

IBM System Storage DS4000 Storage Manager

10.10 Demo Guide

Version 1

February, 2008

Contents

- INTRODUCTION.....1**
 - Audience 1
 - Goals of this Document..... 1
 - New for this Version 1
 - Users of Earlier Versions 1

- GETTING STARTED2**
 - Background Information 2
 - Prerequisites 2
 - Loading the software..... 2
 - Exploring the DSM Demo Program..... 3
 - Setting up a Demo Environment 10

- DS4000 STORAGE MANAGER11**
 - Array Creation (Basic Feature) 12
 - Logical Drive Creation (Basic Feature) 14
 - Dynamic Array Expansion (Basic Feature)..... 16
 - Dynamic RAID Migration (Basic Feature) 18
 - Performance Tuning (Basic Feature) 19
 - Performance Monitor 19
 - Changing the System Cache Settings..... 22
 - Logical Drive Cache Settings 23
 - Changing the Logical Drive Preferred path 24
 - FlashCopy (Premium Feature) 25
 - VolumeCopy (Premium Feature) 29
 - Enhanced Remote Mirroring (Premium Feature) 32

- PUTTING TOGETHER AN EFFECTIVE DEMO..... 42**
 - Scenario 1: Identifying Key Issues and Concerns..... 43
 - Scenario 2: Solving Capacity and Utilization Problems 44
 - Scenario 3: Tuning for Performance 45
 - Scenario 4: Adjusting Performance and Data Protection Levels 46
 - Scenario 5: Reducing the Impact of Hot Backups 47
 - Scenario 6: Implementing Business Continuity Initiatives 48
 - Scenario 7: DS4000 Storage Manager Training Session 49
 - Scenario 8: Using SATA Technology..... 50
 - Scenario 9: Building DR Solutions 51

- APPENDIX..... 52**
 - Removing the red “Needs Attention” icon..... 52

Introduction

Audience

Welcome to the *DS4000 Storage Manager Demo Guide*.

The audience for this demo guide are technically-oriented members of the sales community who wish to understand more about how the DS4000 Storage Manager works. This guide is also for members of Field Sales wishing to use this tool to demonstrate capabilities of the DS4000 Storage Manager.

Goals of this Document

During the sales cycle, the DS4000 Storage Manager Demo can be a powerful tool in demonstrating how quickly and easily IBM storage subsystems can solve business problems. This document fulfills two goals:

- To familiarize you with the workings of the DS4000 Storage Manager Demo software. This goal is addressed by the two sections:
 - [“Getting Started” on page 3](#): This section guides you through the process of installing the DS4000 Storage Manager Demo software and setting up a baseline environment
 - [“DS4000 Storage Manager” on page 13](#): This section further explores the DS4000 Storage Manager functions, providing tutorials for setting up and using both basic and premium features.
- To enable you to put together a demo of the DS4000 Storage Manager product for your prospects, and customers that is tailored to their business needs and storage requirements.

[“Putting Together An Effective Demo” on page 59](#) addresses this goal through the presentation of a series of typical business and sales scenarios.

New for this Version

Key new features in this version are the features of version 10.10; including more partitions, more mirrors, more FlashCopy images per base logical drive, and RAID 6 support on the DS4700 and DS4200.

Users of Earlier Versions

The basic functions described in this demo guide apply to all versions of the FAS*t*T Storage Manager (FSM) beginning with 8.0.

Getting Started

Background Information

The DS4000 Storage Manager (DSM) Demo was originally designed for use in testing environments as a stand-alone simulator of DSM functions. With each revision of DSM, the demo program has been updated with new features.

To prevent accidental access to or corruption of critical data, the DSM Demo does not have the ability to access actual storage subsystems.

Prerequisites

The DSM Demo program runs on Windows 2000 or XP environments. Other environments have not been tested nor are they approved for use.

Loading the software

The DSM Demo program is available from a variety of sources (CD, web, etc.) and comes as a zip file with the following name: *SMdemo-1010V1.zip*.

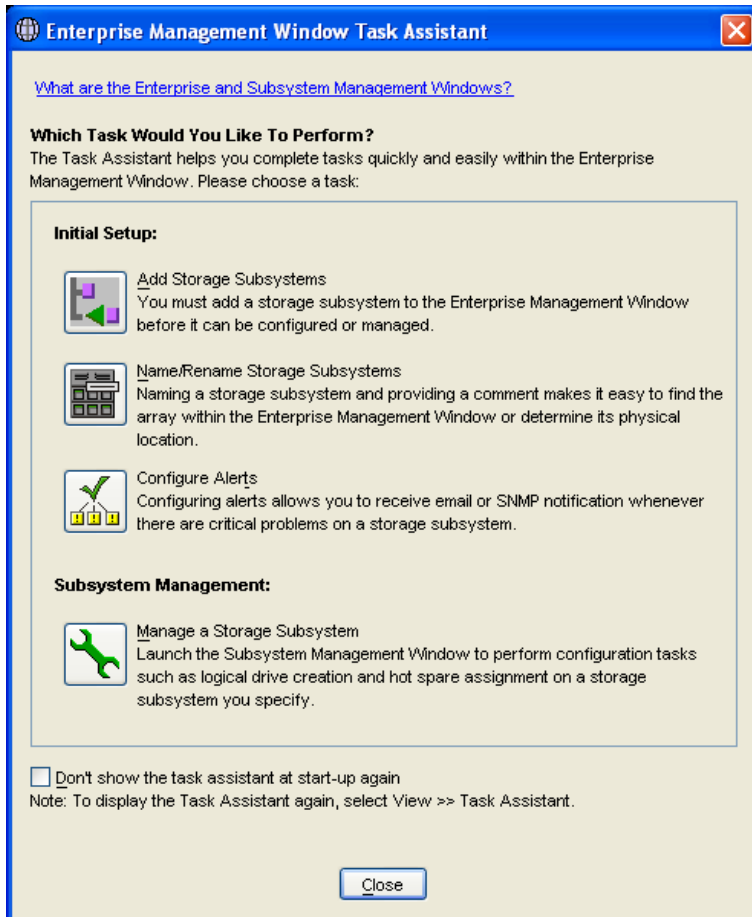
Unzip this file into a folder of your choice. Within this folder will be the **DEMO** folder and simply navigate there and execute the batch file named *StartDemo.bat*.

You're ready to go!

NOTE When the installation of the DSM Demo is completed, it is *not* necessary to reboot your system before executing the *StartDemo* batch file.

Exploring the DSM Demo Program

Executing StartDemo.bat starts a Java session with the DSM Demo program. You'll see the following two screens - the DSM splash screen identifying the DSM demo followed by the Enterprise Management Window Task Assistant screen:



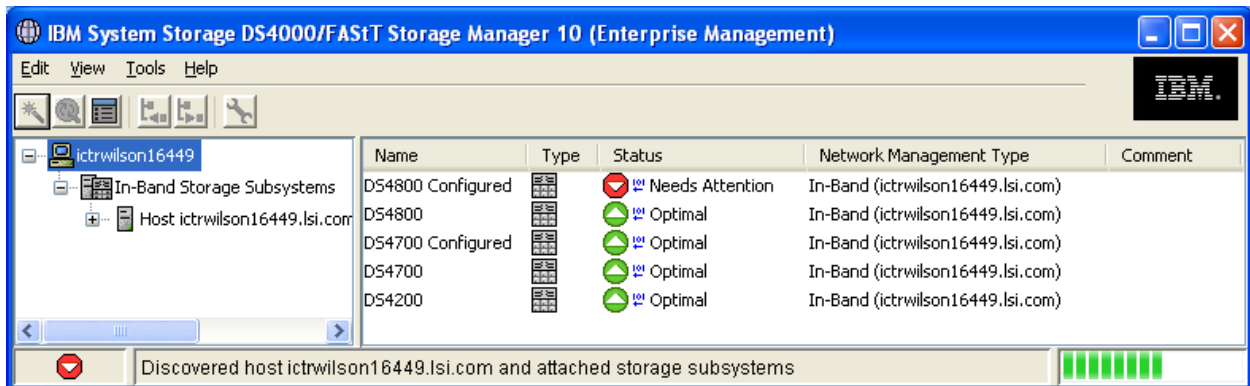
The Enterprise Management Window Task Assistant is a new series of wizards that helps you install your new DS4000 storage system. Common tasks that the Task Assistant provide include:

- Add Storage Subsystems
- Name/Rename Storage Subsystems
- Configure Alerts
- Manage a Storage Subsystem

Feel free to explore the Task Assistant. When you're finished close the Task Assistant window.

Click on the leftmost power icon button to auto-discover the storage subsystems.

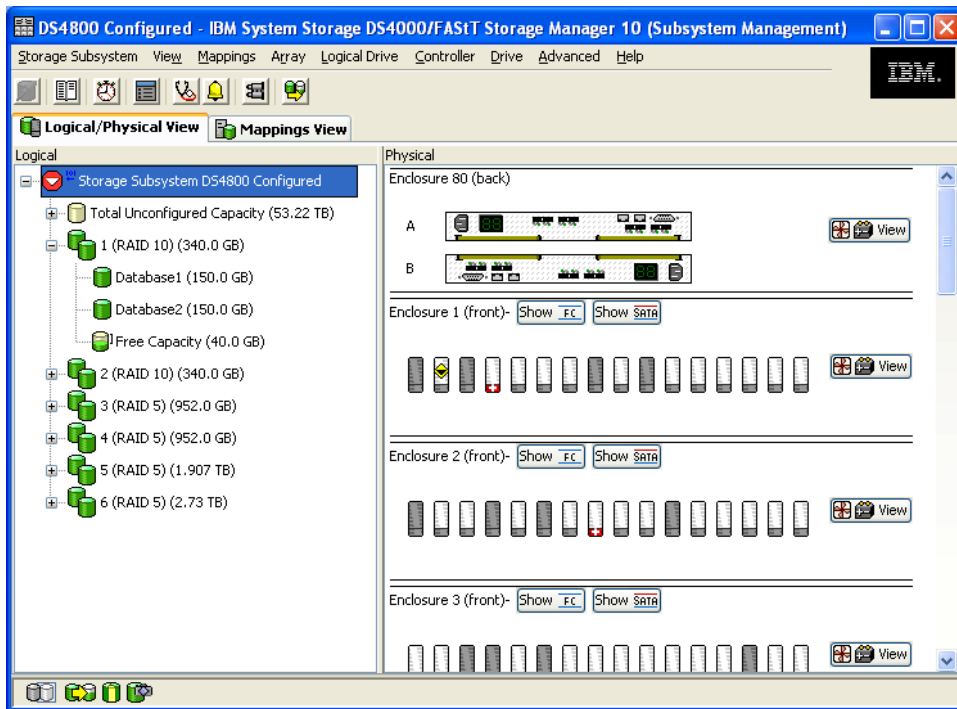
You will now see the **Enterprise Management** window describing the four configurations:



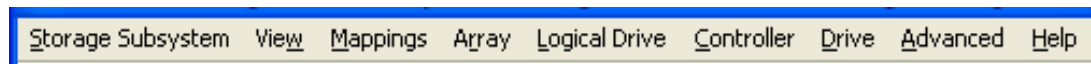
The four storage subsystems are configured as follows:

- **DS4800 Configured** – This system has multiple EXP810 expansion units intermixed with FC and SATA drives, all of the DSM premium features are enabled and there are several arrays configured using different RAID levels.
- **DS4800** – This system has multiple EXP810 expansion units intermixed with FC and SATA drives, all of the DSM premium features are enabled and no arrays are configured.
- **DS4700 Configured** – This system has one controller module (with internal capacity for 16 disk drives) and multiple EXP810 expansion units intermixed with FC and SATA drive, all of the DSM premium features are enabled and there are several arrays configured using different RAID levels.
- **DS4700** – This system has one controller module (with internal capacity for 16 disk drives) and multiple EXP810 expansion units intermixed with FC and SATA drive, all of the DSM premium features are enabled and no arrays are configured.
- **DS4200** – This system has one controller module (with internal capacity for 16 SATA disk drives) and multiple EXP420 expansion units, all of the DSM premium features are enabled and no arrays are configured.

For our exploration of the DSM Demo, we'll use the third storage subsystem configuration, **DS4700 Configured**. Select the **DS4700 Configured** configuration by double-clicking it in the right panel. This displays the **Subsystem Management** window:



The menu bar of the **Subsystem Management** window provides access to all the components and functions of the FAST storage subsystem:



where:

- **Storage Subsystem** provides access to:
 - Premium features
 - Remote mirroring
 - Performance monitoring
 - Recovery Guru
- **View** provides access to:
 - Physical view of the system
 - Mapping of logical drives to hosts
 - Event logs

- **Mappings** allows:
 - Defines, moves, and changes to logical drives
- **Array** allows changes to:
 - Create logical drives
 - Add free capacity
 - Initialization
- **Logical Drive** provides the ability to:
 - Create, initialize, delete, rename
 - Volume Copy
 - Remote Mirror
 - Flash Copy
- **Controller** allows changes:
 - Set Online/Offline
 - Run Diagnostics
- **Drive** allows changes:
 - Initialize, reconstruct, revive
 - Hot spare
- **Advanced** allows
 - Firmware downloads
 - Persistent reservation

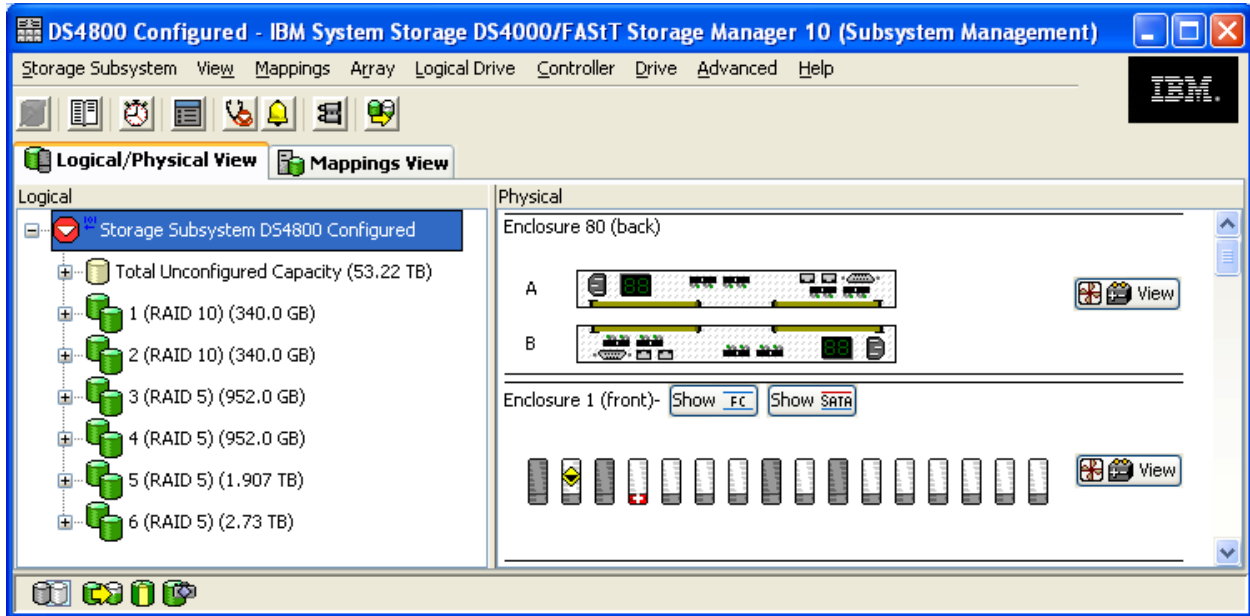
Just below the menu bar are icon shortcuts to more popular options.



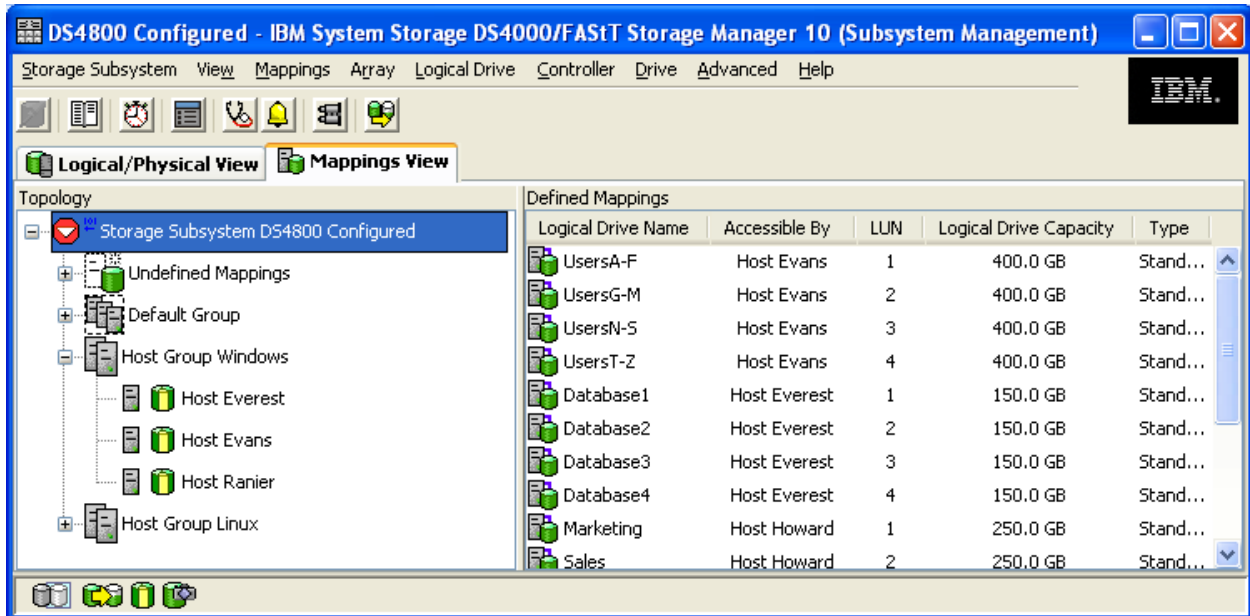
From left to right, the icons are:

- **Create** new logical drives
- **View** diagnostic event log
- **Monitor** performance
- **Display** Task Assistant
- **Recover** from failures
- **Manage** controller enclosure alarm
- **Find node** in tree
- **Launch** Copy Manager

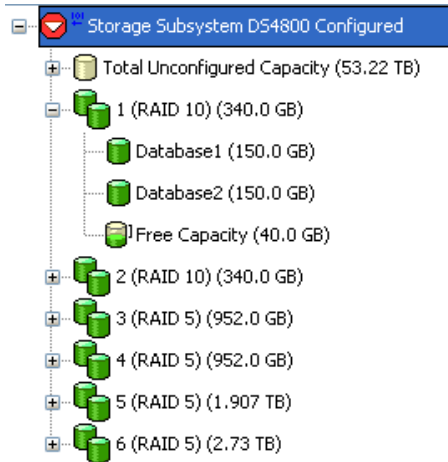
Below the icon shortcuts are the tabbed views for **Logical/Physical View** and **Mappings View**. The first tab, **Logical/Physical View**, provides a visual display of the arrays:



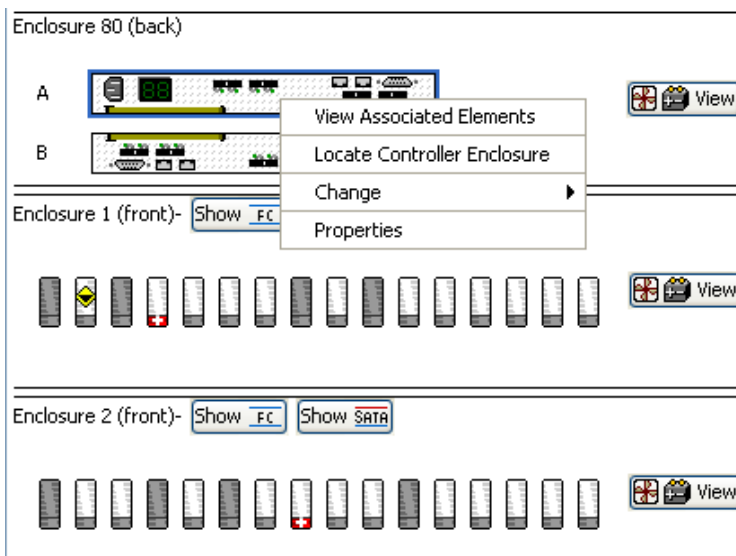
The second tab, **Mappings View**, provides a view of how each logical drive is mapped to a host:



Returning to the **Physical View**, clicking on any of the array icons displays the logical drives defined for that particular array. In this example array **1** has two logical drives – **Database1** and **Database2**:



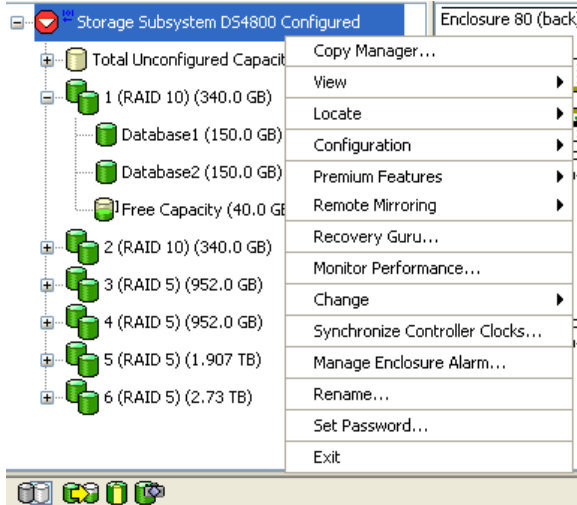
In the right panel are the controller and the drive enclosure objects. Clicking on an item within the respective objects enables access and control of the specific device or controller.



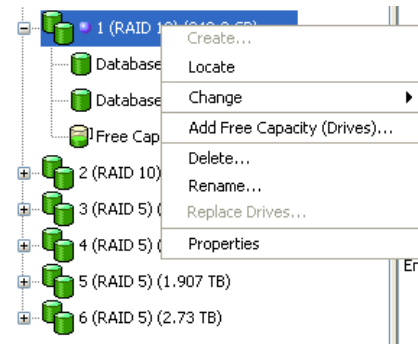
In general, selecting an object (array, logical drive, controller, drive) and right-clicking pops up a list of commands associated with the object. The same control is also achieved by using the equivalent menu selection item. For example, right-clicking a **logical drive** in array **1** is the same as clicking on the **Logical Drive** menu option.

The examples below show that right-clicking of a storage object pops up a list of allowed functions for that object:

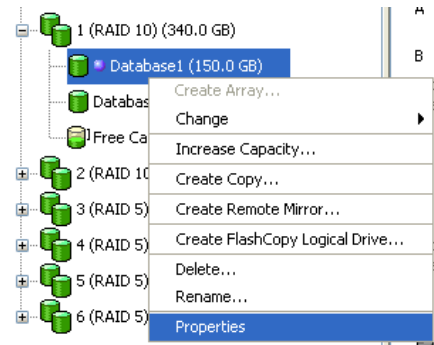
Storage system:



RAID array:



Logical Drive:



Setting up a Demo Environment

The DS4000 Storage Manager Demo is self-contained and runs on virtually any Windows 2000 or XP system.

With the pre-configured storage subsystems, you can select the appropriate storage subsystem as the basis to demonstrate features. For a simple but comprehensive walkthrough of the DS4000 environment, the ***DS4800 Configured*** or ***DS4700 Configured*** storage subsystems are ideal. They contain several drive enclosures, a number of logical drives, and all of the premium features are enabled.

The other systems – ***DS4800***, ***DS4700*** and ***DS4200*** – are also suitable for any in-depth exploration of the DS4000 Storage Manager feature set. These systems have either no arrays, or minimal arrays, defined for the subsystem and can serve as a basis for developing all or additional arrays, logical drives, and enabling premium features that are contained.

You may wish to read [“Putting Together An Effective Demo” on page 42](#) to see how to customize the demo for your customer’s business needs and storage requirements.

DS4000 Storage Manager

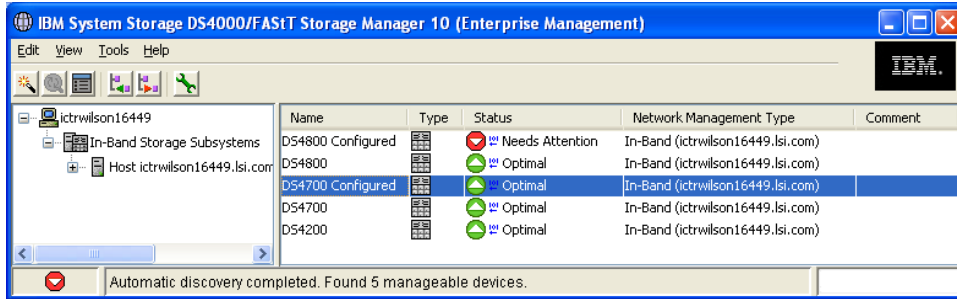
This section covers both basic and premium features of the DS4000 Storage Manager (DSM):

- Basic Features
 - Array Creation
 - Logical Drive Creation
 - Dynamic Array Expansion
 - Dynamic RAID Migration
 - Performance Tuning
- Premium Features
 - FlashCopy
 - VolumeCopy
 - Remote Mirroring

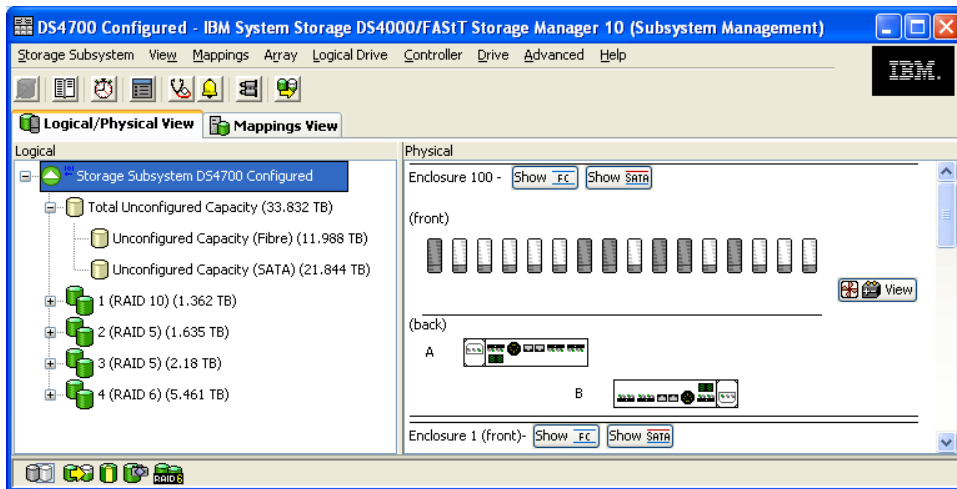
NOTE The examples shown in this section are based on the *DS4700 Configured* storage subsystem described in [“Getting Started” on page 3](#).

Array Creation (Basic Feature)

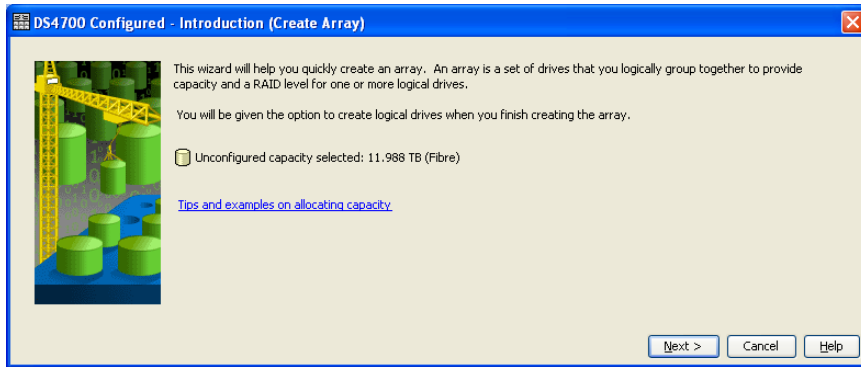
The DS4000 Storage Manager provides an easy-to-use wizard for creating an array. This wizard will assist you in creating a new array. Begin by double-clicking the DS4700 system from the EMW window.



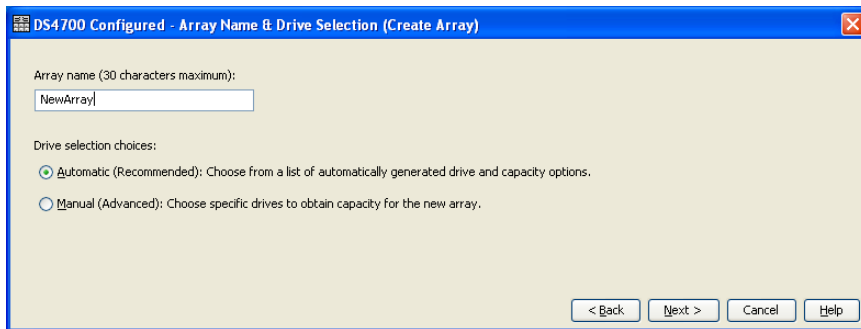
From there, expand the Total Unconfigured Capacity by clicking on the “+” sign. This then shows the amount of unconfigured capacity on Fibre drives and SATA drives.



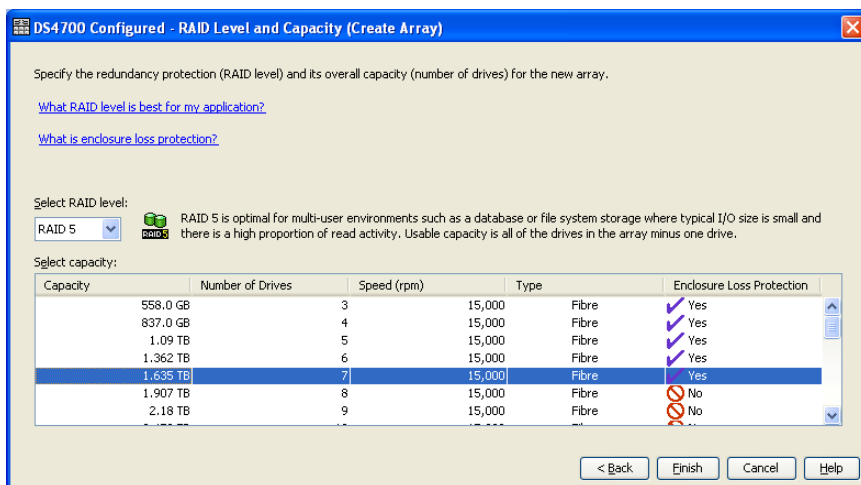
To start the wizard, right-click **Unconfigured Capacity (Fibre)** and select **Create Array**. The **Create Array Wizard** walks you through the following screens:



The first screen lets you name the array (for this example we'll use "NewArray") and choose from either Automatic drive selection or manual drive selection. For this example, we'll choose **Automatic**.



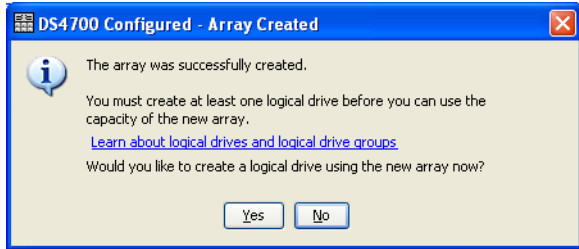
After selecting a RAID level (for this example we'll use "5"), you'll be presented with a list of choices reflecting different capacities, number of drives, drive types and whether enclosure loss protection is achieved or not. For this example, let's choose 1.635 TB if capacity on 7 drives.



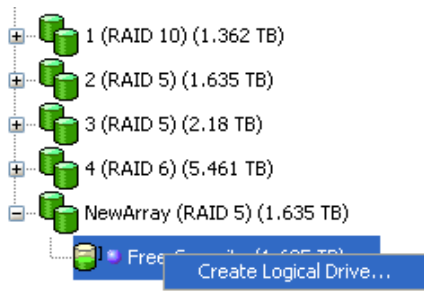
The array is created and the next step is to create the new logical drive.

Logical Drive Creation (Basic Feature)

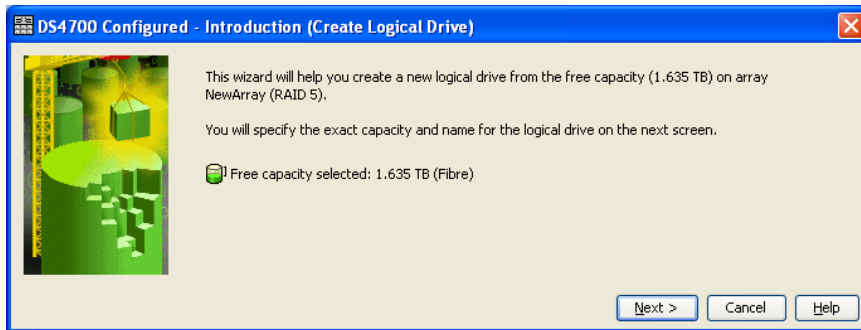
The DS4000 Storage Manager provides an easy-to-use wizard for creating a logical drive of any size. If you have just created an array, you'll be asked if you want to create a logical drive on that new array.



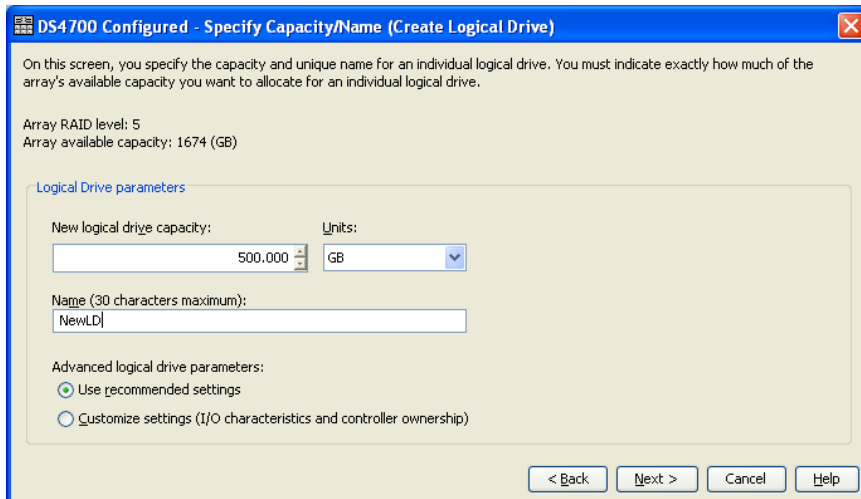
You can also launch the wizard by right-clicking on the free capacity within the array and selecting **Create Logical Drive**.



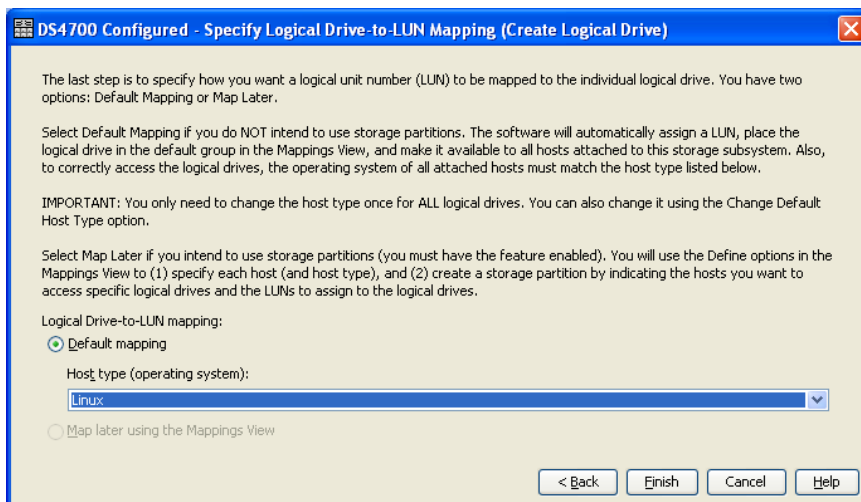
This wizard will assist you in creating a new logical drive.



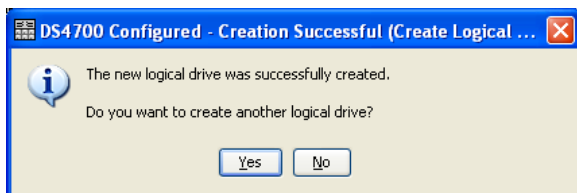
The next screen will ask you for specific parameters for your new logical drive. You can select the required capacity and specify a name for the new logical drive. For our example, we will use **500GB** and name the new logical drive **NewLD**:



The next screen of the wizard asks you to specify the type of host environment that will be accessing this new logical drive. As shown in the next graphic, the pull-down list supplies a number of host environments from which you can select the required host OS environment:



When you click the **Finish** button, the new logical drive is created and a validation message is displayed. If you wish to create another logical drive, you can specify if it is for the same array or a different array, then click **Yes** to perform the process for the new logical drive. Otherwise, click **No**.

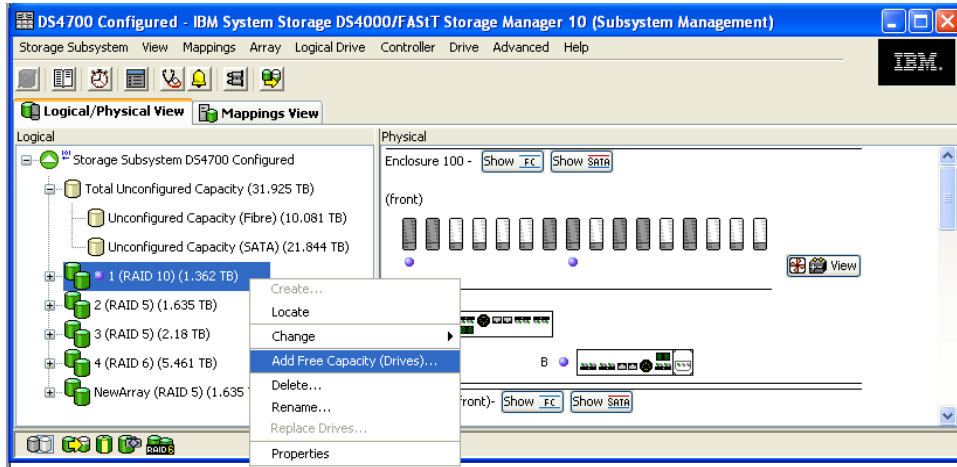


Once you have created all necessary logical drives, you can click **OK** button in the validation dialog box and you're done!

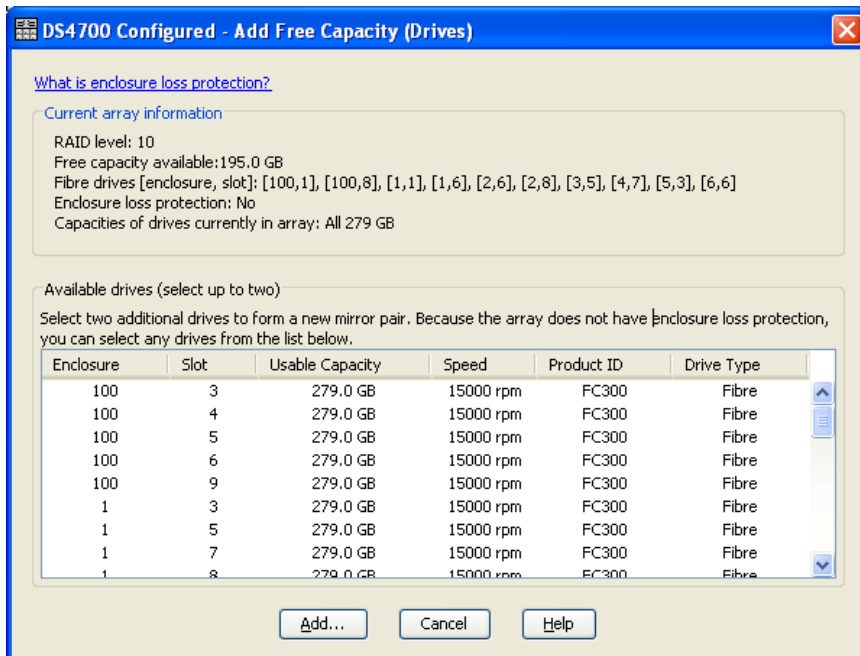
Dynamic Array Expansion (Basic Feature)

The DS4000 Storage Manager provides an easy method to expand the capacity of an array by simply adding more drives to it.

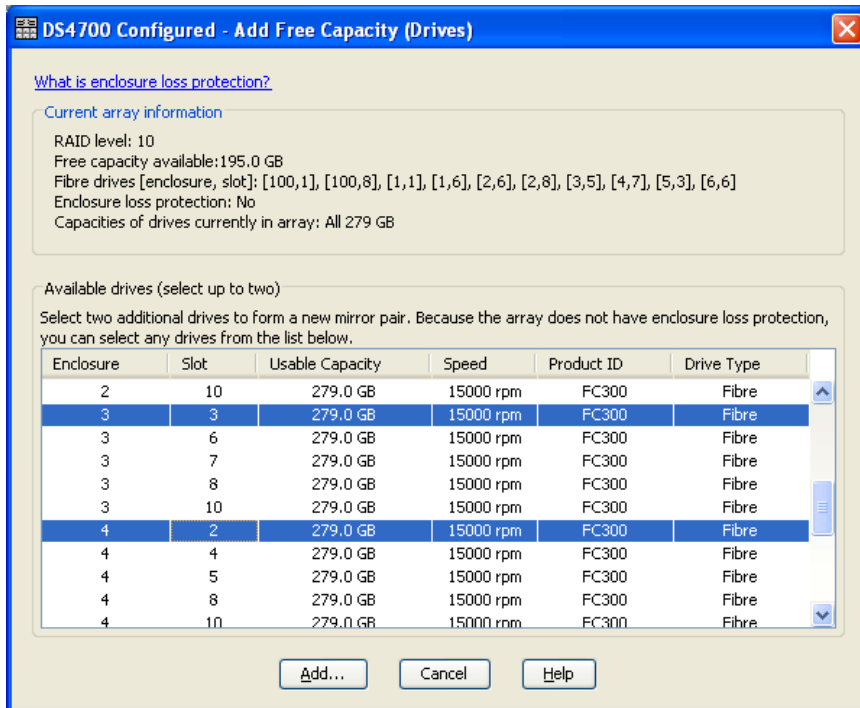
First, select the array that you wish to expand. For this example, right-click array *1* and select **Add Free Capacity**.




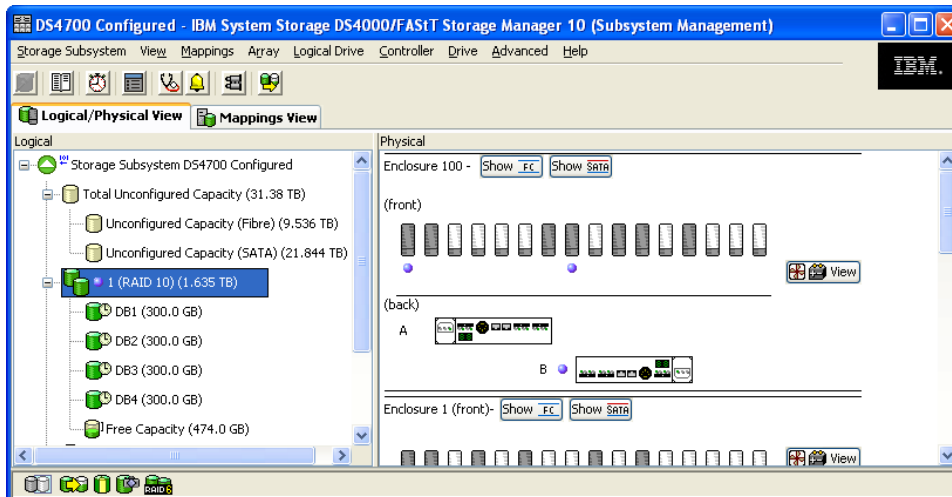
The **Add Free Capacity** dialog window displays, showing all drives that are available (unassigned) for use in dynamic array expansion. The **Array Information** section of the dialog window shows the RAID level and current drive capacities for the selected array. For our example, array *1* is shown as being **RAID level 10** and uses all **279 (300) GB** drives:



In the list box of **Available Drives**, select the number of drives to add (note that RAID 1 requires the selection of 2 drives). For this example, use the first available drive in enclosures 3 and 4.:



You will then get a dialog box requesting confirmation of your wish to perform the operation to expand the array capacity. Select OK. An **In Progress** indicator  is displayed until the operation is completed, after which you will see the original array with its new, upgraded capacity.

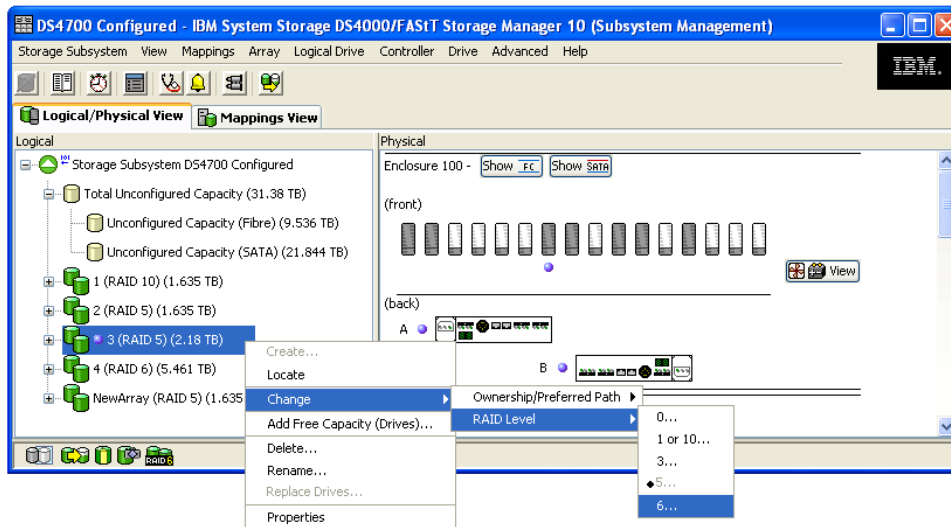


You're done expanding the capacity of an existing array!

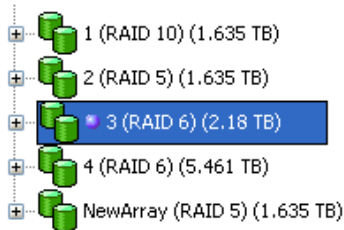
Dynamic RAID Migration (Basic Feature)

Another basic feature of the DS4000 Storage Manager is the easy way to dynamically change the RAID level of an array. This feature allows changing the RAID level for more performance or data protection (or both) while continuing to provide access to all the logical drives in the array.

First, select the array for which you wish to change the RAID level. For this example, select array 3. The RAID level for this array is currently RAID 5, but we will change it to RAID 6. Right-click the selected array and, in the resulting shortcut menus, select **Change**, then **RAID Level**, then select **6**:



This indicates that you want to change the RAID level to RAID 5. Before the operation begins, the **Confirm Change RAID Level** dialog box appears to ask you to confirm your selection. Click the **Yes** button. When the operation is complete, the **Subsystem Management** screen is updated and displayed to show the new RAID level for the array:



That's it — you've successfully changed the RAID level for your storage system.

Performance Tuning (Basic Feature)

The DS4000 Storage Manager also features an easy-to-use performance monitoring tool for DS4000 storage systems. In addition, there are a number of performance tuning options available to control the storage subsystem cache settings.

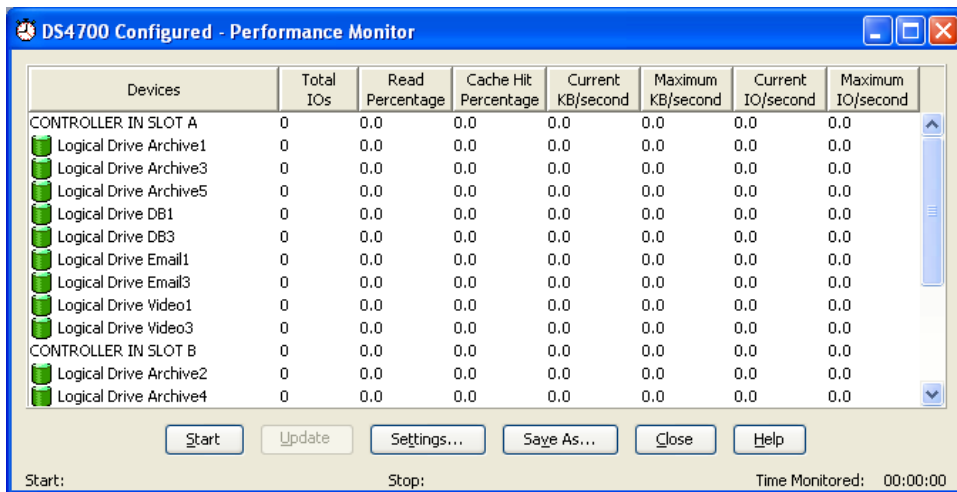
We will first look at the basic performance monitoring tool built into the DS4000 Storage Manager.

Performance Monitor

To start up the Performance Monitor, click the **Monitor Performance** button



This displays the initial **Performance Monitor** window:



Note that there are no accumulated statistics for any of the logical drives listed.

We will begin a performance monitor sample for all the logical drives using a predefined measurement interval. Click the **Start** button to begin.

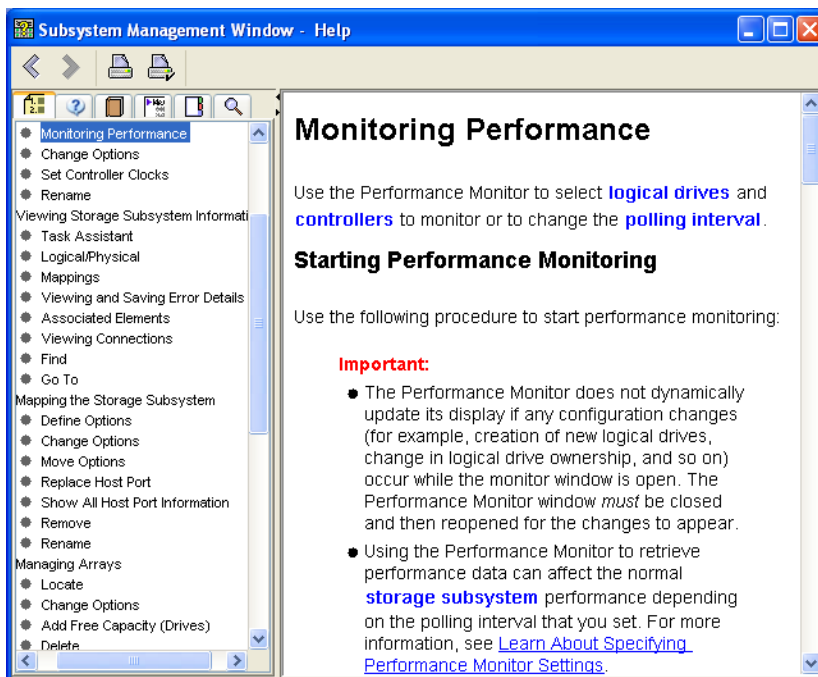
The window now shows statistics for each of the logical drives:

Devices	Total IOs	Read Percentage	Cache Hit Percentage	Current KB/second	Maximum KB/second	Current IO/second	Maximum IO/second
CONTROLLER IN SLOT A	249,357	61.9	17.2	5,381.8	6,437.0	10,764.0	12,875.0
Logical Drive Archive1	24,852	55.3	19.3	302.0	928.4	604.0	1,857.0
Logical Drive Archive3	27,643	58.5	19.9	382.0	977.0	764.0	1,954.0
Logical Drive Archive5	29,063	67.2	15.9	591.0	1,007.0	1,182.0	2,014.0
Logical Drive DB1	31,891	71.7	15.2	1,008.4	1,008.4	2,017.0	2,017.0
Logical Drive DB3	23,284	45.0	17.3	470.6	778.6	941.0	1,557.0
Logical Drive Email1	25,805	55.5	15.2	550.4	857.5	1,101.0	1,715.0
Logical Drive Email3	33,425	76.5	17.2	759.4	937.5	1,519.0	1,875.0
Logical Drive Video1	30,646	72.5	18.0	936.0	1,016.4	1,872.0	2,033.0
Logical Drive Video3	22,748	41.9	18.5	382.0	817.0	764.0	1,634.0
CONTROLLER IN SLOT B	259,926	62.3	18.1	5,829.0	6,575.6	11,658.0	13,151.0
Logical Drive Archive2	24,001	44.6	16.6	463.0	720.4	926.0	1,441.0
Logical Drive Archive4	36,437	78.7	18.1	559.4	977.0	1,119.0	1,954.0

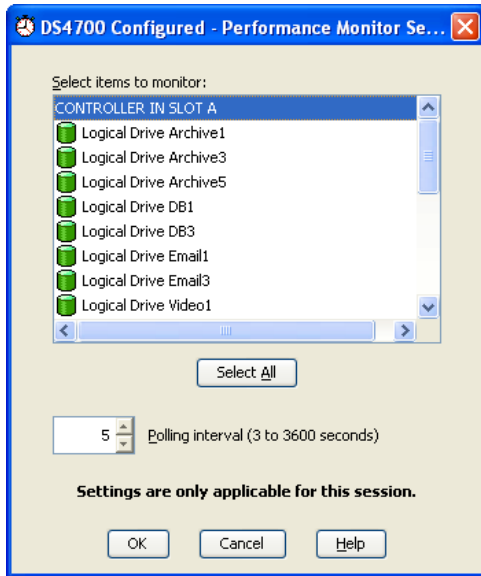
Start: 2/21/08 9:36:06 AM Stop: Time Monitored: 00:00:25

In the **Performance Monitor** window, note that the **Start** button now has changed to the **Stop** button because the performance monitor is now running.

For an explanation of each measurement, click the **Help** button:

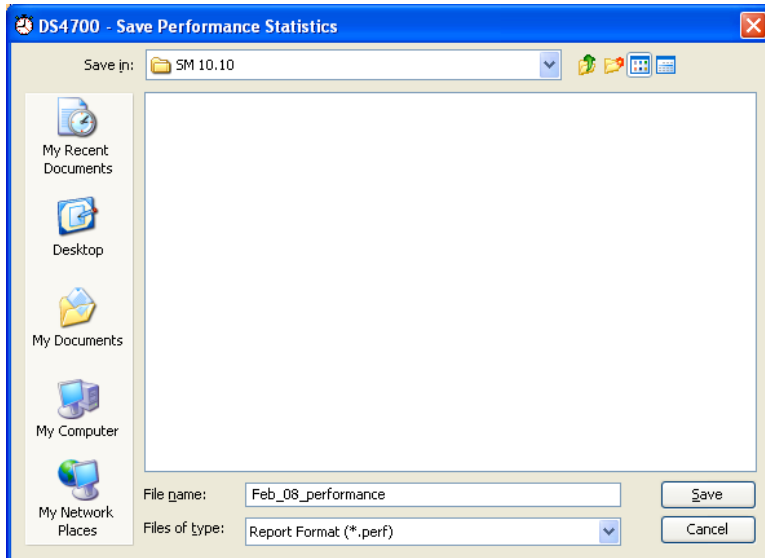


You can set a measurement interval and the performance monitor can also be set up to measure specific logical drives. Both of these options can be performed by clicking the **Stop** button followed by the **Settings** button at the bottom of the **Performance Monitor** screen. This displays the **Performance Monitor Settings** dialog window:



Specify which items are to be monitored, and a desired polling interval, then click **OK** to put these settings into effect and close the dialog screen.

Lastly, to collect statistics for long-term analysis there is the ability to save these measurements to a file on your client system. On the **Performance Monitor** screen, click the **Save as** button to display the **Save Performance Statistics** dialog box:

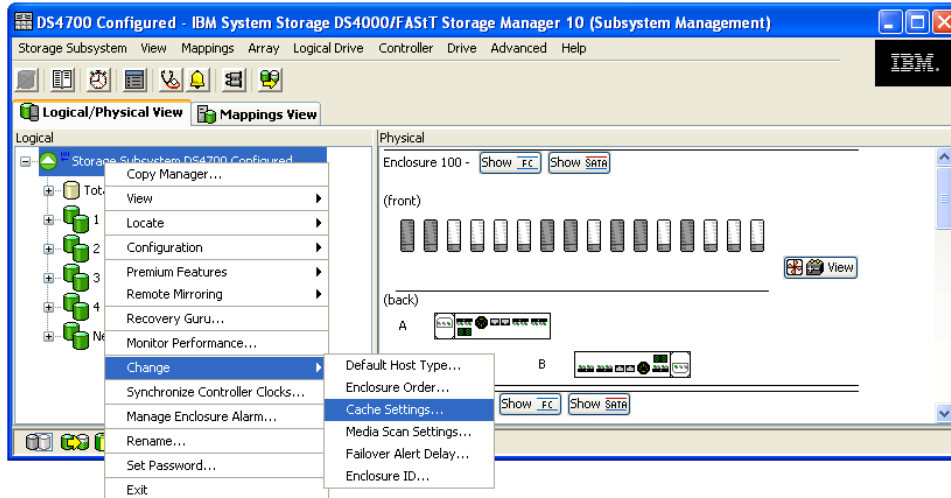


Specify the name of the file in which the statistics are to be saved, then click **Save** to create the file and save the statistics to this file.

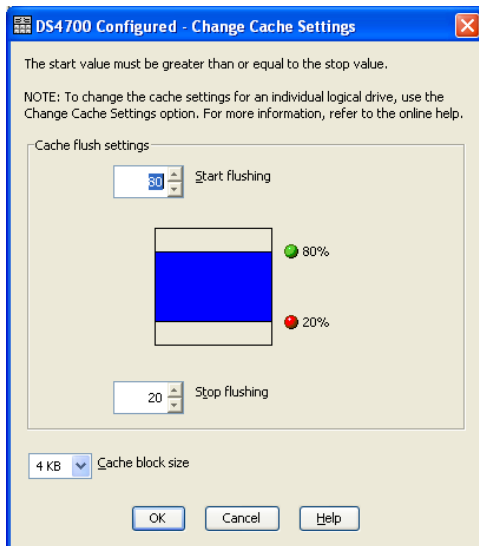
Changing the System Cache Settings

The storage subsystem can also be tuned by adjusting the cache settings for various storage objects.

To change cache settings, display the **Subsystem Management** window. Right-click **Storage Subsystem DS4700 Configured** and select **Change** and select **Cache Settings**:



The Change Cache Settings dialog box displays.



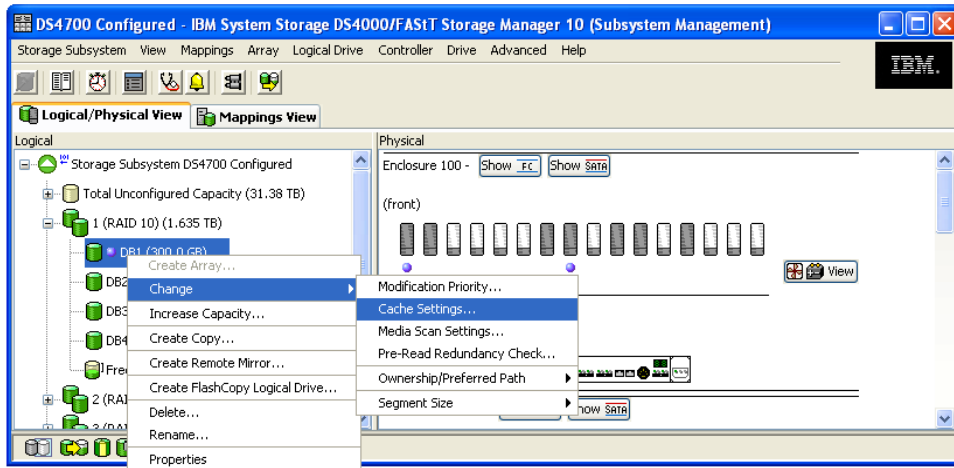
This dialog box allows you to:

- Change the cache flush algorithm.
- Select when to start flushing the cache (when the cache reaches a certain level of use).
- Determine when to stop flushing the cache (when the amount of used cache is reduced to this level of use).

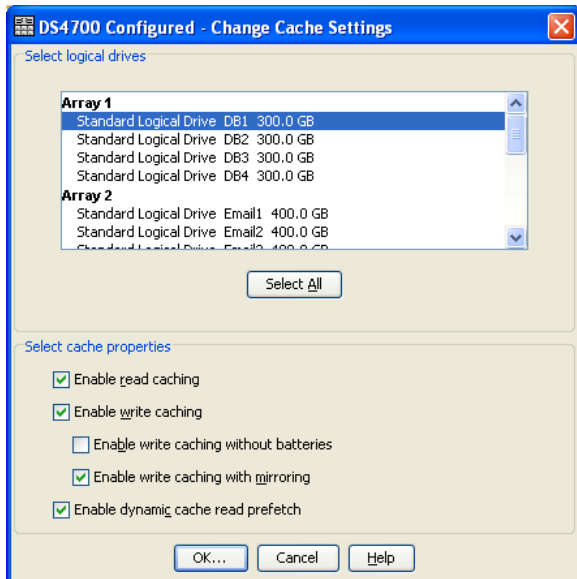
Logical Drive Cache Settings

For each logical drive, you can enable or disable caching on reads or writes.

To illustrate this, display the **Subsystem Management** window and select a logical drive. Right-click the selected logical drive and, from the resulting menus, select **Change**, and then **Cache Settings**:



This displays the **Change Cache Settings** dialog box:



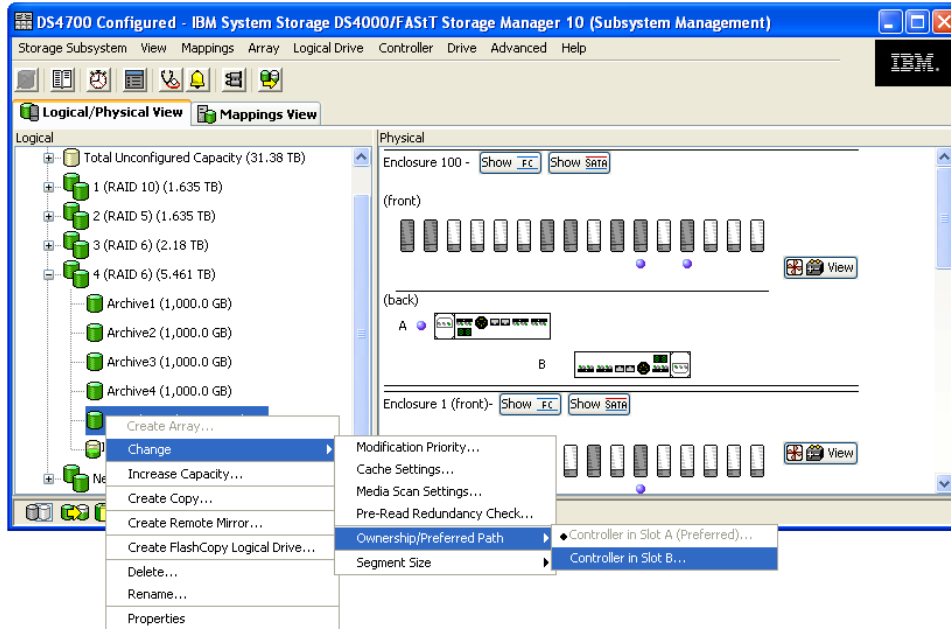
You can enable or disable caching on reads or writes. In addition, another option you can set is whether the controller performs write cache mirroring.

Once these options are set, you will see a dialog box confirming your choices.

Changing the Logical Drive Preferred Path

Logical drives may have their preferred path changed for tuning performance by switching controller access.

In the **Subsystem Management** window, right-click the **Backup3** logical drive and select **Change** then **Ownership/Preferred Path** then **Controller in Slot A**:



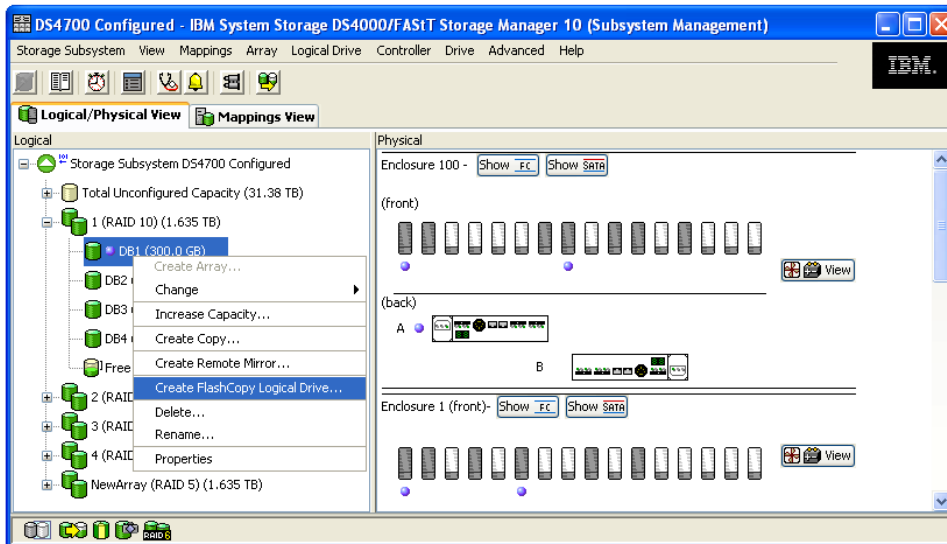
The resulting dialog box asks you to confirm the change from **Controller A** to **Controller B**:

FlashCopy (Premium Feature)

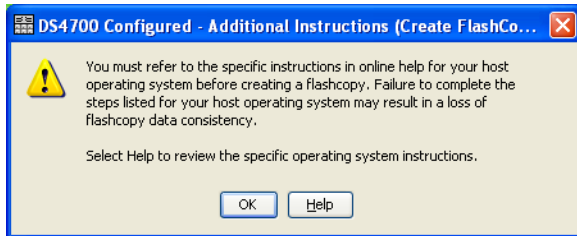
FlashCopy is a premium feature of the DS4000 Storage Manager that allows the creation of point-in-time copies of logical drives. Any logical drive may use FlashCopy to create a point-in-time copy at any time. However, there are setup requirements that need to be decided before the first use.

For the selected logical drive, a FlashCopy wizard walks you through the necessary steps to create a repository which is part of the FlashCopy process.

Start by selecting a logical drive in the **Subsystem Management** window. For this example, we use the **DB1** logical drive in array *I*. Right-click on **DB1** and select **Create FlashCopy Logic Drive**:

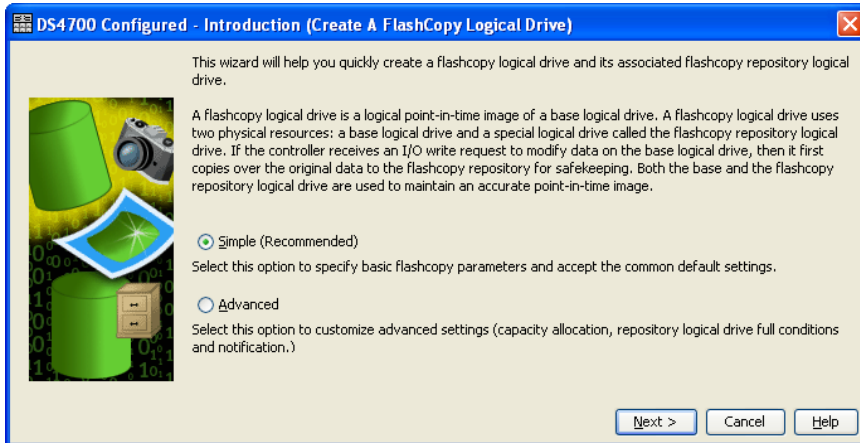


The wizard-assisted process starts up and displays an initial dialog box:

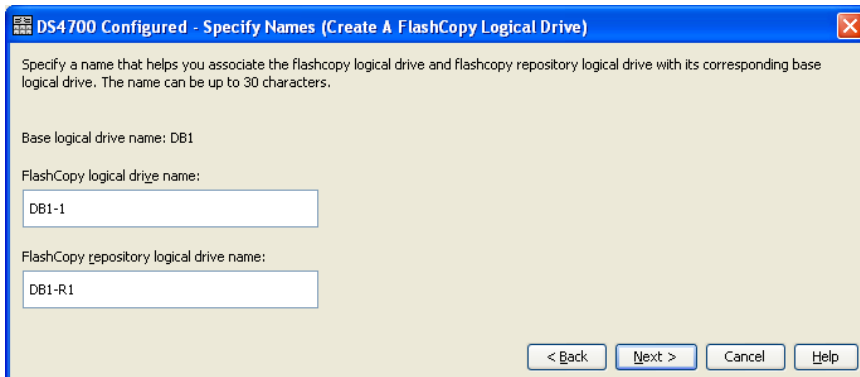


Because FlashCopy point-in-time copies are usually invoked from the server level, this requires an understanding of the host Operating System environment before performing this operation. The dialog box is simply a warning to review the appropriate background material.

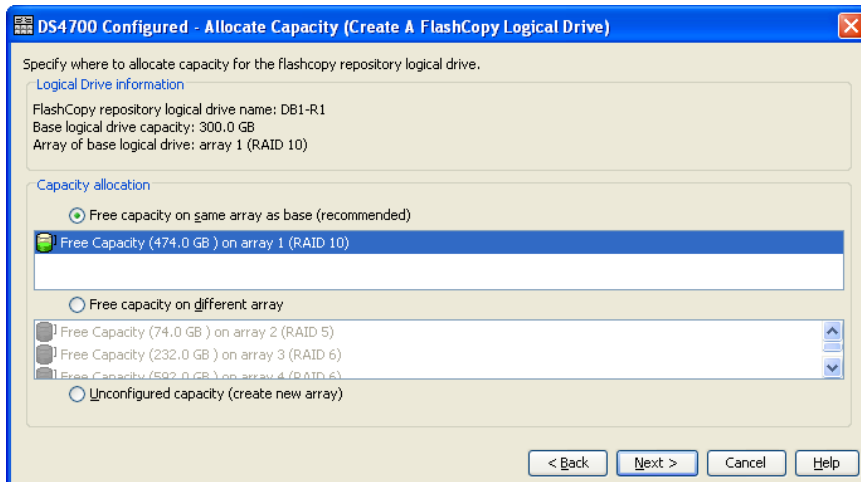
Once you click **OK** in the dialog box, the first screen of the FlashCopy wizard looks like this:



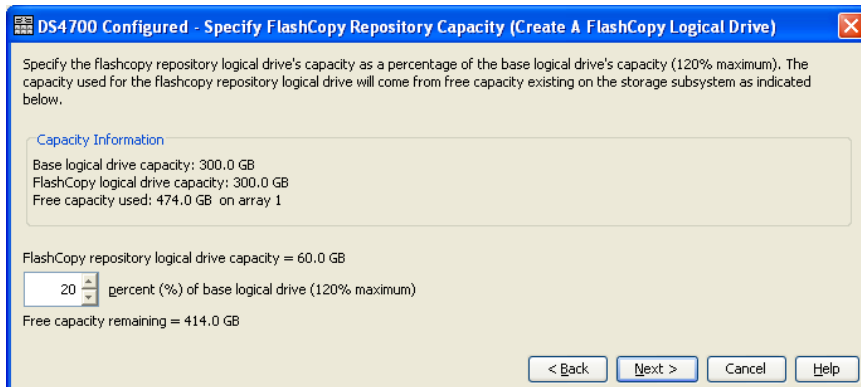
You have the choice of taking the default **Simple** setup or, for more control over the FlashCopy parameters, there's the **Advanced** option. For this example, select the **Advanced** option. You will then specify the names for the FlashCopy logical drive (DB1-1) and its repository logical drive (DB1-R1).



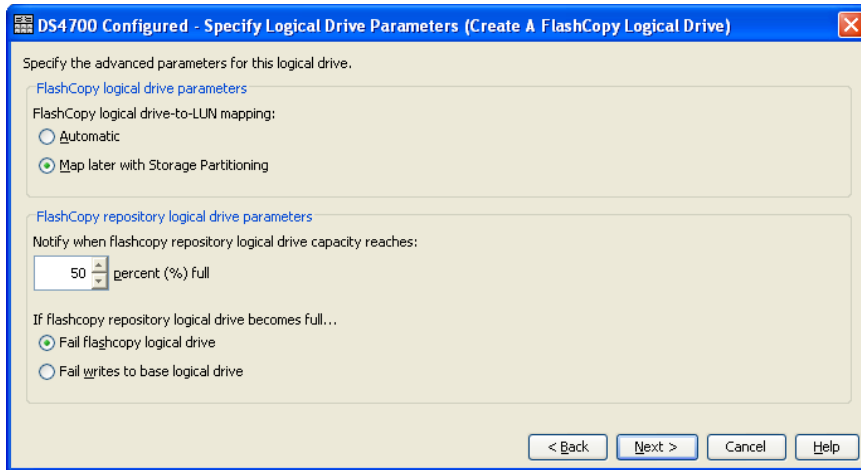
Once you specify the appropriate names and click **Next**, you select the location and size of the FlashCopy repository. Since there is enough free capacity available in the Database array, you can simply select **Next**.



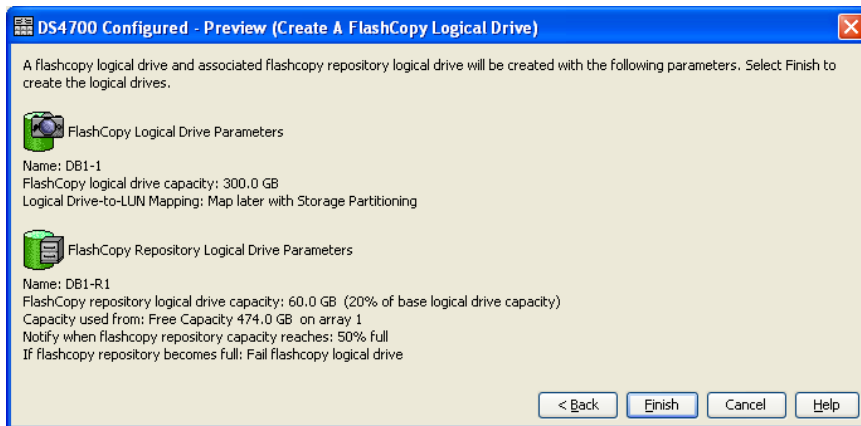
This dialog asks for the percentage of the base logical drive to be used as a size for the repository information. This is simply the amount of changes (writes or updates) to the base logical drive expected during the expected life of the FlashCopy logical drive. For example, a 20% specification allows up to 20% of the original logical drive to change before the repository becomes full. Do note that repository logical drives may be dynamically expanded should they become full.



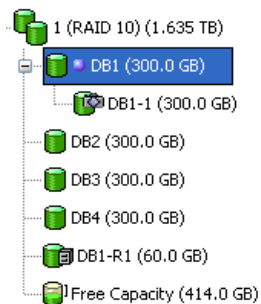
Next you'll be asked to select some parameters for the FlashCopy Logical Drive and its repository.



The wizard continues with the **Summary** screen that shows summary information regarding the FlashCopy logical drive and its repository.



Clicking **Finish** in the **Summary** screen displays a screen with a note regarding the FlashCopy operation. Clicking **OK** closes the dialog screen and performs the operation. The **Subsystem Management** screen eventually displays, showing the addition of the FlashCopy logical drive, **DB1-I**, and the repository logical drive, **DB1-R1**, in array **1**.



You're done!

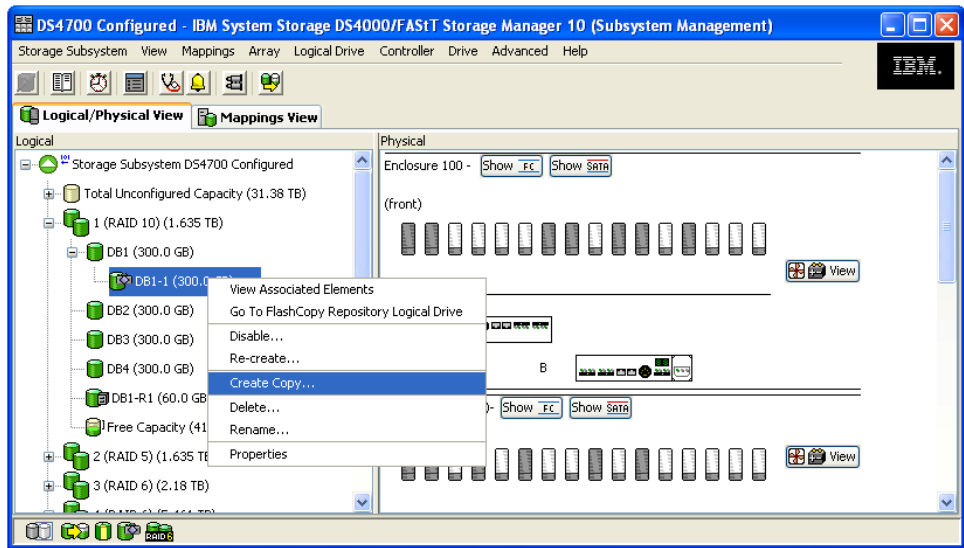
VolumeCopy (Premium Feature)

Another premium feature of the DS4000 Storage Manager is the VolumeCopy capability that allows the copying of logical drives. This feature is used in conjunction with FlashCopy to provide an independent copy of a point-in-time FlashCopy logical drive.

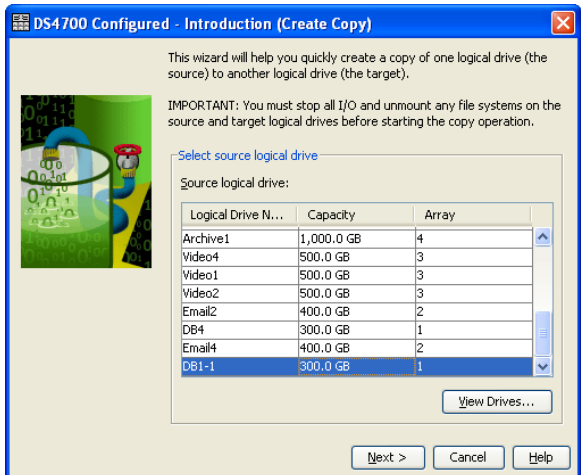
Any logical drive may use the combination of FlashCopy and VolumeCopy to create a full point-in-time copy at any time. However, as with FlashCopy, there are setup requirements that need to be decided before the first use of VolumeCopy.

For the selected logical drive, a VolumeCopy wizard walks you through the necessary steps. Start by selecting a logical drive. For this example, use the FlashCopy image of the logical drive **DB1**.

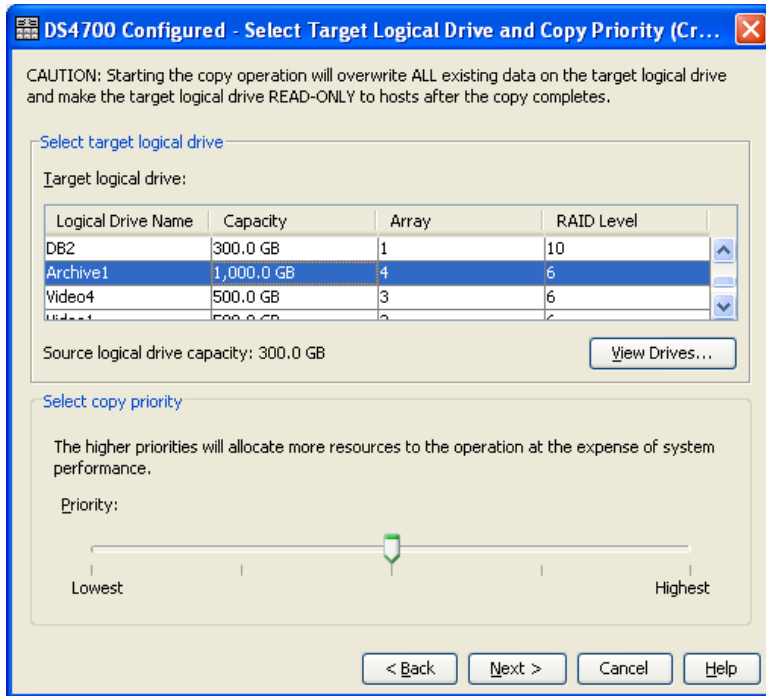
Right-click **DB1-1** and select **Create Copy**:



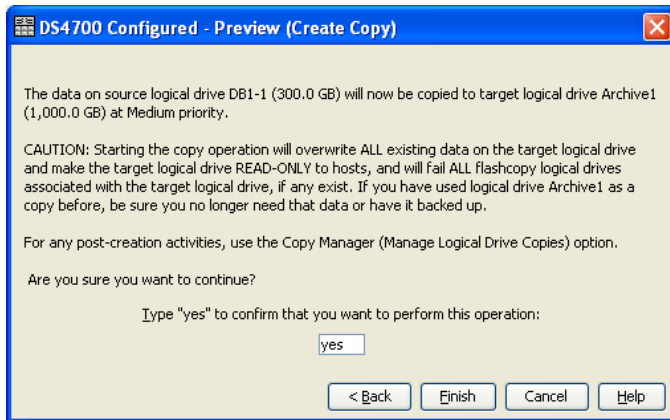
The VolumeCopy wizard starts and you need to select the source of the VolumeCopy. We are copying the **DB1-1** logical drive.




Now you select a target logical drive for the VolumeCopy and the copy priority. For this example, scroll down and select Archive1.



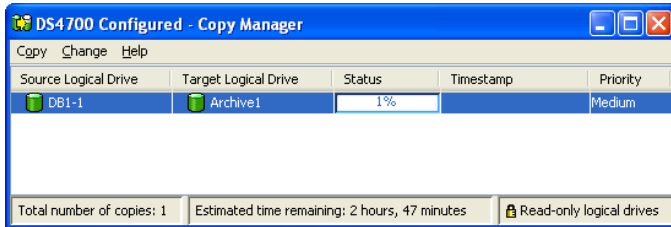
The **Preview** dialog asks you to confirm the start of the VolumeCopy:



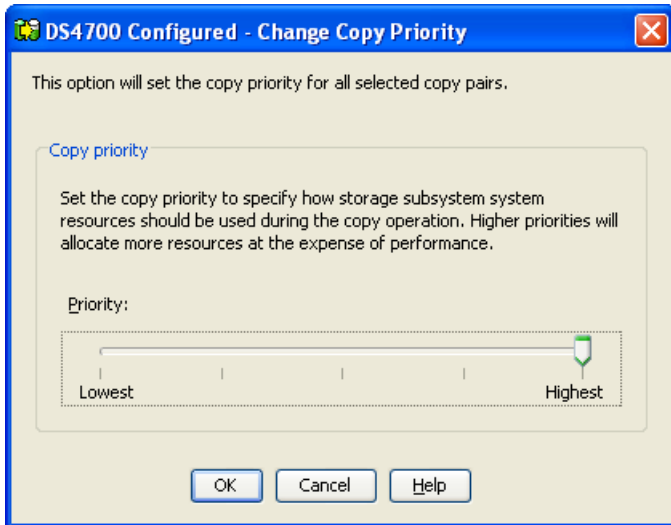
When you click **Finish** in the **Preview** dialog, a new dialog displays to indicate that VolumeCopy has started and asks if you wish to create another VolumeCopy. Select no.

While it's running you can watch its progress by right-clicking the **DB1-1** logical drive in the **Subsystem Management** window and selecting **Copy Manager**, or click the Copy Manager icon  the task bar.

You will see the **Copy Manager** with a VolumeCopy of the **Exchange3** logical drive in progress:



The Copy Manager provides the ability to change the copy priority. Click the **Change** menu item and select **Copy Priority**. The **Change Copy Priority** dialog box displays with a selectable priority bar. Move the **Priority** bar to **Highest**:



The VolumeCopy will now finish in the shortest possible period of time. You're done!

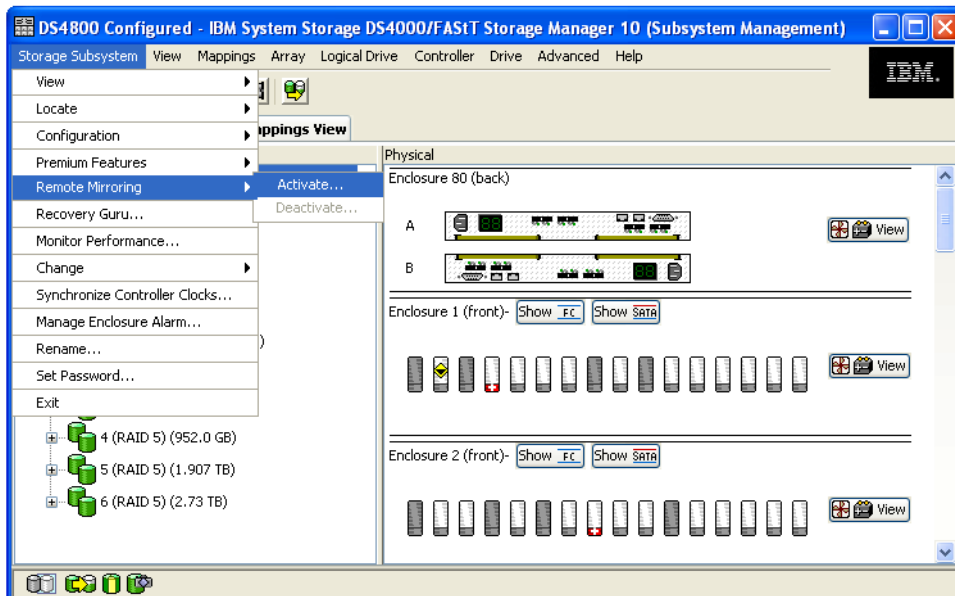
Enhanced Remote Mirroring (Premium Feature)

Remote Mirroring is a premium feature of the DS4000 Storage Manager that provides the ability to mirror logical drives from one storage subsystem to another. Any logical drive may have a logical drive mirror on another storage subsystem. The Remote Mirroring option ensures that each write to the primary logical drive has a corresponding write to the secondary logical drive on the other storage subsystem.

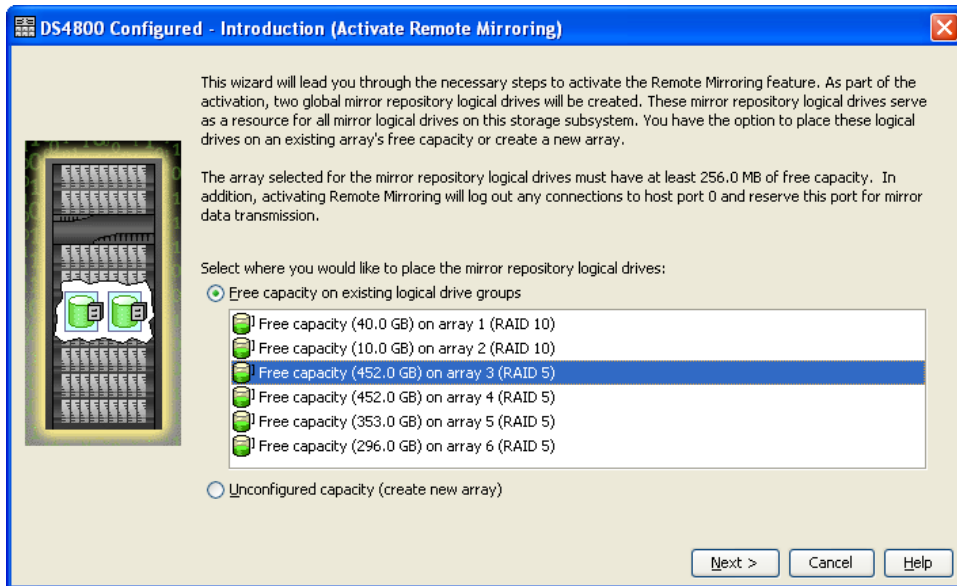
In this section we will activate the Remote Mirroring feature on two storage subsystems and establish a mirroring relationship between a primary logical drive on one storage subsystem and a mirror on another storage subsystem. The steps we will follow are as follows:

- Activate Remote Mirroring for *DS4800 Configured*
- Activate Remote Mirroring for *DS4700 Configured*
- Select a logical drive on *DS4800 Configured* to mirror to *DS4700 Configured*
- Suspend and resume mirroring

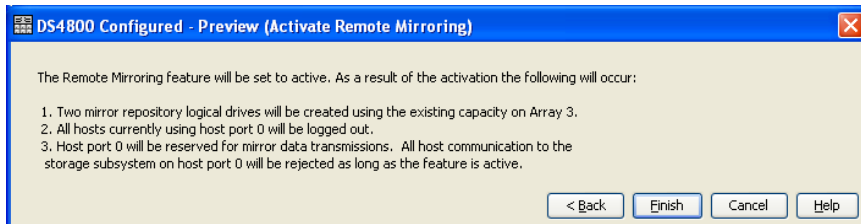
We will start with the *DS4800 Configured* Subsystem Management window. Click **Storage Subsystem** in the menu bar, select **Remote Mirroring** and the **Activate** option:



This will activate the Remote Mirroring wizard which will walk you through the process. The first step will be to create the Remote Mirroring repositories. Select array **3**:

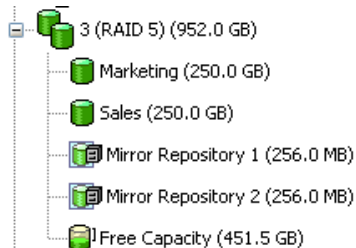


The following indicates the reservation of host ports for use by Remote Mirroring and the creation of the repositories:

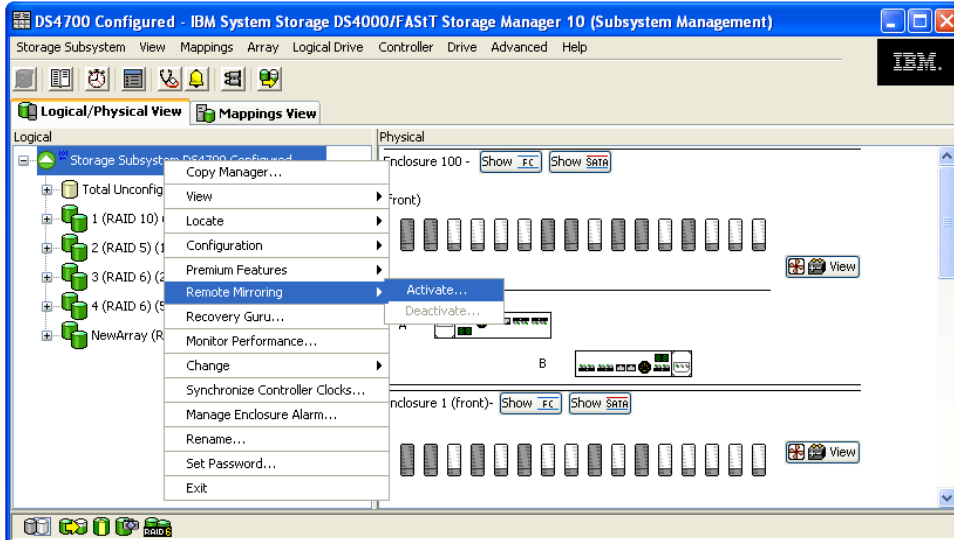


The completed windows appears next. Click OK and Remote Mirroring is now active.

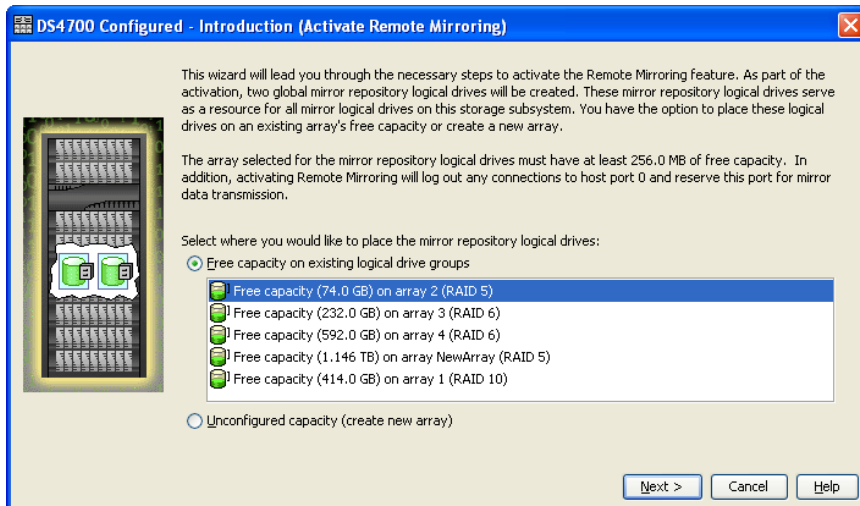
Note that for Array 3 there are two mirror repository logical drives that will support Remote Mirroring for the *DS4800 Configured*:



Now we will activate Remote Mirroring for the *DS4700 Configured*. From the **Enterprise Management** window double-click the *DS4700 Configured* object if it is not already active. From the *DS4700 Configured Subsystem Management* window right click the **Storage Subsystem** object and select **Remote Mirroring** and the **Activate** option:



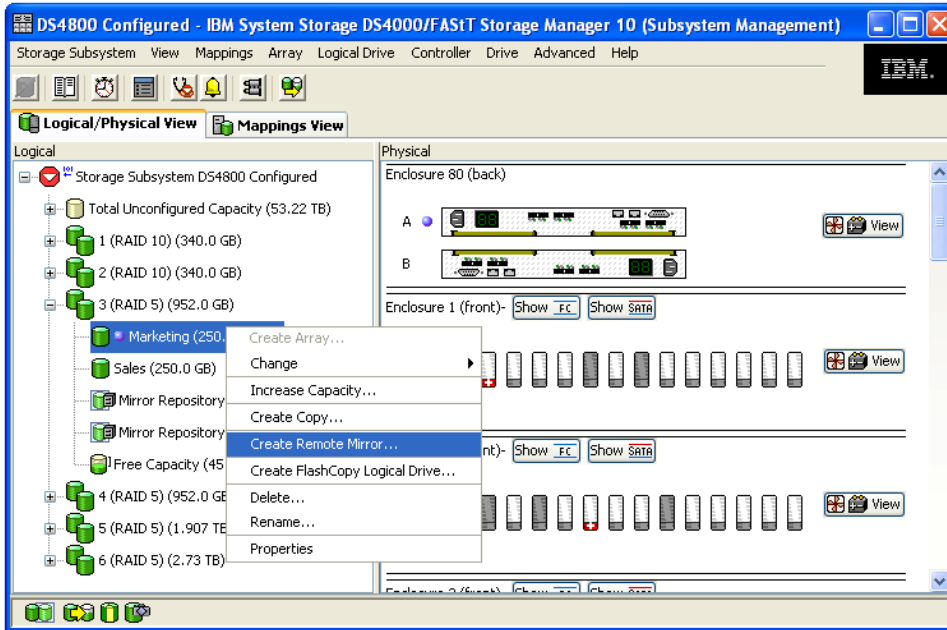
Like on the DS4800 Configured, this will activate the Remote Mirroring wizard which will walk you through the process. The first step will be to create the Remote Mirroring repositories. Select **Array 2**:



Select finish on the next window (reservation of host ports for use by Remote Mirroring and the creation of the repositories), and remote Mirroring for the *DS4700 Configured* is now active.

We will now go back to the *DS4800 Configured* storage subsystem to select a logical drive for remote mirroring to the secondary *DS4700 Configured* storage subsystem.

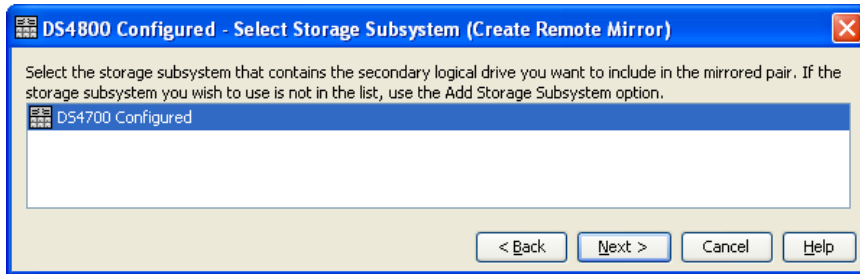
We'll use the **Marketing** logical drive by right-clicking on it and select **Create Remote Mirror**:



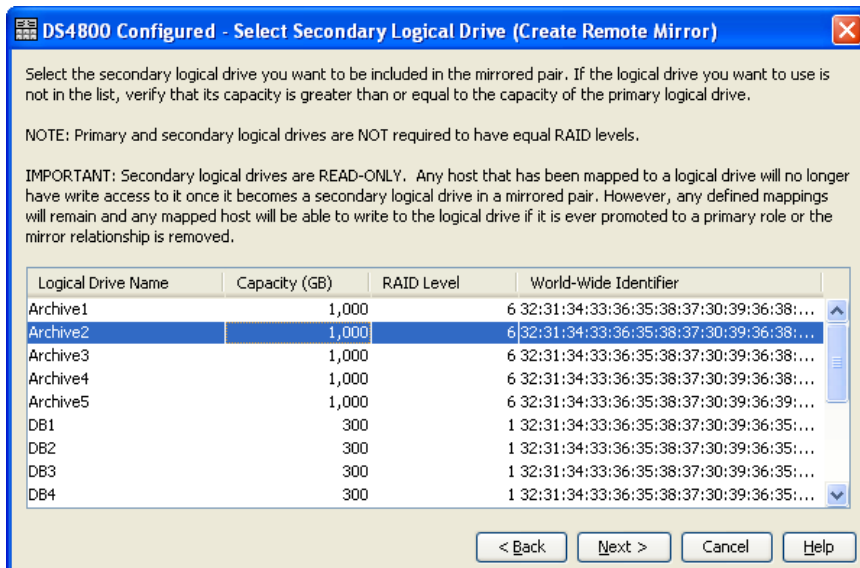
The following provides information on the mirroring requirements:



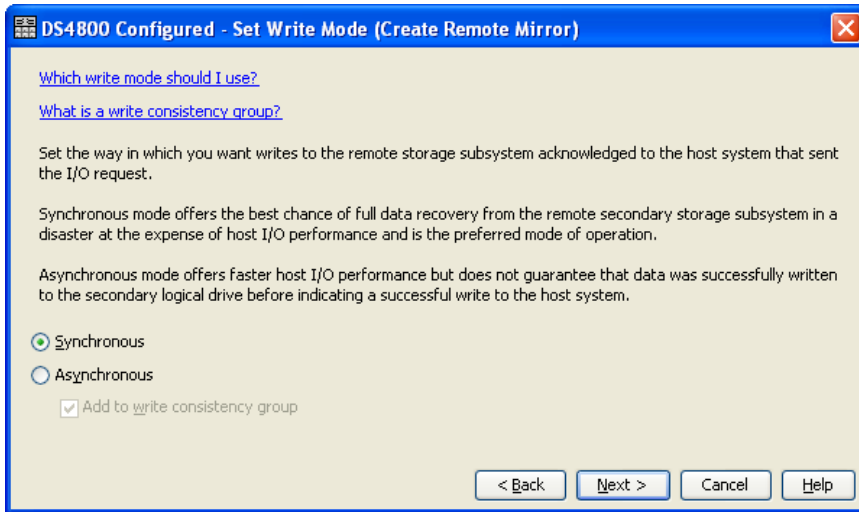
The following dialog box indicates other storage subsystems which have activated the Remote Mirroring option. Select **DS4700 Configured**:



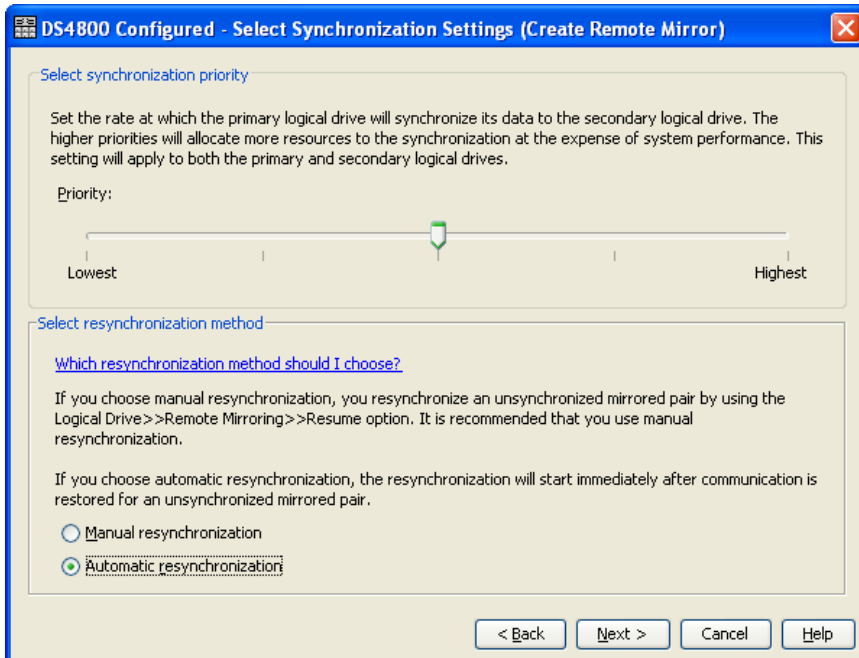
The next dialog box indicates the logical drives on **DS4700 Configured** that are available as mirrors. Select a logical drive that is at least as large as the primary logical drive that was selected on **DS4800 Configured**. Select the **Archive2** logical drive:



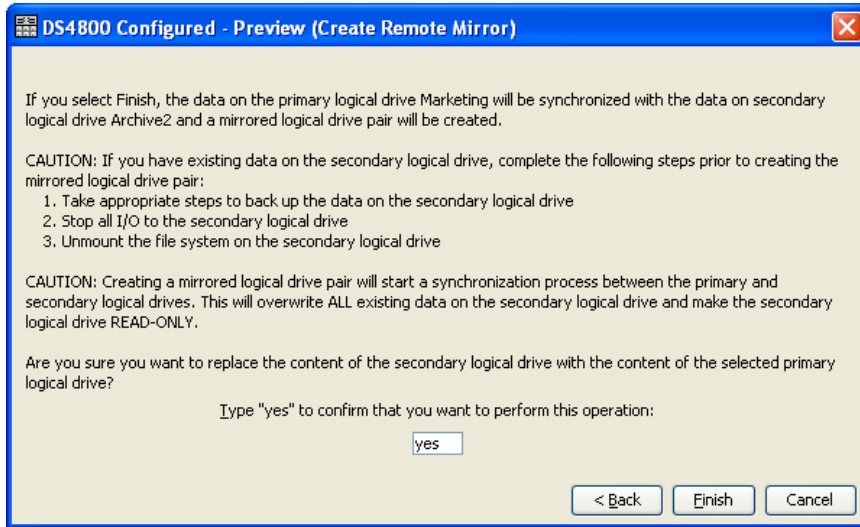
Using the following dialog box select the mirroring mode. There are three modes available: synchronous, asynchronous, and asynchronous with write order consistency. Select:



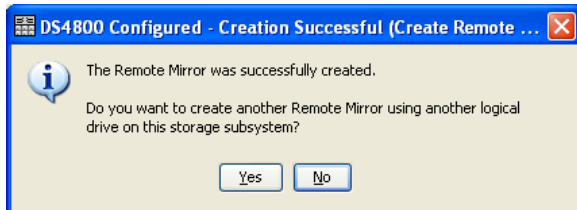
Select **synchronization priority** and either **manual** or **automatic** resynchronization:



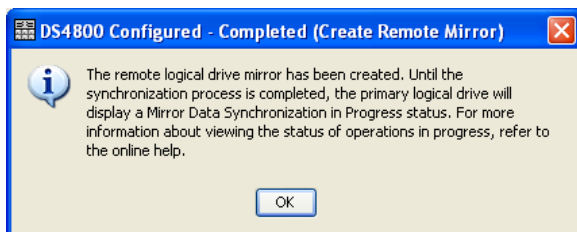
The following indicates that mirroring will begin after confirmation:



Remote Mirroring begins!



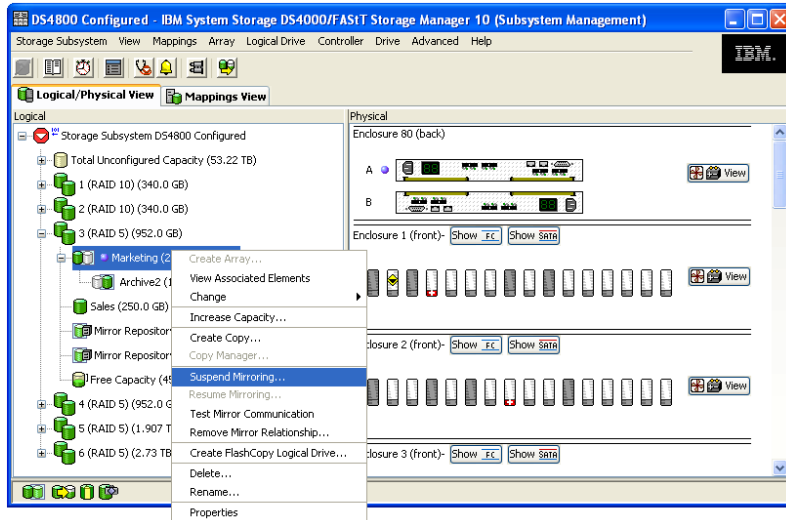
The following provides information on monitoring the mirroring synchronization:



Note that several logical drives have an additional icon to indicate that it is being mirrored:



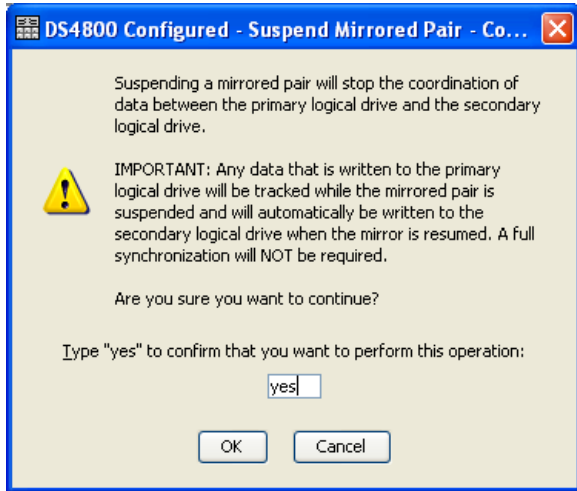
Now we will suspend mirroring by right-clicking on the **Marketing** logical drive and selecting the **Suspend Mirroring** option:



Select the **Marketing** logical drive and click on **Suspend**:



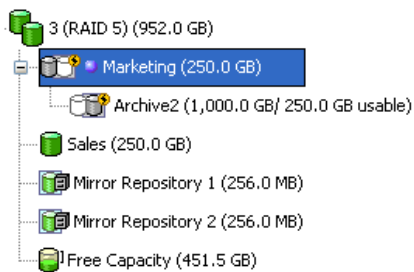
You will be asked to confirm suspending the **Marketing/Archive2** logical drive pair:



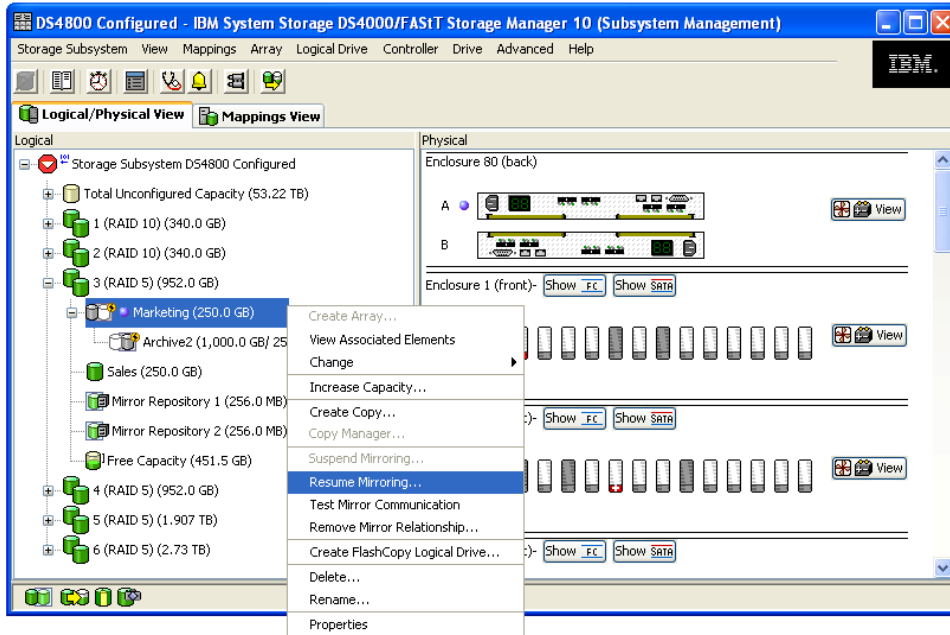
The **Analysis mirrored** logical drive pair operation is now suspended!



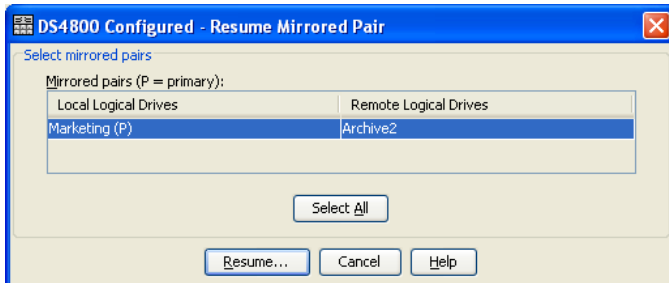
Note that there is a *Suspend* indicator on the **Analysis** logical drive pair:



We will now resume mirroring of the **Marketing** logical drive pair. Select the **Resume Mirroring** option:



Select the **Analysis** logical drive and click on **Resume**:



Confirm the **Resume Mirroring** option and you have just resumed mirroring for the logical drive pair.

Congratulations! You have just activated the Remote Mirroring feature of two storage subsystems, selected and mirrored a logical drive, and suspended and resumed mirroring for that logical drive! Wasn't that easy!

Putting Together an Effective Demo

The DS4000 Storage Manager Demo program is an effective tool that can be used in a variety of situations. Its ease-of-use design can be simply demonstrated to support a strong message that IBM DS4000 storage systems reduces the Total Cost of Ownership (TCO). As a single storage management package, DS4000 Storage Manager's capability is unmatched in the industry.

It would certainly be overwhelming to demonstrate every single feature provided by the DS4000 Storage Manager Demo program. The DS4000 Storage Manager Demo program is versatile enough to be used to show DSM features in a variety of demo situations to address any issues that may crop up.

Our goal for this section is to provide some scenarios on how to address a specific business issue using specific DS4000 Storage Manager functions. Once you are familiar with using the DS4000 Storage Manager Demo program you can begin to develop your own scenarios.

Scenario 1: Identifying Key Issues and Concerns

It's often not clear what the driving forces are behind a storage purchase opportunity. Instead of using standard PowerPoint presentations, use the DS4000 Storage Manager Demo tool as an alternative way of presenting the value propositions of the IBM DS4000 storage systems. By introducing several features visually, this provides an easy way for the prospect to tell you which of these features are important to them.

Simply fire up the DS4000 Storage Manager Demo program and describe it using one or more of the following talking points to emphasize the value propositions of IBM DS4000 storage systems:

- **Manageability:** DS4000 Storage Manager provides a single interface to manage all of IBM DS4000 storage systems regardless of the location. It will grow along with your systems without requiring a corresponding growth in the number of storage administrators. Starting the demo takes you to the Enterprise Management Window. From here all storage subsystems can be managed.
- **Expandability:** DS4000 Storage Manager lets you tailor your IBM storage system to meet growing demands for both capacity and performance. This DS4000 Storage Manager software is the only interface used to grow and manage an DS4000 storage systems - scaling systems from gigabytes through terabytes of online storage.
- **Lowest Total Cost of Ownership:** Because all of your storage systems are managed by a single administrator using a single interface, your costs of ownership are the lowest of all. From the **Subsystem Management Window**, simply right-click the device you want to manage. The DS4000 Storage Manager has been designed for ease-of-use: simple tasks are accomplished through a series of pop-up windows and complex tasks have an associated wizard which steps you through the task.

Scenario 2: Solving Capacity and Utilization Problems

One of the biggest headaches businesses face with their storage is the never ending need to solve capacity and utilization problems. Servers and applications are frequently added to the mix of existing applications and their ever growing need for storage.

Balancing the needs of competing users requires the use of a simple but powerful storage management tool. The difficulty of storage provisioning and balancing is reduced to a series of tasks that are easily accomplished using the DS4000 Storage Manager.

Simply show how DS4000 Storage Manager:

- **Partitions** the storage for different host servers Click on the Mappings tab to list all the hosts for the various logical drives
- Easily **adds** a logical drive for immediate use by a server Simply right-click on the Unconfigured Capacity icon to create a new logical drive
- Easily **expands existing arrays** by adding one or more disks using Dynamic Array Expansion Simply right-click on any array to Add Free Capacity
- Easily **expands the capacity of a logical drive** to deliver more capacity for each logical drive using Dynamic Volume Expansion Simply right-click on any logical drive to Increase Capacity
- Easily **expands system capacity** by adding entire sets of drives and drive enclosures

In short, no matter what the capacity or utilization problem is, using DS4000 Storage Manager reduces the problem down to a few DS4000 Storage Manager exercises. The benefit from using this powerful tool is that optimal storage utilization is a few clicks away.

Scenario 3: Tuning For Performance

Once the issues of capacity and utilization are resolved, there are the normal day-to-day concerns of whether the storage subsystem is running optimally. Business applications only run as fast as their storage.

The DS4000 Storage Manager provides a number of tools to monitor performance and tune the DS4000 storage systems for optimal performance without disruption to the applications that are accessing the storage. And, over time, to continue to tune storage performance to overcome a variety of bottlenecks and deliver the desired level of performance.

The DS4000 Storage Manager provides an easy-to-use:

- Performance monitoring tool using the **Monitor Performance** power icon button
- Method of saving performance monitor statistics for long term trend analysis
- Method of cache setting changes to fine tune storage performance of logical drives, arrays, and controllers
- Changing of Preferred Paths to load balance storage traffic

The DS4000 Storage Manager provides a large number of simple, easy-to-use features which solve just about any performance problems likely to appear. All DS4000 storage systems have the ability to dynamically tune the storage subsystem to the level of performance desired.

Scenario 4: Adjusting Performance and Data Protection Levels

At some point, tuning an existing storage subsystem will reach a plateau – further performance enhancements will not occur with the existing storage configuration. Or, within the current storage configuration, there's the need to increase the level of security for a group of storage resources. The question is: How easily can this be accomplished?

One of the most effective ways to change performance and security metrics of storage subsystems is to change the underlying RAID structure of the disk arrays. In conjunction with the DS4000 Storage Manager's Dynamic Array Expansion feature, provides a simple and robust method of increasing performance and security of any logical drives.

Examples of this are:

- Adding drives to an array adds performance from more spindles as well as capacity
- Existing logical drives on this expanded array will benefit from the increase in performance
- Existing logical drives can also benefit from the increased capacity
- DS4700 and DS4200 arrays built with RAID level 5 may migrate to RAID 6 for more protection

The DS4000 Storage Manager's ability to dynamically change an array's RAID level as well as add drive capacity eliminates the need to shutdown the application and access to the storage. All of these changes are made while providing continuous data access to the logical drive.

Scenario 5: Reducing the Impact of Hot Backups

One significant business problem that IBM DS4000 storage systems solve is the ever increasing backup windows of today's online applications. As databases grow, the time to backup them up also grows. To the point that there's a major impact on online applications whenever backups are taken – response times suffer.

Best practices for virtually all of today's databases provide for the ability to copy critical database files during a hot backup window. Most databases provide a hot backup window which suspends normal disk I/O to allow an online backup. Within this backup window, files are copied to online media and from there backups are created. However, this is a lengthy process, often taking hours to copy files.

DS4000 Storage Manager's FlashCopy feature solves this problem by shortening the hot backup window. First, the hot backup process is split into two parts. The first part replaces the file copy with an extremely quick point-in-time copy using FlashCopy. Then, while the database closes the hot backup window and resumes normal processing of database transactions, part two executes in parallel by copying the point-in-time FlashCopy to backup media.

There are numerous benefits to using FlashCopy:

- The hot backup window is reduced from hours to under a minute
- The vulnerability of the database to failure is reduced
- The backup process reduces the impact of backups on the application
- The backup of the database is performed in parallel while the database continues to process transactions
- The FlashCopy backup itself is a copy from which recovery can be initiated
- FlashCopies are not permanent and its resources can be re-used again

A simple demonstration of the DS4000 Storage Manager's FlashCopy function will show the benefits of reducing the impact of hot backups.

Scenario 6: Implementing Business Continuity Initiates

All of a corporation's business information is mission-critical and crucial to its continued success. To protect these data assets against unplanned outages and contingencies, business continuity initiatives focus on minimizing disruptions to data access and reducing the time to recover to a short a period of time as possible.

The goal is to provide adequate levels of data protection for all storage in the data center.

The IBM DS4000 storage systems with the DS4000 Storage Manager provide a wide range of data protection features to meet every business continuity requirement.

For local data protection, the FlashCopy feature offers rapid point-in-time copies of any logical drive. Particularly useful in database applications, FlashCopy can shorten the backup window while optimizing database backups, and with the most recent FlashCopy logical drive, forms the basis for a quick recovery from any problems affecting the database application. FlashCopy is also useful for replicating data for recovery purposes in the event that the original logical drive is no longer available.

Within the data center, IBM DS4000 storage systems may use the Remote Mirroring feature to replicate data from one storage system to another. This allows data protection between storage systems in the event of an outage of a particular storage system.

For longer distances, the Remote Mirroring feature is used to replicate logical drives from a primary site to a secondary, physically remote, site. This provides the secondary site with the data necessary for initiating a recovery.

No matter what the business continuity requirements are, the combination of DS4000 storage system and DS4000 Storage Manager provides all the necessary functionality to build solutions to handle contingencies ranging from simple outages to disaster recovery at a secondary site.

Scenario 7: DS4000 Storage Manager Training Session

An effective strategy to win over the prospect is to provide training to the eventual administrators and managers of the IBM DS4000 storage system. This will show the ease of use of the DS4000 Storage Manager product as well as ease their concerns about a new software system to learn. Stressing the ease-of-use design, this course can be tailored to the specific needs of the group you are training:

- Basic operations for their particular environment
- Advanced features for when they may need them
- Specific operations on
- Growing a logical drive
- Adding a drive to an array
- Tuning their storage subsystems
- Application specific tips and techniques

This course can be held over several days and is best designed as an interactive exchange of “*How do I ...*” topics and exercises that provide *best practices* for common tasks that DS4000 Storage Manager users will be using.

This strategy has been used successfully on numerous occasions in parallel with the sales process. It’s an excellent vehicle to step ahead of the competition.

Scenario 8: Using SATA Technology

Today, enterprises have an almost unquenchable thirst for storage. Enterprise applications drive this demand—the need to store information is growing at an ever-increasing rate. In addition, new laws requiring extensive archiving of corporate information also fuel this demand.

The dilemma is how to keep more data online while keeping costs down.

There is a unique solution to this problem. Online data used in mission-critical applications employs Fibre Channel drive technology. For data that is less frequently accessed or requires less performance when accessed, Serial ATA (SATA) drive technology is an ideal economic alternative.

IBM's DS4000 storage systems provide two SATA solutions:

- EXP810 Drive Expansion Units add SATA drive technology to the DS4000 line.
- The new DS4700 provides an intermix of drive technologies in a compact configuration. Even a single 3U enclosure can mix 16 SATA and/or Fibre Channel drives for a tiered combination of high performance and high capacity storage.

SATA technology provides an economical alternative to Fibre Channel without sacrificing management flexibility. SATA provides more online storage capability for data that doesn't require the highest levels of performance. Its use as secondary storage provides much faster access than traditional offline storage. Its ability to solve business problems with an appealing cost advantage makes it an excellent storage solution for applications such as:

- Keeping more information online for quicker access
- Online backups to disk for faster recovery
- Moving data from online databases to data warehouse applications, datamarts, and Decision Support Systems
- Secondary site storage using remote mirroring for high availability and disaster recovery requirements

Scenario 9: Building DR Solutions

Protecting corporate data is no easy task. No matter what plans are developed to protect data assets, there's still the possibility of a disaster. Developing plans for planned and unplanned contingencies is the goal of disaster recovery solutions.

Finding the optimal technology to build a robust DR solution is difficult for a number of reasons. Many solutions are proprietary to the application, the database in use, or the hardware and OS platform. Other solutions require customization of the application environment with programming and procedural changes. And others are costly or don't scale well.

Storage-based replication offers the highest performance at the lowest cost:

- No impact on server performance.
- No customization of the application or the database.
- Least invasive and disruptive of all solutions.
- Uses the best practices of database backup and recovery.
- Provides scaling across multiple servers and applications.
- Low implementation effort.

Remote Mirroring provides the ability to replicate data as it changes. Mirroring can be synchronous for keeping two sites in constant synchronization or can be asynchronous for mirroring data over extended distances.

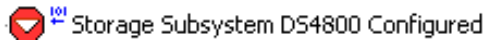
The ability to dynamically switch from synchronous to asynchronous mirroring (and back) provides flexibility in designing DR solutions to accommodate fast changing demand.


IBM DS4000 storage systems provide the replication technology that builds robust DR solutions with the least effort and cost.

Appendix:

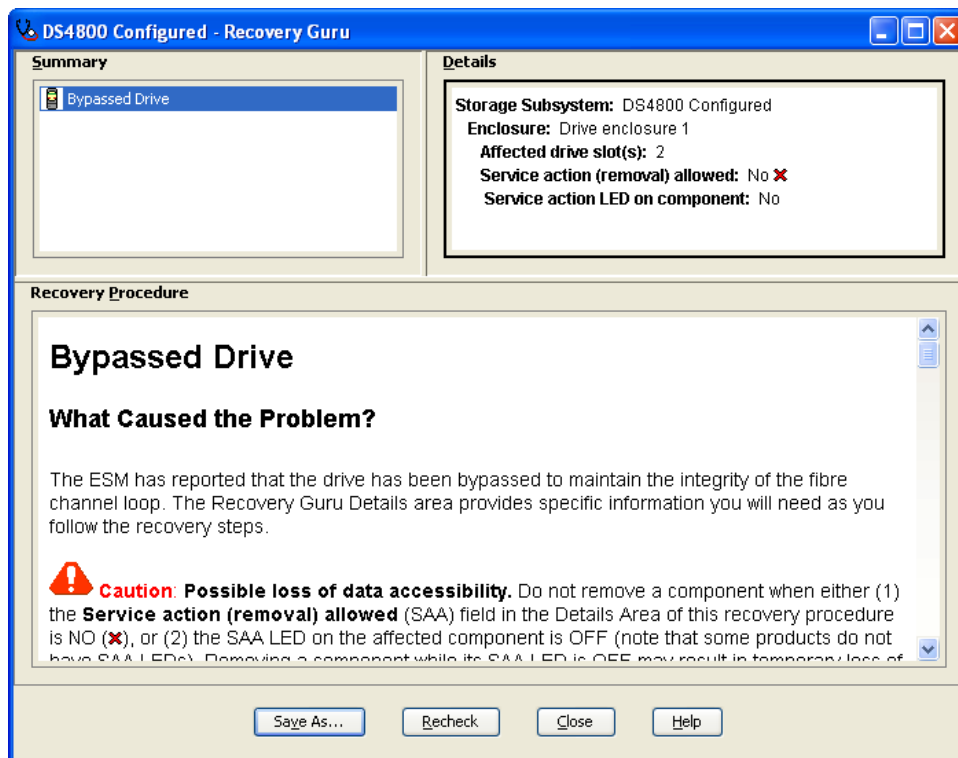
Removing the Red “Needs Attention” Icon


The **DS4800 Configured** storage subsystem has a built-in “needs attention” warning which is seen as:

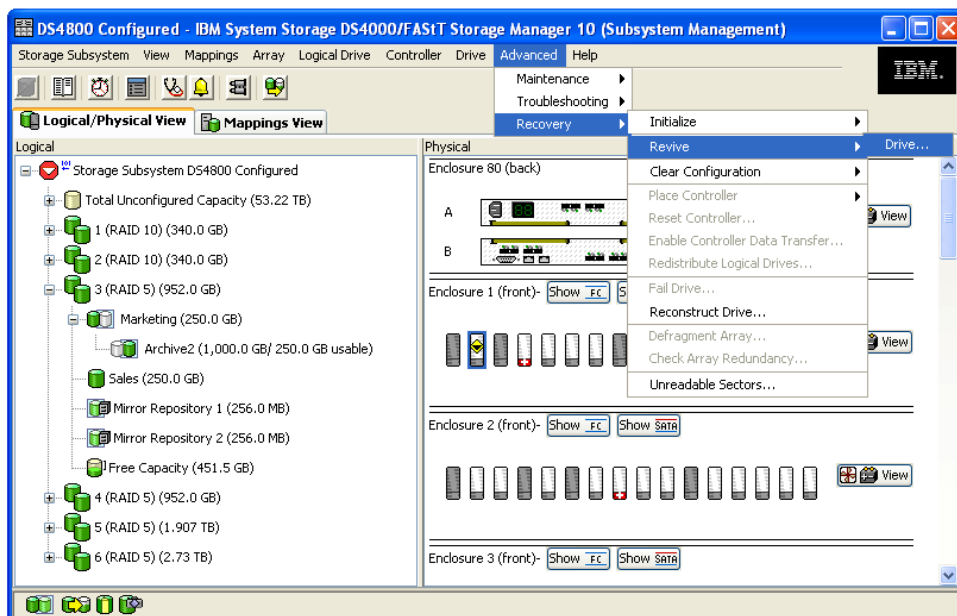


You may fix this by clicking on the *Recovery Guru* icon  or by activating the *Task Assistant*.

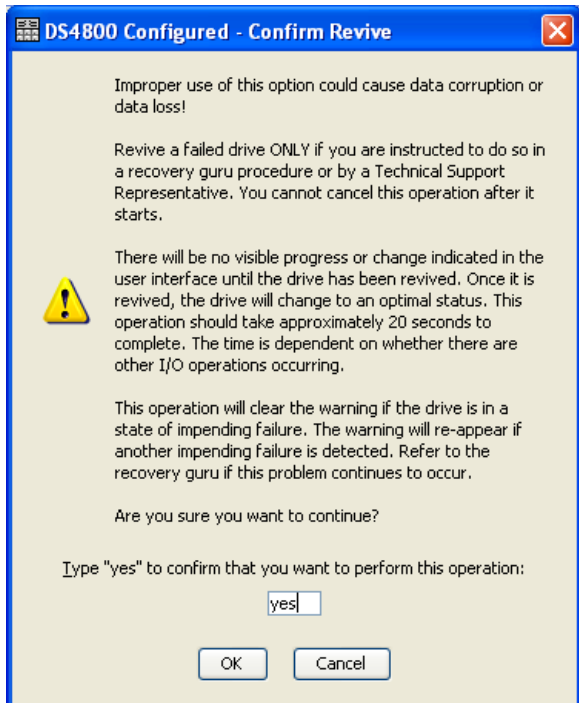
Click on the *Recovery Guru* icon and you will see a *Help* screen:




To fix this particular problem, first select the problem drive  , then from the **Advanced** menu item, click on **Recovery** then **Revive** then **Drive**:



Then you will see a warning and a request for confirmation:



All fixed!  Storage Subsystem DS4800 Configured