

SATARAID5™
Serial ATA
RAID5 Management Software
Home Edition

Users Manual

**Silicon Image**

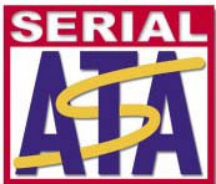
07/01/04

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Revision History:

Revision	Comment	Date
1.00	Initial creation of document	04/06/04
1.01	Updated for beta release.	04/30/04
1.02	Included "For SATARaid users" section.	05/07/04
1.03	Update chapter 6 based on BIOS changes.	06/17/04
1.04	Minor edits and clarifications	06/26/04
1.05	Update for new features for configuring SATARAID5.	06/30/04
1.06	Replaced some screen pictures with new ones to show the new product name.	07/01/04

1	<u>WELCOME</u>	5
1.1	SATARAID5 FEATURES	5
1.2	FOR SATARAID USERS UPGRADING TO SATARAID5	5
1.2.1	RAID FUNCTION LIST FOR DIFFERENT VERSIONS OF BIOS AND RAID DRIVER	5
1.2.2	UPGRADE BIOS AND RAID DRIVER	6
2	<u>AN INTRODUCTION TO RAID</u>	7
2.1	DISK STRIPING (RAID 0)	7
2.2	DISK MIRRORING (RAID 1)	7
2.3	DISK MIRRORING AND STRIPING (RAID 10)	7
2.4	PARITY RAID (RAID 5)	8
2.5	JBOD (JUST BUNCH OF DISKS)	8
3	<u>INSTALLING DRIVERS</u>	9
4	<u>JAVA 2 RUNTIME ENVIRONMENT INSTALLATION</u>	10
5	<u>SATARAID5 GUI INSTALLATION</u>	12
6	<u>CREATING AND DELETING LEGACY RAID GROUPS WITH BIOS UTILITY</u>	13
6.1	CREATING RAID GROUPS	15
6.2	CREATING SPARE DRIVE	16
6.3	CREATING JBOD	16
6.4	DELETING RAID GROUPS, SPARE DRIVE, AND JBOD	17
6.5	REBUILD RAID 1 SET	18
6.6	RESOLVING CONFLICTS	19
6.7	LOW LEVEL FORMATTING	21
6.8	LOGICAL DRIVE INFORMATION	21
6.9	RESERVED DRIVE AND SETTING SIZE FOR RAID SET, SPARE DRIVE, OR JBOD	21
7	<u>ALLOCATING PARTITIONS IN WINDOWS</u>	23
7.1	WINDOWS SERVER 2003 & XP & 2000	23
7.1.1	CREATING THE PARTITIONS	24
8	<u>SATARAID5 GUI OVERVIEW</u>	28

8.1	RAID GROUPS AND DEVICE CONFIGURATION WINDOWS	28
8.2	SATARAID5 MENU COMMANDS	30
8.2.1	CONFIGURATION	31
8.2.2	EXIT	35
8.2.3	CREATE SPARE	36
8.2.4	DELETE SPARE	36
8.2.5	DELETE MEMBER	37
8.2.6	DELETE ORPHAN	37
8.2.7	DEVICE SUMMARY	38
8.2.8	CREATE RAID GROUP	39
8.2.9	REBUILD RAID GROUP	41
8.2.10	DELETE RAID GROUP	41
8.2.11	RAID GROUP SUMMARY	42
8.2.12	TASK MANAGER	44
8.2.13	EVENT LOG	48
8.2.14	RESOURCES	50
8.2.15	CREATE LEGACY RAID GROUP	50
8.2.16	REBUILD LEGACY RAID GROUP	51
8.2.17	DELETE LEGACY RAID GROUP	51
8.2.18	CONVERT LEGACY RAID GROUP	52
8.2.19	CREATE LEGACY SPARE	52
8.2.20	DELETE LEGACY SPARE	53
8.2.21	CONVERT LEGACY SPARE	53
8.2.22	HELP TOPICS	54
8.2.23	ABOUT	54

1 Welcome

Silicon Image's SATARAID5™ software provides Serial ATA RAID 0 (Striping), RAID 1 (Mirroring), RAID 5 (Parity RAID), RAID 10 (Striping and Mirroring), and JBOD (just a bunch of disks) functionality to enhance the industry's leading PCI-to-SATA host controller products. Two major challenges facing the storage industry today are keeping pace with the increasing performance demands of computer systems by improving disk I/O throughput and providing data accessibility in the face of hard disk failures while utilizing full disk capacity. With Silicon Image Serial ATA host controller and SATARAID5, both of these problems are solved.

SATARAID5 software provides a Graphical User Interface (GUI) for easy-to-use configurations of the RAID Groups.

1.1 SATARAID5 Features

- RAID 0, RAID 1, RAID 5, RAID 10, and JBOD Groups are supported.
- Supported OS: Win2000/XP/Server 2003.
- RAID Groups can be created and deleted without exiting Windows.
- Hot Spare and On-line Rebuilding. The spare policy supports testing periodically for a health check of the spare disk. Spare drive can be global or dedicated to a specific RAID group.
- Supports Auto and Manual rebuild policy for a RAID group.
- System GUI Monitoring Utility:
 - Displays/Logs/Alerts Users to Vital RAID Group Information.
 - Manages RAID Group Functions (configures, rebuilds, etc..).
- Supports the ability to partition and map a segment of disk to a virtual LUN or disk.
- Supports up to two RAID groups. Any excess capacity on disk drives can be formatted as independent logical drives.
- Adjustable Stripe Size for RAID 0, RAID 5, and RAID 10.
- Uses the Self-Monitoring, Analysis, and Reporting Technology (SMART) feature in the attached drives for automatic notification of imminent drive failures.
- Employ RAID recovery algorithms to maintain data integrity in the event of a disk failure including bad block management.
- Automatically Selects Highest Available Transfer Speed for All SATA Devices. Supports the following:
 - Data transfer rate up to 150MB/Sec (Sil3114, Sil3124-1), and 300MB/Sec (Sil3124-2)
 - Support up to 4 SATA devices connected to a single controller.
 - ACPI, SATA 1.0 (Sil3114, Sil3124-1), and SATA 2.0 (Sil3124-2)
- Supports drive roaming capability allowing drives from one controller to be moved to another without loss of data.
- Employs a task manager for the scheduling of any RAID or disk management operations including RAID group creation, rebuild, and test.

1.2 For SATARaid Users upgrading to SATARaid5

If you plan to upgrade to RAID 5 driver and/or BIOS from previous drivers without RAID 5 capability, read this section carefully before upgrading BIOS and/or RAID driver. Otherwise, you might get unexpected results.

We do not recommend downgrading from RAID 5 driver to the previous (non-RAID 5) RAID driver.

1.2.1 RAID Function List for Different Versions of BIOS and RAID Driver

The following list shows possible BIOS and RAID driver combination and RAID functions supported by each combination. (Legacy RAID group is a RAID set that is compatible with older Sil3112A, Sil3114, and Sil3124 SATARaid software drivers).

1. Old BIOS with Old RAID Driver
 - Non-RAID Hard Disk
 - Legacy RAID 0 group
 - Legacy RAID 1 group
 - Legacy RAID 10 group
 - Legacy spare drive
2. Old BIOS with New RAID Driver
 - Legacy RAID 0 group
 - Legacy RAID 1 group
 - Legacy RAID 10 group
 - Legacy spare drive

-
- New RAID 0 group (BIOS will not recognize this)
 - New RAID 1 group (BIOS will not recognize this)
 - New RAID 5 group (BIOS will not recognize this)
 - New RAID 10 group (BIOS will not recognize this)
 - New spare drive (BIOS will not recognize this)
 - JBOD (BIOS will not recognize this)
3. RAID 5 BIOS with Old RAID Driver
 - Legacy RAID 0 group
 - Legacy RAID 1 group
 - Legacy RAID 10 group
 - Legacy spare drive
 4. RAID 5 BIOS with New RAID Driver
 - Legacy RAID 0 group
 - Legacy RAID 1 group
 - Legacy RAID 10 group
 - Legacy spare drive
 - New RAID 0 group
 - New RAID 1 group
 - New RAID 5 group
 - New RAID 10 group
 - New spare drive
 - JBOD

1.2.2 Upgrade BIOS and RAID Driver

If you upgrade from old BIOS and old RAID driver to a newer version of BIOS and/or RAID drive, you may lose some functions. Also, the new driver may not recognize non-RAID drives. If you are upgrading the software driver from the previous non-RAID 5 versions, the following is a list of precautions users should realize before upgrading BIOS and RAID driver to a newer version.

1. If you're upgrading to RAID 5 driver only:
 - If the boot drive is a non-RAID drive, the system will not boot.
 - No non-RAID drive support.
 - When creating RAID groups through GUI, only those RAID groups created in legacy mode will be recognized by BIOS.
 - The existing RAID 0 or RAID 10 groups (created with previous version of BIOS or GUI) with 4 KB stripe size will not work.
2. If you're upgrading to RAID 5 BIOS only:
 - If the boot drive is a non-RAID drive, the system will not boot.
 - No non-RAID drive support.
 - RAID driver will not recognize JBOD and RAID 5 group created by BIOS.
3. If you're upgrading to RAID 5 BIOS and RAID 5 driver
 - If the boot drive is a non-RAID drive, the system will not boot.
 - No non-RAID drive support.
 - The existing RAID 0 or RAID 10 groups (created with previous version of BIOS or GUI) with 4 KB strip size will not work.

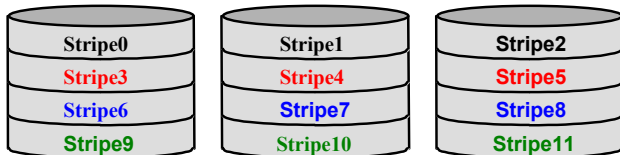
2 An Introduction to RAID

RAID - Redundant Array of Independent Disks

RAID technology manages multiple disk drives to enhance I/O performance and provide redundancy in order to withstand the failure of any individual member, without the loss of data. There are many different methods of implementation for RAID, with each having advantages and disadvantages. Raid levels or set types are given a numerical designator that defines its implementation such as RAID 0 or RAID 1. SATARAID5 provides support for three RAID Group types: Striped (RAID 0), Mirrored (RAID 1), and RAID 10 Mirrored/Striped. Other RAID types are not supported by SATARAID5 software and thus are not discussed.

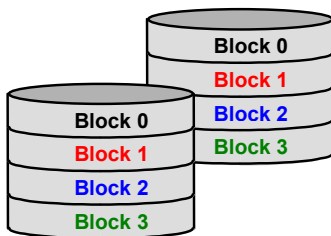
2.1 Disk Striping (RAID 0)

Striping is a performance-oriented, non-redundant data mapping technique. While Striping is discussed as a RAID Group type, it does not provide any fault tolerance. With modern SATA and ATA bus mastering technology, multiple I/O operations can be performed in parallel, enhancing data throughput. Striping arrays use multiple disks to form a larger virtual disk. The figure below illustrates a three-disk stripe set. Stripe one is written to disk one, stripe two to disk two, and so forth. RAID 0 sets can be comprised of two, three, or four drives.



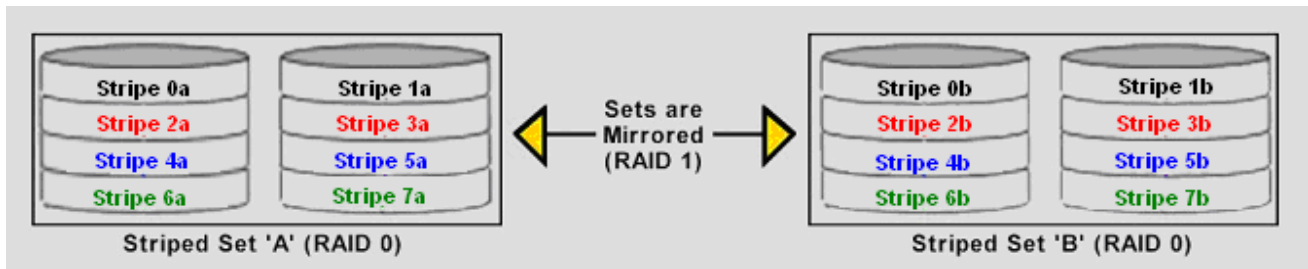
2.2 Disk Mirroring (RAID 1)

Disk mirroring creates an identical twin for a selected disk by having the data simultaneously written to two disks. This redundancy provides instantaneous protection from a single disk failure. If a read failure occurs on one drive, the system reads the data from the other drive. RAID 1 sets are comprised of two drives. A third drive can be allocated as a spare in case one of the drives in the set fails.



2.3 Disk Mirroring and Striping (RAID 10)

RAID 10 combines the features of both RAID 0 and RAID 1. Performance is provided through the use of Striping (RAID 0), while adding the fault tolerance of Mirroring (RAID 1). The implementation of RAID 10 requires four drives. The drives are assigned as two sets of striped pairs.



The data is written to RAID Group A, which is striped (RAID 0). This allows maximum speed. The data is then mirrored to another RAID 0 striped set, which is Set B in the figure above. This provides data redundancy (RAID 1), and thus increased data security.

Under certain circumstances, a RAID 10 set can sustain multiple simultaneous drive failures.

2.4 Parity RAID (RAID 5)

Parity or RAID 5 adds fault tolerance to Disk Striping by including parity information with the data. Parity RAID dedicates the equivalent of one disk for storing parity stripes. The data and parity information is arranged on the disk array so that parity is written to different disks. There are at least 3 members to a Parity RAID set. The following example illustrates how the parity is rotated from disk to disk.



Parity RAID uses less capacity for protection and is the preferred method to reduce the cost per megabyte for larger installations. Mirroring requires 100% increase in capacity to protect the data whereas the above example only requires a 50% increase. The required capacity decreases as the number of disks in the group increases.

2.5 JBOD (Just Bunch of Disks)

The JBOD is a virtual disk that can either be an entire disk drive or a segment of a single disk drive. For home edition, JBOD function only supports one disk.

3 Installing Drivers

Before installing the SATARAID5 software, Silicon Image Serial ATA host adapter driver must be installed. When Windows detects the newly installed SATA host adapter, it will open a Driver Installation Wizard. Click on the Next buttons until the wizard prompts for the location of the driver. Insert the Silicon Image SATA host adapter driver CD into the computer's CD-ROM drive and click on the Browse button. Select the directory on the CD in which the driver resides and click OK.

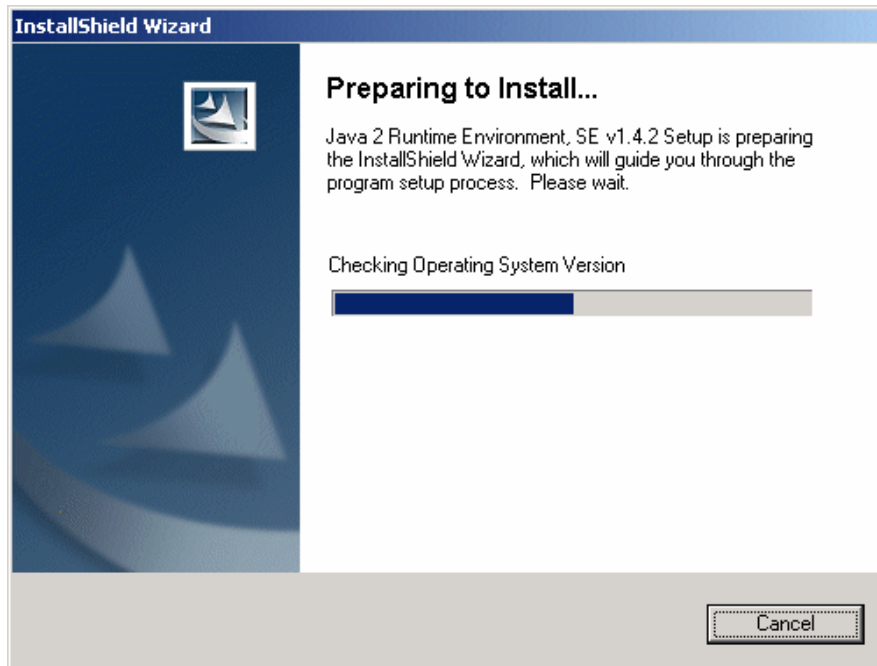


Click the Next button. A window will be displayed to verify proper installation of the host adapter driver. Click Finish. When prompted to restart the computer, click Yes.

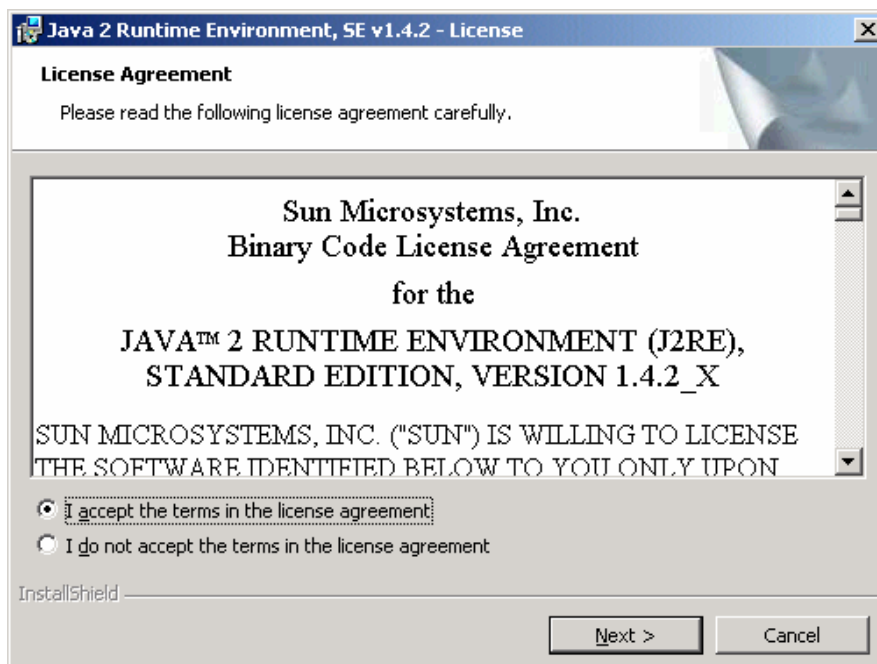
4 JAVA 2 Runtime Environment Installation

The Java 2 Runtime Environment is required for the SATARAID5 GUI. The Java 2 Runtime Installer and executable package must be downloaded from the Sun Microsystems website at <http://java.sun.com/j2se/downloads.html>. The computer must have an Internet connection set up before installation can proceed.

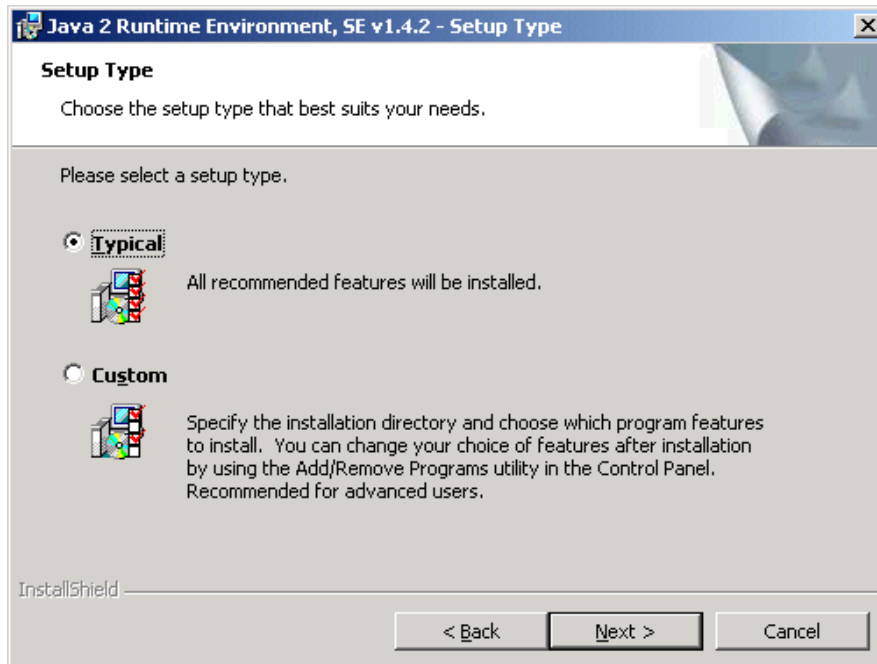
Save the installer file to a known location, such as the My Documents folder. Using Windows Explorer or by clicking on the My Computer icon on the desktop, select the installation file and open it. The installation will begin. The installer program will download the needed files from the Internet.



When a window appears asking for acceptance the license agreement, select *I accept the terms of this license agreement* and click Next.



Choose the Typical setup type and click Next.

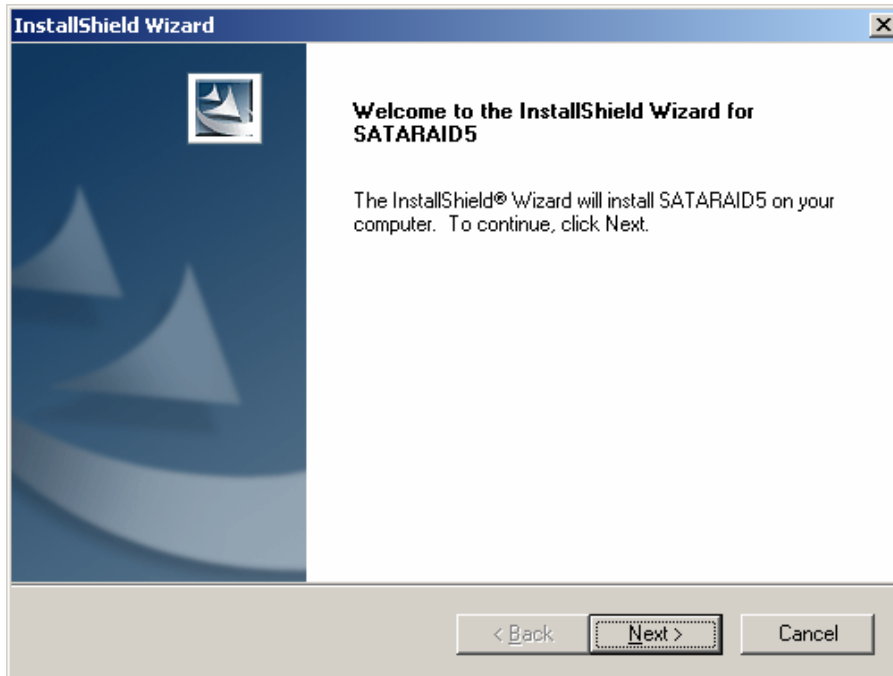


When the installation completes, click Finish. Restart the computer when prompted.

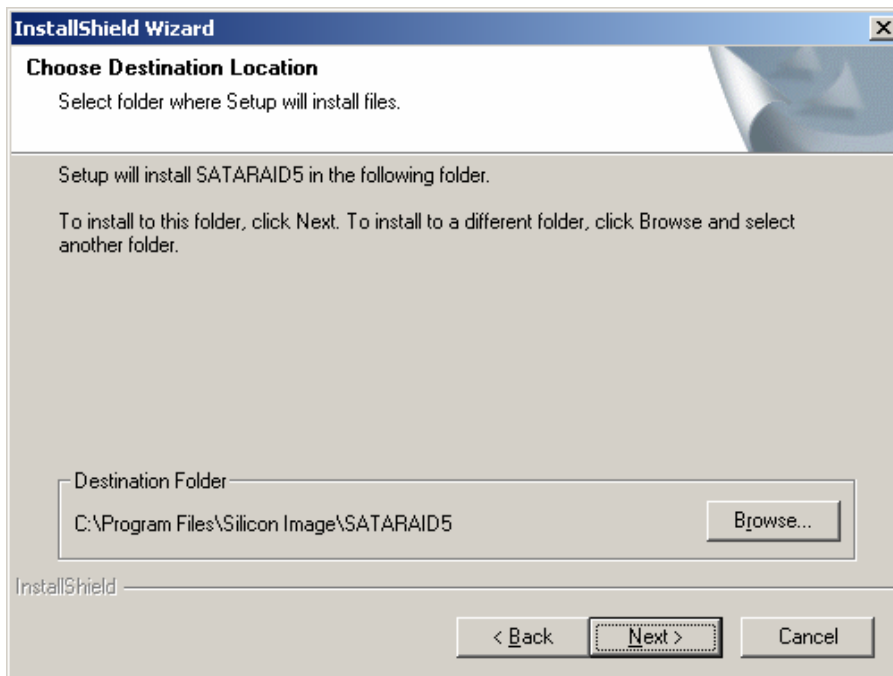
5 SATARAID5 GUI Installation

Insert the Silicon Image SATARAID5 Installation CD into the computer's CD-ROM drive. Using Windows Explorer or by clicking on the My Computer icon on the desktop, display the contents of the CD-ROM. The SATARAID5 GUI Installation program is named SATARAID5.exe. Select this file and open it. The installation will begin.

Click the Next button when the Welcome window appears.



Click the Next button to install the SATARAID5 program in the default directory (recommended). An alternate directory may be selected if desired.



After installation is done, click the Finish button to complete the installation.

6 Creating and Deleting Legacy RAID Groups with BIOS Utility

Legacy RAID sets and JBOD can be created and managed by either the BIOS utility or the SATARAID5 GUI. New RAID groups must be created and managed by the SATARAID5 GUI. See section 8 SATARAID5 GUI Overview for information on configuring RAID Groups using the SATARAID5 GUI.

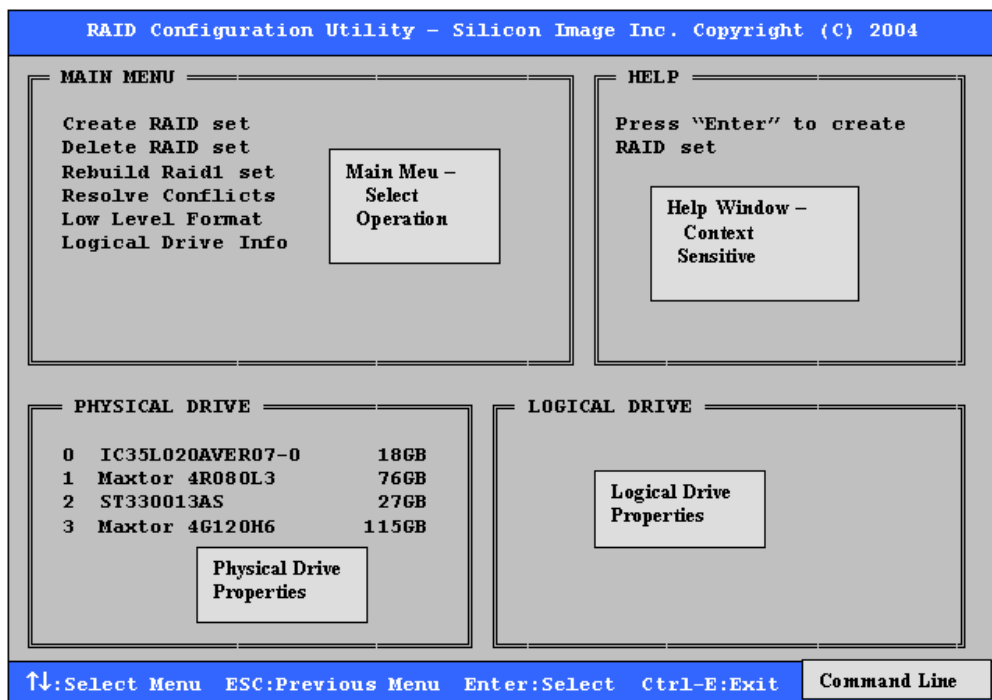
During boot up, a screen similar to that below will appear for about 5 seconds. Press CTRL+S or the F4 key to enter the BIOS RAID utility.

```
SiI 3114 SATARaid BIOS Version 5.1.14
Copyright (C) 1997-2004 Silicon Image, Inc.

Press <Ctrl+S> or F4 to enter RAID utility
0  IC35L020AVER07-0      18 GB
1  Maxtor 4R080L3       76 GB
2  ST330013AS           27 GB
3  Maxtor 4G120H6       115 GB

SiI Raid10 set          IC35L020AVER07-0
                        Maxtor 4R080L3
                        ST330013AS
                        Maxtor 4G120H6
```

The RAID Utility menu screen will be displayed. A brief description of each section is presented on the next page.



Main Menu

The Main Menu in the upper left corner is used to choose the operation to be performed. The selections are:

- Create RAID Group
- Delete RAID Group
- Rebuild RAID 1 Set
- Resolve Conflicts
- Low Level Format
- Logical Drive Info

Create RAID Group is used to create a new legacy RAID Set or for allocating legacy spare drives.

Delete RAID Group is used to delete a legacy RAID Set or to deallocate a legacy spare drive.

Rebuild RAID 1 Set is used to initiate the rebuild of a RAID 1 set after, for example, a drive in the Group has been replaced.

Resolve Conflicts is used to automatically find the member drives of a RAID set which has been disrupted (physical drives swapped around, for example) and restore the Set to proper operation.

Low Level Format allows a single drive to have its data completely wiped out. Drives assigned to Sets or allocated as spares cannot be low level formatted.

Logical Drive Info shows the current configuration of each RAID set, allocated spare, and unallocated physical drive attached to the SATA host adapter.

These operations are detailed in the pages that follow.

Help Window

This window displays context-sensitive help and status messages.

Physical Drive Information

This window displays the model number and capacities of the drives physically attached to the SATA host adapter.

Logical Drive Information

This window displays all logical drives connected to the controller. The upper part lists RAID sets and JBOD drives reported to the system BIOS. The lower part lists spare drives, reserved drives, conflict drives, and invalid drives not reported to the system BIOS.

Command Line

The bottom line of the display lists the currently active command keys:

- Up and Down arrows select the menu item or action
- ESC takes the user to the previous menu
- Enter selects the highlighted choice
- Ctrl-E exits the utility

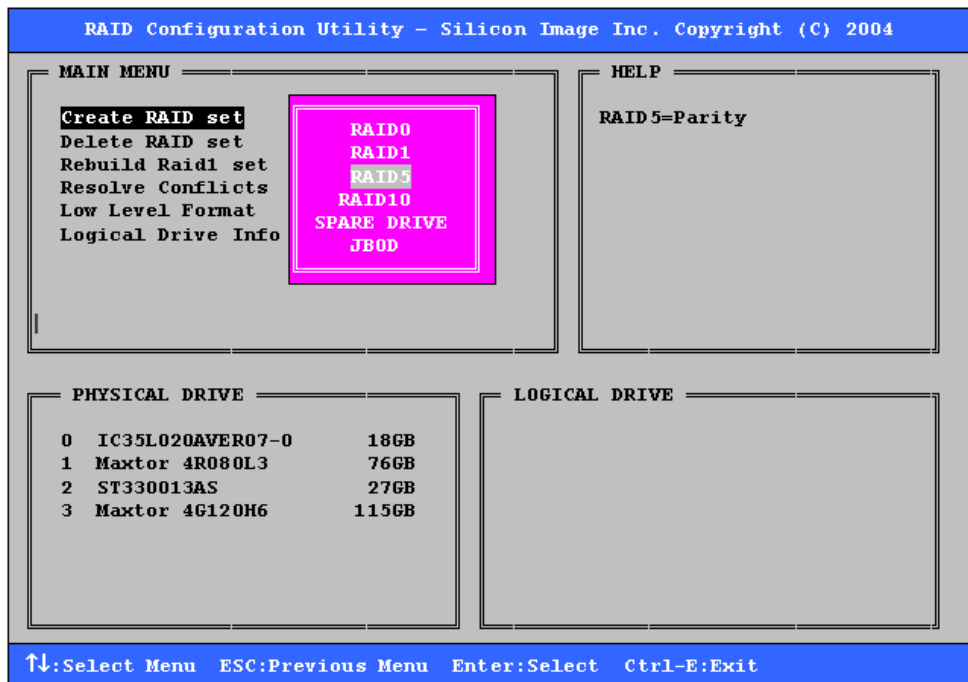
Other keys may be active depending upon the currently selected action.

6.1 Creating RAID Groups

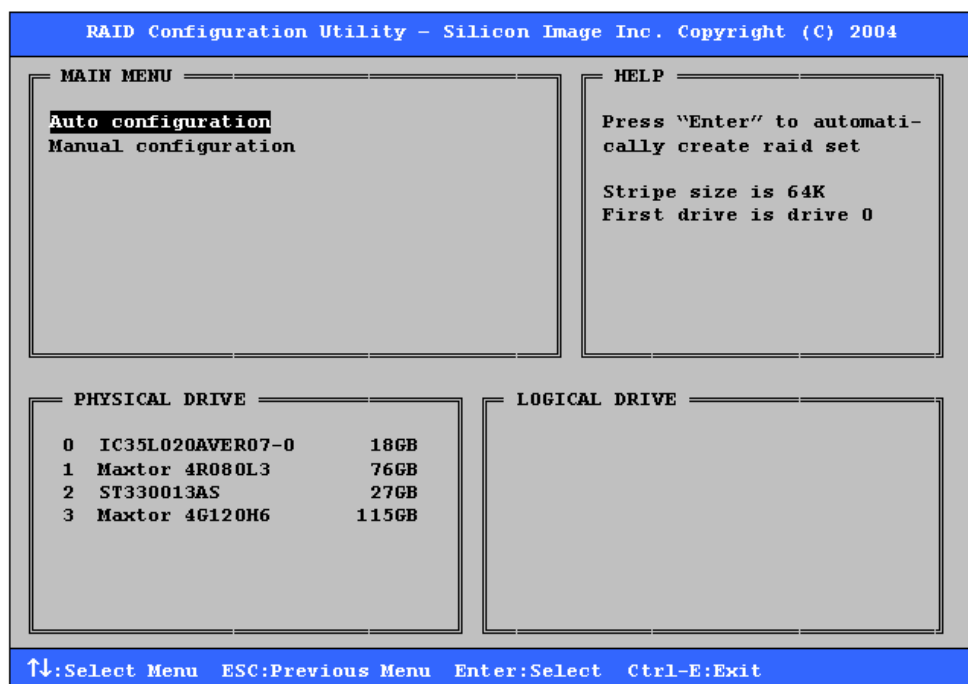
As previously discussed, the Silicon Image SATA host adapter supports RAID 0, 1, 5, 10, and JBOD configurations. The selection of the RAID level to be used should be based upon factors including performance, data security, and number of drives available. It is best to carefully consider the long-term role of the system and plan the data storage strategy appropriately.

Silicon Image has made the creation of RAID sets very simple. They can be created either automatically or to allow the greatest flexibility, manually.

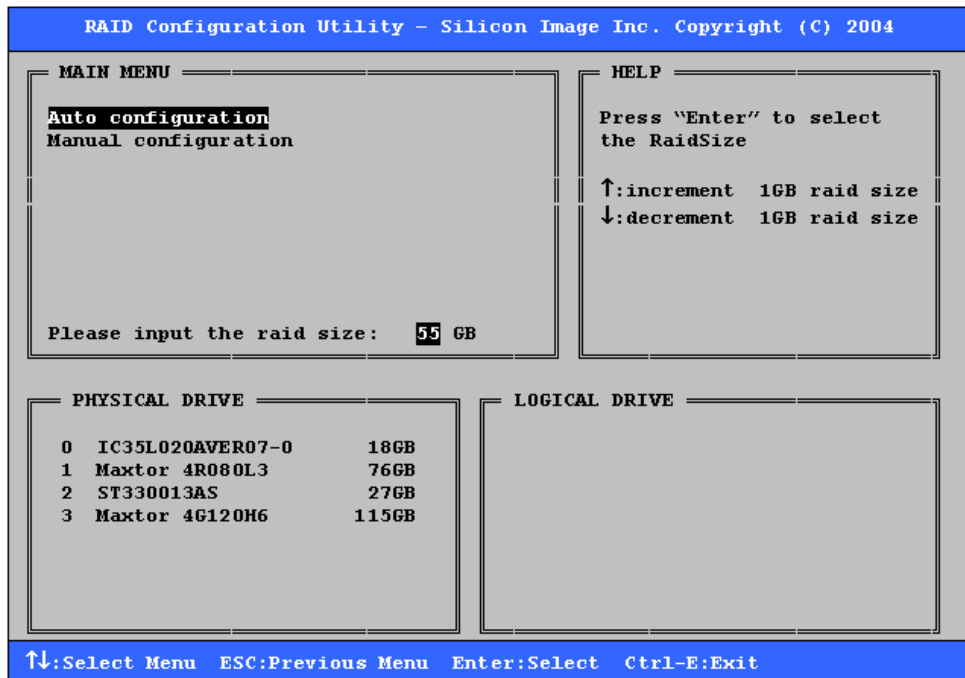
1. Select "Create RAID set"
2. Choose a RAID 0 Striped, a RAID 1 Mirrored, a RAID 5 Parity, or a RAID 10 combination set.



3. Select Automatically or Manually configuration of the RAID Set.



4. If manual configuration is selected, the chunk size of Striped Sets can be selected. For Mirrored Sets, the Source and Target drives can be selected.
5. If auto configuration is selected, BIOS will select RAID member drives automatically and the chunk size of Striped Sets is set to 64KB.
6. Select RAID set size with ↑ and ↓ keys. See section 6.9 for explanation on selecting size.



7. After the RAID set size is set, the message “Are You Sure?” will display before completing the configuration. Answer “N” to abort the creation of the new RAID set, or “Y” to proceed with the RAID set creation.
8. RAID sets can be created in both BIOS and in the SATARaid5 GUI. If you have excess capacity left on your hard drives after creating a RAID set in the BIOS, you can later go to the SATARaid5 GUI to create additional logical drives that fully utilize the capacity on all your hard drives.

6.2 Creating Spare Drive

If there is a RAID 1 set, spare driver can be created. The spare drive can be allocated to the RAID 1 set in the event of a failure of one of the drives in the RAID 1 set.

1. To create a spare drive for RAID 1 set, Select “Create RAID set”
2. Select “Spare Drive” and press Enter.
3. Select spare drive from the physical drive list and press Enter.
4. Select spare drive size with ↑ and ↓ keys. See section 6.9 for explanation on selecting size.
5. After the spare drive size is set, the message “Are You Sure?” will display before completing the configuration. Answer “N” to abort the creation of the spare drive, or “Y” to proceed with the spare drive creation.

6.3 Creating JBOD

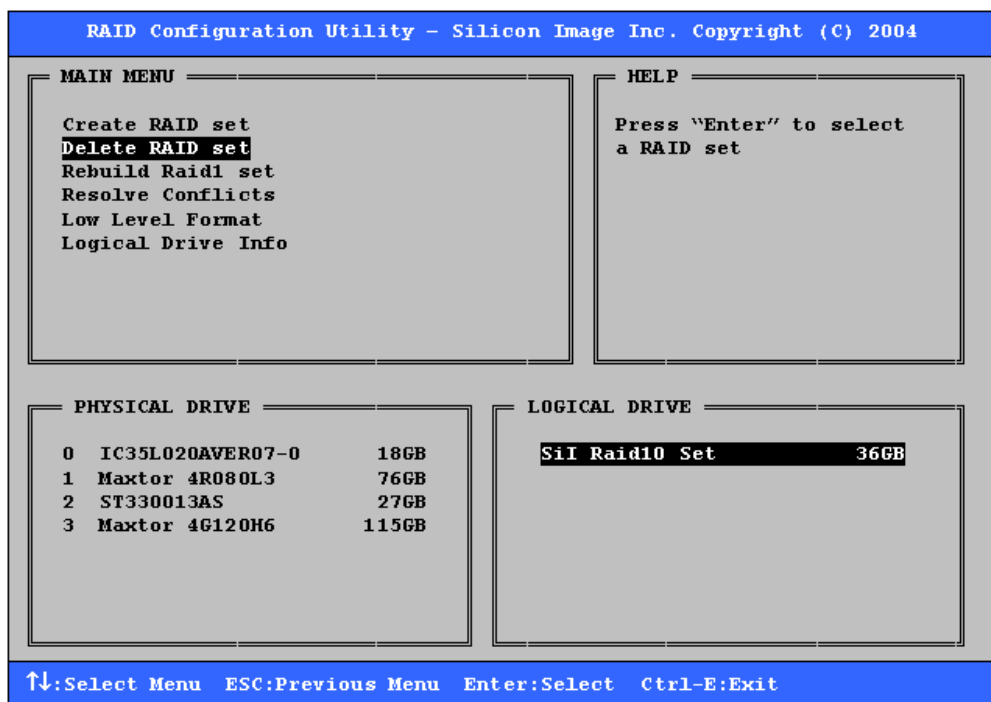
Since BIOS no longer reports non-RAID drives to the system BIOS, if a non-RAID boot drive or data drive is desired, a JBOD can be created so BIOS will report it to the system BIOS.

1. To create a JBOD, Select “Create RAID set”

2. Select "JBOD" and press Enter.
3. Select JBOD drive from the physical drive list and press Enter.
4. Select JBOD size with ↑ and ↓ keys. See section 6.9 for explanation on selecting size.
5. After the JBOD size is set, the message "Are You Sure?" will display before completing the configuration. Answer "N" to abort the creation of the JBOD, or "Y" to proceed with the JBOD creation.

6.4 Deleting RAID Groups, Spare Drive, and JBOD

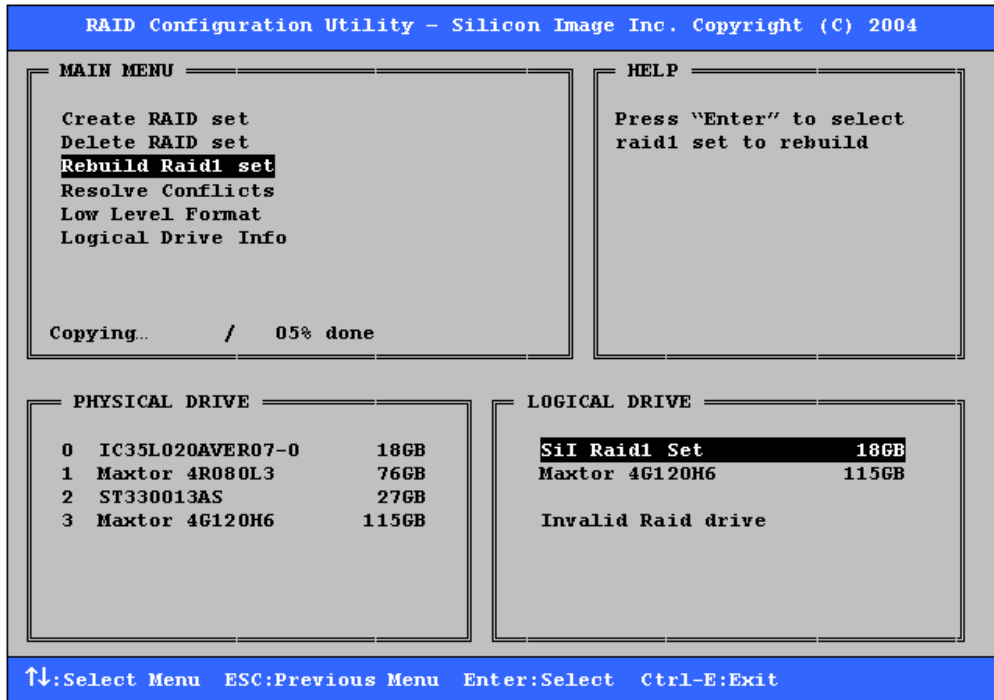
1. To remove one or more RAID sets, spare drives, and JBODs, select "Delete RAID set"
2. Select the desired item to delete from the logical drive list and press Enter.
3. Press "Y" when asked, "Are You Sure?"
4. The drives will be returned to the selection of logical drives from which a new RAID set can be created.



6.5 Rebuild RAID 1 Set

This menu selection is used to initiate the copying of data from an existing drive to a replacement drive that has been installed in a RAID 1 set after the failure of one of the members.

1. Select "Rebuild RAID 1 set"
2. Select the desired set and press Enter.
3. Press "Y" when asked, "Are You Sure?"
4. The set will be rebuilt. The status of the rebuild is displayed in the MAIN MENU window.



6.6 Resolving Conflicts

When a RAID set is created, the metadata written to the disk includes drive connection information including the channel on the host adapter to which it is connected. If after a disk failure the replacement disk was previously part of a RAID set or used in another system, it may have conflicting metadata, specifically in reference to the drive connection information. If so, this will prohibit the RAID set from being either created or rebuilt. In order for the RAID set to function properly, this old metadata must be first overwritten with the new metadata. To correct this, select "Resolve Conflict" and the correct metadata, including the correct drive connection information; will automatically be written to the replacement disk.

1. Select "Resolve Conflicts" and press Enter.

```
RAID Configuration Utility - Silicon Image Inc. Copyright (C) 2004

MAIN MENU
-----
Create RAID set
Delete RAID set
Rebuild Raid1 se
Resolve Conflicts
Low Level Format
Logical Drive Info

HELP
-----
Help for resolving
conflicts

PHYSICAL DRIVE
-----
0 IC35L020AVER07-0      18GB
1 Maxtor 4R080L3       76GB
2 ST330013AS           27GB
3 Maxtor 4G120H6       115GB

LOGICAL DRIVE
-----
SiI Raid1 Set          18GB
Maxtor 4G120H6        115GB

Conflict

↑↓:Select Menu  ESC:Previous Menu  Enter:Select  Ctrl-E:Exit
```

2. Select the "Conflict" entry in the Logical Drive Status window and press Enter.

```
RAID Configuration Utility - Silicon Image Inc. Copyright (C) 2004

MAIN MENU
-----
Create RAID set
Delete RAID set
Rebuild Raid1 se
Resolve Conflicts
Low Level Format
Logical Drive Info

HELP
-----
Press "Enter" to select
the set

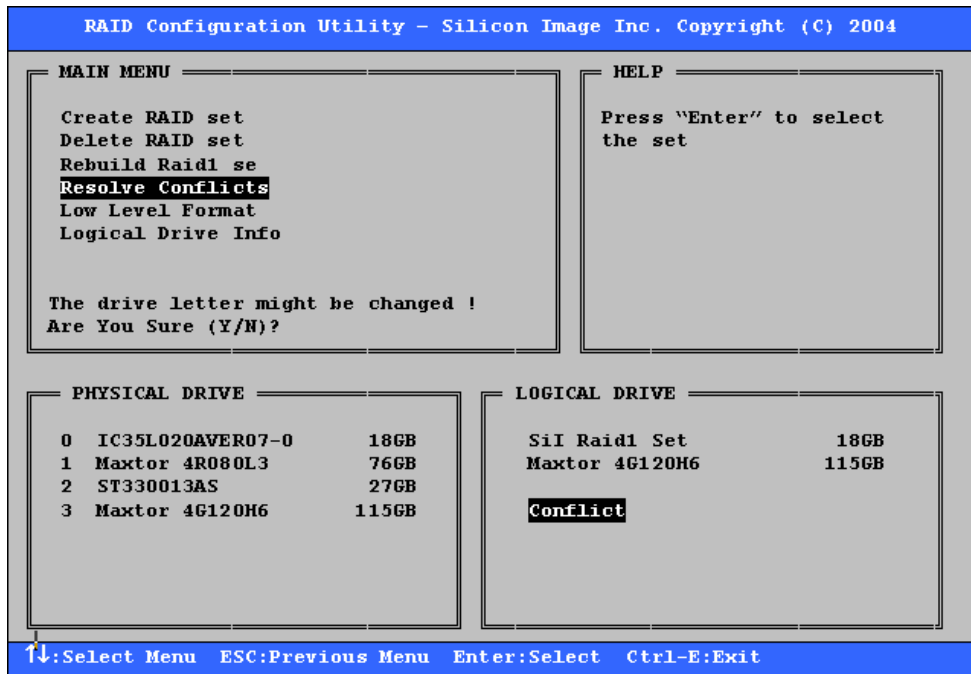
PHYSICAL DRIVE
-----
0 IC35L020AVER07-0      18GB
1 Maxtor 4R080L3       76GB
2 ST330013AS           27GB
3 Maxtor 4G120H6       115GB

LOGICAL DRIVE
-----
SiI Raid1 Set          18GB
Maxtor 4G120H6        115GB

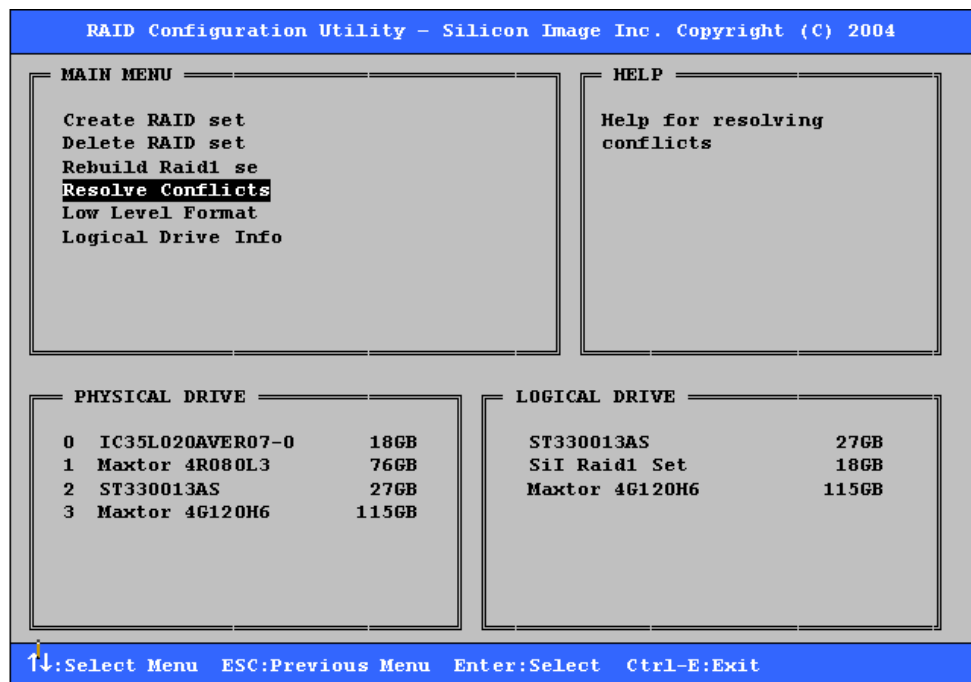
Conflict

↑↓:Select Menu  ESC:Previous Menu  Enter:Select  Ctrl-E:Exit
```

3. Note that some conflict resolutions may result in the drive letter assignment changing; for example the RAID set may have been drive D: but after the conflict resolution, it may become drive E. Be aware of this when performing a conflict resolution. To maintain the same drive lettering, the SATA cables connected to the drives may need to be swapped, or in the case of a SATA-based removable drive unit, the order of the drives within the chassis made need to be changed. Press 'Y' to accept the change and resolve the conflict.



4. The conflict will be resolved. The RAID Set will appear in the Logical Drive window.

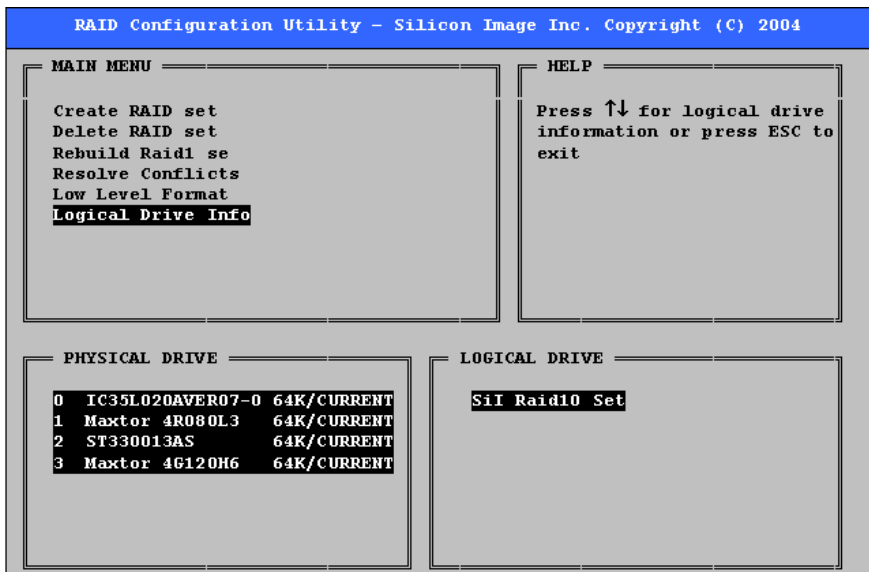
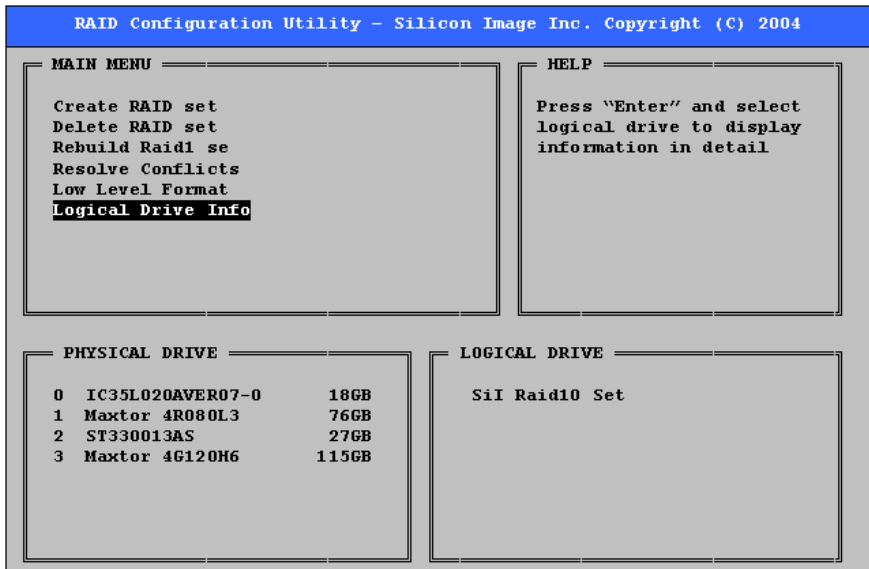


6.7 Low Level Formatting

The Low Level Format menu selection allows the complete erasure of data on a hard drive. This is not an action, which typically needs to be performed as formatting the drive under Windows is usually sufficient to prepare the drive for use.

6.8 Logical Drive Information

This menu item allows the display of the assignment of physical drives within a logical set (RAID set, RAID 1 spare, or unassigned). It is a display-only function. Use the up and down arrow keys to scroll between the drives in the Logical Drive Properties window. Press the ESC key when done viewing logical drive information.



6.9 Reserved Drive and Setting Size for RAID Set, Spare Drive, or JBOD

Once a physical drive has been used to create a RAID set, spare drive, or JBOD by BIOS utility, BIOS saves user selected set or drive size in the reserved area of the physical drive. There is no way to remove the reserved area information even after the user deletes the set or drive. For this reason, after a set or drive is deleted, BIOS recognizes the physical drive as a reserved logical drive and it will not report the drive to the system BIOS.

When user selects to create a RAID set, spare drive, or JBOD, he or she has to select size for the set or drive. BIOS will set a default size for it and user can use the ↑ and ↓ keys to change the size. If the physical drive has never been used to create a

set or drive by the BIOS before, the full size of the physical drive will be set as default size. Otherwise, BIOS will set default size to the size it saved in the reserved area of the physical drive before.

If the user wants to increase the default size, BIOS will display a warning message in the help window and for user's response before changing the default size.

```
RAID Configuration Utility - Silicon Image Inc. Copyright (C) 2004

MAIN MENU
Create RAID set
Delete RAID set
Rebuild Raid1 set
Resolve Conflicts
Low Level Format
Logical Drive Info

Please input the raid size: 18 GB

HELP
This set size has reached reserved size. If you want to continue to increase the set size, you may destroy the data on the disk.

Are you sure you want to increase the size ( Y/N )?

PHYSICAL DRIVE
0 IC35L020AVER07-0 18GB
1 Maxtor 4R080L3 76GB
2 ST330013AS 27GB
3 Maxtor 4G120H6 115GB

LOGICAL DRIVE
SiI Raid1 Set 18GB
Reserved drives

↑:Select Menu ESC:Previous Menu Enter:Select Ctrl-E:Exit
```

7 Allocating Partitions in Windows

After the Raid groups have been created either using BIOS RAID utility or SATARAID5 GUI, the Raid group must have a partition defined on it, then the Raid group must be formatted in preparation for use under Windows.

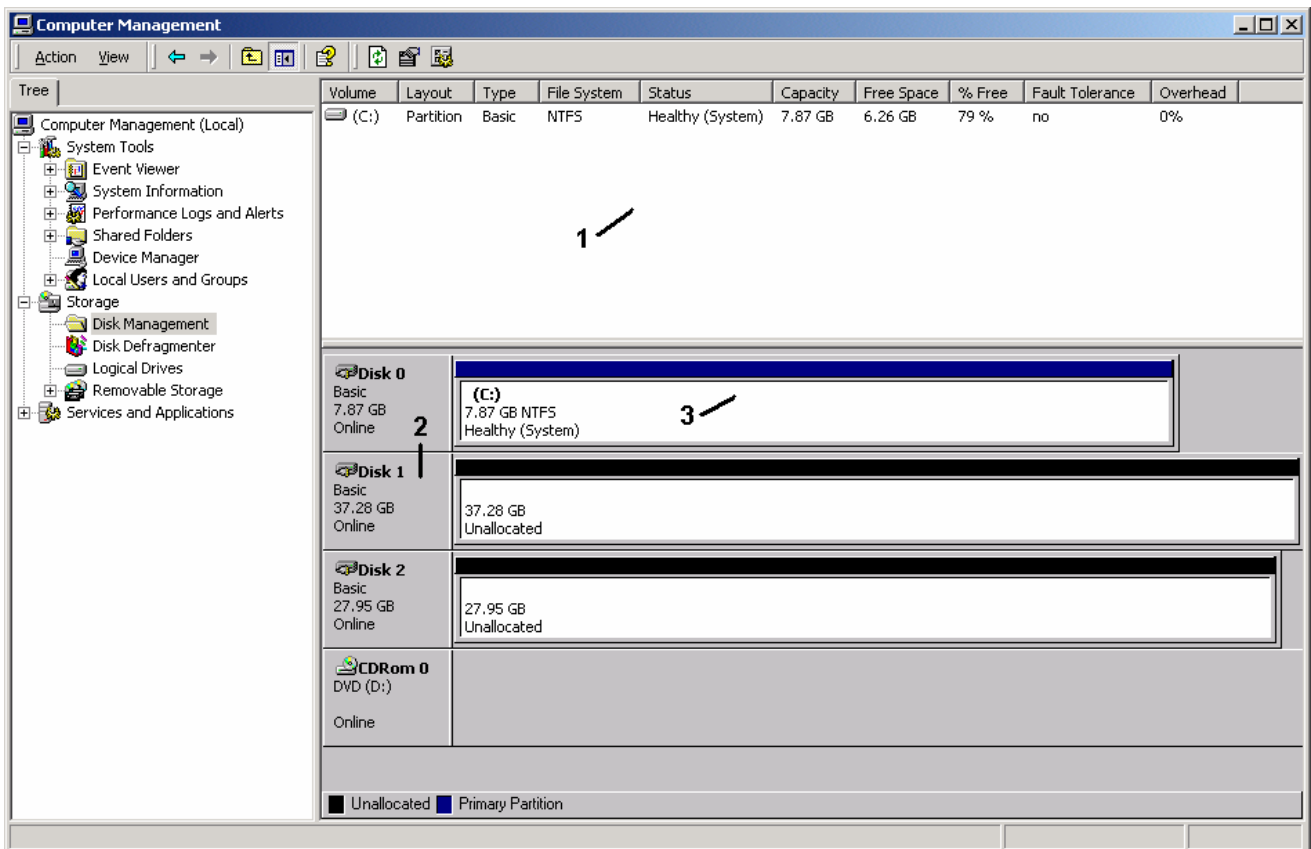
Windows XP, 2000, and Server 2003 use the Disk Management utility that is part of the Operating System. There are enough nuances that make it important to follow the procedure specific to the Operating System.

7.1 Windows Server 2003 & XP & 2000

Before creating any partitions, RAID groups must first be created using the BIOS RAID Utility or the SATARAID5 GUI. Once the sets have been created, allow the system to load Windows. Once Windows is running, open the Disk Management window located at:

Control Panel> Administrative Tools> Computer Management> Storage> Disk Management

A window similar to the following should appear:



This window has three main sections:

- 1) System listing of all formatted and available disks/RAID Groups.
- 2) Report of physical connection of disks/RAID Groups.
- 3) Report of partition status, disk letter, and volume name.

In the physical connection window, every disk should report as:

Basic

Disk Size (the actual available disk space will be reported here)

Online

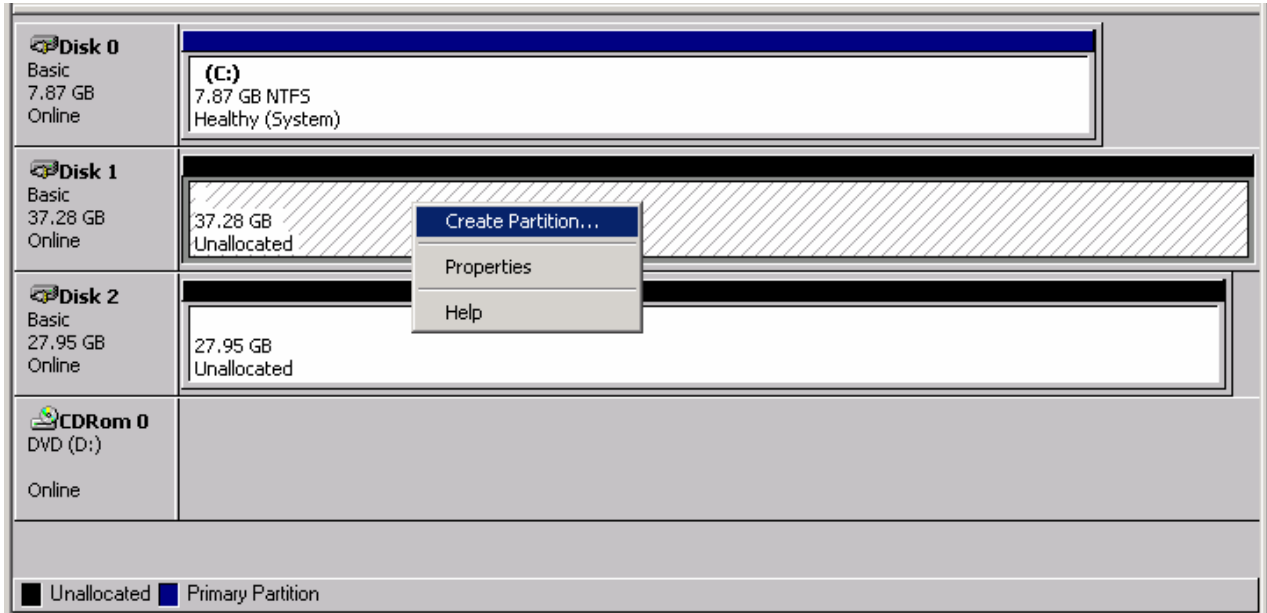
Instead of "Basic," a disk may also report as either "Unknown" or "Dynamic." If the disk reports as "Unknown" right-click on the disk icon and click "Write Signature." A window will appear with the disk in question (all "Unknown" disks may appear in this window). Make sure the box next to each disk is checked, and then click OK. The disk should now report as "Basic."

If a disk reports as “Dynamic,” right-click on the icon of that disk, and click on “Revert to Basic Disk...” Within seconds the disk should report as Basic.

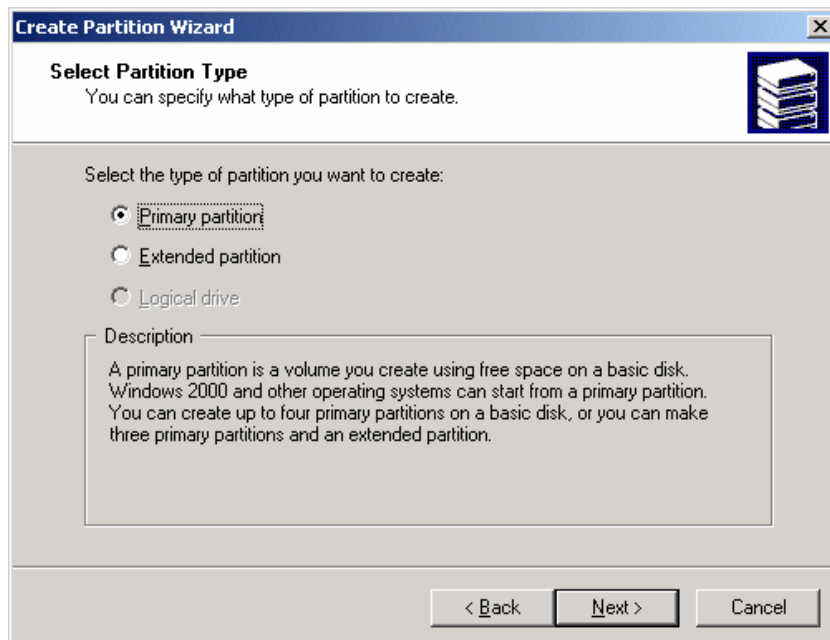
7.1.1 Creating the Partitions

In the Report of physical connection of disks/RAID Groups section, the order in which the drives are displayed corresponds directly to the order the Sets appear in the BIOS. Therefore, the first Unallocated Partition represents Set 1, and so on.

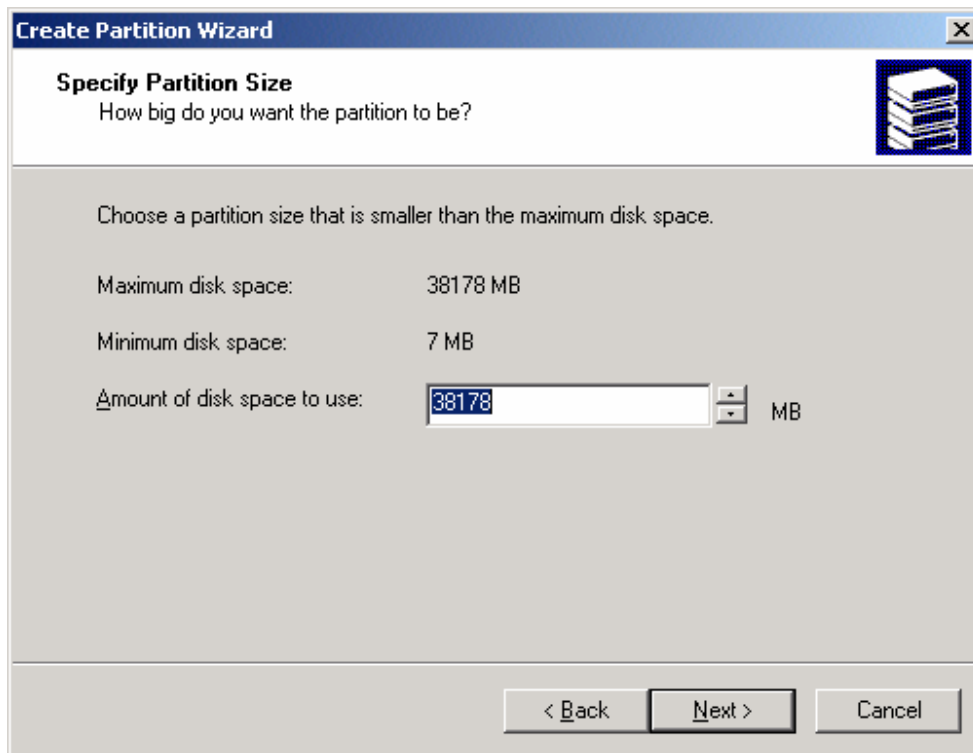
1. In this example, there are two disks with unallocated partitions. Right-click on the partition of the first disk and click on “Create Partition...”



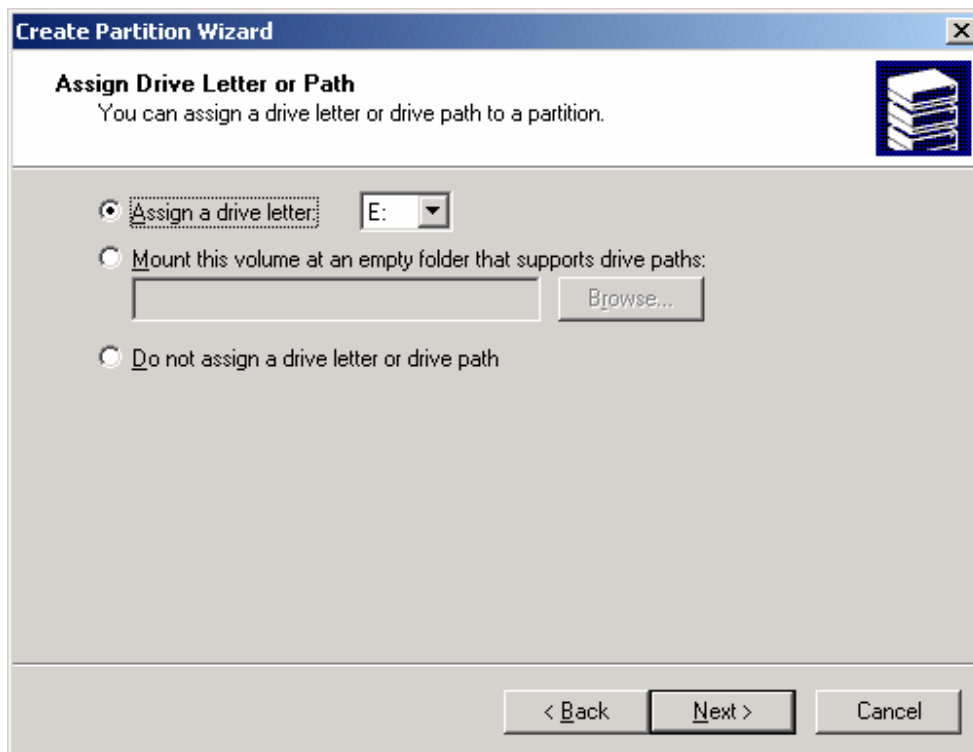
2. The “Create Partition Wizard” should appear. The first window is an introductory window to the Wizard. Click Next.
3. The second window designates the partition type. Choose primary partition and click Next.



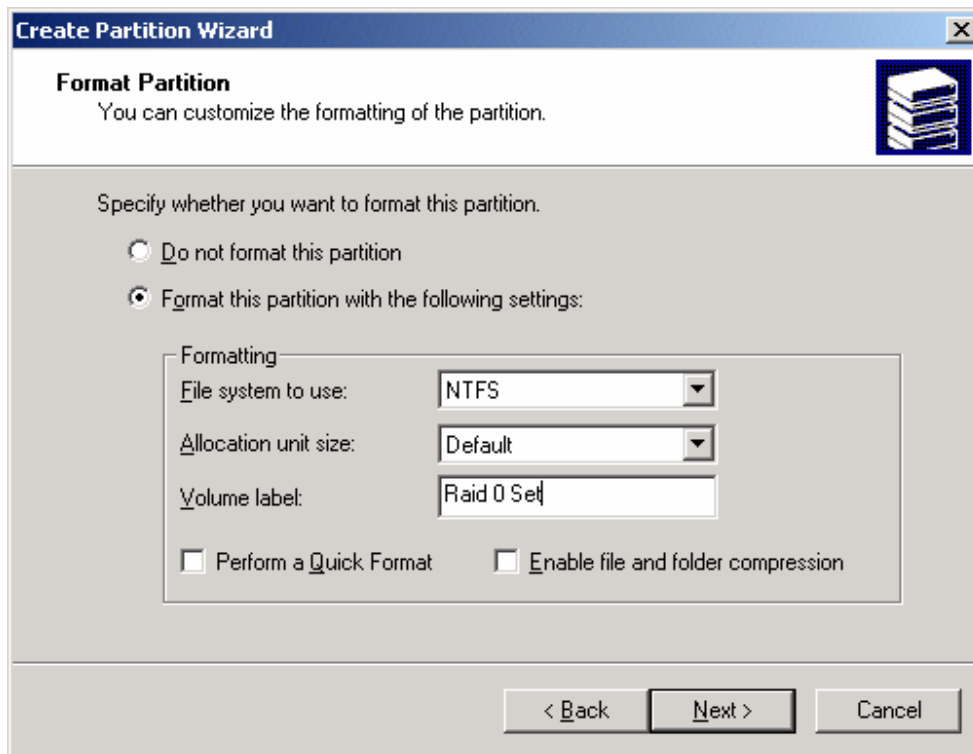
4. The third window designates the partition size. Since this is a Striped RAID set utilizing 2 disk drives, the size of the partition will be approximately twice the size of the smallest single disk drive. Click Next.



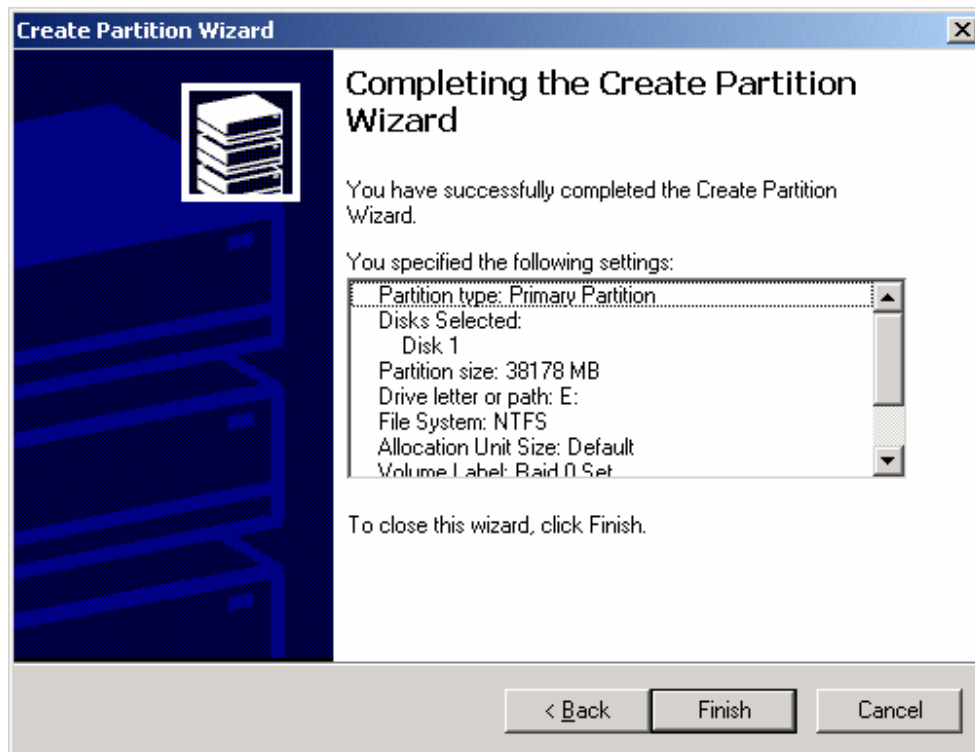
5. The fourth window designates the drive letter of the partition. Change the drive letter if desired. Click Next.



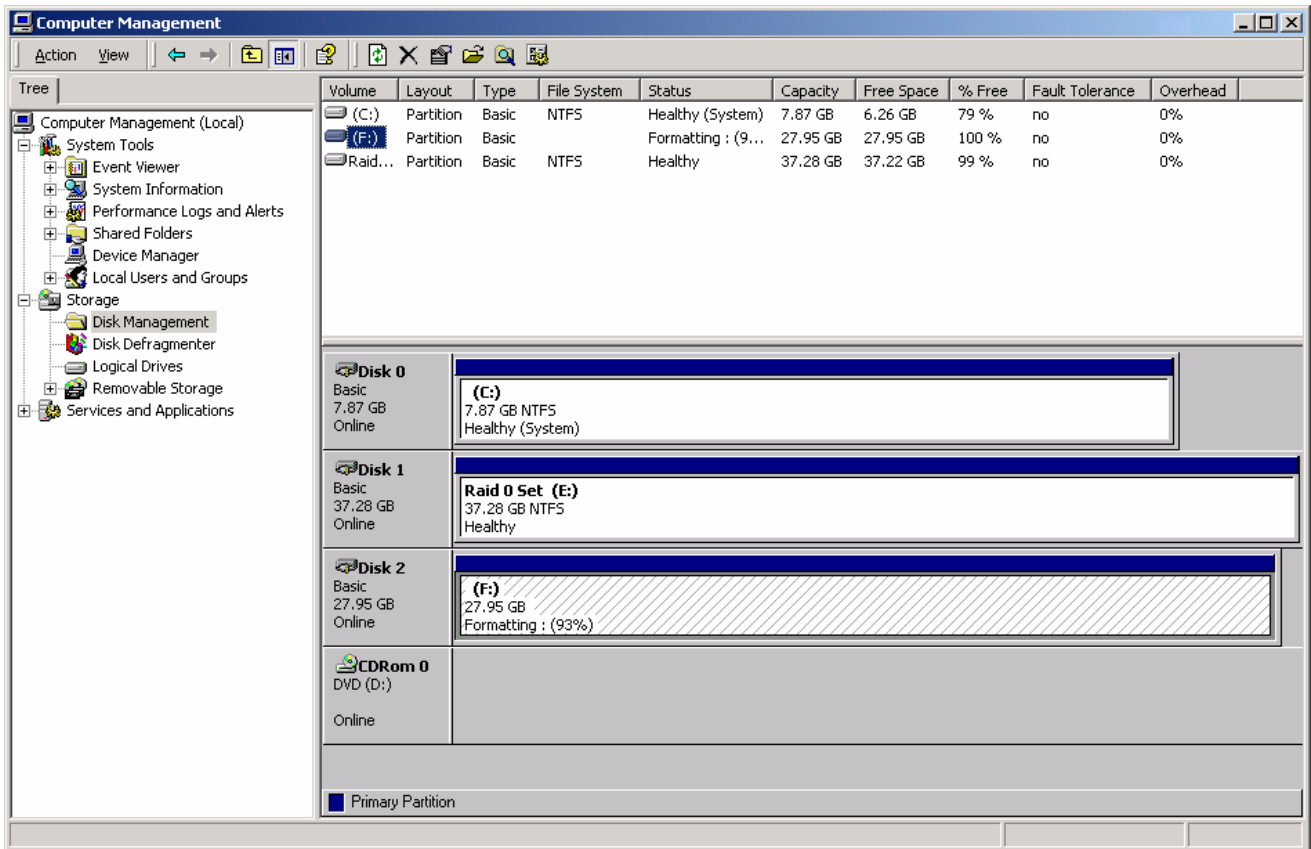
6. The next window allows the volume label to be set and selection of the type of formatting to take place upon the creation of the partition. Make sure the *Format this partition. . .* radio button is selected. Name the volume as desired (suggestions are generic names such as STRIPED SET or something specific to use such as FINANCIAL, CRITICAL, MISCELLANEOUS, etc.). It is recommended to use the default NTFS for the file system. Click Next.



7. The last window is a summary window listing all of the selections made. After verifying that everything is correct, click Finish.



The status of the newly created partition in the Disk Management window should change to Formatting and the percentage complete will be displayed. Depending upon the size of the partition, the format process may take several minutes. When complete, the status will change to "Healthy" and the name and drive letter will be updated. Once the disk reports Healthy, it appears in the listing in System Listing section with all of its pertinent information as well.

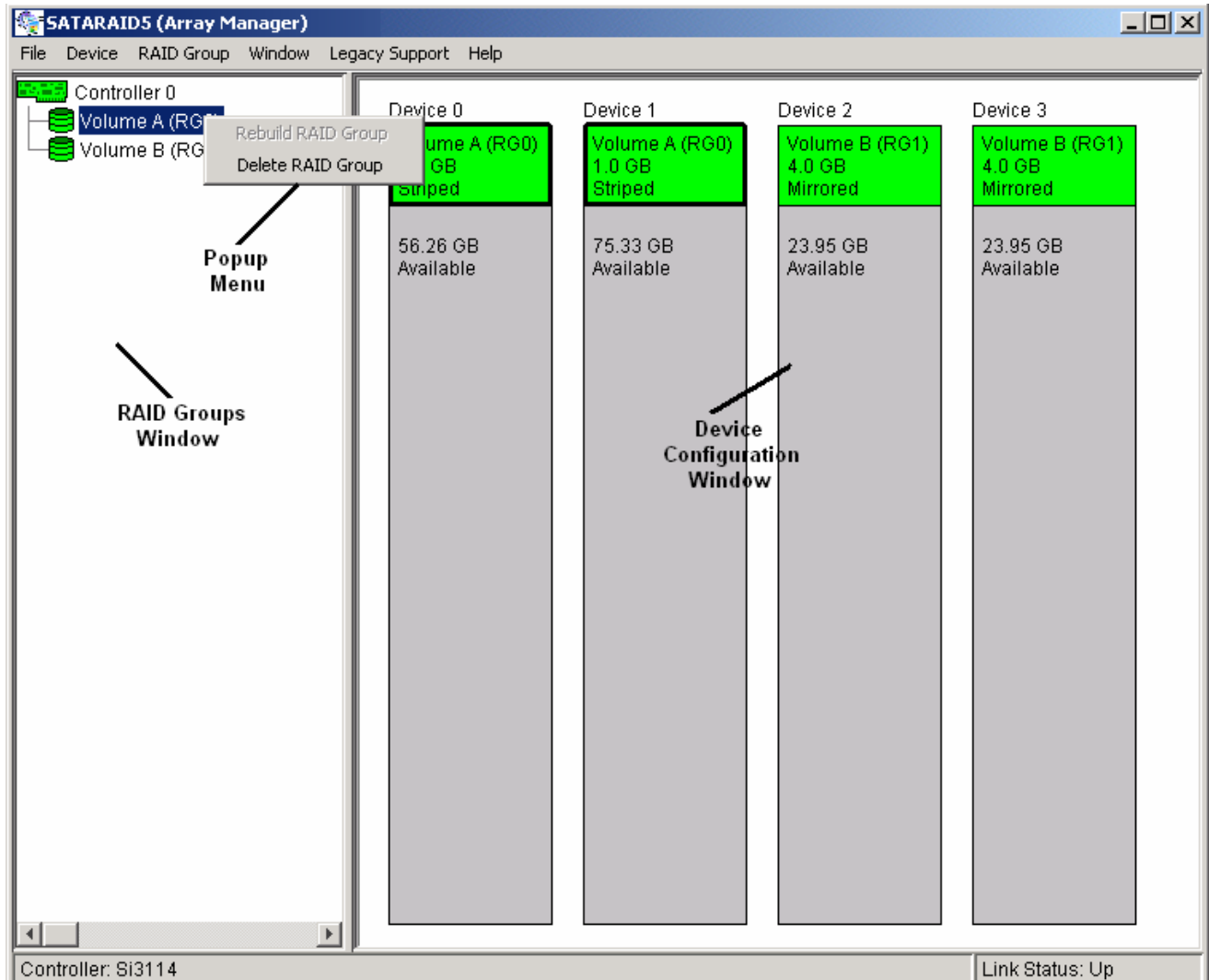


Repeat the above procedure as needed for any other partitions. Close the Data Management window by clicking on the small boxed "X" in the top right corner of the window. Click on the "My Computer" icon on the Desktop. The new drives will be visible and properly named. The new disks are available for use.

8 SATARAID5 GUI Overview

The SATARAID5 GUI Installation program configures the SATARAID5 GUI to automatically start when Windows is started. If the SATARAID5 GUI does not automatically start or is closed by the user, choose the SATARAID5 program from the Start Menu to launch the GUI.

The SATARAID5 GUI monitors the system's RAID Group. The main window will display:



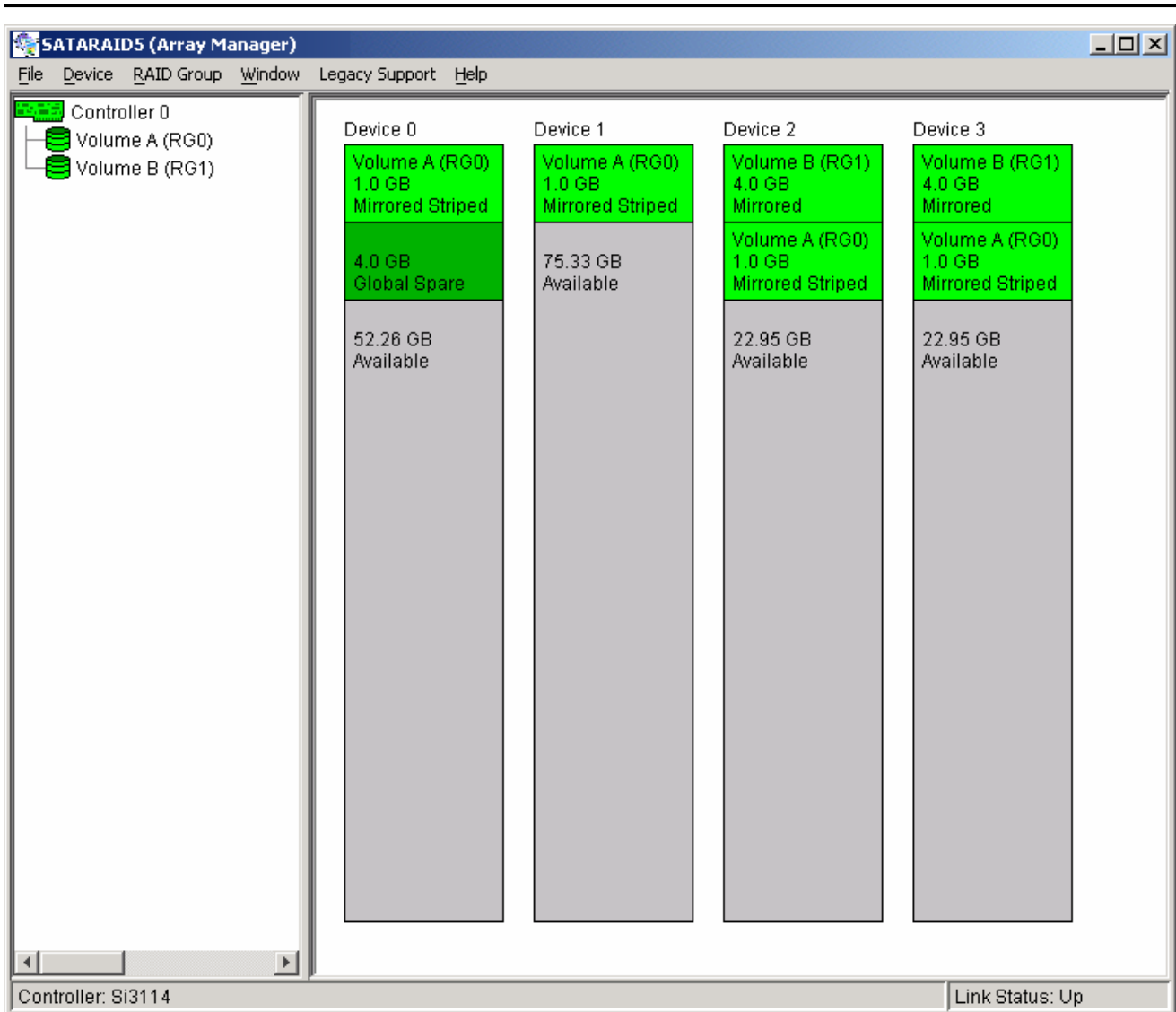
8.1 RAID Groups and Device Configuration Windows

The RAID Groups window identifies SATA host adapters and configured RAID groups. Selecting each RAID group in the RAID Groups window, members consisting of the RAID group will be highlighted in the Device Configuration window.

Right clicking on each node in the RAID Group window, a popup menu will be displayed to let user select action to be performed for the selected controller or RAID group.

The Device Configuration window identifies all physical drives and their partitions. A physical drive can be partitioned to several portions and each portion can be a RAID group member, a spare drive, or a virtual drive.

The following is another example of the main window showing different configuration. One RAID 10 (mirrored-striped) group, one RAID 1 (mirrored) group, and one global spare drive are configured.



8.2 SATARAID5 Menu Commands

The Main menu commands are shown below

File	Device	RAID Group	Window	Legacy Support	Help
Configuration ...	Create Spare	Create RAID Group	Task Manager	Create Legacy RAID Group	Help Topics
Exit	Delete Spare	Rebuild RAID Group	Event Log	Rebuild Legacy RAID Group	About
	Delete Member	Delete RAID Group	Resources	Delete Legacy RAID Group	
	Delete Orphan	RAID Group Summary		Convert Legacy RAID Group	
	Device Summary			Create Legacy Spare	
				Delete Legacy Spare	
				Convert Legacy Spare	

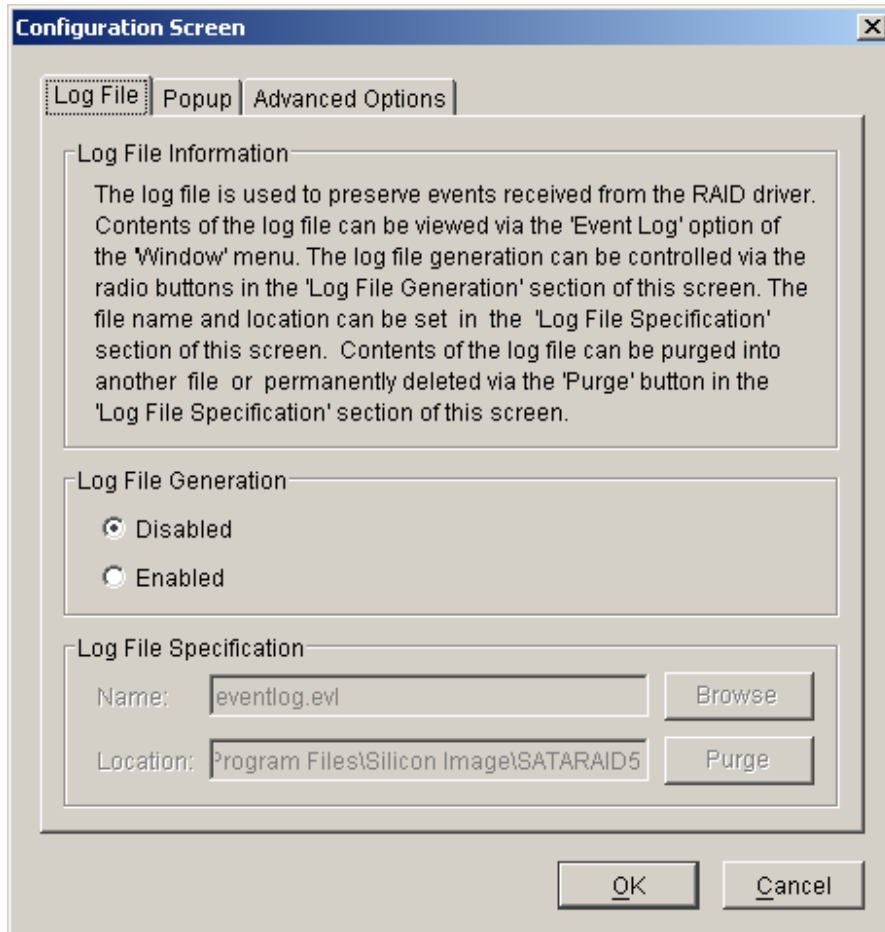
The commands are documented on the pages that follow.

8.2.1 Configuration

SATARAID5 configuration options include customization of the settings for Log File, Popup, and Advanced Options. This command displays a dialog box to let user set different configurations for SATARAID5 with the following three tabs:

Log File Tab

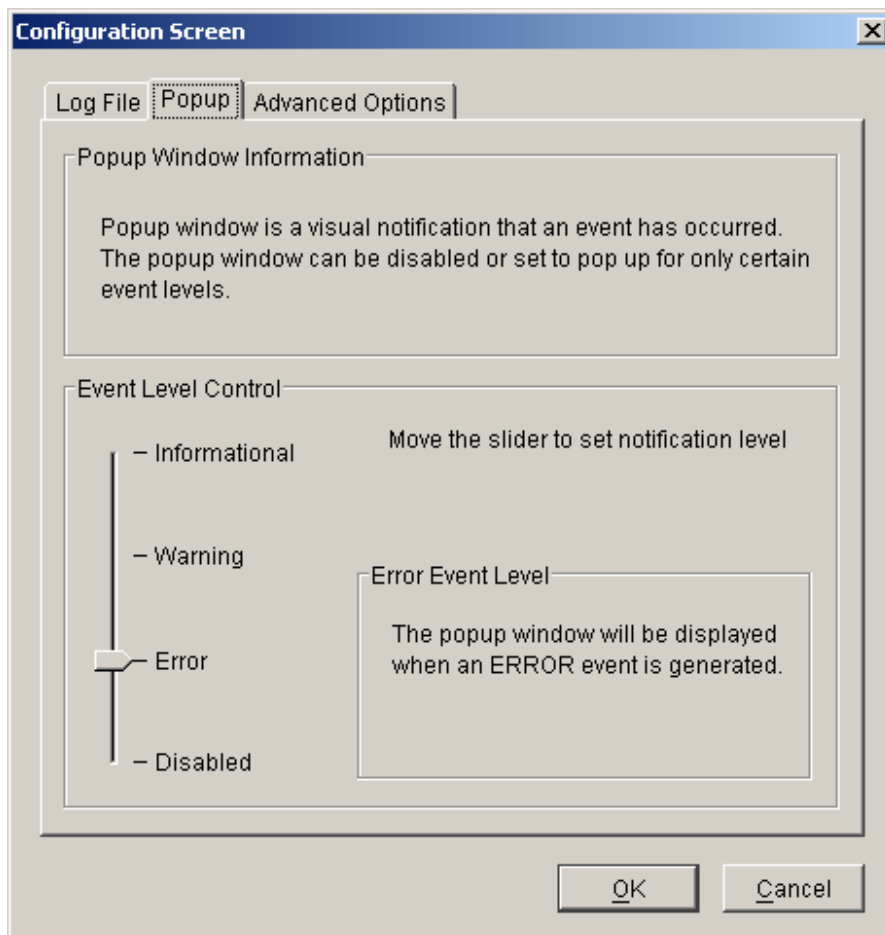
The log file is used to store event information received from all Silicon Image RAID drivers. The log file is a text file and can be viewed with any text viewer (such as Notepad) or with the Event Log window of SATARAID5. Use the Log File tab to set location and the desired filename for the log file.



Popup Tab

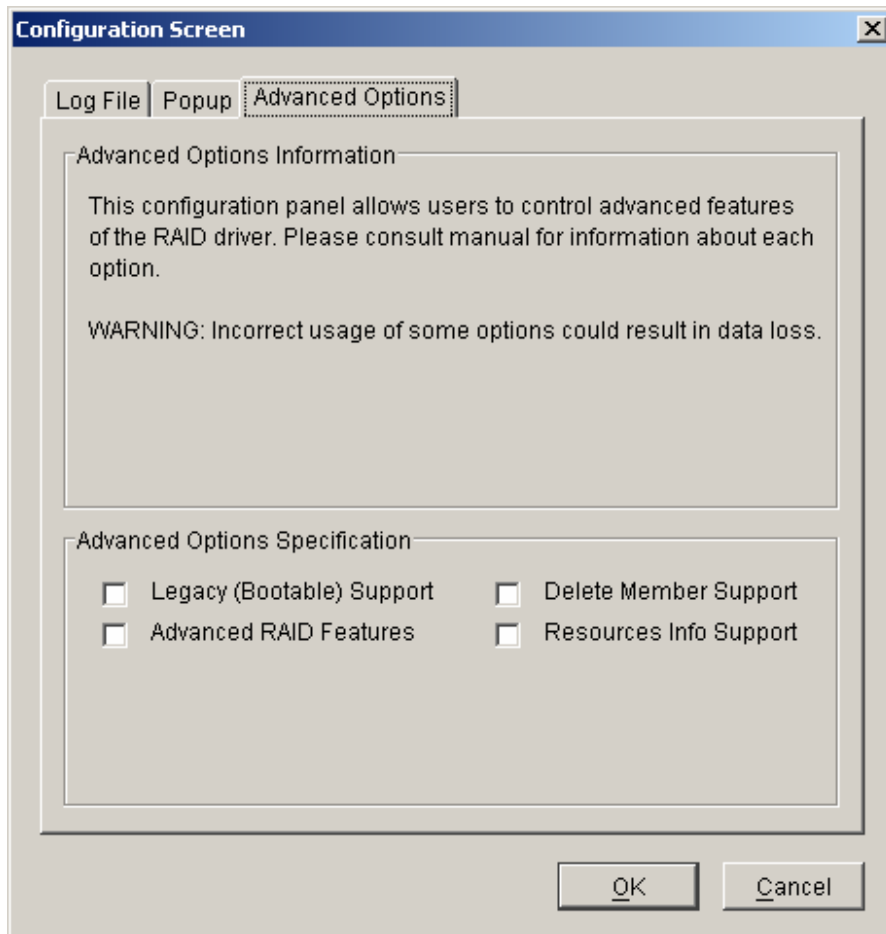
SATARAID5 can be configured to notify the user of events using messages in popup windows. Use the slider control to set the event level for popups to occur:

- Error Level - The following events will trigger a popup window:
 - Errors
- Warning Level - The following events will trigger a popup window:
 - Warnings
 - Errors
- Information Level - The following events will trigger a popup window:
 - Informational
 - Warnings
 - Errors
- Disable All - No events will trigger a popup window.



Advanced Options

The Advanced Options tab is used to control advanced features of the RAID driver. By default, all these advanced options are disabled.



The following features are supported:

1. Legacy (Bootable) Support – When this feature is selected, Legacy Support menu will be available in the menu bar. The Legacy Support Menu includes a list of menu items to support RAID functions for legacy RAID groups. For detailed Legacy Support features, refer to sections from 8.2.15 Create Legacy RAID Group to 8.2.21 Convert Legacy Spare.
2. Delete Member Support – When this feature is selected, Delete Member menu item will be available under the Device menu. The Delete Member menu item allows the user to delete a member from RAID 1 (Mirroring), RAID 5 (Parity RAID), and RAID 10 (Striping and Mirroring) groups. For detailed Delete Member feature, refer to section 8.2.5 Delete Member.
3. Advanced RAID Features – When this feature is selected and user selects to create RAID group, if the RAID group to be created is fault tolerance group (RAID 1, RAID 5, or RAID 10), user will be able to select Improper Shutdown Policy in the Create RAID Group dialog box. The Advanced RAID Features are not supported for Legacy RAID groups.

Create RAID Group [X]

Parameters

RAID Group Label:

RAID Group:

Configuration:

Capacity:

Chunk Size:

Rebuild Priority:

Improper Shutdown Policy

Check Pointing: On (Quick Restore) Off (Best I/O Perf)

Parity: Return Dirty Data Offline Raid Grp

Device	Capacity	Starting LBN
0	26.95 GB	00200000
1	26.95 GB	00200000
2	76.33 GB	00000000

For RAID 1 and RAID 10 Group

Create RAID Group [X]

Parameters

RAID Group Label:

RAID Group:

Configuration:

Capacity:

Chunk Size:

Rebuild Priority:

Improper Shutdown Policy

Check Pointing: On (Quick Restore) Off (Best I/O Perf)

Parity: Return Dirty Data Offline Raid Grp

Device	Capacity	Starting LBN
0	26.95 GB	00200000
1	26.95 GB	00200000
2	76.33 GB	00000000

For RAID 5 Group

- Resources Info Support – When this feature is selected, Resources menu item will be available under the Window menu. This feature is for debugging purpose only. For detailed Resources feature, refer to section

8.2.14 Resources.

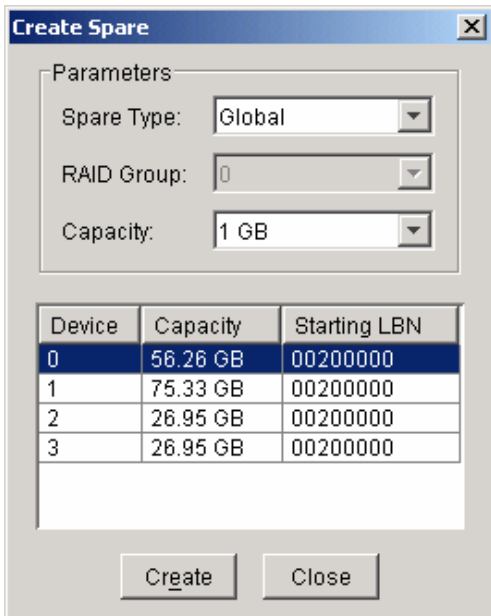
8.2.2 Exit

This command terminates the SATARAID5 program.

8.2.3 Create Spare

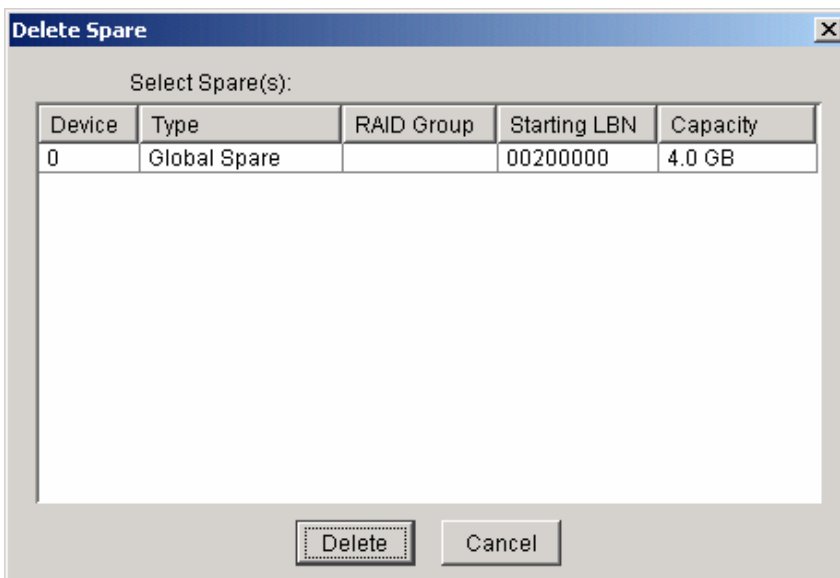
This command displays a dialog box to let user create Spare Drive, user needs to select the following parameters:

- Spare Type: Global -- the spare drive is for all RAID groups in the system.
 Dedicated -- the spare drive is dedicated to the specified RAID group.
- RAID Group: Select the RAID group to which this spare drive is dedicated. This parameter is enabled only when Dedicated spare type is selected.
- Capacity: Select from a list of spare drive size, current options are from 128 MB to 100 GB and MAX.
- Device: Select one device segment from the available device segment list



8.2.4 Delete Spare

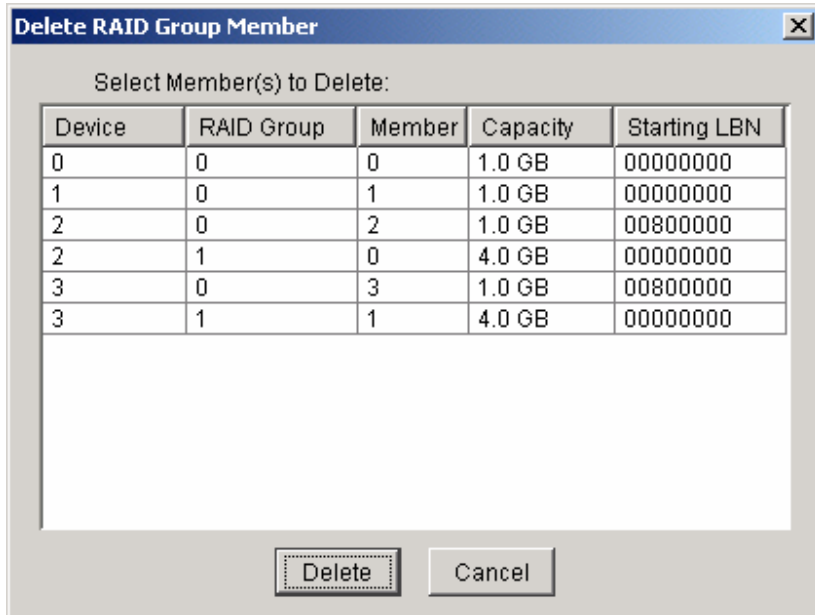
This command displays a dialog box to let user choose one or more Spare Drives to delete.



8.2.5 Delete Member

This command displays a dialog box to let user choose RAID groups' members to delete. Since RAID 0 is not fault-tolerant, RAID 0 members will not be shown in the list.

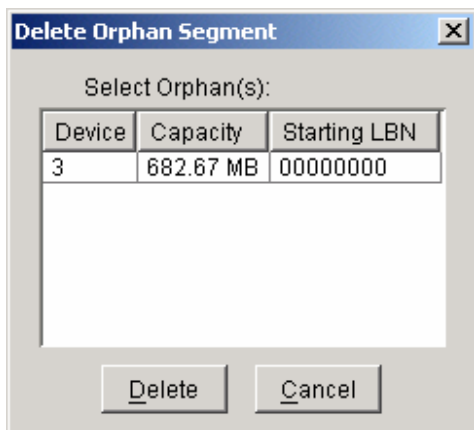
Note: delete RAID group member will reduce the RAID group to be a non-fault-tolerant RAID group.



8.2.6 Delete Orphan

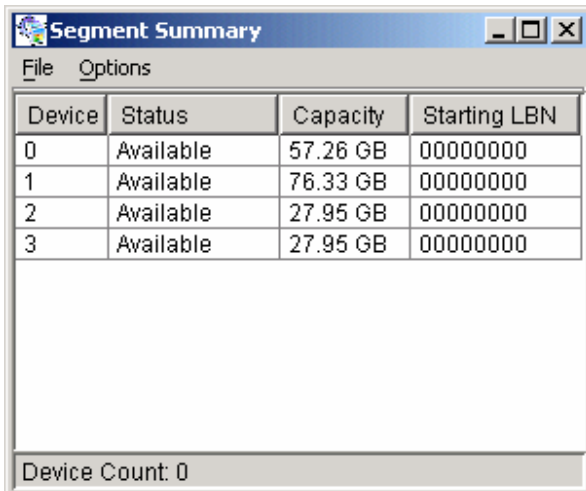
An orphan device segment is part of a RAID group that cannot access another device segment within the same RAID group. When a member of a RAID group fails in a sever manner (such as a loss of power or a complete hard disk failure), it becomes an orphan.

This command displays the Delete Orphan Segment window to show all orphan segments and allow user to delete selected orphan segments.



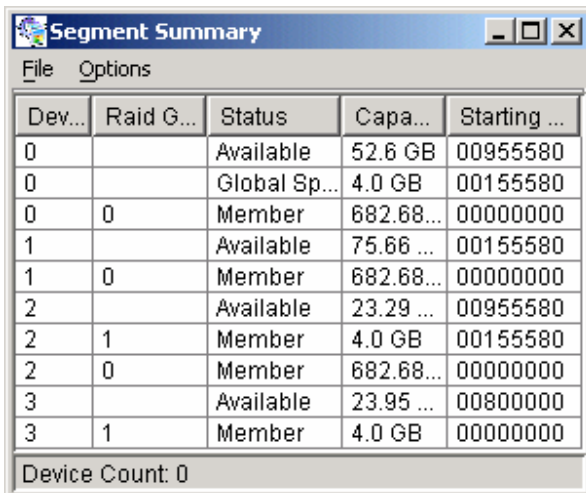
8.2.7 Device Summary

This command displays the Segment Summary window to show all physical devices' segments.



Device	Status	Capacity	Starting LBN
0	Available	57.26 GB	00000000
1	Available	76.33 GB	00000000
2	Available	27.95 GB	00000000
3	Available	27.95 GB	00000000

Device Count: 0



Dev...	Raid G...	Status	Capa...	Starting ...
0		Available	52.6 GB	00955580
0		Global Sp...	4.0 GB	00155580
0	0	Member	682.68...	00000000
1		Available	75.66 ...	00155580
1	0	Member	682.68...	00000000
2		Available	23.29 ...	00955580
2	1	Member	4.0 GB	00155580
2	0	Member	682.68...	00000000
3		Available	23.95 ...	00800000
3	1	Member	4.0 GB	00000000

Device Count: 0

The Segment Summary window has its own menu bar. All options available via the menu bar are shown below

File	Options
Exit	Sorting...
	Fields...

Exit

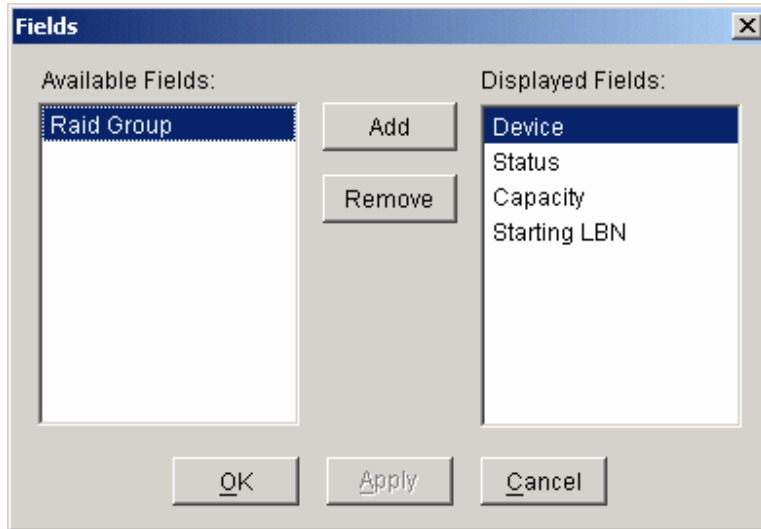
This command closes the Task Summary window.

Sorting

This command sorts the rows based on the selected field.

Fields

This command displays a dialog box to let user choose which fields will be shown in the Segment Summary window.



8.2.8 Create RAID Group

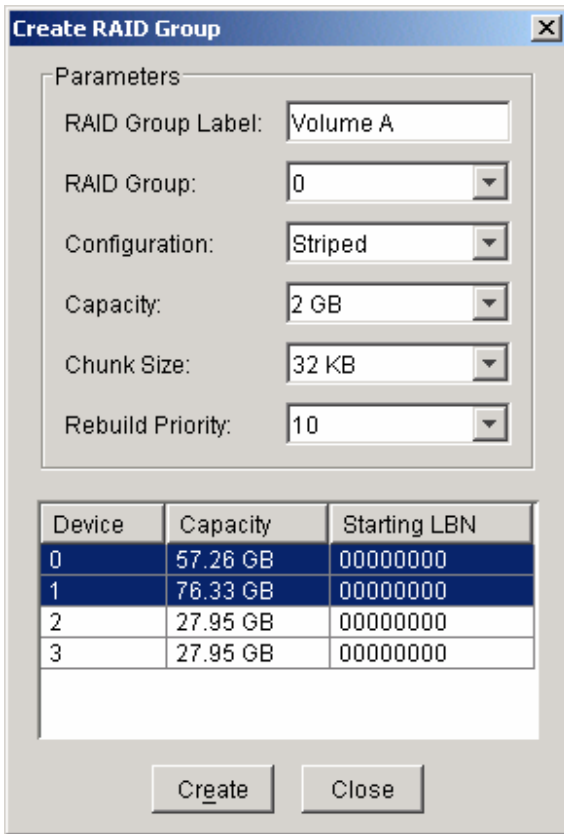
This command displays a dialog box to let user create RAID group, user needs to specify the following parameters:

- RAID Group Label: Provide a name for the RAID group
- RAID Group: Select a group ID from the available ID list. Since the maximum number of RAID groups is limited to 8 so group ID can be from 0 to 7.
- Configuration: Contiguous (for virtual disk or JBOD)
Striped (for RAID 0)
Mirrored (for RAID 1)
Mirrored Striped (for RAID 10)
Parity RAID (for RAID 5)
- Capacity: Select from a list of RAID group size, current options are from 256 MB to 100 GB, and MAX. Selecting MAX will create the largest RAID set possible with the drive(s) selected.
- Chunk Size: Select one from the available list: 8, 16, 32, 64, 128 (KB). RAID 1 set and virtual disk do not require this. Chunk size is also known as stripe size.
- Rebuild Priority: Select one from the available list: 1 to 10. RAID 0 set and virtual disk do not require this. 10 is a higher level of rebuild priority which means that rebuild times will be faster but will take more CPU resources in order to rebuild a failed RAID member. In contrast, selecting 1 will result in slower rebuild times but will take the least amount of CPU resources to complete a rebuild.
- Devices: Select RAID member devices from the available device segment list

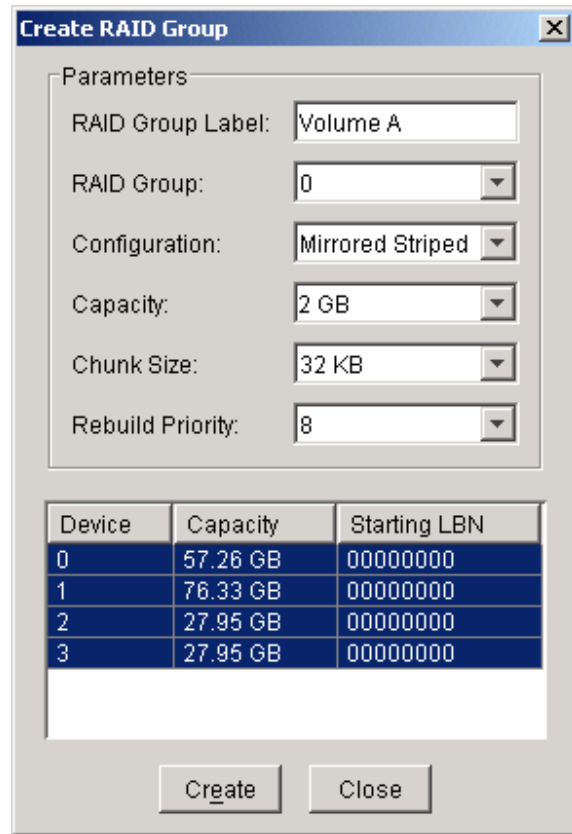
After parameters are set, click on the Create button on the bottom to create the RAID array. The array will appear in the Device Configuration Window of the SATARaid5 GUI.

If no other RAID sets are to be created, then click Cancel to exit the RAID creation window.

Go to the Disk Management Utility in Windows to initialize and format the newly created RAID set. Please refer to Chapter 7 Allocating Partitions in Windows for instructions on initialization and formatting.



Example 1



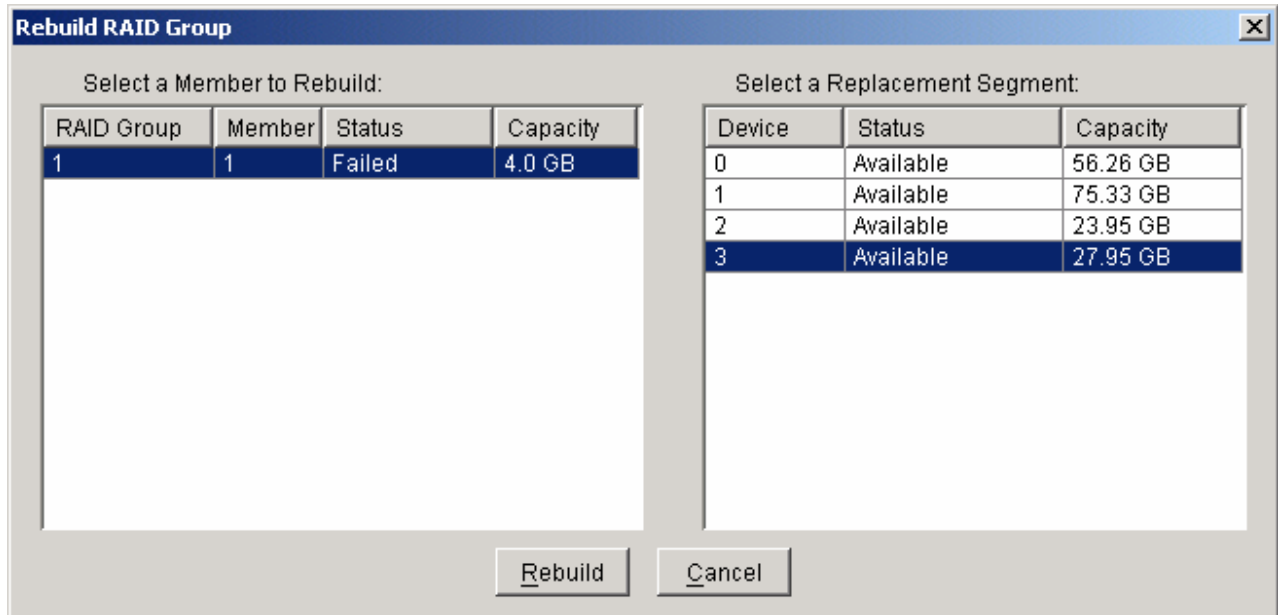
Example 2

In Example 1, a RAID 0 (striped) array called Volume A – RAID Group 0 with capacity of 2GB with 32KB chunk size (stripe size) with rebuild priority 10 is created over hard drive 0 and 1

In Example 2, a RAID 10 (mirrored striped) array called Volume A- RAID Group 0 with capacity of 2GB with 32KB chunk size (stripe size) with rebuild priority of 8 is created over hard drive 0,1,2, and 3.

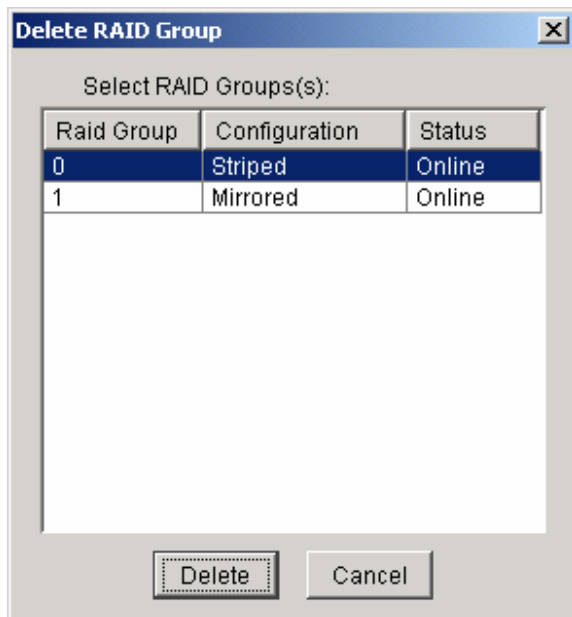
8.2.9 Rebuild RAID Group

This command displays a dialog box to let user choose a replacement segment to rebuild a non-fault tolerant RAID group.



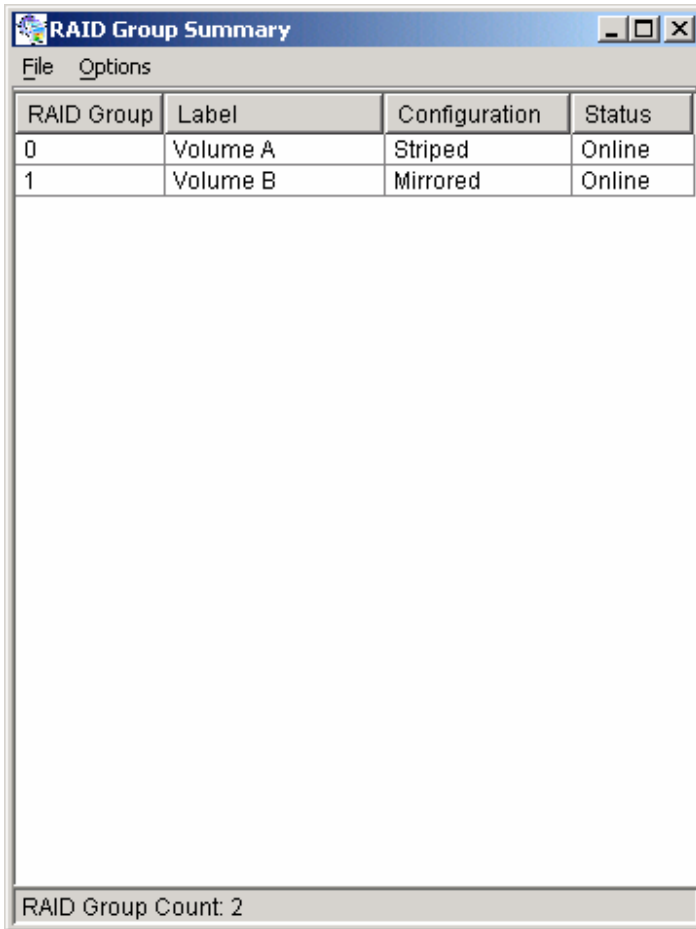
8.2.10 Delete RAID Group

This command displays a dialog box to let user choose RAID groups to delete.



8.2.11 RAID Group Summary

This command displays a dialog box to show all RAID groups' group ID, configuration, and status.



The RAID Group Summary window has its own menu bar. All options available via the menu bar are shown below

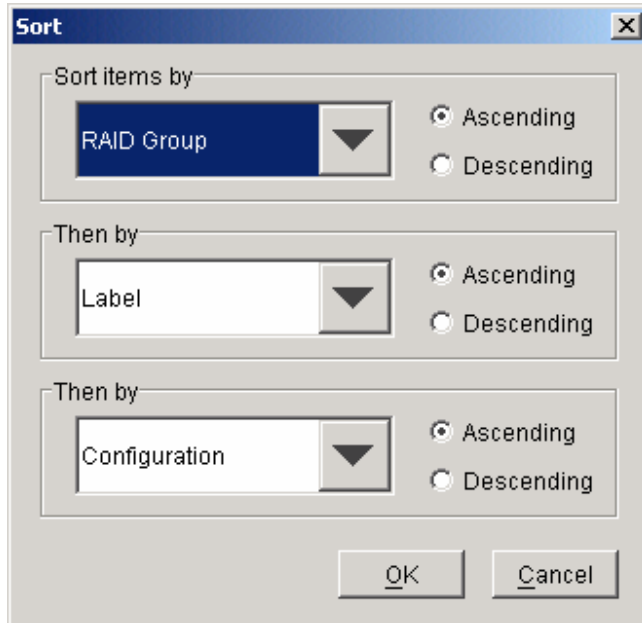
File	Options
Exit	Sorting...
	Fields...

Exit

This command closes the RAID Group Summary window.

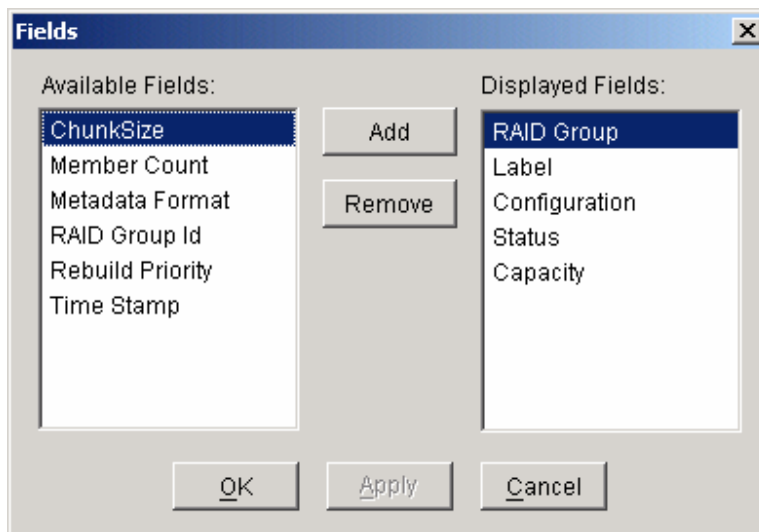
Sorting

This command displays a dialog box to let user choose up to 3 items to sort RAID group items in the RAID Group list.



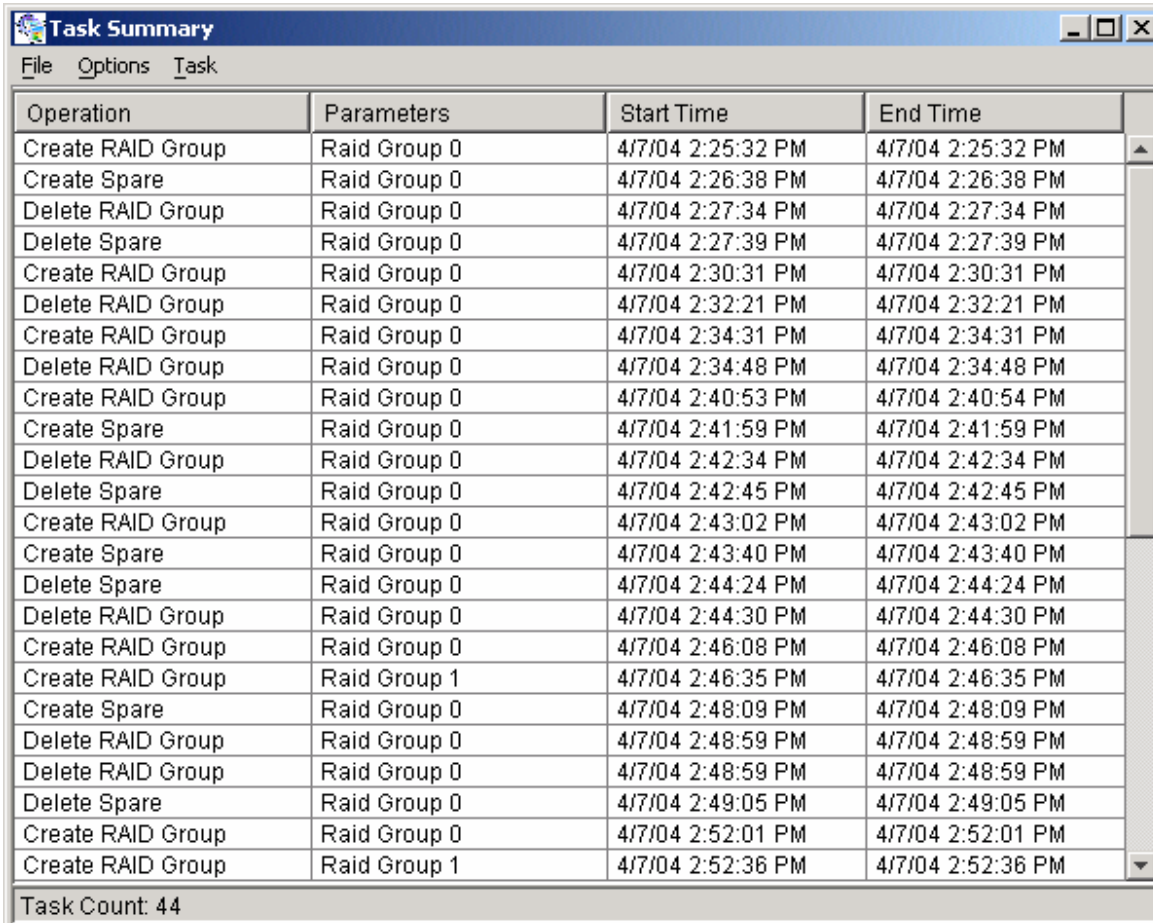
Fields

This command displays a dialog box to let user choose which fields will be shown in the RAID Group Summary window.



8.2.12 Task Manager

This command displays the Task Manager window. The Task Manager window lists all RAID and disk management tasks that have been started and/or done. This window provides user the ability to schedule any RAID and disk management operations including RAID group creation, rebuild, and test.



Operation	Parameters	Start Time	End Time
Create RAID Group	Raid Group 0	4/7/04 2:25:32 PM	4/7/04 2:25:32 PM
Create Spare	Raid Group 0	4/7/04 2:26:38 PM	4/7/04 2:26:38 PM
Delete RAID Group	Raid Group 0	4/7/04 2:27:34 PM	4/7/04 2:27:34 PM
Delete Spare	Raid Group 0	4/7/04 2:27:39 PM	4/7/04 2:27:39 PM
Create RAID Group	Raid Group 0	4/7/04 2:30:31 PM	4/7/04 2:30:31 PM
Delete RAID Group	Raid Group 0	4/7/04 2:32:21 PM	4/7/04 2:32:21 PM
Create RAID Group	Raid Group 0	4/7/04 2:34:31 PM	4/7/04 2:34:31 PM
Delete RAID Group	Raid Group 0	4/7/04 2:34:48 PM	4/7/04 2:34:48 PM
Create RAID Group	Raid Group 0	4/7/04 2:40:53 PM	4/7/04 2:40:54 PM
Create Spare	Raid Group 0	4/7/04 2:41:59 PM	4/7/04 2:41:59 PM
Delete RAID Group	Raid Group 0	4/7/04 2:42:34 PM	4/7/04 2:42:34 PM
Delete Spare	Raid Group 0	4/7/04 2:42:45 PM	4/7/04 2:42:45 PM
Create RAID Group	Raid Group 0	4/7/04 2:43:02 PM	4/7/04 2:43:02 PM
Create Spare	Raid Group 0	4/7/04 2:43:40 PM	4/7/04 2:43:40 PM
Delete Spare	Raid Group 0	4/7/04 2:44:24 PM	4/7/04 2:44:24 PM
Delete RAID Group	Raid Group 0	4/7/04 2:44:30 PM	4/7/04 2:44:30 PM
Create RAID Group	Raid Group 0	4/7/04 2:46:08 PM	4/7/04 2:46:08 PM
Create RAID Group	Raid Group 1	4/7/04 2:46:35 PM	4/7/04 2:46:35 PM
Create Spare	Raid Group 0	4/7/04 2:48:09 PM	4/7/04 2:48:09 PM
Delete RAID Group	Raid Group 0	4/7/04 2:48:59 PM	4/7/04 2:48:59 PM
Delete RAID Group	Raid Group 0	4/7/04 2:48:59 PM	4/7/04 2:48:59 PM
Delete Spare	Raid Group 0	4/7/04 2:49:05 PM	4/7/04 2:49:05 PM
Create RAID Group	Raid Group 0	4/7/04 2:52:01 PM	4/7/04 2:52:01 PM
Create RAID Group	Raid Group 1	4/7/04 2:52:36 PM	4/7/04 2:52:36 PM

Task Count: 44

The Task Manager window has it's own menu bar. All options available via the menu bar are shown below

File	Options	Task
Open...	Sorting...	Modify...
Save...	Fields...	Suspend...
Print...		Resume...
Exit		Cancel...
		Delete...

Open

This option will be available in future revisions.

Save

This option will be available in future revisions.

Print

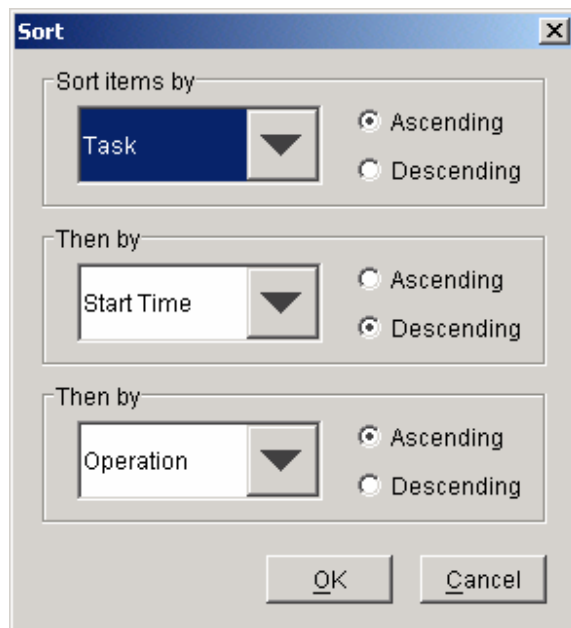
This option will be available in future revisions.

Exit

This command closes the Task Summary window.

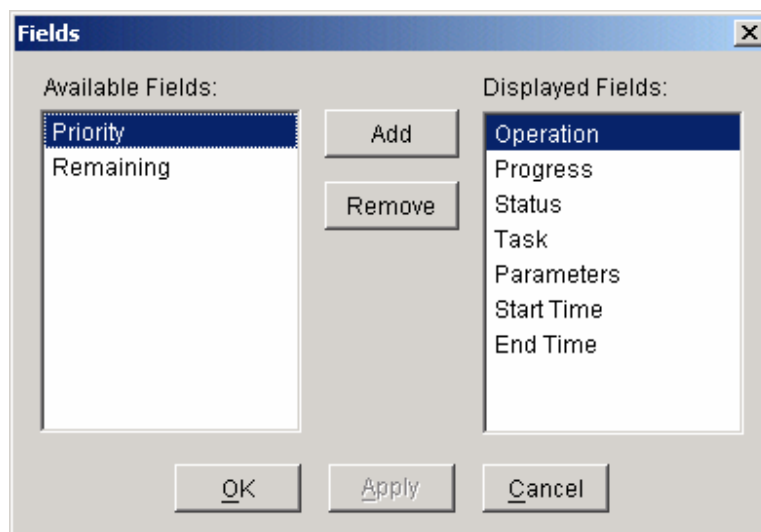
Sorting

This command displays a dialog box to let user choose up to 3 items to sort task items in the task list.



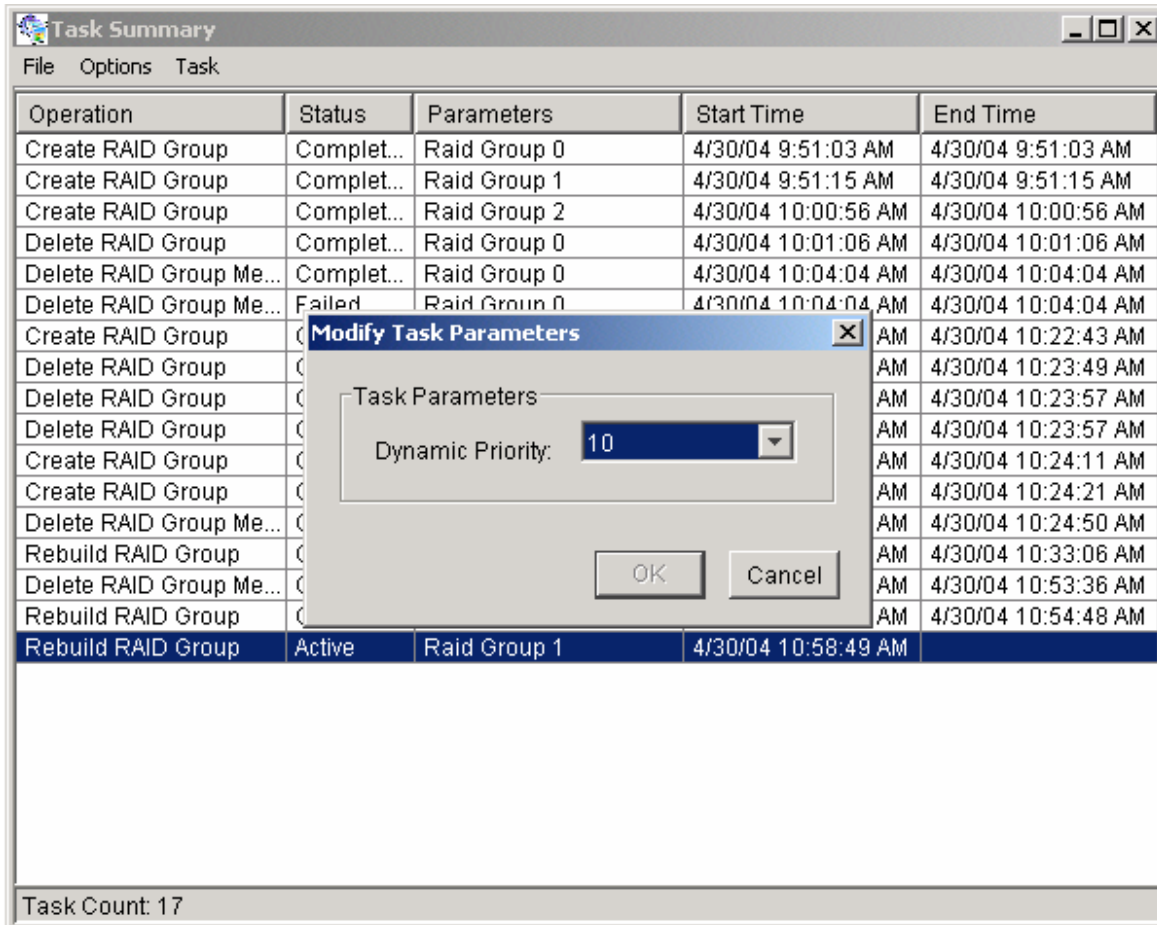
Fields

This command displays a dialog box to let user choose which fields will be shown in the task list.



Modify

This command allows user to modify parameters of the selected task items. The following is an example of changing rebuild priority for a rebuild task.



The screenshot shows a 'Task Summary' window with a table of tasks. A 'Modify Task Parameters' dialog box is open over the table, showing 'Dynamic Priority' set to 10. The table has the following data:

Operation	Status	Parameters	Start Time	End Time
Create RAID Group	Comple...	Raid Group 0	4/30/04 9:51:03 AM	4/30/04 9:51:03 AM
Create RAID Group	Comple...	Raid Group 1	4/30/04 9:51:15 AM	4/30/04 9:51:15 AM
Create RAID Group	Comple...	Raid Group 2	4/30/04 10:00:56 AM	4/30/04 10:00:56 AM
Delete RAID Group	Comple...	Raid Group 0	4/30/04 10:01:06 AM	4/30/04 10:01:06 AM
Delete RAID Group Me...	Comple...	Raid Group 0	4/30/04 10:04:04 AM	4/30/04 10:04:04 AM
Delete RAID Group Me...	Failed	Raid Group 0	4/30/04 10:04:04 AM	4/30/04 10:04:04 AM
Create RAID Group	(C)		AM	4/30/04 10:22:43 AM
Delete RAID Group	(C)		AM	4/30/04 10:23:49 AM
Delete RAID Group	(C)		AM	4/30/04 10:23:57 AM
Delete RAID Group	(C)		AM	4/30/04 10:23:57 AM
Create RAID Group	(C)		AM	4/30/04 10:24:11 AM
Create RAID Group	(C)		AM	4/30/04 10:24:21 AM
Delete RAID Group Me...	(C)		AM	4/30/04 10:24:50 AM
Rebuild RAID Group	(C)		AM	4/30/04 10:33:06 AM
Delete RAID Group Me...	(C)		AM	4/30/04 10:53:36 AM
Rebuild RAID Group	(C)		AM	4/30/04 10:54:48 AM
Rebuild RAID Group	Active	Raid Group 1	4/30/04 10:58:49 AM	

Task Count: 17

Suspend

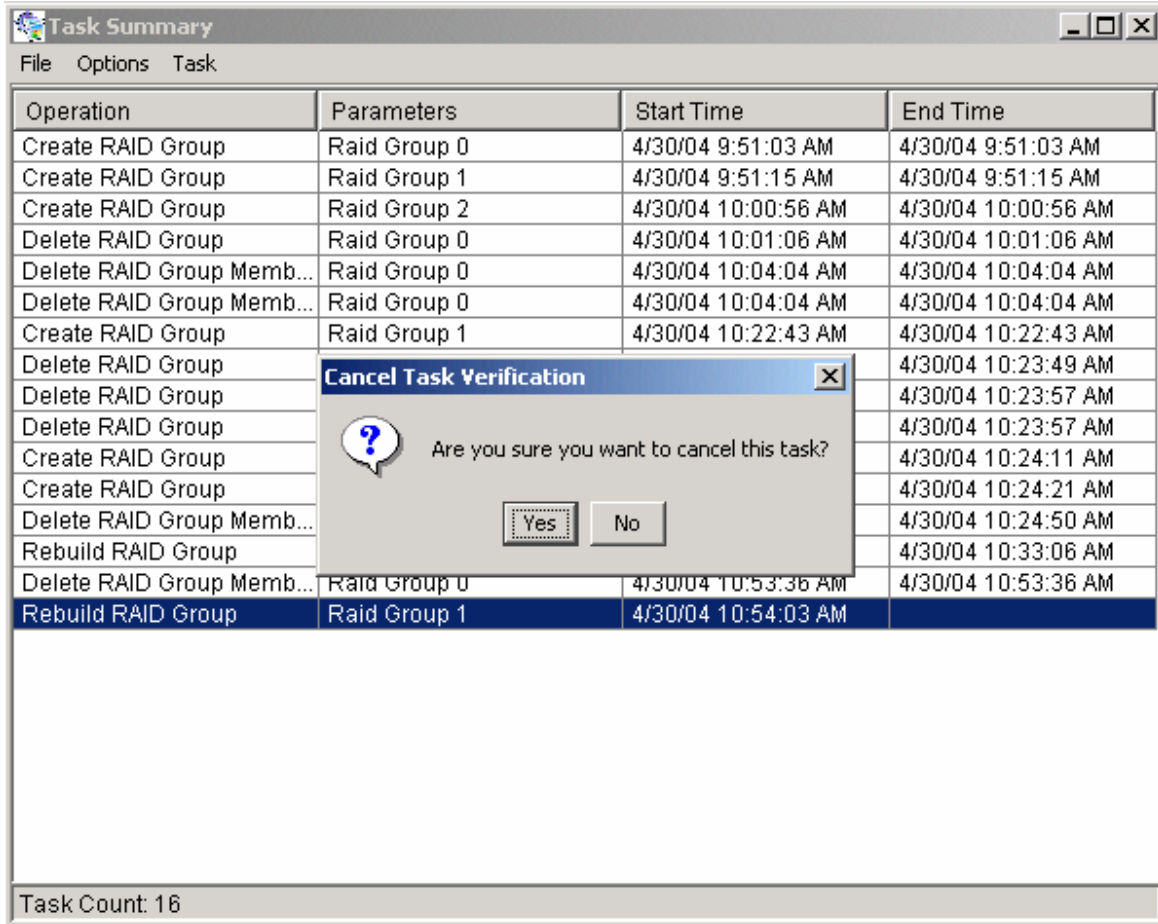
This command allows user to suspend the selected task items.

Resume

This command allows user to resume the suspended task items.

Cancel

This command allows user to cancel the selected task items.



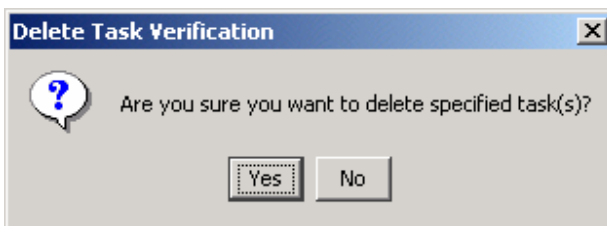
The screenshot shows the 'Task Summary' window with a menu bar (File, Options, Task) and a table of tasks. A dialog box titled 'Cancel Task Verification' is overlaid on the table, asking 'Are you sure you want to cancel this task?' with 'Yes' and 'No' buttons.

Operation	Parameters	Start Time	End Time
Create RAID Group	Raid Group 0	4/30/04 9:51:03 AM	4/30/04 9:51:03 AM
Create RAID Group	Raid Group 1	4/30/04 9:51:15 AM	4/30/04 9:51:15 AM
Create RAID Group	Raid Group 2	4/30/04 10:00:56 AM	4/30/04 10:00:56 AM
Delete RAID Group	Raid Group 0	4/30/04 10:01:06 AM	4/30/04 10:01:06 AM
Delete RAID Group Memb...	Raid Group 0	4/30/04 10:04:04 AM	4/30/04 10:04:04 AM
Delete RAID Group Memb...	Raid Group 0	4/30/04 10:04:04 AM	4/30/04 10:04:04 AM
Create RAID Group	Raid Group 1	4/30/04 10:22:43 AM	4/30/04 10:22:43 AM
Delete RAID Group			4/30/04 10:23:49 AM
Delete RAID Group			4/30/04 10:23:57 AM
Delete RAID Group			4/30/04 10:23:57 AM
Create RAID Group			4/30/04 10:24:11 AM
Create RAID Group			4/30/04 10:24:21 AM
Delete RAID Group Memb...			4/30/04 10:24:50 AM
Rebuild RAID Group			4/30/04 10:33:06 AM
Delete RAID Group Memb...	Raid Group 0	4/30/04 10:53:36 AM	4/30/04 10:53:36 AM
Rebuild RAID Group	Raid Group 1	4/30/04 10:54:03 AM	

Task Count: 16

Delete

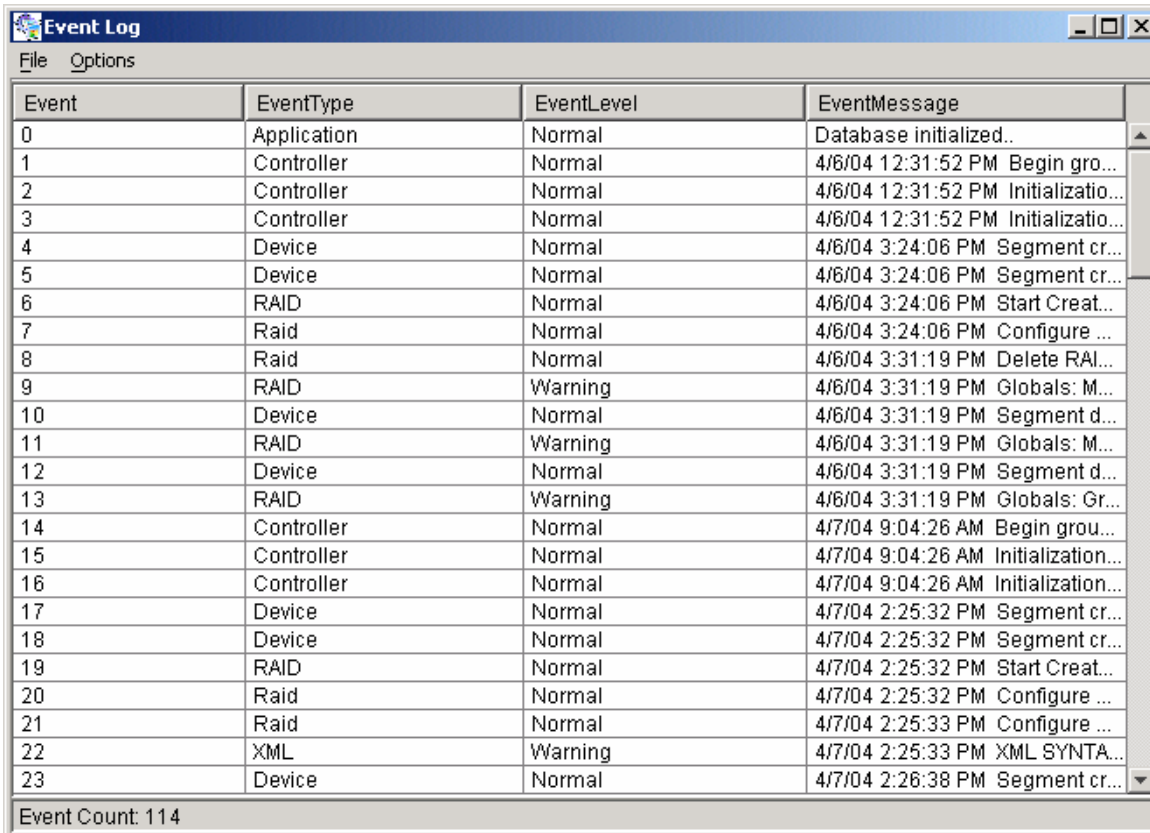
This command displays a dialog box to let user delete the selected task items from the task list in Task Summary window. The following dialog box will pop up to get confirmation from the user.



The dialog box is titled 'Delete Task Verification' and contains a question mark icon, the text 'Are you sure you want to delete specified task(s)?', and 'Yes' and 'No' buttons.

8.2.13 Event Log

This command displays the Event Log window. The Event Log window displays SATA device-related events that occur while SATARAID5 is running.



Event	EventType	EventLevel	EventMessage
0	Application	Normal	Database initialized..
1	Controller	Normal	4/6/04 12:31:52 PM Begin gro...
2	Controller	Normal	4/6/04 12:31:52 PM Initializatio...
3	Controller	Normal	4/6/04 12:31:52 PM Initializatio...
4	Device	Normal	4/6/04 3:24:06 PM Segment cr...
5	Device	Normal	4/6/04 3:24:06 PM Segment cr...
6	RAID	Normal	4/6/04 3:24:06 PM Start Creat...
7	Raid	Normal	4/6/04 3:24:06 PM Configure ...
8	Raid	Normal	4/6/04 3:31:19 PM Delete RAI...
9	RAID	Warning	4/6/04 3:31:19 PM Globals: M...
10	Device	Normal	4/6/04 3:31:19 PM Segment d...
11	RAID	Warning	4/6/04 3:31:19 PM Globals: M...
12	Device	Normal	4/6/04 3:31:19 PM Segment d...
13	RAID	Warning	4/6/04 3:31:19 PM Globals: Gr...
14	Controller	Normal	4/7/04 9:04:26 AM Begin grou...
15	Controller	Normal	4/7/04 9:04:26 AM Initialization...
16	Controller	Normal	4/7/04 9:04:26 AM Initialization...
17	Device	Normal	4/7/04 2:25:32 PM Segment cr...
18	Device	Normal	4/7/04 2:25:32 PM Segment cr...
19	RAID	Normal	4/7/04 2:25:32 PM Start Creat...
20	Raid	Normal	4/7/04 2:25:32 PM Configure ...
21	Raid	Normal	4/7/04 2:25:33 PM Configure ...
22	XML	Warning	4/7/04 2:25:33 PM XML SYNTA...
23	Device	Normal	4/7/04 2:26:38 PM Segment cr...

Event Count: 114

The Event Log window has it's own menu bar. All options available via the menu bar are shown below

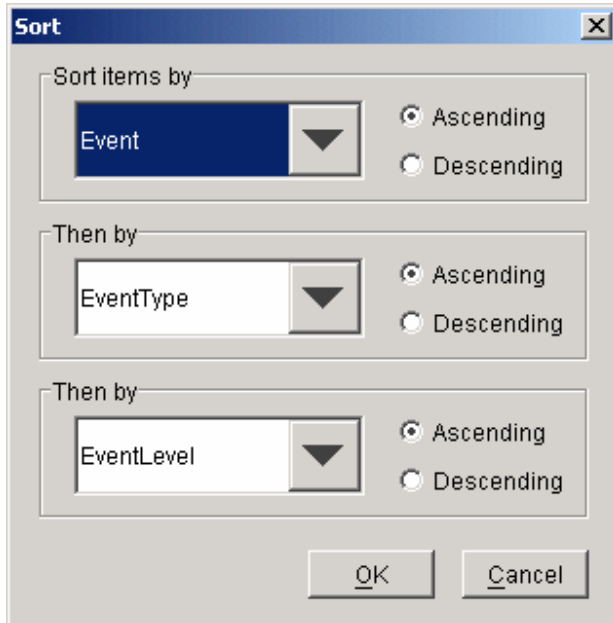
File **Options**
Exit Sorting...
 Fields...

Exit

This command closes the Event Log window.

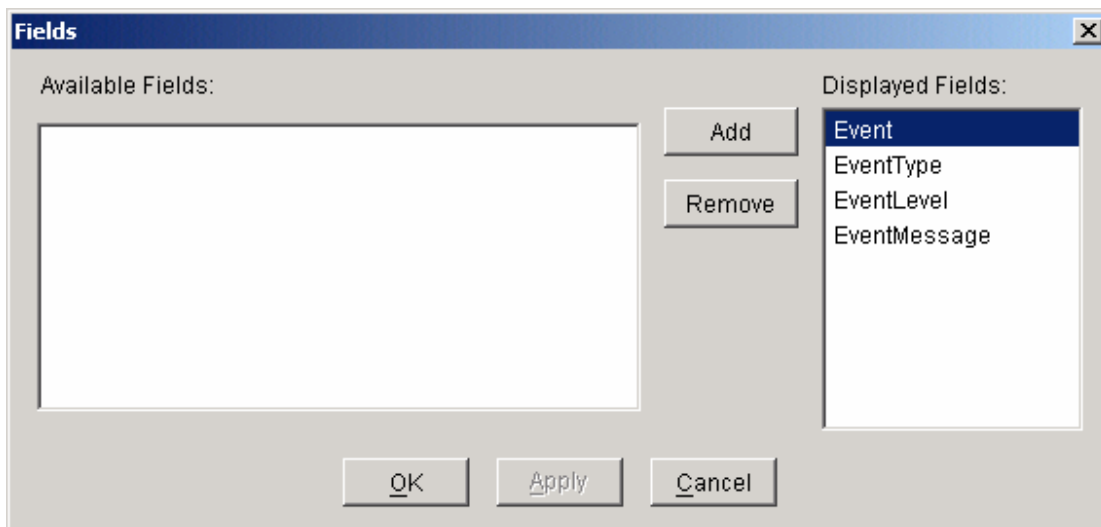
Sorting

This command displays a dialog box to let user choose up to 3 items to sort event items in the event log.



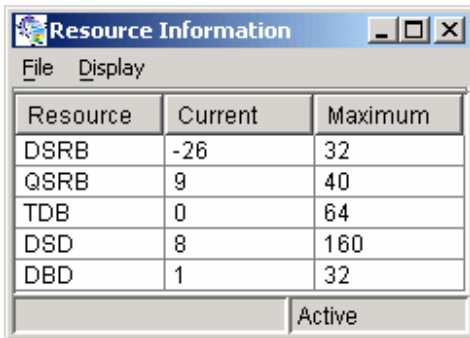
Fields

This command displays a dialog box to let user choose which fields will be shown in the event log.



8.2.14 Resources

This command displays the Resource Information window. This feature is for debugging purpose only.



Resource	Current	Maximum
DSRB	-26	32
QSRB	9	40
TDB	0	64
DSD	8	160
DBD	1	32

Active

8.2.15 Create Legacy RAID Group

This command displays a dialog box to let user create legacy RAID group. This item is disabled if new RAID groups exist.

User needs to select the following parameters:

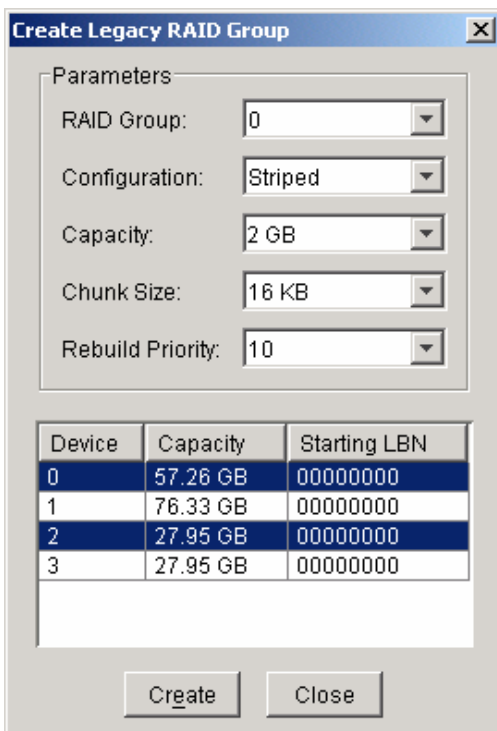
RAID Group: Select a group ID from the available ID list

Configuration: Striped (for RAID 0)
Mirrored (for RAID 1)
Mirrored Striped (for RAID 10)
Parity RAID (for RAID 5)

Capacity: Select from a list of RAID group size, current options are from 256 MB to 100 GB, and MAX.

Chunk Size: Select one from the available list: 8, 16, 32, 64, 128 (KB). RAID 1 set does not require this.

Devices: Select RAID member devices from the available device segment list



Parameters

RAID Group: 0

Configuration: Striped

Capacity: 2 GB

Chunk Size: 16 KB

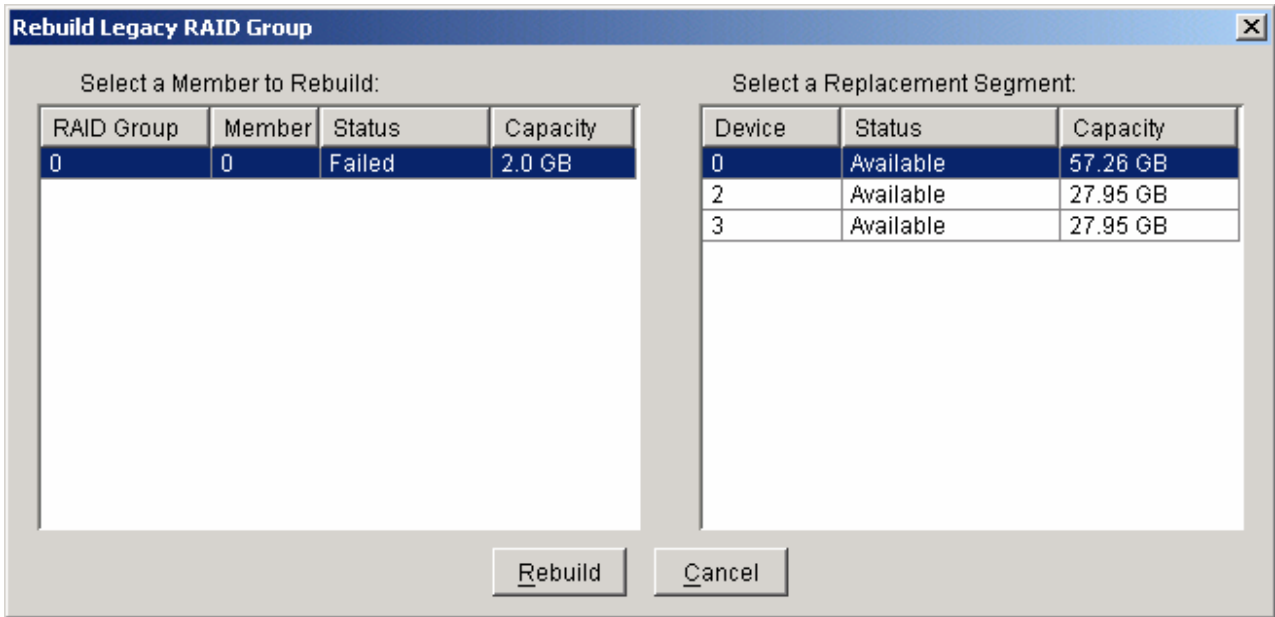
Rebuild Priority: 10

Device	Capacity	Starting LBN
0	57.26 GB	00000000
1	76.33 GB	00000000
2	27.95 GB	00000000
3	27.95 GB	00000000

Create Close

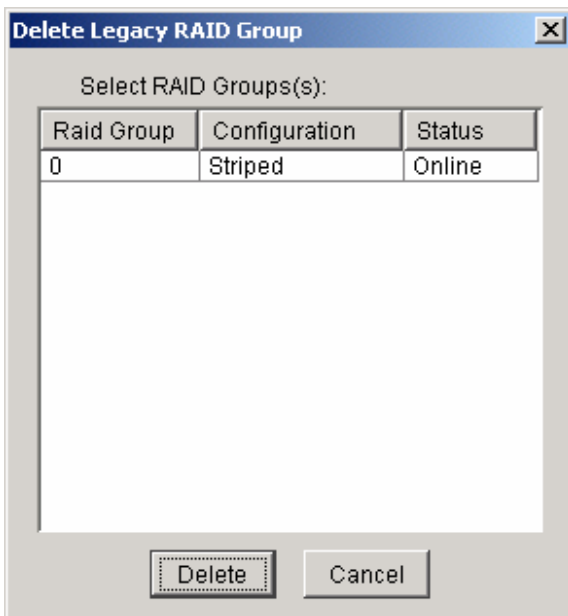
8.2.16 Rebuild Legacy RAID Group

This command displays a dialog box to let user choose a replacement segment to rebuild a non-fault tolerant legacy RAID group.



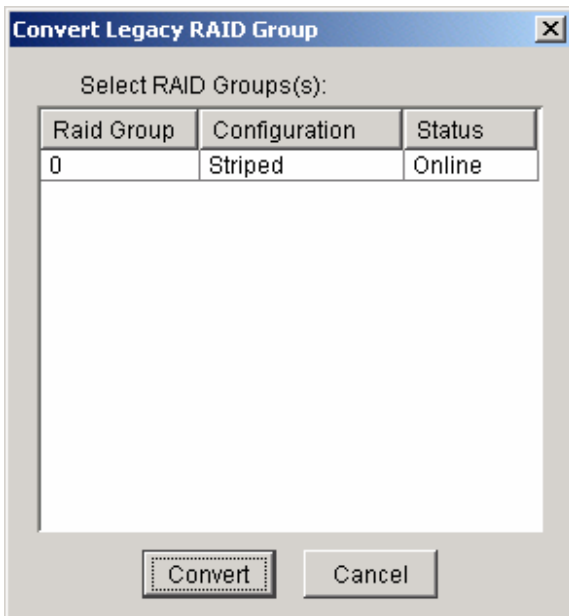
8.2.17 Delete Legacy RAID Group

This command displays a dialog box to let user choose legacy RAID groups to delete. This item is disabled if no legacy RAID groups exist.



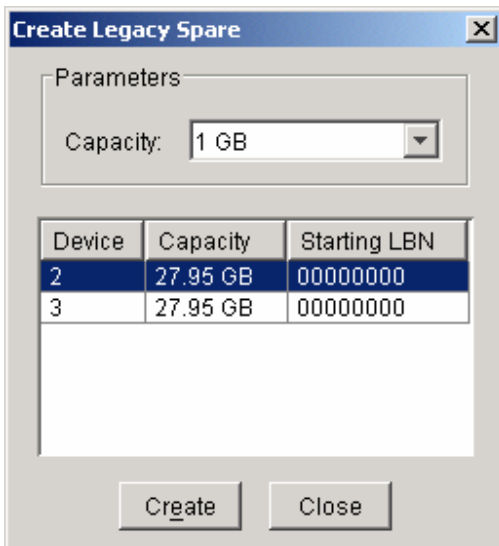
8.2.18 Convert Legacy RAID Group

This command displays a dialog box to let user choose legacy RAID groups to convert to new RAID groups of the same RAID type (configuration). This item is disabled if no legacy RAID groups exist.



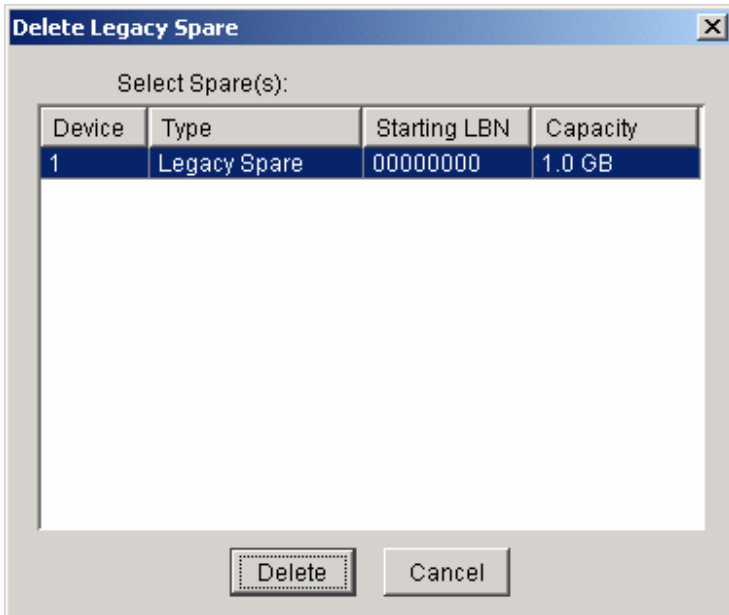
8.2.19 Create Legacy Spare

This command displays a dialog box to let user create legacy spare drive. This item is disabled if new RAID groups exist.



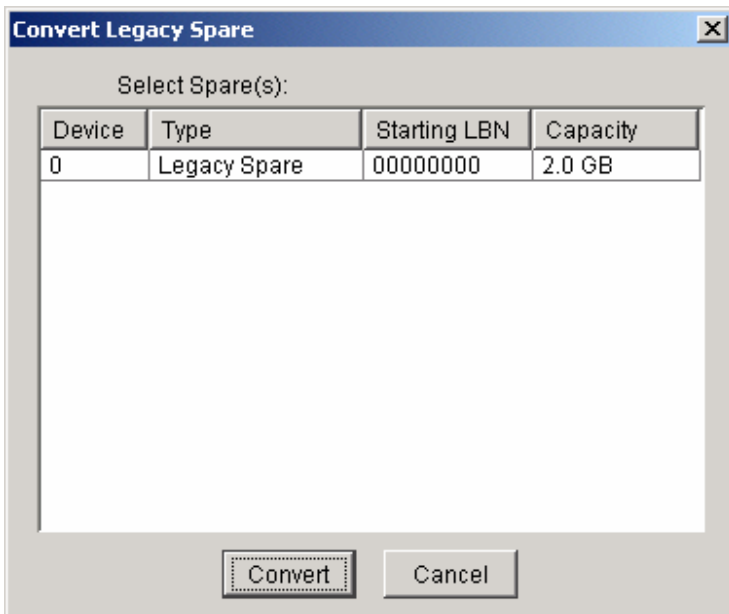
8.2.20 Delete Legacy Spare

This command displays a dialog box to let user delete legacy spare drive. This item is disabled if no legacy spare drive exists.



8.2.21 Convert Legacy Spare

This command displays a dialog box to let user choose legacy spare drives to convert to new spare drives. This item is disabled if no legacy spare drives exist.



8.2.22 Help Topics

This command opens an interactive help dialog using the standard Windows help interface.

This option will be available in future revisions.

8.2.23 About

This command displays a dialog box with more information about the SATARAID5 program, including the revision level.

