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MegaRAID® SAS Device Driver Installation

User Guide

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Revision History

Version and Date	Description of Changes
80-00163-01 Rev. J, April 2013	Updated Table 1 in Chapter 1, the Solaris, Ubuntu, Solaris, XenServer, and OVM OS chapters, and the version number for various operating systems. Added the Oracle Enterprise Linux chapter.
80-00163-01 Rev. I, February 2013	Updated the FreeBSD chapter and added the Oracle Enterprise Linux information.
80-00163-01 Rev. H, December 2012	Added the Debian 6.0 OS, OVM 3.0.3 OS, Fedora OS, and CentOS OS.
80-00163-01 Rev. G, September 2012	Added the Microsoft Windows 8 operating system, Windows Server 2012 OS, Ubuntu Linux OS, and XenServer OS. Updated the FreeBSD operating system.
80-00163-01 Rev. F, June 2012	Updated the operating system versions and the installation procedures.
80-00163-01 Rev. E, January 2011	Updated the user guide with the current versions of the operating systems.
80-00163-01 Rev. D, June 2009	Updated the procedure for installing the FreeBSD operating system.
80-00163-01 Rev. C, April 2009	Updated the Solaris 10 operating system information and driver file names.
80-00163-01 Rev. B, November 2008	Added installation instructions for the FreeBSD and Solaris 10 operating systems.
80-00163-01 Rev. A, August 2007	Updated the installation procedures for the Windows, Red Hat Linux, and SuSE Linux operating systems to include the latest versions. Added a chapter for the SCO operating system.
DB15-000358-00, February 2006	Initial release of document.

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Chapter 1: Overview

This chapter provides an overview of the operating system (OS) drivers for the MegaRAID® SAS RAID controllers.

Subsequent chapters in this document provide detailed installation instructions for the OSs. Use the latest updates provided by the OS manufacturer, and review the `readme` file that accompanies the driver for any updated information.

1.1 Driver Description

You can install the MegaRAID SAS controller in any IBM AT-compatible computer that has a PCI Express local bus. The RAID controller can run under various OSs.

To use the controller with these OSs, you must install software drivers. LSI provides software drivers for the following OSs:

- Microsoft® Windows®
- Red Hat® Linux™
- SuSE® Linux Enterprise Server (SLES®)
- VMware®
- FreeBSD®
- Solaris™
- XenServer®
- Debian®
- OVM®
- Fedora®
- CentOS®
- Oracle® Enterprise Linux (OEL)

1.1.1 Driver Functions

MegaRAID provides drivers for the MegaRAID SAS RAID controllers, which bring up to 6.0 Gb/s Serial Attached SCSI performance and 6.0 Gb/s SATA III performance to host adapter, workstation, and server designs. The controllers support internal and external storage devices, which let you use a system that supports enterprise-class SAS and desktop-class SATA III drives.

The SAS controllers integrate eight high-performance SAS/SATA III PHYs and a PCI Express bus master DMA core. Each of the eight PHYs is capable of 6.0 Gb/s SAS link rates, and 6.0 Gb/s SATA III link rates.

The SAS RAID controllers support the SAS protocol as described in the *Serial Attached SCSI Standard, version 2.0*, and the Serial ATA III (SATA III) protocol defined by the *Serial ATA specification, version 3.0*. SATA III is an extension to SATA 2.0.

The drivers perform these functions:

- They support the PCI Express protocol.
- They support multiple RAID storage adapters (RSAs).
- They provide the ability to see newly configured logical drives in the configuration software utility without rebooting the system.

- They permit the random deletion of logical drives that were created by using MegaRAID Storage Manager (refer to the *MegaRAID SAS Software User Guide* for more information).
- They support the use of the remaining array capacity by MegaRAID Storage Manager.

1.1.2 Driver Updates

Because LSI regularly updates device drivers, a feature might be added to your driver that is not included in the most recent documentation. If you have a question about a feature, consult the `readme` file that accompanies the driver, or contact your MegaRAID support representative. Be sure to use the latest service packs provided by the OS manufacturer.

You can download the latest drivers and software on the LSI website at http://lsi.com/cm/DownloadSearch.do. Under the **Download** tab, select your product from the pull-down list to display the latest drivers available for download.

1.2 Driver Names

The following table lists the device driver files, driver RPM and driver ISO support, and driver deb package for the MegaRAID controllers.

These files are available on the *Universal Driver Suite* CD that accompanied your MegaRAID controller. LSI updates the MegaRAID device drivers frequently. To make sure that you have the current version of these files, download the latest files from the LSI website: http://www.lsi.com. Refer to the `readme` file that accompanies the driver for any updated information.

To make a driver diskette, extract the files from the *Universal Driver Suite* CD to a blank diskette, or download the driver files from the LSI website and extract them to an empty diskette. Label the diskette as the MegaRAID driver diskette for the given OS.

Table 1 MegaRAID Device Driver Files, Driver RPMs Support, Driver ISO Support, and Driver Deb Package Support

Operating System	Device Driver File Names	Driver RPMs and Driver ISO Support	Driver RPMs Support	Driver Deb Package Support

Windows XP (64-bit only)
Windows 2003 SP2
Windows 2003 R2 SP2
Windows Vista® SP2
Windows 7 SP1
Windows 2008 SP2
Windows 2008 R2 SP1
Windows Server® 2012
Chapter 2
	`megasas.cat`
	`megasas.sys`
	`NODEV.INF`
	`OEMSETUP.INF`
	`TXTSETUP.OEM`
		N/A	N/A	N/A

Red Hat Linux 5 Red Hat Linux 6 Chapter 3	N/A	`megaraid_sas.o`	N/A	N/A
SuSE Linux Enterprise Server 10 SuSE Linux Enterprise Server 11 Chapter 4	N/A	`megaraid_sas.ko`	N/A	N/A
Oracle Enterprise Linux	N/A	N/A	`megaraid_sas.o`	N/A

Table 1 MegaRAID Device Driver Files, Driver RPMs Support, Driver ISO Support, and Driver Deb Package Support

Operating System	Device Driver File Names	Driver RPMs and Driver ISO Support	Driver RPMs Support	Driver Deb Package Support
Ubuntu Linux 12.04 Chapter 5	`Package.deb`	N/A	N/A	N/A
FreeBSD Chapter 6	`mfi.ko`, `Makefile`, `build.sh`, `mfi.c`, `mfireg.h`, `mfivar.h`, `mfi_cam.c`, `mfi_debug.c`, `mfi_disk.c`, `mfi_ioctl.h`, `mfi_linux.c`, `mfi_pci.c`	N/A	N/A	N/A
VMware ESX/ESXi 4.*x* and ESXi 5.*x* Chapter 7	VMware installation bundle (VIB) file package `offline_bundle.zip` file package	N/A	N/A	N/A

Solaris 10, 11
Chapter 8
	■ For Gen1 82*XX*, 83*XX*, and 84*XX* SAS RAID controllers:
	`mega_sas` (32-bit), `mega_sas` (64-bit), `mega_sas.conf`
	■ For Gen2 87*XX*, 88*XX*, 92*XX*, 96*XX*, and 98*XX* SAS RAID controllers:
	`mr_sas` (32-bit), `mr_sas` (64-bit), `mr_sas.conf`
	■ For Gen2 MegaRAID Entry controllers
	`mrentry_sas` (32-bit), `mrentry_sas` (64-bit), `mrentry_sas.conf`
		N/A	N/A	N/A

XenServer 6.0 Chapter 9	N/A	`megaraid_sas-v06.504.01.00-2.6.32.12-0.7.1.xs6.0.0.529.170661.iso`	N/A	N/A
Debian 6.0 Chapter 10	N/A	N/A	N/A	`megaraid-6.18-deb6-2.6.32.tgz`
OVM 3.0.3, 3.1.1 Chapter 11	N/A	N/A	`megaraid_sas.o`	N/A
Fedora 9, 11 Chapter 12	N/A	N/A	`megaraid_sas.o`	N/A
CentOS 6.3 Chapter 13	N/A	`megaraid_sas.o`	N/A	N/A
OEL Chapter 14	N/A	`megaraid_sas.o`	N/A	N/A

Chapter 2: Windows Driver Installation

This chapter describes the installation of the following Microsoft® Windows® OSs:

- Windows XP (64-bit only)
- Windows 2003 R2 SP2
- Windows Vista SP2
- Windows 7 Client SP1
- Windows 8
- Windows 2008 SP2
- Windows 2008 R2 SP1
- Windows Server 2012

2.1 MegaRAID Primary Storage

In the MegaRAID primary storage configuration, the Windows OS is installed on virtual drives provided by the MegaRAID controller. The MegaRAID controller includes a pre-boot configuration utility (WebBIOS) that creates the virtual drive before the installation of the Windows OS starts.

To install the Windows OS, prepare a USB flash drive, CD-ROM or diskette, as appropriate, with the MegaRAID driver.

The driver is distributed in a series of nested compressed files. Use an existing Windows device to extract the files for the driver-loading device (USB, CD-ROM, or diskette) by using the appropriate Windows driver. Only two driver choices exist across the supported Windows versions: one for 32-bit systems or one for 64-bit systems.

2.1.1 Storage Configuration

These steps describe how to create the virtual drive used for the Windows OS. You can add other virtual drives to the running OS after the Windows OS has been installed. The MegaRAID preboot BIOS utility (WebBIOS) that creates the virtual disk for the Windows OS is accessible during the power-on self-test (POST) part of bootup.

Refer to the *MegaRAID SAS Software User Guide* for more information about the WebBIOS configuration utility (CU).

The following procedure describes the creation of a RAID 1 array. You can use other RAID levels, and the steps are the same except when selecting the RAID level. In RAID 1, the RAID controller duplicates all data from one drive to a second drive. RAID 1 provides complete data redundancy, but at the cost of doubling the required data storage capacity. It is appropriate for small databases or any other environment that requires fault tolerance but small capacity.

Follow these steps to create the virtual disk in WebBIOS:

1. When the host computer is booting, hold down the Ctrl key and press the H key when the following text appears on the window:

   ```
   Copyright© LSI Corporation
   Press <Ctrl><H> for WebBIOS
   ```

   The **Controller Selection** window appears.
2. If the system has multiple SAS/SATA controllers, select a controller.
3. Click **Start**.

   The main **WebBIOS CU** window appears.

4. Click **Configuration Wizard**.

   The first **Configuration Wizard** window appears.

5. Click **New Configuration**.

NOTE If you choose the first or second option, all of the existing data in the configuration will be deleted. Make a backup copy of any data that you want to keep before you choose an option.

6. Click **Next**.

   A dialog warns that you will lose data if you click **Clear Configuration** or **New Configuration**.

   The **WebBIOS Configuration Method** window appears.

7. Select **Manual Configuration**.

   Manual configuration lets you control all attributes of the new storage configuration as you create drive groups and virtual drives, and set their parameters.

8. Click **Next**.

   The **Disk Group Definition** window appears. You use this window to select drives to create drive groups.

9. Hold down the Ctrl key while you select two ready drives in the Drives panel on the left.

   You must select an even number of drives.

10. Click **Add To Array** to move the drives to a proposed drive group configuration in the Disk Groups panel.

    If you need to undo the changes, click **Reclaim**.

11. Choose whether to use power save mode.
12. Choose whether to use drive encryption.

NOTE A RAID 1 virtual drive can contain up to 16 drive groups and up to 32 drives in a single span. (Other factors, such as the type of controller, can limit the number of drives.) You must use two drives in each RAID 1 drive group in the span.

13. After you finish selecting drives for the drive group, click **Accept DG**.
14. Click **Next**.

    The **Virtual Drive Definition** window appears. You use this window to select the RAID level, strip size, read policy, and other attributes for the new virtual drives.

15. Change the virtual drive options from the defaults listed on the window as needed.

    Here are brief explanations of the virtual drive options:

    — **RAID Level**: The drop-down menu lists the possible RAID levels for the virtual drive. Select **RAID 1**.

    — **Strip Size**: The strip size specifies the length of the data segments that the RAID controller writes across multiple drives, not including parity drives. For example, consider a stripe that contains 64 KB of drive space and has 16 KB of data residing on each drive in the stripe. In this case, the stripe size is 64 KB and the strip size is 16 KB. You can set the strip size to 8, 16, 32, 64, 128, 256, 512, and 1024 KB. A larger strip size produces higher read performance. If your computer regularly performs random read requests, choose a smaller strip size. The default is 64 KB.

    — **Access Policy**: Select the type of data access that is allowed for this virtual drive.

      RW: Permit read/write access. This setting is the default.

      Read Only: Permit read-only access.

Blocked: Do not permit access.

— **Read Policy**: Specify the read policy for this virtual drive.

Normal: Disable the read-ahead capability. This setting is the default.

Ahead: Enable read-ahead capability, which permits the controller to read sequentially ahead of requested data and to store the additional data in cache memory, anticipating that the data will be needed soon. This setting speeds up reads for sequential data, but little improvement exists when accessing random data.

— **Write Policy**: Specify the write policy for this virtual drive.

WBack: In Writeback mode, the controller sends a data transfer completion signal to the host when the controller cache has received all of the data in a transaction. This setting is recommended in Standard mode.

WThru: In Writethrough mode, the controller sends a data transfer completion signal to the host when the drive subsystem has received all of the data in a transaction. This setting is the default.

Write Back with BBU: Select this mode if you want the controller to use Writeback mode, but the controller either has no battery backup unit (BBU) or the BBU is bad. If you do not choose this option, the controller firmware automatically switches to Writethrough mode if it detects a bad or missing BBU.

NOTE You can use Writeback mode with or without a battery. You should use either a battery to protect the controller cache or an uninterruptible power supply (UPS) to protect the entire system. If you do not use a battery or a UPS, and a power failure occurs, you risk losing the data in the controller cache. Although you can enable or disable the disk cache, you should disable it. If you enable the disk cache, the drive sends a data transfer completion signal to the controller when the drive cache has received all the data in a transaction. However, the data has not been actually transferred to the disk media, so you risk losing the data in the disk cache if a power failure occurs. The data is unrecoverable.

— **IO Policy**: The IO policy applies to reads on a specific virtual drive. It does not affect the read-ahead cache.

Direct: Reads are not buffered in cache memory. Data is transferred to the cache and the host concurrently. If the same data block is read again, it comes from cache memory. This setting is the default.

Cached: Reads are buffered in cache memory before they are sent to the host.

— **Drive Policy**: Specify the drive cache policy.

Enable: Enable the drive cache.

Disable: Disable the drive cache.

NoChange: Leave the current drive cache policy as is. This setting is the default.

— **Disable BGI**: Specify the background initialization status.

No: Leave background initialization enabled. A new configuration can be initialized in the background while you use WebBIOS to perform other configuration tasks. This setting is the default.

Yes: Select **Yes** if you do not want to allow background initializations for configurations on this controller.

— **Select Size**: Specify the size of the virtual drive or drives in MB, GB, or TB. Usually, this size is the full size for RAID 1 shown in the Configuration panel on the right. You may specify a smaller size if you want to create other virtual drives on the same drive group.

— **Update Size**: Click **Update Size** to update the Select size field value for the selected RAID levels.

16. Either click **Accept** to accept the changes to the virtual drive definition, or click **Reclaim** to return to the previous settings.
17. Click **Next** after you define the virtual drives.

    The **Configuration Preview** window appears.
18. Check the information in the configuration preview.
19. If the virtual drive configuration is acceptable, click **Accept** to save the configuration. Otherwise, click **Back** to return to the previous screens and change the configuration.
20. If you accept the configuration, click **Yes** at the prompt to save the configuration and initialize the new virtual drive.
21. After the initialization is complete (the elapsed time depends on the RAID level and the disk size), click the **Home** button and then click **Exit** in the left hand window frame.
22. Select **Exit Application**, and reboot the computer with the Windows OS in the DVD drive or the CD drive.

2.2 Primary OS Storage on the MegaRAID Controller

For the Windows XP 64-bit OS and the Windows 2003 OS, the MegaRAID driver is added early in the installation process with a prompt to use the F6 key. For the Windows 2003 OS, this prompt appears after you select the OS, and before the initial Windows Setup window appears. For the Windows XP 64-bit OS and the Windows 2003 OS, the only disk type supported for introducing an additional driver is a 1.44 MB diskette.

For the Windows XP 64-bit OS and the Windows 2003 OS, the F6 keystroke adds a step to the installation process so you can specify an additional device. If the F6 key is not recognized within the time allowed, the OS installation ultimately fails, citing the lack of a disk for the OS. If the `Megasas2` files are not unzipped on the driver diskette, or if the driver bit size does not match (32 bits versus 64 bits), the Windows installation program reports that the `Megasas2` file is corrupted.

For the Windows 2008 OS, the MegaRAID driver is added after other installation steps.

Perform the following steps to set up the primary operating system storage on your MegaRAID controller:

1. The operating system loads and decompresses the core files from the boot DVD first.
2. After the **Install Windows Language selection** window, the **Install Now** window appears, followed by the OS selection, license agreement and installation type.

   On new installations, the **Custom** installation type is the only option.
3. On the next Windows installation window, a Load Driver link introduces the MegaRAID driver.

   For the Windows 2008 OS, you can add the driver from the CD, DVD, or USB flash drive.
4. Click **Browse**, and select the device and the folder with the previously extracted drivers.
5. In the next Windows installation window, select the driver to be installed, and click **Next**.

   If no driver appears, two common problems might have occurred.
   — The folder with the files was not selected.
   — The wrong driver (32-bit as compared to 64-bit) was selected.
6. After the driver is loaded, follow the rest of the standard Windows installation steps.

2.3 Secondary Storage on the MegaRAID Controller with the Windows 2008 OS

As the MegaRAID controller is installed and the previously installed Windows OS starts, the Windows 2008 OS prompts with Found New Hardware.

Perform the following steps to set up secondary storage for the Windows 2008 OS:

1. Select **Locate and Install**.
2. Select **Don't Search Online**.
3. Select **Show Me Other Options**.
4. Select **Browse My Computer**.
5. Click **Browse**.
6. In the **Browse for Folder** window, locate the previously extracted driver files from the local boot disk, CD, DVD, network, or USB device.
7. Click **OK**.
8. Click **Next**.
9. Click **Install**.

   The Hardware Wizard displays the following message: `The software for this device has been successfully installed.`
10. Reboot the system.

    The system does not require a reboot when the MegaRAID controller driver is loaded for the first time.

If you do not install the MegaRAID driver at boot time, the MegaRAID driver is added or updated in the Windows environment using Device Manager. Many methods exist to start Device Manager, including one general method for all supported versions of the Windows OS.

Perform the following steps to add or update the MegaRAID driver in the Windows environment using Device Manager:

1. Select **Start > Search > devmgmt.msc > enter key** (for all versions except the Windows 2003 OS).

   In Device Manager, a MegaRAID controller with no driver appears under the heading Other devices as a RAID Controller or Unknown Device, depending on the system history.
2. Right-click and select either **RAID Controller** or **Unknown Device**, as appropriate.
3. If the device does not appear, double-click **Storage controllers** to expose any detected controllers that are supported by an existing driver.
4. If you locate the MegaRAID controller, right-click on the controller.

   The driver installation steps for the Windows 2008 OS are the same no matter where the device was found.
5. Click **Update Driver Software**.
6. Click **Browse My Computer** to search for driver software.
7. Click the **Browse** button.
8. In the **Browse for Folder** window, locate the previously extracted driver files from the local boot disk, CD, DVD, network, or USB device.
9. Click **OK**.
10. Click **Next**.
11. Click **Install**.

    The Update Driver Software wizard shows the message: `The software for this device has been successfully installed.`
12. Reboot the system.

2.4 Secondary Storage on the MegaRAID Controller with the Windows 2003 OS

The MegaRAID driver is added or updated in the Windows New Hardware wizard at boot time or when using Device Manager. The driver does not install or work unless the Windows Service Pack 2 or later is installed. You can load the driver from the local hard disk, a CD or DVD, or a network location. A USB device might not work even if it appears in My Computer. Put the extracted MegaRAID driver files in a usable place, and then proceed.

When a previously installed Windows OS starts for the first time after a MegaRAID controller has been installed for secondary storage, the Windows 2003 OS automatically launches the Found New Hardware wizard.

Perform the following steps:

1. At the question `Can Windows connect to Windows Update?`, select the answer: **No, not this time**.
2. Click **Next**.
3. Select **Install from a list or specific location**.
4. Click **Next**.
5. Select **Search for the best driver in these locations**.
6. Click the **Include this location in the search** check box.
7. Uncheck **Search removable media**.
8. Click **Browse**.
9. In the **Browse for Folder** window, locate and click on the previously created folder with the extracted driver files.
10. Click **OK**.
11. Click **Next**.
12. Click **Install**.

    The Update Driver Software wizard displays the message `The software for this device has been successfully installed.`
13. Reboot the system.

If you do not install the MegaRAID driver at boot time, the MegaRAID driver is added or updated in the Windows environment by using Device Manager. Many methods exist to start Device Manager, including one general method for all supported variants of the Windows 2003 OS.

Perform the following steps:

1. Select **Run > Search > devmgmt.msc > enter key**.

   In Device Manager, a MegaRAID controller with no driver appears under “Other devices” as a RAID controller.
2. Right-click and select **RAID Controller**.
3. If the device is not shown, double-click **Storage controllers** to expose any detected controllers supported by an existing driver.
4. If you locate the MegaRAID controller, right-click the controller.

   The driver installation steps for the Windows 2003 OS the same no matter where the device was found.
5. Click **Update Driver Software**.
6. Click **Browse My Computer** to search for driver software.
7. Click the **Browse** button.
8. In the **Browse for Folder** window, locate the previously extracted driver files from the local boot disk, CD, DVD, network, or USB device.
9. Click **OK**.
10. Click **Next**.
11. Click **Install**.

The Update Driver Software wizard shows the message `The software for this device has been successfully installed.`

12. Reboot the system.

2.5 Installing a MegaRAID Driver on the Microsoft Windows 8 OS

Microsoft Windows Server 8 includes a MegaRAID driver in box. The driver version 5.2.122.0, dated April 3, 2012.

Consider the following points before you install the driver.

- If you want to use the MegaRAID controller for primary storage, see Section 2.1.1, Storage Configuration, on configuring a virtual disk for the OS in a pre-boot environment. The Windows installation program recognizes the MegaRAID controller, and it automatically installs a driver.
- If you want to use the MegaRAID controller as secondary storage, install the OS with the MegaRAID controller installed. The OS automatically configures the controller with the in-box driver.
- When the Microsoft OS is running on the machine with the MegaRAID controller, upgrade to the latest LSI® MegaRAID driver.

2.5.1 Driver Upgrades

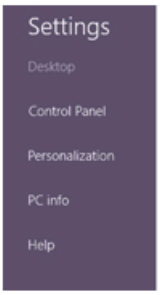
Perform the following steps to upgrade the Windows 8 driver.

1. Download the updated driver and put it on a USB, CD or DVD disc.
2. Boot the Microsoft Windows 8 OS, and then move the mouse to the upper- or lower-right corner of the screen to expose the desk icons for **Search**, **Share**, **Start**, **Devices**, and **Settings**, shown in the following figure.

Figure 1 Settings Option

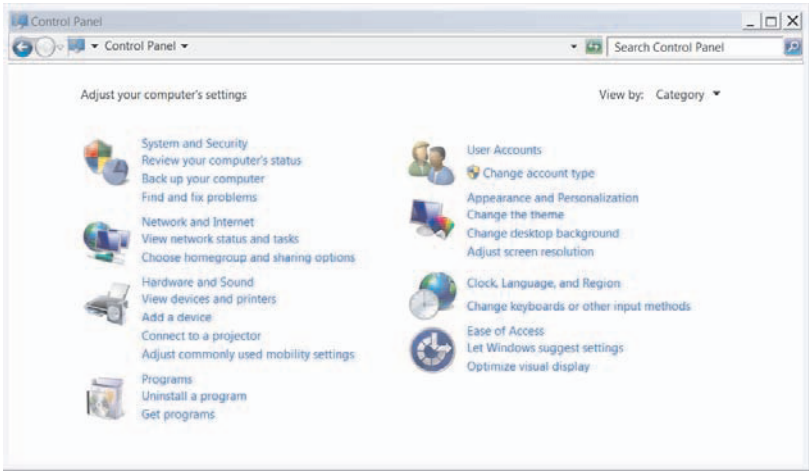
3. Click **Settings**.
4. On the Settings bar, click **Control Panel**, as shown in the following figure.

Figure 2 Settings Bar



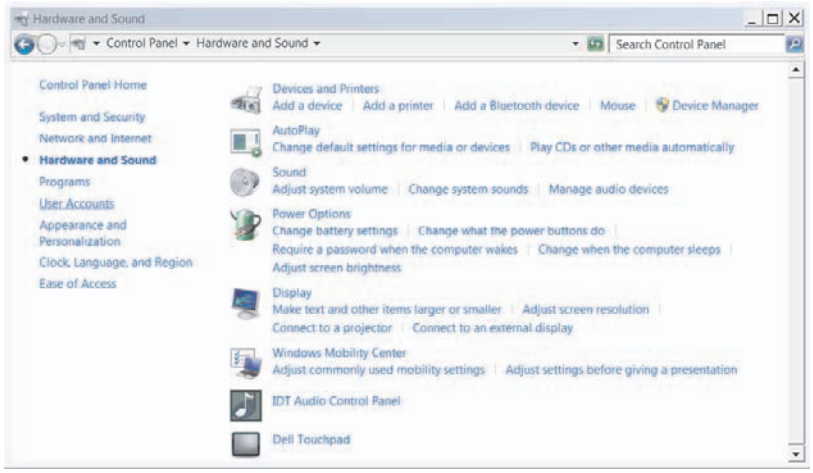
5. In Control Panel, click **Hardware and Sound**.
   The following figure appears.

Figure 3 Hardware and Sound



6. In Hardware and Sound, click **Device Manager** under the heading Devices and Printers.
   The following figure appears.

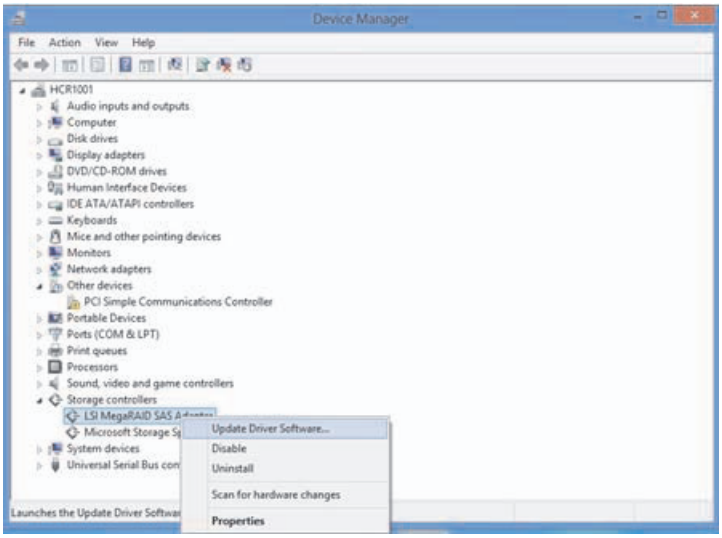
Figure 4 Device Manager



7. In the Device Manager, expand the sub-menu under Storage Controllers and right-click **Update Driver Software**, as shown in the following figure.

   You can find the version of the existing driver by right-clicking **Properties** and selecting the **Driver** tab.

Figure 5 Update Driver Software Option



8. In the Update Driver Software wizard, select **Browse My Computer** to locate the updated driver on the USB, CD, or DVD.
9. When the driver is found, click **Install** to confirm, as shown on the following screen.

Figure 6 Install Button

10. The installation wizard presents progress screens and announces the completion of the installation.
11. After the driver is installed, reboot the system.

2.6 Installing a MegaRAID Driver on the Windows Server 2012 Operating System

The Microsoft Windows Server 2012 operating system package includes a MegaRAID driver in box.

The type of installation to use depends on how you plan to use your MegaRAID controller:

- If you use the MegaRAID controller as primary storage, see Section 2.1.1, Storage Configuration, on configuring a virtual disk for the OS in a pre-boot environment. The Windows installation program recognizes the MegaRAID controller, and it automatically installs a driver.
- If you use the MegaRAID controller as secondary storage, LSI recommends that you install the OS without the MegaRAID controller, shut down the system, install the controller, and let the OS automatically configure the controller with the in-box driver.
- Once the Windows Server 2012 OS is running on the machine with the MegaRAID controller, an upgrade to the latest LSI MegaRAID driver is recommended. The following section describes how to upgrade the driver.

2.6.1 Upgrading the Driver for the Windows Server 2012 Operating System

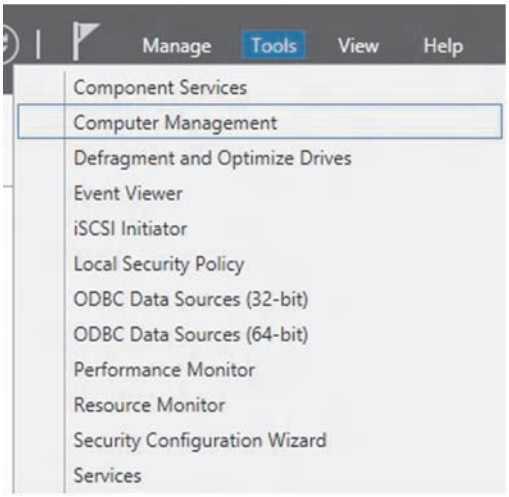
Perform the following steps to upgrade the driver.

1. Download the updated driver from http://www.lsi.com/support, and put it on a USB, CD, or DVD.
2. Boot the Microsoft Server 2012 OS.
3. Click the Server Manager button to start Server Manager, if it does not start automatically.
   The button to start Server Manager is the first item on the left of the start bar, as shown in the following figure.

Figure 7 Server Manager Button

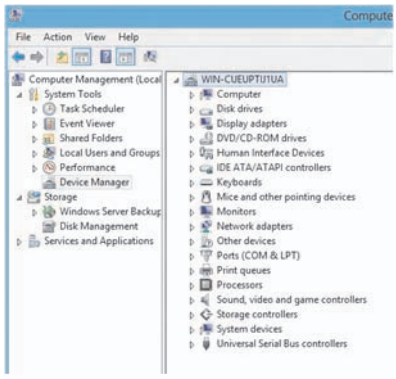
   The Server Manager page appears.
4. In Server Manager, open the Tools menu, and select **Computer Management**, as shown in the following figure.
   The Computer Management window appears, as shown in the following figure.

Figure 8 Computer Management Option



5. In the left frame of the Computer Management window, select **Device Manager**.

Figure 9 Device Manager Option

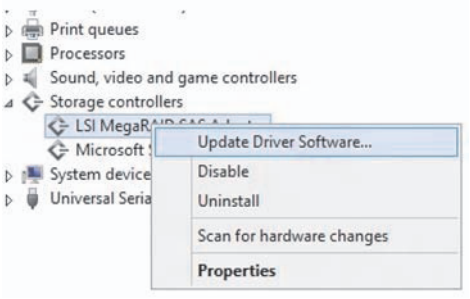


The Device Manager window appears.

6. In the Device Manager window, expand the submenu under **Storage Controllers**, and right-click **Update Driver Software**, as shown in the following figure.

   To find the version of the existing driver, right-click **Properties** and select the **Driver** tab.

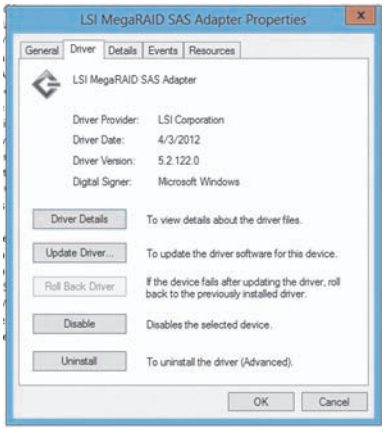
Figure 10 Update Driver Software Option



7. In the Update Driver Software wizard, click the **Browse** button to locate the updated driver on the USB, CD, or DVD.

   After you locate the updated driver, the **Windows Security** dialog box appears.

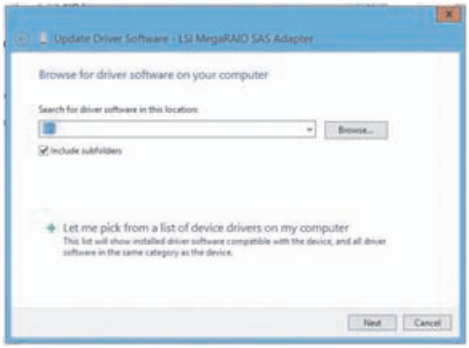
Figure 11 Update Driver Software Wizard



8. Click the **Install** button in the **Windows Security** dialog box, as shown in the following figure.

   The installation wizard presents progress screens and announces the completion of the installation.

Figure 12 Windows Security Dialog



9. Reboot the system after the driver is installed.

Chapter 3: Red Hat Linux Driver Installation

This chapter describes how to install the device driver in new Red Hat Enterprise Linux systems, and how to update the driver on existing operating systems.

Refer to the release notes that accompanied the driver for information on an existing Red Hat Enterprise Linux system.

3.1 Installing the Driver in a New Red Hat Enterprise Linux 5 or 6 OS

You can install the MegaRAID device driver in a new system from the Red Hat Enterprise Linux CD, DVD, or from a driver update disk.

3.1.1 Installing from a CD or a DVD

Perform the following steps to install the MegaSAS device driver in a new Red Hat Linux OS from the Red Hat Enterprise Linux installation media:

1. Refer to your system documentation, if needed, and boot the server with the installation CD or DVD.
2. Follow the installation procedure for the Red Hat OS.

   The driver is loaded automatically during the installation process.

3.1.2 Creating a Driver Update Disk (DUD) with a USB Drive

You can transfer a driver disk image to a USB drive with the rawrite tool from DOS, or the `dd` utility in Linux. The URL for the rawrite tool is http://www.tux.org/pub/dos/rawrite. On a Linux machine, you can use the `dd` command to burn a driver ISO image on a USB drive.

Perform the following steps to create a DUD with a USB drive.

1. Insert a USB stick into a Linux machine, making sure that the USB drive is not mounted.
2. Type the following command:

   `"$ dd if=<driver.iso> of=/dev/sdx"`

   where `/dev/sdx` is the USB drive.
3. Press Enter.
4. Mount the USB stick to verify its contents.
5. Make sure the DUD image is in `iso9660` format or `msdos` format by typing the following command:

   `$df -T`
6. Press Enter.

   The file system type and other information about the mounted devices appear.

3.1.3 Installing from a Driver Update Diskette

Perform the following steps to create the driver update diskette by using the Linux driver image and to install the MegaSAS device driver in a new Red Hat Enterprise Linux OS:

1. Boot the server with the installation CD or DVD.

   Refer to your system documentation, if needed.

2. Enter the following boot option to load the driver disk during installation:

   ```
   linux dd
   ```

3. Press Enter to continue the install.
4. When prompted, insert the driver diskette.

   The utility locates and loads the driver for your controller.
5. Press Alt+Ctrl+F4 to verify that the driver is loaded.
6. Press Alt+Ctrl+F1 to return to the installation.
7. Follow the Red Hat installation procedure to complete the installation.

3.2 Installing the Red Hat Enterprise Linux 5 or 6 Driver in an Existing Installation

You can install the device driver in an existing Red Hat Enterprise Linux 6 system from the Red Hat Enterprise Linux installation CD.

Perform the following steps to add the Red Hat Enterprise Linux 5 or 6 driver to an existing installation:

1. Turn on the power to the system.

   The system initializes the hardware. The system then detects the controller and invokes Kudzu, the Red Hat Enterprise Linux hardware configuration utility.

   The following RAID controller is added to your system:

   ```
   LSI MegaSAS
   ```

2. Select the **Configure the device** option.
3. Highlight the Configure tab, and press Enter.

   The system configures the controller and installs the appropriate driver in the kernel.

   The system boots and displays the devices connected or configured on the controller.

3.3 Installing or Updating the Red Hat Linux System Driver

Perform the following steps to install or update to the latest version of the MegaSAS driver:

1. Boot the system.
2. Go to Console (your terminal GUI).
3. Install the Dynamic Kernel Module Support (DKMS) driver RPM.

   Uninstall the earlier version first, if needed.
4. Install the MegaSAS driver RPM.

   Uninstall the earlier version first, if needed.
5. Reboot the system to load the driver.

Chapter 4: SuSE Linux Enterprise Server (SLES) 10 and 11 Driver Installation

This chapter describes how to install the device driver in new SuSE Linux Enterprise Server (SLES) operating systems (OSs), and how to update the driver on existing systems.

4.1 Installing the Driver in a New SuSE Linux Enterprise Server System

You can install the MegaRAID device driver in a new system from the SuSE SLES Linux CD, DVD, or from a driver update diskette.

NOTE If you use Service Pack (SP) 1 or SP 2, you need to load the driver. If you use SP 3 RC 2, the MegaSAS driver is already on the SuSE SLES Linux CD.

4.1.1 Installing from a CD or a DVD

Perform the following steps to install the driver in a new SuSE Linux Enterprise Server system from the SuSE Linux Enterprise Server installation CD or DVD:

1. Boot the server with the SuSE Linux Enterprise Server SP CD or DVD.

   The system BIOS must support booting from a CD-ROM. BIOS settings might require changes to allow CD-ROM booting. Refer to your system documentation.
2. Follow the installation procedure for the SuSE OS.

   The driver is loaded automatically during installation.

4.1.2 Creating a Driver Update Disk (DUD) with a USB Drive

You can transfer a driver disk image to a USB drive with the rawrite tool from DOS, or the `dd` utility in Linux. The URL for the rawrite tool is http://www.tux.org/pub/dos/rawrite. On a Linux machine, you can use the `dd` command to burn a driver ISO image on a USB drive.

Perform the following steps to create a DUD with a USB drive.

1. Insert a USB stick into a Linux machine, making sure that the USB drive is not mounted.
2. Type the following command:

   `"$ dd if=<driver.iso> of=/dev/sdx"`

   where `/dev/sdx` is the USB drive.
3. Press Enter.
4. Mount the USB stick to verify its contents.
5. Make sure the DUD image is in `iso9660` format or `msdos` format by typing the following command:

   `$df -T`
6. Press Enter.

   The file system type and other information about the mounted devices appear.

4.1.3 Installing from a Driver Update Diskette

To install the MegaSAS device driver in a new SuSE Linux Enterprise Server, create the driver update diskette by using the Linux driver image.

Perform the following steps to install the driver:

1. Refer to your system documentation, if needed, and boot the server with the installation CD or DVD.
2. At the installation message, perform one of the following actions:
   - Press F5 for SuSE Linux Enterprise Server 10.
   - Press F6 for SuSE Linux Enterprise Server 11.
3. Continue the installation procedure and, when prompted, insert the driver diskette.
   The utility locates and loads the driver for your controller.
4. Press Alt+Ctrl+F4 to verify that the driver is loaded.
5. Press Alt+Ctrl+F1 to return to the installation.
6. Follow the SuSE installation procedure to complete the installation.

4.2 Installing or Updating the SuSE Linux Enterprise Server 10 or 11 Driver

Perform the following steps to install or upgrade to the latest version of the MegaSAS driver:

1. Boot the system.
2. Go to Console (your terminal GUI).
3. Run Dynamic Kernel Module Support (DKMS) driver RPM.
   Uninstall the earlier version first, if needed.
4. Install the MegaSAS driver RPM.
   Uninstall the earlier version first, if needed.
5. Reboot the system to load the driver.

NOTE Prior to the MegaRAID version 5.4 of the Linux drivers, one RPM was distributed for all kernel versions. The distribution packaging now includes separate RPMs for each kernel version, which must be selected by kernel version for installation.

Chapter 5: Ubuntu Linux Driver Installation

This chapter describes how to install the device driver in new Ubuntu Linux systems, and how to update the driver on existing operating system OSs.

Refer to the release notes that accompanied the driver for information on an existing Ubuntu Linux system.

NOTE Other supported Ubuntu OS versions follow the same driver installation process described for Ubuntu 12.04 LTS in the following section.

NOTE The Ubuntu OS does not support driver update diskettes.

5.1 Installing the Driver in a New Ubuntu Linux 12.04 LTS OS

You can install the device driver in a new Ubuntu Linux 12.04 LTS system from the `.deb` package, which contains the executables, configuration files, libraries, and documentation in a Debian archive file.

Ubuntu uses the Debian file format for OS components, and LSI provides the MegaRAID driver in this file format.

Perform the procedure in this section if the Ubuntu Linux OS boots from a device that is not managed by a MegaRAID controller, but in which the MegaRAID controller is or will be present on the system and used for managing secondary storage.

Assuming that you already have the `.deb` package, perform the following steps to install the driver.

1. If you are running the OS as root, perform the following steps; otherwise, go to step 2:
   a. Make sure that you are running the OS as root. To do so, if you are logged in as a standard user, type the following command and press Enter:
      ```
      sudo su
      ```
      You are prompted for the password.
   b. Provide the password and press Enter.
   c. In the directory where the package is located, type the following command and press Enter:
      ```
      dpkg -i Package.deb
      ```
      This action installs the driver on the Ubuntu OS.
2. Perform the following steps if you are not running the OS as root:
   a. In the directory where the package is located, type the following command and press Enter:
      ```
      sudo dpkg -i Package.deb
      ```
      You are prompted for the password.
   b. Provide the password and press Enter.
      This action installs the driver on the Ubuntu OS.

5.2 Removing the Driver in a New Ubuntu Linux 12.04 LTS OS

To remove the device driver in an Ubuntu Linux system, perform the following procedure if the Ubuntu Linux OS boots from a device that is not managed by a MegaRAID controller, but in which the MegaRAID controller is or will be present on the system and used for managing secondary storage.

1. If you are running the OS as root, perform the following steps; otherwise, go to step 2:
   a. Make sure that you are running the OS as root. To do so, if you are logged in as a standard user, type the following command and press Enter:

      ```
      sudo su
      ```

      You are prompted for the password.
   b. Provide the password and press Enter.
   c. In the directory where the megaraid_sas driver package is located, type the following command and press Enter:

      ```
      $dpkg -r megaraid-sas
      ```

      This action removes the driver from the Ubuntu OS.
2. Perform the following steps if you are not running the OS as root:
   a. In the directory where the megaraid_sas driver package is located, type the following command and press Enter:

      ```
      sudo $dpkg -r megaraid-sas
      ```

      You are prompted for the password.
   b. Provide the password and press Enter.

      This action removes the driver from the Ubuntu OS.

Chapter 6: FreeBSD Driver Installation

This chapter describes how to install the driver for the FreeBSD OS.

6.1 LSI MegaRAID Drivers and Software for the FreeBSD OS

This section describes the following topics:

- FreeBSD OS administration information
- Installing LSI drivers and software in the FreeBSD OS

6.1.1 FreeBSD OS Administration Information

You can find the latest FreeBSD OS administration information at:

http://www.freebsd.org/doc/en_US.ISO8859-1/books/handbook

http://www.freebsd.org/doc/en_US.ISO8859-1/books/handbook/disks-adding.html

You can search for manual pages online at http://www.freebsd.org/cgi/man.cgi.

6.1.2 Installing LSI Drivers and Software in the FreeBSD OS

This section provides detailed instructions for installing the LSI driver in the FreeBSD OS.

The following sections cover these topics:

- Installing drivers for the FreeBSD OS
- Updating drivers in the FreeBSD OS

6.1.3 Driver Installation for the FreeBSD OS

This section describes how to install the driver for your MegaRAID controller in the FreeBSD OS:

- If the virtual drives you have created are your boot device, install the driver for the controller as you install the FreeBSD OS.
- If the operating system is already installed on a unit connected to another controller or to the motherboard, start the FreeBSD OS, and then install the driver.

NOTE If your FreeBSD system does not have the mpt driver issue, install your MegaRAID controller in the system before you install the LSI driver. Refer to the installation guide that came with your controller for instructions. You can download the installation guide at: http://www.lsi.com/channel/ChannelDownloads.

NOTE If your FreeBSD system has the mpt driver issue, you must disable the mpt driver and recompile the kernel first. If you have a MegaRAID controller installed, you must power down and remove the controller from your system and recompile the kernel. If you leave the controller in your system, the mpt driver claims the device ID and goes into a soft reset continuously, and your system cannot exit boot. See Section 6.4, Installing the FreeBSD OS on Storage Managed by a MegaRAID Controller (Primary Storage), for instructions.

This section covers these topics:

- Obtaining LSI FreeBSD OS drivers
- Creating a FreeBSD OS driver diskette
- Installing FreeBSD OS on storage managed by a MegaRAID controller (primary storage)
- Installing the kernel driver on a FreeBSD OS that boots from a device *not* managed by a MegaRAID controller (secondary storage)

6.2 Obtaining LSI FreeBSD Drivers

LSI drivers can be compiled from source files into the kernel as built-in drivers or they can be modules that are loaded manually or by the operating system. Both source files and modules are available from LSI, but modules with current controller drivers are available for the FreeBSD 7.4, 8.2, 8.3, and 9.0 OSs.

You can obtain the MegaRAID controller driver for the FreeBSD OS from one of these two sources:

- LSI software CD-ROM, which includes the following items:

  Compiled and tested kernel driver modules for the FreeBSD 7.4 OS, located at:

  — 32-bit: `components/7.4.0/i386`
  — 64-bit: `components/7.4.0/amd64`

  Compiled and tested kernel driver modules for the FreeBSD 8.2 OS, located at:

  — 32-bit: `components/8.2.0/i386`
  — 64-bit: `components/8.2.0/amd64`

  Compiled and tested kernel driver modules for the FreeBSD 8.3 OS, located at:

  — 32-bit: `components/8.3.0/i386`
  — 64-bit: `components/8.3.0/amd64`

  Compiled and tested kernel driver modules for the FreeBSD 9.0 OS, located at:

  — 32-bit: `components/9.0/i386`
  — 64-bit: `components/9.0/amd64`

  Driver source files for the FreeBSD 7.x, 8.x, and 9.x OSs are located at the following paths:

  — For the mfi driver: `components/src/mfi.tgz`
  — For the mrsas driver: `components/src/mrsas.tgz`

- LSI website

  You can download the latest compiled and tested driver modules, and the driver source files for the FreeBSD OS from the LSI website at http://www.lsi.com/support/Pages/download-search.aspx.

6.3 Creating a FreeBSD OS Driver Diskette

You need a diskette to install the FreeBSD OS on a virtual drive or a drive that is managed by a MegaRAID controller. The virtual drive or drive then becomes the boot unit for which your version of the FreeBSD OS does not have an up-to-date built-in driver.

Follow these steps to create a driver diskette.

1. Insert a blank diskette and the LSI software CD into an installed FreeBSD OS.
2. Navigate to one of the following folders, depending on the OS version:
   - For the FreeBSD 7.4 OS, navigate to `components/7.4.0`.
   - For the FreeBSD 8.2 OS, navigate to `components/8.2.0`.
   - For the FreeBSD 8.3 OS, navigate to `components/8.3.0`.
   - For the FreeBSD 9.0 OS, navigate to `components/9.0.0`.
3. Copy the appropriate driver to the diskette.

   This driver is the driver from the folder `i386` if you are installing the 32-bit FreeBSD OS, and the `amd64` folder if you are installing the 64-bit FreeBSD OS.

   You need the driver source from the file `components/src/driver_name.tgz` to update the kernel with a new driver.

   For example:
   - For the mfi driver, the driver source is in the `components/src/mfi.tgz` file.
   - For the mrsas driver, the driver source is in the `components/src/mrsas.tgz` file.

6.4 Installing the FreeBSD OS on Storage Managed by a MegaRAID Controller (Primary Storage)

This section describes how to load the FreeBSD OS kernel driver module to enable boot device support and then how to compile the current drivers into the kernel from source files.

Use the procedure in this section if your boot unit is going to be managed by the MegaRAID controller.

6.4.1 Issues Concerning the LSI MPT Driver and the Outdated LSI MPT Driver

The process for using your MegaRAID controller for primary storage might be affected by the LSI mpt driver and FreeBSD versions 6.1 to 9.*X* containing outdated LSI mfi in-box driver.

If the mpt driver issue occurs, the system generates a continuous soft and hard reset, and the system cannot boot. The installation disk will not install the OS and the process must be terminated. To avoid the issue with the mpt driver, you need to disable the mpt driver.

If you have FreeBSD versions up to 7.4, 8.2, or 9.0, your FreeBSD OS most likely contains the outdated mfi driver in the kernel. You might need a new FreeBSD kernel ISO to exclude the outdated mfi driver, before you load the updated mfi driver (version 4.8 or newer) or the mrsas driver. With the new FreeBSD kernel ISO, and the updated mfi driver (version 4.8 or newer) or the mrsas driver, you can complete the installation and boot your FreeBSD system through a MegaRAID virtual drive.

Note that this situation no longer exists after the mpt driver issue is fixed and the outdated inbox mfi driver is replaced with the new mfi driver. LSI is working to resolve this situation so that the extra steps are not necessary in the future. This issue does not affect the FreeBSD 8.3 OS.

See Section 6.4.3, Creating a Custom ISO Image to Exclude the MFI and MPT Drivers, if your FreeBSD OS has this issue.

After you create a custom FreeBSD Installation disk with the new FreeBSD kernel custom ISO image, and you have the mfi driver (version 4.8 or newer) or the mrsas driver ready, follow the instructions in Section 6.4.2, Installing the FreeBSD OS on Storage Managed by a MegaRAID Controller. These instructions describe how to load the FreeBSD kernel driver module to enable boot device support, and then how to compile the current drivers into the kernel from source files.

6.4.2 Installing the FreeBSD OS on Storage Managed by a MegaRAID Controller

Use the following procedure if your boot unit will be managed by the MegaRAID controller.

As a prerequisite, you need an OS Installation CD for the FreeBSD 7.4, FreeBSD 8.2, and FreeBSD 9.0 OSs (i386 or amd64). Use the CD that you created using the instructions in Section 6.4.3, Creating a Custom ISO Image to Exclude the MFI and MPT Drivers. Although LSI does not fully support the FreeBSD 6.X OS, the FreeBSD 6.X OS versions also require a custom ISO image if primary storage is required.

NOTE This procedure is specific to versions of the FreeBSD OSs for which a compiled module is available. For other versions of a FreeBSD OS for which a compiled module is not supplied by LSI, you must compile your own module from source files. See Section 6.6.2, Compiling and Loading the Driver as a Module by Using kldload (Dynamically Loadable Module).

Perform the following steps to install the FreeBSD OS on storage managed by a MegaRAID controller:

1. Disconnect all SCSI, ATA, and SAS devices in the system, except for the CD/DVD drive, and the hard drives that are connected to the MegaRAID controller.
2. Create the RAID virtual drives on the MegaRAID controller using WebBIOS or Preboot CLI.
3. Insert the FreeBSD Installation disk into the CD/DVD drive, and boot from it.
4. At the FreeBSD boot menu, select **Escape to loader prompt** (option 6 in the FreeBSD 7.*x* and 8.*x* OSs, and option 2 in the FreeBSD 9.*x* OS).
5. Insert the diskette containing the `driver_name.ko` module for the specific version of the FreeBSD OS into the diskette drive.

   If you use a USB flash drive, you might need to insert the drive before booting so the drive can be seen in the next step. If so, make sure to boot from the CD/DVD drive and not from the USB drive.

   For the mfi driver, the `driver_name.ko` is `mfi.ko`.

   For the mrsas driver, the `driver_name.ko` is `mrsas.ko`.
6. Perform the following steps at the loader prompt:
   a. To disable the mpt driver, type the following commands and press Enter.

      ```
      set hint.mpt.0.disable=1
      set hint.mpt.1.disable=1
      ```

      NOTE Disabling the mpt driver is not required when you use a custom ISO image because the mpt driver will not exist if the custom image was created correctly. A custom ISO is required only for the OS versions that need it as a prerequisite, as described at the start of this section.

   b. To load a new driver from a diskette drive, type either of the following two commands and press Enter.
      - For the mfi driver, type the following command and press Enter:

        ```
        load disk0:mfi.ko
        ```
      - For the mrsas driver, type the following command and press Enter:

        ```
        load disk0:mrsas.ko
        ```

NOTE If you have multiple units or devices for the OS installation, and the unit or device that you want to use for the installation is not disk0; change `disk0` to the appropriate number, such as `disk1` or `disk5`. The `lsdev` command lists all of the devices from which you can load the driver. If you use a USB flash drive, you might need to insert the flash drive before booting so that it can be accessed in this step.

7. To continue the installation procedure, type the following command, and press Enter.

   ```
   boot
   ```

8. Install the FreeBSD OS, including the kernel source.

   It is very important to include the kernel source files.

9. Remove both the FreeBSD installation disk from the CD/DVD drive, and the diskette from the diskette drive (or the USB flash drive, if used), and reboot.
10. On bootup, repeat step 4 through step 7.
11. Upon boot, continue with the instructions in Section 6.6.1, Updating the Kernel with the New Driver Source, for a statically linked module.

6.4.3 Creating a Custom ISO Image to Exclude the MFI and MPT Drivers

You must create a custom ISO image that excludes mfi drivers and mpt drivers if you install the FreeBSD OS on storage managed by a MegaRAID controller as primary storage, which is described in Section 6.4, Installing the FreeBSD OS on Storage Managed by a MegaRAID Controller (Primary Storage). You must use this procedure if you must exclude the mfi driver from the kernel because of the problem described in Section 6.4.1, Issues Concerning the LSI MPT Driver and the Outdated LSI MPT Driver. In this procedure, the mpt driver is also excluded so that it is not attached to the MegaRAID controller during the OS installation to primary storage. If the mpt driver attaches to the MegaRAID controller, any drives attached to the MegaRAID controller will not be found during the OS installation process.

Because different versions of the FreeBSD OS have different make files, drivers, build procedures, and so on, the easiest way to create a custom ISO image for a specific version of the FreeBSD OS is to install the version of the FreeBSD OS that is needed for the ISO image. The procedure outlined in this section works for all supported versions of the FreeBSD OS (currently, versions 7.4, 8.2, 8.3, and 9.0). Some steps are different for FreeBSD version 9.0 or later, and are noted.

Perform the following steps to create the custom ISO image.

1. Install the required version of the FreeBSD OS on an available disk that is not attached to a MegaRAID controller.

   During installation, you must install all of the system source code. You might need a network connection to download the source code that is used to build the ISO image. The CD or the DVD that is used to install the OS might already contain the source code, depending on the type of installation that is on the CD or the DVD. Otherwise, you can use the `sysinstall` utility to download the source. The installed OS is used only to build the custom ISO, and then it is no longer required.

2. Boot to the disk with the new FreeBSD OS, and then change to the `/usr/src/sys/<arch>/conf` directory, where `<arch>` is either i386 or amd64, depending on what type of architecture the ISO image is for. You must edit the *generic* kernel configuration file in this folder so that the mfi and mpt drivers are not installed when the new custom ISO is built. The mfi and mpt lines can be removed or commented out by adding # before `device`, as shown in the following examples:

   ```
   #device         mfi             # LSI MegaRAID SAS
   #device         mpt             # LSI-Logic MPT-Fusion
   ```

NOTE The preferred method to use when you edit the *generic* configuration file is to copy it to another file, and then create a kernel using this new kernel configuration file. However, using that method here would require a more complex procedure and is unnecessary.

3. Issue the following commands to build the tools and the other items that are required to build the ISO image. This command can take several hours to complete.

   ```
   # cd /usr/src
   # make buildworld TARGET=<arch>
   ```

   where <*arch*> is the architecture for the ISO image to be created.

   If the `make` command fails immediately, the system source code might not be installed correctly. You can install the source code using the `sysinstall` utility. Within the `sysinstall` utility, select the source code from within the *Distributions* selection.

4. For FreeBSD OS version 9.0 or later, the *generic* kernel must be built in a separate command. Previous versions do not require this step. If you are building the kernel for version 9.0 or later, enter the following commands before continuing; otherwise, you can skip this step.

   ```
   # cd /usr/src
   # make buildkernel TARGET=<arch>
   ```

   Where <*arch*> is the architecture for the desired ISO image.

5. Issue the following commands to build the ISO image.

   The `make` command can take several hours to complete. See the second note after this step if you are building the kernel for FreeBSD OS version 9.0 or later.

   ```
   # cd /usr/src/release
   # make release BUILDNAME=FBSD_<version>-CUSTOM \
      CHROOTDIR=/usr/MyCustomBuild \
      EXTSRCDIR=/usr/src \
      TARGET=<arch> \
      NOPORTS=1 \
      NODOC=1 \
      MAKE_ISOS=1
   ```

   Where <*version*> is the FreeBSD version being built, and <*arch*> is the architecture for the desired ISO image. The `BUILDNAME` and `CHROOTDIR` values are examples. You can set these values to whatever you want. Ports and Docs are not included in this example because it is faster and less complex to leave these values out of the build. If Ports and Docs were included, the build process might fail because more packages might be needed. Visit the FreeBSD website at http://www.freebsd.org for complete documentation about the `make release` command.

NOTE The creation of the ISO image is the last step in the `make` process. If the ISO image creation fails, make sure the latest `/usr/local/bin/` files and `/usr/local/lib/` files are copied into the <*CHROOTDIR*>`/usr/local/bin` and <*CHROOTDIR*>`/usr/local/lib` folders. If these folders already exist, and the files are up to date, the next step is to make sure that the `cdrtools` package was installed successfully. If the package was not installed successfully, use the `sysinstall` utility or another method to get this package.

After the `cdrtools` package is installed, make sure again that the `/usr/local/bin/` and `/usr/local/lib/` folders are up to date, as described previously. Then run the `make` command again, but use the `rerelease` command instead of the `release` command. Using the `rerelease` command makes sure that the `make` process starts up from where it failed, and not from the start of the `make` process, which could save several hours.

NOTE For FreeBSD OS version 9.0 or later, the `make release` command has been simplified and follows. See the Makefile for more information.

```
# cd /usr/src/release
# make release TARGET=<arch> \
   NOPORTS=1 \
   NODOC=1
```

6. After you successfully complete the `make` process, all of the new ISO images are located in the `<CHROOTDIR>/R/cdrom` directory.

NOTE For FreeBSD OS version 9.0 or later, the new ISO images are located in the `/usr/obj/usr/src/release` directory.

6.5 Installing the Kernel Driver on a FreeBSD OS That Boots from a Device Not Managed by a MegaRAID Controller (Secondary Storage)

Perform the procedures in this section if the FreeBSD OS boots from a device that is *not* managed by a MegaRAID controller, but in which the MegaRAID controller is or will be present on the system and used for managing secondary storage.

When you use the virtual drive managed by the MegaRAID controller for secondary storage, you do not need to use a driver diskette for driver installation.

NOTE Your MegaRAID controller might be affected by an issue with the LSI mpt driver in the FreeBSD 7.*x*, 8.*x*, and 9.*x* OSs. If the mpt driver issue occurs, the system generates soft reset errors and hard reset errors on bootup, and the DVD does not install the OS. To avoid this issue, you must disable the mpt driver before you install or boot your FreeBSD OS until you exclude the mpt driver from the booting kernel.

It helps to install the FreeBSD OS on the drive attached to the motherboard *before* you install the MegaRAID controller. This step reduces the possibility of installing the FreeBSD OS to the wrong drive or unit.

The following procedures document two types of OS installation:

- Installation on a system does *not* include an LSI controller before the OS installation.
- installation on a system includes an LSI controller before the OS installation.

6.5.1 Installing the FreeBSD OS on a System that Does Not Include an LSI Controller Before the OS Installation

Perform the following steps:

1. Get the latest driver source files for your version of the FreeBSD OS.
   See Section 6.2, Obtaining LSI FreeBSD Drivers.
2. Install the FreeBSD OS—including the kernel source—on a motherboard attached drive.
   It is critical to include kernel source files.
3. After the OS installation, reboot.

4. Follow the instructions for driver installation in Section 6.6.1, Updating the Kernel with the New Driver Source, for a statically linked module, or in Section 6.6.2, Compiling and Loading the Driver as a Module by Using kldload (Dynamically Loadable Module).
5. After the FreeBSD OS is installed and the driver is updated, power down the system and install the MegaRAID controller.

   For assistance, refer to the installation guide that came with the controller.

6.5.2 Installing the FreeBSD OS on a System that Includes an LSI Controller Before the OS Installation

Perform the following steps:

1. Get the latest driver source files for your version of the FreeBSD OS.

   See Section 6.2, Obtaining LSI FreeBSD Drivers.
2. Start the installation process.

   As the DVD loads, you are offered boot options.
3. Select **Escape to prompt** (option 6 in the FreeBSD 7.*x* and 8.*x* OSs, and option 2 in the FreeBSD 9.*x* OS).
4. To disable the mpt driver for the installation, type the following commands at the prompt, and press Enter.

   ```
   set hint.mpt.0.disable=1
   set hint.mpt.1.disable=1
   boot
   ```
5. Proceed with the installation on a drive attached to the motherboard.

   Make sure you install the full the FreeBSD OS source.
6. After the OS installation, follow the instructions for driver installation in Section 6.6.1, Updating the Kernel with the New Driver Source (for a statically linked module), or in Section 6.6.2, Compiling and Loading the Driver as a Module by Using kldload (Dynamically Loadable Module).

6.6 Updating Drivers in the FreeBSD System

You can update drivers either from source files or with driver modules. By using source files, you can compile drivers into the kernel, or you can create modules for versions of the FreeBSD OS for which LSI does not supply modules.

This section includes these topics:

- Updating the kernel with the new driver source
- Compiling and loading the driver as a module using `kldload` (dynamically loadable module)
- Updating the MegaRAID kernel driver module in the FreeBSD OS

6.6.1 Updating the Kernel with the New Driver Source

Use this procedure to update your kernel from driver source files for both a dynamically loadable module and a statically linked module. To obtain the source files, see Section 6.2, Obtaining LSI FreeBSD Drivers.

Perform the following steps to update your kernel with the driver source files:

1. Make sure that the kernel source has been installed on the system.

   The kernel sources are in the `/usr/src/sys` directory.

2. Go to the `/usr/src/sys/dev/` directory and perform the following steps.
   a. Check to see whether a directory with the driver name already exists. If a directory already exists, move it to a different folder.
      - For example, to move the mfi driver, type the following command and press Enter:
        ```
        # mv /usr/src/sys/dev/mfi /root/mfi.backup
        ```
      - To move the mrsas driver, type the following command and press Enter:
        ```
        # mv /usr/src/sys/dev/mrsas /root/mrsas.backup
        ```
   b. Make sure the directory exists.
      - For example, to make sure the mfi directory exists, type the following command and press Enter:
        ```
        # mkdir /usr/src/sys/dev/mfi
        ```
      - To make sure the mrsas directory exists, type the following command and press Enter:
        ```
        # mkdir /usr/src/sys/dev/mrsas
        ```
3. Proceed to the `/usr/src/sys/modules/` directory and perform the following steps.
   a. Check to see whether a directory with the driver name already exists. If a directory already exists, move it to a different folder.
      - For example, to move the mfi driver module, type the following command and press Enter:
        ```
        # mv /usr/src/sys/modules/mfi /root/mfi_module.backup
        ```
      - To move the mrsas driver module, type the following command and press Enter:
        ```
        # mv /usr/src/sys/modules/mrsas /root/mrsas_module.backup
        ```
   b. Make sure the directory exists.

      For example, to make sure the mfi directory exists, type the following command and press Enter:
      ```
      # mkdir /usr/src/sys/modules/mfi
      ```
      To make sure the mrsas directory exists, type the following command and press Enter:
      ```
      # mkdir /usr/src/sys/modules/mrsas
      ```
4. Perform the following steps:
   a. Unpack the compressed driver source file (`mfi.tgz` for the mfi driver and `mrsas.tgz` for the mrsas driver).
   b. Move the `*.c` and `*.h` files to `/usr/src/sys/dev/driver_name` (the driver name is `mfi` for the mfi driver and `mrsas` for the mrsas driver).
   c. Move the Makefile to the `/usr/src/sys/modules/driver_name` (the driver name is `mfi` for the mfi driver and `mrsas` for the mrsas driver).
      - For example, to unpack the compressed driver source file and move the Makefile for the mfi driver, enter the following commands and press Enter:
        ```
        # cd /usr/src/sys/dev
        # tar -xf mfi.tgz
        # mv mfi/Makefile /usr/src/sys/modules/mfi/
        ```
      - To unpack the compressed driver source file and move the Makefile for the mrsas driver, enter the following commands and press Enter:
        ```
        # cd /usr/src/sys/dev
        # tar -xf mrsas.tgz
        # mv mrsas/Makefile /usr/src/sys/modules/mrsas/
        ```
5. Go to `/usr/src/sys/i386/conf` if you are running a 32-bit version of the FreeBSD OS, or `/usr/src/sys/amd64/conf` if you are running a 64-bit version of the FreeBSD OS, and perform the following steps:
   a. Copy the GENERIC configuration file to another filename. For example:
      ```
      # cp GENERIC MYKERNEL
      ```

b. Open your current configuration file (`GENERIC`, `MYKERNEL`, `SMP`, or `PAE`, or custom configuration), with vi or another editor. For example:

```
# vi MYKERNEL
```

c. Comment out the following lines by typing # at the start of the line:

```
#device    cbb    # cardbus (yenta) bridge
#device    mpt    # LSI-Logic MPT-Fusion
```

- For a *dynamically loadable module*, comment out the following lines by typing # at the start of the line:

  For the mfi driver, comment out the following line by typing # at the beginning of the line, if it exists:

  ```
  #device    mfi    # LSI MegaRAID SAS
  ```

  For the mrsas driver, comment out the following line by typing # at the start of the line, if it exists:

  ```
  #device    mrsas  # LSI MegaRAID SAS2
  ```

- For a *statically linked module*, make sure the following lines are *not* commented out:

  For the mfi driver, make sure the following line is *not* commented out:

  ```
  device    mfi    # LSI MegaRAID SAS
  ```

  For the mrsas driver, make sure the following line is *not* commented out:

  ```
  device    mrsas # LSI MegaRAID SAS2
  ```

- If you do not have a MegaRAID 92*XX* or earlier controller installed in your system, make sure to comment out the following line:

  ```
  #device    mfi    # LSI MegaRAID SAS
  ```

d. Save your changes.

NOTE Each line is an entry in this file. Make sure a newly added entry is on a new line.

e. In the `/usr/src/sys/conf/` file, perform the following steps for the mfi driver or the mrsas driver, depending on which driver you use:

- For the mfi driver, add the following entries after the entry for `dev/mfi/mfi_cam.c`:

  ```
  dev/mfi/mfi_syspd.c    optional mfi
  ```

  With LSI 2208-based RAID controller support, if your mfi driver is older than `4.408.`*`xx.xx`*, and you do not have `mrsas.ko` driver in your system, also add the following:

  ```
  dev/mfi/mfi_fp.c       optional mfi
  dev/mfi/mfi_tbolt.c    optional mfi
  ```

- For the mrsas driver, make sure that the following entries are present:

  ```
  dev/mrsas/mrsas.c             optional mrsas
  dev/mrsas/mrsas_cam.c     optional mrsas
  dev/mrsas/mrsas_ioctl.c     optional mrsas
  ```

NOTE Each line is an entry in this file. Make sure a newly added entry is on a new line.

f. Save your changes.

g. To compile the kernel, go to the `/usr/src` directory, type the following commands if your current configuration is MYKERNEL, and press Enter.

```
# cd /usr/src
# make buildkernel KERNCONF=MYKERNEL
```

h. To install the new kernel, type the following commands if your current configuration is MYKERNEL, and press Enter.

```
# make installkernel KERNCONF=MYKERNEL
```

The new kernel is copied to the `/boot/kernel` directory.

The old kernel is moved to the `/boot/kernel.old` directory.

6. Reboot your system to use the new kernel.

   When the system reboots, the new kernel driver module loads automatically.

6.6.2 Compiling and Loading the Driver as a Module by Using kldload (Dynamically Loadable Module)

To use a driver module in case LSI does not supply a driver module for your version of the FreeBSD OS, use the procedures in this section. If you want to install only an LSI-supplied module, see Section 6.6.3, Updating the MegaRAID Kernel Driver Module in the FreeBSD OS.

NOTE You can use `kldload` to load the driver as a module only if your boot drive is attached to the mother board and is not managed by the MegaRAID controller.

Perform the following steps to compile the driver as a module:

1. Boot to the FreeBSD OS.
2. Obtain driver source files; see Section 6.2, Obtaining LSI FreeBSD Drivers.
3. Make sure your kernel is prepared for the dynamically loadable module described in Section 6.6.1, Updating the Kernel with the New Driver Source.
4. To build the driver module, type the following command, depending on which driver you use, and press Enter.
   - For the mfi driver, type the following commands and press Enter.

     ```
     # cd /usr/src/sys/modules/mfi
     # make
     ```

   - For the mrsas driver, type the following commands and press Enter.

     ```
     # cd /usr/src/sys/modules/mrsas
     # make
     ```

   These steps create the driver `driver_name.ko` module in the `/usr/src/sys/modules/`*`driver_name`* directory.
5. To load the kernel driver module, type the following commands, depending on which driver you use, and press Enter.
   - For the mfi driver, type the following commands and press Enter.

     ```
     # cd /usr/src/sys/modules/mfi
     # kldload -v ./mfi.ko
     ```

   - For the mrsas driver, type the following commands and press Enter.

     ```
     # cd /usr/src/sys/modules/mrsas
     # kldload -v ./mrsas.ko
     ```

6. To load the driver automatically during bootup, but still be linked dynamically, perform the following steps, depending on which driver you use:
   - To copy the mfi driver into the boot folder, type the following command, and press Enter.

     ```
     # cp /usr/src/sys/modules/mfi/mfi.ko /boot/kernel/mfi.ko
     ```

   - To copy the mrsas driver into the boot folder, type the following command, and press Enter.

     ```
     # cp /usr/src/sys/modules/mrsas/mrsas.ko /boot/kernel/mrsas.ko
     ```

NOTE Back up the old module in case you want to revert back to it.

— For the mfi driver, enter the following line in the `/boot/loader.conf` file:

```
mfi_load="YES"
```

— For the mrsas driver, enter the following line in the `/boot/loader.conf` file:

```
mrsas_load="YES"
```

6.6.3 Updating the MegaRAID Kernel Driver Module in the FreeBSD OS

This section describes how to update the MegaRAID driver with a kernel driver module in the FreeBSD OS.

NOTE Make a backup of your original driver before updating the MegaRAID driver in case you need to revert back to it. However, you cannot revert back to the original driver if you are booting from that unit.

Perform the following steps to update the MegaRAID driver with a kernel driver module under the FreeBSD OS.

1. Download and extract the driver.

   See Section 6.2, Obtaining LSI FreeBSD Drivers, for instructions.
2. Back up any critical data before you update the MegaRAID driver.
3. Change the directory to the location with the extracted driver.
4. To copy the driver into the `/boot/kernel` directory, perform the following steps, depending on which driver you use.

   — For the mfi driver, type the following command, and press Enter.

   ```
   # cp mfi.ko /boot/kernel
   ```

   — For the mrsas driver, type the following command, and press Enter.

   ```
   # cp mrsas.ko /boot/kernel
   ```

   Make sure that the module version (32-bit or 64-bit) matches the FreeBSD version. If the versions do not match, a kernel panic might occur.
5. To load the driver, perform the following steps, depending on which driver you use.

   — For the mfi driver, type the following command, and press Enter.

   ```
   # kldload -v /boot/kernel/mfi.ko
   ```

   — For the mrsas driver, type the following command, and press Enter.

   ```
   # kldload -v /boot/kernel/mrsas.ko
   ```

   If storage is present, the system log records its presence (usually in `/var/log/messages`).
6. To have the driver load automatically every time the system reboots, add the following line to the `/boot/loader.conf` file, depending on which driver you use.

   — For the mfi driver, type the following line, and press Enter.

   ```
   mfi_load="YES"
   ```

   — For the mrsas driver, type the following line, and press Enter.

   ```
   mrsas_load="YES"
   ```

Chapter 7: VMware ESX/ESXi 4.x and ESXi 5.x Driver Installation

This chapter describes how to install and update the VMware device drivers on VMware ESX/ESXi 4.*x* and ESXi 5.*x* operating systems (OSs).

7.1 Installing Async Drivers on the VMware ESX/ESXi 4.*x* OS

You can use several methods to install async drivers on VMware ESX/ESXi 4.*x*. Some of these methods are applicable only to VMware ESX or ESXi OSs. Some methods copy the `<offline-bundle>.zip` file to the ESX host over the network or use a local CD-ROM. You must choose the appropriate method for your environment.

7.1.1 Installing Async Drivers During a New ESX Installation

Perform the following steps during a new ESX installation:

1. Place the ESX installation DVD in the DVD drive of the host system.
2. Restart the host.
3. Accept the terms of the license agreement.
4. Select a keyboard type.
5. When prompted for custom drivers, click **Yes** to install custom drivers.
6. Click **Add** to eject the ESX installation DVD.
7. Place the driver CD in the DVD drive of the ESX host.
8. Select the driver module to import drivers to the ESX host.
9. Click **Next**.
10. When prompted to load the system drivers, click **Yes**.
11. After you load the driver module, continue installing ESX.

    NOTE After the drivers are installed, you are prompted to remove the driver CD and re-insert the ESX installation DVD.

12. Follow on-screen instructions to complete the installation.

7.1.2 Existing ESX Installation by Using esxupdate and a CD

An existing ESX host can mount the async driver CD and install the offline bundles within using the `esxupdate` utility.

Perform the following steps to install the async driver by using the `esxupdate` utility:

1. Log in to the ESX host using an account with administrator privileges, such as root.
2. Enter the host into Maintenance mode.

    NOTE You can enter host into maintenance mode through the vSphere Client, or by adding the `--maintenancemode` option to the `esxupdate` command.

3. Place the driver CD in the CD-ROM drive of the ESX host.
4. To mount the driver CD, type the following command, and press Enter.

```
mount -r /dev/cdrom /mnt/cdrom
```

5. Navigate to `<cd mount point>/offline-bundle/`, and locate the `<offline-bundle>.zip` file.
6. To install drivers using the offline bundle, type the following command, and press Enter.

   `esxupdate --bundle=<offline-bundle>.zip update`
7. Reboot the ESX host.
8. Exit Maintenance mode.

7.1.3 Existing ESX or ESXi Installation by Using esxupdate and the Datastore Browser

An existing ESX host or ESXi host can install offline bundles that have been copied from the async release ISO to the ESX host or the ESXi host.

1. Extract the contents of the ISO file.
2. Identify the `<offline-bundle>.zip` file or files.
3. Using the Datastore Browser, upload the `<offline-bundle>.zip` file or files to an ESX or ESXi host's datastore.
4. Log in to the ESX host or the ESXi host by using an account with administrator privileges, such as root.
5. Enter the host into Maintenance mode.

   NOTE You can enter host into Maintenance mode through the vSphere Client or by adding the `--maintenancemode` option to the `esxupdate` command.
6. Navigate to the `/vmfs/volumes/<datastorename>/` directory, and locate the `<offline-bundle>.zip` file.
7. To install drivers using the offline bundle, type the following command, and press Enter.

   `esxupdate --bundle=<offline-bundle>.zip` update
8. Reboot the ESX host or the ESXi host.
9. Exit Maintenance mode.

7.1.4 Existing ESX or ESXi Installation by Using vihostupdate and a CD

An ESX host or an ESXi host can be updated remotely by using the `vihostupdate` utility, which is part of the vSphere CLI. For more details on the `vihostupdate` utility, refer to the *vSphere Command-Line Interface Installation and Reference Guide*.

1. Power-on the ESX host or the ESXi host.
2. Place the driver CD in the CD-ROM drive of the host where either the vSphere CLI package is installed or vMA is hosted.
3. Mount the driver CD.
4. Navigate to the `<cd mount point>/offline-bundle/` directory, and locate the `<offline-bundle>.zip` file.
5. To install drivers using the offline bundle, type the following `vihostupdate` command, and press Enter.:

   `vihostupdate <conn_options> --install --bundle <offline-bundle>.zip`

   For example:

   ```
   vihostupdate --server myesxhost --username root --password mypassword
   --install --bundle driver-offline-bundle.zip
   ```

7.2 Installing Async Drivers on the VMware ESXi 5.x OS

An existing ESXi host can install drivers from a specific VIB file or from an `<offline-bundle>.zip` file.

7.2.1 Existing ESXi Installation by Using esxcli and Async Driver VIB File

An existing ESXi host can install async drivers from an async driver VIB file. The VIB file is copied to the ESXi host by using the datastore browser, and then installed using the `esxcli` utility in the ESXi Shell.

NOTE This procedure requires remote ESXi network connectivity using vSphere client.

Perform the following steps to install the async drivers:

1. Extract the contents of the async driver zip file.
2. Identify the `offline-bundle.zip` file.
3. Extract the contents of the `offline-bundle.zip` file.
4. Identify the file `async-driver.vib`.
5. Log in to the ESXi host using vSphere client with administrator privileges, such as root.
6. Using the Datastore Browser, upload the `async-driver.vib` file to an ESXi host's datastore.
7. Enter the host into Maintenance mode.

   NOTE You can enter host into maintenance mode through the vSphere Client, or by adding the `--maintenancemode` option to the `esxcli` command.
8. Log in as root to the ESXi console through SSH or iLO/DRAC.
9. To install drivers from the VIB file (this action requires an absolute path), type the following command, and press Enter.

   ```
   esxcli software vib install –v /path/async-driver.vib
   ```

   For example:

   ```
   esxcli software vib install –v /vmfs/volumes/datastore/async-driver.vib
   ```
10. Reboot the ESXi host.
11. Exit Maintenance mode.

NOTE You can update an ESX host remotely by using the `esxcli` utility, which is part of the vSphere CLI. For more details on using this utility, refer to the vSphere Command-Line Interface Documentation page.

7.2.2 Existing ESXi Installation by Using esxcli and an Offline Bundle Async Driver Zip File

In this procedure, you copy the offline bundle zip file to the ESXi host by using the Datastore Browser and install it by using the `esxcli` utility in the ESXi shell.

NOTE This procedure requires remote ESXi network connectivity using vSphere client.

Perform the following steps to install the async drivers:

1. Extract the contents of the async driver zip file.
2. Identify the `offline-bundle.zip` file.

3. Log in to the ESXi host using vSphere client with administrator privileges, such as root.
4. Using the Datastore Browser, upload the `offline-bundle.zip` file to an ESXi host's datastore.
5. Enter the host into Maintenance mode.

   NOTE You can enter host into Maintenance mode through the vSphere Client or by adding the `--maintenancemode` option to the `esxcli` command.
6. Log in as root to the ESXi console through SSH or iLO/DRAC.
7. To install drivers using the offline bundle (this action requires an absolute path), type the following command, and press Enter.

   ```
   esxcli software vib install –d /path/offline-bundle.zip
   ```

   For example:

   ```
   esxcli software vib install –d /vmfs/volumes/datastore/offline-bundle.zip
   ```
8. Reboot the ESXi host.
9. Exit Maintenance mode.

7.2.3 Upgrade Installation

The upgrade process is similar to a new installation, except for the `esxcli` command. To upgrade, type the following command, and press Enter.

```
esxcli software vib update -v {VIBFILE}
```

NOTE Before you run the `esxcli` command, enter the ESXi host into Maintenance mode. You can enter the host into Maintenance mode through the vSphere Client, or by adding the `-maintenancemode` option to the `esxcli` command.

7.2.4 VUM Installation

The VMware Update Manager (VUM) is a plug-in for the Virtual Center Server (vCenter Server). You can use the VUM utility to install a VIB by importing the associated offline bundle package (a zip file that contains the VIB and metadata). You can then create an add-on baseline and remediate the host or hosts with this baseline.

Refer to the vCenter Server documentation for more information about VUM.

Chapter 8: Solaris 10 x86, Solaris 11, and Solaris Express x86 Driver Installation

This chapter describes how to use the mrsas Driver Package Update to install the LSI MegaRAID controller driver for the Solaris OS. The following topics are documented:

- Contents of the driver distribution
- Supported hardware
- Supported operating system
- Installing the driver package during OS installation
- Installing or upgrading the driver package after OS installation
- Removing the driver package
- Notes

NOTE Section 8.4, Installing the Driver Package During OS Installation (Solaris10 OS, x86 Only), and Section 8.5, Installing the Driver Package during OS Installation (Solaris11 OS, x86 Only), apply to x86 architecture only. The other sections apply to both x86 architecture and SPARC architecture.

8.1 Contents of the Driver Distribution

The driver distribution contains the following files

- `README` – Driver readme file
- `mr_sas.img` – 3.5-in. 1.44-MB diskette image
- `mr_sas.iso` – CD-ROM image
- `mr_sas.tar.Z` – Package image

8.2 Supported Hardware

This driver supports the following LSI MegaRAID controllers:

- The 2108-based family of MegaRAID controllers
- The 2208-based family of MegaRAID controllers
- The 3108-based family of MegaRAID controllers

8.3 Supported Operating Systems

This driver supports the Solaris10 and Solaris11 OSs on both the x86 platform and the SPARC platform. The following driver binaries (built natively) are included in this driver distribution (`.zip` file) and the corresponding supported OSs.

- Solaris 11 and Solaris 11-U1 (x86) OSs

  Use the driver package under the directory `intel/solaris11/`.

- Solaris 10-U9 and Solaris 10-U10 (x86) OSs
  Use the driver package under the directory `intel/solaris10-u9/`.
- Solaris 10-U8 (x86) OS
  Use the driver package under the directory `intel/solaris10-u8/`.
- Solaris 11 and Solaris 11-U1 (SPARC) OSs,
  Use the driver package under the directory `sparc/solaris11/`.
- Solaris 10-U9 and Solaris 10-U10 (SPARC) OSs
  Use the driver package under the directory `sparc/solaris10-u9/`.

8.4 Installing the Driver Package During OS Installation (Solaris10 OS, x86 Only)

Perform the following procedure to install the Solaris 10 OS on any of the supported LSI MegaRAID controllers as a boot-controller (primary storage).

1. Boot the Solaris installation to the following menu:
   a. Solaris Interactive (default)
   b. Custom JumpStart
   c. Solaris Interactive Text (Desktop session)
   d. Solaris Interactive Text (Console session)
   e. Apply driver updates
   f. Single user shell
2. Enter the number of your choice.
3. Select option 5, **Apply driver updates**.
4. Insert the LSI driver CD, and choose the CD/DVD option at the following prompt:
   ```
   Insert media and enter media type:
   Floppy, CD/DVD or End
   ```
   The following messages indicate that the driver is successfully installed:
   ```
   extracting software on cd
   installing driver update in the miniroot
   ```
5. After applying the driver, the Solaris OS returns to the following prompt:
   ```
   Insert media and enter media type:
   Floppy, CD/DVD or End
   ```
6. Select `End`.
   The Solaris OS continues with the installation.
7. Re-insert the Solaris media when prompted to complete this step and proceed with the installation.

8.5 Installing the Driver Package during OS Installation (Solaris11 OS, x86 Only)

Perform the following procedure to install the Solaris 11 OS on any of the supported LSI MegaRAID controllers as a boot-controller (primary storage).

1. Insert the Solaris 11 text install DVD, and boot into the Solaris installation menu.
2. Select the option **[2] Install Additional Drivers**.
3. Press F9 (Quit), and return to the installation menu.

4. In the installation menu, select **[3] Shell**.
5. Copy the driver package `components.tgz` to the `/tmp` directory, and type the following commands to extract the driver:

   ```
   # tar -zxvf components.tgz
   # uncmpress mr_sas.Z
   # tar -xf mr_sas.tar
   ```
6. Install LSI mrsas Driver/ Package by using the following command:

   ```
   # pkgadd -d .
   ```
7. Select **[1]Install** and continue to complete the Solaris 11 OS installation.

8.6 Installing or Upgrading the Driver Package after OS Installation

Perform the following procedure to install or upgrade the driver or package after the Solaris OS installation.

1. Become a superuser on your system.
2. Change the directory (command `cd`) to the directory where the Driver Package Update is, and type the following command:

   ```
   # pkgadd -d .
   ```
3. At the following prompt, enter `y`.

   ```
   Do you want to continue with the installation of <mrsas> [y,n,?]
   ```

   The following message appears after a successful installation:

   ```
   Installation of <mrsas> was successful.
   ```

   If the installation is not successful, the following message appears:

   ```
   Installation of <mrsas> was suspended (administration).
   ```
4. If the installation was successful, skip this step, and go to step 5. If the installation was not successful, remove the previously installed driver package, and then repeat step 3 to apply the drive package.

   See Section 8.7, Removing the Driver Package, for instructions on removing the previously installed driver package. Do *not* reboot.
5. Run the following commands to reconfigure while rebooting the machine:

   ```
   # touch /reconfigure
   # reboot
   ```
6. At the next bootup, enter `b -r` as a boot option.

8.7 Removing the Driver Package

Four possible scenarios exist that you can use to remove the driver/package. Choose the one that applies.

1. Removing an existing LSI driver/Package. See Section 8.7.1, Removing an Existing Driver Package for the instructions.
2. Removing an inbox driver/Package on Solaris10. See Section 8.7.2, Removing an Inbox Driver/Package on the Solaris 10 OS for the instructions.
3. Removing an inbox driver/Package on Solaris11. See Section 8.7.3, Removing an Inbox Driver/Package on the Solaris 11 OS for the instructions.

4. Removing an inbox driver/Package on Solaris11 (Bootable LSI controller). See Section 8.7.4, Removing an Inbox Driver/Package on the Solaris 11 OS (Bootable LSI Controller) for the instructions.

NOTE If the controller is bootable controller, *do not reboot* after you remove the driver/package. Re-install the driver/package and then reboot.

8.7.1 Removing an Existing Driver Package

Perform the following procedure to remove the driver package.

1. Become a super-user on your system.
2. Check to see which MegaRAID driver package is installed on your system by using one of the following commands:
   - `# modinfo | grep mr_sas`
   - `# pkginfo -l | grep mrsas`
3. If the LSI `mrsas` package is installed, remove the package by using the following command:

   ```
   # pkgrm mrsas
   ```

   The following messages appear on the console:

   ```
   The following package is currently installed.
   mrsas LSI MegaRAID SAS 2.0 HBA driver...
   Do you want to remove this package?
   ```
4. Press `y` to remove the `mrsas` package.

   The following messages appear.

   ```
   ## Removing Installed package instance <mrsas>
   Do you want to continue with the removal of this package [y,n,?,q]
   ```
5. Press `y` to remove the `mrsas` package.
6. Run the following commands to reconfigure while rebooting the machine:

   ```
   # touch /reconfigure
   # reboot
   ```
7. At the next bootup, enter `b -r` as a boot option.

8.7.2 Removing an Inbox Driver/Package on the Solaris 10 OS

Perform the following procedure to remove the inbox driver/package on the Solaris 10 OS.

1. Become a super-user on your system.
2. Check to see which MegaRAID driver package is installed on your system by using one of the following commands:
   - `# modinfo | grep mr_sas`
   - `# pkginfo -l | grep mrsas`
3. If the `SUNWmrsas` package is installed, remove the package by using the following command:

   ```
   # pkgrm SUNWmrsas
   ```

   The following messages appear on the console:

   ```
   The following package is currently installed.
   mrsas LSI MegaRAID SAS 2.0 HBA driver...
   Do you want to remove this package?
   ```

4. Press `y` to remove the `mrsas` package.
   The following messages appear.
   ```
   ## Removing Installed package instance <mrsas>
   Do you want to continue with the removal of this package [y,n,?,q]
   ```
5. Press `y` to remove the `mrsas` package.
6. Run the following commands to reconfigure while rebooting the machine:
   ```
   # touch /reconfigure
   # reboot
   ```
7. At the next bootup, enter `b -r` as a boot option.

8.7.3 Removing an Inbox Driver/Package on the Solaris 11 OS

Perform the following procedure to remove the inbox driver/package on the Solaris 11 OS.

1. Become a super-user on your system.
2. Check to see which MegaRAID driver package is installed on your system by using the following command:
   — `# modinfo | grep mr_sas`
   To find the inbox mr_sas package name, run the following commands:
   — `#pkg list | grep mr_sas`
   — `driver/storage/mr_sas ----> inbox mr_sas IPS packagename`
3. If the IPS package is installed, remove the package by using the following command:
   ```
   # pkg uninstall driver/storage/mr_sas
   ```
4. Press `y` to remove the `mrsas` package.
5. Run the following commands to reconfigure while rebooting the machine:
   ```
   # touch /reconfigure
   # reboot
   ```
6. At the next bootup, enter `b -r` as a boot option.

8.7.4 Removing an Inbox Driver/Package on the Solaris 11 OS (Bootable LSI Controller)

Perform the following procedure to remove the inbox driver/package on the Solaris 11 OS that is on a bootable LSI controller.

1. Become a super-user on your system.
2. Check to see which MegaRAID driver package is installed on your system by using the following command:
   — `# modinfo | grep mr_sas`
   To find the inbox mr_sas package name, run the following commands:
   — `#pkg list | grep mr_sas`
   — `driver/storage/mr_sas ----> inbox mr_sas IPS packagename`
3. If an inbox IPS package is installed, rename inbox driver files by using the following commands:
   For x86 systems:
   ```
   #mv   /kernel/drv/mr_sas   /kernel/drv/mr_sas.inbox
   #mv   /kernel/drv/amd64/mr_sas   /kernel/drv/amd64/mr_sas.inbox
   #mv   /kernel/drv/mr_sas.conf   /kernel/drv/mr_sas.conf.inbox
   ```

For SPARC systems:

```
#mv    /kernel/drv/sparcv9/mr_sas    /kernel/drv/sparcv9/mr_sas.inbox
#mv    /kernel/drv/mr_sas.conf    /kernel/drv/mr_sas.conf.inbox
```

4. Continue with the instructions in Section 8.6, Installing or Upgrading the Driver Package after OS Installation to complete the installation of the LSI driver package.

8.8 Notes

The following are known limitations:

- The mr_sas driver is not loaded (attached) in the Solaris 10 Update 4 version when you use certain controllers. This issue is an OS limitation. This issue is fixed in Solaris 10-Update 5 and later.
- In the Solaris 11 OS, the action Install Time Update (ITU) of the driver is not supported. The Solaris 11 OS requires IPS packaging; it does not support the legacy Solaris 10 OS ITU install method.

Chapter 9: XenServer Driver Installation

This chapter describes how to install the XenServer® 6.0 OS.

NOTE The XenServer OS driver support is for 32-bit systems only.

9.1 Creating a Driver Update Disk (DUD) with a USB Drive

You can transfer a driver disk image to a USB drive with the rawrite tool from DOS, or the `dd` utility in Linux. The URL for the rawrite tool is http://www.tux.org/pub/dos/rawrite. On a Linux machine, you can use the `dd` command to burn a driver ISO image on a USB drive.

Perform the following steps to create a DUD with a USB drive.

1. Insert a USB stick into a Linux machine, making sure that the USB drive is not mounted.
2. Type the following command:

   `"$ dd if=<driver.iso> of=/dev/sdx"`

   where `/dev/sdx` is the USB drive.
3. Press Enter.
4. Mount the USB stick to verify its contents.
5. Make sure the DUD image is in `iso9660` format or `msdos` format by typing the following command:

   `$df -T`
6. Press Enter.

   The file system type and other information about the mounted devices appear.

9.2 Installing the XenServer 6.0 OS on Storage Managed by a MegaRAID Controller (Primary Storage)

This section describes how to set up the XenServer 6 OS on your host system. The Citrix Server CD-ROM consists of XenServer and Client. You can use the XenServer CD-ROM to install the Client on a Windows-based system.

LSI distributes the LSI XenServer 6.0 driver in an ISO image. You can update the drivers during the installation or you can update them when new drivers become available.

NOTE For primary storage, before you install the LSI driver, you must have your MegaRAID controller already installed in the system. Refer to the installation guide that came with your controller for the installation instructions. You can download the installation guide at http://www.lsi.com/channel/ChannelDownloads.

Perform the following steps to install the XenServer 6.0 OS driver at boot time on storage managed by a MegaRAID controller. Note that this procedure contains additional actions for the XenServer 5.5.0 OS and the XenServer 5.6.0 OS in step 20.

1. Download the ISO image for installing the Citrix Xenserver OS.
2. Using the ISO image, perform the following steps to make a pen drive as a driver update disk (DUD).
   a. Copy the iso image.

b. Using the Linux command, type the following command in text mode:

`dd if=image of=target`

For example, `dd if=megaraid_sas-08.255.02.00-2.6.27.42-0.1.1.xs5.6.0.44.111158.iso of =/dev/sdb`

Where `/dev/sdb`= pendrive location.

3. Boot the computer from the main installation CD.
4. For the DUD installation, select F9 from the initial boot screen.
5. Accept the End User License Agreement (EULA), then proceed.

   The installer reads from the boot disk, and then loads several screens showing the `megaraid_sas` driver.
6. After you return to the initial boot screen, remove the pen drive, then proceed as normal.

   After the initial boot messages, the installer does some hardware detection and initialization, then a screen appears that prompts you to select which keyboard key map you want to use for the installation.
7. Select the desired key map and choose **OK** to proceed.
8. Select the option to install or upgrade the XenServer OS, and choose **OK** to proceed.

   The next screen displays a message stating that the setup program will install XenServer on the computer, and warning that the installation will overwrite data on any hard drives that you select to use for the installation.
9. Click **OK**.

   The XenServer End User License Agreement (EULA) appears.
10. Click **Accept EULA**.

    If you have multiple local hard disks, you are prompted to choose the primary disk for the installation.
11. Select the desired disk and click **OK** to proceed.

    After you select the primary disk, you are prompted to choose whether you want any of the other drives to be formatted for use by the XenServer OS for VM storage.
12. Click **OK** to proceed.

    The next screen prompts you to specify the source of the installation packages.
13. If you are installing from CD, select **Local media (CD-ROM)**.

    The next screen prompts you to choose whether to verify the integrity of the installation media.
14. Click **Skip verification** to bypass verification of the installation media.

    Verifying installation can take some time.
15. Click **OK** to proceed.

    You are prompted to set a root password.
16. For network configuration, use the default setting and continue to press **OK**.

    You are prompted to select the general geographical area for the time zone.
17. Choose the time zone from the displayed list of geographical areas, then click **OK** to proceed.

    You are prompted to choose a method for setting the system time. The options are **Using NTP** or **Manual time**.
18. Select **Using NTP**.

    You are prompted for the IP address and the gateway.
19. Use the default setting, and click **OK** to continue.

    From this point forward, the installation begins to copy files to hard drive, and a progress bar appears.
20. *For Xenserver 5.6.0 DUD installations only*, perform the following steps:

    Towards the end of the installation process, the installer prompts you for any additional packages. The `megaraid_sas` driver RPM listed is listed as a selection.

a. Before you select the `megaraid_sas` driver RPM, insert the pen drive into the USB slot, and then select **Accept** and continue as normal.

   If you are installing the Xenserver 5.5.0 OS, remove the pen drive when the installation process begins.

b. After the installation completes, select **Reboot**.

   The system now runs under the Citrix Xenserver OS.

9.3 Installing or Updating the XenServer 6.0 OS Driver

Perform the following steps to install or update to the latest version of the MegaSAS driver:

1. Boot the system.
2. Go to Console (your terminal GUI).
3. Install the Dynamic Kernel Module Support (DKMS) driver RPM.
   Uninstall the earlier version first, if needed.
4. Install the MegaSAS driver RPM.
   Uninstall the earlier version first, if needed.
5. Reboot the system to load the driver.

Chapter 10: Debian Driver Installation

This chapter describes how to install the device driver in Debian® 6.0 x64 OS systems.

You can install the device driver in a new Debian 6.0 system from the `.deb` package, which contains the executables, configuration files, libraries, and documentation in a Debian archive file.

Install the device driver in a new Debian 6.0 system if the Debian 6.0 OS boots from a device that is not managed by a MegaRAID controller, but in which the MegaRAID controller is or will be present on the system and used for managing secondary storage.

For secondary storage, the driver must be added to the system; the driver is not in-box. The Debian 6.0 OS uses the Debian file format for OS components, and LSI provides the MegaRAID driver in this file format.

See Section 5.1, Installing the Driver in a New Ubuntu Linux 12.04 LTS OS, and follow the instructions to install the device driver in a new Debian 6.0 OS system.

Chapter 11: OVM Driver Installation

This chapter describes how to install the device driver in new OVM® 3.*x*.*x* systems, and how to update the driver on existing operating systems.

See Section 3, Red Hat Linux Driver Installation, and follow the instructions to install a new OVM 3.*x*.*x* system.

NOTE The OVM OS driver support is for 64-bit systems only.

NOTE The OVM OS does not support a driver update disk.

Chapter 12: Fedora Driver Installation

This chapter describes how to install the device driver in new Fedora 9 and Fedora 11 systems, and how to update the driver on existing operating systems.

See Section 3, Red Hat Linux Driver Installation, and follow the instructions to install a new Fedora system.

NOTE The Fedora OS does not support a driver update disk.

Chapter 13: CentOS Driver Installation

This chapter describes how to install the device driver in new CentOS® 6.3 systems, and how to update the driver on existing operating systems.

See Section 3, Red Hat Linux Driver Installation, and follow the instructions to install a new CentOS 6.3 system.

Chapter 14: Oracle Enterprise Linux Driver Installation

This chapter describes how to install the device driver in new Oracle® Enterprise Linux (OEL) systems, and how to update the driver on existing operating systems.

See Section 3, Red Hat Linux Driver Installation, and follow the instructions to install a new OEL system.

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