



WEBPAM

USER MANUAL

Version 1.3

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In the manual, the appearance of products made by other companies, including, but not limited to software, servers and disk drives, is for the purpose of illustration and explanation only. Promise Technology does not recommend, endorse, prefer or support any product made by another manufacturer.

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Chapter 1: Introduction

- WebPAM Components (page 2)
- How They Work Together (page 2)
- PAM Installation Options (page 3)
- About This Manual (page 5)

Thank you for purchasing a Promise Technology RAID Controller product. This Web-based Promise Array Management (WebPAM) browser-based software is included to improve your RAID Monitoring and Management experience.

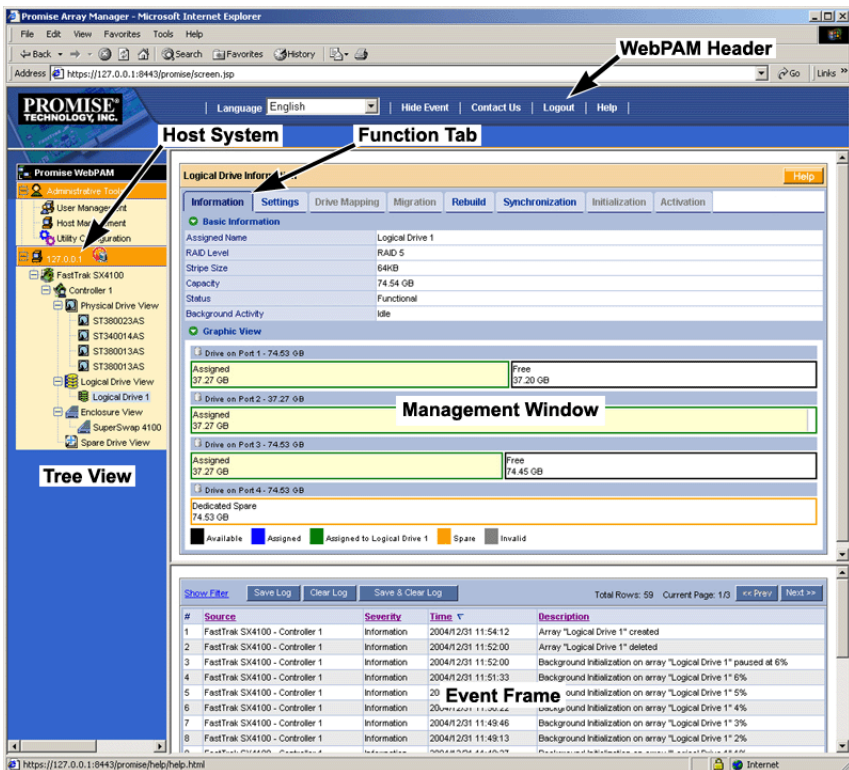


Figure 1. WebPAM in a browser window

For more information about the WebPAM Graphic User Interface (GUI), see Chapter 4 on page 29.

WebPAM Components

There are two components to WebPAM. Depending on your installation, all three may be on the same workstation or work separately across your network:

Utility Server – The Utility Server runs on the “Host PC”. The Utility Server software monitors and reports on the condition of the RAID logical drives and provides a complete set of management tools. It displays a Graphic User Interface (GUI) on your Internet Browser.

Internet Browser – Typically an Internet browser comes with your operating system. WebPAM does not include a browser. For computers that will remotely monitor and manage the RAID, the Internet Browser is the only software required.

Your Internet Browser provides the means for you to monitor and configure your Promise RAID products using WebPAM. You can use the most recent versions of either Internet Explorer or Netscape Navigator.

How They Work Together

The WebPAM software provides an easy way to set up, monitor, modify and repair your RAID. WebPAM works with the Promise FastTrak SX series RAID Controller cards.

WebPAM watches the RAID and when significant events happen, or it discovers a problem, the Utility Server passes the warning along to all connected PCs.

Warnings appear on the PC in the form of email messages and popup alerts. You can select either one or both. You can also select which events and problems WebPAM will report.

A major benefit of WebPAM is that it runs over a TCP/IP network. This enables remote monitoring of your RAIDs, including offsite monitoring over an Internet connection.

Once you become aware of a problem, go to the PC that controls the RAID, called the “Host PC” to take corrective action. If you have more than one RAID PC on your network, WebPAM will indicate which one has the problem.

PAM Installation Options

Following are some examples of ways you can incorporate WebPAM into your network and RAID systems.

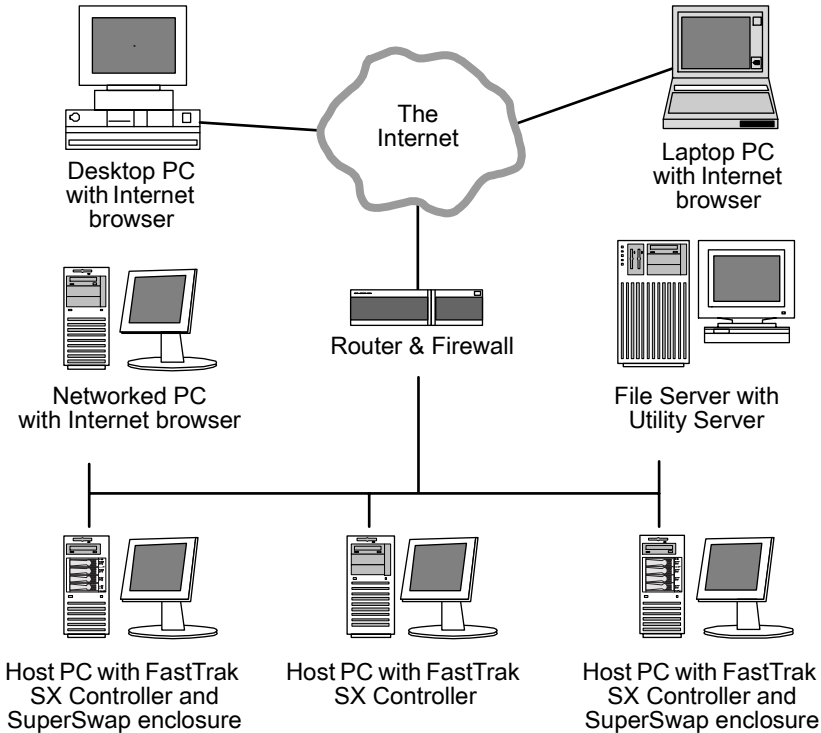


Figure 1. LAN and Internet connections.

In the example above, there are three PCs, each with a FastTrak SX Series RAID Controller card and a connection to the company's LAN.

Two Host PCs have an optional SuperSwap enclosure with up to four SATA physical drives.

The WebPAM runs on each of the PCs with a FastTrak Controller. Networked PCs and also on remote PCs connecting to the company network through the Internet. With this arrangement, you can monitor RAID condition and activity from offsite, such as a hotel room or home office.

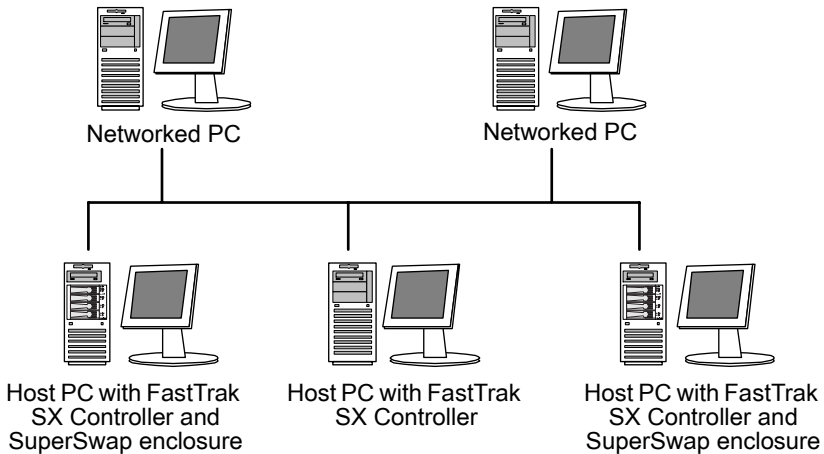


Figure 2. Company LAN without a File Server

In the example above, like the one before, there are three PCs, each with a FastTrak SX Series RAID Controller card and a connection to the company's LAN.

But this network has no file server. The networked PCs access WebPAM through the network connection directly. If this LAN were upgraded with a suitable router and an Internet connection, you could set up offsite monitoring.

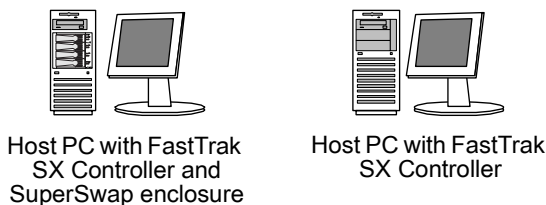


Figure 3. PCs with Internal RAID

This is the simplest arrangement. All monitoring and management are done on the RAID PC. No network connection is used. One PC has an optional SuperSwap enclosure that holds up to four SATA physical drives.

Promise's FastTrak SX Series Controller card is designed to setup and control a RAID within the PC's enclosure. They have the same need of monitoring and management as an external RAID subsystem. Both WebPAM components run on the PC itself.

About This Manual

This *User Manual* describes how to setup, use and maintain the Web-based Promise Array Management (WebPAM) software.

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

An *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.

WebPAM is a software application designed specifically for monitoring and managing Promise Technology's FastTrak SX Series RAID Controller cards.

Chapter 2: Installation

- Utility Server (below)
- Java Runtime Environment (page 8)
- Operating System Support (page 8)
- Before You Start... (page 8)
- Install WebPAM (page 9)

WebPAM installation software will install two major components:

- Utility Server – WebPAM RAID monitoring and Networking software
- Java Runtime Environment (if not previously installed)

Utility Server

The Utility Server installs on the PC with the FastTrak RAID Controller card (the "Host PC").

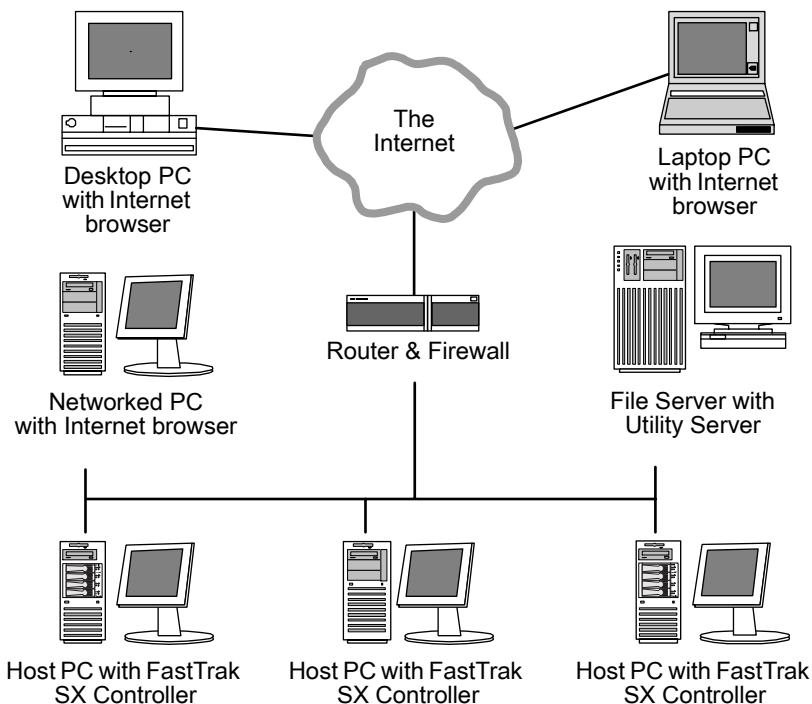


Figure 1. WebPAM on a network

Java Runtime Environment

If you are planning to use other applications that rely on JRE or JDK, always install them first before you install WebPAM. WebPAM will use the existing JRE rather than installing a second one.

WebPAM will install JRE 1.4 on your system unless you already have JRE or JDK versions 1.3.0 or 1.4.

Operating System Support

On the Host PC where you install the FastTrak controller and WebPAM, Promise Technology recommends:

- Windows 2000
- Windows XP Professional
- Windows 2003

The Utility Server supports these operating systems. Choose one of them to take full advantage of all the features of WebPAM.

Before You Start...

In order for WebPAM to install and configure properly, there must be a logical drive on the FastTrak Controller.

To create a logical drive on the FastTrak Controller:

1. Exit Windows and reboot your PC.
2. When the FastTrak BIOS appears, press Ctrl-F to enter the the FastBuild menu.
3. Create a temporary logical drive.

The logical drive will appear as PROMISE LD1 in WebPAM after installation.

4. Exit the FastBuild utility and allow the PC to finish booting to Windows.

For more detailed instructions on the FastBuild utility, see the *FastTrak SX Series RAID Controller User Manual*.

Install WebPAM

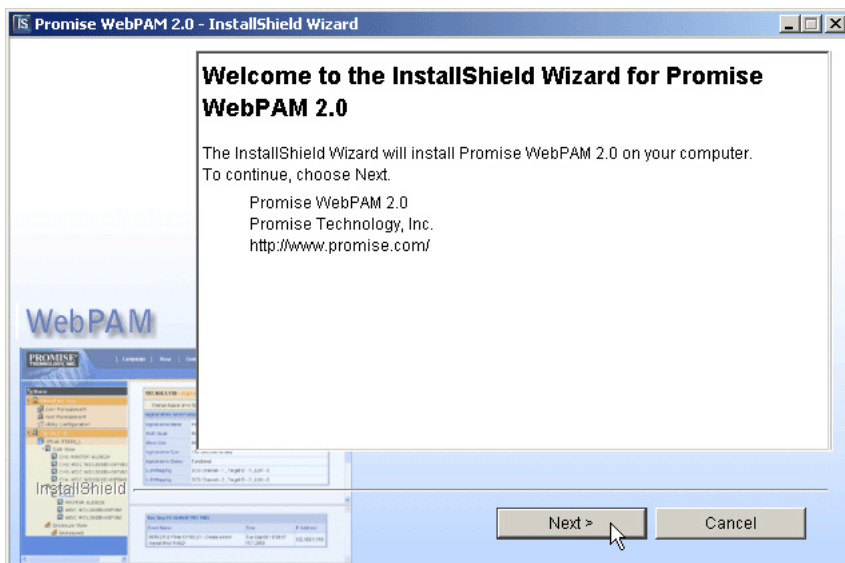
Follow these steps to install WebPAM on your Windows-based PC or Server.

1. Boot the PC/server and launch Windows.
If the computer is already running, exit all programs.
2. Insert the software CD into your CD-ROM drive.
3. Double-click on the Install CD's icon to open it.
4. Double-click on the Installer icon to launch it (right).

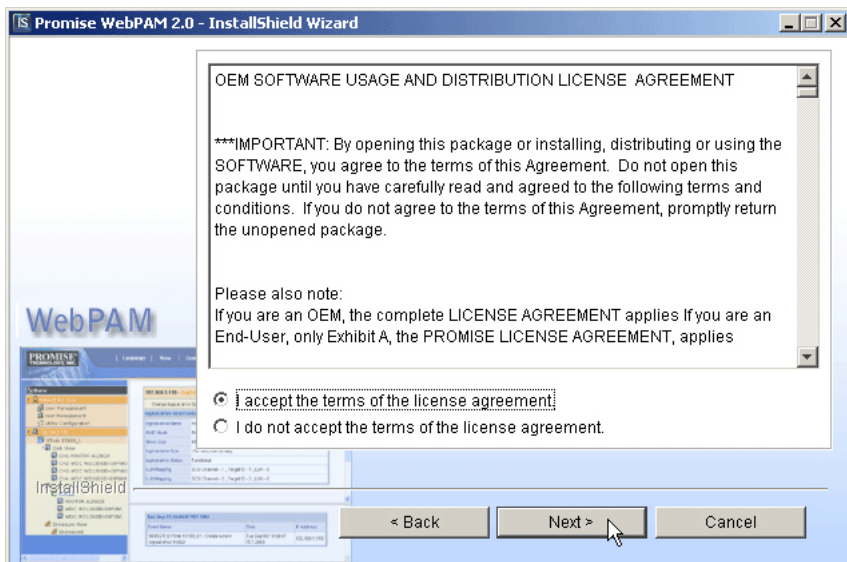


PromiseWebPAM

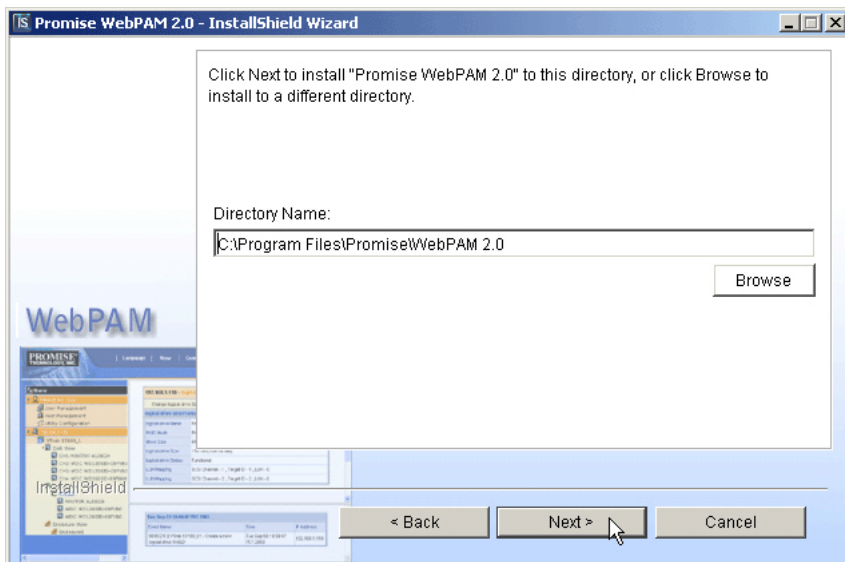
The first WebPAM installation dialog box appears, as shown on the next page.



5. When the Introduction screen appears (above), click the **Next** button.



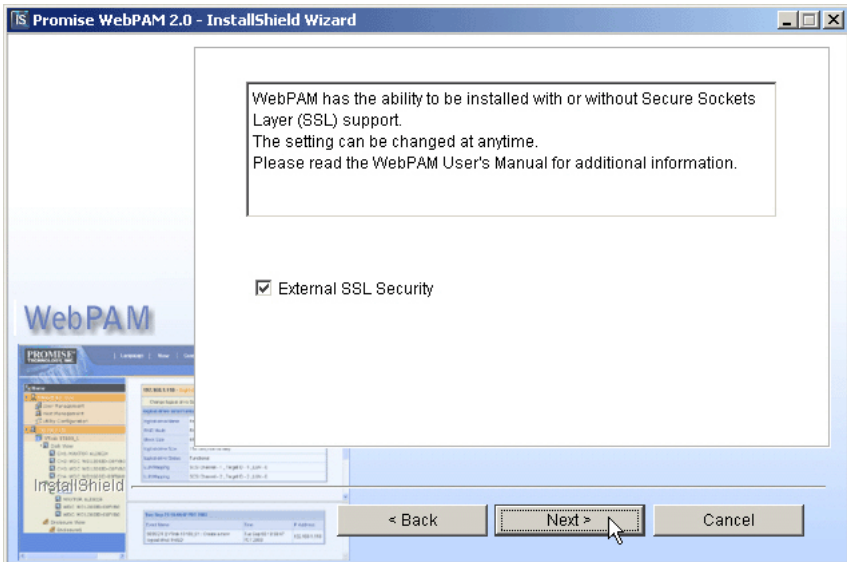
- When the License Agreement appears (above), click the “I accept the terms of the license agreement” radio button. Then click the **Next** button.



7. When the Choose Install Folder screen appears (above), make your selection of a folder for the WebPAM applications you are installing. The default folder is **C:\Program Files\Promise\WebPAM 2.0**. If you want a different folder, type its location and click the **Browse** button.

If you change your mind and want the default location, click on the **Back** button, then the **Next** button.

Click the **Next** button when you are finished.



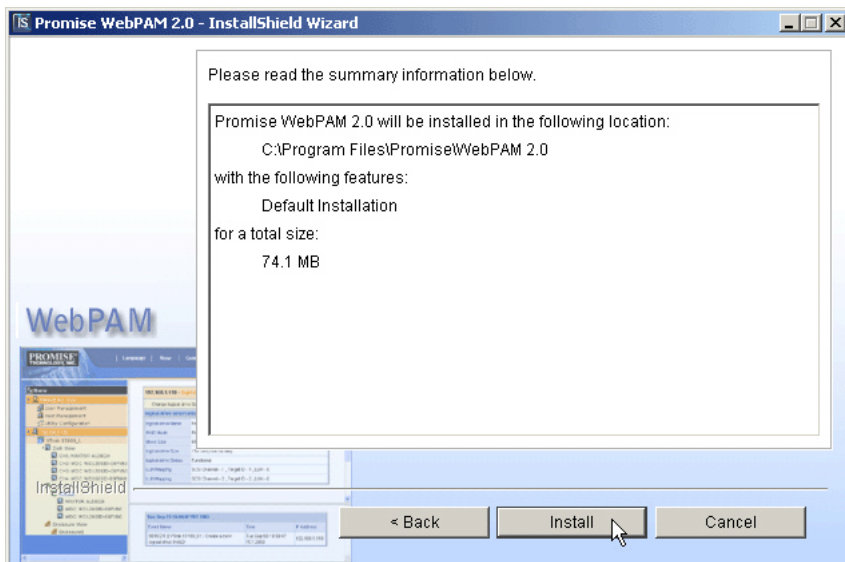
8. When the SSL Security Options screen appears (above), you can check External Security. An explanation follows.

External SSL Security – Applies security to all connections involving the Internet or outside your company firewall.

Security options are invisible to authorized users.

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

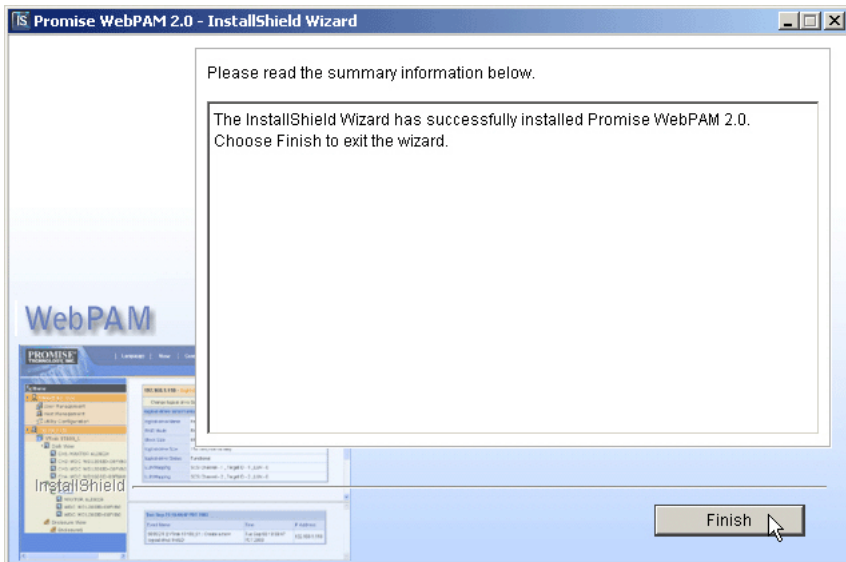
Click the **Next** button when you have made your choice.



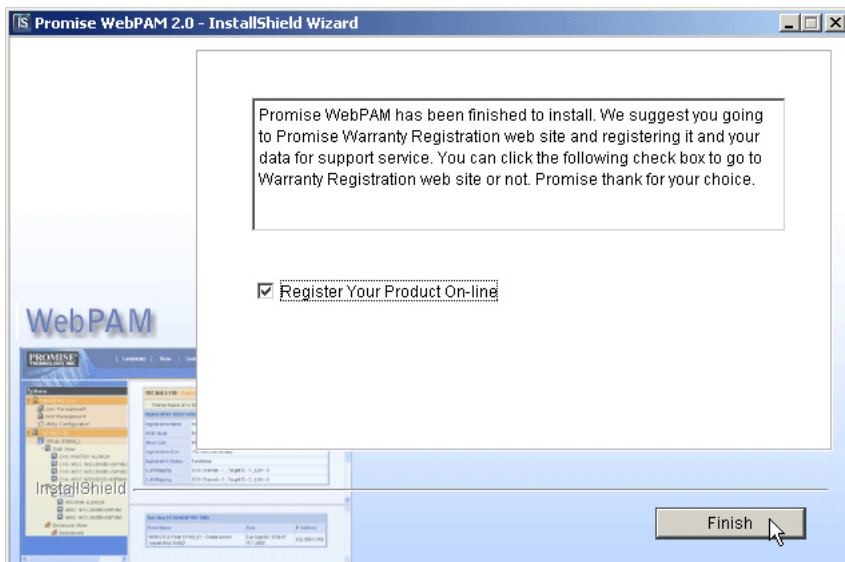
9. When the Installation Summary screen appears (above), review your choices.

To make changes, click the **Back** button.

To continue, click the **Finish** button.



10. When the Install Complete screen appears (above), the installation process is finished. Click the **Finish** button.



11. When the Install Complete screen appears (above), the installation process is finished. Click the **Finish** button to go to the Promise Registration website.



Important

Registration of your VTrak and WebPAM provides useful information that helps Promise Technologies to offer better products and support. Please take a few minutes to register. Thanks!

This completes the WebPAM installation. Go to Chapter 3: Setup (page 17).

Chapter 3: Setup

- Log-in to WebPAM (page 17)
- Access a Host PC (page 19)
- Recommended Initial Settings (page 20)
- Delete the Temporary Logical Drive (page 22)
- Create a New Logical Drive (page 23)
- Log-out of WebPAM (page 27)
- Internet Connection using WebPAM (page 27)
- Run WebPAM without Network Connection (page 27)

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

Log-in to WebPAM

Double-click on the WebPAM icon on your desktop (right). Or,



1. Launch your Browser.
2. In the Browser address field, type in the IP address of the Host PC, as explained below.

If you did *not* choose the External Security option during WebPAM installation (see page 12), use the *Regular* connection.

If you chose the External Security option during WebPAM installation, use the *Secure* connection.

Regular Connection

- WebPAM uses an HTTP connectionhttp://
- Enter the Host PC's IP address 127.0.0.1
- Enter the Port number :8080
- Add to launch WebPAM. /promise

Together, your entry looks like this:

http://127.0.0.1:8080/promise

Secure Connection

- WebPAM uses a secure HTTP connectionhttps://
- Enter the Host PC's IP address 127.0.0.1
- Enter the Port number :8443
- Add to launch WebPAM. /promise

Together, your entry looks like this:

https://127.0.0.1:8443/promise

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



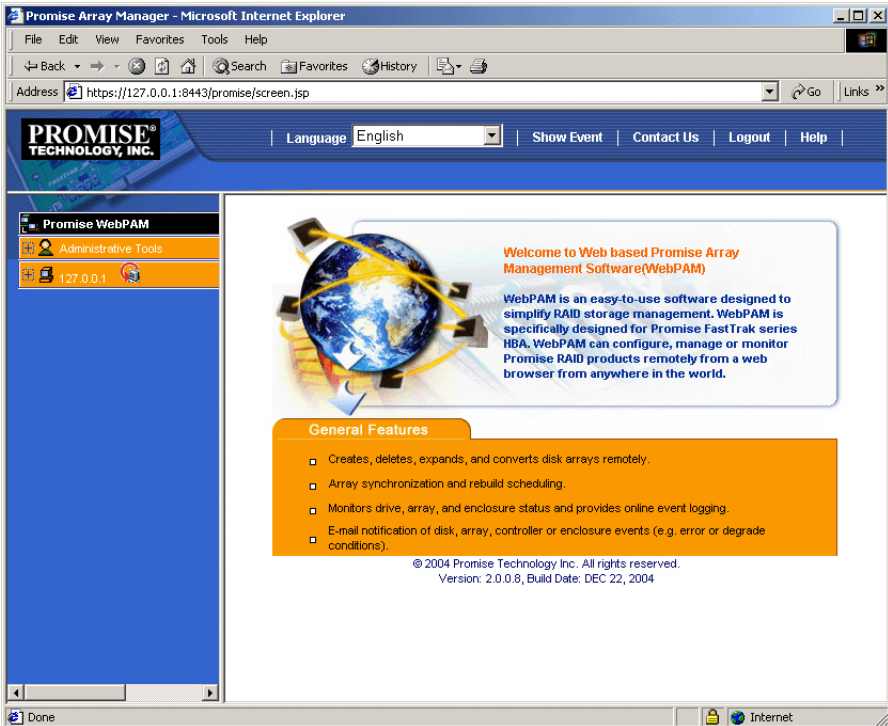
3. When the opening screen appears, type **admin** in the Login ID field.
Type **admin** again in the Password field.
The WebPAM login and password are case sensitive.
4. Click the **Sign in** button.



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 WebPAM opening screen appears.



Access a Host PC

WebPAM includes a navigation tree or Tree View in the left frame of the browser window. Click on 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



Host – Controller, Physical Drives, Logical Drives, Enclosure, Spare Drives, Battery (if present)

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 WebPAM at all, lower your browser's security settings.

A detailed discussion of WebPAM graphic user interface is found in Chapter 4 on page 29.

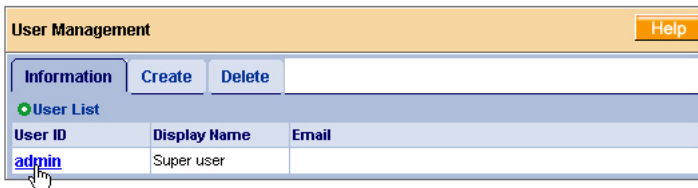
Recommended Initial Settings

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 on the User Management  icon.

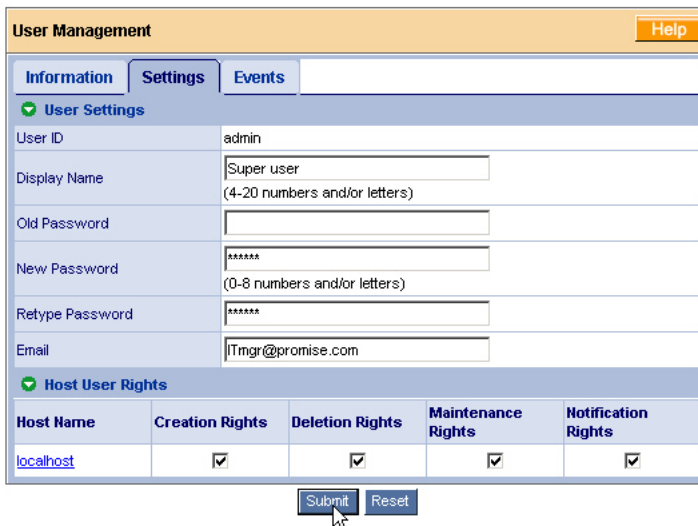


The screenshot shows the 'User Management' window with a 'Help' button in the top right. Below the title bar are tabs for 'Information', 'Create', and 'Delete'. A 'User List' section contains a table with the following data:

User ID	Display Name	Email
admin	Super user	

A mouse cursor is pointing at the 'admin' link in the User ID column.

2. In the Management Window, click on the **admin** link.
3. Click on the Settings tab.



The screenshot shows the 'User Management' window with the 'Settings' tab selected. The 'User ID' is 'admin'. The 'User Settings' section contains the following fields:

User ID	admin
Display Name	Super user (4-20 numbers and/or letters)
Old Password	
New Password	***** (0-8 numbers and/or letters)
Retype Password	*****
Email	ITmgr@promise.com

Below the settings is the 'Host User Rights' section with a table:

Host Name	Creation Rights	Deletion Rights	Maintenance Rights	Notification Rights
localhost	☒	☒	☒	☒

At the bottom are 'Submit' and 'Reset' buttons. A mouse cursor is pointing at the 'Submit' button.

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 on 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 on the Settings tab.

The screenshot shows a web interface titled "Select Events" with a "Help" button in the top right. Below the title bar are three tabs: "Information", "Settings", and "Events", with "Events" being the active tab. The main content area is divided into sections for event selection:

- localhost(127.0.0.1)**
- Email Notification**
 - ☒ Select All Events
 - ☒ Select All Information Events
 - ☒ Select All Warning Events
 - ☒ Select All Critical Events
- Disk Events**
 - ☒ Disk Plugged In
 - ☒ Disk BSL Update
 - ☒ Disk BSL Cleared
 - ☒ Disk Error Fixed
 - ☒ Bad Block Remapped
 - ☒ Disk Patrol Progress
- Enclosure Temperature Error**
 - ☒ Enclosure Temperature Error
 - ☒ Battery Temperature Error
 - ☒ Battery voltage Error
 - ☒ Battery Communication Error

At the bottom of the window are two buttons: "Submit" and "Reset". A mouse cursor is pointing at the "Submit" button.

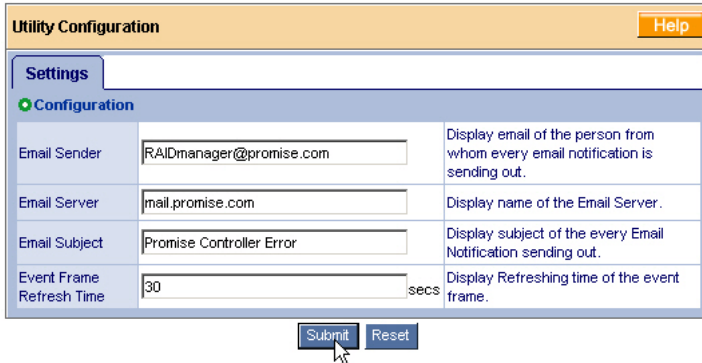
The image above was shortened to fit into the available space.

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 on the **Submit** button.
For more information about Event Notification, see page 38.

Utility Configuration

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

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



Utility Configuration Help		
Settings		
Configuration		
Email Sender	RAIDmanager@promise.com	Display email of the person from whom every email notification is sending out.
Email Server	mail.promise.com	Display name of the Email Server.
Email Subject	Promise Controller Error	Display subject of the every Email Notification sending out.
Event Frame Refresh Time	30 secs	Display Refreshing time of the event frame.
Submit Reset		

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

Delete the Temporary Logical Drive

Before installation, you created a logical drive on the FastTrak RAID Controller using the FastBuild utility. In most cases, the temporary logical drive does not meet your storage requirements, so you should delete it and create a new logical drive using WebPAM.

To delete a logical drive:

1. Expand the Tree icons until you see the Logical Drive View  icon.

- Click on the Logical Drive View icon and select the Delete tab.

Logical Drive View Help

Information **Create** **Delete** Synchronization Schedule

✓ Logical Drive Overview

Select	Assigned Name	RAID Level	Status	Background Activity	Capacity
☒	PROMISE LD 1	RAID 0	Functional	Idle	149.06 GB

Submit Reset

- Check the box to the left of the logical drive you want to delete.
Logical drives created in FastBuild appear in WebPAM as PROMISE LD x.
- Click the **Submit** button.
- In the Confirmation box, click the **OK** button.

The temporary logical drive is deleted.

Create a New Logical Drive

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

- Click on the Logical Drive View  icon.
- Click on the Create tab.

Select RAID Level

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

- ☐ **RAID 0** - Data striped across 2 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: independent connected drives with no RAID interconnection

<< Prev Next >>

- Select the radio button beside the RAID level you want for your logical drive.
WebPAM displays the RAID levels you can use with the available disk drives.

See “Choosing a RAID Level” on page 95 for information about the advantages and requirements of the available RAID levels.

4. Click the **Next** button.

5. If you want to create a logical drive with unused capacity, enter the assigned (used) capacity in the Logical Drive Size field.
To use the maximum capacity, check the Use Maximum Capacity box.
6. Click on the disk drives to select them.
Available drives have a black frame. Selected drives have a red frame.
7. Click the **Next** button.

8. Enter a name for the logical drive in the field provided.
9. Click the **Next** button.

Name	Logical Drive 1
RAID Level	RAID 5
Logical Drive Size	Maximum Capacity
Stripe Block Size	64 KB
Write Cache	Write Back
Gigabyte Boundary	GB Rounding
Initialization	Quick Initialization

<< Prev Finish

10. Select a Stripe Block Size from the dropdown menu.

Choose from 32, 64 or 128 KB. The size selected affects how FastTrak sends and receives data blocks to and from the drives. In general, a larger block size is better when handling large data transfers (such as A/V editing and graphics) while a smaller size is better when handling email and other common server data. The default is 64KB. When in doubt, use the default value.

11. Select a Write Cache policy from the dropdown menu.

- **Write Back** – Increases performance but can result in data loss in the event of a power failure. This is the default.
- **Write Through** – Slower but more secure.

12. Select a Gigabyte Boundary policy from the dropdown menu.

- **GB Rounding** – Rounds the size of the logical drive down to the nearest whole gigabyte. It allows you to install a slightly smaller (within 1 GB) replacement drive, should the need arise. This is the default.
- **None** – No Boundary function.

13. Select an Initialization policy from the dropdown menu.

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

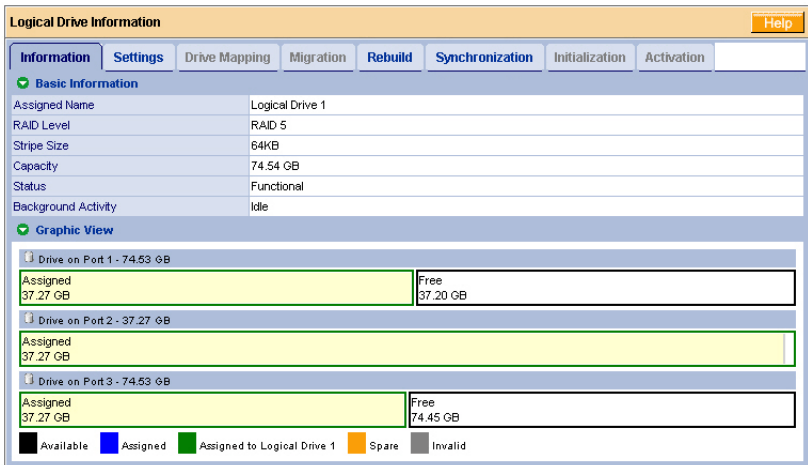
14. Click the **Next** button.

Logical Drive View

Created Successfully

Information Create Delete Sync

The result of the logical drive creation operation are displayed.



Click on the Logical Drive  icon 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 105 for more information.

Log-out of WebPAM

There are two ways to log out of WebPAM:

- Close your browser window
- Click Logout on the WebPAM banner (below)



After logging out, you must enter your username and password to log in again. Clicking Logout brings you back to the Login Screen.

Internet Connection using WebPAM

The above instructions cover connections between the Host PC and other PCs using WebPAM 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.

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

Run WebPAM without Network Connection

While WebPAM was designed to run over a network, you can run WebPAM without a network connection but only from the Host PC. Follow this procedure:

1. Double-click the WebPAM desktop icon.
Your browser opens and displays a “no connection to the Internet is currently available” message.
2. Click the **Work Offline** button.
3. In the WebPAM 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, WebPAM will display normally in your browser.

Chapter 4: WebPAM User Interface

- Banner (page 30)
- Tree View (page 30)
- Management Window (page 32)
- Event Frame (page 33)

This chapter describes WebPAM's Graphic User Interface (GUI). You should understand that WebPAM is software running on top of the Promise RAID BIOS and other applications that came with your Promise RAID product and your Internet Browser. WebPAM adds a graphic user interface to make RAID management functions easier to understand and perform.

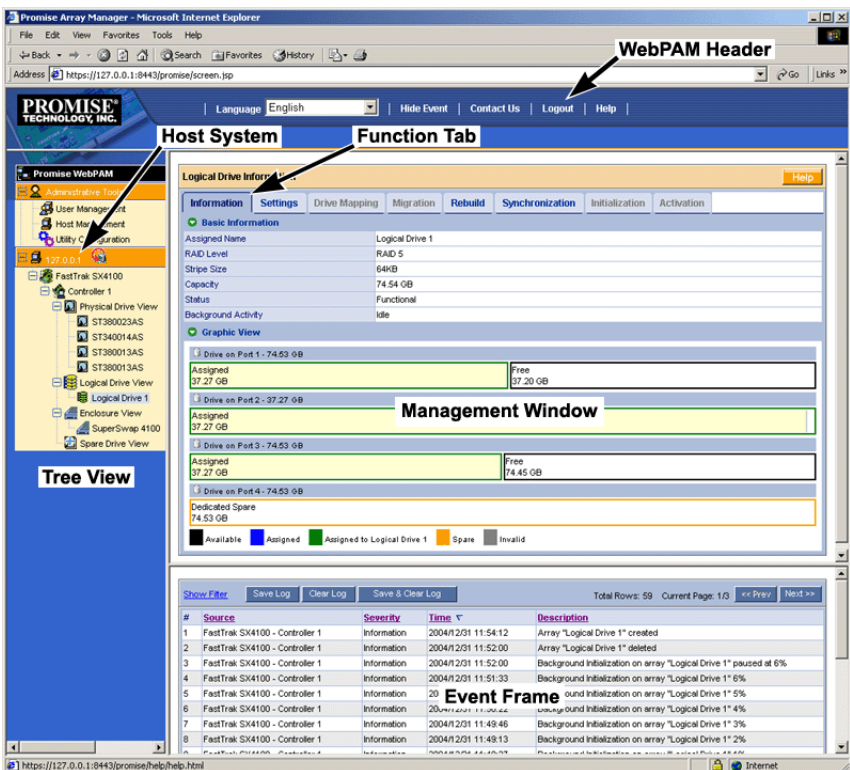


Figure 1. The WebPAM Graphic User Interface

Banner

The WebPAM banner appears at the top of your browser window when you are running Web PAM.

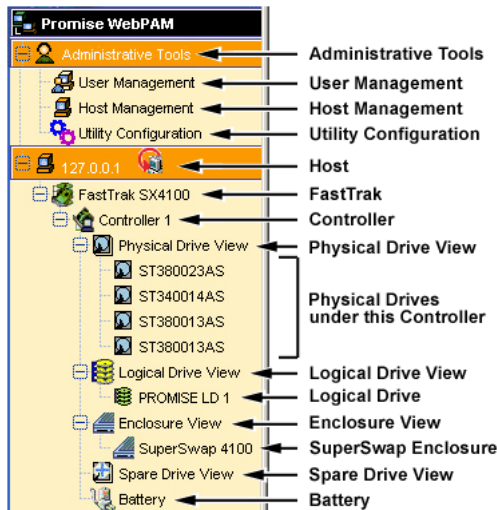


The WebPAM banner enables you to do the following actions:

- Select the language in which WebPAM displays from the dropdown menu. Currently, English and Chinese Traditional are the available languages
- Show or Hide the Event Frame. See Event Frame, below
- Display Promise Technology contact information including links to the Promise website and email accounts
- Log out of WebPAM
- Display the Main Online Help menu

The banner always appears when your browser displays WebPAM.

Tree View



The purpose of Tree View is Navigation. Tree View appears in the left frame of the browser window. Click on 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



Host – Controller, Physical Drives, Logical Drives, Enclosure and Spare Drives



FastTrak – Information on the FastTrak RAID Controller card



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, Write Cache settings, Rebuild and Synchronization functions



Enclosure View – A list of enclosures (one, in most cases) connected to the FastTrak RAID Controller



Enclosure – Refers operating parameters of the SuperSwap enclosure including fan speed, temperature and voltage levels



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



Battery – Information on the cache-backup battery (if present)

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 Tree View icon you select.

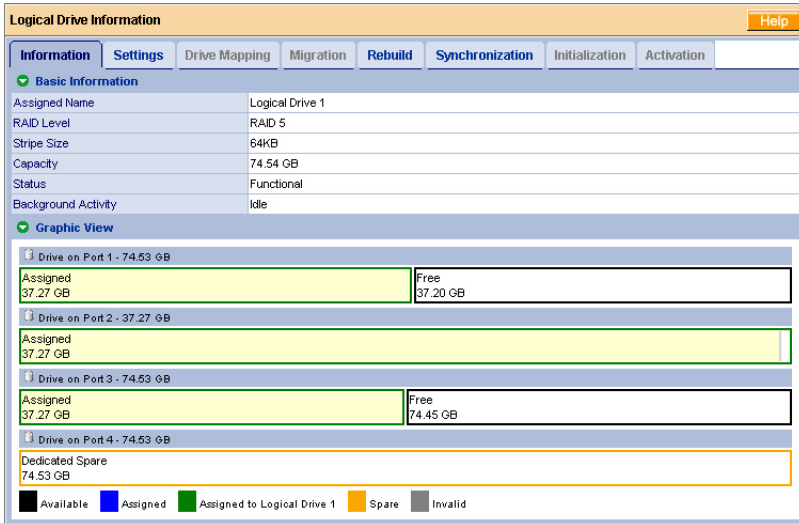


Figure 2. Management Window as it appears when a logical drive icon is selected.

In the example above, the Management Window shows the information about a logical drive because that logical drive's  icon was selected 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 selected. In the example above, you can

- Click on the Settings tab to change the name of the logical drive or its cache settings.
- Click on the Rebuild tab to rebuild a replacement disk drive.
- Click on 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 on .

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 WebPAM Header (above).

Show Filter					Total Rows: 174	Current Page: 7/9	<< Prev	Next >>
Save Log								
Clear Log								
Save & Clear Log								
#	Source	Severity	Time	Description				
121	FastTrak SX4100 - Controller 1	Information	2004/12/31 11:50:22	Background Initialization on array "Logical Drive 1" 4%				
122	FastTrak SX4100 - Controller 1	Information	2004/12/31 11:49:46	Background Initialization on array "Logical Drive 1" 3%				
123	FastTrak SX4100 - Controller 1	Information	2004/12/31 11:49:13	Background Initialization on array "Logical Drive 1" 2%				
124	FastTrak SX4100 - Controller 1	Information	2004/12/31 11:48:37	Background Initialization on array "Logical Drive 1" 1%				
125	FastTrak SX4100 - Controller 1	Information	2004/12/31 11:47:58	Background Initialization on array "Logical Drive 1" started				
126	FastTrak SX4100 - Controller 1	Information	2004/12/31 11:47:58	Array "Logical Drive 1" created				
127	FastTrak SX4100 - Controller 1	Information	2004/12/31 11:37:30	Array "PROMISE LD 1" deleted				
128	FastTrak SX4100 - Controller 1	Information	2004/12/31 11:07:17	Disk 3 plugged in				
129	FastTrak SX4100 - Controller 1	Information	2004/12/31 11:07:17	Disk 4 plugged in				
130	FastTrak SX4100 - Controller 1	Information	2004/12/31 11:07:17	Disk 1 plugged in				
131	FastTrak SX4100 - Controller 1	Information	2004/12/31 11:06:55	Disk 2 plugged in				
132	FastTrak SX4100 - Controller 1	Critical	2004/12/31 11:05:15	Disk 4 unplugged				
133	FastTrak SX4100 - Controller 1	Critical	2004/12/31 11:05:15	Array "PROMISE LD 1" goes offline				
134	FastTrak SX4100 - Controller 1	Critical	2004/12/31 11:05:15	Disk 3 unplugged				
135	FastTrak SX4100 - Controller 1	Critical	2004/12/31 11:05:15	Array "PROMISE LD 1" goes degrade				
136	FastTrak SX4100 - Controller 1	Critical	2004/12/31 11:05:15	Disk 2 unplugged				
137	FastTrak SX4100 - Controller 1	Critical	2004/12/31 11:05:15	Disk 1 unplugged				
138	FastTrak SX4100 - Controller 1	Information	2004/12/31 11:03:56	Disk 3 plugged in				
139	FastTrak SX4100 - Controller 1	Information	2004/12/31 11:03:56	Disk 2 plugged in				
140	FastTrak SX4100 - Controller 1	Information	2004/12/31 11:03:56	Disk 4 plugged in				

Figure 3. Event Frame appears below the Management Window.

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

Click the **Prev** and **Next** buttons to move through the Event list. You can also clear and save the event list as an HTML file, and also display events selected by severity or data and time.

Chapter 5: Monitor and Manage

- Log-in to WebPAM (page 35)
- Log-out of WebPAM (page 36)
- User Management (page 37)
- Host Management (page 45)
- Utility Configuration (page 46)
- FastTrak (page 47)
- Controller (page 48)
- Physical Drives (page 52)
- Logical Drives (page 62)
- Enclosures (page 83)
- Spare Drives (page 85)
- Battery (page 88)

Log-in to WebPAM

Double-click on the WebPAM icon on your desktop (right). Or,

1. Launch your Browser.
2. In the Browser address field, type in the IP address of the Host PC, as explained below.

If you did *not* choose the External Security option during WebPAM installation (see page 12), use the *Regular* connection.

If you chose the External Security option during WebPAM installation, use the *Secure* connection.



Regular Connection

- WebPAM uses an HTTP connection http://
- Enter the Host PC's IP address 127.0.0.1
- Enter the Port number :8080
- Add to launch WebPAM /promise

Together, your entry looks like this:

http://127.0.0.1:8080/promise

Secure Connection

- WebPAM uses a secure HTTP connection https://
- Enter the Host PC's IP address 127.0.0.1
- Enter the Port number :8443
- Add to launch WebPAM /promise

Together, your entry looks like this:

https://127.0.0.1:8443/promise

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

3. When the opening screen appears, type **admin** in the Login ID field. The WebPAM login and password (when used) are case sensitive.
4. Click the **Sign in** button.

Log-out of WebPAM

There are two ways to log out of WebPAM PRO:

- Close your browser window
- Click **Logout** on the WebPAM banner (below)



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

- Add a User (below)
- Event Notification (page 38)
- Delete a User (page 41)
- Change a User's Password (page 41)
- Change a User's Email Address (page 42)
- Change a User's Access Rights (page 43)

Add a User

1. In Tree View, click on the User Management  icon.
2. Click on the Create tab.

User Management

Help

Information

Create

Delete

User Creation

User ID

(4-20 character(s))

Display Name

Password

(0-8 character(s))

Retype Password

Email

Host User Rights

Host Name	Creation Rights	Deletion Rights	Maintenance Rights	Notification Rights
localhost	☒	☒	☒	☒

Submit

Reset

3. Type a User ID into the User ID field.
This will be the User's login name.
4. Type the user's display name into the Display Name field.
This could be the User's actual name.
5. Type a password into the Password field.
Use up to 8 letters and numbers but no spaces or other characters.
6. Type the same password into the Retype Password field.
7. If you plan to set up Event Notification, type the user's email address in the Email field.

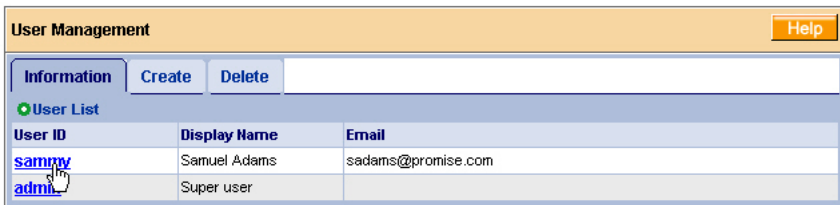
- Under Host User Rights, check the boxes to select rights for this user.

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

- Click on the **Submit** button.

Event Notification

- In Tree View, click on the User Management  icon.



- Click on the User ID link.
- Click on the Settings tab.

Select Events

Help

InformationSettingsEvents

localhost(127.0.0.1)

Email Notification

☒ Select All Events

☒ Select All Information Events☒ Select All Warning Events☒ Select All Critical Events

Disk Events

☒ Disk Plugged In☒ Disk BSL Update☒ Disk BSL Cleared

☒ Disk Error Fixed☒ Bad Block Remapped☒ Disk Patrol Progress

☒ Enclosure Temperature Error☒ Battery Temperature Error☒ Battery voltage Error

☒ Battery Communication Error

SubmitReset

The image above was shortened to fit into the available space.

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 on the **Submit** button.

Event Notification Severity Levels

Information Events

Disk Plugged In
Disk BSL Update
Disk BSL Cleared
Disk Media Patrol Started
Disk Error Fixed
Bad Block Remapped
Disk Patrol Progress
Disk Media Patrol Completed
Disk Media Patrol Paused
Disk Media Patrol Resumed
Disk Media Patrol Aborted
Disk Media Patrol Aborted with Error
Array Online
Array Created
Array Deleted
Array Cache Mode Changed
Synchronization Started
Synchronization Completed
Synchronization Paused
Synchronization Resumed
Synchronization Aborted
Synchronization Progress
Rebuild Started
Rebuild Completed
Rebuild Paused
Rebuild Resumed
Rebuild Aborted
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
Battery Becomes Normal

Warning Events

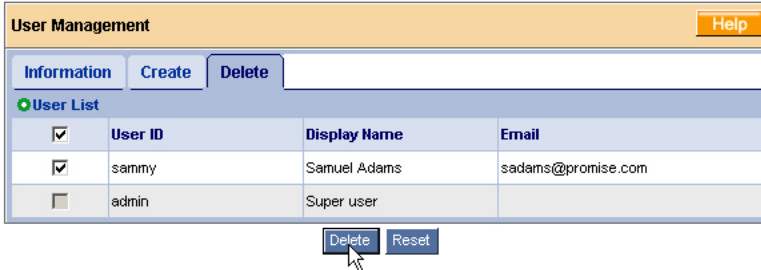
Synchronization Aborted with Error
Rebuild Aborted with Error
Background Initialization Aborted with Error
Migration Aborted with Error
Battery Temperature Unstable
Battery Voltage Unstable
Battery Not Functioning

Critical Events

Disk Unplugged
Disk Setdown
Disk Timeout
Disk ECC Error
Disk Non-ECC Error
Disk S.M.A.R.T. Error
Array Offline
Array Degrade
Array SYNC Inconsistency Found
Array SYNC Inconsistency Fixed
Enclosure Fan Error
Enclosure Voltage 3.3 Error
Enclosure Voltage 5 Error
Enclosure Voltage 12 Error
Enclosure Temperature Error
Battery Temperature Error
Battery Communication Error

Delete a User

1. In Tree View, click on the User Management  icon.
2. Click on the Delete tab.



User Management Help

Information Create **Delete**

➤ User List

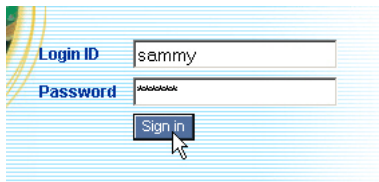
☒	User ID	Display Name	Email
☒	sammy	Samuel Adams	sadams@promise.com
☐	admin	Super user	

Delete Reset

3. Check the box to the left of the user you want to delete.
4. Click the **Delete** button.
5. In the Confirmation box, click the **OK** button.

Change a User's Password

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

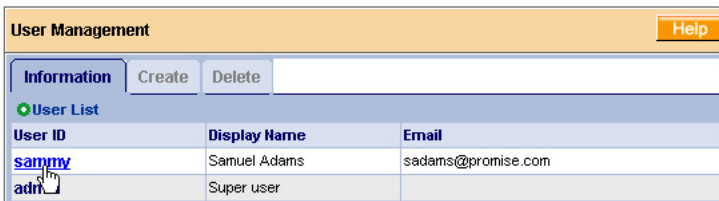


Login ID sammy

Password 123456789

Sign in

1. Log into WebPAM under the User name.



User Management Help

Information Create Delete

➤ User List

User ID	Display Name	Email
sammy	Samuel Adams	sadams@promise.com
admin	Super user	

2. Click on your User ID link.

User Management
Help

Information
Settings
Events

+ **User Settings**

User ID	sammy
Display Name	Samuel Adams (4-20 numbers and/or letters)
Old Password	*****
New Password	***** (0-8 numbers and/or letters)
Retype Password	*****
Email	sadams@promise.com

+ **Host User Rights**

Host Name	Creation Rights	Deletion Rights	Maintenance Rights	Notification Rights
localhost	☒	☒	☒	☒

Submit
Reset

3. Type the current password in the Old Password field.
4. Type a new password in the New Password field.
5. Retype the new password in the Retype Password field.
6. Click the **Submit** button.



Important

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

Change a User's Email Address

In WebPAM, each user can change his/her own email address or the Administrator can do it. To change a user's email address:

User Management
Help

Information
Create
Delete

+ **User List**

User ID	Display Name	Email
sammy	Samuel Adams	sadams@promise.com
admin	Super user	

1. Click on the User ID link for the user whose email address will change.

User Management

Help

Information

Settings

Events

✔ User Settings

User ID

sammy

Display Name

Samuel Adams

(4-20 numbers and/or letters)

Old Password

New Password

(0-8 numbers and/or letters)

Retype Password

Email

sadams@promise.com

✔ Host User Rights

Host Name	Creation Rights	Deletion Rights	Maintenance Rights	Notification Rights
localhost	☒	☒	☒	☒

Submit

Reset

2. Type a new email address in the Email field.
3. Click the **Submit** button.

Change a User's Access Rights

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

1. Log in as the Administrator.

User Management

Help

Information

Create

Delete

✔ User List

User ID	Display Name	Email
sammy	Samuel Adams	sadams@promise.com
admin	Super user	

2. Click on the User ID link for the user whose access rights will change.

User Management

Help

Information

Settings

Events

✔ User Settings

User ID

sammy

Display Name

Samuel Adams

(4-20 numbers and/or letters)

Old Password

New Password

(0-8 numbers and/or letters)

Retype Password

Email

sadams@promise.com

✔ Host User Rights

Host Name	Creation Rights	Deletion Rights	Maintenance Rights	Notification Rights
localhost	☒	☒	☒	☒

Submit

Reset

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

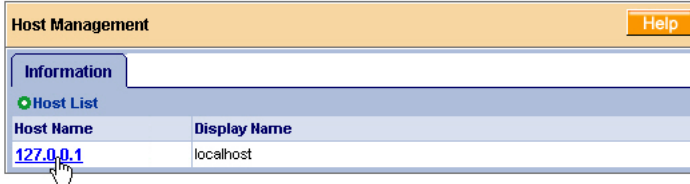
Right	Meaning
Creation	Permission to create a logical drive and a spare drive
Deletion	Permission to delete a logical drive and a spare drive
Maintenance	Permission to migrate, rebuild and synchronize a logical drive; to run Media Patrol on a physical drive; make controller and physical drive settings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

4. Uncheck the boxes of rights to be deleted.
5. Click the **Submit** button.

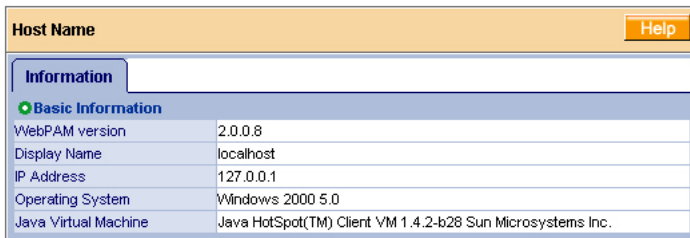
Host Management

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

1. Under Administrative Tools in Tree View, click on the Host Management  icon.



2. Under Host List, click on the link to the host you want to see.
The Host PC link always 127.0.0.1.



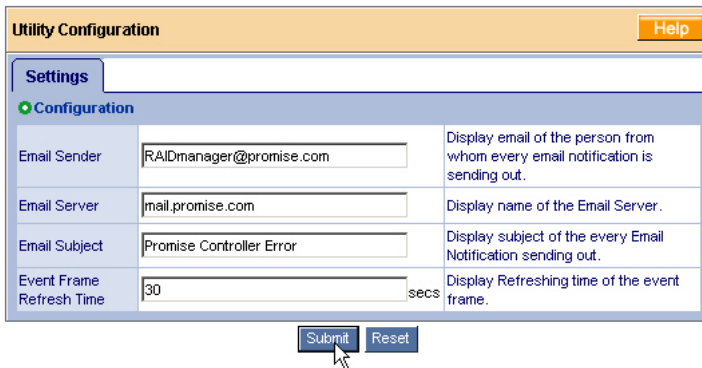
The Information tab displays with information about the Host PC.

- WebPAM Version – The version number of the WebPAM software.
- Display Name – The display name of the Host PC. “localhost” is the default.
- IP Address – 127.0.0.1 is the IP address of the Host PC, accessed at the Host PC. Other addresses, such as 192.168.0.33 refer to a Host PC accessed over the network.
- Operating System – The Operating System running on the Host PC.
- Java Virtual Machine – The version number of JVM running on the Host PC.

Utility Configuration

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

1. Under Administrative Tools in Tree View, click on the Utility Configuration



Utility Configuration		Help
Settings		
Configuration		
Email Sender	RAIDmanager@promise.com	Display email of the person from whom every email notification is sending out.
Email Server	mail.promise.com	Display name of the Email Server.
Email Subject	Promise Controller Error	Display subject of the every Email Notification sending out.
Event Frame Refresh Time	30 secs	Display Refreshing time of the event frame.
Submit Reset		

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. Type a new interval (in seconds) in the Event Frame Refresh Time field.
30 seconds is the default interval.
6. Click the **Submit** button when you are done.

FastTrak

The FastTrak–Information tab displays a photograph of the FastTrak SX-Series RAID Controller installed in your system.



To display this screen in Management View, click on the FastTrak  icon in Tree View.

With the screen displayed, move your cursor over key components of the FastTrak controller card to see a Tool Tip popup message that identifies the component, as shown above.

If you have multiple FastTrak controller cards in the same system, they will appear under the FastTrak icon as Controller 1, Controller 2, and so on.

Controller

- Controller Information (below)
- Controller Settings (page 49)
- Controller Schedule (page 50)
- Controller Lock (page 51)

The term Controller refers to the device that controls your RAID. To access the controller, click on the Controller  icon in Tree View.

Controller Information

Controller		Help	
Information	Settings	Schedule	Lock
✓ Basic Information			
Product Name	FastTrak SX4100		
BIOS Version	2.5.0.32		
Driver Version	2.5.0.19		
✓ Hardware Information			
Memory Size	64 MB		
Maximum Number of Port(s)	4		
Maximum Physical Drive(s)	4		
Maximum Logical Drive(s)	8		

The Information tab displays with information about the controller.

- **Product Name** – The Promise product name for this controller.
- **BIOS Version** – Version number of the controller's BIOS.
- **Driver Version** – Version number of the controller's software driver.
- **Memory Size** – Size of the controller's onboard memory in MB.
- **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.

Controller Settings

Controller	
Information Settings Schedule Lock	
View/Change Controller Parameter	
Rebuild Rate	☐ Low ☐ Medium ☒ High
Media Patrol Rate	☐ Low ☒ Medium ☐ High
Migration/Expansion Rate	☐ Low ☒ Medium ☐ High
Initialization Rate	☒ Low ☐ Medium ☐ High
Synchronization Rate	☒ Low ☐ Medium ☐ High
Automatic Rebuild Status	☒ Enable ☐ Disable
Buzzer Status	☒ Enable ☐ Disable
S.M.A.R.T. Status	☒ Enable ☐ Disable
Enclosure Polling Interval	30 Second(s)
Submit Reset	

Click on the Settings tab to access controller settings.

- **Rates** – Allocates system resources between the background process (such as Rebuild, Media Patrol, Expansion/Migration, 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.

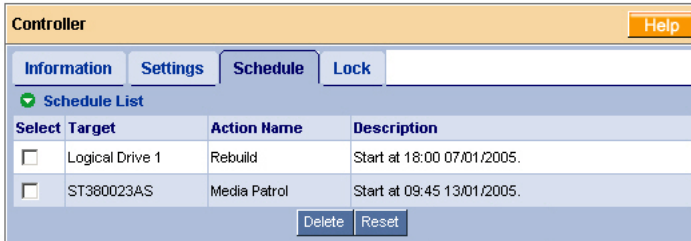
A *Medium* setting tries to balance system resources between the background processes and data input/output activity.

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. Automatic Rebuilding applies to RAID 1 and 3-drive RAID 5 logical drives only.
- **Buzzer** – When enabled, the FastTrak 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 disk drive software. When enabled, the FastTrak controller polls the disk drives for SMART information and reports it to you.
- **Enclosure Polling Interval** – The FastTrak controller periodically polls the SuperSwap enclosure for information and displays it in WebPAM. Choose an

interval from the dropdown menu. The range is 0 to 120 seconds. A setting of 0 seconds disables the polling function.

Controller Schedule



The screenshot shows the 'Controller' window with the 'Schedule' tab selected. The 'Schedule List' table contains two entries: 'Logical Drive 1' with action 'Rebuild' and 'ST380023AS' with action 'Media Patrol'. Both have checkboxes in the 'Select' column. 'Delete' and 'Reset' buttons are at the bottom right.

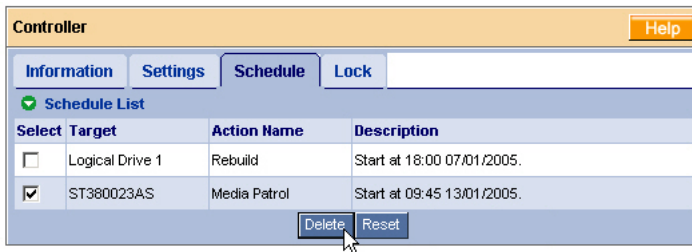
Select	Target	Action Name	Description
☐	Logical Drive 1	Rebuild	Start at 18:00 07/01/2005.
☐	ST380023AS	Media Patrol	Start at 09:45 13/01/2005.

Click on the Schedule tab to access scheduled background processes (such as Rebuild, Media Patrol, Expansion/Migration, Initialization and Synchronization).

To access or schedule a Rebuild, Expansion, Migration, Initialization or Synchronization, click on the Logical Drive  icon in Tree View then select the appropriate tab in Management View.

To access or schedule a Media Patrol, click on the Physical Drive  icon in Tree View then select the Media Patrol tab in Management View.

Delete a Scheduled Process



The screenshot shows the 'Controller' window with the 'Schedule' tab selected. The 'Media Patrol' process for 'ST380023AS' is selected (checkbox checked). A mouse cursor is pointing at the 'Delete' button.

Select	Target	Action Name	Description
☐	Logical Drive 1	Rebuild	Start at 18:00 07/01/2005.
☒	ST380023AS	Media Patrol	Start at 09:45 13/01/2005.

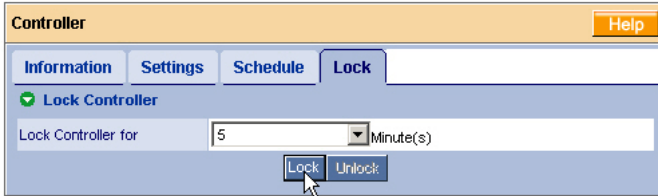
To delete a scheduled process:

1. Click on the Controller  icon in Tree View.
2. Select 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.

Alternative method to delete a scheduled process:

1. Go to its function tab under the Physical Drive  icon or Logical Drive  icon.
2. Under Schedule, click the **Disable** radio button.

Controller Lock



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 on the Controller  icon in Tree View.
2. Select 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 on 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

- Physical Drive View (below)
- Split a Physical Drive (page 53)
- Merge a Physical Drive (page 54)
- Media Patrol Schedule (page 55)
- Physical Drive Information (page 56)
- Physical Drive Settings (page 57)
- Physical Drive Media Patrol (page 58)
- Physical Drive Bad Sector Log (page 59)
- Locate a Physical Drive (page 60)

Physical Drive View

Physical Drive View

Help

InformationSplitMergeMedia Patrol Schedule

Physical Drive Overview

Drive Model	Port No.	Capacity	Status
ST340014AS	1	37.27 GB	Functional
ST380023AS	2	74.53 GB	Functional
ST380013AS	3	74.53 GB	Functional
ST380013AS	4	74.53 GB	Functional

Graphic View

Drive on Port 1 - 37.27 GB

Free
37.27 GB

Drive on Port 2 - 74.53 GB

Free
74.47 GB

Drive on Port 3 - 74.53 GB

Free
111.73 GB

Drive on Port 4 - 74.53 GB

Free
74.53 GB

AvailableAssignedSpareInvalid

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

Split a Physical Drive

The action of splitting a physical drive effectively divides a single physical drive into two drives. Each of the two portions can be used by separate logical drives.

You can split a physical drive only once.

Physical Drive View Help

Information **Split** Merge

✓ **Split Parameters**

Split Size GB

✓ **Physical Drive Overview**

Select	Port No.	Capacity
☐	1	37.27 GB
☒	2	74.53 GB
☐	3	74.53 GB
☐	4	74.53 GB

To split a physical drive:

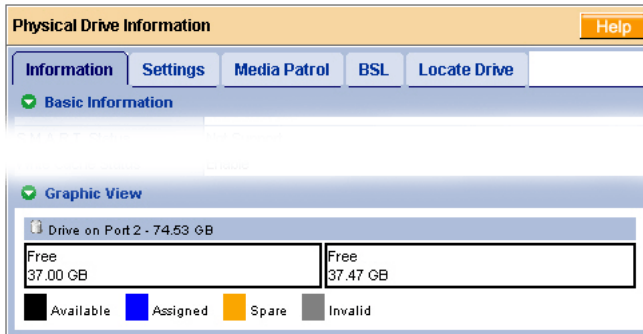
1. Click on the Physical Drive View  icon in Tree View.
2. Click on the Split tab in Management View.
3. Enter a portion size in the Split Size field.

You can enter a value from 1 GB up to the capacity of the physical drive. The value you enter will be the size of the first portion. The remaining drive capacity will be the size of the second portion.

This value will apply to all physical drives you select for the split operation.

4. Check the box(es) to the left of the physical drive(s) you want to split.
5. Click the **Submit** button.

Click on the Physical Drive  icon to see the results of your split operation.



The image above was shortened to fit into the available space.

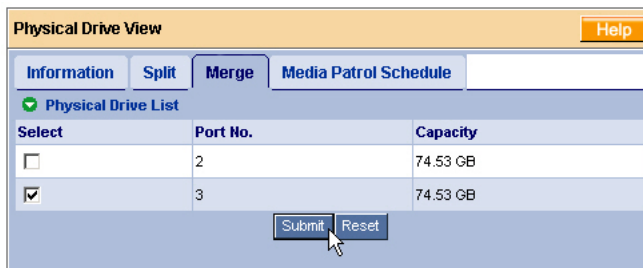
In the example above, note that the first portion is 37 GB as specified in the Split operation. The second portion is the physical drive's capacity minus the split size ($74.47 - 37.00 = 37.47$ GB).

See “Split Physical Drives as Dedicated Spare Drives” on page 87.

Merge a Physical Drive

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.



To merge a physical drive:

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

Click on a Physical Drive  icon to see the results of your merge operation.

Media Patrol Schedule

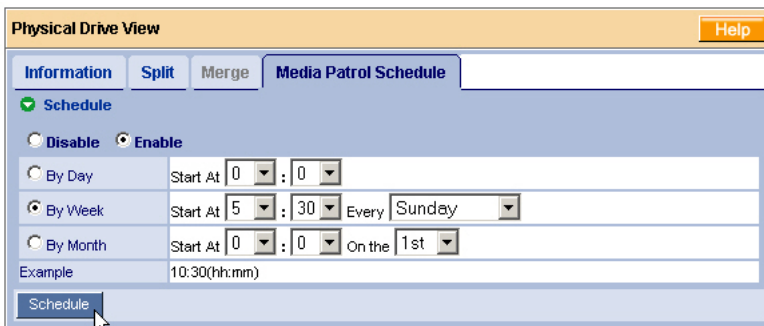
The Physical Drive View—Media Patrol tab allows you to start Media Patrol on all physical drives. You can also run Media Patrol on individual physical drives, see page 58.

Media Patrol is a routine maintenance procedure that checks the magnetic media on each disk 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 nor physical drives assigned as JBOD.

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 (see page 59). This action triggers a BSL update message and an email message if you enabled that notification option (see page 38).

To schedule Media Patrol:

1. Click on the Physical Drive View  icon in Tree View.
2. Click on the Media Patrol tab in Management View.



Physical Drive View Help

Information **Split** **Merge** **Media Patrol Schedule**

☒ **Schedule**

☐ **Disable** ☒ **Enable**

☐ **By Day** Start At :

☒ **By Week** Start At : Every

☐ **By Month** Start At : On the

Example 10:30(hh:mm)

Schedule

3. Click on the **Enable** radio button.
4. Click on the **by Day**, **by Week** or **by Month** radio button.
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.

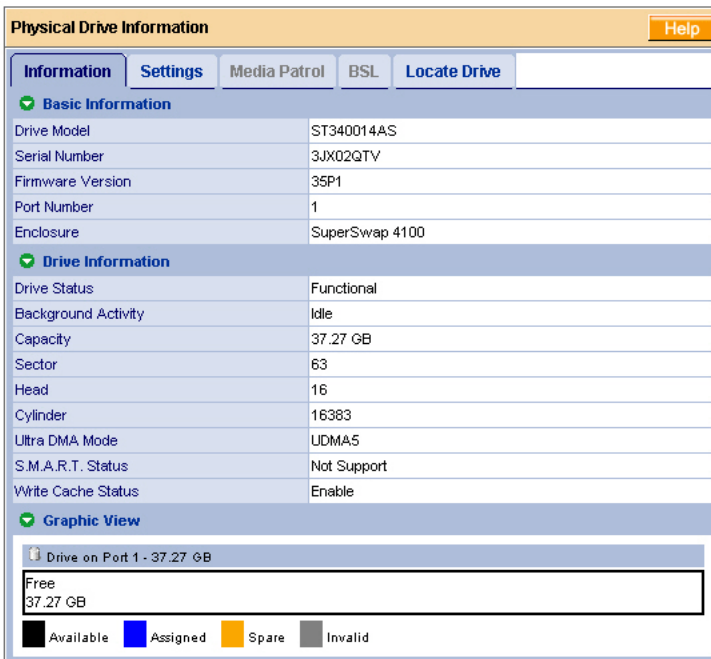
To cancel the scheduled Media Patrol operation:

1. Click on the Physical Drive View  icon in Tree View.
2. Click on the Media Patrol tab in Management View.
3. Click the **Disable** radio button.

Physical Drive Information

To access information about a physical drive:

1. Click on the Physical Drive View  icon in Tree View.
2. Click on the Physical Drive  icon.



The screenshot shows a window titled "Physical Drive Information" with a "Help" button in the top right corner. Below the title bar are five tabs: "Information" (selected), "Settings", "Media Patrol", "BSL", and "Locate Drive". The "Information" tab is active, displaying three sections: "Basic Information", "Drive Information", and "Graphic View".

Basic Information

Drive Model	ST340014AS
Serial Number	3JX02QTV
Firmware Version	35P1
Port Number	1
Enclosure	SuperSwap 4100

Drive Information

Drive Status	Functional
Background Activity	Idle
Capacity	37.27 GB
Sector	63
Head	16
Cylinder	16383
Ultra DMA Mode	UDMA5
S.M.A.R.T. Status	Not Support
Write Cache Status	Enable

Graphic View

Drive on Port 1 - 37.27 GB

Free
37.27 GB

Legend: Available Assigned Spare Invalid

The information tab displays the following information:

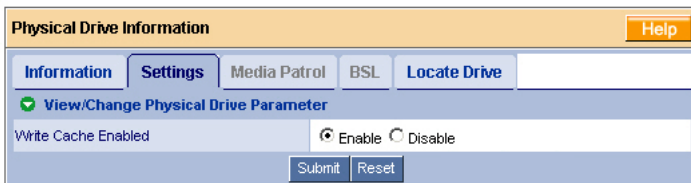
- **Drive Model** – The disk drive manufacturer's model name or number.
- **Serial Number** – The serial number of this disk drive.
- **Firmware Version** – The version number of the firmware on this disk drive.

- **Enclosure** – The model of SuperSwap enclosure in which the disk drive is installed.
- **Drive Status** – The operational of this disk drive. Functional means normal. Others include Offline.
- **Background Activity** – The current background activity affecting this disk drive. Idle means no activity. Others include Initializing and Rebuilding.
- **Capacity** – The data capacity of this disk drive in GB.
- **Sector** – The number of sectors on this disk drive.
- **Head** – The number of heads on this disk drive.
- **Cylinder** – The number of cylinders on this disk drive.
- **Ultra DMA Mode** – The UDMA mode in which this disk drive currently operates.
- **S.M.A.R.T. Status** – SMART, an acronym for Self-Monitoring Analysis and Reporting Technology, is a feature of the disk drive software. When this feature is supported, the drive will pass SMART information to the FastTrak controller when it polls the physical drives.
- **Write Cache Status** – Indicates whether the disk drive's write cache is Enabled or Disabled. You can change this status under the Settings tab (see below).

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 on the Physical Drive View  icon in Tree View.
2. Click on the Physical Drive  icon.
3. Click on the Settings tab in Management View.



The image shows a window titled "Physical Drive Information" with a "Help" button in the top right corner. Below the title bar are five tabs: "Information", "Settings", "Media Patrol", "BSL", and "Locate Drive". The "Settings" tab is currently selected. Under the "Settings" tab, there is a green checkmark icon followed by the text "View/Change Physical Drive Parameter". Below this, it says "Write Cache Enabled" followed by two radio buttons: "Enable" (which is selected) and "Disable". At the bottom of the window are two buttons: "Submit" and "Reset".

4. Click the **Enable** or **Disable** radio button.
5. Click the **Submit** button.

Physical Drive Media Patrol

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 55.

Media Patrol is a routine maintenance procedure that checks the magnetic media on each disk 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 nor physical drives assigned as JBOD.

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 (see page 59). This action triggers a BSL update message and an email message if you enabled that notification option (see page 38).

To start Media Patrol immediately:

1. Click on the Physical Drive View  icon in Tree View.
2. Click on the Physical Drive  icon.
3. Click on the Media Patrol tab in Management View.



4. Click the **Start Now** button.

To schedule Media Patrol to run at a later time:

1. Click on the Physical Drive View  icon in Tree View.
2. Click on the Physical Drive  icon.

- Click on the Media Patrol tab in Management View.

The screenshot shows the 'Physical Drive Information' dialog box with the 'Media Patrol' tab selected. The 'Schedule' checkbox is checked. Below it, the 'Enable' radio button is selected. There are three scheduling options: 'By Day', 'By Week', and 'By Month'. The 'By Week' option is selected, showing a start time of 0:00 and 'Every Sunday'. The 'By Month' option shows a start time of 2:30 and 'On the 5th'. An 'Example' field shows '10:30(hh:mm)'. A 'Schedule' button is at the bottom, and a 'Start Now' button is at the top right of the main area.

- Click on the Enable radio button.
- Click on the **by Day**, **by Week** or **by Month** radio button.
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.
- Click the **Schedule** button.

To cancel the scheduled Media Patrol operation:

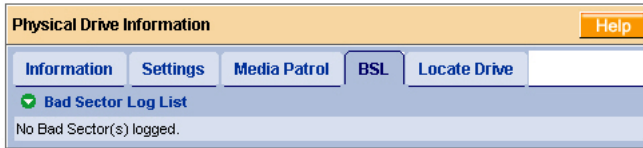
- Click on the Physical Drive View  icon in Tree View.
- Click on the Physical Drive  icon.
- Click on the Media Patrol tab in Management View.
- Click the **Disable** radio button.

Physical Drive Bad Sector Log

On occasion, an error can arise with the media on a physical drive. WebPAM 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:

- Click on the Physical Drive View  icon in Tree View.
- Click on the Physical Drive  icon.
- Click on the BSL tab in Management View.



If any bad sectors are found, they are listed here. WebPAM informs you by popup and email messages when a bad sector error is logged (see page 38).

After 10 bad sectors have been discovered on a physical drive, WebPAM 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 FastTrak 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) 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.

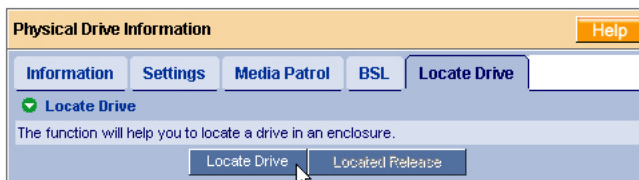
See "Logical Drive Rebuild" on page 71 and "Logical Drive Critical / Offline" on page 79.

See the *FastTrak User Manual* and *SuperSwap User Manual* for more information about replacing a physical drive.

Locate a Physical Drive

When it becomes necessary to access a physical drive installed in a SuperSwap enclosure, this function will help you identify the physical drive you want. To locate a physical drive:

1. Click on the Physical Drive View  icon in Tree View.
2. Click on the Physical Drive  icon.
3. Click on the Locate Drive tab in Management View.



4. Click the **Locate Drive** button.

The Management Window will display the message “Identified started” and the Status LED for this physical drive will flash rapidly on the SuperSwap enclosure.

If you remove the physical drive, the Status LED stops blinking, the Activity LED goes dark and WebPAM will report that the physical drive was unplugged. When you replace the drive, the LEDs will return to normal operation.

If you do not remove the physical drive, click on the **Located Release** button to stop the Status LED from blinking. For more information, see the *SuperSwap User Manual*.

Logical Drives

- Logical Drive View (below)
- Create a Logical Drive (page 62)
- JBOD (page 65)
- Delete a Logical Drive (page 66)
- Logical Drive Information (page 66)
- Logical Drive Settings (page 67)
- Logical Drive Mapping (page 68)
- Logical Drive Migration and Expansion (page 68)
- Logical Drive Rebuild (page 71)
- Synchronize All Logical Drives (page 75)
- Logical Drive Synchronization/Redundancy Check (page 76)
- Logical Drive Initialization (page 78)
- Logical Drive Activation (page 79)

Logical Drive View

Logical Drive View provides a list of all logical drives currently on the Host PC. To access Logical Drive View, click on the Logical Drive View  icon in Tree View.

Logical Drive View					Help
Information	Create	Delete	Synchronization Schedule		
✔ Logical Drive Overview					
Assigned Name	RAID Level	Status	Background Activity	Capacity	
Logical Drive 1	RAID 5	Functional	Idle	105.00 GB	

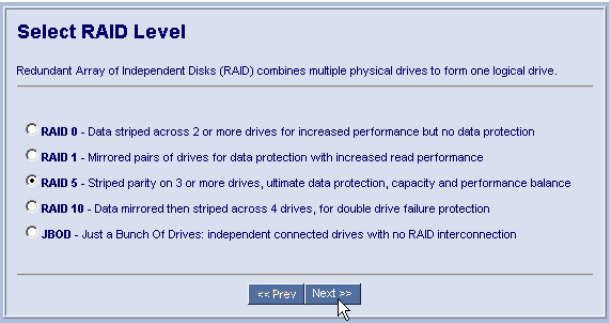
From this screen, you can click on the links to access information and functions of individual logical drives and use the Create and Delete features.

Create a Logical Drive

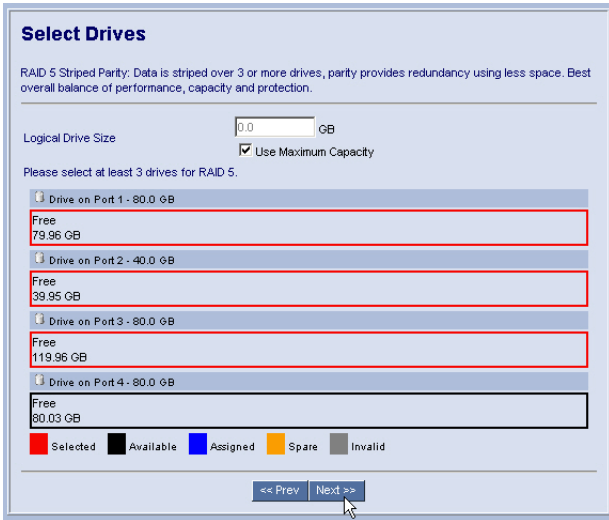
A logical drive is a collection of physical drives in a RAID.

To create a new logical drive:

1. Click on the Logical Drive View  icon.
2. Click on the Create tab.

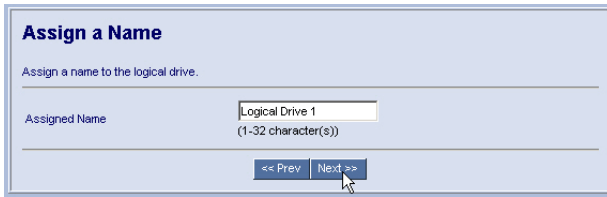


3. Select the radio button beside the RAID level you want for your logical drive. WebPAM displays the RAID levels you can use with the available disk drives. You can also select JBOD on this screen.
See “Choosing a RAID Level” on page 95 for information about the advantages and requirements of the available RAID levels and JBOD.
4. Click the **Next** button.

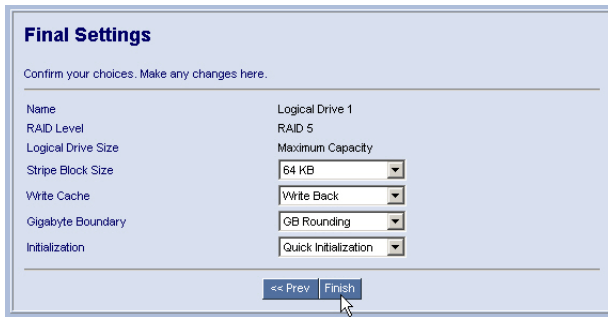


5. If you want to create a logical drive with unused capacity, enter the assigned (used) capacity in the Logical Drive Size field.
To use the maximum capacity, check the Use Maximum Capacity box.
6. Click on the disk drives to select them.
Available drives have a black frame. Selected drives have a red frame.

- Click the **Next** button.



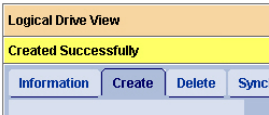
- Enter a name for the logical drive in the field provided.
- Click the **Next** button.



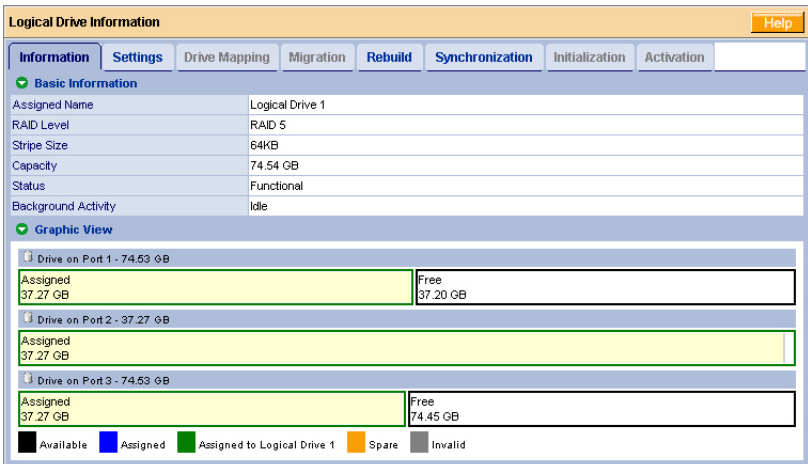
- Select a Stripe Block Size from the dropdown menu.
Choose from 32, 64 or 128 KB. The size selected affects how FastTrak sends and receives data blocks to and from the drives. In general, a larger block size is better when handling large data transfers (such as A/V editing and graphics) while a smaller size is better when handling email and other common server data. The default is 64KB. When in doubt, use the default value.
- Select a Write Cache policy from the dropdown menu.
 - Write Back** – Increases performance but can result in data loss in the event of a power failure. This is the default.
 - Write Through** – Slower but more secure.
- Select a Gigabyte Boundary policy from the dropdown menu.
 - GB Rounding** – Rounds the size of the logical drive down to the nearest whole gigabyte. It allows you to install a slightly smaller (within 1 GB) replacement drive, should the need arise. This is the default.
 - None** – No Boundary function.
- Select an Initialization policy from the dropdown menu.
 - Quick 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.
- **None** – No initialization. This choice is not recommended.

14. Click the **Next** button.



The result of the logical drive creation operation are displayed.



Click on the Logical Drive  icon 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 105 for more information.

JBOD

In WebPAM, JBOD is created, managed and deleted the same as a logical drive. You can also use the FastTrak BIOS for this purpose. See the *FastTrak User Manual* for more information on the BIOS.

In addition, if you attach a physical drive that was initialized using Windows disk management, that drive will be automatically recognized as a JBOD by the FastTrak controller and WebPAM.

Delete a Logical Drive

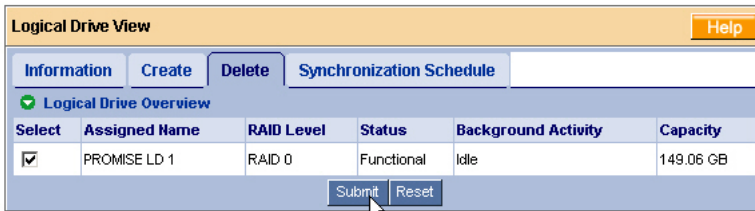


Warning

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!

To delete a logical drive:

1. Click on the Logical Drive View  icon.
2. Select the Delete tab.



Logical Drive View Help					
Information Create Delete Synchronization Schedule					
Logical Drive Overview					
Select	Assigned Name	RAID Level	Status	Background Activity	Capacity
☒	PROMISE LD 1	RAID 0	Functional	Idle	149.06 GB
Submit Reset					

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.

The selected logical drive is deleted.

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 on the Logical Drive View  icon in Tree View.

2. Click on the Logical Drive  icon of the logical drive you want to see.

Logical Drive Information

Help

InformationSettingsDrive MappingMigrationRebuildSynchronizationInitializationActivation

Basic Information

Assigned Name

Logical Drive 1

RAID Level

RAID 5

Stripe Size

64KB

Capacity

74.54 GB

Status

Functional

Background Activity

Idle

Graphic View

Drive on Port 1 - 74.53 GB

Assigned

37.27 GB

Free

37.20 GB

Drive on Port 2 - 37.27 GB

Assigned

37.27 GB

Drive on Port 3 - 74.53 GB

Assigned

37.27 GB

Free

74.45 GB

Drive on Port 4 - 74.53 GB

Dedicated Spare

74.53 GB

Available

Assigned

Assigned to Logical Drive 1

Spare

Invalid

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

Logical Drive Settings

Logical Drive Settings allows you to assign a name to a logical drive and to change its controller cache settings. To access logical drive settings:

1. Click on the Logical Drive View  icon in Tree View.
2. Click on the Logical Drive  icon of the logical drive you want to see.
3. Click on the Settings tab in Management View.

Logical Drive Information

InformationSettingsDrive MappingExpansionMigrationRebuildSynchronization

View/Change Logical Drive Parameter

Assigned Name

PROMISE LD 1

Write Cache Status

Write Through

Write Back

Submit

Reset

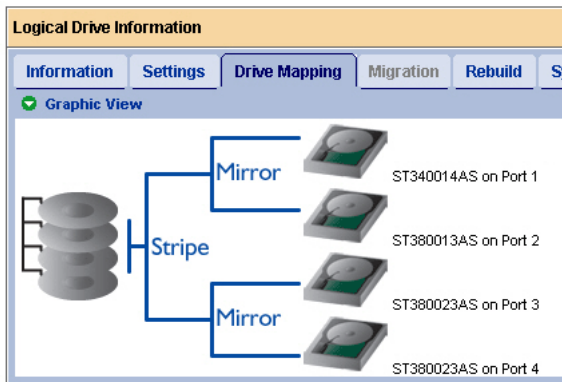
4. Enter a name in the Assigned Name field, as desired.
5. Click the radio button to select Write Through or Write Behind cache status.

- **Write Back** – Increases performance but can result in data loss in the event of a power failure. This is the default.
 - **Write Through** – Slower but more secure.
6. Click the **Submit** button when you are done.

Logical Drive Mapping

This feature applies to RAID 10 logical drives only. To access logical drive settings:

1. Click on the Logical Drive View  icon in Tree View.
2. Click on the Logical Drive  icon of the logical drive you want to see.
3. Click on the Drive Mapping tab in Management View.



The Drive Mapping tab shows how the stripe and mirror components of the RAID 10 logical drive are mapped to the physical drives.

Logical Drive Migration and Expansion

The Logical Drive—Migration tab enables you to migrate or expand a logical drive. Migration is the process of changing the RAID level of an existing logical drive. Expansion is the process of adding more physical drives to a logical drive while keeping the same RAID level.

Migration and Expansion are not available for JBOD.

The Migration feature applies to certain combinations of RAID level and number of physical drives, as described in the table below.

From	To	Result
------	----	--------

RAID 0: 1 or 2 drives	RAID 5: 3 or 4 drives	Increased performance and capacity, adds redundancy
	RAID 10: 4 drives	
RAID 0: 3 drives	RAID 5: 4 drives	Increased performance and capacity, adds redundancy
	RAID 10: 4 drives	
RAID 1: 2 drives	RAID 5: 3 or 4 drives	Increased performance and capacity
	RAID 10: 4 drives	
RAID 10: 4 drives	RAID 5: 4 drives	Increased capacity

The Expansion feature applies only to RAID 0 and RAID 5 arrays. You can add physical drives as described in the table below.

From	To	Result
RAID 0: 1 drive	RAID 0: 2, 3 or 4 drives	Increased capacity
RAID 0: 2 drives	RAID 0: 3 or 4 drives	Increased capacity
RAID 0: 3 drives	RAID 0: 4 drives	Increased capacity
RAID 5: 3 drives	RAID 5: 4 drives	Increased capacity

For more information, see “Migration and Expansion” on page 99.

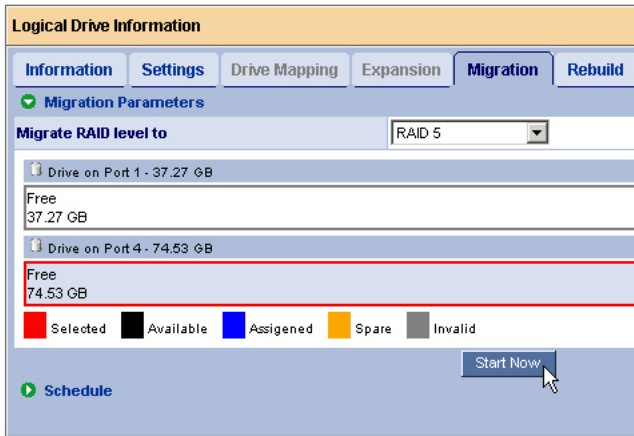
You can set up an Migration to begin immediately (on demand) or schedule a Migration for a time when there is less demand on the RAID system.

On Demand

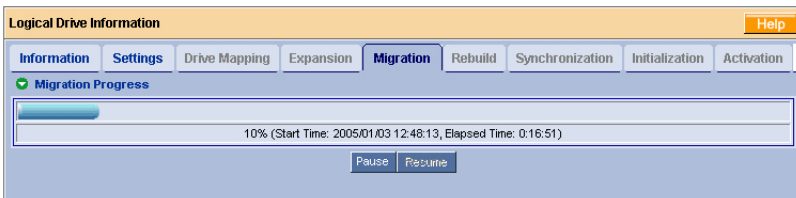
To migrate a logical drive:

1. Click on the Logical Drive View  icon in Tree View.
2. Click on the Logical Drive  icon of the logical drive you want to migrate.

- Click on the Migration tab in Management View.



- If the Migration or Expansion requires additional physical drives, click on a free physical drive to select it.
Available drives have a black frame. Selected drives have a red frame.
- Click the **Start Now** button.



You can monitor Migration or Expansion progress on the Logical Drive Migration tab. Click the respective buttons to pause and resume the Migration.

Scheduled

To schedule a Migration or Expansion:

- Click on the Logical Drive View  icon in Tree View.
- Click on the Logical Drive  icon of the logical drive you want to migrate or expand.

- Click on the Migration tab in Management View.

Logical Drive Information

Information Settings Drive Mapping Expansion **Migration** Rebuild

✓ Migration Parameters

Migrate RAID level to: RAID 5

Drive on Port 1 - 37.27 GB
Free
37.27 GB

Drive on Port 4 - 74.53 GB
Free
74.53 GB

Selected Available Assigned Spare Invalid

Start Now

✓ Schedule

Disable Enable

Start At: 22 : 30 01/04/2005

Example: 10:30 09/21/2004(hh:mm MM/dd/yyyy)

Schedule

- Click on a free physical drive to select it.
Available drives have a black frame. Selected drives have a red frame.
- Click on the **Enable** radio button.
- From the dropdown menus, select a start time.
Start time is based on a 24-hour clock.
- Click in Start At field to display a popup calendar.
- Click on the start date in the calendar or enter a date manually.
- Click the **Schedule** button.

Cancel a Schedule

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

- Click on the Logical Drive View  icon in Tree View.
- Click on the Logical Drive  icon.
- Click on the Migration tab in Management View.
- Click on the **Disable** radio button.

Logical Drive Rebuild

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

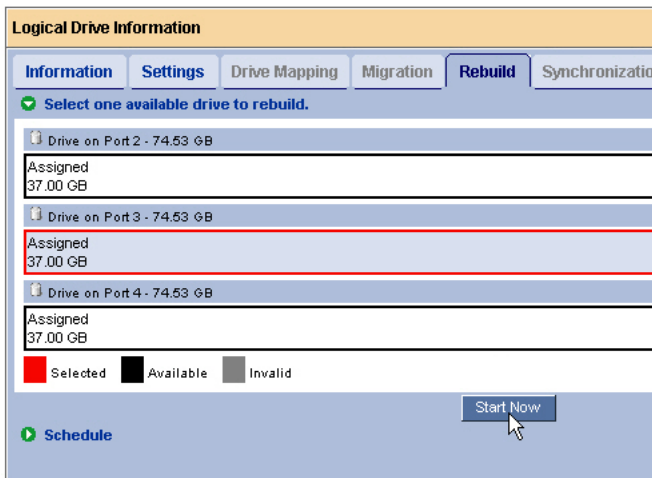
You can set up a Rebuild to:

- 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 or degraded (see "Create a Spare Drive" on page 85)

On Demand

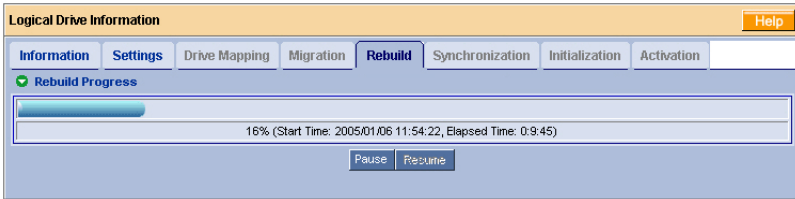
To rebuild a logical drive:

1. Click on the Logical Drive View  icon in Tree View.
2. Click on the Logical Drive  icon of the logical drive you want to rebuild.
3. Click on the Rebuild tab in Management View.



4. Select the logical drive you want to rebuild.
Available drives have a black frame. Selected drives have a red frame.

- Click the **Start Now** button.

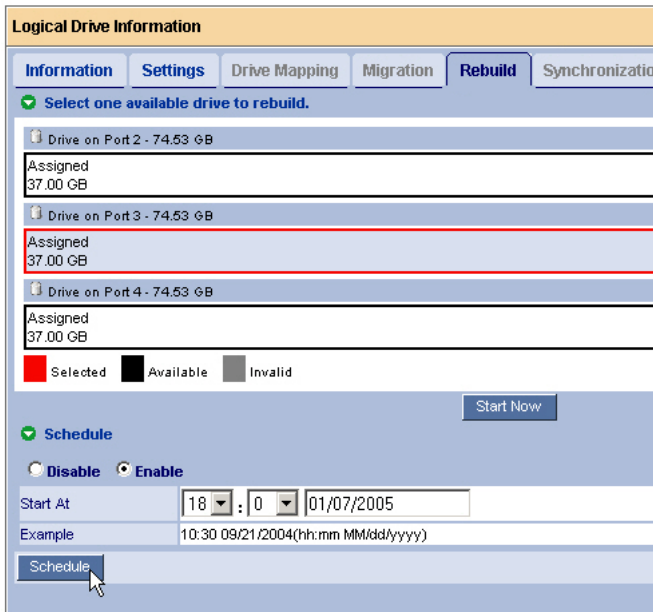


You can monitor Rebuild progress on the Logical Drive Rebuild tab. Click the respective buttons to pause and resume the Rebuild.

Scheduled

To schedule a Rebuild:

- Click on the Logical Drive View  icon in Tree View.
- Click on the Logical Drive  icon of the logical drive you want to rebuild.
- Click on the Rebuild tab in Management View.



- Select the physical drive you want to rebuild.
Available drives have a black frame. Selected drives have a red frame.

5. Click on the **Enable** radio button.
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 on the start date in the calendar or enter a date manually.
9. Click the **Schedule** button.

Cancel a Schedule

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

1. Click on the Logical Drive View  icon in Tree View.
2. Click on the Logical Drive  icon.
3. Click on the Rebuild tab in Management View.
4. Click on the **Disable** radio button.

Automatic Rebuild

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

- The logical drive is a RAID 1 or a 3-drive RAID 5.
See “Create a Logical Drive” on page 62.
- There is a spare drive present in the RAID system.
See “Create a Spare Drive” on page 85.
- Automatic Rebuild Status is enabled in the Controller Settings.
See “Controller Settings” on page 49.

If the three above conditions are met, a logical drive will replace a faulty disk drive and rebuild itself automatically. WebPAM 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 38), WebPAM 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 “Replace the Failed Disk Drive” on page 81 and the *FastTrak User Manual* and *SuperSwap User Manual* for more information on replacing a physical drive.

Synchronize All Logical Drives

The Logical Drive View–Synchronization tab enables you to synchronize all logical drives. You can also synchronize an individual logical drive, see page 76.

Synchronization refers to an automated process of checking and correcting data and parity. Unlike a Rebuild, Synchronization is a maintenance operation.

Synchronization applies to RAID 1, RAID 5 and RAID 10 logical drives. When an logical drive is first created and you select Full Initialization, the same action as Synchronization takes place.

To schedule Synchronization for all logical drives:

1. Click on the Logical Drive View  icon in Tree View.
2. Click on the Synchronization tab in Management View.

The screenshot shows the 'Logical Drive View' window with the 'Synchronization Schedule' tab selected. The 'Scheduled' status is indicated by a green checkmark. The 'Enable' radio button is selected. The 'By Week' option is chosen, with a start time of 5:30 and 'Every Sunday'. The 'Schedule' button at the bottom is highlighted by a mouse cursor.

Logical Drive View		Help
Information	Create	Delete
Synchronization Schedule		
Scheduled		
☐ Disable ☒ Enable		
☐ By Day	Start At	0 : 0
☒ By Week	Start At	5 : 30 Every Sunday
☐ By Month	Start At	0 : 0 On the 1st
Example	10:30(hh:mm)	
Schedule		

3. Click on the **Enable** radio button.
4. Click on the **by Day, by Week** or **by Month** radio button.
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.

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

1. Click on the Logical Drive View  icon in Tree View.
2. Click on the Synchronization tab in Management View.
3. Click on the **Disable** radio button.

Logical Drive Synchronization/Redundancy Check

Synchronization refers to an automated process of checking and correcting data and parity. Unlike a Rebuild, Synchronization is a maintenance operation. You can also synchronize all logical drives at the same time, see page 75.

Redundancy Check is an automated process of checking data and parity but it only reports and does not correct, any inconsistencies that it finds.

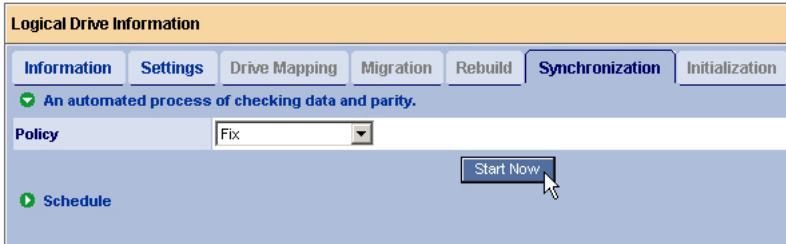
Synchronization and Redundancy Check apply to RAID 1, RAID 5 and RAID 10 logical drives. When an logical drive is first created and you select Full Initialization, the same action as Synchronization takes place.

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

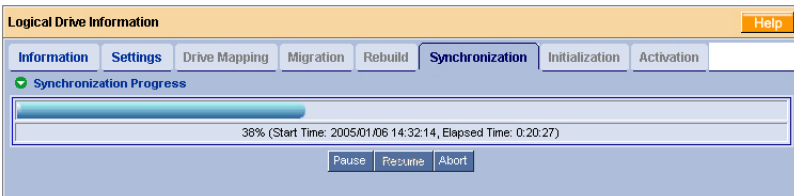
On Demand

To Synchronize or Redundancy Check a logical drive:

1. Click on the Logical Drive View  icon in Tree View.
2. Click on the Logical Drive  icon of the logical drive you want to synchronize.
3. Click on the Synchronization tab in Management View.



4. In the Policy dropdown menu, select *Fix* if you want Synchronization or *Redundancy Check* if you do not want to correct inconsistencies.
5. Click the **Start Now** button.



You can monitor Migration progress on the Logical Drive Migration 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 on the Logical Drive View  icon in Tree View.
2. Click on the Logical Drive  icon of the logical drive you want to synchronize.
3. Click on the Synchronization tab in Management View.

The screenshot shows the 'Logical Drive Information' window with the 'Synchronization' tab selected. The window has a title bar and several tabs: 'Information', 'Settings', 'Drive Mapping', 'Migration', 'Rebuild', 'Synchronization', and 'Initialization'. Below the tabs, there is a green checkmark icon and the text 'An automated process of checking data and parity.' Below this, there is a 'Policy' dropdown menu set to 'Fix' and a 'Start Now' button. Further down, there is a green checkmark icon and the text 'Schedule'. Below this, there are two radio buttons: 'Disable' and 'Enable', with 'Enable' selected. Below the radio buttons, there are three radio buttons: 'By Day', 'By Week', and 'By Month', with 'By Week' selected. Below these, there are three rows of dropdown menus for scheduling. The first row is for 'By Day' with 'Start At' set to '0' and ': 0'. The second row is for 'By Week' with 'Start At' set to '2', ': 0', 'Every' set to 'Sunday', and a day dropdown set to 'Sunday'. The third row is for 'By Month' with 'Start At' set to '0', ': 0', 'On the' set to '1st', and a day dropdown set to '1st'. Below these, there is an 'Example' field showing '10:30(hh:mm)'. At the bottom, there is a 'Schedule' button with a mouse cursor pointing to it.

4. In the Policy dropdown menu, select *Fix* if you want Synchronization or *Redundancy Check* if you do not want to correct inconsistencies.
5. Click on the **Enable** radio button.
6. Click on the **by Day**, **by Week** or **by Month** radio button.
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.

Cancel a Schedule

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

1. Click on the Logical Drive View  icon in Tree View.
2. Click on the Logical Drive  icon.
3. Click on the Synchronization tab in Management View.
4. Click on the **Disable** radio button.

Logical Drive Initialization

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

- **Quick 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.
- **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 selected for the logical drive. The Initialization tab enables you to pause the initialization process so that more of FastTrak's resources are available for other operations. When the other operations are done, you can resume the initialization of your new logical drive.

1. Click on the Logical Drive View  icon in Tree View.
2. Click on the Logical Drive  icon of the logical drive whose initialization you want to pause.
3. Click on the Initialization tab in Management View.
4. Click the **Pause** button.
The initialization process stops.
5. Click the **Resume** button.
The initialization resumes from the point where you paused it.

Logical Drive Activation

This feature enables you to designate a hot plug-and-play logical drive. It will become available in a future release of the FastTrak Controller card.

Logical Drive Critical / Offline

A fault-tolerant logical drive—RAID 1, 5 or 10—goes critical when a disk 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 disk 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.

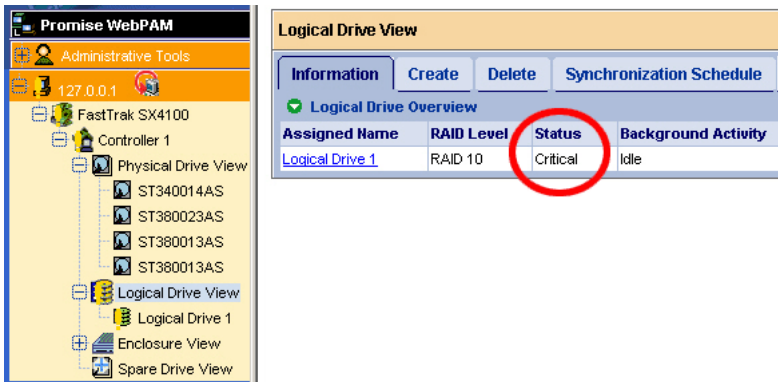
A non-fault tolerant logical drive—RAID 0—goes offline when a disk drive is removed or fails. Since the logical drive is not fault tolerant, the data stored in the disk array is no longer accessible.

If one disk 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 disk drive, delete the logical drive and re-create it. Restore the data from a backup source.

When a Disk Drive Fails

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

- The FastTrak Controller's audible alarm, if enabled, will sound
- The SuperSwap Status LED changes from green to red
- WebPAM reports the condition in Tree View, with popup messages and, if Event Notification is set up, email messages
- If you have a RAID 1 or a 3-drive RAID 5 logical drive with a hot spare drive properly configured, the logical drive will automatically rebuild itself using the spare drive



The screenshot shows the Promise WebPAM interface. On the left is a tree view with the following structure:

- Promise WebPAM
 - Administrative Tools
 - 127.0.0.1
 - FastTrak SX4100
 - Controller 1
 - Physical Drive View
 - ST340014AS
 - ST380023AS
 - ST380013AS
 - ST380013AS
 - Logical Drive View
 - Logical Drive 1
 - Enclosure View
 - Spare Drive View

On the right is the 'Logical Drive View' window. It has tabs for 'Information', 'Create', 'Delete', and 'Synchronization Schedule'. The 'Information' tab is selected, showing a 'Logical Drive Overview' table:

Assigned Name	RAID Level	Status	Background Activity
Logical Drive 1	RAID 10	Critical	Idle

The 'Status' cell in the table is circled in red.

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

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

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

Identify the Failed Disk Drive

Click on the Physical Drive View  icon in the WebPAM user interface. Look for a missing physical drive. A drive that used to be present but is suddenly absent is the failed disk drive.

Physical Drive View

InformationSplitMerge

Physical Drive Overview

Drive Model	Port No.	Capacity	Status
ST340014AS	1	37.27 GB	Functional
ST380023AS	2	74.53 GB	Functional
ST380013AS	4	74.53 GB	Functional

Graphic View

Drive on Port 1 - 37.27 GB

Assigned37.27 GB

Drive on Port 2 - 74.53 GB

Assigned37.27 GB

Free37.26 GB

Drive on Port 4 - 74.53 GB

Assigned37.27 GB

Free37.26 GB

Available

Assigned

Spare

Invalid

No drive on Port 3

Port 1

Port 2

Port 4

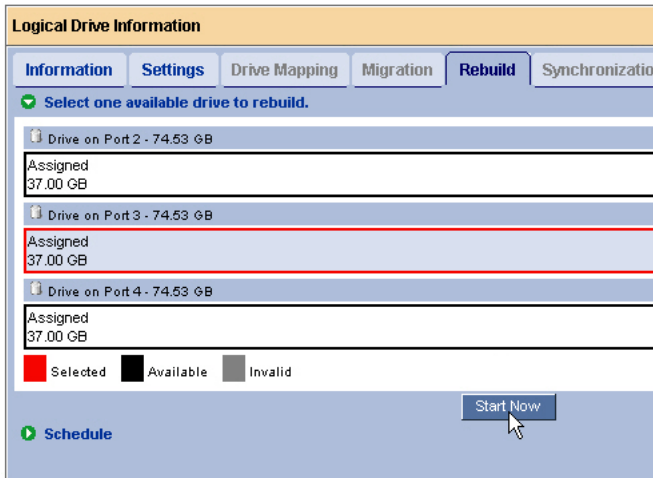
In this example, there were four disk drives connected to the FastTrak Controller. Notice that there is no drive on Port 3. This is the failed drive.

Replace the Failed Disk Drive

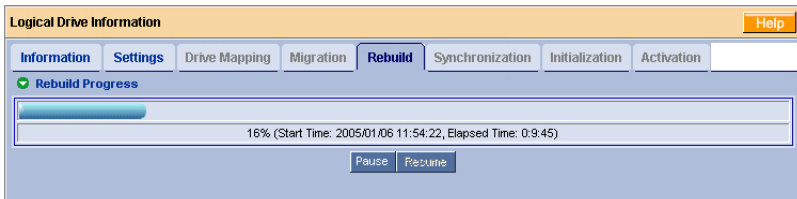
Replace the failed disk drive with a new one of equal or greater capacity. Then rebuild the logical drive. See the *FastTrak User Manual* and *SuperSwap User Manual* for more information about replacing a disk drive.

Rebuild Your Logical Drive

1. Click on the Logical Drive View  icon in Tree View.
2. Click on the Logical Drive  icon of the logical drive you want to rebuild.
3. Click on the Rebuild tab in Management View.



4. Select the physical drive you just replaced.
5. Click the **Start Now** button.

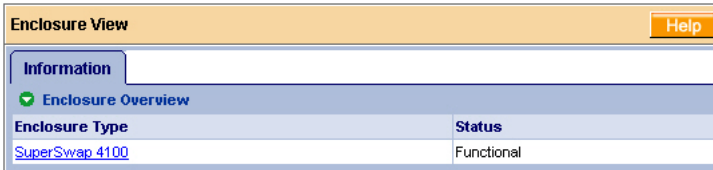


You can monitor Rebuild progress on the Logical Drive Rebuild tab. Click the respective buttons to pause and resume the Rebuild. When the Rebuild is finished, your logical drive will be Functional again.

Enclosures

Enclosure View

Enclosure View provides a list of all enclosures currently on the Host PC. To access Enclosure View, click on the Logical Drive View  icon in Tree View.

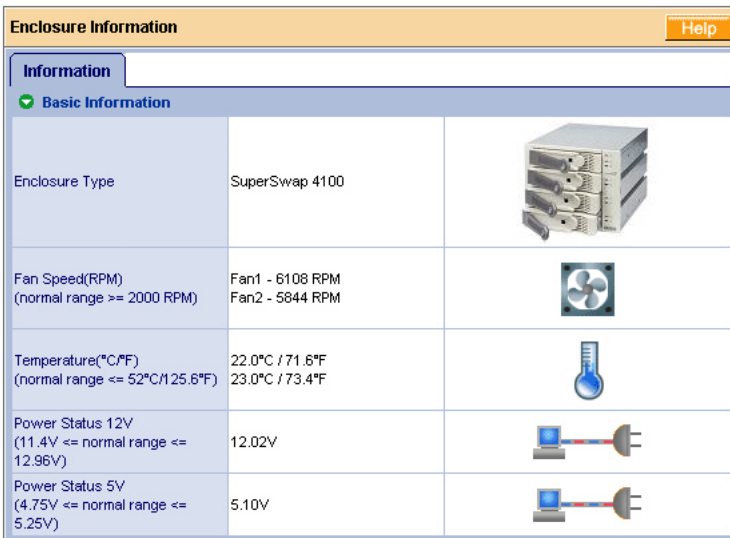


From this window, you can click on the links to access information and functions of individual Enclosures.

Enclosure

To access information about an Enclosure:

1. Click on the Enclosure View  icon in Tree View.
2. Click on the Enclosure  icon.



The information tab displays the following information:

- **Enclosure Type** – The manufacturer’s model name or number.
- **Fan Speed** – The RPM of the enclosure’s cooling fans.
- **Temperature** – The internal temperature of the enclosure. Each reading reflects a separate measurement.
- **Power Status** – The voltages supplied by the enclosure’s 12V and 5V systems.

The Fan, Temperature and Power icons change color when an error is indicated, as shown below.



	LEDs		
State	💡 Status	🗄 Activity	🕒 Enclosure
Green	Disk drive is present and ready	Disk drive is present and ready	Normal status
Blinking	n/a	Read/write activity	n/a
Amber	Disk drive: • is spinning up • is critical • is rebuilding • reports a SMART error	n/a	1 incident (see below) Enclosure is critical but still functional Attention required
Red	Disk drive: • is offline • is not installed	n/a	2 or more incidents (see below)
Dark	Power is off	Disk drive: • has failed • is not installed	Disk drives are spinning up
An incident refers to one occurrence of out-of-range voltage, temperature or fan speed. Any incident requires immediate attention.			

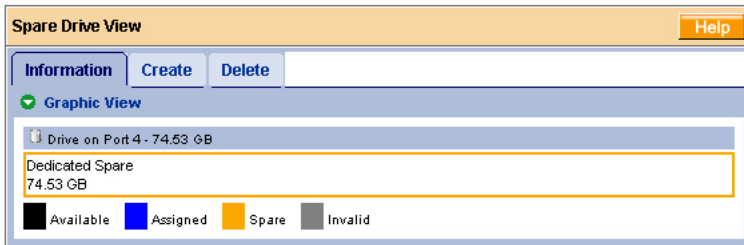
For more information on Enclosures, replacing disk drives and other repair operations, refer to the *SuperSwap User Manual*.

Spare Drives

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. See “Controller Settings” on page 49 and “Logical Drive Rebuild” on page 71 for more information on how spare drives work.

Spare Drive View

Spare Drive View provides a list of all spare drives currently on the Host PC. To access Spare Drive View, click on the Spare Drive View  icon in Tree View.

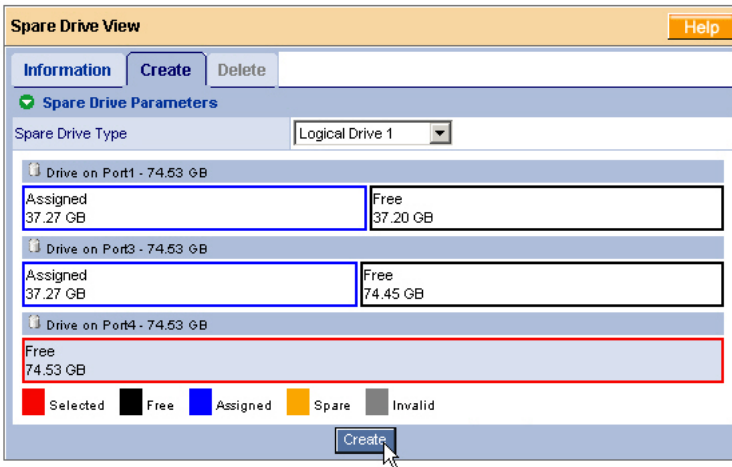


From this screen, you can view the current Spare Drives and click on the tabs to access the Create and Delete features.

Create a Spare Drive

To create a spare drive:

1. Click on the Logical Drive View  icon.
2. Click on the Create tab.

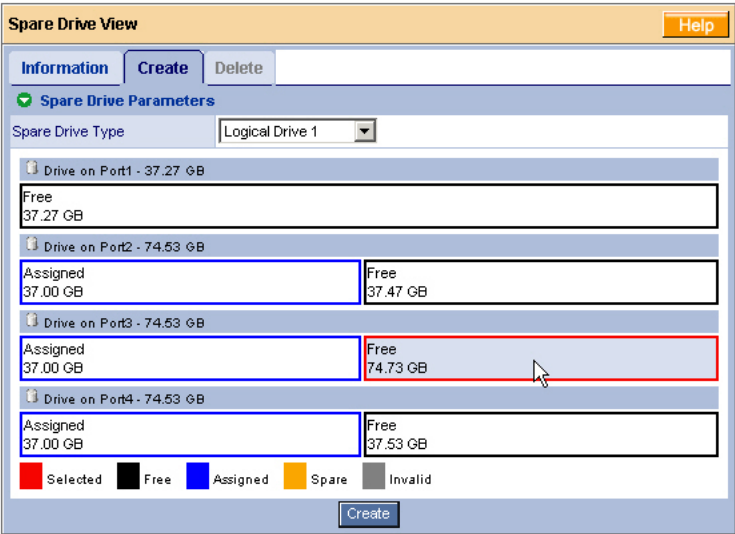


3. From the Logical Drive dropdown menu, select
 - **Global Spare** – This Spare Drive can be used by any qualified Logical Drive.
 - **Logical Drive** – The name of the logical drive to which this Spare Drive will be assigned or dedicated.
4. Click on a disk drive to select it.
Available drives have a black frame. Selected drives have a red frame. Drives with a blue frame are assigned to a logical drive.
5. Click the **Create** button.

The new Spare Drive appears under Physical Drive View and Spare Drive View.

Split Physical Drives as Dedicated Spare Drives

If you have split physical drives in your system, you cannot use the same split drive in logical drive and as a spare drive dedicated to the same logical drive.



In the example above, Logical Drive 1 is selected in dropdown menu, meaning that this spare drive will be dedicated to Logical Drive 1.

We attempt to select the Free 74.73 GB portion of the drive on Port 3 as our spare drive. The 37 GB portion of the drive on Port 3 belongs to Logical Drive 1.

Even though the drive on Port 3 has adequate capacity, if this drive failed, it could not replace itself as a spare drive. Therefore, WebPAM will not permit you to use this drive to make your spare drive.

In this were an actual situation, you would choose the drive on Port 1 for your spare drive.

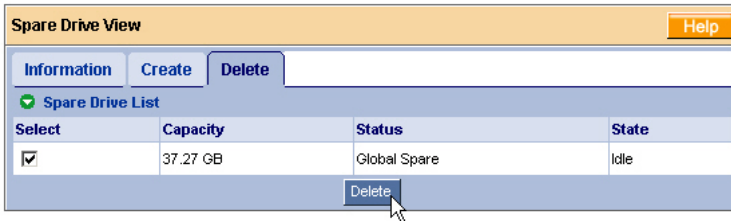
WebPAM will permit you to use a split physical drive as a Global Spare Drive. However, this practice is not recommended because it can result in multiple logical drives going critical or offline at the same time.

See “Split a Physical Drive” on page 53.

Delete a Spare Drive

To delete a spare drive:

1. Click on the Logical Drive View  icon.
2. Select the Delete tab.



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.

Battery

The Information tab displays information about the cache-backup battery.

To access the Controller–Information tab, click on the Battery  icon in Tree View.

- **Temperature** – The battery's operating temperature.

The battery normally has the same temperature as the inside of the PC where it is installed, typically below 38°C or 100°F.

If the battery temperature rises above this value, determine whether the PC is overheating.

If the PC is OK but the battery is too hot, the battery is not accepting a charge properly and you must replace it.

- **Voltage** – The battery supplies 3.3V to back up the controller cache in the event of a power failure. If battery voltage drops below this value, the battery is not accepting a charge properly and you must replace it.

If the Battery icon does not appear in Tree View, the battery is either disconnected or was not installed.

Chapter 6: Technology Background

- Introduction to RAID (below)
 - Choosing a RAID Level (page 95)
 - JBOD – Single Drive (page 94)
 - Choosing Stripe Block Size (page 97)
 - Gigabyte Boundary (page 97)
 - Initialization (page 97)
 - Hot Spare Drive(s) (page 98)
 - Partition and Format the Logical Drive (page 98)
 - Cache Settings (page 99)
 - Migration and Expansion (page 99)
-

Introduction to RAID

RAID (Redundant Array of Independent Disks) allows multiple disk 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 95. 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 disk 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. The logical drive's data capacity is equal to the number of drive members multiplied by the smallest logical drive member's capacity.

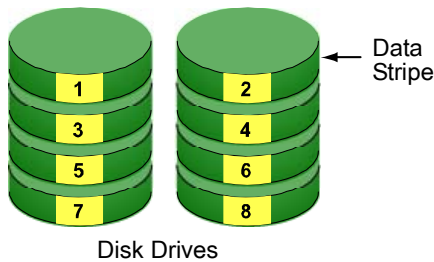


Figure 1. RAID 0 Striping interleaves data across multiple drives

For example, one 100GB and three 120GB drives will form a 400GB (4 x 100GB) logical drive instead of 460 GB.

RAID 0 logical drives on FastTrak consist of one or more disk drives.

RAID 1 – Mirror

When a logical drive is mirrored, identical data is written to a pair of disk 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 disk drive fails or has errors, the other mirrored disk drive continues to function. This is called Fault Tolerance. Moreover, if a spare disk 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.

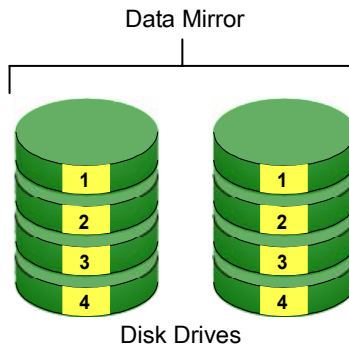


Figure 2. RAID 1 Mirrors identical data to two drives

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

RAID 1 logical drives on FastTrak consist of two disk drives.

RAID 5 – Block Striping with Distributed Parity

RAID 5 organizes data across the disk drives of the logical drive, and stores parity information on to a disk drive dedicated to this purpose. This organization allows increased performance by accessing multiple disk drives simultaneously for each operation, as well as fault tolerance by providing parity data. In the event of a disk drive failure, data can be re-calculated by the RAID system based on the remaining data and the parity information.

Parity data is distributed across the disk drives along with the data blocks. In each case, the parity data is stored on a different disk than its corresponding data block.

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.

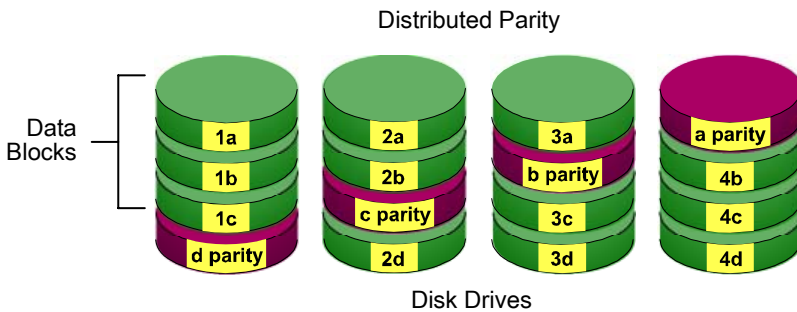


Figure 3. RAID 5 Stripes all drives with data and parity information

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

RAID 5 logical drives on FastTrak consist of 3 or 4 disk drives.

RAID 10 – Mirror / Stripe

Mirror/Stripe combines both of the RAID 0 and RAID 1 logical drive types. It can increase performance by reading and writing data in parallel while protecting data with duplication. At least four disk drives are needed for RAID 10 to be installed. With a four-disk-drive logical drive, one drive pair is mirrored together then striped over a second drive pair.

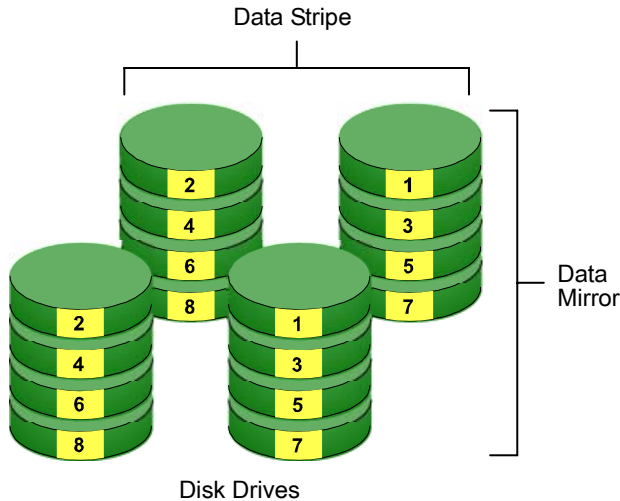


Figure 4. RAID 10 takes a data mirror on one drive pair and stripes it over two drive pairs

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, such a logical drive offers double fault tolerance. Double fault tolerance may allow your logical drive to continue to operate depending on which two disk drives fail.

RAID 10 logical drives on FastTrak consist of 4 disk drives.

JBOD – Single Drive

Just a Bunch of Disks (JBOD) arranges individual physical drives on the FastTrak controller the same as if they were attached to the PC's motherboard controller. The advantage is that a FastTrak Controller can accommodate up to four physical drives, more than most PC motherboards.



JBOD offers none of the performance or security advantages of a RAID logical drive. Any number of physical drives on the FastTrak Controller can be designated as JBOD.

In WebPAM, JBOD is created, managed and deleted the same as a logical drive. You can also use the FastTrak BIOS for this purpose. See the *FastTrak User Manual* for more information on the BIOS.

In addition, if you attach a physical drive that was initialized using Windows disk management, that drive will be automatically recognized as a JBOD by the FastTrak controller and WebPAM.

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
Implements a striped disk logical drive, the data is broken down into blocks and each block is written to a separate disk drive I/O performance is greatly improved by spreading the I/O load across many 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 an 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 RAID 0 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

JBOD

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

Recommended Applications for JBOD

- Non-critical file storage
- Swappable data storage

Choosing Stripe Block Size

The stripe block size value can be set to 32 KB, 64 KB and 128 KB.

64 KB is the default. This selection 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 disk drive in your logical drive. A larger value slows the logical drive down because disk 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 web servers 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 80.5GB drive would be rounded down to 80GB). This can be helpful in the event that a drive fails and an exact replacement model is no longer available.

Initialization

Initialization is the process of setting all of the data bits on all of the disk 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.

Initialization applies to RAID 1, 5 and 10. When you create one of these logical drives, you can specify Quick or Full Initialization. See “Create a Logical Drive” on page 62.

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

Hot Spare Drive(s)

A hot spare is a disk 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.

FastTrak will replace a failing disk 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 – An unassigned disk drive available to any logical drive on the Host PC.
- Dedicated – An unassigned disk drive that can only be used by a specified logical drive.

The hot spare policy function lets you select whether a logical drive will access any unassigned disk drive or a designated drive in the event of disk drive failure. See “Logical Drive Rebuild” on page 71 and “Create a Spare Drive” on page 85 for information.

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

Maintaining a hot spare drive is a good precaution to protect your logical drive integrity in the event of 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 an logical drive as you would any other fixed disk.

See “Appendix B: Partition and Format” on page 105.

Cache Settings

There is a data cache on the FastTrak controller and another one on each physical disk drive. A cache holds data in volatile memory during RAID management and data transfer activity. The right combination of cache settings for your needs can improve FastTrak's efficiency and performance.

Physical Drive Write Cache – Activates the write cache on the disk drive.

Write Back Cache – Activates write-back feature of FastTrak's controller cache. A write back cache holds data after an I/O operation and tells the controller the data has been written. The data is written as soon as the disk drive is no longer busy.

This action increases availability of the logical drive. If the power fails before the data is written to the disk drive, the data will be lost.

The alternative is a write-through cache policy, which reports that the data has been written to the disk only when it actually has.

To make Cache settings, see "Create a Logical Drive" on page 62 and "Logical Drive Settings" on page 67.

Migration and Expansion

Migration is the process of changing the RAID level of an existing logical drive. Expansion is the process of adding more physical drives to a logical drive while keeping the same RAID level. See "Logical Drive Migration and Expansion" on page 68 for instructions how to migrate or expand a logical drive.

Migration and Expansion are not available for JBOD.

The Migration feature applies to certain combinations of RAID level and number of physical drives, as described in the table below.

From	To	Result
RAID 0: 1 or 2 drives	RAID 5: 3 or 4 drives	Increased performance and capacity, adds redundancy
	RAID 10: 4 drives	
RAID 0: 3 drives	RAID 5: 4 drives	Increased performance and capacity, adds redundancy
	RAID 10: 4 drives	
RAID 1: 2 drives	RAID 5: 3 or 4 drives	Increased performance and capacity
	RAID 10: 4 drives	
RAID 10: 4 drives	RAID 5: 4 drives	Increased capacity

The Expansion feature applies only to RAID 0 and RAID 5 arrays. You can add physical drives as described in the table below.

From	To	Result
RAID 0: 1 drive	RAID 0: 2, 3 or 4 drives	Increased capacity
RAID 0: 2 drives	RAID 0: 3 or 4 drives	Increased capacity
RAID 0: 3 drives	RAID 0: 4 drives	Increased capacity
RAID 5: 3 drives	RAID 5: 4 drives	Increased capacity



Important

- The Target logical drive may require more disk drives than the Source logical drive
 - If the Target logical drive requires an EVEN number of disk drives but the Source logical drive has an ODD number, ADD a disk drive as part of the migration process
 - You cannot reduce the number of disk drives in your logical drive
 - You cannot migrate or expand a logical drive when it is Critical or performing activities such as Synchronizing or Rebuilding
-

Ranges of Logical Drive Expansion

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

The current PC Operating Systems support a 10-byte LBA format. This means that a logical drive can have up to 4 billion address blocks or sectors.

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 expansion as shown in the table above. For example:

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

See the chart below.

Current LD Size	Maximum LD Expansion 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 WebPAM to expand a logical drive beyond the maximum expansion size. However, when expansion is finished, your logical drive will be the maximum size listed in the table.

If you require a logical drive larger than the maximum expansion 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.

Appendix A: Frequently Asked Questions

I tried to log into WebPAM but my browser showed the message “cannot be displayed.” What is the problem?

The browser decided prematurely that WebPAM 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 WebPAM, 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 192.168.0.33.

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

One way to do this is through Event Notification. WebPAM will report events to you in the form of email and popup messages. You might only select Warning and Critical events, so that you only receive messages when something is wrong.

Another method is to periodically log into WebPAM and check the Status of your logical drives.

What happens if a logical drive goes degraded?

This condition is caused by a failed physical drive. Depending on your Event Notification settings, WebPAM will send you an email message and display a popup message indicating the degraded condition. An amber ! icon will appear over the FastTrak, Controller, Logical Drive View and Logical Drive icons. The Event Log will post a logical drive degraded entry. If you are running a SuperSwap enclosure, the failed drive’s Status LED turns red.

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. Refer to your *FastTrak User Manual* and your *SuperSwap User Manual* for more information.

Can I use my existing WebPAM setup to monitor a Promise subsystem product also?

No. Promise subsystem products, such as UltraTrak and VTrak, have a more advanced version of WebPAM tailored to their designs.

Why do the Rebuild, Synchronize, Expand 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, Expand and Migrate involve reading, writing and checking all the logical block addresses or individual data blocks on each disk drive. Plus, your disk array remains available while these operations take place. These added requirements increase complexity and take more time.

WebPAM documentation uses the term “logical drive” where earlier Promise products use the term “array.” Why did this change happen?

A disk array is an organized collection of physical disk drives. Logical drives are made from disk arrays. A logical drive is the entity that your operating system recognizes as a single volume (as if it were a single disk drive). Promise uses the term “logical drive” to keep things as simple as possible.

Can I run WebPAM without a network connection?

Yes. You can run WebPAM without a network connection but only from the Host PC. See page 27.

Appendix B: Partition and Format

In order for your operating system to recognize and work with the disk drives attached to your FastTrak SX Series RAID Controller card, the drives must be partitioned and formatted.

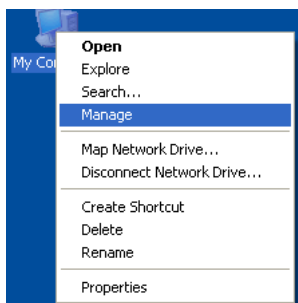
- If your drives were previously partitioned and formatted they are ready to use and you can skip this procedure
- If your drives have not been partitioned and formatted, you must do that job before you can use them

The actions of partitioning and formatting create a file structure on the disk 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 unautomated, therefore please refer to your system documentation for the exact procedure.

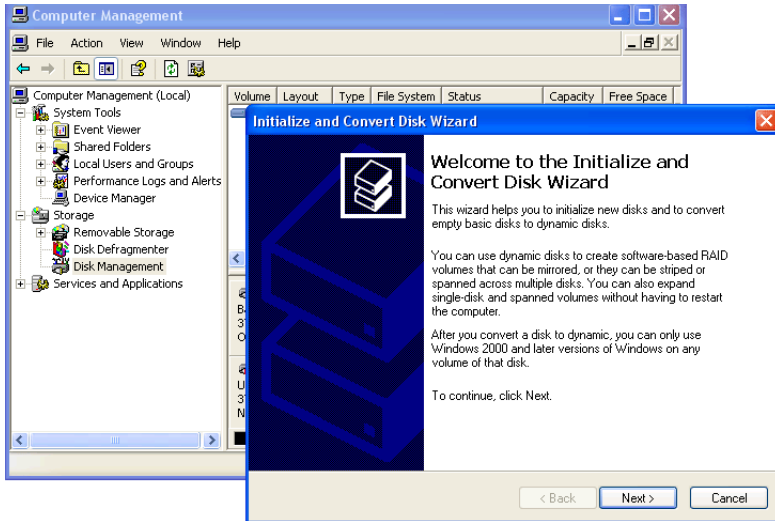


Note

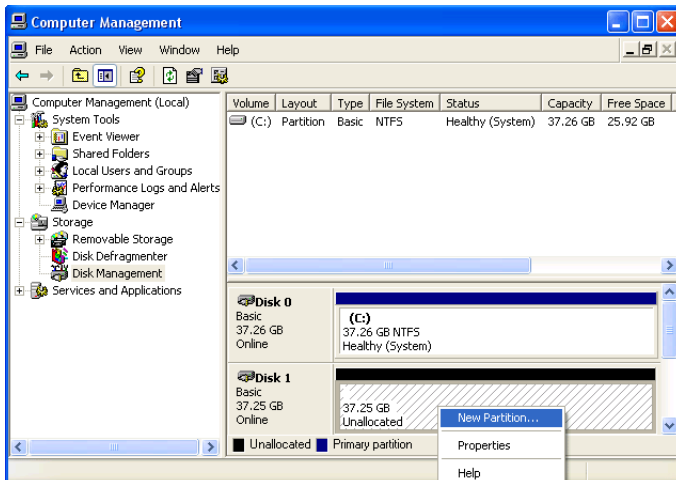
If you plan to boot your computer from this logical disk, go to Windows and Device Driver Installation under the Installation section for instructions. The instructions here are for data logical disks only.



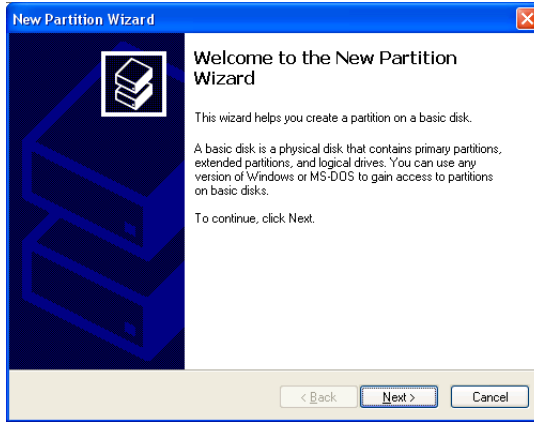
1. From the desktop, right-click on the My Computer icon and select *Manage* from the popup menu. The Computer Management window opens.
2. From the left menu, click on Disk Management. The Disk Management window opens with your new logical disk identified as Disk 1. The Initialize Wizard appears automatically.



3. Click the **Next** button to start the Wizard.
4. In the following windows, select Disk 1 to Initialize. Do not select any disks to Convert. Click the **Finish** button to Initialize the logical disk.

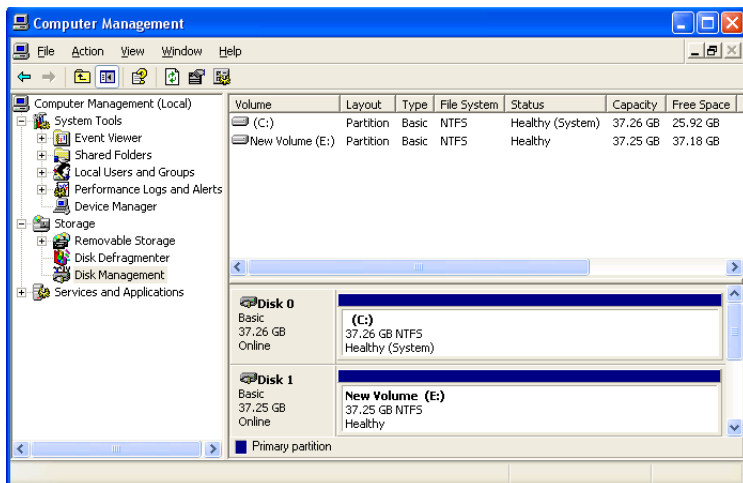


5. Right-click on the Unallocated portion of Disk 1 and select *New Partition...* from the popup menu. The New Partition Wizard appears.



6. Click the **Next** button to start the wizard.
7. In the following windows, do the following actions. Click **Next** to move to the next window.
 - Select 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"
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 disk will appear as a hard drive in the Disk Management window (above) and the My Computer window (below).

