

# **HPE MR Storage Administrator User Guide**

#### Abstract

This document includes feature, installation, and configuration information for HPE MR Storage Administrator users. It is intended for users with a good working knowledge of storage hardware and configuration of logical drives and arrays. Hewlett Packard Enterprise assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

For a comprehensive list of changes to this document, see the Revision History.

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# **Table of Contents**

HPE MR Storage Administrator Application Overview	8
Support Matrix	9
HPE MR Storage Administrator Feature Support Matrix	11
Performing the Initial Setup	15
Displaying or Blocking a Private IP Address	15
Alert Settings	16
Setting Up the Email Server	17
Adding the Email Addresses of Alert Notification Recipients	
Configuring Different Types of Access	19
Server Dashboard	20
Controller Dashboard	22
Controller Configurations	23
Creating a New Storage Configuration Using the Simple Configuration Option	
Creating a New Storage Configuration Using the Advanced Configuration Option	24
Selecting Available Unconfigured Drives	
Selecting Logical Drive Settings	
Clearing the Configuration	
Importing or Clearing Foreign Configurations	28
UNMAP Capability Feature	
UNMAP Capability Feature Behavior	29
UNMAP Feature Support	
Changing Behavior Modes	30
Background Operations Support	32
Managing Controllers	33
Viewing Controller Properties	
Running Consistency Checks	33
Setting Consistency Check Properties	34
Scheduling a Consistency Check Operation	
Running a Patrol Read Operation	35
Setting the Patrol Read Properties	
Starting a Patrol Read Operation	
Stopping a Patrol Read Operation	36
Managing SAS Storage Link Speed	
Managing PCIe Storage Interface	
Setting Adjustable Task Rates	38

Discarding Pinned Cache	39
Downloading the Serial Output Log	40
Updating the Controller Firmware	40
MegaRAID Advanced Software Features	41
Using the MegaRAID CacheCade Pro 2.0 Feature	41
Creating a CacheCade Logical Drive	
Modifying the CacheCade Logical Drive Properties	45
Enabling SSD Caching on a Logical Drive	45
Disabling SSD Caching on a Logical Drive	46
Clearing Configuration on Controllers with CacheCade Logical Drives	
Deleting a CacheCade – SSD Caching Logical Drive	
MegaRAID Fast Path Advanced Software	47
MegaRAID SafeStore Encryption Services	48
Enabling Drive Security	48
Changing Drive Security Settings	50
Disabling Drive Security	51
Importing or Clearing a Foreign Configuration – Security-Enabled Drives	52
Managing Arrays	53
Viewing Array Properties	53
Adding a Logical Drive to an Array	53
RAID Level Transformation	
Migrating the RAID Level of an Array	
Adding Drives to a Configuration	55
Removing Drives from a Configuration	
Migrating the RAID Level Without Adding or Removing Drives	
Managing Logical Drives	57
Viewing Logical Drive Properties	57
Modifying Logical Drive Properties	58
Start and Stop Locating a Logical Drive	59
Erasing a Logical Drive	59
Initializing a Logical Drive	61
Starting Consistency Check on a Logical Drive	61
Expanding the Capacity of a Logical Drive While Online	61
Deleting a Logical Drive	62
Managing Drives	64
Viewing Drive Properties	64
Start and Stop Locating a Drive	65
Making a Drive Offline	65

Marking a Drive as a Missing Drive
Assigning Global Spare Drives
Removing a Global Spare Drive
Assigning Dedicated Spare Drives 69
Rebuilding a Drive
Converting an Unconfigured Bad Drive to an Unconfigured Good Drive
Removing a Drive
Make Unconfigured Good Drives and Make JBOD Drives70
Making Unconfigured Good Drives70
Making a JBOD Drive
Erasing a Drive
Erasing a Drive Securely71
Sanitizing a Drive
Managing Hardware Components75
Monitoring the HPE Smart Storage Energy Pack75
Monitoring Enclosures75
Viewing Enclosure Properties
Viewing Event Logs77
77 Downloading Logs
Clearing the Event Logs
Known Issues and Workarounds79
Appendix A: Multi-Selection Threshold Physical Drives
Appendix B: Support and Other Resources82
Accessing Hewlett Packard Enterprise Support
Accessing Updates
Customer Self Repair
Remote Support83
Warranty Information
Regulatory Information
Bocumentation Feedback
Appendix C: Glossary
Appendix D: Revision History

# HPE MR Storage Administrator Application Overview

The HPE MR Storage Administrator application is a web-based application that lets you monitor, maintain, troubleshoot, and configure MegaRAID products. The HPE MR Storage Administrator graphical user interface (GUI) helps you to view, create, and manage storage configurations.

• **Monitoring and Configuring**: The HPE MR Storage Administrator application lets you monitor the controllers and configure the drives on the controller.

The application displays the status of the controller cards, logical drives, and drives on the controller. The device status icons are displayed on their respective pages to notify you in case of drive failures and other events that require your immediate attention. Real-time email notifications on the status of the server are sent based on your alert settings. The system errors and events are recorded and displayed in an event log file. Additionally, you can also import or clear foreign configurations.

- **Maintaining**: Using the HPE MR Storage Administrator application, you can perform system maintenance tasks, such as updating the controller firmware.
- **Troubleshooting**: The HPE MR Storage Administrator application displays information that is related to drive failures, device failures, and so on.

The application also provides recommendations and displays contextual links, helping you to easily locate drives and devices that have issues and troubleshoot them. In addition, you can download a complete report of all the devices and their configurations, properties, and settings and send it to the support teams for further analysis and troubleshooting.

# **Support Matrix**

The following table provides the support requirements for the HPE MR Storage Administrator application.

Support	Version/Flavors	
Supported Controllers	HPE MR416i-p Gen11	
	HPE MR416i-o Gen11	
	HPE MR216i-p Gen11	
	HPE MR216i-o Gen11	
	HPE MR408i-o Gen11	
	HPE MR416i-p Gen 10+	
	• HPE MR416i-a Gen 10+	
	• HPE MR216i-p Gen 10+	
	• HPE MR216i-a Gen 10+	
	HPE Smart Array P824i-p MegaRAID Gen10 Controller	
Supported operating systems		
Microsoft	Microsoft Hyper-V Server 2022	
	Microsoft Hyper-V Server 2019	
	Microsoft Hyper-V Server 2016	
	Microsoft Windows Server 2016 (Datacenter)	
	Microsoft Windows Server 2016 (Standard)	
	Microsoft Windows Server 2016 (Essentials)	
	Microsoft Hyper-V Server 2012 R2	
	Microsoft Windows Server 2016 RS3	
	Microsoft Windows Server 2012 R2 (Foundation)	
	Microsoft Windows Server 2012 R2 (Essentials)	
	Microsoft Windows Server 2012 R2 (Standard)	
	Microsoft Windows Server 2012 R2 (Datacenter)	

Support	Version/Flavors		
Linux	Version/Flavors         • Red Hat Enterprise Linux 9.1         • Red Hat Enterprise Linux 9         • Red Hat Enterprise Linux 8.7         • Red Hat Enterprise Linux 8.7         • Red Hat Enterprise Linux 8.6         • Red Hat Enterprise Linux 8.7         • Red Hat Enterprise Linux 8.6         • Red Hat Enterprise Linux 8.7         • Red Hat Enterprise Linux 8.4         • Red Hat Enterprise Linux 8.3         • Red Hat Enterprise Linux 8.1         • Red Hat Enterprise Linux 7.8         • Red Hat Enterprise Linux 7.8         • Red Hat Enterprise Server 15 SP5         • SUSE Linux Enterprise Server 15 SP4         • SUSE Linux Enterprise Server 15 SP3         • SUSE Linux Enterprise Server 15 SP1         • SUSE Linux Enterprise Server 15 SP1		
	<ul> <li>SUSE Linux Enterprise Server 12 SP4</li> <li>SUSE Linux Enterprise Server 12 SP3</li> </ul>		
Ubuntu	<ul> <li>Ubuntu 22.04 LTS</li> <li>Ubuntu 20.04 LTS</li> <li>Ubuntu 18.04 LTS</li> </ul>		
openEuler	openEuler 20.03 LTS		
Supported web browsers	<ul> <li>Windows Internet Explorer 9.0 and later</li> <li>Mozilla Firefox version 9.0 and later</li> <li>Google Chrome version 16.0 and later</li> </ul>		
Supported networks	<ul> <li>Internet Protocol versions 4 and 6</li> <li>Network Address Translation</li> <li>Domain</li> <li>HTTP, HTTPS</li> </ul>		

# HPE MR Storage Administrator Feature Support Matrix

The following tables outline the feature support for HPE Smart Array MegaRAID controllers with respect to software features and firmware features.

Feature Name	MegaRAID Firmware		
RAID level	RAID 0, RAID 1, RAID 5, RAID 6, RAID 10, RAID 50, and RAID 60		
Maximum drives	240		
Maximum spans	8		
Maximum logical drives	240		
Maximum media errors	256		
Drive-mixing support	No.		
Strip size support	64 KB, 128 KB, 256 KB, 512 KB, and 1024 KB		
Maximum logical drives per array	64		
Multipath	No		
Controller reset support	Yes		

#### Table 2: MegaRAID Firmware Feature Support Matrix

#### **Table 3: Software Feature Support**

Feature Name	Description
Server Dashboard	The Server Dashboard is the default landing page in the application. The Server Dashboard displays the overall summary of the server and the devices attached to it. You can troubleshoot, configure, maintain, and monitor the controllers from the Server Dashboard. See Server Dashboard for more information.
Controller Dashboard	The Controller Dashboard lets you perform controller related actions and view all the information pertaining to a controller. See Controller Dashboard for more information
Simple Configuration	The Simple Configuration option is the quickest and easiest way to create a new storage configuration. When you select Simple Configuration mode, the system creates the best configuration possible using the available drives. See Creating a New Storage Configuration Using the Simple Configuration Option for more information.
Advanced Configuration	The Advanced Configuration option provides an easy way to create a new storage configuration. The Advanced Configuration option gives you greater flexibility than Simple Configuration because you can select the physical drive and logical drive parameters when you create a logical drive. In addition, you can use the Advanced Configuration option to create spanned arrays. See Creating a New Storage Configuration Using the Advanced Configuration Option for more information.
CacheCade – SSD Caching Configuration	The MegaRAID CacheCade read and write option eliminates the need for manually configured hybrid arrays by intelligently and dynamically managing frequently-accessed data and copying it from HDD volumes to a higher performance layer of SSD cache. Copying the most accessed data (hot spot) to flash the cache relieves the primary HDD array from time-consuming transactions, which allows for more efficient hard disk operation, reduced latency, and accelerated read and write speeds. See Creating a CacheCade Logical Drive for more information.

Feature Name	Description	
Foreign Configuration (Import/ Clear)	A foreign configuration is a RAID configuration that already exists on a replacement set of drives that you install in a storage system. You can use the application to import the foreign configuration to the controller or clear the foreign configuration so that you can create a new configuration using these drives. See Importing or Clearing Foreign Configurations for more information.	
Clear Configuration	The Clear Configuration feature lets you clear all existing configurations on a selected controller. See Clearing the Configuration for more information.	
Update Firmware	The Update Firmware feature lets you update the controller firmware. See Updating the Controller Firmware for more information.	
Online Firmware Update	The Online Firmware Update feature lets you update the controller firmware. See Updating the Controller Firmware for more information.	
	Controller Operations	
Setting Consistency Check Properties	The Consistency Check operation verifies the correctness of the data in logical drives that use RAID levels 1, 5, 6, 10, 50, and 60, configurations. For example, in a system with parity, checking the consistency means calculating the data on one drive and comparing the results to the contents of the parity drive. See Running Consistency Checks for more information.	
Scheduling Consistency Check	The Scheduling Consistency Check feature lets you periodically run a consistency check on fault- tolerant logical drives. See Scheduling a Consistency Check Operation for more information.	
Setting Patrol Read Properties	A Patrol Read operation periodically verifies all sectors of the drives connected to a controller, including the system reserved area in the RAID configured drives. You can run a Patrol Read operation for all RAID levels and for all spare drives. A Patrol Read operation is initiated only when the controller is idle for a defined period and has no other background activities. See Setting the Patrol Read Properties for more information.	
Starting Patrol Read	A Starting Patrol Read operation lets you start a patrol read operation. See Starting a Patrol Read Operation for more information.	
Stopping Patrol Read	A Stopping Patrol Read operation lets you stop an already started patrol read operation. See Stopping a Patrol Read Operation for more information.	
Managing Link Speed	A Managing Link Speed operation lets you change the link speed between the controller and an expander or between the controller and a drive that is directly connected to the controller. See Managing SAS Storage Link Speed for more information.	
Setting Adjustable Task Rates	A Setting Adjustable Task Rates operation lets you change the Rebuild Rate, Transformation Rate, Patrol Read Rate, BGI Rate, and Consistency Check Rate for a controller. See Setting Adjustable Task Rates for more information.	
Discarding Preserved Cache	If the controller loses access to one or more logical drives, the controller preserves the data from the logical drive. This preserved cache is called <i>Pinned Cache</i> . This cache is preserved until you import the logical drive or discard the cache. As long as pinned cache exists, you cannot perform certain operations on the logical drive. See <u>Discarding Pinned Cache</u> for more information.	
Downloading Serial Output Log	The Serial Output Log file contains the firmware terminal log entries for the controller. The log information is shown as total number of entries available on the firmware side. See Downloading the Serial Output Log for more information.	
Background Operations	Provides information on Background Operations Support, such as Pause, Resume, Abort, and so on. See Background Operations Support for more information.	
Advanced Software Features		
Fast Path	The MegaRAID FastPath software is a high-performance I/O accelerator for solid state drive (SSD) arrays connected to a MegaRAID controller card. This advanced software is an optimized version of MegaRAID technology that can dramatically boost storage subsystem and overall application performance; particularly those that demonstrate high random read/write operation workloads – when deployed with a MegaRAID SATA+SAS controllers connected to SSDs. See MegaRAID Fast Path Advanced Software for more information.	

Feature Name	Description	
CacheCade SSD	The CacheCade advanced software option is designed to accelerate the performance of HDD arrays with only incremental investments in SSDs. The CacheCade option helps enable SSDs to be configured as a dedicated pool of controller cache to help maximize I/O performance for transaction-intensive applications, such as data bases, websites, and so on. See MegaRAID Advanced Software Features for more information.	
CacheCade Pro	The MegaRAID CacheCade Pro 2.0 read and write software eliminates the need to manually configure hybrid arrays by intelligently and dynamically managing frequently-accessed data and copying it from HDD volumes to a higher performance layer of SSD cache. See Using the MegaRAID CacheCade Pro 2.0 Feature for more information.	
RAID 5 and RAID 6	<ul> <li>RAID 5         Uses data striping and parity data across three or more drives (distributed parity) to provide high data throughput and data redundancy, especially for applications that require random access.     </li> <li>RAID 6         Uses data striping and parity data across three or more drives (distributed parity) to provide high data throughput and data redundancy, especially for applications that require random access. RAID 6     </li> </ul>	
	Logical Drive Operations	
Logical Drive Settings/Modifying Logical Drive Properties	A Logical Drive Settings/Modifying Logical Drive Properties operation lets you configure the logical drives. See Selecting Logical Drive Settings for more information.	
Start and Stop Locating a Logical Drive	If the drives reside in a disk enclosure, you can identify them by making their LEDs blink. See Start and Stop Locating a Drive for more information.	
Erasing a Logical Drive	An Erasing a Logical Drive operation lets you erase data on Non SEDs (normal HDDs) using the Drive Erase option. The Erase operation is performed as a background task. See Erasing a Drive for more information.	
Initializing a Logical Drive	An Initializing a Logical Drive operation lets you select the <b>Fast Initialization</b> or <b>Full Initialization</b> option to initialize a drive immediately under the <b>Advanced Configuration</b> wizard. See Initializing a Logical Drive for more information.	
Starting Consistency Check on a Logical Drive	A Consistency Check operation verifies whether all stripes in a logical drive with a redundant RAID level have correct parity or mirror values. The Consistency Check operation involves mirroring data when an inconsistent stripe is detected for a RAID 1 configuration, and re-creating the parity from the peer disks in the case of a RAID 5 and RAID 6 configuration. This mechanism applies to variants and secondary RAID levels based on RAID 1 and RAID 5 configurations. See Starting Consistency Check on a Logical Drive for more information.	
Expanding the Online Capacity of a Logical Drive	The Online Capacity Expansion (OCE) feature lets you expand the capacity of a logical drive by adding new drives or making use of unused space on existing disks, without requiring a reboot. See Expanding the Capacity of a Logical Drive While Online for more information.	
Deleting a Logical Drive	The Deleting a Logical Drive feature lets you delete a logical drive. See Deleting a Logical Drive for more information.	
Drive Operations		
Assign Global Spare Drives	A global spare drive replaces a failed drive in any redundant array, as long as the capacity of the global spare drive is equal to or greater than the coerced capacity of the failed drive. See Assigning Global Spare Drives for more information.	
Remove Global Spare Drives	A Remove Global Spare Drives operation lets you remove global spare drives. See Removing a Global Spare Drive for more information.	
Assign Dedicated Spare Drives	A dedicated spare drive provides protection to one or more specified arrays on the controller. See Assigning Dedicated Spare Drives for more information.	
Start and Stop Locating Drive	If the drives are in a disk enclosure, you can identify them by making their LEDs blink. See Start and Stop Locating a Drive for more information.	

Feature Name	Description	
Making a Drive Online and Offline	The Making a Drive Online and Offline feature lets you change the state of a drive. See Making a Drive Offline and Making a Drive Online for more information.	
Replacing a Drive	The Replacing a Drive feature lets you replace a drive if the drive shows signs of failing. See Replacing a Drive for more information.	
Rebuilding a Drive	If a drive that is configured as RAID 1, 5, 6, 10, 50, or 60 fails, the firmware automatically rebuilds the data on a spare drive to prevent data loss. The Rebuild operation is a fully automatic process. You can monitor the progress of drive rebuilds in the <b>Background Processes in Progress</b> window. See Rebuilding a Drive for more information.	
Erasing a Drive	The Erasing a Drive feature lets you erase data on Non SEDs (normal HDDs). The Erase operation is performed as a background task. See Erasing a Drive for more information.	
Sanitizing a Drive	The Sanitizing a Drive feature lets you erase the data that resides on a drive using the Sanitize feature. The Sanitize feature is similar to the Drive Erase feature that is already supported by your controller, except that the Sanitize function is performed by the drive firmware, whereas the Drive Erase function is performed by the controller firmware. See Sanitizing a Drive for more information.	
Converting Unconfigured Bad Drive to Unconfigured Good Drive	When you force a drive offline, it enters the Unconfigured Bad state. If a drive contains valid disk data format (DDF) metadata, its drive state is Unconfigured Good. See Converting an Unconfigured Bad Drive to an Unconfigured Good Drive for more information.	
Make Unconfigured Good Drive	When you power down a controller and insert a new drive, and if the inserted drive does not contain valid DDF metadata, the drive status is listed as <i>JBOD</i> (Just a Bunch of Drives) when you power up the system again. When you power down a controller and insert a new drive, and if the drive contains valid DDF metadata, its drive state is listed as Unconfigured Good. A new drive in the JBOD drive state is exposed to the host operating system as a stand-alone drive. See Make Unconfigured Good Drives and Make JBOD Drives for more information.	
Make JBOD	The Make JBOD feature lets you create JBODs. See Making a JBOD Drive for more information.	
Event Logs		
Viewing Event Logs	The application monitors the activity and performance of the server and all of the controllers attached to it. See Viewing Event Logs for more information.	

# Performing the Initial Setup

After you successfully log into the HPE MR Storage Administrator application, it is recommended that you perform the initial setup tasks before proceeding.

# **Displaying or Blocking a Private IP Address**

This section outlines the strategy that the application follows to display or block a private IP address in a corresponding sub-net.

- Private IP address A private IP address is a non-Internet facing IP address on an internal network.
   Private IP addresses are provided by network devices, such as routers, using network address translation (NAT).
- Virtual IP address A virtual IP address (VIPA) is an IP address that is assigned to multiple domain names or servers that share an IP address based on a single network interface card (NIC).
   VIPAs are allocated to virtual private servers, websites, or any other application that resides on a single server. The

VIPAs are allocated to virtual private servers, websites, or any other application that resides on a single server. The host server for these applications has a network IP address that is assigned by a network administrator, whereas the different server applications have VIPAs. VIPAs enhance network load balancing and redundancy.

Automatic Private IP Addressing – Automatic Private IP Addressing (APIPA) is a feature of Windows-based
operating systems that enable a computer to automatically assign itself an IP address when no Dynamic Host
Configuration Protocol (DHCP) server is available to perform that function.

APIPA serves as a DHCP server failover mechanism and makes it easier to configure and support small local area networks.

- Private IP Address Range The following is the IP address range which falls under either the private, (or) Virtual, (or) APIPA category:
  - NAT 10.0.0.0 10.255.255.255
  - Private (or) Virtual 172.16.0.0 172.31.255.255 or 192.168.0.0 192.168.255.255
  - APIPA 169.254.0.0 to 169.254.255.255

The use cases that follow provide details on how the application behaves in various situations:

Use Case	Standalone / Client	Remarks
No NIC CARD (Windows)	Loopback (or) 127.0.0.1	As the server is not in network, the gateway cannot access the standalone server.
No NIC CARD (Linux)	Loopback (or) 127.0.0.1	Because the server is not in network, the gateway cannot access the standalone server.
Static IP	Using Static IP	—
DHCP IP	Using the DHCP IP	—
Private IP	Using the Private IP	In a more secured environment, private IP address cannot be accessed outside the server.

#### Table 4: Use Case #1: Without Blocking the Private IP

Table 5: Use Case #2: After Blocking the Private IP

Use Case	Standalone / Client	Remarks
No NIC CARD (Windows)	Loopback (or) 127.0.0.1	As the server is not in network, the gateway cannot access the standalone server.
No NIC CARD (Linux)	Loopback (or) 127.0.0.1	Because the server is not in network, the gateway cannot access the standalone server.
Static IP	Using Static IP	—
DHCP IP	Using the DHCP IP	—
Private IP	If a valid IP exists, it is displayed. If no valid IP exists, Loopback (or) 127.0.0.1 is displayed.	In a more secured environment, because a private IP address cannot be accessed outside the server, the application does not populate a private IP address.

Why does the application blocks certain IP addresses: In an enterprise world, when a computer is assigned a private IP address, the local devices see this computer through its private IP address. However, devices residing outside of your local network cannot directly communicate through the private IP address, but uses your router's public IP address to communicate. You must use a NAT router to directly access a local device assigned a private IP address.

In a more secure environment, although the application is able to discover and display the private IP address through the gateway server, when a request is made through the gateway server, the private IP is not accessible. Because the application cannot access the private IP, the application is unable to service the requests which are meant for the private IP.

Because of the previously mentioned reason, when the installation is a gateway, the corresponding gateway server is not able to communicate with the private IP address which in turn becomes an issue. The application works if the private IP addresses are behind the NAT router, which is the most preferable option in an enterprise world.

The diagram that follows shows how a private IP address should be accessed in enterprise networks and the problems with the private IP address:

#### Figure 1: Private IP Address Access



# **Alert Settings**

The Alert Settings tab lets you perform these actions:

- Change the alert delivery method for different severity levels.
- Specify different alert delivery methods for inside and outside the application.
- Revert back to the default alert delivery methods and the default severity level of an individual event.
- Save the alert settings on the server.

Based on the severity level (Information, Warning, Critical, and Fatal), the default alert delivery methods change. By default, each severity level has one or more alert delivery methods configured for it. The different alert delivery methods are as follows:

- System Log By default, all of the severity events are logged in the local system log. In the Windows operating system (OS), the system log is logged in Event Viewer > Application. In the Linux OS, the system log is logged in var > log.
- Event Log By default, all the severity events appear in the event log.
   Click View Event Log to view the event log. Each message that appears in this log has a severity level that indicates the importance of the event (severity), an event ID, a brief description, and a date and timestamp (when it occurred).
- System Messages By default, fatal and critical events are displayed as system messages.
   System messages are displayed in a yellow bar at the top of the Server Dashboard and the Controller Dashboard.
   System messages let you view multiple events in a single location.
- Email By default, fatal events are displayed as email notifications.
   Based on your configuration, the email notifications are delivered to your inbox. In the email notification, aside from the event's description, the email also contains system information and the controller's image details. Using this additional information, you can determine the system and the controller on which the fatal error occurred.

To change the alert delivery method for each severity level, perform these steps:

1. Click Settings in the Server Dashboard.

The Alert Settings page appears, with the default alert delivery methods for each severity level.

#### Figure 2: Alert Settings Page

Alert Settings Mail Server

Choose the alert delivery method for each severity level Displaying default alert settings

Email

Fatal - when a componer	nt fails and data loss occurs			- Actions
Within Application	<ul> <li>System Log</li> </ul>	Event Log	<ul> <li>System Messages</li> </ul>	Save Alert Settings
Outside Application	🕑 Email			Restore Default Alert Settings
Critical - when a compor	nent fails			
Within Application	<ul> <li>System Log</li> </ul>	Event Log	<ul> <li>System Messages</li> </ul>	
Outside Application	Email			
Needs Attention - wh	en a component is close to fa	iture point		
Within Application	System Log	Event Log	System Messages	
Outside Application	Email			
Information - informati	ional message where no user	action is necessary		
Within Application	System Log	Event Log	System Messages	

- 2. Select the desired alert delivery method for each severity level by clicking the required check box.
- Click Save Alert Settings to save the settings on the server.
   Click Restore Default Alert Settings to revert back to the default alert delivery settings.

# Setting Up the Email Server

Perform these steps to enter or edit the mail and the SMTP server settings.

1. Click the Mail Server tab on the Settings page.

The Mail Server page displays the current mail server settings.

#### Figure 3: Mail Server Window

Alert Settings Mail Server Email	
ovide mail and server settings from which the applic	cation will send alert notifications.
Sender Email Address	SMTP Server
lsa-monitor@server.com	127.0.0.1
Port 25 Use Default. For server authentication, please provide the following (optional depending up	pon the server settings)
This server requires authentication	
User Name	Password

- 2. Specify the details in the respective fields as per your requirement.
- 3. Select the **This server requires authentication** check box on your SMTP server if the authentication login feature is enabled. To enable this feature, specify the authentication details in the **User Name** and **Password** fields respectively.
- 4. Click Save.

# Adding the Email Addresses of Alert Notification Recipients

Perform these steps to add email addresses of recipients of the alert notifications.

1. Click the Email tab in the Setting page.

Alert Settings	Mail Server	Email		
rovide email addre splaying current email settin	esses to which the er	nail alert notification	s will be sent.	
Add Email Address		Add		
Email alerts will be sent to	o the following email ids	Remove		
Send Test Mail				

- 2. Specify the details in the respective fields as per your requirement.
- 3. Click Save.

# **Configuring Different Types of Access**

1. To enable logging in with a user name and password, complete the following steps.

#### NOTE

By default, the application is installed without a login so the user can access the application without entering a user name and password.

- a) Stop the MRSA services and nginx services.
- b) Go to the file <MRSA\_Home>/LSIStorageAuthority\conf.
- c) Open the file LSA.conf.
- d) Update the following field value to 0.

```
# bypass authentication (use with caution)
bypass_authentication = 1
```

- e) Start the MRSA services and nginx services.
- 2. To enable remote access of the application, complete the following steps.

#### NOTE

By default, the application is installed in the localhost mode. The user can only access the application from the local host IP.

- a) Stop the MRSA services and nginx services.
- b) Go to <MRSA Home>/LSIStorageAuthority\server\conf.
- c) Open the file nginx.conf.
- d) Edit the following lines:

listen 127.0.0.1:2463 default\_server;

#### Uncomment the following lines:

```
#use below configuration to allow inbound access to this port from remote servers
#listen 2463 default server;
```

e) 4) Start the MRSA services and nginx services.

# Server Dashboard

The Server Dashboard is the default landing page for the software. The **Server Dashboard** displays the overall summary of the server and the devices that are attached to it. You can troubleshoot, configure, maintain, and monitor the controllers from the **Server Dashboard**. The following figure and table describes this page.

#### Figure 5: Server Dashboard Window

1	Hewlett Packard MR Storage Enterprise	Administrator 🔅		Select Controller	*	no-lagin 👻 🕘 🕐
	1 Controller on this server					+ OS Windows Server 2012 R2 6.3.9600
	cence. 💕 💕 🖉	View All Controllers				Download Support Log
	1 Controllier is Optimal					
	🔮 PCI Slot: 1 HPE Smart Array P824i-p I	4R Gen10 👷 ? 💭 💷 🗠				
	1 Arrays, 1 Logical Drives, 7 Drives and Megacel	(			1	Actions
1			Configured Capacity 1.818 TB of 5.727 TB			View Event Log
	Serial No SkiteProf	SAS Address bidi00002020117ec00	Driver 6.714.0	Version 6.10		4 Configure
	201					Update Firmware

#### Table 6: Server Dashboard Description

Callout	Description						
1	<ul> <li>Main Navigation – The main navigation window helps you to traverse among the various views.</li> <li>This navigation is available across all of the pages in the software. The description follows:</li> </ul>						
	<ul> <li>Helps you to navigate to the server dashboard from any page in the software.</li> <li>Select Controllers: Lists the controllers that you are monitoring. The color-coded controller status icons (red, amber, and green) indicate the health status of all the controllers based on their criticality. Click a controller to navigate to its dashboard.</li> <li>Click @Settings to perform initial settings.</li> </ul>						
	<ul> <li>Click View Server Profile and expand the + button to view the server configuration such as the server IP, server name, OS Name, OS version, OS architecture, and the version of the software that is installed. You can also view the controller information such as controller hardware, enclosure of the controller, and information about the drives and logical drives associated with the controller.</li> </ul>						
	<ul> <li>Lets you enable or disable system messages.</li> <li>Displays the application context-sensitive help.</li> </ul>						
2	<ul> <li>Controller Status – Description as follows:</li> <li>Displays the status of all of the controllers that are connected to the server. It displays the total number of controllers and status icons based on their criticality:</li> </ul>						
	<ul> <li>Critical: Indicates that a critical error exists on the controller and the controller needs immediate attention.</li> <li>Needs Attention: Indicates that an error exists on the controller that needs attention, however, not immediately.</li> <li>Ontimal: Indicates that the controller is encreting in an entimal state.</li> </ul>						
	<ul> <li>Optimal: indicates that the controller is operating in an optimal state.</li> <li>Displays critical issues of failed devices and provides recommendations for troubleshooting. You can also see contextual links, which help you to easily locate the device and initiate troubleshooting.</li> <li>Based on the criticality of the controller, the application displays information about that particular controller in the</li> </ul>						
	controller information pane. For example, if a controller is in the critical state, that controller is opened by default. If you want to view information about other controllers, click the respective Controller Status icon. Click <b>View All</b> <b>Controllers</b> to view information about all of the controllers.						
	<b>Download Support Log</b> – Lets you download the support log, which contains consolidated information about the server and all the devices to which it is connected.						
3	<ul> <li>Controller Information: Displays information about the controller.</li> <li>Controller Status: When multiple controllers are connected, the controllers are sorted based on the bus device function.</li> </ul>						
	<ul> <li>Controller summary</li> <li>Controller properties</li> <li>Controller issues</li> </ul>						
	<ul> <li>Controller event logs</li> <li>Lets you perform these tasks:</li> <li>Configure the controllers. See Controller Configurations.</li> </ul>						
	<ul> <li>Download diagnostics.</li> <li>Update the controller firmware.</li> <li>View download, and clear event logs.</li> </ul>						
	<ul> <li>Perform various operations on the controller. See Managing Controllers</li> <li>Navigate to any of the controllers to see its specific view by clicking the appropriate controller.</li> </ul>						
L							

# **Controller Dashboard**

You can perform controller related actions and view all the information pertaining to a controller from the Controller Dashboard. The figure and table that follows describes this page.

#### Figure 6: Controller Dashboard Window

Hewlett Packard MR Enterprise	Storage Administrator 🛛 💿	PCI Slot: 1 HPE Smart Array PR24:-p ME Gen10	no-login 💌
PCI Slot: 1 HPE Smart Array P824	i-p MR Gen10 🔤 🙀 🛄 📾 🗠		
+ Controller Info			Actions
	Configured	Capacity 1.818 TB of 5.727 TB	< Configure
Serial No Salid 190107	SAS Address 0x50000203117xc00	Driver Version 4.714.08.00	Update Firmware Versier 24.23 5.0023
propriet and	And producting index of the product	1.7 / No. 1	Premium Features
			3 ¢ More Actions
1 Arrays 1 Logical Drives	7 Drives 3 Unconfigured Drives	3 Other Hardware Includes Megacell	
+ Array_0 RAID 0 1 Logical Drive	s & 2 Drives Used 1.82 TB-of 1.82 TB Available		Actions
			* Properties
			view its actions & properties

#### **Table 7: Controller Dashboard Description**

Callout	Description
1	<b>Controller Summary</b> – Displays the name of the MegaRAID controller card. The color-coded icons indicate the status of the controller card. Displays the basic controller properties, such as the controller serial number, vendor ID, SAS address, driver version, device ID, host interface, and so on.
	Click the 👫 icon to view the advanced properties of the controller, such as the NVRAM details, BIOS version, firmware properties, emergency spare properties, CacheCade properties, and so on.
2	Controller Views – Displays all of the configured arrays, logical drives, and drives associated with the selected controller card. It also displays the hardware, such as enclosures and backplanes associated with the controller. All these views are displayed as tabs. Click the view to view to view detailed information about the device. For example, click an array to view the associated logical drives and drives. Select any device from the expanded view to perform relevant actions and view device properties.
3	<ul> <li>Controller Actions – Lets you perform the following actions:</li> <li>Create a configuration</li> <li>Clear a configuration</li> <li>Update the controller firmware</li> <li>Import or clear foreign configurations</li> <li>View premium features</li> <li>View the event log</li> </ul>

# **Controller Configurations**

You can use the application to create and modify storage configurations on systems with Hewlett Packard Enterprise controllers.

You can create RAID 0, RAID 1, RAID 5, RAID 6, RAID 10, RAID 50, and RAID 60 storage configurations.

The supported RAID levels differ or might not be supported for some controllers. For more information, see HPE MR Storage Administrator Feature Support Matrix.

You can create these types of configurations:

Simple Configuration

Specifies a limited number of settings and has the system select drives for you. This option is the easiest way to create a logical drive. See Creating a New Storage Configuration Using the Simple Configuration Option for details.

Advanced Configuration

Lets you choose additional settings and customize logical drive creation. This option provides greater flexibility when creating logical drives for your specific requirements. See Creating a New Storage Configuration Using the Advanced Configuration Option for details.

# Creating a New Storage Configuration Using the Simple Configuration Option

The Simple Configuration option is the quickest and easiest way to create a new storage configuration. When you select Simple Configuration mode, the system creates the best configuration possible using the available drives.

Perform these steps to create a simple storage configuration:

1. Select Configure > Simple Configuration from the Server Dashboard or the Controller Dashboard.

The Simple Configuration page opens.

Figure 7: Simple Configuration Page

Simple Configuration	) settings	
1. RAID Level Setting (Compare and select	:t)	
RAID 0 This RAID level is sui data redundancy.Cho	table for high performance sose this option only for no	e with zero on-critical data.
<ol><li>How many logical drives do you wisl</li></ol>	n to create?	
1 each w	vith capacity of	557.75 GB 💌
3. Miscellaneous Drive Attributes		
Assign Spare	Spare will be assign candidate drives. A ensuring the data re	ied depending upon the availability of eligible spare spare drive will take over for a drive if a failure happens, emain intact

Finish

- 2. Select a RAID level for the array from the available RAID level option drop-down box.
- 3. (Optional) Click Compare and Select to view detailed information about each RAID level.

When you use the Simple Configuration option, the RAID controller supports RAID levels 0, 1, 5, 6, and 10. The window text provides a brief description of the RAID level that you select. The RAID levels you can choose depend on the number of drives available.

- 4. Select the number of logical drives you want to create.
- 5. Select the capacity of the logical drives.

Each logical drive has the same capacity.

- 6. Select the Assign Spare check box if you want to assign a dedicated spare drive to the new logical drive. If an Unconfigured Good drive is available, that drive is assigned as a spare drive. Spare drives are drives that are available to replace failed drives automatically in a redundant logical drive (RAID 1, RAID 5, RAID 6, or RAID 10).
- 7. Click Finish.

A message appears stating that the configuration is successfully created.

## **Creating a New Storage Configuration Using the Advanced Configuration Option**

The Advanced Configuration option provides an easy way to create a new storage configuration. The Advanced Configuration option gives you greater flexibility than simple configuration because you can select the drives and the logical drive parameters when you create a logical drive. In addition, you can use the Advanced Configuration procedure to create spanned arrays. Perform these steps to create an advanced storage configuration.

 Select Configure > Advanced Configuration from the Server Dashboard or the Controller Dashboard. The Advanced Configuration page is displayed.

#### Figure 8: Advance Configuration Page

Advanced Configuration Step 1/2 : Choose your new array set	<b>n <sub>(</sub>)</b> tings.		Next
	New	Array 0	
1. RAID Level Setting (Compare and select	0	2 avanable unconfigured unves	
RAID 0	This RAID data redu	level is suitable for high performance with zero indancy.Choose this option only for non-critical data.	

- 2. Select a RAID level for the array from the drop-down box.
- 3. (Optional) Click Compare and Select to view the detailed information on each RAID level.

When you use the Advanced Configuration option, the RAID controller supports RAID levels 10, 50, and 60. The **Compare and Select** option provides you a brief description of the RAID level that you select. The RAID levels that you can choose depend on the number of drives available.

- 4. Click Next.
- 5. Click Add Drives to add drives to the array.
- 6. (Optional) Select the span depth using the slider bar.
- 7. Click Add Drives to add drives to the array.

The Available Unconfigured Drive window appears.

#### Figure 9: Available Unconfigured Drive Window

÷	O Foreign Drives									
-	s Ur	config	jured Drives		5 Unconfigured good					
			Enclosure : Bay 0	Device ID 0	Type 0	Interface 0	Capacity 0	Sector Size 0	Status 0	Model 0
		Ø	Port 31,Box=1,Bay=1	56	HOD	SAS	30068	5128	Unconfigured good	EG000300.JWBHR
		Ŷ	Port 31,Box=1,Bay=2	55	ноо	SAS	30068	5128	Unconfigured good	EG000300.JWBHR
		$\Diamond$	Port 31,Box=1,Bay=3	59	ноо	SAS	30068	5128	Unconfigured good	EG000300JWBHR
		Ŷ	Port 31,Box=1,Bay=4	57	ноо	SAS	30068	5128	Unconfigured good	EG000300.JWBHR
	8	$\Diamond$	Port 41,Box=1,Bay=5	58	ноо	SAS	30068	5128	Unconfigured good	EG000300.JWBHR
÷	O Configured Drives									
÷	* 0 Spares									
÷	0 JB	00								

For information on adding unconfigured drives to the array, see Selecting Available Unconfigured Drives.

- 8. Select the drives from the list of available unconfigured drives and click Add Drives.
- Click Add Logical Drives to add logical drives to the array. The Logical Drive Settings window appears.

#### Figure 10: Logical Drive Settings Window



For information on configuring logical drives, see Selecting Logical Drive Settings.

- 10. Specify all the required details and click Add Logical Drives.
- 11. Click Finish.

A message appears confirming that your configuration is complete.

## **Selecting Available Unconfigured Drives**

The Available Unconfigured Drive window lets you add drives and spare drives to the array.

Perform these steps to add drives and spare drives to the array.

1. Select the drives to add from the Available Unconfigured Drives window, and click Add Drives.

The selected drives appear in the Advanced Configuration window.

You can click the X icon to remove the drives that you have already added.

- Click Add Spares to add dedicated spare drives to the array. The Available Unconfigured Drives window appears.
- Select the drives you want to add as spare drives and click Add Spare Drives. The selected spare drives appear in the Advanced Configuration window.

## **Selecting Logical Drive Settings**

The **Logical Drive Settings** window enables you to configure the logical drives. Detailed descriptions for all of the parameters are present in the **Logical Drive Settings** window.

The logical drive settings differ or might not be supported for some controllers. For more information, see HPE MR Storage Administrator Feature Support Matrix.

Perform these steps to configure a logical drive:

- 1. Specify the number of logical drives you want to create.
- 2. Specify the size of the logical drives you want to create.

Each logical drive has the same capacity. If you specify the capacity first and then the number of logical drives, the logical drive capacity is adjusted with the available capacity.

3. Specify a name for the logical drive in the Logical Drive Name field.

The logical drive name can have a maximum of 15 characters.

4. Select a strip size from the **Strip Size** drop-down list.

Strip sizes of 64~ KB , 128~ KB , 256~ KB , 512~ KB , and 1~ MB are supported.

- 5. Specify the initialization state. The options follow:
  - Fast Initialization
  - Full Initialization
  - No Initialization
- 6. Specify the read policy for the logical drive. The options follow:
  - No Read Ahead
  - Always Read Ahead
- Specify the write policy for the logical drive. The options follow:
  - Write Through
  - Write Back
  - Always Write Back
- Specify the I/O policy for the logical drive. The options follow:
  - Cached IO
  - Direct IO
- Specify a disk cache setting for the logical drive. The options follow:

- Unchanged
- Disabled
- Enabled

#### 10. Click Add Logical Drives.

The newly created logical drive appears in the **Advanced Configuration** window just below the **Logical Drives** section.

#### NOTE

You will lose some drive capacity if you choose drives with uneven and large capacity while creating a logical drive.

If you want to modify the logical drive settings before completing the configuration, click the *logical* icon.

The Logical Drive Settings window opens.

Modify the settings as desired and click Modify Logical Drive.

# **Clearing the Configuration**

You can clear all existing configurations on a selected controller.

Perform these steps to clear the existing configurations on a controller.

- 1. Navigate to the Controller Dashboard.
- 2. Click **Configure**, then click **Clear Configuration**. A confirmation message appears.
- 3. Select **Confirm** and click **Yes**, **Clear configuration** to clear existing configurations on the controller.

#### NOTE

Operating system or file system drives cannot be cleared.

# Importing or Clearing Foreign Configurations

A foreign configuration is a RAID configuration that already exists on a replacement set of drives that you install in a computer system. You can use the application to import the foreign configuration to the controller or clear the foreign configuration so that you can create a new configuration using these drives.

Perform these steps to import or clear foreign configurations.

- 1. Navigate to the Controller Dashboard.
- 2. Click Configure, then click Foreign Configuration.

The Foreign Configuration window appears, which lists all of the foreign configurations.

- 3. Click one of these options:
  - Import All: Import the foreign configurations from all the foreign drives.
  - Clear All: Remove the configurations from all the foreign drives.
- 4. Click Re-Scan to refresh the window.

# **UNMAP** Capability Feature

The UNMAP capability feature is a SCSI command (not a vSphere 5 feature) used with *thin provisioned* storage arrays as a way to reclaim space from disk blocks that have been written to after the data that resides on those disk blocks has

been marked as *deleted* by an application or operating system. The UNMAP feature serves as the mechanism used by the Space Reclamation feature in vSphere 5 to reclaim space left by deleted data.

With thin provisioning, after data has been marked as *deleted* that space is still allocated by the storage array because it is not aware that the data has been deleted which results in inefficient space usage. The UNMAP feature allows an application or OS to tell the storage array that the disk blocks contain deleted data so the array can deallocate the blocks, reducing the amount of space allocated or in use on the array. This function allows thin provisioning to clean-up after itself and greatly increases the value and effectiveness of thin provisioning.

## **UNMAP Capability Feature Behavior**

MRSA behavior for MegaRAID 7.8 designs and later include the behaviors that follow.

- Display the PD Property, whether the PD (physical drive) is UNMAP capable or not.
- Display the PD Capability, whether the PDs can be used for logical drives (LDs) for the UNMAP feature.
- Lets users create an UNMAP supported volume.

MRSA behavior for MegaRAID 7.8 designs include the following limitations.

- The UNMAP feature is not supported for EPD/JBOD designs.
- Host software applications cannot support firmware in designs earlier than MegaRAID 7.8 because of the change in the MegaRAID firmware API.

### **UNMAP Feature Support**

When using the UNMAP feature, you can perform the actions that follow.

Enable the UNMAP capability during SCSI volume creation.

#### Figure 11: Enable the UNMAP Feature During Volume Creation

← Go back to Drive Group, Drives and Other Hard	ware list	Close						
Advanced Configuration ③ Step 1/2 : Choose your new drive group settings.								
1 PAID Level Setting (Compare and se	Drive Group DG_1       1 available unconfigured drive(s)							
1. RAID Level Setting (Compare and select)         RAID 0         This RAID level is suitable for high performance with zero data redundancy. Choose this option only for non-critical data.								
Enable SCSI Unmap	Enabling the SCSI Unmap will reclaim the storage space which is not in use.							
		Next						

Show the PD level UNMAP properties.



nysical Drive Propertie	S		×
General Properties			
SAS Address 0 0x0	SAS Address 1 0x5000cca04a71a0fa	Negotiated Link Speed 12G	Drive Speed 12G
<b>Temperature</b> 28C	<b>Revision Level</b> A2C0	Power Status ON	Native Command Queueing Capable
<b>Unmap Capable</b> Yes	<b>Unmap Capable for Lds</b> Yes	Physical Sector Size 4KB	Lhabled
Enclosure Properties			
Enclosure ID 69	Enclosure Model VirtualSES	Enclosure Location Internal	Enclosure Connector [C1 x1]
Drive Security Propertie	S		
Full Disk Encryption	Full Disk Encryption Type		

# **Changing Behavior Modes**

Perform the following steps to change the behavior mode and parameters:

- 1. In the Change Personality page, select the Change Auto-configure behavior radio button.
- 2. From the **Select Behavior Mode** drop-down list, select an appropriate behavior mode.

The available behavior modes are based on the current firmware support.

- **Unconfigured Good/NONE** If a user selects this option, then all the configured drives are converted to Unconfigured Good Drive.
- **JBOD** If all the physical drives are in unconfigured good state, once you select the JBOD mode, all the physical drives are automatically converted to JBOD physical drives.

#### Figure 13: Change Personality Dialog

Controller Information			Controller Actions
		Configured Capacity 0 KiB of 4.362 TiB	Personality Management
Serial Number	SAS Address	Driver Version	Configure
PXBRV0B36GQUHF	0x500062b20dc71640	7.724.02.00	Update Firmware Package Version
			Show Events
			More Actions
			-
Go back to Array, Drives and Other H	lardware list		Close
ange Personality 💿			
You have chosen to change pe	ersonality of the controller		
You have chosen to change pe	rsonality of the controller		
You have chosen to change pe Controller Personality : RAID	rsonality of the controller		
You have chosen to change pe Controller Personality : RAID Requested Personality : NONE	rsonality of the controller		
You have chosen to change pe Controller Personality : RAID Requested Personality : NONE	rsonality of the controller		
You have chosen to change pe Controller Personality : RAID Requested Personality : NONE Current Behavior Mode : NONE	rsonality of the controller		
You have chosen to change pe Controller Personality : RAID Requested Personality : NONE Current Behavior Mode : NONE	rsonality of the controller		
You have chosen to change pe Controller Personality : RAID Requested Personality : NONE Current Behavior Mode : NONE Change Auto-configure beha	vior		
You have chosen to change pe Controller Personality : RAID Requested Personality : NONE Current Behavior Mode : NONE Change Auto-configure beha Select Behavior Mode	vior		
You have chosen to change pe Controller Personality : RAID Requested Personality : NONE Current Behavior Mode : NONE Current Behavior Mode : NONE Select Behavior Mode NO	vior		
You have chosen to change pe Controller Personality : RAID Requested Personality : NONE Current Behavior Mode : NONE Change Auto-configure beha Select Behavior Mode	vior       Change		

3. Select the appropriate behavior mode and click **Change**.

# **Background Operations Support**

The application provides background Pause, Resume, Abort, Pause All, Resume All, and Abort All features that enhance the functionality where operations running in the background on a drive or a logical drive can be paused for some time, and resumed later.

The background operations, including Consistency Check, Rebuild, Replace, and Initialization are supported by an Abort operation. If any operation is stopped before completion, it is considered to be aborted. An aborted operation cannot be resumed from the place where it was stopped.

To perform Pause, Resume, and Abort operations, go to the **Background Processes in Progress** window in the Server dashboard or the Controller dashboard, and perform the following steps. The **Background Processes in Progress** window appears.

#### Figure 14: Background Processes in Progress Window

ackground Processes in Progress	Pause All   Abort Al
Consistency Check: Virtual Drive: 239	Pause   Abort
(	eth 0
Consistency Check: Virtual Drive: 238	Pause   Abor
	0.416
Consistency Check: Virtual Drive: 237	Pause   Abor
(	0.344e
Consistency Check: Virtual Drive: 236	Pause   Abor
(	0.54%
Consistency Check: Virtual Drive: 235	Pause   Abor
	0.34%

- **Pause** Click **Pause** to suspend the background operation taking place at that particular point of time. When the operations are paused, the **Resume** option appears instead of the **Pause** option.
- Resume Click Resume to resume the operation from the point where it was supported
- **Resume** Click **Resume** to resume the operation from the point where it was suspended.
- Abort Click Abort to abort the ongoing active operation.
- Pause All Click Pause All to suspend all the active operations.
   This option is enabled only if one or more background operations are in an Active state.
- **Resume All** Click **Resume All** to resume all Paused operations from the point at which they were paused. This option is disabled if no operations are paused.
- Abort All Click Abort All to abort all active operations.

#### NOTE

If the Copyback progress bar does not automatically display the progress of the Copyback operation for smallsize volumes, set the maximum event grouping time gap to 0 in the LSA.conf file.

# **Managing Controllers**

The HPE MR Storage Administrator application lets you monitor the activity of all the controllers present in the system and the devices to which they are attached.

## **Viewing Controller Properties**

The Controller Dashboard displays basic controller properties. Click the 📩 icon to view the advanced properties of the controller.

_	Controller Info							Actions
				Configured Capacity 0 KB of 3.637 T	8			< Configure
	Serial No Solid PO164		SAS Address		Driver Version			Update Firmware Venior 24.25.0-0007
	Vendor ID		Sub Vendor ID		Host Interface			Premium Features
	0x1000 Metadata Size		0x1590 Temperature		PCIe			More Actions
	512 MB		54 C				1	
	Advanced Properties							
	NVRAM Present Yes	Shield State Sup Yes	parted	NVRAM Size 32 KB		SSD Gaard on SMART Error Enabled		
	SES Association Type LUN							
	Power State Properties							
	Power savings on unconfigured drives Disabled	Power saving on Disabled	spares	Drive Standby Time 30 mins				
	Protection Information Properties							
	Data Protection Disabled							
	Active Firmware Properties							
	Firmware Package Version 24.20.0-9997	Firmware Build T 12:48:45 PM,6 De	ime c17	Online Firmware Update Enabled				
	Backup Firmware Properties							
	Firmware Package Version 24.20.0-9997							
	Drive Security Properties							
	Drive Security Capable No							
	Cachecade Properties							
	Cachecade SSD Caching Enabled	Write Cache Cape Yes	able	Total Cache Size 0 GB		Maximum Cache Size 2048 GB		

Figure 15: Basic and Advanced Controller Properties Window

# **Running Consistency Checks**

The Consistency Check operation verifies the correctness of the data in logical drives that use RAID levels 1, 5, 6, 10, 50, and 60, configurations. For example, in a system with parity, checking consistency means calculating the data on one drive and comparing the results to the contents of the parity drive. You should periodically run a consistency check on fault-tolerant logical drives.

Because RAID 0 does not provide data redundancy, you cannot run a consistency check on RAID 0 volumes.

To run a consistency check, you must first set the Consistency Check properties, then you can either schedule a consistency check to run at a defined interval chosen by you or you can start the Consistency Check operation immediately.

## **Setting Consistency Check Properties**

Perform these steps to set the properties for a consistency check.

- 1. In the Controller Dashboard, select More Actions > Set Consistency Check Properties.
  - The Set Consistency Check Properties dialog appears.
- 2. Choose one of these two options:
  - Continue Consistency Check and Fix Error The RAID controller continues the consistency check, and if it finds any errors, fixes them.
  - Stop Consistency Check On Error The RAID controller stops the consistency check operation if it finds any errors.
- 3. Click Save.

## Scheduling a Consistency Check Operation

Perform these steps to schedule a Consistency Check operation:

1. In the Controller Dashboard, select More Actions > Schedule Consistency Check.

The Schedule Consistency Check page appears.

#### Figure 16: Schedule Consistency Check Dialog

🗲 Go back to Array, Drives and Other Handware list	Close
Schedule Consistency Check 💿	Next
1. Set Consistency Check Mode Concurrent • 2. Schedule Consistency Check every Daily • From December 19, 2017 🔛 at 07:00 PM •	
	Next

#### 2. Set the Consistency Check Mode.

The available options are:

- Concurrent Run a Consistency Check operation concurrently on all logical drives.
- Sequential Run a Consistency Check operation on one logical drive at a time.
- Disable Disables the Consistency Check feature.
- 3. Set the desired interval at which you want to check the consistency of a drive.

The available options are:

- Hourly, Daily, Weekly, Monthly, and Continuously.
- Select an appropriate date and time range.
- 4. Click Next.

The **Schedule Consistency Check** page appears, letting you add the logical drives on which you want to perform a Consistency Check operation.

5. Click Add Logical Drives.

The Available Logical Drive dialog appears which lists all the logical drives present in the selected array.

- 6. Select the logical drive (s) on which you want to run the a Consistency Check operation.
- 7. Click Save.

The consistency check runs based on the frequency/interval chosen by you. You can also monitor the progress of the consistency check operation. See Background Operations Support

8. (Optional) – Select the logical drive, from the Controller View section, on which you want to immediately perform a Consistency Check operation, then go to **More Actions** > **Start Consistency Check**.

#### NOTE

If you try to run a Consistency Check operation on a logical drive that has not been initialized, a confirmation dialog appears, asking for your confirmation.

# **Running a Patrol Read Operation**

The Patrol Read option lets you periodically verify all sectors of the drives connected to a controller, including the system reserved area in the RAID configured drives. You can run a Patrol Read operation for all RAID levels and for all spare drives. A Patrol Read operation is initiated only when the controller is idle for a defined period and has no other background activities. You can set the Patrol Read properties and start the Patrol Read operation, or you can start the Patrol Read operation without changing the properties.

## **Setting the Patrol Read Properties**

Perform these steps to set the Patrol Read properties.

- Select More Actions > Set Patrol Read Properties in the Controller Dashboard. The Available Logical Drives dialog appears.
- Select the logical drives for which you want to set the Patrol Read properties and click Add Logical Drives. The Set Patrol Read Properties dialog appears.
- 3. Click Select Logical Drives.

Click the X icon to remove the logical drives you have already added.

- 4. Click Next.
- 5. Perform these steps to set the properties:
  - a) Select an operation mode for patrol read from the Set Patrol Read Mode drop-down list. The options follow:
    - Automatic The Patrol Read operation runs automatically at the time interval you specify.
    - **Manual** The Patrol Read operation runs only when you manually start it, by selecting **Start Patrol Read** from the Controller Dashboard.
    - Disabled The Patrol Read operation does not run.
  - b) (Optional) Specify a maximum number of drives to include in the Patrol Read operation concurrently. The count must be a number from 1 to 255.
  - c) Select the frequency at which the Patrol Read operation runs from the drop-down list. The default frequency is Weekly (168 hours), which is suitable for most configurations. The other options are Hourly, Daily, and Monthly.

- d) Select the month, day, and year on which to start the Patrol Read operation.
- e) Select the time of day to start the Patrol Read operation.
- f) (Optional) Select the Start Patrol Read Now check box.
- g) (Optional) Select the Run Patrol Read Non-Stop check box.
- 6. Click Finish.

You can monitor the progress of the Patrol Read operation. See Background Operations Support.

## **Starting a Patrol Read Operation**

Perform these steps to start a Patrol Read operation.

- Select More Actions > Start Patrol Read on the Controller Dashboard. A warning message appears.
- Click Start Patrol Read to start a Patrol Read operation.
   You can monitor the progress of the Patrol Read operation. See Background Operations Support.

## **Stopping a Patrol Read Operation**

Perform this step to stop a Patrol Read operation.

Select More Actions > Stop Patrol Read on the Controller Dashboard.

# Managing SAS Storage Link Speed

The Managing SAS Storage Link Speed feature lets you change the link speed between the controller and an expander or between the controller and a drive that is directly connected to the controller. All phys in a SAS port can have different link speeds or can have the same link speed. You can select a link speed setting. However, if phys in a SAS port have different link speed settings and if a phy is connected to a drive or an expander, the firmware overrides the link speed setting you have selected and instead uses the common maximum link speed among all the phys.

#### NOTE

Lane speeds for UBM backplanes cannot be modified.

Perform these steps to change the link speed.

 Select More Actions > Manage SAS Storage Link Speed on the Controller dashboard. The Manage SAS Storage Link Speed dialog appears.

#### Figure 17: Manage SAS Storage Link Speed Window

Manage SAS Storage Link Speed 😗

Phy	Status	Port Number	Select Link Speed	
0	OPTIMAL	0	6G	٣
1	OPTIMAL	0	3G	٣
2	OPTIMAL	0	MAX	٠
3	OPTIMAL	0	MAX	٣
4	OPTIMAL		12G	٣
5	OPTIMAL		12G	٠
6	OPTIMAL		12G	٠
7	OPTIMAL		MAX	٣
	System restart will b	e required after saving the ch	anges	

- The **Phy** column displays the system-supported phy link values. The phy link values range from 0 through 7.
- The Status column displays the status of the link speed.
- The Port Number column displays the port numbers.
- The Select Link Speed column displays the phy link speeds.
- 2. Select the desired link speed from the Select Link Speed field using the drop-down selector.

The link speed values are MAX, 3G, 6G, or 12G.

By default, the link speed in the controller is set to **MAX** or the value last saved by you. The 12G link speed is supported for some SAS-3 expanders.

3. Click Save.

The link speed value is now reset. The change takes place after you restart the system.

# Managing PCIe Storage Interface

A lane represents a set of differential signal pairs, one pair for transmission and one pair for reception, similar to SAS phys.

The Managing PCIe Storage Interface feature allows you to change the lane speed between a controller and an expander or between the controller and a drive that is directly connected to the controller. MRSA 2.4 and later versions support both SAS/SATA topologies and PCIe topologies using the same device phys to manage the lane speed.

#### NOTE

Lane speeds for UBM backplanes cannot be modified.

Perform the following steps to change the lane speed.

#### 1. In the Controller dashboard, select More Actions > Manage PCIe Storage Interface.

The Manage PCIe Storage Interface Dialog appears.
#### Figure 18: Manage PCIe Storage Interface Dialog

Manage PCIe Storage Interface 💿

lane	Status	Link Number	Lane Speed	Current Speed	Connected Device
0	OPTIMAL	0	2.5GT/5	N/A	
1	OPTIMAL	0	2.5GT/s	N/A	
2	OPTIMAL	0	2.5GT/s	N/A	
з	OPTIMAL	0	2.5GT/s	N/A	
4	OPTIMAL	1	2.5GT/s	N/A	
5	OPTIMAL	1	2.5GT/s	N/A	
6	OPTIMAL	1	2.5GT/s	N/A	
7	OPTIMAL	1	2.5GT/s	N/A	
8	OPTIMAL	2	2.5GT/s	N/A	
9	OPTIMAL	2	2.5GT/s	N/A	
10	OPTIMAL	2	2.5GT/s	N/A	
11	OPTIMAL	2	2.5GT/s	N/A	
12	OPTIMAL	з	2.5GT/s	N/A	
13	OPTIMAL	з	2.5GT/s	N/A	
14	OPTIMAL	з	2.5GT/s	N/A	
15	OPTIMAL	з	2.5GT/s	N/A	
	System restart will b	e required after saving the changes			

- The Lane column displays the system-supported lane values.
- The **Status** column displays the status of the lane.
- The Link Number column displays the link numbers.
- The Lane Speed column displays the lane speed.
- 2. Select the desired lane speed from the Lane Speed field using the drop-down selector. The lane speed values are Unknown, 2.5GT/s, 5GT/s, 8GT/s, and 16GT/s.

By default, the lane speed in the controller is 8GT/s or the value last saved by you.

3. Click Save.

The lane speed value is now reset. The change takes place after you restart the system.

### Setting Adjustable Task Rates

Perform these steps to set the adjustable task rates.

 Select More Actions > Set Adjustable Task Rate on the Controller Dashboard. The Set Adjustable Task Rates dialog appears.

#### Figure 19: Set Adjustable Task Rate Dialog

Se	t Adjustable Task Rate 💿	
	Task	Priority Percentage
	Rabuild Rate	30 0
	Patrol Rate	30
	BGI Rate	30 0
	Consistency Check Rate	30 9
	Transformation Rate	30 Đ
		Save

2. Enter changes, as needed, in the following task rates:

#### NOTE

Setting any of these rates to perform faster can result in the system I/O rate being slower.

• **Rebuild Rate** – Enter a number from 0 to 100 to control the rate at which a rebuild is performed on a drive when it is necessary.

The higher the number, the faster the rebuild occurs.

• Patrol Rate – Enter a number from 0 to 100 to control the rate at which Patrol Read operations are performed.

The Patrol Read function monitors drives to find and resolve potential problems that could cause drive failure. The higher the number, the faster the Patrol Read operation occurs.

 Background Initialization (BGI) Rate – Enter a number from 0 to 100 to control the rate at which logical drives are initialized in the background.

Background initialization establishes mirroring or parity for a RAID logical drive while allowing full host access to the logical drive. The higher the number, the faster the initialization occurs.

 Check Consistency Rate – Enter a number from 0 to 100 to control the rate at which a consistency check is performed.

A Consistency Check operation scans the consistency data on a fault tolerant logical drive to determine whether the data has become corrupted. The higher the number, the faster the Consistency Check operation is performed.

Transformation Rate – Enter a number from 0 to 100 to control the rate at which transformation of a logical drive occurs.

The higher the number, the faster the transformation occurs.

3. Click Save to set the new task rates.

### **Discarding Pinned Cache**

If the controller loses access to one or more logical drives, the controller preserves the data from the logical drive. This preserved cache is called *pinned cache*. This cache is preserved until you import the logical drive or discard the cache. As long as pinned cache exists, you cannot perform certain operations on the logical drive.

#### ATTENTION

If foreign configurations exist, import the foreign configuration before you discard the pinned cache. Otherwise, you might lose data that belongs to the foreign configuration.

Perform these steps to discard the pinned cache.

1. Select More Actions > Discard Preserved Cache on the Controller Dashboard.

#### NOTE

The **Discard Preserved Cache** option is displayed only if pinned cache is present on the controller.

A message appears, prompting you to confirm your choice.

2. Select Confirm and click Yes, Discard.

## **Downloading the Serial Output Log**

You can download the **Serial Output Log** file, which contains the firmware terminal log entries for the controller. The log information is shown as total number of entries available on the firmware side. Perform this step to download the Serial Output Log file.

Select More Actions > Download Serial Output Log on the Controller Dashboard.

The Serial Output Log file is downloaded.

### **Updating the Controller Firmware**

The application lets you update the controller firmware.

Perform these steps to update the controller firmware.

- 1. Navigate to the Controller Dashboard.
- 2. Click Update Firmware.

The Update Firmware window appears. It also displays the current controller firmware version.

#### Figure 20: Update Firmware Window



- 3. Click Browse to locate and open the .rom file.
- 4. Click Update.

After the update is complete, a message is displayed that confirms the success of the update and displays the new version of the controller firmware.

# **MegaRAID Advanced Software Features**

The MegaRAID Advanced Software (Premium) are features that the HPE MR Storage Administrator application supports on certain HPE Smart Array MR controllers.

The MegaRAID advanced software includes these features:

- MegaRAID FastPath
- MegaRAID CacheCade SSD Read Caching software
- MegaRAID CacheCade Pro 2.0 SSD Read/Write Caching software
- RAID 5 and RAID 6

The MegaRAID software licensing authorizes you to enable the MegaRAID advanced software features. By default, the MegaRAID Advanced Software (Premium Features) is enabled.

The Premium Features option on the Controller Dashboard lets you use the MegaRAID Advanced Software features.

Perform these steps to use the advanced controller features:

 Select Actions > Premium Features on the Controller Dashboard. The Premium Features window opens.

#### **Figure 21: Premium Features Window**

Pr	MegaRAID Advanced Software Optic	ons enable special functionality or
	Activated MegaRAID Advanced Soft	ware Options:
	Premium Features	License
	RAID5	Unlimited
	RAID6	Unlimited
	CACHECADE	Unlimited
	CACHECADE2	Unlimited
	FASTPATH	Unlimited

You will be prompted to provide the below Safe ID and Serial Number on the HPE Advanced Software License Management Portal in order to obtain the Activation Key that enables the MegaRAID Advanced Software Options.

### Using the MegaRAID CacheCade Pro 2.0 Feature

#### ATTENTION

CacheCade is only supported on HPE Smart Array P824i-p MR Gen10 controllers. Starting with HPE MR Gen10+ and Gen11 controllers, CacheCade is no longer supported.

The MegaRAID CacheCade Pro 2.0 read and write software eliminates the need to manually configure hybrid arrays by intelligently and dynamically managing frequently accessed data and copying it from HDD volumes to a higher performance layer of SSD cache. Copying the most accessed data (hot spot) to Flash cache relieves the primary HDD array from time-consuming transactions, which allows for more efficient hard disk operation, reduced latency, and accelerated read and write speeds.

The CacheCade Pro 2.0 software is the industry's first software solution that offers both read and write controller-based caching on SSDs. CacheCade Pro 2.0 dramatically enhances the performance gains that were achieved by the previous

generation of software. With the addition of write caching support, read/write-intensive workloads such as Exchange server, high-performance computing (HPC) applications, Web 2.0, and other I/O-intensive OLTP database system workloads, experience dramatic performance improvements.

### Creating a CacheCade Logical Drive

Perform these steps to create a CacheCade logical drive.

 Select Configure > CacheCade – SSD Caching Configuration on the Server Dashboard or the Controller Dashboard.

The CacheCade – SSD Caching Configuration window opens.

#### Figure 22: CacheCade – SSD Caching Configuration Window

	Man	CachaCada - SSD Caching Array 0	
	new (	CacheCade - SSD Caching Array 0	
		1 available unconfigured SSD drives	
1. RAID Level Setting	Compare and select)		
	This DA	P to at it is disble for birth conference with some	
RAID 0	data rec	lundancy.Choose this option only for non-critical data.	

- 2. Select a RAID level for the array. For example, select **RAID 0**.
- 3. (Optional) Click Compare and Select to view the detailed information on each RAID level.
- 4. Click Next.
- Click Add SSD Drives to add SSD drives to the array.
   The Available Unconfigured SSD Drives window appears.

#### Figure 23: Available Unconfigured SSD Drive Window

	available unconfigured SSD drive						
Add	a minimum of 1 dr	ive as required	by RAID0	Level.			
	Port,Box,Bay	Device ID	Туре	Interface	Capacity	Sector Size	Model
•	,Box=1,Bay=2	33	SSD	SATA	240GB	512B	MK0240GFDKQ
_							

- 6. Select the SSD drives and click Add SSD Drives.
- 7. Click Add CacheCade SSD Caching Logical Drives to add CacheCade logical drives to the array. The CacheCade – SSD Caching Logical Drive Settings window appears.



Figure 24: CacheCade – SSD Caching Logical Drive Settings Window

#### NOTE

You can create only one CacheCade – SSD Caching logical drive as the full capacity of the logical drive is used for the creation of the CacheCade – SSD Caching logical drive.

8. Enter a name for the CacheCade – SSD Caching logical drive in the **CacheCade – SSD Caching Logical Drive Name** field.

The logical drive name can have a maximum of 15 characters.

9. Specify the write policy for the CacheCade - SSD Caching logical drives.

The options follow:

- Write Back
- Write Through
- 10. Click Add CacheCade SSD Caching Logical Drives.

The newly created CacheCade – SSD Caching logical drives appears in the **CacheCade – SSD Caching Configuration** window just below the **Add CacheCade – SSD Caching Logical Drives** section.

If you want to modify the CacheCade – SSD Caching logical drives settings before finishing the configuration, click the

11. Click Finish.

A message appears stating that the configuration is complete.

### Modifying the CacheCade Logical Drive Properties

You can modify the name and the write policy of a CacheCade – SSD Caching logical drive any time after a CacheCade – SSD Caching logical drive is created. Perform these steps to change the logical drive properties:

1. Navigate to the Controller Dashboard, click an array name (for example, array\_1).

Click the **second** icon that corresponds to the array to display its contents. The logical drives and drives associated with the selected array appear.

- 2. Click a CacheCade SSD Caching logical drive whose settings you want to change.
- Select Actions > Modify Properties.
   The Modify Logical Drive: <Logical Drive Name> Properties dialog appears.
   Figure 25: SSD Caching Logical Drive LDName Properties Dialog

Modify CacheCade - SSD Caching Logical Drive: ⑦ × LDName Properties

DName	
Write Policy Write Back	A controller attribute indicating the current Write Policy mode
	• Write Through This mode provides for cache data protection upon power failure.Note: It may result in slower performance.
	• Write Back This mode provides optimal performance. Note: Data loss will occur if there is power failure along with cache HPE Smart Storage Battery is not installed, or the HPE Smart Storage Battery has failed or discharged.

- 4. Change the CacheCade SSD Caching Logical Drive Name and the Write Policy properties as needed.
- 5. Click save settings.

### **Enabling SSD Caching on a Logical Drive**

You can enable SSD caching on a logical drive. When you enable SSD caching on a logical drive, that logical drive becomes associated with an existing or with a future CacheCade – SSD Caching logical drive. This option is only available when the logical drives' caching is currently disabled.

1. Navigate to the Controller Dashboard, click an array name (for example, Array\_1).

Click the 👫 icon that corresponds to the array to display its contents.

The logical drives and other drives associated with the selected array appear.

- 2. Click the logical drive on which to enable SSD caching.
- 3. Select Actions > More Actions > Enable SSD Caching.

The following dialog appears.

#### Figure 26: Enable SSD Caching

×

When you enable SSD caching, the Logical drive will become associated with an existing or future CacheCade SSD Caching logical drive.Do you want to enable SSD caching on the selected logical drives?



4. Click Yes.

A confirmation message appears.

### **Disabling SSD Caching on a Logical Drive**

You can disable caching on a logical drive. When you disable SSD caching on a logical drive, any associations that the selected logical drive has with a CacheCade – SSD Caching logical drive are removed. This option is only available when caching on the logical drives is currently enabled.

1. Navigate to the Controller Dashboard, click an array name (for example, Array\_1).

Click the 👘 icon that corresponds to the array to display its contents.

The logical drives and other drives associated with the selected array appear.

- 2. Click the logical drive on which to disable SSD caching.
- 3. Select Actions > More Actions > Disable SSD Caching.

The dialog that follows appears.

#### Figure 27: Disable SSD Caching

×

If you disable SSD caching, any associations that this logical drive has with CacheCade SSD Caching logical drives will be removed. It may take some time to complete this operation. Are you sure you want to disable SSD caching on LogicalDrive ?



4. Click Yes.

A confirmation message appears.

### **Clearing Configuration on Controllers with CacheCade Logical Drives**

You can clear all existing configurations on a selected controller that has CacheCade Pro 2.0 logical drives.

- 1. Navigate to the Controller Dashboard whose configurations you want to clear.
- 2. Click Configure and click Clear Configuration.

The confirmation message that follows appears.

#### Figure 28: Clear Configuration – CacheCade – SSD Caching

There is curr Clearing the the cached d the configura data?	ently data stored in the cache. configuration will permanently delete ata.Are you sure you want to clear tion and permanently lose the cached	×
Confirm	Yes, Clear configuration	

3. Select the **Confirm** checkbox and click **Yes**, **Clear configuration** to clear all the existing configurations on the controller.

#### NOTE

The operating system drives cannot be cleared.

### **Deleting a CacheCade – SSD Caching Logical Drive**

Perform these steps to delete a CacheCade - SSD Caching logical drive.

1. Navigate to the Controller Dashboard, click an array name (for example, Array\_1).

Click the 👘 icon that corresponds to the array to display its contents.

The logical drives and drives associated with the selected array appear.

- 2. Click the CacheCade SSD Caching logical drive that you want to delete.
- 3. Select Actions > Delete.

Confirm

The confirmation message that follows appears.

#### Figure 29: CacheCade – SSD Caching Logical Drive – Delete Confirmation Dialog



Yes, Delete

4. Select **Confirm** and click **Yes**, **Delete** to proceed with the delete operation.

A message appears confirming that the CacheCade - SSD Caching logical drive is deleted successfully.

### MegaRAID Fast Path Advanced Software

The MegaRAID FastPath software is a high-performance I/O accelerator for solid state drive (SSD) arrays connected to a MegaRAID controller card. This advanced software is an optimized version of MegaRAID technology that can dramatically boost storage subsystem and overall application performance. Particularly those that demonstrate high random read/write operation workloads – when deployed with a MegaRAID SATA+SAS controller connected to SSDs.

## MegaRAID SafeStore Encryption Services

The MegaRAID SafeStore software, together with self-encrypting drives (SEDs), secures a drive's data from unauthorized access or modification resulting from theft, loss, or repurposing of drives. If you remove an SED drive from its storage system or the server in which it resides, the data on that drive is encrypted, and it becomes useless to anyone who attempts to access it without the appropriate security authorization.

Auto Lock with Local Key Management locks the SED using an authentication key. When secured in this manner, the drive's data encryption key is locked whenever the drive is powered down. In other words, the moment the SED is switched off or unplugged, it automatically locks down the drive's data. When the drive is powered back on, it requires authentication before being able to unlock its encryption key and read any data on the drive. This action protects against any type of insider or external theft of drives or systems.

The instant Secure Erase feature allows you to instantly and securely render data on SED drives unreadable, saving businesses time and money by simplifying the decommissioning of drives and preserving hardware value for returns and repurposing.

You can enable, change, and disable the drive security feature. You can also import a foreign configuration using the SafeStore Encryption Services advanced software.

### **Enabling Drive Security**

Ensure that MFC settings related to security are enabled in the firmware. Perform the following steps to enable security on the drives.

- 1. In the Controller dashboard, select More Actions > Enable Drive Security.
- 2. Select the Local Key Management (LKM) option from the Choose the security key management mode drop-down list.

The Enable Drive Security dialog appears with the following options that lets you enable the drive security.

#### Figure 30: Enable Drive Security

Enable Drive Security 💿	
Controller ID: 0 AVAGO MegaRAID SAS 9380-8e Enabling drive security on this controller will have the option to create securevirtual drives using	g a security key.
Choose the security key management mode: Local Key Management(LKM)	
Security Key Identifier : AVAGO_SDS_SV\$2876301_tex1d712	-Security Key Identifier
Suggest Security Key Security Key : Confirm :	-Security Key The security key will be used to lock each self encrypted drive attached to the controller. For maximum security, user 32 varied characters, you may optionally choose for the system to suggest a strong security key. Note: The security key is case-sensitive and must be between 8 and 32 characters, contain atleast 1 number, 1 lowercase letter, 1 uppercase letter and 1 non-alphanumeric character(e.g. >?@)
Pause for password at boot time Enforce strong password seculity Password : Confirm : Show Password	-Password Optionally, You may enter a password to provide additional security. If you choose "Pause for password at boot time", you must enterit whenever you boot the server. Note: The password is case sensitive and must be between 8 and 32 characters. If enforce strong password security is selected, then password field should contain atleast 1 number, 1 lowercase letter,1 uppercase letter and 1 non-alphanumeric character(e.g. >?@)
Are you sure you want to enable drive security?	

To enable drive security, the following details must be specified:

- Security Key Identifier The controller, by default, assigns a security key identifier. However, you can change this security key identifier as per your requirement. If you have more than one security key identifier, the controller helps you to determine which security key identifier to enter.
- **Security Key** Provides you with an option to create secure virtual drives by specifying the security key. The security key provided by you locks each SED drive attached to the controller.
- Suggest Security Key Alternatively, you can click this option to have the system create a security key for you.
- Password You can also specify a password to provide additional drive security.
- Pause for password at boot time and Enforce strong password security If you select the Pause for password at boot time, you are prompted to provide the password each time you restart your server.
   If you select Enforce strong password security, the system enforces you to specify a strong password.
- Show Key and Show Password You can either select or clear the Show Key and Show Password check boxes. By default, they are not selected.

To enable drive security, perform the following steps:

3. Either use the default security key identifier provided by the controller or specify a new security key identifier.

#### NOTE

If you create more than one security key, ensure that you change the security key identifier. Otherwise, you cannot differentiate between the security keys.

- 4. Either click **Suggest Security Key** to have the system create a security key for you, or enter a new security key in the **Security Key** field and confirm.
- 5. (Optional) Select the Show Key check box.

If you choose this option, the security key that you specify, or the security key that is created by the system if you have clicked **Suggest Security Key**, will be visible to you. If you do not select this option, the security key will not be visible to you.

#### NOTE

# Ensure that you note down this security key somewhere for future reference. If you are unable to provide the security key when it is required by the system, you will lose access to your data.

The security key is case-sensitive. It must be between 8 and 32 characters and contain at least one number, one lowercase letter, one uppercase letter, and one nonalphanumeric character (for example, < > @ +). The space character is not permitted.

Non-U.S. keyboard users must be careful not to enter double-byte character set (DBCS) characters in the security key field. The firmware works with the ASCII character set only.

6. (Optional) - Select the Pause for password at boot time check box.

If you choose this option, you are prompted to provide the password each time you restart your server.

7. (Optional) – Select the Enforce strong password security check box.

If you choose this option, make sure the password is between 8 and 32 characters and contain at least one number, one lowercase letter, one uppercase letter, and one non-alphanumeric character (for example, < > @ +). The space character is not permitted. The password is case-sensitive.

- 8. (Optional) Enter a password in the **Password** field and confirm the same password once again in the **Confirm** field.
- 9. (Optional) Select the Show Password check box.

If you choose this option, the password that you specify will be visible to you. If you do not select this option, the password will not be visible to you.

Warning messages appear if there is a mismatch between the characters entered in the **Password** field and the **Confirm** field, or if you have entered an invalid character.



#### CAUTION

Make sure to write down this password somewhere for future reference. If you are unable to provide the password when it is required by the system, you will lose access to your data.

10. Select the Confirm check box, then click Enable Security to confirm that you want to enable drive security on this controller.

### Changing Drive Security Settings

#### NOTE

Drive security settings cannot be changed when EKM is enabled. Changes to drive security settings for EKM will fail from MRSA.

Perform the following steps to change the encryption settings for the security key identifier, security key, and password.

1. In the Controller dashboard, select More Actions > Change Drive Security.

The Change Drive Security dialog appears.

#### Figure 31: Change Drive Security Dialog



2. Select the Change current security settings radio button from the Current drive security mode is FW field.

When LKMS is enabled, MRSA will show the current drive security mode asFW/USER instead of LKM.

The following options appear, which list the actions you can perform including editing the security key identifier, the security key, and the password.

#### Figure 32: Change Drive Security Dialog Options

Change Drive Security on Controller ID: 0 AVAGO MegaRAID SAS 9380-8e Drive security is currently enabled. Change the drive security settings on this controller or switch between key manage Current drive security mode isNONE \* Change current security settings 👘 Switch to External Key Management(EKM) mode (EKM is currently not supported by LSA) Use the existing security key identifier Current Security Key Identifier : -Security Key Identifie Specify a security key identifier. The controller has provided a default identifier for you. You may use this string or enter you own identifie If you have multiple security keys, the identifier will help you determine which security key to enter. AVAGO\_SDS\_SV52876301\_1ea1d712 Enter a new security key identifier New Security Key Identifier : -Security Key-Use the existing drive security key The security key will be used to lock each self encrypted drive attached to the controller. For maximum security, user 32 varied characters, you may optionally choose for the system to suggest a strong security key. Enter a new drive security key Nexe: The security key is case-sensitive and must be between 8 and 32 characters, contain atleast 1 number, 1 lowercase letter,1 uppercase letter and 1 non-alp characterie (g. >?(g)) Security Key : Confirm Show Key -Password-Optionally, You may enter a password to provide additional security. If you choose "Pause for password at boot time", you must enterlt whenever you boot the se Pause for password at boot time Enforce strong password security The password is case sensitive and must be between 8 and 32 characters. Password : If enforce strong password security is selected, then password field should contain atleast 1 number, 1 lowercase letter,1 uppercase letter and 1 non-alpha character(e.g.  $>7(\frac{1}{2})$ ) Confirm Show Password Are you sure you want to change the current security settings? Confirm Change Security

3. Either you can use the existing security key identifier assigned by the controller, or you can specify a new security key identifier.

If you change the security key, you need to change the security key identifier. Otherwise, you cannot differentiate between the security keys.

- 4. Either select the **Use the existing drive security key** option or select the **Enter a new drive security key** to specify a new security key and confirm once again.
- 5. Either click **Suggest Security Key** to have the system create a security key, or you can enter a new security key in the **Security Key** text field.
- 6. (Optional) Select the **Show Key** check box.

#### NOTE

The security key is case-sensitive. It must be between 8 and 32 characters and contain at least one number, one lowercase letter, one uppercase letter, and one non-alphanumeric character (for example, < > @ +).

7. (Optional) - Select the Pause for password at boot time check box.

If you choose this option, you are prompted to provide the password each time you restart your server.

8. (Optional) – Select the Enforce strong password security check box.

If you choose this option, make sure the password is between 8 and 32 characters and contain at least one number, one lowercase letter, one uppercase letter, and one non-alphanumeric character (for example, < > @ +). The space character is not permitted. The password is case-sensitive.

- 9. If you chose to use a password, either enter the existing password or enter a new password, and confirm once again.
- 10. (Optional) Select the **Show Password** check box.

If you choose this option, the password that you specify will be visible to you. If you do not select this option, the password will not be visible to you.

11. Select the **Confirm** check box and click **Change Security** to change the security settings.

The **Authenticate Drive Security Settings** dialog appears. Your authentication is required for the changes to take effect. Enter the new security key that you just specified in the **Security Key** field.

12. Enter the new security key that you just specified and click **Authenticate** to authenticate the changes.

The existing configuration on the controller is updated to use the new security settings.

### **Disabling Drive Security**

#### ATTENTION

If you disable drive security, your existing data is not secure and you cannot create any new secure virtual drives. Disabling drive security does not affect the security of data on foreign drives. If you have removed any drives that were previously secured, you still need to enter the password when you import them. Otherwise, you cannot access the data on those drives. If there are any secure drive groups on the controller, you cannot disable drive security. A warning dialog appears if you attempt to do so. To disable drive security, you must first delete the virtual drives on all of the secure drive groups.

Perform the following steps to disable drive security:

1. In the Controller dashboard, select More Actions > Disable Drive Security.

A warning message appears asking for your confirmation.

2. Select Confirm and click Yes, Disable Drive Security.

The software disables drive security.

### Importing or Clearing a Foreign Configuration – Security-Enabled Drives

Perform the following steps to import or clear foreign configuration for security-enabled drives.

- 1. Enable drive security to allow importation of security-enabled foreign drives.
- 2. After you create a security key, navigate to the Controller dashboard, and click **Configure**, then click **Foreign Configuration**.

If locked drives (security is enabled) exist, the Unlock Foreign Drives dialog appears.

- Enter the security key to unlock the configuration.
   The Foreign Configuration window appears, which lists all of the foreign configurations.
- 4. Click one of the following options:
  - Import All: Import the foreign configurations from all the foreign drives.
  - Clear All: Remove the configurations from all the foreign drives.
- 5. Click Re-Scan to refresh the window.
- 6. Repeat the import process for any remaining drives because locked drives can use different security key, and you must verify whether there are any remaining drives to be imported.

# **Managing Arrays**

The HPE MR Storage Administrator application lets you monitor the status of arrays and spanned arrays.

## **Viewing Array Properties**

Select an array in the Controller Dashboard to view its properties.

#### Figure 33: Array Properties Window



If you have selected multiple logical drives or multiple drives, click the 👘 (Expand button) to perform actions such as starting a Consistency Check operation and so on. This expansion is applicable for all the scenarios where you have selected multiple logical drives or multiple drives and performing certain actions through the **Actions** dialog.

Property	Description
Data Protection	Indicates whether the data protection feature is enabled for the array.
Free Capacity	Indicates the free space available in the array.
Secured	Indicates whether the array is secured.
Drive Security Method	Indicates the type of security used, if applicable.
Transport Ready	Indicates whether the drive is transport ready.

#### **Table 8: Array Properties Description**

## Adding a Logical Drive to an Array

You can add logical drives to an existing array if sufficient storage space is present in the existing logical drives of the array.

Perform these steps to add a logical drive to an existing array:

- Navigate to the Controller Dashboard and click an array name (for example, Array\_1). In the right pane, under Actions, the Add Logical Drives option appears.
- 2. Click Add Logical Drives.

The Logical Drive Settings window appears.

Specify the settings for the logical drives you want to create.
 See Selecting Logical Drive Settings for details on creating logical drives.

#### 4. Click Add Logical Drives.

The newly created logical drive gets added to the selected array.

### **RAID Level Transformation**

RAID level transformation is the process of converting one RAID configuration to another. You can perform RAID level transformation at the array level. The table that follows describes the valid RAID level transformation matrix.

Table 9: Array – RAID Level	<b>Transformation Description</b>
-----------------------------	-----------------------------------

Initial RAID Level	Migrated RAID Level
RAID 0	RAID 1
RAID 0	RAID 5
RAID 0	RAID 6
RAID 1	RAID 0
RAID 1	RAID 5
RAID 1	RAID 6
RAID 5	RAID 0
RAID 5	RAID 6
RAID 6	RAID 0
RAID 6	RAID 5

### Migrating the RAID Level of an Array

Perform these steps to migrate the RAID level of an array.

- 1. Navigate to the Controller Dashboard and click an array name (for example, **Array\_1**). In the right pane, under **Actions**, the **Modify Array** option appears.
- 2. Click Modify Array.

The Modify Array window appears.

Figure 34: Modify Array Window



3. Select the RAID level to which you want to migrate the array from the RAID Level Setting drop-down menu.

It is recommended you back up the data before you change the RAID levels.

#### ATTENTION

Checking the "It is advisable to back up data before you proceed. Are you sure you want to continue?" checkbox does *NOT* launch a backup. You must follow the prescribed process to perform an array backup.

#### 4. Click Next.

The **Modify Array** dialog appears and provides you an option to add, remove, or directly change the RAID level. Depending on the source and the target RAID levels, you can also add drives directly without having to choose an option.

#### Figure 35: Modify Array Settings Dialog

#### Adding Drives to a Configuration

For example, if you migrate the RAID level of a array from RAID 0 to RAID 5, the **Modify Array** wizard lets you add unconfigured drives to the existing configuration to enable the RAID level transformation.

#### 1. Click Add Drives in the Modify Array window.

#### NOTE

The drives you add must have the same capacity as or greater capacity than the drives already in the array, or you cannot change the RAID level.

The **Available Unconfigured Drive** window appears. It lists the drives you can add, and it states whether you must add a minimum number of drives to change the RAID level from the current level to the new RAID level.

#### Figure 36: Available Unconfigured Drive Window

2 Av	2 Available Unconfigured Drive ⑦ ×							
Add	Add a maximum of 31 drive as required by RAID6 Level.							
	Port,Box,Bay	Туре	Interface	Capacity	Sector Size	Model		
~	[Port 6I],Box=1,Bay=4	Rotational	SAS	300GB	512B	EG0300JFCKA		
	[D0] D 1 D 2	Detections	CAC	20000	5130	500000 (5000)		

Add Drives

2 drives selected.

- 2. Select the available unconfigured drives and click Add Drives.
- 3. Click Finish.

The RAID level is migrated. A confirmation message appears. You can monitor the progress of the transformation. See Background Operations Support.

### **Removing Drives from a Configuration**

For example, if you migrate the RAID level of a array from RAID 5 to RAID 0, the **Modify Array** wizard lets you remove drives from the existing configuration to enable the RAID level transformation.

1. Select Remove drives in the Modify Array window, and click Next.

The **Modify Array** window appears and it states the number of drives that you must remove to change the RAID level from the current level to a new RAID level and the maximum number of drives that can be removed.

- 2. Click the  $\mathbf{X}$  icon to remove the drives.
- 3. Click Finish.

The RAID Level is migrated. A confirmation message appears. You can monitor the progress of the transformation. See Background Operations Support.

### Migrating the RAID Level Without Adding or Removing Drives

For example, if you migrate the RAID level of your array from RAID 5 to RAID 0, the **Modify Array** wizard lets you migrate the RAID level without adding or removing the drives.

#### Select Migrate RAID level in the Modify Array, and click Next.

The RAID level is migrated. A confirmation message appears. You can monitor the progress of the transformation. See Background Operations Support.

# **Managing Logical Drives**

The HPE MR Storage Administrator application lets you perform various operations on the logical drives.

## **Viewing Logical Drive Properties**

Select a logical drive from an array in the Controller Dashboard to view its properties.

#### Figure 37: Logical Drive Properties



#### **Table 10: Logical Drive Properties**

Property	Description
Status	The current status of the logical drive. These options are available:
	Optimal
	Partially Degraded
	Degraded
	Offline
Read Policy	The read cache policy for the logical drive. These options are available:
	Read Ahead
	No Read Ahead
Write Policy	The write policy for the logical drive. These options are available:
	Write Through
	Write Back
	Always Write Back
IO Policy	The input/output policy for the logical drive. These options are available:
	Direct IO
	Cached IO

Property	Description		
Write Cache Policy	<ul> <li>The Write Cache Policy for the logical drive. These status are displayed:</li> <li>Enabled – When the current cache policy is either Write Back or Always Write Back.</li> <li>Temporarily Disabled – When the default cache policy is either Write Back or Always Write Back, and the current cache policy is Write Through.</li> <li>Disabled – When the status of the HPE Smart Storage energy pack is not Optimal.</li> </ul>		
Access Policy	<ul> <li>The access policy for the logical drive. These options are available:</li> <li>Read Write</li> <li>Read Only</li> <li>Hidden – The Hidden policy is applicable for only hidden logical drives. No other access policies are applicable after you select Hidden as the access policy.</li> </ul>		
Drive Cache The logical drive cache setting. These options are available:  Unchanged  Enable Disable			
Data Protection	Indicates whether the data protection feature is enabled for the logical drive.		
SSD Caching	Indicates whether SSD caching is enabled.		

## **Modifying Logical Drive Properties**

You can change the read policy, write policy, and other logical drive properties at any time after a logical drive is created. Perform these steps to modify the logical drive settings.

1. Navigate to the Controller Dashboard, click an array name (for example, Array\_1).

Click the 👫 icon that corresponds to the array to display its contents.

The logical drives and drives associated with the selected array appear.

- 2. Click the logical drive whose settings you want to change.
- Select More Actions > Modify Properties.
   The Modify <Logical Drive Name> dialog appears.

#### Figure 38: Modify Logical Drive Dialog

ogical Drive Name	
JName_00	
BackGround Initialization Enabled	Enabling/Disabling of a Background Initialization on the storage medium for use
Read Policy No Read Ahead	Enabled  Disabled Disabled
Write Policy Write Through	
I/O Policy Direct IO	

- Change the logical drive properties as needed.
   For information about these properties, see Selecting Logical Drive Settings.
- 5. Click save settings.

### Start and Stop Locating a Logical Drive

If the drives that contain the logical drives are located in a disk enclosure, you can identify them by making their LEDs blink. Perform these steps to identify the logical drives:

1. Navigate to the Controller Dashboard, click an array name (for example, Array\_1).

Click the 👘 icon that corresponds to the array to display its contents.

The logical drives and drives associated with the selected array appear.

- 2. Click the logical drive that you want to locate in the disk enclosure.
- 3. Select Actions > Start Locate.

The LEDs on the drives in the logical drive start blinking.

4. To stop the LEDs from blinking, select Actions > Stop Locate.

### **Erasing a Logical Drive**

The logical drive erase function operates on a specified logical drive and overwrites all user-accessible locations. It supports nonzero patterns and multiple passes. The logical drive erase function optionally deletes the logical drive and erases the data within the logical drive's LBA range. The logical drive erase function is a background operation, and it posts events to notify users of their progress.

#### NOTE

Use disk management tools within the operating system to first unmount the volume before performing an erase.

Perform these steps to erase a logical drive.

1. Navigate to the Controller Dashboard, click a array name (for example, Array).

Click the 👘 icon corresponding to a array to display its contents.

The logical drives and drives associated with the selected array appear.

- 2. Click the logical drive whose content you want to erase.
- 3. Select Actions > Erase.

The Logical Drive Erase dialog appears.

Figure 39: Logical Drive Erase Dialog

Logical Drive Erase 🕐

Х

Logical Drive Erase operates on a specified logical drive and overwrites all user-accessible sectors with the specified pattern for the specified number of passes.

#### Select the mode for Drive erase operation :

#### Simple

Specifies single pass erase Operation that writes pattern A to the Logical Drive.

#### 🔘 Normal

Specifies a three pass erase operation that **F**first overwrites the logical drive contents with random values then overwrites it with pattern A and then overwrites it with pattern B

#### O Thorough

Specifies a nine pass erase operation that repeats the normal mode thrice.

Delete Logical Drive After Erase



The dialog shows these modes:

- Simple
- Normal
- Thorough
- 4. Select a mode and click Erase Logical Drive.

A warning message appears asking for your confirmation.

5. Click Yes, Erase Drive.

After the logical drive erase operation has started, the **Stop Erase** option is enabled in the **Actions** menu. You can monitor the progress of the erase operation. See Background Operations Support.

6. Select the **Delete Logical Drive After Erase** check box to delete the logical drive after the erase operation has completed.

## Initializing a Logical Drive

When you create a new logical drive with the **Advanced Configuration** wizard, you can select the **Fast Initialization** or **Full Initialization** option to initialize the drive immediately. However, you can select **No Initialization** if you want to initialize the logical drive later.

Perform these steps to initialize a logical drive after completing the configuration process.

1. Navigate to the Controller Dashboard, click an array name (for example, Array\_1).

Click the 💼 icon that corresponds to the array to display its contents.

The logical drives and drives associated with the selected array appear.

- 2. Click the logical drive that you want to initialize.
- 3. Select Actions > Start Initialize.

A warning message appears.

#### ATTENTION

Initialization erases all data on the logical drive. Make sure to back up any data you want to keep before you initialize a logical drive. Make sure the operating system is not installed on the logical drive you are initializing.

4. Select the Fast Initialization check box if you want to use this option.

If you leave the check box unselected, the software runs a Full Initialization on the logical drive.

5. Click Yes, Start Initialization to begin the initialization.

You can monitor the progress of the initialization. See Background Operations Support.

### **Starting Consistency Check on a Logical Drive**

Perform the following steps to start consistency check on a logical drive. For more information of consistency check, see Running Consistency Checks.

1. Navigate to the Controller Dashboard, click an array name (for example, Array\_1).

Click the 👫 icon that corresponds to that array to display its contents.

The logical drives and drives associated with the selected array appear.

- 2. Click the logical drive on which you want to start consistency check.
- 3. Select Actions > Start Consistency Check.

The consistency check operation starts. You can see the progress of this operation in the **Background Processes in Progress** section. After the consistency check operation has started, the **Stop Consistency Check** option is enabled in the **Actions** menu.

### Expanding the Capacity of a Logical Drive While Online

Online Capacity Expansion (OCE) lets you expand the capacity of a logical drive by adding new drives or making use of unused space on existing disks, without requiring a reboot. Perform these steps to expand the capacity of a logical drive.

#### ATTENTION

Make sure to back up the data on the logical drive before you proceed with the online capacity expansion and expand the array before performing an OCE operation.

1. Navigate to the Controller Dashboard, click an array name (for example, Array\_1).

Click the 👫 icon that corresponds to the array to display its contents.

The logical drives an drives associated with the selected array appear.

- 2. Click the logical drive whose capacity you want to expand.
- 3. Select More Actions > Expand.

The Expand Logical Drive dialog appears.

#### Figure 40: Expand Logical Drive Dialog

Expand Logical Drive	<b>?</b> ×
Logical Drive: 0	
Current Capacity:400GB	
Available Capacity:531GB	
Enter percentage of available capacity:	
100 🚔 %	
Capacity of the logical drive after expansi	on: 931GB
Expand	

- 4. Select the percentage of the available capacity that you want the logical drive to use.
- 5. Click Expand.

The logical drive expands by the selected percentage of the available capacity.

## **Deleting a Logical Drive**

You can delete logical drives on a controller to reuse that space for new logical drives.



#### CAUTION

All data on a logical drive is lost when you delete it. Make sure to back up the data before you delete a logical drive.

Perform the following steps to delete a logical drive.

1. Navigate to the Controller Dashboard, click an array name (for example, Array\_1).

Click the **m** icon that corresponds to the array to display its contents. The logical drives an drives associated with the selected array appear.

2. Click the logical drive that you want to delete.

#### 3. Select Actions > Delete.

A confirmation dialog appears.

4. Select **Confirm** and click **Yes**, **Delete** to proceed with the delete operation.

#### NOTE

You can delete an operating system or file system logical drive. However, if you try to do so, the following message appears.

Selected Logical Drive has an OS/FS, are you sure you want to delete it?

# **Managing Drives**

The HPE MR Storage Administrator application lets you manage all the drives connected to the controller.

## **Viewing Drive Properties**

Select a drive from an array in the Controller dashboard to view its properties.

#### **Figure 41: Drive Properties**

	0 Fo	reign D	brives								- Actions
the set for and the set of t									Make Drive Offline		
	1 011	comig	area orrives			Start Locating					
-	4 Co	nfigure	ed Drives	4 Onli	ne						Stop Locating
			Enclosure : Bay 0	Device ID 0	Type 0	Interface 0	Capacity 0	Sector Size 0	Status 0	Model 0	Replace Drive
	2	9	Port 3I,Box=1,Bay=1	56	HDD	SAS	30058	5128	Online	EG000300JWBHR	- Properties
	Θ	Ø	Port 3I,Box=1,Bay=2	55	HDD	SAS	300G8	5128	Online	EG000300JWBHR	Status
	Θ	Ø	Port 3I,Box=1,Bay=4	57	HDD	SAS	30068	5128	Online	EG000300JWBHR	Online
	8	$\diamondsuit$	Port 4l.8ox=1.8ay=5	58	HDD	SAS	30068	5128	Online	EG000300.JWBHR	Exposed As PHYSICAL-DEVICE
•	0 Sp	ares									Product ID EG000300JWBHR
•	0 JB	00									Vendor ID
											Serial Number 3770A05J#XFD1710
									Shield Counter 0		
									Device ID 56		
										Usable Capacity 278.8768	

#### **Table 11: Drive Properties**

Property	Description
Status	The current status of the drive.
Exposed As	To differentiate the drives, the drives are exposed as one of the following: <ul> <li>JBOD</li> <li>PHYSICAL-DEVICE</li> </ul>
Product ID	The product ID of the drive.
Vendor ID	The ID assigned to the drive by the vendor.
Serial Number	The serial number of the drive.
Shield Counter	The shield counter value.
Device ID	The device ID of the drive that is assigned by the manufacturer.
Usable Capacity	The usable storage capacity, based on the RAID level used.
Raw Capacity	The actual full capacity of the drive before any coercion mode is applied to reduce the capacity.
	General Properties
SAS Address 0	The World Wide Name (WWN) for the drive.
SAS Address 1	The WWN for the drive.
Negotiated Link Speed	The negotiated link speed for data transfer to and from the drive.
Drive Speed	The speed of the drive.

Raw Capacity 30068 + more properties

Property	Description				
Temperature	The temperature of the drive.				
Revision Level	The revision level of the drive's firmware.				
Power Status	<ul> <li>The power status displays the following status:</li> <li>On – when a drive is spun up.</li> </ul>				
Native Command Queueing	Indicates if the Native Command Queueing (NCQ) function is enabled. NCQ enables the drive to queue the I/O requests and reorder them for efficiency.				
Sector Size	The size of the sector of the drive. The possible options are 4 KB or 512 KB.				
Enclosure Properties					
Enclosure ID	The ID of the enclosure in which the drive is located.				
Enclosure Location	The port number of the enclosure to which the drive is connected.				

## Start and Stop Locating a Drive

If the drives are in a disk enclosure, you can identify them by making their LEDs blink. Perform the following steps to identify the drives:

- 1. Navigate to the drive on the Controller dashboard, and select the drive you want to identify such as, Unconfigured Good drive, Online drive, Configured drive, and so on.
- 2. Select Actions > Start Locating.

The corresponding LED on the drive starts blinking.

3. To stop the LED from blinking, select Actions > Stop Locating.

## Making a Drive Offline

Perform the following steps to make a drive offline.

#### ATTENTION

After you perform this procedure, all of the data on the drive will be lost.

1. Navigate to the Controller Dashboard, click an array name (for example, Array\_1).

Click the 👘 icon corresponding to an array to display its contents.

The logical drives and drives associated with the selected array appear.

- 2. Click the Drive tab, and select the drive that you want to make offline.
- 3. Select Actions > Make Drive Offline.

A confirmation message appears.

4. Select Confirm and click Yes, Make Drive Offline to make the selected drive Offline.

## Making a Drive Online

You can change the state of a drive to online. In an online state, the drive works normally and is a part of a configured logical drive.

#### ATTENTION

When transitioning a drive to an online state manually or forcefully, you lose data on the drive. When adding a drive to an existing volume or replacing a drive in an existing volume, you must manually start the

rebuild process, if the rebuild does not automatically start. When the rebuild process is completed, the drive automatically transitions to an online state.

1. Navigate to the Controller Dashboard, click an array name (for example, Array\_1).

Click the 👘 icon corresponding to an array to display its contents.

The logical drives and drives that are associated with the selected array appear.

- 2. Click the Drive tab, and select the offline drive that you want to make online.
- 3. Select Actions > Make Drive Online.

The drive status changes to Online.

## **Replacing a Drive**

You might want to replace a drive if the drive shows signs of failing. Before you start this operation, be sure that an available unconfigured good replacement drive is available. The replacement drive must have at least as much capacity as the drive you are replacing. Perform the following steps to replace a drive.

#### ATTENTION

Make sure to back up the data on the drive before you replace it.

Navigate to the Controller dashboard, click a array name (for example, Array\_1). Click the = icon corresponding to a array to display its contents.

The logical drives and drives associated with the selected array appear.

2. Click the **Drive** tab, and select a drive which you want to replace.

#### 3. Select Actions > Replace Drive.

The Replace Drive dialog appears.

Figure 42: Replace Drive

### **Replace Drive**

Port 3I,Box=1,Bay=2 will copy the data to selected component.

	Enclosure	Device ID	Interface	Туре	Capacity	Sector Size	Model
0	Port 3I,Box=1,Bay=4	57	SAS	HDD	300GB	512B	EG000300JWBHR
0	Port 4I,Box=1,Bay=5	58	SAS	HDD	300GB	512B	EG000300JWBHR
0	Port 3I,Box=1,Bay=3	59	SAS	HDD	300GB	512B	EG000300JWBHR



×

- Select a replacement drive and click **Replace Drive**. A confirmation message appears.
- 5. Select **Confirm** and click **Yes**, **Replace Drive** to proceed with the replace operation. The drive is replaced and the data is copied to the selected component.

## Marking a Drive as a Missing Drive

If a drive is currently part of a redundant configuration and if the drive is displaying signs of failure, you can mark the drive as missing and start rebuilding data on that drive.

- 1. Navigate to the Controller dashboard and select Arrays.
- 2. Click an array name (for example, Array\_1).
- Click the ficon that corresponds to an array to display its contents.
   The virtual drives and physical drives associated with the selected array appear.
- 4. Click the Physical Drive tab, and select a drive which you want to mark as missing.
- 5. Select Actions > Mark Drive Offline.

A confirmation dialog appears.

6. Select **Confirm** and click **Yes**, **Mark Drive Offline** to proceed towards marking the drive offline. The drive is marked as offline as shown in the following figure.

#### Figure 43: Mark Drive Offline Dialog

1 Drive Groups				6 Drives 2 Unconfigure	ed Drives		1 Other Hardw	are		
I	- 6	DG_0	RAID 1 1 Virtual & 4 Physica	al Drives Used 67.31 GB	of 67.31 G8 Availa	ible				Actions
I		1 Virtual	Drives 4 Physical Drives							* Properties
I			Enclosure:Slot 0	Device ID ()	Type 0	Interface 0	Capacity 0	Sector Size ()	Hodel 0	Select any Drive Group to view its actions & properties
I	8	۵	DN_134:8	16	HOD	SAS	465.2508	5120	\$7950062055	
I		$\Leftrightarrow$	EN_134:9	17	HDD	SAS	465.2568	5128	\$7950043155	
I		$\Leftrightarrow$	EN_134:10	18	ноо	SAS	465.2568	5128	\$7950043155	
I	0	¢	EN_134:1	21	HDD	SAS	33.66GB	5128	HU5151436VL5300	

- 7. Navigate to the Drives tab and expand the Configured Drives section to see the drives that are offline.
- 8. Select a drive whose status is offline and go to Actions > Mark Drive as Missing.
- 9. Navigate to the **Drives** tab.
- 10. Select an Unconfigured Good drive from the list of Unconfigured Good drives, and go to Actions > More Actions > Replace Missing Drive.

The Replace Missing Drive dialog appears.

#### Figure 44: Replace Missing Drive Dialog

Replace Missing Drive								
Replaces a	Replaces a drive of a degraded array that is marked missing with an UNCONFIGURED O							
	Drive Groups	Raid Level	Row Index					
0	Drive Group 0	Raid 1	0					
Replace Missing Drive								

- 11. Select the drive and click Replace Missing Drive.
- 12. Navigate to the Arrays tab and select a new drive.
- 13. Click Actions > More Actions > Start Rebuild.

### **Assigning Global Spare Drives**

A global spare drive replaces a failed drive in any redundant array, as long as the capacity of the global spare drive is equal to or greater than the coerced capacity of the failed drive. Perform the following steps to assign global spare drives.

1. Navigate to the Controller dashboard and click the Drives tab.

All of the associated drives appear.

- 2. Expand Unconfigured Drives and select an unconfigured good drive.
- 3. Select Actions > More Actions > Assign Global Spare Drive.

The unconfigured good drive is changed to a global spare drive. The status of the unconfigured good drive appears as a global spare drive in the **Spare Drives** section.

### **Removing a Global Spare Drive**

Perform the following steps to remove a global spare drive.

- 1. Navigate to the Controller dashboard and click the **Drives** tab. All of the associated drives appear.
- 2. Expand Spare Drives and select a spare drive that you want to remove.
- Select Actions > More Actions > Remove Global Spare Drive.
   The spare drive is removed and is listed in the Unconfigured Drives section as an unconfigured good drive.

## **Assigning Dedicated Spare Drives**

Dedicated spare drives provide protection to one or more specified arrays on the controller. If you select an Unconfigured Good drive, you have the option of assigning it as a dedicated spare drive. Perform these steps to assign a dedicated spare drive.

1. Navigate to the Controller dashboard and click the Drives tab.

All of the associated drives appear.

- 2. Expand **Unconfigured Drives** and select an unconfigured good drive.
- 3. Select Actions > More Actions > Assign Dedicated Spare Drive.

The Arrays dialog appears.

4. Select an array and click Add Dedicated Spare Drive.

A confirmation message appears.

5. Click Done.

The unconfigured good drive is changed to a dedicated spare drive. The status of the unconfigured good drive appears as a dedicated spare drive in the **Spare Drives** section.

## **Rebuilding a Drive**

If a drive configured as RAID 1, 5, 6, 10, 50, or 60 fails, the firmware automatically rebuilds the data on a spare drive to prevent data loss. The rebuild operation is a fully automatic process. You can monitor the progress of drive rebuilds in the **Background Processes in Progress** window. See Background Operations Support.

## Converting an Unconfigured Bad Drive to an Unconfigured Good Drive

Perform the following steps to convert an unconfigured bad drive to an unconfigured good drive.

1. Navigate to the Controller dashboard and click the Drives tab.

All of the associated drives appear.

- 2. Expand **Unconfigured Drives** and select an unconfigured bad drive.
- Select Actions > Make Unconfigured Good.
   A confirmation message appears.
- 4. Select Confirm and click Yes, Make Unconfigured Good to proceed with the operation.

The unconfigured bad drive is changed to an unconfigured good drive. The status of the unconfigured bad drive appears as unconfigured good in the **Unconfigured Drives** section.

## **Removing a Drive**

You might need to remove a non-failed drive that is connected to the controller. Preparing a physical drive for removal spins the drive into a power save mode.

1. Navigate to the Controller dashboard, and click the **Drives** tab.

All of the associated drives appear.

- 2. Expand Unconfigured Drives, and select a drive that you want to remove.
- 3. Select Actions > Prepare for Removal.

The drive is in the power save mode and is ready for removal.

4. Wait until the drive spins down and then remove it.

If you do not want to remove the drive, select Actions > Undo Prepare for Removal.

### Make Unconfigured Good Drives and Make JBOD Drives

When you power down a controller and insert a new drive, and if the inserted drive does not contain valid DDF metadata, the drive status is listed as JBOD (Just a Bunch of Drives) when you power on the system again. When you power down a controller and insert a new drive, and if the drive contains valid DDF metadata, its drive state is Unconfigured Good. A new drive in the JBOD drive state is exposed to the host operating system as a stand-alone drive. You cannot use JBOD drives to create a RAID configuration, because they do not have valid DDF records. Therefore, you must convert JBOD drives to unconfigured good drives.

If the controller supports JBOD drives, the HPE MR Storage Administrator includes options for converting JBOD drives to an unconfigured good drive, or converting unconfigured good drives to JBOD drives.

### **Making Unconfigured Good Drives**

Perform the following steps to change the status of JBOD drives to Unconfigured Good drives.

1. Navigate to the Controller dashboard and click the Drives tab.

All of the associated drives appear.

- 2. Expand **JBOD** and select a JBOD drive.
- Select Actions > Make Unconfigured Good.
   A confirmation message appears.
- 4. Select **Confirm** and click **Yes**, **Make Unconfigured Good** to proceed with the operation. The JBOD drive is changed to an unconfigured good drive.

### Making a JBOD Drive

Perform these steps to change the status of unconfigured good drives to JBOD drives.

- 1. Navigate to the Controller dashboard and click the **Drives** tab. All of the associated drives appear.
- 2. Expand Unconfigured Drives and select an unconfigured good drive.
- 3. Select Actions > Make JBOD.

The unconfigured good drive is changed to a JBOD drive.

### **Erasing a Drive**

You can erase data on Non SEDs (normal HDDs) by using the **Drive Erase** option. For Non–SEDs, the erase operation consists of a series of write operations to a drive that overwrites every user-accessible sector of the drive with specified patterns. It can be repeated in multiple passes using different data patterns for enhanced security. The erase operation is performed as a background task. Perform the following steps to erase a drive.

1. Navigate to the Controller dashboard and click the Drives tab.

All of the associated drives appear.

- 2. Expand Unconfigured Drives and select an unconfigured good drive.
- 3. Select Actions > More Actions > Drive Erase.

The Drive Erase dialog appears.

#### Figure 45: Drive Erase Dialog



Drive Erase operates on a specified drive and overwrites all user-accessible sectors with the specified pattern for the specified number of passes.

#### Select the mode for Drive erase operation :



Specifies single pass erase Operation that writes pattern A to the Drive.

#### O Normal

Specifies a three pass erase operation that **F**first overwrites the drive contents with random values then overwrites it with pattern A and then overwrites it with pattern B

#### O Thorough

Specifies a nine pass erase operation that repeats the normal mode thrice.

**Erase Drive** 

The dialog shows the following modes:

- Simple
- Normal
- Thorough
- 4. Select a mode and click Erase Drive.

A warning message appears asking for your confirmation.

5. Click Yes, Erase Drive.

After the drive erase operation has started, the **Stop Erase** option is enabled in the **Actions** menu. You can monitor the progress of the erase operation. See Background Operations Support.

### **Erasing a Drive Securely**

#### ATTENTION

The following procedure is applicable only to MR416i-p, MR416i-o, MR416i-a, MR216i-p, MR216i-o, MR216i-a, and MR4048i-o.

The Instant Secure Erase feature erases data from encrypted drives.

#### ATTENTION

All data on the drive is lost when you erase it. Before starting this operation, back up any data that you want to keep.

1. Navigate to the Controller dashboard, and click the **Drives** tab.

All of the associated drives appear.

- 2. Expand Unconfigured Drives, and select an unconfigured good drive.
- 3. Select Actions > Instant Secure Erase.

A confirmation message appears.

4. Select Confirm and click Yes, Securely Erase Drive to proceed with the operation.

After the secure erase operation has started, the **Stop Erase** option is enabled in the **Actions** menu. You can monitor the progress of the erase operation. See Background Operations Support.

### Sanitizing a Drive

You can erase the data residing on a drive using the **Sanitize** feature. The **Sanitize** option is similar to the *Drive Erase* feature that is already supported by your controller, except that the **Sanitize** option is performed by the drive firmware, whereas the *Drive Erase* feature is performed by the controller firmware.

The Sanitize option is an industry standard SCSI feature. It uses industry standard Sanitize SCSI Block command. The Sanitize operation is constantly monitored the by controller firmware and the drive sanitization progress events are notified to you through Background Operations Support.

#### ATTENTION

The following procedure is applicable only to P824i-p and newer controllers.

To Sanitize a drive, you must make sure that:

- The selected drive is in an Unconfigured Good state.
- The selected drive is not a JBOD drive.
- The selected drive is not part of any array, dedicated spare drive, or global spare drive.

Sanitize operation is enabled only when no other operation is in progress on the selected drive.

When the Sanitize operation is in progress, you cannot perform any other operation on the drive that is being sanitized.

Perform the following steps to sanitize a drive:

1. Navigate to the Controller dashboard and click the **Drives** tab.

All of the associated drives appear.

- 2. Expand Unconfigured Drives and choose an unconfigured good drive.
  - You can run drive sanitization on multiple Unconfigured Good drives at the same time.

However, the Sanitize option is only enabled when the same type of sanitize operation is supported on all the selected drives. For example, on solid state drives (SSDs), **Block Erase** is allowed, and on hard disk drives (HDDs), **Overwrite** is allowed.

• You cannot run the Sanitize operation on mixed drive types.

For example, you have selected two drives to run the Sanitize operation; one of them is an SSD and the other one is an HDD. In this scenario, you will not be able to run the Sanitize operation because they are not the same drive type, nor are they of the same sanitize operation type.

3. Select Actions > More Actions > Start Sanitize.

The Sanitize Drive dialog appears.

#### NOTE

After you start the drive sanitize operation, you cannot stop or pause the operation until it is complete.

#### Figure 46: Sanitize Dialog

Sanitize Drive	?	×			
Sanitize operation causes the device server to alter information on the logical unit					
Select the mode for sanitize operation					
• Overwrite Overwrite operation causes the device server to alter information by writing a data pattern to the medium one or more times;					
Allow Unrestricted Sanitize Exit					
Sanitize Drive					

Depending on the drives you have selected for sanitization (SSDs or HDDs), the following options are available:

• Overwrite - If you have selected HDD, you can sanitize the physical using the Overwrite option.

This option writes a particular data pattern on the drive one or more times.

• Block Erase – If you have selected SSDs, you can sanitize the drives using the Block Erase option.

This option sets the physical blocks on the drive to a vendor-specific value.

 Allow Unrestricted Sanitize Exit – If, for some reason, the Sanitize operation fails, the system tries to bring the drive out of the failure mode irrespective of whether you select this check box not.

However, if this check box is selected, and if the system succeeds in bringing the drive out of the failure mode, the drive is then returned as an Unconfigured Good drive. If you do not select this check box, and if the Sanitize operation fails, the system places the drive in an Unconfigured Bad state.

#### 4. Click Sanitize Drive.

A confirmation message appears.

5. Click Yes, Sanitize Drive(s) to start sanitizing the selected drives.

You can monitor the progress of the Sanitize operation in the Background Operations section. The status of the drive is also displayed as **Sanitize** until the sanitization operation completes.

The following figure displays the Background Operations section where the sanitize operation is in progress. The figure also displays the status of the drive that is being sanitized.
## Figure 47: Background Operations and Drive Sanitize Dialog

<ul> <li>3 Background Processes in Progress</li> </ul>	Abort J	AR.	More Actions
Clear 2 Drive 52	19 Minutes 15 Seconds remaining Abo	et.	
Clear: Drive 75	1 Hours 59 Minutes 28 Seconds remaining Abo 2 149	HT.	
Sanitize : Drive 53	28		

# **Managing Hardware Components**

When you select the Other Hardware tab from the Controller dashboard, the hardware components window appears.

#### Figure 48: Other Hardware Window

CI Slot: 1 HPE Smart Array	P824i-p MR Gen10 Bis 17 Dec 0			
+ Controller Info				Actions
Serial No SK641P0107		5A5 Address 0x500062b20117ec00	Configured Capacity 931 GB of 5.727 TB Deliver Version 6.714.06.00	Update Firmware Verven 5418-003 Premium Features
				¢ More Actions
1 Arrays 1 Logical Drives		7 Drives 4 Unconfigured Drives	3 Other Hardware Includes Megacel	
• Megacell	Status: Optimal			Actions Properties
+ 2 Enclosures	8 Bays 7 Drives			Select any Amay, Logical Drive or Drive view its actions & properties

## Monitoring the HPE Smart Storage Energy Pack

When the application is running, you can monitor the status of the HPE Smart Storage Energy Pack.

Also, if the HPE Smart Storage Energy Pack is in an Optimal state, **WriteCache Policy** is enabled. If the HPE Smart Storage Energy Pack is in not in an optimal state, **WriteCache Policy** is disabled.

To view the **WriteCache Policy** status, go to the **Array** tab, select an **Array**, then select a **Logical Drive**. The **WriteCache Policy** status is displayed under the **Properties** section, as shown in the following figure.

## Figure 49: WriteCache Policy Window

L	1 Arrays 1 Logical Drives	9 Drives 8 Unconfigured Drives	3 Other Hardware Includes Energy Pack	
	* Energy Pack	Status: Optimal		
	+ 2 Enclosures	10 Bays 9 Drives		

## **Monitoring Enclosures**

When the HPE MR Storage Administrator application is running, you can monitor the status of all of the enclosures connected to the controllers in the server.

## **Viewing Enclosure Properties**

From the Other Hardware tab, under Enclosures, select Box to view its properties.

## Figure 50: Enclosure Properties Window

1 Arrays 1 Logical Drives	9 Drives 8 Unconfigured Drives	3 Other Hardware Includes Energy Pack	
Energy Pack	Status: Optimal		
+ 2 Enclosures	10 Bays 9 Drives		

If you have selected multiple logical drives or multiple drives, click the sicon (Expand button) to perform actions such as starting a consistency check and so on. This action is applicable for all the scenarios where you have selected multiple logical drives or multiple drives and are performing certain actions through the **Actions** dialog.

## **Table 12: Enclosure Properties**

Property	Description
Name	Indicates the name of the enclosure.
Bay count	Indicates the number of bays.
Location	Indicates the location of the enclosure.

# **Viewing Event Logs**

The application monitors the activity and performance of the server and all the controllers cards attached to it. Perform the following steps to view the event logs.

1. Select More Actions > View Event Log on the Server or Controller dashboard.

The **View Event Log** window appears that displays a list of events. Each entry has an event ID, a severity level that indicates the severity of the event, a date and time entry, and a brief description of the event. The event logs are sorted by date and time in the chronological order.

## Figure 51: View Event Log Window

#### iii View Event Log 💿

verityLevel	Eventid	Description	Time, Date	- Actions
Information	54	PCI Slot: 1 Policy change on LD : 1 Previous = Current Wite Policy: WriteBack; Now = Current Write Policy: WriteThrough;	7:30:51 AM,25 Feb/01	2 Download Log
Information	54	PCI Slot: 1 Policy change on LD : 0 Previous = Current Write Policy: WriteBack; Now = Current Write Policy: WriteThrough;	7:30:51 AM,25 Feb/01	Clear Log
Information	54	PCI Slot: 1 Policy change on LD : 0 Previous = Current Write Policy: WriteThrough; Now = Current Write Policy: WriteBack;	7:30:51 AM,25 Feb/01	
Information	113	PCI Slot: 1 Unexpected sense Drive = 76 (Enclosure Id=251; Port Name=Port 61; Box=1; Bay=5) - Warning - specified temperature exceeded CDB = 28 Sense = 70	7:30:51 AM,25 Feb/01	
Information	113	PCI Slot: 1 Unexpected sense Drive = 45 (Enclosure Id=250; Port Name=Port 5I; Box=1; Bay=3) - Warning - specified temperature exceeded CDB = 28 Sense = 70	7:30:51 AM,25 Feb/01	
Information	114	PCI Slot: 1 State change Drive: 75 (Enclosure Id=251; Port Name=Port 6I; Box=1; Bay=6) Previous = UnConfigured Good; Current = Spare;	7:30:51 AM,25 Feb/01	
Information	132	PCI Slot: 1 Dedicated Spare created Drive: 75 (Enclosure Id=251; Port Name=Port 6I; Box=1; Bay=6)	7:30:51 AM,25 Feb/01	
Information	370	PCI Slot: 1 LD is available. LD: 1	7:30:51 AM,25 Feb/01	
Information	138	PCI Slot: 1 Created LD : 1	7:30:51 AM,25 Feb/01	
Information	249	PCI Slot: 1 LD is now OPTIMAL LD: 1	7:30:51 AM,25 Feb/01	
Information	114	PCI Stot: 1 State change Drive: 76 (Enclosure Id=251; Port Name=Port 6I, Box=1; Bay=5) Previous = UnConfigured Good; Current = Online;	7:30:51 AM,25 Feb/01	
Information	114	PCI Slot: 1 State change Drive: 45 (Enclosure Id=250; Port Name=Port SI; Box=1; Bay=3) Previous = UnConfigured Good; Current = Online;	7:30:51 AM,25 Feb/01	
Information	443	PCI Slot: 1 LD is using CacheCade(TM). LD: 0	5:08:31 AM,19 Feb/01	
Information	303	PCI Slot: 1 Controller properties changed	4:59:53 AM, 19 Feb/01	
Information	54	PCI Stot: 1 Policy change on LD : 0 Previous = Current Write Policy: WriteBack; Now = Current Write Policy: WriteThrough;	4:53:47 AM,19 Feb/01	
Information	370	PCI Slot: 1 LD is available. LD: 0	4:53:46 AM,19 Feb/01	
Information	138	PCI Slot: 1 Created LD : 0	4:53:46 AM,19 Feb/01	
Information	249	PCI Slot: 1 LD is now OPTIMAL LD: 0	4:53:46 AM,19 Feb/01	
Information	114	PCI Stot: 1: State change Drive: 41 (Enclosure Id=250; Port Name=Port 5I; Box=1; Bay=2) Previous = UnConfigured Good; Current = Online;	4:53:46 AM,19 Feb/01	
Information	113	PCI Stot: 1 Unexpected sense Drive = 49 (Enclosure Id=250; Port Name=Port 51; Box=1; Bay=4) - Warning - specified temperature exceeded CDB = 28 Sense = 70	2:19:16 AM,10 Feb/01	
Information	114	PCI Slot: 1 State change Drive: 76 (Enclosure Id=251; Port Name=Port 6I, Box=1; Bay=5) Previous = UnConfigured Bad: Current = UnConfigured Good;	4:29:35 AM,9 Feb/01	
Information	547	PCI Stot. 1 Inquiry info of Driver. 76 (Exclosure Id=251: Pert Name=Port 81; Bar=1; Bay=5), Inquiry Info - Vendor: HP EG0300JFCKA 00K702JW21; Serial Number: 00K702JW21; Capacity: 279 G0.	4:29:35 AM,9 Feb'01	
Information	247	PCI Slot: 1 Device Inserted Device Type : Disk Device Id: 76	4:29:35 AM,9 Feb/01	
Information	91	PCI Slot. 1 Drive inserted : 76 (Enclosure Id=251; Port Name=Port 6I; Box=1; Bay=5)	4.29:35 AM,9 Feb'01	
Information	114	PCI Slot: 1 State change Drive: 75 (Enclosure Id=251; Port Name=Port 6I; Box=1; Bay=6) Previous = UnConfigured Bad; Current = UnConfigured Good;	4:29:35 AM,9 Feb/01	
Information	547	PCI Slot: 1 lequiny lefo of Drive: 75 (Electosure Id=251: Port Name=Port R: Bar=1; Bay=6). Inquiny Info - Vendor: HP EG0300JFCKA 00K7032VJ3 ; Model: EG0300JFCKA 00K7032VJ3 ; Senial Number: 00K7032VJ3 ; Capacity: 279 GB	4:29:35 AM,9 Feb'01	
Information	247	PCI Slot: 1 Device Inserted Device Type : Disk Device Id: 75	4:29:35 AM,9 Feb'01	
Information	91	PCI Slot. 1 Drive inserted : 75 (Enclosure Id=251; Port Name=Port 6I; Box=1; Bay=6)	4:29:35 AM,9 Feb'01	
Information	167	PCI Slot: 1 Communication restored on enclosure : 251 (Port Name=Port 6I; Box=1)	4:29:35 AM,9 Feb'01	
Information	338	PCI Slot. 1 Controller requests a host bus rescan	4:28:53 AM,9 Feb'01	

2. (Optional) - Click Load More to view more events in the same page.

## **Downloading Logs**

To download the event logs, navigate to the **View Event Log** window, then click **Download Log** to download the event log file.

## **Clearing the Event Logs**

Perform the following steps to clear the event logs.

- Click Clear Log in the View Event Log window. A confirmation dialog appears.
- 2. Select **Confirm**, and click **Yes**, **Clear Log**. The event logs are cleared.

# **Known Issues and Workarounds**

The following is a list of known issues and workarounds.

• **Issue**: The desktop shortcut is linked with a batch file. If the Windows User Account Control (UAC) is enabled, the privilege escalation prompt is not presented for users who have administrative privileges, but not administrator resulting in access denied message.

Workaround: Enter the LSA URL, localhost:port directly into the browser

• **Issue**: The event API length for the serial number field is 10 characters. Only 10 characters are displayed in the event data for the PD serial number.

Workaround: None.

• **Issue**: When heavy I/Os are active, MRSA may be slow and the user may see stale data. **Workaround**: Refresh the browser or restart the MRSA service to retrieve the updated data.

- **Issue**: When the user enables or disables a controller, the controller is not loaded or unloaded in MRSA by default. **Workaround**: Restart the MRSA service to retrieve the updated controller list.
- Issue: A repurposed event occurs.
   Workaround: Restart the MRSA service.
- **Issue**: Only the GUI is branded per HPE terminologies. Downloaded files are not branded. **Workaround**: None.
- **Issue**: Light Weight Agent only allows two Snapdump files to be downloaded at a time. **Workaround**: None.
- **Issue**: An IR/IT firmware downgrade is not supported from one phase to another phase due to limitations in underlying layers.

Workaround: None.

• **Issue**: MRSA does not detect all the controllers in a HyperV Environment when the controller passthrough is enabled or disabled.

Workaround: Restart the MRSA service to reload and update the library.

- **Issue**: MRSA may be inaccessible after a successful firmware update while I/O's are occurring. **Workaround**: Restart the MRSA services.
- Issue: MRSA may hang when downloading support logs on multiple clients.
   Workaround: Restart the MRSA services. Collect logs from one client at a time during non-heavy IO or drive/ blackplane operations.

## NOTE

Downloading the support log is available only for admin users.

- **Issue**: Allows the *Guest* user to log in when the *Guest* user is disabled through the **User Accounts**. **Workaround**:
  - 1. Open the Command Prompt.
  - 2. Enter lusrmgr.msc.
  - 3. Select **Users**, then **Guest**.
  - 4. Right-click on the Guest User, and select the Properties option.
  - 5. Select the check box, Account is Disabled, if not already selected.
- **Issue**: The server response of IPv4 and IPv6 addresses groups are intermixed in the presence of multi NIC cards. **Workaround**: None.
- **Issue**: When an auto rebuild is enabled, multiclick PD actions are not updated properly. **Workaround**: Manually refresh the page.
- Issue: Google Chrome may not position popup windows correctly.

## Workaround: None.

Version: 61.0.3163.100 and later

- **Issue**: When using Mozilla FireFox, do not save the user name and password, or click the user name text box to enable saving.
  - Workaround: None.
- **Issue**: Operations performed during an online controller reset fail.
- Workaround: Do not perform any operation in MRSA during an online controller reset.
- **Issue**: Zoom operations.

Workaround: Do not zoom operations on a browser until the monitor resolution is low.

- Issue: Performing any action (for example, Configuration) from the Server summary page, then manually refreshing the page causes the user to be redirected to the initially selected Action page.
   Workaround: Do not perform a manual refresh.
- **Issue**: Converting a JBOD PD from JBOD to UG causes the application to display different action menu names. MRSA displays it as **Make unconfigured good**.
- **Issue**: If the same dedicated hot spare is assigned to multiple drive groups, you may see inconsistency in the Element Count and DHSP Element selection check boxes on the Controller page.
- Issue: In MegaRAID, when the patrol read is running at the physical drive level, it is a controller level operation. Each individual physical drive patrol read progress bar will not disappear after completing 100%.
   Workaround: Wait for all of the physical drive progress bars to complete. Once all of the physical drive progress bars have reached 100%, they disappear.
- **Issue**: During installation or uninstallation, the publisher can show as unknown on the **User Account Control** message box.
- **Issue**: MRSA does not allow the physical drive to be selected from non-spanned virtual drives or spanned virtual drives.
- Issue: The Modify option for the existing setup.exe does not work.
   Workaround: Uninstall and reinstall the build instead of using the Modify option.

# **Multi-Selection Threshold Physical Drives**

While selecting physical drives, you can only select up to 32 PDs.

If you want to select more than 32 PDs, perform the following steps:

- 1. Navigate to the directory \LSIStorageAuthority\server\html\files
- 2. Open the Configfile.json file.
- In the Configfile.json file, search for the maxVDs field. The maxVDs field is set by default to a value of 32 to accept 32 PDs.
- 4. Modify this value to 64.
- 5. Clear your browser's history.

Now, you can select more than 32 PDs, up to a maximum of 64 PDs.

# **Support and Other Resources**

## **Accessing Hewlett Packard Enterprise Support**

For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website:

#### http://www.hpe.com/assistance

To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website:

#### http://www.hpe.com/support/hpesc

#### Information to collect:

- Technical support registration number (if applicable)
- · Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages
- Product-specific reports and logs
- · Add-on products or components
- Third-party products or components

## **Accessing Updates**

Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.

To download product updates:

## Hewlett Packard Enterprise Support Center

#### www.hpe.com/support/hpesc

#### Hewlett Packard Enterprise Support Center: Software downloads

www.hpe.com/support/downloads

#### **My HPE Software Center**

www.hpe.com/support/softwaredepot

To subscribe to eNewsletters and alerts:

#### www.hpe.com/support/e-updates

To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center More Information on Access to Support Materials page:

www.hpe.com/support/AccessToSupportMaterials

#### NOTE

Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HPE Passport set up with relevant entitlements.

## **Customer Self Repair**

Hewlett Packard Enterprise customer self repair (CSR) programs allow you to repair your product. If a CSR part needs to be replaced, it will be shipped directly to you so that you can install it at your convenience. Some parts do not qualify for CSR. Your Hewlett Packard Enterprise authorized service provider will determine whether a repair can be accomplished by CSR.

For more information about CSR, contact your local service provider or go to the CSR website: www.hpe.com/support/selfrepair

## **Remote Support**

Remote support is available with supported devices as part of your warranty or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which will initiate a fast and accurate resolution based on your product's service level. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

If your product includes additional remote support details, use search to locate that information.

## **Remote support and Proactive Care information**

- HPE Get Connected
   www.hpe.com/services/getconnected
- HPE Proactive Care Services
   www.hpe.com/services/proactivecare
- HPE Proactive Care Service: Supported Products List www.hpe.com/services/proactivecaresupportedproducts
   HPE Proactive Care Advanced Service: Supported Products List www.hpe.com/services/proactivecareadvancedsupportedproducts

## **Proactive Care Customer Information**

- Proactive Care Central
- Proactive Care Service Activation
   www.hpe.com/services/proactivecarecentralgetstarted

## **Warranty Information**

To view the warranty for your product or to view the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products* reference document, go to the Enterprise Safety and Compliance website:

www.hpe.com/support/Safety-Compliance-EnterpriseProducts

## Additional warranty information

- HPE ProLiant and x86 Servers and Options
   www.hpe.com/support/ProLiantServers-Warranties
- HPE Enterprise Servers www.hpe.com/support/EnterpriseServers-Warranties
- HPE Storage Products
   www.hpe.com/support/Storage-Warranties
   HPE Networking Products
   www.hpe.com/support/Networking-Warranties

## **Regulatory Information**

To view the regulatory information for your product, view the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the Hewlett Packard Enterprise Support Center:

www.hpe.com/support/Safety-Compliance-EnterpriseProducts

## Additional regulatory information

Hewlett Packard Enterprise is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements such as REACH (Regulation EC No 1907/2006 of the European Parliament and the Council). A chemical information report for this product can be found at:

#### www.hpe.com/info/reach

For Hewlett Packard Enterprise product environmental and safety information and compliance data, includingRoHS and REACH, see:

#### www.hpe.com/info/ecodata

For Hewlett Packard Enterprise environmental information, including company programs, product recycling, and energy efficiency, see:

www.hpe.com/info/environment

## **Documentation Feedback**

Hewlett Packard Enterprise is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback (docsfeedback@hpe.com). When submitting your feedback, include the document title, part number, edition, and publication date located on the front cover of the document. For online help content, include the product name, product version, help edition, and publication date located on the legal notices page.

# Glossary

This glossary defines the terms used in this document.

access policy	A logical drive property indicating what kind of access is allowed for a particular logical drive. The possible values are <i>Read/Write</i> , <i>Read Only</i> , or <i>Blocked</i> .
array	A group of drives attached to a RAID controller on which one or more logical drives can be created. All logical drives in the array use all of the drives in the array.
BIOS	Basic Input/Output System. The computer BIOS is stored on a flash memory chip. The BIOS controls communications between the microprocessor and peripheral devices, such as the keyboard and the video controller, and miscellaneous functions, such as system messages.
cache	Fast memory that holds recently accessed data. Use of cache memory speeds subsequent access to the same data. When data is read from or written to main memory, a copy is also saved in cache memory with the associated main memory address. The cache memory software monitors the addresses of subsequent reads to see if the required data is already stored in cache memory. If it is already in cache memory (a cache hit), it is read from cache memory immediately and the main memory read is aborted (or not started). If the data is not cached (a cache miss), it is fetched from main memory and saved in cache memory.
caching	The process of using a high speed memory buffer to speed up a computer system's overall read/write performance. The cache can be accessed at a higher speed than a drive subsystem. To improve read performance, the cache usually contains the most recently accessed data, as well as data from adjacent drive sectors. To improve write performance, the cache can temporarily store data in accordance with its write back policies.
capacity	A property that indicates the amount of storage space on a drive or logical drive.
coerced capacity	A drive property indicating the capacity to which a drive has been coerced (forced) to make it compatible with other drives that are nominally the same capacity. For example, a 4-GB drive from one manufacturer might be 4196 MB, and a 4-GB from another manufacturer might be 4128 MB. These drives could be coerced to a usable capacity of 4088 MB each for use in a array in a storage configuration.
coercion mode	A controller property indicating the capacity to which drives of nominally identical capacity are coerced (forced) to make them usable in a storage configuration.
consistency check	An operation that verifies that all stripes in a logical drive with a redundant RAID level are consistent and that automatically fixes any errors. For RAID 1 arrays, this operation verifies correct mirrored data for each stripe.
consistency check rate	The rate at which consistency check operations are run on a computer system.
controller	A chip that controls the transfer of data between the microprocessor and memory or between the microprocessor and a peripheral device such as a drive. HPE Smart Array P824i-p MR Gen10 Controllers perform RAID functions such as striping and mirroring to provide data protection.
copyback	<ul> <li>The procedure used to copy data from a source drive of a logical drive to a destination drive that is not a part of the logical drive. The copyback operation is often used to create or restore a specific physical configuration for a array (for example, a specific arrangement of array members on the device I/O buses). The copyback operation can be run automatically or manually.</li> <li>Typically, a drive fails or is expected to fail, and the data is rebuilt on a spare drive. The failed drive is replaced with a new drive. Then the data is copied from the spare drive to the new drive, and the spare drive reverts from a rebuild drive to its original spare drive status. The copyback operation runs as a background activity, and the logical drive is still available online to the host.</li> </ul>

A logical drive property that indicates whether the logical drive currently supports Write Back
<ul> <li>In Write Back mode, the controller sends a data transfer completion signal to the host when the controller cache has received all of the data in a transaction.</li> </ul>
<ul> <li>In Write Through mode, the controller sends a data transfer completion signal to the host when the drive subsystem has received all of the data in a transaction.</li> </ul>
A controller or drive property indicating the manufacturer-assigned device ID.
Data disk format.
A drives or a logical drive property indicating the status of the appropriate drive. Drive State
A drive can be in any one of the following states:
<ul> <li>Unconfigured Good – A drive accessible to the RAID controller but not configured as a part of a logical drive or as a spare drive.</li> </ul>
• Spare Drive – A drive that is configured as a spare drive.
<ul> <li>Online – A drive that can be accessed by the RAID controller and will be part of the logical drive.</li> </ul>
• Rebuild – A drive to which data is being written to restore full redundancy for a logical drive.
<ul> <li>Failed – A drive that was originally configured as Online or Spare Drive, but on which the firmware detects an unrecoverable error.</li> </ul>
<ul> <li>Unconfigured Bad – A drive on which the firmware detects an unrecoverable error; the drive was Unconfigured Good or the drive could not be initialized.</li> </ul>
<ul> <li>Missing – A drive that was Online, but which has been removed from its location.</li> </ul>
<ul> <li>Offline – A drive that is part of a logical drive but which has invalid data as far as the RAID configuration is concerned.</li> </ul>
<ul> <li>None – A drive with an unsupported flag set.</li> </ul>
Logical Drive State
A logical drive can be in any one of the following states:
Optimal – A logical drive whose members are all online.
<ul> <li>Partially Degraded – A logical drive with a redundant RAID level that is capable of sustaining more than one member drive failure.</li> </ul>
This state also applies to the logical drive's member drives. Currently, a RAID 6 or RAID 60 logical drive is the only logical drive that can be partially degraded.
<ul> <li>Degraded – A logical drive with a redundant RAID level with one or more member failures and can no longer sustain a subsequent drive failure.</li> </ul>
• <b>Offline</b> – A logical drive with one or more member failures that make the data inaccessible.
A drive property indicating the characteristics of the drive.
A mode of initialization that quickly writes zeros to the first and last sectors of the logical drive. This allows you to immediately start writing data to the logical drive while the initialization is running in the background.
The capability of the drive subsystem to undergo a single drive failure per array without compromising data integrity and processing capability. HPE Smart Array MR Controllers provide fault tolerance through redundant arrays in RAID levels 1, 5, 6, 10, 50, and 60. They also support spare drive drives and the auto-rebuild feature.
Software stored in read-only memory (ROM) or programmable ROM (PROM). Firmware is often responsible for the behavior of a system when it is first turned on. A typical example would be a monitor program in a system that loads the full operating system from a drive or from a network, then passes control to the operating system.
The process of writing a specific value to all data fields on a drive, to map out unreadable or bad sectors. Because most drives are formatted when manufactured, formatting is usually done only if a drive generates many media errors.
File system.
Graphical user interface.

HPE Smart Storage Energy Pack	Refers to a energy pack backup unit.
JBOD	Just a bunch of disks. JBOD generally refers to a collection of hard disks that are directly managed by the host. JBOD is an alternative to using a RAID configuration. Rather than configuring a storage array to use a RAID level, the disks within the array are treated as independent disks.
initialization	The process of writing zeros to the data fields of a logical drive and, in fault-tolerant RAID levels, generating the corresponding parity to put the logical drive in a Ready state. Initialization erases all previous data on the drives. Arrays will work without initializing, but they can fail a consistency check because the parity fields have not been generated.
IO policy	A logical drive property indicating whether Cached I/O or Direct I/O is being used. In Cached I/ O mode, all reads are buffered in cache memory. In Direct I/O mode, reads are not buffered in cache memory. Data is transferred to cache and the host concurrently. If the same data block is read again, it comes from cache memory. (The IO Policy applies to reads on a specific logical drive. It does not affect the read ahead cache.)
load-balancing	A method of spreading work between two or more computers, network links, CPUs, drives, or other resources. Load balancing maximizes resource use, throughput, or response time.
LDF	Logical disk format.
logical drive or disk (LD)	A storage unit created by a RAID controller from one or more drives. Although a logical drive can be created from several drives, it is seen by the operating system as a single drive. Depending on the RAID level used, the logical drive can retain redundant data in case of a drive failure.
logical drive state	A logical drive property indicating the condition of the logical drive. Examples include Optimal and Degraded.
mirroring	The process of providing complete data redundancy with two drives by maintaining an exact copy of one drive's data on the second drive. If one drive fails, the contents of the other drive can be used to maintain the integrity of the system and to rebuild the failed drive.
multipathing	The firmware provides support for detecting and using multiple paths from the HPE Smart Array P824i-p MR Gen10 Controllers to the SAS devices that are in enclosures. Devices connected to enclosures have multiple paths to them. With redundant paths to the same port of a device, if one path fails, another path can be used to communicate between the controller and the device. Using multiple paths with load balancing, instead of a single path, can increase reliability through redundancy.
offline	A drive is offline when it is part of a logical drive but its data is not accessible to the logical drive.
OS	Operating system.
patrol read	A process that checks the drives in a storage configuration for drive errors that could lead to drive failure and lost data. The patrol read operation can find and sometimes fix any potential problem with drives before host access. This enhances overall system performance because error recovery during a normal I/O operation might not be necessary.
patrol read rate	The user-defined rate at which patrol read operations are run on a computer system.
physical drive or disk (PD)	A disk used to emphasize a contract with virtual disks.
RAID	<ul> <li>A group of multiple, independent drives that provide high performance by increasing the number of drives used for saving and accessing data.</li> <li>A RAID array improves input/output (I/O) performance and data availability. The group of drives appears to the host system as a single storage unit or as multiple logical drives. Data throughput improves because several drives can be accessed simultaneously. RAID configurations also improve data storage availability and fault tolerance. Redundant RAID levels (RAID levels 1, 5, 6, 10, 50, and 60) provide data protection.</li> </ul>
RAID 0	Uses data striping on two or more drives to provide high data throughput, especially for large files in an environment that requires no data redundancy.
RAID 1	Uses data mirroring on pairs of drives so that data written to one drive is simultaneously written to the other drive. RAID 1 works well for small databases or other small applications that require complete data redundancy.

RAID 5	Uses data striping and parity data across three or more drives (distributed parity) to provide high data throughput and data redundancy, especially for applications that require random access.
RAID 6	Uses data striping and parity data across three or more drives (distributed parity) to provide high data throughput and data redundancy, especially for applications that require random access. RAID 6 can survive the failure of two drives.
RAID 10	A combination of RAID 0 and RAID 1 that uses data striping across two mirrored arrays. It provides high data throughput and complete data redundancy.
RAID 50	A combination of RAID 0 and RAID 5 that uses data striping across two arrays with parity data. It provides high data throughput and complete data redundancy.
RAID 60	A combination of RAID 0 and RAID 6 that uses data striping across two arrays with parity data. It provides high data throughput and complete data redundancy. RAID 60 can survive the failure of two drives in each RAID set in the spanned array.
RAID level	A logical drive property indicating the RAID level of the logical drive. HPE Smart Array MR Controllers support RAID levels 0, 1, 5, 6, 10, 50, and 60.
RAID transformation	A feature in RAID subsystems that allows changing a RAID level to another level without powering down the system.
raw capacity	A drive property indicating the actual full capacity of the drive before any coercion mode is applied to reduce the capacity.
read policy	A controller attribute indicating the current Read Policy mode. In Always Read Ahead mode, the controller reads sequentially ahead of requested data and stores the additional data in cache memory, anticipating that the data will be needed soon. This speeds up reads for sequential data, but there is little improvement when accessing random data. In No Read Ahead mode (known as Normal mode in WebBIOS), read ahead capability is disabled.
rebuild	The regeneration of all data to a replacement drive in a redundant logical drive after a drive failure. A drive rebuild normally occurs without interrupting normal operations on the affected logical drive, though some degradation of performance of the drive subsystem can occur.
rebuild rate	The percentage of central processing unit (CPU) resources devoted to rebuilding data onto a new drive after a drive in a storage configuration has failed.
reclaim logical drive	A method of undoing the configuration of a new logical drive. If you highlight the logical drive in the <b>Configuration</b> wizard and click <b>Reclaim</b> , the individual drives are removed from the logical drive configuration.
redundancy	A property of a storage configuration that prevents data from being lost when one drive fails in the configuration.
redundant configuration	A logical drive that has redundant data on drives in the array that can be used to rebuild a failed drive. The redundant data can be parity data striped across multiple drives in a array, or it can be a complete mirrored copy of the data stored on a second drive. A redundant configuration protects the data in case a drive fails in the configuration.
SAS	Acronym for Serial-Attached SCSI. SAS is a serial, point-to-point, enterprise-level device interface that leverages the Small Computer System Interface (SCSI) protocol set. The SAS interface provides improved performance, simplified cabling, smaller connectors, lower pin count, and lower power requirements when compared to parallel SCSI.
SATA	Acronym for Serial Advanced Technology Attachment. A physical storage interface standard. SATA is a serial link that provides point-to-point connections between devices. The thinner serial cables allow for better airflow within the system and permit smaller chassis designs.
SCSI device type	A drive property indicating the type of the device, such as drive.
serial no.	A controller property indicating the manufacturer-assigned serial number.
spare drive	A standby drive that can automatically replace a failed drive in a logical drive and prevent data from being lost. A spare drive can be dedicated to a single redundant array or it can be part of the global spare drive pool for all arrays controlled by the controller. When a drive fails, the application automatically uses a spare drive to replace it and then rebuilds the data from the failed drive to the spare drive. Spare Drives can be used in RAID 1, 5, 6, 10, 50, and 60 storage configurations.

stripe size	A logical drive property indicating the length of the interleaved data segments that the RAID controller writes across multiple drives, not including parity drives. For example, consider a stripe that contains 64 KB of drive space and has 16 KB of data residing on each drive in the stripe. In this case, the stripe size is 64 KB, and the strip size is 16 KB. The user can select the stripe size.
striping	A technique used to write data across all drives in a logical drive. Each stripe consists of consecutive logical drive data addresses that are mapped in fixed-size units to each drive in the logical drive using a sequential pattern. For example, if the logical drive includes five drives, the stripe writes data to drives one through five without repeating any of the drives. The amount of space consumed by a stripe is the same on each drive. Striping by itself does not provide data redundancy. Striping in combination with parity does provide data redundancy.
strip size	The portion of a stripe that resides on a single drive in the array.
subvendor ID	A controller property that lists additional vendor ID information about the controller.
transformation	The process of moving logical drives and spare drive drives from one controller to another by disconnecting the drives from one controller and attaching them to another one. The firmware on the new controller will detect and retain the logical drive information on the drives.
transformation rate	The user-defined rate at which an array modification operation is carried out.
URI	Uniform Resource Identifier.
vendor ID	A controller property indicating the vendor-assigned ID number of the controller.
vendor info	A drive property listing the name of the vendor of the drive.
write-back	In Write-Back Caching mode, the controller sends a data transfer completion signal to the host when the controller cache has received all of the data in a drive write transaction. Data is written to the drive subsystem in accordance with policies set up by the controller. These policies include the amount of dirty/clean cache lines, the number of cache lines available, and elapsed time from the last cache flush.
write policy	See Default Write Policy.
write-through	In Write-Through Caching mode, the controller sends a data transfer completion signal to the host when the drive subsystem has received all of the data and has completed the write transaction to the drive.

# **Revision History**

## Version 1.8, January 2024

Updated the Abstract and Support Matrix.

## Version 1.7, September 2023

Updated the Making a Drive Online and Known Issues and Workarounds sections.

Added Changing Behavior Modes.

## Version 1.6, May 2023

Updated the Using the MegaRAID CacheCade Pro 2.0 Feautre and Known Issues and Workarounds sections.

Added Configuring Different Types of Access.

## Version 1.5, October 2022

Updated the Support Matrix, Erasing a Drive Securely, Sanitizing a Drive, Known Issues and Workarounds, and Glossary sections.

## Version 1.4, April 2022

Added Known Issues and Workarounds, Marking a Drive as a Missing Drive, Removing a Drive, Erasing a Drive Securely, MegaRAID SafeStore Encryption Services, UNMAP Capability Feature, and Multi-Selection Threshold for Virtual and Physical Drives sections.

Updated Clearing the Configuration, Deleting a Logical Drive, Performing Initial Configuration, Glossary, and Support Matrix sections.

## Version 1.3, February 2021

Added new Known Issues and Workarounds, Marking a Drive as a Missing Drive, Removing a Drive, Erasing a Drive Securely, MegaRAID SafeStore Encryption Services, UNMAP Capability Feature, and Multi-Selection Threshold for Virtual and Physical Drives sections.

Updated Clearing the Configuration, Deleting a Logical Drive, Performing Initial Configuration, Glossary, and Support Matrix sections.

## Preliminary, Version 1.1, January 2020

Updated the Overview, Server Dashboard, and Configuration sections.

## Preliminary, Version 1.0, December 25, 2017

Initial document release.