



Made for ideas.

LACIE RAID MANAGER USER MANUAL



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of this document. You will find the latest content as well as expandable illustrations, easier navigation, and search capability.

INTRODUCTION

WHAT IS IN THIS MANUAL

Welcome to the User Manual for LaCie RAID Manager. Created specifically for next generation LaCie Thunderbolt 2 enclosures, LaCie RAID Manager gives you the tools to manage your LaCie professional direct-attached storage (DAS). Use LaCie RAID Manager to configure RAID, set up important email alerts, and maintain the health of the hard drives.

This manual helps you navigate LaCie RAID Manager to create the optimal RAID arrays for your environment.

LACIE RAID MANAGER SUPPORTED HARDWARE AND SOFTWARE

The LaCie RAID Manager interface is available within a web browser.

LaCie professional DAS

Use LaCie RAID Manager with the following products:

- LaCie 8big Rack Thunderbolt 2



- LaCie 5big Thunderbolt 2



Computer operating system

- Mac OS X 10.9 and later

Browsers

Use one of the browsers listed below:

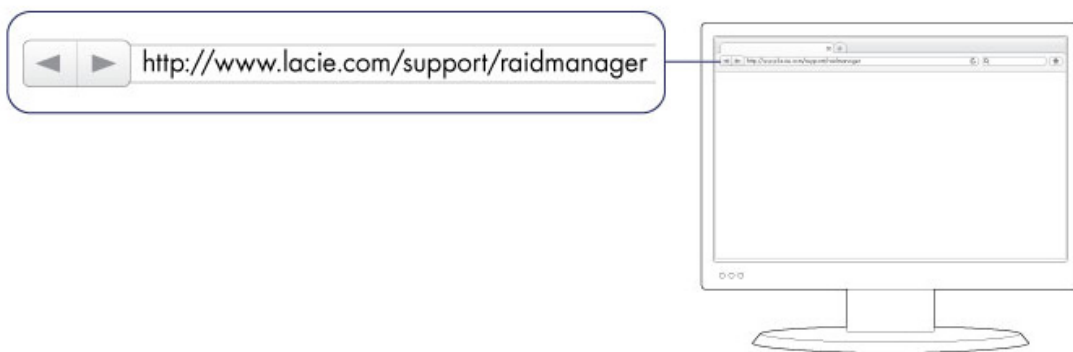
- The latest version of Firefox® (Java must be enabled)
- The latest version of Safari® (Java must be enabled)

INSTALL LACIE RAID MANAGER

Download and install LaCie RAID Manager before connecting the LaCie enclosure to your computer. LaCie RAID Manager gives you:

- The driver to mount the LaCie enclosure
- LaCie RAID Manager to monitor and manage the storage

DOWNLOAD



Download the LaCie RAID Manager installer at <http://www.lacie.com/support/raidmanager/>.

Technical info: LaCie RAID Manager is compatible with Mac OS 10.9 and higher.

Install

Important info regarding LaCie RAID Manager and LaCie Desktop Manager: Older versions of LaCie Desktop Manager may conflict with LaCie RAID Manager. If you are using LaCie Desktop Manager, go to [LaCie support](#) to download and install the latest version. It is recommended that you install the new version before following the steps below.

1. Launch the installer on the computer that will connect to the LaCie enclosure.
2. Follow the on-screen instructions to complete the installation. You may be prompted to restart your computer.

You can now connect the LaCie enclosure to your computer. See the user manual for your LaCie product for instructions:

- [LaCie 8big Rack Thunderbolt 2](#)
- [LaCie 5big Thunderbolt 2](#)

The storage in your LaCie enclosure is preconfigured as RAID 5 and formatted for Mac (HFS+).

LOG IN TO LACIE RAID MANAGER

LaCie RAID Manager launches in a web browser that supports Java. It is recommended that you use one of the following browsers:

- Safari
- Firefox

Technical note: LaCie RAID Manager may experience problems with Google Chrome.

Check the settings in Safari to confirm that Safari or Firefox is selected as the default browser:

1. Launch Safari.
2. Go to **Safari > Preferences > General**.
3. Choose the **Default web browser** pull-down menu to select **Safari** or **Firefox**.

BROWSERS AND JAVA

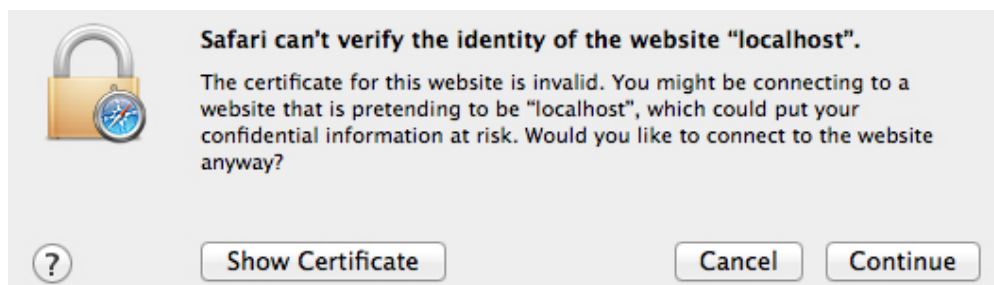
Confirm that Java is enabled in the browser.

- **Safari:** Go to **Safari > Preferences > Security** and check the box next to **Enable JavaScript**.
- **Firefox:** Go to **Tools > Add-ons > Plugins**. Click on the **Java Applet Plug-in** to turn Java on.

LAUNCH LACIE RAID MANAGER

Once it is installed, you can launch LaCie RAID Manager at **Finder > Go > Applications > LaCie RAID Manager**.

SAFARI AND LOCALHOST MESSAGE

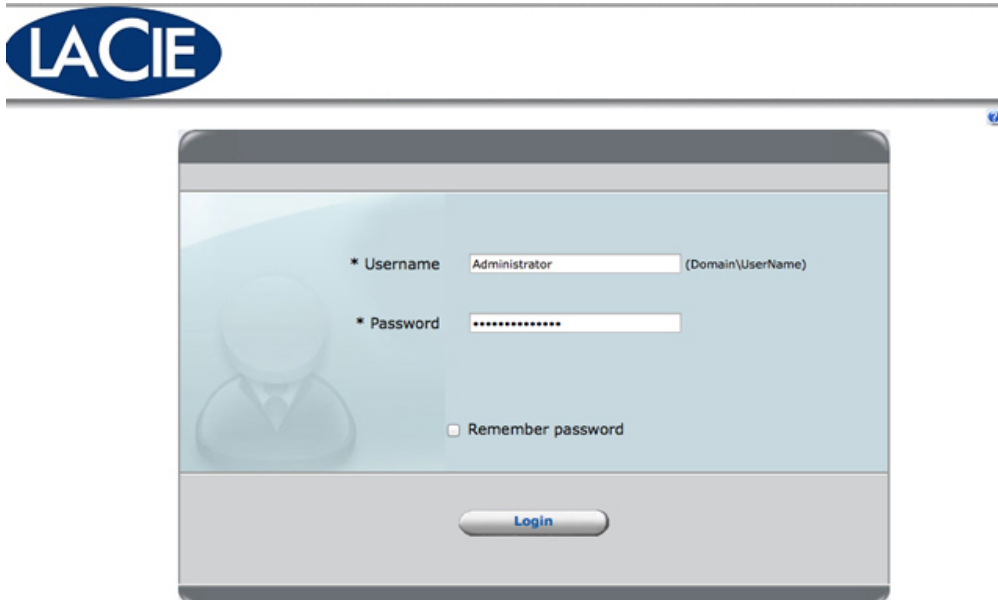


Upon first launching LaCie RAID Manager, Safari users may see a message that reads *Safari can't verify the website "localhost"*. Choose **Continue** to access the login page.

LOGIN PAGE

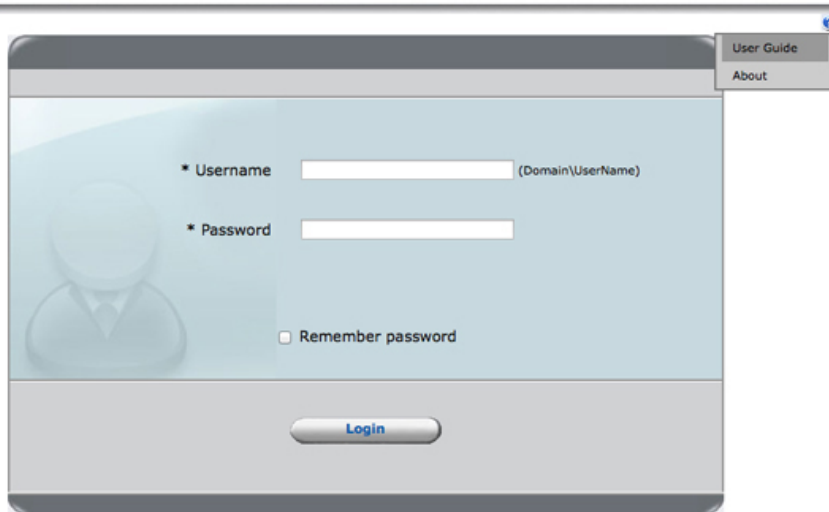


1. Enter a username and password with administration rights to the computer you are using. See the example below.



2. Choose **Login**.

Built-in user guide



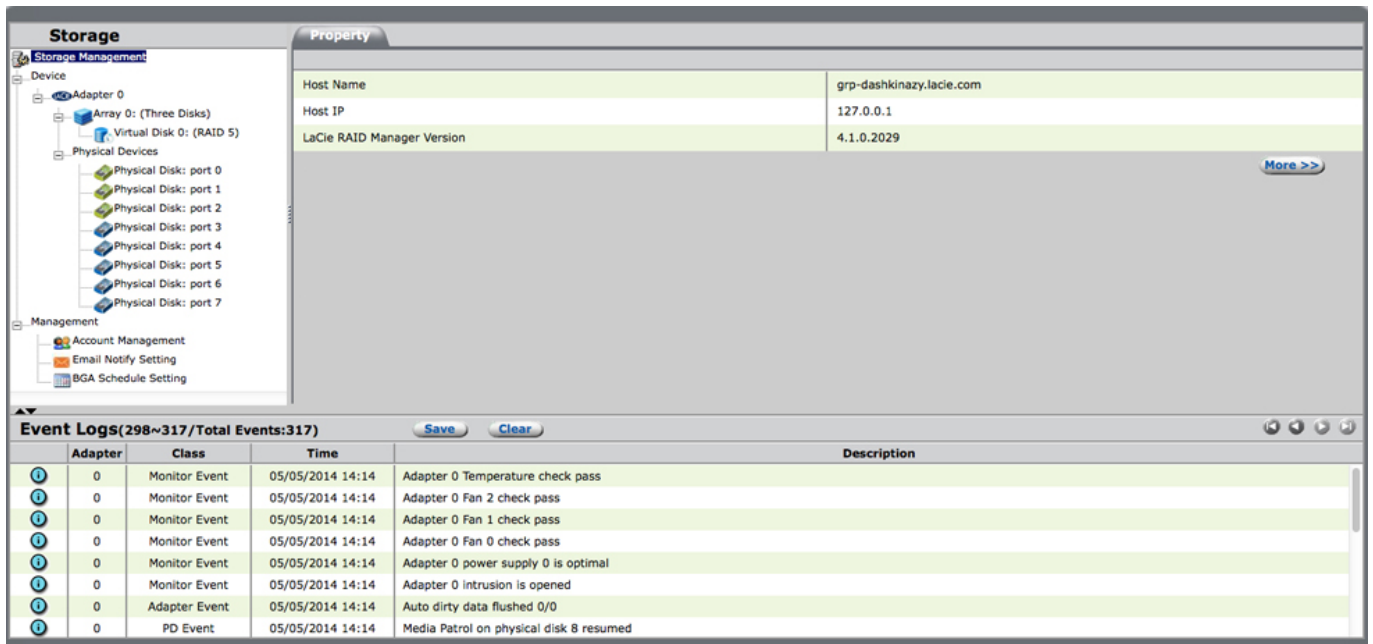
Click on the question mark on the upper right for quick tips on how to use LaCie RAID Manager.

QUIT LACIE RAID MANAGER

1. Quit the browser or close the browser tab that hosts LaCie RAID Manager.
2. Right click on the LaCie icon in the Dock and choose **Quit**.



LEARN THE LACIE RAID MANAGER INTERFACE

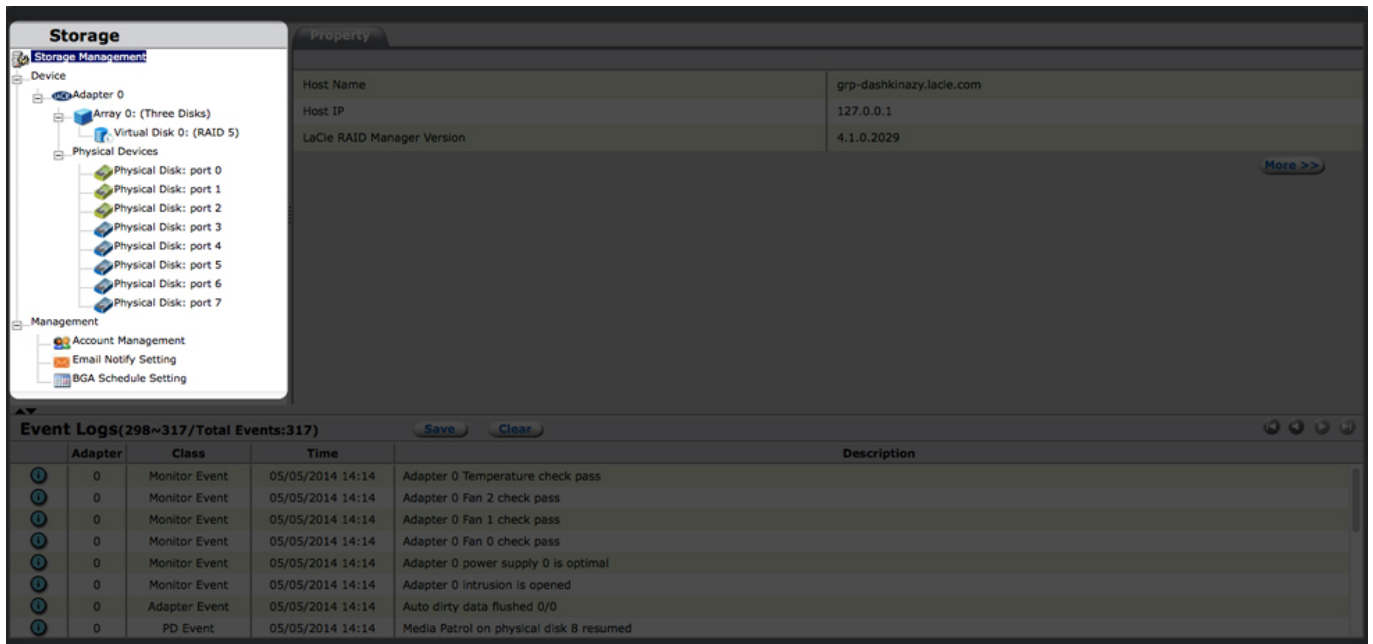


The LaCie RAID Manager user interface has the following three panes:

- Storage
- Properties
- Event Logs

The application also includes specially assigned buttons to help you power off the LaCie device or identify it.

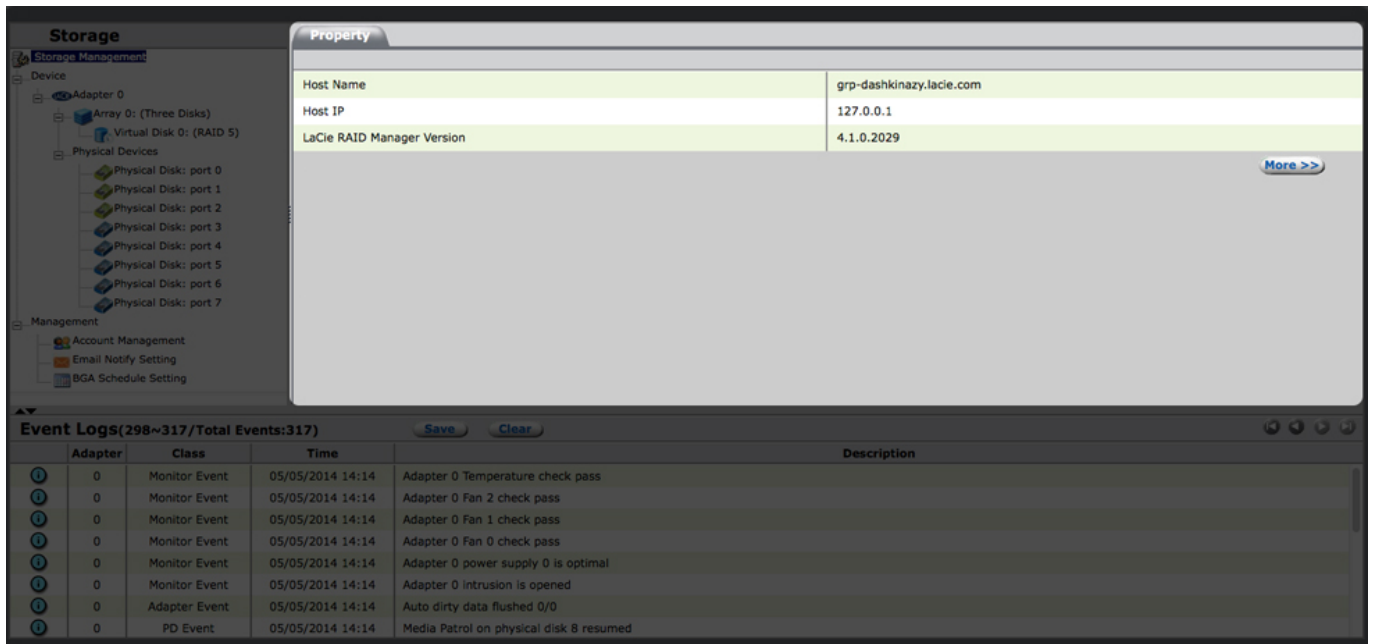
STORAGE



The Storage pane uses a tree view to list and show the relationships between the various physical/virtual devices associated with the application:

- Adapter
- Array
- Virtual Disk
- Physical Devices (enclosures)
- Physical Disks (hard drives with the enclosure)
- Management (email alerts and background scheduling for hard drive consistency checks)

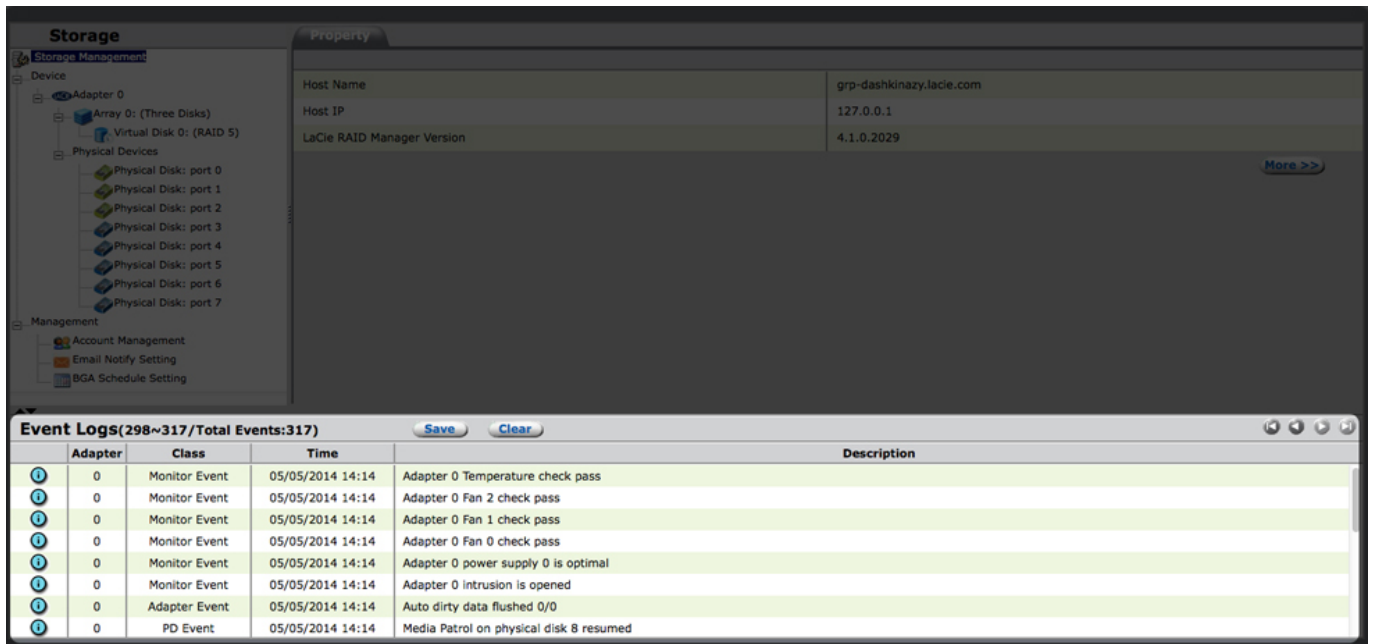
PROPERTIES



The Properties pane lists the properties of the device selected in the Storage pane. Depending on the device selected in the Storage pane, one or more of the following tabs appear:

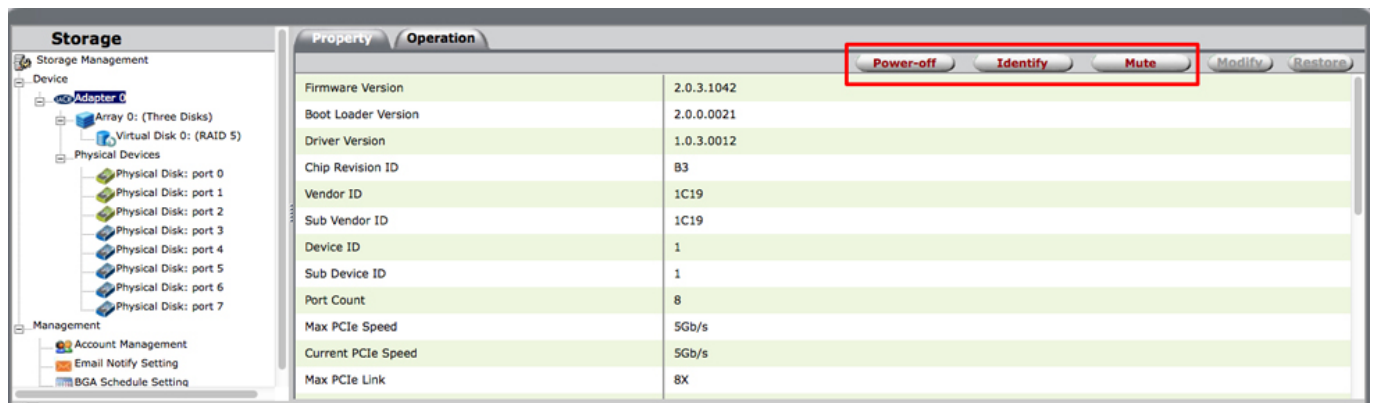
- **Property:** Select Property to view/modify the properties of the device selected in the Storage pane.
- **Operation:** Roll-over the Operation tab to view a menu of operations that can be performed on the device.
- **Create VD:** This tab allows you to configure the virtual disk. Create VD is only available during the virtual disk (VD) creation process.
- **Management:** The management tab appears when you access Management.

EVENT LOGS



The Events Logs pane lists enclosure events. The events are categorized into informational, warning, and error events.

POWER AND ID BUTTONS



Specially assigned buttons are available when **Adapter** is selected in the Storage pane.

- **Power-off:** Choose **Power-off** to place the LaCie enclosure into idle mode. This is the same behavior as a short press on the enclosure's power button. See the user manual for your product.
- **Identify:** Choose **Identify** to make the LED on your enclosure blink and the audible alarm to sound (LaCie 8big Rack Thunderbolt 2 only).
- **Mute:** Choose **Mute** to turn off the sound on an audible alarm.

Built-in user guide

At any time you can click on the question mark on the upper right for quick tips on how to use LaCie RAID Manager.

DISCOVER LACIE RAID MANAGER STORAGE MANAGEMENT

The storage in your LaCie enclosure is preconfigured as RAID 5 and formatted for Mac (HFS+). It is ready to use out of the box. LaCie RAID Manager gives you additional options to adjust the existing configuration or create new arrays.

Review the information below to discover how LaCie RAID Manager administers your LaCie professional DAS.

HIERARCHY

The Storage pane lists LaCie RAID Manager's hierarchical management structure:

- **Adapter:** The RAID-on-Chip (ROC) controller board within your LaCie enclosure. LaCie RAID Manager is only compatible with enclosures that feature the specially configured ROC circuit board.
- **Array:** A combination of two or more physical disks that are presented to the operating system as a single storage device comprising a virtual disk.
- **Virtual Disk:** A combination of two or more physical disks that are presented to the operating system as a single storage device. The virtual disk is the volume that you use to store and access media.

When building a new configuration, you must:

1. Create a new array (including RAID selection)
2. Create a new virtual disk
3. Format the virtual disk for Mac using Disk Utility

See [Create Arrays and Virtual Disks](#) for instructions on how to create an array and a virtual disk. Review the information below for details on the RAID levels available to your LaCie product.

RAID

The information below provides a basic guide to the RAID modes available to your LaCie professional DAS. Note that the levels of performance and protection differ based upon the number of drives in a volume.

RAID example

The level of RAID available to a volume is contingent upon the amount of hard drives. For example, a volume with four hard drives supports all levels of RAID except for RAID 1, which is not compatible with volumes greater than two hard drives. RAID 0 appears to be the best choice for a volume with four hard drives since it offers 100% storage capacity and the best performance. However, RAID 0 does not provide data protection in case of drive failure. Further, its performance is not much greater than RAID 5, which includes data protection in case one drive should fail.

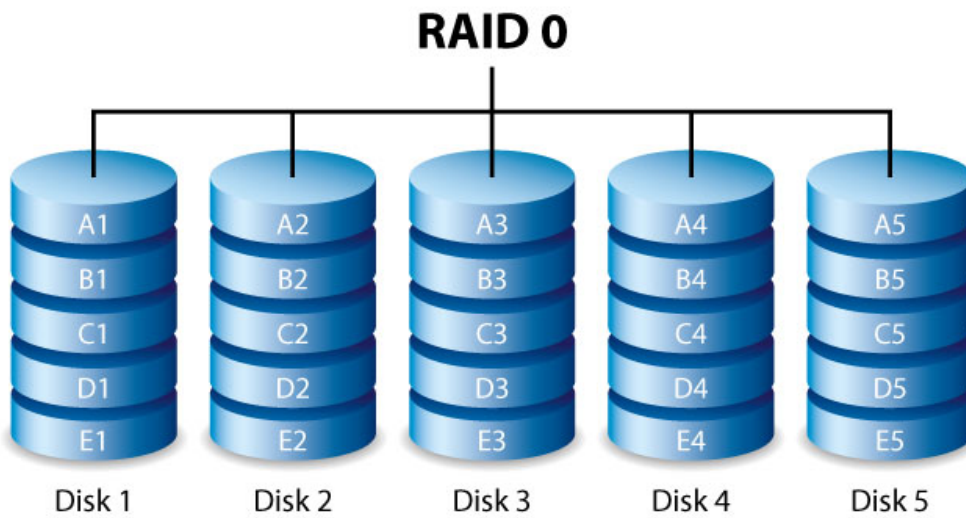
RAID 6 and, in unique cases, RAID 10, can provide data protection in the event that two drives fail.

RAID levels

Review the summaries of each RAID before selecting the configuration for the LaCie 8big storage.

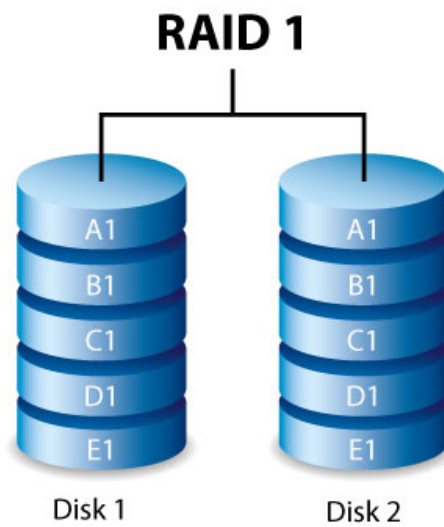
| RAID mode | Minimum hard drives |
|-----------|---------------------|
| RAID 0 | 2 |
| RAID 1 | 2 (only) |
| RAID 5 | 3 |
| RAID 6 | 4 |
| RAID 10 | 4 |

RAID 0



RAID 0 is the fastest RAID mode since it writes data across all of the volume's hard drives. Further, the capacities of each hard drive are added together for optimal data storage. However, RAID 0 lacks a very important feature: data protection. If one hard drive fails, all data becomes inaccessible. A recommended option is RAID 5, which offers comparable performance and data protection in case a single hard drive fails.

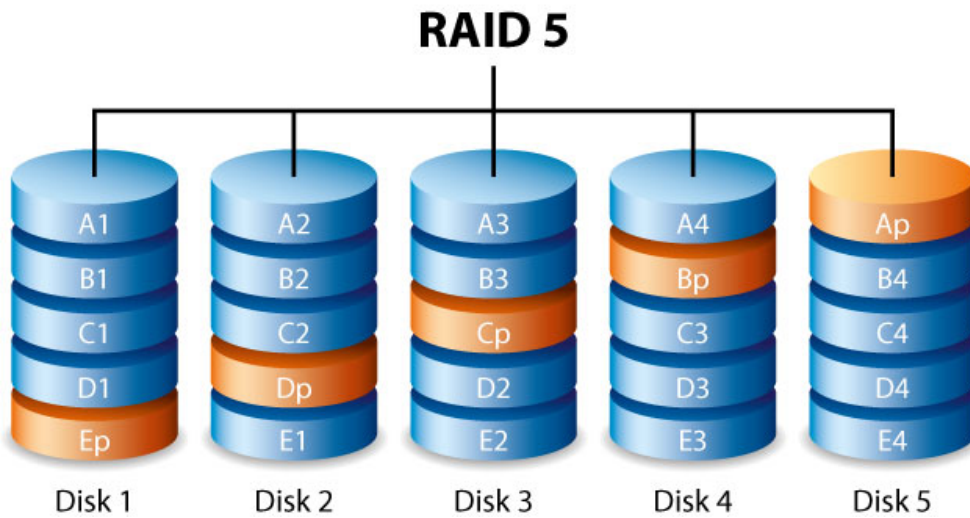
RAID 1



RAID 1 provides enhanced data security since all data is written to each hard drive in the volume. If a single hard drive fails, data remains available on the other hard drive in the volume. However, due to the time it takes to write data multiple times, performance is no faster than using a single hard drive and, at times, slower. Additionally, RAID 1 will cut hard drive capacity by 50% or more since each bit of data is stored on both hard drives in the volume.

LaCie RAID Manager can create a RAID 1 array with two hard drives.

RAID 5



RAID 5 writes data across all hard drives in the volume and a parity block for each data block. If one physical hard drive fails, the data from the failed hard drive can be rebuilt onto a replacement hard drive. While the files stored on a RAID 5 volume remain intact should one hard drive fail, data can be lost if a second hard drive fails before the RAID is rebuilt with the replacement hard drive.

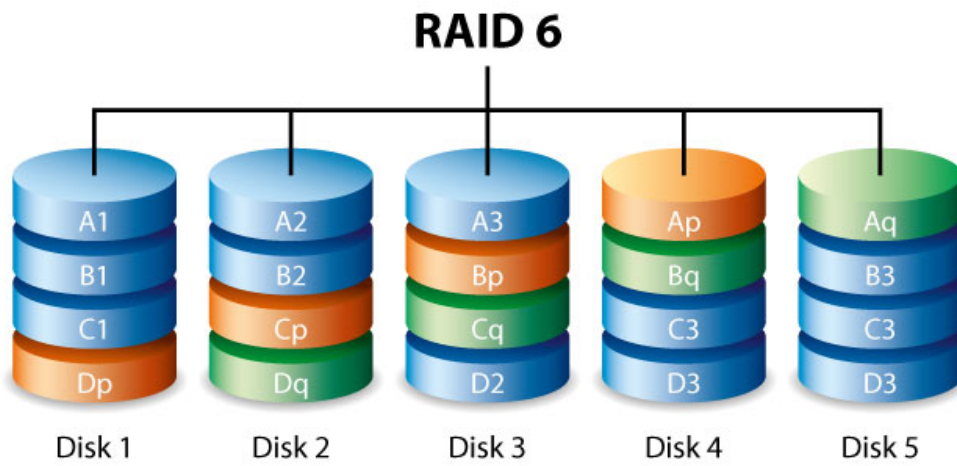
A minimum of three hard drives is required to create a RAID 5 volume.

RAID 5 offers performance that can approach RAID 0. The strong advantage that RAID 5 gives you is data protection. Additionally, you still have approximately 75% of the storage capacity of a RAID 0 array (based upon total available hard drives and storage capacities). The equation for determining the storage is: (The size of the hard drive with the smallest capacity in the array)*(Total hard drives-1).

Example 1: An array is assigned five 3TB hard drives for a total of 15TB. The equation is: $3\text{TB} * 4 = 12\text{TB}$.

Example 2: An array is assigned Three 2TB hard drives and one 3TB hard drive for a total of 9TB. The equation is: $2\text{TB} * 3 = 6\text{TB}$.

RAID 6

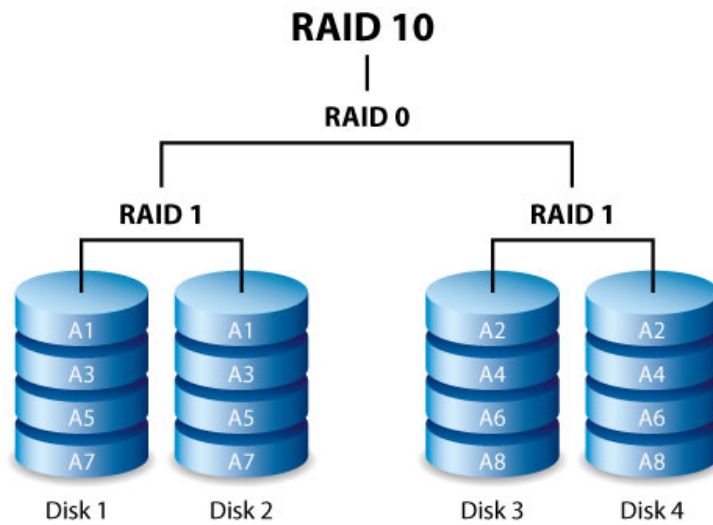


RAID 6 writes data across all hard drives in the volume and two parity blocks for each data block. If one physical hard drive fails, the data from the failed hard drive can be rebuilt onto a replacement hard drive. With two parity blocks per data block, RAID 6 supports up to two hard drive failures with no data loss.

RAID 6 synchronizing from a failed hard drive is slower than RAID 5 due to the use of double parity. However, it is far less critical due to its double-disk security.

A minimum of four hard drives is required to create a RAID 6 volume. RAID 6 offers very good data protection with a slight loss in performance compared to RAID 5.

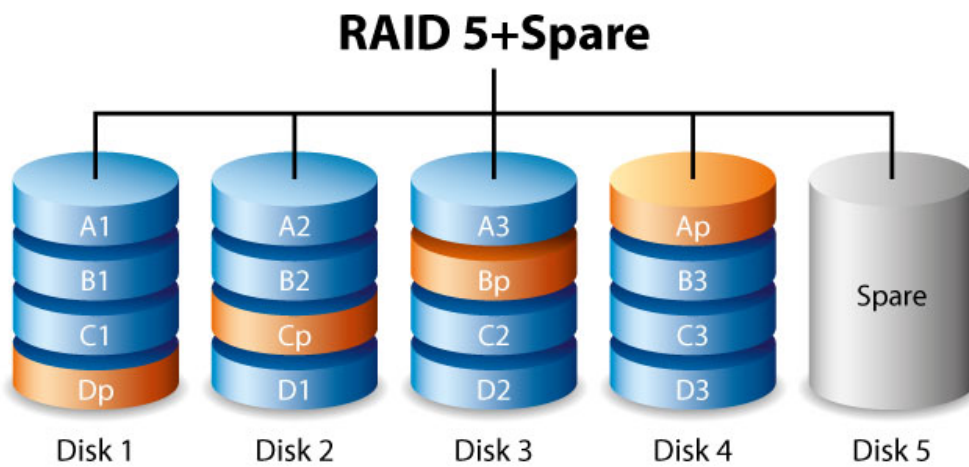
RAID 10



RAID 10 combines the protection of RAID 1 with the performance of RAID 0. Using four hard drive as an example, RAID 10 creates two RAID 1 segments, and then combines them into a RAID 0 stripe. With eight hard drive, the RAID 0 stripe will include four RAID 1 segments. Such configurations offer exceptional data protection, allowing for two hard drive to fail across two RAID 1 segments. Additionally, RAID 10 writes data at the file level and, due to the RAID 0 stripe, gives users higher performance when managing greater amounts of smaller files. This means a more generous input output per second for data, referred to as IOPS.

RAID 10 is a great choice for database managers that need to read and write a multitude of smaller files across the volume's hard drives. The impressive IOPS and data protection offered by RAID 10 gives database managers impressive reliability both in keeping files safe and rapid access.

RAID+Spare



A RAID+Spare volume gives you a “hot-spare” that is ready to synchronize data immediately should a hard drive fail. If a hard drive in the volume fails, the data starts to synchronize with the spare. The clear advantage for a RAID volume with a spare is that you do not have to wait for a replacement hard drive. However, the spare cannot be used as storage during standard operation since its sole task is to take over should a hard drive fail. You can replace the failed hard drive immediately and, once synchronization is complete, assign it as new hot spare.

Important info: For RAID+Spare volumes, data remains intact when a single hard drive fails and the spare begins synchronizing automatically. However, if a second hard drive in a RAID 5 volume fails before synchronization is complete, all data in the volume will be lost. The same is true for a RAID 1 volume. In the case of RAID 10, the second failed hard drive would have to be on the same mirrored set as the spare hard drive.. RAID 6 allows for two hard drives to fail.

CREATE ARRAYS AND VIRTUAL DISKS

Use LaCie RAID Manager to create one or more volumes to run with your preferred application.

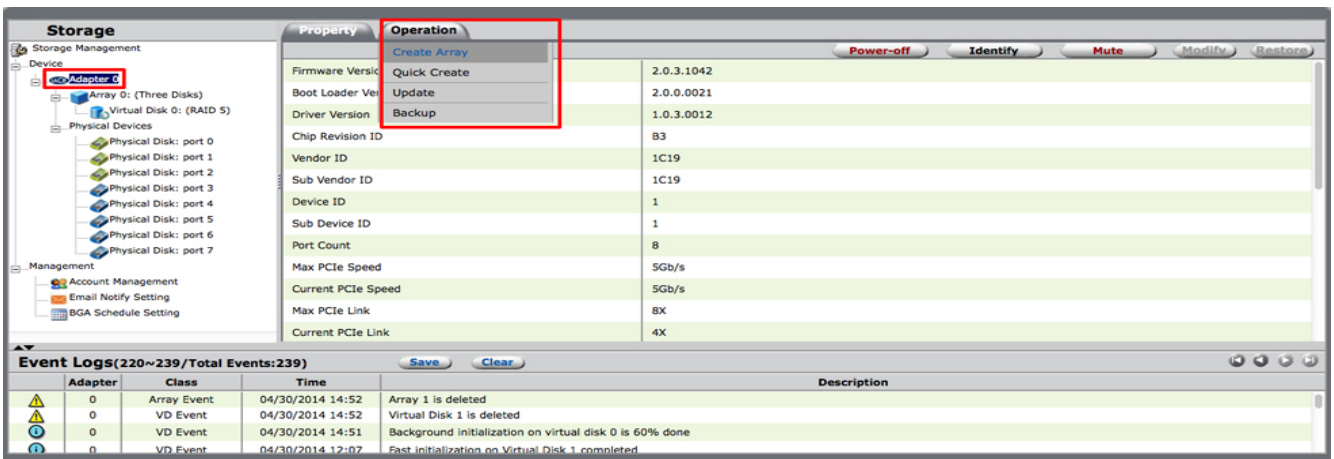
CREATING AN ARRAY

Your LaCie enclosure must have unassigned hard drives (physical disks) to create a new array. If necessary, you can delete an existing array to make hard drives available for a new array (see [Delete Arrays and Virtual Disks](#) for instructions). Since all data will be permanently removed, make certain to back up the existing array before deleting it.

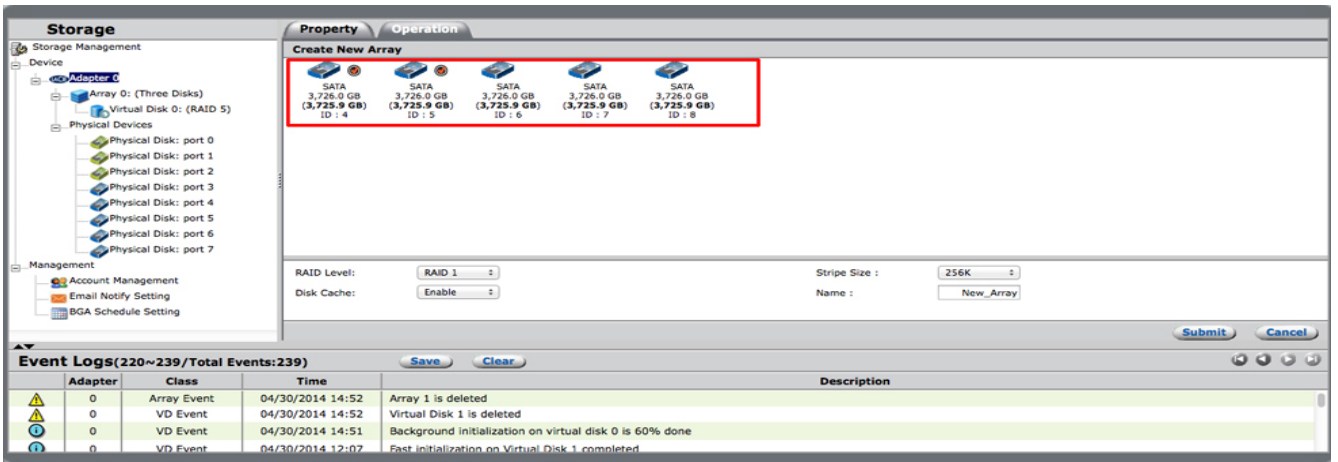
You must know the RAID level that best suits your needs before creating the array. Understanding RAID will help you choose the appropriate number of hard drives for the new array. See [Discover LaCie RAID Manager Storage Management](#) for details on RAID.

Follow the instructions below to create a new array:

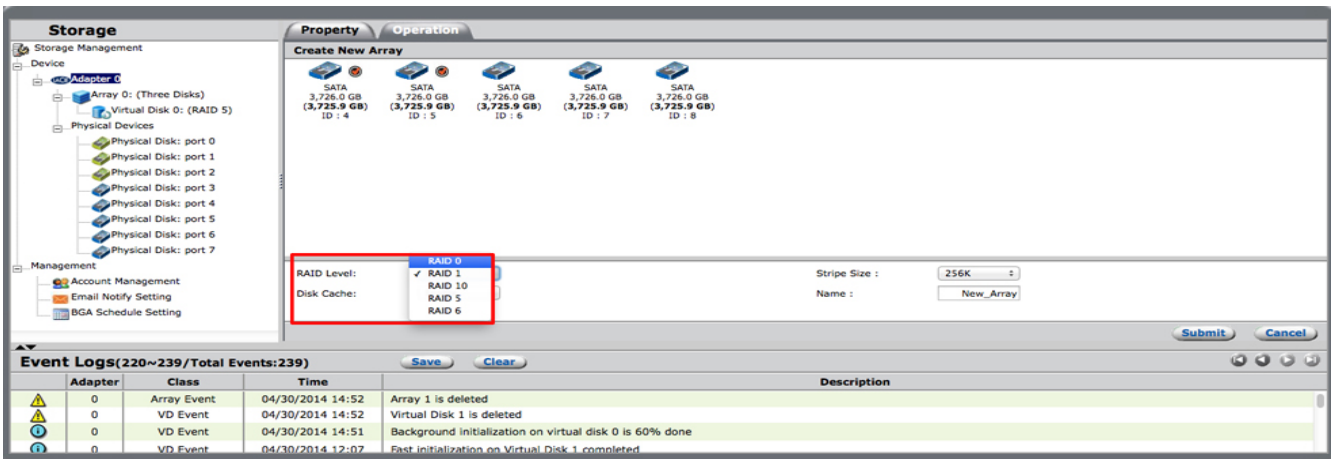
1. Select **Adapter** in the list of Storage pane.
2. Roll over the Operation tab and choose **Create Array**. *Note on Quick Create:* Selecting **Quick Create** skips the steps below while choosing the optimal RAID level for the amount of disks in the array. *Quick Create* allows you to build an array based on performance or protection.



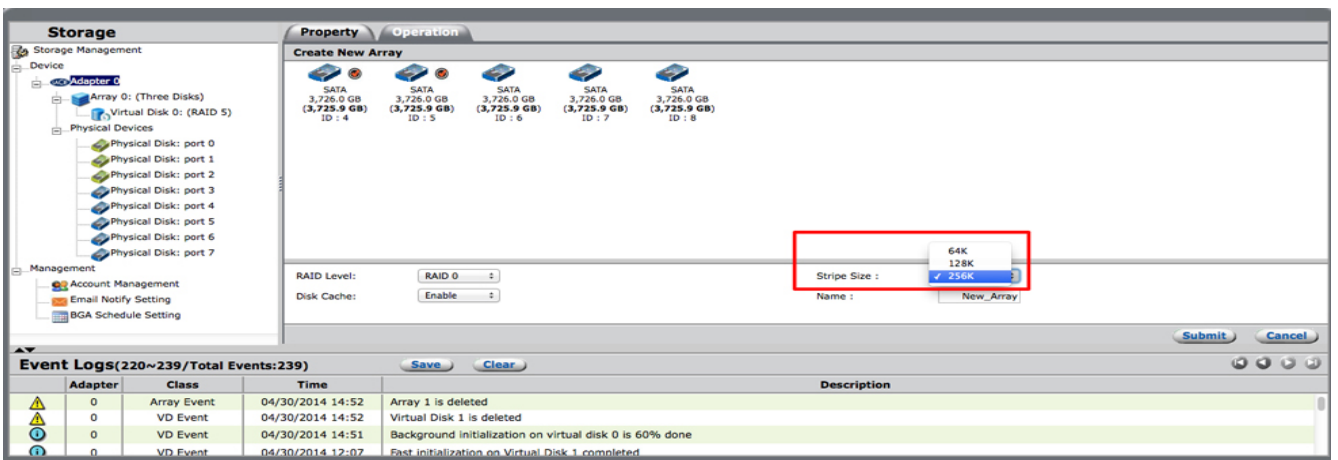
3. Add hard drives on the Create New Array page. To select a hard drive, click on its icon. A check mark appears next to a selected hard drive.



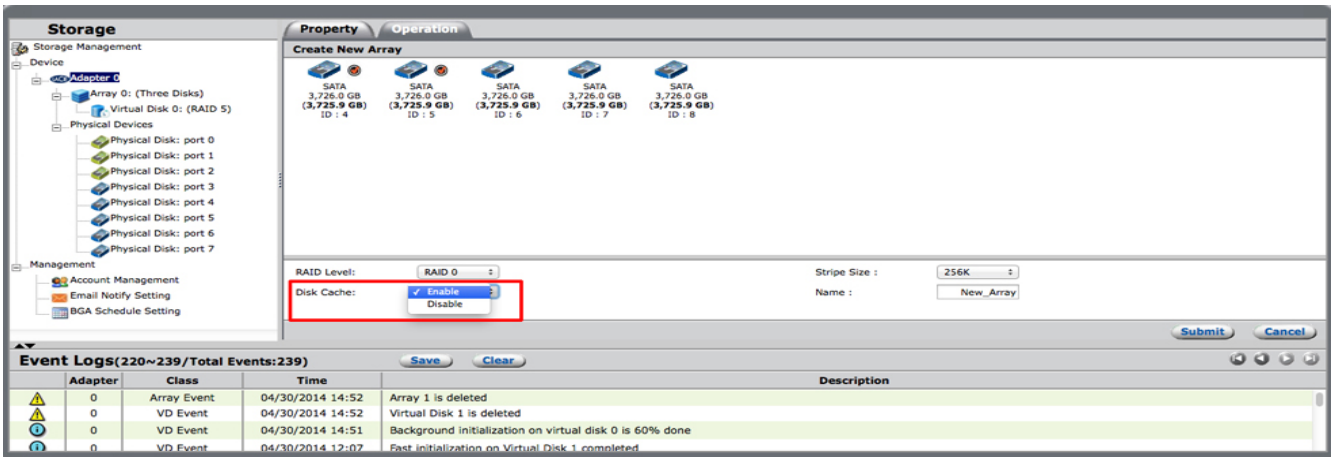
4. Once you have selected the hard drives, click on the pull-down menu for **RAID Level**. Choose a RAID level that is compatible with the amount of hard drives that you selected. For example, you can choose RAID 5 with three or more hard drives. RAID 1 is only available with two hard drives.



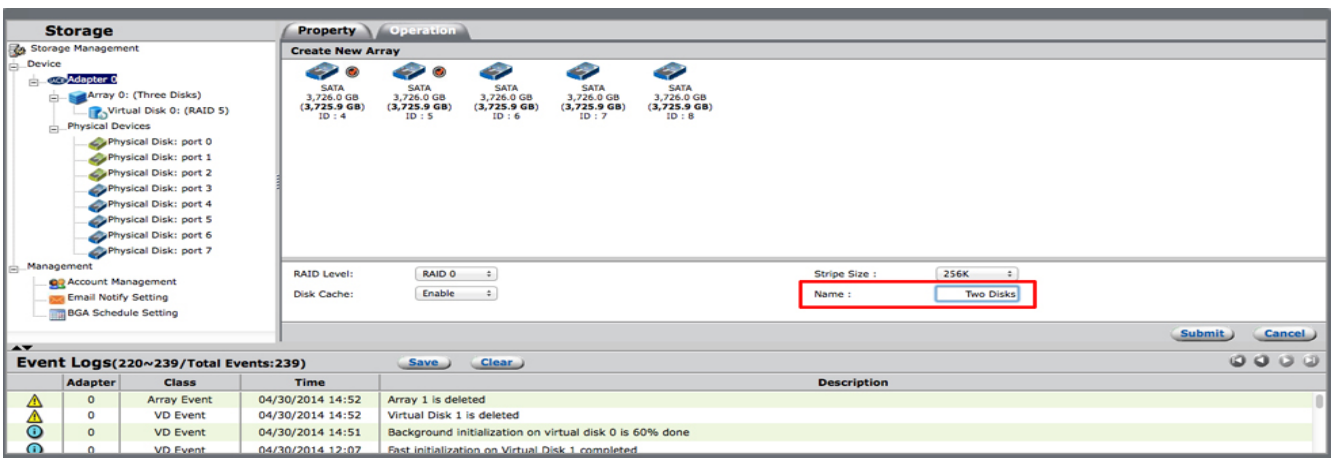
5. Click on the pull-down menu for **Stripe Size**. See the explanation below for help with choosing the optimal stripe size.



6. Click on the pull-down menu for **Disk Cache**. Choose **Enable** (performance) or **Disable** (data protection). See the explanation below for help with choosing the optimal disk cache.

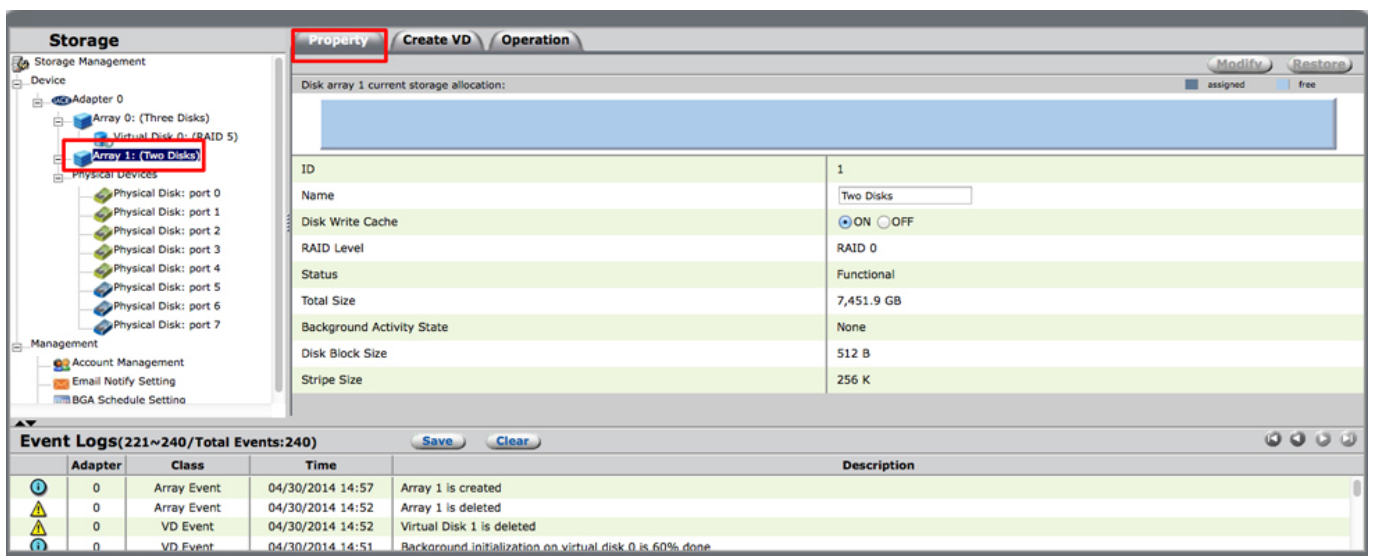


7. Enter a name for the array in the **Name** field.



8. Choose **Submit** at the bottom of the screen. If the selected RAID level does not support the selected combination of drives, the submit button remains grey.

A new array link appears in your left navigation panel, displaying the new array properties.



You can now create a virtual disk to use as storage volumes.

Creating an array notes

Stripe size

Stripe size specifies the size of single data block on the virtual disk. Available stripe sizes are 64K, 128K, and 256K. Support for different stripe sizes can vary.

The larger the stripe size, the longer it takes for the RAID controller to read from and write to data blocks on the physical disks. For best read/write performance, a larger stripe size is recommended for applications requiring large data transfers, such as audio, video, and graphics. A smaller stripe size enhances read/write performance for applications with content much smaller in size, such as emails and documents.

Disk cache

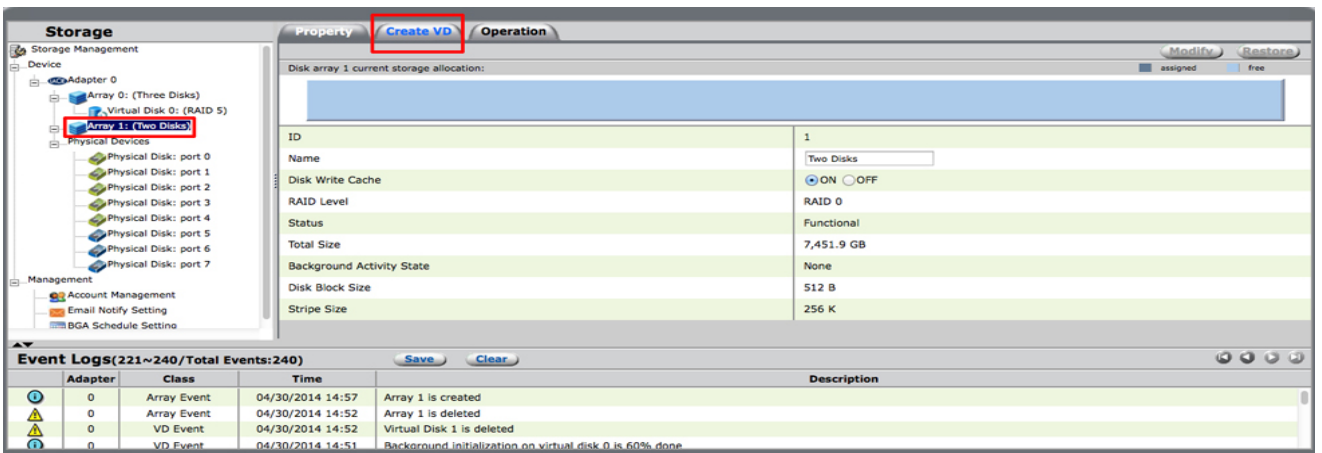
Caching data optimizes your LaCie product for best write performance. Write data is stored temporarily in DDR cache memory and flushed to the hard disk at the appropriate time. This means that transfer speeds can be faster since your computer retrieves data directly from the cache rather than searching on the hard drives. However, in the event of power failure, there is a serious risk of losing data integrity if the transfer of data from the DDR cache to the hard disk is not completed.

When data caching is disabled, all data is accessed from the hard drives. This option is recommended when data protection is critical to your workflow. While access to data is not as fast when disk caching is disabled, transfer rates remain quite high due to the use of a hardware RAID controller and Thunderbolt 2 technology.

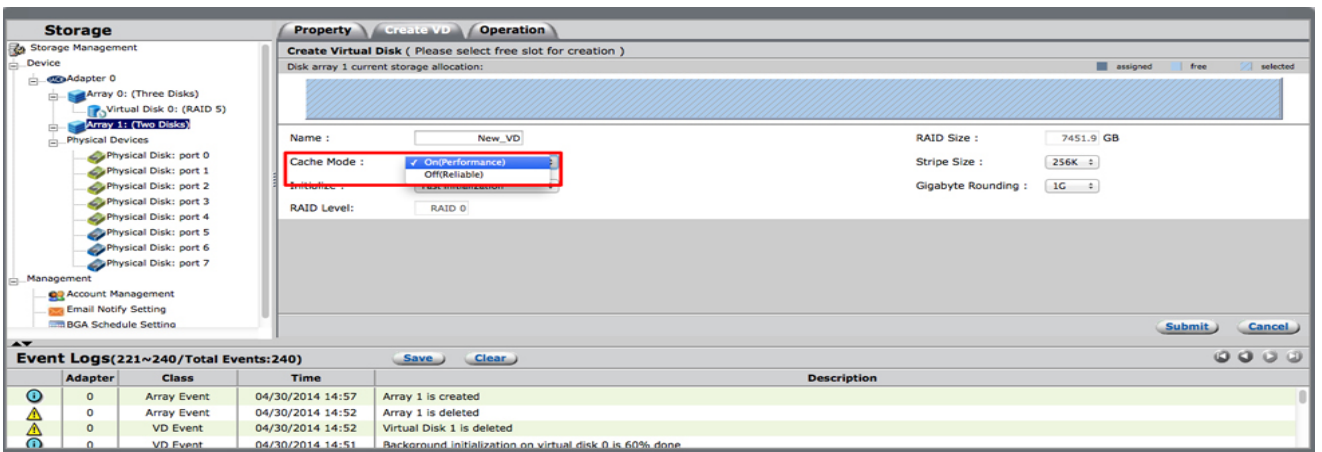
CREATING A VIRTUAL DISK

Virtual disks act as storage volumes for your computer. Following the creation of the virtual disk, use Disk Utility to create a single partition or, divide the virtual disk into multiple partitions. For optimal performance, it is recommended that you reduce the number of partitions and always format using HFS+ (Journaled). To review the number of supported partitions and partition size for your operating system, see [Mac OS X: Mac OS Extended format \(HFS Plus\) volume and file limits](#).

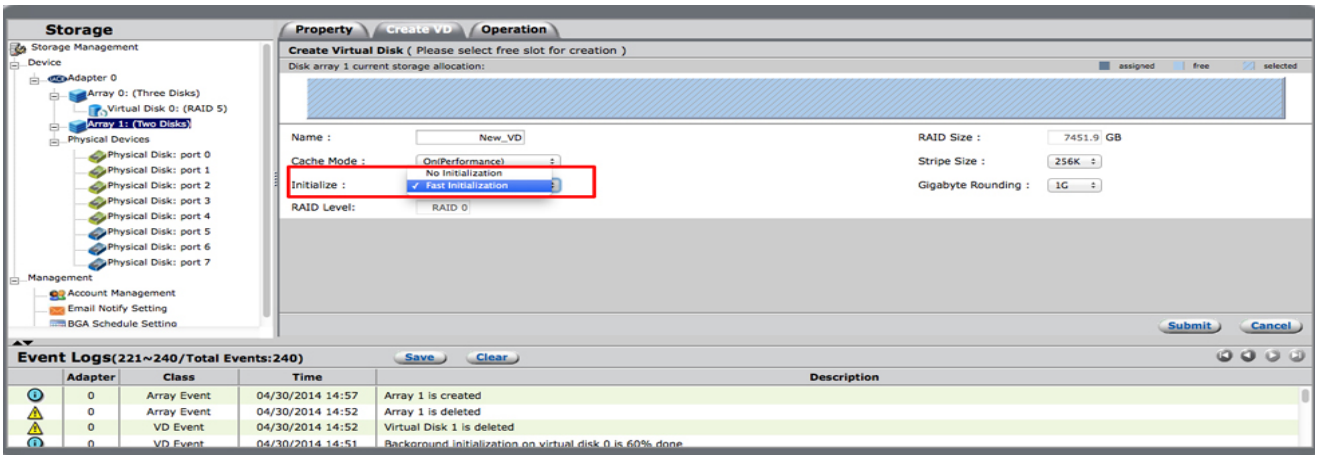
1. Select the array in the Storage pane and choose the tab **Create VD**.



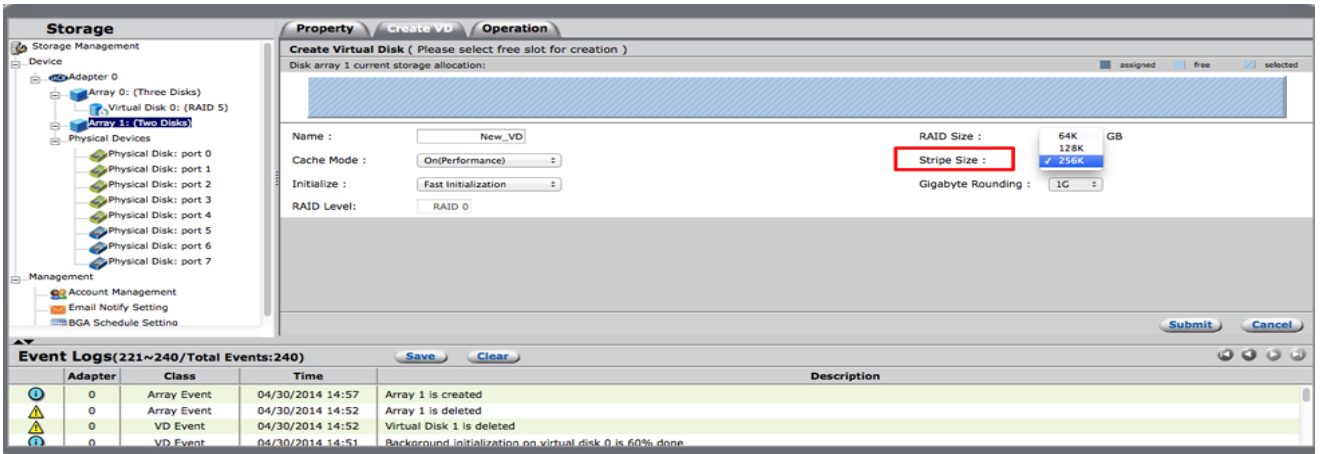
2. The Create Virtual Disk window presents options for the virtual disk. Click on the **Cache Mode** pull-down menu to choose **On** (performance) or **Off** (protection). See the explanation below for help with choosing the optimal cache mode.



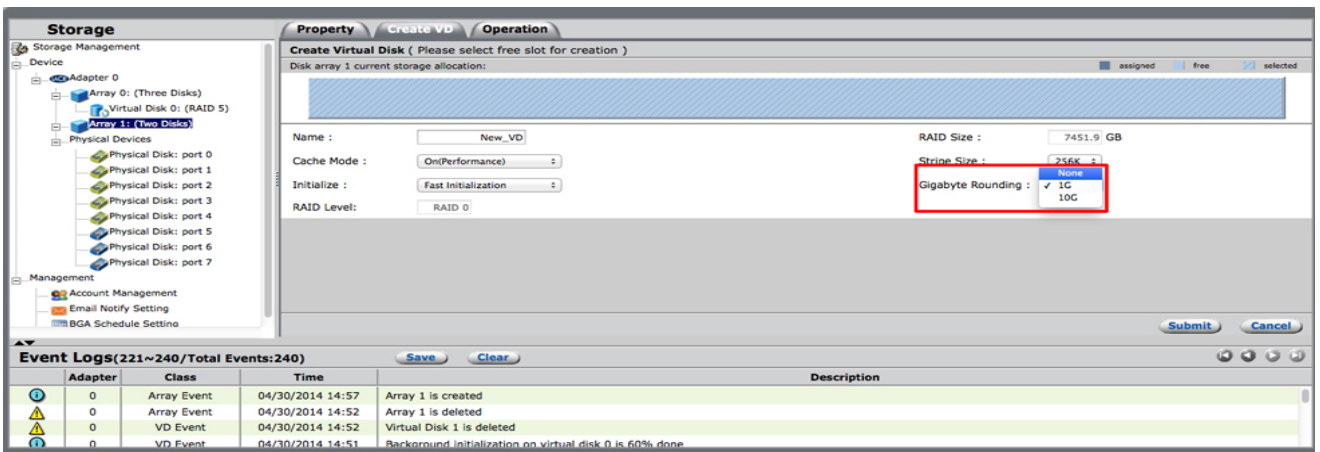
3. Click on the **Initialize** pull-down menu to choose **No Initialization**, **Fast Initialization**, **Foreground Initialization**, or **Background Initialization**. Options can vary based upon the level of RAID. The screenshot example has only two options since it is a RAID 0 array. See the explanation below for help with choosing the initialization.



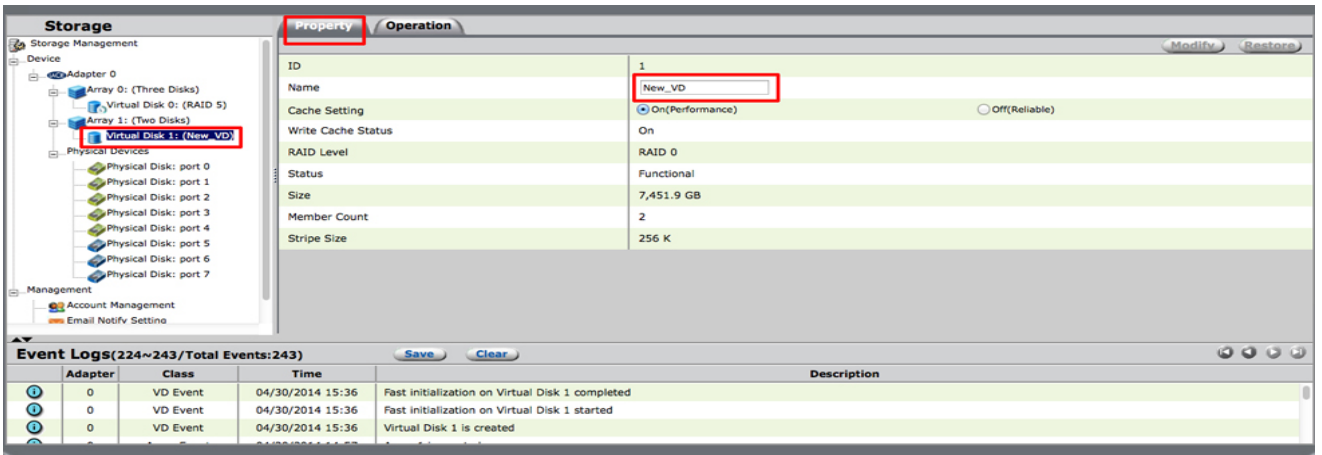
4. Click on the **Stripe Size** pull-down menu to choose **64**, **128K**, or **256K**. See the explanation below for help with choosing the stripe size.



5. Click on the **Gigabyte Rounding** pull-down menu to choose **None**, **1G**, or **10G**. See the explanation below for help with choosing the gigabyte rounding.



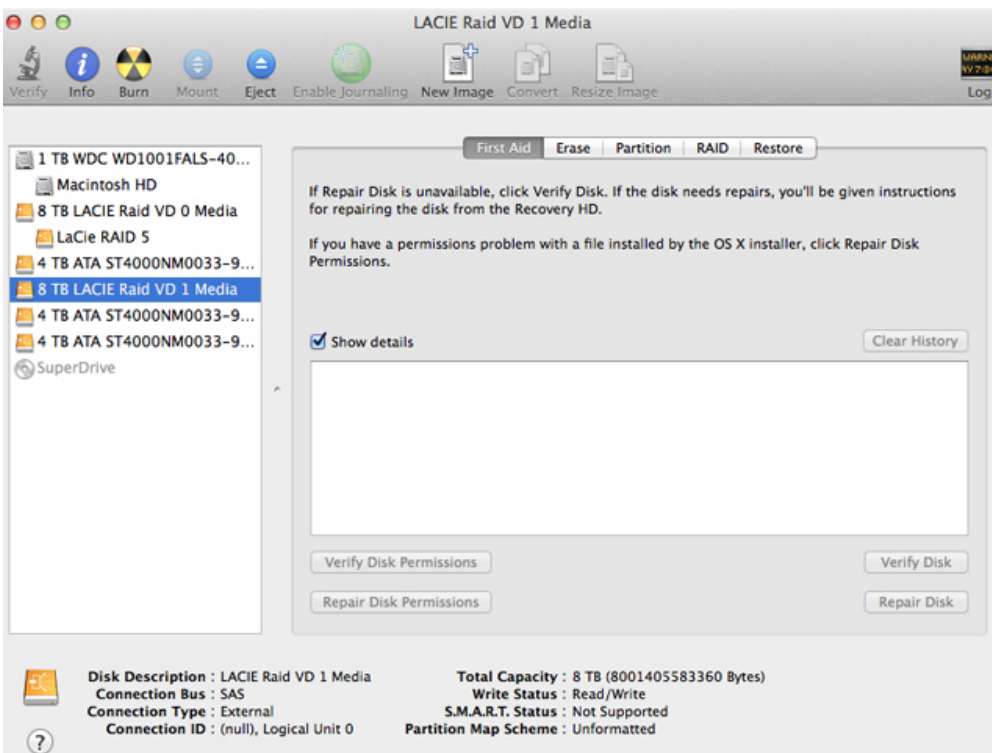
6. Choose **Submit**. LaCie RAID Manager creates the virtual disk and displays the Property tab for the new virtual disk. You can rename the virtual disk by entering a name in the field and selecting **Modify**.



- Following the creation of the virtual disk, a message appears indicating that it is not readable. Choose **Initialize** to format the virtual disk for Mac.

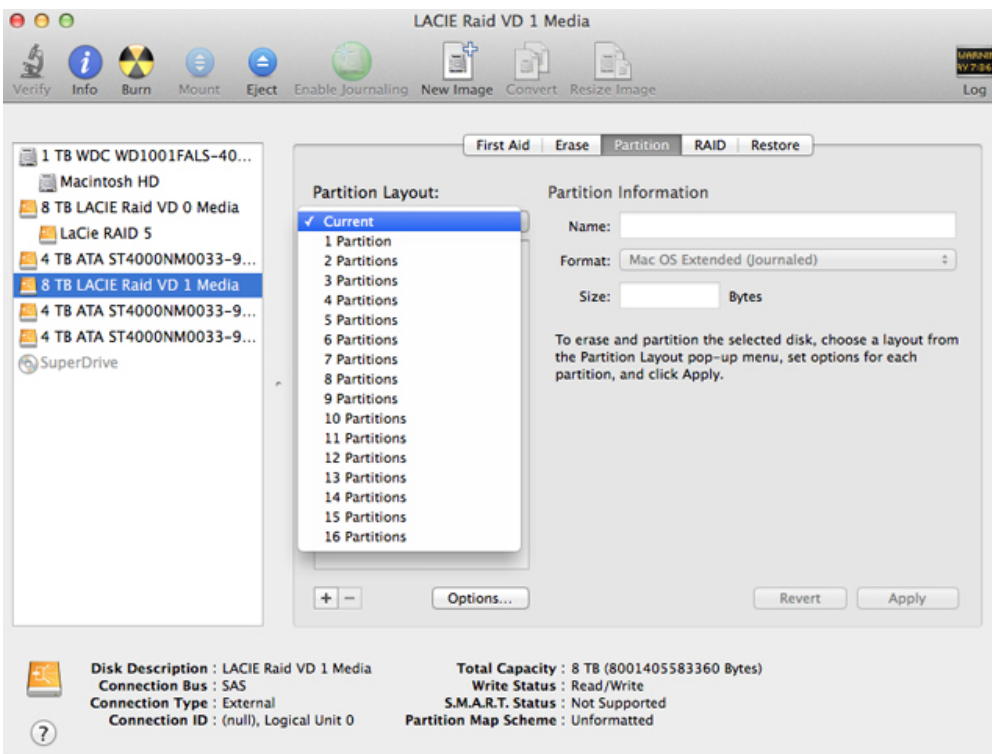


- The operating system launches Disk Utility. While Disk Utility can display a number of partitions, you can identify your virtual disk since it maintains the number used in LaCie RAID Manager. In this example, the new virtual disk in LaCie RAID Manager is 1. Click on your new virtual disk on the left.

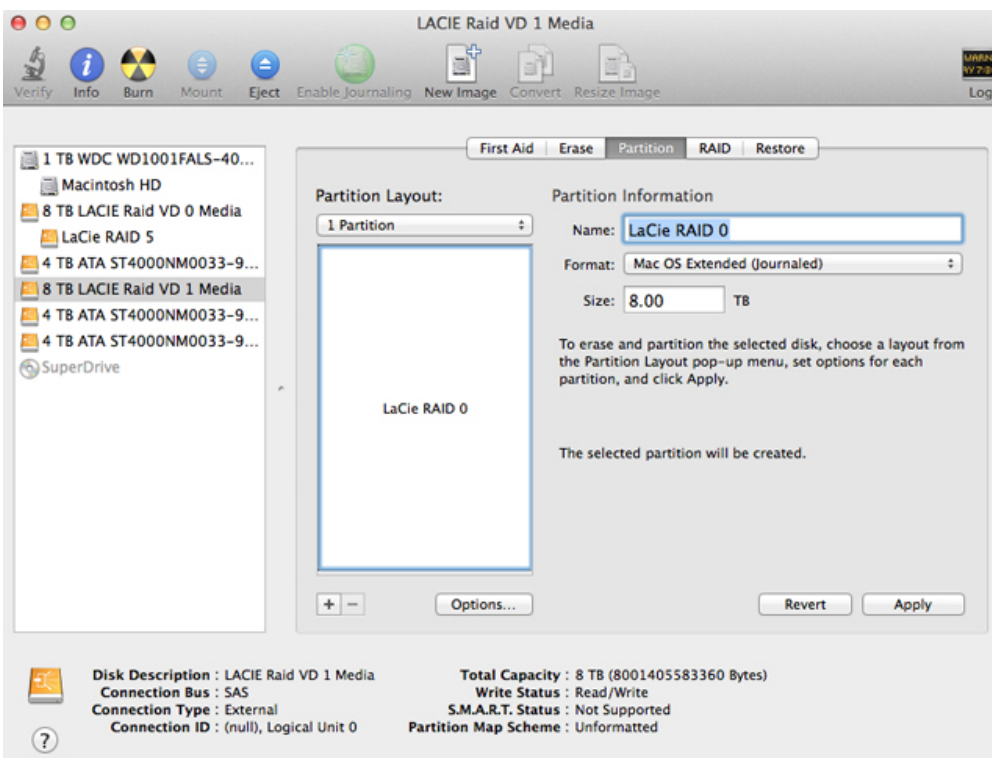


- Choose the **Erase** tab to quickly create a single partition or, as seen in the screenshot, the **Partition** tab for

additional options regarding partitions on the desktop. **Note:** Your operating system supports large volume sizes, allowing you to limit the number of partitions on your desktop.



10. Enter a name for each partition and select its format using the **Format** pull-down menu. Choose **Apply** to create the partitions. You can choose the partition in the Partition Layout section and enter a name in the applicable field. **Note:** It is highly recommended that partitions are formatted Mac OS Extended (Journaled) for optimal performance. Choosing other formats will impact transfer rates.



Creating a virtual disk notes

Cache mode

Caching data optimizes your LaCie product for best write performance. Write data is stored temporarily in DDR cache memory and flushed to the hard disk at the appropriate time. This means that transfer speeds can be faster since your computer retrieves data directly from the cache rather than searching on the hard drives. However, in the event of power failure, there is a serious risk of losing data integrity if the transfer of data from the DDR cache to the hard disk is not completed.

When data caching is off, all data is accessed from the hard drives. This option is recommended when data protection is critical to your workflow. While access to data is not as fast when disk caching is disabled, transfer rates remain quite high due to the use of a hardware RAID controller and Thunderbolt 2 technology.

Initialize

To help prevent errors handling data, it is recommended that you perform an initialization. During the initialize process, mirror or parity data is checked and updated to ensure consistency of data on the physical disks constituting the virtual disk. Available initialization options during the creation of a virtual disk include:

- **No initialization:** The data check is skipped. This option is not recommended as you can encounter data errors.
- **Fast initialization:** Fast initialization is a destructive process that erases all data on the virtual disk including the Master Boot Records (MBR) on all physical disks. This is a good option if you wish to perform a cursory consistency check before starting a project. However, it is not a full initialization that performs a thorough consistency check on the hard drives. See [Check the Virtual Disk for Errors](#) for further information.
- **Foreground initialization:** This option is similar to a fast initialization since the MBR for all the physical disks are erased. Therefore, it is also a destructive process. Since it performs a thorough consistency check, this option can take many hours to several days based upon the total capacity of the virtual disk. As its name indicates, a foreground initialization runs in the foreground and can take a good amount of processing power which will affect performance. Choose foreground initialization if you do not anticipate starting high-end video or graphic projects within the week.
- **Background initialization:** This option is a thorough, non-destructive consistency check of the physical disks. Since it runs in the background, the demand on the processor is reduced when compare with a foreground initialization. However, performance can be impacted, especially when working on high-end video or graphic projects. A background initialization can take many hours to several days based upon the total capacity of the virtual disk.

Gigabyte rounding

Gigabyte rounding is applicable to RAID levels using mirroring, such as RAID 1 and RAID 10. It defines the flexibility in size for spare drives used to rebuild degraded virtual disks and arrays. Available options for gigabyte rounding are:

- None
- 1G
- 10G

For example, a 120.5 GB physical disk and a 115.7 GB physical disk can create a 115.7 GB RAID 1 virtual disk. If Gigabyte Rounding is set to 1G, then the RAID controller floors the size of the physical disks to the nearest lower GB size. The 120.5 GB and 115.7 GB disks are treated as 120 GB and 115 GB physical disks, resulting in a 115 GB RAID 1 virtual disk. If the 115.7 GB physical disk fails, the virtual disk can be rebuilt with a spare drive sized between 115GB and 115.7 GB, providing flexibility in size up to 0.7 GB. If 10G is select, the rounding would go to the nearest lower 10GB size, which is 110. This would allow the spare to range between 110GB and 115.7GB.

Stripe size

Stripe size specifies the size of single data block on the virtual disk. Available stripe sizes are 64K, 128K, and 256K. Support for different stripe sizes can vary.

The larger the stripe size, the longer it takes for the RAID controller to read from and write to data blocks on the physical disks. For best read/write performance, a larger stripe size is recommended for applications requiring large data transfers, such as audio, video, and graphics. A smaller stripe size enhances read/write performance for applications with content much smaller in size, such as emails and documents.

Data security

Any loss, corruption, or destruction of data while using a LaCie hard drive or a LaCie hard drive system is the sole responsibility of the user, and under no circumstances will LaCie be held liable for the recovery or restoration of this data. To help prevent the loss of your data, LaCie highly recommends that you keep TWO copies of your data: one copy on your LaCie storage device; and, a second copy on one of the following:

- Direct-attached storage (DAS)
- A NAS
- Some form of removable storage or archival media

Important Info: 1GB = 1,000,000,000 bytes. 1TB = 1,000,000,000,000 bytes. Once formatted, the actual available storage capacity varies depending upon the operating environment (typically 10-15% less).

DELETE ARRAYS AND VIRTUAL DISKS

Important info: Deleting a virtual disk permanently removes all of its data.

Delete the virtual disk before deleting the array.

DATA SECURITY

It is highly recommended that you back up all data on a virtual disk before deleting it.

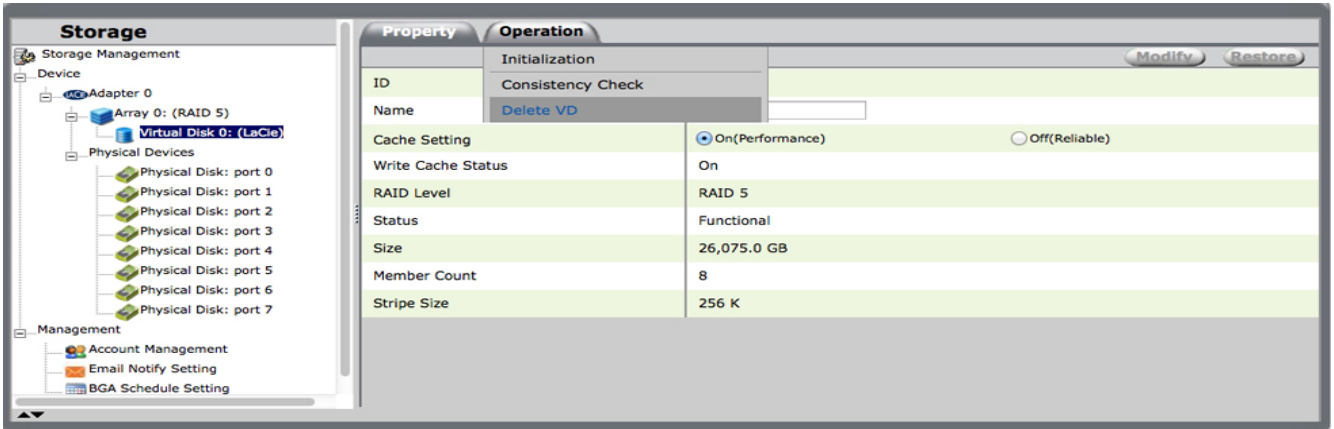
Any loss, corruption, or destruction of data while using a LaCie hard drive or a LaCie hard drive system is the sole responsibility of the user, and under no circumstances will LaCie be held liable for the recovery or restoration of this data. To help prevent the loss of your data, LaCie highly recommends that you keep TWO copies of your data: one copy on your LaCie storage device; and, a second copy on one of the following:

- Direct-attached storage (DAS)
- A NAS
- Some form of removable storage or archival media

Important Info: 1GB = 1,000,000,000 bytes. 1TB = 1,000,000,000,000 bytes. Once formatted, the actual available storage capacity varies depending upon the operating environment (typically 10-15% less).

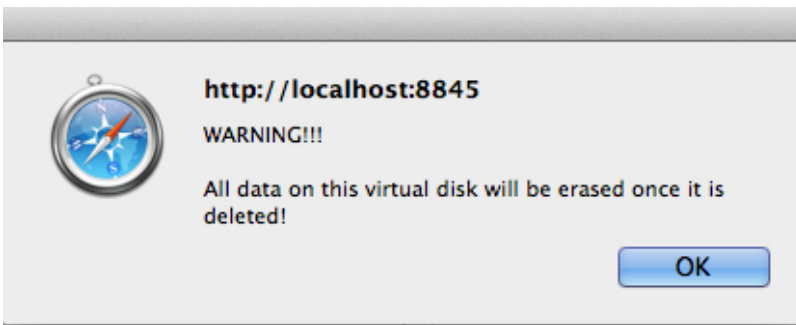
DELETING A VIRTUAL DISK

1. Select the virtual disk in the Storage pane and roll over the Operation tab.

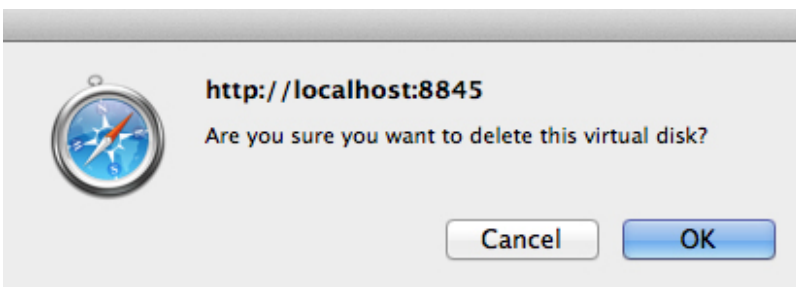


2. Choose **Delete VD**.

3. The first of three warnings appears. If you want to delete the virtual disk, choose **OK**.



4. The second of three warnings appears. Choose **OK**.



5. The Third of three warnings appears. Choose **OK**.



http://localhost:8845

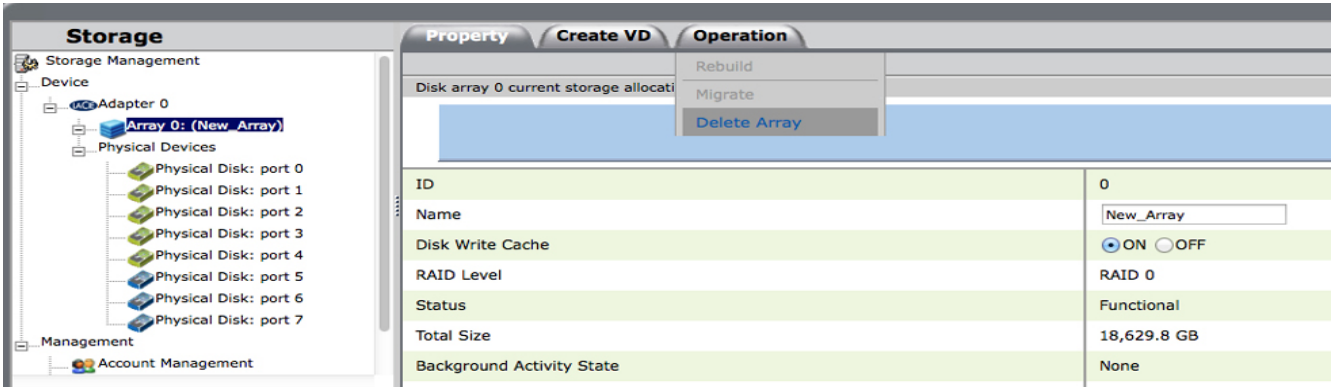
Do you want to delete the partition information if it has one?

Cancel

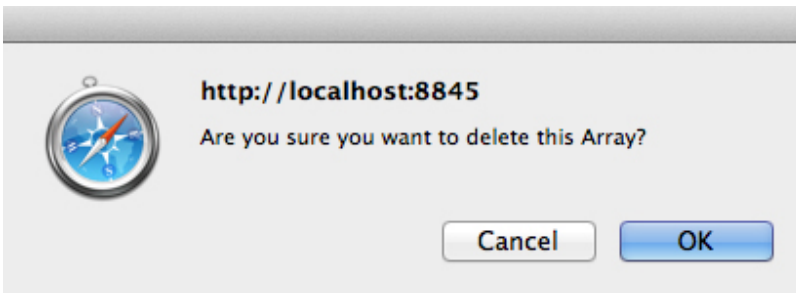
OK

DELETING AN ARRAY

1. Select the array in the Storage pane and roll over the Operation tab.



2. Choose **Delete Array**.
3. A warning appears asking you to confirm that you want to delete the array. Choose **OK**.



4. Freeing the hard drives from the array also removes the formatting. The operating system asks how to treat the hard drives in a series of popup windows. Choose **Ignore** for each hard drive.



MANAGE DISK FAILURE: AUTO-REBUILD AND ASSIGNING SPARE HARD DRIVES

Using LED indications, your LaCie professional DAS alerts you if a hard drive is failing or has failed. See the user manual for your LaCie product to review the LED indications. LaCie RAID Manager also senses when a hard drive is at risk and updates the Event Log accordingly. Additionally, LaCie RAID Manager has built-in notifications that will send you email alerts when a disk fails or the enclosure experiences high temperatures (see [Manage the Array and Virtual Disk](#)).

With the exception of RAID 6, the loss of a single hard drive in the array will degrade the RAID and prevent it from protecting your data. To help you prepare for the potential of hard drive failure, LaCie RAID Manager gives you two critical options:

- Auto-Rebuild
- Assigning a spare hard drive

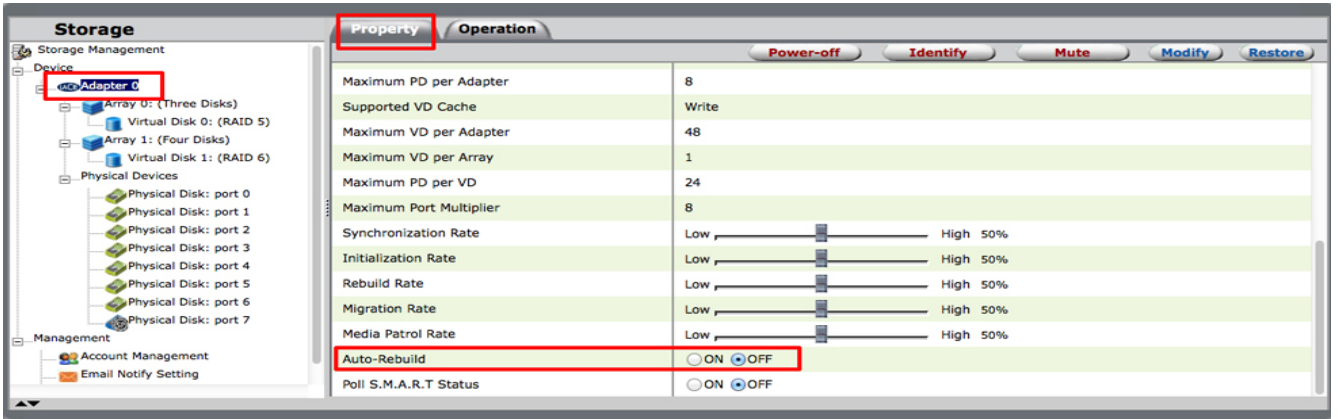
Important info on RAID 0 and disk failure: RAID 0 is fast and it provides access to the total disk capacity in the array. However, it does not offer data protection in the event of disk failure. Therefore, if a disk fails in a RAID 0 array, all data is lost.

ENABLING AUTO-REBUILD

LaCie RAID Manager will automatically rebuild a degraded array when auto-rebuild is enabled. The rebuild operation will start immediately if a spare drive is available in the enclosure (see below). If you have not assigned a spare drive, auto-rebuild will begin once the failed hard drive is hot-swapped with a replacement. See your LaCie product's user manual for instructions on how to hot-swap a hard drive.

Enable auto-rebuild:

1. Choose **Adapter** in the Storage pane and select the **Property** tab.



2. Scroll down to **Auto-Rebuild** and choose the **On** radio button.

Important info: If your degraded array does not auto-rebuild even when a global/dedicated spare drive is available, verify that the spare drive is compatible with your LaCie hard drive enclosure.

ASSIGNING A SPARE HARD DRIVE

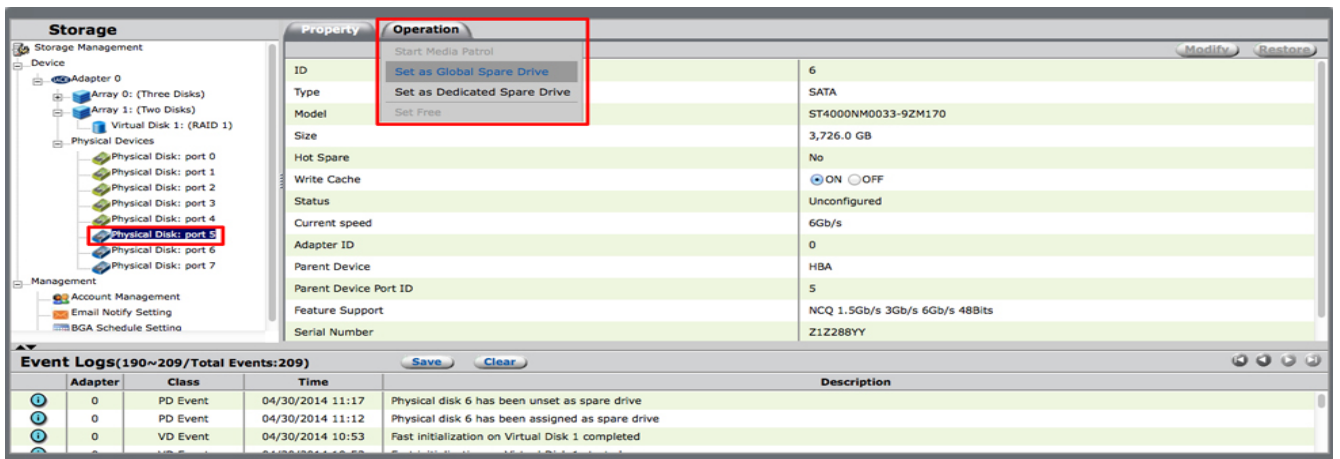
LaCie RAID Manager offers two options for assigning a spare hard drive:

- **Global spare drive:** Global spare drives can be used by any array.
- **Dedicated spare drive:** Dedicated spare drives are used exclusively for rebuilding a specific array.

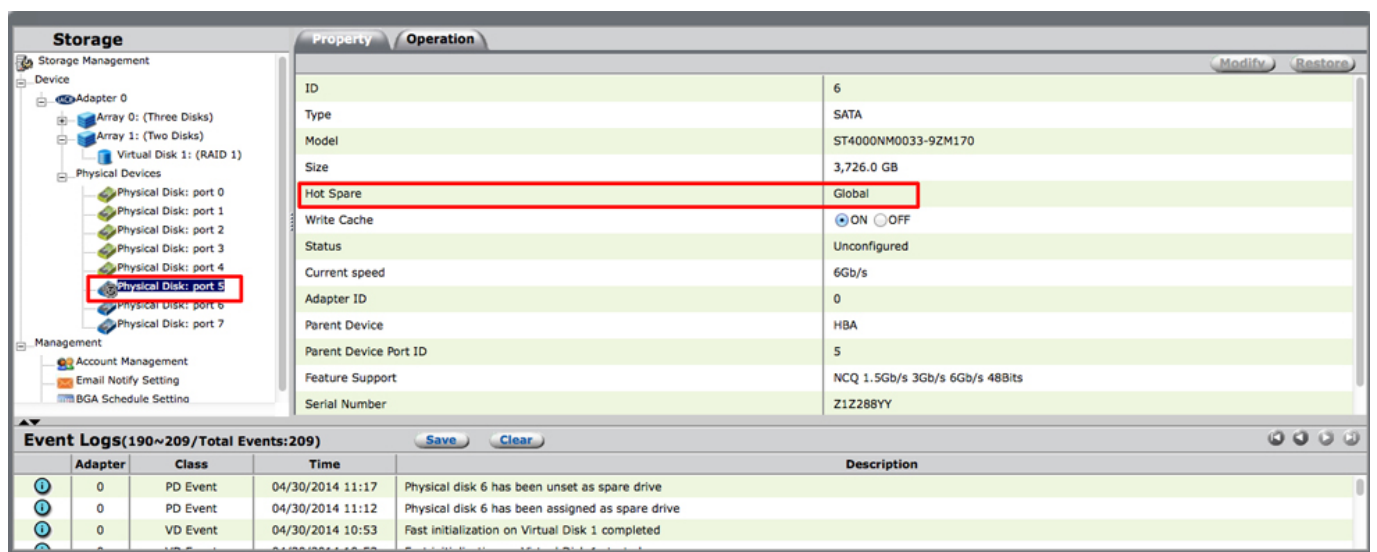
Only an unconfigured physical disk can be assigned as a spare drive. A physical disk which is either fully or partially configured cannot be used as a spare drive.

Creating a global spare drive

1. Select Physical Disk in the Storage pane.
2. Roll-over the **Operation** tab and select **Set as Global Spare Drive**.

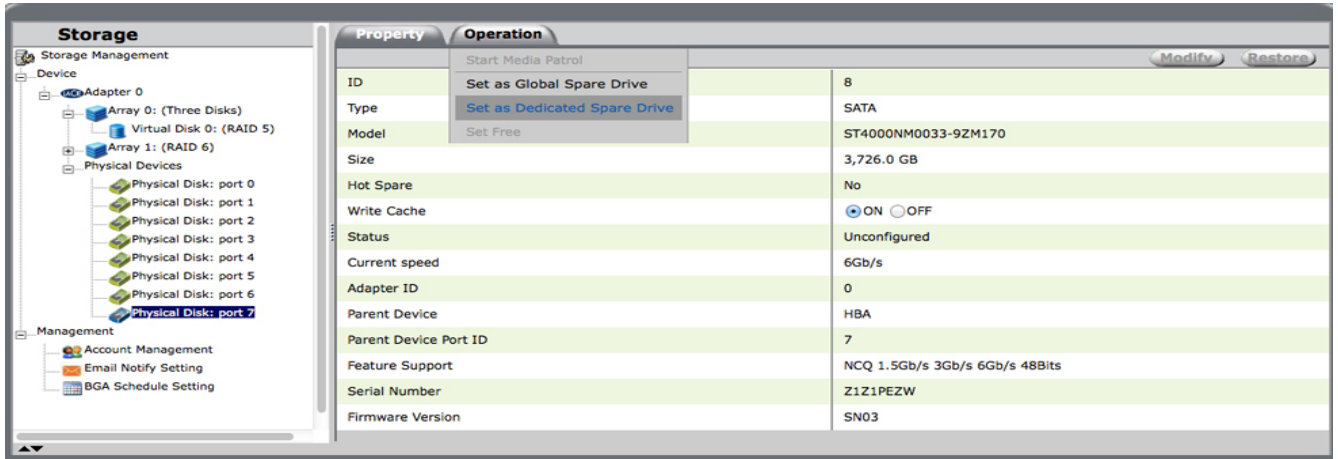


The hard drive's Property tab confirms that it has been assigned as a global spare drive.

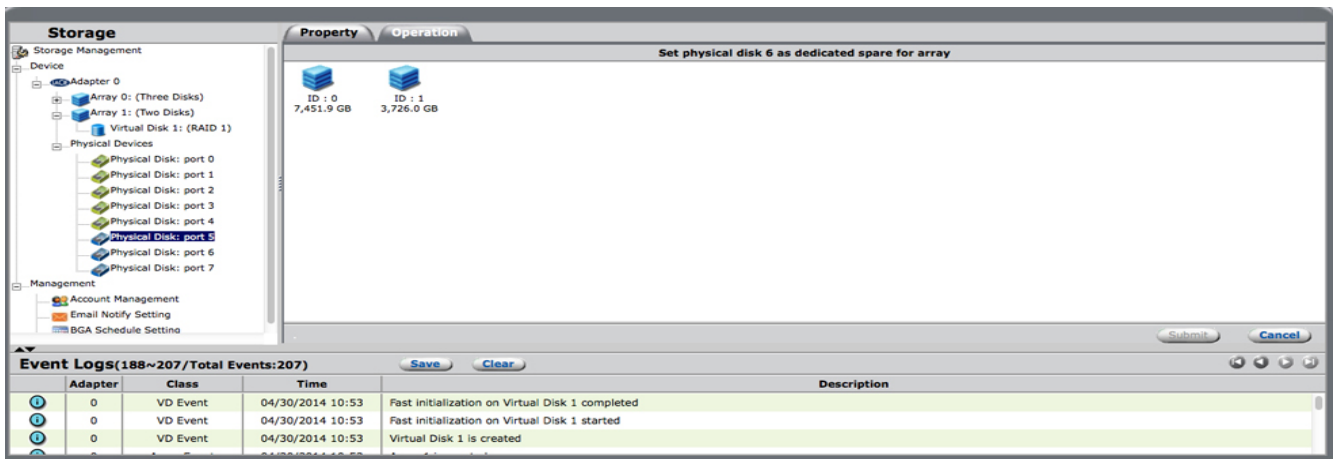


Creating a dedicated spare drive

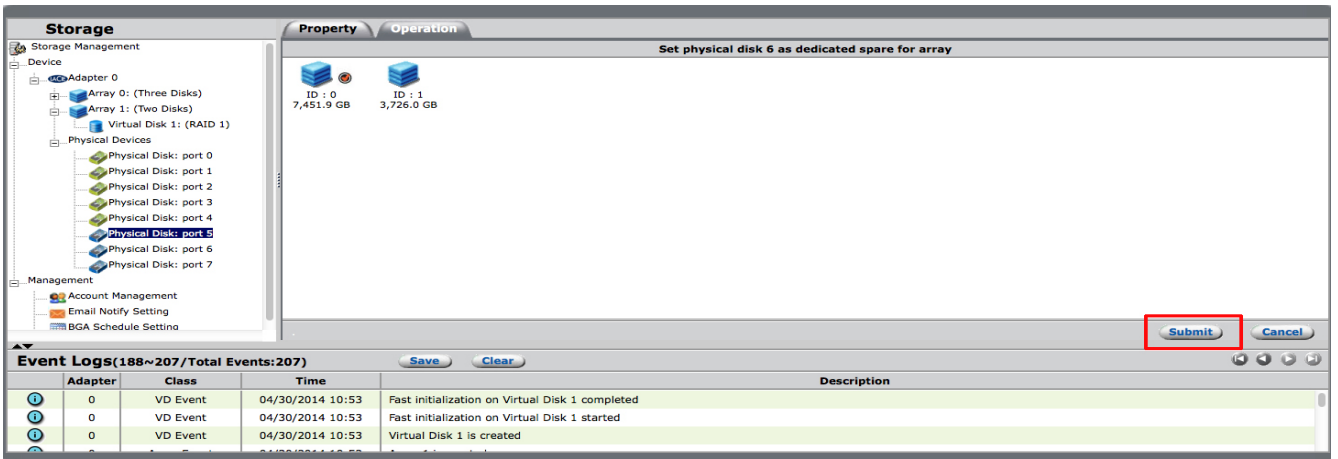
1. Select Physical Disk in the Storage pane.
2. Roll-over the **Operation** tab and select **Set as Global Spare Drive**.



3. A screen appears prompting you to choose a RAID array. Click on the array to assign to the spare hard drive.



4. A checkmark appears next to the selected array. Choose **Submit**.



The hard drive's Property tab confirms that it has been assigned as a dedicated spare drive.

RELEASING A PHYSICAL DISK FROM SPARE DRIVE STATUS

1. Select a hard drive assigned as a global or dedicated spare in the Storage pane.
2. Roll-over the **Operation** tab and select **Unset as Spare Drive**.

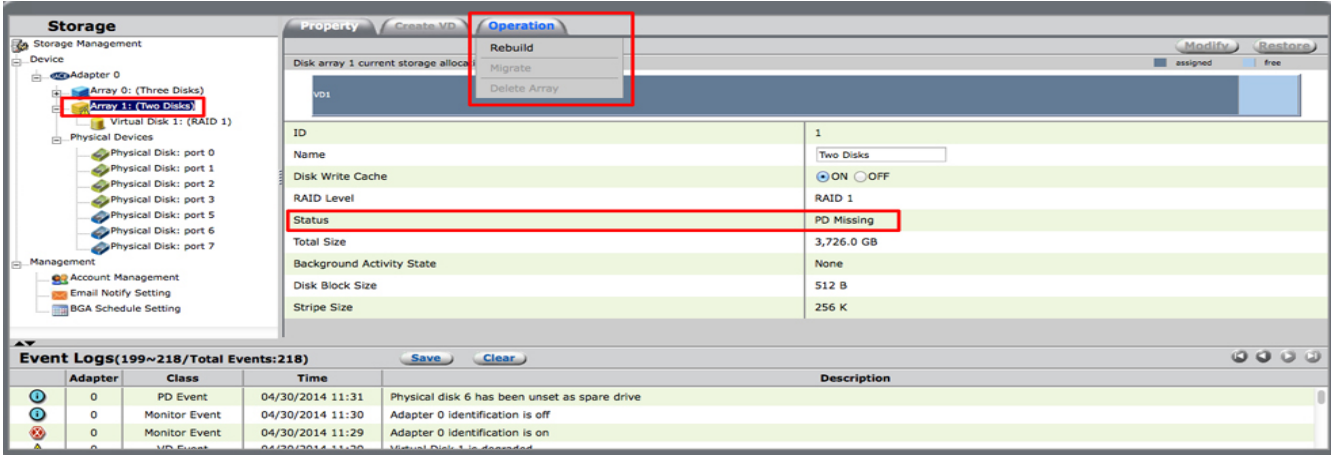
LaCie RAID Manager confirms the change by updating the Status of the physical disk in the Property tab.

MANAGE DISK FAILURE: MANUAL REBUILD

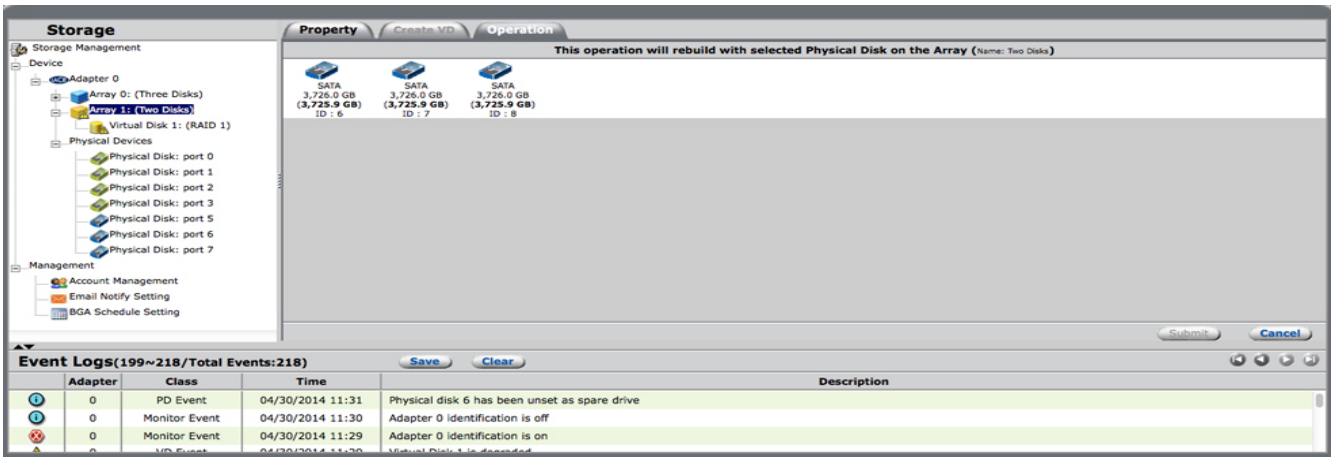
This section describes the procedure for manually rebuilding a degraded array when Auto-Rebuild is disabled and a dedicated spare drive is not available. You must have at least one unconfigured hard drive in the enclosure to perform the steps below.

REBUILDING A DEGRADED ARRAY

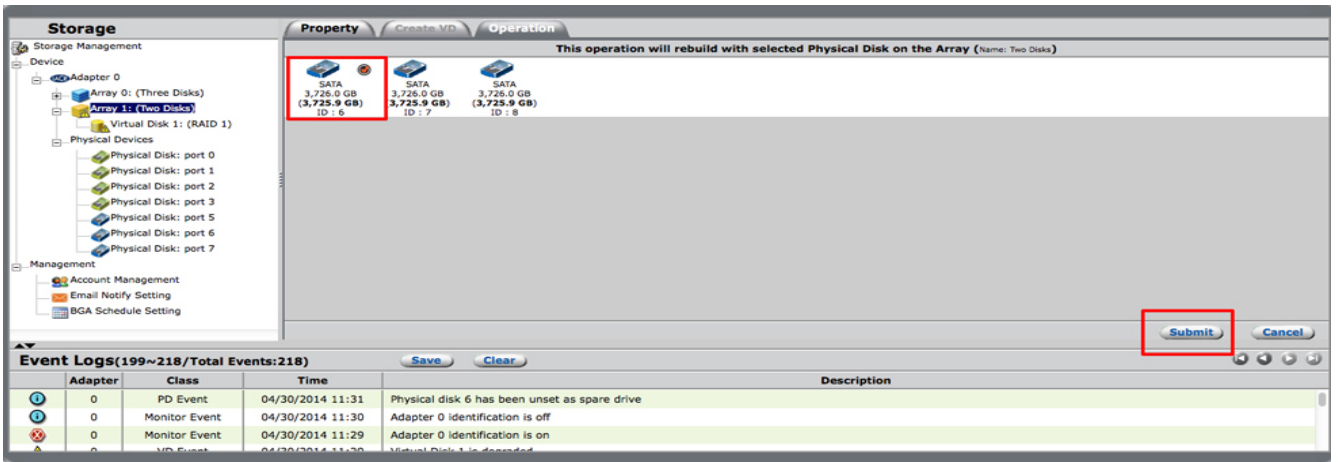
1. Select the degraded array in the Storage pane. You will recognize the degraded array by its yellow icon.
2. Roll over the **Operation** tab and select **Rebuild**.



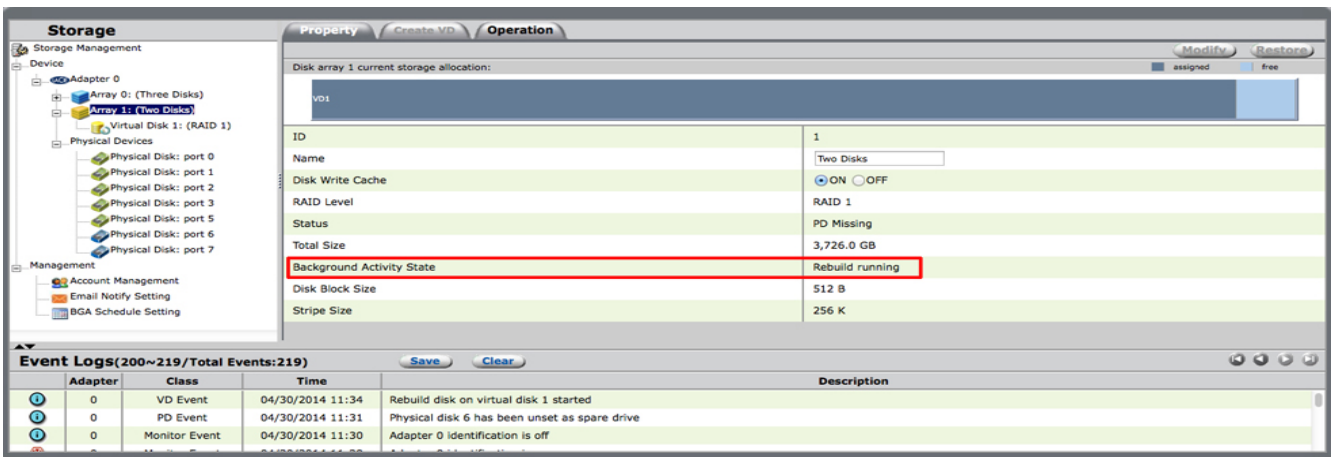
3. LaCie RAID Manager displays hard drives that have not been added to an array.



4. Select a hard drive from the list and choose **Submit**.



5. Choose the Property tab for the array. The Background Activity State shows that the rebuild is running.



CHECK THE VIRTUAL DISK FOR ERRORS

LaCie RAID Manager can help you maintain optimal performance on a virtual disk using *Consistency check* and *Consistency fix*.

A consistency check scans and reports the integrity of parity or mirrored data on the virtual disk. Periodic consistency checks are highly recommended as part of regular maintenance for virtual disks. Users should also run a consistency check when a virtual disk is not performing as expected.

A consistency fix scans, reports, and fixes parity or mirrored data on the virtual disk. You can choose to run the consistency fix instead of the consistency check if you suspect that your virtual disk is experiencing problems. A consistency fix can take longer to run than a consistency check.

RUNNING A FULL INITIALIZATION BEFORE RUNNING A CONSISTENCY CHECK/FIX

As described in [Create Arrays and Virtual Disks](#), LaCie RAID Manager runs an initialization on a virtual disk when it is first created. Similar to a consistency fix, the initialization scans the virtual disk's hard drives for errors and performs repairs if necessary. There are two types of initialization:

- **Fast initialization:** Fast initialization is a destructive process that erases all data on the virtual disk, including the Master Boot Records (MBR) on all physical disks. This is a good option if you wish to perform a cursory consistency check before starting a project.
- **Full initialization:** A thorough consistency check of the virtual disk's hard drives. A full initialization can take many hours to several days based upon the total capacity of the virtual disk.

The option to run a consistency check/fix is available only after a full initialization has been performed on a virtual disk.

Full initializations: background and foreground

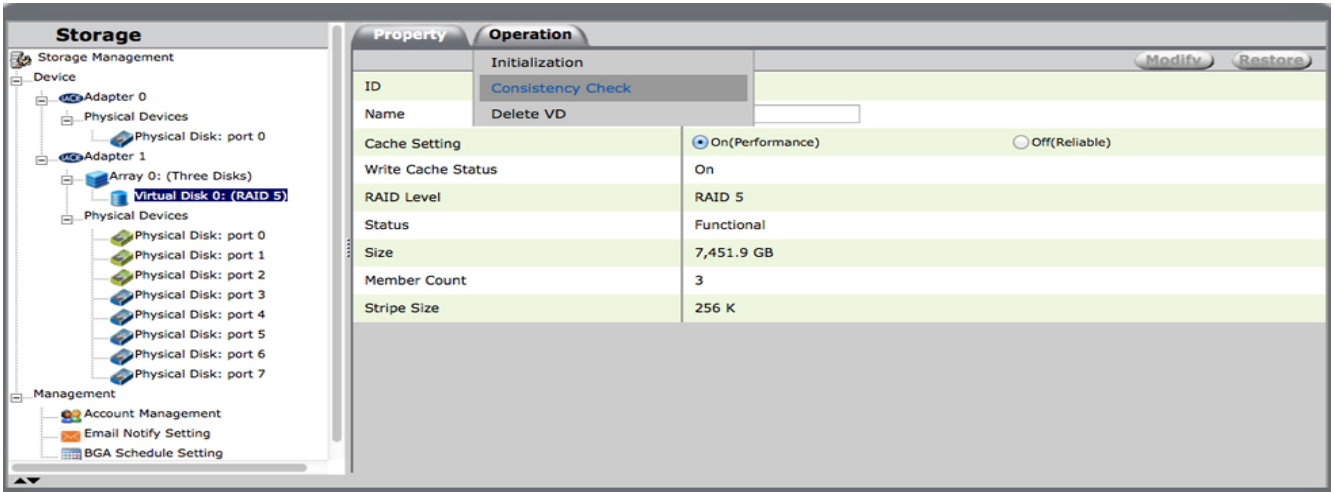
A full initialization can be run as one of the following:

- **Background initialization:** A thorough, non-destructive consistency check of the physical disks. Since it runs in the background, the demand on the processor is reduced when compared with a foreground initialization. However, performance can be impacted, especially when working on high-end video or graphic projects. A background initialization can take many hours to several days based upon the total capacity of the virtual disk.
- **Foreground initialization:** This option is similar to a fast initialization since the MBR for all the physical disks are erased. Therefore, it is also a destructive process. Since it performs a thorough consistency check, this option can take many hours to several days based upon the total capacity of the virtual disk. As its name indicates, a foreground initialization runs in the foreground and can take a good amount of processing power which will affect performance. Choose foreground initialization when you want you want to wipe the hard drives and you do not anticipate starting high-end video or graphic projects within the week.

PERFORMING A CONSISTENCY CHECK/FIX

Follow the instructions below to run a consistency check/fix:

1. Choose the virtual disk in the Storage pane and roll over the Operation tab.

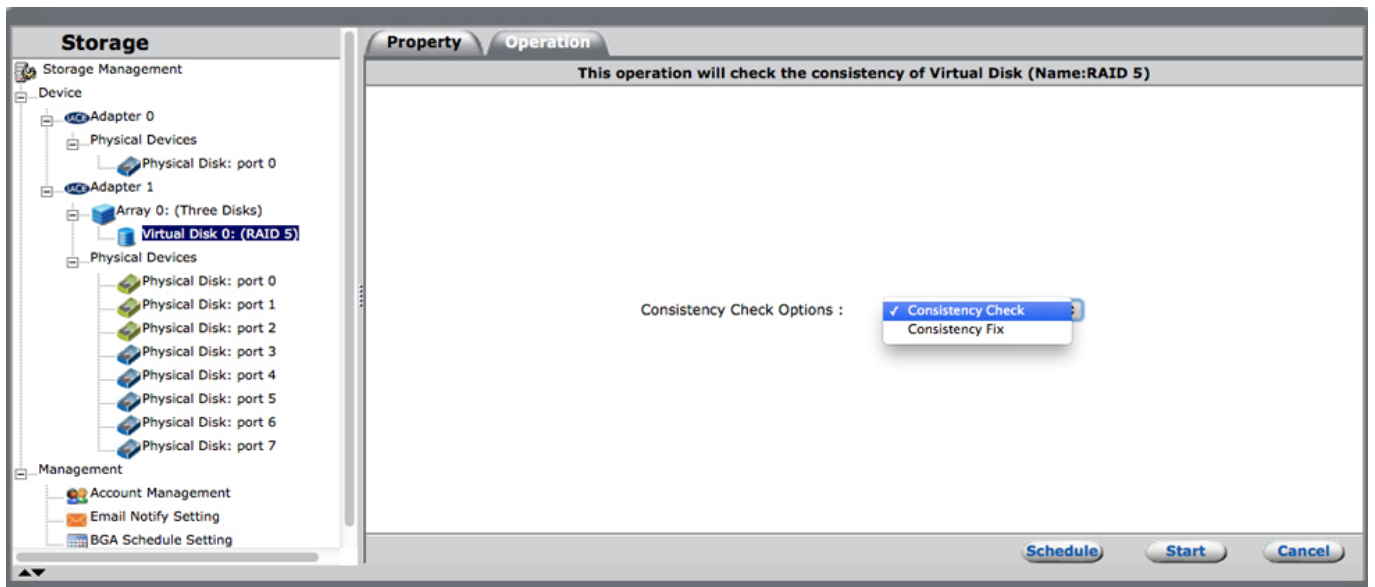


2. Choose **Consistency Check**.
3. In the pull-down menu, select **Consistency Check** or **Consistency Fix**.



4. Choose **Submit**

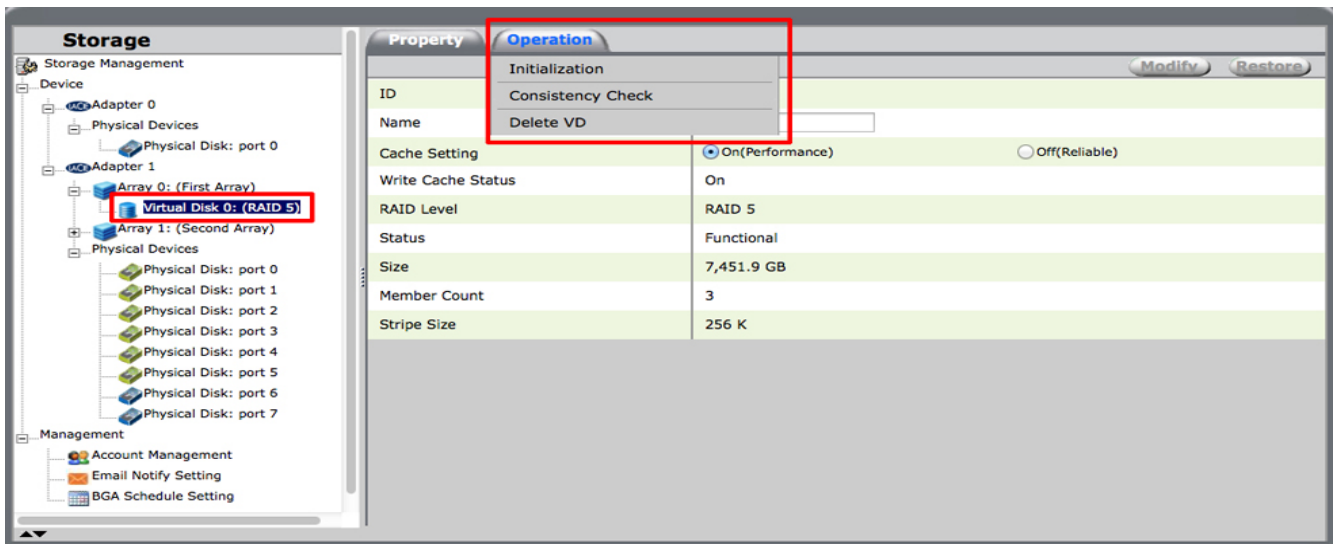
The consistency check/fix will take many hours to several days based upon the total capacity of the virtual disk. You can continue to use the hard drives but performance can be affected by the consistency check/fix.



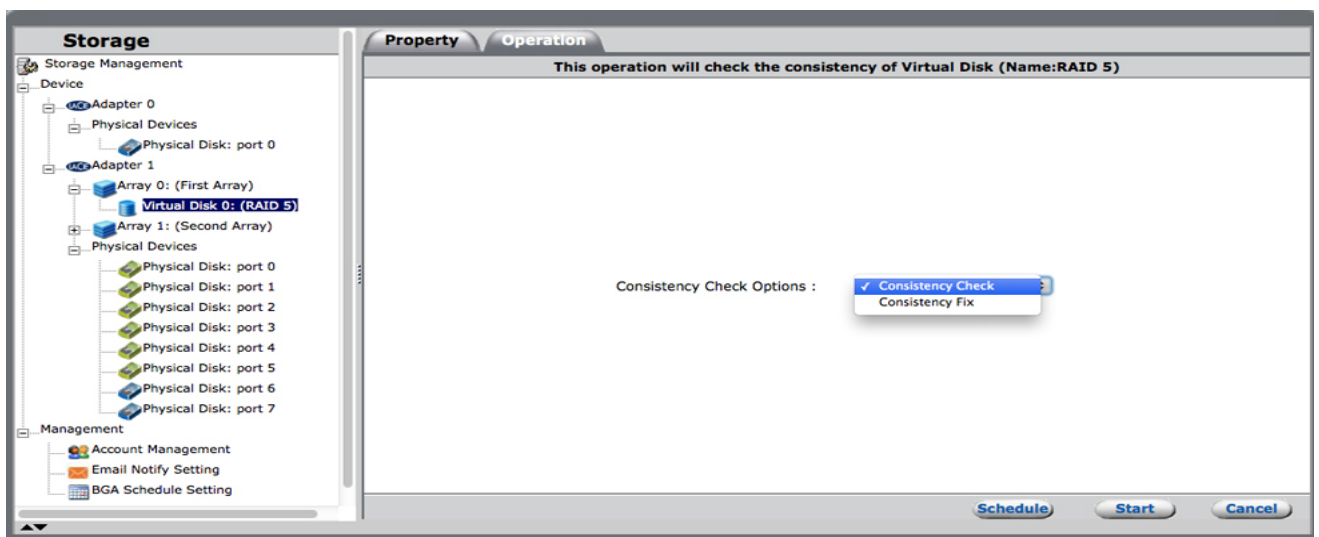
SCHEDULING A CONSISTENCY CHECK/FIX OR BACKGROUND INITIALIZATION

LaCie RAID Manager gives you the option to schedule regular consistency checks/fixes and background initializations. Regular maintenance on the hard drives can help to prevent data errors and improve the health of the virtual disk.

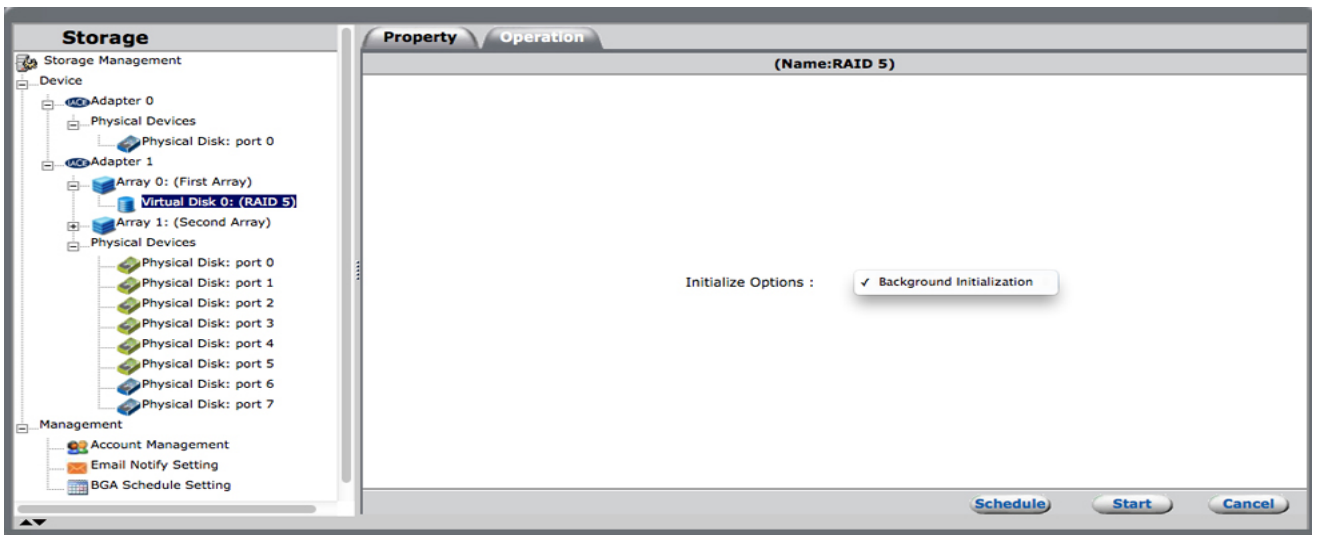
1. Choose the virtual disk in the Storage pane and roll over the Operation tab.



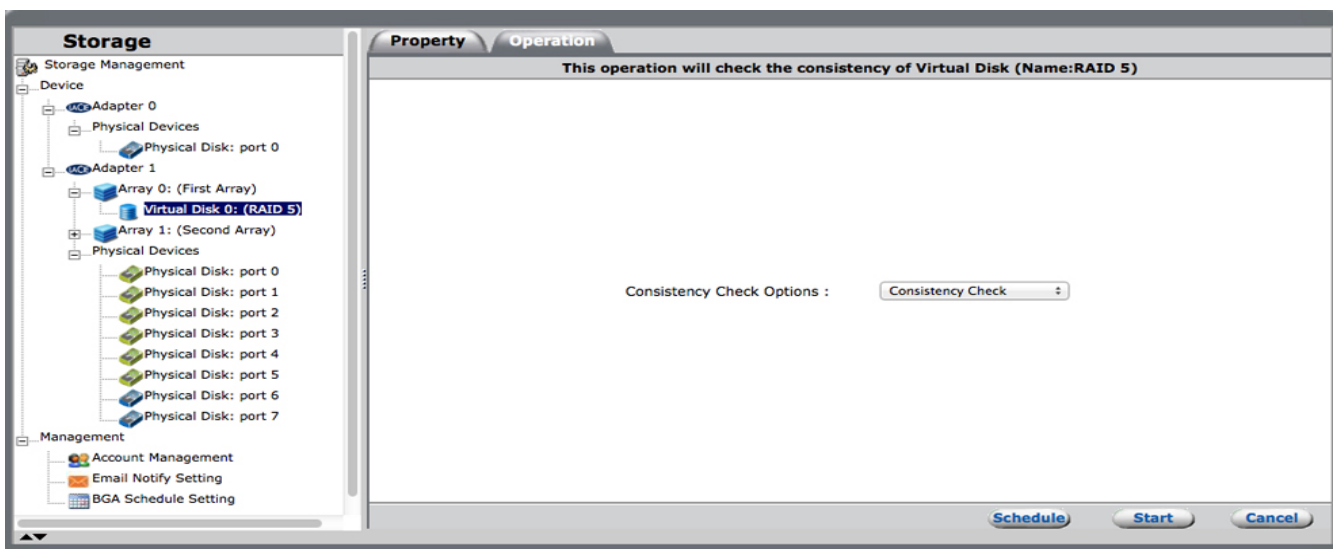
2. Choose **Initialization** or **Consistency Check**.
3. Click on the pull-down menu to choose:
 - **Consistency Check** or **Consistency Fix**.



- **Background Initialization. Note:** The option for a foreground initialization is not available when a full initialization has been performed on the virtual disk.

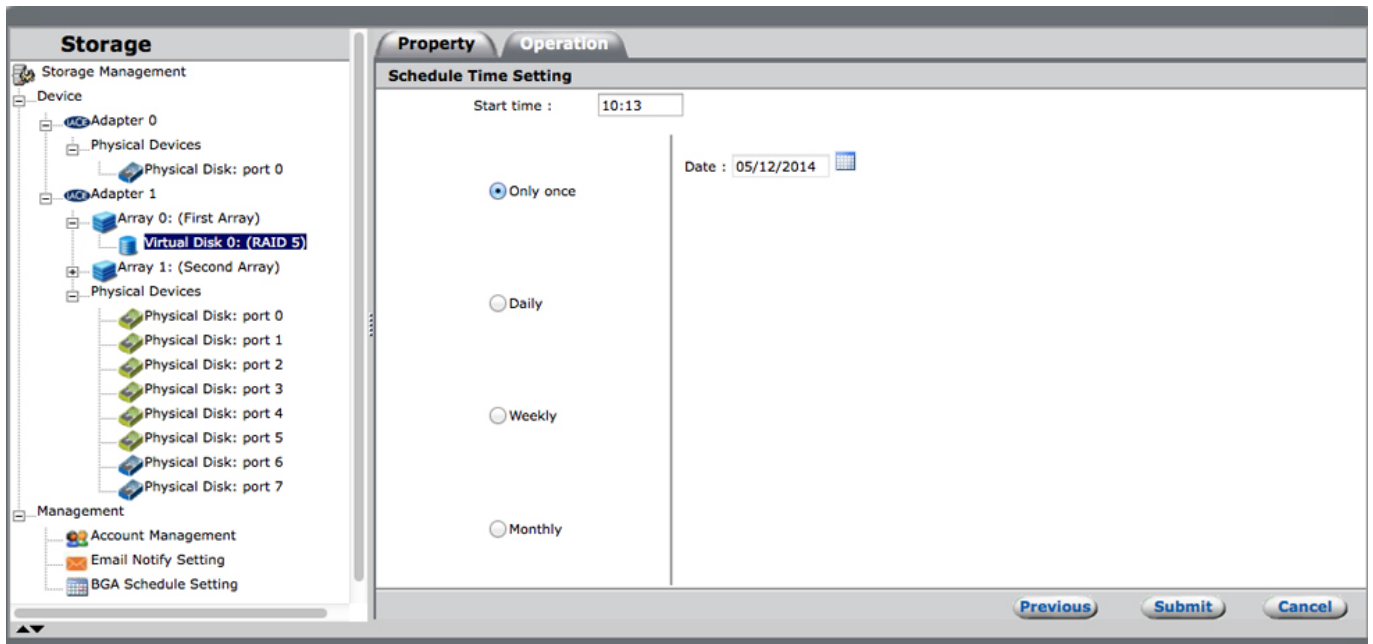


4. Choose **Schedule**.



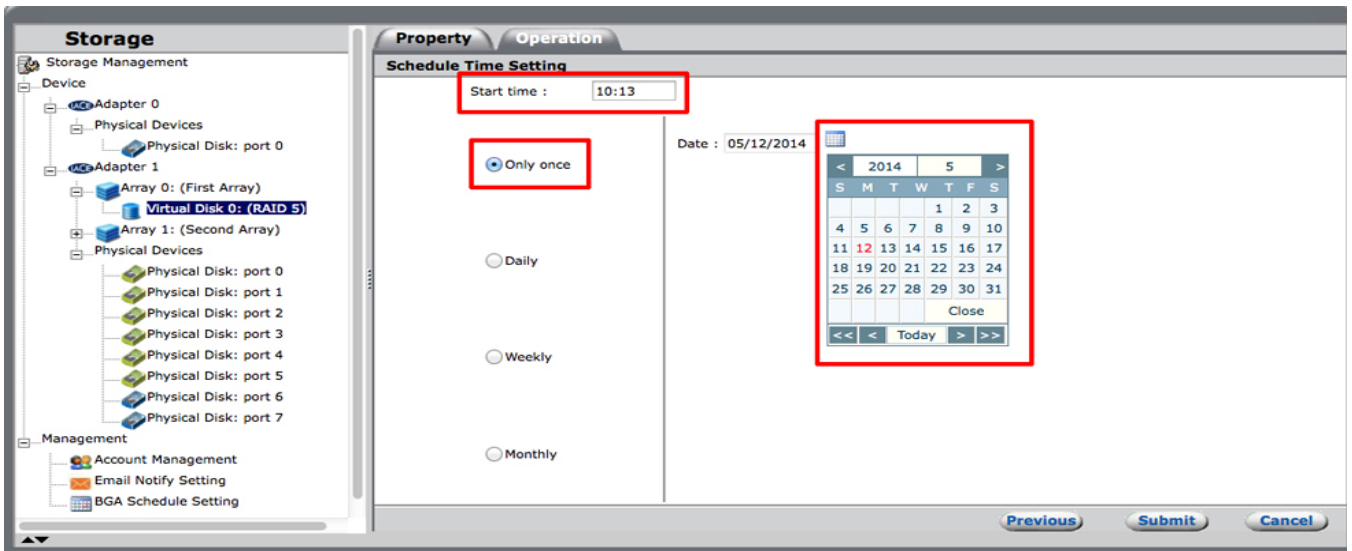
5. Select the frequency and choose **Submit**. See below for scheduling options.

Scheduling options

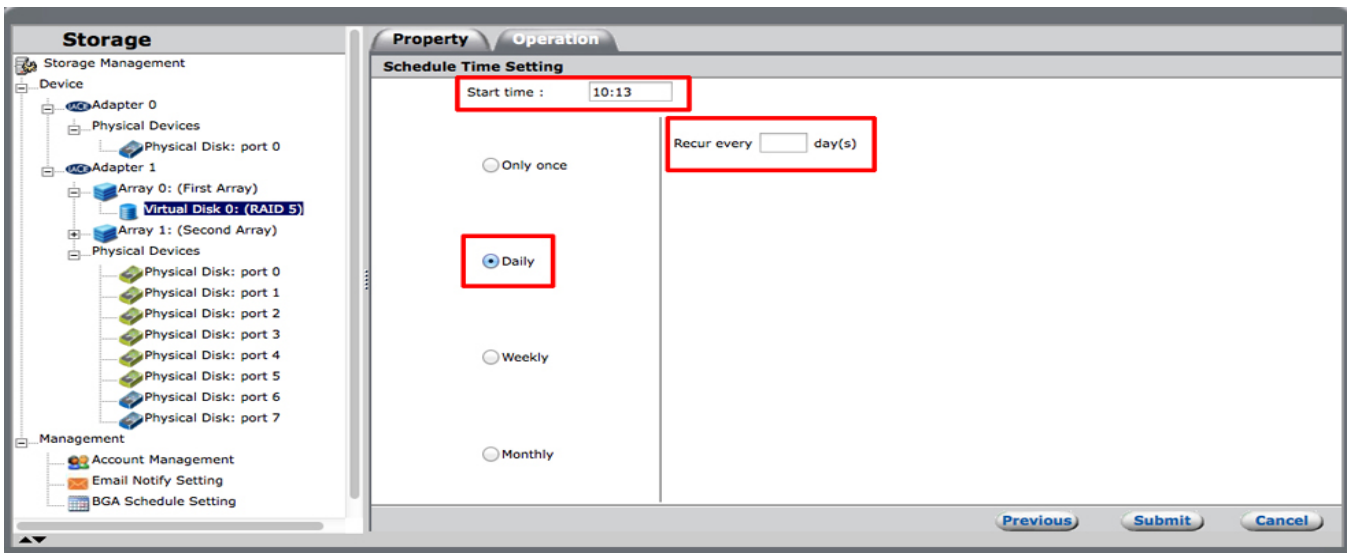


Consistency checks/fixes and initializations can be scheduled:

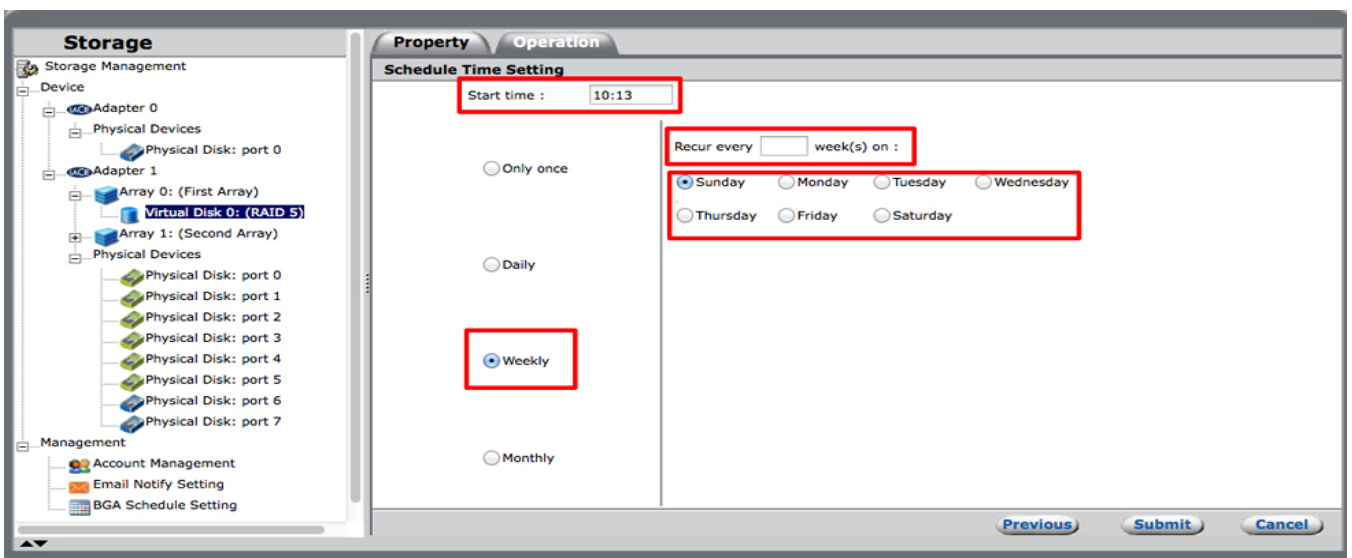
- **Only once:** Click on the calendar icon to choose a time and enter the time in the **Start time** field.



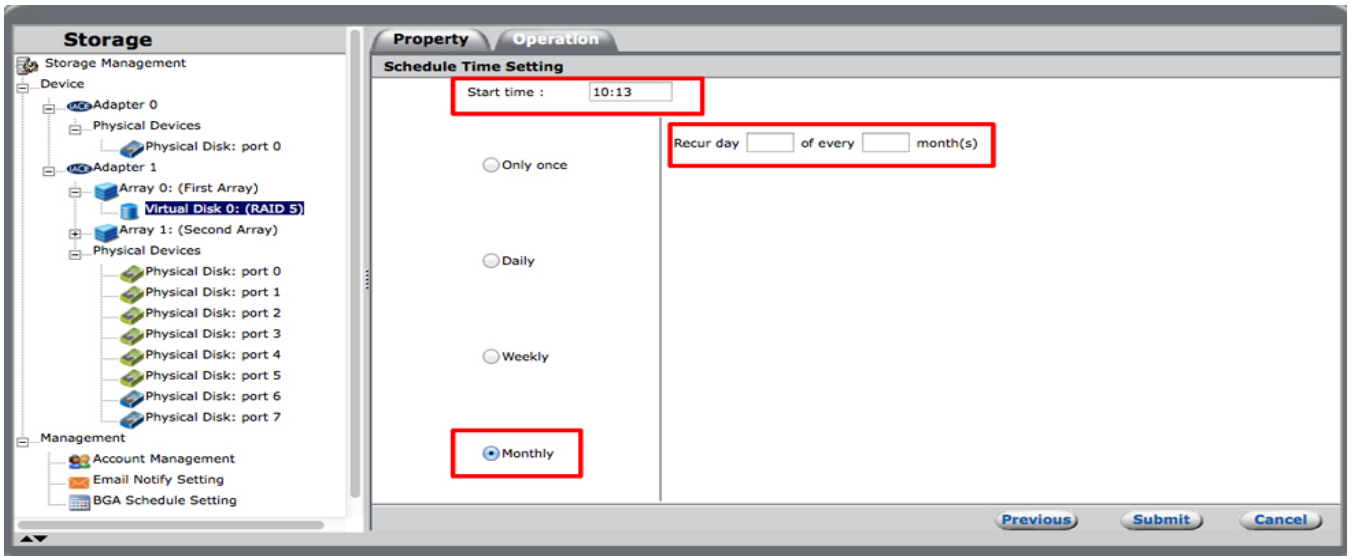
- **Daily:** Choose the frequency and enter the time in the **Start time** field. For example, *Recur every 1 day(s)* or *Recur every 3 day(s)*. The former will run each day and the latter will run every three days.



- **Weekly:** Choose the frequency, day of the week, and enter the time in the **Start time** field. For example, *Recur every 1 week(s)* or *Recur every 3 week(s)*. The former will run once a week and the latter will run once every three weeks.

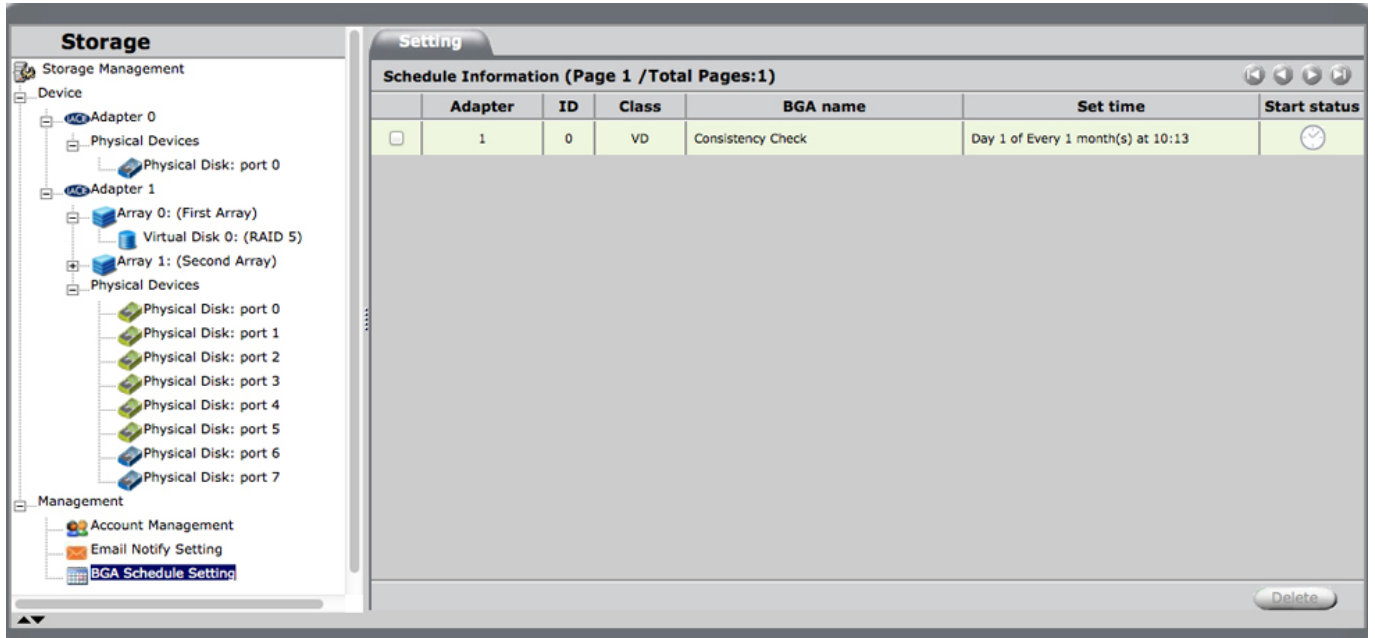


- **Monthly:** Choose the day of the month, the frequency, and enter the time in the **Start time** field. For example, *Recur day 1 of every 1 month(s)* or *Recur day 28 of every 3 month(s)*. The former will run once a month on the first day of the month. The latter will run once every three months on the twenty-eighth day of the month. To avoid potential confusion with certain months, it is recommended that you choose a date between 1 - 28.



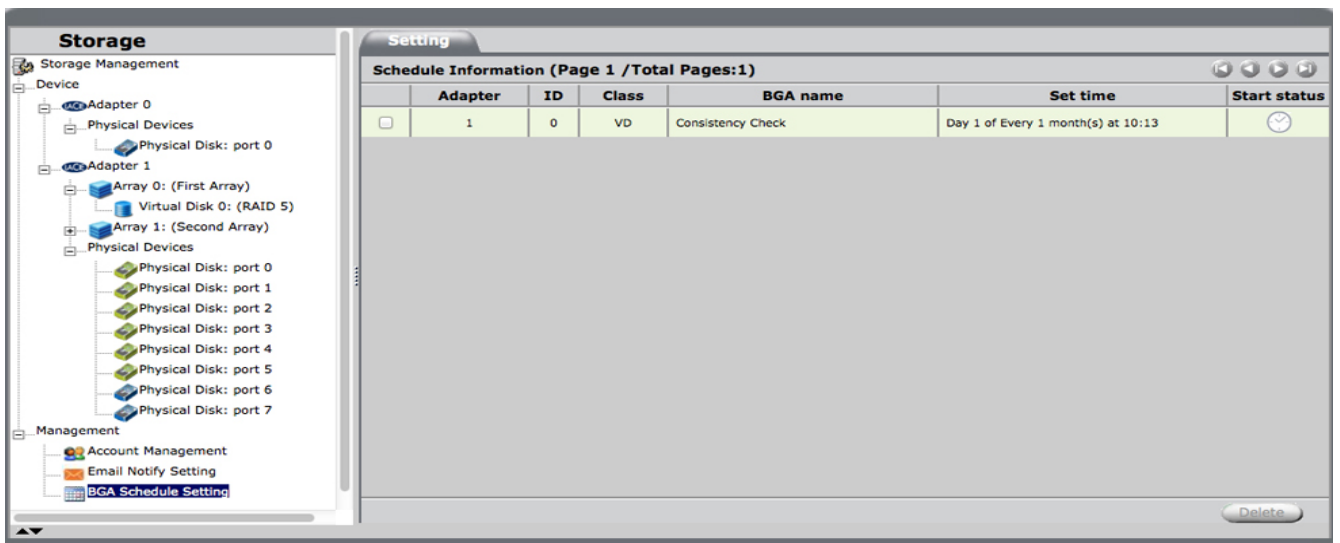
REVIEWING SCHEDULED CONSISTENCY CHECKS/FIXES AND INITIALIZATIONS

To see scheduled operations, go to the Storage pane and choose **Management > BGA Schedule Setting**.



Deleting scheduled consistency checks/fixes and initializations

1. Go to the Storage pane and choose **Management > BGA Schedule Setting**.
2. Click on the check box for the operation you want to delete.



3. Choose **Delete**.

Storage

Storage Management

- Device
 - Adapter 0
 - Physical Devices
 - Physical Disk: port 0
 - Adapter 1
 - Array 0: (First Array)
 - Virtual Disk 0: (RAID 5)
 - Array 1: (Second Array)
 - Physical Devices
 - Physical Disk: port 0
 - Physical Disk: port 1
 - Physical Disk: port 2
 - Physical Disk: port 3
 - Physical Disk: port 4
 - Physical Disk: port 5
 - Physical Disk: port 6
 - Physical Disk: port 7
- Management
 - Account Management
 - Email Notify Setting
 - BGA Schedule Setting**

Setting

Schedule Information (Page 1 /Total Pages:1)

| | Adapter | ID | Class | BGA name | Set time | Start status |
|-------------------------------------|---------|----|-------|-------------------|------------------------------------|--------------|
| <input checked="" type="checkbox"/> | 1 | 0 | VD | Consistency Check | Day 1 of Every 1 month(s) at 10:13 | |

Delete

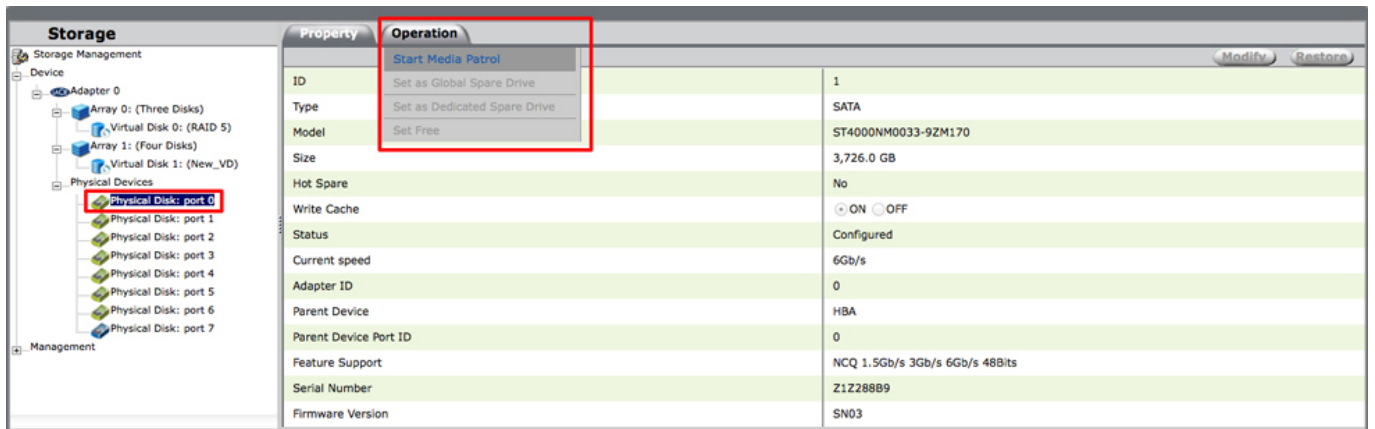
CHECK INDIVIDUAL HARD DRIVES FOR ERRORS

Media Patrol checks and repairs media errors on a hard drive. Run media patrol on a configured physical disk that is part of a virtual disk.

Important info: Do not run Media Patrol on a spare or unconfigured hard drive.

While a consistency check scans and reports the integrity of parity or mirrored data on the virtual disk, Media Patrol searches for errors on a single hard drive.

STARTING MEDIA PATROL



1. Choose a hard drive in the Storage pane by selecting **Physical Devices > Physical Disk: port X**. "X" can be the number 0 - 7 depending upon the amount of hard drives in your LaCie enclosure. See the note below.
2. Roll over the Operation tab and choose **Start Media Patrol**.

Media Patrol can take several hours to days based upon the capacity of the hard drive. You can continue to use the virtual disk but performance can be affected during while Media Patrol is running.

Hard drive numbers

The numbers for physical disk in LaCie RAID Manager begins with 0 while your LaCie enclosure starts with 1. The table below lists the matching numbers.

| LaCie RAID Manager | LaCie enclosure |
|--------------------|-----------------|
| 0 | 1 |
| 1 | 2 |
| 2 | 3 |
| 3 | 4 |
| 4 | 5 |
| 5 | 6 |
| 6 | 7 |
| 7 | 8 |

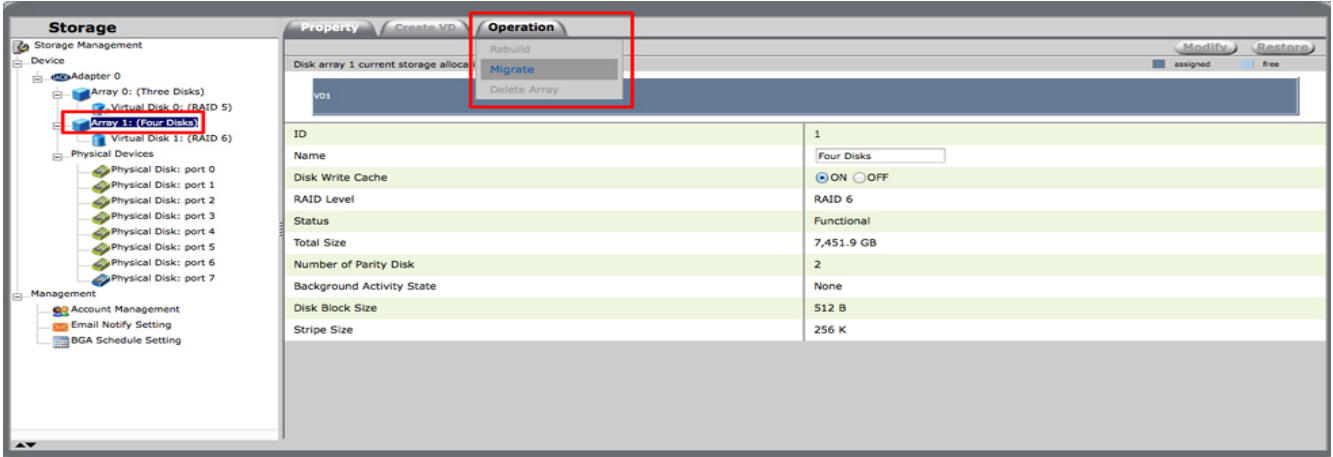
MANAGE THE ARRAY AND VIRTUAL DISK

LaCie RAID Manager has a number of management functions to help you:

- Add disk capacity to the array
- Migrate the RAID
- Receive updates on the health of the enclosure
- Enhance performance

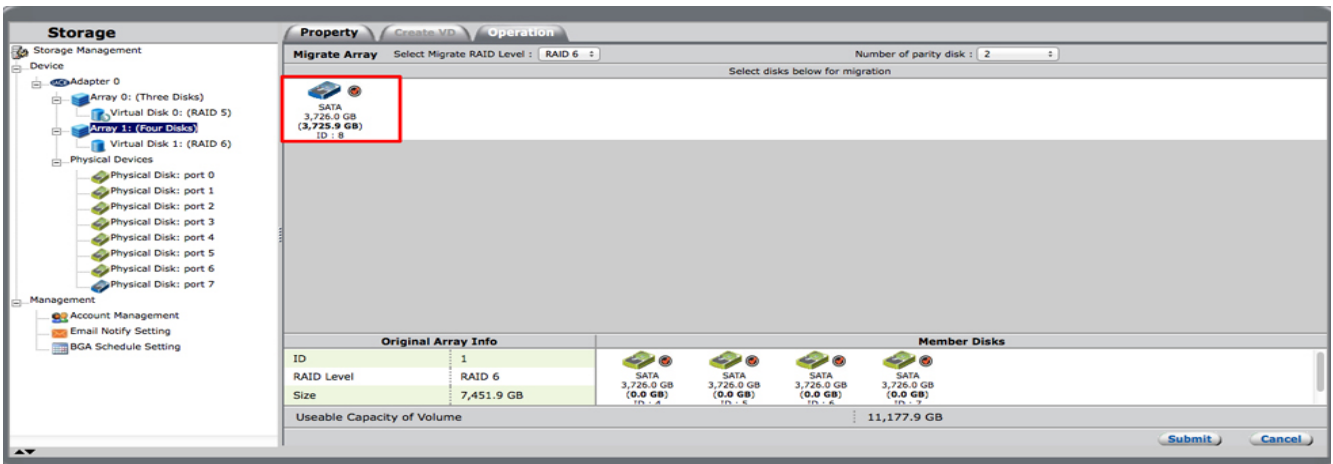
EXPANDING THE ARRAY'S DISK CAPACITY

1. Select the array in the Storage pane and roll over the Operation tab.



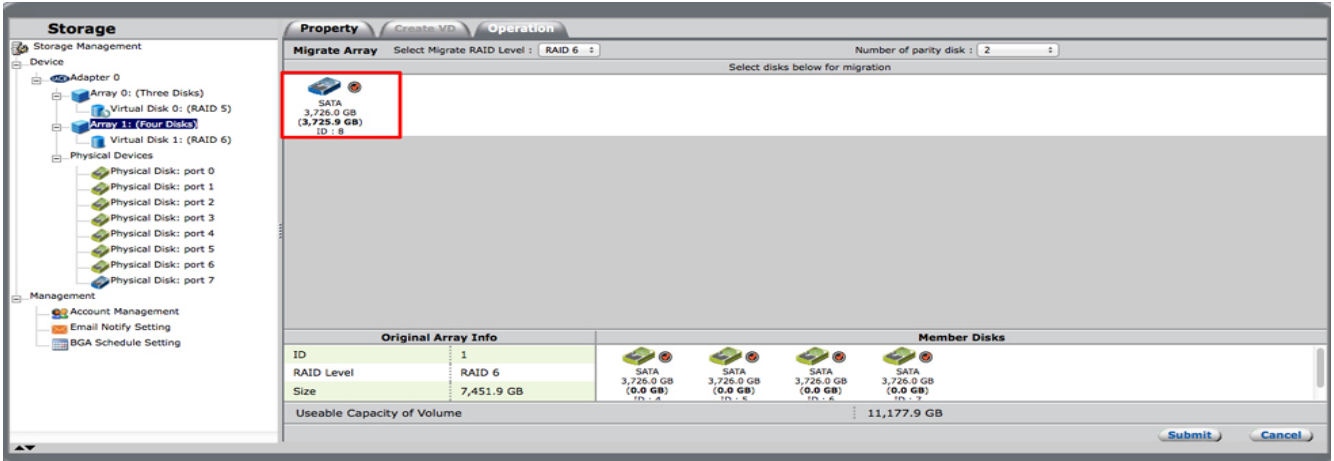
2. Choose **Migrate**.

3. Click on one or more available disks to add to the array. A checkmark appears next to a selected disk.



4. Choose **Submit**.

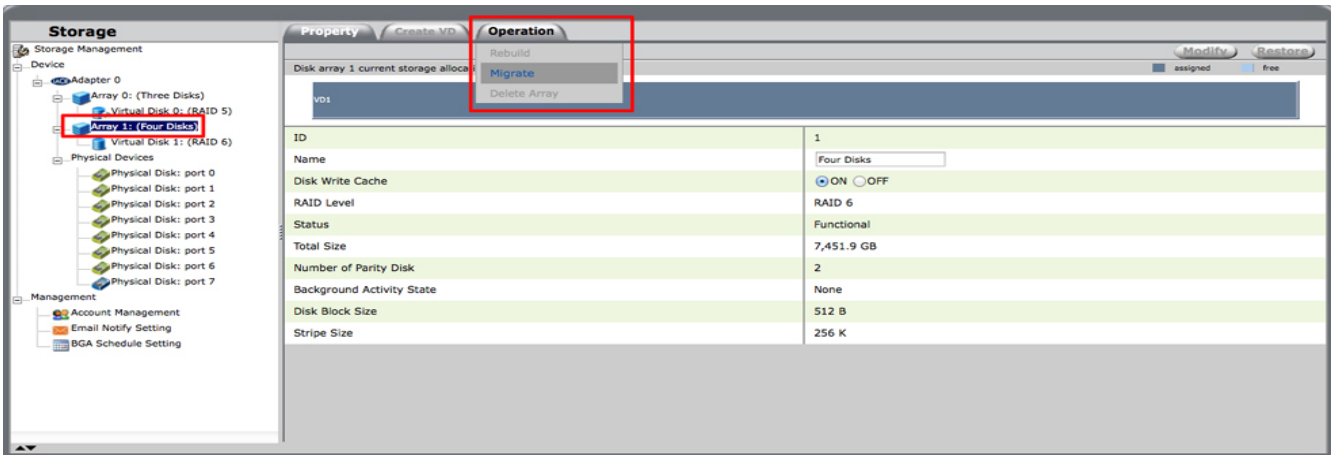
5. The Property tab provides a status bar letting you know the progress of the expansion.



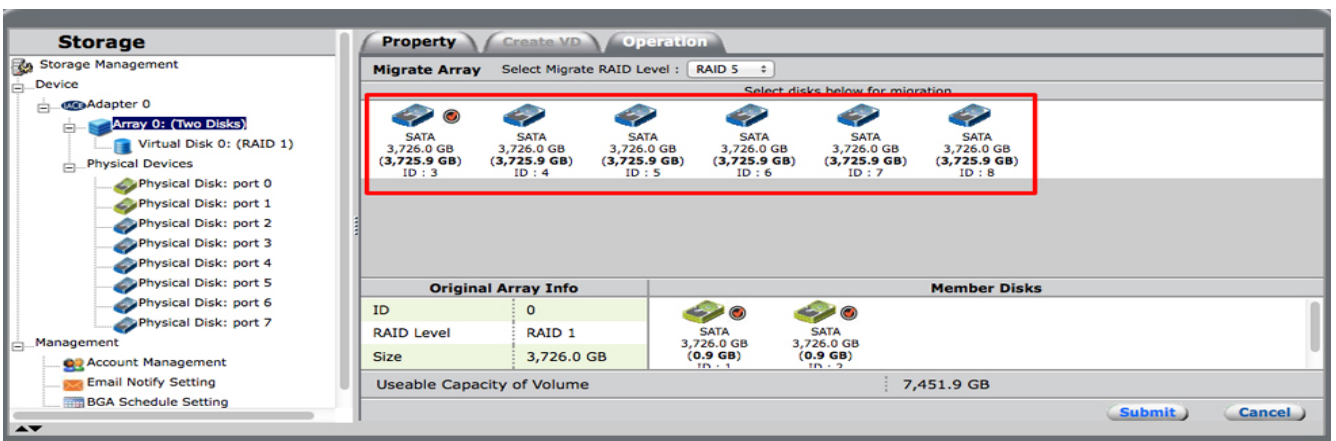
MIGRATING TO A HIGHER RAID

See [Discover LaCie RAID Manager Storage Management](#) for details on RAID levels available to your LaCie professional DAS. Make certain that you know the RAID level and its requirements before following the steps below.

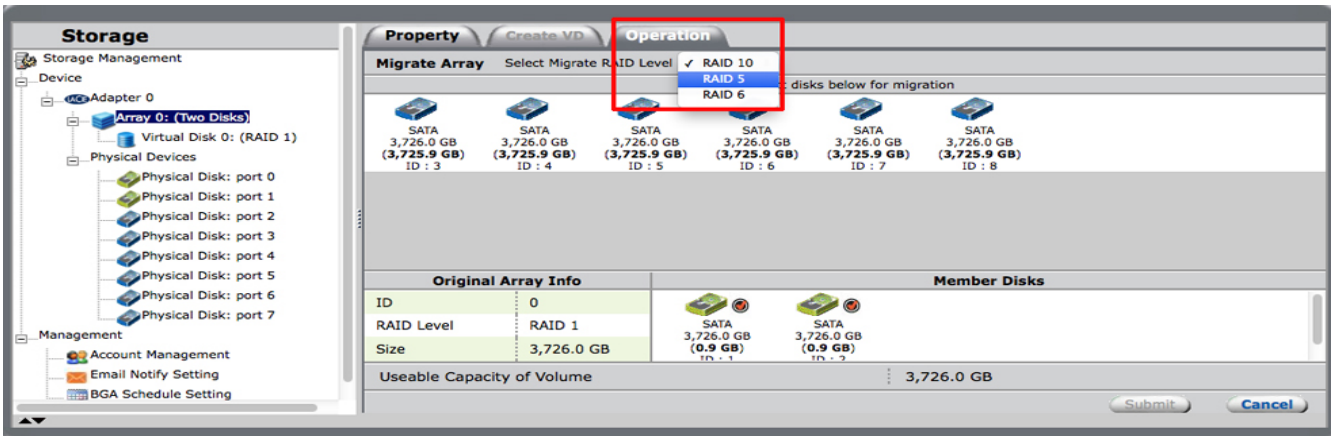
1. Select the array in the Storage pane and roll over the Operation tab.



2. Choose **Migrate**.
3. If necessary, click on one or more available hard drives to add to the array. For example, you must add at least one hard drive when migrating from RAID 1 to RAID 5. However, you do not need to add hard drives if you migrate from a RAID 10 array with four hard drives to RAID 6.

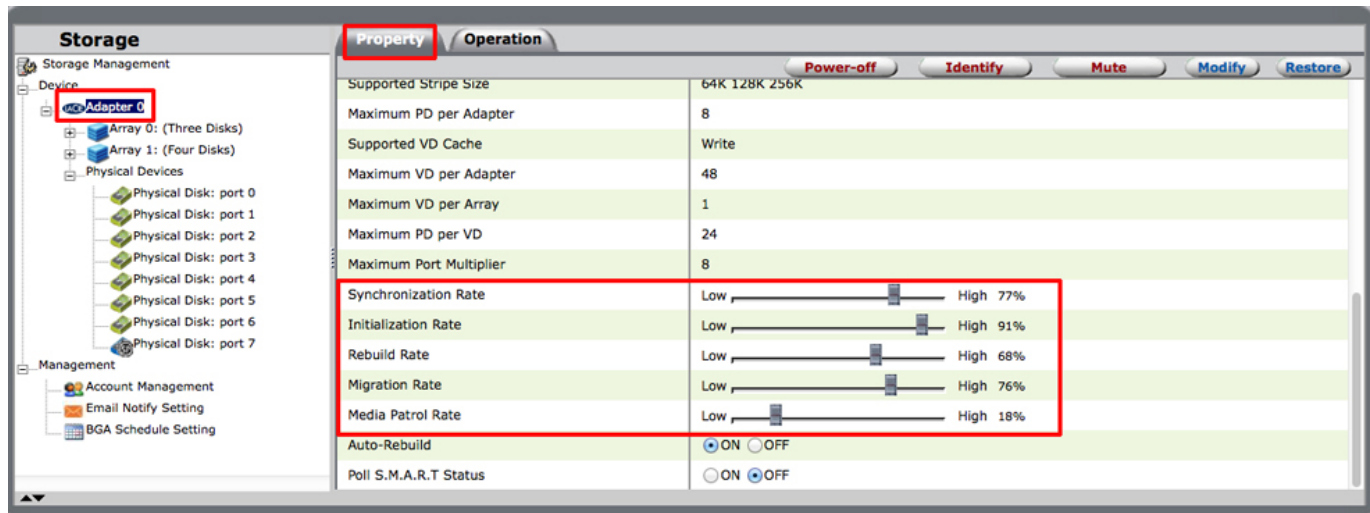


4. Click on the RAID pull-down menu to choose the RAID level.



5. Choose **Submit**.
6. The Property tab provides a status bar letting you know the progress of the RAID migration.

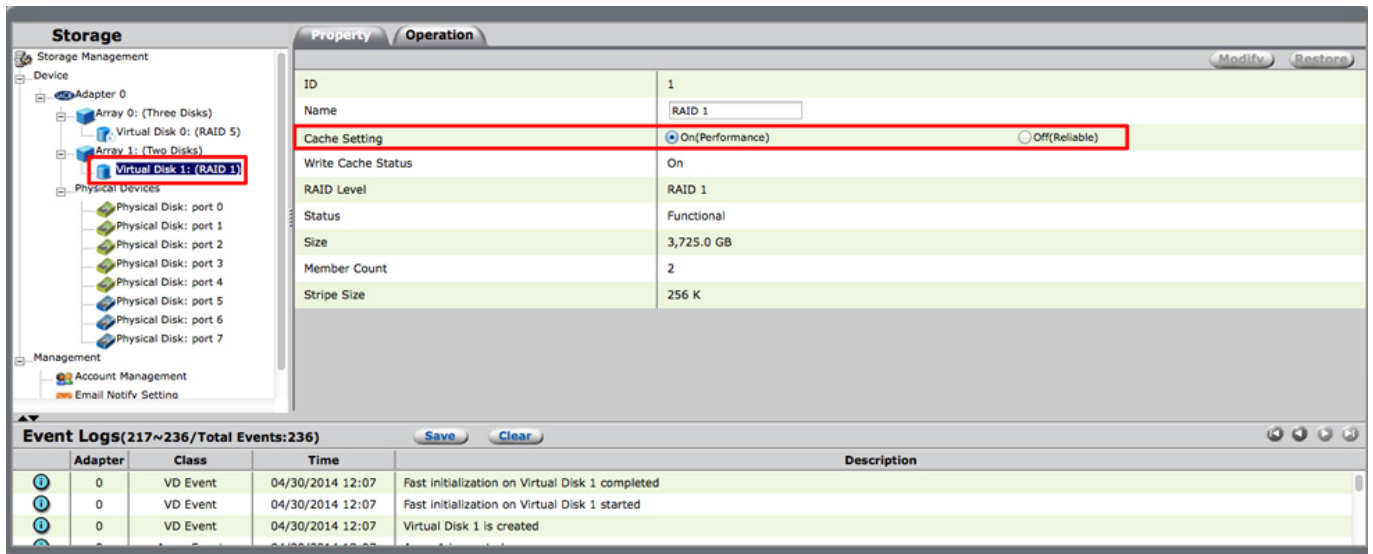
ENHANCING PERFORMANCE: CONTROLLING THE RATE OF BACKGROUND ACTIVITIES



The LaCie professional DAS prioritizes background activities based on the specified control rates. When background activities are in progress, the device is still available to the operating system for normal operations. However, the response time may be slower depending on the background activity control rate.

The rate of various background activities can be modified from the Property tab for the Adapter. Move the slider to adjust the rates and choose **Modify** to confirm the changes.

Modifying the virtual disk cache



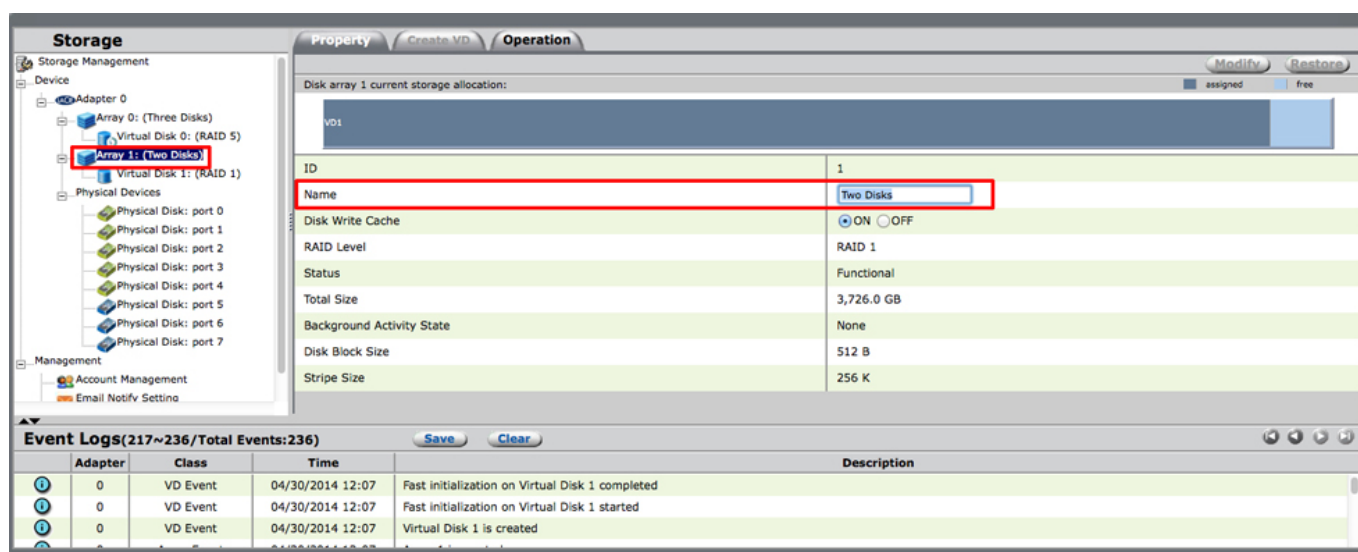
The choice between protection and performance can vary with projects. To accommodate such changes, the cache mode for a virtual disk can be modified from the Property tab for the virtual disk. Select between the options and choose **Modify** to confirm changes.

VIEWING PROPERTIES AND RENAMING

Viewing properties: array, virtual disk, and physical disk

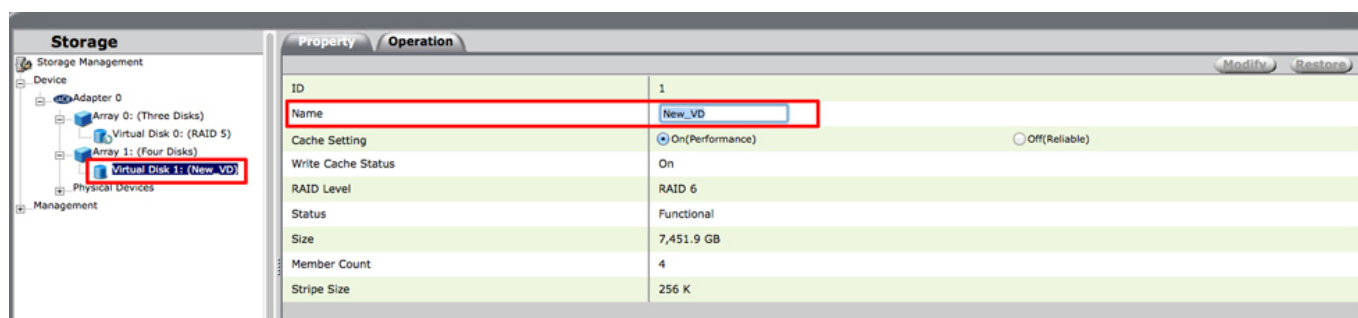
To view the properties of an array, virtual disk, or physical disk, select the item in the Storage pane. The Property tab gives you all the pertinent details.

Renaming the array



The name for an array can be modified from the Property tab for the array. Type a new name in the Name field and select **Modify** to confirm the change.

Renaming the virtual disk



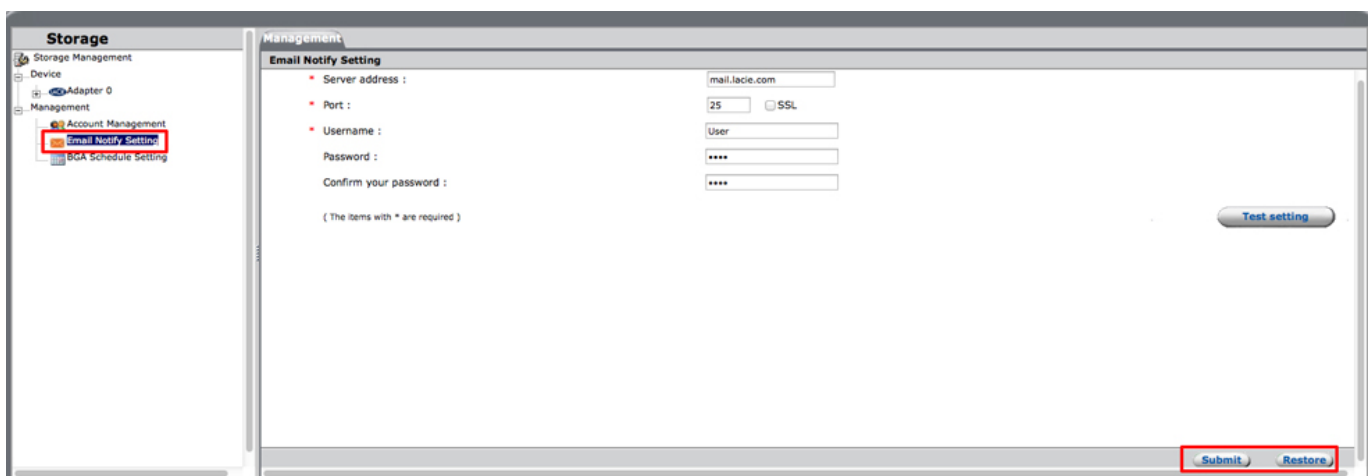
The name for a virtual disk can be modified from the Property tab for the virtual disk. Type a new name in the Name field and select **Modify** to confirm the change.

RECEIVE EMAIL NOTIFICATIONS

LaCie RAID Manager can send event notifications to a user's email account. To configure email alerts, you must have a working SMTP email server. You can use popular email services such as iCloud, Gmail, Outlook, Yahoo Mail, etc.

To send alerts, the LaCie device must be connected to a computer with access to the Internet.

CONFIGURING THE EMAIL SERVER SETTINGS



Before configuring email notification settings, you must have the following information:

- Your email provider's server address.
- Your username and password.
- Your email provider's port.
- If your email provider uses secure socket layer (SSL) for sending emails.

Steps:

1. In the Storage pane, select **Management > E-Mail Notify Settings**.
2. Fill in all fields (see example below).
3. To confirm that the settings are properly configured, choose **Test setting**.
4. Choose **Submit** to save the settings.

Example: Gmail

Gmail has the following settings:

- **Server address:** smtp.gmail.com
- **Port:** 465
- **SSL:** Yes (check the box)

It is recommended that you adjust your router settings to allow port forwarding for the computer that uses the LaCie Thunderbolt 2 device. When configuring port forwarding, use the IP address for the computer. For stability,

you can adjust the network settings on the same computer to a static IP address. Make certain that the static IP address is compatible with your router's settings and that it is not used by another device on the network.

Entering an incorrect IP address can adversely affect network connectivity.

The port number should be available from your email provider. In the Gmail example, the port number is 465.

Check the documentation for your router to learn more on port forwarding and IP addresses.



Configuring the parameters for email notifications

1. In the Storage pane, select **Management > Account Management**.
2. Enter the email address and the types of notifications you want to receive: **Error**; **Warning**; and **Info**.





CHECK THE ARRAY'S HEALTH AND STATUS: ICONS

LaCie RAID Manager features icons to easily identify the state of the LaCie professional DAS and its components.







ARRAY

| Icon | Description | Notes |
|---|----------------|--|
|  | Online array | The array is operating normally. |
|  | Degraded array | The array is degraded and has no fault tolerance. In this state, data is not recoverable if one physical disk fails. Rebuild the array by replacing the failed physical disks. |









EVENTS

| Icon | Description | Notes |
|---|----------------|--|
|  | Normal event | Example: Physical disk 1 is assigned as spare. |
|  | Unknown event | Any event that was not recognized by LaCie RAID Manager. |
|  | Warning event | Example: Virtual Disk 1 is deleted. |
|  | Critical event | Example: Virtual Disk 1 is degraded. |

PHYSICAL DISK

| Icon | Description | Notes |
|---|----------------------------|--|
|  | Unconfigured physical disk | The physical disk is available for use in an array and virtual disk. |
|  | Configured physical disk | The physical disk is part of a virtual disk. |
|  | Foreign physical disk | The foreign physical disk is part of a virtual disk created with another RAID device. The foreign physical disk cannot be used with this device unless the RAID configuration metadata is erased on the disk. |
|  | Offline physical disk | The physical disk is part of a virtual disk and has an error. Check the event log for details and replace the physical disk if necessary. Note: An offline physical disk can render a virtual disk offline or degrade it. |
|  | Unconfigured spare drive | The spare drive is available for rebuilding virtual disks and arrays. |
|  | Configured spare drive | The spare drive was used to rebuild a virtual disk. |

VIRTUAL DISK

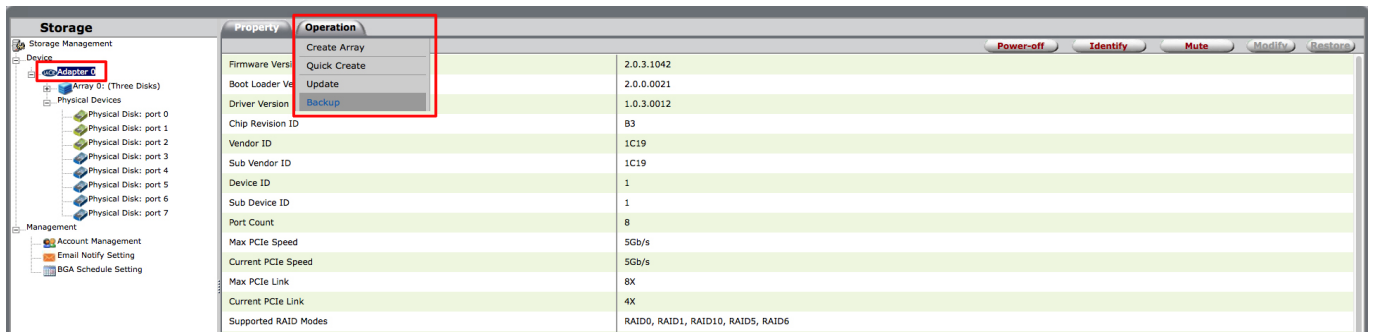
| Icon | Description | Notes |
|---|---|--|
|  | Online virtual disk | The virtual disk is operating normally. |
|  | Online Virtual Disk with Background Activity | The virtual disk is operating normally and performing a background activity. |
|  | Offline virtual disk | This virtual disk is not operating because one or more member physical disks are not connected. Data cannot be written to or read from the virtual disk. |
|  | Foreign virtual disk | The RAID configuration metadata on the physical disk indicates that it is part of a virtual disk that was created with another RAID device. |
|  | Partially optimal virtual disk | One or more physical disks in the virtual disk have failed and reduced the fault tolerance of the virtual disk. The virtual disk is still operating normally. |
|  | Partially optimal virtual disk with background activity | The partially optimal virtual disk is performing a background activity. |
|  | Degraded virtual disk | The virtual disk is degraded and has no fault tolerance. In this state, data is not recoverable if one physical disk fails. Rebuild the virtual disk by replacing the failed physical disks. |
|  | Degraded virtual disk with background activity | The degraded virtual disk is rebuilding. |

UPDATING THE FIRMWARE

LaCie strives to enhance existing products, including occasional updates to your LaCie professional DAS's firmware. Make certain to check the support page for your product to check for firmware updates.

The RAID controller firmware can be updated using LaCie RAID Manager. When new firmware is available, download it from the LaCie website and follow the instructions below.

BACK UP BIOS

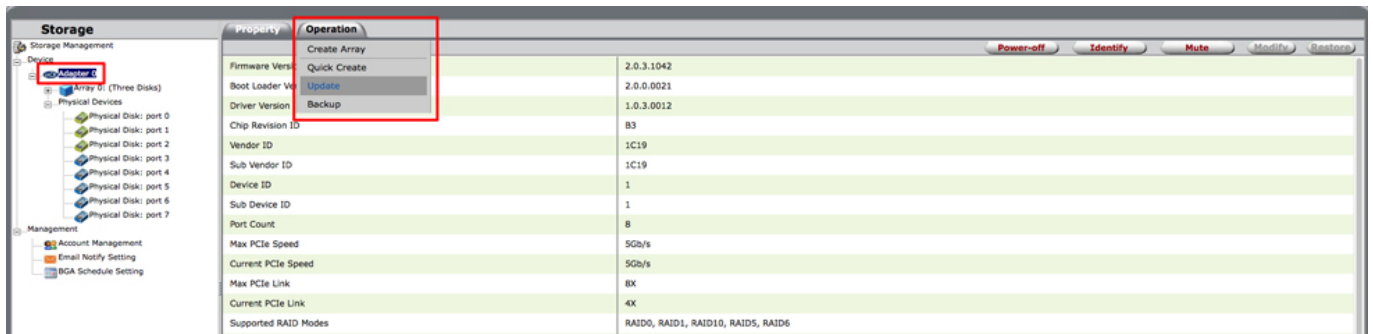


Before updating the firmware, it is recommended that you back up the existing BIOS. This is useful if a problem occurs during the update.

1. Select **Adapter** in the Storage pane.
2. Roll-over the Operation tab, and choose **Backup**.

The BIOS file name begins with BINFILE followed by the date. Check your Downloads folder.

Update the firmware



Important info: Make certain that the file downloaded from LaCie has been unzipped before following the steps below.

1. Select **Adapter** in the Storage pane.
2. Roll-over the Operation tab, and choose **Update**.
3. Click on **Choose File** and browse to the location of the firmware image.
4. Choose **Update**.

The update can take several minutes. You may be prompted to restart the LaCie device.