



**Marvell. Moving Forward Faster**

# ▶ **Marvell Storage Utility**

## User Manual for 88SE91xx

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# 1 GETTING STARTED

This chapter contains the following sections:

- [Overview](#)
- [Installing the Marvell Storage Utility \(MSU\)](#)

## 1.1 Overview

The Marvell Storage Utility (MSU), formerly the Marvell RAID Utility (MRU), is a browser-based management utility for Marvell 88SE91xx controllers. Using storage and enclosure devices connected to the controller, it can create and manage RAID and HyperDuo virtual disks and arrays.

This section discusses the following:

- [Software Components](#)
- [System Requirements](#)
- [Supported Browsers](#)
- [Supported Operating Systems](#)
- [Supported RAID Levels](#)

### 1.1.1 Software Components

The MSU installation package includes the following components:

- **Marvell Storage Utility (MSU)**  
MSU is a browser-based utility which can create and manage RAID and HyperDuo virtual disks and arrays. It can control both local and remote RAID controllers.
- **Tray Application for Windows**  
The tray application appears as an icon in the Windows System Tray and has right-click menu options for controlling MSU.

**Note:** The Marvell BIOS Configuration Utility (a built-in component of Marvell RAID controllers) can also create and manage RAID or HyperDuo virtual disks and arrays. Documentation for the Marvell BIOS Configuration Utility is available separately on the Marvell Extranet.

### 1.1.2 System Requirements

MSU has the following system requirements:

- Local/remote Marvell 88SE91xx controller (with drivers installed)
- Network connection (for remote controllers)
- Supported browser (see 1.1.3, [Supported Browsers](#))
- Supported operating system (see section 1.1.4, [Supported Operating Systems](#))

### 1.1.3 Supported Browsers

MSU supports the following browsers:

- Microsoft Internet Explorer 6.0 (and higher)
- Firefox 3.0 (and higher)

#### 1.1.4 Supported Operating Systems

MSU currently supports the following operating systems:

- Windows XP
- Windows Server 2003
- Windows Vista
- Windows Server 2008
- Windows 7

#### 1.1.5 Supported RAID Levels

MSU supports the following RAID levels:

- RAID 0 (Striping)
- RAID 1 (Disk Mirroring)

## 1.2 Installing the Marvell Storage Utility (MSU)

This section discusses the following:

- [Installing the 88SE91xx Controller](#)
- [Connecting Physical Disks](#)
- [Installing MSU in Windows](#)

### 1.2.1 Installing the 88SE91xx Controller

Before installing MSU, install the 88SE91xx controller in the system. Refer to the controller HBA (Host Bus Adapter) or evaluation board documentation for hardware and software installation instructions.

### 1.2.2 Connecting Physical Disks

After installing the controller, connect physical disks to the controller.

#### To connect physical disks

1. Select a RAID level that is best suited for your application.  
For information on RAID levels, see Appendix B, [Selecting a RAID Level](#).  
**Note:** If you are using HyperDuo, you can skip this step.
2. Connect the required number of physical disks to available ports on the controller, either directly or through a backplane/enclosure. Refer to the controller HBA or evaluation board documentation for installation instructions.
3. Power-up the physical disks.  
**Note:** To create virtual disks and arrays, only use physical disks connected to a single controller.

### 1.2.3 Installing MSU in Windows

This section discusses the following:

- [Verifying 88SE91xx Controller Drivers Installation](#)
- [Installing MSU in Windows](#)

#### 1.2.3.1 Verifying 88SE91xx Controller Drivers Installation

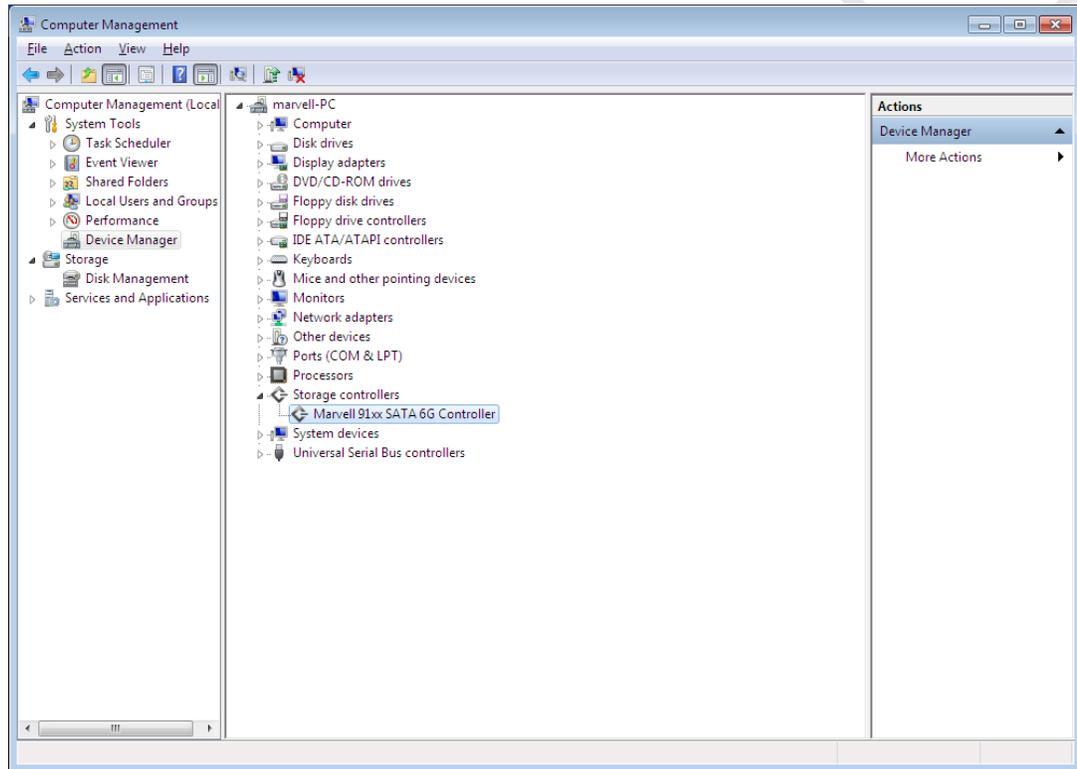
Before installing MSU, verify that the drivers for the 88SE91xx controller are installed. If the drivers are installed correctly, the controller is listed in the Windows Device Manager.

#### To verify drivers installation

1. From the **Start** menu, right-click **My Computer**, and select **Manage**.  
The **Computer Management** utility appears, as shown in Figure 1-1.
2. Browse to **System Tools > Device Manager**.

3. If the drivers are installed correctly, the RAID controller is listed under one of the following categories:
  - **SCSI and RAID controllers** (for Windows XP and Windows Server 2003)
  - **Storage controllers** (for Windows Vista, Windows Server 2008, and Windows 7).

**Figure 1-1 Device Manager (Windows 7)**



**Note:** Figure 1-1 shows the Device Manager on Windows 7 with an example 88SE91xx controller (Marvell 88SE91xx SATA 6G Controller) installed.

### 1.2.3.2 Installing MSU in Windows

This section describes the procedure for installing MSU in Windows.

#### To install MSU in Windows

1. Verify that the drivers for the RAID controller are installed, as described in section 1.2.3.1, [Verifying 88SE91xx Controller Drivers Installation](#).
2. Run **MSUSetup.exe**.

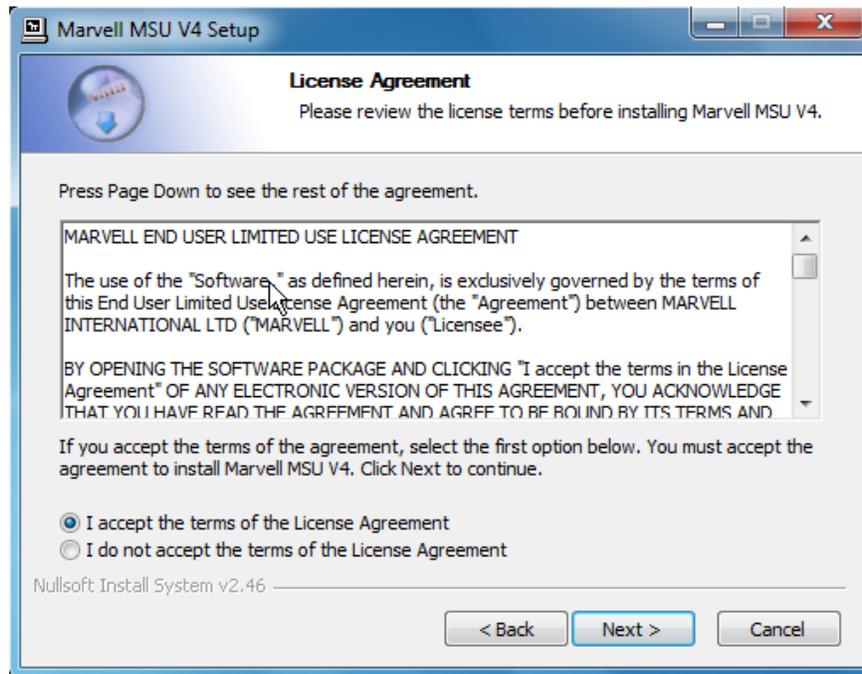
The **MSU Setup Wizard** appears, as shown in Figure 1-2.

Figure 1-2 MSU Setup Wizard



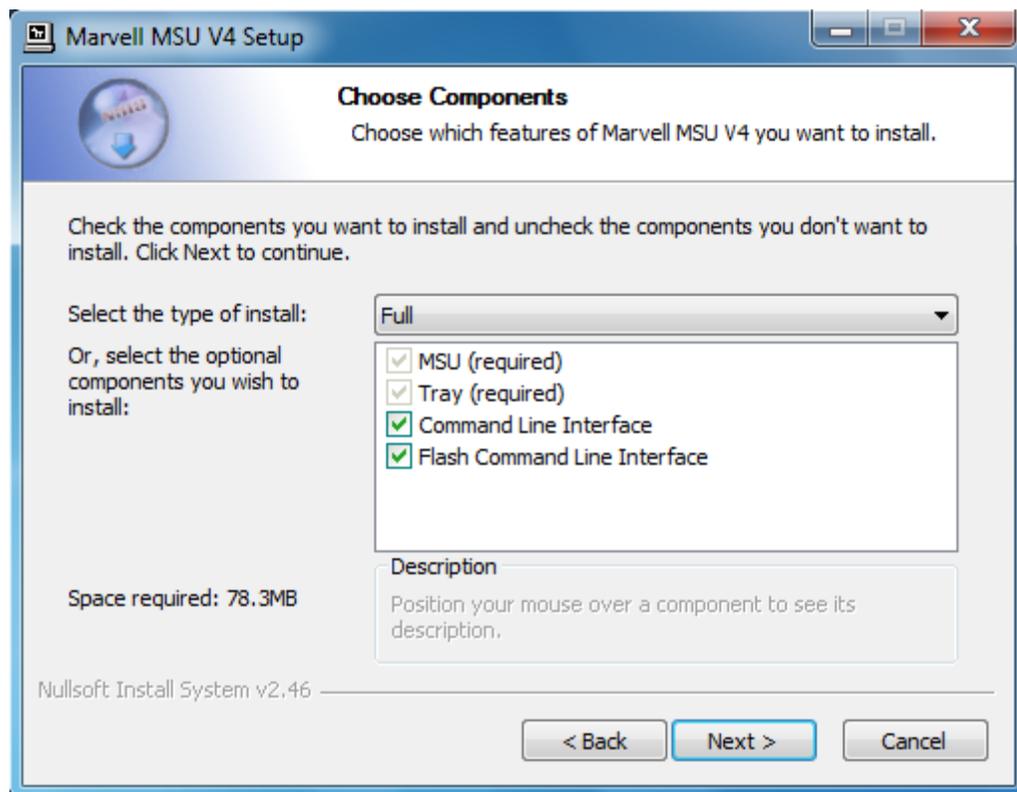
3. Select **Next**, as shown in Figure 1-2.  
The **License Agreement** window appears, as shown in Figure 1-3.

Figure 1-3 License Agreement



4. Read the **License Agreement**.  
Select **I accept the terms of the License Agreement**, as shown in Figure 1-3.
5. Select **Next**, as shown in Figure 1-3, to continue with the installation.  
The **Choose Components** window appears, as shown in Figure 1-4.

Figure 1-4 Choose Components



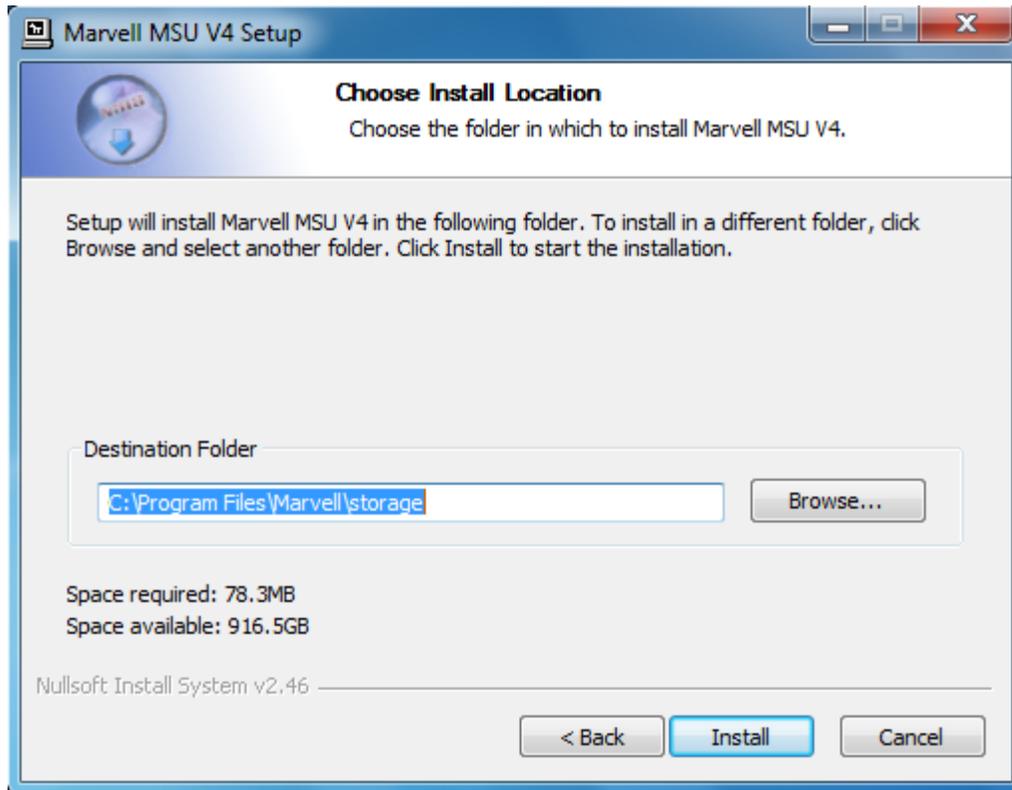
**Note:** Installation of the Command Line Interface utility and Flash Command Line Interface utility is optional and disabled by default. Check these components if you wish to install them.

6. Select **Next**, as shown in Figure 1-4.

The **Choose Install Location** window appears, as shown in Figure 1-5, with the default location displayed in the **Destination Folder** field.

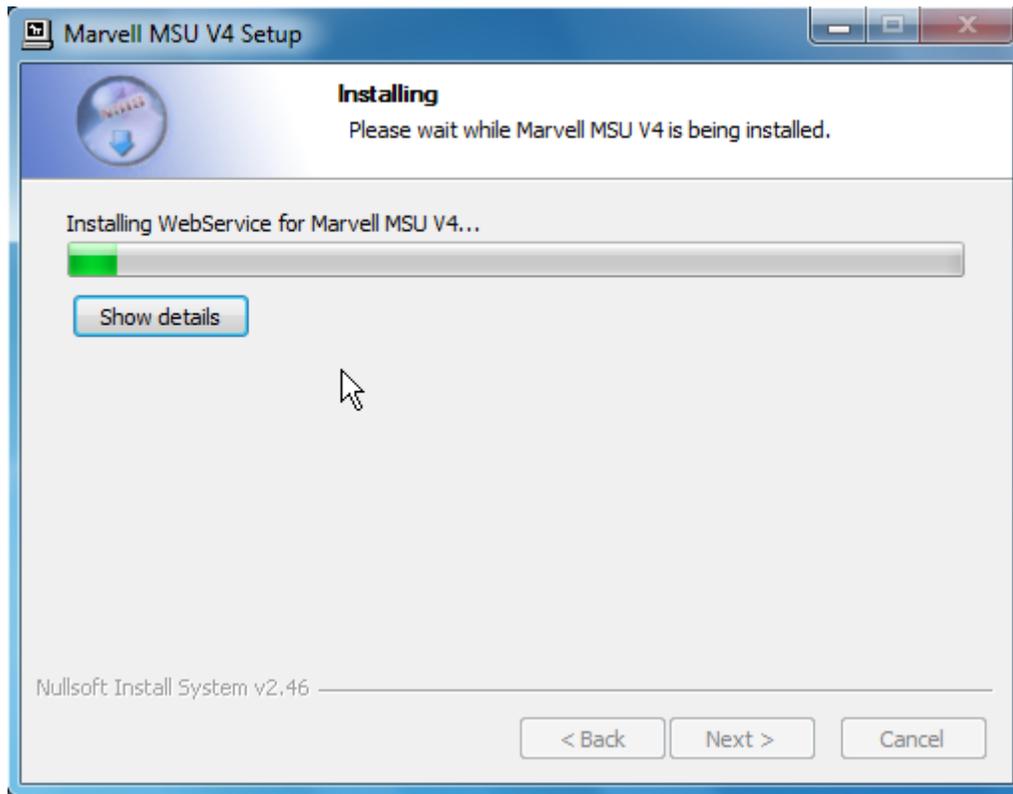
7. Select **Browse**, as shown in Figure 1-5, to specify an alternate folder if required.

Figure 1-5 Choose Install Location



8. Select **Install**, as shown in Figure 1-5, to begin installation.  
The installation wizard displays progress, as shown in Figure 1-6.

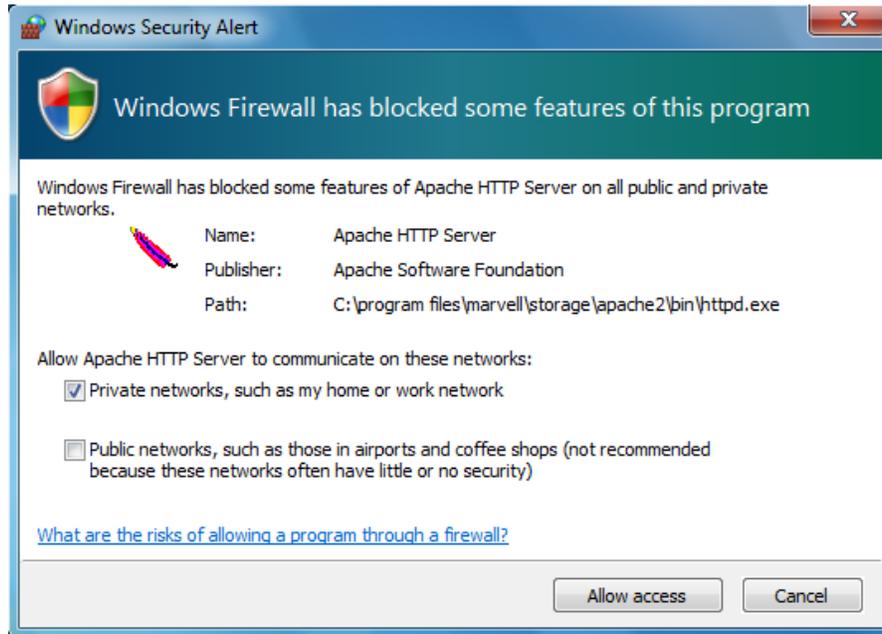
Figure 1-6 Installation Progress



9. After installing the Apache2 HTTP Server (which is a built-in component of the installation package), the installation triggers a **Windows Security Alert** on some versions of Windows, as shown in Figure 1-7.

Select **Unblock** or **Allow Access** to continue.

Figure 1-7 Windows Security Alert



**Note:** Figure 1-7 shows the Security Alert that appears in Windows 7. The alert is similar for other Windows operating systems.

10. When the installation is complete, the wizard confirms the completion, as shown in Figure 1-8.  
Click **Finish**, as shown in Figure 1-8. MSU is now installed.

Figure 1-8 Installation Complete



## 2 MARVELL STORAGE UTILITY (MSU)

This chapter contains the following sections:

- [Overview](#)
- [Enabling Scripting](#)
- [Opening MSU](#)
- [Tray Application for Windows](#)
- [Login](#)
- [User Interface](#)
- [Logout](#)

## 2.1 Overview

The Marvell Storage Utility (MSU) is a browser-based management utility for Marvell 88SE91xx controllers. It can create and manage RAID and HyperDuo virtual disks and arrays, using storage and enclosure devices connected to the 88SE91xx controller. This chapter provides an introduction to MSU and an overview of its user interface. In the chapters that follow, MSU is described in detail for each of the following functions:

- RAID Virtual Disks and Arrays (see Chapter 3, [MSU for RAID](#))
- HyperDuo Virtual Disks (see Chapter 4, [MSU for HyperDuo](#))

## 2.2 Enabling Scripting

Before opening MSU, verify that Active Scripting or JavaScript is enabled in the browser. This section discusses the following:

- [Enabling Active Scripting in Internet Explorer](#)
- [Verifying JavaScript is Enabled in Firefox](#)

### 2.2.1 Enabling Active Scripting in Internet Explorer

This section describes the procedure to enable Active Scripting in Internet Explorer.

**Note:** Active Scripting might be disabled by default for some versions of Windows.

#### To enable Active Scripting in Internet Explorer

1. From the menu bar, select **Tools > Internet Options**, as shown in Figure 2-1.  
The **Internet Options** dialog box appears, with the **General** tab selected, as shown in Figure 2-2.

Figure 2-1 Internet Explorer Tools Menu

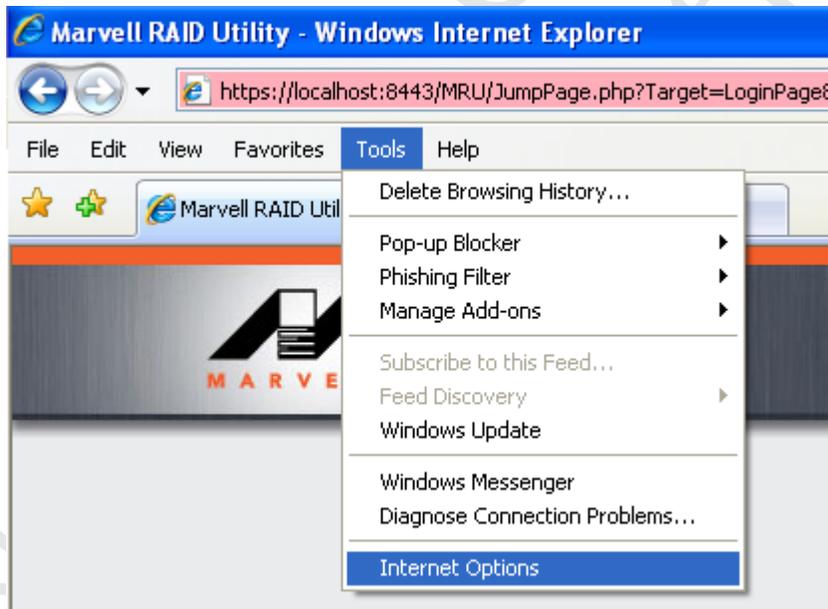
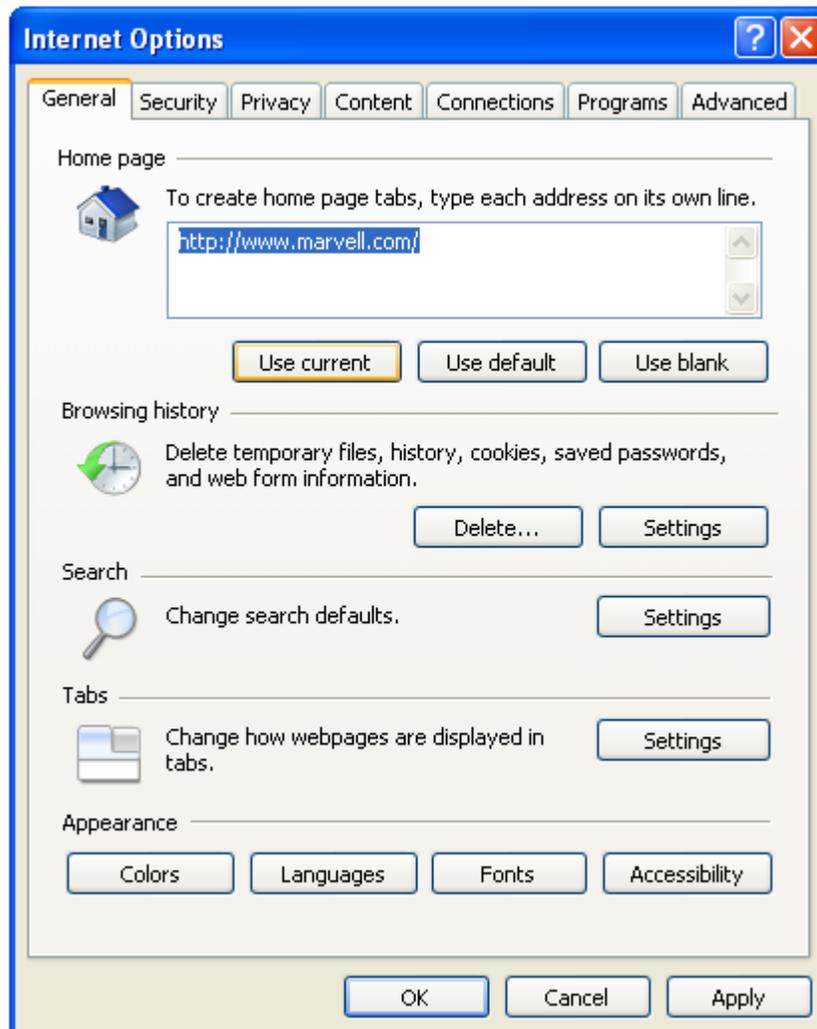


Figure 2-2 Internet Options



2. Select the **Security** tab, as shown in Figure 2-3.

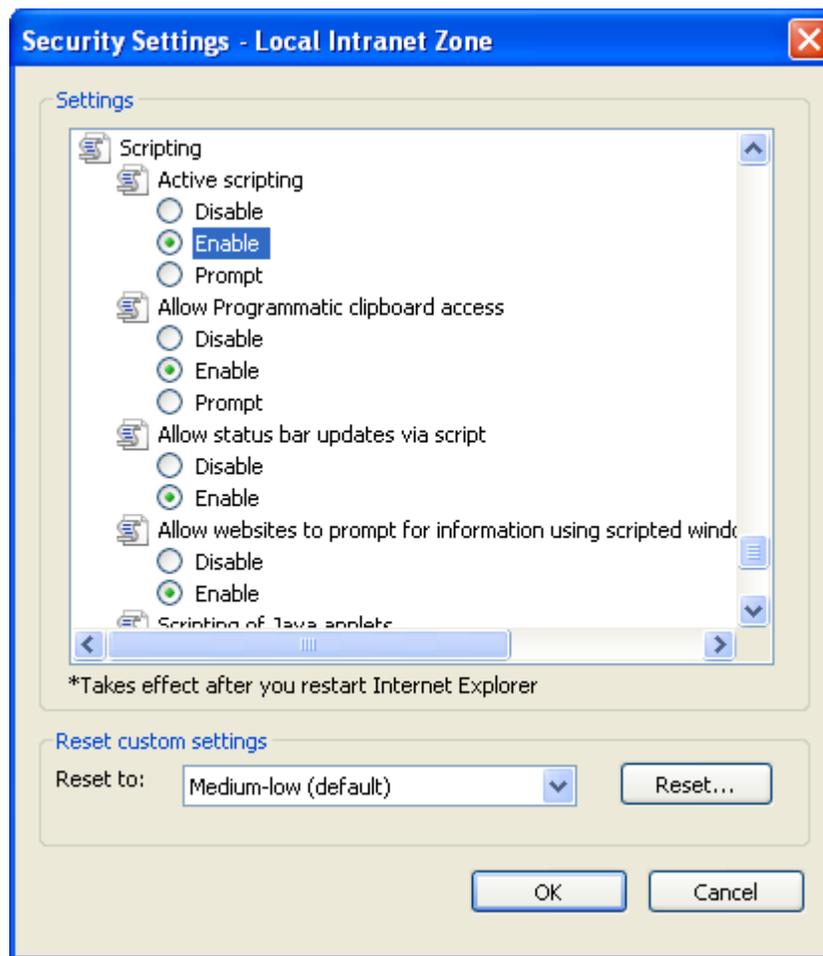
Figure 2-3 Security



3. Select **Local Intranet** under **Select a zone to view or change security settings**.
4. Select **Custom level...**, as shown in Figure 2-3.

The **Security Settings - Local Intranet Zone** dialog box appears, as shown in Figure 2-4.

Figure 2-4 Security Settings - Internet Zone



5. In the list of settings, browse to **Scripting > Active scripting**.
6. Select **Enable** to enable **Active scripting** as shown in Figure 2-4.
7. Select **OK** to confirm the selection.  
This closes the **Security Settings - Local Intranet Zone** dialog box.
8. Select **OK** to exit the **Internet Options** dialog.

### 2.2.2 Verifying JavaScript is Enabled in Firefox

This section describes the procedure to verify that JavaScript is enabled in Firefox.

**Note:** JavaScript is enabled by default in Firefox. If MSU does not open in Firefox, verify that JavaScript is enabled.

#### To verify that JavaScript is enabled in Firefox

1. From the menu bar, select **Tools > Options...**, as shown in Figure 2-5.  
The **Options** dialog box appears, with the **General** tab selected, as shown in Figure 2-6.

Figure 2-5 Firefox Tools Menu

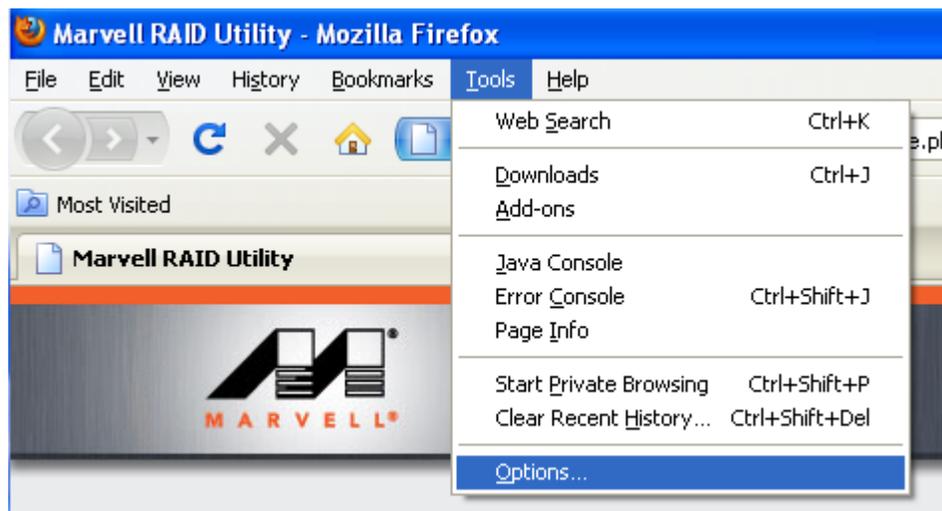
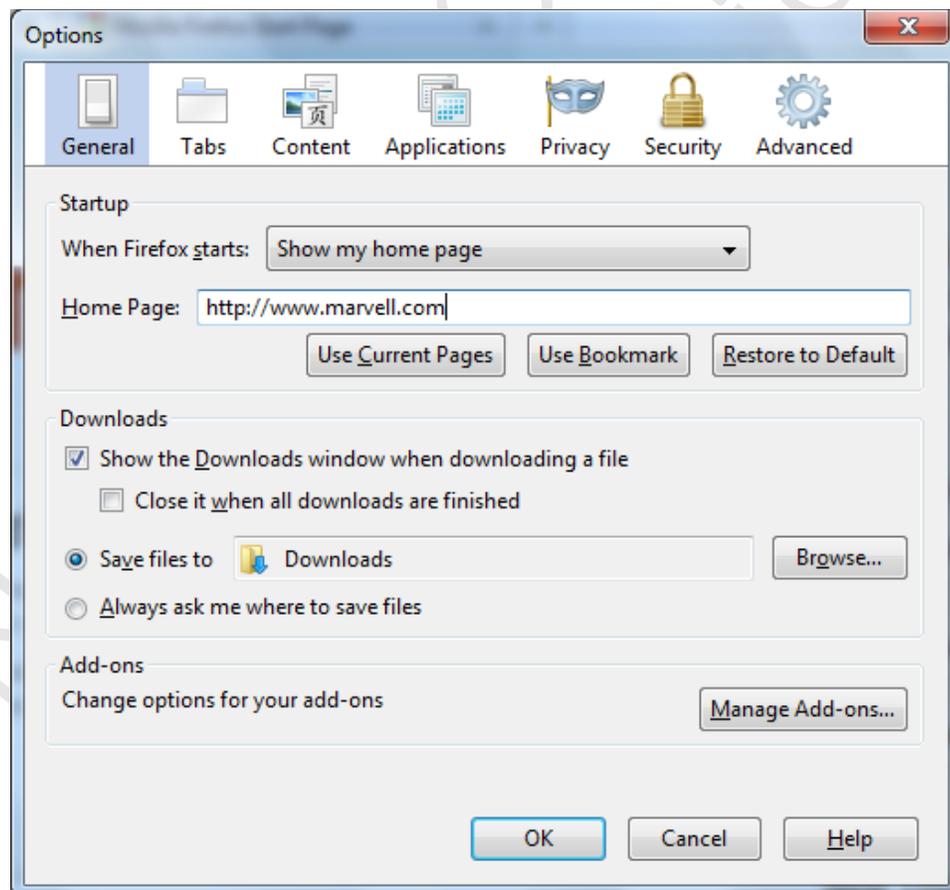


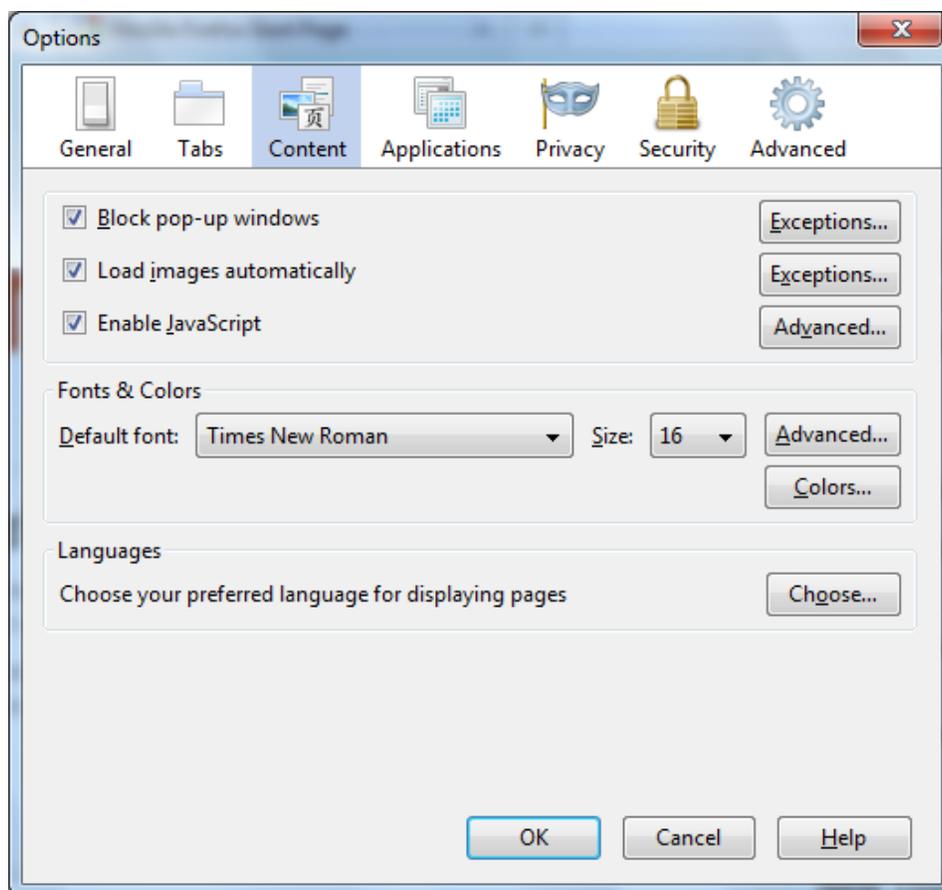
Figure 2-6 Firefox Options Dialog



2. Select the **Content** tab, as shown in Figure 2-6.

- As shown in Figure 2-7, **Enable Javascript** should be selected by default. Enable Javascript if it is disabled.

Figure 2-7 Content



- Select **OK** to confirm the selection. This closes the **Options** dialog.

## 2.3 Opening MSU

This section discusses the following:

- [Opening MSU in Windows](#)
- [Tray Application for Windows](#)

### 2.3.1 Opening MSU in Windows

This section describes the procedure to open MSU in Windows.

#### To open MSU in Windows

1. Verify that Active Scripting or JavaScript is enabled in the default browser, as described in 2.2, [Enabling Scripting](#).
2. Open MSU.

The MSU can be opened using any of the following methods:

- Double-click the desktop shortcut for MSU, as shown in Figure 2-8.

Figure 2-8 MSU Desktop Shortcut



OR

- Right-click the desktop shortcut for MSU, and select **Open**.

OR

- Double-click the MSU Tray Application icon.

OR

- Right-click the MSU Tray Application icon, and select **Open MSU**.

3. Upon opening, the **Login** page appears, as described in 2.5, [Login](#).

#### To control a local 88SE91xx controller

4. By default, MSU uses the following URL to select the default local 88SE91xx controller (if any) installed on the local system.

```
https://localhost:8443/MSU/JumpPage.php?Target=LoginPage
```

**Note:** If MSU does not open the login page, replace `localhost` in the URL with the IP address of the local controller (127.0.0.1).

#### To control a remote RAID controller

5. Type the following URL the browser address bar.

```
https://ip_address:8443/MSU/JumpPage.php?Target=LoginPage
```

**Note:** Replace `ip_address` with the IP address of the remote RAID controller. Alternatively, you can use the System Name instead of the IP address in most internal network environments.

## 2.4 Tray Application for Windows

When MSU opens in Windows, the Tray Application appears in the System Tray, as shown in Figure 2-9.

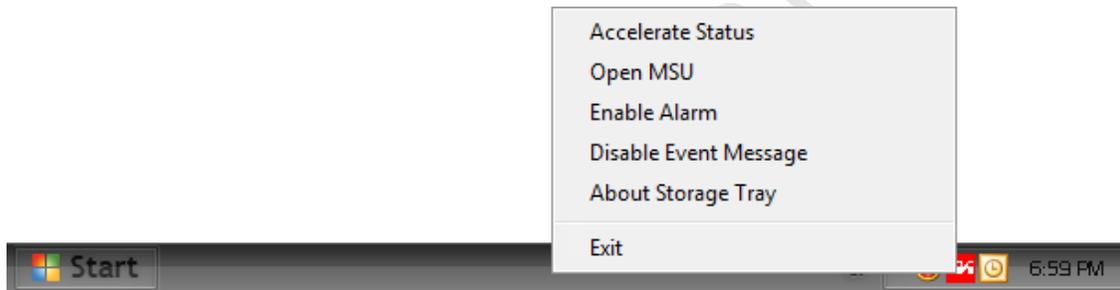
Figure 2-9 Tray Application



The Tray Application provides right-click menu options for controlling the MSU, as shown in Figure 2-10. The menu has options for performing the following tasks:

- Accelerate Status
- Open MSU
- Enable/Disable Alarm
- Enable/Disable Pop-up Event Messages
- View Version Information
- Exit MSU

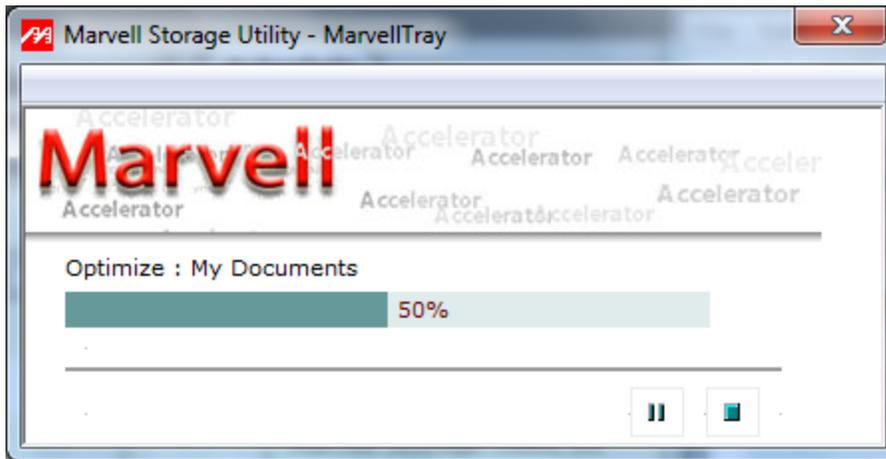
Figure 2-10 Tray Application: Right-click Menu



### 2.4.1 Accelerate Status

Select **Accelerate Status** to see a pop-up window that displays the status of a scheduled acceleration task, as shown in Figure 2-11.

Figure 2-11 Tray Application: Accelerate Status



#### 2.4.2 Open MSU

Select **Open MSU** to open MSU in the system's default browser.

**Note:** You can also open MSU by double-clicking the Tray Application icon.

#### 2.4.3 Enable/Disable Alarm

The audible alarm is disabled by default. To enable the audible alarm for critical and warning events, select **Enable Alarm**. The alarm is played through speakers connected to the Line Out jack on the computer's sound card. On controller HBAs and evaluation boards with on-board buzzer, the hardware buzzer is also sounded.

**Note:** The audible alarm uses the file `c:/program files/marvell/raid/tray/alarm.wav`.

#### 2.4.4 Enable/Disable Pop-up Event Messages

Event messages are pop-up messages that appear above the System Tray, as shown in Figure 2-12. Event messages are enabled by default.

Select **Enable Event Messages** and **Disable Event Messages** to toggle between enable/disable states.

Figure 2-12 Tray Application: Pop-up Event Message



#### 2.4.5 View Version Information

Select **About Storage Tray** to view version information for the MSU Tray Application.

#### 2.4.6 Exit MSU

Select **Exit** to exit MSU (and the Tray Application).

## 2.5 Login

This section discusses the following:

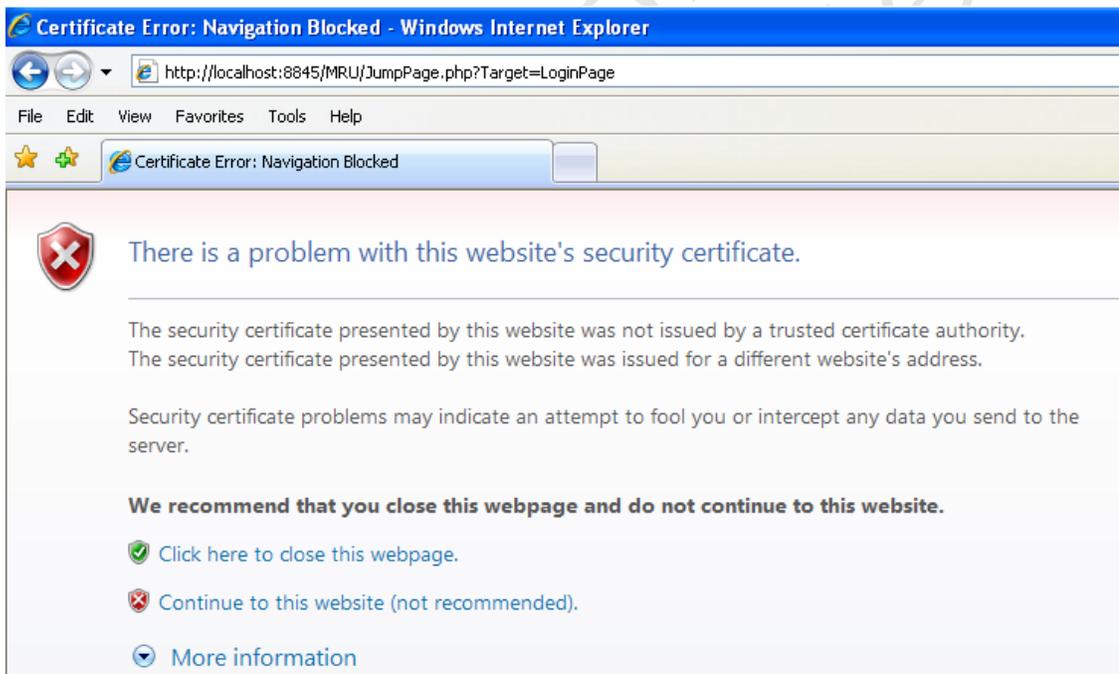
- [Security Warning](#)
- [Login Page](#)

### 2.5.1 Security Warning

**Note:** This section only applies to Internet Explorer.

When opening MSU in some versions of Windows, Internet Explorer may detect a problem with the security certificate for the MSU web page, as shown in Figure 2-13. Select **Continue to this website (not recommended)**, as shown in Figure 2-13, to continue opening MSU.

**Figure 2-13 Internet Explorer: Website Security Certificate Warning**



### 2.5.2 Login Page

When MSU opens, it prompts for the user's operating system (or network) credentials, as shown in Figure 2-14. Users with administrator privileges are granted full read/modify permission in MSU. Users without administrator privileges are granted view-only permission in MSU.

Figure 2-14 MSU Login



The screenshot shows a login window with a light blue background and a grey header and footer. On the left side, there is a faint image of a person in a suit. The main area contains the following elements:

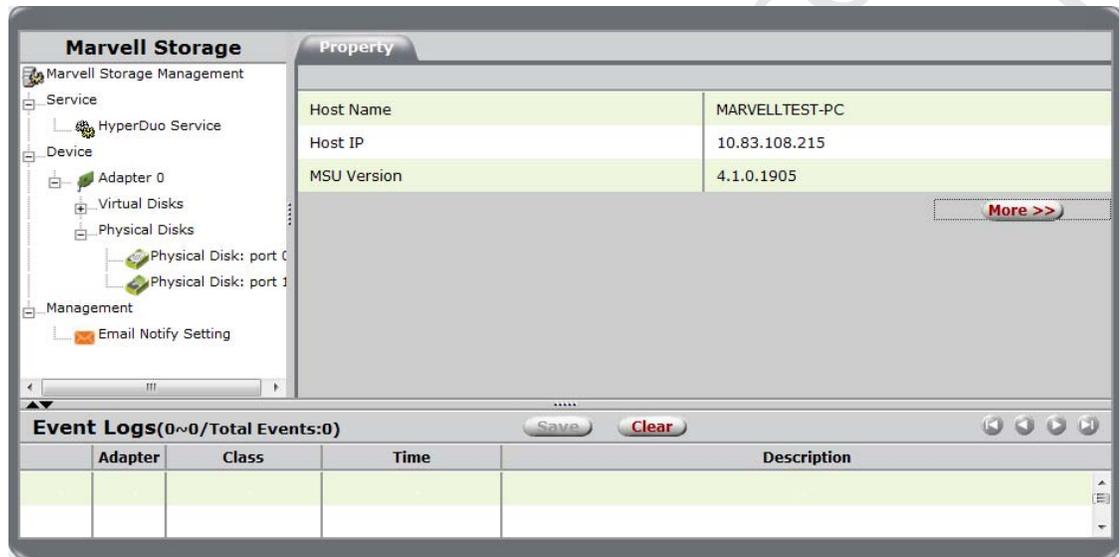
- \* Username  (Domain\UserName)
- \* Password
- Remember password
- A **Login** button at the bottom center.

## 2.6 User Interface

The MSU user interface, as shown in Figure 2-15, contains the following three panes:

- Marvell Storage Management
- Properties
- Event Logs

Figure 2-15 MSU User Interface

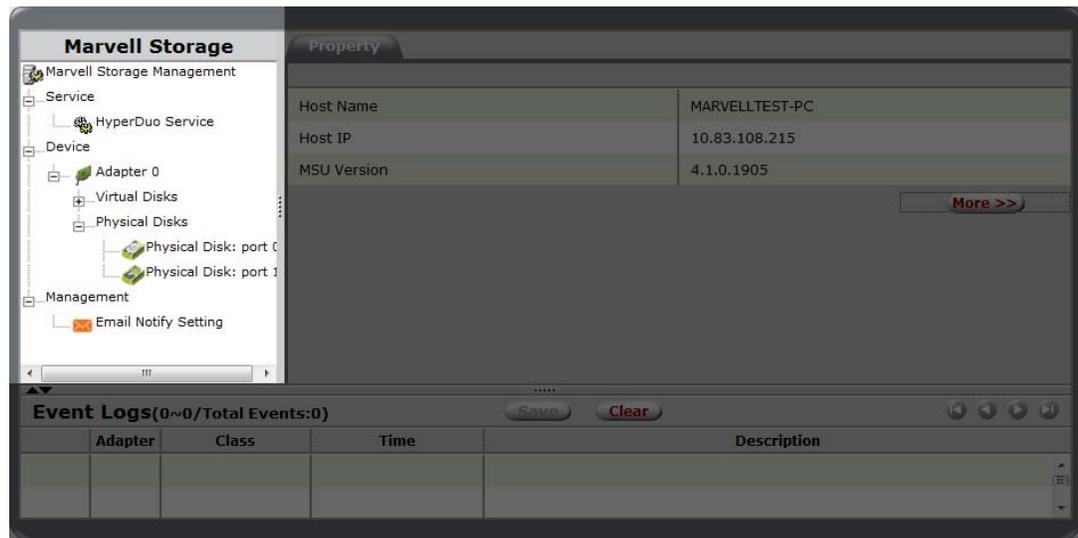


### 2.6.1 Marvell Storage Management

As shown in Figure 2-16, the Marvell Storage Management pane uses a *tree* view to list and show the relationships between the various physical/virtual devices attached to the system. Depending on the usage of the controller, this list includes the following devices and services:

- Adapter
- Physical Disk
- Virtual Disk
- Array
- Enclosures
- Battery
- HyperDuo Service
- Email Notify Setting

Figure 2-16 Marvell Storage Management Pane

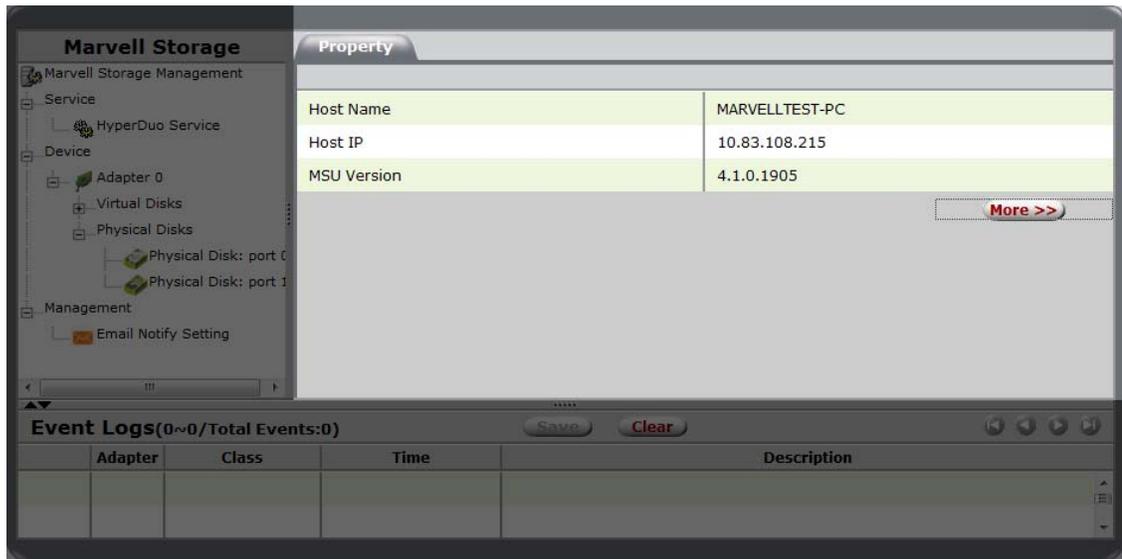


## 2.6.2 Properties

As shown in Figure 2-17, the Properties pane lists the properties of the device selected in the System pane. The Properties pane contains tabs at the top. Depending on the device selected in the System pane, one or more of the following tabs appear:

- **Property**  
Select Property to view/modify the properties of the device selected in the System pane.
- **Operation**  
Roll-over the Operation tab to view a menu of operations that can be performed on the device selected in the System pane.
- **Programs**  
This tab allows you to configure the virtual disk.
- **Schedule**  
This tab allows you to schedule regular maintenance tasks.

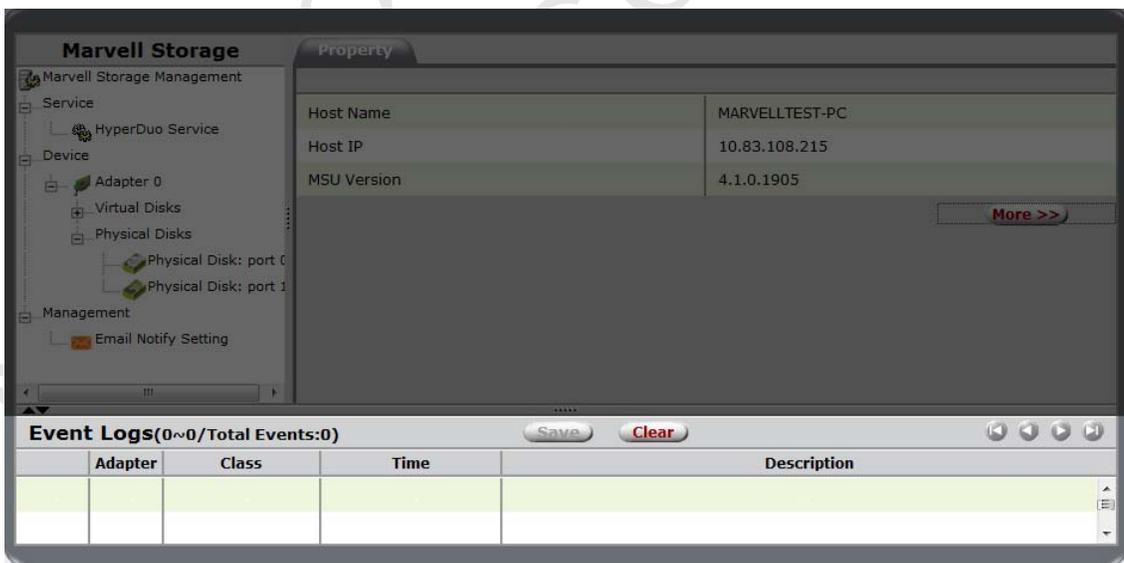
Figure 2-17 Properties Pane



### 2.6.3 Event Logs

As shown in Figure 2-18, the Events Logs pane lists adapter events. The events are categorized into informational, warning, and error events. For information on the icons used for different event types, see Appendix C, [Icons used in MSU](#).

Figure 2-18 Event Logs Pane



## 2.7 Logout

Select **Logout**, as shown in Figure 2-19, to logout of MSU.

Figure 2-19 MSU Logout



**Note:** To exit MSU, right-click the Tray Application, and select **Exit MSU**.

# 3 MSU FOR RAID

This chapter contains the following sections:

- Overview
- Creating Virtual Disk
- Managing Virtual Disk
- Managing Physical Disks
- Managing Enclosures
- Monitoring Virtual Disk
- Migrating Virtual Disk
- Rebuilding Degraded Virtual Disk
- Deleting Virtual Disk

**Note:** The contents of this chapter are currently under revision.



### 3.1 Overview

An IO Processor (IOP) is similar to an IOC, except that it contains an on-board CPU that enables hardware RAID functionality. At this time, MSU supports the Marvell 88SE91xx 6 Gbps SATA RAID IOP can create and manage RAID 0 and RAID 1 virtual disks.

**Note:** MSU v4.1.1503 is an early build that does not offer complete support for 88SE91xx IOP. The Marvell BIOS Utility (MBU) for 88SE91xx offers more flexibility for creating and managing virtual disks. For more information, see Appendix A, [MBU for 88SE91xx IO Processor \(IOP\)](#). Check the OEM website for an updated version of MSU that offers enhanced support for the 88SE91xx.

## 3.2 Creating Virtual Disk

This section discusses the following:

- [Optimizing Virtual Disk for Performance/Reliability](#)
- [Customizing Virtual Disk for your Application](#)

### 3.2.1 Optimizing Virtual Disk for Performance/Reliability

This section describes the procedure to quickly create a virtual disk that is optimized for either best read/write performance or best fault tolerance (reliability).

**Note:** This is particularly useful if you are new to RAID technology and are not sure about which RAID level suits your application the most.

**To quickly create virtual disk optimized for performance/reliability**

1. Select **Adapter**.
2. Roll-over the **Operation** tab, and select **Quick Create VD**, as shown in Figure 3-1.  
The **Create Options** screen appears, as shown in Figure 3-2.

**Figure 3-1 Quick Create VD**

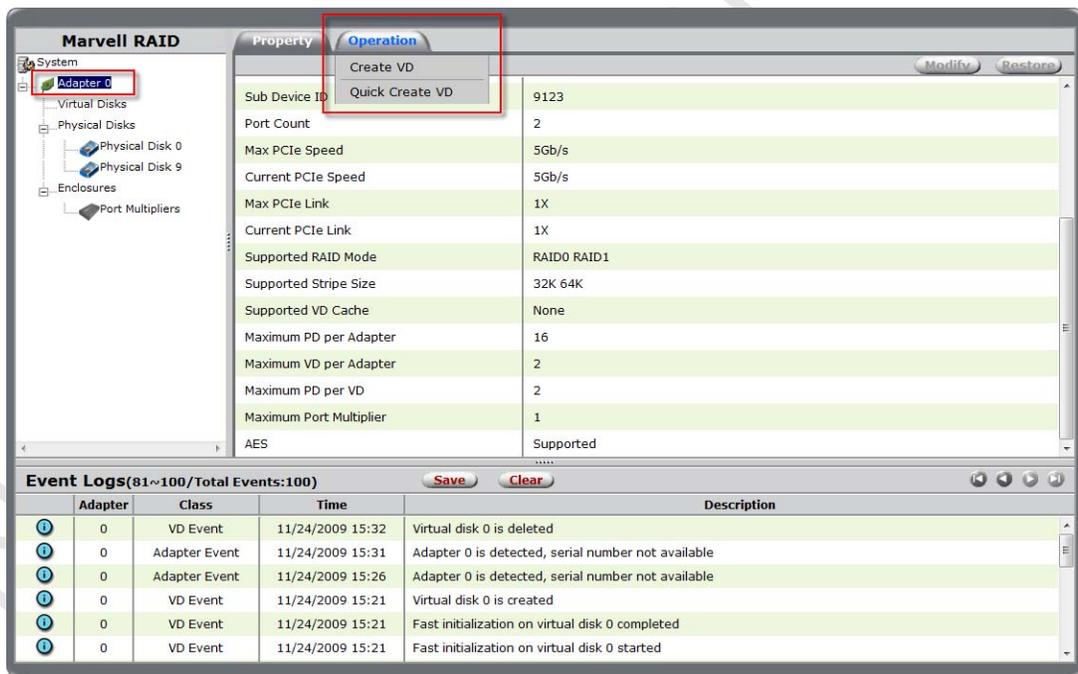
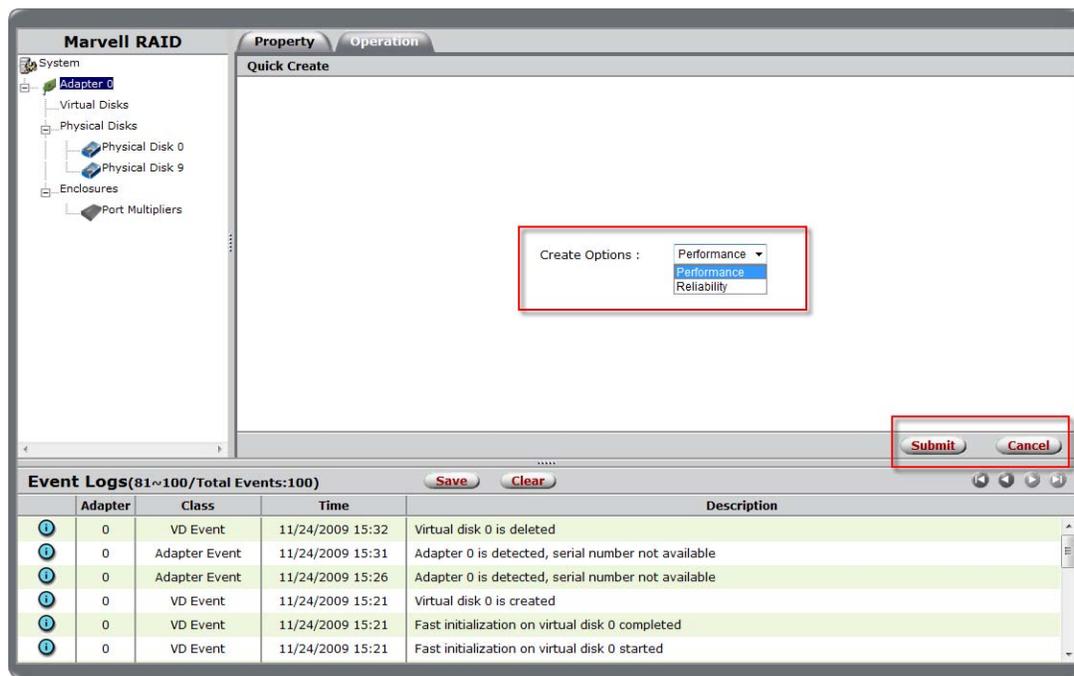


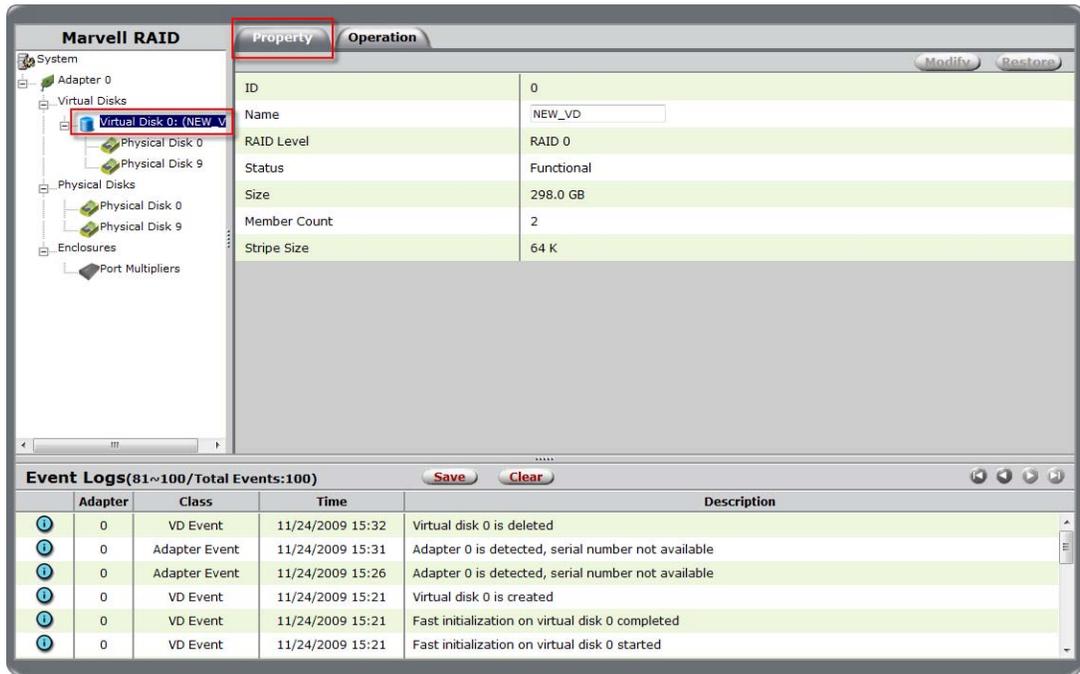
Figure 3-2 Create Options



3. As shown in Figure 3-2, select one of the following options:
  - Select **Performance** for creating a virtual disk that is optimized for best read and write performance.
  - Select **Reliability** for creating a virtual disk that is optimized for best fault tolerance.

Based on the performance/reliability selection and the capabilities of the RAID controller, MSU creates a suitable virtual disk using some or all available physical disks.
4. After creating the virtual disk, MSU displays the **Property** tab for the new **Virtual Disk**, as shown in Figure 3-3.

Figure 3-3 VD Created



### 3.2.2 Customizing Virtual Disk for your Application

This section describes the procedure to create a custom virtual disk that is most suitable for your application.

**Note:** MSU v4.1.1503 is an early build that does not offer complete support for 88SE91xx IOP. The Marvell BIOS Utility (MBU) for 88SE91xx offers more flexibility for creating and managing virtual disks. For more information, see Appendix A, [MBU for 88SE91xx IO Processor \(IOP\)](#). Check the OEM website for an updated version of MSU that offers enhanced support for the 88SE91xx.

#### To create a custom virtual disk most suitable for your application

1. Select **Adapter**.
2. Roll-over the **Operation** tab, and select **Create VD**, as shown in Figure 3-4.

The **Create New VD** screen appears, as shown in Figure 3-5.

Figure 3-4 Create VD

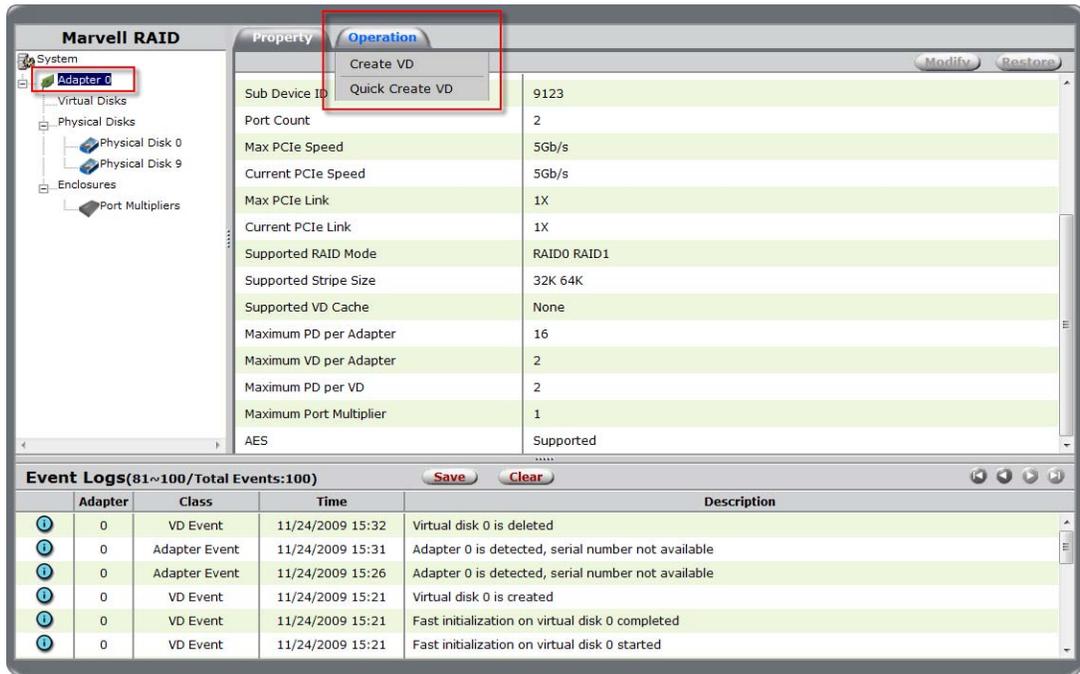
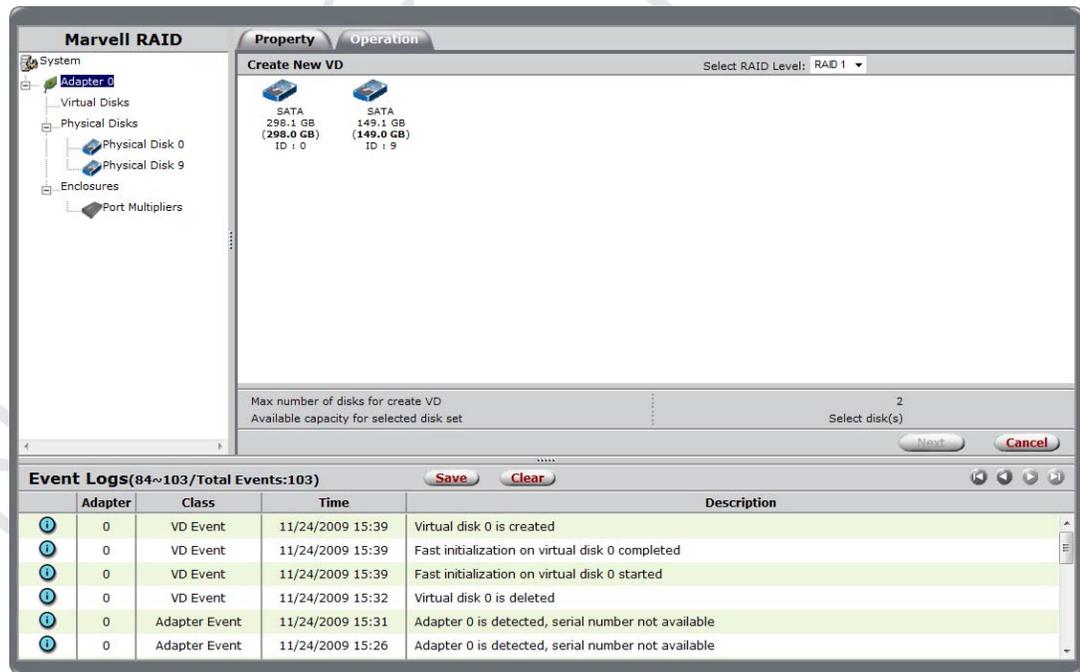
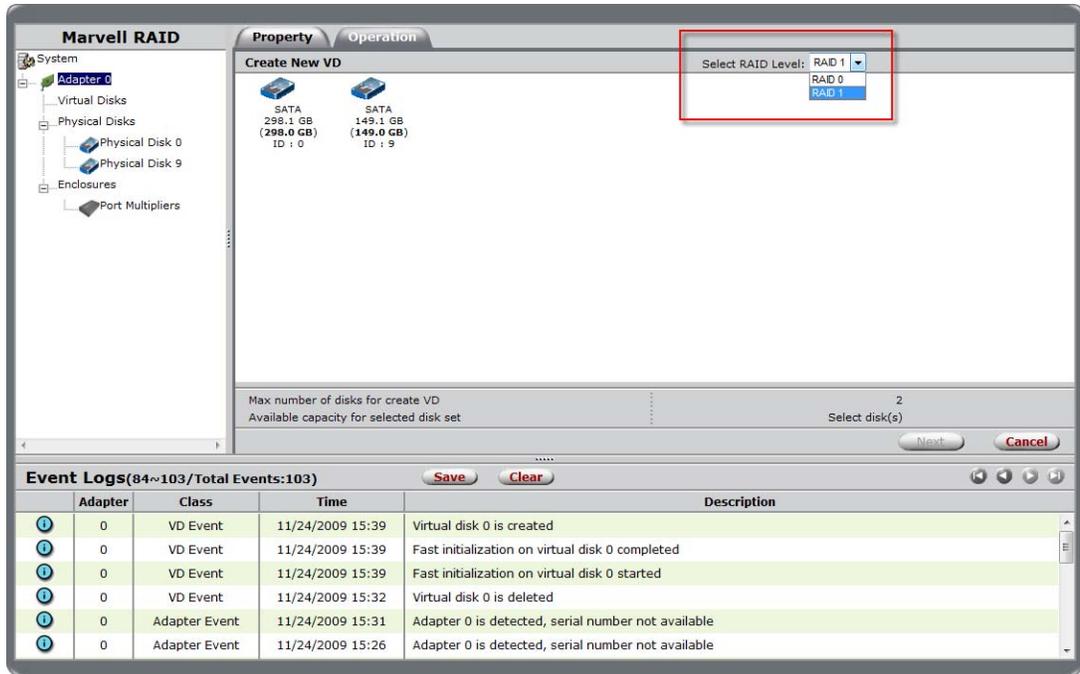


Figure 3-5 Create New VD



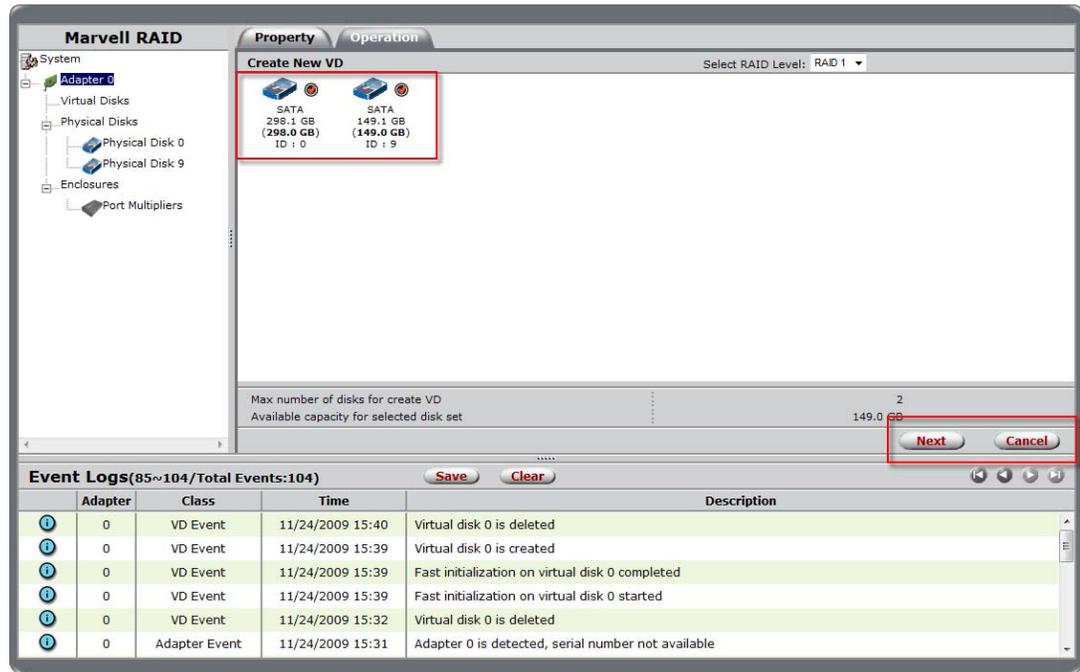
3. Select RAID Level suitable for your application, as shown in Figure 3-6.  
For information on RAID levels, see Appendix B, [Selecting a RAID Level](#).

Figure 3-6 Select RAID Level



**Note:** Marvell RAID controllers support different sets of RAID levels depending on the hardware model and OEM software package. Some software packages, depending on OEM selections, support limited RAID levels by design. Check with the OEM vendor for information specific to your controller.

Figure 3-7 Select Physical Disks

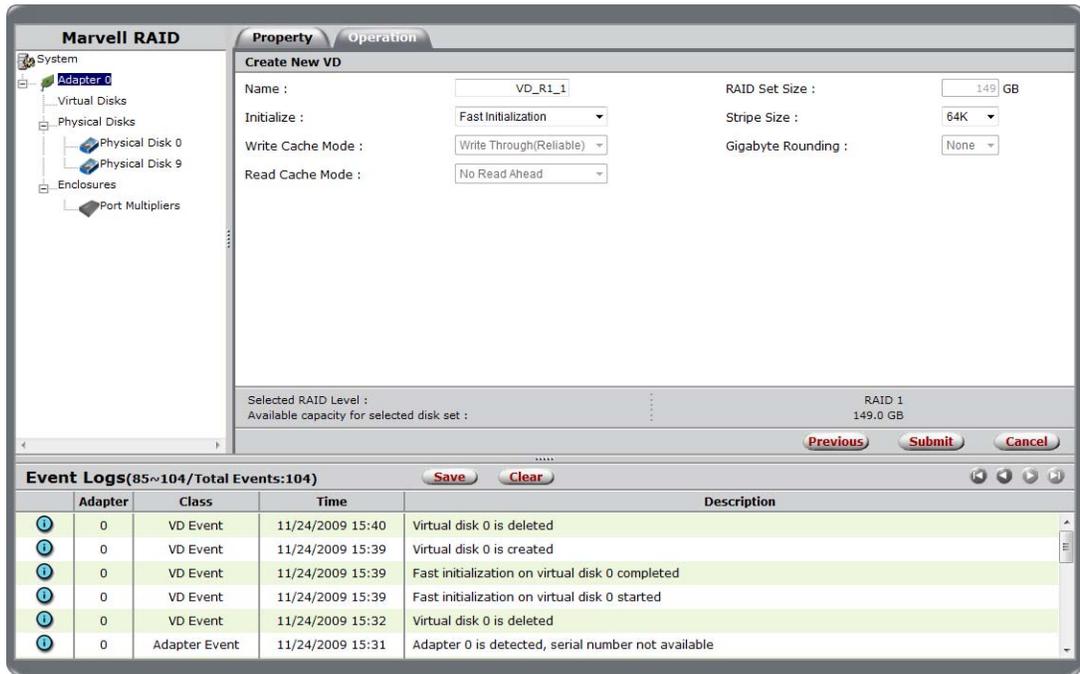


- After selecting the physical disks, select **Next** as shown in Figure 3-7.

The **Create New VD** screen now presents options to configure the virtual disk, as shown in Figure 3-8.

**Note:** Next is grayed-out until the minimum required number of physical disks are selected.

Figure 3-8 Create New VD

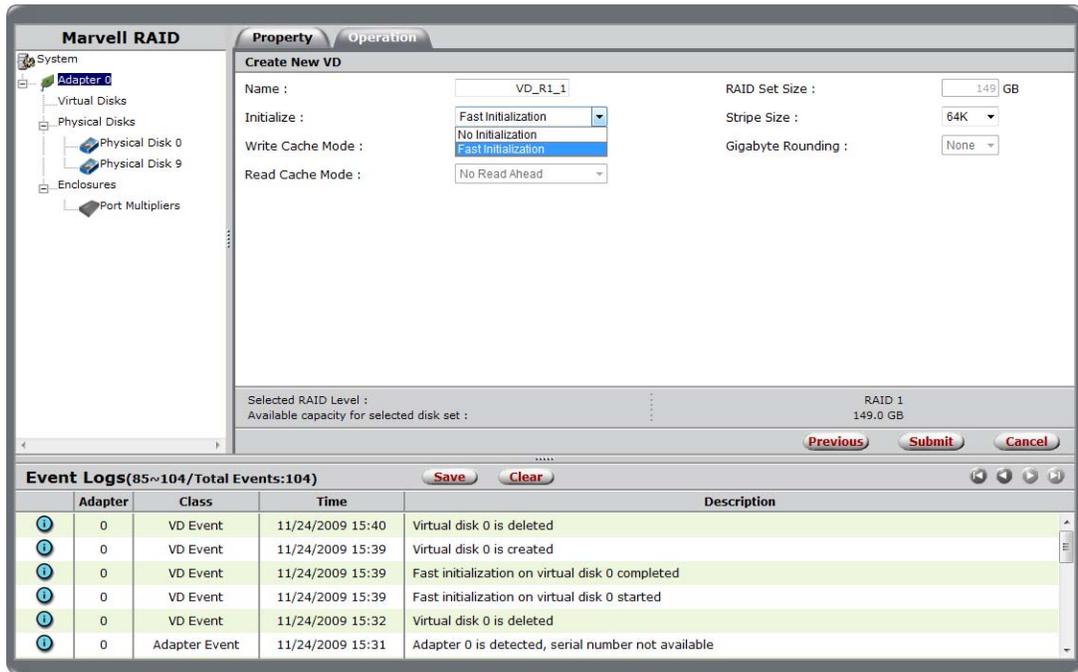


- As shown in Figure 3-8, MSU assigns a default name to the virtual disk. You can type a new name in the **Name** field.

- After selecting the Name, select the **Initialization** method for the virtual disk. As shown in Figure 3-9, MSU has three options for Initialization, with the default being **Fast Initialization**.

**Note:** For information on Initialization, see Appendix D, [Glossary](#).

Figure 3-9 Initialization

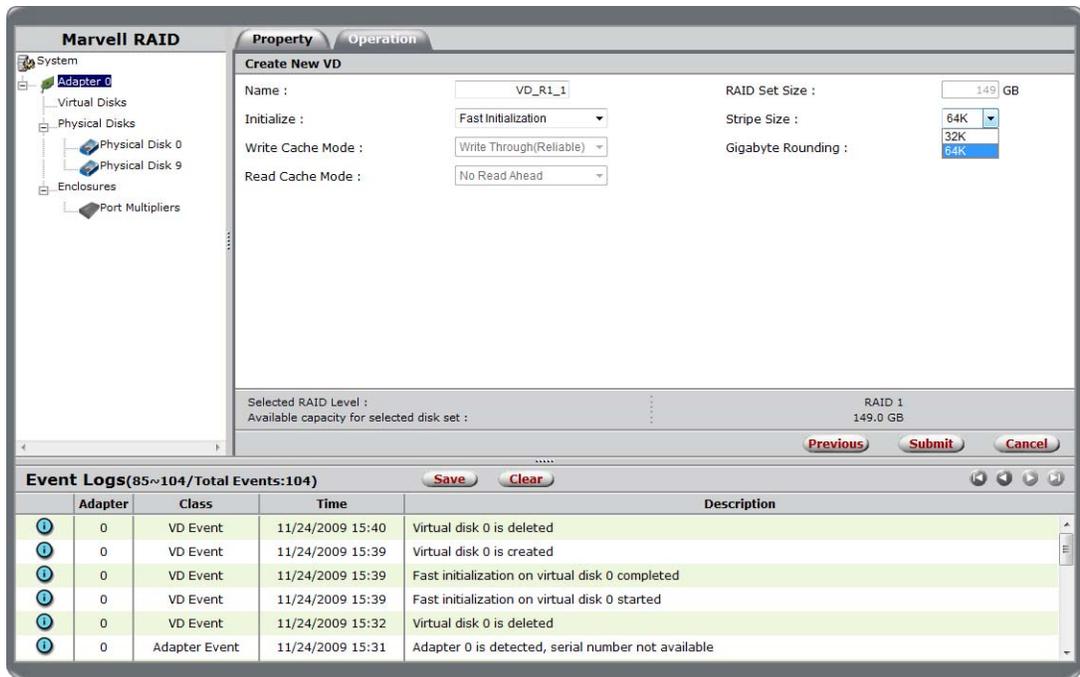


- After selecting the Name, select **Stripe Size** for the virtual disk.

As shown in Figure 3-10, the RAID controller being used has four options for Stripe Size, with the default being **64K**.

**Note:** Availability of Stripe Sizes depends on the capabilities of the controller. For information on Stripe Size, see Appendix D, [Glossary](#).

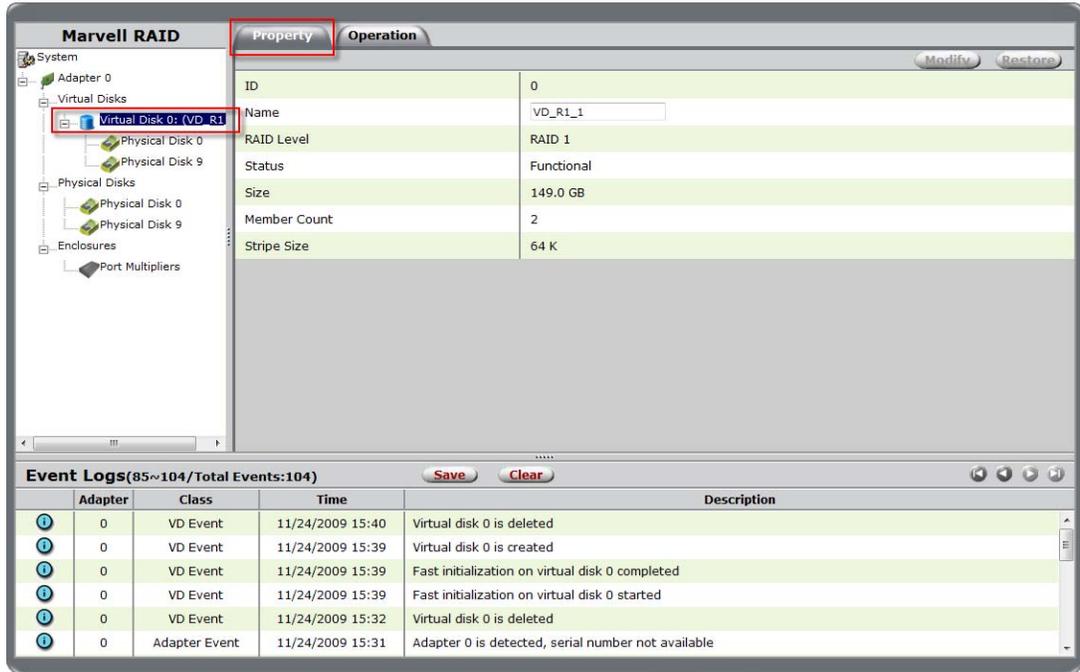
**Figure 3-10** Stripe Size



**Note:** The MBU for 88SE91xx supports selection of Gigabyte Rounding. For more information, see Appendix A, [MBU for 88SE91xx IO Processor \(IOP\)](#)

- After selecting Stripe Size, select **Submit** to create the virtual disk. MSU creates the virtual disk and displays the **Property** tab for the new virtual disk, as shown in Figure 3-11.

Figure 3-11 VD Created



### 3.3 Managing Virtual Disk

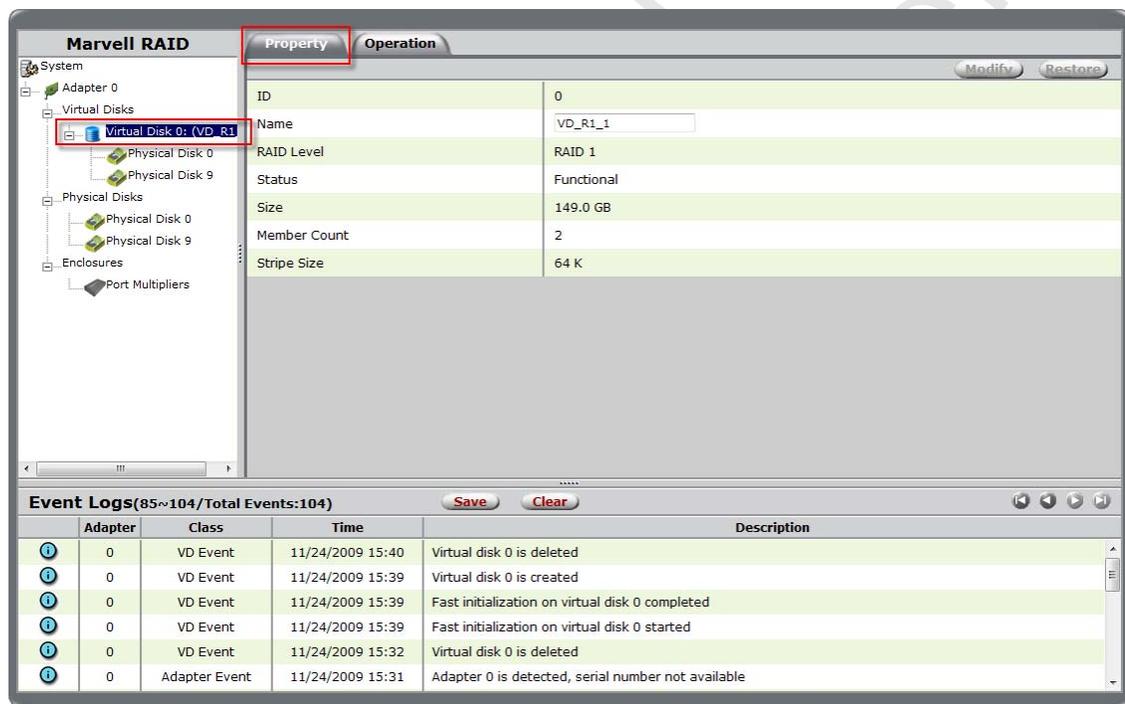
This section discusses the following:

- [Viewing Properties of Virtual Disk](#)
- [Renaming Virtual Disk](#)

#### 3.3.1 Viewing Properties of Virtual Disk

To view the properties of a virtual disk, select the Virtual Disk (**Virtual Disk 0: (VD\_R1\_1)** in this example) in the list of system devices, as shown in Figure 3-12. Upon selection, MSU displays the **Property** tab for the virtual disk.

Figure 3-12 Properties of Virtual Disk

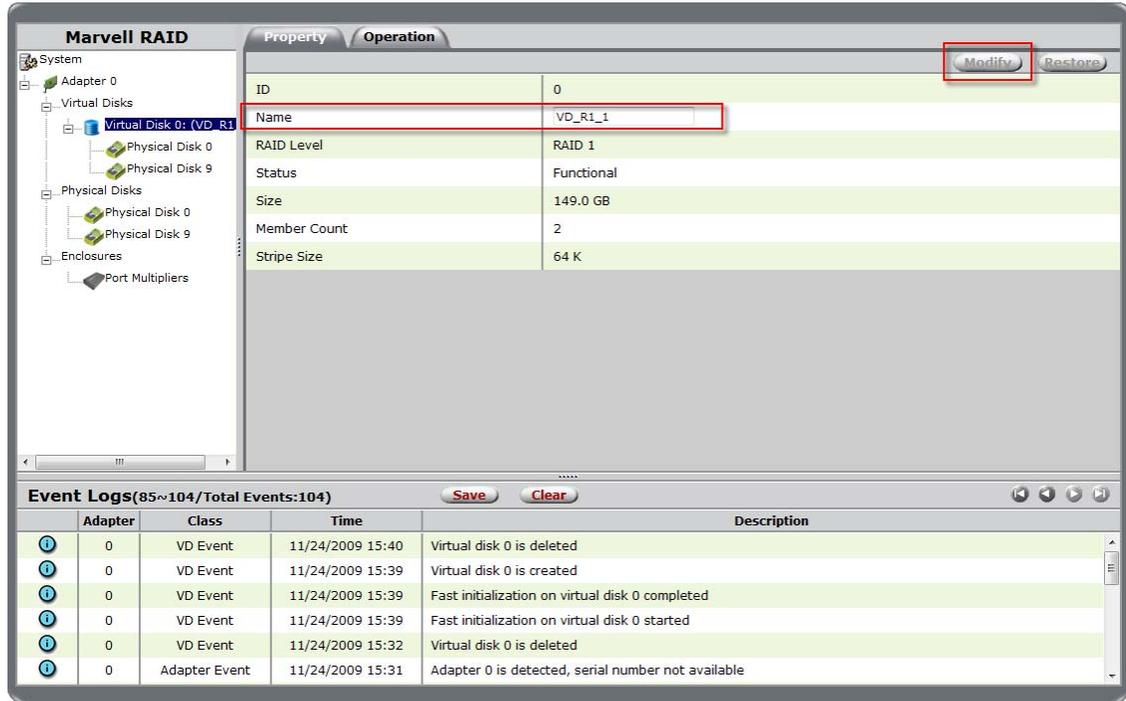


MSU uses different icons to indicate the status of the virtual disk. For more information, see Appendix C, [Icons used in MSU](#).

#### 3.3.2 Renaming Virtual Disk

The name for a virtual disk can be modified from the **Property** tab for the **Virtual Disk**, as shown in Figure 3-13. Type a new name in the **Name** field and select **Modify** to confirm changes.

Figure 3-13 Renaming Virtual Disk



**Note:** Modify is grayed-out until the settings change.

### 3.4 Managing Physical Disks

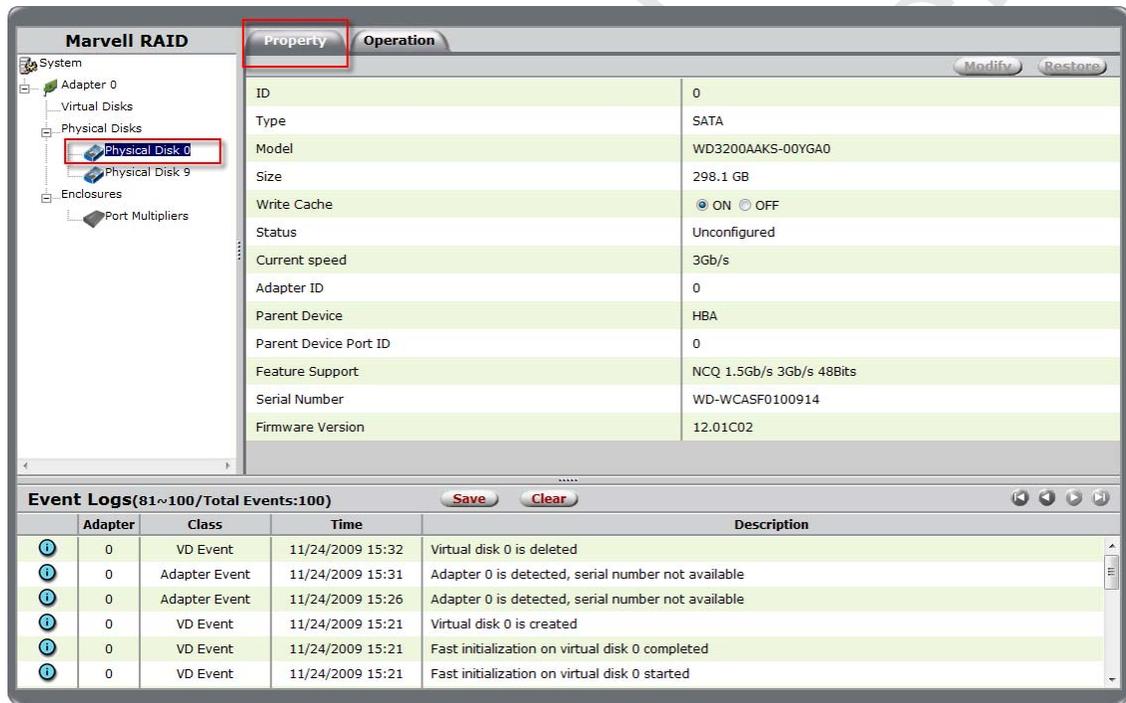
This section discusses the following:

- Viewing Properties of Physical Disk
- Erasing RAID Configuration Data on Foreign Physical Disk

#### 3.4.1 Viewing Properties of Physical Disk

To view the properties of a physical disk, select the **Physical Disk** in the list of system devices, as shown in Figure 3-14. Upon selection, MSU displays the **Property** tab for the physical disk.

Figure 3-14 Properties of Physical Disk



**Note:** The properties of a physical disk can not be edited.

MSU uses different icons to indicate the status of the physical disk. For more information, see Appendix C, [Icons used in MSU](#).

#### 3.4.2 Erasing RAID Configuration Data on Foreign Physical Disk

This section describes the procedure to erase RAID configuration data (if any) on a foreign physical disk.

**Note:** The RAID controller stores RAID configuration data on all physical disks that are part of a virtual disk. RAID configuration data must be erased on the physical disk before it can be used with another virtual disk.

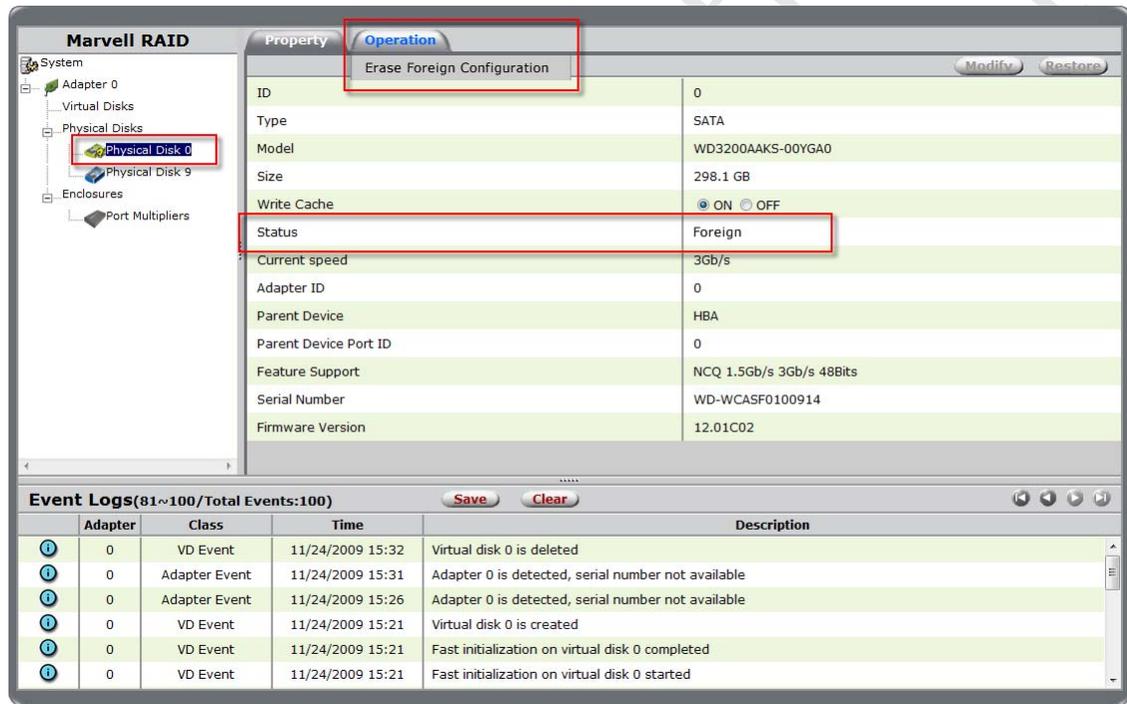
**To erase RAID configuration data**

**WARNING** If the physical disk was originally part of another virtual disk, erasing RAID configuration data may damage that virtual disk, depending on its fault tolerance capabilities.



1. Select foreign **Physical Disk** in the list of system devices, as shown in Figure 3-15.
2. Rollover the **Operation** tab, and select **Erase Foreign Configuration**, as shown in Figure 3-15.

**Figure 3-15 Erasing RAID Configuration Data on Physical Disk**



### 3.5 Managing Enclosures

This section discusses the following:

- Viewing Properties of Port Multiplier

#### 3.5.1 Viewing Properties of Port Multiplier

To view the properties of a port multiplier, select **Port Multipliers** in the list of system devices. Upon selection, MSU displays the **Property** tab listing all port multipliers connected to the RAID controller, as shown in Figure 3-16.

Select **[Detail>>]**, as shown in Figure 3-16, to view detailed properties of the port multiplier.

Figure 3-16 Properties of Port Multiplier

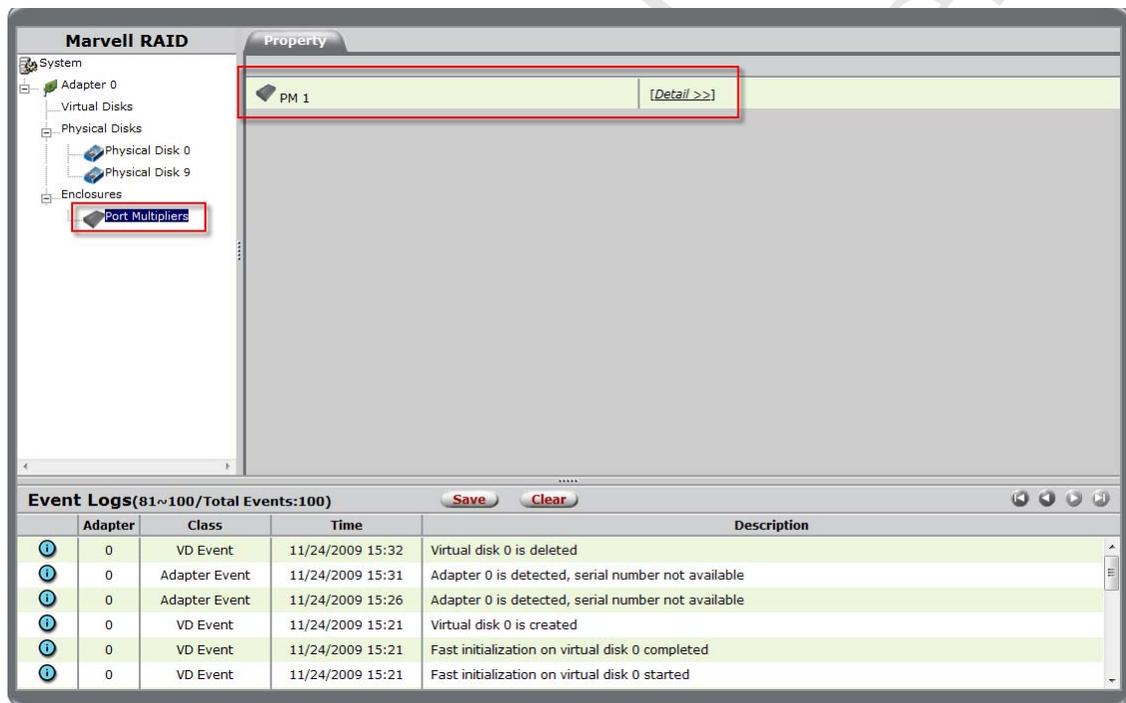
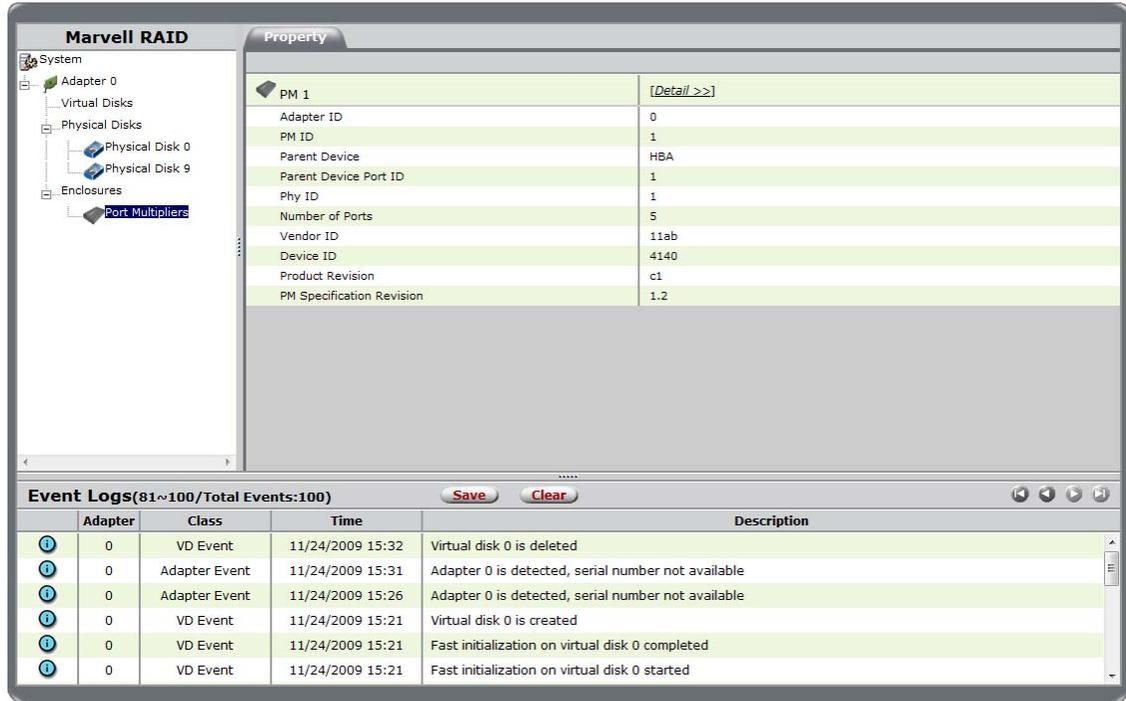


Figure 3-17 shows detailed properties of port multiplier PM 1. Select **[Detail>>]**, as shown in Figure 3-17, to hide details.

**Figure 3-17 Detailed Properties of Port Multiplier**



The screenshot displays the Marvell RAID utility interface. On the left, a tree view shows the system hierarchy: System > Adapter 0 > Port Multipliers > PM 1. The main area shows the 'Property' tab for PM 1, listing various identifiers and specifications. Below this, the 'Event Logs' section shows a list of events with columns for Adapter, Class, Time, and Description.

Property		
PM 1		[Detail >>]
Adapter ID		0
PM ID		1
Parent Device		HBA
Parent Device Port ID		1
Phy ID		1
Number of Ports		5
Vendor ID		11ab
Device ID		4140
Product Revision		c1
PM Specification Revision		1.2

Event Logs(81~100/Total Events:100)				
	Adapter	Class	Time	Description
①	0	VD Event	11/24/2009 15:32	Virtual disk 0 is deleted
①	0	Adapter Event	11/24/2009 15:31	Adapter 0 is detected, serial number not available
①	0	Adapter Event	11/24/2009 15:26	Adapter 0 is detected, serial number not available
①	0	VD Event	11/24/2009 15:21	Virtual disk 0 is created
①	0	VD Event	11/24/2009 15:21	Fast initialization on virtual disk 0 completed
①	0	VD Event	11/24/2009 15:21	Fast initialization on virtual disk 0 started

### 3.6 Monitoring Virtual Disk

This section discusses the following:

- Receiving E-mail Event Notifications
- Viewing Events using Windows Event Viewer
- Enabling Alarm for Critical Events

#### 3.6.1 Receiving E-mail Event Notifications

MSU can send event notifications to a user’s email account. This requires a working SMTP email server. This involves the following two steps:

- Configuring SMTP E-mail Server Settings
- Selecting Event Notifications

##### 3.6.1.1 Configuring SMTP E-mail Server Settings

This section describes the procedure to configure SMTP e-mail server settings in MSU.

##### To configure SMTP e-mail server settings

1. Select **System** in the list of system devices.
2. Roll-over the **Toolset** tab, and select **Email Setting**, as shown in Figure 3-18.

The **Email Setting** window appears, as shown in Figure 3-19.

Figure 3-18 System Toolset Menu

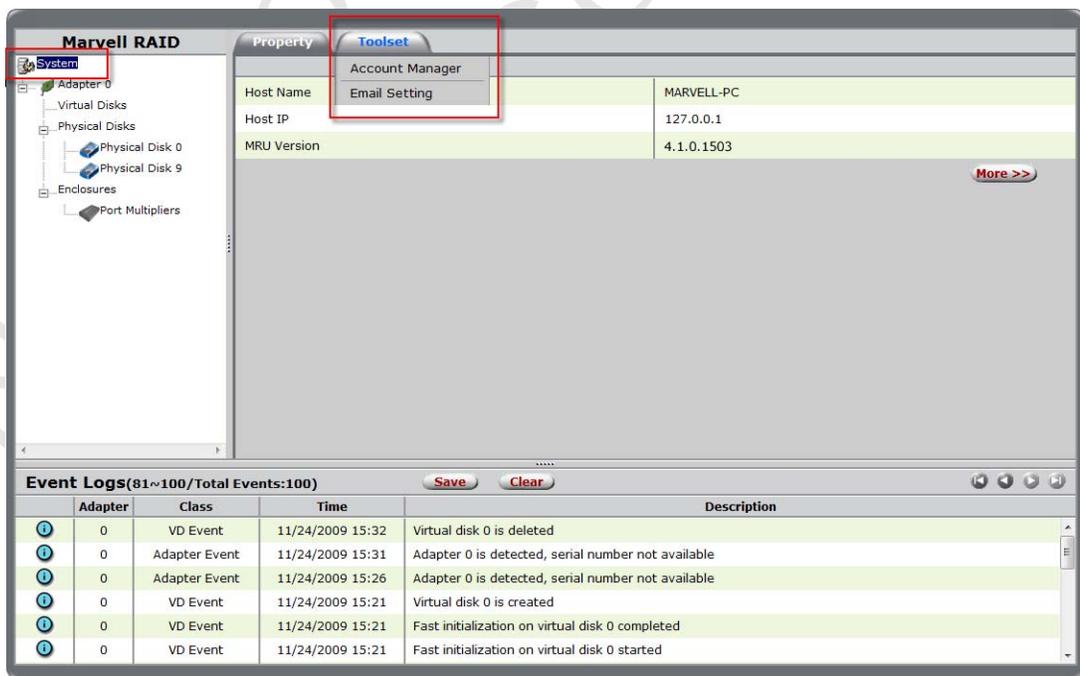
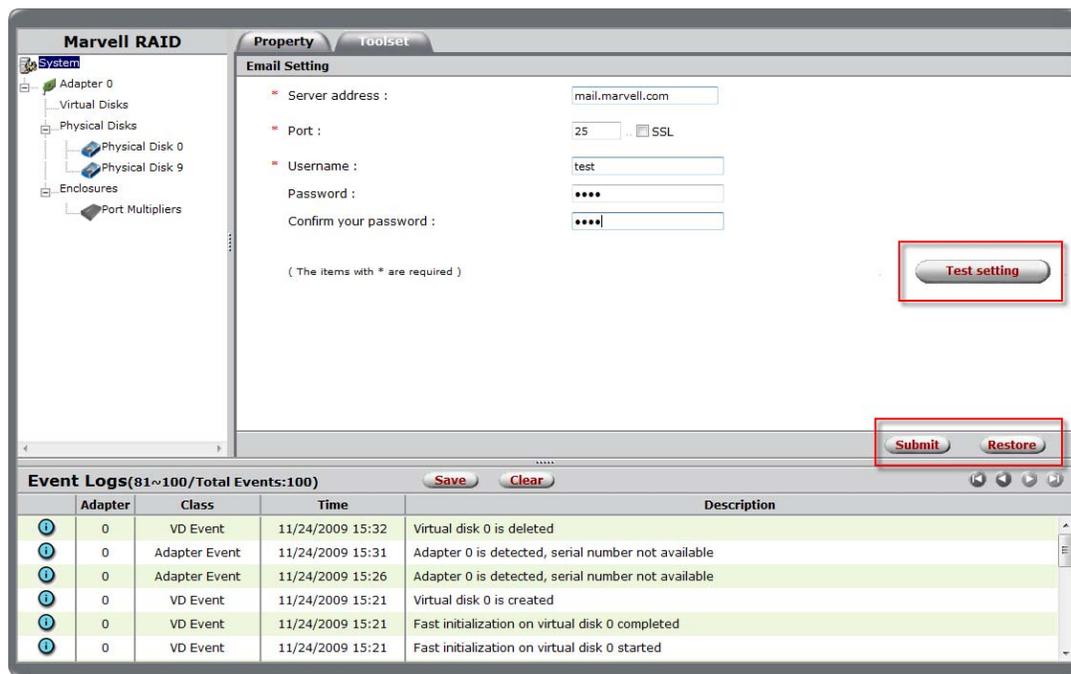


Figure 3-19 Email Settings



3. Configure the email server settings, and select **Test setting**, as shown in Figure 3-19. MSU sends a test mail to the configured email address. If the test mail is received, the settings are working correctly.
4. Select **Submit** to save settings. MSU confirms changes with the message **Setting updated successfully!**

### 3.6.1.2 Selecting Event Notifications

This section describes the procedure for selecting event types (information, error, warning) that trigger email notifications.

**Note:** For information on the icons used for different event types, see Appendix C, [Icons used in MSU](#).

#### To receive e-mail event notifications

1. Select **System** in the list of system devices.
2. Roll-over the **Toolset** tab, and select **Account Manager**, as shown in Figure 3-20. The **Account Manager** window appears, as shown in Figure 3-21.

Figure 3-20 System Toolset Menu

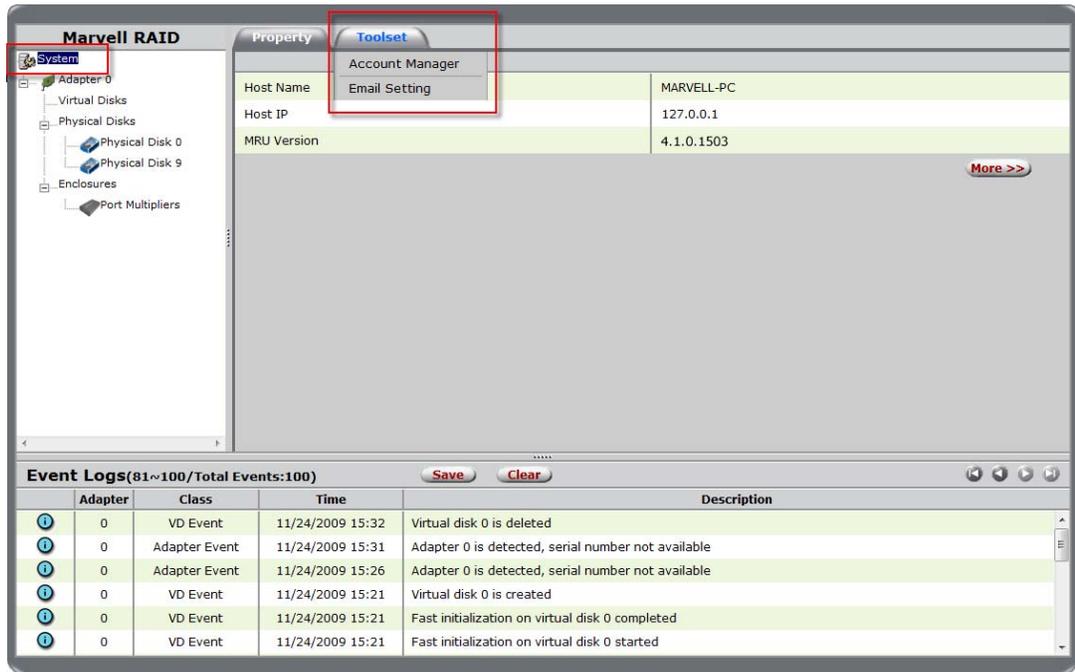
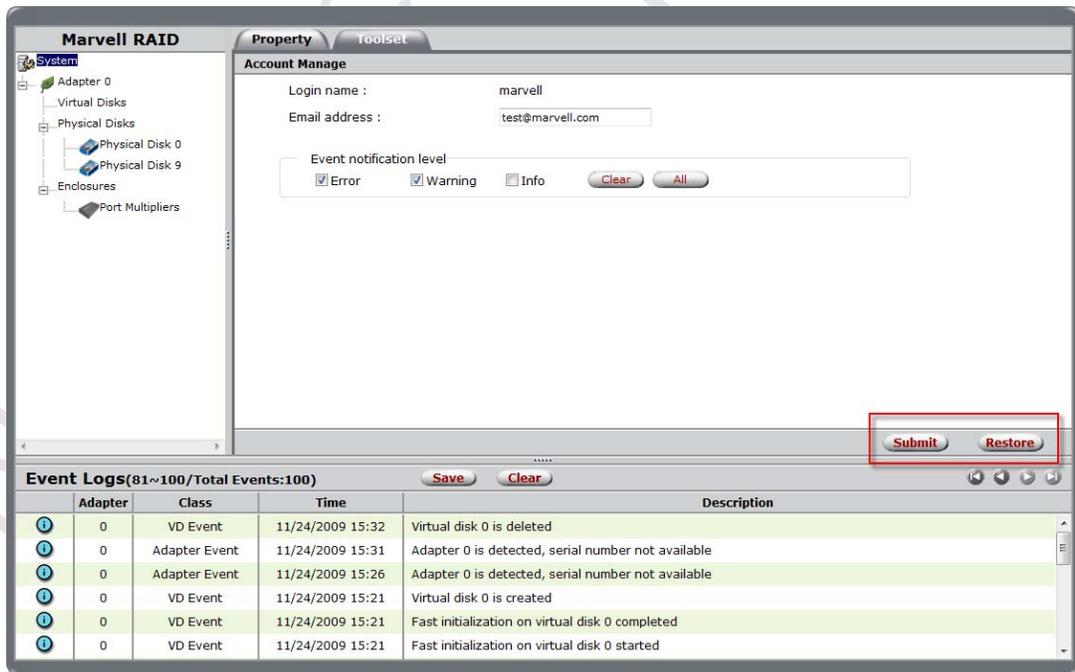


Figure 3-21 Account Manage



3. Type the **E-mail address**, as shown in Figure 3-21.

**Note:** The E-mail address must be valid for the SMTP server configured in Email Setting.

4. Specify the event types that trigger email notifications by selecting options for **Event notification level**, as shown in Figure 3-21.
5. Select **Submit** to save settings.  
 MSU confirms changes with the message **Account updated successfully!**

### 3.6.2 Viewing Events using Windows Event Viewer

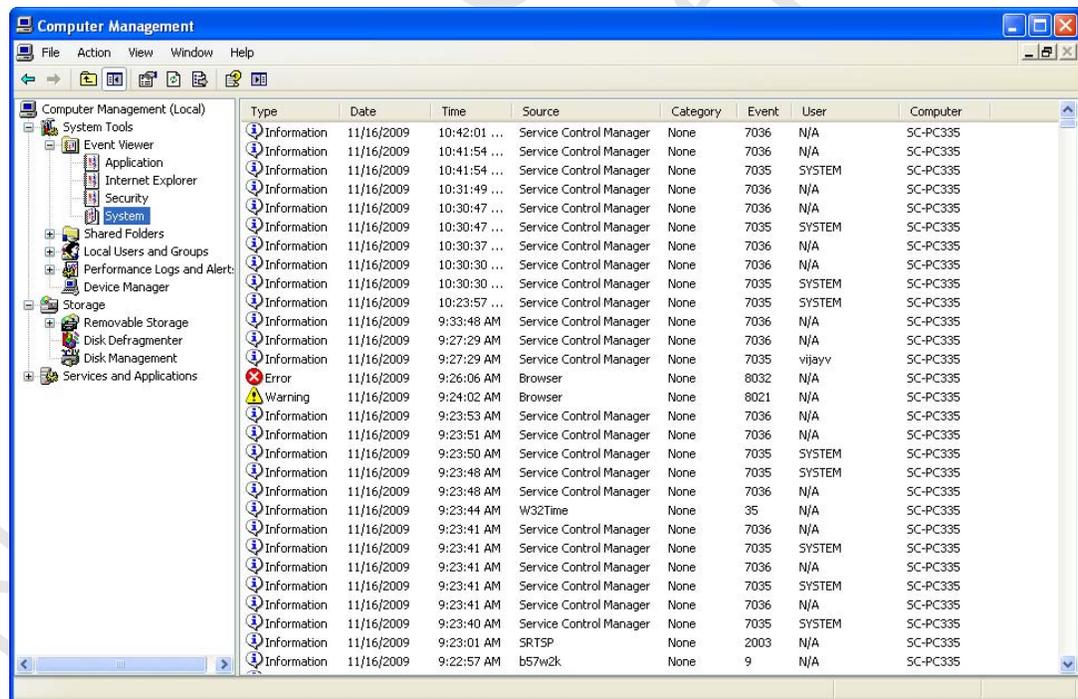
**Note:** This section applies only to Windows OS.

In Windows, MSU events can also be viewed in the Event Viewer (since adapter events are triggered by the OS/driver).

#### To view events in the Windows Event Viewer

1. From the **Start** menu, right-click **My Computer**, and select **Manage**.  
 The **Computer Management** utility appears, as shown in Figure 3-22.
2. Browse to **System Tools > Event Viewer > System** to view all system events including that of MSU, as shown in Figure 3-22.

**Figure 3-22 Event Viewer (Windows XP)**



### 3.6.3 Enabling Alarm for Critical Events

MSU can play an audible alarm when critical events (warning and error) occur. When a hardware buzzer is present, the buzzer is also sounded. The audible alarm is disabled by default. The alarm can be enabled/disabled using the Tray Application, as shown in Figure 3-23.

Figure 3-23 Enabling Alarm using Tray Application



**Note:** See 2.4.3, [Enable/Disable Alarm](#) for information on enabling/disabling alarm using the Tray Application.

## 3.7 Migrating Virtual Disk

This section discusses the following:

- [Migrating Virtual Disk to Higher RAID Level](#)
- [Expanding Disk Capacity on Operating Virtual Disk](#)

### 3.7.1 Migrating Virtual Disk to Higher RAID Level

It is not possible to migrate a virtual disk to another RAID level. If you wish to change the RAID level for an operating virtual disk, create a new virtual disk with the desired configuration and transfer data from the existing virtual disk.

### 3.7.2 Expanding Disk Capacity on Operating Virtual Disk

It is not possible to expand disk capacity on an operating virtual disk. If you wish to expand capacity, create a new virtual disk with the desired configuration and transfer data from the existing virtual disk.

### 3.8 Rebuilding Degraded Virtual Disk

At this time, MSU cannot initiate, pause, resume, stop, or complete rebuilding of virtual disks. To rebuild virtual disks created with 88SE91xx, use the MBU as described in Appendix A, [MBU for 88SE91xx IO Processor \(IOP\)](#).

### 3.9 Deleting Virtual Disk

This section describes the procedure for deleting a virtual disk.

**Note:** After deleting a virtual disk, the physical disks constituting the virtual disk become available for use in other virtual disks.

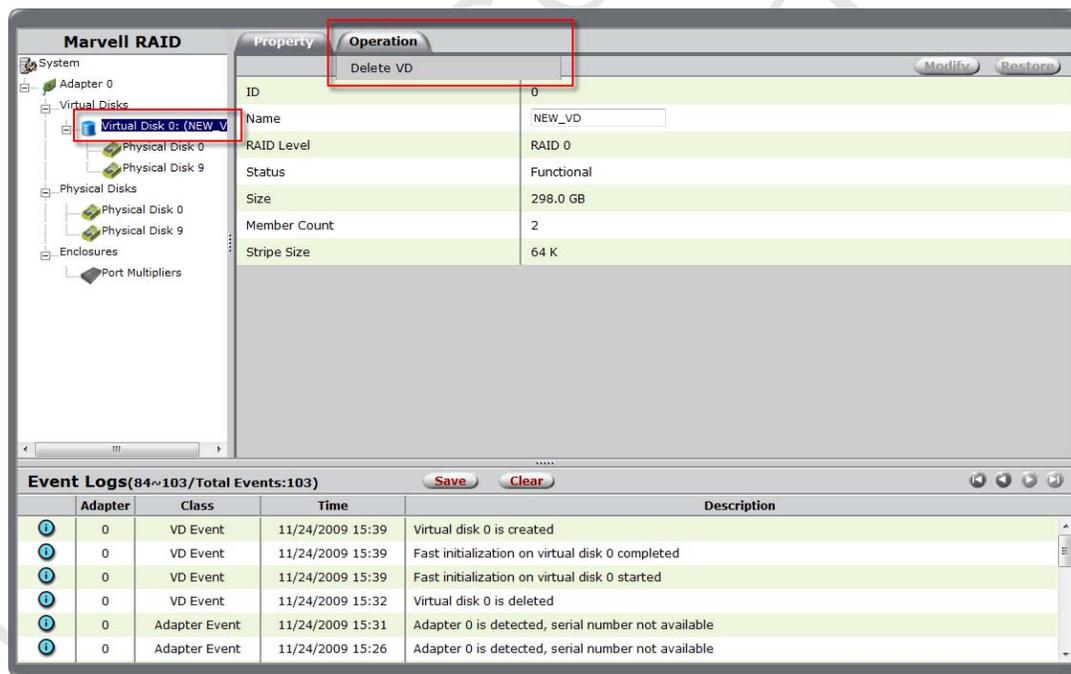
**To delete a virtual disk**

**WARNING** Deleting a virtual disk permanently erases all data on the virtual disk. However, you can choose to keep partition information on the virtual disk.



1. Select the **Virtual Disk** in the list of system of devices.  
The **Property** tab for the Virtual Disk appears.
2. Roll-over the **Operation** tab and select **Delete VD**, as shown in Figure 3-24.

Figure 3-24 Delete VD



3. MSU displays the warning **All data on this virtual disk will be erased once it is deleted!**  
Select **OK** to acknowledge the warning.
4. MSU requests confirmation of deletion with a pop-up message **Are you sure you want to delete this virtual disk?**  
Select **OK** to confirm deletion.
5. MSU displays a pop-up message asking **Do you want to delete the partition information if this has one?**  
Select **OK** to delete partition information or **Cancel** to keep partition information.

# 4 MSU FOR HYPERDUO

This chapter contains the following sections:

- [Overview](#)
- [Creating HyperDuo Virtual Disk](#)
- [Managing HyperDuo Virtual Disk](#)
- [Monitoring HyperDuo Virtual Disk](#)
- [Rebuilding Degraded Virtual Disk](#)
- [Deleting HyperDuo Virtual Disk](#)



## 4.1 Overview

This chapter describes MSU functionality for Marvell controllers with HyperDuo, such as the Marvell 88SE9130 SATA controller.

## 4.2 Creating HyperDuo Virtual Disk

This section describes the procedure to quickly create a HyperDuo virtual disk, or hyper disk, that is optimized for either best read/write performance or best fault tolerance (reliability).

To quickly create virtual disk optimized for performance/reliability

1. Select **Adapter**.
2. Roll-over the **Operation** tab and select **Create HyperDuo**, as shown in Figure 4-1.

The **Create HyperDuo** screen appears, as shown in Figure 4-2.

Figure 4-1 Create HyperDuo

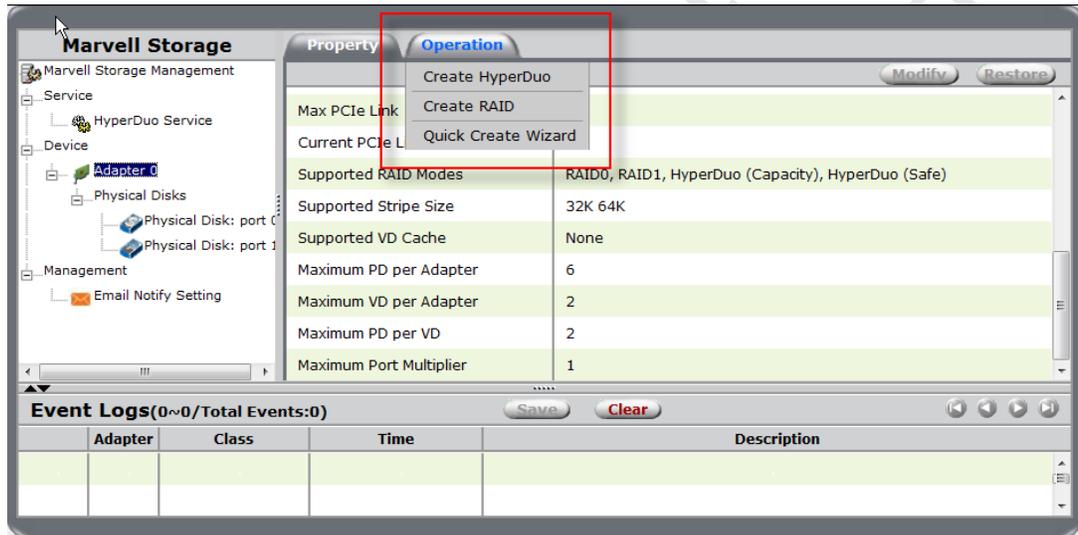
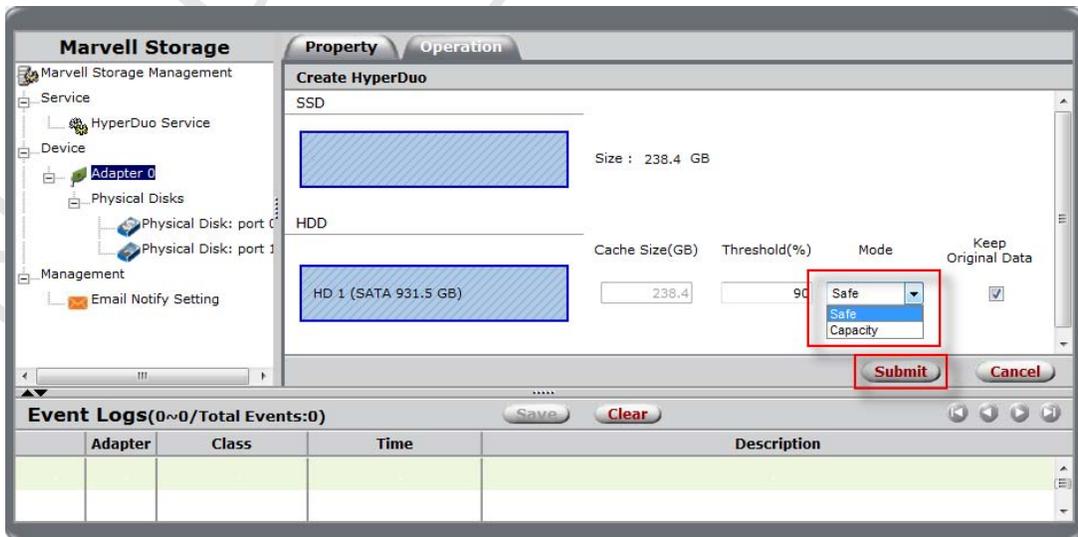


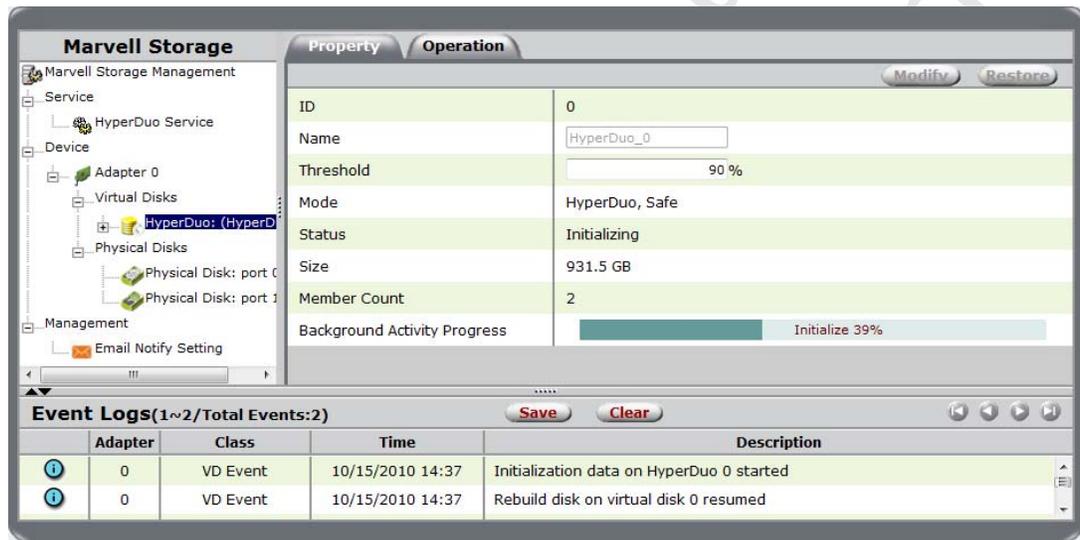
Figure 4-2 Create HyperDuo Screen



3. As shown in Figure 4-2, select one of the following options:
  - **Safe** mode creates a virtual disk that is optimized for best fault tolerance. It is safe to use with hard drives that contain existing data.
  - **Capacity** mode creates a virtual disk that is optimized for best read and write performance.

**Note:** Capacity mode is a data-destructive process. Please back up all data before using capacity mode.
4. MSU displays the **Property** tab for the HyperDuo virtual disk and begins initialization, as shown in Figure 4-3. This can take up to 30 minutes to complete.

**Figure 4-3 Initialization**



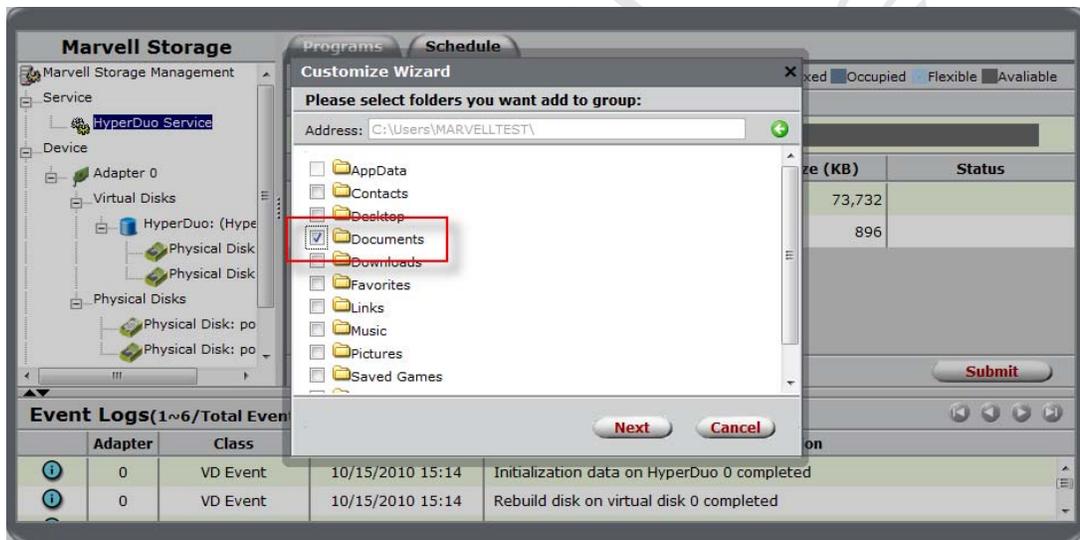
### 4.3 Managing HyperDuo Virtual Disk

This section describes procedures for customizing your HyperDuo virtual disk.

#### To add folders for HyperDuo optimization

1. Select **HyperDuo Service**.
2. Select **Advanced**.  
The **Customize Wizard** window appears, as shown in Figure 4-4.
3. Check folders to add them, as shown in Figure 4-4.
4. Review the folders. Select the red X beside a folder or file to remove it.
5. Select **Submit** to save settings.

Figure 4-4 Customize Wizard



#### To change method of optimization

1. Select **HyperDuo Service**.
2. Check folders or programs, as shown in Figure 4-5.
  - Check **Auto** to have the MSU manage the optimization of a folder or program automatically.
  - Check **Cache** to manually select a folder or program for optimization.
  - Check neither to specify that a folder or program should never be optimized.
3. Select **Submit** to commit changes, as shown in Figure 4-5.
4. Select **OK** in the pop-up that follows.  
MSU begins optimization, as shown in Figure 4-6.

Figure 4-5 Check Methods of Optimization

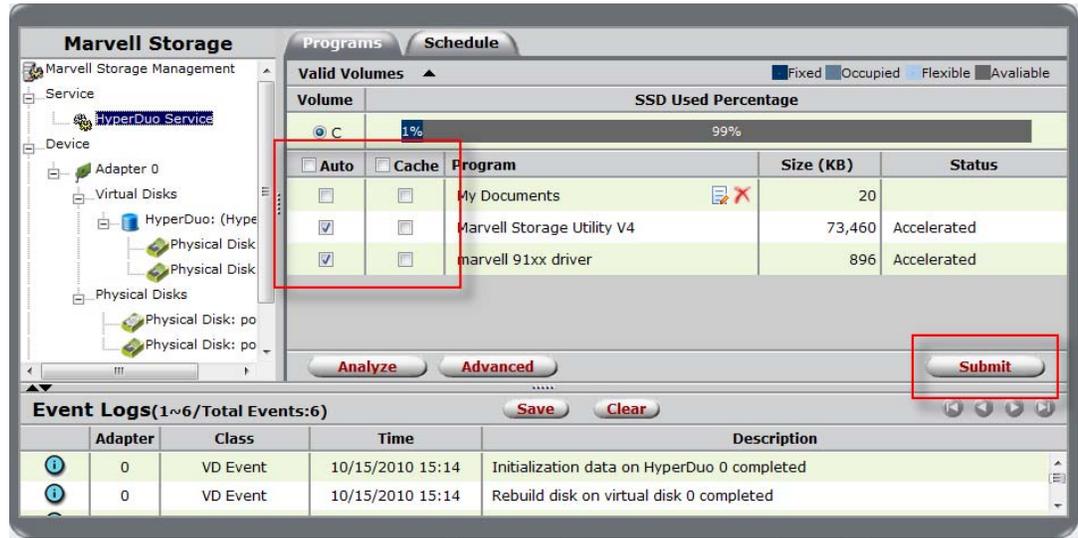
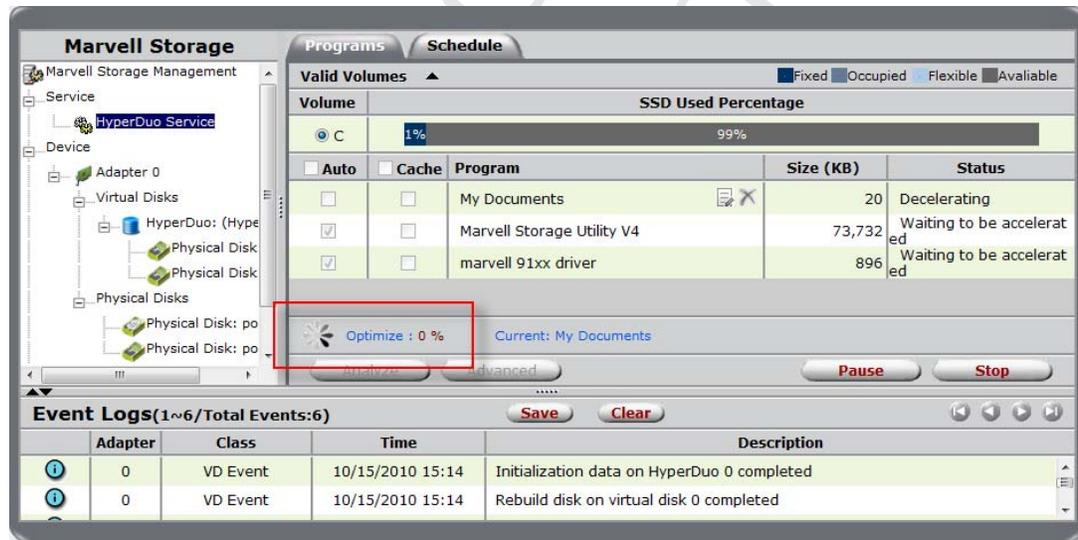


Figure 4-6 Optimization in Progress



## 4.4 Monitoring HyperDuo Virtual Disk

This section discusses the following:

- [Receiving Email Event Notifications](#)
- [Viewing Events using Windows Event Viewer](#)
- [Enabling Alarm for Critical Events](#)

### 4.4.1 Receiving Email Event Notifications

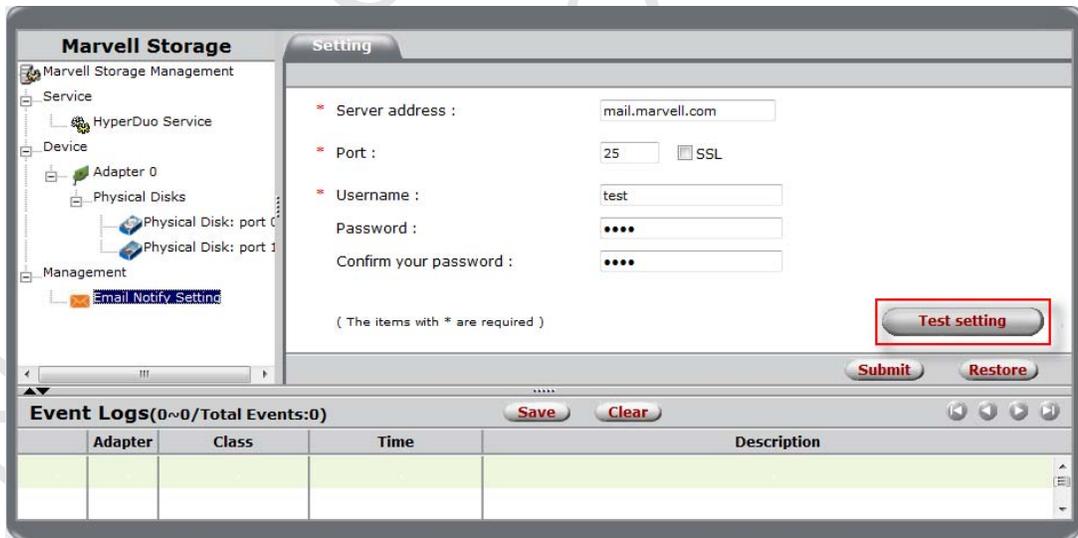
This section describes the procedure to configure MSU to send event notifications to a user's email account.

**Note:** This requires a working SMTP email server.

#### To configure email event notifications

1. Select **Email Notify Setting**, as shown in Figure 4-7.
2. Configure the email server settings and select **Test setting**, as shown in Figure 4-7.  
MSU sends a test email to the configured email address. If the test email is received, the settings are working correctly.
3. Select **Submit** to save settings.  
MSU confirms changes with the message **Setting updated successfully!**

Figure 4-7 Email Notify Setting



### 4.4.2 Viewing Events using Windows Event Viewer

**Note:** This section applies to Windows operating systems only.

Because adapter events are triggered by the Windows driver, MSU events can also be viewed in the Windows Event Viewer.

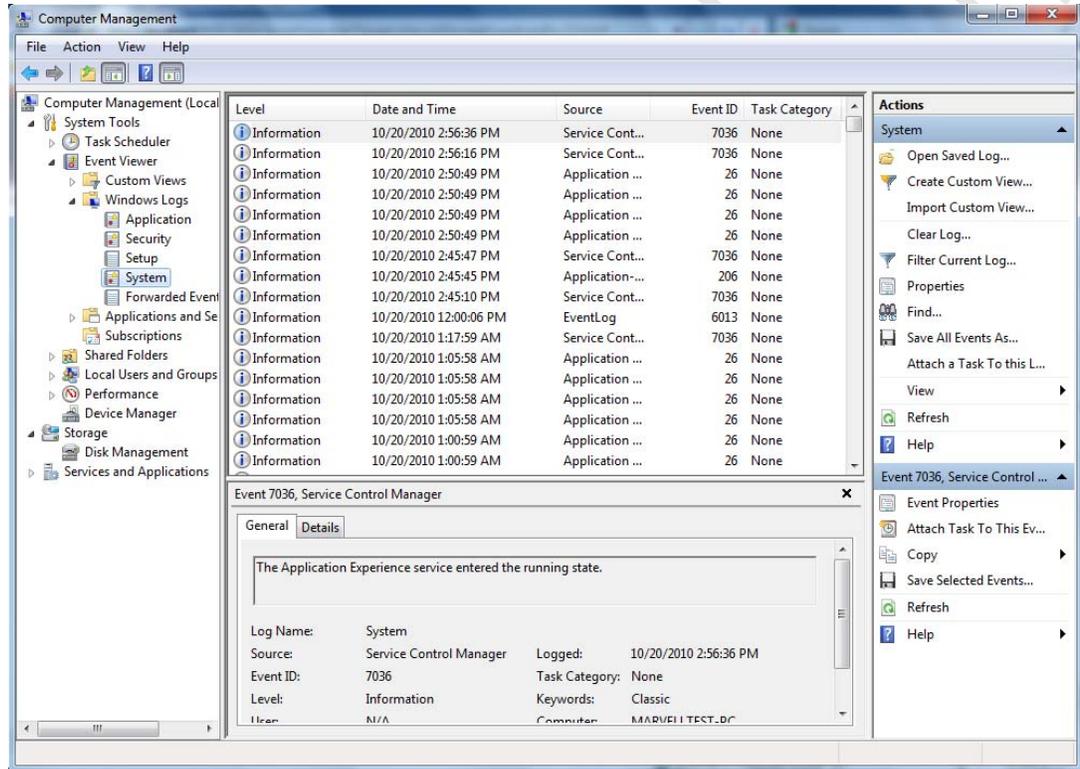
**To view events in the Windows Event Viewer**

1. From the **Start** menu, right-click **My Computer** (in XP or 2003) or **Computer** (in Vista, 2008, or 7) and select **Manage**.

The **Computer Management** utility appears, as shown in Figure 4-8.

2. Browse to **System Tools > Event Viewer > System** (in XP or 2003) or **System Tools > Event Viewer > Windows Logs > System** (in Vista, 2008, or 7) to view all system events including those of MSU, as shown in Figure 4-8.

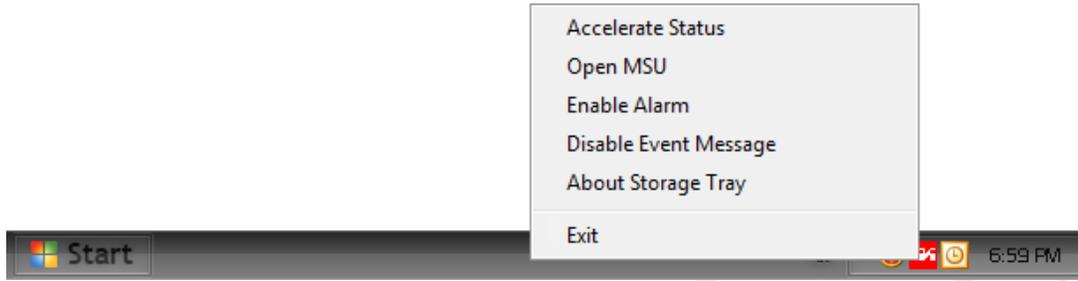
**Figure 4-8 Event Viewer (Windows 7)**



**4.4.3 Enabling Alarm for Critical Events**

MSU can play an audible alarm when critical events (warning and error) occur. When a hardware buzzer is present, the buzzer is also sounded. The audible alarm is disabled by default. the alarm can be enabled or disabled using the Tray Application, as shown in Figure 4-9.

Figure 4-9 Enabling Alarm using Tray Application





## 4.5 Rebuilding Degraded Virtual Disk

At this time, MSU cannot initiate, pause, resume, stop, or complete rebuilding of virtual disks. To rebuild virtual disks created with 88SE91xx, use the MBU as described in Appendix A, MBU FOR 88SE91xx IO Processor (IOP).

## 4.6 Deleting HyperDuo Virtual Disk

This section describes the procedure for deleting a HyperDuo virtual disk.

**Note:** After deleting a virtual disk, the physical disks constituting the virtual disk become available for use in other virtual disks.

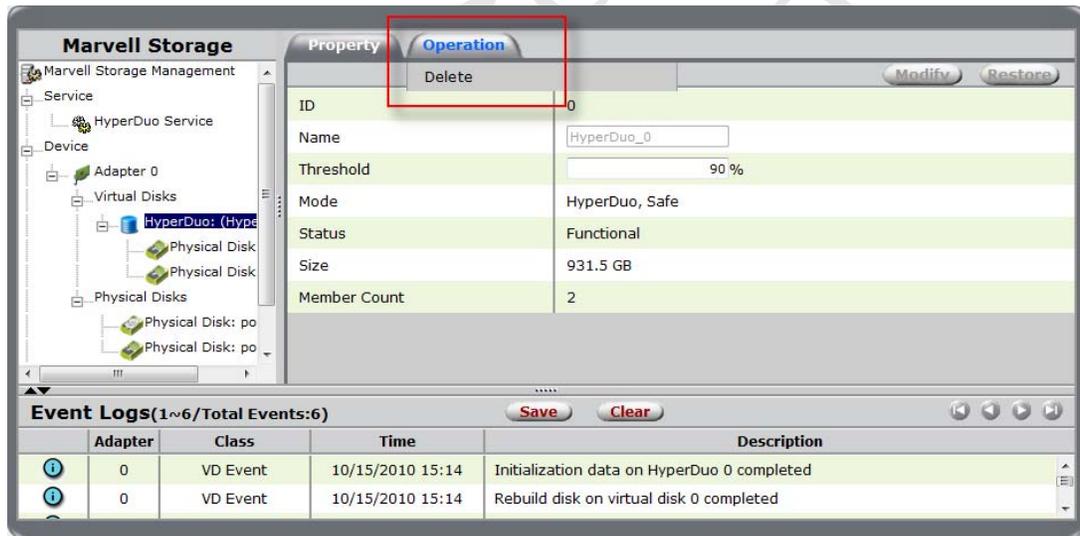
### To delete a virtual disk

**WARNING** Deleting a virtual disk permanently erases all data on the virtual disk. However, you can choose to keep partition information on the virtual disk.



1. Select **HyperDuo** from the **Virtual Disks** menu under **Adapter**.  
The **Property** tab for the HyperDuo virtual disk appears.
2. Roll over the **Operation** tab and select **Delete**, as shown in Figure 4-10.

Figure 4-10 Delete



3. MSU requests confirmation of deletion with a pop-up message: **Are you sure you want to delete this HyperDuo?**  
Select **OK** to confirm deletion.
4. MSU displays a pop-up message asking **Do you want to delete the partition information if this has one?**  
Select **OK** to delete partition information or **Cancel** to keep it.



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# A MBU FOR 88SE91XX IO PROCESSOR (IOP)

This appendix contains the following sections:

- [Overview](#)
- [Launching the BIOS](#)
- [Navigating the BIOS](#)
- [Creating Virtual Disk](#)
- [Erasing RAID Configuration Data](#)
- [Rebuilding Virtual Disk](#)
- [Deleting Virtual Disk](#)

**Note:** The contents of this appendix are currently under revision.

## A.1 Overview

This section discusses the following:

- [Supported Controllers](#)
- [Supported RAID Functionality](#)

### A.1.1 Supported Controllers

The Marvell BIOS utility (MBU) supports 88SE91xx controllers with on-board CPU.

**Note:** Controllers in the 88SE91xx family may contain an on-board CPU depending on OEM selections. The on-board CPU enables RAID functionality and requires firmware programming. Contact the OEM vendor for specific information on the capabilities of the 88SE91xx controller.

### A.1.2 Supported RAID Functionality

Table 1-1 lists the RAID functionality supported by the BIOS.

**Table 1-1 Supported RAID Functionality**

Feature	Description
RAID Levels	RAID 0 and RAID 1
Number of Virtual Disks (VDs) per controller	1 or 2 (depends on OEM selection)
Number of HDDs per VD	2
Stripe Sizes	32K and 64K
Rebuild	Manual rebuild for RAID 1

**Note:** Visit the Marvell Extranet or contact your FAE/sales representative to check for newer versions of BIOS with enhanced functionality.

## A.2 Launching the BIOS

**Note:** The BIOS is only applicable to 88SE91xx controllers with on-board CPU.

Table 1-2 lists the keyboard controls for launching the BIOS during the controller's Power-On Self Test (POST).

**Table 1-2 Launching the BIOS**

Key	Function
 + 	<p>Launch the Marvell BIOS Utility</p> <p>Press the key combination during the controller's POST.</p> <p><b>Note:</b> After pressing Ctrl+M, you may have to wait a few seconds before the BIOS appears.</p>

Figure 1-1 shows the messages displayed during the POST of an 88SE91xx controller with on-board CPU.

**Figure 1-1 BIOS Post Messages**

```

Marvell 88SE91xx Adapter - BIOS Version 1.0.0.1008
PCI-E X1 Bandwidth Usage: 5.0Gbps   Configure SATA as: AHCI Mode

Virtual Disk
  No Virtual Disk!
Physical Disk
  [ID] [Disk Name]                [Size]      [Speed]
  0    SATA ST3750330MS          715GB       3.0G
  8    SATA ST3750330MS          715GB       3.0G
  16   ATAPI SONY DVD-ROM DDU1615 Not Available UDMA2

Press <Ctrl>+<M> to enter BIOS Setup or <Space> to continue_
  
```

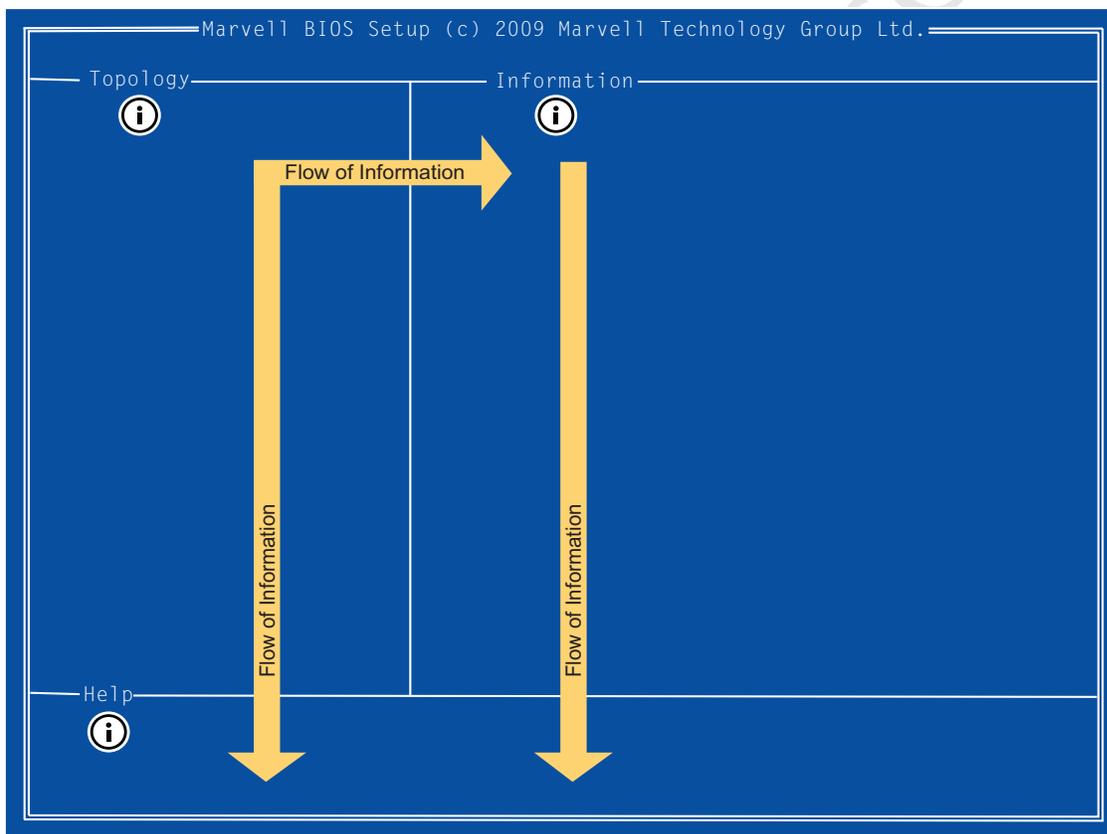
**Note:** The 88SE91xx controller has two SATA ports and one PATA port. Figure 1-1 shows a setup where a 88SE91xx controller's SATA ports are connected to two SATA drives and the PATA port to a ATAPI DVD-ROM drive.

## A.3 Navigating the BIOS

As shown in Figure 1-2, the BIOS user interface (UI) is divided into three main panes:

- **Topology**
- **Information**
- **Help**

Figure 1-2 BIOS User Interface



**Note:** This symbol is a visual element used in this document to emphasize specific areas of the BIOS UI as relevant to the topic under discussion. It is *not* part of the Marvell BIOS UI.

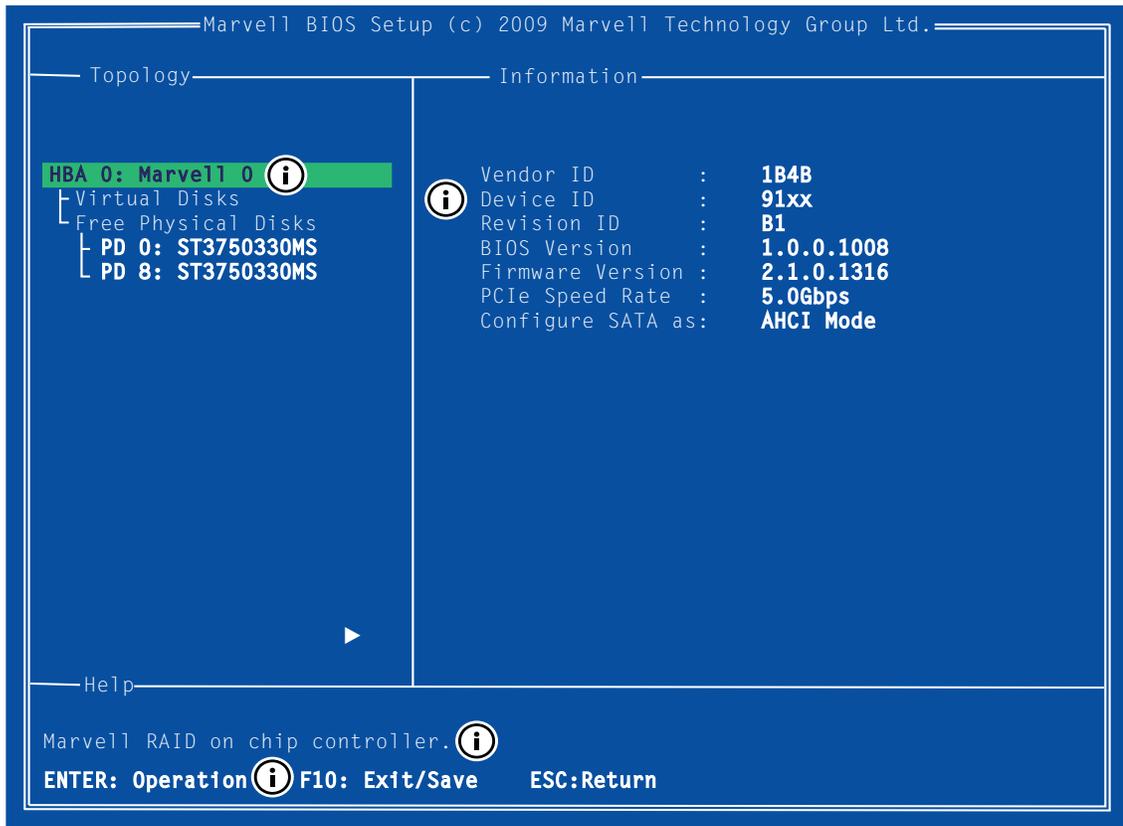
The arrow lines in Figure 1-2 show the flow of information in the user interface. Selections made in a pane determine the contents shown in other panes in the following ways:

- Content in the **Information** pane is populated based on selections in the **Topology** pane.
- Content in the **Help** pane is populated based on selections in both the **Topology** and **Information** panes.

### A.3.1 Topology

As shown in Figure 1-3, the **Topology** pane uses a tree *view* to list and show the relationships between the various physical/virtual devices attached to the system. The devices on this list include the HBA, physical disks, and virtual disks.

Figure 1-3 BIOS UI Example Selection



### A.3.2 Information

The **Information** pane is populated based on the selection in the **Topology** pane. Figure 1-3 shows information relevant to the selection **HBA 0: Marvell 0**.

### A.3.3 Help

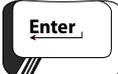
The **Help** pane is populated based on selections in both the **Topology** and **Information** panes. The **Help** pane in Figure 1-3 shows a brief description and lists keyboard controls for performing actions relevant to the selection (which in Figure 1-3 is **HBA 0: Marvell 0**).

**Note:** The **Help** pane is used by the BIOS to display important information relevant to the selection. The pane may contain short descriptions on selections, messages on selecting list items, default values for settings, among others.

### A.3.4 Keyboard Controls

Table 1-3 lists the controls for navigating and using the BIOS UI.

**Table 1-3 Navigation Keys**

Key	Function
	Scrolls menu/list items.
	
	Selects an item and shows a pop-up menu with options.
	Toggles between Enable/Disable states and Select/Unselect states (as applicable).
	Go backwards.
	Confirm (Y) or Deny (N) settings.
	Save and Exit the BIOS.

## A.4 Creating Virtual Disk

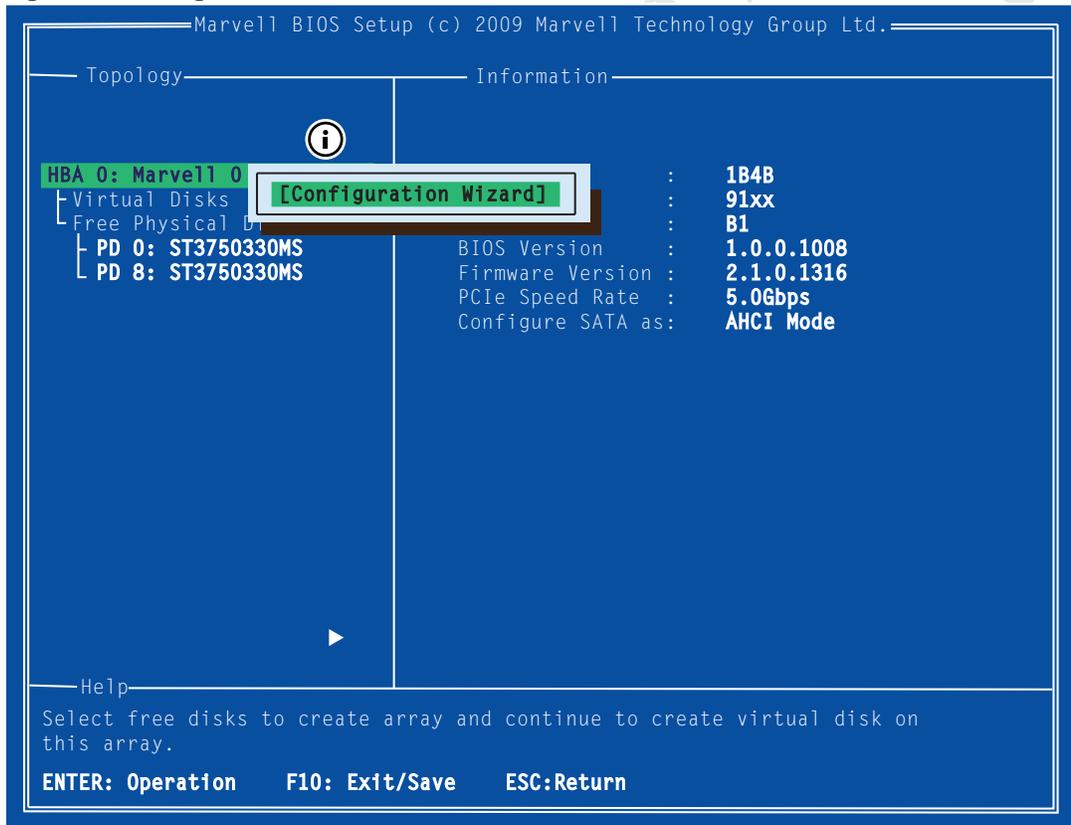
This section describes the procedure for creating a virtual disk using the BIOS Configuration Wizard.

### To create a virtual disk

1. In the **Topology** pane, scroll to **HBA 0: Marvell 0** and press **Enter** to select. A menu pops-up, as shown in Figure 1-4.

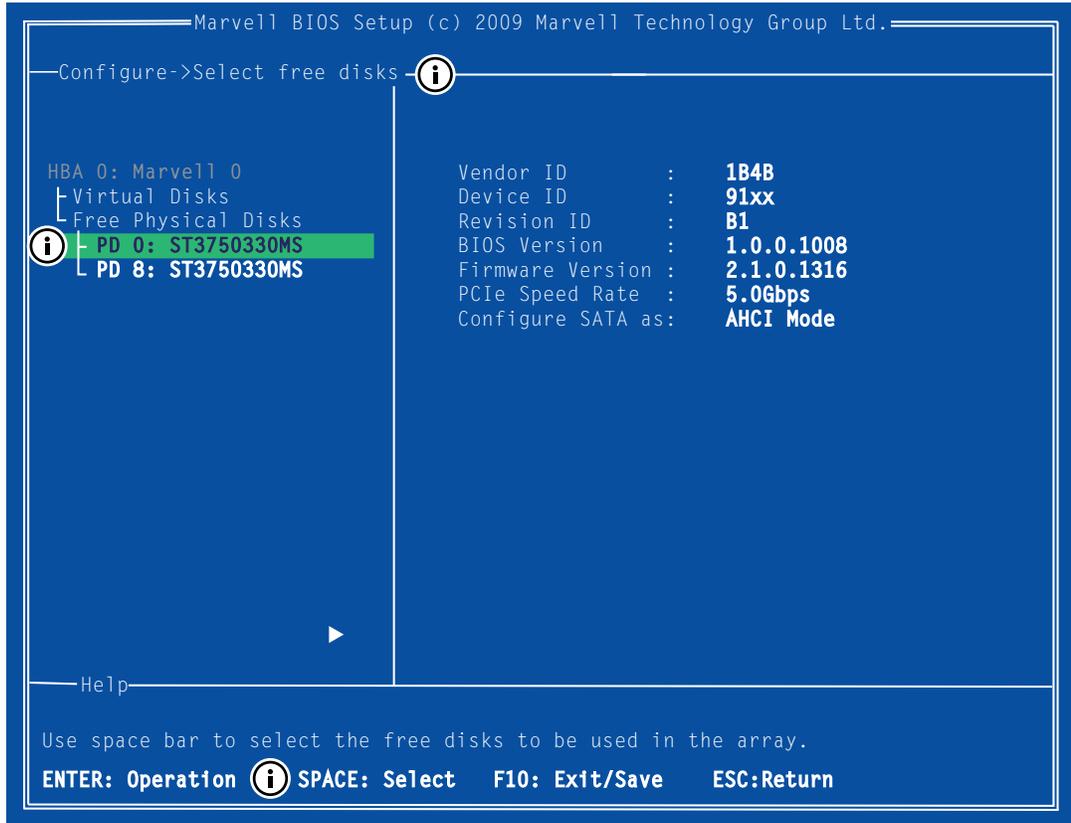
Select **Configuration Wizard** and press **Enter** to begin creating the virtual disk.

Figure 1-4 Configuration Wizard



2. Press **Space** to select/unselect a disk, as shown in Figure 1-5. Use the arrow keys to scroll the list of free disks.

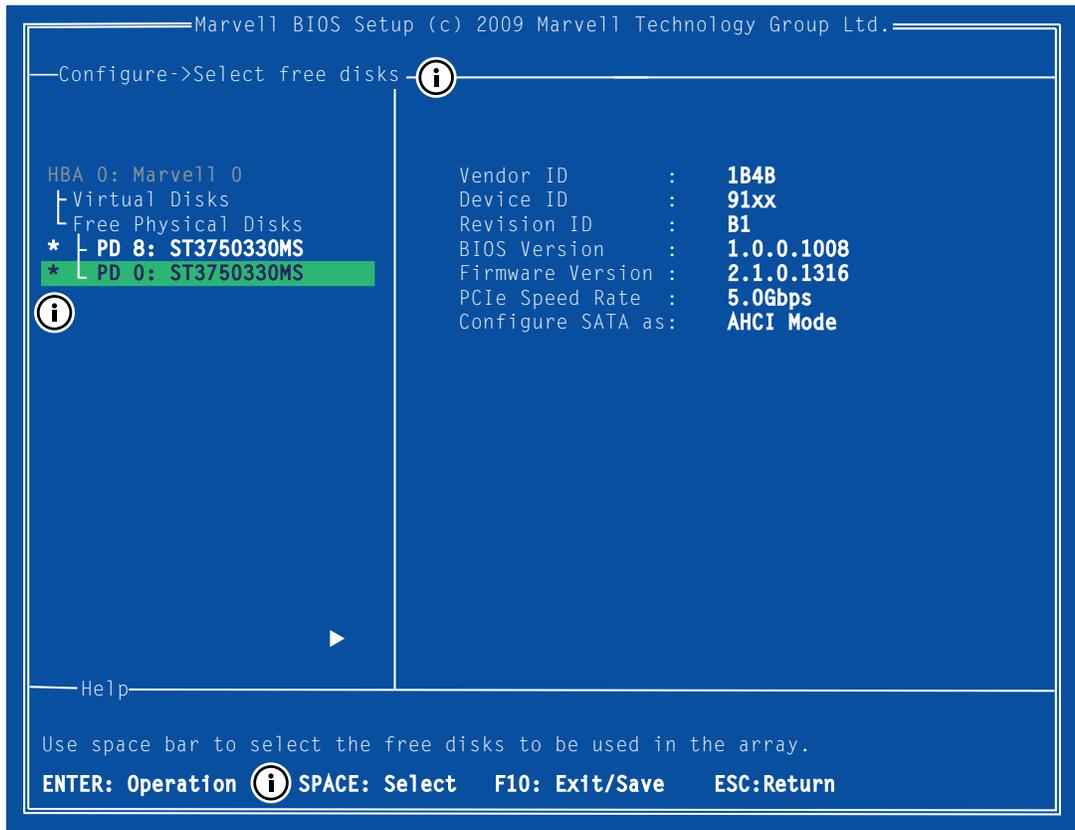
Figure 1-5 Select Free Disks



**Note:** The 88SE91xx controller supports the creation of RAID 0 and RAID 1 virtual disks comprising of exactly two SATA physical disks. PATA physical disks cannot be used to create RAID virtual disks.

3. After selecting the required disks, press **Enter** to continue, as shown in Figure 1-6.

Figure 1-6 Confirm Disk Selection

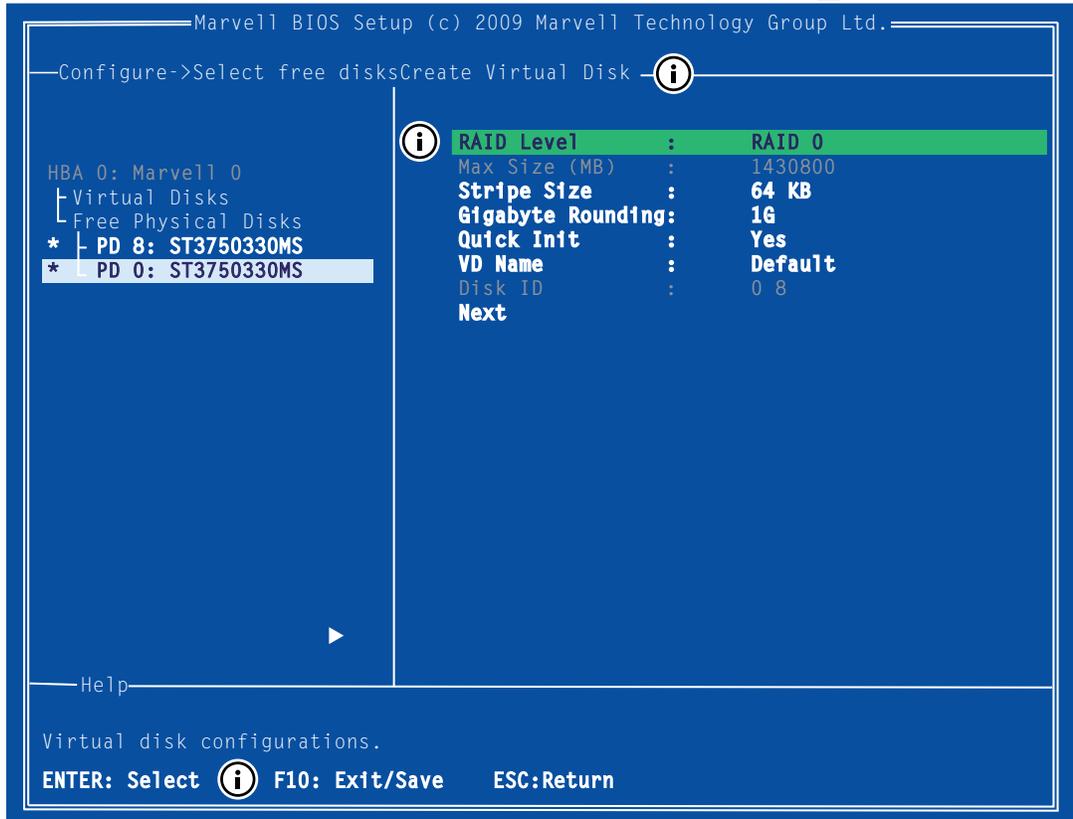


**Note:** When a disk is selected, an asterisk (\*) appears to the left of the disk label, as shown in Figure 1-6.

4. **Create Virtual Disk** by configuring its settings in the **Information** pane, as shown in Figure 1-7.

The controls for making selections are listed in the **Help** pane when an available setting is highlighted.

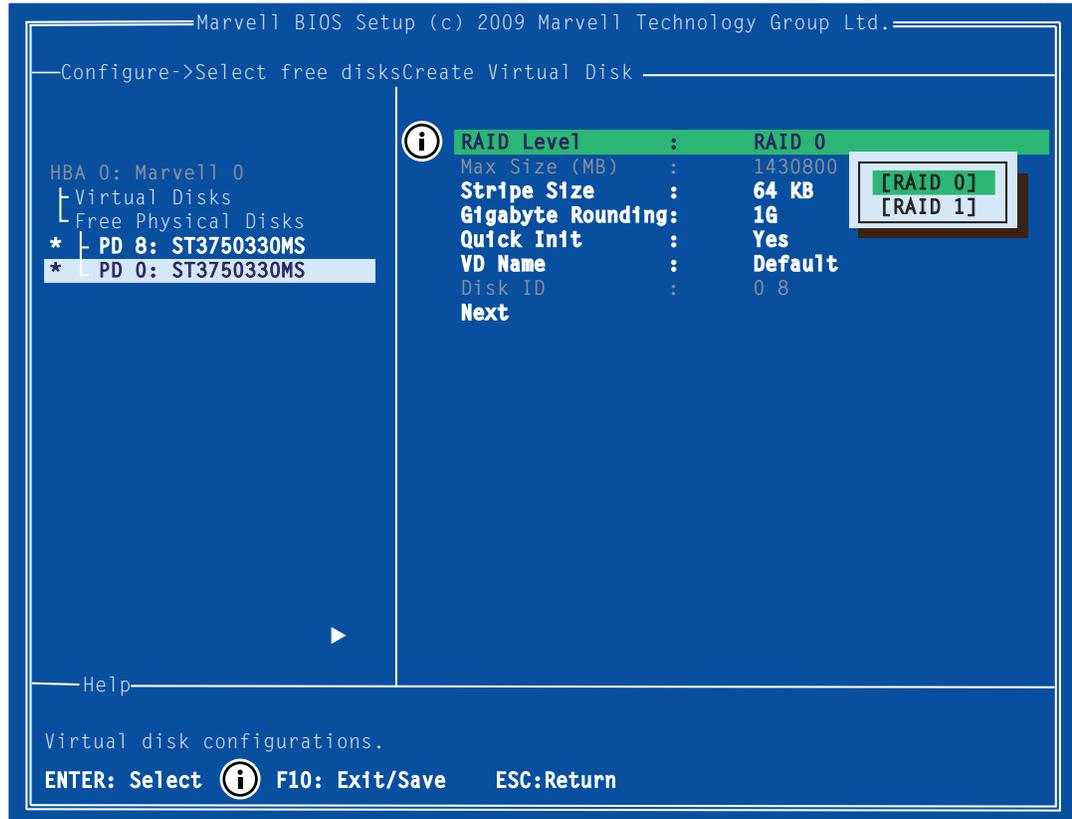
**Figure 1-7 Configure Virtual Disk**



**Note:** Max Size (MB) and Disk ID are properties of the virtual disk that cannot be edited. Max Size (MB) is the size of the RAID virtual disk as determined by the selected RAID Level. Disk ID lists the IDs of the physical disks comprising the virtual disk.

5. **RAID Level**, as shown in Figure 1-7, is highlighted when the **Create Virtual Disk** screen is presented. Press **Enter** to select a **RAID Level**. A menu pops-up, as shown in Figure 1-8, and lists available RAID levels.
6. Scroll the list, as shown in Figure 1-8, and press **Enter** to select a **RAID Level** (RAID 0, RAID 1).

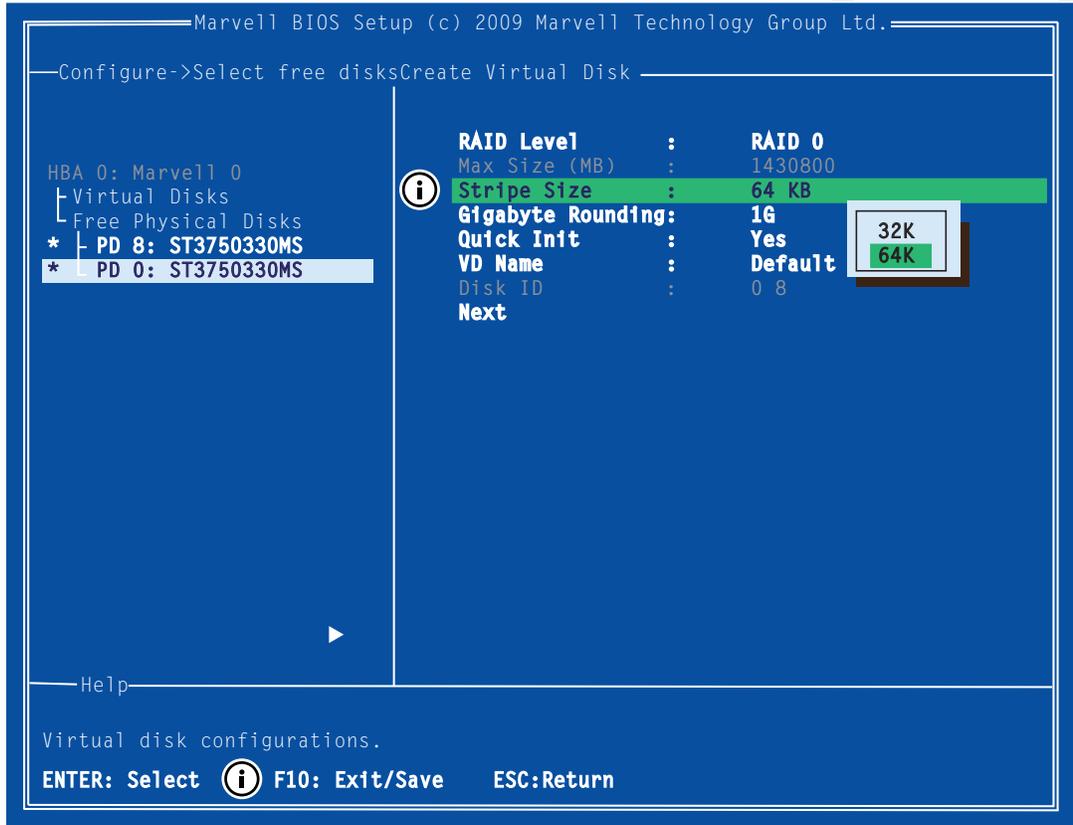
**Figure 1-8 RAID Level**



**Note:** The default RAID Level is RAID 0. For information on RAID levels, see Appendix B, [Selecting a RAID Level](#).

7. Scroll to **Stripe Size** and press **Enter** to select.  
A menu pops-up, as shown in Figure 1-9, and lists available stripe sizes for the selected RAID level.
8. Scroll the list, as shown in Figure 1-9, and press **Enter** to select **Stripe Size (32K, 64K)**.

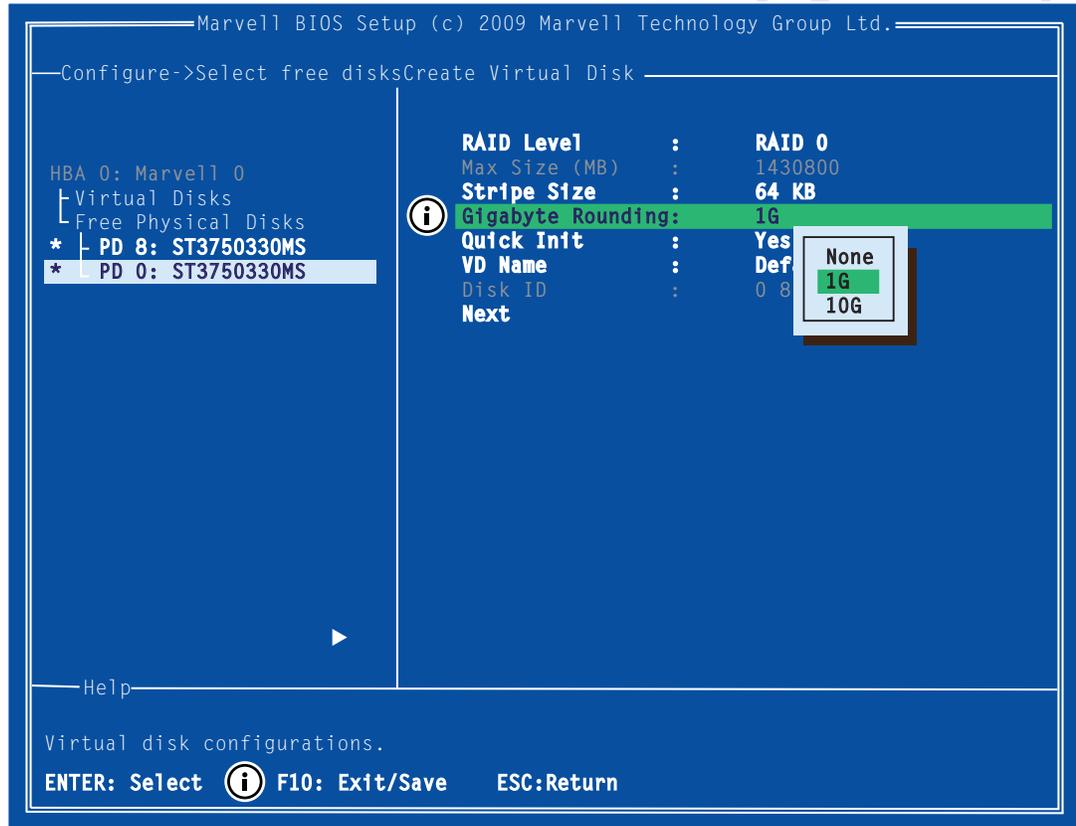
Figure 1-9 Stripe Size



**Note:** The default Stripe Size is 64 KB. For information on Stripe Size, see Appendix D, [Glossary](#).

9. Scroll to **Gigabyte Rounding** and press **Enter** to select.  
A menu pops-up, as shown in Figure 1-10, and lists available stripe sizes for the selected RAID level.
10. Scroll the list, as shown in Figure 1-10, and press **Enter** to select **Gigabyte Rounding** (None, 1G, 10G).

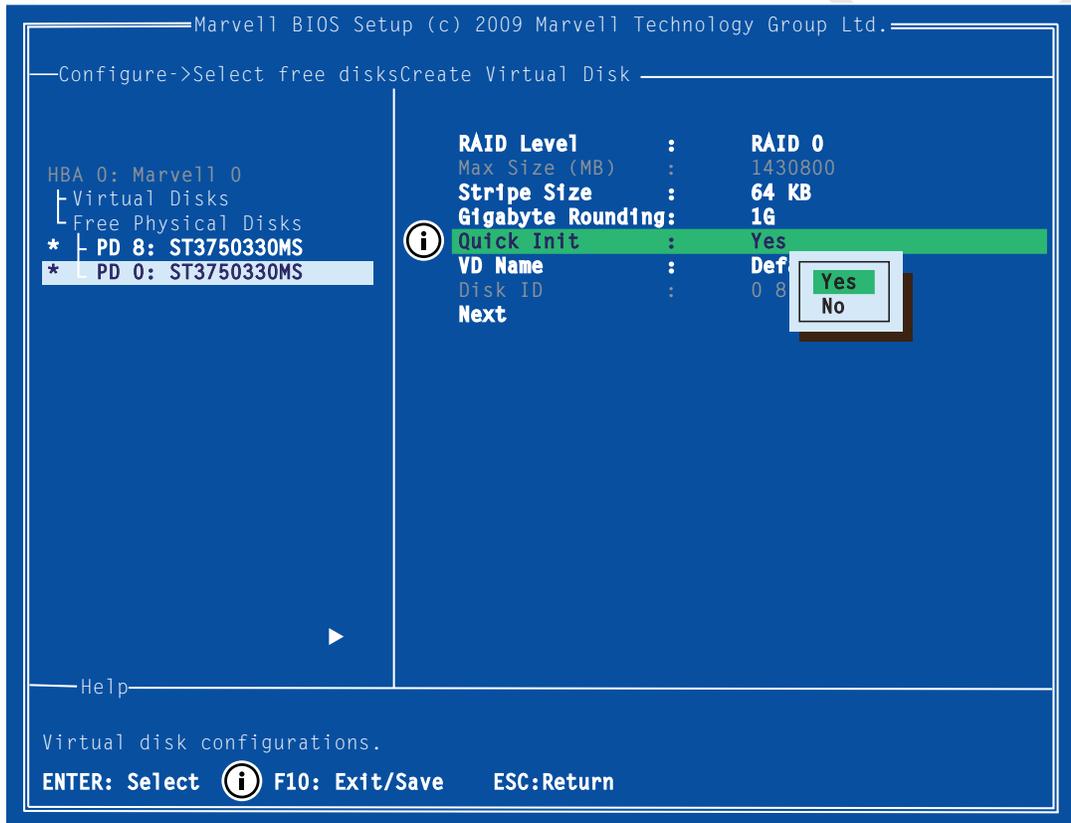
**Figure 1-10 Gigabyte Rounding**



**Note:** The default setting for Gigabyte Rounding is 1G. For information on Gigabyte Rounding, see Appendix D, [Glossary](#).

11. Scroll to **Quick Init** and press **Enter** to enable or disable quick initialization of the virtual disk.  
A menu pops-up, as shown in Figure 1-11, and lists available options for quick initialization of the virtual disk.
12. Scroll the list, as shown in Figure 1-11, and press **Enter** to select **Quick Init** (Yes, No).

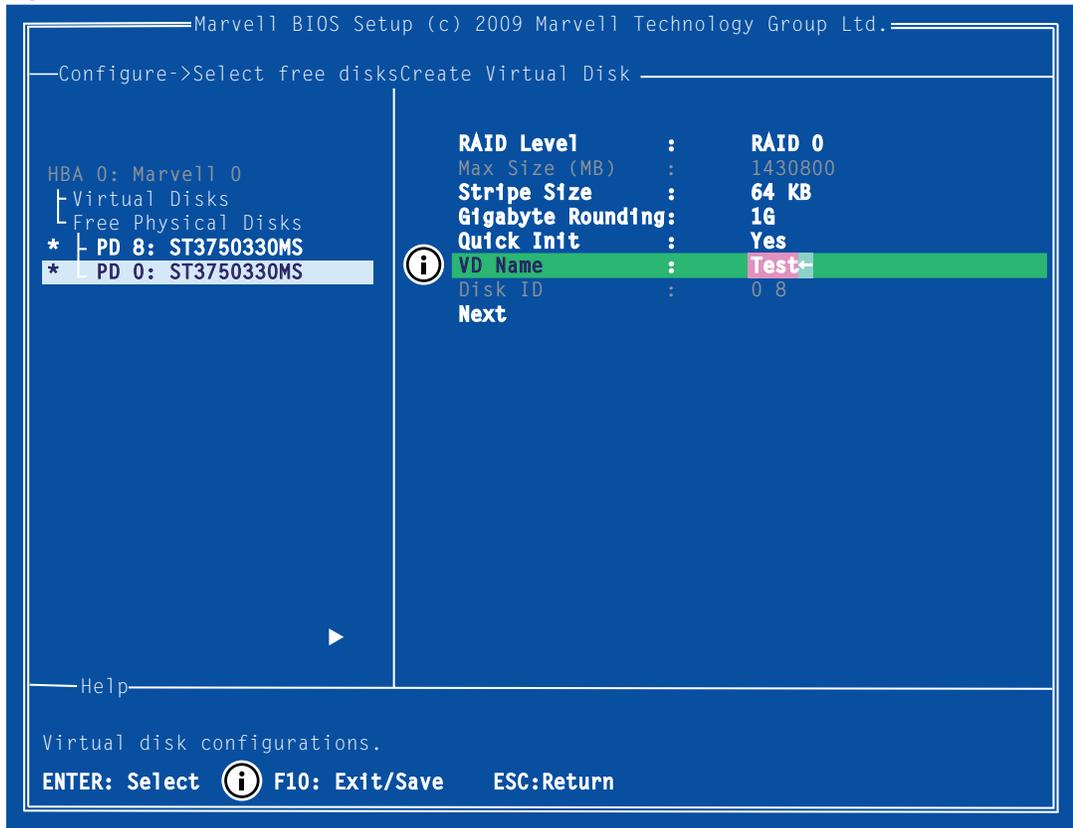
**Figure 1-11 Quick Init**



**Note:** The default setting for Quick Init is Yes.

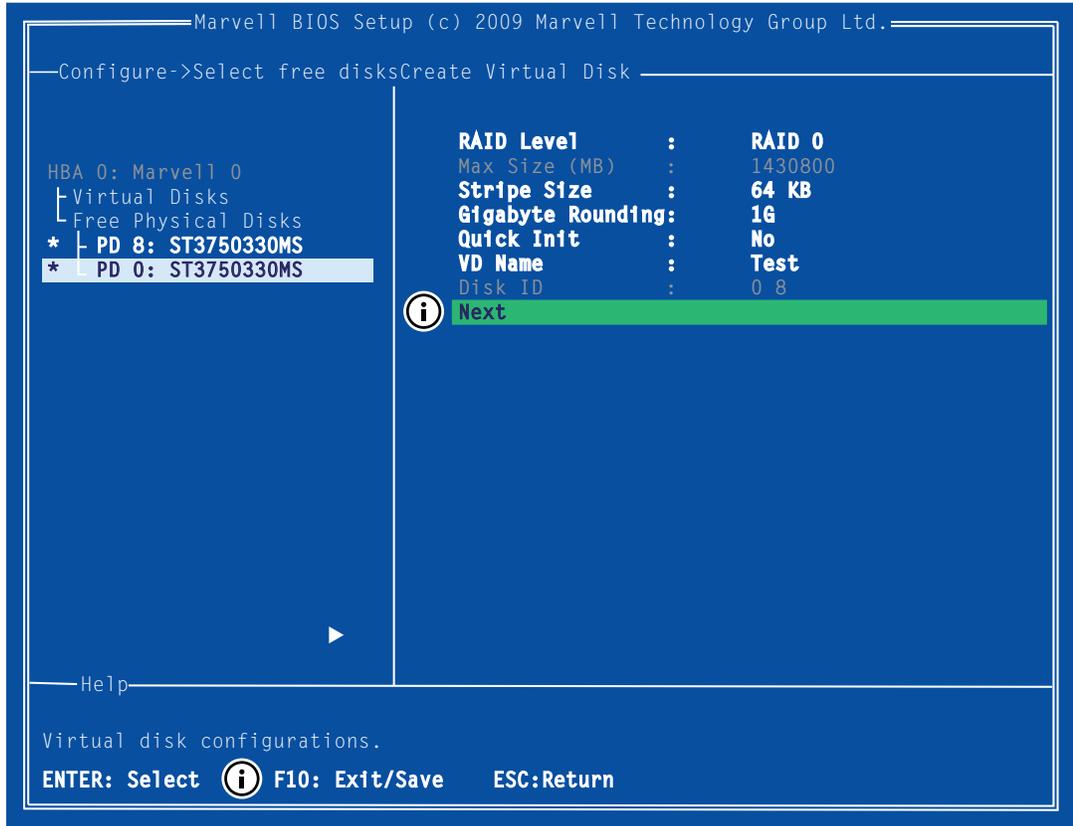
13. Scroll to **VD Name** and the **Default** name is cleared for a new name, as shown in Figure 1-12.  
**Type** a new name and press **Enter** to confirm the selection.

**Figure 1-12 VD Name**



- After configuring the virtual disk, scroll to **Next**, as shown in Figure 1-13.  
Press **Enter** to create the virtual disk.

**Figure 1-13 Create Virtual Disk**



- Press **Y** to select **Yes**, as shown in Figure 1-14, to confirm the creation of the virtual disk. The virtual disk is now listed in the **Topology** pane, as shown in Figure 1-15.

**Figure 1-14 Create Virtual Disk Confirmation**

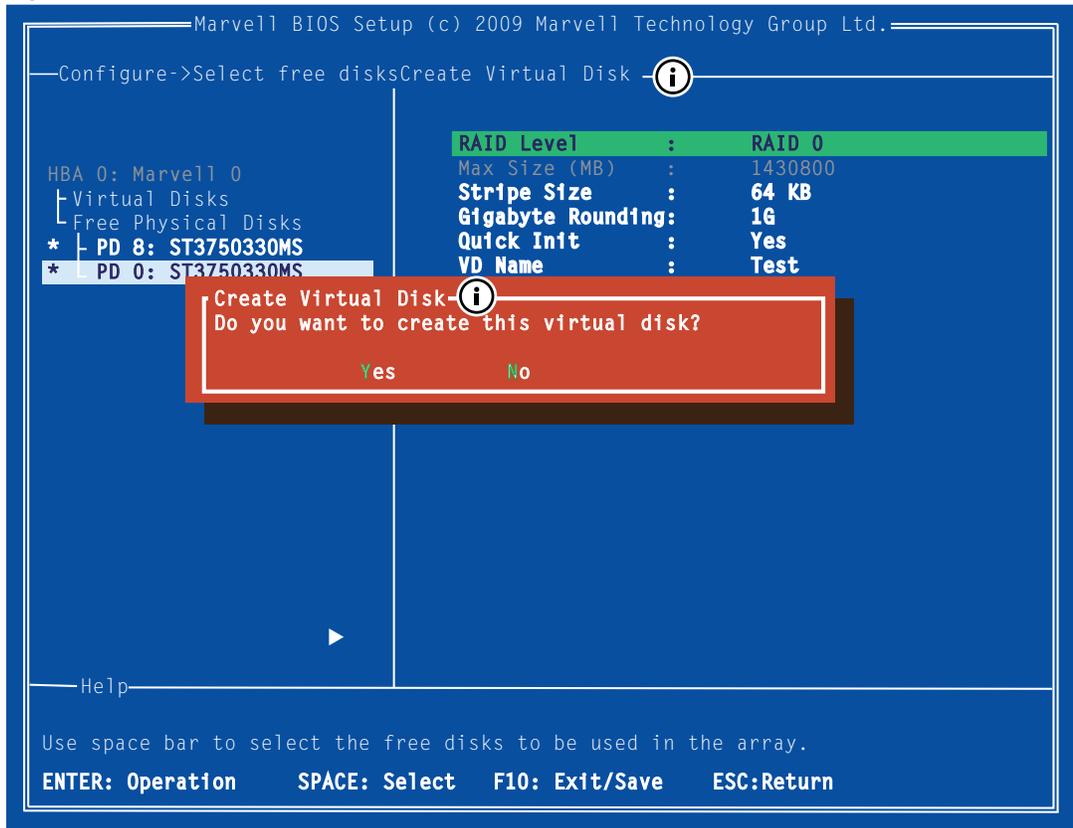
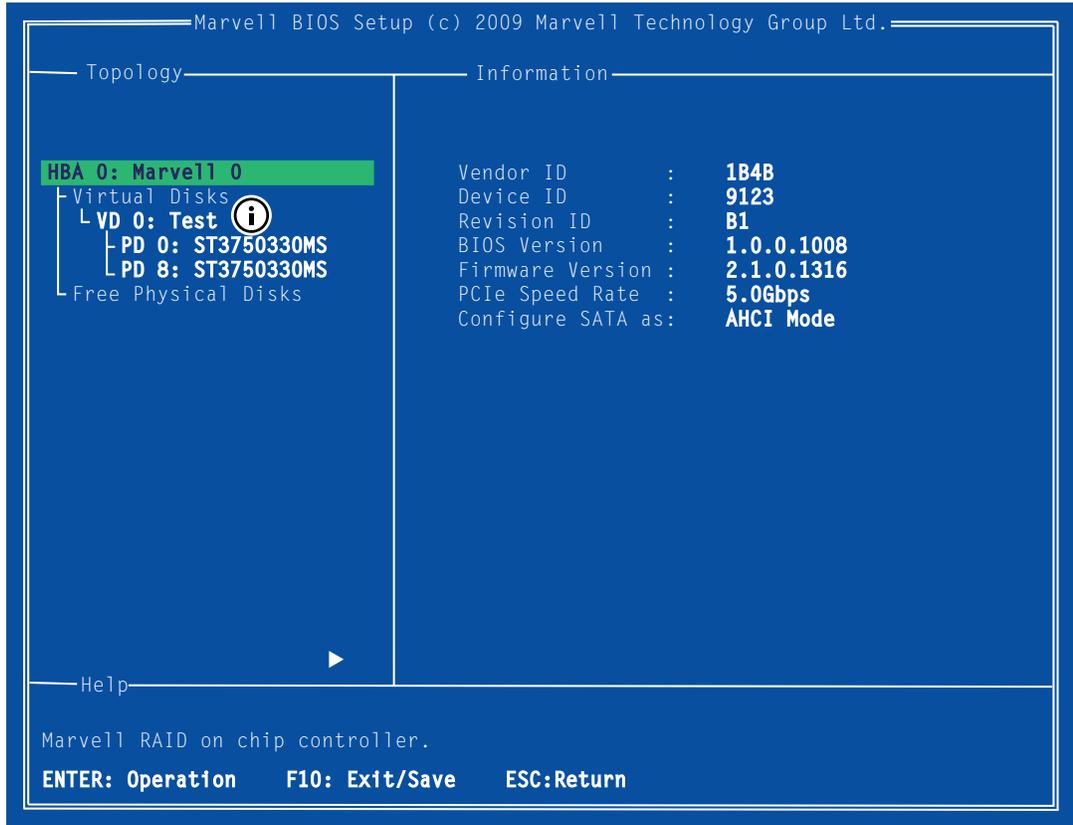


Figure 1-15 Virtual Disk in Topology Pane



## A.5 Erasing RAID Configuration Data

This topic describes the procedure to erase RAID configuration data (if any) on a foreign physical disk.

**Note:** The RAID controller stores RAID configuration data on all physical disks that are part of a virtual disk. RAID configuration data must be erased on the physical disk before it can be used with another virtual disk.

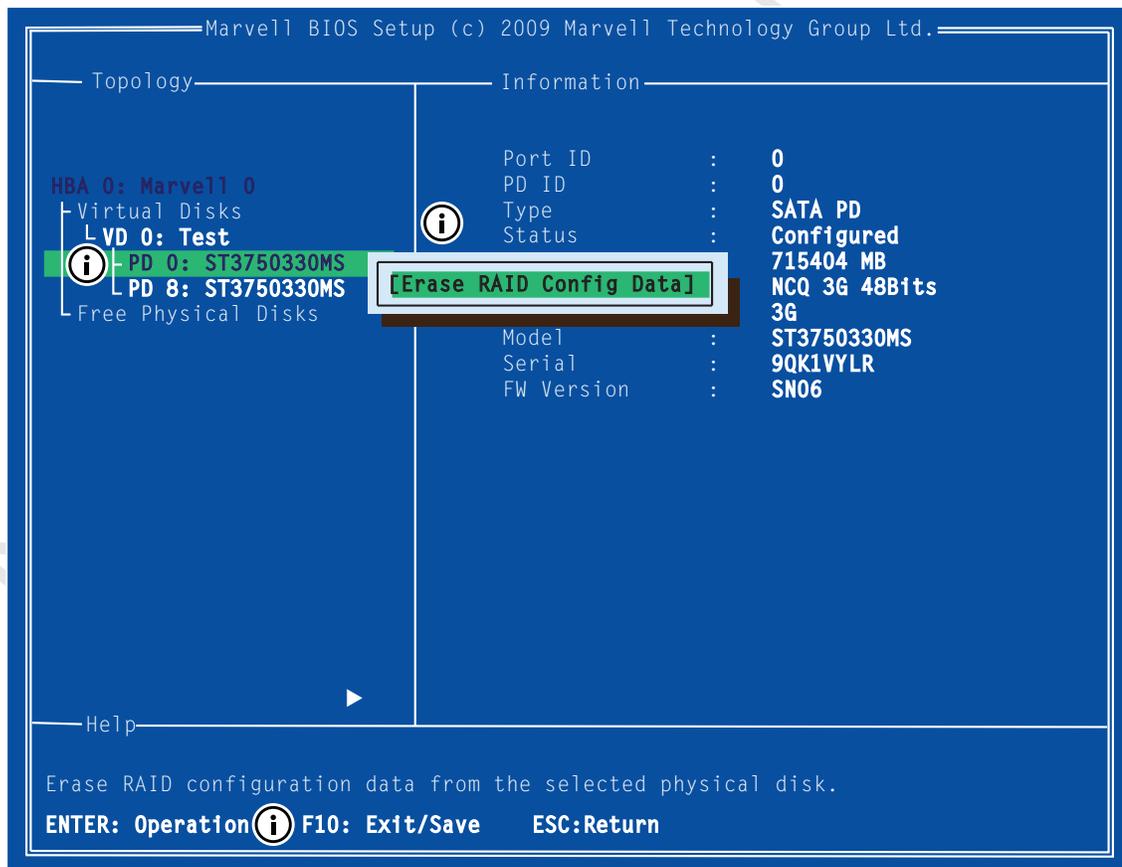
### To erase RAID configuration data

**WARNING** If the physical disk was originally part of another virtual disk, using **Erase RAID Configuration Data** may damage that virtual disk.



1. In the **Topology** pane, select **Physical Disk (VD 0: Default > PD 0: ST3750330MS** in Figure 1-16) and press **Enter**. A menu pops-up, as shown Figure 1-16.
2. Select **Erase RAID Config Data** to erase the RAID configuration data, as shown in Figure 1-16.
3. Select **Yes** when prompted to confirm the operation.

Figure 1-16 Erase RAID Configuration Data



## A.6 Rebuilding Virtual Disk

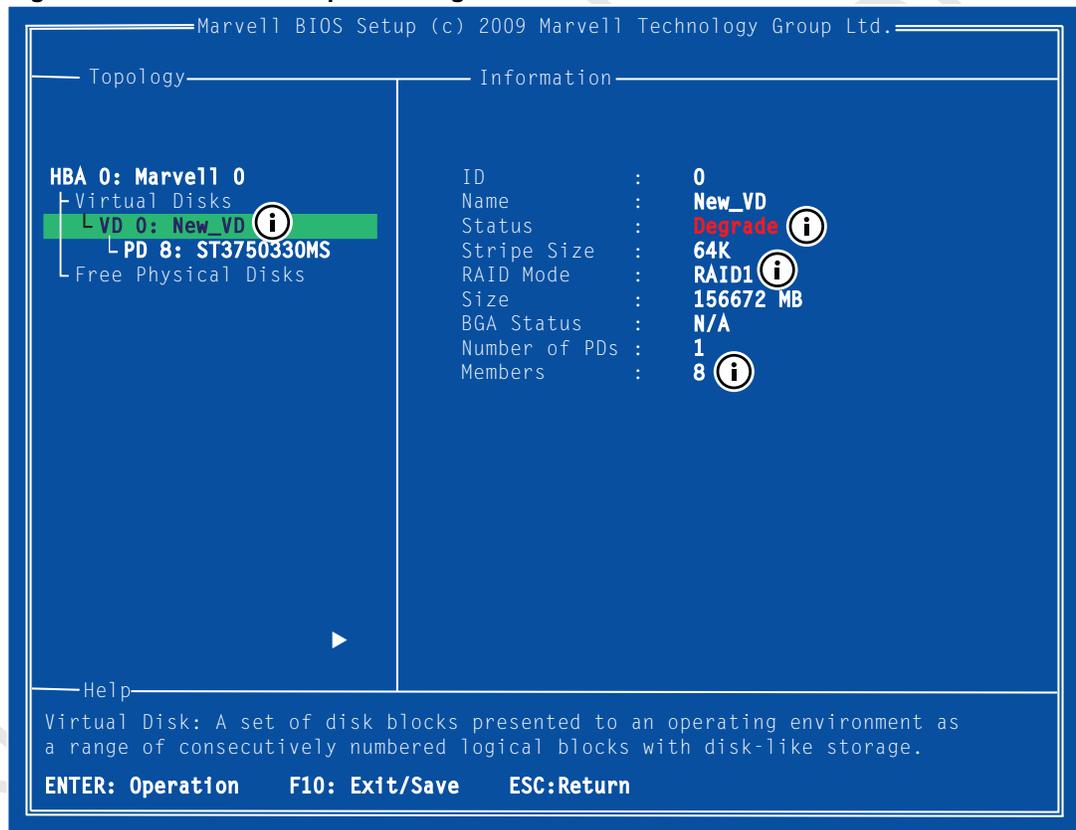
This topic describes the procedure to manually rebuild a degraded virtual disk. This is applicable to the RAID 1 virtual disk created with the 88SE91xx controller.

**Note:** The 88SE91xx BIOS supports manual rebuilding of RAID 1 virtual disks. The rebuild process is both initiated and completed in the BIOS. The Marvell RAID Utility (MSU), which runs in an OS environment, cannot be used to either initiate, resume, or complete the rebuild process. Spare physical disks are not supported.

### To manually rebuild a RAID 1 virtual disk

1. When a virtual disk is degraded, the **Status** of a virtual disk is changed from **Functional** to **Degrade**, as shown in Figure 1-17.

Figure 1-17 Virtual Disk Properties: Degrade VD

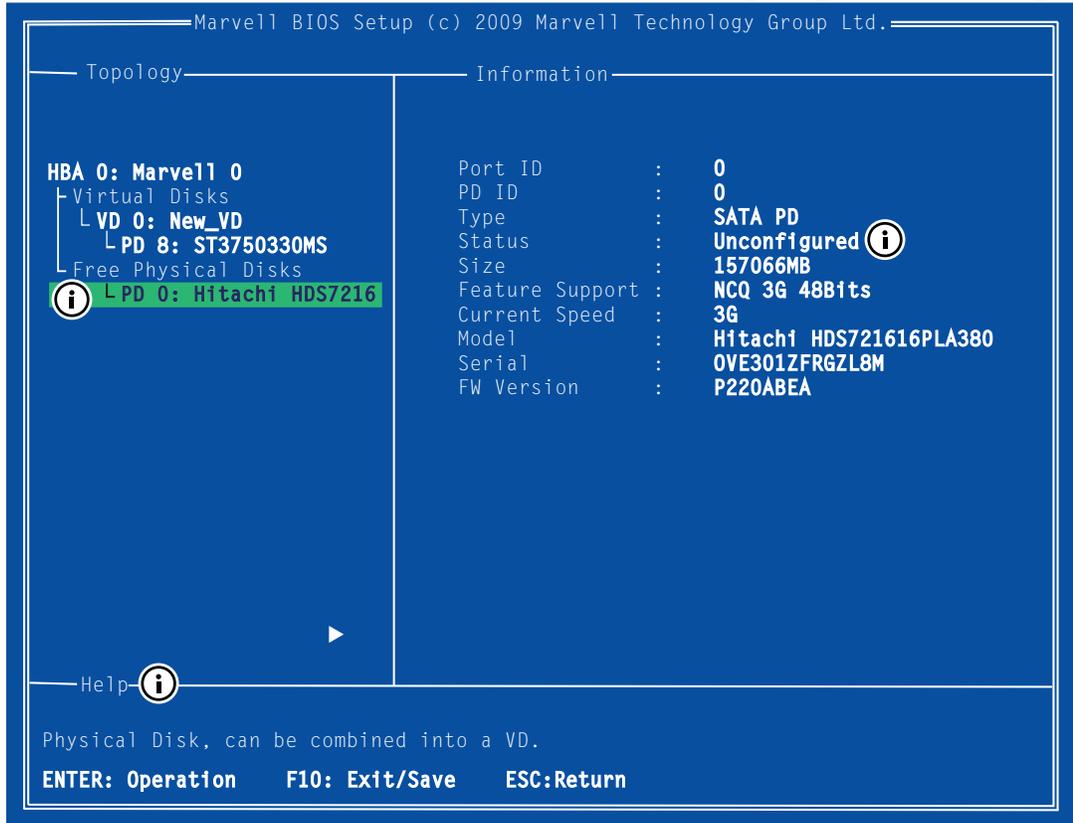


2. Replace the faulty physical disk with an identical physical disk.

**Note:** If an identical disk is unavailable, use a replacement physical disk of larger size or one with a slightly smaller size as determined the Gigabyte Rounding setting for the virtual disk.

The 88SE91xx detects the new physical disk and lists the device under Free Physical Disks in the Topology pane, as shown in Figure 1-18.

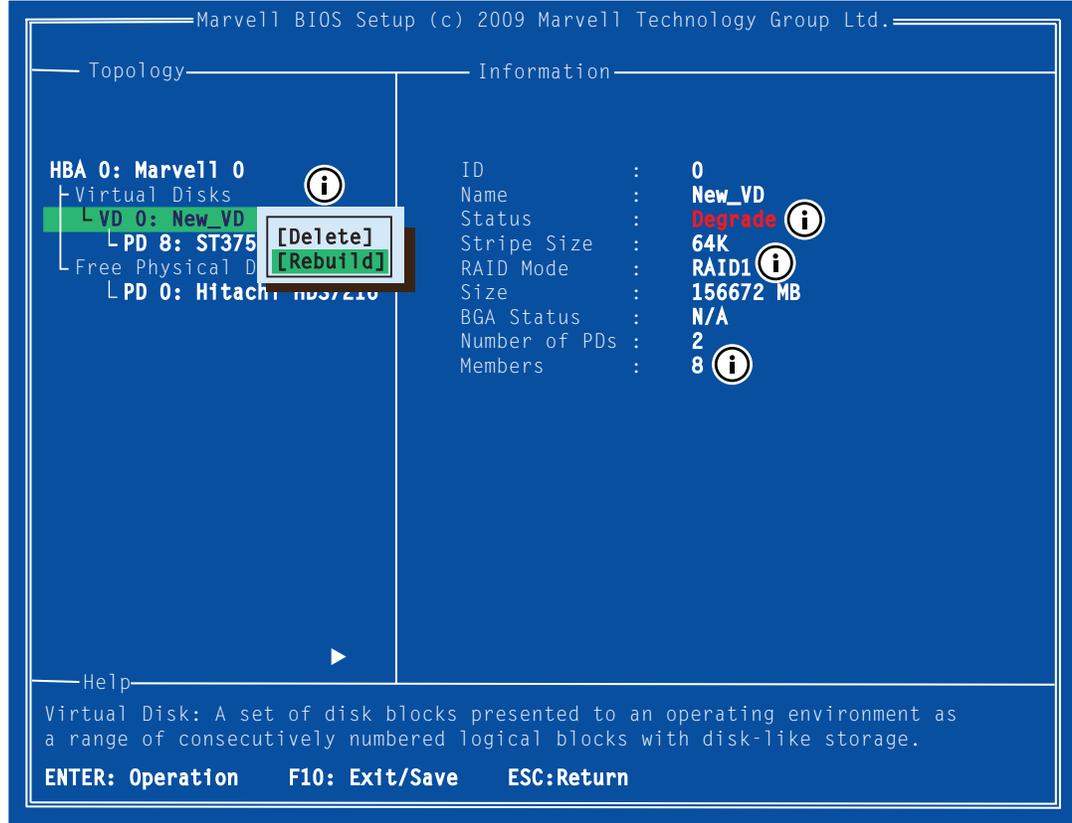
**Figure 1-18 Replacement Physical Disk**



- In the **Topology** pane, scroll to **Virtual Disks (VD 0: New\_VD** in Figure 1-19), and press **Enter** to select. A menu pops-up, as shown in Figure 1-19.

Scroll to **Rebuild** and press **Enter** to configure the rebuild process.

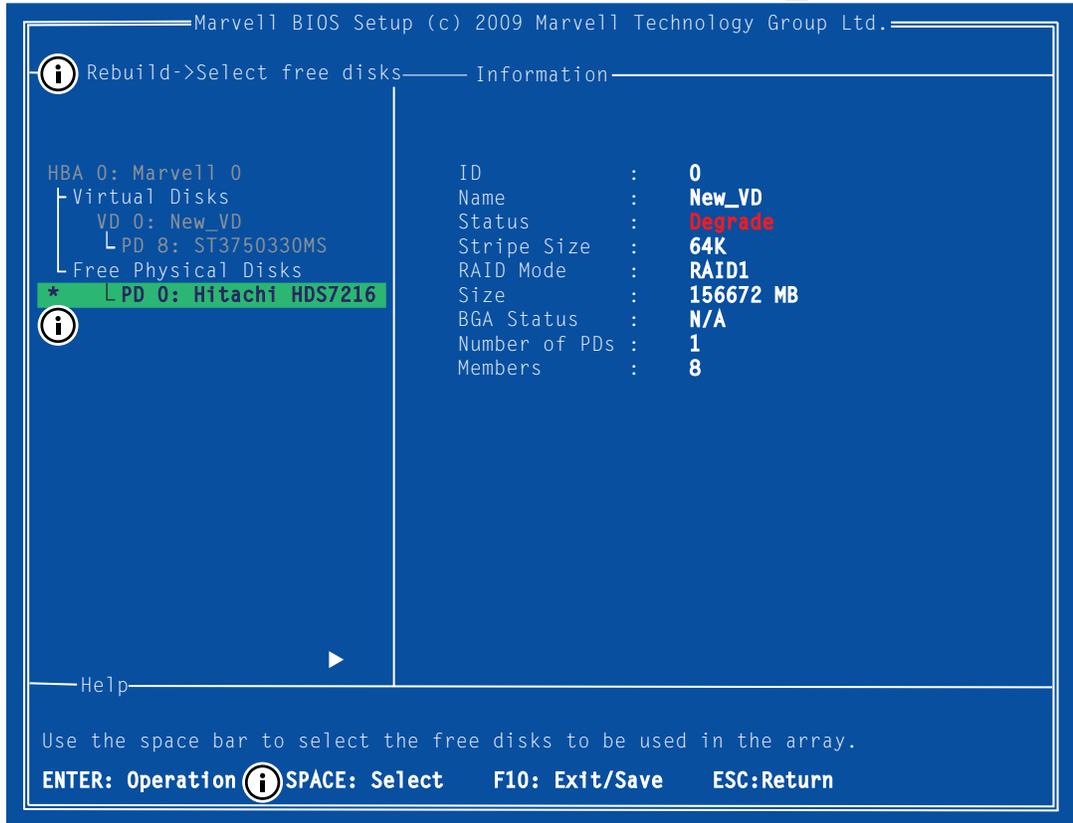
**Figure 1-19 Rebuild Virtual Disk**



4. Scroll through the list of free disks, as shown in Figure 1-20, and press **Space** to select or unselect a replacement physical disk.

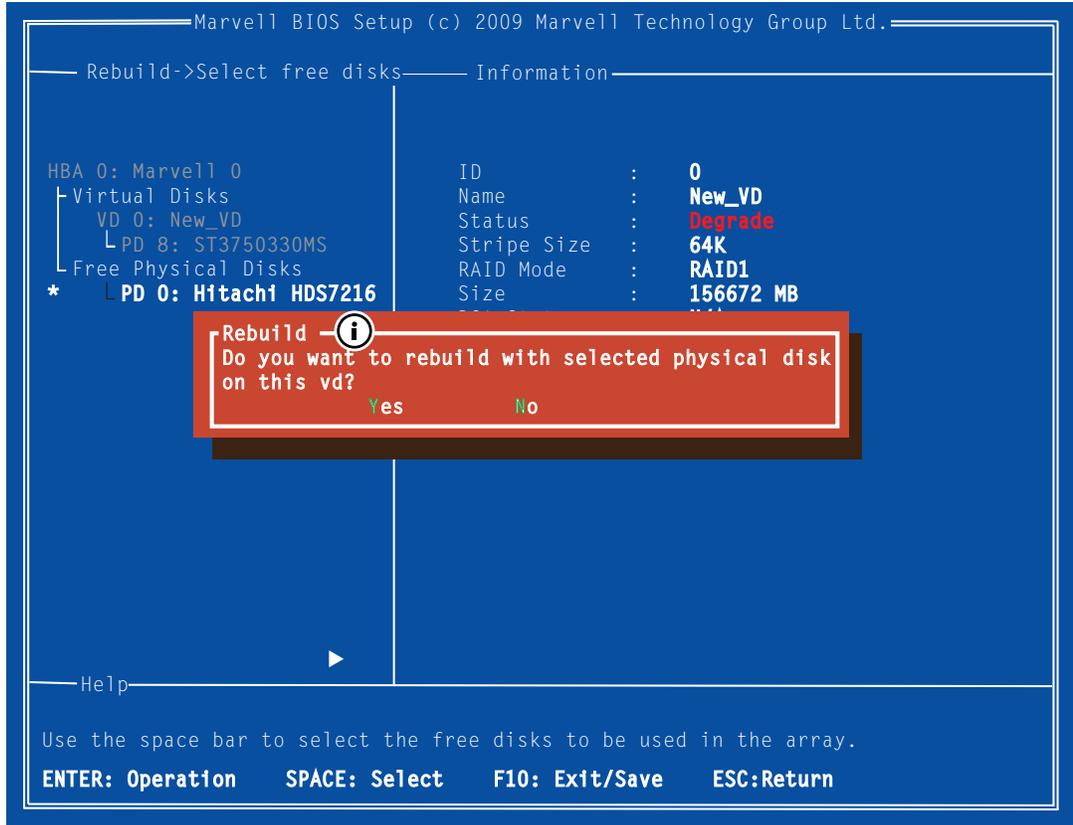
Press **Enter** to continue.

**Figure 1-20 Select Replacement Disk**



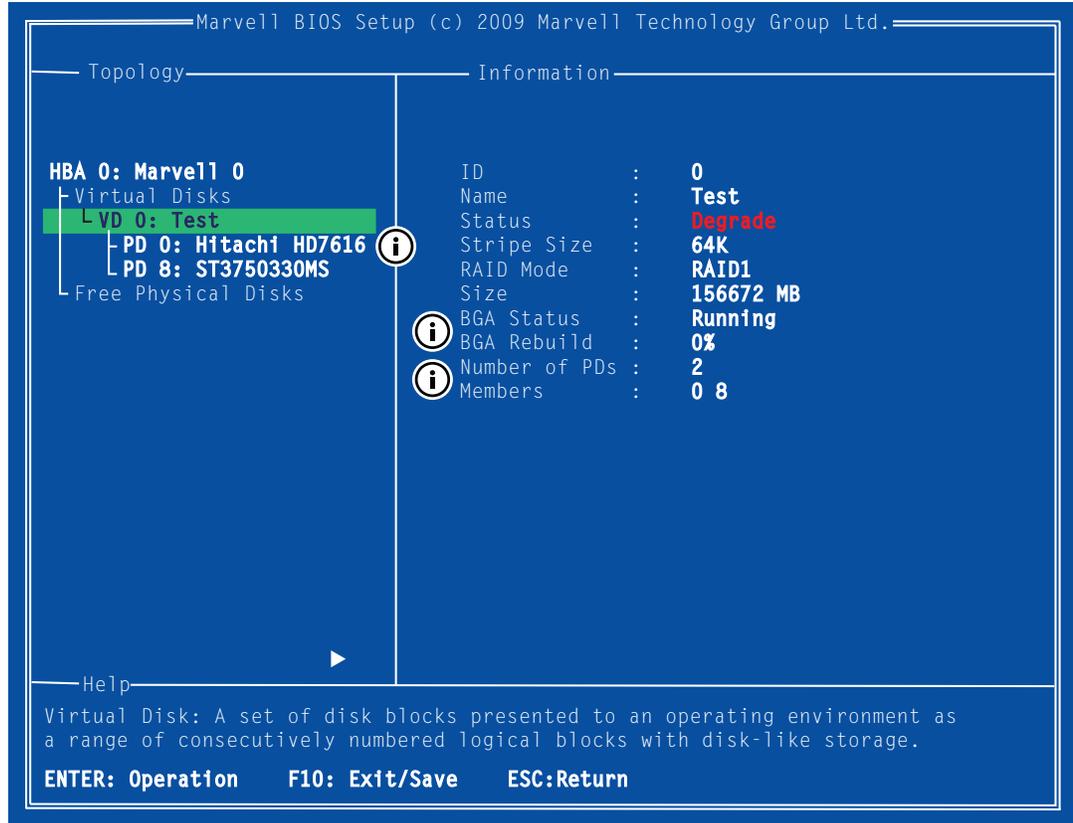
- Press **Y** to select **Yes**, as shown in Figure 1-21, when prompted to confirm the rebuild process.

**Figure 1-21 Confirm Rebuild Virtual Disk**



- The status of the Rebuild process is reflected in the properties of the virtual disk, as shown in Figure 1-22.

Figure 1-22 Rebuild Status



#### To pause the rebuild process

- In the **Topology** pane, scroll to the partially rebuilt **Virtual Disk**.
- Press **Enter** to view available operations on **Virtual Disk**.
- Scroll to **Pause** and press **Enter** to pause the rebuild process.

**Note:** Incomplete rebuild procedures are paused upon exiting the BIOS. The rebuild procedure(s) can be resumed manually upon re-entering the BIOS.

#### To resume the rebuild process

- In the **Topology** pane, scroll to the partially rebuilt **Virtual Disk**.
- Press **Enter** to view available operations on **Virtual Disk**.
- Scroll to **Resume** and press **Enter** to resume the rebuild process.

**Note:** The rebuild process is both initiated and completed in the BIOS. The Marvell RAID Utility (MSU), which runs in an OS environment, cannot be used to either initiate, pause, resume, or complete the rebuild process.

## A.7 Deleting Virtual Disk

This topic describes the procedure to delete a virtual disk.

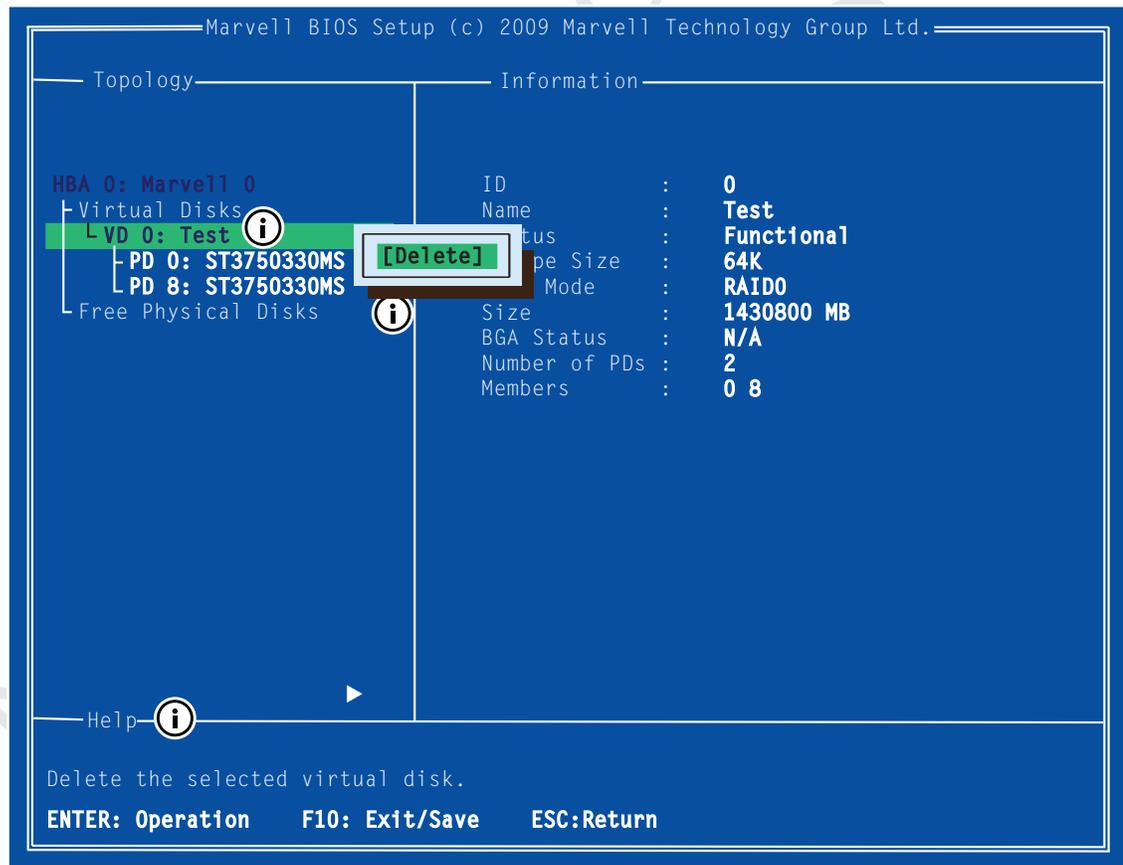
### To delete a virtual disk

**WARNING** Using **Delete** permanently erases all data on the virtual disk.



1. In the **Topology** pane, select **Virtual Disk (VD 0: Default** in Figure 1-23) and press **Enter**. A menu pops-up, as shown Figure 1-23.
2. Select **Delete** to delete the virtual disk, as shown in Figure 1-23.
3. Press **Y** to select **Yes** when prompted **Do you want to delete this virtual disk?**
4. Press **Y** to select **Yes** when prompted **Do you want to delete MBR from this virtual disk?**

Figure 1-23 Delete Virtual Disk



# B SELECTING A RAID LEVEL

This chapter contains the following sections:

- RAID Overview
- Comparing RAID Levels
- RAID 0 (Striping)
- RAID 1 (Disk Mirroring)

## B.1 RAID Overview

RAID is an acronym for Redundant Array of Independent Disks. The RAID storage systems are created by combining multiple (two or more) physical disks and storing data using techniques specified by different RAID levels. Each RAID level offers a unique set of characteristics suitable for certain applications. See Section B.2, [Comparing RAID Levels](#) for a comparison of RAID levels across a number of parameters.

## B.2 Comparing RAID Levels

Table 2-1 compares RAID levels across a number of parameters. These ratings are intended to help you identify RAID levels with characteristics suitable for your application.

**Note:** A specific quantitative comparison is not possible because RAID performance is dependent on a number of variables that are unique to the equipment setup, such as the number of physical disks, performance characteristics of those disks, spindle synchronization, performance characteristics of the RAID controller, among others.

**Table 2-1 Comparing RAID Levels**

RAID Level	0	1
Read Performance	☆☆☆	☆☆☆
Write Performance	☆☆☆	☆☆☆
Fault Tolerance	✘	☆☆☆
Efficient use of disk capacity	☆☆☆	☆☆☆
Automatic rebuild	✘	✓
Minimum number of drives	2	Exactly 2

**Legend**

- ☆☆☆ Best
- ☆☆☆ Best-
- ☆☆☆ Good
- ☆☆☆ Good-
- ☆☆☆ Poor

## B.3 RAID 0 (Striping)

RAID 0 stripes data evenly across multiple (two or more) physical disks. It does not store parity or mirror data for fault tolerance.

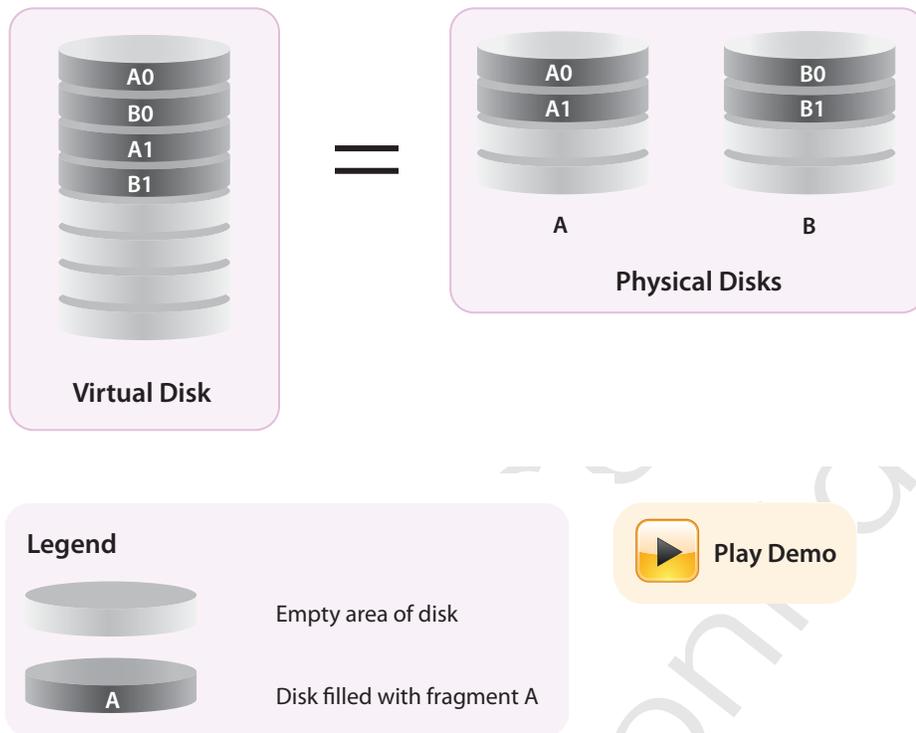
Table 2-2 describes RAID 0 across a number of parameters.

Table 2-2 RAID 0

Parameter	Rating	Description
Read Performance	☆☆☆	RAID 0 offers the best read/write performance because data striped across multiple physical disks can be both read and written simultaneously. With the minimum two physical disks, RAID 0 can perform two operations (read or write) simultaneously. The number of simultaneous operations increases with the number of disks in the RAID 0 set.
Write Performance	☆☆☆	RAID 0 offers the best read/write performance because data striped across multiple physical disks can be both read and written simultaneously. With the minimum two physical disks, RAID 0 can perform two operations (read or write) simultaneously. The number of simultaneous operations increases with the number of disks in the RAID 0 set.
Fault Tolerance	✘	RAID 0 does not contain parity or mirror data for fault tolerance. Data is not recoverable if any one of the physical disks fails.
Efficient use of disk capacity	☆☆☆	RAID 0 does not offer fault tolerance. The storage space on the virtual disk/array is used fully and efficiently to store data. <b>Note:</b> When creating a RAID 0 with physical disks of different sizes, the storage space added to the virtual disk/array by each physical disk is limited to the size of the smallest physical disk. For example, a RAID 0 virtual disk/array comprising of 150 GB and 100 GB physical disks creates a 200 GB virtual disk/array (twice the size of the smallest physical disk 100 GB).
Automatic rebuild	✘	Not Applicable. RAID 0 does not offer fault tolerance.
Minimum number of drives	2	
Suitable Applications		RAID 0 is ideally suited for applications requiring best read/write performance and where fault tolerance is not required.

Figure 2-1 describes RAID 0.

Figure 2-1 RAID 0



**Note:** Click **Play Demo** to launch an Adobe Flash™ demonstration RAID 0. To view the demonstration, Adobe Reader™ 9 (or higher) is required. If Play Demo is disabled, or if an error message, or blank window appears upon clicking Play Demo, then upgrade to the latest version of Adobe Reader™ at <http://get.adobe.com/reader/>.

## B.4 RAID 1 (Disk Mirroring)

RAID 1 uses exactly two physical disks and creates a copy (or mirror) of the primary physical disk on the secondary physical disk, as shown in Figure 2-2.

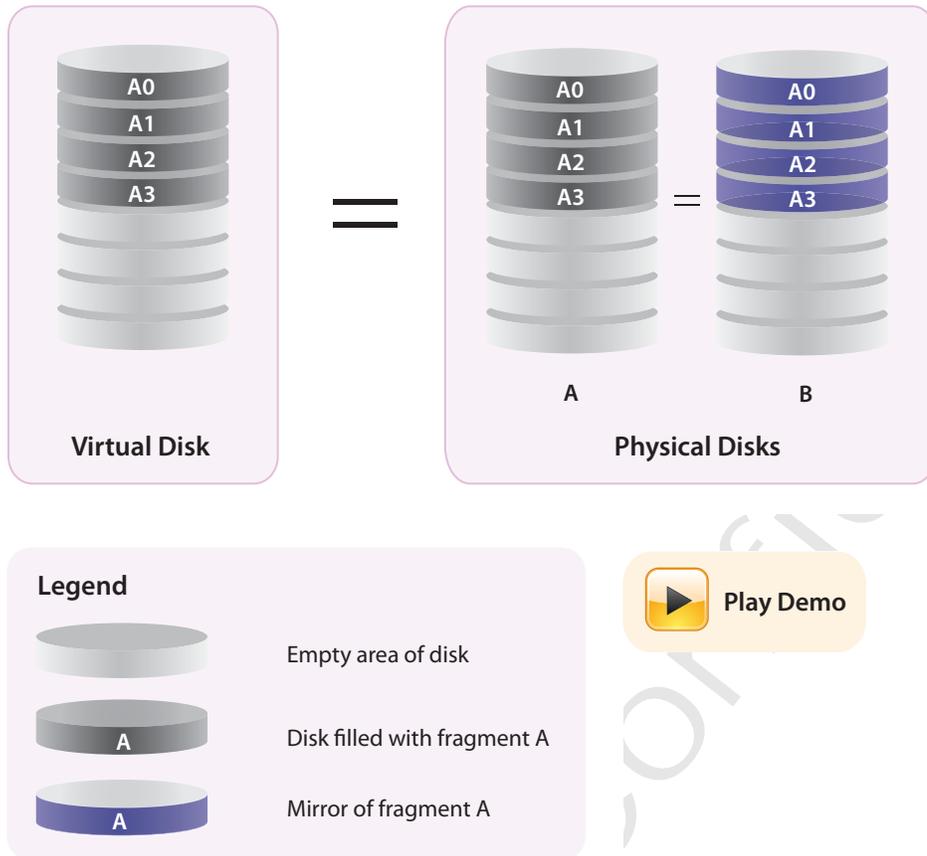
Table 2-3 describes RAID 1 across a number of parameters.

Table 2-3 RAID 1

Parameter	Rating	Description
Read Performance	☆☆☆	RAID 1 can perform two read operations simultaneously. Since data is identical on both physical disks, a read command can be sent to the secondary disk when the primary disk is busy with another read operation.
Write Performance	☆☆☆	Write performance is comparatively lower than read performance because data (original and mirror) must be written on two physical disks simultaneously.
Fault Tolerance	☆☆☆	RAID 1 virtual disks/arrays can tolerate the failure of one physical disk. <b>Note:</b> Although RAID 1 can tolerate the failure of only one physical disk, it receives high fault tolerance rating because one physical disk in a RAID 1 virtual disk/array (which always comprises of only two physical disks) is equivalent to 50% of the disks. As such, from a purely statistical viewpoint, RAID 1 can tolerate the failure of up to 50% of the physical disks. No other RAID level offers this percentage level of fault tolerance, which explains the high rating for RAID 1. Use this rating after considering the aforementioned limitations of RAID 1 with regard to your application.
Efficient use of disk capacity	☆☆☆	Data on the primary disk is mirrored on the secondary disk. Only 50% of the combined physical disk space is available for use.
Automatic rebuild	✓	Available.
Minimum number of drives		RAID 1 uses exactly two physical disks.
Suitable Applications		RAID 1 is ideally suited for applications requiring high read performance and fault tolerance.

Figure 2-2 describes RAID 1.

Figure 2-2 RAID 1



**Note:** Click **Play Demo** to launch an Adobe Flash™ demonstration RAID 1. To view the demonstration, Adobe Reader™ 9 (or higher) is required. If Play Demo is disabled, or if an error message, or blank window appears upon clicking Play Demo, then upgrade to the latest version of Adobe Reader™ at <http://get.adobe.com/reader/>.



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# C ICONS USED IN MSU

This appendix describes the icons used in MSU for the following physical/virtual devices:

- Arrays
- Events
- Physical Disks
- Virtual Disks
- Other Devices

**Note:** The contents of this appendix are currently under revision.

## C.1 Arrays

Table 3-1 lists the icons used to indicate the status of arrays.

**Table 3-1 Icons for Arrays**

Symbol	Description	Notes
	Online Array	The array is operating normally.
	Degraded Array	The array is degraded and has no fault tolerance. In this state, data is not recoverable if even one physical disk fails. Rebuild the array by replacing the failed physical disk(s).

## C.2 Events

Table 3-2 lists the icons used for adapter events.

**Table 3-2 Icons for Events**

Symbol	Description	Notes
	Normal Event	Example: Physical disk 1 is assigned as spare.
	Unknown Event	Any event that was not recognized by MSU. See Windows Events Viewer for more information on the event.
	Warning Event	Example: Virtual Disk 1 is deleted.
	Critical Event	Example: Virtual Disk 1 is degraded.

### C.3 Physical Disks

Table 3-3 lists the icons used to indicate the status of physical disks.

**Table 3-3 Icons for Physical Disks**

Symbol	Description	Notes
	Unconfigured Physical Disk	The physical disk is available for use in a virtual disk (or array).
	Configured Physical Disk	The physical disk is part of a virtual disk.
	Foreign Physical Disk	The foreign physical disk is part of a virtual disk created with another RAID controller. The foreign physical disk cannot be used on the RAID controller unless the RAID configuration metadata is erased on the disk.
	Offline Physical Disk	The physical disk is part of a virtual disk and has an error. Check the event log for details and replace the physical disk if necessary. <b>Note:</b> An offline physical disk can render a virtual disk offline or degrade it.
	Unconfigured Spare Drive	The spare drive is available for rebuilding virtual disks and arrays.
	Configured Spare Drive	The spare drive was used to rebuild a virtual disk and is now part of the same.
	SAS/SATA Tape Device	n/a
	CD/DVD Device	n/a

## C.4 Virtual Disks

Table 3-4 lists the icons used to indicate the status of virtual disks.

**Table 3-4 Icons for Virtual Disks**

Symbol	Description	Notes
	Online Virtual Disk	The virtual disk is operating normally.
	Online Virtual Disk with Background Activity	The virtual disk is operating normally and performing a background activity.
	Offline Virtual Disk	This virtual disk is not operating because one or more member physical disks are not connected. Data can neither be written nor read from the virtual disk.
	Foreign Virtual Disk	The RAID configuration metadata on the physical disk indicates that it is part of a virtual disk that was created with another RAID controller.
	Partially Optimal Virtual Disk	One or more physical disks in the virtual disk have failed and reduced the fault tolerance of the virtual disk. The virtual disk is still operating normally.
	Partially Optimal Virtual Disk with Background Activity	The partially optimal virtual disk is performing a background activity.
	Degraded Virtual Disk	The virtual disk is degraded and has no fault tolerance. In this state, data is not recoverable if even one physical disk fails. Rebuild the virtual disk by replacing the failed physical disk(s).
	Degraded Virtual Disk with Background Activity	The degraded virtual disk is rebuilding.

## C.5 Other Devices

Table 3-5 lists the icons used in MSU.

**Table 3-5 Miscellaneous Icons**

Symbol	Description
	Adapter
	Battery Backup Unit (BBU)
	Enclosure
	Port Multiplier

# D

## GLOSSARY

This glossary describes abbreviations, acronyms, and terms used in this manual.

**Note:** The contents of this appendix are currently under revision.

### A

#### Adapter

Adapter refers to any board that hosts the [Controller](#).

**Note:** Commands are executed on the controller, which is hosted on either an HBA (Host Bus Adapter), evaluation board, or OEM motherboard.

Related terms: [Controller](#)

#### Advanced Power Management

The controller uses one of the following modes to reduce the power consumption of physical disks.

- Normal mode: Full RPM
- Standby mode: Reduce RPM during idle periods
- Power-off mode: Power-down physical disk if physical disk is idle for a specified duration.

Related terms: [Staggered Spin-Up](#)

#### AES

Acronym for Advanced Encryption Standard.

**Note:** This feature requires hardware and software support

#### AES Link

Refers to AES encryption being applied to data at the link level (transmission from one network location to another).

**Note:** This feature requires hardware and software support.

#### Array

An array is a combination of two or more physical disks that are presented to the operating system as a single storage device comprising of one (or more) virtual disk(s).

Related terms: [Virtual Disk](#)

**Auto-Rebuild** When enabled, degraded virtual disks are automatically rebuilt if a global spare drive of suitable size is available.

Related terms: [Rebuild](#), [Spare](#), [Global Spare Drive](#), [Hot Spare](#), [Hot Swap](#), [Gigabyte Rounding](#).

## B

**Background Initialization** Refers to [Full Initialization](#) running as a background activity.

**BBU** Abbreviation for Battery Backup Unit.

**BGA** Abbreviation for Background Activity.

**BIOS POST** BIOS Power-On Self Test.  
This is a pre-boot diagnostic test procedure that checks if the required hardware is present and functioning correctly. The system typically continues to boot even if errors are encountered (unless they are fatal errors).

## C

**CLI** Command Line Interface

**Consistency Check** Consistency Check checks and reports the integrity of parity/mirror data on the virtual disk.

**Notes:**

- Not applicable to [RAID 0 \(Striping\)](#) virtual disk or JBOD.
- Consistency Check can be performed only on fully-initialized virtual disks.
- Consistency errors are recorded in the [Event Logs](#).
- Consistency Check is recommended as a regular maintenance procedure for virtual disks.
- Aside from regular maintenance runs, also run Consistency Check when a virtual disk is not performing as expected.

Related terms: [Full Initialization](#), [Consistency Fix](#), [Synchronization Rate](#).

**Consistency Fix** Consistency Fix checks, reports, and fixes parity/mirror data on virtual disks.

**Note:** *Consistency Fix can be performed only on fully-initialized virtual disks.*

Related terms: [Full Initialization](#), [Consistency Check](#), [Synchronization Rate](#).

**Controller** Refers to the RAID controller on which commands are executed.

**Note:** *Although the terms Adapter and Controller are used interchangeably, commands are executed on the RAID controller which is hosted on the Adapter.*

Related terms: [Adapter](#)

**Copyback** Copy Back replaces a functioning physical disk on an operating array by copying all the contents of the functioning physical disk to a replacement physical disk, without degrading the array. This is useful when the functioning disk shows signs of impending failure.

**Note:** *Copy Back is only available for RAID-On-Chip (ROC) controllers.*

## D

**Disk Data Format (DDF)** The DDF/metadata contains controller attributes, RAID configuration data, [Read Check Table](#), watermark for background activities, and temporary data swap space for some processes.

64 MB of disk space on every RAID configured physical disk is reserved for storing DDF/metadata. The remaining space is reported as the usable capacity of the physical disk.

**Drive Size Coercion** Drive Size Coercion is designed for fault tolerance virtual disks, such as [RAID 1 \(Disk Mirroring\)](#). When using physical disks of varying sizes, the controller limits (or coerces) the usable size of each physical disk to size of the smallest physical disk. This is useful when it is not possible to use physical disks of the same size.

**Dedicated Spare Drive** A dedicated spare drive is a spare that is assigned for exclusive use by a specific array.

**Note:** *Dedicated Spare Drive is only available for RAID-On-Chip (ROC) controllers.*

Related terms: [Global Spare Drive](#), [Hot Spare](#), [Hot Swap](#), [Spare](#).

**Degraded Virtual Disk/Array**

A fault-tolerant virtual disk/array becomes degraded when one or more member physical disks fail. In this state, the fault tolerance of the degraded virtual disk/array is compromised to the extent determined by the RAID level and number of failed member physical disks. Rebuild the virtual disk/array to ensure continued and maximum fault tolerance.

Related terms: [Rebuild](#)

**E**

**ESD**

Electrostatic Discharge

**Erase Foreign Configuration**

Erase Foreign Configuration erases the RAID configuration metadata on a foreign virtual disk. This is useful when using a foreign physical disk in a new virtual disk.

*Note: If the foreign physical disk was originally part of another virtual disk, erasing RAID configuration data might damage that virtual disk, depending on the virtual disk's fault tolerance capabilities.*

**Event Logs**

Refers to the Event Logs pane in the Marvell RAID Utility.

**F**

**Fast Initialization**

In this mode, MSU erases the Master Boot Record (MBR) in all physical disks constituting the virtual disk. This is a destructive process that erases all data on the virtual disk.

*Note: Fast Initialization is available only when creating a virtual disk, except for RAID-On-Chip Controllers (ROCs).*

Related terms: [Full Initialization](#)

**Fault Tolerance**

Refers to the ability of a virtual disk to remain operational even when one or more member physical disks fail. The extent of fault tolerance is determined by the RAID level of the virtual disk.

Related terms: [Redundancy](#)

**Foreground Initialization**

Foreground Initialization writes 0 to the entire virtual disk. As with [Fast Initialization](#), all data on the virtual disk is destroyed.

Related terms: [Fast Initialization](#), [Full Initialization](#).

**Full Initialization**

In this mode, mirror (or parity) data is updated to ensure consistency of data on the physical disks constituting the virtual disk. This non-destructive method of initialization is performed in the background while the operating system continues to access the virtual disk.

**Notes:**

- Full initialization is required for all parity-based RAID virtual disks (RAID 5)
- A virtual disk consisting of five or more physical disks suffers degraded write performance when it is not fully initialized.

Related terms: [Fast Initialization](#), [Quick Initialization](#), [Initialization Rate](#).

## G

**Global Spare Drive**

A global spare drive is a spare that is available for use by all virtual disks.

Related terms: [Dedicated Spare Drive](#), [Hot Spare](#), [Hot Swap](#), [Spare](#).

## Gigabyte Rounding

Gigabyte Rounding defines the flexibility in size for spare drives used to rebuild degraded virtual disks. Available options for Gigabyte Rounding are None, 1G, and 10G.

While Gigabyte Rounding can be used for all RAID levels, it is primarily designed for the RAID level using the disk mirroring concept ([RAID 1 \(Disk Mirroring\)](#)) in order to make it easier to find a spare drive of suitable size when rebuilding a degraded virtual disk. When a physical disk fails, it must be replaced with one that is of same size or larger. When Gigabyte Rounding is enabled, it permits the installation of a spare drive that is slightly smaller (determined by the Gigabyte Rounding setting) than that of the smallest physical disk in the virtual disk.

For example, 120.5 GB and 115.7 GB physical disks can create a 115.7 GB RAID 1 virtual disk. If Gigabyte Rounding is set to 1G, then the controller floors the size of the physical disks to the nearest lower GB size. The 120.5 GB and 115.7 GB disks are treated as 120 GB and 115 GB physical disks, resulting in a 115 GB RAID 1 virtual disk. If the 120.5 GB physical disk fails, the virtual disk can be rebuilt with a spare drive sized at 115 GB or higher, thereby making it easier to find a suitable spare drive.

Related terms: [Auto-Rebuild](#), [Rebuild](#), [Spare](#).

## H

### HBA

Host Bus Adapter

### HDD

Hard Disk Drive.

Also referred to as Physical Disk.

### Hot Spare

This feature allows for the automatic replacement of a failed or offline physical disk with a spare drive connected to the controller. The automatic replacement is performed while the virtual disk is still operating.

Related terms: [Auto-Rebuild](#), [Global Spare Drive](#), [Hot Swap](#), [Spare](#).

### Hot Swap

This feature allow users to manually hot-swap (replace) a failed or offline physical disk with a spare drive at the same location while the virtual disk (or array) is still operating.

Related terms: [Global Spare Drive](#), [Hot Spare](#), [Spare](#).

**Hot Plug** When using Windows/Linux, physical disks can be plugged in and out with requiring a complete system power-down. On Windows, the physical disk is unplugged using the Safely Remove Hardware icon in the System Tray.

## I

**Import** Controllers supporting this feature allow you to import a virtual disk created with another RAID controller.

**Initialization** See [Full Initialization](#).

**Initialization Rate** The controller assigns priority to Background Initialization based on the Initialization Rate. Default is 50% (Medium).

*Note: When background activities are in progress, the controller is still available to the OS for normal operations. However, the response time may be lower depending on the background activity control rate.*

Related terms: [Full Initialization](#), [Quick Initialization](#).

**INT13h** INT13h, or Interrupt 0x13, is an interrupt vector in x386-based systems that allows the system to boot from a controller. Enable INT13h when a physical device or virtual disk attached to the controller is a bootable device.

**IOC** Abbreviation for IO Controller.

IO Controllers (IOCs) such as the Marvell 88SE63xx/88SE64xx SAS controllers can create and manage RAID 0, 1, 5, and 10 virtual disks.

*Note: Marvell RAID controllers support different sets of RAID levels depending on the hardware model and OEM software package. Some software packages, depending on OEM selections, support limited RAID levels by design. Check with the OEM vendor for information specific to your controller.*

## IOP

Abbreviation for IO Processor.

IO Processors (IOPs) are similar to IOCs, except that it contains an on-board CPU that enables hardware RAID functionality. The Marvell 88SE91xx 6 Gbps SATA RAID IOP can create and manage RAID 0 and RAID 1 virtual disks.

**Note:** Marvell RAID controllers support different sets of RAID levels depending on the hardware model and OEM software package. Some software packages, depending on OEM selections, support limited RAID levels by design. Check with the OEM vendor for information specific to your controller.

## K

### Key-phrase

Refers to the alpha-numeric string used to generate the AES key for data encryption.

**Note:** MSU uses an algorithm to combine the key-phrase with internal 128/256-bit AES keys to generate the AES key used for encryption.

## L

### LBA

Logical Block Addressing

### Locate

Locate turns the LED on a physical disk ON or OFF. This is useful when identifying a physical disk in an enclosure or backplane.

**Note:** The enclosure or backplane must support the Locate feature.

## M

### MBR

Master Boot Record

### Media Patrol

Media Patrol checks and fixes media errors on physical disks.

For a configured physical disk, Media Patrol checks and fixes media errors immediately. For spare drives, Media Patrol logs all media errors and fixes them when the spare drive is used to rebuild a virtual disk/array.

Related terms: [Media Patrol Rate](#)

- Media Patrol Rate** The controller assigns priority to [Media Patrol](#) based on the Media Patrol Rate. Default is 100% (High).
- Note: When background activities are in progress, the controller is still available to the OS for normal operations. However, the response time may be lower depending on the background activity control rate.*
- Related terms: [Media Patrol](#)
- Metadata** Metadata, stored by MSU on physical disks, contains RAID configuration data about the virtual disk and/or array.
- Migrate** Migrate allows you to increase the disk capacity and change the RAID level of an operating RAID array.
- Related terms: [Online Capacity Expansion](#)
- Module Consolidate** Enable Module Consolidate to consolidate all requests sent from the OS. Enabling this feature can improve sequential read/write performance. Default is On (Enable).

## N

- No Initialization** No initialization is performed on the virtual disk.
- Related terms: [Quick Initialization](#), [Full Initialization](#), [Initialization Rate](#).
- No Read Ahead** In this read cache mode, data is not pre-fetched in anticipation of the next read operation. This is suitable for applications that access data randomly.
- Related terms: [Read Ahead](#)
- NVRAM** Non-Volatile Random Access Memory

## O

- Online Capacity Expansion** Refers to disk capacity expansion of an operating RAID array.
- Note: The RAID level does not change.*
- Related terms: [Migrate](#)

## P

**PCB** Printed Circuit Board

**PCIe** PCI Express

**PD** Physical Disk

**PD Table** Physical Disk Table.

PD Table is the mapping of PD ID and WWN for each physical disk. It is stored in the SPI Flash. PD ID is assigned to each physical disk, starting with 0 and subsequently in increments of one. So the first physical disk is assigned an ID of 0, the next 1, and so on. This ID is persistent throughout the life of the HBA. Clearing or erasing PD table clears information on the PD IDs for all physical disks ever connected to the HBA. After clearing, the PD ID assignment would restart from 0.

**Poll S.M.A.R.T. Status** Enable Poll S.M.A.R.T. Status to periodically check S.M.A.R.T. status of physical disks. Default is Off (Disable).

If MSU's request for S.M.A.R.T status fails or if the physical disk is no longer in S.M.A.R.T status, MSU logs the event in Event Logs.

## Q

**Quick Initialization** In this mode, the Master Boot Record (MBR) is erased on all physical disks constituting the virtual disk. This is a destructive process that permanently erases all data on the virtual disk.

Related terms: [Full Initialization](#), [Initialization Rate](#).

## R

**Read Check Table** Used to record the sectors with invalid data, including events such as losing write-back cache or unavailability of fault-tolerance data during background activities (which prevents the controller from reading the wrong data).

- Read Ahead** In this read cache mode, the controller's read performance is configured for sequential access of data. It reads extra blocks from the physical disk to cache memory, in anticipation of the next read command from the application.
- Note:* For applications requiring random access of data, enabling Read Ahead might degrade read performance due to the overhead of advance read operations.
- Related terms: [No Read Ahead](#)
- Rebuild** Rebuild is the process of reconstructing data on a degraded virtual disk. Data is reconstructed on the replacement physical disk(s) using parity or mirror data on the virtual disk.
- Note:* Virtual disks can be rebuilt only as long as they are fault tolerant. All data is lost on the virtual disk/array if the number of failed member physical disks is greater than its fault tolerance capabilities
- Related terms: [Auto-Rebuild](#), [Fault Tolerance](#), [Rebuild Rate](#).
- Rebuild Rate** The controller assigns priority to [Rebuild](#) based on the Rebuild Rate. Default is 50% (Medium).
- Note:* When background activities are in progress, the controller is still available to the OS for normal operations. However, the response time may be lower depending on the background activity control rate.
- Related terms: [Rebuild](#), [Auto-Rebuild](#).
- Redundancy** Refers to the concept of duplicating data either through mirroring or storing parity information, in order to enable rebuilding of virtual disks/arrays in the event of the failure of one or more member physical disks.
- Related terms: [Fault Tolerance](#)
- Relearn** The Relearn procedure stabilizes/optimizes BBU performance. During Relearn, the BBU is discharged completely and then re-charged to full capacity. If MSU detects that BBU capacity/voltage is low and/or unstable, it automatically initiates the Relearn procedure. Relearn may also be scheduled as a maintenance task for the BBU to ensure stable/optimal performance.

<b>ROC</b>	<p>Abbreviation for RAID-On-Chip Controller.</p> <p>RAID-On-Chip (ROC) controllers such as the Marvell 88RC8180 can create and manage RAID 0, 1, 1E, 5, 10, 50, and 60 arrays. ROCs contain an on-board CPU which enables hardware RAID functionality.</p> <p><i>Note: Marvell RAID controllers support different sets of RAID levels depending on the hardware model and OEM software package. Some software packages, depending on OEM selections, support limited RAID levels by design. Check with the OEM vendor for information specific to your controller.</i></p>
<b>S</b>	
<b>SAS</b>	Serial Attached SCSI (Small Computer System Interface)
<b>SATA</b>	Serial ATA (Advanced Technology Attachment)
<b>Serial Console</b>	Enable Serial Console to transmit the BIOS display video through the system's serial port. Another serial port can then receive this signal and display the same in a terminal.
<b>Set Free</b>	Set Free releases an offline physical disk from a virtual disk.
<b>S.M.A.R.T. Monitoring</b>	When enabled, the controller periodically checks the S.M.A.R.T. status of physical disks. Any departure from S.M.A.R.T. status is reported in the <a href="#">Event Logs</a> .
<b>Spare</b>	<p>Refers to physical disk assigned as spare drive for use in rebuilding virtual disks.</p> <p>Related terms: <a href="#">Global Spare Drive</a>, <a href="#">Hot Spare</a>, <a href="#">Hot Swap</a>.</p>

**Staggered Spin-Up** In order to avoid excessive power-draw at power-up, physical disks can be powered-up sequentially (instead of powering-up simultaneously).

Depending on power supply, the speed of the computer, and other system configuration variations, you may want to spin up fewer or more physical disks at the same time. This can be configured in the BIOS. The total time for spinning-up all physical disks completely is limited to a maximum of 10 seconds. For example, in a setup consisting of eight physical disks, HDDs can be spun-up in groups of 4, 2, 1, and 1 with a delay of 2 seconds between the spin-up groups.

Related Terms: [Advanced Power Management](#)

**Stripe Size** Stripe Size specifies the size of single data block on the virtual disk. Available stripe sizes are 16 KB, 32 KB, 64 KB (default), and 128 KB.

**Note:** *The larger the stripe size, the longer it takes for the controller to read from and write to data blocks on the physical disks. For best read/write performance, a larger stripe size is recommended for applications requiring large data transfers such as audio, video, and graphics. A smaller stripe size enhances read/write performance for applications with content much smaller in size, such as e-mails, and documents.*

**Synchronization Rate** The controller assigns priority to [Consistency Check](#) and [Consistency Fix](#) based on the Synchronization Rate. Default is 50% (Medium).

**Note:** *When background activities are in progress, the controller is still available to the OS for normal operations. However, the response time may be lower depending on the background activity control rate.*

Related terms: [Consistency Check](#), [Consistency Fix](#).

## V

**VD** [Virtual Disk](#)

**Virtual Disk** A virtual disk is a combination of two or more physical disks that are presented to the operating system as a single storage device.

Related terms: [Array](#)

## W

### Wipe Out

Performs [Quick Initialization](#) of the physical or virtual disk.

### Write-Back (Performance)

In this write cache mode, the controller is configured for best write performance. Write data is stored temporarily in DDR cache memory and flushed to the hard disk at the appropriate time. In the event of power failure, there is a risk of losing data integrity if the transfer of data from the DDR cache to hard disk is not completed.

***Note:** A BBU (Battery Backup Unit) is recommended when using Write-Back cache mode. When a BBU is available and optimally charged, the controller automatically turns on Write-Back (Performance) cache.*

Related terms: [Write-Through \(Reliability\)](#)

### Write-Through (Reliability)

This is the default write cache mode. In this mode, all write operations are performed on the hard disk before a completion status is returned to the operating system.

Related terms: [Write-Back \(Performance\)](#)

# E TROUBLESHOOTING

Table 5-1 lists potential issues you might encounter when using MSU and possible solutions for the same.

**Table 5-1 Troubleshooting**

Category	Issue	Possible Solutions
Adapter Detection	MSU does not detect the adapter Adapter is detected but serial number is not available	<ul style="list-style-type: none"> <li>Verify that the drivers for the RAID controller are installed, as described in 1.2, <a href="#">Installing the Marvell Storage Utility (MSU)</a>.</li> <li>Re-install MSU.</li> <li>Install the latest version of MSU.</li> </ul>
Adapter Events	No events are displayed in MSU	<ul style="list-style-type: none"> <li>In Windows, use Windows Event Viewer to view adapter events.</li> <li>Verify that the drivers for the controller are installed, as described in 1.2, <a href="#">Installing the Marvell Storage Utility (MSU)</a>.</li> <li>Re-install MSU.</li> <li>Install the latest version of MSU.</li> </ul>
Auto-Rebuild	Auto-Rebuild is enabled but the virtual disk does not rebuild automatically	<ul style="list-style-type: none"> <li>If your degraded virtual disk/array does not auto-rebuild even when a global spare drive is available, verify that the spare drive is suitable for the virtual disk.</li> </ul>
Other	Other	<ul style="list-style-type: none"> <li>Contact us at <a href="mailto:docfeedback@marvell.com">docfeedback@marvell.com</a>. A quick response is guaranteed.</li> </ul>



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