

User's Guide
maxView Storage Manager for Microsemi Adaptec
ARC-Family (Series 6/7/8) Controllers

Released
September 2016





Microsemi Corporate Headquarters
One Enterprise, Aliso Viejo,
CA 92656 USA

Within the USA: +1 (800) 713-4113
Outside the USA: +1 (949) 380-6100
Fax: +1 (949) 215-4996
Email: sales.support@microsemi.com
www.microsemi.com

© 2016 Microsemi Corporation. All rights reserved. Microsemi and the Microsemi logo are trademarks of Microsemi Corporation. All other trademarks and service marks are the property of their respective owners.

Microsemi makes no warranty, representation, or guarantee regarding the information contained herein or the suitability of its products and services for any particular purpose, nor does Microsemi assume any liability whatsoever arising out of the application or use of any product or circuit. The products sold hereunder and any other products sold by Microsemi have been subject to limited testing and should not be used in conjunction with mission-critical equipment or applications. Any performance specifications are believed to be reliable but are not verified, and Buyer must conduct and complete all performance and other testing of the products, alone and together with, or installed in, any end-products. Buyer shall not rely on any data and performance specifications or parameters provided by Microsemi. It is the Buyer's responsibility to independently determine suitability of any products and to test and verify the same. The information provided by Microsemi hereunder is provided "as is, where is" and with all faults, and the entire risk associated with such information is entirely with the Buyer. Microsemi does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other IP rights, whether with regard to such information itself or anything described by such information. Information provided in this document is proprietary to Microsemi, and Microsemi reserves the right to make any changes to the information in this document or to any products and services at any time without notice.

Microsemi Corporation (Nasdaq: MSCC) offers a comprehensive portfolio of semiconductor and system solutions for aerospace & defense, communications, data center and industrial markets. Products include high-performance and radiation-hardened analog mixed-signal integrated circuits, FPGAs, SoCs and ASICs; power management products; timing and synchronization devices and precise time solutions, setting the world's standard for time; voice processing devices; RF solutions; discrete components; enterprise storage and communication solutions; security technologies and scalable anti-tamper products; Ethernet solutions; Power-over-Ethernet ICs and midspans; as well as custom design capabilities and services. Microsemi is headquartered in Aliso Viejo, California, and has approximately 4,800 employees globally. Learn more at www.microsemi.com.

Revision History

Issue	Issue Date	Details of Change
1	April 2016	maxView Storage Manager Version 2.01.00
2	September 2016	maxView Storage Manager Version 2.02.00

Contents

Microsemi Adaptec® Product Support.....	9
Software License Agreement.....	10
1 About this Guide.....	13
1.1 What You Need to Know Before You Begin.....	13
1.2 Terminology Used in this Guide.....	14
1.3 How to Find More Information.....	14
2 Introduction to maxView Storage Manager.....	15
2.1 Getting Started.....	15
2.2 About maxView Storage Manager	15
2.2.1 About the maxView Storage Manager Agent	16
2.2.2 About the maxView Storage Manager Web Server.....	16
2.2.3 About the maxView Storage Manager CIM Server.....	16
2.3 System Requirements.....	17
2.4 Browser Support.....	17
2.5 Typical Storage Space Configurations.....	18
2.5.1 A Simple Storage Space.....	18
2.5.2 An Advanced Storage Space.....	18
2.5.3 Continuing to Grow Your Storage Space.....	19
3 Installing maxView Storage Manager.....	20
3.1 Before You Begin the Installation.....	20
3.1.1 Gather Installation Information.....	20
3.1.2 Download the Installation Packages.....	20
3.2 Installing on Windows.....	21
3.3 Installing on Red Hat, CentOS, SuSE, or Fedora Linux.....	22
3.4 Installing on Debian or Ubuntu Linux.....	22
3.5 Installing on Solaris.....	23
3.6 Installing on a Hypervisor.....	23
3.6.1 Installing on VMware.....	23
3.6.2 Installing on Citrix XenServer.....	24
3.6.3 Installing on Microsoft Hyper-V.....	24
3.7 Installing on a Guest Operating System.....	25
3.7.1 Installing on a Windows Guest OS - VMware/XenServer.....	25
3.7.2 Installing on a Windows Guest OS - Hyper-V.....	26
3.7.3 Installing on a Linux Guest OS - VMware/XenServer	26
3.7.4 Installing on a Linux Guest OS - Hyper-V.....	27
3.8 Installing on PowerPC.....	27
3.9 Running maxView Storage Manager from a Bootable USB Image	27
3.10 Uninstalling maxView Storage Manager.....	28
3.10.1 Uninstalling from Windows.....	28
3.10.2 Uninstalling from Red Hat, CentOS, SuSE, or Fedora Linux.....	28
3.10.3 Uninstalling from Debian or Ubuntu Linux.....	29
3.10.4 Uninstalling from Solaris.....	29
3.10.5 Uninstalling from VMware.....	29

4 Exploring maxView Storage Manager.....	30
4.1 Starting maxView Storage Manager and Logging In	30
4.2 Working in maxView Storage Manager.....	30
4.3 Overview of the Main Window.....	31
4.3.1 The Enterprise View	31
4.3.1.1 What do the Enterprise View Icons Mean?	33
4.3.2 The Ribbon	33
4.3.3 The Storage Dashboard.....	34
4.4 Checking System Status from the Main Window.....	34
4.5 Revealing More Device Information	35
4.6 Getting Help.....	36
4.7 Logging Out of maxView Storage Manager.....	37
5 Building Your Storage Space.....	39
5.1 Overview.....	39
5.2 Choosing a Management System.....	39
5.2.1 'Local' or 'Remote'?.....	39
5.2.2 Logging in on the Local System	40
5.3 Starting maxView Storage Manager on Remote Systems.....	40
5.3.1 Starting the Agent Only	40
5.3.1.1 Windows.....	41
5.3.1.2 Linux or VMware.....	41
5.3.1.3 Solaris.....	41
5.4 Logging into Remote Systems from the Local System.....	42
5.5 Creating Logical Drives.....	43
5.5.1 Express Configuration	43
5.5.2 Custom Configuration.....	45
5.5.3 Partitioning and Formatting Your Logical Drives.....	48
5.5.4 Creating Logical Drives on Other Systems in Your Storage Space.....	48
6 Protecting Your Data.....	49
6.1 Creating and Managing Hot Spares.....	49
6.1.1 Hot Spare Limitations.....	49
6.1.2 Global Spare or Dedicated Spare?.....	49
6.1.3 Designating a Global Hot Spare.....	49
6.1.4 Assigning a Dedicated Hot Spare or Pool Hot Spare.....	50
6.1.5 Deleting a Global Hot Spare	52
6.1.6 Removing or Deleting a Dedicated Hot Spare.....	52
6.2 Enabling Copyback.....	53
6.3 Enabling Automatic Failover.....	54
6.4 Enabling Controller Cache Preservation.....	55
7 Modifying Your Storage Space.....	56
7.1 Understanding Logical Drives.....	56
7.2 Creating and Modifying Logical Drives.....	56
7.2.1 Including Different-sized Disk Drives in a Logical Drive.....	57
7.2.2 Creating a Logical Drive Using Available Segments.....	58
7.2.3 Creating a Hybrid RAID Logical Drive	58
7.3 Fine-tuning Logical Drives.....	59
7.3.1 Renaming a Logical Drive.....	59
7.3.2 Changing the Read Cache Setting.....	60
7.3.3 Changing the Write Cache Setting.....	60
7.3.4 Changing the Stripe Size	61

7.3.5 Changing the Initialize Method	61
7.4 Optimizing Logical Drive Performance.....	61
7.5 Verifying Logical Drives.....	62
7.5.1 Verifying and Fixing a Logical Drive.....	63
7.5.2 Enabling/Disabling Background Consistency Check.....	64
7.6 Increasing the Capacity of a Logical Drive.....	64
7.7 Changing the RAID Level of a Logical Drive.....	65
7.8 Erasing a Logical Drive.....	66
7.9 Deleting a Logical Drive.....	66
7.10 Deleting all Logical Drives on a Controller.....	67
7.11 Maintaining an Energy-Efficient Storage Space.....	68
7.11.1 Setting Power Management Options for a Logical Drive.....	68
7.11.2 Setting Power Management Options for a Controller.....	69
7.11.3 Disabling Power Management for a Logical Drive.....	70
8 Working with maxCache Devices.....	72
8.1 Creating a maxCache Device.....	72
8.2 Configuring maxCache for a Logical Drive.....	73
8.3 Configuring maxCache for a Controller.....	74
8.4 Setting the maxCache Flush and Fetch Rate	74
8.5 Verifying and Fixing the maxCache Device.....	75
8.6 Deleting the maxCache Device.....	76
8.7 Using maxCache with Microsemi Adaptec Series 6Q Controllers.....	76
8.8 Analyzing maxCache Performance	77
9 Working with Scheduled Tasks.....	78
9.1 Scheduling a Task.....	78
9.2 Monitoring Tasks	79
9.2.1 What if a Task Misses its Start Time?.....	80
9.3 Modifying a Task	80
9.4 Deleting a Task	81
10 Maintaining Physical Devices.....	82
10.1 Viewing Device Properties	82
10.2 Locating Drives in Your Storage Space.....	82
10.2.1 Locating Disk Drives.....	83
10.2.2 Locating Physical Disks in a Logical Drive.....	83
10.2.3 Locating SSDs in the maxCache Device.....	84
10.3 Working with Failed or Failing Disk Drives.....	85
10.3.1 Replacing Disk Drives in a Logical Drive.....	85
10.3.2 Setting a Disk Drive to 'Failed'.....	85
10.4 Initializing, Uninitializing, and Erasing Disk Drives.....	86
10.4.1 Initializing a Disk Drive	86
10.4.2 Uninitializing a Disk Drive.....	87
10.4.3 Initializing/Uninitializing all Drives on a Controller	88
10.4.4 Erasing a Disk Drive	89
10.5 Verifying and Fixing a Disk Drive.....	89
10.6 Configuring the Physical Drive Write Cache Policy.....	90
10.6.1 Configuring the Global Physical Drive Write Cache Policy.....	90
10.6.2 Configuring the Write Cache Policy for an Individual Drive.....	91
10.7 Working with Controllers.....	92
10.7.1 Silencing a Controller Alarm.....	92
10.7.2 Disabling a Controller Alarm.....	92
10.7.3 Rescanning a Controller.....	93

10.7.4	Setting a Controller's Default Task Priority.....	93
10.7.5	Enabling Native Command Queuing on a Controller.....	93
10.7.6	Setting the Connection Speed for a Controller.....	94
10.8	Working with System Alarms.....	94
10.9	Updating Controller, Enclosure, and Disk Drive Firmware.....	95
10.9.1	Before You Begin.....	95
10.9.2	Updating the Controller Firmware	95
10.9.3	Updating the Disk Drive Firmware	98
10.9.4	Updating the Enclosure Firmware	99
11	Monitoring Status and Activity.....	101
11.1	Monitoring Options.....	101
11.2	Checking Status from the Main Window	101
11.2.1	Viewing Activity Status in the Event Log.....	102
11.2.1.1	What Do the Event Status Icons Mean?.....	102
11.2.2	Viewing Task Status in the Task Log.....	103
11.2.3	Viewing Component Status in the Storage Dashboard.....	103
11.2.3.1	Monitoring Enclosure Status.....	105
11.2.3.2	Viewing SMART Statistics.....	105
11.2.4	Viewing Storage Space Usage in Chart View.....	106
11.3	Notifying Users by Email About Status and Activity	107
11.3.1	Setting Up Email Notifications.....	107
11.3.2	Sending a Test Message.....	109
11.3.3	Modifying or Removing an Email Recipient	110
11.3.4	Modifying Email Server Settings.....	111
11.3.5	Disabling Email Notifications.....	111
11.4	Monitoring Status and Activity with SNMP Traps	111
11.5	Monitoring Advanced Statistics about Activity in Your Storage Space.....	112
11.5.1	Setting up Statistics Logging.....	112
11.5.2	Viewing Advanced Statistics.....	113
11.5.3	Resetting the Statistics Counters.....	114
11.6	Changing an Operating System's Event Log Setting.....	114
12	Managing Your Storage Space.....	116
12.1	Deploying Servers	116
12.1.1	Creating a Server Template File.....	116
12.1.2	Duplicating the Server Template.....	117
12.2	Managing Remote Systems.....	119
12.2.1	Adding Remote Systems with the Wizard.....	120
12.2.2	Manually Adding a Remote System.....	120
12.2.3	Removing a Remote System.....	120
12.2.4	Changing the Auto-Discovery Settings.....	121
12.3	Clearing the Controller Configuration.....	122
12.4	Changing the Agent Base Port Setting.....	123
12.5	Changing the Web Server Port.....	124
12.6	Granting Standard Users Admin Privilege	125
13	Solving Problems.....	126
13.1	General Troubleshooting Tips.....	126
13.2	Identifying a Failed or Failing Component.....	126
13.3	Recovering from a Disk Drive Failure.....	127
13.3.1	Failed Disk Drive Protected by a Hot Spare.....	127
13.3.2	Failed Disk Drive Not Protected by a Hot Spare.....	127
13.3.3	Failure in Multiple Logical Drives Simultaneously.....	127

13.3.4 Disk Drive Failure in a RAID 0 Logical Drive.....	128
13.3.5 Multiple Disk Drive Failures in the Same Logical Drive	128
13.3.6 Forcing a Logical Drive with Multiple Drive Failures Back Online	129
13.4 Rebuilding Logical Drives.....	129
13.5 Creating a Support Archive File.....	129
Appendix A Silent Installation on Windows and Linux.....	131
A.1 Completing a Silent Installation.....	131
A.1.1 Windows Silent Installation.....	131
A.1.1.1 Switches, Properties, and Values	132
A.1.2 Linux Silent Installation.....	132
A.2 Example Command Line Installations.....	133
Appendix B Configuring SNMP Notifications on Windows and Linux.....	134
B.1 Setting Up SNMP Notifications on Windows.....	134
B.2 Setting Up SNMP Notifications on Linux.....	135
Appendix C Using the maxView Plugin for VMware vSphere Web Client.....	136
C.1 Installing the maxView Plugin for vSphere Web Client.....	136
C.2 Starting the maxView Plugin for vSphere Web Client.....	137
C.3 Monitoring maxView Resources in vSphere Web Client.....	138
Appendix D Using maxView Storage Manager with HBAs and Non-RAID Mode Controllers	
.....	141
Appendix E Selecting the Best RAID Level.....	143
E.1 Comparing RAID Levels.....	143
E.2 Understanding Drive Segments.....	143
E.3 Non-redundant Logical Drives (RAID 0).....	144
E.4 RAID 1 Logical Drives	144
E.5 RAID 1 Enhanced Logical Drives.....	145
E.6 RAID 10 Logical Drives.....	146
E.7 RAID 5 Logical Drives.....	147
E.8 RAID 5EE Logical Drives.....	148
E.9 RAID 50 Logical Drive.....	149
E.10 RAID 6 Logical Drives.....	150
E.11 RAID 60 Logical Drives.....	150
Appendix F Icons At-a-Glance.....	151

Microsemi Adaptec® Product Support

If you have questions about installing or using your Microsemi Adaptec® 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.

Note: Please visit the Support section of www.adaptec.com for the most up to date contact information.

Self Help and Support in English

- Visit our Web site at www.adaptec.com.
- Search the Adaptec Support Knowledgebase (ASK) at ask.adaptec.com for articles, troubleshooting tips, and frequently asked questions for your product.
- For support via e-mail, submit your question at ask.adaptec.com.
- To contact Technical Support, visit our product support site at start.adaptec.com and click on "Contact Support" for options.

Technische Informationen und Support in Deutsch

- Besuchen Sie unsere Webseite www.adaptec.com/de-de
- Suchen Sie in der Adaptec Support Knowledgebase (ASK) unter ask-de.adaptec.com nach Artikeln, Tipps zur Fehlerbehebung und häufig gestellten Fragen zu Ihrem Produkt.
- Support per Email erhalten Sie unter ask-de.adaptec.com.
- Um den Technischen Support zu kontaktieren, besuchen Sie uns bitte unter start.adaptec.com und klicken Sie auf „Support kontaktieren“, für Auswahlmöglichkeiten.

Техническая поддержка и информация на русском языке

- Посещаете наш сайт www.adaptec.com/ru-ru/.
- База знаний Adaptec (ASK) на сайте ask-ru.adaptec.com ask-ru.adaptec.com – статьи, советы по устранению неисправностей и часто задаваемые вопросы о Вашем продукте.
- Для поддержки по электронной почте отправьте Ваш запрос на сайте ask-ru.adaptec.com
- Для обращения в службу Технической Поддержки, пожалуйста, посетите наш web сайт start.adaptec.com и используйте ссылку "Contact Support".

日本語での技術情報とサポート

- 弊社のウェブサイト、www.adaptec.com/ja-jp をご覧ください。
- ask.adaptec.co.jp のAdaptec Support Knowledgebase (ASK)で、お使いの製品の情報 トラブルシューティングのヒント、よくある質問を検索してください。
- Eメールでのサポートには ask.adaptec.co.jp から質問を送ってください。
- テクニカルサポートへコンタクトするには、弊社ウェブサイト start.adaptec.com をご覧になり、"Contact Support"をクリックして下さい。

Software License Agreement

PLEASE READ CAREFULLY: THE USE OF THIS SOFTWARE IS SUBJECT TO THE SOFTWARE LICENSE TERMS OF MICROSEMI, INC. AND OTHER LICENSORS WHOSE SOFTWARE MAY BE BUNDLED WITH THIS PRODUCT.

BY YOUR USE OF THE SOFTWARE INCLUDED WITH THIS PRODUCT YOU AGREE TO THE LICENSE TERMS REQUIRED BY THE LICENSOR OF THAT SOFTWARE, AS SET FORTH DURING THE INSTALLATION PROCESS. IF YOU DO NOT AGREE TO THE LICENSE TERMS APPLICABLE TO THE SOFTWARE, YOU MAY RETURN THE ENTIRE UNUSED PRODUCT FOR A FULL REFUND.

In return for acquiring a license to use the Microsemi software, which may include software from third party licensors and patches made available by Microsemi (“Software”), and the related documentation, you agree to the following terms and conditions:

1. License. This Agreement grants you, the Licensee, a license to:
 - a. Use the Software on a single computer system, which is not intended for use by more than five (5) users; and:
 - b. Make one copy of the Software in machine readable form solely for back-up purposes, provided you reproduce Microsemi's copyright proprietary legends. Notwithstanding the foregoing, the Software may be used on the home, laptop or other secondary computer of the principal user of the Software, and an additional copy of the Software may be made to support such use. As used in this license, the Software is “in use” when it is either loaded into RAM or installed on a hard disk or other permanent memory device. The Software may be “in use” on only one computer at any given time. (Different license terms and fees are applicable for networked or multiple user applications.) As a specific condition of this license, you agree to use the Software in compliance with all applicable laws, including copyright laws, and that you will not copy, transmit, perform or distribute any audio or other content using the Software without obtaining all necessary licenses or permissions from the owner of the content.
2. Restrictions. You may not distribute copies of the Software to others or electronically transfer the Software from one computer to another over a network. You may not post or otherwise make available the Software, or any portion thereof, in any form, on the Internet. You may not use the Software in a computer service business, including in time sharing applications. The Software contains trade secrets and, in order to protect them, you may not decompile, reverse engineer, disassemble, or otherwise reduce the Software to a human-perceivable form. YOU MAY NOT MODIFY, ADAPT, TRANSLATE, RENT, LEASE, LOAN, RESELL FOR PROFIT, DISTRIBUTE, NETWORK OR CREATE DERIVATIVE WORKS BASED UPON THE SOFTWARE OR ANY PART THEREOF.
3. Ownership of Software. As Licensee, you own the media upon which the software is recorded or fixed, but Microsemi and its licensors retain title and ownership of the Software recorded on the original media and all subsequent copies of the Software, regardless of the form or media in which or on which the original and other copies may exist. This license is not a sale of the Software or any copy.
4. Confidentiality. You agree to maintain the Software in confidence and that you will not disclose the Software to any third party without the express written consent of Microsemi. You further agree to take all reasonable precautions to preclude access of unauthorized persons to the Software.
5. Term. This license is effective until January 1, 2045, unless terminated earlier. You may terminate the license at any time by destroying the Software (including the related documentation) together with all copies or modifications in any form. Microsemi will have the right to terminate our license immediately if you fail to comply with any term or condition of this Agreement. Upon any termination, including termination by you, you must destroy the Software (including the related documentation), together with all copies or modifications in any form.

6. **Special Terms Applicable to Databases.** Where a database is included with the Software, you acknowledge that it is licensed only in connection with the use of the Software to perform disc creation, and that the database and all data derived therefrom must be maintained in confidence in accordance with the provisions of Section 4. This license does not grant you any rights to distribute or disclose such database or data.
7. **Limited Warranty.** Microsemi and its Licensor warrant only that the media upon which the Software is furnished will be free from defects in material or workmanship under normal use and service for a period of thirty (30) days from the date of delivery to you. MICROSEMI AND ITS LICENSORS DO NOT AND CANNOT WARRANT THE PERFORMANCE OR RESULTS YOU MAY OBTAIN BY USING THE SOFTWARE OR DOCUMENTATION. THE FOREGOING STATES THE SOLE AND EXCLUSIVE REMEDIES MICROSEMI AND ITS LICENSORS WILL PROVIDE FOR BREACH OF WARRANTY. EXCEPT FOR THE FOREGOING LIMITED WARRANTY, MICROSEMI AND ITS LICENSORS MAKE NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED, AS TO NON-INFRINGEMENT OF THIRD PARTY RIGHTS, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow the exclusion of implied warranties or limitations on how long an implied warranty may last, so the above limitations may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.
8. **The entire liability of Microsemi and its licensors, and your exclusive remedy for a breach of this warranty, shall be:**
 - a. The replacement of any media not meeting the above limited warranty which is returned to Microsemi; or
 - b. if Microsemi or its distributor is unable to deliver replacement media which is free from defects in materials or workmanship, you may terminate this Agreement by returning the Software and your money will be refunded.
9. **Limitation of Liability.** IN NO EVENT WILL MICROSEMI OR ITS LICENSORS BE LIABLE TO YOU FOR ANY INCIDENTAL, CONSEQUENTIAL OR INDIRECT DAMAGES, INCLUDING ANY LOST PROFITS, LOST SAVINGS, OR LOSS OF DATA, EVEN IF MICROSEMI OR A LICENSOR HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, OR FOR ANY CLAIM BY ANY OTHER PARTY. Some states do not allow the exclusion or limitation of special, incidental, or consequential damages, so the above limitation or exclusion may not apply to you.
10. **Export.** You acknowledge that the laws and regulations of the United States and other countries may restrict the export and re-export of the Software. You agree that you will not export or re-export the Software or documentation in any form in violation of applicable United States and foreign law.
11. **Government Restricted Rights.** The Software is subject to restricted rights as follows. If the Software is acquired under the terms of a GSA contract: use, reproduction or disclosure is subject to the restrictions set forth in the applicable ADP Schedule contract. If the Software is acquired under the terms of a DoD or civilian agency contract, use, duplication or disclosure by the Government is subject to the restrictions of this Agreement in accordance with 48 C.F.R. 12.212 of the Federal Acquisition Regulations and its successors and 49 C.F.R. 227.7202-1 of the DoD FAR Supplement and its successors.
12. **General.** You acknowledge that you have read this Agreement, understand it, and that by using the Software you agree to be bound by its terms and conditions. You further agree that it is the complete and exclusive statement of the agreement between Microsemi and you, and supersedes any proposal or prior agreement, oral or written, and any other communication between Microsemi and you relating to the subject matter of this Agreement. No additional or any different terms will be enforceable against Microsemi unless Microsemi gives its express consent, including an express waiver of the terms of this Agreement, in writing signed by an officer of Microsemi. You assume full responsibility for the use of the Software and agree to use the Software legally and responsibly. This Agreement shall be governed by California law, except as to copyright matters, which are covered by Federal law. This Agreement is deemed entered into at Sunnyvale, California by both parties. Should any provision of this Agreement be declared unenforceable in any jurisdiction, then such

provision shall be deemed severable from this Agreement and shall not affect the remainder hereof.
All rights in the Software not specifically granted in this Agreement are reserved by Microsemi.

Should you have any questions concerning this license, contact:

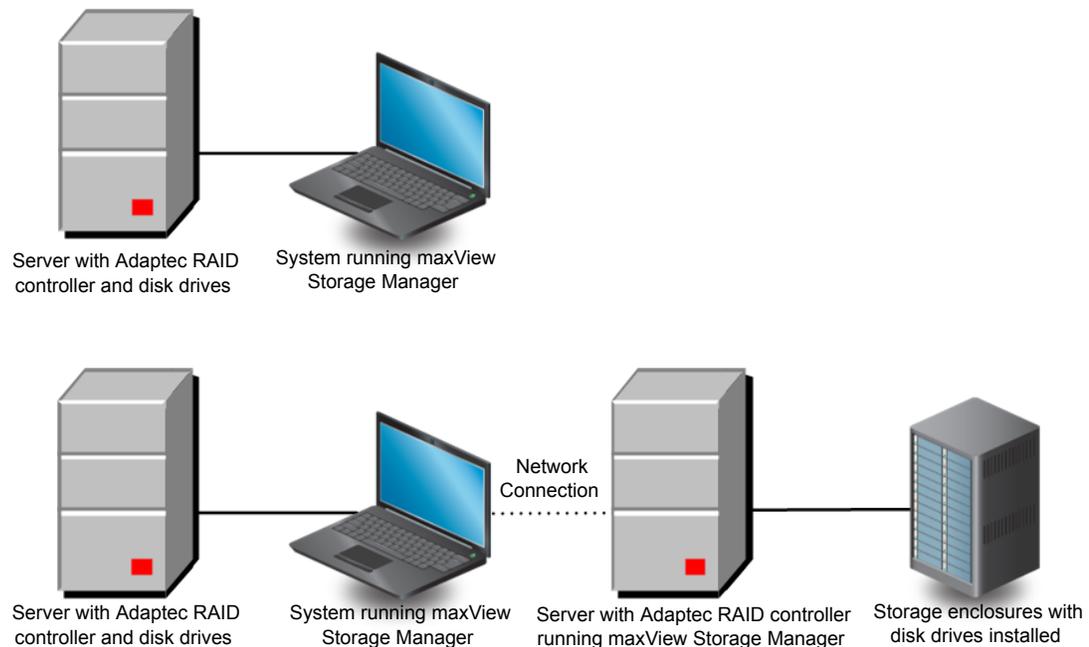
Microsemi Corporation
Legal Department
One Enterprise
Aliso Viejo, CA 92656
(949) 380-6100

1 About this Guide

maxView Storage Manager™ is a browser-based software application that helps you build a storage space using Microsemi 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 controllers, servers, and enclosures.

This guide describes how to install and use maxView Storage Manager to build and manage *direct attached storage*; that is, storage where the controller and disk drives reside inside, or are directly attached to, the computer accessing them, similar to the basic configurations shown in the figures below.

Note: This guide focuses on using maxView Storage Manager with Microsemi Adaptec Series 6/7/8 controllers (RAID/HBA). For information about using maxView Storage Manager with Microsemi Smart-family controllers, see [How to Find More Information](#) on page 14.



1.1 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 Microsemi Adaptec RAID products, some of the features and functions described may not be available for your controller or enclosure.

1.2 Terminology Used in this Guide

Because this guide provides information that can be used to manage multiple Microsemi 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 a logical device or array)
- System (also known as a server, workstation, or computer)
- Enclosure (also known as a storage enclosure or disk drive enclosure)

1.3 How to Find More Information

You can find more information about your Microsemi Adaptec RAID controller, management software, and utilities by referring to these documents, available for download at start.adaptec.com:

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

For information about using maxView Storage Manager with Microsemi Smart-family controllers (RAID/HBA), see the *maxView Storage Manager User's Guide for Microsemi Smart-Family Controllers* (PMC-2153109).

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.

2.1 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 20).

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 39).

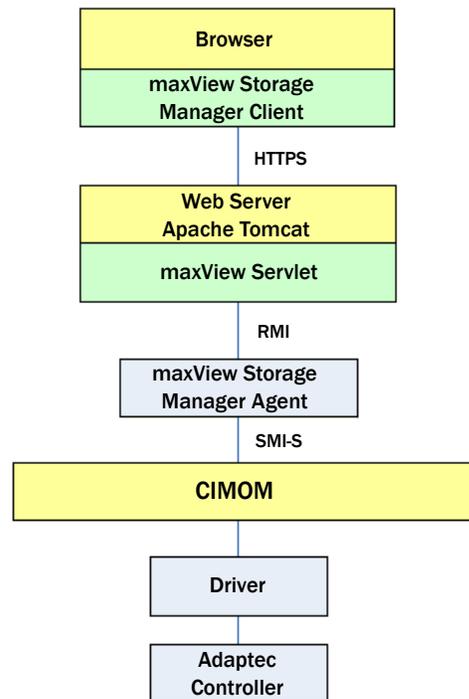
2.2 About maxView Storage Manager

maxView Storage Manager is a browser-based software application that helps you build a storage space for your data, using Microsemi 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 17). A software stack comprising a Web server, Agent, and CIMOM server allows maxView Storage Manager to communicate with the controller(s) in your storage space and coordinate activity in your system.

A flexible installation model allows you to install all software components on a single machine, or distribute components on different machines across your network, with the maxView Storage Manager GUI and Web server on one machine, and the Agent and CIMOM server on others.



2.2.1 About the maxView Storage Manager Agent

The maxView Storage Manager *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 install 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 40).

2.2.2 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 the maxView Storage Manager GUI.

2.2.3 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 controllers in your system and provide notifications to the maxView Storage Manager Agent. The maxView Storage Manager CIM Server is installed automatically with the maxView Storage Manager Agent.

2.3 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
- One of these operating systems:
 - Microsoft® Windows® Server 2016, Windows Server 2012 R2 (64-bit), Windows Server 2012 (64-bit), Windows Server 2008 R2 (64-bit), Windows SBS 2011 (64-bit), Windows 7, Windows 8.1, Windows 10, Windows PE 5.x (64-bit)
 - Red Hat® Enterprise Linux 7.2, 7.1, 6.8, 6.7, 5.11, 5.10 (64-bit)
 - SuSE Linux Enterprise Server 12, 11 (64-bit)
 - Debian Linux 8.1 (64-bit)
 - Ubuntu Linux 16.04, 14.04.4 (64-bit)
 - Fedora Linux 22 (64-bit)
 - CentOS 7.2, 7.1, 6.8, 6.7, 5.11, 5.10 (64-bit)
 - Solaris 11, 10 U9 (64-bit)
 - Hypervisors:
 - VMware vSphere 6.0, VMware ESXi 6.0, 5.5 (64-bit)
 - Citrix XenServer 6.5.1 (64-bit)
 - Microsoft Hyper-V (64-bit)

See the Readme, available at <http://start.adaptec.com>, for the most up-to-date list of supported operating system versions.

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.

2.4 Browser Support

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

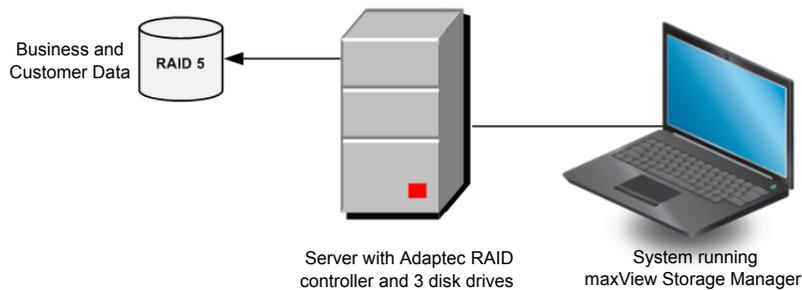
- Microsoft® Internet Explorer® 10, 11, or newer
- Microsoft® Edge browser for Windows 10
- Google® Chrome™ 32 or newer
- Mozilla Firefox® 31 or newer

2.5 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.

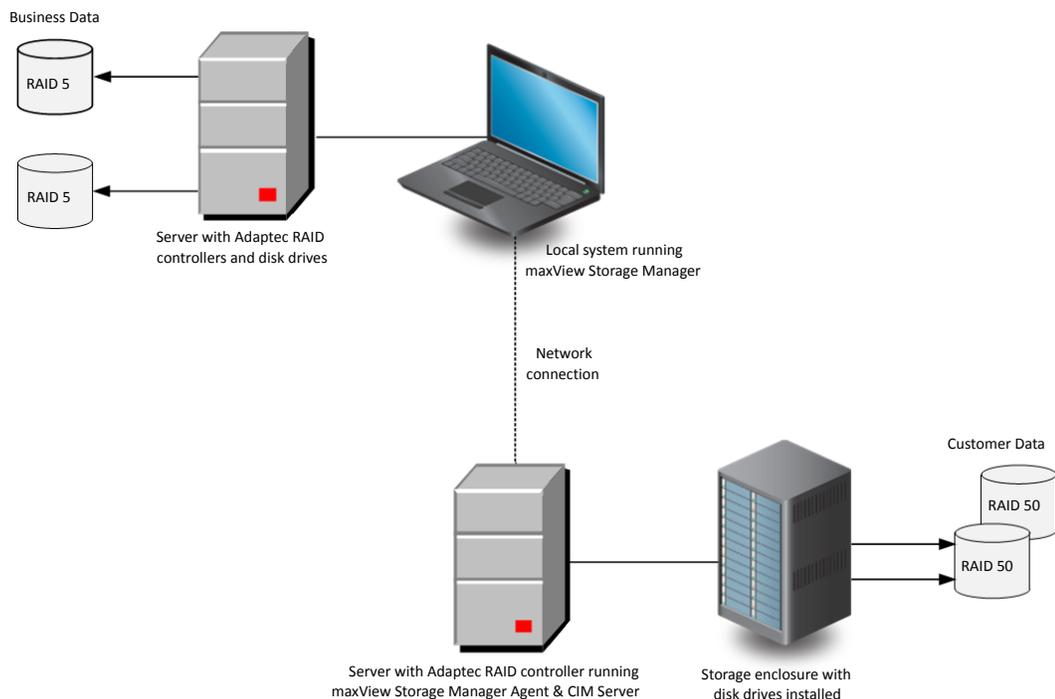
2.5.1 A Simple Storage Space

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.



2.5.2 An Advanced Storage Space

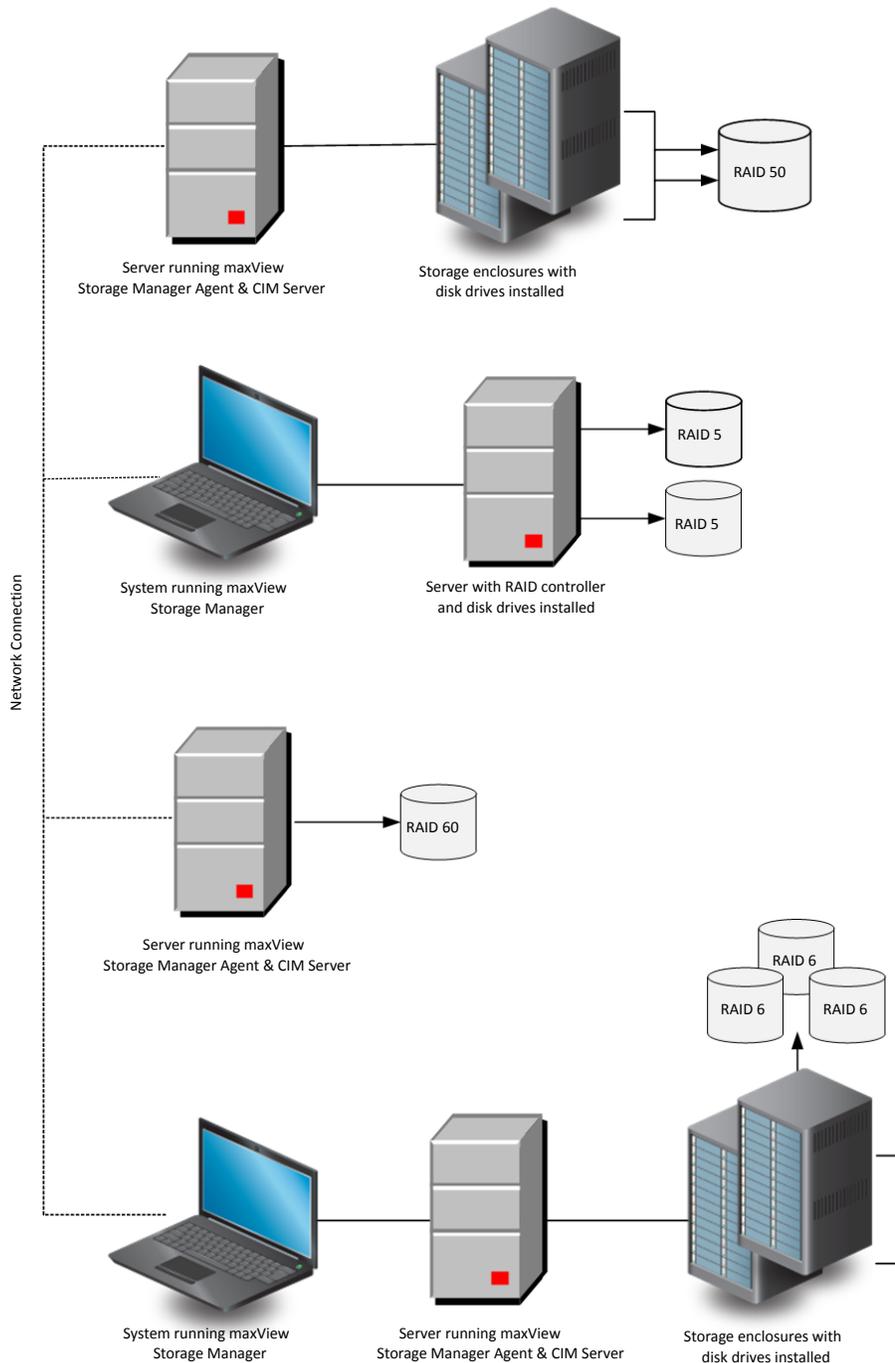
This example shows how you can grow your storage space as the requirements of your application change. On the first server, segments from each disk drive have been used to build two RAID 5 logical drives. A second server connected to two 12-disk enclosures has been added. The additional storage space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



2.5.3 Continuing to Grow Your Storage Space

For more advanced applications, such as high-volume transaction processing in a "cloud" or data center environment, 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 the supported 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.

Note: VMware users can install the maxView plugin for vSphere Web Client for Windows and monitor storage resources without using the maxView Storage Manager GUI. For more information, see [Using the maxView Plugin for VMware vSphere Web Client](#) on page 136.

3.1 Before You Begin the Installation

Complete the following steps before you begin the installation.

3.1.1 Gather Installation Information

Prepare the following information:

- 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 16.
- 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 16.

Note: You can install over an existing maxView Storage Manager installation if it is no more than two versions older than the current release. Otherwise, you must remove the old version before beginning a new installation. See [Uninstalling maxView Storage Manager](#) on page 28 for details.

3.1.2 Download the Installation Packages

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

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.

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.

3.2 Installing on Windows

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

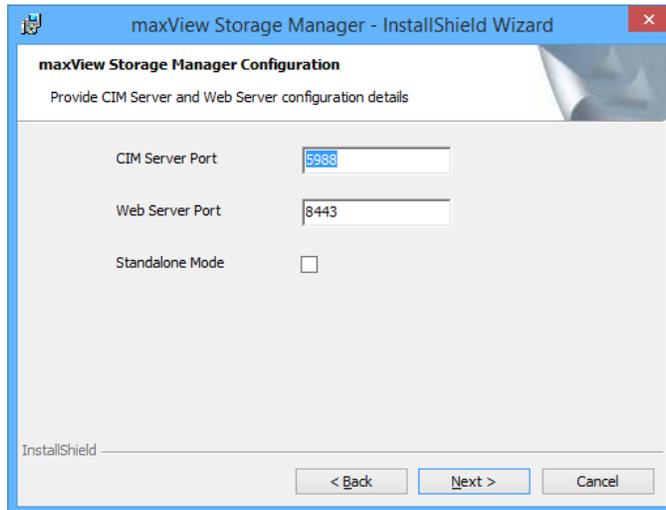
Note: You need administrator privileges to install maxView Storage Manager. For details on verifying privileges, refer to your operating system documentation.

1. Open Windows Explorer or My Computer, then change to the directory where the Windows installer package is located (see [Downloading the Installer Package](#) on page 20 for details).
2. Double-click the setup program for your operating system version:

Options	Description
Windows 64-bit	setup_asm_x64.exe

The Installation wizard opens.

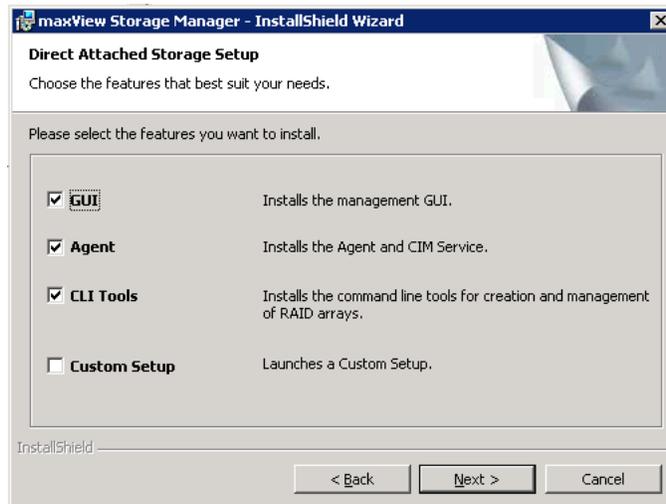
3. Click **Next** to begin the installation, click **I accept the terms of the license...**, then click **Next**.
4. In the Configuration Settings screen, accept or modify the default server ports:
 - a) CIM Server Port default: 5988.
 - b) Web Server Port default: 8443.



5. To *disable* remote system management from the GUI, click the **Standalone Mode** check box.

Note: In Standalone mode, maxView Storage Manager displays the system name as "localhost" and events as "127.0.0.1/localhost".
6. Click **Next**, then click **OK** to verify the CIM Server and Web Server port numbers.
7. In the Features screen, ensure that **GUI and/or Agent** is selected. Optionally, select **CLI Tools**. Then click **Next**.

Note: You must install the Agent on at least one machine.



8. Click **Install** to begin the installation.
9. 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.

3.3 Installing on Red Hat, CentOS, SuSE, or Fedora Linux

This section describes how to install maxView Storage Manager on systems running Red Hat Linux, CentOS, 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 17.

1. Open a shell window, then change to the directory where the Linux installer package is located (see [Downloading the Installer Package](#) on page 20 for details).
2. Run the `.bin` file for your operating system version (x.xx-xxxx=version-build number):

Options	Description
Linux 64-bit	<code>./StorMan-X.XX-XXXXX.x86_64.bin</code>

3. When prompted for configuration details, enter the following:
Enter the CIM Server HTTP Port: [default:5988]
Standalone Mode: [default: No]
Note: Standalone Mode *disables* remote system management from the GUI. maxView Storage Manager displays the system name as "localhost", and events as "127.0.0.1/localhost".
4. Repeat these steps to install maxView Storage Manager on every Linux system that will be part of your storage space.
When the installation completes a confirmation message is displayed and the maxView Storage Manager icon is placed on your desktop.

3.4 Installing on Debian or Ubuntu Linux

This section describes how to install maxView Storage Manager on systems running Debian or Ubuntu Linux.

1. Open a shell window, then change to the directory where the Linux installer package is located (see [Downloading the Installer Package](#) on page 20 for details).
2. Install the `.deb` package for your operating system version (x.xx-xxxx=version-build number).

- | Options | Description |
|--------------|--------------------------------------|
| Linux 64-bit | dpkg -i StorMan-X.XX-XXXXX_amd64.deb |
- When prompted for configuration details, enter the following:
 Enter the CIM Server HTTP Port: [default:5988]
 Standalone Mode: [default: No]
Note: Standalone Mode *disables* remote system management from the GUI. maxView Storage Manager displays the system name as "localhost", and events as "127.0.0.1/localhost".
 - 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.

3.5 Installing on Solaris

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

- On the Solaris machine, change to the directory where the Solaris installer package is located (see [Downloading the Installer Package](#) on page 20 for details).
- Install maxView Storage Manager:

```
pkgadd -d StorMan.pkg
```
- At the prompt to continue, select `y`, then press `Enter`.
- Enter the following configuration details:
 Enter your username [default: root].
 Enter your operating system password.
 Enter the CIM Server HTTP Port: [default:5988].
- 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.

3.6 Installing on a Hypervisor

This section describes how to install maxView Storage Manager host components on a VMware, Citrix XenServer, or Microsoft Hyper-V hypervisor. After you complete the steps in this section, continue with [Installing on a Guest Operating System](#) on page 25 .

3.6.1 Installing on VMware

Use the following procedure to install the .vib files for a VMware ESXi 5.5 or 6.0 system. Perform the installation from a remote system running a Telnet/SSH client. Use a terminal emulator to access the ESXi server remotely.

- Copy the following files from the installer download location to the `/tmp` directory on your local ESXi server (see [Downloading the Installer Package](#) on page 20 for details):
 - vmware-esx-provider-arconf.vib
 - vmware-esx-provider-arc-cim-provider.vib

The `arconf.vib` is for command line communication.

The `arc-cim-provider.vib` is for remote management communication.

- Check for existing installation of `arconf`.

```
esxcli software vib list | grep arconf
```

3. Remove the existing arcconf package.

```
esxcli software vib remove -n arcconf
```

 When the package is removed, you receive the message "Reboot Required: false."
4. Check for an existing installation of arc-cim-provider.

```
esxcli software vib list | grep arc-cim-provider
```
5. Remove the existing arc-cim-provider package.

```
esxcli software vib remove -n arc-cim-provider
```

 When the package is removed, you receive the message "Reboot Required: true."
6. Set the installation acceptance level to either PartnerSupported or CommunitySupported:

```
esxcli software acceptance set --level=PartnerSupported
```
7. Install the arcconf package.

```
esxcli software vib install --no-sig-check -v /tmp/vmware-esx-provider-arcconf.vib
```

 When the package is installed, you receive the message "Reboot Required: false."
8. Install the arc-cim-provider package.

```
esxcli software vib install --no-sig-check -v /tmp/vmware-esx-provider-arc-cim-provider.vib
```

 When the package is installed, you receive the message "Reboot Required: true."
9. Reboot the system.
10. Continue with [Installing on a Guest Operating System](#) on page 25.

3.6.2 Installing on Citrix XenServer

Use the following procedure to install the maxView Storage Manager support package on a Citrix XenServer host. This package installs and configures the components necessary to run maxView Storage Manager from a XenServer guest operating system.

Note: Before installing the maxView Storage Manager support package on the XenServer host, you *must* install the XenServer Integration Suite Supplemental Pack. Do not continue until you complete this task. See your XenServer installation guide for details.

1. Copy the XenServer module rpm from the installer download location to your XenServer /tmp directory (see [Downloading the Installer Package](#) on page 20 for details).
2. Install the rpm package for your operating system version (x.xx-xxxxx=version-build number).

Options	Description
XenServer 64-bit	<code>rpm -i StorMan-X.XX-XXXXX.x86_64.rpm</code>
3. Continue with [Installing on a Guest Operating System](#) on page 25.

3.6.3 Installing on Microsoft Hyper-V

Use the following procedure to install the maxView Storage Manager Agent package on a Microsoft Hyper-V host. The Agent package installs and configures the components necessary to run maxView Storage Manager from a Hyper-V guest operating system.

1. Open Windows Explorer or My Computer, then change to the directory where the Hyper-V Agent installer is located (see [Downloading the Installer Package](#) on page 20 for details).
2. Double-click the setup program for your operating system version:

Options	Description
Hyper-V 64-bit	<code>Setup_maxView_Hyper-v_Agent_x64.exe</code>

 The Installation wizard opens.
3. Click **Next** to begin the installation, click **I accept the terms of the license...**, then click **Next**.
4. In the Configuration Settings screen, accept or modify the default CIM server port, then click **Next**.

- a) CIM Server Port default: 5988.
5. In the Setup Type screen, select **Complete** (recommended) or **Custom** (to choose components to install), then click **Next**.
6. Click **Install** to begin the installation. When the installation is complete, click **Finish**.
7. Continue with [Installing on a Guest Operating System](#) on page 25.

3.7 Installing on a Guest Operating System

This section describes how to install maxView Storage Manager on a VMware, Citrix XenServer, or Microsoft Hyper-V guest operating system. You can install maxView Storage Manager on a Windows guest OS or a Linux guest OS.

3.7.1 Installing on a Windows Guest OS - VMware/XenServer

Use the following procedure to install maxView Storage Manager on a Windows guest OS running on VMware or Citrix XenServer.

1. On the VMware or XenServer guest OS, change to the directory where the guest OS installer package is located (see [Downloading the Installer Package](#) on page 20 for details).
2. Double-click the setup program for your operating system:

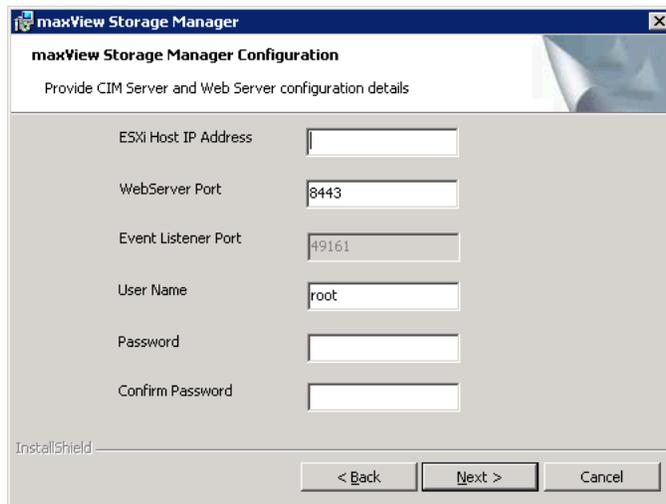
Options	Description
Windows GOS 64-bit	Setup_maxView_GOS_x64.exe
Windows GOS 32-bit	Setup_maxView_GOS_x86.exe

The Installation wizard opens.

3. Choose the hypervisor type (ESXi Server or XenServer), then click **Next**.



4. Enter the following configuration details:
 - a) Host IP Address (ESXi or XenServer host)
 - b) Web Server Port: 8443
 - c) Host user name (default: root)
 - d) Host operating system password/password confirmation



Note: The configuration details screen differs slightly for VMware and XenServer. However, the information you need to enter is the same for both operating systems.

5. Click **Next**, then click **Install**.

When the installation is complete you receive a confirmation message.

3.7.2 Installing on a Windows Guest OS - Hyper-V

Use the following procedure to install maxView Storage Manager on a Windows guest OS running on Microsoft Hyper-V.

1. On the Hyper-V guest OS, change to the directory where the guest OS installer package is located (see [Downloading the Installer Package](#) on page 20 for details).
2. Double-click the setup program for your operating system:

Options	Description
Windows GOS 64-bit	Setup_maxView_Hyper-V_GUI_x64.exe
Windows GOS 32-bit	Setup_maxView_Hyper-V_GUI_x86.exe

The Installation wizard opens.

3. Click **Next** to begin the installation, click **I accept the terms of the license...**, then click **Next**.
4. In the Configuration Settings screen, accept or modify the default Web Server port, then click **Next**.
 - a) Web Server Port default: 8443
5. In the Setup Type screen, select **Complete** (recommended) or **Custom** (to choose components to install), then click **Next**.
6. Click **Install** to begin the installation.

When the installation is complete you receive a confirmation message.

3.7.3 Installing on a Linux Guest OS - VMware/XenServer

Use the following procedure to install maxView Storage Manager on a Linux guest OS running on VMware or Citrix XenServer.

1. On the VMware or XenServer guest OS, change to the directory where the Linux installer package is located (see [Downloading the Installer Package](#) on page 20 for details).
2. Run the installer for your operating system version (x.xx=version number):

Options	Description
Linux GOS 64-bit	./Storman-X.XX.GOS86_64.bin

- At the prompt, choose the GOS type. Enter 1 for ESXi, 2 for XenServer:

```
Select the GOS Type. 1.ESXi Server 2.XenServer:
```
- Enter the following configuration details:
 Hypervisor IP address
 Hypervisor username [default: root]
 Hypervisor password
 Event Listener Port [default: 65500]

When the installation is complete you receive a confirmation message.

3.7.4 Installing on a Linux Guest OS - Hyper-V

Use the following procedure to install maxView Storage Manager on a Linux guest OS running on Microsoft Hyper-V.

- On the Hyper-V guest OS, change to the directory where the Linux guest OS installer is located (see [Downloading the Installer Package](#) on page 20 for details).
- Run the installer for your operating system version (<xxxxx>=version number):

Options	Description
Linux GOS 64-bit	./StorMan-<xxxxx>.Hyper-V_GUI_x86_64.bin
Linux GOS 32-bit	./StorMan-<xxxxx>.Hyper-V_GUI_x86.bin

When the installation is complete you receive a confirmation message.

3.8 Installing on PowerPC

Note: maxView Storage Manager for PowerPC is supported on Microsemi Adaptec Series 8 controllers only. See the Readme for supported OS versions.

To install maxView Storage Manager for PowerPC:

- Installing on RHEL 64-bit:

```
rpm -i StorMan-2.02-xxxxx.ppc64le.rpm
```
- Installing on Ubuntu 64-bit:

```
dpkg -i StorMan_2.02-xxxxx_ppc64el.deb
```
- Installing on SLES 64-bit:

```
rpm -i --nodeps StorMan-2.02-xxxxx.ppc64le.rpm
```

Where xxxxx is the installer version.

3.9 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:

- Download the bootable USB image
- Create a "live" image on a USB flash drive
Note: We recommend using LiveUSB Creator, available at fedorahosted.org (see Step [2], below).
- 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 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 a "live" 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 arconf** 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 43.

3.10 Uninstalling maxView Storage Manager

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

3.10.1 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.

3.10.2 Uninstalling from Red Hat, CentOS, SuSE, or Fedora Linux

This section describes how to uninstall maxView Storage Manager from systems running Red Hat, CentOS, 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.

3.10.3 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.

3.10.4 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.

3.10.5 Uninstalling from VMware

Use the following procedure to remove maxView Storage Manager from a VMware ESXi 5.5 or 6.0 system.

1. Log in with the user name: root
2. List the installed packages:

```
esxcli software vib list | grep arconf  
esxcli software vib list | grep arc-cim-provider
```
3. Remove the arconf package:

```
esxcli software vib remove -n arconf
```
4. Remove the arc-cim-provider package:

```
esxcli software vib remove -n arc-cim-provider
```
5. Reboot the system.

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

4 Exploring maxView Storage Manager

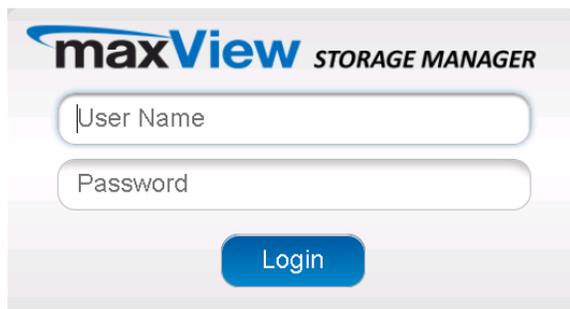
This section familiarizes you with the main features of the maxView Storage Manager graphical user interface. It describes how to start and log into maxView Storage Manager. It also explains how to get help and log out of maxView Storage Manager when you are finished working with the application.

4.1 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. You can login as the Administrator, with full management-level access to your storage space, or as a Standard user, with restricted access to your storage space (see [Working in maxView Storage Manager](#) on page 30 for more information about access permissions).

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, then type this URL in the address bar and press **Return**:

<https://127.0.0.1:8443/maxview/manager/login.xhtml>.

2. For full management-level access to your storage space, enter the Administrator account username and password for your operating system. For Standard-level access to your storage space, enter your regular network login credentials. Then click **Login**.

The maxView Storage Manager main window opens.

4.2 Working in maxView Storage Manager

You can perform most tasks in maxView Storage Manager by:

- Selecting storage components in the Enterprise View (controllers, hard drives, logical drives, and so on)
- Clicking icons on the *ribbon*, at the top of the maxView Storage Manager main window
- Working with information in the *Storage Dashboard* and *Chart View*
- Checking status in the Event Log and Task Log

If you are logged in as the Administrator, you have full access to manage and modify the components of your storage space, using all of the features of maxView Storage Manager. If you are logged in as a Standard user, you have restricted "view-only" access to your storage space, with limited ability to perform non-destructive operations, as described in the table below.

Note: maxView Storage Manager allows you to give Standard users Administrator privileges. For details, see [Granting Standard Users Admin Privilege](#) on page 125.

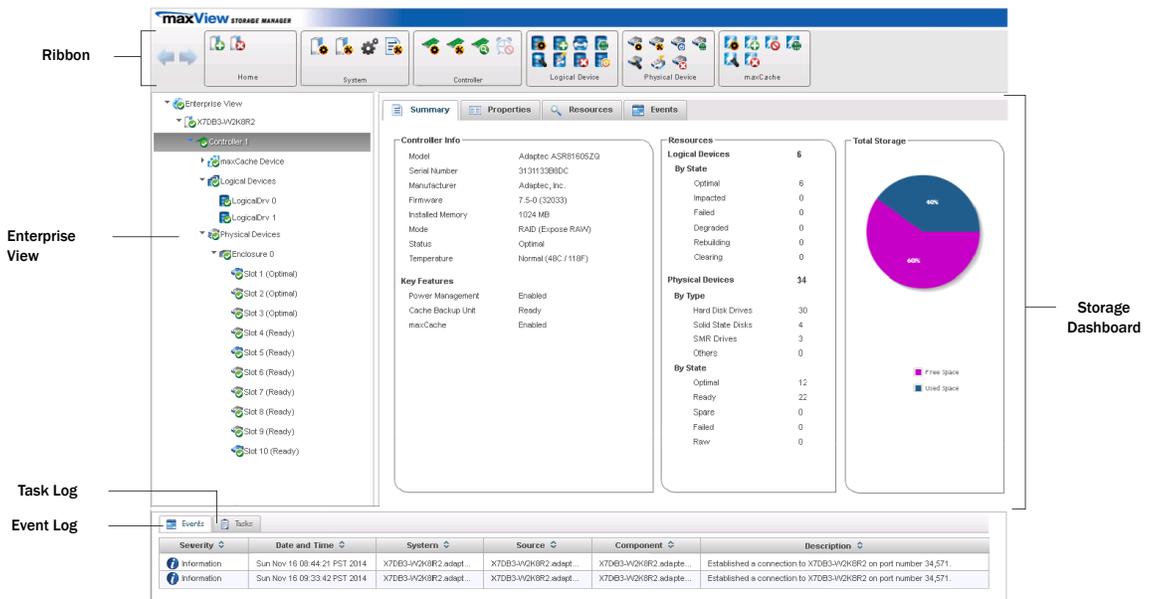
Standard users can:	Standard users can't:
Rescan controllers	Create logical drives
Save activity logs	Modify logical drives
Identify physical devices, logical devices, and enclosures	Delete logical drives
Silence alarms	Perform data migrations
View component properties on the Storage Dashboard	Schedule, modify, or delete tasks
View component properties on the Storage Dashboard	Clear the controller configuration

4.3 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 always shows 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.



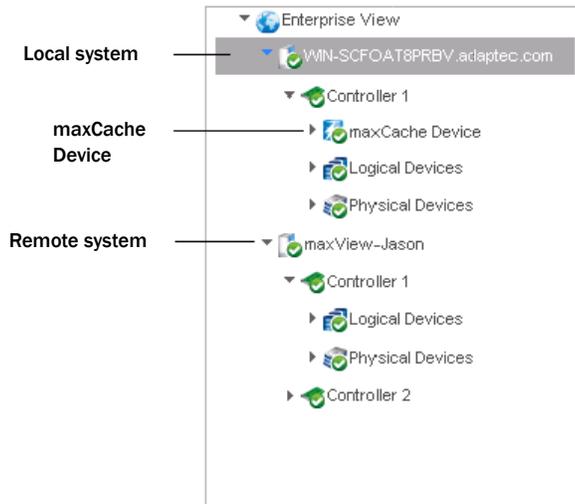
The screenshot shows the maxView Storage Manager interface. The Ribbon at the top includes Home, System, Controller, Logical Device, Physical Device, and maxCache. The Enterprise View on the left shows a tree structure for Controller 1, including maxCache Device, Logical Devices (LogicalDrv 0, LogicalDrv 1), Physical Devices (Enclosure 0, Slots 1-10), and Enclosure 0. The Storage Dashboard on the right displays Controller Info, Resources (Logical Devices: 6, Physical Devices: 34), and a Total Storage pie chart. The Event Log at the bottom shows two information events from Sun Nov 16, 2014.

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

4.3.1 The Enterprise View

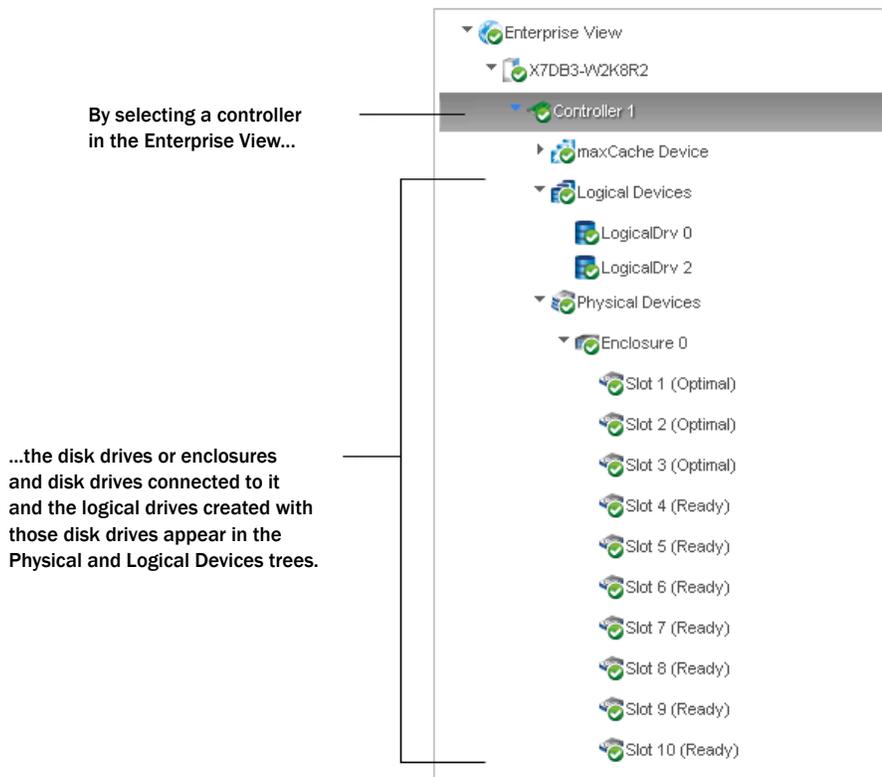
The Enterprise View is an expandable “tree” that shows the physical and logical components of your storage space. The Enterprise View lists the local system (the system you’re working on) and any remote systems that you have logged in to from the local system. (See ‘Local’ or ‘Remote?’ on page 39 for more information.) It also lists the *maxCache Devices* in your system.

Note: maxCache is supported on Microsemi Adaptec Series Q controllers only. See [Working with maxCache Devices](#) on page 72 for more information about maxCache.



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

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



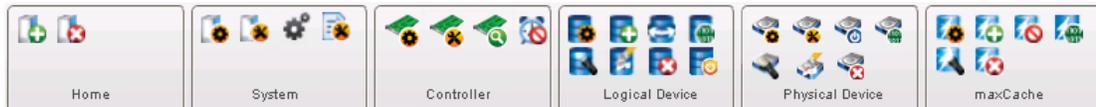
You can perform most tasks in maxView Storage Manager by selecting a component in the Enterprise View, such as a controller or disk drive, then using the related commands on the *ribbon*, as described in the section below.

4.3.1.1 What do the Enterprise View Icons Mean?

Icon	Description
	System with controller and directly attached disk drives or enclosures
	Controller
	Enclosure
	Logical device
	maxCache Device (healthy) ¹
	Hard disk drive
	Solid State Drive (SSD)
	SMR ² drive
	Connector or other physical device

4.3.2 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 of related tasks for Systems, Controllers, Logical Devices, Physical Devices, and maxCache Devices; the Home group (on the left) provides commands for working with remote systems (see [Managing Remote Systems](#) on page 119). Active options 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, these options are activated:

- Create Logical Drive and Delete Logical Drive in the Logical Device group
- Initialize Physical Device in the Physical Device group
- Create maxCache Device in maxCache group
- All 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.

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 126.

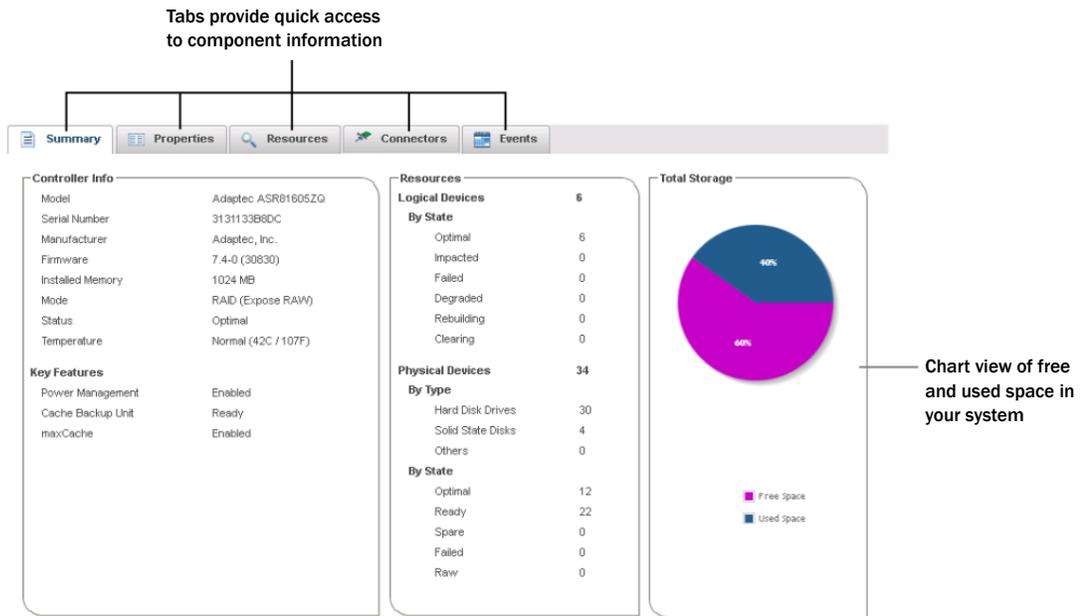
² Shingled Magnetic Recording

Note: For clarity, the figure above shows all options in the activated (highlighted) state. Normally, options are activated or dimmed, depending on which type of component you select in the Enterprise View.

For a description of the icons on the ribbon, see [Icons At-a-Glance](#) on page 151.

4.3.3 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.



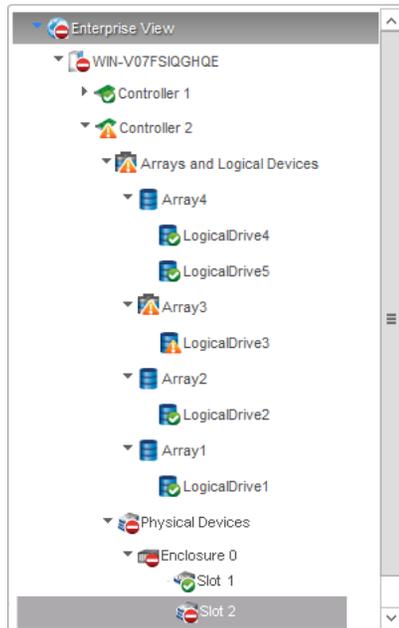
For more information about the types of information provided on the Storage Dashboard for each component in your storage space, see [Viewing Component Information and Status in the Storage Dashboard](#) on page 103; also see [Revealing More Device Information](#) on page 35.

4.4 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 verifying or rebuilding a logical device. 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 102 and [Working with Scheduled Tasks](#) on page 78.



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 126 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 105).

For more information about checking status from the main window, see [Monitoring Status and Activity](#) on page 101.

4.5 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 Device); similarly, you can click a physical disk to see which (if any) logical drive it belongs to.

Note: Click the Arrow icons, on the right side of the Resources table, to jump to that resource in the Enterprise View tree.

Summary Properties Resources Events

Physical Disks						
Device	Protocol	Block	State	Total	Free	
Enclosure 0						
Slot 1	SATA	512	Optimal	465.7 GB	440 GB	↗
Slot 2	SATA	512	Optimal	465.7 GB	440 GB	↗
Slot 3	SATA	512	Optimal	465.7 GB	440 GB	↗
Slot 4	SATA	512	Optimal	465.7 GB	440 GB	↗
Slot 5	SATA	512	Optimal	1.8 TB	1.7 TB	↗
Slot 6	SATA	512	Optimal	1.8 TB	1.7 TB	↗
Slot 7	SATA	512	Optimal	1.8 TB	1.7 TB	↗
Slot 8	SATA	512	Hot spare	1.8 TB	1.7 TB	↗
Slot 9	SATA	512	Optimal	465.7 GB	0.0 GB	↗
Slot 10	SATA	512	Optimal	465.7 GB	440 GB	↗
Slot 11	SATA	512	Optimal	465.7 GB	0.0 GB	↗
Slot 12	SATA	512	Optimal	465.7 GB	0.0 GB	↗
Other devices						

Logical Disks	
Device	
LogicalDrv0	
LogicalDrv2	

Two disk drives plus a hot spare comprise the selected logical drive

maxCache Device	
Device	
MaxCache 0	Optim

Summary Properties Resources Events

Physical Disks						
Device	Protocol	Block	State	Total	Free	
Enclosure 0						
Slot 1	SATA	512	Optimal	465.7 GB	440 GB	↗
Slot 2	SATA	512	Optimal	465.7 GB	440 GB	↗
Slot 3	SATA	512	Optimal	465.7 GB	440 GB	↗
Slot 4	SATA	512	Optimal	465.7 GB	440 GB	↗
Slot 5	SATA	512	Optimal	1.8 TB	1.7 TB	↗
Slot 6	SATA	512	Optimal	1.8 TB	1.7 TB	↗
Slot 7	SATA	512	Optimal	1.8 TB	1.7 TB	↗
Slot 8	SATA	512	Hot spare	1.8 TB	1.7 TB	↗
Slot 9	SATA	512	Optimal	465.7 GB	0.0 GB	↗
Slot 10	SATA	512	Optimal	465.7 GB	440 GB	↗
Slot 11	SATA	512	Optimal	465.7 GB	0.0 GB	↗
Slot 12	SATA	512	Optimal	465.7 GB	0.0 GB	↗
Other devices						

Logical Disks	
Device	
LogicalDrv0	
LogicalDrv2	

maxCache Device	
Device	
MaxCache 0	

The maxCache Device is comprised of three SSDs

4.6 Getting Help

maxView Storage Manager provides online help that includes conceptual information 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.



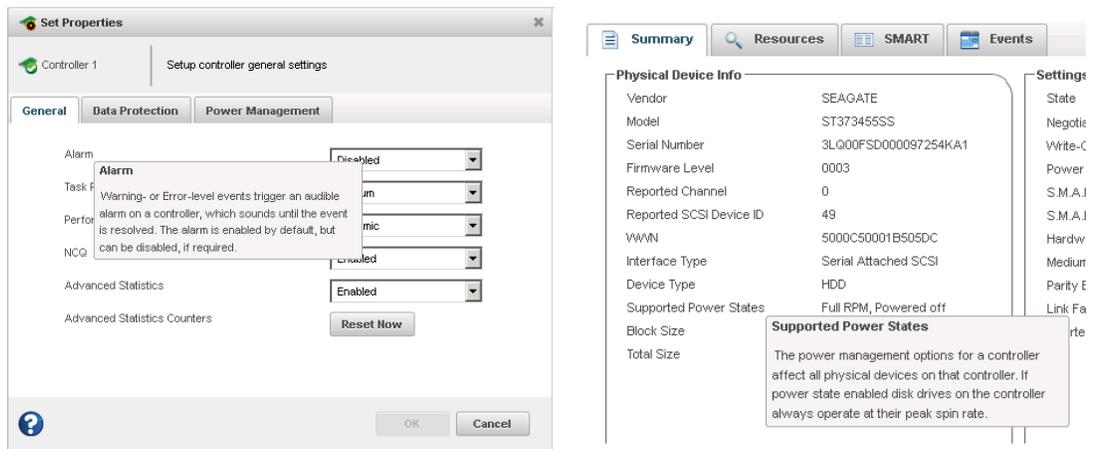
Click here to open the Help window

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.



Click here for help with this procedure

For help with individual options in the Set Properties dialog box (for controllers, logical drives, and physical drives), or specific information fields on the Storage Dashboard, mouse over any field or option name for a brief description of that option.



4.7 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:



Click here to log out

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 56.)

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.

5.1 Overview

To build your storage space, complete these steps:

1. Choose at least one management system (see [Choosing a Management System](#) on page 39).
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 40).
4. Log in to all other systems from the management system (see [Logging into Remote Systems from the Local System](#) on page 42).
5. Create logical drives for all systems in your storage space (see [Creating Logical Drives](#) on page 43).

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 56.

5.2 Choosing a Management System

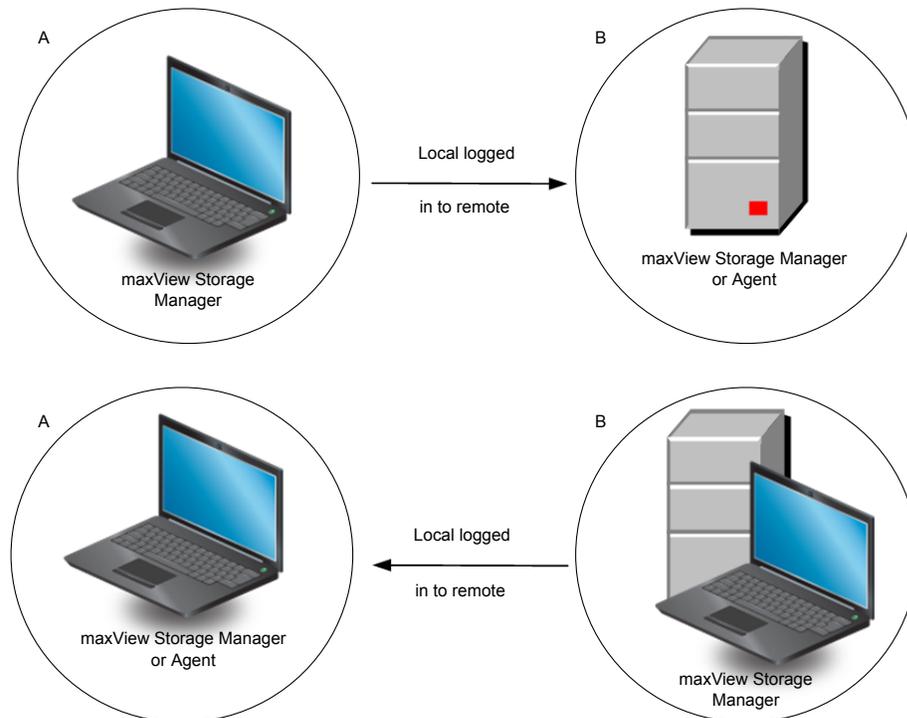
You must designate at least one system as a *management system*, a system from which you will manage the storage on all systems in your storage space.

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

5.2.1 ‘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.



5.2.2 Logging in on the Local System

To log in on the local system, see [Starting maxView Storage Manager and Logging In](#) on page 30.

5.3 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 16.)

- 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 40.

5.3.1 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 is also running on the remote system, and that you start the services in the proper order:

1. CIM server
2. Agent

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 and CIM server, see [About maxView Storage Manager](#) on page 15.

5.3.1.1 Windows

On Windows systems, the Agent and CIM server start automatically when the system is powered on.

To verify that the Agent and CIM server are 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 is running. If not, you can choose to restart the services. Be sure to observe the proper startup order: CIM server first, then the Agent.

5.3.1.2 Linux or VMware

On Linux systems and VMware Guest OSs, the Agent and CIM server 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	<code>service stor_cimserver start</code>
Stop service	<code>service stor_cimserver stop</code>
Check status	<code>service stor_cimserver status</code>

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

Options	Description
Start service	<code>Sfcbd-watchdog start</code>
Stop service	<code>Sfcbd-watchdog stop</code>

2. Start the Agent:

Options	Description
Start service	<code>service stor_agent start</code>
Stop service	<code>service stor_agent stop</code>

5.3.1.3 Solaris

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

1. Start the CIM server:

Options	Description
Start service	<code>svcadm enable stor_cimserver</code>
Stop service	<code>svcadm disable stor_cimserver</code>
Check status	<code>svcs -l stor_cimserver</code>

2. Start the Agent:

Options	Description
Start service	<code>svcadm enable ADPTstor_agent</code>
Stop service	<code>svcadm disable ADPTstor_agent</code>

5.4 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 16) 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.

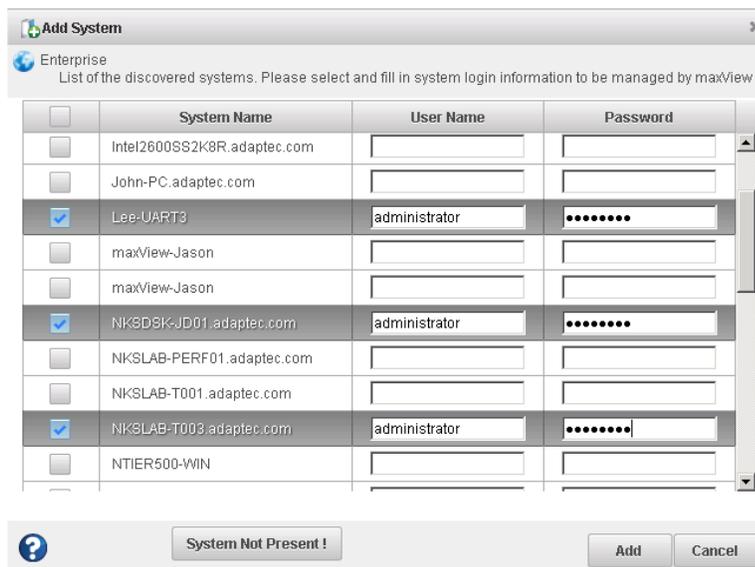
To log in to a remote system:

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 120.

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 119.

5.5 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 43.
- 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 45

Note:

1. Mixing SAS and SATA disk drives within the same logical drive is not recommend, and may impact performance. maxView Storage Manager displays a warning message if you try to create a logical drive using a combination of SAS and SATA device types.
2. maxView Storage Manager supports SMR HA³ and SMR DM drives for all RAID levels, including migration and expansion. However, mixing SMR and PMR⁴ drives within the same logical drive is not recommended, and may impact performance. maxView Storage Manager displays a warning message if you try to create a logical drive using a combination of SMR and PMR device types.
3. SMR HM (Host Managed) drives are not supported for RAID volumes, expansion or migration. (maxView Storage Manager displays SMR HM drives as Raw devices, which cannot be initialized.)

5.5.1 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 45. See [Selecting the Best RAID Level](#) on page 143 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:

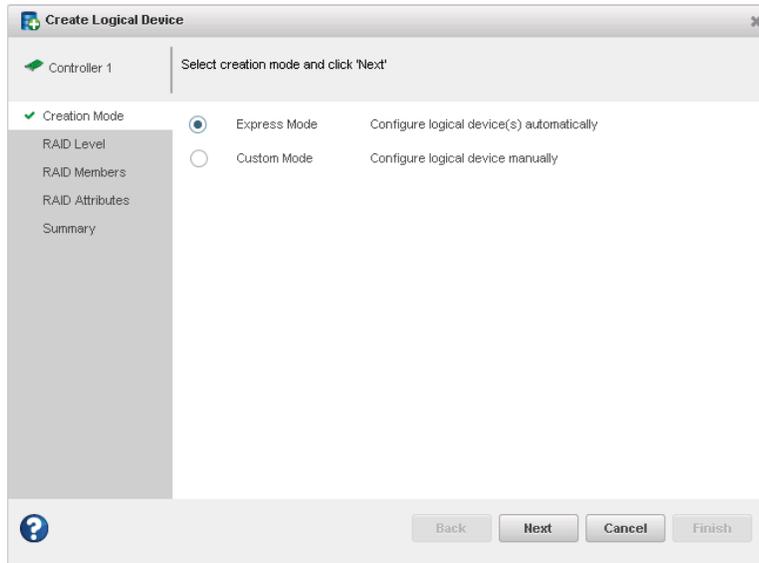
1. In the Enterprise View, select a system, then select a controller on that system.
2. On the ribbon, in the Logical Device group, click **Create Logical Drive**.



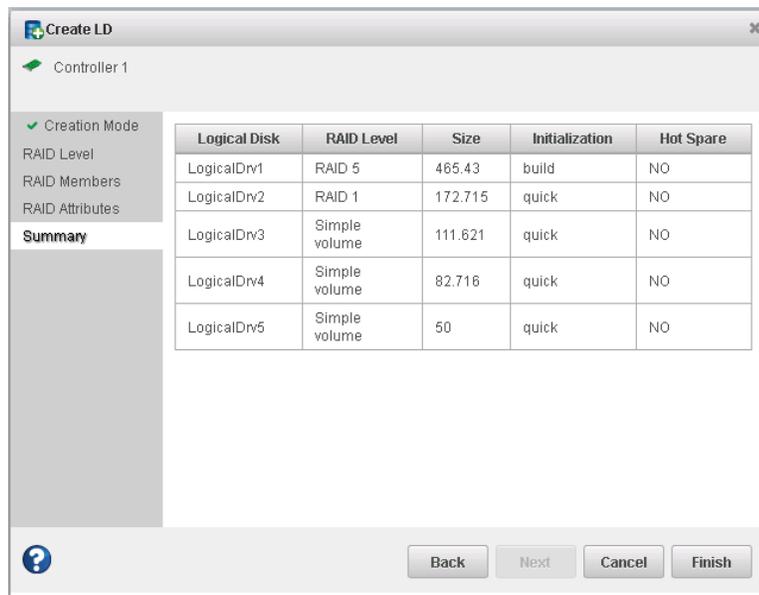
³ SMR: Shingled Magnetic Recording. HA: Host Aware (backward compatible with standard HDD). DM: Device Managed (backward compatible with standard HDD).

⁴ PMR: Perpendicular Magnetic Recording; standard HDD recording technology.

- When the wizard opens, ensure that **Express Mode** is selected, then click **Next**.



- Review the logical drive configuration summary.



- Click **Finish**.
maxView Storage Manager builds the logical drive(s). Use the Event Log and Task Log to track build progress.
- Repeat Steps [2]-[5] for each controller in your storage space.
- Partition and format your logical drives. See [Partitioning and Formatting Your Logical Drives](#) on page 48.

5.5.2 Custom Configuration

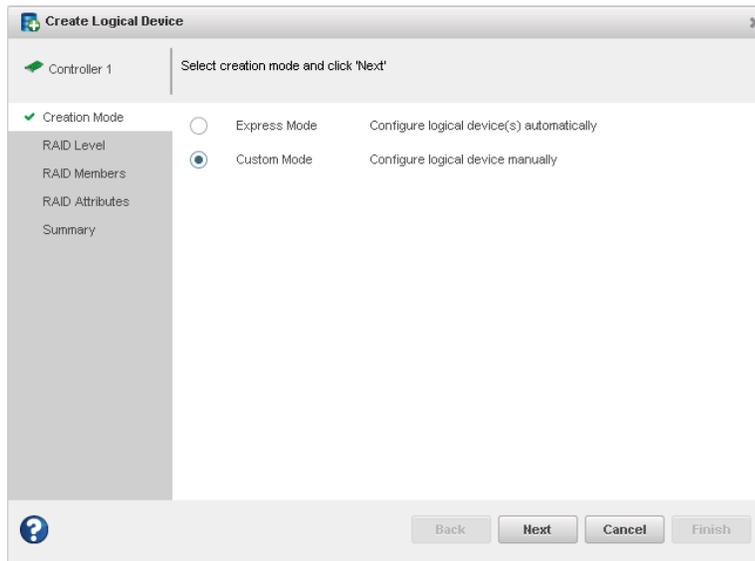
Custom configuration helps you build your storage space manually by stepping you through the process of creating logical drives, setting RAID levels, and configuring other settings.

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**.

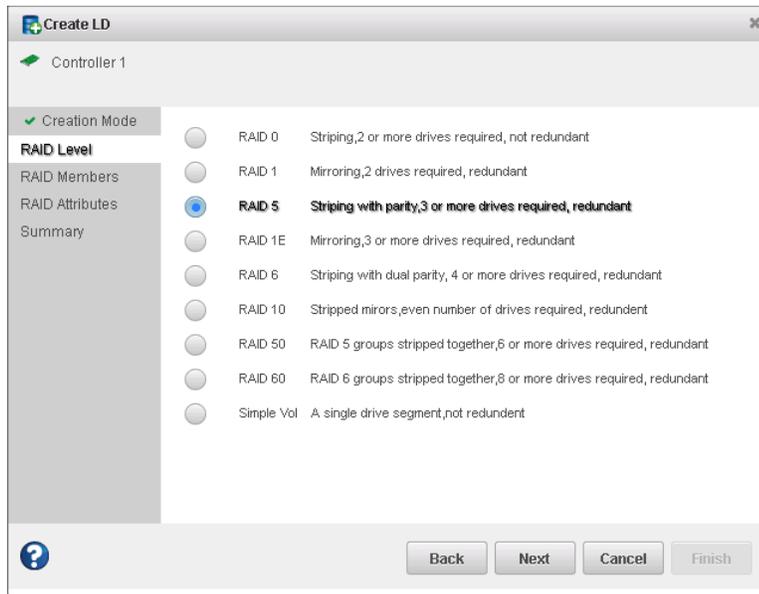


3. When the wizard opens, select **Custom Mode**, then click **Next**.



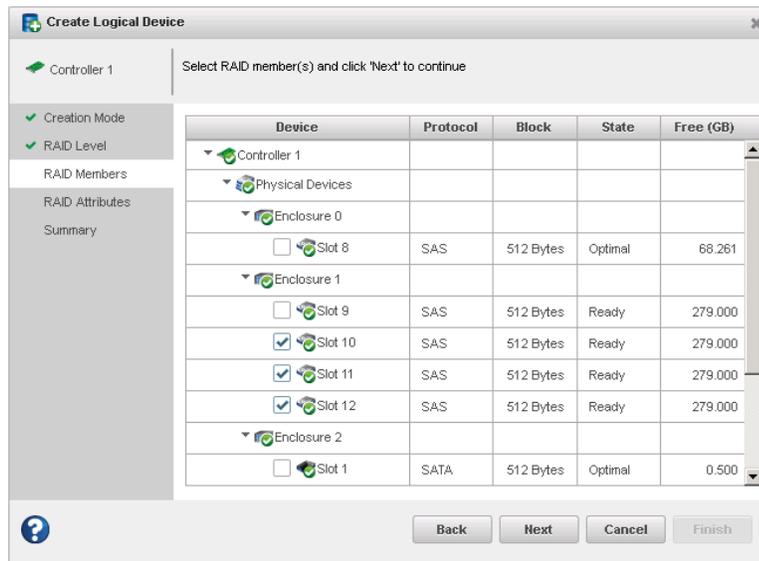
4. Select a RAID level, then click **Next**.

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



See [Selecting the Best RAID Level](#) on page 143 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 58.

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.)
- Change the Read Cache, Write Cache, and maxCache settings.

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 Device. (You can enable maxCache later, after you create the maxCache Device.) For more information, see [Working with maxCache Devices](#) on page 72.

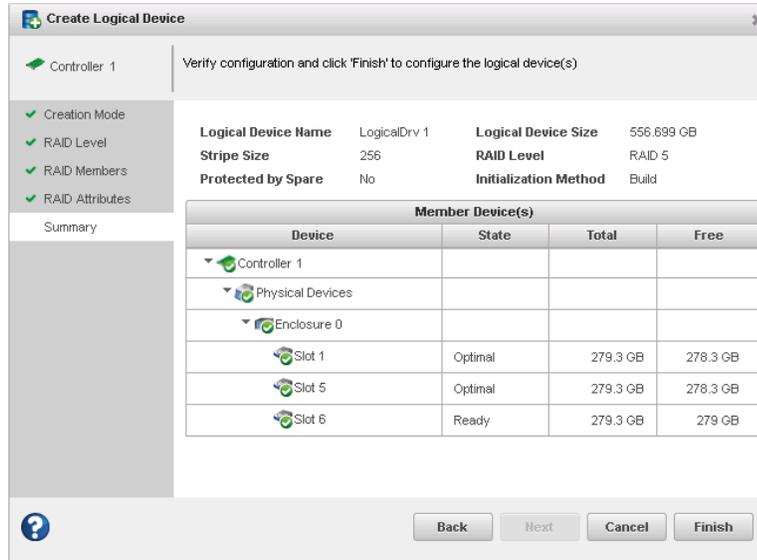


- Set the build method to Build, Clear, or Quick. The build method determines how a logical drive is initialized (prepared for reading and writing), and how long initialization will take.
- Set the build priority to: High, Medium, or Low.
- Create the logical drive without OS verification. By default, maxView Storage Manager waits until the logical drive is visible to the OS and receives a creation confirmation event (from the OS) in the event log.

See [Fine-tuning Logical Drives](#) on page 59 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] to [9] for each logical drive that you want to create on the controller.
- 11.** Repeat Steps [1] to [10] 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 48 for more information.

5.5.3 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.

5.5.4 Creating Logical Drives on Other Systems in Your Storage Space

If you installed maxView Storage Manager and Microsemi 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](#) on page 42), 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 116).

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 Microsemi 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, copyback, and controller cache preservation to protect your data.

6.1 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 127.)

6.1.1 Hot Spare Limitations

- Hot spares protect redundant logical drives only. You cannot protect a RAID 0 logical drive or simple volume with a hot spare.
- 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 comprised of SATA disk drives, or a SATA hot spare for a logical drive comprised of SAS disk drives.
- You can designate a SMR HA⁵ or SMR DM drive for all hot spare types. maxView Storage Manager displays a warning message if you try to protect a logical drive comprised of PMR⁶ drives with a SMR drive, or vice-versa.
- SMR HM (Host Managed) drives are not supported as hot spares.

Note: A hot spare can failover to one physical drive only, regardless of the number of logical drive segments on the failed drive, or if the spare has additional space after failover. If multiple drives fail in the same logical drive, you need the same number of spares to reconstruct the data.

6.1.2 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.) When a physical drive in a logical drive fails, the logical drive is automatically rebuilt, with its data reconstructed using the hot spare in place of the failed drive. If the failed physical drive is part of more than one logical drive, the global hot spare restores the configuration and becomes part of the same number of logical drives. 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 49.

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 50.

6.1.3 Designating a Global Hot Spare

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

⁵ SMR: Shingled Magnetic Recording. HA: Host Aware (backward compatible with standard HDD). DM: Device Managed (backward compatible with standard HDD).

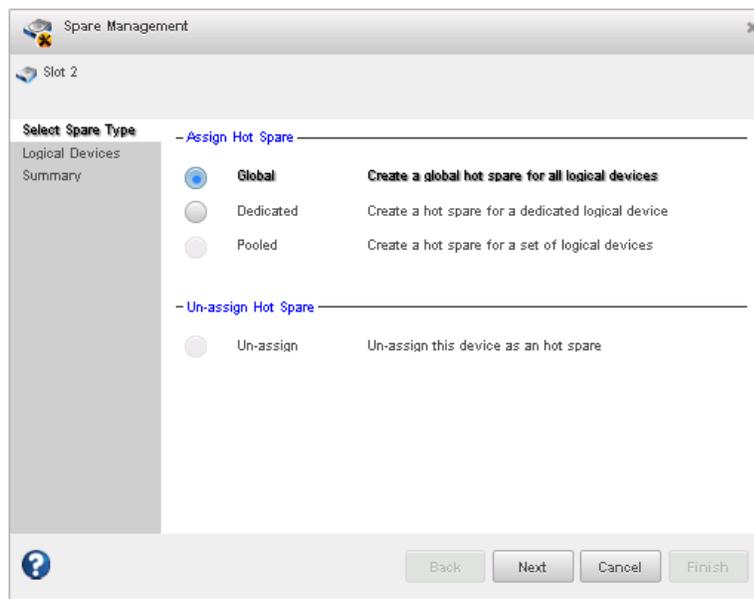
⁶ PMR: Perpendicular Magnetic Recording; standard HDD recording technology.

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 49 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.

6.1.4 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.

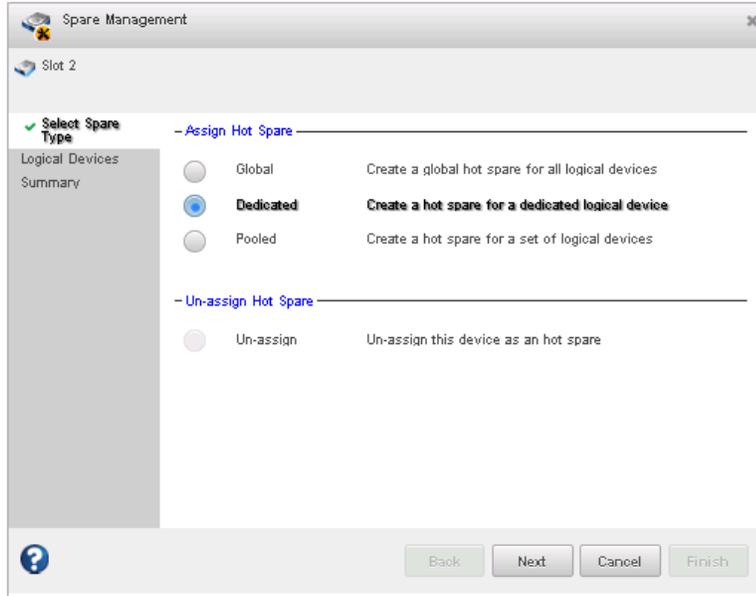
To assign a dedicated spare or pool hot spare:

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 49 for help selecting a disk drive.)
2. On the ribbon, in the Physical Device group, click **Spare Management**.

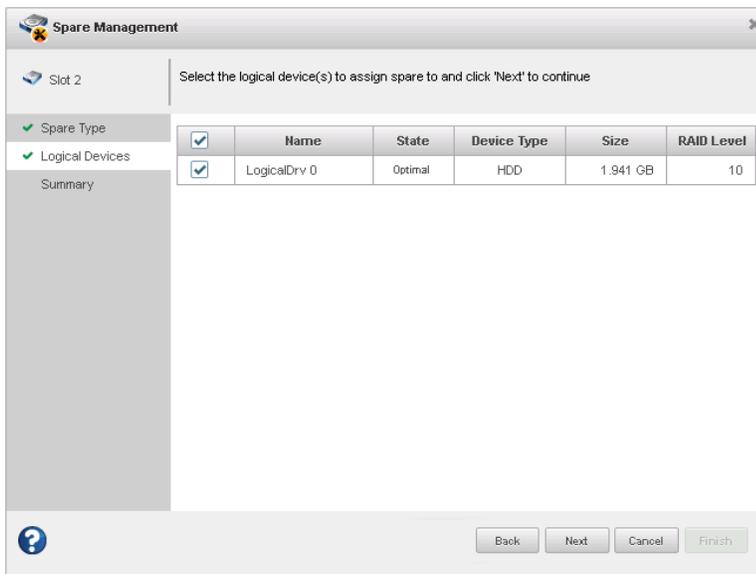


The Spare Management wizard opens.

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**.

6.1.5 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.

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.

6.1.6 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.

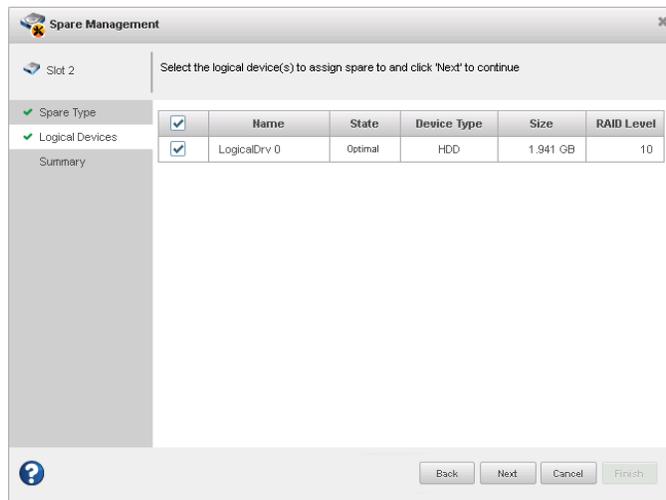
To remove or delete a dedicated hot spare:

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**.



- 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.

6.2 Enabling Copyback

When a logical drive is rebuilt using a hot spare (see [Failed Disk Drive Protected by a Hot Spare](#) on page 127), data from the failed drive is transferred to the hot spare. When *copyback* is enabled, data is moved back to its original location once the controller detects that the failed drive has been replaced. Once the data is copied back, the hot spare becomes available again.

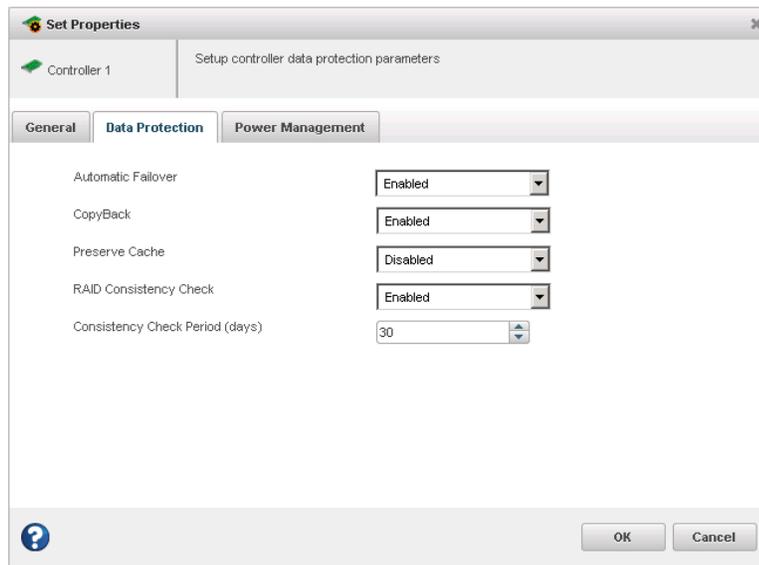
To enable or disable copyback:

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



The Set Properties window opens.

- Click the **Data Protection** tab.
- In the Copyback drop-down list, select *Enabled* or *Disabled*, then click **Apply**.



6.3 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 129). Failover applies to redundant logical drives only (see [Selecting the Best RAID Level](#) on page 143).

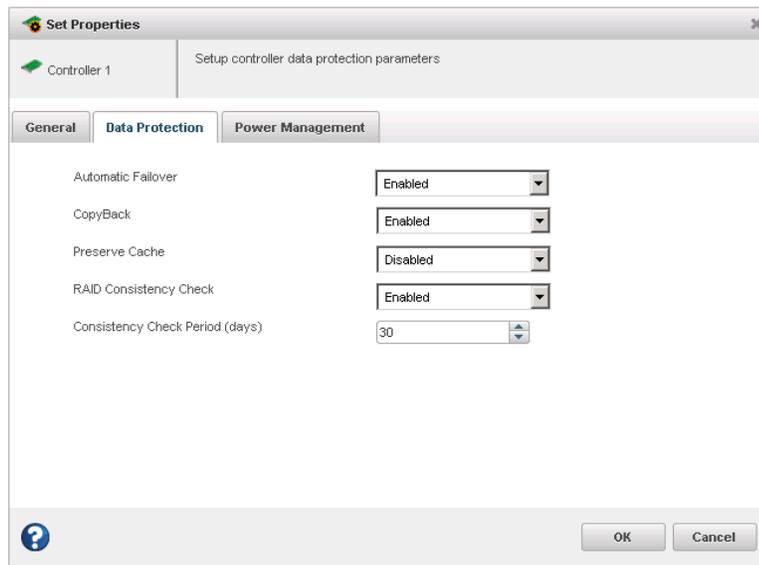
To enable or disable failover:

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 Protection** tab.
4. In the Failover drop-down list, select *Enabled* or *Disabled*, then click **Apply**.



6.4 Enabling Controller Cache Preservation

This option enables and disables controller cache preservation. With cache preservation enabled, the system preserves the controller's DDR cache to prevent data loss in the event of (1) a power failure or unsafe shutdown of external enclosures while the host system and controller still have power; and (2) connectivity problems with drives.

"Dirty pages" (data that have not been committed to disk) are restored to the cache when power is restored and the logical drives on the controller are back online. Once the preserved cache is restored, the controller flushes the data to disk using its normal scheduling mechanism.

Note: You cannot enable maxCache read and/or write caching on a controller with cache preservation enabled; nor can you create a maxCache Device on the controller. The following operations are not permitted on a controller in the Cache Preserved state:

- Creating a logical drive
- Changing the Performance mode
- Running a consistency check
- Changing the RAID Level of a logical drive
- Forcing a logical drive online or offline
- Changing the cache page size

To enable or disable cache preservation:

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 Protection** tab.
4. In the Preserve Cache drop-down list, select `Enabled` or `Disabled`, then click **Apply**.

7 Modifying Your Storage Space

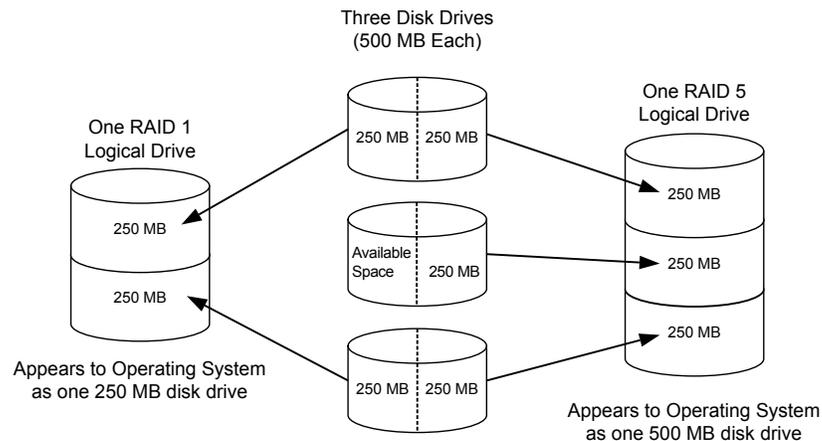
This section provides additional scenarios for creating and modifying logical drives. It explains how to create *hybrid RAID* drives; optimize logical drive performance; and use maxView Storage Manager's power management features to create an energy-efficient storage space.

7.1 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 143 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 49 for more information.)

7.2 Creating and Modifying Logical Drives

For basic instructions for creating logical drives, see [Building Your Storage Space](#) on page 39.

This section describes 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 57.

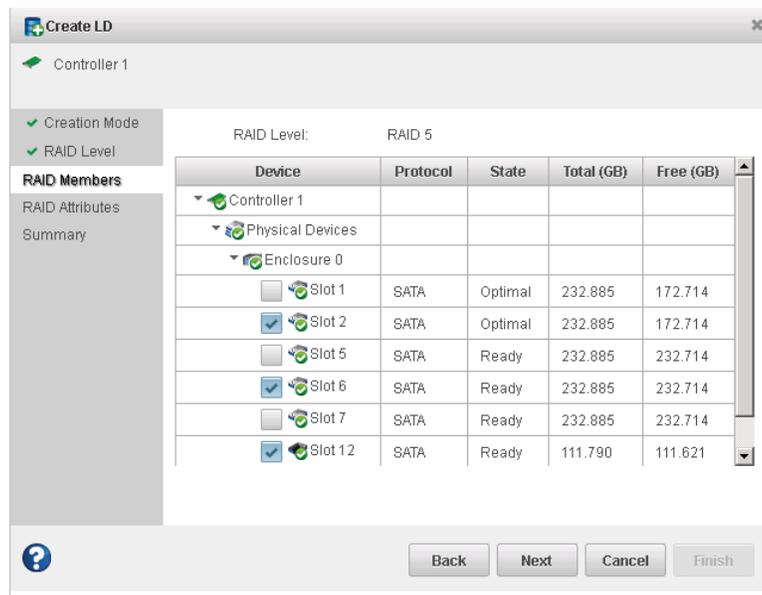
- To create a logical drive using available *segments* of disk drives, see [Creating a Logical Drive Using Available Segments](#) on page 58.
- To create a *hybrid RAID* logical drive using a combination of hard disk drives and SSDs, see [Creating a Hybrid RAID Logical Drive](#) on page 58.

7.2.1 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 143 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 45. 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.

Device	State	Total (GB)	Free (GB)
Enclosure 0			
Slot 1	Optimal	232.885	172.714
Slot 2	Optimal	232.885	61.094
Slot 3	Dedicated hot spare	232.885	6.103
Slot 4	Ready	232.885	232.714
Slot 5	Ready	232.885	232.714
Slot 6	Optimal	232.885	121.094
Slot 7	Ready	232.885	232.714
Slot 8	Hot spare	232.885	6.103
Slot 9	Optimal	46.585	6.103
Slot 10	Optimal	46.585	6.103
Slot 11	Optimal	46.585	6.103
Slot 12	Optimal	111.790	0.001
Other devices			

RAID5 with different size disks.
No segment is larger than smallest disk drive (111GB, in this example).

You can include a disk drive's available space in a new logical drive (see [Creating a Logical Drive Using Available Segments](#) on page 58), or add it to an existing logical drive (see [Increasing the Capacity of a Logical Drive](#) on page 64).

7.2.2 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 45. 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.

7.2.3 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:

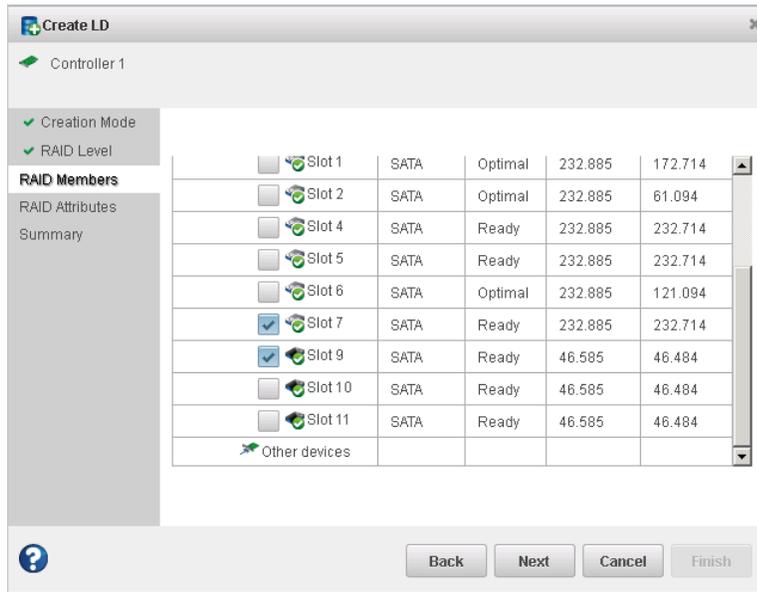
1. In the Enterprise View, select a system, then select a controller on that system.
Note the number and location of SSDs in your system; for instance, SSD 1 in Slot 1 on Enclosure 1, SSD 2 in Slot 3 on Enclosure 1, and so on. This information will be helpful as you create the hybrid RAID drive in the 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 59 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.

7.3 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.

7.3.1 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**. Names can include any combination of letters, numbers, and spaces.
maxView Storage Manager updates the logical drive name and displays the new name in the Enterprise View.

7.3.2 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 [Configuring maxCache for a Logical Drive](#) on page 73.

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**.

7.3.3 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 *Microsemi 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**.

7.3.4 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 64 and [Changing the RAID Level of a Logical Drive](#) on page 65.

7.3.5 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 64).

- **Build**—(slowest) For RAID 1 logical drives, data is copied from the primary drive to the mirror drive; for RAID 5 and RAID 6 logical drives, parity is computed and written. maxView Storage Manager performs Build initializations in the background; you can use the logical drive immediately, though performance will be impacted until the build is complete. 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.
 - Note:** For a redundant logical drive, write performance will be impacted while it is in Quick Init mode until a Verify with Fix is performed (see [Verifying and Fixing a Logical Drive](#) on page 63).
- **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 128.

7.4 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

Performance Mode	Performance Criteria	Best Performance
		R10 Web server SATA: R0 Sequential reads (all request sizes) R0 Sequential writes (all request sizes) R0 File/print server R5 Sequential writes (256Kb request size) R5 Random writes R6 Sequential writes (all request sizes) R10 Sequential writes (all request sizes) R10 Workstation
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.

7.5 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 63.
- 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 64.

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 63.

7.5.1 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 the task to be completed overnight or on a weekend.

Note: For performance reasons, verifying a logical drive with fix is *required* for all redundant logical drives created using the Quick Initialization method (see [Changing the Initialize Method](#) on page 61). For other logical drive types, you can 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 78.)

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 controller.

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

7.6 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.

7.7 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 143 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.

7.8 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.

7.9 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 58), or to expand an existing logical drive (see [Increasing the Capacity of a Logical Drive](#) on page 64).

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.

7.10 Deleting all Logical Drives on a Controller

Use the following procedure to delete *all* logical drives on a controller or to select the logical drives on the controller that you want to delete. The logical drives are removed from the Enterprise View and the disk drives or segments in the logical drives become available for use in new logical drives.

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.

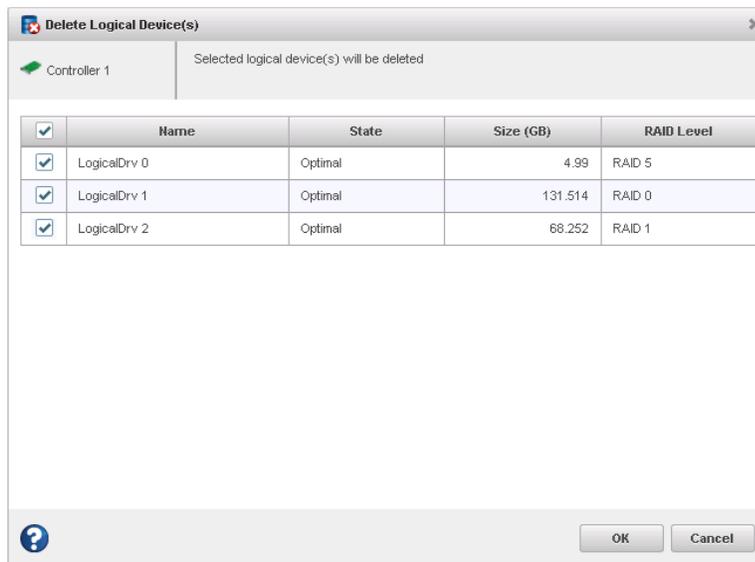
To delete all logical drives on a controller:

1. In the Enterprise View, select a controller.
2. On the ribbon, in the Logical Device group, click **Delete**.



The Delete Logical Devices window opens.

3. To select all drives on the controller, click the check box at the top of the left column. You can also select the logical drives individually.



4. Click **OK**.

7.11 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 68.
- To configure power management for a controller, see [Setting Power Management Options for a Controller](#) on page 69.
- To disable power management on a logical drive, see [Disabling Power Management for a Logical Drive](#) on page 70.

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.

7.11.1 Setting Power Management Options for a Logical Drive

This section describes how to set the power management options for an existing logical drive.

For each logical drive in your storage space, you can 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.

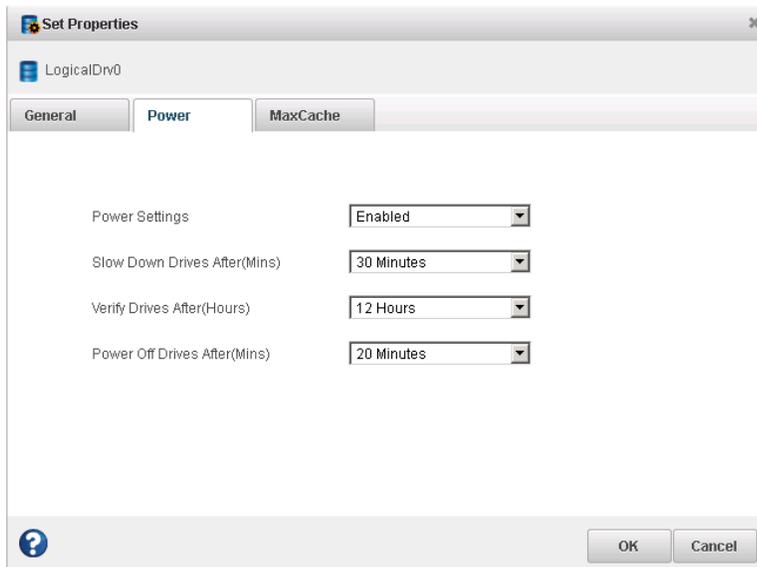
To set the power management options for a logical drive:

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**.

7.11.2 Setting Power Management Options for a Controller

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

Note: The 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 *Microsemi Adaptec RAID Controller Installation and User's Guide*.

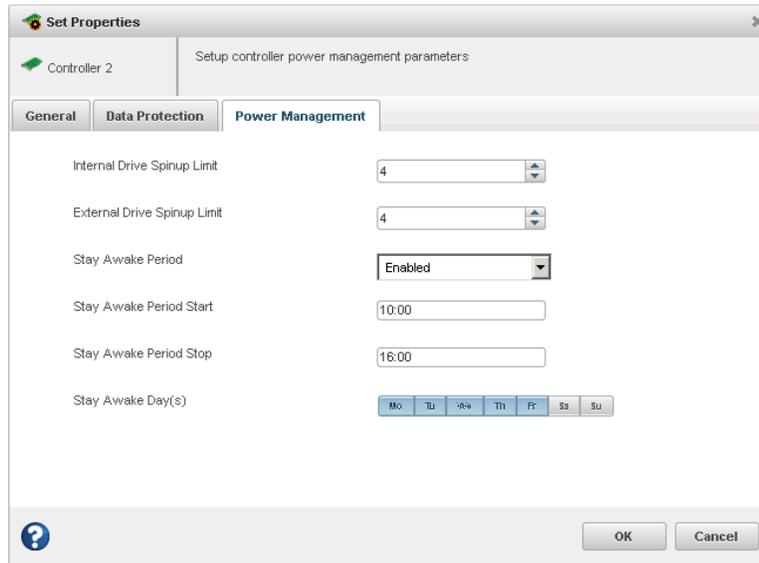
To set the stay awake period for the disk drives on a controller:

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**.
5. Enter the stay awake period start time and end time in 24-hour, *hh:mm*, format; for example, 09:00 for 9AM, 14:00 for 2PM, and so on. You can enter the time manually or with slider controls.



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 68).
7. Enter the maximum number of internal disk drives that the controller may spin-up at the same time. Then, enter the maximum number of external drives (drives in an enclosure) that the controller may spin-up at the same time.
8. Click **OK**.

7.11.3 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 Working with maxCache Devices

Microsemi Adaptec Series Q controllers support an advanced SSD caching technology called maxCache™. maxCache uses a reserved logical drive comprised of SSDs only, called the *maxCache Device*, to support read and redundant write caching for storage connected directly to your controller.

maxCache accelerates application performance in IO-intensive applications with mixed workloads. It 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 43).

With maxCache read caching enabled, the system copies frequently read "hot" data to the maxCache Device for faster retrieval. With maxCache write caching enabled, the maxCache Device is populated with certain "hot" blocks from the logical drives on the controller. All writes to these hot blocks go directly to the maxCache Device. The data remain on the maxCache Device 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 Device, and to enable and disable maxCache for the logical drives in your storage space.

Note: Microsemi Adaptec Series 6Q controllers support maxCache read caching only. For Series 6Q controllers, the maxCache Device is a simple collection of SSDs; it is not a logical device. For more information, see [Using maxCache with Microsemi Adaptec Series 6Q Controllers](#) on page 76. For more information about maxCache technology, visit www.adaptec.com.

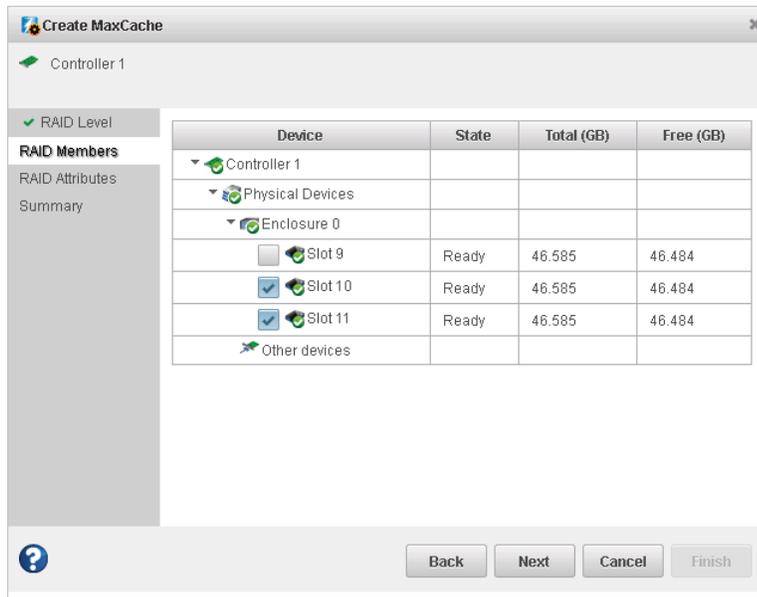
8.1 Creating a maxCache Device

To create a maxCache Device:

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 maxCache Device, then click **Next**.
See [Selecting the Best RAID Level](#) on page 143 for more information about RAID levels.
4. Select the SSDs that you want to include in the maxCache Device. 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 Device. You can:
 - Enter a name for the maxCache Device. Names can include any combination of letters and numbers, but cannot include spaces.
 - Set a smaller logical drive size. (By default, the maxCache Device 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 59 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 Device. Use the Event Log and Task Log to track build progress.

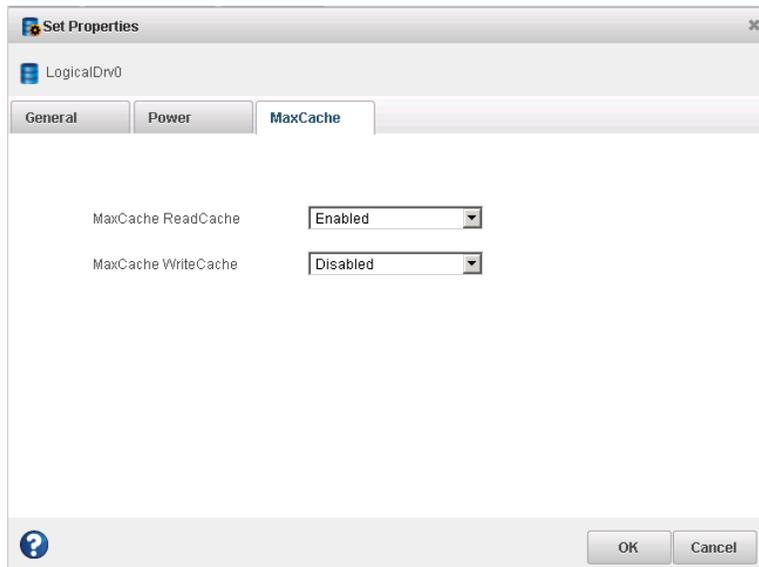
8.2 Configuring maxCache for a Logical Drive

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**.

8.3 Configuring maxCache 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 Device 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 the maxCache Settings for a Logical Drive](#) on page 73.

To disable maxCache write caching for a controller:

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



3. Click **OK**.

8.4 Setting the maxCache Flush and Fetch Rate

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

To set the maxCache Device Flush and Fetch rate:

1. In the Enterprise View, select a controller, then select the maxCache Device 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 Device before it is flushed from the cache.

4. Click **OK**.

8.5 Verifying and Fixing the maxCache Device

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 Device. Optionally, you can choose to verify the maxCache Device without fixing inconsistent or bad data, or run a *coherency check* to compare valid pages of the maxCache Device with their corresponding logical drive storage.

To verify and fix the maxCache Device:

1. Ensure that no activity is taking place on the controller for the maxCache Device.
2. In the Enterprise View, select the maxCache Device 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 Device without fixing bad data	...click Verify .
To perform a coherency check on the max-Cache meta-data	...click Coherency Check , then select <i>Once</i> or <i>Always</i> 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.

8.6 Deleting the maxCache Device

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

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

To delete the maxCache Device:

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



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

8.7 Using maxCache with Microsemi Adaptec Series 6Q Controllers

Microsemi 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*. For Series 6Q controllers, the maxCache Device is a simple collection of SSDs. Unlike the maxCache Device for newer Series Q controllers, 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 the maxCache settings for a Logical Drive](#) on page 73.

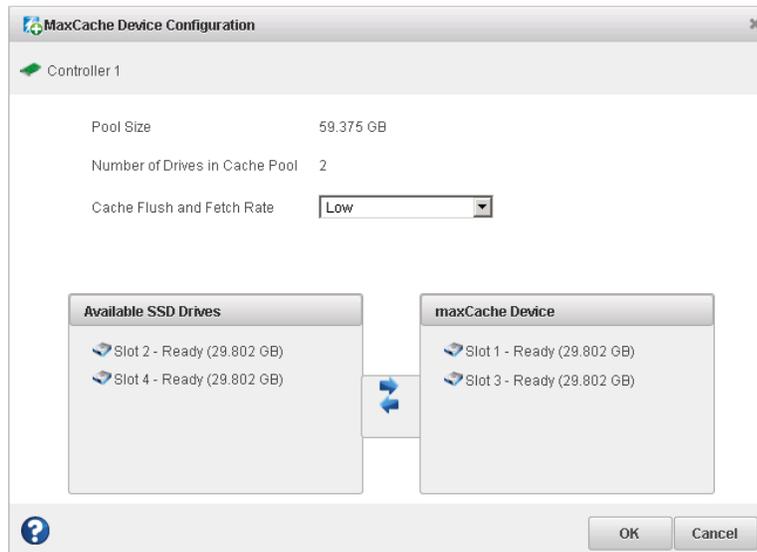
To configure the maxCache Device on a Series 6Q controller:

1. In the Enterprise View, select a system, then select a 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.

8.8 Analyzing maxCache Performance

maxView Storage Manager provides advanced usage statistics about the maxCache Devices on Series Q RAID controllers. You can use these statistics to gain a better understanding of how maxCache is performing in your storage space. Use the Statistics Viewer to view the maxCache statistics; see [Viewing Advanced Statistics](#) on page 113 for more information.

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.

9.1 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 the RAID level of a logical drive
- Modifying the stripe size of a logical drive (as part of an expansion or migration)
- Verifying or verifying and fixing a logical drive
- Erasing or clearing 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!*



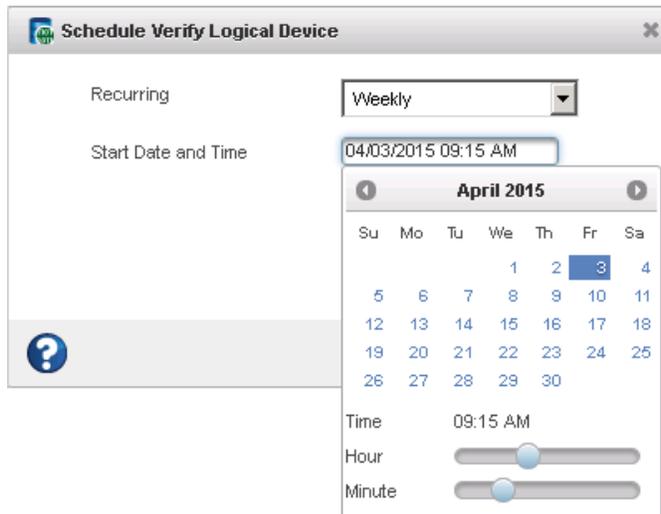
2. Click **Schedule**.

The schedule window opens.

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



- Click in the **Start Date and Time** field to pick the task start date from the calendar and/or set the task start time with the slider controls. 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.

- 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.
- Click **OK**.
The task is saved and the scheduled task is added to the Task Log.

9.2 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.

Use the Event Log for information about running or non-recurring tasks

Use the Task Log for general task information, status, and progress

Task Id	System	Description	State	Start Time	Recurring	Priority	Progress
2	10.25.64.80	Build/Verify logical device: controller 1, logical device 0 ("LogicalDrv0")	Scheduled	Fri Jul 20 23:29:00 PDT 2012	Monthly	Low	
				Wed Jul 11			

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 103.)

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 80.
	Error	The task failed. Delete the task to clear the error. Schedule the task again, as described in Scheduling a Task on page 78.

9.2.1 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 80.

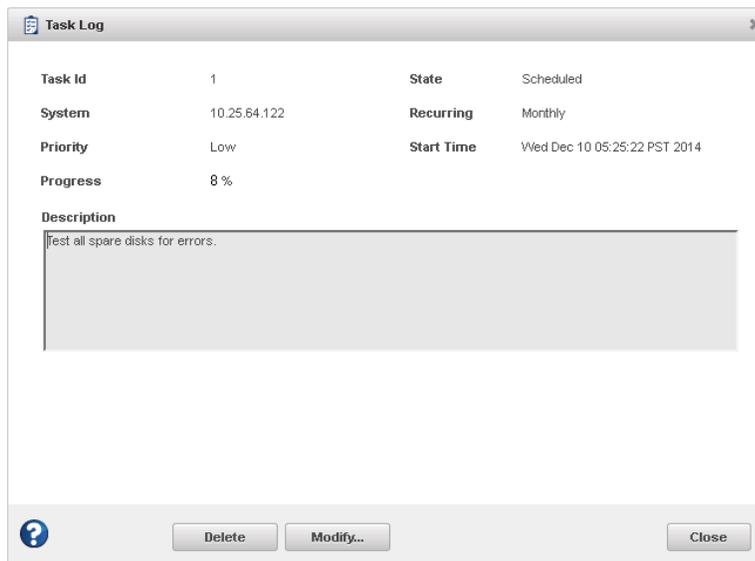
If a recurring task misses its start time, it is automatically rescheduled to run at the next scheduled interval.

9.3 Modifying a Task

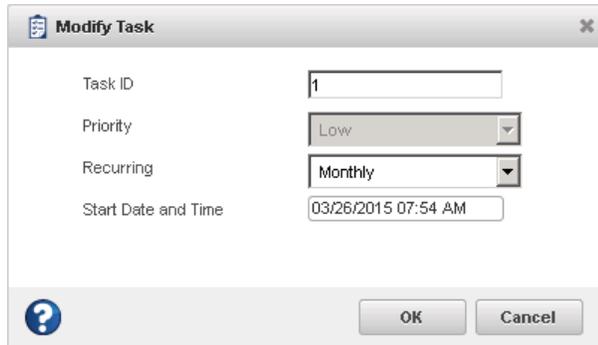
If the requirements for a scheduled task change, you can use maxView Storage Manager to modify the task. You can reschedule a task for a different date or time; change it from recurring to non-recurring; and modify the task description that appears in the Task Log. Creating a custom task description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

9.4 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.

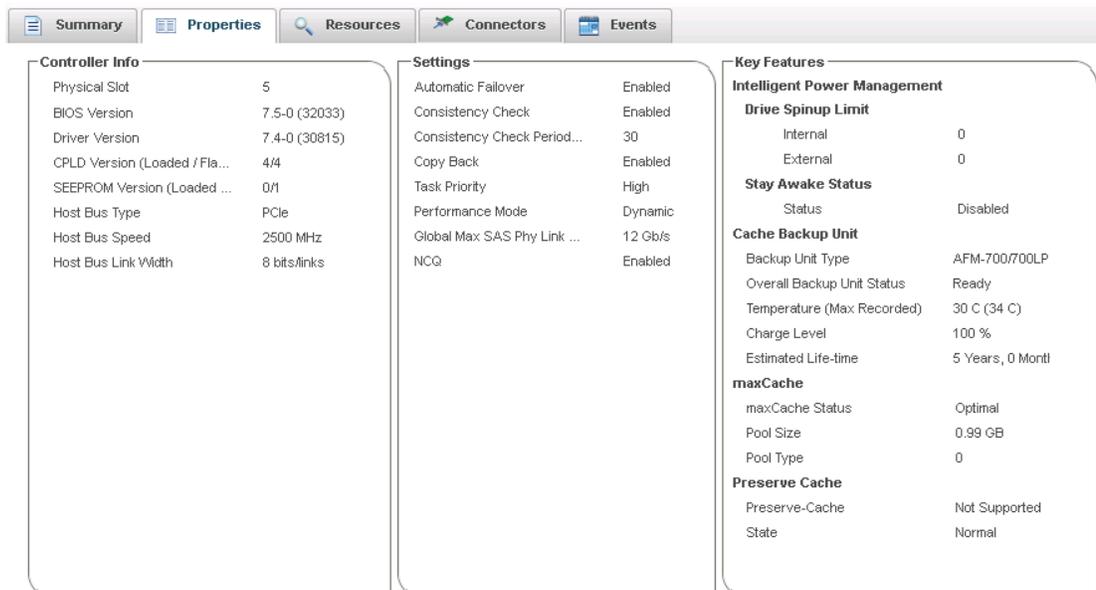
10 Maintaining Physical Devices

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

10.1 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 103.



Controller Info		Settings		Key Features	
Physical Slot	5	Automatic Failover	Enabled	Intelligent Power Management	
BIOS Version	7.5-0 (32033)	Consistency Check	Enabled	Drive Spinup Limit	
Driver Version	7.4-0 (30815)	Consistency Check Period...	30	Internal	0
CPLD Version (Loaded / Fla...	4/4	Copy Back	Enabled	External	0
SEEPROM Version (Loaded ...	0/1	Task Priority	High	Stay Awake Status	
Host Bus Type	PCIe	Performance Mode	Dynamic	Status	Disabled
Host Bus Speed	2500 MHz	Global Max SAS Phy Link ...	12 Gb/s	Cache Backup Unit	
Host Bus Link Width	8 bits/links	NCQ	Enabled	Backup Unit Type	AFM-700/700LP
				Overall Backup Unit Status	Ready
				Temperature (Max Recorded)	30 C (34 C)
				Charge Level	100 %
				Estimated Life-time	5 Years, 0 Month
				maxCache	
				maxCache Status	Optimal
				Pool Size	0.99 GB
				Pool Type	0
				Preserve Cache	
				Preserve-Cache State	Not Supported Normal

10.2 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 on a controller	Controller icon: 
All disk drives included in a logical drive	Logical Drive icon:

To Locate...	Select...
	
All SSDs in the maxCache Device	maxCache Device icon: 

10.2.1 Locating Disk Drives

To locate an individual disk drive or all physical drives on the controller:

1. In the Enterprise View, select a controller; optionally, in the Physical Devices tree, select an individual drive on the controller.
2. On the ribbon, in the Physical Device group, click **Locate**.



The Locate Physical Device window opens.

3. Click the **Locate** button.
The LED on the disk drive(s) begin to blink.
4. To stop blinking the drive(s) , click **Stop**.



5. Click **Cancel** to close the Locate Physical Device window.

10.2.2 Locating Physical Disks in a Logical Drive

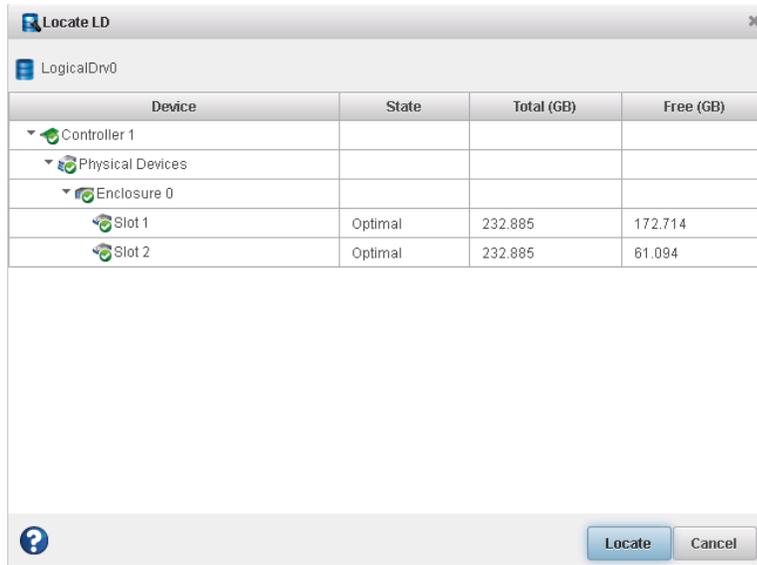
To locate all physical disks in a logical drive:

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.

10.2.3 Locating SSDs in the maxCache Device

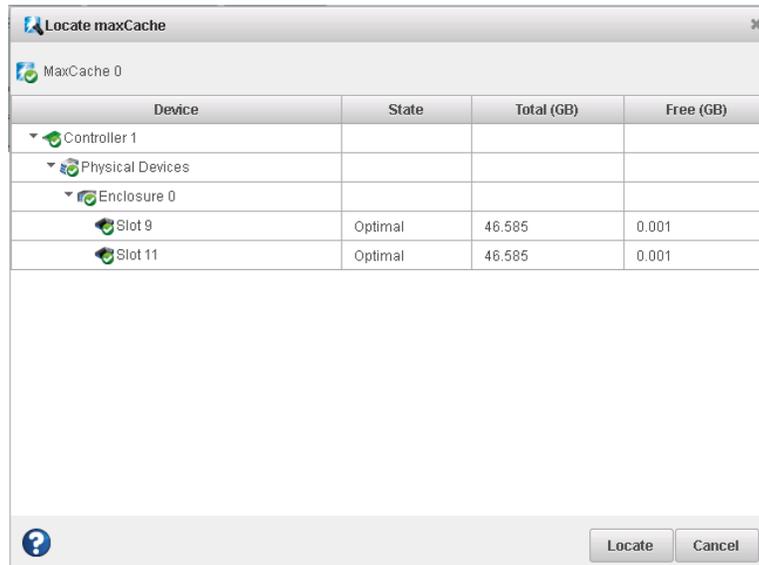
To locate all Solid State Drives (SSDs) in the maxCache Device:

1. In the Enterprise View, select a controller; then, in the maxCache Devices tree, select the maxCache Device 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 Device.

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.

10.3 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.

10.3.1 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 129), you may lose data. For help solving disk drive problems, see [Recovering from a Disk Drive Failure](#) on page 127.

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 85.)
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 129.)
5. Repeat these steps for each disk drive you want to replace.

10.3.2 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.

10.4 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 (and SSDs) in your storage space. You can initialize or uninitialize individual disks, or use the wizard to initialize/uninitialize all disks on a controller.

10.4.1 Initializing a Disk Drive

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.

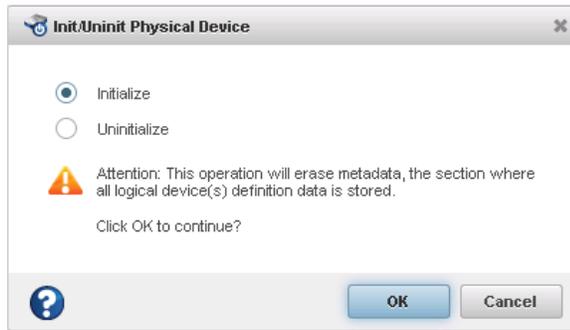
To initialize a disk drive:

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** button, then click **OK**.



maxView Storage Manager begins the initialization.

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

10.4.2 Uninitializing a Disk Drive

You can 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 Microsemi 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 Microsemi 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 *Microsemi Adaptec RAID Controllers Installation and User's Guide*.

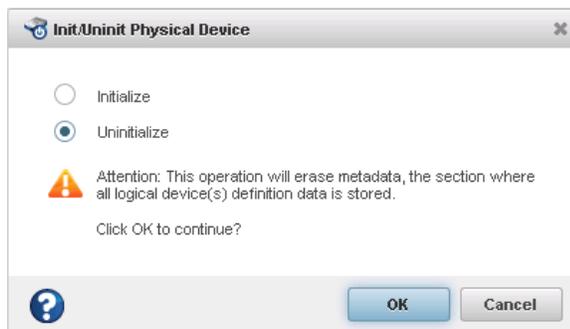
To uninitialize a disk drive:

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 Initialize/Uninitialize Physical Device window opens.

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



4. When prompted, click **OK** to close the Initialize/Uninitialize Device window.

10.4.3 Initializing/Uninitializing all Drives on a Controller

To initialize or uninitialize all disk drives (or SSDs) on a controller, use the Initialize/Uninitialize Physical Devices wizard to clear the meta-data on all drives at once.

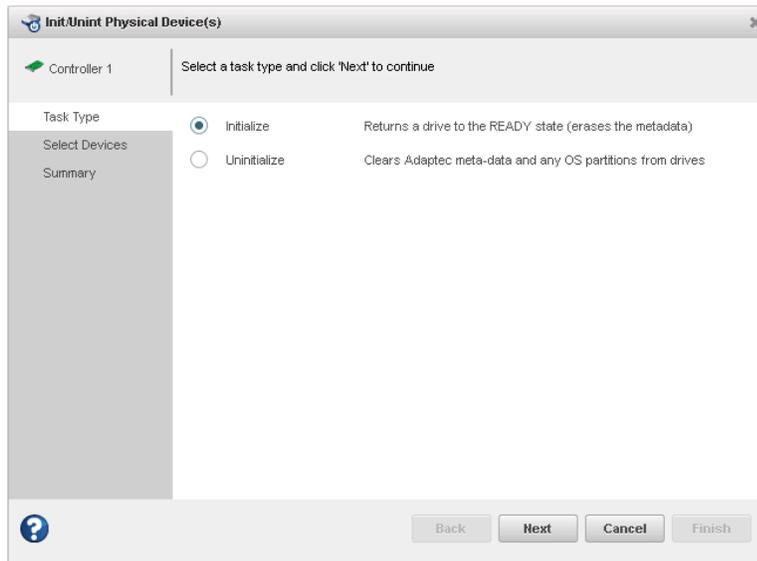
To initialize or uninitialize drives with the wizard:

1. In the Enterprise View, select a controller.
2. On the ribbon, in the Physical Device group, click **Initialize**.



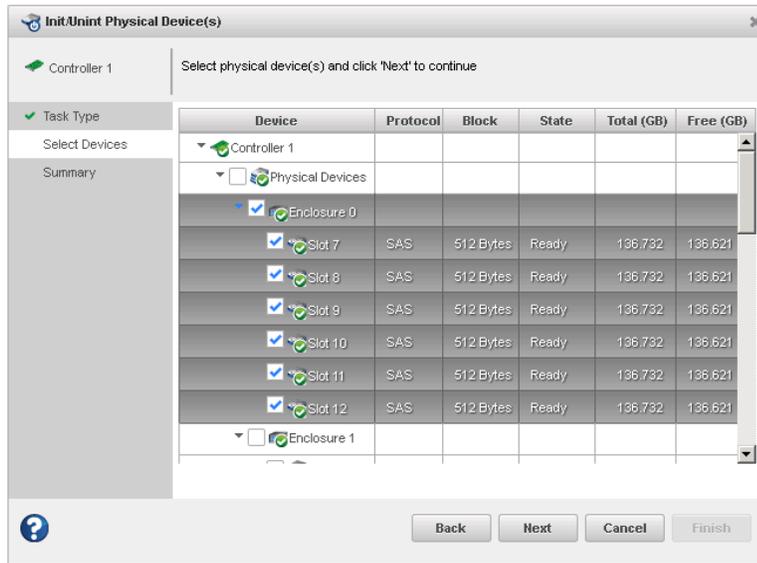
The Initialize/Uninitialize Physical Devices wizard opens.

3. Select Initialize or Uninitialize, then click **Next**.



4. Select drives on the controller to initialize or uninitialize, then click **Next**.

Note: Only drives in the Ready or Raw state can be initialized or uninitialized.



5. Review the Summary, then click **Finish**.

10.4.4 Erasing a Disk Drive

You can use maxView Storage Manager to *securely* erase existing data on any disk drive or SSD 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. For newer SATA drives, you can choose to perform a Secure ATA Erase, which implements the secure erase feature at the drive firmware level.

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. Select the erase type: *Secure Erase* Or *ATA Secure Erase*.
4. Click **Erase** to erase the drive.

10.5 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, click **Verify** (radio button).



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.

10.6 Configuring the Physical Drive Write Cache Policy

This section describes how to enable or disable write caching on the physical drives in your storage space. You can configure the write cache setting for an individual drive or for all drives on a controller.

Caution: Enabling write caching can improve drive 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.

- To configure the write cache policy for all drives on a controller, see [Configuring the Global Physical Drive Write Cache Policy](#) on page 90.
- To configure the write cache policy for an individual drive, see [Configuring the Write Cache Policy for an Individual Drive](#) on page 91.

10.6.1 Configuring the Global Physical Drive Write Cache Policy

This option allows you to configure the write cache policy for all physical drives on a controller. You can enable or disable write caching on all drives on the controller, or choose "Drive Specific" to configure the write cache policy for individual drives.

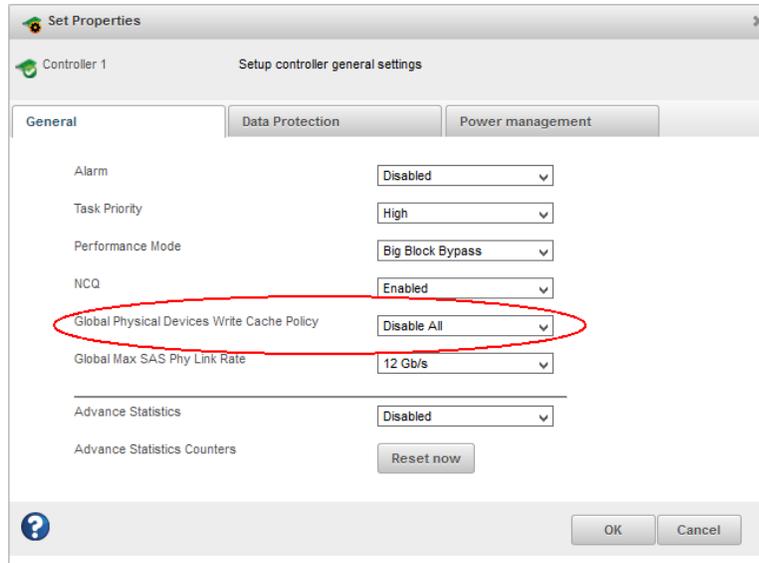
To configure the Global Physical Drive Write Cache policy:

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 Global Physical Devices Write Cache Policy drop-down list, select `Enable All`, `Disable All`, or `Drive Specific`.



4. Click **OK**.
5. If you selected `Drive Specific`, continue with [Configuring the Write Cache Policy for an Individual Drive](#) on page 91.

10.6.2 Configuring the Write Cache Policy for an Individual Drive

Note: You can change the write cache setting for an individual drive only if the Global Write Cache Policy is set to "Drive Specific."

By default, disk drive write caching is disabled in maxView Storage Manager.

To enable or disable write caching on an individual 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 **Set Properties**.



The Set Properties window opens.

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

10.7 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 92.
- To disable a controller alarm, see [Disabling a Controller Alarm](#) on page 92.
- To re-scan a controller, see [Rescanning a Controller](#) on page 93.
- To set the controller's default task priority, see [Setting a Controller's Default Task Priority](#) on page 93.
- To enable Native Command Queuing (NCQ) on a controller, see [Enabling Native Command Queuing on a Controller](#) on page 93.
- To optimize controller performance, see [Optimizing Controller Performance](#).
- To change the operating mode of connectors on the controller, see [Changing the Connector Operating Mode](#).

10.7.1 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**.



10.7.2 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.

10.7.3 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.

10.7.4 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**.

10.7.5 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**.

10.7.6 Setting the Connection Speed for a Controller

You can set the maximum connection speed (or PHY link rate) for SAS devices on a controller to 6Gb/s or 12Gb/s, as needed. This option is useful if you have cables or backplanes that are not 12G-SAS capable, and want to avoid connection problems by attaching 12G devices at 6G speed.

To set the maximum PHY link rate 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. From the Global Max SAS Phy Link Rate drop-down list, select 12Gb/s or 6Gb/s.
4. Click **OK**.

10.8 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.

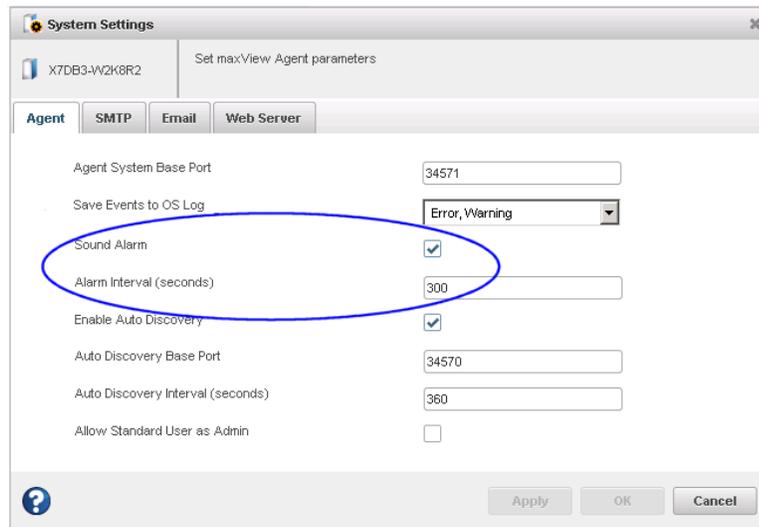
Note: A system alarm is not the same as a controller alarm. For controller alarm information, see [Working with Controllers](#) on page 92.

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. Modify the alarm settings, as needed.
You can disable the system alarm by deselecting **Sound Alarm**.
4. Click **OK**.
The changes take effect immediately.

10.9 Updating Controller, Enclosure, 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, enclosures, 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, enclosures, or disk drives in your storage space, review the prerequisites in [Before You Begin](#) on page 95, then follow one of these sets of instructions:

- [Updating the Controller Firmware](#) on page 95
- [Updating the Disk Drive Firmware](#) on page 98
- [Updating the Enclosure Firmware](#) on page 99

10.9.1 Before You Begin

Before you begin, download the latest firmware images from 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 or .bin file extension. Disk drive and enclosure image file names vary by manufacturer.

10.9.2 Updating the Controller Firmware

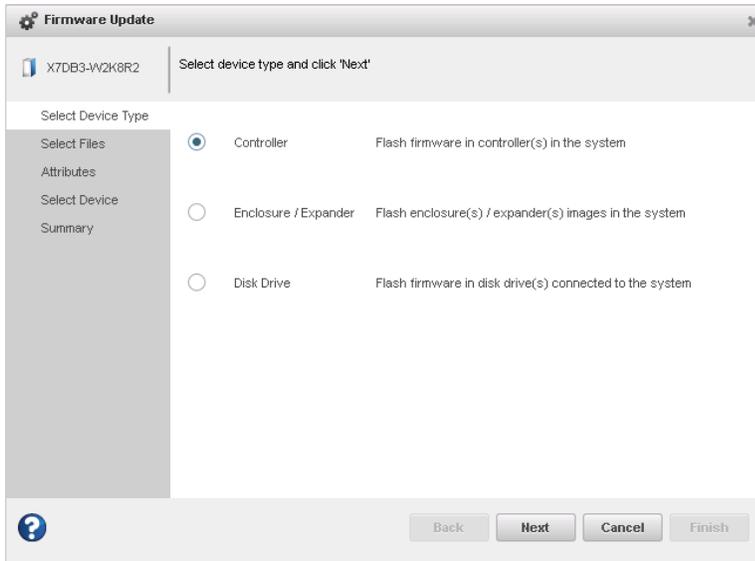
Use the Firmware Update wizard to update the firmware for one or more controllers of the same type on the local or a remote system.

To update the controller firmware:

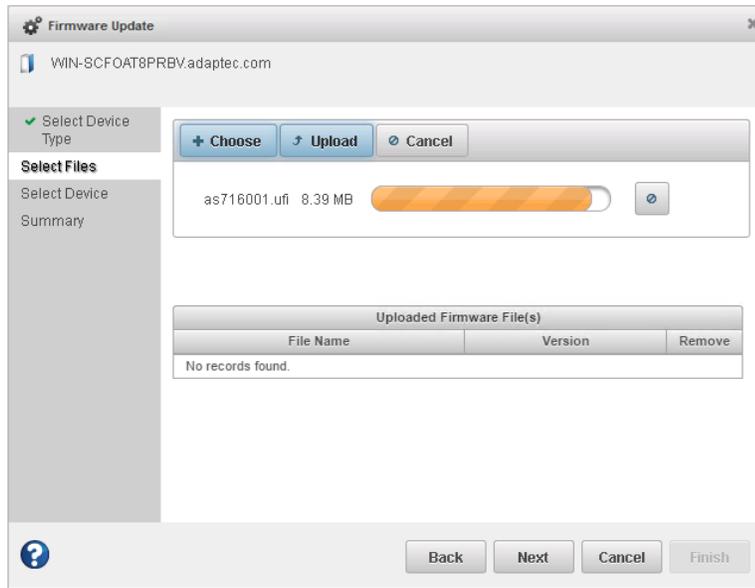
1. In the Enterprise View, select a system.
2. On the ribbon, in the System group, click **Firmware Update**.



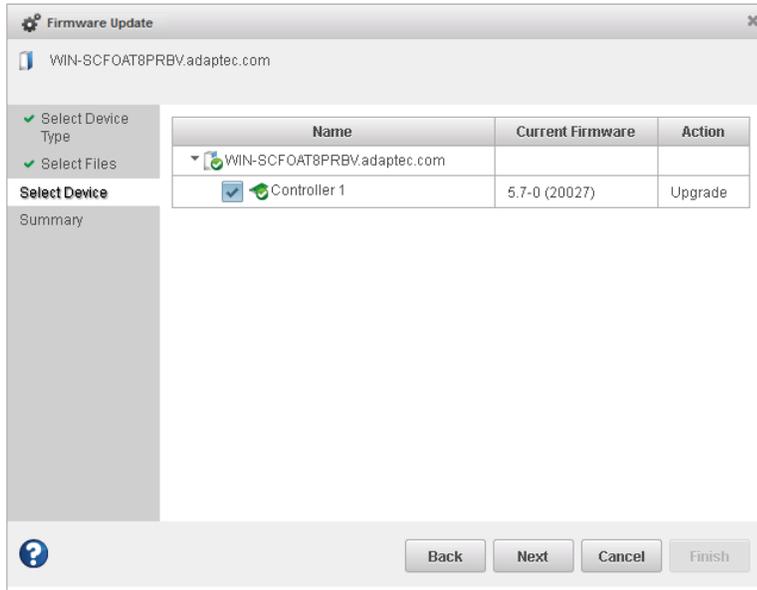
- When the wizard opens, select **Controller**, then click **Next**.



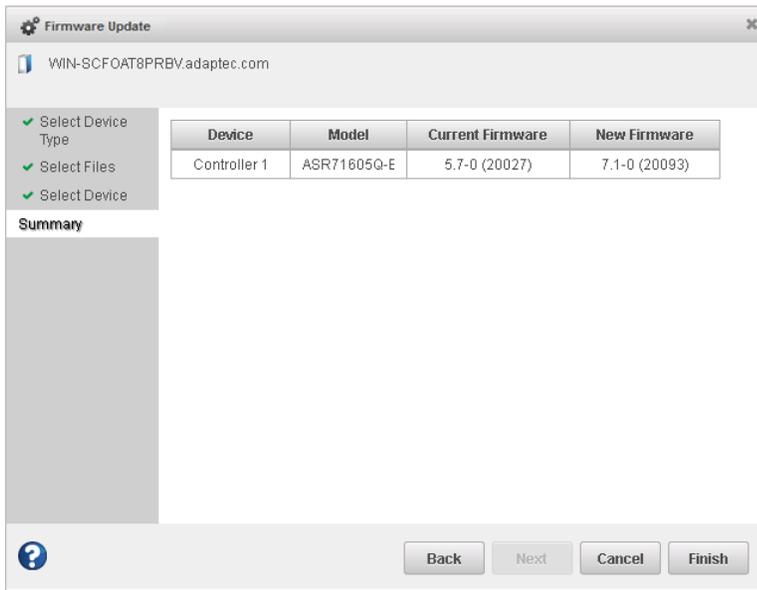
- Click **Choose**, browse the file system for the firmware update file (typically, a .ufi or .bin file), click **Open** to select the file (the button label may be different on your browser), then click **Upload**.



- When the file name appears in the Uploaded Firmware File(s) list, click **Next**.
- 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!

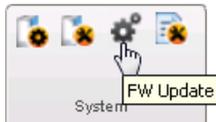
8. When the update is complete, click **OK**. Restart the server to activate the new firmware image.

10.9.3 Updating the Disk Drive Firmware

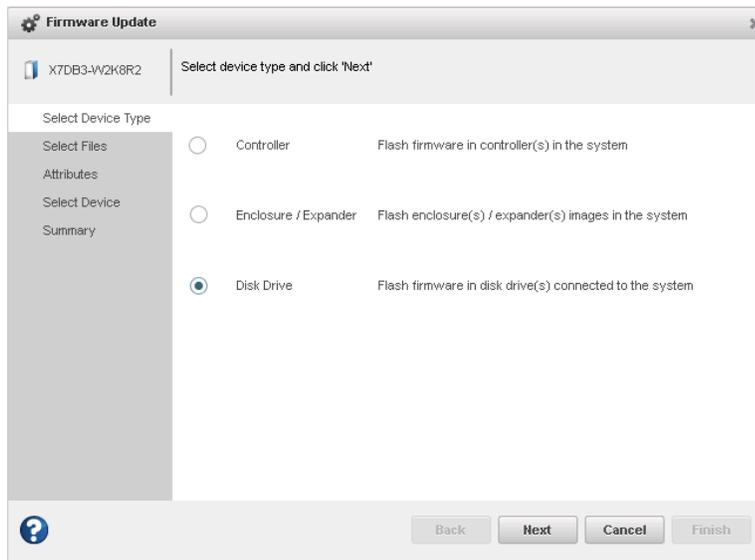
Use the Firmware Update wizard to update the firmware for one or more disk drives of the same type on the local or a remote system. The procedure is similar to updating the controller firmware (see [Updating the Controller Firmware](#) on page 95).

To update the disk drive firmware:

1. In the Enterprise View, select a system.
2. On the ribbon, in the System group, click **Firmware 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 Firmware File(s) list, click **Next**.
6. In the Attributes panel, select the Chunk Size, from 1-n, in kilobytes (KB), then click **Next**.
7. In the Select Devices panel, select the disk drives you want to update, then click **Next**.
8. Review the update summary, then click **Finish**.

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

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

10.9.4 Updating the Enclosure Firmware

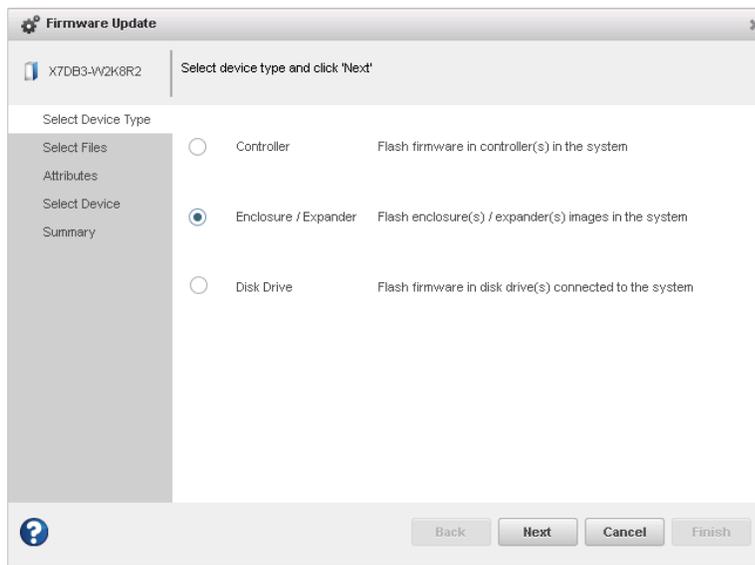
Use the Firmware Update wizard to update the firmware for one or more enclosures or expanders of the same type on the local or a remote system.

To update the enclosure/expander firmware:

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



3. When the wizard opens, select **Enclosure/Expander**, 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**.

Note: If the upgrade requires multiple firmware update files, update one file at a time or use a combined firmware image to complete the upgrade.

5. When the file name appears in the Uploaded Firmware File(s) list, click **Next**.
6. Select the **Chunk Size**, from 1-n, in kilobytes (KB).
7. Select the firmware **Upgrade Type**:
 - **Firmware**—update the firmware image on the expander or enclosure
 - **Manufacturer**—update the manufacturing image (BOOT SEEPROM) on the expander or enclosure
 - **CPLD**—update the CPLD image on the expander or enclosure
8. Select the firmware upgrade **Mode**:
 - **Download Microcode Data Only**—transfer microcode to the device using one or more write buffer commands; requires system reset or power cycle to activate.
 - **Download Microcode with Offsets and Activate**—transfer microcode to the device using one or more write buffer commands and activate immediately.

- **Download Microcode with Offsets, Save and Activate**—transfer microcode to the device using one or more write buffer commands, save to non-volatile storage, then activate.

Note: In this release, maxView Storage Manager supports option 3 only for expander firmware upgrade: Download Microcode with Offsets, Save and Activate.

9. When you are ready to continue, click **Next**.

10. In the Select Devices panel, select the enclosure(s) you want to update, then click **Next**.

11. Review the summary information, then click **Finish**.

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

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

11 Monitoring Status and Activity

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

11.1 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 102 and [Changing an Operating System's Event Log Setting](#) on page 114.
- **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 103.
- **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 103.
- **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 106.
- **Notifications**—You can set maxView Storage Manager to email 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 [Notifying Users by Email About Status and Activity](#) on page 107.
- **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 112.
- **Audible Alarm**—A series of beeps sounds whenever a serious event occurs on your storage space. See [Working with System Alarms](#) on page 94.

11.2 Checking Status from the Main Window

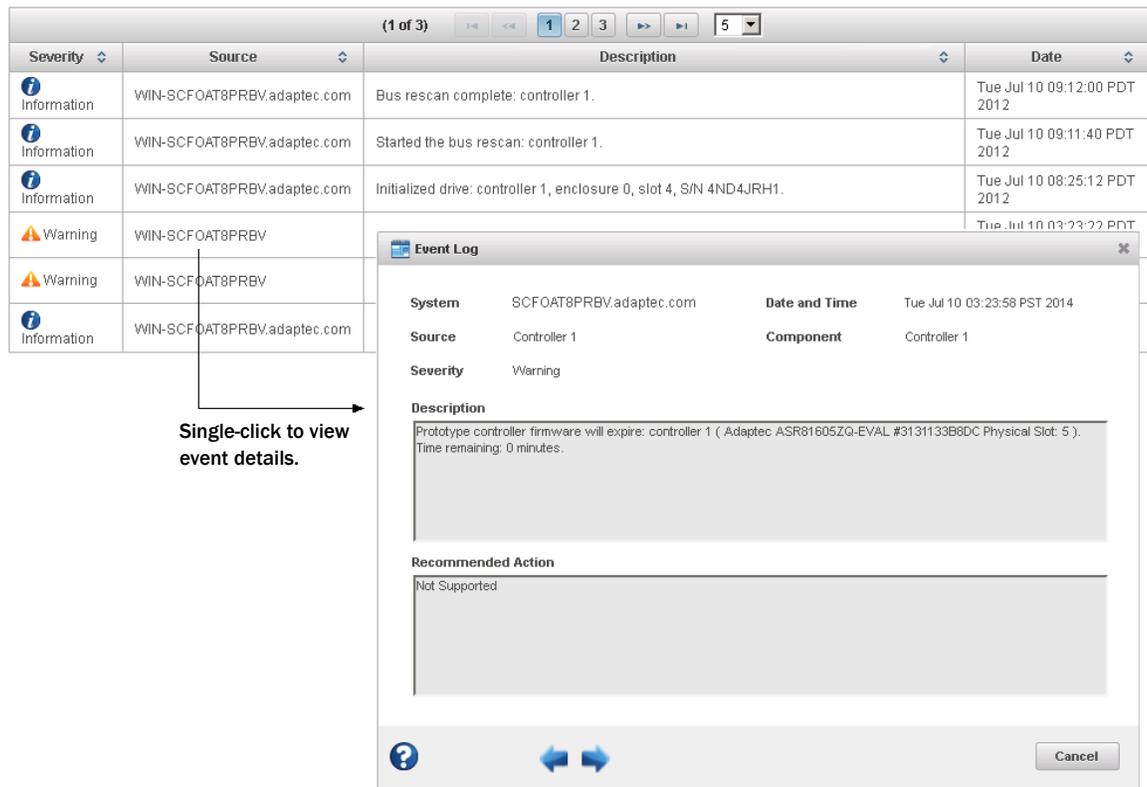
You can view status information and messages about the activity occurring in your storage space by looking at the *event log*, status icons, and *task log* in the main window of maxView Storage Manager. (You can also view all events for a system in its operating system event log; see [Changing an Operating System's Event Log Setting](#) on page 114.) 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.

11.2.1 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 102) 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 103).

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.



The screenshot shows the Event Log interface with a table of events and a detailed view of a warning event. The table has columns for Severity, Source, Description, and Date. The detailed view shows the following information:

System	SCFOAT8PRBV.adaptec.com	Date and Time	Tue Jul 10 03:23:58 PST 2014
Source	Controller 1	Component	Controller 1
Severity	Warning		
Description	Prototype controller firmware will expire: controller 1 (Adaptec ASR81605ZQ-EVAL #3131133B8DC Physical Slot: 5). Time remaining: 0 minutes.		
Recommended Action	Not Supported		

Single-click to view event details.

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.

11.2.1.1 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.

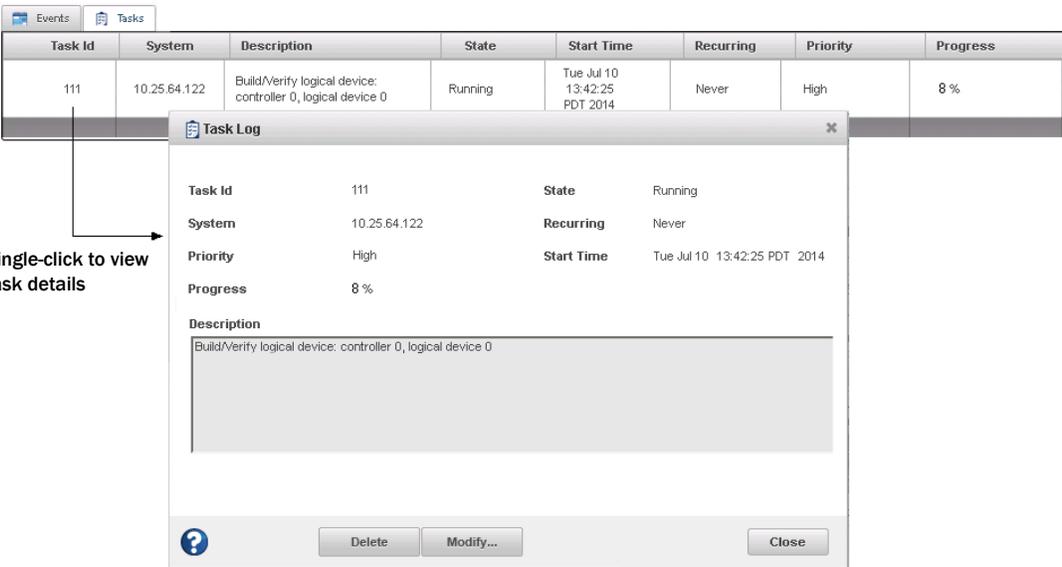
Icon	Status	Examples
	Error	<p>A controller has failed.</p> <p>A logical drive has failed.</p> <p>A disk drive or hot spare has failed.</p> <p>An enclosure is overheating.</p> <p>Multiple fans or power supplies within an enclosure have failed.</p> <p>An enclosure is not responding.</p>

Note: All Warning- and Error-level events also cause the audible alarm to sound. See [Working with Controllers](#) on page 92 for more information.

11.2.2 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, scheduling, and modifying tasks in maxView Storage Manager, see [Working with Scheduled Tasks](#) on page 78.



The screenshot shows a 'Tasks' tab with a table of tasks. A task with ID 111 is selected, and a 'Task Log' detail window is open for it. The task details are as follows:

Task Id	System	Description	State	Start Time	Recurring	Priority	Progress
111	10.25.64.122	Build/Verify logical device: controller 0, logical device 0	Running	Tue Jul 10 13:42:25 PDT 2014	Never	High	8 %

The 'Task Log' detail window shows the following information:

- Task Id:** 111
- System:** 10.25.64.122
- Priority:** High
- Progress:** 8 %
- Description:** Build/Verify logical device: controller 0, logical device 0
- State:** Running
- Recurring:** Never
- Start Time:** Tue Jul 10 13:42:25 PDT 2014

Buttons at the bottom of the detail window include a help icon, 'Delete', 'Modify...', and 'Close'.

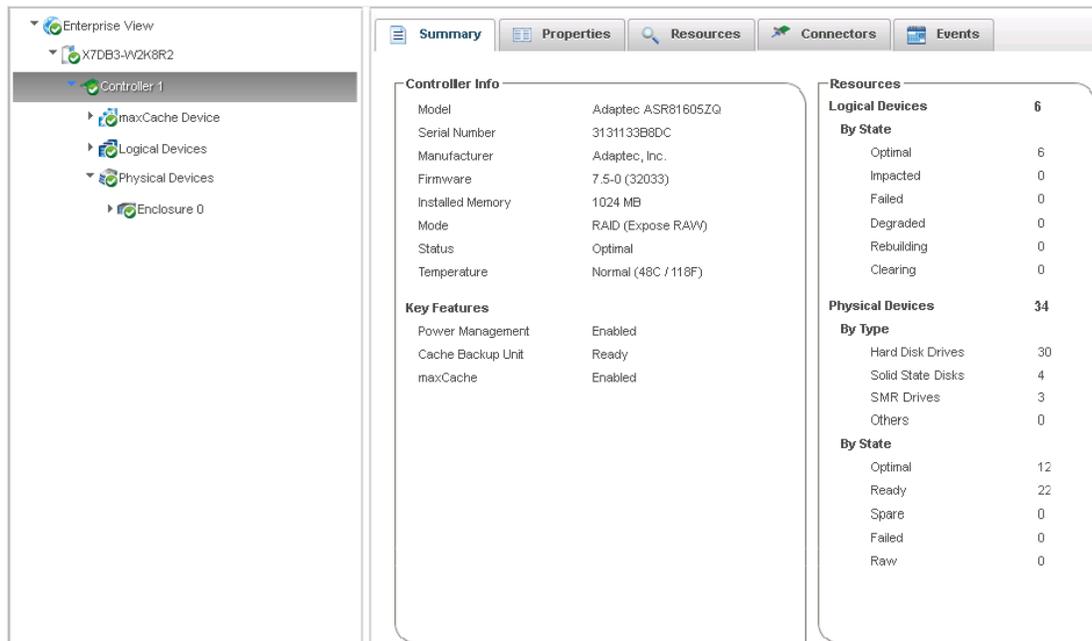
Single-click to view task details

11.2.3 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. 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 for the selected device (see [Viewing Activity Status in the Event Log](#) on page 102).

Note: For information about Chart View, on the right side of the Storage Dashboard, see [Viewing Storage Space Usage in Chart View](#) on page 106.



The following table lists the categories and types of information provided on the Storage Dashboard for each component in your storage space. All top-level nodes in the Enterprise View (System, Controller, Logical Drives, Physical Devices, and so on) include a Summary tab and Events tab.

Component	Categories/Tabs	Examples
System	Summary Properties	System name and IP address Operating system Number and type of controllers Alarm status (see Working with System Alarms on page 94) Web Server settings SMTP settings
Controller	Summary Properties Resources	Model, key features, driver and firmware version, controller mode, 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 Device	Summary Resources	Raid level, segment and group info (RAID x0), size, mount point, and status Member drives and locations Cache settings Hot spare protection Power management status Drive segment allocation
Enclosure	Summary Resources Slots	Enclosure type, vendor, model and status Fan, power supply, and temperature status (see Monitoring Enclosure Status on page 105) Speaker status

Component	Categories/Tabs	Examples
		Slot allocation and usage
Hard drives and SSDs	Summary Resources SMART Statistics	Drive type (hard drive, SSD, SMR), interface type (SAS/SATA), vendor, and model Drive state (Ready, Optimal, Hot Spare), mount point Channel number and device ID Cache settings, power management status, and transfer speed Drive segment allocation SMART statistics (see Viewing SMART Statistics on page 105)

11.2.3.1 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.

Resources	
Fan(s)	6
Optimal	6
Malfunctioning	0
Not Installed	0
Power Supplies	2
Optimal	2
Malfunctioning	0
Not Installed	0
Temperature Sensor(s)	2
Normal	2
Abnormal	0
Not Installed	0
Speaker(s)	1
On	1
Off	0
Not Installed	0

11.2.3.2 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.

Summary Resources SMART Events

Please refer to drive vendors data sheet for description

(2 of 3) 1 2 3

ID	Name	Normal
0xBB	Temperature	100
0xC2	Reported I/O Error Detection Code Errors	30
0xC3	Unknown Attribute	120
0xC4	Unknown Attribute	100
0xC9	Unknown Attribute	120
0xCC	Unknown Attribute	120
0xE6	Life Curve Status	100
0xE7	SSD Life Left	100
0xE9	Unknown Attribute	0
0xEA	Unknown Attribute	0

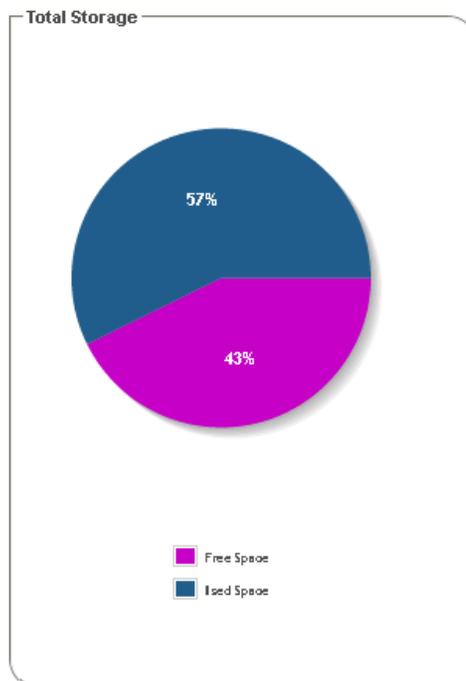
(2 of 3) 1 2 3

SSD wear-level and longevity indicators

11.2.4 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.



11.3 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.

Only the users you specify receive email notifications. You can specify which types of events generate email messages (Error, Informational, Warning). You can also specify if you want to be notified instantly when an event occurs to ensure that urgent issues receive immediate attention from the right people. Alternatively, you can specify that you want events “coalesced” and receive only one email message for each event type.

Follow the instructions in this section to:

- Set up email notifications (see [Setting Up Email Notifications](#) on page 107).
- Send a test email (see [Sending a Test Message](#) on page 109).
- Modify or remove an email recipient (see [Modifying or Removing an Email Recipient](#) on page 110).
- Modify email server settings (see [Modifying Email Server Settings](#) on page 111).
- Disable email notifications (see [Disabling Email Notifications](#) on page 111)

11.3.1 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:

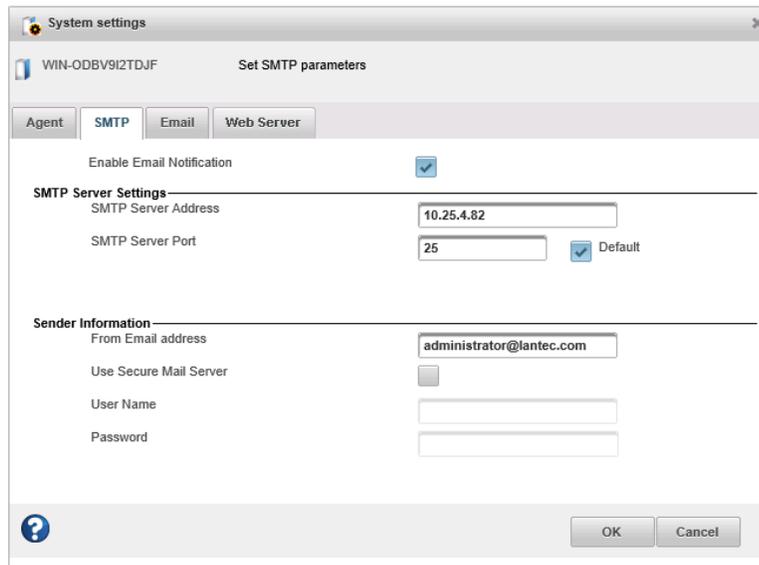
- The address of your Simple Mail Transfer Protocol (SMTP) server (host name and domain, or TCP/IP address)
- The email address of each person who will receive email notifications

To set up email notifications:

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

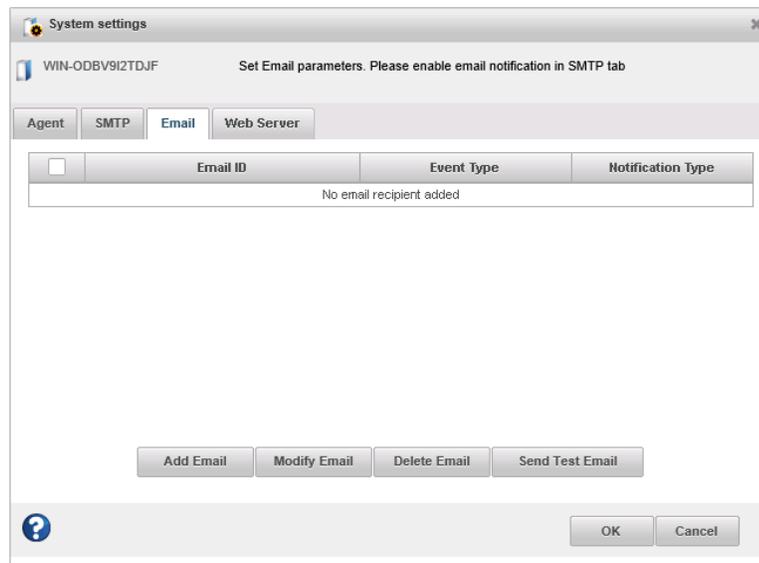


3. When the System settings window opens, click the **SMTP** tab.
4. Select **Enable Email Notifications**.
5. Enter the IP address of your SMTP server and the server's port number (or use the default port). Then, enter the “From” address that you want to appear in your email notifications. If an email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



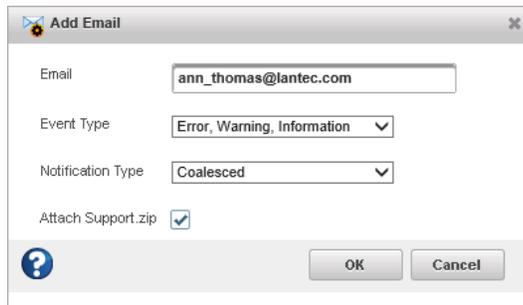
The screenshot shows the 'System settings' window with the 'Set SMTP parameters' tab selected. The 'SMTP' tab is active, and the 'Enable Email Notification' checkbox is checked. The 'SMTP Server Settings' section includes fields for 'SMTP Server Address' (10.25.4.82) and 'SMTP Server Port' (25), with a 'Default' checkbox checked. The 'Sender Information' section includes fields for 'From Email address' (administrator@lantec.com), 'Use Secure Mail Server' (unchecked), 'User Name', and 'Password'. The window has 'OK' and 'Cancel' buttons at the bottom right.

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



The screenshot shows the 'System settings' window with the 'Set Email parameters. Please enable email notification in SMTP tab' tab selected. The 'Email' tab is active. The window displays a table with columns for 'Email ID', 'Event Type', and 'Notification Type'. The table is currently empty, with the text 'No email recipient added' centered below it. Below the table are buttons for 'Add Email', 'Modify Email', 'Delete Email', and 'Send Test Email'. The window has 'OK' and 'Cancel' buttons at the bottom right.

8. 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 select the notification type—Instant or Coalesced. To include a support archive file with the email, click **Attach Support.zip**, then click **OK**. (For more information about event levels, see [What Do the Event Status Icons Mean?](#) on page 102; for more information about the support archive file, see [Creating a Support Archive File](#) on page 129.)

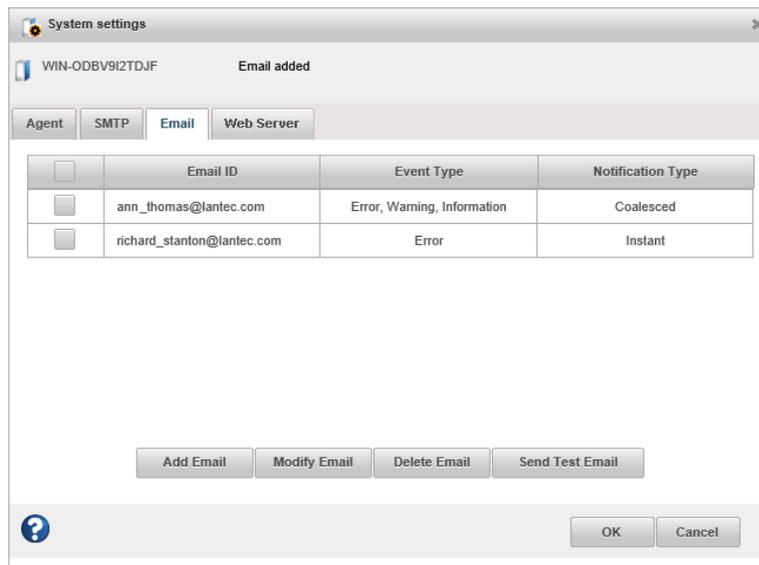


The 'Add Email' dialog box contains the following fields and options:

- Email:
- Event Type:
- Notification Type:
- Attach Support.zip:

Buttons: ? (help), OK, Cancel

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



The 'System settings' window shows the 'Email' tab selected. The table below lists the configured email recipients:

	Email ID	Event Type	Notification Type
<input type="checkbox"/>	ann_thomas@lantec.com	Error, Warning, Information	Coalesced
<input type="checkbox"/>	richard_stanton@lantec.com	Error	Instant

Buttons: Add Email, Modify Email, Delete Email, Send Test Email, ? (help), OK, Cancel

- When you're done adding email recipients, click **OK**.
The email recipients and your SMTP server settings are saved.
- 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 109).

11.3.2 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:

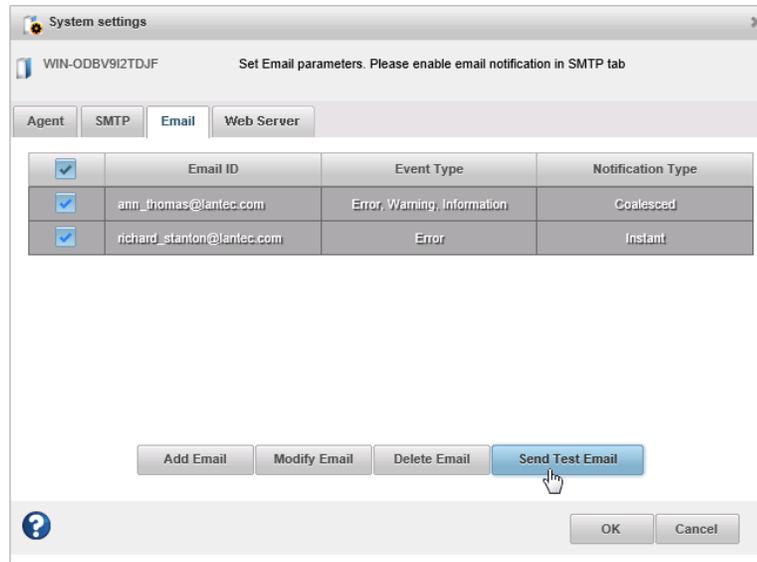
- In the Enterprise View, select the system you want.
- On the ribbon, in the System group, click **System Settings**.



- 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 or Removing an Email Recipient](#) on page 110.)
- Ensure that your SMTP server address is correct. (See [Modifying Email Server Settings](#) on page 111.)
- Try sending the test message again.

11.3.3 Modifying or Removing an Email Recipient

This section describes how to modify a recipient's email address, change the types of event notifications the recipient receives, or stop sending email notifications to a recipient from a selected system.

To modify recipient 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 **Modify Email**, change the recipient information, as needed, then click **Modify** to save your changes.

Or,

- Click **Delete Email** to remove the recipient from the notification list.

The changes become effective immediately.

5. Click **OK** to close the Email Notifications Manager.

11.3.4 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.

11.3.5 Disabling Email Notifications

This section describes how to disable email notifications on a selected system.

Note: If you disable email notifications, events continue to be generated but email messages won't be sent.

To disable 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. Clear the **Enable Email Notifications** check box.
5. Click **OK** to save your changes.

11.4 Monitoring Status and Activity with SNMP Traps

On Windows and Linux systems, you can monitor status and activity in your storage space with Simple Network Management Protocol (SNMP) traps. Using the maxView Storage Manager GUI or an OS monitoring tool, a system can receive SNMP trap notifications, for instance, when a disk drive fails or a logical drive verification begins.

For information about about setting up SNMP traps on your system, see [Configuring SNMP Notifications on Windows and Linux](#) on page 134.

11.5 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 112).
- View the advanced statistics for a controller, hard drive, SSD, logical drive, or maxCache Device (see [Viewing Advanced Statistics](#) on page 113).
- Reset the statistics counters (see [Resetting the Statistics Counters](#) on page 114).

11.5.1 Setting up Statistics Logging

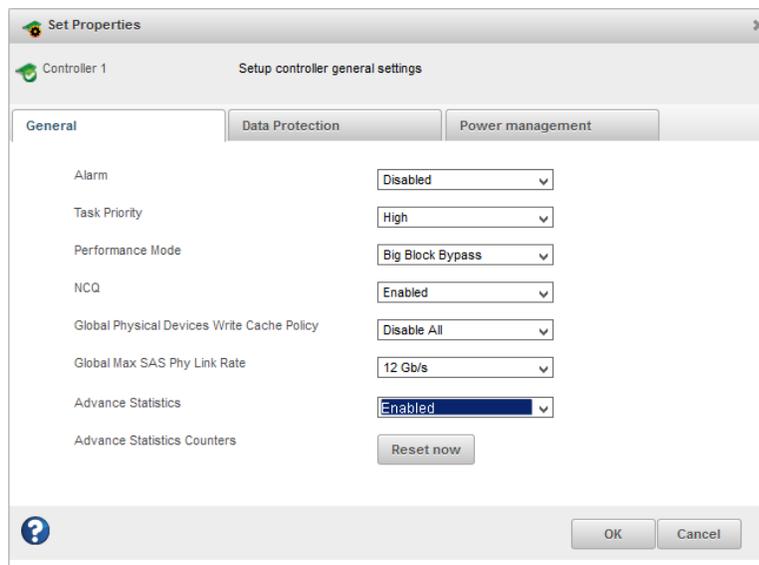
To set up statistics logging for the controllers in your storage space:

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.

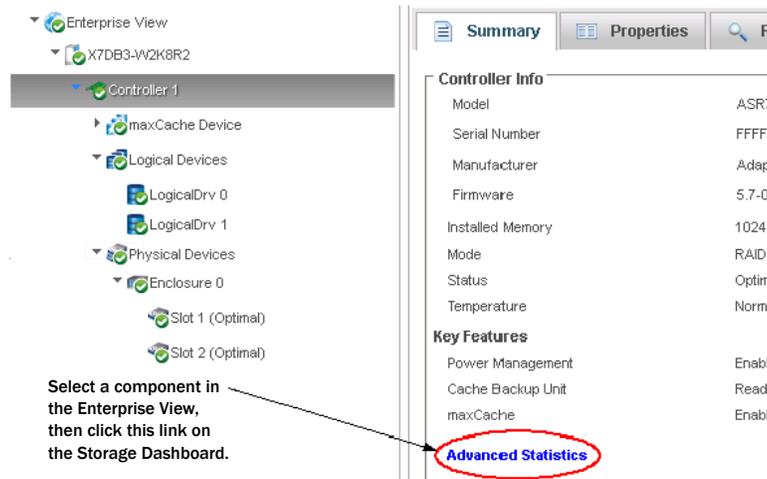
3. In the Advanced Statistics drop-down list, select **Enabled**.



4. Click **OK**.

11.5.2 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. 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.

Advanced Statistics

Controller 1

General

Adapter General

Statistics Parameter	Value
Statistics Version	3.0
SSD Cache Size	380721
Pages on Fetch List	0
Fetch List Candidates	0
Candidate Replacements	0
Pages on dirty List	0
Pages on failed List	0

Adapter Outstanding Commands

	0	1	2	4	8
	138	0	0	0	0

Advanced Statistics

LogicalDrv4 - Optimal (99.989 GB)

General | DRAM | IO Statistics | **MaxCache Statistics**

SSD Cache

Statistics Parameter	Value
Read hits	19461
Write hits	62523
Valid Pages	1
Updates on Writes	0
Invalidations by RW Balance	0
Invalidations by Updates	0
Invalidations by Others	0
Page Fetches	0

SSD Cache Page Hit Distribution

	0	1	2	4	8	16	32	64	128	256	512	1024	2048
	40514	8355	4314	330	1	0	0	0	1	0	0	0	0

11.5.3 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.

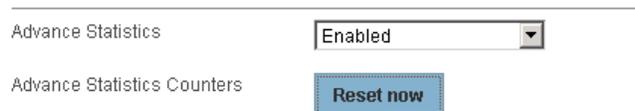
To reset the statistics counters for a controller:

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.

11.6 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 select the type of events that are recorded, or you can disable operating system event logging.

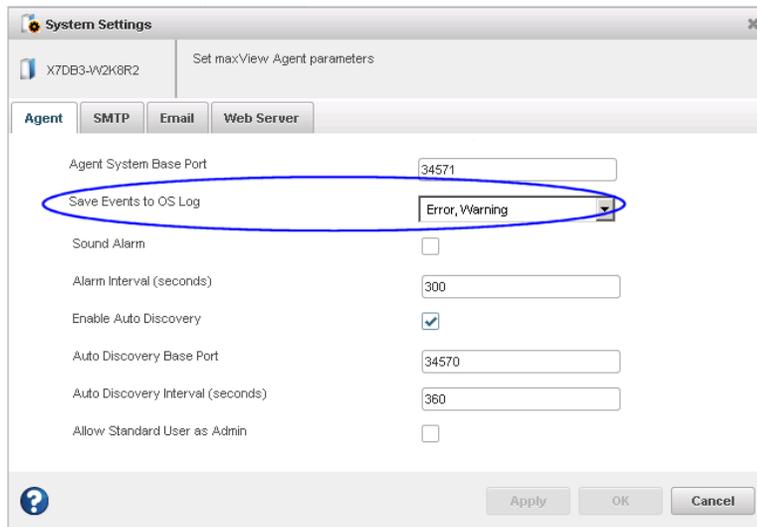
To change or disable operating system event logging on a system:

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



The Agent Settings window opens.

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
- Change the Web Server port
- Grant Standard users Admin Privilege

12.1 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 its configuration to a *server 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.
3. Log in to each remote system in your storage space and restore the configuration from the server template file.

The following sections provide details on each of these steps.

12.1.1 Creating a Server Template File

This procedure saves the configuration of a system 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(s), operational settings, physical drive size, logical drive size, RAID level, and more. The default name of the server template file is `ControllerConf.xml`.

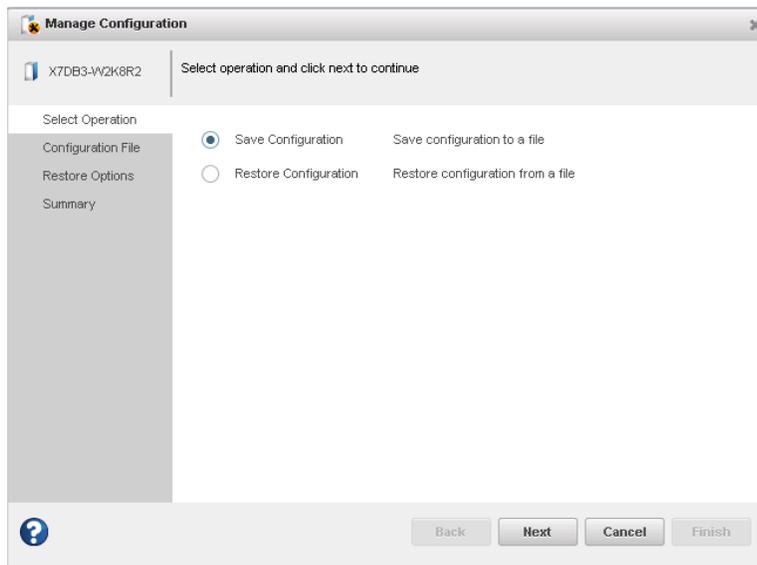
To create a server template file:

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



The Manage Configuration wizard opens.

3. Select **Save Configuration**, then click **Next**.



4. Review the Summary information, then click **Finish**.
5. When the File Download window opens, click **Save File**, then click **OK**.

Note: The procedure for downloading and saving the template file may vary, depending on the Web browser.
6. Continue with [Duplicating the Server Template](#) on page 117 to deploy the same configuration on multiple systems in your storage space.

12.1.2 Duplicating the Server Template

When you are ready to duplicate the server template on other systems in your storage space, you can restore the configuration 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%.

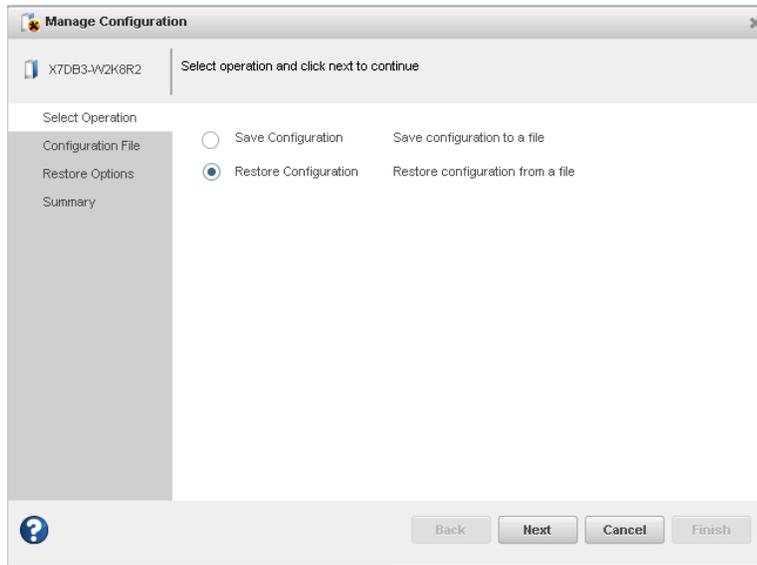
To duplicate the server template on another system:

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

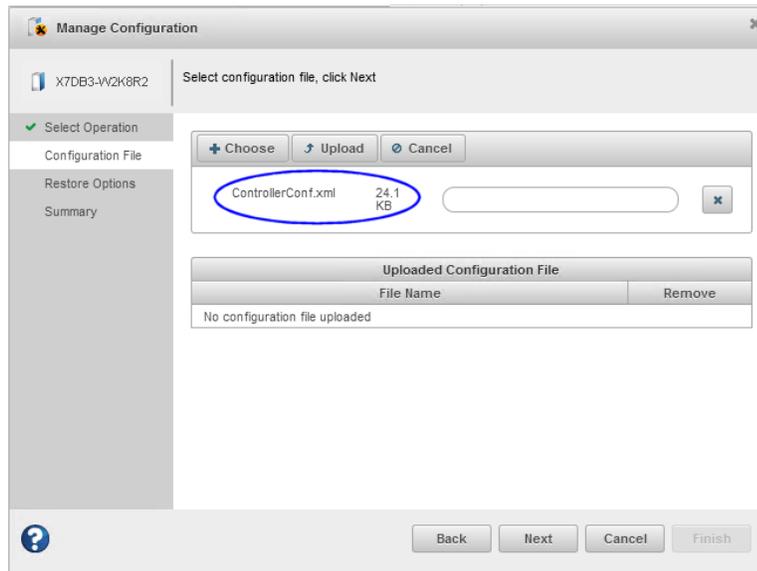


The Manage Configuration wizard opens.

3. Select **Restore Configuration**, then click **Next**.

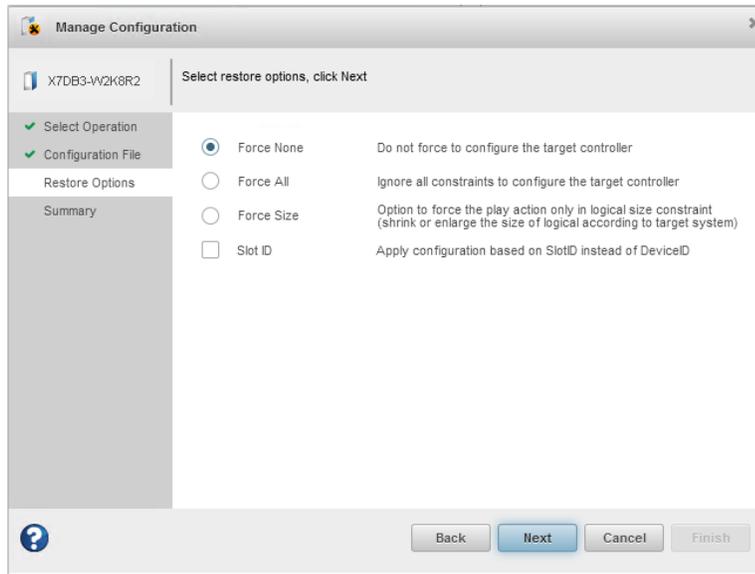


4. In the Configuration File panel, click **Choose**, navigate the file system to your server template file, then click **Open**. When the file name appears in the "selected file" area (circled in blue in figure below), click **Upload**, wait for the upload to complete, then click **Next**.



5. In the Restore Options panel, choose a Force option if a 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 Size	To force deployment of just the logical drives

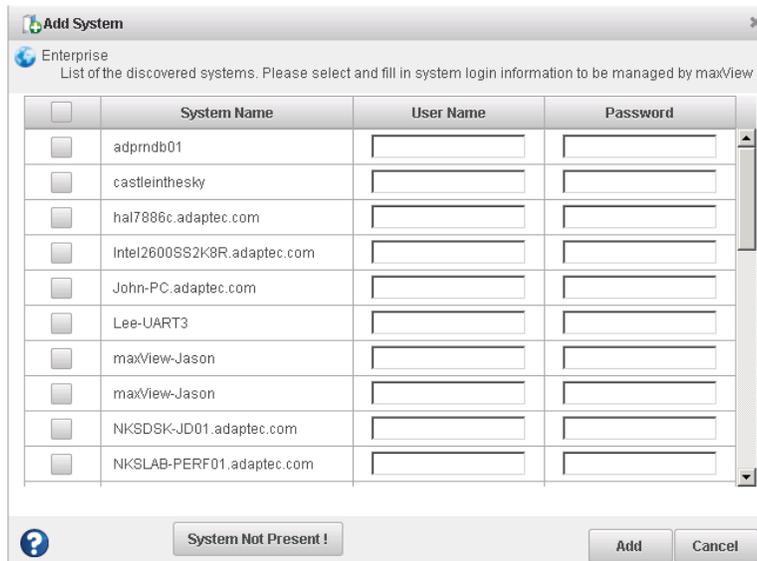


6. To apply the configuration based on SlotID rather than DeviceID, click the **Slot ID** check box.
7. Click **Next**, review the summary information, then click **Finish**.
maxView Storage Manager duplicates the system configuration on the new controller.

12.2 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.



12.2.1 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 42. 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.

12.2.2 Manually Adding a Remote System

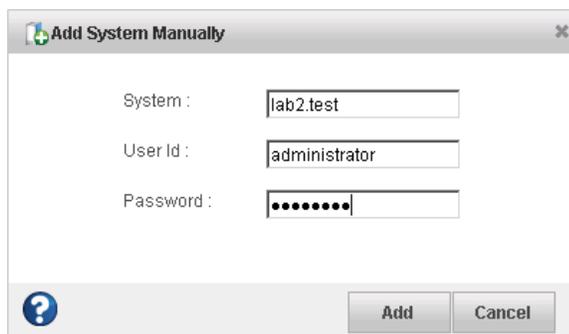
You can add a remote system manually if auto-discovery fails to find the system on your network.

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.

12.2.3 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.

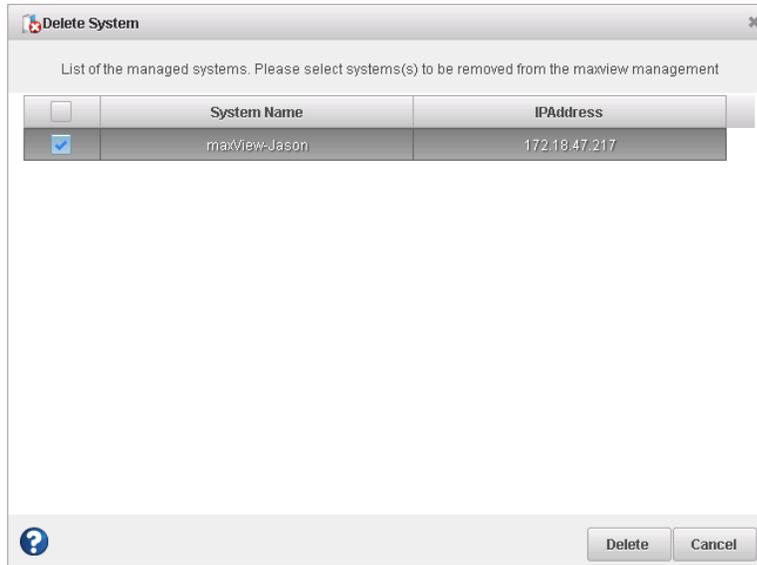
To remove a remote system:

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.

12.2.4 Changing the Auto-Discovery Settings

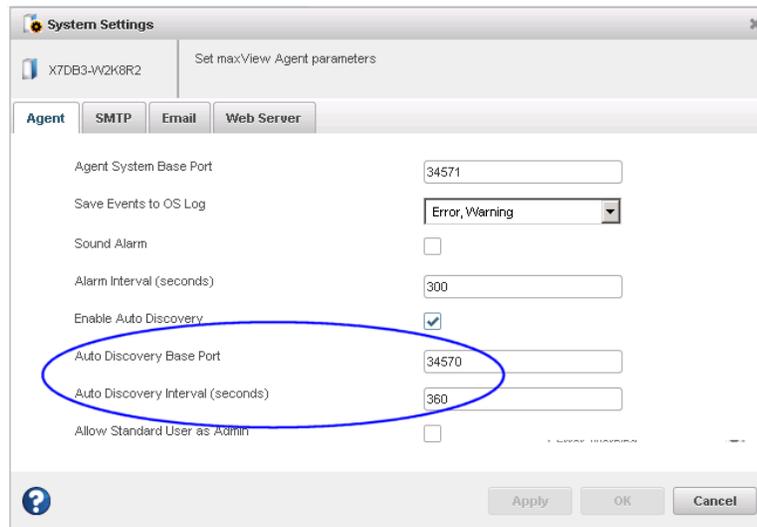
Auto-discovery, in maxView Storage Manager, is enabled by default. The auto-discovery task runs in the background each time maxView Storage Manager is started. You can disable auto-discovery if desired, and configure the auto-discovery settings described below.

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.

12.3 Clearing the Controller Configuration

You can clear the configuration of a controller 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.

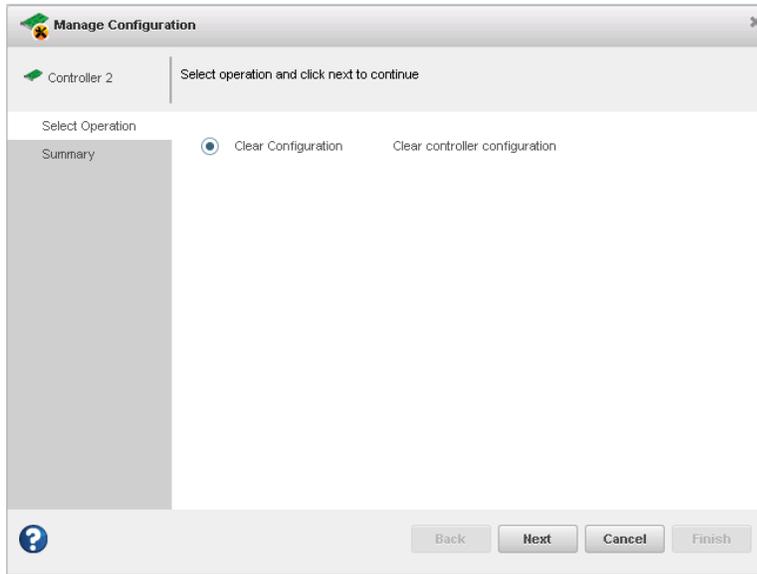
To clear the controller configuration:

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



The Manage Configuration wizard opens.

3. Select **Clear Configuration**, then click **Next**.



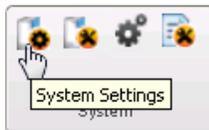
4. Review the Summary information, then click **Finish**.

12.4 Changing the Agent Base Port Setting

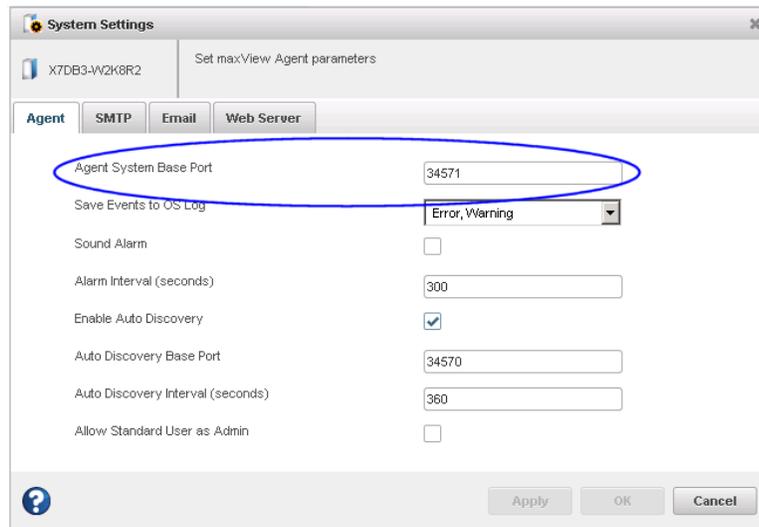
You can change the base port setting for the maxView Storage Manager Agent, if needed, to accommodate changes in your network or IT requirements. The Agent can use any open port for communication. The default port is 34571. If you change the port, you must restart the maxView Storage Manager Agent for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

12.5 Changing the Web Server Port

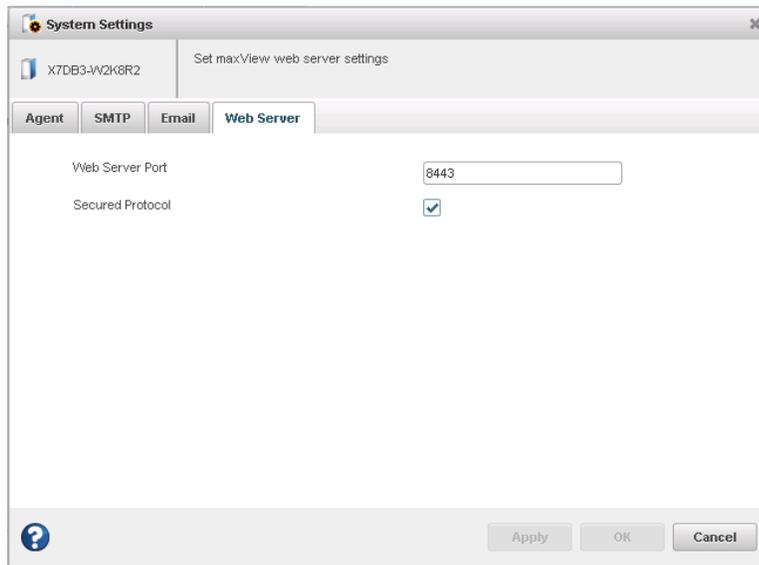
You can change the port used by the maxView Storage Manager Web Server, if needed, to accommodate changes in your network or IT requirements. The Web Server can use any open port for communication. The default port is 8443. If you change the port, you must restart maxView Storage Manager for the change to take effect.

To change the Web Server port:

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



When the System Settings window opens, click the **Web Server** tab.



3. Enter the new Web Server port. Optionally, click **Secured Protocol** to enable/disable secure communication over https.
4. Click **Apply**.
5. Restart maxView Storage Manager.

12.6 Granting Standard Users Admin Privilege

Normally, Standard users have restricted access to your storage space, with limited ability to perform non-destructive operations in maxView Storage Manager (see [Working in maxView Storage Manager](#) on page 30). You can grant Standard users Admin Privilege to accommodate changes in your system policies or IT requirements.

To grant Admin privilege to Standard users:

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



The Agent Settings window opens.

3. Click the **Allow Standard User as Admin** check box, then click **Apply**.
4. Restart the Agent.

13 Solving Problems

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

13.1 General Troubleshooting Tips

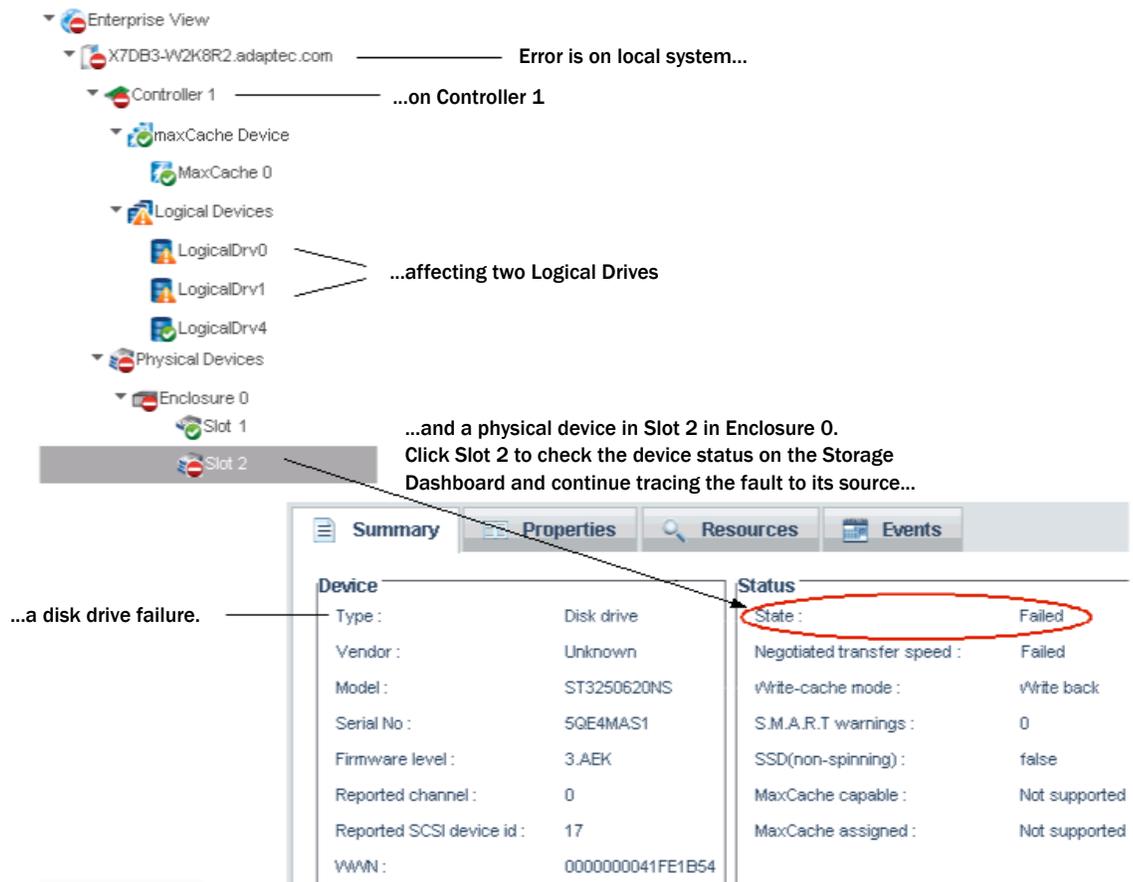
If you experience problems installing or using maxView Storage Manager, try these troubleshooting tips first:

- 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 42 for more information.)
- Check all cable connections.
- Try uninstalling and reinstalling maxView Storage Manager.
- Check the Readme for compatibility issues and known problems.

13.2 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, then continue tracing the problem to its source.



Enterprise View

- X7DB3-W2K8R2.adaptec.com — Error is on local system...
- Controller 1 — ...on Controller 1
 - maxCache Device
 - MaxCache 0
 - Logical Devices
 - LogicalDrv0 — ...affecting two Logical Drives
 - LogicalDrv1
 - LogicalDrv4
 - Physical Devices
 - Enclosure 0
 - Slot 1
 - Slot 2 — ...and a physical device in Slot 2 in Enclosure 0. Click Slot 2 to check the device status on the Storage Dashboard and continue tracing the fault to its source...

Summary Properties Resources Events

Device	Status
Type : Disk drive	State : Failed
Vendor : Unknown	Negotiated transfer speed : Failed
Model : ST3250620NS	Write-cache mode : Write back
Serial No : 5QE4MAS1	S.M.A.R.T warnings : 0
Firmware level : 3.AEK	SSD(non-spinning) : false
Reported channel : 0	MaxCache capable : Not supported
Reported SCSI device id : 17	MaxCache assigned : Not supported
WWN : 0000000041FE1B54	

13.3 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 127.
- If the logical drive is *not* protected by a hot spare, see [Failed Disk Drive Not Protected by a Hot Spare](#) on page 127.
- If there is a disk drive failure in more than one logical drive simultaneously, see [Failure in Multiple Logical Drives Simultaneously](#) on page 127.
- If it is a RAID 0 logical drive, see [Disk Drive Failure in a RAID 0 Logical Drive](#) on page 128.
- If multiple disk drives fail within the same logical drive, see [Multiple Disk Drive Failures in the Same Logical Drive](#) on page 128 and [Forcing a Logical Drive with Multiple Drive Failures Back Online](#) on page 129.

13.3.1 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*—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 53 for more information.

13.3.2 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 129.

13.3.3 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 127.

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 53 for more information.

13.3.4 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.

13.3.5 Multiple Disk Drive Failures in the Same Logical Drive

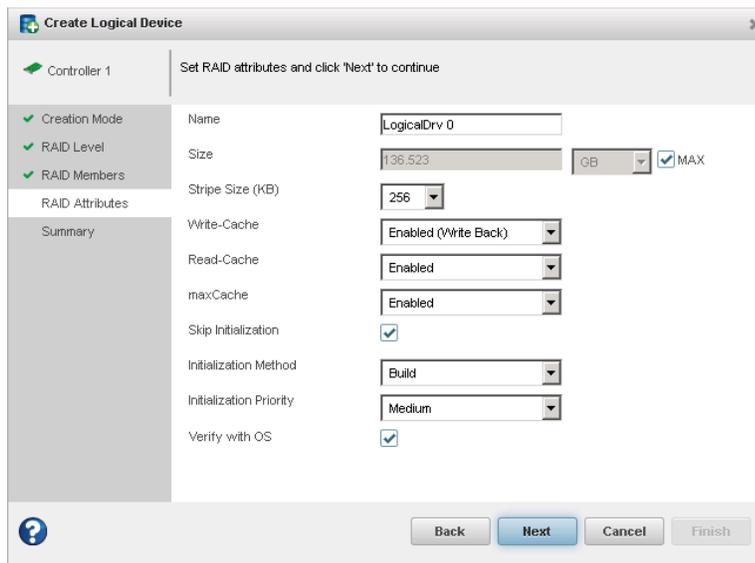
If multiple disk drives fail in the same logical drive, you *may* be able to recover the data by recreating the logical drive in the wizard *without* the initialization step. Omitting the initialization step reconstructs the logical drive meta-data without modifying or destroying any other data on the 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 143 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]. 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.

13.3.6 Forcing a Logical Drive with Multiple Drive Failures Back Online

If multiple disk drives fail in the same logical drive, you may be able to recover the data by forcing the logical drive back online. For instance, if two drives fail in a RAID 5, forcing it online may allow you to access the data, depending on which disk drives failed.

Caution: This procedure is not guaranteed to successfully recover your logical drive. The surest way to recover your data is to restore the failed logical drive from backup.

To force a logical drive online:

1. In the Enterprise view, select the failed logical drive (see [Identifying a Failed or Failing Component](#) on page 126).
2. On the ribbon, in the Logical Device group, click **Force Online**.



3. Click **Force**, then click **OK**.
4. If prompted to run Verify with Fix, follow the instructions in [Verifying and Fixing a Logical Drive](#) on page 63 to check the logical drive for data and file system integrity.

13.4 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.

13.5 Creating a Support Archive File

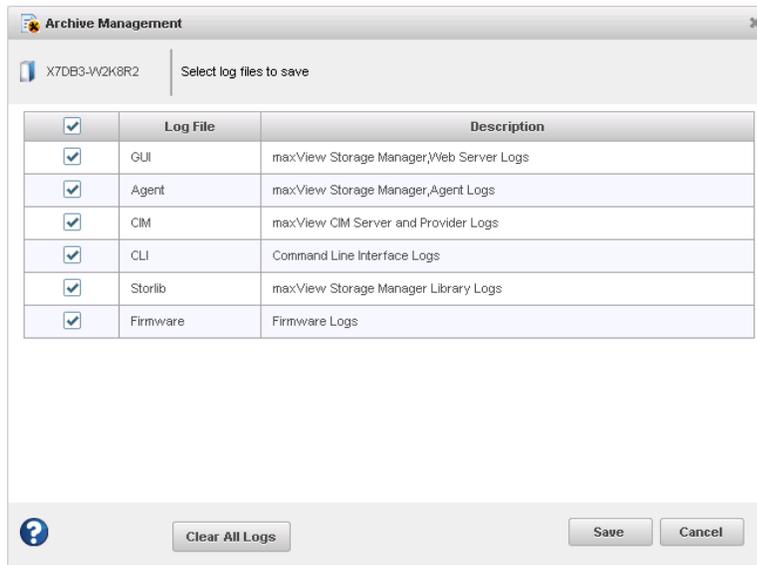
Your Microsemi support representative might ask you to create a support archive file to help diagnose a problem with your system. Saved information includes device logs, drive logs, event logs, error logs, controller logs, history logs, and SMART statistics.

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 **Archive Management**.



The Archive Management window opens.



3. Select the logs you want to save.
4. Click **Save**.
5. When the File Download window opens, click **OK**.
6. In the Archive Management window, click **Clear All Logs**, or **Cancel** to exit.

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.

A.1 Completing a Silent Installation

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

A.1.1 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 [Downloading the Installer Package](#) on page 20 for details).
2. Run the silent installation from the command line using one of these commands:

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

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.

A.1.1.1 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:\pms.log
INSTALLDIR (optional)	Specifies the installation path. If specified, the installation path must be enclosed in escaped quotation marks. Example: INSTALLDIR="\Program Files\Adaptec\maxView Storage Manager\" Note: The default installation path is "C:\Program Files\Adaptec\maxView Storage Manager".
ADDLOCAL (optional)	<ul style="list-style-type: none"> • ALL (default)—Installs the maxView Storage Manager Console (GUI and Agent), and ARCCONF (CLI). If you specify ALL, do not specify any of the following values. • ARCCONF—Installs the Command Line Interface tool (ARCCONF) • Agent—Installs the maxView Storage Manager Agent • Console—Installs the maxView Storage Manager GUI <p>Note: Use commas to separate multiple values.</p>

A.1.2 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 [Downloading the Installer Package](#) on page 20 [Downloading the Installer Package](#) for details).
2. Run the silent installation from the command line using one of these commands (x.xx-xxxx=version-build number):

Options	Description
Linux 64-bit	./StorMan-X.XX-XXXXX.x86_64.bin --silent

Note: Linux systems also support silent upgrade and silent removal. See [Example Command Line Installations](#) on page 133.

A.2 Example Command Line Installations

This section shows typical command line installations for Windows and Linux. In the Linux examples, <x.xx>-<xxxxx>=version-build number.

- Normal Windows Installation:

```
setup_asm_x64.exe /s /v"/qb /lv* c:\pmc.log"
```

- Install to Specific Location on Windows:

```
setup_asm_x64.exe /s /v"/qb INSTALLDIR="C:\Program Files\Adaptec\maxView Storage Manager\""
```

- Install Specific Feature on Windows:

```
setup_asm_x64.exe /s /v"/qb ADDLOCAL=ARCCONF /lv* c:\pmc.log"
```

- Normal Linux Installation:

```
./StorMan-<x.xx>-<xxxxx>.x86_64.bin --silent
```

- Linux Software Upgrade:

```
./StorMan-<x.xx>-<xxxxx>.x86_64.bin --upgrade
```

- Linux uninstallation (removal):

```
./StorMan-<x.xx>-<xxxxx>.x86_64.bin --remove
```

Alternative: `rpm -e StorMan`

B Configuring SNMP Notifications on Windows and Linux

This appendix describes how to enable SNMP trap notifications on Windows and Linux.

After installing and configuring the SNMP service, you can monitor activity in your storage space with the maxView Storage Manager GUI or any OS monitoring tool, such as a Mib Browser.

B.1 Setting Up SNMP Notifications on Windows

1. Install and enable the SNMP service on your Windows system. Define the SNMP community to which to send trap messages ("public", for instance). Then designate that name as an Accepted Community in the SNMP Service Properties.

For details on installing and configuring SNMP on Windows, refer to your operating system documentation.

2. On Windows Server 2012 and Windows 8.x systems, the SNMP sub-agent does not have permission to open a socket over TCP/IP or UDP, preventing it from communicating with the maxView Storage Manager Agent. Use the following PowerShell scripts to allow the SNMP sub-agent to communicate with the maxView Agent and send trap notifications:

- a) Outbound Rule for Port 34572:

```
$OutBound = @{
    DisplayName = "Maxview Outbound Rule on TCP port 34572 for SNMP Service"
    Direction = "Outbound"
    InterfaceType = "Any"
    Action = "Allow"
    Protocol = "TCP"
    Service = "snmp"
    Program = "$($env:systemdrive)\WINDOWS\system32\snmp.exe"
    Enabled = "TRUE"
    RemotePort = "34572"
    PolicyStore = "ConfigurableServiceStore"
}
New-NetFirewallRule @OutBound
```

- b) Inbound Rule for Port 34572:

```
$InBound = @{
    DisplayName = "Maxview Inbound Rule on TCP port 34572 for SNMP Service"
    Direction = "Inbound"
    InterfaceType = "Any"
    Action = "Allow"
    Protocol = "TCP"
    Service = "snmp"
    Program = "$($env:systemdrive)\WINDOWS\system32\snmp.exe"
    Enabled = "TRUE"
    RemotePort = "34572"
    PolicyStore = "ConfigurableServiceStore"
}
New-NetFirewallRule @InBound
```

3. To remove the NetFirewall rules (as needed):

- a) Outbound Rule for Port 34572:

```
Remove-NetFirewallRule -DisplayName "Maxview Outbound Rule on TCP port 34572 for
SNMP Service" -PolicyStore "ConfigurableServiceStore"
```

- b) Inbound Rule for Port 34572:

```
Remove-NetFirewallRule -DisplayName "Maxview Inbound Rule on TCP port 34572 for
SNMP Service" -PolicyStore "ConfigurableServiceStore"
```

B.2 Setting Up SNMP Notifications on Linux

1. Install the Net-SNMP RPM packages:

- net-snmp
- libsnmp15
- snmp-mibs

2. In `/etc/snmp/snmpd.conf` configuration file:

- a) Comment out the `com2sec` entry:

```
# com2sec notConfigUser default public
```

- b) Add the following lines at the end of the file:

```
rocommunity public  
trapsink localhost  
master agentx
```

- c) (*SLES 10 only*) Register the `agentx` socket:

```
agentxsocket /var/agentx/master
```

3. Copy `aus.mib` from `/usr/StorMan` to `/usr/share/snmp/mibs/`:

```
#cp /usr/StorMan/aus.mib /usr/share/snmp/mibs
```

4. Restart the SNMP agent:

```
#service snmpd restart
```

5. Start `aus-snmpd` from `/usr/StorMan`:

```
#./aus-snmpd
```

C Using the maxView Plugin for VMware vSphere Web Client

The maxView plugin for VMware vSphere Web Client is a monitoring tool that lets you explore your storage resources directly from the vSphere Web client, without using maxView Storage Manager as a separate Web GUI. It replicates most of the information on the maxView Storage Manager Dashboard (see [The Storage Dashboard](#) on page 34) for the controllers, logical devices, physical devices, enclosures, and systems (hosts) in your storage space, with a vSphere "look and feel" and native navigation.

Note: The maxView plugin is a monitoring tool only. To modify your storage space, such as creating or deleting a logical drive or designating a hot spare, you must use the maxView Storage Manager GUI or CLI (ARCCONF).

C.1 Installing the maxView Plugin for vSphere Web Client

Follow the instructions in this section to install the maxView plugin for vSphere Web Client on a Windows x64 system.

Note: Before you begin, ensure that VMware vSphere Web Client is already installed on the Windows host. You need administrator privileges to install the maxView plugin.

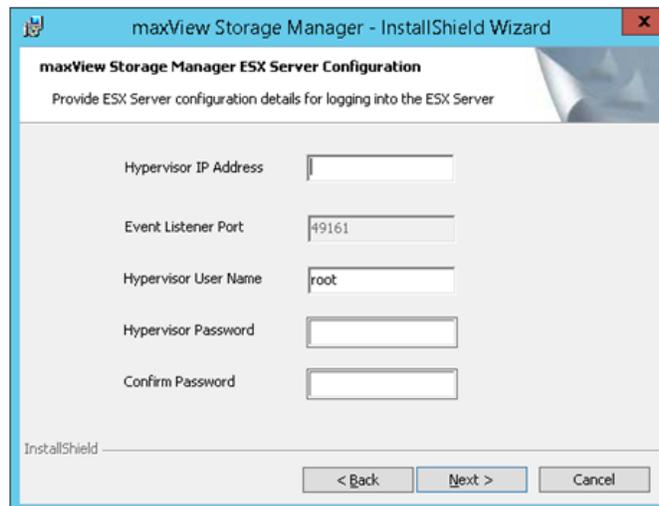
1. Download the setup program for the maxView vSphere plugin at start.adaptec.com (see [Downloading the Installer Package](#) on page 20).

2. Double-click the setup program:

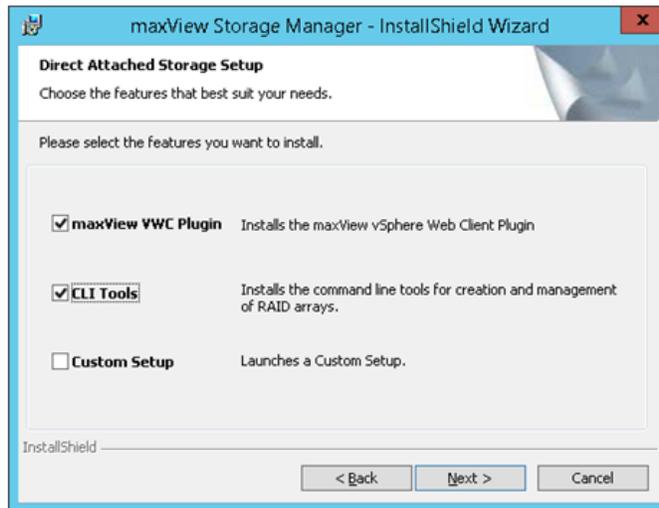
Options	Description
VMware ESXi 5.5 client	setup_maxView_VWC_Plugin_x64.exe
VMware ESXi 6.0 client	setup_maxView_VWC6_Plugin_x64.exe

The Installation wizard opens.

3. Click **Next** to begin the installation, accept the terms in the license agreement, then click **Next**.
4. Enter the following configuration settings for your VMware ESXi server, then click **Next**:
 - a) Hypervisor IP address
 - b) Hypervisor user name
 - c) Hypervisor password



- In the Features screen, ensure that **maxView VWC Plugin** is selected. Optionally, select **CLI Tools**. Then click **Next**.

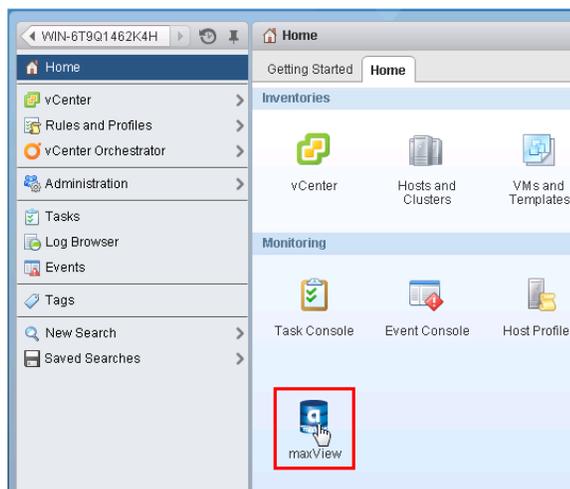


- Click **Install** to begin the installation.

When the installation is complete, you receive a confirmation message that the plugin is installed.

C.2 Starting the maxView Plugin for vSphere Web Client

- Launch the VMware vSphere Web Client: double-click the vSphere desktop icon, then enter your login credentials.
- In the Monitoring section on the vSphere Home screen (on the right), click the **maxView** icon; the Controller information screen opens.



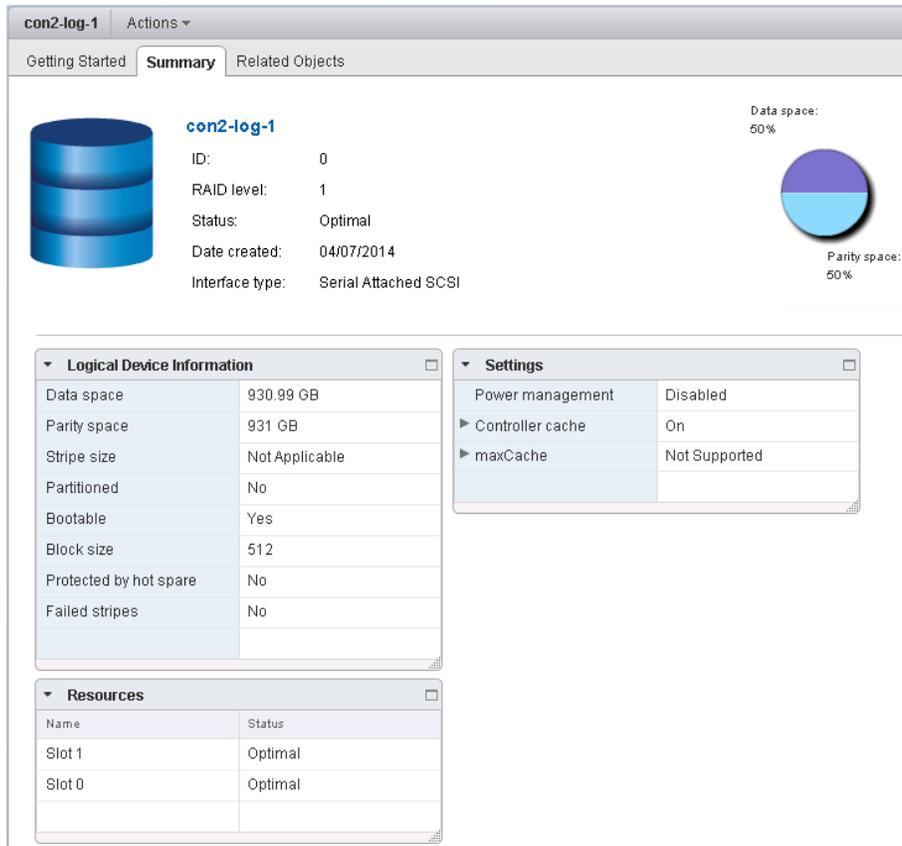
- Alternatively, in the Navigation pane (on the left), click **vCenter**, scroll down to the maxView tree, then select a resource category, such as Controller, Logical Device, Physical Device, or Enclosure, to open the information screen for that item.



C.3 Monitoring maxView Resources in vSphere Web Client

For each maxView resource in your storage space—controller, logical device, physical device, and so on—you can view summary information about the resource (or "object") and view its related resources, such as the physical devices in a logical drive, the logical drives on a controller, or the controllers on a host.

For example, the figure below shows the summary information screen for a logical drive, with expandable information fields containing general information about the logical drive, its settings, and resources. (Each expandable field has an arrow next to it.)



con2-log-1

ID: 0
 RAID level: 1
 Status: Optimal
 Date created: 04/07/2014
 Interface type: Serial Attached SCSI

Data space: 50%
 Parity space: 50%

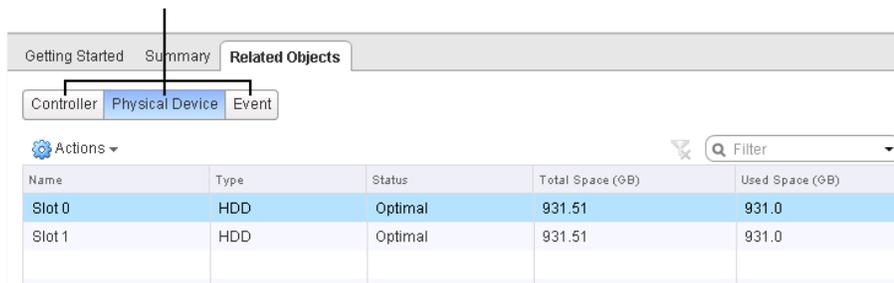
Logical Device Information	
Data space	930.99 GB
Parity space	931 GB
Stripe size	Not Applicable
Partitioned	No
Bootable	Yes
Block size	512
Protected by hot spare	No
Failed stripes	No

Settings	
Power management	Disabled
Controller cache	On
maxCache	Not Supported

Resources	
Name	Status
Slot 1	Optimal
Slot 0	Optimal

Click on the **Related Objects** tab (next to the Summary tab) to show the physical devices comprising the logical drive, the logical drive's controller, or a filtered list of events for that logical drive.

Button bar provides quick access to related object information



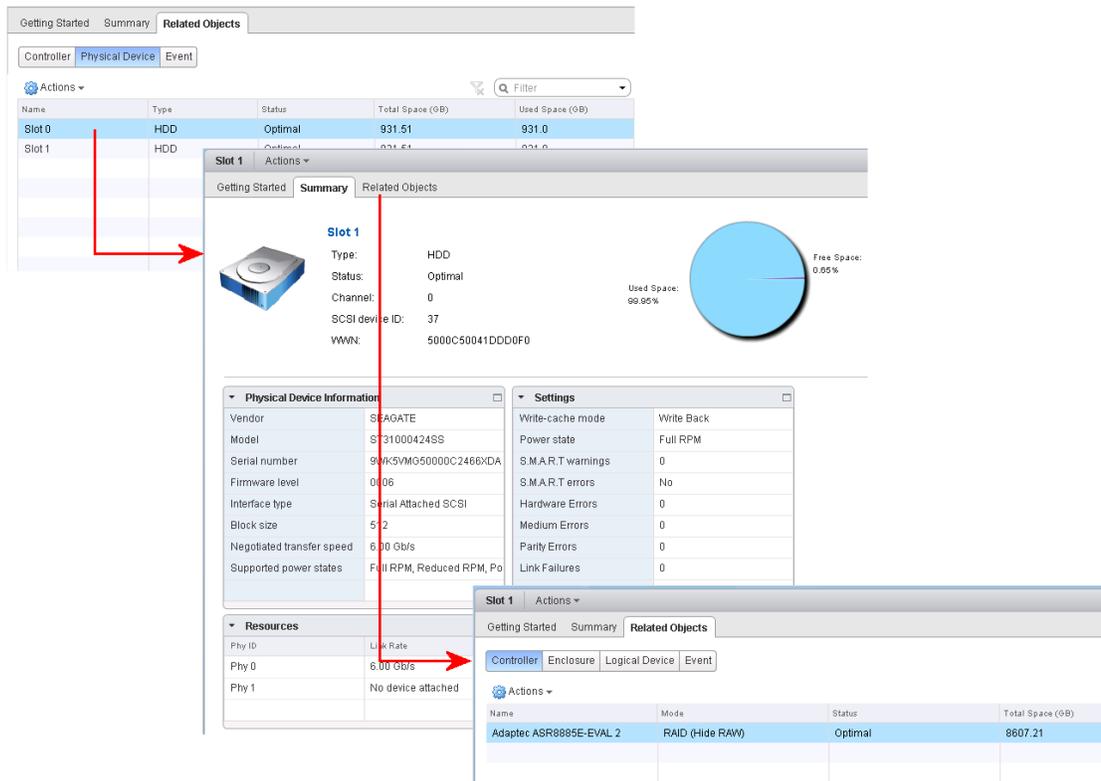
Getting Started Summary **Related Objects**

Controller Physical Device Event

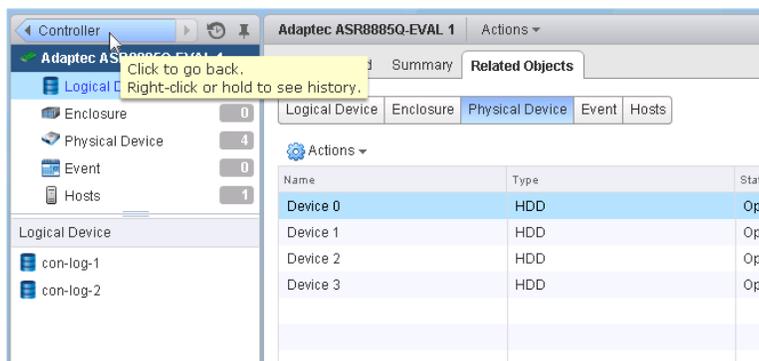
Actions Filter

Name	Type	Status	Total Space (GB)	Used Space (GB)
Slot 0	HDD	Optimal	931.51	931.0
Slot 1	HDD	Optimal	931.51	931.0

To drill down further, click on any item in the related objects table, below the button bar. For example, click on a physical device in the table shown below to view summary information for that device, its related objects, and so on.



When you're ready to monitor a different resource, click the resource category in the Navigation pane (on the left). Or click on the History window one or more times (in the upper-left corner of the vSphere client) to return to the vCenter top-level screen; then select a resource in the maxView tree.



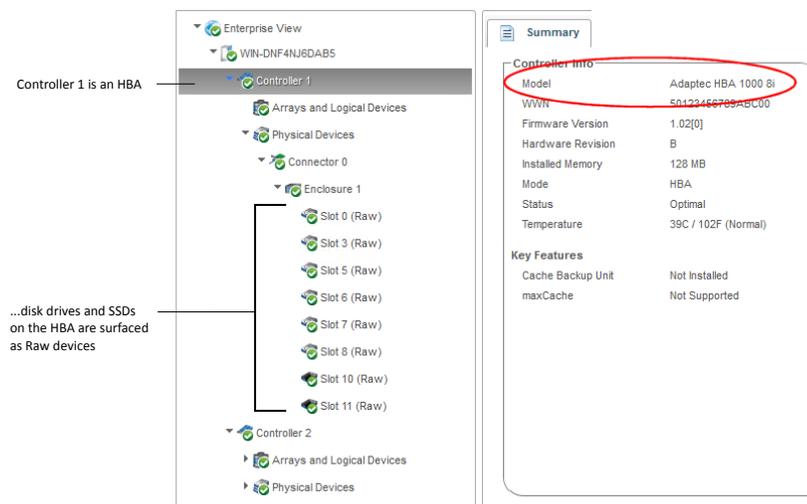
Once you return to the top-level screen or choose a resource in the Navigation pane, the procedure for viewing the resource summary and drilling down for more detail is identical for all maxView resources in your storage space.

For more information about the types of information provided on the summary screen and related objects screens for each maxView resource, see [Viewing Component Status in the Storage Dashboard](#) on page 103.

D Using maxView Storage Manager with HBAs and Non-RAID Mode Controllers

maxView Storage Manager allows you to manage storage resources on Microsemi Adaptec Host Bus Adapters (HBAs) and RAID controllers operating in HBA mode (see the *Microsemi Adaptec RAID Controllers Command Line Utility User's Guide* for details about changing the controller mode). In the Enterprise View, maxView Storage Manager displays HBAs and non-RAID mode controllers in the controller list. Drives on the HBA are surfaced to the OS as Raw devices; that is, storage devices without Microsemi Adaptec RAID meta-data.

Note: maxView Storage Manager identifies the drive as a Raw device even if it has an OS partition.



With HBAs and non-RAID mode controllers, maxView Storage Manager limits access to features that are not used to configure and maintain RAID volumes (see table below). For example, on the Ribbon, you can use the options in the Controller group to manage your controller, but not options in the Logical Device group (because HBAs don't support logical volumes); similarly, you can use options in the System group to upgrade the controller firmware, but not the Spare Management option in the Physical Devices group (because HBAs don't support spares); and so on.

Ribbon	Options for HBAs / Non-RAID Mode Controllers
System Group	Firmware Update
Controller Group	Rescan, Properties (non-RAID mode controllers only)
Logical Device Group	None
Physical Devices Group	Force Offline, Uninitialize
maxCache Group	None

Similar to its function for RAID controllers, the Storage Dashboard provides detailed information about the HBAs and non-RAID mode controllers in your storage space, including the enclosures, disk drives, and SSDs connected to them (for more information about the dashboard, see [Viewing Component Status in the Storage Dashboard](#) on page 103).

Tabs on the dashboard provide quick access to summary information, controller properties, resources, and the connector configuration. The Events tab shows filtered events for the device (see [Viewing Activity Status in the Event Log](#) on page 102).

The following table lists the categories and types of information provided on the Storage Dashboard for HBAs and connected devices.

Component	Categories	Examples
Controller	Summary Properties Resources Connectors	Model, WWN, key features, firmware version, controller mode, status, number and type of physical devices. Slot, driver version, bus type and speed, number of ports, settings (mostly disabled) Physical drive assignments by connector, including protocol, state, free and used space Connector name, number of devices, functional mode
Physical Devices (node)	Summary	Physical drive assignments by connector, including protocol, state, free and used space
Connector	Summary	Functional mode, number of devices
Enclosure	Summary	Enclosure type, vendor, model, ID, channel, firmware version, status Fan, power supply, and temperature status (see Monitoring Enclosure Status on page 105) Slot allocation and usage
Hard drives and SSDs	Summary Resources SMART	Drive type (hard drive, SSD), vendor, interface (SAS/SATA), and model Block size, total size, rotational speed Boot type Firmware version, WWN, transfer speed Free space, used space, reserved space SMART statistics (see Viewing SMART Statistics on page 105)

E 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.

Note: Not all RAID levels are supported by all controllers.

E.1 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.

E.2 Understanding Drive Segments

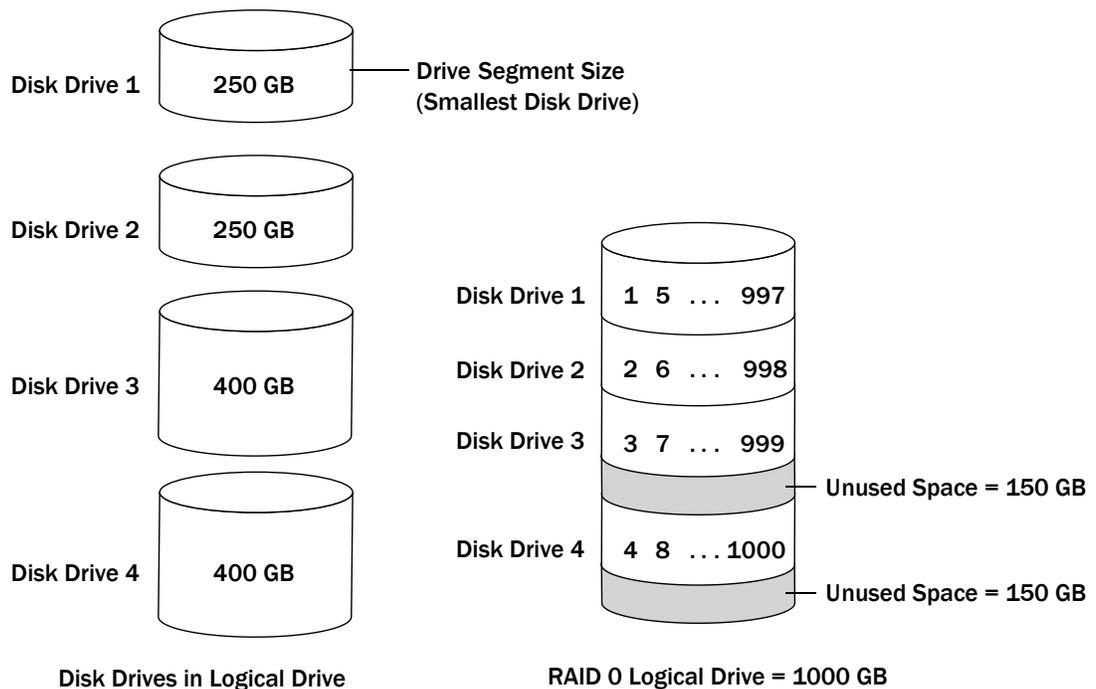
A *drive segment* is a disk drive or portion of a disk drive that is used to create a logical drive. A disk drive can include both *RAID segments* (segments that are part of a logical drive) and available segments. Each segment can be part of only one logical drive at a time. If a disk drive is not part of any logical drive, the entire disk is an available segment.

E.3 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.

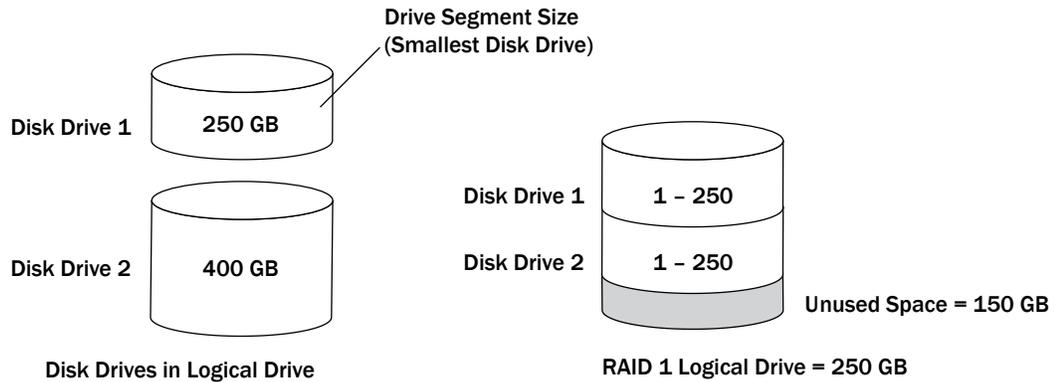
Drive segment size is limited to the size of the smallest disk drive in the logical drive. For instance, an array with two 250 GB disk drives and two 400 GB disk drives can create a RAID 0 drive segment of 250 GB, for a total of 1000 GB for the volume, as shown in this figure.



E.4 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 up to twice the read rate and an equal write rate of single disks. However, capacity is only 50 percent of independent disk drives.

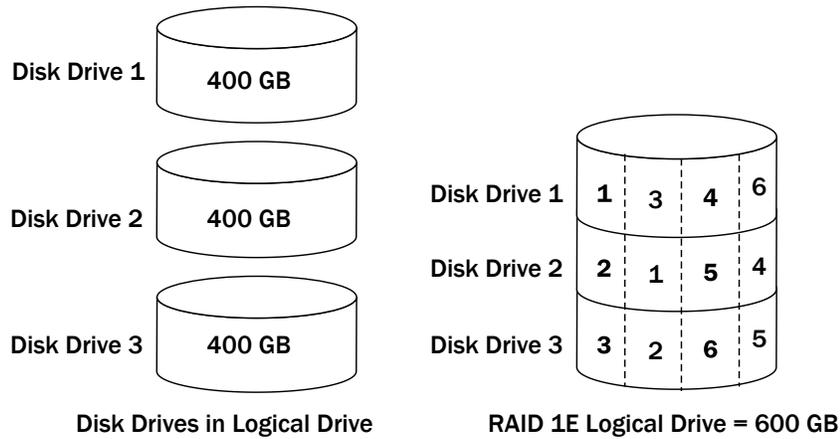
If the RAID 1 logical drive is built from different- sized disk drives, the free space, drive segment size is the size of the smaller disk drive, as shown in this figure.



E.5 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.

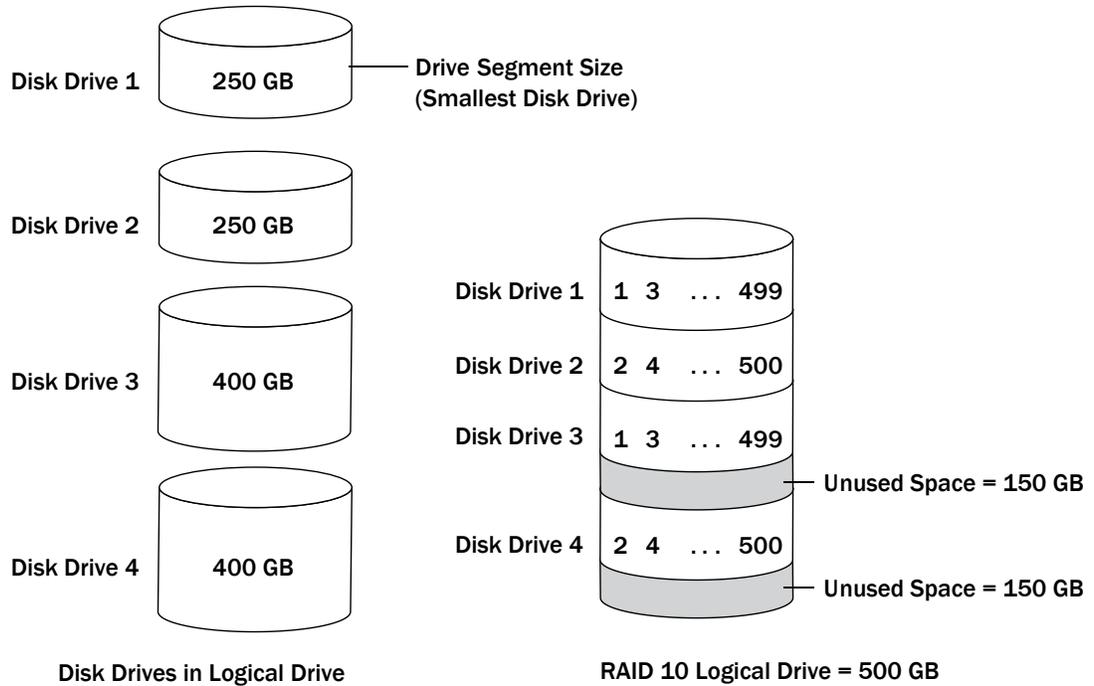
In this example, the large bold numbers represent the striped data, and the smaller, non-bold numbers represent the mirrored data stripes.



E.6 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.

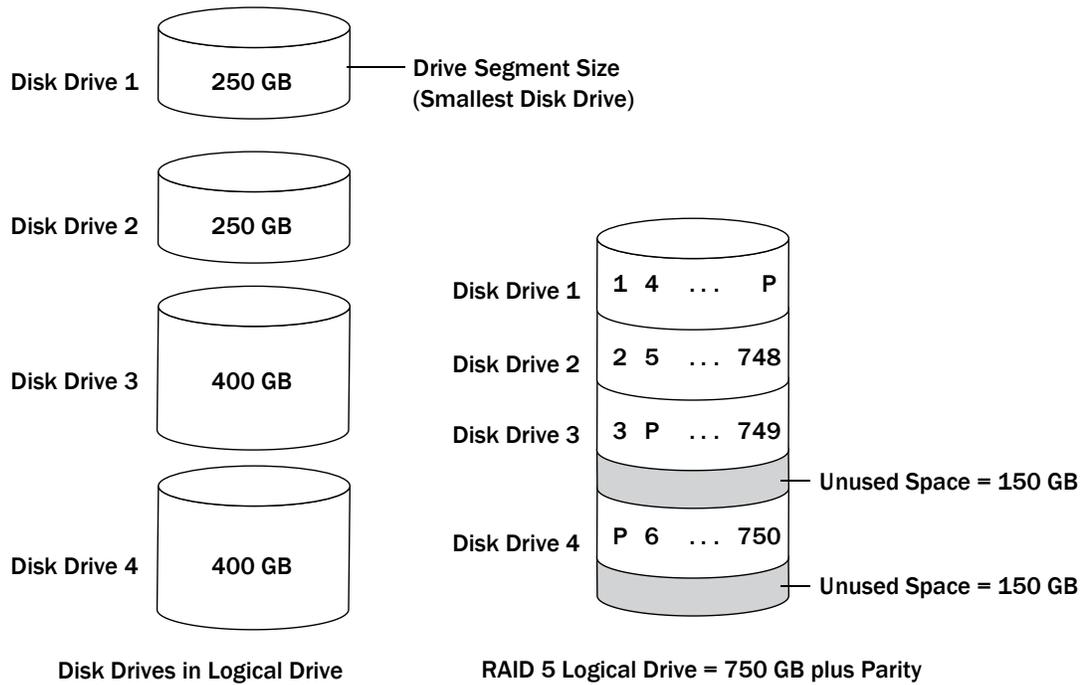


E.7 RAID 5 Logical Drives

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.



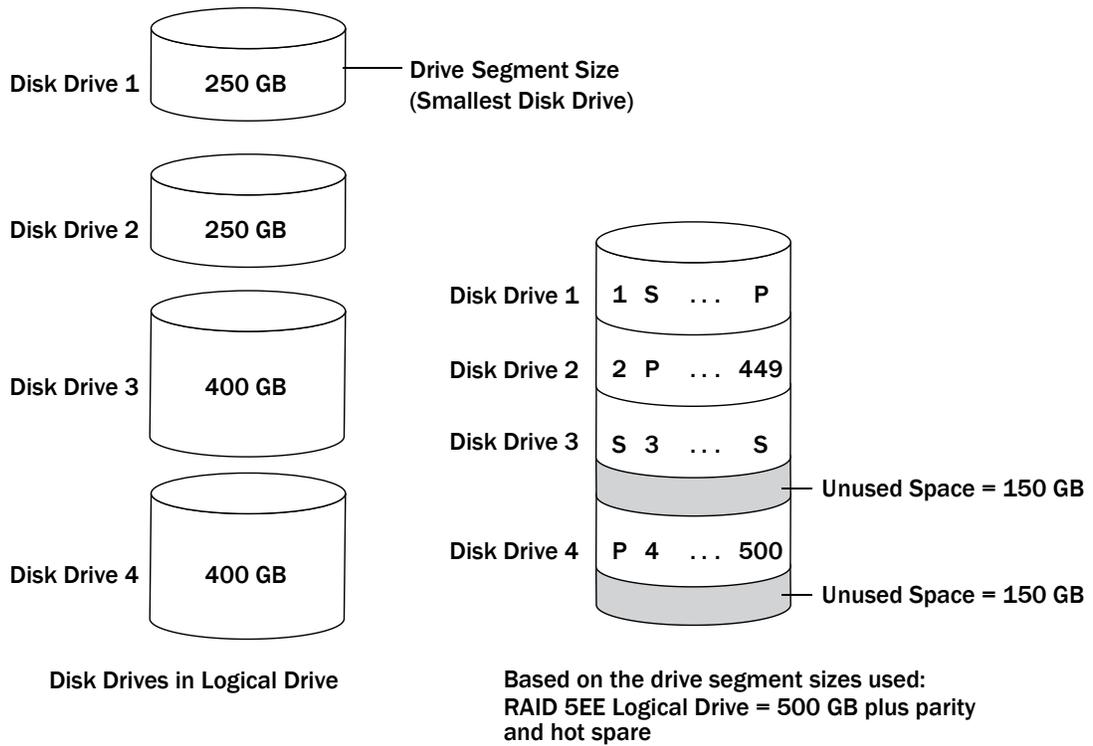
E.8 RAID 5EE Logical Drives

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.



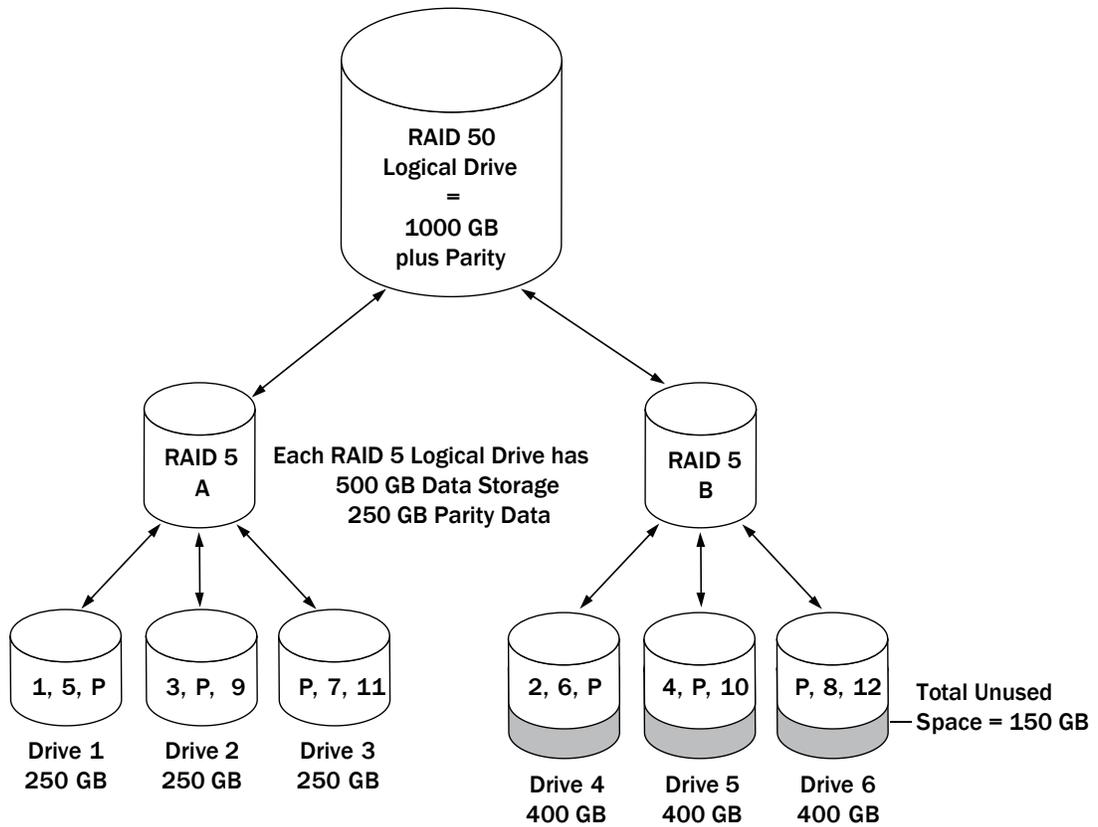
E.9 RAID 50 Logical Drive

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 147.)

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.

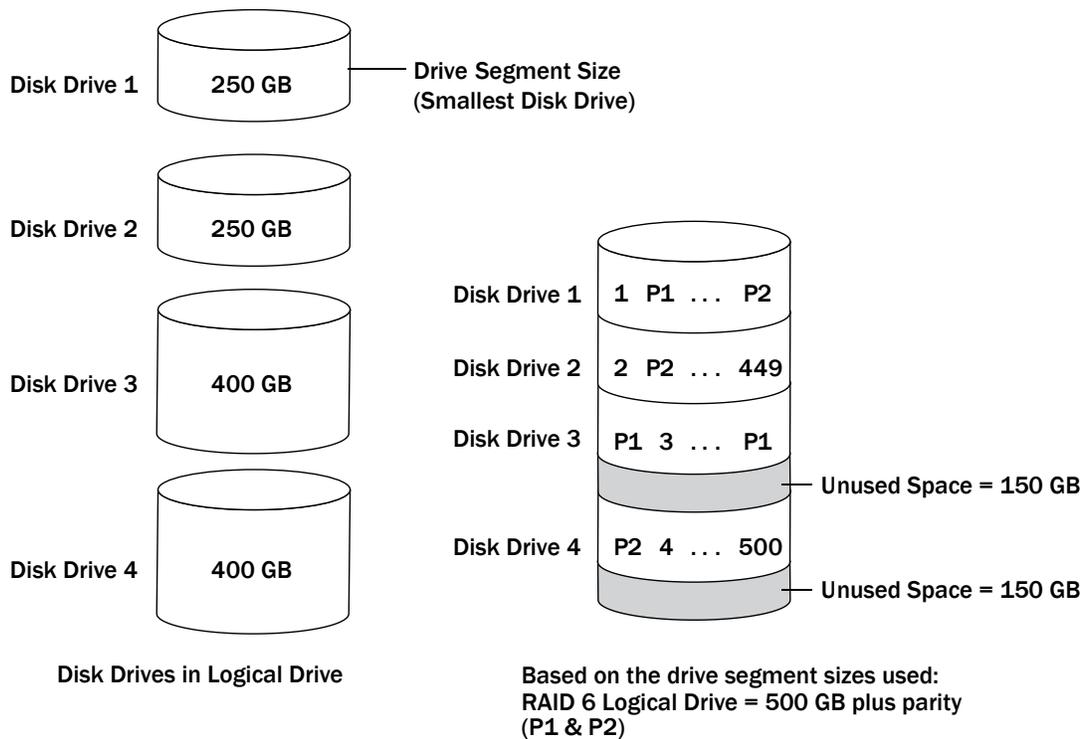


E.10 RAID 6 Logical Drives

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.



E.11 RAID 60 Logical Drives

Similar to a RAID 50 logical drive (see [RAID 50 Logical Drives](#) on page 149), 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.

F 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 31 for more information.

Ribbon Home Icons

Icon	Description
	Remote system add
	Remote system delete

Ribbon System Icons

Icon	Description
	System settings
	Manage configuration (save/restore)
	Firmware update
	Save archive file

Ribbon Controller Icons

Icon	Description
	Controller settings
	Manage configuration (clear)
	Controller rescan
	Silence alarm

Ribbon Logical Device Icons

Icon	Description
	Logical drive settings
	Logical drive create
	Logical drive expand/migrate

Icon	Description
	Logical drive verify
	Logical drive locate
	Logical drive delete
	Logical drive erase
	Logical drive force online

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 Device create
	maxCache Device set properties
	maxCache Device locate
	maxCache Device verify
	maxCache Device delete
	maxCache Device disable

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
	SMR 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

Icon	Description
	Physical disks OK
	Physical disks failure
	Physical disks missing
	Physical disks warning

Enterprise View MaxCache Device Icons

Icon	Description
	maxCache Device error
	maxCache Device missing
	maxCache Device OK
	maxCache Device warning

Tab Icons

Icon	Description
	Summary
	Properties
	Resources
	Events
	Task

Dialog Box Icons

Icon	Description
	E-mail notification
	Chart

Index

A

- activity in storage space
 - 34
 - event log 34
 - task log 34
- activity on storage space, See monitoring
- adapters, See controllers
- Add System wizard 120
- adding maxCache SSD caching
 - 72, 76
 - Series 6Q controllers 72, 76
- advanced settings 47, 73
- Agent
 - 16, 40–41
 - introduction 16, 40
 - starting
 - 41
 - Linux 41
 - Solaris 41
 - Windows 41
 - startup order 40
- alarm
 - 92
 - controllers
 - 92
 - disabling 92
 - disabling
 - 92
 - controller-level 92
 - systems
 - 92
 - silencing 92
- ARCCONF command line utility 14
- archive file 108, 129
- auto-discovery 119
- automatic verification 62

B

- background consistency check 63–64
- background verification 63
- boards, See controllers
- bootable USB image 17, 27
- build method
 - 47, 61, 127–128
 - Build 47, 61
 - Clear 47, 61
 - Quick 47, 61
 - Skip Initialization 61, 127–128

- building storage space
 - 15, 39, 43, 45, 48, 56, 72, 76
 - adding maxCache SSD caching 72, 76
 - custom configuration 43, 45
 - express configuration 43

C

- cache preservation 55
- cards, See controllers
- CIM server 16, 20
- command line utility
 - 14
 - ARCCONF 14
- components
 - 14, 82
 - defined 14
 - viewing properties 82
- Configuration Event Detail window 102
- configuring 43
 - See also building storage space
- configuring logical drives 43
- controller
 - 35, 104, 122
 - clearing configuration 122
 - controller cache preservation 55
- controllers
 - 82, 92–93, 95, 98
 - disabling alarm 92
 - properties 82
 - rescanning 92–93
 - updating firmware 95, 98
- copyback 53
- custom configuration 43, 45

D

- dedicated hot spares
 - 49–50, 52
 - creating 49–50
 - deleting 52
 - removing 52
- deleting all logical drives 67
- deleting logical drives 66
- deleting tasks 81
- direct attached storage
 - 13
 - defined 13

- disk drive
 - 95, 98
 - updating firmware 95, 98
- disk drive segments 143
- disk drives
 - 46, 53, 56–58, 61, 66, 82, 85–89, 95, 127–129
 - conceptual graphic 56
 - different sizes in same logical drive 56–57
 - failed state 85
 - failure recovery
 - 53, 61, 127–129
 - multiple disk drives 61, 127–129
 - multiple logical drives 127
 - RAID 0 logical drives 127–128
 - with hot spare 53, 127
 - without hot spare 127
 - identifying 82
 - initializing 86, 88
 - locating 82
 - properties 82
 - replacing in logical drives 85
 - secure erasing 89
 - segments in logical drives 57–58, 66
 - uninitializing 87
 - updating firmware 95
 - within logical drives 46
- drives
 - 82
 - identifying 82
 - locating 82
- E**
- email notifications
 - 101, 107, 109–111
 - "from" address 107
 - changing "from" address 107, 110–111
 - changing SMTP server 107, 110–111
 - disabling 107, 111
 - failed test emails 110
 - modifying recipient information 107, 110
 - recipient addresses 107
 - removing recipients 107, 110
 - setup 107
 - SMTP server settings 107
 - test emails 107, 109
- Email Notifications Manager
 - 101, 107, 109
 - opening 107
 - test emails 107, 109
- enclosure
 - 95, 99
 - updating firmware 95, 99
- enclosures
 - 35, 82, 104–105, 142
 - fan status 35, 104–105, 142
 - identifying 82
 - locating 82
 - monitoring 35, 104–105, 142
 - power status 35, 104–105, 142
 - status 35
 - temperature status 35, 104–105, 142
- Enterprise View
 - 31, 33
 - icons 33
- Error (task status) 79
- event log 34, 101
- event log (operating system) 114
- events 34
 - See also monitoring
- expander
 - 95, 99
 - updating firmware 95, 99
- expanding logical drives 58, 61, 64, 66
- express configuration
 - 43
 - RAID levels 43
- F**
- failed disk drives
 - 61, 127–128
 - multiple disk drives 61, 127–128
 - multiple logical drives 127
 - RAID 0 logical drives 127–128
 - without hot spare 127
- failed logical drive
 - 127, 129
 - force online 127, 129
- failover 54
- firmware 95, 98–99
- Firmware Update wizard 95
- force online 127, 129
- formatting logical drives 44, 48
- G**
- global hot spares
 - 49, 52
 - deleting 52
- Green Backup status 104
- H**
- hard disk
 - 14
 - hard disk drive 14

hard disk (*continued*)
 hard disk drive (*continued*)
 hard drive, See disk drive

help 36

hot spares

49, 49–50, 52, 56

 creating 49

 creating dedicated 49–50

 creating pool spare 49–50

 dedicated

49

 defined 49

 deleting 52

 global

49

 defined 49

 limitations 49–50

 removing 52

hybrid RAID 46, 57–58

I

icons

33, 102, 108

 Enterprise View 33

 event status icons 102, 108

identifying components 82

initialize method 61, 63

initializing disk drives

86, 88, 128

 skipping 128

L

Linux

41

 starting the Agent 41

local systems 39

locating drives 82

logging in 30, 39–40

logging into remote systems 42

logging out 37

logical drives

39, 43–48, 56, 56–67, 73, 85, 127, 129,
143–150

 advanced settings 47, 73

 automatic verification 62

 background consistency check 63

 background verification 63

 build method 47, 61

 building

43

 basic 43

 changing RAID levels 61, 65

 custom configuration 43, 45

logical drives (*continued*)

 defined 56

 deleting 66–67

 different-sized disk drives 56–57

 disabling background consistency check 63–64

 disk drive segments 57–58, 66, 143

 enabling background consistency check 63–64

 expanding 58, 61, 64, 66

 fine-tuning 47, 59, 73

 formatting 44, 48

 hot-swap rebuilding 85, 129

 hybrid RAID 46, 57–58

 increasing capacity 58, 61, 64, 66

 initialize methods 61, 63

 manual verification 63

 maximum size 64

 non-redundant 144

 partitioning 44, 48

 RAID 1 144

 RAID 10 146

 RAID 1E 145

 RAID 5 147

 RAID 50 149

 RAID 5EE 148

 RAID 6 150

 RAID 60 150

 RAID segments 143

 read cache 60

 rebuilding 127

 remove disk drive or segment 64–65

 renaming 59

 replace disk drive or segment 64–65

 replacing disk drives 85

 selecting disk drives 46

 selecting RAID levels 45

 stripe size 61

 verifying 62

 verifying and fixing 61, 63, 129

 write cache setting 60

M

main window

31, 37, 82, 101–103, 108, 140–141, 151

 event details 102

 event log 101

 Logout button 37

 monitoring activity and status 101

 notification types

101–102, 108

 event log 101

 event status icons 102, 108

 overview 31, 151

 status icons 102, 108

- main window (*continued*)
 - Storage Dashboard [82](#), [101–103](#), [140–141](#)
 - task details [103](#)
- manual verification [63](#)
- maxCache
 - [72](#), [76](#), [113](#)
 - cache hits and misses [113](#)
 - with Series 6Q controllers [72](#), [76](#)
 - write caching [72](#)
- maxCache Device
 - [72](#), [74–76](#)
 - coherency check [75](#)
 - creating [72](#), [76](#)
 - deleting [76](#)
 - Flush and Fetch rate [74](#)
 - selecting a RAID level [72](#)
 - selecting SSDs [72](#)
 - verifying and fixing [75](#)
- maxCache statistics [77](#), [112–113](#)
- maxView Storage Manager
 - [15–17](#), [22](#), [31](#), [33](#), [40](#), [42](#), [101](#), [151](#)
 - Agent [16](#), [40](#)
 - beginning steps [15](#)
 - Enterprise View [31](#)
 - event log [101](#)
 - icons [33](#)
 - introduction [15](#), [40](#)
 - logging into remote systems [42](#)
 - main window overview [31](#), [151](#)
 - maxCache devices [31](#)
 - ribbon [33](#)
 - Ribbon [31](#)
 - system requirements [17](#), [22](#)
- modifying tasks [80](#)
- monitoring
 - [34](#), [79](#), [82](#), [101](#), [101–103](#), [107–111](#), [115](#), [140–141](#)
 - device properties [82](#)
 - email notifications
 - [101](#), [107](#), [109–111](#)
 - "from" address [107](#)
 - changing "from" address [107](#), [110–111](#)
 - changing SMTP server [107](#), [110–111](#)
 - failed test emails [110](#)
 - modifying recipient information [107](#), [110](#)
 - recipient addresses [107](#)
 - removing recipients [107](#), [110](#)
 - setup [107](#)
 - SMTP server settings [107](#)
 - test emails [107](#), [109](#)
 - Email Notifications Manager [101](#), [107](#)
 - event details [102](#)
 - event log [34](#), [101](#)
 - options [101](#)

- monitoring (*continued*)
 - SNMP traps [111](#)
 - status icons [102](#), [108](#)
 - Storage Dashboard [82](#), [101–103](#), [140–141](#)
 - task details [103](#)
 - task log [34](#)
 - tasks [79](#)
- monitoring tasks [79](#)

N

- Native Command Queuing [93](#)
- NCQ [93](#)
- non-RAID Mode controllers [141–142](#)
- non-redundant logical drives [144](#)
- notification types
 - [101](#), [107](#), [111](#)
 - email notifications [101](#), [107](#)
 - SNMP traps [111](#)

O

- online help [36](#)
- operating system event log [114](#)
- operating systems [17](#)

P

- partitioning logical drives [44](#), [48](#)
- PHY link rate [94](#)
- physical drives
 - [89](#)
 - verifying and fixing [89](#)
- pool hot spares [49–50](#)
- power management
 - [68–70](#)
 - disabling [70](#)
 - stay awake period [69](#)
 - timers [68](#)
- Properties tab [82](#)
- pure HBAs [141–142](#)

R

- RAID
 - [61](#), [144–150](#)
 - non-redundant logical drives [144](#)
 - RAID 0 [144](#)
 - RAID 1 [144](#)
 - RAID 10 [146](#)
 - RAID 1E [145](#)
 - RAID 5 [147](#)
 - RAID 50 [149](#)
 - RAID 5EE [148](#)

- RAID (*continued*)
 - RAID 6
 - [61, 150](#)
 - stripe size [61](#)
 - RAID 60
 - [61, 150](#)
 - stripe size [61](#)
 - RAID levels
 - [43, 45, 61, 65](#)
 - changing [61, 65](#)
 - custom configuration [45](#)
 - express configuration [43](#)
 - selecting [45](#)
 - RAID segments [143](#)
 - RAW drive [87](#)
 - RAW state [87](#)
 - read cache [60](#)
 - rebuilding (defined) [127](#)
 - rebuilding logical drives [85, 129](#)
 - recurring tasks [78](#)
 - remote systems
 - [39, 120](#)
 - adding manually [120](#)
 - removing [120](#)
 - renaming logical drives [59](#)
 - rescanning controllers [92–93](#)
 - Resources View [35, 104](#)
 - ribbon
 - [33, 42, 59–60, 64–65, 90–91, 93, 129](#)
 - Add system [42](#)
 - Change logical device name [59](#)
 - Configure disk drive cache [91](#)
 - Configure global disk drive cache [90](#)
 - Configure read cache [60](#)
 - Expand or change logical device [64–65](#)
 - overview [33](#)
 - Rescan [93](#)
 - Save support archive [129](#)
- S**
- Scheduled (task status) [79](#)
- scheduling tasks
 - [63, 78, 80](#)
 - rescheduling [80](#)
 - supported tasks
 - [63](#)
 - verifying with fix [63](#)
 - tasks you can schedule [78](#)
- secure erase [89](#)
- segments [56, 143](#)
- Selectable performance modes [61](#)
- Self-Monitoring Analysis and Reporting Technology (SMART) [106](#)
- Server Template File [116](#)
- Shingled Magnetic Recording device [43](#)
- silencing alarm
 - [92](#)
 - system-level [92](#)
- silent installation
 - [131–132](#)
 - switches, properties, and values [131–132](#)
- Skip Initialization method [128](#)
- SMART statistics [106](#)
- SMI-S provider [16, 20](#)
- SMR drive
 - [43](#)
 - Device Managed (SMR DM) [43](#)
 - Host Aware (SMR HA) [43](#)
 - Host Managed (SMR HM) [43](#)
 - Perpendicular Magnetic Recording device (PMR) [43](#)
- SMTP server [107, 110–111](#)
- SNMP traps [111](#)
- Solaris
 - [41](#)
 - starting the Agent [41](#)
- spares, See hot spares
- statistics counters
 - [114](#)
 - resetting [114](#)
- statistics logging
 - [77, 112–114](#)
 - counters [114](#)
 - enabling [112](#)
 - viewing [77, 112–113](#)
- Statistics Viewer [77, 112–113](#)
- status [34–35](#)
 - See also monitoring
 - enclosures [35](#)
 - event log [34](#)
 - task log [34](#)
 - See also monitoring
- status icons
 - [102, 108](#)
 - main window [102, 108](#)
- Storage Dashboard [82, 101–103, 140–141](#)
- storage space
 - [14, 18](#)
 - examples [18](#)
- stripe size
 - [61](#)
 - changing [61](#)
- support archive file [108, 129](#)
- system requirements [17, 22](#)
- systems
 - [39, 82](#)
 - local systems [39](#)
 - properties [82](#)
 - remote systems [39](#)

T

task log [34](#)

tasks

[78–81](#)

deleting [81](#)

missed start times [80](#)

modifying [80](#)

monitoring [79](#)

recurring [78](#)

scheduling [78](#)

temperature status [35](#), [104–105](#), [142](#)

terminology [14](#)

U

uninitializing disk drives [87–88](#)

updating firmware [95](#), [98–99](#)

V

verifying and fixing logical drives [61](#), [63](#), [129](#)

verifying and fixing physical drives [89](#)

verifying logical drives

[62–63](#)

automatic verification [62](#)

background verification [63](#)

manual verification [63](#)

W

Windows

[41](#)

starting the Agent [41](#)

write cache [60](#)

write-back [60](#)

write-through [60](#)