

# GV-Storage System V2

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## *User's Manual*





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# Regulatory Notice



## FCC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

### Class A

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.



## CE Notice

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

## RoHS RoHS Compliance

The Restriction of Hazardous Substances (RoHS) Directive is to forbid the use of hazardous materials of production. To meet the RoHS Directive requirements, this product is made to be RoHS compliant.



## WEEE Compliance

This product is subject to the Waste Electrical and Electronic Equipment (WEEE) Directive and made compliant with the WEEE requirements.

## Safety Instructions



Observe these safety instructions to help ensure against injury to yourself and damage to the product.

- **Read** all safety and installation instructions before you operate the product.
- **Do not operate** the product in high humidity areas or expose it to water or moisture.
- **Do not put** the product in an unstable, a slanting or vibrated place.
- **Do not block** any ventilation opening.
- **Do not install** the product near any heat sources such as radiator, heat register or other apparatus that produce heat.
- **Do not defeat** the safety purpose of the grounding-type plug. A grounding plug has two blades and a third grounding prong. The third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- **Do not overload** wall outlets or extension cords, as this may cause fire or electric shock.
- **Do not use** the product when abnormality occurs, such as emitting smoke from the product, smelling burning, being damaged by drop, invasion of foreign objects inside the product, etc. Be always sure to remove the power adaptor at once and contact your dealer.
- **Do not attempt** to service the product yourself, as removing the casing may expose you to dangerous voltage and void the warranty.



# Concepts

## RAID Concepts

RAID is the abbreviation of Redundant Array of Independent Disks. The basic idea of RAID is to combine multiple drives together to form one large logical drive. This RAID drive obtains performance, capacity and reliability than a single drive. The operating system detects the RAID drive as a single storage device.

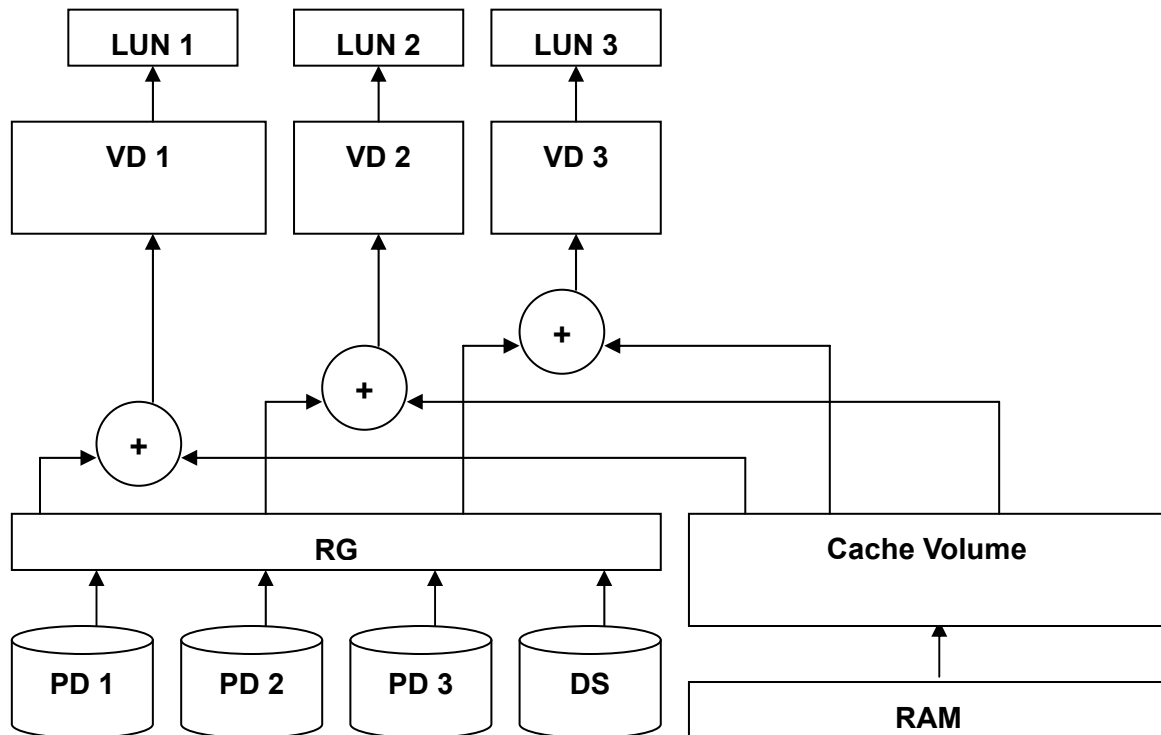
## RAID Levels

There are various RAID levels with different degrees of data protection, data availability, and performance. A description of supported RAID levels follow:

Type	Description	Min. No. of Drives
RAID 0	Disk striping.	1
RAID 1	Disk mirroring over two disks.	2
RAID 3	Striping with parity on the dedicated disk.	3
RAID 5	Striping with interspersed parity over the member disks.	3
RAID 6	2-dimensional parity protection over the member disks.	4
RAID 0+1	Mirroring of the member RAID 0 volumes.	4
RAID 10	Striping over the member RAID 1 volumes.	4
RAID 30	Striping over the member RAID 3 volumes.	6
RAID 50	Striping over the member RAID 5 volumes.	6
RAID 60	Striping over the member RAID 6 volumes.	8
JBOD	The abbreviation of <i>Just a Bunch Of Disks</i> . Independently address a drive.	1
N-way mirror	Extension to RAID 1 level. It has N copies of the disk.	N

## Volume Relationship

The following diagram describes the relationship of RAID components.

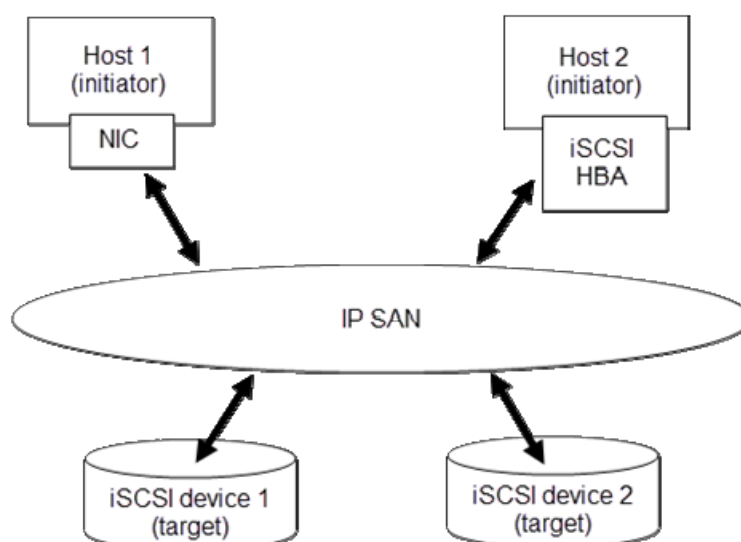


One RG (RAID group) consists of a set of VDs (Virtual Disk) and owns one RAID level attribute. Each RG can be divided into several VDs. The VDs in one RG share the same RAID level, but may have different volume capacity. All VDs share the CV (Cache Volume) to execute the data transaction. LUN (Logical Unit Number) is a unique identifier, in which users can access through SCSI commands.

## iSCSI Concepts

iSCSI (Internet SCSI) is a protocol which encapsulates SCSI (Small Computer System Interface) commands and data in TCP/IP packets for linking storage devices with servers over common IP infrastructures. iSCSI provides high performance SANs over standard IP networks like LAN, WAN or the Internet.

IP SANs are true SANs (Storage Area Networks) which allow several servers to attach to an infinite number of storage volumes by using iSCSI over TCP/IP networks. IP SANs can scale the storage capacity with any type and brand of storage system. In addition, it can be used by any type of network (Ethernet, Fast Ethernet, Gigabit Ethernet, and 10 Gigabit Ethernet) and combination of operating systems (Microsoft Windows, Linux, Solaris, Mac, etc.) within the SAN network. IP SANs also include mechanisms for security, data replication, multi-path and high availability.



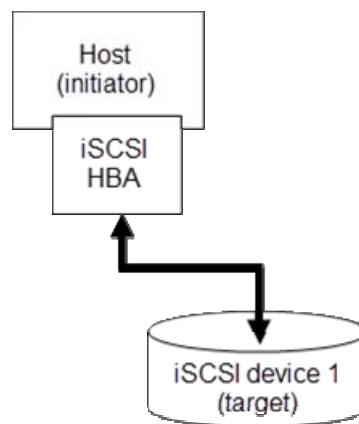
Storage protocol, such as iSCSI, has “two ends” in the connection. These ends are initiator and target. In iSCSI, we call them iSCSI initiator and iSCSI target. The iSCSI initiator requests or initiates any iSCSI communication. It requests all SCSI operations like read or write. An initiator is usually located on the host side (either an iSCSI HBA or iSCSI SW initiator).

The target is the storage device itself or an appliance which controls and serves volumes or virtual volumes. The target is the device which performs SCSI command or bridge to an attached storage device.

## SAS Concepts

Serial-attached SCSI offers advantages over older parallel technologies. The cables are thinner, and the connectors are less bulky. Serial data transfer allows the use of longer cables than parallel data transfer.

The target is the storage device itself or an appliance which controls and serves volumes or virtual volumes. The target is the device which performs SCSI command or bridge to an attached storage device.



# Chapter 1 Introduction

## Large Storage Capacity

GV-Storage System V2, the IP SAN storage system, is a high-performance RAID storage system based on the latest iSCSI technology for users looking for a cost-effective and shared storage solution over the network. Compared to the desktop PC and consumer NAS system which only allow for 2 ~ 8 hard disks for data storage, GV-Storage System V2 is equipped with 24 hard disk drives, storage capacity up to 144 TB (with 6 TB HDD). GV-Storage System V2 can connect to 7 units of 24-bay GV-Expansion Systems, the JBOD systems, increasing storage up to 192 hard disks with 1,152 TB.

## High Availability

GV-Storage System V2 has fully redundant components including power supplies, fan modules, and SAS JBOD expansion ports linked to GV-Expansion System. All of these components are hot-swappable to create a high availability platform and provide non-stop services.

## Compatible GeoVision Surveillance Systems

GV-Storage System V2 is compatible with GeoVision Surveillance Systems and Software. With its large storage capacity and high availability, GV-Storage System V2 is an ideal choice for safe and long-term data storage.

## 1.1 Compatible GeoVision Products

- GV-Hot Swap System V5 Series
- GV-NVR System Lite V2
- GV-Tower DVR / NVR / VMS System
- GV-DVR / NVR / VMS / Recording Server / Backup center / Redundant Server / Failover Server

## 1.2 Models

<b>GV-Storage System V2</b>	<b>IP SAN Storage System</b> Host Interface: 6 x 1 GbE iSCSI ports Form Factor: 4U 24 Bays
<b>GV-Expansion System</b>	<b>JBOD System</b> Host Interface: 6 Gbps SAS JBOD (IN) + 6 Gbps SAS JBOD (OUT) ports Form Factor: 4U 24 Bays Up to 7 GV-Expansion Systems can be connected to GV-Storage System V2

## 1.3 Key Features

### GV-Storage System V2:

- 4U 24 Bay hot-swap SATA II / III HDD for data storage
- Storage capacity up to 144 TB (with 6 TB HDD)
- Six 1 GbE iSCSI data ports
- RAID levels 0, 1, 0+1, 3, 5, 6, 10, 30, 50, 60, JBOD, and N-way mirror
- Fully redundant & hot pluggable designs: power supplies and fans
- Hardware iSCSI offload engine
- Background logical drive rebuilding
- Automatic rebuilding onto hot spare (Local & Global Hot Spare)
- Web management interface enabled on a specific Ethernet interface
- Multi-path and load-balancing Features
- Storage expendable up to 1152 TB with 192 hard drives by connecting up to 7 GV-Expansion Systems (4U, 24-bay)

### GV-Expansion System:

- Up to 7 sets of GV-Expansion System connection for expansion from GV-Storage System V2
- Fully redundant & hot pluggable designs: power supplies and fans

## 1.4 Packing List

### **GV-Storage System V2:**

- GV-Storage System V2
- HDD Tray x 24
- Power Cord x 2
- RS-232 Cable  
(For UPS, phone jack to DB9 male).
- Rail Kit
- Keys, Screws for Drives and Rail Kit (packet)
- Quick Start Guide
- Software Disk

### **GV-Expansion System:**

- GV-Expansion System
- HDD Tray x 24
- Power Cord x 2
- Mini-SAS Cable
- Rail Kit
- Keys, Screws for Drives and Rail Kit (packet)
- Quick Start Guide
- Software Disk

## 1.5 Maximum Recorded Channels

The maximum number of channels supported by GV-Storage System V2 varies with the resolution, as listed below. It's highly suggested to keep the total bitrates under 2700 Mbps for better recording performance.

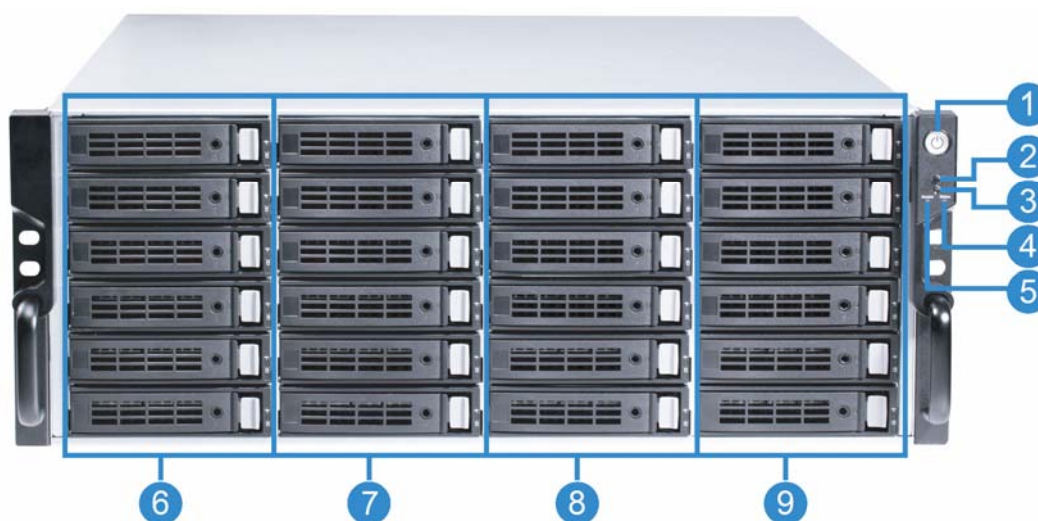
Video Streaming		Complex Scenes		Normal Scenes	
Resolution	Frame rate	Bitrate	Record Channels	Bitrate	Record Channels
1.3 MP	30 fps	5 Mbps	534 ch	1.73 Mbps	1560 ch
2 MP	30 fps	7 Mbps	385 ch	3.86 Mbps	699 ch
3 MP	20 fps	10.48 Mbps	257 ch	3.38 Mbps	798 ch
4 MP	15 fps	11.65 Mbps	231 ch	8.93 Mbps	302 ch
5 MP	10 fps	16.48 Mbps	163 ch	3.16 Mbps	854 ch



# Chapter 2 Overview

## 2.1 Front View

This section provides basic information about the hardware components of GV-Storage System V2 and GV-Expansion System.



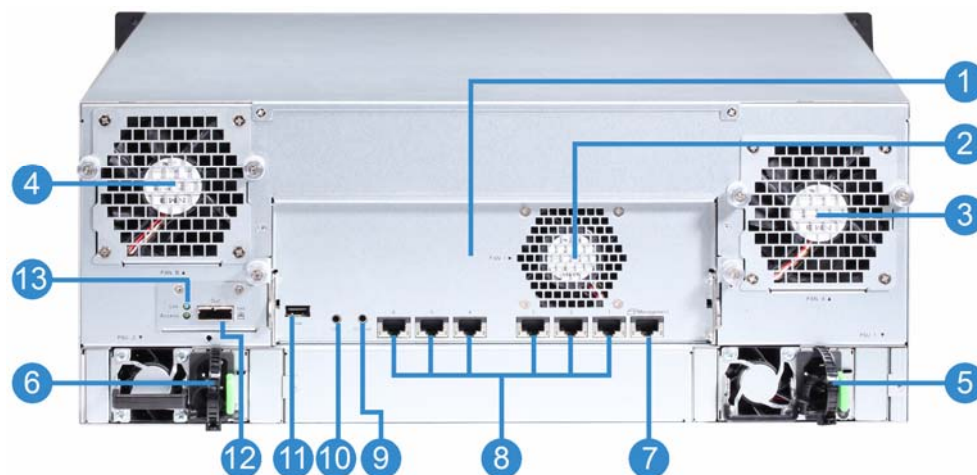
**Figure 2-1**

No.	Name	Description
1	Power button and power LED	Blue: Power ON. Off: Power OFF.
2	Mute button	Press to mute the alarm.
3	IP reset button	Reset the IP address of the management port to default settings: 192.168.0.199.
4	Status LED:	Red: System failure. Off: System OK.
5	Access LED	This indicates host connectivity, not the hard drive activity. Blink: There is host activity (data I/O or management). OFF: There is no host activity.
6~9	HDD Groups	HDD Groups A, B, C, D

**Note:** IP Reset button is not available in GV-Expansion System.

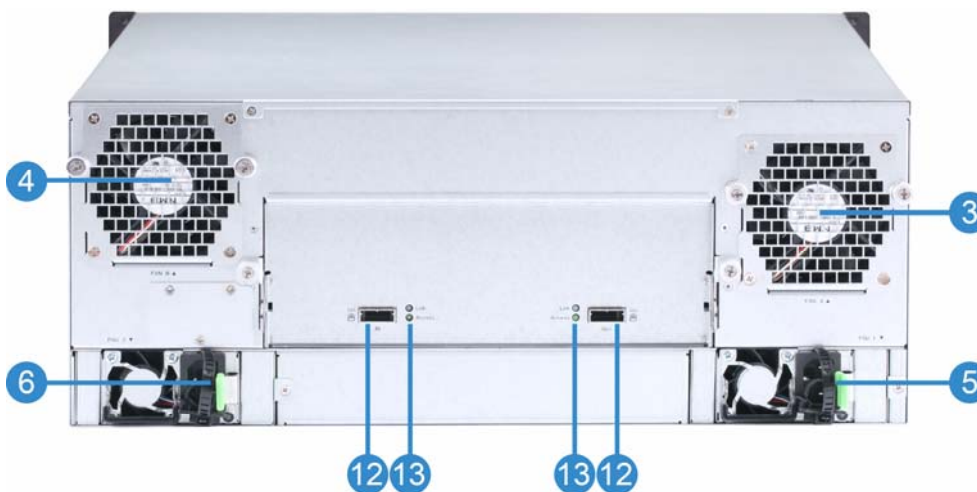
## 2.2 Rear View

- **GV-Storage System V2:**



*Figure 2-2*

- **GV-Expansion System:**



*Figure 2-3*

No.	Description
1	Controller
2	Fan 1
3	Fan A
4	Fan B
5	Power Supply Unit (PSU1)
6	Power Supply Unit (PSU2)
7	Management Port
8	6 x 1 GbE iSCSI Ports
9	Console Port (Debug Port)
10	UPS Port
11	USB Port (No function. Reserved for the future design purpose.)
12	SAS JBOD Expansion Port
13	<p><b>Link LED:</b></p> <p>Blue: Asserted when GV-Storage System V2 and GV-Expansion System are connected.</p> <p><b>Access LED:</b></p> <p>Blinking green: Asserted when the link is established and packets are being transmitted along with any receive activity.</p>

# Chapter 3 Installation

## 3.1 Installation Overview

Before starting, prepare the following items:

- A management computer with a Gigabit Ethernet network interface card (recommended) on the same network as the GV-Storage System V2.
- Connection cables:
  - **GV-Storage System V2:** CAT 5e or CAT 6 (recommended) network cables for one management port and six iSCSI data ports.
  - **GV-Expansion System:** SAS cables (supplied)
- Prepare a storage system configuration plan by the network administrator. The plan should include network information for the management port and iSCSI data ports. If using static IP addresses, please prepare a list of the static IP addresses, the subnet mask, and the default gateway.
- A Gigabit Layer 2 or Layer 3 managed stackable switch.
- CHAP security information, including CHAP username and secret (optional).

### 3.1.1 Number Drive Slots

The drives can be installed into any slot in the enclosure. Slot numbering is reflected in Web UI.

Slot 1	Slot 7	Slot 13	Slot 19
Slot 2	Slot 8	Slot 14	Slot 20
Slot 3	Slot 9	Slot 15	Slot 21
Slot 4	Slot 10	Slot 16	Slot 22
Slot 5	Slot 11	Slot 17	Slot 23
Slot 6	Slot 12	Slot 18	Slot 24



**Tip:** Install at least one drive in Slot 1 to 4 (marked gray slots). System event logs are saved in these drives. Otherwise, event logs no longer exist after a reboot.

### 3.1.2 Install the System & Network

#### GV-Storage System V2:

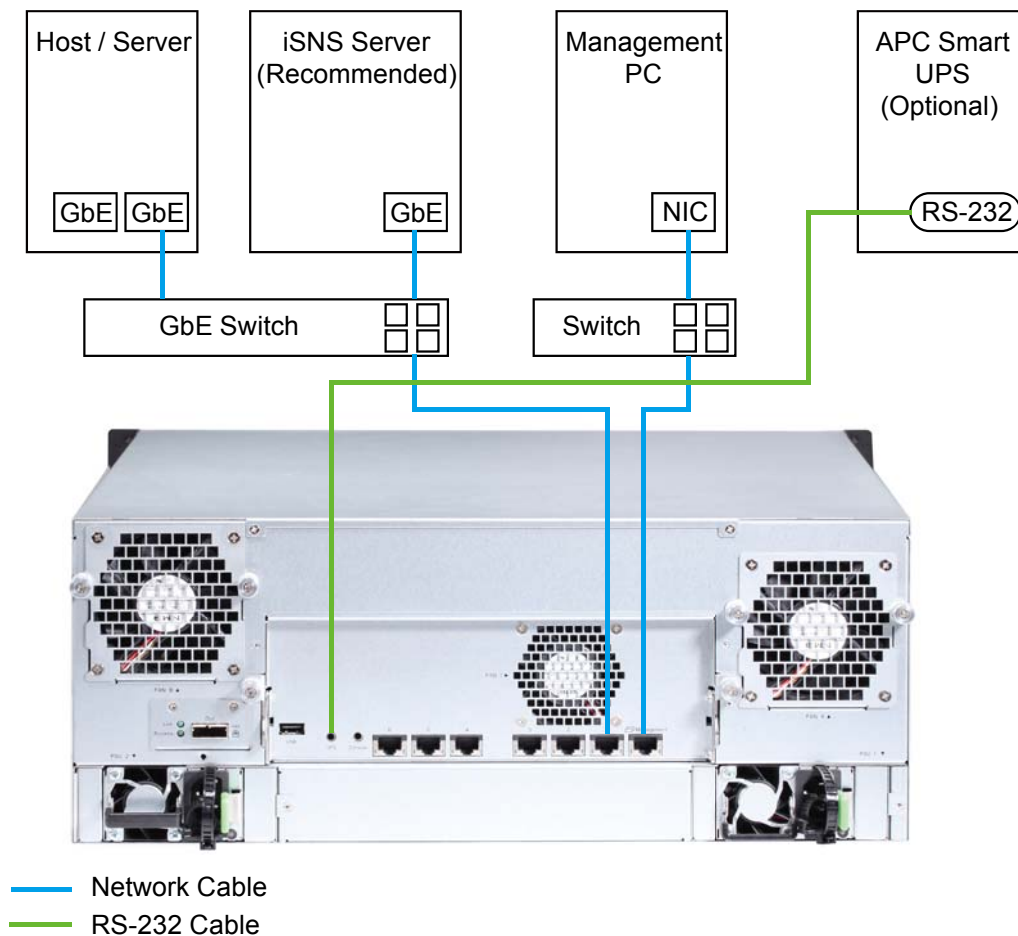
Use the following instructions to install and deploy the storage system.

- Install the Rail Kit onto the unit and insert it into the rack.



**Caution:** The system is very heavy. It's recommend that a mechanical lifter or at least two persons be used to raise and align the system to prevent injury during installation. Use care when inserting or removing a system into or out of a rack to prevent the accidental tipping or the rack causing damage or personal injury.

- Install the Disk Drives.
- Connect the management port cable and data port cables on the network plan, the topology examples are on the following.



**Figure 3-1**

## GV-Expansion System:

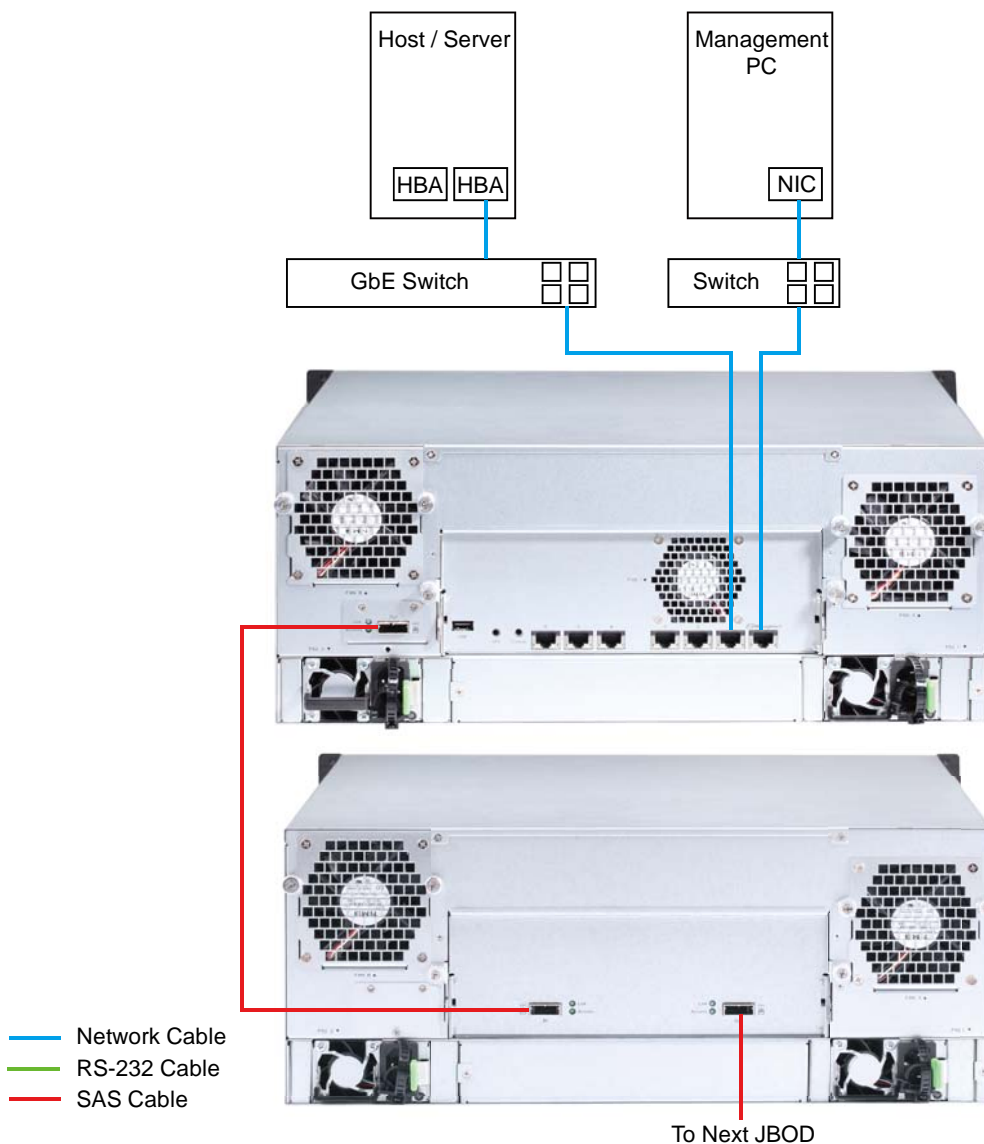
Use the following instructions to install and deploy the Expansion system.

- Install the Rail Kit onto the unit and insert it into the rack.

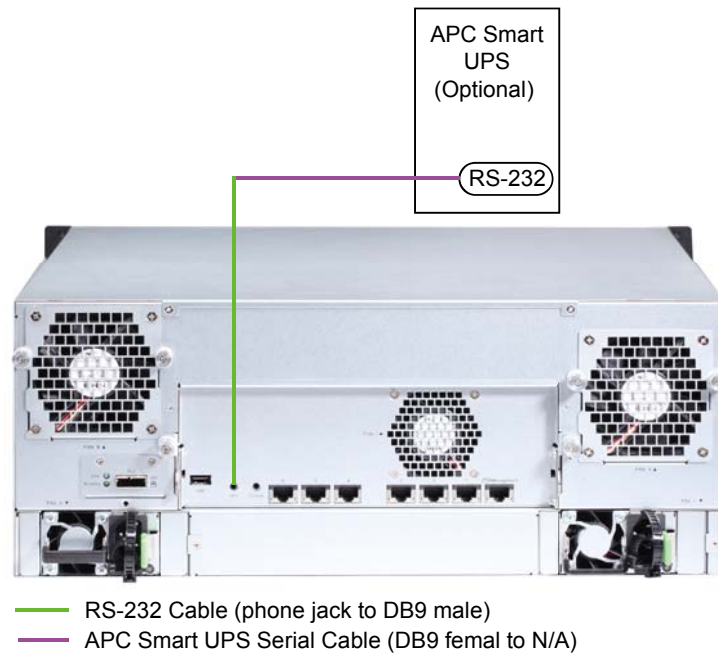


**CAUTION:** The system is very heavy. It's recommended that a mechanical lifter or at least two persons be used to raise and align the system to prevent injury during installation. Be careful to insert or remove a system into or out of a rack to prevent from accidental tipping or the rack damage or personal injury.

- Install the Disk Drives.
- Connect SAS cable to the head unit, the topology examples are on the following.



**Figure 3-2**

**UPS typology:****Figure 3-3**

- Use RS-232 cable for UPS (gray color, phone jack to DB9 male) to connect from controller to APC Smart UPS serial cable (DB9 female side, supplied with your UPS system), and then connect the serial cable to APC Smart UPS.



**Caution:** It may not work to connect the RS-232 cable for UPS (gray color, phone jack to DB9 male) to APC Smart UPS directly.

- Attach the power cords and power on the system, and then power on the hosts and the iSNS server (optional for iSCSI environment).
- Start the configuration.

## 3.2 Turning on/off the Storage System

### 3.2.1 Power on the Storage System

The power button is located at the right front handle. To turn on the system, you may press the power button once. After you turn the power ON, the system performs a booting process which takes a few minutes.



**Figure 3-4**

### 3.2.2 Power off the Storage System

If it becomes necessary to power down the system, use a normal, controlled shutdown from through either the power button or the Web UI to ensure all data is flushed from the cache first.

1. Shutdown using Web UI:
  - Select **System Maintenance -> Reboot and Shutdown**.
  - Click the **Shutdown** icon.
  - System shutdown begins. When shutdown process completes, the power LED will turn off.
2. Shutdown using the power button:
  - Forced shutdown: press and hold for more than 4 seconds. The power will be cut off immediately.
  - Graceful shutdown: press one to initialize graceful shutdown. Press 2nd time within 4 seconds to confirm and start graceful shutdown. If there is no 2nd press within 4 seconds, disable graceful shutdown and return to normal operating mode.



# Chapter 4 Quick Setup

## 4.1 Management Interfaces

There are several management methods to manage the storage system, described on the following.



**Tip:** GV-Storage System V2 supports SSH for remote access only.

---

### 4.1.1 Web UI

GV-Storage System V2 supports graphic user interface operation. It supports most common Web browsers. Be sure to connect the LAN cable to the management port of the system.

**The default settings:**

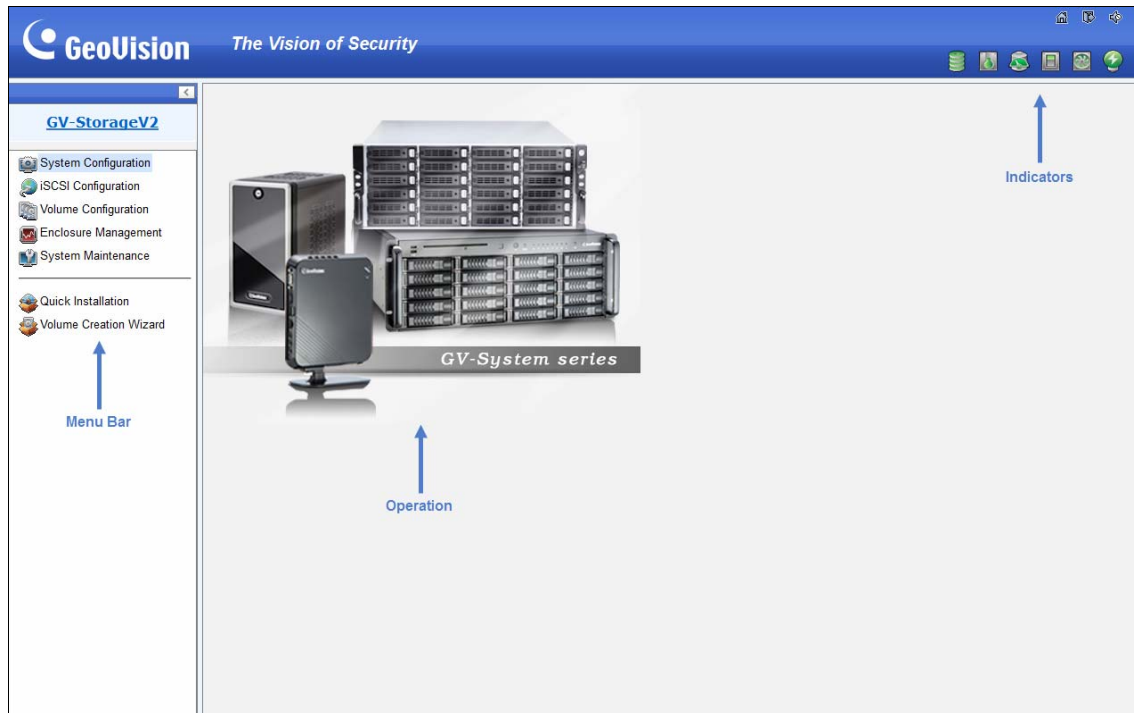
- Management IP address: 192.168.0.199 / 255.255.252.0
- User Name: admin
- Password: 0000

1. Type the IP address of the system into your browser. The Login page appears.



**Figure 4-1**

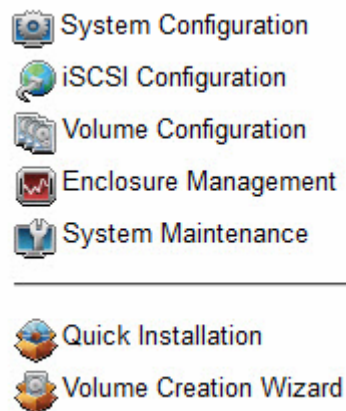
2. Type the login user name and password. The Web UI appears.



**Figure 4-2**

### Menu Bar:

Choose the functions from the Menu Bar on the left side of the window to make any configuration changes.



**Figure 4-3**

**Indicators:**

There are up to seven indicators and three icons at the top-right corner.



**Figure 4-4**

Icon	Description
	RAID indicator: Green: All RAID groups are functioning. Red: A RAID group is degraded or has failed.
	Temperature indicator: Green: Temperature is normal. Red: Temperature is too high.
	Voltage indicator: Green: Voltage values are normal. Red: Voltage values are out of range.
	UPS indicator: Green: UPS is functioning or no UPS is connected. Red: UPS connection has failed.
	Fan indicator: Green: Fan is working well. Red: Fan failed.
	Power indicator: Green: Power supplies are connected and working well. Red: A power supply has failed or is no longer connected.
	Return to home page.
	Logout of the management Web UI.
	Mute alarm beeper.



**Tip:** If the status indicators in Internet Explorer (IE) are displayed in gray, but not in blinking red, please enable **Tools -> Internet Options -> Advanced -> Play animations in webpages** options in IE. The default value is enabled, but some applications disable it.

## 4.2 Using the Guided Configurations

To help users get started quickly, two guided configuration tools are available in the Web UI. **Quick Installation** Tool guides you an easy way to create a volume. **Volume Creation Wizard** provides a smarter policy to help users to create a volume. If you are an advanced user, you can skip these steps.

### 4.2.1 Quick Installation Tool

This tool guides you through the process of setting up basic array information, configuring network settings, and the creation of a volume on the storage system. Click **Volume Configuration** to make sure that it has some free hard drives installed in the system.

Physical Disks RAID Groups Virtual Disks Snapshots Logical Units													
Show disk for: - Local - Show disk size in: GB													
<< first < prev 1 next > last >>													
	Slot	Size (GB)	RAID Group	Status	Health	Usage	Vendor	Serial Number	Rate	Write Cache	Standby	Read-Ahead	Command Queuing
▼	1	931		Online	Good	Free	WDC	WD-WCAW3LVV0NT5	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	2	931		Online	Good	Free	WDC	WD-WCAW3AYZVPRH	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	3	931		Online	Good	Free	WDC	WD-WCAW3AYZVXL9	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	4	931		Online	Good	Free	WDC	WD-WCAW3LVV0XUD	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
<< first < prev 1 next > last >>													
Disk Health Check Disk Check Report													

**Figure 4-5**

1. Click **Quick Installation** from the menu bar.

2. Type a **System Name** and set up the **Date and Time**. Click **Next** to proceed.

Quick Installation

Step 1: System Settings

**System Name**

System Name: GV-StorageV2-CD8A60

**Date and Time**

☒ Change Date and Time

Current Time: 2014/11/18 11:32:6

Time Zone: (GMT+08:00) Taipei

☒ Setup Date and Time Manually

Date: 2014 / 11 / 18

Time: 11 : 26 : 39

☐ NTP

Server:

Next >> Cancel

**Figure 4-6**

3. Confirm or change the IP address of the management port and DNS server. If the default HTTP (80) and HTTPS (443) port numbers are not allowed on your network, they can be changed here as well.

Quick Installation

Step 2: Network Settings

**MAC Address**

MAC Address: 00:13:78:CD:8A:60

**Address**

☐ Use DHCP

☐ Use BOOTP

☒ Specify a Static IP Address

IP Address: 192.168.0.199

Subnet Mask: 255.255.252.0

Gateway: 192.168.0.1

**DNS Server Address**

Address: 192.168.0.1

**Service Ports**

HTTP Port: 80

HTTPS Port: 443

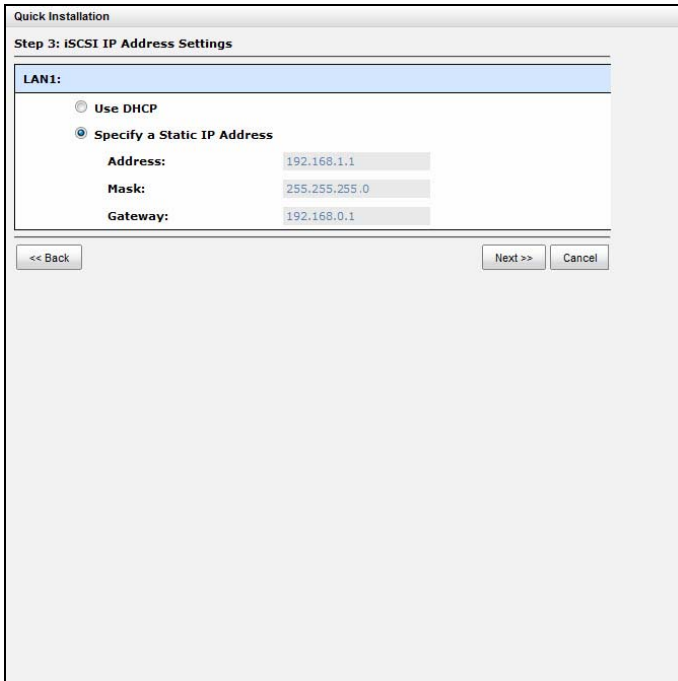
SSH Port: 22

<< Back Next >> Cancel

**Figure 4-7**

**Note:** SSH port is not available.

4. Change the IP address of the 1<sup>st</sup> iSCSI port if necessary. The default IP address is 192.168.1.1. Then click **Next**.



Quick Installation

Step 3: iSCSI IP Address Settings

LAN1:

☐ Use DHCP

☒ Specify a Static IP Address

Address: 192.168.1.1

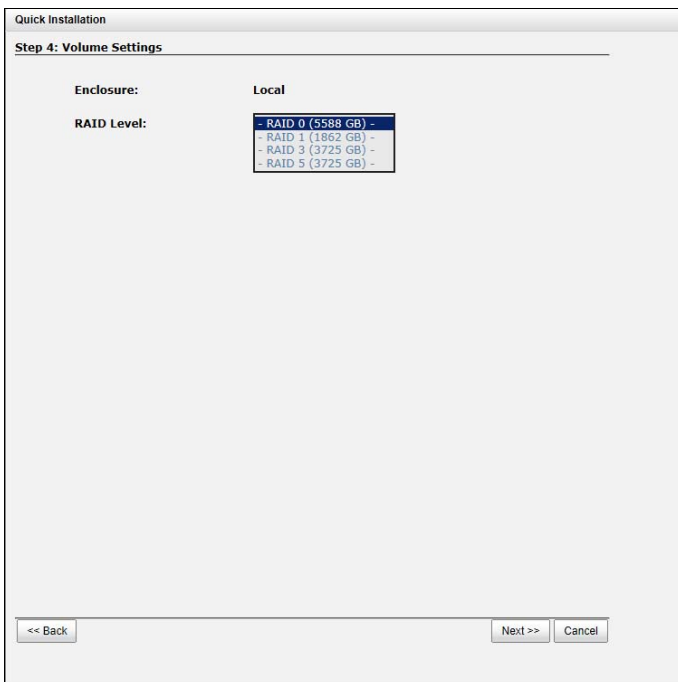
Mask: 255.255.255.0

Gateway: 192.168.0.1

<< Back      Next >>      Cancel

**Figure 4-8**

5. Choose a **RAID Level**. The number in the brackets is the maximum capacity at the RAID level. This step utilizes all drives in the storage system as well as any JBOD expansion arrays present.



Quick Installation

Step 4: Volume Settings

Enclosure: Local

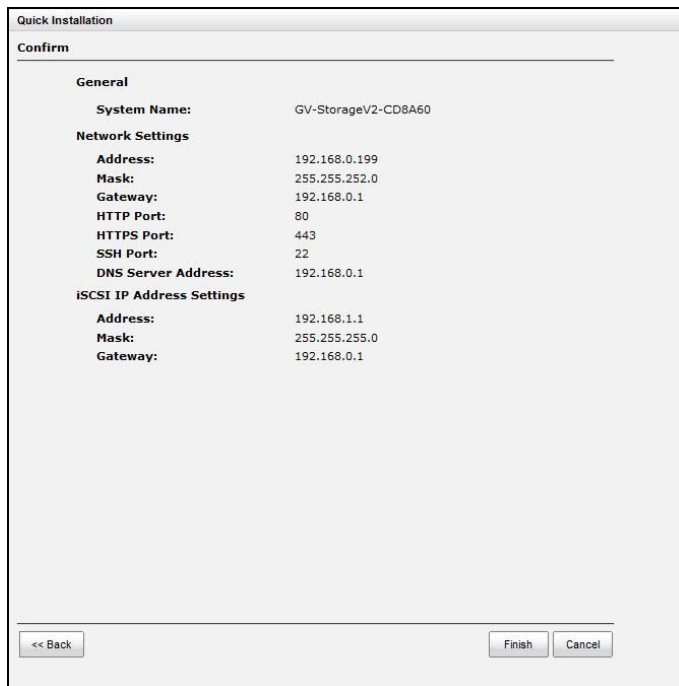
RAID Level:

- RAID 0 (5588 GB) -
- RAID 1 (1862 GB) -
- RAID 3 (3725 GB) -
- RAID 5 (3725 GB) -

<< Back      Next >>      Cancel

**Figure 4-10**

6. Verify all items, and then click **Finish** to complete the quick installation.



The image shows a 'Quick Installation' window with a 'Confirm' tab. It displays the following settings:

General	
System Name:	GV-StorageV2-CD8A60

Network Settings	
Address:	192.168.0.199
Mask:	255.255.252.0
Gateway:	192.168.0.1
HTTP Port:	80
HTTPS Port:	443
SSH Port:	22
DNS Server Address:	192.168.0.1

iSCSI IP Address Settings	
Address:	192.168.1.1
Mask:	255.255.255.0
Gateway:	192.168.0.1

At the bottom, there are three buttons: '<< Back', 'Finish', and 'Cancel'.

**Figure 4-11**

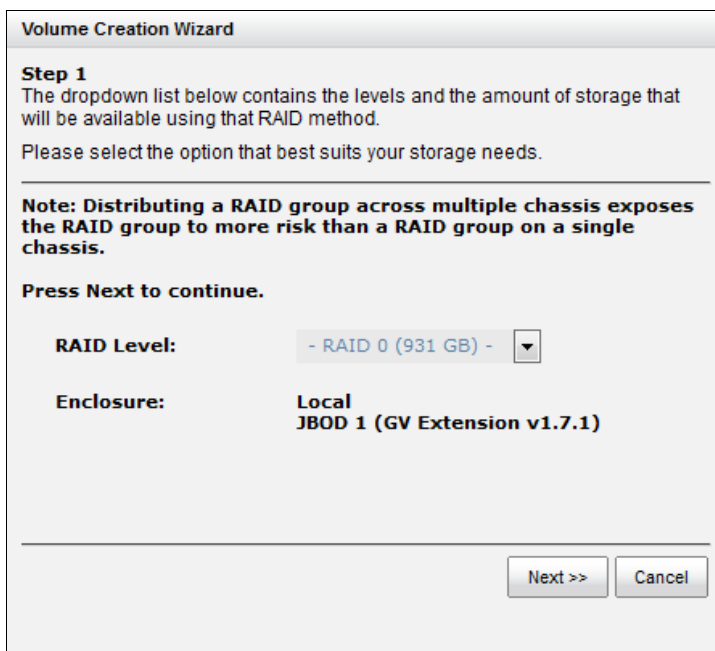
## 4.2.2 Volume Creation Wizard

The **Volume Creation Wizard** provides a smarter policy to determine all possibilities and volume sizes in the different RAID levels that can be created using the existing free drives. It provides:

- Largest capacity for each RAID level from which to choose.
- The fewest number of drives for each RAID level / volume size.

This way, after choosing RAID level, you may find that some drives are still available (free status). This phenomenon is the result of using smart design. Take an example, user chooses the RAID 5 level and the system has 12\*200 GB + 4\*80 GB free drives inserted. Generally, if using all 16 drives for a RAID 5 group, the maximum size of volume is  $(16-1)*80 \text{ GB} = 1200 \text{ GB}$ . This wizard provides a smarter check and searches the most efficient way of using free drives. It uses 200 GB drives only to provide  $(12-1)*200 \text{ GB} = 2200 \text{ GB}$  capacity, the volume size is larger and less drives.

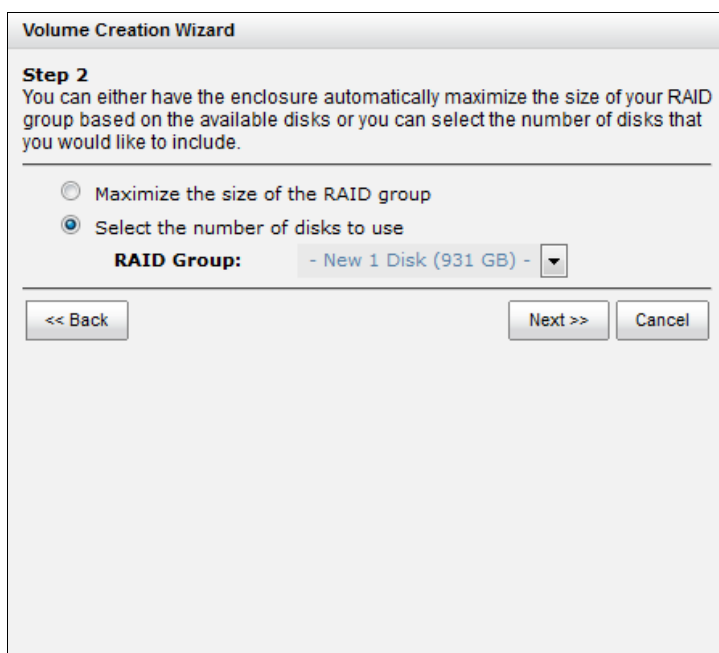
1. Click **Volume Creation Wizard** from the menu bar.
2. Choose a **RAID Level**. The number in the brackets is the maximum capacity at the RAID level.



**Figure 4-12**



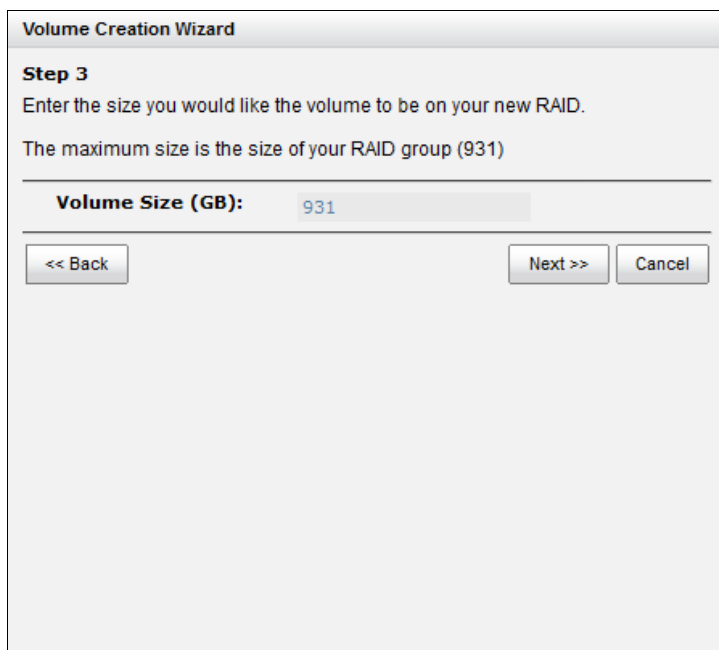
3. Select the default option **Maximize the size of the RAID group** or manual option **Select the number of disks to use**. From the drop-down list, select the desired RAID Group capacity combination. Click **Next** to proceed.



The screenshot shows the 'Volume Creation Wizard' window at Step 2. The title bar reads 'Volume Creation Wizard'. Below the title, it says 'Step 2' and provides instructions: 'You can either have the enclosure automatically maximize the size of your RAID group based on the available disks or you can select the number of disks that you would like to include.' There are two radio buttons: 'Maximize the size of the RAID group' (which is selected) and 'Select the number of disks to use'. Below the radio buttons, there is a label 'RAID Group:' followed by a dropdown menu showing '- New 1 Disk (931 GB) -'. At the bottom of the window, there are three buttons: '<< Back', 'Next >>', and 'Cancel'.

**Figure 4-13**

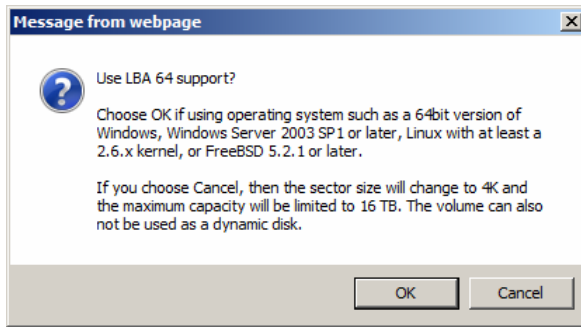
4. Type the desired **Volume Size (GB)** that is less than or equal to the default available size shown. Then click **Next**.



The screenshot shows the 'Volume Creation Wizard' window at Step 3. The title bar reads 'Volume Creation Wizard'. Below the title, it says 'Step 3' and provides instructions: 'Enter the size you would like the volume to be on your new RAID. The maximum size is the size of your RAID group (931)'. There is a label 'Volume Size (GB):' followed by a text input field containing the number '931'. At the bottom of the window, there are three buttons: '<< Back', 'Next >>', and 'Cancel'.

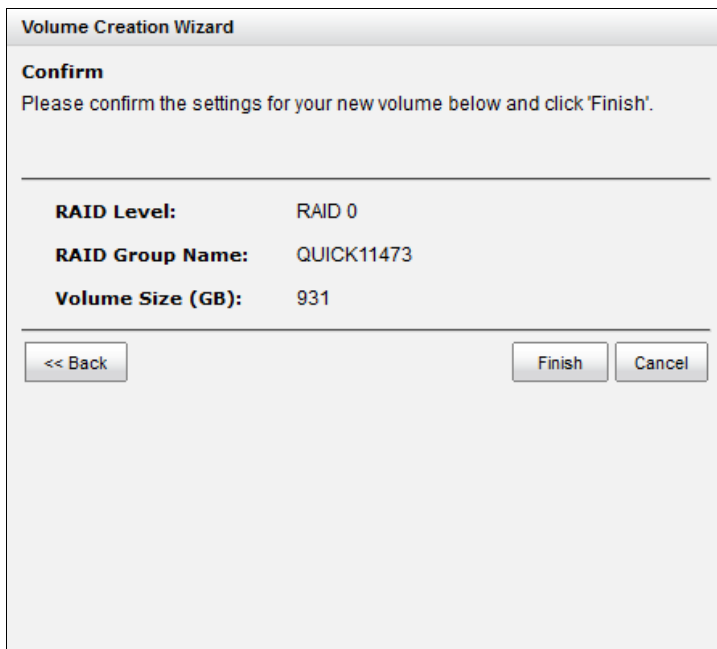
**Figure 4-14**

5. It depends on the operation system to use LBA 64 support.



**Figure 4-15**

6. Finally, verify the selections and click **Finish** if they are correct.



**Figure 4-16**

The volume is created and named by the system automatically. It is available to use now.

# Chapter 5 Basic Configuration

## 5.1 Interface Hierarchy

This table describes the hierarchy of the Web GUI.

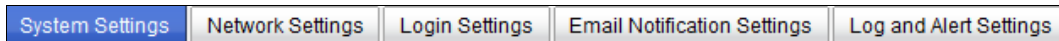
Menu Bar	L1	L2, Button or Menu
System Configuration	System Settings	System Name / Date and Time / System Indication
	Network Settings	MAC Address / IP Address / DNS Server Address / Service Ports
	Login Settings	Login Options / Admin Password / User Password
	Email Notification Settings	Email Settings / Send Test Mail
	Log and Alert Settings	SNMP Trap Settings / Windows Messenger / Syslog Server Settings / Admin Interface and Front Display Alerts / Device Buzzer
iSCSI Configuration	Network Setup	<b>Options:</b> [ <a href="#">iSCSI Bonding Settings</a>   Delete iSCSI Bonding] / Set VLAN ID / iSCSI IP Address Settings / Make Default Gateway / [ <a href="#">Enable</a>   Disable] Jumbo Frames / Ping Host / Reset Port
	Entity and iSNS Settings	Entity Name / iSNS IP Address
	iSCSI Node	<b>Options:</b> Authentication Method / Change Portal / Rename Alias / Users
	Active Sessions	Connection Details / Disconnect
	CHAP Accounts	Create User <b>Options:</b> Modify User Information / Delete User

Menu Bar	L1	L2, Button or Menu
Volume Configuration	Physical Disks	<p>Show disk for: &lt; <u>-Local-</u>   -JBOD<math>n</math>- &gt;</p> <p>*<math>n</math> indicates the number of the GV-Expansion System.</p> <p>Show disk size in: &lt; <u>(GB)</u>   (MB) &gt;</p> <p>Disk Health Check / Disk Check Report</p> <p><b>Options:</b> Set Free Disk / Set Global Spare / Set Local Spare / Set Dedicated Spare / Upgrade / Disk Scrub / Read Error Cleared / Turn [<u>on</u>   off] the Indication LED / More information</p>
	RAID Groups	<p>Show RAID size in: &lt; <u>(GB)</u>   (MB) &gt; Create</p> <p><b>Options:</b> Migrate RAID Level / Move RAID Level / Activate / Deactivate / Verify Parity / Delete / Change Preferred Controller / Change RAID Options / Add RAID Set / More information</p> <p><b>RAID Set options:</b> Remove / Move RAID Level / List Disks</p> <p>RAID Group Policy options: Delete / Change RAID Options</p>
	Virtual Disks	<p>Create / Cloning Options</p> <p><b>Options:</b> Extend / Set SSD Caching / Verify Parity / Delete / Set Properties / Space Reclamation / Attach LUN / Detach LUNs / List LUNs / Set Clone / Set Snapshot Space / Cleanup Snapshots / Take a Snapshot / Scheduled Snapshots / List Snapshots / More information</p>
	Snapshots	<p>Set Snapshot Space / Scheduled Snapshots / Take a Snapshot / Cleanup Snapshots</p> <p><b>Options:</b> Set Quota / Rollback / Delete</p>
	Logical Units	<p>Attach LUN</p> <p><b>Options:</b> Detach LUN</p>

Menu Bar	L1	L2, Button or Menu
Enclosure Management	Hardware Monitor	Show information for: < <u>-Local-</u>   -JBODn- > Temperature (Internal)/(Case): < ( <u>C</u> ) / (F) > Controller 1 Monitors / Controller 2 Monitors / Backplane <b>Options:</b> Auto Shutdown
	UPS	UPS Type / Shutdown Battery Level (%) / Shutdown Delay (Seconds) / Shutdown UPS / UPS Status / UPS Battery Level
	SES	[ <u>E</u> nable   Disable]
	S.M.A.R.T.	Show information for: < <u>-Local-</u>   -JBODn- > Temperature (Internal)/(Case): < ( <u>C</u> ) / (F) >
System Maintenance	System information	Download System Information
	Event log	Event Log Level to Show: < Information   Warning   Error > Download / Mute Buzzer / Clear
	Upgrade	Controller Module Firmware Update / JBOD Firmware Update / Controller Mode / SSD Caching License
	Reset to Factory Default	Reset
	Configuration Backup	Import or Export / Import File
	Volume Restoration	<b>Options:</b> Restore
	Reboot and Shutdown	Reboot / Shutdown
Quick Installation		Step 1 / Step 2 / Step 3 / Step 4 / Confirm
Volume Creation Wizard		Step 1 / Step 2 / Step 3 / Confirm

## 5.2 System Configuration

The **System Configuration** menu option is for accessing the **System Settings**, **Network Settings**, **Login Settings**, **Email Notification Settings** and **Log and Alert Settings** option tabs.



**Figure 5-1**

### 5.2.1 System Settings

The **System Settings** tab is used to set up the system name and date. The default system name is composed of the model name and the serial number of this system.

**Change General System Settings**  
On this screen you can change the name of the device, set the current date and time manually or automatically using an NTP (Network Time Protocol) server, and identify the device by flashing an indicator.

**System Name**  
System Name: GV-StorageV2-CD8A60

**Date and Time**  
☐ **Change Date and Time**  
Current Time: 2014/11/18 16:21:2  
Time Zone: (GMT+08:00) Taipei  
☒ **Setup Date and Time Manually**  
Date: 2014 / 11 / 18  
Time: 16 : 18 : 40  
☐ **NTP**  
Server:

**System Identification**  
Flash the status light on the front display.

**Figure 5-2**

The options are available on this tab:

- **System Name:** Change the **System Name**, highlight the old name and type in a new one.
- **Date and Time:** Change the current date, time and time zone settings. The changes can be done manually or synchronized from an NTP (Network Time Protocol) server.
- **System Identification:** Click **OK** to flash the status light to locate the storage system in the racks. To stop flashing the status light, click **Stop**.

When it is done, click **Apply**.

## 5.2.2 Network Settings

The **Network Settings** tab is used to view the MAC address and change basic network settings.

Quick Installation

Step 2: Network Settings

MAC Address	
MAC Address:	00:13:78:CD:8A:60

Address	
<input type="radio"/> Use DHCP	
<input type="radio"/> Use BOOTP	
<input checked="" type="radio"/> Specify a Static IP Address	
IP Address:	192.168.0.199
Subnet Mask:	255.255.252.0
Gateway:	192.168.0.1

DNS Server Address	
Address:	192.168.0.1

Service Ports	
HTTP Port:	80
HTTPS Port:	443
SSH Port:	22

<< Back      Next >>      Cancel

**Figure 5-3**

The options are available on this tab:

- **MAC Address:** Display the MAC address of the management port in the system.
- **IP Address:** The option can change IP address for remote administration usage. There are three options: **DHCP**, **BOOTP** and **Specify a Static IP Address**. The default setting is Specify a Static IP Address.
- **DNS Server Address:** If necessary, the IP address of DNS server can be typed or changed here.
- **Service Ports:** If the default port numbers of HTTP, HTTPS and SSH are not allowed on the network, they can be changed here.

When it is done, click **Apply**.

### 5.2.3 Login Settings

The **Login Settings** tab is used to control access to the storage system. For the security reason, set the auto logout option or set the limit access of one administrator at a time. The other options can change the Admin and User passwords.

**Change Login Options and Passwords**  
 When the auto logout option is enabled, you will be logged out of the admin interface after the time specified. The login lock option prevents multiple people from administering the storage server at the same time.

**Login Options**

**Auto Logout:**

- Disable -

**Login Lock:**

- Disable -

**Admin Password**

☐ **Change Admin Password**  

**Current Password:**

**New Password:**

**Re-type New Password:**

**User Password**

☐ **Change User Password**  

**New Password:**

**Re-type New Password:**

Apply

**Figure 5-4**

The options are available on this tab:

- **Auto Logout:** When the auto logout option is enabled, you will be logged out of the admin interface after the time specified. There are Disable (default), 5 minutes, 30 minutes and 1 hour options.
- **Login Lock:** When the login lock is enabled, the system allows only one user to login to the Web UI at a time. There are Disable (default) and Enable options.
- **Change Admin Password:** Check it to change administrator password. The maximum length of password is 12 alphanumeric characters.
- **Change User Password:** Check it to change user password. The maximum length of password is 12 alphanumeric characters.

When it is done, click **Apply**.



### 5.2.4 Email Notification Settings

The **Email Notification Settings** tab is used to configure up to three email addresses for receiving the event notifications. Fill in the necessary fields and click **Send Test Email** to test whether it is available. Some email servers will check the mail-from address and need the SMTP relay settings for authentication.



**Tip:** Please make sure the DNS server IP is well set up in **System Configuration** → **Network Settings**. So the event notification emails can be sent successfully.

You can also select which levels of event logs which you would like to receive. The default setting only includes **Warning** and **Error** event logs.

**Configure Email Notification Settings**  
 You can specify up to three email addresses for email notifications. You should use the SMTP server option to specify a specific email server that you would like to use for sending email notifications (required if your network will not allow this device to send the email directly).  
 After the information is set, you can click 'Send test mail' to test whether email functions are available.

Email Settings	
<b>From Email Address:</b>	mailman@GV-StorageV2.com
<b>To Email Address #1:</b>	
<b>Alert Levels To Send1:</b>	<input type="checkbox"/> Information <input checked="" type="checkbox"/> Warning <input checked="" type="checkbox"/> Error
<b>To Email Address #2:</b>	
<b>Alert Levels To Send2:</b>	<input type="checkbox"/> Information <input checked="" type="checkbox"/> Warning <input checked="" type="checkbox"/> Error
<b>To Email Address #3:</b>	
<b>Alert Levels To Send3:</b>	<input type="checkbox"/> Information <input checked="" type="checkbox"/> Warning <input checked="" type="checkbox"/> Error
<input type="checkbox"/> Specify a SMTP Server ▾	
SMTP Server Address:	
Use Authentication:	No ▾
User Name:	
Password:	
Re-type Password:	
Send Test Email	

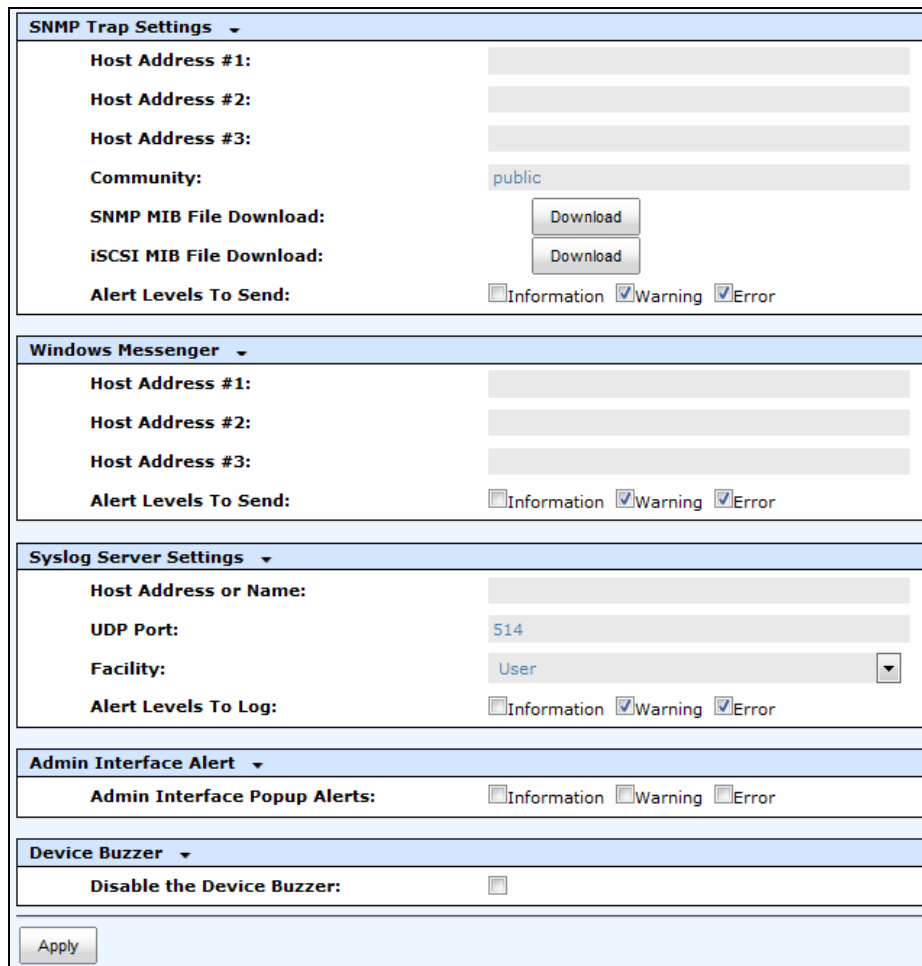
Apply

**Figure 5-5**

When it is done, click **Apply**.

## 5.2.5 Log and Alert Settings

The **Log and Alert Settings** tab is used to set up SNMP traps (for alerting via SNMP), pop-up messages via Windows messenger (not MSN or Skype), alerts via the syslog protocol, the pop-up alerts and alerts on the front display. The device buzzer is also managed here.



**SNMP Trap Settings**

Host Address #1:

Host Address #2:

Host Address #3:

Community:

SNMP MIB File Download:

iSCSI MIB File Download:

Alert Levels To Send: ☐ Information ☒ Warning ☒ Error

---

**Windows Messenger**

Host Address #1:

Host Address #2:

Host Address #3:

Alert Levels To Send: ☐ Information ☒ Warning ☒ Error

---

**Syslog Server Settings**

Host Address or Name:

UDP Port:

Facility:

Alert Levels To Log: ☐ Information ☒ Warning ☒ Error

---

**Admin Interface Alert**

Admin Interface Popup Alerts: ☐ Information ☐ Warning ☐ Error

---

**Device Buzzer**

Disable the Device Buzzer: ☐

**Figure 5-6**

The options are available on this tab:

- **SNMP Trap Settings:** It allows up to three SNMP trap addresses. The default community setting is public. You can check the alert levels which you would like to receive. The default setting only includes **Warning** and **Error** event logs. If necessary, click **Download** to get the MIB file for importing to the SNMP client tool.

There are many SNMP tools available on the Internet.

- SNMPc: <http://www.snmpc.com/>
- Net-SNMP: <http://net-snmp.sourceforge.net/>

- **Windows Messenger:** You must enable the Messenger service in Windows (**Start → Control Panel → Administrative Tools → Services → Messenger**). It allows up to three host addresses. The same, you can check the alert levels which you would like to receive.
- **System Server Settings:** Fill in the host address and the facility for syslog service. The default UDP port is 514. You can also check the alert levels here.

There are some syslog server tools available on the Internet for Windows.

- WinSyslog: <http://www.winsyslog.com/>
- Kiwi Syslog Daemon: <http://www.kiwisyslog.com/>

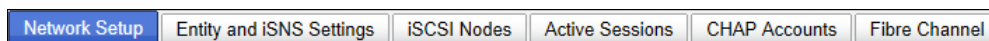
Most UNIX systems build in syslog daemon.

- **Admin Interface Alert:** You can check the alert levels which you would like to have pop-up message in the Web UI.
- **Device Buzzer:** Check it to disable the device buzzer. Uncheck it to activate the device buzzer.

When it is done, click **Apply**.

## 5.3 Host Port / iSCSI Configuration

The **Host port / iSCSI Configuration** menu option is for accessing the **Network Setup**, **Entity and iSNS Settings**, **iSCSI Nodes**, **Active Sessions**, **CHAP Account** option tabs.



*Figure 5-7*

### 5.3.1 Network Setup

The **Network Setup** tab is used to change IP addresses of 6 GbE iSCSI data ports. These network ports must be assigned IP addresses then they can be used. For better performance or fault tolerance reason, they can be bonding as Trunking or LACP. These bonding network ports share a single IP address.

Network Setup	Entity and iSNS Settings			iSCSI Nodes	Active Sessions	CHAP Accounts					
	Name	LAG	LAG No	VLAN ID	Use DHCP	IP Address	Netmask	Gateway	Jumbo Frames	MAC Address	Link
▼	LAN1	No	N/A	N/A	Yes	192.168.1.1	255.255.255.0	192.168.0.1	Disabled	00:13:78:cd:8a:62	1 Gbps
▼	LAN2	No	N/A	N/A	No	192.168.2.1	255.255.255.0	192.168.2.254	Disabled	00:13:78:cd:8a:63	Down
▼	LAN3	No	N/A	N/A	No	192.168.3.1	255.255.255.0	192.168.3.254	Disabled	00:13:78:cd:8a:64	Down
▼	LAN4	No	N/A	N/A	No	192.168.4.1	255.255.255.0	192.168.4.254	Disabled	00:13:78:cd:8a:65	Down
▼	LAN5	No	N/A	N/A	No	192.168.5.1	255.255.255.0	192.168.5.254	Disabled	00:13:78:cd:8a:66	Down
▼	LAN6	No	N/A	N/A	No	192.168.6.1	255.255.255.0	192.168.6.254	Disabled	00:13:78:cd:8a:67	Down

iSCSI Bonding Settings  
Set VLAN ID  
iSCSI IP Address Settings  
Make Default Gateway  
Enable Jumbo Frames  
Ping Host  
Reset Port

**Figure 5-8**

This figure shows six iSCSI data ports. These data ports are set up with a static IP address.

The options are available on this tab:

- ▼ → **iSCSI Bonding Settings:** The default mode of each iSCSI data port is individually connected without any bonding. Trunking and LACP (Link Aggregation Control Protocol) settings can be set up here. At least two iSCSI data ports must be checked for iSCSI bonding.

**Network Bonding Settings**  
Select the network interfaces that you would like to bond together.

**Bonding Method:** ☒ Trunking ☐ LACP

**IP Address:** 192.168.6.1

**Subnet Mask:** 255.255.255.0

**Gateway:** 192.168.6.254

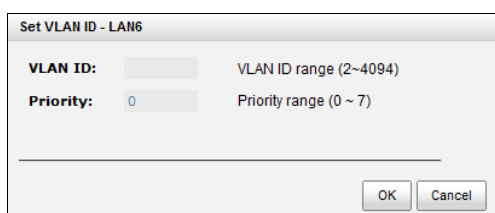
**Network Setup:** ☐ LAN1 ☐ LAN2 ☐ LAN3 ☐ LAN4 ☐ LAN5 ☐ LAN6

OK Cancel

**Figure 5-9**

- **Trunking:** Configures multiple iSCSI ports to be grouped together into one in order to increase the connection speed beyond the limit of a single iSCSI port.
- **LACP:** The Link Aggregation Control Protocol is part of IEEE specification 802.3ad that allows bonding several physical ports together to form a single logical channel. LACP allows a network switch to negotiate an automatic bundle by sending LACP packets to the peer. The advantages of LACP are that it increases bandwidth usage and it automatically performs a failover when the link status fails on a port.

- ▼ → **Set VLAN ID:** VLAN is a logical grouping mechanism implemented on switch device. VLANs are collections of switching ports that comprise a single broadcast domain. It allows network traffic to flow more efficiently within these logical subgroups. Please consult your network switch user manual for VLAN setting instructions. Most of the work is done at the switch part. All you need to do is to make sure that your iSCSI port's VLAN ID matches that of switch port. If your network environment supports VLAN, you can use this function to change the configurations. Fill in VLAN ID and Priority settings to enable VLAN.



The dialog box titled "Set VLAN ID - LAN6" contains two input fields. The first is labeled "VLAN ID:" with a text box next to it, and to its right is the text "VLAN ID range (2~4094)". The second is labeled "Priority:" with a text box containing the value "0", and to its right is the text "Priority range (0 ~ 7)". At the bottom right of the dialog are "OK" and "Cancel" buttons.

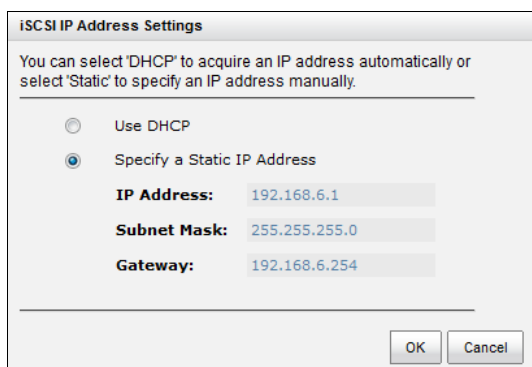
**Figure 5-10**

- **VLAN ID:** VLAN ID is a 12-bit number. Its range is from 2 to 4094, while 0, 1, and 4095 are reserved for special purposes.
- **Priority:** The PCP (Priority Code Point) is a 3-bit number and reserved for QoS. The definition complies with IEEE 802.1p protocol, ranging from 0 to 7, with 0 as the default value. In normal cases, you don't need to set this value. Using the default will do just fine.



**Tip:** If iSCSI ports are assigned with VLAN ID before creating aggregation takes place, aggregation will remove VLAN ID. You need to repeat the steps to set VLAN ID for the aggregation group.

- ▼ → **iSCSI IP Address Settings:** It can assign an iSCSI IP address of the iSCSI data port. There are two options: **Use DHCP** to acquire an IP address automatically or **Specify a Static IP Address** to set the IP address manually.



The dialog box titled "iSCSI IP Address Settings" contains a message: "You can select 'DHCP' to acquire an IP address automatically or select 'Static' to specify an IP address manually." Below this are two radio buttons. The first is "Use DHCP" and is unselected. The second is "Specify a Static IP Address" and is selected. Below the radio buttons are three text boxes: "IP Address:" with the value "192.168.6.1", "Subnet Mask:" with the value "255.255.255.0", and "Gateway:" with the value "192.168.6.254". At the bottom right are "OK" and "Cancel" buttons.

**Figure 5-11**

- ▼ → **Make Default Gateway:** Set the gateway of the IP address as default gateway. There can be only one default gateway. To remove the default gateway, click ▼ → **Remove Default Gateway.**
- ▼ → **Enable jumbo frames:** It can enable the MTU (Maximum Transmission Unit) size. The maximum jumbo frame size is **3900** bytes. To disable jumbo frames, click ▼ → **Disable Jumbo Frames.**



**Caution:** VLAN ID, jumbo frames for both the switching hub and HBA on host must be enabled. Otherwise, the LAN connection cannot work properly.

---

- ▼ → **Ping host:** It can verify the port connection from a target to the corresponding host data port. Input the host's IP address and click **Start**. The system will display the ping result. Or click **Stop** to stop the test.



The screenshot shows a dialog box titled "Please input the host's IP address:". It contains a text input field with the IP address "192.168.5.3" entered. To the right of the input field are two buttons: "Start" and "Stop". Below the input field is a large, empty rectangular area, likely intended for displaying the ping results. The dialog box has a standard Windows-style border with a title bar.

**Figure 5-12**

- ▼ → **Reset Port:** If the behavior of the port is abnormal, try to reset port to make it normal.

### 5.3.2 Entity and iSCSI Settings

The **Entity and iSCSI Settings** tab is used to view the entity name of the system, and set up iSNS IP for the iSNS (Internet Storage Name Service) protocol. It allows automated discovery, management and configuration of iSCSI devices on a TCP/IP network. To use iSNS, an iSNS server needs to be added to the SAN. When this is done, the iSNS server IP address must be added to the storage system for iSCSI initiator service to send queries to it.

**Entity Name and iSNS Configuration Information**  
 The entity name is for a device or gateway that is accessible from the network. The iSNS protocol allows automated discovery, management, and configuration of iSCSI devices on a network. Enter the required information below to use iSNS with this device.

**Entity Name:**

**iSNS IP Address:**

Figure 5-13

To make changes, type the **Entity Name** and the **iSNS IP Address**, and then click **Apply**.

### 5.3.3 iSCSI Nodes

The **iSCSI Nodes** tab is used to view the target name for iSCSI initiator. GV-Storage System V2 has up to 32 multiple nodes.

<< first < prev 1 2 3 next > last >>					
	ID	Auth	Node Name	Portal	Alias
▼	0	None	iqn.2004-10.geovision:storagesystem-000cd8a60:dev0	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	
▼	1	None	iqn.2004-10.geovision:storagesystem-000cd8a60:dev1	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	
▼	2	None	iqn.2004-10.geovision:storagesystem-000cd8a60:dev2	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	
▼	3	None	iqn.2004-10.geovision:storagesystem-000cd8a60:dev3	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	
▼	4	None	iqn.2004-10.geovision:storagesystem-000cd8a60:dev4	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	
▼	5	None	iqn.2004-10.geovision:storagesystem-000cd8a60:dev5	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	
▼	6	None	iqn.2004-10.geovision:storagesystem-000cd8a60:dev6	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	
▼	7	None	iqn.2004-10.geovision:storagesystem-000cd8a60:dev7	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	
▼	8	None	iqn.2004-10.geovision:storagesystem-000cd8a60:dev8	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	
▼	9	None	iqn.2004-10.geovision:storagesystem-000cd8a60:dev9	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	
▼	10	None	iqn.2004-10.geovision:storagesystem-000cd8a60:dev10	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	
▼	11	None	iqn.2004-10.geovision:storagesystem-000cd8a60:dev11	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	
<< first < prev 1 2 3 next > last >>					

Figure 5-14

The options are available on this tab:

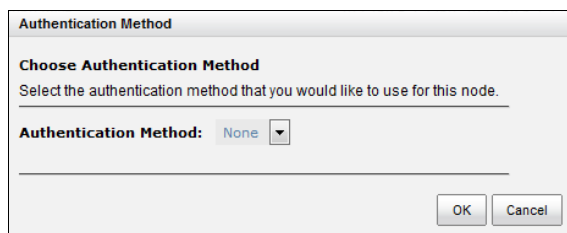
- ▼ → **Authentication Method**: CHAP (Challenge Handshake Authentication Protocol) is a strong authentication method used in point-to-point for user login. It's a type of authentication in which the authentication server sends the client a key to be used for encrypting the username and password. CHAP enables the username and password to transmit in an encrypted form for protection.



**Tip:** A CHAP account must be added before you can use this authentication method. Please refer to **CHAP Accounts** session to create an account if none exists.

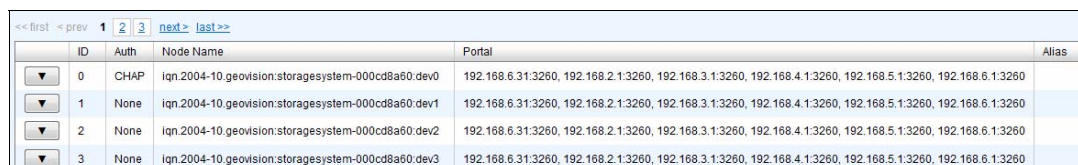
To use CHAP authentication, please follow the procedures.

- Select one of nodes from one controller.
- Click ▼ → **Authentication Method**.
- Select **CHAP** from the drop-down list.



**Figure 5-15**

- Click **OK**.



ID	Auth	Node Name	Portal	Alias
0	CHAP	iqn.2004-10.geovision:storagesystem-000cd8a60:dev0	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	
1	None	iqn.2004-10.geovision:storagesystem-000cd8a60:dev1	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	
2	None	iqn.2004-10.geovision:storagesystem-000cd8a60:dev2	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	
3	None	iqn.2004-10.geovision:storagesystem-000cd8a60:dev3	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	

**Figure 5-16**

- Click ▼ → **Users**.
- Select CHAP user(s) which will be used. It can be more than one, but it must be at least one CHAP to enable on the node.



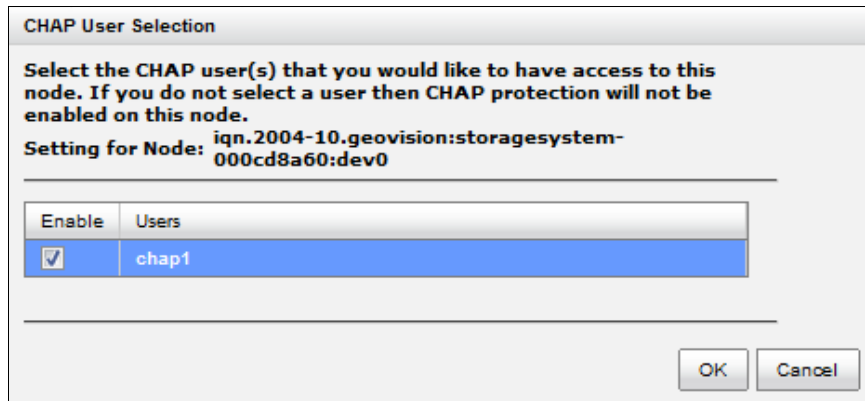


Figure 5-17

- Click **OK**.

To disable CHAP authentication, please follow the procedures.

- Select the node which wants to disable CHAP.
- Click ▼ → **Authentication Method**.
- Change it to **None** from the drop-down list.
- Click **OK**.
- ▼ → **Change Portal**: Use this iSCSI node option to change the network ports available.
  - Select one of nodes from one controller.
  - Click ▼ → **Change Portal**.
  - Select the network ports that you would like to be available for this iSCSI node.

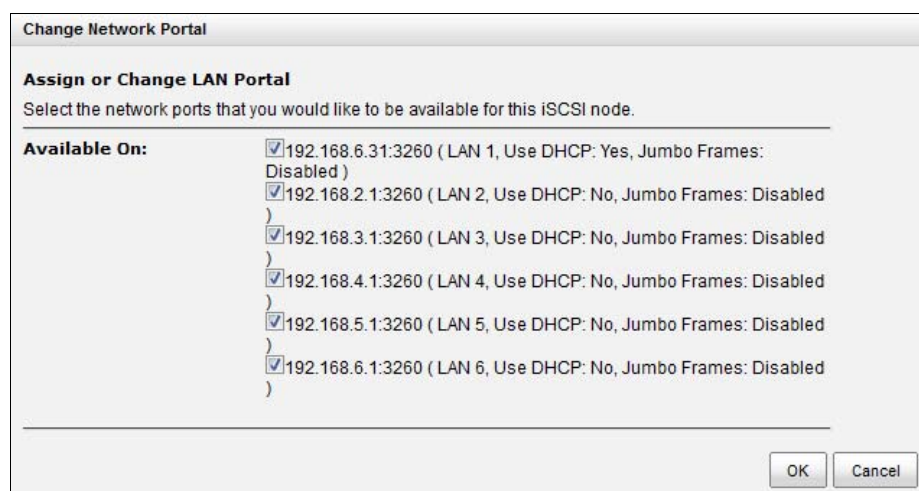
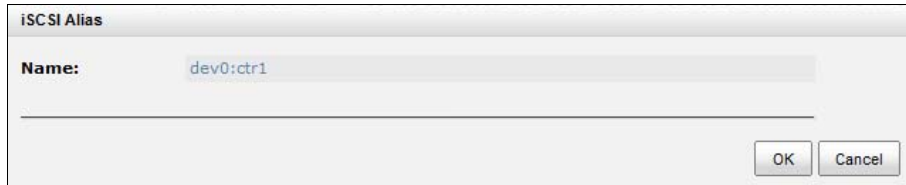


Figure 5-18

- Click **OK**.

- ▼ → **Rename Alias**: Use this option to add or change iSCSI alias.
  - Select one of nodes from one controller.
  - Click ▼ → **Rename Alias**.
  - Type the Alias Name. Leave it empty to remove the alias.
  - Click **OK**.



The dialog box titled "iSCSI Alias" has a "Name:" label followed by a text input field containing "dev0:ctr1". At the bottom right, there are "OK" and "Cancel" buttons.

**Figure 5-19**

After creating an alias, it is displayed at the end of the portal information.

<< first < prev 1 2 3 next > last >>					
	ID	Auth	Node Name	Portal	Alias
▼	0	CHAP	iqn.2004-10.geovision.storagesystem-000cd8a60.dev0	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	dev0.ctr1
▼	1	None	iqn.2004-10.geovision.storagesystem-000cd8a60.dev1	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	
▼	2	None	iqn.2004-10.geovision.storagesystem-000cd8a60.dev2	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	
▼	3	None	iqn.2004-10.geovision.storagesystem-000cd8a60.dev3	192.168.6.31:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260, 192.168.5.1:3260, 192.168.6.1:3260	

**Figure 5-20**



**Tip:** After setting CHAP, the host initiator should be set with the same CHAP account. Otherwise, the host cannot connect to the volume.

### 5.3.4 Active Sessions

The **Active Session** tab is used to display all currently active iSCSI sessions and their connection information. GV-Storage System V2 has up to 256 sessions.

No.	TSIH	Initiator Name	Target Name	InitialR2T	Immed. Data	MaxOutR2T	MaxDataBurstLen	DataSeqInOrder	DataPDUInOrder
0	0x0101	geovision.com	iqn.2004-10.geovision.storage:system-000c05a50.dev0	Yes	Yes	1	262144	Yes	Yes

Connection Details  
Disconnected

**Figure 5-21**

This table shows the column descriptions. Most of the options are standard parameters used in the negotiation between the initiator and target when an iSCSI connection is created.

Column Name	Description
TSIH	TSIH (Target Session Identifying Handle) is used for this active session.
Initiator Name	It displays the host computer name.
Target Name	It displays the controller name.
InitialR2T	InitialR2T (Initial Ready to Transfer) is used to turn off either the use of a unidirectional R2T command or the output part of a bidirectional command. The default value is Yes.
Immed. data	Immed. data (Immediate Data) sets the support for immediate data between the initiator and the target. Both must be set to the same setting. The default value is Yes.
MaxDataOutR2T	MaxDataOutR2T (Maximum Data Outstanding Ready to Transfer) determines the maximum number of outstanding ready to transfer per task. The default value is 1.
MaxDataBurstLen	MaxDataBurstLen (Maximum Data Burst Length) determines the maximum SCSI data payload. The default value is 256kb.
DataSeqInOrder	DataSeqInOrder (Data Sequence in Order) determines if the PDU (Protocol Data Units) are transferred in continuously non-decreasing sequence offsets. The default value is Yes.
DataPDU InOrder	DataPDU InOrder (Data PDU in Order) determines if the data PDUs within sequences are to be in order and overlays forbidden. The default value is Yes.

The options are available on this tab:

- ▼ → **Connection Details:** It can list all connection(s) of the selected session.

Connection					
No.	Initiator IP	Initiator Name	MaxRecvDataSegLen	MaxTransDataSegLen	Authentication
1	192.168.5.3	geovision.com	16384	65536	No

**Figure 5-22**

- ▼ → **Disconnect:** Disconnect the selected session, click **OK** to confirm.

### 5.3.5 CHAP Accounts

The **CHAP Account** tab is used to manage the CHAP accounts on the system.

The options are available on this tab:

- Create User:** Create a CHAP user.

Create

Create a CHAP User

Enter the required information below to create a new CHAP user. If you would like this CHAP user to have access to more than one node, then you can use the control key (Windows and Linux) or the command key (Mac) to select multiple nodes.

User Name:

chap1

(Max: 223)

Secret:

.....

(Min: 12, Max: 16)

Re-type Secret:

.....

(Min: 12, Max: 16)

Nodes:

0

1

2

3

4

5

6

7

8

9

OK

Cancel

**Figure 5-23**

- Type the required information for **User Name**, **Secret**, and **Re-type Secret**.
- If you would like this CHAP user to have access, select one or multiple nodes. If selecting none, you can add it later by **iSCSI Configuration → iSCSI Nodes → Users**.
- Click **OK**.

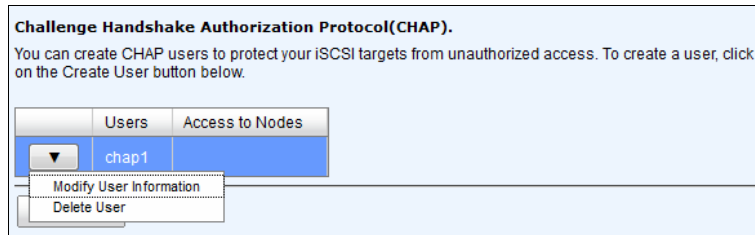


Figure 5-24

- ▼ → **Modify User Information:** Modify the selected CHAP user information.
- ▼ → **Delete User:** Delete the selected CHAP user.

## 5.4 Volume Configuration

The **Volume configuration** menu option is for accessing the **Physical Disks**, **RAID Groups**, **Virtual Disks**, **Snapshots**, and **Logical Units** option tabs.



Figure 5-25

### 5.4.1 Physical Disks

The **Physical Disks** tab provides the status of the hard drives in the system. The two drop-down lists at the top enable you to switch between the local system and any expansion JBOD systems attached. The other is to change the drive size units (MB or GB).

Show disk for: Local Show disk size in: GB

<< first < prev 1 2 next > last >>

	Slot	Size (GB)	RAID Group	Status	Health	Usage	Vendor	Serial Number	Rate	Write Cache	Standby	Read-ahead	Command Queuing
▼	1	931	V-1	Online	Good	RAID	WDC	WD-WCAW3FPH2VX1	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	2	931	V-1	Online	Good	RAID	WDC	WD-WCAW3FPH2251	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	3	931	V-1	Online	Good	RAID	WDC	WD-WCAW34VZV5PX	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	4	931	V-1	Online	Good	RAID	WDC	WD-WCAW3LV0J2C	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	5	931	V-2	Online	Good	RAID	WDC	WD-WCAW34VZVD4H	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	6	931	V-2	Online	Good	RAID	WDC	WD-WCAW36887660	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	7	931	V-2	Online	Good	RAID	WDC	WD-WCAW3FPH2Z44	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	8	931	V-2	Online	Good	RAID	WDC	WD-WCAW36887551	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	9	931	V-3	Online	Good	RAID	WDC	WD-WCAW3LV05U5	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	10	931	V-3	Online	Good	RAID	WDC	WD-WCAW3LV08DC	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	11	931	V-3	Online	Good	RAID	WDC	WD-WCAW34VZVTLH	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	12	931	V-3	Online	Good	RAID	WDC	WD-WCAW3LV0LKH	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	13	931	V-4	Online	Good	RAID	WDC	WD-WCAW34VZVXL9	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	14	931	V-4	Online	Good	RAID	WDC	WD-WCAW34VZVJ7K	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	15	931	V-4	Online	Good	RAID	WDC	WD-WCAW3LV08NTS	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	16	931	V-4	Online	Good	RAID	WDC	WD-WCAW34VZVPRH	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled

<< first < prev 1 2 next > last >>

Disk Health Check Disk Check Report

Figure 5-26

This table shows the column descriptions.

Column Name	Description
Slot	The position of a hard drive. The button next to the number of slot shows the functions which can be executed.
Size (GB) or (MB)	Capacity of hard drive. The unit can be displayed in GB or MB.
RAID Group	RAID group name.
RAID Set	The number of RAID Set: N/A: The RAID group is traditional provisioning. Number: The RAID group is the number of RAID set of thin provisioning.
Virtual Disk	Virtual disk name for SSD caching.
Status	The status of the hard drive: Online: The hard drive is online. Rebuilding: The hard drive is being rebuilt. Transitioning: The hard drive is being migrated or is replaced by another disk when rebuilding occurs. Scrubbing: The hard drive is being scrubbed.
Health	The health of the hard drive: Good: The hard drive is good. Failed: The hard drive is failed. Error Alert: S.M.A.R.T. error alerts. Read Errors: The hard drive has unrecoverable read errors.
Usage	The usage of the hard drive: RAID: This hard drive has been set to a RAID group. Free: This hard drive is free for use. Dedicated Spare: This hard drive has been set as dedicated spare of a RAID group. Local Spare: This hard drive has been set as local spare of the enclosure. Global Spare: This hard drive has been set as global spare of whole system.

Column Name	Description
Vendor	Hard drive vendor.
Serial Number	Hard drive serial number.
Rate	Hard drive rate: SAS 6.0 Gb/s. SAS 3.0 Gb/s. SATA 6.0 Gb/s. SATA 3.0 Gb/s. SATA 1.5 Gb/s. SAS SSD 6.0 Gb/s. SATA SSD 6.0 Gb/s.
Write Cache	Hard drive write cache is enabled or disabled. The default value is Enabled.
Standby	HDD auto spindown to save power. The default value is Disabled.
Read-Ahead	This feature makes data be loaded to disk's buffer in advance for further use. The default value is Enabled.
Command Queuing	Newer SATA and most SCSI disks can queue multiple commands and handle one by one. The default value is Enabled.

The options are available on this tab:

- **Disk Health Check:** Check the health of the selected disks. It cannot check the disks which are in used.



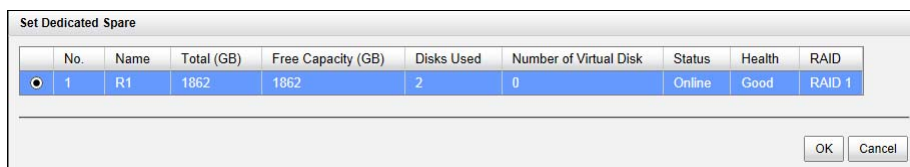
**Figure 5-27**

- **Disk Check Report:** Download the disk check report. It's available after executing Disk Health Check.
- ▼ → **Set Free Disk:** Make the selected hard drive be free for use.
- ▼ → **Set Global Spare:** Set the selected hard drive to global spare of all RIAD groups.

- ▼ → **Set Local Spare**: Set the selected hard drive to local spare of the RAID groups which locates in the same enclosure.
- ▼ → **Set Dedicated Spare**: Set a hard drive to dedicated spare of the selected RAID group.
- ▼ → **Upgrade**: Upgrade the firmware of the hard drive.
- ▼ → **Disk Scrub**: Scrub the hard drive. It's not available when the hard drive is in used.
- ▼ → **Read Error Cleared**: Clean the read error of the hard drive.
- ▼ → **Turn on/off the indication LED**: Turn on the indication LED of the hard drive. Click again to turn off.
- ▼ → **More information**: Display hard drive detail information.

Take an example to set the physical disk to dedicated spare disk.

1. Check ▼ → **Set Dedicated Spare** at one free physical disk.



**Figure 5-28**

2. If there is any RAID group which is in protected RAID level and can be set with dedicate spare disk, select one RAID group, and then click **OK**.



**Tip:** In GV-Storage System V2, the maximum number of physical drives in a system is 192.



### 5.4.2 RAID Groups

The **RAID Groups** tab provides to create, modify, delete, or view the status of the RAID groups. Use the drop-down list at the top to change the drive size units (MB or GB).

Select the traditional RAID group, it displays on the following.

Show RAID size in: GB ▼								
	Name	Total (GB)	Free Capacity (GB)	Disks Used	Number of Virtual Disk	Status	Health	RAID
▼	J-1	2793	0	4	1	Online	Good	RAID 5
▼	J-2	2793	0	4	3	Online	Good	RAID 5
▼	QUICK16818	931	0	1	1	Online	Good	RAID 0
▼	V-1	2793	0	4	1	Online	Good	RAID 5
▼	V-2	2793	0	4	1	Online	Good	RAID 5
▼	V-3	2793	0	4	1	Online	Good	RAID 5
▼	V-4	2793	0	4	1	Online	Good	RAID 5
▼	V-5	2793	2793	2	0	Online	Failed	RAID 0
Create								

**Figure 5-29**

This table shows the column descriptions.

Column Name	Description
Name	RAID group name.
Total (GB) or (MB)	Total capacity of the RAID group. The unit can be displayed in GB or MB.
Free Capacity (GB) or (MB)	Free capacity of the RAID group. The unit can be displayed in GB or MB.
Available Size (GB) or (MB)	Available capacity of the RAID group. The unit can be displayed in GB or MB.
Thin Provisioning	The status of Thin provisioning: Disabled. Enabled.
Disks Uses	The number of physical disks in the RAID group.
Number of Virtual Disk	The number of virtual disks in the RAID group.

Column Name	Description
Status	<p>The status of the RAID group:</p> <p>Online: the RAID group is online.</p> <p>Offline: the RAID group is offline.</p> <p>Rebuilding: the RAID group is being rebuilt.</p> <p>Migrating: the RAID group is being migrated.</p> <p>Scrubbing: the RAID group is being scrubbed.</p>
Health	<p>The health of the RAID group:</p> <p>Good: the RAID group is good.</p> <p>Failed: the RAID group fails.</p> <p>Degraded: the RAID group is not healthy and not completed.</p> <p>The reason could be lack of disk(s) or have failed disk</p>
RAID	The RAID level of the RAID group.

The options are available on this tab:

- **Create:** Create a RAID group.



**Caution:** For safety and performance, it is highly suggested to create RAID 5 with 4 drives for each host.

The options are available after creating a RAID group:

- **▼ → Migrate RAID Level:** Change the RAID level of a RAID group. Please refer to next chapter for details.
- **▼ → Move RAID Level:** Move the member disks of RAID group to totally different physical disks.
- **▼ → Activate/Deactivate:** Activate or deactivate the RAID group after disk roaming. Activate can be executed when the RAID group status is offline. Conversely, Deactivate can be executed when the status is online. These are for online disk roaming purpose.
- **▼ → Verify Parity:** Regenerate parity for the RAID group. It supports the RAID level 3 / 5 / 6 / 30 / 50 / 60.
- **▼ → Delete:** Delete the RAID group.
- **▼ → Change RAID Options:** Change the RAID property options.
  - Write Cache:

- ✓ Enabled: When the write cache is enabled, data transfer operations are written to fast cache memory instead of being written directly to disk. This may improve performance but may take the data lost risk when losing power if there is no BBM protection.
- ✓ Disabled: Disable disk write cache. (Default)
- Standby:
  - ✓ Disabled: Disable auto spin down. (Default)
  - ✓ 30 sec / 1 min / 5 min / 30 min: The hard drives will be spun down for power saving when the disk is idle for the period of time specified.
- Read-Ahead:
  - ✓ Enabled: The system will discern what data will be needed next based on what was just retrieved from disk and then preload this data into the disks buffer. This feature will improve performance when the data being retrieved is sequential. (Default)
  - ✓ Disabled: Disable disk read ahead.
- Command Queuing:
  - ✓ Enabled: Sends multiple commands at once to a disk to improve performance. (Default)
  - ✓ Disabled: Disable disk command queuing.
- ▼ → **More information:** Display RAID group detail information.

More Information

Physical Disk(s)

No.	Enc ID	Enc No.	Slot	WWN	Size (MB)	Size (GB)	RAID Group Name	RAID Set	Status	Health
1	1	2	1	2049001378cd8030	953613	931	J-1	N/A	Online	Good
2	1	2	2	202f001378cd8030	953613	931	J-1	N/A	Online	Good
3	1	2	3	2019001378cd8030	953613	931	J-1	N/A	Online	Good
4	1	2	4	2007001378cd8a60	953613	931	J-1	N/A	Online	Good

RAID Group(s)

No.	Name	Total (MB)	Total (GB)	Free Capacity (MB)	Free Capacity (GB)	Available Size (MB)	Available Size (GB)
1	J-1	2860839	2793	807	0	807	0

Virtual Disk(s)

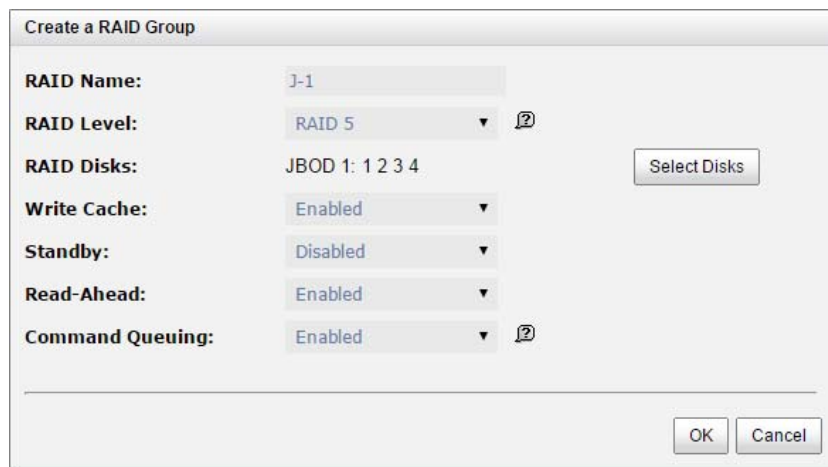
No.	Name	WWN	Size (MB)	Size (GB)	Target ID	Clone	Cache Mode	Priority	Bg Rate	Read Policy
1	JVD-1	2021001378cd8a60	2860032	2793	4294967295	N/A	WB	HI	4	Enabled

Close

Figure 5-30

Take an example of creating a RAID group.

1. Click the **Create**.



**Figure 5-31**

2. Type a **RAID Name** for the RAID group.
3. Select a **RAID Level** from the drop-down list.
4. Click the **Select Disks** to select disks from either local or expansion JBOD systems, and click **OK** to complete the selection. The selected disks are displayed at **RAID Disks**.
5. Optionally, configure the following:
  - **Write Cache:** It's to enable or disable the write cache option of hard drives. The default value is Disabled.
  - **Standby:** It's to enable or disable the auto spin down function of hard drives, when this option is enabled and hard drives have no I/O access after certain period of time, they will spin down automatically. The default value is Disabled.
  - **Read-Ahead:** It's to enable or disable the read ahead function. The default value is Enabled.
  - **Command Queuing:** It's to enable or disable the hard drives' command queue function. The default value is Enabled.
6. At the confirmation dialog, click **OK** to create the RAID group.



**Tip:** In GV-Storage System V2, the maximum number of physical drives in a RAID group is 64.

### 5.4.3 Virtual Disks

The **Virtual Disks** tab provides to create, modify, delete, or view the status of the virtual disk. Use the drop-down list at the top to change the drive size units (MB or GB).

Show disk size in: <span>GB</span>																
<< first < prev 1 next > last >>																
	Name	Size (GB)	Write	Priority	Bg Rate	Type	Clone	Schedule Clone	Status	Health	R %	RAID	LUN #	Snapshot Space (GB)	Snapshot #	RAID Group
▼	JVD-1	2793	WB	HI	4	RAID	N/A	N/A	Initializing	Optimal	83	RAID 5	0	0/0	0	J-1
▼	JVD-2	2793	WB	HI	4	RAID	N/A	N/A	Online	Optimal		RAID 5	1	0/0	0	V-1
▼	JVD-3	2793	WB	HI	4	RAID	N/A	N/A	Online	Optimal		RAID 5	1	0/0	0	V-2
▼	QUICK17218	931	WB	HI	4	RAID	N/A	N/A	Online	Optimal		RAID 0	1	0/0	0	QUICK16818
▼	V-3	2793	WB	HI	4	RAID	N/A	N/A	Online	Optimal		RAID 5	1	0/0	0	V-3
▼	V-4	2793	WB	HI	4	RAID	N/A	N/A	Online	Optimal		RAID 5	1	0/0	0	V-4
▼	V-777	793	WB	HI	4	RAID	N/A	N/A	Online	Optimal		RAID 5	0	0/0	0	J-2
▼	VJ-2	1000	WB	HI	4	RAID	N/A	N/A	Online	Optimal		RAID 5	0	1/1000	1	J-2
<< first < prev 1 next > last >>																
<div>Create Cloning Options</div>																

**Figure 5-32**

This table shows the column descriptions.

Column Name	Description
Name	Virtual disk name.
Size (GB) or (MB)	Total capacity of the virtual disk. The unit can be displayed in GB or MB.
Write	The right of virtual disk: WT: Write Through. WB: Write Back. RO: Read Only.
Priority	The priority of virtual disk: HI: High priority. MD: Middle priority. LO: Low priority.
Bg Rate	Background task priority: 4 / 3 / 2 / 1 / 0: Default value is 4. The higher number the background priority of a VD is, the more background I/O will be scheduled to execute.

Column Name	Description
Type	The type of the virtual disk: RAID: the virtual disk is normal. BACKUP: the virtual disk is for backup usage.
Clone	The clone target name of the virtual disk.
Schedule Clone	The clone schedule of the virtual disk.
Status	The status of the virtual disk: Online: The virtual disk is online. Offline: The virtual disk is offline. Initiating: The virtual disk is being initialized. Rebuilding: The virtual disk is being rebuilt. Migrating: The virtual disk is being migrated. Rollback: The virtual disk is being rolled back. Parity checking: The virtual disk is being parity check.
Health	The health of virtual disk: Optimal: the virtual disk is working well and there is no failed disk in the RG. Degraded: At least one disk from the RG of the Virtual disk is failed or plugged out. Failed: the RAID group disk of the VD has single or multiple failed disks than its RAID level can recover from data loss. Partially optimal: the virtual disk has experienced recoverable read errors. After passing parity check, the health will become Optimal.
R %	Ratio (%) of initializing or rebuilding.
RAID	RAID level.
LUN #	Number of LUN(s) that virtual disk is attached.
Snapshot space (GB) or (MB)	The virtual disk size that is used for snapshot. The number means Used snapshot space / Total snapshot space. The unit can be displayed in GB or MB.
Snapshot #	Number of snapshot(s) that have been taken.
RAID Group	The RAID group name of the virtual disk

The options are available on this tab:

- **Create:** Create a virtual disk for a host.
- **Cloning Options:** Set the clone options. Detail is described in chapter 5.

The options are available after creating a virtual disk:

- ▼ -> **Extend:** Extend the virtual disk capacity.
- ▼ -> **Verify Parity:** Execute parity check for the virtual disk. It supports RAID 3 / 5 / 6 / 30 / 50 / 60. The options are:
  - Verify and repair data inconsistencies.
  - Only verify for data inconsistencies. Stop verifying when 1 10 20 30 40 50 60 70 80 90 100 inconsistencies have been found.
- ▼ -> **Delete:** Delete the virtual disk.
- ▼ -> **Set Properties:** Change the virtual disk name, Cache mode, priority, bg rate and read ahead.
  - Cache Mode:
    - ✓ Write-through Cache: A caching technique in which the completion of a write request is not signaled until data is safely stored in non-volatile media. Each data is synchronized in both data cache and accessed physical disks.
    - ✓ Write-back Cache: A caching technique in which the completion of a write request is signaled as soon as the data is in cache and actual writing to non-volatile media occurs at a later time. It speeds up system write performance but needs to bear the risk where data may be inconsistent between data cache and the physical disks in one short time interval. (Default)
    - ✓ Read-Only: Set the volume to be read-only, any write request is forbidden.
  - Priority:
    - ✓ High Priority (Default)
    - ✓ Medium Priority.
    - ✓ Low Priority.
  - Bg Rate:
    - ✓ 4 / 3 / 2 / 1 / 0: Default value is 4. The higher number the background priority of a virtual disk has, the more background I/O will be scheduled to execute.
  - Read-Ahead:
    - ✓ Enabled: The system will discern what data will be needed next based on what was just retrieved from disk and then preload this data into the disks buffer.

This feature will improve performance when the data being retrieved is sequential. (Default)

- ✓ Disabled: Disable disk read ahead.
- AV-Media Mode:
  - ✓ Enabled: Enable AV-media mode for optimizing video editing.
  - ✓ Disabled: Disable AV-media mode. (Default)
- Type:
  - ✓ RAID: The virtual disk is normal. (Default)
  - ✓ Backup Target: The virtual disk is used for clone usage.
- ▼ -> **Space Reclamation**: Reclaim space for the virtual disk.
- ▼ -> **Attach LUN**: Attach a logical unit number to the virtual disk.
- ▼ -> **Detach LUNs**: Detach a logical unit number from the virtual disk.
- ▼ -> **List LUNs**: List all of the attached logical unit numbers.
- ▼ -> **Set Clone**: Set the target virtual disk for clone.
- ▼ -> **Clear Clone**: Clear the clone function.
- ▼ -> **Start Clone**: Start the clone function.
- ▼ -> **Stop Clone**: Stop the clone function.
- ▼ -> **Schedule Clone**: Set the clone function by schedule.
- ▼ -> **Set Snapshot Space**: Set snapshot space for preparing to take snapshots.
- ▼ -> **Cleanup Snapshots**: Clean all snapshots of the virtual disk and release the snapshot space.
- ▼ -> **Take a Snapshot**: Take a snapshot on the virtual disk.
- ▼ -> **Schedule Snapshots**: Set the snapshots by schedule.
- ▼ -> **List Snapshots**: List all snapshots of the virtual disk.
- ▼ -> **More Information**: Show the detail information of the virtual disk.



Take an example of creating a virtual disk.

1. Click **Create**.

The screenshot shows a 'Create a Virtual Disk' window with the following settings:

- Virtual Disk Name:** JVD-1
- Data Storage:** J-1
- Size:** 2793 GB
- Stripe Size (KB):** 64
- Block Size (Bytes):** 4096
- Cache Mode:** Write-through Cache, Write-back Cache (selected)
- Priority:** High Priority (selected), Medium Priority, Low Priority
- Bg Rate:** 4
- Read-Ahead:** Enabled
- AV-Media Mode:** Disabled
- Erase:** Do Not Erase
- Disk Type:** RAID

Buttons: OK, Cancel

**Figure 5-33**

2. Type a **Virtual Disk Name** for the virtual disk.
3. Select a **Data Storage** from the drop-down list.
4. Type required **Size**. The total size of the RAID Group is suggested to use.
5. Optionally, configure the following:
  - **Stripe Size (KB):** The options are 4 KB, 8 KB, 16 KB, 32 KB, 64 KB. The default value is 64 KB.
  - **Block Size (Bytes):** The options are 512 to 65536. The default value is 512 bytes. The size of 4096 bytes is suggested.
  - **Cache Mode:** The options are Write-through Cache and Write-back Cache. The default value is Write-back Cache (suggested).
  - **Priority:** The options are High, Medium and Low Priority. The default value is High priority.
  - **Bg Rate:** Background task priority. The higher number the background priority of a virtual disk has, the more background I/O will be scheduled to execute. The options are 0 to 4. The default value is 4.
  - **Read-Ahead:** The system will discern what data will be needed next based on what was just retrieved from disk and then preload this data into the disks buffer. This feature will improve performance when the data being retrieved is sequential. The default value is Enabled.
  - **AV-Media Mode:** Optimize for video editing. The default value is Disabled.

- **Erase:** This option is available when the RAID group is not thin provisioning. This option will wipe out old data in virtual disk to prevent that OS recognizes the old partition. The options are Do Not Erase, erase First 1 GB or Full Disk. The default value is Don Not Erase.
  - **Space Reclaim:** This option is available when the RAID group is thin provisioning. There are Enabled or Disabled. The default value is Enabled.
  - **Fast Rebuild:** This option is available when the RAID group is not RAID 0. There are Enabled or Disabled. The default value is Disabled.
  - **Disk Type:** Select type for normal or backup usage. The options are RAID (for general usage) and Backup Target (for Clone). The default value is RAID.
6. Click **OK** to create the virtual disk.
  7. At the confirmation message, click **OK**.



**Tip:** In GV-Storage System V2, the maximum number of virtual disks in a RAID group is 96. The maximum virtual disk number in a system is 2048.

---

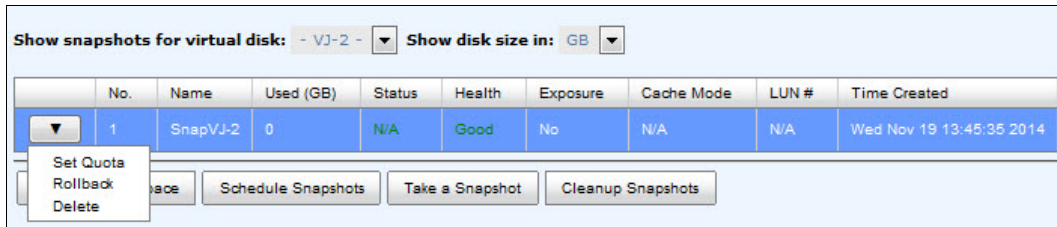


**Caution:**

1. If you shut down or reboot the system when creating a virtual disk, the erase process will stop.
  2. Don't assign the same VD to more than one host for recording usage; otherwise you may suffer data lost or corrupt.
-

### 5.4.4 Snapshots

The **Snapshots** tab provides to create, modify, delete, or view the status of snapshot. The two drop-down lists at the top enable you to switch the virtual disks. The other is to change the drive size units (MB or GB).



**Figure 5-34**

This table shows the column descriptions.

Column Name	Description
No.	Number.
Name	Snapshot name.
Used (GB) or (MB)	The amount of the snapshot space that has been used. The unit can be displayed in GB or MB.
Status	The status of the snapshot: N/A: The snapshot is normal. Replicated: The snapshot is for clone usage. Abort: The snapshot is over space and abort.
Health	The health of the snapshot: Good: The snapshot is good. Failed: The snapshot fails.
Exposure	The snapshot is exposed or not.
Cache Mode	The cache mode of the snapshot: N/A: Unknown when the snapshot is unexposed. Read-write: The snapshot can be read / write. Read-only: The snapshot is read only.
LUN #	Number of LUN(s) that snapshot is attached.
Time Created	The created time of the snapshot.

The options are available on this tab:

- **Set Snapshot Space:** Set snapshot space for preparing to take snapshots.
- **Schedule Snapshots:** Set the snapshots by schedule.
- **Take a Snapshot:** Take a snapshot on the virtual disk.
- **Cleanup Snapshots:** Clean all snapshots of the virtual disk and release the snapshot space.

The options are available after taking a snapshot:

- ▼ -> **Set Quota:** Set the snapshot quota.
- ▼ -> **Rollback:** Rollback the snapshot.
- ▼ -> **Delete:** Delete the snapshot.

The options are available after setting the quota of the snapshot:

- ▼ -> **Unexpose:** Unexpose the snapshot VD.
- ▼ -> **Attach LUN:** Attach a logical unit number to the snapshot.
- ▼ -> **Detach LUNs:** Detach a logical unit number from the virtual disk.
- ▼ -> **List LUNs:** List all of the attached logical unit numbers.

Take an example of taking a snapshot.

1. Before taking a snapshot, it must reserve some storage space for saving variant data.

Click **Set Snapshot Space**.



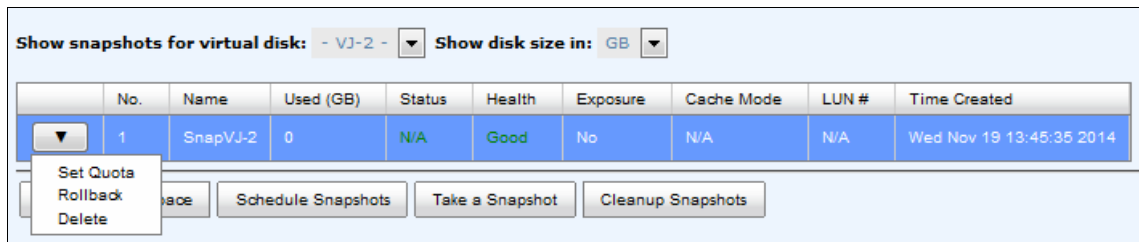
The dialog box titled "Set Snapshot Space" contains the following fields and controls:

- Virtual Disk:** A dropdown menu showing "VJ-2".
- Size:** A text input field containing "10", followed by a "GB" unit selector and a dropdown menu.
- Free Capacity:** A text input field showing "0GB".
- Available:** "1000GB" and **Minimum:** "1GB" are displayed next to the Size field's unit selector.
- Buttons:** "OK" and "Cancel" buttons are located at the bottom right.

**Figure 5-35**

2. Select a **Virtual Disk** from the drop-down list.
3. Type a **Size** which is reserved for the snapshot space.
4. Click **OK**. The snapshot space is created.
5. Click **Take a Snapshot**.
6. Use the drop-down list to select a **Virtual Disk**.
7. Type a **Snapshot Name**.

8. Click **OK**. The snapshot is taken.



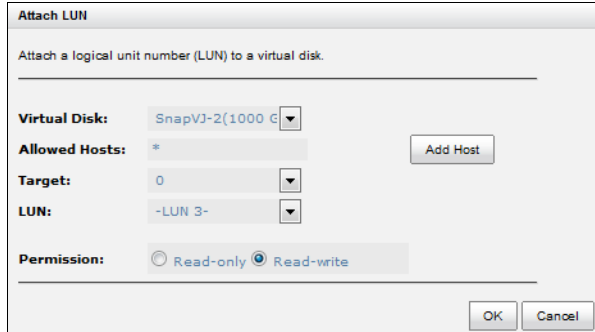
**Figure 5-36**

9. Set quota to expose the snapshot. Click ▼ -> **Set Quota** option.



**Figure 5-37**

10. Type a size which is reserved for the snapshot. If the size is zero, the exposed snapshot will be read only. Otherwise, the exposed snapshot can be read / written, and the size will be the maximum capacity for writing.
11. Attach LUN to the snapshot.



**Figure 5-38**

12. Done. The Snapshot can be used.

## 5.4.5 Logical Units

The **Logical Units** tab provides to attach, detach or view the status of logical unit numbers for each virtual disk.

Physical Disks

RAID Groups

Virtual Disks

Snapshots

Logical Units

	Allowed Hosts	Target	LUN	Permission	Virtual Disk	Number of Session
▼	nvrssystem	0	0	Read-write	JVD-1	0
▼	recordingserver	0	2	Read-write	JVD-3	0
▼	vmssystem	0	1	Read-write	JVD-2	0

	Allowed Hosts	Target	LUN	Permission	Virtual Disk	Number of Session
▼	*	0	0	Read-write	JVD-1	1
▼	*	0	1	Read-write	JVD-2	1
▼	*	0	2	Read-write	JVD-3	1

Attach LUN

**Figure 5-39**

This table shows the column descriptions.

Column Name	Description
Allowed Hosts	The FC node name / iSCSI node name for access control (in lower-case letters) or a wildcard (*) for access by all hosts.
Target	The number of the target.
LUN	The number of the LUN assigned.
Permission	The permission level: Read-write. Read-only.
Virtual Disk	The name of the virtual disk assigned to this LUN.
Number of Session	The number of the active connection linked to the logical unit.

The options are available on this tab:

- **Attach LUN:** Attach a logical unit number to the virtual disk.

The options are available after attaching LUN:

- **▼ -> Detach LUNs:** Detach a logical unit number from the virtual disk.

Take an example of attaching a LUN on GV-Storage System V2.

1. Click **Attach LUN**.

**Figure 5-40**

2. Select the **Protocol**. (FC models only)
3. Select a **Virtual Disk** from the drop-down list.
4. Type the **Allowed Hosts** with semicolons (;) or click **Add Host** to add one by one. Fill-in wildcard (\*) for access by all hosts.
5. Select a **Target** number from the drop-down list.
6. Select a **LUN** from the drop-down list.
7. Check the **Permission** level.
8. Click **OK**.

The matching rules of access control are followed from created time of the LUNs. The earlier created LUN is prior to the matching rules. For example: there are 2 LUN rules for the same VD, one is "\*", LUN 0; and the other is "iqn.host1", LUN 1. The host "iqn.host2" can login successfully because it matches the rule 1.

Wildcard "\*" and "?" are allowed in this field. "\*" can replace any word. "?" can replace only one character. For example:

- "iqn.host?" -> "iqn.host1" and "iqn.host2" are accepted.
- "iqn.host\*" -> "iqn.host1" and "iqn.host12345" are accepted.

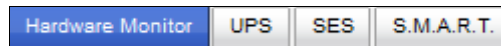
This field cannot accept comma, so "iqn.host1, iqn.host2" stands a long string, not 2 iqns.



**Tip:** In GV-Storage System V2, the maximum LUN number is 2048.

## 5.5 Enclosure Management

The **Enclosure Management** menu option is for accessing the **Hardware Monitor**, **UPS**, **SES**, and **S.M.A.R.T.** option tabs.



**Figure 5-41**

For the enclosure management, there are many sensors for different purposes, such as temperature sensors, voltage sensors, hard disk status, fan sensors, power sensors, and LED status. Due to the different hardware characteristics among these sensors, they have different polling intervals. Below are the details of the polling time intervals:

- Temperature sensors: 1 minute.
- Voltage sensors: 1 minute.
- Hard disk sensors: 10 minutes.
- Fan sensors: 10 seconds . When there are 3 errors consecutively, system sends ERROR event log.
- Power sensors: 10 seconds, when there are 3 errors consecutively, system sends ERROR event log.
- LED status: 10 seconds.



### 5.5.1 Hardware Monitor

The **Hardware Monitor** tab displays the information of current voltages and temperatures, provide an Auto shutdown option.

Show information for: - Local - Temperature (Internal)/(Case): (C)

<< first < prev 1 **2** next > last >>

Type	Item	Value	Status
Voltage	Onboard +12V	+11.90 V (min = +11.40 V, max = +12.60 V)	OK
Voltage	Onboard +5V	+4.89 V (min = +4.60 V, max = +5.40 V)	OK
Voltage	Onboard +5VSB	+5.03 V (min = +4.60 V, max = +5.40 V)	OK
Voltage	Onboard +3.3V	+3.29 V (min = +3.14 V, max = +3.47 V)	OK
Voltage	Onboard +3.3VSB	+3.28 V (min = +3.14 V, max = +3.47 V)	OK
Voltage	Onboard +1.8V	+1.81 V (min = +1.71 V, max = +1.89 V)	OK
Voltage	Onboard +1.5V	+1.48 V (min = +1.42 V, max = +1.58 V)	OK
Voltage	Onboard +1.05V	+1.03 V (min = +1.00 V, max = +1.10 V)	OK
Voltage	Onboard Vcore	+1.06 V (min = +0.85 V, max = +1.28 V)	OK
Voltage	PSU +12V	+12.36 V (min = +11.04 V, max = +12.96 V)	OK
Voltage	PSU +5V	+5.03 V (min = +4.60 V, max = +5.40 V)	OK
Voltage	PSU +5VSB	+5.08 V (min = +4.60 V, max = +5.40 V)	OK
Voltage	PSU +3.3V	+3.33 V (min = +3.04 V, max = +3.66 V)	OK
Voltage	Backplane +3.3VSB	+3.34 V (min = +3.04 V, max = +3.66 V)	OK
Voltage	Backplane +1.2V	+1.19 V (min = +1.10 V, max = +1.30 V)	OK
Temperature	CPU Core 0	+48.0 (C) (hyst = +5.0 (C), high = +79.0 (C))	OK
Temperature	CPU Core 1	+47.0 (C) (hyst = +5.0 (C), high = +79.0 (C))	OK
Temperature	SAS Expander	+38.7 (C) (hyst = +0.0 (C), high = +65.0 (C))	OK
Temperature	Canister Temperature	+39.6 (C) (hyst = +0.0 (C), high = +65.0 (C))	OK
Temperature	HWM Internal	+39.8 (C) (hyst = +0.0 (C), high = +65.0 (C))	OK

<< first < prev 1 **2** next > last >>

**Auto Shutdown:** ☒

If auto shutdown is enabled, the system will shut down automatically when the internal power levels or temperature are not within normal levels.

**Figure 5-42**

If **Auto Shutdown** is checked, the system will shutdown automatically when the voltage or temperature is out of the normal range. For better data protection, it is recommended to check **Auto Shutdown**.

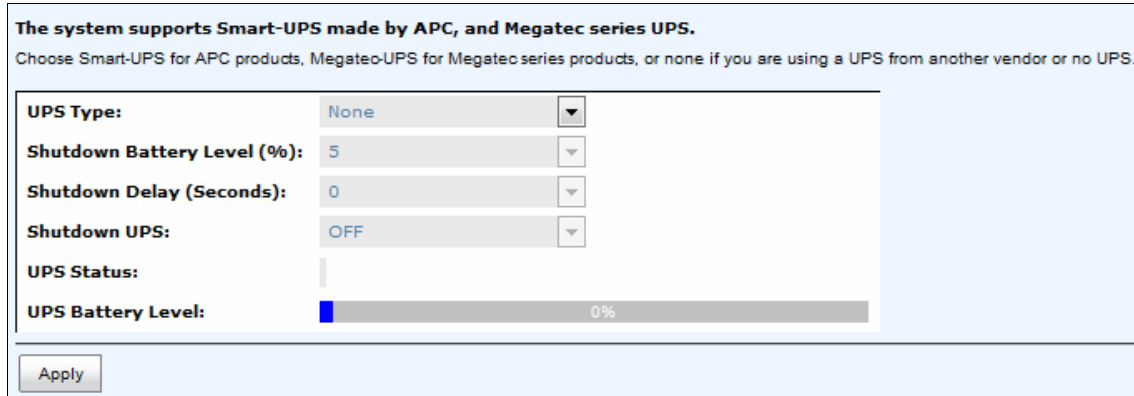
For better protection and avoiding single short period of high temperature that could trigger an automatic shutdown, the system uses to gauge if a shutdown is needed. This is done using several sensors placed on key systems that the system checks every 30 seconds for present temperatures.

- The core processor temperature limit is 80°C.
- The interface temperature limit is 65°C.
- The SAS Controller and SAS Expander temperature limits are 65°C.

When one of these sensors reports a temperature above the threshold for three continuous minutes, the system shuts down automatically.

## 5.5.2 UPS

The **UPS** tab is used to set up a UPS (Uninterruptible Power Supply).



**Figure 5-43**

Currently, the system only supports and communicates with Smart-UPS series by APC (American Power Conversion Corp, <http://www.apc.com/>) and Megatec UPS.



**Tip:** Connection with other vendors of UPS can work well, but they have no such communication features with the system.

Now we support the traditional UPS via serial port and network UPS via SNMP. If using the UPS with serial port, connect the system to UPS via the included cable for communication. (The cable plugs into the serial cable that comes with the UPS.) Then set up the shutdown values for when the power goes out.

This table shows the available options and their descriptions.

Options	Description
UPS Type	Select UPS Type: None: No UPS or other vendors. Smart-UPS (Serial port): APC Smart-UPS with serial port. Smart-UPS (SNMP): APC Smart-UPS with network function. Megatec-UPS: Megatec UPS.
Shutdown Battery Level (%)	When the battery level goes down and lower than the configured threshold, the system will auto shutdown. This function will be disabled if the configured threshold is set to "0".

Options	Description
Shutdown Delay (Seconds)	When there is the power outage happening, if the power cannot be recovered within the configured time, such as 30 seconds, the system will auto shutdown at the moment. This function will be disabled if the configured seconds is set to "0".
Shutdown UPS	The status of shutdown UPS:  ON: The system will send the command to shutdown the connected UPS if one of the above functions is triggered when the power outage is happening.  OFF: Disable this function.
Status	The status of UPS:  Detecting...  Running  Unable to detect UPS  Communication lost  UPS reboot in progress  UPS shutdown in progress  Batteries failed. Please change them NOW!
Battery level (%)	Current power percentage of battery level.

The system will shutdown either **Shutdown Battery level (%)** or **Shutdown Delay (Seconds)** reaches the condition. User should set these values carefully.

### 5.5.3 SES

The **SES** (SCSI Enclosure Services, one of the enclosure management standards) tab is used to enable or disable the management of SES.

**SCSI Enclosure Services (SES)**  
SES is an enclosure management standard. Use this screen to enable or disable SES.

Allowed Hosts	Target	LUN
*	1	0

Disable

**Figure 5-44**

The options are available on this tab:

- **Enable:** Click **Enable** to enable SES.
- **Disable:** Click **Disable** to disable SES.

The SES client software is available at the following web site:

SANtools: <http://www.santools.com/>

## 5.5.4 S.M.A.R.T.

S.M.A.R.T. (Self-Monitoring Analysis and Reporting Technology) is a diagnostic tool for hard drives to deliver warning of drive failures in advance. It provides users a chance to take actions before a possible drive failure.

**Self-Monitoring Analysis and Reporting Technology (S.M.A.R.T.)**  
Below is the current S.M.A.R.T. information for the drives attached to this device.  
S.M.A.R.T. provides users with an opportunity to take action before possible drive failure.

Show information for: Local - Temperature (Internal)/(Case): (C)

<< first < prev 1 2 next > last >>

Slot	HDD Rate	Media Wear	Reallocated Sector (Ct)	Erase Fail (Count)	Unexpected Power Loss (Co)	Uncorrectable Error (C)	Temperature (Inter)	Read Error (Rate)	Spin Up (Time)	Seek Error (Rate)	Spin Up (Retries)	Calibration (Retries)
1	SATA 6.0Gb/s	N/A	200(140)	N/A	N/A	N/A	30	200(51)	173(21)	200(0)	100(0)	100(0)
2	SATA 6.0Gb/s	N/A	200(140)	N/A	N/A	N/A	31	200(51)	176(21)	200(0)	100(0)	100(0)
3	SATA 6.0Gb/s	N/A	200(140)	N/A	N/A	N/A	31	200(51)	174(21)	200(0)	100(0)	100(0)
4	SATA 6.0Gb/s	N/A	200(140)	N/A	N/A	N/A	31	200(51)	175(21)	200(0)	100(0)	100(0)
5	SATA 6.0Gb/s	N/A	200(140)	N/A	N/A	N/A	32	200(51)	177(21)	200(0)	100(0)	100(0)
6	SATA 6.0Gb/s	N/A	200(140)	N/A	N/A	N/A	29	200(51)	174(21)	200(0)	100(0)	100(0)
7	SATA 6.0Gb/s	N/A	200(140)	N/A	N/A	N/A	32	200(51)	175(21)	200(0)	100(0)	100(0)
8	SATA 6.0Gb/s	N/A	200(140)	N/A	N/A	N/A	32	200(51)	173(21)	200(0)	100(0)	100(0)
9	SATA 6.0Gb/s	N/A	200(140)	N/A	N/A	N/A	34	200(51)	173(21)	200(0)	100(0)	100(0)
10	SATA 6.0Gb/s	N/A	200(140)	N/A	N/A	N/A	33	200(51)	177(21)	200(0)	100(0)	100(0)
11	SATA 6.0Gb/s	N/A	200(140)	N/A	N/A	N/A	32	200(51)	174(21)	200(0)	100(0)	100(0)
12	SATA 6.0Gb/s	N/A	200(140)	N/A	N/A	N/A	30	200(51)	175(21)	200(0)	100(0)	100(0)
13	SATA 6.0Gb/s	N/A	200(140)	N/A	N/A	N/A	31	200(51)	176(21)	200(0)	100(0)	100(0)
14	SATA 6.0Gb/s	N/A	200(140)	N/A	N/A	N/A	31	200(51)	172(21)	200(0)	100(0)	100(0)
15	SATA 6.0Gb/s	N/A	200(140)	N/A	N/A	N/A	30	200(51)	174(21)	200(0)	100(0)	100(0)
16	SATA 6.0Gb/s	N/A	200(140)	N/A	N/A	N/A	31	200(51)	173(21)	200(0)	100(0)	100(0)

<< first < prev 1 2 next > last >>

**Figure 5-45**

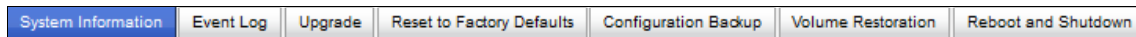
S.M.A.R.T. measures many attributes of the hard drive all the time and inspects the properties of hard drives which are close to be out of tolerance. The advanced notice of possible hard drive failure can allow users to back up hard drive or replace the hard drive. This is much better than hard drive crash when it is writing data or rebuilding a failed hard drive.

This tool displays S.M.A.R.T. information of hard drives. The number is the current value; the number in parenthesis is the threshold value. The threshold values from different hard drive vendors are different; please refer to hard drive vendors' specification for details.

S.M.A.R.T. only supports SATA drives. SAS drives do not have this function and will show N/A in the web page.

## 5.6 System Maintenance

The **System Maintenance** menu option is accessing the **System Information**, **Event Log**, **Upgrade**, **Reset to Factory Defaults**, **Configuration Backup**, **Volume Restoration**, and **Reboot and Shutdown** option tabs.



**Figure 5-46**

### 5.6.1 System Information

The **System Information** provides to display system information. It includes CPU Type, installed System Memory, Firmware Version, SAS IOC Firmware No., SAS Expander Firmware No., MAC/SAS Address, Controller Hardware No., Master Controller, Backplane ID, JBOD MAC/SAS Address, Status, Error Message (This item is only visible when the system status is Degraded or Lockdown.) status.

Item	Information
CPU Type	Intel(R) S1200 series
System Memory	4096 MB
Firmware Version	GV-StorageV2 1.1.1 (build 201408281700)
SAS IOC Firmware No.	17.00.01.00
SAS Expander Firmware No.	1320
Controller Serial Number	001378CD8A60 (5001378007900A80)
Serial Number (S/N)	QG42414092601201
Backplane ID and HW No.	QV424 1.0
JBOD MAC/SAS Address	JBOD 1 MAC/SAS Address 001378CD88C0
JBOD Firmware Version	JBOD 1: 1.7.1
QThin	Inactive

Get System Information

**Figure 5-47**

The options are available on this tab:

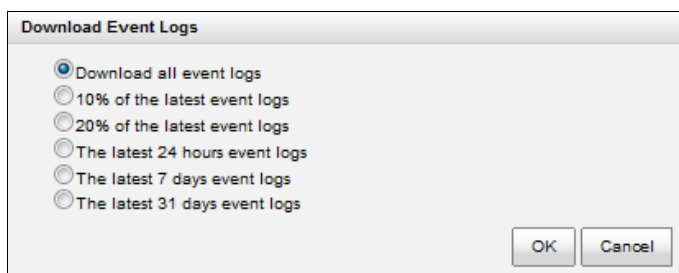
- **Get System Information:** Download the system information for debug.

## 5.6.2 Event log

The **Event Log** tab provides a log or event messages. Choose the buttons of INFO, WARNING, or ERROR levels to display those particular events.

The options are available on this tab:

- **Download:** Save the event log as a text file with file name “log-ModelName-SerialNumber-Date-Time.txt”. It will pop up a filter dialog as the following. The default it “Download all event logs”.



**Figure 5-48**

- **Mute Buzzer:** Stop alarm if the system alerts.
- **Clear:** Clear all event logs.



**Tip:** Please plug-in any of the first four hard drives, then event logs can be saved and displayed in next system boot up. Otherwise, the event logs cannot be saved and would be disappeared.

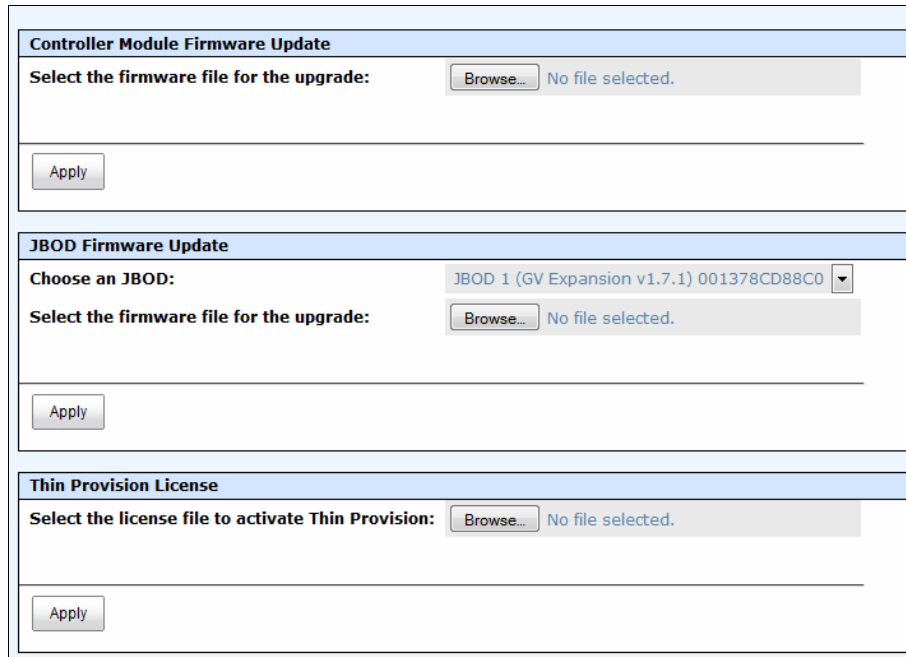
Event Log Level to Show		
<input type="button" value="Information"/> <input type="button" value="Warning"/> <input type="button" value="Error"/>		
<< first < prev 1 2 3 4 5 6 7 8 9 10 next > last >>		
Type	Time	Content
Information	Wed, 05 Nov 2014 15:56:10	iSCSI login from addison (192.168.5.201:1103) succeeded.
Information	Wed, 05 Nov 2014 15:56:01	iSCSI login from addison (192.168.5.201:1098) succeeded.
Information	Wed, 05 Nov 2014 15:47:00	iSCSI login from addison (192.168.5.201:9872) succeeded.
Information	Wed, 05 Nov 2014 15:46:26	iSCSI logout from addison (192.168.5.201:9862) was received, reason [close the session].
Information	Wed, 05 Nov 2014 15:46:26	iSCSI login from addison (192.168.5.201:9862) succeeded.
Information	Wed, 05 Nov 2014 15:44:27	iSCSI logout from addison (192.168.5.201:8546) was received, reason [close the session].
Information	Wed, 05 Nov 2014 15:39:14	LUN 1 is attached to virtual disk 'QUICK37888'.
Information	Wed, 05 Nov 2014 15:39:13	Virtual disk 'QUICK37888' has been created.
Information	Wed, 05 Nov 2014 15:39:13	RAID group 'QUICK36223' has been created.
Information	Wed, 05 Nov 2014 15:32:22	admin login from 192.168.5.201 via web UI.
Information	Wed, 05 Nov 2014 15:31:06	admin logout from 192.168.5.201 via web UI.
Information	Wed, 05 Nov 2014 15:26:41	Power(PSU2) is restored to work.
Error	Wed, 05 Nov 2014 15:26:31	Power(PSU2) is not functioning.
Information	Wed, 05 Nov 2014 15:08:30	Assign disk 18 to be the dedicated spare disk of RAID group 'V-5'.
Information	Wed, 05 Nov 2014 15:08:29	Disk 18 (WDC , WD-WCAW3AYZVJ7R) has been inserted into system.
Warning	Wed, 05 Nov 2014 15:08:14	Disk 18 (WDC , WD-WCAW3AYZVJ7R) has been removed from system.
Warning	Wed, 05 Nov 2014 15:08:14	RAID group 'V-5' is in degraded mode.
Information	Wed, 05 Nov 2014 14:46:44	iSCSI login from addison (192.168.5.201:8546) succeeded.
Information	Wed, 05 Nov 2014 14:46:36	iSCSI logout from addison (192.168.5.201:8526) was received, reason [close the session].
Information	Wed, 05 Nov 2014 14:46:36	iSCSI login from addison (192.168.5.201:8526) succeeded.
<< first < prev 1 2 3 4 5 6 7 8 9 10 next > last >>		
<input type="button" value="Download"/> <input type="button" value="Mute Buzzer"/> <input type="button" value="Clear"/>		

Figure 5-49

The event logs are displayed in reverse order which means the latest event log is on the first / top page. They are actually saved in the first four hard drives; each hard drive has one copy of event log. For one system, there are four copies of event logs to make sure users can check event log any time when there are failed disks.

### 5.6.3 Upgrade

The **Upgrade** tab is used to upgrade controller firmware, JBOD firmware, and change operation mode. Before upgrade, it recommends to use **Configuration Backup** tab to export all configurations to a file.



The screenshot shows a web interface with three distinct sections for firmware and license management. Each section is titled and contains a 'Browse...' button to select a file and an 'Apply' button to execute the action.

- Controller Module Firmware Update:** Contains the text 'Select the firmware file for the upgrade:' followed by a 'Browse...' button and the text 'No file selected.' Below this is an 'Apply' button.
- JBOD Firmware Update:** Contains a dropdown menu for 'Choose an JBOD:' with the selected value 'JBOD 1 (GV Expansion v1.7.1) 001378CD88C0'. Below this is the text 'Select the firmware file for the upgrade:' followed by a 'Browse...' button and the text 'No file selected.' Below this is an 'Apply' button.
- Thin Provision License:** Contains the text 'Select the license file to activate Thin Provision:' followed by a 'Browse...' button and the text 'No file selected.' Below this is an 'Apply' button.

**Figure 5-50**

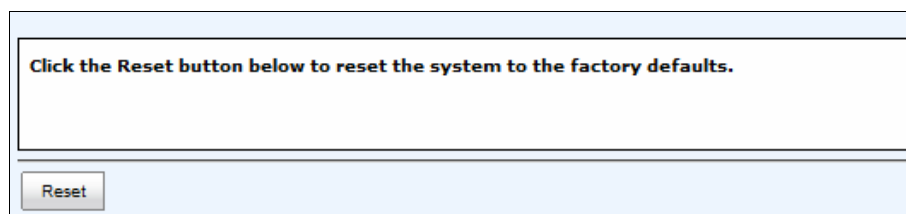
The options are available on this tab:

- **Controller Module Firmware Update:** Please prepare new controller firmware file named “xxxx.bin” in local hard drive, then click **Browse** to select the firmware file. Click **Apply**, it will pop up a warning message. Click **OK** to start upgrading the firmware.  
When upgrading, there is a progress bar running. After finished upgrading, the system must reboot manually to make the new firmware take effect.
- **JBOD Firmware Update:** To upgrade JBOD firmware, choose an JBOD first. The other steps are the same as controller firmware update.
- **Thin Provision License:** Select the license file to activate Thin Provision. This option is reserved for future use.



### 5.6.4 Reset to Factory Defaults

The **Reset to factory defaults** tab allows users to reset the system configurations back to the factory default settings.



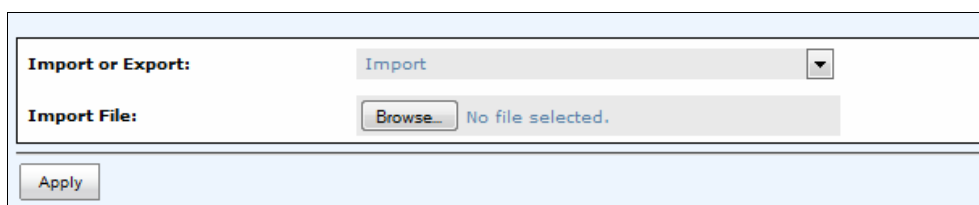
**Figure 5-51**

The default values are:

- Management IP Address: 192.168.0.199
- User Name: admin
- Password: 0000

### 5.6.5 Configuration Backup

The **Configuration Backup** is used to either save system configuration (export) or apply a saved configuration (import).



**Figure 5-52**

While the volume configuration settings are available for exporting, to prevent conflicts and overwriting existing data, they cannot be imported.

The options are available on this tab:

- **Import:** Import all system configurations excluding volume configuration.
- **Export:** Export all configurations to a file.



**Caution:** Import option will import all system configurations excluding volume configuration and the current system configurations will be replaced.

## 5.6.6 Volume Restoration

The **Volume Restoration** can restore the volume configuration from the volume creation history. It is used for RAID group corrupt and tries to recreate the volume. When trying to do data recovery, the same volume configurations as original must be set and all member disks must be installed by the same sequence as original. Otherwise, data recovery will fail. The volume restoration does not guarantee that the lost data can be restored. Please get help from the expert before executing the function.

**Restore the Volume Configuration**

The volume restoration can restore your previous volume configurations when a RAID group corruption or a mis-delete occurs. Before restoration, please make sure that all the member disks are installed exactly in the same slots as before. The volume restoration cannot not guarantee all the lost data will be recovered. Please contact for support before using this function.

<< first < prev 1 2 3 4 5 next > last >>

	RAID Group Name	RAID	Virtual Disk	Volume Size (GB)	Disks Used	Disk Slot	Time	Event Log
▼	V-1	RAID 5	V-1	2793	4	Local: 1, 2, 3, 4	2014/10/03 17:01:38 CST	The virtual disk is created.
▼	G4-2	RAID 5	G4-WD-2	2793	4	Local: 14, 7, 1; JBOD1: 1	2014/08/25 14:23:52 CST	The virtual disk is created.
▼	G2-2	RAID 5	G2-WD-2	2793	4	Local: 4, 2; JBOD1: 7, 5	2014/09/16 10:50:15 CST	Physical disk is inserted into the system.
▼	G2-2	RAID 5	G2-WD-2	2793	2	Local: 4; JBOD1: 5	2014/09/15 16:08:08 CST	Physical disk is removed from the system.
▼	G2-2	RAID 5	G2-WD-2	2793	1	Local: 4	2014/09/15 16:08:08 CST	Physical disk is removed from the system.
▼	G2-2	RAID 5	G2-WD-2	2793	3	Local: 4; JBOD1: 7, 5	2014/09/15 16:08:08 CST	Physical disk is removed from the system.
▼	G2-2	RAID 5	G2-WD-2	2793	4	Local: 4, 2; JBOD1: 7, 5	2014/08/25 14:21:05 CST	The virtual disk is created.
▼	G5-2	RAID 5	G5-WD-2_2	1397	4	Local: 3, 12, 18, 11	2014/08/29 16:17:05 CST	The virtual disk is created.
▼	G5-2	RAID 5	G5-WD-2_1	1396	4	Local: 3, 12, 18, 11	2014/08/29 16:16:48 CST	The virtual disk is created.
▼	G5-2	RAID 5	G5-WD-2	2793	4	Local: 3, 12, 18, 11	2014/08/25 14:25:10 CST	The virtual disk is created.
▼	V-2	RAID 5	V-2	2793	4	Local: 5, 6, 7, 8	2014/10/24 17:49:13 CST	Physical disk is inserted into the system.
▼	V-2	RAID 5	V-2	2793	4	Local: 5, 6, 7	2014/10/23 11:02:35 CST	Physical disk is removed from the system.

<< first < prev 1 2 3 4 5 next > last >>

**Figure 5-53**

This table shows the column descriptions.

Column Name	Description
RAID Group Name	The original RAID group name.
RAID	The original RAID level.
Virtual Disk	The original virtual disk name.
Volume Size (GB)	The original capacity of the virtual disk.
Disks Used	The original physical disk number of the RAID group.
Disk slot	The original physical disk locations.
Time	The last action time of the virtual disk.
Event Log	The last event of the virtual disk.

The options are available on this tab:

- **Restore:** Restore the virtual disk of the RAID group.



**Tip:** When trying to do data recovery, the same volume configurations as original must be set and all member disks must be installed by the same sequence as original. Otherwise, data recovery will fail.

---

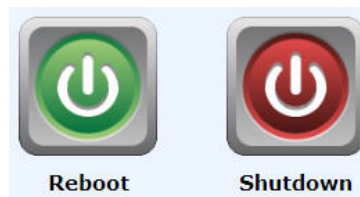


**Caution:** The data recovery does not guarantee that the lost data can be restored 100%. It depends on the real operation and the degree of physical damages on disks. Users will take their own risk to do these procedures.

---

### 5.6.7 Reboot and Shutdown

The **Reboot and Shutdown** function is used to reboot or shutdown the system. Before powering off the system, it is highly recommended to execute **Shutdown** function to flush the data from cache onto the physical disks. The step is important for data protection.



*Figure 5-54*

# Chapter 6 Advanced Operations

## 6.1 Volume Rebuild

If one physical disk of the RAID group which is set as protected RAID level (e.g.: RAID 5, or RAID 6) fails or has been removed, then the status of RAID group will be changed to degraded mode. At the same time, the system will search the spare disk to execute volume rebuild the degraded RAID group into complete one.

There are three types of spare disks which can be set in **Physical Disks**:

- **Dedicated Spare**: The hard drive has been set as dedicated spare of a RAID group.
- **Local Spare**: The hard drive has been set as local spare of the enclosure.
- **Global Spare**: The hard drive has been set as global spare of whole system.

The detection sequence is the dedicated spare disk as the rebuild disk first, then local spare disk and global spare disk.

The following examples are scenarios for a RAID 6.

1. When there is no global spare disk or dedicated spare disk in the system, The RAID group will be in degraded mode and wait until there is one disk assigned as spare disk, or the failed disk is removed and replaced with new clean disk, and then the Auto-Rebuild starts.
2. When there are spare disks for the degraded array, system starts Auto-Rebuild immediately. In RAID 6, if there is another disk failure occurs during rebuilding, system will start the above Auto-Rebuild process as well. Auto-Rebuild feature only works at that the status of RAID group is **Online**. Thus, it will not conflict with the online roaming feature.
3. In degraded mode, the health of the RAID group is **Degraded**. When rebuilding, the status of RAID group and virtual disk will display **Rebuilding**, the column **R%** in virtual disk will display the ratio in percentage. After complete rebuilding, the status will become **Online**.



**Tip:** The dedicated spare cannot be set if there is no RAID group or only RAID groups with RAID 0 or JBOD level.

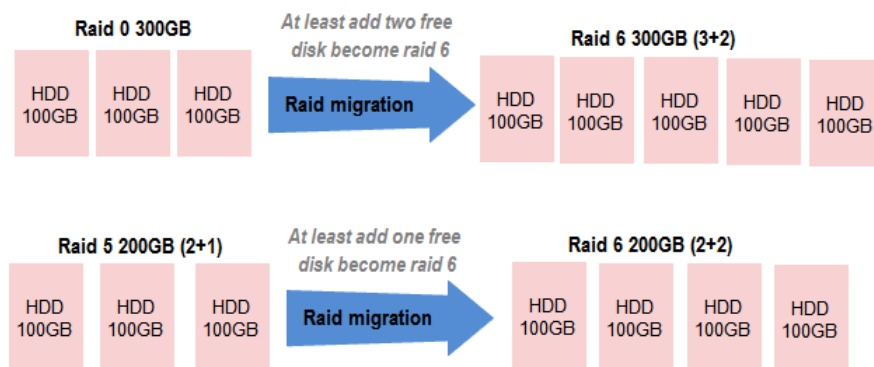
---

Sometimes, rebuild is called recover; they are the same meaning. This table describes the relationship between RAID levels and recovery.

Operation	Description
RAID 0	Disk striping. No protection for data. RAID group fails if any hard drive fails or unplugs.
RAID 1	Disk mirroring over 2 disks. RAID 1 allows one hard drive fails or unplugging. Need one new hard drive to insert to the system and rebuild to be completed.
N-way mirror	Extension to RAID 1 level. It has N copies of the disk. N-way mirror allows N-1 hard drives failure or unplugging.
RAID 3	Striping with parity on the dedicated disk. RAID 3 allows one hard drive failure or unplugging.
RAID 5	Striping with interspersed parity over the member disks. RAID 5 allows one hard drive failure or unplugging.
RAID 6	2-dimensional parity protection over the member disks. RAID 6 allows two hard drives failure or unplugging. If it needs to rebuild two hard drives at the same time, it will rebuild the first one, then the other in sequence.
RAID 0+1	Mirroring of RAID 0 volumes. RAID 0+1 allows two hard drive failures or unplugging, but at the same array.
RAID 10	Striping over the member of RAID 1 volumes. RAID 10 allows two hard drive failure or unplugging, but in different arrays.
RAID 30	Striping over the member of RAID 3 volumes. RAID 30 allows two hard drive failure or unplugging, but in different arrays.
RAID 50	Striping over the member of RAID 5 volumes. RAID 50 allows two hard drive failures or unplugging, but in different arrays.
RAID 60	Striping over the member of RAID 6 volumes. RAID 60 allows four hard drive failures or unplugging, every two in different arrays.
JBOD	The abbreviation of “Just a Bunch Of Disks”. No data protection. RG fails if any hard drive failures or unplugs.

## 6.2 Migrate and Move RAID Groups

**Migrate RAID Level** function changes the RAID group to different RAID level or adds the member disks of the RAID group for larger capacity. Usually, the RAID group migrates to higher RAID level for better protection. To do migration, the total size of RAID group must be larger than or equal to the original RAID group. The limitation is that it's not allowed expanding the same RAID level with the same physical disks of the original RAID group. There is a similar function **Move RAID Level** which will move the member disks of the RAID group to totally different physical disks. In addition, thin provision RAID group cannot execute migrate or move, it uses **Add RAID Set** to enlarge capacity. Describe more detail in the Thin Provision section.



**Figure 6-1**

There are some limitations when a RAID group is being migrated or moved. System would reject these operations:

1. Add dedicated spare.
2. Remove a dedicated spare.
3. Create a new virtual disk.
4. Delete a virtual disk.
5. Extend a virtual disk.
6. Scrub a virtual disk.
7. Perform another migration operation.
8. Scrub entire RAID group.
9. Take a snapshot.
10. Delete a snapshot.
11. Expose a snapshot.
12. Rollback to a snapshot.



**Tip:** Migrate function will migrate the member disks of RAID group to the same physical disks but it should increase the number of disks or it should be different RAID level. Move function will move the member disks of RAID group to totally different physical disks.



**Caution:** RAID group migration or moving cannot be executed during rebuilding or virtual disk extension.

Take an example of migrate the RAID group.

1. Select **Volume Configuration -> RAID Groups**.
2. Select a RAID group, and then click ▼ -> **Migrate RAID Level**.
3. Select a **RAID Level** from the drop-down list.
4. Click **Select Disks** to select disks from either local or expansion JBOD systems, and click **OK** to complete the selection. The selected disks are displayed at **Disks Used**.

Migrate RAID Level

RAID Name: V-1

RAID Level: RAID 5

Disks Used: Local: 1 2 3 4

Select Disks

OK Cancel

**Figure 6-2**

5. At the confirmation dialog, click **OK** to execute migration.

6. Migration starts and the status of **Physical Disks**, **RAID Groups** and **Virtual Disks** are changing. The complete percentage of migration is displayed in **R%**.

Show disk for: - Local -

Show disk size in: GB

<< first < prev 1 2 next > last >>

	Slot	Size (GB)	RAID Group	Status	Health	Usage	Vendor	Serial Number	Rate	Write Cache	Standby	Read-Ahead	Command Queuing
▼	1	931	V-1	Transitioning	Good	RAID	WDC	WD-WCAW3FPHZVK1	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	2	931	V-1	Transitioning	Good	RAID	WDC	WD-WCAW3FPHZ251	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	3	931	V-1	Transitioning	Good	RAID	WDC	WD-WCAW3AYZV5FX	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	4	931	V-1	Transitioning	Good	RAID	WDC	WD-WCAW3LVV0J2C	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled
▼	5	931	V-2	Online	Good	RAID	WDC	WD-WCAW3AYZVDAN	SATA 6.0Gb/s	Enabled	Disabled	Enabled	Enabled

Show RAID size in: GB

	Name	Total (GB)	Free Capacity (GB)	Disks Used	Number of Virtual Disk	Status	Health	RAID
▼	J-1	2793	0	4	1	Online	Good	RAID 5
▼	J-2	2793	0	4	3	Online	Good	RAID 5
▼	QUICK16818	931	0	1	1	Online	Good	RAID 0
▼	V-1	2793	0	4	1	Migrating	Good	RAID 5
▼	V-2	2793	0	4	1	Online	Good	RAID 5
▼	V-3	2793	0	4	1	Online	Good	RAID 5
▼	V-4	2793	0	4	1	Online	Good	RAID 5
▼	V-5	2793	2793	2	0	Offline	Good	RAID 0

Create

Show disk size in: GB

<< first < prev 1 next > last >>

	Name	Size (GB)	Write	Priority	Bg Rate	Type	Clone	Schedule Clone	Status	Health	R %	RAID	LUN #	Snapshot Space (GB)	Snapshot #	RAID Group
▼	JVD-1	2793	WB	HI	4	RAID	N/A	N/A	Online	Optimal		RAID 5	1	0/0	0	J-1
▼	JVD-2	2793	WB	HI	4	RAID	N/A	N/A	Migrating	Optimal	0	RAID 5	1	0/0	0	V-1
▼	JVD-3	2793	WB	HI	4	RAID	N/A	N/A	Online	Optimal		RAID 5	1	0/0	0	V-2
▼	QUICK17218	931	WB	HI	4	RAID	N/A	N/A	Online	Optimal		RAID 0	0	0/0	0	QUICK16818
▼	V-3	2793	WB	HI	4	RAID	N/A	N/A	Online	Optimal		RAID 5	0	0/0	0	V-3
▼	V-4	2793	WB	HI	4	RAID	N/A	N/A	Online	Optimal		RAID 5	0	0/0	0	V-4
▼	V-777	793	WB	HI	4	RAID	N/A	N/A	Online	Optimal		RAID 5	0	0/0	0	J-2
▼	VJ-2	1000	WB	HI	4	RAID	N/A	N/A	Online	Optimal		RAID 5	0	1/1000	1	J-2

<< first < prev 1 next > last >>

Create Cloning Options

**Figure 6-3**

**Move RAID Level** usage is the same as **Migrate RAID Level** except it cannot change the RAID level.



## 6.3 Extend Virtual Disks

**Extend** function extend the size of the virtual disk if there is enough free space.

Take an example of extending the virtual disk.

1. Select **Volume Configuration -> Virtual Disks**.
2. Select a virtual disk, and then click ▼ -> **Extend**.
3. Change the virtual disk size. The size must be larger than the current, and then click **OK** to start extension.



**Figure 6-4**

4. Extension starts. If the virtual disk needs initialization, it will display the status **Initiating** and the complete percentage of initialization in **R%**.



**Tip:** The extension size must be larger than the current size of the virtual disk.

---



**Caution:** Extension cannot be executed during rebuilding or migration.

---

## 6.4 Disk Roaming

Physical disks can be re-sequenced in the same system or move all physical disks in the same RAID group from system-1 to system-2. This is called disk roaming. System can execute disk roaming online. Please follow the procedures.

1. In **Volume Configuration -> RAID Group** tab, selects a RAID group. And then click ▼ -> **Deactivate**.
2. Click **OK** to apply. The **Status** changes to **Offline**.
3. Move all physical disks of the RAID group to another system.
4. In **Volume Configuration -> RAID Group** tab, selects the snapshot. And then click ▼ -> **Activate**.
5. Click **OK** to apply. The **Status** changes to **Online**.

Disk roaming has some constraints as described in the followings:

1. Check the firmware version of two systems first. It is better that either systems have the same firmware version or the firmware version of the system-2 is newer.
2. All physical disks of the RAID group should be moved from system-1 to system-2 together. The configuration of both RAID group and virtual disk will be kept but LUN configuration will be cleared in order to avoid conflict with the current setting of the system-2.

## 6.5 JBOD Expansion

GV-Storage System V2 space can be expanded by adding up to 7 GV-Expansion Systems.

### 6.5.1 Connecting JBOD

GV-Storage System V2 supports expansion systems with SAS connections. When connecting to an expansion system, it will be displayed at the **Show disk for:** drop-down list in **Volume Configuration -> Physical Disks** tab. For example: Local, JBOD 1, JBOD 2, ...etc. Local means disks in local controller, JOB 1 means disks in JBOD 1 controller, and so on.

In **Enclosure Management -> Hardware monitor** tab, select the enclosure at the **Show information for:** drop-down list, it can display the hardware status of SAS JBODs.

In **Enclosure Management -> S.M.A.R.T.** tab, select the enclosure at the **Show information for:** drop-down list, it can display the SMART information of the disks in JBODs.

SAS JBOD expansion has some constraints as described in the followings:

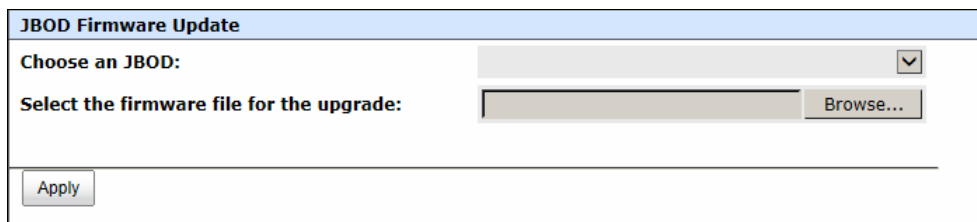
1. User could create RAID group among multiple chassis, max number of disks in a single RAID group is 32.
2. Local spare disk can support the RAID groups which located in the local chassis.
3. Global spare disk can support all RAID groups which located in the different chassis.
4. When support SATA drives for the redundant JBOD model, the 6G MUX board is required. The 3G MUX board does not apply to this model.
5. The following table is the maximum number of GV-Expansion Systems and HDDs with different chassis can be cascaded.

GV-Storage System	1
GV-Expansion System	7
Max HDD no.	192

## 6.5.2 Upgrade Firmware

Before upgrade, it recommends to use **System maintenance -> Configuration Backup** tab to export all configurations to a file. To upgrade the firmware of GV-Expansion System, please follow the procedures.

1. In **System Maintenance -> Upgrade** tab, choose an JBOD first, and then click **Browse** to select the firmware file.



**Figure 6-5**

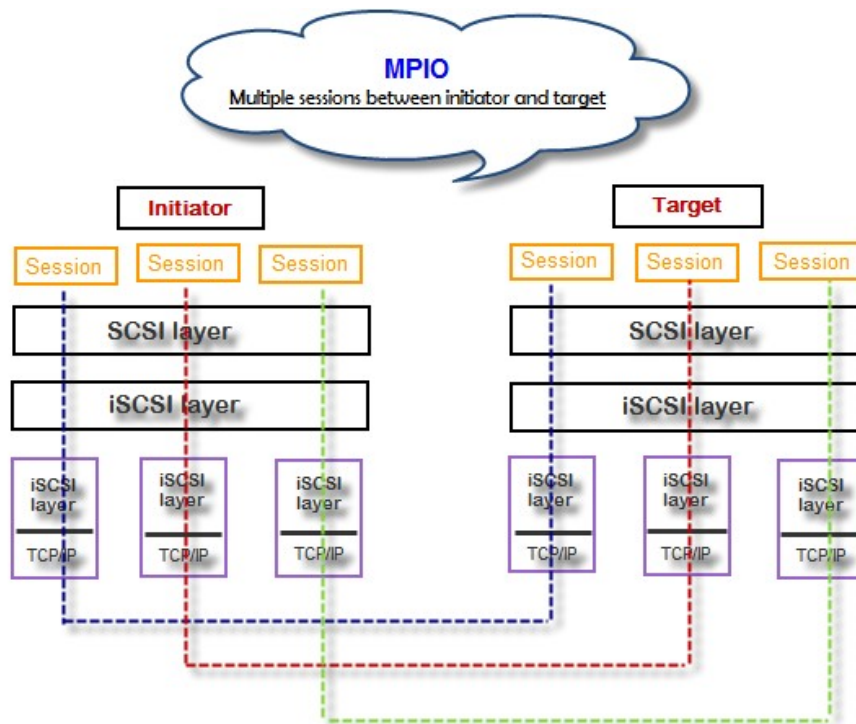
2. Click **Apply**, and it will pop up a warning message. Click **OK** to start upgrading the JBOD firmware.
3. After finished upgrading, the GV-Expansion System must reboot manually to make the new firmware took effect.

## 6.6 MPIO and MC/S

These features come from iSCSI initiator. They can be set up from iSCSI initiator to establish redundant paths for sending I/O from the initiator to the target.

### 6.6.1 MPIO

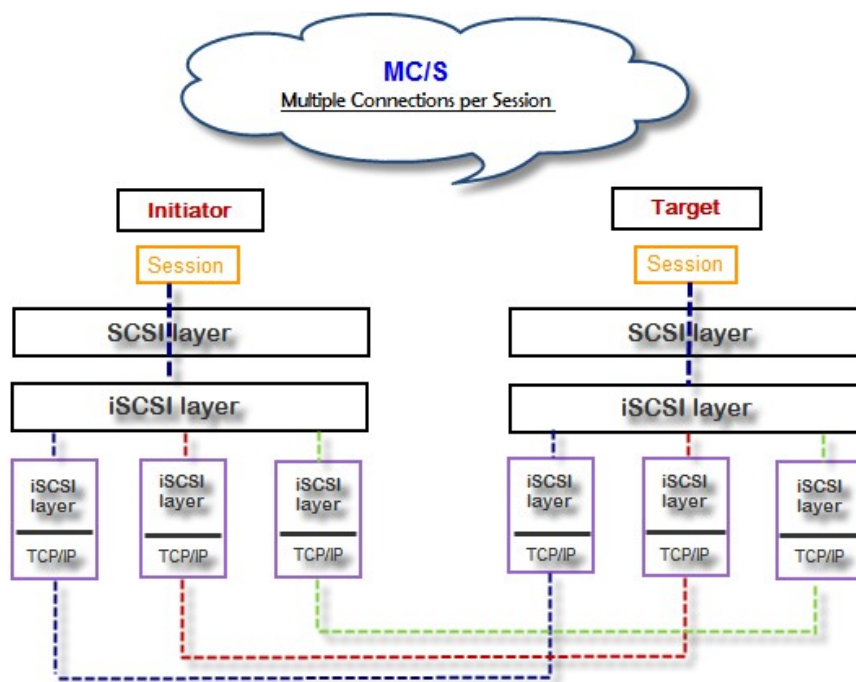
In Microsoft Windows server base system, Microsoft MPIO driver allows initiators to login multiple sessions to the same target and aggregate the duplicate devices into a single device. Each session to the target can be established using different NICs, network infrastructure and target ports. If one session fails, then another session can continue processing I/O without interruption to the application.



**Figure 6-6**

### 6.6.2 MC/S

MC/S (Multiple Connections per Session) is a feature of iSCSI protocol, which allows combining several connections inside a single session for performance and failover purposes. In this way, I/O can be sent on any TCP/IP connection to the target. If one connection fails, another connection can continue processing I/O without interruption to the application.



**Figure 6-7**

### 6.6.3 Difference

MC/S is implemented on iSCSI level, while MPIO is implemented on the higher level. Hence, all MPIO infrastructures are shared among all SCSI transports, including Fiber Channel, SAS, etc. MPIO is the most common usage across all OS vendors. The primary difference between these two is which level the redundancy is maintained. MPIO creates multiple iSCSI sessions with the target storage. Load balance and failover occurs between the multiple sessions. MC/S creates multiple connections within a single iSCSI session to manage load balance and failover. Notice that iSCSI connections and sessions are different than TCP/IP connections and sessions. The above figures describe the difference between MPIO and MC/S.

There are some considerations when user chooses MC/S or MPIO for multi-path.

1. If user uses hardware iSCSI off-load HBA, then MPIO is the only one choice.
2. If user needs to specify different load balance policies for different LUNs, then MPIO should be used.
3. If user installs anyone of Windows XP, Windows Vista or Windows 7, MC/S is the only option since Microsoft MPIO is supported Windows Server editions only.
4. MC/S can provide higher throughput than MPIO in Windows system, but it consumes more CPU resources than MPIO.

## 6.7 Trunking and LACP

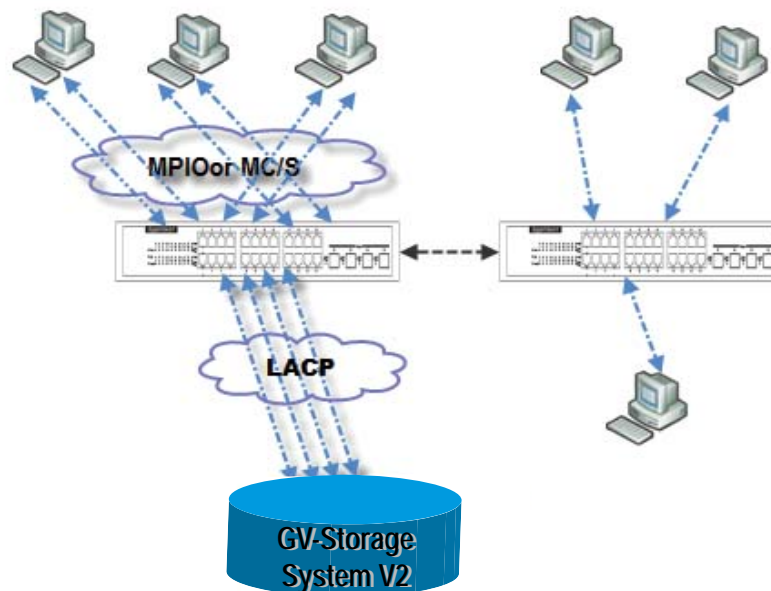
Link aggregation is the technique of taking several distinct Ethernet links to let them appear as a single link. It has a larger bandwidth and provides the fault tolerance ability. Beside the advantage of wide bandwidth, the I/O traffic remains operating until all physical links fail. If any link is restored, it will be added to the link group automatically.

### 6.7.1 LACP

The Link Aggregation Control Protocol (LACP) is a part of IEEE specification 802.3ad. It allows bundling several physical ports together to form a single logical channel. A network switch negotiates an automatic bundle by sending LACP packets to the peer. Theoretically, LACP port can be defined as active or passive. GeoVision controller implements it as active mode which means that LACP port sends LACP protocol packets automatically. Please notice that using the same configurations between GeoVision controller and gigabit switch.

The usage occasion of LACP:

- It's necessary to use LACP in a network environment of multiple switches. When adding new devices, LACP will separate the traffic to each path dynamically.



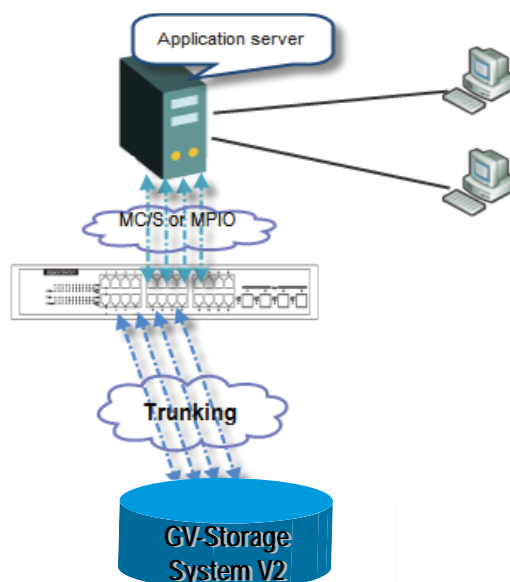
**Figure 6-8**

### 6.7.2 Trunking

Trunking is not a standard protocol. It defines the usage of multiple iSCSI data ports in parallel to increase the link speed beyond the limits of any single port.

The usage occasion of Trunking:

- This is a simple SAN environment. There is only one switch to connect the server and storage. And there is no extra server to be added in the future.
- There is no idea of using LACP or Trunking, uses Trunking first.
- There is a request of monitoring the traffic on a trunk in switch.



**Figure 6-9**



**Caution:** Before using trunking or LACP, the gigabit switch must support either trunking or LACP. Otherwise, host cannot connect the link with storage device.

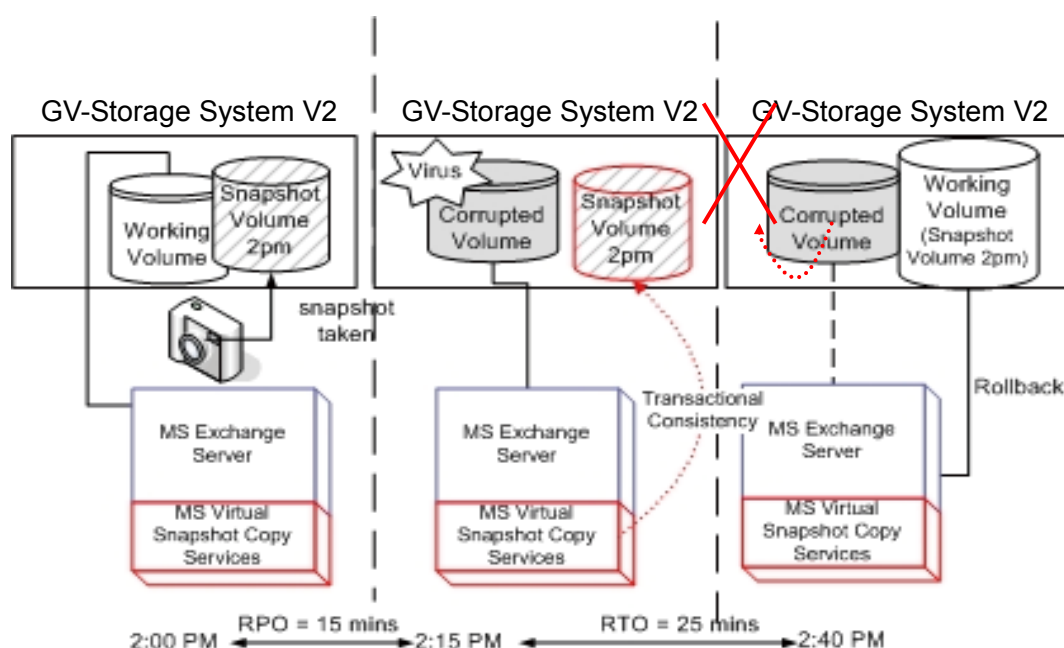
## 6.8 Snapshots



**Caution:** This function is not applicable for surveillance applications. The information below is for your reference.

Snapshot-on-the-box captures the instant state of data in the target volume in a logical sense. The underlying logic is Copy-on-Write, moving out the data which would be written to certain location where a write action occurs since the time of data capture. The certain location, named as “Snapshot virtual disk”, is essentially a new virtual disk which can be attached to a LUN provisioned to a host as a disk like other ordinary virtual disks in the system.

Rollback restores the data back to the state of any time which was previously captured in case for any unfortunate reason it might be (e.g. virus attack, data corruption, human errors and so on). Snapshot virtual disk is allocated within the same RAID group in which the snapshot is taken, we suggest to reserve 20% of the RAID group size or more for snapshot space. Please refer to the following figure for snapshot concept.



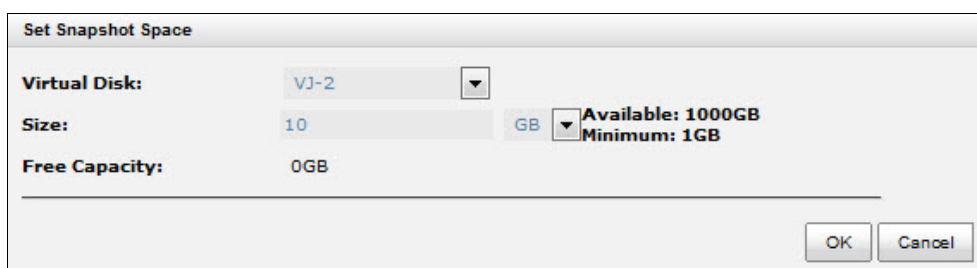
**Figure 6-10**



### 6.8.1 Take a Snapshot

Take an example of taking a snapshot.

1. Before taking a snapshot, it must reserve some storage space for saving variant data. There are two methods to set snapshot space. In **Virtual Disks** tab, selects a virtual disk. And then click ▼ -> **Set Snapshot Space** or in **Snapshots** tab, click **Set Snapshot Space**.



The 'Set Snapshot Space' dialog box shows the following fields:

- Virtual Disk:** VJ-2
- Size:** 10 GB
- Free Capacity:** 0GB
- Available:** 1000GB
- Minimum:** 1GB

Buttons: OK, Cancel

**Figure 6-11**

2. Type a **Size** which is reserved for the snapshot space, and then click **OK**. The minimum size is suggested to be 20% of the virtual disk size. Now there are two numbers in **Snapshot Space (GB)** column in **Virtual Disks** tab. They mean used snapshot space and total snapshot space.
3. There are two methods to take snapshot. In **Virtual Disks** tab, selects a virtual disk. And then click ▼ -> **Take a Snapshot** or in **Snapshots** tab, click **Take a Snapshot**.
4. Type a **Snapshot Name**, and then click **OK**. The snapshot is taken.

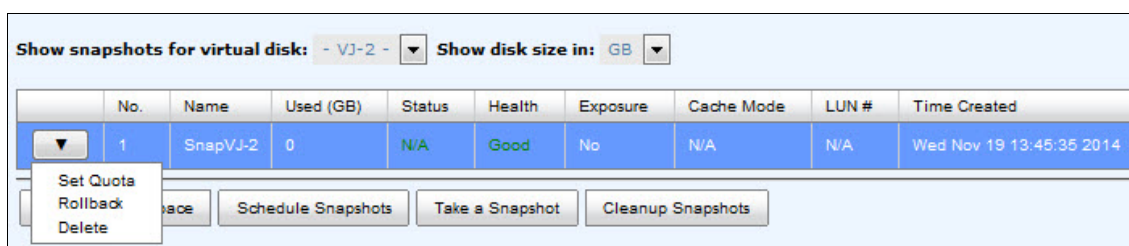


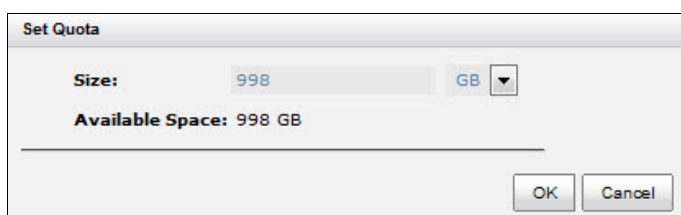
Table: Snapshots for virtual disk: - VJ-2 -

No.	Name	Used (GB)	Status	Health	Exposure	Cache Mode	LUN #	Time Created
1	SnapVJ-2	0	N/A	Good	No	N/A	N/A	Wed Nov 19 13:45:35 2014

Actions: Set Quota, Rollback, Delete, Schedule Snapshots, Take a Snapshot, Cleanup Snapshots

**Figure 6-12**

5. Set quota to expose the snapshot. Click ▼ -> **Set Quota** option.



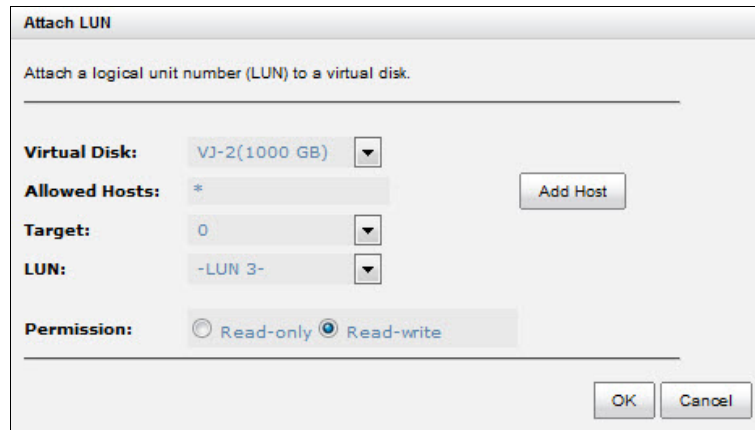
The 'Set Quota' dialog box shows the following fields:

- Size:** 998 GB
- Available Space:** 998 GB

Buttons: OK, Cancel

**Figure 6-13**

6. Type a size which is reserved for the snapshot. If the size is zero, the exposed snapshot will be read only. Otherwise, the exposed snapshot can be read / written, and the size will be the maximum capacity for writing.
7. Attach LUN to the snapshot.



**Figure 6-14**

8. Done. The Snapshot can be used.

## 6.8.2 Cleanup Snapshots

To cleanup all the snapshots, please follow the procedures.

1. There are two methods to cleanup snapshots. In **Virtual Disks** tab, selects a virtual disk. And then click ▼ -> **Cleanup Snapshots** or in **Snapshots** tab, click **Cleanup Snapshots**.
2. Click **OK** to apply. It will delete all snapshots of the virtual disk and release the snapshot space.

## 6.8.3 Schedule Snapshots

The snapshots can be taken by schedule such as hourly or daily. Please follow the procedures.

1. There are two methods to set schedule snapshots. In **Virtual Disks** tab, selects a virtual disk. And then click ▼ -> **Schedule Snapshots** or in **Snapshots** tab, click **Schedule Snapshots**.
2. Check the schedules which you want. They can be set by monthly, weekly, daily, or hourly. Check **Auto Mapping** to attach LUN automatically when the snapshot is taken. And the LUN is allowed to access by **Allowed Hosts**.
3. Click **OK** to apply.

**Schedule Snapshots**

- VJ-2 -

**Months to Take Snapshots:** ☐ All  
☐ 01 ☐ 02 ☐ 03 ☐ 04  
☐ 05 ☐ 06 ☐ 07 ☐ 08  
☐ 09 ☐ 10 ☐ 11 ☐ 12

**Weeks to Take Snapshots:** ☐ All  
☐ 1 ☐ 2 ☐ 3 ☐ 4  
☐ 5

**Days to Take Snapshots:** ☐ All  
☐ Sun ☐ Mon ☐ Tue ☐ Wed  
☐ Thu ☐ Fri ☐ Sat

**Hours to Take Snapshots:** ☐ All  
☐ 00 ☐ 01 ☐ 02 ☐ 03  
☐ 04 ☐ 05 ☐ 06 ☐ 07  
☐ 08 ☐ 09 ☐ 10 ☐ 11  
☐ 12 ☐ 13 ☐ 14 ☐ 15  
☐ 16 ☐ 17 ☐ 18 ☐ 19  
☐ 20 ☐ 21 ☐ 22 ☐ 23

**Minutes to Take Snapshots:** ☐ All  
☐ 00 ☐ 15 ☐ 30 ☐ 45

**Auto Mapping:** ☐  
 Allowed Hosts: \*

OK Cancel

Figure 6-15



**Tip:** Daily snapshot will be taken at every 00:00. Weekly snapshot will be taken every Sunday 00:00. Monthly snapshot will be taken every first day of month 00:00.

### 6.8.4 Rollback

The data in snapshot can rollback to the original virtual disk. Please follow the procedures.

1. In **Snapshots** tab, selects a snapshot. And then click ▼ -> **Schedule Rollback**.
2. Click **OK** to apply.



**Caution:** Before executing rollback, it is better that the disk is unmounted on the host computer for flushing data from cache.

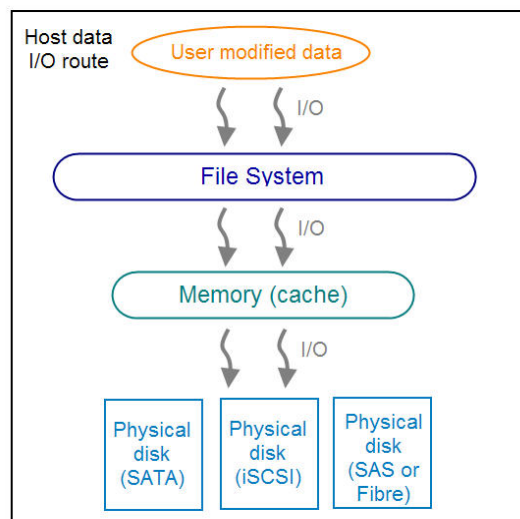
### 6.8.5 Snapshot Constraint

Snapshot function applies Copy-on-Write technique on virtual disk and provides a quick and efficient backup methodology. When taking a snapshot, it does not copy any data at first time until a request of data modification comes in. The snapshot copies the original data to snapshot space and then overwrites the original data with new changes. With this technique, snapshot only copies the changed data instead of copying whole data. It will save a lot of disk space.

- Create a data-consistent snapshot

Before using snapshot, user has to know why sometimes the data corrupts after rollback of snapshot. Please refer to the following diagram.

When user modifies the data from host, the data will pass through file system and memory of the host (write caching). Then the host will flush the data from memory to physical disks, no matter the disk is local disk (IDE or SATA), DAS (SCSI or SAS), or SAN (fibre or iSCSI). From the viewpoint of storage device, it cannot control the behavior of host side. This case maybe happens. If a snapshot is taken, some data is still in memory and not flush to disk. Then the snapshot may have an incomplete image of original data. The problem does not belong to the storage device. To avoid this data inconsistent issue between snapshot and original data, user has to make the operating system flush the data from memory of host (write caching) into disk before taking snapshot.



**Figure 6-16**

On Linux and UNIX platform, a command named **sync** can be used to make the operating system flush data from write caching into disk. For Windows platform, Microsoft also provides

a tool – **sync**, which can do exactly the same thing as the **sync** command in Linux/UNIX. It will tell the OS to flush the data on demand. For more detail about **sync** tool, please refer to: <http://technet.microsoft.com/en-us/sysinternals/bb897438.aspx>

Besides the **sync** tool, Microsoft develops **VSS** (volume shadow copy service) to prevent this issue. VSS is a mechanism for creating consistent point-in-time copies of data known as shadow copies. It is a coordinator between backup software, application (SQL or Exchange...) and storages to make sure the snapshot without the problem of data-inconsistent. For more detail about the VSS, please refer to <http://technet.microsoft.com/en-us/library/cc785914.aspx>. GV-Storage System V2 can support Microsoft VSS.

- What if the snapshot space is over?

Before using snapshot, a snapshot space is needed from RAID group capacity. After a period of working snapshot, what if the snapshot size over the snapshot space of user defined?

There are two different situations:

1. If there are two or more snapshots existed, the system will try to remove the oldest snapshots (to release more space for the latest snapshot) until enough space is released.
2. If there is only one snapshot existed, the snapshot will fail. Because the snapshot space is run out.

For example, there are two or more snapshots existed on a virtual disk and the latest snapshot keeps growing. When it comes to the moment that the snapshot space is run out, the system will try to remove the oldest snapshot to release more space for the latest snapshot usage. As the latest snapshot is growing, the system keeps removing the old snapshots. When it comes that the latest snapshot is the only one in system, there is no more snapshot space which can be released for incoming changes, then snapshot will fail.

- How many snapshots can be created on a virtual disk?

There are up to 64 snapshots can be created per virtual disk. What if the 65th snapshot has been taken? There are two different situations:

1. If the snapshot is configured as schedule snapshot, the latest one (the 65th snapshot) will replace the oldest one (the first snapshot) and so on.
2. If the snapshot is taken manually, when taking the 65th snapshot will fail and a warning message will be showed on Web UI.

- Rollback and delete snapshot

When a snapshot has been rollbacked, the related snapshots which are earlier than it will also

be removed. But the rest snapshots will be kept after rollback. If a snapshot has been deleted, the other snapshots which are earlier than it will also be deleted. The space occupied by these snapshots will be released after deleting.

## 6.9 Clone

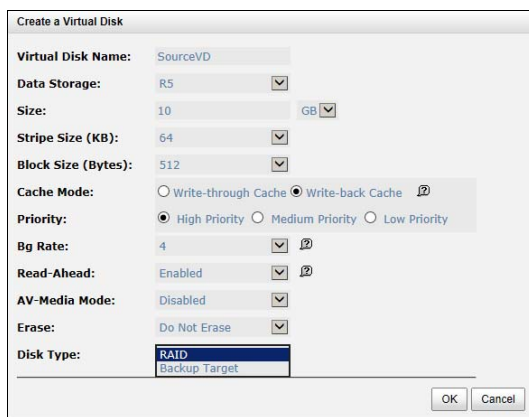
Clone function can backup data from the source virtual disk to target. Here is the clone operation. At the beginning, copy all data from the source virtual disk to target. It is also called full copy. Afterwards, use snapshot technology to perform the incremental copy. Please be fully aware that the incremental copy needs to use snapshot to compare the data difference. Therefore, the enough snapshot space for the virtual disk is very important. Of course, clone job can also be set as schedule.

### 6.9.1 Set up Clone

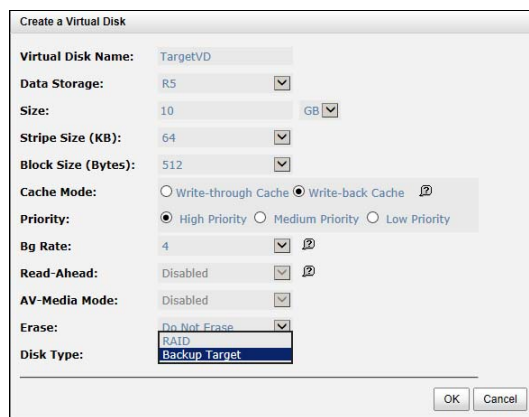
Take an example of clone the virtual disk.

1. Before cloning, it must prepare backup target virtual disk. In **Virtual Disks** tab, click **Create**. And then select **Disk Type** to **Backup Target**.

#### Source side



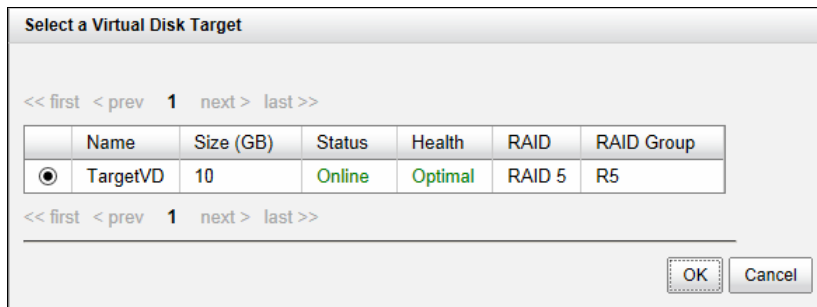
#### Target side



**Figure 6-17**

2. Select the source virtual disk, and then click ▼ -> **Set Clone**.

3. Select a target virtual disk, and then click **OK**.



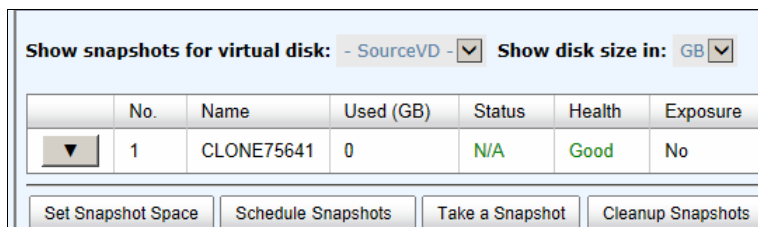
**Figure 6-18**

4. At this time, if the source virtual disk has no snapshot space, it will be allocated snapshot space for clone usage automatically. The size will depend on the parameter of **Cloning Options**.

## 6.9.2 Start and Stop Clone

To start clone, please follow the procedures.

1. Select the source virtual disk, and then click ▼ -> **Start Clone**.
2. Click **OK**. The source virtual disk will take a snapshot, and then start cloning.



**Figure 6-19**

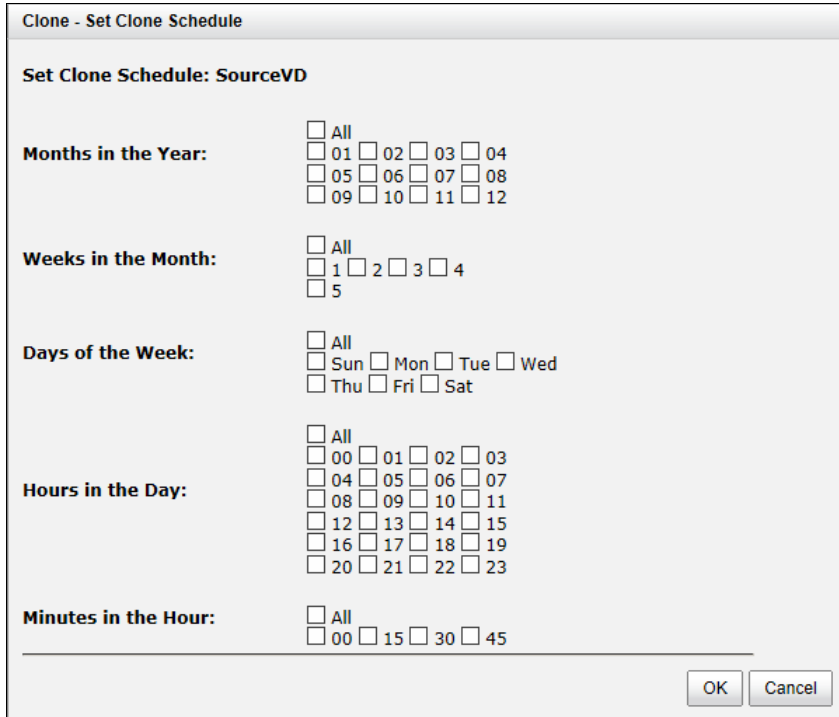
To stop clone, please follow the procedures.

1. Select the source virtual disk, and then click ▼ -> **Stop Clone**.
2. Click **OK** to stop cloning.

### 6.9.3 Schedule Clone

The clone job can be set by schedule such as hourly or daily. Please follow the procedures.

1. Select the source virtual disk, and then click ▼ -> **Schedule Clone**.
2. Check the schedules which you want. They can be set by monthly, weekly, daily, or hourly. Click **OK** to apply.



The dialog box titled "Clone - Set Clone Schedule" contains the following sections:

- Set Clone Schedule: SourceVD**
- Months in the Year:**
  - ☐ All
  - ☐ 01 ☐ 02 ☐ 03 ☐ 04
  - ☐ 05 ☐ 06 ☐ 07 ☐ 08
  - ☐ 09 ☐ 10 ☐ 11 ☐ 12
- Weeks in the Month:**
  - ☐ All
  - ☐ 1 ☐ 2 ☐ 3 ☐ 4
  - ☐ 5
- Days of the Week:**
  - ☐ All
  - ☐ Sun ☐ Mon ☐ Tue ☐ Wed
  - ☐ Thu ☐ Fri ☐ Sat
- Hours in the Day:**
  - ☐ All
  - ☐ 00 ☐ 01 ☐ 02 ☐ 03
  - ☐ 04 ☐ 05 ☐ 06 ☐ 07
  - ☐ 08 ☐ 09 ☐ 10 ☐ 11
  - ☐ 12 ☐ 13 ☐ 14 ☐ 15
  - ☐ 16 ☐ 17 ☐ 18 ☐ 19
  - ☐ 20 ☐ 21 ☐ 22 ☐ 23
- Minutes in the Hour:**
  - ☐ All
  - ☐ 00 ☐ 15 ☐ 30 ☐ 45

At the bottom right, there are **OK** and **Cancel** buttons.

**Figure 6-20**

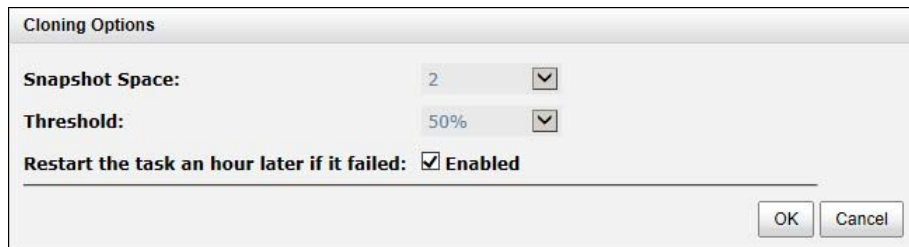


**TIP:** Daily clone will be taken at every 00:00. Weekly clone will be taken every Sunday 00:00. Monthly clone will be taken every first day of month 00:00.



### 6.9.4 Cloning Options

There are three clone options, described on the following.



The image shows a 'Cloning Options' dialog box with a title bar. It contains three settings: 'Snapshot Space' with a dropdown menu showing '2', 'Threshold' with a dropdown menu showing '50%', and 'Restart the task an hour later if it failed:' with a checked checkbox and the word 'Enabled'. At the bottom right, there are 'OK' and 'Cancel' buttons.

**Figure 6-21**

- **Snapshot Space:** This setting is the ratio of the source virtual disk and snapshot space. If the ratio sets to 2, it means when the clone process is starting, the system will book the free RAID group space to set as the snapshot space which capacity is double the source virtual disk automatically. The options are 0.5 ~ 3.
- **Threshold:** The setting will be effective after enabling schedule clone. The threshold will monitor the usage amount of the snapshot space. When the used snapshot space achieves the threshold, system will take a snapshot and start clone process automatically. The purpose of threshold could prevent the incremental copy failure immediately when running out of the snapshot space. For example, the default threshold is 50%. The system will check the snapshot space every hour. When the snapshot space is used over 50%, the system will start clone job automatically. And then continue monitoring the snapshot space. When the rest snapshot space has been used 50%, in other words, the total snapshot space has been used 75%, the system will start clone job again.
- **Restart the task an hour later if it failed:** The setting will be effective after enabling schedule clone. When running out of the snapshot space, the virtual disk clone process will be stopped because there is no more available snapshot space. If this option is checked, the system will clear the snapshots of clone in order to release snapshot space automatically, and the clone task will be restarted after an hour. This task will start a full copy.



**Caution:** The default snapshot space allocated by the system is two times the size of source virtual disk. That is the best value of our suggestion. If user sets snapshot space by manually and lower than the default value, user should take the risk if the snapshot space is not enough and the clone job will fail.

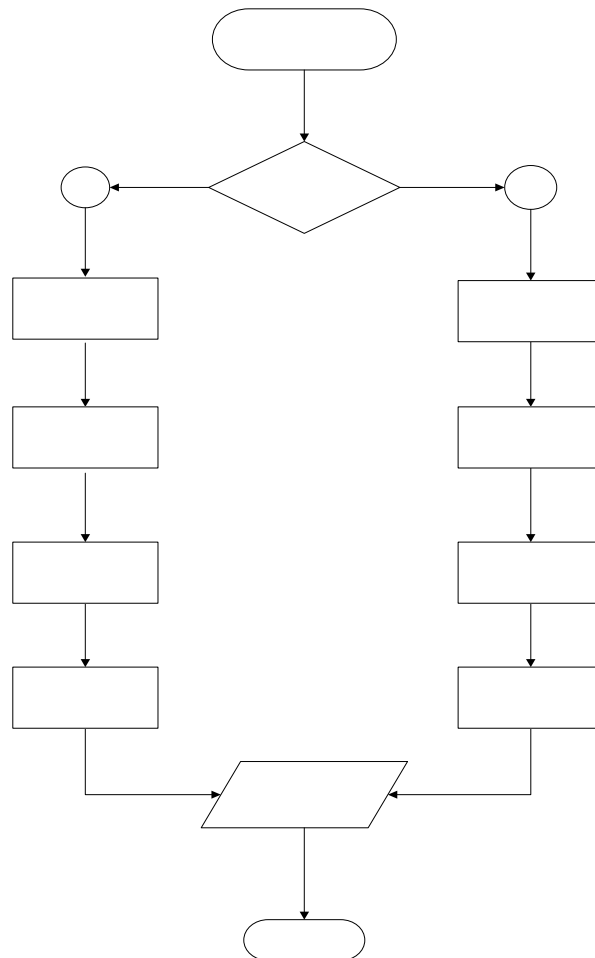
### 6.9.5 Clear Clone

To clear the clone job, please follow the procedures.

1. Select the source virtual disk, and then click ▼ -> **Clear Clone**.
2. Click **OK** to clear clone job.

### 6.9.6 Clone Constraint

While the clone is processing manually, the increment data of the virtual disk is over the snapshot space. The clone will complete the task, but the clone snapshot will fail. At the next time, when trying to start clone, it will get a warning message “This is not enough of snapshot space for the operation”. The user needs to clean up the snapshot space in order to operate the clone process. Each time the clone snapshot failed, it means that the system loses the reference value of incremental data. So it will start a full copy at the next clone process. When running out of the snapshot space, the flow diagram of the virtual disk clone procedure will be like the following.



**Figure 6-22**

## 6.10 Fast Rebuild

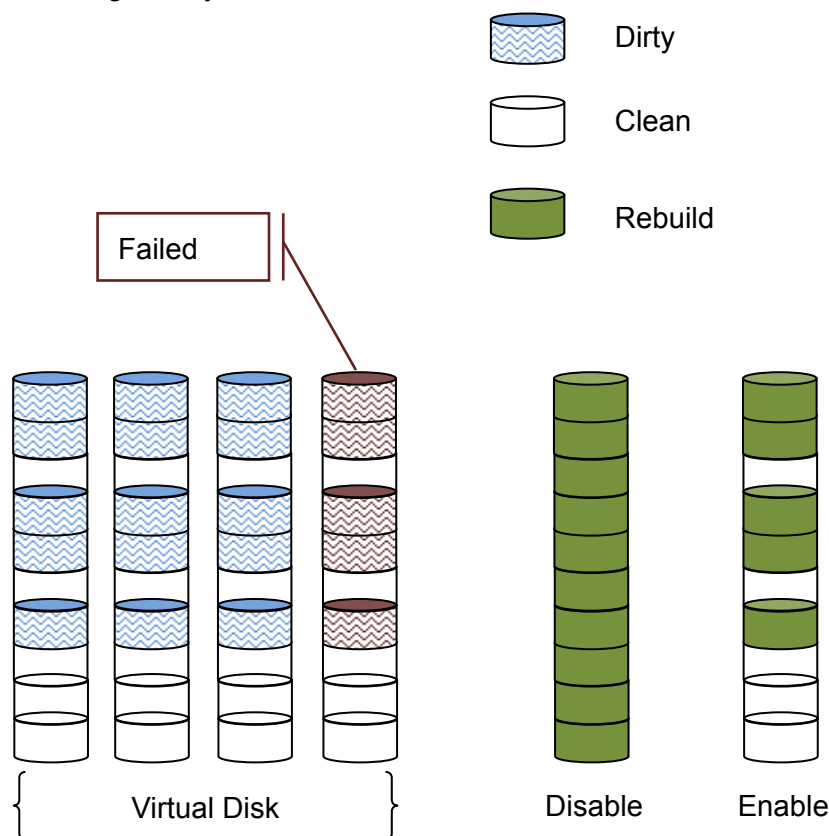


**Caution:** The storage system currently does not support Fast Rebuild. This feature will be available in the near future.

When executing rebuild, the Fast Rebuild feature skips any partition of the virtual disk where no write changes have occurred, it will focus only on the parts that have changed. This mechanism may reduce the amount of time needed for the rebuild task. It also reduces the risk of RAID failure cause of reducing the time required for the RAID status from degraded mode to healthy. At the same time, it frees up CPU resources more quickly to be available for other I/O and demands.

### 6.10.1 Solution

Without Fast Rebuild feature, rebuild will start from the beginning partition to the end. It may spend lots of time to complete the task. When enabling Fast Rebuild feature, it will rebuild the partition with the changed only.



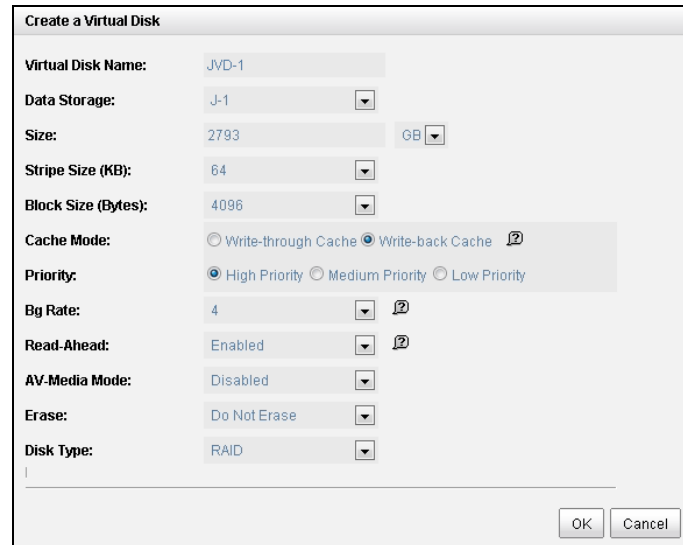
**Figure 6-23**



**Tip:** With less changed partition, the Fast Rebuild feature may go faster. If the virtual disk is full of changed partition. The rebuild may take the same time without Fast Rebuild feature.

## 6.10.2 Configuration

When creating a virtual disk, enable the Fast Rebuild. The default is disabled.



**Figure 6-24**

## 6.10.3 Constraint

Here are some constraints about Fast Rebuild.

- Only thick/fat RAID group supports this feature. Thin provision RAID group already has this feature implement.
- When rebuild happened in a fast rebuild virtual disk, clean partitions are not rebuilt since there are no data saved there. Though clean partitions are never rebuilt, their health status is good.
- If all partitions of the fast rebuild virtual disk are clean, then no rebuild would happen and no event would be sent.
- The RAID stacks could not use optimize algorithm to compute parities of a partition which is not rebuilt. Thus, the performance of random write in a clean partition would be worse.



**Caution:** The fast rebuild should not be enabled for a virtual disk whose access pattern is random write.

# Chapter 7 Troubleshooting

## 7.1 System Buzzer

The system buzzer features are listed below:

- The system buzzer alarms 1 second when system boots up successfully.
- The system buzzer alarms continuously when there is error occurred. The alarm will be stopped after error resolved or be muted.
- The alarm will be muted automatically when the error is resolved. E.g., when RAID 5 is degraded and alarm rings immediately, user changes / adds one physical disk for rebuilding. When the rebuilding is done, the alarm will be muted automatically.

## 7.2 Event Notifications

### Physical Disk Events

Level	Type	Description
INFO	PD inserted	Disk <slot> is inserted into system
WARNING	PD removed	Disk <slot> is removed from system
ERROR	HDD read error	Disk <slot> read block error
ERROR	HDD write error	Disk <slot> write block error
ERROR	HDD error	Disk <slot> is disabled
ERROR	HDD IO timeout	Disk <slot> gets no response
INFO	PD upgrade started	PD [<string>] starts upgrading firmware process.
INFO	PD upgrade finished	PD [<string>] finished upgrading firmware process.
WARNING	PD upgrade failed	PD [<string>] upgrade firmware failed.
INFO	PD RPS started L2L	Assign PD <slot> to replace PD <slot>.
INFO	PD RPS finished L2L	PD <slot> is replaced by PD <slot>.
ERROR	PD RPS failed L2L	Failed to replace PD <slot> with PD <slot>.

## Hardware Events

Level	Type	Description
WARNING	ECC single	Single-bit ECC error is detected at <address>
ERROR	ECC multiple	Multi-bit ECC error is detected at <address>
INFO	ECC dimm	ECC memory is installed
INFO	ECC none	Non-ECC memory is installed
INFO	SCSI bus reset	Received SCSI Bus Reset event at the SCSI Bus <number>
ERROR	SCSI host error	SCSI Host allocation failed
ERROR	SATA enable device fail	Failed to enable the SATA pci device
ERROR	SATA EDMA mem fail	Failed to allocate memory for SATA EDMA
ERROR	SATA remap mem fail	Failed to remap SATA memory io space
ERROR	SATA PRD mem fail	Failed to init SATA PRD memory manager
ERROR	SATA revision id fail	Failed to get SATA revision id
ERROR	SATA set reg fail	Failed to set SATA register
ERROR	SATA init fail	Core failed to initialize the SATA adapter
ERROR	SATA diag fail	SATA Adapter diagnostics failed
ERROR	Mode ID fail	SATA Mode ID failed
ERROR	SATA chip count error	SATA Chip count error
INFO	SAS port reply error	SAS HBA port <number> reply terminated abnormally
INFO	SAS unknown port reply error	SAS frontend reply terminated abnormally
INFO	FC port reply error	FC HBA port <number> reply terminated abnormally
INFO	FC unknown port reply error	FC frontend reply terminated abnormally
INFO	Port linkup	The Port <number> link status is changed to Up.
INFO	Port linkdown	The Port<number> link status is changed to Down.

**EMS Events**

Level	Type	Description
INFO	Power install	Power(<string>) is installed
ERROR	Power absent	Power(<string>) is absent
INFO	Power restore	Power(<string>) is restored to work.
ERROR	Power fail	Power(<string>) is not functioning
WARNING	Power detect	PSU signal detection(<string>)
INFO	Fan restore	Fan(<string>) is restored to work.
ERROR	Fan fail	Fan(<string>) is not functioning
INFO	Fan install	Fan(<string>) is installed
ERROR	Fan not present	Fan(<string>) is not present
ERROR	Fan over speed	Fan(<string>) is over speed
WARNING	Thermal level 1	System temperature(<string>) is higher.
ERROR	Thermal level 2	System Overheated(<string>)!!!
ERROR	Thermal level 2 shutdown	System Overheated(<string>)!!! The system will auto-shutdown immediately.
ERROR	Thermal level 2 CTR shutdown	The controller will auto shutdown immediately, reason [ Overheated(<string>) ].
WARNING	Thermal ignore value	Unable to update thermal value on <string>
WARNING	Voltage level 1	System voltage(<string>) is higher/lower.
ERROR	Voltage level 2	System voltages(<string>) failed!!!
ERROR	Voltage level 2 shutdown	System voltages(<string>) failed!!! The system will auto-shutdown immediately.
ERROR	Voltage level 2 CTR shutdown	The controller will auto shutdown immediately, reason [ Voltage abnormal(<string>) ].
INFO	UPS OK	Successfully detect UPS
WARNING	UPS fail	Failed to detect UPS
ERROR	UPS AC loss	AC loss for system is detected

Level	Type	Description
ERROR	UPS power low	UPS Power Low!!! The system will auto-shutdown immediately.
WARNING	SMART T.E.C.	Disk <slot> S.M.A.R.T. Threshold Exceed Condition occurred for attribute <string>
WARNING	SMART fail	Disk <slot>: Failure to get S.M.A.R.T information
WARNING	RedBoot failover	RedBoot failover event occurred
WARNING	Watchdog shutdown	Watchdog timeout shutdown occurred
WARNING	Watchdog reset	Watchdog timeout reset occurred

### RMS Events

Level	Type	Description
INFO	Console Login	<username> login from <IP or serial console> via Console UI
INFO	Console Logout	<username> logout from <IP or serial console> via Console UI
INFO	Web Login	<username> login from <IP> via Web UI
INFO	Web Logout	<username> logout from <IP> via Web UI
INFO	Log clear	All event logs are cleared
WARNING	Send mail fail	Failed to send event to <email>.

### LVM Events

Level	Type	Description
INFO	RG create OK	RG <name> has been created.
INFO	RG create fail	Failed to create RG <name>.
INFO	RG delete	RG <name> has been deleted.
INFO	RG rename	RG <name> has been renamed as <name>.
INFO	VD create OK	VD <name> has been created.
INFO	VD create fail	Failed to create VD <name>.



Level	Type	Description
INFO	VD delete	VD <name> has been deleted.
INFO	VD rename	Name of VD <name> has been renamed to <name>.
INFO	VD read only	Cache policy of VD <name> has been set as read only.
INFO	VD write back	Cache policy of VD <name> has been set as write-back.
INFO	VD write through	Cache policy of VD <name> has been set as write-through.
INFO	VD extend	Size of VD <name> extends.
INFO	VD attach LUN OK	VD <name> has been LUN-attached.
INFO	VD attach LUN fail	Failed to attach LUN to VD <name>.
INFO	VD detach LUN OK	VD <name> has been detached.
INFO	VD detach LUN fail	Failed to attach LUN from bus <number>, SCSI ID <number>, lun <number>.
INFO	VD init started	VD <name> starts initialization.
INFO	VD init finished	VD <name> completes initialization.
WARNING	VD init failed	Failed to complete initialization of VD <name>.
INFO	VD rebuild started	VD <name> starts rebuilding.
INFO	VD rebuild finished	VD <name> completes rebuilding.
WARNING	VD rebuild failed	Failed to complete rebuild of VD <name>.
INFO	VD migrate started	VD <name> starts migration.
INFO	VD migrate finished	VD <name> completes migration.
ERROR	VD migrate failed	Failed to complete migration of VD <name>.
INFO	VD scrub started	Parity checking on VD <name> starts.
INFO	VD scrub finished	Parity checking on VD <name> completes with <address> parity/data inconsistency found.

Level	Type	Description
INFO	VD scrub aborted	Parity checking on VD <name> stops with <address> parity/data inconsistency found.
INFO	RG migrate started	RG <name> starts migration.
INFO	RG migrate finished	RG <name> completes migration.
INFO	RG move started	RG <name> starts move.
INFO	RG move finished	RG <name> completes move.
INFO	VD move started	VD <name> starts move.
INFO	VD move finished	VD <name> completes move.
ERROR	VD move failed	Failed to complete move of VD <name>.
INFO	VD attach LUN	LUN <number> is attached to VD <name>.
INFO	VD detach LUN	LUN <number> is detached from VD <name>.
INFO	RG activated	RG <name> has been manually activated.
INFO	RG deactivated	RG <name> has been manually deactivated.
DEBUG	VD rewrite started	Rewrite at LBA <address> of VD <name> starts.
DEBUG	VD rewrite finished	Rewrite at LBA <address> of VD <name> completes.
DEBUG	VD rewrite failed	Rewrite at LBA <address> of VD <name> failed.
WARNING	RG degraded	RG <name> is in degraded mode.
WARNING	VD degraded	VD <name> is in degraded mode.
ERROR	RG failed	RG <name> is failed.
ERROR	VD failed	VD <name> is failed.
ERROR	VD IO fault	I/O failure for stripe number <address> in VD <name>.
DEBUG	Recoverable read error	Recoverable read error occurred at LBA <address>-<address> of VD <name>.

Level	Type	Description
WARNING	Recoverable write error	Recoverable write error occurred at LBA <address>-<address> of VD <name>.
DEBUG	Unrecoverable read error	Unrecoverable read error occurred at LBA <address>-<address> of VD <name>.
ERROR	Unrecoverable write error	Unrecoverable write error occurred at LBA <address>-<address> of VD <name>.
ERROR	Config read fail	Config read failed at LBA <address>-<address> of PD <slot>.
ERROR	Config write fail	Config write failed at LBA <address>-<address> of PD <slot>.
ERROR	CV boot error adjust global	Failed to change size of the global cache.
INFO	CV boot global	The global cache is ok.
ERROR	CV boot error create global	Failed to create the global cache.
INFO	PD dedicated spare	Assign PD <slot> to be the dedicated spare disk of RG <name>.
INFO	PD global spare	Assign PD <slot> to Global Spare Disks.
WARNING	PD read error	Read error occurred at LBA <address>-<address> of PD <slot>.
WARNING	PD write error	Write error occurred at LBA <address>-<address> of PD <slot>.
WARNING	Scrub wrong parity	The parity/data inconsistency is found at LBA <address>-<address> when checking parity on VD <name>.
WARNING	Scrub data recovered	The data at LBA <address>-<address> is recovered when checking parity on VD <name>.
WARNING	Scrub recovered data	A recoverable read error occurred at LBA <address>-<address> when checking parity on VD <name>.

Level	Type	Description
WARNING	Scrub parity recovered	The parity at LBA <address>-<address> is regenerated when checking parity on VD <name>.
INFO	PD freed	PD <slot> has been freed from RG <name>.
INFO	RG imported	Configuration of RG <name> has been imported.
INFO	RG restored	Configuration of RG <name> has been restored.
INFO	VD restored	Configuration of VD <name> has been restored.
INFO	PD scrub started	PD <slot> starts disk scrubbing process.
INFO	Disk scrub finished	PD <slot> completed disk scrubbing process.
INFO	Large RG created	A large RG <name> with <number> disks included is created
INFO	Weak RG created	A RG <name> made up disks across <number> chassis is created
INFO	RG size shrunk	The total size of RG <name> shrunk
INFO	VD erase finished	VD <name> finished erasing process.
WARNING	VD erase failed	The erasing process of VD <name> failed.
INFO	VD erase started	VD <name> starts erasing process.
WARNING	RG disk missing	RG <name> can not be activated because of missing disks.
ERROR	PD VD read write fault	Read error at LBA <address>-<address> of PD <slot> and rewrite failed at LBA <address>-<address> of VD <name>.
ERROR	PD IO retry fault	Over I/O retry limit in last 10 minutes on PD <slot>, replacing the disk is highly recommended.
ERROR	PD substitute L2L	Over I/O retry limit in last 10 minutes on PD <slot>, the disk is disabled for automatic rebuilding with PD <slot>.

**Snapshot Events**

Level	Type	Description
WARNING	Snap mem	Failed to allocate snapshot memory for VD <name>.
WARNING	Snap space overflow	Failed to allocate snapshot space for VD <name>.
WARNING	Snap threshold	The snapshot space threshold of VD <name> has been reached.
INFO	Snap delete	The snapshot VD <name> has been deleted.
INFO	Snap auto delete	The oldest snapshot VD <name> has been deleted to obtain extra snapshot space.
INFO	Snap take	A snapshot on VD <name> has been taken.
INFO	Snap set space	Set the snapshot space of VD <name> to <number> MB.
INFO	Snap rollback started	Snapshot rollback of VD <name> has been started.
INFO	Snap rollback finished	Snapshot rollback of VD <name> has been finished.
WARNING	Snap quota reached	The quota assigned to snapshot <name> is reached.
INFO	Snap clear space	The snapshot space of VD <name> is cleared

**iSCSI Events**

Level	Type	Description
INFO	iSCSI login accepted	iSCSI login from <IP> succeeds.
INFO	iSCSI login rejected	iSCSI login from <IP> was rejected, reason [<string>]
INFO	iSCSI logout recvd	iSCSI logout from <IP> was received, reason [<string>].

## Battery Backup Events

Level	Type	Description
INFO	BBM start syncing	Abnormal shutdown detected, start flushing battery-backed data (<number> KB).
INFO	BBM stop syncing	Abnormal shutdown detected, flushing battery-backed data finished
INFO	BBM installed	Battery backup module is detected
INFO	BBM status good	Battery backup module is good
INFO	BBM status charging	Battery backup module is charging
WARNING	BBM status fail	Battery backup module is failed
INFO	BBM enabled	Battery backup feature is <string>.
INFO	BBM inserted	Battery backup module is inserted
INFO	BBM removed	Battery backup module is removed

## JBOD Events

Level	Type	Description
INFO	PD upgrade started	JBOD <name> PD [<string>] starts upgrading firmware process.
INFO	PD upgrade finished	JBOD <name> PD [<string>] finished upgrading firmware process.
WARNING	PD upgrade failed	JBOD <name> PD [<string>] upgrade firmware failed.
INFO	PD freed	JBOD <name> PD <slot> has been freed from RG <name>.
INFO	PD inserted	JBOD <name> disk <slot> is inserted into system.
Warning	PD removed	JBOD <name> disk <slot> is removed from system.
ERROR	HDD read error	JBOD <name> disk <slot> read block error
ERROR	HDD write error	JBOD <name> disk <slot> write block error

Level	Type	Description
ERROR	HDD error	JBOD <name> disk <slot> is disabled.
ERROR	HDD IO timeout	JBOD <name> disk <slot> gets no response
INFO	JBOD inserted	JBOD <name> is inserted into system
WARNING	JBOD removed	JBOD <name> is removed from system
WARNING	JBOD SMART T.E.C	JBOD <name> disk <slot>: S.M.A.R.T. Threshold Exceed Condition occurred for attribute <string>
WARNING	JBOD SMART fail	JBOD <name> disk <slot>: Failure to get S.M.A.R.T information
INFO	JBOD CTR inserted	Controller(<number>) of JBOD <name> is inserted into system
WARNING	JBOD CTR iremoved	Controller(<number>) of JBOD <name> is removed from system
WARNING	JBOD degraded	JBOD <name> is in degraded mode.
INFO	PD dedicated spare	Assign JBOD <name> PD <slot> to be the dedicated spare disk of RG <name>.
INFO	PD global spare	Assign JBOD <name> PD <slot> to Global Spare Disks.
ERROR	Config read fail	Config read error occurred at LBA <address>-<address> of JBOD <name> PD <slot>.
ERROR	Config write fail	Config write error occurred at LBA <address>-<address> of JBOD <name> PD <slot>.
DEBUG	PD read error	Read error occurred at LBA <address>-<address> of JBOD <name> PD <slot>.
WARNING	PD write error	Write error occurred at LBA <address>-<address> of JBOD <name> PD <slot>.
INFO	PD scrub started	JBOD <name> PD <slot> starts disk

Level	Type	Description
		scrubbing process.
INFO	PD scrub completed	JBOD <name> PD <slot> completed disk scrubbing process.
WARNING	PS fail	Power Supply of <string> in JBOD <name> is FAIL
INFO	PS normal	Power Supply of <string> in JBOD <name> is NORMAL
WARNING	FAN fail	Cooling fan of <string> in JBOD <name> is FAIL
INFO	FAN normal	Cooling fan of <string> in JBOD <name> is NORMAL
WARNING	Volt warn OV	Voltage of <string> read as <string> in JBOD <name> is WARN OVER
WARNING	Volt warn UV	Voltage of <string> read as <string> in JBOD <name> is WARN UNDER
WARNING	Volt crit OV	Voltage of <string> read as <string> in JBOD <name> is CRIT OVER
WARNING	Volt crit UV	Voltage of <item> read as <string> in JBOD <name> is CRIT UNDER
INFO	Volt recovery	Voltage of <string> in JBOD <string> is NORMAL
WARNING	Therm warn OT	Temperature of <string> read as <string> in JBOD <name> is OT WARNING
WARNING	Therm warn UT	Temperature of <string> read as <string> in JBOD <name> is UT WARNING
WARNING	Therm fail OT	Temperature of <string> read as <string> in JBOD <name> is OT FAILURE
WARNING	Therm fail UT	Temperature of <string> read as <string> in JBOD <name> is UT FAILURE
INFO	Therm recovery	Temperature of <string> in JBOD <name> is NORMAL



Level	Type	Description
INFO	JBOD HDD path NG	Path redundancy to JBOD <name> PD <number> is lost
INFO	PD RPS started L2F	Assign JBOD <name> PD <slot> to replace PD <slot>.
INFO	PD RPS started F2L	Assign PD <slot> to replace JBOD <name> PD <slot>.
INFO	PD RPS started F2F	Assign JBOD <name> PD <slot> to replace JBOD <name> PD <slot>.
INFO	PD RPS finished L2F	PD <slot> is replaced by JBOD <name> PD <slot>.
INFO	PD RPS finished F2L	JBOD <name> PD <slot> is replaced by PD <slot>.
INFO	PD RPS finished F2F	JBOD <name> PD <slot> is replaced by JBOD <name> PD <slot>.
ERROR	PD RPS failed L2F	Failed to replace PD <slot> with JBOD %4d PD <slot>.
ERROR	PD RPS failed F2L	Failed to replace JBOD <name> PD <slot> with PD <slot>.
ERROR	PD RPS failed F2F	Failed to replace JBOD <name> PD <slot> with JBOD <name> PD <slot>.
ERROR	PD VD read write fault	Read error at LBA <address>-<address> of JBOD <name> PD <slot> and rewrite failed at LBA <address>-<address> of VD <name>.
ERROR	PD IO retry fault	Over I/O retry limit in last 10 minutes on JBOD <name> PD <slot>, replacing the disk is highly recommended.
ERROR	PD substitute L2F	Over I/O retry limit in last 10 minutes on PD <slot>, the disk is disabled for automatic rebuilding with JBOD <name> PD <slot>.
ERROR	PD substitute F2L	Over I/O retry limit in last 10 minutes on JBOD <name> PD <slot>, the disk is disabled for automatic rebuilding with PD <slot>.

Level	Type	Description
ERROR	PD substitute F2F	Over I/O retry limit in last 10 minutes on JBOD <name> PD <slot>, the disk is disabled for automatic rebuilding with JBOD <name> PD <slot>.

### System Maintenance Events

Level	Type	Description
INFO	System shutdown	System shutdown.
INFO	System reboot	System reboot.
INFO	System console shutdown	System shutdown from <string> via Console UI
INFO	System web shutdown	System shutdown from <string> via Web UI
INFO	System button shutdown	System shutdown via power button
INFO	System console reboot	System reboot from <string> via Console UI
INFO	System web reboot	System reboot from <string> via Web UI
INFO	FW upgrade start	System firmware upgrade starts.
INFO	FW upgrade success	System firmware upgrade succeeds.
WARNING	FW upgrade failure	System firmware upgrade is failed.
ERROR	IPC FW upgrade timeout	System firmware upgrade timeout on another controller
INFO	Config imported	<string> config imported

**Clone Events**

Level	Type	Description
INFO	VD clone started	VD <name> starts cloning process.
INFO	VD clone finished	VD <name> finished cloning process.
WARNING	VD clone failed	The cloning in VD <name> failed.
INFO	VD clone aborted	The cloning in VD <name> was aborted.
INFO	VD clone set	The clone of VD <name> has been designated.
INFO	VD clone reset	The clone of VD <name> is no longer designated.
WARNING	Auto clone error	Auto clone task: <string>.
WARNING	Auto clone no snap	Auto clone task: Snapshot <name> is not found for VD <name>.

- DEBUG level events are displayed in download event log file only.

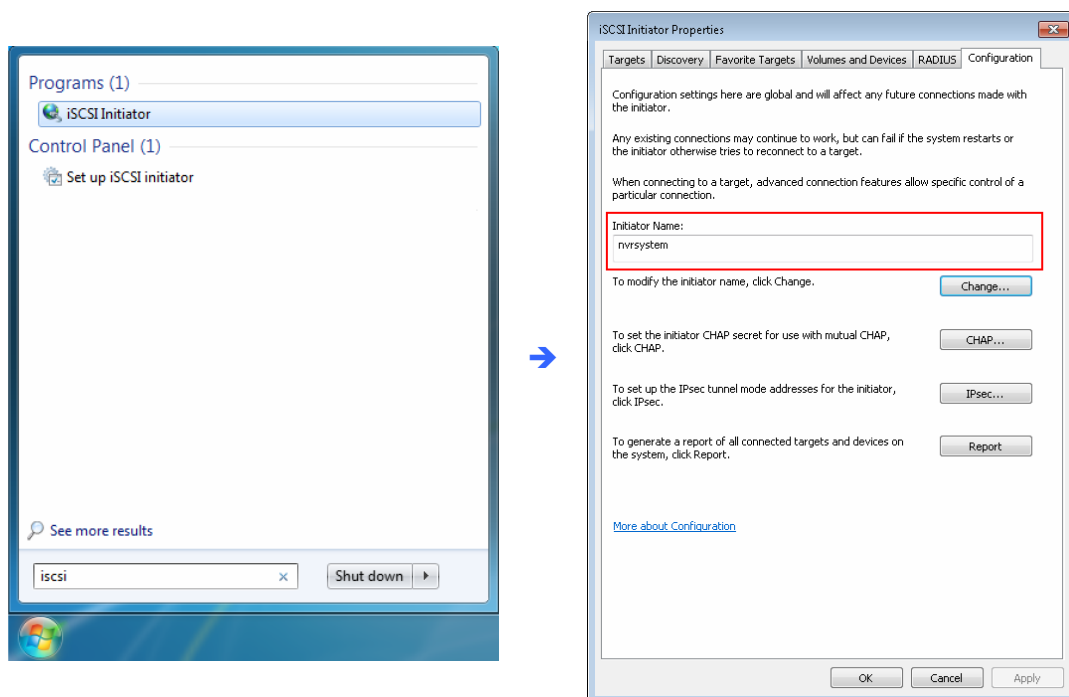
# Chapter 8 Software Application

## 8.1 Microsoft iSCSI Initiator

Here is the step by step to set up Microsoft iSCSI Initiator. Please visit Microsoft website for latest iSCSI initiator. This example is based on Microsoft Windows 7 in which iSCSI Initiator is integrated.

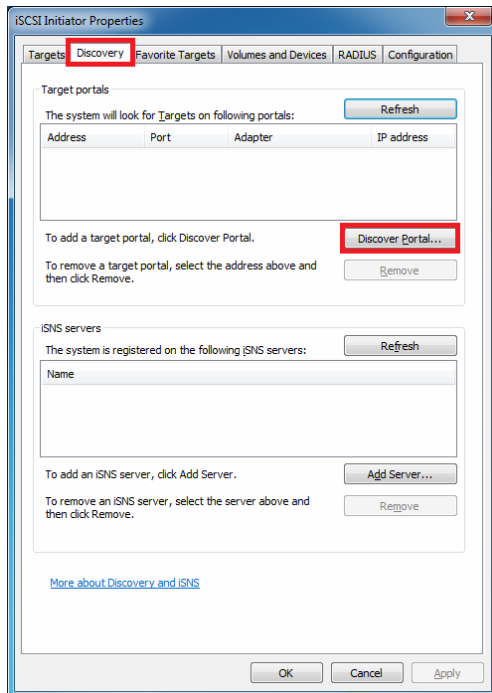
### 8.1.1 Configure Initiator on the Host

1. Search and run Microsoft iSCSI Initiator. Type the "Initiator Name" which should be matched with the one created on GV-Storage System.



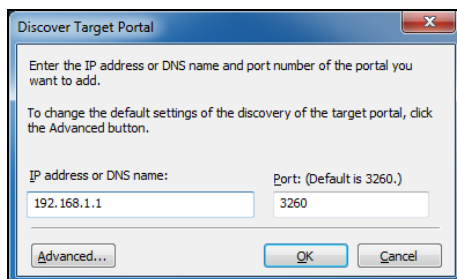
**Figure 8-1**

2. To add target portals, click the **Discovery** tab and click **Discover Portal**.



**Figure 8-2**

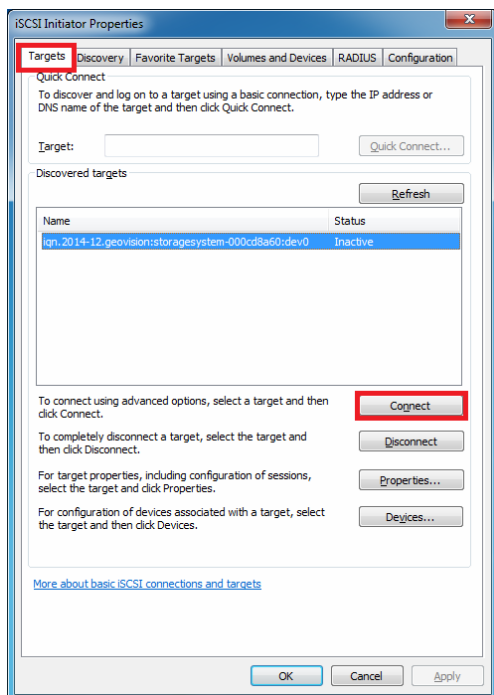
3. Type the IP address of GV-Storage System V2, and click **OK**.  
 By default, the IP addresses of 6 iSCSI data ports are as follows:  
 Port 1: 192.168.1.1  
 Port 2: 192.168.2.1  
 Port 3: 192.168.3.1  
 Port 4: 192.168.4.1  
 Port 5: 192.168.5.1  
 Port 6: 192.168.6.1



**Figure 8-3**

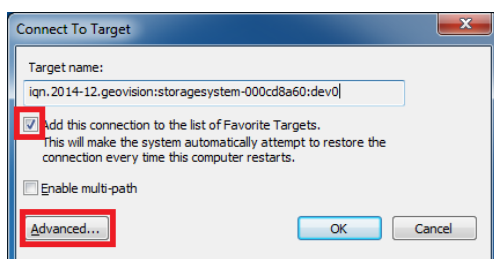
(In this example, the iSCSI data port 1 of 192.168.1.1.)

4. Click the **Targets** tab and click **Connect**.



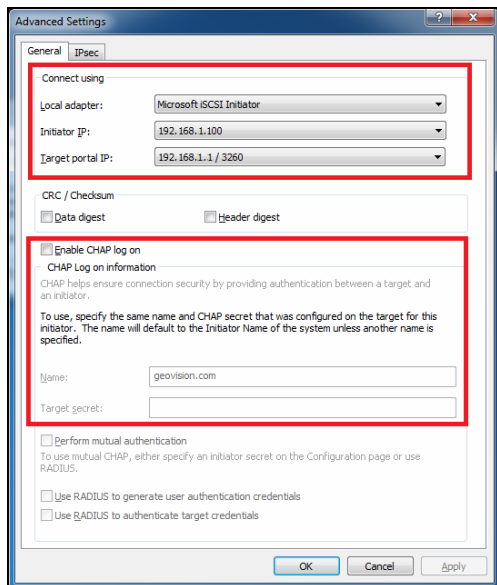
**Figure 8-4**

5. Select **Add this connection to the list of Favorite Targets** and click **Advanced**.



**Figure 8-5**

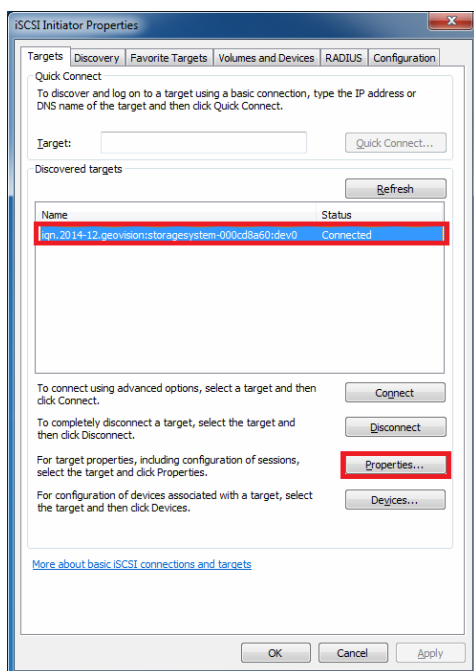
6. Select **Local Adaptor** to Microsoft iSCSI Initiator, select **Initiator IP** to the host IP and select **Target Portal** to iSCSI data port 1. If the CHAP authentication is enabled at the storage system, select **CHAP logon information** and type a valid username and target secret (password). Click **OK**.



**Figure 8-6**

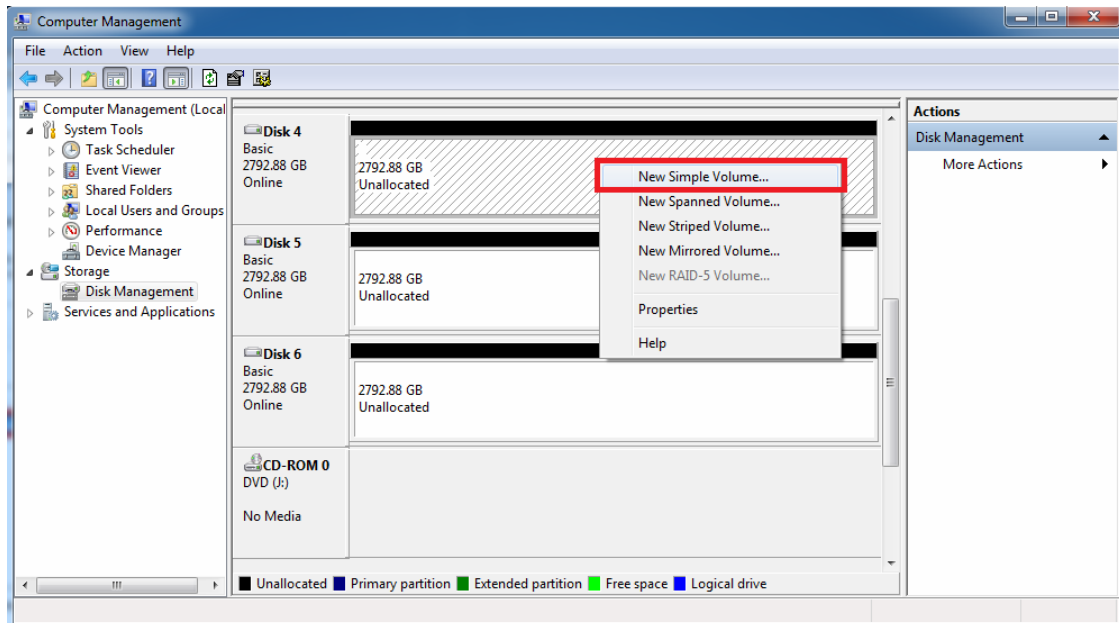
In the example of **Figure 8-6**, the Host IP address is 192.168.1.100. The iSCSI data port 1 of 192.168.1.1.

7. When the connection with the storage system is established, the status changes into “Connected”.



**Figure 8-7**

8. When connecting to the iSCSI disk for the first time, it is necessary to format it as well as a local disk. Run Windows **Disk Management** to configure a disk. Note the settings of the formatted partition should be **Basic disk storage** and **NTFS file system**.



**Figure 8-8**

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**Note:** If the HDD size exceeds 2 TB, right-click the disk and select **Convert to GPT Disk**.

---



8.1.2 Set up MCS

- 1. If running MC/S, please continue.
- 2. Select one target name, click **Properties**.
- 3. Click **MCS** to add additional connections.

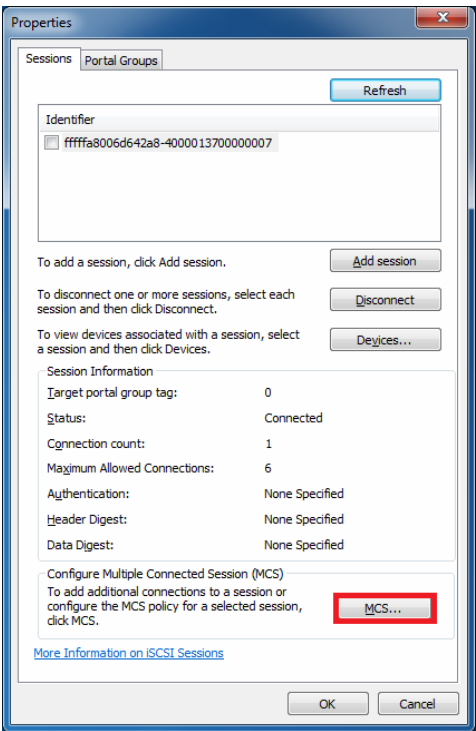


Figure 8-9

- 4. Click **Add**.

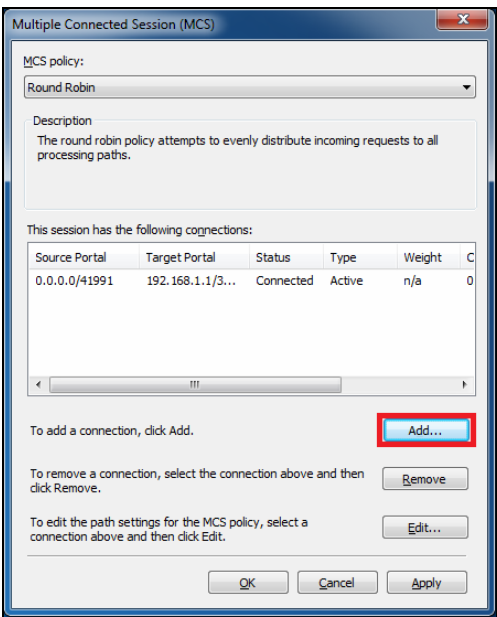
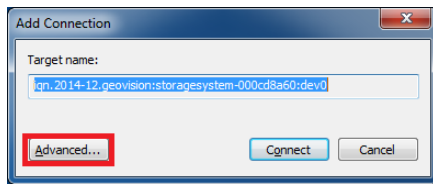


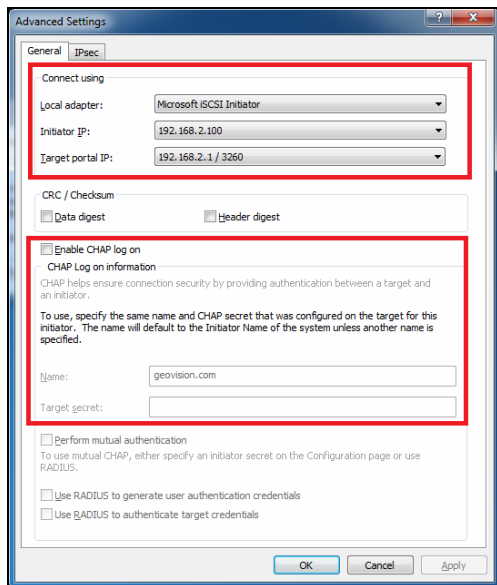
Figure 8-10

- Click **Advanced**.



**Figure 8-11**

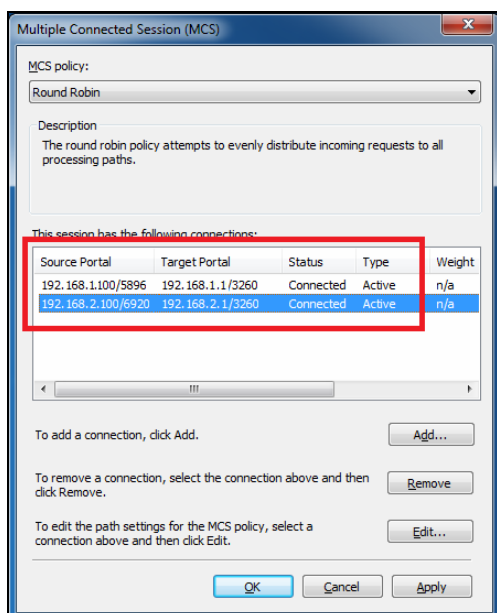
- Select **Target Portal** to iSCSI data port 2, set up the CHAP authentication if necessary and click **OK**.



**Figure 8-12**

In the example of **Figure 8-12**, the iSCSI data port 2 is 192.168.2.1.

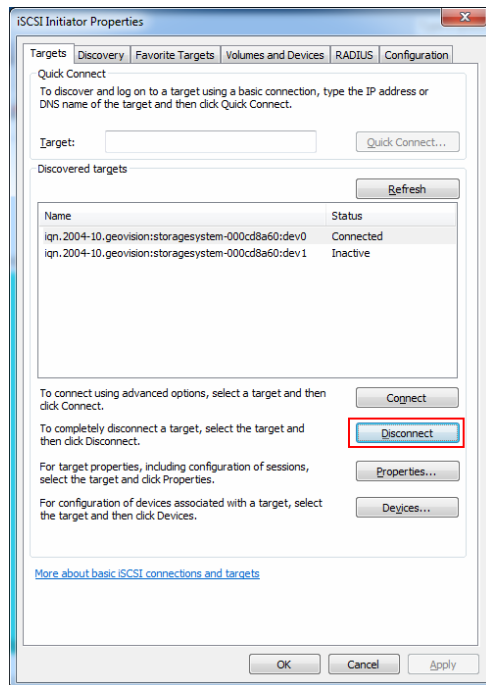
- Now you can see the status of both Source Portals display “Connected”. Click **Apply**.



**Figure 8-13**

### 8.1.3 Disconnect

1. Select the target name, click **Disconnect**, and then click **Yes**.



**Figure 8-14**

2. Done, the iSCSI device disconnect successfully.

# Specifications

## GV-Storage System V2

### System

CPU	Intel processor
RAM	4 GB DDR3 ECC
Management Port	RJ-45, 10 / 100 / 1000 Mbps
iSCSI Port	1 GbE iSCSI ports x 6
UPS Port	UPS port x 1 (phone jack to DB9 male)
SAS Port	6 Gbps SAS port x 1
No. of Hot Swap Drive Bays	24
HDD Type	SATA II / III
Power	Output: 550 W x 2 Input: 100 ~ 230V, 50 ~ 60 Hz
Fan	Hot pluggable and redundant fan x 3

### Physical

LED Indicator	Yes (Power, HDD, Status, Access)
Color	Black
Form Factor	4U 19 inch rackmount chassis
Dimensions (W x H x D)	481 x 176 x 550 mm / 19 x 7 x 22 in
Weight	34 kg / 75 lb (Diskless)
Regulatory	CE / FCC / BSMI /C-Tick / LVD

### Environment

Operating Temperature	0 ~ 40°C / 32 ~ 104 °F
Humidity	5 ~ 95% RH (non-condensing)

**Management**

<b>Management Method</b>	Web UI
<b>RAID Mode</b>	RAID 0 / 1 / 3 / 5 / 6 / 0+1 / 10 / 30 / 50 / 60, JBOD and N-way mirror
<b>Automatic RAID Creation</b>	Yes
<b>RAID Migration</b>	Yes
<b>RAID Expansion</b>	Yes
<b>Alert</b>	Email, SNMP, Windows Messenger, System Buzzer
<b>Security</b>	CHAP authentication
<b>HDD Health Detection</b>	S.M.A.R.T. diagnostics
<b>Language</b>	English / French / German / Japanese / Russian / Simplified Chinese

All specifications are subject to change without notice.

## GV-Expansion System

### System

<b>SAS Port</b>	6 Gbps SAS port x 2
<b>No. of Hot Swap Drive Bays</b>	24
<b>HDD Type</b>	SATA II / III
<b>Power</b>	Output: 550 W x 2 Input: 100 ~ 230V, 50 ~ 60 Hz
<b>Fan</b>	Hot pluggable and redundant fan x 3

### Physical

<b>LED Indicator</b>	Yes (Power, HDD, Status, Access)
<b>Color</b>	Black
<b>Form Factor</b>	4U 19 inch rackmount chassis
<b>Dimensions (W x H x D)</b>	481 x 176 x 550 mm / 19 x 7 x 22 in
<b>Weight</b>	34 kg / 75 lb (Diskless)
<b>Regulatory</b>	CE / FCC / BSMI / C-Tick / LVD

### Environment

<b>Operating Temperature</b>	0 ~ 40°C / 32 ~ 104 °F
<b>Humidity</b>	5 ~ 95% RH (non-condensing)

All specifications are subject to change without notice.

# Glossary and Acronym List

## Common Terminology

Item	Description
RAID	Redundant Array of Independent Disks. There are different RAID levels with different degree of data protection, data availability, and performance to host environment.
PD	The Physical Disk belongs to the member disk of one specific RAID group.
RG	RAID Group. A collection of removable media. One RAID group consists of a set of virtual disks and owns one RAID level attribute.
VD	Virtual Disk. Each RAID group could be divided into several virtual disks. The virtual disks from one RAID group have the same RAID level, but may have different volume capacity.
LUN	Logical Unit Number. A logical unit number (LUN) is a unique identifier which enables it to differentiate among separate devices (each one is a logical unit).
GUI	Graphic User Interface.
RAID cell	When creating a RAID group with a compound RAID level, such as 10, 30, 50 and 60, this field indicates the number of subgroups in the RAID group. For example, 8 disks can be grouped into a RAID group of RAID 10 with 2 cells, 4 cells. In the 2-cell case, PD {0, 1, 2, 3} forms one RAID 1 subgroup and PD {4, 5, 6, 7} forms another RAID 1 subgroup. In the 4-cells, the 4 subgroups are physical disk {0, 1}, physical disk {2, 3}, physical disk {4, 5} and physical disk {6,7}.
WT	Write-Through cache-write policy. A caching technique in which the completion of a write request is not signaled until data is safely stored in non-volatile media. Each data is synchronized in both data cache and accessed physical disks.
WB	Write-Back cache-write policy. A caching technique in which the completion of a write request is signaled as soon as the data is in cache and actual writing to non-volatile media occurs at a later time. It speeds up system write performance but needs to bear the risk where data may be inconsistent between data cache and the physical disks in one short time interval.

Item	Description
RO	Set the volume to be Read-Only.
DS	Dedicated Spare disks. The spare disks are only used by one specific RAID group. Others could not use these dedicated spare disks for any rebuilding purpose.
LS	Local Spare disks. The spare disks are only used by the RAID groups of the local enclosure. Other enclosure could not use these local spare disks for any rebuilding purpose.
GS	Global Spare disks. It is shared for rebuilding purpose. If some RAID groups need to use the global spare disks for rebuilding, they could get the spare disks out from the common spare disks pool for such requirement.
DG	DeGraded mode. Not all of the array's member disks are functioning, but the array is able to respond to application read and write requests to its virtual disks.
SCSI	Small Computer Systems Interface
SAS	Serial Attached SCSI
S.M.A.R.T.	Self-Monitoring Analysis and Reporting Technology
WWN	World Wide Name
HBA	Host Bus Adapter
SES	SCSI Enclosure Services
NIC	Network Interface Card
BBM	Battery Backup Module



**iSCSI / SAS Terminology**

Item	Description
iSCSI	Internet Small Computer Systems Interface
LACP	Link Aggregation Control Protocol
MPIO	Multi-Path Input/Output
MC/S	Multiple Connections per Session
MTU	Maximum Transmission Unit
CHAP	Challenge Handshake Authentication Protocol. An optional security mechanism to control access to an iSCSI storage system over the iSCSI data ports.
iSNS	Internet Storage Name Service
SAS	Serial Attached SCSI

## Appendix-Default Settings

The default settings for GV-Storage System V2 are detailed in this table.

Port Type	Field	Default Setting
Management Port	ID	admin
	Password	0000
	IP	192.168.0.199
	Subnet Mask	255.255.252.0
	HTTP port	80
	HTTPS port	443
iSCSI Port	Port 1	192.168.1.1
	Port 2	192.168.2.1
	Port 3	192.168.3.1
	Port 4	192.168.4.1
	Port 5	192.168.5.1
	Port 6	192.168.6.1
	Subnet Mask	255.255.255.0
	iSCSI port	3260