MegaRAID® SAS Device Driver Installation

User Guide

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Revision History

Version and Date	Description of Changes
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..
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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™

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 for MegaRAID controllers. The driver 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 this driver, download the driver 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

Operating System	Device Driver File Names	Installation Reference
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	`megasas.cat`, `megasas.sys`, `NODEV.INF`, `OEMSETUP.INF`, `TXTSETUP.OEM`	Chapter 2
Red Hat Linux 4 Red Hat Linux 5 Red Hat Linux 6	`megaraid_sas.o`	Chapter 3
SuSE Linux Enterprise Server 9 SuSE Linux Enterprise Server 10 SuSE Linux Enterprise Server 11	`megaraid_sas.ko`	Chapter 4
FreeBSD	`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`	Chapter 5
VMware ESX/ESXi 4.*x* and ESXi 5.0	VMware installation bundle (VIB) file package `offline_bundle.zip` file package	Chapter 6

Solaris 10, 11	■ 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`
		Chapter 7

Chapter 2: Windows Driver Installation

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

■ 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

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 preboot configuration utility (WebBIOS) that creates the virtual drive before the installation of the Windows OS starts.

Perform the following step to install the Windows OS:

1. 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. Using an existing Windows device, 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's 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. When you have finished 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, stripe 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: Allow 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 would be 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** when you are finished defining 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 boottime 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 there, 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.

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 system OSs.

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 4, 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 install.

3.1.2 Installing from a Driver Update Diskette

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

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.

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Chapter 3: Red Hat Linux Driver Installation
Installing the Red Hat Enterprise Linux 4, 5, or 6 Driver in an Existing Installation

3.2 Installing the Red Hat Enterprise Linux 4, 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 4, 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.

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Chapter 4: SuSE Linux Enterprise Server (SLES) 10 and 11 Driver Installation
Installing the Driver in a New SuSE Linux Enterprise Server System

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 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 these 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.

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Chapter 4: SuSE Linux Enterprise Server (SLES) 10 and 11 Driver Installation
Installing or Updating the SuSE Linux Enterprise Server 10 or 11 Driver

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.

Chapter 5: FreeBSD Driver Installation

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

5.1 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

5.1.1 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

5.1.2 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:

- Driver installation for the FreeBSD OS
- Updating drivers in the FreeBSD OS

5.1.3 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.

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)

5.2 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 and 8.2 OSs.

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

- LSI software CD-ROM, which includes:

  Compiled and tested kernel driver modules for the FreeBSD 7.4 OS, located at:
  - 32-bit: `components/7.4/x86`
  - 64-bit: `components/7.4/x86_64`

  Compiled and tested kernel driver modules for the FreeBSD 8.2 OS, located at:
  - 32-bit: `components/8.2/x86`
  - 64-bit: `components/8.2/x86_64`

  Driver source files for the FreeBSD 7.x and 8.x OSs are located at `components/src/mfi.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/channel/ChannelDownloads.

5.3 Creating a FreeBSD OS Driver Diskette

You need a diskette to install the FreeBSD OS on a virtual drive or drive that is managed by a MegaRAID controller card. 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`.
   - For the FreeBSD 8.2 OS, navigate to `components/8.2`.
3. Copy the appropriate driver to the diskette.

   This driver is the driver from the `x86` folder if you are installing a 32-bit FreeBSD OS, and the `x86_64` folder if you are installing a 64-bit FreeBSD OS.

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

5.4 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.

> **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 steps. You can download the installation guide at http://www.lsi.com/channel/ChannelDownloads.

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Chapter 5: FreeBSD Driver Installation
Installing the FreeBSD OS on Storage Managed by a MegaRAID Controller (Primary Storage)

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

> **NOTE** FreeBSD - 6.1-9.X OS includes outdated LSI driver package. For a successful OS installation—primary and secondary—substitute the packaged LSI driver before you attempt an installation.

> **NOTE** Your MegaRAID controller might be affected by an issue with the LSI mpt driver in the FreeBSD 7.*x* and 8 operating systems. 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 need to disable the mpt driver before you install or boot your FreeBSD OS until you exclude the mpt driver from the booting kernel.

The prerequisite for this procedure is an OS installation CD for the FreeBSD 7.4 or FreeBSD 8.2 (x86 or amd64) OSs.

> **NOTE** This procedure is specific to the FreeBSD 7.4 or FreeBSD 8.2 OSs because it requires a compiled module. 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 5.6.2, 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 or the DVD, 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. Boot to the FreeBSD CD/DVD.
4. At the FreeBSD boot menu, select **6 Escape to loader prompt**.
5. Insert the diskette containing the `mfi.ko` module into the diskette drive.
6. Perform the following steps at the loader prompt:
   a. To disable the mpt driver, enter:

      ```
      OK:set hint.mpt.0.disable=1
      OK:set hint.mpt.1.disable=1
      ```
   b. To load a new driver from a diskette drive, enter:

      ```
      OK: load disk0:mfi.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`.

   > **NOTE** At this point the old driver is unloaded but it will still be installed as a part of the new installation. The installed kernel has to be rebuilt.

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

   `OK:boot`
8. Install the FreeBSD OS, including the kernel source.

   It is very important to include the kernel source files.
9. Remove the FreeBSD installation CD, and reboot.
10. On bootup, repeat step 6 and step 7.
11. After bootup, continue with the procedure described in Section 5.6.1, Updating the Kernel with the New Driver Source.

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Chapter 5: FreeBSD Driver Installation
Installing the Kernel Driver on a FreeBSD OS That Boots from a Device Not Managed by a
MegaRAID Controller (Secondary Storage)

5.5 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** The FreeBSD - 6.1-9.X OS includes an outdated LSI driver package. Thus, for a successful OS installation for primary and secondary, you must substitute the packaged LSI driver before you attempt an installation. See the instructions in this section for how to carry out this action.

> **NOTE** Your MegaRAID controller might be affected by an issue with the LSI mpt driver in the FreeBSD 7.*x* and 8.*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 need to 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.

Perform the following steps:

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

   See Section 5.2, Obtaining LSI FreeBSD Drivers.

2. If your system does *not* include an LSI controller before the OS installation, perform the following steps. If your system includes an LSI controller, go to step 3.

   a. Install the FreeBSD OS—including the kernel source—on a motherboard attached drive.

      It is critical to include kernel source files.

   b. After the OS installation, reboot and then follow the instructions for driver installation in Section 5.6.1, Updating the Kernel with the New Driver Source (for a statically linked module) or in Section 5.6.2, Compiling and Loading the Driver as a Module by Using kldload (Dynamically Loadable Module).

   c. After the FreeBSD OS is installed and the driver is updated, power-down the system, and install the MegaRAID controller.

      For assistance, see the quick installation guide that came with the controller.

3. If your system includes an LSI controller, perform the following steps:

   a. Start the installation process.

      As the DVD loads, you are offered boot options.

   b. Select **#6: Escape to prompt**.

   c. To disable the mpt driver for the installation, type the following command at the prompt, and press Enter.

      ```
      OK:   set hint.mpt.0.disable=1
      OK:   set hint.mpt.1.disable=1
      OK:   boot
      ```

   d. Proceed with the installation on a drive attached to the motherboard.

      Make sure you install the full the FreeBSD OS source.

After the OS installation, follow the instructions for driver installation in Section 5.6.1, Updating the Kernel with the New Driver Source (for static linking) or in Section 5.6.2, Compiling and Loading the Driver as a Module by Using kldload (Dynamically Loadable Module).

5.6   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

5.6.1   Updating the Kernel with the New Driver Source

To obtain the source files, see Section 5.2, Obtaining LSI FreeBSD Drivers.

Perform the following steps to update your kernel from 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. Proceed to the `/usr/sys/dev/` directory.
   If a directory with the name `mfi` already exists, move it to a different folder.
   For example:
   ```
   # mv /usr/src/sys/dev/mfi /root/mfi.backup
   ```
3. Proceed to the `/usr/sys/modules/` directory.
   If a directory with the name `mfi` already exists, move it to a different folder.
   ```
   # mv /usr/src/sys/modules/mfi /root/mfi_module.backup
   ```
4. Unpack `mfi.tgz`, and move the `*.c` and `*.h` files to `/usr/src/sys/dev/mfi`, and move the Makefile to `/usr/src/sys/modules/mfi`.
   For example:
   ```
   # cd /usr/src/sys/dev
   # tar -x -f mfi.tgz
   # mv mfi/Makefile /usr/src/sys/modules/mfi/
   ```
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. Open your current configuration file (`GENERIC`, `MYKERNEL`, `SMP`, or `PAE`, or custom config), with vi or another editor.
   b. Comment out the following lines by entering # at the beginning of the line:
      ```
      #device    cbb    # cardbus (yenta) bridge
      #device    mpt    # LSI-Logic MPT-Fusion
      ```
      For a dynamically loadable module, comment out the following line by entering # at the start of the line:
      ```
      #device    mfi    # LSI MegaRAID SAS
      ```
      For a statically linked module, make sure the following line is *not* commented out:
      ```
      device    mfi    # LSI MegaRAID SAS
      ```
   c. Save your changes.

d. In the `/usr/src/sys/conf/files` folder, add the following entry after the entries for `dev/mfi/mfi_cam.c`:

`dev/mfi/mfi_syspd.c optional mfi`

For the mfi driver with LSI 2208-based RAID controller support, also add the following entries:

`dev/mfi/mfi_fp.c optional mfi`

`dev/mfi/mfi_tbolt.c optional mfi`

e. Save your changes.

f. To compile the kernel, go to the `/usr/src` directory, type the following commands, and press Enter.

`# cd /usr/src`

`# make buildkernel KERNCONF=MYKERNEL`

g. To install the new kernel, type the following commands, 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.

5.6.2 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 5.6.3, Updating the MegaRAID Kernel Driver Module in the FreeBSD OS.

> **NOTE** You can use only `kldload` to load the driver as a module 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 5.2, Obtaining LSI FreeBSD Drivers.

3. Make sure your kernel is prepared for dynamically loadable module described in Section 5.6.1, Updating the Kernel with the New Driver Source.

4. To build the `mfi.ko` module, type the following commands, and press Enter.

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

`# make`

This step creates the `mfi.ko` module in the `/usr/src/sys/modules/mfi` directory.

5. To load the kernel driver module, type the following commands, and press Enter.

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

`# kldload -v ./mfi.ko`

6. To load the driver automatically on the bootup, but still be linked dynamically, perform the following steps:

a. To copy `mfi.ko` into the boot folder, type the following command, and press Enter.

`cp /sys/modules/mfi/mfi.ko /boot/kernel/mfi.ko`

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

b. Enter the line '`mfi_load="YES"`' to the `/boot/loader.conf` file.

5.6.3   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 in the FreeBSD OS:

1. Download and extract the driver.
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, type the following commands, and press Enter.

   ```
   cp mfi.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 could occur.
5. To load the driver, type the following command, and press Enter.

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

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

   ```
   mfi_load=YES
   ```

Chapter 6: VMware ESX/ESXi 4.x and ESXi 5.0 Driver Installation

This chapter describes how to install and update the VMware device drivers on VMware ESX/ESXi 4.x and ESXi 5.0 operating systems (OSs).

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

You have several methods you can use to install async drivers on VMware ESX/ESXi 4.x. Some of these methods are applicable to only 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.

6.1.1 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.

6.1.2 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.

6.1.3 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 file `<offline-bundle>.zip`.

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.

6.1.4 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`

6.2 Installing Async Drivers on the VMware ESXi 5.0 OS

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

6.2.1 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.

6.2.2 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.

6.2.3   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.

6.2.4   VUM Installation

The VMware Update Manager (VUM) is a plugin 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.

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Chapter 7: Solaris 10 x86, Solaris 11, and Solaris Express x86 Driver Installation
Installing the Solaris 10 U5 OS on Storage Managed by a MegaRAID Controller (Primary Storage)

Chapter 7: Solaris 10 x86, Solaris 11, and Solaris Express x86 Driver Installation

This chapter describes how to install the MegaRAID driver for the Solaris® 10 x86 OS and the Solaris 11 OS on RAID-configured drives in a new Sun x86 system.

Users with x86-based systems can install their choice of the Solaris 10 U5 OS, Solaris Express OS, or Solaris 11 OS with the in-box LSI driver (an in-box driver is a driver written by LSI or other third parties, and distributed on the Solaris OS installation disk). You can configure the MegaRAID controller for either primary or secondary storage. For the Solaris 10 OS and the Solaris 11 OS, the following points apply:

■ The earliest Solaris 10 OS version that LSI supports without Solaris patches is the Solaris 10 Update 5.

■ If you use Solaris 10 Update 6 OS or later, the MegaRAID SAS driver is on the OS installation DVD (in-box).

The in-box drivers shipped with the Solaris 10 OS and the Solaris 11 OS have identical version numbers, but the binary has changed over time:

■ On the Solaris 10 OS up to Update 9, the in-box driver supports only the LSI 2108-based RAID controllers.

■ On the Solaris 10 Update 10 OS and later, the in-box driver supports both LSI 2108-based RAID controllers and LSI 2208-based RAID controllers.

■ For the Solaris 10 OS, you can introduce the newer driver during the OS installation or after the OS installation has been completed. The only way to update to a newer driver on the Solaris 11 OS is to use the manual procedure described in Section 7.5, Updating the MegaRAID Driver on the Solaris OS on Storage Not Managed by a MegaRAID Controller (Secondary Storage) after OS Installation.

This chapter describes the following topics:

■ Installing the Solaris 10 U5 OS on storage managed by a MegaRAID controller (primary storage)

■ Adding the MegaRAID driver for secondary storage during the Solaris 10 OS installation

■ Adding the MegaRAID driver for secondary storage after the Solaris OS installation

■ Installing the Solaris 11 OS on storage managed by a MegaRAID controller (primary storage)

■ Updating the MegaRAID driver on the Solaris OS on storage not managed by a MegaRAID controller (secondary storage) after OS installation

> **NOTE** The SPARC-based OS is always 64 bits.
>
> The X86-based Solaris 11 OS is 64 bits only.
>
> The X86-based Solaris 10 OS is distributed to run in 32 bits or 64 bits; Sun merged the 32-bit and 64-bit components into single packages.
>
> The X86-based Solaris 9 OS and prior shipped with separate 32-bit and 64-bit packages.

7.1 Installing the Solaris 10 U5 OS on Storage Managed by a MegaRAID Controller (Primary Storage)

This section describes how to load the Solaris 10 U5 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 following procedure if your boot unit will be managed by the MegaRAID controller.

> **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 steps. You can download the installation guide at http://www.lsi.com/channel/ChannelDownloads.

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Chapter 7: Solaris 10 x86, Solaris 11, and Solaris Express x86 Driver Installation
Adding the MegaRAID Driver for Secondary Storage during the Solaris 10 OS Installation

Perform the following steps to install the Solaris 10 U5 OS driver at boot time on storage managed by a MegaRAID controller:

1. Create a CD with an updated MegaRAID driver ISO image.

2. Disconnect all SCSI, ATA, and SAS devices in the system, except for the CD, and the hard drives connected to the MegaRAID controller.

3. Create the RAID virtual drives on the MegaRAID controller using WebBIOS or Preboot CLI.

    See Section 2.1.1, Storage Configuration for instructions on how to create a RAID virtual drive.

4. Insert the DVD with text install.

5. After text install is loaded, select your type of keyboard and language.

    The Solaris 10 installation process then presents a menu similar to the following menu:

    1. Solaris Interactive (default)

    2. Custom JumpStart

    3. Solaris Interactive Text (Desktop session)

    4. Solaris Interactive Text (Console session)

    5. Apply driver updates

    6. Single user shell

    Enter the number of your choice.

6. Select **5. Apply driver updates** (option 5 in the previous menu).

7. When prompted, insert the CD with the updated MegaRAID driver.

8. At the installation menu, select **1. Solaris Interactive**.

9. Follow the rest of the instructions to complete the installation normally.

7.2 Adding the MegaRAID Driver for Secondary Storage during the Solaris 10 OS Installation

Perform the procedures in this section if the Solaris 10 U5 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.

Perform the following steps to install the driver:

1. Insert the DVD with text install.

2. After text install is loaded, select your keyboard type and your language.

3. In the installation menu, select **[2] Install Additional Drivers**.

4. Press F9 (Quit), and return to the installation menu.

5. In the installation menu, select **[3] Shell**.

6. Copy the driver package `components.tgz` to `/tmp`.

7. To extract the driver, type the following commands, and press Enter.

    ```
    $ tar -zxvf components.tgz
    $ uncompress mr_sas.Z
    $ tar -xvf mr_sas.tar
    ```

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8. To load the driver, type the following commands, and press Enter.

   ```
   $ pkgadd -d.
   ```

   The dot (.) is part of this command.

9. Select **[1] Install**.

10. Follow the rest of the instructions to complete the installation normally.

7.3 Adding the MegaRAID Driver for Secondary Storage after the Solaris OS Installation

Perform the procedures in this section if the Solaris 10 OS or the Solaris 11 OS boots from a device that is *not* managed by a MegaRAID controller, but in which the MegaRAID controller is present or will be present on the system, and used for managing secondary storage.

1. Install the Solaris OS with the MegaRAID controller removed from the system.

2. Download the latest MegaRAID Solaris driver from the LSI Support website.

3. Install the MegaRAID controller while the system is shut down.

4. Boot the system.

5. Copy the driver package `components.tgz` to `/tmp`.

6. To extract the driver, type the following commands, and press Enter.

   ```
   $ tar -zxvf components.tgz
   $ uncompress mr_sas.Z
   $ tar -xvf mr_sas.tar
   ```

7. To load the driver, type the following command, and press Enter.

   ```
   $ pkgadd -d.
   ```

   The dot (.) is part of this command.

7.4 Installing the Solaris 11 OS on Storage Managed by a MegaRAID Controller (Primary Storage)

This section describes how to load the Solaris 11 OS kernel driver module to enable boot device support, and then how to update the current drivers in the kernel from source files.

Perform the following steps to install the Solaris 11 OS driver at boot time on storage managed by a MegaRAID controller:

1. Install the Solaris 11 OS with the MegaRAID in-box driver.

2. Rename the in-box driver files, and replace them by copying the LSI `mr_sas` driver files to these locations for the Solaris 64-bit x86 OS:

   ```
   /kernel/drv/mr_sas.conf
   /kernel/drv/amd64/mr_sas
   ```

3. Reboot your system.

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Controller (Secondary Storage) after OS Installation

7.5 Updating the MegaRAID Driver on the Solaris OS on Storage Not Managed by a MegaRAID Controller (Secondary Storage) after OS Installation

Perform the procedures in this section if the Solaris OS boots from a device that is *not* managed by a MegaRAID controller, but in which the MegaRAID controller is present or will be present on the system and used for managing the secondary storage. On the Solaris 11 OS, this method is required because the driver file formats changed.

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.

Perform the following steps to update the in-box MegaRAID driver on storage not managed by a MegaRAID controller:

1. Rename the in-box driver files and replace them by copying LSI `mr_sas` driver files to these locations.

   a. For the Solaris 32-bit x86 OS, copy the LSI `mr_sas` driver files to these locations:

   ```
   /kernel/drv/mr_sas.conf
   /kernel/drv/mr_sas
   ```

   b. For the Solaris 64-bit x86 OS, copy the LSI `mr_sas` driver files to these locations:

   ```
   /kernel/drv/mr_sas.conf
   /kernel/drv/amd64/mr_sas
   ```

2. Reboot your system.

   After the reboot, the `mr_sas` driver does not get loaded.

3. Type the following command, and press Enter.

   ```
   #rem_drv mr_sas
   ```

4. Copy the LSI `mr_sas` driver files to the following locations:

   a. For the Solaris 32-bit x86 OS, copy the LSI `mr_sas` driver files to these locations:

   ```
   /kernel/drv/mr_sas.conf
   /kernel/drv/mr_sas
   ```

   b. For the Solaris 64-bit x86 OS, copy the LSI `mr_sas` driver files to these locations:

   ```
   /kernel/drv/mr_sas.conf
   /kernel/drv/amd64/mr_sas
   ```

5. Perform one of the following three steps, depending on the MegaRAID controller you have:

   a. Type the following command for LSI 2108-based RAID controllers, and press Enter.

   ```
   #add_drv –m "* 0666 root root" –i '"pciex1000,79"' –c scsi mr_sas
   ```
   or

   b. Type the following command for LSI 2208-based RAID controllers, and press Enter.

   ```
   #add_drv –m "* 0666 root root" –i '"pciex1000,5b"' –c scsi mr_sas
   ```
   or

   c. Type the following command for LSI 3108-based RAID controllers, and press Enter.

   ```
   #add_drv –m "* 0666 root root" –i '"pciex1000,5d"' –c scsi mr_sas
   ```

6. Type the following command to verify the driver version that is loaded, and press Enter.

   ```
   #modinfo
   ```