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Hitachi Compute Rack Series
MegaRAID Storage Manager
Instruction Manual

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Preface

This document describes how to use the MegaRAID Storage Manager.

This preface includes the following information:

- ☐ Intended Audience
- ☐ Product Version
- ☐ Release Notes
- ☐ Document Conventions
- ☐ Getting Help
- ☐ Comments

Notice: The use of MegaRAID Storage Manager and all other Hitachi Data Systems products is governed by the terms of your agreement(s) with Hitachi Data Systems.

Intended Audience

This document is intended for the personnel who are involved in managing, configuring and operating the Compute Rack.

Product Version

This document revision applies to MegaRAID Storage Manager version 11.08.03-02.

Release Notes

Release notes contain requirements and more recent product information that may not be fully described in this manual. Be sure to review the release notes before installation.

Document Revision Level

Revision	Date	Description
01	March 2012	First Release
MK-90CRC010-02	December 2012	Revision 02, supersedes and replaces Revision 01
MK-90CRC010-03	July 2013	Revision 03, supersedes and replaces Revision 02

Document Organization

The table below provides an overview of the contents and organization of this document. Click the chapter title in the left column to go to that chapter. The first page of each chapter provides links to the sections in that chapter.

Chapter	Description
Chapter 1, Usage Precautions	This chapter explains what you should know about MegaRAID Storage Manager (MSM) before use. Read this chapter before you uses the product.
Chapter 2, MegaRAID Storage Manager	This chapter explains how to install, remove, configure, and use **MSM**.
Chapter 3, Operation of Disk Arrays	This chapter explains how to operate disk arrays.
Chapter 4, In the Event of a Fault	This chapter explains the troubleshooting procedures against disk array faults.
Chapter 5, Appendix	This chapter explains a **MSM** events list etc.

Abbreviation of Disk Array Management Utility

In this manual, MegaRAID Storage Manager is abbreviated to the following:
- MegaRAID Storage Manager (hereafter MSM)

Version of MegaRAID Storage Manager

The version number displayed in the windows of MegaRAID Storage Manager shown in this manual may differ from the version number of your MegaRAID Storage Manager.

Document Conventions

The term "Compute Rack" refers to all the models of the Compute Rack, unless otherwise noted.

This document uses the following typographic conventions:

Convention	Description
Bold	Indicates text on a window, other than the window title, including menus, menu options, fields, and labels. Example: Click **OK**.
Italic	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: `copy source-file target-file` ***Note:*** Angled brackets (< >) are also used to indicate variables.
screen/code	Indicates text that is displayed on screen or entered by the user. Example: `# pairdisplay -g oradb`
< > angled brackets	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: `# pairdisplay -g <group>` ***Note:*** Italic font is also used to indicate variables.
[ ] square brackets	Indicates optional values. Example: [a | b] indicates that you can choose a, b, or nothing.
{ } braces	Indicates required or expected values. Example: { a | b } indicates that you must choose either a or b.
| vertical bar	Indicates that you have a choice between two or more options or arguments. Examples: [a | b] indicates that you can choose a, b, or nothing. { a | b } indicates that you must choose either a or b.
underline	Indicates the default value. Example: [<u>a</u> | b]

This document uses the following icons to draw attention to information:

Icon	Meaning	Description
⚠️	WARNING	This indicates the presence of a potential risk that might cause death or severe injury.
⚠️	CAUTION	This indicates the presence of a potential risk that might cause relatively mild or moderate injury.
NOTICE	NOTICE	This indicates the presence of a potential risk that might cause severe damage to the equipment and/or damage to surrounding properties.
Note	Note	This indicates notes not directly related to injury or severe damage to equipment.
Tip	Tip	This indicates advice on how to make the best use of the equipment.

Getting Help

If you purchased this product from an authorized HDS reseller, contact that reseller for support. For the name of your nearest HDS authorized reseller, refer to the HDS support web site for locations and contact information. To contact the Hitachi Data Systems Support Center, please visit the HDS website for current telephone numbers and other contact information: http://support.hds.com.

Before calling the Hitachi Data Systems Support Center, please provide as much information about the problem as possible, including:

- The circumstances surrounding the error or failure.

- The exact content of any error message(s) displayed on the host system(s).

Comments

Please send us your comments on this document: doc.comments@hds.com. Include the document title, number, and revision, and refer to specific sections and paragraphs whenever possible. All comments become the property of Hitachi Data Systems Corporation. **Thank you!**

MegaRAID Storage Manager Instruction Manual

1

Usage Precautions

This chapter explains what you should know about **MegaRAID Storage Manager (MSM)** before use. Read this chapter before you uses the product.

- ☐ [RAID utility](#)
- ☐ [MegaRAID Storage Manager](#)
- ☐ [Restrictions on use of MegaRAID Storage Manager](#)
- ☐ [LSI Software RAID](#)

RAID utility

This system unit supports two types of RAID utilities, **Server installation and monitoring tool internal storage monitor** and **MSM**.

If you use unified management by **MSM**, install **MSM**.

Tip	For **Server installation and monitoring tool internal storage monitor**, see "Server installation and monitoring tool User's Guide - internal storage monitoring functions".

MegaRAID Storage Manager

MSM is the utility software for managing disk array-mounted system units. **MSM** consists of **MegaRAID Storage Manager Server** (**MSM Server**) and **MegaRAID Storage Manager Client** (**MSM Client**).
A **MSM** instance becomes an MSM Server or an MSM Client depending on the specification made at the time of installation.

NOTICE

In an environment without **Server installation and monitoring tool internal storage monitor** / **MSM** installed, you might fail to detect a fault that causes loss of critical data or suffer inconvenience in fault analysis. Make sure that you install and use **Server installation and monitoring tool internal storage monitor** / **MSM**.

Note	When you update MSM, always remove the old version before installing the new version.

Tip	A management PC is a PC that manages and monitors servers by **MSM Client**. A "management server" is a server that manages and monitors servers including itself. A "managed server" is a server that is managed and monitored.

MSM provides the following functions:

- Monitoring, managing, and maintaining disk array controllers and physical and virtual drives connected to disk array controllers, as well as remotely conducting these operations from a management PC

- Centralized management

MSM consists of the following modules: (This is different from the actual program configuration.)

Table 1-1

General module	Description
MSM Server	Core of **MSM**. It conducts various fault monitoring. (This module outputs events to the system log.)
MSM Client	Displays fault events on the GUI. (It is also used for remote management with a management PC.)
MSM SNMP	Reports faults via the SNMP interface.
MSM remote	Conducts real-time communication between different **MSM** instances over the network.[1]
*1: This module sends multicast packets on the network every five seconds. IP address: 229.111.112.12 (A packet is sent from each LAN port.)	

Content and operation of an **MSM** installation depend on its installation format.

Table 1-2

No.	Installation format	Installed content and its operation
1	Complete	All modules except **MSM SNMP** (recommended) or all modules Management and operation is enabled by **MSM Server** itself and by remote control.
2	Standalone (Recommended installation format)	All modules except **MSM remote** and **MSM SNMP** (recommended) or all modules except **MSM remote** Operation is enabled only by **MSM Server** itself.
3	Client	**MSM Client** module Remote management and operation with a management PC is enabled.

Centralized management of **MSM** is enabled from a management PC.
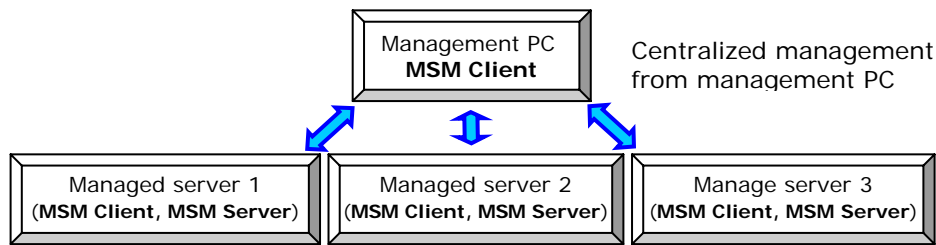
Figure 1-1

A single management server can manage multiple servers including itself. If there is only one server, the server can be its own manager.
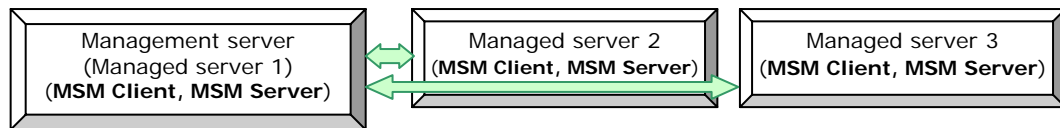
Figure 1-2

> **Note**
>
> A management PC cannot manage a server that is connected to a network segment different from that of the management PC itself. When server management is centralized by a management PC, place the servers in the same segment.

> **Tip**
>
> For centralized management by the **MSM** remote monitoring, a multicast packet is sent on the network every five seconds for each server.
>
> (Recommended installation format)
>
> When you do not conduct central management from a management PC or a management server, which also manages itself, install **MSM** in the "Standalone" format.
>
> OS event log logging and notification by pop-up windows are made only at the system unit where the event has occurred.
>
> The above processing is not performed on the remotely connected management PC.
>
> Services MrMonitor and MrMonitor monitoring are not installed in **MSM** Ver.11.08.XX.XX or later.

Restrictions on use of MegaRAID Storage Manager

This section explains the restrictions that you should know before using MSM (MSM Client) with a management PC.

For other restrictions, see "Restrictions" on page 2-184.

With Remote monitoring

In an environment where centralized management is conducted, make sure that the **MSM Client** of the management PC has been stopped when you restart or switch off a managed server.

If you restart or power off a managed server with the **MSM Client** running, the **MSM Client** becomes silent for about five minutes.

With Centralized management by Linux

When **MSM** is installed on Linux®, set the host name in the format conforming to the fully qualified domain name (FQDN). Remote monitoring does not work if a host name does not conform to the FQDN format.

When introducing network security

MSM uses its reserved ports 3071 and 5571. These port numbers cannot be changed. When introducing network security, register these ports as exceptions.

When you use the firewall of Windows or Red Hat Enterprise Linux, you need to register the MSM module as an exception. For Linux, **MSM** functions are limited. See "Setting network security" on page 2-161 for details.

IP addresses

MSM needs to obtain an IP address for its operation. Set an IP address for each system unit. When a system unit obtains an IP address automatically, connect the system unit to a DHCP server.

Restart the system unit after setting an IP address.

Disable an unused LAN if any.

For centralized management of managed servers, set the default gateway address.

When there are multiple LAN addresses, the LAN address with the highest bind priority is configured as the default IP address of **MSM**.

> **Note**
>
> In an environment where an IP address cannot be obtained, **MSM** may not be able to issue event notifications (That is, **MSM** may not be able to record events in the application log and MegaRAID Storage Manager log).
>
> In this case, an event is registered in the Windows application log with source: MSMFramework, Type: Warning, and Event ID: 1.
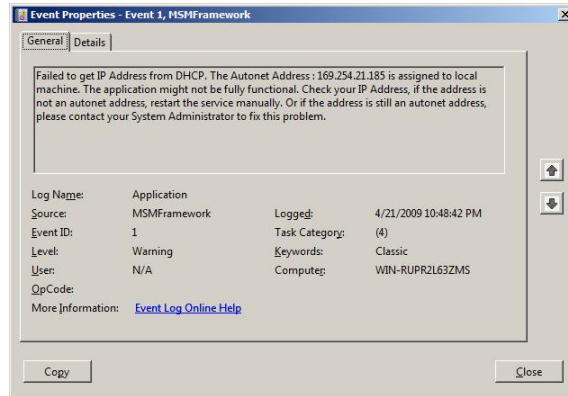
Changing an IP address, enabling or disabling a network, or connecting or disconnecting a TP line

In the event of IP changing an address, enabling or disabling a network, or connecting or disconnecting a TP line, stop **MSM** service according to the following procedure:

For Windows:

1. Activate the service.

2. Right-click the **MSMFramework** service, and select [**Stop (O)**].

3. The **Another Service Stop** window opens. Click [**Yes (Y)**].

4. Confirm that the **MSMFramework** service has stopped and the [**State**] has become blank.

5. Change an IP address, enable or disable network, or connect or disconnect a TP line.

6. Right-click the **MSMFramework** service, and select [**Start (S)**].

7. Confirm that the **MSMFramework** service has started and the [**State**] has become **Started**.

8. Restart the system unit.

   The procedure is completed.

| Note | If you fail to follow the above procedure, **MSM** may become unstable (unable to display status of servers including itself, or having CPU overload). If the system shows such a phenomenon, execute the above procedure excluding step 5. |

If no LAN cable is connected although a LAN port is available with a fixed IP address in the OS setup, the following pop-up message may appear after the system unit is started.

Action: Confirm the following and restart the system unit.

- Check the connection of the LAN port and the LAN cable.

- Disable an unused LAN port if any.

For Linux:

1. At **/etc/rc.d/init.d/**, stop the following service by the **stop** command:
   - vivaldiframeworkd

   [Command]
   # service vivaldiframeworkd stop

2. Change an IP address, enable or disable a network, or connect or disconnect a TP line.

3. At **/etc/rc.d/init.d/**, start the following service by the **start** command:
   - vivaldiframeworkd

   [Command]
   # service vivaldiframeworkd start

4. Restart the system unit.

   The procedure is completed.

Note If you fail to follow the above procedure, **MSM** may become unstable (unable to display status of servers including itself, or having CPU overload). If the system shows such a phenomenon, repeat the procedure above excluding step 3.

If no LAN cable is connected although a LAN port is available with a fixed IP address in the OS setup, the following pop-up message may appear after the system starts.

Action: Confirm the following and restart the system unit.

- Check the connection of the LAN port and the LAN cable.

- Disable an unused LAN port if any.

MegaRAID Storage Manager of management PC and management server

The **MSM** version differs depending on a model.

If system units of different **MSM** versions exist in the same network, the management PC or the management server might not be able to connect to a managed server.

In such a case, update the **MSM** of the management PC to the latest version before using it. If centralized management by a management PC is not conducted, let the system unit with the latest version of **MSM** take the management server role.

Centralized management by a management PC

Update **MSM** of management PC to the latest version.

Management PC
MSM Client
Latest version

Managed server 1
(**MSM Client, MSM Server**)
Latest version

Managed server 2
(**MSM Client, MSM Server**)
Old version

Managed server 3
(**MSM Client, MSM Server**)
Old version
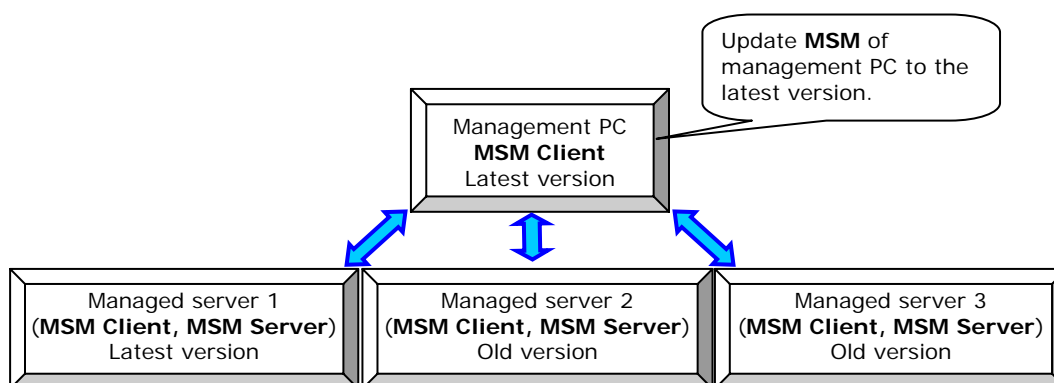
Figure 1-3

Centralized management by a management server

Management server
(Managed server 1)
(**MSM Client, MSM Server**)
Latest version

Management server
(Managed server 2)
(**MSM Client, MSM Server**)
Old version

Management server
(Managed server 3)
(**MSM Client, MSM Server**)
Old version

Let the system unit with the latest version of **MSM** take the management server role
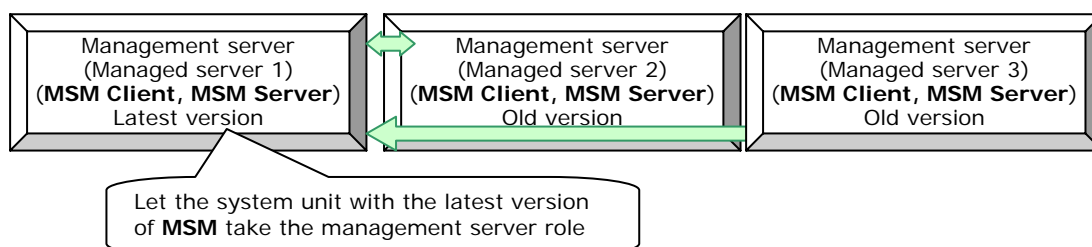
Figure 1-4

For **MSM** update procedure, see "Installing and removing MegaRAID Storage Manager" on page 2-2.

You must restart the system unit after **MSM** update.

System environment required for MegaRAID Storage Manager

MSM requires a system environment that satisfies the following conditions:

- Intel Pentium or equivalent processors
- A system memory capacity of at least 256 MB (512 MB recommended)
- A network interface (when remote management functionality is used)
- A spare capacity of 400 MB or more in the physical drive

  (We recommend a spare capacity of 1 GB or more including the space for log files.)
- A mouse or other pointing device
- A graphic controller and a display with 800 x 800 dots or more

  (We recommend a resolution of 1024 x 768 or higher.)
- For Windows:

  Windows Server 2012, Windows Server 2008 R2, Windows Server 2008, or Windows XP
- For Linux:

  Red Hat Enterprise Linux Server 6, Red Hat Enterprise Linux 5
- TCP/IP protocol installation (when the remote management function is used)

LSI Software RAID

For LSI Software RAID, the functions of **MSM** listed below cannot be used:

Table 1-3

Function	Description	Reference pages
Expansion of virtual drive capacity	Expands the capacity by adding a new physical drive to the existing virtual drive.	2-135
Write cache change	Changes the cache setting of disk array controller.	2-140
LED blinking	Makes LED of each physical drive blink.	2-143
Cache back module (BBU) diagnosis	Diagnoses the cache back module (BBU).	2-145
Enable/disable setting of SMART copyback	Changes the enable/disable setting of SMART copyback. * This function is configured with MegaCli.	2-148
Firmware update	Updates the firmware of disk array controller.	-
Patrol Read setting	Configures Patrol Read, which runs in the background.	2-179
Task rate setting	Sets the rates of various tasks.	-
Setting of power-saving mode of physical drives	Sets the power-saving mode of physical drives.	-
Setting of consistency check processing method	Sets consistency check processing method.	-
SSD Guard™	Sets SSD Guard™.	-
Buzzer setting of disk array controller	Configures the buzzer of disk array controller.	-

2

MegaRAID Storage Manager

This chapter explains how to install, remove, configure, and use **MSM**.

- ☐ Installing and removing MegaRAID Storage Manager
- ☐ Activating MegaRAID Storage Manager
- ☐ Exiting MegaRAID Storage Manager
- ☐ Initialization
- ☐ Screen configuration and descriptions of MegaRAID Storage Manager
- ☐ Functions of MegaRAID Storage Manager
- ☐ Replacing a physical drive</toc>

Installing and removing MegaRAID Storage Manager

NOTICE

In an environment without **Server installation and monitoring tool internal storage monitor** / **MSM** installed, you might fail to detect a fault that causes loss of critical data or suffer inconvenience in fault analysis. Make sure that you install and use **Server installation and monitoring tool internal storage monitor** / **MSM**.

> **Note** When you update **MSM**, always remove the old version of **MSM** before installing a new version.

Installation

The **MSM** installation procedure is described below.

MSM installation is different in location and procedure depending on a management configuration.

- For standalone server management
  - Server: Installed by the standalone format

    (Exclude **MSM Remote** and **MSM SNMP** using the installation option.)

- Centralized management of managed servers (single or multiple) from a management PC
  - Management PC: Installed in the client format

    (Exclude **MSM SNMP** using the installation option.)

  - Managed server: Installed in the complete format

    (Exclude **MSM SNMP** using the installation option.)

- Centralized management of multiple managed servers by the management server
  - Management server: installed in the complete format

    (Exclude **MSM SNMP** using the installation option.)

  - Managed server: installed in the complete format

    (Exclude **MSM SNMP** using the installation option.)

The **MSM Client** function must be installed for maintenance work of managed servers. Install all **MSM** modules (**MSM Server** and **MSM Client**. **MSM SNMP** is excluded.) on the managed server.

After installation, refer to "Initialization" on page 2-71 for configuration.

If you install the **MSM** to Red Hat Enterprise Linux 6 (64-bit x86_64), there are libraries required to install it. Please install the required libraries refer to "Required libraries in Red Hat Enterprise Linux 6 (64-bit x86_64) environment" on page 2-4.

(Recommended installation format)

When you do not conduct centralized management from a management PC or a management server, which also manages itself, install **MSM** in the standalone format.

For a Linux environment, we recommend that you use GUI for installation.

For Windows, Microsoft visual c++ 2005 is installed before the installation of **MSM**.

In the case of Windows, if you set up **MSM** while the **Windows Server Post-setup Security Updates** window is kept open after completion of the OS installation, the **MSM** alert window opens as **Windows Security Alert** because the firewall is enabled.

Handle this situation with reference to "Setting network security" on page 2-161.

For Linux, CUI installation of **MSM** is not supported except for the standalone format. Install **MSM** with reference to "Linux: Installation in the standalone format (Recommended format)" on page 2-32.

If **MSM** is installed in the CUI environment of Linux, the only **MSM** functions that can be used are event output to Linux (var/log/messages) and some functions that use MegaCli (functions described in this manual such as a consistency check).

Pop-up window notification is disabled in the default setting of Linux event notifications. To enable pop-up window notification in the GUI environment, see "Setting" on page 2-171.

In a non-GUI environment, pop-up window notification is not supported and should remain disabled.

Required libraries in Red Hat Enterprise Linux 6 (64-bit x86_64) environment

If you install the **MSM** to Red Hat Enterprise Linux 6 (64-bit x86_64), there are libraries required to install it.

Please install libraries from the media of each Red Hat Enterprise Linux 6.

- Required libraries for Red Hat Enterprise Linux Server 6.4 (64-bit x86_64)
    - libstdc++-4.4.7-3.el6.i686.rpm
    - compat-libstdc++-33-3.2.3-69.el6.i686.rpm
    - libXau-1.0.6-4.el6.i686.rpm
    - libxcb-1.8.1-1.el6.i686.rpm
    - libX11-1.5.0-4.el6.i686.rpm
    - libXext-1.3.1-2.el6.i686.rpm
    - libXi-1.6.1-3.el6.i686.rpm
    - libXtst-1.2.1-2.el6.i686.rpm
- Required libraries for Red Hat Enterprise Linux Server 6.2 (64-bit x86_64)
    - libstdc++-4.4.6-3.el6.i686.rpm
    - compat-libstdc++-33-3.2.3-69.el6.i686.rpm
    - libXau-1.0.5-1.el6.i686.rpm
    - libxcb-1.5-1.el6.i686.rpm
    - libX11-1.3-2.el6.i686.rpm
    - libXext-1.1-3.el6.i686.rpm
    - libXi-1.3-3.el6.i686.rpm
    - libXtst-1.0.99.2-3.el6.i686.rpm
- Required libraries for Red Hat Enterprise Linux Server 6.1 (64-bit x86_64)
    - libstdc++-4.4.5-6.el6.i686.rpm
    - compat-libstdc++-33-3.2.3-69.el6.i686.rpm
    - libXau-1.0.5-1.el6.i686.rpm
    - libxcb-1.5-1.el6.i686.rpm
    - libX11-1.3-2.el6.i686.rpm
    - libXext-1.1-3.el6.i686.rpm
    - libXi-1.3-3.el6.i686.rpm
    - libXtst-1.0.99.2-3.el6.i686.rpm

Tip	Please perform the following command to install the library. (The following is one example) # rpm -ivh <Library to install>

Windows: Installation in the standalone format (Recommended format)

> **Note**
> In the event of installation in the standalone format, **MSM** alone cannot realize centralized management from a management PC nor the centralized management of multiple servers by a management server, which also manages itself.
>
> Make sure that you select **Custom** in the **Setup Type** window of step 11 of the installation procedure. Do not select standalone for installation.

1. Start Windows and logon as Administrator.

2. Insert the "Server installation and monitoring tool DVD" or "Driver Kit CD" in the CD/DVD drive.

3. **[When "Server installation and monitoring tool DVD" is used]**

   Execute the following **MegaRAID Storage Manager** installer file while referring to "Support_EN.html" as attachment in the "Server installation and monitoring tool DVD". The directory path of **MSM** is different according to the system unit and OS.

   (1) Default installation location

   "d:\(*the target directory path*)\TOOL\MSM_Installer.exe" *1 *2

   (2) Non-default installation location, and fault monitoring through SNMP interface

   "d:\(*the target directory path*)\Setup.exe" *2

   [When "Driver Kit CD" is used]
   Select **Start** > **Run**, enter information as shown below, and click **OK**.

   (1) Default installation location

   "d:\Win2008\UTILITY\MSM\TOOL\MSM_Installer.exe" *1 *2

   (2) Non-default installation location, and fault monitoring through SNMP interface

   "d:\Win2008\UTILITY\MSM\Setup.exe" *2

   *1: Running MSM_Installer.exe, the DOS prompt window opens. After a few minutes, when a pop-up window opens asking you to restart the system unit, perform the procedure from step 20.

   *2: d stands for a CD/DVD drive.
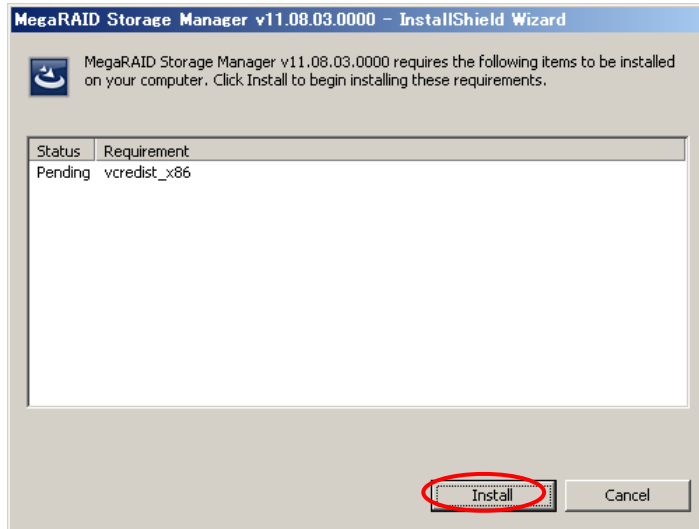
4. Click **Install** when the following window opens.

The following progress window is displayed.
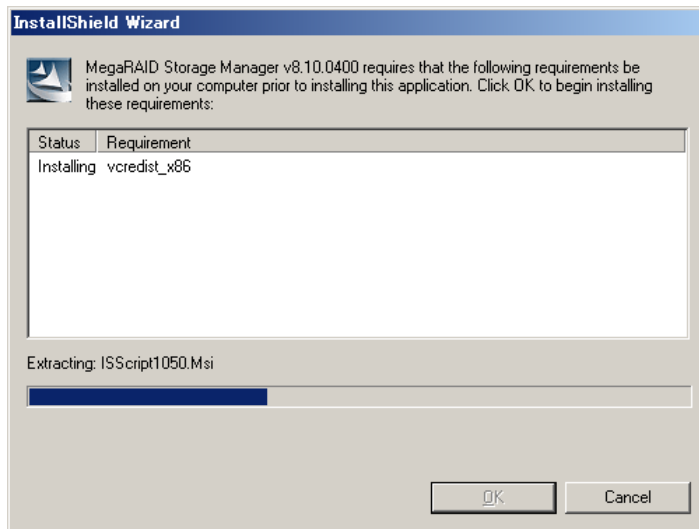
5. Click **Yes** when the following window opens.
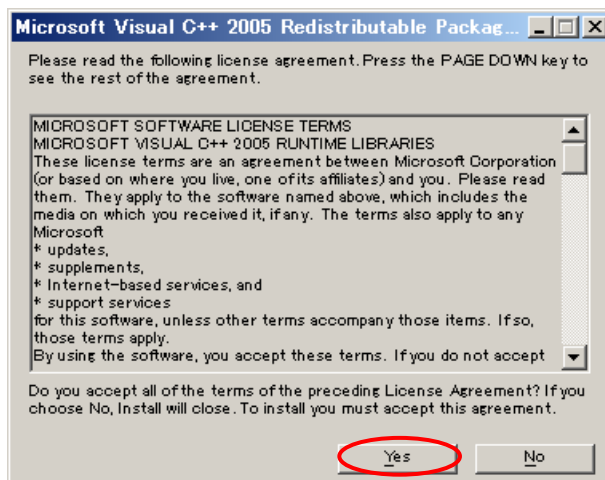
6. Click **Next** when the following window opens.

7. The license agreement window opens. Select **I accept the terms in the license agreement** and click **Next**.

8. The **Customer Information** window opens. Read the description on the **MSM** usage privileges and click **Next**.

Select **Only for current user** if you use **MSM** only as Administrator.

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9. The window for specifying **MSM** installation destination opens. Change the installation location as necessary and click **Next**.

The default installation destinations are as follows:

- 64bit OS:

  C:\Program Files (x86)\MegaRAID Storage Manager

- 32bit OS:

  C:\Program Files\MegaRAID Storage Manager

10. The **Setup Type** window opens. Confirm the installation descriptions and click **Next**.

Make sure that you check **Custom Installation**, and click **Next**.
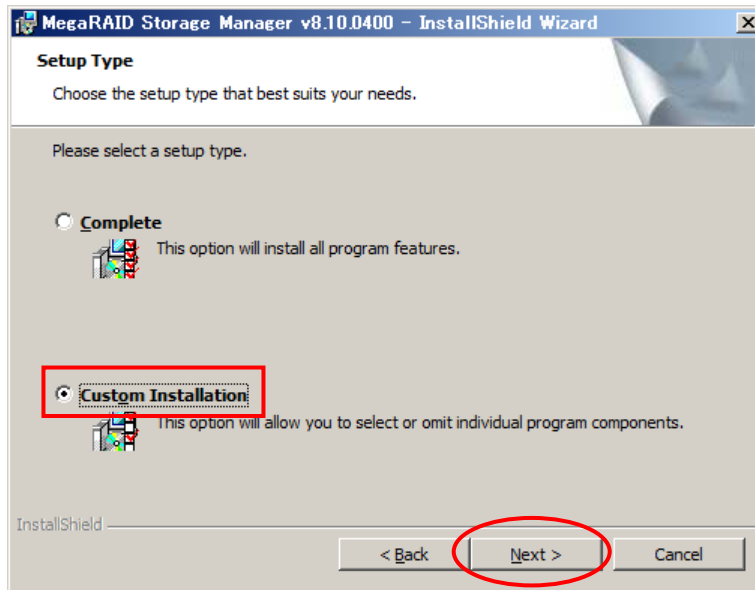
11. The detailed version of the **Setup Type** window opens. Check **Custom** and click **Next**.

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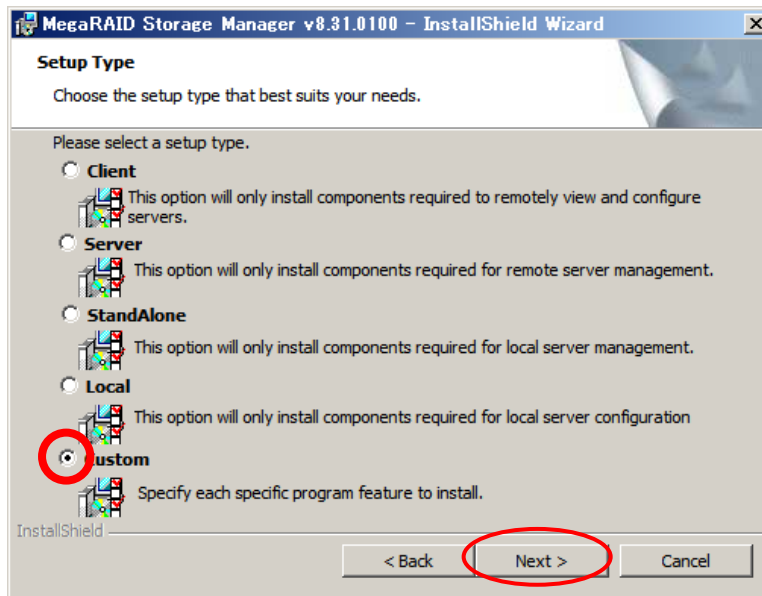
12. The **Custom Setup** window opens.

If you use SNMP, do not select anything and go to the next step.

If you do not use SNMP, select **Server** > **Optional Utilities** > **SNMP**, and select **This feature will not be available**.

(*We recommend that you select **This feature will not be available**.)
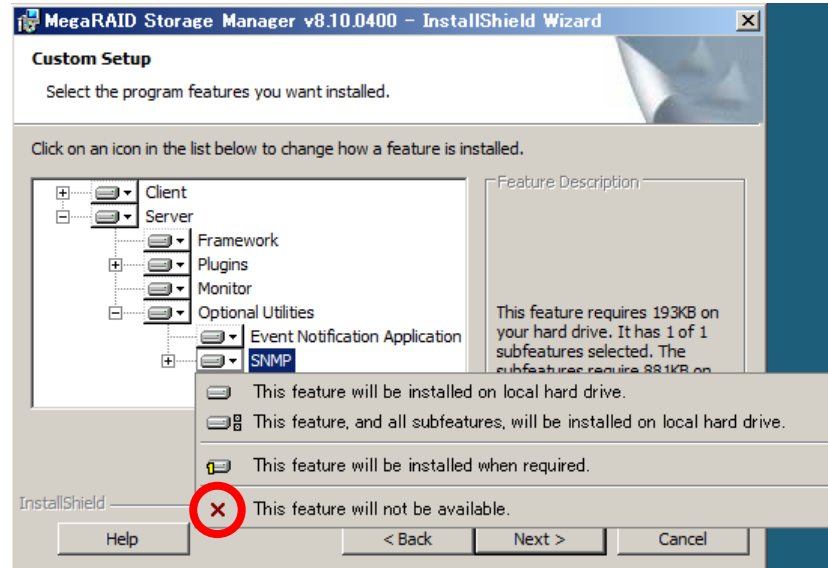
13. Select **Server** > **Plugins** > **NetworkCapability**, and select **This feature will not be available**.
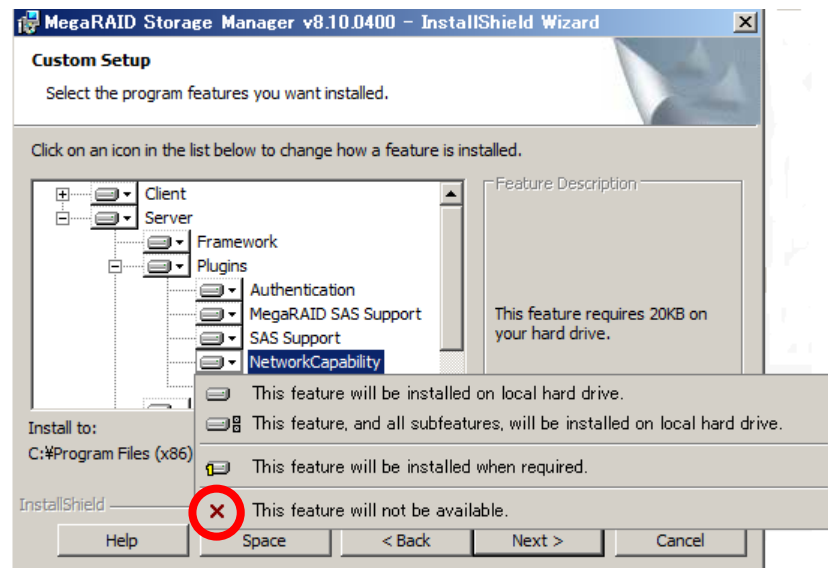
14. Select **Server** > **Plugins** > **CIM**, select **This feature will not be available**, and click **Next**.
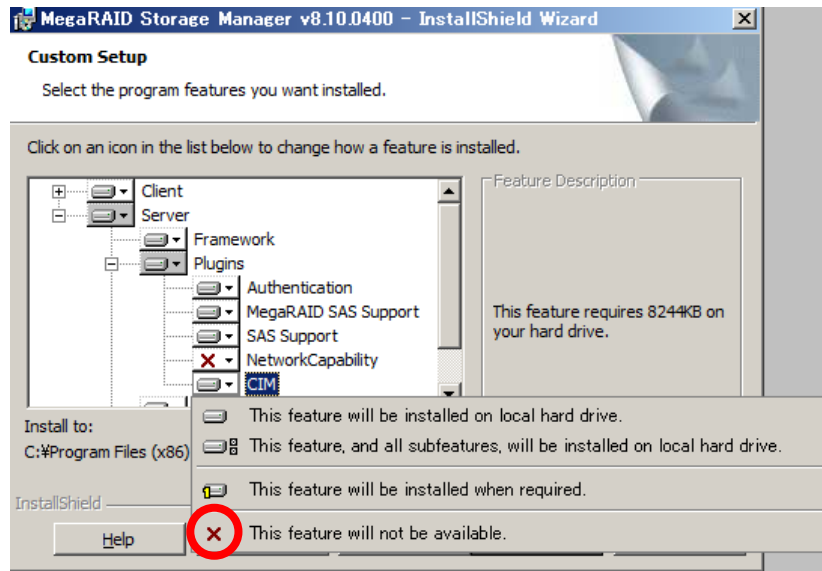
15. The **Ready to Install the program** window opens. Confirm the content and click **Install**.
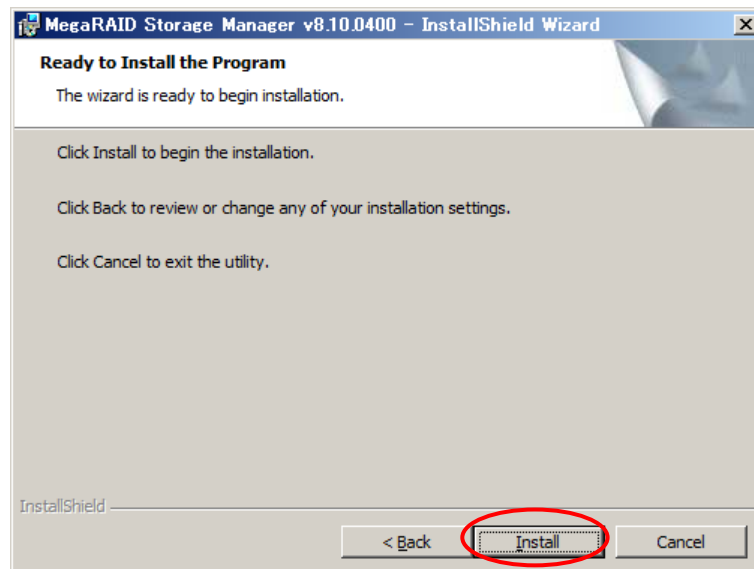
Installation starts.

16. When the installation is finished, the **InstallShield Wizard Completed** window is displayed. Click **Finish**.
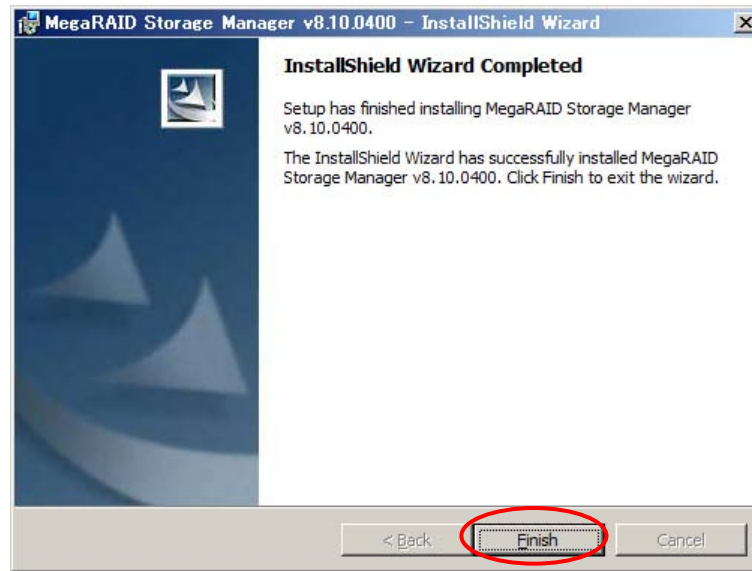
17. The installer is terminated, and an **MSM** icon is generated on the desktop.

18. **[When "Server installation and monitoring tool DVD" is used]**
Execute the following **MegaRAID Storage Manager** installer file while referring to "Support_EN.html" as attachment in the "Server installation and monitoring tool DVD". The directory path of **MSM** is different according to the system unit and OS.

> "d:\(*the target directory path*)\TOOL\MSM_Installer.exe"

[When "Driver Kit CD" is used]
Select **Start > Run**, enter information as shown below, and click **OK**.

> "d:\Win2008\UTILITY\MSM\TOOL\MSM_Installer.exe"

* d stands for a CD/DVD drive.

When this file is executed, the DOS prompt window opens.

| Tip | Make sure that you execute MSM_Installer.exe. |

19. After completion, a pop-up window opens to prompt you to restart the system unit.
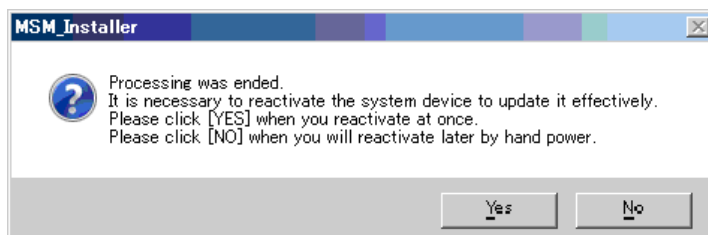
20. Remove the CD/DVD from the drive, and click **YES** on the pop-up window.

    The system unit restarts.

> **Tip** Make sure that you restart the system unit after **MSM** installation.

---

21. When Windows has started, logon as Administrator.

    The Window firewall blocks the **MSM** module (javaw) if enabled. Handle this matter with reference to "Setting network security" on page 2-161.

    MSM installation in the standalone format is completed.

    After installation, configure the disk array controller in accordance with your operation with reference to "Initialization" on page 2-71.

MegaRAID Storage Manager Instruction Manual

Windows: Installation in complete format (Installation on a management server or managed server)

| ![Note] | Make sure that you select **Custom Installation** in the **Setup Type** window of step 10 of the installation procedure. Do not select **Complete** for installation. |

| ![Tip] | If you intend to manage a standalone server without network connection, follow the description "Windows: Installation in the standalone format". |

1. Boot Windows and logon as Administrator.

2. Insert the "Server installation and monitoring tool DVD" or "Driver Kit CD" in the CD/DVD drive.

3. **[When "Server installation and monitoring tool DVD" is used]**
   Execute the following **MegaRAID Storage Manager** installer file while referring to "Support_EN.html" as attachment in the "Server installation and monitoring tool DVD". The directory path of **MSM** is different according to the system unit and OS.

   "d:\(*the target directory path*)\Setup.exe"

   [When "Driver Kit CD" is used]
   Select **Start** > **Run**, enter information as shown below, and click **OK**.

   "d:\Win2008\UTILITY\MSM\Setup.exe"

   * d stands for a CD/DVD drive.

4. Click **Install** when the following window opens.

The following progress window is displayed.

5. Click **Yes** when the following window opens.

6. Click **Next** when the following window is displayed.

MegaRAID Storage Manager Instruction Manual

7. The **license agreement** window opens. Select **I accept the terms in the license agreement** and click **Next**.

8. The **Customer Information** window opens. Read the description on the **MSM** usage privileges and click **Next**.

   Select **Only for current user** if you use **MSM** only as Administrator.

9. The window for specifying **MSM** installation destination opens. Change the installation location as necessary and click **Next**.

The default installation destinations are as follows:

- 64bit OS:

    C:\Program Files (x86)\MegaRAID Storage Manager

- 32bit OS:

    C:\Program Files\MegaRAID Storage Manager

10. The **Setup Type** window opens. Confirm the installation details and click **Next**.

    <u>Make sure that you check **Custom Installation**</u>, and click **Next**.
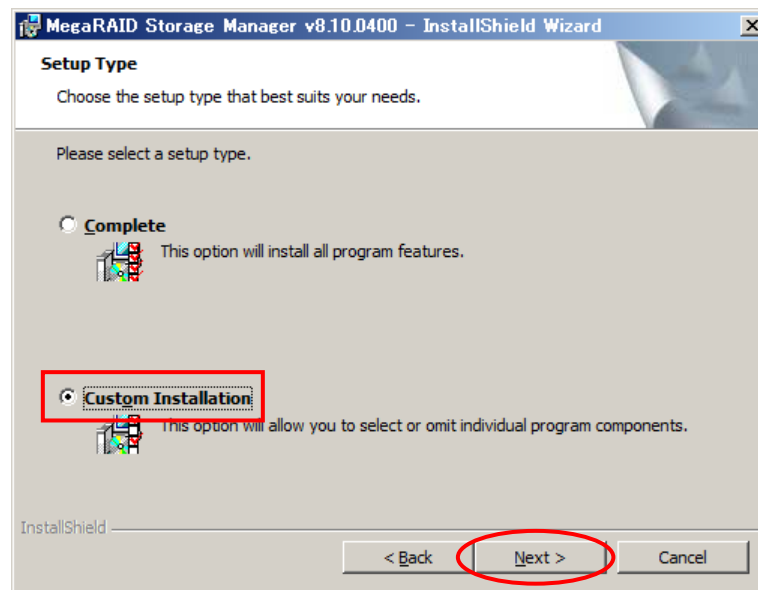
11. The detailed **Setup Type** window opens. Check **Custom** and click **Next**.
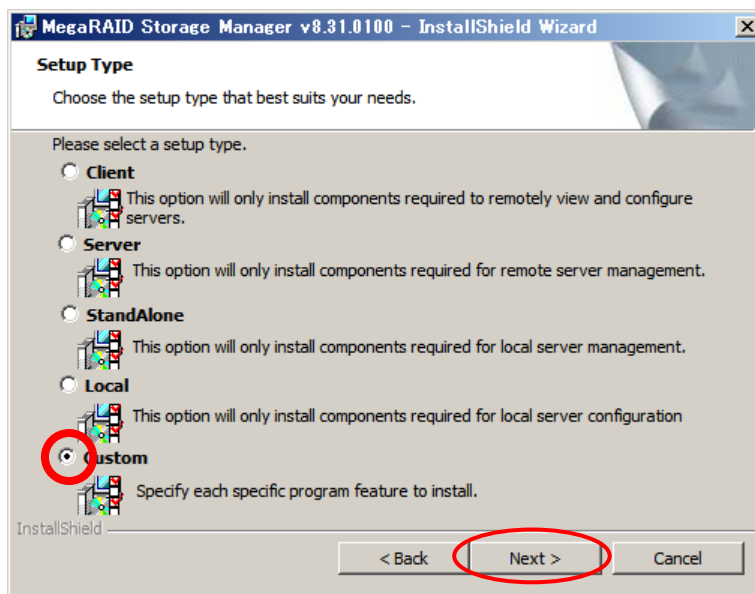
12. The **Custom Setup** window opens.

If you use SNMP, do not select anything and click **Next**.

If you do not use SNMP, select **Server** > **Optional Utilities** > **SNMP**, select **This feature will not be available**, and click **Next**.

(* We recommend that you select **This feature will not be available**.)
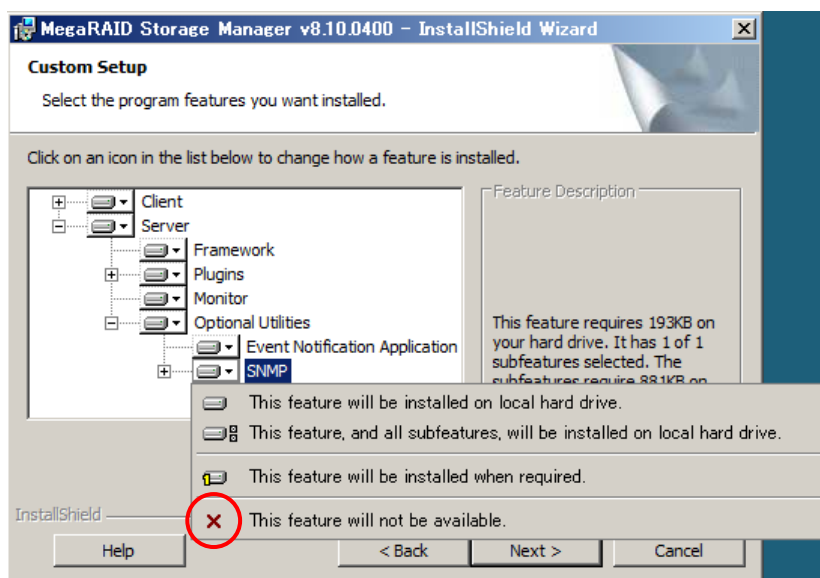
13. The **Ready to Install the Program** window opens. Confirm the content and click **Install**.
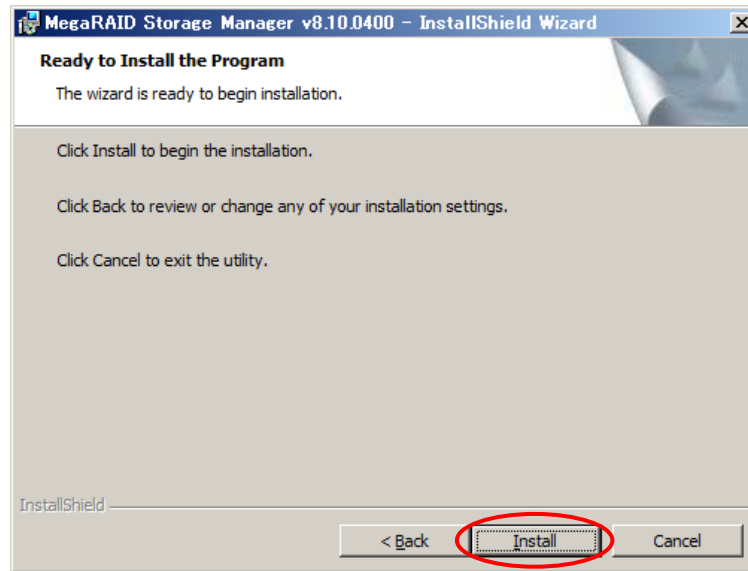
Installation starts.

14. When the installation is finished, the **InstallShield Wizard Completed** window opens. Click **Finish**.
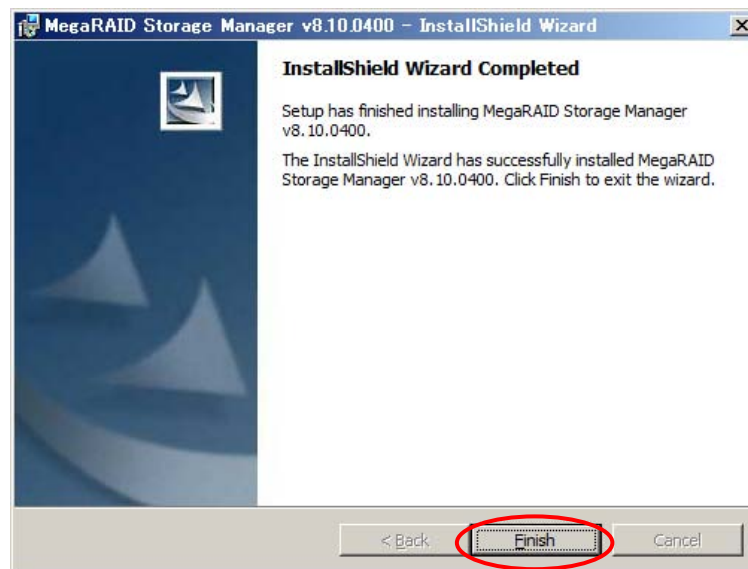
15. The installer is terminated, and then an **MSM** icon is generated on the desktop.

16. **[When "Server installation and monitoring tool DVD" is used]**
Execute the following **MegaRAID Storage Manager** installer file while referring to "Support_EN.html" as attachment in the "Server installation and monitoring tool DVD". The directory path of **MSM** is different according to the system unit and OS.

"d:\(*the target directory path*)\TOOL\MSM_Installer.exe"

[When "Driver Kit CD" is used]
Select **Start** > **Run**, enter information as shown below, and click **OK**.

"d:\Win2008\UTILITY\MSM\TOOL\MSM_Installer.exe"

* d stands for a CD/DVD drive.

When this is executed, the DOS prompt window opens.

Tip	Make sure that you execute MSM_Installer.exe.

17. After completion, a pop-up window opens to prompt you to restart the system unit.
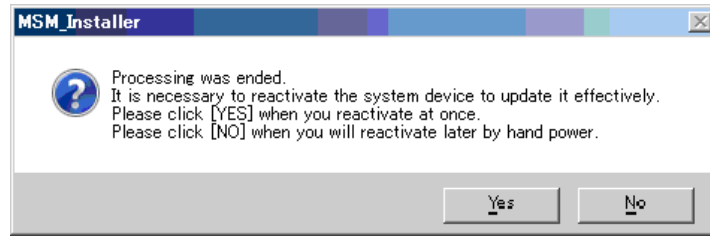
18. Remove the CD/DVD from the drive, and click **YES** on the pop-up window.

    The system unit restarts.

`Tip`	Make sure that you restart the system unit after **MSM** installation.

---

19. When Windows has started, logon as Administrator.

    The Window firewall blocks the **MSM** module (javaw) if enabled. Handle this situation with reference to "Setting network security" on page 2-171.

MSM installation in the complete format is completed.

After installation, configure the disk array controller in accordance with your operation with reference to "Initialization" on page 2-71.

Windows: Installation in client format (Installation on a management PC)

Note	Make sure that you select **Custom** in the **Setup Type** window of step 11 of the installation procedure. Do not select **Client** for installation.

Tip	**MSM** installation to a management PC is not required for the standalone operation.

1. Boot Windows and logon as Administrator.

2. Insert the "Server installation and monitoring tool DVD" or "Driver Kit CD" in the CD/DVD drive.

3. **[When "Server installation and monitoring tool DVD" is used]**
   Execute the following **MegaRAID Storage Manager** installer file while referring to "Support_EN.html" as attachment in the "Server installation and monitoring tool DVD". The directory path of **MSM** is different according to the system unit and OS.

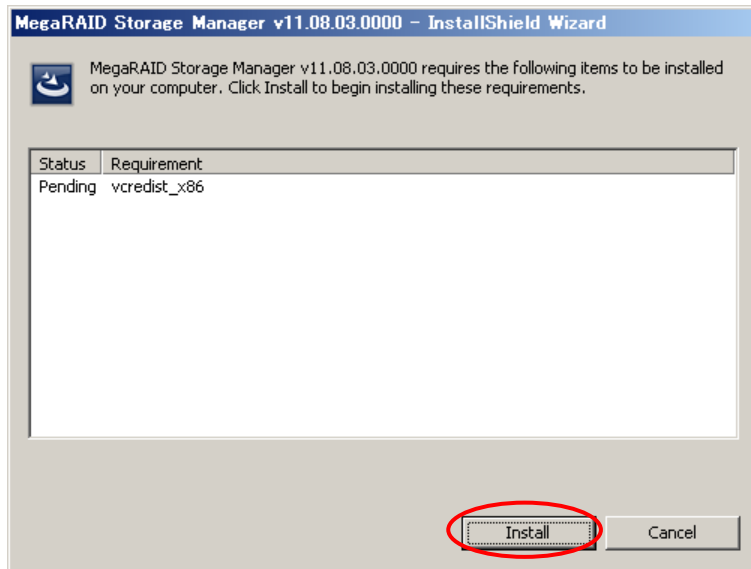   "d:\(*the target directory path*)\Setup.exe"

   [When "Driver Kit CD" is used]
   Select **Start** > **Run**, enter information as shown below, and click **OK**.
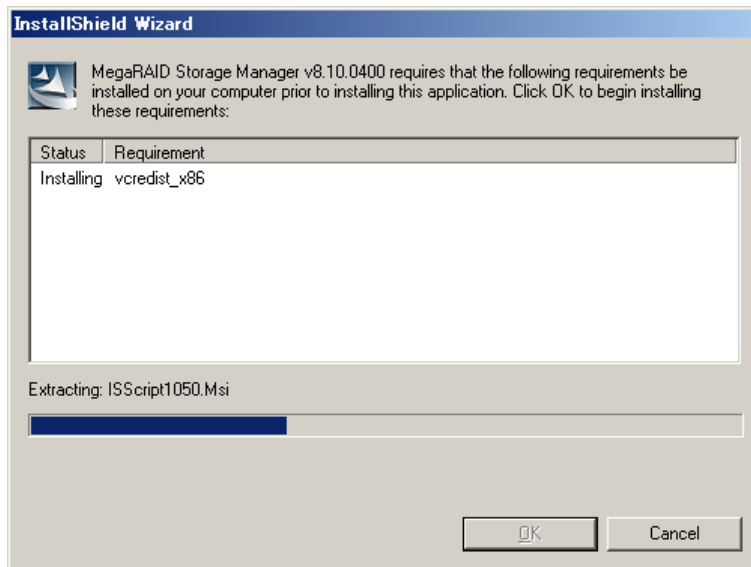
   "d:\Win2008\UTILITY\MSM\Setup.exe"
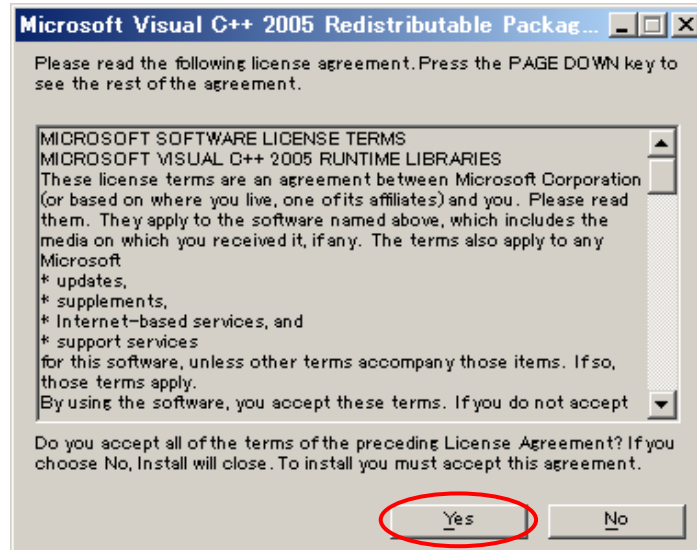
   * d stands for a CD/DVD drive.

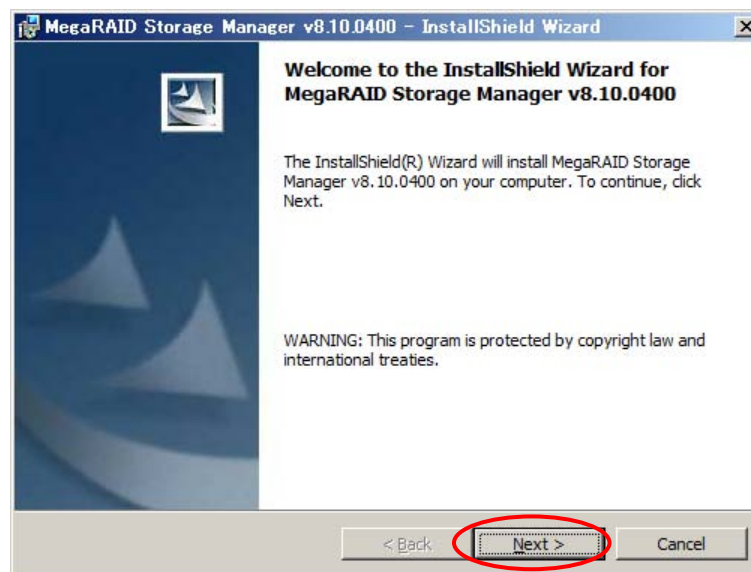4. Click **Install** when the following window opens.

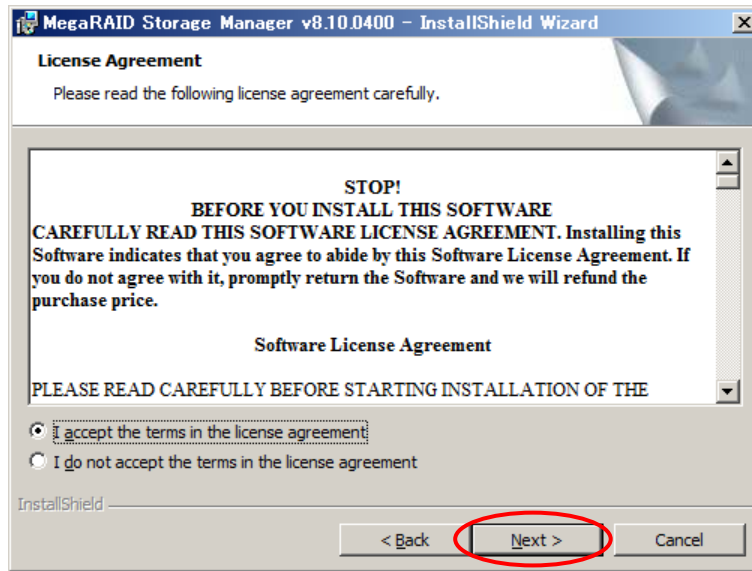The following progress window is displayed.

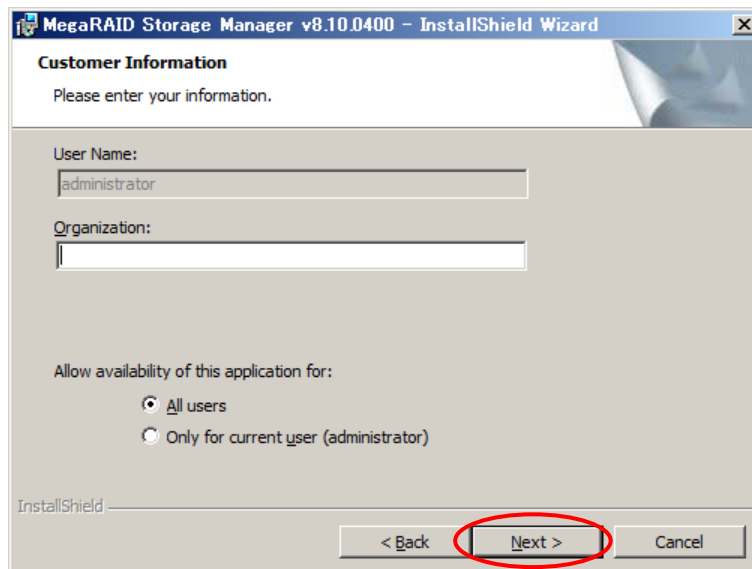5. Click **Yes** when the following window opens.

6. Click **Next** when the following window is displayed.

7. The **License Agreement** window opens. Select **I accept the terms in the license agreement** and click **Next**.

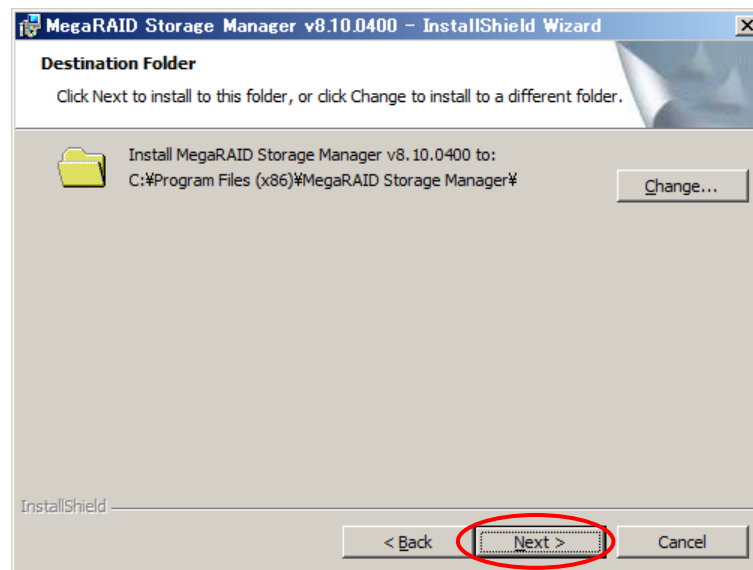**MegaRAID Storage Manager Instruction Manual**

8. The **Customer Information** window opens. Read the description on the **MSM** usage privileges and click **Next**.

Select **Only for current user** if you use **MSM** only as Administrator.

9. The screen for specifying **MSM** installation destination opens. Change the installation location as necessary and click **Next**.

The default installation destinations are as follows:

- 64bit OS:

  C:\Program Files (x86)\MegaRAID Storage Manager

- 32bit OS:

 C:\Program Files\MegaRAID Storage Manager
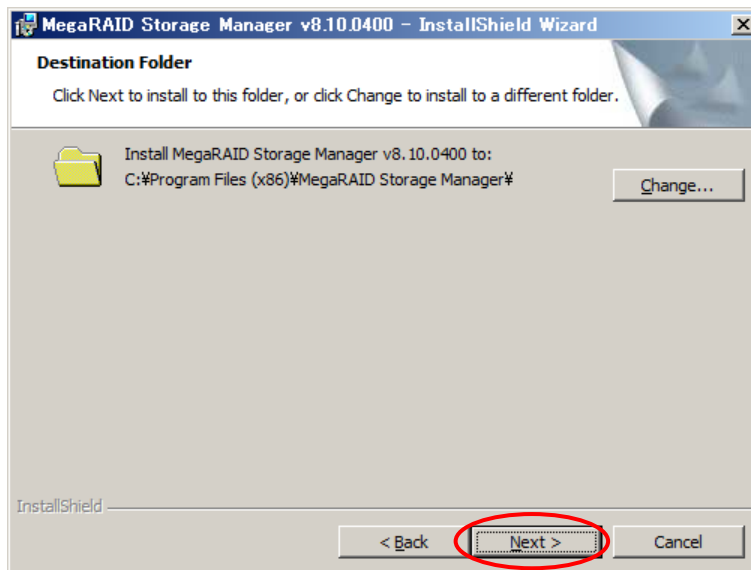
10. The **Setup Type** window opens. Confirm the installation details and click **Next**.

For a management PC, check **Custom Installation**.
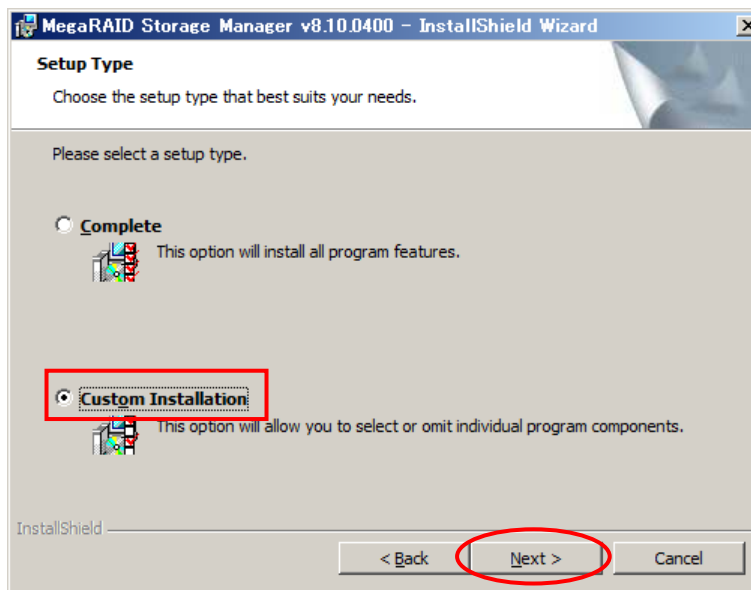
11. The detailed **Setup Type** window opens. Check **Custom** and click **Next**.
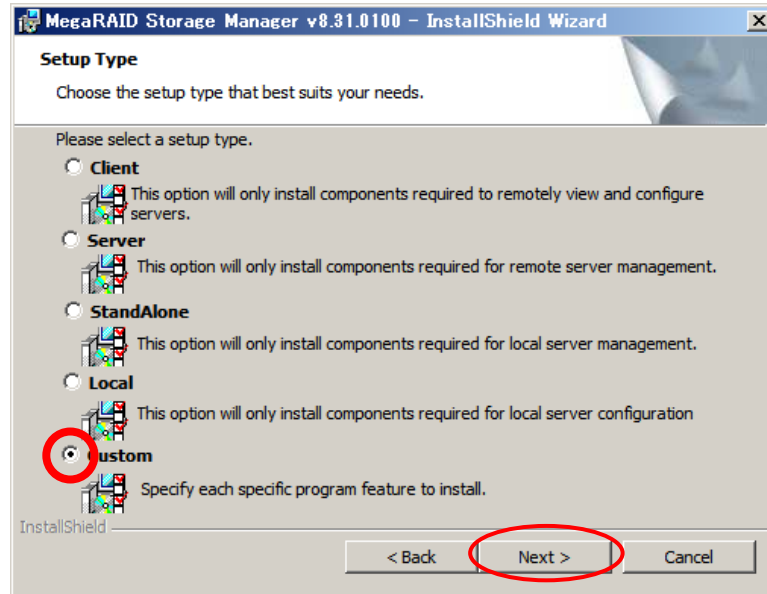
| Tip | If you check **Client** here, real-time remote management will be disabled after installation. |

12. The **Custom Setup** window opens. Select **Server** > **Optional Utilities** > **SNMP**, select **This feature will not be available**, and click **Next**.
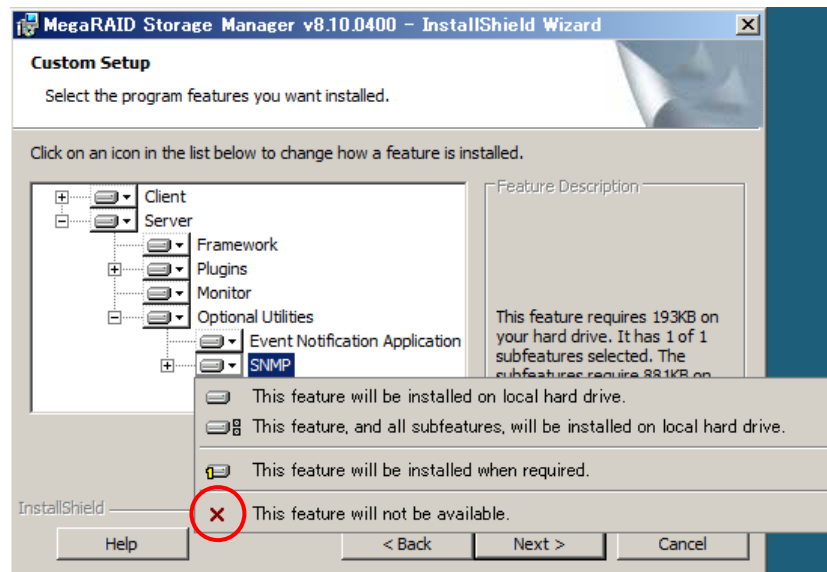
13. The **Ready to Install the Program** window opens. Confirm the content and click **Install**.
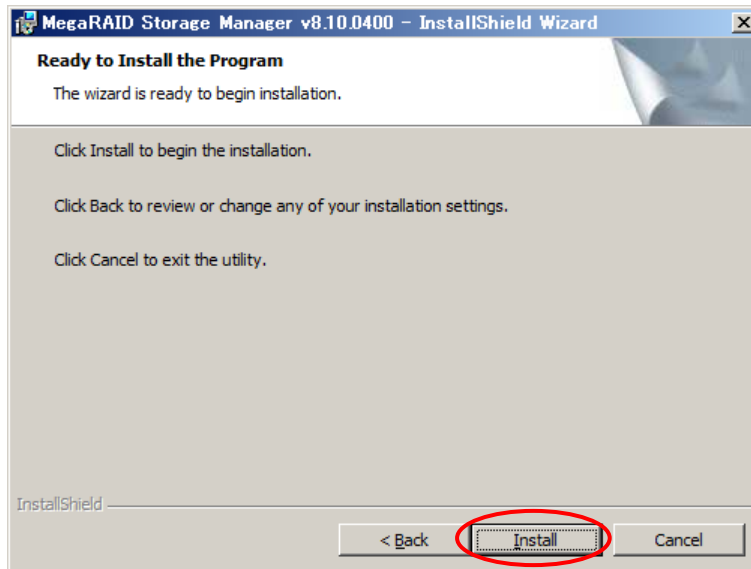
Installation starts.

14. When the installation is finished, the **InstallShield Wizard Completed** window opens. Click **Finish**.
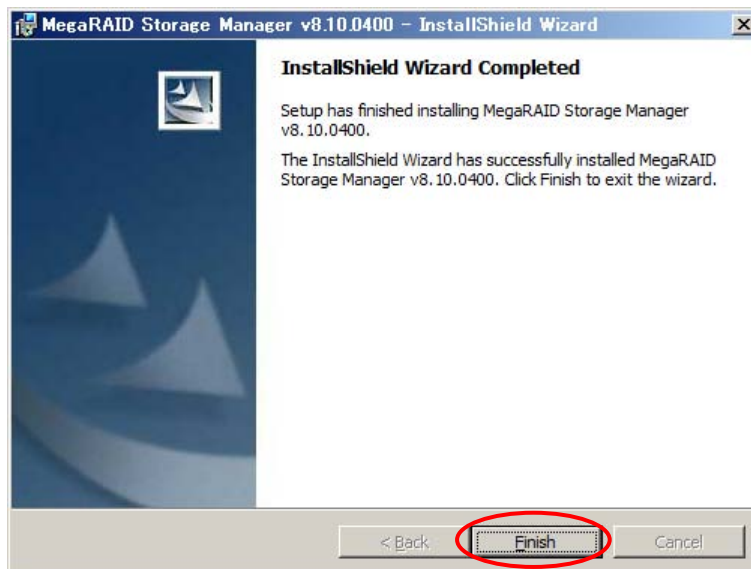
15. The installer is terminated, and an **MSM** icon is created on the desktop.

16. Remove the CD/DVD from the drive, and restart the system unit.

Tip	Make sure that you restart the system unit after **MSM** installation.

MSM installation in the client format is completed.

Linux: Installation in the standalone format (Recommended format)

> **Note**
>
> To install **MSM** on Linux and use the functions described in this manual, do it in an environment where all selectable items in the Linux installer have been selected for one of the Linux installation packages listed below.
>
> The items marked by (*[1]) are not required if **MSM** is used only with CUI.
>
> In this case, the only **MSM** functions that can be used are event output to Linux (var/log/messages) and some functions that use MegaCli (functions described in this manual such as consistency check). Therefore, we recommend that you install all of the following items:
>
> [Red Hat Enterprise Linux 6]
> - Desktop *[1]
> - General Purpose Desktop *[1]
> - X Window System *[1]
> - Base
> - Compatibility library
>
> [Red Hat Enterprise Linux 5]
> - GNOME desktop environment *[1]
> - X Window System *[1]
> - Base
> - Support of legacy software
>
> If these items are not installed, **MSM** installation and functions described in this manual cannot be performed normally.
>
> Disable SE Linux of the OS or set it to "Permissive".
>
> When installed with the standalone format, **MSM** alone cannot realize centralized management from a management PC nor the centralized management of multiple servers by a management server, which also manages itself.
>
> When you update **MSM**, remove the current **MSM** in the correct procedure, and then install a new version of **MSM**. To remove **MSM**, see the MSM manual that you have used for installation.

1. Start Linux, and logon as root.
   If you install the MSM to Red Hat Enterprise Linux 6 (64-bit x86_64), some libraries are required. Please refer to "Required libraries in Red Hat Enterprise Linux 6 (64-bit x86_64) environment" on page 2-4 and install them.

2. Start X Windows.

   # startx

   * Not required for a CUI environment

3. Insert the "Driver Kit" CD-ROM in the CD/DVD drive.

4. Start the terminal.

5. Mount the CD-ROM. This step is not required if the CD-ROM has been automatically mounted.

   # mount /dev/cdrom /media/

Tip If the above command does not mount the CD-ROM, try the command again appending any number (1, 2, 3, ...) to "cdrom", and then see if the CD has been mounted.

[Example: When the number is "2"]

  # mount /dev/cdrom2 /media/

---

6. Copy "MSM_linux_installer-x.xx-xx.tar.gz" to any directory from "Driver Kit" CD-ROM.
"MSM_linux_installer-x.xx-xx.tar.gz" is in **\hitachi_utilities\msm** directory.

   * "x" in MSM_linux_installer-x.xx-xx.tar.gz varies depending on the **MSM** version.

   Find out the actual file name.

7. Execute the following command.

   # cd /*copy-directory* (the copy destination in step 6)

   # tar -xvzf *copy-file* (the copy destination in step 6)

8. The **disk** directory and files are created.

9. Execute the **MSM** installation command.

Move to the directory in which the file has been uncompressed, and execute one of the following installation commands:

[Installation command: 1]

> # cd */copy-directory* (the copy destination in step 6) / disk
> # ./msminstall.sh

[Installation command: 2]

> # cd */copy-directory* (the copy destination in step 6) / disk
> # ./install.csh

We recommend [Installation command: 1]. After execution of the command, go to step 12.

To display the window for installation format specification, execute [Installation command: 2], and then go to step 10.

The **install.csh** command has the following command options:
(When you have selected a command option, go to step 12.)

* Command options of **install.csh**:
  # ./install.csh -(first argument) -ru (second argument)

- First argument:

  a: Installation in the complete format (all **MSM** modules)

  s: Installation in the standalone format (all modules excluding **MSM Remote**)

  c: Installation in the client format (only the **MSM Client** module)

- Second argument:

  popup: When an event occurs, it is not displayed in a pop-up window (not supported).

  snmp: The SNMP module is not installed.

Select an appropriate installation in accordance with your operation.

The **msminstall.sh** command is equivalent to the standalone format installation by the **install.csh** command with the snmp specification.

   #./install.csh -s -ru snmp

Note Do not specify popup of the second argument because it may prevent event outputs to Linux, which is not supported.

The message below during installation command execution indicates that the **MSM** installation has not been done successfully. The kernel may be incompatible with **MSM**. In this case, check if the environment of the target system unit is supported.

```
root@localhost:~/Desktop/xL/disk                    _ □ ×

File  Edit  View  Search  Terminal  Help
[root@localhost disk]# ./msminstall.sh

 without snmp....
Checking for any Old Version
No Old Version Found
Continuing with installation
File /usr/lib/libstdc++.so.6 not found
Install the libstdc++ rpm from the OS CD and retry
Refer to MSM readme for more details
mv: cannot stat `/usr/local/MegaRAID Storage Manager/MegaMonitor/config-current.
xml': No such file or directory
cp: cannot create regular file `/usr/local/MegaRAID Storage Manager/MegaMonitor/
config-current.xml': No such file or directory
cp: cannot create regular file `/usr/local/MegaRAID Storage Manager/MegaPopup/po
pup': No such file or directory
error: Failed dependencies:
        Lib_Utils is needed by MegaCli-8.00.46-1.i386
[root@localhost disk]# 
```

> **Tip** **MSM** is installed in the following directory:
> # /usr/local/MegaRAID Storage Manager

10. The license agreement description opens awaiting your response.

    Read the license agreement, and enter **Y** or **y** and press **Enter**.

```
You assume full responsibility for the legal and responsible use of the Software
 and Documentation.  You agree that this Agreement is the complete agreement bet
ween you and LSI (and that any verbal or written statements that are not reflect
ed in this Agreement, and any prior agreements, are superseded by this Agreement
).  To be effective, any amendment of this Agreement must be in writing and sign
ed by both you and LSI.  Should any provisions of this Agreement be held to be u
nenforceable, then such provision shall be separable from this Agreement and sha
ll not effect the remainder of the Agreement.  This Agreement shall be governed
by California law, not including its choice of law provisions.  The United Natio
ns Convention on the International Sale of Goods shall not be applied to this Ag
reement.  All rights in the Software and Documentation not specifically granted
in this Agreement are reserved by LSI or its licensors.  The English language ve
rsion of this Agreement shall be the official version.  The terms and conditions
 of this Software License Agreement shall be binding upon you and your respectiv
e heirs, successors and assigns.

10.     Survival

The provisions of Sections 2, 3, 4, 7, 8 and 9 shall survive any termination of
this Agreement.




Press Y to accept the License Agreement :█
```

11. The window for specifying the installation format opens.

    For the standalone format, enter **3** and press **Enter**.

```
Press 0 to exit from installation
Choose[1-3]:
            (1) - Complete
                  This option will install all program features.
            (2) - Client
                  This option will only install components required to remotely
view and
                  configure servers.
            (3) - StandAlone
                  This option will only install components required for local se
rver management
Note : Installer can also be run in a command line mode
Usage : install.sh [-option]
The options are :
            a
              The Complete Installation of MegaRAID Storage Manager (MSM)
            c
              The Client components only program of MSM
            s
             The StandAlone component of MSM
Setup Type :█
```

    Installation starts.

> **Tip** **MSM** is installed in the following directory:
> # /usr/local/MegaRAID Storage Manager

12. Installation starts. After ending installation, unmount the CD-ROM, then remove the CD-ROM from the drive, and restart the system unit.

```
 without snmp....
Checking for any Old Version
No Old Version Found
Continuing with installation
Preparing...                    ####################################### [100%]
Installing....
   1:Lib_Utils              ####################################### [100%]
Preparing...                    ####################################### [100%]
Installing....
   1:Lib_Utils2             ####################################### [100%]
Installing  MegaRAID_Storage_Manager-11.08.03-02
Preparing...                    ####################################### [100%]
Installing....
   1:MegaRAID_Storage_Manage####################################### [100%]
/
/
/
Starting Framework:
/

/
Dec 7, 2012 3:38:13 PM java.util.prefs.FileSystemPreferences$3 run
INFO: Created system preferences directory in java.home.

set: KEY=INSTALLER_VERSION   VAL=v11.08.03-02

/
Preparing...                    ####################################### [100%]
   1:MegaCli                ####################################### [100%]
[root@localhost disk]#
```

> **Tip** Make sure that you restart the system unit after **MSM** installation.

MSM installation in the standalone format is completed.

After installation, configure the disk array controller in accordance with your operation form with reference to "<u>Initialization</u>" on page 2-71.

This installation includes a command line program. The command line program is installed in the following directory:

 /opt/MegaRAID/MegaCli

The name of the program to be executed varies depending on the OS.

- 64bit OS: MegaCli64
- 32bit OS: MegaCli

> **Tip** Various messages may be displayed during installation. See "<u>Precautions</u>" on page 2-187 for details.

Linux: Installation in the complete format (Installation on a management server or managed server)

> **Note**
>
> To install **MSM** on Linux and use the functions described in this manual, do it in an environment where all selectable items in the Linux installer have been selected for on of the Linux installation packages below.
>
> [Red Hat Enterprise Linux 6]
>
> - Desktop
> - General Purpose Desktop
> - X Window System
> - Base
> - Compatibility library
>
> [Red Hat Enterprise Linux 5]
>
> - GNOME desktop environment
> - X Window System
> - Base
> - Support of legacy software
>
> If these items are not installed, **MSM** installation and functions described in this manual cannot be performed normally.
>
> Disable SE Linux of the OS or set it to "Permissive".
>
> If you intend to manage the server without network connection, perform the procedure of "Linux: Installation in the standalone format (Recommended format)" on page 2-32.
>
> Set the host name in the format conforming to the fully qualified domain name (FQDN). Remote monitoring does not work if a host name does not conform to the FQDN format.
>
> When you update **MSM**, remove the current **MSM** in the correct procedure, and then install a new version of **MSM**. To remove **MSM**, see the MSM manual that you have used for installation.

1. Start Linux, and logon as root.
   If you install the MSM to Red Hat Enterprise Linux 6 (64-bit x86_64), some libraries are required. Please refer to "Required libraries in Red Hat Enterprise Linux 6 (64-bit x86_64) environment" on page 2-4 and install them.

2. Start X Windows.

   # startx

3. Insert the "Driver Kit" CD-ROM in the CD/DVD drive.

4. Start the terminal.

5. Mount the CD-ROM. This step is not required if the CD-ROM has been automatically mounted.

   # mount /dev/cdrom /media/

Tip | If the above command does not mount the CD-ROM, try the command again appending any number (1, 2, 3, ...) to "cdrom", and then see if the CD has been mounted.

[Example: When the number is "2"]

   # mount /dev/cdrom2 /media/

---

6. Copy "MSM_linux_installer-x.xx-xx.tar.gz" to any directory from "Driver Kit" CD-ROM.
   "MSM_linux_installer-x.xx-xx.tar.gz" is in **\hitachi_utilities\msm** directory.

   * "x" in MSM_linux_installer-x.xx-xx.tar.gz varies depending on the **MSM** version.

   Find out the actual file name.

7. Execute the following command.

   # cd /*copy-directory* (the copy destination in step 6)

   # tar -xvzf *copy-file* (the copy destination in step 6)

8. The **disk** directory and files are created.

9. Execute the **MSM** installation command.

Move to the directory in which the file has been uncompressed, and execute one of the following installation commands:

[Installation command: 1]

> # cd /*copy-directory* (the copy destination in step 6) / disk
> # ./remsminstall.sh

[Installation command: 2]

> # cd /*copy-directory* (the copy destination in step 6) / disk
> # ./install.csh

We recommend [Installation command: 1]. After execution of the command, go to step 12.

To display the window for installation format specification, execute [Installation command: 2], and then go to step 10.

MegaRAID Storage Manager Instruction Manual

The **install.csh** command has the following command options:
(When you have selected a command option, go to step 12.)

* Command options of **install.csh**:
  # ./install.csh -(first argument) -ru (second argument)

- First argument:

  a: Installation in the complete format (all **MSM** modules)

  s: Installation in the standalone format (all modules excluding **MSM Remote**)

  c: Installation in the client format (only the **MSM Client** module)

- Second argument:

  popup: When an event occurs, it is not displayed in a pop-up window (not supported).

  snmp: The SNMP module is not installed.

Select an appropriate installation in accordance with your operation.

The **remsminstall.sh** command is equivalent to the complete format installation by the **install.csh** command with the snmp specification.

  #./install.csh -a -ru snmp

Note	Do not specify popup of the second argument because it may prevent event outputs to Linux, which is not supported.
	The message below during installation command execution indicates that the **MSM** installation has not been done successfully. The kernel may be incompatible with **MSM**. In this case, check if the environment of the target system unit is supported.

```
root@localhost:~/Desktop/xL/disk                    _ □ ×
File  Edit  View  Search  Terminal  Help
[root@localhost disk]# ./msminstall.sh

 without snmp....
Checking for any Old Version
No Old Version Found
Continuing with installation
File /usr/lib/libstdc++.so.6 not found
Install the libstdc++ rpm from the OS CD and retry
Refer to MSM readme for more details
mv: cannot stat `/usr/local/MegaRAID Storage Manager/MegaMonitor/config-current.
xml': No such file or directory
cp: cannot create regular file `/usr/local/MegaRAID Storage Manager/MegaMonitor/
config-current.xml': No such file or directory
cp: cannot create regular file `/usr/local/MegaRAID Storage Manager/MegaPopup/po
pup': No such file or directory
error: Failed dependencies:
        Lib_Utils is needed by MegaCli-8.00.46-1.i386
[root@localhost disk]# ▊
```

---

10. The license agreement description opens awaiting your response.

    Read the license agreement, and enter **Y** or **y** and press **Enter**.

```
You assume full responsibility for the legal and responsible use of the Software
 and Documentation.  You agree that this Agreement is the complete agreement bet
ween you and LSI (and that any verbal or written statements that are not reflect
ed in this Agreement, and any prior agreements, are superseded by this Agreement
).  To be effective, any amendment of this Agreement must be in writing and sign
ed by both you and LSI.  Should any provisions of this Agreement be held to be u
nenforceable, then such provision shall be separable from this Agreement and sha
ll not effect the remainder of the Agreement.  This Agreement shall be governed
by California law, not including its choice of law provisions.  The United Natio
ns Convention on the International Sale of Goods shall not be applied to this Ag
reement.  All rights in the Software and Documentation not specifically granted
in this Agreement are reserved by LSI or its licensors.  The English language ve
rsion of this Agreement shall be the official version.  The terms and conditions
 of this Software License Agreement shall be binding upon you and your respectiv
e heirs, successors and assigns.

10.    Survival

The provisions of Sections 2, 3, 4, 7, 8 and 9 shall survive any termination of
this Agreement.


Press Y to accept the License Agreement :█
```

11. The window for specifying the installation format opens.

    For the complete format, type **1** and press **Enter**.

```
Press 0 to exit from installation
Choose[1-3]:
            (1) - Complete
                This option will install all program features.
            (2) - Client
                This option will only install components required to remotely
view and
                configure servers.
            (3) - StandAlone
                This option will only install components required for local se
rver management
Note : Installer can also be run in a command line mode
Usage : install.sh [-option]
The options are :
            a
              The Complete Installation of MegaRAID Storage Manager (MSM)
            c
              The Client components only program of MSM
            s
             The StandAlone component of MSM
Setup Type :█
```

    Installation starts.

12. Installation starts. After ending installation, unmount the CD-ROM, remove the CD-ROM from the drive, and restart the system unit.

```
 without snmp....
Checking for any Old Version
No Old Version Found
Continuing with installation
Preparing...               ###################################### [100%]
Installing....
   1:Lib_Utils              ###################################### [100%]
Preparing...               ###################################### [100%]
Installing....
   1:Lib_Utils2             ###################################### [100%]
Installing  MegaRAID_Storage_Manager-11.08.03-02
Preparing...               ###################################### [100%]
Installing....
   1:MegaRAID_Storage_Manage###################################### [100%]
/
/
/
Starting Framework:
/

/
Dec 7, 2012 3:38:13 PM java.util.prefs.FileSystemPreferences$3 run
INFO: Created system preferences directory in java.home.

set: KEY=INSTALLER_VERSION   VAL=v11.08.03-02

/
Preparing...               ###################################### [100%]
   1:MegaCli                ###################################### [100%]
[root@localhost disk]#
```

> **Tip** Make sure that you restart the system unit after **MSM** installation.

MSM installation in the complete format is completed.

After installation, configure the disk array controller in accordance with your operation form with reference to ".

This installation includes a command line program. The command line program is installed in the following directory:

    /opt/MegaRAID/MegaCli

The name of the program to be executed varies depending on the OS.

- 64bit OS: MegaCli64
- 32bit OS: MegaCli

> **Tip** Various messages may be displayed during installation. See
> " for details.

Linux: Installation in the client format (Installation on a management PC)

> **Note**
>
> To install **MSM** on Linux and use the functions described in this manual, do it in an environment where all selectable items in the Linux installer have been selected for on of the Linux installation packages below.
>
> [Red Hat Enterprise Linux 6]
> - Desktop
> - General Purpose Desktop
> - X Window System
> - Base
> - Compatibility library
>
> [Red Hat Enterprise Linux 5]
> - GNOME desktop environment
> - X Window System
> - Base
> - Support of legacy software
>
> If these items are not installed, **MSM** installation and functions described in this manual cannot be performed normally.
>
> Disable SE Linux of the OS or set it to "Permissive".
>
> Set the host name in the format conforming to the fully qualified domain name (FQDN). Remote monitoring does not work if a host name does not conform to the FQDN format.
>
> When you update **MSM**, remove the current **MSM** in the correct procedure, and then install a new version of **MSM**. To remove **MSM**, see the MSM manual that you have used for installation.

1. Start Linux, and logon as root.
   If you install the MSM to Red Hat Enterprise Linux 6 (64-bit x86_64), some libraries are required. Please refer to "Required libraries in Red Hat Enterprise Linux 6 (64-bit x86_64) environment" on page 2-4 and install them.

2. Start X Windows.

   # startx

3. Insert the "Driver Kit" CD-ROM in the CD/DVD drive.

4. Start the terminal.

5. Mount the CD-ROM. This step is not required if the CD-ROM has been automatically mounted.

   # mount /dev/cdrom /media/

Tip	If the above command does not mount the CD-ROM, try the command again appending any number (1, 2, 3, …) to "cdrom", and then see if the CD has been mounted.
	[Example: When the number is "2"]
	# mount /dev/cdrom2 /media/

6. Copy "MSM_linux_installer-x.xx-xx.tar.gz" to any directory from "Driver Kit" CD-ROM.
    "MSM_linux_installer-x.xx-xx.tar.gz" is in **\hitachi_utilities\msm** directory.

    * "x" in MSM_linux_installer-x.xx-xx.tar.gz varies depending on the **MSM** version. Find out the actual file name.

7. Execute the following command.

    # cd /*copy-directory* (the copy destination in step 6)

    # tar -xvzf *copy-file* (the copy destination in step 6)

8. The **disk** directory and files are created.

9. Execute the **MSM** installation command.

Move to the directory in which the file has been uncompressed, and execute one of the following installation commands:

> \# cd /*copy-directory* (the copy destination in step 6) / disk
> \# ./install.csh

The **install.csh** command has the following command options:
(When you have selected a command option, go to step 12.)

* Command options of **install.csh**:
  # ./install.csh -(first argument) -ru (second argument)

- First argument:

  a: Installation in the complete format (all **MSM** modules)

  s: Installation in the standalone format (all modules excluding **MSM Remote**)

  c: Installation in the client format (only the **MSM Client** module)

- Second argument:

  popup: When an event occurs, it is not displayed in a pop-up window (not supported).

  snmp: The SNMP module is not installed.

Select an appropriate installation in accordance with your operation.

	Do not specify popup of the second argument because it may prevent event outputs to Linux, which is not supported.
Note	

The message below during installation command execution indicates that the **MSM** installation has not been done successfully. The kernel may be incompatible with **MSM**. In this case, check if the environment of the target system unit is supported.

```
root@localhost:~/Desktop/xL/disk                    _ □ ×

File  Edit  View  Search  Terminal  Help
[root@localhost disk]# ./msminstall.sh

 without snmp....
Checking for any Old Version
No Old Version Found
Continuing with installation
File /usr/lib/libstdc++.so.6 not found
Install the libstdc++ rpm from the OS CD and retry
Refer to MSM readme for more details
mv: cannot stat `/usr/local/MegaRAID Storage Manager/MegaMonitor/config-current.
xml': No such file or directory
cp: cannot create regular file `/usr/local/MegaRAID Storage Manager/MegaMonitor/
config-current.xml': No such file or directory
cp: cannot create regular file `/usr/local/MegaRAID Storage Manager/MegaPopup/po
pup': No such file or directory
error: Failed dependencies:
        Lib_Utils is needed by MegaCli-8.00.46-1.i386
[root@localhost disk]#
```

	MSM is installed in the following directory:
Tip	# /usr/local/MegaRAID Storage Manager

---

10. The license agreement description opens awaiting your response.

Read the license agreement, and type **Y** or **y** and press **Enter**.

```
You assume full responsibility for the legal and responsible use of the Software
 and Documentation.  You agree that this Agreement is the complete agreement bet
ween you and LSI (and that any verbal or written statements that are not reflect
ed in this Agreement, and any prior agreements, are superseded by this Agreement
).  To be effective, any amendment of this Agreement must be in writing and sign
ed by both you and LSI.  Should any provisions of this Agreement be held to be u
nenforceable, then such provision shall be separable from this Agreement and sha
ll not effect the remainder of the Agreement.  This Agreement shall be governed
by California law, not including its choice of law provisions.  The United Natio
ns Convention on the International Sale of Goods shall not be applied to this Ag
reement.  All rights in the Software and Documentation not specifically granted
in this Agreement are reserved by LSI or its licensors.  The English language ve
rsion of this Agreement shall be the official version.  The terms and conditions
 of this Software License Agreement shall be binding upon you and your respectiv
e heirs, successors and assigns.

10.    Survival

The provisions of Sections 2, 3, 4, 7, 8 and 9 shall survive any termination of
this Agreement.



Press Y to accept the License Agreement :█
```

11. The window for specifying the installation format opens.

For the client format, type **2** and press **Enter**.

```
Press 0 to exit from installation
Choose[1-3]:
          (1) - Complete
              This option will install all program features.
          (2) - Client
              This option will only install components required to remotely
view and
              configure servers.
          (3) - StandAlone
              This option will only install components required for local se
rver management
Note : Installer can also be run in a command line mode
Usage : install.sh [-option]
The options are :
          a
            The Complete Installation of MegaRAID Storage Manager (MSM)
          c
            The Client components only program of MSM
          s
           The StandAlone component of MSM
Setup Type :█
```

Installation starts.

Tip

MSM is installed in the following directory:
 # /usr/local/MegaRAID Storage Manager

---

12. Installation starts. After ending installation, unmount the CD-ROM, then remove the CD-ROM from the drive, and restart the system unit.

> **Tip** Make sure that you restart the system unit after **MSM** installation.

MSM installation with the client format is completed.

Uninstallation

This subsection explains the **MSM** uninstallation procedure.

Use this procedure also for uninstallation from a management PC.

Uninstalling the Windows edition

Tip	**MSM** has its own uninstallation module.

Use this uninstallation module instead of a general application removal utility.

Before you start uninstallation of **MSM**, close the **MSM Client** (including remote connections). Close other applications as well.

The pop-up message shown below may be displayed.

Click [**Abort**] when this pop-up is displayed.

Then close all applications and retry.
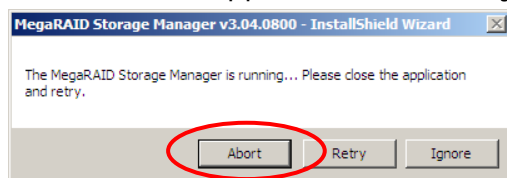
1. Start Windows and logon as Administrator.

2. For Windows Server 2012, select **All apps** after pressing **Windows Logo** key and **Space** key in this order. And select **MegaRAID Storage Manager** > **Uninstall**.
   For OS's other than Windows Server 2012, click **Start** > **All Programs** * > **MegaRAID Storage Manager** > **Uninstall**.

   * In the classic **Start** menu, click **Programs**.
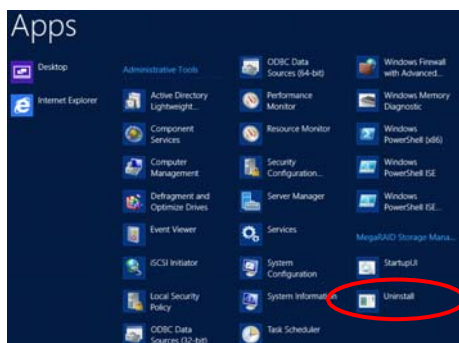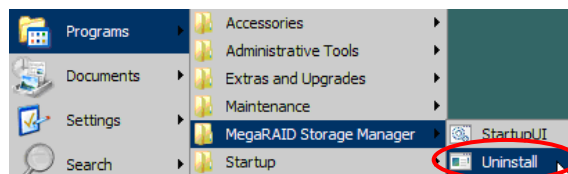
Windows Server 2012   OS's other than Windows Server 2012

3. The uninstallation start window opens. Click **Yes**.
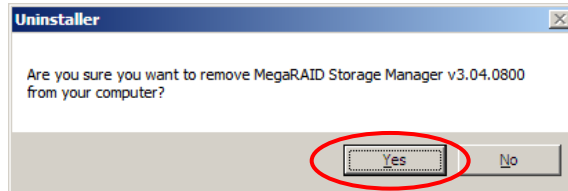
Before you start uninstallation of **MSM**, close the **MSM Client** (including remote connections). Close other applications as well.

The pop-up message shown below may be displayed.

Click [**Abort**] when this pop-up is displayed.

Then close all applications and retry.
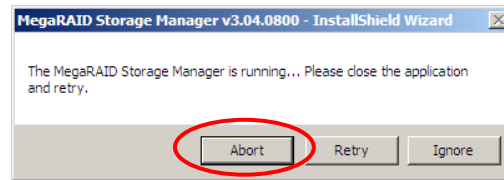
4. Uninstallation starts.

   The dialog box closes when the uninstallation is completed.
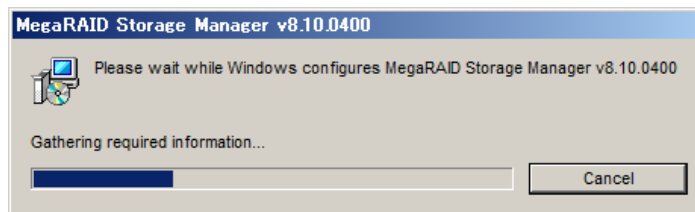
After the dialog box closes, the following pop-up massage may be displayed asking you to restart the system. Select **No** in such cases.

(Do not restart the system at this point.)
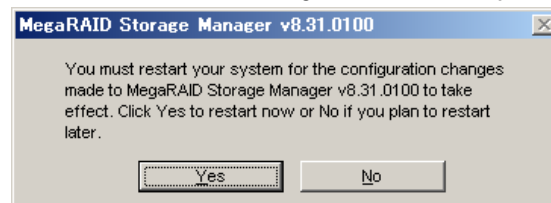
5. After step 4, check if the **MSM** installation directory still remains.

   The default installation destinations are as follows:

   - 64bit OS:

     C:\Program Files (x86)\MegaRAID Storage Manager

   - 32bit OS:

     C:\Program Files\MegaRAID Storage Manager

     If any of the above directories remains, remove it manually.

     If you cannot remove it, restart the system unit and retry.

   Uninstallation of the Windows edition of **MSM** is completed. Restart the system unit.

Make sure that you restart the system unit after **MSM** removal.

Uninstalling the Linux edition

<table>
<tr><td>Note</td><td>If the MSM SNMP module has been installed on Red Hat Enterprise Linux 6, perform the following procedure at the time of MSM uninstallation. If you do not perform it, the MSM SNMP module becomes unable to be removed.
- Enable the run level of snmpd of Linux.
   # chkconfig snmpd on
- Reboot the system unit.
- Uninstall MSM according to the procedure in this section.
- Disable the run level of snmpd of Linux.
   # chkconfig snmpd off
- Reboot the system unit.</td></tr>
</table>

<table>
<tr><td>Tip</td><td>Before you start uninstallation of MSM, close the MSM Client (including remote connections). Close other applications as well.
If MSM is running, MSM uninstallation cannot be performed.</td></tr>
</table>

1. Start Linux, and log on as root.

2. Start X Windows.

   # startx

3. Click **Application** > **System Tools** > **Uninstall MegaRAID Storage Manager** in the GUI menu.
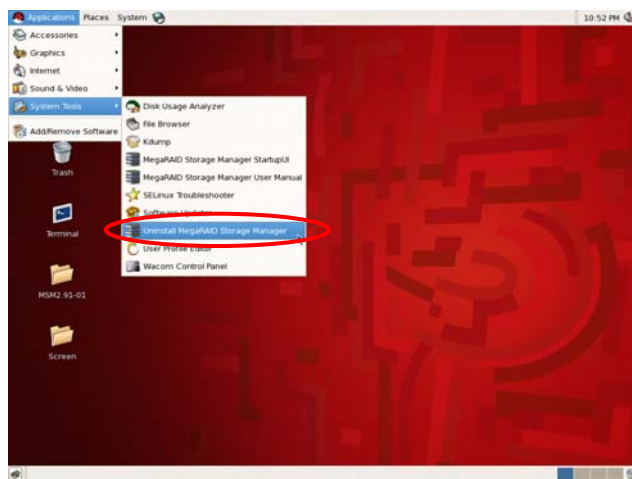
<table>
<tr><td>Tip</td><td>Before you start uninstallation of MSM, close the MSM Client (including remote connections). Close other applications as well.
MSM sometimes cannot be uninstalled. In such a case, close all applications and retry.</td></tr>
</table>

4. Uninstallation starts.

   Uninstallation completes in about a minute. Check **Application** > **System Tools again**. If **Uninstall MegaRAID Storage Manager** has been deleted, uninstallation is completed. If not deleted after you wait several minutes, use the command line as explained in the Tip below.

> **Tip**
>
> **MSM** can be uninstalled from the command line.
>
> Move to the **MSM** installation directory, and execute the following command:
>
>   # ./uninstaller.sh
>
> Before you execute the above command, close the **MSM Client** (including remote connections). Close other applications as well. **MSM** sometimes cannot be uninstalled with the message below.
>
> In such a case, close all applications and retry.
>
>   MegaRAID Storage Manager is running. Please shutdown the
>   process and retry.
>   Error: %preun (MegaRAID_Storage_Manager-xxxxxx.noarch)
>   scriptlet failed. Exit status 1
>   (* "x" varies depending on the MSM version.)

---

5. Uninstall the command line programs.

   Enter the following command:

       # rpm -ev MegaCli

   The command is completed if the MegaRAID folder under #/opt has been deleted.

   If the MegaRAID directory remains after execution of the above command, remove it manually.

6. Uninstall the utility library programs.

   Enter the following command:

       # rpm -ev Lib_Utils-xxx-xxx.noarch .... (Note 1) (Note 2) (Note 3)
       # rpm -ev Lib_Utils2-xxx-xxx.noarch ... (Note 1) (Note 2) (Note 3)

The command is completed if the **lsi** folder under #/opt has been deleted.

If the **lsi** directory remains after execution of the above command, remove it manually.

Note 1: They are the same as the file names created under the **disk** directory expanded at the time of Linux installation. However, rpm is not required.

Note 2: These utility programs are not installed for Ver.3.04-08 or earlier.

Note 3: The following command displays utility programs currently installed:

      # rpm -qa Lib_Utils*

Uninstallation of the Linux edition **MSM** is completed. Restart the system unit.

Tip   Make sure that you restart the system unit after **MSM** uninstallation.

Activating MegaRAID Storage Manager

This section explains how to activate, log in, and exit **MSM**.

[Tip]	To be enough time whenever you start **MSM** after system unit activation.
	Services MrMonitor and MrMonitor monitoring are not installed in **MSM** Ver.11.08.XX.XX or later. Therefore, the following events recorded in the OS event log just after OS boot will not be collected.
	[Windows OS, Linux OS]
	Monitor has started successfully
	[Only Windows]
	service monitor has started successfully

Activating MSM

1. Activate **MSM** in the following procedure:

   - For Windows

     For Windows Server 2012, select **All apps** after pressing **Windows Logo** key and **Space** key in this order. And select **MegaRAID Storage Manager** > **StartupUI**.

     For OS's other than Windows Server 2012, click **Start** > **All Programs** * > **MegaRAID Storage Manager** > **StartupUI**.

     * In the classic **Start** menu, click **Programs**.
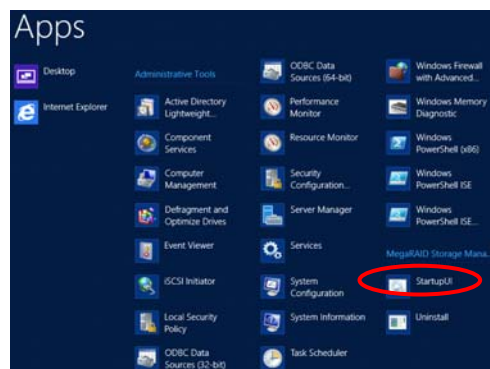
Windows Server 2012	OS's other than Windows Server 2012
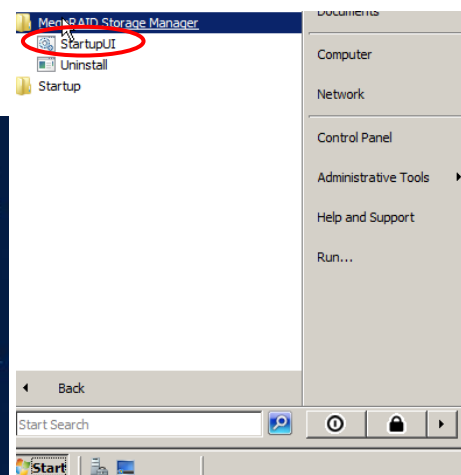
You can start **MSM** also by double-clicking the **MegaRAID Storage Manager** icon on the desktop.

- For Linux

  With X Window running, click **Application** > **System Tools** > **MegaRAID Storage Manager StartupUI**.
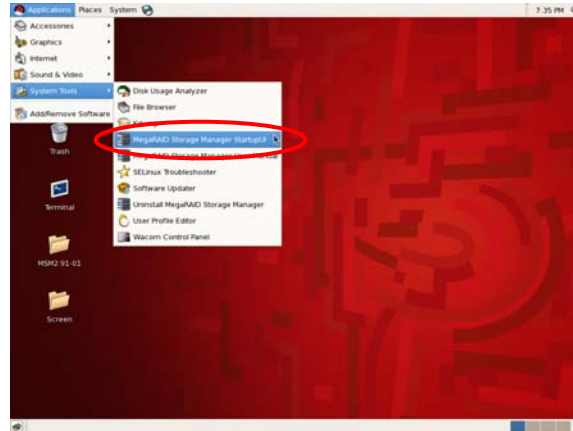
2. The server selection window opens.

   Select and double-click a server displayed in the **Remote servers** window, or select the server and click **Login**.
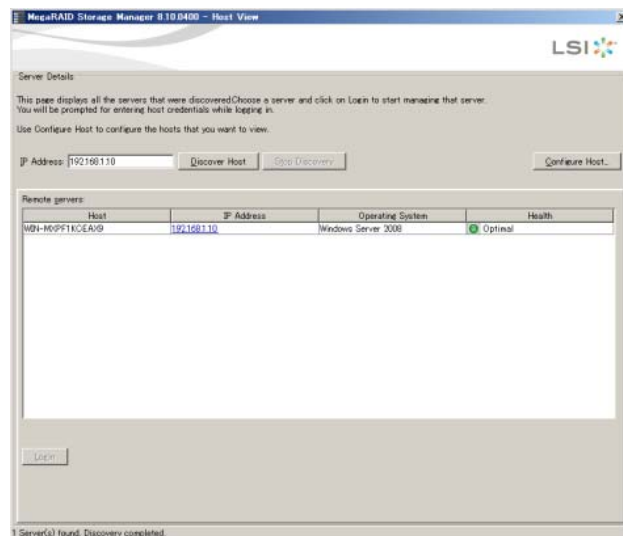
> **Tip** If the system unit is not connected to LAN, the **Remote servers** window is blank.
>
> In this case, the window shown below opens.
>
> To log in the local server, enter "127.0.0.1" in **IP Address** and click **Discover Host**. Servers are displayed in the **Remote servers** window. Select and double-click a server, or select the server and click **Login**.
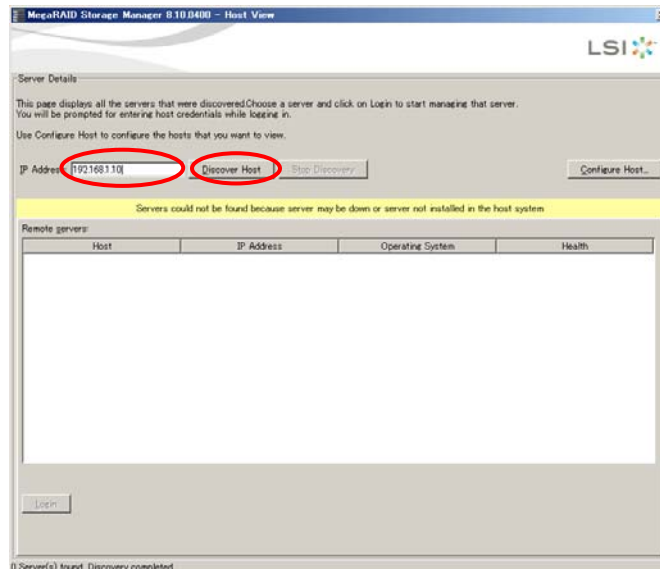
> Windows Server 2012 is indicated as "Windows NT(unknown)" in the **Operating System** pane of this dialog box.

3. The login window opens.

   Enter your user name and password in the **User Name** and **Password** fields, and click **Login**.
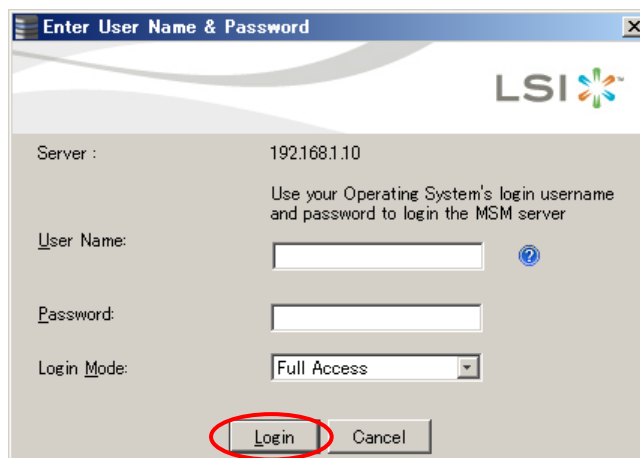
> **Note**
>
> Only one user can logon a managed server at a time with **Login Mode** set to **Full Access**. Simultaneous log on a managed server with **Full Access** is not allowed.
>
> When you logon the server with **Login Mode** of **Full Access**, you have to use the user name and password of the administrator account (Windows: Administrator, Linux: root).

4. The main window opens.
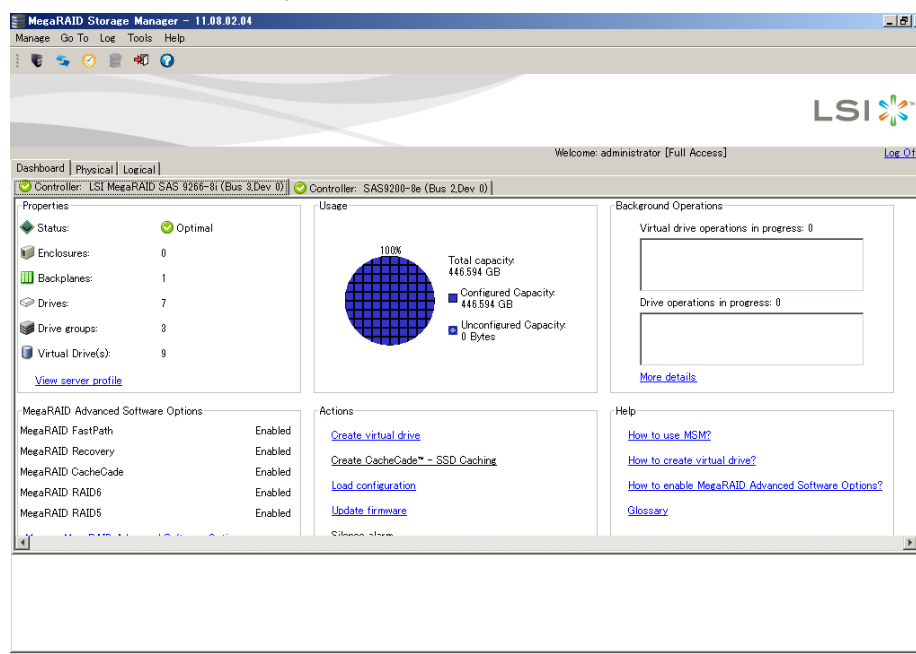
Starting MSM (for remote connection)

This section explains the case when **MSM** has been installed in the complete format

1. Activate **MSM** in the following procedure:

   - For Windows

   For Windows Server 2012, select **All apps** after pressing **Windows Logo** key and **Space** key in this order. And select **MegaRAID Storage Manager** > **StartupUI**.

   For OS's other than Windows Server 2012, click **Start** > **All Programs*** > **MegaRAID Storage Manager** > **StartupUI**.

   * In the classic **Start** menu, click **Programs**.

Windows Server 2012   OS's other than Windows Server 2012

You can start **MSM** also by double-clicking the **MegaRAID Storage Manager** icon on the desktop.

MegaRAID Storage Manager Instruction Manual
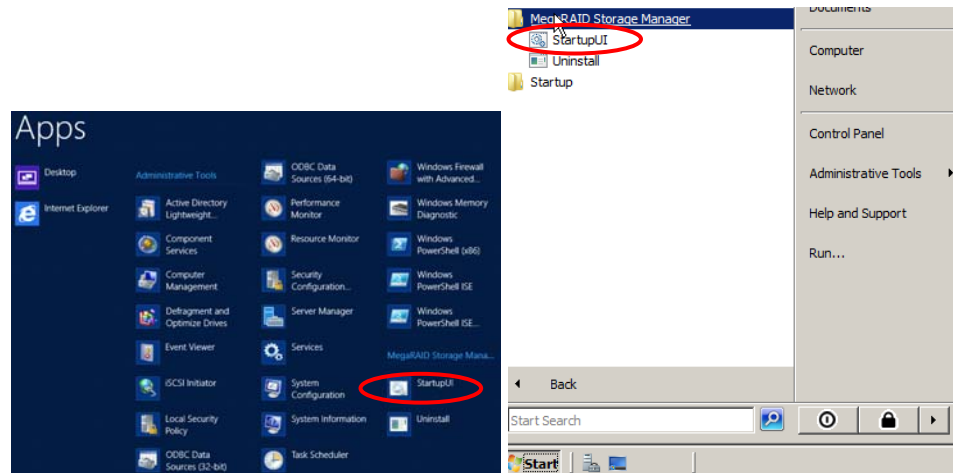
- For Linux

  With X Window running, click **Application** > **System Tool** > **MegaRAID Storage Manager StartupUI**.

2. The server selection window opens.

   In the **IP Address** entry field, enter the IP address of the server to be started (192.168.1.2, for example), and click **Discover Host**.
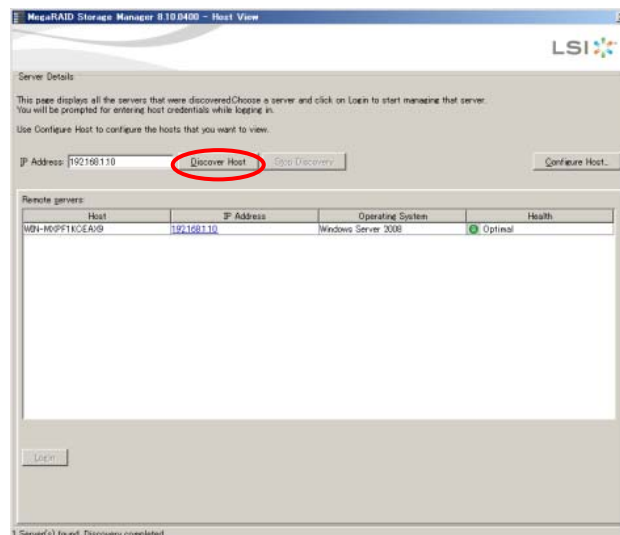
3. The server selection window opens.

   The server specified in step 2 is displayed in **Remote servers**. Select and double-click the server, or select the server and click **Login**.
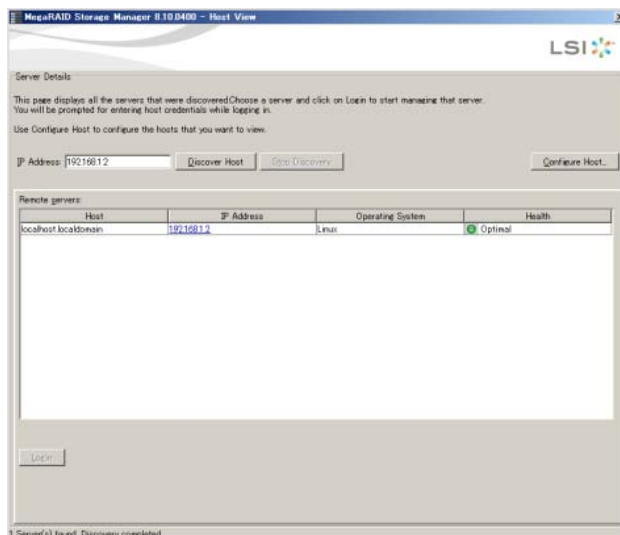
   | Tip | Windows Server 2012 is indicated as "Windows NT(unknown)" in the **Operating System** pane of this dialog box. |

4. The login window opens.

   Enter your user name and password in the **User Name** and **Password** fields, and click **Login**.

   | Note | Only one user can logon a managed server at a time with **Login Mode** set to **Full Access**. Simultaneous log on a managed server with **Full Access** is not allowed. |
   | | When you logon the server with **Login Mode** of **Full Access**, you have to use the user name and password of the administrator account (Windows: Administrator, Linux: root). |

MegaRAID Storage Manager Instruction Manual

5. The main window opens.
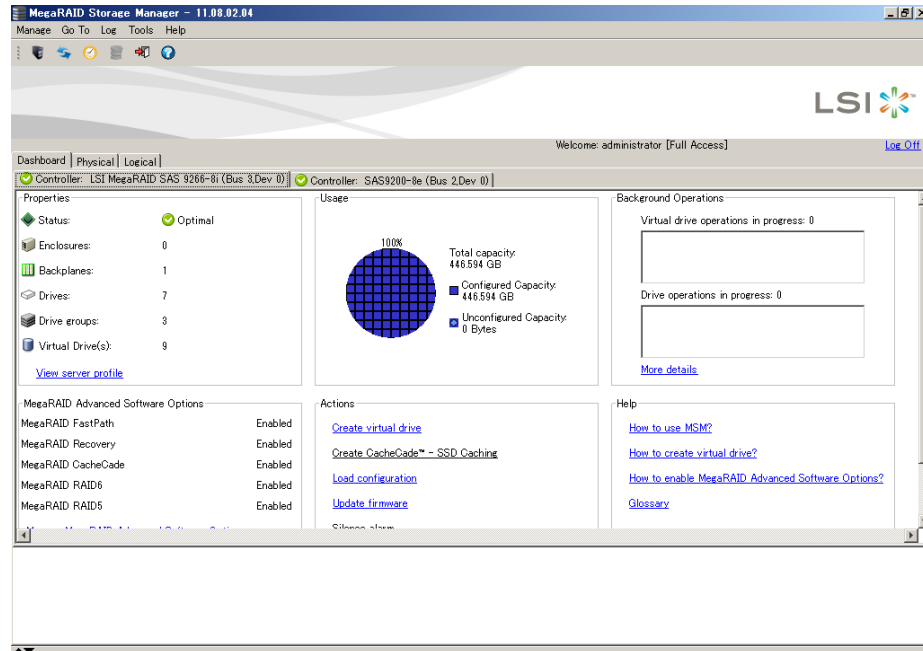
6. You can log on a multiple server by repeating step 2 above.
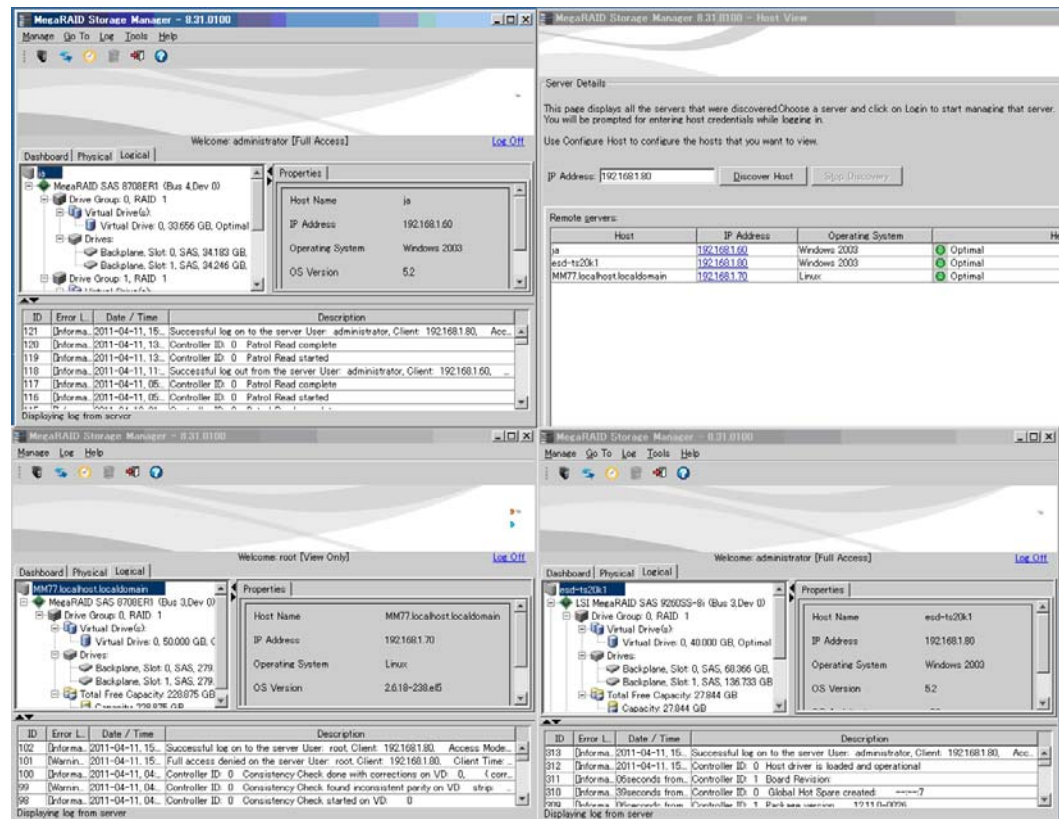
Displaying multiple connected servers

This section explains the case where multiple remote servers are connected (installed in the complete format).

1. Activate **MSM** in the following procedure:

   - For Windows

     For Windows Server 2012, select **All apps** after pressing **Windows Logo** key and **Space** key in this order. And select **MegaRAID Storage Manager** > **StartupUI**.

     For OS's other than Windows Server 2012, click **Start** > **All Programs*** > **MegaRAID Storage Manager** > **StartupUI**.

     * In the classic **Start** menu, click **Programs**.
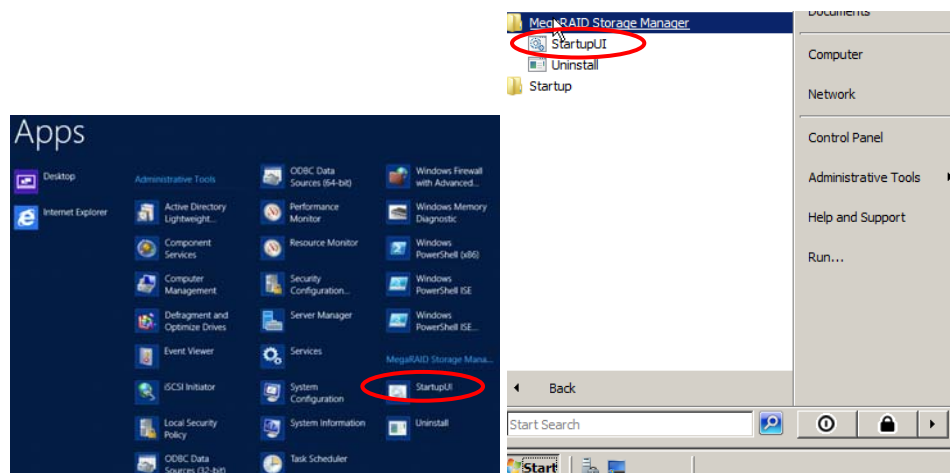
Windows Server 2012   OS's other than Windows Server 2012

     You can start **MSM** also by double-clicking the **MegaRAID Storage Manager** icon on the desktop.

- For Linux

  With X Window running, click **Application** > **System Tool** > **MegaRAID Storage Manager StartupUI**.

2. The server selection window opens.

   Click **Configure Host**.
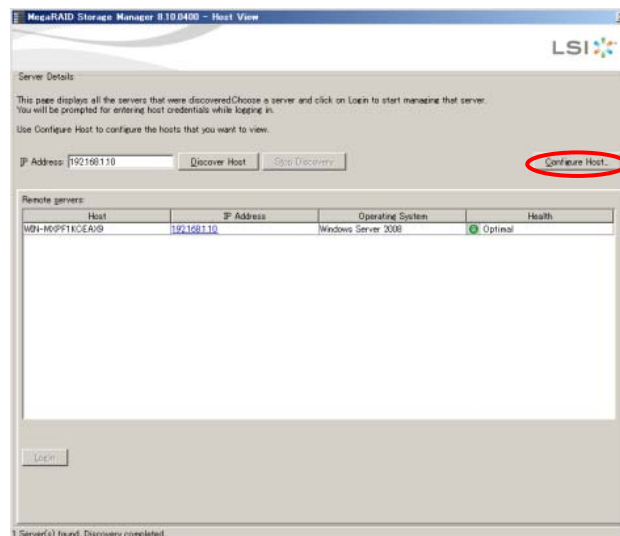
Tip | Windows Server 2012 is indicated as "Windows NT(unknown)" in the **Operating System** pane of this dialog box.

---

3. The **Configure Host** window opens.

   Select **Display all the systems in the network of local server.**, and click **Save Settings**.
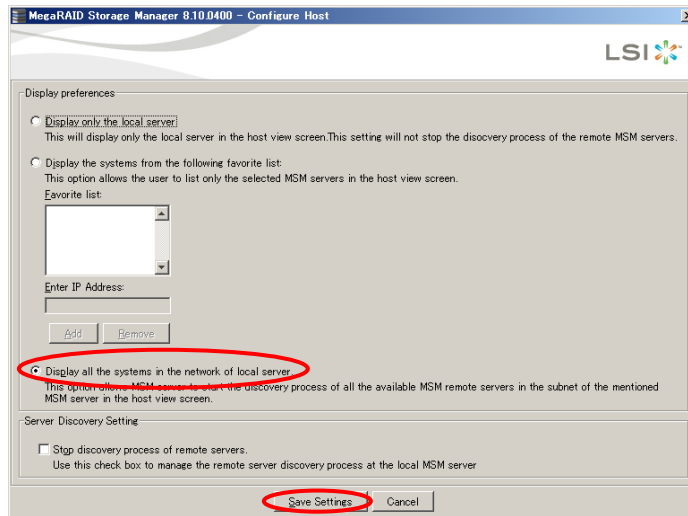
4. The **Confirmation** pop-up message is displayed.

   Click **Yes**.

   The connected servers are searched for.
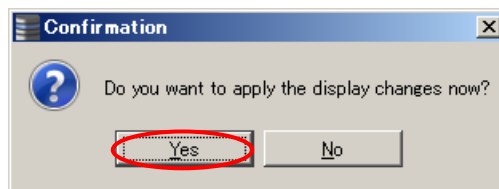
5. The server selection window opens.

   All the connected servers are displayed in the **Remote servers** list.
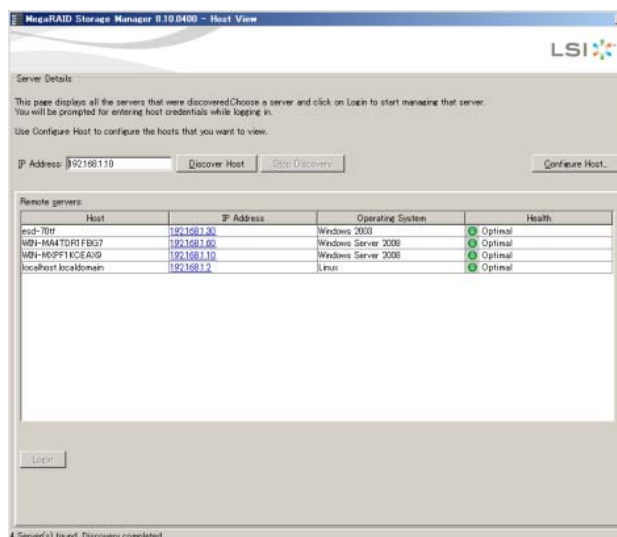
Switching servers to be displayed (for remote connection)

> **Note**
> **Manage > Server** cannot be used. Do not use this method.
> To switch server to be displayed, close **MSM** and perform the procedure "Starting MSM (for remote connection)" on page 2-60.

1. In the main window, select **Server** from the **Manage** menu.
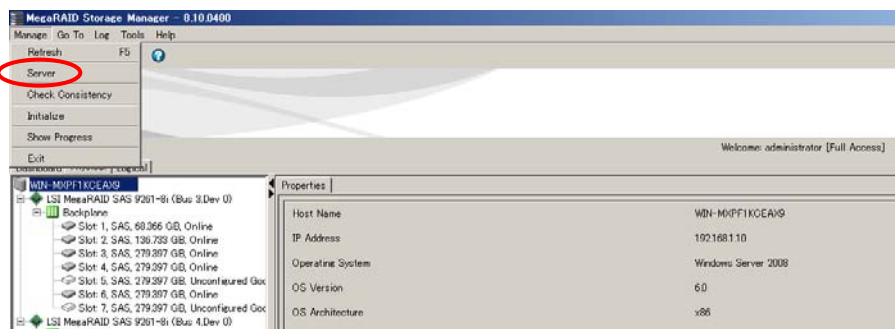
2. The server selection window opens.

   Select and double-click the server to logon (to start), or select the server and click **Login**.
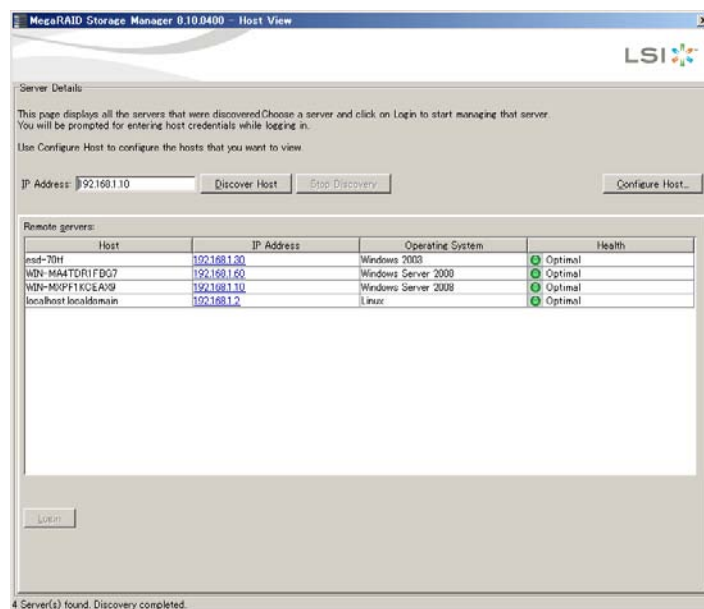
> **Tip**
> Windows Server 2012 is indicated as "Windows NT(unknown)" in the **Operating System** pane of this dialog box.

3. A switch warning pop-up massage is displayed.

Select **Confirm**, and click **Yes**.
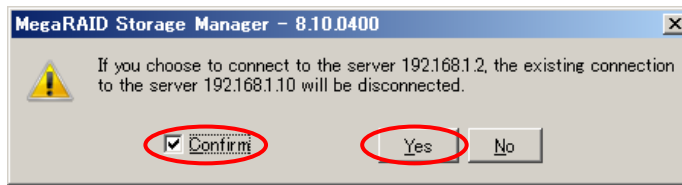
4. The login window opens.

Enter your user name and password in the **User Name** and **Password** fields, and click **Login**.


Note	Only one user can logon a managed server at a time with **Login Mode** set to **Full Access**. Simultaneous log on a managed server with **Full Access** is not allowed. When you logon the server with **Login Mode** of **Full Access**, you have to use the user name and password of the administrator account (Windows: Administrator, Linux: root).

5. The main window of the selected server is displayed.

MegaRAID Storage Manager Instruction Manual
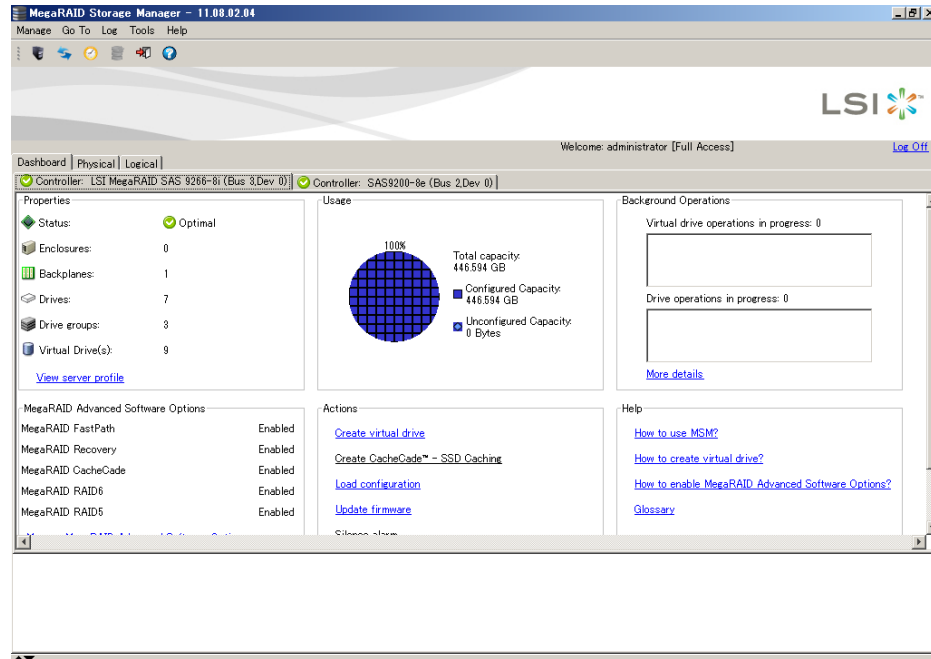
Exiting MegaRAID Storage Manager

This section explains how to exit **MSM**.

1. Click ⊠ at the upper right corner of the window, or select **Exit** from the **Manage** menu. You can also click **Log Off**. (Note 1)
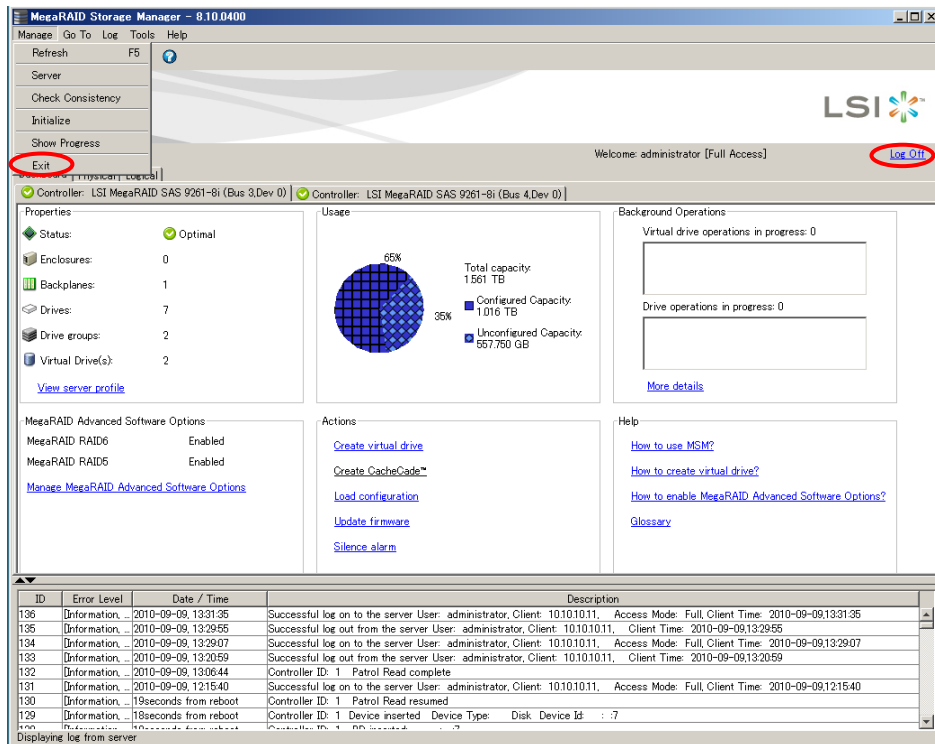
Note 1:   When you click **Log Off** in **Dashboard**, the following pop-up massage is displayed.

Click **Yes**.

(Then the server selection window opens again. Click ⊠ at the upper-right corner.)
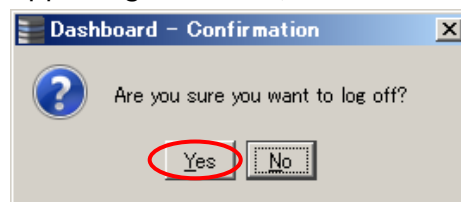
Initialization

Initialize the system unit in accordance with its operation form.

The table below lists the setting items.

Setting item	Description	Reference pages
Exception setting of network security	Sets a network security exception for **MSM**.	2-161
Event notification setting	Sets the conditions for event notifications for disk array events.	2-171
Patrol Read setting*	Configures Patrol Read, which runs in the background.	2-179
Hot spare setting*	If a hot spare physical drive has been included in the purchased system unit, the hot spare is configured as a global hot spare at the time of shipment. Change the setting to a dedicated hot spare as necessary.	2-125
* These cannot be used depending on the disk array controller type (including LSI Software RAID). These cannot be used depending on the number of the maximum mark of the physical drive which can be carried in a system unit.		

For setting details, see the page referenced in the table above.

Screen configuration and descriptions of MegaRAID Storage Manager

The **MSM** main window configuration is described below.
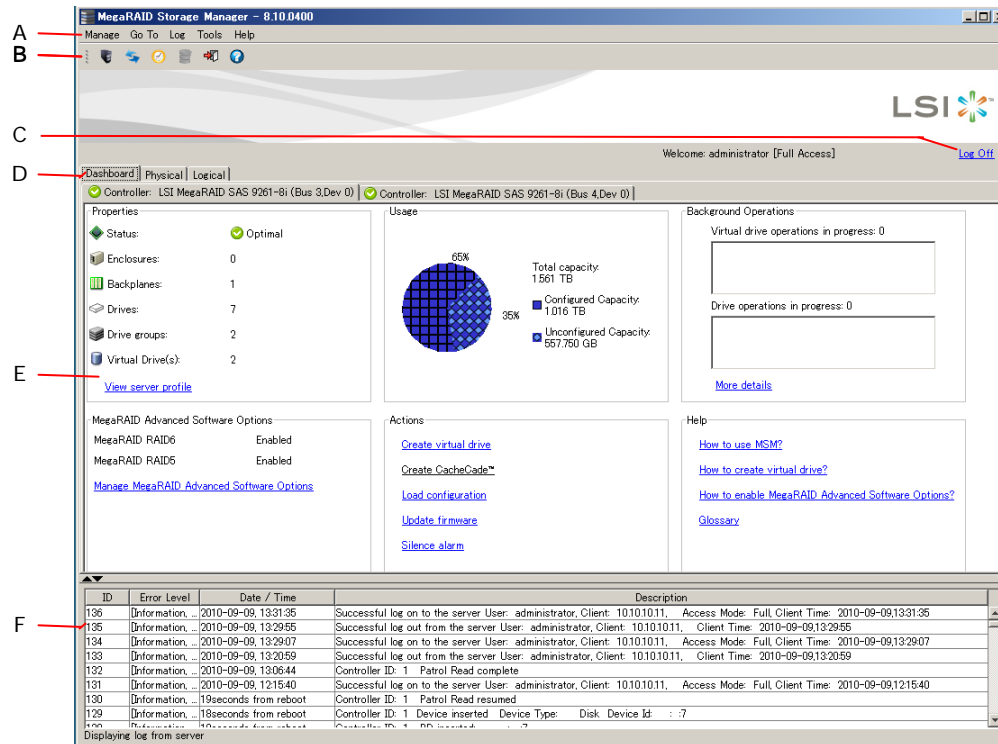
A **Menu bar**
Lists five menus: **Manage**, **Go To**, **Log**, **Tools**, and **Help**.

B **Menu bar (graphical)**
Lists six menus: **Server**, **Refresh**, **Group show progress**, **Create Virtual Driv**e, **Exit**, and **Help**.

C **Log Off**
Exits **MSM**.

D **Tabs**
Switches between the **Dashboard**, **Physical**, and **Logical** views.

E **Configuration information**
Displays the RAID (Dashboard), Physical, and Logical configuration information.

F **Message window**
Displays an event log.

Menus

The **MSM** menu items are described below.

Manage: Manager menu

```
Manage
  Refresh          F5
  Server
  Check Consistency
  Initialize
  Show Progress
  Exit
```
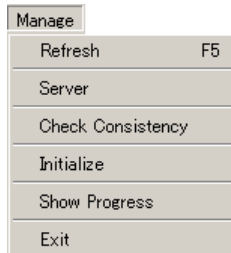
Menu item	Description
Refresh F5	Refreshes the controller and connected devices.
Server	Switches the displayed server. (Not supported)
Check Consistency	Performs a consistency check.
Initialize	Performs initialization.
Show Progress	Displays the status of running tasks (initialization of a virtual drive, rebuild, consistency check, and capacity expansion).
Exit	Exits **MSM**.

Go To: Execution menu

The **Go To** menu shows different menu items depending on the selected device (controller, physical drive, or virtual drive) in the **Physical** view or the **Logical** view.

You can also display some of the operation menu items by right-clicking a target device.

- Main view

Menu item	Description
Controller	Menu for RAID controller
Drive Group	Menu for expansion of the virtual drive capacity
Physical Drive	Menu for physical drives
Virtual Drive	Menu for virtual drives
BBU	Menu for battery functions

NOTICE

Replacing or deleting the configuration data during disk array operation will erase all data of virtual drives that have been configured. Be careful during operation.

- When **Controller** is selected in the **Physical** view or the **Logical** view
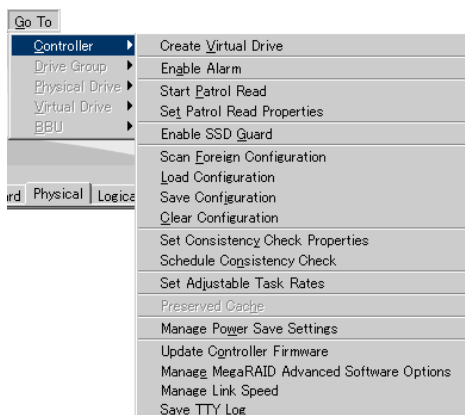
Menu item	Description
Create Virtual Drive	Structures a new virtual drive
Enable Alarm/Disable Alarm*	Configures the buzzer alarm (switching between **Enable** and **Disable**).
Start Patrol Read	Starts Patrol Read.
Set Patrol Read Properties	Sets the processing method of Patrol Read.
Enable SSD Guard*	Configures SSD Guard^{TM}. (Default: Disable)
Scan Foreign Configuration*	Reads configuration information from a physical drive and sets it again.
Load Configuration	Replaces the current configuration information with file content.

Menu item	Description
Save Configuration	Saves configuration information.
Clear Configuration	Deletes configuration information.
Set Consistency Check Properties*	Sets the consistency check processing method.
Set Adjustable Task Rates	Sets the rates of various tasks.
Manage Power Save Settings*	Sets the power-saving mode of physical drives.
Update Controller Firmware*	Updates the firmware of the disk array controller.
Manage MegaRAID Advanced Software Options*	Displays the advanced software options for MegaRAID.
Manage Link Speed*	Sets the transmission speed of a virtual drive.
Save TTY Log	Saves the TTY log of the disk array controller.
*These menus may not be displayed depending on the disk array controller type (including LSI Software RAID).	

> **Note** Do not use **Load Configuration**, **Clear Configuration**, or **Scan Foreign Configuration**. All data on the drive will be erased by replacing or deleting configuration data.
>
> **Manage Power Save Settings**, **Manage MegaRAID Advanced Software Options**, **Manage Link Speed**, and **Save TTY Log** are not supported.

- When **Drive Group** is selected in the **Logical** view
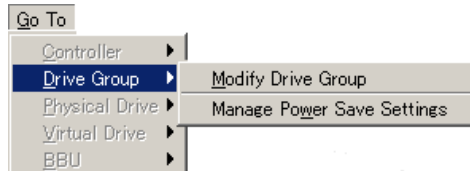
Menu item	Description
Modify Drive Group*	Menu for expansion of the virtual drive capacity
Manage Power Save Settings*	Sets power-saving mode of virtual drives
* These menus may not be displayed depending on the disk array controller type (including LSI Software RAID).	

- When **Physical Drive** is selected in the **Physical** or **Logical** view (When a physical drive included in a virtual drive is selected)
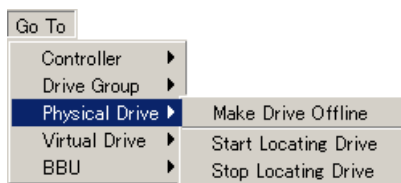
Menu item	Description
Make Drive Offline / Make Drive Online	Sets a physical drive to on-line or off-line. (Switching between on-line and off-line)
Start Locating Drive	Makes the LED of a physical drive blink.
Stop Locating Drive	Stops blinking the LED of a physical drive.

Do not use **Make Drive Offline**. Otherwise, a normal physical drive will be registered as an error, and isolated from the disk array.

Do not use **Make Drive Online**. Otherwise, the generation of a parity and mirror data will be started automatically, thus losing all data on the disk array.

The menu items **Start Locating Drive** and **Stop Locating Drive** are not supported for LSI Software RAID.

- When **Physical Drive** is selected in the **Physical** or **Logical** view (When a physical drive configured as a hot spare is selected)
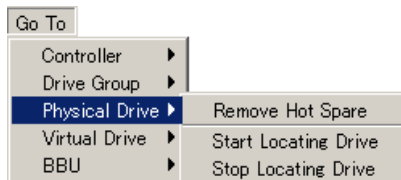
Menu item	Description
Remove Hot Spare	Release a hot spare.
Start Locating Drive	Makes the LED of a physical drive blink.
Stop Locating Drive	Stops blinking the LED of a physical drive.

The menu items **Start Locating Drive** and **Stop Locating Drive** are not supported for LSI Software RAID.

- When **Physical Drive** is selected in the **Physical** view
  (when an unused physical drive is selected)
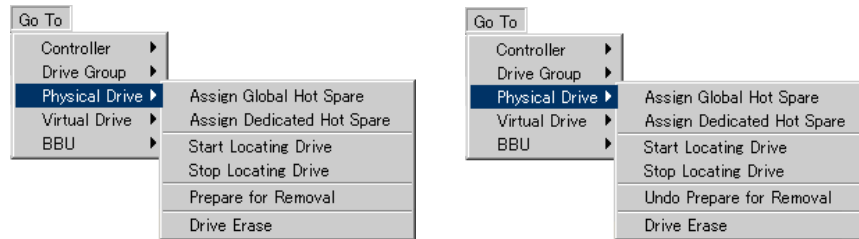
Menu item	Description
Assign Global Hot Spare	Sets a physical drive as a global hot spare drive.
Assign Dedicated Hot Spare	Sets a physical drive as a dedicated hot spare drive.
Start Locating Drive	Makes the LED of a physical drive blink.
Stop Locating Drive	Stops blinking the LED of a physical drive.
Prepare for Removal	Sets a physical drive off-line, and stops the motor.
Undo Prepare for Removal	Starts the motor of a physical drive that has been set off-line by Prepare for Removal so that the drive can be used.
Drive Erase*	Executes the Drive Erase function for a physical drive.
* These menus may not be displayed depending on the disk array controller type (including LSI Software RAID).	

> **Note**
> Do not use **Prepare for Removal**, **Undo Prepare for Removal**, or **Drive Erase**. Only one of **Prepare for Removal** or **Undo Prepare for Removal** is displayed depending on the current setting.
>
> For hot spare setting, see "Configuring a hot spare" on page 2-125.

> **Tip**
> The menu items **Start Locating Drive** and **Stop Locating Drive** are not supported for LSI Software RAID.
>
> The menu items **Prepare for Removal** and **Undo Prepare for Removal** are not displayed.

- When **Virtual Drive** is selected in the **Logical** view

```
Go To
  Controller        ▶
  Drive Group       ▶
  Physical Drive    ▶
  Virtual Drive     ▶   Rename Virtual Drive
  BBU               ▶   Delete Virtual Drive
                        Set Virtual Drive Properties
                        Enable MegaRAID Recovery
                        Start Locating Virtual Drive
                        Stop Locating Virtual Drive
                        Start Consistency Check
                        Start Initialization
                        Expand
                        Virtual Drive Erase
```
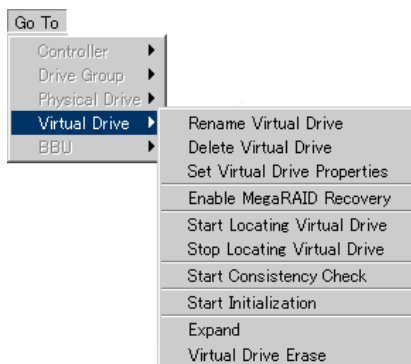
Menu item	Description
Rename Virtual Drive	Renames a virtual drive.
Delete Virtual Drive	Deletes a virtual drive.
Set Virtual Drive Properties	Changes the setting of a virtual drive.
Start Locating Virtual Drive	Makes the LED of a virtual drive blink.
Stop Locating Virtual Drive	Stops blinking the LED of a virtual drive.
Start Consistency Check	Performs a consistency check.
Start Initialization	Performs initialization.
Expand	Expands the capacity of a virtual drive.
Virtual Drive Erase*	Executes the Drive Erase function for a virtual drive.
* These menus may not be displayed depending on the disk array controller type (including LSI Software RAID).	

> **Note**
>
> **Virtual Drive Erase** is not supported.
>
> The menu item **Expand** is displayed only when there is a virtual drive that has not exhausted the capacity of the drive group. This item is not supported.

> **Tip**
>
> The menu items **Start Locating Virtual Drive** and **Stop Locating Virtual Drive** are not supported for LSI Software RAID.

- When **BBU** is selected in the **Physical** view
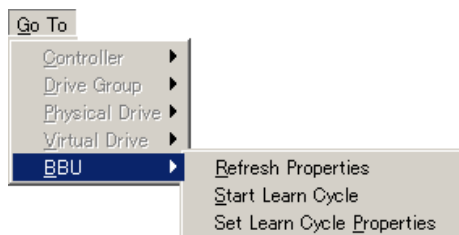
Menu item	Description
Refresh Properties	Updates the property of the cache backup module.
Start Learn Cycle	Performs diagnosis (Learn Cycle).
Set Learn Cycle Properties	Changes the setting of diagnosis (Learn Cycle).

> **Note** This item is displayed only for disk array controllers (with cache backup)
>
> **Set Learn Cycle Properties** is not supported. Avoid its use. Use the auto diagnosis with the default setting (**Enable**).

> **Tip** To check if the device is a disk array controller (with cache backup), check **BBU Present** of "Controller" on page 2-88. If the value is **Yes**, the device is a disk array controller (with cache backup).

Log: Log menu
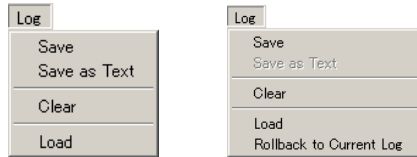
Menu item	Description
Save	Saves an event log.
Save as Text	Saves an event log in the text format.
Clear	Deletes an event log.
Load	Opens a saved event log.
Rollback to Current Log	Closes Load, and displays the latest event. (This item is added to the menu when Load is clicked.)

> **Note** Do not use **Clear**. Otherwise, fault analysis may be affected.

Tools: Tool menu
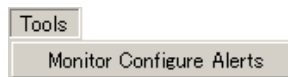
Menu item	Description
Monitor Configure Alerts	Displays the event notification setting window.

Help: Help menu

Menu item		Description
Contents		Displays help.
About MegaRAID Storage Manager		Displays **MSM** version information.
	Server Info	Displays server details.

Window icons

Menu item	Description
	Represents a server.
	Represents a disk array controller.
RAID	Represents a port of a disk array controller.
	Represents an enclosure device.
	Represents a virtual drive group.
	Represents a virtual drive.
	Represents a RAID group.
	Represents a physical drive.
	Represents a global hot spare drive.
	Represents a dedicated hot spare drive.
	Represent a physical drive being rebuilt.
	Represents degradation of a virtual drive.
	Represents a device failure.
	Represents a drive that was once used.
	Represents a cache backup module.

The menu item **Enclosure** is not displayed for LSI Software RAID.

Functions of MegaRAID Storage Manager

This section explains **MSM** functions.

The following table lists the major **MSM** functions:

Function	Description	Reference pages
Display of properties	Configures the properties (detailed information) of devices such as physical drives and virtual drives.	2-85
Creating new virtual drive(s)[1]	Structures new virtual drive(s).	2-99
Changing the setting of virtual drive(s)[1]	Changes the setting of virtual drive(s).	2-113
Initialize of virtual drive(s)[1]	Initializes virtual drive(s).	2-116
Consistency check of virtual drive(s)	Checks the consistency of virtual drive(s) of redundant configuration.	2-118
Configuration a hot spare[1]	Creates and deletes a global hot spare or a dedicated hot spare.	2-125
Expanding virtual drive capacity[1]	Expands the capacity by adding a new physical drive to the existing virtual drive.	2-135
Deleting virtual drive(s)[1]	Deletes virtual drive(s).	2-139
Changing write cache[1]	Changes the cache setting of the disk array controller. There is restriction in write cache change. Make sure that you read the precaution in the page of the detailed description.	2-140
Blinking LEDs[1]	Makes LED of each physical drive blink.	2-143
Diagnosing cache back module (BBU)[1] [2]	Diagnoses the cache back module (BBU).	2-145
Enabling and disabling SMART copyback[1]	Changes the enable/disable setting of SMART copyback. * This function is configured with MegaCli.	2-148
Rescan	Rescans a device.	2-153
Event reference	References various events that occur in the disk array.	2-153
Displaying task progress and terminating tasks	Displays the progress of running tasks such as rebuild and consistency check, and stops tasks.	2-157
Updating firmware	Updates the firmware of the disk array controller. **Firmware update is not supported.** Do not execute the following: **[Firmware update]** **Go To** > **Controller** > **Update Controller Firmware**	-
Setting network security exceptions	Sets a network security exception for **MSM**.	2-161
Setting an event notification	Sets the conditions for event notifications for disk array events.	2-171

Function	Description	Reference pages
Setting patrol Read*[1]	Configures Patrol Read, which runs in the background.	2-179
Task rate setting	Sets the rates of various tasks. **Task rate setting is not supported.** Do not execute the following: **[Task rate setting]** **Go To** > **Controller** > **Set Adjustable Task Rates** *Always set the task rate to the default value (30%)	-
Setting of power-saving mode of physical drives	Sets the power-saving mode of physical drives. **The power-saving mode setting for physical drives is not supported.** Do not execute the following: **[Setting of power-saving mode of physical drives]** **Go To** > **Controller** > **Manage Power Save Settings**	-
Setting of the consistency check schedule	Sets a consistency check schedule. Make sure that you apply this setting for LSI Software RAID. For a RAID device other than LSI Software RAID, this setting is not required because Patrol Read runs periodically. *This function is configured by MegaCli.	2-120
Setting of the consistency check processing method	Sets a consistency check processing method. **Setting of the consistency check method is not supported.** Do not execute the following: **[Setting of the consistency check processing method]** **Go To** > **Controller** > **Set Consistency Check Properties**	-

SSD GuardTM	Configures SSD Guard^{TM}. [Default: Disable]
	
	SSD GuardTM is not supported.
	
	Do not execute the following:
	
	[SSD Guard^{TM} setting]
	
	   Go To > **Controller** > **Enable SSD Guard**
	
	   , or
	
	   Go To > **Controller** > **Disable SSD Guard**
		-

Buzzer setting of the disk array controller	Configures the buzzer of the disk array controller.
	
	Buzzer setting of disk array controllers is not supported.
	
	Do not execute the following:
	
	[Buzzer setting of the disk array controller]
	
	   Go To > **Controller** > **Enable Alarm**
	
	   , or
	
	   Go To > **Controller** > **Disable Alarm**
		-

Function	Description	Reference pages
Restrictions Precautions	Explains restrictions and precautions on use of **MSM**.	2-184 and 2-187
*1: These cannot be used depending on the disk array controller type (including LSI Software RAID). These cannot be used depending on the number of the maximum mark of the physical drive which can be carried in a system unit.		
*2: This function can be used only for disk array controllers (with cache backup). To check if the device is a disk array controller (with cache backup), check **BBU Present** of "Controller" on page 2-88. If the value is **Yes**, the device is a disk array controller (with cache backup).		

Details of each function are explained in the pages that follow.

> **Note** Firmware update, task rate setting, setting of power-saving mode of physical drives, setting of the consistency check processing method, SSD Guard, and buzzer setting of the disk array controller are not supported.

Display of properties

This function enables you to reference the properties of devices that are displayed in the **Physical** view and **Logical** view of the main window.

The default view is the **Dashboard** view. You can switch between **Physical** and **Logical** views by operating the respective tab.

The **Dashboard** view displays the overall properties of the target RAID.
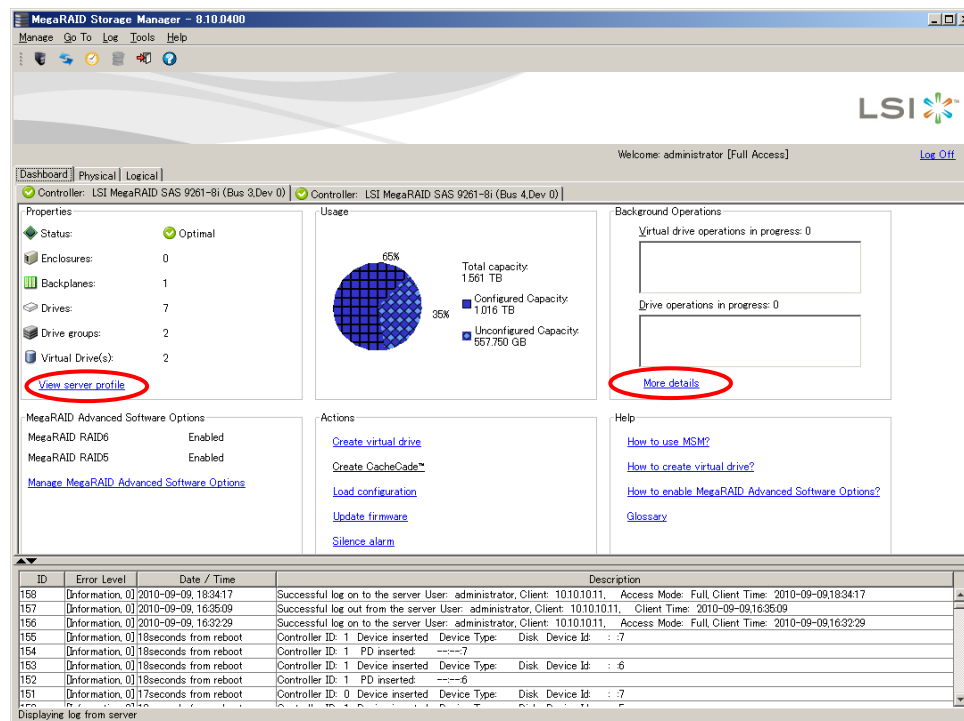
> **Note**: Do not use menu items other than **Properties** > **View server profile** and **Background Operations** > **More details**.

In addition to the content displayed in the **Physical** view, the **Logical** view displays information on the status of the logical drives built.

Click the target device to display its properties.

- **Physical** view

- **Logical** view

MegaRAID Storage Manager

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Properties of each drive are as follows:

Server

This screen displays the installation OS, the host name, the IP address, and other information of the servers.
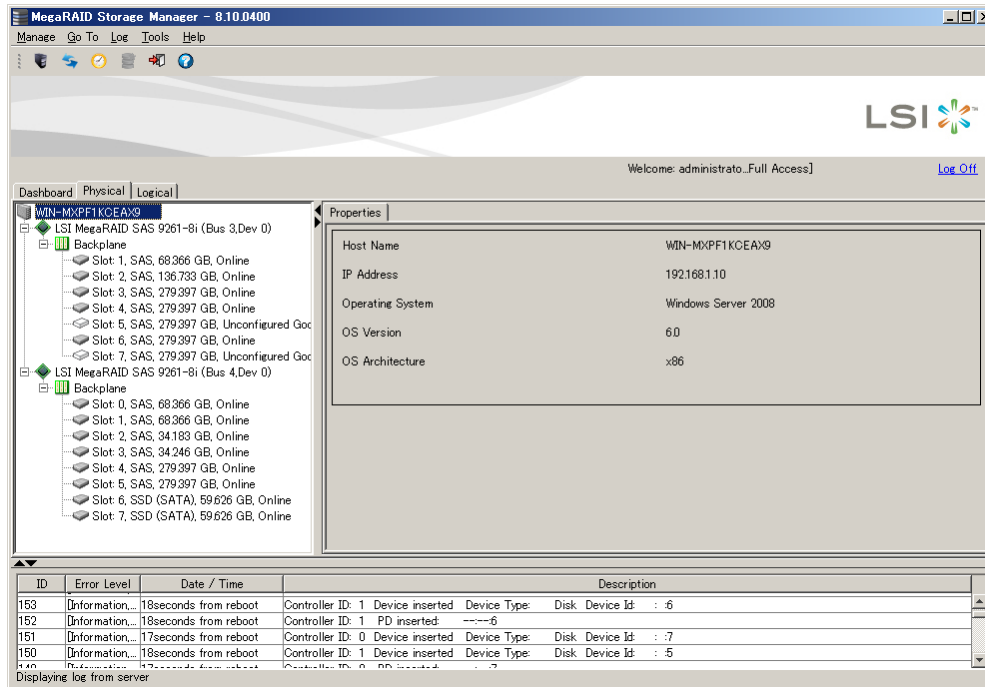
Property	Description
Host Name	Host name of the server
IP Address	IP address of the server
Operating System	Operating system (OS) installed in the server
OS Version	Version of the OS installed in the server
OS Architecture	Architecture of the OS installed in the server

> **Tip**
> In Windows Server 2012, **Operating System** is displayed as "Windows NT(unknown)".

Controller

Displays the BIOS version and the firmware version of the disk array controller.
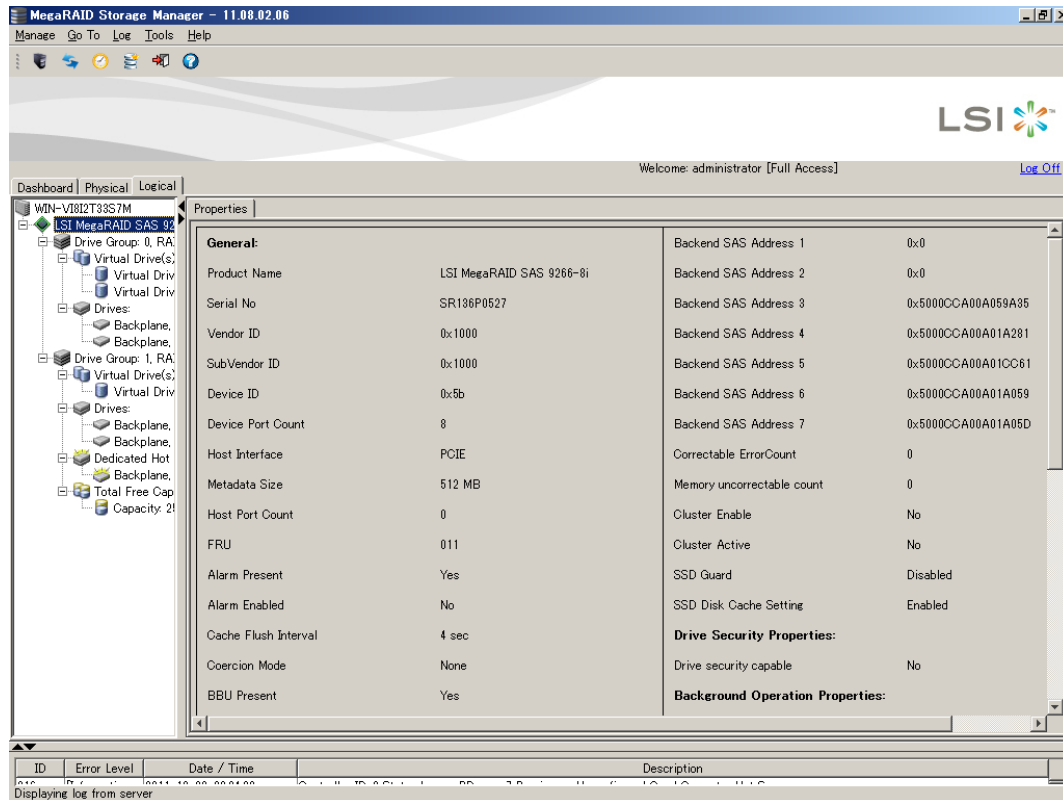
Property item	Description
Product Name	Vender's name of the disk array controller board
Serial No	Serial number of the disk array controller board
Vendor ID	Vendor ID of the disk array controller board
SubVender ID	Sub-vendor ID of the disk array controller board
Device ID	Device ID of the disk array controller board
Device Port Count	Number of the SAS ports of the disk array controller board
Host Interface	Host interface of the disk array controller board
Metadata Size	Meta data size of the disk array controller board
Host Port Count	Number of the host ports of the disk array controller board
FRU	Customer-replaceable component number * FRU is not supported.
Alarm Present	Implementation status of the buzzer alarm
Alarm Enabled*[1]	Enabled/disabled status of the buzzer alarm
Cache Flush Interval	Interval of cache memory flush
Coercion Mode	Capacity control setting of physical drives

Property item	Description
BBU Present	Implementation status of cache backup module
NVRAM Present	Implementation status of NVRAM
NVRAM Size[1]	Size of NVRAM
BIOS Version[1]	BIOS version of disk array controller board
Native Command Queuing	Enabled/disabled status of command queuing
Flash Size[1]	Flash memory capacity of disk array controller board
Memory Size[1]	Cache memory capacity
Chip Temperature[1]	Temperature of disk array controller
Shield State Support	Diagnosis of the physical drives of disk array controller. This function is disabled regardless of the setting.
Power savings on unconfigured drives	Power-saving mode of unused physical drives
Power saving on hot spares	Power-saving mode setting of physical drives configured as hot spares
Power Save Policy for Configured Drives[1]	Power-saving mode setting of physical drives configured for virtual drives
Firmware Package Version	Firmware package version of disk array controller board
Firmware Version[1]	Firmware version of disk array controller board
Firmware Build Time[1]	Time stamp of firmware of disk array controller board
Backend SAS Address 0 to 7	Back-end address of SAS device
Correctable Error Count[1]	Number of errors that can be corrected
Memory uncorrectable count[1]	Number of errors for which memory correction is disabled
Cluster Enable	Cluster setting
Cluster Active	Cluster operation status
SSD Guard	Setting of SSD Guard™
SSD Disk Cache Setting	Setting of SSD cache
Drive security capable	Enabling/disabling of encryption
Rebuild Rate	Priority of rebuild processing
Patrol Read Rate[1]	Priority of Patrol Read processing
Reconstruction Rate[1]	Priority of disk array configuration processing such as capacity expansion
BGI Rate	Priority of background processing
Consistency Check Rate	Priority of consistency check
Global Hotspare for Emergency[1]	Availability of rebuild of a physical drive (global hot spare) of a different type (Not supported)
Unconfigured Good for Emergency[1]	Availability of rebuild of a physical drive (not used) of a different type (Not supported)
Emergency for SMARTer[1]	Availability of SMART copyback of a physical drive (hot spare) of a different type (Not supported)
*1: These menus may not be displayed depending on the disk array controller type (including LSI Software RAID).	

Physical drive

Displays physical drive properties such as vendor name, device ID, and status.
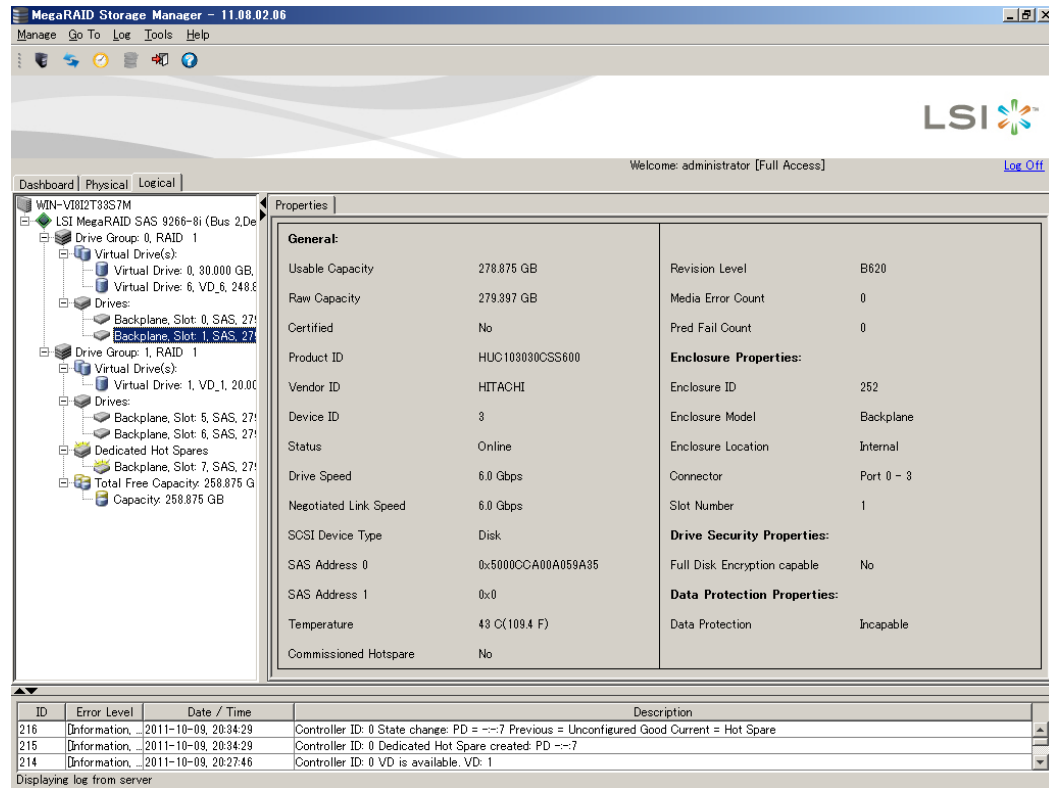
Property item	Description
Usable Capacity	Configured capacity of a physical drive
Raw Capacity	Raw data size of a physical drive
Certified*1	Device recognition function (not supported)
Product ID	Product name of a physical drive
Vendor ID	Vendor name of a physical drive
Device ID	Device ID of a physical drive

Property item	Description
Status	Status of a physical drive including the following: **Online**: Operating normally **Failed**: Failed and detached from the disk array. The disk array controller detached the physical drive due to its fault. **Offline**: Failed and detached from the disk array. The physical drive is detached from the disk array because the user registered a fault. **Unconfigured Bad**: Failed and detached from the disk array. Inconsistency has been identified in the disk array configuration data. This happens, for example, when you insert a physical drive that has been used. **Rebuild**: Being rebuilt **Unconfigured Good**: The physical drive is not used. **Hot Spare**: The physical drive is configured as a hot spare (global or dedicated). **being replaced with <copy destination hot spare>**: SMART copyback is running, copying data from this physical drive, on which SMART error occurs, to the copy destination hot spare. The physical drive becomes **Unconfigured Bad** when the SMART copyback finishes. **replacing <copy source physical drive>**: SMART copyback is running, copying data from the drive on which SMART error occurs to this hot spare. This hot spare becomes **Online** when the SMART copyback finishes.
Drive Type[1]	Type of a physical drive
Drive Speed	Transmission speed of a physical drive
Negotiated Link Speed	Negotiated link speed for data transmission of a physical drive
SCSI Device Type	SCSI device type
SAS Address x[2]	SAS address
Temperature[1]	Temperature of a physical drive
Commissioned Hotspare[1, 3]	(Not supported)
Power Status[3]	Power status of a physical drive
Emergency Hotspare[1, 3]	Availability of the hot spare functionality for a virtual drive made up of physical drives of different types
Revision Level	Revision level of a physical drive
Media Error Count	Number of media errors of a physical drive
Pred Fail Count	Number of received SMART reports
Enclosure ID[2]	Enclosure ID
Enclosure Model[2]	Model of an enclosure
Enclosure Location[2]	Location of an enclosure

Property item	Description
Connector*[2]	Group of physical ports to which a physical drive is connected
Slot Number	Slot number on which a physical drive is mounted
Full Disk Encryption capable	Availability setting of encryption for a physical drive
Secured*[1, 2]	Encryption function of a physical drive (not supported)
Type*[1, 2]	Device type of a physical drive
Data Protection	Encryption function of a physical drive (not supported)
*1: This item is not displayed depending on a type of a connected physical drive.	
*2: This item is not displayed for LSI Software RAID.	
*3: This item is not displayed depending on the status of a physical drive.	

> **Note**
>
> **Media Error Count** and **Pred Fail Count** are initialized when the power is switched on or off, or when the system unit is restarted.

> **Tip**
>
> The number displayed in " Physical Drive 1 : 70136 MB " (Physical Drive x) does not coincide with Device ID.
>
> **Device ID** and **Slot Number** do not coincide. **Slot Number** is recorded in the **MSM** log.
>
> For a system unit with SATA physical drive installed, the following message may be displayed when you click a physical drive icon on **MSM**. The message does not indicate a problem and you can ignore it.
>
> ```
> Controller ID X: Unexpected sense: PD = X - Invalid field in
> CDB,
> CDB = 0x4d 0x00 0x4d 0x00 0x00 0x00 0x00 0x00 0x20 0x00 ,
> Sense = 0x70 0x00 0x05 0x00 0x00 0x00 0x00 0x0a 0x00 0x00 0x00
>         0x00 0x24 0x00 0x00 0x00 0x00 0x00
> ```

Virtual drive

Displays information on the configuration of a virtual drive.

Property item	Description
RAID Level	RAID level of a virtual drive
Name*[1]	Volume name of a virtual drive
Size	Capacity of a virtual drive
Mirror Data Size	Mirroring size of a virtual drive (displayed only for RAID1 and RAID10)
Parity Size	Parity size of a virtual drive (displayed only for RAID5 and RAID6)
Stripe Size	Stripe size of a virtual drive
Virtual Disk State	The operating status of a virtual drive including the following: **Optimal**: Operating normally **Degraded:** The virtual drive is degraded. One physical drive (two physical drives for RAID6) of the virtual drive has failed. Or it is being rebuilt. **Partially Degraded**: Partially degraded. One physical drive of the RAID6 virtual drive has failed. Or it is being rebuilt. This item is displayed only for RAID6. **Offline**: The virtual drive is inoperable. Multiple physical drives of the virtual drive have failed, or a physical drive of a non-redundant virtual drive has failed.
Disk Cache Policy	Cache policy of a physical drive
Read Policy	Read policy of a virtual drive
IO Policy	Data input and output policy of a virtual drive

Property item	Description
Current Write Policy*[2]	Current write policy of a virtual drive
	(1) When Default Write Policy = "Write Through": Always "Write Through"
	(2) When Default Write Policy = "Always Write Back": Always "Write Back"
	(3) When Default Write Policy = "Write Back with BBU": "Write Back" or "Write Through"
Default Write Policy	Default write policy of the configured virtual drive
Current Access Policy	Data access policy of the current virtual drive
Default Access Policy	Data access policy of the configured virtual drive
Default Power save policy*[3]	Power-saving mode setting of the configured physical drive
Current Power save policy*[3]	Power-saving mode of the current physical drives

*1: This item is not displayed for a virtual drive configured with MegaRAID WebBIOS.

*2: The following display and operation are made when Default Write Policy = "Write Back with BBU":

- The value is changed to "Write Trough" for a RAID not supporting BBU.
  At this time, "Reason for difference in write policy": "BBU is not installed" is displayed.

- The value is changed to "Write Trough" when the capacity is being expanded.
  At this time, "Reason for difference in write policy": "Reconstruction is in progress" is displayed.

*3: These items may not be displayed depending on the disk array controller type (including LSI Software RAID).

Tip

The number displayed in "🖳 Physical Drive 1 : 70136 MB" (Physical Drive x) does not coincide with Device ID.

When the entire capacity of a drive group is not used, **Total Free Capacity** is displayed. In this case, you can construct an additional virtual drive on the drive group.

The RAID level that can be used is the one currently constructed in the drive group.

Enclosure

Displays enclosure information.
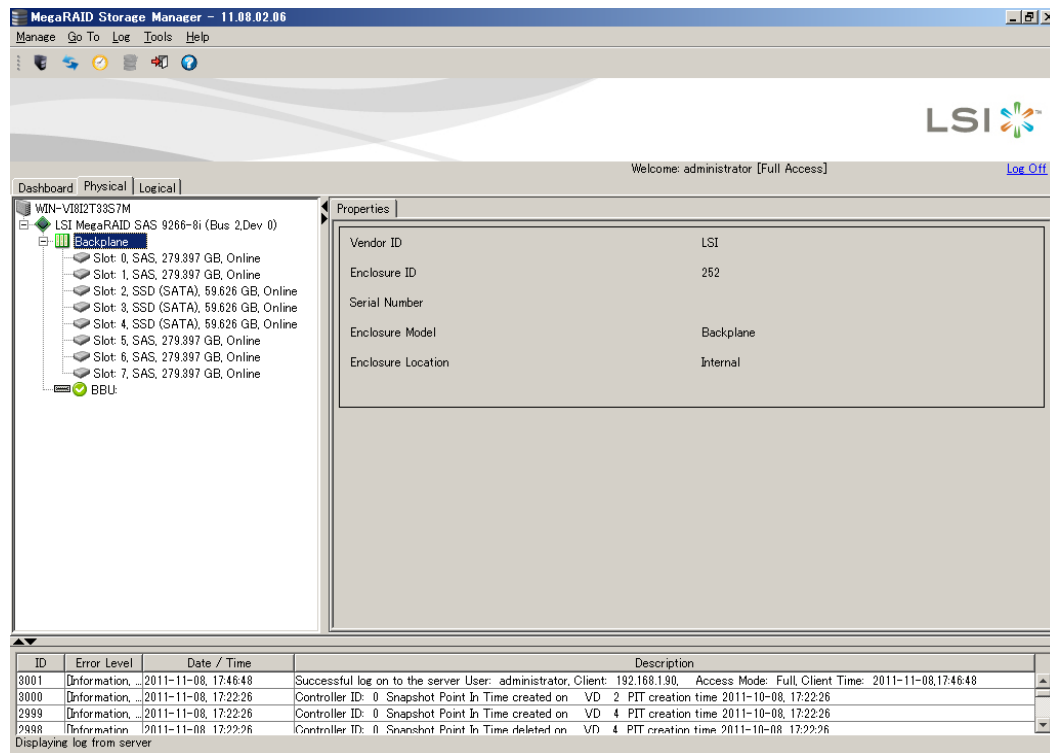
Property item	Description
Vendor ID	Vendor name of an enclosure
Enclosure ID	ID of an enclosure
Serial Number	Serial number of an enclosure
Enclosure Model	Model of an enclosure
Enclosure Location	Location of an enclosure

Tip No enclosure device is displayed for LSI Software RAID

Enclosure (for expansion)

Displays information on an extension enclosure.
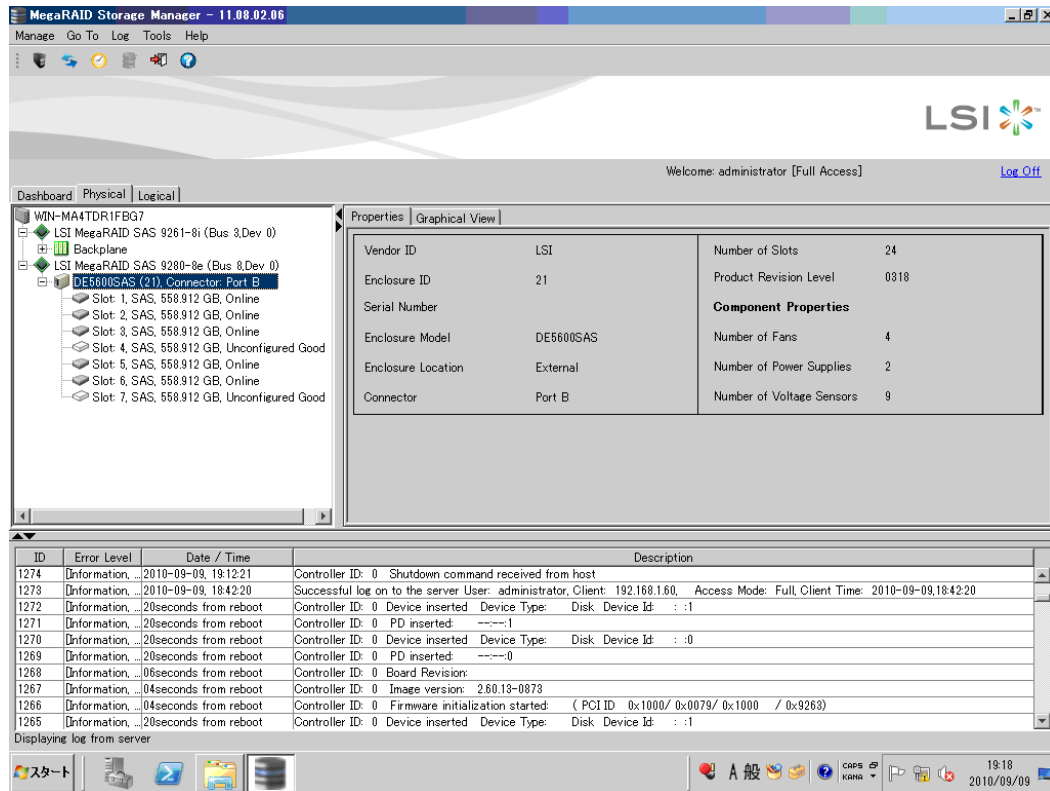
Property item	Description
Vendor ID	Vendor name of an enclosure
Enclosure ID	ID of an enclosure
Serial Number	Serial number of an enclosure
Enclosure Model	Model of an enclosure
Enclosure Location	Location of an enclosure
Connector	Connector of an enclosure
Number of Slots	Number of slots
Product Revision Level	Revision level of the product
Number of Fans	Number of fans
Number of Power Supplies	Number of power sources
Number of Voltage Sensors	Number voltage sensors

Tip No enclosure device is displayed for LSI Software RAID.

Displays graphical information on an extension enclosure.
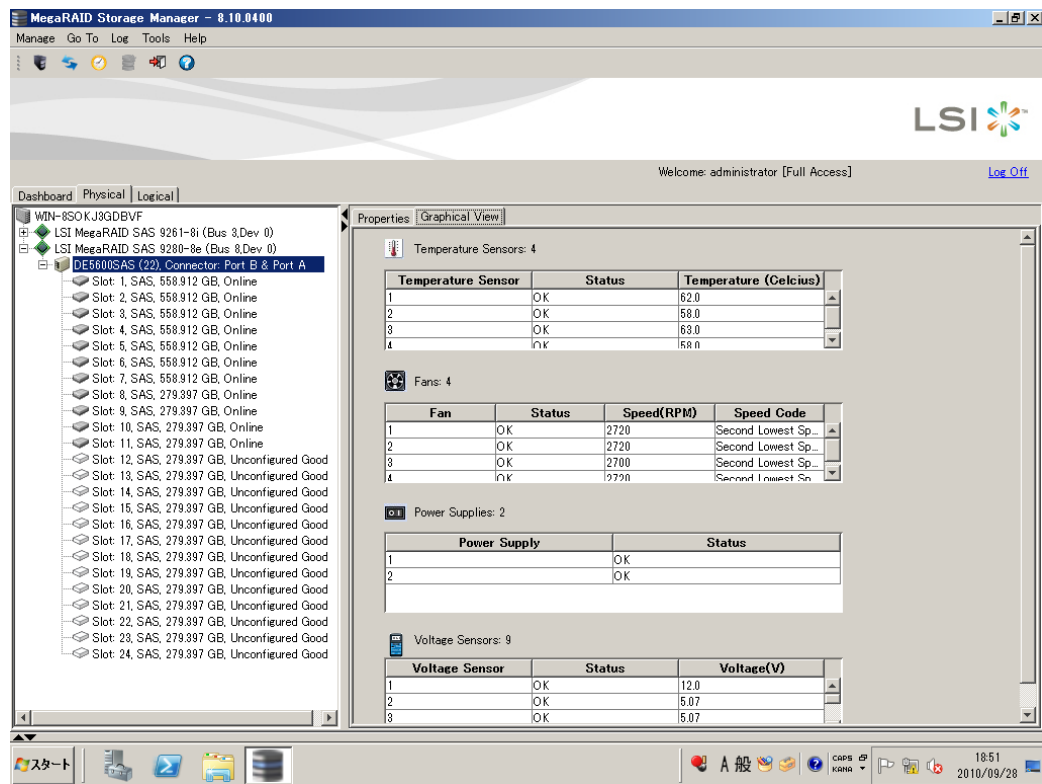
| Tip | Information is not displayed on a real-time basis. Execute a rescan when an incident occurs. For how to rescan, see "Rescan" on page 2-153. |

Cache back module (BBU)

Displays information on the cache backup module (BBU)
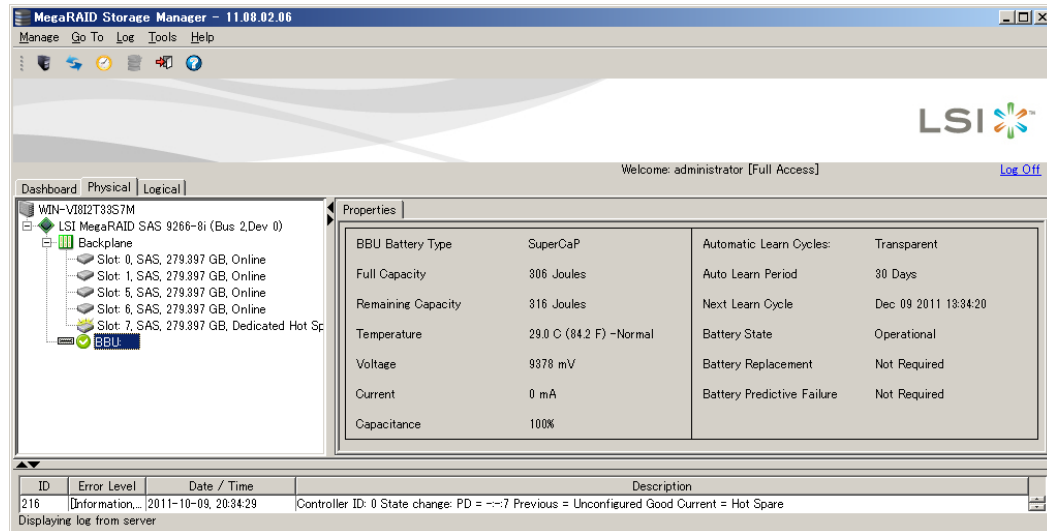
Property item	Description
BBU Battery Type	Battery type
Full Capacity	Maximum electric capacity
Remaining Capacity	Remaining electric capacity
Temperature	Environment temperature
Voltage	Charging voltage
Current	Electric current
Capacitance	Capacitance
Automatic Learn Cycles	Automatic diagnosis setting
Auto Learn Period	Automatic diagnosis interval (fixed number of days)
Next Learn Cycle	Date and time of the next automatic diagnosis
	It is 28 days after the last diagnosis.
Battery State	Battery state
Battery Replacement	Necessity of battery replacement (Not supported)
Battery Predictive Failure	Necessity of battery replacement as a preventive action (Not supported)

> **Note**
> This item is displayed only for disk array controllers (with cache backup).

> **Tip**
> To check if the device is a disk array controller (with cache backup), check **BBU Present** of "Controller" on page 2-88. If the value is **Yes**, the device is a disk array controller (with cache backup).

Creating new virtual drives

This section explains how to create a new virtual drive.

> **Note** LSI Software RAID supports creation of virtual drives of only RAID0 and RAID1.
>
> The maximum number of virtual drives created for each disk array controller is 24.
>
> The maximum number of virtual drives created for each drive group is 16.
>
> **MSM** does not support creation of a virtual drive that includes both HDD and SSD.
>
> If all of the following conditions are met, the entire capacity of a drive group may not be used. In such a case, a total free capacity of 2 MB or less remains.
> - There are 1 or more virtual drives in the drive group.
> - The remaining capacity of the drive group is 1 TB or more.
> - When you try to use all the remaining capacity to create a virtual drive

The following table shows the number of physical drives required for creating virtual drives of different RAID levels.
However, you cannot configure virtual drive more than maximum number of physical drive in the system unit.

RAID level	Number of physical drives required
RAID0	at least 1 unit
RAID1	2 units
RAID5	at least 3 units
RAID6	at least 4 units
RAID10	at least 4 units, a maximum of 16 units

> **Tip** To configure a hot spare, you need a separate physical drive in addition to physical drives required for each RAID level. You cannot configure a hot spare for RAID0.

There are two virtual drive configuration options: **Simple** and **Advanced**. Use only **Advanced**.

The overview of these options is as follow:

- **Advanced**:

  You can make only virtual drive configuration for any purpose. Select this option when you want to specify a physical drive to build or the capacity of a virtual drive.

- **Simple**:

    This option allows you to interactively and easily configure a currently configurable virtual drive for any purpose. You can specify the RAID level and creation of a hot spare.

> **Note** Do not create a virtual drive with the **Simple** option.
>
> Do not create a new virtual drive when a task such as rebuilding is running.
>
> **MSM** does not support a RAID6 configuration with 3 physical drives. Avoid such a configuration.
>
> **MSM** does not support a RAID1 configuration with 3 or more physical drives. Avoid such a configuration.
>
> A RAID10 configuration must have 4 or more even-number physical drives. For example, a RAID10 configuration cannot be made up of 5 or 7 physical drives.
>
> In the case where there are 1 or more virtual drives and a global hot spare, clear the global hot spare one and then reconfigure as a dedicated hot spare, if you are to create a new virtual drive using a physical drive with a different capacity. After that, create a new virtual drive. For how to set and remove a hot spare, see "Configuring a hot spare" on page 2-125.
>
> If you create a virtual drive using a physical drive with a different capacity, the following pop-up error message is displayed:
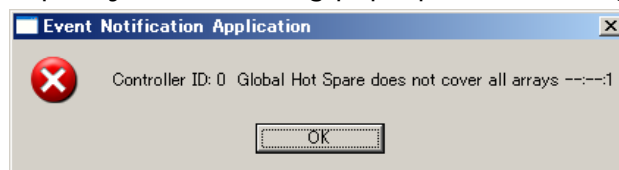
Next we explain how to create a new virtual drive with the **Advanced** option.

In the following example, we describe the case where you create a RAID5 virtual drive with 3 physical drives. To create a RAID10 virtual drive, perform step 1 and step 2, and see "Creating a RAID10 virtual drive" on page 2-107.

1. With the **Controller** selected, click **Go To** > **Controller** > **Create Virtual Drive** in the menu.

    You can also right-click the **Controller** and click **Create Virtual Drive**. The other way is to click ⬛ in the graphical menu.
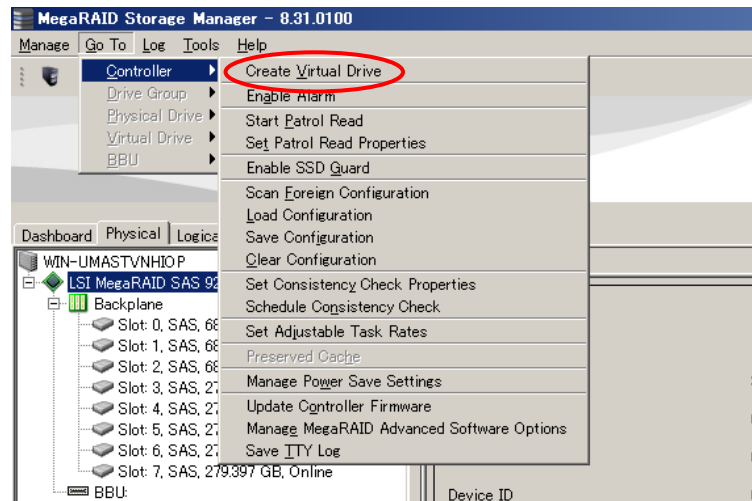
2. The **Console mode** window opens.

    Select **Advanced**, and click **Next**.

    | Note | Do not create a virtual drive with the **Simple** option. |

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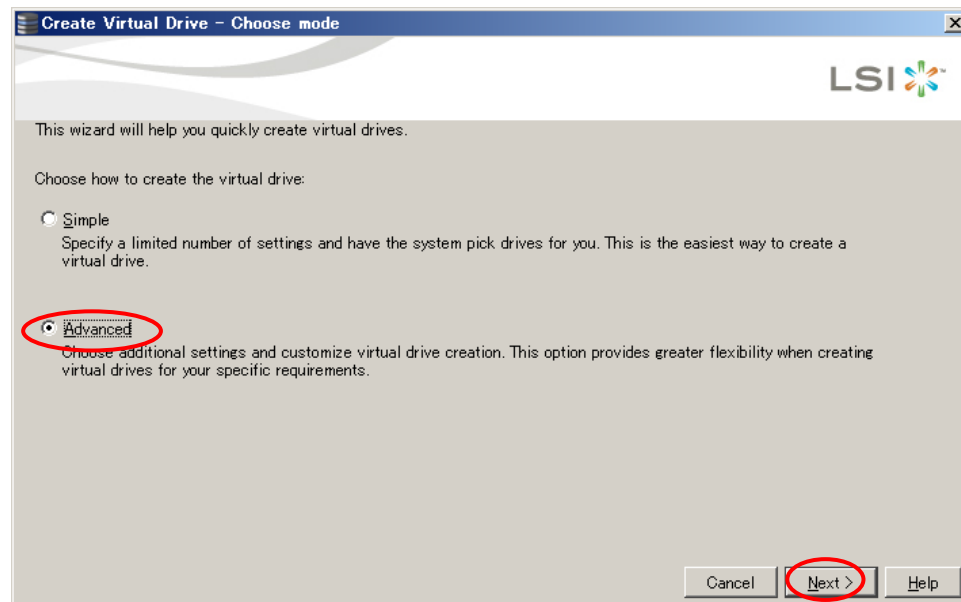
| Tip | If there is a virtual drive that does not use the entire capacity of the drive group, clicking **Next**. The following selection window opens. |
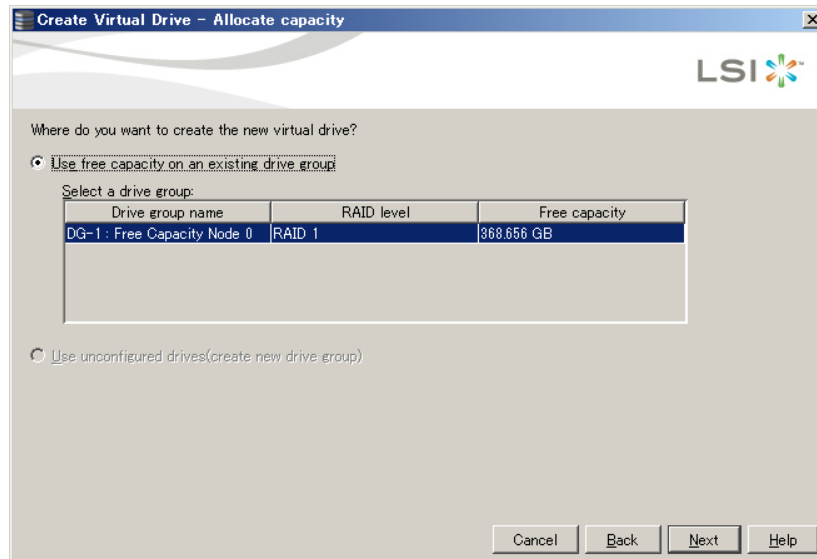
To create a new virtual drive in the existing drive group, select **Use free capacity on an existing drive group** and select the target virtual drive, and then click **Next** to go to step 6.

To create a new virtual drive using a physical drive in the **Unconfigured Good** state (not used), select **Use Unconfigured drives (create new drive group)**, and then click **Next** to go to step 3.

3. Selecting **Advanced** displays the **Drive Group Settings** window.

   Select the desired RAID level (**RAID5**) from **RAID level**.
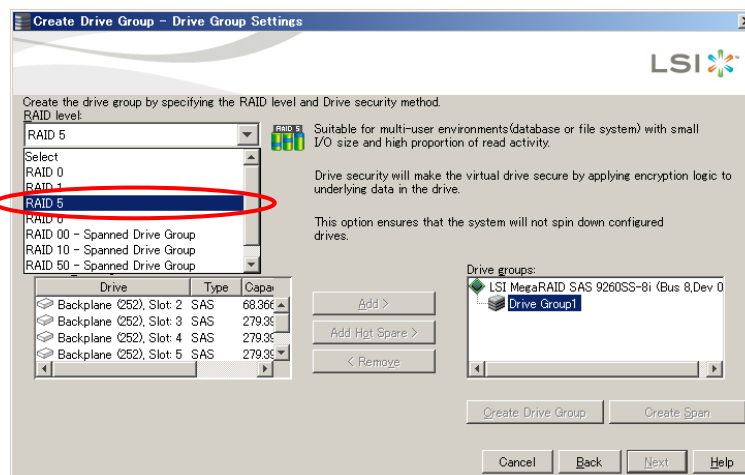
4. In the **Select unconfigured drives** window, select three physical drives to create while pressing **Ctrl**.

    With three physical drives selected, click **Add**.
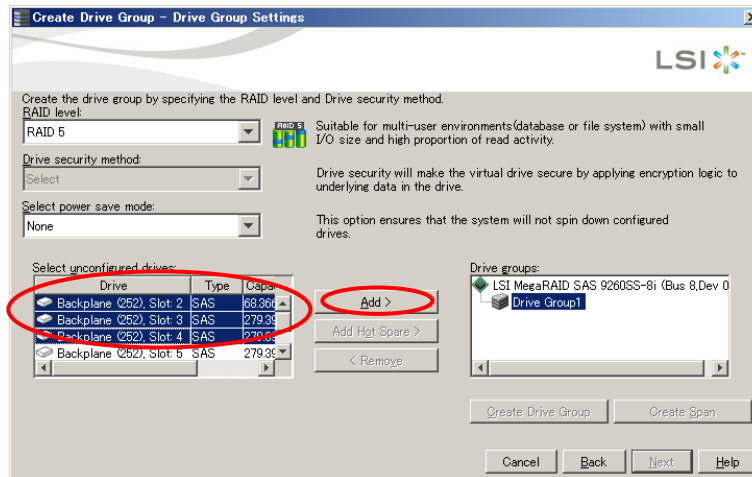
Note	Make sure that **Select power save mode** is set to **None**. This item may not be displayed depending on the disk array controller type (including LSI Software RAID).

Tip	If you have selected a wrong physical drive, click **Cancel** to exist from virtual drive creation and try to build a physical drive from the beginning.

---

5. Confirm whether the selected drives have moved to the **Drive groups** window or not.

    After configuration, click **Create Drive Group**. Then, click **Next**.
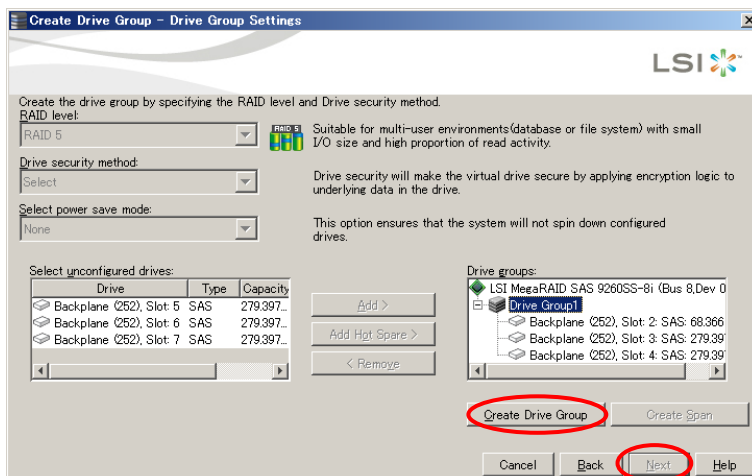
Tip	You can also configure a dedicated hot spare when you create a virtual drive (RAID1, RAID5, or RAID6). See "Configuring a dedicated hot spare when creating a virtual drive" on page 2-131.

6. The **Virtual drive settings** window is displayed. Specify parameters for the new virtual drive, and click **Create Virtual Drive**.

The parameters for a new virtual drive are as follows:

Parameter	Description
Virtual drive name	Sets a volume name (voluntary)
Capacity	Sets the capacity of a virtual drive
Initialization state	Sets an initialization method (**Full Initialize** is recommended.)
Stripe size	Sets a stripe size (only for RAID5 and RAID6) (Default: **64 KB** (recommended))
Read policy	Sets a read policy. **No Read Ahead** is recommended.

Write policy	Sets write policy.
	 - For a disk array controller (with cache backup):
	     Default: **Write Back with BBU** is mandatory.
	 - For others:
	     Default: **Write Through** is recommended.
	     When a UPS is connected, **Always Write Back** can be selected.

IO policy	Sets an IO policy. (Default: **Direct IO** (recommended))
Access policy	Sets data access policy. (Default: **Read Write** (recommended))
Disk cache policy	Sets a physical drive cache. (**Disabled** is recommended)

Set each parameter to the required or recommended value.

Set "Write policy" in accordance with your environment with reference to the description in the above table.

"Write Back with BBU" can be selected only for disk array controllers (with cache backup).

![Note]	We cannot guarantee normal operation of the product if the recommend values are not used.
	For LSI Software RAID, the parameters specified for the new virtual drive are applied to all virtual drives in the same drive group.
	If you specify **Always Write Back** for LSI Software RAID, **Write Back with BBU** is displayed after the restart of the system unit, but this is not a problem.

![Tip]	With Linux, only alpha-numeral characters are allowed for the volume name.
	To check if the device is a disk array controller (with cache backup), check **BBU Present** of "<u>Controller</u>" on page <u>2-88</u>. If the value is **Yes**, the device is a disk array controller (with cache backup).

---

7. The **Write Through Selected** pop-up window is displayed. Click **Yes**.

Write Through Selected

⚠ Write Through mode eliminates risk of losing cached data in case of power failure. But it may result in slower performance.

Are you sure you want to select Write Through mode?

[Yes]   [No]

![Tip]	This pop-up message is displayed when **Write policy** is set to **Write Through**. An attempt to set this parameter to another value displays the same pop-up message.

---

8. The new virtual drive is displayed in **Drive groups**. Click **Next**.

9. The **Summary** window opens. Confirm the content and click **Finish**.
   The virtual drive is created.

10. The pop-up window is displayed to notify you of the completion of the virtual drive creation. Click **OK**.
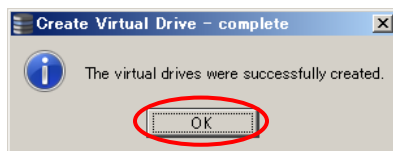
11. Initialize the virtual drive.

Make sure that you initialize the virtual drive. See "Initializing virtual drive" on page 2-116 for how to initialize a virtual drive.

Tip	If you have set **Init State** to **Full Initialize**, clicking **Finish** starts initialization of the virtual drive. You do not have to initialize the virtual drive again.
	To find the initialization progress, see "Displaying task progress and terminating a task" on page 2-157.

Creating a RAID10 virtual drive

1. Selecting **Advanced** displays the **Drive Group Settings** window.

Select the desired RAID level (**RAID 10** - **Spanned drive group**) from **RAID level**.
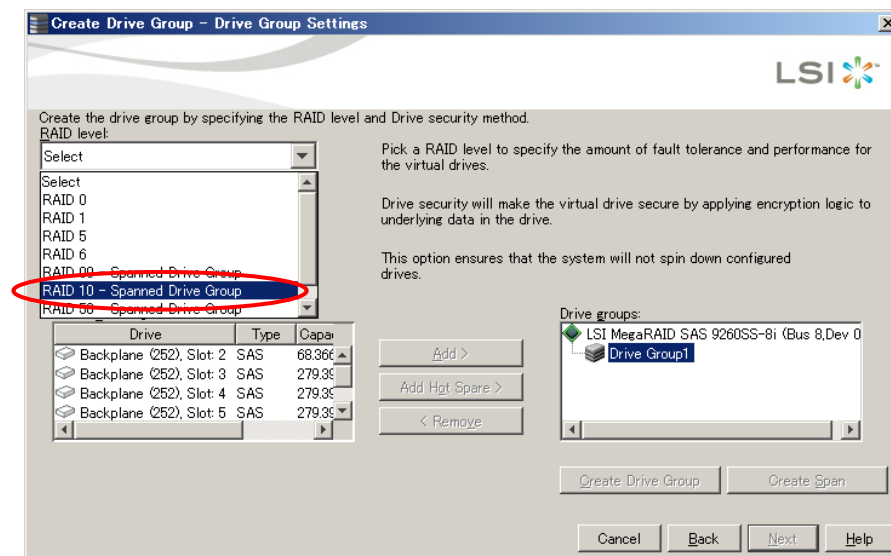
2. In the **Select unconfigured drives** window, select two physical drives to create while pressing **Ctrl**.

   With two physical drives selected, click **Add**.
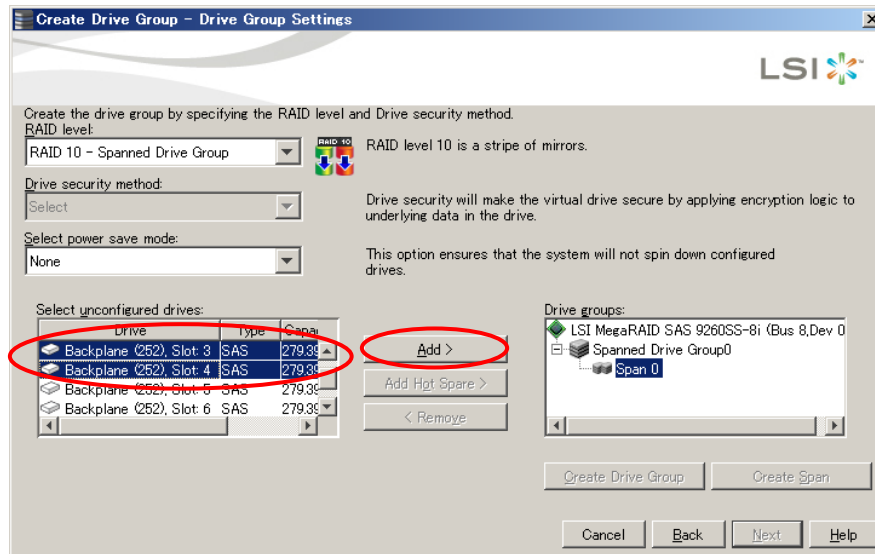
| Note | Make sure that **Select power save mode** is set to **None**. This item might not be displayed depending on the disk array controller type (including LSI Software RAID). |

| Tip | If you have selected a wrong physical drive, click **Cancel** to exist from virtual drive creation and try to build a physical drive from the beginning. |

3. Confirm whether the selected drives have moved to the **Drive groups** window or not.

   After confirmation, click **Create Span**.
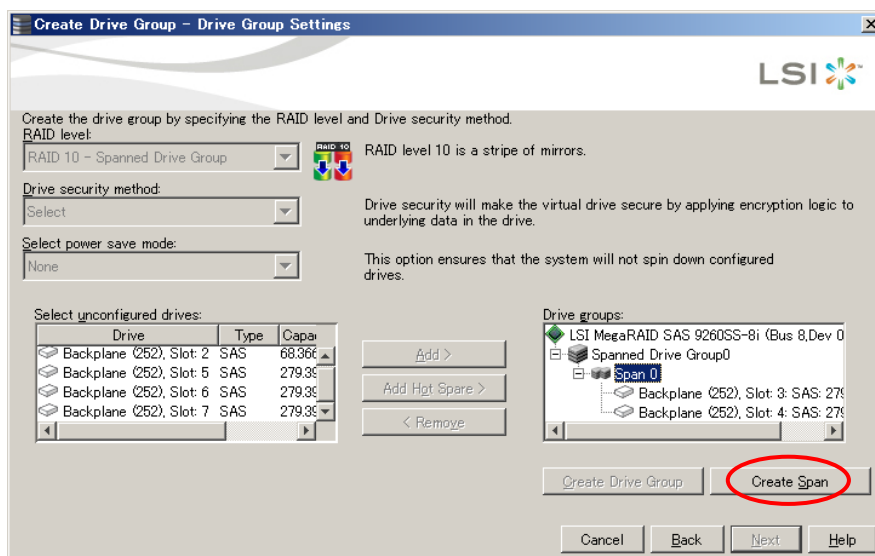
4. In the **Select unconfigured drives** window, select two physical drives to create while pressing **Ctrl** again.

   With two physical drives selected, click **Add**.

> **Tip** You can also configure a dedicated hot spare when you create a virtual drive (RAID10). See "Configuring a dedicated hot spare when creating a virtual drive" on page 2-131.

---

5. Confirm that the selected drives have moved to the **Drive groups** window and there are two spans.

   After confirmation, click **Create Drive Group**. Then, click **Next**.

6. The **Virtual drive settings** window is displayed. Specify parameters for the new virtual drive, and click **Create Virtual Drive**.

The parameters for a new virtual drive are as follows:

Parameter	Description
Virtual drive name	Sets a volume name (voluntary)
Capacity	Sets the capacity of a virtual drive
Initialization state	Sets an initialization method (**Full Initialize** is recommended.)
Stripe size	Sets a stripe size (Default: **64 KB** (recommended))
Read policy	Sets a read policy (**No Read Ahead** is recommended.)

Write policy	Sets a write policy.
	 - For a disk array controller (with cache backup):
	  Default: **Write Back with BBU** is mandatory.
	 - For others:
	  Default: **Write Through** is recommended.
	  When a UPS is connected, **Always Write Back** can be selected.

IO policy	Sets an IO policy. (default: **Direct IO** (recommended))
Access policy	Sets a data access policy. (Default: **Read Write** (recommended))
Disk cache policy	Sets a physical drive cache. (**Disabled** is recommended)

<u>Set each parameter to the required or recommended value.</u>

<u>Set "Write policy" in accordance with your environment with reference to the description in the above table.</u>

<u>"Write Back with BBU" can be selected only for disk array controllers (with cache backup).</u>

> **Note**
>
> We cannot guarantee normal operation of the product if the recommend values are not used.

> **Tip**
>
> With Linux, only alpha-numeral characters are allowed for the volume name.
>
> To check if the device is a disk array controller (with cache backup), check **BBU Present** of "Controller" on page 2-88. If the value is **Yes**, the device is a disk array controller (with cache backup).

7. The **Write Through Selected** pop-up window is displayed. Click **Yes**.

> **Tip** This pop-up message is displayed when **Write policy** is set to **Write Through**. An attempt to set this parameter to another value displays the same pop-up message.

8. The new virtual drive is displayed in **Drive groups**. Click **Next**.

9. The **Summary** window opens. Confirm the content and click **Finish**.

    The virtual drive is created.

10. The pop-up window is displayed to notify you that the virtual drive has been created. Click **OK**.
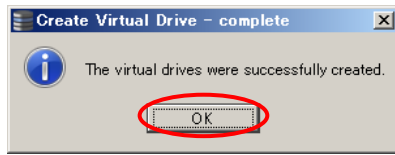
11. Initialize the virtual drive.

    Make sure that you initialize the virtual drive. See "Initializing virtual drive" on page 2-116 for how to initialize a virtual drive.

Tip

If you have set **Init State** to **Full Initialize**, clicking **Finish** starts initialization of the virtual drive. You do not have to initialize the virtual drive again.

To find the initialization progress, see "Displaying task progress and terminating a task" on page 2-157.

Changing the setting of virtual drive(s)

Change the setting of a virtual drive in the procedure described below.

Note	LSI Software RAID is not supported.

1. In the **Logical** view, select the virtual drive that you have created.

2. Right-click the virtual drive, and click **Set Virtual Drive Properties**.
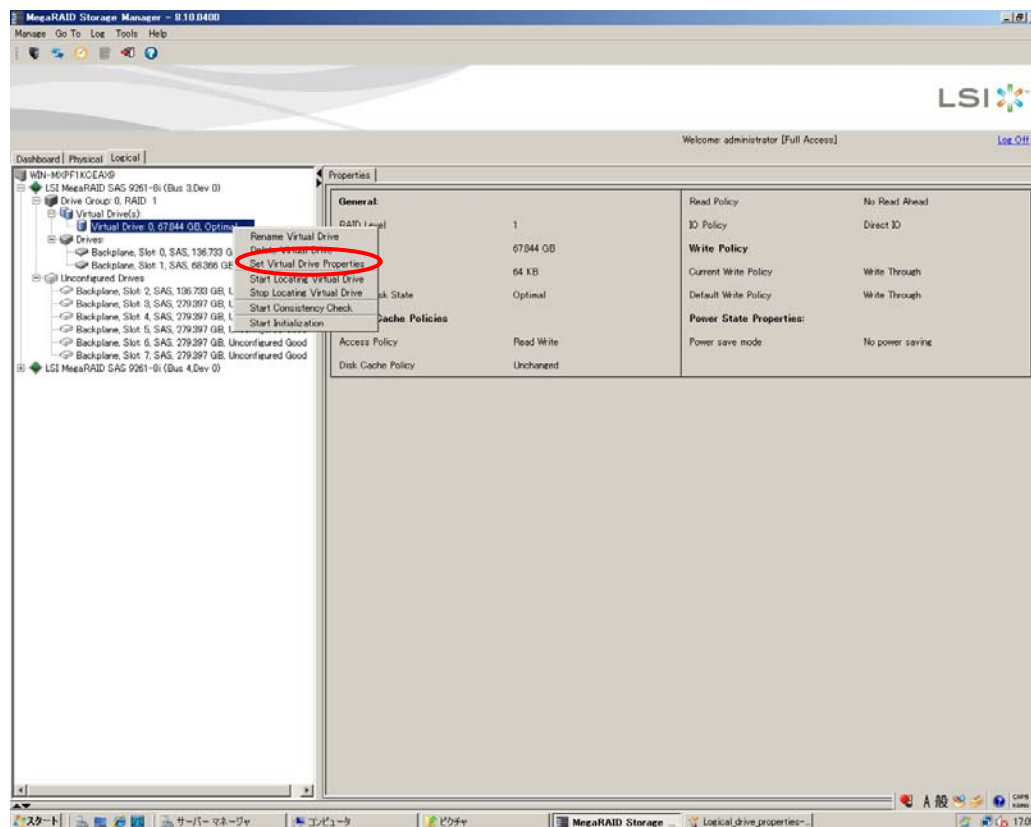
3. The following parameters are displayed:

Parameter	Description
Name	Sets a virtual drive name. (voluntary)
Read Policy	Sets a read policy. **No Read Ahead** is recommended.

Write Policy*[2]	Sets a write policy setting
	  - For a disk array controller (with cache backup):
	    Default: **Write Back with BBU** is mandatory.
	  - For other cases:
	    Default: **Write Through** is recommended.
	    When a UPS is connected, **Always Write Back** can be selected

IO Policy*[1]	Sets an IO policy. (Default: **Direct IO** (recommended))
Access Policy*[1]	Sets a data access policy. (Default: **Read Write** (recommended))
Disk Cache Policy*[1]	Sets a physical drive cache. (**Disabled** is recommended)
Background Initialization*[1]	Sets background initialization (**Disabled** is recommended.)
*1: Use the default value for this parameter.	
*2: **Write Back with BBU** can be selected only for disk array controllers (with cache backup).	

4. Click **Go** after you have changed the setting.

5. The following pop-up message is displayed. Check **Confirm** and click **Yes**.
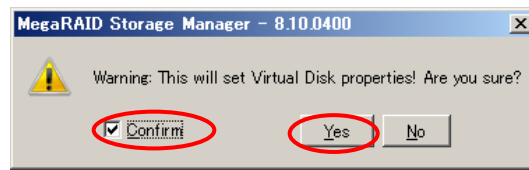
The setting is saved.

> ⚠️**Note**
>
> For how to change the write policy, see "Changing write cache" on page 2-140.
>
> We cannot guarantee normal operation of the product if the recommend values are not used.
>
> For LSI Software RAID, the parameters specified for the new virtual drive are applied to all virtual drives in the same drive group.
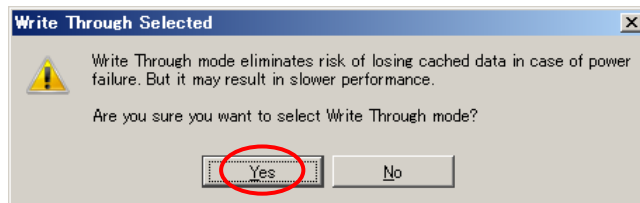>
> If you specify **Always Write Back** for LSI Software RAID, **Write Back with BBU** is displayed after the restart of the system unit, but this is not a problem.
>
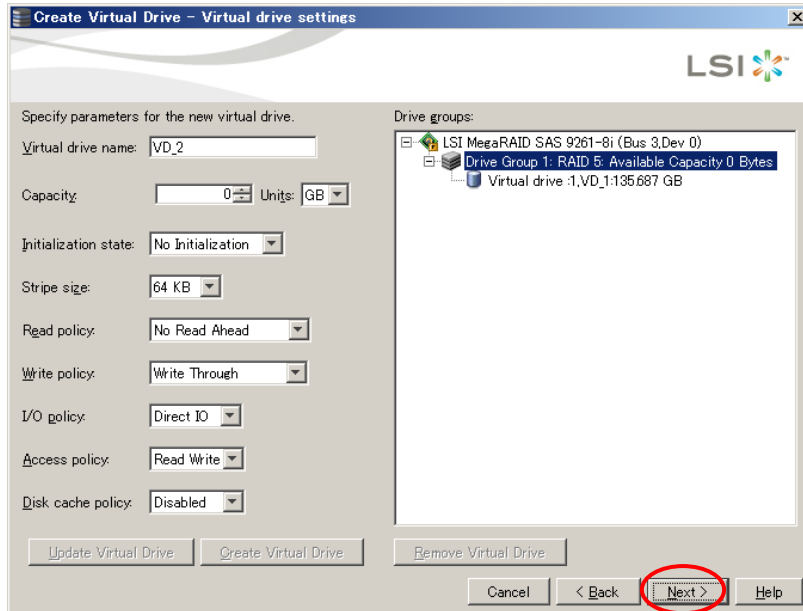> The setting value of **Disk Cache Policy** is not displayed for LSI Software RAID.

> 💡**Tip**
>
> To check if the device is a disk array controller (with cache backup), check **BBU Present** of "Controller" on page 2-88. If the value is **Yes**, the device is a disk array controller (with cache backup).

Initializing virtual drive(s)

Initialize a virtual drive in the procedure described below.

NOTICE

All data in a virtual drive are lost when the drive is initialized. Be extremely careful in initializing the drive. Make a backup of important data.

Note During initialization of virtual drive, do not restart, power on, or power off system unit. Processing stops and progress returns to 0%.

Tip The period of time required for initializing a virtual drive is proportional to the capacity of a physical drive, not to the capacity of the virtual drive.

You can start initializing multiple virtual drives in a disk group, but the progress differs among different virtual drives. Simultaneous initialization of multiple virtual drives may take more time than initializing them individually. See "<u>Estimate of various processing time</u>" on page 5-2.

---

1. Click **Manage** > **Initialize**.
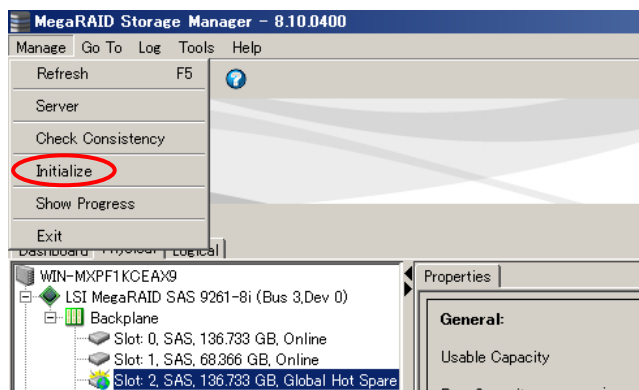
2. The **Group Initialization** window opens.

    If there are multiple disk array controllers, select a target one. (You do not have to select a disk array controller if there is only one.)

    Then, select the target virtual drive and click **Start**.
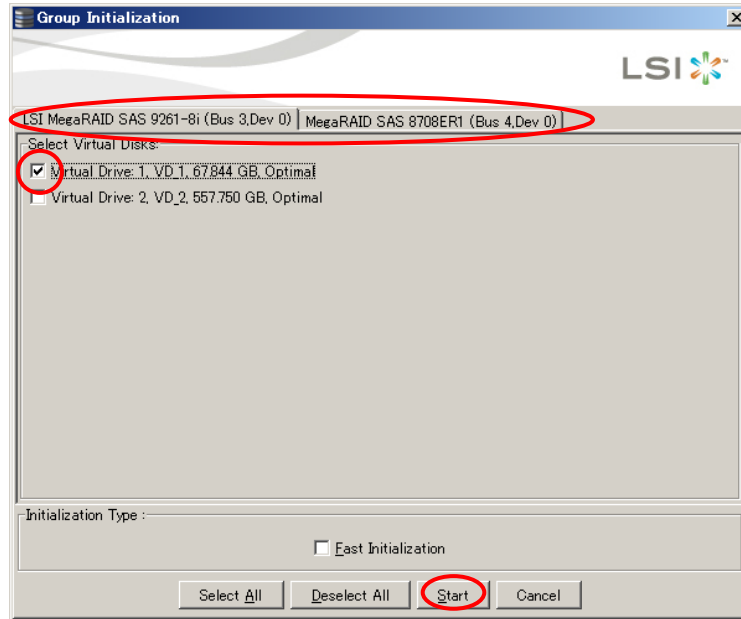
![Note]	Do not use **Fast Initialization**. Otherwise, **MSM** may not function normally.
	Do not execute initialization if a consistency check is running for any other virtual drives of the same drive group.

![Tip]	A virtual drive with an OS installed does not appear in the **Group Initialization** window.

3. The initialization confirmation dialog box opens. Click **Yes**.

    Initialization starts.
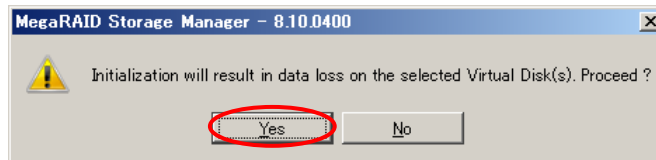
![Tip]	To find the initialization progress, see "Displaying task progress and terminating a task" on page 2-157.

Consistency check of virtual drives

A consistency check reads data in all the areas of a target physical drive to check parity and mirror data consistency and to search for bad sectors. If any inconsistency is found, the parity or the mirror data is corrected.

NOTICE

Conduct periodical consistency checks for LSI Software RAID. If there is a bad sector during the rebuild operation in the event of a physical drive failure, the data in the sector will be lost. See "Operation of Disk Arrays" on page 3-1 for details.

Tip　No consistency check is required for RAID devices other than LSI Software RAID because Patrol Read is executed for periodically.

MSM: Consistency check of virtual drive(s)

Conduct a consistency check from **MSM** in the procedure described below.

Note　When you conduct a consistency check for a RAID device other than LSI Software RAID, stop Patrol Read beforehand. If you attempt a consistency check while Patrol Read is running, the system unit may shut down. For how to stop Patrol Read, see "Preparation for consistency check: Stopping Patrol Read" on page 2-123.

Check Consistency cannot be selected while rebuild or other task is running.

A consistency check is executable only for redundant virtual drives (RAID1, RAID5, RAID6, or RAID10).

Do not execute a consistency check if initialization is running for any other virtual drive of the same drive group.

A consistency check is not applicable to a hot spare. Use Patrol Read to check a hot spare. See "Setting Patrol Read" on page 2-179 for details.

---

1. Click **Manage** > **Check Consistency** in the menu.
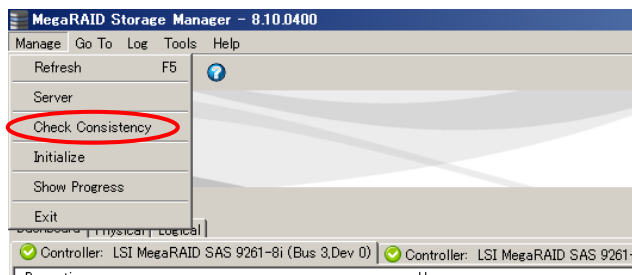
2. The **Group Consistency Check** window opens.

    If there are multiple disk array controllers, select a target one. (You do not have to select a disk array controller if there is only one.)

    Then, select the target virtual drive and click **Start**.

    A consistency check starts.
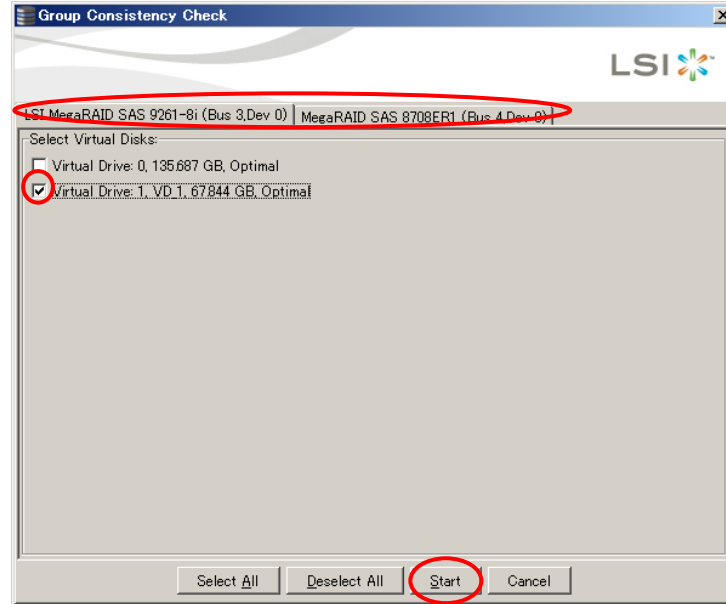
| Tip | To confirm the consistency check progress, see "Displaying task progress and terminating a task" on page 2-157. |

If the virtual drive is not fully initialized, the following pop-up window opens. Click **Yes**.

MegaRAID Storage Manager Instruction Manual
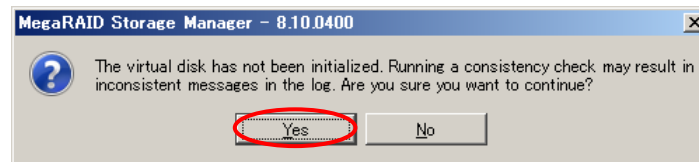
Command line: Consistency check of virtual drive(s)

This subsection explains how to execute a consistency check manually by entering a command on the command line or from a terminal. For LSI Software RAID, incorporate this command in a batch file so that the command can be executed periodically according to an OS task schedule.

RAID devices other than LSI Software RAID are configured as factory default in such a manner that Patrol Read verifies their physical drives periodically to correct bad sectors. Therefore, you do not have to execute a periodical consistency check for RAID devices other than LSI Software RAID.

> **Note** When you execute a consistency check for a RAID device other than LSI Software RAID, stop Patrol Read beforehand. If you attempt a consistency check while Patrol Read is running, the system unit may shut down. For how to stop Patrol Read, see "Preparation for consistency check: Stopping Patrol Read" on page 2-123.
>
> **Check Consistency** is not selectable while a task such as rebuilding is running.
>
> Consistency check is executable only for redundant virtual drives (RAID1, RAID5, RAID6, or RAID10).
>
> The command line can be used only for consistency check of virtual drives. Do not use the command line for any other purposes. Otherwise, a malfunction may occur.

---

1. For Windows, start the command prompt.

   For Linux, start the terminal.

2. For Windows, move to the **MSM** installation directory.

   For Linux, move to the following directory:

   /opt/MegaRAID/MegaCli

> **Tip** For Windows, **MSM** is installed in the following default directory:
>   - 64bit OS:
>   C:\Program Files (x86)\MegaRAID Storage Manager
>   - 32bit OS:
>   C:\Program Files\MegaRAID Storage Manager

---

3. Enter the following commands:

For Windows:

   # MegaCli -LDCC -Start -force -Lx -ax

For Linux:

   # ./MegaCli -LDCC -Start -force -Lx -ax

      - Lx: x is a virtual drive number.

         0, 1, 2, … ALL ("ALL" indicates all devices.)

      -ax: x is a disk array controller number.

         0, 1, 2, … ALL ("ALL" indicates all disk array controllers.)

Tip Distinguish between upper and lower case letters when you execute the above command on Linux.

If you execute the above command on 64 bit OS, replace the word "**MegaCli**" with "**MegaCli64**".
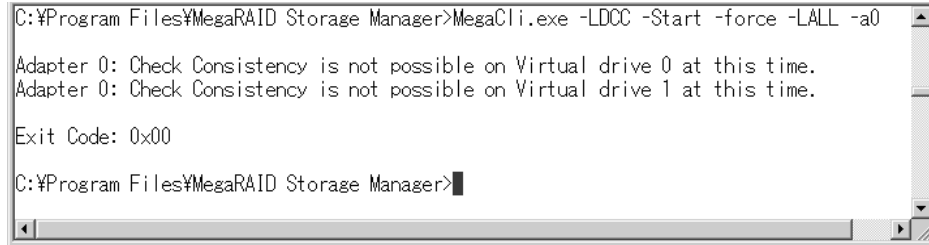
In Windows Server 2012, if you execute the above command, the message "No more interfaces" is output.

The following example specifies all virtual drives of disk array controller a0:

```
C:¥Program Files¥MegaRAID Storage Manager>MegaCli.exe -LDCC -Start -force -LALL -a0

Start Check Consistency on Virtual Drive 0 (target id: 0) Success.
Start Check Consistency on Virtual Drive 1 (target id: 1) Success.

Exit Code: 0x00

C:¥Program Files¥MegaRAID Storage Manager>
```

4. A consistency check starts.

   If any processing, such as rebuilding or consistency check, is running in background, a message **Check Consistency is not possible on Virtual Drive … at this time** is displayed and no consistency check is performed.

```
C:\Program Files\MegaRAID Storage Manager>MegaCli.exe -LDCC -Start -force -LALL -a0

Adapter 0: Check Consistency is not possible on Virtual drive 0 at this time.
Adapter 0: Check Consistency is not possible on Virtual drive 1 at this time.

Exit Code: 0x00

C:\Program Files\MegaRAID Storage Manager>
```

> **Tip**
> The consistency check continues to be conducted even when you terminate the command line window or the terminal.
>
> The start and end events are registered in the **MSM** event log and the Windows application log.
>
> To confirm the consistency check progress, see "Displaying task progress and terminating a task" on page 2-157.

Preparation for consistency check: Stopping Patrol Read

When you execute a consistency check for a RAID device other than LSI Software RAID, stop Patrol Read beforehand. If you attempt to perform a consistency check while Patrol Read is running, the system unit may shut down.

Stop Patrol Read in the procedure described below.

Tip The schedule setting of Patrol Read stays effective after you stop Patrol Read in the procedure described below.

That is, Patrol Read will be executed according to the factory default schedule even after you stop it.

You can start initialization of multiple virtual drives in a disk group, but the progress differs among different virtual drives. Simultaneous initialization of multiple virtual drives may take more time than each individual process. See "Estimate of various processing time" on page 5-2.

Stop Patrol one if running, before conducting a consistency check.

---

1. For Windows, start the command prompt.

   For Linux, start the terminal.

2. For Windows, move to the **MSM** installation directory.

   For Linux, move to the following directory:

   /opt/MegaRAID/MegaCli

Tip For Windows, **MSM** is installed in the following default directory:
   - 64bit OS:
      C:\Program Files (x86)\MegaRAID Storage Manager
   - 32bit OS:
      C:\Program Files\MegaRAID Storage Manager

---

3. Enter the following commands:

   For Windows:

   # MegaCli -AdpPR -Stop -ax

   For Linux:

   # ./MegaCli -AdpPR -Stop -ax
      -ax: x is a disk array controller number.
         0, 1, 2, ... ALL ("ALL" indicates all disk array controllers.)

Tip Distinguish between upper and lower case letters when you execute the above command on Linux.

If you execute the above command on 64 bit OS, replace the word "**MegaCli**" with "**MegaCli64**".

In Windows Server 2012, if you execute the above command, the message "No more interfaces" is output.

To stop Patrol Read from **MSM**, select and right-click **Controller** and click **Stop Patrol Read**.

(**Stop Patrol Read** is not displayed when Patrol Read is not running.)
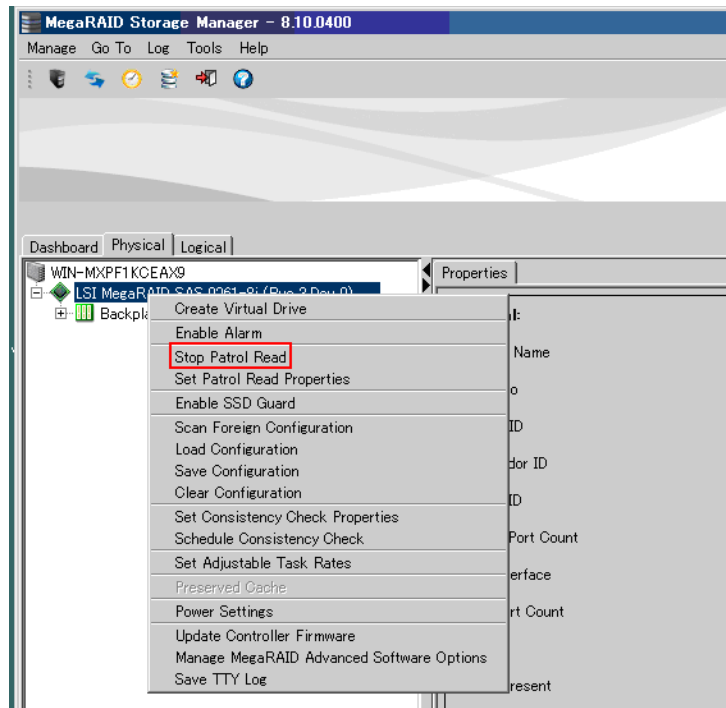
4. After execution of the command, confirm that one of the following messages is displayed:

Read the message and continue with a consistency check.

Execution results displayed when Patrol Read is stopped:

   # No Patrol Read is in progress

   # Exit Code: 0x00

Execution results displayed when Patrol Read is running:

   # Adapter x: Patrol Read is stopped.

   # Exit Code: 0x00

* "x" stands for a specified disk array controller number.

Configuring a hot spare

This section describes how a hot spare works and is to configured it.

> **Note** A hot spare setting is applicable only to drives of the same type.
>
> A hot spare setting is applicable only to virtual drives under the same controller.

About hot spare

The hot spare function protects virtual drives that have redundancy. If a single physical drive of a redundant virtual drive fails, rebuilding (reconfiguring data) is performed using a hot spare.
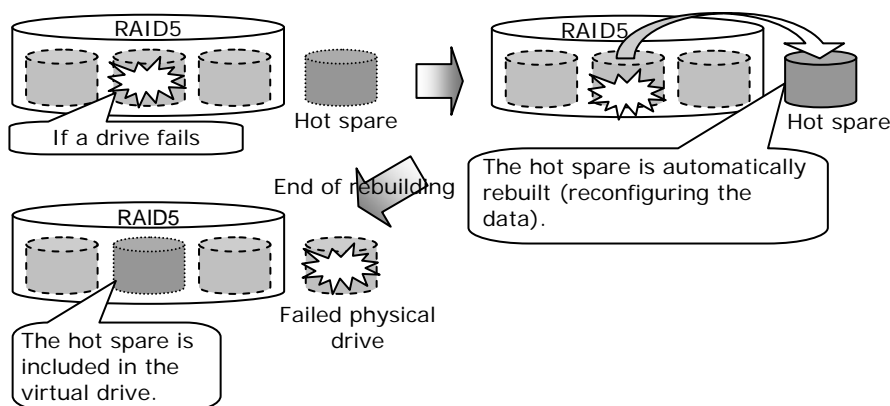
> **Tip** In a system unit that supports hot swapping, a new physical drive is automatically configured as a hot spare during system operation when you replace the failed physical drive after completion of rebuilding.

There are two types of hot spares: global hot spare and dedicated hot spare.

A global hot spare can be used by any redundant virtual drive under the same disk array controller.

A dedicated hot spare is used only by a specified virtual drive under the same disk array controller

> **Tip** A global hot spare is displayed only in the **Physical** view. A dedicated hot spare is displayed in both the **Physical** and **Logical** views.

You need to pay attention to the operation of a hot spare if the same disk array controller is equipped with physical drives with a different capacity.

<u>Do not use a global hot spare if the disk array controller is equipped with physical drives with a different capacy. Use a dedicated hot spare for a virtual drive that consists of physical drives with the same capacity.</u>

Rebuilding is executed for a hot spare whose capacity is larger than that of the failed physical drive. After completion of rebuilding, a new physical drive substituting the failed drive automatically becomes a hot spare. However, because the capacity of this hot spare is smaller than the one before, rebuilding cannot be executed in a next fault if the capacity of the failed physical drive is larger than the hot spare.

If physical drives with a different capacity exist, cancel a global hot spare once. Then, configure a dedicated hot spare to a virtual drive that consists of physical drives with the same capacity. Cancel a global hot spare in the procedure described below.

1. For Windows, start the command prompt.

    For Linux, start the terminal.

2. For Windows, move to the MSM installation directory.

    For Linux, move to the following directory:

    /opt/MegaRAID/MegaCli

> **Tip** For Windows, **MSM** is installed in the following default directory:
> - 64bit OS:
>   C:\Program Files (x86)\MegaRAID Storage Manager
> - 32bit OS:
>   C:\Program Files\MegaRAID Storage Manager

---

3. Enter the following commands:

For Windows:

   # MegaCli -PDHSP -Rmv -PhysDrv[?:Sx] -ax

For Linux:

   # ./MegaCli -PDHSP -Rmv -PhysDrv[?:Sx] -ax

      Sx: Sx is a slot number for a target global hot spare.

         0, 1, 2, ...

      -ax: x is a disk array controller number.

         0, 1, 2, ... ALL ("ALL" indicates all disk array controllers.)

> **Tip** Distinguish between upper and lower case letters when you execute the above command on Linux.
>
> If you execute the above command on 64 bit OS, replace the word "**MegaCli**" with "**MegaCli64**".
>
> In Windows Server 2012, if you execute the above command, the message "No more interfaces" is output.

The global hot spare is cancelled.

In the above-mentioned procedure, use a dedicated hot spare for a system unit equipped with physical drives have the same capacity. That is, remove the global hot spare, and then configure a dedicated hot spare.

If a physical drive for hot spare use is mounted on the purchased system unit, **the hot spare is configured as a global hot spare before shipment.**

Configuring a global hot spare

This subsection describes how to configure a hot spare for a current virtual drive (RIAD1, RIAD5, RAID6, or RAID10).

> **Note** A hot spare is applicable only to redundant virtual drives (RAID1, RAID5, RAID6, and RAID10). Hot spare setting for a RAID0 drive is not supported.

> **Tip** A global hot spare is displayed only in the **Physical** view, not in the **Logical** view.

---

1. In the **Physical** view, select the physical drive that you want to configure as a global hot spare.

2. Right-click the selected physical drive, and click **Assign Global Hot Spare**.
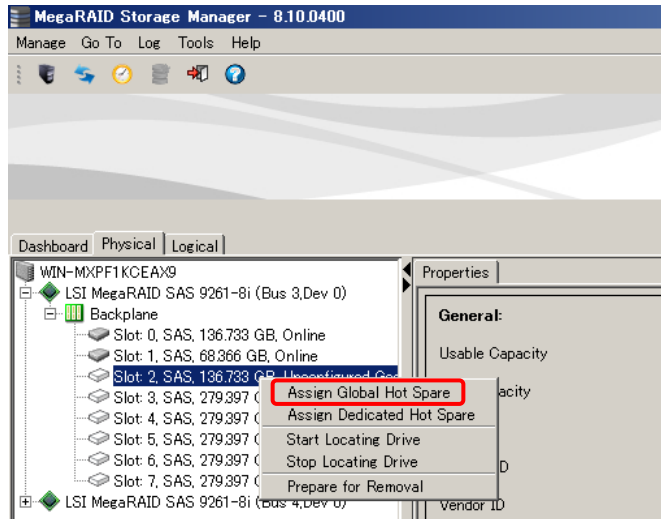
3. The drive is configured as a global hot spare.
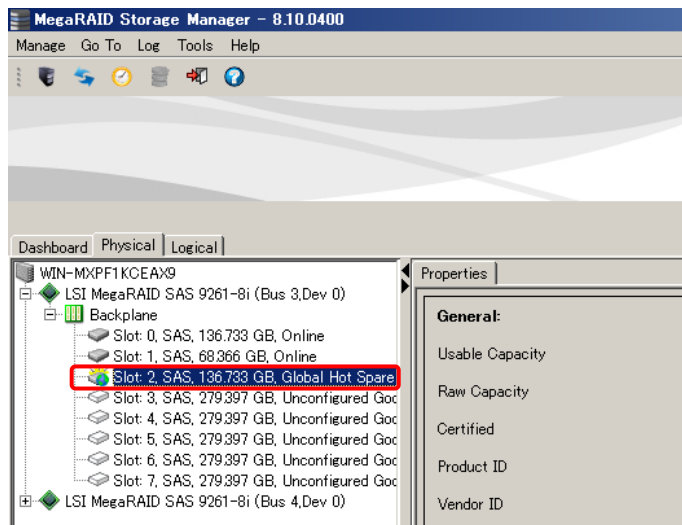
Configuring a dedicated hot spare

This subsection describes how to configure a hot spare to a current virtual drive (RIAD1, RIAD5, RAID6, or RAID10).

> **Note**
> A hot spare is applicable only to redundant virtual drives (RAID1, RAID5, RAID6, and RAID10). Hot spare setting for a RAID0 drive is not supported.
>
> Configure a dedicated hot spare only for a single drive group, not for multiple drive groups.

Configuring a hot spare for an existing drive group

1. In the **Physical** view, select the physical drive that you want to configure as a dedicated hot spare.

2. Right-click the selected physical drive, and click **Assign Dedicated Hot Spare**.
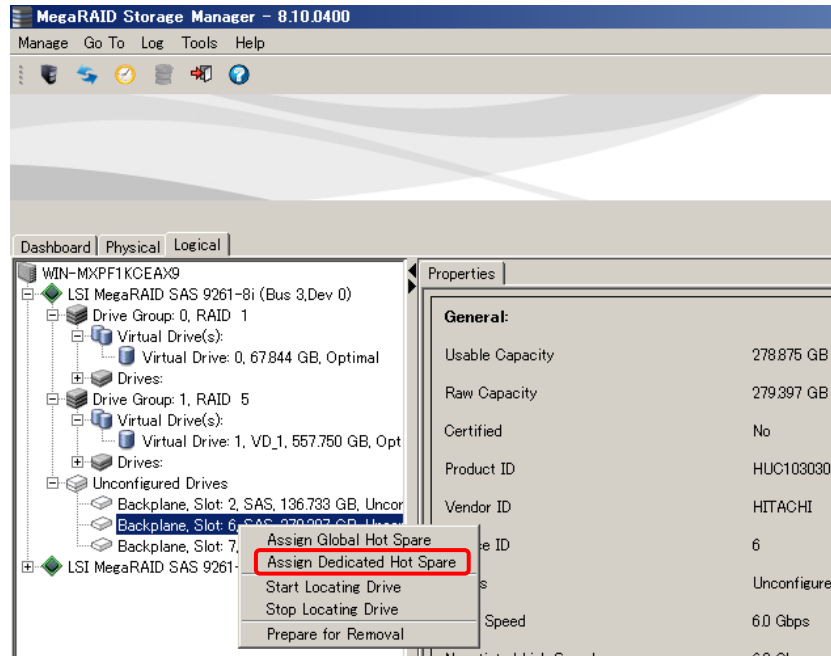
3. The window for configuring a dedicated hot spare opens.

    Select a target drive group and click **OK**.
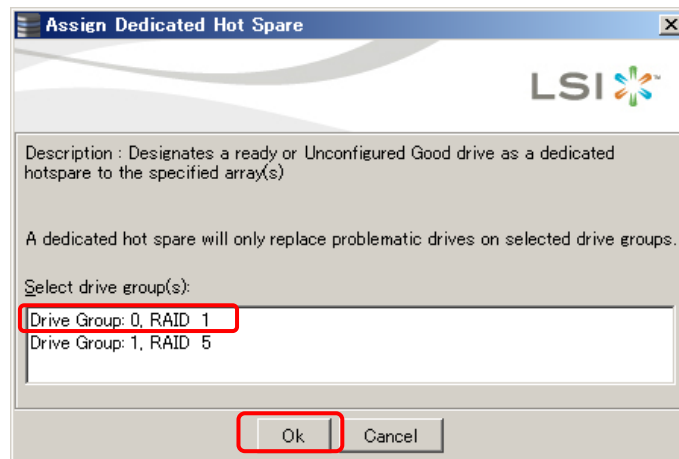
4. The dedicated hot spare is configured.

In the **Logical** view, a hot spare is displayed for the target drive group.
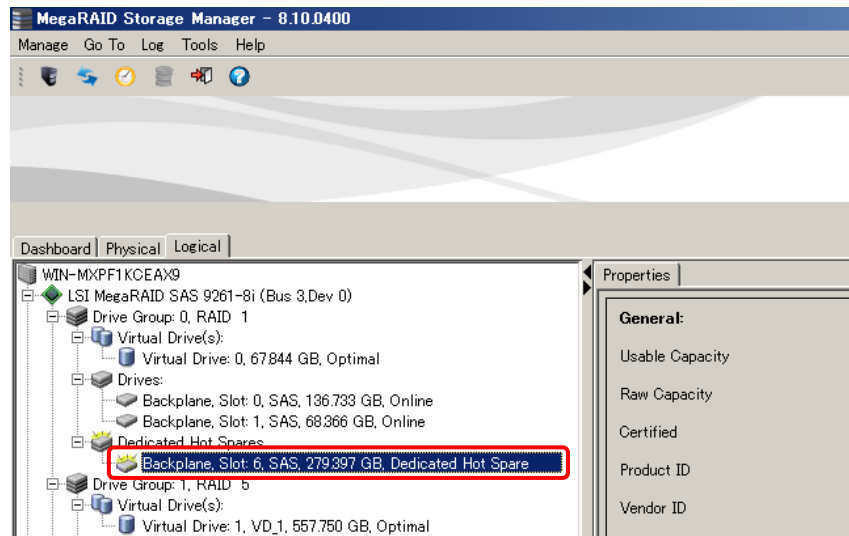
Configuring a dedicated hot spare when creating a virtual drive

You can configure a hot spare when you create a virtual drive (RAID1, RAID5, RAID6, or RAID10). Follow the procedure described below after performing steps 1 and 2 of "Functions of MegaRAID Storage Manager" on page 2-82.

| Note | A dedicated hot spare cannot be configured in this procedure when you create a virtual drive in an existing drive group. |

1. Selecting **Advanced** displays the **Drive Group Settings** window.

    After setting the RAID level, select multiple physical drives while pressing **Ctrl** in the **Select unconfigured drive**s window.

    With the target physical drives selected, click **Add**.
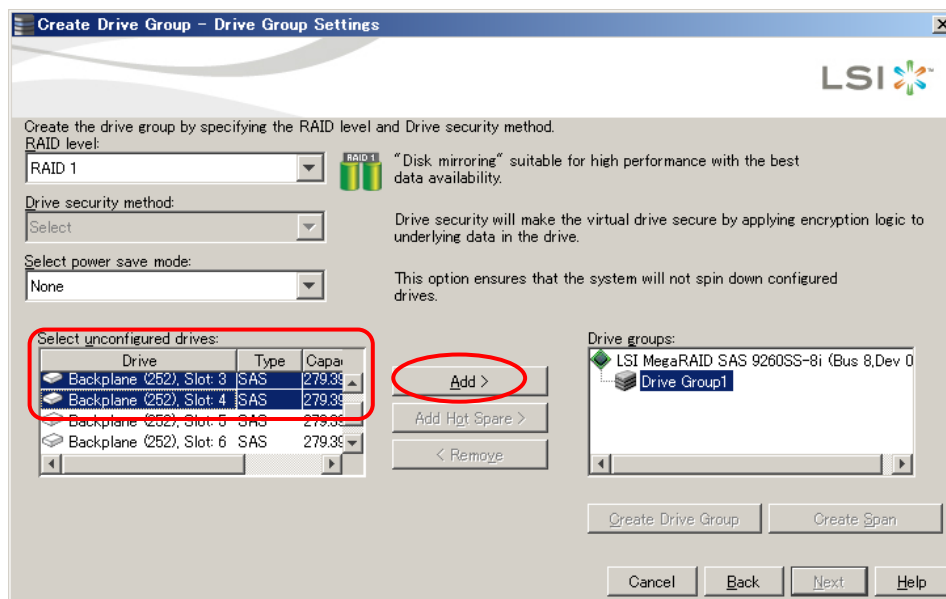
| Note | Make sure that **Select power save mode** is set to **None**. This parameter may not be displayed depending on the disk array controller type (including LSI Software RAID). |

2. Confirm whether the selected drives have moved to the **Drive groups** window or not.

Then, click **Create Drive Group**.
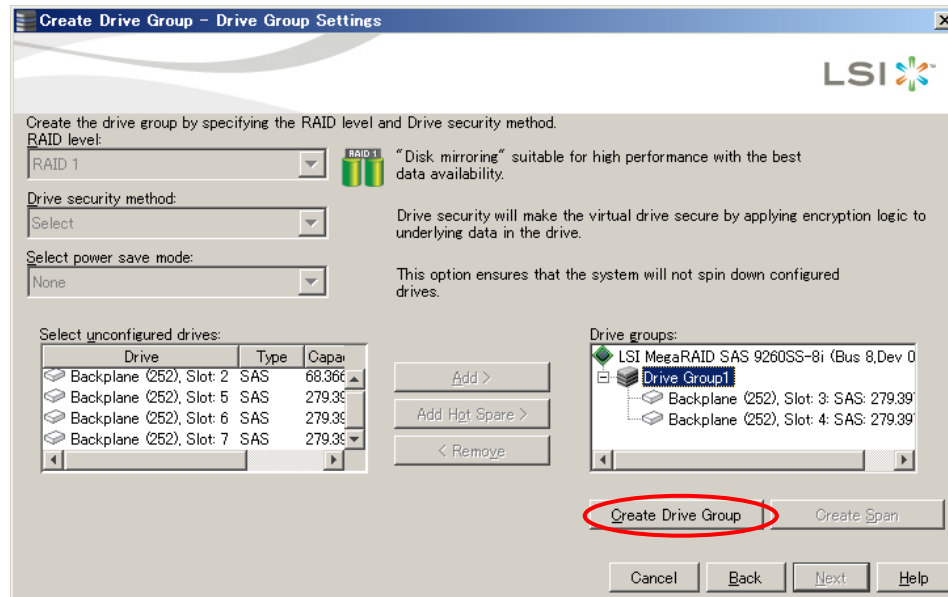
3. In the **Select unconfigured drives** window, reselect the physical drive to be configured as a hot spare window.

Next, select the drive group to which the hot spare is configured, and click **Add Hot Spare**.
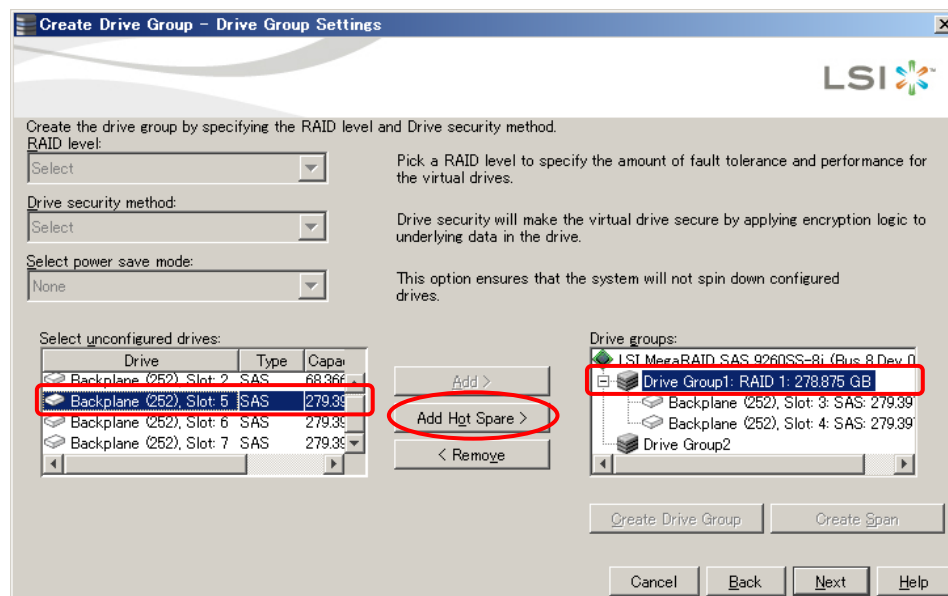
4. Confirm whether the physical drive configured as the dedicated hot spare has been moved to the **Drive groups** window, and click **Next**.
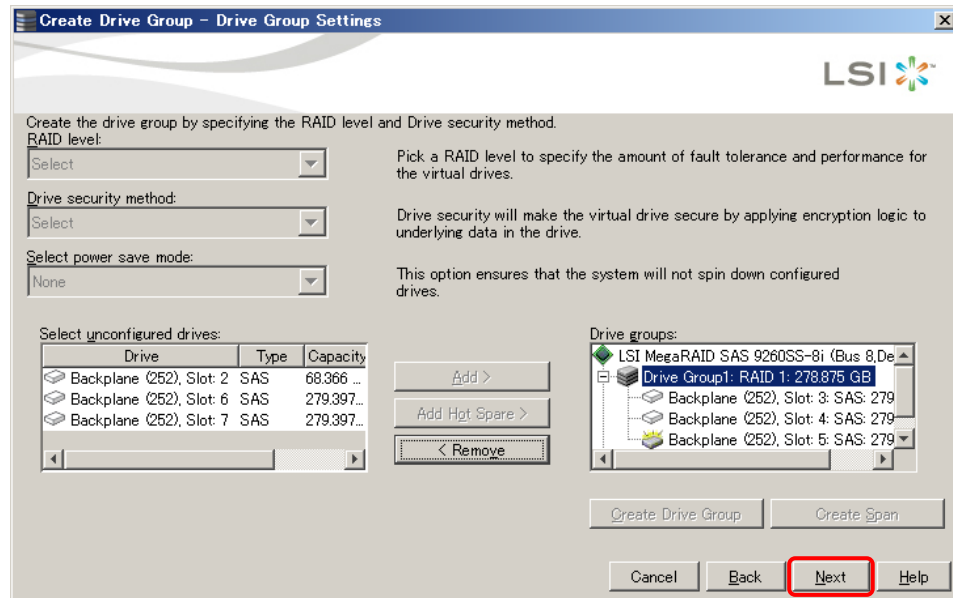
5. Create the virtual drive with reference to "Functions of MegaRAID Storage Manager" on page 2-82.

Removing a hot spare

This subsection explains how to remove a configured global hot spare.

This procedure is also applicable to removing a dedicated hot spare.

1. In the **Physical** view, select a physical drive set to the global hot spare that you want to remove.

2. Right-click the selected global hot spare, and click **Remove Hot Spare** in the menu.

   Alternatively, you can click **Go To** > **Physical Drive** > **Remove Hot Spare**.
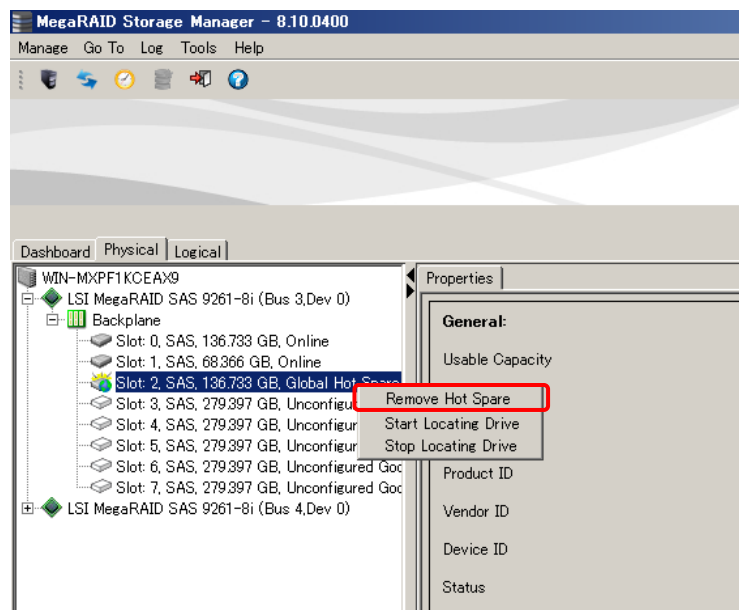
3. A dialog box opens for confirming the deletion of the hot spare. Select **Confirm** and click **Yes**.

   The global hot spare is removed.
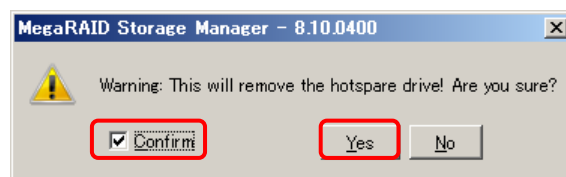
Expansing virtual drive capacity

The capacity of a RAID5 or RAID6 virtual drive can be expanded without erasing data by adding an unused physical drive.

Follow the procedure described below. **To prepare against any unexpected risk, make a full system backup before expanding the capacity.**

NOTICE

During capacity expansion, do not restart, power on, or power off the system unit. Do not stop the system until the expansion is completed. A failure to do so may cause loss of data.

> **Note** Capacity expansion is not supported for the case where there are multiple virtual drives in the drive group or there is a virtual drive that is not using the entire capacity of the drive group.

> **Tip** During capacity expansion, the IO policy of all virtual drives under the disk array controller is temporarily set to **Cached IO**.
>
> Capacity expansion for a disk array controller (with cache backup) sets the write policy of the virtual drive to **Write Through** (when set to **Write Back With BBU**).
>
> Background initialization is automatically executed after expansion of the capacity. (Background initialization takes about 1 minute per 10-GB data of the prior-expansion virtual drive.)
>
> To check if the device is a disk array controller (with cache backup), check **BBU Present** of "Controller" on page 2-88. If the value is **Yes**, the device is a disk array controller (with cache backup).

1. In the **Logical** view, click the drive group that contains the target virtual drive.

2. Click **Go To** > **Drive Group** > **Modify Drive Group** in the menu.

   Alternatively, right-click the drive group and click **Modify Drive Group.**
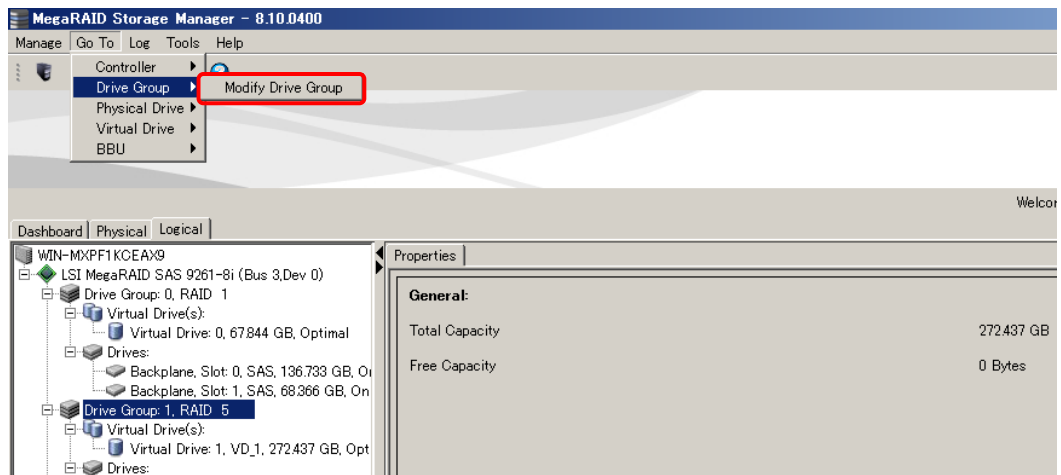
3. The confirmation dialog box opens to prompt you to back up data. After the backup, select **Confirm** and click **Yes**.
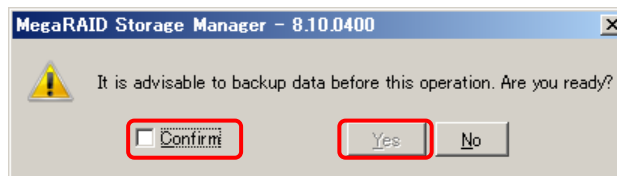
4. The **Modify Drive Group** window opens. Select the RAID level to be applied after expansion, and click **Next**.
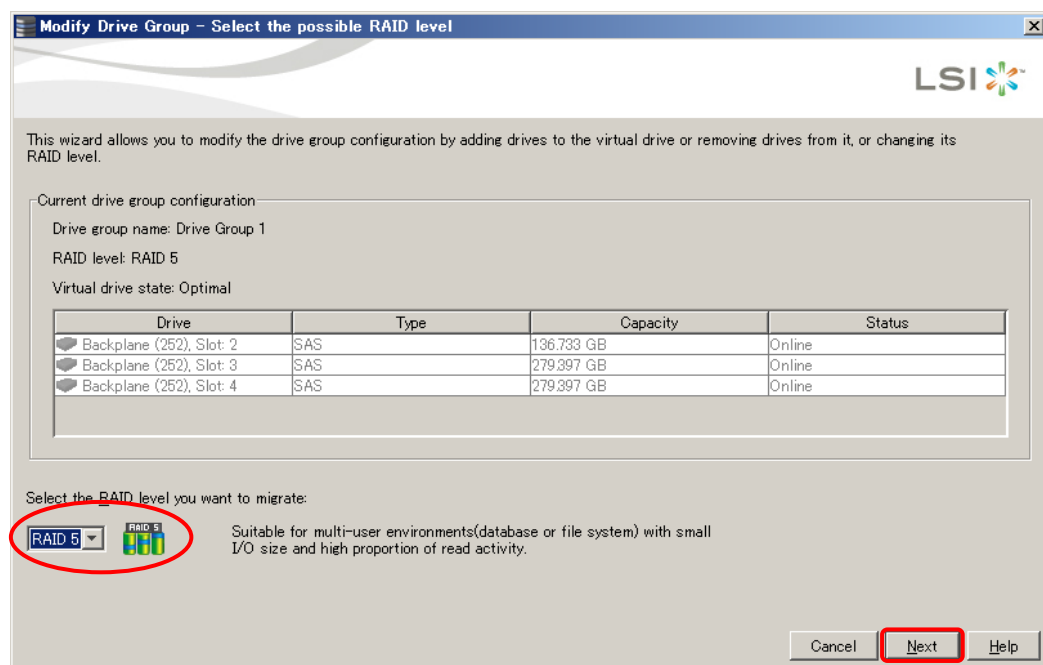
	Select the same RAID level as the current one. Selecting a different RAID level may cause unsuccessful capacity expansion or corruption of disk array data.
Note	

5. The **Add drive to the current configuration** window opens. Check the drive to be added and click **Next**.
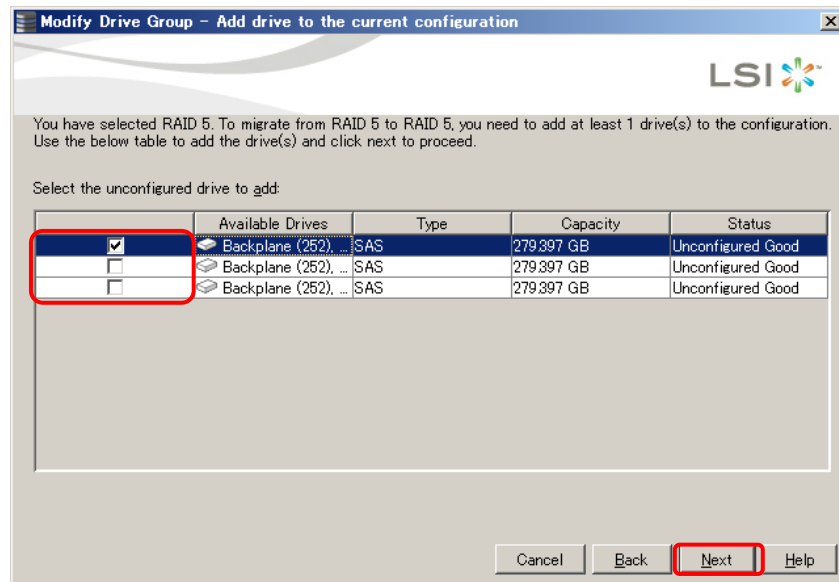
6. The **Summary** window opens. Click **Finish**.
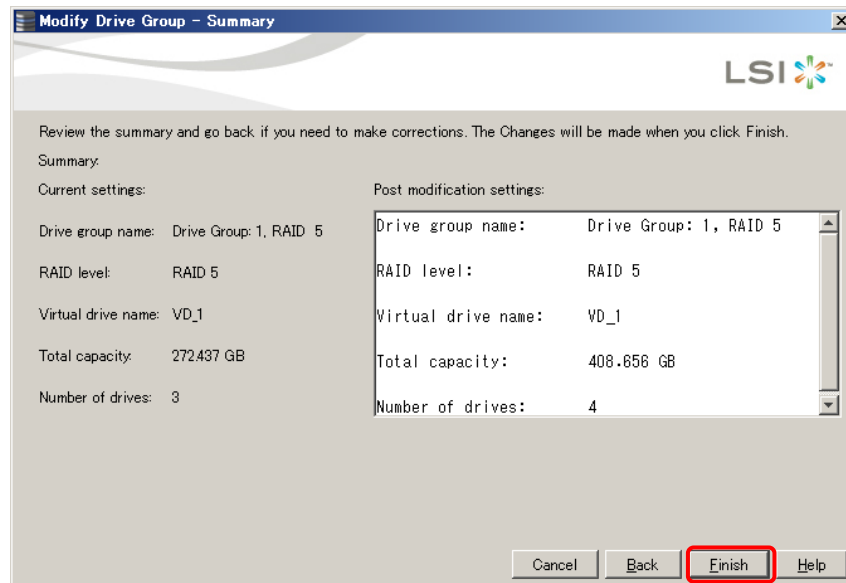
7. The **Confirmation** window opens. Click **Yes**.

Capacity expansion starts.
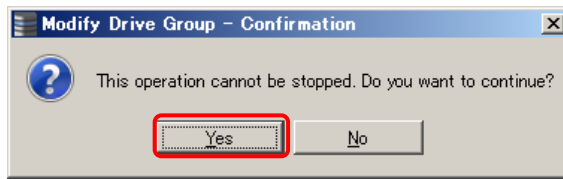
> To confirm the capacity expansion progress, see "Displaying task progress and terminating a task" on page 2-157.

Deleting virtual drive(s)

This paragraph describes how to delete a virtual drive, and return all physical drives of the virtual drive to the unused state.

Follow the procedure described below.

> **NOTICE**
>
> All data in a virtual drive are lost when the drive is deleted. Be careful in deleting a drive. Backup important data.

1. In the **Logical** view, select the virtual drive to be deleted.

2. Click **Go To** > **Virtual Drive** > **Delete Virtual Drive** in the menu.

   Alternatively, right-click the virtual drive and click **Delete Virtual Drive**.
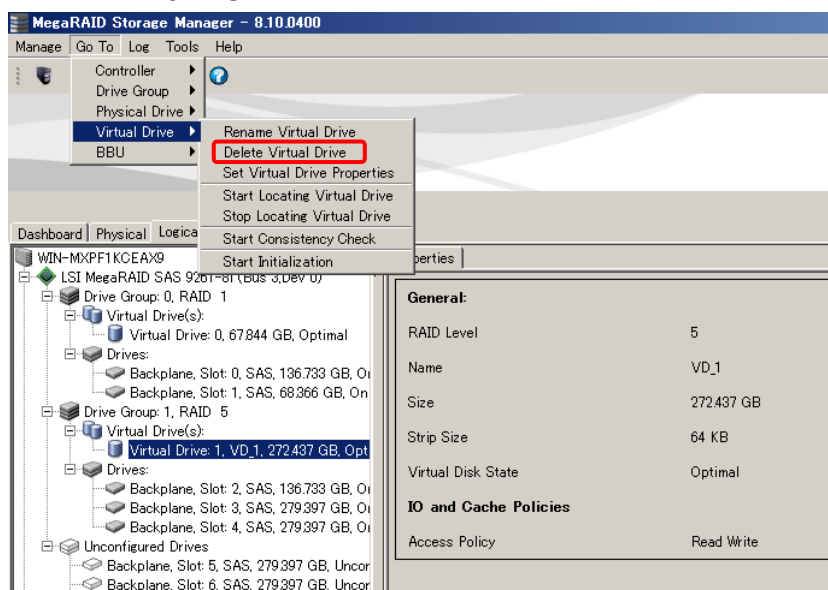
3. A dialog box opens for confirming the deletion of the virtual drive. Select **Confirm** and click **Yes**.
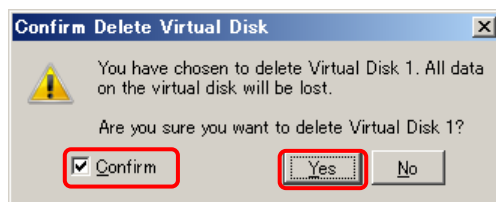
   The virtual drive is deleted. The virtual drive is deleted also from the **Logical** view.

Note	Within a drive group, it is only possible to delete the last virtual drive that you created.
	To delete a virtual drive older than the last one, delete all the virtual drives from the last drive through the target one in descending order of creation date.

Changing write cache

MSM allows you to change the write cache setting for each virtual drive.

Tip	To check if the device is a disk array controller (with cache backup), check **BBU Present** of "Controller" on page 2-88. If the value is **Yes**, the device is a disk array controller (with cache backup).

1. In the **Logical** view, select the virtual drive for which you want to change the write cache setting.

2. Right-click the selected virtual drive and click **Set Virtual Drive Properties** in the menu.

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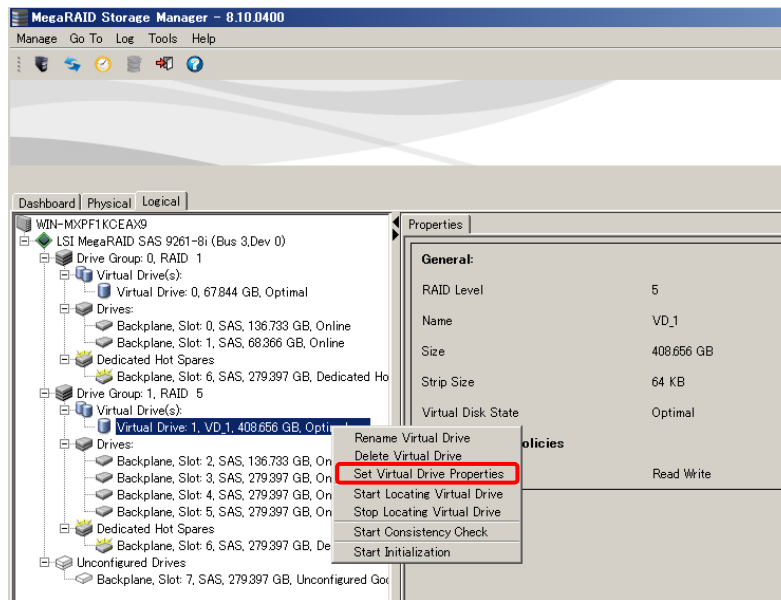
3. Select **Write Policy**, change the setting in accordance with the environment as described below, and click **OK**.

For the disk array controller (with cache backup):

Change the setting to **Write Back with BBU**.

For the system unit is connected to an uninterruptible power supply (UPS):

Change the setting to **Always Write Back**.
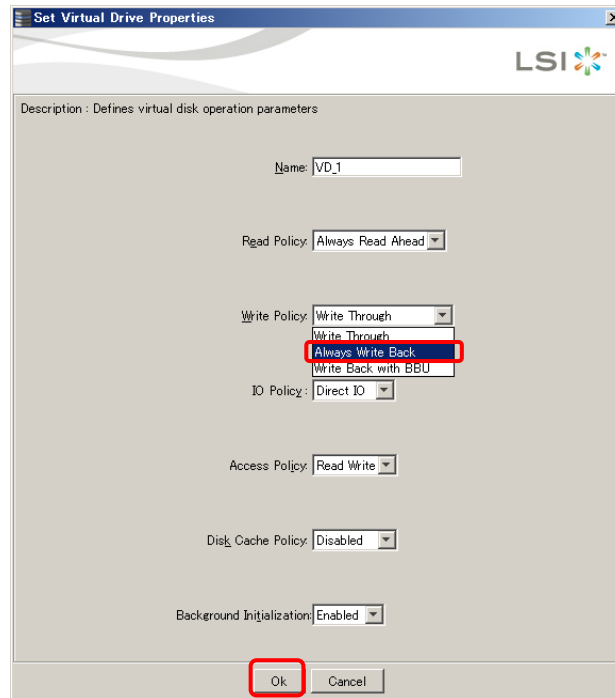
4. The pop-up window for confirming the write cache setting opens. Click **Yes**.
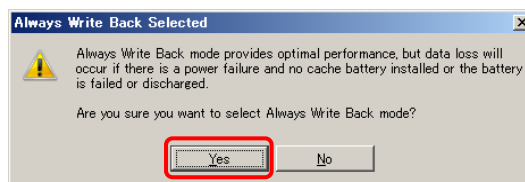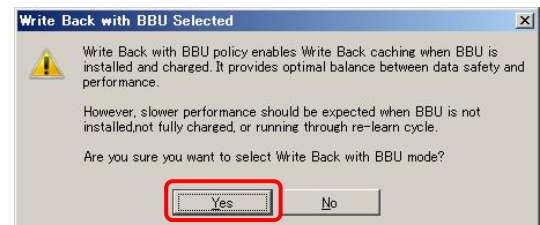
Setting to **Always Write Back**   Setting to **Write Back with BBU**

5. The cache change dialog box opens. Select **Confirm** and click **Yes**.
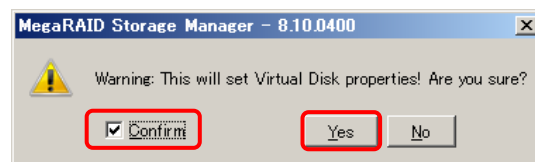
The write cache is configured for the virtual drive.

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6. Confirm that **Write Policy** is displayed as shown below.

    When setting to **Always Write Back**:

    Current Write Policy: Write Back

    Default Write Policy: Always Write Back

    When setting to **Write Back with BBU**

    Current Write Policy: Write Back

    Default Write Policy: Write Back with BBU
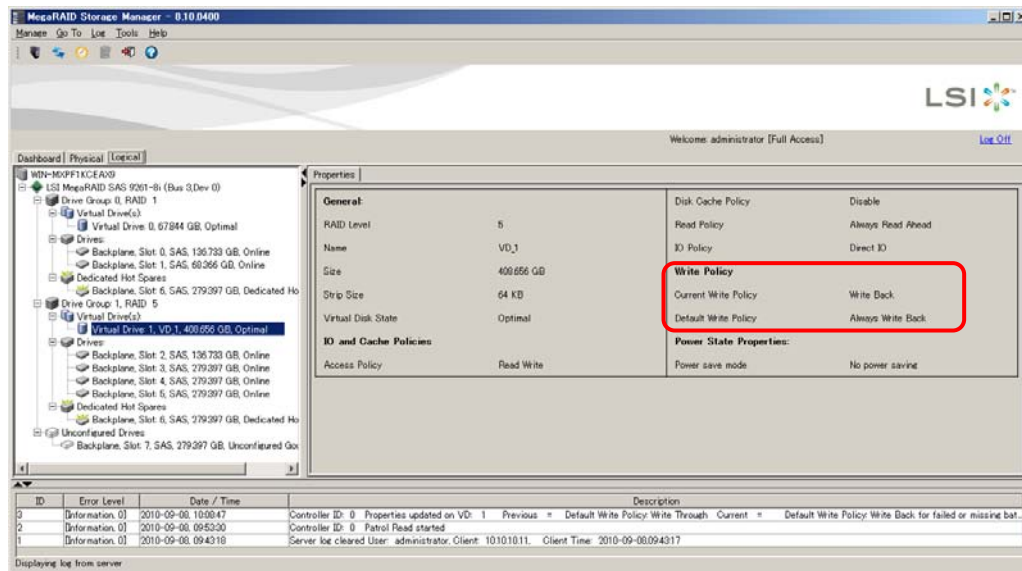
Blinking LEDs

You can blink the LEDs on individual mounted physical drives and logical drives to confirm their location.

This paragraph describes a virtual drive as an example. The procedure also applies to physical drives.

Note	LSI Software RAID is not supported.

Blinking LEDs

1. In the **Logical** view, select the virtual drive whose LEDs you want to blink

2. Click **Go To** > **Virtual Drive** > **Start Locating Virtual Drive**.

    Alternatively, right-click the virtual drive and click **Start Locating Virtual Drive** in the menu.
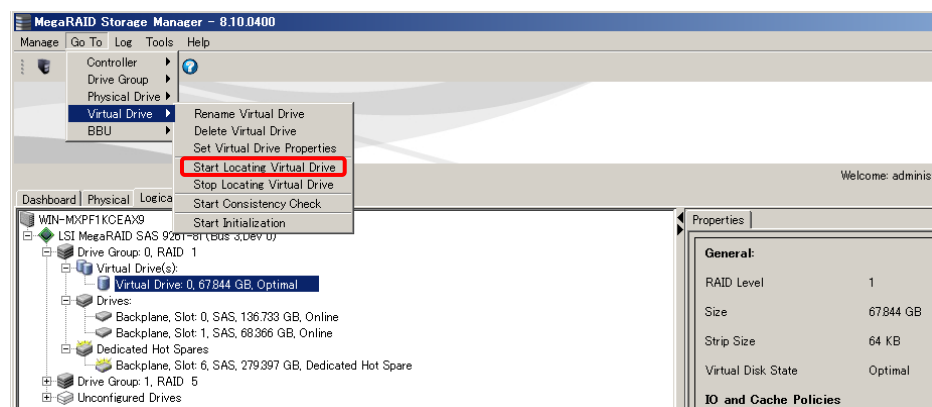
Tip	If you select a physical drive, click **Start Locating Drive**.

3. The LEDs on the physical drives that make up the virtual drive will blink.

Stopping blinking LEDs

1. In the **Logical** view, select the virtual drive whose LEDs you want to stop blinking.

2. Click **Go To** > **Virtual Drive** > **Stop Locating Virtual Drive**.

   Alternatively, right-click the virtual drive and click **Stop Locating Virtual Drive** in the menu.
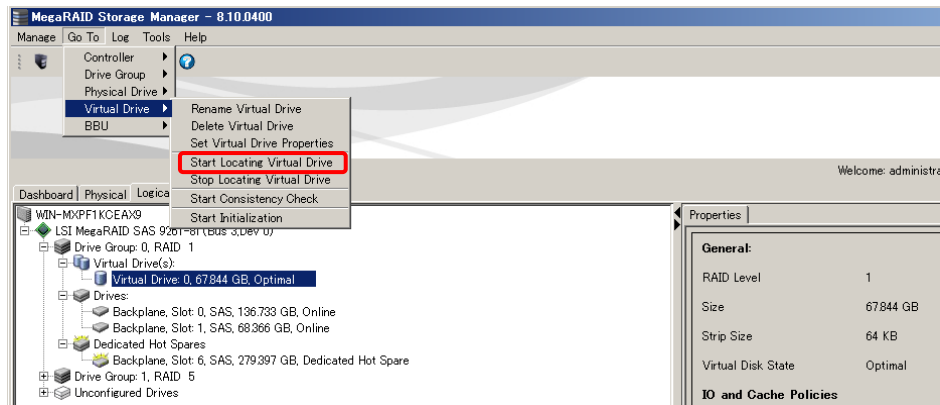
Diagnosing cache back module (BBU)

The diagnostic function Learn Cycle performs one cycle of charging and discharging a cache back module to diagnose its status. Diagnosis can be performed in the procedure described below. However, automatic diagnosis is performed periodically.

Note

This function can be used only for disk array controllers (with cache backup).

Set Learn Cycle Properties is not supported. Do not use this parameter. Use automatic diagnosis with factory default (**Enable**).

The diagnosis progress cannot be confirmed.

Tip

To check if the device is a disk array controller (with cache backup), check **BBU Present** of "Controller" on page 2-88. If the value is **Yes**, the device is a disk array controller (with cache backup).

The diagnosis time is about 5 minutes.

Automatic diagnosis is performed 28 days after the last diagnosis. (For example, if automatic diagnosis is executed at 11 pm on May 10, the next one will be done at 11 pm on June 7.)

MSM: Execution of diagnosis

Execute diagnosis from **MSM** in the procedure described below.

1. Select **BBU** in the **Physical** view.

2. Right-click the selected **BBU**, and click **Start Learn Cycle**.

    Diagnosis starts.
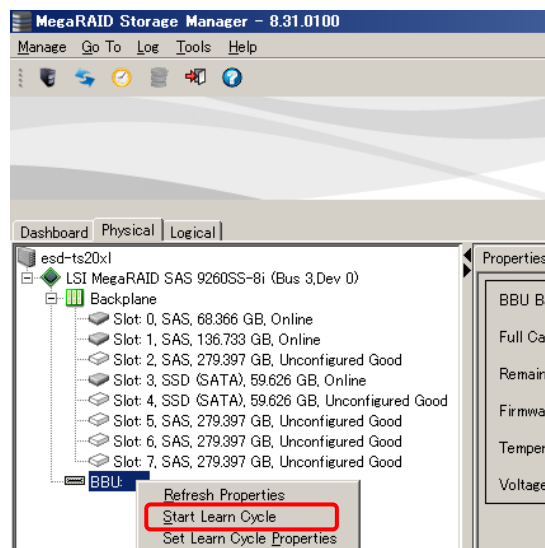
Tip	MSM takes a log named **Battery relearn started.** when a diagnosis starts.

MSM takes a log called **Battery relearn completed.** when a diagnosis completes.

After you click **Start Learn Cycle**, preparation for diagnosis is made. It may take about two minutes to start diagnosis.

Command line: Execution of diagnosis

This is the procedure for executing diagnosis manually by entering a command on the command line or from a terminal. To execute diagnosis periodically, include this command in a batch file so that it is executed by an OS task schedule. Set an interval of less than 28 days because automatic diagnosis is already scheduled for every 28 days.*

* The BBU property **Next Learn Cycle** indicates the date and time of next automatic diagnosis.

1. For Windows, start the command prompt.

    For Linux, start the terminal.

2. For Windows, move to the **MSM** installation directory.

    For Linux, move to the following directory:

    /opt/MegaRAID/MegaCli

Tip	For Windows, **MSM** is installed in the following default directory:

- 64bit OS:

   C:\Program Files (x86)\MegaRAID Storage Manager
- 32bit OS:

   C:\Program Files\MegaRAID Storage Manager

3. Enter the following commands:

    For Windows:

    # MegaCli -AdpBbuCmd -BbuLearn -a0

    For Linux:

    # ./MegaCli -AdpBbuCmd -BbuLearn -a0

Tip	Distinguish between upper and lower case letters when you execute the above command on Linux.

If you execute the above command on 64 bit OS, replace the word "**MegaCli**" with "**MegaCli64**".

In Windows Server 2012, if you execute the above command, the message "No more interfaces" is output.

4. Diagnosis starts.

```
C:¥Program Files¥MegaRAID Storage Manager>megacli.exe -AdpBbuCmd -BbuLearn -a0

Adapter 0: BBU Learn Succeeded.

Exit Code: 0x00
```

Tip The diagnosis continues to run after you terminate the command line window or the terminal.

Start and end events are registered in the **MSM** event log as well as in the Windows application log.

SMART copyback

The SMART copyback function allows you to copy all data from a physical drive expected to fail from which SMART warning is issued to a hot spare drive. (The physical drive is a part of a virtual drive which is created using RAID1, RAID5, RAID6, or RAID10.)

Consequently, the function makes it possible to replace the physical drive safely with redundancy of the virtual drive retained.

In addition the function lowers the possibility for a degraded virtual drive to fail additionally with another physical drive failure during rebuild operation.

> **Note** Since the SMART copyback operation copies all data of a physical drive expected to fail, system performance becomes lower when the operation runs than when it doesn't run.
>
> This function is not supported on LSI Software RAID systems.

> **Tip** The SMART copyback function is disabled by default.
>
> Use **MegaCli** on the command line to enable or disable the function.
>
> During the SMART copyback operation, the physical drive from which the SMART warning occurs is marked as **being replaced with <copy destination hot spare>** in the **Physical** view.
>
> During the SMART copyback operation, the copy destination hot spare is marked as **replacing <copy source physical drive>** or **Copyback in progress** in the **Physical** view.
>
> The physical drive from which the SMART warning occurs becomes the **Unconfigured Bad** status after the SMART copyback operation finishes.
>
> If the SMART copyback operation is suspended before completion, the related physical drives revert to their original status.
>
> To confirm the SMART copyback operation progress, see "Displaying task progress and terminating a task" on page 2-157.

Enabling SMART copyback function

To enable SMART copyback:

1. For Windows, start the command prompt.
   For Linux, start the terminal.

2. For Windows, move to the MSM installation directory.
   For Linux, move to the following directory:
     /opt/MegaRAID/MegaCli

For Windows, **MSM** is installed in the following default directory:
  - 64bit OS:
    C:\Program Files (x86)\MegaRAID Storage Manager
  - 32bit OS:
    C:\Program Files\MegaRAID Storage Manager

---

3. Execute the following command:

   For Windows:

     # MegaCli -AdpSetProp -CopyBackDsbl -0 -a0

   For Linux:

     # ./MegaCli -AdpSetProp -CopyBackDsbl -0 -a0

Distinguish between upper and lower case letters when you execute the above command on Linux.

If you execute the above command on 64 bit OS, replace the word "**MegaCli**" with "**MegaCli64**".

In Windows Server 2012, if you execute the above command, the message "No more interfaces" is output.

---

4. The following message is displayed:

```
Adapter 0:  Set CopyBack to Enable success.
Exit Code:  0x00
```

5. Execute one of the following commands:

   When enabling SMART copyback for a HDD:

     For Windows:
       # MegaCli -AdpSetProp -SMARTCpyBkEnbl -1 -a0
     For Linux:
       # ./MegaCli -AdpSetProp -SMARTCpyBkEnbl -1 -a0

   When enabling SMART copyback for a SSD:

For Windows:

MegaCli -AdpSetProp -SSDSMARTCpyBkEnbl -1 -a0

For Linux:

./MegaCli -AdpSetProp -SSDSMARTCpyBkEnbl -1 -a0

Distinguish between upper and lower case letters when you execute the above command on Linux.

If you execute the above command on 64 bit OS, replace the word "**MegaCli**" with "**MegaCli64**".

---

6. The following message is displayed:

When enabling SMART copyback for a HDD:

```
Adapter 0:  Set Copyback on SMART error is Enable success.
Exit Code:  0x00
```

When enabling SMART copyback for a SSD:

```
Adapter 0:  Set Copyback on SMART error for SSD device is Enable success.
Exit Code:  0x00
```

The procedure for enabling SMART copyback function is completed.

Disabling SMART copyback

To disable SMART copyback:

1. For Windows, start the command prompt.
   For Linux, start the terminal.

2. For Windows, move to the **MSM** installation directory.
   For Linux, move to the following directory:
   /opt/MegaRAID/MegaCli

Tip	For Windows, **MSM** is installed in the following default directory:
	  - 64bit OS:
	    C:\Program Files (x86)\MegaRAID Storage Manager
	  - 32bit OS:
	    C:\Program Files\MegaRAID Storage Manager

---

3. Execute one of the following commands:

   When disabling SMART copyback for a HDD:

   For Windows:
   > # MegaCli -AdpSetProp -SMARTCpyBkEnbl -0 -a0

   For Linux:
   > # ./MegaCli -AdpSetProp -SMARTCpyBkEnbl -0 -a0

   When disabling SMART copyback for a SSD:

   For Windows:
   > # MegaCli -AdpSetProp -SSDSMARTCpyBkEnbl -0 -a0

   For Linux:
   > # ./MegaCli -AdpSetProp -SSDSMARTCpyBkEnbl -0 -a0

Tip	Distinguish between upper and lower case letters when you execute the above command on Linux. If you execute the above command on 64 bit OS, replace the word "**MegaCli**" with "**MegaCli64**". In Windows Server 2012, if you execute the above command, the message "No more interfaces" is output.

---

4. The following message is displayed:

   When disabling SMART copyback for a HDD:

   ```
   Adapter 0:  Set Copyback on SMART error is Disable success.
   Exit Code:  0x00
   ```

   When disabling SMART copyback for a SSD:

   ```
   Adapter 0:  Set Copyback on SMART error for SSD device is Disable success.
   Exit Code:  0x00
   ```

5. Execute one of the following commands:

   For Windows:

   # MegaCli -AdpSetProp -CopyBackDsbl -1 -a0

   For Linux:

   # ./MegaCli -AdpSetProp -CopyBackDsbl -1 -a0

   > **Tip**
   > Distinguish between upper and lower case letters when you execute the above command on Linux.
   >
   > If you execute the above command on 64 bit OS, replace the word "**MegaCli**" with "**MegaCli64**".

6. The following message is displayed:

   ```
   Adapter 0:  Set CopyBack to Disable success.
   Exit Code:  0x00
   ```

The procedure for disabling SMART copyback function is completed.

Rescan

Rescan allows the system unit to recognize that you have added new physical drive during its operation.

Follow the procedure described below.

1. Click **Manage** > **Refresh** in the menu. Alternatively, click in the graphical menu.
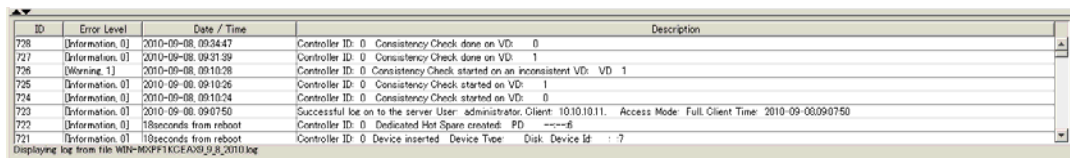
   Rescan starts.
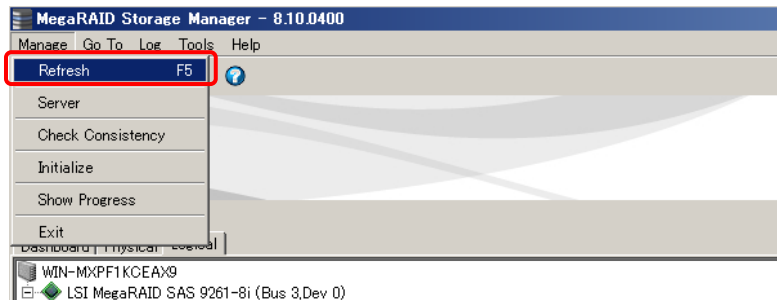
Rescan finishes after a while.

Event reference

When you start **MSM**, the event log reported by managed servers is automatically displayed in the message window on the main screen.

You can store and delete the event log. You can also display the stored log.

Follow the procedures described below.

Save

Saves the current event log.

1. Click **Log** > **Save** or **Save as Text** in the menu.
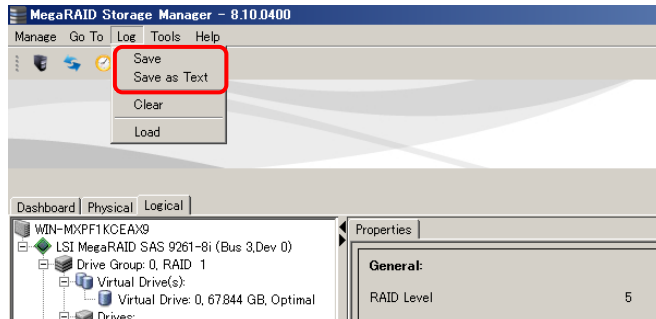
2. The window for saving the log opens.

   Specify the saving location of the event log as well as the file name, and then click **Save**.

   The event log is saved.
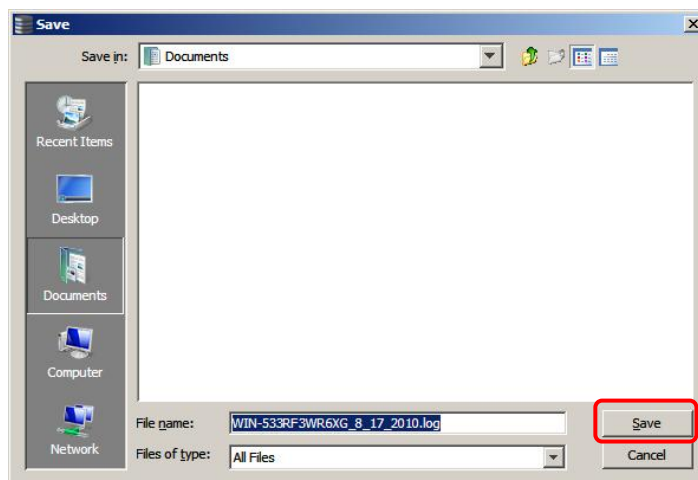
Tip	The maximum number of events in the current event log that can be saved is 3000. Save the event log before the number of events does not exceed 3000, and then delete the events.
	See "Collecting/Operating event logs" on page 3-3 for details.
	For Linux, only alphanumeric characters can be used for the name of a file to be saved.

Clear

Deletes the event log that is currently displayed.

	Do not use **Clear**. Otherwise, fault analysis may be affected.

1. Click **Log** > **Clear** in the menu.
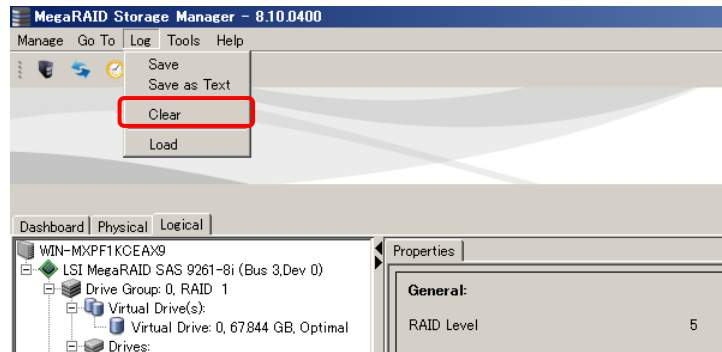
2. The dialog box is displayed for confirming the deletion of the event log opens. Click **Yes**.
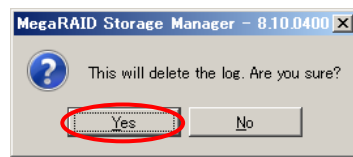
3. The dialog box for confirming whether or not to save the current event log opens.

   Clicking **Yes** saves the event log. Specify the saving location and the file name as in the case of the **Save** function.

   Clicking **No** deletes the event log without saving.
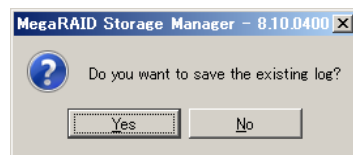
4. The event log displayed in the message window is deleted.
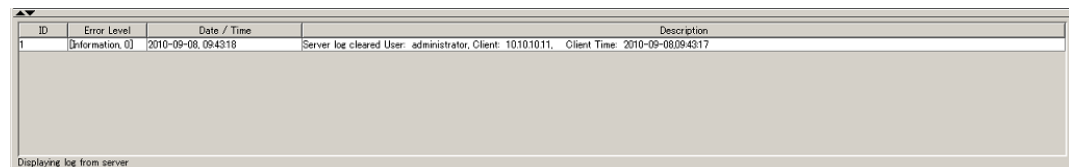
Load

Loads and displays the saved event log.

1. Click **Log** > **Load** in the menu.
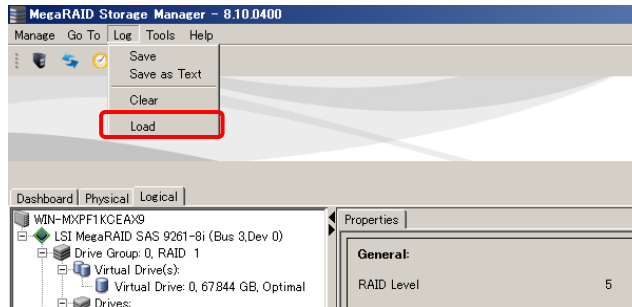
2. Select the event log file to be loaded, and then click **Open**.

3. The loaded event log is displayed in the message window.

> **Tip**
>
> After you have viewed the saved log, select **Log** > **Rollback to Current Log**. The latest events are not displayed until you select **Rollback to Current Log**.
>
>
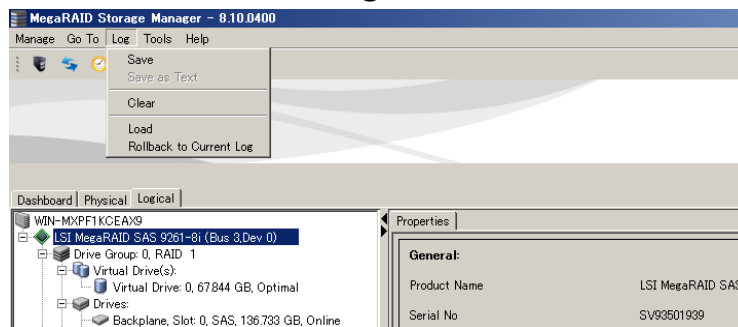
Displaying task progress and terminating a task

This function allows you to display the status of running tasks (initialization of a virtual drive, rebuild, consistency check, and capacity expansion). You can also stop a task.

Follow the procedures described below.

> **Note** **Suspend**, **Suspend All**, and **Suspend Patrol Read** displayed in the task progress window are not supported and should not be used.
>
> The progress displayed by **Show Progress** or **Background operation** of **Dashboard** sometimes stops. In such a case, execute **Manage** > **Refresh**. In the case of **Show Progress**, close the **Show Progress** window before executing **Manage** > **Refresh**.
>
> When **Full Initialize** is specified upon creation of a virtual drive, progress item **Clear:** displayed in **Background operation** of **Dashboard** stays at 0%.
>
> To erase this progress display, execute **Manage** > **Refresh**.

Displaying task progress

1. Click **Manage** > **Show Progress** in the menu. Alternatively, click **More details** of **Dashboard**.
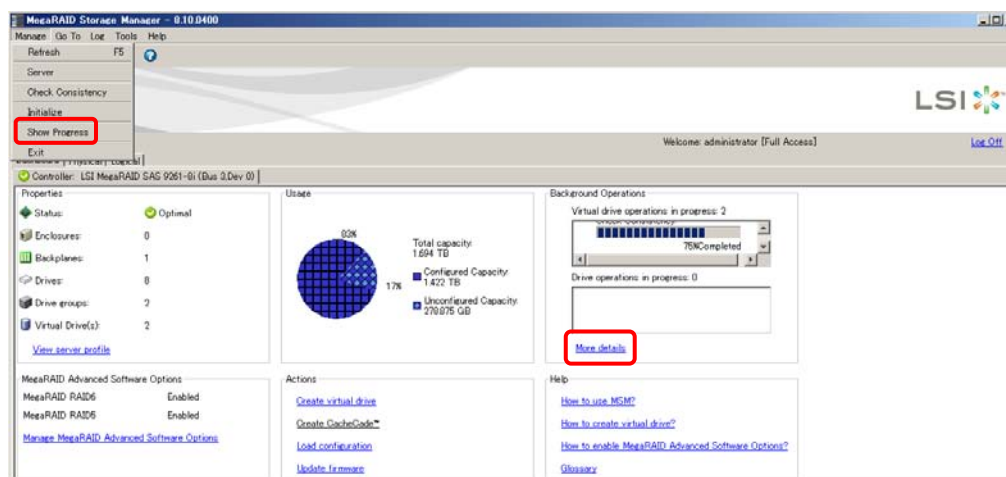
   If there are multiple disk array controllers, select the target one. (You do not have to select a disk array controller if there is only one.)

- The progress of running tasks is displayed. The progress status windows of different tasks are shown below.
  Initializing virtual drive(s)
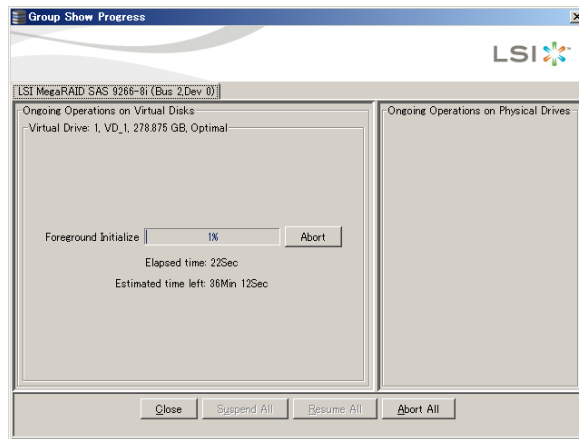
- Rebuild
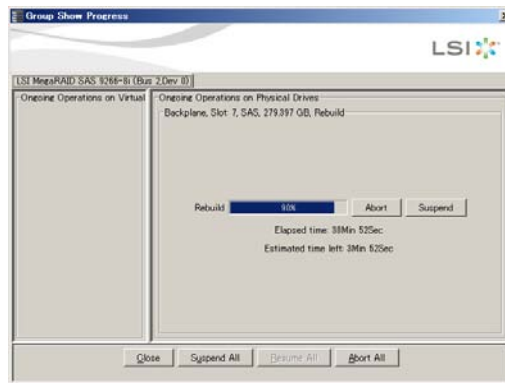
- Consistency check
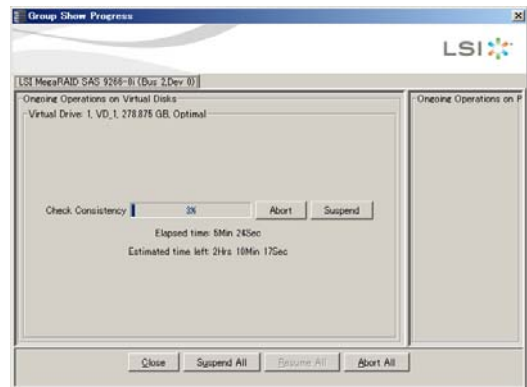
- Expending virtual drive capacity
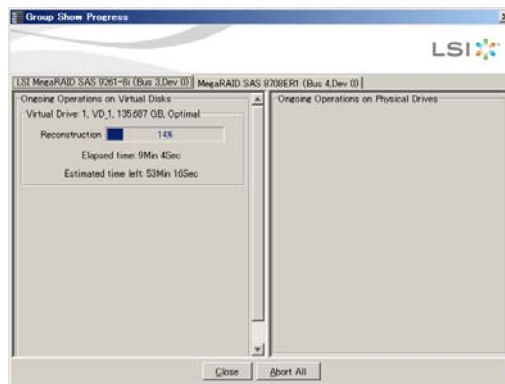
- Patrol Read
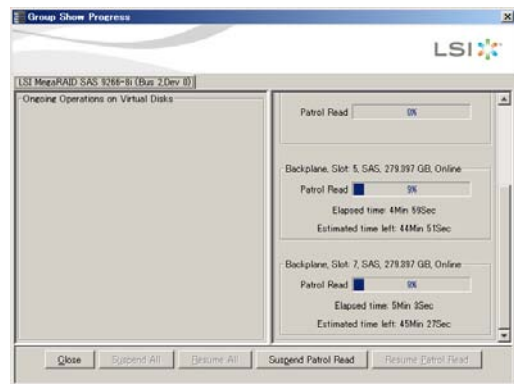
- SMART copyback*[1]
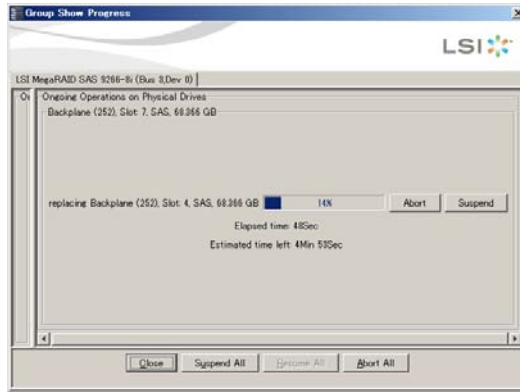
*1: **replacing <copy source physical drive>** in the example window may be displayed as **Copyback in progress**.

Terminating a task

NOTICE

During capacity expansion, do not restart, power on, or power off the system unit. Do not stop the system until a task is completed. Otherwise, data may be lost.

---

1. Click **Abort** in the task progress window.

   To terminate all tasks, click **Abort All**.

> **Note** **Suspend**, **Suspend All**, and **Suspend Patrol Read** displayed in the task progress window are not supported and should not be used.

---

2. The dialog box for confirming the termination of the task opens. Click **Yes**.
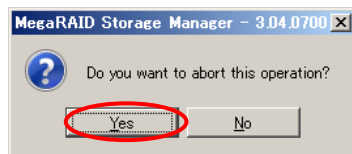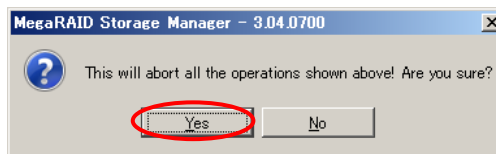
When clicking **Abort**　　　　When clicking **Abort All**

3. The task stops.
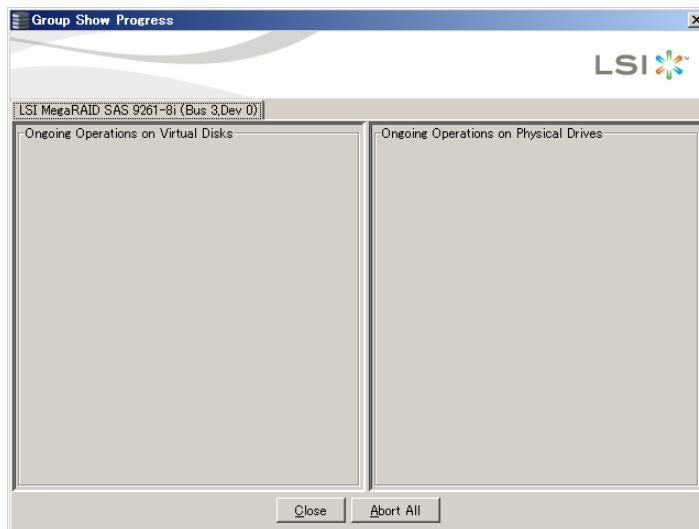
> **Tip** Patrol Read cannot be terminated in the task progress window.
>
> Select the controller, and then select **Go To** > **Controller** > **Stop Patrol Read**.

MegaRAID Storage Manager Instruction Manual

Setting network security exceptions

This function sets network security exception for **MSM**.

Port number

MSM uses its reserved ports 3071 and 5571. These port numbers cannot be changed. When you introduce a network security feature, register these ports as exceptions.

3071: TCP, UDP;   5571: UDP

> **Note**
>
> Port 5571 is not used by this version of **MSM**, hat is reserved for **MSM**. If you introduce network security, please register this port number as an exception.
>
> Do not use the **MSM** ports for any other applications.

Setting exceptions with Windows firewall function

When you install or start MSM with the Windows firewall function and popup message enabled, a pop-up message of **Windows Security Alert** opens.

Pop-up windows:

- When you set up **MSM** after OS installation without closing the **Windows Server Post-Setup Security Updates** window

- When enabling the firewall function

Windows Server 2012
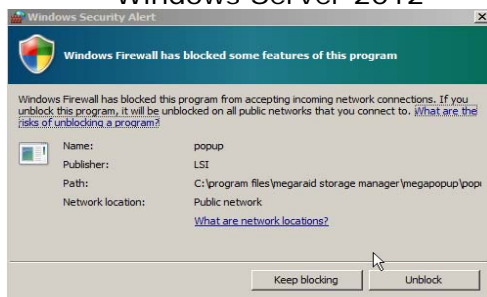
Windows Server 2008 R2

Windows Server 2008

Windows Server 2003 R2 / Windows Server 2003

- When you start **MSM** with the firewall function enabled

| Windows Server 2012 | Windows Server 2008 R2 |
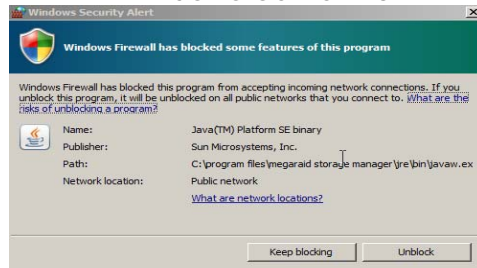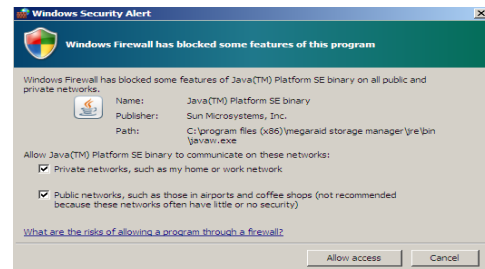
Windows Server 2008

Windows Server 2003 R2 /
Windows Server 2003

To inhibit the pop-up display, set an exception in the procedure described below.

When a pop-up message is displayed

When the **Windows Security Alert** pop-up message is displayed and the program name is **java** or **javaw**, click **Unblock** to register the program as an exception.

> **Tip**
> For Windows Server 2012 / Windows Server 2008 R2, select both **Private Network** and **Public Network**, and then click **Allow access**.

Setting exceptions from the Windows firewall

When you enable the Windows firewall, follow the procedure described below to register the program as a firewall exception.

1. Click the **Exceptions** tab in the Windows firewall window.

> **Tip**
> For Windows Server 2012, select **Allow an app or feature through Windows Firewall**.
>
> For Windows Server 2008 R2, select **Allow a program or feature through Windows Firewall**.

2. Click **Add Program**.

	For Windows Server 2012, select **Allow another app**.
Tip	For Windows Server 2008 R2, select **Allow another program**.
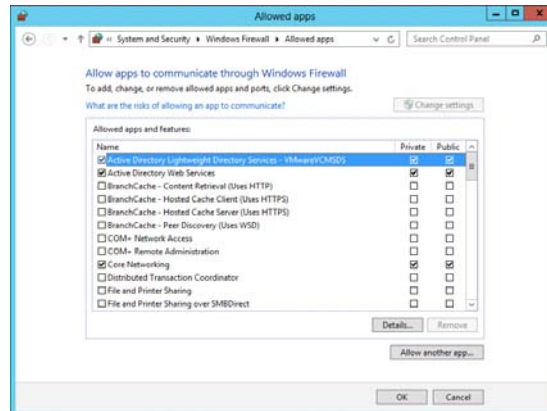
Windows Server 2012   Windows Server 2008 R2
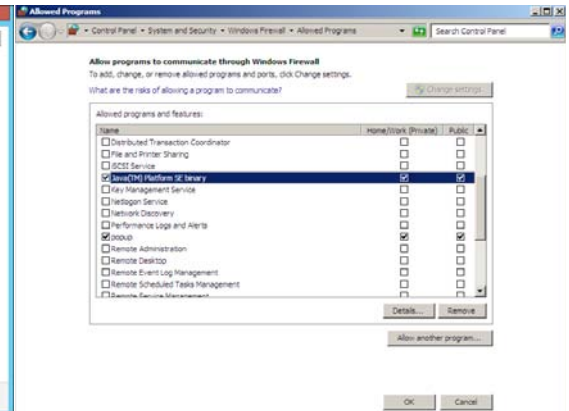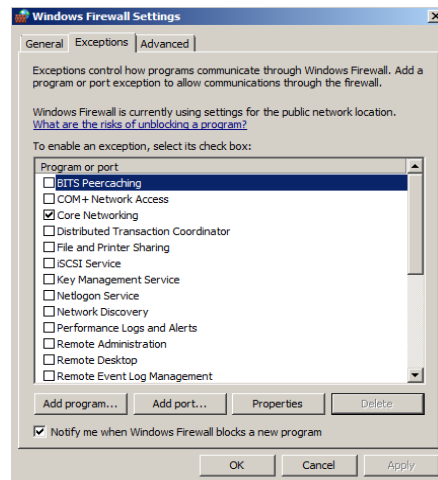
Windows Server 2008   Windows Server 2003 R2 /
                                             Windows Server 2003

3. Click **Browse**, enter the program path, and click **OK**.

	For Windows Server 2012 / Windows Server 2008 R2, click **Browse**,
Tip	enter the program path, and click **Add**.
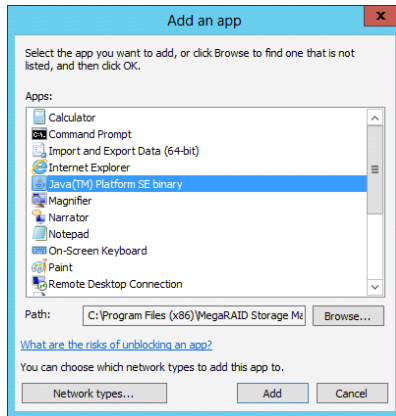
Windows Server 2012

Windows Server 2008 R2

Windows Server 2008
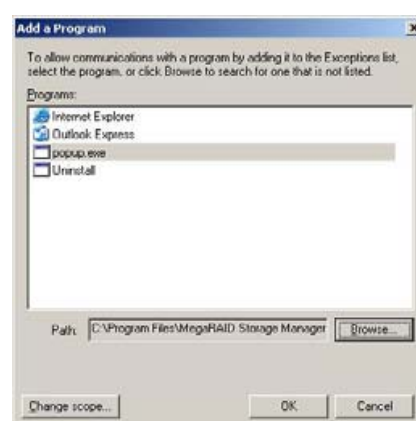
Windows Server 2003 R2 /
Windows Server 2003

The program paths* are as follows:

* When **MSM** is installed in the default location.

java:

- 64bit OS:

  C:\Program Files (x86)\MegaRAID Storage Manager\JRE\bin

- 32bit OS:

  C:\Program Files\MegaRAID Storage Manager\JRE\bin

javaw:

- 64bit OS:

  C:\Program Files (x86)\MegaRAID Storage Manager\JRE\bin

- 32bit OS:

  C:\Program Files\MegaRAID Storage Manager\JRE\bin

4. Confirm that these programs are added in the **Exception** tab and their check boxes are selected.

Set **java** and **javaw** for the program.

Tip

For Windows Server 2012, confirm that the program is added to **Allow apps and features** and the checkbox of **Name**, **Private**, and **Public** are selected. Otherwise, select the unchecked the checkbox, and select **OK**.

For Windows Server 2008 R2, select **Allow a program or feature through Windows Firewall**. Confirm in the window opened that the programs are added as allowed programs, and the check boxes **Name**, **Home/Work (Private)**, and **Public** are selected. If any of these check boxes is not selected, select it.

Exception programs for Ver.8.10-04, Ver.8.31-01 are **javaw**, **mrmonitor**, and **popup**.

Exception programs for Ver.3.04-08 and earlier are **javaw** and **popup**.
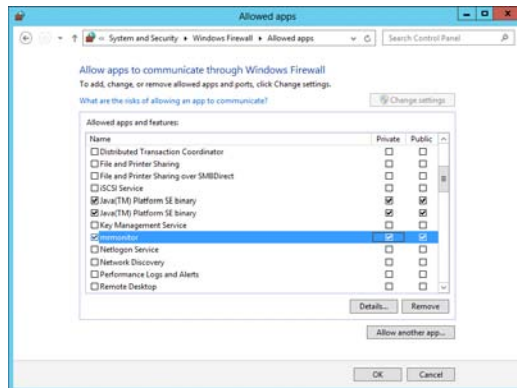
Windows Server 2012
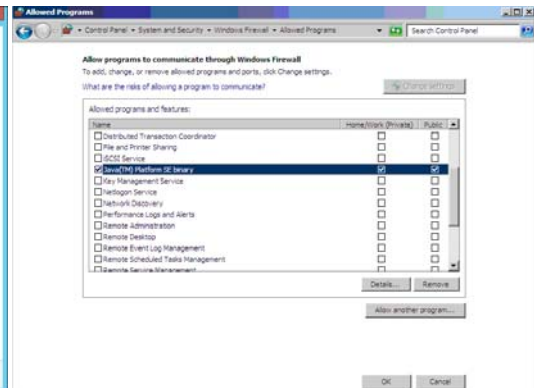
Windows Server 2008 R2
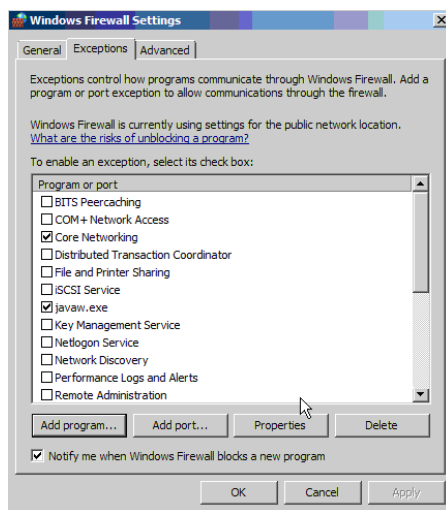
Windows Server 2008

Windows Server 2003 R2 / Windows Server 2003

Setting exceptions with the Red Hat Enterprise Linux firewall function

When the Red Hat Enterprise Linux firewall function is enabled, servers of other **MSM** instances cannot be viewed through the network. When you enable the firewall, register ports 3071 and 5571 as exceptions in the following procedure. (However, some functions such as progress windows are restricted.)

> **Note** Centralized management is not possible when the firewall is enabled.

1. For Red Hat Enterprise Linux 6, click [**System**] > [**Administration**] > [**Firewall**] in the Linux OS menu. (Close the [**Firewall Configuration Startup**] window, which is displayed after selecting [**Firewall**].

   For Red Hat Enterprise Linux 5, click [**System**] > [**Administration**] > [**Security Level and Firewall**] in the Linux OS menu.

Red Hat Enterprise Linux 6   Red Hat Enterprise Linux 5

2. For Red Hat Enterprise Linux 6, click [**Other ports**] in the menu on the left.

    For Red Hat Enterprise Linux 5, select the [**Firewall Options**] tab and click [**Other ports**].
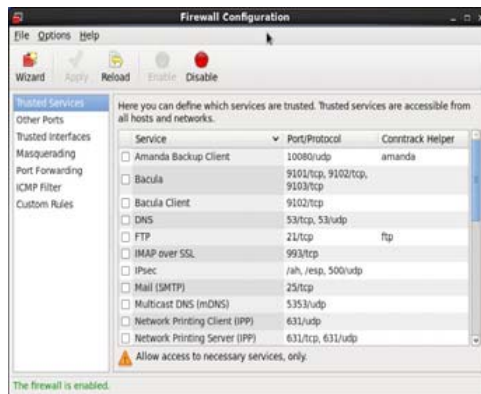
Red Hat Enterprise Linux 6   Red Hat Enterprise Linux 5
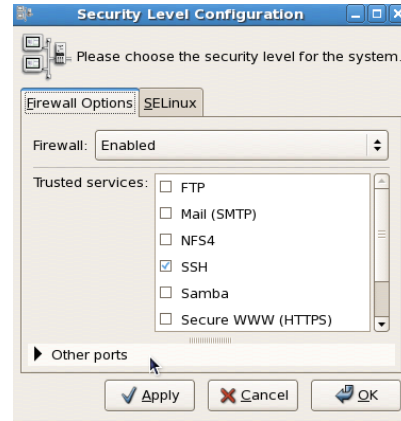
3. The following window is displayed: Click **Add**.
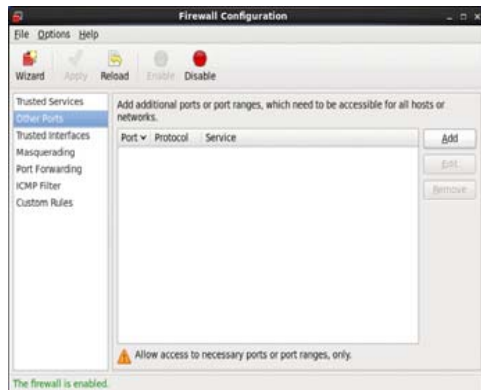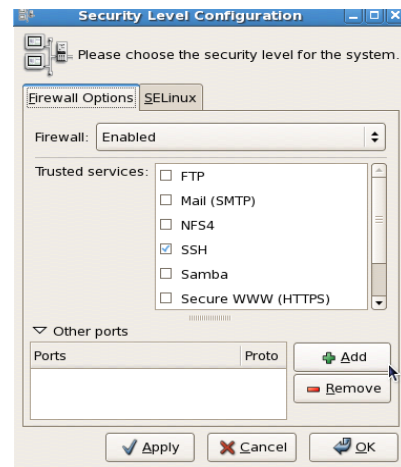
Red Hat Enterprise Linux 6   Red Hat Enterprise Linux 5

4. The following window is displayed:

   For Red Hat Enterprise Linux 6, select [**User Defined**], set [**Port / Port Range**] to "3071" and [**Protocol**] to **tcp**, and then click **OK**.

   For Red Hat Enterprise Linux 5, set [**Port**] to "3071" and [**Protocol**] to **tcp**, and then click **OK**.
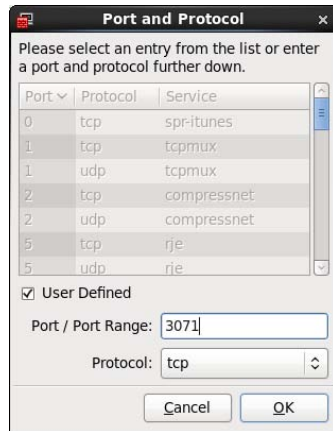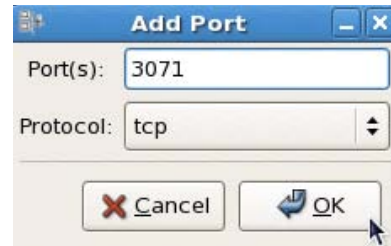
Red Hat Enterprise Linux 6   Red Hat Enterprise Linux 5

5. The port specified in step 4 is added in [**Other ports**].
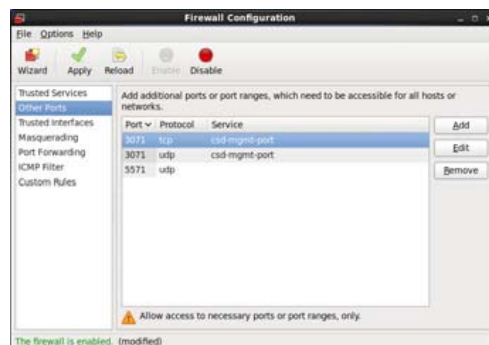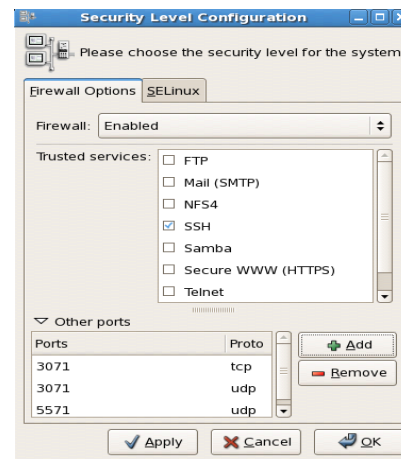
Red Hat Enterprise Linux 6   Red Hat Enterprise Linux 5

6. Repeat steps 3 and 4 and add a port with the following.

   Setting

   (1) Port: 3071, Protocol: udp

   (2) Port: 5571, Protocol: udp

7. Confirm that <u>three</u> setting items have been added in [**Other ports**].
   For Red Hat Enterprise Linux 6, click [**Apply**].
   For Red Hat Enterprise Linux 5, click **OK**.
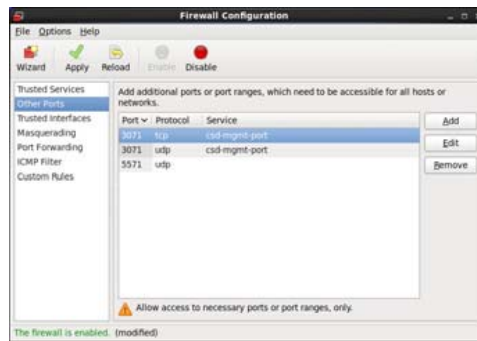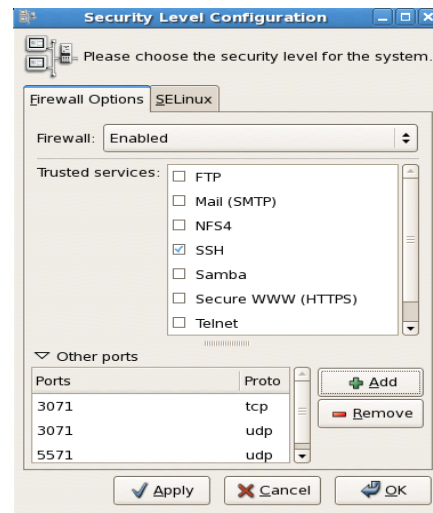
Red Hat Enterprise Linux 6   Red Hat Enterprise Linux 5

8. The following pop-up massage is displayed.
   Click **Yes** to apply the setting.

Red Hat Enterprise Linux 6   Red Hat Enterprise Linux 5

Tip
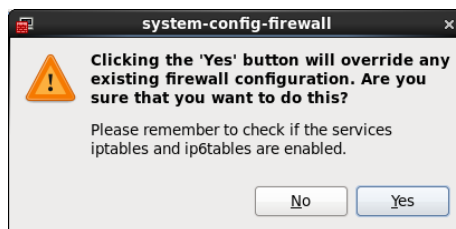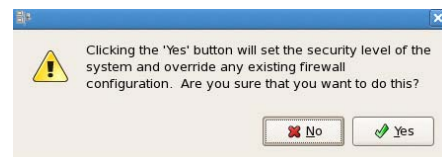
In the CUI environment, add the following items in file **/etc/sysconfig/iptables** to register exceptions:

In Red Hat Enterprise Linux 6

-A INPUT -m state --state NEW -m tcp -p tcp --dport 3071 -j ACCEPT

-A INPUT -m state --state NEW -m udp -p udp --dport 3071 -j ACCEPT

-A INPUT -m state --state NEW -m udp -p udp --dport 5571 -j ACCEPT

In Red Hat Enterprise Linux 5

-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 3071 -j ACCEPT

-A RH-Firewall-1-INPUT -m state --state NEW -m udp -p udp --dport 3071 -j ACCEPT

-A RH-Firewall-1-INPUT -m state --state NEW -m udp -p udp --dport 5571 -j ACCEPT

Make sure that you restart the system after adding these items to the file.

Setting event notification

This function sets an event notification when a disk array event occurs.

The following items can be set for an event notification:

Setting item	Description
Customizing an event notification	Sets what kind of notification should be made for each event level.
Setting email	Configures items required for email event notifications.

Clicking **Tools** > **Monitor Configure Alerts** in the menu displays the event notification setting window.
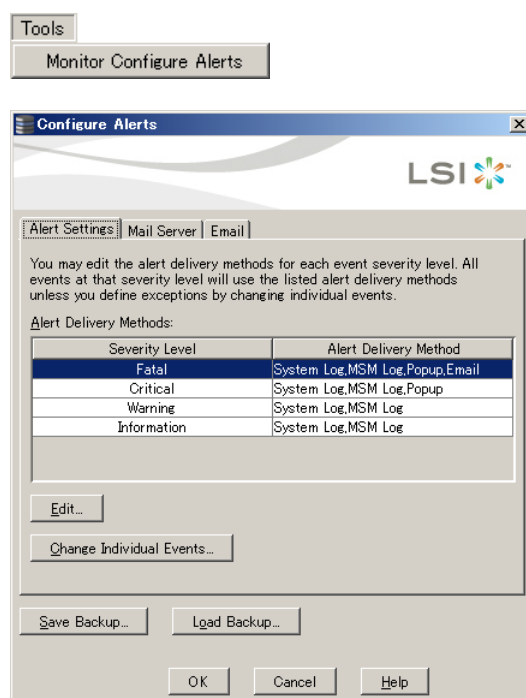
> **Note**
> You cannot operate event notification setting from **MSM Client** of a management PC. Try this setting it from **MSM Client** of a managed server or a management server.

> **Tip**
> We recommend that you make a backup using **Save Backup** when you have made event notification setting. You can restore the setting to the original by **Load Backup** when you reconfigure the system unit.

Customizing an event notification

Sets what kind of event notification should be made for each event level. The initial settings are as follows:

Severity level	Alert delivery method	
	Windows OS	**Linux OS**
Fatal (error)	Recorded in the OS event log (system log) Output to the **MSM** message window (MSM log) Pop-up window (Popup) Email notification (email)	Recorded in the OS event log (system log) Output to the **MSM** message window (MSM log) Email notification (email)
Critical (error)	Recorded in the OS event log (system log) Output to the **MSM** message window (MSM log) Pop-up window (Popup)	Recorded in the OS event log (system log) Output to the **MSM** message window (MSM log)
Warning	Recorded in the OS event log (system log) Output to the **MSM** message window (MSM log)	Recorded in the OS event log (system log) Output to the **MSM** message window (MSM log)
Information	Recorded in the OS event log (system log) Output to the **MSM** message window (MSM log)	Recorded in the OS event log (system log) Output to the **MSM** message window (MSM log)

> **Note**: For a non-GUI environment of Linux, pop-up window notification is not supported and should not be enabled.

> **Tip**: **MSM** messages are recorded in the OS event log and displayed on pop-up windows not in a system unit which is remotely connected for management, but in a system unit where **MSM** events have occurred.
>
> Use the **MSM** Log with the initial value.

Change the setting in the following procedure as necessary.

1. Select a target severity level in the **Alert Delivery Methods** box of the **Alert Settings** tab, and click **Edit**.
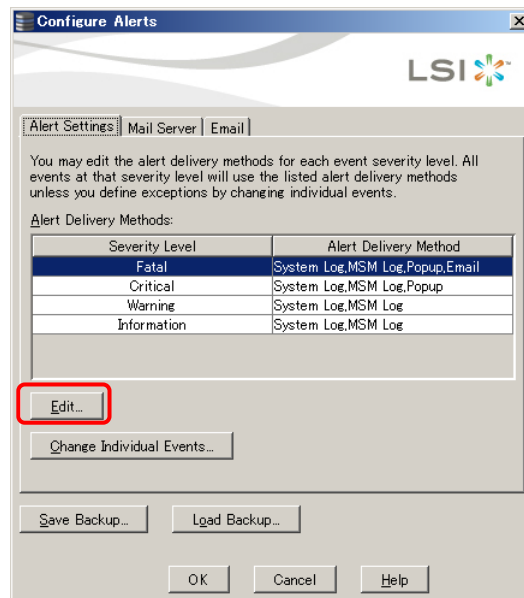
2. Change to any setting. Checking the box enables the selected function(s).
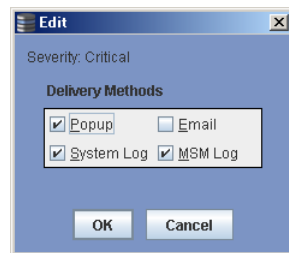
Setting item	Function
MSM Log	Outputs events to the **MSM** message window.
System Log	Records events in the OS event log
Popup	Pop-up window
Email	Email notification

3. Click **OK** after you finish the setting.

4. The event notification setting window opens again. Click **OK**.
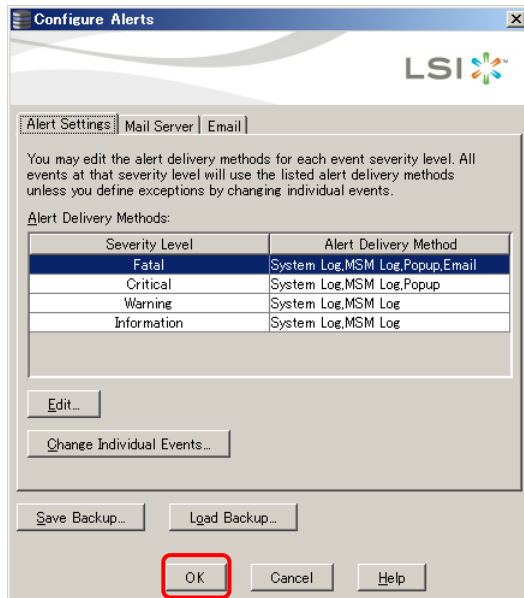
Event notification setting is now completed.

You can also change the severity level and the alert delivery method for each event message. In this case, change the setting in the following procedure:

1. Click **Change Individual Events** of the **Alert Settings** tab.

    The list of event messages is displayed.

2. Click an event message.

To change the severity level, click **Severity** and select a level in the displayed pull-down menu.

To change the alert delivery method, select any setting in the **Alert Delivery Methods** box.
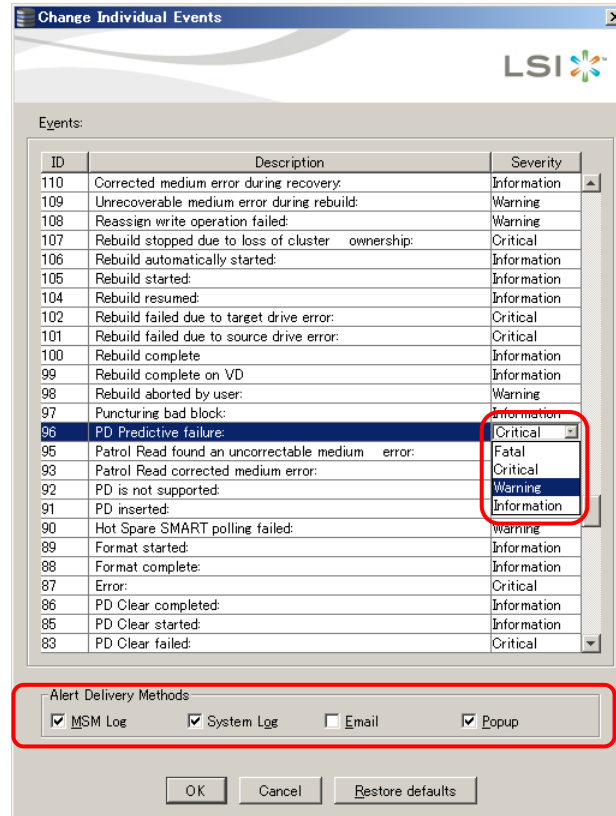
3. Click **OK** when you finish the setting.

4. The event notification setting window opens again. Click **OK**.

The setting of severity level and the alert delivery methods are now completed.

> Do not click **Restore defaults** in the event message list window. Otherwise, the setting is initialized and some important event notifications may not be made.
>
> If you have made a wrong setting, click **Cancel**. In this case, the following pop-up window opens. Click **Yes**.
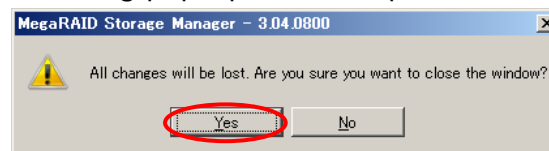
Setting email

Sets the items required for email event notifications.

> **Note** When you want to receive event notifications from the **MSM** by email, open port 25 and port 7 in your SMTP server's firewall.

1. Click the **Mail Server** tab.

2. Enter information into each box.

Entry	Description
Sender email Address	Enter the email address of the sender. The address specified herein is used as the sender address of email.
SMTP Server	Enter the SMTP server name or its IP address.
User name	Enter the username registered for SMTP.[1]
Password	Enter the password registered for SMTP.[1]

> **Note** *1: When **This server requires authentication** is selected, **AUTH-LOGIN (LOGIN)** is used as the authentication method of **MSM**.

3. Click the **Email** tab.
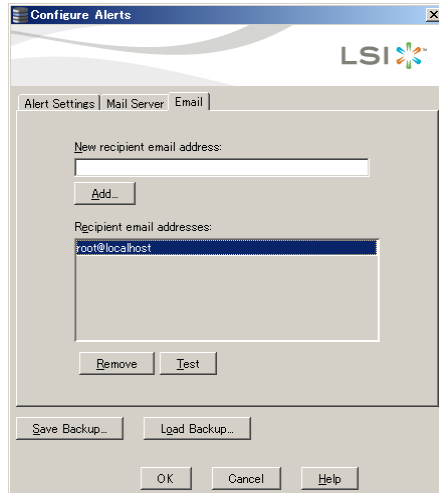
4. Enter the email address of a sender in **New recipient email address**, and click **Add**.
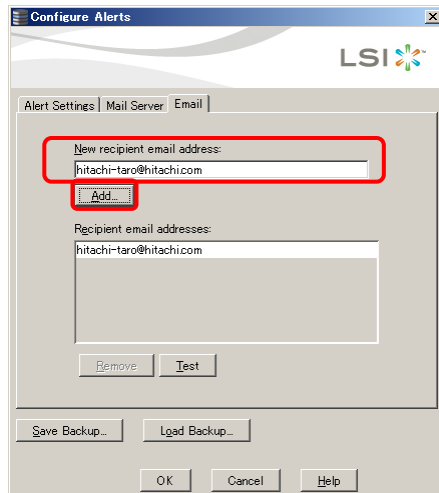
5. Click **OK** when you finish the setting.

> **Tip**
>
> You can send an email test event by clicking **Test**. After setting, send a test event to confirm that email notification can be sent properly.
>
>

Title of transmitted email

The title of the transmitted email is as follows:

<Severify>: Vivaldi E-mail Notification: Event occurred on: <ServerName>

<Severity> stands for a severity level (INFO, WARNING, CRITICAL, or STOP). <Server Name> stands for a server name where the event occurred.

The body of the email includes the event content and the date and time.

However, ignore for the time and date.

Example:

```
Title:INFO: Vivaldi E-mail Notification: Event occurred on: XXXXXX

Controller ID: 0 VD is now OPTIMAL VD 0
Generated on:Sat Jun 09 13:56:42 2007
```

Setting Patrol Read

Patrol Read periodically verifies and repairs bad sectors of each physical drive. Other normal functions take precedence in the IO processing, so that Patrol Read has almost no impact on performance.

> **Note** Do not disable Patrol Read while running. Stop Patrol Read first whenever you disable.
>
> To stop Patrol Read, select the controller and click **Go To** > **Controller** > **Stop Patrol Read**.
>
> Patrol Read does not support LSI Software RAID. Disable Patrol Read.

Prerequisite

Patrol Read setting including schedule management is configured in the hardware before shipment. The default setting of the schedule is 3 days. (We recommend that you use the factory default setting for the schedule.)

If you start the system after the scheduled date and time of Patrol Read, Patrol Read starts immediately even when you change the setting through **MSM**.

If you have implemented centralized management, be sure to set Patrol Read on the target server.

Set the scheduler interval to 1 day or longer for this version.

Use the following command to reset the interval setting to the factory default:

MegaCli -AdpPR -SetDelay 72 -aALL

Apply Patrol Read to all virtual drives and hot spares.

1. Select the disk array controller in the **Physical** view or the **Logical** view.

2. Click **Go to** > **Controller** > **Set Patrol Read Properties**.
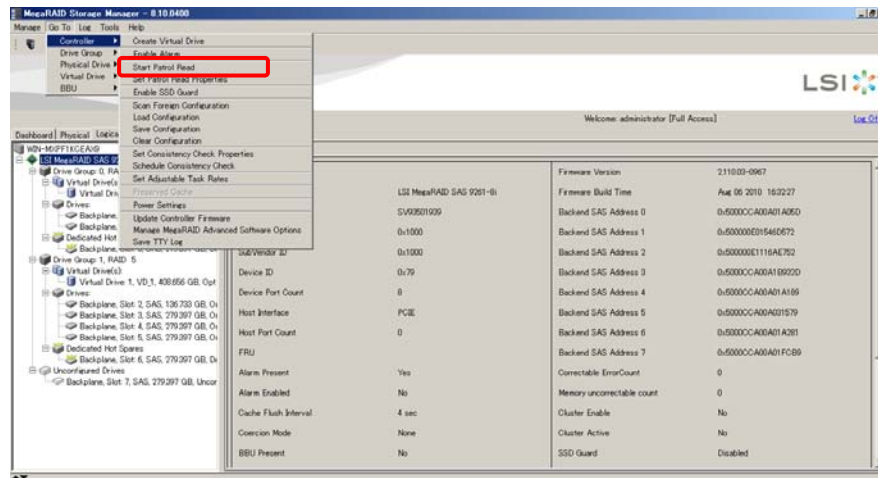
3. The Patrol setting window opens.
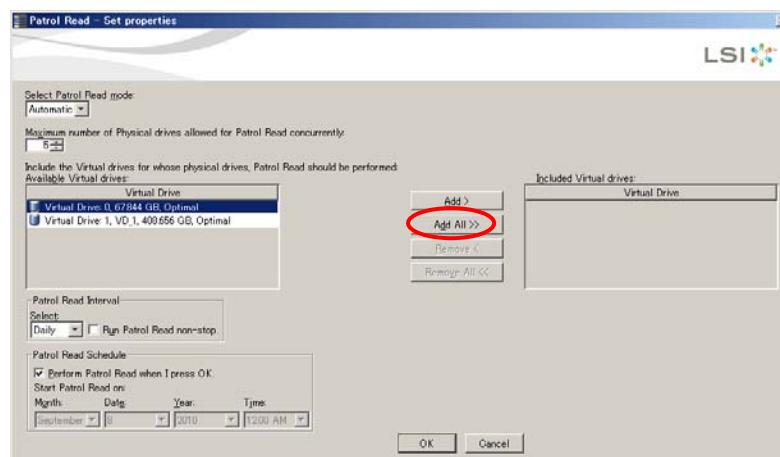
Set Patrol Read in detail as described below.

- Select Patrol Read mode:

  Specifies the execution of Patrol Read.

  Automatic: Executes Patrol Read automatically.

  Manual: Executes Patrol Read manually.

  Disable: Disables Patrol Read.

  * We recommend that you execute Patrol Read by **Automatic**.

- Maximum number of Physical drives allowed for Patrol Read concurrently:

  Specifies the maximum number of physical drives for which Patrol Read is executed.

  Use the default setting.

  * The number of connected physical drives is displayed by default.

- Available Virtual drives:

  Displays the virtual drives for which Patrol Read can be executed.

- Included Virtual drives:

  Displays the virtual drives for which Patrol Read can be executed.

  * Typically, use **Add All** to set all virtual drives of **Available Virtual** drives to **Included Virtual drives**.

When you set **Select Patrol Read mode** to **Disable**, click **OK** and go to step 5.

---

4. Set an interval of executing Patrol Read.

- Patrol Read Interval:
  - **Hourly**: Every hour
  - **Daily**: Every day
  - **Weekly**: Every week
  - **Monthly**: Every month (30 days)

  * Do not use (select) **Run Patrol Read non-stop**.

- Patrol Read Schedule:

    Specifies a starting date and time of a schedule.

    Selecting **Perform Patrol Read when I press OK** starts Patrol Read immediately regardless of the specified starting date and time of the schedule.

    Set the starting date and time of the schedule to later than or equal to the current time.
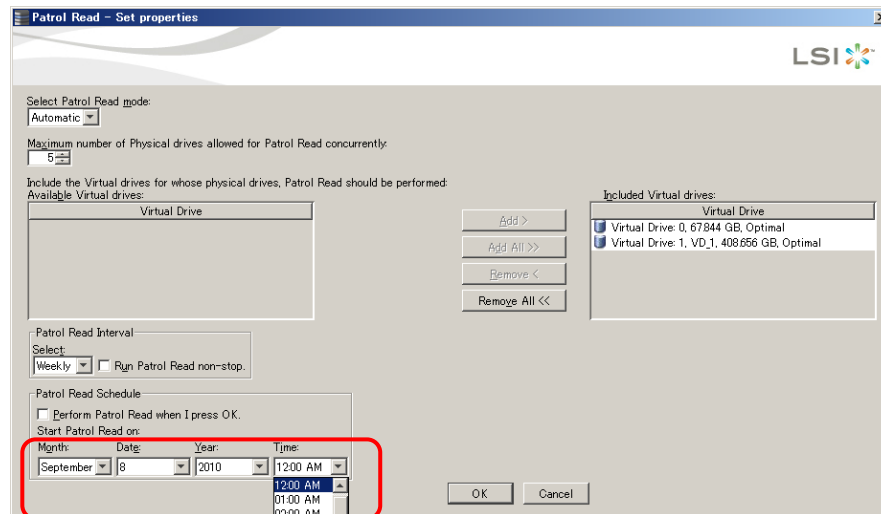
Click **OK**.
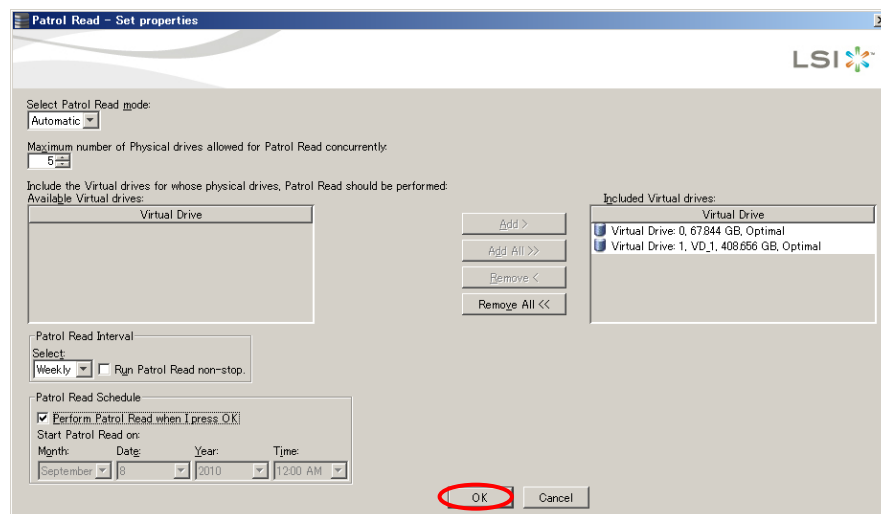
Note	Minutes are cut off in the time displayed as **Patrol Read Schedule**. Therefore, the displayed time can be almost an hour earlier than the actual starting time.

5. The dialog box for confirming the setting opens. Click **OK**.

If you check **Perform Patrol Read when I press OK**	If you do not check **Perform Patrol Read when I press OK**

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6. The starting event is obtained in the message window, and the Patrol Read starts.

> **Tip** Patrol Read does not start if disabled or already running.

Restrictions

This section explains the restrictions on using **MSM**.

- Do not use **Go To** > **Controller** > **Load Configuration** which is not supported.

- Do not use **Go To** > **Controller** > **Scan Foreign Configuration** which is not supported.

- RAID level change by **Go To** > **Controller** > **Modify Drive Group** is not supported. Only capacity expansion with the same RAID level is supported.

  Do not use this item for any purpose other than capacity expansion.

- Do not use **Go To** > **Controller** > **Set Adjustable Task Rates** which is not supported.

- Do not use **Go To** > **Controller** > **Power Settings** which is not supported.

- Do not use **Go To** > **Controller** > **Schedule Consistency Check** which is not supported.

- Do not use **Go To** > **Controller** > **Set Consistency Check Properties** which is not supported.

- Do not use **Go To** > **Controller** > **Enable SSD Guard** which is not supported.

- Do not use **Go To** > **Controller** > **Disable SSD Guard** which is not supported.

- Do not use **Go To** > **Controller** > **Enable Alarm** which is not supported.

- Do not use **Go To** > **Controller** > **Disable Alarm** which is not supported.

- Do not use **Go To** > **Controller** > **Manage Link Speed** which is not supported.

- Do not use **Go To** > **Controller** > **Save TTY Log** which is not supported.

- Do not use **Go To** > **Controller** > **Drive Erase** which is not supported.

- Do not use **Go To** > **Controller** > **Virtual Drive Erase** which is not supported.

- In an environment where centralized management is conducted, make sure that you stop the **MSM** of the management PC before you start or restart a managed server. Starting a managed server with **MSM** running may hang up the **MSM** of the management PC. If the network fails due to a LAN cable disconnection or other causes while **MSM Client** is running on a managed server or a management server, the **MSM Client** window may disappear or a pop-up massage is displayed to prompt you to logon again. In such cases, the array configuration and the array controller are not displayed after you logon or restart the **MSM Client**.
  In such a case, check the network status and repair the fault. If the network connection status does not recover, restart the system unit before starting **MSM Client**.

- For Linux, only the root has the administrator privileges. You cannot logon the system by assigning the root privilege to an ordinary user name.

- Disable any unused LAN adapter of the system unit.

- Do not try an operation prohibited or not described in this manual.

- Otherwise, the disk array malfunction or data inconsistency can be caused.

- **MSM** does not support the operation on a guest OS of Hyper-V®.

- If you logon **MSM** with the **View Only** permission, you are restricted to the following capabilities:

  - Outputting an event notification configuration to a file

  - Outputting an event log to a file

  - Only displaying and viewing information regarding other functions

  Logon with the **View Only** permission is allowed only for the accounts registered in the target server.

- Logon with the **Full Access** permission is allowed only for the administrator accounts registered in a target server (For Windows: Administrator privilege; for Linux: root).

- For Linux, CUI installation of **MSM** is not supported except for the standalone format.

- If MSM is installed in the CUI environment of Linux, the only **MSM** functions that can be used are event output to Linux (var/log/messages) and some functions that use **MegaCli** (functions described in this manual such as consistency check).

- When you execute a consistency check for a RAID device other than LSI Software RAID, stop Patrol Read beforehand. If you execute a consistency check while Patrol Read is running, the system unit may stop.

- **MSM** does not support creation of a virtual drive that includes both HDD and SSD.

- The maximum number of virtual drives created for a disk array controller is 24.

- The maximum number of virtual drives created for a disk group is 16.

- Within a drive group, it is only possible to delete the last virtual drive that you created.

  To delete a virtual drive older than the last one, delete all the virtual drives from the last drive through the target one in descending order of creation.

- Do not execute initialization if a consistency check is working for any other virtual drives in the same drive group.

- Do not execute a consistency check if initialization is working for any other virtual drives in the same drive group.

- Capacity expansion is not supported for the case where there are multiple virtual drives in the drive group or there is a virtual drive that is not using the entire capacity of the drive group.

- For a system unit with system memory of 4 GB or more, the following additional settings will improve the **MSM** performance.

  The amount of system memory used by **MSM** increases a maximum of 1 GB than the standard setting.

  [Windows]

  (1) Move to the following folder:

  64bit OS: C:\Program Files (x86)\MegaRAID Storage Manager

  32bit OS: C:\Program Files\MegaRAID Storage Manager

  (2) Open the file **startupui.bat**, and change as follows:

  Before change:

  start JRE\bin\javaw -Duser.country…………………

  After change:

  start JRE\bin\javaw -Xms1024m -Xmx1024m - Duser.country………………

  [Linux]

  (1) Move to the following folder:

  /usr/local/MegaRAID Storage Manager

  (2) Open the file **startupui.sh**, and change as follows:

  Before change:

  LD_LIBRARY_PATH=$MSM_HOME/lib ./jre/bin/java -DVENUS=true….

  After change:

  LD_LIBRARY_PATH=$MSM_HOME/lib ./jre/bin/java -Xms1024m - Xmx1024m -DVENUS=true….

- In the following conditions, the event time in the **MSM** message window are displayed one day early. To find out the date and time of an **MSM** event occurrence, see the OS system log (var/log/messages):

  - Linux (UTC is not specified in the time zone setting of the system clock.)

    - LSI Software RAID

  - The system has been started in the time period between 15:00:00 and 23:59:59.

  - The event is one of those that occur during system activation (for example, ID0: Firmware initialization started).

- Do not use **Suspend**, **Suspend All**, and **Suspend Patrol Read** displayed in the task progress window which is not supported.

- When you want to receive event notifications from the **MSM** by email, open port 25 and port 7 in your SMTP server's firewall.

Precautions

This section explains precautions on using **MSM**.

- The following messages may be displayed during installation on Linux:

  Warning: libstdc++34-3.4.0-1.i386.rpm: V3 DSA signature: NOKEY, key ID 4f2a6fd2

  The above message output does not have any impact.

- The following messages are displayed during installation on Linux:

  Can not find snmptrap in /usr/bin

  Can not continue installation of LSI SAS Agent

  Please install the net-snmp agent

  The above messages indicate that the activation of the SNMP demon was not successful during **MSM** installation. You can ignore this message. Check whether snmp of Linux has been installed.

- **MSM** installation on Linux sometimes was not successful when the following message is displayed:

  Example: error while loading shared libraries: libstdc++.so.5: cannot open shared object file: No such file or directory

  This phenomenon happens when *libstdc++.so.5* has not been installed because **Legacy Software Development** was not selected during Linux installation. Check whether **Legacy Software Development** is set as an installation option.

- For Linux OS (AMD/Intel 64), we recommend that you install all packages by selecting **System** > **Compatibility Arch Support** > **Multilib support packages** at the time of package installation.

- Transmission of multicast packets

  If you have installed **MSM** in the complete format, multicast packets of class D are transmitted. The IP address is 229.111.112.12.

  If you do not conduct remote monitoring, we recommend that you install **MSM** in the standalone format. See "Installing and removing MegaRAID Storage Manager" on page 2-1 for details.

- For both Windows and Linux, do not change the default setting for the **MSM** service activation. With the default setting, **MSM** automatically starts when the OS is launched. We do not guarantee that the **MSM** service starts normally for an activation method other than the automatic activation during OS start.

- Consistency check

  Consistency check sometimes detects a data inconsistency. However, if both condition 1 and 2 below apply, the inconsistency does not affect the operation of the system unit. Ignore the warning in such a case.

  Condition 1: The virtual drive is of **RAID1 or RAID10**.

Condition 2: The virtual drive contains a partition to which Windows paging is made.

The Windows specification presents apparent data inconsistency in page files.

Windows sometimes updates the system memory before the RAID firmware finishes writing data in the physical drive of RAID1 (RAID10), and this causes data inconsistency.

In the event of such a case for user data or other data that requires consistency, Windows later issues a write command to recover the data consistency.

Thus the consistency for RAID1 (RAID10) is maintained, and the operation of the system unit is not affected.

- During **MSM** operation, the **MSM** screen sometimes corrupts. In such a case, refresh the screen by minimizing and then maximizing the window for example.

- MIB file

  For MIB of Windows, use the following file included in the "Server installation and monitoring tool DVD" or "Driver Kit CD".

  [When "Server installation and monitoring tool DVD" is used]

  Execute the following **MegaRAID Storage Manager** installer file while referring to "Support_EN.html" as attachment in the "Server installation and monitoring tool DVD". The directory path of **MSM** is different according to the system unit and OS.

  "d:(*the target directory path*)\lsi-adaptersas.mib"

  [When "Driver Kit CD" is used]

  "d:WIN2008\UTILITY\MSM\lsi-adaptersas.mib"

  * d stands for the CD/DVD drive.

  For Linux, use the following MIB file, which is expanded upon installation of SNMP.

  "./etc/lsi_mrdsnmp/sas/LSI-AdapterSAS.mib"

- When you start **MSM** right after OS activation, wait about five minutes and then boot the OS.

- For a system unit with SATA physical drive installed, the following message may be displayed when you click a physical drive icon on **MSM**. The message does not indicate a problem and may be ignorable.

  Controller ID: X Unexpected sense: PD = X - Invalid field in CDB, CDB = 0x4d 0x00 0x4d 0x00 0x00 0x00 0x00 0x00 0x20 0x00, Sense = 0x70 0x00 0x05 0x00 0x00 0x00 0x00 0x0a 0x00 0x00 0x00 0x00 0x24 0x00 0x00 0x00 0x00 0x00

- If **Failed of Audit Logon**^{*1} is enabled^{*2}, a **Fail Audit** event is recorded in the security log of Windows Events when **MSM** logon fails (due to, for example, a wrong user name or password). An example of **Fail Audit** is shown below.

  *1: The UI display may be different depending on the OS version and an environment.

  *2: Depending on the OS version, the default value may be **Enable**.

  *3: The account domain name sometimes is not displayed correctly.

Account unsuccessful in logon:
Security ID: XXXXXXXX
Account name: YYYYYYYY
Account domain: ZZZZZZZZ

- OS warning log event: **Write Cache Enabled**

  When the write policy is set to **Write Back** and the server is used as a domain controller, the following event may be recorded in the Windows system log:

Type	Warning
Source	Disk
Description	The driver detected that the device \Device\Harddisk0\DR0 has its write cache enabled. Data corruption may occur.

- The check item **Policy** > **Enable write caching on the device** of disk drive properties of the device manager depends on the write policy setting.

  The setting cannot be changed by changing this check item. To change the setting, change the write policy on **MSM**.

- This disk array controller does not support SCSI commands that have the FUA bit.

- Services MrMonitor and MrMonitor monitoring are not installed in **MSM** Ver.11.08.XX.XX or later.

Replacing a physical drive

This section explains how to replace a physical drive in the event of a failure.

Note	In replacing a physical drive, make sure that you also read the manual that accompanies the system unit.

Tip	If a system unit shuts down or reboots during the rebuild operation, the operation is suspended. The operation resumes from the point where the operation was suspended after the system unit is booted.

With a hot spare

If a physical drive fails in a virtual drive that has a hot spare configured, rebuild is automatically executed. During rebuild, the virtual drive is indicated by a yellow icon 🟡, and the physical drive icon becomes 💾 .

1. Wait until rebuilding is finished.

   To confirm the progress of rebuilding, see "Displaying task progress and terminating a task" on page 2-157.

2. When rebuilding finishes, replace the failed physical drive.

   A failed physical drive is indicated by a red icon 🔴 in the **Physical** and **Logical** views.

   The LED of the failed physical drive turns on.

3. Wait 1 minute or more, and insert a new physical drive.

4. Confirm that the error LED turns off and the substituted physical drive is indicated by a hot spare icon in the **Physical** and **Logical** views.

Without a hot spare

If a fault occurs in a virtual drive, the virtual drive operates in the degraded mode. During the degraded operation, the virtual drive is indicated by a yellow icon ●, and the physical drive icon becomes red ●.

1. Replace the failed physical drive.

    A failed physical drive is indicated by a red icon ● in the **Physical** and **Logical** views.

    The LED of the failed physical drive turns on.

2. Wait 1 minute or more, and insert a new physical drive.

3. The substituted physical drive is rebuilt.

    It takes about 1 to 2 minutes until rebuilding starts.

    While rebuilding is running, the physical drive is indicted by the icon ● , and the error LED changes to blinking.

4. After rebuilding is finished, confirm that the error LED turns off, and the substituted physical drive and the virtual drive are displayed as normal in the **Physical** and **Logical** views.

3

Operation of Disk Arrays

This section explains how to operate disk arrays.

☐ [Daily operation](#)

Daily operation

Backup

Use of disk arrays improves the reliability, but it does not protect data perfectly. Therefore, as the minimum preventive action, **backup the data periodically**. For details on how to make a backup, see the User's Guide *(Hitachi Compute Rack xxxx User's Guide)* of the system unit.

> **Tip**
>
> As more data increases, it takes a longer time to back up the data. The backup time can be shortened by backing up only the difference files (including updated files or new ones). For how to backup the difference file, see the manual of the backup program you use.
>
> We recommend that you use four or five pieces of backup media and rotate them every day.

Periodical consistency check of LSI Software RAID virtual drives

If a bad sector (inaccessible area) is detected in a physical drive during data read or data write processing, replacement processing (replacement by a spare area) is automatically performed. This replacement processing, however, is not performed for a bad sector in the mirror data area or in an area that is not accessed in daily operation. If a physical drive fails in this status, rebuilding cannot be performed normally due to inability of reading the mirror data, resulting in loss of data of the bad sector.

To avoid this status, **make sure that you perform a consistency check periodically for LSI Software RAID**. The consistency check reads data from all area of each physical drive to check if the mirror data is corrupted. **For LSI Software RAID, make sure that you perform a consistency check about once a week**.

We recommend that you perform a consistency check after business hours because of significant decrease in system (disk access) performance during the check. For how to perform consistency check of a virtual drive, see "Consistency check of virtual drives" on page 2-118.

> **Tip**
>
> RAID devices other than LSI Software RAID are configured as factory default so that Patrol Read verifies their physical drives periodically to correct bad sectors. Therefore, you do not have to execute a periodical consistency check for RAID devices other than LSI Software RAID.

Collecting/Operating event logs

The event log records information including disk array status and error causes/factors. Each log is classified into four levels: **Fatal**, **Critical**, **Warning**, and **Information**.

Collection of events makes it possible to locate the cause of an error early using the past log and take proper actions promptly, which minimizes the system down time.

Collect logs regularly considering the following preconditions and log collection guidelines.

Preconditions

- Up to 3000 events can be saved in the current event log.

- There are two logging methods: **Save Log** and **Save Log Text**.

   The following table shows their features.

Logging method	Format	Capacity for 3000 events (KB)	Save time for 3000 Events	
			MSM server	Management PC
Save Log	Xml	Approx. 2500	Approx. 3 minutes	Approx. 35 minutes
Save Log Text	Text	Approx. 500	Approx. 2 minutes	Approx. 2 minutes

Log collection guidelines

The number of events is calculated as follows with a system configuration and system operation under the following conditions:

- Conditions
    - Number of HDDs in the system: 8
    - Number of logical devices: 4
    - Patrol read execution frequency: Once a week
    - Consistency check execution frequency: Once a week for all logical devices
    - System shutdown/reboot execution frequency: Once a week
- Number of events that occur weekly
    - Number of events at system startup due to system shutdown/reboot: 42
    - Number of patrol read events executed weekly: 6 maximum (1 time /3 days, 2 events/time)
    - Number of consistency check events executed weekly: 8 (2 [start/end] x 4 logical devices)

Total of events per week: 56

Total of events per year: 56 x 52 weeks = <u>2912</u>

This calculation of the number of events assumes no error.

Therefore, semiannual log collection is recommended under the above conditions and operation. The **Save Log Text** logging method is also recommended.

After events are collected, clear them with the **Clear Log** menu.

The event log is registered as the Windows event viewer application log for Windows or as the system log (/var/log/messages) for Linux.

4

In the Event of a Fault

This section explains the troubleshooting procedures against disk array faults.

☐ Troubleshooting procedures

Troubleshooting procedures

Checking the status of both disk array and physical drives

Check the status of both virtual drives and physical drives by **MSM** to verify what fault occurred.

Checking events

Check the event log in the **MSM** message window. If a fault-related event is recorded, contact the sales representative or call maintenance personnel. Some events are displayed as pop-up messages at the occurrence of an event.

For Windows, before the pop-up notification window opens, the pop-up notification list is displayed as shown below.
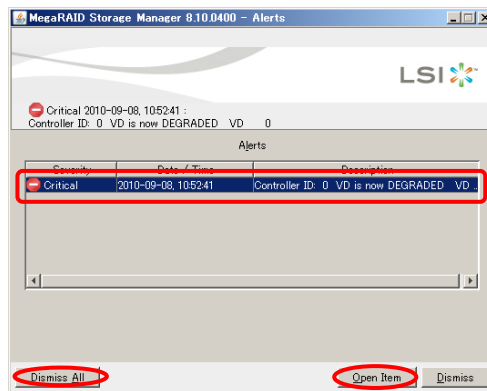
Select the target pop-up notification from **Alerts** and click **Open Item** to display the pop-up notification window as shown below.

Tip	To close a pop-up notification window, click **OK**.
	In the pop-up notification list, click **Dismiss All** and then **Yes** to close the window.
	For Linux, pop-up windows are not displayed if no X Window has been launched.
	If a drive group includes multiple virtual drives, a failure of a physical drive causes all virtual drives of the drive group to be in a degraded operation (**Degraded** or **Partially Degraded**).

Data backup

A failure of a physical drive can be recovered by replacing the physical drive. However, if rebuilding is not successful for some reason, data may be completely lost. Make sure that **you create a data backup** if a fault occurs.

Contacting the maintenance company

If you confirm any fault in the current system status, contact the sales representative or call maintenance personnel.

5

Appendix

MegaRAID Storage Manager Instruction Manual

Estimate of various processing time

This section provides an estimate of the time required for processing by the system unit in the unloaded state.

> **Note** The processing time indication returns to 0 when it takes more than 18 hours to process task. In this case, estimated time of completion is not displayed correctly due to continue the progress rate.

> **Tip** The "unloaded state of the system unit" means the state in which you have installed on the system unit without only other applications, and the system unit is idle. The processing time given in this document is the processing when individual tasks run on the OS.
>
> The system unit has the feature* that dynamically varies the task rate depending on the IO load.
>
> This feature prioritizes IO processing over task processing, so that actual processing time can be 30 times or more the estimated processing time when the system is highly loaded. (It may take over a day.)
>
> * This feature shortens the task processing time by raising the task rate when there is no IO processing.

Estimate of virtual drive initialization time (in the unloaded state of system unit)

Physical drive capacity	Initialization time
147 GB (SAS 2.5-inch)	Approx. 15 min
250 GB (SATA 3.5-inch)	Approx. 300 min
80 GB (SSD SATA 2.5-inch)	Approx. 10 min
200 GB (SSD SATA 2.5-inch)	Approx. 20 min
250 GB (SATA 3.5-inch) (LSI Software RAID (built-in SATA RAID))	Approx. 9 hours

> **Tip** The time required for initializing a virtual drive is proportional to the capacity of the physical drive, not to the capacity or the RAID level of the virtual drive.
>
> We recommend that you execute tasks when IO processing is less active (for example, at night).

Estimate of virtual drive consistency check time (in the unloaded state of system unit)

RAID level	Virtual drive capacity	Consistency check time
RAID 1	147 GB (SAS 2.5-inch: 147-GB HDD × 2)	Approx. 15 min
	250 GB (SATA 3.5-inch: 250-GB HDD × 2)	Approx. 25 min
	80 GB (SSD SATA 2.5-inch: 80-GB SSD × 2)	Approx. 10 min
	200 GB (SSD SAS 2.5-inch: 200-GB SSD × 2)	Approx. 20 min
RAID1 (LSI Software RAID (built-in SATA RAID))	250 GB (SATA 3.5-inch: 250-GB HDD × 2)	Approx. 40 min
RAID 5	294 GB (SAS 2.5-inch: 147-GB HDD × 3)	Approx. 15 min
	500 GB (SATA 3.5-inch: 250-GB HDD × 3)	Approx. 25 min
	160 GB (SSD SATA 2.5-inch: 80-GB SSD × 3)	Approx. 10 min
	400 GB (SSD SAS 2.5-inch: 200-GB SSD × 3)	Approx. 25 min
RAID 6	294 GB (SAS 2.5-inch: 147-GB HDD × 4)	Approx. 15 min
	500 GB (SATA 3.5-inch: 250-GB HDD × 4)	Approx. 25 min
	160 GB (SSD SATA 2.5-inch: 80-GB SSD × 4)	Approx. 10 min
	400 GB (SSD SAS 2.5-inch: 200-GB SSD × 4)	Approx. 25 min
RAID 10	294 GB (SAS 2.5-inch: 147-GB HDD × 4)	Approx. 15 min
	500 GB (SATA 3.5-inch: 250-GB HDD × 4)	Approx. 25 min
	160 GB (SSD SATA 2.5-inch: 80-GB SSD × 4)	Approx. 15 min
	400 GB (SSD SAS 2.5-inch: 200-GB SSD × 4)	Approx. 45 min

> **Tip**
> The time required for a consistency check of a virtual drive is proportional to the capacity of the virtual drive.
>
> This does not apply to the case when you execute a consistency check for multiple virtual drives simultaneously in the same group.
>
> We recommend that you execute tasks when IO processing is less active (for example, at night).

Estimate of rebuilding time (in the unloaded state of system unit)

RAID level	Virtual drive capacity	Rebuild time
RAID 1	147 GB (SAS 2.5-inch: 147-GB HDD × 2)	Approx. 15 min
	250 GB (SATA 3.5-inch: 250-GB HDD × 2)	Approx. 30 min
	80 GB (SSD SATA 2.5-inch: 80-GB SSD × 2)	Approx. 10 min
	200 GB (SSD SAS 2.5-inch: 200-GB SSD × 2)	Approx. 10 min
RAID1 (LSI Software RAID (built-in SATA RAID))	250 GB (SATA 3.5-inch: 250-GB HDD × 2)	Approx. 50 min
RAID 5	294 GB (SAS 2.5-inch: 147-GB HDD × 3)	Approx. 15 min
	500 GB (SATA 3.5-inch: 250-GB HDD × 3)	Approx. 25 min
	160 GB (SSD SATA 2.5-inch: 80-GB SSD × 3)	Approx. 10 min
	400 GB (SSD SAS 2.5-inch: 200-GB SSD × 3)	Approx. 10 min
RAID 6	294 GB (SAS 2.5-inch: 147-GB HDD × 4)	Approx. 20 min
	500 GB (SATA 3.5-inch: 250-GB HDD × 4)	Approx. 50 min
	160 GB (SSD SATA 2.5-inch: 80-GB SSD × 4)	Approx. 10 min
	400 GB (SSD SAS 2.5-inch: 200-GB SSD × 4)	Approx. 10 min
RAID 10	294 GB (SAS 2.5-inch: 147-GB HDD × 4)	Approx. 15 min
	500 GB (SATA 3.5-inch: 250-GB HDD × 4)	Approx. 25 min
	160 GB (SSD SATA 2.5-inch: 80-GB SSD × 4)	Approx. 10 min
	400 GB (SSD SAS 2.5-inch: 200-GB SSD × 4)	Approx. 10 min

Tip: The time required for rebuilding is proportional to the capacity of the physical drive, not to the capacity of the virtual drive. We recommend that you execute tasks when IO processing is less active (for example, at night).

Estimate of virtual drive capacity expansion time (in the unloaded state of the system unit)

RAID level	Manner of capacity expansion			Capacity expansion time
	Hard structure	Virtual drive capacity before carrying out capacity extension	Virtual drive capacity after carrying out capacity extension	
RAID 0	SAS 2.5-inch: 147-GB HDD × 3	441 GB	558 GB (One set of 147-GB HDD is added)	Approx. 100 min
	SATA 3.5-inch: 250-GB HDD × 3	750 GB	1000 GB (One set of 250-GB HDD is added)	Approx. 6 hours
	SSD SATA 2.5-inch: 80-GB SSD × 3	240 GB	320 GB (One set of 80-GB SSD is added)	Approx. 50 min
	SSD SAS 2.5-inch: 200-GB SSD × 3	600 GB	800 GB (One set of 200-GB SSD is added)	Approx. 70 min
RAID 5	SAS 2.5-inch: 147-GB HDD × 3	294 GB	441 GB (One set of 147-GB HDD is added)	Approx. 80 min
	SATA 3.5-inch: 250-GB HDD × 3	500 GB	750 GB (One set of 250-GB HDD is added)	Approx. 4 hours
	SSD SATA 2.5-inch: 80-GB SSD × 3	160 GB	240 GB (One set of 80-GB SSD is added)	Approx. 35 min
	SSD SAS 2.5-inch: 200-GB SSD × 3	400 GB	600 GB (One set of 200-GB SSD is added)	Approx. 50 min
RAID 6	SAS 2.5-inch: 147-GB HDD × 4	294 GB	441 GB (One set of 147-GB HDD is added)	Approx. 80 min
	SATA 3.5-inch: 250-GB HDD x 4	500 GB	750 GB (One set of 250-GB HDD is added)	Approx. 6 hours
	SSD SATA 2.5-inch: 80-GB SSD x 4	160 GB	240 GB (One set of 80-GB SSD is added)	Approx. 35 min
	SSD SAS 2.5-inch: 200-GB SSD x 4	400 GB	600 GB (One set of 200-GB SSD is added)	Approx. 50 min

> **Tip**
>
> The time required for capacity expansion is proportional to the capacity of the target virtual drive. It does not depend on the number of physical drives to be added.
>
> We recommend that you execute tasks when IO processing is less active (for example, at night).

Events list

This section lists the events that are recorded in the **MSM** log and Windows Event Viewer (or to the system log for Linux).

Some events are notified by pop-up messages.

For Windows, before the pop-up notification window appears, the pop-up notification list is displayed as shown below.

(For Linux, pop-up windows are not displayed if no X Window has been launched.)
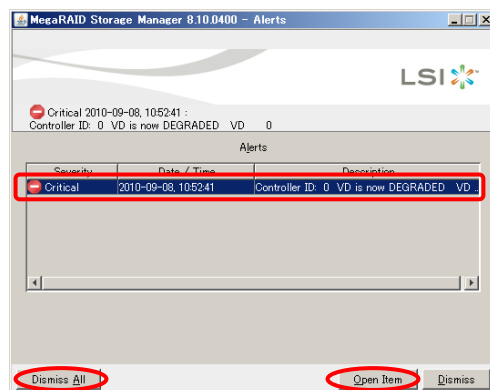
Select the target pop-up notification from **Alerts** and click **Open Item** to display the pop-up notification window as shown below.

> **Tip**
>
> Events that occurred during the period between power-on and OS activation are not recorded in the event log.
>
> All pop-up messages do not indicate faults. Confirm what event occurred.
>
> To close a pop-up notification window, click **OK**.
>
> On the pop-up notification list, click **Dismiss All** and then **Yes** to close the window.
>
> For Linux, pop-up windows are not displayed if no X Window has been launched.

MSM registers events in Windows Event Viewer Application Log (or the system log for Linux).

Events are registered in the log of the server on which **MSM Server** has been installed.

MSM registers events in Windows Event Viewer Application Log with source: MR_MONITOR. This applies also for Linux.
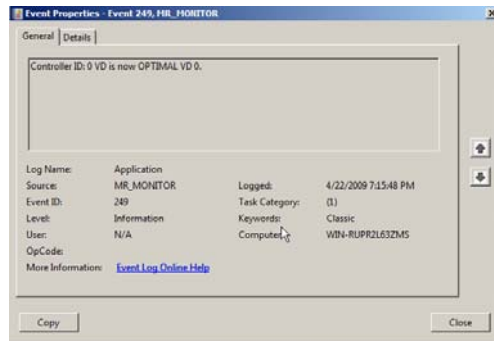
Windows Server 2012 /
Windows Server 2008 R2 /
Windows Server 2008
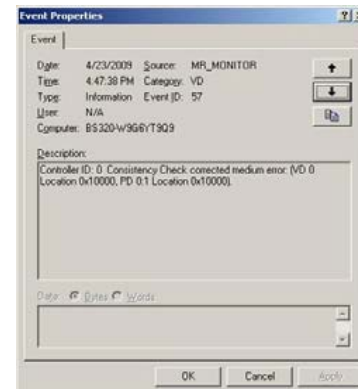
Windows Server 2003 R2 /
Windows Server 2003

The following items are described in the list of event log below.

- Event ID:

  The identification number assigned to each event type

- Level:

  The severity of an event

  - Fatal

  - Critical

  - Warning

  - Information

The following are the types of the events registered in Windows Event Viewer Application Log:

1. Fatal, Critical
2. Warning
3. Information

- Remarks

  Added in Ver.x.xx-xx: Indicates that the event is supported from **MSM** version x.xx-xx.

  ("x" in x.xx-xx varies depending on the **MSM** version.)

Actions for event notification

As long as no hard disk is faulty, the system operation automatically recovers from events of Warning level and Caution level. In this case, no hard disk needs to be replaced.

However, if the same event occurs repeatedly, the relevant hard disk should be replaced.

To replace a hard disk, contact the dealer of purchase or call the maintenance personnel.

Note that the security of data at an error event is not guaranteed.

> **Tip** There are variable parts in a message as listed below.

Notation	Meaning
<VDs>	Logical drive number Example: 0
<PDs>	Enclosure number and device ID connected to hard disk [Enclosure number]: Displayed in the device ID format Since enclosure number varies depending on the system condition, ignore it. Example: 1:0
<Version>	Various versions Example: 1.02-0096
<rate>	The value of newly set rate Example: 30%
<val>	Newly set value Example: 10
<date>	Date and time Example: Aug 01 12:00:00 2007
<sec>	Elapse time [seconds] Example: 60
<location>	Event occurrence location (address) [hexadecimal] Example: 0x1000
<strip>	Event occurrence stripe number [hexadecimal] Example: 0x1000
<setting>	Setting value Example: BGI: Enabled
<state>	Status Example: Optimal
<cdb>	Command issued to hard disk Example: 0x28 0x00 0x00 0x12 0x00 0x00 0x00 0x00 0x80 0x00
<sense>	Request sense data received from hard disk Example: 0xf0 0x00 0x03 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x11 0x01

List of MegaRAID Storage Manager events

Event ID	Category	Level	Message	Description and required action	Remarks
0	CTRL	Information	Firmware initialization started (PCI ID 0xXXXX/0xXXXX/0xXXXX/ 0xXXXX)	Disk array controller has started firmware initialization. Action is not required.	
1	CTRL	Information	Image version <version>	The firmware version of disk array controller. Action is not required.	
4	CONFIG	Information	Configuration cleared	Configuration information has been initialized. Action is not required.	
7	CTRL	Information	Alarm disabled by user	The user disabled the buzzer of disk array controller. Action is not required.	
8	CTRL	Information	Alarm enabled by user	The user enabled the buzzer of disk array controller. Action is not required.	
9	CTRL	Information	Background initialization rate changed <rate>	The rate of background initialization has been changed. Action is not required.	
10	CTRL	Warning	Controller cache discarded due to memory/battery problems.	Power-off or reboot has been done inappropriately during write processing. Or power-off or reboot has been done during consistency check, rebuild, Patrol Read, or initialization. This is not a problem of cache memory or battery. Action is not required. If this event is registered during system activation made after a hang-up of the system unit, cache memory might have a problem. In this case, contact the sales representative or call maintenance personnel.	
11	CTRL	Fatal	Unable to recover cache data due to configuration mismatch	There was a mismatch in the configuration data, so that the cache data could not be recovered. Some data may have been lost. We recommend that you reconfigure the disk array and restore the data from the backup.	
12	CTRL	Information	Cache data recovered successfully	Succeeded in the recovery of cache data. Action is not required.	

Event ID	Category	Level	Message	Description and required action	Remarks
13	CTRL	Fatal	Controller cache discarded due to firmware version incompatibility	Cache data was discarded due to incompatibility of the firmware version of disk array controller board. Some data may have been lost. We recommend that you reconfigure the disk array and restore the data from the backup.	
14	CTRL	Information	Consistency Check rate changed <rate>	The rate of a consistency check has been changed. Action is not required.	
15	CTRL	Fatal	Fatal firmware error : <code>	A fatal error has been detected in the firmware. Contact the sales representative or call maintenance personnel.	
16	CTRL	Information	Factory defaults restored	The hardware setting of disk array controller has been reset to the factory default. Action is not required.	
17	CTRL	Warning	Flash downloaded image corrupt	The firmware image used for update is corrupted. Use a good firmware image.	
18	CTRL	Critical	Flash erase error	Initialization of flash memory failed. Contact the sales representative or call maintenance personnel.	
19	CTRL	Critical	Flash timeout during erase	A timeout occurred during the initialization of the flash memory. Contact the sales representative or call maintenance personnel.	
20	CTRL	Critical	Flash error	Access to flash memory failed. Contact the sales representative or call maintenance personnel.	
21	CTRL	Information	Flashing image <version>	Updating the firmware or other image. Action is not required.	
22	CTRL	Information	Flash of new firmware image(s) complete	Update of disk array controller has been completed. Action is not required.	
23	CTRL	Critical	Flash programming error	Failed in writing into flash memory. Contact the sales representative or call maintenance personnel.	
24	CTRL	Critical	Flash timeout during programming	A timeout occurred during writing data into flash memory. Contact the sales representative or call maintenance personnel.	

Event ID	Category	Level	Message	Description and required action	Remarks
25	CTRL	Critical	Flash chip type unknown	This flash memory is unknown. Contact the sales representative or call maintenance personnel.	
26	CTRL	Critical	Flash command set unknown	This flash command is unknown. Contact the sales representative or call maintenance personnel.	
27	CTRL	Critical	Flash verify failure	An error occurred during flash memory verification. Contact the sales representative or call maintenance personnel.	
28	CTRL	Information	Flush rate changed <val> Seconds.	The cache flash timing rate of disk array controller has been changed. Action is not required.	
29	CTRL	Information	Hibernate command received from host	The host has issued the command to enter standby mode or hibernate mode. Action is not required.	
31	CTRL	Information	Event log wrapped	The event log has wrapped in the disk array controller. No action is needed.	
32	CTRL	Fatal	Multi-bit ECC error: ECAR=<address>	A multi-bit error has been detected in cache memory of disk array controller. Contact the sales representative or call maintenance personnel.	
33	CTRL	Warning	Single-bit ECC error: ECAR=<address>	A single-bit error has been detected in cache memory of disk array controller. The error should have been corrected and action is not required. However, if this error occurs frequently, contact the sales representative or call maintenance personnel.	
34	CTRL	Fatal	Not enough controller memory	A required memory space cannot be obtained in disk array controller. Contact the sales representative or call maintenance personnel.	
35	CTRL	Information	Patrol Read complete	Patrol Read has been completed. Action is not required.	
36	CTRL	Information	Patrol Read paused	Patrol Read has temporarily stopped. Action is not required.	
37	CTRL	Information	Patrol Read Rate changed <rate>	Patrol Read rate has been changed. Action is not required.	
38	CTRL	Information	Patrol Read resumed	Patrol Read has started again. Action is not required.	

Event ID	Category	Level	Message	Description and required action	Remarks
39	CTRL	Information	Patrol Read started	Patrol Read has started. Action is not required.	
40	CTRL	Information	Rebuild rate changed <rate>	The rebuilding rate has been changed. Action is not required.	
41	CTRL	Information	Reconstruction rate changed <rate>	The rate of capacity expansion processing rate has been changed. Action is not required.	
42	CTRL	Information	Shutdown command received from host	The host issued a shutdown command. Action is not required.	
43	CTRL	Information	Test event:	This is a test event. Action is not required.	
44	CTRL	Information	Time established since power on Time <date> <sec>Seconds.	The time point when disk array controller started and the time elapsed since then. Action is not required.	
45	CTRL	Information	User entered firmware debugger	The firmware debugger has started. Action is not required.	
46	VD	Warning	Background Initialization aborted on VD <VDs>	The background initialization has stopped. Action is not required if the user stopped it. If it stopped by a cause other than a user operation, check the physical drive for failures.	
47	VD	Information	Background Initialization corrected medium error (<VDs> Location <location>, PD <PDs> Location <location>).	The medium error that occurred during background initialization has been repaired. Action is not required.	
48	VD	Information	Background Initialization completed on VD <VDs>	The background initialization has been completed. Action is not required.	
49	VD	Warning	Background Initialization completed with uncorrectable errors on VD <VDs>	The background initialization has been completed, but there is an unrecoverable error. Initialize (**Full Initialize**) the virtual drive.	
50	VD	Warning	Background Initialization detected uncorrectable multiple medium errors (PD <PDs> Location <location> VD <VDs> Location <location>)	The background initialization has been completed, but there is an unrecoverable medium error. Initialize (**Full Initialize**) the virtual drive.	
51	VD	Critical	Background Initialization failed on VD <VDs>	The background initialization has unsuccessfully terminated. Check the physical drive for failures.	

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Event ID	Category	Level	Message	Description and required action	Remarks
53	VD	Information	Background Initialization started on VD <VDs>	The background initialization has started. Action is not required.	
54	VD	Information	Policy change on VD <VDs> Previous = <setting> Current = <setting>	The policy of the virtual drive has been changed. Action is not required.	
56	VD	Warning	Consistency Check aborted on VD <VDs>	The consistency check has stopped. Action is not required if the user stopped it. If it was stopped by some other cause, contact the sales representative or call maintenance personnel.	
57	VD	Information	Consistency Check corrected medium error (<VDs> Location <location>, PD <PDs> Location <location>).	A medium error was detected during consistency check, and it has been corrected. Action is not required.	
58	VD	Information	Consistency Check done on VD <VDs>	The consistency check has been completed. Action is not required.	
59	VD	Information	Consistency Check done with corrections on VD <VDs>	The consistency check has been completed, but an inconsistency has been detected. No action is needed.	For RAID1 and RAID10, see "Consistency check" of "Precautions" on page 2-187 for the action to be taken.
60	VD	Warning	Consistency Check detected uncorrectable multiple medium errors (PD <PDs> Location <location> VD <VDs>)	An unrecoverable medium error was detected during consistency check. Medium errors have occurred at the same address in multiple physical drives. This phenomenon happens when a medium error occurs at the source drive during rebuild. We recommend that you initialize the virtual drive and restore the data from the backup.	
61	VD	Critical	Consistency Check failed on VD <VDs>	The consistency check has unsuccessfully terminated. Check the physical drive for faults. If a fault has been detected, contact the sales representative or call maintenance personnel.	

Event ID	Category	Level	Message	Description and required action	Remarks
62	VD	Warning	Consistency Check completed with uncorrectable errors on VD:	The consistency check has finished, but an unrecoverable error has been detected. Medium errors have occurred at the same address in multiple physical drives. This phenomenon happens when a medium error occurs at the source drive during rebuild. We recommend that you initialize the virtual drive and restore the data from the backup.	
63	VD	Warning	Consistency Check found inconsistent parity on VD strip (VD = <VDs>, strip = <strip>)	Data inconsistency has been detected in consistency check. We recommend that you initialize the virtual drive and restore the data from the backup.	For RAID1 and RAID10, see "Consistency check" of "Precautions" on page 2-187 for the action to be taken.
64	VD	Warning	Consistency Check inconsistency logging disabled, too many inconsistencies on VD <VDs>.	Consistency check has detected 10 or more locations of data inconsistency. Data inconsistency events will not be output anymore. We recommend that you initialize the virtual drive and restore the data from the backup.	For RAID1 and RAID10, see "Consistency check" of "Precautions" on page 2-187 for the action to be taken.
66	VD	Information	Consistency Check started on VD <VDs>	The consistency check has started. Action is not required.	
67	VD	Warning	Initialization aborted on VD <VDs>	Initialization of the virtual drive has stopped. Action is not required if the user stopped it. If it was stopped by some other cause, contact the sales representative or call maintenance personnel.	
68	VD	Critical	Initialization failed on VD <VDs>	Initialization of the virtual drive has failed. Check whether there is a fault in the physical drive. If you find a fault, contact the sales representative or call maintenance personnel.	
70	VD	Information	Fast initialization started on VD <VDs>	Initialization (fast mode) of the virtual drive has started. Action is not required.	
71	VD	Information	Full initialization started on VD <VDs>	Initialization (full mode) of the virtual drive has started. Action is not required.	

Event ID	Category	Level	Message	Description and required action	Remarks
72	VD	Information	Initialization complete on VD <VDs>	Initialization of the virtual drive has been completed. Action is not required.	
73	VD	Information	Properties updated on <VDs> Previous = <settings> Current = <settings>	The properties of the virtual drive have been updated. Action is not required.	
74	VD	Information	Reconstruction complete on VD <VDs>	Capacity expansion of the virtual drive has been completed. Action is not required.	
75	VD	Fatal	Reconstruction stopped due to unrecoverable errors VD <VDs>.	Capacity expansion of the virtual drive has stopped due to an unrecoverable error. Contact the sales representative or call maintenance personnel.	
76	VD	Warning	Reconstruct detected uncorrectable multiple medium errors (VD <VDs> Location <location>,PD <PDs> Location <location>)	Medium errors have occurred at the same address in multiple physical drives during capacity expansion of the virtual drive. This phenomenon happens when a medium error occurs at the source drive during rebuild. We recommend that you initialize the virtual drive and restore the data from the backup.	
78	VD	Information	Reconstruction resumed VD <VDs>	Capacity expansion processing has been started again. Action is not required.	
79	VD	Fatal	Reconstruction resume failed due to configuration mismatch	The capacity expansion could not be started again due to a configuration data mismatch. We recommend that you initialize the virtual drive and restore the data from the backup.	
80	VD	Information	Reconstructing started VD <VDs>	Capacity expansion of the virtual drive has started. Action is not required.	
81	VD	Information	State change on VD <VDs> Previous = <state> Current = <state>	The state of the virtual drive has changed. Action is not required.	
87	PD	Critical	Error <PDs>	An error has occurred in the physical drive. Check the physical drive for failures. If you find a fault, contact the sales representative or call maintenance personnel.	
88	PD	Information	Format complete:	Low level formatting has been completed. Action is not required.	
89	PD	Information	Format started:	Low level formatting has started. Action is not required.	

Event ID	Category	Level	Message	Description and required action	Remarks
91	PD	Information	PD inserted <PDs>	The physical drive has been inserted. Action is not required.	"Precautions" on page 2-187
92	PD	Warning	PD is not supported:	The device type is not supported. Use a supported physical drive.	
93	PD	Information	Patrol Read corrected medium error: PD <PDs> Location <location>	The medium error detected by Patrol Read has been repaired. Action is not required.	
95	PD	Warning	Patrol Read found an uncorrectable medium error PD <PDs> Location <location>	A medium error that cannot be repaired by Patrol Read has been detected. Medium errors have occurred at the same address in multiple physical drives. This phenomenon happens when a medium error occurs at the source drive during rebuild. We recommend that you initialize the virtual drive and restore the data from the backup.	
96	PD	Critical	Predictive failure:	The physical drive reported a SMART error. Replace the physical drive as a preventive action.	
97	PD	Information	Puncturing bad block PD <PDs> Location <location>	A medium error has been created in the physical drive. During rebuild, if a medium error occurs in the source drive or at the same address of multiple physical drives when writing data, a medium error is intentionally created to inhibit data access (because the data integrity cannot be guaranteed). We recommend that you initialize the virtual drive and restore the data from the backup.	
98	PD	Warning	Rebuild aborted by user PD <PDs>	Rebuilding has been stopped by user operation. Execute rebuild again if necessary.	
99	PD	Information	Rebuild complete on <VDs>	Rebuilding has been completed. Action is not required.	
100	PD	Information	Rebuild complete	Rebuilding has been completed. Action is not required.	
101	PD	Critical	Rebuild failed due to source drive error PD <PDs>	Rebuilding failed due to an error at the source drive. Contact the sales representative or call maintenance personnel.	
102	PD	Critical	Rebuild failed due to target drive error PD <PDs>	Rebuilding has failed due to an error at the target drive. Contact the sales representative or call maintenance personnel.	

Event ID	Category	Level	Message	Description and required action	Remarks
104	PD	Information	Rebuild resumed PD <PDs>	Rebuilding has started again. Action is not required.	
105	PD	Information	Rebuild started PD <PDs>	Rebuilding has started. Action is not required.	
106	PD	Information	Rebuild automatically started PD <PDs>	Rebuilding has started automatically for the hot spare. Action is not required.	
108	PD	Warning	Reassign write operation failed:	Failed in getting a substitute area for the physical drive. Check the physical drive for failures. If you find a fault, contact the sales representative or call maintenance personnel.	
109	PD	Warning	Unrecoverable medium error during rebuild:	A medium error has been detected during rebuild. Some data might have been lost. We recommend that you initialize the virtual drive and restore the data from the backup.	
110	PD	Information	Corrected medium error during recovery PD <PDs> Location <location>	The medium error has been repaired. Action is not required.	
111	PD	Warning	Unrecoverable medium error during recovery PD <PDs> Location <location>	A medium error has been detected, but it could not be repaired. This message is output when a medium error occurs at the same address of physical drives or in a configuration without redundancy. Initialization of the virtual drive and restoration of backup data are recommended.	
112	PD	Warning	PD removed <PDs>	The physical drive has been disconnected. If you have intentionally removed the physical drive, action is not required. In other cases, contact the sales representative or call maintenance personnel.	The level was corrected in Ver.2.67-02. "Precautions" on page 2-187.
113	PD	Warning	Unexpected sense PD = <PDs>, CDB = <cdb>, Sense = <sense>	Request sense data has been obtained from the physical drive. Check the physical drive for failures. If no fault is found, this situation should have been handled properly, and action is not required. For details on the request sense data, see "Request sense data" on page 5-38.	

Event ID	Category	Level	Message	Description and required action	Remarks
114	PD	Information	State change PD = <PDs> Previous = <state> Current = <state>	The status of the physical drive has changed. Action is not required.	
115	PD	Information	State change by user:	The status of the physical drive has changed. Action is not required.	
118	PD	Warning	Dedicated Hot Spare PD <PDs> no longer useful due to deleted array	The dedicated hot spare configured for the deleted disk array has not been used for a long time. Remove the hot spare once, and configure it again.	
119	SAS	Critical	SAS topology error: Loop detected	SAS topology error: A loop connection has been detected. Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
120	SAS	Critical	SAS topology error: Device not addressable	SAS topology error: The device could not be addressed. Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
121	SAS	Critical	SAS topology error: Multiple ports to the same SAS address	SAS topology error: Multiple ports have the same SAS address. Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
122	SAS	Critical	SAS topology error: Expander error	SAS topology error: The expander has failed. Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
123	SAS	Critical	SAS topology error: SMP timeout	SAS topology error: SMP timeout has occurred. Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
124	SAS	Critical	SAS topology error: Out of route entries	SAS topology error: An entry is out of route. Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
125	SAS	Critical	SAS topology error: Index not found	SAS topology error: The index cannot be found. Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
126	SAS	Critical	SAS topology error: SMP function failed	SAS topology error: SMP function has failed. Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
127	SAS	Critical	SAS topology error: SMP CRC error	SAS topology error: SMP has a CRC error. Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01

Event ID	Category	Level	Message	Description and required action	Remarks
128	SAS	Critical	SAS topology error: Multiple subtractive	SAS topology error: Multiple subtractive Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
129	SAS	Critical	SAS topology error: Table to table	SAS topology error: Table to table Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
130	SAS	Critical	SAS topology error: Multiple paths	SAS topology error: Multiple paths. Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
131	PD	Fatal	Unable to access device PD <PDs>	The device cannot be accessed. Use a supported physical drive. If this problem still happens with a supported physical drive, contact the sales representative or call maintenance personnel.	
132	PD	Information	Dedicated Hot Spare created PD <PDs>	The dedicated hot spare has been created. Action is not required.	
133	PD	Information	Dedicated Hot Spare disabled PD <PDs>	The dedicated hot spare has been disabled. Action is not required.	
134	PD	Critical	Dedicated Hot Spare <PDs> no longer useful for all arrays	The dedicated hot spare has not been used for a long time. Action is not required.	
135	PD	Information	Global Hot Spare created <PDs>	The global hot spare has been created. Action is not required.	
136	PD	Information	Global Hot Spare disabled <PDs>	The global hot spare has been disabled. Action is not required.	
137	PD	Critical	Global Hot Spare does not cover all arrays <PDs>	There is no virtual drive that can be protected by the global hot spare. As a hot spare, use a physical drive whose capacity is the same as the physical drives of a virtual drive.	
138	VD	Information	Created VD <VDs>	The virtual drive has been created. Action is not required.	
139	VD	Information	Deleted VD <VDs>	The virtual drive has been deleted. Action is not required.	
140	VD	Warning	VD Marked inconsistent due to active writes at shutdown	The system has been shutdown during the write processing. We recommend that you restore the data from the backup.	
141	BBU	Information	Battery Present	Cache backup is enabled. Action is not required.	Added in Ver.8.31-01

Event ID	Category	Level	Message	Description and required action	Remarks
142	BBU	Warning	Battery Not Present	Cache backup is disabled. Check the cable connection of cache backup. In other cases, contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
143	BBU	Information	New Battery Detected	A new cache backup module has been connected. Action is not required.	Added in Ver.8.31-01
144	BBU	Information	Battery has been replaced	The cache backup module has been replaced. Action is not required.	Added in Ver.8.31-01
145	BBU	Warning	Battery temperature is high	The cache backup module has high temperature. If ID 149 is issued within one minute of this event, ignore this event. Check the environmental temperature and the fan for any abnormality. In other cases, contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
146	BBU	Warning	Battery voltage low	The voltage of the cache backup module is low. If this event occurs repeatedly during system operation, contact the sales representative or call maintenance personnel. When this event log is output after booting the system unit from the situation that the system unit was turned off, no action is needed.	Added in Ver.8.31-01
147	BBU	Information	Battery started charging	The cache backup module has started battery charging. Action is not required.	Added in Ver.8.31-01
148	BBU	Information	Battery is discharging	The cache backup module is discharging. Action is not required.	Added in Ver.8.31-01
149	BBU	Information	Battery temperature is normal	The temperature of the cache backup module has returned to a normal level. Action is not required.	Added in Ver.8.31-01
150	BBU	Fatal	Battery has failed and cannot support data retention. Please replace the battery.	The cache backup module has failed and cannot hold data. Contact the sales representative or call maintenance personnel. Ignore this event when this event occurs just after the system startup.	Added in Ver.8.31-01
151	BBU	Information	Battery relearn started	The diagnosis of the cache backup module has started. Action is not required.	Added in Ver.8.31-01
152	BBU	Information	Battery relearn in progress	The diagnosis of the cache backup module is in progress. Action is not required.	Added in Ver.8.31-01

Event ID	Category	Level	Message	Description and required action	Remarks
153	BBU	Information	Battery relearn completed	The diagnosis of the cache backup module has been completed. Action is not required.	Added in Ver.8.31-01
154	BBU	Information	Battery relearn timed out	A timeout occurred during the diagnosis of the cache backup module. Action is not required.	Added in Ver.8.31-01
155	BBU	Information	Battery relearn pending: Battery is under charge	The diagnosis of the cache backup module is suspended. The cache backup module is being charged. Action is not required.	Added in Ver.8.31-01
156	BBU	Information	Battery relearn postponed	The diagnosis of the cache backup module has been postponed. Action is not required.	Added in Ver.8.31-01
157	BBU	Information	Battery relearn will start in 4 days	The diagnosis of the cache backup module will start 4 days later. Action is not required.	Added in Ver.8.31-01
158	BBU	Information	Battery relearn will start in 2 day	The diagnosis of the cache backup module will start 2 days later. Action is not required.	Added in Ver.8.31-01
159	BBU	Information	Battery relearn will start in 1 day	The diagnosis of the cache backup module will start 1 day later. Action is not required.	Added in Ver.8.31-01
160	BBU	Information	Battery relearn will start in 5 hours	The diagnosis of the cache backup module will start 5 hours later. Action is not required.	Added in Ver.8.31-01
161	BBU	Warning	Battery removed	The cache backup module has been disconnected. Check the cable connection of cache backup module. In other cases, contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
162	BBU	Warning	Current capacity of the battery is below threshold	The capacity of the cache backup module is below the threshold. Action is not required.	Added in Ver.8.31-01
163	BBU	Information	Current capacity of the battery is above threshold	The capacity of the cache backup module is above the threshold. Action is not required.	Added in Ver.8.31-01
164	ENCL	Information	SES enclosure discovered: Port %	A SES enclosure has been discovered. Action is not required.	Added in Ver.8.10-04
165	ENCL	Information	SAF-TE enclosure discovered: Port %	A SAF-TE enclosure has been discovered. Action is not required.	Added in Ver.8.10-04
166	ENCL	Critical	Communication lost on enclosure: Port %	Communication with the enclosure has been lost. Check whether the enclosure is properly connected and powered on. In other cases, contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04

Event ID	Category	Level	Message	Description and required action	Remarks
167	ENCL	Information	Communication restored on enclosure:Port %	Communication with the enclosure has resumed. Action is not required.	Added in Ver.8.10-04
168	ENCL	Critical	Fan failed on enclosure:Port % %	The fan of the enclosure has failed. Contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
169	ENCL	Information	Fan inserted on enclosure:Port % %	The fan of the enclosure has been connected. Action is not required.	Added in Ver.8.10-04
170	ENCL	Warning	Fan removed on enclosure:Port % %	The fan in the enclosure has been disconnected. Check the connection and the power of the ESM unit. In other cases, contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
171	ENCL	Critical	Power supply failed on enclosure:Port % Power supply %	The power unit in the enclosure has failed. Contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
172	ENCL	Information	Power supply inserted on enclosure:Port % Power supply %	The power unit in the enclosure has been connected. Action is not required.	Added in Ver.8.10-04
173	ENCL	Warning	Power supply removed on enclosure:Port % Power supply %	The power unit in the enclosure has been disconnected. Check whether the enclosure is properly connected and powered on. In other cases, contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
174	ENCL	Critical	ESM failed on enclosure:Port % %	The ESM unit in the enclosure has failed. Contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
175	ENCL	Information	ESM inserted on enclosure:Port % %	The ESM unit in the enclosure has been connected. Action is not required.	Added in Ver.8.10-04
176	ENCL	Critical	SIM removed on enclosure:Port % %	The SIM in the enclosure has been disconnected. Check the connection and the power of the ESM unit. In other cases, contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
177	ENCL	Warning	Temperature sensor below warning threshold on enclosure:Port % %	The enclosure temperature is below the warning threshold of the temperature sensor. Check the environmental temperature and the fan for any abnormality.	Added in Ver.8.10-04

Event ID	Category	Level	Message	Description and required action	Remarks
178	ENCL	Critical	Temperature sensor below error threshold on enclosure:Port % %	The enclosure temperature is below the error threshold of the temperature sensor. Check the environmental temperature and the fan for any abnormality. If there may be other abnormalities, contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
179	ENCL	Warning	Temperature sensor above warning threshold on enclosure:Port % %	The enclosure temperature is above the warning threshold of the temperature sensor. Check the environmental temperature and the fan for any abnormality.	Added in Ver.8.10-04
180	ENCL	Critical	Temperature sensor above error threshold on enclosure:Port % %	The enclosure temperature is above the error threshold of the temperature sensor. Check the environmental temperature and the fan for any abnormality. In other cases, contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
181	ENCL	Critical	Enclosure shutdown	The enclosure has been shutdown. Action is not required. If the enclosure is not shutdown intentionally, contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
182	ENCL	Warning	Too many enclosures connected to port. Enclosure not supported;	Enclosures cannot be supported because the number of enclosure connections exceeds the supported number. Check the number of enclosure connections. If the number of connections is normal, contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
183	ENCL	Critical	Firmware mismatch on enclosure:	A firmware mismatch has happened in the enclosure. Contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
184	ENCL	Warning	Sensor bad on enclosure:	The sensor of the enclosure is abnormal. Contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
185	ENCL	Critical	Phy is bad on enclosure:	The phy of the enclosure is abnormal. Contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
186	ENCL	Critical	Unstable Enclosure:	The sensor of the enclosure is abnormal. Contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04

Event ID	Category	Level	Message	Description and required action	Remarks
187	ENCL	Critical	Hardware error on enclosure:	A hardware error has occurred in the enclosure. Contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
188	ENCL	Critical	No response from enclosure:	The enclosure returns no responses. Check whether the enclosure is properly connected and powered on. In other cases, contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
189	ENCL	Critical	SAS/SATA mixing not supported in enclosure; disabled PD <PDs>	Both SAS and SATA physical drives exists in the enclosure, so that they cannot be used. Use a supported physical drive.	
190	ENCL	Information	Unsupported hotplug was detected on SES enclosure:	An unsupported hot plug has been detected in the SES enclosure. Check the connections of the parts mounted on the enclosure.	Added in Ver.8.10-04
193	PD	Critical	PD too small to be used for auto-rebuild:	The capacity of the substituted physical drive is too small for starting rebuild. Replace with a physical drive of an adequate capacity.	
194	BBU	Information	BBU enabled; changing WT logical drives to WB	The cache backup function has been enabled. The write policy has been changed from WT to WB. Action is not required.	Added in Ver.8.31-01
195	BBU	Warning	BBU disabled; changing WB logical drives to WT	The cache backup function has been disabled. The write policy was changed from WB to WT. If this event repeatedly occurs not during the diagnosis of the cache backup module (ID 152), check the cable connection of the cache backup module. If the cable connection has no problems, contact the sales representative or call maintenance personnel. When this event log is output after booting the system unit from the situation that the system unit was turned off, no action is needed.	Added in Ver.8.31-01
196	PD	Warning	Bad block table is 80% full on PD <PDs>	The remaining substitute area for bad blocks is running short. Occurrence of a bad block without an available substitute area causes a disk fault. Collect the backup data, and contact the sales representative or call maintenance personnel.	

Event ID	Category	Level	Message	Description and required action	Remarks
197	PD	Critical	Bad block table is full; unable to log block:	The substitute area for bad blocks has been exhausted. Occurrence of a bad block without an available substitute area causes a disk fault. Collect the backup data, and contact the sales representative or call maintenance personnel.	
200	BBU	Critical	Battery/charger problems detected; SOH Bad	A fault was detected in the cache backup module. Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
201	CTRL	Warning	Single-bit ECC error; warning threshold exceeded	The number of single-bit errors detected in cache memory of the disk array controller has exceeded the threshold. Contact the sales representative or call maintenance personnel.	
202	CTRL	Critical	Single-bit ECC error; critical threshold exceeded	The number of single-bit errors detected in cache memory of the disk array controller has exceeded the threshold. Contact the sales representative or call maintenance personnel.	
203	CTRL	Critical	Single-bit ECC error; further reporting disabled	The number of single-bit errors detected in cache memory of the disk array controller has exceeded the threshold. Contact the sales representative or call maintenance personnel.	
204	ENCL	Warning	Power supply switched off for enclosure:Port % Power supply %	The power to the enclosure has been turned off. Action is not required. If the power-off is not intentional, contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
205	ENCL	Information	Power supply switched on for enclosure:Port % Power supply %	The power for the enclosure has been turned on. Action is not required.	Added in Ver.8.10-04
206	ENCL	Warning	Power supply cable removed on enclosure:Port % Power supply %	The power cable in the enclosure has been disconnected. Check whether the power cable has been removed. In other cases, contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
207	ENCL	Information	Power supply cable inserted on enclosure:Port % Power supply %	The power cable in the enclosure has been connected. Action is not required.	Added in Ver.8.10-04
208	ENCL	Information	Fan returned to normal on enclosure:	The fan in the enclosure has been connected. Action is not required.	Added in Ver.8.10-04

Event ID	Category	Level	Message	Description and required action	Remarks
218	CONFIG	Information	Foreign Configuration Detected	Old configuration information has been deleted. Action is not required.	
219	CONFIG	Information	Foreign Configuration Imported	Old configuration information has been imported. Action is not required.	
220	CONFIG	Information	Foreign Configuration Cleared	Old configuration information has been cleared. Action is not required.	
223	SAS	Warning	Link lost on SAS wide port: {1} PHY = {2}	The link of the SAS wide port has been lost. Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
224	SAS	Information	Link restored on SAS wide port: {1} PHY = {2}	The link of the SAS wide port has been restored. Action is not required.	Added in Ver.8.31-01
225	SAS	Warning	Allowed error rate exceeded on SAS port: {1} PHY = {2}	The error rate of the SAS port has exceeded the allowed value. Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
226	PD	Information	Bad block reassigned	A bad block has been replaced. Action is not required.	
227	CTRL	Information	Controller Hot Plug detected	A disk array controller has been hot-plugged. Action is not required.	
228	ENCL	Warning	Controller[%] Temperature sensor differential detected on enclosure:PD %(c Port A/p1) Sensor %	The temperature sensor has detected changes of ambient temperature in the enclosure. No action is needed.	Added in Ver.8.10-04
234	ENCL	Information	Firmware download in progress on enclosure	Firmware download is in progress on an enclosure. Action is not required.	Added in Ver.8.10-04
235	ENCL	Warning	Firmware download failed on enclosure	Firmware download to an enclosure has failed. Contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
237	CTRL	Information	Dirty Cache data discarded by user	Dirty cache data has been discarded by the user. Action is not required.	
238	CTRL	Warning	PDs missing from configuration at boot	A physical drive has not been discovered during system activation. If the removal is not intentional, contact the sales representative or call maintenance personnel.	

Event ID	Category	Level	Message	Description and required action	Remarks
239	CTRL	Critical	VDs missing drives and will go offline at boot	A virtual drive has been put to offline because it was not discovered during system activation. Contact the sales representative or call maintenance personnel.	
240	CTRL	Critical	VDs missing at boot <VDs>	A virtual drive has not been discovered during system activation. If the removal is not intentional, contact the sales representative or call maintenance personnel.	
241	CTRL	Critical	Previous configuration completely missing at boot	The previous configuration information has been lost during system activation. Reconfigure virtual drives.	
242	BBU	Information	Battery charge complete	The charging of the cache backup module has been completed. Action is not required.	Added in Ver.8.31-01
243	ENCL	Information	Fan speed changed on enclosure:Port % %	The fan speed in the enclosure has been changed. Action is not required.	Added in Ver.8.10-04
244	PD	Information	Dedicated spare imported as global due to missing arrays	A dedicated hot spare has been changed to a global hot spare because the target virtual drive of the dedicated hot spare is missing. Reconfigure a virtual drive and a dedicated hot spare as necessary.	
245	PD	Warning	PD rebuild not possible as SAS/SATA is not supported in an array	The substituted physical drive cannot be rebuilt because it is of a different type. Use a physical drive of a correct type (SAS or SATA).	
246	ENCL	Information	SEP has been rebooted as a part of enclosure firmware download. SEP will be unavailable until this process completes.	The processor of the enclosure is restarting. The processor will become operative when the restart is complete. Action is not required.	Added in Ver.8.10-04
247	PD	Information	Device inserted	The device has been inserted. Action is not required.	
248	PD	Warning	Device removed	The physical drive has been disconnected. If you have intentionally removed the physical drive, action is not required. In other cases, contact the sales representative or call maintenance personnel.	The level was corrected in Ver.2.67-02.
249	VD	Information	VD is now OPTIMAL	The physical drive has become optimal. Action is not required.	

Event ID	Category	Level	Message	Description and required action	Remarks
250	VD	Warning	VD is now PARTIALLY DEGRADED	The virtual drive has become partially degraded. Contact the sales representative or call maintenance personnel.	
251	VD	Critical	VD is now DEGRADED	The virtual drive has become degraded. Contact the sales representative or call maintenance personnel.	
252	VD	Fatal	VD is now OFFLINE	The virtual drive has become offline. Contact the sales representative or call maintenance personnel.	
253	BBU	Warning	Battery requires reconditioning; please initiate a LEARN cycle	The cache backup module requires reconditioning. Execute diagnosis.	Added in Ver.8.31-01
257	PD	Warning	PD missing	A device is missing. If the removal is not intentional, contact the sales representative or call maintenance personnel.	
258	CTRL	Warning	Puncturing of LBAs enabled	The puncturing function is enabled. Action is not required.	Added in Ver.2.29-00
259	CTRL	Warning	Puncturing of LBAs disabled	The puncturing function is disabled. Action is not required.	Added in Ver.2.29-00
261	CTRL	Information	Package version	Package version. Action is not required.	Added in Ver.2.29-00
263	CTRL	Warning	Foreign configuration table overflow	The array configuration table has overflowed. An error occurred on the disk array controller. Contact the sales representative or call maintenance personnel.	Added in Ver.2.29-00
264	CTRL	Warning	Partial foreign configuration imported,PDs not imported:	The configuration information has been partially added. Not all physical drives have been added. Check whether you have added a physical drive that was used in some other system unit. If you have not done anything, contact the sales representative or call maintenance personnel.	Added in Ver.2.29-00
265	CTRL	Information	Connector is active:	The connector is active. Action is not required.	Added in Ver.2.29-00
266	CTRL	Information	Board Revision	Board revision. Action is not required.	Added in Ver.2.29-00
267	CTRL	Warning	Command timeout on PD:	Timeout occurred in a command on the device. Contact the sales representative or call maintenance personnel.	Added in Ver.2.29-00

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Event ID	Category	Level	Message	Description and required action	Remarks
268	CTRL	Warning	PD Reset:	The device was reset. Action is not required. However, if this error occurs frequently, contact the sales representative or call maintenance personnel.	Added in Ver.2.29-00
269	CTRL	Warning	VD bad block table is 80% full:	The remaining substitute area for bad blocks is running short. Occurrence of a bad block without an available substitute area causes a disk fault. Collect the backup data, and contact the sales representative or call maintenance personnel.	Added in Ver.2.29-00
271	CTRL	Fatal	Uncorrectable medium error logged:	An uncorrectable medium error has been logged. Contact the sales representative or call maintenance personnel.	Added in Ver.2.29-00
272	CTRL	Information	VD medium error corrected:	A virtual drive medium error has been fixed. Action is not required.	Added in Ver.2.29-00
273	CTRL	Warning	PD Bad block table is 100% full:	The substitute area for bad blocks has been exhausted. Occurrence of a bad block without an available substitute area causes a disk fault. Collect the backup data, and contact the sales representative or call maintenance personnel.	Added in Ver.2.29-00
274	CTRL	Warning	VD Bad block table is 100% full:	The substitute area for bad blocks has been exhausted. Occurrence of a bad block without an available substitute area causes a disk fault. Collect the backup data, and contact the sales representative or call maintenance personnel.	Added in Ver.2.29-00
275	CTRL	Fatal	Controller needs replacement since IOP is faulty	An IOP fault is suspected. The controller board of the disk array needs to be replaced. Contact the sales representative or call maintenance personnel.	Added in Ver.2.29-00
276	PD	Information	CopyBack started on PD: {1} Source PD: {2}	CopyBack has started. Action is not required.	Added in Ver.8.31-01
277	PD	Warning	CopyBack aborted on PD: {1} Source PD: {2}	CopyBack has stopped. Action is not required if the user stopped it.	Added in Ver.8.31-01
278	PD	Information	CopyBack completed on PD: {1} Source PD: {2}	CopyBack has been completed. Action is not required.	Added in Ver.8.31-01
280	PD	Information	CopyBack resumed on PD: {1} Source PD: {2}	CopyBack has started again. Action is not required.	Added in Ver.8.31-01
281	PD	Information	CopyBack automatically started on PD: {1} Source PD: {2}	CopyBack has started automatically. Action is not required.	Added in Ver.8.31-01

Event ID	Category	Level	Message	Description and required action	Remarks
282	PD	Critical	CopyBack failed due to source drive error on PD: {1} Source PD: {2}	CopyBack failed due to an error at the source drive. Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
284	BBU	Information	BBU FRU is:	FRU of the cache backup module has been loaded. Action is not required.	Added in Ver.8.31-01
292	CTRL	Warning	Patrol Read can't be started, as PDs are either not ONLINE, or are in a VD with an active process, or are in an excluded VD	Patrol Read could not be started because there are no virtual drives that can be activated. Check the virtual drives of the disk array controller, and then contact the sales representative or call maintenance personnel.	Added in Ver.3.04-08
293	PD	Information	Copyback aborted by user on PD: {1} Source PD: {2}	Copyback has been stopped by the user. Action is not required.	Added in Ver.8.31-01
294	PD	Critical	Copyback aborted on the hot spare as hot spare needed for rebuild. Hot Spare PD: {1} Source PD: {2}	Copyback has aborted because the hot spare was needed for rebuild. Action is not required.	Added in Ver.8.31-01
295	PD	Warning	Copyback aborted as rebuild required in the array. PD: {1} Source PD: {2}	Copyback has aborted because rebuild was requested. Action is not required.	Added in Ver.8.31-01
297	PD	Warning	Copyback cannot be started as drive is too small. PD: {1} Source PD: {2}	The capacity of the substituted physical drive is too small for starting Copyback. Check whether a correct physical drive is mounted. If a correct physical drive is mounted, the physical drive has a fault. Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
298	PD	Warning	Copyback cannot be started as SAS/SATA is not supported in an array. PD: {1} Source PD: {2}	Copyback could not be started because the physical drive is of a different type. Check whether a correct physical drive is mounted. If a correct physical drive is mounted, the physical drive has a fault. Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
303	CTRL	Information	Controller properties changed	The controller properties have been changed. Action is not required.	Added in Ver.8.10-04
304	CTRL	Information	Patrol Read properties changed	The Patrol Read properties have been changed. Action is not required.	Added in Ver.8.10-04

Event ID	Category	Level	Message	Description and required action	Remarks
306	BBU	Information	Battery properties changed	The properties of the cache backup module have been changed. Action is not required.	Added in Ver.8.31-01
307	BBU	Warning	Periodic Battery Relearn is pending. Please initiate manual learn cycle as Automatic learn is not enabled.	The diagnosis of the cache backup module is suspended. Start the diagnosis manually because automatic diagnosis is disabled. In other cases, contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
327	CTRL	Warning	Consistency Check started on an inconsistent VD:	Consistency check has been executed on a virtual drive that has not been initialized or whose capacity has been expanded. Action is not required.	Added in Ver.2.67-02
331	CTRL	Information	Power state change on	The power status has been changed. Action is not required.	Added in Ver.8.31-01
332	ENCL	Information	Enclosure element status changed	The enclosure status has been changed. Action is not required.	Added in Ver.8.10-04
333	PD	Information	Rebuild is not allowed on PD as HDD/SSD mix is not supported in VDs. PD:	Rebuilding cannot be executed because the virtual drive is configured so as not to allow mixture of HDD and SSD. Check the type of the substituted drive.	Added in Ver.8.10-04
334	PD	Information	Copyback is not allowed on PD as HDD/SSD mix is not supported in VDs. PD: {1} Source PD: {2}	Copyback cannot be executed because the virtual drive is configured so as not to allow mixture of HDD and SSD. Check the type of the spare drive.	Added in Ver.8.31-01
335	VD	Information	VD Bad block table is Cleared. VD:	A bad block table has been deleted. Action is not required.	Added in Ver.8.10-04
336	CTRL	Critical	SAS topology error:	An SAS topology error occurred. Check the RAID setting of the enclosure.	Added in Ver.8.10-04
337	VD	Information	VD cluster of medium error corrected:	A cluster medium error has been repaired. Action is not required.	Added in Ver.8.10-04
338	CTRL	Information	Controller requests a host bus rescan	The controller has requested rescan of a host bus. Action is not required.	Added in Ver.8.10-04
339	CTRL	Information	Controller repurposed and factory defaults restored	The controller has been redefined and the factory default has been restored. Action is not required.	Added in Ver.8.10-04
346	CTRL	Information	Snapshot enabled on	A snapshot is enabled. Action is not required.	Added in Ver.8.10-04

Event ID	Category	Level	Message	Description and required action	Remarks
347	CTRL	Information	Snapshot disabled by the user on	Snapshot has been disabled by the user. Action is not required.	Added in Ver.8.10-04
348	CTRL	Critical	Snapshot disabled on	A snapshot is disabled. Check whether the snapshot repository or the snapshot view is full. Enable snapshot again.	Added in Ver.8.10-04
349	CTRL	Information	Snapshot Point In Time created on	A snapshot has been created. Action is not required.	Added in Ver.8.10-04
350	CTRL	Information	Snapshot Point In Time deleted on	A snapshot has been deleted. (When automatically deleted) action is not required.	Added in Ver.8.10-04
351	CTRL	Information	Snapshot View created on	A snapshot view has been created. Action is not required.	Added in Ver.8.10-04
352	CTRL	Information	Snapshot View deleted on	A snapshot view has been deleted. Action is not required.	Added in Ver.8.10-04
353	CTRL	Information	Snapshot rollback started for Point In Time on	A snapshot rollback has started. Action is not required.	Added in Ver.8.10-04
354	CTRL	Fatal	Snapshot rollback internally aborted for Point In Time on	A snapshot rollback has been aborted. Study the past events to find out if the snapshot data is enabled. You cannot execute rollback if the snapshot data is disabled. Reconfigure the snapshot in this case.	Added in Ver.8.10-04
355	CTRL	Information	Snapshot rollback completed for Point In Time on	A snapshot rollback has been completed. Action is not required.	Added in Ver.8.10-04
356	CTRL	Information	Snapshot rollback progress on Point In Time on	Snapshot rollback is in progress. Action is not required.	Added in Ver.8.10-04
357	CTRL	Warning	Snapshot repository 80% full on	The snapshot repository has been used 80%. Reconsider the area of the snapshot repository.	Added in Ver.8.10-04
358	CTRL	Critical	Snapshot repository full on	The snapshot repository has been exhausted. Reconsider the area of the snapshot repository.	Added in Ver.8.10-04
359	CTRL	Warning	Snapshot View 80% full on	The snapshot view has been used 80%. Reconsider the area of the snapshot view.	Added in Ver.8.10-04
360	CTRL	Critical	Snapshot View full on	The snapshot view has been exhausted. Reconsider the area of the snapshot view.	Added in Ver.8.10-04

Event ID	Category	Level	Message	Description and required action	Remarks
361	VD	Critical	Repository lost for VD	The snapshot repository for the virtual drive has been deleted. Check if the repository has been intentionally deleted. If you cannot check it, set the snapshot repository to the virtual drive again.	Added in Ver.8.10-04
362	VD	Warning	Repository restored for VD	The snapshot repository for the virtual drive has been restored. Confirm that the correct data has been restored.	Added in Ver.8.10-04
363	CTRL	Critical	Snapshot encountered an unexpected internal error:	An unexpected internal error occurred in the snapshot. Check if there are any other errors. Also check the snapshot settings.	Added in Ver.8.10-04
364	CTRL	Information	Auto Snapshot enabled on	Auto snapshot is enabled. Action is not required.	Added in Ver.8.10-04
365	CTRL	Information	Auto Snapshot disabled on	Auto snapshot is disabled. Action is not required.	Added in Ver.8.10-04
366	CTRL	Critical	Configuration command could not be committed to disk, please retry.	Update of the configuration information has not been finished. Retry the update.	Added in Ver.8.10-04
367	PD	Information	COD on PD updated as it was stale. PD:	The configuration data has been updated. Action is not required.	Added in Ver.8.10-04
368	CTRL	Warning	Power state change failed on	Power state change has failed. Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
369	VD	Warning	VD is not available. VD:	The virtual drive cannot be used. Check the virtual drive settings. Check if there are any other errors. If there are, take appropriate action. In other cases, contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
370	VD	Information	VD is available. VD:	Cache Cade or the virtual drive has become available. Action is not required.	Added in Ver.8.10-04
371	VD	Information	VD is used for Cachecade(TM). VD:	The Cache Cade function is assigned for the virtual drive. Action is not required.	Added in Ver.8.10-04
372	VD	Information	VD is being cached in Cachecade(TM). VD:	The Cache Cade function has stored the cache data of the virtual drive. Action is not required.	Added in Ver.8.10-04
373	VD	Information	VD is no longer being cached in Cachecade(TM). VD:	The Cache Cade function cannot store the cache data of the virtual drive anymore. Action is not required.	Added in Ver.8.10-04

Event ID	Category	Level	Message	Description and required action	Remarks
374	CTRL	Critical	Snapshot deleted due to resource constraints on	One of the snapshot data item has been deleted because of the exceedance of the snapshot data capacity. Reconsider the area of the snapshot repository.	Added in Ver.8.10-04
375	CTRL	Warning	Auto Snapshot failed for	Auto snapshot failed because it is set to "Stop taking snapshot" and the number of snapshots has reached the maximum number(8). Check if there is any problem in the auto snapshot setting.	Added in Ver.8.10-04
376	CTRL	Warning	Controller reset on-board expander	The controller has reset the expander. Action is not required. If this event occurs frequently, contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
377	VD	Warning	Cachecade(TM) VD capacity changed VD:	The capacity of the virtual drive for Cache Cade has been changed. Check if any constituting drive has been changed or has a fault. If there is any fault, contact the sales representative or call maintenance personnel.	Added in Ver.8.10-04
379	VD	Information	Advanced Software Options Key was applied	The activation key has been authorized. Action is not required.	Added in Ver.8.10-04
380	VD	Information	Snapshot schedule properties changed on VDs:	The snapshot schedule has been changed. Action is not required.	Added in Ver.8.10-04
381	VD	Information	Snapshot scheduled action is due-Schedule timer expired on VDs:	The term of the snapshot schedule has expired. Action is not required.	Added in Ver.8.10-04
383	CTRL	Information	Advanced Software Options was transferred	Advanced Software Options have been transferred. Action is not required.	Added in Ver.8.10-04
384	CTRL	Information	Advanced Software Options Serial number:	Serial number. Action is not required.	Added in Ver.8.10-04
385	CTRL	Warning	Advanced Software Options Serial number mismatched. Key vault Serial number is:	Serial number mismatch. Perform re-hosting.	Added in Ver.8.10-04
387	CTRL	Information	Power policy changed in VD:	The power policy has been changed. Action is not required.	Added in Ver.8.31-01
388	CTRL	Warning	Cannot transition to max power savings on VD:	The power policy cannot become max power savings mode. Restore the power policy to the factory default.	Added in Ver.8.31-01
389	CTRL	Information	Host driver is loaded and operational	The host driver has been normally loaded and is in operational. Action is not required.	Added in Ver.8.31-01

Event ID	Category	Level	Message	Description and required action	Remarks
392	SAS	Warning	Link failed on Wide Port {1} Link {2}	The link of the wide port has been lost. Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
393	SAS	Information	Link restored on Wide Port {1} Link {2}	The link of the wide port has been restored. Action is not required.	Added in Ver.8.31-01
394	BBU	Information	Memory module FRU is:	The cache backup module has been loaded. Action is not required.	Added in Ver.8.31-01
395	BBU	Critical	Cache-Vault power pack is sub-optimal. Please replace the pack.	The cache backup module has entered fault mode. Replace the cache backup module. Contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
397	BBU	Warning	Cache-Vault microcode update required.	The firmware of disk array controller and that of the cache backup module does not match. Check if the firmware of disk array controller is supported. In other cases, contact the sales representative or call maintenance personnel.	Added in Ver.8.31-01
403	CTRL	Information	Drive Cache settings enabled during rebuild on PD:	Rebuilding will be executed with the physical drive cache enabled. Action is not required.	Added in Ver.8.31-01
404	CTRL	Information	Drive Cache settings restored after rebuild on PD:	The physical drive cache will be restored to the original after rebuilding. Action is not required.	Added in Ver.8.31-01
407	CTRL	Information	Consistency Check suspended on VD : {1}	The consistency check has been suspended. Action is not required.	Added in Ver.8.31-01
408	CTRL	Information	Consistency Check resumed on VD : {1}	The consistency check has started again. Action is not required.	Added in Ver.8.31-01
409	CTRL	Information	Background Initialization suspended on VD : {1}	The background initialization has been suspended. Action is not required.	Added in Ver.8.31-01
410	CTRL	Information	Background Initialization resumed on VD : {1}	The background initialization has started again. Action is not required.	Added in Ver.8.31-01
411	CTRL	Information	Reconstruction suspended on VD : {1}	Capacity expansion processing has been suspended. Action is not required.	Added in Ver.8.31-01
412	CTRL	Information	Rebuild suspended on PD : {1}	Rebuilding has been suspended. Action is not required.	Added in Ver.8.31-01
413	CTRL	Information	Copyback suspended on PD : {1}	Copyback has been suspended. Action is not required.	Added in Ver.8.31-01
414	CTRL	Information	Reminder: Consistency Check suspended on VD : {1}	Reminder: The consistency check has been suspended. Action is not required.	Added in Ver.8.31-01
415	CTRL	Information	Reminder: Background Initialization suspended on VD : {1}	Reminder: The background initialization has been suspended. Action is not required.	Added in Ver.8.31-01

Event ID	Category	Level	Message	Description and required action	Remarks
416	CTRL	Information	Reminder: Reconstruction suspended on VD : {1}	Reminder: Capacity expansion processing has been suspended. Action is not required.	Added in Ver.8.31-01
417	CTRL	Information	Reminder: Rebuild suspended on PD : {1}	Reminder: Rebuild has been suspended. Action is not required.	Added in Ver.8.31-01
418	CTRL	Information	Reminder: Copyback suspended on PD : {1}	Reminder: Copyback has been suspended. Action is not required.	Added in Ver.8.31-01
419	CTRL	Information	Reminder: Patrol Read suspended	Reminder: Patrol Read has been suspended. Action is not required.	Added in Ver.8.31-01
420	CTRL	Information	Erase aborted on PD : {1}	The user has suspended the erase operation. The original data has been deleted. Restore the backup data as necessary.	Added in Ver.8.31-01
421	CTRL	Critical	Erase failed on PD : {1} (Error {2})	The erase operation has stopped. The physical drive may have failed. Contact the sales representative or call maintenance personnel. Restore the backup data as necessary.	Added in Ver.8.31-01
423	CTRL	Information	Erase started on PD : {1}	The erase operation has started. After completion of the erase operation, restore the backup data as necessary.	Added in Ver.8.31-01
424	CTRL	Information	Erase completed on PD : {1}	The erase operation has been completed. The original data has been deleted. Restore the backup data as necessary.	Added in Ver.8.31-01
425	CTRL	Information	Erase aborted on VD : {1}	The user has suspended the erase operation. The original data has been deleted. Restore the backup data.	Added in Ver.8.31-01
426	CTRL	Critical	Erase failed on VD : {1}	The erase operation has stopped. The physical drive may have failed. Contact the sales representative or call maintenance personnel. Restore the backup data as necessary.	Added in Ver.8.31-01
428	CTRL	Information	Erase started on VD : {1}	The erase operation has started. After completion of the erase operation, restore the backup data as necessary.	Added in Ver.8.31-01

Event ID	Category	Level	Message	Description and required action	Remarks
429	CTRL	Information	Erase complete on VD : {1}	The erase operation has been completed. The original data has been deleted. Restore the backup data as necessary.	Added in Ver.8.31-01
430	CTRL	Warning	Potential leakage during erase on VD : {1}	The original data may be readable during the erase operation. After completion of the erase operation, restore the backup data as necessary.	Added in Ver.8.31-01
440	SAS	Information	Link speed changed on SAS port {1} PHY = {2}	The link speed of SAS port has been changed. Action is not required.	Added in Ver.8.31-01
445	CTRL	Warning	Patrol Read aborted on PD : {1}	Patrol Read has stopped. Action is not required if the user stopped it.	Added in Ver.8.31-01
61440	MONITOR	Information	Monitor has started successfully.	The RAID monitor service has started. Action is not required.	
61441	MONITOR	Information	Monitor has shutdown successfully	The RAID monitor service has stopped. Action is not required.	
61442	MONITOR	Warning	No controllers detected	The disk array controller cannot be found. Check whether a correct device driver is installed	
NA	NA	NA	Successful log on to the server	You have logged on to the server successfully. Action is not required.	
NA	NA	NA	Successful log out from the server	You have logged out from the server. Action is not required.	
NA	NA	NA	Full access denied on the server	You have logged on to the server in full access mode. Action is not required.	
NA	NA	NA	Server log cleared	The server log has been cleared. Action is not required.	

Request sense data

The request sense data shown below is output following <CDB> to the event log.

```
CDB = xx xx xx
```

```
Sense = 0xf0 0x00 0x04 0x00 0x01 0x00 0x00 0x28 0x00 0x00 0x00
        0x00 0xc4 0x00 0x00 0x00 0x00 0x00 0x20 0x28 0x00 0x21
        0xb0 0x01 0x15 0x02 0x00 0x00 0x00 0x15 0x00 0x78 0x00
        0x00 0x00 0x22 0x1f 0x40 0x00 0x00 0x00 0x00 0x00 0x00
        0x00 0x00 0x00 0x00
```

The first three bytes of the <Sense> data are "sense key" that indicates the main error code from the hard disk.

The following table describes each sense key:

Sense key	Name	Description
0x00	No Sense	Indicates that there is no particular sense key.
0x01	Recovered Error	Indicates that the last command was executed successfully with device recovery processing.
0x02	Not Ready	Indicates that the device is not accessible.
0x03	Medium Error	Indicates that an uncorrectable error was detected due to a media defect or stored-data error.
0x04	Hardware Error	Indicates that an uncorrectable hardware error was detected during execution of command or self-diagnosis in the device.
0x05	Illegal Request	Indicates that an invalid value was detected in the CDB or parameter transferred by the designation in the command.
0x06	Unit Attention	Indicates that unit attention condition occurred.
0x07	Data Protect	Indicates that violating access was attempted to data area of read/write-protected recording media.
0x08	Blank Check	Indicates that the write-once device or sequential-access device detected blank area or data end mark during read operation or the write-once device attempted to write data to a non-blank area.
0x09	(Reserved)	-
0x0A	Copy Aborted	Indicates that the **Copy** command, **Compare** command, or **CopyandVerify** command abended due to an error in the source device or destination device.
0x0B	Aborted Command	Indicates that the target caused the command to abend.
0x0C	Equal	Indicates that the **Search Data** command ended successfully with data search condition **Equal** met.
0x0D	Volume Overflow	Indicates that unwritten data is remaining in the buffer because media data area ended in the device with a buffer.
0x0E	Miscompare	Indicates that a mismatch was detected in the data compare command.
0x0F	(Reserved)	-

List of services

MSM services are listed below.

Windows

- MSMFramework

Linux

- msm_profile

- vivaldiframeworkd

- lsi_mrdsnmpd (daemon)

> **Note** For both Windows and Linux, use the default setting values of **MSM** service startup.
>
> (Services automatically start during the OS startup by default.)

List of processes

MSM processes are listed below.

Windows:

- cmd.exe

- javaw.exe

- popup.exe

- VivaldiFramework.exe

Linux:

- sh /usr/local/MegaRAID Storage Manager/Framework/startup.sh

- ../jre/bin/java -classpath ../jre/lib/rt.jar:../jre/lib/jsse.jar:../jre/lib/
  jce.jar:mail.jar:Framework.jar -Djava.library.path=.
  Framework.FrameworkManager

- . /bin/sh ./popup

- /bin/sh /usr/local/MegaRAID Storage Manager/startupui.sh [1]

- ../jre/bin/java -classpath .:Popup.jar:../GUI.jar Popup.Communicator
  ajsgyqkj=71244

- ./jre/bin/java -Duser.country=US -Duser.language=en -DVENUS=true
  -DGUI_VERSION=11.08.03.00 -classpath
  .:GUI.jar:monitorgui.jar:DebugLog.jar:log4j-1.2.15.jar:jaxen-
  1.1.jar:jdom-1.1.jar GUI.VivaldiStartupDialog ajsgyqkj=71244 [1]

- /usr/sbin/lsi_mrdsnmpagent -c /etc/snmp/snmpd.conf
  (When SNMP is enabled)

*1:   only while running **MSM**.

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Port number

This section explains the port numbers used by **MSM**.

- Port numbers

    3071: protocol: TCP and UDP

    5571: protocol: UID

    49152 to 65535: Dynamic and/or Private Ports

> **Note** Although Port 5571 is not used by this version of **MSM** but is reserved for **MSM**. If you introduce the network security, register the port number as an exception.
>
> Do not use the **MSM** ports for other applications.

System log (in Linux)

This section explains how events are stored in different syslog files for Linux.

Linux syslog event output

To store events in different files based on their levels, add the lines listed below to one of the following log setting files:

   For Red Hat Enterprise Linux 6: /etc/rsyslog.conf

   For Red Hat Enterprise Linux 5: /etc/syslog.conf

The lines to be added are as follows:

- user.=info   /var/log/user.info
- user.=crit   /var/log/user.crit
- user.=warning /var/log/user.warning
- user.=emerg   /var/log/user.emerg

Level

The correspondence between the above levels and the event levels used in this manual is as follows:

- Information = info
- Critical = crit
- Warning = warning
- Fatal = emerg

MegaRAID Storage Manager Instruction Manual

Hitachi Data Systems

MK-90CRC010-01