AMD SP5100 + Promise SATA RAID Guide

Tyan Computer Corporation

v1.00

Index:

Section 1: Promise Firmware Overview

The RAID controller must be enabled in the BIOS before it can be used. The RAID controller setting is located in the BIOS under the Chipset tab > Southbridge Chipset Configuration. The following options must be set:

OnChip SATA Channel: Enabled
OnChip SATA Type: RAID

```
                         BIOS SETUP UTILITY
                                                    Chipset

 SouthBridge Chipset Configuration              Native IDE:
                                                  Use IO address
 SB700 CIMx Version : 5.5.0                      asigned by PCI base
                                                 register as IDE port
 OHCI HC(Bus 0 Dev 18 Fn 0)     [Enabled]       RAID:
 OHCI HC(Bus0 Dev 18 Fn 1)      [Enabled]       AHCI:
 EHCI HC(Bus0 Dev 18 Fn 2)      [Enabled]       Legacy IDE:
 OHCI HC(Bus0 Dev 19 Func 0)    [Enabled]         Use legacy IDE
 OHCI HC(Bus 0 Dev 19 Func 1)   [Enabled]       control port
 EHCI HC(Bus 0 Dev 19 Fn 2)     [Enabled]
 OHCI HC (Bus 0 Dev 20 Fn 5)    [Enabled]


 OnChip SATA Channel            [Enabled]       ←      Select Screen
 OnChip SATA Type               [RAID]          ↑↓     Select Item
 SATA IDE Combined Mode         [Enabled]       +-     Change Option
 PATA Channel Config            [SATA as primary]  F1  General Help
                                                F10    Save and Exit
 Power Saving Features          [Disabled]      ESC    Exit



       v02.68 (C)Copyright 1985-2009, American Megatrends, Inc.
```

The RAID firmware will load during post once these settings have been changed.

Firmware and Option ROM Information

The Firmware will eventually require an update as Promise makes improvements to the solution. This update process is done by TYAN directly and would not require any interaction on your part. However, there will be times that a support agent will ask you what specific firmware version is present on your motherboard. It is not a given that every motherboard released will all have the same exact version over its life cycle. You can find the particular version of the Promise firmware, called the Option ROM, during the POST process.

```
RAID Option ROM Advanced Version 5.0.0160.31.999
(c) 2004-2010 Promise Technology, Inc. All rights reserved.

ID   Mode       LD Name                        LD Size   Status

01   RAID 1     RAID                            62.99G   Functional


Press <Ctrl-F> to enter RAID Option ROM Utility..._
```
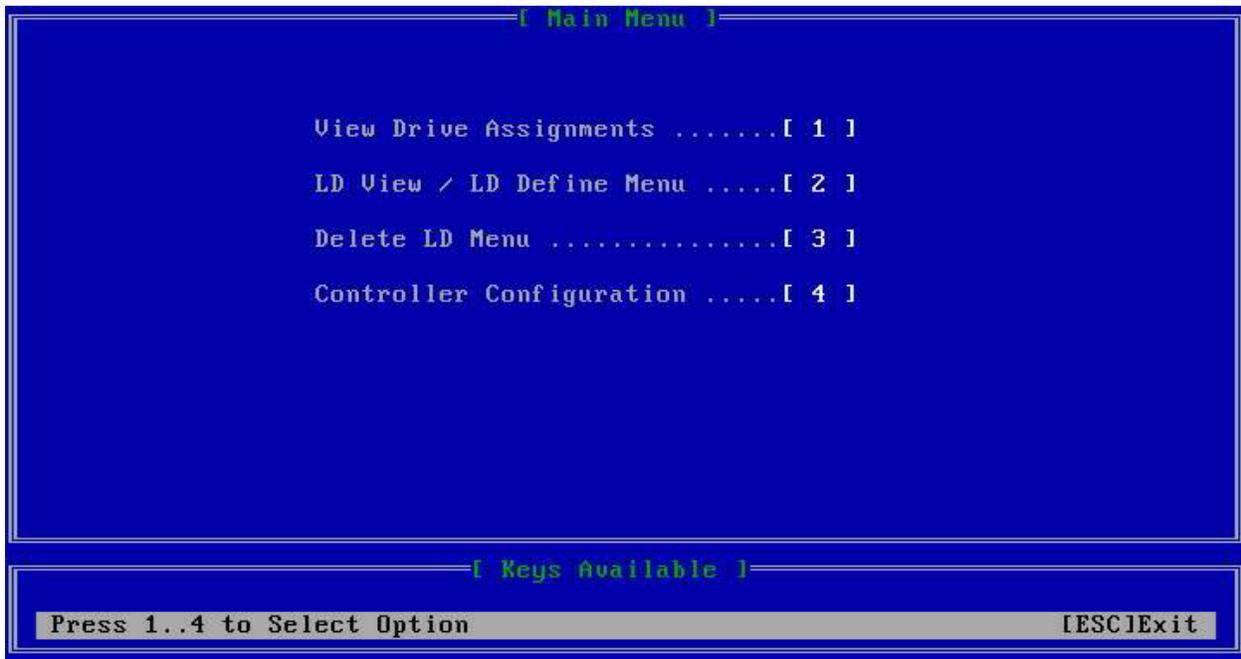
Firmware Menus

The main screen of the firmware is entered by pressing Ctrl + F as firmware is loaded and displayed during POST. The main screen allows you to:

- View drive assignments
- View and create Logical Disks
- Delete Logical Disks
- Configure the RAID controller

Press the number on your keyboard that corresponds to the menu item that you wish to select.

```
=[ Main Menu ]=

        View Drive Assignments .......[ 1 ]

        LD View / LD Define Menu .....[ 2 ]

        Delete LD Menu ...............[ 3 ]

        Controller Configuration .....[ 4 ]




=[ Keys Available ]=
 Press 1..4 to Select Option                    [ESC]Exit
```

Drive Assignments Menu

Pressing 1 on the main menu opens the Drive Assignments page.

```
===========================[ View Drive Assignments ]============================
                                                                       [01/01]
   Port:ID  Drive Model          Capabilities    Capacity(GB)  Assignment
    01:00   OCZ-VERTEX              SATA 3G           64.02
            Extent 1                                  63.95        Free
    02:00   OCZ-VERTEX              SATA 3G           64.02
            Extent 1                                  63.95        Free




===============================[ Keys Available ]===============================
 [↑] Up  [↓] Down  [PaUp/PaDn] Switch Page [Ctrl+H] Full Erase
 [ESC] Exit
```

Pressing Ctrl + H on the Drive Assignments page allows you to erase selected hard drives. Both the amount of times to erase and the pattern that the controller erases the drives with can be modified.

```
===========================[ View Drive Assignments ]============================
                                                                       [01/01]
   Port:ID  Drive Model          Capabilities    Capacity(GB)  Assignment
    01:00   OCZ-VERTEX              SATA 3G           64.02
            Extent 1                                  63.95        Free
    02:00   OCZ-VERTEX              SATA 3G           64.02
            Extent 1                                  63.95        Free

          ┌──────────────────────────────────────────────┐
          │  Port         :     01                        │
          │  Target ID    :     00                        │
          │  Drive Model  :     OCZ-VERTEX                │
          │  Erase Count  :     1                         │
          │  Erase Pattern:     55AA                      │
          │                                               │
          │  [Ctrl+E] Execute    [ESC] Back               │
          │  [↑] Up    [↓] Down  [BackSpace] Delete        │
          │  [1-9] Erase Count   [A-Z/a-z/0-9] Erase Pattern│
          └──────────────────────────────────────────────┘

===============================[ Keys Available ]===============================
 [↑] Up  [↓] Down  [PaUp/PaDn] Switch Page [Ctrl+H] Full Erase
 [ESC] Exit
```

5

Logical Drive Menu

Pressing 2 on the main menu opens the Logical Drive Menu. This screen lists all of the RAID arrays that are currently defined and present on the controller. JBOD disks are viewed by pressing Ctrl + V. RAID Arrays are created from this menu by pressing Ctrl + C.

```
=[ LD View Menu ]=

    LD No          RAID Mode        Drv      Capacity(GB)        Status

    LD  1          RAID 1            2            62.99        Functional












=[ Keys Available ]=
 [↑] Up  [↓] Down  [PaUp/PaDn] Switch Page  [Ctrl+C] Define LD
 [Enter] View LD  [Ctrl+V] View JBOD Disk  [ESC] Exit
```

Selecting an existing array by pressing the Enter key allows you to view details about the selected array.

```
=[ View LD Defination Menu ]=

   LD No  LD Name                      RAID Mode    Drv    Capacity(GB)
   LD  1  Logical Drive 1                RAID 1      2           62.99

   Stripe Block        NA
   Read Policy         NA              Write Policy      WriteThru


=[ Drives Assignments ]=
   Port:ID  Drive Model        Capabilities      Capacity(GB)
    01:00   OCZ-VERTEX           SATA 3G              64.02
    02:00   OCZ-VERTEX           SATA 3G              64.02






                    Any Key To Continue.......
```

6

Pressing Ctrl + C in the Logical Drive menu allows you to create a RAID array.

```
==================[ LD Define Menu ]==================

  LD No  LD Name                    RAID Mode   Drv
  LD  1  Logical Drive 1             RAID 0      0

  Stripe Block        128 KB        Initialization  Fast
  Gigabyte Boundary   ON
  Read Policy         NA            Write Policy    WriteThru

==================[ Drives Assignments ]==================

  Port:ID  Drive Model       Capabilities     Capacity(GB)   Assignment
   01:00   OCZ-VERTEX           SATA 3G           64.02           N
   02:00   OCZ-VERTEX           SATA 3G           64.02           N




==================[ Keys Available ]==================
  [↑] Up   [↓] Down   [PaUp/PaDn] Switch Page   [Space] Change Option
  [Ctrl+Y] Save   [ESC] Exit
```

7

Delete Logical Disk Menu

Pressing 3 on the main menu opens the Logical Disk deletion menu. JBOD disks can be viewed by pressing Ctrl + V. Press Ctrl + Alt + D to delete any Logical Disk listed.

```
==========================[ Delete LD Menu ]==========================

    LD No          RAID Mode          Drv      Capacity(GB)        Status

    LD  1          RAID 1              2            62.99        Functional




=========================[ Keys Available ]=========================
 [↑] Up   [↓] Down   [PgUp/PgDn] Switch Page   [Del/Alt+D] Delete LD
 [Ctrl+V] View JBOD Disk   [ESC] Exit
```

Pressing Ctrl + Alt + D will bring up the drive deletion menu. It will give you a warning instructing you that you are about to delete all of the data on the selected array.

```
========================[ View LD Defination Menu ]========================

  LD No  LD Name                        RAID Mode    Drv    Capacity(GB)
  LD  1  Logical Drive 1                  RAID 1      2           62.99

  Stripe Block          NA
  Read Policy           NA               Write Policy       WriteThru

=========================[ Drives Assignments ]=========================
  Port:ID  Drive Model        Capabilities    Capacity(GB)
   01:00   OCZ-VERTEX          SATA 3G            64.02
   02:00   OCZ-VERTEX          SATA 3G            64.02




           Press Ctrl-Y to delete the data in the disk!
           or press any other key to abort...
```

Adapter Configuration

Pressing 4 on the main menu opens the Adapter Configuration menu. This menu lists the IRQ currently assigned to the controller as well as the ACHI Base Address.

```
══════════════[ Adapter Configuration - Options ]══════════════
                No Parameters Defined for Current Disk(s)...

══════════════[ System Resources Configuration ]═══════════════


   Controller IRQ: 11
   AHCI HBA MMIO Base Address: FDEFE400










══════════════════════[ Keys Available ]═══════════════════════

 [ESC] Exit
```

9

Section 2: Promise RAID Creation

Creating an array using the Promise Option ROM during POST:

The RAID firmware can be used to create a RAID array. During POST the firmware displays this screen. Press Ctrl + F to enter the firmware.

```
RAID Option ROM Advanced Version 5.0.0160.31.999
(c) 2004-2010 Promise Technology, Inc. All rights reserved.

ID   Mode      LD Name                      LD Size   Status
─────────────────────────────────────────────────────────────
01   RAID 1    RAID                         62.99G    Functional


Press <Ctrl-F> to enter RAID Option ROM Utility..._
```

Once you are in the firmware, press the 2 key to enter the LD View / Define menu.

```
═══════════════════════[ Main Menu ]═══════════════════

           View Drive Assignments .......[ 1 ]

           LD View / LD Define Menu .....[ 2 ]

           Delete LD Menu ...............[ 3 ]

           Controller Configuration .....[ 4 ]



════════════════════[ Keys Available ]═════════════════
  Press 1..4 to Select Option                    [ESC]Exit
```

Press Ctrl + C at the LD View menu to create a RAID array.

```
================[ LD View Menu ]================




                < There is no any LD >




================[ Keys Available ]================
[↑] Up   [↓] Down   [PaUp/PaDn] Switch Page   [Ctrl+C] Define LD
[Enter] View LD   [Ctrl+V] View JBOD Disk   [ESC] Exit
```

Create the RAID array by selecting the RAID mode and drives to use. Press Ctrl + Y to finalize the array.

```
================[ LD Define Menu ]================
  LD No   LD Name                      RAID Mode    Drv
  LD  1   Logical Drive 1               RAID 1        0

  Stripe Block        NA               Initialization    Fast
  Gigabyte Boundary   ON
  Read Policy         NA               Write Policy      WriteThru

================[ Drives Assignments ]================
  Port:ID  Drive Model        Capabilities    Capacity(GB)    Assignment
   00:00   6V080E0             SATA 3G             80.00            N
   02:00   OCZ-VERTEX          SATA 3G             64.02            N
   03:00   ST380817AS          SATA 1.5G           80.02            N




================[ Keys Available ]================
[↑] Up   [↓] Down   [PaUp/PaDn] Switch Page   [Space] Change Option
[Ctrl+Y] Save   [ESC] Exit
```

11

Creating an array using the Promise WebPAM interface:

Log into the WebPAM interface using a web browser. After you have logged in, expand the IP address of the Promise RAID controller. Expand the controller in the navigation bar on the left side of the screen and select the Logical Drive View. This will list all of the logical drives on the controller. Click the button in the right half of the screen labeled 'Create'.
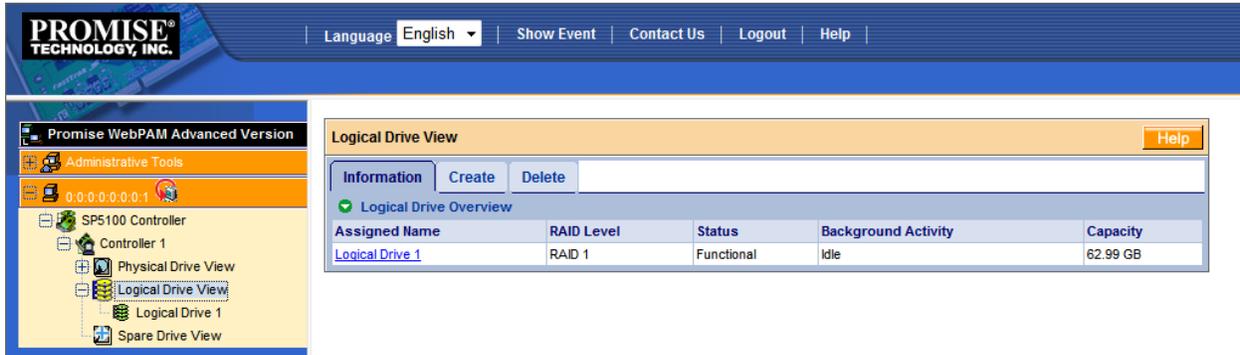
Once you have clicked the Create button you will be asked which RAID level you wish to select:

After selecting the RAID level you will be asked to choose the drive group that you wish to use:
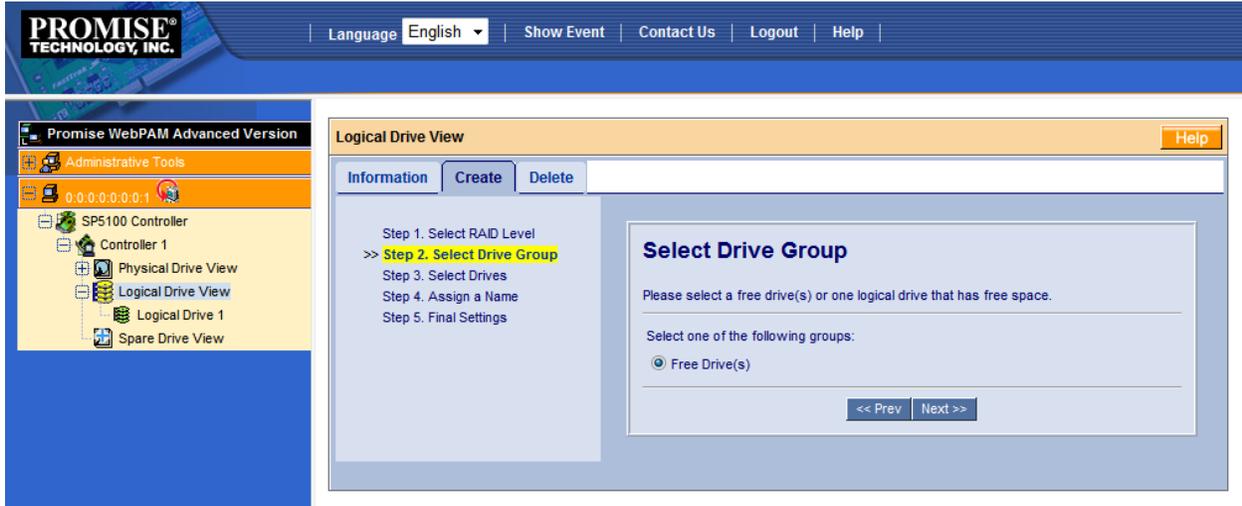
After you have selected the drive group you will be asked to select which drives you wish to use. The border around the drive indicates the drive's status:

- A black border around a drive indicates that the drive is available
- A red border around a drive indicates that the drive has been selected for use in the array
- A blue border around a drive indicates that the drive has already been assigned to an array and cannot be used in a new array
- A yellow border around a drive indicates that the drive has been designated as a hot spare
- A grey border around a drive indicates that the drive is invalid

After selecting the drives that you wish to use, press the Next button to continue.
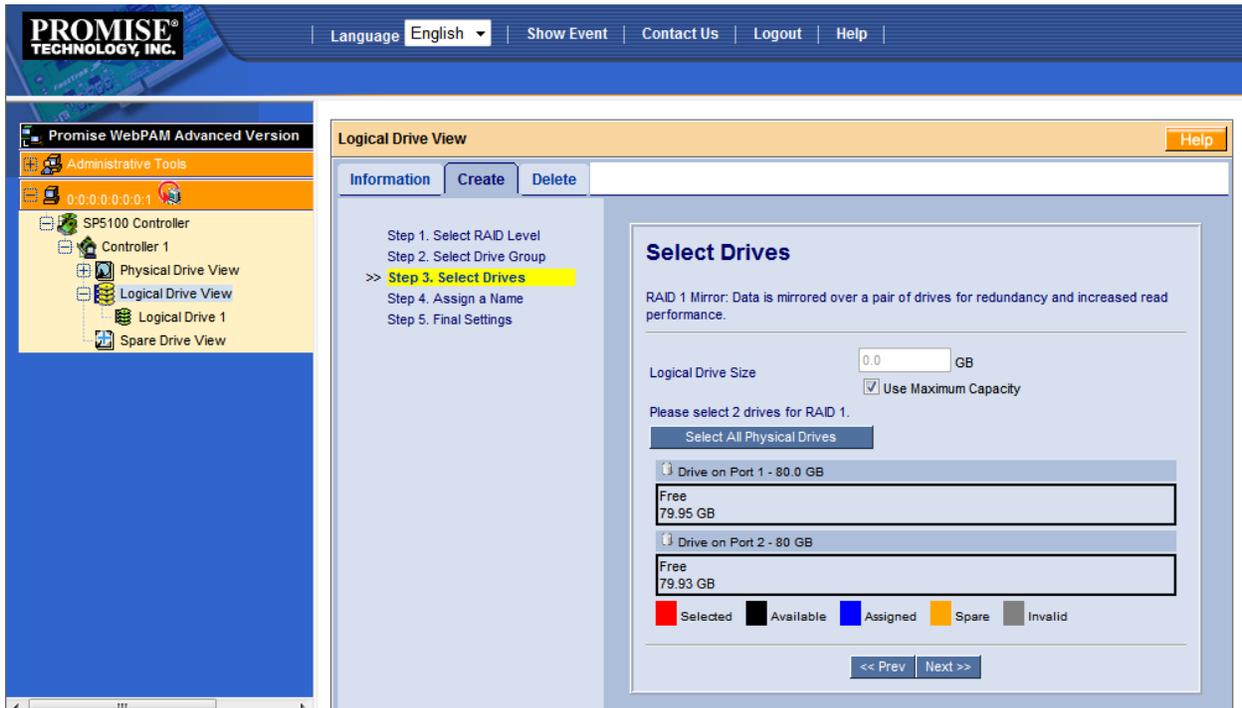
After selecting the drives to use you will be asked to provide a name for the array:
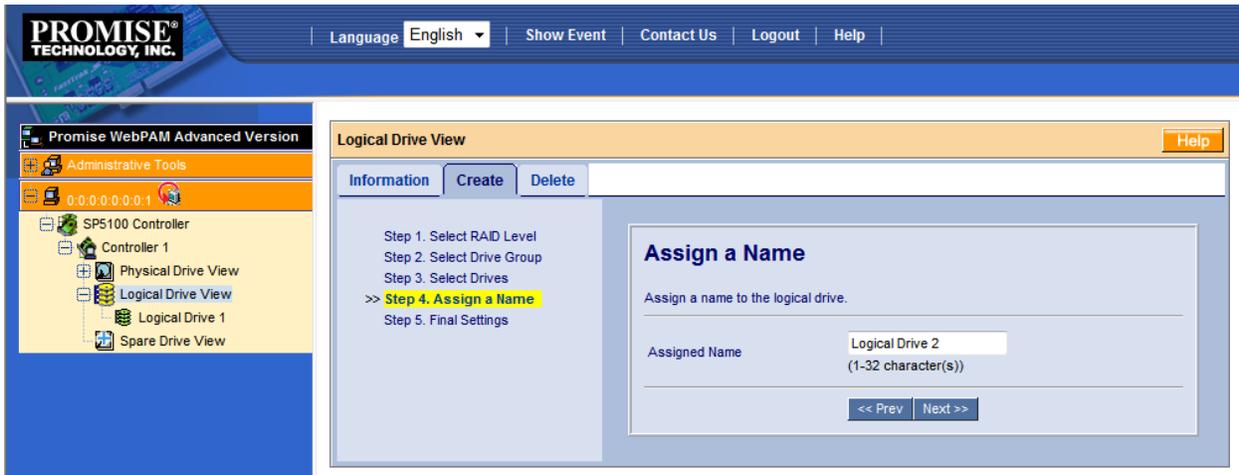
After naming the array you will then be asked to select some final settings, including:

- Stripe block size
- Read policy
- Write policy
- Gigabyte boundary
- Initialization speed
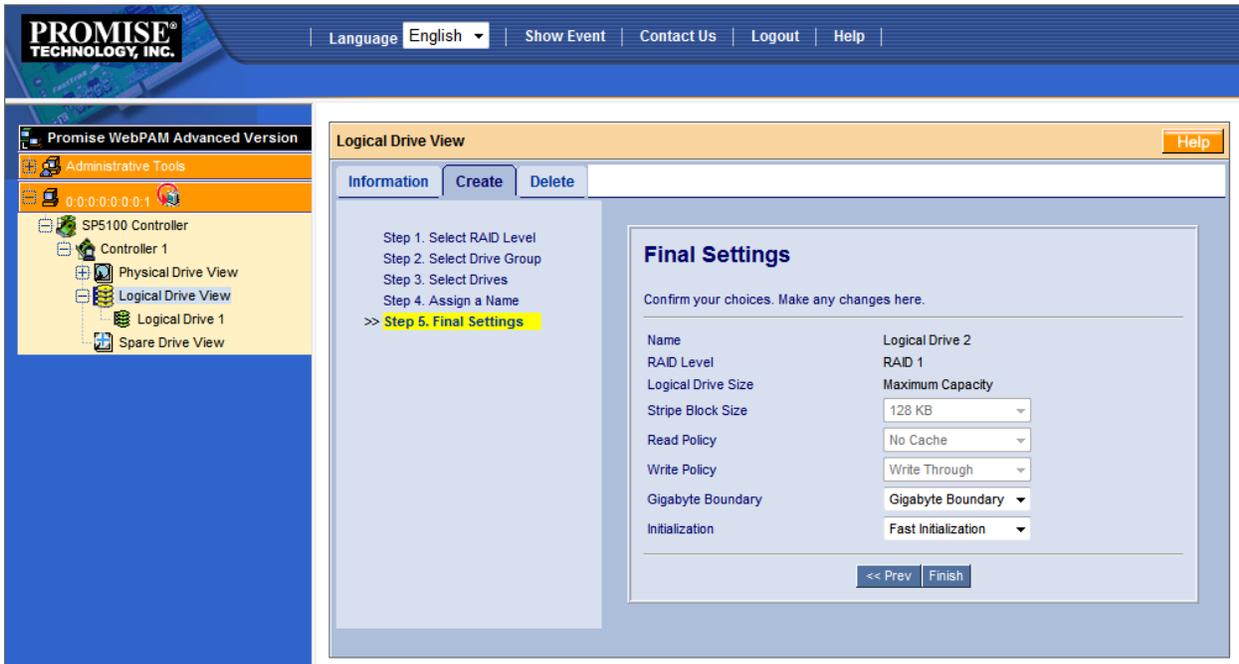
After you have chosen your final settings, press the Finish button. Your RAID array has been created and is now online.

Note: RAID Arrays are not a substitution for proper data backup. Certain RAID arrays are designed to add redundancy but no RAID controller or array can eliminate the possibility of failure. RAID arrays work best when complimenting a well implemented backup routine. TYAN Computer Corporation is not responsible for any data loss.

Supported RAID Levels:

Raid 0 – Raid 0 is a striped array with no data redundancy. This type of Raid array can increase read and write speeds as data is split evenly across the total amount of drives present. Raid 0 arrays are not fault tolerant and can not be rebuilt in the case of a drive failure.

The maximum size of a Raid 0 array = $N * S_{min}$, where N is the total number of drives and S_{min} is the capacity of the smallest drive in the array.

Minimum amount of drives for a Raid 0: 2 drives

Raid 1 – Raid 1 is a mirrored array set. Data on each drive is identical. Raid 1 arrays lack the performance advantage of Raid 0 but since it is a mirrored array it is redundant. A Raid 1 array is rebuildable as long as at least a single drive in the array remains.

The maximum size of a Raid 1 array = S_{min}, where S_{min} is the capacity of the smallest drive in the array.

Minimum amount of drives for a Raid 1: 2 drives

Raid 5 – Raid 5 combines both data striping and parity information. Parity information is distributed across all member drives and is fault tolerant. Parity information is only calculated on write operations. Due to this write performance can be poor; however since parity information is not read during read operations, read performance on a Raid 5 can be close to the speed of Raid 0. A Raid 5 array can survive a single disk failure.

The maximum size of a Raid 5 array is equal to $(N-1) * S_{min}$, where N is the total number of drives and S_{min} is the capacity of the smallest drive in the array.

Minimum amount of drives for a Raid 5: 3 drives

Raid 10 – Raid 10 is also known as Raid 1+0. It is a stripe of mirror arrays. In some cases it can yield disk performance close to Raid 0. It is fault tolerant, up to one driver per mirror set. In an array of 4 drives it can be fault tolerant up to 2 drive failures, depending on which drives fail. If both drives in the same mirror set within the Raid 10 fail the array itself will be failed and not recoverable.

The maximum size of a Raid 5 array is equal to $(N/2) * S_{min}$, where N is the total number of drives and S_{min} is the capacity of the smallest drive in the array.

Minimum amount of drives for a Raid 10: 4 drives

SPAN – A Span array offers no performance or redundancy benefits. It does not include any striping or mirroring. The only benefit to a Span array is that it increases the total capacity beyond that of any single drive.

The maximum size of a Span array is equal to the combined capacity of all the included drives in the array.

Minimum amount of drives for a Span array: 2 drives

JBOD – JBOD drives are single connected disks that are not part of any array.

RAID Settings:

Stripe Block Size – The stripe block setting changes the amount of data to stripe across each drive. Depending on the size and types of data being stored on the hard drive, smaller or larger stripe sizes may yield higher performance. The default stripe size generally yields the best performance however. This setting can not be changed after an array has been created.

Read Policy – Available settings are N/A, Read Cache, and Read Ahead.

Read Cache caches the most recently used data read from the hard drives. If the data access repeats, it will read from the cache in memory rather than repeating the read operation from the hard disk. Since cache memory is faster than a read operation from the hard drives, this will increase performance if data reads are frequently repeated.

Read Ahead – This read policy is best used for sequential disk access. If sequential read commands are detected, the cache manager will do an additional read and put data in the cache without waiting for host issue the next read command. This overlaps the disk access and host read access, therefore access latency is reduced. Enabling read ahead will boost sequential access, but incorrect read predictions would cause unnecessary disk activity. Therefore, using Read Ahead on an array expected to have mainly random read commands will result in poor performance.

Write policy – There are two write policies, WriteThru and Writeback.

WriteThru – This write policy skips the write cache and immediately writes data to the hard drives. The write command is not flagged complete until the data has been completely transferred to the drives. This does not give any performance advantage. However, since the write operation stays open until the data has completely been transferred, there is less risk of data loss.

WriteBack – Data is transferred directly to the write cache and the write operation is marked complete. The controller will write the data from the cache to the hard drives at the earliest opportunity. This increases write performance for files small enough to fit in the cache because writing to cache is much faster than writing directly to the hard drive. WriteBack write caching does increase the risk of data loss however because the cache memory is volatile and loses its contents when power is lost. It is highly recommended to use an uninterruptible power supply unit when WriteBack is used in order to safeguard against data loss due to power outage.

> **Note:** WriteBack write caching can only be enabled if read caching is enabled first. Read caching must be enabled for this option to be available.

Gigabyte Boundary – Actual storage space on hard drives usually do not exactly match their advertised capacities. For example, an 80GB hard drive may actually have a capacity of 80.02GB. Since a failed hard drive in a RAID array can only be replaced with a hard drive with one of equal or greater capacity, there is a situation that can exist where all the hard drives in a particular RAID array may be slightly larger than their advertised size. If one of the drives in this array failed it would be difficult to find a replacement drive since other drives of the same advertised size may have slightly less actual capacity than the ones originally used to create the array.

Since hard drives can vary so much in their actual capacities the Gigabyte Boundary option rounds down to the nearest gigabyte so that more hard drives can be used to rebuild with. In this example, the 80.02GB hard drive would be rounded off to 80.0GB at array creation. This increases the probability of finding a suitable replacement drive should the original ever fail.

Initialization Speed – Available settings are Full, Fast, and None. Select Fast Initialization for a quick RAID array initialization.

Hot spare assignment

Hot spare drives can only be added using the WebPAM web interface. They can not be assigned in the firmware during POST.

To assign a hot spare, log in to the web interface and enter Spare Drive View. Select the Create tab, select a hard drive, and click the Create button.

There are two types of Hot Spares: Global and Local hot spares. You can choose to designate a spare drive as a global spare which will automatically replace a failed drive in any array or you can assign a spare drive as a local spare which will belong only to a single specific array. You can select which array owns the spare by using the Spare Drive Type dropdown menu.
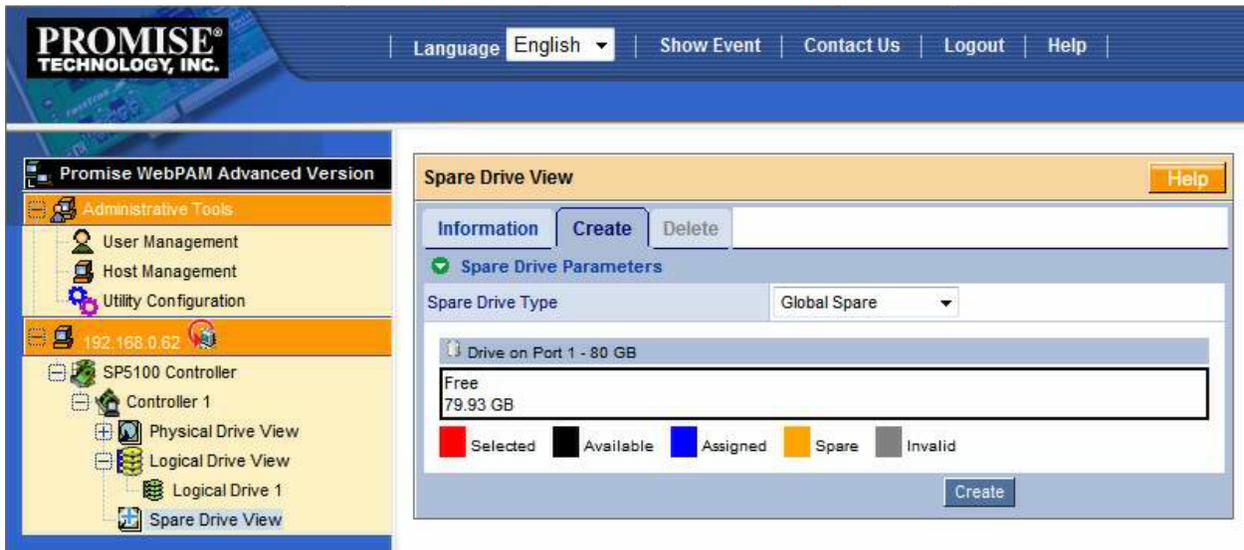
> **Note:** Hot spare drives can not be part of any logical drive (RAID or JBOD). If there are no drives listed as available, enter the Logical Drive View and make sure the intended drive is not part of an array. Single hard drives are often automatically assigned as JBOD disks, so if this is the case simply delete the JBOD array in order to free the intended hot spare drive.

Section 3: Promise WebPAM Software

In order to check the status of your RAID arrays, log into the Promise WebPAM software using your web browser. The computer with the RAID array must have the Promise WebPAM software installed. The address will be the IP address of the computer, port 8443/promise. In this example, the address used was https://192.168.0.20:8443/promise. This address will be different on your local machine, depending on the IP address assigned to your local computer. In order to access the controller across the network the software must be installed and the network functionality must be enabled during installation. It can not be enabled at a later time.

The default login information for both LoginID and Password are: **admin**

TYAN Computer Corporation strongly suggests for your own safety and security that you update these default settings to your own information as soon as the system has been configured.

Note: The WebPAM software requires secure http protocol. You will use https: to gain access to the WebPAM software

---

Email Alert Configuration

The RAID controller can be configured to send email alerts when an array goes critical. This can be configured through the WebPAM interface by logging in and accessing the Utility Configuration tab under Administrative Tools in the navigation bar on the left side of the screen. For settings on which alerts will have email alerts sent, see the user account events tab on Page 18.

User Management

The Promise WebPAM interface allows the user to create and modify multiple user accounts on the controller. Each user account can have its own email address to send alerts and can have separate permissions.

To view, modify, or delete user accounts, select User Management under the Administrative Tools section of the navigation bar on the left side of the screen.
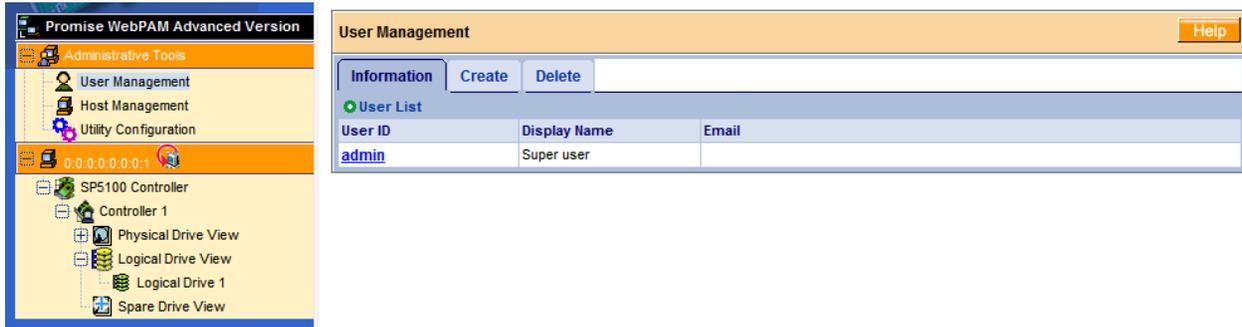
To view the current settings of an existing user account, click on the user account's name. The information tab of the user account shows the current settings.

In order to change the settings, click on the Settings tab. You can change the password, email address, Netsend IP, and user permissions.
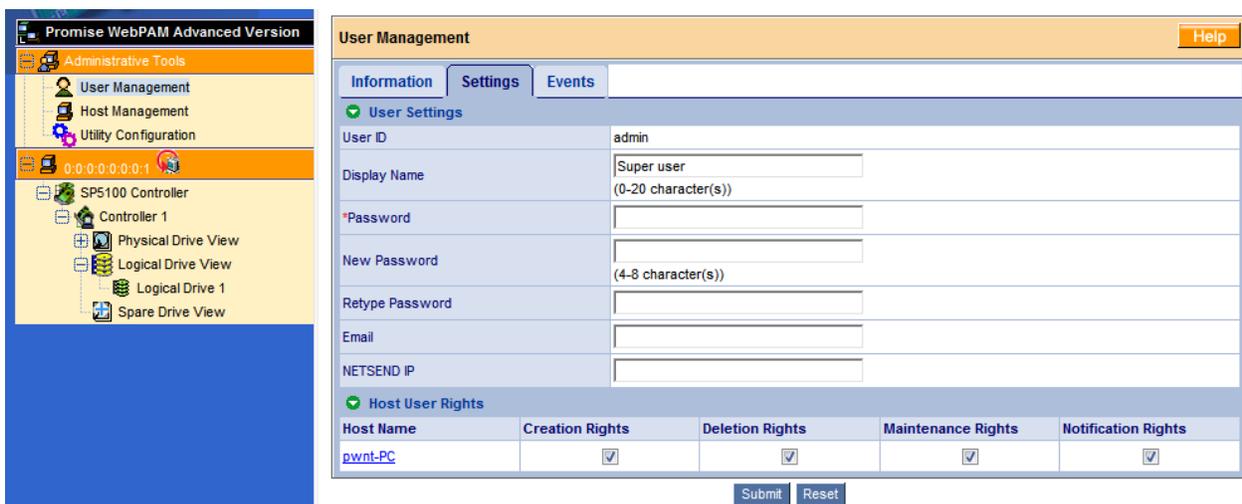
The email alerts are also configurable. In order to modify which alerts the Promise controller will email the user about, click on the Events tab.
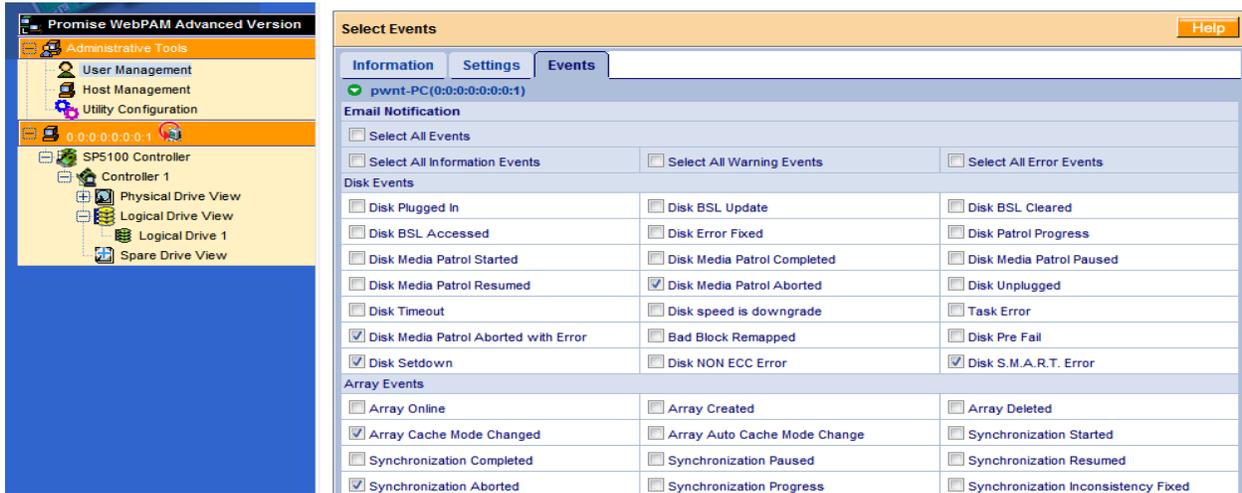
New User Creation

In order to create a new user account, click on the Create tab of User Management. Enter the desired User ID, password, email address, and permissions and click the Submit button. Once the account has been created, email alerts can be modified using the Events tab shown above.

In order to delete a user account, click on the Delete tab under User Management. Select the accounts that you wish to delete and click the Submit button.
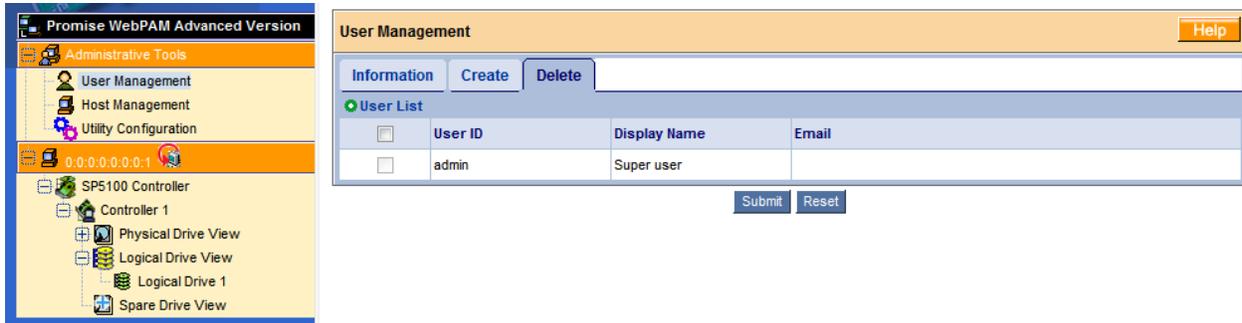
Logical Disk Management

To delete a logical disk from the WebPAM interface, select the Logical Drive View tab of the controller on the navigation bar on the left side of the screen.

Click on the Delete tab.

Select the drive which you wish to delete and click the Submit button. Confirm your choice to delete the Logical Disk.
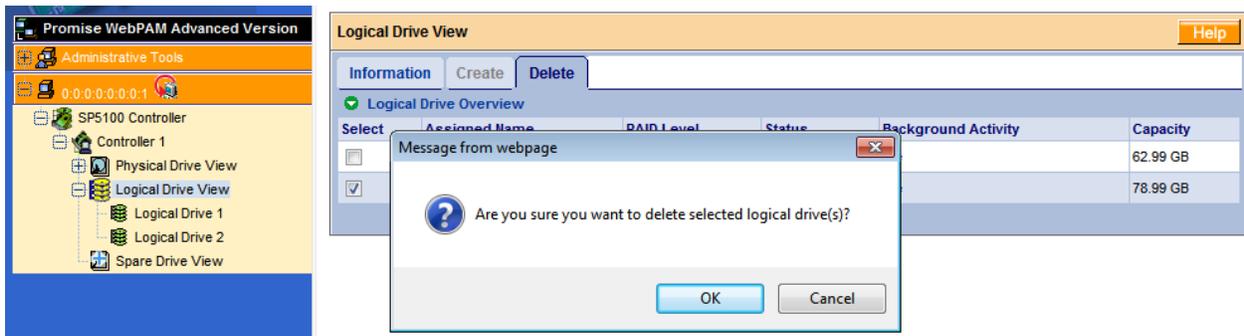
Host Management

The Promise WebPAM network configuration information can be viewed under the Host Management section of the Administrative Tools on the navigation bar on the left side of the screen. This section is for display purposes only and none of the settings are modifiable.

Select the IP address of your computer from Host Management to view the following information:

- WebPAM version
- Display name
- IP address
- Java Virtual Machine version

Section 4: Promise RAID Rebuild Process

The RAID rebuild process can only be initiated through the WebPAM interface. It can not be started through the Option ROM during POST. The firmware will however display the following critical status alert during POST when an array goes critical:

```
RAID Option ROM Advanced Version 5.0.0160.31.999
(c) 2004-2010 Promise Technology, Inc. All rights reserved.

ID   Mode       LD Name                      LD Size   Status

01   RAID 1     RAID                          62.99G   Critical

Problem is detected with Array : 1
Critical Status:
A disk member of an array has failed or is not responding.
Please refer to your AMD User Manual for further details.

Press <Ctrl-F> to enter RAID Option ROM Utility...
```

The rebuild process is identical for all RAID levels. In order to begin the rebuild process you must enter the Promise WebPAM interface. The navigation bar is found on the left side of the screen. You can view the status of your RAID arrays with the Logical Drive View tab. In this example, we can see that there is one array present on the controller – a RAID 1 that has gone critical.
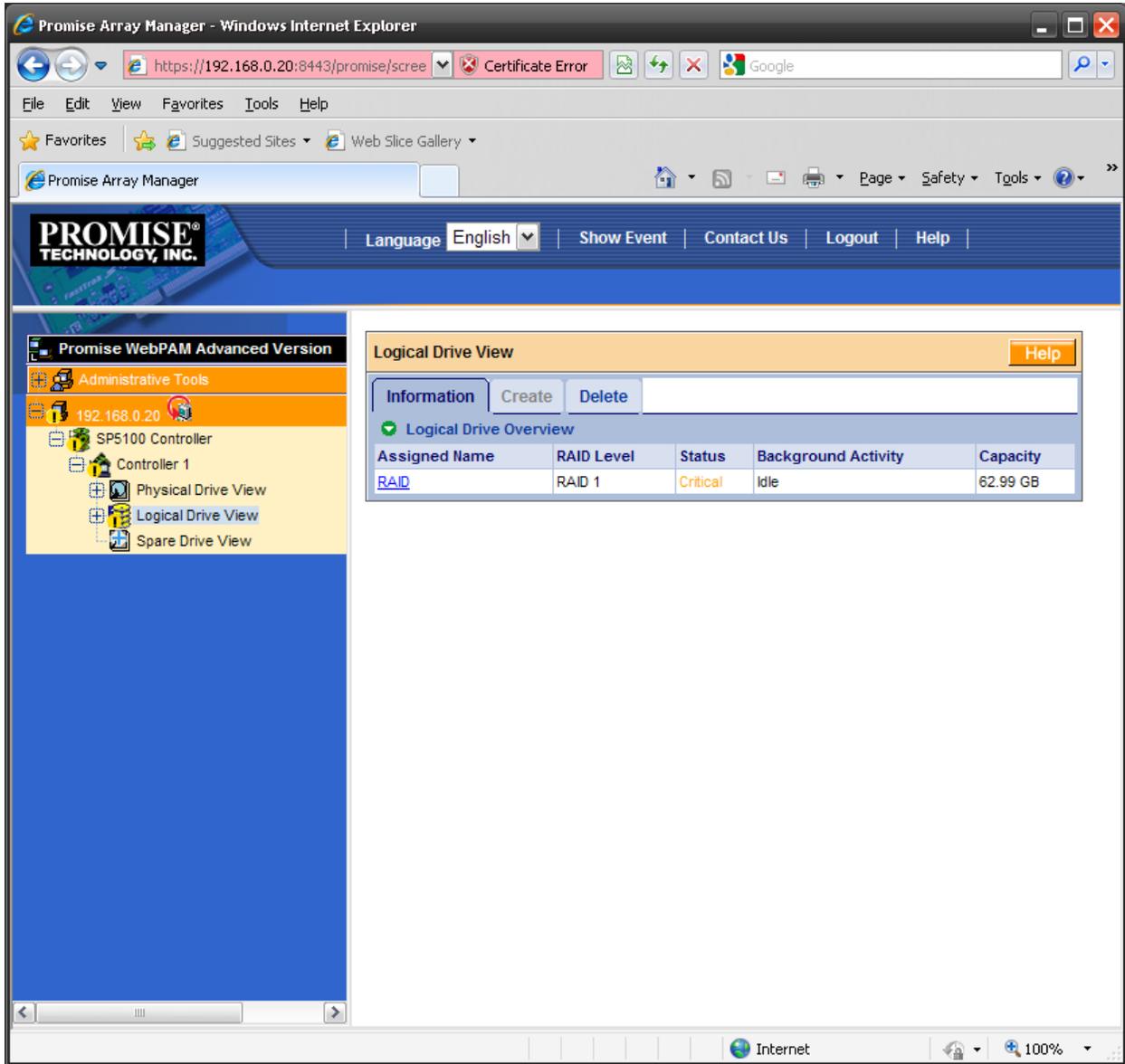
Logical drive view

The physical drives attached to the controller can be viewed under the Physical Drive View tab. In this example, there is only one drive attached to the controller.
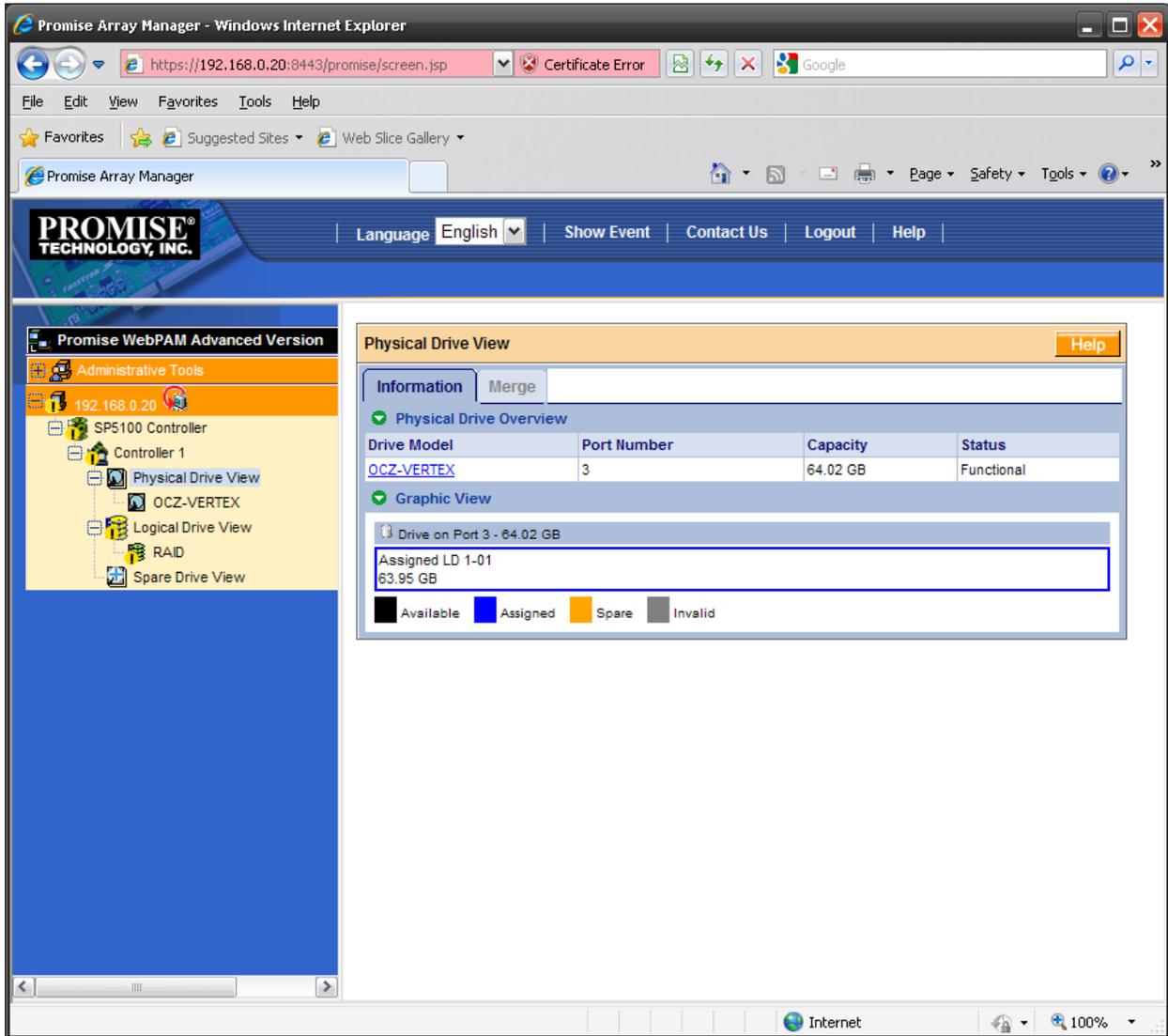
Physical Drive View

We have added a drive and it is now visible in the physical drive view.


Physical Drive View

We have selected the flagged RAID array under the Logical Drive View heading on the navigation bar on the left side of the screen. Here we can see information about the selected RAID array. The status on this array is 'Critical'. The Rebuild tab is visible at the top of the array chart.
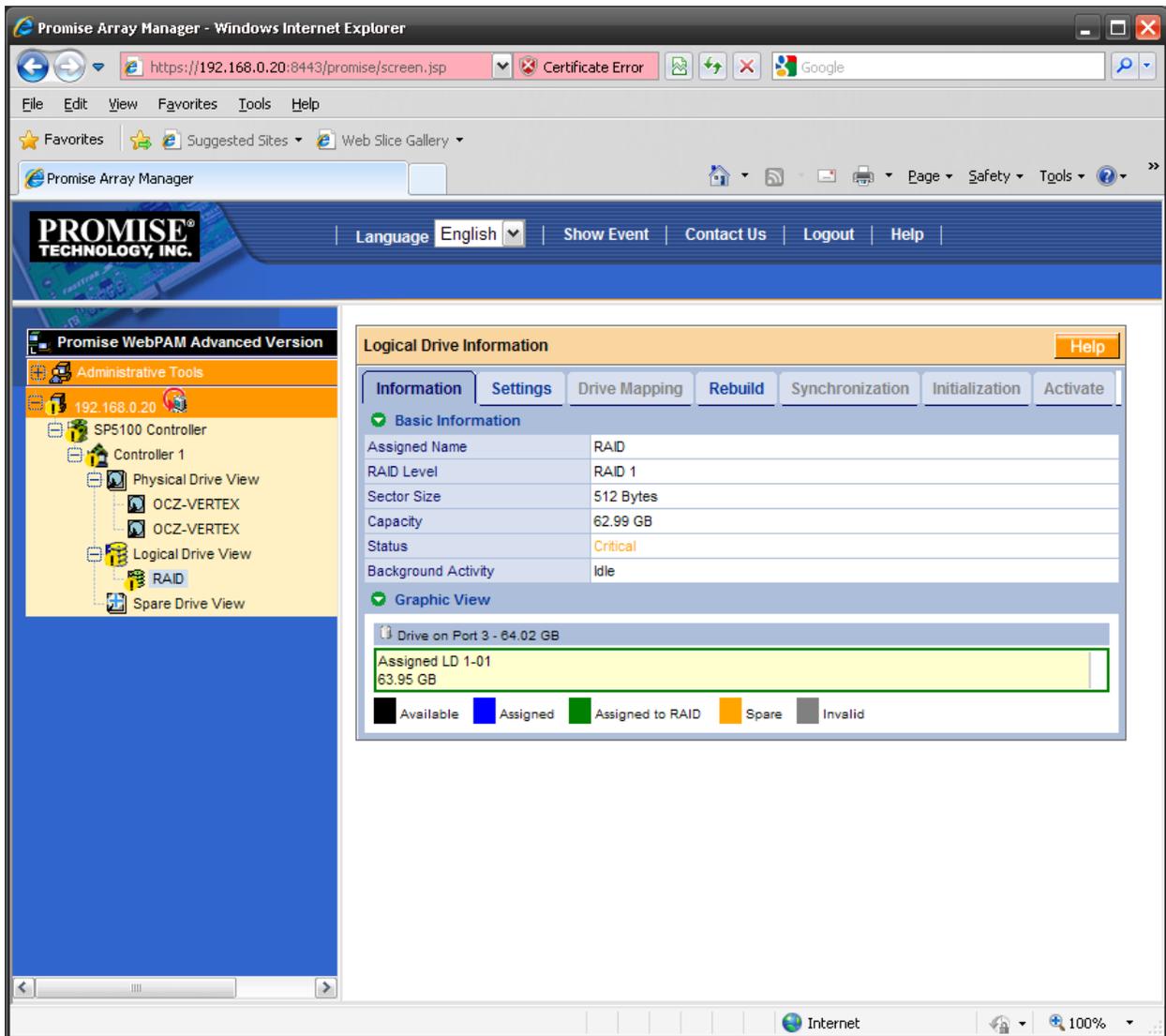

Logical Drive Information

Here we have selected the Rebuild tab of the array. This window shows available hard drives that are not part of any RAID array. In this case, we only had one spare hard drive attached, but if there were any more free hard drives they would be listed here as well.

To begin the rebuild process, select the drive that you wish to rebuild to by clicking on the drive and pressing the Start Now button.
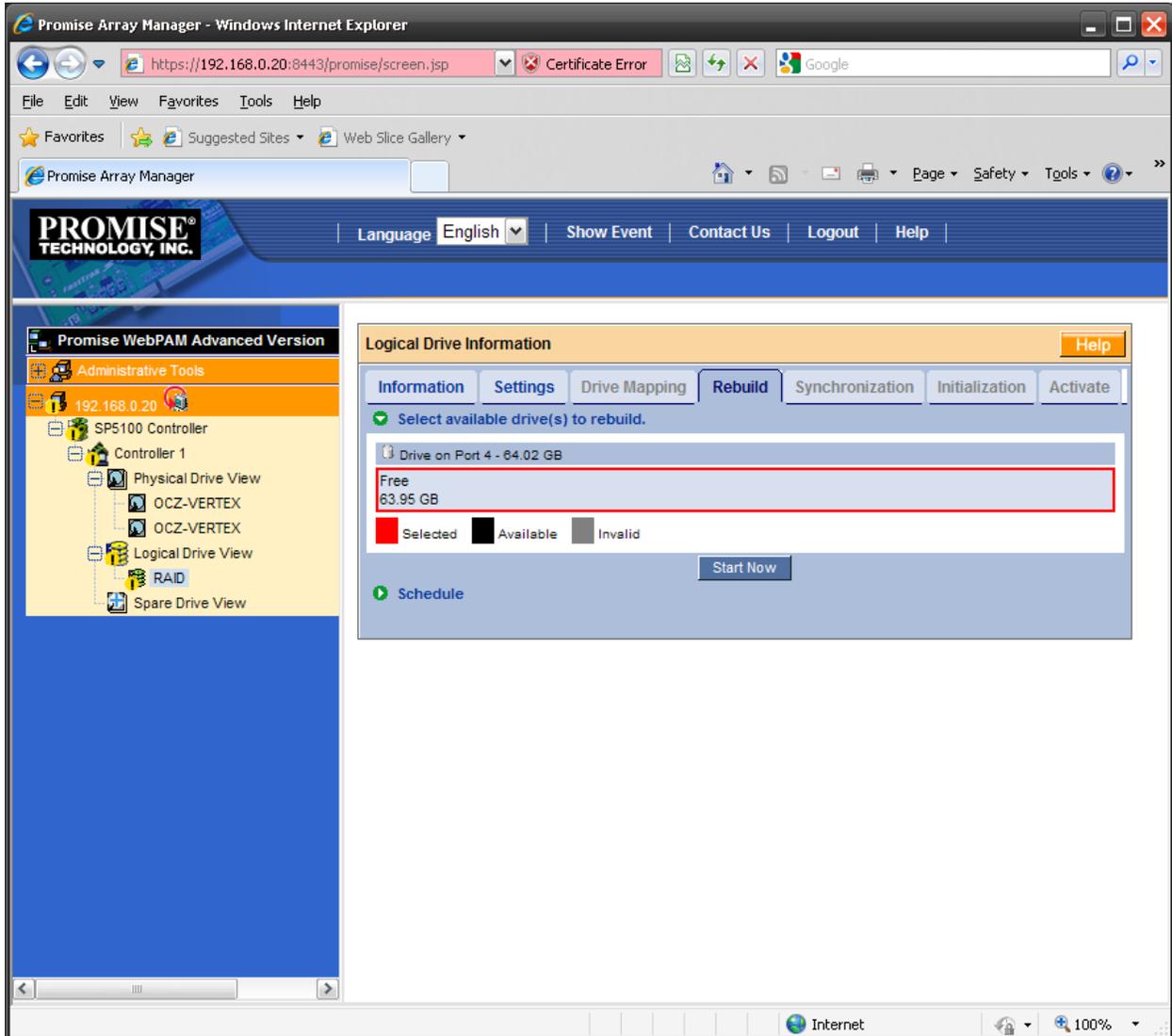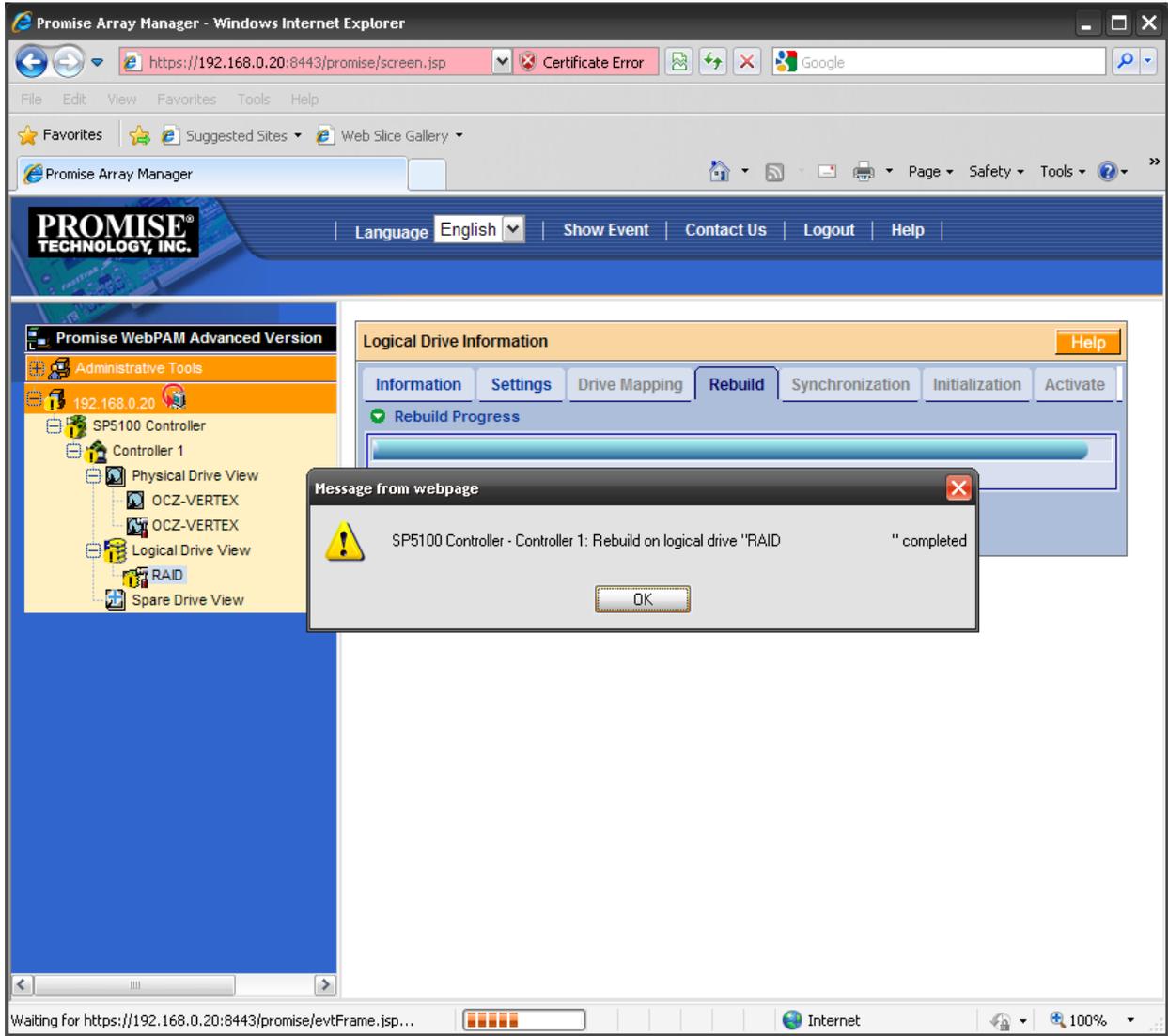

Logical Drive Information

During the rebuild process, you may check the progress by monitoring the Rebuild tab of the array.
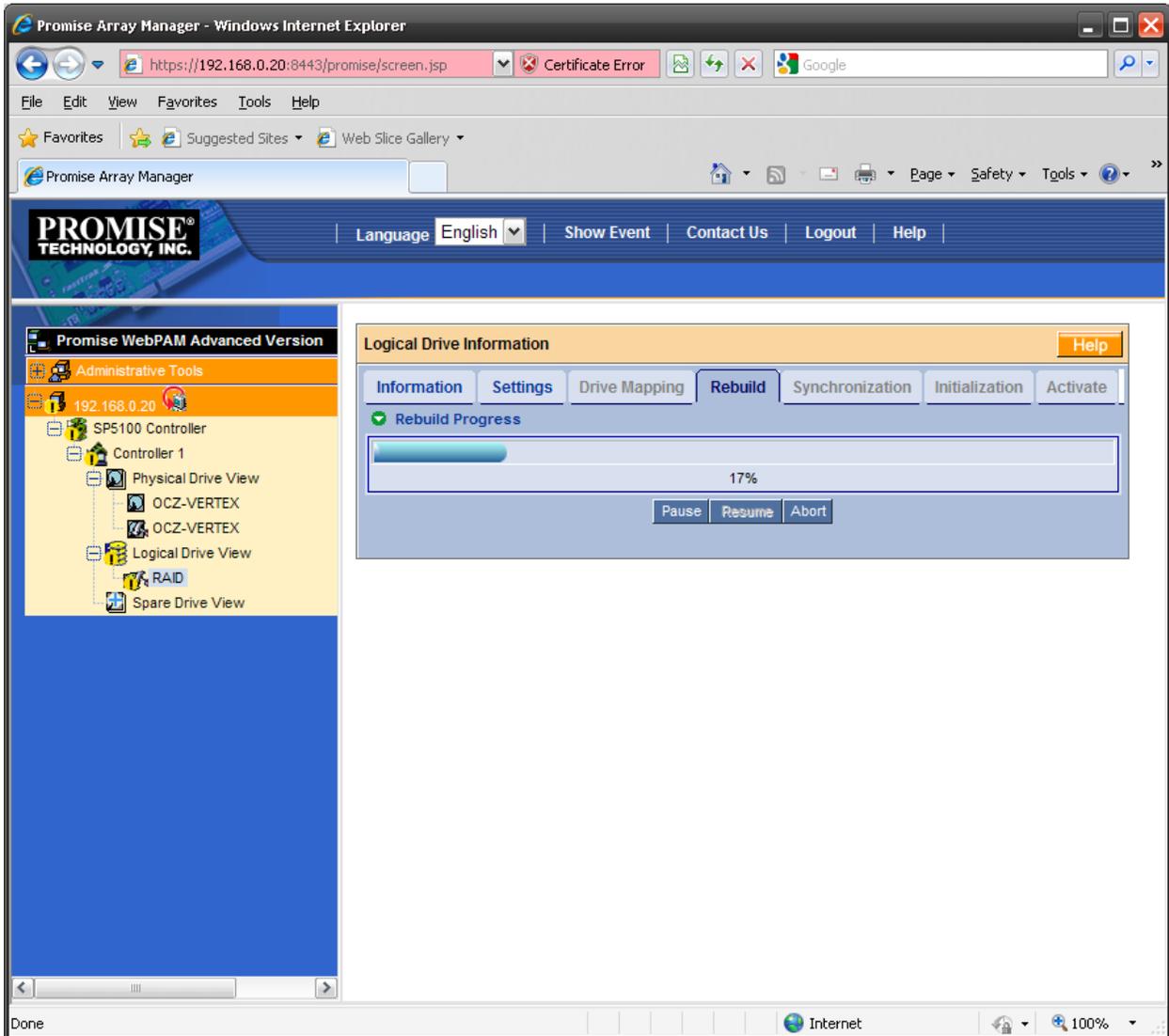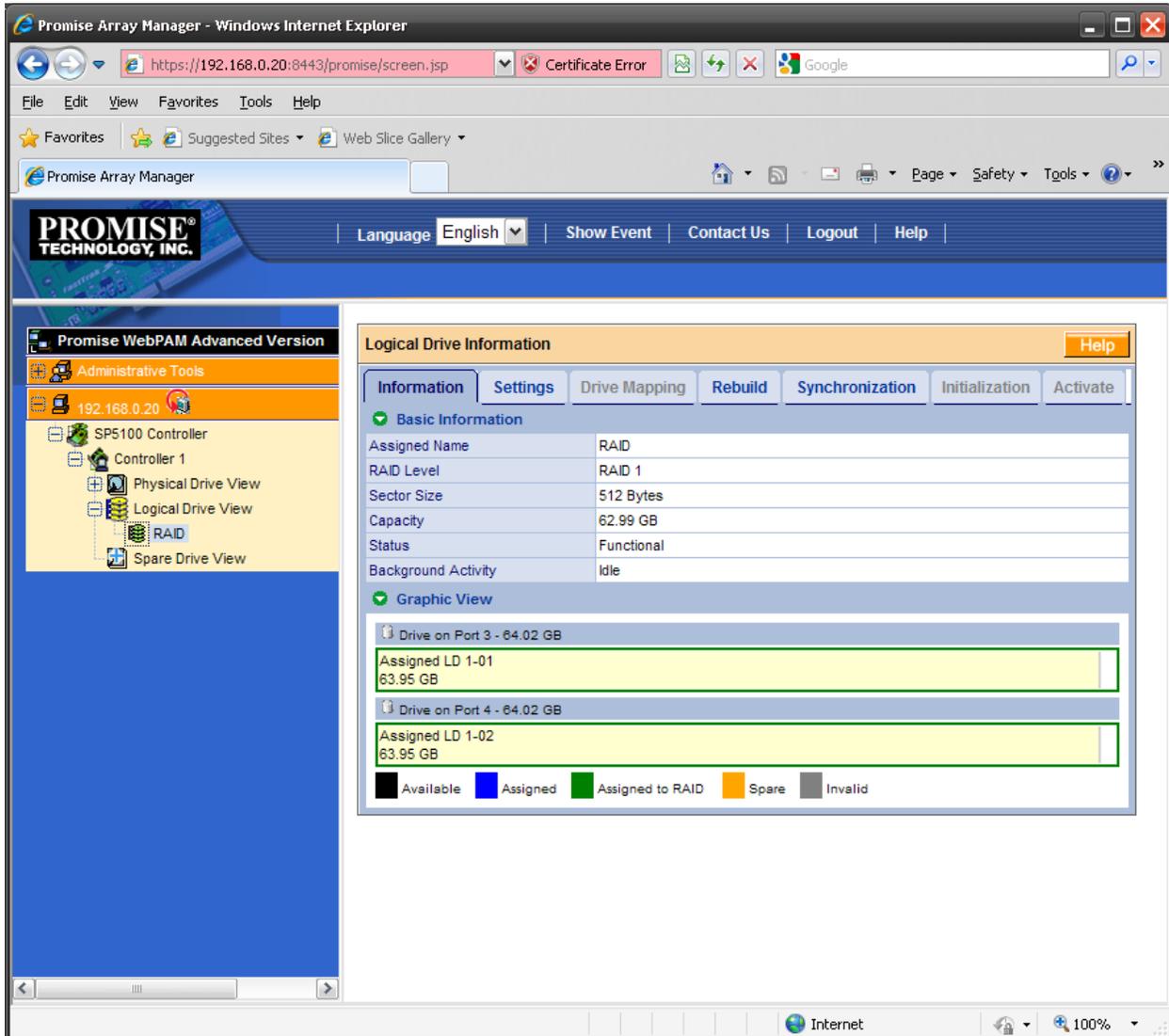

Rebuild progress bar

Once the array has completed the rebuild process the controller will display an alert informing you of the completion.

Rebuild completion

Now that the rebuild process has completed we can see that the array's status has gone from Critical to Functional.

Logical Drive Information

Note: The RAID rebuild process can only be initiated with the WebPAM interface. The firmware during POST can only be used to create and delete arrays and can't assign spares or rebuild arrays. If the operating system is not bootable for any reason the WebPAM interface will not be accessible. A potential workaround in this situation would be to add a spare hard drive and install windows along with the WebPAM software to the spare drive to allow access to this interface if the original operating system is non-operational.