ARS-2019
USB 2.0 to SATA
Mirror Smart Subsystem

User's Manual

—— **Version: 1.1** ——

ACARD
TECHNOLOGY

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WEEE Statement English

In order to cope with the increasing waste electrical and electronic equipment, reduce the use of landfill and incinerator, and prevent the harmful matter of waste equipment from entering the environment, the European Union (EU) has set the Directive on Waste Electrical and Electronic Equipment (WEEE) asking manufacturers to collect, recycle and treat waste electrical and electronic equipment properly. Member nations already established their free of charge recycle systems of WEEE before August 13, 2005. Accordingly, ACARD has to be responsible for recycling all products exported to Germany. You can return your ACARD product that needs recycling to a local collector.

WEEE Erklärung German

Mit dem Ziel die steigende Menge elektrischer und elektronischer Altgeräte zu bewältigen ohne hierzu unnötig Mülldeponien und Verbrennungsanlagen zu belasten und um die Verschmutzung der Umwelt durch freiwerdende Stoffe aus den Altgeräten zu vermeiden, hat die Europäische Union (EU) die Richtlinie über Elektro- und Elektronik-Altgeräte erlassen. Die Richtlinie verpflichtet Hersteller, elektrische und elektronische Altgeräte umweltgerecht einzusammeln, zu recyceln und zu entsorgen. Die Mitgliedsstaaten der EU haben bereits ihre kostenfreien Recyclesysteme konform der WEEE vor dem 13. August 2005 eingerichtet. Entsprechend der Richtlinie ist ACARD verantwortlich für die umweltgerechte Entsorgung aller nach Deutschland exportierten ACARD Produkte. Sie können Ihr zu entsorgendes ACARD Produkt zu Ihrer örtlichen Sammelstelle bringen.

AEEA verklaring Dutch

Met het doel de stijgende hoeveelheid afgedankte elektrische en elektronische apparatuur te beheersen zonder hiervoor onnodig stortplaatsen en verbrandingsovens te belasten en om de vervuiling van het milieu door vrijkomende stoffen uit de afgedankte apparatuur te voorkomen, heeft de Europese Unie (EU) de richtlijn betreffende afgedankte elektrische en elektronische apparatuur besloten. Deze richtlijn verplicht fabrikanten afgedankte elektrische en elektronische apparatuur in te zamelen, te recyclen en te verwijderen. De lidstaten van de EU hebben reeds de kosteloze recyclesystemen volgens de AEEA vóór de 13 augustus 2005 ingericht. Conform de richtlijn is ACARD verantwoordelijk voor de verwijdering van alle naar Nederland geëxporteerde ACARD producten. U kunt uw afgedankt ACARD product naar uw locale inzamelplaats brengen.

Elektrik ve Elektronik Madde Atıkları Demeci Turkish

 Elektrik ve electronik madde atıklarının yukselmesiyle basedebilmek ,arazi doldurma ve cop yakma fırını kullanımını azaltmak,atık madde zararlarının cevreye yayılmasını onlemek icin Avrupa Birligi (AB),ureticilerden elektrik ve elektronik madde atıklarını gerektigi gibi toplamalarını,geri donusturmelerini ve kimyasal isleme tabi tutmalarını talep etmek icin Elektrik ve Elektronik Madde Atıkları uzerine bir direktif hazırladı.Topluluk uyeleri,13 Agustos 2005' ten once elektrik ve elektronik madde atıklarının ucretsiz geri donusum sistemlerini coktan olusturmuslardı.Bundan dolayı, ACARD, Almanya'ya ihrac ettigi butun urunlerin geri donusumunden sorumludur. ACARD urunleri geri donusum gerektirirse yerel toplayıcılara geri verebilirsiniz.

WEEE бюлетень

Чтобы справиться с увеличивающимся ненужным электрическим и электронным оборудованием, уменьшите использование закапывания мусора и использования установки для сжигания отходов, препятствуйте вредному выбросам загрязнять окружающую среду, Европейский союз (ЕС)установил Директиву по Ненужному Электрическому и Электронному Оборудованию (WEEE) для того, чтобы изготовителей собрали, перерабатывали и вообще проявили внимание к ненужному электрическому и электронному оборудованию должным образом. Члены нации установили бесплатную систему переработки WEEE до 13 августа 2005. Соответственно, ACARD обязан быть ответственным за то, что переработал все продукты, экспортируемые в Германию. Вы можете возвратить ваш продукт ACARD, который нуждается в рециркуляции местному сборщику.

WEEE Statement

Afin de gérer la quantité croissante de déchets électriques et électroniques, de réduire l'utilisation des décharges et des incinérateurs et d'éviter que des déchets nocifs ne polluent l'environnement, l'Union Européenne a publié la directive WEEE sur les déchets électriques et électroniques. Celle-ci spécifie que les fabricants doivent collecter, recycler et traiter l'équipement électronique et électrique usagé. Depuis le 13 août 2005, les pays membres ont mis en place un système de recyclage gratuit selon le WEEE.

De ce fait, Acard est responsable du recyclage de tous les produits exportés vers l'Allemagne. Vous pouvez mettre au rebut votre équipement ACARD usagé dans votre centre local de recyclage.

Pour plus d'informations sur les lieux de mise au rebut des équipements usagés destinés au recyclage, veuillez contacter votre mairie, votre service de traitement des déchets ménagers ou le magasin où vous avez acheté le produit.

RAEE

Con la finalidad de reducir el incremento de residuos eléctricos y de material electrónico, reduciendo el uso de los vertederos e incineradoras y prevenir el preocupante aumento del contacto de estos residuos con el medio ambiente. Por este motivo la Unión Europea ha fijado la Directiva de Residuos de Aparatos Eléctricos y Electrónicos (RAEE) solicitando a los fabricantes la recolección, reciclaje y tratamiento de ests residuos correctamente. Los paises miembros ya han establecido su sistema de reciclaje gratuito de RAEE antes del 13 de Agosto del 2005. Por este motivo ACARD es el responsable del reciclaje de todos los productos exportados a Alemania. Usted puede devolver su producto ACARD a un punto de recogida local cuando desee reciclarlo.

Dichiarazione WEEE

Per far fronte all'aumento dei residui delle apparecchiature elettriche ed elettroniche, ridurre l'uso di materiale di riporto e degli inceneritori, ed impedire che il materiale nocivo delle apparecchiature residue entri a contatto con l'ambiente, l' Unione Europea (UE) ha stabilito le Direttive sui Residui delle apparecchiature Elettriche ed Elettroniche (WEEE) chiedendo ai fornitori di raccogliere correttamente, riciclare e trattare le apparecchiature elettriche ed elettroniche residue. Le nazioni facenti parte dell' Unione Europea hanno già stabilito il loro sistema gratuito di riciclaggio di questo materiale (WEEE) prima del 13 agosto 2005. Di conseguenza, ACARD è responsabile del riciclaggio di tutti i prodotti esportati in Germania. Potete restituire il vostro prodotto acquistato da ACARD che deve essere riciclato da un' azienda specifica locale.

Table of Contents

Chapter 1 Introduction

1.1 Overview

ARS-2019 is a USB 2.0 to SATA RAID subsystem using ACARD's ROC (RAID-On-Chip) technology, which is essential for HDD mirroring, data rebuilding and protection. ARS-2019 supports hot plugging in USB host system and SATA hard drive. Its system configuration and monitoring is through Mirror Smart Utility and LCD control panel. This user-friendly feature requires no effort.

1.2 Features

- Supports RAID 0, RAID 1, JBOD and Normal
- Supports SATA hard drives
- Supports real time rebuilding
- Supports hot swap
- LCD panel to setup and monitor
- LED indicators showing the status of hard drives
- Warning signal for the system failure
- E-mail notification for the system failure
- Key lock for hard drive security
- On-board Flash ROM for easy firmware update

1.3 Specifications

- RAID level: 0, 1, JBOD and Normal
- Auto rebuilding: Yes
- Hot Swap:Yes
- Host interface:
  - ◆ USB 2.0 features with the transfer rate up to 480Mb/s
- Drive interface:
  - ◆ SATA drive interface with the transfer rate up to 1.5Gb/s
  - ◆ Drive hot swap
- Remote management: GUI utility software

■   Error notification: via built-in buzzer, LEDs or E-mail

■   On-board Flash ROM: Yes

■   OS Support: Windows 2000 SP4/XP SP1/2003 Server,
Mac OS X 10.3 and later, Linux

■   Dimension: 280 (L) $\times$ 172 (W) $\times$ 152 (H) mm

■   Power supply: 100V~240V, 50~60Hz auto-switching power supply

■   Temperature:

       ◆   Operation : 5°C~40°C (not condensed)

       ◆   Non-operation : $-$ 5°C~50°C

1.4 Package

■	ARS-2019	$\times$ 1
■	USB cable	$\times$ 1
■	Support CD	$\times$ 1
■	User's manual	$\times$ 1
■	Power cord	$\times$ 1
■	Pack of screws	$\times$ 2
■	Key	$\times$ 2

1.5 Quick Start

Step 1: Prepare 2 SATA hard drives of the same model.

Step 2: Unlock the 2 trays and take them out of ARS-2019.

Step 3: Put a hard drive into each tray and aim its end to the tray's connector.
Fasten the hard drive with screws.

Step 4: Put the 2 trays back to ARS-2019 and lock them.

Step 5: Connect ARS-2019 with a power cord, and turn on.

Step 6: Connect ARS-2019 with the USB 2.0 cable.

Step 7: Connect the other end of the USB 2.0 cable to the USB port of host system.

Step 8: After powering on, the system will detect a hard drive named Mirror USB
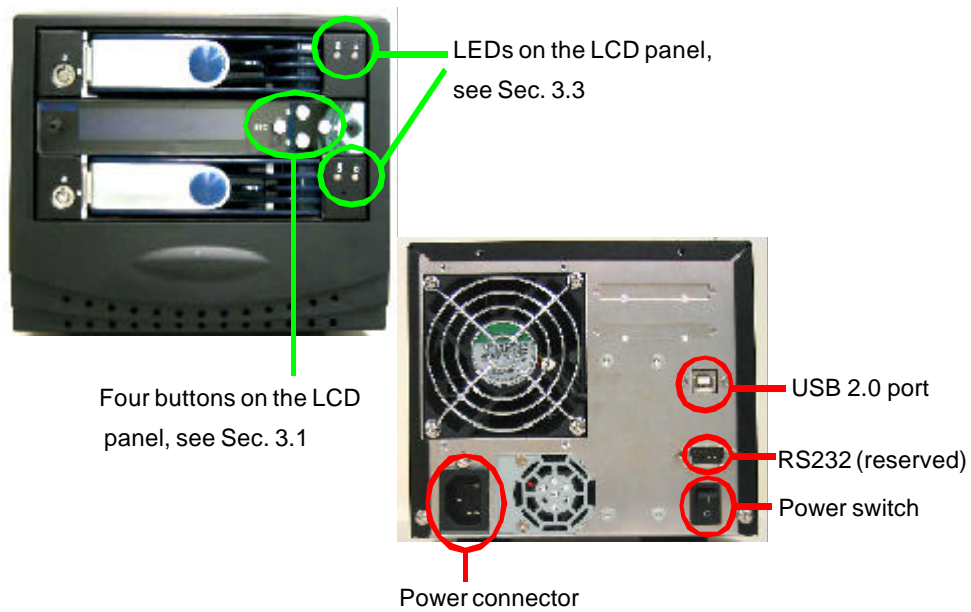Device. Before using it, partition and format if necessary.

NOTICE:

(1) Be sure to unlock the tray before removing it.

(2) The provided trays are designed for ACARD ARS-2018/2018E/
    2019. Do not use any substitutes without ACARD's authorization.
    ACARD will not maintain or provide any after service/warranty if
    the problem is due to using a substitute.
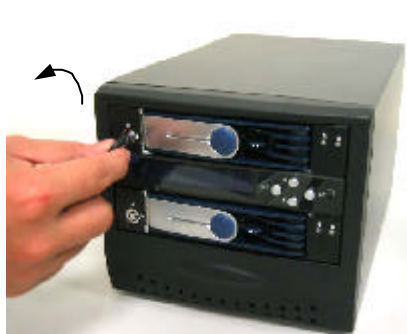
1.6 HDD Compatibility

ARS-2019 is designed for standard 3.5" SATA hard drives. Visit ACARD website:
www.acard.com to get the latest support list. If your hard drive is not approved,
contact ACARD or our local distributor.

Chapter 2 Installation

LEDs on the LCD panel,
see Sec. 3.3

Four buttons on the LCD
panel, see Sec. 3.1

USB 2.0 port

RS232 (reserved)

Power switch

Power connector

2.1 Install the Hard Drives

(1). Unlock counterclockwise.
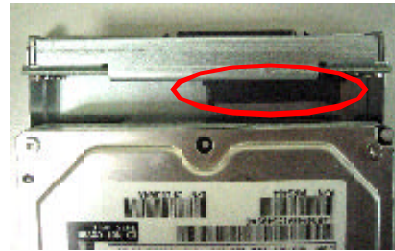
(2). Open the tray by pushing the fastener
to the left.

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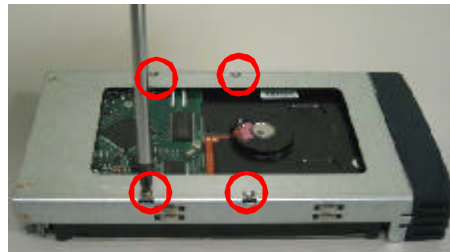(3). Pull the handle to slide the tray out.

(4). Put a hard drive into the tray, and aim its end to the connector of the tray.

(5). Push the hard drive till it attaches the connector.

(6). Turn the tray carefully and fasten with 4 screws.

(7). Slide the tray into ARS-2019 and push it to the full.

(8). Finally push the handle to lock the tray.
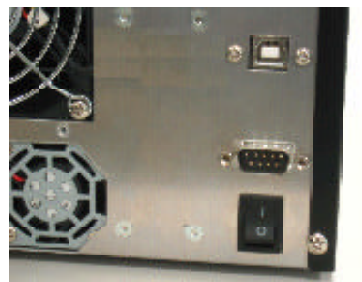
(9). Lock clockwise.

2.2 Connect ARS-2019 to Host System
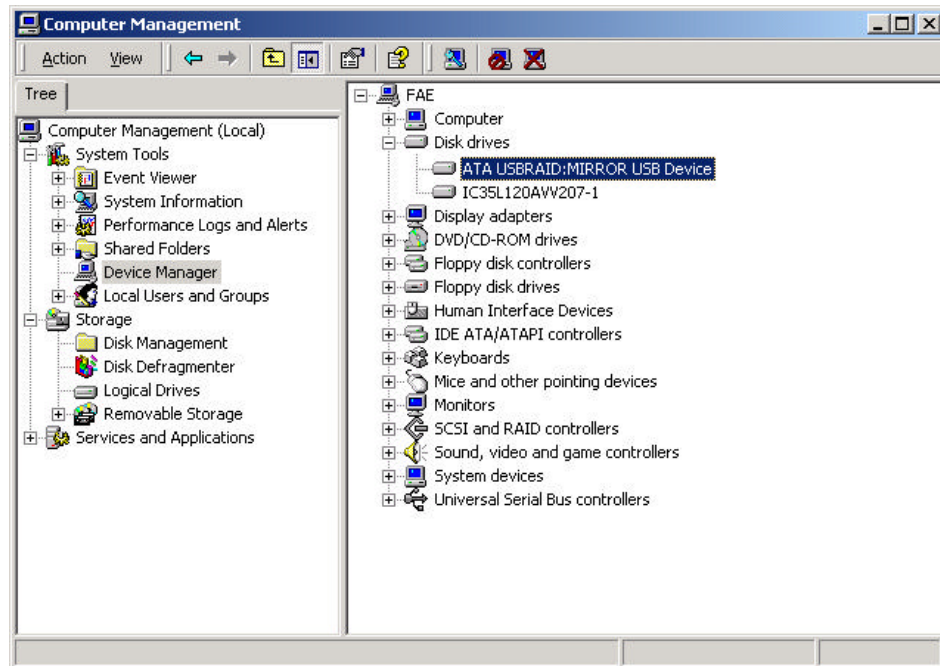
(1). Connect the power cord.

(2). Turn on.

(3). Connect the USB 2.0 cable.

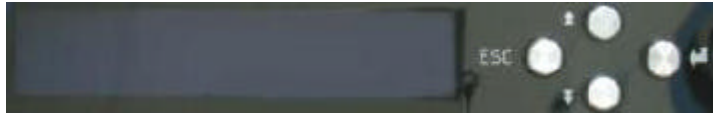(4). Connect the other end of USB 2.0 cable to the USB port of PC.

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(5). Find ARS-2019 in "Device Manager" under "My Computer".

Chapter 3 LCD Control Panel

3.1 The View

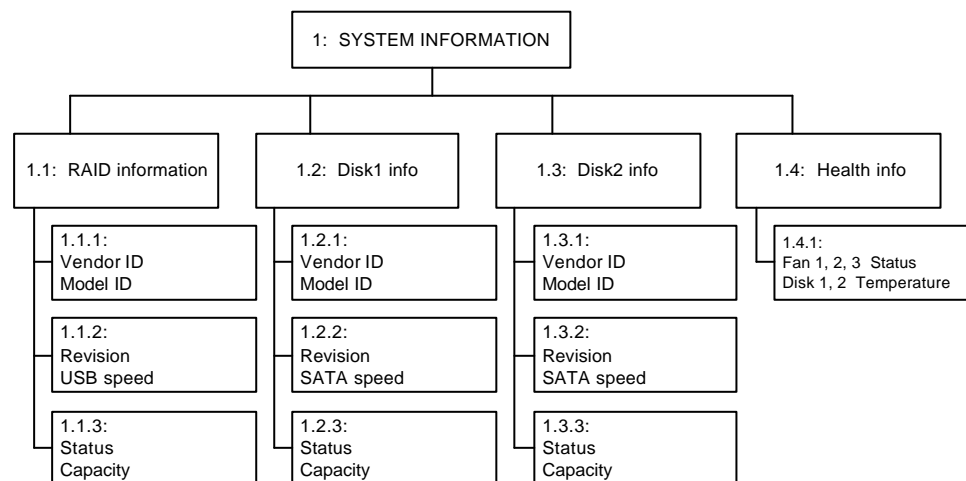▲ : to scroll up the function menu
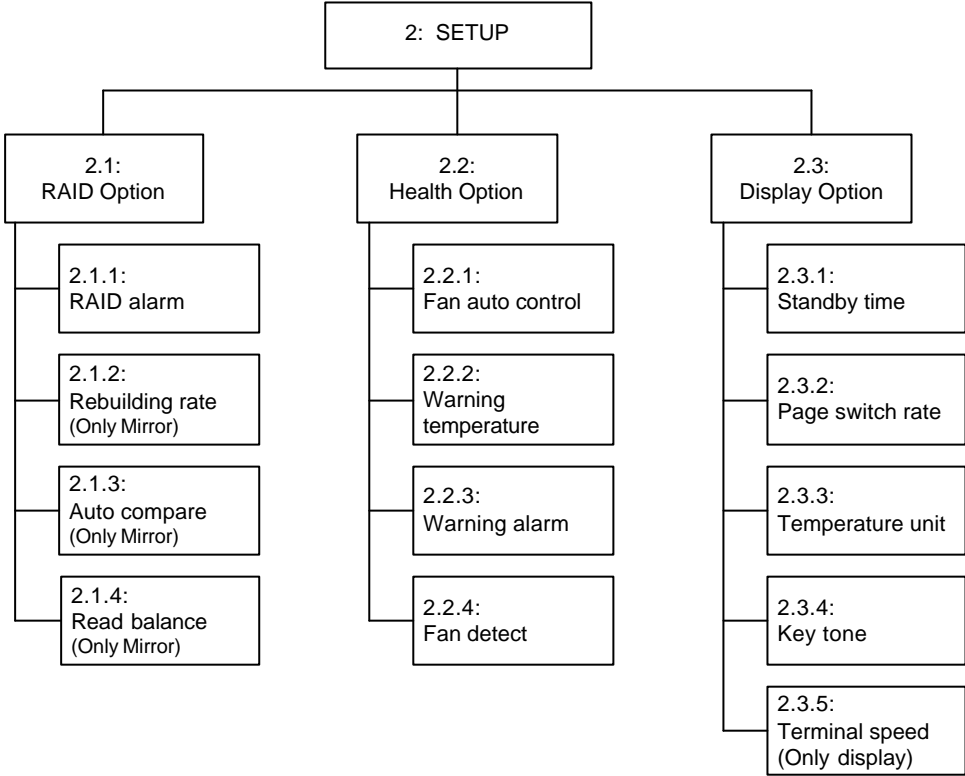
▼ : to scroll down the function menu

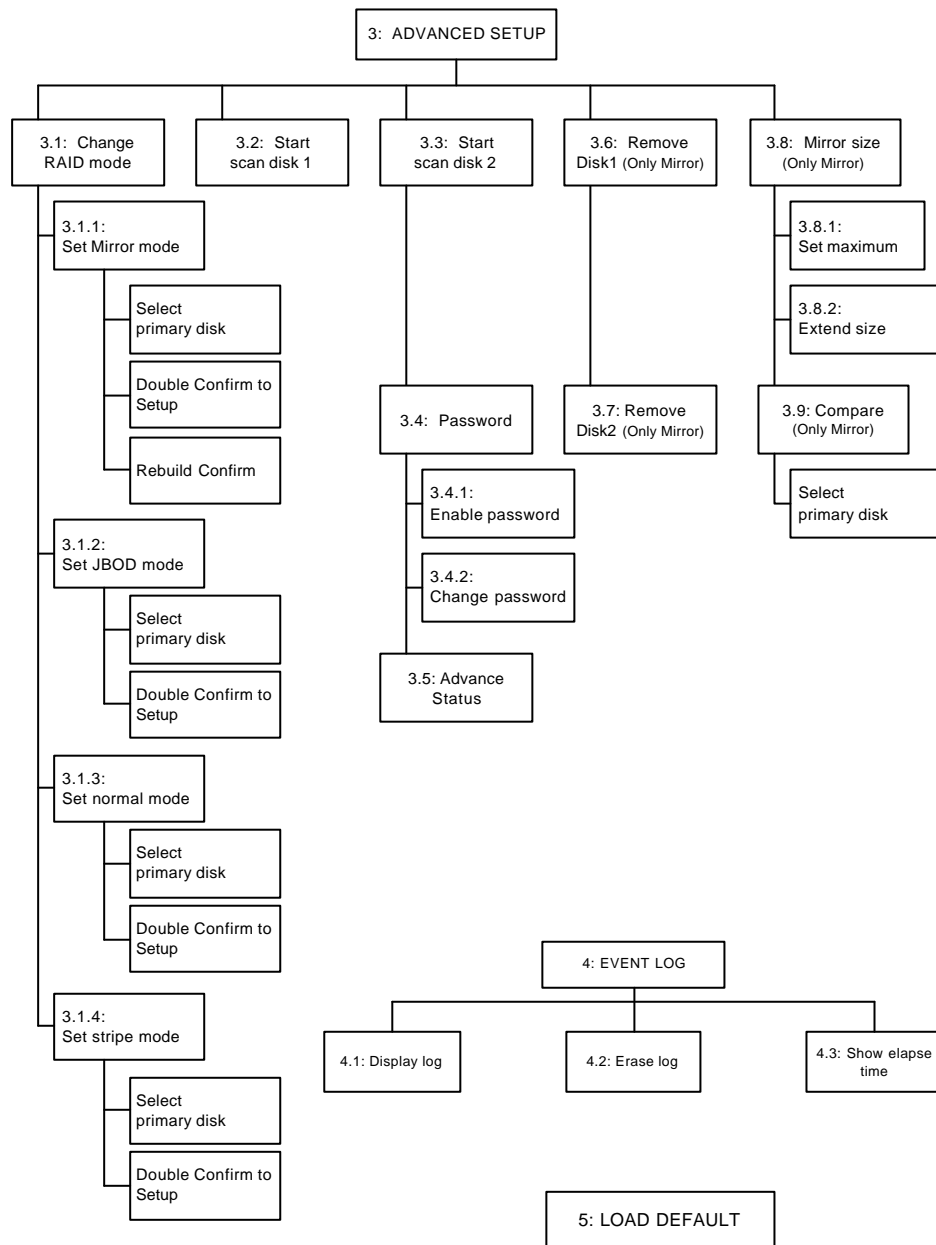↵ : to confirm a setting and enter the selected function.

ESC : to cancel a setting and return to the previous layer.

3.2 The Operation

There are 5 major function menus in ARS-2019 as the following charts show: 1. System Information, 2. Setup, 3. Advanced Setup, 4. Event Log, 5. Load Default.

```
                           ┌──────────────────────────┐
                           │  1:  SYSTEM INFORMATION   │
                           └──────────────────────────┘
            ┌───────────────────┬───────────────────┬───────────────────┐
  ┌──────────────────┐ ┌──────────────────┐ ┌──────────────────┐ ┌──────────────────┐
  │ 1.1: RAID info   │ │ 1.2: Disk1 info  │ │ 1.3: Disk2 info  │ │ 1.4: Health info │
  └──────────────────┘ └──────────────────┘ └──────────────────┘ └──────────────────┘
```

1.1: RAID information	1.2: Disk1 info	1.3: Disk2 info	1.4: Health info
1.1.1: Vendor ID Model ID	1.2.1: Vendor ID Model ID	1.3.1: Vendor ID Model ID	1.4.1: Fan 1, 2, 3 Status Disk 1, 2 Temperature
1.1.2: Revision USB speed	1.2.2: Revision SATA speed	1.3.2: Revision SATA speed	
1.1.3: Status Capacity	1.2.3: Status Capacity	1.3.3: Status Capacity	

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```
                        ┌─────────────────┐
                        │  2:  SETUP      │
                        └─────────────────┘
            ┌───────────────────┼───────────────────┐
    ┌───────────────┐   ┌───────────────┐   ┌───────────────┐
    │ 2.1:          │   │ 2.2:          │   │ 2.3:          │
    │ RAID Option   │   │ Health Option │   │ Display Option│
    └───────────────┘   └───────────────┘   └───────────────┘
        │                   │                   │
    ┌───────────────┐   ┌───────────────┐   ┌───────────────┐
    │ 2.1.1:        │   │ 2.2.1:        │   │ 2.3.1:        │
    │ RAID alarm    │   │ Fan auto      │   │ Standby time  │
    │               │   │ control       │   │               │
    └───────────────┘   └───────────────┘   └───────────────┘
    ┌───────────────┐   ┌───────────────┐   ┌───────────────┐
    │ 2.1.2:        │   │ 2.2.2:        │   │ 2.3.2:        │
    │ Rebuilding    │   │ Warning       │   │ Page switch   │
    │ rate          │   │ temperature   │   │ rate          │
    │ (Only Mirror) │   │               │   │               │
    └───────────────┘   └───────────────┘   └───────────────┘
    ┌───────────────┐   ┌───────────────┐   ┌───────────────┐
    │ 2.1.3:        │   │ 2.2.3:        │   │ 2.3.3:        │
    │ Auto compare  │   │ Warning alarm │   │ Temperature   │
    │ (Only Mirror) │   │               │   │ unit          │
    └───────────────┘   └───────────────┘   └───────────────┘
    ┌───────────────┐   ┌───────────────┐   ┌───────────────┐
    │ 2.1.4:        │   │ 2.2.4:        │   │ 2.3.4:        │
    │ Read balance  │   │ Fan detect    │   │ Key tone      │
    │ (Only Mirror) │   │               │   │               │
    └───────────────┘   └───────────────┘   └───────────────┘
                                            ┌───────────────┐
                                            │ 2.3.5:        │
                                            │ Terminal speed│
                                            │ (Only display)│
                                            └───────────────┘
```

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3: ADVANCED SETUP

3.1: Change RAID mode

3.2: Start scan disk 1

3.3: Start scan disk 2

3.6: Remove Disk1 (Only Mirror)

3.8: Mirror size (Only Mirror)

3.1.1: Set Mirror mode

Select primary disk

Double Confirm to Setup

Rebuild Confirm

3.1.2: Set JBOD mode

Select primary disk

Double Confirm to Setup

3.1.3: Set normal mode

Select primary disk

Double Confirm to Setup

3.1.4: Set stripe mode

Select primary disk

Double Confirm to Setup

3.4: Password

3.4.1: Enable password

3.4.2: Change password

3.5: Advance Status

3.7: Remove Disk2 (Only Mirror)

3.8.1: Set maximum

3.8.2: Extend size

3.9: Compare (Only Mirror)

Select primary disk

4: EVENT LOG

4.1: Display log

4.2: Erase log

4.3: Show elapse time

5: LOAD DEFAULT

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1. SYSTEM INFORMATION : the information of the system

    1.1 RAID information : the informaiton of RAID subsystem

        Display the RAID subsystem's vendor, model name, firmware version, USB speed, RAID mode, RAID capacity.

    1.2 Disk 1 info : the information of the upper hard drive

        Display the upper hard drive's brand, model, firmware version, SATA speed, status and capacity.

    1.3 Disk 2 info : the informaiton of the lower hard drive

        Display the lower hard drive's brand, model, firmware version, SATA speed, status and capacity.

    1.4 Health info : the condition of the system

        Display the hard drive temperature, the fan status of the trays, and the fan status of the system.

2. SETUP : the settings of the system configuration

    2.1 RAID Option : the RAID configuration

    2.1.1 RAID alarm : trigger the alarm. Default is OFF.

        When RAID becomes abnormal, the alarm will be triggered to warn the system administrator.

    2.1.2 Rebuilding rate : set data rebuilding rate

        Options are Slow, Normal, Fast. Default is Normal.

    2.1.3 Auto compare : compare the two hard drives' contents automatically.

        Default is OFF. This function enables automatic comparison of data after rebuilding.

    2.1.4 Read balance : read the two hard drives' data by turns. Default is ON.

        This function lets each hard drive's data be read for one minute to prolong the hard drive's life.

    2.2 Health Opt. : the setting of the system environment

    2.2.1 Fan auto control : control a fan automatically

        The system will adjust the speed of a fan automatically according to the warning temperature.

    2.2.2 Warning Temperature : set the warning temperature

        If the system temperature is over the set level, there will be an alarm

and a blinking on the screen to warn the system administrator, and the warning will be recorded to the event log.

2.2.3 Warning alarm : trigger the warning alarm

When the system becomes abnormal, the buzzer will be trigger to warn the system administrator.

2.2.4 Fan detect : detect the rotation of a fan

This function lets the system produce a warning and show a message whenever the fan is malfunctioned. Default is Enable.

2.3   Display Opt. : the setting of LCD

2.3.1 Standby time : set the time for the system to return to standby mode

If the system idle time is over the set time, the system will return to standby mode.

2.3.2 Page switch rate : set the rate of information switching

It is to set the time interval of page switching in standby mode.

2.3.3 Temperature unit : set the unit of temperature

It is to set the temperature unit in °C or °F.

2.3.4 Key tone : set the sound of keypad

It is to enable or disable the sound of key pressing.

2.3.5 Terminal speed: display the baud rate

It shows the baud rate 19200bps for an engineer to debug.

3. ADVANCED SETUP : the settings of the advanced functions

  3.1   Change RAID mode : set mirroring, JBOD, Stripe or normal mode (see Appendix 3)

3.1.1 Set Mirror mode : set the system in Mirroring mode

3.1.2 Set JBOD mode : set the system in JBOD mode

3.1.3 Set normal mode : set the system in normal mode

3.1.4 Set Stripe mode : set the system in Stripe mode

  3.2   Scan Disk 1 : scan the upper hard drive

It is to check if the upper hard drive is in good condition. While scanning, the system will ask if you want to continue scanning when it detects a failed track in the hard drive. Once this function is triggered, the menu will change to "Stop scan disk1", and meanwhile the system administrator can stop scanning.

3.3 **Scan Disk 2** : scan the lower hard drive

It is to check if the the lower hard drive is in good condition. While scanning, the system will ask if you want to continue scanning when it detects a failed track in the hard drive. Once this function is triggered, the menu will change to "Stop scan disk2", and meanwhile the system administrator can stop scanning.

3.4 **Password** : the setting of a password

3.4.1 Enable password : enable the password protection

Once activating the password protection, the system will ask you to key in the password.

3.4.2 Change password : set a new password

Key in the old password, then key in a new password, and confirm the new password to finish the change. If you don't activate the password protection, the function will be hidden.

3.5 **Advanced status** : the condition of the system

It is to display the scanning, rebuilding or comparing progress.

The progress will be displayed in standby mode, too. If there is nothing proceeding in the system, the function will be hidden.

3.6 **Remove Disk 1** : safely remove the upper hard drive (for mirror mode only)

3.7 **Remove Disk 2** : safely remove the lower hard drive (for mirror mode only)

3.8 **Mirror size** : set the Mirror capacity

3.8.1 Set maximum : set the maximum capacity

3.8.2 Extend size : extend the size of Mirror

When the two hard drives of the original system have been changed, and the capacity is bigger than the previous mirroring size, you are allowed to execute this function to extend the size of Mirror. The newly increased capacity will be indicated as the second partition.

3.9 **Compare** : compare the data

It is to compare if the two hard drives' data are the same. During comparison if there is any data inconsistent, the system will start to rebuild the remaining data from the primary hard drive to the secondary one. Once this function is activated, the menu will change to "Stop compare", and meanwhile the system administrator can stop comparing.

4. EVENT LOG : the record of the system events

   4.1   **Display log** : display all records (record limit is 1024)

   4.2   **Erase log** : erase all records

   4.3   **Elapse time** : display the uptime since Mirror Smart was turned on
            If the system hasn't been restarted over 3 years, the timer will be reset.

5. LOAD DEFAULT : reload the defaults
            Once the defaults are restored, the password will be deleted.
            1. Fan detection: ON
            2. Fan auto control: ON
            3. Read balance: ON
            4. Rebuilding rate: Normal
            5. Warning temperature: 50°C
            6. RAID alarm: OFF
            7. Auto compare: OFF

3.3 The LEDs
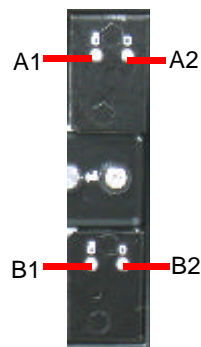
No	Name of LED	Indication
A1, B1	Hard drive power /alarm LED	1. Steady green light means normal power supply. 2. Blinking green light means rebuilding. 3. Steady green with blinking red light means a system problem. See troubleshooting. 4. Steady red light means a hard drive is failed or removed.
A2, B2	Hard drive access LED	The light means busy reading/writing.

Chapter 4 Troubleshooting

If you have any problem in using ARS-2019, you can try to solve it with the methods below. But if you still cannot solve, fill in the technical support form at the end of the manual, and send to us.

1. Computer cannot detect Mirror Smart
- Confirm if Mirror Smart and every hard drive are connected well, and the power switch is ON.
- Confirm if Mirror Smart is well connected to the computer by the USB cable.
- Confirm if the USB driver is installed properly.

2. Computer detects an unknown device or a wrong HDD model
Usually it is because that Mirror Smart hasn't connected with any hard drive. Accordingly, the device which the computer detected is Mirror Smart's controller. As for the detection of a wrong hard drive model, perhaps the model is not in the support list. Visit ACARD's website to get the latest support list, or download the most recent firmware of Mirror Smart.

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3. Mirror Smart produces an unknown beep or its handle is ejected

	Description	LCD	Buzzer	LED
1	Fan failure	Shows the condition by message	A short beep per 8 sec.	None
2	High temperature	Shows the condition by message	Three short beeps per 8 sec.	Alarm LED blinks red with beep
3	Bad sector in HDD	Shows the condition by message	Two shor beeps per 8 sec.	Alarm LED blinks red with beep
4	HDD failure or capacity smaller than the mirror size	Shows the condition by message	Beep in every sec., lasting 10 sec.	Alarm LED blinks red per half sec., lasting 10 sec., and remains red
5	HDD rebuilding	Shows the condition by message	None	Target HDD Alarm LED blinks green per sec.
6	Completion of rebuilding	Shows the condition by message	A long beep	Alarm LED "OFF"
7	HDD comparing	Shows the condition by message	None	Target HDD Alarm LED blinks green per 2 sec.
8	Completion of comparison	Shows the condition by message	A short beep and then a long beep	Alarm LED "OFF"
9	RAID alarm	Shows the condition by message	A long beep and then 5 short beeps	Alarm LED remains red

4. An error happens in accessing Mirror Smart's hard drives or the system's idle mode

● Confirm if the connection of Mirror Smart and USB cable is appropriate.
● Confirm if the quality of USB cable is acceptable.
● If the problem is hard drive, get another one, and reset Mirror Smart.

5. Update the firmware of Mirror Smart and change the mirror size

Refer to Appendix 2.

6. OS doesn't detect Mirror Smart's hard drives

● Confirm if the USB driver has been correctly installed (see the following steps 1 to 3).

● Confirm if Device Manager has detected the disk of Mirror Smart (see step 4).

● Confirm If the hard drive has been initialized, partitioned and formatted with the disk management tool (see step 5).

Step 1. Right-click "My Computer" to choose "Manage".
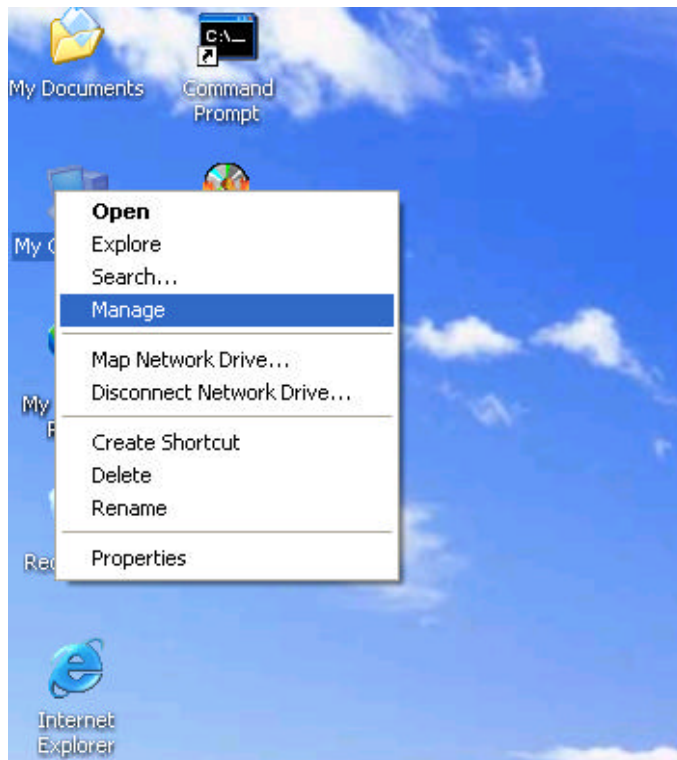
Figure 4-1

Step 2. Enter "Computer Management" to choose "Device Manager".

Figure 4-2

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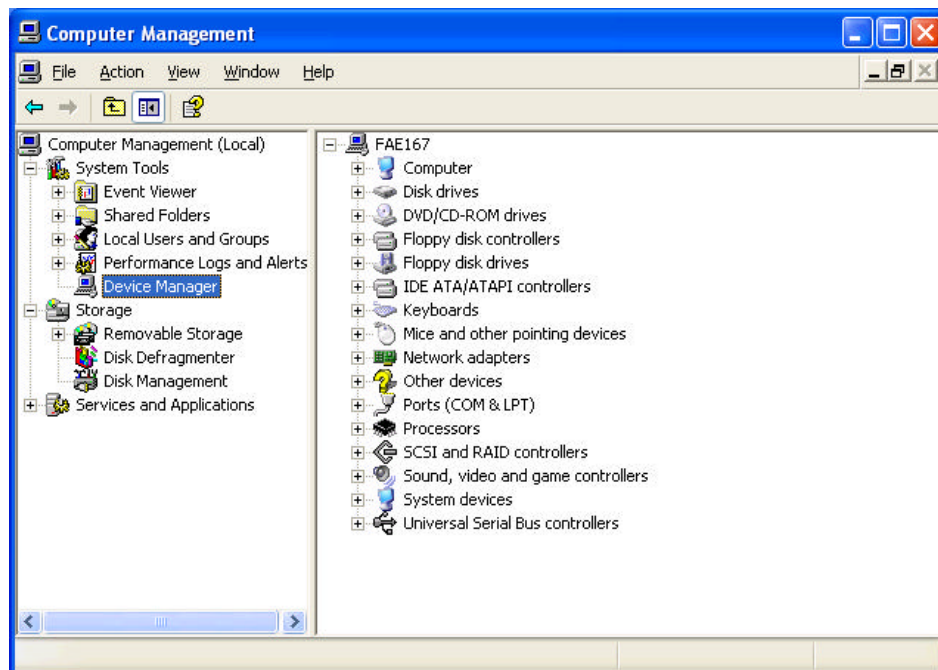
Step 3. In "Device Manager" double click "Universal Serial Bus controllers" to examine if the driver of USB controller has been installed properly.
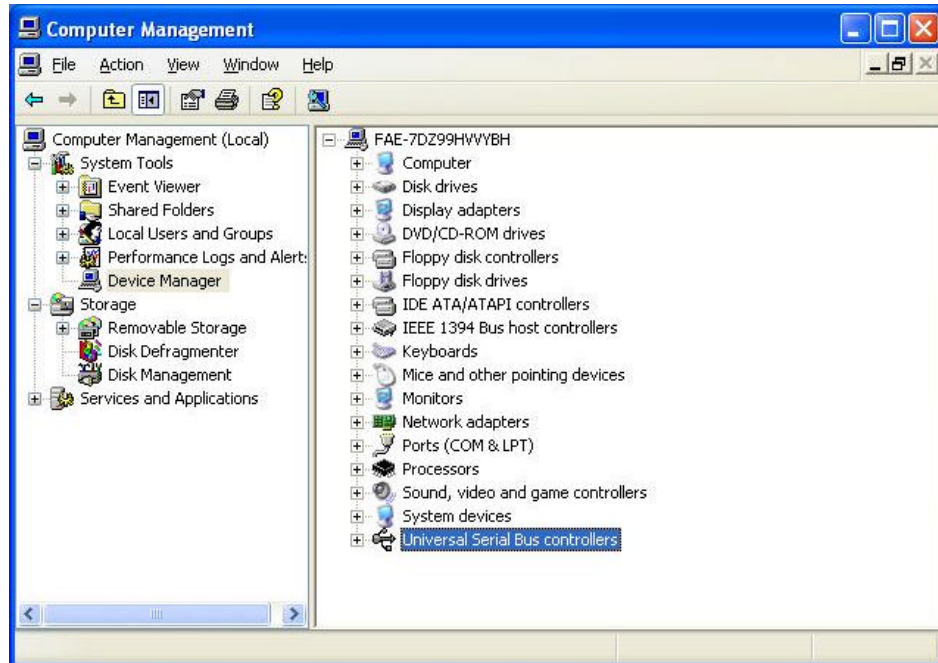
Figure 4-3

Step 4. In "Device Manager" double click "Disk drives" to confirm if the system has detected the disk of Mirror Smart.
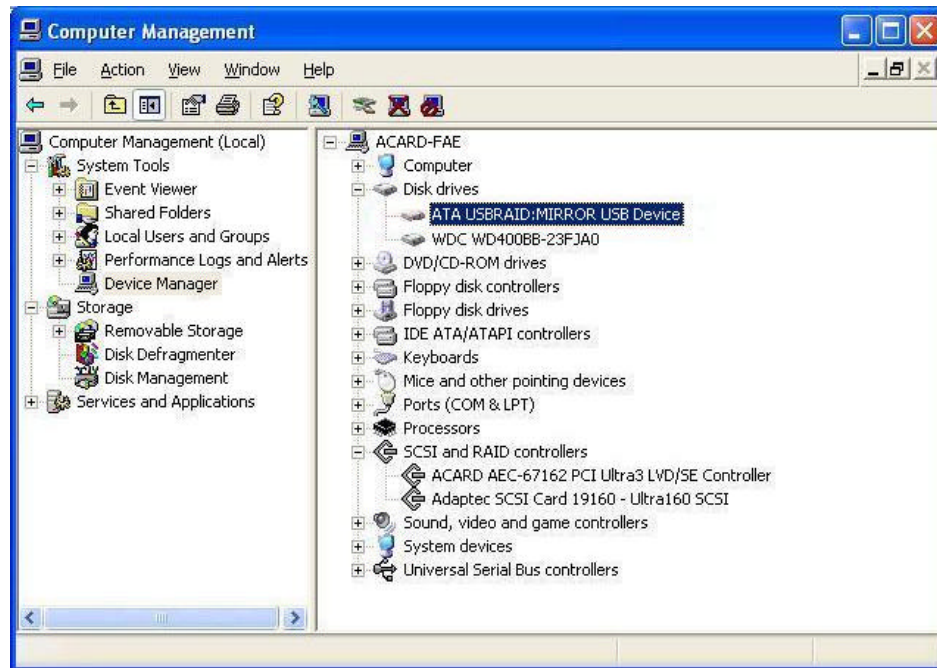
Figure 4-4

Step 5. Add a new partition for the hard drive of Mirror Smart in the "Disk Management" so as to access the new hard drive.
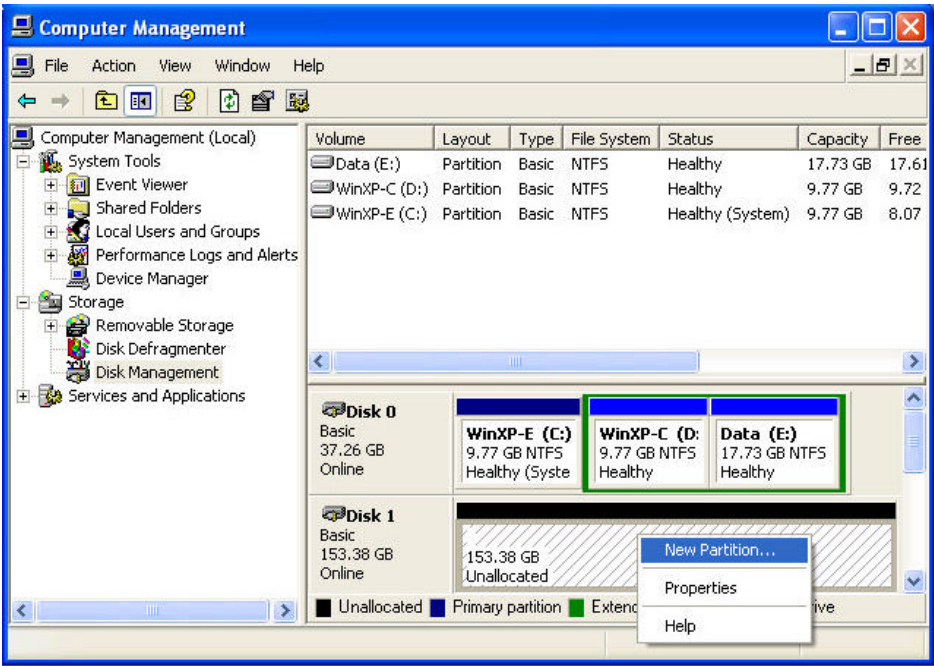
Figure 4-5

The following figure shows the condition of the hard drive after partition.

Figure 4-6

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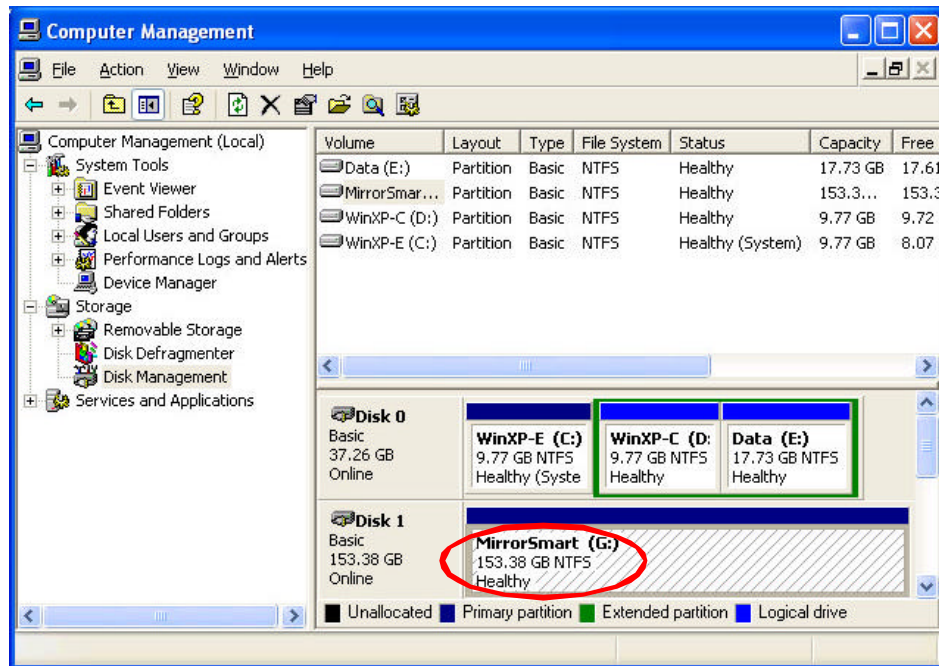
Appendix 1 Migrate Existing HDD to Mirror

Migrate the source HDD into Mirror Smart to form a new mirroring disk

Step 1. Take two empty trays out of Mirror Smart.

Step 2. Install source HDD into one tray, and replace it to Mirror Smart.

Step 3. Connect Mirror Smart to computer according to section 2.2.

Step 4. Power on Mirror Smart and then computer. Be sure that Mirror Smart's hard drive power LED is steady green.

Step 5. Install the tartget HDD into another tray, and replace it to Mirror Smart. Now Mirror Smart will copy the data of source HDD to target HDD. In rebuilding, access is all right.

NOTICE: In a set of Mirror Smart you are suggested to use two identical hard drives. If you replace a failed hard drive with a new one, the new hard drive's capacity must be equal to or larger than the original one's.

Appendix 2 Mirror Smart Utility

The Mirror Smart Utility is used to manage and control ARS-2019. With it you can easily set, change and examine all things about the hard drives.

After entering the utility, if you want to change some basic settings, you can click "Setup" and select "Preference" as shown below.

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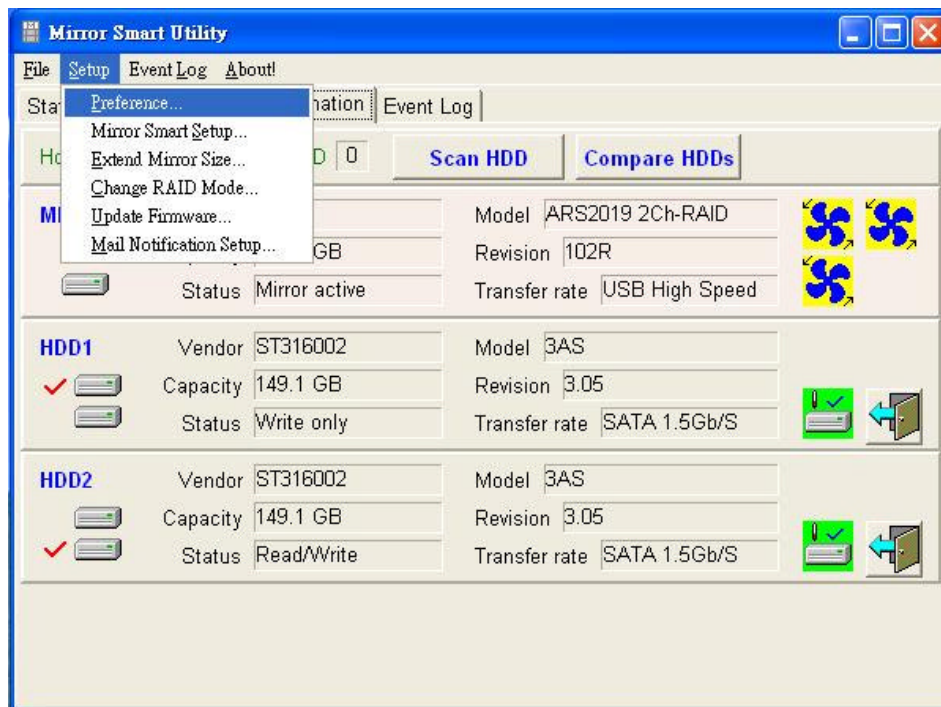
The main items in "Preference" are explained as follows.
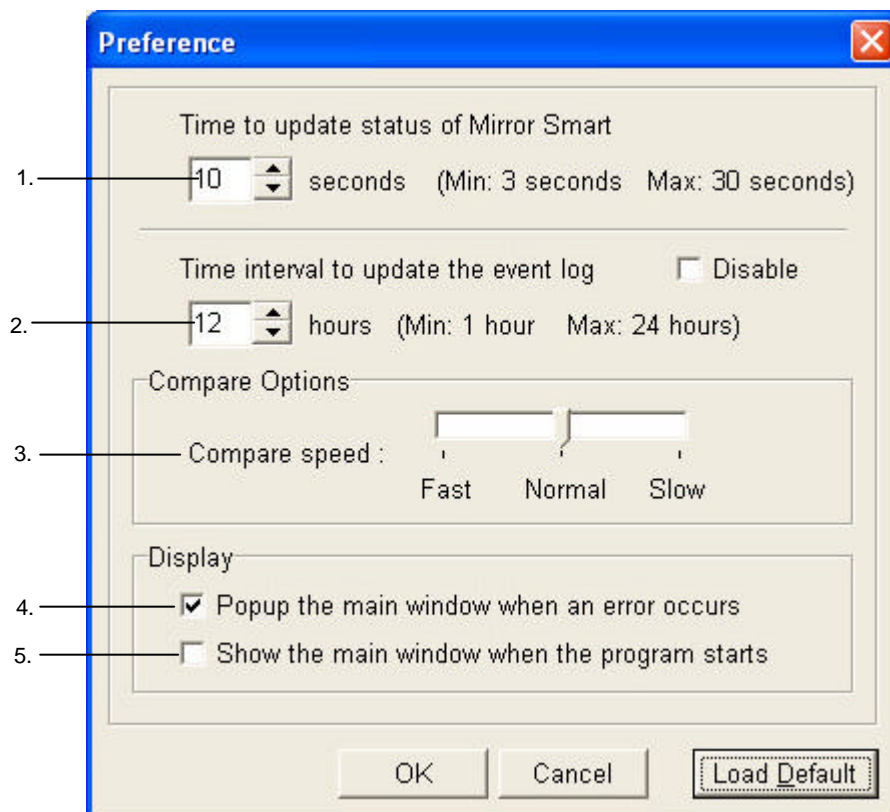
1. Set the time interval to update.
2. Set the time interval to update the event log.
3. Set the HDD comparison speed.
4. Set to pop up the main window when an error occurs.
5. Set to show the main window when the program is running.

If you want to set the functions of Mirror Smart, you can click "Setup" and select "Mirror Smart Setup" as shown below.
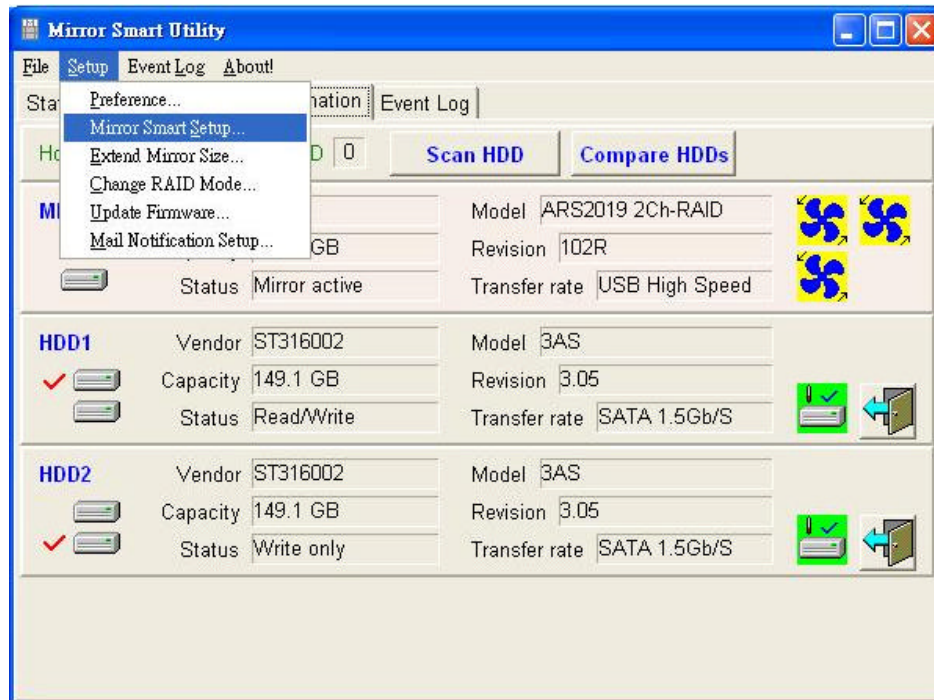
The main items in "Mirror Smart Setup" are explained as follows.
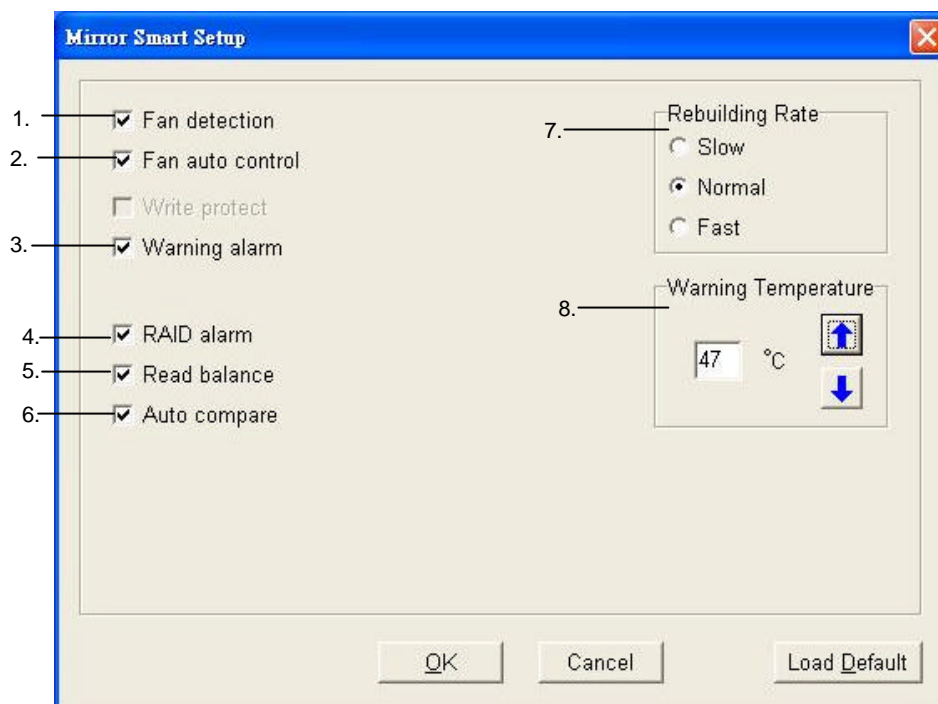
1. The system will produce a warning and show a message when the fan is malfunctioned.
2. The system will adjust the speed of fans automatically according to the warning temperature.
3. The alarm will be triggered to warn the system administrator when RAID becomes abnormal.
4. Each hard drive's data will be read for one minute to prolong the drive's life.
5. Automatic comparison after data rebuilding.
6. The buzzer will be triggered to warn the system administrator when the system becomes abnormal.
7. The speed of data rebuilding
8. If the system temperature is over the set level, there will be an alarm and a blinking on the screen to warn the system administrator, and the warning will be recorded to the event log.

If you want to change the RAID mode, you can click "Setup" and select "Change RAID mode" as shown below.

Select RAID mode

Select a hard drive as the primary disk

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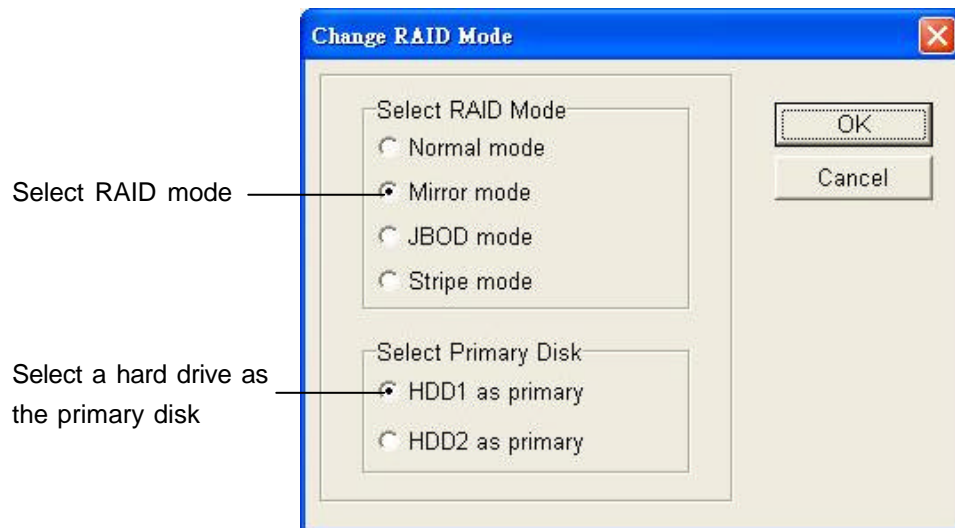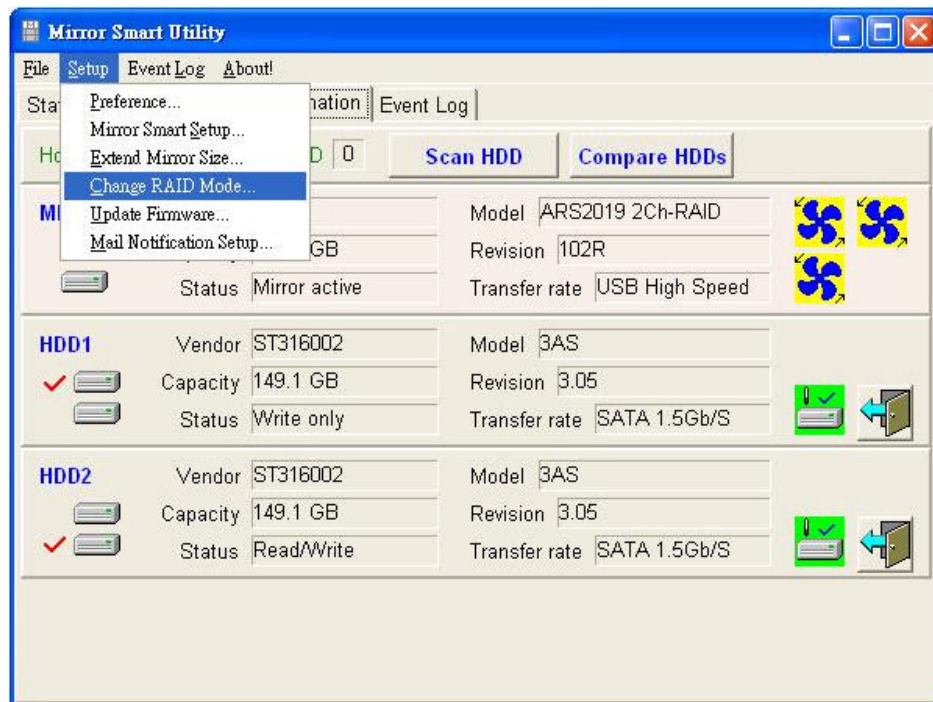
If you want to change the size of Mirror Smart, you can click "Setup" and select "Extend Mirror Size" as shown below.
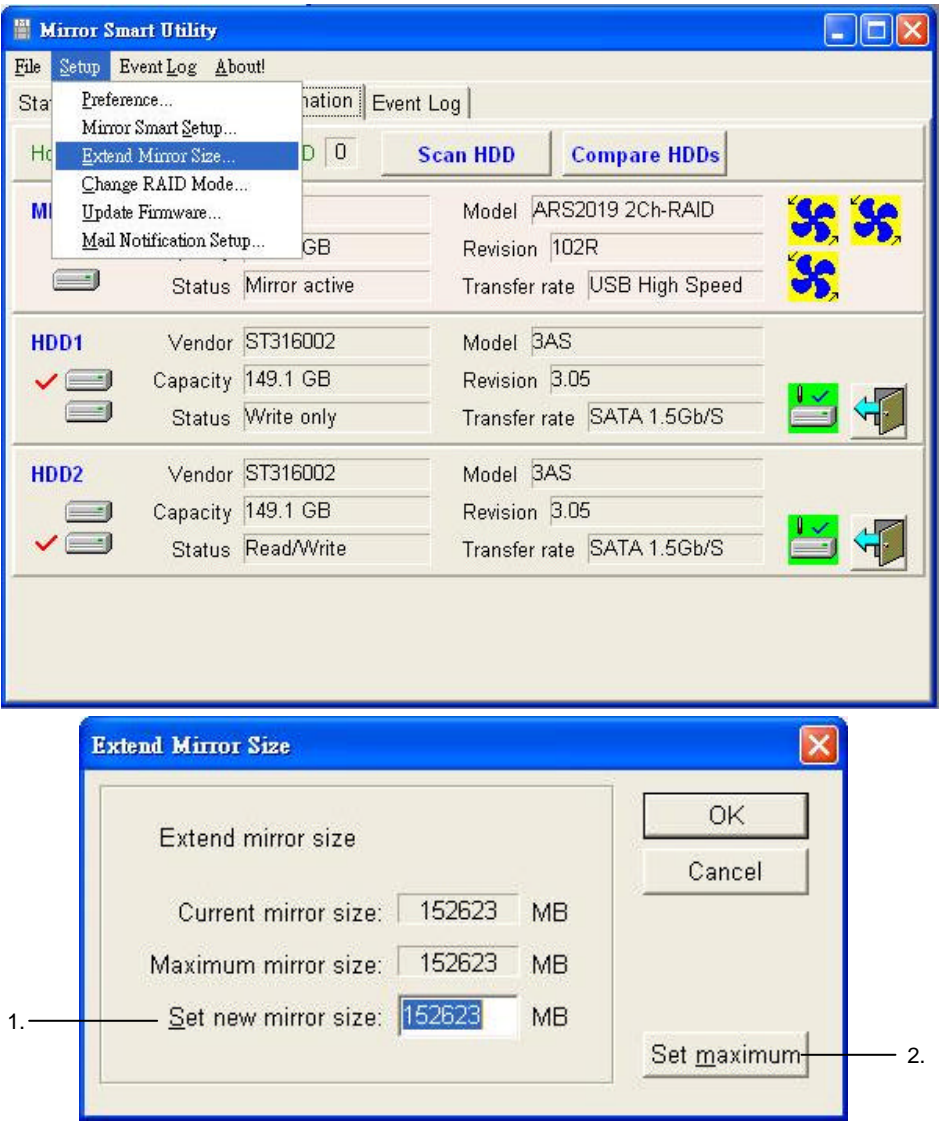
1. Set a new size equal to or larger than the current one.

2. Set the maximum size.

If the current size is the maximum size, you cannot change the size again.

If you want to update the firmware of Mirror Smart, you can click "Setup" and select "Update Firmware" as shown below.
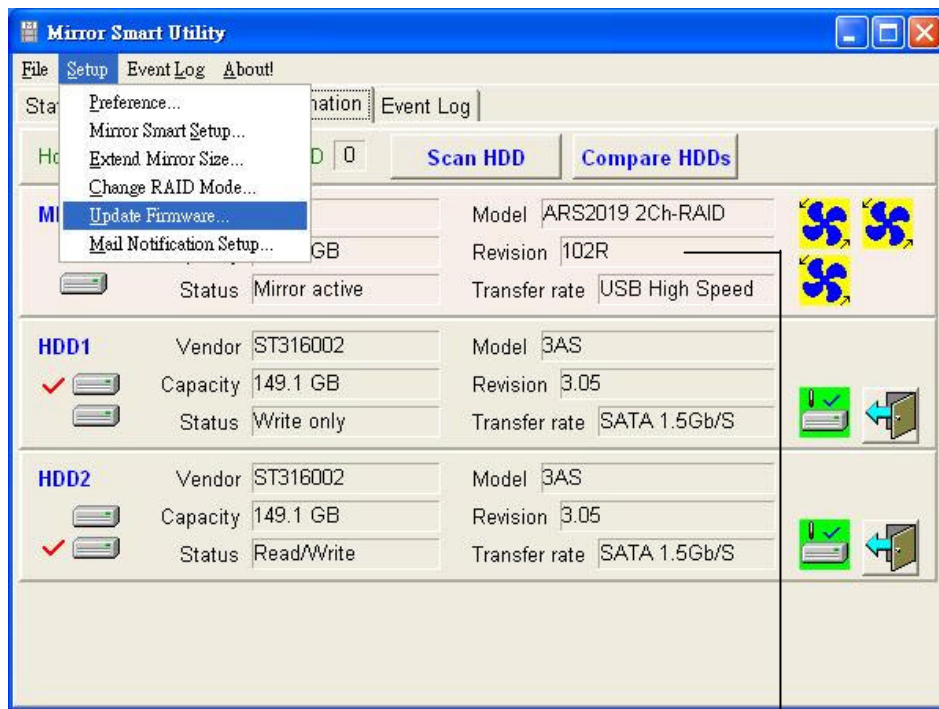
The current version
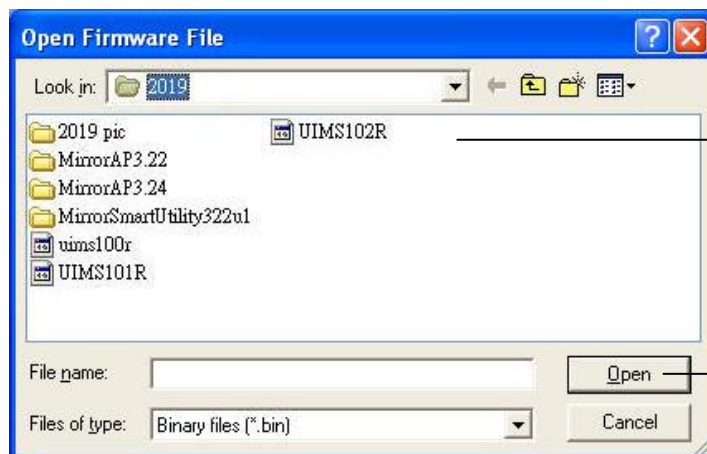
Update to the newest version
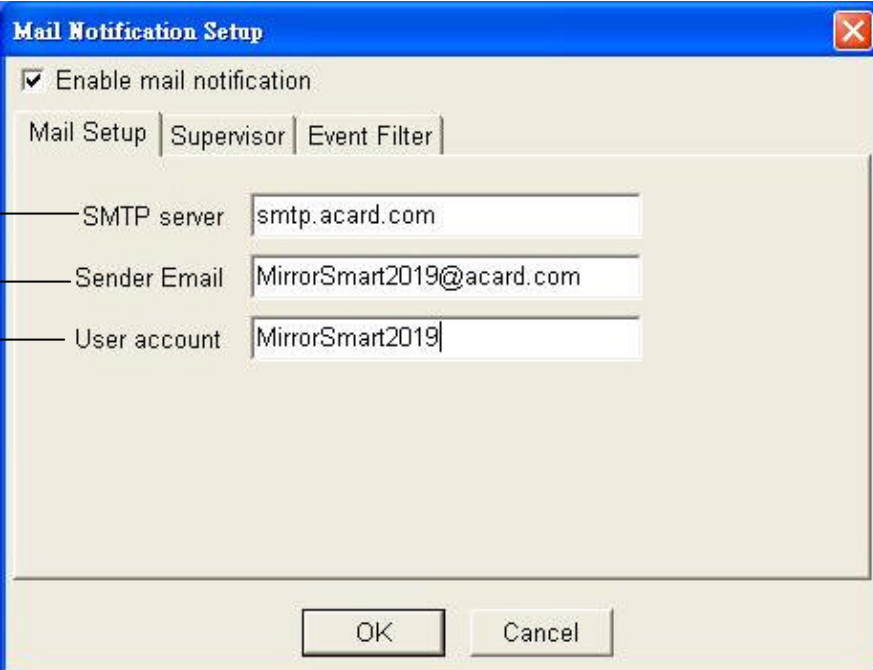
Click "Open" and then "Yes" to confirm

Confirm the firmware update

Completion
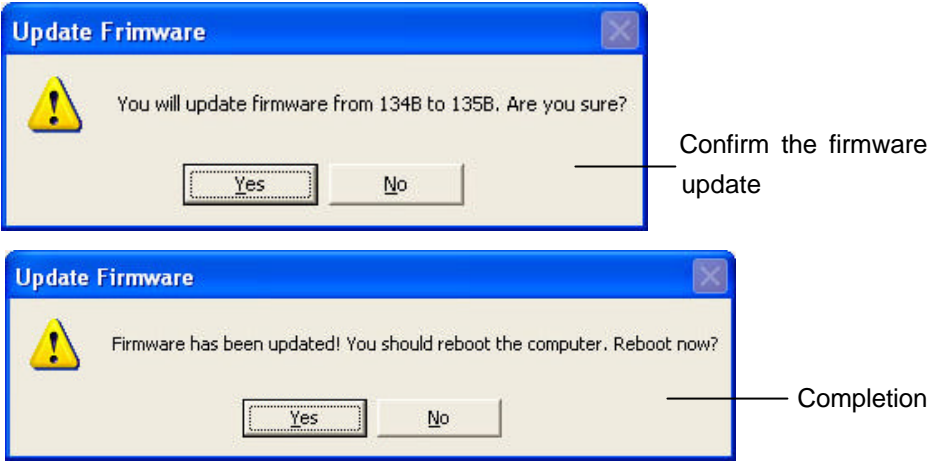
If you want to receive an e-mail when the system or a hard drive fails, you can click "Setup" and select "Mail Notification Setup" as shown below.
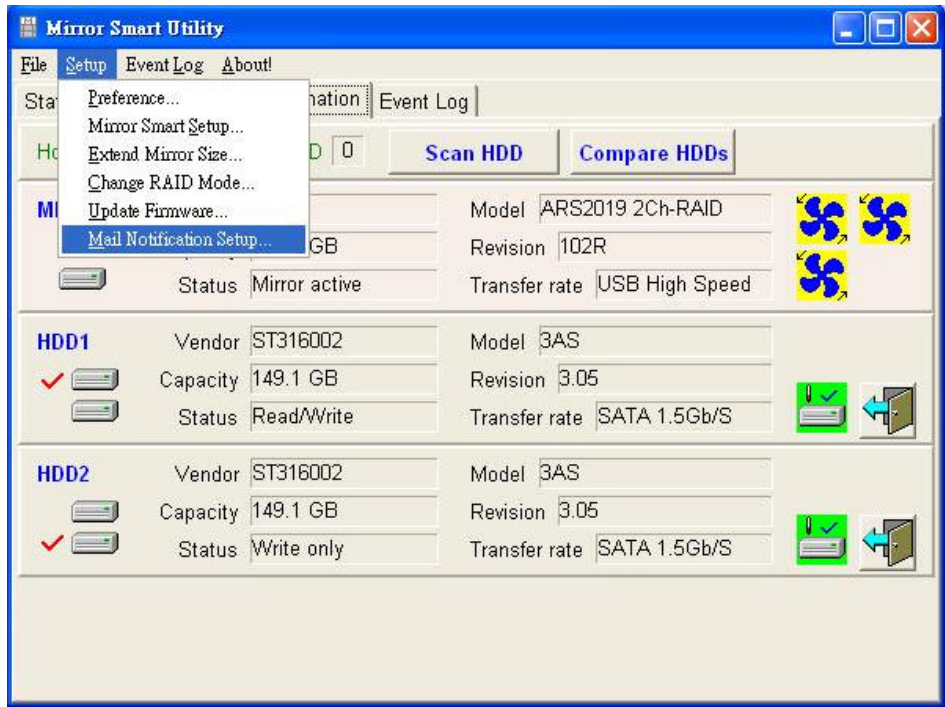
In "Mail Setup" be sure that Enable mail notification is checked. Type related data in the following three rows: 1. SMTP server, 2. User account, 3. Sender Email.

Then click "Supervisor", and type the receiver's mail address in the row near to the bottom. Click "Add" to add the address to the list.
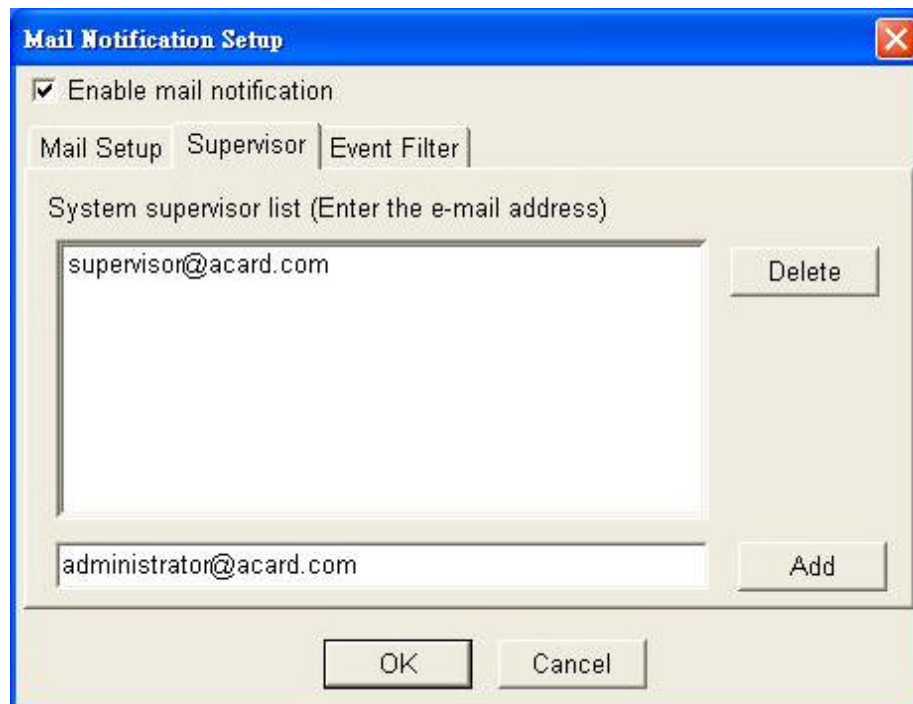
Finally click "Event Filter", and choose one or more events about which an e-mail will be sent to the supervisor. There are six events for option: 1. HDD failed, 2. HDD is removed, 3. HDD is inserted, 4. Fan failed, 5. HDD over heat, 6. HDD rebuilding/compare.
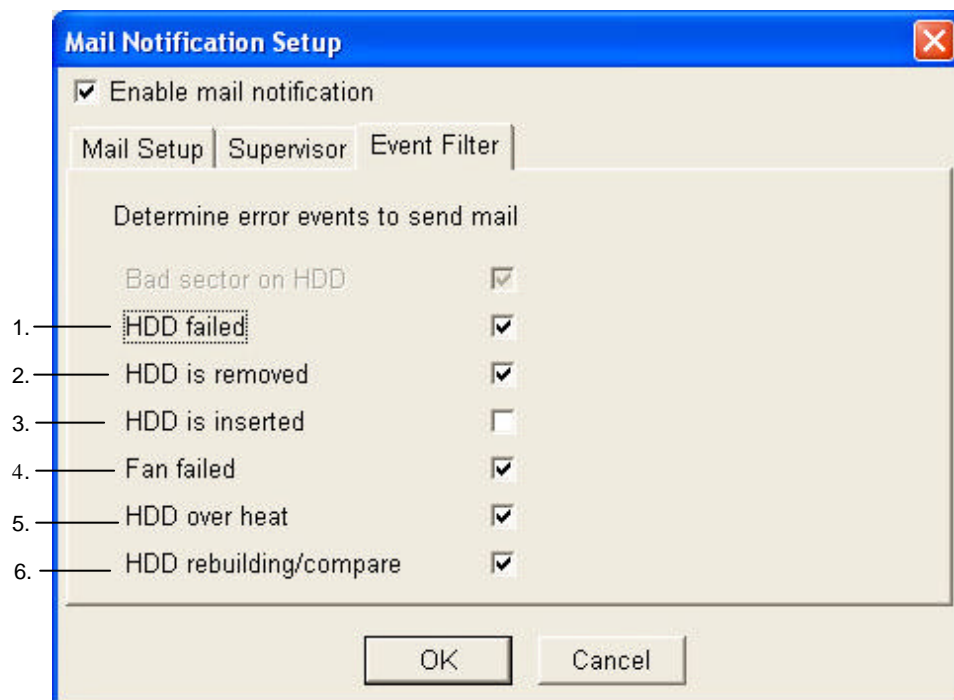
If you want to know the version of Mirror Smart Utility, you can click "About!".
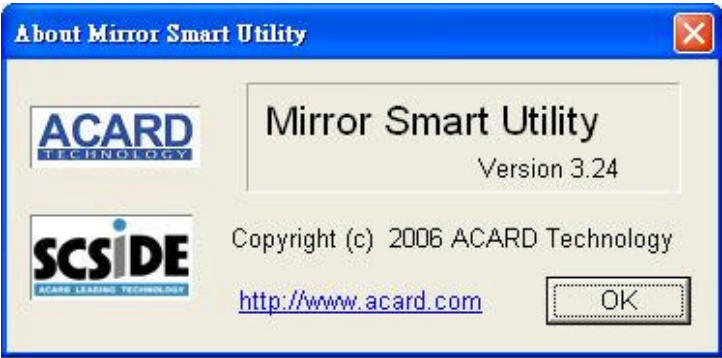
Click "Status List" to see the status of Mirror Smart.

Click "Mirror Smart Information" to see the HDD details and the Mirror status.
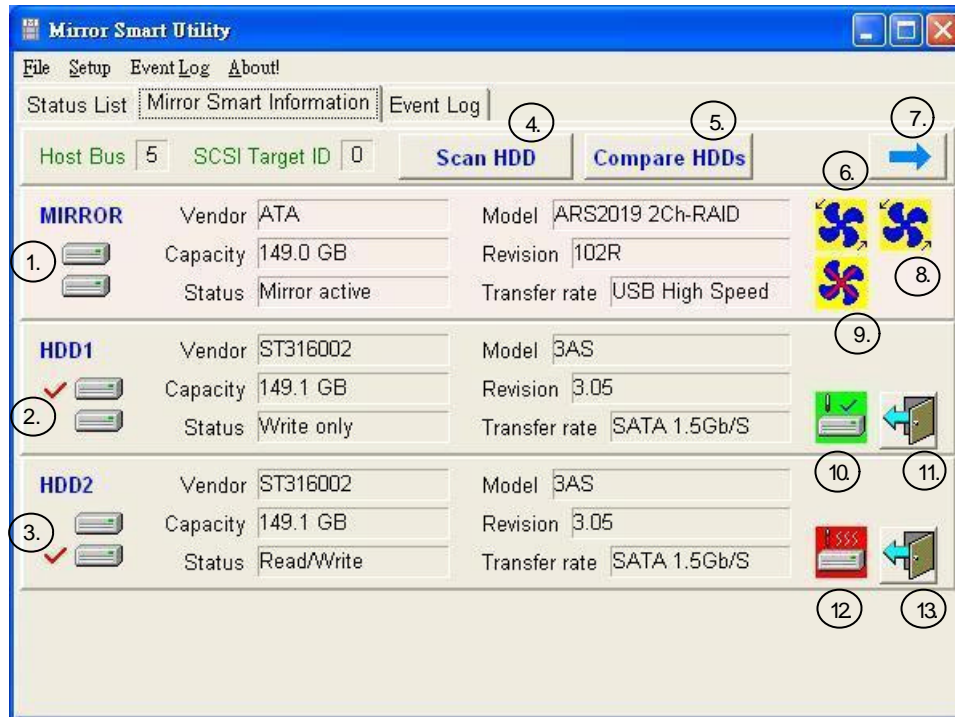
1. The system's firmware version, capacity, status, USB speed as one HDD.
2. HDD's frimware version capactiy, status, SATA bus speed in the upper tray.
3. HDD's frimware version, capacity, status, SATA bus speed in the lower tray.
4. Scan the HDD.
5. Compare two HDDs' data.
6. Fan 1 is good.
7. See the information of other Mirror Smarts.
8. Fan 3 is good.
9. Fan 2 is failed.
10. The temperature of the HDD in the upper tray (normal).
11. Remove the HDD in the upper tray safely (for Mirror only).
12. The temperature of the HDD in the lower tray (over heated).
13. Remove the HDD in the lower tray safely (for Mirror only).

Click "Compare HDDs" to see if the Source HDD and the Target HDD contain the same data. The percentage bar on the bottom of the figure shows the process of comparison or rebuilding.
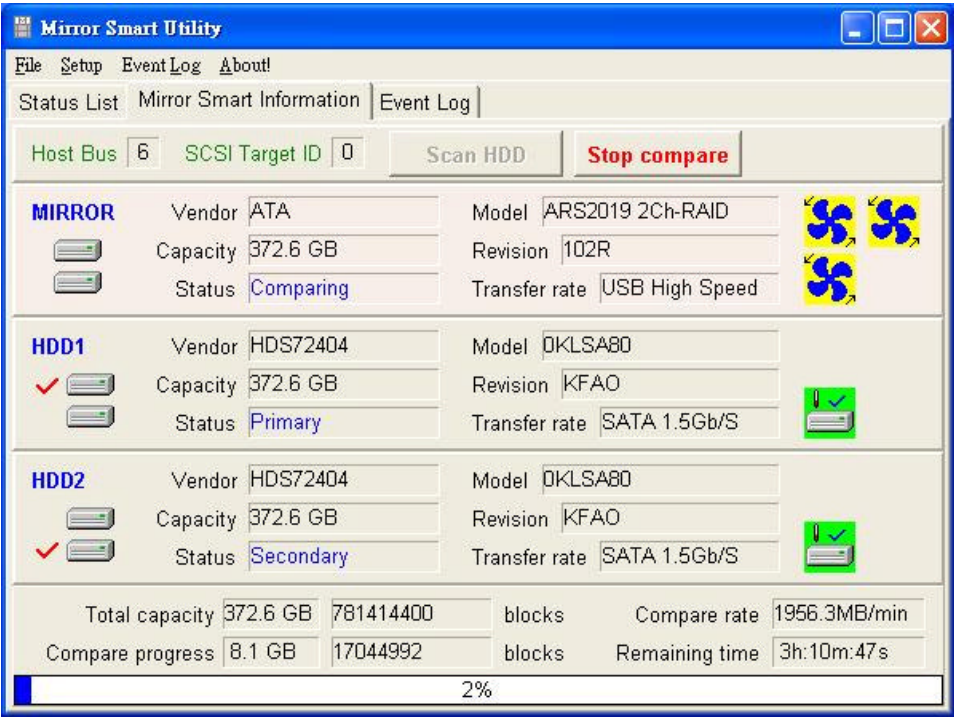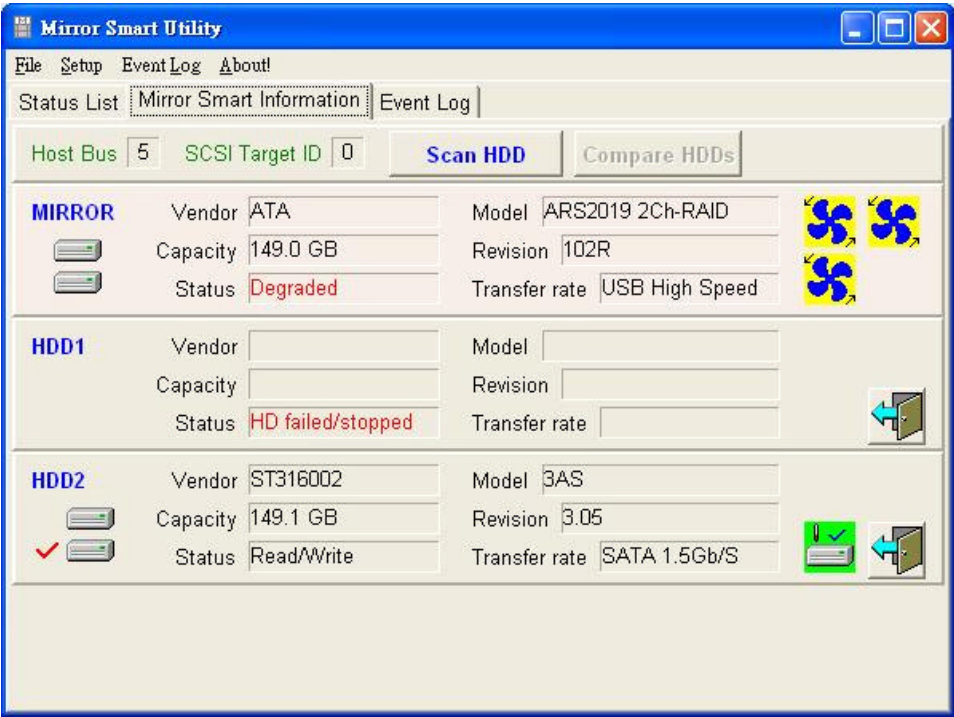
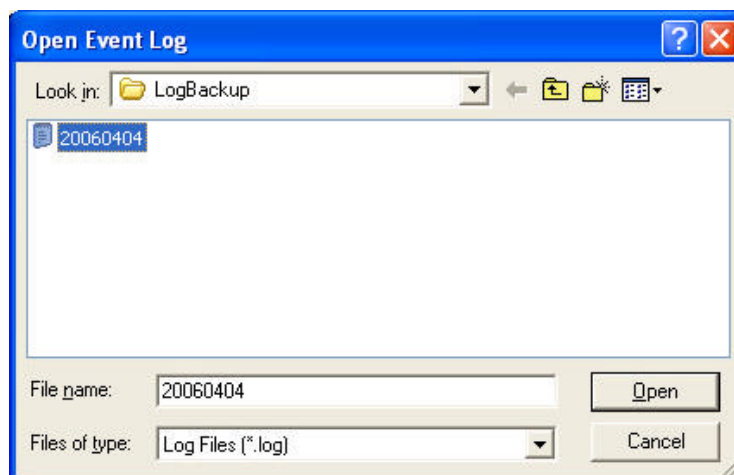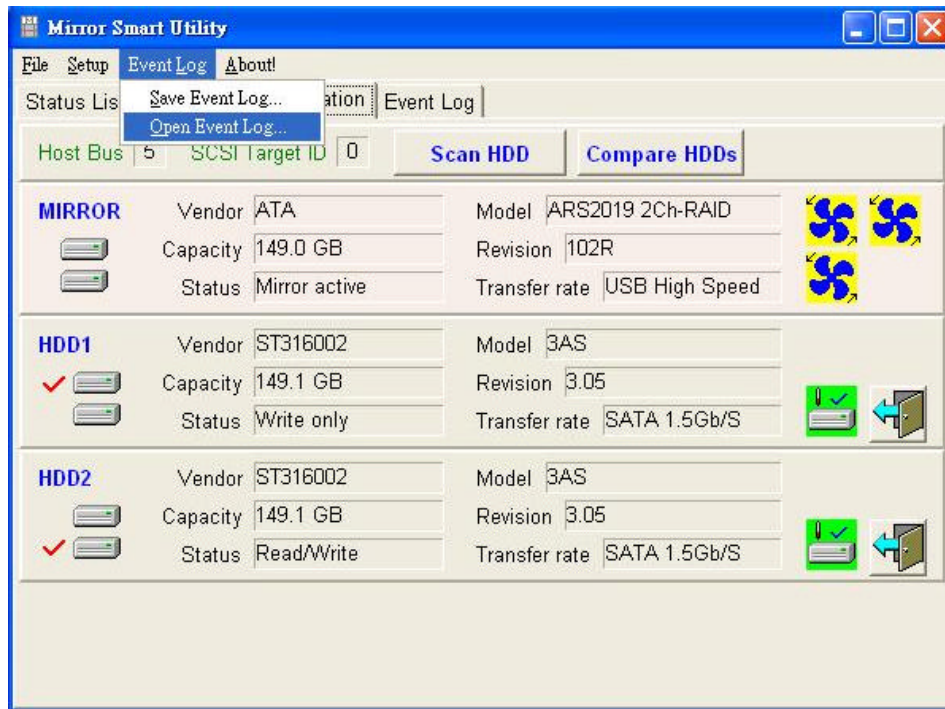If you didn't install a hard drive, the status will be shown as follows.
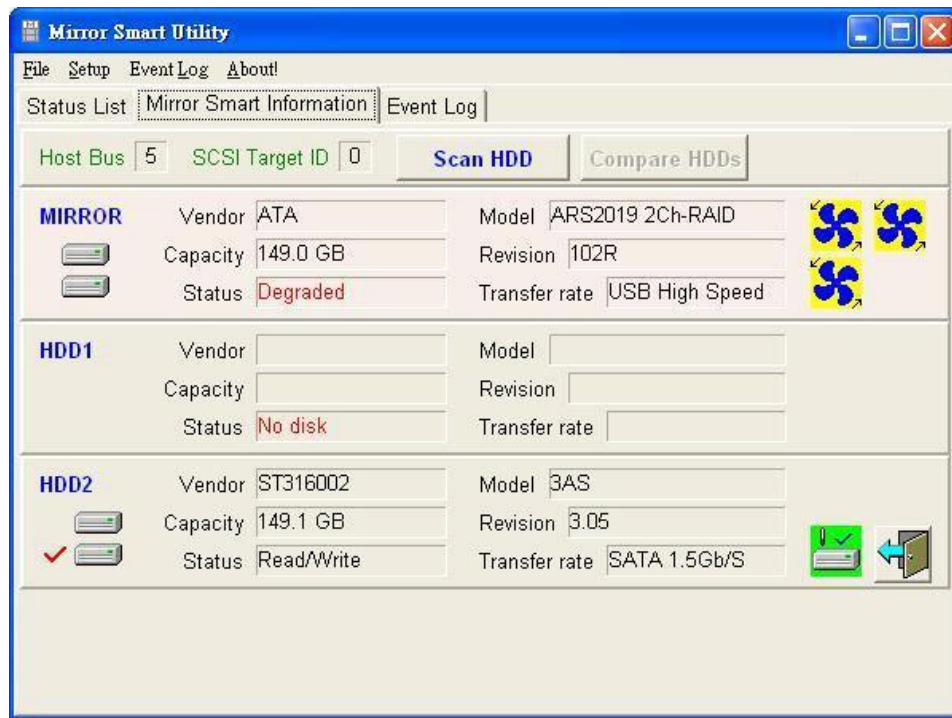
If the system didn't detect the hard drive, or the hard drive is failed, the status will be shown as follows.

If you want to read the record of an event log, click "Open Event Log" under "Event Log". Then, choose the file you need.
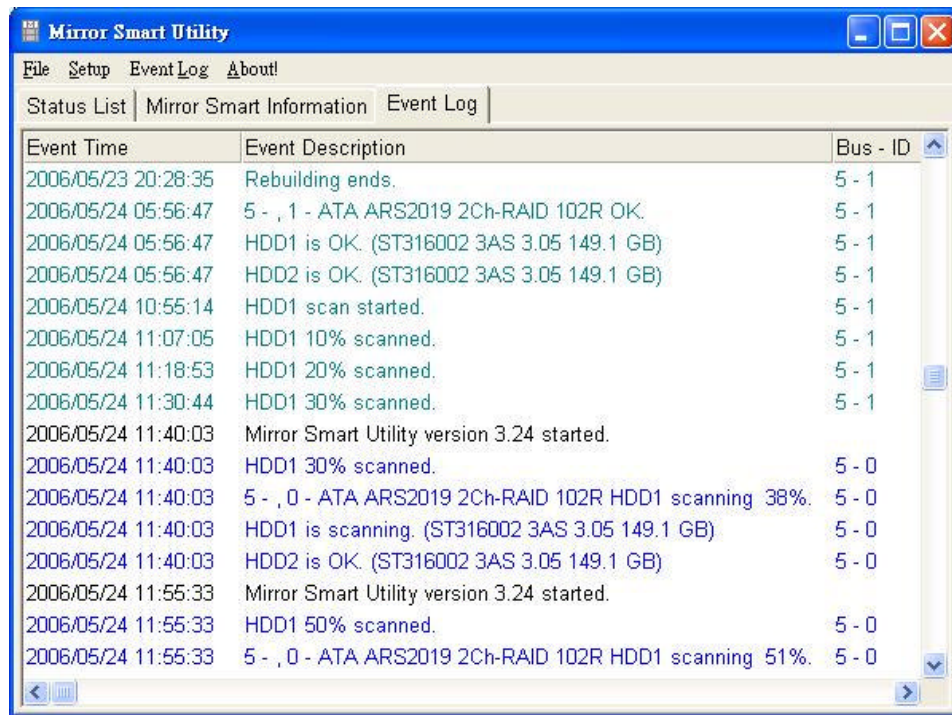
Click the file to read as the following figure shows.

Mirror Smart Utility		
File Setup Event Log About!		
Status List │ Mirror Smart Information Event Log │		
Event Time	**Event Description**	**Bus - ID**
2006/05/24 15:27:49	70% rebuilt.	5 - 0
2006/05/24 15:36:37	80% rebuilt.	5 - 0
2006/05/24 15:37:25	HDD2 over heat.	5 - 0
2006/05/24 15:43:28	HDD2 over heat.	5 - 0
2006/05/24 15:45:22	90% rebuilt.	5 - 0
2006/05/24 15:48:43	HDD2 over heat.	5 - 0
2006/05/24 15:54:13	Rebuilding ends.	5 - 0
2006/05/24 15:54:13	Compare started.	5 - 0
2006/05/24 15:54:40	HDD2 over heat.	5 - 0
2006/05/24 16:01:44	HDDs compare stopped.	5 - 0
2006/05/24 16:02:10	HDD2 scan started.	5 - 0
2006/05/24 16:02:46	HDD2 scan stopped.	5 - 0
2006/05/24 16:03:22	HDD1 over heat.	5 - 0
2006/05/24 16:03:22	HDD2 over heat.	5 - 0
2006/05/24 16:16:55	HDD1 was removed: ST316002 3AS 3.05 149.1 GB	5 - 0
2006/05/24 16:17:52	HDD1 failed or stopped:	5 - 0

The "Event Log" describes the time and status when an event happens. It is helpful for you to solve the problems.

Appendix 3 About RAID

RAID (Redundant Array of Independent Disks) is a system composed of many hard drives; that is, multiple physical drives form a single virtual drive to be recognized by the system. The advantages of RAID technology are increasing the read/write speed of a hard drive, achieving better data protection, and enlarging the capacity of a single drive like Drive C, Drive D, etc. Different classes of RAID have different composition modes and different functions.

RAID 0 (Striping)

RAID 0 must be composed of a pair of hard drives at least. When data are written into the whole hard drive, they will be equally striped and written into each hard drive of the array. Thus the access speed becomes quicker. The effect of RAID 0 is proportioned to the number of hard drives. More hard drives mean more read/write heads, and therefore the speed is quicker. Though RAID 0 is quick in read/write speed, it has no data redundancy, and accordingly has no fault tolerance.
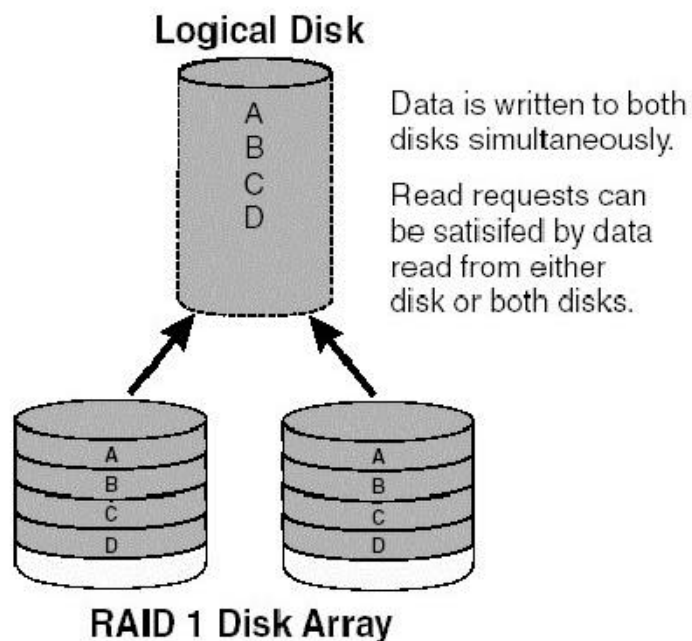
It is suggested to compose RAID 0 with hard drives of the same capacity. Because the capacity of striped disk array is the multiplication of the smallest hard drive capacity with the number of hard drives. For example, a 100GB hard drive and a 120GB hard drive unite into RAID 0. The total capacity is 200GB (100GB×2).
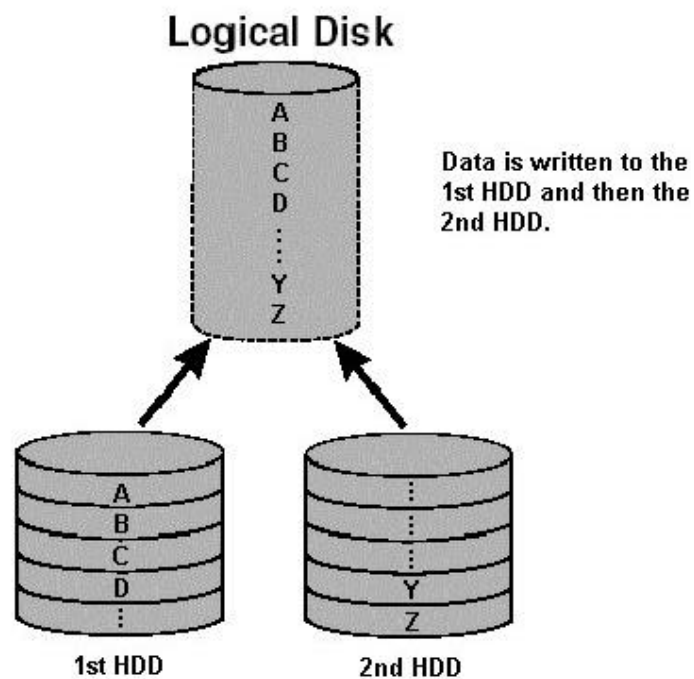

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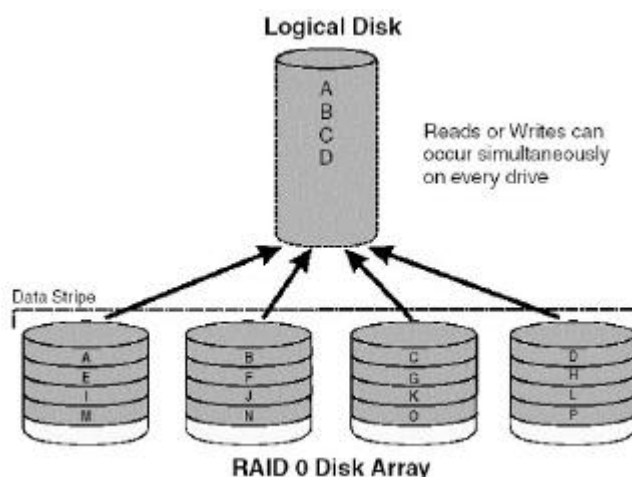
RAID 1 (Mirroring)

RAID 1 must be composed of hard drives in even number. The RAID controller will divide the hard drives into a pair, and write data simultaneously into the two hard drives. The two hard drives contain the same data. When one hard drive's data are damaged, you can replace the failed hard drive, and the RAID controller will restore the data by the backup on the other hard drive. For a single hard drive RAID 1 is the best in fault tolerance.

It is suggested to compose RAID 1with hard drives of the same capacity. Because the capacity of mirrored disk array is that of the smallest hard drive. For example, a 100GB hard drive and a 120GB one unite into RAID 1. The total capacity is 100GB.

Logical Disk

A
B
C
D

Data is written to both disks simultaneously.

Read requests can be satisifed by data read from either disk or both disks.

A
B
C
D

A
B
C
D

RAID 1 Disk Array

JBOD (Just a Bunch of Disks)

JBOD, formal word spanning, is not a real RAID setting. It simply links a bunch of disks into a big hard drive. It doesn't have the functions of quick read/write speed and error tolerance. However, compared with RAID 0, JBOD doesn't waste the hard drive capacity. Its capacity is the total of all hard drive capacities. For example, set a 100GB hard drive and a 120GB one as JBOD. The total capacity is 220GB.

Logical Disk

A
B
C
D
⋮
Y
Z

Data is written to the
1st HDD and then the
2nd HDD.

A
B
C
D
⋮

⋮
⋮
⋮
Y
Z

1st HDD   2nd HDD

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Technical Support Form
Email: **support@acard.com**
http://www.acard.com

Model: ARS-2019	***F/W Version:**	
System Configuration		
Motherboard *		
BIOS version		
Chipset		
Memory		
Display card		
OS version *		
Hard Disk	Tray 1	Tray 2
Brand *		
Model *		
Capacity *		
Problem description * :		

Required columns are marked with asterisks (*) .

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