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Intel RAID Software v6.x (and newer) Upgrade/Installation Procedures

For Intel® Server RAID Controller U3-1 and Intel® Server RAID Controller U3-1L

intel.

Revision History

Date	Rev	Modifications
12/21/01	1.1	Initial Release

Table of Contents

Definitions

- Flash Recovery Utility (FRU) – The Flash Recovery Utility erases and writes a new binary image of the RAID firmware into the flash memory of the RAID adapter. The IIR 5.x and 6.x software stacks each have a version of this utility.
- Hardware Guide – Also known as the *Hardware Installation and User's Guide*, the Hardware Guide provides information about the features and specifications of the applicable RAID adapter with the IIR 6.x software stack.
- Host Drive – A term used to refer to a logical drive or RAID array. Host drive is analogous to a RAID volume in the IIR 5.x stack.
- I2O – Intelligent I/O, a standard interface for I2O systems that works across diverse operating systems and software revisions. Analogous to IIR 5.x software.
- IIR – Intel Integrated RAID, Intel's RAID software for use with intelligent Intel I/O processors.
- IIR 5.x software stack – Original Intel I2O Based RAID software. No more updates will be available for this RAID software architecture. Not compatible with IIR 6.x software stack.
- IIR 6.x software stack – Entirely new and revamped Intel RAID software with advanced features, completely new (non-I2O based) architecture, and new GUI (graphical user interface) tools. IIR 6.x will continue to be updated with innovative features and enhancements. Not compatible with IIR 5.x.
- IOP – I/O Processor
- OS – Operating System
- RAID Configuration Utility (RCU) – A BIOS based utility used to configure a RAID volume prior to OS installation. This utility is only available on the IIR 5.x software stack.
- RAID Software Suite – The drivers, tools, and utilities that are part of the RAID software stack for IIR 5.x and IIR 6.x.
- RAID Volume – A term that is analogous to a host drive in the IIR 6.x stack.
- Software Guide – Also known as the *Software Installation and User's Guide*, the Software Guide contains:
  - Detailed instructions for the software installation of an IIR 6.x controller
  - Descriptions to using the RAID Software Suite, the drivers, tools and utilities of the IIR 6.x controller.
- Storage Console (StorCon) – A full-featured monitoring and configuration utility with a text-based user interface. StorCon manages all aspects of the RAID subsystem as well as many features of the IIR adapter running 6.x firmware.
- User Documentation Set – The set of three (3) documents consisting of the Quick Start Guide, Hardware Guide, and Software Guide that describes the applicable IIR adapter running 6.x firmware.

1.0   Introduction

1.1   General

This document details the steps necessary to preserve existing data on hard drives when updating the software on Intel® Server RAID Controllers from the previous Intelligent I/O (I2O) based architecture (known in this document as "5.x software" or "5.x firmware") to the new Intel Integrated RAID (IIR) software architecture (known in this document as "6.x software" or "6.x firmware").

This procedure is valid for the following Intel Server RAID Controllers:
- SRCU31
- SRCU31L

Note: This document is written with the assumption that the user has a working knowledge of computer hardware and software. Failure to properly implement the procedures set forth below may lead to data loss.

Attention!

Backup the existing data on the RAID volumes of your Intel Server RAID Controller to another source and verify the data backup before updating to the new 6.x firmware and software stack. The new 6.x IIR firmware is NOT backward compatible with the old 5.x IIR firmware. The two software stacks use different disk data formats. After a firmware update, the new 6.x firmware will not recognize the pre-existing data and will overwrite the data when you recreate the RAID configuration. Therefore, you must ensure the data has been backed up successfully before attempting an update to the new 6.x IIR firmware.

Additionally, Intel Server RAID controllers with old 5.x IIR and new 6.x IIR software architectures are not supported in the same system. Utilizing two different Intel RAID controllers with the two different software stacks is not a valid method for data migration. It is strongly recommended that you follow the procedure described in this paper to migrate the data successfully.

Finally, this procedure should be attempted only during a scheduled down time of your server. The length of time to complete this procedure will vary depending on the current amount of data, size of array, etc.

2.0   Procedure Overview

In all cases, upgrading an Intel Server RAID controller from the old IIR 5.x software stack to the new IIR 6.x software stack involves moving the data from the original I2O RAID array to a new location and then back again after upgrading the software. As indicated above, the disk data formats are not the same, so the controller software should not be upgraded until after a full backup and data migration.

Follow the detailed steps in Section 2.2 to complete the upgrade. If the upgrade is unsuccessful at any point, refer to Appendix A for the suggested back-out method.

2.1   Data Backup/Restore and Firmware Upgrade Flow

Figure 1 shows the flow for the data migration and firmware upgrade. The following sections provide further details.


```
START → Pre-planning → Record the I2O software configuration → Perform backup and verify backup → Uninstall I2O software and unmount volume for non-bootable RAID Volume*

→ Recreate the RAID configuration → Re-install operating system for bootable host drive* → Update the RAID software tools → Restore and validate data → FINISH
```

* if required
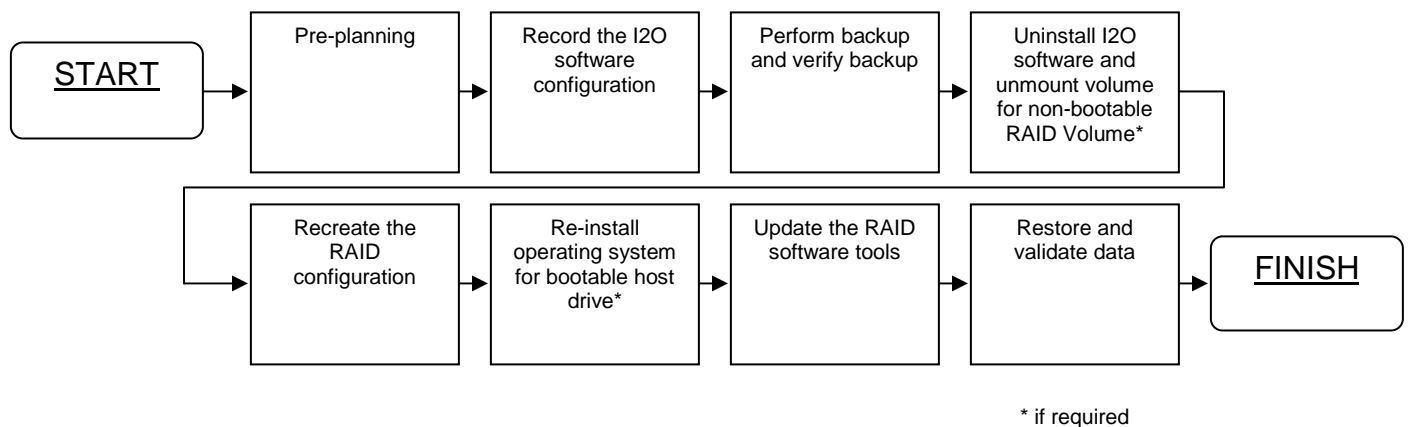
2.2 Detailed Steps for Upgrade

2.2.1 Pre-Planning

Before migrating the data and upgrading the firmware, do the following:
1. Gather everything you need:
   - Obtain the IIR version 6.1.2.6i (or newer) firmware files for the operating system that is applicable to your needs. Download the files from the web site, http://support.intel.com/support/motherboards/server.
     - i. IIR version 6.x Firmware Flash Recovery Utility (FRU)
     - ii. The latest revision of the IIR 6.x firmware
     - iii. Driver(s) for the applicable OS
     - iv. IIR 6.x software tools and utilities for the applicable OS
   - Intel® System Resource CD (shipped with your Intel server board)
   - Intel® Server RAID Controller Resource CD (shipped with your RAID controller)
   - Intel® Server RAID Controller User's Guide
2. Extract the v6.1.2.6i (or newer) firmware to a floppy disk
3. Read this upgrade procedure document in its entirety before proceeding with the software upgrade.
4. Obtain the IIR version 6.x firmware user documentation set for the SRCU31 or SRCU31L adapter from the same web site.
5. Have the I2O user manual for the SRCU31 or SRCU31L adapter available for back-out purposes.

2.2.2 Record the Version 5.x IIR Firmware Configuration

Follow the steps below to document the current RAID software configuration on your system installed with the Intel RAID adapter.

Refer to Appendix B for an example record of a version 5.x IIR firmware configuration on a Microsoft* Windows* 2000 system.

1. In Table 2, record the I2O firmware version that is currently running on the Intel RAID adapter. You can identify the I2O firmware version (vX.XX.XXX) when the following appears while the card is enumerating during boot up:

   ```
   Press Ctrl-C to run the RAID Configuration Utility
   RAID Controller Firmware vX.XX.XXX
   ```

2. Have the floppy or CD-ROM of the matching I2O firmware readily available.

Note: If you do not have the old CD-ROM or floppy containing the matching firmware, obtain the I2O firmware from the web site, http://support.intel.com/support/motherboards/server

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Should the upgrade to the new IIR 6.x software stack fail, you can follow the back-out method described later in this document and reprogram the flash memory with the appropriate I2O firmware version.

3. Use Table 2 below to document the RAID array configuration attached to the Intel RAID controller. Determine the volume name, volume size, RAID level, write cache setting, and stripe size of all applicable RAID volumes via the RAID Configuration Utility (RCU). Refer to the I2O user manual for detailed instructions on using the RCU.

4. For each RAID volume, record its physical drive configuration in Table 3 (below). Ensure that all physical drives for each RAID volume are documented.

5. Note in Table 4 which data is stored on which RAID Volume and OS partition(s) so that you will be sure to copy the data back to the appropriate place after upgrading.

Table 2.   Original RAID Configuration

Current I2O Firmware Version:					
RAID Volume / Host Drive					
RAID Volume Name	RAID Volume Size (MB)	RAID Level	Number of Hard Drives	Write Cache Setting (Disabled/ Enabled)	Stripe Size (k)

Table 3.   Physical Drive Configuration for each RAID Volume

RAID Volume Name	Bus:SCSI ID (#:#)	Hard Drive Manufacturer	Hard Drive Model	Hard Drive Capacity (MB)	Capacity Used on Hard Drive (MB)

Table 4.   RAID Volume to OS Partition Relationship

RAID Volume Name	OS Partition	Data

2.2.3   Perform Backup and Verify Backup

Note: If you are using a tape device for backup, it is suggested that the device be attached to another controller (not the Intel Server RAID controller).

Take all precautions necessary before attempting a backup. Using the backup method of your choice, perform a full backup of your data (refer to the user manual of your backup method for details). Verify that the backup is successful and that all data is accessible before proceeding to the next step.

You may wish to perform a second backup for added security of your data.

For additional protection, backup your OS and ensure that disaster recovery is in place.

2.2.4 Uninstall version 5.x IIR firmware and Unmount Volume for Non-Bootable RAID Volume (If Required)

Note: In the event that the operating system IS installed on drives attached to the RAID controller being updated, skip to Section 2.2.5.

Follow the steps below if your operating system is NOT installed on drive(s) attached to the RAID controller being updated (for example, the OS is installed on another storage device).

1. After verifying the backup is successful, uninstall the old 5.x drivers, tools, and utilities since the old software is no longer applicable. Refer to the I2O user manual for the uninstall instructions.
2. Unmount the applicable RAID volume.

Note: If the software uninstall fails and you do not wish to continue this procedure, follow the steps listed in "Section A.1 Back-Out after Software Uninstall", to re-install the I2O drivers.

2.2.5 Upgrade to the IIR Version 6.x Firmware

Now that you have downloaded the upgrade files and performed a full backup successfully, you can update the controller to the new IIR version 6.x firmware. From the upgrade files, use the new IIR Flash Recovery Utility (FRU) to overwrite the flash memory of RAID adapter with the new binary image.

Note: this procedure requires that you manually open the computer and change jumper settings on the RAID adapter (see the I2O user manual for details on locating and changing the jumper for your adapter).

Note: If the firmware upgrade fails and you do not wish to continue this procedure, follow the steps in Appendix A, to revert to the I2O firmware and, if necessary, to re-install the I2O drivers.

2.2.5.1   Firmware Recovery Procedure via Flash Recovery Utility

1. Set the IIR controller's IOP to Reset (Flash Recovery) mode:

Warning: Shock hazards may be present inside the computer in which this card is installed. Disconnect all power cords to the computer before the removal of any covers. Follow the warnings noted in your computer's user or service manual before installing this board. ONLY after all the covers are reinstalled should you reconnect the power cords and power up the computer for the software installation and use.

a) Take all precautions to prevent electrostatic discharge (ESD) damage before handling the IIR controller.
b) Power off all system components and disconnect their power cords.
c) Remove the cover from the system to gain access to the PCI slots.
d) If necessary, disconnect the SCSI cable from the adapter card. Remove the IIR

controller from your system.

    e) On jumper block J7D1 for SRCU31, or jumper block J7A1 for SRCU31L, move the jumper from position 2-3 to position 1-2.

    f) Re-install the adapter in the PCI slot in which it was previously installed. If necessary, reconnect the SCSI cable to the adapter card.

    g) Replace the cover and reconnect all power cords.

2. Use the IIR 6.x software stack to flash the firmware.

    a) Boot the server to the Intel® System Resource CD that shipped with your Intel server board (server BIOS must be configured to boot from CDROM).

    b) When the server boots to the System Resource CD, select *QUIT* from the menu and exit to DOS.

    c) Insert the floppy (created in step 1.2) containing the Intel RAID firmware v6.1.2.6i (or newer).

    d) Type *a:* and press *ENTER*

    e) Type *autoexec.bat* and press *ENTER*

    f) The FRU utility will start up and pause at the copyright information. Press <Enter> to continue.

    g) The FRU utility will pause to ensure that the flash programming jumper is set correctly for Reset mode (see step 1). If the adapter is in Reset mode, press <Y> to continue, otherwise press <N>, shut down the system, and perform step 1.

    h) The FRU utility will automatically update to a set version of the IIR firmware. The firmware download may take up to 3 minutes.

3. Reset the jumper to run mode.

    a) Power off all system components and disconnect power cords.

    b) Remove the system cover.

    c) If necessary, disconnect the SCSI cable from the adapter card. Remove the IIR controller from your system.

    d) On Jumper block J7D1 for SRCU31, or jumper block J7A1 for SRCU31L, move the jumper from position 1-2 to position 2-3.

    e) Reinstall the IIR controller in the PCI slot in which it was previously installed. If necessary, reconnect the SCSI cable to the adapter card.

    f) Replace the cover, reconnect all power cords and power up the system.

2.2.6 Recreate the RAID Configuration

The next step is to recreate the RAID configuration via the new IIR version 6.x software. Using the information that was captured in Table 2, Table 3, and Table 4, recreate the RAID volumes, now recognized as host drives, via the expansion ROM version of Storage Console (StorCon). Refer to the IIR 6.x Software Guide for instructions on creating host drives that are comparable to the original RAID volumes.

Note: If a failure occurs while you are recreating the RAID configuration and you do not wish to continue this procedure, follow "Section A.3 Full Back-Out", to do a full back-out.

As mentioned previously in this document, the disk data formats are NOT the same between the previous I2O and the new IIR version 6.x software stacks. Therefore, you will notice a reduction of approximately 36MB per drive upon the creation of new host drives. This loss of disk space is due to additional data security measures implemented in the new stack. Consider this space limitation when you are creating new host drives to ensure that all of the data will fit on the new RAID configuration.

2.2.7   Re-Install Operating System for Bootable Host Drive (If Required)

In the event that the system configuration does NOT have the operating system installed on drives attached to the RAID controller being updated, skip to Section 2.2.8.

If your configuration requires that the bootable operating system be installed on drive(s) attached to the RAID controller being updated, re-install the OS according to the instructions provided in the IIR version 6.x Software Guide. While you are installing the OS, install the IIR 6.x drivers, when appropriate.

Note: If a failure occurs while you are reinstalling the OS and you do not wish to continue this procedure, follow "Section A.3 Full Back-Out", to do a full back-out.

2.2.8   Upgrade the RAID Software Suite

Follow the steps below to upgrade the RAID Software Suite:

1. Boot your server to the OS and log in using a user account with administrative rights.
2. If you have not already done so, upgrade to the new software by installing the drivers, tools and utilities of the IIR 6.x RAID Software Suite for your applicable OS. Refer to the instructions obtained from the http://support.intel.com/support/motherboards/server and the IIR 6.x Software Guide for details.

Note: If a failure occurs while you are updating the RAID Software Suite and you do not wish to continue this procedure, follow "Section A.3 Full Back-Out", to do a full back-out.

2.2.9   Restore and Validate Data

1. Recreate the OS partitions/RAID volumes per Table 4.
2. Restore the backed up data to the appropriate OS partitions on the appropriate host drives. Use the same method to restore the data to the new host drive as was used to back it up from the old RAID volume.
3. Validate your data.

If the data validation is successful, you have now completed the upgrade procedure.

Note: If the data validation is unsuccessful, refer to "Section A.3 Full Back-Out" for details.

Appendix A: Back-Out Methods

Depending on when a failure occurs during the upgrade, you will follow 1 of 3 back-out methods described in this appendix (Section A.1 , Section A.2 , or Section A.3).

Sections A.1 to A. 3 provide more details for each back-out step.

A.1   Back-Out after Software Uninstall

If a failure occurs during , "**Section 2.2.4   Uninstall version 5.x IIR firmware and Unmount Volume for Non-Bootable RAID Volume (If Required)**" and you do not wish to continue the upgrade procedure:

Remount the volume and reinstall the old software stack (see Section A.8)

A.2   Back-Out after Firmware Upgrade

If a failure occurs during "**Section 2.2.5 Upgrade to the IIR Version 6.x Firmware**" and you do not wish to continue the upgrade procedure:
*   Revert to the old firmware (see Section A.4)
*   Verify the firmware version (see Section A.5)
*   Remount the volume and reinstall the old software stack (see Section A.8), if necessary

A.3   Full Back-Out

If a failure occurs during or any time after following the upgrade instructions in, "**Section 2.2.6 Recreate the RAID Configuration**" and you do not wish to continue the upgrade procedure, follow the flow shown in Figure 2 for a full back-out.

Figure 2
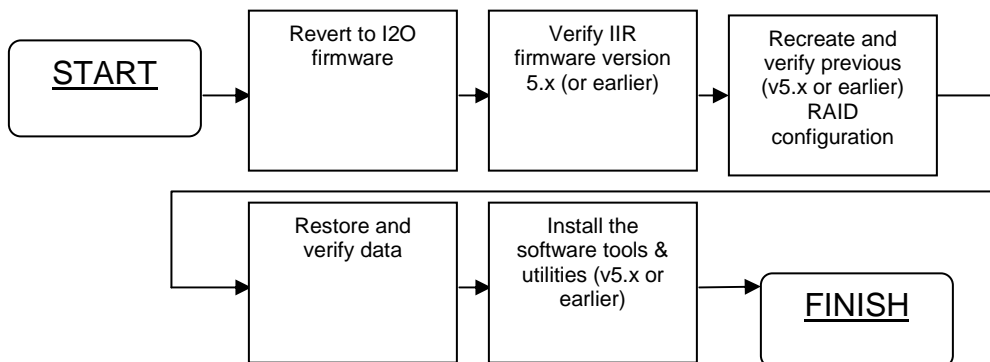
A.4   Revert to I2O (IIR version 5.x or earlier) Firmware

Use the following steps to reprogram the flash memory back to the previous I2O firmware version, as recorded in Table 2 . If you have the I2O/IIR version 5.x or earlier CD-ROM for the applicable RAID adapter, follow the procedure in A.4.1 . If you have the I2O/IIR version 5.x bootable floppy, follow the procedure in A.4.2 .

Note: If you do not have the old CD-ROM or floppy containing the appropriate firmware version, obtain the I2O firmware from the web site, http://support.intel.com/support/motherboards/server

Warning: Shock hazards may be present inside the computer in which this card is being installed. Disconnect all power cords to the computer before removal of any covers. Follow the warnings noted in your computer's user or service manual before installing this board. ONLY after all the covers are reinstalled should you reconnect the power cords and power up the computer for the software installation and use.

A.4.1 I2O FRU Using the Bootable RAID CD-ROM

1. Turn off the computer and disconnect the power cord(s).

2. Open the computer to access the RAID adapter and remove it. Locate the IOP mode select jumper (see the I2O Hardware Guide for the location of the jumper) on the RAID adapter and place the jumper over pins 1 and 2. Reinstall the adapter to its previous slot.

3. Replace the computer cover, reconnect the power cord(s) and power-on the computer.

4. If necessary, change the computer's BIOS setting so that your system boots from CD-ROM.

5. Boot the CD-ROM to the ROM-DOS main menu.

6. Select option number 4, RAID Recovery, from the ROM-DOS menu; press <Enter>.

7. Using one of the following two methods:

   a) Update Production Firmware: select this option if you are using the firmware image located on the RAID CD-ROM; press <Enter>, and go to step 8

   b) Update from floppy: select this option if you are using the firmware located on a floppy diskette. Insert the floppy diskette; press <Enter>, and go to step 8

8. Follow the on-screen prompts; press <Enter> then press <Y> to begin the upgrade.

9. After the update is completed, you will be instructed to reboot. Remove the floppy diskette or CD-ROM and power-off the computer. Unplug the power cord(s).

10. Open the computer to access the RAID adapter and remove it. Locate the IOP mode select jumper (see the I2O Hardware Guide for the location of the jumper) on the RAID adapter and replace the jumper over pins 2 and 3. Reinstall the adapter to its previous slot.

11. Replace the computer cover, reconnect the power cord(s), and power-on the computer

12. If necessary, change the computer's BIOS setting so that your system boots no longer boots from CD-ROM.

A.4.2 I2O FRU Using the Bootable Recovery/Update Utility Floppy Diskette

1. Turn off the computer and disconnect the power cord(s).

2. Open the computer to access the RAID adapter and remove it. Locate the IOP mode select jumper (see the I2O Hardware Guide for the location of the jumper) on the RAID adapter and place the jumper over pins 1 and 2. Reinstall the adapter to its previous slot.

3. Replace the computer cover, reattach the power cord(s) and power-on the computer.

4. Boot the *Recovery/Update Utility* floppy diskette to the ROM-DOS main menu.

5. Select option number 2, *Flash Recovery Utility*, from the ROM-DOS menu; press <Enter>.

6. Follow the prompts; press <Enter> then <Y> to load the program.

7. Select *Download the RAID firmware to flash memory*, press <Enter>.

8. Remove the *Utility* diskette and insert the diskette with the RAID adapter firmware located on it; press <Enter>.

9. Press <Tab> once to go down to the RAID.BIN file; press <Enter>.

10. Press <Enter> again to continue the upgrade.

11. A red text box with a progress indicator will come up. Do not reboot until the progress bar is at 100%.

12. A *Successful* message appears; press <Enter> to continue.

13. Scroll down to *Exit Program*; press <Enter>.

14. You will be instructed to power-off the computer. Remove the floppy diskette and power-off the computer. Unplug the power cord(s).

15. Open the computer to access the RAID adapter and remove it. Locate the IOP mode select jumper (see the I2O Hardware Guide for the location of the jumper) on the RAID adapter and replace the jumper over pins 2 and 3. Reinstall the adapter to its previous slot.

16. Replace the computer cover, reconnect the power cord(s) and power-on the computer.

A.5   Verify IIR 5.x Firmware Version

After reverting back to the I2O/IIR version 5.x or earlier firmware, verify the firmware version matches the version recorded in Table 2. Follow the instructions described in Section 2.2.2 to validate the firmware version.

A.6   Recreate and Verify IIR version 5.x RAID Configuration

Recreate the RAID volumes documented in Table 2 and Table 3 via the RCU. Refer to the applicable I2O user manual for detailed instructions on using the RCU.

A.7 *Restore and Verify Data*

1. Restore the OS, if possible, and remount the OS volumes via the backup method used. If it is not possible to restore the OS, reinstall the OS and recreate the partitions and volumes as recorded in Table 4 .
2. Restore the data from the backup. Validate the data and verify functionality.

A.8 *Update IIR version 5.x Software Tools*

1. Uninstall the IIR version 6.x Software Suite if it is currently installed. Refer to the IIR 6.x Software Guide for details regarding the uninstall.
2. If necessary, reinstall the IIR version 5.x tools using your 5.x CD-ROM or floppy disk.

Appendix B: Example Record of Intel RAID software v5.x (or earlier) Configuration

Table 5 through Table 7 are example records of a RAID configuration using the RAID software v5.x (or earlier) on a Windows* 2000 system.

Table 5.   Original RAID Configuration

Current I2O Firmware Version:	v5.10.018				
RAID Volume / Host Drive					
RAID Volume Name	**RAID Volume Size (MB)**	**RAID Level**	**Number of Hard Drives**	**Write Cache Setting (Disabled/ Enabled)**	**Stripe Size (k)**
Volume1	3000	5	3	Disabled	64
Volume2	2000	0	1	Disabled	64

Table 6.   Physical Drive Configuration for each RAID Volume

RAID Volume Name	**Bus:SCSI ID (#:#)**	**Hard Drive Manufacturer**	**Hard Drive Model**	**Hard Drive Capacity (MB)**	**Capacity Used on Hard Drive (MB)**
Volume1	0:0	Seagate	ST34502LC	4291	1500
Volume1	0:1	IBM	DRVS09D	8678	1500
Volume1	0:2	Quantum	Atlas 10000	8678	1500
Volume2	0:3	IBM	DRVS09D	8678	2000

Table 7.   RAID Volume to OS Partition Relationship

RAID Volume Name	**OS Partition**	**Data**
Volume1	d:\	marketing files, financials
Volume2	e:\	support database