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.
## Revision History

<table>
<thead>
<tr>
<th>Issue</th>
<th>Issue Date</th>
<th>Details of Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>December 2015</td>
<td>First Production release. maxView Storage Manager v2.00</td>
</tr>
<tr>
<td>2</td>
<td>April 2016</td>
<td>V1.1.0 Maintenance Release. maxView Storage Manager v2.01</td>
</tr>
<tr>
<td>3</td>
<td>September 2016</td>
<td>V1.2.0 Maintenance Release. maxView Storage Manager v2.02</td>
</tr>
</tbody>
</table>
Contents

Microsemi Adaptec® Product Support........................................................................................................... 8
Software License Agreement........................................................................................................................... 9

1 About this Guide........................................................................................................................................... 12
   1.1 What You Need to Know Before You Begin ......................................................................................... 12
   1.2 Terminology Used in this Guide ........................................................................................................... 12
   1.3 How to Find More Information ............................................................................................................ 13

2 Introduction to maxView Storage Manager............................................................................................... 14
   2.1 Getting Started .................................................................................................................................... 14
   2.2 About maxView Storage Manager ......................................................................................................... 14
      2.2.1 About the maxView Storage Manager Agent .................................................................................. 15
      2.2.2 About the maxView Storage Manager Web Server ....................................................................... 15
      2.2.3 About the maxView Storage Manager CIM Server ...................................................................... 15
   2.3 System Requirements ............................................................................................................................ 16
   2.4 Browser Support ................................................................................................................................... 16

3 Installing maxView Storage Manager ........................................................................................................ 19
   3.1 Before You Begin the Installation .......................................................................................................... 19
      3.1.1 Gather Installation Information ....................................................................................................... 19
      3.1.2 Download the Installation Package .................................................................................................. 19
   3.2 Installing on Windows ............................................................................................................................ 20
   3.3 Installing on Red Hat, CentOS, or SuSE Linux ....................................................................................... 21
   3.4 Installing on Ubuntu Linux .................................................................................................................... 21
   3.5 Installing on a Hypervisor ....................................................................................................................... 22
      3.5.1 Installing on VMware ........................................................................................................................ 22
      3.5.2 Installing on Citrix XenServer .......................................................................................................... 23
      3.5.3 Installing on Microsoft Hyper-V ..................................................................................................... 23
   3.6 Installing on a Guest Operating System .................................................................................................. 23
      3.6.1 Installing on a Windows Guest OS - VMware/XenServer ........................................................... 23
      3.6.2 Installing on a Windows Guest OS - Hyper-V ............................................................................. 25
      3.6.3 Installing on a Linux Guest OS - VMware/XenServer ................................................................... 25
      3.6.4 Installing on a Linux Guest OS - Hyper-V ................................................................................... 25
   3.7 Running maxView Storage Manager from a Bootable USB Image ....................................................... 26
   3.8 Uninstalling maxView Storage Manager ............................................................................................... 27
      3.8.1 Uninstalling from Windows ............................................................................................................. 27
      3.8.2 Uninstalling from Red Hat, CentOS, or SuSE Linux ....................................................................... 27
      3.8.3 Uninstalling from Ubuntu Linux ...................................................................................................... 27
      3.8.4 Uninstalling from VMware ............................................................................................................. 27

4 Exploring maxView Storage Manager ........................................................................................................ 28
   4.1 Starting maxView Storage Manager and Logging In ........................................................................... 28
   4.2 Working in maxView Storage Manager ............................................................................................... 28
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.3</td>
<td>Overview of the Main Window</td>
<td>29</td>
</tr>
<tr>
<td>4.3.1</td>
<td>The Enterprise View</td>
<td>29</td>
</tr>
<tr>
<td>4.3.1.1</td>
<td>What do the Enterprise View Icons Mean?</td>
<td>31</td>
</tr>
<tr>
<td>4.3.2</td>
<td>The Ribbon</td>
<td>31</td>
</tr>
<tr>
<td>4.3.3</td>
<td>The Storage Dashboard</td>
<td>32</td>
</tr>
<tr>
<td>4.4</td>
<td>Checking System Status from the Main Window</td>
<td>32</td>
</tr>
<tr>
<td>4.5</td>
<td>Revealing More Device Information</td>
<td>33</td>
</tr>
<tr>
<td>4.6</td>
<td>Getting Help</td>
<td>34</td>
</tr>
<tr>
<td>4.7</td>
<td>Logging Out of maxView Storage Manager</td>
<td>35</td>
</tr>
<tr>
<td>5</td>
<td>Building Your Storage Space</td>
<td>36</td>
</tr>
<tr>
<td>5.1</td>
<td>Overview</td>
<td>36</td>
</tr>
<tr>
<td>5.2</td>
<td>Choosing a Management System</td>
<td>36</td>
</tr>
<tr>
<td>5.2.1</td>
<td>‘Local’ or ‘Remote’?</td>
<td>36</td>
</tr>
<tr>
<td>5.2.2</td>
<td>Logging in on the Local System</td>
<td>37</td>
</tr>
<tr>
<td>5.3</td>
<td>Starting maxView Storage Manager on Remote Systems</td>
<td>37</td>
</tr>
<tr>
<td>5.3.1</td>
<td>Starting the Agent Only</td>
<td>37</td>
</tr>
<tr>
<td>5.3.1.1</td>
<td>Windows</td>
<td>38</td>
</tr>
<tr>
<td>5.3.1.2</td>
<td>Linux or VMware</td>
<td>38</td>
</tr>
<tr>
<td>5.4</td>
<td>Logging into Remote Systems from the Local System</td>
<td>38</td>
</tr>
<tr>
<td>5.5</td>
<td>Creating Arrays and Logical Drives</td>
<td>39</td>
</tr>
<tr>
<td>5.5.1</td>
<td>Creating a Logical Drive on a New Array</td>
<td>39</td>
</tr>
<tr>
<td>5.5.2</td>
<td>Creating a Logical Drive on an Existing Array</td>
<td>43</td>
</tr>
<tr>
<td>5.5.3</td>
<td>Partitioning and Formatting Your Logical Drives</td>
<td>46</td>
</tr>
<tr>
<td>5.5.4</td>
<td>Creating Logical Drives on Other Systems in Your Storage Space</td>
<td>46</td>
</tr>
<tr>
<td>6</td>
<td>Protecting Your Data</td>
<td>48</td>
</tr>
<tr>
<td>6.1</td>
<td>Dedicated Spare or Auto-Replace Spare?</td>
<td>48</td>
</tr>
<tr>
<td>6.2</td>
<td>Hot Spare Limitations</td>
<td>48</td>
</tr>
<tr>
<td>6.3</td>
<td>Assigning a Dedicated Hot Spare</td>
<td>48</td>
</tr>
<tr>
<td>6.4</td>
<td>Assigning an Auto-Replace Hot Spare</td>
<td>50</td>
</tr>
<tr>
<td>6.5</td>
<td>Removing a Hot Spare</td>
<td>52</td>
</tr>
<tr>
<td>6.6</td>
<td>Setting the Spare Activation Mode</td>
<td>54</td>
</tr>
<tr>
<td>7</td>
<td>Modifying Your Storage Space</td>
<td>56</td>
</tr>
<tr>
<td>7.1</td>
<td>Understanding Arrays and Logical Drives</td>
<td>56</td>
</tr>
<tr>
<td>7.2</td>
<td>Creating and Modifying Logical Drives</td>
<td>56</td>
</tr>
<tr>
<td>7.2.1</td>
<td>Including Different-sized Disk Drives in a Logical Drive</td>
<td>57</td>
</tr>
<tr>
<td>7.2.2</td>
<td>Creating a Logical Drive Using Available Segments</td>
<td>58</td>
</tr>
<tr>
<td>7.3</td>
<td>Enabling Background Consistency Check</td>
<td>58</td>
</tr>
<tr>
<td>7.4</td>
<td>Moving a Logical Drive</td>
<td>59</td>
</tr>
<tr>
<td>7.5</td>
<td>Moving an Array</td>
<td>61</td>
</tr>
<tr>
<td>7.6</td>
<td>Working with Mirrored Arrays</td>
<td>62</td>
</tr>
<tr>
<td>7.6.1</td>
<td>Creating a Split Mirror Backup</td>
<td>63</td>
</tr>
<tr>
<td>7.6.2</td>
<td>Re-mirroring, Rolling Back, or Reactivating a Split Mirror Backup</td>
<td>63</td>
</tr>
<tr>
<td>7.7</td>
<td>Healing an Array</td>
<td>64</td>
</tr>
<tr>
<td>7.8</td>
<td>Changing the Logical Drive Rebuild Priority</td>
<td>65</td>
</tr>
<tr>
<td>7.9</td>
<td>Renaming a Logical Drive</td>
<td>66</td>
</tr>
<tr>
<td>7.10</td>
<td>Deleting an Array or Logical Drive</td>
<td>67</td>
</tr>
<tr>
<td>8</td>
<td>Maintaining Physical Devices</td>
<td>68</td>
</tr>
<tr>
<td>8.1</td>
<td>Viewing Device Properties</td>
<td>68</td>
</tr>
<tr>
<td>8.2</td>
<td>Locating Drives in Your Storage Space</td>
<td>68</td>
</tr>
<tr>
<td>8.2.1</td>
<td>Locating Disk Drives</td>
<td>69</td>
</tr>
</tbody>
</table>
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

- 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

- 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
maxView Storage Manager™ is a browser-based software application that helps you build a storage space using Microsemi Adaptec Smart-family controllers, disk drives, and enclosures, and then manage your stored data, whether you have a single 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 Smart-family controllers (RAID/HBA). For information about using maxView Storage Manager with Microsemi Adaptec legacy RAID controllers (Series 6/7/8), see How to Find More Information on page 13.

### 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 Smart-family controllers (RAID/HBA), 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).

### 1.2 Terminology Used in this Guide

Because this guide provides information that can be used to manage multiple Microsemi Adaptec Smart-family controllers 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)
- Array (also known as a logical device)
- 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 Smart-family controller, management software, and utilities by referring to these documents, available for download at www.pmcs.com/myPMC:

- SmartIOC 2000 Installation and User’s Guide—Describes how to install drivers and configure the SmartIOC 2000 controller for initial use (PMC-2152189).
- SmartIOC 2000 Command Line Utility User’s Guide—Describes how to use the ARCCONF utility to perform RAID configuration and storage management tasks from an interactive command line (PMC-2152175).
- SmartIOC 2000 Smart Storage Administrator User Guide—Describes how to use the PMCSSA CLI and GUI toolsets for configuration, management, monitoring, and diagnosing of SmartIOC 2000 controllers. (ESC-2160449).
- SmartIOC 2000 Software/Firmware Release Notes—Provides driver, firmware, and release package information, and known issues (PMC-2152108).
- README: maxView Storage Manager & ARCCONF Command Line Utility—Provides product information, installation notes, and known issues for maxView Storage Manager and ARCCONF command line utility.

For information about using maxView Storage Manager with Microsemi Adaptec legacy RAID controllers (Series 6/7/8), see the maxView Storage Manager User’s Guide for Microsemi ARC-Family Controllers (CDP-00285-06-A).
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 19).

Step 3: Start maxView Storage Manager and explore its graphical user interface (see Exploring maxView Storage Manager on page 28).

Step 4: Build your storage space (see Building Your Storage Space on page 36).

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 arrays and 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 16). 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 37).

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:
  - Red Hat® Enterprise Linux
  - SuSE Linux Enterprise Server
  - Ubuntu Linux
  - CentOS
  - Hypervisors:
    - VMware vSphere, VMware ESXi
    - Citrix XenServer
    - Microsoft Hyper-V

See the *Release Notes* for a complete 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](#) 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 109.

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 112.

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 15.
- 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 15.

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 27 for details.

3.1.2 Download the Installation Package

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

1. Open a browser window, then type www.pmcs.com/myPMC in the address bar.
2. Enter your myPMC account credentials.
3. Navigate to the HBA 1000, SmartIOC 2000, PM8068 or PM8069 product page.
4. Download the maxView Storage Manager installation package (zip file archive).
5. When the download completes, extract the package contents to a temporary location on your machine.

Note: See the Release Notes for a complete list of installer packages for the supported operating systems.
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 Download the Installation Package on page 19 for details).

2. Double-click the setup program for your operating system version:

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows 64-bit</td>
<td>setup_asm_x64.exe</td>
</tr>
</tbody>
</table>

   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, or SuSE Linux

This section describes how to install maxView Storage Manager on systems running Red Hat Linux, CentOS, or SuSE Linux. For a list of supported Linux operating systems, see System Requirements.

1. Open a shell window, then change to the directory where the Linux installer package is located (see Download the Installation Package on page 19 for details).

2. Run the `.bin` file for your operating system version (x.xx-xxxxx=version-build number):

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

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 Ubuntu Linux

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

1. Open a shell window, then change to the directory where the Linux installer package is located (see Download the Installation Package on page 19 for details).

2. Install the `.deb` package for your operating system version (x.xx-xxxxx=version-build number).
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 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 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 23.

3.5.1 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.

1. Copy the following files from the installer download location to the /tmp directory on your local ESXi server (see Download the Installation Package on page 19 for details):
   - vmware-esx-provider-arcconf.vib
   - vmware-esx-provider-arc-cim-provider.vib
   The arcconf.vib is for command line communication.
   The arc-cim-provider.vib is for remote management communication.

2. Check for existing installation of arcconf.
   esxcli software vib list | grep arcconf

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.

### 3.5.2 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 Download the Installation Package on page 19 for details).
2. Install the rpm package for your operating system version (x.xx-xxxxx=version-build number).
   
<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>XenServer 64-bit</td>
<td>rpm -i StorMan-X.XX-XXXXX.x86_64.rpm</td>
</tr>
</tbody>
</table>

### 3.5.3 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 Download the Installation Package on page 19 for details).
2. Double-click the setup program for your operating system version:
   
<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyper-V 64-bit</td>
<td>Setup_maxView_Hyper-v_Agent_x64.exe</td>
</tr>
<tr>
<td></td>
<td>The Installation wizard opens.</td>
</tr>
</tbody>
</table>
3. Click Next to begin the installation, click I accept the terms of the license..., then click Next.
4. In the Configuration Settings screen, 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 23.

### 3.6 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.

#### 3.6.1 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 Download the Installation Package on page 19 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**.
3.6.2 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 Download the Installation Package on page 19 for details).
2. Double-click the setup program for your operating system:

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows GOS 64-bit</td>
<td>Setup_maxView_Hyper-V_GUI_x64.exe</td>
</tr>
<tr>
<td>Windows GOS 32-bit</td>
<td>Setup_maxView_Hyper-V_GUI_x86.exe</td>
</tr>
</tbody>
</table>

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.

3.6.3 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 Download the Installation Package on page 19 for details).
2. Run the installer for your operating system version (x.xx=version number):

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linux GOS 64-bit</td>
<td>./Storman-X.XX.GOS86_64.bin</td>
</tr>
</tbody>
</table>

3. At the prompt, choose the GOS type. Enter 1 for ESXi, 2 for XenServer:
   Select the GOS Type. 1.ESXi Server 2.XenServer:
4. 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.

3.6.4 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.

1. On the Hyper-V guest OS, change to the directory where the Linux guest OS installer is located (see Download the Installation Package on page 19 for details).
2. Run the installer for your operating system version (<xxxx>=version number):
3. When the installation is complete you receive a confirmation message.

3.7 Running maxView Storage Manager from a Bootable USB Image

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

1. Download the bootable USB image from the myPMC customer portal
2. Create a "live" image on a USB flash drive
   - Note: We recommend using LiveUSB Creator, available at fedorahosted.org (see Step [2], below).
3. Boot from the USB flash drive, login to maxView Storage Manager and configure your controller

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

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

To run maxView Storage Manager from a bootable USB image:

1. Download the bootable USB image from the myPMC customer portal:
   a) Open a browser window, then type www.pmcs.com/myPMC in the address bar.
   b) Enter your myPMC account credentials.
   c) Navigate to the HBA 1000, SmartIOC 2000, PM8068 or PM8069 product page.
   d) Locate and download the bootable USB image (zip file archive).
   e) 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/1/1/liveusb-creator/liveusb-creator- 3.11.8-setup.exe.
   b) Start LiveUSB Creator from the Windows All Programs menu.
   c) In the Use Existing Live CD field, click Browse, then locate and select the maxView Storage Manager bootable iso image.
   d) In the Target Device field, select the USB flash drive (e:\, for instance).
   e) Click Create Live USB.

3. Insert the USB drive on the machine you want to configure.
   The Boot menu opens in a shell window.

4. Select Launch maxView from the menu.
   After a minute or so, the maxView Storage Manager login screen opens in a browser window.
   - Note: If you prefer to configure the controller from the command line, select Launch arcconf from the Boot menu, then enter root, with no password, for the login credentials.

5. Enter root/root for the login credentials.
6. Continue with Creating Arrays and Logical Drives on page 39.

3.8 Uninstalling maxView Storage Manager

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

3.8.1 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.

3.8.2 Uninstalling from Red Hat, CentOS, or SuSE Linux

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

3.8.3 Uninstalling from Ubuntu Linux

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

3.8.4 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:
   ```bash
   esxcli software vib list | grep arcconf
   esxcli software vib list | grep arc-cim-provider
   ```
3. Remove the arcconf package:
   ```bash
   esxcli software vib remove -n arcconf
   ```
4. Remove the arc-cim-provider package:
   ```bash
   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 28 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.

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.

   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.

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 104.
### Standard users can:

- Rescan controllers
- Save activity logs
- Identify physical devices, logical devices, and enclosures
- Silence alarms
- View component properties on the Storage Dashboard

### Standard users can’t:

- Create arrays and logical drives
- Modify arrays and logical drives
- Delete arrays and logical drives
- Perform data migrations
- 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.

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 36 for more information.)
Expand a system in the Enterprise View to see its controllers, arrays, logical drives ("devices"), physical drives, and enclosures.

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

By selecting a controller in the Enterprise View...

...the disk drives or enclosures and disk drives connected to it and the arrays and logical drives created with those disk drives appear in the Physical and Logical Devices trees.
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?

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="System icon" /></td>
<td>System with controller and directly attached disk drives or enclosures</td>
</tr>
<tr>
<td><img src="image" alt="Controller icon" /></td>
<td>Controller</td>
</tr>
<tr>
<td><img src="image" alt="Enclosure icon" /></td>
<td>Enclosure</td>
</tr>
<tr>
<td><img src="image" alt="Logical device icon" /></td>
<td>Logical device</td>
</tr>
<tr>
<td><img src="image" alt="Array icon" /></td>
<td>Array (healthy)¹</td>
</tr>
<tr>
<td><img src="image" alt="Hard disk drive icon" /></td>
<td>Hard disk drive</td>
</tr>
<tr>
<td><img src="image" alt="Solid State Drive (SSD) icon" /></td>
<td>Solid State Drive (SSD)</td>
</tr>
<tr>
<td><img src="image" alt="Connector or other physical device icon" /></td>
<td>Connector or other physical device</td>
</tr>
</tbody>
</table>

### 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, Arrays, Logical Devices, Physical Devices, and maxCache Devices². The Home group (on the left) provides commands for working with remote systems (see Managing Remote Systems on page 98). 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 in the Logical Device group
- Spare Management in the Physical Device group
- All options in the Controller group

If you select an array in the Enterprise View, options in the Array group are highlighted; selecting a disk drive highlights options in the Physical Device group; and so on.

For a description of the icons on the ribbon, see Icons At-a-Glance on page 127.

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 105.

² Supported on Microsemi Adaptec legacy RAID controllers only.
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 85; also see Revealing More Device Information.

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 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 83 and Working with Scheduled Tasks.

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 105 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 87).

For more information about checking status from the main window, see Monitoring Status and Activity on page 83.

4.5 Revealing More Device Information

You can reveal more information about disk drive, array, and logical drive 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 and spares; similarly, you can click a physical disk to see which array (if any) 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.
Two disk drives plus a dedicated hot spare comprise the selected logical drive.

Disk in Slot 0 belongs to Array B.

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.

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.
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:

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 arrays and logical drives.

**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 36).
2. Start and log in to maxView Storage Manager on the management system (see Starting maxView Storage Manager and Logging In on page 28).
3. Start maxView Storage Manager or the Agent on all other systems (see Starting maxView Storage Manager on Remote Systems on page 37).
4. Log in to all other systems from the management system (see Logging into Remote Systems from the Local System on page 38).
5. Create arrays and logical drives for all systems in your storage space (see Creating Arrays and Logical Drives on page 39).

As your storage requirements change, you can add systems, controllers, and disk drives, then modify the arrays and 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 28.

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 15.)

- 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 28.
- To start the Agent only on a remote system, follow the instructions in Starting the Agent Only on page 37.

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 14.
5.3.1  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  service stor_cimserver start
     Stop service  service stor_cimserver stop
     Check status  service stor_cimserver status

   To start operations from the VMware console, use these commands:
   - Options  Description
     Start service  Sfcbd-watchdog start
     Stop service  Sfcbd-watchdog stop

2. Start the Agent:
   - Options  Description
     Start service  service stor_agent start
     Stop service  service stor_agent stop

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 15) 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 99.

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 98.

5.5 Creating Arrays and Logical Drives

maxView Storage Manager provides a wizard to help you create, or configure, the arrays and logical drives in your storage space. You can choose from two configuration methods:

- Create logical drive on new array—Helps you set the RAID level for the logical drive, group disk drives and SSDs, determine logical drive size and other advanced settings.
  For instructions, see Creating a Logical Drive on a New Array on page 39.

- Create logical drive on existing array—Helps you select an array on which to create the logical drive, set the RAID level, group disk drives and SSDs, determine logical drive size and configure advanced settings.
  For instructions, see Creating a Logical Drive on an Existing Array on page 43

Note:

1. Mixing SAS and SATA drives within the same logical drive is not supported. The wizard does not allow you to select a combination of SAS/SATA drive types.

5.5.1 Creating a Logical Drive on a New Array

Before you can create a logical drive, you must create an array. Use the On New Array configuration method to step through the process of creating a logical drive on a new array, setting the RAID level, and configuring other settings.
To create a logical drive on an existing array, see Creating a Logical Drive on an Existing Array on page 43.

By default, maxView Storage Manager uses all available disk space to maximize the capacity of a new logical drive.

To create a logical drive on a new array:

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 Device.
3. When the wizard opens, select On New Array, then click Next.
4. Select a RAID level for the logical drive, then click Next.
See Selecting the Best RAID Level on page 119 for more information about RAID levels.

5. Select the disk drives you want to include in the logical drive, then click **Next**. Be sure the drive type is the same for all drives (SAS or SATA, not mixed), and that you select the right number of drives for the RAID level you selected.

6. *(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, numbers, and spaces.
- Set the size and unit of measure for the logical drive. (By default, a new logical drive uses all available disk space.)
- Change the stripe size—the amount of data, in bytes, written per disk in the logical drive. (The default stripe size usually provides the best performance.)
- Set the initialization method to Default or Build. The initialization method determines how the logical drive is prepared for reading and writing, and how long initialization will take:
  - **Default**—Initializes parity blocks in the background while the logical drive is available for access by the operating system. A lower RAID level results in faster parity initialization.
  - **Build**—Overwrites both the data and parity blocks in the foreground. The logical drive remains invisible and unavailable to the operating system until the parity initialization process completes. All parity groups are initialized in parallel, but initialization is faster for single parity groups (RAID 5). RAID level does not affect performance during Build initialization.

  **Note:** Not all initialization methods are available for all RAID levels.

7. Click **Next**, then review the array and logical drive settings.

   This example shows a RAID 5 logical drive ready to be created on Array A.
8. Click Finish.
   maxView Storage Manager builds the array and logical drive. Use the Event Log and Task Log to track build progress.

9. If you have other disk drives or available disk space and want to create additional arrays on the controller, repeat Steps [2]-[8].

10. Repeat Steps [1]-[9] for each controller in your storage space.

11. Partition and format your logical drives. See Partitioning and Formatting Your Logical Drives on page 46.

5.5.2 Creating a Logical Drive on an Existing Array

After you create an array, you can continue to build your storage space by creating more logical drives on that array. Use the On Existing Array configuration method to step through the process of creating a logical drive on an existing array, setting the RAID level, and configuring other settings.

To create a logical drive on a new array, see Creating a Logical Drive on a New Array on page 39.

By default, maxView Storage Manager uses all available disk space to maximize the capacity of a new logical drive.

To create a logical drive on an existing array:

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 Device.

3. When the wizard opens, select On Existing Array, then click Next.
4. Select the array on which to create the logical drive, then click **Next**.

5. Select a RAID level for the logical drive, then click **Next**.
See Selecting the Best RAID Level on page 119 for more information about RAID levels.

6. *(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, numbers, and spaces.
- Set the size and unit of measure for the logical drive. (By default, a new logical drive uses all available disk space.)
- Change the stripe size—the amount of data, in bytes, written per disk in the logical drive. (The default stripe size usually provides the best performance.)
- Set the initialization method to Default or Build. The initialization method determines how the logical drive is prepared for reading and writing, and how long initialization will take:
  - **Default**—Initializes parity blocks in the background while the logical drive is available for access by the operating system. A lower RAID level results in faster parity initialization.
• **Build**—Overwrites both the data and parity blocks in the foreground. The logical drive remains invisible and unavailable to the operating system until the parity initialization process completes. All parity groups are initialized in parallel, but initialization is faster for single parity groups (RAID 5). RAID level does not affect performance during Build initialization.

**Note:** Not all initialization methods are available for all RAID levels.

7. Click **Next**, then review the array and logical drive settings.

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

8. Click **Finish**.

   maxView Storage Manager builds the logical drive on the array. Use the Event Log and Task Log to track build progress.

9. If you have other disk drives or available disk space and want to create more logical drives on an existing array, repeat Steps [2]-[8].

10. Repeat Steps [1]-[9] for each controller in your storage space.

11. Partition and format your logical drives. See **Partitioning and Formatting Your Logical Drives** on page 46.

### 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 Smart-family 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 create logical drives on new or existing arrays, 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 38), then repeat the steps to create logical drives on new or existing arrays, 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 95).
6 Protecting Your Data

In addition to standard RAID (RAID 0, RAID 1, RAID 5, RAID 10), Microsemi Adaptec controllers provide additional methods of protecting your data, including dedicated and auto-replace hot spare drives.

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 106.)

6.1 Dedicated Spare or Auto-Replace Spare?

A dedicated hot spare is assigned to one or more arrays. It will protect any redundant logical drive on those arrays.

After using a dedicated hot spare to rebuild a failed logical drive, data is moved back to its original location, using a process called copyback, once the controller detects that the failed drive has been replaced. Once the data is copied back, the hot spare becomes available again. You must create an array before you can assign a dedicated hot spare to protect it. To assign a dedicated hot spare, see Assigning a Dedicated Hot Spare on page 48.

An auto-replace hot spare is assigned to a specific array. It will protect any redundant logical drive on that array. After using an auto-replace spare to rebuild a failed logical drive, it becomes a permanent part of the array. You must create an array before you can assign an auto-replace hot spare to protect it. To assign an auto-replace hot spare, see Assigning an Auto-Replace Hot Spare on page 50.

6.2 Hot Spare Limitations

- Hot spares protect redundant logical drives only. You cannot protect a RAID 0 logical drive with a hot spare.
- You cannot create a hot spare from a disk drive that is already part of an array.
- You should select a disk drive that is at least as big as the largest disk drive it might replace.
- You must designate a SAS hot spare drive for an array comprised of SAS disk drives, and a SATA hot spare drive for an array comprised of SATA disk drives.

6.3 Assigning a Dedicated Hot Spare

A dedicated hot spare is assigned to one or more arrays. It will protect any redundant logical drive on those arrays.

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

To assign a dedicated spare:

1. In the Enterprise View, select a controller, an array on that controller, or a Ready physical drive.
2. On the ribbon, in the Physical Device group, click **Spare Management**.

The Spare Management wizard opens.

3. Select the **Dedicated** spare type, then click **Next**.

4. If you selected a controller or physical drive in the Enterprise view, select the arrays you want to protect with a dedicated spare, then click **Next**.
5. If you selected a controller or array in the Enterprise view, select the physical drive(s) you want to dedicate as hot spares, then click **Next**. (See [Hot Spare Limitations](#) on page 48 for help selecting drives.)

![Spare Management Wizard](image)

6. Review the summary of dedicated spares and protected arrays, then click **Finish**.

### 6.4 Assigning an Auto-Replace Hot Spare

An auto-replace hot spare is assigned to a specific array. After using an auto-replace spare to rebuild a failed logical drive, it becomes a permanent part of the array.

To assign an auto-replace hot spare to an array:

1. In the Enterprise View, select a controller or an array on that controller.
   
   **Note:** The Auto-Replace option is always available when you select an array on a controller. However, when you select the controller itself, the option is available only if one or more auto-replace spares already exist. Otherwise, you can just assign Dedicated spares in the wizard.

2. On the ribbon, in the Physical Device group, click **Spare Management**.
   
   ![Spare Management](image)

   The Spare Management wizard opens.

3. Select the **Auto-Replace** spare type, then click **Next**.
4. If you selected a controller in the Enterprise view, select the array you want to protect with an auto-replace spare, then click **Next**.

5. Select the physical drive(s) you want to assign as auto-replace hot spares, then click **Next**. (See [Hot Spare Limitations](#) on page 48 for help selecting drives.)
6. Review the summary of auto-replace spares and protected arrays, then click Finish.

6.5 Removing a Hot Spare

You can remove a dedicated or auto-replace hot spare from an array. Removing the last hot spare from an array returns the drive to the Ready state. You may want to remove a hot spare to:

- Make disk drive space available for another array or logical drive.
- Convert an auto-replace hot spare into a dedicated hot spare.
- Remove the ‘hot spare’ designation from a drive that you no longer want to use as a spare.

To remove a hot spare:

1. In the Enterprise View, select an array or an existing hot spare drive.
2. On the ribbon, in the Physical Device group, click Spare Management.

The Spare Management wizard opens.

3. Select Un-AssignKey, then click Next. (Un-AssignKey is preselected for an existing hot spare.)
4. If you selected a hot spare in the Enterprise view, select the array(s) from which to remove the spare, then click Next.

5. If you selected an array in the Enterprise view, select the hot spare(s) to remove from the array, then click Next.
6. Review the summary of affected hot spares and arrays, then click Finish.
   If the spare protects only one array, it is deleted and the drive becomes available for other uses in your storage space. If the spare protects more than one array, it is removed from the selected array(s) but continues to protect the other arrays to which it is assigned.

6.6 Setting the Spare Activation Mode

The spare activation mode determines when a hot spare is used to rebuild a failed logical drive. You can choose to activate a spare when:

- A data drive fails; this is the default mode.
- A data drive reports a predictive failure (SMART) status.

In normal operations, the firmware starts rebuilding a failed logical drive with a spare only when a data drive fails. With the predictive failure activation mode, rebuilding can begin before the drive fails, reducing the likelihood of data loss.

The spare activation mode applies to all arrays on a controller.

To set the spare activation mode:

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. From the Spare Activation Mode drop-down list, select Failure (default) or Predictive, then click OK.
7 Modifying Your Storage Space

This section provides additional scenarios for creating and modifying arrays and logical drives. It explains how to check your logical drives for bad or inconsistent data; optimize controller and logical drive performance; move arrays and logical drives; and perform advanced operations, such as creating a split mirror backup array.

7.1 Understanding Arrays and 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 to store data.

The group of physical drives containing the logical drive is called a drive array, or just array. Because all the physical drives in an array are commonly configured into just one logical drive, the term array is often used as a synonym for logical drive. However, an array can contain several logical drives, each of a different size.

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 119 for more information.)

You can also protect your logical drives by assigning one or more hot spares to them. (See Protecting Your Data on page 48 for more information.)

7.2 Creating and Modifying Logical Drives

For basic instructions for creating logical drives, see Building Your Storage Space on page 36.

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.

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 119 for more information about redundancy.)

Note: You cannot combine SAS and SATA disk drives within the same array or logical drive.

To create a logical drive with disk drives of different sizes, follow the instructions in Creating a Logical Drive on a New Array on page 39. 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.
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 Creating a Logical Drive on an Existing Array on page 43. 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.

7.3 Enabling Background Consistency Check

When background consistency check is enabled, maxView Storage Manager continually and automatically checks your logical drives for bad or inconsistent data, and then fixes any problems. Enabling consistency check ensures that you can recover data if a logical drive fails. The scanning process checks physical drives in fault-tolerant logical drives for bad sectors. It also verifies the consistency of parity data, if applicable. The available modes are High, Disable, Idle. If you select the Idle mode, you must also specify a delay value and parallel scan count.

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 Mode drop-down list, select High, Disabled, or Idle.

5. If you selected the Idle mode, enter the consistency check delay (in seconds) and parallel consistency check count:
   - **Consistency Check Delay**—Amount of time the controller must be inactive before the surface scan is started. Enter a value from 0-30. A value of 0 disables the scan.
   - **Parallel Consistency Check Count**—Number of logical drives on which the controller will perform the consistency check in parallel.

6. Click OK.

7.4 Moving a Logical Drive

maxView Storage Manager allows you to move a single logical drive from one array to another array. You can choose the following destinations:

- Move Logical Drive To a New Array
- Move Logical Drive To an Existing Array

If you move the logical drive to a new array, the array is created automatically. If you move the logical drive to an existing array, it must have sufficient space and member disk drives to store the logical drive data and accommodate the RAID level; for example, three drives, minimum, for a RAID 5.

**Note:** Moving a logical drive can be a time-consuming process. All data in the logical drive is moved onto the new or existing array, and the controller continues to service I/O requests to other logical drives.

To move a logical drive:

1. In the Enterprise View, select a logical drive.
2. On the ribbon, in the Logical Device group, click **Expand/Migrate Logical Device**.
3. When the wizard opens, select **To New Array** or **To Existing Array**, then click **Next**.
4. If you are moving the logical drive to a new array, select the physical drives for the array. Be sure
the drive type is the same for all drives (SAS or SATA, not mixed).

5. If you are moving the logical drive to an existing array, expand the Arrays and Logical Devices list,
then select the destination array.

Note: The drives must have sufficient capacity to store the logical drive data.
6. Click Next, review the summary information, then click Finish. maxView Storage Manager moves the logical drive onto the new or existing array. If you moved the last logical drive on an array, maxView Storage Manager deletes the array and removes it from the Enterprise View.

### 7.5 Moving an Array

You can move an array by replacing its physical drives with drives of the same type or different type. For example, you can replace SAS drives in the array with other SAS drives, or replace SAS drives with SATA drives. You cannot combine drive types in the same array, however. If you choose to replace SAS drives with SATA drives, for example, all drives in the array must be replaced with SATA drives. The replacement drives must be in the Ready state; that is, not part of any array or assigned as a spare.

Moving an array automatically removes any previously assigned spare drives. Replaced drives in the array are freed and become Ready drives that can be used in other arrays, logical drives, or as spares.

**Note:** Moving an array can be a time-consuming process. All data in each logical drive is copied to the replacement drives, and the controller continues to service I/O requests to other logical drives.

To move an array:

1. In the Enterprise View, select an array.
2. On the ribbon, in the Array group, click Modify Array.

3. When the wizard opens, select an action, then click Next:
   - Select Move Drives to replace array drives with drives of the same type.
   - Select Change Drive Type to replace array drives with drives of a different type.
4. Select one or more drives. For Move Drives, the wizard displays only physical devices of the same type. For Change Drive Type, the wizard displays only physical devices of a different type. The RAID level determines the number of drives you need to select.

Note: The drives must have sufficient capacity to hold all of the logical drives in the source array.

5. Click Next, review the summary information, then click Finish.

7.6 Working with Mirrored Arrays

maxView Storage Manager allows you to split a mirrored array and then recombine it. This process entails splitting a RAID 1 or RAID 10 array into two identical new arrays consisting of RAID 0 logical drives. Arrays with other RAID configurations cannot be split.
7.6.1 Creating a Split Mirror Backup

Use this option to split a mirrored array, consisting of one or more RAID 1 or RAID 10 logical drives, into two arrays: a primary array and a backup array, with these characteristics:

- The primary array and backup array will contain identical RAID 0 logical drives.
- The primary array continues to be fully accessible to the operating system.
- The backup array is hidden from the operating system and data on the drive is frozen.

**Note:** You can use the backup array to restore the primary array with its original contents. See Re-mirroring, Rolling Back, or Reactivating a Split Mirror Backup on page 63.

- The primary array includes the designation "Split Mirror Set Primary" as the device type.
- The backup array includes the designation "Split Mirror Set Backup" as the device type.

If the array is protected by a spare drive, the drive is unassigned after the split.

To create a split mirror backup:

1. In the Enterprise View, select a mirrored array.
2. On the ribbon, in the Array group, click **Split Mirror Backup**.
3. When prompted to create the backup array, click **OK**.

7.6.2 Re-mirroring, Rolling Back, or Reactivating a Split Mirror Backup

When you re-mirror a split mirrored array, you recombine the primary array and backup array into a single array. You can:

- Re-mirror the array and preserve the existing data; the backup array is discarded. This option re-creates the original mirrored array with the current contents of the primary array.
- Re-mirror the array and roll back to the contents of the backup array; existing data is discarded.

This option re-creates the mirrored array but restores its original contents from the backup array.

You can also reactivate the split mirror backup. This option makes the backup array fully accessible to the operating system. maxView Storage Manager removes the "Split Mirror Set Backup" designation and re-designates it as a Data Array.

To re-mirror, roll back, or reactivate a split mirror backup:

1. In the Enterprise View, select the Split Mirror Set Primary array; that is, an array with an existing split mirror backup.
Note: Use the Summary tab on the Storage Dashboard to verify the array type.

2. On the ribbon, in the Array group, click Remirror/Activate Backup.

3. When prompted to select a re-mirroring task, choose: Re-mirror array, Re-mirror with roll-back, or Activate Backup.
   
   Note: Microsemi recommends that you do not perform a re-mirror with roll back if the logical drive to be rolled back is mounted or in use by the operating system.

4. Click OK.

7.7 Healing an Array

You can use the Heal Array operation to replace failed physical drives in the array with healthy physical drives. After replacement, the original array and logical drive numbering is unaffected.

The Heal Array operation is part of the Modify Array wizard (see Moving an Array on page 61). It is available in the wizard only if:

- The array has at least one failed drive.
- The array is not rebuilding to a spare.
- A sufficient number of Ready physical drives of the same type and correct size are available to replace each failed physical drive in the array.

   Note: The correct size is defined as a drive as large as the smallest drive on the array, but no larger than the smallest spare.

For a RAID 0 volume, the heal operation recreates the volume. For other RAID volume types, the heal operation rebuilds the volume.

To heal an array:

1. In the Enterprise View, select an array.
2. On the ribbon, in the Array group, click Modify Array.
3. When the wizard opens, select **Heal Array**, then click **Next**.

4. Select one or more drives to replace the failed drives in the array.

   **Note:** The drives must have sufficient capacity to hold all of the logical drives in the array.

5. Click **Next**, review the summary information, then click **Finish**.

### 7.8 Changing the Logical Drive Rebuild Priority

The Rebuild Priority setting determines the urgency with which the controller treats an internal command to rebuild a failed logical drive:

- At the low setting, normal system operations take priority over a rebuild.
Modifying Your Storage Space

- At the medium setting, normal system operations and rebuilds get equal priority.
- At the medium high setting, rebuilds get higher priority than normal system operations.
- At the high setting, rebuilds take precedence over all other system operations.

If the logical drive is part of an array with an online spare, rebuilding begins automatically when drive failure occurs. If the array does not have an online spare, rebuilding begins when the failed physical drive is replaced. For more information, see Rebuilding Logical Drives on page 107.

To change the rebuild priority:
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 Rebuild Priority Mode drop-down list, select Low, Medium, Medium High, or High. The Rebuild Priority field is circled in the next figure.

   4. Click OK.

7.9 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.

7.10 **Deleting an Array or Logical Drive**

When you delete an array or logical drive, it is removed from the Enterprise View and the disk drives or segments in the logical drive(s) become available to use in a new array or logical drive (see **Creating a Logical Drive Using Available Segments** on page 58).

**Caution:** When you delete an array you lose all data on the logical drive(s) within the array, in addition to the array itself. When you delete a logical drive, you lose all data stored on that logical drive. Be sure you no longer need the data on the array or logical drive before you delete it.

To delete an array or logical drive:

1. In the Enterprise View, select the array or logical drive you want to delete.
2. On the ribbon, in the Array group or Logical Device group (shown below), click **Delete**.

3. When prompted to continue, click **Delete** to delete the array or logical drive.
   
   **Note:** If a deleted logical drive is the only logical in the array, the array itself is also deleted.
# 8 Maintaining Physical Devices

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

## 8.1 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 85.

<table>
<thead>
<tr>
<th>Controller Info</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Unit</td>
<td>Pool Timeout</td>
</tr>
<tr>
<td>Drive</td>
<td>Rebuild Priority</td>
</tr>
<tr>
<td>Type</td>
<td>Expand Priority</td>
</tr>
<tr>
<td>Host Bus Type</td>
<td>Consistency Check Mode</td>
</tr>
<tr>
<td>Speed</td>
<td>Consistency Check Delay</td>
</tr>
<tr>
<td>RAID</td>
<td>Parallel Consistency Check Count</td>
</tr>
<tr>
<td>Online</td>
<td>Space Allocation Mode</td>
</tr>
<tr>
<td>Supported</td>
<td>Online Depth</td>
</tr>
<tr>
<td>Number of Parts</td>
<td>Monitor and Performance Delay</td>
</tr>
<tr>
<td>SSD</td>
<td>Elevator Sort</td>
</tr>
<tr>
<td>NVMe</td>
<td>Degraded Performance Optimization</td>
</tr>
<tr>
<td>Array</td>
<td>Latency</td>
</tr>
<tr>
<td>Controller</td>
<td>Global Physical Drive Write Cache</td>
</tr>
<tr>
<td>Boot Controler</td>
<td>Boot Volume</td>
</tr>
<tr>
<td>Primary Boot Volume</td>
<td>Secondary Boot Volume</td>
</tr>
</tbody>
</table>

## 8.2 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.

<table>
<thead>
<tr>
<th>To Locate...</th>
<th>Select...</th>
</tr>
</thead>
<tbody>
<tr>
<td>A disk drive</td>
<td>Disk Drive icon:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>All disk drives on a controller</th>
<th>Controller icon:</th>
</tr>
</thead>
<tbody>
<tr>
<td>All disk drives included in an array</td>
<td>Array icon:</td>
</tr>
<tr>
<td>All disk drives included in a logical drive</td>
<td>Logical Drive icon:</td>
</tr>
</tbody>
</table>
8.2.1 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. From the drop-down list, select the timeout period (1 hour, 4 hours, 24 hours).
4. Click the Locate button.
   The LED on the disk drive(s) begin to blink.
5. To stop blinking the drive(s) immediately, click Stop.

6. Click Cancel to close the Locate Physical Device window.
   The LED(s) continue to blink for the duration of the timeout period.

8.2.2 Locating Physical Disks in an Array or Logical Drive
To locate all physical disks in an array or logical drive:

1. In the Enterprise View, open the Arrays and Logical Devices tree for a controller, then select an array or logical drive.
2. On the ribbon, in the Array group or Logical Device group (shown below), click Locate.
The Locate Logical Device window opens and displays a list of the physical disks associated with the array or logical drive.

3. Select the timeout period (1 hour, 4 hours, 24 hours), then click Locate.

   ![Locate Logical Device Window](image)

   The LEDs on the disk drives begin to blink.

4. Click Cancel to close the Locate window.
   The LEDs continue to blink for the duration of the timeout period.

5. Click Stop to stop blinking the drives immediately.

8.3 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.

8.3.1 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 107), you may lose data. For help solving disk drive problems, see Recovering from a Disk Drive Failure on page 106.

   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 70.)
   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 107.)
   5. Repeat these steps for each disk drive you want to replace.

8.3.2 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**.

   ![Force Offline](image)

   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.

### 8.4 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.

Optionally, you can choose the erase pattern.

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**.

   ![Secure Erase](image)

   The Secure Erase Physical Device window opens.
3. From the drop-down list, select the erase pattern:
   - **Zero** (default)—Initializes all blocks to zero.
   - **Random Zero**—Initializes block to random value then zero.
   - **Random Random Zero**—Initializes block to random value, next block to random value, then zero.
4. Click **Erase** to erase the drive.
8.5 Uninitializing 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 uninitialize individual disks, or use the wizard to uninitialize all disks on a controller.

8.5.1 Uninitializing a Disk Drive

You can uninitialize any disk drive (or SSD) in the Failed state, Ready state, or Raw state; for instance, a failed drive in a logical drive. 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 HBA mode, and can be exchanged with drives on the motherboard's SATA interface.

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.

Note: The Initialize option is not supported in this release.

3. Click the Uninitialize button, then click OK.

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

8.5.2 Uninitializing all Drives on a Controller

To 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 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.

**Note:** The Initialize option is not supported in this release.

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

![Initialize/Uninitialize Physical Devices wizard](image)

4. Select drives on the controller to uninitialized, then click **Next**.

   **Note:** Only drives in the Failed, Ready, or Raw state can be uninitialized.

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

### 8.6 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.

**Caution:** Enabling write caching can improve drive performance. However, a power, device, or system failure, or a dirty shut down may result in data loss or file-system corruption.

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**.

![Set Properties](image)

When the Set Properties window opens, click the **Cache** tab.

3. In the Global Physical Devices Write Cache Policy drop-down list, select `[Enable All]` or `[Disable All]`.

---

CONFIDENTIAL Document Number: PMC-2153109, Issue 3
4. Click OK.

8.7 **Working with Controllers**

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

- To re-scan a controller, see Rescanning a Controller on page 74.
- To optimize controller performance, see Optimizing Controller Performance on page 74.
- To change the operating mode of connectors on the controller, see Changing the Connector Operating Mode on page 75.

8.7.1 **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.

8.7.2 **Optimizing Controller Performance**

You can enable the following performance optimizations on a controller to improve I/O throughput and ensure optimal performance of the arrays and logical drives in your storage space.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queue Depth</td>
<td>Sets the max drive request queue depth for the controller. Valid values are Automatic, 2, 4, 8, 16, and 32.</td>
</tr>
<tr>
<td>Monitor and Performance Delay</td>
<td>Sets the MNP Analysis delay for the controller, in seconds. Set the value to zero to disable Monitor and Performance Analysis. Default is 60 minutes (3600 seconds).</td>
</tr>
<tr>
<td>Elevator Sort</td>
<td>Sets the behavior of the drive’s write Elevator sort algorithm, a scheduling optimization that prioritizes I/O requests such that disk arm and head motion continues in the same direction. Enabling the elevator sort improves seek times and disabling the elevator sort improves throughput.</td>
</tr>
<tr>
<td>Degraded Performance Optimiz-</td>
<td>For degraded RAID 5 logical drives, enabling this setting directs the controller to attempt to improve performance of large read requests by buffering physical drive requests. Disabling this setting forces the controller to read from the same drives multiple times.</td>
</tr>
<tr>
<td>Latency</td>
<td>Enables Flexible Latency Optimization for HDDs. When latency optimization is enabled, the controller detects high-latency I/O requests and applies a cutoff, or threshold, value, after which it suspends elevator sorting and services the request right away. You can set the latency optimization to low, medium, high, aggressive level 1, or aggressive level 2.</td>
</tr>
</tbody>
</table>
To enable/disable performance optimizations on a controller:

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

When the Set Properties window opens, click the **Performance** tab.
3. Enable/disable performance optimizations, as needed.

4. Click **OK**.

### 8.7.3 Changing the Connector Operating Mode

Use this option to change the behavior of the connectors on your Microsemi Adaptec Smart-family controller. The connectors on the controller can operate in three modes:

- **HBA Mode**: exposes physical drives to the operating system
- **RAID Mode**: exposes only RAID volumes to the operating system
- **Mixed Mode**: exposes RAID volumes and physical drives to the operating system

By default, products with RAID support are configured to operate in Mixed Mode. Mode options vary, depending on the configuration of logical and physical devices on the connector. For example, you cannot switch the connector to HBA mode if the connector is already configured with a RAID volume.

A reboot is required for connector mode changes to take effect.

**Note**: Changing from Mixed Mode or HBA Mode to RAID Mode removes access to the physical drives from the operating system.

To change the connector mode on a controller:

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

3. From the drop-down list, change the connector mode for each port to RAID, HBA, or Mixed.

4. Click **OK**.

5. Reboot the server.

8.8 **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 74.

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.

8.9 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 77, then follow one of these sets of instructions:

- Updating the Controller Firmware on page 77
- Updating the Disk Drive Firmware on page 80
- Updating the Enclosure Firmware on page 81

8.9.1 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.

8.9.2 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.
3. When the wizard opens, select **Controller**, then click **Next**.

4. Click **Choose**, browse the file system for the firmware update file (typically, a .ufi or .bin 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. Select the controllers you want to update, then click **Next**.
7. Review the update summary, then click **Finish**.

   ![Firmware Update screenshot]

   **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.
8.9.3 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 77).

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.
### 8.9.4 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.
9 Monitoring Status and Activity

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

9.1 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 83 and **Changing an Operating System’s Event Log Setting** on page 93.

- **Task Log**—The main window also features a task log that provides status information about the progress of tasks in your storage space, such as the creation of a logical drive.
  
  See **Viewing Task Status in the Task Log** on page 85.

- **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 85.

- **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 88.

- **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 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 88.

- **Audible Alarm**—A series of beeps sounds whenever a serious event occurs on your storage space.
  
  See **Working with System Alarms** on page 76.

9.2 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 93.) 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.

9.2.1 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 84) 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 85).
Single-click any event to open the Event Log Detail window to see more information in an easier-to-read format. Use the up and down arrows to view previous or following events.

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

### 9.2.1.1 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.

<table>
<thead>
<tr>
<th>Icon</th>
<th>Status</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Information Icon]</td>
<td>Information</td>
<td>The local system successfully connected to a remote system. A logical drive was created. A hot spare was deleted.</td>
</tr>
<tr>
<td>![Warning Icon]</td>
<td>Warning</td>
<td>A logical drive is in a degraded state. A disk drive is being rebuilt. A controller is not responding to an enclosure.</td>
</tr>
<tr>
<td>![Error Icon]</td>
<td>Error</td>
<td>A controller has failed. A logical drive has failed. A disk drive or hot spare has failed. An enclosure is overheating. Multiple fans or power supplies within an enclosure have failed. An enclosure is not responding.</td>
</tr>
</tbody>
</table>
9.2.2 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.

<table>
<thead>
<tr>
<th>Task Id</th>
<th>System</th>
<th>Description</th>
<th>State</th>
<th>Start Time</th>
<th>Recurring</th>
<th>Priority</th>
<th>Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>111</td>
<td>10:25:04:122</td>
<td>build/verify logical device controller 0, logical device 0</td>
<td>Running</td>
<td>Tue Jul 10 15:42:25 PDT 2014</td>
<td>Never</td>
<td>High</td>
<td>8%</td>
</tr>
</tbody>
</table>

9.2.3 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, arrays, logical drives, enclosures, disk drives and SSDs. Occupying the largest portion of the main window in maxView Storage Manager, the Storage Dashboard organizes component information by category, with one 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 83).

Note: For information about Chart View, on the right side of the Storage Dashboard, see Viewing Storage Space Usage in Chart View on page 88.
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, Arrays, Logical Drives, Physical Devices, and so on) include a Summary tab and Events tab.

<table>
<thead>
<tr>
<th>Component</th>
<th>Categories/Tabs</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>System</td>
<td>Summary, Properties</td>
<td>System name and IP address, Operating system, Number and type of controllers, Alarm status (see Working with System Alarms on page 76), Web Server settings, SMTP settings</td>
</tr>
<tr>
<td>Controller</td>
<td>Summary, Properties, Resources, Connectors</td>
<td>Model, key features, driver and firmware version, controller mode, and status, Number of physical drives, arrays, logical drives, and status, I2C address for PBSI interface (hex), Connector functional mode, Performance optimizations and other settings, Physical drive assignments by logical device (see Revealing More Device Information on page 33)</td>
</tr>
<tr>
<td>Arrays</td>
<td>Summary, Resources</td>
<td>Total size and unused size, Spare rebuild mode, Logical drive RAID level, size, status</td>
</tr>
<tr>
<td>Logical drives</td>
<td>Summary, Resources</td>
<td>Raid level, segment and group (RAID 10 only), size, mount point, status, Member drives and sizes</td>
</tr>
<tr>
<td>Enclosure</td>
<td>Summary, Resources, Slots</td>
<td>Enclosure type, vendor, model and status, Fan, power supply, and temperature status (see Monitoring Enclosure Status on page 87), Speaker status, Slot allocation and usage</td>
</tr>
<tr>
<td>Hard drives and SSDs</td>
<td>Summary, Resources, SMART Statistics</td>
<td>Drive type (hard drive, SSD), interface type (SAS/SATA), vendor, and model, Drive state (Ready, Optimal, Hot Spare), mount point, Channel number and device ID, Transfer speed, Drive segment allocation</td>
</tr>
</tbody>
</table>
9.2.3.1 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.

<table>
<thead>
<tr>
<th>Resources</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fan(s)</td>
<td>6</td>
</tr>
<tr>
<td>Optimal</td>
<td>6</td>
</tr>
<tr>
<td>Malfunctioning</td>
<td>0</td>
</tr>
<tr>
<td>Not Installed</td>
<td>0</td>
</tr>
<tr>
<td>Power Supplies</td>
<td>2</td>
</tr>
<tr>
<td>Optimal</td>
<td>2</td>
</tr>
<tr>
<td>Malfunctioning</td>
<td>0</td>
</tr>
<tr>
<td>Not Installed</td>
<td>0</td>
</tr>
<tr>
<td>Temperature Sensor(s)</td>
<td>2</td>
</tr>
<tr>
<td>Normal</td>
<td>2</td>
</tr>
<tr>
<td>Abnormal</td>
<td>0</td>
</tr>
<tr>
<td>Not Installed</td>
<td>0</td>
</tr>
<tr>
<td>Speaker(s)</td>
<td>1</td>
</tr>
<tr>
<td>On</td>
<td>1</td>
</tr>
<tr>
<td>Off</td>
<td>0</td>
</tr>
<tr>
<td>Not Installed</td>
<td>0</td>
</tr>
</tbody>
</table>

9.2.3.2 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.
9.2.4 Viewing Storage Space Usage in Chart View

Chart View provides a visual representation of the free and used space for a system, controller, array, 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.

![Chart View Example](image)

9.3 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

![Notification Example](image)
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 89).
• Send a test email (see Sending a Test Message on page 91).
• Modify or remove an email recipient (see Modifying or Removing an Email Recipient on page 92).
• Modify email server settings (see Modifying Email Server Settings on page 93).
• Disable email notifications (see Disabling Email Notifications on page 93)

9.3.1 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.
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.

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 84; for more information about the support archive file, see Creating a Support Archive File on page 107.)
Repeat this step to add more email recipients. Each recipient appears in the Email Notifications Manager, as shown below:

9. When you’re done adding email recipients, click **OK**. The email recipients and your SMTP server settings are saved.

10. 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 91).

### 9.3.2 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:

1. In the Enterprise View, select the system you want.
2. On the ribbon, in the System group, click **System Settings**.
3. When the System settings window opens, click the **Email** tab.
The Email Notifications Manager opens.

4. Select one or more email addresses to send a test message to. To select all addresses, click the check box at the top of the list, as shown in the figure below.

![Email Notifications Manager](image)

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 92.)
   - Ensure that your SMTP server address is correct. (See Modifying Email Server Settings on page 93.)
   - Try sending the test message again.

### 9.3.3 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**.

![System Settings](image)

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.

### 9.3.4 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.

### 9.3.5 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.

### 9.4 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.
10 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

10.1 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.

10.1.1 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 96 to deploy the same configuration on multiple systems in your storage space.

### 10.1.2 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**.

   ![Manage Configuration](image)

   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:

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Force All</td>
<td>To force deployment of all features</td>
</tr>
<tr>
<td>Force Size</td>
<td>To force deployment of just the logical drives</td>
</tr>
</tbody>
</table>
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.

### 10.2 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.
10.2.1 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 38. 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.

10.2.2 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.

10.2.3 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.

10.2.4 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.

### 10.3 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 array and logical device information, partition 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**.

### 10.4 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**.

   ![System Settings](image.png)

   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.

### 10.5 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.

### 10.6 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 28). 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.
11 Solving Problems

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

11.1 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 38 for more information.)
- Check all cable connections.
- Try uninstalling and reinstalling maxView Storage Manager.
- Check the Release Notes for compatibility issues and known problems.

11.2 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.

...a disk drive failure.

...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...

...a disk drive failure.

...on Controller 2

...affecting two Logical Drives

Error is on local system...
11.3 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 106.
- If the logical drive is not protected by a hot spare, see Failed Disk Drive Not Protected by a Hot Spare on page 106.
- If there is a disk drive failure in more than one logical drive simultaneously, see Failure in Multiple Logical Drives Simultaneously on page 106.
- If it is a RAID 0 logical drive, see Disk Drive Failure in a RAID 0 Logical Drive on page 107.
- If multiple disk drives fail within the same logical drive, see Forcing a Logical Drive with Multiple Drive Failures Back Online on page 107.

11.3.1 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 the logical drive is protected with a dedicated hot spare, 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 to protect other logical drives. No further action is necessary.
   If the logical drive is protected with an auto-replace hot spare, the spare becomes a permanent part of the array. You must designate a new hot spare to protect the logical drive(s) on that array.
   See Protecting Your Data on page 48 for more information about managing spares.

11.3.2 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 107.

11.3.3 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 106.
11.3.4 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.

11.3.5 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 105).
2. On the ribbon, in the Logical Device group, click **Force Online**.

3. Click **Force**, then click **OK**.

11.4 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.

Note: You can use the Heal Array operation as an alternative to a hot-swap rebuild if you have a
sufficient number of Ready physical drives of the same type in your storage space. See Healing
an Array on page 64.

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.

11.5 Creating a Support Archive File

Your 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 for details).

2. Run the silent installation from the command line using one of these commands:

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows 64-bit</td>
<td>setup_asm_x64.exe /s /v&quot;/qn &lt;properties&gt;&quot;</td>
</tr>
<tr>
<td>Windows 32-bit</td>
<td>setup_asm_x86.exe /s /v&quot;/qn &lt;properties&gt;&quot;</td>
</tr>
</tbody>
</table>

where <properties> is one or more of the options listed in Switches, Properties, and Values on page 110.

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 Switches, Properties, and Values

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

<table>
<thead>
<tr>
<th>Switch or Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/s (required)</td>
<td>Suppress dialog boxes.</td>
</tr>
<tr>
<td>/v (required)</td>
<td>Pass command line parameters to the setup program.</td>
</tr>
<tr>
<td>/qn</td>
<td>Suppress progress bar during installation.</td>
</tr>
<tr>
<td>/qb</td>
<td>Show progress bar during installation.</td>
</tr>
<tr>
<td>/lv* &lt;path&gt; (optional)</td>
<td>Generate verbose installation log at &lt;path&gt;.  &lt;br&gt;Example: /lv* c:\pmc.log</td>
</tr>
</tbody>
</table>

INSTALLDIR (optional)  
Specifies the installation path. If specified, the installation path must be enclosed in escaped quotation marks.  
Example: INSTALLDIR="C:\Program Files\Adaptec\maxView Storage Manager"  
*Note: The default installation path is "C:\Program Files\Adaptec\maxView Storage Manager".*

ADDLOCAL (optional)  
- ALL (default)—Installs the maxView Storage Manager 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

*Note: Use commas to separate multiple values.*

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 19 for details).

2. Run the silent installation from the command line using one of these commands:

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linux 64-bit</td>
<td>./StorMan-XX-XXXX.x86_64.bin --silent</td>
</tr>
</tbody>
</table>

*Note: Linux systems also support silent upgrade and silent removal. See Example Command Line Installations on page 111.*
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 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 32) 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).

B.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 from the Web site (see Downloading the Installer Package on page 19).
2. Double-click the setup program:

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMware ESXi 5.5</td>
<td>setup_maxView_VWC_Plugin_x64.exe</td>
</tr>
<tr>
<td>VMware ESXi 6.0</td>
<td>setup_maxView_VWC6_Plugin_x64.exe</td>
</tr>
</tbody>
</table>

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

![maxView Storage Manager - InstallShield Wizard](image)

6. Click Install to begin the installation.

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

**B.2 Starting the maxView Plugin for vSphere Web Client**

1. Launch the VMware vSphere Web Client: double-click the vSphere desktop icon, then enter your login credentials.

2. In the Monitoring section on the vSphere Home screen (on the right), click the maxView icon; the Controller information screen opens.

![vSphere Home screen](image)

3. 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.
B.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.)
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**

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 85.
maxView Storage Manager allows you to manage storage resources on Microsemi Adaptec Host Bus Adapters (HBAs) and RAID controllers operating in HBA mode (see Changing the Connector Operating Mode on page 75). 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 Array group or 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.

<table>
<thead>
<tr>
<th>Ribbon</th>
<th>Options for HBAs / Non-RAID Mode Controllers</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Group</td>
<td>Firmware Update</td>
</tr>
<tr>
<td>Controller Group</td>
<td>Rescan, Properties (non-RAID mode controllers only)</td>
</tr>
<tr>
<td>Array Group</td>
<td>None</td>
</tr>
<tr>
<td>Logical Device Group</td>
<td>None</td>
</tr>
<tr>
<td>Physical Devices Group</td>
<td>Force Offline, Uninitialize</td>
</tr>
</tbody>
</table>

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 85).

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 83).
The following table lists the categories and types of information provided on the Storage Dashboard for HBAs and connected devices.

<table>
<thead>
<tr>
<th>Component</th>
<th>Categories</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller</td>
<td>Summary</td>
<td>Model, WWN, key features, firmware version, controller mode, status, number and type of physical devices.</td>
</tr>
<tr>
<td></td>
<td>Properties</td>
<td>Slot, driver version, bus type and speed, number of ports, settings (mostly disabled)</td>
</tr>
<tr>
<td></td>
<td>Resources</td>
<td>Physical drive assignments by connector, including protocol, state, free and used space</td>
</tr>
<tr>
<td></td>
<td>Connectors</td>
<td>Connector name, number of devices, functional mode</td>
</tr>
<tr>
<td>Physical Devices</td>
<td>Summary</td>
<td>Physical drive assignments by connector, including protocol, state, free and used space</td>
</tr>
<tr>
<td>(node)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connector</td>
<td>Summary</td>
<td>Functional mode, number of devices</td>
</tr>
<tr>
<td>Enclosure</td>
<td>Summary</td>
<td>Enclosure type, vendor, model, ID, channel, firmware version, status Fan, power supply, and temperature status (see Monitoring Enclosure Status on page 87) Slot allocation and usage</td>
</tr>
<tr>
<td>Hard drives and</td>
<td>Summary</td>
<td>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 87)</td>
</tr>
<tr>
<td>SSDs</td>
<td>Resources</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SMART</td>
<td></td>
</tr>
</tbody>
</table>
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. See the Release Notes for supported RAID levels on specific controller models.

### D.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.

<table>
<thead>
<tr>
<th>RAID Level</th>
<th>Redundancy</th>
<th>Disk Drive Usage</th>
<th>Read Performance</th>
<th>Write Performance</th>
<th>Built-in Hot Spare</th>
<th>Minimum Disk Drives</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAID 0</td>
<td>No</td>
<td>100%</td>
<td>***</td>
<td>***</td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>RAID 1</td>
<td>Yes</td>
<td>50%</td>
<td>**</td>
<td>**</td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>RAID 1E</td>
<td>Yes</td>
<td>50%</td>
<td>**</td>
<td>**</td>
<td>No</td>
<td>3</td>
</tr>
<tr>
<td>RAID 10</td>
<td>Yes</td>
<td>50%</td>
<td>**</td>
<td>**</td>
<td>No</td>
<td>4</td>
</tr>
<tr>
<td>RAID 5</td>
<td>Yes</td>
<td>67 – 94%</td>
<td>**</td>
<td>**</td>
<td>No</td>
<td>3</td>
</tr>
<tr>
<td>RAID 5EE</td>
<td>Yes</td>
<td>50 – 88%</td>
<td>**</td>
<td>*</td>
<td>Yes</td>
<td>4</td>
</tr>
<tr>
<td>RAID 50</td>
<td>Yes</td>
<td>67 – 94%</td>
<td>**</td>
<td>*</td>
<td>No</td>
<td>6</td>
</tr>
<tr>
<td>RAID 6</td>
<td>Yes</td>
<td>50 – 88%</td>
<td>**</td>
<td>*</td>
<td>No</td>
<td>4</td>
</tr>
<tr>
<td>RAID 60</td>
<td>Yes</td>
<td>50 – 88%</td>
<td>**</td>
<td>*</td>
<td>No</td>
<td>8</td>
</tr>
</tbody>
</table>

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.

### D.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.
D.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.

D.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.
### D.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.
D.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.
D.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.
D.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.

Based on the drive segment sizes used:

**RAID 5EE Logical Drive** = 500 GB plus parity and hot spare
D.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 123.)

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.
D.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.

![Diagram of RAID 6 Logical Drive](image)

**Disk Drives in Logical Drive**

- Disk Drive 1: 250 GB
- Disk Drive 2: 250 GB
- Disk Drive 3: 400 GB
- Disk Drive 4: 400 GB

**Drive Segment Size (Smallest Disk Drive)**

- Disk Drive 1: P1
- Disk Drive 2: P2
- Disk Drive 3: P1
- Disk Drive 4: P2

**Unused Space = 150 GB**

Based on the drive segment sizes used:
RAID 6 Logical Drive = 500 GB plus parity (P1 & P2)

D.11  **RAID 60 Logical Drives**

Similar to a RAID 50 logical drive (see RAID 50 Logical Drives on page 125), 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.
E 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 29 for more information.

Ribbon Home Icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Remote system add" /></td>
<td>Remote system add</td>
</tr>
<tr>
<td><img src="image" alt="Remote system delete" /></td>
<td>Remote system delete</td>
</tr>
</tbody>
</table>

Ribbon System Icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="System settings" /></td>
<td>System settings</td>
</tr>
<tr>
<td><img src="image" alt="Manage configuration (save/restore)" /></td>
<td>Manage configuration (save/restore)</td>
</tr>
<tr>
<td><img src="image" alt="Firmware update" /></td>
<td>Firmware update</td>
</tr>
<tr>
<td><img src="image" alt="Save archive file" /></td>
<td>Save archive file</td>
</tr>
</tbody>
</table>

Ribbon Controller Icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Controller settings" /></td>
<td>Controller settings</td>
</tr>
<tr>
<td><img src="image" alt="Manage configuration (clear)" /></td>
<td>Manage configuration (clear)</td>
</tr>
<tr>
<td><img src="image" alt="Controller rescan" /></td>
<td>Controller rescan</td>
</tr>
</tbody>
</table>

Ribbon Array Icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Array settings" /></td>
<td>Array settings</td>
</tr>
<tr>
<td><img src="image" alt="Array modify" /></td>
<td>Array modify</td>
</tr>
<tr>
<td><img src="image" alt="Array split/mirror" /></td>
<td>Array split/mirror</td>
</tr>
<tr>
<td><img src="image" alt="Array locate" /></td>
<td>Array locate</td>
</tr>
<tr>
<td><img src="image" alt="Array delete" /></td>
<td>Array delete</td>
</tr>
</tbody>
</table>
## Ribbon Logical Device Icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Logical drive settings</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Logical drive create</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Logical drive expand/migrate</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Logical drive locate</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Logical drive delete</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Logical drive force online</td>
</tr>
</tbody>
</table>

## Ribbon Physical Device Icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Physical disk properties</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Assign/unassign physical disk as spare</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Force physical disk offline</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Physical disk secure erase</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Physical disk locate</td>
</tr>
</tbody>
</table>

## Enterprise View Icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Enterprise View</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Local or remote system</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Controller</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Enclosure</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Logical disk</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Logical disks</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Physical disk</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Hard disk drive</td>
</tr>
<tr>
<td>Icon</td>
<td>Description</td>
</tr>
<tr>
<td>------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Solid State drive</td>
<td></td>
</tr>
<tr>
<td>Physical disks</td>
<td></td>
</tr>
<tr>
<td>Enclosure</td>
<td></td>
</tr>
<tr>
<td>Connector or other physical device</td>
<td></td>
</tr>
</tbody>
</table>

**Enterprise View Status Icons**

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>⚡</td>
<td>Enterprise OK</td>
</tr>
<tr>
<td>🚫</td>
<td>Enterprise error</td>
</tr>
<tr>
<td>🚫</td>
<td>Enterprise no access</td>
</tr>
<tr>
<td>🚫</td>
<td>Enterprise warning</td>
</tr>
</tbody>
</table>

**Enterprise View System Icons**

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>⚡</td>
<td>System OK</td>
</tr>
<tr>
<td>🚫</td>
<td>System error</td>
</tr>
<tr>
<td>⚫</td>
<td>System missing</td>
</tr>
<tr>
<td>⚫</td>
<td>System no access</td>
</tr>
<tr>
<td>🚫</td>
<td>System warning</td>
</tr>
</tbody>
</table>

**Enterprise View Connector Icons**

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>⚡</td>
<td>Connector OK</td>
</tr>
<tr>
<td>🚫</td>
<td>Connector failed</td>
</tr>
<tr>
<td>⚫</td>
<td>Connector missing</td>
</tr>
<tr>
<td>🚫</td>
<td>Connector warning</td>
</tr>
</tbody>
</table>
## Enterprise View Controller Icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Green Checkmark]</td>
<td>Controller OK</td>
</tr>
<tr>
<td>![Red X]</td>
<td>Controller failed</td>
</tr>
<tr>
<td>![Gray Icon]</td>
<td>Controller missing</td>
</tr>
<tr>
<td>![Yellow Exclamation Mark]</td>
<td>Controller warning</td>
</tr>
</tbody>
</table>

## Enterprise View Enclosure Icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Green Checkmark]</td>
<td>Enclosure Management OK</td>
</tr>
<tr>
<td>![Red X]</td>
<td>Enclosure Management failed</td>
</tr>
<tr>
<td>![Gray Icon]</td>
<td>Enclosure missing</td>
</tr>
<tr>
<td>![Yellow Exclamation Mark]</td>
<td>Enclosure Management warning</td>
</tr>
</tbody>
</table>

## Enterprise View Physical Disk Icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Green Checkmark]</td>
<td>Physical disk OK</td>
</tr>
<tr>
<td>![Green Checkmark]</td>
<td>Physical disks OK</td>
</tr>
<tr>
<td>![Red X]</td>
<td>Physical disks failure</td>
</tr>
<tr>
<td>![Gray Icon]</td>
<td>Physical disks missing</td>
</tr>
<tr>
<td>![Yellow Exclamation Mark]</td>
<td>Physical disks warning</td>
</tr>
</tbody>
</table>

## Tab Icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![File]</td>
<td>Summary</td>
</tr>
<tr>
<td>![Properties]</td>
<td>Properties</td>
</tr>
<tr>
<td>![Search]</td>
<td>Resources</td>
</tr>
<tr>
<td>![Calendar]</td>
<td>Events</td>
</tr>
<tr>
<td>Icon</td>
<td>Description</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td></td>
<td>Task</td>
</tr>
</tbody>
</table>

**Dialog Box Icons**

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E-mail notification</td>
</tr>
<tr>
<td></td>
<td>Chart</td>
</tr>
</tbody>
</table>
# Index

## A

activity in storage space 32
- event log 32
task log 32
activity on storage space, See monitoring adapters, See controllers
Add System wizard 99
Agent
- introduction 15, 37
- starting 38
  - Linux 38
  - Windows 38
- startup order 37
archive file 90, 107
arrays
- deleting 67
- auto-discovery 98
- auto-replace hot spares 48

## B

background consistency check 58
boards, See controllers
bootable USB image 26
build method
- Build 42, 46
- Default 42, 46
building storage space
- 14, 36, 39–40, 43, 47, 56, 57–58
- on existing array 39–40, 43, 58
- on new array 39, 43, 57

## C

cards, See controllers
CIM server 15, 19
components
- defined 13
- viewing properties 68
Configuration Event Detail window 84
configuring 39–40, 43, 57–58
  - See also building storage space
connector modes 75
controller
- 33, 86, 101
  - clearing configuration 101
controller connector modes 75
controller performance optimization 74
controllers
- 68, 74, 77, 80
  - properties 68
  - rescanning 74
  - updating firmware 77, 80

dedicated hot spares 48, 52
- creating 48
- removing 52
deleting logical drives 67
direct attached storage
- 12
  - defined 12
disk drive
- 77, 80
  - updating firmware 77, 80
disk drive segments 119
disk drives
- 41, 56–58, 67–68, 70–72, 77, 106–107
  - conceptual graphic 56
  - different sizes in same logical drive 57
  - failed state 70
  - failure recovery 106–107
    - multiple disk drives 106–107
    - multiple logical drives 106
    - RAID 0 logical drives 106–107
    - with hot spare 106
    - without hot spare 106
  - identifying 68
  - locating 68
  - properties 68
  - replacing in logical drives 70
  - secure erasing 71
  - segments in logical drives 57–58, 67
  - uninitializing 72
  - updating firmware 77
  - within logical drives 41
drives 68
  - identifying 68
locating drives (continued)  
  68

E

email notifications  
  83, 88–89, 91–93  
  "from" address 89  
  changing "from" address 89, 92–93  
  changing SMTP server 89, 92–93  
  disabling 89, 93  
  failed test emails 92  
  modifying recipient information 89, 92  
  recipient addresses 89  
  removing recipients 89, 92  
  setup 89  
  SMTP server settings 89  
  test emails 89, 91  
  Email Notifications Manager  
    83, 88–89, 91  
    opening 89  
    test emails 89, 91  
  enclosure  
    77, 81  
    updating firmware 77, 81  
  enclosures  
    33, 68, 86–87, 118  
    fan status 33, 86–87, 118  
    identifying 68  
    locating 68  
    monitoring 33, 86–87, 118  
    power status 33, 86–87, 118  
    status 33  
    temperature status 33, 86–87, 118

Enterprise View  
  29, 31  
  icons 31  
  event log 32, 83  
  event log (operating system) 93  
  events 32  
  See also monitoring expander  
    77, 81  
    updating firmware 77, 81

F

failed disk drives  
  106–107  
  multiple logical drives 106  
  RAID 0 logical drives 106–107  
  without hot spare 106  
  failed logical drive  
    106–107  
  force online 106–107

firmware 77, 80–81  
  Firmware Update wizard 77  
  force online 106–107  
  formatting logical drives 43, 46

H

hard disk  
  13  
  hard disk drive 13  
  hard drive, See disk drive  
  help 34  
  hot spare activation 54  
  hot spares  
    48, 50–52  
    auto-replace 48, 50  
    creating dedicated 48  
    limitations 48, 50–51  
    removing 52

I

icons  
  31, 83–84, 90  
  Enterprise View 31  
  event status icons 83–84, 90  
  identifying components 68

L

Linux  
  38  
  starting the Agent 38  
  local systems 36  
  locating drives 68  
  logging in 28, 36–37  
  logging into remote systems 38  
  logging out 35  
  logical drives  
    build method 42, 46  
    building on existing array 39–40, 43, 58  
    building on new array 39, 43, 57  
    defined 56  
    deleting 67  
    different-sized disk drives 57  
    disabling background consistency check 58  
    disk drive segments 57–58, 67, 119  
    enabling background consistency check 58  
    formatting 43, 46  
    hot-swap rebuilding 66, 70, 107  
    non-redundant 120
logical drives (continued)
  options for creating 39
  partitioning 43, 46
  RAID 1 120
  RAID 10 122
  RAID 1E 121
  RAID 5 123
  RAID 50 125
  RAID 5EE 124
  RAID 6 126
  RAID 60 126
  RAID segments 119
  rebuild priority 65
  rebuilding 106
  renaming 66
  replacing disk drives 70
  selecting disk drives 41
  selecting RAID levels 40, 44

M

main window
  29, 35, 68, 83–85, 90, 116–117, 127
  event details 84
  event log 83
  Logout button 35
  monitoring activity and status 83
  notification types
    83–84, 90
    event log 83
    event status icons 83–84, 90
  overview 29, 127
  status icons 83–84, 90
  Storage Dashboard 68, 83, 85, 116–117
  task details 85
maxView Storage Manager
  14–16, 29, 31, 37–38, 83, 127
  Agent 15, 37
  beginning steps 14
  Enterprise View 29
  event log 83
  icons 31
  introduction 14, 37
  logging into remote systems 38
  main window overview 29, 127
  ribbon 31
  Ribbon 29
  system requirements 16
monitoring
  device properties 68
  email notifications
    83, 88–89, 91–93
    "from" address 89

monitoring (continued)
  email notifications (continued)
    changing "from" address 89, 92–93
    changing SMTP server 89, 92–93
    failed test emails 92
    modifying recipient information 89, 92
    recipient addresses 89
    removing recipients 89, 92
    setup 89
    SMTP server settings 89
    test emails 89, 91
  Email Notifications Manager 83, 88
  event details 84
  event log 32, 83
  options 83
  status icons 83–84, 90
  Storage Dashboard 68, 83, 85, 116–117
  task details 85
  task log 32

N

non-RAID Mode controllers 117–118
non-redundant logical drives 120
notification types
  83, 88
  email notifications 83, 88

O

online help 34
operating system event log 93
operating systems 16

P

partitioning logical drives 43, 46
Properties tab 68
pure HBAs 117–118

R

RAID 120–126
  non-redundant logical drives 120
  RAID 0 120
  RAID 1 120
  RAID 10 122
  RAID 1E 121
  RAID 5 123
  RAID 50 125
  RAID 5EE 124
  RAID 6 126
  RAID 60 126
RAID levels 40, 44
  selecting 40, 44
RAID segments 119
RAW drive 72
RAW state 72
reactivating split mirror backup 63
rebuild priority 65
rebuilding (defined) 106
remirroring split mirror backup 63
remote systems 36, 99
  adding manually 99
  removing 99
renaming logical drives 66
rescanning controllers 74
Resources View 33, 86
ribbon 31, 38, 66, 73–74, 108
Add system 38
  Change logical device name 66
  Configure global disk drive cache 73
overview 31
Rescan 74
  Save support archive 108
Ribbon 29

S
  secure erase 71
segments 56, 119
Self-Monitoring Analysis and Reporting Technology (SMART) 87
Server Template File 95
silent installation 109–110
  switches, properties, and values 109–110
SMART statistics 87
SMI-S provider 15, 19
SMTP server 89, 92–93
split mirror backup array 63
status 32–33
  See also monitoring enclosures 33
  event log 32
  task log 32
  See also monitoring status icons 83–84, 90
  main window 83–84, 90
Storage Dashboard 68, 83, 85, 116–117
storage space 12, 17
  examples 17
support archive file 90, 107
system requirements 16
systems 36, 68
  local systems 36
  properties 68
  remote systems 36

T
task log 32
temperature status 33, 86–87, 118
terminology 12

U
  uninitialized disk drives 72
  updating firmware 77, 80–81

W
  Windows 38
  starting the Agent 38