ServeRAID C100 and ServeRAID C105

User's Guide

Second Edition (July 2013)

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Chapter 1: Overview

This guide documents the ServeRAID C100 and ServeRAID C105 features, and includes instructions for using the Human Interface Infrastructure Configuration Utility, the MegaCLI command line utility, and MegaRAID Storage Manager™. You can use these utilities to create storage configurations on drives controlled by ServeRAID C105. The manual also includes instructions for installing the ServeRAID C100 and ServeRAID C105 drivers in the Microsoft® Windows® operating systems and the Linux™ operating system.

1.1 Conventions

The following is a list of notational conventions used throughout this guide.

Table 1 Conventions

Notation	Example	Meaning and Use
Courier typeface	`.nwk` file	Names of commands, files, and directories are shown in Courier typeface.
Bold typeface	**fd1sp**	In a command line, keywords are shown in bold, non-italic typeface. Enter them exactly as shown.
Italics	*module*	In command lines and names italics indicate user variables. Italicized text must be replaced with appropriate user-specified items. Enter items of the type called for, using lowercase.
Italic underscore	*full_pathname*	When an underscore appears in an italicized string, enter a user-supplied item of the type called for with no spaces.
Initial capital letters	Undo Edit Apply	Names of menu commands, options, check buttons, text buttons, options buttons, text boxes, list boxes, and so on, are shown in text with initial capital lettering to avoid misreading. These elements may appear on your screen in all lowercase.
Brackets	[*version*]	You may, but need not, select one item enclosed within brackets. Do not enter the brackets.
Bar	les | les.out2	You may select one (but not more than one) item from a list separated by bars. Do not enter the bar.
Braces	{property | -all}	You must select one (but not more than one) item enclosed within braces. Do not enter the braces.
Ellipses	option...	In command formats, elements preceding ellipses may be repeated any number of times. Do not enter the ellipses. In menu items, if an ellipsis appears in an item, clicking that item brings up a dialog box.
Semicolon and other punctuation		Use as shown in the text.

NOTE Notes contain supplementary information that can affect system performance.

CAUTION Attentions are notifications that an action has the potential to adversely affect equipment operation, system performance, or data integrity.

1.2 ServeRAID C100 and ServeRAID C105 Features

ServeRAID C100 and ServeRAID C105 offer software RAID functionality and provide the ability to create and manage storage configurations on drives controlled by ServeRAID C100 and ServeRAID C100. ServeRAID C100 and ServeRAID C105 provide a cost-effective way to achieve high transfer rates and reliability.

The following sections list the driver features, BIOS features, disk management features, and UEFI support features for ServeRAID C100 and ServeRAID C105. In addition, the following section documents the differences between ServeRAID C100 and ServeRAID C105.

1.2.1 Driver Features

The driver for ServeRAID C100 and ServeRAID C105 supports the following features:

- Support for 48-bit Logical Block Addressing (LBA)
- Support for drive roaming
- Support for virtual drives larger than 2 terabytes
- Support for migration path from ServeRAID C100 and ServeRAID C105 to ServeRAID SATA hardware (this feature requires support from hardware RAID)
- Support for Patrol Read
- Automatic resumption of rebuilding, Check Consistency, full initialization, and background initialization
- Online mirror rebuilding
- Support for auto rebuild
- Support for SATA 6GB drives

NOTE ServeRAID C105 supports only SATA HDDs; it does not support SSD or SAS.

- Check Consistency for RAID 1 and RAID 10
- Global hotspare support

NOTE ServeRAID C105 supports global hotspares, but it does not support dedicated hotspares.

- Soft Bad Block Management (SBBM) support
- Support for up to 8 physical drives and eight virtual drives
- Stripe size of 64 Kbytes only
- Support for Disk Coercion (1Gbyte)
- Hot Plug support (drive insertion and removal) in the Microsoft® Windows® operating system and the Linux™ operating system
- Support for random deletion of virtual drives
- Error logging and notification
- Support for Microsoft Windows Server 2008 and Microsoft Windows Server 2008 R2 operating systems
- Support for Red Hat Enterprise Linux (RHEL) and SuSE Linux Enterprise Server (SLES) using kernels 2.6 and above

1.2.2 BIOS Features

The ServeRAID C100 and ServeRAID C105 BIOS support has the following features:

- Support for Interrupt 13 and Enhanced Disk Drive Specification
- Support for Int19h
- Support for BIOS Boot Specification (BBS) (If available in system BIOS, this feature allows the user to select the controller from which to boot.)
- Support for power-on self test (POST)
- Support for Post Memory Management (PMM): Specification v7, July 2010
- Industry-standard EBDA
- POST and run-time BIOS support for device insertion and removal
- Support for Stop On Error during boot-up

The following features are supported by the BIOS:

- Automatic resumption of rebuilding, Check Consistency, and full initialization, and Background Initialization (BGI)

NOTE The BIOS does not start or resume background initialization. If BGI is already in progress, you cannot start Check Consistency.

- Global hotspare support
- Soft Bad Block Management (SBBM) support
- Support for RAID levels 0, 1, and 10
- Support for auto rebuild
- Support for up to eight physical drives and eight virtual drives
- Stripe size of 64 Kbytes only
- Support for Disk Coercion, with options *None*, *128 Mbytes*, and *1 Gbyte*

1.2.3 HII Configuration Features

The HII Configuration Utility supports the following features:

- Ability to configure controllers, drive groups, and virtual drives in a pre-boot environment
- Ability to perform other configuration tasks in a pre-boot environment
- Ability to select and change the settings for some virtual drive parameters
- Ability to select a virtual drive as boot device (by default, virtual drive 0 is the boot drive)
- Support for RAID levels 0, 1, and 10
- Support for running a consistency check
- Support for running a patrol read
- Ability to set the rates for the BGI, consistency check, and patrol read
- Ability to place drives online or offline

1.2.4 Manageability/Disk Console Features

The following features are available to manage the virtual drives and physical drives in the system:

- Configuration information display (in HII Configuration Utility and MegaRAID Storage Manager)
- Support for RAID levels 0, 1, and 10
- Rebuilding mirror while system is operational

- Consistency check while system is operational
- Array management software
- Error logging and notification
- Support for hot device insertion and removal
- Automatic resume of rebuilding on restart
- Support for manual rebuild
- Ability to create up to eight virtual drives per configuration
- Auto-configuration support of newly added drive
- Support for global hotspares
- Support for disk coercion
- Drive group initialization support (fast and normal)
- Virtual drive availability immediately after creation
- Supported stripe size of 64 Kbytes only

1.2.5 UEFI Support

Significant challenges face operating system and platform developers to innovate using the legacy PC-AT BIOS boot environment. These challenges include memory constraints, maintenance challenges, and increased complexities due to a lack of industry-wide standards.

To handle these challenges, the Unified Extensible Firmware Interface (UEFI) was developed to do the following:

- Define a clean interface between operating systems and the hardware platform at boot time.
- Support an architecture-independent mechanism for initializing add-in cards.

UEFI provides users with expanded platform support. The UEFI driver, a boot service device driver, handles block IO requests and SCSI pass-through commands (SPT), and offers the ability to launch pre-boot management applications through a driver configuration protocol (DCP). Also, the UEFI driver supports driver diagnostic protocol, which allows administrators to access pre-boot diagnostics.

1.2.6 Differences Between ServeRAID C100 and ServeRAID C105

The following table identifies the differences between ServeRAID C100 and ServeRAID C105.

Table 2 Controller Properties

Property	ServeRAID C100	ServeRAID C105
Number of Ports	4 AHCI ports	■ 4 standard SCU ports ■ 4 SCU ports with Feature-on-Demand (FoD) key
Drive Support	SATA HDD	SATA HDD
Drive Swap Support	Simple swap	Simple swap and hotswap
Optical Device Support	■ Supported ■ Needs to be enabled in F1 Setup	■ Not supported ■ Always enabled
RAID Support	Needs to be enabled in F1 Setup	Always enabled
RAID Level Support	RAID 0, 1, 10	RAID 0, 1, 10
Server Support	x3100 M3, x3150 M3	BeNain, WuLing, Kestrel

1.3 RAID Overview

This section provides a brief overview of the types of RAID configurations that ServeRAID C100 and ServeRAID C105 support.

The first step in creating a RAID storage configuration is to configure drives in *drive groups* (also known as *arrays*). As defined for ServeRAID C105, a *drive group* is a group of one to eight drives that is seen by the host computer system as one large disk drive, or *virtual drive*. Only one RAID level can be assigned to each array.

- A RAID 0 drive group consists of one to eight drives.
- A RAID 1 drive group consists of two drives.
- A RAID 10 drive group consists of four, six, or eight drives.

NOTE Some hardware configurations do not support eight drives. Depending on the hardware, the actual maximum number of drives for RAID 0 and RAID 10 arrays might be fewer than eight.

You can use any of these three strategies when creating RAID drive groups and virtual drives:

- **Maximize Fault Tolerance**: You can maximize fault tolerance to protect against loss of data by creating a RAID 1 drive group with *mirroring*. All data is written to the primary drive in the array and is also written (mirrored) to a second drive.
- **Maximize Virtual Drive Performance**: You can maximize virtual drive performance by creating a RAID 0 array with *striping*. Data is broken into segments and can be simultaneously written to or read from several different *stripes* on several different drives in the array.

  RAID 10 arrays combine both striping and mirroring to provide high data transfer rates and data redundancy.
- **Maximize Storage Capacity**: You can maximize storage capacity when selecting a RAID level. Striping alone (RAID 0) requires less storage space than mirrored data (RAID 1).

1.3.1 RAID 0 Description

RAID 0 provides disk striping across all drives in the drive group. RAID 0 does not provide any data redundancy, but does offer the best performance of any RAID level. RAID 0 breaks up data into smaller segments called strips, and then stripes the data segments across each drive in the array. The size of each data segment is determined by the strip size, which is 64 Kbytes.

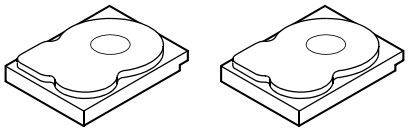
NOTE It is possible to create each disk as a single-drive RAID 0 drive group. However, spanning across single drive RAID 0 arrays is not supported.

By breaking up a large file into smaller segments, and writing or reading from several drives at once, ServeRAID C105 can read or write the file faster. This feature makes RAID 0 ideal for applications that require high bandwidth but do not require fault tolerance.

Uses	Provides high data throughput, especially for large files; any environment that does not require fault tolerance
Strong Points	Provides increased data throughput for large files; no capacity loss penalty for parity
Weak Points	Does not provide fault tolerance; all data lost if any drive fails
Drives	One to eight

The following figure shows a RAID 0 array with two drives.

Figure 1 RAID 0 Array Example with Two Drives



Segment 1	Segment 2
Segment 3	Segment 4
Segment 5	Segment 6
Segment 7	Segment 8

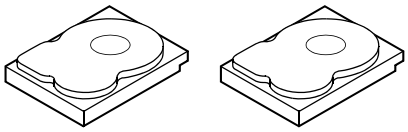
1.3.2 RAID 1 Description

RAID 1 duplicates all data from one drive to a second drive. RAID 1 provides complete data redundancy, but at the cost of doubling the required data storage capacity.

Uses	Databases or any other mission critical environment that requires fault tolerance
Strong Points	Provides complete data redundancy; RAID 1 is ideal for any application that requires fault tolerance
Weak Points	Requires twice as many drives; performance is impaired during drive rebuilds
Drives	Two

The following figure shows a RAID 1 drive group.

Figure 2 RAID 1 Array



Segment 1	Segment 1 Duplicated
Segment 2	Segment 2 Duplicated
Segment 3	Segment 3 Duplicated
Segment 4	Segment 4 Duplicated

1.3.3 RAID 10 Description

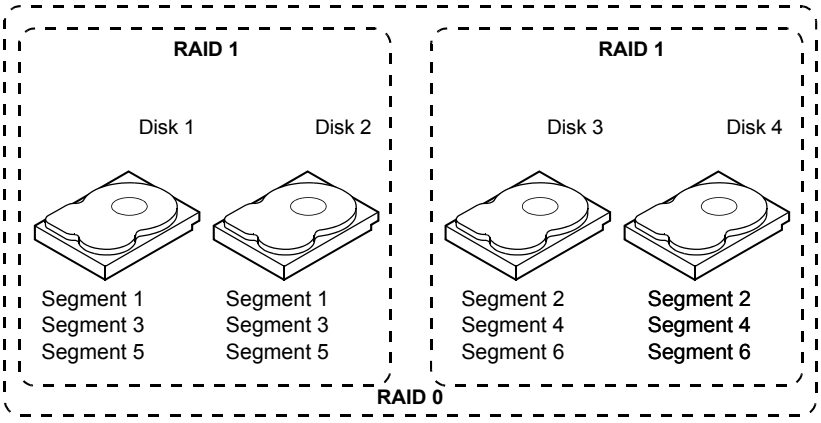
RAID 10, a combination of RAID 1 and RAID 0, has mirrored drives. It breaks up data into smaller blocks, and then stripes the blocks of data to each RAID 1 RAID set. Each RAID 1 RAID set then duplicates its data to its other drive. The size of each block is determined by the strip size parameter, which is 64 Kbytes. RAID 10 can sustain one drive failure in each drive group while maintaining data integrity.

NOTE On a RAID 10 array, you can create only one virtual drive, and that virtual drive must occupy the entire space of the RAID 10 array.

Uses	Works best for data storage that must have 100% redundancy of RAID 1 (mirrored drive groups) and that also needs the enhanced I/O performance of RAID 0 (striped drive groups); RAID 10 works well for medium-sized databases or any environment that requires a higher degree of fault tolerance and moderate to medium capacity
Strong Points	Provides both high data transfer rates and complete data redundancy
Weak Points	Requires twice as many drives
Drives	Four, six, or eight

The following figure shows a RAID 10 array with four drives.

Figure 3 RAID 10 Array



Chapter 2: Driver Installation

Device drivers for the ServeRAID C100 and ServeRAID C105 can be obtained from the **Support & downloads** section of the IBM web site (http://www.ibm.com). Usage instructions and step-by-step installation instructions for your specific device driver are available in the README file that accompanies that driver on the download site.

Chapter 3: Human Interface Infrastructure Configuration Utility

The Human Interface Infrastructure (HII) Configuration Utility (CU) is used to configure controllers, drive groups, and virtual drives, and to perform other configuration tasks in a pre-boot environment.

This chapter describes how to configure controllers, drive groups, and virtual drives with the HII Configuration Utility. To ensure the best performance, select the optimal RAID level for the virtual drive you create. For an explanation of RAID levels, see Section 1.3, RAID Overview.

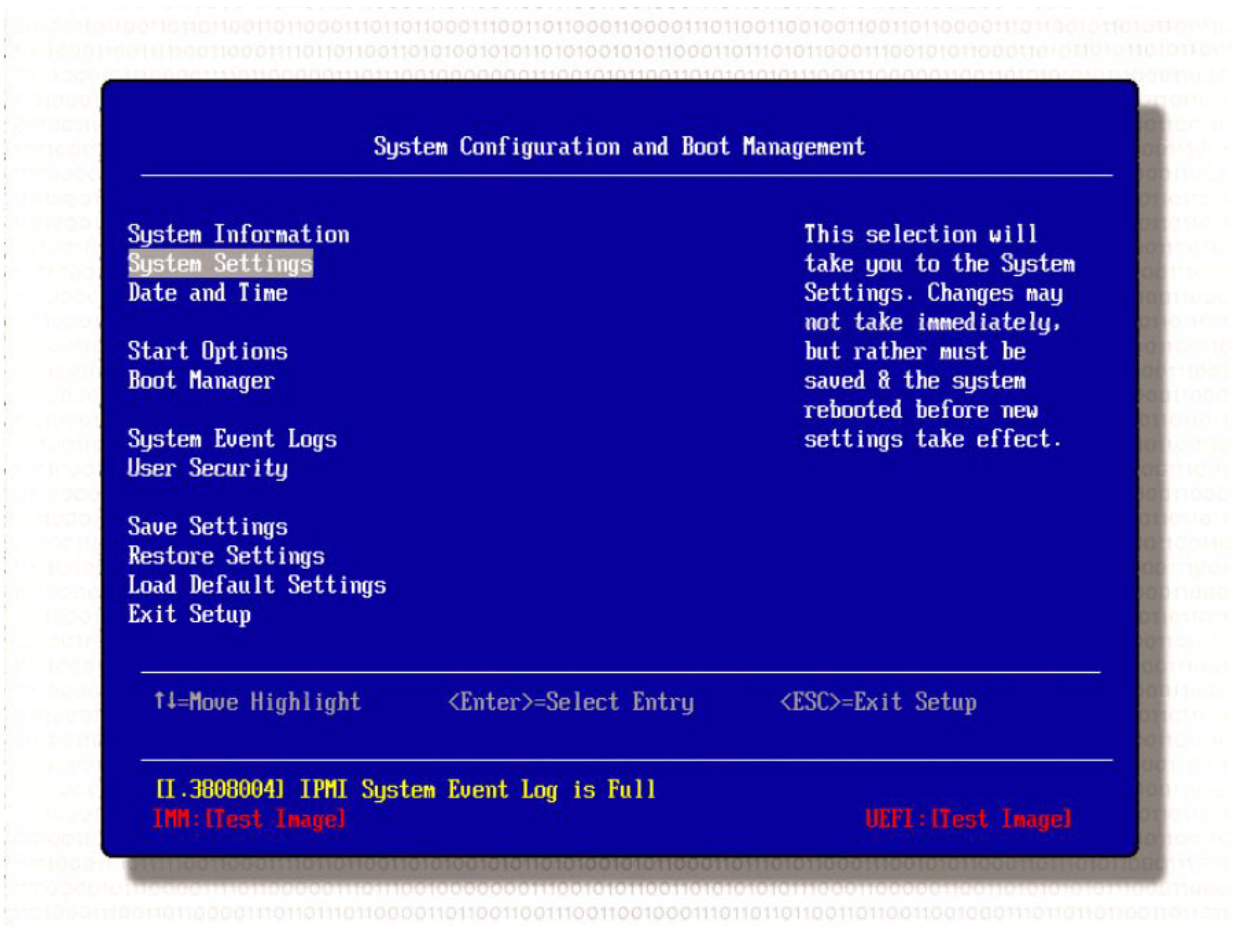
3.1 Accessing the Configuration Options Screen

You can use the Configuration Options screen to manage the controller, virtual drives, and physical drives.

Perform the following steps to access the Configuration Options screen.

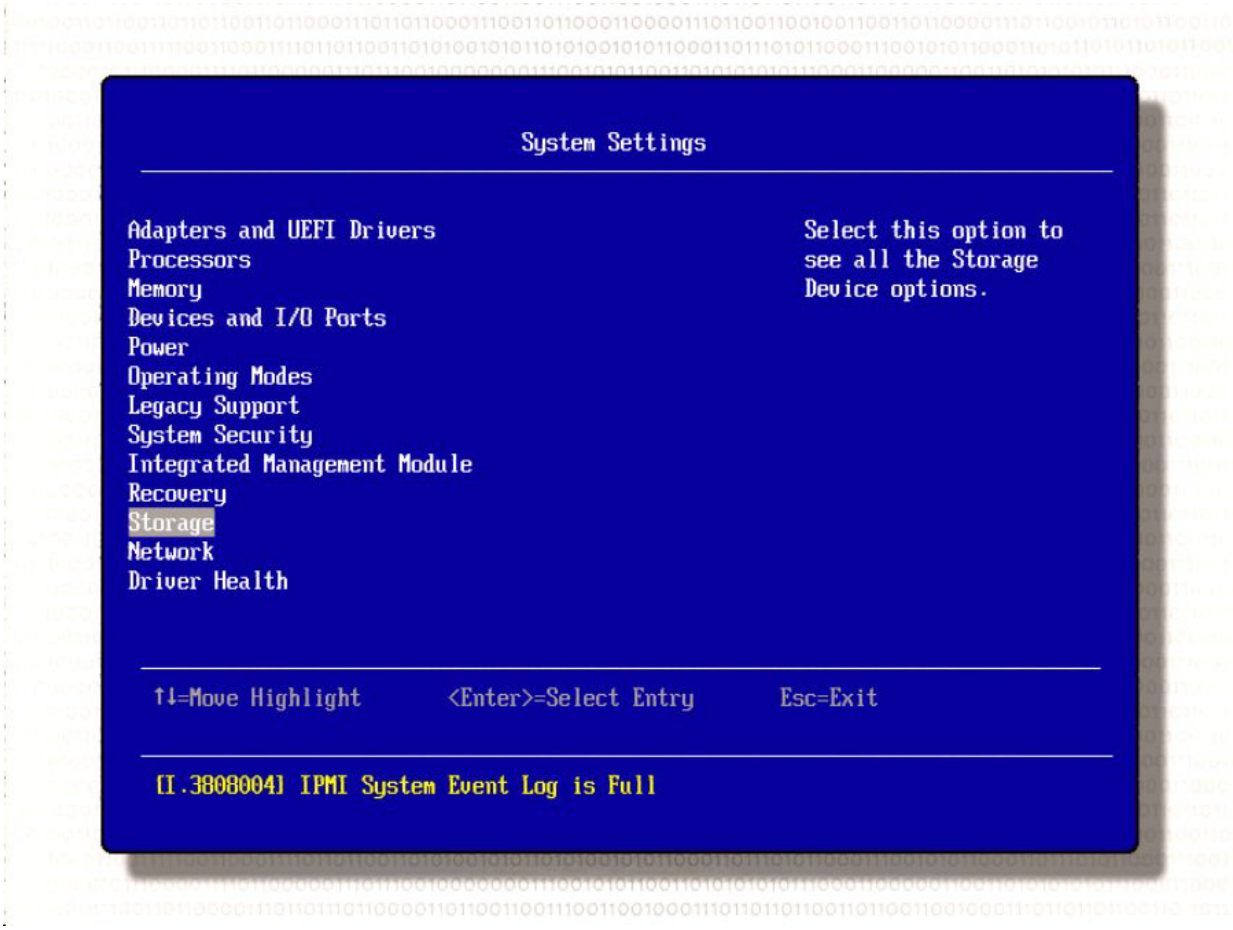
1. Boot the system.
2. Press **F1** during bootup to enter setup.
   The System Configuration and Boot Management screen appears, as shown in the following figure.

Figure 4 System Configuration and Boot Management Screen



3. Highlight **System Settings** and press **Enter**.
   The System Settings screen appears, as shown in the following figure.

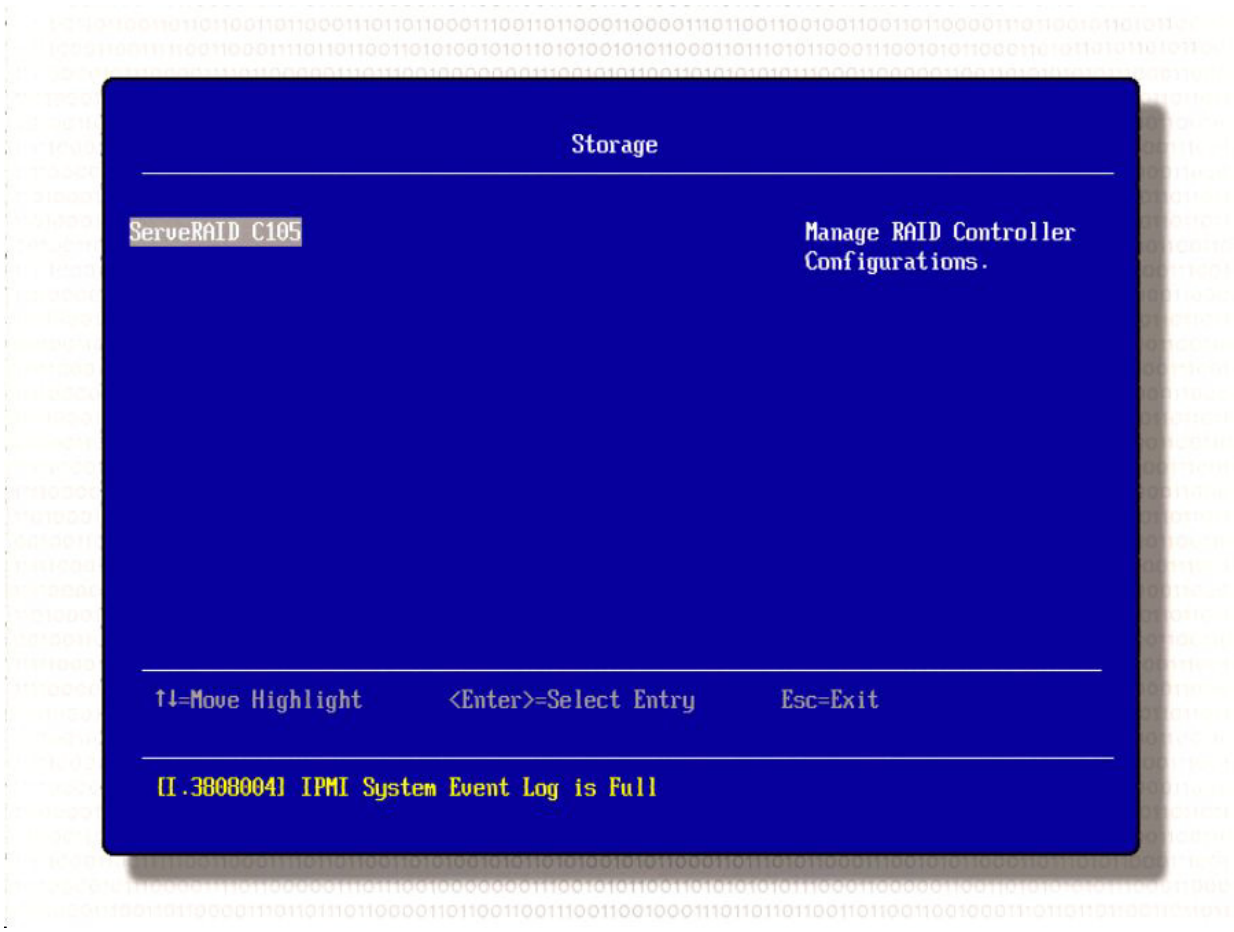
Figure 5 System Settings Screen



4. Highlight **Devices and I/O Ports** and press **Enter**.
   The Devices and I/O Ports screen appears.
5. Verify that the **Configure SATA as** field is set to **RAID** on the Devices and I/O Ports screen.
6. If this field is set to RAID, press **Esc** to return to the **System Settings** screen.
   If this field is not set to RAID, perform the following steps:
   a. Highlight the **Configure SATA as** options and press **Enter**.
      IDE, **AHCI**, and **RAID** appear as the options.
   b. Highlight **RAID** and press **Enter**.
   c. Press **Esc** until you return to the System Configuration and Boot Management screen.
   d. Highlight **Save Settings** and press **Enter**.
   e. Reboot your system.
   f. Press **F1** during bootup to enter setup.
      The System Configuration and Boot Management screen appears, as shown in the following figure.
   g. Highlight **System Settings** and press **Enter**.
   The System Settings screen appears. The Storage menu option is now available on this screen.

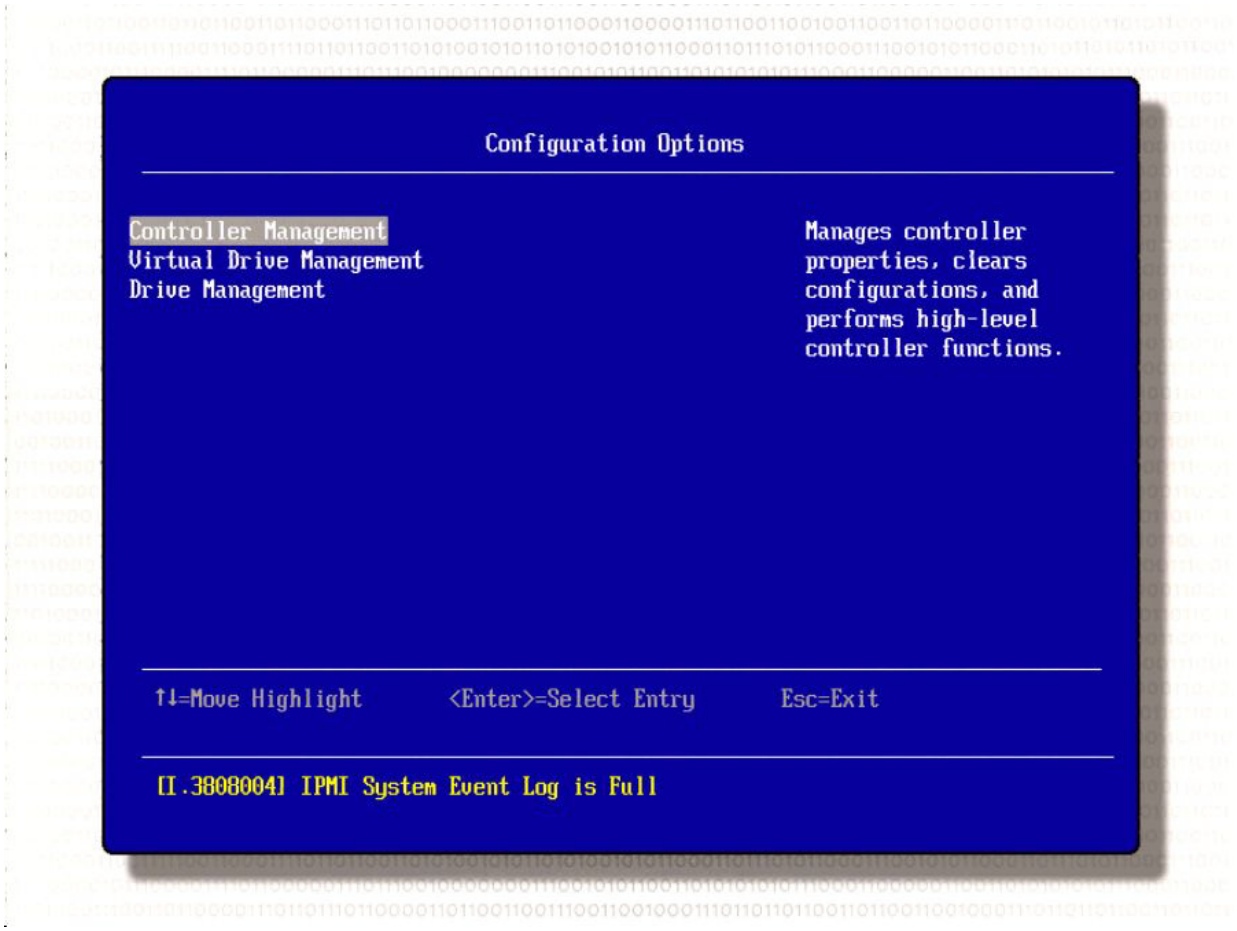
7. Highlight **Storage** on the System Settings screen and press **Enter**.
   The Storage screen appears, as shown in the following figure.

Figure 6 Storage Screen



8. Highlight your controller and press **Enter**.
   The Configuration Options screen appears, as shown in the following figure. This screen lists the following management options:
   - **Controller Management**: Select this option to view and/or change the controller properties, save configurations, and perform other tasks. You can view information about the controller and the devices connected to it. For more information, see Section 3.2, Managing Controllers.
   - **Virtual Drive Management**: Select this option to access the Virtual Drive Management screen, where you can create virtual drive configurations, change the virtual drive name, delete virtual drives, initialize drives, and perform other tasks. For more information, see Section 3.3, Managing Virtual Drives.
   - **Drive Management**: Select this option to access the Drive Management screen, where you can view drive properties and perform tasks. For more information, see Section 3.4, Managing Drives.

Figure 7 Configuration Options Screen



3.2 Managing Controllers

This section explains how you can use the HII configuration utility to view and change the properties for controllers, and clear a configuration.

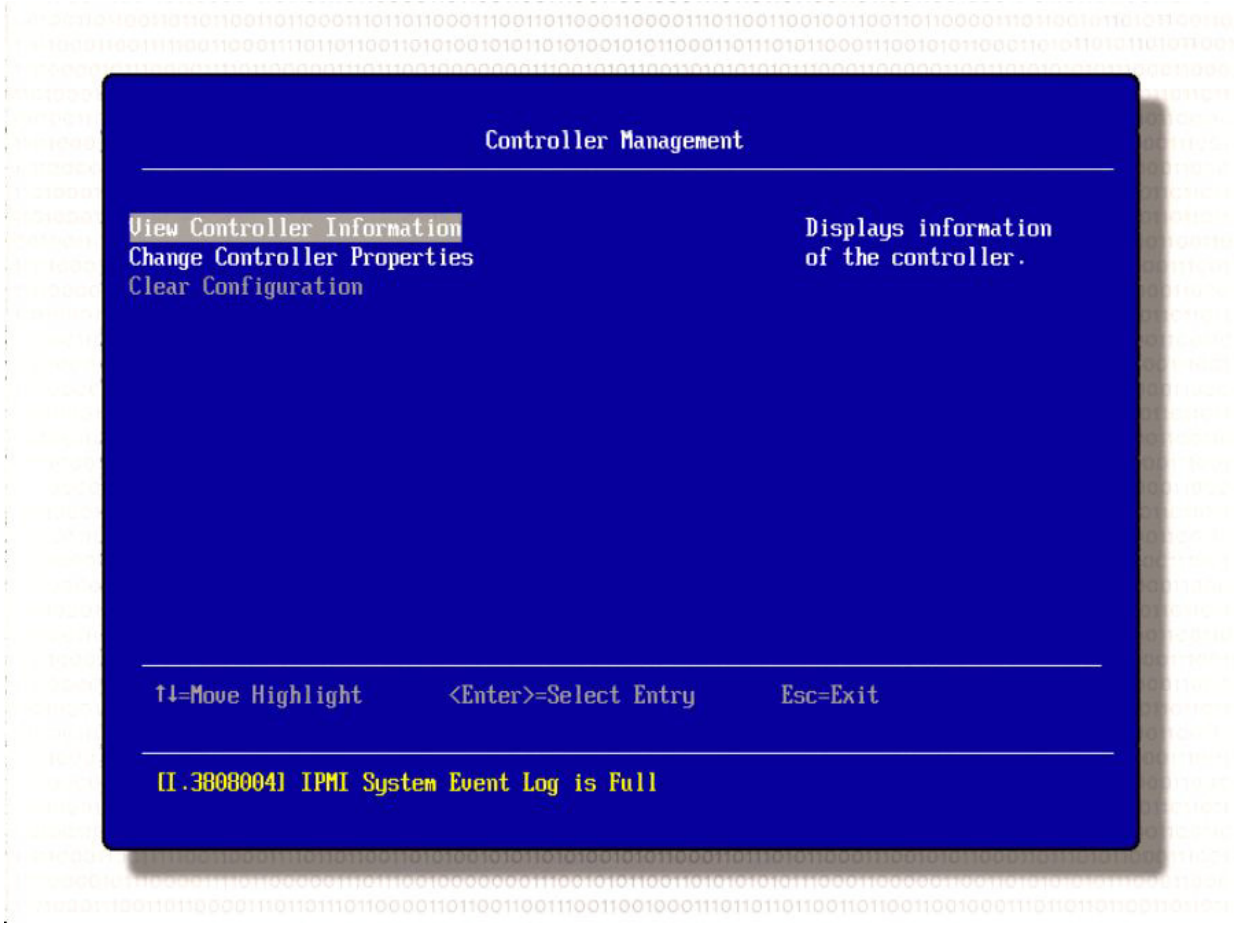
3.2.1 Viewing Controller Properties

The HII configuration utility displays information for one controller at a time.

Perform the following steps to view the controller properties.

1. Highlight **Controller Management** on the Configuration Options screen (Figure 7), and press **Enter**. The Controller Management screen appears, as shown in the following figure.

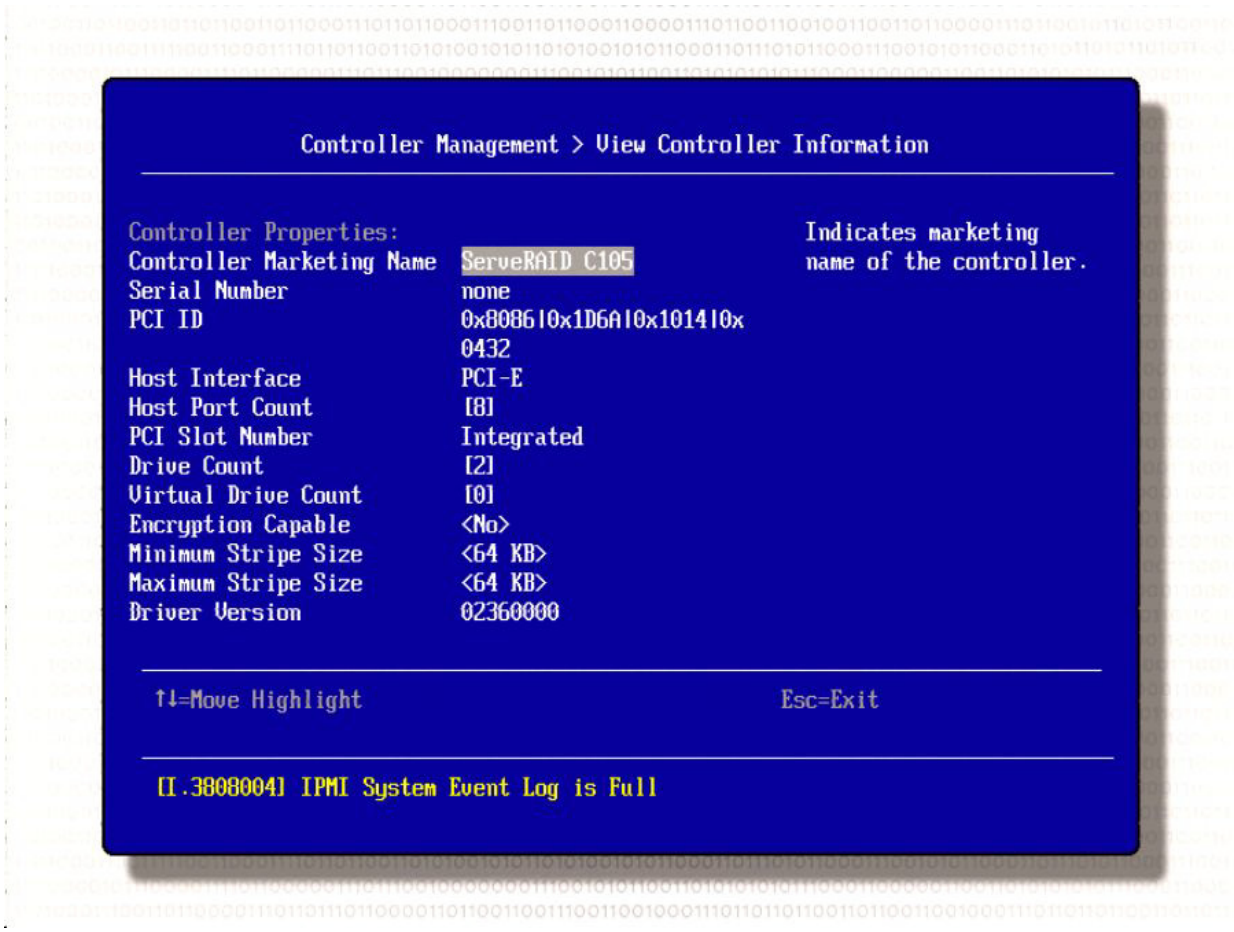
Figure 8 Controller Management Screen



2. Highlight **View Controller Information** and press **Enter**.

   The Controller Management >> View Controller Information screen appears, as shown in the following figure.

Figure 9 Controller Management >> View Controller Information Screen



The information on this screen is read-only; it cannot be modified directly. Most of this information is self-explanatory, such as the number of virtual drives that are defined on this controller, and the number of drives connected to the controller.

The following table defines the controller properties.

Table 3 Controller Properties

Property	Description
Controller Marketing Name	ServeRAID C105
Serial Number	Indicates the manufacturer-assigned serial number.
PCI ID	The ID number for the Peripheral Component Interconnect local bus.
Host Interface	Indicates the type of interface used by the computer host system, such as PCI-E.
Host Port Count	Indicates the maximum number of ports supported by the software RAID controller in which devices (such as CD-ROM and disks) can be connected.
PCI Slot Number	N/A for software RAID
Drive Count	The number of drives connected to the selected controller.
Virtual Drive Count	The number of virtual drives supported by the selected controller.

Table 3 Controller Properties

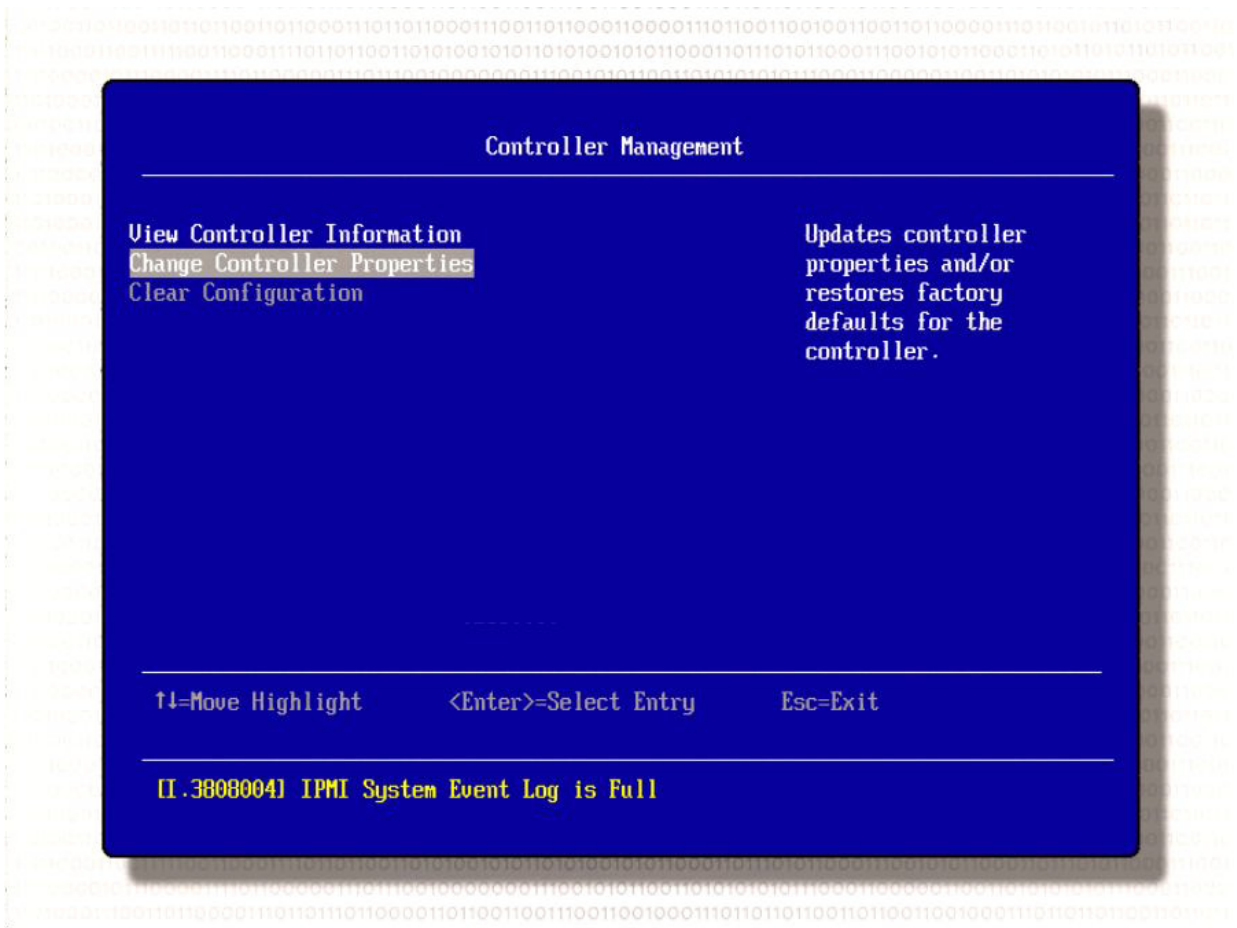
Property	Description
Encryption Capable	N/A for software RAID
Minimum Stripe Size	64 KB is the only stripe size available.
Maximum Stripe Size	64 KB is the only stripe size available.
Driver Version	The version of the device driver.

3.2.2 Changing Controller Properties

You can use the HII configuration utility to change the properties for a controller. Perform the following steps to change information for a controller.

1. Highlight **Controller Management** on the Configuration Options screen (Figure 7) and press **Enter**.
   The Controller Management screen appears, as shown in the following figure.

Figure 10 Controller Management Screen



2. Highlight **Change Controller Properties** and press **Enter**.
   The Controller Management >> Change Controller Properties screen appears, as shown in the following figure.

Figure 11 Controller Management >> Change Controller Properties Screen

3. Change the following controller properties as desired.
   a. **Set Factory Defaults**: Use the arrow keys to move the cursor to this property and press **Enter**. On the Confirm screen, select **Yes** to confirm your selection.
   b. **Rebuild Rate**: Use the arrow keys to move the cursor to this property. Press the plus (+) key to increase the rate or the minus (-) key to decrease the rate.
   c. **Background Initialization (BGI) Rate**: Use the arrow keys to move the cursor to this property. Press the plus (+) key to increase the rate or the minus (-) key to decrease the rate.
   d. **Consistency Check Rate**: Use the arrow keys to move the cursor to this property. Press the plus (+) key to increase the rate or the minus (-) key to decrease the rate.
   e. **Disk Coercion**: Use the arrow keys to move the cursor to this property. Press the plus key (+) to set the value
   f. to **128 MB**, **1 GB** or **None**.
   g. **Read Ahead**: Use the arrow keys to **Enable** or **Disable**.
   h. **Disk WC**: Use the arrow keys to **Enable** or **Disable**.
   i. **Auto Rebuild**: Use the arrow keys to **Enable** or **Disable**.
   j. **Auto Resume**: Use the arrow keys to **Enable** or **Disable**.

The following table defines these controller properties.

Table 4 Changing Controller Properties

Property	Description
Set Factory Defaults	Resets factory default values for all of the controller properties.
Set Boot Devices	Selects the virtual drive to use as the boot device.
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. The default value is 30 percent.
Background Initialization (BGI) Rate	Background initialization is a check for media errors on the drives when you create a virtual drive. It is an automatic operation that starts five minutes after you create the virtual drive. This check ensures that striped data segments are the same on all of the drives in the drive group. The default value is 30 percent.
Consistency Check Rate	A consistency check is an operation that verifies that all stripes in a virtual drive with a redundant RAID level are consistent and that automatically fixes any errors. The consistency check rate is the rate at which consistency check operations are run on a computer system. The default value is 30 percent.
Disk Coercion	Drive coercion is a tool for forcing drives of varying capacities to the same capacity so they can be used in a drive group. The coercion mode options are None, 128MB-way, and 1GB-way. The number you choose depends on how much the drives from various vendors vary in their actual size.
Read Ahead	When disk Read Ahead is enabled, extra data is read sequentially ahead of the data that is actually requested, and this extra data is stored in cache memory. If the additional read-ahead data is then requested, it can be read faster from the cache than from the disk directly. This setting speeds up reads for sequential data, but there is little improvement when accessing random data.
Disk WC	You can disable the disk write cache option when you create a virtual drive, but you can enable this option later using the configuration utilities. When the disk Write Cache is enabled, a write transaction is considered to be complete when all the data has been written to the disk cache. When disk Write Cache is disabled, the write transaction is complete only when the data has been written to the disk.
Auto Rebuild	Auto-rebuild allows a failed drive to be replaced and the data automatically rebuilt by *hot-swapping* the drive in the same drive bay. The RAID drive group continues to handle requests while the rebuild occurs.
Auto Resume	When Enabled, you can stop a consistency check, rebuild, or initialization, and resume it later where it left off, instead of aborting it and starting over.

4. Highlight **Apply Changes** and press **Enter** to register your changes.
   Your changes are registered and the controller properties are changed.

3.2.3 Clearing Configurations

Perform the following steps to clear all of the existing configurations on the controller.

1. Highlight **Controller Management** on the Configuration Options screen (Figure 7) and press **Enter**.
2. Highlight **Clear Configuration** on the Controller Management screen (Figure 8) and press **Enter**.
3. Highlight **Yes** to confirm your selection on the Confirm screen.
   This action clears the existing configurations.

3.3 Managing Virtual Drives

You can use the Virtual Drive Management screen to create virtual drive configurations, view and change the virtual drive properties, delete virtual drives, initialize drives, and perform other tasks related to the virtual drives.

3.3.1 Configuring Virtual Drives

This section provides detailed instructions for configuring drive groups and virtual drives with the HII configuration utility.

It is recommended that you use drives with the same capacity when you create a storage configuration. If you use drives with different capacities in one array, the configuration utility limits each drive to the capacity of the smallest drive.

The number of physical drives in a specific array determines the possible RAID levels that you can implement with the array.

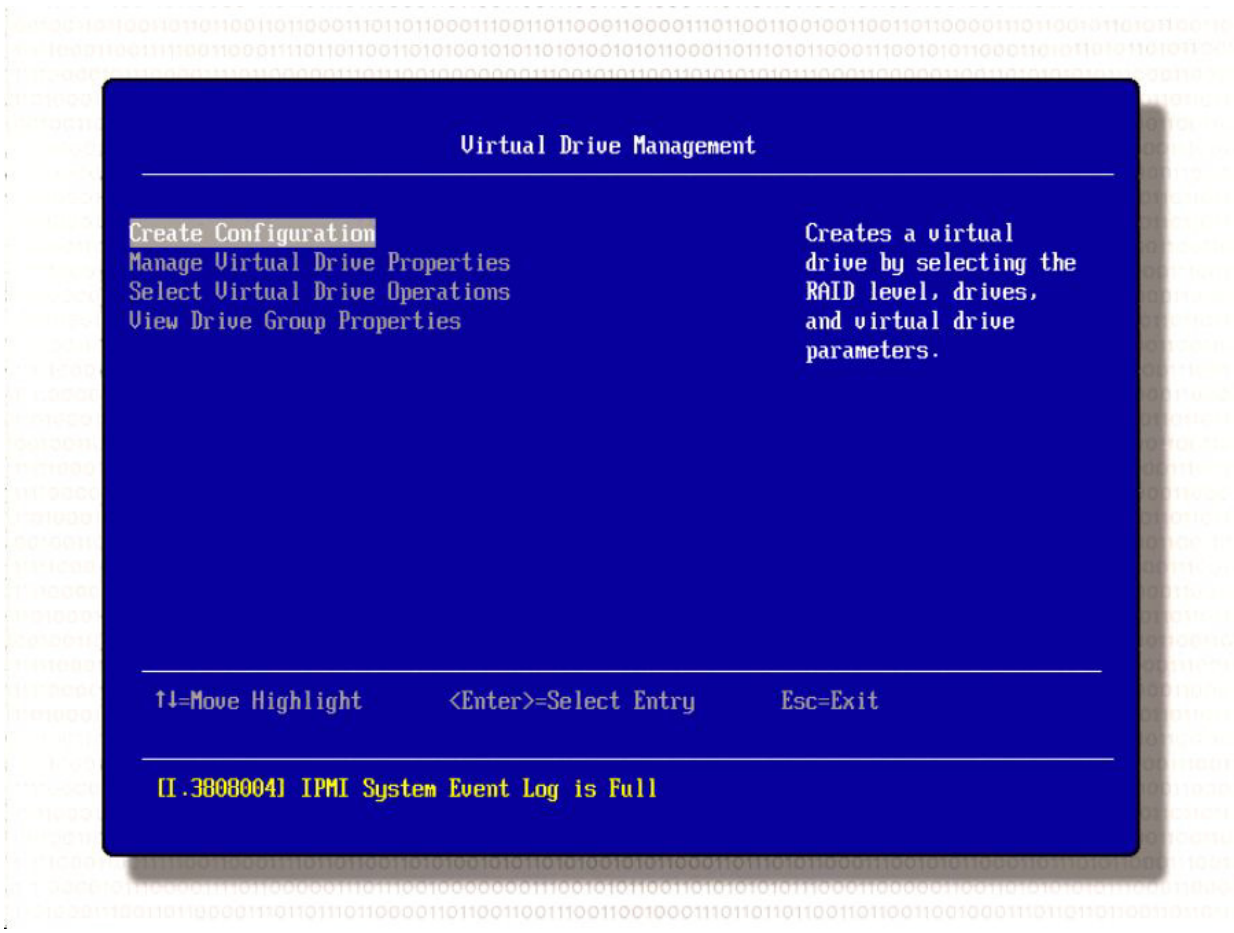
- RAID 0 requires from one to eight physical drives.
- RAID 1 requires two physical drives.
- RAID 5 required three to eight physical drives.
- RAID 10 requires four, six, or eight physical drives.

NOTE The stripe size is read-only. You cannot change the settings for this property.

Follow these steps to access the Virtual Drive Management screen and create a virtual drive configuration.

1. Highlight **Virtual Drive Management** on the Configuration Options screen (Figure 7) and press **Enter**. The Virtual Drive Management screen appears, as shown in the following figure.

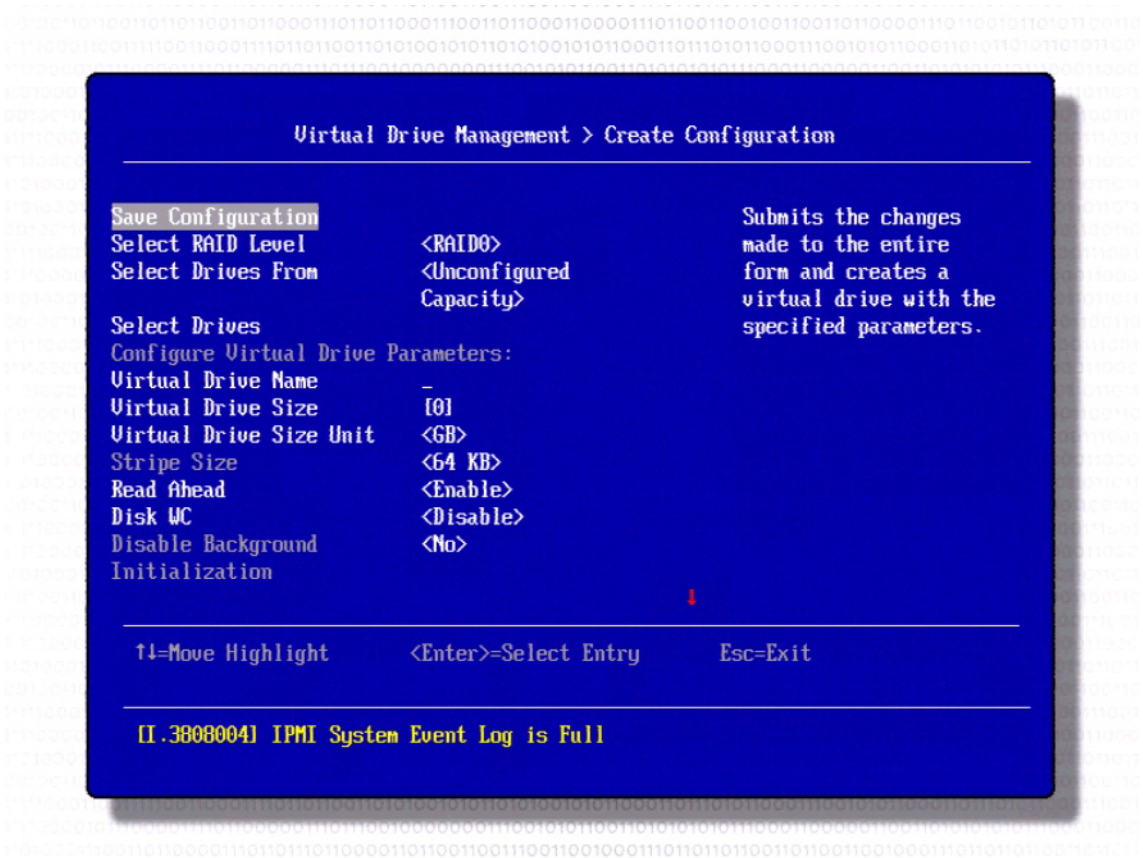
Figure 12 Virtual Drive Management Screen



2. Highlight **Create Configuration** and press **Enter**.

   The Virtual Drive Management >> Create Configuration screen appears, as shown in the following figure. The default settings display in the fields.

Figure 13 Virtual Drive Management >> Create Configuration Screen



3. Use the arrow keys to select any highlighted fields (one at a time) that you want to change the setting for and press **Enter**.
4. Select the setting for each property that you want to change from the default.

   You can change the settings for the following fields on this screen:

   — **Select RAID Level**: The menu lists the possible RAID levels for the virtual drive. See Section 1.3, RAID Overview, for more information about RAID levels.

   — **Select Drives From**: The menu lists the sources that you can use to select drives for the virtual drive. The options are **Unconfigured Capacity** and **Free Capacity**.

   — **Select Drives**: Press this button and a screen appears that lists the Unconfigured Good drives or the free capacity, depending on the value you selected in the Select Drive From field.

   — **Virtual Drive Name**: Enter the name of the virtual drive.

   — **Virtual Drive Size**: Enter the capacity of the virtual drive. Normally, this value is the full capacity of the drives in the virtual drive.

   — **Virtual Drive Size Unit**: Enter the unit of capacity you want to use for the virtual drive. The options are **MB**, **GB**, and **TB**.

— **Read Ahead –** When disk Read Ahead is enabled, extra data is read sequentially ahead of the data that is actually requested, and this extra data is stored in cache memory. If the additional read-ahead data is then requested, it can be read faster from the cache than from the disk directly. This setting speeds up reads for sequential data, but there is little improvement when accessing random data.

— **Disk WC –** You can disable the disk write cache option when you create a virtual drive, but you can enable this option later using the configuration utilities. When the disk Write Cache is enabled, a write transaction is considered to be complete when all the data has been written to the disk cache. When disk Write Cache is disabled, the write transaction is complete only when the data has been written to the disk.

— **Disable Background:** Use this option to select the amount of system resources dedicated to background initialization of virtual drives connected to the selected controller.

The following setting is read-only and cannot be changed.

— **Stripe Size:** A stripe consists of the data segments that the RAID controller writes across multiple drives, not including parity drives. The default is 64 KB.

3.3.2 Managing Virtual Drive Properties

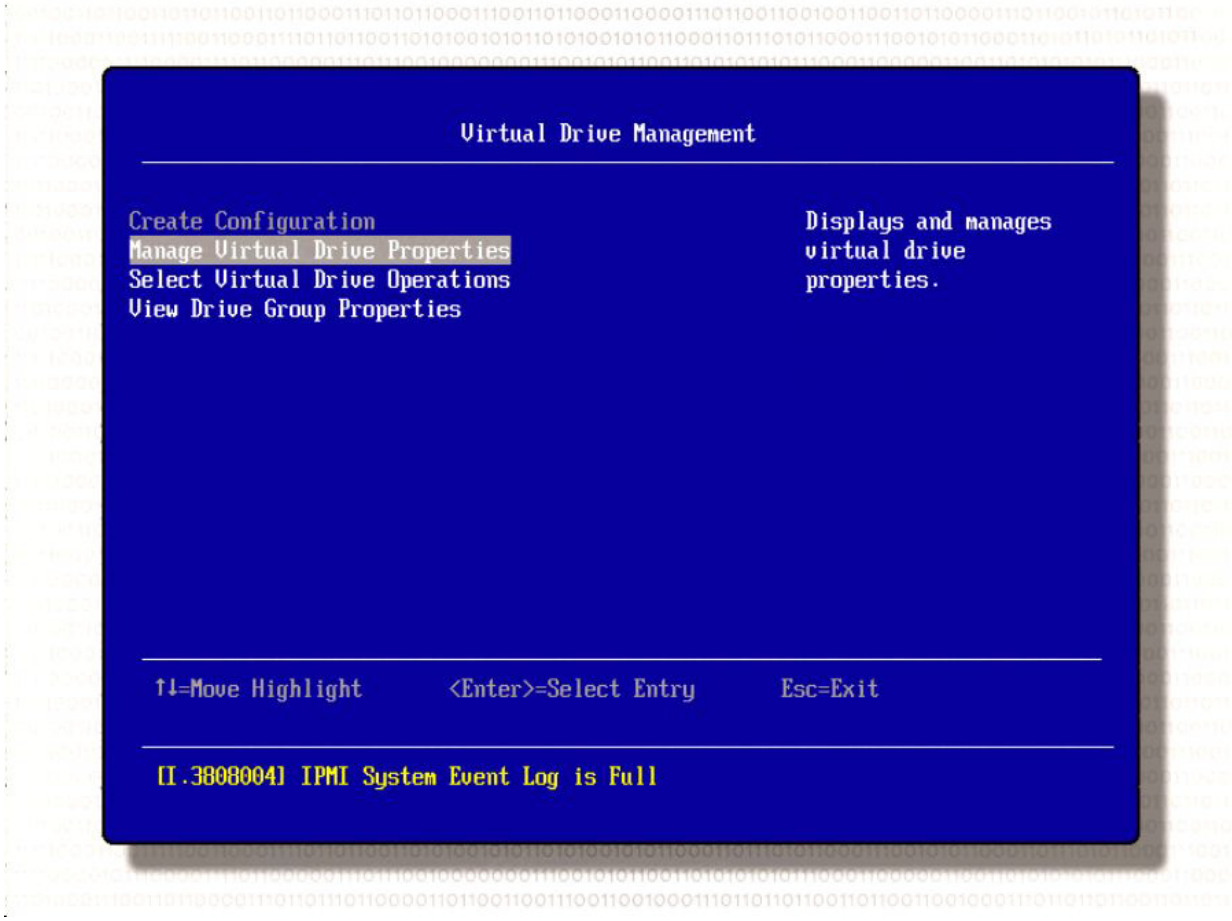
After you create a virtual drive, you can use the Virtual Drive Management screen to change the name of the virtual drive.

NOTE You can change only the virtual drive name for the virtual drive that is selected. The other virtual drive properties are read-only.

Perform the following steps to access the virtual drive properties screen and change the name of the virtual drive.

1. Highlight **Virtual Drive Management** on the Configuration Options screen (Figure 7) and press **Enter**. The Virtual Drive Management screen appears, as shown in the following figure.

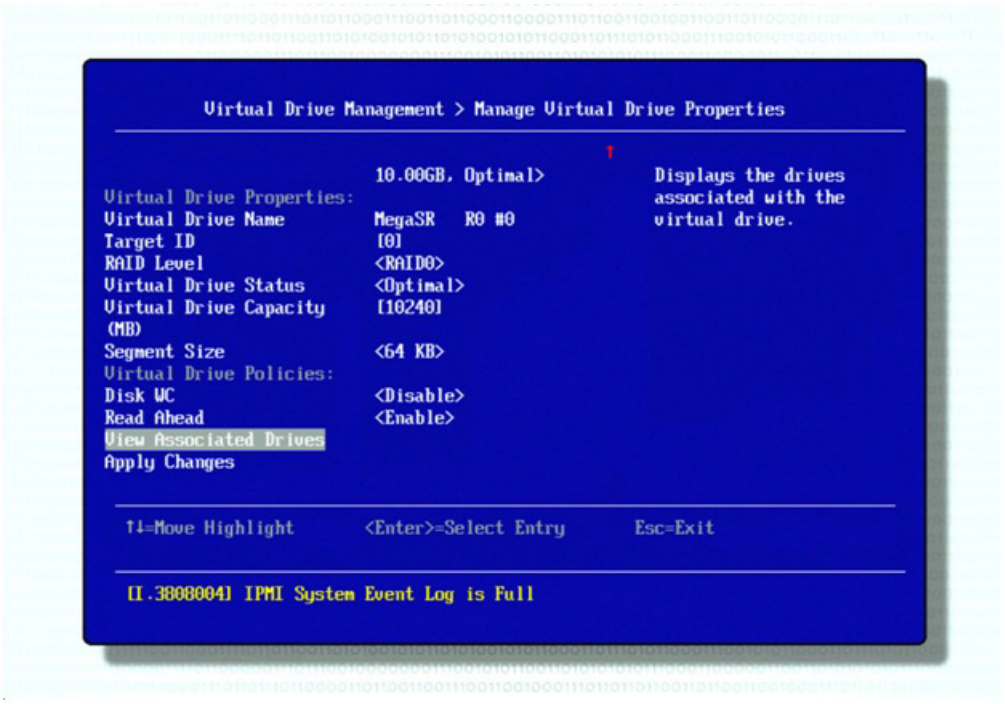
Figure 14 Virtual Drive Management Screen



2. Highlight **Manage Virtual Drive Properties** and press **Enter**.

   The Virtual Drive Management >> Manage Virtual Drive Properties screen appears, as shown in the following figure.

Figure 15 Virtual Drive Management >> Manage Virtual Drive Properties Screen



3. Highlight the **Virtual Drive Name** field and press **Enter**.
4. Enter a different name for the virtual drive and press **Enter**.
5. Highlight **Apply Changes** and press **Enter** to make the selected change.

   The name of the virtual drive is changed.

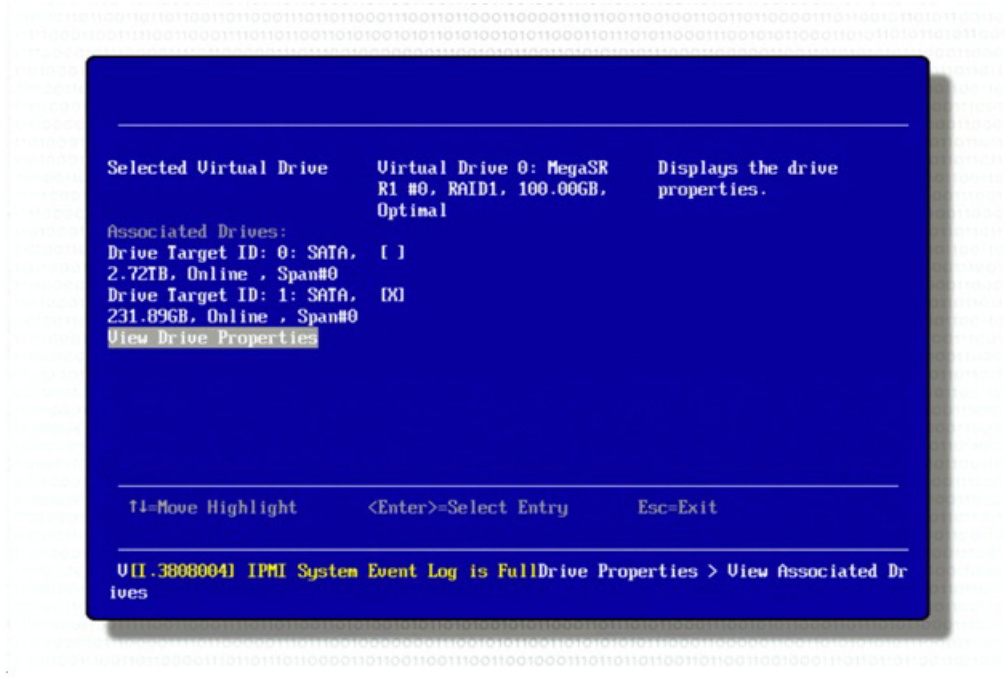
3.3.2.1 Viewing Associated Drives

Perform the following steps to view associated drives for a virtual drive properties:

1. Highlight the **View Associated Drives** in the **Manage Virtual Drive Properties** menu and Press **Enter**.

   The drives associated with the current virtual drive appears, as shown in the following figure.

Figure 16 Associated Drives for a Virtual Drive



2. Highlight **View Drive Properties** and Press **Enter**.
   The Drive properties page for the physical drive appears.

3.3.3 Selecting Virtual Drive Operations

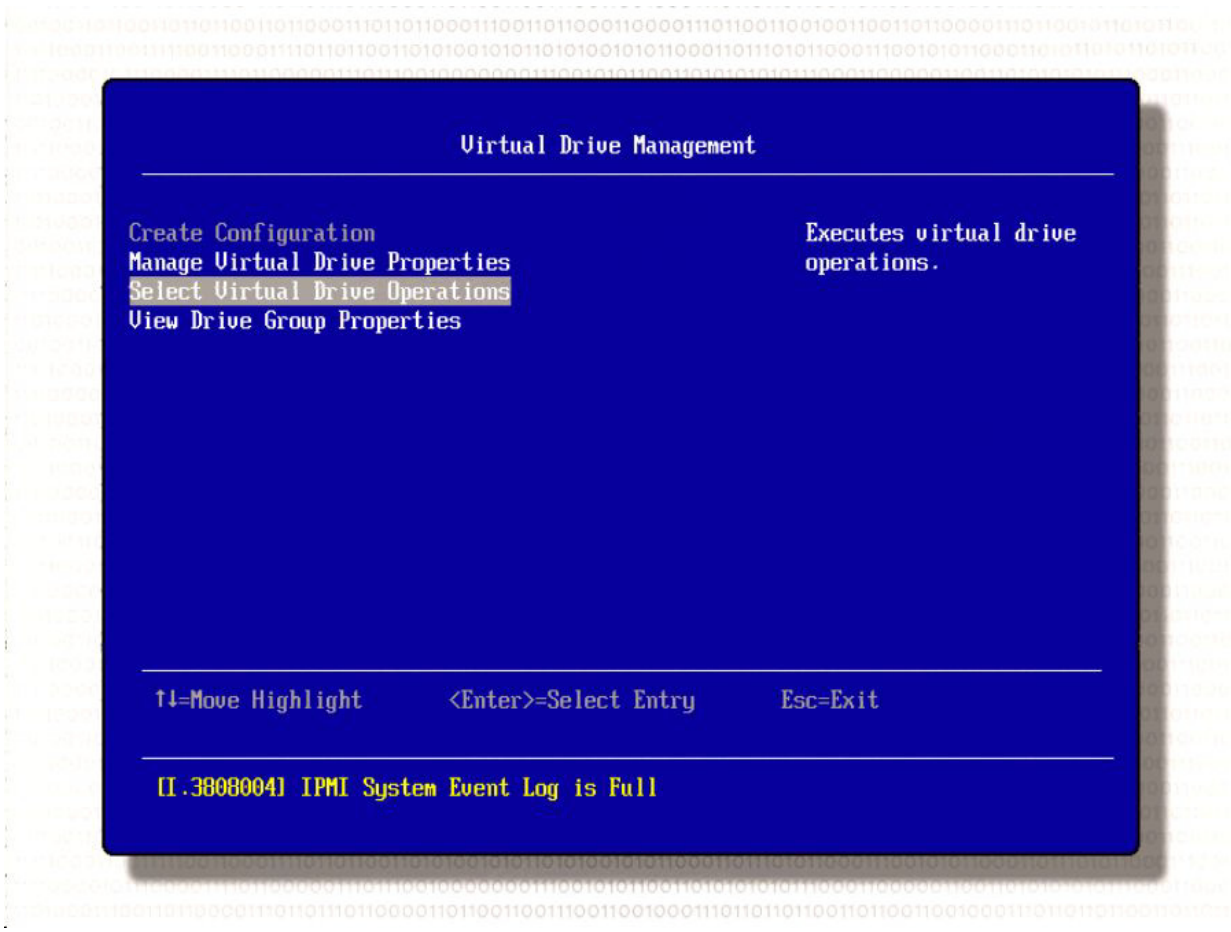
You can use the Virtual Drive Management screen to select and launch operations related to the virtual drive properties.

Perform the following steps to access the virtual drive operations screen and carry out operations for the virtual drive properties.

1. Highlight **Virtual Drive Management** on the Configuration Options screen (Figure 7) and press **Enter**.

The Virtual Drive Management screen appears, as shown in the following figure.

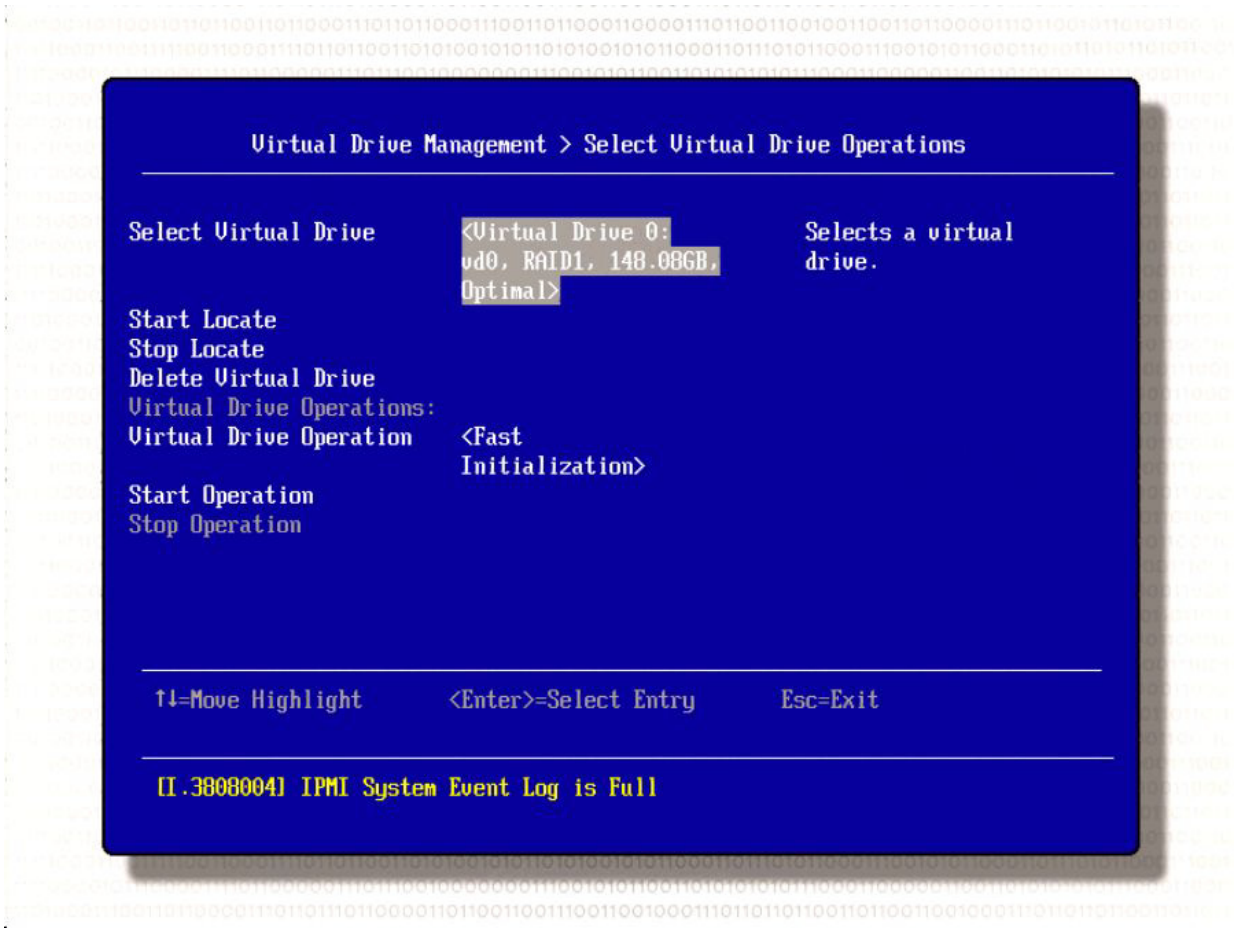
Figure 17 Virtual Drive Management Screen



2. Highlight **Select Virtual Drive Operations** and press **Enter**.

   The Virtual Drive Management >> Select Virtual Drive Operations screen appears, as shown in the following figures.

Figure 18 Select Virtual Drive Operations Screen



3. Highlight each operation you want to carry out and press **Enter**.

   The options for the virtual drive operations appear. Here are brief explanations of the virtual drive operations:

   — **Select Virtual Drive**: Select the virtual drive you want to carry out operations on. The screen displays the virtual drive number, virtual drive name, RAID level, virtual drive capacity, and virtual drive status.

   — **Start Locate**: Flash the LEDs on all the drives associated with the virtual drive.

   — **Stop Locate**: Stop flashing the LEDs on the drives associated to the virtual drive.

   — **Virtual Drive Operation**: Select **Fast Initialization** or **Slow Initialization** to initialize this virtual drive. A fast initialization quickly writes zeroes to the first and last 10-MB regions of the new virtual drive and then completes the initialization in the background. A slow initialization is not complete until the entire virtual drive has been initialized with zeroes. It is seldom necessary to use this option, because the virtual drive was initialized right after you created it.

NOTE If you have redundant virtual drives (i.e., virtual drives that use RAID 1, 5, or 10), you have the option to perform the Check Consistency operation. The consistency check operation corrects inconsistencies between a protected volume and its replica.

4. Highlight **Start Operation** and press **Enter**.
   The confirmation screen appears.

> **NOTE** The Start Operation option and the Stop Operation option toggle based on the current status of the operation. For example, after you start an operation, the Start Operation field is no longer highlighted, and the Stop Operation field is highlighted.

5. Highlight **Yes** and press **Enter** to confirm that you want to carry out the operations.

> **NOTE** After you choose an operation and select **Start Operation**, the progress bar appears, showing zero percent. To see the change in the percentage of progress, return to the previous page and then access this page again.

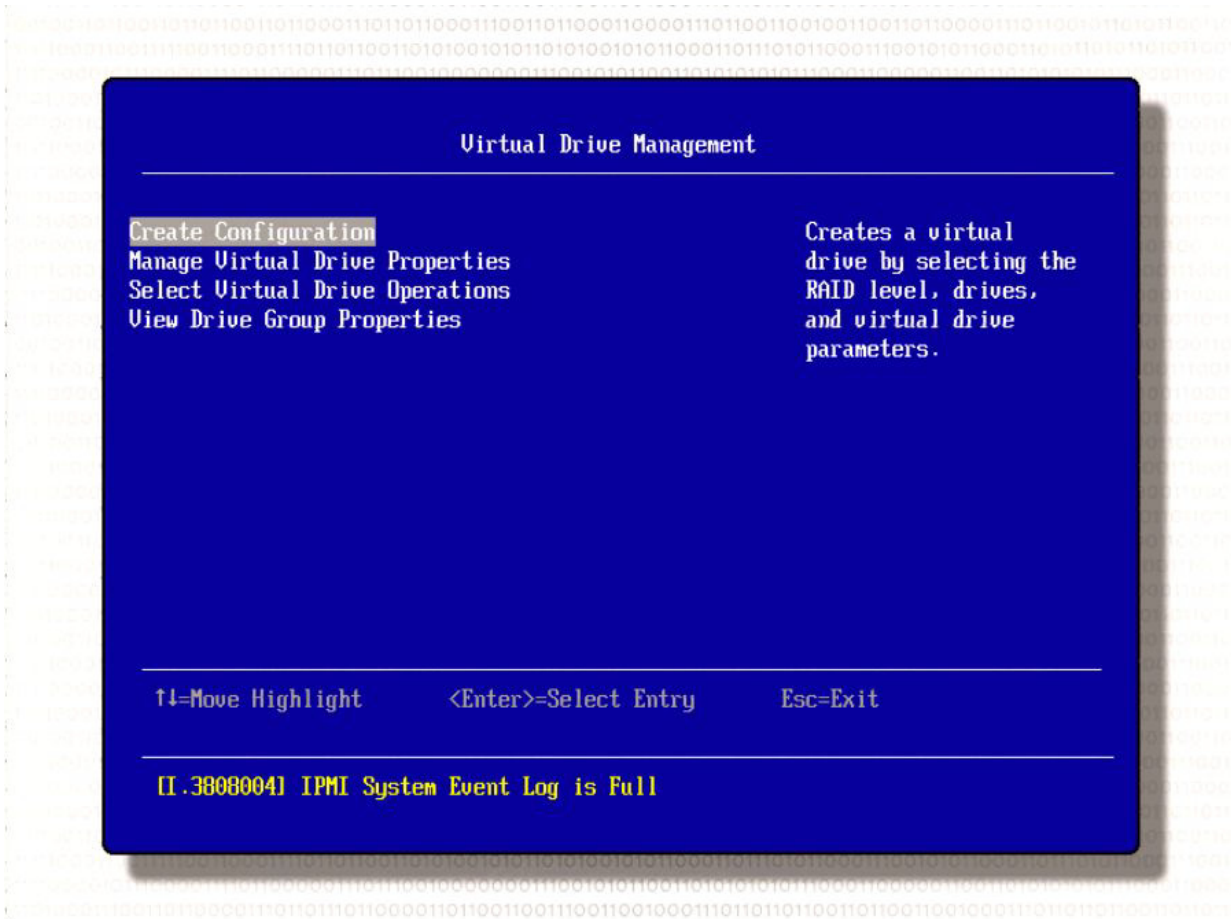
3.3.4 Viewing Drive Group Properties

You can use the Virtual Drive Management screen to access the drive group properties screen and view the properties. The drive group contains the drives that are used to create the virtual drive.

Perform the following steps to access the drive group properties screen and view the drive group properties.

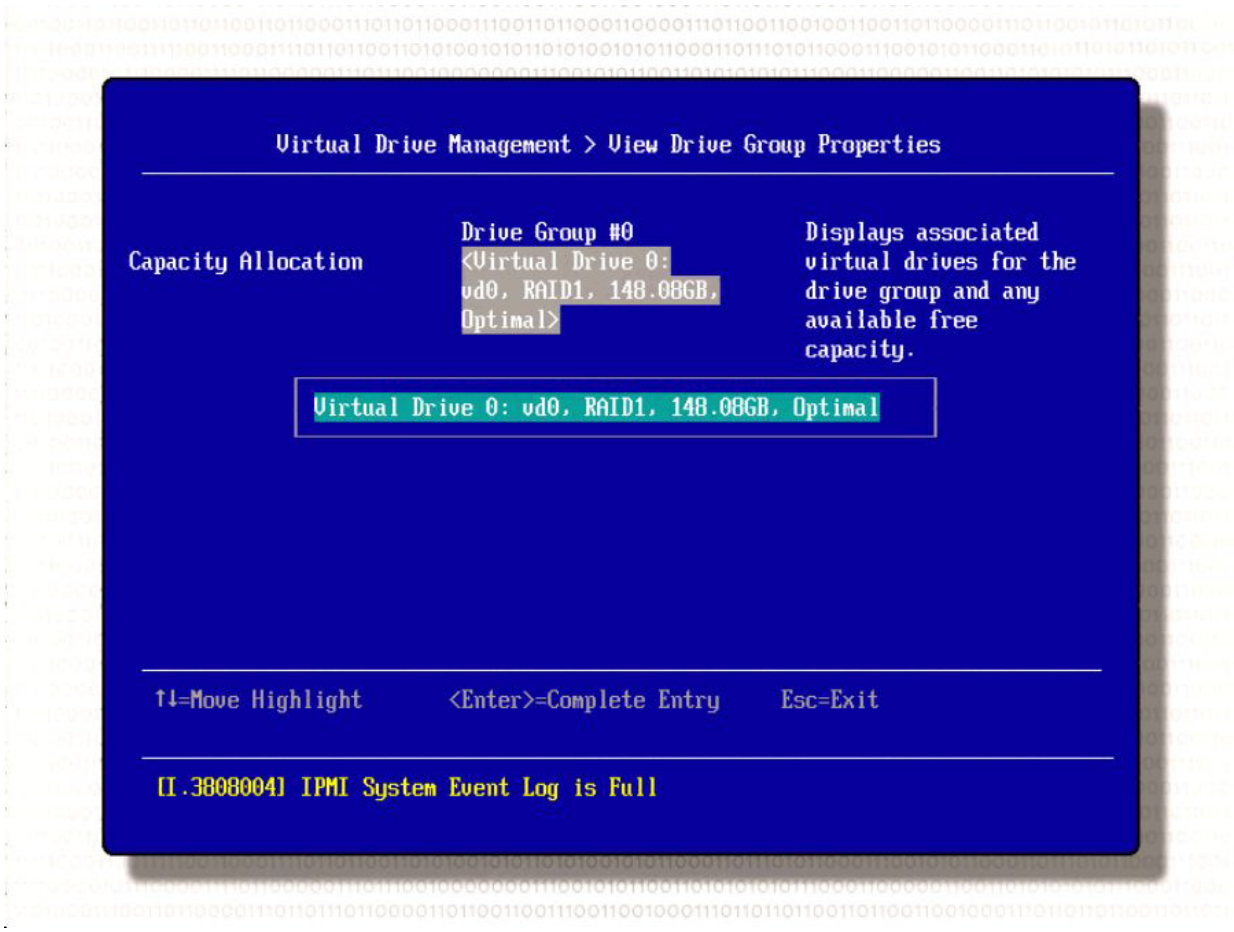
1. Highlight **Virtual Drive Management** on the Configuration Options screen (Figure 7) and press **Enter**.
   The Virtual Drive Management screen appears, as shown in the following figure.

Figure 19 Virtual Drive Management Screen



2. Highlight **View Drive Group Properties** and press **Enter**.
   The Virtual Drive Management >> View Drive Group Properties screen appears, as shown in the following figure.

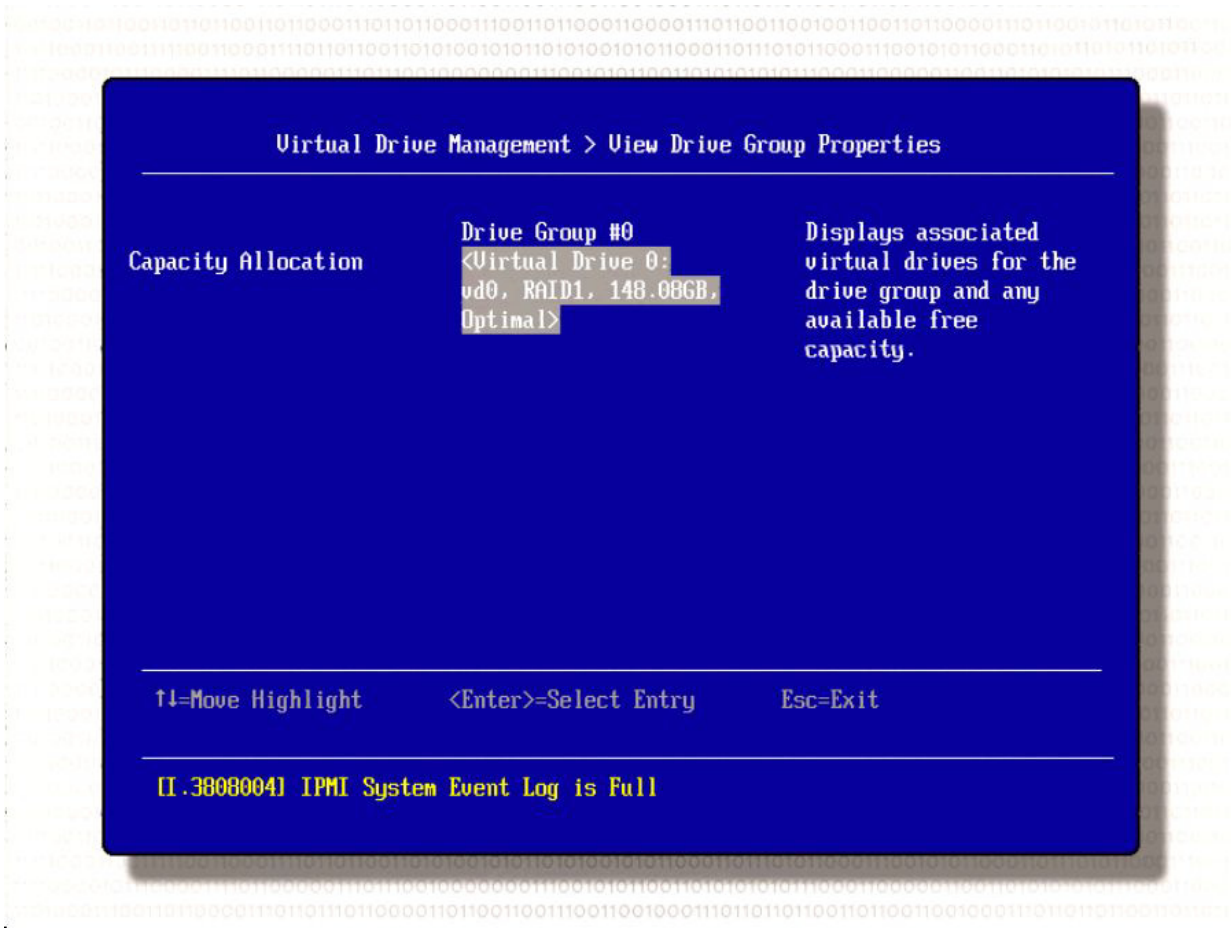
Figure 20 View Drive Group Properties Screen



The screen displays the drive group number, drive group name, RAID level, virtual drive capacity, and virtual drive status.

3. Highlight the drive group and press **Enter**.
   The drive group properties and any free capacity appear in the list, as shown in the following figure.

Figure 21 Drive Group Properties and Free Space



3.4 Managing Drives

You can use the Drive Management screen to view and change the physical drive properties of the drives in a drive group.

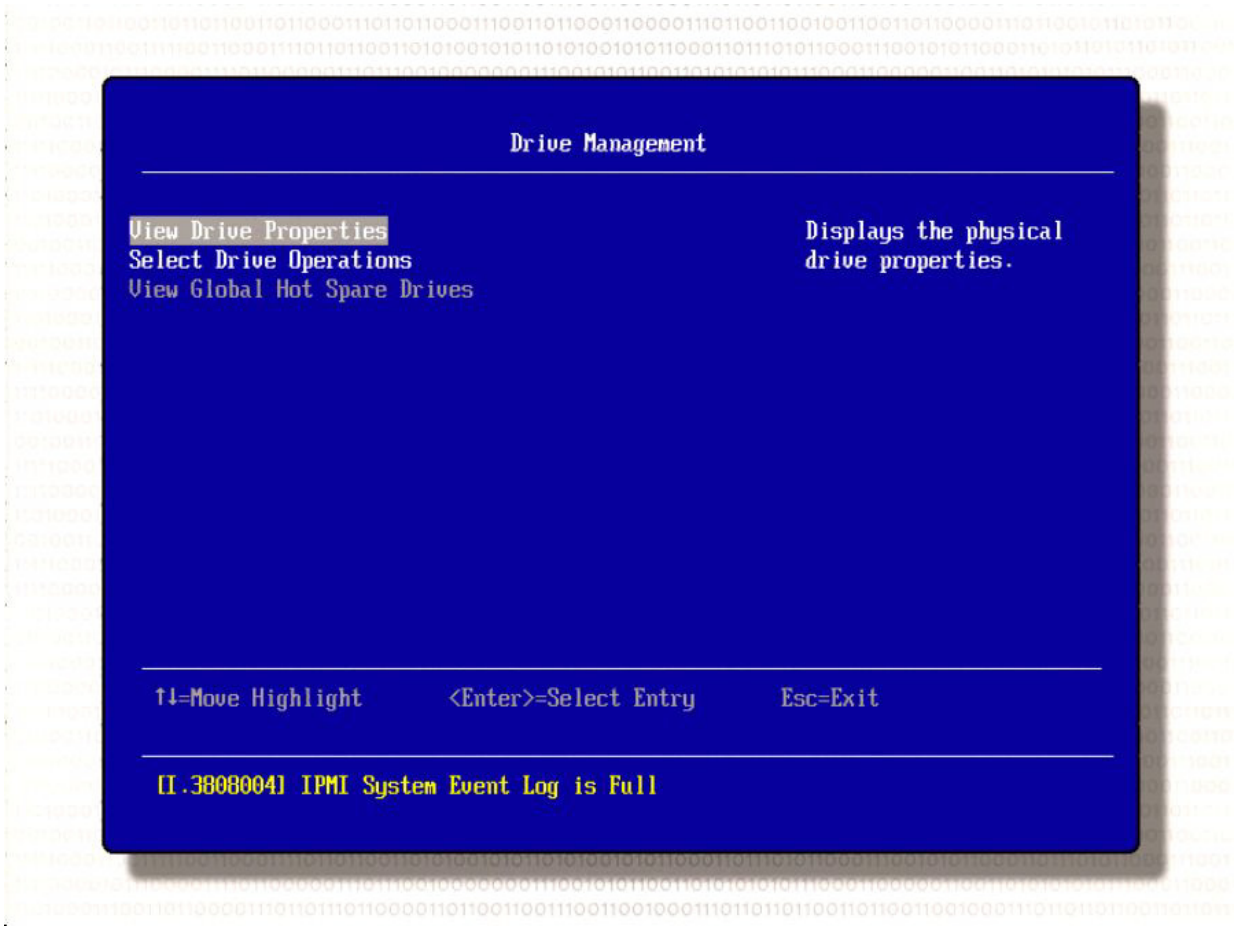
3.4.1 Viewing Drive Properties

Perform the following steps to access the drive properties screen and view the values for the properties.

1. Highlight **Drive Management** on the Configuration Options screen (Figure 7) and press **Enter**.

The Drive Management screen appears, as shown in Figure 22.

Figure 22 Drive Management Screen



2. Highlight **View Drive Properties** and press **Enter**.

   The Drive Management >> View Drive Properties screen appears, as shown in the following figures.

NOTE The following two figures show the drive properties. Scroll down on Figure 24 to see the additional properties on the View Drive Properties screen.

Figure 23 Drive Management >> View Drive Properties Screen

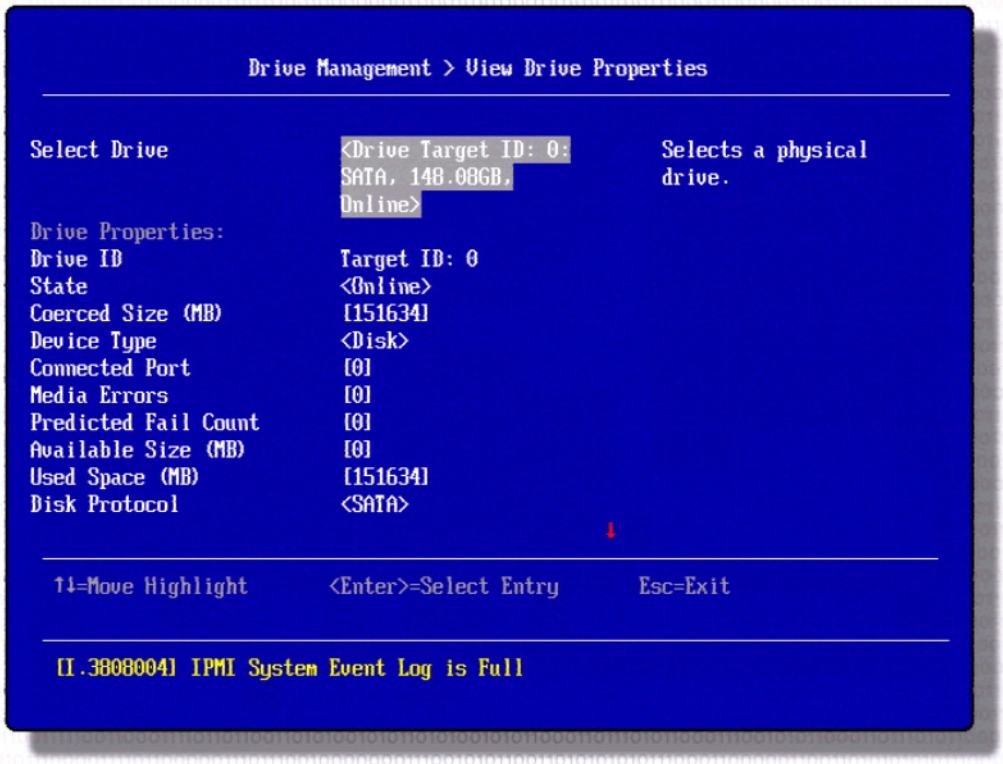
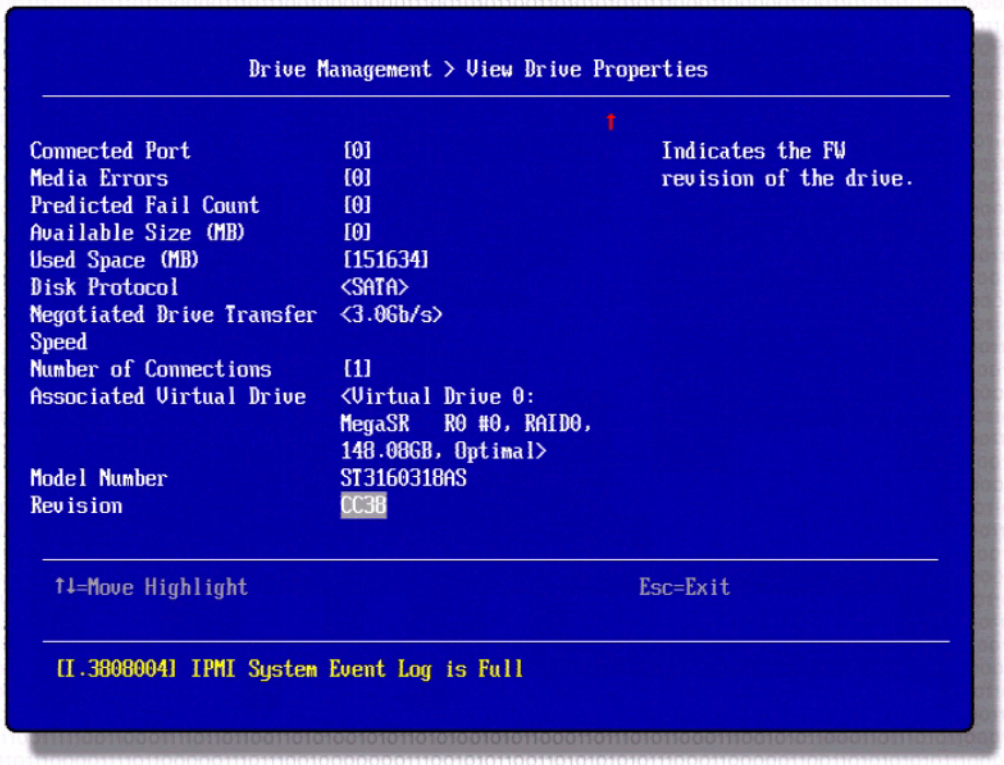


Figure 24 Drive Management >> View Drive Properties Screen (Continued)



You can highlight the Associated Virtual Drive field and press **Enter** to view the properties. However, you cannot change the values in this field.

Here are brief explanations of the drive properties and their values:

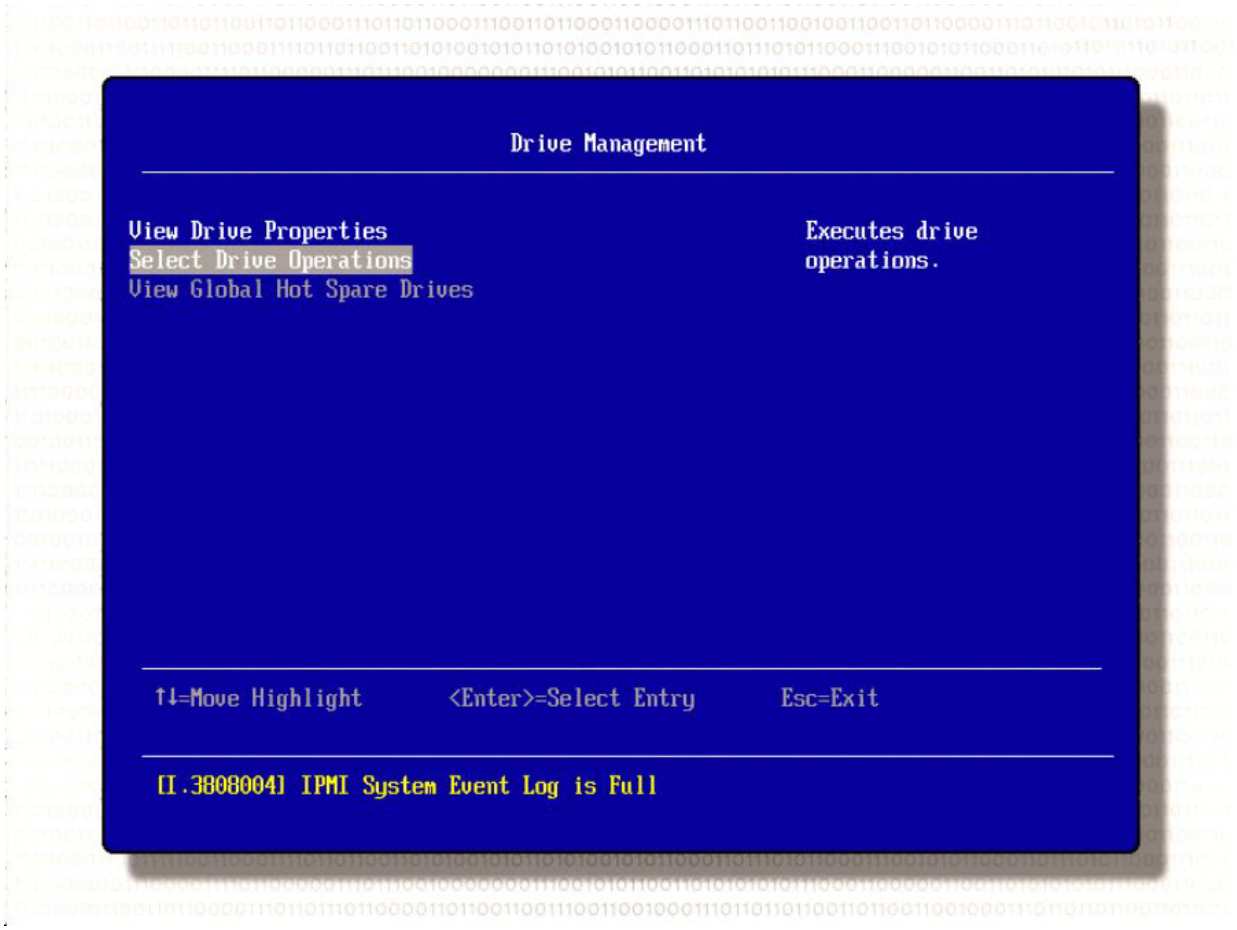
- **Select Drive**: The drive number, drive slot, drive type, drive capacity, and drive status of the selected drive.
- **Drive ID**: Indicates the ID and drive slot of the selected drive.
- **State**: Indicates the state of the selected drive, such as Online, Offline, or Unconfigured Good.
- **Coerced Size (MB)**: Indicates the capacity to which the selected drive has been coerced to make it compatible with other drives that are nominally the same capacity.
- **Device Type**: Indicates the type of device selected, such as a drive, tape, or CD/DVD-ROM.
- **Connected Por**t: Indicates the port that the selected drive is connected to.
- **Media Errors**: Indicates the number of media errors on the drive. Media errors are physical defects on the drive.
- **Predicted Fail Count**: Indicates the predicted number of drive failures.
- **Available Size (MB)**: Indicates the free capacity of the selected drive.
- **Used Space (MB)**: Indicates the configured space of the selected drive in MB.
- **Disk Protocol**: Indicates the type of drive selected, such as SATA.
- **Negotiated Drive Transfer Speed**: Indicates the negotiated link speed for the data transfer to or from the selected drive.
- **Number of Connections**: Indicates the number of devices connected.
- **Associated Virtual Drive**: Indicates the virtual drive number, virtual drive name, RAID level, virtual drive capacity, and virtual drive status.

3.4.2 Selecting Drive Operations

Perform the following steps to access the drive operations screen and carry out the operations.

1. Highlight **Drive Management** on the Configuration Options screen (Figure 7) and press **Enter**. The Drive Management >> Select screen appears, as shown in the following figure.

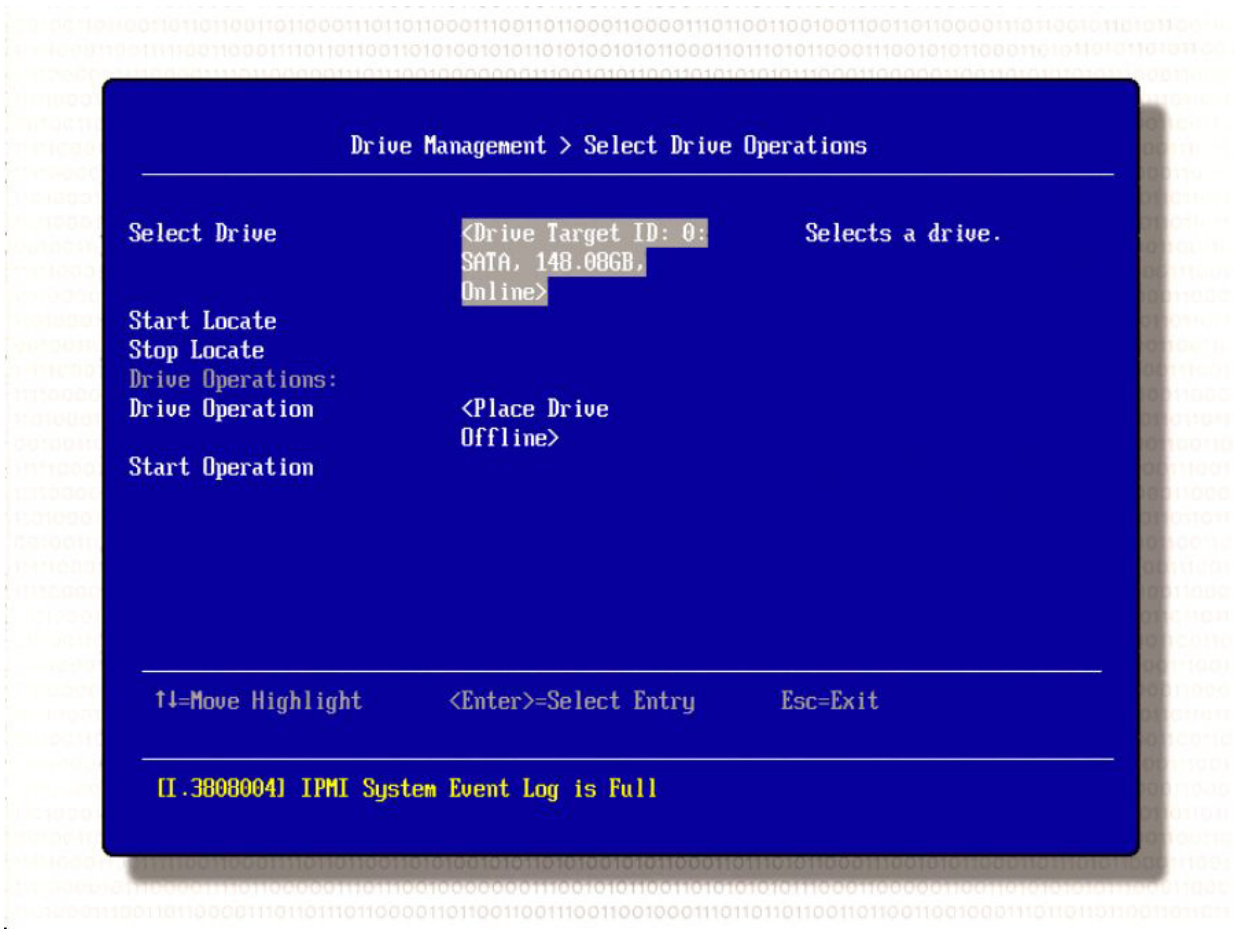
Figure 25 Drive Management Screen



2. Highlight **Select Drive Operations** and press **Enter**.

The Drive Management >> Select Drive Operations screen appears, as shown in the following figure.

Figure 26 Drive Management >> Select Drive Operations Screen



3. Highlight an operation and press **Enter**.

   The following items describe the drive operations:

   — **Select Drive**: Select the drive you want to carry out operations on. The screen displays the drive number, slot number, drive type, drive capacity, and drive status.

   — **Start Locate**: Flash the LED on the selected drive.

   — **Stop Locate**: Stop flashing the LED on the selected drive.

   — **Drive Operation**: Make a drive offline or online. The options are **Place Drive Offline** and **Place Drive Online**.

   NOTE If a good drive is part of a redundant drive group that includes a hotspare, and you force the drive offline, the data on the drive is rebuilt on the hotspare drive. The good drive that you forced offline goes into the *Unconfigured Bad* state.

4. Highlight **Start Operation** and press **Enter**.

   The confirmation screen appears.

5. Highlight **Yes** and press **Enter**.

   The controller performs the selected operations.

3.4.3 Viewing Global Hotspare Drives

Highlight **View Global Hot Spare** and press **Enter** to display all the assigned global hot spare on the RAID controller. A hot spare disk is a disk that replaces a failing or failed disk in a RAID configuration. The replacement is automatic or manually, depending in the hot spare policy,

Chapter 4: MegaCLI Command Line Interface

The MegaCLI utility is a command line interface application that you can use to configure and maintain storage configurations created with ServeRAID C100 and ServeRAID C105.

NOTE The MegaCLI utility runs in the Microsoft® Windows® operating system environment and the Linux® operating system environment.

NOTE The MegaCLI utility supports IBM ServeRAID products. However, some of the commands might not be supported by ServeRAID C100 and ServeRAID C105.

4.1 MegaCLI Overview

You can use the MegaCLI utility to perform the following tasks:

- Configure virtual drives and create configurations on the controller
- Display the configuration on the controller
- Display and change virtual drive's properties on the controller
- Display and change physical drive's properties on the controller
- Display and change controller properties
- Load a configuration to the controller from a file
- Save an controller configuration to a file
- Start or stop rebuild, consistency check, and initialization
- Suspend and display an ongoing background initialization
- Display relevant user messages on the console or write them to the log file
- Work in silent mode, if selected (no messages are displayed on the console)
- Display controller inventory data in a single command
- Customize output strings
- Exit with predefined success or failure exit codes
- Set some predefined environment variables, such as number of controllers and the number of virtual drives
- Display help on how to use the command line options

4.2 Exception Handling

MegaCLI exits with exit code 0 for all successful operations. In case of failure, it exits with exit code 1 to 255, depending on the failure conditions. For example, assume that a rebuild is started on three physical drives. MegaCLI successfully starts rebuilding the first drive but fails to start rebuilding the second drive. If this happens, MegaCLI does not attempt to start rebuilding the third drive; instead, it exits with an error exit code. In this case, the error code is EXIT_ERR_START_RBLD. So even if the command was partially successful, an error code is still generated.

Some operations such as `GetNumberOfAdapters` or `GetNumberofLogicaldrives` return with the actual number of controllers or virtual disks. These return values are special cases and do not reflect any error conditions based on the return code, which in these cases contains meaningful values.

4.3 Command Line Abbreviations and Conventions

This section explains the abbreviations and conventions used with MegaCLI Configuration Utility commands.

4.3.1 Abbreviations Used in the Command Line

Table 5 lists the abbreviations for the virtual drive parameters used in the following sections.

Table 5 Command Line Abbreviations

Convention	Description
WB	WriteBack write policy
WT	WriteThrough write policy
ADRA	Adaptive Read Ahead read policy
RA	Read Ahead read policy
NORA	Normal Read policy (No read ahead)
DIO	Direct I/O cache policy
CIO	Cached I/O cache policy

4.3.2 Conventions

You can specify multiple values for some options. You can enter commands for a single controller (-aN), multiple selected controllers (-a0,1,2) or all controllers (-aALL). This usage is denoted as -aN| -a0,1,2|-aALL in the command line syntax used in this chapter. Table 6 lists all of the conventions used in the command line options.

NOTE All options in the MegaRAID Command Tool are position-dependent, unless otherwise specified.

Table 6 Conventions

Convention	Description
MegaCLI	Specifies the command line interface used. Type either MegaCLI under Microsoft Windows and Linux
|	Specifies "or," meaning you can choose between options.
-aN	N specifies the controller number for the command.
-a0,1,2	Specifies the command is for controllers 0, 1, and 2. You can select two or more controllers in this manner.
-aALL	Specifies the command is for all controllers.
-Lx	x specifies the virtual drive number for the command.
-L0,1,2	Specifies the command is for virtual drives 0, 1, and 2. You can select two or more virtual drives in this manner.
-Lall	Specifies the command is for all virtual drives.
[E0:S0,E1,S1,...]	Specifies when one or more physical devices need(s) to be specified in the command line. Each [E:S] pair specifies one physical device where E means the device ID of the enclosure in which a drive resides, and S means the slot number of the enclosure.

Table 6 Conventions (Continued)

Convention	Description
[ ]	Indicates that the parameter is optional.
{ }	Indicates that the parameters are grouped and that they must be given at the same time.
-Force	Specifies that the MegaCLI utility does not ask you for confirmation before it performs this command. You might lose data using this option with some commands.

You can specify the `-Silent` command line option for all possible functions of the MegaCLI. If you enter this option at the command line, no messages appear on the screen.

The following MegaCLI CT commands that are supported in hardware RAID configurations are *not* supported by ServeRAID C105:

- Adapter Cache Flush (`-AdpCacheFlush`)
- Cluster Enable is not supported
- Foreign Configuration (`-CfgForeign`)
- Virtual Drive Reconstruction (`-LDRecon`)
- Set Virtual Drive Properties (`-LDSetProp`)
- Display Enclosure Information (`-EncInfo`)
- Mark Configured Physical Disk Drive as Missing (`-PDMarkMissing`)
- Display List of Missing Physical Disk Drives (`-PDGetMissing`)
- Diagnostics (`-AdpDiag`, `-AdpBatTest`, `-AdpNVRAM`)

The following sections describe the MegaCLI commands.

NOTE ServeRAID C105 does not support Write Policy, Read Policy, or I/O Policy. ServeRAID C105 supports only enabling and disabling the drive's write cache and read-ahead functions.

NOTE MegaCLI for ServeRAID C105 does not support the concept of disk enclosures, except for a default *Enclosure 0* (E0). Some of the commands support an E0:S*n* syntax that enables you to specify a drive in a particular "slot" in this default enclosure.

4.4 Controller Commands

You can use the commands in this section to set or display properties related to the controller(s).

NOTE The drivers for ServeRAID C105 function as virtual "adapters" or "controllers." Because the drivers are not actual hardware components, some of the controller parameters do not apply to them.

4.4.1 Display Controller Information

Use the command in Table 7 to display information on controller parameters such as the number of virtual drives and initiator ID.

Table 7 Display Controller Information

Syntax	`MegaCLI -AdpAllInfo -aN|-a0,1,2|-aALL`
Description	Displays parameters on the selected controller(s). The parameters includes initiator ID, current status of auto rebuild, number of virtual drives, rebuild rate, bus number/device number, present RAM, settings, and serial number of the board.

4.4.2 Enable or Disable Automatic Rebuild

Use the command in Table 8 to turn automatic rebuild on or off for the selected controller(s). If you have configured hotspares and enabled automatic rebuild, the RAID controller automatically tries to use them to rebuild failed disks. Automatic rebuild also controls whether a rebuild will start when a drive that was part of the array is reinserted.

Table 8 Enable or Disable Automatic Rebuild

Syntax	`MegaCLI -AdpAutoRbld -Enbl|-Dsbl|-Dsply -aN|-a0,1,2|-aALL`
Description	Enables or disables automatic rebuild on the selected controller(s). The `-Dsply` option shows the status of the automatic rebuild state.

4.4.3 Set Controller Properties

This command sets the properties on the selected controller(s). For example, for `{RebuildRate -val}`, you can enter a value between 0 percent and 100 percent. (The rebuild rate is the percentage of the compute cycles dedicated to rebuilding failed drives.) At 0 percent, the rebuild is done only if the system is not doing anything else. At 100 percent, the rebuild has a higher priority than any other system activity.

NOTE The default rebuild rate of 30 percent is recommended.

Use the command in Table 9 to display or set controller properties.

Table 9 Set Controller Properties

Syntax	`MegaCLI -AdpSetProp {CacheFlushInterval -val}|{RebuildRate -val}| {PatrolReadRate -val}|{BgiRate -val}|{CCRate -val}| {ReconRate -val}| {SpinupDriveCount -val}|{SpinupDelay -val}|{CoercionMode -val} | {ClusterEnable -val}|{PredFailPollInterval -val}| {BatWarnDsbl -val}| {EccBucketSize -val}|{EccBucketLeakRate -val}|{AbortCCOnError -val}|AlarmEnbl | AlarmDsbl | AlarmSilence |{SMARTCpyBkEnbl -val} | -AutoDetectBackPlaneDsbl | -CopyBackDsbl | -LoadBalanceMode | NCQEnbl | NCQDsbl | {SSDSMARTCpyBkEnbl -val} | {MaintainPdFailHistoryEnbl -val} | {EnblSpinDownUnConfigDrvs -val} | {EnblSSDPatrolRead -val} | AutoEnhancedImportEnbl | AutoEnhancedImportDsbl | {-UseFDEOnlyEncrypt -val} | {-PrCorrectUncfgdAreas -val} | -aN| -a0,1,2|-aALL`
Description	Sets the properties on the selected controller(s). The possible settings are: `CacheFlushInterval`: Cache flush interval in seconds. Values: 0 to 255. `RebuildRate`: Rebuild rate. Values: 0 to 100. `PatrolReadRate`: Patrol read rate. Values: 0 to 100. `BgiRate`: Background initilization rate. Values: 0 to 100. `CCRate`: Consistency check rate. Values: 0 to 100. `ReconRate`: Reconstruction rate. Values: 0 to 100. `SpinupDriveCount`: Max number of drives to spin up at one time. Values: 0 to 8. `SpinupDelay`: Number of seconds to delay among spinup groups. Values: 0 to 8. `CoercionMode`: Drive capacity Coercion mode. Values: 0 - None, 1 - 128 MB, 2 - 1 GB. The coercion type can be set only when there is no configuration present on the controller. `ClusterEnable`: Cluster is enabled or disabled. Values: 0 - Disabled, 1 - Enabled. `PredFailPollInterval`: Number of seconds between predicted fail polls. Values: 0 to 65535. `BatWarnDsbl`: Disable warnings for missing battery or missing hardware. Values: 0 - Enabled, 1 - Disabled. `EccBucketSize`: Size of ECC single-bit-error bucket. Values: 0 to 255. `EccBucketLeakRate`: Leak rate (in minutes) of ECC single-bit-error bucket. Values: 0 to 65535. `AbortCCOnError`: `AlarmEnbl`: Set alarm to Enabled. `AlarmDsbl`: Set alarm to Disabled. `AlarmSilence`: Silence an active alarm. `SMARTCpyBkEnbl`: Enable copyback operation on Self-Monitoring Analysis and Reporting Technology (SMART) errors. Copyback is initiated when the first SMART error occurs on a drive that is part of a virtual drive. `AutoDetectBackPlaneDsbl`: Detect automatically if the backplane has been disabled. `CopyBackDsbl`: Disable or enable the copyback operation. `LoadBalanceMode`: Disable or enable the load balancing mode. `NCQEnbl`: Enable the native command queueing. `NCQDsbl`: Disable the native command queueing. `SSDSMARTCpyBkEnbl`: Enable copyback operation on Self-Monitoring Analysis and Reporting Technology (SMART) errors on a Solid State Drive (SSD). Copyback is initiated when the first SMART error occurs on a SSD that is part of a virtual drive. `MaintainPdFailHistoryEnbl`: Enable maintenance of the history of a failed drive. `EnblSpinDownUnConfigDrvs`: Enable spindown of unconfigured drives. `EnblSSDPatrolRead`: Enable the patrol read operation (media scan) on a SSD. `AutoEnhancedImportEnbl`: Enable the automatic enhanced import of foreign drives. `AutoEnhancedImportDsbl`: Disable the automatic enhanced import of foreign drives. `UseFDEOnlyEncrypt`: Use encryption on FDE drives only. `PrCorrectUncfgdAreas`: Ignores all patrol read errors by writing 0s.

4.4.4 Display Specified Controller Properties

Use the command in Table 10 to display specified properties on the selected controller(s).

Table 10 Display Specified Controller Properties

Syntax	`MegaCLI -AdpGetProp CacheFlushInterval | RebuildRate | PatrolReadRate| BgiRate | CCRate | ReconRate | SpinupDriveCount | SpinupDelay | CoercionMode | PredFailPollInterval | ClusterEnable | BatWarnDsbl | EccBucketSize | EccBucketLeakRate | EccBucketCount | AlarmDsply | AbortCCOnError | AutoDetectBackPlaneDsbl | CopyBackDsbl | LoadBalanceMode | SMARTCpyBkEnbl | SSDSMARTCpyBkEnbl | MaintainPdFailHistoryEnbl | EnblSpinDownUnConfigDrvs | EnblSSDPatrolRead | NCQDsply | UseFDEOnlyEncrypt | WBSupport | AutoEnhancedImportDsbl | PrCorrectUncfgdAreas | DsblSpinDownUnConfigDrvs | -aN|-a0,1,2|-aALL`
Description	Displays the properties on the selected controller(s). `EccBucketCount`: Count of single-bit ECC errors currently in the bucket. `WBSupport`: Enables support for the WriteBack option as the Write Policy. `DsblSpinDownUnConfigDrvs`: Disable spindown of unconfigured drives. See Table 9 for explanations of the other options.

4.4.5 Display Controller Time

Use the command in Table 11 to display the current time and date of the selected controller.

Table 11 Display Controller Time

Syntax	`MegaCLI -AdpGetTime -aN`
Description	Displays the time and date on the controller. This command uses a 24-hour format. For example, 7 p.m. would display as `19:00:00`.

4.4.6 Set Factory Defaults

Use the command in Table 12 to set the factory defaults on the selected controller(s).

Table 12 Set Factory Defaults

Syntax	`MegaCLI -AdpFacDefSet -aN|-a0,1,2|-aALL`
Description	Sets the factory defaults on the selected controller(s). You cannot set the factory defaults if the controller already has a configuration defined on it.

4.5 Event Log Commands

4.5.1 Manage the Event Log Entries

Use the command in Table 13 to manage the event entries in the event log for the selected controller(s).

Table 13 Event Log Management

Syntax	`MegaCLI -AdpEventLog -GetEventlogInfo |{-GetEvents | GetSinceShutdown| GetSinceReboot | IncludeDeleted | {GetLatest <number>} -f <filename>} |Clear -aN|-a0,1,2|-aALL`
Description	The RAID driver maintains a volatile circular list of 100 events, which is deleted at reboot. The following command options are available: ■ `-GetEventlogInfo`: Displays overall event information such as total number of events, newest sequence number, oldest sequence number, shutdown sequence number, reboot sequence number, and clear sequence number. ■ `-GetEvents`: Gets event log entry details. The information shown consists of the total number of entries and the details of each error log entry. `Start_entry` specifies the initial event log entry when displaying the log. ■ `-GetSinceShutdown`: Displays all the events since last controller shutdown. ■ `-GetSinceReboot`: Displays all the events since last controller reboot. ■ `-IncludeDeleted`: Displays all events, including deleted events. ■ `-GetLatest`: Displays the latest number of events, if it exists. The event data is written to the file in reverse order. ■ `-Clear`: Clears the event log for the selected controller(s).

4.6 Configuration Commands

You can use the commands in this section to create storage configurations.

4.6.1 Add RAID 0 or 1 Configuration

Use the command in Table 14 to add a RAID level 0 or 1 configuration to the existing configuration on the selected controller. For RAID level 10, see Section 4.6.3, Add RAID 10 Configuration.

NOTE ServeRAID C105 supports only SATA HDDs; it does not support SSD or SAS.

Table 14 Add RAID 0 or 1 Configuration

Syntax	`MegaCLI -CfgLDAdd -R0|-R1|[[E0]:Sn] [ -szXXXXXXXX [-szYYYYYYYY [...]]] [-strpszM] [-Hsp[E5:S5,...]] [-afterLdX] -aN`
Description	Adds a RAID level 0 or 1 configuration to a specified controller. Even if no configuration is present, you have the option to write the configuration to the controller. ■ `-Rx[[E0]:Sn]`: Used to specify the RAID level and the physical drive enclosure/slot numbers for an array. **NOTE** No enclosure number is needed for simple swap configurations, in which a drive is not part of an enclosure. For example, in a RAID 1 configuration with a drive in slot 2 that is not in an enclosure, and a drive in an enclosure in slot 3, the syntax is `-R1[:2,1:3]`. ■ `-strpszM`: Used (optionally) to specify a stripe size. You can set the stripe size to 64 Kbytes. ■ `-Hsp[Ex:Sx,...]`: Used to create a global hotspare, with physical drive enclosure/slot numbers specified. ■ `-szXXXX`: Used to specify the size of a virtual drive, where *XXXX* is a decimal number of Mbytes. However, the actual size of the virtual drive may be smaller, because the driver requires the number of blocks from physical drives in each virtual drive to be aligned to the stripe size. This option also can be used to create a configuration on the free space available in the array. ■ `-AfterLdX`: Used to specify which free slot should be used (optional). By default, MegaCLI uses the first free slot available in the array. This option has no meaning if the array is not already used for configuration.

4.6.2 Configure Each Disk as RAID 0

Use the command in Table 15 to configure each drive in Unconfigured-Good state as RAID 0.

NOTE The MegaCLI utility does *not* support spanning across these single-drive RAID 0 configurations.

Table 15 Configure Each Disk as RAID 0

Syntax	`MegaCLI -CfgEachDskRAID0 [{WT | WB }] [{NORA | RA | ADRA}] [{Direct | Cached}] [{-strpszM} -aN|-a0,1,2|-aALL`
Description	Configures each drive in Unconfigured-Good state as RAID 0 on this controller. The options `{WT |WB} {NORA | RA | ADRA} {Direct | Cached}` must be entered in the sequence that is shown. ■ `WT`: Used to select Write-through caching, in which a write transaction is considered to be complete when all the data has been written to the disk cache. ■ `WB`: Used to select Write-back caching, in which the write transaction is complete only when the data has been written to the disk. ■ `NORA`: Used to select Normal Read Ahead caching, which specifies that the controller reads only the requested data and does not read ahead for the current virtual drive. ■ `RA`: Used to select Read Ahead caching, which specifies that data is read sequentially ahead of the data that is actually requested and is stored in a cache. If the additional read-ahead data is then requested, it can be read faster from the cache than from the disk directly. Read-Ahead supplies sequential data faster, but is not as effective when accessing random data. ■ `ADRA`: Used to select Adaptive Read Ahead, which specifies that the controller begins using Read Ahead caching if the two most recent disk accesses occurred in sequential sectors. If all read requests are random, the algorithm reverts to No Read Ahead; however, all requests are still evaluated for possible sequential operation. If you select Read Ahead, there is a danger that data could be lost if the power fails before the cached data is written to disk. ■ `Direct`: Used to specify that the controller does not buffer reads 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. ■ `Cached`: Used to specify that the controller buffers all reads in cache memory. ■ `{-strpszM}`: Used to specify the size of the segments written to each drive in the configuration. You can set the stripe size to 64 Kbytes.

4.6.3 Add RAID 10 Configuration

Use the command in Table 16 to add a RAID 10 configuration to the existing configuration on the selected controller. For RAID levels 0, 1 or 5, see Section 4.6.1, Add RAID 0 or 1 Configuration.

NOTE On a RAID 10 array, you can create only one virtual drive, and that virtual drive must occupy the entire space of the RAID 10 array.

Table 16 Add RAID 10 Configuration

Syntax	`MegaCLI -CfgSpanAdd -R10| -Array0[E0:Sn] -Array1[E0:Sn] [...] [{WT | WB}] [{NORA | RA | ADRA}] [{Direct | Cached}] [{-strpszM}] -aN`
Description	Creates a RAID level 10 (spanned) configuration from the specified arrays. Even if no configuration is present, you must use this option to write the configuration to the controller. Multiple arrays are specified using the `-ArrayX[E0:Sn,...]` option. (Note that *X* starts from 0, not 1.) All the arrays must have the same number of physical drives. At least two arrays must be provided. The options `{WT |WB} {NORA | RA | ADRA} {Direct | Cached}` must be entered in the sequence that is shown.

4.6.4 Clear Existing Configuration

Use the command in Table 17 to clear the existing storage configuration on the selected controller(s).

Table 17 Clear Existing Configuration

Syntax	`MegaCLI -CfgClr -aN|-a0,1,2|-aALL`
Description	Clears the existing storage configuration.

4.6.5 Display Existing Configuration

Use the command in Table 18 to display the virtual drive and drive information for the configuration on the selected controller(s). This command also provides information about the remaining unconfigured space.

Table 18 Display Existing Configuration

Syntax	`MegaCLI -CfgDsply -aN|-a0,1,2|-aALL`
Description	Displays the existing configuration on the selected controller(s), which includes the virtual drive and component physical drive-related details.

4.6.6 Save Controller Configuration

Use the command in Table 19 to save the configuration for the selected controller(s) to the given filename.

Table 19 Save Controller Configuration

Syntax	`MegaCLI -CfgSave -fFileName -aN`
Description	Saves the configuration for the selected controller(s) to the given filename, in binary format. The command also stores the controller properties structure in the file.

4.6.7 Restore Configuration Data from File

Use the command in Table 20 to read the configuration from the file and load it on the selected controller(s). You can restore the read/write properties and RAID configuration using hotspares.

Table 20 Restore Configuration Data from File

Syntax	`MegaCLI -CfgRestore -fFileName -aN`
Description	Reads the configuration from the file and loads it on the controller. MegaCLI can store or restore all read and write controller properties, all read and write properties for virtual drives, and the RAID configuration including hotspares. **NOTE** The `-CfgSave` option stores the configuration data and the controller properties in the file. Configuration data has only the device ID and sequence number information of the physical drives used in the configuration. The `CfgRestore` option will fail if the same device IDs of the physical drives are not present. The utility does not validate the setup before restoring the configuration.

4.6.8 Delete Virtual Drive(s)

Use the command in Table 21 to delete one or more virtual drives on the selected controller(s).

Table 21 Delete Virtual Drives

Syntax	`MegaCLI -CfgLDDel-Lx|-L0,1,2|-Lall -aN|-a0,1,2|-aALL`
Description	Deletes one virtual drive, multiple virtual drives, or all the selected virtual drives on selected controller(s).

4.6.9 Display Free Space

Use the command in Table 22 to display the free space that is available to use for configuration on the selected controller(s).

Table 22 Display Free Space

Syntax	`MegaCLI -CfgFreeSpaceInfo -aN|-a0,1,2|-aALL`
Description	Displays all the free space available for configuration on the selected controller(s). The information includes the number of disk groups, the number of spans in each disk group, the number of free space slots in each disk group, the start block, and the size (in both blocks and megabytes) of each free space slot.

4.7 Virtual Drive Commands

You can use the commands in this section to select settings for the virtual drives and to perform actions on them.

4.7.1 Display Virtual Drive Information

Use the command in Table 23 to display information about virtual drives on the selected controller(s).

Table 23 Display Virtual Drive Information

Syntax	`MegaCLI -LDInfo -Lx|-L0,1,2|-Lall -aN|-a0,1,2|-aALL`
Description	Displays information about the virtual drive(s) on the selected controller(s). This information includes the name, RAID level, RAID level qualifier, size in megabytes, state, stripe size, number of drives, and span depth. Also displays activity progress, if any, including initialization, background initialization, and consistency check.

4.7.2 Display Virtual Drive Disk Cache Settings

Use the command in Table 24 to display the disk cache settings for the virtual drive(s) on the selected controller(s).

Table 24 Display Virtual Drive Cache Settings

Syntax	`MegaCLI -LDGetProp -DskCache -Lx|-L0,1,2| -Lall -aN|-a0,1,2|-aALL`
Description	Displays the disk cache settings of the virtual drive(s): `-DskCache`: Displays physical drive cache policy. ServeRAID C105 does not support setting virtual drive parameters.

4.7.3 Manage Virtual Drive Initialization

Use the command in Table 25 to manage initialization of the virtual drive(s) on the selected controller(s).

Table 25 Manage Virtual Drive Initialization

Syntax	`MegaCLI -LDInit -Start [Fast | Full] |-Abort|-ShowProg|-ProgDsply -Lx|-L0,1,2|-Lall -aN|-a0,1,2|-aALL`
Description	Allows you to select the following actions for virtual drive initialization: ■ `-Start`: Starts the initialization (writing 0s) on the virtual drive(s) and displays the progress (this is optional). The fast initialization option initializes the first 100 Mbytes on the virtual drive. The full option allows you to initialize the entire virtual drive. ■ `-Abort`: Aborts the ongoing initialization on the LD(s). ■ `-ShowProg`: Displays the snapshot of the ongoing initialization, if any. ■ `-ProgDsply`: Displays the progress of the ongoing initialization until at least one initialization is completed or a key is pressed.

4.7.4 Manage Consistency Check

Use the command in Table 26 to manage a data consistency check (CC) on the virtual drives for the selected controller(s).

Table 26 Manage Consistency Check

Syntax	`MegaCLI -LDCC -Start|-Abort|-ShowProg|-ProgDsply -Lx|-L0,1,2|-Lall -aN|-a0,1,2|-aALL`
Description	Allows you to select the following actions for a data consistency check: ■ `-Start`: Starts a CC on the virtual drive(s), and then displays the progress (optional) and time remaining. ■ `-Abort`: Aborts an ongoing CC on the virtual drive(s). ■ `-ShowProg`: Displays a snapshot of an ongoing CC. ■ `-ProgDsply`: Displays ongoing CC progress until at least one CC is completed or a key is pressed.

4.7.5 View Ongoing Background Initialization

Use the command in Table 27 to view ongoing background initialization of the selected virtual drives, after the `-LDInit` command has been issued to start the initialization. This function completes only when all background initialization processes complete or the user presses a key to exit.

Table 27 View Ongoing Background Initialization

Syntax	`MegaCLI -LDBI -Enbl|-Dsbl|-GetSetting|-ShowProg|-ProgDsply -Lx|-L0,1,2|-Lall -aN|-a0,1,2|-aALL`
Description	Displays ongoing background initialization of the selected virtual drives. This function completes only when all background initialization processes complete or the user presses a key to exit. ■ `-Enbl`, `-Dsbl`: Enables or disables the background initialization on the given controller(s). ■ `-ProgDsply`: Allows the user to view ongoing background initialization until all background initialization processes complete or the user presses a key to exit. ■ `-ShowProg`: Displays current progress value. ■ `-GetSetting`: Displays current background initialization setting (enabled or disabled).

4.7.6 Display Virtual Drive and Physical Drive Information

Use the command in Table 28 to display information about the virtual drives and drives for the selected controller(s), such as the number of virtual drives, RAID level, and drive size.

Table 28 Display Virtual Drive and Drive Information

Syntax	`MegaCLI -LDPDInfo -aN|-a0,1,2|-aALL`
Description	Displays information about the virtual drive(s) and the drive(s) on the selected controller(s). Displays information including the number of virtual drives, the RAID level of the virtual drives, and physical drive size information, such as raw size, coerced size, and uncoerced size.

4.7.7 Display Number of Virtual Drives

Use the command in Table 29 to display the number of virtual drives attached to the controller.

Table 29 Display Number of Virtual Drives

Syntax	`MegaCLI -LDGetNum -aN|-a0,1,2|-aALL`
Description	Displays the number of virtual drives attached to the controller. The return value is the number of virtual drives.

4.8 Physical Drive Commands

You can use the commands in this section to select settings for the drives and perform actions on them.

4.8.1 Display Drive Information

Use the command in Table 30 to display information about the drives on the selected controller(s).

Table 30 Display Drive Information

Syntax	`MegaCLI -PDInfo -PhysDrv[E0:Sn....] -aN|-a0,1,2|-aALL`
Description	Provides information about the drives connected to the enclosure and controller slot. This includes information such as the enclosure number, slot number, device ID, sequence number, drive type, capacity (if a drive), foreign state, and inquiry data. `-Physdrv[E0:S0,...]`: Specifies the physical drive enclosure and the slots for the drives to provide information about.

4.8.2 Set Drive State to Online

Use the command in Table 31 to set the state of a drive to *Online*. In an online state, the physical drive is working normally and is a part of a configured virtual drive.

Table 31 Set Drive State to Online

Syntax	`MegaCLI -PDOnline -PhysDrv[E0:Sn....] -aN|-a0,1,2|-aALL`
Description	Changes the drive state to *Online*. `-Physdrv[E0:S0,...]`: Specifies the physical drive enclosure and the slots for the drives.

4.8.3 Set Drive State to Offline

Use the command in Table 32 to set the state of a drive to *Offline*. In the offline state, the virtual drive is not available to the controller.

Table 32 Set Drive State to Offline

Syntax	`MegaCLI -PDOffline -PhysDrv[E0:S....] -aN|-a0,1,2|-aALL`
Description	Changes the drive state to *Offline*. `-Physdrv[E0:S0,...]`: Specifies the physical drive enclosure and the slots for the drives.

4.8.4 Set Drive State to Unconfigured-Good

Use the command in Table 33 to set the state of a drive from *Unconfigured-Bad* to *Unconfigured-Good*.

Table 33 Set Drive State to Unconfigured-Good

Syntax	`MegaCLI -PDMakeGood -PhysDrv[E0:Sn...] -aN|-a0,1,2|-aALL`
Description	Changes the drive state from *Unconfigured-Bad* to *Unconfigured-Good*. ■ `-Physdrv[E0:S0,...]`: Specifies the physical drive enclosure and the slots for the drives. ■ `Force`: Force the drive to the *Unconfigured Good* state.

4.8.5 Change the Drive State

Use the command in Table 34 to change the drive state, as it relates to hotspares, and to associate the drive to an enclosure.

NOTE Software RAID does not support dedicated hotspares.

Table 34 Change Drive State

Syntax	`MegaCli -PDHSP {-Set [{-Dedicated -ArrayN |-Array0,1...}] [-EnclAffinity] [-nonRevertible] } | -Rmv -PhysDrv[E0:S0,E1:S1,...] -aN|-a0,1,2|-aALL`
Description	Changes the drive state (as it relates to hotspares) and associates the drive to an enclosure and virtual drive on a single controller, multiple controllers, or all controllers: ■ `-Set`: Changes the drive state for the enclosure. ■ `-Array0`: Dedicates the hotspare to a specific drive group number N. ■ `-EnclAffinity`: Associates the hotspare to a selected enclosure. ■ `-Rmv`: Changes the drive state to *ready* (removes the hotspare). ■ `-Physdrv[E0:S0,...]`: Specifies the physical drive enclosure and the slots for the drives. You can get the list of arrays by using the CLI command "CfgDsply". In the results of the CfgDsply command, the number associated with "DISK GROUPS" is the array number.

4.8.6 Manage a Drive Initialization

Use the command in Table 35 to manage a drive initialization on the selected controller(s).

Table 35 Manage Drive Initialization

Syntax	`MegaCli -PDClear -Start |-Stop|-ShowProg |-ProgDsply -PhysDrv[E0:S0,E1:S1....] -aN|-a0,1,2|-aALL`
Description	Manages initialization or displays initialization progress on a single controller, multiple controllers, or all controllers: ■ `-Start`: Starts initialization on the selected drive(s). ■ `-Stop`: Stops an ongoing initialization on the selected drive(s). ■ `-ShowProg`: Displays the current progress percentage and time remaining for the initialization. This option is useful for running the application through scripts. ■ `-ProgDsply`: Displays the ongoing clear progress. The routine continues to display the initialization progress until at least one initialization is completed or a key is pressed.

4.8.7 Manage Global Hotspares

Use the command in Table 36 to manage the configuration and assignment of global hotspares. Make sure the capacity of the hotspare drive is equal to or larger than the capacity of the disks in the array and that it is the same type of drive.

NOTE The hotspare drive rebuilds a failed drive even if the hotspare and the drives in the drive group are different types of drives. Once the rebuild is completed, it is recommended that you replace the new drive group member with a drive of the same type.

Table 36 Manage Hotspares

Syntax	`MegaCLI -PDHSP {-Set | -Rmv} -PhysDrv[E0:Sn....] -aN|-a0,1,2|-aALL`
Description	■ `-Set`: Changes the drive state to *hotspare* for the enclosure. ■ `-Rmv`: Changes the physical drive state to *ready* (removes the hotspare).

4.8.8 Rebuild Drive

Use the command in Table 37 to start or stop a rebuild on a drive and display the rebuild progress. When a drive in a drive group fails, you can rebuild the drive by recreating the data that was stored on the drive before it failed.

Table 37 Rebuild Drive

Syntax	`MegaCLI -PDRbld -Start |-Stop|-ShowProg |-ProgDsply -PhysDrv [E0:Sn....] -aN|-a0,1,2|-aALL`
Description	Manages a drive rebuild or displays the rebuild progress on one or more controllers. The drive must meet the size requirements before it can be rebuilt, and it must be part of an array: ■ `-Start`: Starts a rebuild on the selected physical drive(s) and displays the rebuild progress (optional). ■ `-Stop`: Stops an ongoing rebuild on the selected physical drive(s). ■ `-ShowProg`: Displays the current progress percentage and time remaining for the rebuild. This option is useful for running the application through scripts. ■ `-ProgDsply`: Displays the ongoing rebuild progress until at least one initialization is completed or a key is pressed. ■ `- Physdrv[E0:S0,...]`: Specifies the physical drive enclosure and the slots for the drives.

4.8.9 Locate Drive(s) and Activate LED

Use the command in Table 38 to locate drive(s) by flashing the drive activity LED.

Table 38 Locate Drive and Flash LED

Syntax	`MegaCLI -PDLocate -Start |-Stop -PhysDrv[E0:Sn....] -aN|-a0,1,2|-aALL`
Description	Locates the drive(s) for the selected controller(s) and flashes the disk activity LED.

4.8.10 Replace Configured Disk Drives and Start Automatic Rebuild

Use the command in Table 39 to replace a configured drive and start an automatic rebuild of the drive.

Table 39 Replace Configured Disk Drives and Start Automatic Rebuild

Syntax	`MegaCLI -PDReplaceMissing -PhysDrv[E0:Sn] -ArrayX -RowY -aN`
Description	Replaces the configured physical drives, and then starts an automatic rebuild. The specified array Index and row must be a missing drive.

4.8.11 Prepare Unconfigured Physical Drives for Removal

Use the command in Table 40 to prepare an unconfigured drive(s) for removal from the selected controller(s).

Table 40 Prepare Unconfigured Drives for Removal

Syntax	`MegaCLI -PDPrpRmv [-Undo] -PhysDrv[E0:Sn....] -aN|-a0,1,2|-aALL`
Description	Prepares unconfigured physical drive(s) for removal. The drive is spun down, and the drive state is set to *unaffiliated*, which marks it as offline even though it is not a part of configuration. The `-Undo` option undoes this operation, and this drive is marked as *Unconfigured-Good*.

4.8.12 Display Number of Physical Drives

Use the command in Table 41 to display the total number of drives attached to a controller.

Table 41 Display Number of Drives

Syntax	`MegaCLI -PDGetNum -aN|-a0,1,2|-aALL`
Description	Displays the total number of drives attached to a controller. The return value is the number of drives.

4.8.12.1 Display List of Physical Drives

Use the command in Table 42 to display a list of the physical drives connected to the selected controller(s).

Table 42 Display List of Physical Drives

Syntax	`MegaCLI -PDList -aN|-a0,1..|-aAll`
Description	Displays information about all drives connected to the selected controller(s). This information includes information such as the drive type, size, and serial number.

4.9 Miscellaneous Commands

The commands in this section are used to display various information about the MegaCLI utility.

4.9.1 Display Version Information

Use the command in Table 44 to display the CLI version, the version of the device driver, the version of the Unified extended firmware interface (UEFI) device driver, the firmware versions for the attached physical device, and the enclosure.

Table 43 Display Version Information

Syntax	`MegaCLI -Version -Cli | Ctrl | Driver | Pd | Uefi | -aN` (`Uefi` works only for EFI.)
Description	Displays the firmware versions and other code levels installed on the controller, the CLI version, the version of the device driver, the version of the UEFI device driver, the firmware versions for the attached physical device, and enclosure in a list as location information, model string, and firmware version.

4.9.2 Display MegaCLI Version

Use the command in Table 44 to display the version number of the MegaCLI utility.

Table 44 Display MegaCLI Version

Syntax	`MegaCLI -v`
Description	Displays the version number of the MegaCLI utility.

4.9.3 Display Help for MegaCLI

Use the command in Table 45 to display help information for the MegaCLI utility.

Table 45 Display Help for MegaCLI

Syntax	`MegaCLI -h|-Help|?`
Description	Displays help for the MegaCLI utility.

4.9.4 Display Summary Information

Use the command in Table 46 to display help information for the MegaCLI utility.

Table 46 Display Summary Information

Syntax	`MegaCLI -ShowSummary [-f filename] -aN`
Description	Displays a summary of the system information, the controller information, the drive information, the virtual drive information, and the enclosure information.

Chapter 5: MegaRAID Storage Manager Overview and Installation

MegaRAID Storage Manager (MSM) is a configuration and monitoring utility used with ServeRAID C100 and ServeRAID C105. This chapter provides a brief overview of the MegaRAID Storage Manager utility and explains how to install it on the supported operating systems.

5.1 Overview

MegaRAID Storage Manager may be installed either on the local system which contains the RAID controllers that you wish to monitor, or on a remote system such as a workstation or a laptop with network connectivity to the system you wish to monitor. Because of this, the system hardware and software requirements for installing MegaRAID Storage Manager might differ from the system requirements for the ServeRAID controller(s) you are using.

MegaRAID Storage Manager enables you to configure, monitor, and maintain storage configurations created under ServeRAID C105. The MegaRAID Storage Manager graphical user interface (GUI) makes it easy for you to create and manage storage configurations.

NOTE MegaRAID Storage Manager can be used to manage a wide range of ServeRAID controllers. Some MegaRAID Storage Manager features are not applicable for ServeRAID C105.

5.1.1 Creating Storage Configurations

MegaRAID Storage Manager enables you to easily configure the controllers, disk drives, and virtual disks on your workstation or server. The Simple Configuration mode and the Advanced Configuration mode greatly simplify the process of creating drive groups and virtual drives. You can use the these configuration modes to create the best possible configuration with the available hardware.

You can create the following 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 virtual drive.
- **Advanced configuration** lets you choose additional settings and customize virtual drive creation. This option provides greater flexibility when creating virtual drives for your specific requirements.

See Section 7.1, Creating a New Storage Configuration, for the procedures used to create storage configurations.

5.1.2 Monitoring Storage Devices

MegaRAID Storage Manager displays the status of virtual disks, drives, and other storage devices on the workstation or server that you are monitoring. System errors and events are recorded in an event log file and are displayed on the screen. Special device icons appear on the screen to notify you of disk failures and other events that require immediate attention.

5.1.3 Maintaining Storage Configurations

You can use MegaRAID Storage Manager to perform system maintenance tasks such as running consistency checks on arrays that support redundancy.

5.2 Hardware and Software Requirements

The hardware requirements for MegaRAID Storage Manager are as follows:

- PC-compatible computer with an IA-32 (32-bit) Intel Architecture processor or an EM64T (64-bit) processor and at least 128 Mbytes of system memory

NOTE It is recommended that you use at least 1 Gbyte of system memory.

- Physical drive with at least 50 Mbytes available free space

The supported operating systems for the MegaRAID Storage Manager are as follows:

- Microsoft® Windows® Server versions 2008, 2008R2
- Microsoft Windows Workstation version 7 & 8
- Red Hat® Enterprise Linux™ (RHEL) versions 5 & 6
- SuSE® Linux Enterprise Server (SLES) versions 10 & 11

NOTE MegaRAID Storage Manager supports the RHEL6 operating system (OS) with a few prerequisites. By nature, the RHEL6 OS default installation deploys only limited inbox libraries though it is shipped in the CD image for the full installation. This design from the RHEL6 OS adds an overhead for the Java® application programming users, and a few required libraries are not deployed during the default RHEL6 operating system installation. Because of this, you can either install the additional libraries or run a native 64-bit version of MSM.

Refer to your server documentation and to the operating system documentation for more information on hardware requirements and operating system requirements.

5.3 Installation

This section explains how to install (or reinstall) MegaRAID Storage Manager on your workstation or server.

5.3.1 Installing MegaRAID Storage Manager on Microsoft Windows

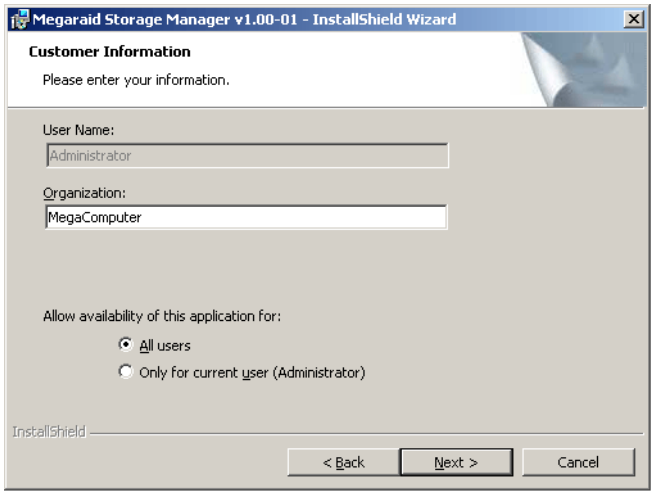
Follow these steps to install MegaRAID Storage Manager on a system running a Microsoft Windows operating system.

1. Unzip the zip file containing the MegaRAID Storage Manager in Windows Explorer.
2. Double-click the `setup.exe` file to start the installation program.
3. When the Welcome screen appears, click **Next**.

   If MegaRAID Storage Manager is already installed on this system, the Program Maintenance screen appears. Read the screen text and select **Modify**, **Repair**, or **Remove**.
4. When the next screen appears, read and accept the user license, and click **Next**.

   The Customer Information screen appears, as shown in the following figure.

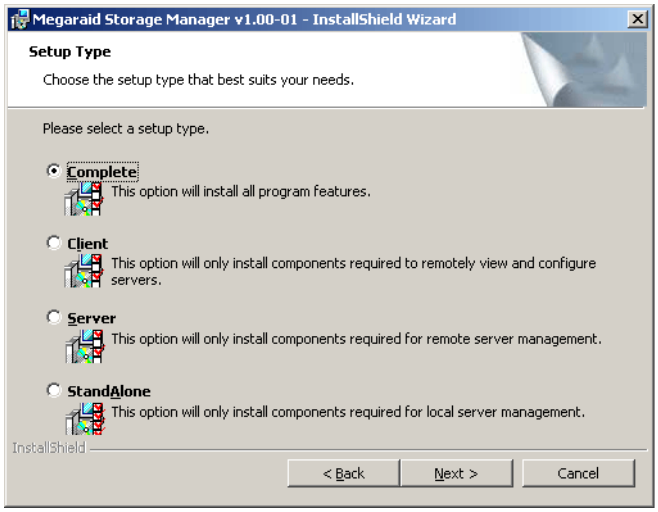
Figure 26 Customer Information Screen



5. Enter your user name and organization name. In the bottom part of the screen, select an installation option:
   - If you select **All users**, any user with administrative privileges can use this version of MegaRAID Storage Manager to view or change storage configurations.
   - If you select **Only for current user**, the MegaRAID Storage Manager shortcuts and associated icons will be available only to the user with this user name.
6. Click **Next** to continue.
7. On the next screen, accept the default Destination Folder, or click **Change** to select a different destination folder. Click **Next** to continue.

   The Setup Type screen appears, as shown in the following figure.

Figure 27 Setup Type Screen



8. Select one of the Setup options. The options are fully explained in the screen text.
   - Normally, you would select **Complete** if you are installing MegaRAID Storage Manager on a server. This option installs the complete MSM.
   - Select **Client** if you are installing MegaRAID Storage Manager on a PC that will be used to view and configure servers over a network.

Master GUI, Monitor Configurator, Help files for both MSM and Monitor Confgurator, and DebugLog are available. The following are not available: Popup, SNMP, Monitor, Framework, Storelib and Storelib-IR, StorelibJNI and StorelibIRJNI.

— Select **Server** to install only those components required for remote server management.

Popup, SNMP, Monitor, Framework, Storelib and Storelib-IR, StorelibJNI and StorelibIRJNI are available. Master GUI, Monitor Configurator, Help files for both MSM and Monitor Confgurator, and DebugLog are not available.

— Select **StandAlone** to use MegaRAID Storage Manager to create and manage storage configurations on a standalone workstation.

All of the components are available except for the Network Capability Plugin.

9. Click **Next** to proceed.
10. Click **Install** to install the program.
11. Click **Finish** when the final Configuration Wizard screen appears.

If you select **Client** installation for a PC used to monitor servers, and if there are no available servers with a registered framework on the local subnet (that is, servers with a complete installation of MegaRAID Storage Manager), you cannot connect to a remote server unless you first edit the `startupui.bat` file. Specifically, you must add the IP address of the remote server to the end of the `startupui.bat` file.

For example, to connect to a remote framework on server 192.168.0.10, add the IP address to the end of `startupui.bat` as shown in this example:

```
start JRE\bin\javaw -classpath .;GUI.jar GUI.VivaldiStartupDialog
ajsgyqkj=71244 192.168.0.10
```

Be sure to include a space in front of the IP address, as shown in the example.

5.3.2 Installing MegaRAID Storage Manager for Linux

Follow these steps if you need to install MegaRAID Storage Manager on a system running Linux:

1. Copy the `MSM_linux_installer...tar.gz` file to a temporary folder.
2. Untar the `MSM_linux_installer...tar.gz` file using the following command:

   ```
   tar -zxvf MSM_linux_installer...tar.gz
   ```

   A new `disk` directory is created.
3. Go to the new `disk` directory.
4. In the `disk` directory, find and read the `readme.txt` file.
5. To start the installation, enter the following command:

   ```
   ./install.sh
   ```

If you select **Client** installation for a PC used to monitor servers, and if there are no available servers with a registered framework on the local subnet (that is, servers with a complete installation of MegaRAID Storage Manager), you cannot connect to a remote server unless you first edit the `startupui.sh` file. Specifically, you must add the IP address of the remote server to the end of the `startupui.sh` file.

For example, to connect to a remote framework on server 192.168.0.10, add the IP address to `startupui.sh` as shown in this example:

```
start JRE\bin\javaw -classpath .;GUI.jar GUI.VivaldiStartupDialog
ajsgyqkj=71244 192.168.0.10
```

Be sure to include a space in front of the IP address, as shown in the example.

5.3.3 Linux Installation Messages

One or more of the following messages may appear while you are installing MegaRAID Storage Manager on a Linux system:

- More than one copy of MegaRAID Storage Manager has been installed.

  This message indicates that the user has installed more than one copy of MegaRAID Storage Manager. (This can be done by using the `rpm-force` command to install the `rpm` file directly, which is not recommended, instead of using the `install.sh` file.) In such cases, the user must uninstall all the `rpm` files manually before installing MegaRAID Storage Manager with the procedure listed previously.
- The version is already installed.

  This message indicates that the version of MegaRAID Storage Manager you are trying to install is already installed on the system.
- The installed version is newer.

  This message indicates that a version of MegaRAID Storage Manager is already installed on the system, and it is a newer version than the version you are trying to install.
- Exiting installation.

  This message appears when the installation is complete.
- RPM installation failed.

  This message indicates that the installation failed for some reason. Additional message text explains the cause of the failure.

Chapter 6: MegaRAID Storage Manager Screens and Menus

This chapter explains how to start MegaRAID Storage Manager and describes the MegaRAID Storage Manager screens and menus.

6.1 Starting MegaRAID Storage Manager

Follow these steps to start MegaRAID Storage Manager and view the main menu screen:

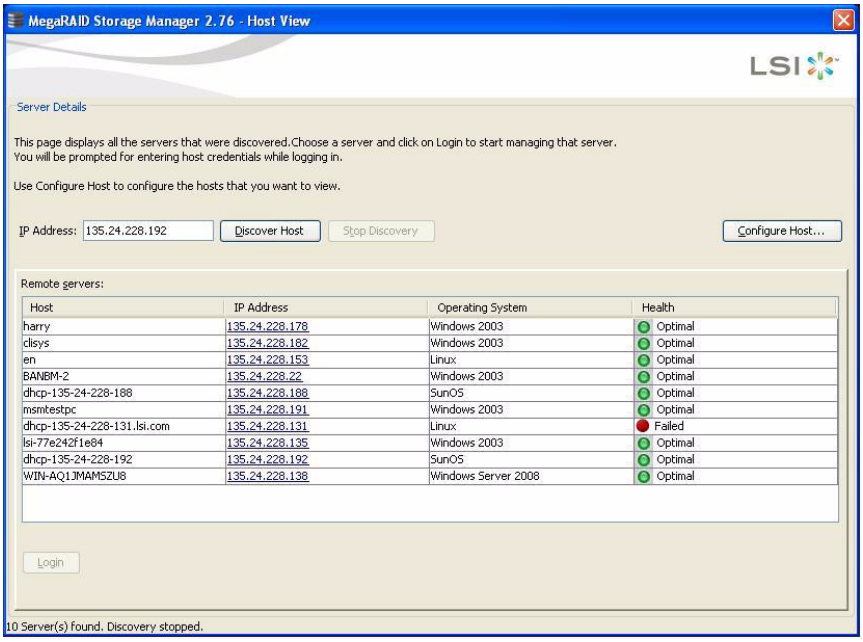
1. Start the program using the method required for your operating system environment:
   - To start MegaRAID Storage Manager on a Microsoft Windows system, select **Start > Programs > MegaRAID Storage Manager > StartupUI**, or double-click the MegaRAID Storage Manager shortcut on the desktop.

     NOTE If a warning appears stating that Windows Firewall has blocked some features of the program, click **Unblock** to allow MegaRAID Storage Manager to start. (The Windows Firewall sometimes blocks the operation of programs that use Java.)

   - To start MegaRAID Storage Manager on a RHEL system, select **Applications > System Tools > MegaRAID Storage Manager StartupUI**.
   - To start MegaRAID Storage Manager on a SUSE system, select **Start > System > More Programs -> MegaRAID Storage Manager**.

   When the program starts, the Select Server window appears, as shown in the following figure.

Figure 28 Select Server Window



If the circle in the server icon is yellow instead of green, it means that the server is running in a degraded state—for example, because a disk drive used in a virtual disk has failed. If the circle is red, the storage configuration in the server has failed.

NOTE To access servers on a different subnet, type in the box at the bottom of the screen the IP address of a server in the desired subnet where MegaRAID Storage Manager is running, and click **Update**. If you check the **Connect to remote Framework** box, you can also access a standalone installation of MegaRAID Storage Manager, if it has a network connection.

2. Double-click the icon of the server that you want to access.

   The Server Login window appears, as shown in the following figure.

Figure 29 Server Login Window

3. Enter your user name and your password.

   The question mark icon opens a dialog box that explains what you need for full access to the server and for view-only access to the server.

4. Select an access mode from the drop-down menu.
   - Select **Full Access** if you need to both view the current configuration and change the configuration.
   - Select **View Only** if you need to only view and monitor the configuration.

5. Click **Login**.

NOTE If the computer is networked, this is the login to the computer itself, not the network login.

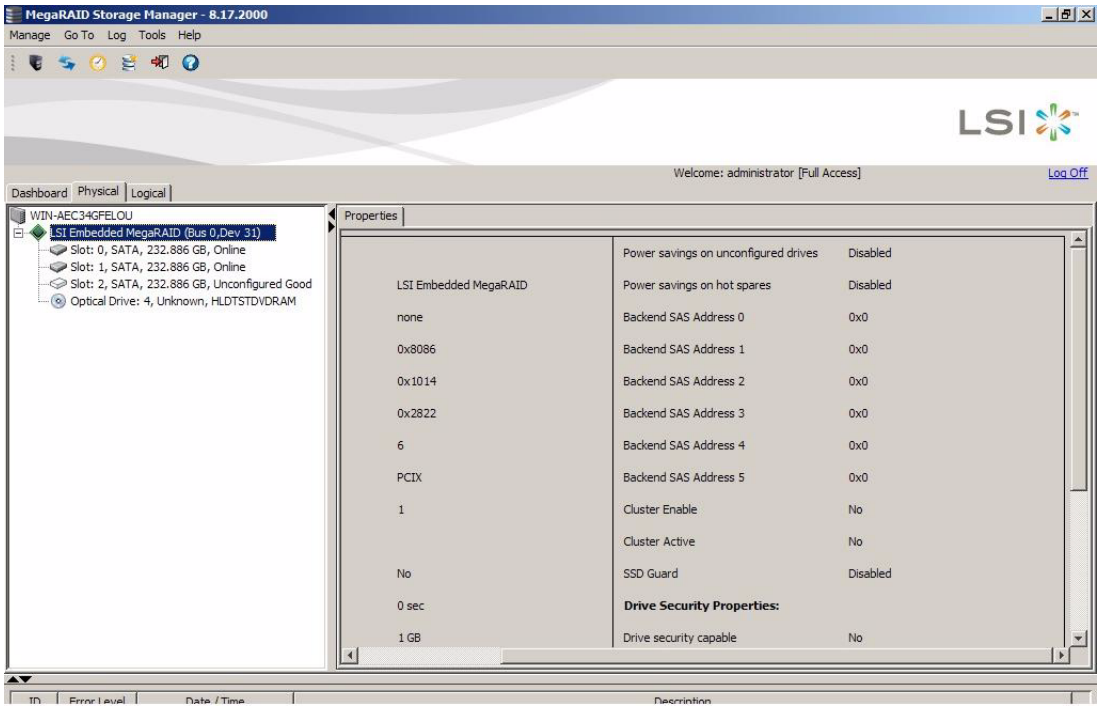
6. Enter the root/administrator user name and password to use the Full Access mode.

   If your user name and password are correct for the Login mode you have chosen, the MegaRAID Storage Manager main menu appears.

6.2 MegaRAID Storage Manager Screen

This section describes the MegaRAID Storage Manager main menu screen, which is shown in the following figure.

Figure 30 MegaRAID Storage Manager Main Menu Screen



The following topics describe the panels and menu options that appear on this screen.

6.2.1 Dashboard/Physical View/Logical View

The left panel of the ServeRAID C105 main menu screen displays the *Dashboard* view, the *Physical* view, or the *Logical* view of the system and the attached devices, depending on which tab is selected.

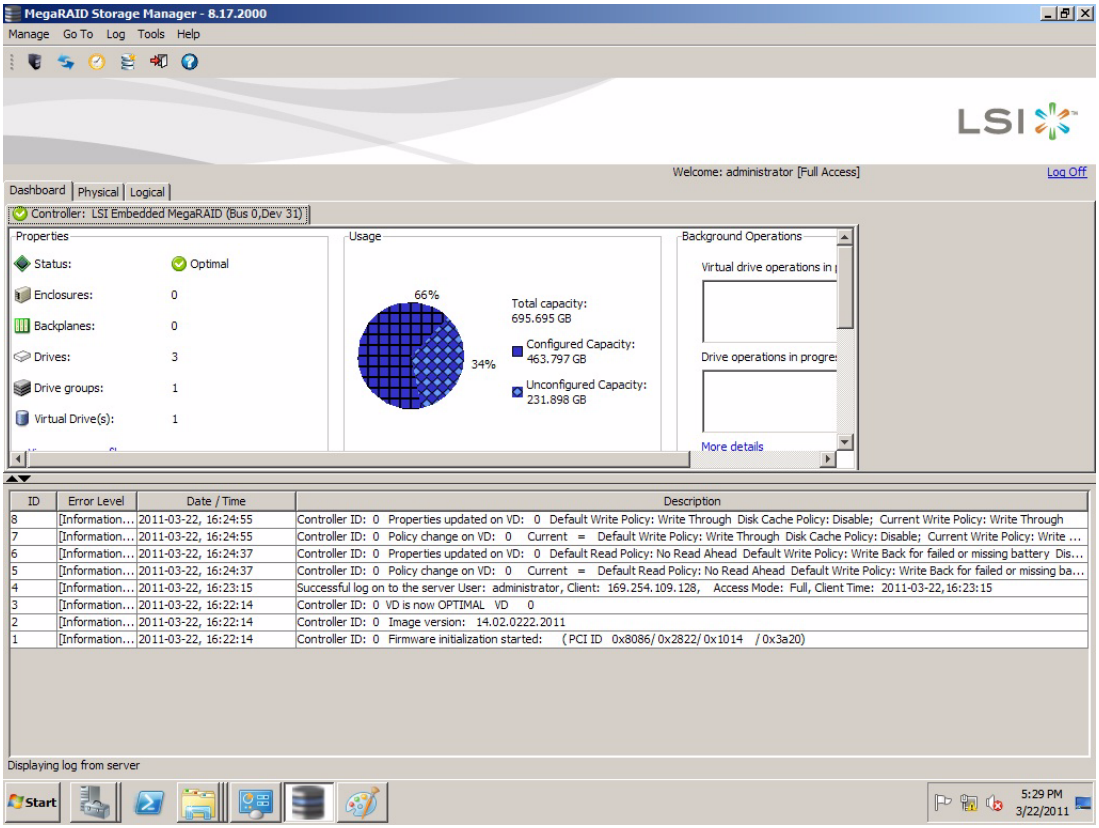
6.2.1.1 Dashboard View

The *Dashboard* view shows an overview of the system and covers the following features:

- Properties of the virtual drives and the physical drives
- Total capacity, configured capacity, and unconfigured capacity
- Background operations in progress
- MSM features and their status (enabled or disabled)
- Actions you can perform
- Links to Online Help

The following figure shows the Dashboard view.

Figure 31 MegaRAID Storage Manager Dashboard View

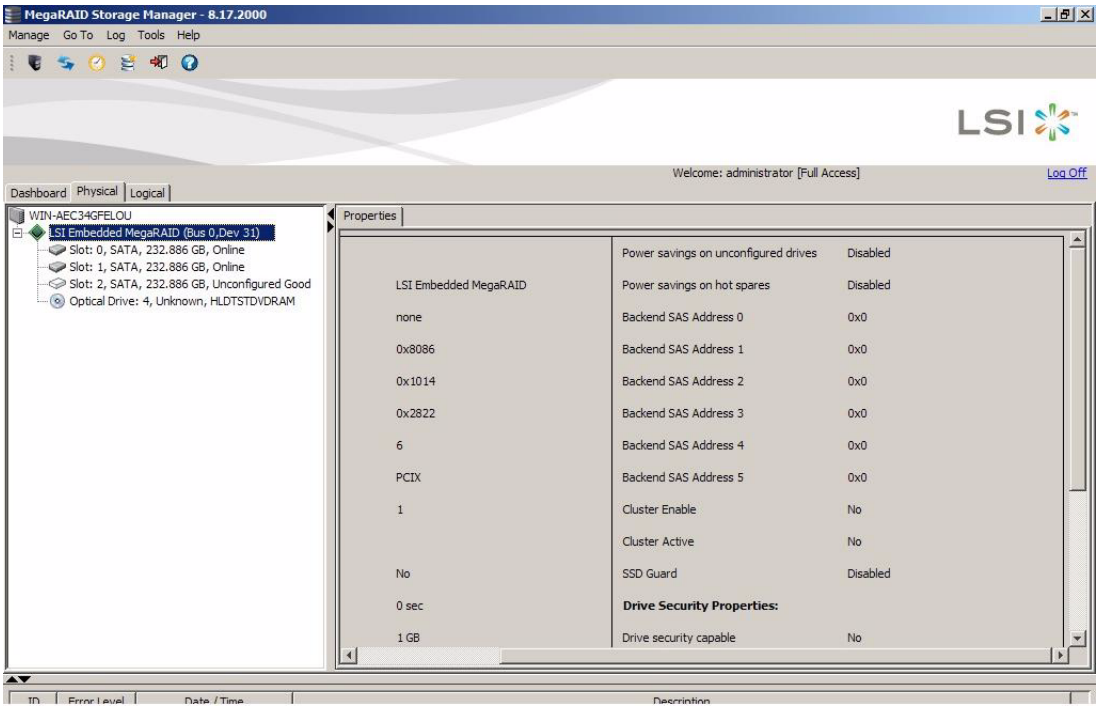


6.2.1.2 Physical view

The *Physical* view shows the hierarchy of physical devices in the system. At the top of the hierarchy is the system itself, followed by the controller and the backplane. One or more controllers are installed in the system. The controller label identifies the controller so that you can easily differentiate between multiple controllers. Each controller has one or more ports. Drives and other devices are attached to the ports. The properties for each item appear in the right panel of the screen under the Properties tab.

The following figure shows the Physical view and the Properties tab.

Figure 32 MegaRAID Storage Manager Physical View

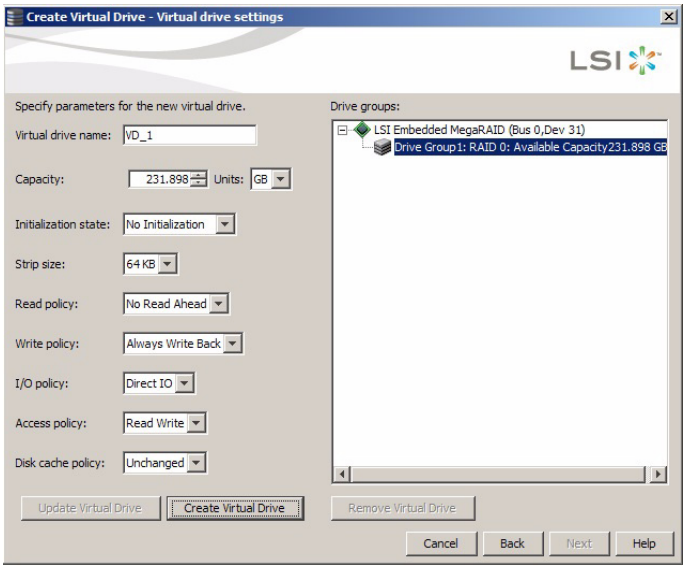


6.2.1.3 Logical View

The *Logical* view shows the hierarchy of controllers, virtual drives, and the drives and drive groups that make up the virtual drives. The properties for these components appear in the right panel under the Properties tab.

The following figure shows the Logical view and the Properties tab.

Figure 33 MegaRAID Storage Manager Logical View



The following icons in the left panel represent the controllers, disk drives, and other devices:

-  - Status
-  - System
-  - Controller
-  - Backplane
-  - Port
-  - Drive group
-  - Virtual drive
-  - Online drive
-  - Global hotspare
-  - Tape drive
-  - CD-ROM
-  - Foreign drive
-  - Unconfigured foreign drive
-  - Unconfigured drive

NOTE MegaRAID Storage Manager shows the icons for tape drive devices; however, no tape-related operations are supported by the utility. If these operations are required, use a separate backup application.

A red circle to the right of an icon indicates that the device has failed. For example, this icon indicates that a physical drive has failed:  .

A yellow circle to the right of an icon indicates that a device is running in a degraded state. For example, this icon indicates that a virtual disk is running in a degraded state because a disk drive has failed: .

6.2.2 Event Log Panel

The lower part of the MegaRAID Storage Manager main menu screen displays the system event log entries, as shown in Figure 30. New event log entries appear during the session. Each entry has a timestamp and date, an error level indicating the severity of the event, and a brief description of the event.

For more information about the event log, see Section 8.1, Monitoring System Events. For more information about the event log entries, see Appendix A, ServeRAID C100 and ServeRAID C105 MegaRAID Storage Manager Events and Messages.

6.2.3 Menu Bar

Here are brief descriptions of the main selections on the MegaRAID Storage Manager menu bar. Specific menu options are described in more detail in Chapter 7, Chapter 8, and Chapter 9 of this manual.

6.2.3.1 Manage Menu

The Manage menu has a Refresh option for updating the display in the ServeRAID C105 main menu screen (refresh is seldom required; the display normally updates automatically) and an Exit option to end your session on ServeRAID C105. The Server menu item shows all the servers that were discovered by a scan. In addition, you can perform a check consistency, initialize multiple virtual groups, and show the progress of group operations on virtual drives.

6.2.3.2 Go To Menu

The Go To menu is available when you select a controller, drive group, physical drive, virtual drive, or battery backup unit in the main menu screen. The menu options vary depending on the type of device selected in the left panel of the ServeRAID C105 main menu. The options also vary depending on the current state of the selected device. For example, if you select an offline drive, the Make Drive Online option appears in the Physical Drive menu.

Configuration options are also available. This is where you access the Configuration Wizard that you use to perform configuration drive groups and virtual drives. To access the Wizard, select the controller in the left panel, and then select **Go To > Controller > Create Virtual Drive**.

6.2.3.3 Log Menu

The Log menu includes options for saving and clearing the message log. For more information, see Appendix A, ServeRAID C100 and ServeRAID C105 MegaRAID Storage Manager Events and Messages.

6.2.3.4 Tools Menu

On the Tools menu you can select **Tools > Configure Alerts** to access the Configure Alerts screen, which you can use to set the alert delivery rules, event severity levels, exceptions, and email settings. For more information, see Section 8.2, Configuring Alert Notifications.

6.2.3.5 Help Menu

On the Help menu you can select **Help > Contents** to view the Online Help for MegaRAID Storage Manager. You can select **Help > About MegaRAID Storage Manager** to view version information for the MegaRAID Storage Manager.

NOTE When you use the Online Help for MegaRAID Storage Manager, you might see a warning message that Internet Explorer has restricted the file from showing active content. If this warning appears, click on the active content warning bar and enable the active content.

NOTE If you are using the Linux operating system, you must install the Firefox® browser or the Mozilla® browser for the MegaRAID Storage Manager Online Help to display.

Chapter 7: Configuration

This chapter explains how to use MegaRAID Storage Manager to create and modify storage configurations on ServeRAID controllers.

The controllers support RAID 0, RAID 1, and RAID 10 storage configurations. The Configuration Wizard allows you to easily create new storage configurations and modify the configurations. To learn more about RAID and RAID levels, see Section 1.3, RAID Overview.

NOTE You cannot create or modify a storage configuration unless you are logged on to a server with administrator privileges.

7.1 Creating a New Storage Configuration

You can use the MegaRAID Storage Manager Configuration Wizard to create new storage configurations. To open the MegaRAID Storage Manager Configuration Wizard, select a controller in the left panel of the MegaRAID Storage Manager main menu screen and then select **Operations > Advanced Operations > Configuration > Configuration Wizard**.

You can use the ServeRAID C105 to create new storage configurations on systems with ServeRAID controllers. You can create the following 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 virtual drive.
- **Advanced configuration** lets you choose additional settings and customize virtual drive creation. This option provides greater flexibility when creating virtual drives for your specific requirements.

This section describes the virtual drive parameters and explain how to create simple and advanced storage configurations.

7.1.1 Selecting Virtual Drive Settings

This section describes the virtual drive settings that you can select when you use the advanced configuration procedure to create virtual drives. You should change these parameters only if you have a specific reason for doing so. It is usually best to leave them at their default settings.

- **Initialization state**: Initialization prepares the storage medium for use. Specify the initialization status:
  - *No Initialization*: (the default) The new configuration is not initialized and the existing data on the drives is not overwritten.
  - *Fast Initialization*: This option allows you to start writing data to the virtual drive immediately.
  - *Full Initialization*: A complete initialization is done on the new configuration. You cannot write data to the new virtual drive until the initialization is complete. This can take a long time if the drives are large.
- **Stripe size**: The setting is 64 KB only.
- **Access policy**: Select the type of data access that is allowed for this virtual drive.
  - *Read/Write*: (the default) Allow read/write access. This is the default.
  - *Read Only*: Allow read-only access.
  - *Blocked*: Do not allow access.
- **Disk cache policy**: Select a cache setting for this drive:
  - *Enabled*: Enable the disk cache.
  - *Disabled*: Disable the disk cache.
  - *Unchanged*: (the default) Leave the current disk cache policy unchanged.

7.1.2 Creating a Virtual Drive Using Simple Configuration

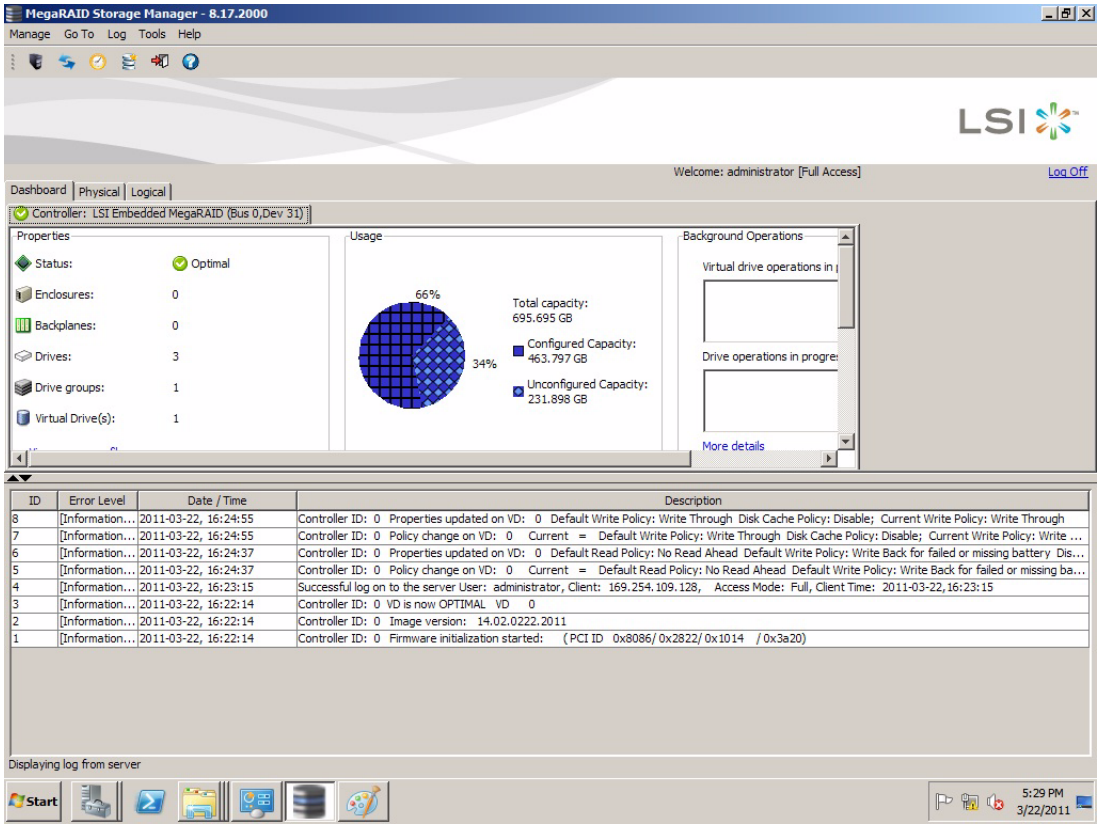
Simple configuration is the quickest and easiest way to create a new storage configuration. When you select simple configuration mode, the system creates the best configuration possible using the available drives.

NOTE You cannot created spanned drives using the simple configuration procedure. To create spanned drives, use the advanced configuration procedure described in Section 7.1.3, Creating a Virtual Drive Using Advanced Configuration.

Follow these steps to create a new storage configuration in simple configuration mode.

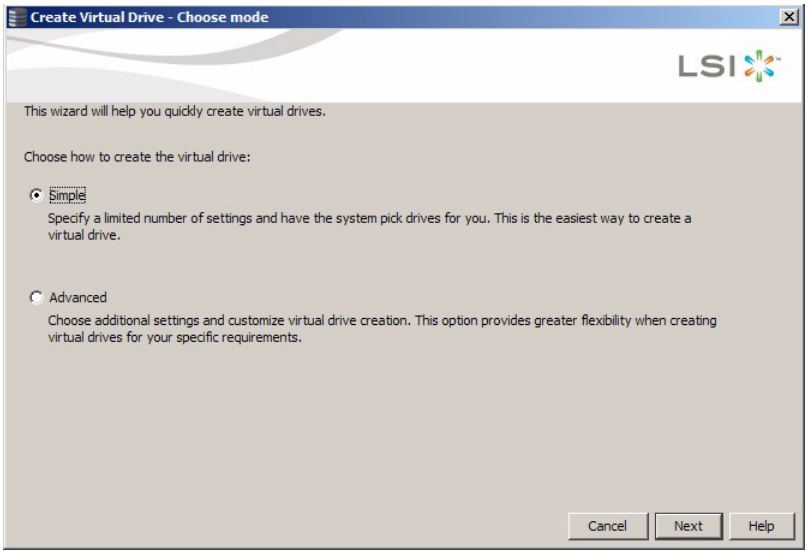
1. Click the **Dashboard** tab on the MSM main menu screen.
   The Create Virtual Drive option appears in the Actions section of the Dashboard, as shown in the following figure.

Figure 34 Virtual Drive Creation Menu



2. Click **Create Virtual Drive** in the Actions section of the screen.
   The dialog box for the configuration mode (Simple or Advanced) appears, as shown in the following figure.

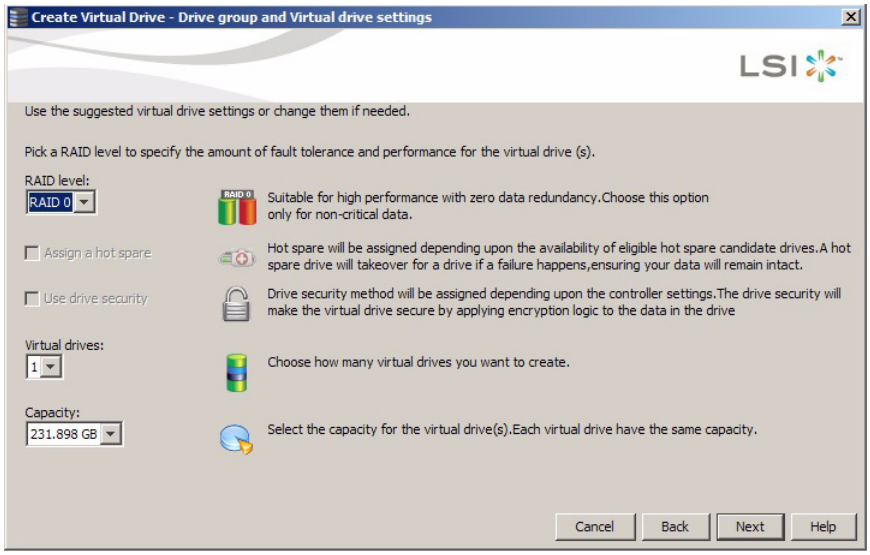
Figure 35 Virtual Drive Simple Configuration Mode



3. Click **Simple** and press **Next**.

   The Create Virtual Drive screen appears, as shown in the following figure.

Figure 36 Create Virtual Drive Screen



4. Select the RAID level desired for the virtual drive.

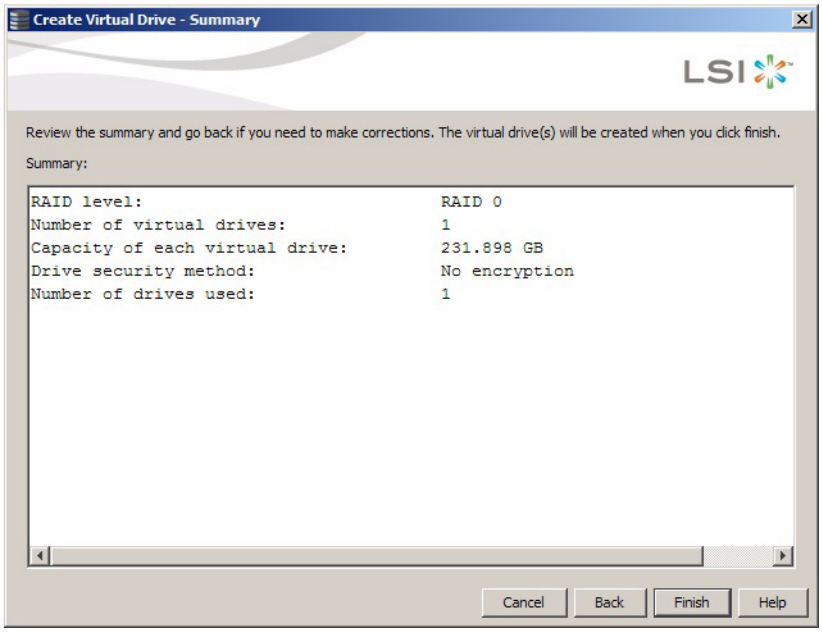
   When you use simple configuration, the RAID controller supports RAID level 1. In addition, it supports independent drives (configured as RAID 0). The screen text gives a brief description of the RAID level that you select. The RAID levels that you can choose depend on the number of drives available. To learn more about RAID levels, see Section 1.3, RAID Overview.
5. Use the drop-down menu in the **Virtual drives** field to choose how many virtual drives you want to create.
6. Select the capacity of the virtual drive(s).

   Each virtual drive has the same capacity.

7. Click **Next**.

   The **Create Virtual Drive - Summary** window appears, as shown in the following figure. This window shows the selections you made for simple configuration.

Figure 37 Create Virtual Drive - Summary Window



8. Click **Back** to return to the previous screen to change any selections or click **Finish** to accept and complete the configuration.

   The new virtual drive is created after you click **Finish**. After the configuration is completed, a dialog box notifies you that the virtual drives were created successfully.

7.1.3 Creating a Virtual Drive Using Advanced Configuration

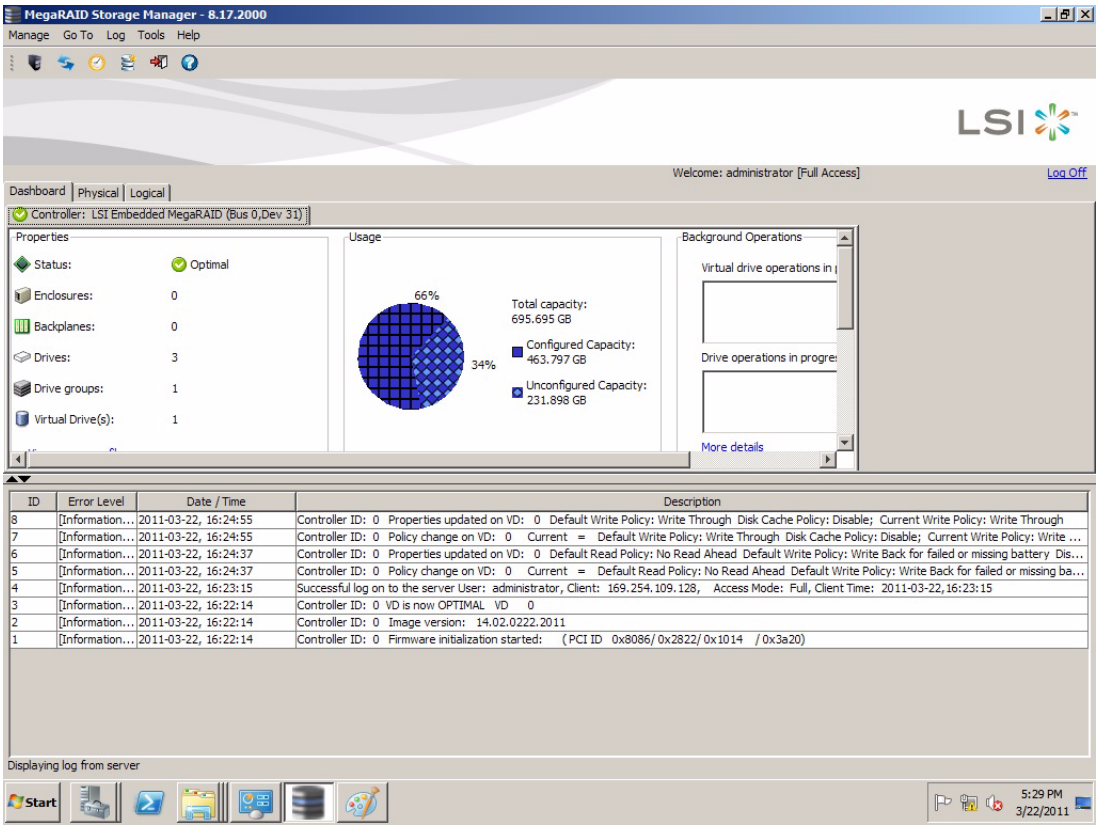
The advanced configuration procedure provides an easy way to create a new storage configuration. Advanced configuration gives you greater flexibility than simple configuration because you can select the drives and the virtual drive parameters when you create a virtual drive. In addition, you can use the advanced configuration procedure to create spanned drive groups.

Follow these steps to create a new storage configuration in the advanced configuration mode. This example shows the configuration of a spanned drive group.

1. Click the **Dashboard** tab on the MSM main menu screen.

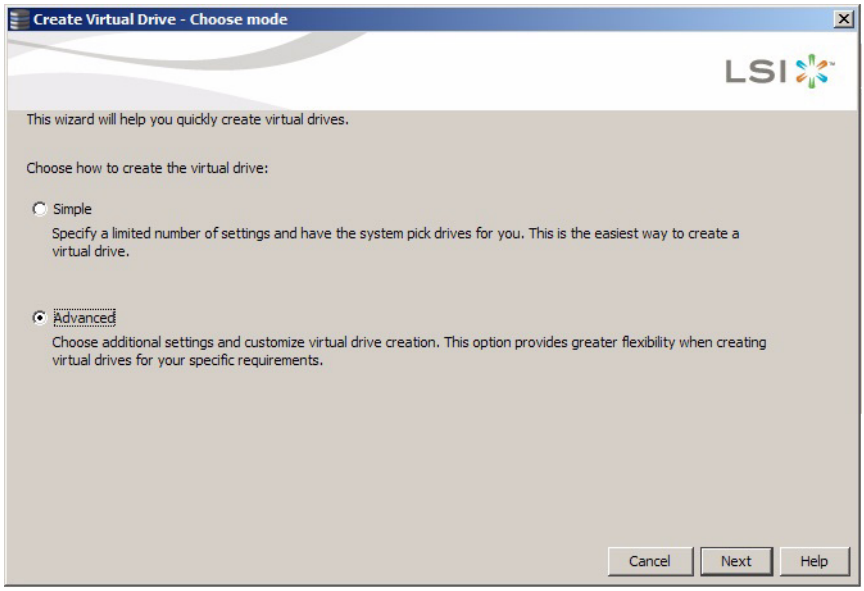
   The Create Virtual Drive option appears in the Actions section of the Dashboard, as shown in the following figure.

Figure 38 Virtual Drive Creation Menu



2. Click **Create Virtual Drive** in the Actions section of the screen.
   The dialog box for the configuration mode (Simple or Advanced) appears, as shown in the following figure.

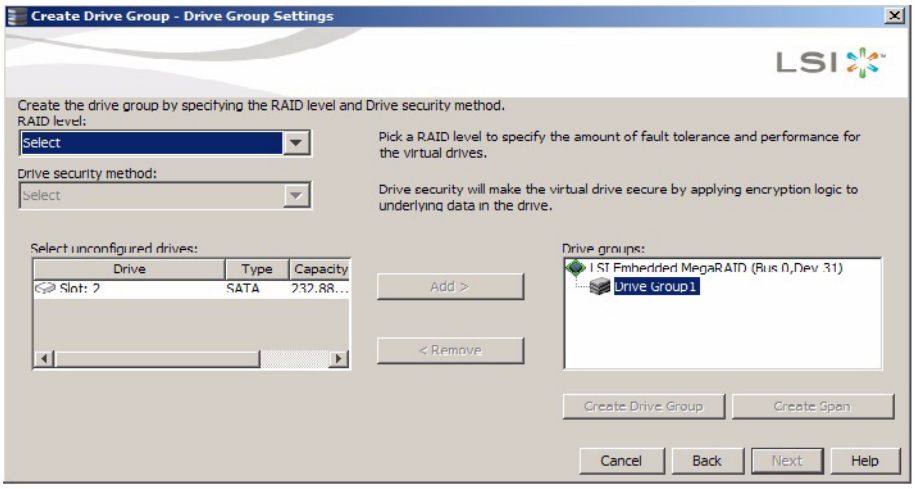
Figure 39 Virtual Drive Advanced Configuration Mode



3. Click **Advanced** and then click **Next**.

   The Create Drive Group Settings dialog box appears, as shown in the following figure.

Figure 40 Create Drive Group Settings Dialog Box



4. Select the following items on the Create Drive Group Settings dialog box:
   a. Select the RAID level desired for the drive group from the drop-down menu.

      Drive Group 1 appears in the **Drive groups** field.

      The RAID controller supports RAID levels 1 and 10. In addition, it supports independent drives configured as RAID 0. The screen text gives a brief description of the RAID level you select. RAID levels you can choose depend on the number of drives available.
   b. Select *unconfigured* drives from the list of drives and click **Add>** to add them to the drive group.

      The selected drives appear under **Span {number}** below **Drive Group {number}**.
   c. If you are creating a RAID 10 drive group, perform the following steps; if not, go to step g.

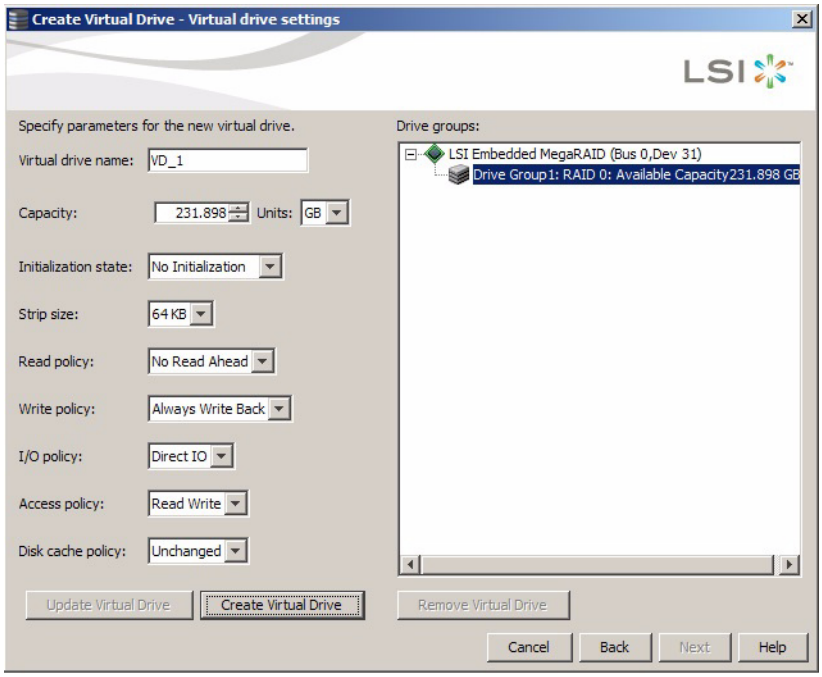
      NOTE On a RAID 10 array, you can create only one virtual drive, and that virtual drive must occupy the entire space of the RAID 10 array.

   d. Click **Create Span** to create a second span in the drive group.
   e. Select *unconfigured* drives from the list of drives and click **Add>** to add them to the second drive group.

      The selected drives appear in the second span under **Span {number}** below the second drive group, **Drive Group {number}**.
   f. Click **Create Drive Group** to make a drive group with the spans.
   g. Click **Next** to complete the steps for RAID 10 configuration.
   h. Click **Create Drive Group** to make a drive group.
   i. Click **Next** to complete this step.

      The Virtual drive settings window appears, as shown in the following figure. The drive group and the default virtual drive settings appear. The options to update the virtual drive or remove the virtual drive are grayed out until you create the virtual drive.

Figure 41 Virtual Drive Settings Dialog Box



j. Change any virtual drive settings, if desired.

See Section 7.1.1, Selecting Virtual Drive Settings, for more information about the virtual drive settings.

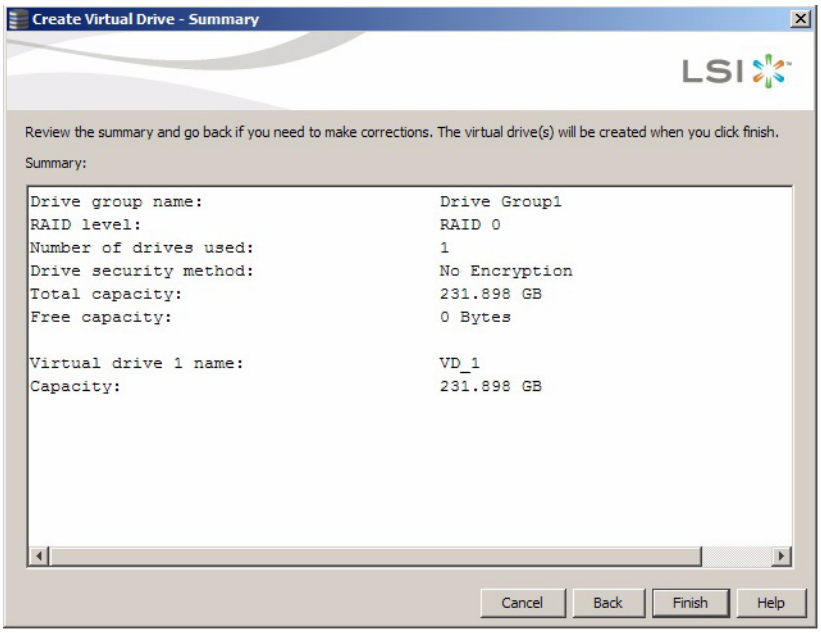
5. Click **Create Virtual Drive**.

The new virtual drive appears under the drive group. The options **Update Virtual Drive** and **Remove Virtual Drive** are available. **Update Virtual Drive** allows you to change the virtual drive settings, and **Remove Virtual Drive** allows you to delete the virtual drive.

6. Click **Next**.

The **Create Virtual Drive - Summary** window appears, as shown in the following figure. This window shows the selections you made for the advanced configuration.

Figure 42 Virtual Drive Summary Window



7. Click **Back** to return to the previous screen to change any selections or click **Finish** to accept and complete the configuration.

   After you click **Finish**, the new storage configuration is created and initialized.

   After the configuration is completed, a dialog box notifies you that the virtual drives were created successfully. If more drive capacity exists, the dialog box asks whether you want to create more virtual drives. If no more drive capacity exists, you are prompted to close the configuration session.
8. Select **Yes** or **No** to indicate whether you want to create additional virtual drives.

   If you select **Yes**, the system takes you to the Create Virtual Drive screen, as shown in Figure 36. If you select **No**, the utility asks whether you want to close the wizard.
9. If you selected **No** in the previous step, select **Yes** or **No** to indicate whether you want to close the wizard.

   If you select **Yes**, the configuration procedure closes. If you select **No**, the dialog box closes and you remain on the same page.

7.2 Changing Adjustable Task Rates

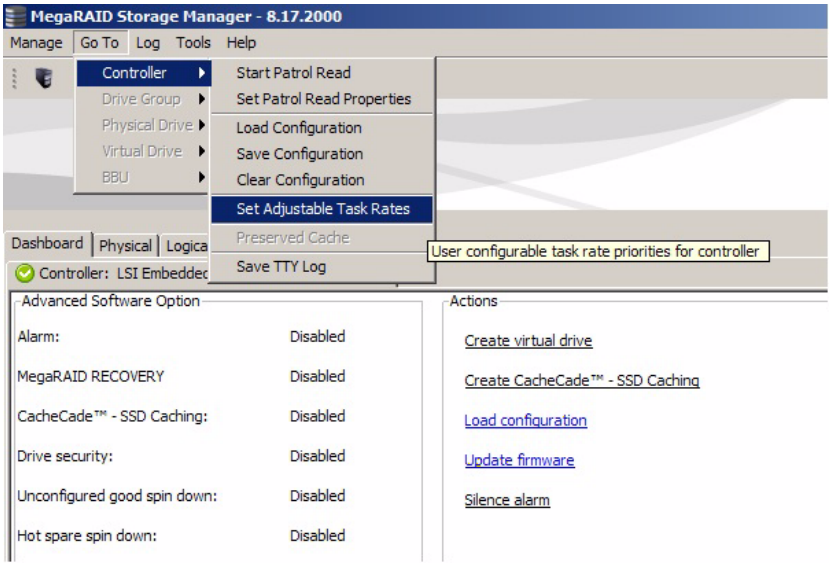
Follow these steps if you need to change the adjustable rates for rebuilds, and other system tasks that run in the background:

NOTE It is recommended that you leave the adjustable task rates at their default settings to achieve the best system performance. If you raise the task rates above the defaults, foreground tasks will run more slowly and it might seem that the system is not responding. If you lower the task rates below the defaults, rebuilds and other background tasks might run very slowly and might not complete within a reasonable time. If you decide to change the values, record the original default value here so you can restore them later, if necessary:
Rebuild Rate: _____
Background Initialization (BGI) Rate: _____
Check Consistency Rate: _____

NOTE Select a controller icon in the **Physical** tab or the **Logical** tab in the left panel of the ServeRAID C105 main menu screen.

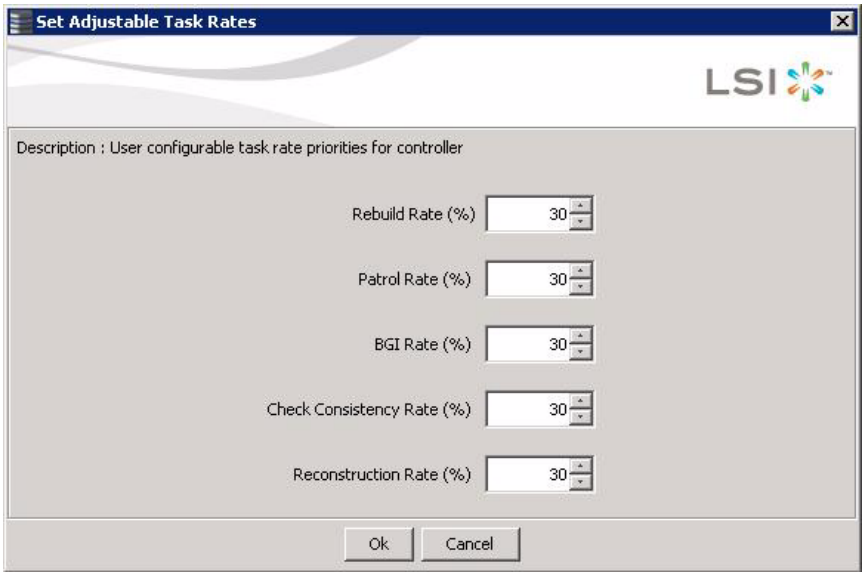
1. Select **Go To > Controller > Set Adjustable Task Rates** from the menu bar, as shown in the following figure.

Figure 43 Set Adjustable Task Rates Menu



The Set Adjustable Task Rates dialog box appears, as shown in the following figure.

Figure 44 Set Adjustable Task Rates Dialog Box



2. Enter changes, as needed, to the following task rates:
   - Rebuild Rate
   - Patrol Read
   - Background Initialization (BGI) (for fast initialization)
   - Check Consistency (for consistency checks).
   - Reconstruction

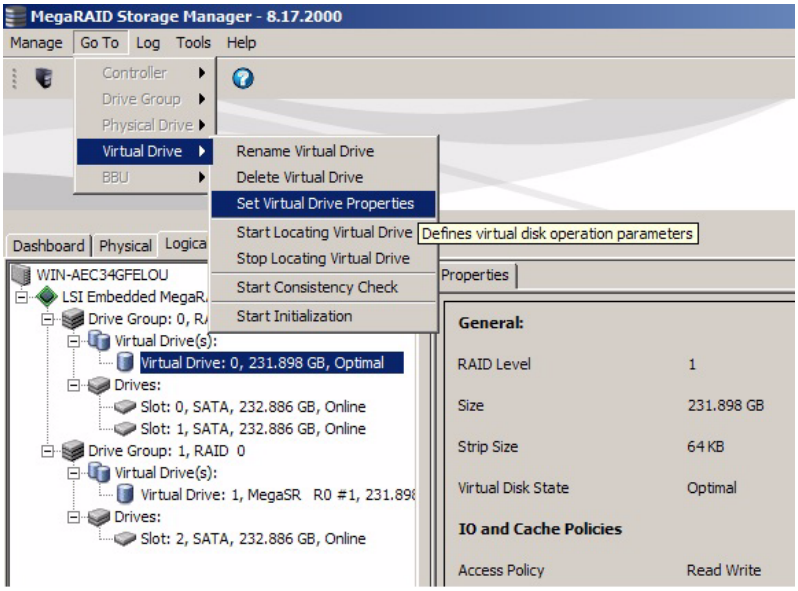
   Each task rate can be set from 0 to 100 percent. The higher the number, the faster the activity runs in the background, possibly impacting other system tasks.
3. Click **OK** to accept the new task rates.
4. When the warning message appears, click **OK** to confirm that you want to change the task rates.

7.3 Changing Virtual Drive Properties

You can change the Read Policy, Write Policy, and other virtual drive properties at any time after a virtual drive is created. Follow these steps to change the virtual drive properties.

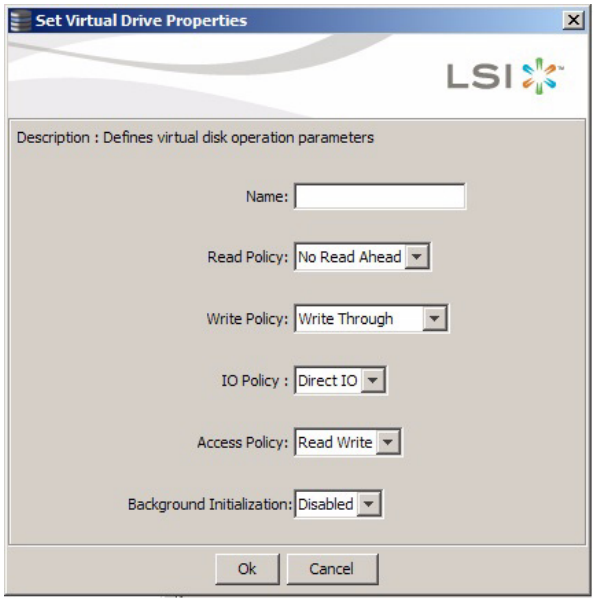
1. Select a virtual drive icon in the **Physical** tab or the **Logical** tab in the left panel of the ServeRAID C105 main menu screen.
2. Select **Go To > Virtual Drive > Set Virtual Drive Properties** from the menu bar, as shown in the following figure.

Figure 45 Set Virtual Drive Properties Menu



The Set Virtual Drive Properties dialog box appears, as shown in the following figure.

Figure 46 Set Virtual Drive Properties Screen



3. Change the virtual drive properties as needed.
   For information about these properties, see Section 7.1.1, Selecting Virtual Drive Settings.
4. Click **Ok** to accept the changes.

The virtual drive settings are updated.

7.4 Deleting a Virtual Drive

NOTE Be sure to back up the data that is on the virtual drive before you delete it. Be sure that the operating system is not installed on this virtual drive.

You can delete virtual drives to rearrange the storage space. To delete a virtual drive, follow these steps.

1. Back up all user data that is on the virtual drive you want to delete.
2. On the MegaRAID Storage Manager main menu screen, select the **Logical** tab, and click the icon of the virtual drive you want to delete.
3. Select **Go To > Virtual Drive > Delete Virtual Drive**.
4. When the warning messages appear, click **Yes** to confirm that you want to delete the virtual drive.
   You are asked twice whether you want to delete a virtual disk to avoid deleting the virtual disk by mistake.

Chapter 8: Monitoring System Events and Storage Devices

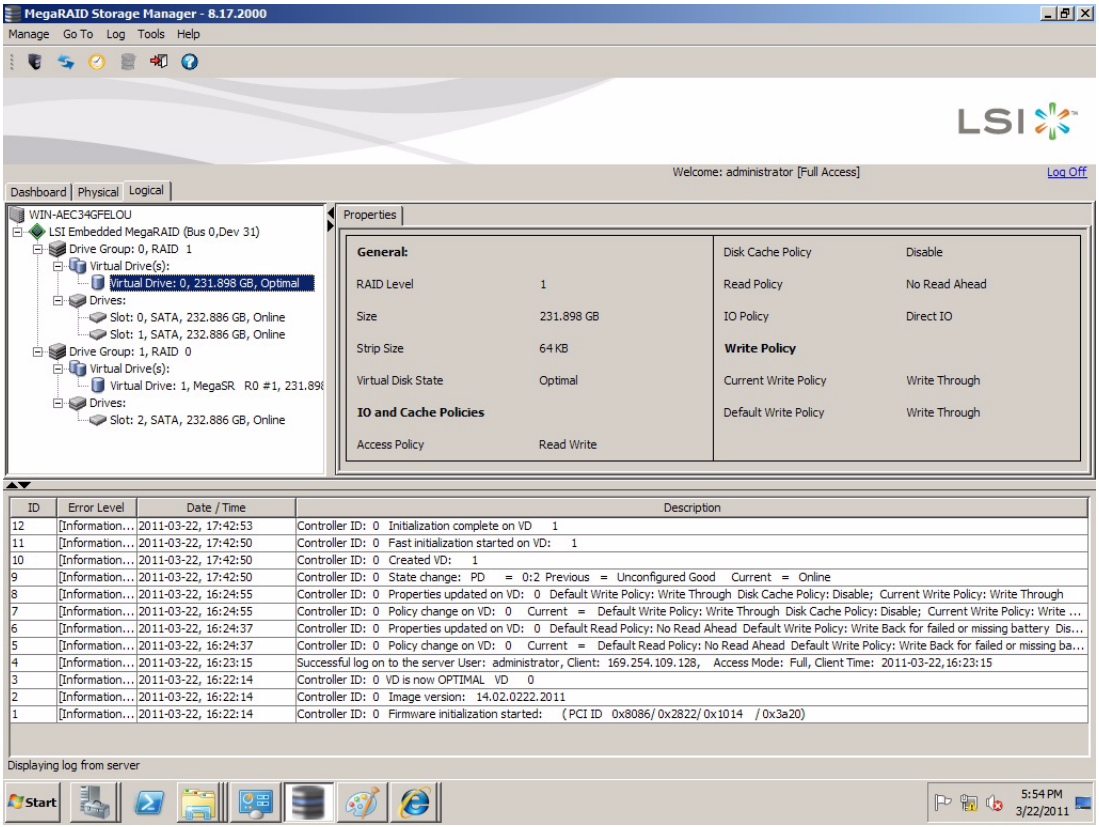
The MegaRAID Storage Manager enables you to monitor the status of disk drives, virtual disks, and other storage devices.

8.1 Monitoring System Events

MegaRAID Storage Manager monitors the activity and performance of all controllers in the system and the storage devices connected to them. When an event occurs (such as the creation of a new virtual disk or the removal of a physical drive) an event message appears in the log displayed at the bottom of the MegaRAID Storage Manager main menu screen, as shown in the following figure.

You can use MegaRAID Storage Manager to alert you about events. There are settings are for the delivery of alerts, the severity level of events, exceptions, and email settings.

Figure 47 Event Information Window



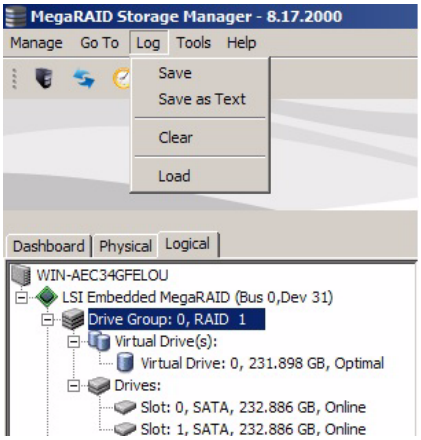
Each message that appears in the event log has a severity level that indicates the importance of the event, a date and timestamp, and a brief description. You can click an event to display the same information in a window. (For a list of all events, see Appendix A, ServeRAID C100 and ServeRAID C105 MegaRAID Storage Manager Events and Messages.)

The Log menu has four options:

- **Save**: Saves the current log to a `.log` file.
- **Save as Text**: Saves the current log in `.txt` format.
- **Clear**: Clears the current log information. You have the option of saving the log first.
- **Load**: Enables you to load a local `.log` file.

The following figure shows the log menu.

Figure 48 Log Menu



8.2 Configuring Alert Notifications

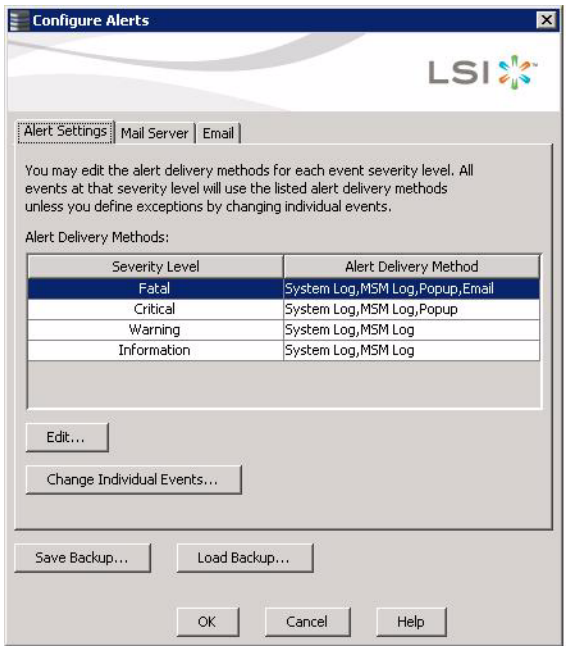
The Alert Notification Configuration feature allows you to control and configure the alerts that ServeRAID C105 sends when various system events occur.

To access the Alert Notification Configuration screen, select **Tools > Configure Alerts** on the main menu screen, as shown in the following figure.

Figure 49 Alert Notification Configuration Menu

The Alerts Notification Configuration screen appears, as shown in the following figure. The screen contains three tabs: **Alert Settings**, **Mail Server**, and **Email**. You can use each tab to perform tasks for that topic.

Figure 50 Alerts Notification Configuration Screen



You can select the **Alert Settings** tab to perform the following actions:

- Select the methods for the delivery of alerts.
- Change the severity level of events.
- Save an `.xml` backup file of the entire alert configuration.
- Load all of the values from a previously saved backup into the dialog to edit or send to the monitor.

CAUTION When you load a saved backup file, all unsaved changes made in the current session are lost.

You can select the **Mail Server** tab to perform the following actions:

- Enter or edit the sender e-mail address.
- Enter the SMTP server.
- Require authentication of the email server.
- Save an `.xml` backup file of the entire alert configuration.
- Load all of the values from a previously saved backup into the dialog to edit or send to the monitor.

CAUTION When you load a saved backup file, all unsaved changes made in the current session will be lost.

You can select the **Email** tab to perform the following actions:

- Add new email addresses for recipients of alert notifications.
- Send test messages to the recipient email addresses.
- Remove email addresses of recipients of alert notifications.
- Save an `.xml` backup file of the entire alert configuration.
- Load all of the values from a previously saved backup into the dialog to edit or send to the monitor.

CAUTION When you load a saved backup file, all unsaved changes made in the current session will be lost.

8.2.1 Setting Alert Delivery Methods

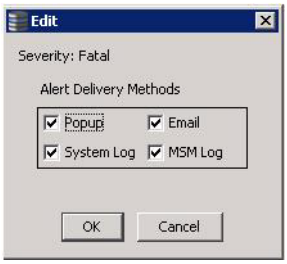
You can select the methods used to send alert deliveries, including by popup, email, system log, or MSM log. You can select the alert delivery methods for each event severity level (Information, Warning, Critical and Fatal).

Perform the following steps to select the alert delivery methods:

1. On the Alerts Notification Configuration screen, click the **Alerts Setting** tab.
2. Under the **Alerts Delivery Methods** heading, select one of the severity levels.
3. Click **Edit**.

   The Alert Notification Delivery Methods dialog box appears, as shown in the following figure.

Figure 51 Alert Notification Delivery Methods Dialog Box



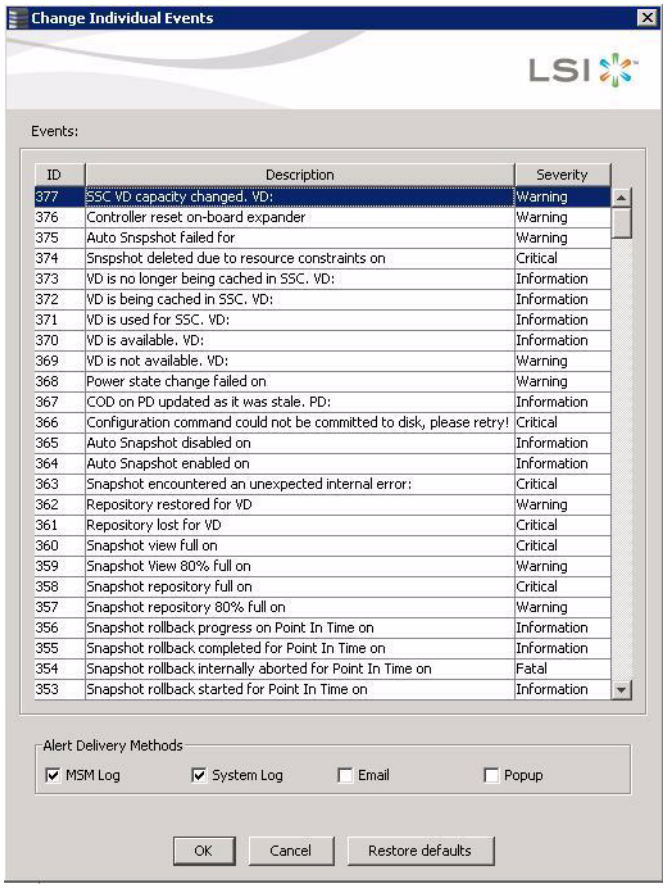
4. Select the desired alert delivery methods for alert notifications at the event severity level.
5. Click **OK** to set the delivery methods used for the severity level that you selected.

8.2.2 Changing Alert Delivery Methods for Individual Events

You can change the alert delivery options for an event without changing the severity level.

1. On the Alerts Notification Configuration screen, click the **Alerts Setting** tab.
   The the **Alerts Setting** portion of the screen appears, as shown in the following figure.
2. Click **Change Individual Events**.
   The **Change Individual Events** dialog box appears, as shown in the following figure. The dialog box shows the events by their ID number, description, and severity level.

Figure 52 Change Individual Events Dialog Box



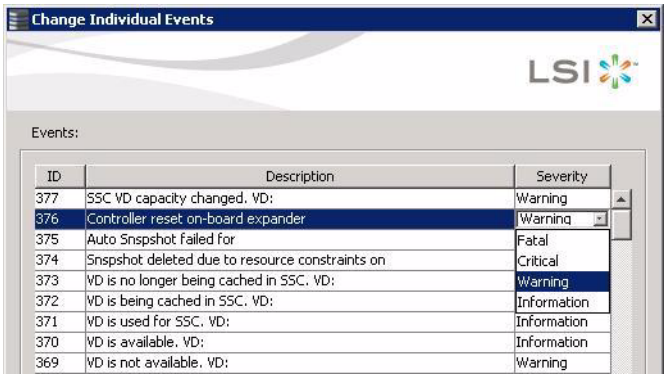
3. Click an event in the list to select it.
   The current alert delivery methods appear for the selected event under the **Alert Delivery Methods** heading.
4. Select the desired alert delivery methods for the event.
5. Press ESC to return to the **Alerts Notification Configuration** screen.
6. Click **OK**.
   This action saves all of the changes made to the event.

8.3 Changing the Severity Level for Individual Events

To change the event severity level for a specific event, perform the following steps.

1. On the Alerts Notification Configuration screen, click the **Alerts Setting** tab.
   The **Alerts Setting** portion of the screen appears.
2. Click **Change Individual Events**.
   The **Change Individual Events** dialog box appears, as shown in the following figure. The dialog box shows the events by their ID number, description, and severity level.
3. Click an event in the list to select it.
   The current alert delivery methods appear for the selected event.
4. Click the **Severity** cell for the event.
   The Event Severity drop-down menu appears for that event, as shown in the following figure.

Figure 53 Change Individual Events Severity Level Menu

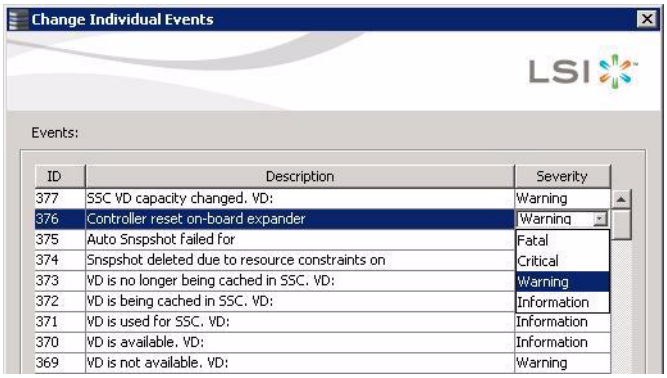


5. Select a different severity level for the event from the menu.
6. Press ESC to return to the **Alerts Notification Configuration** screen.
7. Click **OK** to save all of the changes made to the events.

8.3.1 Multiple Events Displayed in a Single Pop-up Window

You can view multiple events in a single pop-up window as shown in the following figure.

Figure 54 Pop-up for Multiple Events



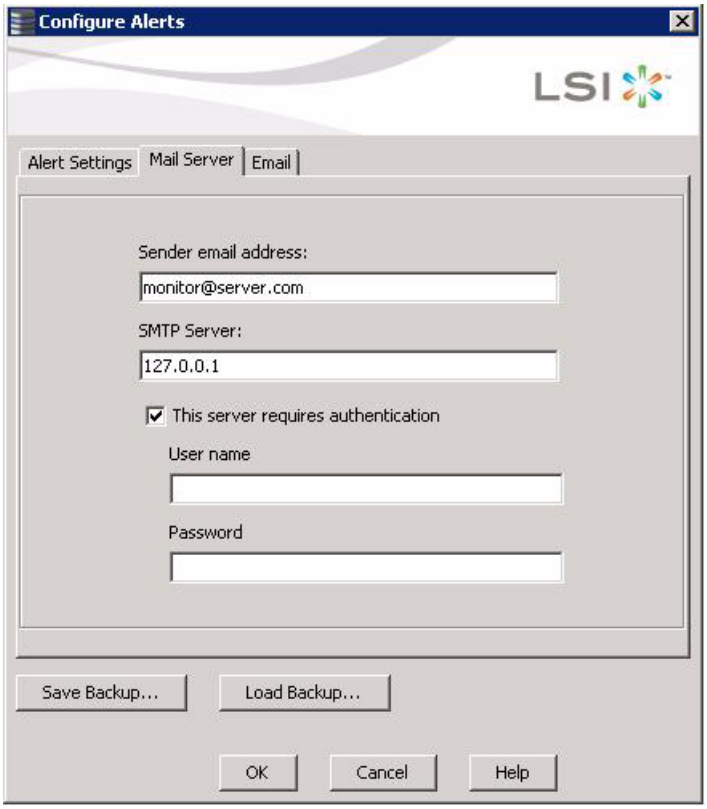
8.3.2 Entering or Editing the Sender Email Address and SMTP Server

You can use the **Alerts Notification Configuration** screen to enter or edit the sender e-mail address and the SMTP server.

1. On the Alerts Notification Configuration screen, click the **Mail Server** tab.

   The **Mail Server** options appear, as shown in the following figure.

Figure 55 Mail Server Options



2. Enter a new sender email address in the **Sender email address** field or edit the existing sender email address.
3. Click **OK**.

8.3.3 Authenticating a Server

You can use the Alerts Notification Configuration screen to authenticate the SMTP server, providing an extra level of security. The authentication check box enables the **User name** and **Password** fields when selected by default. Clearing the check box disables these fields.

Perform the following steps to enter or edit the address:

1. On the Alerts Notification Configuration screen, click the **Mail Server** tab.

   The **Mail Server** options appears, as shown in the following figure. The authentication check box is selected by default.
2. Enter a user name in the **User name** field.
3. Enter the password in the **Password** field.
4. Click **OK**.

8.3.4 Saving Backup Configurations

You can save an `.xml` backup file of the entire alert configuration. This includes all the settings on the three tabs.

1. On the Alerts Notification Configuration screen, click the **Alert Setting** tab, **Mail Server** tab, or **Email** tab.
2. Click **Save Backup**.

   The drive directory appears.
3. Enter a filename with an `.xml` extension for the backup configuration (in the format `filename.xml`).
4. Click **Save**.

   The drive directory disappears.
5. Click **OK**.

   The backup configuration is saved and the Alert Notification Configuration screen closes.

8.3.5 Loading Backup Configurations

You can load all of the values from a previously saved backup into the dialog (all tabs) to edit or send to the monitor.

NOTE If you choose to load a backup configuration and the Configure Alerts dialog currently contains changes that have not yet been sent to the monitor, the changes will be lost. You are prompted to confirm your choice.

1. On the Alerts Notification Configuration screen, click the **Alert Setting** tab, **Mail Server** tab, or **Email** tab.
2. Click **Load Backup**.

   A message warns that when you load a saved backup file, all unsaved changes made in the current session will be lost.
3. Click **Yes**.

   The drive directory appears, from which you can select a backup configuration to load.
4. Select the backup configuration file (it should be in `.xml` format).
5. Click **Open**.

   The drive directory disappears.
6. Click **OK**.

   The backup configuration is loaded and the Alerts Notification Configuration screen closes.

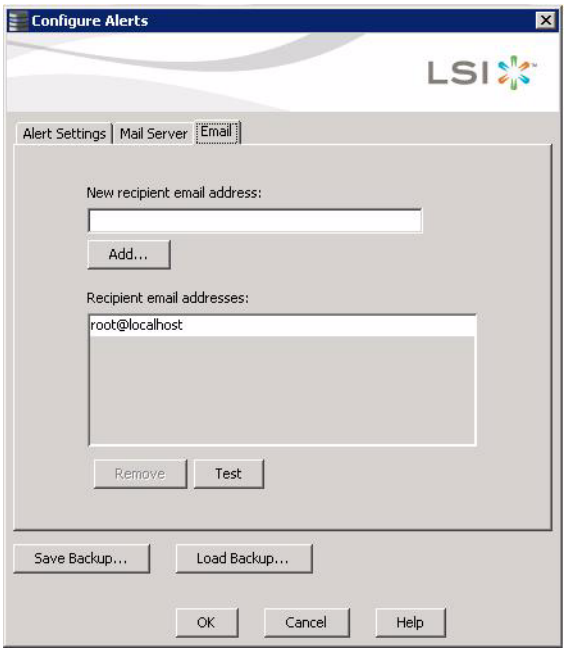
8.3.6 Adding Email Addresses of Recipients of Alert Notifications

The **Email** tab portion of the Alerts Notification Configuration screen shows the email addresses of recipients of the alert notifications. MegaRAID Storage Manager sends alert notifications to those email addresses. Use the screen to add or remove email addresses of recipients, and to send test messages to recipients that you add.

To add email addresses of recipients of the alert notifications, perform the following steps:

1. Click the **E-mail** tab on the Event Notification Configuration screen.
   The **E-mail** section of the screen appears, as shown in the following figure.

Figure 56 Email Settings



2. Enter the email address you want to add in the **New recipient email address** field.
3. Click **Add**.
   The new email address appears in the **Recipient email addresses** field.

8.3.7 Testing Email Addresses of Recipients of Alert Notifications

Use the **Email** tab portion of the Alerts Notification Configuration screen to send test messages to the email addresses that you added for the recipients of alert notifications.

1. Click the **E-mail** tab on the Event Notification Configuration screen.
   The **E-mail** section of the screen appears, as shown in the following figure.
2. Click an email address in the **Recipient email addresses** field.
3. Click **Test**.
4. Confirm whether the test message was sent to the email address.
   If MegaRAID Storage Manager cannot send an email message to the email address, an error message appears.

8.3.8 Removing Email Addresses of Recipients of Alert Notifications

Use the **Email** tab portion of the Alerts Notification Configuration screen to remove email addresses of the recipients of alert notifications.

1. Click the **E-mail** tab on the Event Notification Configuration screen.
   The **E-mail** section of the screen appears, as shown in the following figure.
2. Click an email address in the **Recipient email addresses** field.
   The **Remove** button, which was grayed out, is now active.
3. Click **Remove**.
   The email address is deleted from the list.

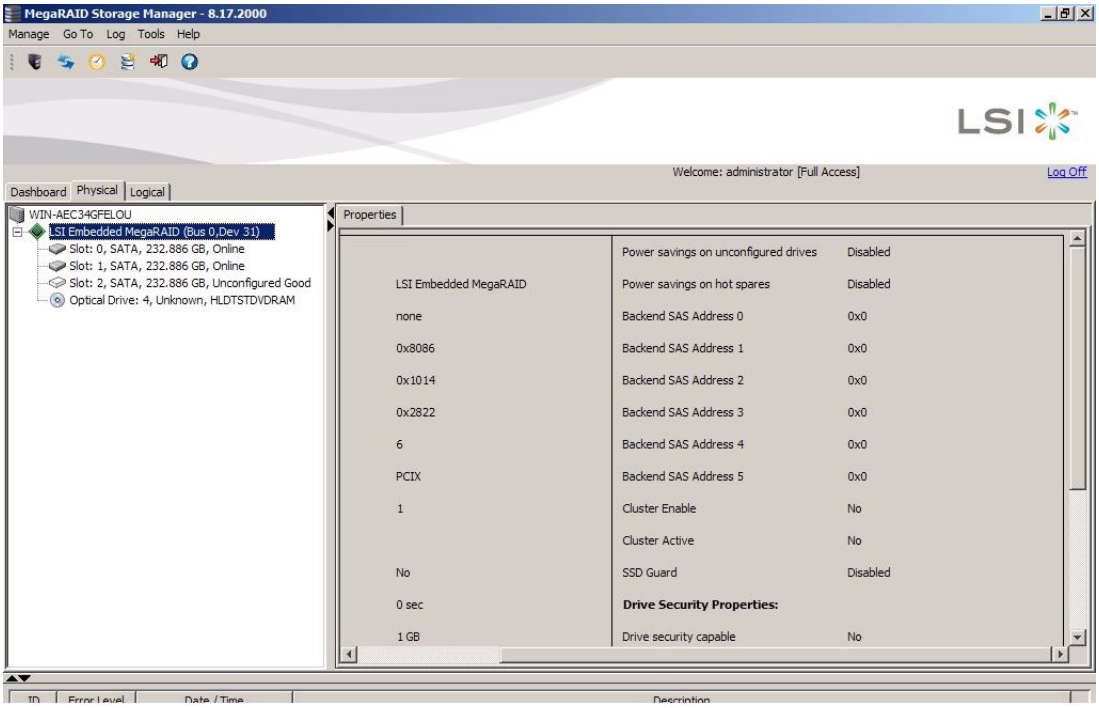
8.4 Monitoring Controllers

NOTE The ServeRAID C105 drivers act as virtual "controllers." Because these are not actual hardware storage controllers installed in the computer system, some of the controller properties shown in the screen below do not apply to them.

When MegaRAID Storage Manager is running, you can see the status of all controllers in the left panel of the MegaRAID Storage Manager main menu screen. If the controller is operating normally, the controller icon looks like this: . If the controller has failed, a small red circle appears to the right of the icon. See Section 6.2.1, Dashboard/Physical View/Logical View, for a complete list of device icons.

To display complete controller information, click a controller icon in the left panel of the MegaRAID Storage Manager main menu screen, and click the **Properties** tab in the right panel. The following figure shows the Controller Information properties.

Figure 57 Controller Information Properties



Most of the information on this screen is self-explanatory. Note that the *Rebuild Rate*, *Consistency Check Rate*, and *BGI Rate* (background initialization) options are all user selectable. For more information, see Section 7.2, Changing Adjustable Task Rates.

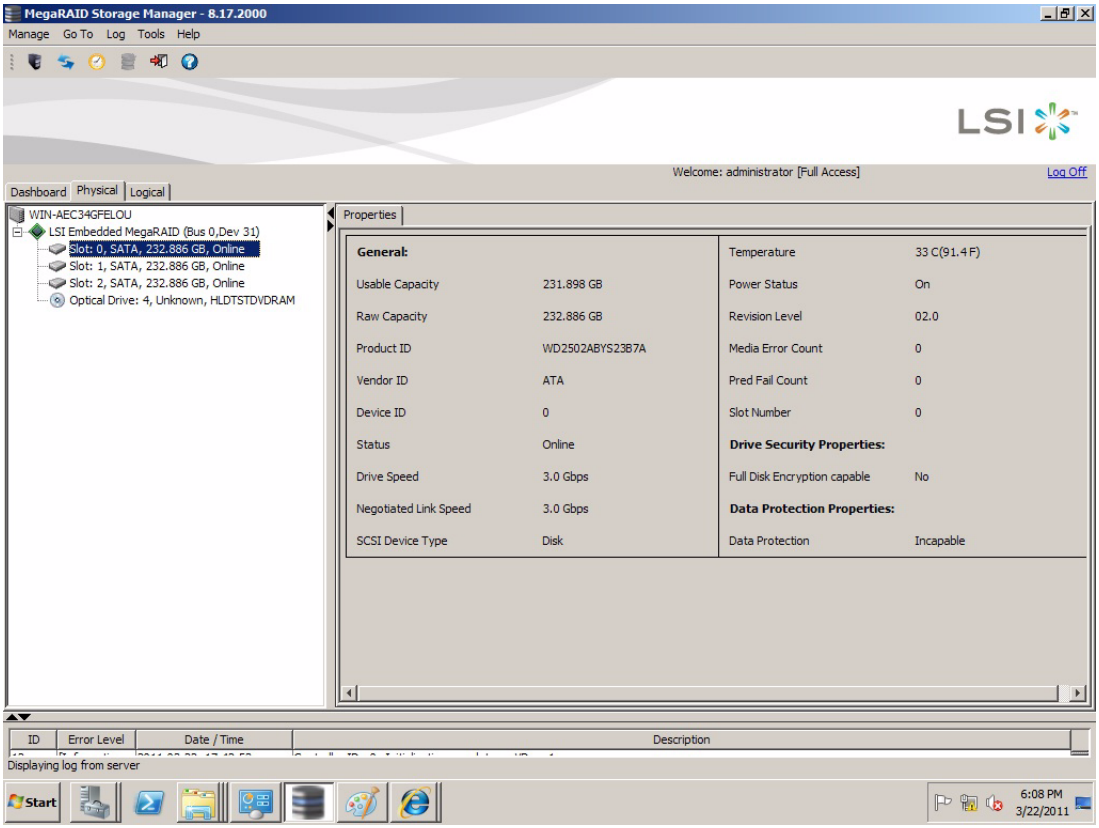
8.5 Monitoring Disk Drives

When MegaRAID Storage Manager is running, you can see the status of all drives in the left panel of the MegaRAID Storage Manager main menu screen. If the disk drive is operating normally, its icon looks like this: . If the disk drive has failed, a small red circle appears to the right of the icon, like this: . See Section 6.2.1, Dashboard/Physical View/Logical View, for a complete list of device icons.

To display complete disk drive information, click a disk drive icon in the left panel of the MegaRAID Storage Manager main menu screen, and click the **Properties** tab in the right panel.

The following figure shows the Properties panel for a physical drive.

Figure 58 Physical Drive Information



The information on this panel is self-explanatory. There are no user-selectable properties for physical devices. Icons for other storage devices such as CD-ROM drives and DAT drives may also appear in the left panel.

If the drives are in a drive enclosure, you can identify which drive is represented by each drive LED on the enclosure. Follow these steps to locate the drive:

1. Click the drive icon in the left panel.
2. Click **Go To > Physical Drive > Start Locating Drive**.

   The LED on the drive in the enclosure starts blinking to show its location.

NOTE LEDs on drives that are global hotspares do not blink.

3. To stop the drive LED on the enclosure from blinking, select **Go To > Physical Drive > Stop Locating Drive**.

To display a graphical view of a drive, click a drive icon in the left panel of the ServeRAID C105 main menu screen, and click the **Graphical View** tab. In Graphical View, the drive's storage capacity is color coded according to the legend shown on the screen: configured space is blue, available space is white, and reserved space is red. When you select a virtual drive from the drop-down menu, the drive space used by that virtual drive is displayed in green.

8.6 Running a Patrol Read

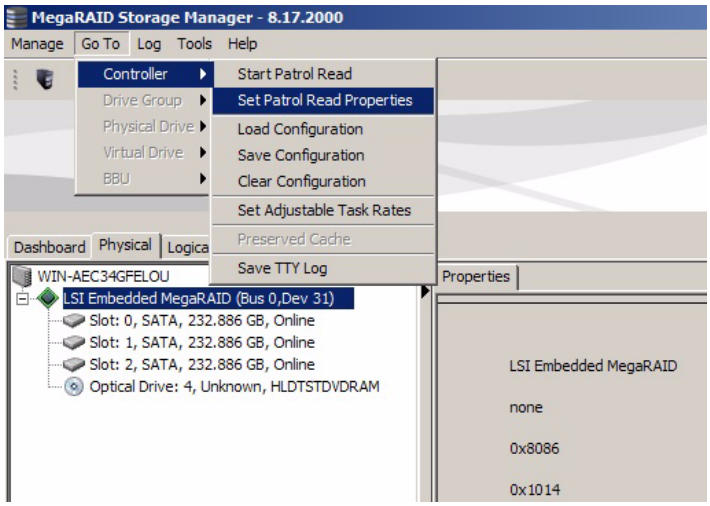
A patrol read periodically verifies all sectors of drives connected to a controller, including the system reserved area in the RAID configured drives. A patrol read can be used for all RAID levels and for all hotspare drives. This operation is initiated only when the controller is idle for a defined time 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 without changing the properties.

To set the patrol read properties and then start a patrol read, follow these steps:

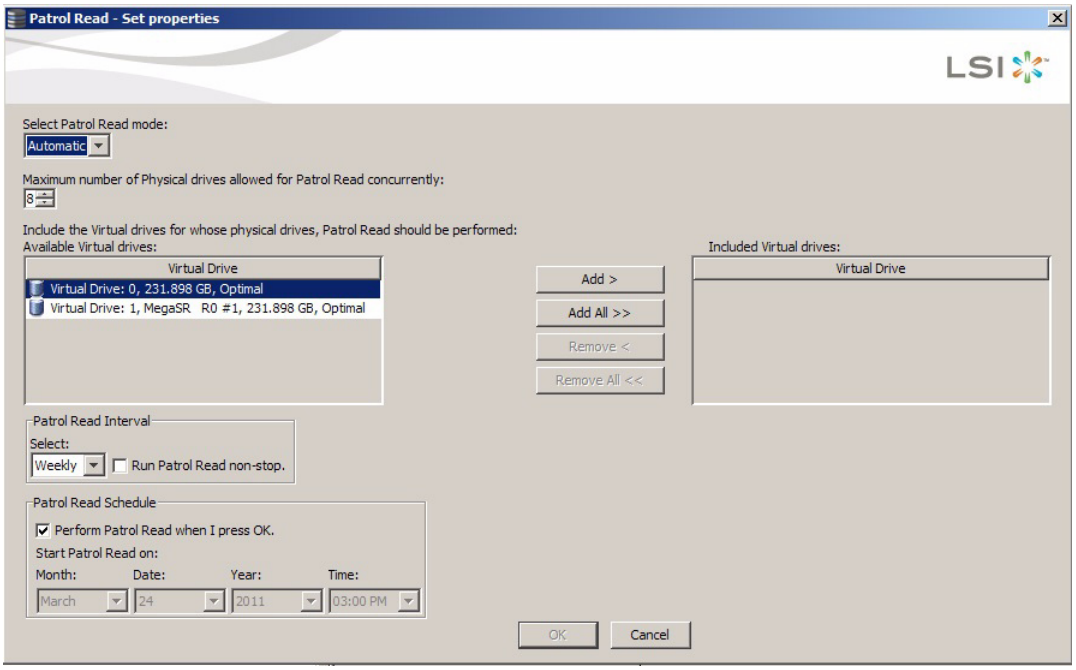
1. Click a controller icon in the left panel of the ServeRAID C105 main menu.
2. Select **Go To > Controller > Set Patrol Read Properties**.

Figure 59 Start Patrol Read Menu



The Patrol Read - Set properties screen displays, as shown in the following figure.

Figure 60 Patrol Read Configuration



3. Select a mode for a patrol read from these options:
   - **Automatic**: Patrol read runs automatically at the time interval you specify on this screen.
   - **Manual**: Patrol read runs only when you manually start it by selecting **Start Patrol Read** from the controller Options panel.
   - **Disabled**: Patrol read does not run.
4. Specify a maximum count of drives to include in the patrol read.

   The count must be from 1 to 8 drives. Eight drives is the maximum supported by ServeRAID C105.
5. Click virtual drives in the list under the heading **Virtual Drives** to include in the patrol read and click **Add >** or click **Add All >>** to include all of the virtual drives.
6. (Optional) Change the frequency at which the patrol read will run.

   The default frequency is weekly (168 hours), which is suitable for most configurations. The other options are hourly, daily, and monthly.

NOTE It is recommended that you leave the patrol read frequency and other patrol read settings at the default values to achieve the best system performance. If you decide to change the values, record the original default value here so you can restore them later, if necessary:
Patrol Read Frequency: _____
Continuous Patrolling: Enabled/Disabled
Patrol Read Task Rate: _____

7. (Optional) Set Patrol Read to run at a specific time.

   The default is for the patrol read to start when you click **OK** on this screen. To change the default so that the patrol read starts at a specific time, follow these steps (otherwise, skip this step and proceed to the next step):
   a. Uncheck the box **Perform Patrol Read when I click OK**.
   b. Select the month, year, day, and time to start patrol read.

8. Click **OK** to enable your patrol read selections.

NOTE Patrol read does not report its progress while it is running. The patrol read status is reported in the event log only.

To start a patrol read without changing the patrol read properties, follow these steps:

1. Click a controller icon in the left panel of the ServeRAID C105 main menu screen.
2. Select **Go To > Controller > Start Patrol Read** in the menu bar.
3. When prompted, click **Yes** to confirm that you want to start a patrol read.

8.6.1 Patrol Read Task Rates

You have the option to change the patrol read *task rate*. The task rate determines the amount of system resources that are dedicated to a patrol read when it is running. It is recommended, however, that you leave the patrol read task rate at its default setting.

If you raise the task rate above the default, foreground tasks will run more slowly and it might seem that the system is not responding. If you lower the task rate below the default, rebuilds and other background tasks might run very slowly and might not complete within a reasonable time. For more information, about the patrol read task rate, see Section 7.2, Changing Adjustable Task Rates.

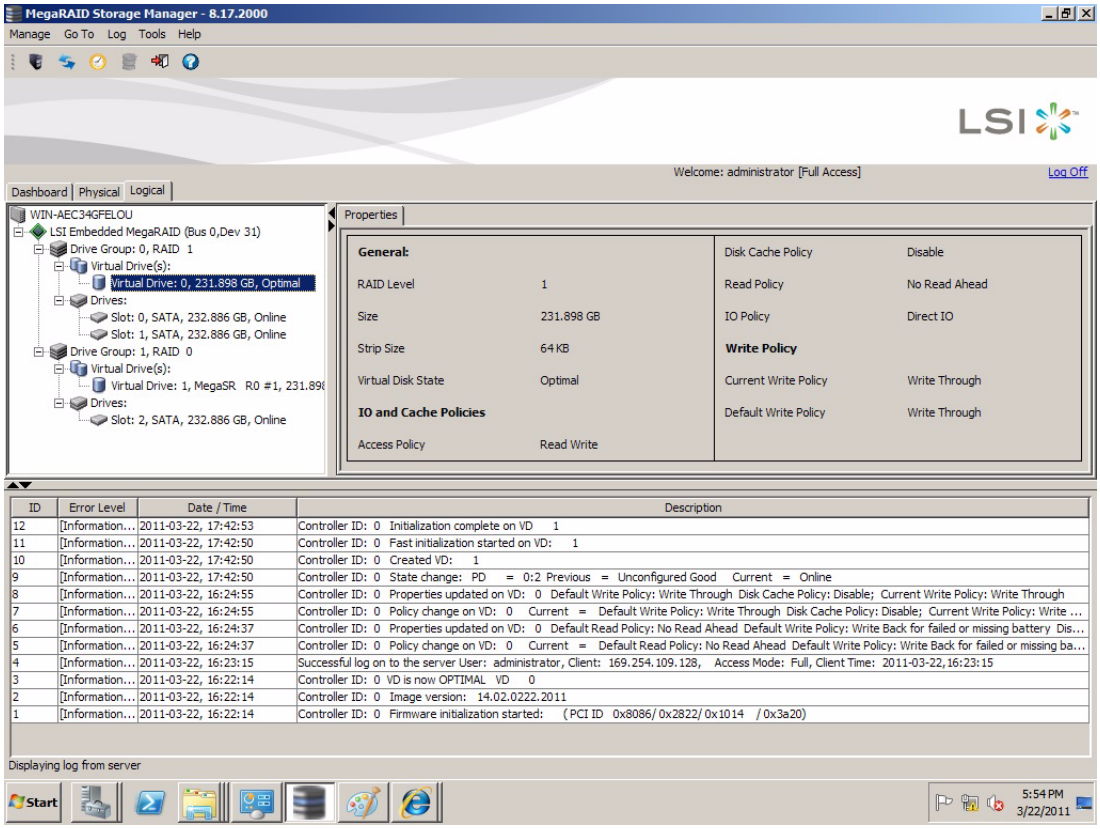
8.7 Monitoring Virtual Drives

When MegaRAID Storage Manager is running, you can see the status of all virtual drives. If a virtual drive is operating normally, the icon looks like this: . If the virtual drive is running in Degraded mode (for example, if a drive has failed) a small yellow circle appears to the right of the icon: .

When the Logical tab is selected, the left panel of the MegaRAID Storage Manager main menu screen shows the drives used by each virtual drive. The same drive can be used by multiple virtual drives.

To display complete virtual drive information, click the **Logical** tab in the left panel, and click on a virtual drive icon in the left panel. The properties appear in the right panel. The following figure shows the Properties panel for a virtual drive.

Figure 61 Virtual Drive Properties



The RAID level, stripe size, and access policy of the virtual disk are set when the virtual drive is configured.

If the drives in the virtual drive are in an enclosure, you can identify them by making their LEDs blink. To do this, follow these steps:

1. Click the virtual drive icon in the left panel.
2. Click **Go To > Virtual Drive > Start Locating Virtual Drive** or right-click a virtual drive and select **Start Locating Virtual Drive** from the menu.

   The LEDs on the drives in the virtual drive start blinking (except for hotspare drives).
3. To stop the LEDs from blinking, click **Go To > Virtual Drive > Stop Locating Virtual Drive**.

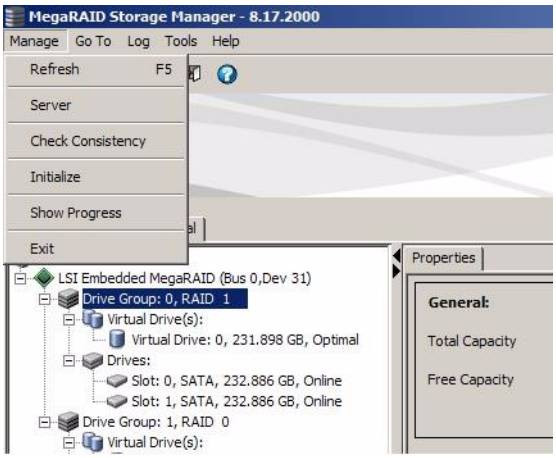
8.8 Monitoring Rebuilds and Other Processes

MegaRAID Storage Manager allows you to monitor the progress of rebuilds and other lengthy processes in the Group Show Progress window.

Follow these steps to monitor the progress of these operations.

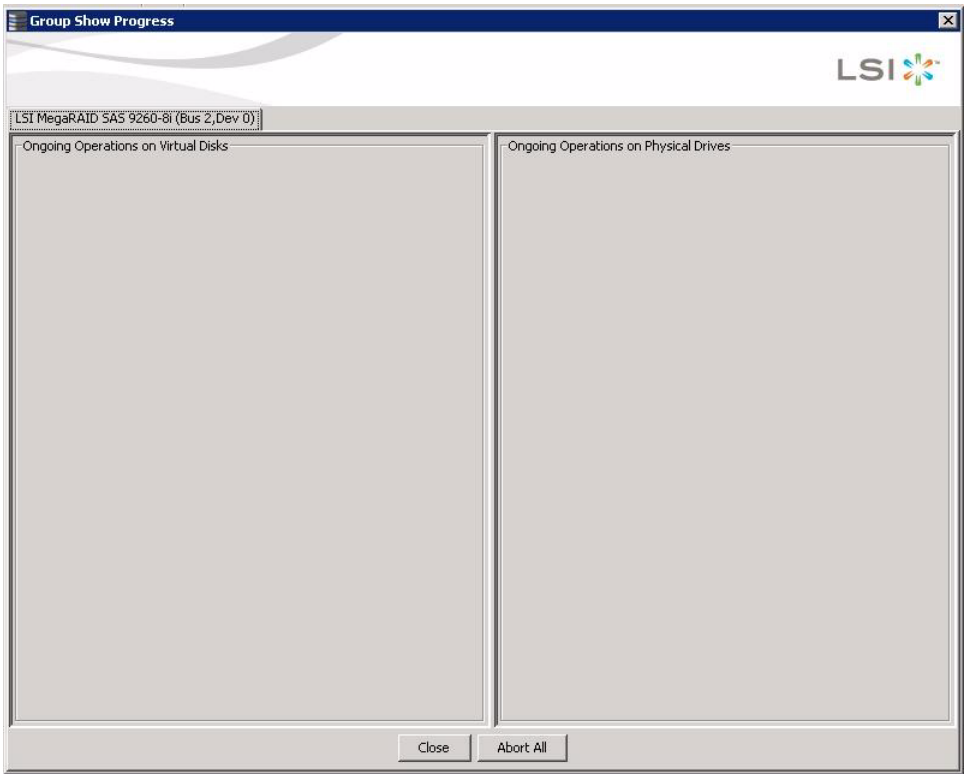
1. Select **Manage > Show Progress** on the menu bar to open this window, as shown in the following figure.

Figure 62 Group Show Progress Menu



The Group Show Progress window appears, as shown in the following figure.

Figure 63 Group Show Progress Window



Operations on virtual disks appear in the left panel of the Group Show Progress window, and operations on physical drives appear in the right panel. The following operations appear in this window:

- Background or foreground initialization of a virtual disk
- Consistency check (see Section 9.2, Running a Consistency Check)
- Modify drive group
- Rebuild (see Section 9.3, Rebuilding a Drive)

2. (Optional) To abort an ongoing process, click the **Abort** button next to the status indicator.
3. (Optional) Click **Abort All** to abort all ongoing processes.
4. Click **Close** to close the window.

Chapter 9: Maintaining and Managing Storage Configurations

This section explains how to use MegaRAID Storage Manager to maintain and manage storage configurations.

9.1 Initializing a Virtual Drive

To initialize a virtual drive after completing the configuration process, follow these steps:

1. Select the **Logical** tab in the left panel of the MegaRAID Storage Manager main menu screen, and click the icon of the virtual drive that you want to initialize.
2. Select **Go To > Virtual Drive > Start Initialization**.

   The Initialize dialog box appears.
3. Select the virtual disk(s) to initialize.

   CAUTION Initialization erases all data on the virtual drive. Make sure you back up any data you want to keep before you initialize. Make sure the operating system is not installed on the virtual drive you are initializing.
4. Select the **Fast Initialization** check box if you want to use this option.

   If you leave the box unchecked, MegaRAID Storage Manager runs a Full Initialization on the virtual disk. (For more information, see Section 7.1.1, Selecting Virtual Drive Settings.)
5. Click **Start** to begin the initialization.

   You can monitor the progress of the initialization. See Section 8.8, Monitoring Rebuilds and Other Processes, for more information.

9.1.1 Running a Group Initialization

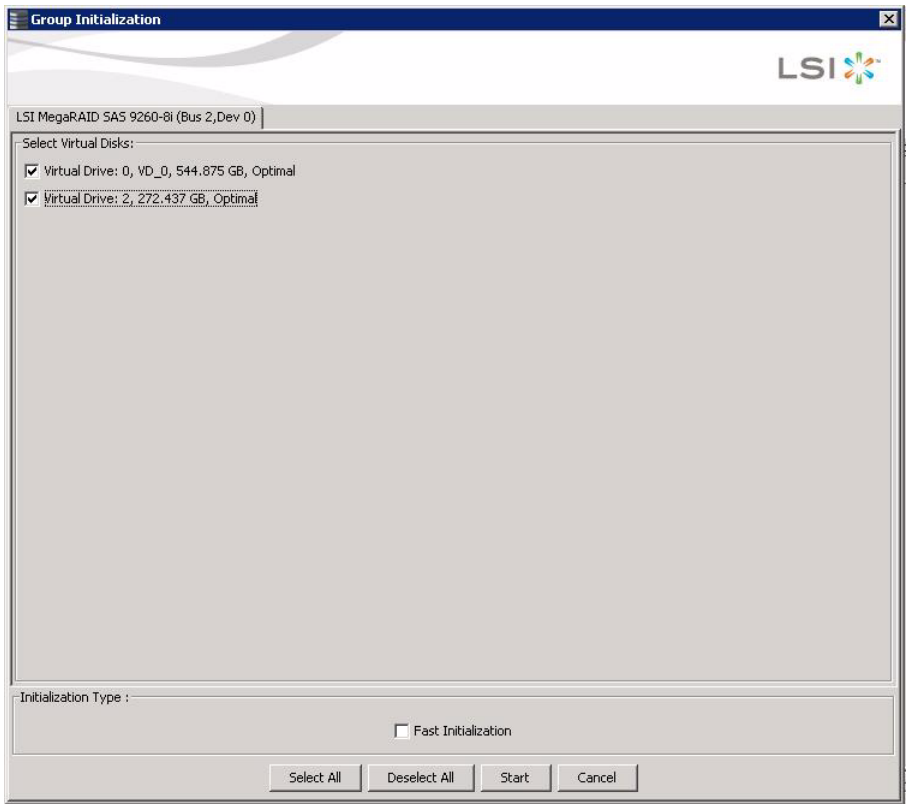
Initialization prepares the storage medium for use. You can run an initialization on multiple drives at one time.

Follow these steps to run a group initialization.

1. Click **Manage > Initialize**.

   The Group Initialization appears, as shown in the following figure.

Figure 64 Group Initialization Dialog Box



2. Check the virtual drives to run the initialization on or click **Select All** to select all of the virtual drives.
3. Click **Start**.

   You can monitor the progress of the group initialization. See Section 8.8, Monitoring Rebuilds and Other Processes, for more information.

9.2 Running a Consistency Check

The Consistency Check operation verifies correctness of the data in virtual drives that use RAID levels 1 and 10 (RAID 0 does not provide data redundancy). For example, in a system with parity, checking consistency means computing the data on one drive and comparing the results to the contents of the parity drive.

You should run a consistency check on fault-tolerant virtual drives periodically. You must run the consistency check if you suspect that the virtual drive data might be corrupted. Be sure to back up the data before running a consistency check if you think the data might be corrupted.

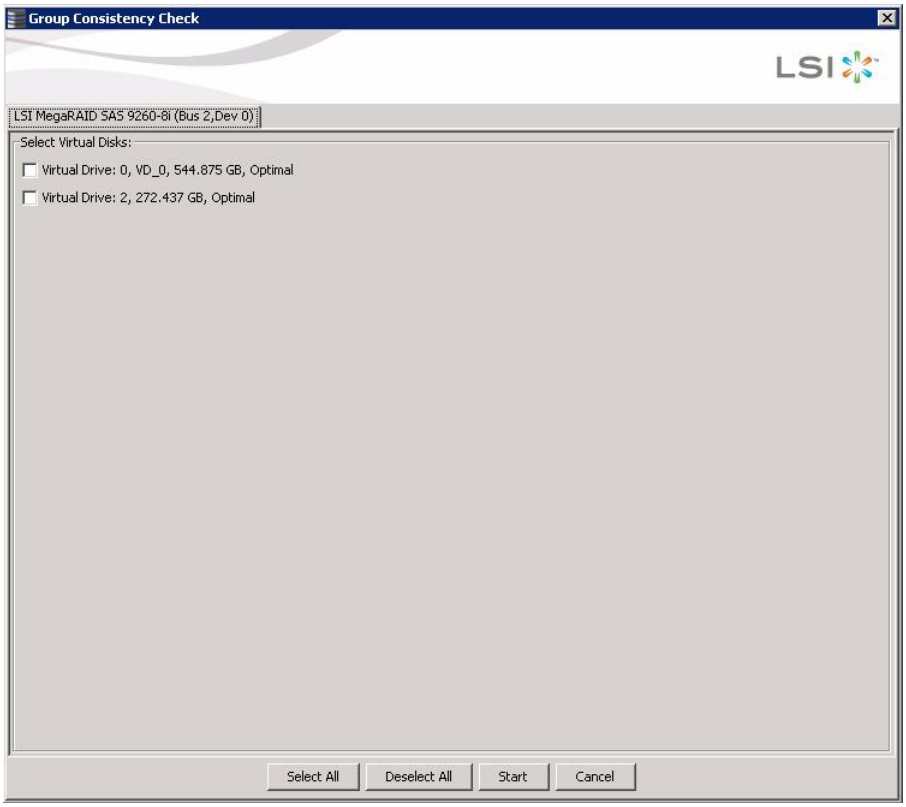
To run a consistency check, first set the consistency check properties and then schedule the consistency check. This section explains how to set the properties, schedule the check, and run the consistency check.

9.2.1 Running a Group Consistency Check

You can run a consistency check on multiple drives at one time. Follow these steps to run a group consistency check.

1. Click **Manage > Check Consistency**.
   The Group Consistency Check appears, as shown in the following figure.

Figure 65 Group Consistency Check Dialog Box



2. Check the virtual drives to run the consistency check on or click **Select All** to select all of the virtual drives.
3. Click **Start**.

You can monitor the progress of the group consistency check. See Section 8.8, Monitoring Rebuilds and Other Processes, for more information.

9.2.2 Scanning for New Drives

You can use the Scan for Foreign Configuration option to find drives with 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. In addition, if one or more drives are removed from a configuration, by a cable pull or drive removal, for example, the configuration on those drives is considered a foreign configuration by the RAID controller. Drives that are foreign are listed on the physical drives list with a special symbol in ServeRAID C100 and ServeRAID C105.

The utility allows you to import the existing configuration to the RAID controller or clear the configuration so you can create a new configuration using these drives. You can preview the foreign configuration before you decide whether to import it.

ServeRAID C100 and ServeRAID C105 normally detect newly installed drives and display icons for them in the main menu screen. If for some reason, ServeRAID C100 and ServeRAID C105 do not detect a new drive (or drives), you can use the Scan for Foreign Configuration command to find it.

Follow these steps to scan for a foreign configuration:

1. Select a controller icon in the left panel of the main menu screen.
2. Select **Go To > Controller > Scan for Foreign Configuration**.

   If ServeRAID C105 detects any new drives, it displays a list of them on the screen. If not, it notifies you that no foreign configuration is found.
3. Follow the instructions on the screen to complete the drive detection.

9.3 Rebuilding a Drive

If a single drive in a RAID 1 or RAID 10 virtual disk fails, the system is protected from data loss. The failed drive must be replaced, and the drive's data must be rebuilt on a new drive to restore the system to fault tolerance. (You can choose to rebuild the data on the failed drive if the drive is still operational.) If hotspare disks are available, the failed drive is rebuilt automatically without any user intervention.

If a drive has failed, a red circle appears to the right of the disk drive icon: . A small yellow circle appears to the right of the icon of the virtual drive that uses this drive: . This icon indicates that the virtual drive is in a degraded state; the data is still safe, but data could be lost if another drive fails.

Follow these steps if you need to rebuild a physical drive:

1. Right-click the icon of the failed drive, and select **Rebuild**.
2. Click **Yes** when the warning message appears.

   If the drive is still good, a rebuild starts. You can monitor the progress of the rebuild in the Group Show Progress window by selecting **Manage > Show Progress**.

   If the drive cannot be rebuilt, an error message appears. Continue with the next step.
3. Shut down the system, disconnect the power cord, and open the computer case.
4. Replace the failed disk drive with a new drive of equal capacity.
5. Close the computer case, reconnect the power cord, and restart the computer.
6. Restart MegaRAID Storage Manager.

   When the new drive spins up, the drive icon changes back to normal status, and the rebuild process begins automatically. You can monitor the progress of the rebuild in the Group Show Progress window by selecting **Manage > Show Progress**.

9.4 Making a Drive Offline or Missing

If a drive is currently part of a redundant configuration and you want to use it in another configuration, you can use ServeRAID C100 and ServeRAID C105 commands to remove the drive from the first configuration and change the drive state to Unconfigured Good.

CAUTION After you perform this procedure, *all data on that drive is lost*.

To remove the drive from the configuration without harming the data on the virtual drive, follow these steps:

1. On the main menu screen, click **Go To > Physical Drive > Make Drive (O)ffline**.

   The drive status changes to Offline.

2. Click **Go To > Physical Drive > (M)ark Drive as Missing**.

   The drive status changes to Unconfigured Good.

   CAUTION After you perform this step, the data on this drive is no longer valid.

3. If necessary, create a hotspare drive for the virtual drive from which you have removed the drive. (See Section 7.2, Changing Adjustable Task Rates.)

   When a hotspare is available, the data on the virtual drive will be rebuilt. You can now use the removed drive for another configuration.

   CAUTION If ServeRAID C100 and ServeRAID C105 detect that a drive in a virtual drive has failed, they make the drive offline. If this happens, you must remove the drive and replace it. You cannot make the drive usable for another configuration by using the **Mark physical disk as missing** and **Rescan** commands.

Appendix A: ServeRAID C100 and ServeRAID C105 MegaRAID Storage Manager Events and Messages

This appendix lists the MegaRAID Storage Manager events and their related messages that can appear in the event log.

MegaRAID Storage Manager monitors the activity and performance of all controllers in the workstation and the devices attached to them. When an event occurs, such as the start of an initialization, an event message appears in the log at the bottom of the MegaRAID Storage Manager main menu screen.

NOTE MegaRAID Storage Manager can be used to manage a wide range of ServeRAID controllers. Some of the events and messages listed in this appendix are not applicable to ServeRAID C100 and ServeRAID C105.

Each message that appears in the event log has an error level that indicates the severity of the event, as shown in Table 47.

Table 47 Event Error Levels

Error Level	Meaning
Information	Informational message; no user action is necessary.
Warning	Some component may be close to a failure point.
Caution	A component has failed, but the system has not lost data.
Fatal	A component has failed, and data loss has occurred or will occur.
Dead	A catastrophic error has occurred, and the controller has died. This event is seen only after the controller has been restarted.

Table 48 lists all of the MegaRAID Storage Manager event messages. The event message descriptions include placeholders for specific values that are determined when the event is generated. Some of the error messages are relevant only for hardware RAID.

Table 48 Event Messages

Number (Hex)	Number (Decimal)	Type	Event Text
0x0000	0	Information	Firmware initialization started (PCI ID %04x/%04x/%04x/%04x)
0x0001	1	Information	Firmware version %s
0x0002	2	Fatal	Unable to recover cache data from TBBU
0x0003	3	Information	Cache data recovered from TBBU successfully
0x0004	4	Information	Configuration cleared
0x0005	5	Warning	Cluster down; communication with peer lost
0x0006	6	Information	%s ownership changed from %02x to %02x
0x0007	7	Information	Alarm disabled by user
0x0008	8	Information	Alarm enabled by user
0x0009	9	Information	Background initialization rate changed to %d%%
0x000a	10	Fatal	Controller cache discarded due to memory/battery problems
0x000b	11	Fatal	Unable to recover cache data due to configuration mismatch
0x000c	12	Information	Cache data recovered successfully

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Table 48 Event Messages

Number (Hex)	Number (Decimal)	Type	Event Text
0x000d	13	Fatal	Controller cache discarded due to firmware version incompatibility
0x000e	14	Information	Consistency Check rate changed to %d%%
0x000f	15	Dead	Fatal firmware error: %s
0x0010	16	Information	Factory defaults restored
0x0011	17	Information	Flash downloaded image corrupt
0x0012	18	Caution	Flash erase error
0x0013	19	Caution	Flash timeout during erase
0x0014	20	Caution	Flash error
0x0015	21	Information	Flashing image: %s
0x0016	22	Information	Flash of new firmware image(s) complete
0x0017	23	Caution	Flash programming error
0x0018	24	Caution	Flash timeout during programming
0x0019	25	Caution	Flash chip type unknown
0x001a	26	Caution	Flash command set unknown
0x001b	27	Caution	Flash verify failure
0x001c	28	Information	Flush rate changed to %d seconds
0x001d	29	Information	Hibernate command received from host
0x001e	30	Information	Event log cleared
0x001f	31	Information	Event log wrapped
0x0020	32	Dead	Multi-bit ECC error: ECAR=%x, ELOG=%x, (%s)
0x0021	33	Warning	Single-bit ECC error: ECAR=%x, ELOG=%x, (%s)
0x0022	34	Dead	Not enough controller memory
0x0023	35	Information	Patrol Read complete
0x0024	36	Information	Patrol Read paused
0x0025	37	Information	Patrol Read Rate changed to %d%%
0x0026	38	Information	Patrol Read resumed
0x0027	39	Information	Patrol Read started
0x0028	40	Information	Rebuild rate changed to %d%%
0x0029	41	Information	Reconstruction rate changed to %d%%
0x002a	42	Information	Shutdown command received from host
0x002b	43	Information	Test event: %s
0x002c	44	Information	Time established as %s; (%d seconds since power on)
0x002d	45	Information	User entered firmware debugger
0x002e	46	Warning	Background Initialization aborted on %s
0x002f	47	Warning	Background Initialization corrected medium error (%s at %lx
0x0030	48	Information	Background Initialization completed on %s
0x0031	49	Fatal	Background Initialization corrected medium error (%s at %lx, %s at %lx)
0x0032	50	Fatal	Background Initialization detected uncorrectable double medium errors (%s at %lx on %s)

Table 48 Event Messages

Number (Hex)	Number (Decimal)	Type	Event Text
0x0033	51	Caution	Background Initialization failed on %s
0x0034	52	Progress	Background Initialization progress on %s is %s
0x0035	53	Information	Background Initialization started on %s
0x0036	54	Information	Policy change on %s from %s to %s
0x0038	56	Warning	Consistency Check aborted on %s
0x0039	57	Warning	Consistency Check corrected medium error (%s at %lx, %s at %lx)
0x003a	58	Information	Consistency Check done on %s
0x003b	59	Information	Consistency Check done with corrections on %s, (corrections=%d)
0x003c	60	Fatal	Consistency Check detected uncorrectable double medium errors (%s at %lx on %s)
0x003d	61	Caution	Consistency Check failed on %s
0x003e	62	Fatal	Consistency Check failed with uncorrectable data on %s
0x003f	63	Warning	Consistency Check found inconsistent parity on %s at strip %lx
0x0040	64	Warning	Consistency Check inconsistency logging disabled on %s (too many inconsistencies)
0x0041	65	Progress	Consistency Check progress on %s is %s
0x0042	66	Information	Consistency Check started on %s
0x0043	67	Warning	Initialization aborted on %s
0x0044	68	Caution	Initialization failed on %s
0x0045	69	Progress	Initialization progress on %s is %s
0x0046	70	Information	Fast initialization started on %s
0x0047	71	Information	Full initialization started on %s
0x0048	72	Information	Initialization complete on %s
0x0049	73	Information	Properties updated to %s (from %s)
0x004a	74	Information	Reconstruction complete on %s
0x004b	75	Fatal	Reconstruction of %s stopped due to unrecoverable errors
0x004c	76	Fatal	Reconstruct detected uncorrectable double medium errors (%s at %lx on %s at %lx)
0x004d	77	Progress	Reconstruction progress on %s is %s
0x004e	78	Information	Reconstruction resumed on %s
0x004f	79	Fatal	Reconstruction resume of %s failed due to configuration mismatch
0x0050	80	Information	Reconstructing started on %s
0x0051	81	Information	State change on %s from %s to %s
0x0052	82	Information	Clear aborted on %s
0x0053	83	Caution	Clear failed on %s (Error %02x)
0x0054	84	Progress	Clear progress on %s is %s
0x0055	85	Information	Clear started on %s
0x0056	86	Information	Clear completed on %s
0x0057	87	Warning	Error on %s (Error %02x)
0x0058	88	Information	Format complete on %s

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Table 48 Event Messages

Number (Hex)	Number (Decimal)	Type	Event Text
0x0059	89	Information	Format started on %s
0x005a	90	Caution	Hot Spare SMART polling failed on %s (Error %02x)
0x005b	91	Information	Inserted: %s
0x005c	92	Warning	%s is not supported
0x005d	93	Warning	Patrol Read corrected medium error on %s at %lx
0x005e	94	Progress	Patrol Read progress on %s is %s
0x005f	95	Fatal	Patrol Read found an uncorrectable medium error on %s at %lx
0x0060	96	Caution	Predictive failure: %s
0x0061	97	Fatal	Puncturing bad block on %s at %lx
0x0062	98	Information	Rebuild aborted by user on %s
0x0063	99	Information	Rebuild complete on %s
0x0064	100	Information	Rebuild complete on %s
0x0065	101	Caution	Rebuild failed on %s due to source drive error
0x0066	102	Caution	Rebuild failed on %s due to target drive error
0x0067	103	Progress	Rebuild progress on %s is %s
0x0068	104	Information	Rebuild resumed on %s
0x0069	105	Information	Rebuild started on %s
0x006a	106	Information	Rebuild automatically started on %s
0x006b	107	Caution	Rebuild stopped on %s due to loss of cluster ownership
0x006c	108	Fatal	Reassign write operation failed on %s at %lx
0x006d	109	Fatal	Unrecoverable medium error during rebuild on %s at %lx
0x006e	110	Information	Corrected medium error during recovery on %s at %lx
0x006f	111	Fatal	Unrecoverable medium error during recovery on %s at %lx
0x0070	112	Information	Removed: %s
0x0071	113	Warning	Unexpected sense: %s, CDB%s, Sense: %s
0x0072	114	Information	State change on %s from %s to %s
0x0073	115	Information	State change by user on %s from %s to %s
0x0074	116	Warning	Redundant path to %s broken
0x0075	117	Information	Redundant path to %s restored
0x0076	118	Information	Dedicated Hot Spare PD %s no longer useful due to deleted array
0x0077	119	Caution	SAS topology error: Loop detected
0x0078	120	Caution	SAS topology error: Unaddressable device
0x0079	121	Caution	SAS topology error: Multiple ports to the same SAS address
0x007a	122	Caution	SAS topology error: Expander error
0x007b	123	Caution	SAS topology error: SMP timeout
0x007c	124	Caution	SAS topology error: Out of route entries
0x007d	125	Caution	SAS topology error: Index not found
0x007e	126	Caution	SAS topology error: SMP function failed
0x007f	127	Caution	SAS topology error: SMP CRC error

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Table 48 Event Messages

Number (Hex)	Number (Decimal)	Type	Event Text
0x0080	128	Caution	SAS topology error: Multiple subtractive
0x0081	129	Caution	SAS topology error: Table to table
0x0082	130	Caution	SAS topology error: Multiple paths
0x0083	131	Fatal	Unable to access device %s
0x0084	132	Information	Dedicated Hot Spare created on %s (%s)
0x0085	133	Information	Dedicated Hot Spare %s (%s) disabled
0x0086	134	Caution	Dedicated Hot Spare %s no longer useful for all arrays
0x0087	135	Information	Global Hot Spare created on %s (%s)
0x0088	136	Information	Global Hot Spare %s (%s) disabled
0x0089	137	Caution	Global Hot Spare %s does not cover all arrays
0x008a	138	Information	Created %s
0x008b	139	Information	Deleted %s
0x008c	140	Information	Marking %s inconsistent due to active writes at shutdown
0x008d	141	Information	Battery Present
0x008e	142	Warning	Battery Not Present
0x008f	143	Information	New Battery Detected
0x0090	144	Information	Battery has been replaced
0x0091	145	Caution	Battery temperature is high
0x0092	146	Warning	Battery voltage low
0x0093	147	Information	Battery started charging
0x0094	148	Information	Battery is discharging
0x0095	149	Information	Battery temperature is normal
0x0096	150	Fatal	Battery needs replacement - SOH Bad
0x0097	151	Information	Battery relearn started
0x0098	152	Information	Battery relearn in progress
0x0099	153	Information	Battery relearn completed
0x009a	154	Caution	Battery relearn timed out
0x009b	155	Information	Battery relearn pending: Battery is under charge
0x009c	156	Information	Battery relearn postponed
0x009d	157	Information	Battery relearn will start in 4 days
0x009e	158	Information	Battery relearn will start in 2 day
0x009f	159	Information	Battery relearn will start in 1 day
0x00a0	160	Information	Battery relearn will start in 5 hours
0x00a1	161	Information	Battery removed
0x00a2	162	Information	Current capacity of the battery is below threshold
0x00a3	163	Information	Current capacity of the battery is above threshold
0x00a4	164	Information	Enclosure (SES) discovered on %s
0x00a5	165	Information	Enclosure (SAFTE) discovered on %s
0x00a6	166	Caution	Enclosure %s communication lost

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Table 48 Event Messages

Number (Hex)	Number (Decimal)	Type	Event Text
0x00a7	167	Information	Enclosure %s communication restored
0x00a8	168	Caution	Enclosure %s fan %d failed
0x00a9	169	Information	Enclosure %s fan %d inserted
0x00aa	170	Caution	Enclosure %s fan %d removed
0x00ab	171	Caution	Enclosure %s power supply %d failed
0x00ac	172	Information	Enclosure %s power supply %d inserted
0x00ad	173	Caution	Enclosure %s power supply %d removed
0x00ae	174	Caution	Enclosure %s EMM %d failed
0x00af	175	Information	Enclosure %s EMM %d inserted
0x00b0	176	Caution	Enclosure %s EMM %d removed
0x00b1	177	Warning	Enclosure %s temperature sensor %d below warning threshold
0x00b2	178	Caution	Enclosure %s temperature sensor %d below error threshold
0x00b3	179	Warning	Enclosure %s temperature sensor %d above warning threshold
0x00b4	180	Caution	Enclosure %s temperature sensor %d above error threshold
0x00b5	181	Caution	Enclosure %s shutdown
0x00b6	182	Warning	Enclosure %s not supported; too many enclosures connected to port
0x00b7	183	Caution	Enclosure %s firmware mismatch (EMM %d)
0x00b8	184	Warning	Enclosure %s sensor %d bad
0x00b9	185	Caution	Enclosure %s phy bad for slot %d
0x00ba	186	Caution	Enclosure %s is unstable
0x00bb	187	Caution	Enclosure %s hardware error
0x00bc	188	Caution	Enclosure %s not responding
0x00bd	189	Information	SAS/SATA mixing not supported in enclosure; %s disabled
0x00be	190	Information	Enclosure (SES) hotplug on %s was detected, but is not supported
0x00bf	191	Information	Clustering enabled
0x00c0	192	Information	Clustering disabled
0x00c1	193	Information	PD too small to be used for auto-rebuild on %s
0x00c2	194	Information	BBU enabled; changing WT virtual disks to WB
0x00c3	195	Warning	BBU disabled; changing WB virtual disks to WT
0x00c4	196	Warning	Bad block table on %s is 80% full
0x00c5	197	Fatal	Bad block table on %s is full; unable to log block %lx
0x00c6	198	Information	Consistency Check Aborted Due to Ownership Loss on %s
0x00c7	199	Information	Background Initialization (BGI) Aborted Due to Ownership Loss on %s
0x00c8	200	Caution	Battery/charger problems detected; SOH Bad
0x00c9	201	Warning	Single-bit ECC error: ECAR=%x, ELOG=%x, (%s); warning threshold exceeded
0x00ca	202	Caution	Single-bit ECC error: ECAR=%x, ELOG=%x, (%s); critical threshold exceeded
0x00cb	203	Caution	Single-bit ECC error: ECAR=%x, ELOG=%x, (%s); further reporting disabled
0x00cc	204	Caution	Enclosure %s Power supply %d switched off
0x00cd	205	Information	Enclosure %s Power supply %d switched on

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Table 48 Event Messages

Number (Hex)	Number (Decimal)	Type	Event Text
0x00ce	206	Caution	Enclosure %s Power supply %d cable removed
0x00cf	207	Information	Enclosure %s Power supply %d cable inserted
0x00d0	208	Information	Enclosure %s Fan %d returned to normal
0x00d1	209	Information	BBU Retention test was initiated on previous boot
0x00d2	210	Information	BBU Retention test passed
0x00d3	211	Caution	BBU Retention test failed!
0x00d4	212	Information	NVRAM Retention test was initiated on previous boot
0x00d5	213	Information	NVRAM Retention test passed
0x00d6	214	Caution	NVRAM Retention test failed!
0x00d7	215	Information	%s test completed %d passes successfully
0x00d8	216	Caution	%s test FAILED on %d pass. Fail data: errorOffset=%x goodData=%x badData=%x
0x00d9	217	Information	Self check diagnostics completed
0x00da	218	Information	Foreign Configuration Detected
0x00db	219	Information	Foreign Configuration Imported
0x00dc	220	Information	Foreign Configuration Cleared
0x00dd	221	Warning	NVRAM is corrupt; reinitializing
0x00de	222	Warning	NVRAM mismatch occurred
0x00df	223	Warning	SAS wide port %d lost link on PHY %d
0x00e0	224	Information	SAS wide port %d restored link on PHY %d
0x00e1	225	Warning	SAS port %d, PHY %d has exceeded the allowed error rate
0x00e2	226	Warning	Bad block reassigned on %s at %lx to %lx
0x00e3	227	Information	Controller Hot Plug detected
0x00e4	228	Warning	Enclosure %s temperature sensor %d differential detected
0x00e5	229	Information	Disk test cannot start. No qualifying disks found
0x00e6	230	Information	Time duration provided by host is not sufficient for self check
0x00e7	231	Information	Marked Missing for %s on array %d row %d
0x00e8	232	Information	Replaced Missing as %s on array %d row %d
0x00e9	233	Information	Enclosure %s Temperature %d returned to normal
0x00ea	234	Information	Enclosure %s Firmware download in progress
0x00eb	235	Warning	Enclosure %s Firmware download failed
0x00ec	236	Warning	%s is not a certified drive
0x00ed	237	Information	Dirty cache data discarded by user
0x00ee	238	Information	PDs missing from configuration at boot
0x00ef	239	Information	VDs missing drives and will go offline at boot: %s
0x00f0	240	Information	VDs missing at boot: %s
0x00f1	241	Information	Previous configuration completely missing at boot
0x00f2	242	Information	Battery charge complete
0x00f3	243	Information	Enclosure %s fan %d speed changed
0x00f4	244	Information	Dedicated spare %s imported as global due to missing arrays

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Table 48 Event Messages

Number (Hex)	Number (Decimal)	Type	Event Text
0x00f5	245	Information	%s rebuild not possible as SAS/SATA is not supported in an array
0x00f6	246	Information	SEP %s has been rebooted as a part of enclosure firmware download. SEP will be unavailable until this process completes.
0x00f7	247	Information	Inserted: %s Info: %s
0x00f8	248	Information	Removed: %s Info: %s
0x00f9	249	Information	%s is now OPTIMAL
0x00fa	250	Warning	%s is now PARTIALLY DEGRADED
0x00fb	251	Caution	%s is now DEGRADED
0x00fc	252	Fatal	%s is now OFFLINE
0x00fd	253	Warning	Battery requires reconditioning; please initiate a LEARN cycle
0x00fe	254	Warning	VD %s disabled because RAID-5 is not supported by this RAID key
0x00ff	255	Warning	VD %s disabled because RAID-6 is not supported by this controller
0x0100	256	Warning	VD %s disabled because SAS drives are not supported by this RAID key
0x0101	257	Warning	PD missing: %s
0x0102	258	Warning	Puncturing of LBAs enabled
0x0103	259	Warning	Puncturing of LBAs disabled
0x0104	260	Critical	Enclosure %s EMM %d not installed
0x0105	261	Information	Package version %s
0x0106	262	Warning	Global affinity Hot Spare %s commissioned in a different enclosure
0x0107	263	Warning	Foreign configuration table overflow
0x0108	264	Warning	Partial foreign configuration imported, PDs not imported:%s
0x0109	265	Information	Connector %s is active
0x010a	266	Information	Board Revision %s
0x010b	267	Warning	Command timeout on PD %s, CDB:%s
0x010c	268	Warning	PD %s reset (Type %02x)
0x010d	269	Warning	VD bad block table on %s is 80% full
0x010e	270	Fatal	VD bad block table on %s is full; unable to log block %lx (on %s at %lx)
0x010f	271	Fatal	Uncorrectable medium error logged for %s at %lx (on %s at %lx)
0x0110	272	Information	VD medium error corrected on %s at %lx
0x0111	273	Warning	Bad block table on PD %s is 100% full
0x0112	274	Warning	VD bad block table on PD %s is 100% full
0x0113	275	Fatal	Controller needs replacement, IOP is faulty
0x0114	276	Information	CopyBack started on PD %s from PD %s
0x0115	277	Information	CopyBack aborted on PD %s and src is PD %s
0x0116	278	Information	CopyBack complete on PD %s from PD %s
0x0117	279	Progress	CopyBack progress on PD %s is %s
0x0118	280	Information	CopyBack resumed on PD %s from %s
0x0119	281	Information	CopyBack automatically started on PD %s from %s
0x011a	282	Critical	CopyBack failed on PD %s due to source %s error

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Table 48 Event Messages

Number (Hex)	Number (Decimal)	Type	Event Text
0x011b	283	Warning	Early Power off warning was unsuccessful
0x011c	284	Information	BBU FRU is %s
0x011d	285	Information	%s FRU is %s
0x011e	286	Information	Controller hardware revision ID %s
0x011f	287	Warning	Foreign import shall result in a backward incompatible upgrade of configuration metadata
0x0120	288	Information	Redundant path restored for PD %s
0x0121	289	Warning	Redundant path broken for PD %s
0x0122	290	Information	Redundant enclosure EMM %s inserted for EMM %s
0x0123	291	Information	Redundant enclosure EMM %s removed for EMM %s
0x0124	292	Warning	Patrol Read can't be started, as PDs are either not ONLINE, or are in a VD with an active process, or are in an excluded VD
0x0125	293	Information	Copyback aborted by user on PD %s and src is PD %s
0x0126	294	Critical	Copyback aborted on hot spare %s from %s, as hot spare needed for rebuild
0x0127	295	Warning	Copyback aborted on PD %s from PD %s, as rebuild required in the array
0x0128	296	Fatal	Controller cache discarded for missing or offline VD %s When a VD with cached data goes offline or missing during runtime, the cache for the VD is discarded. Because the VD is offline, the cache cannot be saved.
0x0129	297	Information	Copyback cannot be started as PD %s is too small for src PD %s
0x012a	298	Information	Copyback cannot be started on PD %s from PD %s, as SAS/SATA is not supported in an array
0x012b	299	Information	Microcode update started on PD %s
0x012c	300	Information	Microcode update completed on PD %s
0x012d	301	Warning	Microcode update timeout on PD %s
0x012e	302	Warning	Microcode update failed on PD %s
0x012f	303	Information	Controller properties changed
0x0130	304	Information	Patrol Read properties changed
0x0131	305	Information	CC Schedule properties changed
0x0132	306	Information	Battery properties changed
0x0133	307	Warning	Periodic Battery Relearn is pending. Please initiate manual learn cycle as Automatic learn is not enabled
0x0134	308	Information	Drive security key created
0x0135	309	Information	Drive security key backed up
0x0136	310	Information	Drive security key from escrow, verified
0x0137	311	Information	Drive security key changed
0x0138	312	Warning	Drive security key, re-key operation failed
0x0139	313	Warning	Drive security key is invalid
0x013a	314	Information	Drive security key destroyed
0x013b	315	Warning	Drive security key from escrow is invalid
0x013c	316	Information	VD %s is now secured
0x013d	317	Warning	VD %s is partially secured

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Table 48 Event Messages

Number (Hex)	Number (Decimal)	Type	Event Text
0x013e	318	Information	PD %s security activated
0x013f	319	Information	PD %s security disabled
0x0140	320	Information	PD %s is reprovisioned
0x0141	321	Information	PD %s security key changed
0x0142	322	Fatal	Security subsystem problems detected for PD %s
0x0143	323	Fatal	Controller cache pinned for missing or offline VD %s
0x0144	324	Fatal	Controller cache pinned for missing or offline VDs: %s
0x0145	325	Information	Controller cache discarded by user for VDs: %s
0x0146	326	Information	Controller cache destaged for VD %s
0x0147	327	Warning	Consistency Check started on an inconsistent VD %s
0x0148	328	Warning	Drive security key failure, cannot access secured configuration
0x0149	329	Warning	Drive security password from user is invalid
0x014a	330	Warning	Detected error with the remote battery connector cable
0x014b	331	Information	Power state change on PD %s from %s to %s
0x014c	332	Information	Enclosure %s element (SES code 0x%x) status changed
0x014d	333	Information	PD %s rebuild not possible as HDD/CacheCade software mix is not supported in a drive group
0x014e	334	Information	Copyback cannot be started on PD %s from %s, as HDD/CacheCade software mix is not supported in a drive group
0x014f	335	Information	VD bad block table on %s is cleared
0x0150	336	Caution	SAS topology error: 0x%lx
0x0151	337	Information	VD cluster of medium errors corrected for %s at %lx (on %s at %lx)
0x0152	338	Information	Controller requests a host bus rescan
0x0153	339	Information	Controller repurposed and factory defaults restored
0x0154	340	Information	Drive security key binding updated
0x0155	341	Information	Drive security is in EKM mode
0x0156	342	Warning	Drive security failed to communicate with EKMS
0x0157	343	Information	%s needs key to be %s %s
0x0158	344	Warning	%s secure failed
0x0159	345	Critical	Controller encountered a fatal error and was reset
0x015a	346	Information	Snapshots enabled on %s (Repository %s)
0x015b	347	Information	Snapshots disabled on %s (Repository %s) by the user
0x015c	348	Critical	Snapshots disabled on %s (Repository %s), due to a fatal error
0x015d	349	Information	Snapshot created on %s at %s
0x015e	350	Information	Snapshot deleted on %s at %s
0x015f	351	Information	View created at %s to a snapshot at %s for %s
0x0160	352	Information	View at %s is deleted, to snapshot at %s for %s
0x0161	353	Information	Snapshot rollback started on %s from snapshot at %s
0x0162	354	Fatal	Snapshot rollback on %s internally aborted for snapshot at %s

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Table 48 Event Messages

Number (Hex)	Number (Decimal)	Type	Event Text
0x0163	355	Information	Snapshot rollback on %s completed for snapshot at %s
0x0164	356	Information	Snapshot rollback progress for snapshot at %s, on %s is %s
0x0165	357	Warning	Snapshot space for %s in snapshot repository %s, is 80%% full
0x0166	358	Critical	Snapshot space for %s in snapshot repository %s, is full
0x0167	359	Warning	View at %s to snapshot at %s, is 80%% full on snapshot repository %s
0x0168	360	Critical	View at %s to snapshot at %s, is full on snapshot repository %s
0x0169	361	Critical	Snapshot repository lost for %s
0x016a	362	Warning	Snaphot repository restored for %s
0x016b	363	Critical	Snapshot encountered an unexpected internal error: 0x%lx
0x016c	364	Information	Auto Snapshot enabled on %s (snapshot repository %s)
0x016d	365	Information	Auto Snapshot disabled on %s (snapshot repository %s)
0x016e	366	Critical	Configuration command could not be committed to disk, please retry
0x016f	367	Information	COD on %s updated as it was stale
0x0170	368	Warning	Power state change failed on %s (from %s to %s)
0x0171	369	Warning	%s is not available
0x0172	370	Information	%s is available
0x0173	371	Information	%s is used for CacheCade with capacity 0x%lx logical blocks
0x0174	372	Information	%s is using CacheCade %s
0x0175	373	Information	%s is no longer using CacheCade %s
0x0176	374	Critical	Snapshot deleted due to resource constraints for %s in snapshot repository %s
0x0177	375	Warning	Auto Snapshot failed for %s in snapshot repository %s
0x0178	376	Warning	Controller reset on-board expander
0x0179	377	Warning	CacheCade (%s) capacity changed and is now 0x%lx logical blocks
0x017a	378	Warning	Battery cannot initiate transparent learn cycles
0x017b	379	Information	Premium feature %s key was applied for - %s
0x017c	380	Information	Snapshot schedule properties changed on %s
0x017d	381	Information	Snapshot scheduled action is due on %s
0x017e	382	Information	Performance Metrics: collection command 0x%lx
0x017f	383	Information	Premium feature %s key was transferred - %s
0x0180	384	Information	Premium feature serial number %s
0x0181	385	Warning	Premium feature serial number mismatched. Key-vault serial num - %s
0x0182	386	Warning	Battery cannot support data retention for more than %d hours. Please replace the battery
0x0183	387	Information	%s power policy changed to %s (from %s)
0x0184	388	Warning	%s cannot transition to max power savings
0x0185	389	Information	Host driver is loaded and operational
0x0186	390	Information	%s mirror broken
0x0187	391	Information	%s mirror joined
0x0188	392	Warning	%s link %d failure in wide port

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Table 48 Event Messages

Number (Hex)	Number (Decimal)	Type	Event Text
0x0189	393	Information	%s link %d restored in wide port
0x018a	394	Information	Memory module FRU is %s
0x018b	395	Warning	Cache-vault power pack is sub-optimal. Please replace the pack
0x018c	396	Warning	Foreign configuration auto-import did not import any drives
0x018d	397	Warning	Cache-vault microcode update required
0x018e	398	Warning	CacheCade (%s) capacity exceeds maximum allowed size, extra capacity is not used
0x018f	399	Warning	LD (%s) protection information lost
0x0190	400	Information	Diagnostics passed for %s
0x0191	401	Critical	Diagnostics failed for %s
0x0192	402	Information	Server Power capability Diagnostic Test Started
0x0193	403	Information	Drive Cache settings enabled during rebuild for %s
0x0194	404	Information	Drive Cache settings restored after rebuild for %s
0x0195	405	Information	Drive %s commissioned as Emergency spare
0x0196	406	Warning	Reminder: Potential non-optimal configuration due to drive %s commissioned as emergency spare
0x0197	407	Information	Consistency Check suspended on %s
0x0198	408	Information	Consistency Check resumed on %s
0x0199	409	Information	Background Initialization suspended on %s
0x019a	410	Information	Background Initialization resumed on %
0x019b	411	Information	Reconstruction suspended on %s
0x019c	412	Information	Rebuild suspended on %
0x019d	413	Information	Copyback suspended on %s
0x019e	414	Information	Reminder: Consistency Check suspended on %
0x019f	415	Information	Reminder: Background Initialization suspended on %s
0x01a0	416	Information	Reminder: Reconstruction suspended on %s
0x01a1	417	Information	Reminder: Rebuild suspended on %s
0x01a2	418	Information	Reminder: Copyback suspended on %s
0x01a3	419	Information	Reminder: Patrol Read suspended
0x01a4	420	Information	Erase aborted on %s
0x01a5	421	Critical	Erase failed on %s (Error %02x)
0x01a6	422	Progress	Erase progress on %s is %s
0x01a7	423	Information	Erase started on %s
0x01a8	424	Information	Erase completed on %s
0x01a9	425	Information	Erase aborted on %s
0x01aa	426	Critical	Erase failed on %s
0x01ab	427	Progress	Erase progress on %s is %s
0x01ac	428	Information	Erase started on %s
0x01ad	429	Information	Erase complete on %s

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Table 48 Event Messages

Number (Hex)	Number (Decimal)	Type	Event Text
0x01ae	430	Warning	Potential leakage during erase on %s
0x01af	431	Warning	Battery charging was suspended due to high battery temperature
0x01b0	432	Information	NVCache firmware update was successful
0x01b1	433	Warning	NVCache firmware update failed
0x01b2	434	Fatal	%s access blocked as cached data in CacheCade is unavailable
0x01b3	435	Information	CacheCade disassociate started on %s
0x01b4	436	Information	CacheCade disassociate completed on %s
0x01b5	437	Critical	CacheCade disassociate failed on %s
0x01b6	438	Progress	CacheCade disassociate progress on %s is %s
0x01b7	439	Information	CacheCade disassociate aborted by user on %s
0x01b8	440	Information	Link speed changed on SAS port %d and PHY %d
0x01b9	441	Warning	Advanced Software Options was deactivated for - %s
0x01ba	442	Information	%s is now accessible
0x01bb	443	Information	%s is using CacheCade
0x01bc	444	Information	%s is no longer using CacheCade
0x01bd	445	Information	Patrol Read aborted on %s

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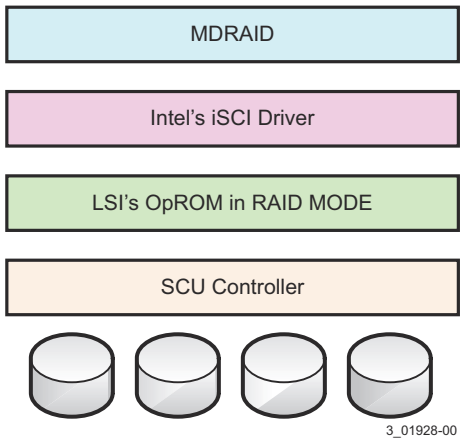
Appendix B: MDRAID Migration

This appendix describes the process to migrate from ServeRAID to MDRAID.

Perform the following steps to run MDRAID and check if the DDF created using ServeRAID is recognized on the Romley platform:

1. Set AHCI in AHCI/Compatibility/Enhanced mode (non LSI mode).
2. Set SCU in LSI's RAID mode.
3. Install the OS on AHCI controller.
4. Create RAID 0/RAID 1 or RAID 5 volumes using pre-boot applications.
5. Boot into the OS using the `nodmraid` option, the native iSCI driver would claim the SCU controller and discover the drives.
6. Use MDADM to import the VOLUMES created using ServeRAID's pre-boot applications by performing the following steps:
   a. `fdisk -l` (show all connected disk)
   b. `mdadm --examine /dev/devicename` (examine all connected hard disks)
   c. `mdadm --examine --scan --config=mdadm.conf > /etc/mdadm.conf` (populate the mdadm.conf file)
   d. `mdadm --assemble -scan` (scan all the PD's and create the mdraid volume)
   e. `mdadm /proc/mdstat` or `mdadm --detail /dev/md126`
7. Create file system over the imported MDRAID volume and perform the I/O operations.

Figure 66 Setup After Migration



Perform the following steps to run MDRAID and check if the DDF created using ServeRAID is recognized on the Denlow Platform:

1. Install the OS on AHCI controller in AHCI mode.
2. Halt the system and remove the OS PD.
3. Set AHCI in LSI RAID mode.
4. Create RAID 0/RAID 1 or RAID 5 volumes using pre-boot applications.
5. Reboot and set the AHCI in AHCI mode.
6. Connect the OS PD into any one of the available AHCI port.
7. Boot into the OS with `nodmraid` option, the native AHCI driver would claim the AHCI controller and discover the drives.
8. Use MDADM to import the VOLUMES created using LSI's SWR pre-boot applications. Use the following steps –
9. fdisk -l (this will shows all the connected disk)
    a. `mdadm --examine /dev/devicename` (examine all connected hard disks)
    b. `mdadm --examine --scan --config=mdadm.conf > /etc/mdadm.conf` (populate the mdadm.conf file)
    c. `mdadm --assemble –scan` (scan all the PD's and create the mdraid volume)
    d. `mdadm /proc/mdstat` or `mdadm --detail /dev/md126`
10. Create file system over the imported MDRAID volume and perform the I/O operations.

Part number: 60Y1450