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Integrated Mirroring Guide: Dell™ PowerEdge Expandable RAID Controller 4/im; Integrated Mirroring™ Guide

- [Integrated Mirroring \(IM\) Overview](#)
 - [Fusion MPT SCSI BIOS and Configuration Utility](#)
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-

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Initial release: ?

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Model ?

Integrated Mirroring™ Guide:

Integrated Mirroring (IM) Overview

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Introduction

This chapter provides general information about the Integrated Mirroring (IM) feature.

The Integrated Mirroring feature provides simultaneous physical mirroring of two hard drives, to assure fault tolerant, high availability data. If a hard drive fails, the hot swap capability allows the system to be easily restored by simply swapping drives. The system then automatically re-mirrors the swapped drive.

The Integrated Mirroring feature uses the same device drivers as the standard Fusion-MPT based controllers, providing seamless and transparent fault tolerance. This eliminates the need for complex backup software or expensive RAID hardware. The Integrated Mirroring feature operates independently from the operating system, which helps to conserve system resources. The configuration utility makes it easy to configure mirrored disk pairs.

Features

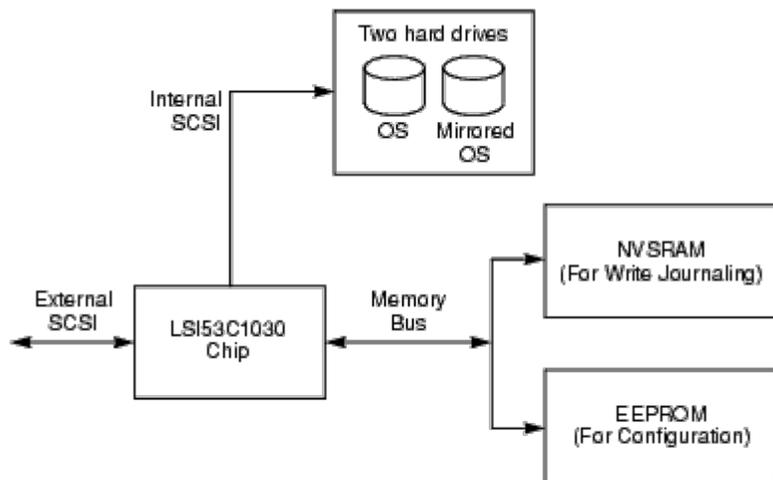
Following is a list of some key features of the Integrated Mirroring feature:

- Two-drive physical mirroring
 - Support for drives of different types and capacities
 - Fusion-MPT architecture
 - Configuration utility
 - Hot swap capability
 - Error notification
 - OS-specific event log
 - Errors displayed on CIM browser
 - SAF-TE drive status LED support for Integrated Mirroring feature drives
 - Write journaling, which allows automatic synchronization of potentially inconsistent data after unexpected power-down situations
 - Automatic background resynchronization while host I/Os continue
 - Media verification
-

Description

The Integrated Mirroring (IM) feature provides physical mirroring for the boot volume, as shown in the following figure. The IM firmware maintains a second drive as a mirror of the first drive, which is the boot drive. The runtime mirroring of the boot drive is transparent to the BIOS, drivers, and operating system. Host-based status software monitors the state of the mirrored drives and reports any error conditions.

Figure 1-1. Typical System Implementation



The user can configure the mirroring attributes during initial setup and reconfigure them in response to hardware failures or changes in the environment using the BIOS Configuration Utility.

Integrated Mirroring Firmware

This section describes features of the Integrated Mirroring (IM) firmware.

Host Interface

The IM host interface uses the "Message Passing Interface". Through the Fusion-MPT interface, the host operating system has access to the virtual IM drive as well as the physical drives. This allows support for domain validation and Ultra320 SCSI expander configuration.

Initialization

The firmware enables the physical drives in the IM volume before becoming operational to the host OS. The I/Os include the following:

- Inquiry
- Test Unit Ready
- Start Stop Unit
- Read Capacity
- Inquiry/EVPD to read the serial number of the disk from the "Vital Product Data"
- Mode Sense/Mode Select I/Os to configure disk write caching

Disk write caching may be enabled or disabled, depending upon the Configuration Utility settings. During initialization, the firmware determines whether full or partial synchronization is needed. The firmware may also be reset without rebooting the OS.

It may take the firmware from 5 to 30 seconds to spin up the IM physical drives before becoming operational to the host. However, the SCSI BIOS does not have to spin up the IM physical drives, this should have little impact on operating system boot time.

Hot Swap

The IM firmware supports "hot swap." The hot-swapped hard drive is automatically resynchronized in the background, without any host or user intervention. The hot-swapped disk must be at the same physical SCSI ID as one of the physical disks configured in the IM volume. The firmware detects "Hot Swap" removal on preconfigured IM drives through a failed SCSI I/O with "Selection Timeout" status, and marks the disk with a status of "Disk Missing". If a disk has a "Disk Missing" status, it is periodically polled with an Inquiry CDB to detect disk insertion.

Following a "hot swap" event, the firmware readies the new physical drive by spinning it up and verifying sufficient

capacity for the IM volume. The IM firmware resynchronizes all hot-swapped disks that have been removed, even if the identical disk is re-inserted. The IM firmware marks all hot-swapped disks as the secondary disk and marks the other mirrored disk as the primary disk. The IM firmware resynchronizes all data from the primary disk onto the new secondary disk.

Disk Write Caching

The IM firmware disables disk write caching. This is done to increase data integrity, so that the disk write log stored in NVSRAM is always valid. If disk write caching is enabled (not recommended), the disk write log could be invalid. For example, consider this case: a write I/O completes to the first physical IM drive. The duplicated write I/O remains in the cache of the second drive. Both I/Os are reported as complete from the IM firmware, and the system is powered off.

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Fusion-MPT SCSI BIOS

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When you boot the system, the system loads the ROM code known as the Fusion-MPT SCSI BIOS. This enables the system to boot from Ultra320 SCSI drives. This BIOS also contains an embedded configuration manager, which allows you to configure options provided by the firmware. This SCSI BIOS integrates with a standard system BIOS.

Features

The SCSI BIOS supports these features:

- Complies with the Fusion-MPT Specification, version 1.2
- Allows selection and configuration for up to 256 adapters
- Allows boot device selection from any four host adapters
- Includes automatic INT13h drive mapping for SCSI drives
- Shares a user interface with SCSI BIOS and Configuration Utility

Description

During the boot time initialization, the SCSI BIOS determines if there are other types of hard drives, such as an IDE drive, already installed by the system BIOS. If there are, the SCSI BIOS maps any SCSI drives it finds behind the drive(s) already installed. Otherwise, the SCSI BIOS installs drives starting with the system boot drive. In this case, the system boots from a drive controlled by the SCSI BIOS.

BIOS Boot Specification

The SCSI BIOS provides support for the BIOS Boot Specification, which allows you to choose which device to boot from by selecting the priority.

To use this feature, the system BIOS must also be compatible with the BIOS Boot Specification. If your system supports the BIOS Boot Specification, then you will use the system BIOS setup menu to select the boot and drive order. In the system BIOS, the Boot Connection Devices menu appears with a list of available boot options. Use that menu to select the device and rearrange the order. Then exit to continue the boot process.

CD-ROM Boot Initialization

The Fusion-MPT SCSI BIOS supports boot initialization from a CD-ROM drive, using one of the following five types of emulation:

- No emulation disk

- Floppy 1.2 Mbyte emulation disk
- Floppy 1.44 Mbyte emulation disk
- Floppy 2.88 Mbyte emulation disk
- Hard disk emulation

The type of emulation assigns the drive letter for the CD-ROM. For example, if a 1.44 Mbyte floppy emulation CD was loaded, then the CDROM drive would become the designated A: drive, and the existing floppy would become drive B:.

Using the Fusion-MPT SCSI BIOS Configuration Utility

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The SCSI BIOS allows you to change the default configuration of your host adapters by using the embedded BIOS Configuration Utility.

When the BIOS loads, the following message will appear on your monitor:

```
"Press Ctrl-M to start LSI Logic Configuration Utility..."
```

This message remains on your screen for about five seconds, giving you time to start the utility. After you press **Ctrl-M**, the message changes to:

```
"Please wait, invoking LSI Logic Configuration Utility..."
```

After a brief pause, your computer monitor displays the **Main** menu of the SCSI BIOS Configuration Utility.



NOTE: Not all devices detected by the Configuration Utility can be controlled by this SCSI BIOS. Devices such as tape drives and scanners require that a device driver specific to that peripheral be loaded. However, the SCSI BIOS Configuration Utility does allow parameters to be modified for these devices.

User Inputs

You make configuration changes in the main area of the menu. This area is lighter in color than the header or footer areas as displayed on line in the Configuration Utility's menu. Table 2-1. lists the various keyboard options you use to make changes. Settings with gray or yellow text can be changed, settings with white text cannot. This is true regardless of the **Color/Mono** setting chosen.

Table 2-1. Keyboard Options

Keyboard Option	Description
F1 = Help	Provides context sensitive help for the cursor resident field.
F2 = menu	Sets cursor context to the menu area. Select a menu item and press Enter . This option is only available from the Main menu.
Arrow Keys = Select	Moves the cursor up, down, left, or right.

Item	
+/- = Change [Item]	Changes items with values in [] brackets. Use the '+' and '-' keys in the top row of the main keyboard or use the numeric keypad '+' and '-' keys to change values. When pressed, they toggle a modifiable field to its next relative value. '+' toggles the value up and '-' toggles the value down.
Esc = Abort/Exit	Aborts the current context operation and/or exits the current screen.
Home/End = Select Item	Moves the cursor to the start/end of a scrollable field.
Enter = Execute <Item>	Executes options with values in < > brackets. Press Enter to execute the field's associated function.

Main Menu

When you invoke the Configuration Utility, the **Main** menu appears. This screen displays the host adapters in the system and information about them. Table 2-2. lists the fields on this menu and their descriptions.

Table 2-2. Main Menu Fields and Descriptions

Field	Field Type	Description
Adapter	Information	Indicates the specific family of host adapters. Clicking on an entry under Adapter will lead to the Adapter Properties menu.
PCI Bus	Information	Indicates the PCI bus number (range 0x00-0xFF, 0-255 decimal) assigned by the system BIOS to an adapter.
Dev/Func	Information	Indicates the PCI Device/Function assigned by the system BIOS to an adapter. An 8-bit value is mapped as follows: <ul style="list-style-type: none"> • Bits [7:3]: Device (range 0x00-0x1F, 0-31 decimal) • Bits [2:0]: Function (range [0-7])
Port Number	Information	Indicates the I/O port number that communicates with an adapter, which the system BIOS assigns.
IRQ	Information	Indicates the Interrupt Request Line used by an adapter, which is assigned by the system BIOS.
NVM	Information	Indicates whether an adapter has NVM associated with it. An adapter's configuration is stored in its associated NVM. NVM can refer to NVRAM that is resident on a host adapter.
Boot Order	Information	Indicates the relative boot order (0 to 3) of the channel. The Fusion-MPT SCSI BIOS traverses up to four channels in the specified order in search of bootable media. To modify this field, access the Boot Adapter List menu.
LSI Logic Control	Information	Indicates whether an adapter is eligible for LSI Logic software control or is reserved for control by non-LSI Logic software.
Mirror Status	Information	The Mirror Status column gives an overall status of the Mirrored Pair. The value of this field is Optimal , Degraded , Resyncing , Failed , or No value . No value , indicated by a dash, means a mirrored pair does not reside on this adapter. A degraded status indicates the user should navigate to the Mirroring Properties menu to investigate what is causing the mirrored pair to run in degraded mode.

On the **Main** menu, two selections are the **Boot Adapter List** and **Global Properties** menus. These menus can be accessed by pressing the **F2** key.

- The **Boot Adapter List** menu allows selection and ordering of boot channels.
- The **Global Properties** menu allows changes to global scope settings.

You can only access channels with LSI Logic Control enabled. To get to the **Integrated Mirroring** feature menu, select an adapter to first get to the **Adapter Properties** menu.

To select a channel, use only the arrow keys and enter key. Then, press **Enter** to view and modify the selected channel's properties (and to gain access to the attached devices). After selecting a channel and pressing **Enter**, the SCSI bus is scanned and the **Adapter Properties** menu appears.

Adapter Properties Menu

The **Adapter Properties** menu allows you to view and modify channel settings. It also provides access to a channel's device settings. To display this menu, select a channel under **Adapter** field on the **Main** menu and press **Enter**. Table 2-3. lists the fields on this menu and their descriptions.

 **NOTE:** If the field displays in gray or yellow text it is available for changes. If it displays in white text it is not available.

Table 2-3. Adapter Properties Menu Fields and Descriptions

Field	Field Type [Value]	Description
Device Properties	Executable	Select this option and press Enter to view and modify device properties.
Mirroring Properties	Executable	Select this option and press Enter to view and modify mirroring properties.
Synchronize Whole Mirror	Executable	Select this option and press Enter to synchronize the whole mirror.  NOTE: In the present version of the Fusion-MPT SCSI BIOS, this field provides information only. When the mirror is set using the Mirroring Properties menu, and those changes are saved, synchronization occurs automatically.
Host SCSI ID	Configuration [0 to 7/ 0 to 15]	Indicates the SCSI identifier of an adapter. Dell Computer recommends that this field be set to the highest priority SCSI identifier, which is 7 and is the default value.
SCSI Bus Scan Order	Configuration [Low to High (0 .. Max)/ High to Low (Max .. 0)]	Indicates the order in which to scan SCSI identifiers on a channel. Changing this item will affect drive letter assignment(s) if more than one device is attached to an adapter. The default value is Low to High .
Removable Media Support	Configuration [None/ With Media Installed]	Specifies the removable media support option for a channel. Removable media support only applies to devices that report themselves as a hard drive. It does not apply to CD-ROM devices or Magnetic Optical devices. <ul style="list-style-type: none"> • <i>None</i> (default) indicates no removable media support whether the drive is selected as first (BBS), or is first in the scan order (non-BBS). • <i>With Media Installed</i> provides removable media support regardless of the drive number assignment. You must have media in the drive at bootup.
CHS	Configuration	Defines how the Cylinder Head Sector (CHS) values are mapped onto a disk

Mapping	[SCSI Plug and Play Mapping/Alternate CHS Mapping]	<p>without pre-existing partition information.</p> <ul style="list-style-type: none"> • <i>SCSI Plug and Play Mapping</i> (default) automatically determines the most efficient and compatible mapping. • <i>Alternate CHS Mapping</i> uses an alternate, possibly less efficient, mapping that may be required if a device is moved between adapters from different vendors. <p>⚠ CAUTION: Neither of these options has any effect after a disk has been partitioned using the FDISK command. FDISK is a tool that you can use to delete one or all partition entries. If you delete all partition entries, you must reboot to clear the memory. Otherwise, the old partitioning data will be reused, thus nullifying the previous operation. Use care to ensure that the correct disk is the target of an FDISK command.</p>
Spinup Delay (secs)	Configuration [1 to 15]	<p>Indicates the delay in seconds between spinups of devices attached to an adapter. Staggered spinups balance the total electrical current load on the system during boot. The default value is 2 seconds.</p> <p>🔑 NOTE: <i>Your hard disk drives may require a jumper to be installed before this setting will work. Please refer to your hard disk drive documentation.</i></p>
Secondary Cluster Server	Configuration [Yes/No]	<p>Indicates whether an adapter has one or more devices attached that are shared with one or more other adapters. Therefore, the Fusion-MPT SCSI BIOS should avoid SCSI bus resets as much as possible.</p> <p>This option allows you to enable an adapter to join a cluster of adapters without doing any SCSI bus resets. This is a requirement for the Microsoft Cluster Server. The default value is <i>No</i>.</p>
Termination Control	Configuration [Auto/Off]	<p>If available, the field Indicates whether an adapter has automatic termination control. If not available, its current status is either <i>Auto</i> or <i>Off</i>.</p> <ul style="list-style-type: none"> • <i>Auto</i> (default) means that the adapter automatically determines whether it should enable or disable its termination. • <i>Off</i> means termination on the adapter is off and the devices at the ends of the SCSI bus must terminate the bus.
Restore Defaults	Executable	Press Enter to obtain default settings.

Device Properties Menu

The **Device Properties** menu allows you to view and update individual device settings for an adapter. Table 2-4. lists the fields on this menu and their descriptions.

Table 2-4. Device Properties Menu Fields and Descriptions

Field	Field Type [Value]	Description
SCSI ID	Information	Displays the device's SCSI identifier.
Device Identifier	Information	Indicates the ASCII device identifier string, as extracted from the device's inquiry data.

Restore Defaults	Executable	Press Enter to obtain default settings.
Verify	Executable	Allows verification of all sectors on a device and reassigns defective Logical Block Addresses, if enabled. To verify all sectors, select the device from the menu and use the arrow keys to move the cursor to the Verify column. Press Enter .
Format	Executable	Allows low-level formatting on a disk drive, if enabled. Low-level formatting will completely and irreversibly erase all data on the drive. To low level format a device, select the device from the menu and use the arrow keys to move the cursor to the Format column. Press Enter .  NOTE: Formatting will default the drive to a 512-byte sector size even if the drive had previously been formatted to another sector size.
MT/Sec	Configuration [async/5/10/20/40/80/160]	Indicates the maximum synchronous data transfer rate of the adapter in megatransfers per second. Can be changed to a lower transfer rate. The default value is 160.
MB/Sec	Configuration [async/5/10/20/40/80/160/320]	Indicates the maximum synchronous data transfer rate of the adapter in megabytes per second corresponding to the width and transfer rate settings that follow. The default value is 320.
Data Width	Configuration [8/16]	Displays the maximum data width of the adapter in bits. Can be changed to narrow width. The default value is 16.
Scan ID	Configuration [Yes/No]	Indicates whether to scan for this SCSI identifier at boot time. Utilizing this setting allows you to ignore a device. This decreases boot time by disabling inquiry of unused SCSI identifiers. The default value is <i>Yes</i> . Set this option to <i>No</i> if there is a device that you do not want to be available to the system. Also, on a bus with only a few devices attached, you can speed up boot time by changing this setting to <i>No</i> for all unused SCSI IDs.
Scan LUNs > 0	Configuration [Yes/No]	Indicates whether to scan for Logical Unit Numbers (LUNs) greater than zero for a device. LUN 0 is always queried. Use this option if a multi-LUN device responds to unoccupied LUNs or if it is desired to reduce the visibility of a multi-LUN device to LUN 0 only. The default value is <i>Yes</i> . Set this option to <i>No</i> if you have problems with a device that responds to all LUNs whether they are occupied or not. Also, if a SCSI device with multiple LUNs exists on your system but you do not want all of those LUNs to be available to the system, set this option to <i>No</i> . This will limit the scan to LUN 0.
Disconnect	Configuration [On/Off]	Indicates whether to allow a device to disconnect during SCSI operations. Some (usually newer) devices run faster with disconnect enabled, while some (usually older) devices run faster with disconnect disabled. The default value is <i>On</i> .
SCSI Timeout	Executable [0-9999]	Indicates the maximum allowable time for completion of a SCSI operation in seconds. Since timeouts provide a safeguard that allows the system to recover should an operation fail, Dell Computer recommends that a value greater than zero be used. A value of zero allows unlimited time for an operation to complete and could result in the system hanging (waiting forever) should an operation fail. The default value is <i>10</i> .

		 NOTE: This field is executable and must be selected with the Enter key. You also input the new value with the number keys from either the keyboard or number pad.
Queue Tags	Configuration [On/Off]	Indicates whether to allow the use of queue tags for a device. This item specifies queue tag control to higher level device drivers. The default value is On.

Changing a setting for the host adapter (for example, SCSI ID 7) will change the setting for all Target IDs. The number of fields displayed requires the menu to scroll left/right in order to display the information. When accessing this menu online, use the **Home/End** keys to scroll to columns currently not displayed. The scroll indicator on the bottom of the menu shows where the cursor is relative to the first and last columns.

Mirroring Properties Menu

The following restrictions were made in order to simplify the IM configuration:

- One mirrored boot volume is allowed per system.
- One disk drive is required for the boot drive and one disk drive for the mirror drive.
- Disks selected for a mirrored boot volume must be connected to the same channel of the same physical adapter. This adapter must be in the BIOS boot order.
- Disks selected must be single-LUN disks that support wide, synchronous transfers, must be SMART enabled, and must be minimally compliant with SCSI-2 standard.
- Removable media devices cannot be used for mirrored volumes.
- Different size disks are allowed, but excess space on the larger disk is unusable.
- Configuration of volume properties is kept to a minimum.
- Default settings are provided for all modifiable fields.

The **Mirroring Properties** menu is part of the standard BIOS configuration utility. One of the items on the **Adapter Properties** menu allows access to a **Mirroring Properties** menu, which allows creation and configuration of an IM Volume. An IM Volume exists as soon as two disks have been selected through the **Mirroring Properties** menu and the user saves the changes. The **Mirroring Properties** menu has additional configuration options and displays the IM volume properties and status.

To select this menu, follow these steps:

1. Select an adapter using the arrow keys while on the **Main** menu.
2. Press **Enter** to move to the **Adapter Properties** menu.
3. Select **Mirroring Properties** using the arrow keys.
4. Press Enter to move to the **Mirroring Properties** menu.

Table 2-5. lists the fields on this menu and their descriptions.

Table 2-5. Mirroring Properties Menu Fields and Descriptions

Field	Field Type	Description
SCSI ID	Information	Displays the device's SCSI identifier.
Device Identifier	Information	Indicates the ASCII device identifier string, as extracted from the device's inquiry data.
Mirrored Pair	Configuration	Displays disks connected to the adapter selected from the top-level screen. The fields under the Mirrored Pair column are enabled for hard disks only. The possible Mirrored Pair field choices include Primary , Secondary , or No .
Status	Information	The Status field may be any of the following: disk missing, incompatible, offline, out of sync, or disk initializing. The primary copy (disk) is the one that the firmware assumes

		has the most up-to-date and reliable data.
Predict Failure	Information	Displays SMART information. A SMART enabled drive can predict when the drive is about to fail. When failure is predicted, the drive should be replaced.
Size (MB)	Information	Displays the capacity of the mirrored pair volume. Since half of this capacity is used as a mirror, the volume size is half of the combined capacity of the two disks. Volume size is actually slightly less than half because the utility rounds the size down to increase compatibility in case a disk of the volume must be replaced. Even if replacement disks are of the same size class, they may differ slightly in actual capacity.

To create an IM Volume, follow these steps:

1. Select the Primary disk that will make up the volume using the arrow keys while in the **Mirroring Properties** menu.
2. Select the Secondary disk that will make up the volume.
3. Press the **<ESC>** key.
4. Select "**Save changes then exit this menu**".

The "SCSI ID" field shows which SCSI ID the operating system uses to access the mirrored pair of drives. This addressing information remains constant after volume creation, until the volume is reconfigured with drives that have different SCSI IDs.

If partitions are defined on a disk selected as Secondary, a warning message appears, stating that existing data on the disk will be lost during the mirror creation process. You can then deselect that drive, if desired, or continue. This step is provided as a precaution against unintentionally destroying valid data on a disk.

Synchronization of the IM Secondary device from the primary disk starts after IM configuration is complete. Only one primary disk and one secondary disk can be selected. The primary and secondary disks must be attached to the same channel of the same adapter board. To abort IM volume configuration, press the **<ESC>** key until you are prompted to save or discard changes. For abort operations, you should discard changes.

The **Mirroring Properties** menu also allows the volume to be reconfigured after it has been created. The mirrored volume can be changed back to standard disks by changing the values under the **Mirrored Pair** column to **No** for both the Primary and Secondary disks. When this is done, the virtual IM Volume is turned off and the operating system can see both of the physical drives. This can be done if mirroring is no longer desired.

Boot Adapter List Menu

The **Boot Adapter List** menu specifies the order in which adapters and/or channels boot when more than one host adapter is in a system. Up to four of the total adapters in a system can be selected as bootable. To control a Boot Volume, only one of the four "active" controllers can be used.

To select this menu, follow these steps:

1. Press **F2** while on the **Main** menu to move the cursor to the menu area.
2. Move the cursor to **Boot Adapter List** with the arrow keys.
3. Press **Enter**.

Adapters/channels can be added or deleted using this menu. To add an adapter/channel to the boot list, press the Insert key while on the **Boot Adapter List**. Use the arrow keys to select the desired adapter/channel and press **Enter** to add it to the end of the **Boot Adapter List**.

To remove an adapter/channel from the boot list, press the **Delete** key while on the desired adapter in the **Boot Adapter List**. You can also change the boot order by using the "+" or "-" keys. For example, place the cursor on the adapter that you want to change, and use the "+" or "-" key to raise or lower the boot order.

Table 2-6. lists the fields on this menu and their descriptions.

Table 2-6. Boot Adapter List Menu Fields and Descriptions

Field	Field Type [Value]	Description
Adapter	Information	Indicates the specific family of host adapters.
PCI Bus	Information	Indicates the PCI bus number (range 0x00-0xFF, 0-255 decimal) assigned by the system BIOS to an adapter.
Dev/Func	Information	Indicates the PCI Device/Function assigned by the system BIOS to an adapter. An 8-bit value is mapped as follows: <ul style="list-style-type: none"> • Bits [7:3]: Device (range 0x00-0x1F, 0-31 decimal) • Bits [2:0]: Function (range 0-7)
Boot Order	Configuration [0 to 3]	Indicates the relative boot order (0 to 3) of the listed channel. The Fusion-MPT SCSI BIOS traverses up to four channels in the specified order in search of bootable media.
Current Status	Information	Indicates whether an adapter/channel in the boot list was enabled during the most recent boot. The Fusion-MPT SCSI BIOS ignores disabled adapters/channels and their attached devices, although they are still visible to the configuration utility.
Enabled/ Disabled	Configuration [On/Off]	Indicates whether to enable an adapter/channel upon the next boot. The Fusion-MPT SCSI BIOS ignores disabled adapters/channels and their attached devices, although they are still visible to the configuration utility.

Global Properties Menu

The **Global Properties** menu allows you to pause if an alert message has been displayed, to display boot information, and to set display and video modes.

To select this menu, follow these steps:

1. Press **F2** while on the **Main** menu to move the cursor to the menu area.
2. Move the cursor to **Global Properties** with the arrow keys.
3. Press **Enter**.

Table 2-7. lists the fields and their descriptions.

Table 2-7. Global Properties Fields and Descriptions

Field	Field Type [Value]	Description
Pause When Boot Alert Displayed	Configuration [Yes/No]	Specifies a pause during the boot for user acknowledgement of some error messages. The pause occurs after displaying a boot alert message. ¹ To continue after displaying a message, specify No (default). To wait for any key after displaying a message, specify Yes. You must enable this setting on all adapters in the boot list to display a pause when a boot alert occurs.
Boot	Configuration	Specifies how much BIOS information displays during boot.

Information Display Mode	[Terse/Verbose]	<ul style="list-style-type: none"> To display minimum information, specify Terse mode. To display detailed information, specify Verbose mode (default).
Video Mode	Configuration [Color/Monochrome]	Specifies the default video mode for the SCSI BIOS Configuration Utility. The monochrome setting enhances readability on a monochrome monitor. The default value is Color .
Restore Defaults	Executable	Press Enter to obtain default settings.

 ¹ The boot alert only applies to the four adapters in the boot order list. A boot alert occurs when the user adds a new adapter and the system BIOS scans the new adapter first. The alert also occurs when the user removes any of the adapters.

Exiting the Fusion-MPT SCSI BIOS Configuration Utility

The **Exit** menu for the Fusion-MPT SCSI BIOS Configuration Utility is used for all five of the menus listed above. However, the available functionality is different for the **Main** menu and the four subordinate menus.

To exit from the **Adapter Properties**, **Device Properties**, **Boot Adapter List**, or **Global Properties** menus, use these exit options:

- Cancel exit** Returns you to the previous menu.
- Save changes then exit this menu** Implements any changes you made on the previous menu and returns you to the **Main** menu.
- Discard changes then exit this menu** Restores the default settings and returns you to the **Main** menu.

To exit from the **Main** menu, use these exit options:

- Cancel exit** Returns you to the Main menu.
- Exit the Configuration Utility** Exits the configuration and automatically reboots your system.

 **NOTE:** If you reboot the system without properly exiting from this utility, some changes may not take effect.

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Dell™ PowerEdge Expandable RAID Controller 4/im: Integrated Mirroring™ Guide

Common Information Model (CIM) Solution

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Description

The CIM solution enables the presentation of local storage components through an easy to navigate user interface. Use the CIM solution to quickly identify and locate storage device failures. The CIM solution also provides information concerning the topology of the adapters and connected devices. The CIM solution supports IM virtual volumes and the underlying physical drives that compose the virtual volume.

The CIM solution is a CIM compliant management application for Fusion-MPT mass storage elements. This tool allows you to communicate with devices and manage the attached Fusion-MPT host adapters, peripheral devices, and device drivers. The CIM solution supports the LSI53C1030, LSI53C1020, LSIFC929, and LSIFC919 controllers and their associated host adapters.

Components

The CIM solution consists of two separate software components that are installed as detailed in the installation instructions at the end of this Guide: a CIM Browser and a CIM Provider. The CIM Browser provides an easily-navigated window to monitor the attached storage elements. The monitored elements include host adapters, peripheral devices, and device drivers.

The CIM Provider provides information about the Fusion-MPT controllers and the connected devices.

Features

The CIM solution offers the following features:

- Visual acknowledgement of component failures
- Displays current information about each adapter and its attached storage devices
- Monitors the current status of Fusion-MPT IM volumes
- Provides graphical representation of Fusion-MPT storage elements
- Displays device and adapter hierarchy as a device tree
- Implements a highly portable user interface
- Launches the CIM Browser as a stand-alone application
- Launches the CIM Provider automatically

Installation and System Requirements

The tool and system requirements for the CIM installation are:

- 40 MBytes of available disk space for Linux installations
- TCP/IP protocol installed and enabled
- Video card support for at least 256 colors
- Desktop area must be 800 by 600 pixels or greater. Dell Computer recommends using a desktop area of 1024 by 768 pixels.

Dell Computer recommends viewing under KDE or GNOME.

CIM Browser Window Description

This section describes the CIM Browser window.

Connect Menu Options

The **Connect** menu is located on the upper left corner of the CIM Browser window. Table 3-1. provides description of the options available on the **Connect** menu.

Table 3-1. Connect Menu Option Description

Option	Description
Change Privilege	By default, the CIMBrowser opens with end-user privileges and is limited to read-only information. In order to send commands to devices the user is required to obtain administrator privileges (see below). Entering the correct password will grant administrator privileges.
Change Password	This feature will, if the user is logged in as an administrator, allow the user to change the administrator's password.
Logout Admin	This will logout the administrator and return to end-user based functionality.

The only commands currently supported are for the management of the Dell PV22XS enclosure. These commands can be invoked by accessing the sub-menu of the Dell PV22XS SCSI Device in the tree structure.

Hardware Device Tree Options

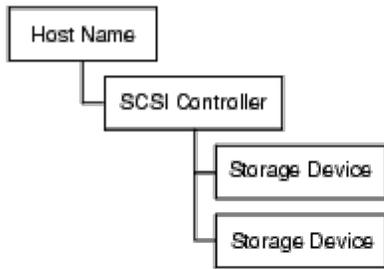
The hardware device tree provides an easily navigated list of the devices being monitored by the CIM Browser. Clicking on a device in the tree provides information about the device. Figure 3.1 illustrates the structure of the hardware device tree for SCSI and for SCSI with IM. Table 3-2. describes each level in the device trees.

The status of the device is given by a green status icon, a yellow status icon, or a red status icon that appears in the right-hand window. A green status icon indicates that the device is functioning properly. A yellow status icon indicates that there is a problem with the device and the CIM Browser cannot identify the problem. A red status icon indicates that there is a problem with the device and the CIM Browser can identify the problem.

On the IM Volume and Physical Disk levels, the CIM Browser displays a floppy disk icon if the media is present. If the media is not present, as could be the case with removable media such as CD-ROMs or tape drives, the CIM Browser displays a floppy drive with an "X."

Figure 3-1. Hardware Device Tree Structures

a) **SCSI Hardware Device Tree**



b) **SCSI with IM Hardware Device Tree**

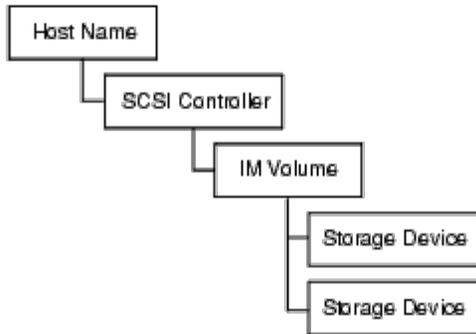


Table 3-2. Device Tree Description

Device Tree Level	Description
Host Name	<p>This level displays the name of the system that the CIM Provider is running on and that the CIM Browser is monitoring. The CIM Browser displays a window that provides information about the system that the CIM Provider is running on.</p> <p>The "System Connection" option usually reads "ok." However, if the system is too busy to respond this option reads "Provider is busy" and the devices connected to the system do not appear in the device tree.</p>
FC or SCSI Controller	<p>This level displays information concerning the host adapter. The CIM Browser displays a separate entry for each channel.</p>
IM	<p>This level describes the logical IM volume. The CIM Browser only includes this level in the device tree</p>

Volume	<p>if an IM volume is present on the monitored system.</p> <p>The Status field describes the status of the IM volume and has 2 options: "Ok" or "Unknown." "Ok" indicates either that the IM volume is completely operational. The "Unknown" option indicates that there is problem with the IM volume that the CIM Browser cannot identify.</p> <p>The "Redundancy Status" field describes the status of the IM volume redundancy and has three options: "Fully Redundant", "In Degraded Mode", or "Redundancy Is Lost." "Fully Redundant" indicates that the IM volume is functioning properly and that the data is fully redundant. "In Degraded Mode" indicates that the IM volume is running in a degraded mode. A possible cause of this mode is the failure of a single disk. "Redundancy is Lost" indicates that the redundant data is lost. A possible cause of this mode is the failure of both disks.</p> <p>The "Additional Redundancy Information" field options are "Resynch in progress" or "Resynch not in progress." When the resynchronization is in progress, the CIM Browser displays a status bar giving the approximate percent completion and an estimate of the time until completion.</p>
Physical Disk	This level provides information on the physical disks in the system. Physical disks have a "Physical Disk State" field that provides information concerning the status of the physical disk.
Storage Device	This field provides information on the storage device.

Linux Installation Instructions for the CIM Solution

This section describes a Linux installation for version 3.03.00 of the CIM solution.

Installing the CIM Solution

Follow these steps to install the CIM solution:

1. Unzip the CIM package after downloading it.
2. Double click on the "**install.htm**" program that you downloaded from the LSI Logic website.
A "**Security Warning**" window appears. You must grant additional privileges to the InstallAnywhere to complete the installation.
3. Click on "**Yes.**"
4. Click on "**Start Installer for Linux...**"
The InstallAnywhere begins.
5. Follow the instructions and steps in InstallAnywhere.

If this button does not appear in the browser, launch a terminal window and type "**./install.bin**" from the directory that accesses the CDROM.

To verify the installation for the CIM Browser, launch the application from /usr/local/bin/LSICim prompt by typing:
./CIMLSIBrowser

Uninstalling the CIM Solution

To uninstall the CIM solution, follow these steps:

- **Exit** the CIM Browser.
- Change the directory by typing
cd /usr/local/bin/LSICim/UninstallerData
- At the command prompt type.

./Uninstall_CIM_Solution

- Click the **Uninstall** button in the InstallAnywhere window.
-

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