RAIDXpert

User Manual

Version 2.1

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Contents

Chapter 5: Monitoring and Managing, cont.

Chapter 1: Introduction

This chapter includes the following topics:

The AMD RAIDXpert software offers local and remote management and monitoring of all logical drives on the AMD Chipset SATA Controller wherever they exist on the network.

Figure 1.   RAIDXpert in a browser window
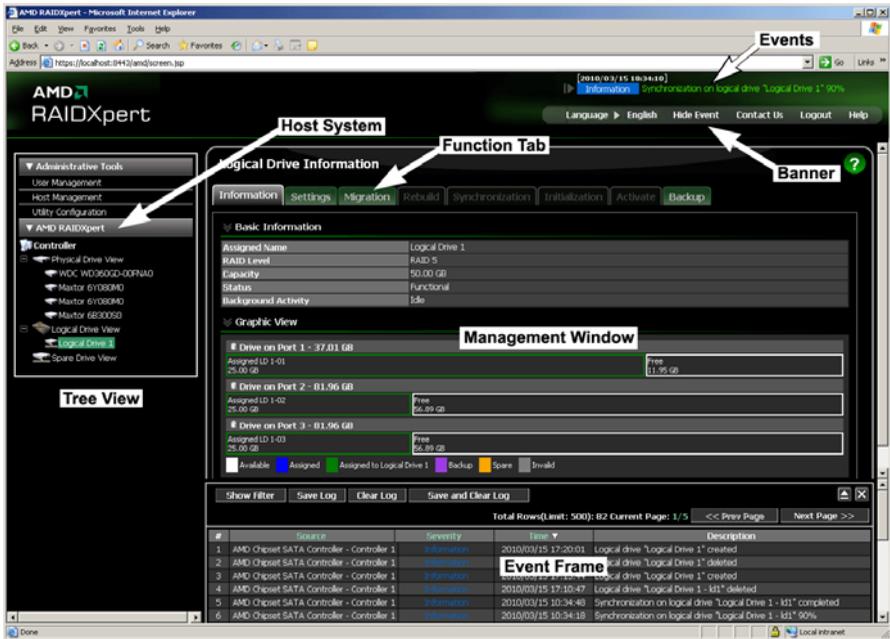
Its browser-based GUI provides email notification of all major events or alarms, memory cache management, drive event logging, logical drive maintenance, rebuild, and access to all components in the RAID configuration—server, controller, logical drives, and physical drives.

RAIDXpert is designed to work with the AMD Chipset SATA RAID Controller. Other brands of RAID controllers are not supported.

RAIDXpert Components

The RAIDXpert installation software installs two major components:

- RAIDXpert management and networking software
- Java Runtime Environment (in a private folder)

RAIDXpert Software

The RAIDXpert software installs on the PC with the AMD Chipset SATA Controller (the "Host PC").

Figure 2. RAIDXpert on a network

Host PCs with the AMD Chipset SATA Controller and RAIDXpert
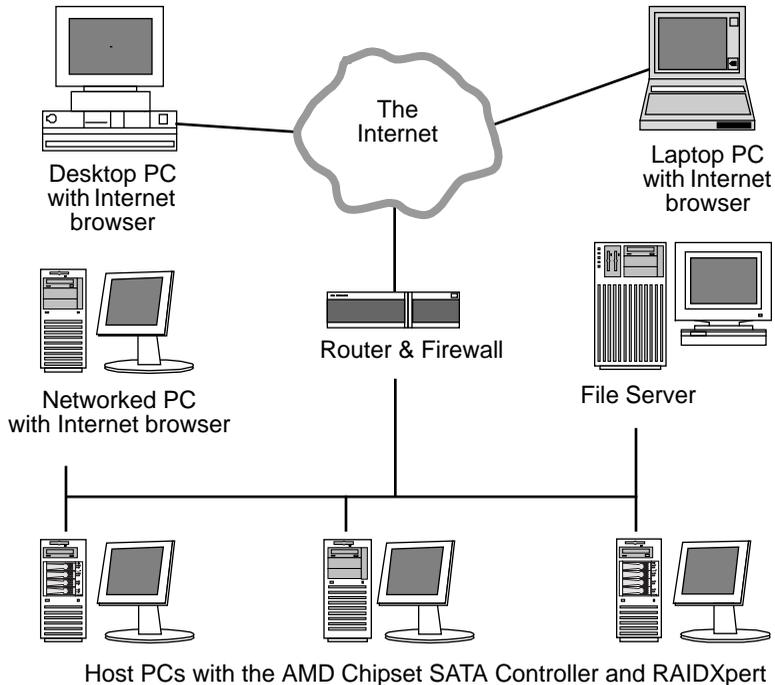
Java Runtime Environment

The RAIDXpert installation program installs a private JRE in folder *_jvm* under the same directory where RAIDXpert is installed. RAIDXpert uses this private JRE to avoid incompatibility issues with any other JREs that may be present on your system.

Operating System Support

On the Host PC with the AMD Chipset SATA Controller, where you install RAIDXpert, AMD recommends 32-bit or 64-bit versions of:

- Windows 7
- Windows Vista
- Windows Server 2008
- Windows XP
- Windows Server 2003

- Red Hat Enterprise 4.8
- Red Hat Enterprise 5.4
- SuSE Linux ES 10 SP3
- SuSE Linux ES 11

These operating systems support RAIDXpert. Choose one of them to take full advantage of RAIDXpert's features and functions.

Browser Support

On the Host PC with the AMD Chipset SATA Controller, where you install RAIDXpert, you must have one of the following browsers:

- Internet Explorer 5.0 or newer
- Mozilla Firefox 1.0 or newer
- Netscape Navigator 6.1 or newer

If you do not have one of the above browsers, install the browser first and make it the default browser. Then install RAIDXpert.

You must use one of the browsers listed above on your networked PC in order to access RAIDXpert over the network.

About This Manual

This *User Manual* describes how to set up and use the RAIDXpert software to maintain your RAID system.

This manual includes a full table of contents, chapter task lists, and numerous cross-references to help you find the specific information you are looking for.

Also included are four levels of notices:

Note

A *Note* provides helpful information such as hints or alternative ways of doing a task.

Important

Important calls attention to an essential step or point required to complete a task. Important items include things often missed.

Caution

A *Caution* informs you of possible equipment damage or loss of data and how to avoid them.

Warning

A *Warning* notifies you of probable equipment damage or loss of data, or the possibility of physical injury, and how to avoid them.

Chapter 2: Installation

This chapter includes the following topic:

- Windows (below)
- Windows with RAID Ready Backup (below)
- Linux (page 6)

On Windows PCs and Servers, you can install the RAIDXpert software with or without the RAID Ready Backup feature. RAID Ready Backup enables you to create and maintain a mirror of your RAID Ready logical drive.

For more information, see "Backing up a RAID Ready Logical Drive" on page 68 and "RAID Ready – Single Drive" on page 99.

Windows

Follow these steps to install RAIDXpert on your Windows-based PC or Server.

1. Boot the PC or server, launch Windows, and log in as the Administrator.

   If the computer is already running, exit all programs. If you are not logged in as the Administrator, log out, then log in again as the Administrator.

1. Insert the software CD into your CD-ROM drive.
2. Double-click the Install CD's icon to open it.
3. Double-click the Installer icon to launch it (right).

   The first RAIDXpert installation dialog box appears.

   RAIDXpert_install.exe

4. Follow the prompts in the installation dialog boxes.

Windows with RAID Ready Backup

Follow these steps to install RAIDXpert with the RAID Ready Backup feature on your Windows-based PC or Server.

1. Boot the PC or server, launch Windows, and log in as the Administrator.

   If the computer is already running, exit all programs. If you are not logged in as the Administrator, log out, then log in again as the Administrator.

2. Insert the software CD into your CD-ROM drive.
3. Click the **Start** menu and choose **Run...**
4. In the Run dialog box, type **d:\Setup.exe /z**"**SBD**" and click the **OK** button.

   If your CD ROM has a different drive letter, type that letter in the place of **d**.

   The first RAIDXpert installation dialog box appears.

5. Follow the prompts in the installation dialog boxes.

Linux

Follow these steps to install RAIDXpert on your Linux-based PC or Server.

1. Boot the PC or server, log in as **root**, and launch the Linux GUI.

   If the computer is already running, exit all programs. If you are not logged in as **root**, log out, then log in again as **root**.

2. Insert the software CD into your CD-ROM drive.

3. In the CD window, double-click the **RAIDXpert...bin** icon to begin installation (right).

   RAIDXpertxxx.bin

4. When the Run or Display? dialog box appears, click *Run in Terminal*.

   After several moments, the first RAIDXpert installation dialog box appears.

5. Follow the prompts in the installation dialog boxes.

Installation under Windows and Linux, continued

1. When the first installation screen appears, choose an installer language from the dropdown menu.
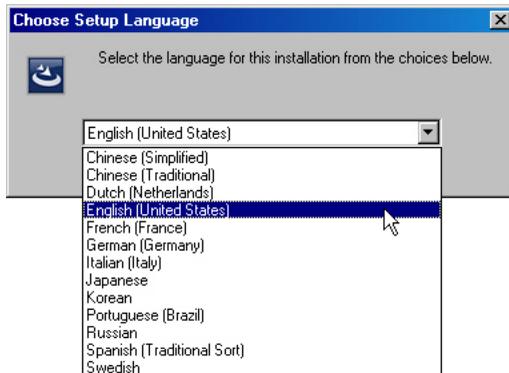
2. When the Welcome screen appears, click the **Next** button.
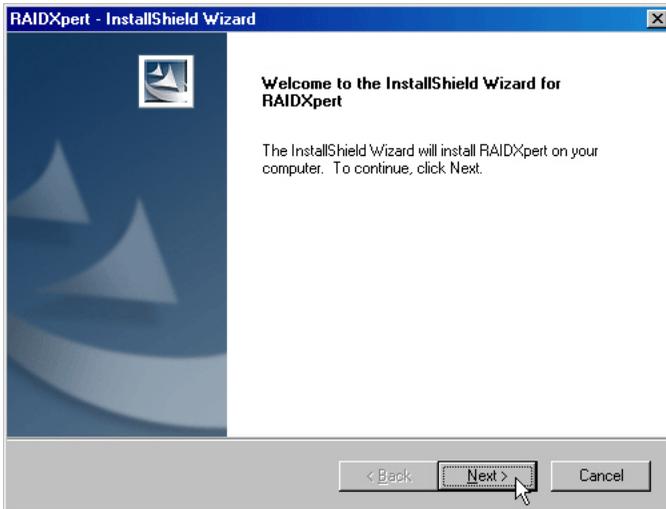
3. When the License Agreement screen appears, click the "I accept the terms of the license agreement" option to proceed with installation. Then click the **Next** button to continue.

   Note: If you leave the "I do not accept the terms of the license" option selected, the installation will quit when you click **Next**.
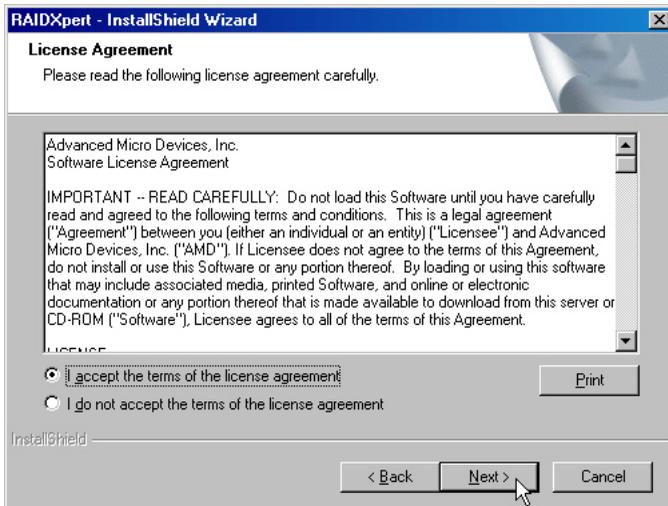
4. When the Choose Install Folder screen appears, make your selection of a folder for the RAIDXpert applications you are installing.

For example, the Windows default folder is:

 C:\Program Files\AMD\RAIDXpert

If you want a different folder, type its location or click the **Browse...** button and select a new location.

Click the **Next** button when you are finished.
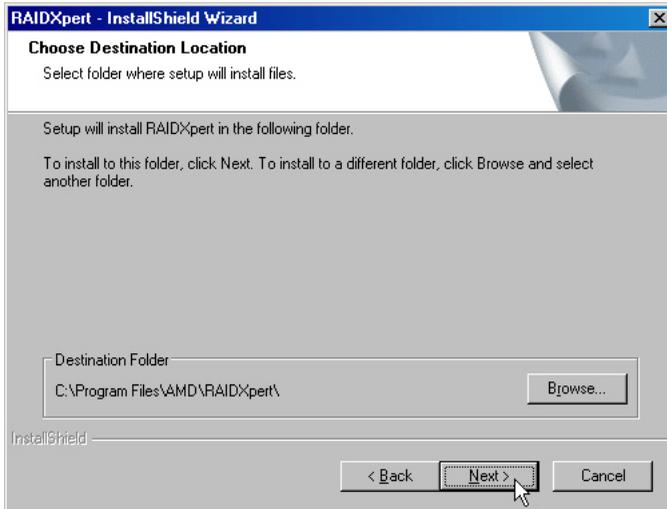
5. When the Check HTTP SSL screen appears (next page), you can choose to apply security to external connections, that is, connections involving the Internet or outside your company firewall. Security options are invisible to authorized users.

External Http Security – Check the box to install Secure Socket Layer (SSL) support for external connections to RAIDXpert.

AMD provides a default certificate for the server as well as for internal data communication. However, in some cases it is better to install and verify your own certificate for the webserver. And, if possible, verify your certificate by certificate authority like Verisign or Thwate. See your MIS Administrator for guidance.

Click the **Next** button when you have made your choice.
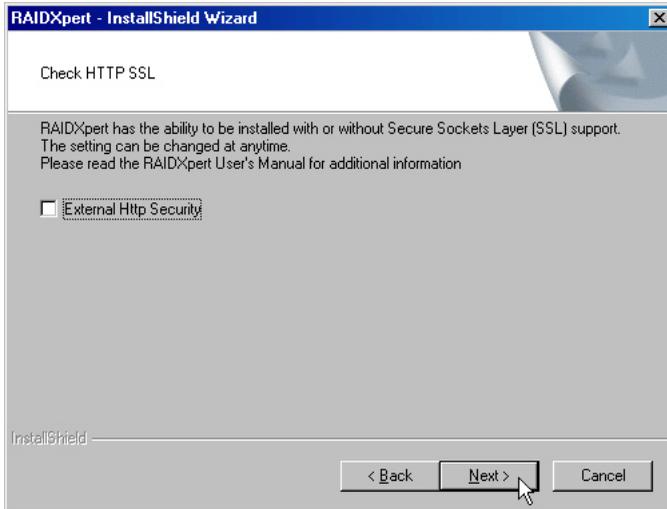
6. When the Ready to Install screen appears, click the **Install** button to continue.
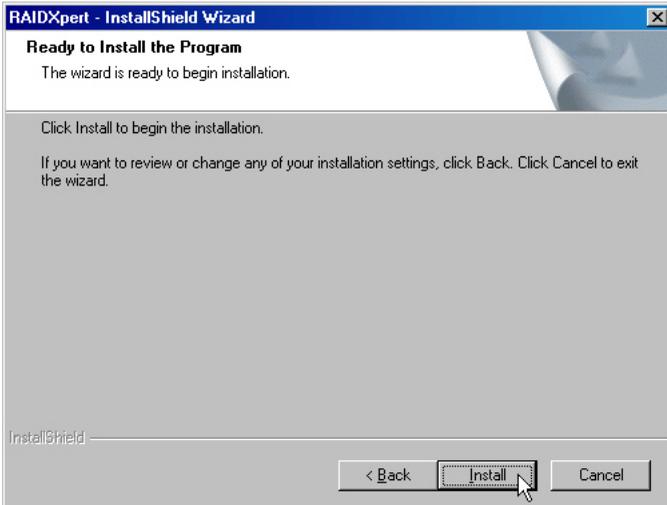
7.   When the Install Complete screen appears, click the **Finish** button.
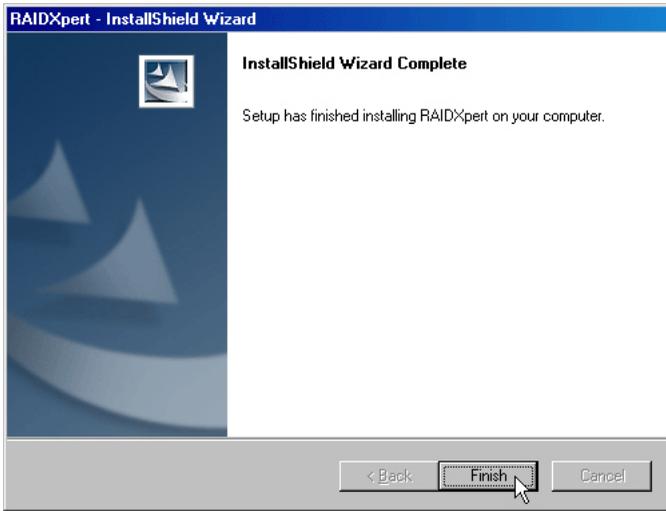
This completes the RAIDXpert installation. Go to "Chapter 3: Setup" on page 11

Chapter 3: Setup

This chapter includes the following topics:

After installation, the next step is to log into and configure RAIDXpert.

Logging into RAIDXpert

Windows PCs: In the Windows Start menu, choose

Programs > AMD > RAIDXpert > RAIDXpert.

Linux PCs: Choose *RAIDXpert* in the Applications menu.

Or, log on manually with your browser:

1. Launch the Browser.
2. In the Browser address field, type the entry explained below.

   If you did *not* choose the External Security option during RAIDXpert installation (see page 8), use the *Regular* connection.

   If you chose the External Security option during RAIDXpert installation (see page 8), use the *Secure* connection (on the next page).

Regular Connection:

- RAIDXpert uses an HTTP connection .http://
- Enter the Host PC's IP address . . . . .127.0.0.1 or localhost
- Enter the Port number . . . . :25902
- Add to launch RAIDXpert. . . . . /amd

Together, your entry looks like this:

http://127.0.0.1:25902/amd or **http://localhost:25902/amd**

Secure Connection:

- RAIDXpert uses a secure HTTP connection . . . . .https://
- Enter the Host PC's IP address . . . . .127.0.0.1 or localhost
- Enter the Port number . . . . :8443
- Add to launch RAIDXpert. . . . ./amd

Together, your entry looks like this:

https://127.0.0.1:8443/amd or **https://localhost:8443/amd**

Note that the IP address shown above applies to a log-in at the Host PC. When you log in over a network, enter the Host PC's actual IP address or hostname.

3. Press the Enter key.

4. When the login screen appears, type **admin** in the Login ID field.

Type **admin** again in the Password field.

The RAIDXpert login and password are case sensitive.

5. Click the **Sign in** button.

Note

Make a Bookmark (Netscape Navigator) or set a Favorite (Internet Explorer) of the Login Screen so you can access it easily next time.

After sign-in, the RAIDXpert opening screen appears.

Choosing a Language

RAIDXpert can display in multiple languages.

To choose your language:

1.   Click the currently displayed language in the RAIDXpert banner.

      A list of available languages displays.

2.   Click the language you prefer.

      The RAIDXpert GUI displays in the language selected.

	Notes
	• You can also choose the language at the Login Screen.
	• To display some of the supported languages, you might have to install additional fonts or other files to your operating system.

Accessing the Host PC

RAIDXpert includes a navigation tree or Tree View in the left frame of the browser window. Click the + icons to expand the tree. A Host PC's RAID system is made up of:

•   **Administrative Tools** – User and Host Management, and Utility Configuration

•   **AMD RAIDXpert** – Controller, Physical Drives, Logical Drives, and Spare Drives

If you do not see these details in the Tree View and you are connecting over a network, it means your network connection to the Host PC is not working. Restore your connection before proceeding.

If you do not see RAIDXpert at all, lower your browser's security settings.

A detailed discussion of RAIDXpert graphic user interface is found in Chapter 4 on page 25.

Making the Recommended Initial Settings

These settings are recommended and now is the best time to make them. You can change them later as necessary.

Administrator's Settings

To make the Administrator's password and notification settings:

1. In Tree View, under Administrative Tools, click **User Management**.
2. In the Management Window, click the **admin** link.
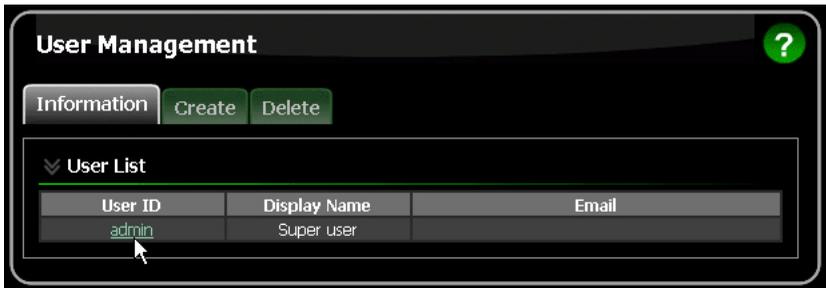
3. Click the **Settings** tab.

4. If you want to change the default password, type the new password into the New Password field.

    Use up to 8 letters and numbers but no spaces or other characters.

5. Type the same password into the Retype Password field.

6. If you plan to set up Event Notification, type the Administrator's email address in the Email field.

7. Click the **Submit** button.

    If the action was successful, the Management Window will display the message "Update Success."

8. If you plan to set up Event Notification, click the **Settings** tab.
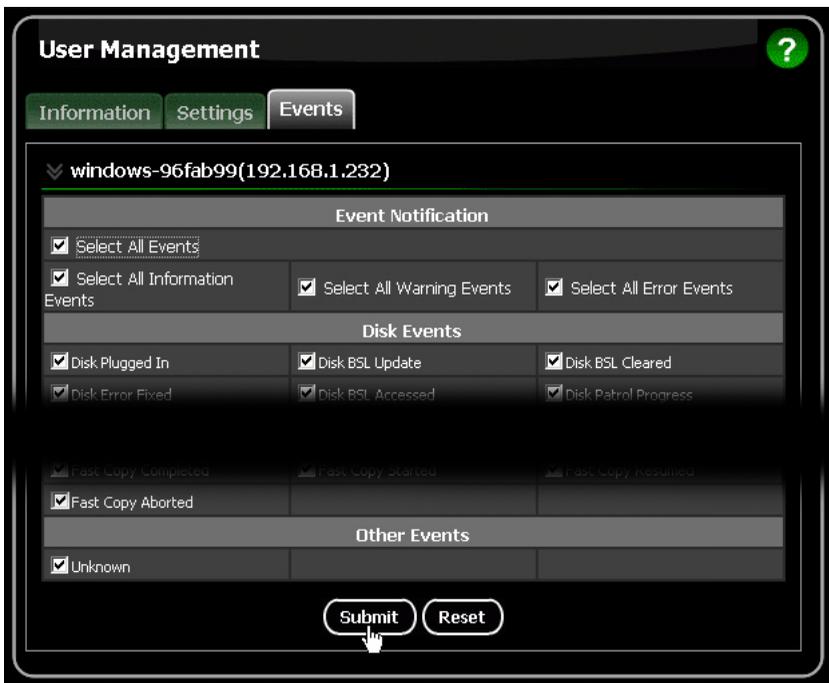
The image above was shortened to fit on this page.

9. Check the boxes of the notification events that you want to have reported to you via email and popup messages.

    To select events by their severity, check one of the four Select Events boxes at the top of the window.

10. Click the **Submit** button.

    For more information about Event Notification, see page 36.

Utility Configuration

If you plan to set up Event Notification, you must make these settings.

1. In Tree View, under Administrative Tools, click **Utility Configuration**.

2. Enter the Sender's address in the Email Sender field.

    Be sure the sender has an account in your email system. See your IT administrator.

3. Enter your email server in the Email Server field.

4. Optional. Change the Email Subject line as needed.

5. Click the **Submit** button when you are done.

Creating a New Logical Drive

A logical drive is a collection of physical drives in a RAID. To create a new logical drive:

1. Click **Logical Drive View** in Tree View.

2. Click the **Create** tab in Management View.

   The Select RAID Level screen appears.

3. Select the option beside the RAID level you want for your logical drive.

   RAIDXpert displays the RAID levels you can use with the available physical drives. See page 101 for information about the available RAID levels.
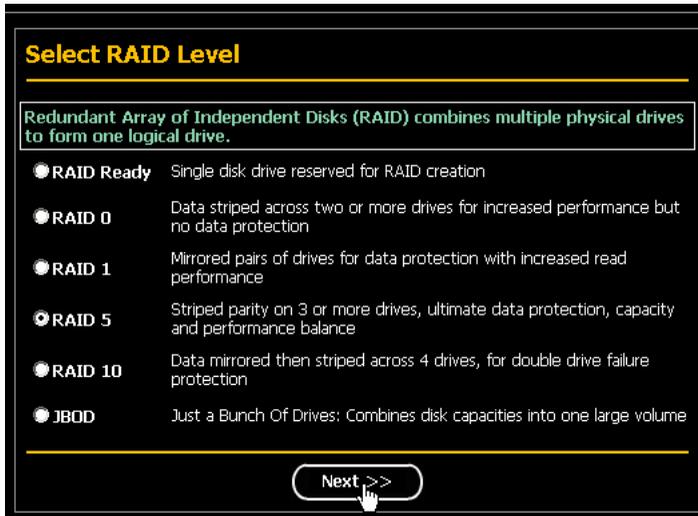
4. In the Select Drive Group screen, click the following option:

   • **Single Disk(s)** – Selects single disks (unassigned physical drives)

5. Click the **Next** button.

The Select Drives screen appears.

6. If you want to split the capacity of your physical drives between two logical drives, enter the capacity for the first logical drive in the Logical Drive Size field.

Or, to use the maximum capacity of the physical drives, check the Use Maximum Capacity box.

For RAID Ready and JBOD, the system will check the Use Maximum Capacity Box automatically.

Logical Drive Size `0.0` GB(☑ **Use Maximum Capacity**)

Please select at least 3 drives for RAID 5.

7. Click the physical drives to select them.

Available drives have a white frame. Selected drives have a red frame.

For RAID Ready, select only one physical drive.

Select Drives

RAID 5 Striped Parity: Data is striped over 3 or more drives, parity provides redundancy using less space. Best overall balance of performance, capacity and protection.

Logical Drive Size `50.0` GB(☐ **Use Maximum Capacity**)

Please select at least 3 drives for RAID 5.

Drive on Port 1 - 81.9 GB
Single Disk
81.89 GB

Drive on Port 2 - 81.9 GB
Single Disk
81.89 GB

Drive on Port 3 - 81.9 GB
Single Disk
81.89 GB

Drive on Port 4 - 81.9 GB
Single Disk
81.89 GB

■ Selected   ■ Available   ■ Assigned   ■ Spare   ■ Invalid

(<< Prev)   (Next >>)

8. Click the **Next** button.

The Assign a Name screen appears.

9. Accept the default name or enter a new name for the logical drive in the field provided.

10. Click the **Next** button.

The Final Settings screen appears.

11. RAID 0, 5, and 10. Choose a Stripe Block Size from the dropdown menu.

The choices are 64 and 128 KB. For more information, see "Choosing Stripe Block Size" on page 103.

The Write Cache policy is Write Through. You cannot change this setting.

12. RAID 0, 1, 5, and 10. Choose a Gigabyte Boundary policy from the dropdown menu.

- **GigaByte Boundary** – Rounds the size of the logical drive down to the nearest whole gigabyte. This is the default. For more information, see "Gigabyte Boundary" on page 103.

- **None** – No Boundary function.

13. Choose an Initialization policy from the dropdown menu.

- **Fast Initialization** – Erases the reserve and master boot sectors of the physical drives being added to the logical drive.

- **Full Initialization** – Erases all sectors of the physical drives being added to the logical drive. RAID 1, 5, and 10 only.

- **None** – No initialization. This choice is not recommended.

14. Click the **Finish** button.

   If there are physical drives available, the Select RAID Level screen appears again, where you can create an additional logical drive.

   Click the **Logical Drive** in Tree View to see all of the information about your new logical drive.

Before you can use your new logical drive, you must partition and format the logical drive using your PC's operating system. See "Appendix B: Partition and Format" on page 111 for more information.

Logging out of RAIDXpert

There are two ways to log out of RAIDXpert:

• Close your browser window

• Click **Logout** on the RAIDXpert Banner
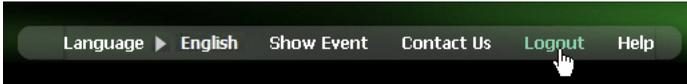
After logging out, you must enter your username and password to log in again. Clicking **Logout** brings you back to the Login Screen.

Connecting to RAIDXpert from the Internet

The above instructions cover connections between the Host PC and other PCs using RAIDXpert over your company network. It is also possible to connect to a Host PC from the Internet.

Your MIS Administrator can tell you how to access your network from outside the firewall. Once you are logged onto the network, you can access the Host PC using its IP address. See "Logging into RAIDXpert" on page 11 for more information.

Please note that only the Host PC can read and write data to the logical drives. However, other PCs can monitor the Host PC from virtually any location.

Running RAIDXpert without Network Connection

RAIDXpert was designed to run over a network. You can run RAIDXpert without a network connection, directly on the Host PC.

To run RAIDXpert on the Host PC:

1. Choose RAIDXpert in the Windows Programs menu.

   Or choose RAIDXpert in the Linux Applications menu.

   Your browser opens and displays a "no connection to the Internet is currently available" message.

2. Click the **Work Offline** button.

3. In the RAIDXpert login screen, enter your user name and password (if used), then click the **Sign in** button.

   A "webpage unavailable while offline" message will display.

4. Click the **Connect** button.

   A "no connection to the Internet is currently available" message will display.

5. Click the **Try Again** button.

After a few moments, RAIDXpert will display normally in your browser.

Chapter 4: RAIDXpert User Interface

- Banner (page 26)
- Tree View (page 26)
- Management Window (page 28)
- Event Frame (page 29)

This chapter describes RAIDXpert's Graphic User Interface (GUI). You should understand that RAIDXpert is software running on your Internet Browser. RAIDXpert adds a graphic user interface to make RAID management functions easier to understand and perform.

Figure 1. The RAIDXpert Graphic User Interface
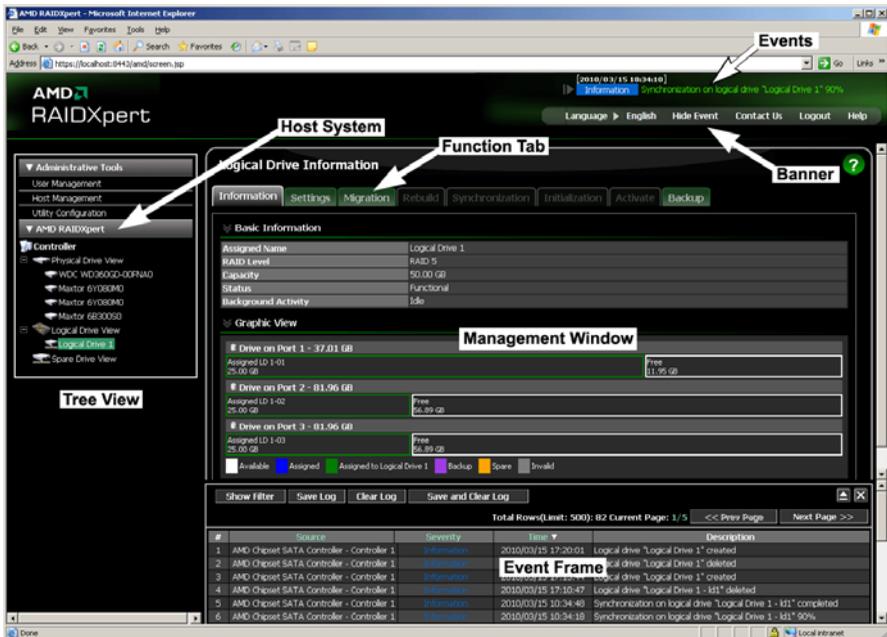
Banner

The RAIDXpert banner appears at the top of your browser window when you are running RAIDXpert.

Figure 2. The RAIDXpert Banner
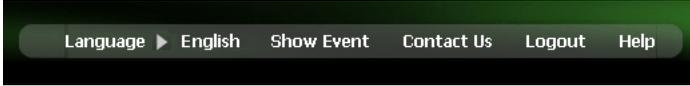
The RAIDXpert banner enables you to do the following actions:

• Select the language in which RAIDXpert displays from the dropdown menu.

• Show or Hide the Event Frame. See Event Frame, below

• Display AMD contact information including links to the AMD website and address

• Log out of RAIDXpert

• Display the Main Online Help menu

The banner always appears when your browser displays RAIDXpert.

Tree View

Figure 3. The RAIDXpert Tree View
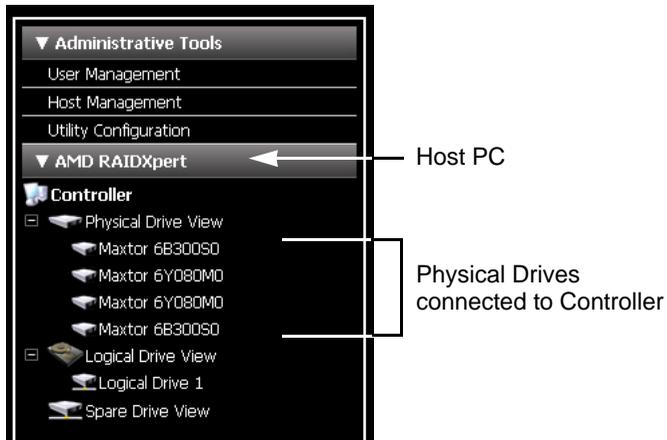
The purpose of Tree View is Navigation. Tree View appears in the left frame of the browser window. Click the + icons to expand the tree.

A Host PC's RAID system is made up of:

- **Administrative Tools** – User and Host Management, and Utility Configuration
    - **User Management** – Create and Delete Users, Passwords, and Permissions
    - **Host Management** – Information on Host PCs
    - **Utility Configuration** – Email settings and Event Frame refresh interval
- **AMD RAIDXpert** – Controller, Physical Drives, Logical Drives, and Spare Drives

     Controller – Priority settings, Status settings, Scheduled activities, Lock

     Physical Drive View – Information on attached physical drives, Split/Merge function

     Physical Drive – Information on a specific physical drive, Cache setting, Media Patrol, Bad Sector Log (BSL) and Drive Locator

     Logical Drive View – Information on logical drives, Create and Delete logical drives

     Logical Drives – Information on logical drives, Cache settings, Rebuild, and Synchronization functions

     Spare Drive View – Physical drives assigned as global or dedicated hot spares

Management Window

The purpose of the Management Window is to monitor and manage your RAID system. The Management Window appears in the right frame of the browser window. What appears in the Management Window depends on which item you click in Tree View.

Figure 4.   Management Window as it appears when you click a logical drive in Tree View
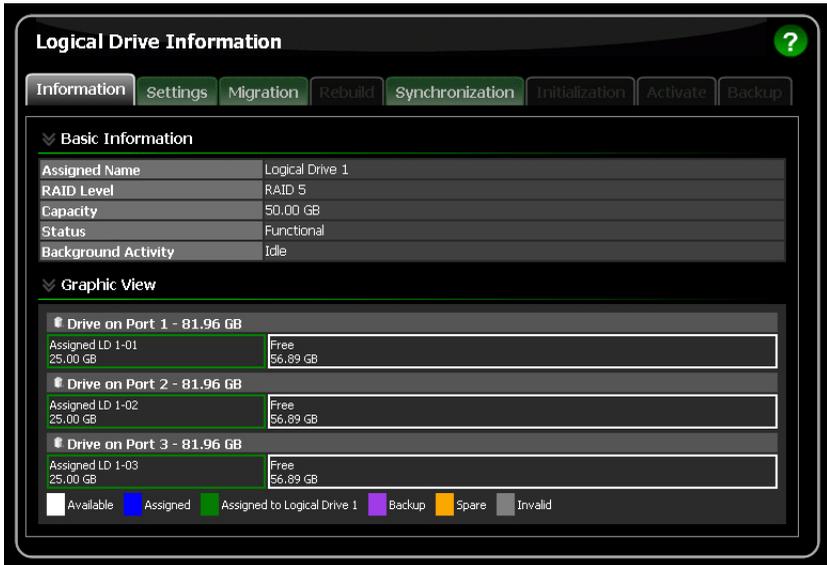
In the example above, the Management Window shows the information about a logical drive because you clicked a Logical Drive in Tree View.

Every Management View window has at least one tab, typically the Information tab. In most cases, there are other tabs each with a particular function that applies to the RAID component you have chosen. In the example above, you can:

- Click the **Settings** tab to change the name of the logical drive or its cache settings.

- Click the **Rebuild** tab to rebuild a replacement physical drive.

- Click the **Synchronization** tab to set the synchronization policy, set an automatic synchronization schedule, or begin a manual synchronization operation.

A full discussion of these and other RAID monitoring and management functions is included in "Chapter 5: Monitoring and Managing" on page 31.

Event Frame

The purpose of the Event Frame is to maintain a log of all events related to your RAID system. The information is especially helpful for RAID management and troubleshooting.

To see the Event Frame, click **Show Event** from the RAIDXpert banner.
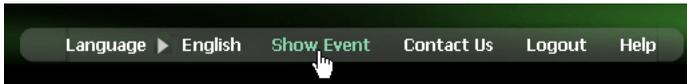
Figure 5. Event Frame appears below the Management Window.

The Event Frame lists 20 per screen. Events are listed by events by Number, Source (the AMD Chipset SATA Controller), Severity (Information, Warning, Critical), Date and Time of occurrence, and Description.

Click the **Prev Page** and **Next Page** buttons to move through the Event list.

Click the Close Management Window ▲ button in the top right corner of the Event Frame to hide the Management Window and allow more space to view the Event Frame.

Click the Open Management Window ▼ to display the Management Window again.

On the Event Frame, you can also:

• Clear the events
• Save the events an text file
• Display events by severity
• Display events by date and time
• Filter the events

Current Event

You can view the current event in the top right corner RAIDXpert window above the Banner. Click the Open Events icon to display the current events.

Figure 6.   Viewing the current event

Open Events icon   Close Events icon

The most recent event displays until another one happens. The next event appears automatically. There is no interruption of activity and there are no buttons to click.

Each event lists the date and time of occurrence, level of severity, and a description, the same as the Event Log.

To hide the current event, click the Close Events icon.

Chapter 5: Monitoring and Managing

Logging into RAIDXpert

Windows PCs: In the Windows Start menu, choose

Programs > AMD > RAIDXpert > RAIDXpert.

Linux PCs: Choose *RAIDXpert* in the Applications menu.

Or, log on manually with your browser:

1. Launch the Browser.
2. In the Browser address field, type the entry explained below.

   If you did *not* choose the External Security option during RAIDXpert installation (see page 8), use the *Regular* connection.

   If you chose the External Security option during RAIDXpert installation (see page 8), use the *Secure* connection.

Regular Connection:

- RAIDXpert uses an HTTP connection .http://
- Enter the Host PC's IP address . . . . .127.0.0.1 or localhost
- Enter the Port number . . . . :25902
- Add to launch RAIDXpert. . . . . /amd

Together, your entry looks like this:

   http://127.0.0.1:25902/amd or **http://localhost:25902/amd**

Secure Connection:

- RAIDXpert uses a secure HTTP connection . . . . .https://
- Enter the Host PC's IP address . . . . .127.0.0.1 or localhost
- Enter the Port number . . . . :8443
- Add to launch RAIDXpert. . . . . /amd

Together, your entry looks like this:

> **https://127.0.0.1:8443/amd** or **https://localhost:8443/amd**

Note that the IP address shown above applies to a log-in at the Host PC. When you log in over a network, enter the Host PC's actual IP address or hostname.

3. Press the Enter key.

4. When the login screen appears, type **admin** in the Login ID field.

    Type **admin** again in the Password field.

    The RAIDXpert login and password are case sensitive.

5. Click the **Sign in** button.

	Note
	Make a Bookmark (Netscape Navigator) or set a Favorite (Internet Explorer) of the Login Screen so you can access it easily next time.

After sign-in, the RAIDXpert opening screen appears.

Choosing a Language

RAIDXpert can display in multiple languages.

To choose your language:

1.   Click the currently displayed language in the RAIDXpert banner.

     A list of available languages displays.

2.   Click the language you prefer.

     The RAIDXpert GUI displays in the language selected.

Notes

- •   You can also choose the language at the Login Screen.
- •   To display some of the supported languages, you might have to install additional fonts or other files to your operating system.

Logging out of RAIDXpert

There are two ways to log out of RAIDXpert:

- •   Close your browser window
- •   Click **Logout** on the RAIDXpert banner
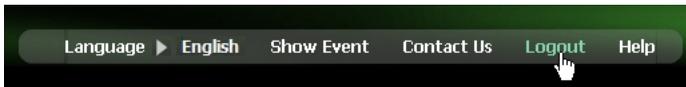
After logging out, you must enter your user name and password to log in again. Clicking **Logout** brings you back to the Login Screen.

User Management

- Adding a User (below)
- Setting up Email Event Notification (page 36)
- Deleting a User (page 39)
- Changing a User's Password (page 40)
- Changing a User's Email Address (page 41)
- Changing a User's Access Rights (page 42)

Adding a User

1. Log into RAIDXpert as the Administrator.
2. Click **User Management** in Tree View.
3. Click the **Create** tab in Management View.

4. Type a User ID into the User ID field.
   This ID will be the User's login name.
5. Type the user's display name into the Display Name field.
   This name could be the User's actual name.
6. Type a password into the Password field.
   Use up to 8 letters and numbers but no spaces or other characters.
7. Type the same password into the Retype Password field.

8. If you plan to set up Event Notification, type the user's email address in the Email field.

9. Under Host User Rights, check the boxes to select rights for this user.

Right	Meaning
Creation	Permission to create a logical drive and a spare drive
Deletion	Permission to delete a logical drive and a spare drive
Maintenance	Permission to migrate, rebuild, and synchronize a logical drive; to run Media Patrol on a physical drive; make controller and physical drive settings
Notification	Permission to receive notification of events affecting the logical drive

10. Click the **Submit** button.

Setting up Email Event Notification

1. Click **User Management** in Tree View.

2. Click the **User ID** link in Management View.
3. Click the **Events** tab.

The image above was shortened to fit on the page.

4. Check the boxes of the notification events that you want to have reported to you via email and popup messages.

   To select events by their severity, check one of the four Select Events boxes at the top of the window. See the table on the next page.

5. Click the **Submit** button.

Event Notification Severity Levels

Warning Events

Disk Unplugged
Disk Timeout
Task Error
Disk Media Patrol Aborted with Error
Bad Block Remapped
Disk Pre Fail
Array Critical
Array Degrade
Synchronization Requested
Redundancy Check Rejected

Error Events

Disk Setdown
Disk Non-ECC Error
Disk S.M.A.R.T. Error

Error Events

Array Offline
Background Initialization Aborted with Error
Synchronization Aborted with Error
Redundancy Check Aborted with Error
Redundancy Check Inconsistency Found
Rebuild Aborted with Error
Rebuild Error Aborted on Stream
Background Initialization Aborted with Error
Migration Aborted with Error
Backup Aborted
Fast Copy Aborted
Unknown Error

Event Notification Severity Levels, continued

Information Events

Disk Plugged In
Disk BSL Update
Disk BSL Cleared
Disk Error Fixed
Disk BSL Accessed
Disk Patrol Progress
Disk Media Patrol Started
Disk Media Patrol Completed
Disk Media Patrol Paused
Disk Media Patrol Resumed
Disk Media Patrol Aborted
Array Online
Array Created
Array Deleted
Array Cache Mode Changed
Array Auto Cache Mode Change
Synchronization Started
Synchronization Completed
Synchronization Paused
Synchronization Resumed
Synchronization Aborted
Synchronization Progress
Synchronization Inconsistency Fixed
Redundancy Check Started
Redundancy Check Completed
Redundancy Check Paused
Redundancy Check Resumed
Redundancy Check Aborted
Redundancy Check Progress

Information Events

Rebuild Started
Rebuild Completed
Rebuild Paused
Rebuild Resumed
Rebuild Aborted
Rebuild Restarted
Rebuild Progress
Background Initialization Progress
Background Initialization Started
Background Initialization Completed
Background Initialization Paused
Background Initialization Resumed
Background Initialization Aborted
Migration Started
Migration Completed
Migration Paused
Migration Resumed
Migration Aborted
Migration Progress
Backup Started
Backup Completed
Backup Paused
Backup Resumed
Backup Progress
Fast Copy Started
Fast Copy Completed
Fast Copy Paused
Fast Copy Resumed
Fast Copy Progress

Deleting a User

1. Log into RAIDXpert as the Administrator.
2. Click **User Management** in Tree View.
3. Click the **Delete** tab in Management View.
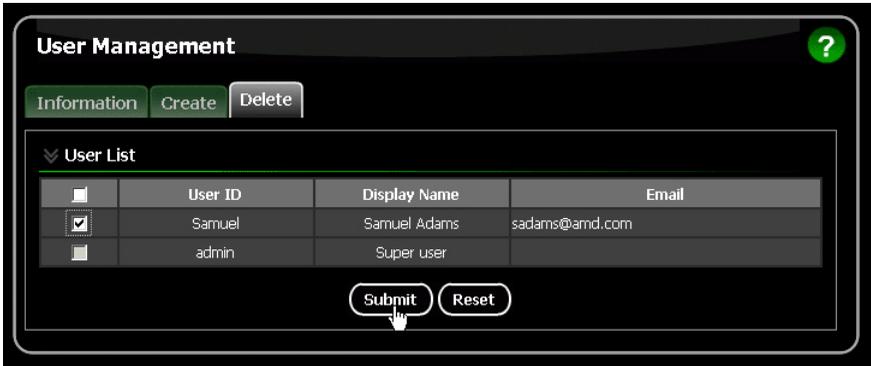
4. Check the box to the left of the user you want to delete.

5. Click the **Delete** button.

6. In the Confirmation box, click the **OK** button.

Changing a User's Password

In RAIDXpert, each user can change his or her own password. To change a user's password:

1. Log into RAIDXpert under your User name.
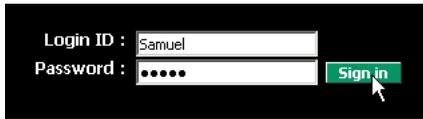
2. Click **User Management** in Tree View.

3. Click your **User ID** link in Management View.
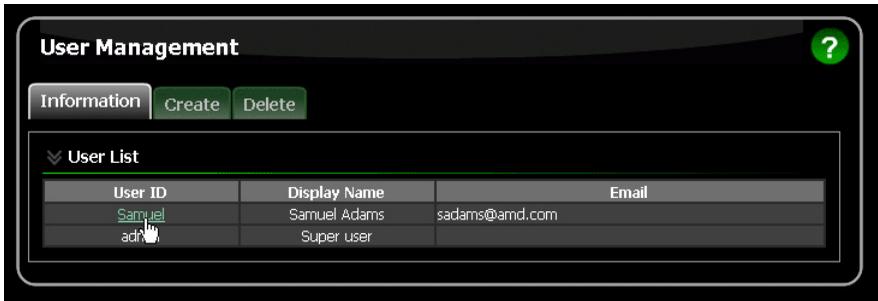
4. Click the **Settings** tab.

5. Type the current password in the Old Password field.

6. Type a new password in the New Password field.
7. Retype the new password in the Retype Password field.
8. Click the **Submit** button.

Important

If a user forgets his or her password, the Administrator must delete that User account and create a new one, as described above.

Changing a User's Email Address

In RAIDXpert, each user can change his or her own email address or the Administrator can do it. To change your email address:

1. Log into RAIDXpert under your User name.

2. Click **User Management** in Tree View.
3. Click your **User ID** link in Management View.

4. Click the **Settings** tab.
5. Type a new email address in the Email field.
6. Click the **Submit** button.

Changing a User's Access Rights

In RAIDXpert, the Administrator can change a user's access rights. To change a user's access rights:

1. Log in as the Administrator.
2. Click **User Management** in Tree View.

   The user list displays in Management View.
3. Click the **User ID** link for the user whose access rights will change.

4. Under Host User Rights, check the boxes to select rights for this user.
    Uncheck the boxes of rights to be deleted.

Right	Meaning
Creation	Permission to create a logical drive and a spare drive
Deletion	Permission to delete a logical drive and a spare drive
Maintenance	Permission to migrate, rebuild, and synchronize a logical drive; to run Media Patrol on a physical drive; make controller and physical drive settings
Notification	Permission to receive notification of events affecting the logical drive

5. Click the **Submit** button.

Host Management

This function provides information only. There are no user settings. To access Host Management:

1. Click **Host Management** in Tree View.

   Host information displays in Management View.
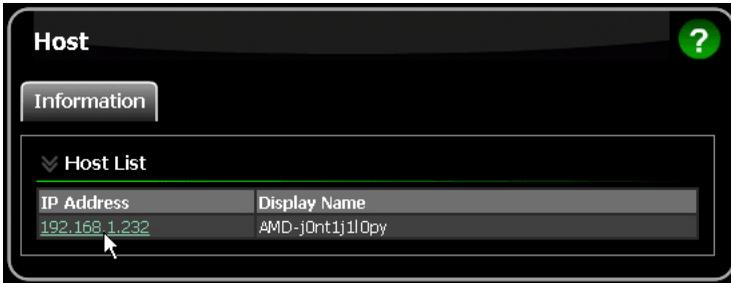
2. Under Host List, click the **IP Address** link to the host you want to see.
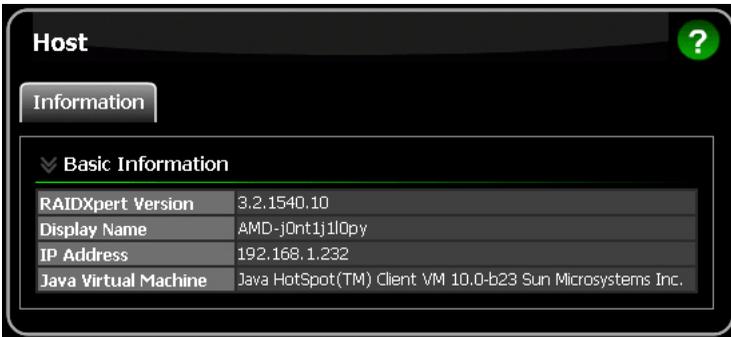
The Information tab displays with information about the Host PC.

- **RAIDXpert Version** – The version number of the RAIDXpert software.

- **Display Name** – The display name of the Host PC. "localhost" is the default. Supported characters include letters (A to Z) and (a to z), numbers (0 to 9), and a hyphen (-).

- **IP Address** – Refers to the Host PC. 127.0.0.1 means accessed at the Host PC itself. Other addresses, such as 192.168.1.232, means accessed either at the Host PC or over a network.

- **Java Virtual Machine** – The version number of private JVM that installs with RAIDXpert.

Utility Configuration

- Making Utility Configuration Settings (page 45)
- Choosing Utility Configuration Options (page 46)

Making Utility Configuration Settings

Use this function to make email settings for RAIDXpert and also to set the refresh interval for the Event Frame.

To make Utility Configuration settings:

1. Click **Utility Configuration** in Tree View.

    The Utility Configuration Settings appear in Management View.

2. Enter the Sender's address in the Email Sender field.

    Be sure the sender has an account in your email system. See your IT administrator.

3. Enter your email server in the Email Server field.

4. Keep or change the Email Subject line.

5. Choose an interval from the Event Frame Refresh Time dropdown menu.

    30 seconds is the default interval.

6. Click the **Enable** or **Disable** options for:

    - **Backup Prompt** – Offers to make a backup copy of a RAID Ready logical drive. See page 46.

    - **System Event Notification** – Displays messages on the Host PC's desktop. See page 47.

7. Click the **Submit** button when you are done.

Also see "Setting up Email Event Notification" on page 36.
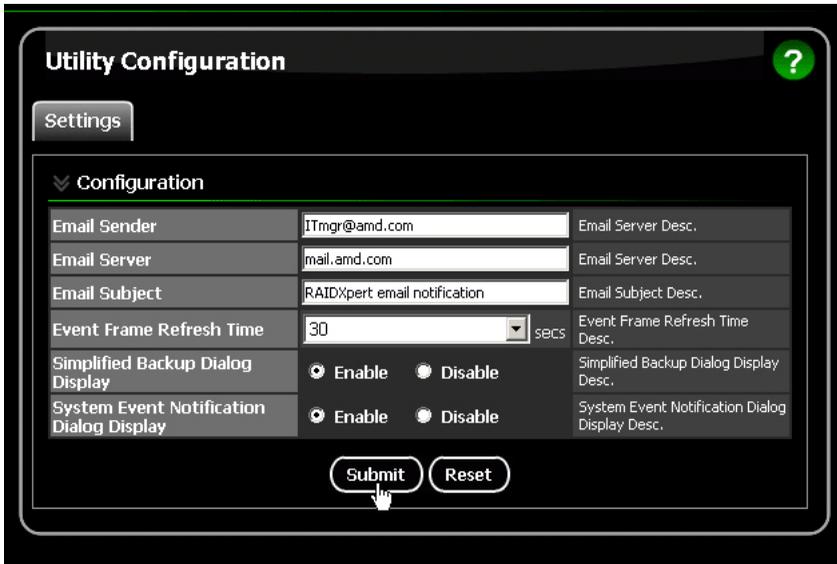
Choosing Utility Configuration Options

Backup Prompt

This feature makes a copy of your RAID Ready logical drive onto a separate disk drive. Because a RAID Ready consists of only one physical drive, there is no redundancy to protect against drive failure. The Backup feature provides that protection. The backup drive is monitored as a logical drive in the RAIDXpert interface.

When you have a RAID Ready logical drive on your system and you plug in a new disk drive, RAIDXpert will ask you if you want to make a backup of the RAID Ready logical drive. Capabilities include:

- Bootable drives
- Automatic incremental backups
- Backup continues after system reboot
- Hot unplug and plug-in of backup drive

System Event Notification

An example of a System Event Notification message.

These messages display on the top right corner of the Host PC's desktop, whether or not RAIDXpert is running at the time. This feature makes it easy to monitor your RAID system without having to keep a browser window open and dedicated to the RAID.

Click **OK** to delete the message from your desktop.

Controller

- Viewing Controller Information (below)
- Making Controller Settings (page 49)
- Viewing Controller Scheduled Activities (page 50)
- Locking the Controller (page 51)

The term Controller refers to the device that controls your RAID.

Viewing Controller Information

To view controller information, click ![icon] **Controller** in Tree View.

The Information tab displays with information about the controller.
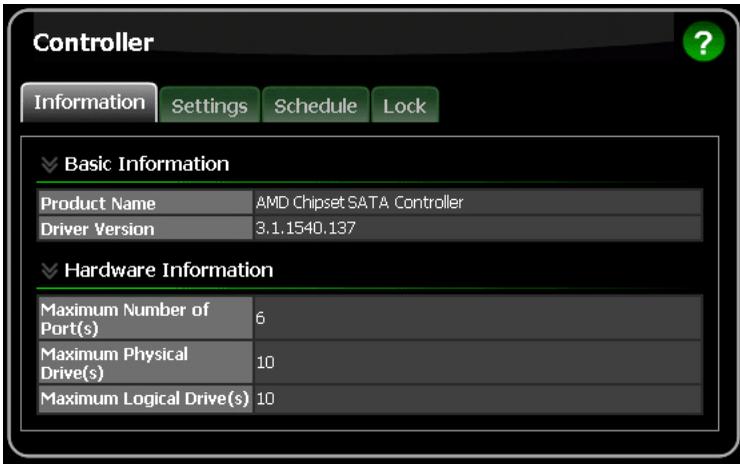
- **Product Name** – The AMD product name for this controller.
- **Driver Version** – Version number of the controller's software driver.
- **Maximum Number of Ports** – The number of ports on the controller.
- **Maximum Physical Drives** – The maximum number of physical (disk) drives the controller can support.
- **Maximum Logical Drives** – The maximum number of logical drives (arrays) the controller can support.

Making Controller Settings

To make controller settings:

1. Click ![icon] **Controller** in Tree View.
2. Click the **Settings** tab in Management View.
3. Click the **Enable** or **Disable** options for each feature.

- **Rates** – Allocates system resources between the background activity such as Rebuild, Media Patrol, Migration/Expansion, Initialization, and Synchronization, and the data read/write activity.

  A *High* setting assigns most of the system resources to background processes. The process will finished sooner but read/write requests are handled slower.

  A *Medium* setting tries to balance system resources between the background processes and data input/output activity.

  A *Low* setting assigns most of the system resources to handling read/write requests. Read/write requests are handled at nearly normal speed while the background processes take longer.

- **Automatic Rebuild Status** – When enabled, and a hot spare drive is available, a critical or degraded logical drive will rebuild itself automatically.

When enabled, and a hot spare drive is not available, a critical or degraded logical drive will rebuild itself automatically when you replace the failed physical drive with a new one. See page 84.

- **Automatic Rebuild Policy** – Selects which physical drive to use as a hot spare:
  - A spare drive only. See page 89.
  - The free portion of a physical drive whose other portion is assigned to a logical drive. Or a spare drive.

    A logical drive cannot use the free portion of its own physical drive to rebuild itself. It can only use the free portion of a physical drive belonging to a different logical drive for this purpose.
- **Buzzer** – When enabled, the Controller's buzzer will sound to report a problem.
- **S.M.A.R.T. Status** – SMART, an acronym for Self-Monitoring Analysis and Reporting Technology, is a feature of the physical drive software. When enabled, the SATA controller polls the physical drives for SMART information and reports it to you.
- **S.M.A.R.T. Check Polling Interval** – The interval of time in seconds when the SATA controller polls the physical drives for SMART information. 120 seconds is the default.

4. Click the **Submit** button.

   Your settings take effect immediately.

Viewing Controller Scheduled Activities

To view scheduled background activities:

1. Click [icon] **Controller** in Tree View.
2. Click the **Schedule** tab in Management View.
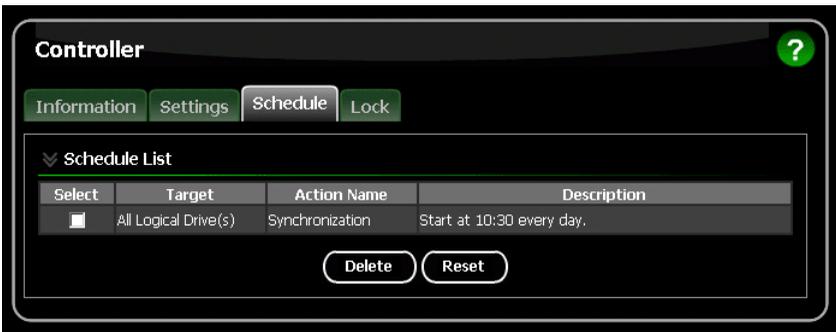
The Schedule tab displays all scheduled background activity, such as Media Patrol, Migration, Rebuild, Synchronization, Redundancy Check, and Initialization.

Adding a Scheduled Activity

To add a schedule for these activities, see:

Deleting a Scheduled Activity

To delete a scheduled background activity:

1. Click ![icon] **Controller** in Tree View.
2. Click the **Schedule** tab in Management View.
3. Check the box to the left of the process you want to delete.
4. Click the **Delete** button.
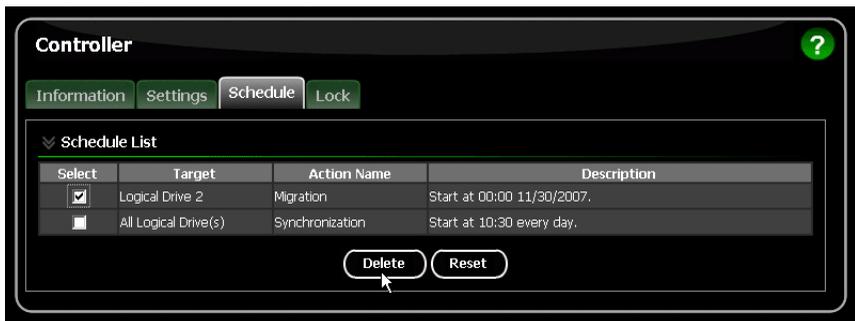
5. In the Confirmation box, click the **OK** button.

You can also go to the tab where the background activity is scheduled and click the **Disable** option.

Locking the Controller

The Lock tab displays lock status and enables you to lock or unlock a subsystem controller. The locking mechanism isolates the controller during maintenance operations and other periods when you want to avoid interruption from other users trying to access the logical drives under this controller.

To lock the Controller on the Host PC:

1. Click ![icon] **Controller** in Tree View.
2. Click the **Lock** tab in Management View.
3. From the dropdown menu, select a period of time to hold the lock.

   The lock time range is 1 to 30 minutes.
4. Click the **Lock** button to set the lock.

   The lock will release itself automatically at the end of the period you specified.

5. To release the lock before the scheduled time, click the **Unlock** button.

Physical Drives

- Viewing Physical Drives (below)
- Merging a Physical Drive (page 54)
- Scheduling Media Patrol – All Physical Drives (page 54)
- Viewing Physical Drive Information (page 55)
- Making Physical Drive Settings (page 57)
- Running Media Patrol – One Physical Drive (page 58)
- Viewing the Physical Drive Bad Sector Log (page 59)
- Deleting Physical Drive Backup Information (page 60)

Viewing Physical Drives

To access Physical Drive View, click **Physical Drive View** in Tree View. From this window, you can click the links to access information and functions of individual physical drives and use the Merge feature.

Merging a Physical Drive

A physical drive is logically split when its capacity is divided between two assignments, such as two different logical drives. When the logical drives are deleted, the split remains. The action of merging a physical drive reunites the two portions of a split drive back into a single physical drive.

The Merge function is not available when either or both portions of the physical drive are assigned to a logical drive. The physical drive is identified by the port number to which it is attached.
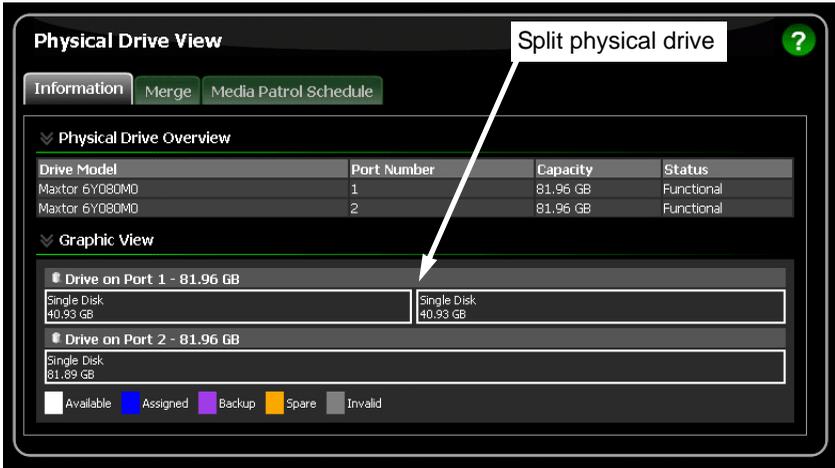
To merge a physical drive:

1. Click **Physical Drive View** in Tree View.
2. Click the **Merge** tab in Management View.
3. Check the box to the left of the physical drive you want to merge.
4. Click the **Submit** button.

Click **Physical Drive View** again to see the results of your merge operation.

Scheduling Media Patrol – All Physical Drives

The Physical Drive View–Media Patrol tab allows you to start Media Patrol on all physical drives. For more information, see "Media Patrol" on page 107. You can also run Media Patrol on individual physical drives, see page 58.

To schedule Media Patrol:

1. Click **Physical Drive View** in Tree View.
2. Click the **Media Patrol Schedule** tab in Management View.

3. Click the **Enable** option.
4. Click the **by Day**, **by Week** or **by Month** option.
5. From the dropdown menus, select a start time and a day of the Week or Month, if applicable.

   Start time is based on a 24-hour clock.
6. Click the **Schedule** button.
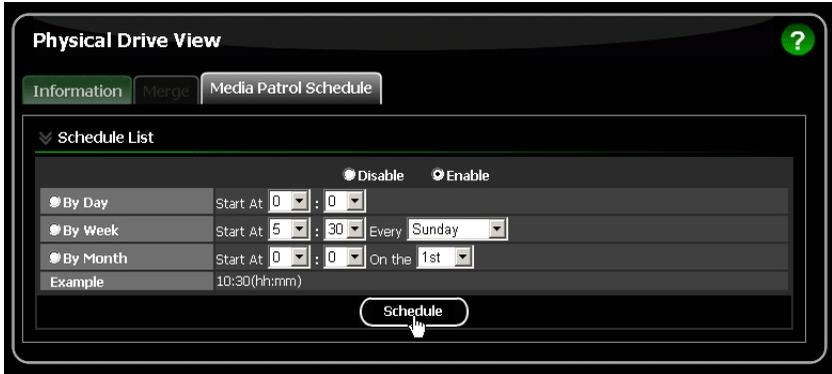
Canceling a Schedule

To cancel the scheduled Media Patrol operation:

1. Click **Physical Drive View** in Tree View.
2. Click the **Media Patrol Schedule** tab in Management View.
3. Click the **Disable** option.

Viewing Physical Drive Information

To access information about a physical drive:

1. Click **Physical Drive View** in Tree View.
2. Click the **Physical Drive** whose setting you want to view.

   The Information tab appears in Management View.

The Information tab displays the following information:

- **Drive Model** – The physical drive manufacturer's model name or number.
- **Serial Number** – The serial number of this physical drive.
- **Firmware Version** – The version number of the firmware on this physical drive.
- **Port Number** – The number of the motherboard SATA port to which a physical drive is attached. Drives attached to a SATA port multiplier show the port number to which the port multiplier is connected.
- **Target ID** – Physical drives attached to motherboard SATA ports show target ID 1. Drives attached to a SATA port multiplier each show a different target ID number.
- **Drive Status** – The operational status of this physical drive. Functional means normal. Others include Offline.
- **Background Activity** – The current background activity affecting this physical drive. Idle means no activity. Others include Initializing and Rebuilding.
- **Capacity** – The data capacity of this physical drive in GB.

- **S.M.A.R.T. Status** – SMART, an acronym for Self-Monitoring Analysis and Reporting Technology, is a feature of the physical drive software. When this feature is supported, the drive will pass SMART information to the SATA controller when it polls the physical drives.

- **Write Cache Status** – Indicates whether the physical drive's write cache is Enabled or Disabled. You can change this status under the Settings tab (see below).

- **SATA** – The SATA data rate of the physical drive, 1.5 Gb/s or 3Gb/s.

- **Command Queue** – Shows NCQ (Native Command Queueing) if supported by this physical drive.

Making Physical Drive Settings

Physical Drive Settings allows you to enable or disable the Write Cache on an individual physical drive. To access the physical drive setting:

1. Click **Physical Drive View** in Tree View.
2. Click the **Physical Drive** on which you want to make settings.
3. Click the **Settings** tab in Management View.
4. Click the **Enable** or **Disable** options.

    The options appear that the physical drives supports.

5. Click the **Submit** button.
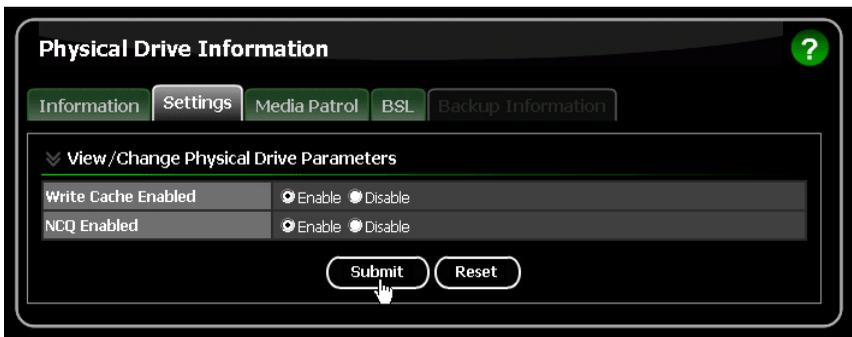
Running Media Patrol – One Physical Drive

The Physical Drive–Media Patrol tab allows you to start Media Patrol on an individual physical drive. You can also run Media Patrol on all physical drives at the same time, see page 54.

For more information, see "Media Patrol" on page 107.

On Demand

To start Media Patrol immediately:

1. Click **Physical Drive View** in Tree View.
2. Click the **Physical Drive** on which you want to run Media Patrol.
3. Click the **Media Patrol** tab in Management View.
4. Click the **Start Now** button.
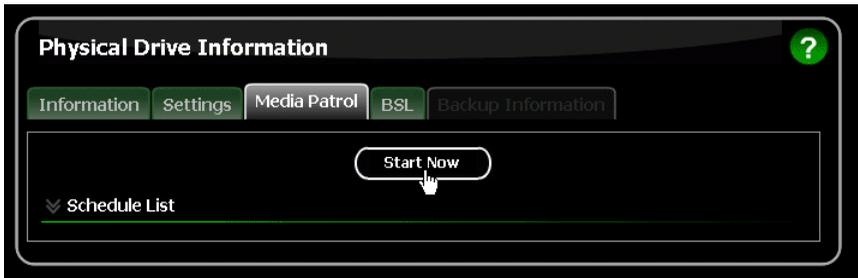
Scheduled

To schedule Media Patrol to run at a later time:

1. Click **Physical Drive View** in Tree View.
2. Click the **Physical Drive**.
3. Click the **Media Patrol** tab in Management View.
4. Click the Enable option.
5. Click the **by Day**, **by Week** or **by Month** option.

    From the dropdown menus, select a start time and a day of the Week or Month, if applicable.

    Start time is based on a 24-hour clock.
6. Click the **Schedule** button.
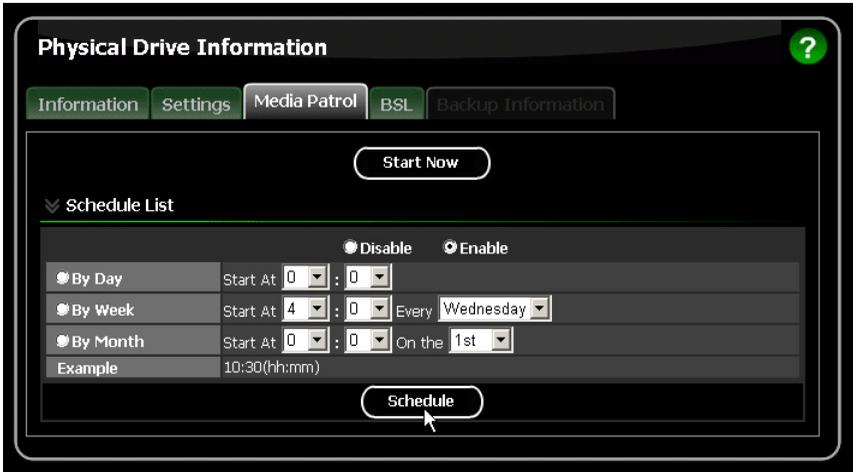
Canceling a Schedule

To cancel the scheduled Media Patrol operation:

1. Click **Physical Drive View** in Tree View.
2. Click the **Physical Drive** whose schedule you want to cancel.
3. Click the **Media Patrol** tab in Management View.
4. Click the **Disable** option.

Viewing the Physical Drive Bad Sector Log

On occasion, an error can arise with the media on a physical drive. RAIDXpert keeps track of bad sectors in order to inform you of the condition of individual physical drives.

To access a physical drive's bad sector log:

1. Click **Physical Drive View** in Tree View.
2. Click the **Physical Drive** whose bad sector log you want to view.
3. Click the **BSL** tab in Management View.

If any bad sectors are found, they are listed here. RAIDXpert informs you by popup and email messages when a bad sector error is logged (see page 36).

After 10 bad sectors have been discovered on a physical drive, RAIDXpert issues a warning to replace the drive.

After 20 bad sectors have been discovered:

- On fault-tolerant (RAID 1, 5, or 10) logical drives, the RAID controller will set down the physical drive (take it offline) and the logical drive will go critical.

    Replace the physical drive and rebuild your logical drive.

- On non-fault-tolerant (RAID 0 or RAID Ready) logical drives, the physical drive remains online.

    Backup your data, replace the physical drive, create a new logical drive and copy your data to it.

See "Rebuilding a Logical Drive" on page 74 and "Managing a Critical or Offline Logical Drive" on page 84.

See your system *User Manual* for more information about replacing a physical drive.

Deleting Physical Drive Backup Information

When you make a backup of your RAID Ready logical drive, the physical drive used for the backup becomes a RAID 1 mirrored pair with the RAID Ready drive. See "Backing up a RAID Ready Logical Drive" on page 68.

To make the physical drive available for use in other logical drives or as a spare, you must delete the backup information.

Important

When you delete a backup drive, you delete all data on the backup drive. This operation does not affect the data on the RAID Ready logical drive.

Note

If your backup drive is present in your RAIDXpert system when you delete the corresponding RAID Ready logical drive, the backup drive is deleted at the same time. In that situation, you do not need to delete backup information separately.

To delete backup information from a physical drive:

1. Click **Physical Drive View** in Tree View.
2. Click the **Physical Drive** marked as a backup drive.
3. Click the **Backup Information** tab in Management View.
4. Click the **Delete** button.

Physical Drive Information

| Information | Settings | Media Patrol | BSL | Backup Information |

Backup Information

| Name | Logical Drive 1 | the name of target logical drive |
| Time | 2007/11/29 17:59:39 | the time of backup |

Delete

5. In the Confirmation box, click the **OK** button.

The backup information is removed and the physical drive is ready for use in a logical drive or as a spare drive.

Logical Drives

- Viewing Logical Drives (below)
- Creating a Logical Drive (page 62)
- Deleting a Logical Drive (page 67)
- Viewing Logical Drive Information (page 68)
- Making Logical Drive Settings (page 68)
- Backing up a RAID Ready Logical Drive (page 68)
- Migrating a Logical Drive (page 71)
- Rebuilding a Logical Drive (page 74)
- Synchronizing All Logical Drives (page 78)
- Synchronizing One Logical Drive (page 79)
- Initializing a Logical Drive (page 82)
- Logical Drive Activation (page 83)
- Managing a Critical or Offline Logical Drive (page 84)

Viewing Logical Drives

Logical Drive View provides a list of all logical drives currently on the Host PC. To see a list of your logical drives, click **Logical Drive View** in Tree View.
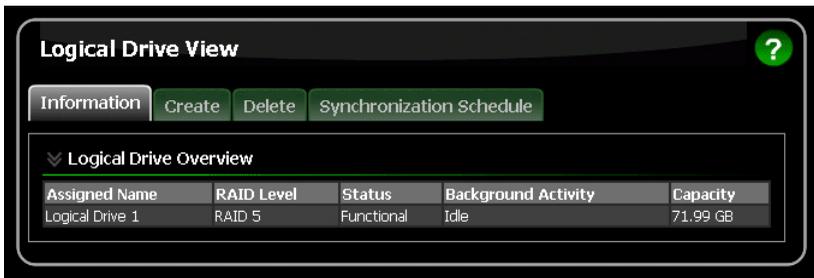
From this screen, you can click the links to access information and functions of individual logical drives and use the Create and Delete features.

Creating a Logical Drive

A logical drive is a collection of physical drives in a RAID.

To create a new logical drive:

1. Click **Logical Drive View** in Tree View.
2. Click the **Create** tab in Management View.

   The Select RAID Level screen appears.

3. Select the option beside the RAID level you want for your logical drive.

    RAIDXpert displays the RAID levels you can use with the available physical drives. See page 101 for information about the available RAID levels.

Select RAID Level

Redundant Array of Independent Disks (RAID) combines multiple physical drives to form one logical drive.

- **RAID Ready** Single disk drive reserved for RAID creation
- **RAID 0** Data striped across two or more drives for increased performance but no data protection
- **RAID 1** Mirrored pairs of drives for data protection with increased read performance
- **RAID 5** Striped parity on 3 or more drives, ultimate data protection, capacity and performance balance
- **RAID 10** Data mirrored then striped across 4 drives, for double drive failure protection
- **JBOD** Just a Bunch Of Drives: Combines disk capacities into one large volume

Next >>
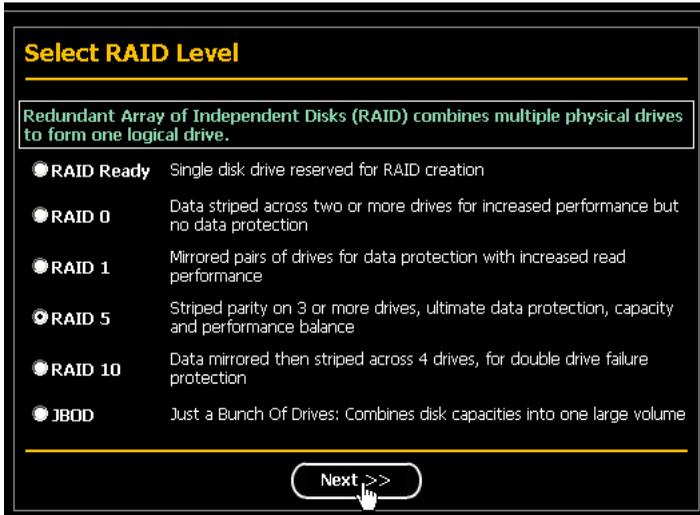
4. In the Select Drive Type screen, click the option for one of the following:
    - **Single Disk(s)** – Selects single disks (unassigned physical drives)
    - **Logical Drive** – Select the Free portion of physical drives whose other portion is assigned to a Logical Drive

    The available choices depend on the RAID level you selected and the physical drives available.
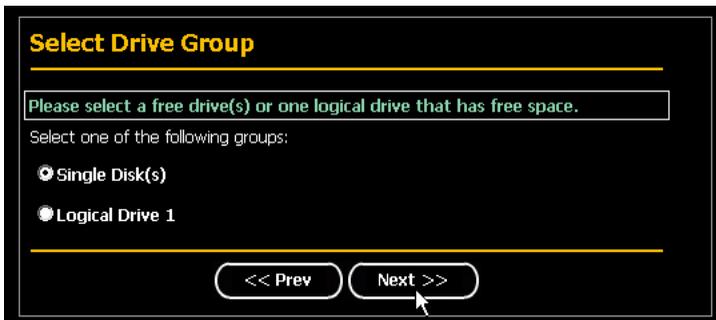
Select Drive Group

Please select a free drive(s) or one logical drive that has free space.

Select one of the following groups:

- **Single Disk(s)**
- **Logical Drive 1**

<< Prev   Next >>

5. Click the **Next** button.

    The Select Drives screen appears.

6. If you want to split the capacity of your physical drives between two logical drives, enter the capacity for the first logical drive in the Logical Drive Size field.

Or, to use the maximum capacity of the physical drives, check the Use Maximum Capacity box.

For RAID Ready and JBOD, the system will check the Use Maximum Capacity Box automatically.

| Logical Drive Size | 0.0 | GB(☑ Use Maximum Capacity) |
| Please select at least 3 drives for RAID 5. | | |

7. Click the physical drives to select them.

Available drives have a white frame. Selected drives have a red frame.

For optimal performance, select physical drives of the same model and capacity. Also see the Note on the facing page.

For RAID Ready, select only one physical drive.

8. Click the **Next** button.

The Assign a Name screen appears.

9. Accept the default name or enter a new name for the logical drive in the field provided.

10. Click the **Next** button.

The Final Settings screen appears.

11. RAID 0, 5, and 10. Choose a Stripe Block Size from the dropdown menu.

The choices are 64 and 128 KB. For more information, see "Choosing Stripe Block Size" on page 103.

The Write Cache policy is Write Through. You cannot change this setting.

12. RAID 0, 1, 5, and 10. Choose a Gigabyte Boundary policy from the dropdown menu.

• **Gigabyte Boundary** – Rounds the size of the logical drive down to the nearest whole gigabyte. This is the default. For more information, see "Gigabyte Boundary" on page 103.

• **None** – No Boundary function.

13. Choose an Initialization policy from the dropdown menu.

• **Fast Initialization** – Erases the reserve and master boot sectors of the physical drives being added to the logical drive.

• **Full Initialization** – Erases all sectors of the physical drives being added to the logical drive. RAID 1, 5, and 10 only.

• **None** – No initialization. This choice is not recommended.

14. Click the **Finish** button.

   If there are physical drives available, the Select RAID Level screen appears again, where you can create an additional logical drive.

Click the **Logical Drive** in Tree View to see all of the information about your new logical drive.

Before you can use your new logical drive, you must partition and format the logical drive using your PC's operating system. See "Appendix B: Partition and Format" on page 111 for more information.

Deleting a Logical Drive

Warning

When you delete a logical drive, you delete all data on the logical drive. Be sure to backup any important data before you delete a logical drive!

Note

If you are deleting a RAID Ready logical drive and your backup drive is present in your RAIDXpert system, the backup drive is automatically deleted at the same time.

To delete a logical drive:

1. Click **Logical Drive View** in Tree View.
2. Click the **Delete** tab in Management View.
3. Check the box to the left of the logical drive you want to delete.
4. Click the **Submit** button.

5. In the Confirmation box, click the **OK** button.
6. In the Warning box, click the **OK** button.

   The selected logical drive is deleted.

Viewing Logical Drive Information

Logical Drive View provides a list of all logical drives currently on the Host PC.

To access Logical Drive View:

1. Click **Logical Drive View** in Tree View.
2. Click the **Logical Drive** you want to view.

From this screen, you can click the links to access the Settings, Migration, Rebuild, Synchronization, Initialization, and Activation features. The features that apply to this logical drive have green tabs. Features that do not apply have blackened tabs.

Making Logical Drive Settings

Logical Drive Settings enables you to change the name of a logical drive.

To access logical drive settings:

1. Click **Logical Drive View** in Tree View.
2. Click the **Logical Drive** whose name you want to change.
3. Click the **Settings** tab in Management View.
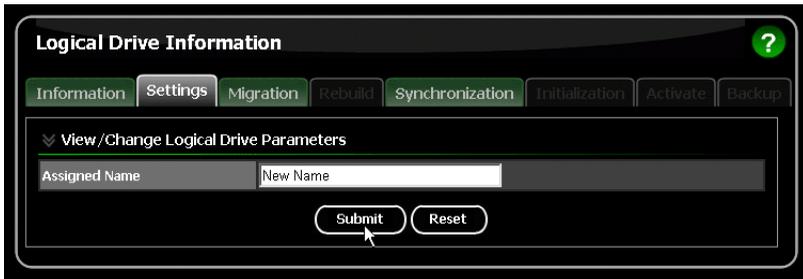
4. Enter a name in the Assigned Name field.
5. Click the **Submit** button.

Backing up a RAID Ready Logical Drive

This feature is only supported by Windows. To use RAID Ready Backup, you must include it during RAIDXpert installation. See "Windows with RAID Ready Backup" on page 5 and "RAID Ready – Single Drive" on page 99 for more information.

RAID Ready Backup enables you to create and maintain a mirror of your RAID Ready logical drive. The two drives appear to your system as a single RAID 1 logical drive.

If you write data to your RAID Ready drive without the backup drive in your system, RAIDXpert will automatically update the data on the backup drive when you insert it the next time.

You can set up your RAID Ready backup drive in one of two ways:

• By clicking a popup box
• By selecting a physical drive

Set up by Clicking a Popup Box

When you plug an unformatted physical drive into your system, RAIDXpert displays a popup box:

Click the **Yes** button to make a backup of your RAID Ready logical drive to the physical drive that you just plugged into your system.

Set up by Selecting a Physical Drive

This option requires one unassigned physical drive connected to the AMD Controller.

To backup your RAID Ready by selecting a drive:

1.   Click **Logical Drive View** in Tree View.
2.   Click the **Logical Drive** whose name you want to change.
3.   Click the **Backup** tab in Management View.
4.   Click a Single Disk (unassigned physical drive) to use as the backup drive.

     Available drives have a white frame. Selected drives have a red frame.
5.   Click the **Start Now** button.

     The data on your RAID Ready drive is copied to the backup drive.
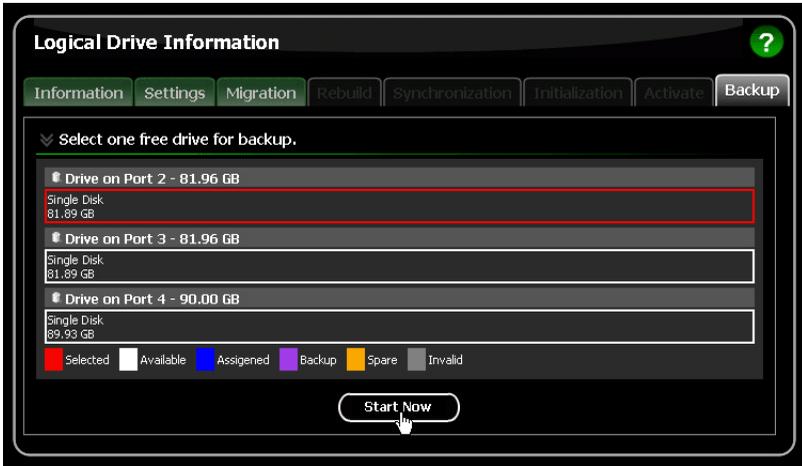
Click the **Backup** tab to monitor the progress of the backup operation.
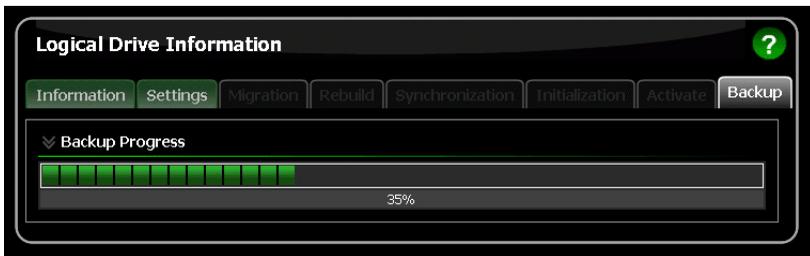
Backup Drive Features

There is no pause or resume button for the backup. However, if you reboot your system with the backup drive still attached, the backup function will continue automatically after the reboot is completed.

When the backup is finished, the backup drive is an exact duplicate of your RAID Ready logical drive. If your RAID Ready was a bootable drive, your backup drive will be bootable also. Your system can boot from either drive.

If you leave the backup drive in your system and you reboot the system, the RAID Ready and backup drive will appear as a RAID 1 mirrored logical drive.

To use your backup drive in a different logical drive, you must delete the backup information. See "Deleting Physical Drive Backup Information" on page 60.

Migrating a Logical Drive

The Logical Drive–Migration tab enables you to:

- Change the RAID level of an existing logical drive
- Add physical drives to a logical drive while keeping the same RAID level. This action is also called *Expansion*

You can change the RAID level of a logical drive with certain combinations of RAID level and number of physical drives, as described in the table below.

Important

Migrating to some RAID levels might require you to add physical drives. Add drives that are the same size or larger than those in the current logical drive.

From	To	Result
RAID Ready: 1 drive	RAID 0: 2 to 6 drives	Increases capacity
	RAID 1: 2 drives	Adds redundancy
	RAID 5: 3 to 6 drives*	Increases performance and capacity, adds redundancy
	RAID 10: 4 drives	
	JBOD: 2 to 6 drives	Increases capacity
RAID 0: 2 drives	RAID 5: 3 to 6 drives*	Increases performance and capacity, adds redundancy
	RAID 10: 4 drives	
RAID 0: 3 drives	RAID 5: 4 drives*	Increases performance and capacity, adds redundancy
RAID 1: 2 drives	RAID 0: 2 drives	Increases capacity, loses redundancy
	RAID 5: 3 to 6 drives*	Increases performance and capacity
	RAID 10: 4 drives	
RAID 10: 4 drives	RAID 0: 4 drives	Increases capacity, loses redundancy
	RAID 5: 4 to 6 drives*	Increases capacity
* Only with AMD Chipset SATA Controllers that support RAID 5.		

You can add physical drives to an existing logical drive while keeping the same RAID level for:

- RAID 0
- RAID 5
- JBOD

RAIDXpert supports up to six physical drives for these logical drives. For more information, see "Migration" on page 105.

You can set up a Migration to begin immediately (on demand) or schedule a Migration for a time when there is less demand on the RAID system.

On Demand

To migrate a logical drive:

1. Click **Logical Drive View** in Tree View.
2. Click the **Logical Drive** you want to migrate.
3. Click the **Migration** tab in Management View.
4. From the Migrate RAID Level to dropdown menu, choose the target RAID level for your logical drive.
5. If your intended action requires additional physical drives, click a Single Disk (unassigned physical drive) to select it.

    Available drives have a white frame. Selected drives have a red frame.
6. Click the **Start Now** button.
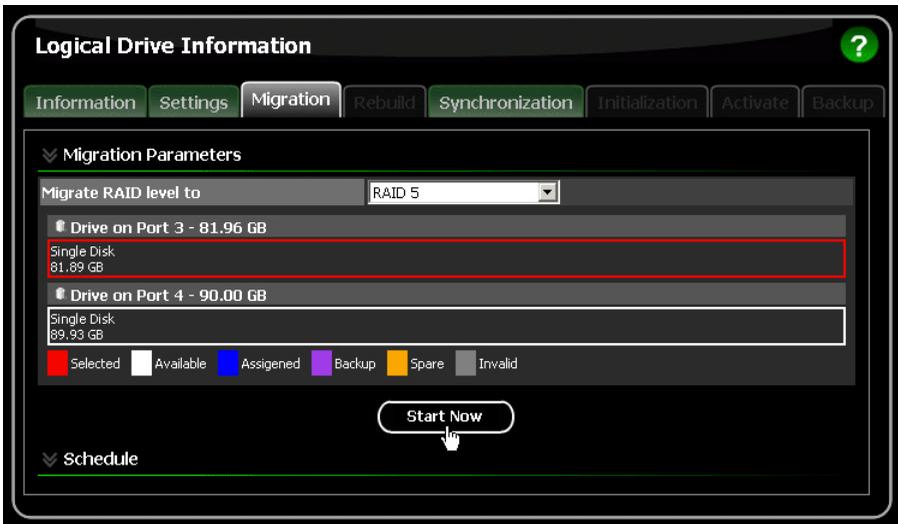
You can monitor Migration progress on the Logical Drive Migration tab. Click the respective buttons to pause and resume the Migration.
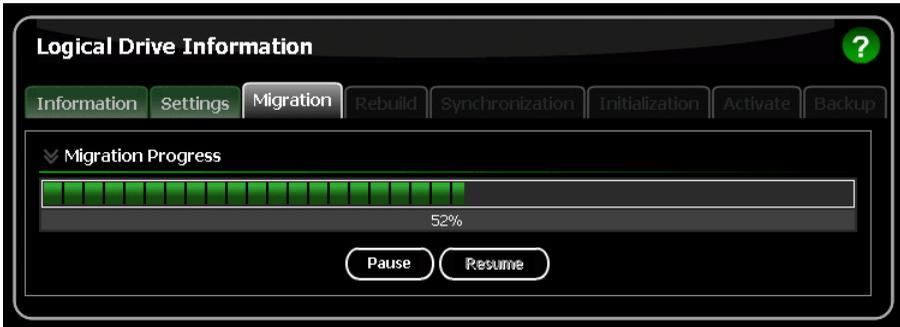
Scheduled

To schedule a Migration:

1. Click **Logical Drive View** in Tree View.
2. Click the **Logical Drive** you want to migrate.
3. Click the **Migration** tab in Management View.
4. From the Migrate RAID Level to dropdown menu, choose the target RAID level for your logical drive.
5. If your intended action requires additional physical drives, click a Single Disk (unassigned physical drive) to select it.

   Available drives have a white frame. Selected drives have a red frame.
6. Click the **Enable** option.
7. From the dropdown menus, select a start time.

   Start time is based on a 24-hour clock.
8. Click in Start At field to display a popup calendar.
9. Click the start date in the calendar or enter a date manually.
10. Click the **Schedule** button.
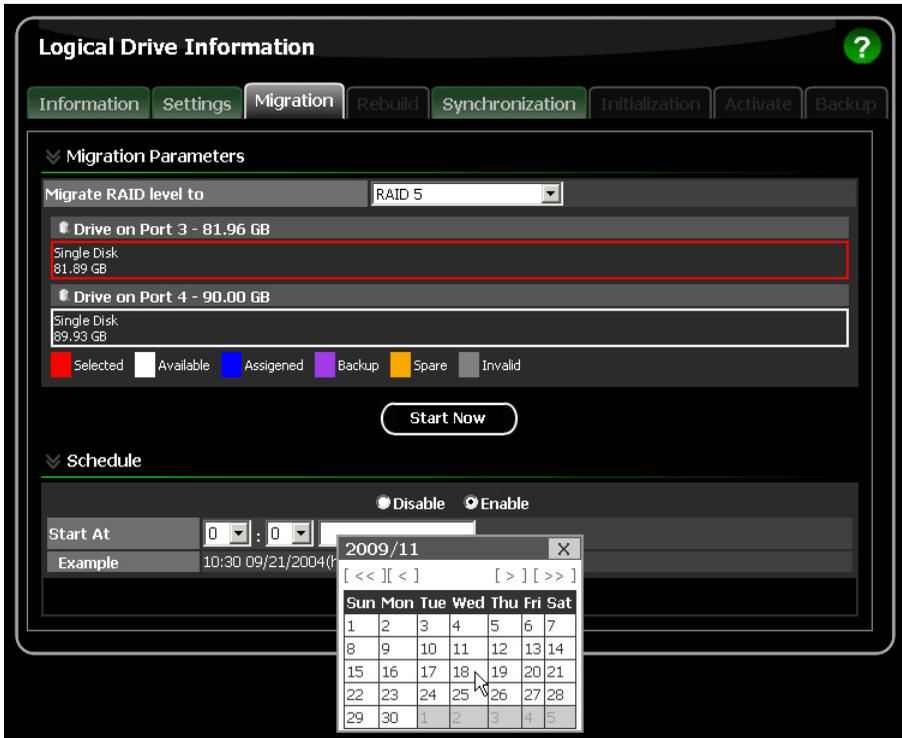
Canceling a Schedule

If you want to cancel the scheduled Migration, do the following:

1. Click **Logical Drive View** in Tree View.
2. Click the **Logical Drive** whose schedule you want to cancel.
3. Click the **Migration** tab in Management View.
4. Click the **Disable** option.

Rebuilding a Logical Drive

Rebuild refers to the process of repairing a logical drive by reconstructing the data on one of its physical drives. This feature only applies to logical drives with redundancy: RAID 1, 5, and 10.

Rebuilding requires a spare drive or a Single Disk of equal or greater capacity as the failed physical drive. See "Managing a Critical or Offline Logical Drive" on page 84.

You can set up a Rebuild to:

- Begin immediately (on demand)
- Schedule a Rebuild for a time when there is less demand on the RAID system
- Begin automatically when a logical drive goes critical. See page 77.

On Demand

To rebuild a logical drive:

1. Click **Logical Drive View** in Tree View.
2. Click the **Logical Drive** you want to rebuild.
3. Click the **Rebuild** tab in Management View.
4. Click a Single Disk (unassigned physical drive) to use as a replacement drive.

   Available drives have a white frame. Selected drives have a red frame.
5. Click the **Start Now** button.
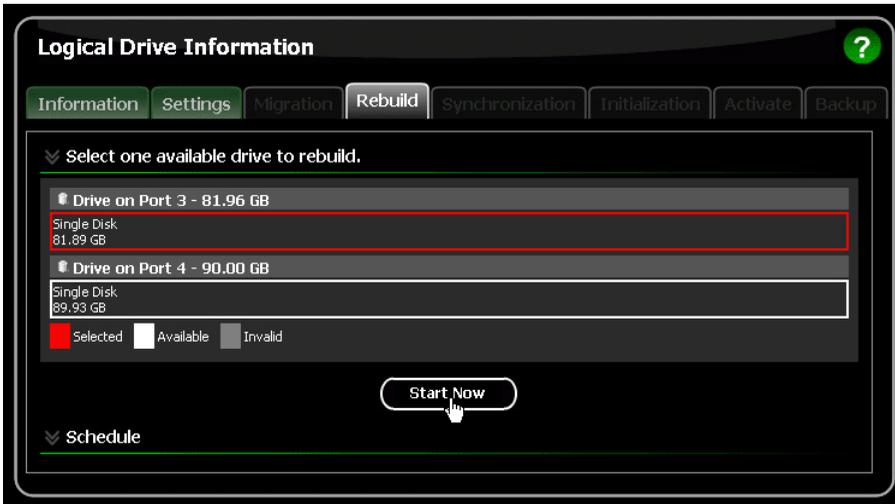
You can monitor Rebuild progress on the Logical Drive Rebuild tab. Click the respective buttons to pause and resume the Rebuild.
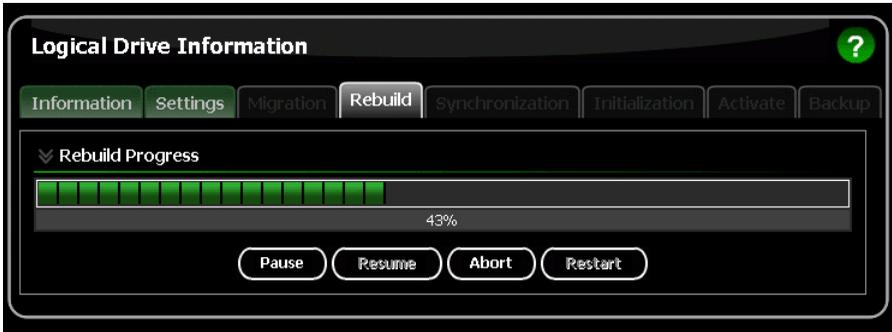
Scheduled

To schedule a Rebuild:

1. Click **Logical Drive View** in Tree View.
2. Click the **Logical Drive** you want to rebuild.
3. Click the **Rebuild** tab in Management View.
4. Click a Single Disk (unassigned physical drive) to use as a replacement drive.

   Available drives have a white frame. Selected drives have a red frame.
5. Click the **Enable** option.
6. From the dropdown menus, select a start time.

   Start time is based on a 24-hour clock.
7. Click in Start At field to display a popup calendar.
8. Click the start date in the calendar or enter a date manually.
9. Click the **Schedule** button.
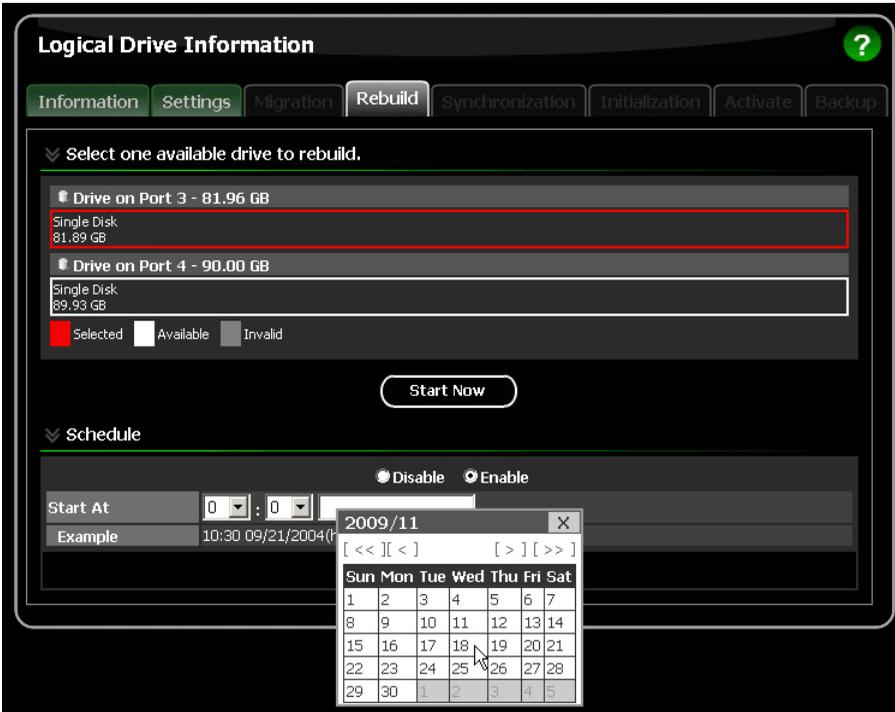
Canceling a Schedule

If you want to cancel the scheduled Rebuild, do the following:

1. Click **Logical Drive View** in Tree View.
2. Click the **Logical Drive** whose schedule you want to cancel.
3. Click the **Rebuild** tab in Management View.
4. Click the **Disable** option.

Automatic Rebuilding

Automatic rebuilding of a logical drive is possible under the following conditions:

- The logical drive is a RAID 1 or a RAID 5 with 3 physical drives.
  See "Creating a Logical Drive" on page 62.
- There is a spare drive present in the RAID system.
  See "Creating a Spare Drive" on page 89.
- Automatic Rebuild Status is enabled in the Controller Settings.
  See "Making Controller Settings" on page 49.

If the three above conditions are met, a logical drive will replace a faulty physical drive and rebuild itself automatically. RAIDXpert will report the critical logical drive

and automatic rebuild in its user interface as well as via popup messages. Depending on your Event Notification settings (see page 36), RAIDXpert can also notify you via email message.

When the automatic rebuild operation is completed, you must remove and replace the faulty physical drive with a new one.

See "Replacing the Failed Physical Drive" on page 87 and your system *User Manual* for more information on replacing a physical drive.

Synchronizing All Logical Drives

The Logical Drive View–Synchronization Schedule tab enables you to synchronize all logical drives. You can also synchronize an individual logical drive, see page 79.

- **Synchronization** – An automated process of checking and correcting data and parity. Unlike a Rebuild, Synchronization is a maintenance operation.
- **Redundancy Check** – An automated process of checking data and parity but it only reports and does not correct, any inconsistencies that it finds.

Synchronization and Redundancy Check apply to RAID 1, 5, and 10 logical drives. To perform a Synchronization or Redundancy Check immediately (on demand), see "Synchronizing One Logical Drive" on page 79.

Scheduled

To schedule Synchronization for all logical drives:

1. Click **Logical Drive View** in Tree View.
2. Click the **Synchronization Schedule** tab in Management View.
3. In the Policy dropdown menu, choose:
    - **Fix** – If you want Synchronization
    - **Redundancy Check** – If you do *not* want to correct inconsistencies
4. Click the **Enable** option.
5. Click the **by Day**, **by Week** or **by Month** option.
6. From the dropdown menus, select a start time and a day of the Week or Month, if applicable.

    Start time is based on a 24-hour clock.
7. Click the **Schedule** button.
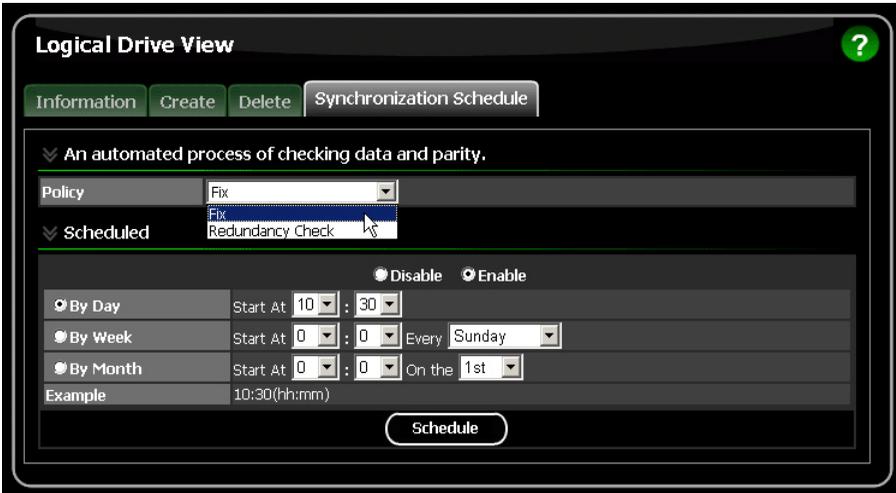
Canceling a Schedule

If you want to cancel the scheduled Synchronization, do the following:

1. Click **Logical Drive View** in Tree View.
2. Click the **Synchronization Schedule** tab in Management View.
3. Click the **Disable** option.

Synchronizing One Logical Drive

The Logical Drive Synchronization tab enables you to synchronize an individual logical drive. You can also synchronize all logical drives at the same time, see page 78.

- **Synchronization** – An automated process of checking and correcting data and parity. Unlike a Rebuild, Synchronization is a maintenance operation.
- **Redundancy Check** – An automated process of checking data and parity but it only reports and does not correct, any inconsistencies that it finds.

Synchronization and Redundancy Check apply to RAID 1, 5, and 10 logical drives. You can set up a Synchronization or Redundancy Check to begin immediately (on demand) or schedule them for a time when there is less demand on the RAID system.

Note

You cannot start a Redundancy Check until all other background activities are finished. They include: Rebuild, Full Initialization, Migration, Expansion, and Synchronization (with Fix option). Any of these tasks can take a long time, depending on the size of your physical drives.

On Demand

To Synchronize or Redundancy Check a logical drive:

1.   Click **Logical Drive View** in Tree View.
2.   Click the **Logical Drive** you want to synchronize.
3.   Click the **Synchronization** tab in Management View.
4.   In the Policy dropdown menu, choose:
     •   **Fix** – If you want Synchronization
     •   **Redundancy Check** – If you do *not* want to correct inconsistencies
5.   Click the **Start Now** button.
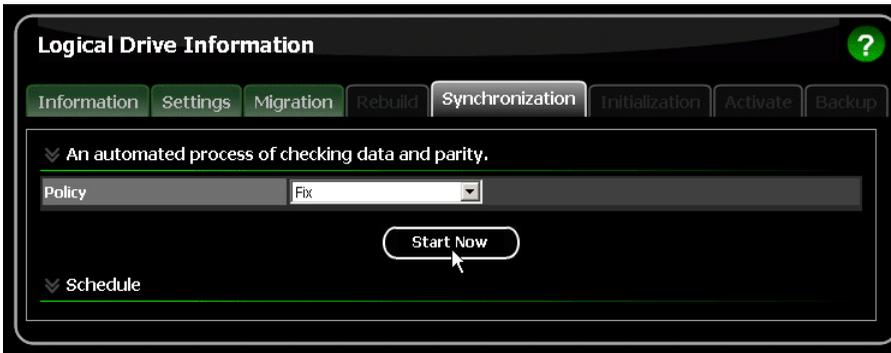
You can monitor Synchronization or Redundancy Check progress on the Synchronization tab.

Click the respective buttons to pause, resume, or abort the Synchronization or Redundancy Check.
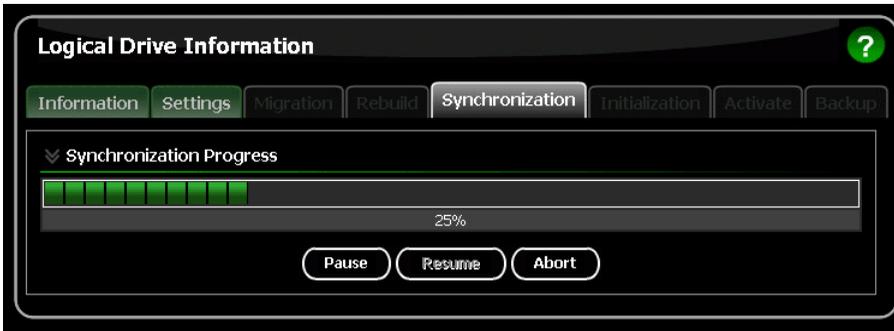
Scheduled

To schedule a Synchronization or Redundancy Check:

1. Click **Logical Drive View** in Tree View.
2. Click the **Logical Drive** you want to synchronize.
3. Click the **Synchronization** tab in Management View.
4. In the Policy dropdown menu, choose:
    *   **Fix** – If you want Synchronization
    *   **Redundancy Check** – If you do *not* want to correct inconsistencies
5. Click the **Enable** option.
6. Click the **by Day**, **by Week** or **by Month** option.
7. From the dropdown menus, select a start time and a day of the Week or Month, if applicable.

    Start time is based on a 24-hour clock.
8. Click the **Schedule** button.

Canceling a Schedule

If you want to cancel the scheduled Synchronization or Redundancy Check, do the following:

1. Click **Logical Drive View** in Tree View.

2. Click the **Logical Drive** whose schedule you want to cancel.

3. Click the **Synchronization** tab in Management View.

4. Click the **Disable** option.

Initializing a Logical Drive

When logical drive is first created, you can select one of three choices for initialization:

- **Fast Initialization** – Erases the reserve and master boot sectors of the physical drives being added to the logical drive.

- **Full Initialization** – Erases all sectors of the physical drives being added to the logical drive. RAID 1, 5, and 10 only.

- **None** – No initialization. This choice is not recommended.

When you select full initialization, the process takes some time, depending on the size of the physical drives in the logical drive. The Initialization tab enables you to pause the initialization process so that more of the controller's resources are available for other operations. When the other operations are done, you can resume the initialization of your new logical drive.

To initialize a logical drive:

1. Click **Logical Drive View** in Tree View.
2. Click the **Logical Drive** whose initialization you want to view, pause, resume, or abort.
3. Click the **Initialization** tab in Management View.
4. Optional. Click the **Pause**, **Resume**, or **Abort** button.
5. Optional, Abort only. In the Confirmation box, click the **OK** button.

Logical Drive Activation

The Activation feature enables you to hot-plug a RAID 1 logical drive.

When you disconnect both physical drives from a RAID 1 logical drive, the logical drive goes *Offline*. If you then reconnect both physical drives, the array returns to *Functional* status. But if you only reconnect one of the physical drives, the logical drive remains *Offline*.

Activation changes the logical drive status from *Offline* to *Critical*. You can then access the data on the logical drive and rebuild the logical drive using a spare or unassigned physical drive.

To activate an offline RAID 1 logical drive:

1. Click **Logical Drive View** in Tree View.
2. Click the **Logical Drive** you want to activate.
3. Click the **Activation** tab in Management View.
4. Click the **Activate** button.

In a few moments, the logical drive status goes from *Offline* to *Critical*. Critical status allows you to access your data and rebuild the logical drive.

See "Rebuilding a Logical Drive" on page 74.
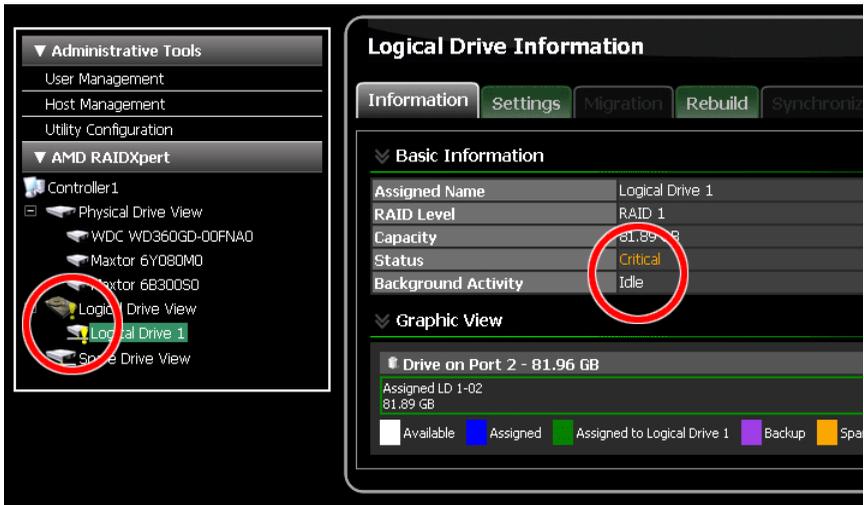
Managing a Critical or Offline Logical Drive

A fault-tolerant logical drive—RAID 1, 5, or 10—goes *Critical* when a physical drive is removed or fails. Due to the fault tolerance of the logical drive, the data is still available and online. However, once the logical drive goes critical, it has lost its fault tolerance and performance may be adversely affected.

If the fault was caused by a failed physical drive that was removed, the drive must be replaced by another drive, either identical or larger, in order for the RAID system to rebuild and restore optimal configuration.

A non-fault tolerant logical drive—RAID 0 or JBOD—goes *Offline* when a physical drive is removed or fails. A RAID Ready logical drive, which has only

one physical drive, disappears from the interface if the physical drive is removed or fails. Since these logical drives are not fault tolerant, the data stored in the logical drive is no longer accessible.

If one physical drive fails, all of the data on the logical drive is lost. You must replace the failed drive. Then, if the logical drive had more than one physical drive, delete the logical drive, and re-create it. Restore the data from a backup source.

If you created a backup drive for your RAID Ready logical drive, the use the backup drive to restore the data. See "Backing up a RAID Ready Logical Drive" on page 68.

When a Physical Drive Fails

The following will occur when a physical drive fails or goes offline:

• The Controller's audible alarm, if enabled, will sound. See page 49.

• RAIDXpert reports the condition in Tree View, with popup messages and, if Event Notification is set up, email messages. See page 36.

• If you have a RAID 1 or 5 logical drive with a hot spare drive properly configured, the logical drive will automatically rebuild itself using the spare drive. See pages 49 and 89.

In the example above, amber **!** icons appear over the Logical Drive View and Logical Drive icons. Click **Logical Drive View** or the **Logical Drive** to verify the condition of the logical drive.

In this example, the Status is *Critical* and Background activity is *Idle*. This condition indicates that there is no automatic rebuild, so you must take action to restore the logical drive:

1. Identify the failed physical drive.
2. Replace the failed physical drive.
3. Rebuild your logical drive.

Identifying the Failed Physical Drive

1. Click **Physical Drive View** in Tree View.
2. Look for a missing physical drive.

   A physical drive that used to be present but is suddenly absent is the failed physical drive.

In this example, there were four physical drives connected to the AMD motherboard. Notice that there is no drive on Port 3. That is the failed drive.

This procedure cannot locate a failed drive attached to a SATA port multiplier as all such drives have the same port number. If your port multiplier has LEDs for each drive and you can see them easily, check for a LED that has changed color or gone dark. See the SATA port multiplier's user documentation for more information.

Replacing the Failed Physical Drive

Replace the failed physical drive with a new one of equal or greater capacity. Then rebuild the logical drive. See your system *User Manual* for more information about replacing a physical drive.

Rebuilding Your Logical Drive

These instructions describe a manual rebuild. They apply when you have not enabled Automatic Rebuild and have no Spare drive.

1. Click **Logical Drive View** in Tree View.
2. Click the **Logical Drive** you want to rebuild.
3. Click the **Rebuild** tab in Management View.
4. Click the physical drive in the interface representing the drive that you just replaced.
5. Click the **Start Now** button.
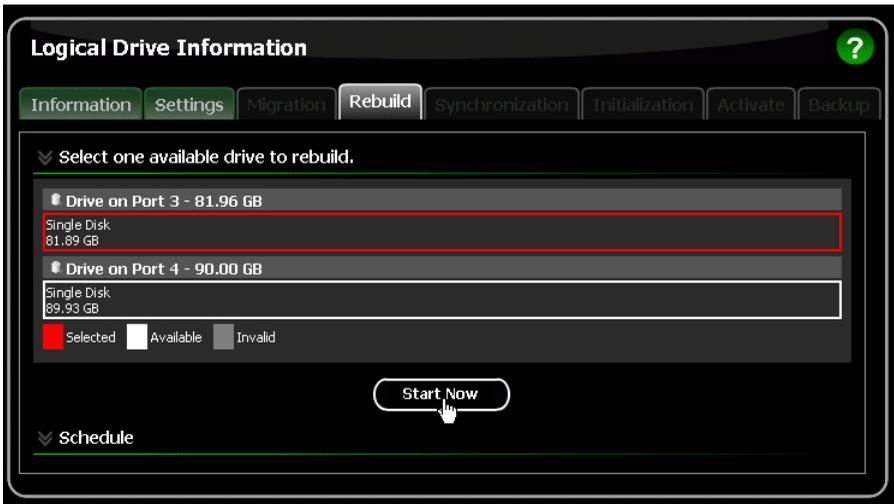
You can monitor Rebuild progress on the Rebuild tab. Click the respective buttons to pause and resume the Rebuild. When the Rebuild is finished, your logical drive will be Functional again.
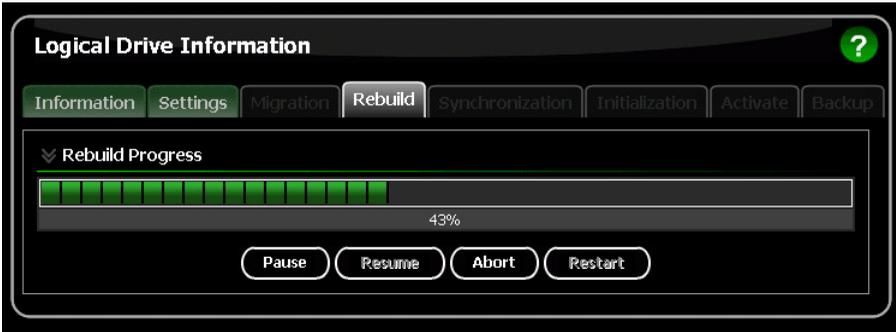
Spare Drives

- Viewing Spare Drives (below)
- Creating a Spare Drive (page 89)
- Deleting a Spare Drive (page 90)

A spare drive is a physical drive designated to function as a hot spare drive. A hot spare drive automatically replaces a failed physical drive.

You can also set the Controller to rebuild a logical drive from a Free physical drive. See "Making Controller Settings" on page 49 and "Rebuilding a Logical Drive" on page 74 for more information on how spare drives work.

Viewing Spare Drives

Spare Drive View provides a list of all spare drives currently on the Host PC.

To see a list of your spare drives, click **Spare Drive View** in Tree View.
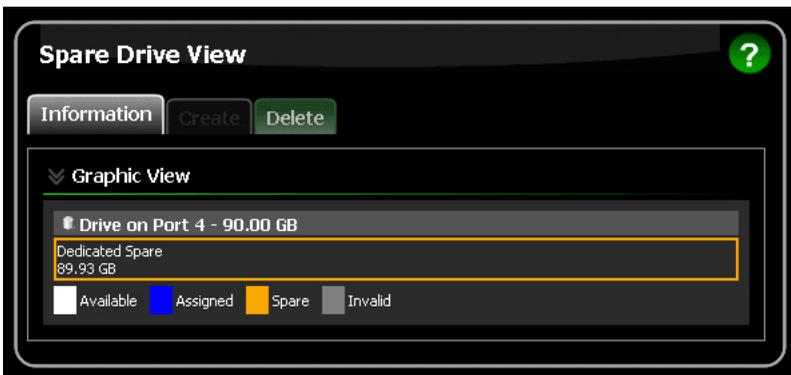
From this screen, you can view the current Spare Drives and click the tabs to access the Create and Delete features.

Creating a Spare Drive

To create a spare drive:

1. Click **Spare Drive View** in Tree View.
2. Click the **Create** tab in Management View.
3. From the Spare Drive dropdown menu, choose one of the following options.

   - **Global Spare** – This spare drive can be used by any logical drive.
   - **Logical Drive** – The name of the logical drive to which this spare drive will be assigned or dedicated.

4.   Click a Single Disk (unassigned physical drive) to use as a spare drive.

Available drives have a white frame. Selected drives have a red frame. Drives with a blue frame are assigned to a logical drive.

You cannot select for a spare drive a split physical drive, where part of the physical drive currently supports a logical drive.

5.   Click the **Create** button.
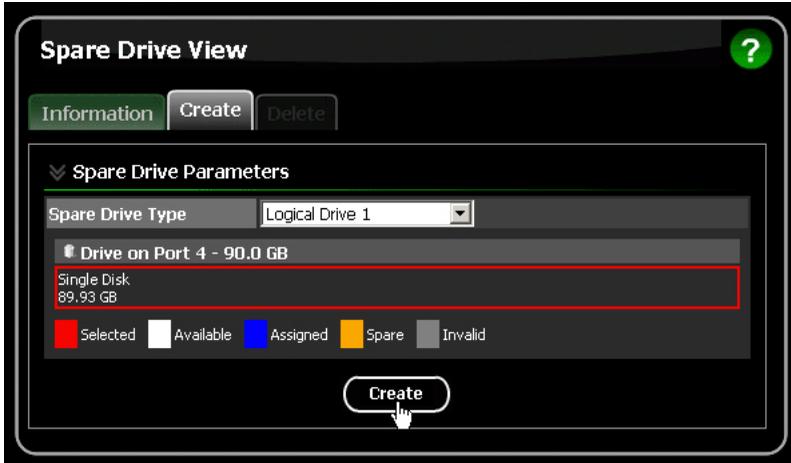
The new Spare Drive appears under Physical Drive View and Spare Drive View.

Deleting a Spare Drive

To delete a spare drive:

1.   Click **Spare Drive View** in Tree View.
2.   Click the **Delete** tab in Management View.
3.   Check the box to the left of the spare drive you want to delete.
4.   Click the **Delete** button.
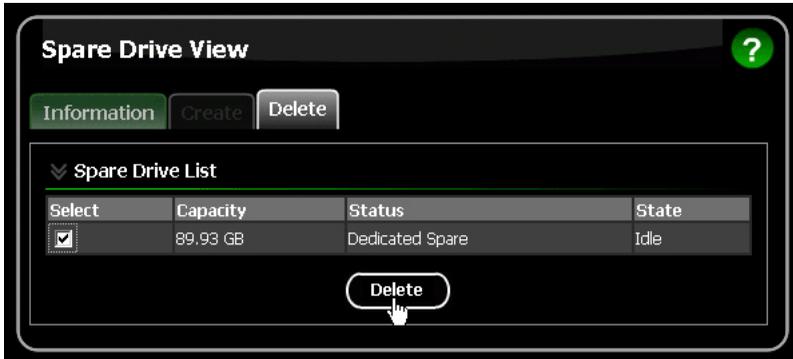
5.   In the Confirmation box, click the **OK** button.

The selected spare drive is deleted.

Chapter 6: Technology Background

Physical and Logical Drive Support

The AMD Chipset SATA Controller supports up to:

- 10 physical drives per system
- 10 logical drives per system

Port Multiplier

For motherboards with fewer than 10 SATA ports, to connect all 10 supported physical drives, you must attach a port multiplier to one of the SATA or external SATA (eSATA) ports.

A port multiplier enables a single SATA or eSATA port on the motherboard to support up to five SATA drives. Port multipliers are available through third-party vendors. Be sure to follow the installation instructions that come with the port multiplier.

Note that physical drives attached to an eSATA port are considered hot-pluggable, meaning you can attach or remove them at any time.

If you plan to use your physical drives to create a RAID 0, 1, 5, or 10 logical drive or a JBOD, attach the port multiplier to a SATA port.

If you plan to use your physical drives to create single, removable, RAID Ready drives, you can attach the port multiplier to an eSATA port or attach a physical drive to the eSATA port directly.

Introduction to RAID

RAID (Redundant Array of Independent Disks) allows multiple physical drives to be combined together in a logical drive. The operating system sees the logical drive as a single storage device, and treats it as such. The RAID software and/or controller handle all of the individual drives on its own. The benefits of a RAID can include:

- Higher data transfer rates for increased server performance
- Increased overall storage capacity for a single drive designation (such as, C, D, E, etc.)
- Data redundancy/fault tolerance for ensuring continuous system operation in the event of a hard drive failure

Different types of logical drives use different organizational models and have varying benefits. Also see Choosing RAID Level on page 101. The following outline breaks down the properties for each type of RAID logical drive:

RAID 0 – Stripe

When a logical drive is striped, the read and write blocks of data are interleaved between the sectors of multiple physical drives. Performance is increased, since the workload is balanced between drives or "members" that form the logical drive. Identical drives are recommended for performance as well as data storage efficiency.

Figure 1. RAID 0 interleaves data across two physical drives
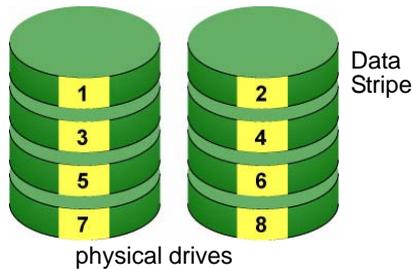
The logical drive's data capacity is equal to the number of drive members multiplied by the smallest logical drive member's capacity. For example, one 100 GB and three 120 GB drives will form a 400 GB (4 x 100GB) logical drive instead of 460 GB.

RAID 0 logical drives on the AMD Chipset SATA Controller consist of 1 to 6 physical drives.

RAID 1 – Mirror

When a logical drive is mirrored, identical data is written to a pair of physical drives, while reads are performed in parallel. The reads are performed using elevator seek and load balancing techniques where the workload is distributed in the most efficient manner. Whichever drive is not busy and is positioned closer to the data will be accessed first.

With RAID 1, if one physical drive fails or has errors, the other mirrored physical drive continues to provide fault tolerance. Moreover, if a spare drive is present, the spare drive will be used as the replacement drive and data will begin to be mirrored to it from the remaining good drive.

Figure 2. RAID 1 mirrors identical data across to two physical drives

Data Mirror
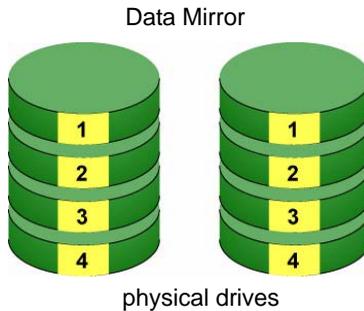
physical drives

Due to the data redundancy of mirroring, the capacity of the logical drive equals the size of the smallest physical drive. For example, two 100 GB physical drives which have a combined capacity of 200 GB instead would have 100 GB of usable storage when set up in a mirrored logical drive. Similar to RAID 0 striping, if physical drives of different capacities are used, there will also be unused capacity on the larger drive.

RAID 1 logical drives on the AMD Chipset SATA Controller consist of 2 physical drives.

RAID 5 – Block Striping with Distributed Parity

RAID 5 stripes data and distributes parity information across the physical drives along with the data blocks. This organization increases performance by accessing multiple physical drives simultaneously for each operation, as well as fault tolerance by providing parity data. In the event of a physical drive failure, data can be re-calculated by the RAID system based on the remaining data and the parity information.

RAID 5 makes efficient use of hard drives and is the most versatile RAID Level. It works well for file, database, application and web servers.

Figure 3.   RAID 5 Stripes all drives with data and parity information

Distributed Parity

Data
Blocks

1a	2a	3a	a parity
1b	2b	b parity	4b
1c	c parity	3c	4c
d parity	2d	3d	4d
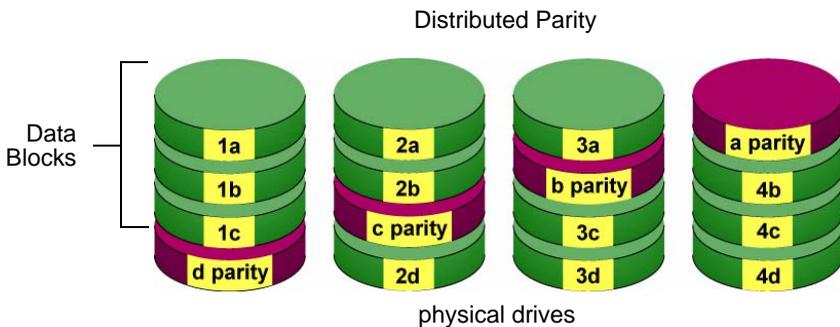
physical drives

The capacity of a RAID 5 logical drive is the smallest physical drive size multiplied by the number of physical drives, less one. Hence, a RAID 5 logical drive with four 100 GB physical drives will have a capacity of 300 GB. A logical drive with two 120 GB physical drives and one 100 GB physical drive will have a capacity of 200 GB.

RAID 5 logical drives on the AMD Chipset SATA Controller consist of 3 or 6 physical drives.

RAID 10 – Mirror/Stripe

RAID 10 combines the properties of RAID 0 and RAID 1 logical drives. RAID 10 increases performance by reading and writing data in parallel while protecting data with duplication. Four physical drives are required for RAID 10. One drive pair is mirrored together then striped over a second drive pair.

Figure 4. RAID 10 mirrors data over one drive pair and stripes it over the other drive pair
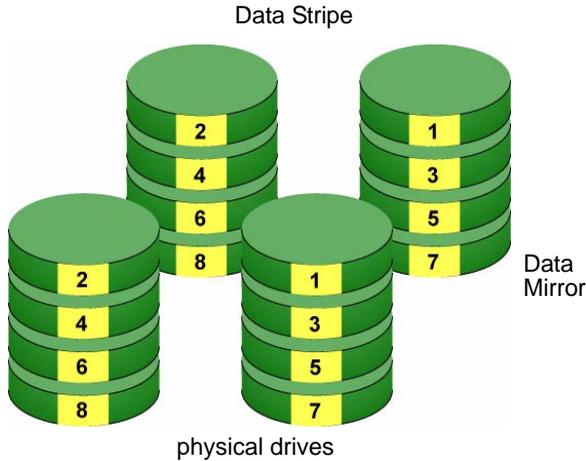
The data capacity is similar to a RAID 1 logical drive, with half of the total storage capacity dedicated for redundancy. An added plus for using RAID 10 is that, in many situations, RAID 10 offers double fault tolerance. Double fault tolerance may allow your logical drive to continue to operate depending on which two physical drives fail.

RAID 10 logical drives on the AMD Chipset SATA Controller consist of 4 physical drives only.

RAID Ready – Single Drive

RAID Ready arranges individual physical drives the same as if they were attached to the PC's motherboard controller. The advantage is that the AMD Chipset SATA Controller can accommodate up to 10 physical drives, more than most PC motherboards.

Figure 5. RAID Ready deals with individual physical drives
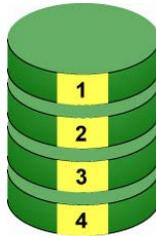
As a single physical drive, RAID Ready does not offer the performance or security advantages of other RAID logical drives. However, you can create a backup of your RAID Ready drive by:

- Inserting an unformatted physical drive
- Designating an installed physical drive

For more information, see "Windows with RAID Ready Backup" on page 5 and "Backing up a RAID Ready Logical Drive" on page 68.

In RAIDXpert, you create, manage, and delete a RAID Ready the same as a logical drive. A RAID Ready logical drive has only one physical drive. You can designate from one to four of your physical drives as RAID Ready.

JBOD – Concatenation

JBOD stands for "Just a Bunch of Disks" and normally refers to one or more physical drives working independently. The AMD Chipset SATA Controller offers the added feature of concatenation, where the capacity of multiple drives is added together. When one drive is full, the data is saved to the next drive automatically. By way of example, using this feature, three 500 GB physical drives concatenated together have the equivalent capacity of single 1.5 TB drive.

Figure 6.   JBOD concatenates the capacity of multiple drives
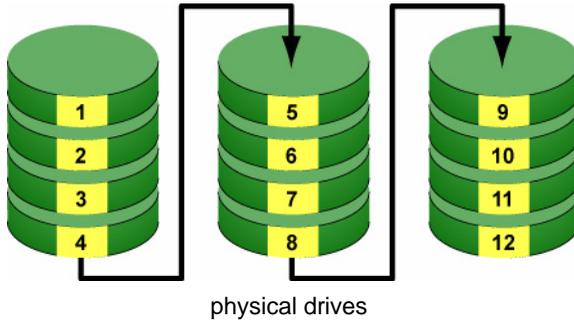
physical drives

As independent physical drives, JBOD does not offer the performance or security advantages of RAID logical drives. However, in RAIDXpert, you create, manage, and delete a JBOD the same as a logical drive.

You can designate from 2 to 4 physical drives with online capacity expansion.

If you attach a single physical drive that was previously partitioned, RAIDXpert will recognize it as a JBOD. However, RAIDXpert does not allow you to create a single-drive JBOD.

Choosing a RAID Level

There are several issues to consider when choosing the RAID Level for your logical drive. The following discussion summarizes some advantages, disadvantages, and applications for each choice.

RAID 0

Advantages	Disadvantages
Data is broken down into blocks and each block is written to a separate physical drive I/O performance is greatly improved by spreading the I/O load across multiple channels and drives No parity calculation overhead is involved	Not a true RAID because it is not fault-tolerant The failure of just one drive will result in all data in a logical drive being lost Should not be used in mission critical environments

Recommended Applications for RAID 0:

- Image Editing
- Pre-Press Applications
- Any application requiring high bandwidth

RAID 1

Advantages	Disadvantages
Simplest RAID storage subsystem design Can increase read performance by processing data requests in parallel since the same data resides on two different drives	Very high disk overhead - uses only 50% of total capacity

Recommended Applications for RAID 1:

- Accounting
- Payroll
- Financial
- Any application requiring very high availability

RAID 5

Advantages	Disadvantages
High Read data transaction rate Medium Write data transaction rate Good aggregate transfer rate	Disk failure has a medium impact on throughput

Recommended Applications for RAID 5:

- File and Application servers
- WWW, E-mail, and News servers
- Intranet servers
- Most versatile RAID level

RAID 10

Advantages	Disadvantages
Implemented as a mirrored logical drive whose segments are striped logical drives High I/O rates are achieved thanks to multiple stripe segments	Very high disk overhead - uses only 50% of total capacity

Recommended Applications for RAID 10:

- Imaging applications
- Database servers
- General fileserver

RAID Ready

Advantages	Disadvantages
Easy management of multiple independent physical drives	No increase in performance, capacity or fault tolerance.

Recommended Applications for RAID Ready:

- Non-critical file storage
- Swappable data storage

When combined with a backup drive, RAID Ready is comparable to RAID 1. See "Backing up a RAID Ready Logical Drive" on page 68.

JBOD

Advantages	Disadvantages
Enables you to manage multiple physical drives from a single controller	The failure of just one drive will result in all data in all drives being lost
	Not suitable for mission critical environments

Recommended Applications for JBOD:

- Any application requiring large data capacity but where read/write speed or fault-tolerance are not important
- Applications were low-cost operation critical

Choosing Stripe Block Size

For RAID 0, 5, and 10 logical drives, the stripe block size value can be set to 64 KB or 128 KB. 64 KB is the default. Your choice will directly affect performance. There are two issues to consider when selecting the stripe block size.

- Choose a stripe block size equal to or smaller than the smallest cache buffer found on any physical drive in your logical drive. A larger value slows the logical drive down because physical drives with smaller cache buffers need more time for multiple accesses to fill their buffers.
- If your data retrieval consists of fixed-size data blocks, such as some database and video applications, choose that data block size as your stripe block size.

Generally speaking, email, POS, and webservers prefer smaller stripe block sizes. Video and database applications prefer larger stripe block sizes.

Gigabyte Boundary

The Gigabyte Boundary feature is designed for logical drives in which a drive has failed and the user cannot replace the drive with the same capacity or larger. Instead, the Gigabyte Boundary feature permits the installation of a replacement drive that is slightly smaller (within 1 gigabyte) than the remaining working drive (for example, an 80.5-GB drive would be rounded down to 80 GB). This can be helpful in the event that a drive fails and an exact replacement model is no longer available.

Gigabyte Boundary is available for all RAID levels. If you split the capacity of your physical drives between two logical drives, you can choose Gigabyte Boundary for the second logical drive. See "Creating a Logical Drive" on page 62.

Initialization

Initialization is the process of setting all of the data bits on all of the physical drives to zero. This has the effect of erasing any existing data from the drives. This action is especially helpful in creating accurate parity in logical drives with more than four drives.

Fast Initialization is available for all RAID levels and JBOD. Full Initialization is available for RAID 1, 5, and 10. See "Creating a Logical Drive" on page 62.

The Full Initialization process begins immediately after the logical drive is created and can take some time to finish, depending on the size of the physical drives in your logical drive. Your logical drive is available while initialization is in progress.

If any of the physical drives in your logical drive were previously used in other logical drives, or you are not sure, choose *Full Initialization*

Hot Spare Drive(s)

A hot spare is a physical drive that is connected to the logical drive system but is not assigned as a member of the logical drive. In the event of the failure of a drive within a functioning fault tolerant logical drive, the hot spare is activated as a member of the logical drive to replace a drive that has failed.

The AMD Chipset SATA Controller replaces a failing physical drive in a logical drive with an unassigned drive, if one is available. The unassigned drive is not part of any logical drive. Such a drive is called a *hot spare* drive. There are two types:

- **Global** – The spare drive is available to any logical drive on the Host PC.
- **Dedicated** – The spare drive can only be used by the specified logical drive.

The hot spare policy function lets you select whether a logical drive will access any unassigned physical drive or a designated drive in the event of physical drive failure. See "Rebuilding a Logical Drive" on page 74 and "Creating a Spare Drive" on page 89 for information.

The spare drive effectively takes the place of the failed drive and the RAID system immediately begins to rebuild data onto the spare drive. When the rebuild is complete, the logical drive returns to fault tolerant status.

Maintaining a hot spare drive is a good precaution to protect your logical drive integrity in the event of physical drive failure.

Partition and Format the Logical Drive

Like any other type of fixed disk media in your system, a RAID logical drive must also be partitioned and formatted before use. Use the same method of partitioning and formatting on a logical drive as you would any other fixed disk.

See "Appendix B: Partition and Format" on page 111.

Migration

Migration is the process of:

- Changing the RAID level of an existing logical drive
- Adding more physical drives to a logical drive while keeping the same RAID level

See "Migrating a Logical Drive" on page 71 for instructions.

You can change the RAID level of a logical drive with certain combinations of RAID level and number of physical drives, as described in the table below.

From	To	Result
RAID Ready: 1 drive	RAID 0: 2 to 6 drives	Increases capacity
	RAID 1: 2 drives	Adds redundancy
	RAID 5: 3 to 6 drives*	Increases performance and capacity, adds redundancy
	RAID 10: 4 drives	
	JBOD: 2 to 6 drives	Increases capacity
RAID 0: 2 drives	RAID 5: 3 to 6 drives*	Increases performance and capacity, adds redundancy
	RAID 10: 4 drives	
RAID 0: 3 drives	RAID 5: 4 drives*	Increases performance and capacity, adds redundancy
RAID 1: 2 drives	RAID 0: 2 drives	Increases capacity, loses redundancy
	RAID 5: 3 to 6 drives*	Increases performance and capacity
	RAID 10: 4 drives	
RAID 10: 4 drives	RAID 0: 4 drives	Increases capacity, loses redundancy
	RAID 5: 4 to 6 drives*	Increases capacity
* Only with AMD Chipset SATA Controllers that support RAID 5.		

You can add physical drives to an existing logical drive while keeping the same RAID level for:

• RAID 0
• RAID 5
• JBOD

RAIDXpert supports up to six physical drives for these logical drives.

	Important
	• The Target logical drive may require more physical drives than the Source logical drive
	• Add physical drives that are the same size or larger than those in the current logical drive.
	• If the Target logical drive requires an EVEN number of physical drives but the Source logical drive has an ODD number, ADD a physical drive as part of the migration process
	• You cannot reduce the number of physical drives in your logical drive
	• You cannot migrate a logical drive when it is Critical or performing activities such as Synchronizing or Rebuilding
	• You cannot migrate a JBOD to a RAID or a RAID to a JBOD. But you can migrate a RAID Ready to a JBOD

Ranges of Logical Drive Migration

There are limitations to how large you can expand a logical drive, depending on the size of your current logical drive.

The Windows 2000 and Windows XP (32-bit) operating systems support a 10-byte LBA format. This means that a logical drive can have up to 4 billion address blocks or sectors. This limitation does not apply to Windows XP (64-bit), 2003 Server, Vista, and Linux OSes with the 2.6 kernel.

For Windows 2000 and Windows XP (32-bit), multiply the number of blocks by the sector size to find the capacity of a logical drive:

4,000,000,000 blocks x 512 bytes per sector = 2,048,000,000,000 bytes of data for a 2TB drive.

Note that you cannot change the size of the sectors nor can you increase the number of address blocks above 4 billion.

As a result, there are range limits imposed upon logical drive migration as shown in the table above.

For example:

- You can migrate a 2.5 TB logical drive up to 4 TB
- You can only migrate a 1.9 TB logical drive up to 2 TB

See the chart below.

Current LD Size	Maximum LD Migration Size	Sector Size
8 to 16 TB	16 TB	4096 bytes
4 to 8 TB	8 TB	2048 bytes
2 to 4 TB	4 TB	1024 bytes
0 to 2 TB	2 TB	512 bytes

You can direct RAIDXpert to migrate a logical drive beyond the maximum size. However, when migration is finished, your logical drive will be the maximum size listed in the table.

If you require a logical drive larger than the maximum migration size:

1. Backup the data from the current logical drive.
2. Delete the current logical drive.
3. Create a new logical drive with the desired capacity.
4. Restore the data to the new logical drive.

Media Patrol

Media Patrol is a routine maintenance procedure that checks the magnetic media on each physical drive, sector by sector. Media Patrol checks physical drives assigned to logical drives, spare drives, and currently unassigned physical drives that were once part of a logical drive or a spare. Media Patrol does not check new physical drives that have never been configured.

Unlike Synchronization and Redundancy Check, Media Patrol is concerned with the condition of the media itself, not the data recorded on the media. If Media Patrol encounters a suspect sector, it will attempt to regenerate the data and write to the suspect sector.

- If the write operation is successful, Media Patrol continues checking other sectors.
- If the write operation fails, Media Patrol reports the error to your PC's system log and to the physical drive's Bad Sector Log.

The error report to the physical drive's Bad Sector Log triggers a BSL update message and an email message if you enabled that option.

To schedule or run Media Patrol, see "Scheduling Media Patrol – All Physical Drives" on page 54 or "Running Media Patrol – One Physical Drive" on page 58.

See also "Setting up Email Event Notification" on page 36 and "Viewing the Physical Drive Bad Sector Log" on page 59.

Appendix A: Frequently Asked Questions

I tried to log into RAIDXpert but my browser showed the message "cannot be displayed." What is the problem?

The browser decided prematurely that RAIDXpert was not responding. Click the **Refresh** button. This action usually brings up the login screen.

I can access the Host PC over my company's intranet. But I can't access it from an outside Internet connection. How do I make the Internet connection work?

This condition is not related to the Host PC or RAIDXpert, but is due to your firewall and network connection protocol. Contact your MIS Administrator.

Why do I have to use a different IP address when I access the Host PC over the network?

Computers on a TCP/IP network are identified by their IP addresses. When you work on the Host PC, you use 127.0.0.1, which is the IP address for "home" or "this computer". When you access the Host PC from a different computer, you must enter the Host PC's IP address as the network knows it, such as 192.168.1.33.

How can I be sure everything is working OK by using RAIDXpert?

One way to do this is through Event Notification. RAIDXpert will report events to you in the form of email and popup messages. You might only select Warning and Error events, so that you only receive messages when something is wrong. See "Setting up Email Event Notification" on page 36.

Another method is to periodically log into RAIDXpert and check the status of your logical drives.

What happens if a logical drive goes critical?

This condition is caused by a failed physical drive. Depending on your Event Notification settings, RAIDXpert will send you and email message and display a popup message indicating the critical condition.

An amber **!** icon will appear over the Logical Drive View and Logical Drive icons. The Event Log will post a logical drive critical entry.

If a spare drive is available, the logical drive will begin to rebuild automatically. If there is no spare drive, you must identify the failed physical drive and replace it.

See "Managing a Critical or Offline Logical Drive" on page 84. Also refer to your system's *User Manual* for more information.

Why do the Rebuild, Synchronize, and Migrate operations take so long compared to moving data?

When data is moved, the operation consists of reading, writing, and checking one or more files. Rebuild, Synchronize, and Migrate involve reading, writing, and checking all the logical block addresses or individual data blocks on each physical drive. Plus, your logical drive remains available while these operations take place. These added requirements increase complexity and take more time.

Can I run RAIDXpert without a network connection?

Yes. You can run RAIDXpert without a network connection but only from the Host PC. See page 23.

Why can't I create a RAID 5 logical drive?

Some versions of the AMD Chipset SATA Controller do not support RAID 5. If your controller is one of them, choose a RAID 1 or a RAID 10 logical drive instead.

How can I keep my backup drive up-to-date with my RAID Ready logical drive?

Each time you plug-in your backup drive, the Fast Copy program finds all of the changes on the RAID Ready drive and updates the backup up drive automatically.

Why doesn't RAIDXpert display all of the physical drives in my system when I create a logical drive?

RAIDXpert displays only the physical drives that are qualified for use in your logical drive. A physical drive is unsuitable for use in a logical drive when it is:

- Fully assigned to a logical drive
- Attached to an eSATA port
- The PC's boot drive

How can I use a physical drive attached to an eSATA port?

Create a RAID Ready logical drive. See "Creating a Logical Drive" on page 62.

Appendix B: Partition and Format

In order for your operating system to recognize and work with the physical drives attached to your AMD Chipset SATA Controller, the drives must be partitioned and formatted.

- If your drives were previously partitioned and formatted they are ready to use and you can skip this procedure
- If your drives have not been partitioned and formatted, you must do that job before you can use them

The actions of partitioning and formatting create a file structure on the physical drives with which your operating system can work. In the example below, we show how this is done in Windows.

A similar procedure is required for Linux PC's. However, partitioning and formatting in Linux is not automated, therefore please refer to your system documentation for the exact procedure.

Note

If you plan to boot your computer from this logical drive, the partitioning and formatting are done when you install the OS onto the logical drive. The instructions here are for data logical drives only.
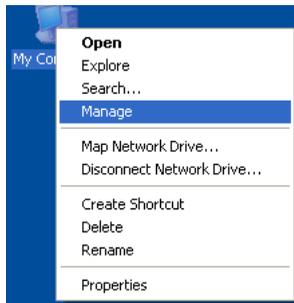
1. From the desktop, right-click the My Computer icon and choose *Manage* from the popup menu. The Computer Management window opens.
2. From the left menu, click **Disk Management**. The Disk Management window opens with your new logical drive identified as Disk 1. The Initialize Wizard appears automatically.
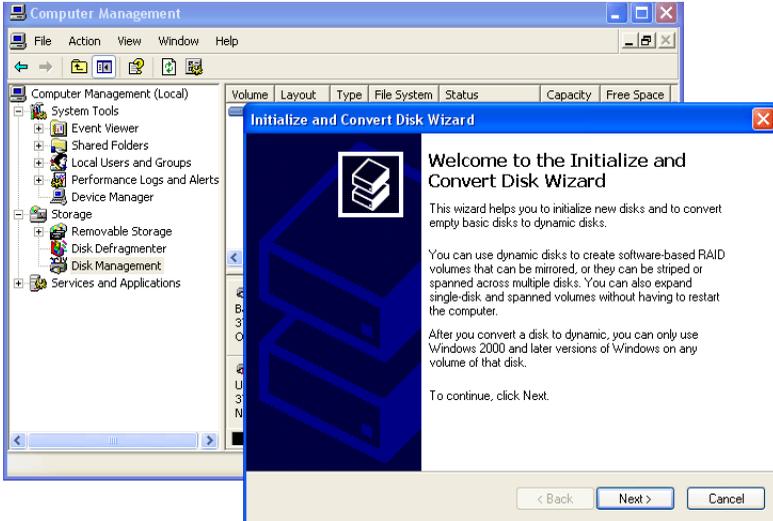
3. Click the **Next** button to start the Wizard.

4. In the following windows, choose Disk 1 to Initialize. Do not choose any disks to Convert. Click the **Finish** button to Initialize the logical drive.
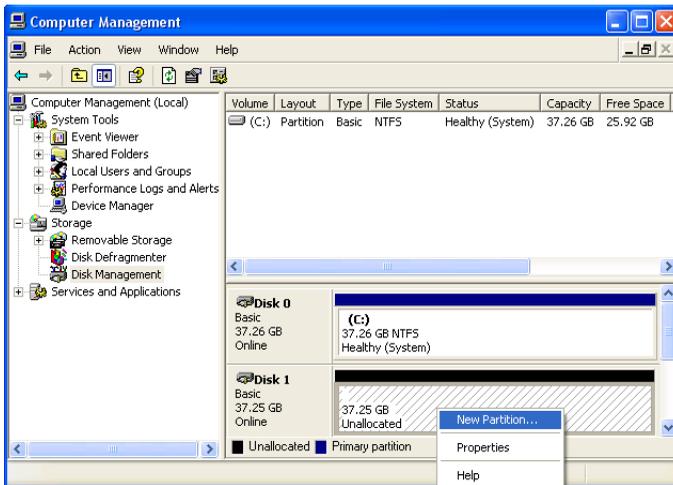
5. Right-click the Unallocated portion of Disk 1 and choose *New Partition...* from the popup menu. The New Partition Wizard appears.

6. Click the **Next** button to start the wizard.
7. In the following windows, do the following actions.
    •   Choose *Primary Partition*
    •   Specify the maximum available partition size in MB
    •   Assign the available drive letter of your choice
    •   Choose *Format this partition* with the following settings:
    •   File system: NTFS
    •   Allocation unit size: Default
    •   Volume label: Enter your choice of name
    •   Do not check "Perform a quick format" or "Enable file and folder compression"

    Click **Next** to move to the next window.
8. Review your selections and click **Finish**. The New Partition Wizard will disappear while partitioning and formatting begin.

    This process will take some time. The Disk Management window displays the progress.
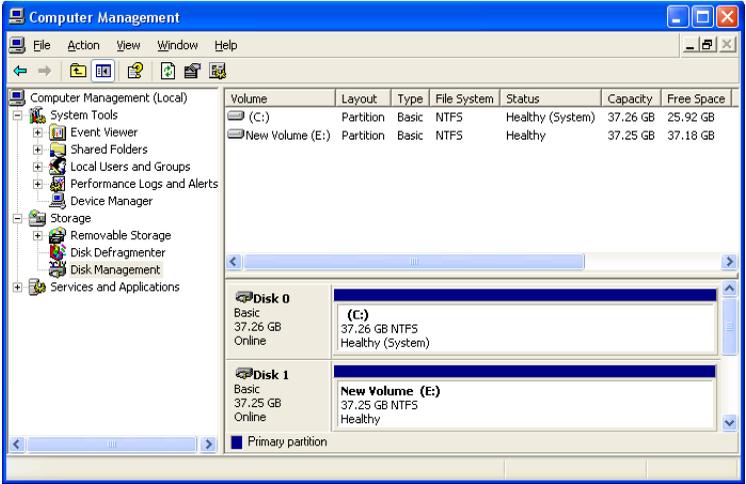
When formatting is complete, your logical drive will appear as a hard disk drive in the Disk Management window (above) and the My Computer window (below).