QNAP

QNAP SYSTEMS, INC.

EvoStor-1641CT
SCSI-to-SATA RAID Subsystem

User Manual

EvoStor-1641CT
User Manual (Version: 1.0)

CUSTOMER SERVICE

To obtain service or technical support for your system, please refer to the registration card for information.

LIMITED WARRANTY

In no event shall the liability of QNAP Systems, Inc. exceed the price paid for the product from direct, indirect, special, incidental, or consequential software, or its documentation. QNAP offers no refunds for its products. QNAP makes no warranty or representation, expressed, implied, or statutory, with respect to its products or the contents or use of this documentation and all accompanying software, and specifically disclaims its quality, performance, merchantability, or fitness for any particular purpose. QNAP reserves the right to revise or update its products, software, or documentation without obligation to notify any individual or entity.

CAUTION

1. There is a danger of explosion if battery is incorrectly replaced.
2. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instruction.
3. Should you return any components of EvoStor-1641CT package for refund or maintenance, make sure they are carefully packed for shipping. Any form of damages due to improper packaging will not be compensated.

Table of Contents

Chapter 1   EvoStor-1641CT Overview

1.1   Product Overview

EvoStor-1641CT (hereafter referred as EvoStor) external RAID system is designed to offer high performance, high reliability and low cost alternatives to SCSI to SATA RAID subsystems. It utilizes cost-effective SATA drives with simple storage setup and management process making it ideal for small to medium-sized companies and departments.

System Features

- Intel Xeon Processor
- Built-in 128 MB cache memory, expandable up to 1 GB
- Compatible with all SCSI-3 and SCSI-2/LVD host adapters up to 320 MB/s
- LCD panel for easy RAID configuration and status monitoring
- EvoStor Management Technology: Windows-based utility monitors status of RAIDs through in-band SCSI command, enable remote management
- Supports up to 16 hot-swappable SATA II hard drives
- Local audible event notification buzzer
- Real time drive activity and status indicators
- Supports RAID levels 0, 1, 3, 5 and NRAID
- Supports multiple logic volume creation, each logic volume could be configured as one RAID level independently
- Supports hot spare and automatic hot rebuild
- Transparent data transfer for all popular operating systems
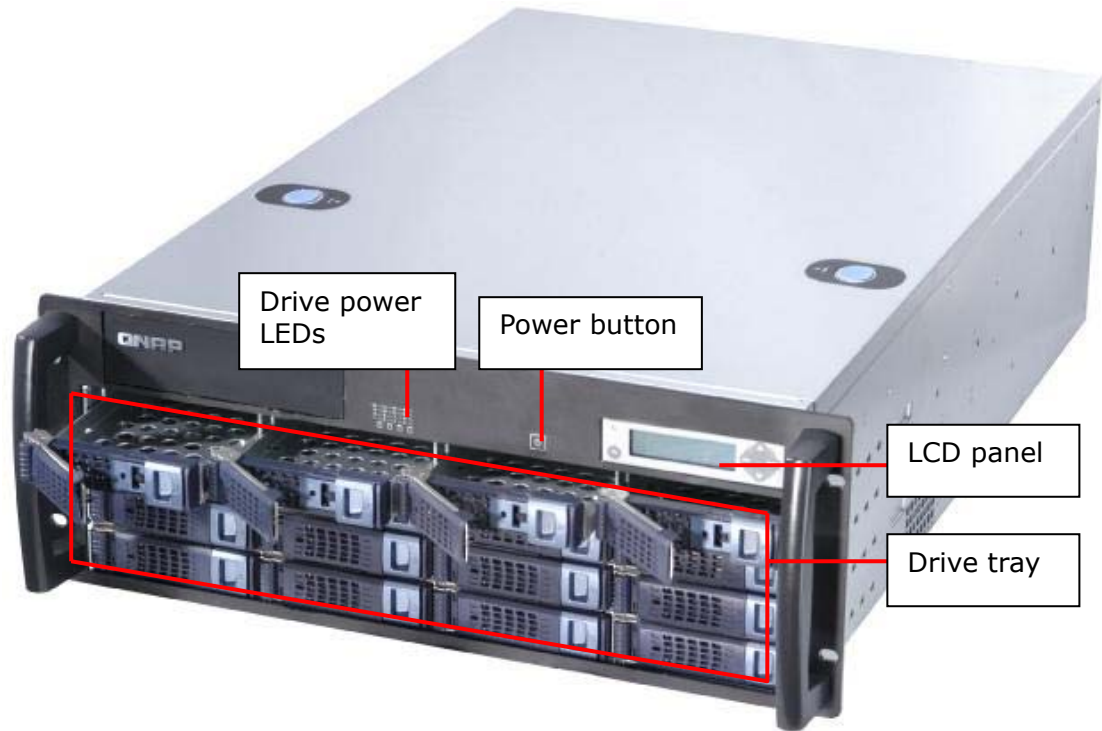
1.2   Package Contents

i. EvoStor-1641CT RAID system x 1
ii. SCSI U320 cable x 1
iii. Power cord x 3
iv. HDD tray screws x 64
v. RS-232 x 1
vi. CD-ROM (user manual included) x 1
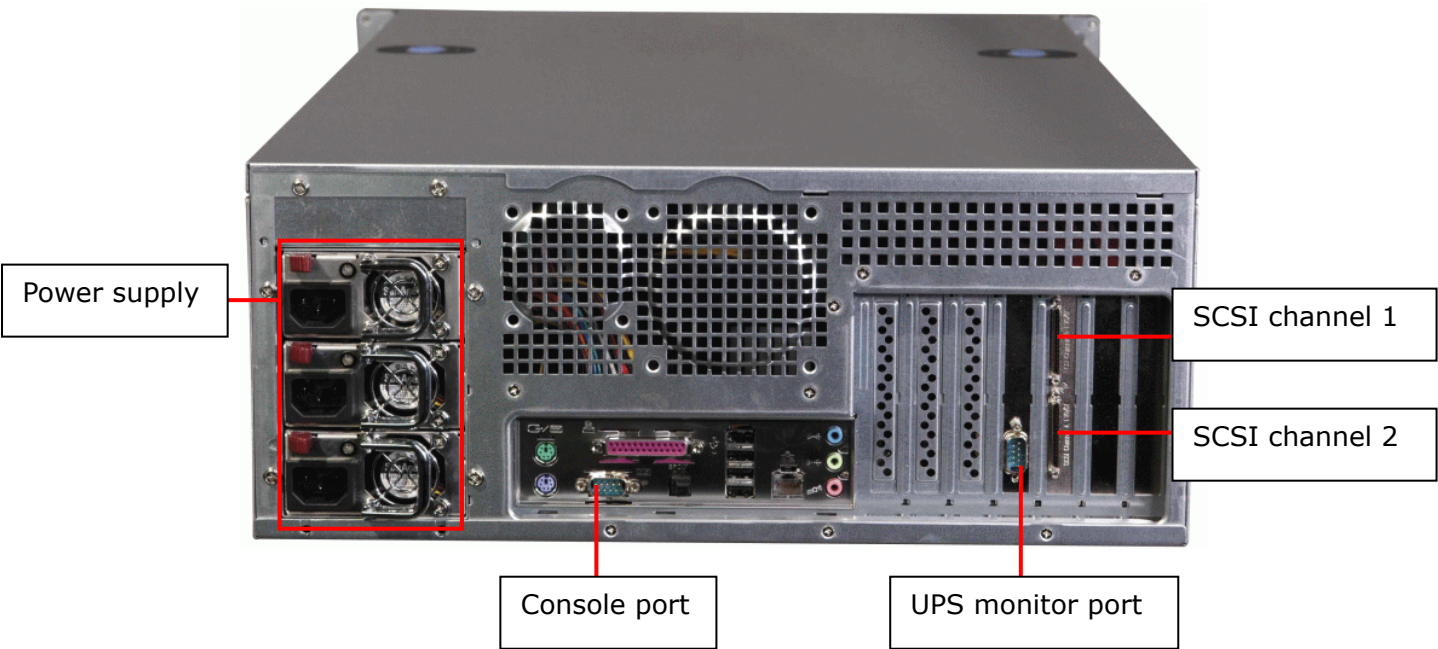
1.3   System Requirements

- An Ultra 320 SCSI host bus adaptor
- A personal computer installed with an O.S. that supports SCSI device access

1.4 System Overview

Front View

Drive power LEDs

Power button

LCD panel

Drive tray

Rear View

Power supply

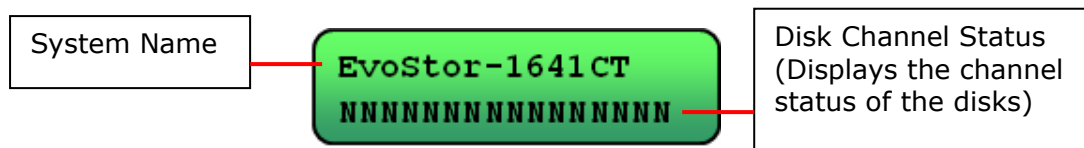SCSI channel 1

SCSI channel 2

Console port

UPS monitor port

Chapter 2   Installation

Follow the steps below to install EvoStor system:

1. Unpack EvoStor package.

2. Install hard disk. (Skip this step if a hard disk is included in the package).

3. Connect the power cable.

4. Turn on EvoStor. When the system is on, the following message will be
   displayed on the LCD panel.

System Name	EvoStor-1641CT NNNNNNNNNNNNNNNN	Disk Channel Status (Displays the channel status of the disks)

Note: Please refer to Appendix C for further information on symbols of disk channel status.

5. Set the SCSI ID for EvoStor via the LCD panel if the ID duplicates with other SCSI devices.

6. Create disk volume via the LCD panel. If you configure EvoStor as RAID 1, 3, or 5, the percentage of initialization will be shown. Complete initialization before proceeding to step 7.

```
Initializing LUN1
0.1% complete!
```
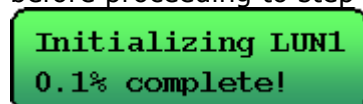
Note: Please select LUN0 as the ID for this logic volume, as some O.S. are not able to recognize logic volume ID other than LUN0. For information about creating more than one logic volume, please contact the O.S. distributor. For more details on Steps 5 and 6, please refer to Chapter 3.1.2.

7. Connect a SCSI terminator to EvoStor. Then connect EvoStor to the host computer via a SCSI cable.
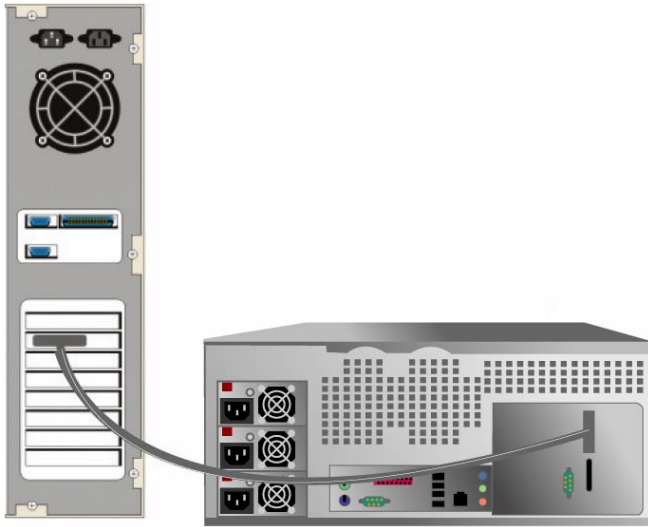

8. Turn on the host computer. In the startup screen of BIOS, it will be shown that EvoStor is detected. Note that if you create the logic volume on LUN0, EvoStor RAID Controller resided on LUN0 will not be shown.

```
LSI Logic Corp. Symbios SDMS (TM) V4.0 PCI SCSI BIOS, PCI Rev. 2.0, 2.1
Copyright 1995-2005 LSI Logic Corp.
PCI-4.17.00

HBA ID LUN VENDOR    PRODUCT          REV   SYNC  WIDE CYL/HD/SEC
--- -- --- -------- --------------- ---- ----- ---- -----------
0   0   0   EvoStor   RAID Controller
0   0   1   EvoStor   Logic Volume    320.0  16   1024/255/63
0   7   0   LSILogic 53C1030          0001 320.0 16
1   7   0   LSILogic 53C1030          0001 320.0 16
```

9. Skip the following steps if the above logic volume is resided on LUN0. After Windows starts, the Found New Hardware Wizard will appear.

Found New Hardware

EvoStor RAID Controller SCSI Processor Device
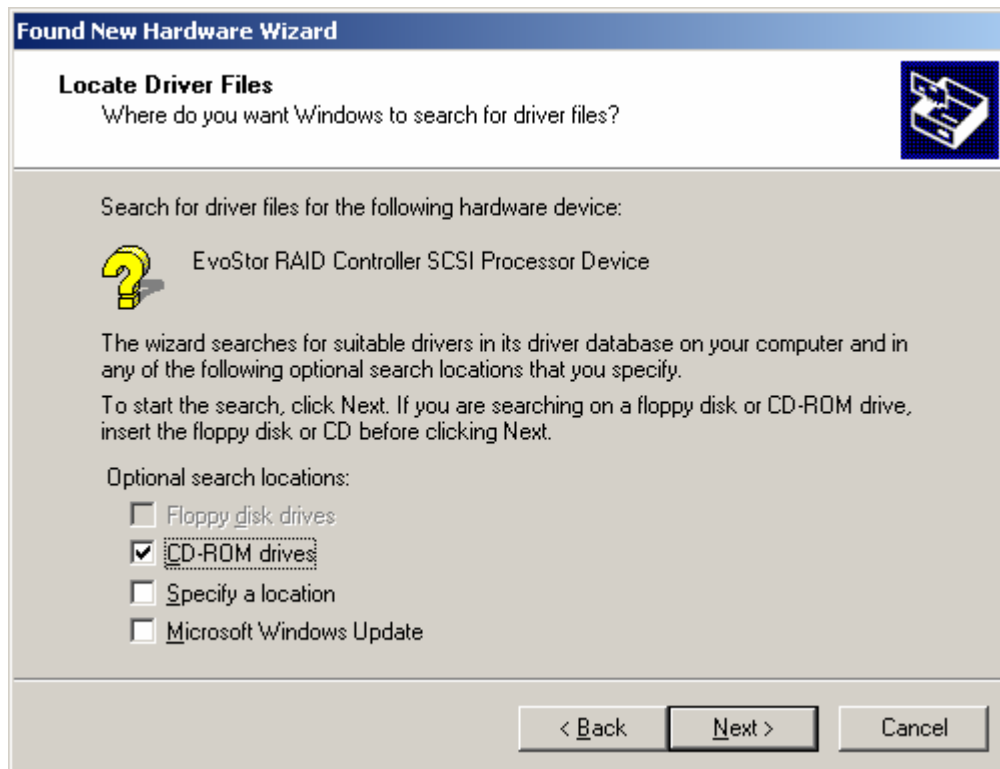
Please wait ...

8
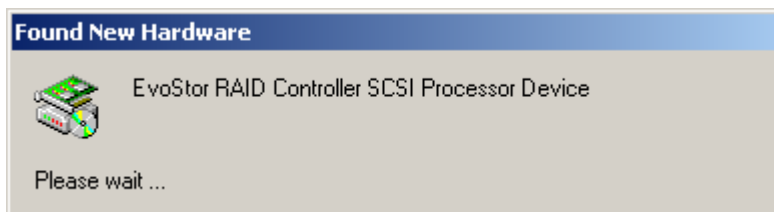
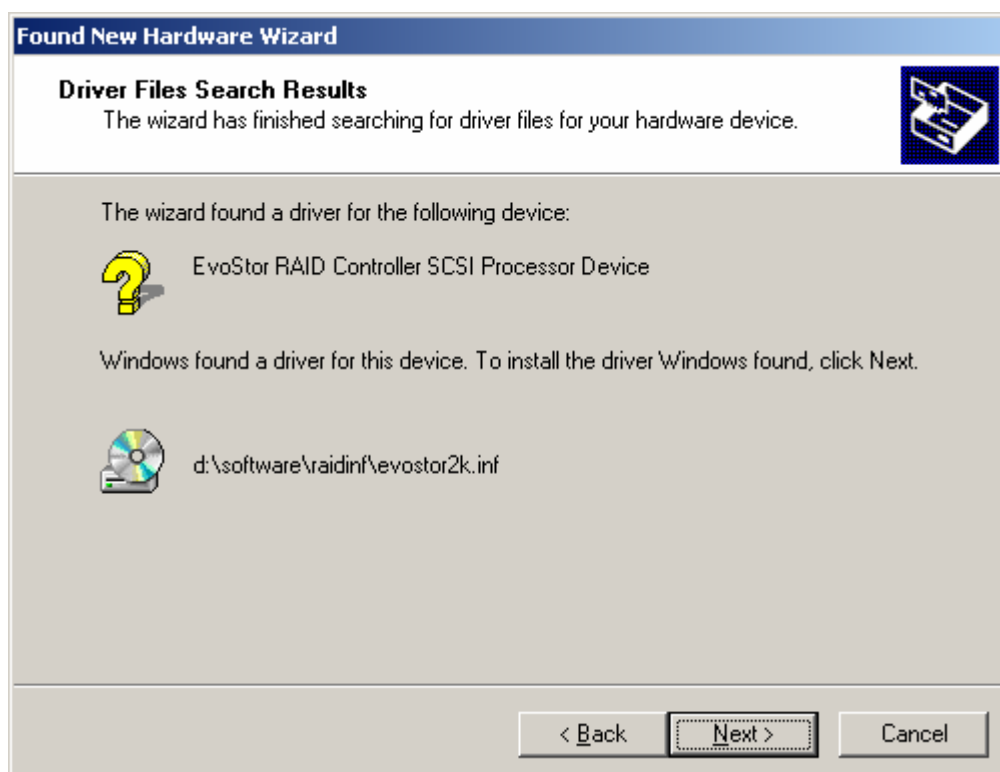10. In the Found New Hardware Wizard dialog box, click **Next**.

11. Insert the enclosed CD-ROM and select "Search for a suitable driver for my device (recommended)". Then click **Next**.

12. In Optional search locations, select CD-ROM drives and click **Next**.

13. The Found New Hardware Wizard will find the driver to install in the CD-ROM. Click **Next**.

14. Click **Finish** to complete the installation. Format EvoStor before using the system.
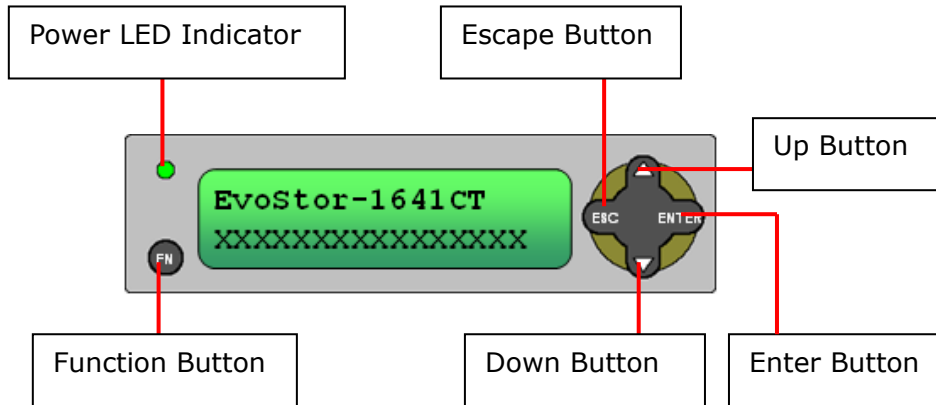

For information on EvoStor management software installation, please refer to Chapter 3.2.

Chapter 3   System Configuration

3.1   Configuring EvoStor via the LCD panel

The buttons and LED indicators of the LCD panel are described as below:

- Up and Down buttons: To navigate up and down to select the appropriate function.
- *Enter: To confirm the selection or enter a value.
- *ESC: To return to the previous menu.
- Function button: To enter system configuration menu.
- Power LED Indicator: The light will be on when power is connected.

*Note: The terms "Enter" and "ESC" mentioned in this chapter refers to the Enter button and the ESC button on the LCD panel respectively.

3.1.1 System Messages

To view system messages of EvoStor, press Enter on the LCD panel when the system is successfully turned on. Then press the Up and Down buttons to select the information you want to view. After that, press ESC to return to the previous menu. The following information is available currently:

Field	Description
Mute Beeper	Turn off the beeper of EvoStor
SCSI ID Info	Current SCSI ID of EvoStor
Volume Info	Available logic volume information
Disk Info	Physical disk model name and capacity
Hardware Status	System temperature, power and fan status
UPS Status	Display the UPS operation status
Show Log	Display operational events
Firmware Version	Firmware version of EvoStor

3.1.2 Configuring EvoStor

To configure the EvoStor, press Function button on the LCD panel when the system is successfully turned on. Then press the Up and Down buttons to select the function you want to configure. Each function requires an 8-character password for authentication. The default password is eight empty characters. After configuring the settings, press ESC to return to the previous menu. The following functions are available currently:

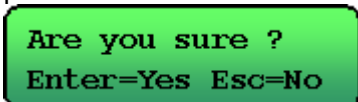| Field	Description
SCSI ID Set	Change the Target SCSI ID on dual channels
Create Volume	Construct a new logical volume from unused physical drives
Delete Volume	Remove existing logical volume from system
Create Spare	Add hot spare drives to the logical volume
Delete Spare	Remove hot spare drives from the logical volume
Activate Volume	Activate the incomplete logical volume
Set Clock Timer	Set up the current system clock
Change Password	Modify the password
Restore Config	Restore the default setting of SCSI ID and password
Configure UPS	Enable UPS function
Restart System	Reboot system
Shutdown System	Turn off system

- **Configure SCSI ID Set**

    1. Press the Function button and the LCD panel will display the following information. Press Enter to proceed.
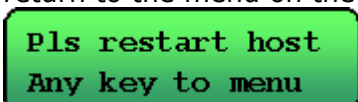

    2. Use the Up and Down buttons to enter the password. The following message will be shown. Press Enter to confirm or ESC to return to the previous menu.

    3. Use the Up and Down buttons to adjust the SCSI value and press Enter. Make sure the SCSI ID does not duplicate with that of other SCSI devices.

    4. Press the Enter button to confirm the SCSI value or press ESC to cancel.

    5. When completing the setting, restart the computer. Press any key to return to the menu on the LCD panel.
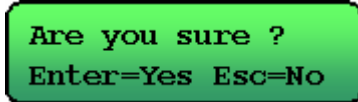
- **Create Volume**

    i. Press the Function button and use the Up and Down buttons to select Create Volume. Then press Enter.

    ```
    >Create Volume
     Delete Volume
    ```

    ii. Use the Up and Down, and Enter buttons to enter password. When finished, the following message will be displayed. Press Enter to confirm the setting or ESC to cancel.

    ```
    Are you sure ?
    Enter=Yes Esc=No
    ```

    iii. You can further configure the volume with the following advanced options:

Advanced Setting	Description	Sub-menu
Volume ID	The ID number of logic volume	LUN 0~LUN 31 (Logic Unit Number)
RAID Level	RAID level	NRAID, RAID 0, 1, 3 and 5
Spare Disks	Spare disks of EvoStor	Select spare disk
Data Disks	Data disks of EvoStor	Select data disks
Stripe Size	The size of striped block	4, 8, 16, 32, 64, and 128K
Create LUN Now	Create logic volume instantly	Yes or No

    Use the Up and Down buttons to select the configuration item and press Enter to proceed to the sub-menu.

    iv. Use the Up and Down buttons to select the value and press Enter to confirm.

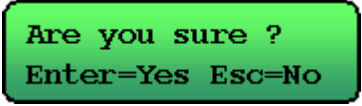   v. When finished, restart the computer. Press any button to return to the menu.

- **Delete Volume**

    i. Press the Function button and use the Up and Down buttons to select
    Delete Volume. Press Enter to proceed.

    ```
    >Delete Volume
     Set Clock Timer
    ```

    ii. Use the Up and Down, and the Enter buttons to enter the password.
    When finished, the following message will be displayed on the LCD panel:

    ```
    Are you sure ?
    Enter=Yes Esc=No
    ```

    iii. Use the Up and Down buttons to select the appropriate option. Then press
    Enter to confirm.

    iv. Press Enter to confirm and return to the main menu or press ESC to cancel.

    ```
    Del Volume 1 ?
    Enter=Yes Esc=NO
    ```

- **Create Spare**

    i. Press the Function button and the LCD panel will display the following information. Press Enter to proceed.

    ```
    >Create Spare
     Delete Spare
    ```

    ii. Use the Up and Down buttons to enter the password. The following message will then be shown:

    ```
    Are you sure ?
    Enter=Yes Esc=No
    ```
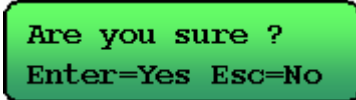
    Press Enter to confirm or ESC to return to the previous menu.

    iii. You can further create the spare disks with the following advanced options:

Advanced Setting	Description	Sub-menu
Volume ID	The ID number of logic volume	The available identifier of LUN
Spare Disks	Spare disks of EvoStor	Select spare disk
Attach LUN Now	Create local spare instantly	Yes or No

    Use the Up and Down buttons to select the configuration item and press Enter to proceed to the sub-menu.

    iv. Use the Up and Down buttons to select the value and press Enter to confirm.

- **Delete Spare**

    i. Press the Function button and the LCD panel will display the following information. Press Enter to proceed.

    ```
    >Delete Spare
     Activate Volume
    ```

    ii. Use the Up and Down buttons to enter the password. The following message will then be shown:

    ```
    Are you sure ?
    Enter=Yes Esc=No
    ```
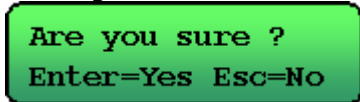
    Press Enter to confirm or ESC to return to the previous menu.

    iii. You can further delete the spare disks with the following advanced options:

Advanced Setting	Description	Sub-menu
Spare Disks	Spare disks of EvoStor	Select spare disks

    Use the Up and Down buttons to select the configuration item and press Enter to proceed to the sub-menu.

    iv. Use the Up and Down buttons to select the value and press Enter to confirm.
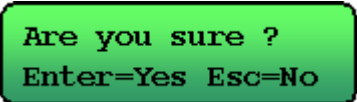
- **Activate Volume**

  i. Press the Function button and the LCD panel will display the following information. Press Enter to proceed.

  ```
  >Activate Volume
   Set Clock Timer
  ```

  ii. Use the Up and Down buttons to enter the password. The following message will be shown:

  ```
  Are you sure ?
  Enter=Yes Esc=No
  ```

  Press Enter to confirm or ESC to return to the previous menu.

  iii. You can further activate the volume with the following advanced options:

Advanced Setting	Description	Sub-menu
Volume ID	The ID number of logic volume	The available identifier of LUN

  Use the Up and Down buttons to select the configuration item and press Enter to proceed to the sub-menu.

  iv. Use the Up and Down buttons to select the value and press Enter to confirm.

- **Set Clock Timer**

  i. Press the Function button, and Up and Down buttons to select Set Clock Timer. Then press Enter to proceed.

  ```
  >Set Clock Timer
   Change Password
  ```

  ii. Use the Up and Down, and the Enter buttons to enter the password. When finished, the following message will be displayed. Press Enter to confirm or ESC to exit.

  ```
  Are you sure ?
  Enter=Yes Esc=No
  ```

  iii. Set the time and press Enter to confirm.

  iv. Press Enter to save the time or ESC to exit.

  ```
  Save Time Now ?
  Enter=Yes Esc=No
  ```

- **Change Password**

    i. Press Enter and the Up and Down buttons to select Change Password. Then press Enter to proceed.

    ```
    >Change Password
     Restore Config
    ```

    ii. Enter the password. The following message will be displayed on the LCD panel. Press Enter to confirm or ESC to exit.

    ```
    Are you sure ?
    Enter=Yes Esc=No
    ```

    iii. Enter the new password and press Enter.

    ```
    New Password
    ▄
    ```

    iv. Press Enter to save the new password or ESC to exit.

    ```
    Save Pwd now ?
    Enter=Yes Esc=No
    ```
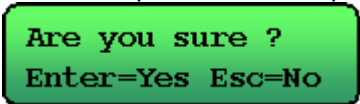
- **Restore Configuration**

    i. Press the Function button and select Restore Config.

    ```
    >Restore Config
     Restart System
    ```

    ii. Enter the password and press Enter to confirm.

    ```
    Are you sure ?
    Enter=Yes Esc=No
    ```

    iii. Wait for the system to restart.

    ```
    Restoring Config
    System Restart..
    ```

    Note: The password will not be restored when selecting restoring configuration. To restore the password to default, refer to Chapter 5.5.

- **Configure UPS**

  ➢ **Enable UPS**
     i. Press the Function button and the LCD panel will display the following information. Press Enter to proceed.
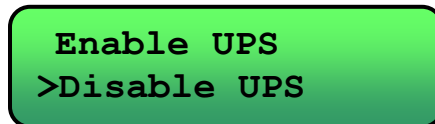
     ```
     >Configure UPS
      Restart System
     ```

     ii. Use the Up and Down buttons to enter the password. The following message will then be shown. Press Enter to confirm or ESC to return to the previous menu.
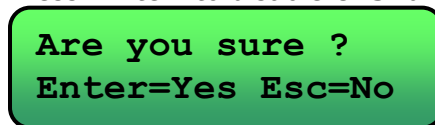
     ```
     Input Password:
     ```

     iii. Select "Enable UPS" to enable UPS function.

     ```
     >Enable UPS
      Disable UPS
     ```

     iv. Input "Alive Setting" value to set the automatic shutdown timer after power loss.

     ```
     Alive Setting
     01 Minutes
     ```
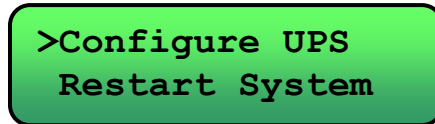
     v. Press Enter to enable UPS function.

     ```
     Are you sure ?
     Enter=Yes Esc=No
     ```

➢ **Disable UPS**
   i. Press the Function button and the LCD panel will display the following information. Press the Enter button to proceed. Select "Configure UPS".

   ```
   >Configure UPS
     Restart System
   ```

   ii. Use the Up and Down buttons to enter the password. The following message will then be shown. Press Enter to confirm or ESC button to return to the previous menu.

   ```
   Input Password:
   ```

   iii. Select "Disable UPS"

   ```
     Enable UPS
   >Disable UPS
   ```

   iv. Press "Enter" to disable UPS function.

   ```
   Are you sure ?
   Enter=Yes Esc=No
   ```

- **Restart System**
  i. Press the Function switch and select Restart System. Press Enter to confirm.

  ```
  >Restart System
   Shutdown System
  ```

  ii. Enter the password and press Enter to confirm. To quit, press ESC.

  ```
  Are you sure ?
  Enter=Yes Esc=No
  ```

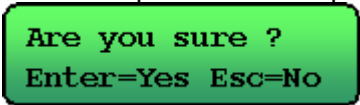 iii. Wait for the system to restart.

  ```
  Restarting
  System..
  ```

- **Shut down System**

  i. Press the Function button and select Shutdown System. Then press ESC to proceed.

  ```
  >Shutdown System
   SCSI ID Set
  ```

  ii. Enter the password and press Enter to confirm.

  ```
  Are you sure ?
  Enter=Yes Esc=No
  ```

  iii. The system will shut down and the following message will be shown.

  ```
  Shutdown System.
  ..
  ```

3.2 Using EvoStor Management Utilities

Besides configuration via the LCD panel, you can also configure EvoStor via the management utilities included in the CD-ROM. The utilities are:
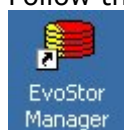
- **EvoStor Manager**
  EvoStor Manager is a GUI software which provides system monitoring and configuration functions via the Internet. Run EvoStor Agent before running EvoStor Manager.

- **EvoStor Agent**
  EvoStor Agent works as a communication means between EvoStor and EvoStor Manager. It receives management request from EvoStor Manager in the Internet and transfers the request to SCSI command of EvoStor to provide remote management and monitoring functions.

3.2.1 EvoStor Management Software (EvoStor Manager)

1. Run Install EvoStor Manager in the enclosed CD-ROM.

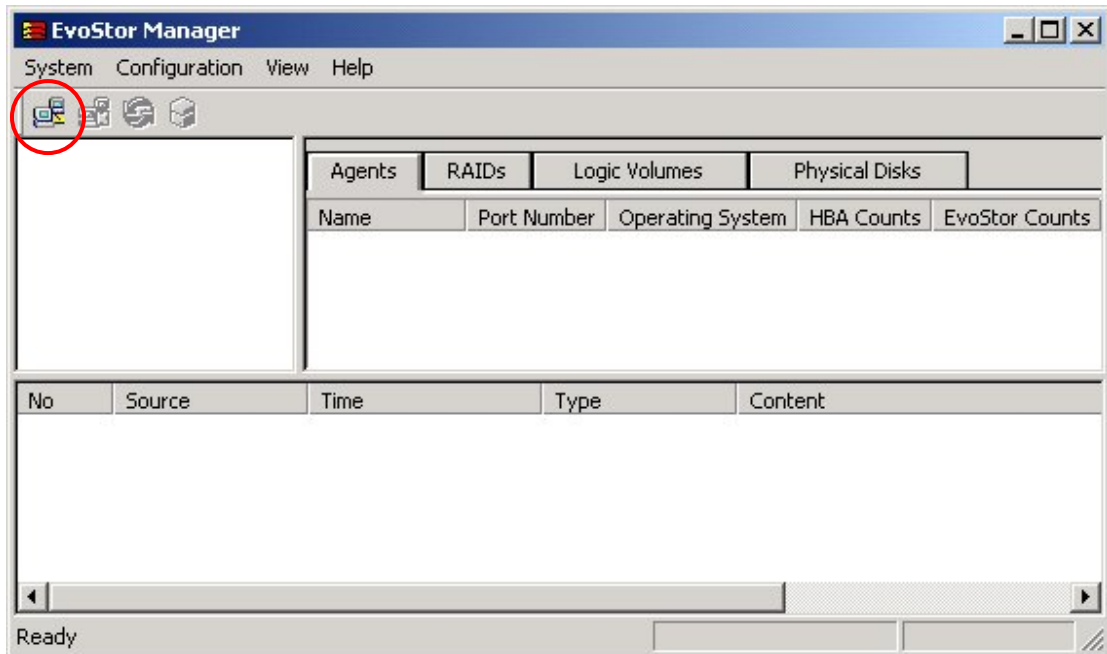2. Follow the instructions to complete the installation. When finished, a shortcut will be created on the desktop.

- **Using EvoStor Manager**

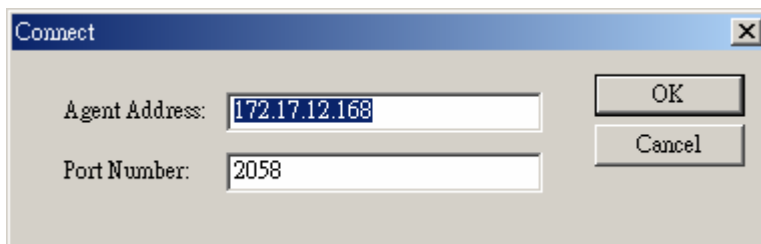   Run EvoStor Manager, the following screen will pop up. Click the Connect icon
    [icon] or select Connect in System.

    Enter the agent address, e.g. 172.17.12.168 and port number (default value:
   2058). Then click OK.

    Note: The port number must be the same as that preset by EvoStor Agent for
    successful connection. For further details on port number configuration of
    EvoStor Agent, please refer to Chapter 3.2.2.

    Note: The port number of EvoStor Manager must be the same as that of
    EvoStor Agent for successful connection.

- **Monitoring Page Overview**

  Upon successful connection, the following screen will be displayed:
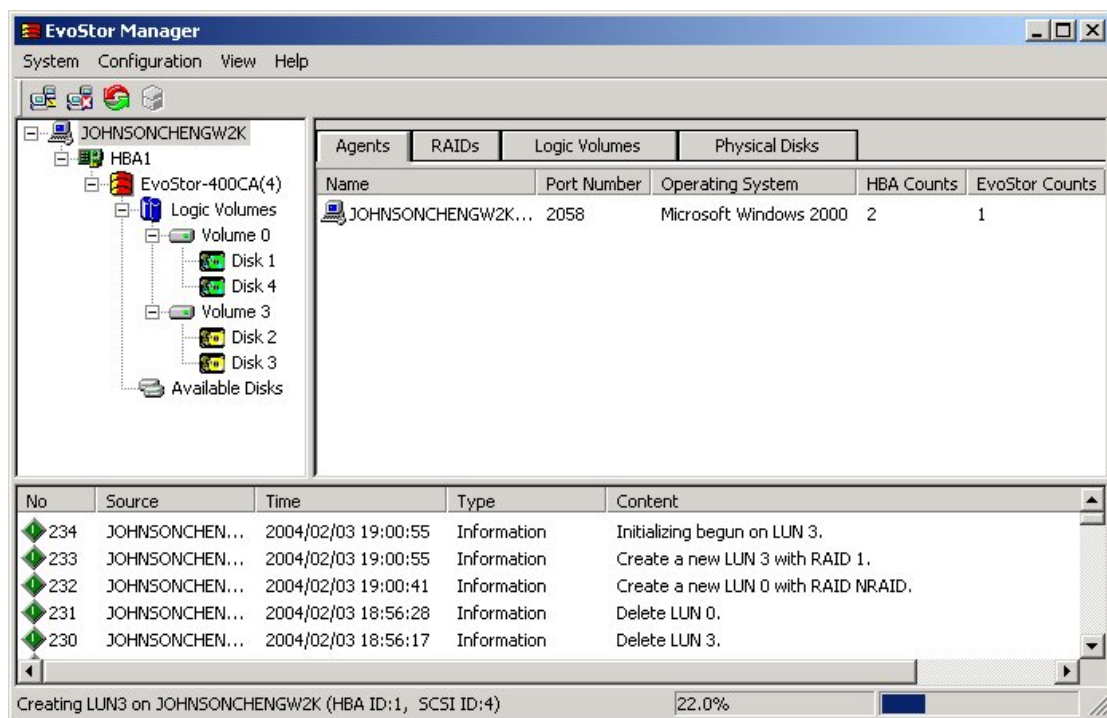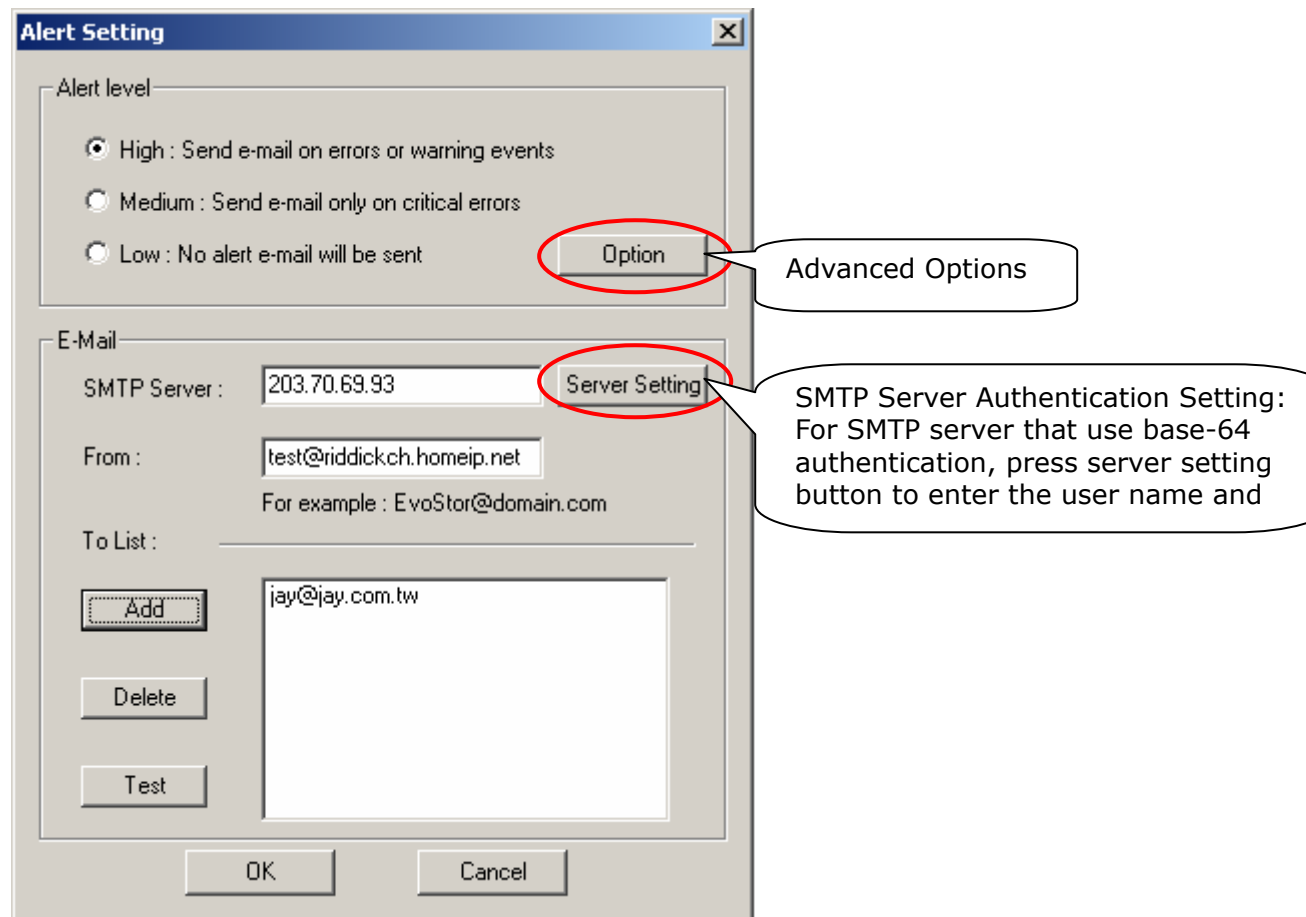
Four options in the main menu:

1. System

Manager Menu Options

- ✓ Connect: To establish connection with EvoStor.
- ✓ Disconnect: To disconnect from EvoStor.
- ✓ Alert Setting: To specify the alert level for sending notification email and the recipients.

Click Option and the window below will be shown:

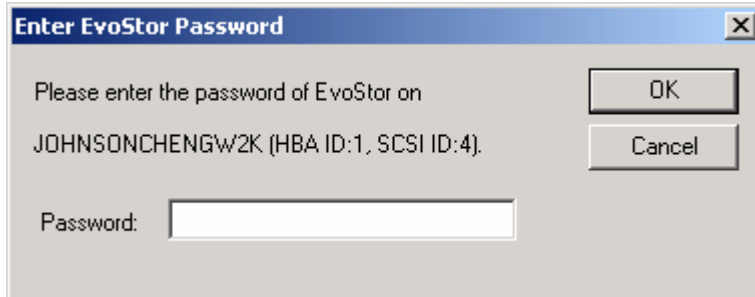| Field	Option
Type	Alert type: warning or error messages.
Interval	Time interval for sending an alert mail.
Range	Monitoring items and the safety range, including voltage, CPU temperature (℃), system temperature (℃), and fan speed.

Alert emails will be sent to particular recipients when the values of the items being monitored are out of the safety range.

✓ Upgrade Firmware: To upgrade the firmware version.
✓ Rescan: Enable this option to detect the status of connection to Agent.
✓ Save Log As: To back up event logs.
✓ Clear All Logs: To clear all event logs.
✓ Exit: To exit the monitoring page and EvoStor Manager.

2. Configuration

A password must be entered when modifying any setting in Configuration. The default password is 8 empty characters. Hence, you can press Enter directly.

The options include:

✓ SCSI ID Setting: Set SCSI ID.

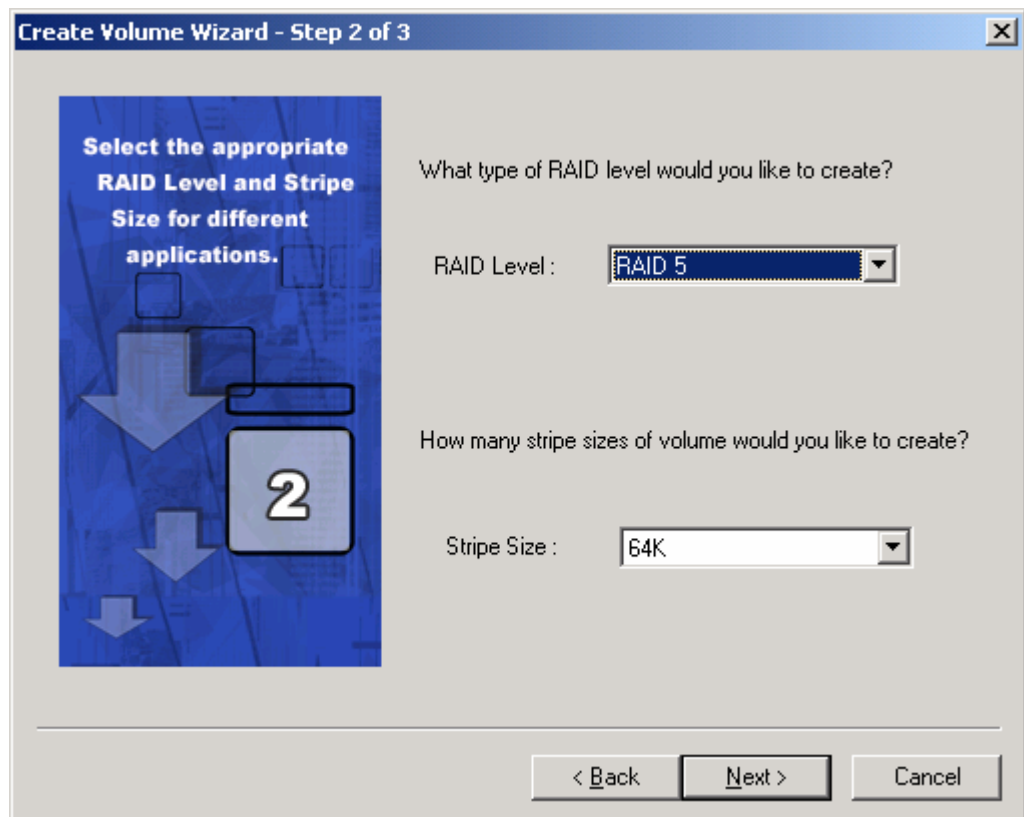
✓ Create Logic Volume

Follow the steps below to create logic volume for EvoStor:

i. Select logic volume ID.

Note: Please select LUN0 as the ID for EvoStor, as some O.S. are not able to recognize logic volume ID other than LUN0. For information about creating more than one logic volume, please contact the O.S. distributor.
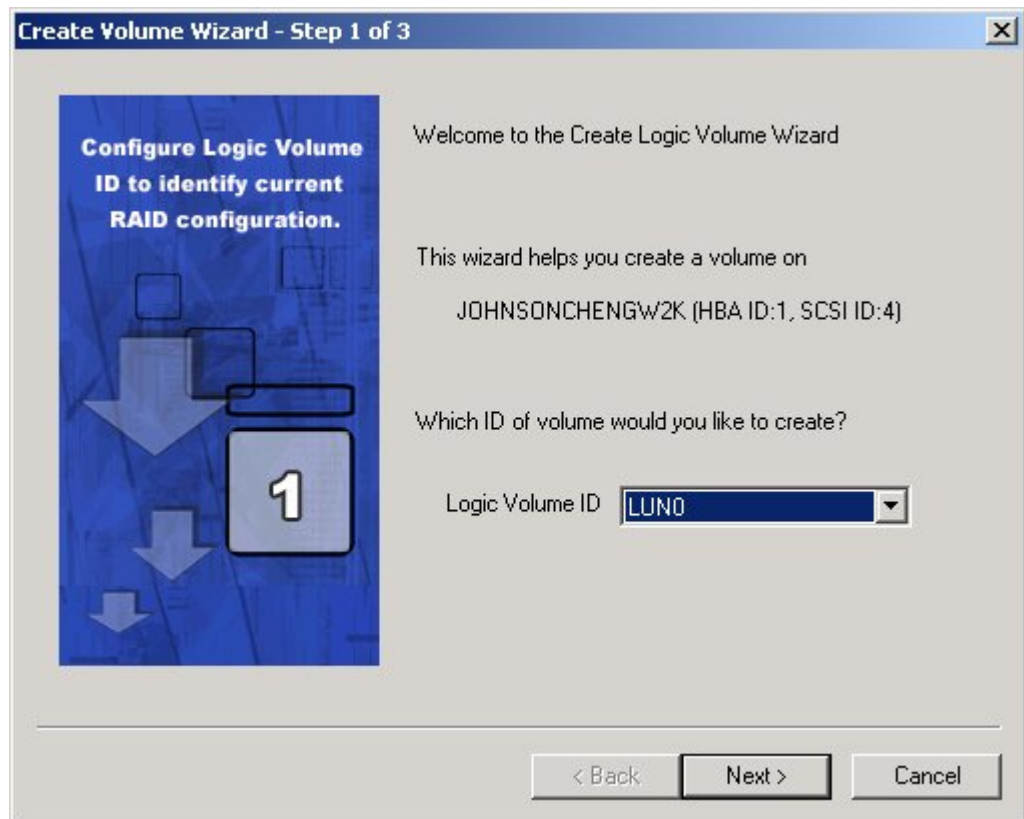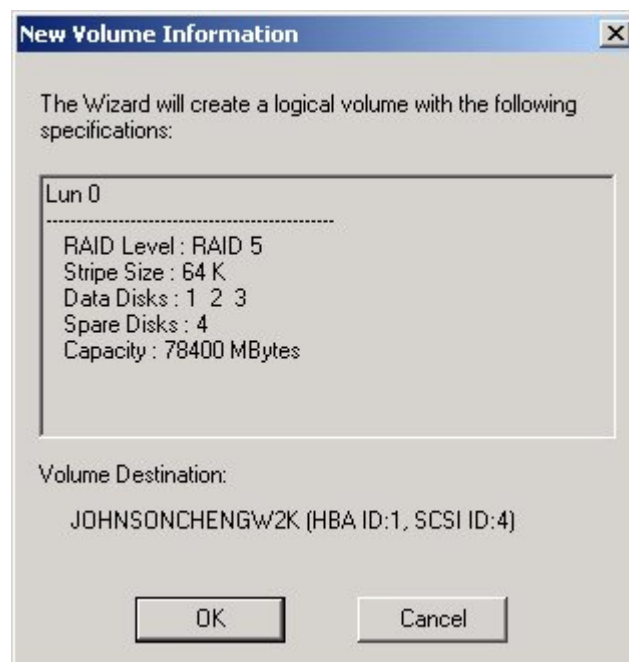
ii. Select the RAID level and stripe size to create for EvoStor.

iii. Select the data and spare disk(s) to create for a volume. Then click Finish.
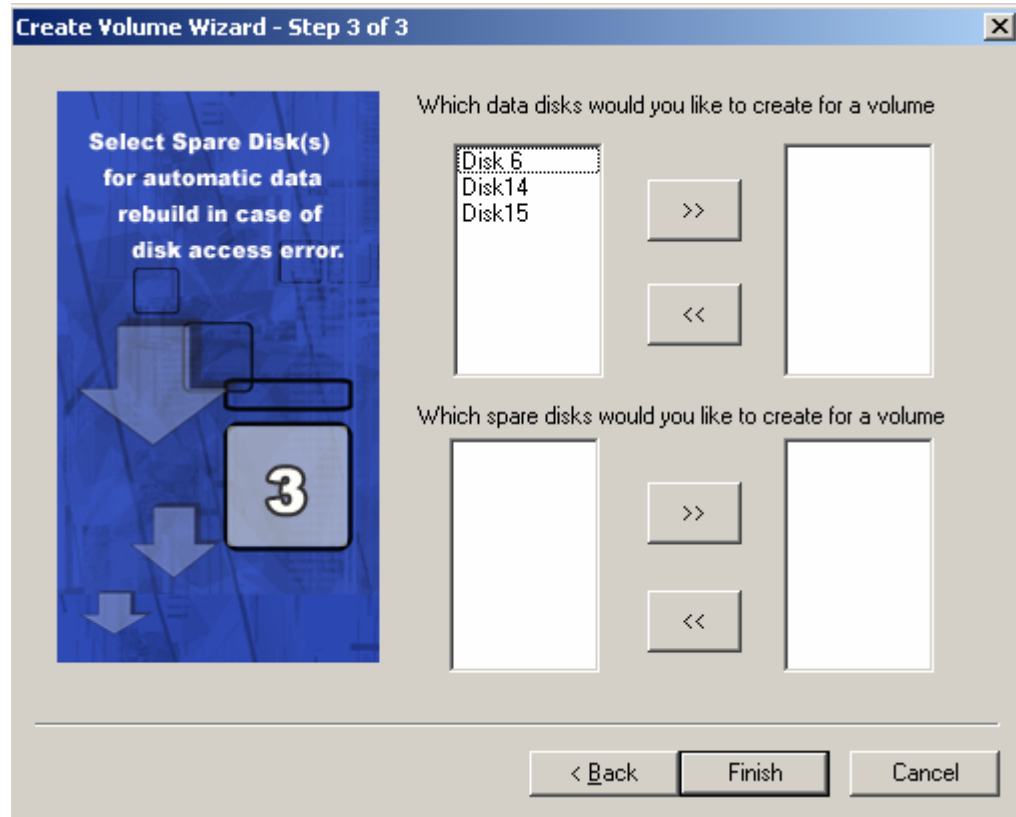
iv. When finished, the following screen will be shown to display new volume information.

v. When the system is being configured and begins to initialize logic volumes, the number of percentage for initialization will be displayed on the tool bar.

Creating LUN0 on JOHNSONCHENGW2K (HBA ID:1, SCSI ID:4)　　3.2%

Field	Option
Logic Volume	Select logic volume (LUN 0~31)
Member Disks	Spare Disks: Configure spare disks
	Data Disks: Configure data disks

✓ Delete Logic Volume: To remove logic volume.

✓ Change password: To change password.

Change Password

Change password of EvoStor on JOHNSONCHENGW2K (HBA ID:1, SCSI ID:4).

Old Password:

New Password:

Confirm Password:

OK

Cancel

3. View

Select the items to view in Manager Menu. Available options include:

✓ Agents:

Field	Description
Name	The server name running EvoStor Agent.
Port Number	The TCP port number for Manager/Agent connection.
Operating System	The OS of the server running EvoStor Agent.
HBA Counts	The number of ASPI interface cards supported by the server.
RAID Counts	The number of EvoStor connected to this agent.

✓ RAIDS:

Field	Description
Model Name	EvoStor model
Agent	The server running EvoStor Agent
HBA ID	The ID of SCSI adaptor connected by EvoStor
SCSI ID	The SCSI ID of EvoStor
Firmware Version	EvoStor firmware version
Power	The voltage value of EvoStor 5V and 3.3V
Fan	Fan speed
Temperature	The CPU temperature and system temperature of EvoStor

✓ Logic Volumes:

Field	Description
Logic Volume ID	The ID number of logic volume
Agent	The server running EvoStor Agent
HBA ID	The ID of SCSI adaptor connected by EvoStor
SCSI ID	The SCSI ID of EvoStor
Status	Status of EvoStor: • Degrading • Initializing • Ready • Rebuilding • Error
RAID Level	RAID level configured for EvoStor
Data Disks	The data disk ID number of EvoStor
Spare Disks	The spare disk ID number of EvoStor
Capacity	The capacity of logic volume

✓ Physical Disks

Field	Description
Disk ID	The slot ID of hard disk
Agent	The server running EvoStor Agent
HBA ID	The ID of SCSI adaptor connected by EvoStor
SCSI ID	The SCSI ID of EvoStor
Logic Volume ID	The logic volume ID of EvoStor
Status	Status of hard disk: ● Degrading ● Error ● Initializing ● On line ● Off line ● Rebuilding ● Vacant
Model Name	The model name of hard disk
Capacity	The disk capacity of hard disk

4. Help

The version number of EvoStor Manager will be shown:
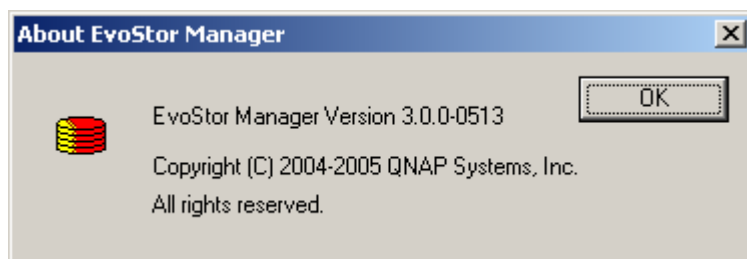
3.2.2 EvoStor Agent

Run Install EvoStor Agent in the enclosed CD-ROM.

Follow the instructions to complete the installation. A shortcut will be created on the desktop .

Note: You will be prompted to install ASPI (Advanced SCSI Programming Interface) if it has not been installed to the PC. Restart the PC after installation. For further details, please refer to Appendix A.

● **Using EvoStor Agent**

When EvoStor Agent is installed, it will be run every time when Windows starts up. An icon will be created in the toolbar.
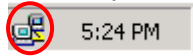
Right click the icon and choose to stop or exit EvoStor Agent.

Stop: Stop the functions of EvoStor Agent. The communication and processing between EvoStor Agent and EvoStor will stop. Right click the mouse and a list will be displayed:
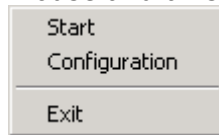
i.   Start: To restart EvoStor Agent. EvoStor Agent will accept and process the commands between EvoStor Manager and EvoStor.

ii.   Configuration: To configure the parameters of EvoStor Agent. The available parameters are shown in the following screen:
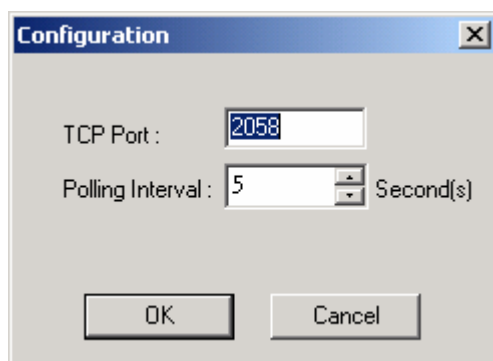
TCP Port: The TCP port number for EvoStor service. The default value is 2058. Make sure the port number is the same as the one entered for EvoStor Manager connection.

Polling Interval: The time interval for EvoStor Agent to inquire RAID status. The default value is 5 seconds. Setting the time interval too small will affect system performance.

iii. Exit: Shut down EvoStor Agent. The agent icon will be removed from the toolbar. You need to run the agent again from the desktop.

Exit: Same as the above exit function.

Chapter 4   Accessing EvoStor

EvoStor emulates a standard SCSI-3 direct access device (hard disk) to host, it is compatible with all SCSI-3 or SCSI-2/LVD host adapters, so no special access software for specific operating system is required. Like any other type of fixed disk media in your system, a RAID must also be partitioned and formatted before use. The method of partitioning and formatting on a RAID is the same as that for other disks. The following sections provide a brief overview on how to access EvoStor in Windows 2000 and Red Hat Linux operating system. For other operating system, please contact your operating system supplier for further information.

4.1   Using Microsoft® Windows 2000

i. Detecting new drive

Right click **My Computer** on the desktop and select **Manage**. Select **Disk Management** when the following screen pops up, the computer will detect the new logical disk. If there is an existing hard disk, the newly detected one will be numbered as disk 1.
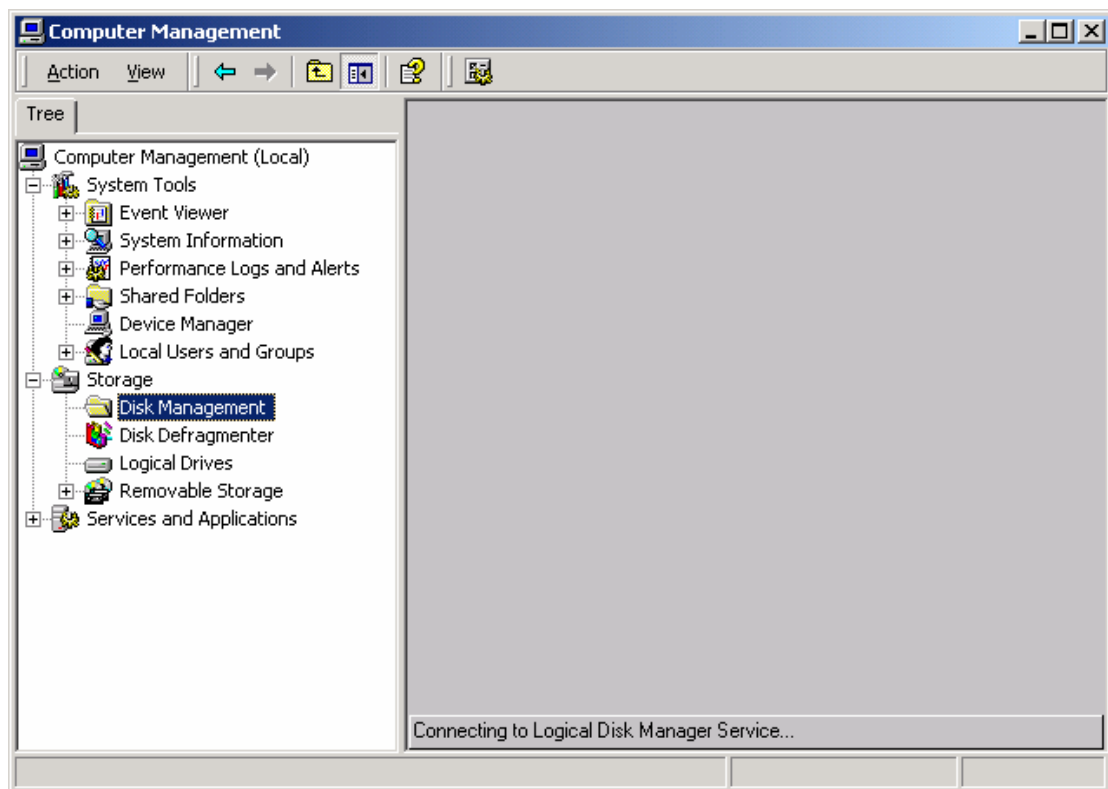
ii. Writing Signature

Before using new disk, the host computer will prompt for writing signature for the newly detected disk. Click **Next** to proceed.
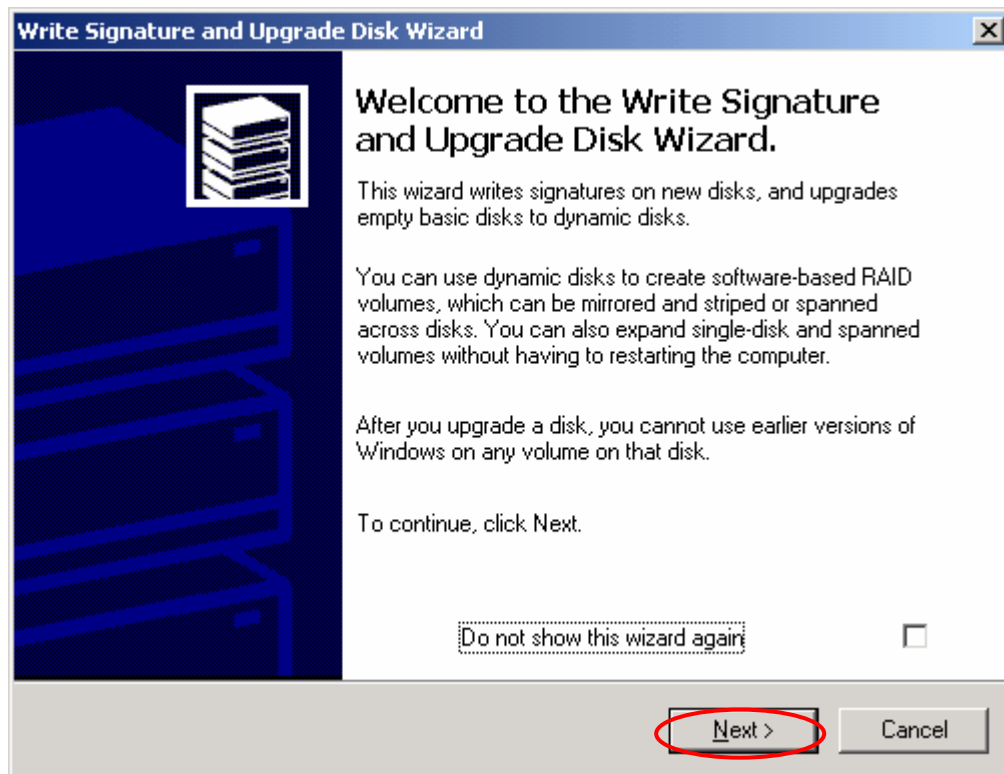
iii. The following example is based on Disk 1. Select Disk 1 and click **Next**.
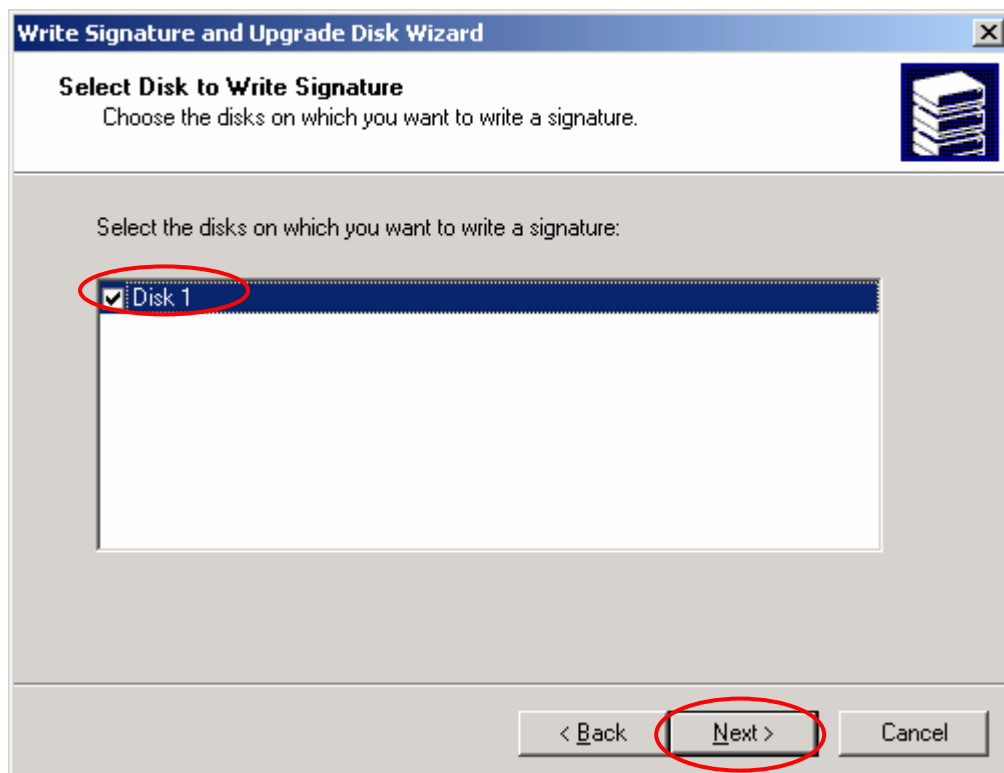
iv. Click **Finish** to complete writing signature for Disk 1. Do not select to upgrade the disk.
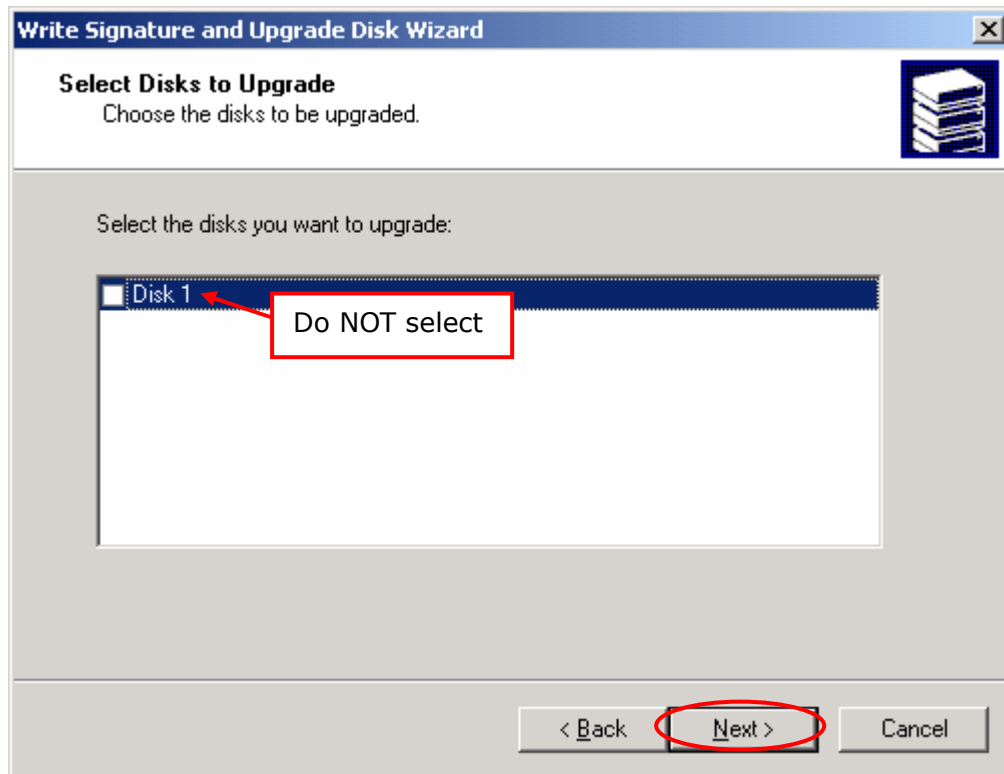
v. Click **Finish** to complete.
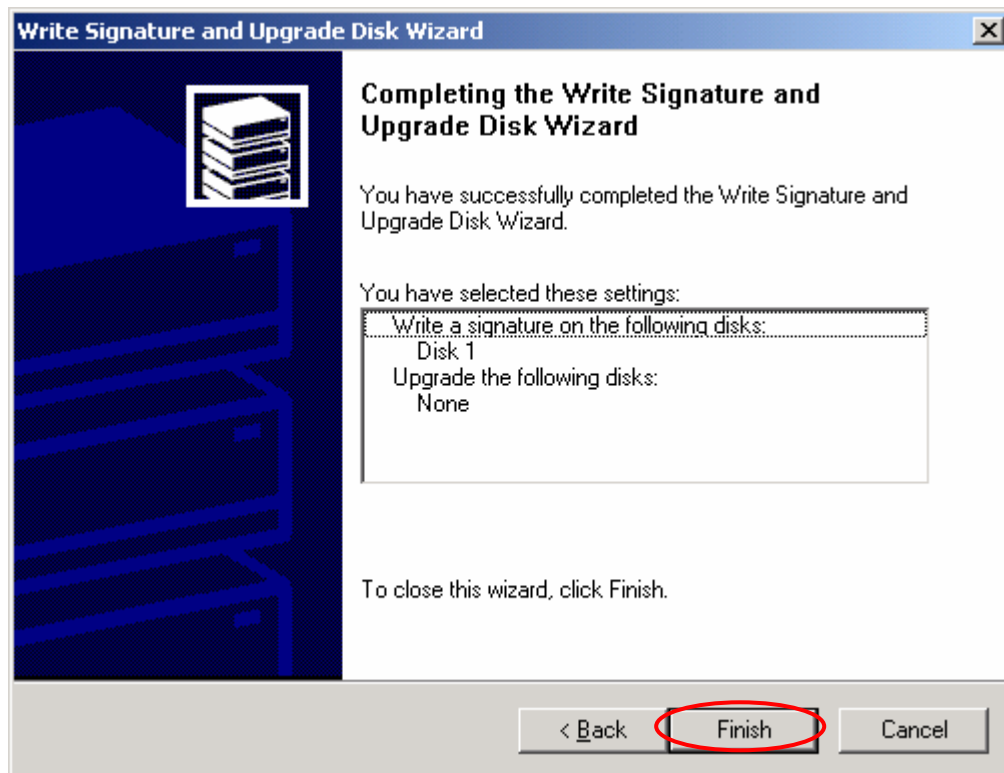
vi. Creating disk volume.

Right click the newly detected disk and select **Create Volume**.
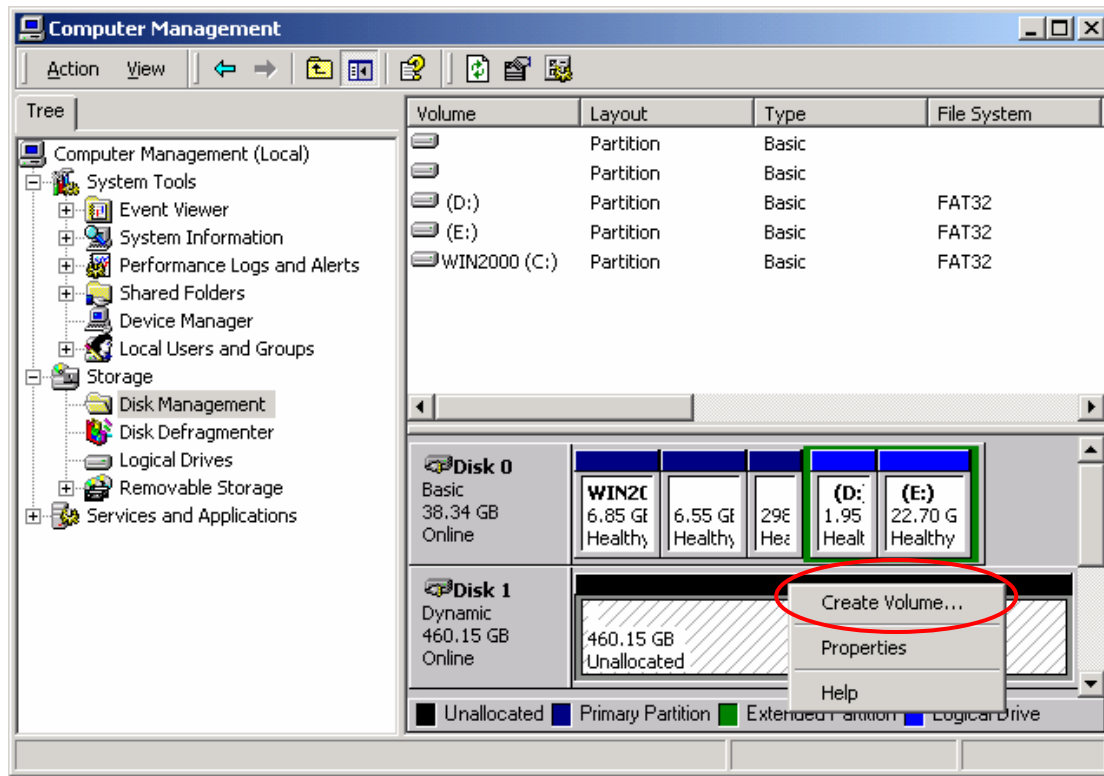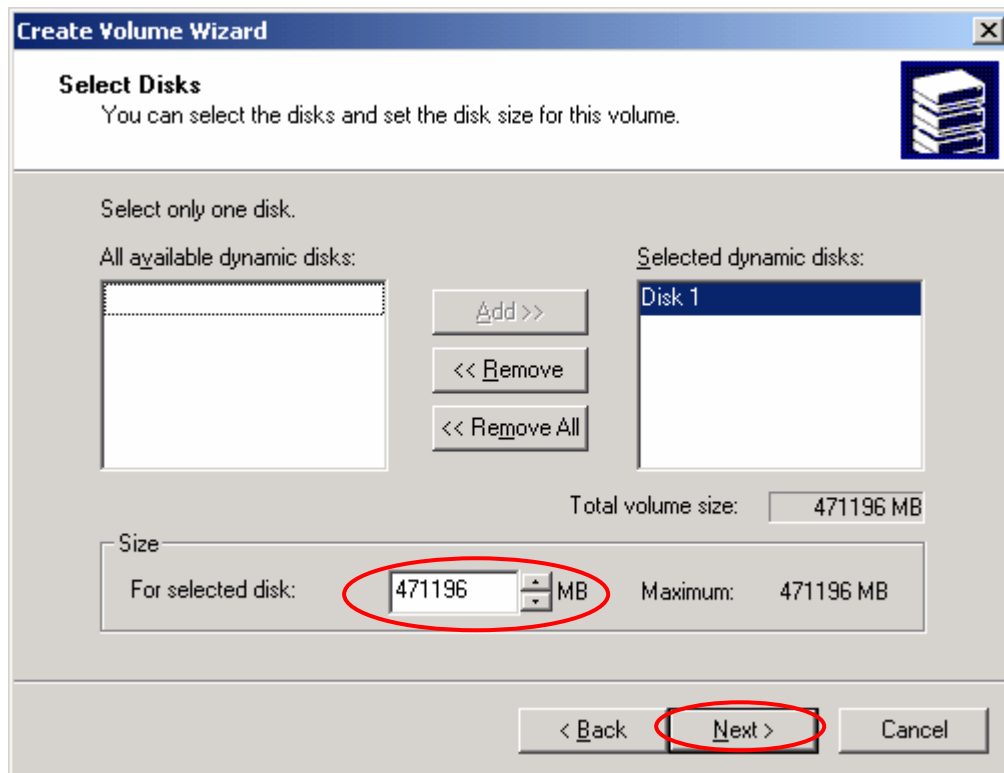
vii. Create Volume Wizard will appear. Click **Next** to proceed.
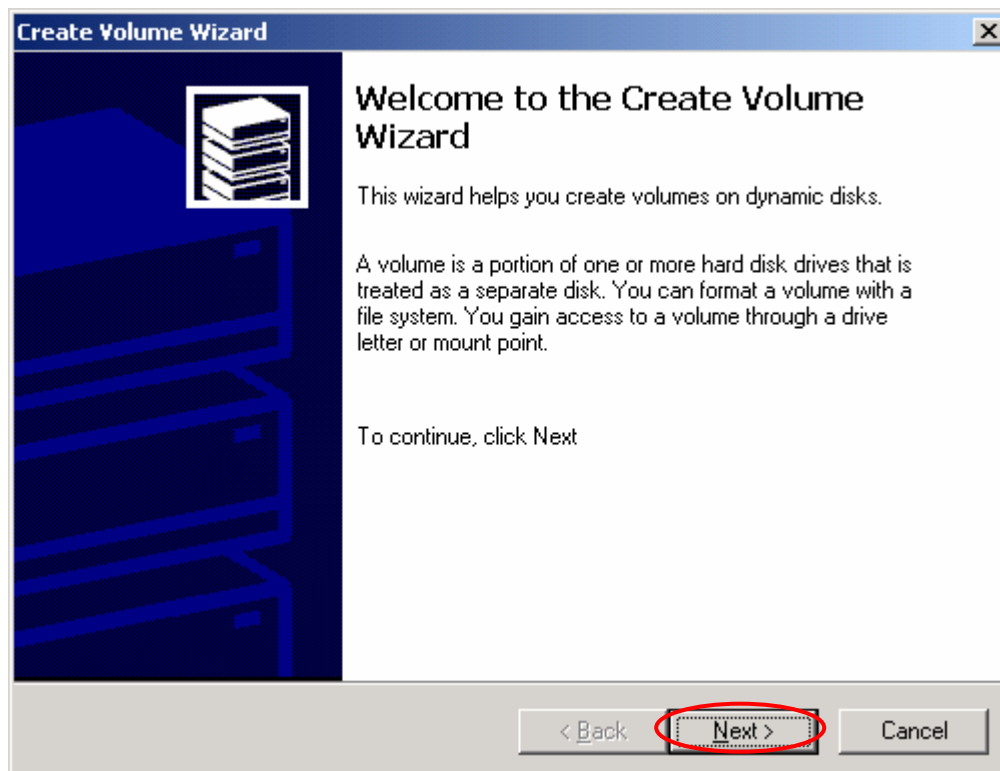
viii. Select simple volume as the volume type. Click **Next** to proceed.
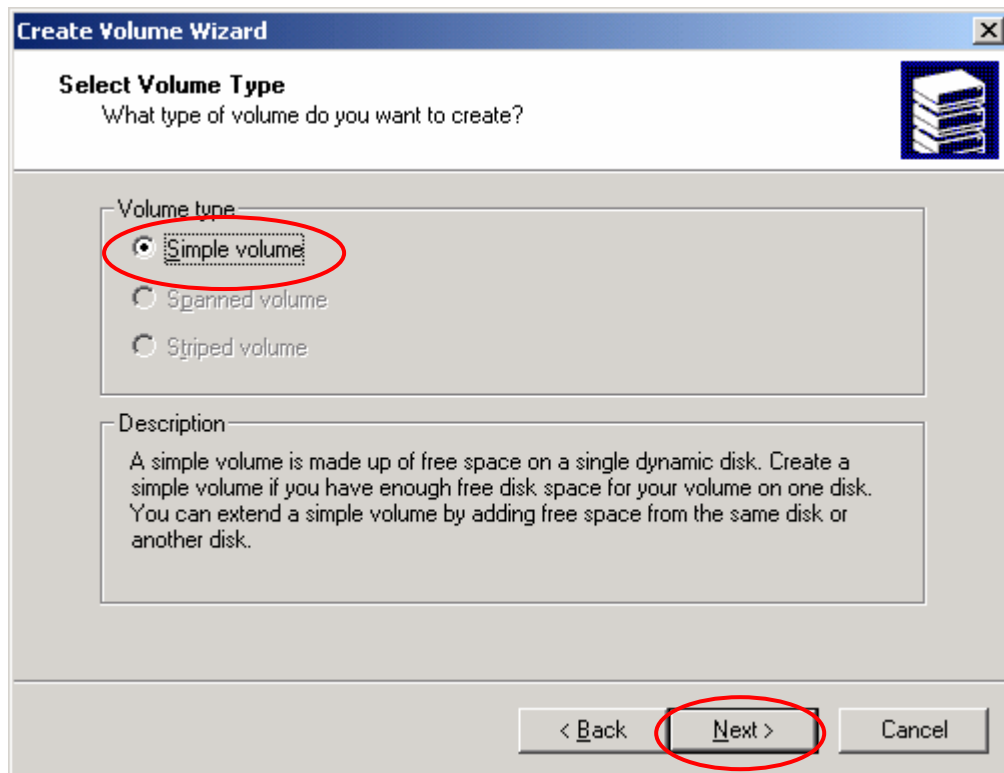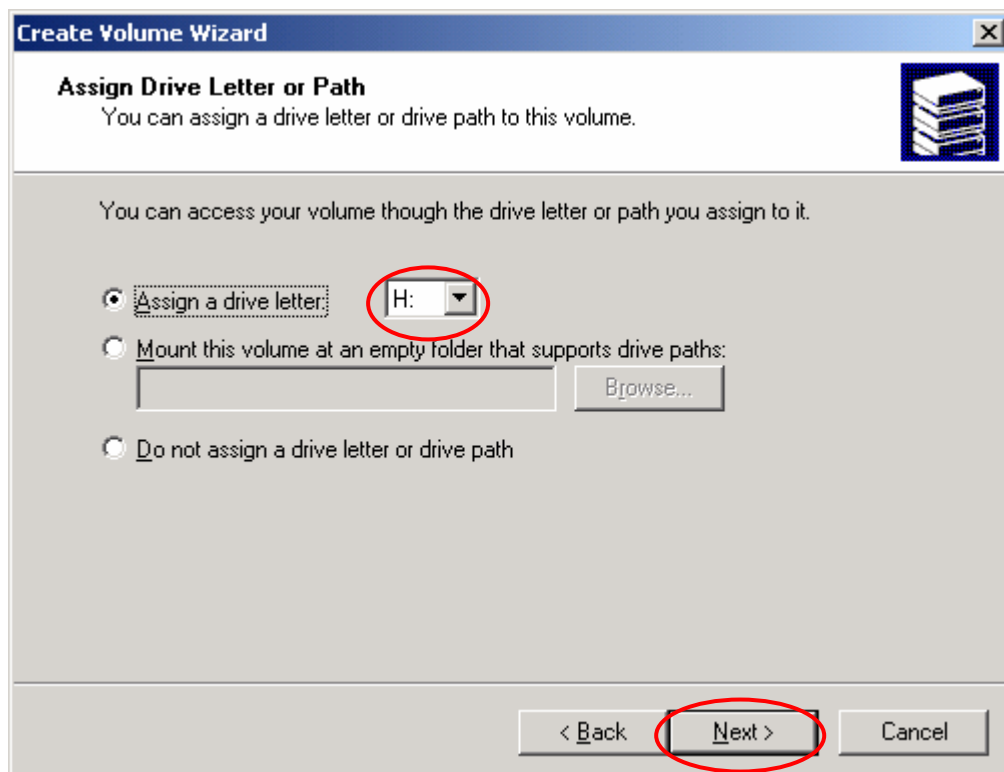
ix. Select the disk and set the disk size for the volume. Click **Next** to proceed.

x. Assign a drive letter or drive path to the volume. Click **Next** to proceed.

xi. Customize the formatting of the partition. Click **Next** to proceed.
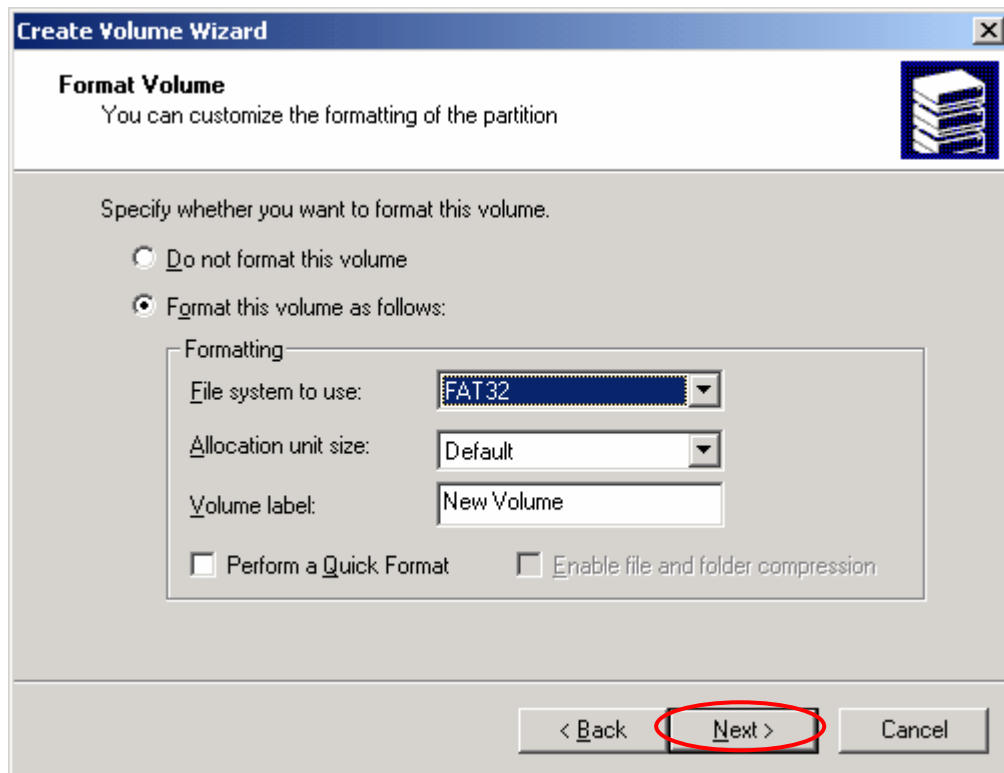
xii. Click **Finish** to complete the Create Volume Wizard.
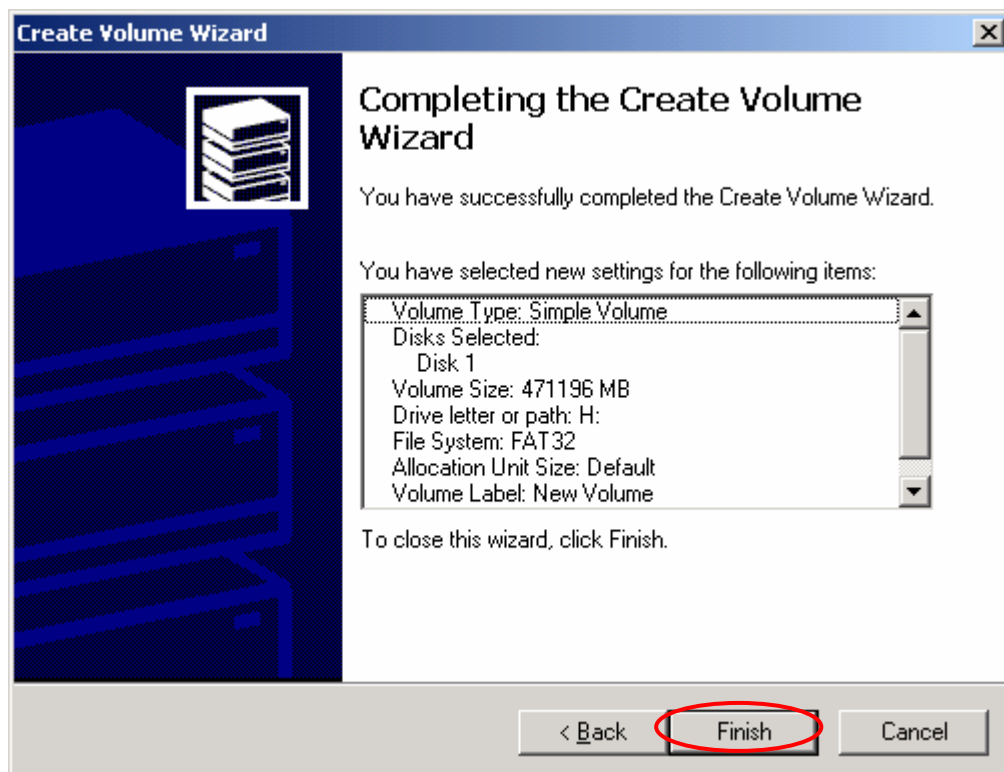
xiii.   The disk will be formatted. It will be ready for use when its status is Healthy.
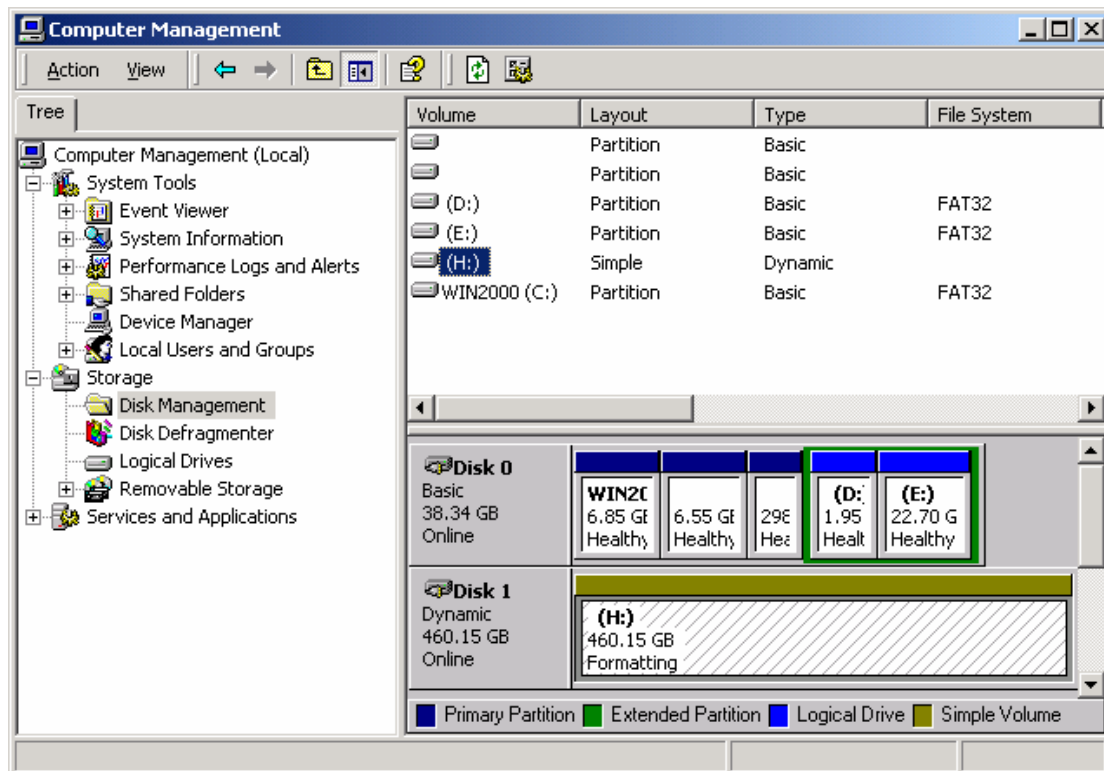
4.2 Using Red Hat Linux

1. Confirm SCSI support

Enter Linux operation system, run 'make menuconfig' in Linux kernel source
directory to enter Linux Kernel Menu Configuration page. Press the down arrow
button, select SCSI support and press Enter.

```
Linux Kernel v2.4.18 Configuration
┌───────────────────────────── Main Menu ─────────────────────────────┐
│ Arrow keys navigate the menu.  <Enter> selects submenus --->.        │
│ Highlighted letters are hotkeys.  Pressing <Y> includes, <N> excludes,│
│ <M> modularizes features.  Press <Esc><Esc> to exit, <?> for Help.   │
│ Legend: [*] built-in  [ ] excluded  <M> module  < > module capable   │
│  ┌─(-)─────────────────────────────────────────────────────────────┐ │
│  │        Networking options  --->                                  │ │
│  │        Network device support  --->                              │ │
│  │        Amateur Radio support  --->                               │ │
│  │        IrDA (infrared) support  --->                             │ │
│  │        ATA/IDE/MFM/RLL support  --->                             │ │
│  │        SCSI support  --->                                        │ │
│  │        IEEE 1394 (FireWire) support (EXPERIMENTAL)  --->         │ │
│  │        I2O device support  --->                                  │ │
│  │        ISDN subsystem  --->                                      │ │
│  │        Input core support  --->                                  │ │
│  │        Character devices  --->                                   │ │
│  └─(+)─────────────────────────────────────────────────────────────┘ │
│            <Select>      < Exit >     < Help >                        │
└───────────────────────────────────────────────────────────────────────┘
```

Make sure the following highlighted items are selected—SCSI support, SCSI disk
support, SCSI generic support, and Probe all LUNs on each SCSI device.

```
Linux Kernel v2.4.18 Configuration
┌───────────────────────────── SCSI support ──────────────────────────┐
│ Arrow keys navigate the menu.  <Enter> selects submenus --->.        │
│ Highlighted letters are hotkeys.  Pressing <Y> includes, <N> excludes,│
│ <M> modularizes features.  Press <Esc><Esc> to exit, <?> for Help.   │
│ Legend: [*] built-in  [ ] excluded  <M> module  < > module capable   │
│  ┌───────────────────────────────────────────────────────────────────┐ │
│  │ <*> SCSI support?                                                 │ │
│  │ --- SCSI support type (disk, tape, CD-ROM)                        │ │
│  │ <*>     SCSI disk support                                         │ │
│  │ (40) Maximum number of SCSI disks that can be loaded as modules   │ │
│  │ < >     SCSI tape support                                         │ │
│  │ < >     SCSI OnStream SC-x0 tape support                          │ │
│  │ < >     SCSI CD-ROM support                                       │ │
│  │ <*>     SCSI generic support                                      │ │
│  │ --- Some SCSI devices (e.g. CD jukebox) support multiple LUNs     │ │
│  │ [ ]     Enable extra checks in new queueing code                  │ │
│  │ [*]     Probe all LUNs on each SCSI device                        │ │
│  └─(+)───────────────────────────────────────────────────────────────┘ │
│            <Select>      < Exit >     < Help >                        │
└───────────────────────────────────────────────────────────────────────┘
```

EvoStor subsystem supports multiple logic volumes; hence "Probe all LUNs on each SCSI device" must be selected. If the operation system has been installed with SCSI support, the above highlighted items will be selected. If not, save the above settings and compile a new kernel. Restart the system with the new kernel.

2. Confirm disk name detected by the system after restart

SCSI devices are named with **/dev/sda, /dev/sdb**, … by Linux operation system in the order that the devices are detected. When disk volume has been created on EvoStor, turn on Linux system and run **dmesg** to view the names of all detected SCSI devices.

As shown in the example above, Linux has detected two SCSI devices. The first one (LUN 0) as a SCSI processor used by EvoStor for SCSI management. The second one (LUN 1) is a SCSI logic volume created by the user. The system has named it as **/dev/sda**.

After turning on EvoStor, if the Linux host computer cannot detect EvoStor, check the connection of SCSI cable and terminator. Then enter **echo "scsi add-single-device W X Y Z > /proc/scsi**. Add EvoStor in the host computer, W, X, Y, and Z represents SCSI adaptor, SCSI ID, EvoStor SCSI ID, and newly created LUN respectively. You can then enter **cat/proc/scsi** to check if the new EvoStor has been added to the system.

3. Create disk partition

When a name has been assigned, e.g. **/dev/sda**, use fdisk or other disk partitioning tool to create disk partition, e.g. **/dev/sda1, /dev/sda2**.

4. Format disk partition

Format the new partitions as appropriate file system, to format the partition **/dev/sda1** as ext2 file system, run **#mke2fs /dev/sda1**.

5. Mount newly added disk partition to system directory

Mount newly added disk partition to system directory, EvoStor subsystem is ready for use.

Chapter 5   EvoStor Maintenance

EvoStor supports self-diagnosis and firmware upgrade, the options are described below:

Options on LCD Panel	Description
Enter Diagnosis mode, no need to select any functions	Firmware upgrade
Auto Test	Test the system automatically
Reset Password	Reset password to default

5.1   Entering Diagnosis Mode

To enter diagnosis mode, follow the steps below:

1. Turn off EvoStor. It is recommended to turn off EvoStor via LCD panel.

2. Connect the RS-232C null modem cable between the maintenance port of EvoStor and the PC serial (COM) port. (Make sure you use the included null modem cable to convert the serial port signals).

3. Configure the VT-100 terminal emulation software in your PC. (Microsoft$^{®}$ Windows includes a terminal emulation program as presented with the "Hyper Terminal" icon in the accessories window), the communication parameters should be set to the following values:

Communication Parameters	
Baud Rate	115, 200
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

4. Turn on EvoStor, you will see the following snapshot in your terminal emulation program:
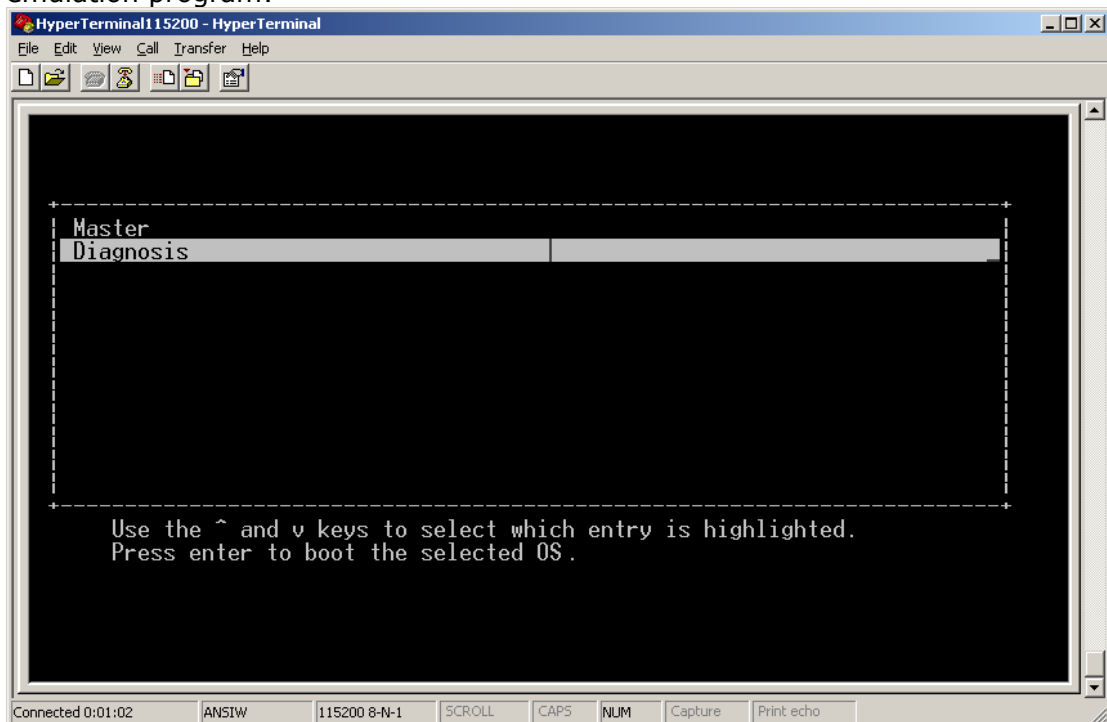
5. Press the down arrow key to select "Diagnosis", then press enter to make the EvoStor enter diagnosis mode.

6. After EvoStor enters diagnosis mode, the LCD will display the following information.
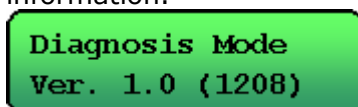
5.2   Firmware Upgrade

When EvoStor is operated in diagnosis mode, you could use EvoStor Manager to upgrade the most new firmware.

5.3   Restoring Firmware

If EvoStor cannot be turned on due to firmware upgrade failure caused by power outage or unexpected interruption, restore the firmware again in diagnosis mode. Then following the instructions above to exit diagnosis mode and restart the system.

5.4 Auto Test

EvoStor Auto Test function supports self-checking of hardware, including system voltage, temperature, fan, RS-232 connector and basic hard disk writing. Follow the steps below to run Auto Test:

1. Enter diagnosis mode, press the Function button and Up & Down buttons to select Auto Test. Press Enter to proceed.

```
>Auto Test
```

2. All testing items will be shown on LCD panel in the process. If no errors are found, the following message will appear. Otherwise, those items that do not pass the test will be displayed. Press any button to return to the main menu.

```
ALL PASS !
Any key to Exit.
```

Note: An extra loop back test tool is required for RS-232 connector test. Please contact our company for purchase or further information.

5.5 Resetting Password

To restore the password of EvoStor via LCD panel, follow the steps below:

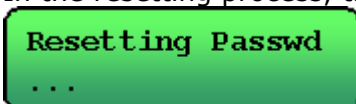1. Enter diagnosis mode, press the Function button and Up & Down buttons to select Reset Password. Then press Enter to proceed.

```
>Reset Password
```

2. In the resetting process, the screen below will be shown.

```
Resetting Passwd
...
```

3. When finished, the LCD panel will return to the main menu.

Appendix A SCSI

SCSI stands for Small Computer System Interface. SCSI interface provides fast data transfer to individual attached devices. All devices connected to a SCSI interface should be assigned with a SCSI ID, which cannot duplicate with one another. A SCSI controller is used to ensure the maximum performance of all connected SCSI devices.

SCSI Interface			Bus Width (bit)	Bus Speed (MHz)	Speed (MB/s)	PIN	Maximum number of connected devices (interface cards inclusive)
SCSI-1			8	5	5	50-pin	8
SCSI-2		Fast	8	10	10	50-pin	8
		Wide	16	5	10	68-pin	16
		Fast Wide	16	10	20	68-pin	16
SCSI-3	SPI-1 (Fast-20)	Ultra	8	20	20	50-pin	8
		Wide Ultra	16	20	40	68-pin	16
	SPI-2 (Fast-40)	Ultra2	8	40	40	50-pin	8
		Wide Ultra2	16	40	80	68-pin	16
	SPI-3 (Fast-80)	Ultra160	16	80	160	68-pin	16
	SPI-4 (Fast-160)	Ultra320	16	160	320	68-pin	16

Advanced SCSI Programming Interface (ASPI)

SCSI interface can support various devices which may have their own drivers that are incompatible with one another. To solve this problem, SCSI programming interfaces are developed, e.g. LADDR by Microsoft®, CAM by ANSI and ASPI by Adaptec. ASPI (Advanced SCSI Programming Interface) is an interface specification for sending commands to SCSI host adapters. Software drivers can be classified as two components with ASPI—ASPI Manager and ASPI Module.

➢ ASPI Manager (for management of SCSI card)
  ASPI Manager is OS and hardware dependent. It accepts commands and sends SCSI command to the target.

➢ ASPI Module (driver for SCSI device)
  ASPI Module is a driver for the communication between ASPI Manager and SCSI card.

Select SCSI ID

Each SCSI device should be assigned with a unique SCSI ID for identification. The SCSI ID of the SCSI adaptor of host will be 7 usually, which indicates a higher priority. EvoStor can select SCSI ID from 0-15, the default value is 4.

Logic volume and LUN (Logic unit number)

Each SCSI device can be attached with several logic units, to which each SCSI command can be sent. LUN 0 is reserved for the first logic volume and processing management commands for EvoStor. Other logic volumes created by users are mapped to LUN 1~31 for the main server to read and write the disk.

SCSI Terminator

A SCSI terminator must be installed at the end of a SCSI connection. If EvoStor is the last SCSI device in a SCSI connection, a SCSI terminator must be installed. SCSI terminator will provide a suitable SCSI cable to reject arrival of command.

Appendix B   RAID

RAID stands for Redundant Arrays of Inexpensive Disks, which is an idea initiated by Gibson Patterson and Katz at the University of California Berkeley in 1988. The basic idea of RAID is to combine multiple inexpensive disk drives into an array of disk drives that acquires a performance which is better that a single large expensive drive. RAID can be classified as five types of array architectures to make disk arrays fault-tolerant and provide a better storing performance. When there is a disk failure, RAID read the mirror copy in another disk, which enhances data recovery.

To distribute data evenly to each disk, data will be partitioned as a block, usually 32K or 64K. Data will be written to the disk according to RAID type.

RAID can be classified as below:

NRAID (Non-RAID)
The capacity of all drives is combined to a single logical drive. When a drive is full, data will be written to another drive until it is full. Access speed will not be increased and data redundancy is not provided. The capacity of the logical drive is the total capacity of all physical drives. When one of the drives fails, NRAID will not function properly.

RAID 0
RAID 0 (striping disk) combines two or more disks into one larger disk. It offers the fastest disk access but it does not have any protection of your data if the striped array fails. The disk capacity equals the number of disks in the array times the size of the smallest disk. Striping disk is usually used to maximize your disk capacity or for fast disk access but **not for storing important data.**

RAID 1
RAID 1 (mirroring disk) protects your data by automatically backing up the contents of one disk onto the second disk of a mirrored pair. This protects your data if one of the disks fails. Unfortunately, the storing capacity is equal to a single disk, as the second drive is used to automatically back up the first. Mirroring Disk is suitable for personal or corporate use to store important data.

RAID 0+1
RAID 0+1 (disk stripping with mirroring) is a combination of RAID 0 and RAID 1 to provide disk striping with mirroring performance. It provides full redundancy of the hard drives that and allows multiple disk failure, which enhances file access speed and data recovery capacity. At least four drives are needed for RAID 0+1. Half of them will be used for mirroring.

RAID 3
Three or more drives are required for RAID 3. One of the drives will be used specifically for storing parity data. When a drive fails, replace it with a new one. The controller will recover the lost data from the parity drive. RAID 3 is featured with its fast reading and slow writing (due to checking parity data in the same volume).

RAID 5
Three or more hard disks can be teamed up to form a large-capacity RAID 5 disk volume. It is similar to RAID 3 except that parity information is interspersed across the drive array. When one of the disks fails, data can be recovered from other disks.

Stripe Size
RAID distributes data is distributed across each drive. The data should be striped evenly, e.g. 4KB, 8KB, 16KB, 32KB, 64KB or 128KB, and written to RAID subsystem according to the RAID level.

RAID Initialization
RAID initialization will clear all data on RAID subsystem for accurate parity data checking. It is applicable for RAID 1, RAID 0+1, RAID 3 and RAID 5. When RAID subsystem is configured as the one of these configurations, initialization will start and the information will be displayed on the LCD panel. Initialization time will depend on the size of RAID subsystem.

Spare Drives
Spare drives are attached to RAID subsystem directly but are not a member of the subsystem. For RAID configuration that supports fault tolerance (i.e. data recovery), when any of the subsystem members fails, a spare disk will be added to replace that failed disk. RAID subsystem will recover the data from hot swap disk. When the failed disk is repaired or replaced, it will become a spare disk automatically.

Appendix C   Abbreviations for RAID Status

Abbreviation	Description
D	Data disk of RAID
F	Disk failure
G	Data access degrading
I	Data initialization
N	Normal (Status of disks)
R	Data recovery
S	Spare disks
T	Disk testing
U	Unable to restore RAID
X	No disk in disk tray