Intel® Matrix Storage Manager 8.x

User's Manual

January 2009

Revision 1.0
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<th>Revision Number</th>
<th>Description</th>
<th>Revision Date</th>
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<tr>
<td>N/A</td>
<td>1.0</td>
<td>Aligns with 8.x release</td>
<td>January 2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Clarified RAID-Ready requirements</td>
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§
1 **Introduction**

The purpose of this document is to enable a user to properly set up and configure a system using Intel® Matrix Storage Manager. It provides steps for set up and configuration, as well as a brief overview on Intel® Matrix Storage Manager features.

**Note:** The information in this document is only relevant on systems with a supported Intel chipset that include a supported Intel chipset, with a supported operating system.

- Supported Intel chipsets - [http://support.intel.com/support/chipsets/imsm/sb/CS-020644.htm](http://support.intel.com/support/chipsets/imsm/sb/CS-020644.htm)
- Supported operating systems - [http://support.intel.com/support/chipsets/imsm/sb/CS-020648.htm](http://support.intel.com/support/chipsets/imsm/sb/CS-020648.htm)

**Note:** 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.

1.1 **Terminology**

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHCI</td>
<td>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.</td>
</tr>
<tr>
<td>Continuous Update Policy</td>
<td>When a recovery volume is using this policy, data on the master drive is copied to the recovery drive automatically as long as both drives are connected to the system.</td>
</tr>
<tr>
<td>Intel® Matrix Storage Manager Option ROM</td>
<td>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.</td>
</tr>
<tr>
<td>Master Drive</td>
<td>The hard drive that is the designated source drive in a recovery volume.</td>
</tr>
<tr>
<td>Matrix RAID</td>
<td>Two independent RAID volumes within a single RAID array.</td>
</tr>
<tr>
<td>Member</td>
<td>A hard drive used within a RAID array.</td>
</tr>
<tr>
<td>Term</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Migration</td>
<td>The process of converting a system's data storage configuration from a non-RAID configuration (pass-thru) to a RAID configuration.</td>
</tr>
<tr>
<td>Hot Plug</td>
<td>The unannounced removal and insertion of a Serial ATA hard drive while the system is powered on.</td>
</tr>
<tr>
<td>NCQ</td>
<td>Native Command Queuing: 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.</td>
</tr>
<tr>
<td>On Request Update Policy</td>
<td>When a recovery volume is using this policy, data on the master drive is copied to the recovery drive when you request it. Only changes since the last update process are copied.</td>
</tr>
<tr>
<td>OS</td>
<td>Operating System</td>
</tr>
<tr>
<td>Port0</td>
<td>A serial ATA port (connector) on a motherboard identified as Port0.</td>
</tr>
<tr>
<td>Port1</td>
<td>A serial ATA port (connector) on a motherboard identified as Port1.</td>
</tr>
<tr>
<td>Port2</td>
<td>A serial ATA port (connector) on a motherboard identified as Port2.</td>
</tr>
<tr>
<td>Port3</td>
<td>A serial ATA port (connector) on a motherboard identified as Port3.</td>
</tr>
<tr>
<td>POST</td>
<td>Power-On Self Test</td>
</tr>
<tr>
<td>RAID</td>
<td>Redundant Array of Independent Drives: allows data to be distributed across multiple hard drives to provide data redundancy or to enhance data storage performance.</td>
</tr>
<tr>
<td>RAID 0 (striping)</td>
<td>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.</td>
</tr>
<tr>
<td>RAID 1 (mirroring)</td>
<td>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.</td>
</tr>
<tr>
<td>RAID 5 (striping with parity)</td>
<td>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.</td>
</tr>
<tr>
<td>RAID 10 (striping and mirroring)</td>
<td>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.</td>
</tr>
<tr>
<td>RAID Array</td>
<td>A logical grouping of physical hard drives.</td>
</tr>
<tr>
<td>Term</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>RAID Level Migration</td>
<td>The process of converting a system's data storage configuration from one RAID level to another.</td>
</tr>
<tr>
<td>RAID Volume</td>
<td>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.</td>
</tr>
<tr>
<td>Recovery Drive</td>
<td>The hard drive that is the designated target drive in a recovery volume.</td>
</tr>
<tr>
<td>Recovery Volume</td>
<td>A volume utilizing Intel(R) Rapid Recover Technology.</td>
</tr>
</tbody>
</table>

### 1.2 Reference Documents

<table>
<thead>
<tr>
<th>Document</th>
<th>Document No./Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Applicable</td>
<td></td>
</tr>
</tbody>
</table>
2 Intel® Matrix Storage Manager Features

2.1 Feature Overview

The Intel® Matrix Storage Manager software package provides high-performance Serial ATA and Serial ATA RAID capabilities for supported operating systems.

Supported operating systems - http://support.intel.com/support/chipsets/imsm/sb/CS-020648.htm

The key features of the Intel® Matrix Storage Manager are as follows:

- RAID 0
- RAID 1
- RAID 5
- RAID 10
- Matrix RAID
- RAID migration and RAID level migration
- Intel® Rapid Recover Technology
- Advanced Host Controller Interface (AHCI) support

2.2 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.
Table 1. RAID 0 Overview

<table>
<thead>
<tr>
<th>Hard Drives Required:</th>
<th>2-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advantage:</td>
<td>Highest transfer rates</td>
</tr>
<tr>
<td>Fault-tolerance:</td>
<td>None – if one disk fails all data will be lost</td>
</tr>
<tr>
<td>Application:</td>
<td>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.</td>
</tr>
</tbody>
</table>

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

2.3 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.

Table 2. RAID 1 Overview

<table>
<thead>
<tr>
<th>Hard Drives Required:</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advantage:</td>
<td>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.</td>
</tr>
<tr>
<td>Fault-tolerance:</td>
<td>Excellent – disk mirroring means that all data on one disk is duplicated on another disk.</td>
</tr>
<tr>
<td>Application:</td>
<td>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.</td>
</tr>
</tbody>
</table>

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

2.4 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.
Table 3. RAID 5 Overview

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

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

2.5 RAID 10

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.

Table 4. RAID 10 Overview

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

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

2.6 Matrix RAID

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

As an example, on a system 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.

Example: Refer to Figure 1.
2.7 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 following RAID migrations are supported:

**Note:** All migrations may not be available as 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

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:
http://support.intel.com/support/chipsets/imsm/sb/CS-020674.htm

2.8 RAID Level Migration

The RAID level migration feature enables a 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 RAID level migrations are supported:

**Note:** All migrations may not be available as each migration is supported on specific platform configurations.

- 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

RAID level 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 RAID level migrations and the platforms on which each migration is supported: [http://support.intel.com/support/chipsets/imsm/sb/CS-020674.htm](http://support.intel.com/support/chipsets/imsm/sb/CS-020674.htm)

### 2.9 Intel® Rapid Recover Technology

Intel® Rapid Recover Technology utilizes RAID 1 (mirroring) functionality to copy data from a designated master drive to a designated recovery drive. The master drive data can be copied to the recovery drive either continuously or on request.

When using the continuous update policy, changes made to the data on the master drive while the system is not docked are automatically copied to the recovery drive when the system is re-docked. When using the on request update policy, the master drive data can be restored to a previous state by copying the data on the recovery drive back to the master drive.

Table 5 provides an overview of the advantages, the disadvantages, and the typical usage of Intel® Rapid Recover Technology.

**Table 5. Recovery Volume Overview**

<table>
<thead>
<tr>
<th>Hard Drives Required</th>
<th>Advantage</th>
<th>Disadvantage</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>More control over how data is copied between master and recovery drives; fast volume updates (only changes to the master drive since the last update are copied to the recovery drive); member hard drive data can be viewed in Microsoft Windows Explorer*.</td>
<td>No increase in volume capacity.</td>
<td>Critical data protection for mobile systems; fast restoration of the master drive to a previous or default state.</td>
</tr>
</tbody>
</table>

Refer to the following web site for more information on Intel® Rapid Recovery Technology: [http://support.intel.com/support/chipsets/imsm/sb/CS-026142.htm](http://support.intel.com/support/chipsets/imsm/sb/CS-026142.htm)
2.10 **Advanced Host Controller Interface**

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:
http://support.intel.com/support/chipsets/imst/sb/CS-012304.htm

2.10.1 **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:

- Chipset that supports AHCI
- Intel® Matrix Storage Manager
- One or more Serial ATA (SATA) hard drives that support NCQ

2.10.2 **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:

- Chipset that supports AHCI
- Intel® Matrix Storage Manager
- Hot plug capability correctly enabled in the system BIOS by the OEM/motherboard manufacturer
3 RAID BIOS Configuration

3.1 Overview

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. Version 7.0 of the option ROM supports platforms based on the Intel® 82801HEM I/O controller hub.

3.2 Enabling RAID in BIOS

Use the following steps to enable RAID in the system BIOS:

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. Press 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 the <F10> key to save the BIOS settings and exit the BIOS Setup program.
4 Intel® Matrix Storage Manager Option ROM

4.1 Overview

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

4.2 User Interface

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

Example: Refer to Figure 2.

Figure 2. User Prompt

NOTE: The hard drive(s) and hard drive information listed for your system can differ from the following example.

4.3 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.

4.4 RAID Volume Creation

Use the following steps to create a RAID volume using the Intel® Matrix Storage Manager user interface:

**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.

1. Press the <Ctrl> and <i> keys simultaneously when the following window appears during POST:

   ![RAID Volume Creation Window](image)

2. Select option 1. Create RAID Volume and press the <Enter> key.

   ![RAID Volume Creation Screen](image)

   1. Create RAID Volume
   2. Delete RAID Volume
   3. Reset Disks to Non-RAID
   4. Recovery Volume Options
   5. Exit
3. Type in a volume name and press the <Enter> key, or press the <Enter> key to accept the default name.

4. Select the RAID level by using the <↑> or <↓> keys to scroll through the available values, then press the <Enter> key.

   Choose the RAID level best suited to your usage model.

   - RAID0: Data striped across multiple physical drives for performance.
   - RAID1: Data mirrored across multiple physical drives for redundancy.
   - RAID5: Data and parity striped across three or more physical drives for performance and redundancy.
5. Press the <Enter> key to select the physical disks. A dialog similar to the following will appear:

![Dialog screenshot]

Select the appropriate number of hard drives by using the <↑> or <↓> keys to scroll through the list of available hard drives. Press the <Space> key to select a drive. When you have finished selecting hard drives, press the <Enter> key.

6. Select 2 to 4 disks to use in creating the volume.
7. Unless you have selected RAID 1, select the strip size by using the <↑> or <↓> keys to scroll through the available values, then press the <Enter> key.

8. Select the volume capacity and press the <Enter> key. **Note:** 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).
9. At the Create Volume prompt, press the <Enter> key to create the volume. The following prompt will appear:

```
Name: RAID Volume0
RAID Level: RAID0(Striped)
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.

10. Press the <Y> key to confirm volume creation.

11. To exit the option ROM user interface, select option 5. Exit and press the <Enter> key.

12. Press the <Y> key again to confirm exit.

**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.
5 Loading Driver During OS Installation

5.1 Overview

Unless using Microsoft Windows Vista*, the Intel® Matrix Storage Manager driver must be loaded during operating system installation using the F6 installation method. This is required in order to install an operating system onto a hard drive or RAID volume when in RAID mode or onto a hard drive when in AHCI mode.

If using Microsoft Windows Vista, this is not required, as the operating system includes a driver for the AHCI and RAID controllers. Refer to Intel® Matrix Storage Manager Installation for instructions on how to installed an updated version of the software after the operating system is installed.

5.2 F6 Installation Method

The F6 installation method requires a floppy with the driver files.

5.2.1 Automatic F6 Floppy Creation

Use the following steps to automatically create a floppy that contains the files needed during the F6 installation process:

1. Download the latest Floppy Configuration Utility from the Intel download site:
2. Run the .EXE file.

   Note: Use F6flopy32.exe on a 32-bit system. Use F6flopy64.exe on a 64-bit system.

5.2.2 Manual F6 Floppy Creation

Use the following steps to manually create a floppy that contains the files needed during the F6 installation process:

1. Download the Intel® Matrix Storage Manager and save it to your local drive (or use the CD shipped with your motherboard which contains the Intel® Matrix Storage Manager). **Note:** The Intel® Matrix Storage Manager can be downloaded from the following website: http://downloadfinder.intel.com/scripts-df/Product_Filter.asp?ProductID=2101
2. Extract the driver files by running 'C:\IATAXX_CD.EXE –A -A -P C:\<path>'. **Note:** This is described in the ‘Advanced Installation Instructions’ section of the README.TXT.
3. Copy the IAAHCI.CAT, IAACHI.INF, IASTOR.CAT, IASTOR.INF, IASTOR.SYS, and TXTSETUP.OEM, files to the root directory of a floppy diskette. **Note:** 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.

### 5.2.3 F6 Installation Steps

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

1. Press the `<F6>` key 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. Insert the floppy disk containing the driver files when you see the following prompt: 'Please insert the disk labeled Manufacturer-supplied hardware support disk into Drive A:' and press the `<Enter>` key. Refer to Automatic F6 Floppy Creation for instructions.

4. Select the RAID or AHCI controller entry that corresponds to your BIOS setup and press the `<Enter>` key. **Note:** Not all available selections may appear in the list; use the `<↑>` or `<↓>` to see additional options.

5. Press the `<Enter>` key to confirm.

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

6.1 Overview

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

Warning: 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 Software

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 be downloaded from the following Intel website: http://downloadfinder.intel.com/scripts-df/Product_Filter.asp?ProductID=2101

6.3 Installation Steps

Note: The instructions below assume that the BIOS has been configured correctly and the RAID driver has been installed using the F6 installation method (if applicable).
1. Run the Intel® Matrix Storage Manager executable.
2. Click **Next** to continue.

![Intel(R) Matrix Storage Manager 7.0.0.1012](image)

**Welcome to the setup for the Intel(R) Matrix Storage Manager.**

This setup program will install Intel(R) Matrix Storage Manager onto your computer. It is strongly recommended that you exit all Windows programs before continuing setup.
3. Carefully review the warning and click **Next** to continue.

**Warning!**
**Please read the following information:**

The driver you are about to install might be used to control the hard drive from which this computer is booting or to control a hard drive that contains important data.

For this reason, you cannot remove or uninstall this driver from the computer after installation. However, you can uninstall other, non-critical components. The following components can be uninstalled:

- Intel(R) Matrix Storage Console
- Help Documentation
- Start Menu Shortcuts
- System Tray Icon Service
- Event Monitor Service

Click Next to continue the setup. Click Cancel to exit the setup.
4. Click **Yes** to accept the license agreement terms.

![License Agreement](image)

**License Agreement**

Please read the following license agreement carefully. Press the Page Down key to view the rest of the agreement.

---

**INTEL SOFTWARE LICENSE AGREEMENT (Alpha / Beta, Organizational Use)**

**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.

The Software contains pre-release "alpha" or "beta" code, which may not be fully functional and which Intel Corporation ("Intel") may substantially modify in producing any "final" version of the Software. Intel can provide no assurance

You must accept all of the terms of the license agreement in order to continue the setup program. Do you accept the terms?

[Back] [Yes] [No]

---

*Intel(R) Installation Frameworks*
5. Review the readme if needed and click **Next** to continue.

![Intel® Matrix Storage Manager Installation](image)

---

**Readme File Information**

Refer to the Readme file below to view system requirements and installation information. Press the Page Down key to view the rest of the file.

```
******************************************************************************
******************************************************************************
* Installation Readme for Intel(R) Matrix Storage Manager.  
* Refer to the system requirements for the operating  
* systems supported by Intel(R) Matrix Storage Manager.  
* This document makes references to products developed by  
* Intel. There are some restrictions on how these products  
* may be used, and what information may be disclosed to  
* others. Please read the Disclaimer section at the bottom  
* of this document, and contact your Intel field  
* representative if you would like more information.  
******************************************************************************
******************************************************************************
```
6. Click **Finish** to complete installation and reboot the system.

6.4 **How to Confirm Software Installation**

Refer to Figure 3 to confirm that Intel® Matrix Storage Manager has been installed.
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 Professional.

1. Click on the **Start** button and then the **Control Panel** entry.
2. Double-click the **System** icon. **Note:** If using Microsoft Windows Vista, first select **Classic View**.
3. Select the **Hardware** tab.
4. Click on the **Device Manager** button.
5. Expand the **SCSI and RAID Controllers** entry.
6. Right-click on the **Intel(R) 82801XX SATA Controller** entry.
7. Select the **Driver** tab.
8. Click on the **Driver Details** button. The iastor.sys file should be listed. **Example:** Refer to Figure 4.

**Figure 4. Driver Details Example**

```plaintext
NOTE: The controller shown here may differ from the controller displayed for your system.
```
6.5 **Version Identification**

There are two ways to determine which version of the Intel® Matrix Storage Manager is installed:
1. Use the Intel® Matrix Storage Console
2. Locate the RAID driver (iaStor.sys) file and view the file properties

6.5.1 **Version Identification Using Intel® Matrix Storage Console**

1. To access the Intel® Matrix Storage Console, refer to Figure 3.
2. Under the View menu, select **System Report**.
3. Select the **Intel® RAID Technology** tab for the driver version information.

**Example:** Refer to Figure 5.

**Figure 5. Driver Version Information**

![System Report](image)

**NOTE:** Driver version information shown here may differ from the information displayed for your system.

6.5.2 **Version Identification Using Driver File**

1. Locate the file iastor.sys in the following path: `<System Root>\Windows\System32\Drivers`
2. Right-click on iastor.sys and select **Properties**.
3. Select the **Version** tab. The version number should be listed after the File Version parameter in the following format: x.y.z.aaaa
7    RAID-Ready Setup

7.1 Overview

A "RAID Ready" system is a specific system configuration that allows a user to perform a RAID migration at a later date.

For more information on RAID migrations, see RAID Migration.

7.2 System Requirements

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

- Contains a supported Intel chipset
- Includes a single Serial ATA (SATA) hard drive
- RAID controller must be enabled in the BIOS
- Motherboard BIOS must include the Intel® Matrix Storage Manager option ROM
- Intel® Matrix Storage Manager must be loaded
- A partition that does not take up the entire capacity of the hard drive (4-5MB of free space is sufficient)

7.3 RAID-Ready System Setup Steps

*Note:* The system must meet all the requirements listed in System Requirements.

1. Enable RAID in system BIOS using the steps listed in Enabling RAID in BIOS.
2. Install Intel® Matrix Storage Manager driver using the steps listed in F6 Installation Steps.
3. Install Intel® Matrix Storage Manager using the steps listed in Installation Steps.
8 RAID Migration

8.1 Overview

The following sections explain how to migrate from a RAID-Ready system to a RAID system.

8.2 RAID Migration Steps: RAID-Ready to 2-drive RAID 0/1

Use the following steps to convert a RAID-Ready system into a system with a 2-drive RAID 0 or 1 volume:

*Note:* The steps listed in this section assume that the system is a properly configured RAID-Ready system. For more information on how to configure a RAID-Ready system, see RAID-Ready System Setup Steps.

*Warning:* 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.

1. Physically add an additional SATA hard drive to the system.
2. Boot into Windows* and open the Intel® Matrix Storage Console. **Example:** Refer to Figure 3.
3. Select Protect data from a hard drive failure with RAID 1 or Improve storage performance with RAID 0.
4. Select **Yes** to confirm volume creation. In the following example, RAID 1 was selected. Refer to Figure 6, Figure 7, and Figure 8 for examples of volume creation progress indicators.

5. When the migration is complete, reboot the system if needed.
6. If applicable, use a third party application or the Microsoft* Windows* operating system tools to create and format a new data partition in any unused space or use a third party application to extend the partition to utilize any remaining space.

**Figure 6. Tray Icon Status**
8.3 RAID Migration Steps: RAID-Ready to 3 or 4-drive RAID 0/5

Use the following steps to convert a RAID-Ready system into a system with a 3 or 4-drive RAID 0/5 volume:

**Note:** The steps listed in this section assume that the system is a properly configured RAID-Ready system. For more information on how to configure a RAID-Ready system, see RAID-Ready System Setup Steps.
Warning: 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.

Warning: It is very important to note which disk is the source drive (the one containing all of the information to be migrated). On a RAID-Ready system, this can be determined by noting the port the single hard drive is attached to a note during POST. 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.

1. Physically add two or three additional SATA hard drives to the system.
2. Boot into Windows* and open the Intel® Matrix Storage Console. Example: Refer to Figure 3.
3. Select Advanced Mode from the View menu.
4. Select Create RAID Volume from Existing Hard Drive from the Actions menu.
5. Click Next to continue.
6. Type in a volume name and press the <Enter> key, or press the <Enter> key to accept the default name.
7. Select a RAID level.

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

8. Select a strip size.
9. Click **Next** to continue.
10. Select a source hard drive source. **Note:** The source hard drive can be selected 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 this hard drive will be preserved and
migrated to the new RAID volume.

![Create RAID Volume from Existing Hard Drive Wizard](image)

11. Click **Next** to continue.

12. Select the member hard drives. **Note:** The member hard drives can be selected by double-clicking on the hard drive, or by single-clicking on the hard drive and then...
selecting the right arrow key.

**Warning:** The data on the member hard drives will be deleted. Back up all important data before continuing.

13. Click **Next** to continue.

14. Use the field or the slider bar to specify the amount of available array space that will be used by the volume. **Note:** Any remaining space can be used to create a
second volume.

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.

<table>
<thead>
<tr>
<th>Volume Size</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum</td>
<td>223.6</td>
</tr>
<tr>
<td>Minimum</td>
<td>111.8</td>
</tr>
</tbody>
</table>

Percentage of Available Space: 100

Volume Size (GB): 223.6

The minimum required size for the RAID volume is determined by the size of the source hard drive. If you create a volume that uses less than 100% of the hard drive space, you may create a second RAID volume to use the remaining space.
15. Click **Finish** to begin the migration process.

16. Once the migration is complete, reboot if needed.

17. If applicable, use a third party application or the Microsoft* Windows* operating system tools to create and format a new data partition in any unused space or use a third party application to extend the partition to utilize any remaining space.
RAID and recovery volumes can be created using the Intel® Matrix Storage Console.

*Note:* RAID volume creation is only available as an option if you are have two or more SATA hard drives in addition to another bootable device. If you wish to create a RAID volume using your boot device, you will need to perform a RAID migration. See RAID Migration for instructions on how to perform a migration.

### 9.1 RAID Volume Creation

*Warning:* Creating a RAID volume will permanently delete any existing data on the selected hard drives. Back up all important data before beginning these steps. If you wish to preserve the data, see RAID Migration for instructions on how to perform a RAID migration.

To create a RAID volume, use the following steps:

1. Open the Intel® Matrix Storage Console. (Start >> All Programs >> Intel® Matrix Storage Manager >> Intel® Matrix Storage Console)
2. Switch to advanced mode by selecting the Advanced Mode option under the View menu.
3. Select Create RAID Volume under the Actions menu.
4. Select Next.
5. Enter a name for the RAID volume.

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 3
The name is limited to 16 English alpha-numeric characters.

RAID Level
RAID 0

Strip Size
128 KB
6. Select a RAID level.

**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 1
- RAID 10
- RAID 5
7. Select a strip size.

8. Select Next to continue.
9. Select the hard drives that will be used to create the RAID volume.

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# 9UT

Selected
Port 1: ST3120026AS - Serial# 5ME
Port 2: ST380013AS - Serial# 3UV8
Port 3: WDC WD1600JD-32HB80

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.

10. When you are finished selecting hard drives, select Next to continue.
11. Enter a size for the RAID volume.

![Create RAID Volume 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.

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Volume Size (GB)</td>
<td>149.1</td>
</tr>
<tr>
<td>Minimum Volume Size (GB)</td>
<td>1.5</td>
</tr>
<tr>
<td>Percentage of Available Space</td>
<td>100%</td>
</tr>
<tr>
<td>Volume Size (GB)</td>
<td>149.1</td>
</tr>
</tbody>
</table>

If you specify a size that is lower than the maximum volume size, you will need to create a second RAID volume in order to utilize the remaining space.

12. Select Next to continue.
13. Select Finish to create the RAID volume.

9.2 Recovery Volume Creation

A recovery volume can be created using either Basic mode or Advanced mode in the Intel® Matrix Storage Console.

9.2.1 Recovery Volume Creation in Basic Mode

Warning: Creating a recovery volume will permanently delete any existing data on the drive selected as the recovery drive. Back up all important data before beginning these steps.

Note: This option may or may not be available depending on your system configuration. If you do not see the option listed, refer to Recovery Volume Creation in Advanced Mode.

To create a recovery volume in Basic mode, use the following steps:
1. Open the Intel® Matrix Storage Console. (Start >> All Programs >> Intel® Matrix Storage Manager >> Intel® Matrix Storage Console)
2. Select **Protect data using Intel® Rapid Recover Technology**.

3. Select **Yes** to confirm volume creation.

### 9.2.2 Recovery Volume Creation in Advanced Mode

*Warning:* Creating a recovery volume will permanently delete any existing data on the drive selected as the recovery drive. Back up all important data before beginning these steps.

To create a recovery volume in Basic mode, use the following steps:

1. Open the Intel® Matrix Storage Console. (Start >> All Programs >> Intel® Matrix Storage Manager >> Intel® Matrix Storage Console)
2. Select **Advanced Mode** in the View menu.
3. Select **Create Recovery Volume** in the Actions menu.

![Create Recovery Volume wizard](image)

4. Select **Next** to continue.

5. Modify the recovery volume name if you wish.
6. Select a hard drive to be used as the master hard drive for the recovery volume.

![Create Recovery Volume Wizard](image)

**Confirm Volume Name and Select Master Drive**

The master drive will be the source drive for the recovery volume.

**Volume Name**

Recovery_0000

The name is limited to 16 English alpha-numeric characters.

**Available Master Drives**

- **Port 0:** HTS721000G9SA00 - Serial# M6PCD61Z4GDN0Z0 - 74.5 GB

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Hard Drive</td>
<td>Yes</td>
</tr>
<tr>
<td>Partition</td>
<td>(C:) - NTFS</td>
</tr>
<tr>
<td>Size</td>
<td>74.5 GB</td>
</tr>
<tr>
<td>Device Port</td>
<td>0</td>
</tr>
<tr>
<td>Device Port</td>
<td>Internal</td>
</tr>
</tbody>
</table>
7. Select a hard drive to be used as the recovery hard drive for the recovery volume.

WARNING: Existing data on the selected recovery drive will be permanently deleted. Back up all important data before continuing.

Available Recovery Drives

Port 2: ST380817AS - Serial# 5MR20357 - 74.5 GB

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Hard Drive</td>
<td>No</td>
</tr>
<tr>
<td>Partition</td>
<td>No Partition Found</td>
</tr>
<tr>
<td>Size</td>
<td>74.5 GB</td>
</tr>
<tr>
<td>Device Port</td>
<td>2</td>
</tr>
<tr>
<td>Generation</td>
<td>1</td>
</tr>
</tbody>
</table>
8. Select an update policy.

Select Update Policy
Select one of the following update policies. To modify the policy later, right-click on the recovery volume and select Modify Volume.

- Continuous update: data on the master drive is copied to the recovery drive automatically as long as both drives are connected to the system.

- Update on request: data on the master drive is copied to the recovery drive when you request it by right-clicking on the volume and selecting Update Volume. Only changes since the last update process are copied.
9. Select **Finish** to begin recovery volume creation.

Completing the Create Recovery Volume Wizard

Completing this action will create a new recovery volume.

To view volume creation progress, right-click on the volume in the Intel(R) Matrix Storage Console and select Show Volume Creation Progress.

You may continue to use other applications during the creation process.

Select 'Finish' to create the volume.
Appendix A Error Messages

A.1 Incompatible Hardware

Issue: The following error message appears during installation:

Solution: This issue can be resolved by installing the Intel® Matrix Storage Manager on a system with a supported Intel chipset, or by ensuring that AHCI or RAID is enabled in the system BIOS. See http://support.intel.com/support/chipsets/imst/sb/CS-020644.htm for more information.

A.2 Operating System Not Supported

Issue: The following error message appears during installation:

Solution: This issue can be resolved by installing the Intel® Matrix Storage Manager on a supported operating system. See http://support.intel.com/support/chipsets/imsm/sb/CS-020648.htm for more information.

A.3 Source Hard Drive Cannot Be Larger

Issue: When attempting to migrate from a single hard drive (or a RAID-Ready configuration) to a RAID configuration, the following error message appears and the migration process will not begin:
Solution: Follow the steps listed in the error message to resolve the problem.

A.4  **Hard Drive Has System Files**

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

*Solution:* Select a new hard drive.

A.5  **Source Hard Drive is Dynamic Disk**

*Issue:* When attempting to migrate from a RAID-Ready configuration to a RAID configuration, an error message is received that says the migration cannot continue because the source drive is a dynamic disk. However, Microsoft* Windows* Disk Management shows the disk as basic, not dynamic.
Solution: Reduce the size of the partition by a few MBs and see if that resolves the issue. See http://support.intel.com/support/chipsets/imsm/sb/CS-021322.htm for more information.