* on page 96.
- To disable a controller alarm, see *Disabling a Controller Alarm* on page 96.
- To re-scan a controller, see *Rescanning a Controller* on page 97.
- To set the controller's default task priority, see *Setting a Controller's Default Task Priority* on page 97.
- To enable Native Command Queuing (NCQ) on a controller, see *Enabling Native Command Queuing on a Controller* on page 98.

Silencing a Controller Alarm

When a Warning- or Error-level event occurs, an audible alarm is triggered on the controller. You can silence the alarm on your local system while you fix the problem.
To silence the alarm:

1. In the Enterprise View, select the controller.
2. On the ribbon, in the Controller group, click **Silence Alarm**.

Disabling a Controller Alarm

Warning- or Error-level events trigger an audible alarm on a controller, which sounds until the event is resolved. The alarm is enabled by default, but can be disabled, 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 a controller.
2. On the ribbon, in the Controller group, click **Set Properties**.

The Set Properties window opens.

3. In the Alarm drop-down list, select Disabled.

   Note: To enable a disabled alarm, select Enabled from the drop-down list.

4. Click **Apply**.
   The alarm is disabled for that system.

Rescanning a Controller

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

To rescan a controller:

1. In the Enterprise View, select the controller.
2. On the ribbon, in the Controller group, click **Rescan**.

The Rescan window opens.

3. Click the **Rescan** button (on the Rescan window).
   maxView Storage Manager scans all the channels or ports on the controller you selected.
4. When the rescan is finished, click **Cancel** to close the Rescan window.

Setting a Controller's Default Task Priority

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

To set the default priority for all tasks running on the controller:

1. In the Enterprise View, select a controller.
2. On the ribbon, in the Controller group, click **Set Properties**.

The Set Properties window opens.

3. On the General Settings tab, in the Task Priority drop-down list, select High, Medium, or Low.
4. Click **Apply**.

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. On the ribbon, in the Controller group, click **Set Properties**.

The Set Properties window opens.

3. On the General Settings tab, in the NCQ drop-down list, select Enabled or Disabled.
4. Click **Apply**.

Working with System Alarms

Warning- or Error-level events on a system trigger an audible alarm, a series of beeps which sound every five minutes (or 300 seconds) until the event is resolved.

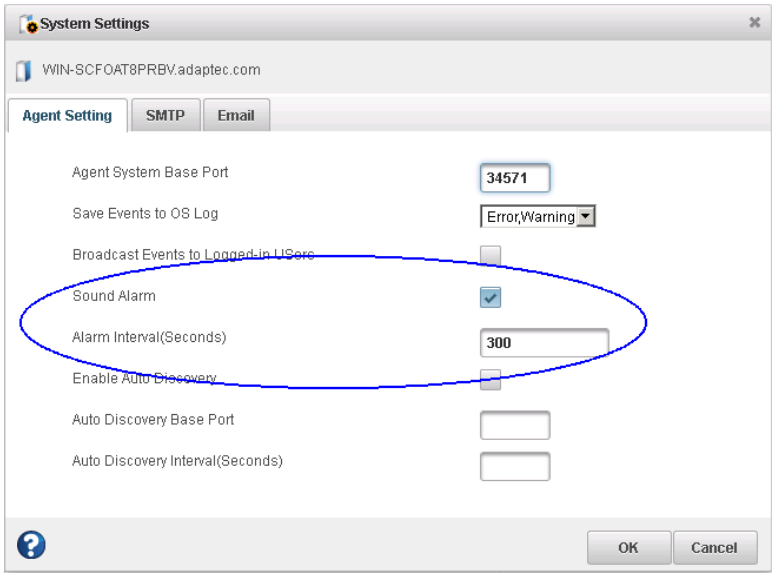
The alarm is enabled by default, but can be disabled on any system, if required. You can also change the frequency and duration of the alarm.

> **Note:** A system alarm is not the same as a controller alarm. For controller alarm information, see *Working with Controllers* on page 96.

To change alarm settings on a system:

1. In the Enterprise View, select a system.
2. On the ribbon, in the System group, click **System Settings**.

The maxView Storage Manager Agent Settings window opens. The alarm settings are circled in the next figure.



3. Edit the alarm settings, as needed.

   You can disable the system alarm by deselecting **Sound Alarm**.

4. Click **OK**.
   The changes take effect immediately.

Updating Controller and Disk Drive Firmware

Note: This task is recommended for advanced users only.

maxView Storage Manager includes a wizard to help you update the firmware on the controllers and disk drives in your storage space. The wizard updates the firmware for devices of the same type on the local or a remote system.

For example, if your storage space includes disk drives from two different manufactures, you must update the firmware for each manufacturer's drives separately by running the wizard twice. Additionally, if you have more than one system in your storage space, you must run the wizard for each system separately.

To update the firmware on the controllers and disk drives in your storage space, review the prerequisites in *Before You Begin* on page 99, then follow one of these sets of instructions:

- *Updating the Controller Firmware* on page 99
- *Updating the Disk Drive Firmware* on page 102

Before You Begin

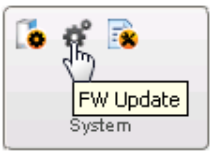
Before you begin, download the latest firmware images from the Adaptec Web site at *www.adaptec.com*, or from your vendor's support site on the World Wide Web. Controller images come in sets of one or more files and have a .ufi file extension. Disk drive image file names vary by manufacturer.

Updating the Controller Firmware

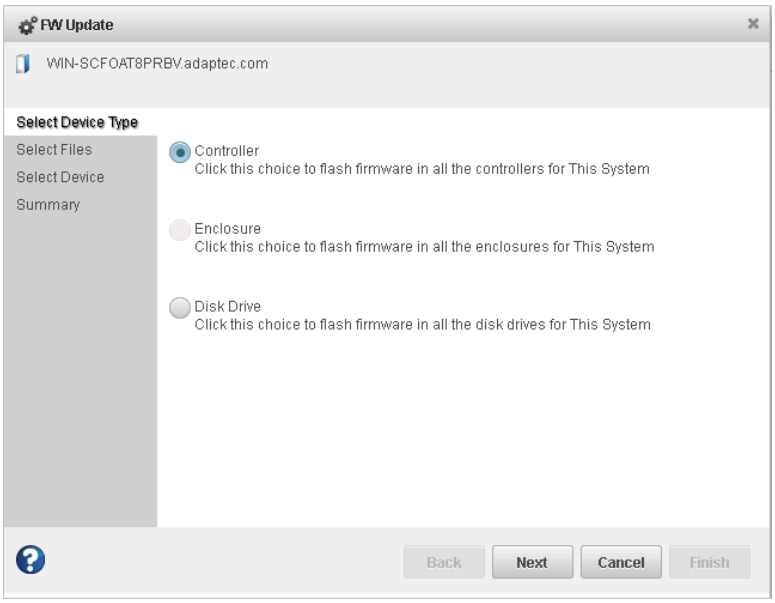
Use the Firmware Update wizard to update the firmware for one or more controllers of the same type on the local or a remote system.

To update the controller firmware:

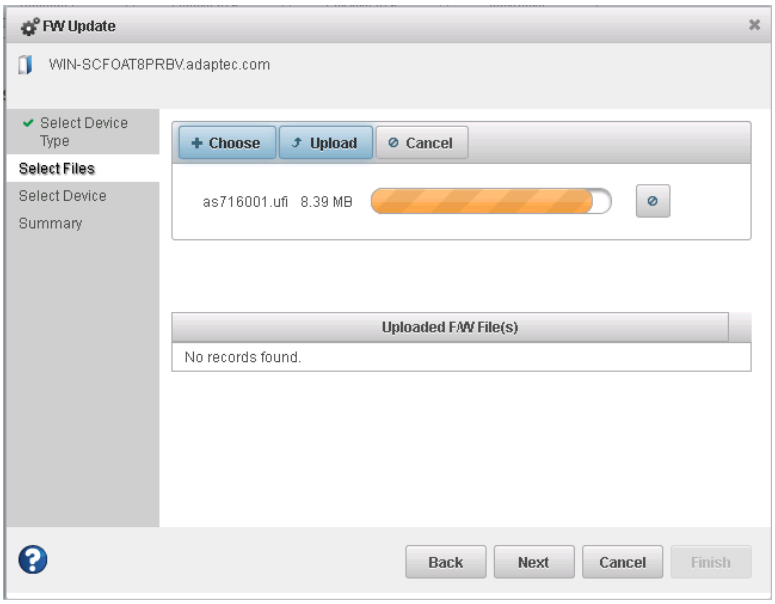
1. In the Enterprise View, select a system.
2. On the ribbon, in the System group, click **FW Update**.



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

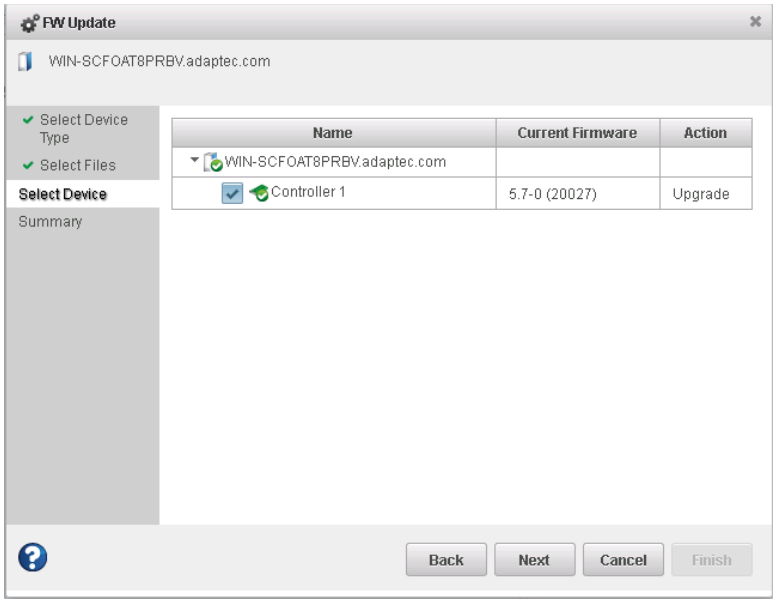


4. Click **Choose**, browse the file system for the firmware update file (typically, a .ufi file), click **Open** to select the file (the button label may be different on your browser), then click **Upload**.

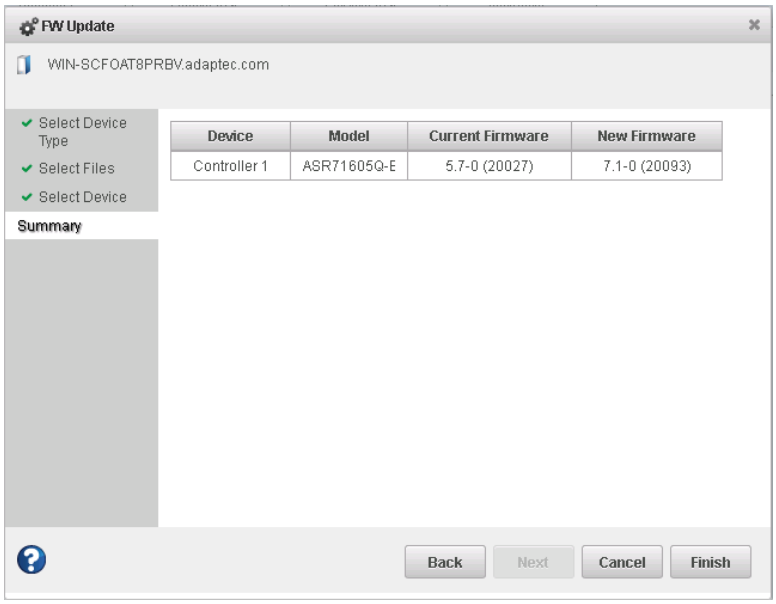


5. When the file name appears in the Uploaded F/W File(s) list, click **Next**.

6. Select the controllers you want to update, then click **Next**.



7. Review the update summary, then click **Finish**.



Caution: Do *not* power down the controller(s) while the update is in progress!

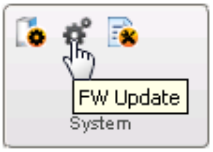
8. When the update is complete, click **OK**. Restart the server to activate the new firmware image.

Updating the Disk Drive Firmware

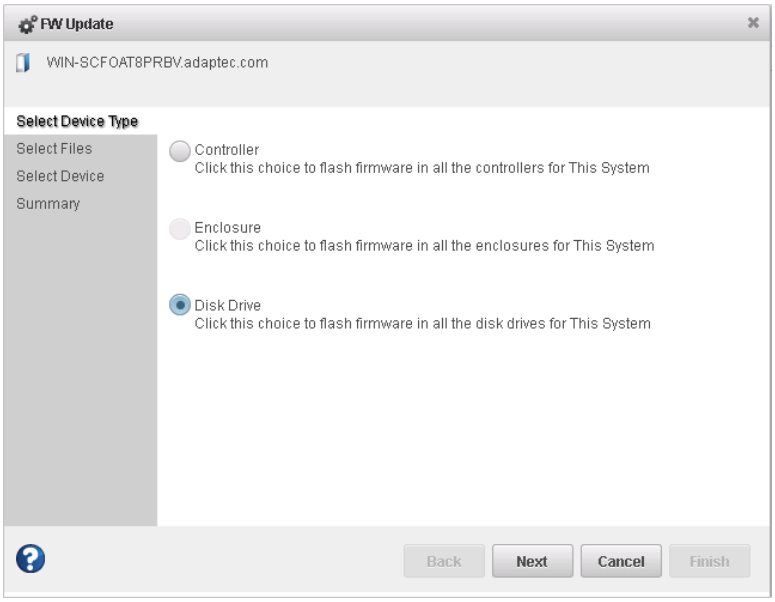
Use the Firmware Update wizard to update the firmware for one or more disk drives of the same type on the local or a remote system. The procedure is similar to updating the controller firmware (see *Updating the Controller Firmware* on page 99).

To update the disk drive firmware:

1. In the Enterprise View, select a system.
2. On the ribbon, in the System group, click **FW Update**.



3. When the wizard opens, select **Disk Drive**, then click **Next**.



4. In the Select Files panel, click **Choose**, browse the file system for the firmware update file, click **Open** to select the file (the button label may be different on your browser), then click **Upload**.
5. When the file name appears in the Uploaded F/W File(s) list, click **Next**.
6. In the Select Devices panel, select the disk drives you want to update, then click **Next**.
7. Review the update summary, then click **Finish**.

   Caution: Do *not* power down the controller(s) while the update is in progress!

8. When the update is complete, click **OK**. Restart the server to activate the new firmware image.

11 Monitoring Status and Activity

This section describes how maxView Storage Manager helps you monitor status and activity in your storage space.

Monitoring Options

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

- **Event Log**—The main window of maxView Storage Manager features an event log that provides at-a-glance status information about activity (or *events*) occurring in your storage space. All Warning- and Error-level events are also recorded in your *operating system's* event log.
  See *Viewing Activity Status in the Event Log* on page 104 and *Changing an Operating System's Event Log Setting* on page 118.
- **Task Log**—The main window also features a task log that provides status information about the progress of current or recurring tasks in your storage space, such as the creation or verification of a logical drive.
  See *Viewing Task Status in the Task Log* on page 105.
- **Storage Dashboard**—Occupying the largest portion of the main window in maxView Storage Manager, the Storage Dashboard provides complete, at-a-glance, information about the components of your storage space, including status information, physical and logical device properties, resources, and reliability indicators for hard drives and SSDs.
  See *Viewing Component Status in the Storage Dashboard* on page 105.
- **Chart View**—Provides a visual representation of free and used space for a system, controller, or your entire storage space.
  See *Viewing Storage Space Usage in Chart View* on page 108.
- **Notifications**—You can set maxView Storage Manager to email or broadcast status notifications in your choice of format to help you monitor activities in your storage space, such as:
  - Changes in the status of physical devices, such as disk drive failures.
  - Changes on local or remote systems, such as the expansion of a logical drive or the creation of a hot spare.
  - Changes in temperature in storage enclosures, or that fans or power supplies within an enclosure have failed.

  See pages *Notifying Users by Email About Status and Activity* on page 109 and *Broadcasting Alerts About Status and Activity* on page 115.
- **Advanced Statistics**—You can set maxView Storage Manager to log advanced I/O and usage statistics for the RAID controllers in your system.
  See *Monitoring Advanced Statistics about Activity in Your Storage Space* on page 115.
- **Audible Alarm**—A series of beeps sounds whenever a serious event occurs on your storage space.
  See *Working with System Alarms* on page 98.

Checking Status from the Main Window

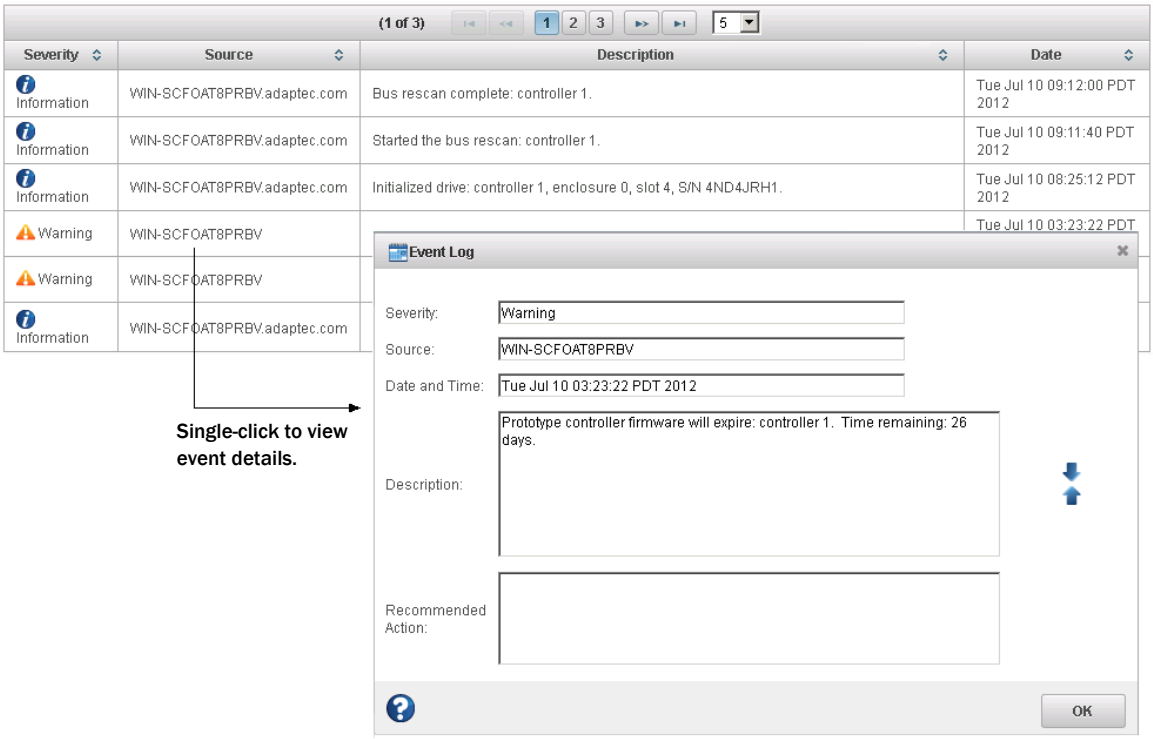
You can view status information and messages about the activity occurring in your storage space by looking at the *event log*, status icons, and *task log* in the main window of maxView Storage Manager. (You can also view all events for a system in its operating system event log; see *Changing an Operating System's Event Log Setting* on page 118.) Using the Storage Dashboard and Chart View, you can also monitor the physical and logical components of your storage space from the main window, including summary information and status, physical and logical device properties and resources, and usage and I/O statistics.

Viewing Activity 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 *What Do the Event Status Icons Mean?* on page 104) in the left-hand column, as shown in the figure below.

You can view events as they occur in the bottom panel of the maxView Storage Manager main window. The main window displays the last 100 events in your storage space. To view more events, filtered by device (a controller, for example), open the **Event tab** on the Storage Dashboard (see *Viewing Component Status in the Storage Dashboard* on page 105).

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



To make it easier to find a specific event, click on the column heads to sort the events. For example, sorting the events by Severity can help you find specific Error- or Warning-level events quickly.

What Do the Event Status Icons Mean?

maxView 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 disk drive or hot spare has failed. An enclosure is overheating. Multiple fans or power supplies within an enclosure have failed.

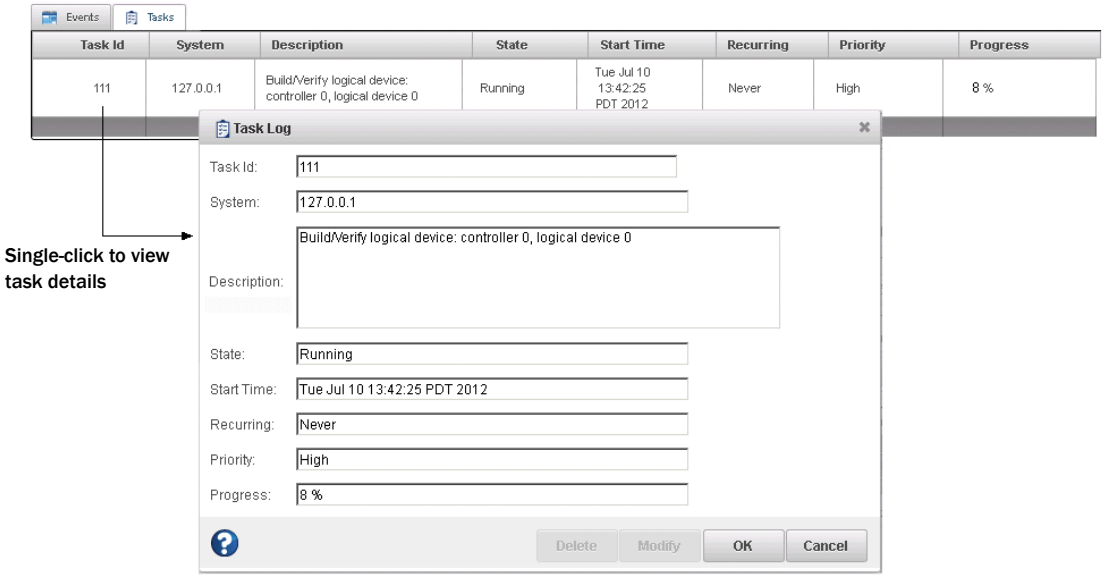
Icon	Status	Examples
		An enclosure is not responding.

Note: All Warning- and Error-level events also cause the audible alarm to sound. See *Working with Controllers* on page 96 for more information.

Viewing Task Status in the Task Log

The Task Log shows the status and progress of tasks in your storage space, with the most recent task listed at the top.

Single-click any task to open the Task Log Detail window to see more information in an easier-to-read format. For more information about monitoring and scheduling tasks in maxView Storage Manager, see *Working with Scheduled Tasks* on page 85.

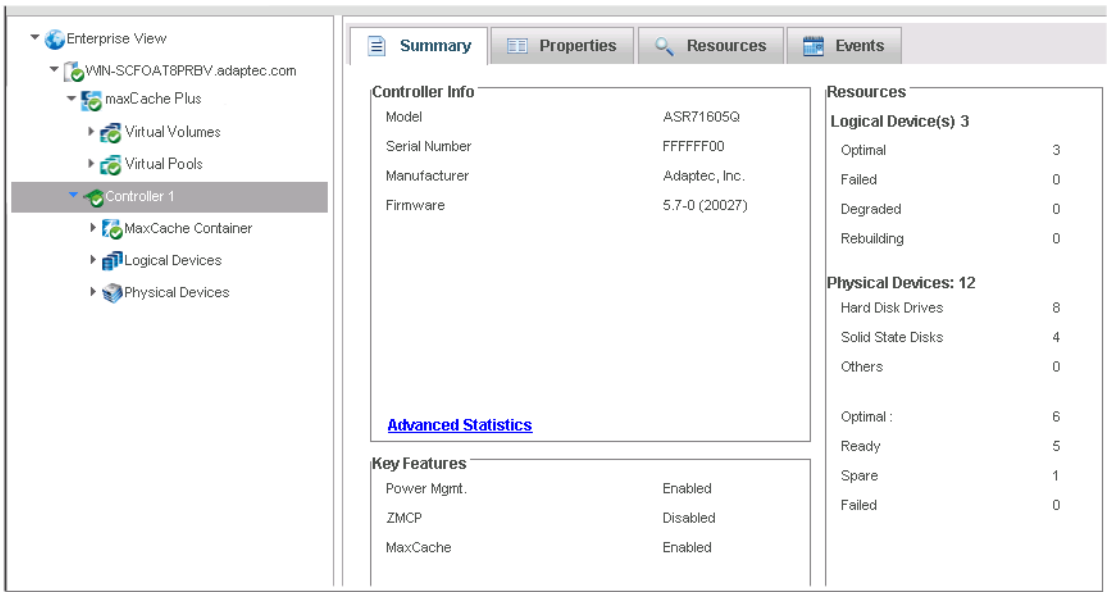


Viewing Component Status in the Storage Dashboard

The Storage Dashboard provides detailed information about the components of your storage space, including local and remote systems, controllers, logical drives, enclosures, disk drives and SSDs, and maxCache devices (maxCache Container, virtual pools, virtual volumes). Occupying the largest portion of the main window in maxView Storage Manager, the Storage Dashboard organizes component information by category, with a tabs providing one-click access to summary information and status, properties, resources, and usage statistics.

The information on the Storage Dashboard varies, depending on which component is selected in the Enterprise View. The figure below shows the Storage Dashboard for a controller. Tabs provide access to summary information, controller properties, and resources. The Events tab shows filtered events about the selected device (see *Viewing Activity Status in the Event Log* on page 104).

Note: For information about Chart View, on the right side of the Storage Dashboard, see *Viewing Storage Space Usage in Chart View* on page 108.



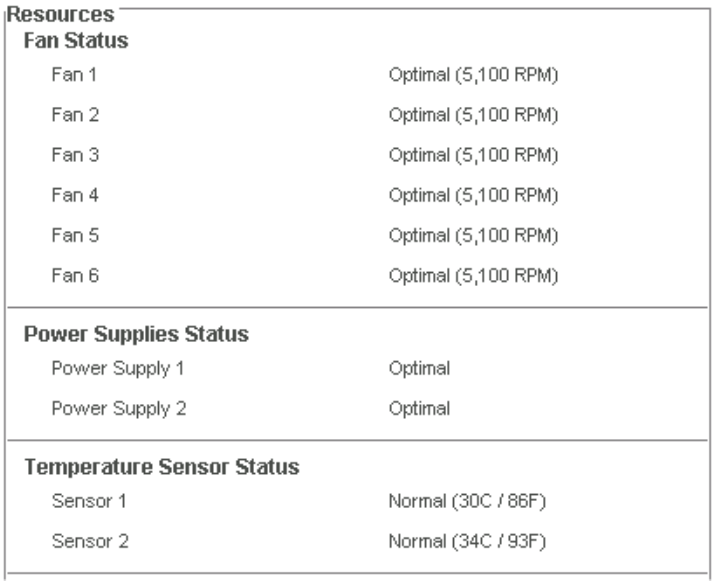
This table lists the categories and types of information provided on the Storage Dashboard for each component in your storage space.

Component	Categories	Examples
System	Summary	System name and IP address Operating system Number and type of controllers Alarm status (see *Working with System Alarms* on page 98)
Controller	Summary Properties Resources	Model, key features, and status Number of physical drives, logical drives and status Performance mode, settings, and power management features maxCache status Health and activity of flash backup module, if present ("Green backup" status) Physical drive assignments by logical device (see *Revealing More Device Information* on page 35)
Logical drives and maxCache Container	Summary Resources	Raid level, size, and status Member drives and locations Cache settings Hot spare protection Power management status Drive segment allocation
Enclosure	Summary	Enclosure type, vendor, model and status Fan, power supply, and temperature status (see *Monitoring Enclosure Status* on page 107) Slot allocation and usage
Hard drives and SSDs	Summary Resources SMART Statistics	Drive type (hard drive, SSD), vendor, and model Drive state (Ready, Optimal, Hot Spare) Channel number and device ID Cache settings, power management status, and transfer speed Drive segment allocation SMART statistics (see *Viewing SMART Statistics* on page 108)
maxCache Plus (top-level tree node)	Summary Resources	maxCache Plus version info and features Number of virtual pools, virtual volumes, and logical devices Virtual device state (online, offline, suboptimal) Logical device assignments by virtual pool and virtual volume (see *Revealing More Device Information* on page 35)
Virtual pool	Summary	Volume membership, member logical drives

Component	Categories	Examples
	Resources	Pool state (online, offline) Pool ID, name, and description Tier level, chunk size, and pool size
Virtual volume	Summary Resources	Pool members, pool state, pool usage and tier levels Volume state (online, offline, suboptimal) Volume ID, name, and description Volume type (Tiered, Cached, Cached LD, Pass Through), volume size Fetch/Flush mode

Monitoring Enclosure Status

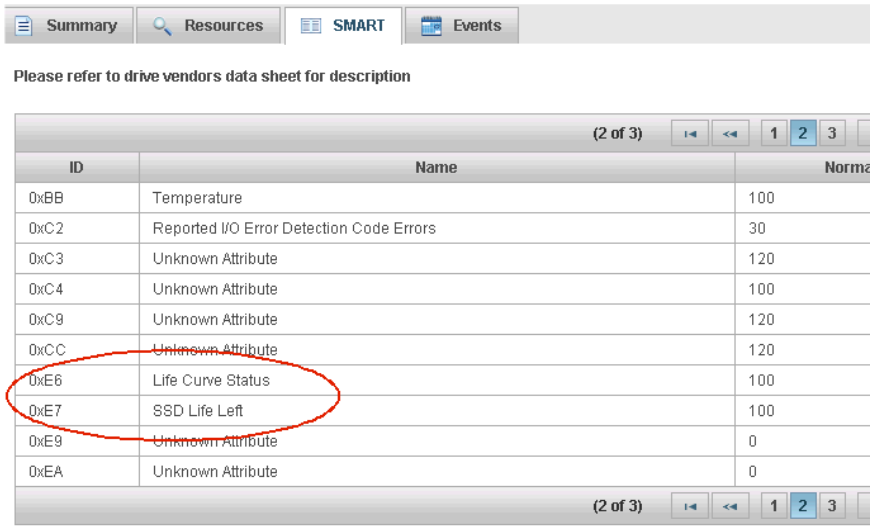
If your storage space includes an enclosure with an enclosure management device, such as a SCSI Accessed Fault-Tolerant Enclosure (SAF-TE) processor, maxView Storage Manager displays temperature, fan, and power module status on the Storage Dashboard, as shown in the figure below.



Viewing SMART Statistics

You can use the Storage Dashboard to view various indicators of reliability for the SATA hard drives and SSDs in your storage space. maxView Storage Manager displays SMART statistics for the drives using *Self-Monitoring, Analysis and Reporting Technology* available on most contemporary hard drives and non-spinning storage devices. You can use this information to verify the health of your hard drives and SSDs and to predict drive failures.

To view the SMART statistics for a hard drive or SSD, select the drive in the Enterprise View, then click the **SMART** tab on the Storage Dashboard. For SSDs, the statistics include wear-level and longevity indicators, as shown in next figure. Refer to your drive vendor's data sheet for a description of individual report items.

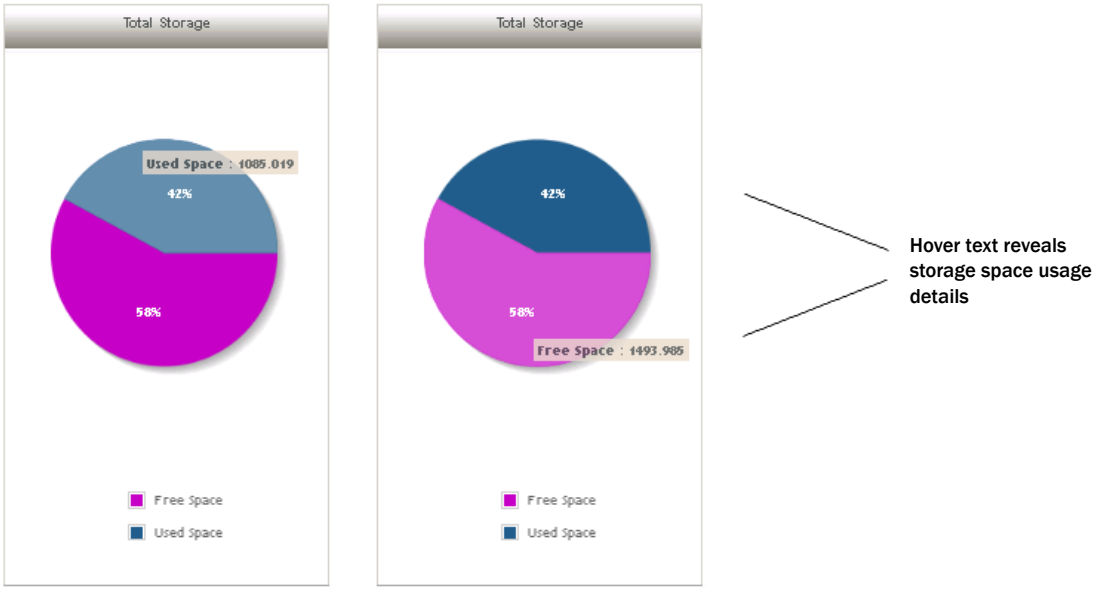


SSD wear-level and longevity indicators

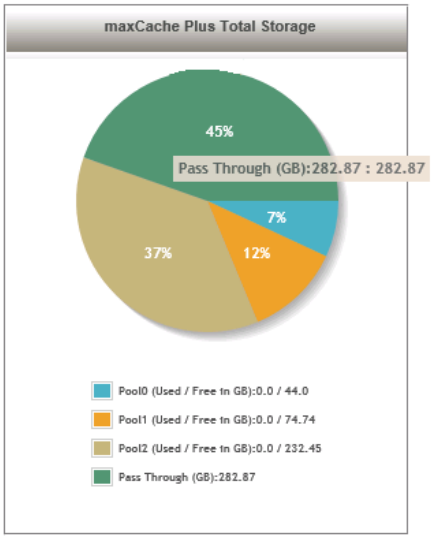
Viewing Storage Space Usage in Chart View

Chart View provides a visual representation of the free and used space for a system, controller, or your entire storage space (all systems and controllers). Located on the right side of the Storage Dashboard in the maxView main window, Chart View displays a pie chart of storage space usage.

To view storage space usage in Chart View, simply select a component in the Enterprise View (a system, for instance); the chart view is updated immediately. To view more details about the use of storage space on that component, move your mouse over any colored section of the pie chart. Hover text reveals the amount of space represented by that section, as shown in the figure below.



For maxCache Plus devices, chart view shows the free and used space for the virtual pools and virtual volumes in your system. To reveal the chart view for maxCache Plus devices, simply select the **maxCache Plus** node in the Enterprise view. Like chart view for other components, hover text reveals the amount of space represented by each colored section of the pie chart, as shown in the figure below.



Notifying Users by Email About Status and Activity

You can set up maxView Storage Manager to send email messages (or *notifications*) to one or more email addresses when an event occurs on a system, such as the creation of a logical drive or the failure of a disk drive. 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 maxView Storage Manager Agent only. Email notifications can also help ensure that urgent issues receive immediate attention from the right people.

Follow the instructions in this section to:

- Set up email notifications (see *Setting Up Email Notifications* on page 110).

- Send a test email (see *Sending a Test Message* on page 112).
- Modify or remove an email recipient (see *Modifying Recipient Information or Removing a Recipient* on page 113).
- Modify email server settings (see *Modifying Email Server Settings* on page 114).
- Create an email notification template (see *Creating an Email Notification Template* on page 114).

Setting Up Email Notifications

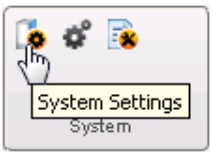
This section describes how to set up email notifications for one system. If you want to monitor multiple systems by email, you must complete the tasks in this section for each one separately.

Before you begin, note this information:

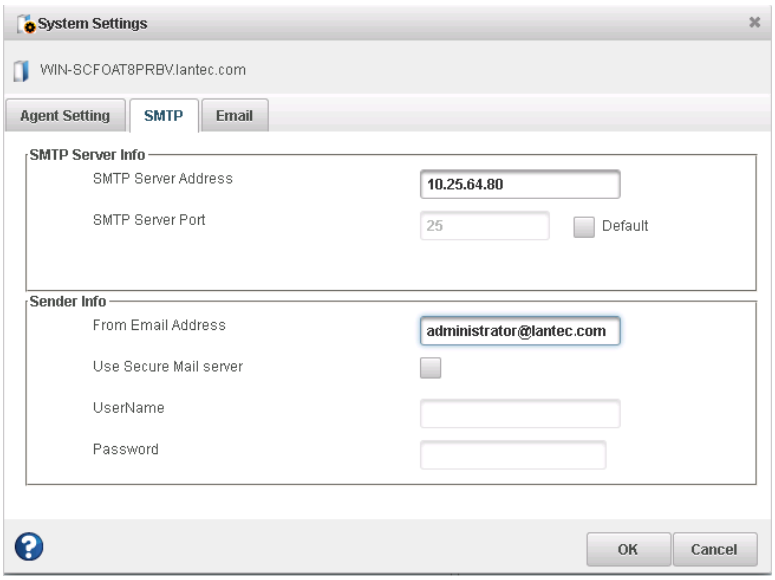
- The address of your Simple Mail Transfer Protocol (SMTP) server (host name and domain, or TCP/IP address)
- The email address of each person who will receive email notifications

To set up email notifications:

1. In the Enterprise View, select a system.
2. On the ribbon, in the System group, click **System Settings**.

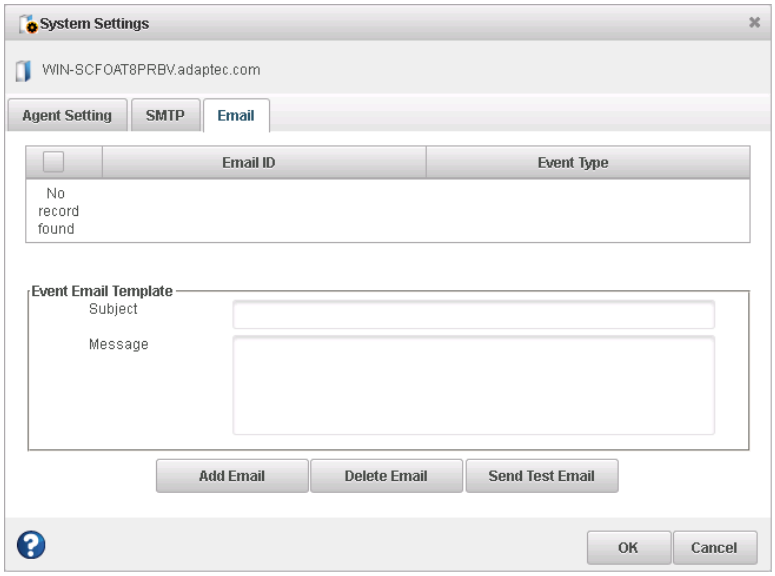


3. When the System Settings window opens, click the **SMTP** tab.
4. Enter the IP address of your SMTP server and the server's port number (or use the default port). Then, enter the “From” address that you want to appear in your email notifications. If an email recipient will be replying to email notifications, be sure that the “From” address belongs to a system that is actively monitored.

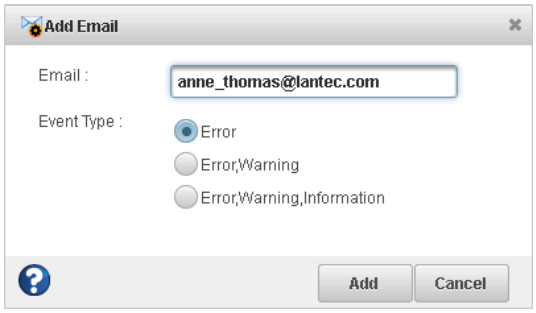


5. If authentication is enabled on your SMTP server (that is, the server requires authentication details before it will send messages to users), select **Use Secure Mail Server**, then enter the SMTP server's login credentials (username/password) in the space provided.

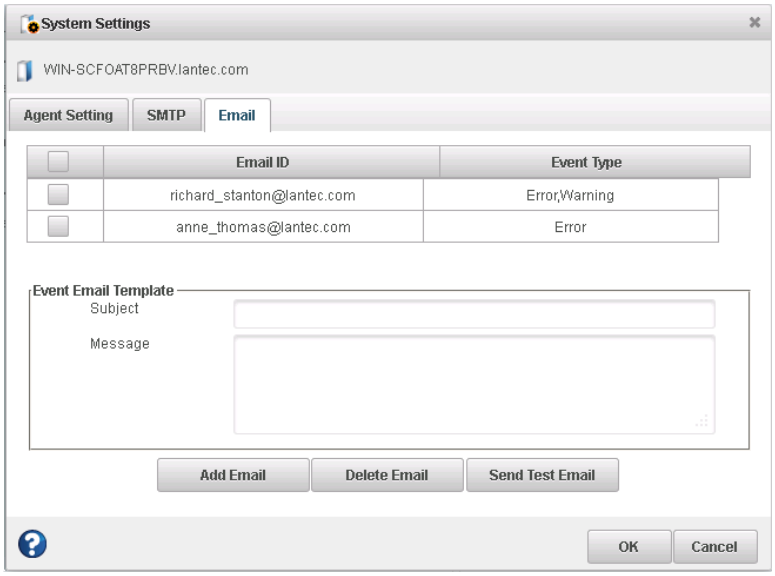
6. On the System Settings window, click the **Email** tab.
   The Email Notifications Manager opens.



7. Click **Add Email**. When the Add Email window opens, enter the recipient's email address, select the level of events that will trigger an email notification for that recipient (Error, Error/Warning, Error/Warning/Informational), then click **Add**. (For more information about event levels, see *What Do the Event Status Icons Mean?* on page 104.)



   Repeat this step to add more email recipients.
   Each recipient appears in the Email Notifications Manager, as shown below:

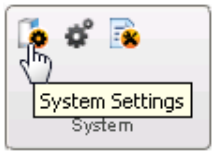


8. When you're done adding email recipients, click **OK**.
   The email recipients and your SMTP server settings are saved.
9. Repeat the steps in this section *for each system* you want to monitor with email notifications, then continue by sending test messages to all recipients (see *Sending a Test Message* on page 112).

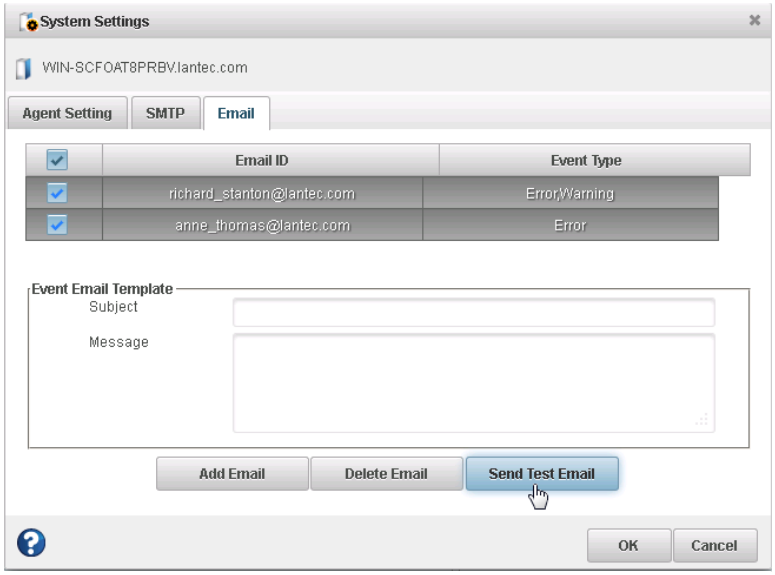
Sending a Test Message

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. On the ribbon, in the System group, click **System Settings**.



3. When the System Settings window opens, click the **Email** tab.
   The Email Notifications Manager opens.
4. Select one or more email addresses to send a test message to. To select all addresses, click the check box at the top of the list, as shown in the figure below.



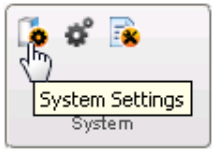
5. Click **Send Test Email**.
   If the test is successful, the email recipient(s) receive the test message. If the test fails:
   - Ensure that the recipient's email address is correct. (See *Modifying Recipient Information or Removing a Recipient* on page 113.)
   - Ensure that your SMTP server address is correct. (See *Modifying Email Server Settings* on page 114.)
   - Try sending the test message again.

Modifying Recipient Information or Removing a Recipient

To modify a recipient's email address or change the types of event notifications the recipient receives, you have to *delete and recreate* the recipient record in the Email Notifications Manager.

To modify a recipient's information or to stop sending email notifications to a recipient:

1. In the Enterprise View, select a system.
2. On the ribbon, in the System group, click **System Settings**.



3. When the System Settings window opens, click the **Email** tab.
   The Email Notifications Manager opens.
4. Select the email recipient you want to modify or remove, then click **Delete Email**.
   If you simply want to stop sending email notifications to the recipient, click **OK** to close the Email Notifications Manager; otherwise, continue with the next step.
5. To modify the recipient's email address or to change the types of event notifications the recipient receives, click **Add Email**. When the Add Email window opens, change the information as required, then click **OK**.
   The modified information appears in Email Notifications Manager.
6. Click **OK** to close the Email Notifications Manager and save the changes.

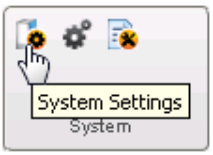
Modifying Email Server Settings

You can modify these email server settings, if required:

- Address and port of your SMTP server
- 'From' address that will appear in email notifications
- Secure server login credentials

To modify email server settings:

1. In the Enterprise View, select a system.
2. On the ribbon, in the System group, click **System Settings**.



3. When the System Settings window opens, click the **SMTP** tab.
4. Edit the SMTP server settings as required, then click **OK** to save your changes.

Creating an Email Notification Template

You can create an email notification template with a custom subject line and notification preamble. The notification preamble precedes the system-generated event message (created by maxView Storage Manager), which includes (but is not limited to) the following information:

- System on which the event occurred
- Timestamp
- Severity level (Error, Warning, Information)
- Event details

To create an email notification template:

1. In the Enterprise View, select a system.
2. On the ribbon, in the System group, click **System Settings**.

3. When the System Settings window opens, click the **Email** tab.
   The Email Notifications Manager opens.
4. In the Event Email Template section, enter a subject line for the email notification, then enter a notification message.

5. Click **OK** to save the template.

Broadcasting Alerts About Status and Activity

You can set maxView 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 maxView 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.

> **Note:** Event alerts are independent of email notifications (see *Notifying Users by Email About Status and Activity* on page 109).

To enable event alerts:

1. In the Enterprise View, select a system.
2. On the ribbon, in the System group, click **System Settings**.

   The Agent Settings window for that system opens.
3. Click **Broadcast Events to Logged-In Users**, then click **OK**.
4. Restart maxView Storage Manager to apply the change.

Monitoring Advanced Statistics about Activity in Your Storage Space

You can set maxView Storage Manager to log advanced I/O and usage statistics about the RAID controllers, hard drives, SSDs, and logical drives in your storage space, including maxCache caching statistics.

Follow the instructions in this section to:

- Enable statistics logging on a controller (see *Setting up Statistics Logging* on page 116).

  > **Note:** Statistics logging for maxCache Plus virtual volumes is enabled by default and does not require user activation or setup.

- View the advanced statistics for a controller, hard drive, SSD, logical drive, or virtual volume (see *Viewing Advanced Statistics* on page 117).
- Reset the statistics counters (see *Resetting the Statistics Counters* on page 118).

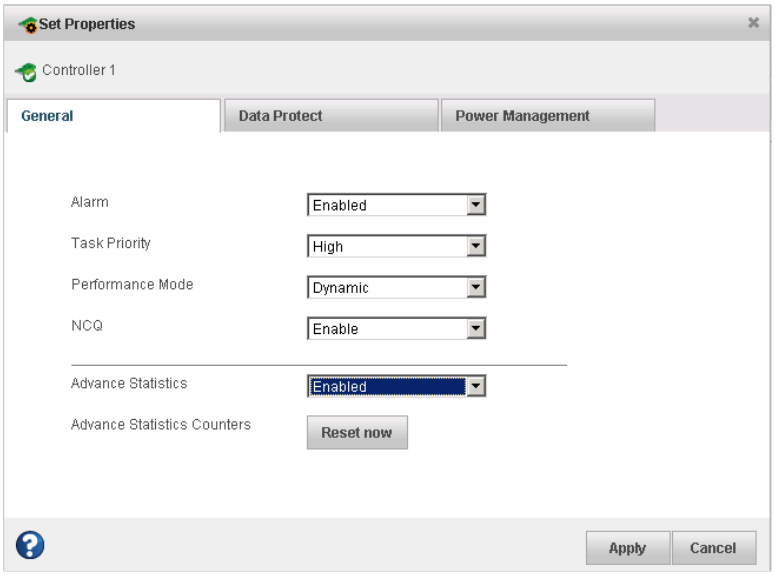
Setting up Statistics Logging

To set up statistics logging for the controllers in your storage space:

1. In the Enterprise View, select a system, then select a controller.
2. On the ribbon, in the Controller group, click **Set Properties**.

The Set Properties window opens.

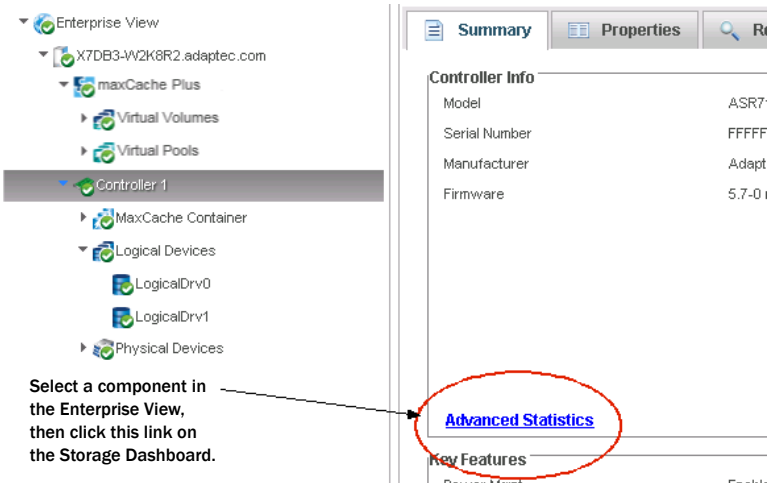
3. In the Advanced Statistics drop-down list, select Enabled.



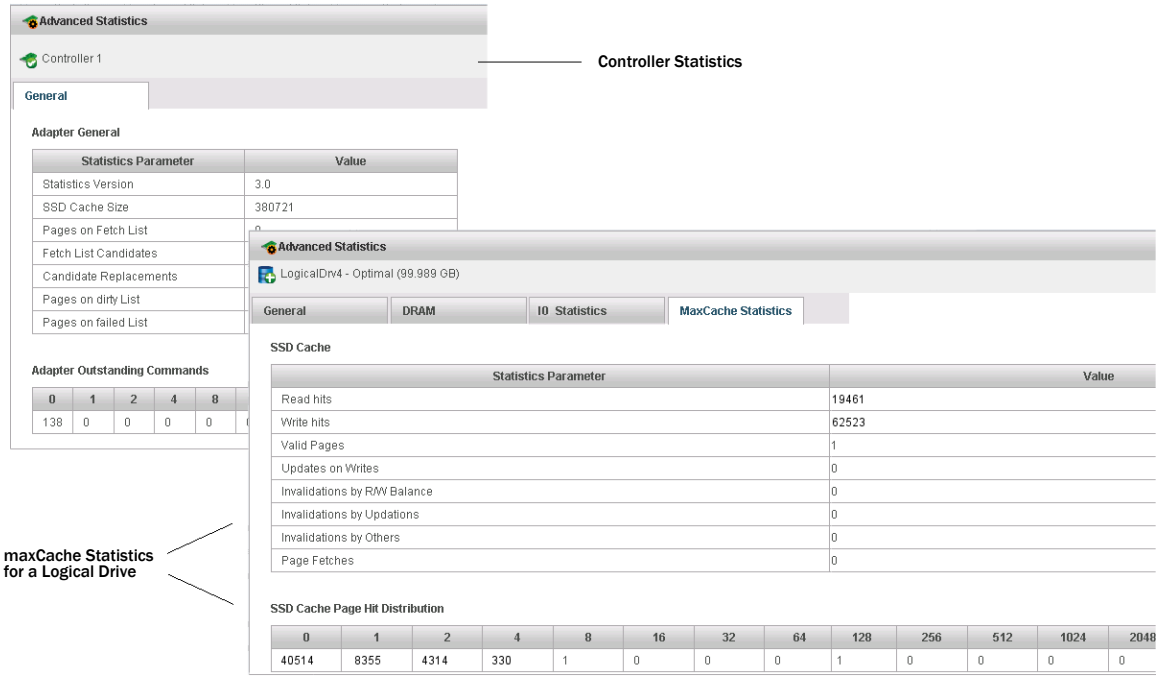
4. Click **Apply**.

Viewing Advanced Statistics

Use the Statistics Viewer to view the advanced statistics for the controllers, hard drives, SSDs, logical drives, and maxCache devices in your storage space, including virtual volumes and the maxCache Container. To view the statistics for a component, select it in the Enterprise View then, on the Storage Dashboard, click the **Advanced Statistics** link, on the Summary tab.



The statistics listed vary, depending on which type of component you select. The following example shows the advanced statistics for a controller (on the left) and the maxCache statistics for a logical drive, including cache hits and misses and a histogram of cache hit distribution.



Resetting the Statistics Counters

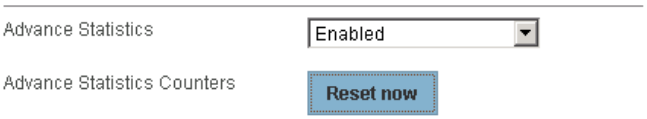
In maxView Storage Manager, advanced statistics are cumulative. That is, the statistics continue to accumulate until you reset the counters for a controller to zero.

To reset the statistics counters for a controller:

1. In the Enterprise View, select a system, then select the controller you want to reset.
2. On the ribbon, in the Controller group, click **Set Properties**.

The Set Properties window opens.

3. Click the **Reset Now** button, then click **Apply**.



The statistics counters are reset.

Changing an Operating System's Event Log Setting

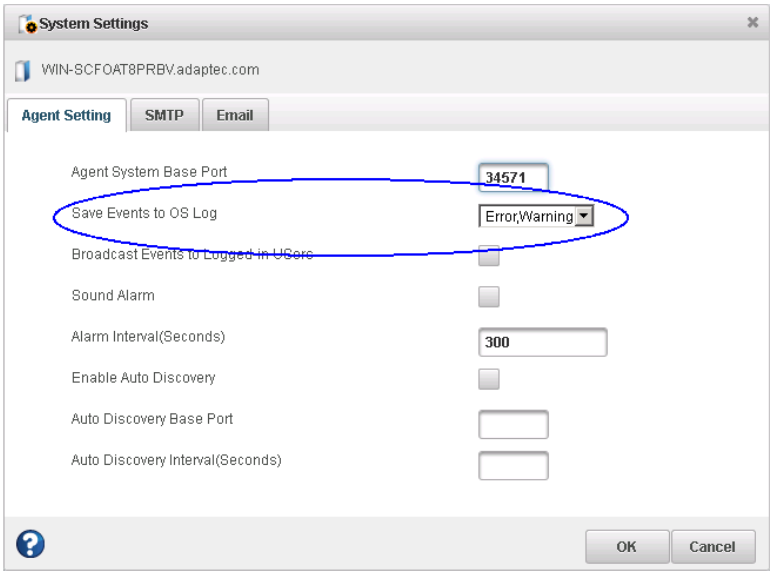
In addition to the maxView Storage Manager event log, all Warning- and Error-level events on a system are recorded in its *operating system* event log. You can customize the level of events that are recorded, or you can disable operating system event logging.

To change or disable operating system event logging on a system:

1. In the Enterprise View, select a system.
2. On the ribbon, in the System group, click **System Settings**.

The Agent Settings window opens for that system.

3. In the Save Events to OS Log drop-down list, select the type of events that you want to log, then click **OK**.



4. Restart maxView Storage Manager to apply the new setting.

12 Managing Your Storage Space

This section describes the advanced features in maxView Storage Manager that help you manage your storage space. You can:

- Deploy servers with a *server template file*
- Manage remote systems and auto-discovery tasks with the Remote System wizard
- Clear a controller configuration
- Use a custom base port for the maxView Storage Manager Agent

Deploying Servers

maxView Storage Manager helps you deploy servers in your storage space without configuring each server manually. You can select an optimally configured server in your storage space, save the controller configuration to a *sever template file*, then duplicate the configuration on servers throughout your network.

The basic procedure works like this:

1. Choose the system you want to use as the model for other servers in your storage space.
2. Save the configuration to a server template file for each controller on that system.
3. Log in to each remote system in your storage space and restore the controller(s) from the server template file(s).

The following sections provide details on each of these steps.

Creating a Server Template File

This procedure saves the configuration of a controller that you want to use as a model for other servers in your storage space. It creates a server template file in XML format, which defines the controller type, operational settings, physical drive size, logical drive size, RAID level, and more. The default name of the server template file is ControllerConf.xml.

To create a server template file:

1. In the Enterprise View, select a system, then select a controller on that system.
2. On the ribbon, in the Controller group, click **Save Configuration**.

   The Save Configuration window opens.

3. Click **Save** to continue.
4. When the File Download window opens, click **Save**, enter a name for the server template file or accept the default name, then click **Save** again.
5. When the download is complete, click **Close**.
6. Continue with *Duplicating the Server Template* on page 120 to deploy the same controller configuration on multiple systems in your storage space.

Duplicating the Server Template

When you are ready to duplicate the server template on other systems in your storage space, you can restore the controller(s) on those systems from the server template file.

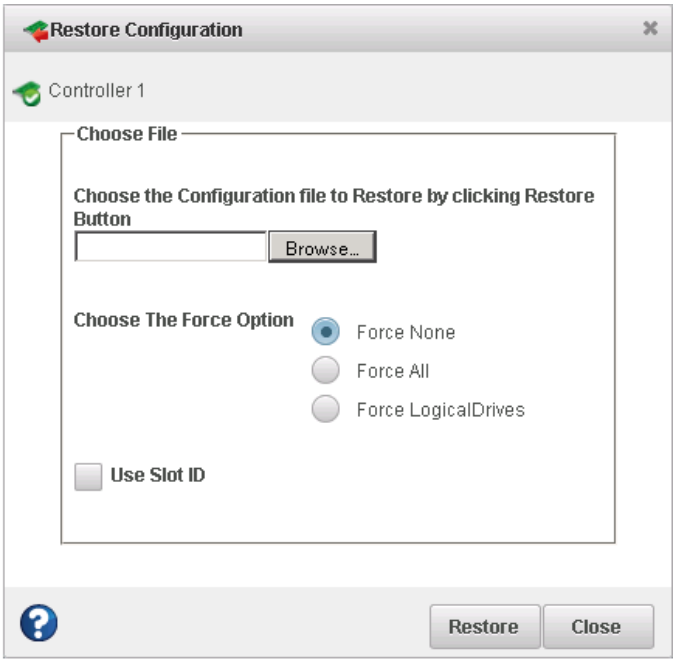
Keep in mind that:

- The server template file (default, ControllerConf.xml) is editable. For example, you may need to change the disk drive capacity or logical drive size to accommodate the differences on each machine.
- Drives from the same vendor with slightly different capacities (147GB vs 150GB, for instance) are considered interchangeable. If the logical drive capacity changes as a result of the size difference, it is scaled accordingly. For example, if the new drives have 4% more capacity due to vendor or model changes, then all logical drives are increased in size by 4%.

To duplicate the server template on another system:

1. In the Enterprise View, select a system, then select a controller on that system.
2. On the ribbon, in the Controller group, click **Restore Configuration**.

The Restore Configuration window opens.



3. Click **Browse**, navigate the file system to your server template file, then click **Open**.
4. Choose a Force option if the new controller does not support all of the features of the template controller, or if the drive capacity on the new system does not match the configuration in the server template file. The default is Force None. You can choose to:

Options	Description
Force All	To force deployment of all features
Force Logical Drives	To force deployment of just the logical drives

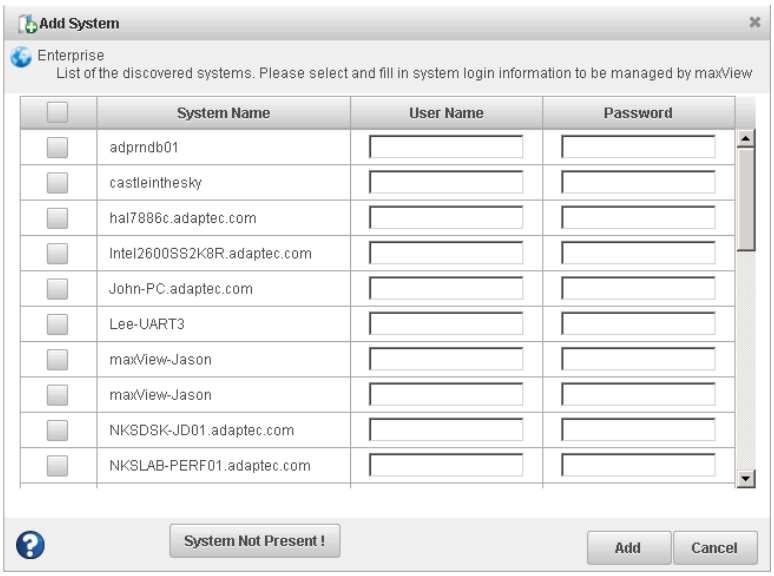
5. To retain the slot information for enclosures, click **Use Slot ID**.
6. Click **Restore**.
   maxView Storage Manager duplicates the controller configuration on the new controller.

7. Repeat these steps for each controller on the server. Choose a different server template file in Step *3* on page 121, as needed.

Managing Remote Systems

maxView 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 maxView Storage Manager, an "auto-discovery" task runs in the background, continuously searching your network for systems running the maxView Storage Manager Agent. The wizard presents a list of discovered systems (see figure below). You can select systems to add to the Enterprise View when you start maxView Storage Manager; add systems manually if they are not discovered automatically; and remove systems that you no longer want to manage.



Adding Remote Systems with the Wizard

For basic instructions for adding remote systems with the wizard, see *Logging into Remote Systems from the Local System* on page 41. Once you add a system in the wizard, it automatically appears in the Enterprise View each time you start maxView Storage Manager. You can work with a remote system's controllers, disk drives, and logical drives as if they were part of your local system.

> **Note:** The wizard adds all selected systems to the Enterprise view even if login fails on some systems. For those systems, try running the wizard again with different login credentials.

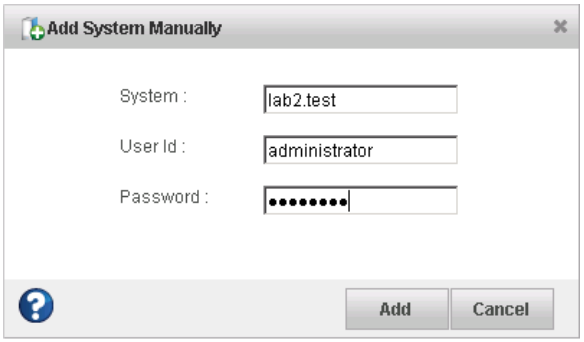
Manually Adding a Remote System

You can add a remote system manually if auto-discovery fails to find the system on your network.

To manually add a remote system:

1. On the ribbon, in the Home group, click **Add System**.

2. When the Add System window opens, click **System Not Present**.
   The Add System Manually window opens.
3. Enter the system name and login credentials in the space provided, then click **Add**.



   The window closes and the system appears in the discovered systems list in the Add System window.
4. Select the system, then click **Add**.
   maxView Storage Manager connects to the remote system and adds it to the Enterprise View.

Removing a Remote System

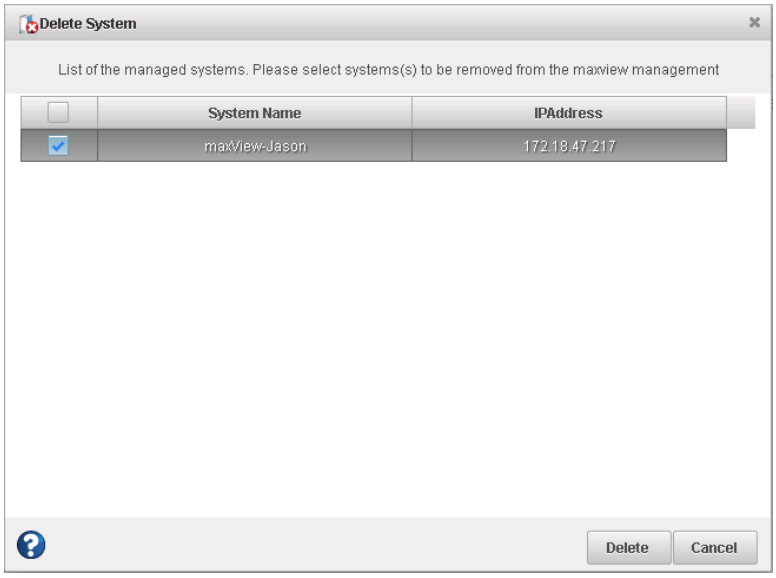
If you no longer want to manage a remote system, you can remove it from the Enterprise View.

Note: Removing a remote system from the Enterprise View does not take it off-line.

To remove a remote system:

1. On the ribbon, in the Home group, click **Delete System**.

   The Delete System window opens.
2. Select the system(s) you want to remove. To select all systems in the list, click the checkbox at the top of the window.



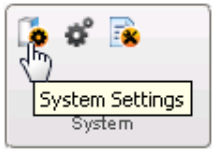
3. Click **Delete**.
   maxView Storage Manager removes the remote system(s) from the Enterprise View.

Changing the Auto-Discovery Settings

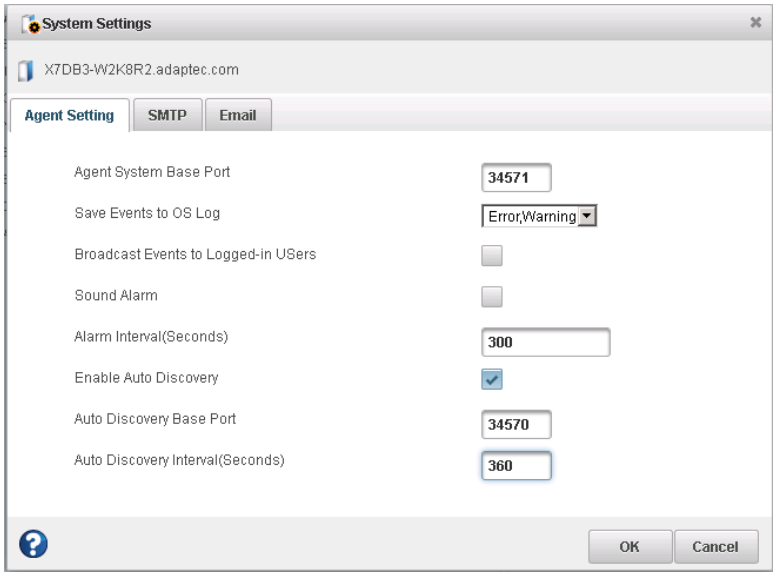
Auto-discovery, in maxView Storage Manager, is enabled by default. The auto-discovery task runs in the background each time maxView Storage Manager is started. You can disable auto-discovery if desired, and configure the auto-discovery settings described below.

To change the auto-discovery settings on a system:

1. In the Enterprise View, select a system.
2. On the ribbon, in the System group, click **System Settings**.



The maxView Storage Manager Agent Settings window opens for that system. 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 needed:
   - In the Auto Discovery Base Port field, enter the port number for the auto-discovery task. You can use any available port for auto-discovery. The default port is 34570. If you change the port, you must restart the maxView Storage Manager Agent for the change to take effect.
   - In the Auto Discovery Interval field, enter the number of seconds between each auto-discovery check. This number determines how often maxView Storage Manager checks for changes in remote system resources. The default is 360 seconds.
5. Click **OK** to save the changes.

Clearing the Controller Configuration

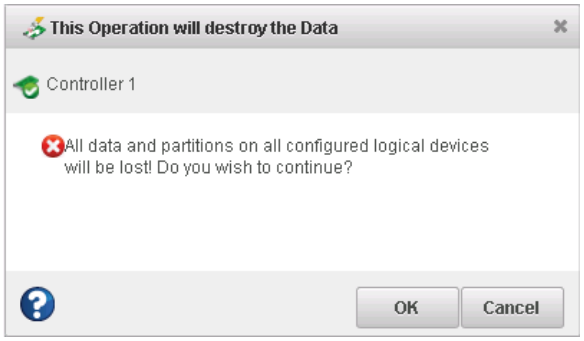
You can clear the configuration of a controller, if needed, to accommodate changes in your storage space. For example, you may want to clear a controller if you upgraded your hardware or if you plan to move the controller to another machine. Clearing the configuration destroys the controller meta-data, including logical device information, partition information, maxCache information, and so on. Once you clear the controller configuration, your online data is no longer accessible.

> **Caution:** When you clear a controller configuration, you lose all data stored on that controller. Be sure you no longer need the data on the controller before proceeding.

To clear the controller configuration:

1. In the Enterprise View, select a system, then select a controller on that system.
2. On the ribbon, in the Controller group, click **Clear Configuration**.

A message window opens, warning that this operation destroys your data.



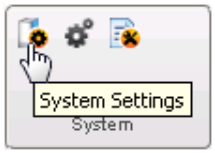
3. Click **OK** to clear the configuration; click **Cancel** to close the window without clearing the configuration.

Changing the Agent Base Port Setting

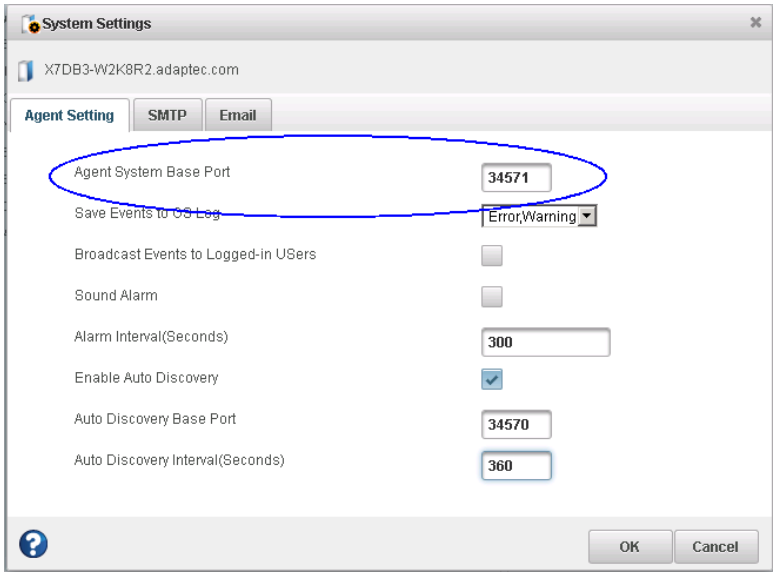
You can change the base port setting for the maxView Storage Manager Agent, if needed, to accommodate changes in your network or IT requirements. The Agent can use any open port for communication. The default port is 34571. If you change the port, you must restart the maxView Storage Manager Agent for the change to take effect.

To change the Agent base port setting:

1. In the Enterprise View, select a system.
2. On the ribbon, in the System group, click **System Settings**.



The Agent Settings window opens. In the figure below, the base port setting is circled in blue.



3. Enter the new base port, then click **OK**.
4. Restart the Agent.

13 Solving Problems

This section describes how to troubleshoot the components in your storage space.

General Troubleshooting Tips

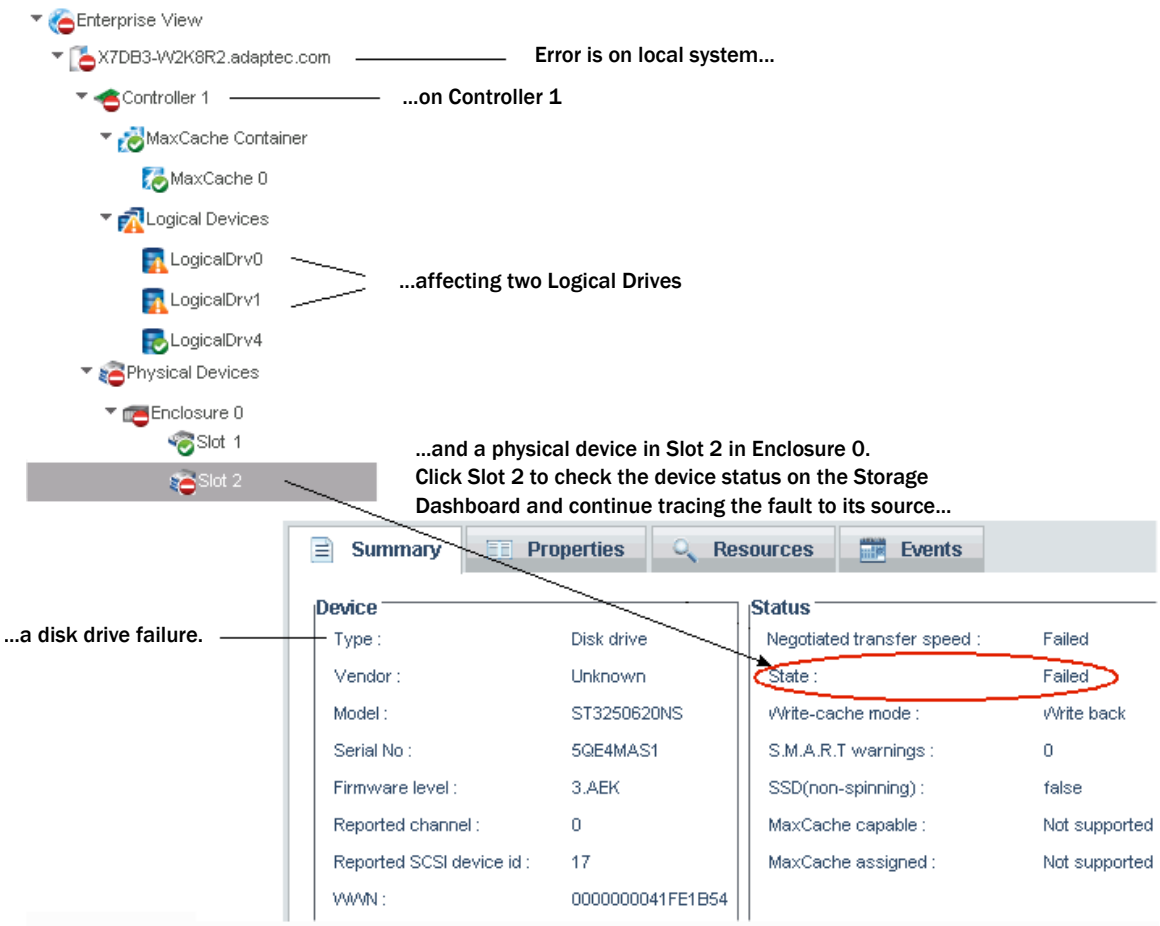
If you experience problems installing or using maxView Storage Manager, try these troubleshooting tips first:

- Ensure that all managed systems are powered on and that you are logged in to any remote systems that you want to manage. (See *Logging into Remote Systems from the Local System* on page 41 for more information.)
- Check all cable connections.
- Try uninstalling and reinstalling maxView Storage Manager.
- Check the Readme for compatibility issues and known problems.

Identifying a Failed or Failing Component

When you receive notice of a Warning- or Error-level event, use maxView 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, expand the tree in the Enterprise View, look for the orange and red warning and error icons, and continue tracing the problem to its source.



Recovering from a Disk Drive Failure

This section describes how to recover when a disk drive or SSD fails:

- If the logical drive is protected by a hot spare, see *Failed Disk Drive Protected by a Hot Spare* on page 128.
- If the logical drive is *not* protected by a hot spare, see *Failed Disk Drive Not Protected by a Hot Spare* on page 128.
- If there is a disk drive failure in more than one logical drive simultaneously, see *Failure in Multiple Logical Drives Simultaneously* on page 128.
- If it is a RAID 0 logical drive, see *Disk Drive Failure in a RAID 0 Logical Drive* on page 129.
- If multiple disk drives fail within the same logical drive, see *Multiple Disk Drive Failures in the Same Logical Drive* on page 129.

Failed Disk Drive Protected by a Hot Spare

If a disk drive in a logical drive fails and that logical drive is protected by a hot spare, the hot spare is automatically incorporated into the logical drive and takes over for the failed drive.

For example, if a disk drive fails in a RAID 5 logical drive, the logical drive is automatically *rebuilt*, with its data reconstructed using the hot spare in place of the failed drive. You can access the logical drive while it's rebuilding.

To recover from the failure:

1. Remove and replace the failed disk drive, following the 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 *Removing or Deleting a Dedicated Hot Spare* on page 51 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 52 for more information.

Failed Disk Drive *Not* Protected by a Hot Spare

If a disk drive in a logical drive fails when the logical drive is not protected by a hot spare, remove and replace the failed disk drive. The controller detects the new disk drive and begins to rebuild it. You can access the logical drive while it's rebuilding.

For example, when one of the disk drives fails in a RAID 1 logical drive, 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 130.

Failure in Multiple Logical Drives Simultaneously

If a disk drive fails 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.)

  Note: If the number of disk drive failures exceeds the number of hot spares, see *Failed Disk Drive Not Protected by a Hot Spare* on page 128.

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 52 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 cannot be recovered.

Correct the cause of the failure or replace the failed disk drives. Then, restore your data from backup, if available.

Multiple Disk Drive Failures in the Same Logical Drive

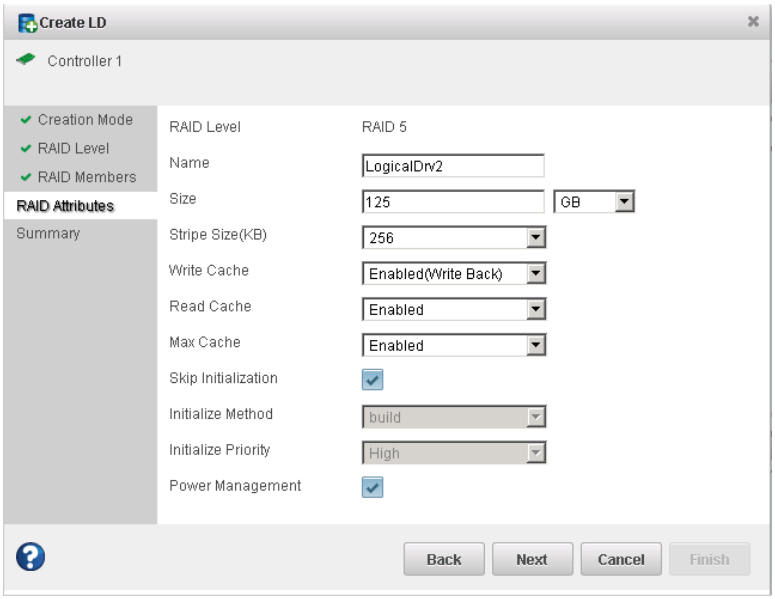
If multiple disk drives fail in the same logical drive, you *may* be able to recover the data by recreating the logical drive in the wizard *without* the initialization step. Omitting the initialization step reconstructs the logical drive meta-data without modifying or destroying any other data on the disks.

> **Note:** RAID 6 and RAID 60 logical drives support two simultaneous disk drive failures. 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 134 for more information.

> **Caution:** This procedure is not guaranteed to successfully recover your logical drive. The 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 creation wizard, select **Custom Configuration**, 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, then click **Next**.
4. Ensure that all RAID Attributes are the same as the original logical drive, click **Skip Initialization**, then click **Next**.



5. Click **Finish**.
   maxView Storage Manager builds the logical drive.
6. Check the logical drive for data and file system integrity. If you still cannot access the data, initialize the *physical* drives (to erase the meta-data), then rebuild the logical drive again without initialization, selecting the disk drives in a different *order* in Step *3* on page 129. You may need to try several different disk drive orders (called the “stripe order”) before you can recover the data..

   > **Note:** On the Summary panel, uninitialized logical drives have an “Impacted” status.

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.

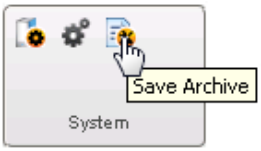
   If necessary, replace the failed disk drive with a new disk drive of equal or larger size.
3. The controller detects the reinserted (or new) disk drive and begins to rebuild the logical drive.

Creating a Support Archive File

Your Adaptec by PMC support representative might ask you to create a configuration and status information archive file to help diagnose a problem with your system.

To create the support archive file:

1. In the Enterprise View, select the system on which the problem is occurring. (Look for the orange or red error icons in the Enterprise View.)
2. On the ribbon, in the System group, click **Save Archive**.



   The Save Archive window opens.
3. Click **Save**.
4. When the File Download window opens, enter a name for the archive file or accept the default name, then click **Save**.
5. In the Save Archive window, click **Close**.

A Silent Installation on Windows and Linux

This appendix describes how to complete a silent installation of maxView Storage Manager on Windows and Linux systems. A silent installation uses command line parameters to complete an installation without messages or user interaction.

Note: Silent installation on Linux is supported on Red Hat, CentOS, and SLES only.

Completing a Silent Installation

This section describes the silent installation process for Windows and Linux.

Windows Silent Installation

To complete a silent installation on Windows:

1. Open a command prompt window, then change to the directory where you downloaded the Windows setup program (see *Download the Installation Packages* on page 22 for details).
2. Run the silent installation from the command line using one of these commands:

Options	Description
Windows 64-bit	setup_asm_x64.exe /s /v"/qn <properties>"
Windows 32-bit	setup_asm_x86.exe /s /v"/qn <properties>"

where <*properties*> is one or more of the options listed in *Switches, Properties, and Values* on page 132.

Separate properties with spaces and enclose all properties after /v in quotes, with NO leading space. Separate feature names for the ADDLOCAL property with commas.

Linux Silent Installation

To complete a silent installation on Red Hat Linux, CentOS, or SLES:

1. Open a shell window, then change to the directory where you downloaded the Linux installer package (see *Download the Installation Packages* on page 22 for details).
2. Run the silent installation from the command line using one of these commands:

Options	Description
Linux 64-bit	StorMan-<version>.x86_64.bin --silent <username> <password>
Linux 32-bit	StorMan-<version>.i386.bin --silent <username> <password>

Linux systems also support silent upgrade and silent removal. See *Example Command Line Installations* on page 132.

Switches, Properties, and Values

This section describes the command line options for Windows silent installation. These options are not supported on Linux.

Switch or Property	Description
/s (required)	Suppress dialog boxes.
/v (required)	Pass command line parameters to the setup program.
/qn	Suppress progress bar during installation.
/qb	Show progress bar during installation.
/lv* <*path*> (optional)	Generate verbose installation log at <*path*>. Example: /lv* c:\pmc.log
INSTALLDIR (optional)	Specifies the installation path. If specified, the installation path must be enclosed in escaped quotation marks. Example: INSTALLDIR=\"C:\Program Files\Adaptec\maxView Storage Manager\" **Note:** The default installation path is "C:\Program Files\Adaptec\maxView Storage Manager".
ADDLOCAL (optional)	• ALL (default)—Installs the maxView Storage Manager GUI and CLI (ARCCONF). If you specify ALL, do not also specify any of the following values. • CLITools—Installs the Command Line Interface tool (ARCCONF). • Console—Installs the maxView Storage Manager GUI. **Note:** Use commas to separate multiple values.
USERNAME PASSWORD CONFIRMPASSWORD	Credentials for Windows Administrator account. **Note:** All three credential properties are required.

Example Command Line Installations

This section shows typical command line installations for Windows and Linux.

- Normal Windows Installation:

  setup_asm_x64.exe /s /v"/qb USERNAME=<username> PASSWORD=<password> CONFIRMPASSWORD=<password> /lv* c:\pmc.log"

- Install to Specific Location on Windows:

  setup_asm_x64.exe /s /v"/qb USERNAME=<username> PASSWORD=<password> CONFIRMPASSWORD=<password> INSTALLDIR=\"C:\Program Files\Adaptec\maxView Storage Manager\""

- Install Specific Feature on Windows:

  setup_asm_x64.exe /s /v"/qb ADDLOCAL=CLITools USERNAME=<username> PASSWORD=<password> CONFIRMPASSWORD=<password> /lv* c:\pmc.log"

- Normal Linux Installation:

  ./StorMan-<version>.i386.bin --silent <username> <password>

- Linux Software Upgrade:

./StorMan-<version>.i386.bin --upgrade

- Linux uninstallation (removal):

  ./StorMan-<version>.i386.bin --removal

  Alternative: rpm –e StorMan

B Selecting the Best RAID Level

When you create logical drives in maxView 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 section provides a comparison of all the RAID levels supported by maxView 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

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.

Understanding Drive Segments

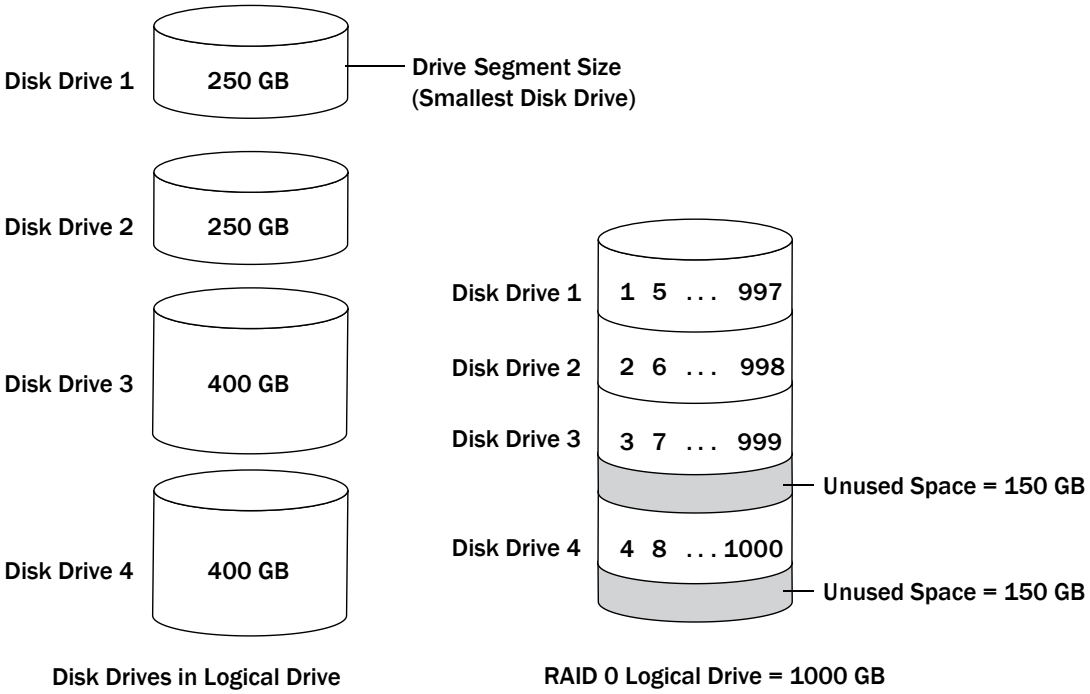
A *drive segment* is a disk drive or portion of a disk drive that is used to create a logical drive. A disk drive can include both *RAID segments* (segments that are part of a logical drive) and available segments. Each segment can be part of only one logical drive at a time. If a disk drive is not part 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 logical drives do not maintain redundant data, so they offer *no data protection*.

Compared to an equal-sized group of independent disks, a RAID 0 logical drives provides improved I/O performance.

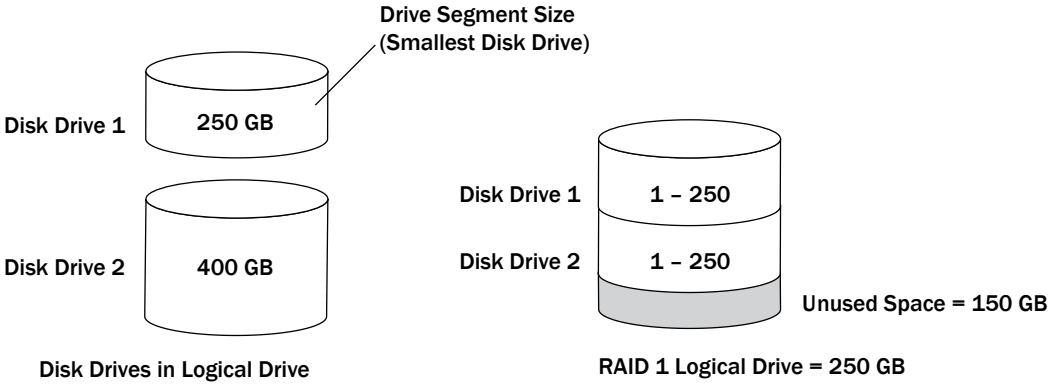
Drive segment size is limited to the size of the smallest disk drive in the logical drive. For instance, an array with two 250 GB disk drives and two 400 GB disk drives can create a RAID 0 drive segment of 250 GB, for a total of 1000 GB for the volume, as shown in this figure.



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.

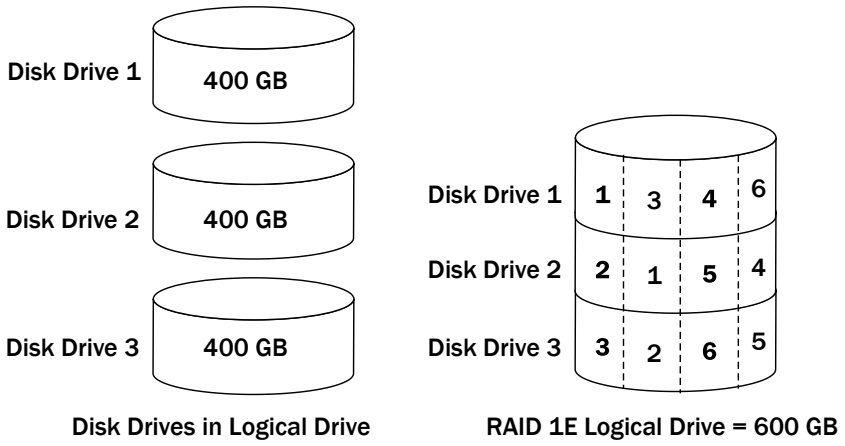
If the RAID 1 logical drive is built from different- sized disk drives, the free space, drive segment size is the size of the smaller disk drive, as shown in this figure.



RAID 1 Enhanced Logical Drives

A RAID 1 Enhanced (RAID 1E) logical drive—also known as a *striped mirror*—is similar to a RAID 1 array 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.

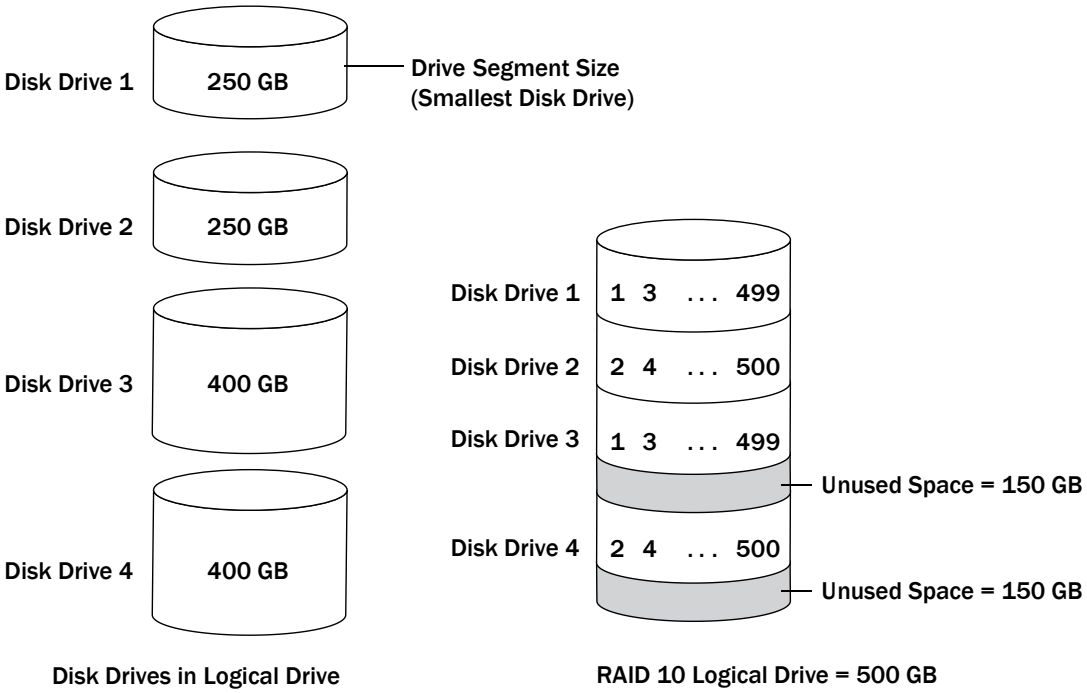
In this example, the large bold numbers represent the striped data, and the smaller, non-bold numbers represent the mirrored data stripes.



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, an array 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.

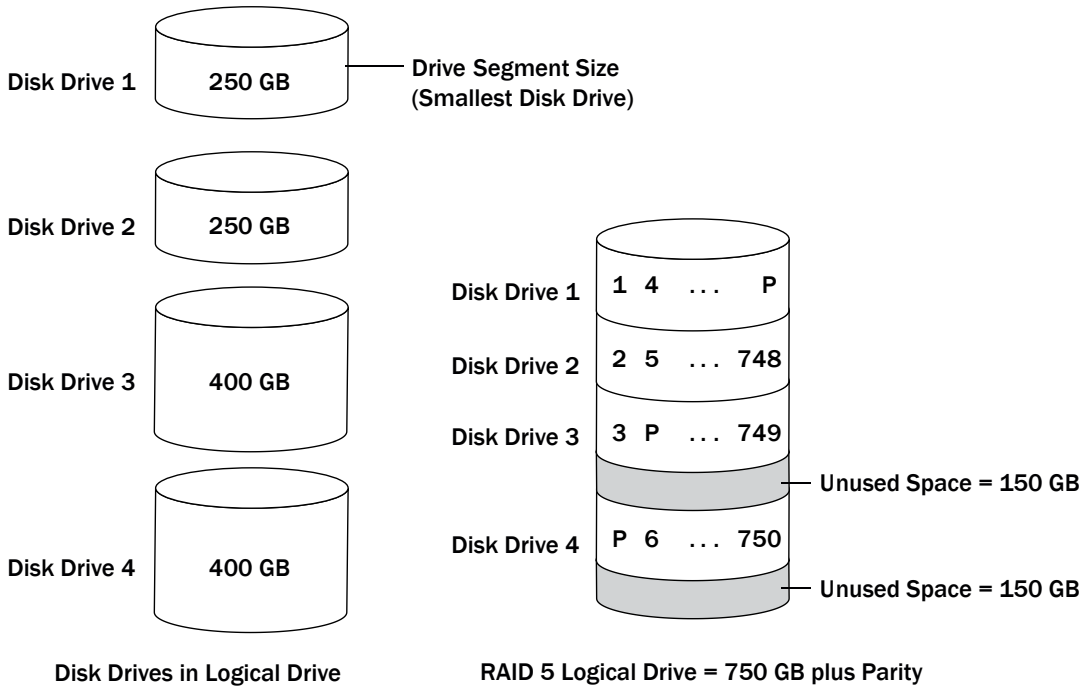


RAID 5 Logical Drives

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, an array 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.



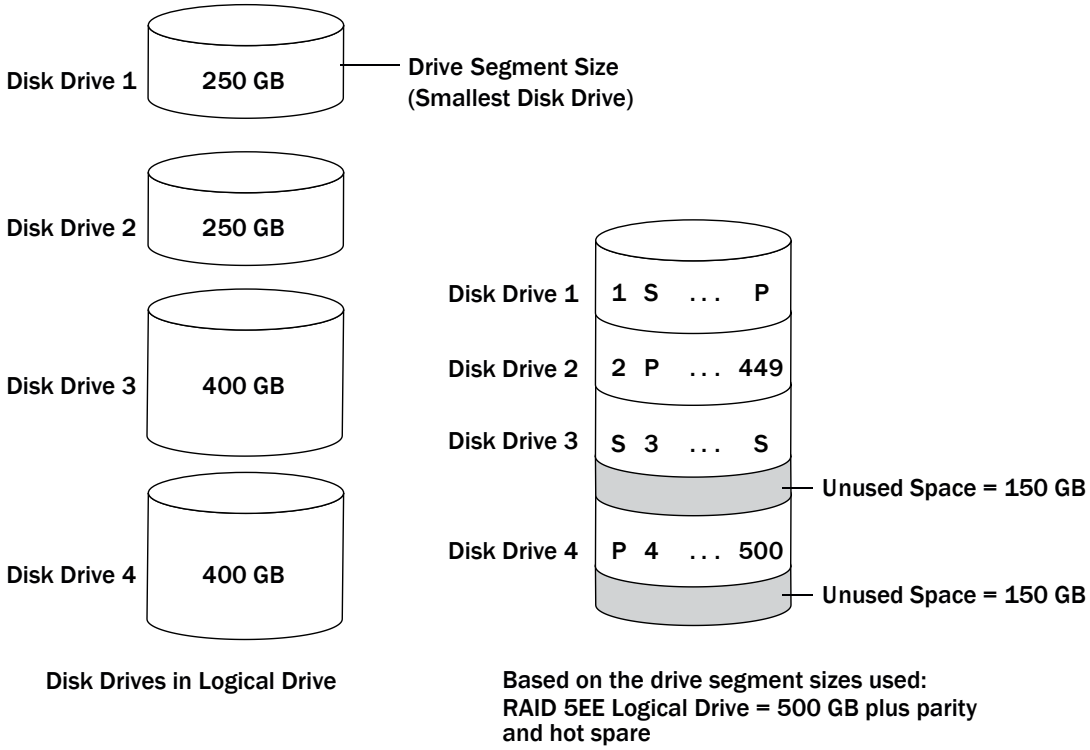
RAID 5EE Logical Drives

A RAID 5EE logical drive—also known as a *hot space*—is similar to a RAID 5 array except that it includes a *distributed spare* drive and must be built from a minimum of four disk drives.

Unlike a hot spare, 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 array 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 figure, S represents the distributed spare, P represents the distributed parity data.



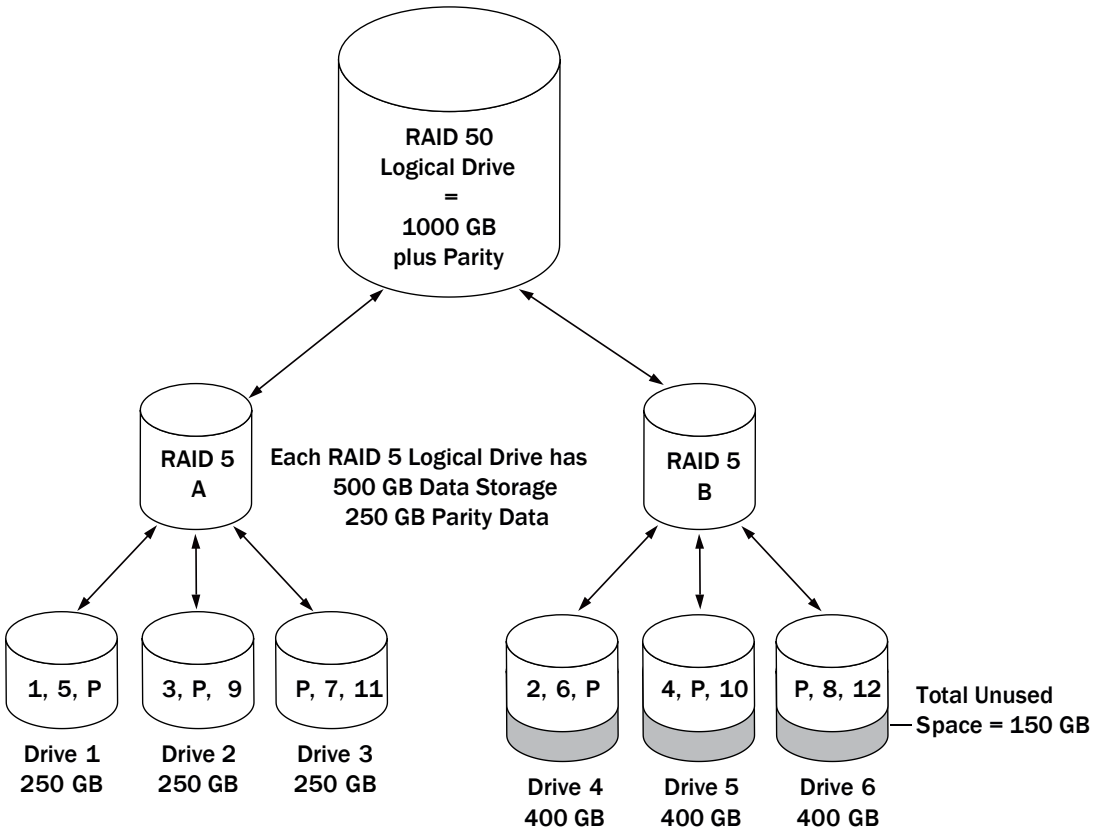
RAID 50 Logical Drive

A RAID 50 logical drive is built from six to forty-eight disk drives configured as two or more RAID 5 arrays, 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 138.)

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 figure, P represents the distributed parity data.

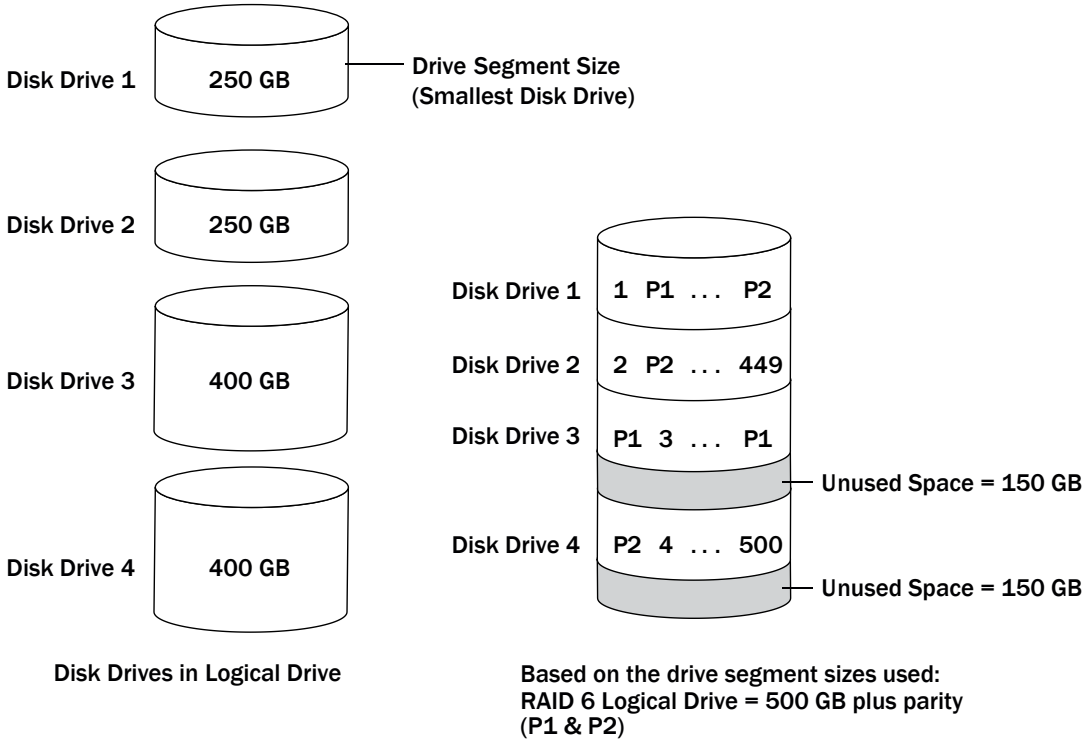


RAID 6 Logical Drives

A RAID 6 logical drive—also known 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 *RAID 50 Logical Drive* on page 140), a RAID 60 logical drive—also known as dual drive failure protection—is built from 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.

C Using the maxConf Command Line Utility

This appendix explains how to use of the maxConf command line utility. This utility allows you to:

- Create and delete virtual pools, virtual volumes, and cached logical drives
- Display and modify configuration settings

Note: maxConf is supported on qualifying Adaptec Series Q controllers only. See the Readme for a list of controllers that support maxConf.

Installing maxConf

maxConf is installed with the maxView Storage Manager application. It is supported on Windows, Red Hat Linux, and SuSe Linux systems only. For details about installing maxView Storage Manager on different operating systems, see *Installing maxView Storage Manager* on page 22.

Starting the Command Line Utility

1. To start maxConf, enter one of the following commands:

Options	Description
Windows	<install_dir>\maxconf.exe
Linux	/usr/<install_dir>/maxconf

where install_dir is the directory where the utility is installed.

2. To see a list of available commands, type MAXCONF at the prompt.

maxConf Commands

The following commands are available in maxConf. The commands are described on the following pages, in alphabetical order.

Table 1: maxConf Commands

create delete getconfig	getstats modify

Note: In the command syntax descriptions, <> indicates a required parameter and [] indicates an optional parameter.

maxconf create

Description

Creates a new virtual pool, tiered virtual volume, cached virtual volume, or cached logical drive.

Syntax

MAXCONF CREATE VIRTUALPOOL [Options] LEVEL <level> <LD#> <LD#> <LD#> ... [noprompt]
MAXCONF CREATE VIRTUALVOLUME TIER [Options] <Tier0 Pool#> <Size from Tier0 Pool> <Tier1 Pool#> <Size from Tier1 Pool> [noprompt]
MAXCONF CREATE VIRTUALVOLUME CACHE [Options] <Cache Mode> <Tier0 Pool#> <Size from Tier0 Pool> <Tier1 Pool#> <Size from Tier1 Pool> [noprompt]
MAXCONF CREATE VIRTUALVOLUME CACHEDLD [Options] <Cache Mode> <LD#> <Tier0 Pool#> <Cache Size> [noprompt]

Parameters

Options

Keyword identifying one or more of the following options:

- NAME—alias for a virtual pool or virtual volume. Maximum length is 31 characters. Default is pool# or volume#.
- DESCRIPTION—device description for a virtual pool or virtual volume. Maximum length is 31 characters.
- CHUNK (virtual pool only)—chunk size, in kilobytes, for the virtual pool. Valid values are:
  - 64, 256, 1024, 4096
  - Default chunk size is 256KB
- FFMODE (virtual volume only)—fetch and flush rate for the virtual volume. Valid values are:
  - 1-Aggressive
  - 2-Normal (default)
  - 3-Passive

LEVEL <level>

Indicates the tier level of a virtual pool. Valid values are:

- 0-Upper tier (fastest media)
- 1-Lower tier (slower media)

LD#

Logical drive number(s) for a virtual pool or cached logical drive. Virtual pools support a maximum of eight logical drives. Cached logical drives support exactly *one* logical drive.

Cache Mode

Indicates the cache mode for a cached virtual volume. Valid values are:

- WTCACHE — Enables write through cache. Uses the cache for fast retrieval and updates primary storage at the same time.
- WBCACHE — Enables write back cache. Uses cache for the "freshest" data and updates primary storage at a later time.

  Note: For a cached LD volume, the cache mode defaults to Write-Through.

Cache Size

In a cached logical drive, indicates the size of the cache, in gigabytes, in the Tier 0 virtual pool.

<Tier0 Pool#> <Size from Tier0 Pool>

Tier 0 virtual pool number and pool size, in gigabytes. Use MAX to use all available pool space.

<Tier1 Pool#> <Size from Tier1 Pool>

Tier 1 virtual pool number and pool size, in gigabytes. Use MAX to use all available pool space.

noprompt

Suppresses the confirmation prompt.

Examples

MAXCONF CREATE VIRTUALPOOL NAME UpPool DESCRIPTION "This is Tier 0 Pool" LEVEL 0 4 5 6
MAXCONF CREATE VIRTUALPOOL NAME DownPool DESCRIPTION "This is Tier 1 Pool" CHUNK 1024 LEVEL 1 7 8
MAXCONF CREATE VIRTUALVOLUME TIER NAME TieredVol FFMode 1 0 2 1 10
MAXCONF CREATE VIRTUALVOLUME CACHE NAME CachedVol WBCACHE 0 MAX 1 10
MAXCONF CREATE VIRTUALVOLUME CACHEDLD WTCACHE 2 0 2

maxconf delete

Description

Deletes one or all virtual pools or virtual volumes, including cached logical devices. All data stored on the devices will be lost.

Syntax

MAXCONF DELETE VIRTUALPOOL <pool#>|ALL [noprompt]
MAXCONF DELETE VIRTUALVOLUME <volume#>|ALL [noprompt]

Parameters

pool#
The number of the virtual pool to be deleted.

volume#
The number of the virtual volume to be deleted.

ALL
Deletes all virtual pools or virtual volumes.

noprompt
Suppresses the confirmation prompt.

Examples

MAXCONF DELETE VIRTUALPOOL 2
MAXCONF DELETE VIRTUALPOOL ALL
MAXCONF DELETE VIRTUALVOLUME 0
MAXCONF DELETE VIRTUALVOLUME ALL

maxconf getconfig

Description

Lists information about virtual pools, virtual volumes, logical devices, and the maxCache Plus driver. The information includes (but is not limited to) the following:

- Resources (number of devices, status)
- Device number, size, health
- Used space, free space
- Tier level, virtual volume members, virtual pool members
- LBA start range/end range

Syntax

MAXCONF GETCONFIG [DRIVER|LOGICALDEVICE|VIRTUALPOOL|VIRTUALVOLUME|ALL]

Parameters

DRIVER
List driver information only.

LOGICALDEVICE
List logical device information only.

VIRTUALPOOL
List virtual pool information only.

VIRTUALVOLUME
List virtual volume information only.

ALL
List information about all devices.

Examples

MAXCONF GETCONFIG DRIVER
MAXCONF GETCONFIG VIRTUALVOLUME
MAXCONF GETCONFIG ALL

maxconf getstats

Description

Displays statistics about a virtual volume. The information includes (but is not limited to) the following:

- SSD/HDD used and free chunks
- Read/Write IO count
- Sequential vs Random IO count
- SSD read/write IO count
- Policy Engine statistics

Syntax

MAXCONF GETSTATS VIRTUALVOLUME <volume#> [noprompt]

Parameters

volume#
The virtual volume number.

noprompt
Suppresses the confirmation prompt.

Examples

MAXCONF GETSTATS VIRTUALVOLUME 1

maxconf modify

Description

Modifies properties of a virtual volume or virtual pool.

Syntax

MAXCONF MODIFY VIRTUALPOOL <pool#> <PROPERTY> <value> [noprompt]
MAXCONF MODIFY VIRTUALVOLUME <volume#> <PROPERTY> <value> [noprompt]

Parameters

pool#
The virtual pool number.

volume#

The virtual volume number.

<PROPERTY>

Keyword identifying the property to modify:

Options:

- NAME—modify the device name for a virtual pool or virtual volume. Value is free text. Maximum length is 31 characters.
- DESCRIPTION—modify the device description for a virtual pool or virtual volume. Value is free text. Maximum length is 31 characters.
- LEVEL (virtual pool only)—modify the tier level of a virtual pool.
- FFMODE (virtual volume only)—modify the fetch and flush rate of a virtual volume. Valid values are:
  - 1-Aggressive
  - 2-Normal
  - 3-Passive

noprompt

Suppresses the confirmation prompt.

Examples

MAXCONF MODIFY VIRTUALPOOL 0 DESCRIPTION ssdpool
MAXCONF MODIFY VIRTUALPOOL 0 LEVEL 0
MAXCONF MODIFY VIRTUALVOLUME 1 DESCRIPTION cachingvolume
MAXCONF MODIFY VIRTUALVOLUME 1 FFMODE 3

D Icons At-a-Glance

The following is a complete list of icons used in maxView Storage Manager. It contains the icons on the ribbon, in the Enterprise View and on tabs and dialog boxes.

See *Overview of the Main Window* on page 30 for more information.

Ribbon Home Icons

Icon	Description
	Remote system add
	Remote system delete

Ribbon System Icons

Icon	Description
	System settings
	Firmware update
	Save archive file

Ribbon Controller Icons

Icon	Description
	Controller settings
	Save configuration
	Restore configuration
	Controller rescan
	Silence alarm
	Clear configuration

Ribbon Logical Device Icons

Icon	Description
	Logical disk settings
	Logical disk create
	Logical disk expand
	Logical disk verify
	Logical disk locate

Icon	Description
	Logical disk delete
	Logical disk erase

Ribbon Physical Device Icons

Icon	Description
	Physical disk properties
	Assign/unassign physical disk as spare
	Force physical disk offline
	Physical disk initialization
	Physical disk verify
	Physical disk secure erase
	Physical disk locate

Ribbon maxCache Icons

Icon	Description
	maxCache container create
	maxCache set properties
	maxCache container locate
	maxCache container verify
	maxCache container delete
	maxCache container disable

Ribbon Virtual Pool Icons (maxCache Plus)

Icon	Description
	Virtual pool create
	Virtual pool set properties
	Virtual pool delete

Ribbon Virtual Volume Icons (maxCache Plus)

Icon	Description
	Virtual volume create

Icon	Description
	Virtual volume set properties
	Virtual volume delete

Enterprise View Icons

Icon	Description
	Enterprise View
	Local or remote system
	Controller
	Enclosure
	Logical disk
	Logical disks
	Physical disk
	Hard disk drive
	Solid State drive
	Physical disks
	Enclosure
	Connector or other physical device

Enterprise View Status Icons

Icon	Description
	Enterprise OK
	Enterprise error
	Enterprise no access
	Enterprise warning

Enterprise View System Icons

Icon	Description
	System OK
	System error

Icon	Description
	System missing
	System no access
	System warning

Enterprise View Connector Icons

Icon	Description
	Connector OK
	Connector failed
	Connector missing
	Connector warning

Enterprise View Controller Icons

Icon	Description
	Controller OK
	Controller failed
	Controller missing
	Controller warning

Enterprise View Enclosure Icons

Icon	Description
	Enclosure Management OK
	Enclosure Management failed
	Enclosure missing
	Enclosure Management warning

Enterprise View Physical Disk Icons

Icon	Description
	Physical disk OK
	Physical disks OK

Icon	Description
	Physical disks failure
	Physical disks missing
	Physical disks warning

Enterprise View MaxCache Container Icons

Icon	Description
	maxCache container error
	maxCache container missing
	maxCache container OK
	maxCache container warning

Tab Icons

Icon	Description
	Summary
	Properties
	Resources
	Events
	Task

Dialog Box Icons

Icon	Description
	E-mail notification
	Chart

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