

Intel[®] Matrix Storage Manager Enables Intel® Matrix Storage Technology

User's Manual Revision 2.7 May 2006



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Revision History

Revision Number	Description	Revision Date
1.0	Initial Release	March 20, 2003
1.1	Added RAID 1 information	June 6, 2003
2.0	Added Intel® Matrix RAID Technology, AHCI/Native Command Queuing information	June 15, 2004
2.1	Updated screen captures	June 21, 2004
2.2	Updated ICH6R requirements and Option ROM updates	November 16, 2004
2.3	Updated Unattended Installation instructions to add AHCI instructions.	December 7, 2004
	Updated for ICH6M	
2.4	Removed incorrect RAID 0 restore information	January 10, 2005
	Updated AHCI information throughout	
	Added automatic F6 floppy instructions	
2.5	Updated User's Manual to include Intel® Matrix Storage Manager 5.0 feature set	May, 2005
2.6	Replaced list of chipsets that support AHCI with link to web site	January, 2006
2.6	Minor content revisions/inclusions	May, 2006
	Removed Serial ATA information and volume recovery information	

Conventions

The following conventions are used in this manual:

Note: Notes call attention to important information.



Caution: Cautions warn the user about how to prevent damage to hardware or loss of data.

1 Document Scope

This document discusses how to properly configure your system when using the Intel® Matrix Storage Manager.

The information in this document is only relevant on systems implementing an AHCI or RAID solution using a supported Intel chipset and a supported operating system.

- Supported Intel chipsets
 <u>http://support.intel.com/support/chipsets/imsm/sb/CS-020644.htm</u>
- Supported operating system <u>http://support.intel.com/support/chipsets/imsm/sb/CS-020648.htm</u>

Please note that the Intel® Matrix Storage Manager does NOT support Beta or pre-released versions of any Windows* operating systems.

The majority of the information in this document is related to either software configuration or hardware integration. Intel is not responsible for the software written by third party vendors or the implementation of Intel components in the products of third party manufacturers.

Customers should always contact the place of purchase or system/software manufacturer with support questions about their specific hardware or software configuration.

2 Intel® Matrix Storage Manager Feature Overview

The Intel® Matrix Storage Manager software package provides high-performance Serial ATA and Serial ATA RAID capabilities in Windows* XP, Windows 2000, Windows Server 2003, Windows XP x64 Edition, and Windows Server 2003 x64 Edition. It was previously known by the names "Intel® Application Accelerator RAID Edition" and "Intel® Application Accelerator 4.x".

The key features of the Intel® Matrix Storage Manager are as follows and are discussed in more detail in the following sections:

- RAID 0
- RAID 1
- RAID 5
- RAID 10
- Matrix RAID
- RAID migration
- Advanced Host Controller Interface support

2.1 RAID 0 (Striping)

RAID 0 uses the read/write capabilities of two or more hard drives working in unison to maximize the storage performance of a computer system.

Table 1 provides an overview of the advantages, the level of fault-tolerance provided, and the typical usage of RAID 0.

Hard Drives Required:	2-6
Advantage:	Highest transfer rates
Fault-tolerance:	None – if one disk fails all data will be lost
Application:	Typically used in desktops and workstations for maximum performance for temporary data and high I/O rate. 2-drive RAID 0 available in specific mobile configurations.

Table 1. RAID 0

Refer to the following web site for more information on RAID 0: http://support.intel.com/support/chipsets/iaa_raid/sb/CS-009337.htm

2.2 RAID 1 (Mirroring)

A RAID 1 array contains two hard drives where the data between the two is mirrored in real time to provide good data reliability in the case of a single disk failure; when one disk drive fails, all data is immediately available on the other without any impact to the integrity of the data.

Table 2 provides an overview of the advantages, the level of fault-tolerance provided, and the typical usage of RAID 1.

Hard Drives Required:	2
Advantage:	100% redundancy of data. One disk may fail, but data will continue to be accessible. A rebuild to a new disk is recommended to maintain data redundancy.
Fault-tolerance:	Excellent – disk mirroring means that all data on one disk is duplicated on another disk.
Application:	Typically used for smaller systems where capacity of one disk is sufficient and for any application(s) requiring very high availability. Available in specific mobile configurations.

Table 2: RAID 1

Refer to the following web site for more information on RAID 1: http://support.intel.com/support/chipsets/iaa_raid/sb/CS-009338.htm

2.3 RAID 5 (Striping with Parity)

A RAID 5 array contains three or more hard drives where the data and parity are striped across all the hard drives in the array. Parity is a mathematical method for recreating data that was lost from a single drive, which increases fault-tolerance.

Table 3 provides an overview of the advantages, the level of fault-tolerance provided, and the typical usage of RAID 5.

Hard Drives Required:	3-6
Advantage:	Higher percentage of usable capacity and high read performance as well as fault-tolerance.
Fault-tolerance:	Excellent - parity information allows data to be rebuilt after replacing a failed hard drive with a new drive.
Application:	Storage of large amounts of critical data. Not available in mobile configurations.

Table 3. RAID 5

Refer to the following web site for more information on RAID 5: http://support.intel.com/support/chipsets/imsm/sb/CS-020653.htm



2.4 RAID 10 (RAID 1+0)

A RAID 10 array uses four hard drives to create a combination of RAID levels 0 and 1. It is a striped set whose members are each a mirrored set.

Table 4 provides an overview of the advantages, the level of fault-tolerance provided, and the typical usage of RAID 10.

Hard Drives Required:	4
Advantage:	Combines the read performance of RAID 0 with the fault-tolerance of RAID 1.
Fault-tolerance:	Excellent – disk mirroring means that all data on one disk is duplicated on another disk.
Application:	High-performance applications requiring data protection, such as video editing. Not available in mobile configurations.

Table 4. RAID 10

Refer to the following web site for more information on RAID 10: http://support.intel.com/support/chipsets/imsm/sb/CS-020655.htm

2.5 Matrix RAID (Two Volumes Per Array)

Matrix RAID allows you to create two RAID volumes on a single RAID array.

As an example, on a systems with an Intel® 82801GR I/O controller hub (ICH7R), Intel® Matrix Storage Manager allows you to create both a RAID 0 volume as well as a RAID 5 volume across four Serial ATA hard drives. This is shown in Figure 5.



Figure 5. Matrix RAID

Refer to the following web site for more information on matrix RAID: <u>http://support.intel.com/support/chipsets/imsm/sb/CS-020681.htm</u>

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2.6 RAID Migration

The RAID migration feature enables a properly configured PC, known as a "RAID Ready" system, to be converted into a high-performance RAID 0, RAID 1, RAID 5, or RAID 10 configuration by adding one or more Serial ATA hard drives to the system and invoking the RAID migration process from within Windows*.

The RAID migration feature also allows the user to migrate data from a RAID 0, RAID 1, or RAID 10 volume to RAID 5 by adding any additional Serial ATA hard drives necessary and invoking the modify volume process from within Windows.

The following migrations are supported by Intel® Matrix Storage Manager:

Note that each migration is supported on specific platform configurations.

- "RAID Ready" to 2, 3, 4, 5 or 6-drive RAID 0
- "RAID Ready" to 2-drive RAID 1
- "RAID Ready" to 3, 4, 5 or 6-drive RAID 5
- "RAID Ready" to 4-drive RAID 10
- 2-drive RAID 0 to 3, 4, 5 or 6-drive RAID 5
- 3-drive RAID 0 to 4, 5, or 6-drive RAID 5
- 4-drive RAID 0 to 5 or 6-drive RAID 5
- 2-drive RAID 1 to 3, 4, 5 or 6-drive RAID 5
- 4-drive RAID 10 to 4, 5, or 6-drive RAID 5

The migrations do not require re-installation of the operating system. All applications and data remain intact.

See the following web site for more information on migrations and the platforms on which each migration is supported: <u>http://support.intel.com/support/chipsets/imsm/sb/CS-020674.htm</u>

2.7 Advanced Host Controller Interface (AHCI) Support

Advanced Host Controller Interface (AHCI) is an interface specification that allows the storage driver to enable advanced Serial ATA features such as Native Command Queuing and Native Hot Plug.

 Intel chipsets that support AHCI <u>http://support.intel.com/support/chipsets/imst/sb/CS-012304.htm</u>



2.7.1 Native Command Queuing

Native Command Queuing (NCQ) is a feature supported by AHCI that allows Serial ATA hard drives to accept more than one command at a time. NCQ, when used in conjunction with one or more hard drives that support NCQ, increases storage performance on random workloads by allowing the drive to internally optimize the order of commands.



Note: To take advantage of NCQ, you need the following:

- A chipset that supports AHCI
- Intel® Matrix Storage Manager
- One or more Serial ATA hard drives which support NCQ

2.7.2 Hot Plug

Hot plug, also referred to as hot swap, is a feature supported by AHCI that allows Serial ATA hard drives to be removed or inserted while the system is powered on and running. As an example, hot plug may be used to replace a failed hard drive that is in an externally-accessible drive enclosure.



Note: To take advantage of hot plug, you need the following:

- A chipset that supports AHCI
- Intel® Matrix Storage Manager
- Hot plug capability correctly enabled in the system BIOS by the OEM/motherboard manufacturer

3 Configuring the BIOS for RAID

To install the Intel® Matrix Storage Manager, the system BIOS must include the Intel® Matrix Storage Manager option ROM.

The Intel® Matrix Storage Manager option ROM is tied to the controller hub:

- Platforms based on the Intel® 82801GHM I/O controller hub (ICH7MDH) should use version 5.7 of the option ROM
- Platforms based on the Intel® 82801GR/GH I/O controller hub (ICH7R/ICH7DH) should use version 5.x, where x is between 1 and 6, of the option ROM
- Platforms based on the Intel® 82801FR I/O controller hub (ICH6R) should use version 4.x of the option ROM
- Platforms based on the Intel® 82801ER I/O controller hub (ICH5R) should use version 3.x of the option ROM

3.1 BIOS Settings

The RAID option must be enabled in the system BIOS before the system can load the Intel® Matrix Storage Manager option ROM.



Note: The instructions listed below are specific to motherboards manufactured by Intel with a supported Intel chipset. The specific BIOS settings on non-Intel manufactured motherboards may differ. Refer to the motherboard documentation or contact the motherboard manufacturer or your place of purchase for specific instructions. Always follow the instructions that are provided with your motherboard.

- 1. Enter the BIOS Setup program by pressing the <F2> key after the Power-On-Self-Test (POST) memory test begins.
- 2. Select the Advanced menu, then the Drive Configuration menu.
- 3. Switch the Drive Mode option from Legacy to Enhanced.
- 4. Enable Intel(R) RAID Technology.
- 5. Press <F10> to save the BIOS settings and exit the BIOS Setup program.



4 Intel® Matrix Storage Manager Option ROM

The Intel® Matrix Storage Manager option ROM is a PnP option ROM that provides a preoperating system user interface for RAID configurations. It also provides BIOS and DOS disk services (Int13h).

4.1 How to Enter the Option ROM User Interface

To enter the Intel® Matrix Storage Manager option ROM user interface, press the <Ctrl> and <i> keys simultaneously when the following message appears during the Power-On Self Test (POST):



Note: The 'Drive Model', 'Serial #', and 'Size' listed in your system can differ from the following example.

Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.				
RAID Volumes: None defined.				
Physical Disks: Port Drive Model Ø Maxtor 6Y060M0 1 Maxtor 6Y080M0 2 Maxtor 6Y200M0	Serial # Y2NGJ4FE Y2R1Z18E Y6ØMQ3RE	Size 57.3GB 76.3GB 189.9GB	Type/Status(Vol ID) Non-RAID Disk Non-RAID Disk Non-RAID Disk Non-RAID Disk	
Press <u>{CTRL-I></u> to ente	er Configuration Util	ity		

4.2 Option ROM Version Identification

To identify the specific version of the Intel® Matrix Storage Manager option ROM integrated into the system BIOS, enter the option ROM user interface. The version number is located in the top right corner with the following format: vX.Y.W.XXXX, where X and Y are the major and minor version numbers.

4.3 RAID Volume Actions

4.3.1 RAID Volume Creation

- 1. Select option *l Create RAID Volume* and press the <Enter> key.
- 2. Type in a volume name and press the <Enter> key, or simply press the <Enter> key to accept the default name.
- 3. Select the RAID level by scrolling through the available values (RAID 0, RAID 1, RAID 5, RAID 10) by using the $< \uparrow >$ or $< \downarrow >$ keys.
- 4. Press the <Enter> key after you have selected the desired RAID level.
- 5. Unless you have selected RAID 1, select the strip value for the RAID array by scrolling through the available values by using the <↑> or <↓> keys and pressing the <Enter> key. The available values range from 4 KB to 128 KB in power of 2 increments. The strip value should be chosen based on the planned drive usage. The default selection is 128 KB for RAID 0 and RAID 10 volumes, and 64KB for RAID 5 volumes.
- 6. Press <Enter> to select the physical disks. This will bring up another dialog.
- 7. Select the appropriate number of hard drives by scrolling through the list of available hard drives by using the $< \uparrow >$ or $< \downarrow >$ keys and pressing the <Space> key to select the drive. When you have finished selecting hard drives, press the <Enter> key.
- 8. Select the volume size.
- 9. At the Create Volume prompt, press the <Enter> key to create the volume. Confirm this selection by pressing the <Y> key after the prompt.
- 10. Scroll to option 4 Exit and press the <Enter> key to exit the RAID Configuration utility. Confirm the exit by pressing the <Y> key.
- *Note:* To change any of the information before the volume creation has been confirmed, you must exit the Create Volume process and restart it. Press the <Esc> key to exit the Create Volume process.

4.3.2 RAID Volume Creation Example



Note: The following procedure should only be used with a newly-built system or if you are reinstalling your operating system. The following procedure should not be used to migrate an existing system to RAID 0. If you wish to create matrix RAID volumes after the operating system software is loaded, they should be created using the Intel® Matrix Storage Console in Windows.

During the Power-On Self Test (POST), the following message will appear for a few seconds.

Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx Copyright(C) 2003-05 Intel Corporation. All Rights Reserved. RAID Volumes: None defined. Physical Disks: Port Drive Model Serial # Size Type/Status(Vol ID) 0 Maxtor 6V060M0 Y2NGJ4FE 57.3GB Non-RAID Disk 1 Maxtor 6V080M0 Y2RIZI8E 76.3GB Non-RAID Disk 2 Maxtor 6Y200M0 Y60MQ3RE 189.9GB Non-RAID Disk Press (GREEN) to enter Configuration Utility..

1. Press the <Ctrl> and <i> keys simultaneously, and the following window will appear:

Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.				
	<mark>1 -</mark> 2 - 3 - 4 -	Create RAID U Delete RAID U Reset Disks t Exit	<mark>Jolume</mark> Jolume Jo Non-RAID	,
Г	E DISK/	VOLUME INFORM	1ATION]	
RAID Volumes: None defined.				
Physical Disks: Port Drive Model Ø Maxtor 6Y060M0 1 Maxtor 6Y080M0 2 Maxtor 6Y200M0	Serial # Y2NGJ4FE Y2R1Z18E Y60MQ3RE		Size 57.3GB 76.3GB 189.9GB	Type/Status(Vol ID) Non-RAID Disk Non-RAID Disk Non-RAID Disk
[†↓]-Select	LES	Cl-Exit	LENTE	R]-Select Menu

2. Select option 1 'Create RAID Volume' and press the <Enter> key and the following window will appear:

in

Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
Name: UolumeØ RAID Level: RAIDØ(Stripe) Disks: Select Disks Strip Size: 128KB Capacity: 0.0 GB Create Volume
[HELP] Enter a string between 1 and 16 characters in length that can be used to uniquely identify the RAID volume. This name is case sensitive and can not contain special characters.
[†↓]Change [TAB]-Next [ESC]-Previous Menu [ENTER]-Select

3. Specify a RAID volume name and then press the <TAB> or <ENTER> key to advance to the next field:

Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
Name: RAID_VolumeØ RAID Level: RAID@(Stripe) Disks: Select Disks Strip Size: 128KB Capacity: Ø.Ø GB Create Volume
[HELP] Choose the RAID level best suited to your usage model. RAIDO - Data striped across multiple physical drives for performance. RAID1 - Data mirrored across multiple physical drives for redundancy.
RAID10 - Striped volume whose segments are RAID 1 volumes. Requires four hard drives. Functionally equivalent to RAID0+1. RAID5 - Data and parity striped across three or more physical drives for performance and redundancy.
[1] [1] [1] [1] [1] [1] [1] [1] [1] [1]

4. Specify the RAID level and then press the <TAB> or <ENTER> key to advance to the next field:



Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.	
Name: RAID_VolumeØ RAID Level: RAIDØ(Stripe) Disks: Select Disks Strip Size: 128KB Capacity: 0.0 GB Create Volume	
Press "ENTER" to select the physical disks to use.	
[1]JChange [TAB]-Next [ESC]-Previous Menu [ENTER]-Select	

5. Press the <Enter> key to select the physical disks to use and the following prompt will appear:

Intel(R) Applicatio Copyright(C) 2003-0 Nam RAID Leve	n Accelerator RAI 14 Intel Corporati 15 GREATE VOLUME M 10 RAIDØ(Stripe) 15 RAIDØ(Stripe)	D Option ROM v4.0.0.6074 on. All Rights Reserved. ENU]	
Port Drive Model 0 Maxtor 5T040H4 1 Maxtor 5T040H4	Serial # SN;0001 SN;0006	Size Status 38.1GB Non-RAID Dis 38.1GB Non-RAID Dis	s k
Select a minimum of Select the di [↑↓]-Previous/Next [two disks to use sks to use for cr SPACEJ-Selects [for creating the volume. eating the volume. ENTER]-Selection Complete:	
[†↓]Change [TAB]-	Next [ESC]-Previ	ous Menu [ENTER]-Select	

6. Select a minimum of two hard drives to use for creating the volume by using the [SPACE] bar to select. A green arrow will appear immediately to the left of the hard drives after they have been selected similar to the following:

Intel(R) Matrix St Copyright(C) 2003-0	orage Manager opt 5 Intel Corporati 1 ORFOTE HOLUME	tion ROM v5.0.0.1032 ICHx ion. All Rights Reserved.	
Nam RAID Leve	e: RAID_VolumeØ L: RAIDØ(Stripe) E: SELECT_DISKS		
Port Drive Model 9 Maxtor 6¥060M0 1 Maxtor 6¥080M0 2 Maxtor 6¥200M0	Serial # Y2NGJ4FE Y2R1Z18E <mark>Y60MQ3RE</mark>	Size Status 57.3GB Non-RAID Disk 76.3GB Non-RAID Disk 189.9GB Non-RAID Disk	
Select 2 to 4	disks to use in	creating the volume.	
	STHCE1-SELECTS	CENTERS Selection Complete	
[1] [1] [1] [1] [1] [1] [1] [1] [1] [1]	lext [ESC]-Previ	ious Menu [ENTER]-Select	

7. Press the <ENTER> key after your selection is complete. The window will be returned to the main menu:

(Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
	Name: RAID_VolumeØ RAID_Level: RAID@(Stripe) Disks: Select Disks Strip Size: 128KB Capacity: 171.8 GB Create Volume
	[HELP]
	The following are typical values: RAIDO - 128KB RAID10 - 64KB RAID5 - 64KB RAID5 - 64KB

- Select the strip size value for the RAID 0 array by scrolling through the available values by using the <↑> or <↓> keys and pressing the <Enter> key to select and advance to the next field.
 - The available values range from 4KB to 128 KB in power of 2 increments. The strip value should be chosen based on the planned drive usage. Some suggested selections for RAID 0 are listed below.
 - 16 KB Best for sequential transfers
 - 64 KB Good general purpose strip size
 - 128 KB Best performance for most desktops and workstations
- 9. Scroll down to 'Capacity', enter the volume capacity, and press <ENTER>. The default value indicates the maximum volume capacity using the selected disks. If less than the maximum volume capacity is chosen, creation of a second volume is needed to utilize the remaining space (i.e. a matrix RAID configuration).



Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
Name: VolumeØ RAID Level: RAIDØ(Stripe) Disks: Select Disks Strip Size: 128KB Capacity: 171.3 GB Create Volume
Enter the volume capacity. The default value indicates the maximum volume capacity using the selected disks. If less than the maximum capacity is chosen, creation of a second volume is needed to utilize the remaining space.
[†↓]Change [TAB]-Next [ESC]-Previous Menu [ENTER]-Select

10. Scroll down to 'Create Volume' and press the <ENTER> key to create the specified volume. The following prompt will appear:

Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
Name: RAID_Volume0 RAID Level: RAIDO(Stripe) Disks: Select Disks Strip Size: 128KB Capacity: 171.8 GB
WARNING: ALL DATA ON SELECTED DISKS WILL BE LOST. Are you sure you want to create this volume? (Y/N):
Press "ENTER" to Create the specified volume.
[1] [1] [1] [1] [1] [1] [1] [1] [1] [1]

11. Confirm this selection by pressing the <Y> key after the prompt. The window will be returned to the main menu with an updated status similar to the following:



Note: The disk/volume information listed for your system can differ from the following example.

	Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.						
	I MAIN MENU] I. Create RAID Volume 2. Delete RAID Volume 3. Reset Disks to Non-RAID 4. Exit						
		E DISK/VOLUM	E INFORMA	TION]			
RAID ID Ø	Volumes: Name RAID_Volume0	Level RAIDO(Stripe)	Strip 128KB	Size 171.8GB	Status Normal	Bootable Yes	
Phys Port Ø 1 2	ical Disks: Drive Model Maxtor 6Y060M0 Maxtor 6Y080M0 Maxtor 6Y200M0	Serial # Y2NGJ4FE Y2R1Z18E Y6ØMQ3RE		Size 57.3GB 76.3GB 189.9GB	Type/State Member Di: Member Di: Member Di:	us(Vol ID) sk(Ø) sk(Ø) sk(Ø)	
	[†↓]-Select	[ESC]-Ex:	it	LENTE	R]-Select	Menu	

12. Scroll to option 4 'Exit' and press the <Enter> key to exit the Intel® Matrix Storage Manager option ROM. The following prompt will appear:

Intel(R) Ma Copyright(C)	trix Storage Manager 2003-05 Intel Corpo I MAIN 1. Create 1 2. Delete 1 3. Reset D: 4. Exit	r option ROM v5.0.0.1032 ICHx pration. All Rights Reserved. RAID Volume AAID Volume isks to Non-RAID	
RAID Volumes: ID Nam Ø RAI Physical Powt Dwi	E DISK/VOLUME C CONFIRM Are you sure you war	EXIT J EXIT J Int to exit? (Y/N):	Bootable (es
Ø Maxtor 6Y060M0 1 Maxtor 6Y080M0 2 Maxtor 6Y200M0	Y2NGJ4FE Y2R1Z18E Y6ØMQ3RE	57.3GB Member Disk(76.3GB Member Disk(189.9GB Member Disk(
[↑↓]-Select	[ESC]-Exit	[ENTER]-Select Menu	l .

13. Confirm the exit by pressing $\langle Y \rangle$ key.



4.3.3 RAID Volume Deletion

Caution: All data on the RAID drives will be lost unless the volume that is selected is a RAID 1 volume.

- 1. Select option 2 Delete RAID Volume and press the <Enter> key to delete the RAID volume.
- 2. Use the up and down arrow keys to select the volume you would like to delete.
- 3. Press the <Delete> key to delete the RAID volume. Confirm the volume deletion by pressing the <Y> key.

4.3.4 RAID Volume Deletion Example

Caution: By performing this operation, all data on the RAID drives will be lost. If your system is currently booting to a RAID volume and you delete the RAID volume, your system will become unbootable.

1. Select option 2 'Delete RAID Volume' from the main menu window and press the <Enter> key to select a RAID volume for deletion. The following window will appear:

	Intel(R) Matr	ix Storage Manager	r option ROM	v5.0.0.1032	ICHx
	Copyright(C) 2	003-05 Intel Corpo	pration. All	Rights Rese	rved.
Name	Level	Stripe) 3	Capacity	Status	Bootable
RAID_Vol	umeð RAIDØ		171.8GB	Normal	<mark>Yes</mark>
De 1 WARNING :	eting a volume cause any memb EXISTING DAT	Will destroy the er disks to become A WITHIN THIS VOL	P]===== volume data e available a JME WILL BE L	on the drive s non-RAID d OST AND NON-	(s) and isks. RECOVERABLE.
	[1]Select	[<esc>]-Previous</esc>	Menu []-Delete Vol	ume

2. Select the volume and press the <Delete> key to delete the RAID volume and the following prompt will appear:

I	ntel(R) Matr	ix Storage Mana	ger option	n ROM v5	.0.0.1032	ICHx
Ca	pyright(C) 2	003-05 Intel Co	rporation	. All R	ights Rese	rved.
Name	Level	(Stripe) 3	es Caj	pacity	Status	Bootable
RAID_Volum	neØ RAIDØ		1'	71.8GB	Normal	Yes
	0L	=C DELETE VOLUM L DATA IN THE V	E VERIFIC	ATION]= L BE LOS	T	
Ar	e you sure y	ou want to dele	te volume	"RAID_V	olume0"? (Y∕N>:
Delet	ing a volume	will destroy t	he volume	data on	the drive	(s) and
ca	use any memb	er disks to bec	ome availa	able as	non-RAID d	isks.
WARNING:	EXISTING DAT	A WITHIN THIS U	OLUME WILA	L BE LOS	T AND NON-	RECOVERABLE.
	4110-14				D-1-4- 11-1	

3. Confirm the volume deletion by pressing the $\langle Y \rangle$ key.

4.3.5 Reset Disks to Non-RAID

Note: Possible reasons to 'Reset Disks to Non-RAID' could include issues such as incompatible RAID configurations, a failed volume or a failed member of a RAID 0 volume.

Caution: All data on the RAID drives and any internal RAID structures will be lost unless the drives are members of a RAID 1 volume. Resetting drives that are members of a RAID 1 volume to non-RAID will not result in the loss of data on those member drives.

- 1. Select option 3 'Reset Disks to Non-RAID' and press the <Enter> key to delete the RAID set and remove any RAID structures from the drives.
- 2. In the selection screen, use the <space> bar to select the drives you would like to reset. Press <Enter> after selecting the drives.
- 3. Confirm the selection by pressing the $\langle Y \rangle$ key.



4.3.6 Reset Disks to Non-RAID Example



Caution: By performing this operation, any internal RAID structures will be lost and all data on the RAID member hard drives unless they are members of a RAID 1 volume.

 Select option 3 'Reset Disks to Non-RAID' and press the <Enter> key to delete the RAID volume and remove any RAID structures from the drives and the following window will appear:

	Intel(R) Matrix St Copyright(C) 2003-4 Resetting RAID dat from the selected the drive will rev	orage Manager op 5 Intel Corporat 1. Create RAID I. RESET RAID D Ca will remove in RAID disks. By r vert back to a no	tion ROM v5.0.0.1032 ICHx ion. All Rights Reserved. Volume ATA J ternal RAID structures emoving these structures, n-RAID disk.	
RH ID Ø Ph Po Ø 1	WHRNING: Resetting a Port Drive Model 0 Maxtor 6¥060M0 1 Maxtor 6¥080M0 2 Maxtor 6¥200M0 Select f	disk causes all Serial # Y2NGJ4FE Y2R1Z18E Y6ØMQ3RE :he disks that sh	data on the disk to be lost. Size Status 57.3GB Member Disk 76.3GB Nember Disk 189.9GB Member Disk nould be reset.	e
	===[↑↓]-Previous/Next	[SPACE]-Selects	[ENTER]-Selection Complete===	
	[↑↓]-Select	[ESC]-Exit	[ENTER]-Select Menu	

2. Select the hard drives that should be reset by using the [SPACE] bar to select. A green arrow will appear immediately to the left of the hard drives after they have been selected similar to the following:

		C	Intel(R opyright) Matrix (t(C) 2003	Storage -05 Inte	Manager o 1 Corpora	ption tion.	ROM v5.0.0.10 All Rights R	32 ICH× eserved.	
						reate RAI	D Volu DATA	.me]		J
L	Resetting RAID data will remove internal RAID structures from the selected RAID disks. By removing these structures, the drive will revert back to a non-RAID disk.									
R	A D	WAR	NING: R		a disk c	auses all	data	on the disk t		е
Ø		Port	Drive Maxtor	Model 64060M0	Se ¥2	rial # NGJ4FE		Size Stat 57.3GB Memb	us er Disk	
	h D	1 2	Maxtor Maxtor	64080M0 64200M0	¥2 ¥6	R1Z18E ØMQ3RE		76.3GB Memb 189.9GB Memb	er Disk er Disk	
12				Select	the dis	ks that s	hould	be reset.		
	L	[†	1]-Prev	ious/Next	ESPACE]-Selects	[EN]	[ER]—Selection	Complete===	
╚			ALL 0-1	4	LE04	1.1.14			+ M	
		[1↓]-Sel e	ect	LESC]-Exit		[ENTER]-Sel	ect Menu	

- 3. Press the <ENTER> key to complete the selection.
- 4. Confirm the selection by pressing the <Y> key.



5

Loading the Intel® Matrix Storage Manager Driver During Operating System Installation

In order to install an operating system onto a RAID volume or onto a Serial ATA hard drive when in AHCI mode, the Intel® Matrix Storage Manager driver must be installed during operating system installation using the F6 installation method.

5.1 F6 Floppy Diskette Creation

To **automatically** create the F6 floppy diskette, download the latest Floppy Configuration Utility from the Intel download site: <u>http://downloadfinder.intel.com/scripts-</u> df/Product Filter.asp?ProductID=2101 and run the .EXE file.



Note: Use the instructions in the F6README.txt to determine whether the system contains a 32-bit or 64-bit processor. Use F6flpy32.exe on a 32-bit system. Use F6flpy64.exe on a 64-bit system.

To **manually** create an F6 floppy diskette that contains the files that are needed when installing the driver by the F6 installation method, complete the following steps:

- Download the Intel® Matrix Storage Manager (or use the CD shipped with your motherboard which contains the Intel® Matrix Storage Manager). The Intel® Matrix Storage Manager can be downloaded from the following website: http://downloadfinder.intel.com/scripts-df/Product Filter.asp?ProductID=2101
- 2. The following files need to be extracted from the compressed .CAB file (which is contained inside the Intel® Matrix Storage Manager .EXE package): IAAHCI.CAT, IAACHI.INF, IASTOR.CAT, IASTOR.INF, IASTOR.SYS, and TXTSETUP.OEM.
- 3. To extract these files, run 'C:\IATA5X_MULTI.EXE –A -A -P C:\path>' (as described in the 'Advanced Installation Instructions' section of the README.TXT.)
- 4. After these files have been extracted, copy the IAAHCI.CAT, IAACHI.INF, IASTOR.CAT, IASTOR.INF, IASTOR.SYS, and TXTSETUP.OEM. files to a floppy diskette. If the system has a 32-bit processor, copy the files found in the Drivers folder; if the system has a 64-bit processor, copy the files found in the Drivers64 folder. Note: These files should be placed in the root directory of the floppy.



Note: Any spaces in the pathname or filename require quotes around the pathname or filename. The switches do not require quotes. For example:

"C:\My Documents\setup.exe" -A -P

5.2 Installation Using F6 Installation Method

To install the Intel® Matrix Storage Manager driver using the F6 installation method, complete the following steps:

- 1. Press F6 at the beginning of Windows XP setup (during text-mode phase) when prompted in the status line with the 'Press F6 if you need to install a third party SCSI or RAID driver' message. Note: After pressing F6, nothing will happen immediately; setup will temporarily continue loading drivers and then you will be prompted with a screen to load support for mass storage device(s).
- 2. Press the 'S' key to 'Specify Additional Device'.
- 3. You will be prompted to 'Please insert the disk labeled Manufacturer-supplied hardware support disk into Drive A:' After you see the prompt, insert the floppy disk containing the following files: IAAHCI.CAT, IAACHI.INF, IASTOR.CAT, IASTOR.INF, IASTOR.SYS, and TXTSETUP.OEM. and press ENTER.



Note: See Section 14.1 titled 'Instructions on Creating F6 Floppy Diskette' for instructions on how to extract these files from the Intel® Matrix Storage Manager Setup.exe file.

- 4. After pressing ENTER, you should be shown a list of controllers that includes your particular RAID or AHCI controller. Select the entry that corresponds to your BIOS setup and press ENTER. Note: Only four selections may appear in the list; use the up or down arrow keys to see additional options.
- 5. The next screen should confirm the selected RAID or AHCI controller. Press ENTER again to continue.
- 6. At this point, you have successfully F6 installed the Intel® Matrix Storage Manager driver and Windows XP setup should continue. Leave the floppy disk in the floppy drive until the system reboots itself because Windows setup will need to copy the files again from the floppy to the Windows installation folders. After Windows setup has copied these files again, remove the floppy diskette so that Windows setup can reboot as needed.



6 Intel® Matrix Storage Manager Installation

After installing an operating system onto a RAID volume or on a Serial ATA hard drive when in RAID or AHCI mode, the Intel® Matrix Storage Manager can be loaded from within Windows. This installs the user interface (i.e. Intel® Matrix Storage Console), the tray icon service, and the monitor service onto the system, allowing you to monitor the health of your RAID volume and/or hard drives. This is not required; however, it is recommended.

This method can also be used to upgrade to a newer version of the Intel® Matrix Storage Manager.

6.1 Installation Caution

Caution: The Intel® Matrix Storage Manager driver may be used to operate the hard drive from which the system is booting or a hard drive that contains important data. For this reason, you cannot remove or un-install this driver from the system; however, you will have the ability to un-install all other non-driver components.

The following non-driver components can be un-installed:

- Intel® Matrix Storage Console
- Help documentation
- Start Menu shortcuts
- System tray icon service
- RAID monitor service

6.2 Where to Obtain Intel® Matrix Storage Manager

If a CD-ROM was included with your motherboard or system, it should include the Intel® Matrix Storage Manager.

The Intel® Matrix Storage Manager can also be downloaded from the following Intel website: <u>http://downloadfinder.intel.com/scripts-df/Product_Filter.asp?ProductID=2101</u>

6.3 Installation

Once the Intel® Matrix Storage Manager has been obtained, identify the location of the file on your hard drive. Then, run the file(e.g. iata5x_enu.exe or iata5x_cd.exe) by double-clicking on the file name; this will launch the installation program.



Note: The instructions below assume that the Intel® Matrix Storage Manager option ROM and BIOS have been configured correctly and the RAID driver has been installed using the F6 installation method.

6.3.1 Installation Steps

After you click on the .EXE file, installation will begin and the following screen will temporarily appear:

InstallS	nield Wizard	
	Intel(R) Matrix Storage Manager Setup is preparing the InstallShield® Wizard, which will guide you through the rest of the setup process. Please wait.	
		Cancel
		<u></u>



6.3.2 Installation: Welcome Screen

Click on the 'Next' button after the following welcome window appears:



6.3.3 Installation: Uninstall Warning

Carefully read through the uninstall warning in the following window and then click on the 'Next' button:

Intel(R) Matrix Storage Manager Setup	
Warning! Please read the following information:	
The driver about to be installed may be used to operate the hard drive from which system is booting or a hard drive that contains important data. For this reason, you cannot remove or un-install this driver from the system after installation; however, you will have the ability to un-install all other non-driver components. The following non-driver components can be un-installed: Intel(R) Matrix Storage Console Help Documentation Start Menu Shortcuts System Tray Icon Service Event Monitor Service	the
InstallShield	Cancel



6.3.4 Installation: License Agreement

Carefully read through the uninstall warning in the following window and then click on the 'Next' button:

Intel(R) Matrix Storage Manager Setup	×		
License Agreement Please read the following license agreement carefully.			
Press the PAGE DOWN key to see the rest of the agreement.			
INTEL SOFTWARE LICENSE AGREEMENT (OEM / IHV / ISV Distribution & Single User) IMPORTANT - READ BEFORE COPYING, INSTALLING OR USING. Do not use or load this software and any associated materials (collectively, the "Software") until you have carefully read the following terms and conditions. By loading or using the Software, you agree to the terms of this Agreement. If you do not wish to so agree, do not install or use the Software. Please Also Note:			
Do you accept all the terms of the preceding License Agreement? If you choose No, the setup will close. To install Intel(R) Matrix Storage Manager, you must accept this agreement.			
< <u>B</u> ack <u>Y</u> es <u>N</u> o			

6.3.5 Installation: Choose Destination Location

Select the folder in the following window where you would like Setup to install the files and then click on the 'Next' button:

Intel(R) Matrix Storage Manager Setup	
Choose Destination Location Select folder where Setup will install files.	
Setup will install Intel(R) Matrix Storage Manager in the following folder.	
To install to this folder, click Next. To install to a different folder, click Browse and selec another folder.	st
Destination Folder	
H:\Program Files\Intel\Intel Matrix Storage Manager Brows	e
InstallShield	
< <u>B</u> ack (<u>Next</u> >) (Cancel

intel



6.3.6 Installation: Select Program Folder

Select a program folder in the following window where you would like Setup to add the program icons:

Intel(R) Matrix Storage Manager Setup	×
Select Program Folder Please select a program folder.	
Setup will add program icons to the Program Folder listed below. You may type a new folder name, or select one from the existing folders list. Click Next to continue. <u>P</u> rogram Folders:	
Intel(R) Matrix Storage Manager Existing Folders:	
Administrative Tools Games Intel(R) Matrix Storage Manager	
Statup	
InstallShield	1
< <u>B</u> ack <u>N</u> ext > Lancel	

int_{el}.

6.3.7 Installation: Setup Status

The status of the Intel® Matrix Storage Manager Setup will then appear in the following window:

Intel(R) Matrix Storage Manager Setup	
Setup Status	
Intel(F) Matrix Storage Manager Setup is performing the requested operations.	
Installing:	
95%	
last-IIC bield	
Install5hield	Cancel



6.3.8 Installation: InstallShield* Wizard Complete

After installation is complete, the following window will appear. Select 'Finish':

Intel(R) Matrix Storage Manager Setup		
	InstallShield(R) Wizard Complete The InstallShield(R) Wizard has successfully installed Intel(R) Matrix Storage Manager. Before you can use the program, you must restart your computer. Yes, I want to restart my computer now. No, I will restart my computer later. Remove any disks from their drives, and then click Finish to complete setup.	
	< <u>B</u> ack Finish Cancel	

6.4 Confirming Installation of Intel® Matrix Storage Manager

To confirm that the Intel® Matrix Storage Manager has been installed, complete the following steps:

- Click on Start Button / All Programs
- Find the 'Intel® Matrix Storage Manager' program group
- Select the 'Intel® Matrix Storage Console' shortcut
- The Intel® Matrix Storage Console should be shown

If installation was done by have-disk, F6, or an unattended installation method, you can confirm that the Intel® Matrix Storage Manager has been loaded by completing the following steps:



Note: The following instructions assume classic mode in Windows* XP:

• Click on Start Button / Control Panel

- Double-click on the 'System' icon
- Select the 'Hardware' tab
- Select 'Device Manager' button
- Expand the 'SCSI and RAID Controllers' entry
- Right-click on the 'Intel(R) 82801GR/GH SATA RAID Controller'
- Select the 'Driver' tab
- Select the 'Driver Details' button
- The iaStor.sys file should be listed, as in the following example



6.5 Identifying Version of Intel® Matrix Storage Manager Installed

There are two ways to determine which version of the Intel® Matrix Storage Manager is installed:

- Use the Intel® Matrix Storage Console
- Locate the RAID driver (iaStor.sys) file and view the file properties

6.5.1 Using the Intel® Matrix Storage Console:

- Run the Intel® Matrix Storage Console from the following Start Menu path:
 - Windows XP: Start → All Programs → Intel® Matrix Storage Manager → Intel® Matrix Storage Console
 - Windows 2000: Start → Programs → Intel® Matrix Storage Manager → Intel® Matrix Storage Console
- Click the 'Device Information' tab
- •Single left-mouse click on the 'Intel(R) 82801GR/GH SATA RAID Controller' item in the Devices tree



- Note: the specific Intel SATA RAID Controller depends on your system, but will be in the format "82801xR"
- Look for a parameter in the Parameters list box titled 'Driver Version'. The version number should be listed in the following format:
 5.x.x.xxxx

6.5.2 RAID Driver File Properties:

- Locate the file "iaStor.sys" in the following path:
 <System Root>\Windows\System32\Drivers
- Single right-mouse click on "iaStor.sys" and select 'Properties'
- Select the 'Version' tab
- A parameter called "File version" should be located at the top of this tab's view. Next to it will be the RAID driver version. The version number should be listed in the following format:

— 5.x.x.xxx

7 "RAID Ready"

A "RAID Ready" system is a specific system configuration that enables a seamless migration from a single non-RAID disk drive to a RAID 0, RAID 1, RAID 5, or RAID 10 array. The Intel® Matrix Storage Manager offers the flexibility to upgrade from a single Serial ATA (SATA) hard drive to a RAID 0, RAID 1, RAID 5, or RAID 10 configuration when one or more SATA hard drives are added to the system. This process will create a new RAID volume from an existing disk.

7.1 "RAID Ready" System Requirements

In order for a system to be considered "RAID Ready", it must meet all of the following requirements:

- 1. System must contain a supported Intel chipset and one Serial ATA (SATA) hard drive
- 2. RAID controller must be enabled in the BIOS
- 3. Motherboard BIOS must include the Intel® Matrix Storage Manager option ROM
- 4. Intel® Matrix Storage Manager must be loaded

7.2 Steps to Set Up a "RAID Ready" System

To set up a "RAID Ready" system, complete the following steps:

- Note: The system must meet all the "RAID Ready" system requirements specified in Section 8.1.
 - 1. Install Intel® Matrix Storage Manager driver during operating system installation or preinstall the driver on a SATA hard drive (configured as non-RAID disk – also known as RAID Ready Mode)
 - 2. Install Intel® Matrix Storage Manager driver from within the operating system to add Start Menu links and the Intel® Matrix Storage Console

7.3 Converting "RAID Ready" System into RAID System Using the Migration Feature

7.3.1 Converting "RAID Ready" System into RAID 0 or RAID 1 System With Two Hard Drives



Note: The steps listed in this section assume that the operating system has been installed on an existing Serial ATA hard drive and the required driver was installed during the operating system setup.



Caution: This operation will delete all existing data from the additional hard drive or drives and the data cannot be recovered. It is critical to backup all important data on the additional drives before proceeding. The data on the source hard drive, however, will be preserved.

To turn a RAID Ready system into a RAID 0 or RAID 1 system using two hard drives, complete the following steps:

- 1. Physically add an additional Serial ATA hard drive to the system
- 2. Boot to Windows* and install the Intel® Matrix Storage Manager (if needed)
- 3. Open the Intel® Matrix Storage Console (Start/All Programs/Intel® Matrix Storage Manager/Intel® Matrix Storage Console)
- 4. The Intel® Matrix Storage Console user interface should look as follows:

🍁 Intel(R) Matrix	Storage Console		
<u>F</u> ile ⊻iew <u>H</u> elp			
int _e l.	<i>Wiew hard drive and RAID status</i> Protect data from a hard drive failure with RAID 1 Improve storage performance with RAID 0	View hard drive and RAID status All hard drives are OK. Detail: System functioning normally. Protect data from a hard drive failure with RAI Improve storage performance with RAID 0	D 1

- *Note:* If the user interface does not look similar to the view displayed above, switch to the Basic mode by clicking on the 'View' menu, then selecting 'Basic mode'.
 - 5. Click on the 'Protect data from a hard drive failure with RAID 1' or 'Improve storage performance with RAID 0' icon in the right-hand pane to create a RAID volume.
 - 6. Click on the 'Create a RAID x volume' icon to begin the migration process. In the following example, RAID 1 was selected.

🍁 Intel(R) Matrix	Storage Console	
<u>F</u> ile ⊻iew <u>H</u> elp		
int _e l.	 	Protect data from a hard drive failure with RAID 1 Image: Configure your hard drives as RAID 1 to increase user file protection. Hard drive capacity will be reduced. Image: Configure your hard drives as RAID 1 to increase user file protection. Hard drive capacity will be reduced. Image: Configure your hard drives as RAID 1 to increase user file protection. Hard drive capacity will be reduced. Image: Configure your hard drives will be lost. Image: Configure your hard drives will be lost. Image: Configure your hard drives will be lost. Image: Configure your hard drives your hard drives your hard drives your hard drives. RAID 1 duplicates user file across multiple hard drives, increasing data protection.

7. Click 'yes' to confirm.

Intel(R) Matrix Storage Console
Are you sure you want to create a RAID 1 volume?

8. The tray icon will indicate that the migration is in progress.





9. While the migration is in progress, the status of the user interface will appear as follows:



10. A progress dialog will display the status of the migration as a percentage complete, as shown in the following dialog:

6% of Volume_0000 Migration Completed	
Migration is in progress. To reopen this dialog at any point during the migration, right-click on the migrating volume while in the Advanced Mode of the Intel(R) Matrix Storage Console and select Show Migration Progress.	
6% Complete - Time Remaining: 2 hr 16 min	54 sec

- 11. When the migration is complete, reboot the system.
- 12. Optional: Use 3rd party application or Windows* to create and format a new data partition on unused space, if any (see Note below)

7.3.2 Converting "RAID Ready" System into RAID System With Three or Four Hard Drives

To turn a RAID Ready system into a RAID 0, RAID 5, or RAID 10 system using three or four hard drives, complete the following steps:

- 1. Physically add two or more additional Serial ATA hard drives to the system
- 2. Boot to Windows* and install the Intel® Matrix Storage Manager (if needed)

- 3. Open the Intel® Matrix Storage Console (Start/All Programs/Intel® Matrix Storage Manager/Intel® Matrix Storage Console)
- 4. Switch to the Advanced mode (View menu, Advanced Mode) as demonstrated in the following dialog:





Note: The user interface should look similar to the following example:



5. Perform a 'Create RAID Volume from Existing Hard Drive' migration (right-mouse click on 'RAID Volumes' entry in the device tree or select option under 'Actions' file menu). The menu option is shown in the following image:







6. Click on the 'Next' button after the following welcome screen appears:

7. A desired RAID volume name should be typed in where the 'Volume_0000' text currently appears below. The RAID volume name must also be in English alphanumeric ASCII characters and has a maximum limit of 16 characters.

Create RAID Volume from Existing Hard Drive Wizard	×
Configure Volume You can configure the new RAID volume by entering a name and by selecting the RAID level and strip size below.	
Volume Name Volume_0000 The name is limited to 16 English alpha-numeric characters.	
RAID Level	
Strip Size	
< <u>B</u> ack <u>N</u> ext > Cancel	



8. Select a RAID level. If there are not enough hard drives in the system to create the selected RAID level, an error dialog will appear when the 'Next' button is selected and a new RAID level will need to be selected (or additional hard drives will need to be added to the system). In the following example, RAID 10 was selected.

Create RAID Volume from Existing Hard Drive Wizard	×
Configure Volume You can configure the new RAID volume by entering a name and by selecting the RAID level and strip size below.	
Volume Name	
RAID 10	
The name is limited to 16 English alpha-numeric characters.	
RAID Level	
RAID 10	
Strip Size	
128 KB	
< <u>B</u> ack <u>N</u> ext > Cancel	

9. Select the desired strip size setting. As indicated, the default setting for RAID 10 is 128KB. The default setting for RAID 0 is also 128KB. The default setting for RAID 5 is 64KB. Even though the default setting is the recommended setting for most users, you should choose the strip size value that is best suited to your specific RAID usage model. Additional details on the most typical strip size settings are listed in Section 17.3.4 titled 'Strip Size Descriptions'.

Create RAID Volume from Existing Hard Drive Wizard	×
Configure Volume You can configure the new RAID volume by entering a name and by selecting the RAID level and strip size below.	
Volume Name	
RAID 10	
The name is limited to 16 English alpha-numeric characters.	
RAID Level	
RAID 10	
Strip Size	
< <u>B</u> ack <u>N</u> ext > Cancel	

- 10. Select 'Next' after choosing a strip size
- 11. In the left-hand 'Available' window, select the source hard drive and then click 'Next'. The source hard drive can be selected either by double-clicking on the hard drive, or by single-clicking on the hard drive and then selecting the right arrow key. The data on the hard drive you select will be preserved and migrated across to a new RAID volume.



Caution: It is very important to note which disk is the source disk (the one containing all of the information to be migrated). On a RAID Ready system, this can be determined by making a note during POST of which port (e.g. Port 0 or Port 1) the single disk is attached to. You can also use the Intel® Matrix Storage Manager before the additional disks are installed to verify the port and serial number of the drive that contains the data.

Create RAID Volume from Existing Hard Drive Wizard			
Select Source Hard Drive The data on the hard drive you select will be preserved and migrated across a new RAID volume.			
Available Port 0: ST3120026AS - Serial# 3JT Port 1: ST3120026AS - Serial# 5MS Port 2: ST380013AS - Serial# 3JV88 Port 3: WDC WD1600JD-32HBB0 -	Selected		
	< <u>B</u> ack <u>N</u> ext > Cancel		

12. Select the member hard drives from the hard drives listed in the left-hand 'Available' window and then click 'Next'. If fewer hard drives are selected than are required for the RAID level, an error dialog will appear when the 'Next' button is clicked. Once the new RAID volume is created, it will span the source hard drive as well as any member hard drive(s):



Caution: CRITICAL WARNING: Existing data on the selected hard drive(s) will be permanently deleted. Back up all important data before continuing.

int_{el},

Create RAID Volume from Existing Hard Drive Wizard	\mathbf{X}		
Select Member Hard Drive(s) Once the new RAID volume is created, it will span the source hard drive as well as 3 member hard drive(s).			
Available Selected Port 1: ST3120026AS · Serial# 3JV88 Image: Selected Port 2: ST380013AS · Serial# 3JV88 Image: Selected Port 3: WDC WD1600JD-32HBB0 · Image: Selected Image: Selected Image: Selected			
K Back Next > Cancel			



13. Use the fields or the slider bar to specify the amount of available array space to be used by the new RAID volume and then click 'Next':

Create RAID Volume from Existing Hard Drive Wizard		
Specify Volume Size Use the fields or the slider below to specify the amount of available array space to be used by the new RAID volume.		
Maximum Volume Size (GB):	223.6	
Minimum Volume Size (GB):	111.8	
Percentage of Available Space:	100	
Volume Size (GB):	223.6	
The minimum required size for the RAID volun you create a volume that uses less than 100% RAID volume to use the remaining space.	ne is determined by the size of the source hard drive. If S of the hard drive space, you may create a second	
	< <u>B</u> ack <u>N</u> ext > Cancel	



The migration process may take up to several hours to complete depending on the size of the disks being used and the strip size selected. While you can still continue using your computer during the migration process, after the migration process starts, it cannot be stopped. If the migration process gets interrupted and your system is rebooted for any reason, it will pick up the migration process where it left off.



14. Select 'Finish' to begin migrating data to the new volume:

- 15. After the migration is complete, reboot the system
- 16. Optional: Use 3rd party application or Windows* to create and format a new data partition on unused space, if any (see Note below)



te: To ensure that non-Windows* partitions are kept intact, the migration to a RAID volume does not utilize the extra space made available by adding the additional hard drive(s). To take advantage of the extra hard drive space you will need to do one of the following:

- Create a new partition using Windows Disk Management (See Section 17.3.3 for instructions)
- or
- Extend the partition to fill the rest of the available space. Windows does not natively include tools to do this, but there are 3rd party software utilities to accomplish this such as PartitionMagic* or Partition Commander*.

7.3.3 Creating a New Partition Using Windows* Disk Management

To create a new partition using Windows* Disk Management, complete the following steps:



1. Complete one of the following tasks, then proceed with the remaining steps:

a) Right-mouse click 'My Computer', select 'Manage'. In the Computer Management program window, left-mouse click 'Disk Management' in the program tree on the left (located under 'Storage' subsection).

or

b) Within the Control Panel (Start/Control Panel), double-click 'Administrative Tools'. In the window that appears, double-click 'Computer Management'. In the Computer Management program window, left-mouse click 'Disk Management' in the program tree on the left (located under 'Storage' subsection).

- 2. Maximize the Computer Management program window for easier viewing.
- 3. In the Computer Management program window, you should see your RAID volume represented as a physical disk. Notice that the RAID volume size is the size of the Serial ATA disks combined. At this point, you should see the partitions within the RAID volume that were originally on the single disk you used as your source. After the partitions, you should see a gray area labeled 'Free Space'. This area must be partitioned and formatted before it may be used.

7.3.4 Strip Size Descriptions

Strip Size Settings	Descriptions
4KB	For specialized usage models requiring 4KB strips
8KB	For specialized usage models requiring 8KB strips
16KB	Best for sequential transfers
32KB	Good for sequential transfers
64KB	Good general purpose strip size
128KB	Best performance for RAID 0 or RAID 10 for most desktops and workstations

"RAID Ready"

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8 Uninstalling the Intel® Matrix Storage Manager

8.1 Uninstall Warning

Caution: CRITICAL WARNING: Removing the Intel® Matrix Storage Manager from a system that has been configured as RAID will DELETE ALL EXISTING DATA from the RAID-controlled hard drive(s) and the data cannot be recovered. It is critical that you backup all important data before proceeding.

Uninstalling the Intel® Matrix Storage Manager would render all data on any existing RAID volumes inaccessible and therefore it cannot be automatically uninstalled. It is recommended that any RAID volume be deleted before disabling the Intel® 82801GR/GH SATA RAID Controller. Disabling the Intel® 82801GR/GH SATA RAID Controller would re-enable the SATA controller and the operating system would no longer use the Intel® Matrix Storage Manager driver.

For instructions on how to manually uninstall the Intel® Matrix Storage Manager, please refer to Section 8.2 titled 'Uninstallation on Windows* XP'.

8.2 Uninstallation on Windows* XP

To manually uninstall the Intel® Matrix Storage Manager from your system, complete the following steps:

Caution: CRITICAL WARNING: All the data on the RAID-controlled hard drive(s) will be DELETED and will not be accessible after completing these steps. Backup all important data before proceeding.

- 1. Reboot the system
- 2. Depending on your system configuration, complete one of the following set of tasks:

If the system has the Intel® Matrix Storage Manager option ROM installed, follow the steps listed in section 4.3.3 to delete any RAID volumes

or

If the system does not have the Intel® Matrix Storage Manager option ROM installed:

a. Enter the system BIOS Setup (usually done by pressing a key such as 'F2' or 'Delete' during boot-up)

b. Change the IDE configuration for the AHCI-controlled hard drive(s) from 'AHCI' to 'IDE' or disable AHCI Technology



- 3. Delete any partitions on the hard drives that were previously connected to the AHCI controller
- 4. Reinstall the operating system



Note: If you experience any difficulties making these changes to the system BIOS, please contact the motherboard manufacturer or your place of purchase for assistance.



9 Unattended Installation Under Windows* XP

To install the Intel® Matrix Storage Manager as outlined in the Microsoft* document "Deployment Guide Automating Windows NT Setup," use the supplied TXTSETUP.OEM file included in the application package and insert the lines below into the UNATTEND.TXT file. This method is available for Windows* XP.

First, determine if your system contains a 32-bit or 64-bit processor.

Then, extract the IAAHCI.CAT, IAACHI.INF, IASTOR.CAT, IASTOR.INF, IASTOR.SYS, and TXTSETUP.OEM files from the compressed .CAB file. To extract these files, run 'C:\IATA5X.EXE -A -A -PC:\path>' as described in the 'Advanced Installation Instructions' section of the README.TXT. If the system has a 32-bit processor, the files will be located in the Drivers folder; if the system has a 64-bit processor, the files will be located in the Drivers64 folder.

Note: This same procedure can be used for systems with the following controller hubs by replacing the text within the quotation marks:

- Intel® 82801ER SATA RAID Controller
- Intel® 6300ESB SATA RAID Controller
- Intel® 82801FR SATA RAID Controller
- Intel® 82801FR SATA AHCI Controller
- Intel® 82801FBM SATA AHCI Controller
- Intel® 82801GBM SATA AHCI Controller
- Intel® 82801GHM SATA RAID Controller
- Intel® 631xESB/632xESB SATA RAID Controller
- Intel® 631xESB/632xESB SATA AHCI Controller

Systems Configured for RAID Mode:

// Insert the lines below into the UNATTEND.TXT file

[MassStorageDrivers]

"Intel(R) 82801GR/GH SATA RAID Controller" = OEM

[OEMBootFiles] iaStor.inf iaStor.sys

iaStor.cat Txtsetup.oem

Systems Configured for AHCI Mode:

// Insert the lines below into the UNATTEND.TXT file

[MassStorageDrivers]

"Intel(R) 82801GR/GH SATA AHCI Controller" = OEM

[OEMBootFiles] iaAhci.inf iaStor.sys iaAhci.cat Txtsetup.oem

Place iaAhci.cat, iaAhci.inf, iaStor.cat, iaStor.inf, iaStor.sys, and Txtsetup.oem in the following folder:

<SystemRoot>:\i386\\$OEM\$\Textmode

10 Intel® Matrix Storage Console

10.1 Description

The Intel® Matrix Storage Console is a Windows*-based application that provides management capabilities and detailed status information for storage devices and RAID arrays.

10.2 User Interface Modes

The Intel® Matrix Storage Console provides device information using one of two views: Basic and Advanced.

Basic mode displays the status of the hard drives and an illustration of the current RAID volume. This mode is visual and uses animations to communicate the current status and any user actions. Basic mode is the default view of the user interface.

Advanced mode displays a combination of logical and physical views of the hard drives and any supported RAID volumes that may be present. The logical view provides details on the arrays and volumes in the RAID configuration. The physical view provides details on the hard drives and how they are connected to each other.

The user can switch between the Basic and Advanced modes by selecting the appropriate option in the View menu. If the user is in Basic mode, they can also click on the **Switch to Advanced Mode view** button if it is present.

10.3 Create RAID Volume

The Intel® Matrix Storage Manager offers the ability to create a RAID volume. This option should be used if you are using a third bootable device such as an IDE or SCSI hard drive – in addition to using two or more Serial ATA hard drives. One benefit of using a third bootable device and creating a RAID volume is that the operating system is not located on the RAID volume. Should something happen to the RAID volume, the operating system should not be impacted.

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Note: The 'Create RAID Volume' option is not selectable unless a third bootable device (such as an IDE or SCSI hard drive) is installed in the system – in addition to using two or more Serial ATA hard drives.

To create a RAID volume, click on 'Actions' in the Intel® Matrix Storage Console file menu and then select 'Create RAID Volume' as illustrated below:

💠 Intel(R) Matrix Storage Console					
File	View	Actions	ns Help		
Create RAID Volume					
		Creat	Create RAID Volume from Existing Hard Drive AID Controller		
	Rescan for Plug and Play Devices				
H	□ ST3120026AS			-	
			000		
	WDC WD1600UD-32HBB0				



Note: The 'Actions' menu will only be present in Advanced mode. If the 'Actions' menu is not present, switch to Advanced mode using the View menu, or click on the 'Switch to Advanced mode view' button if it is present. The following image provides an example:

🍁 Intel(R) Matrix	Storage Console		
<u>F</u> ile ⊻iew <u>H</u> elp			
	View hard drive and RAID status		
int _e l.		View hard drive and RAID status All hard drives are OK.	
		Detail: System functioning normally. Switch to Advanced Mode view	

10.3.1 Create RAID Volume Wizard

Click on the 'Next' button after the following welcome window appears:



Caution: CRITICAL WARNING: Creating an initial RAID volume will permanently delete existing data on the selected hard drives or array. Back up all important data before continuing. To preserve the



existing data on a hard drive, use the 'Create RAID Volume from Existing Hard Drive' action instead.



10.3.2 Configure Volume

Select the RAID volume name, RAID level, and strip size and then click 'Next':

RAID Volume Name:

A desired RAID volume name needs to be typed in where the 'RAID 5' text currently appears above. The RAID volume name has a maximum limit of 16 characters. The RAID volume name must also be in English alphanumeric ASCII characters.

Create RAID Volume Wizard	×
Configure Volume You can configure the new RAID volume by entering a name and by selecting the RAID level and strip size below.	
Volume Name RAID 5 The name is limited to 16 English alpha-numeric characters.	
RAID Level	
RAID 0	
Strip Size	
128 KB	
< <u>B</u> ack <u>N</u> ext > Cancel	



RAID Level:

Select the desired RAID level. In this example, RAID 5 was selected.

Create RAID Volume Wizard	×
Configure Volume You can configure the new RAID volume by entering a name and by selecting the RAID level and strip size below.	
Volume Name RAID 5 The name is limited to 16 English alpha-numeric characters.	
RAID Level RAID 0 RAID 0 RAID 1 RAID 1 RAID 10 RAID 5	
< <u>B</u> ack <u>N</u> ext > Cancel	

Strip Sizes:

Select the desired strip size setting. As indicated, the default setting for RAID 5 is 64KB. The default setting for RAID 0 and RAID 10 is 128KB. Even though the default setting is the recommended setting for most users, you should choose the strip size value which is best suited to your specific RAID usage model. Additional details on the most typical strip size settings are listed in Section 17.3.4 titled 'Strip Size Descriptions'.

Create RAID Volume Wizard	×
Configure Volume You can configure the new RAID volume by entering a name and by selecting the RAID level and strip size below.	
Volume Name	
RAID 5	
The name is limited to 16 English alpha-numeric characters.	
RAID Level	
RAID 5	
Strip Size	
64 KB	
< <u>B</u> ack <u>N</u> ext > Cancel	

10.3.3 Select Volume Location

In the left-hand 'Available' window, specify the location for the new RAID volume by selecting 2, 3, or 4 hard drives or an array and then click 'Next':

Caution: CRITICAL WARNING: Selecting hard drives will permanently delete the data on the hard drives. Back up all important data before continuing. Selecting an existing array will preserve any volume(s) on the array.

Create RAID Volume Wizard			
Select Volume Location Specify the location for the new RAID volume by selecting 3 to 4 hard drives or an array below.			
Available Port 0: ST3120026AS - Serial# 3JT? *	Selected Port 1: ST3120026AS - Serial# 5MS Port 2: ST380013AS - Serial# 3JV88 Port 3: WDC WD1600JD-32HBB0 -		
WARNING: Selecting hard drives will permanently delete important data before continuing. Selecting an existing array will preserve any volume(s) on	the data on the hard drives. Back up all the array. Back Next > Cancel		

10.3.4 Specify Volume Size

Use the fields or slider bar to specify the amount of available array space to be used by the new RAID volume and then click 'Next':

Create RAID Volume Wizard		×
Specify Volume Size Use the fields or the slider below to specify be used by the new RAID volume.	the amount of available array space to	
Maximum Volume Size (GB):	149.1	
Minimum Volume Size (GB):	1.5	
Percentage of Available Space:	100	
Volume Size (GB):	149.1	
If you specify a size that is lower than the maximu RAID volume in order to utilize the remaining space	m volume size, you will need to create a second ce.	
	< <u>B</u> ack <u>N</u> ext > Cancel	

10.4 Completing Create RAID Volume Wizard

Select 'Finish' to create the new RAID volume:

Caution: CRITICAL WARNING: Completing this action will permanently delete existing data on the selected hard drive(s). Back up all important data before continuing.



Appendix A Error Messages

A.1 Incompatible Hardware Error Message

Issue: The following error message appears during installation:



Resolution: This issue is resolved by installing the Intel® Matrix Storage Manager on a system with a supported Intel chipset.

(see <u>http://support.intel.com/support/chipsets/imst/sb/CS-020644.htm</u>).

A.2 Operating System Not Supported Error Message

Issue: The following error message appears during installation:



Resolution: This issue is resolved by installing the Intel® Matrix Storage Manager on a system with a supported operating system. (see <u>http://support.intel.com/support/chipsets/imsm/sb/CS-020648.htm</u>)

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Note: <u>Note for Windows* XP users</u>: To successfully complete installation of the Intel® Matrix Storage Manager with Windows* XP, the user must be logged on with Administrator rights.

A.3 Error: Volume Modification Failed

Issue: When attempting to migrate a 2 or 3-drive RAID 0 volume or a 2-drive RAID 1 volume to RAID 5, the following error message appears after clicking **Finish** in the Modify Volume wizard:



Resolution: The hard drive(s) added to the system must be equal to or greater in size than the hard drive members of the RAID 0 or RAID 1 volume.

A.4 Error: Source Hard Drive Cannot Be Larger

Issue: When attempting to migrate from a single hard drive (or RAID Ready configuration) to a RAID configuration, the following error message appears and the migration process will not begin:



Resolution: Follow the steps listed in the error message to correct the problem.

A.5 Hard Drive has System Files Error

Issue: The following error message appears after selecting a hard drive as a member hard drive during the "Create RAID Volume" process:

Select Volum Specify the array below	e Location e location for the new RAID volu v.	ume by selecting 3 to 4 hard drive	es or an
Available Port 0: ST3120	0026AS - Serial# 3JT 4	Selected	
eate RAID Volume Wiz	ard .		
This hard drive has	s system files and cannot be us	ed to create a RAID volume. Ple	ease select another hard drive
This hard drive has	s system files and cannot be us	ed to create a RAID volume. Ple	ease select another hard drive
This hard drive has WARNING: Selec important data bef	s system files and cannot be us ting hard drives will permanent ore continuing.	ed to create a RAID volume. Ple DK	ease select another hard drive res. Back up all
X This hard drive has WARNING: Select important data befine Selecting an existing	s system files and cannot be us ting hard drives will permanent fore continuing. ing array will preserve any volur	ed to create a RAID volume. Ple DK y delete the data on the hard driv ne(s) on the array.	res. Back up all

Resolution: Select a new hard drive.

Appendix B Glossary

AHCI	Advanced Host Controller Interface: an interface specification that allows the storage driver to enable advanced Serial ATA features such as Native Command Queuing, native hot plug, and power management.
Intel® Matrix Storage Manager Option ROM	The option ROM is a code module built into the system BIOS that provides boot support for RAID volumes as well as a user interface for configuring and managing RAID volumes.
Matrix RAID	Two independent RAID volumes within a single RAID array.
Member	A hard drive used within a RAID array.
Migration	The process of converting a system's data storage configuration from a non-RAID configuration (pass-thru) to a RAID configuration.
Hot Plug	The unannounced removal and insertion of a Serial ATA hard drive while the system is powered on.
NCQ	A command protocol in Serial ATA that allows multiple commands to be outstanding within a hard drive at the same time. The commands are dynamically reordered to increase hard drive performance.
Port0	Serial ATA port (connector) on a motherboard identified as Port0
Port1	Serial ATA port (connector) on a motherboard identified as Port1
Port2	Serial ATA port (connector) on a motherboard identified as Port2
Port3	Serial ATA port (connector) on a motherboard identified as Port3
POST	Power-On Self Test
RAID	Redundant Array of Independent Drives: RAID allows data to be distributed across multiple hard drives to provide data redundancy or to enhance data storage performance.
RAID 0 (striping)	The data in the RAID volume is striped across the array's members. Striping divides data into units and distributes those units across the members without creating data redundancy, but improving read/write performance.
RAID 1 (mirroring)	The data in the RAID volume is mirrored across the RAID array's members. Mirroring is the term used to describe the key feature of RAID 1, which writes duplicate data to each member; therefore, creating data redundancy and increasing fault tolerance.
RAID 5 (striping with parity)	The data in the RAID volume and parity are striped across the array's members. Parity information is written with the data in a rotating sequence across the members of the array. This RAID level is a preferred configuration for efficiency, fault-tolerance, and performance.
RAID 10 (striping and mirroring)	The RAID level where information is striped across a two disk array for system performance. Each of the drives in the array has a mirror for fault tolerance. RAID 10 provides the performance benefits of RAID 0 and the redundancy of RAID 1. However, it requires four hard drives.
RAID Array	A logical grouping of physical hard drives.

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RAID Level	A defined set of characteristics applied to a RAID volume, which determines how data is stored and managed to improve read/write performance or to increase fault tolerance.
RAID Level Migration	The process of converting a system's data storage configuration from one RAID level to another. See Table 3 for the supported level migrations.
RAID Ready	Term used to describe a system that an end-user can turn into a RAID system by adding additional Serial ATA hard drive(s) and invoking the migration feature
RAID Volume	A fixed amount of space across a RAID array that appears as a single physical hard drive to the operating system. Each RAID volume is created with a specific RAID level to provide data redundancy or to enhance data storage performance.
Spare Hard Drive	A Serial ATA hard drive that is designated by the RAID software to be automatically used as the target of an auto-rebuild in the event that a RAID member fails or is missing. RAID level 0 cannot use spares. RAID levels 1, 5 and 10 can use one or more spares.
Strip	A grouping of data on a single physical hard drive within a RAID volume.
Stripe	The sum of all strips on a horizontal axis across the physical hard drives within a RAID volume