Dell™ PowerVault™ Data Protection Solution Storage Expansion Guide

Notes, Notices, and Cautions

NOTE: A NOTE indicates important information that helps you make better use of your computer.

NOTICE: A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

⚠ **CAUTION: A CAUTION indicates a potential for property damage, personal injury, or death.**

Contents

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Introduction

Additional storage is needed when the backup requirements of your IT environment grow beyond the storage capacity of your Dell™ PowerVault™ Data Protection Solution. The storage is needed by Microsoft® System Center Data Protection Manager (DPM) 2007 to accommodate the backup data of your protected systems. The following situations may require additional storage on the PowerVault Data Protection Solution:

- Protecting additional systems
- Protecting additional files on the protected system
- Protecting additional applications (for example, SQL Server™ 2005, Microsoft Exchange server, and Microsoft Office Sharepoint Server 2007)
- Increasing the number of DPM recovery points

See "Expanding Disk Storage" on page 7 for the guidelines, procedures and tools to plan your disk expansion.

> **NOTE:** Prior to planning or deploying additional storage or tape devices on your system, review the *Dell PowerVault Data Protection Solutions Information Update* for the latest information.

> **NOTE:** For documents referenced in this guide, see the *Dell PowerVault Protection Quick Reference Guide* at support.dell.com.

In addition to providing continuous disk-to-disk backup protection, DPM includes the ability to provide disk-to-tape and long-term tape archival of protected data. Attaching a PowerVault Data Protection Solution supported tape drive, autoloader or library augments the disk-to-disk protection.

"Using Tape Drives and Libraries with DPM" on page 23 outlines the steps needed to attach a supported tape drive to your system.

Throughout this document, a running example illustrates the steps and tools used to accomplish the tasks within that section. The example scenario is based on a system administrator's successfully deployed DP500 PowerVault

Data Protection Solution with six configured internal disks. The DP500 is protecting the organization's Exchange Server. The examples illustrate how the system administrator:

- Expands the DPM storage pool
- Adds additional external storage
- Attaches a tape drive for long term archival

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Expanding Disk Storage

This section discusses how to:

- Plan for storage expansion
- Install the additional storage hardware on your system
- Make the additional storage space available to DPM

Planning Additional Disk Storage

As your IT needs outgrow the internal storage standard with your PowerVault Data Protection Solution, additional disk drives are required. To meet those needs, develop a plan which considers the requirements for:

- Estimating the additional DPM storage pool capacity
- Determining the appropriate RAID adapter and RAID configuration
- Determining whether to add disk drives internally or externally
- Determining when the system can support hardware installation downtime
- Using global hot spares
- Installing Dell's systems management tools

Estimating Additional Storage Requirements

The storage capacity must be estimated based on the size of the additional data sources to be protected and the number of recovery points retained on the DPM server. Refer to the "Allocating Space for Protection Groups" and "Planning the Storage Pool" sections of *Planning a System Center Data Protection Manager 2007 Deployment* for more info. These sections outline a methodology for estimating the storage requirements for DPM.

Example: Storage Space Estimation

In this example, the server administrator is protecting two additional servers:

- The first server contains a sales-tracking SQL database.
- The second server is running Exchange Server.

The total storage space in use for these two servers is 350GB. The system administrator must factor in an estimated storage space growth of 10 percent over the next four years resulting in approximately 500GB of data that must be protected.

The "Allocating Space for Protection Groups" section in *Planning a System Center Data Protection Manager 2007 Deployment* describes the methodology DPM uses to allocate space requirements for protection groups. Using computations based on 500GB of protected data results in the following estimates:

Storage space for the initial (replica) backup	623GB
Storage space for recovery points	376GB
Total additional DPM space (estimated)	1TB

From the above example, five 250GB drives provide 1TB of usable storage space. In a RAID 5 configuration, the space equivalent of one physical disk stores parity data used to recover data in case of single disk failure. Approximately 250GB of the total disk space is dedicated to parity. The available space for DPM's data pool is four times 250GB, or 1TB total (Figure 2-1).

NOTE: The parity data is distributed across all of the physical disks. The total space used for parity equals one physical disk.

Figure 2-1.   Logical View of Disk Space Usage in a RAID 5 Group of N Physical Disks
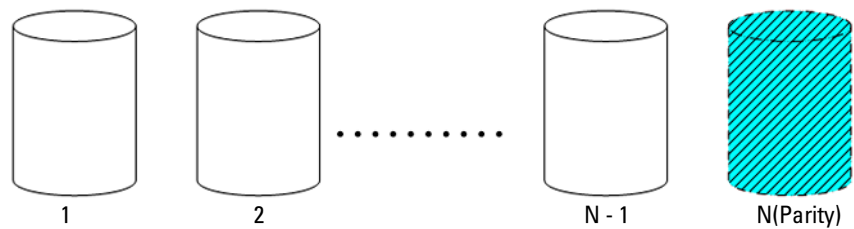
RAID Adapter Considerations

PowerVault Data Protection Solutions include an internal Dell PERC-series RAID adapter that manages internal disk drives. Additional internal disk drives are managed by the internal controller.

Some PowerVault Data Protection Solutions support external RAID adapters, such as the PERC 6/E, which can be used to manage disks in an external enclosure.

> **NOTE:** Refer to the *Dell PowerVault Data Protection Solution Support Matrix* for more information on supported RAID adapters for your system.

RAID adapters combine a number of physical disks into a RAID disk group. The adapter then creates one or more virtual disks from the RAID group which the operating system and DPM use to store data. RAID 5 configurations only are recommended for use with DPM. In a DPM environment, RAID 5 provides the best cost, performance and reliability for this configuration type. Refer to the "Planning the Disk Configuration" section in *Planning a System Center Data Protection Manager 2007 Deployment* for additional details on RAID types.

Example: Choosing a RAID Adapter

In our example, the system administrator's PowerVault DP500 has all six internal drives configured. The administrator adds additional storage using a PowerVault MD1000 Storage Enclosure to expand storage capacity. Attaching the MD1000 to the DP500 requires an external RAID controller. Using the *Dell PowerVault Data Protection Solution Support Matrix* information, the administrator chooses to install a PERC 6/E.

Disk Size Selection and Considerations

When adding additional physical disks to your PowerVault Data Protection Solution, consider the following:

- If adding internal disks to your data protection solution, make sure that there are at least three drive slots available to add at least three drives. RAID 5 virtual disks require a minimum of three physical disks.

- If adding additional disks to an existing storage enclosure, ensure there are at least three drive slots available. Refer to the external storage enclosure's *Hardware Owner's Manual* for detailed configuration rules.

NOTE: A maximum of eight physical disks within each RAID 5 disk group is recommended.

NOTE: All disk drives added to a disk group should be the same size. When combining drives of dissimilar size for RAID 5, the size of the smallest drive will be used by each disk within that disk group. As a result, using a larger drive wastes its disk space.

NOTE: It is not required to have the same size of disks in each of your RAID disk groups. For example, if your internal RAID disk group is made up of four 250GB drives, you could add an external RAID group made up of five 500GB disk drives.

Figure 2-2.   Dissimilar Disks in a RAID Group
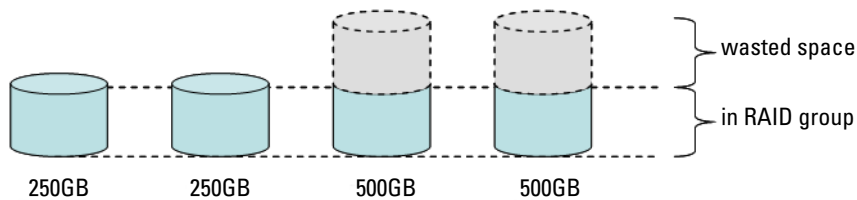
Benefits of Hot Spares

For additional protection against a single disk failure, add a global hot spare to your RAID configuration. The physical disk assigned as a hot spare automatically replaces the physical disk on which an error has been detected. The caveat to using a hot spare is that you lose a storage slot within the system or external storage enclosure that could have been used by a data disk. RAID 5 configurations protect against "single" disk failures. A hot spare provides unattended and uninterrupted protection against an additional disk failure.

There are two types of hot spares that can be allocated: global or dedicated. If you choose to implement a hot spare, global hot spares are recommended. Refer to the "Assign and Unassign Global Hot Spare" section of your *Dell OpenMange Server Administrator User's Guide* for more information on how to configure global hot spares.

Installing Dell OpenManage™ Server Administrator

Dell OpenManage™ Server Administrator (OMSA) must be installed on the DPM server to provide the following benefits:

- Monitors the state of the system and storage subsystems
- Provide alerts of failing components to avoid unplanned downtime
- Creates and manages RAID 5 virtual disks

> **NOTE:** OMSA should be installed from the *Dell Systems Console and Agent CD* included with your system. For more details on installation procedures, refer to the "Installing Server Administrator" section of the *Dell OpenManage Server Administrator User's Guide*.

> **NOTE:** During the OMSA installation, if prompted, choose the Storage Management option. This options installs features that help manage the PowerVault Data Protection Solution storage devices.

The OMSA user guide and the OMSA application are located on the *Dell Systems Console and Agent CD* and can be downloaded from support.dell.com.

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Adding Physical Disks

This section describes the steps involved in adding physical storage to your PowerVault Data Protection Solution. It covers installing both the internal drives and the external storage enclosures, such as the MD1000.

> ✎ **NOTE:** Before making any hardware changes to your system, you should back up your operating system drive.

For PowerVault Data Protection Solution supported drives and external storage enclosures, refer to *Dell PowerVault Data Protection Solution Support Matrix*.

Installing Internal Drives

Refer to the "Hard Drives" section of your *Dell PowerVault Systems Hardware Owner's Manual* to add additional disks.

Installing a RAID Adapter for External Storage

A RAID adapter with external ports is required to attach an external storage enclosure to your system. Refer to the *Dell PowerVault Data Protection Solution Support Matrix* for supported RAID adapters for your system. Follow the instructions in the applicable *PowerEdge™ Expandable Raid Controller User's Guide* to install the adapter in your system.

Installing an External Storage Enclosure

Refer to the applicable external storage enclosure's *Getting Started With Your System* document for instructions on how to unpack and setup your storage enclosure.

Refer to your storage enclosure's *Hardware Owner's Manual* to complete the installation of your storage enclosure.

Installing Drives in the Storage Enclosure

If you need to add drives to an existing storage enclosure, refer to the "Removing and Installing Drives" section of the storage enclosure's *Hardware Owner's Manual*.

Example: Installing a Storage Enclosure

The system administrator adds an MD1000 storage enclosure containing five 250GB drives and a PERC 6/E adapter to the DP500 using the following steps:

1 Install OMSA (if not already installed) on the system.

2 Perform a full backup of the operating system.

3 Shut down the system and disconnect the power from the system.

4 Install the PERC 6/E adapter in the DP500.

5 Unpack and install the MD1000 following the instructions in the MD1000 *Getting Started With Your System* document.

6 Cable the MD1000 to a port on the PERC 6/E adapter.

7 Install the drives in the MD1000 (if not already installed).

8 Power on the MD1000.

9 Power on the DP500.

10 Install the PERC 6/E drivers and update the adapter firmware (if necessary).

11 Using OMSA, verify the system and storage has been correctly configured.

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Configuring Virtual Disks for DPM

For DPM to use additional hard disks, the disk drives must be configured into one or more RAID 5 virtual disks. Creation of the RAID virtual disks is accomplished using OpenManage Server Administrator (OMSA).

Use these guidelines when configuring virtual disks:

- Configure all DPM virtual disks as RAID Level 5.
- RAID 5 virtual disks require a minimum of three physical disks.
- RAID 5 virtual disks should have no more than eight disks (excluding the optional global hot spare).
- Configure an optional global hot spare disk.
- Ensure the size of each virtual disk does not exceed 1.8TB.
- Any number of virtual disks can be created from the RAID disk group.
- Virtual disks used by DPM must not contain formatted OS partitions.

Configuring Virtual Disks and Hot Spares with OMSA

Refer to the "Storage Management Tasks" section of the *Server Administrator User's Guide* to learn how to create virtual disks on the newly added physical disks. This section also provides instructions for creating optional global hot spares.

Example: Using OMSA to Configure Virtual Disks

The server administrator uses OMSA to create a virtual disk from the five physical disks within the MD1000 that have been attached to the DP500 system. The series of steps below show how a system administrator would create the 1TB RAID 5 virtual disk needed by DPM's storage pool to support the additional protected servers.
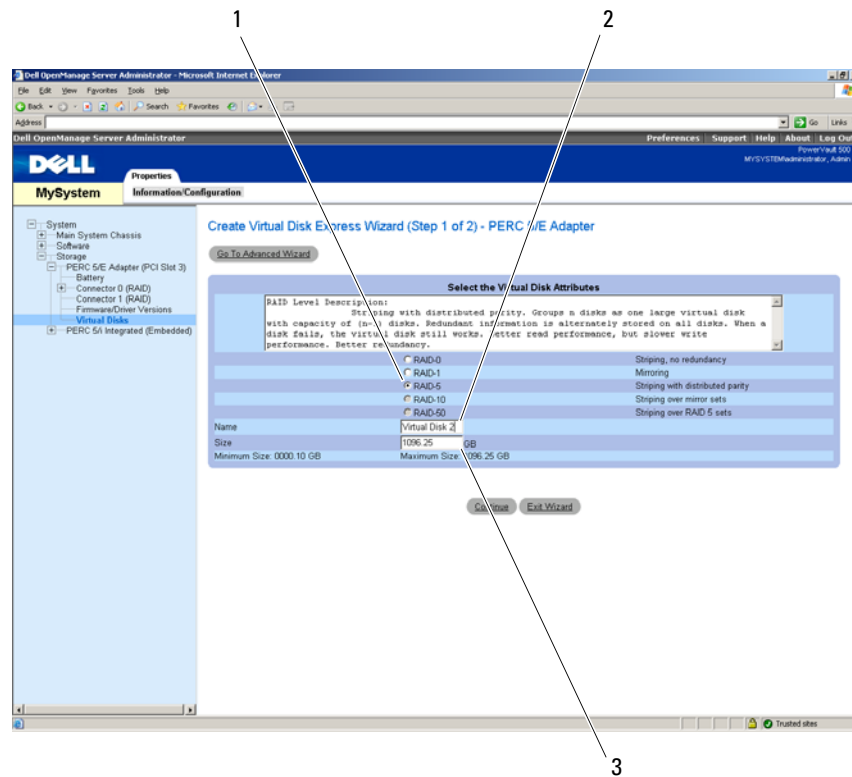
Figure 4-1.   OMSA Virtual Disk Wizard
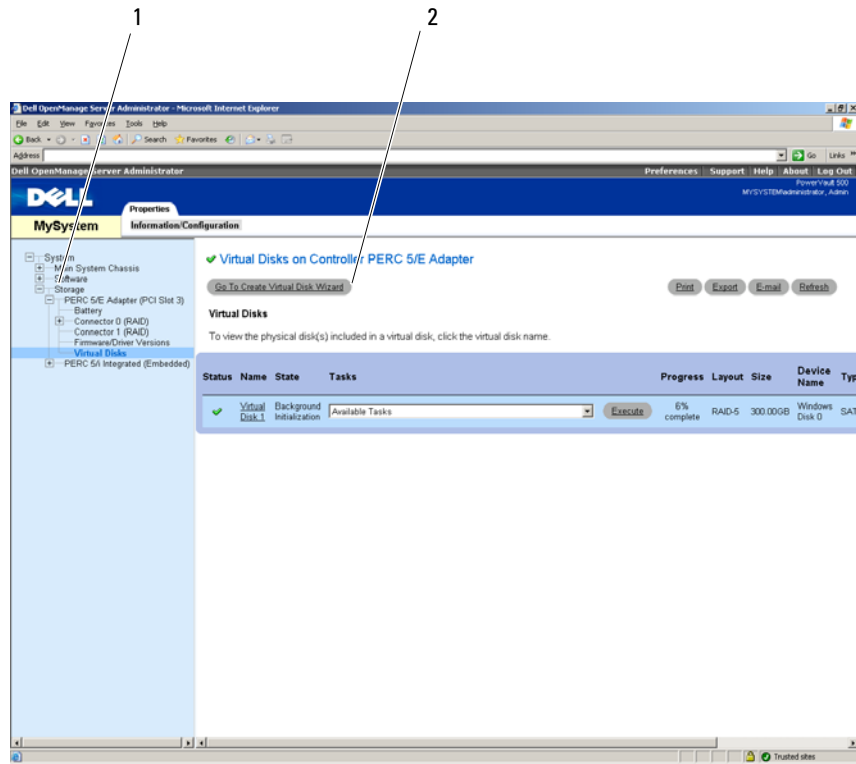
1	Storage management	2	Go to Create Virtual Disk Wizard option

  1 Go to the storage management section of the OMSA virtual disk wizard.

  2 Click **Go to Create Virtual Disk Wizard**.

Figure 4-2. Virtual Disk Attributes

1   2

3

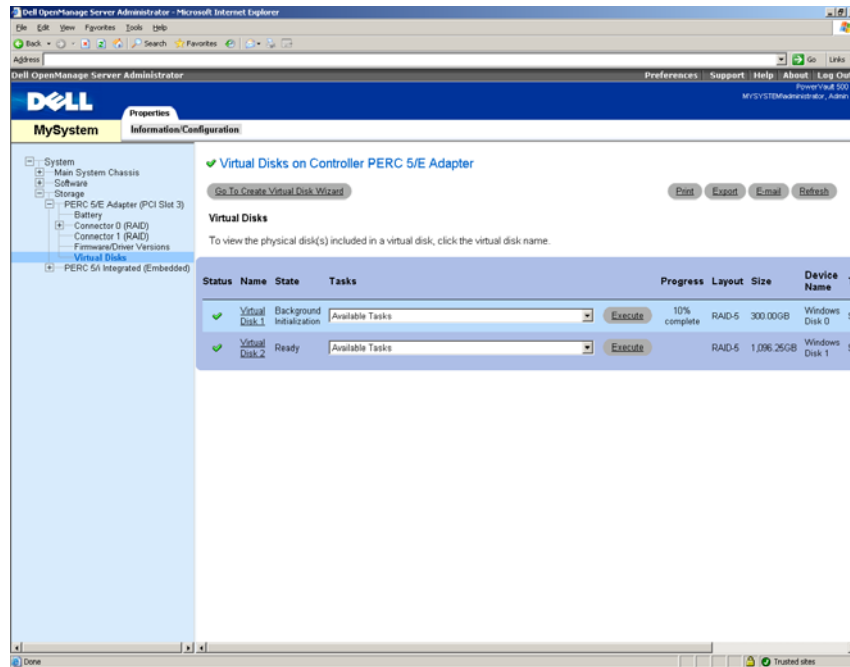| 1	RAID type	2	Virtual disk name
3	Virtual disk size		

3 Select the RAID-5 option.

4 Enter the name of the virtual disk.

5 Enter the size of the virtual disk (1000 = 1TB).

6 Click **Continue**.

Figure 4-3. Virtual Disk Summary
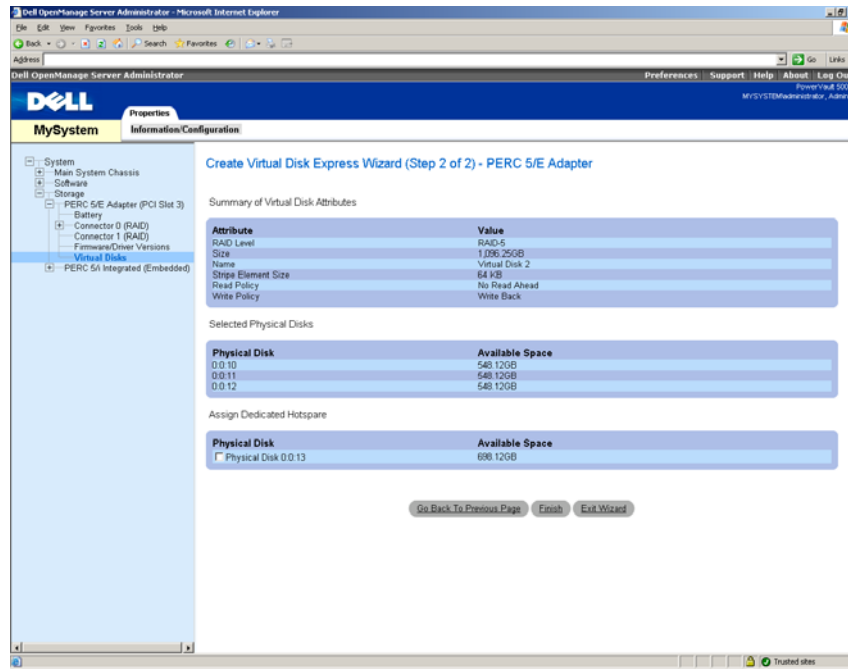
7 When the summary page appears, click **Finish**.

Figure 4-4.   Virtual Disk Created

In Figure 4-4 above, the new virtual disk you added (Virtual Disk 2) is shown as ready.

# Adding Available/Free Disks to DPM Storage Pool

To use additional virtual disks created in the previous steps, they must be added to DPM's storage pool. Virtual disks are added to DPM's storage pool using the DPM Administrator console. Refer to the help within the DPM Administrator console or the "Adding Disks to the Storage Pool" section of *Deploying System Center Data Protection Manager 2007*.

NOTE: The DPM Administrator console refers to raw disks and virtual disks simply as "Disks."

Example: Adding Virtual Disks to DPM's Storage Pool

The steps below shows how a systems administrator would add virtual disks to DPM's storage pool.

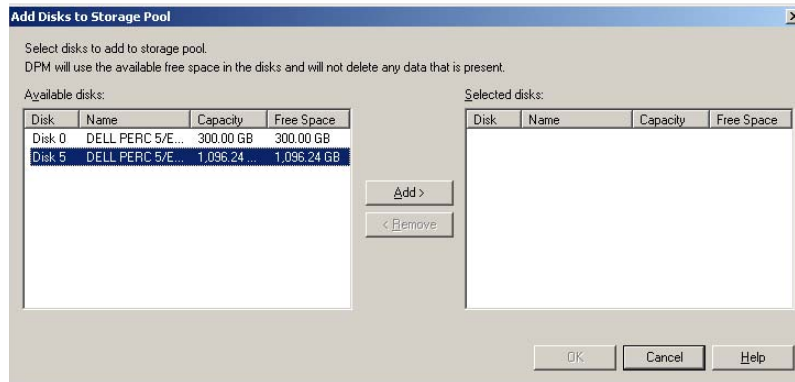**Figure 4-5.   DPM Disk Management Screen**
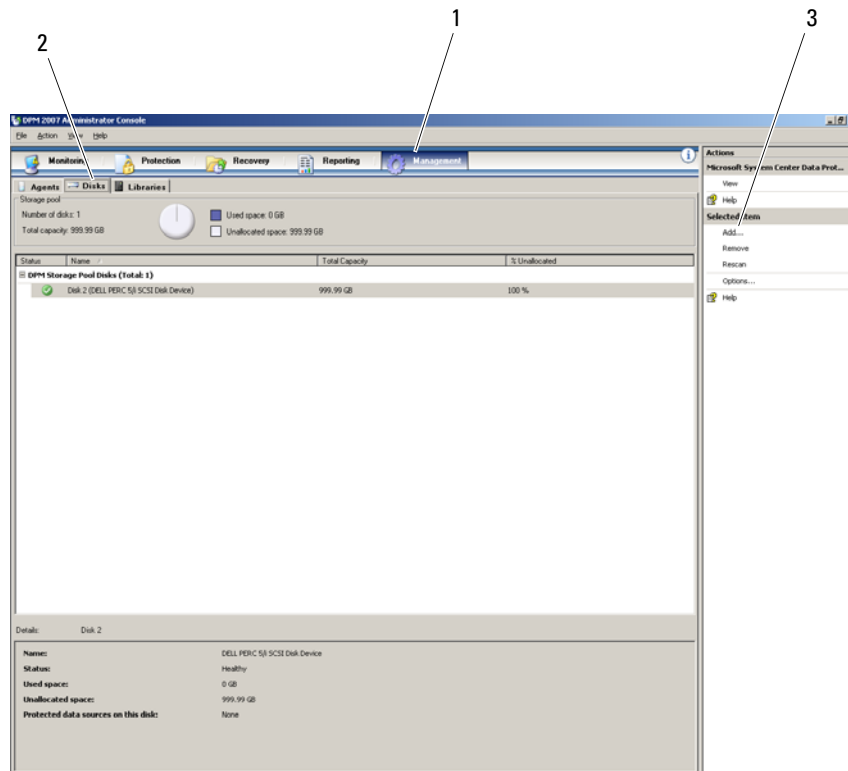
1	Management option	2	Disks tab
3	Add virtual disk option		

1 Select the **Management** option.

2 Select the **Disks** tab.

3 Under **Selected item**, click **Add**.

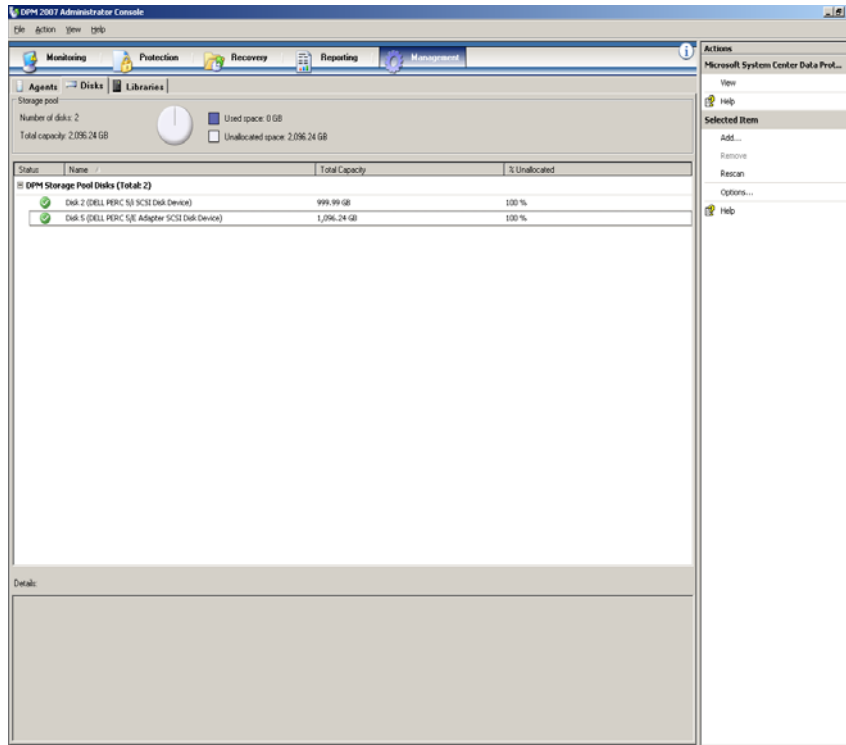**Figure 4-6.   DPM Storage Pool Disk Selection**

4   In the **Add Disks to Storage Pool** window, select the disks you want to add.

5   Click **Add**.

Figure 4-7.   Completing DPM Storage Pool Disk Selection
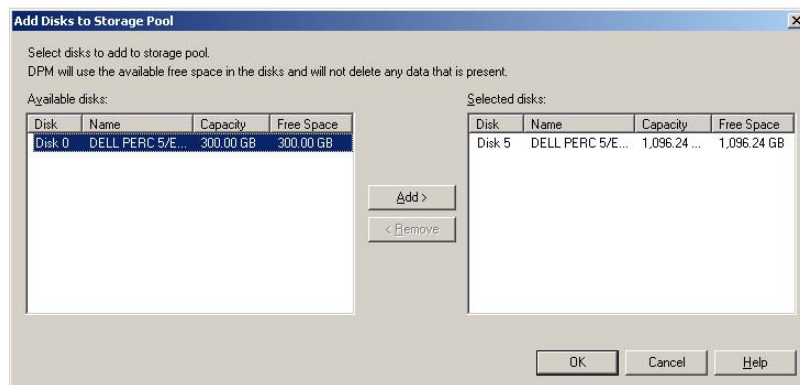
6   Click **OK**.

Figure 4-8. New Disk in DPM Storage Pool

The new disk now appears as part of the storage pool.

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Using Tape Drives and Libraries with DPM

The PowerVault Data Protection Solution supports disk-to-tape backup of the protected systems and disk-to-disk-to-tape archival for long-term protection. Refer to the "Backup Solutions Combining Disk and Tape" section of *Planning a System Center Data Protection Manager 2007 Deployment*. To use these features, you need to attach a tape drive or a tape library to your solution.

Supported Tape Drives and Libraries

Refer to the *PowerVault Data Protection Solution Support Matrix* for a list of supported tape drives, autoloaders and libraries.

Installing Tape Drives and Tape Libraries

Refer to the tape drive or the tape library documentation to install and attach tape drives/tapes to your system. Install the necessary drivers and update device firmware, if necessary. Refer to the *Dell PowerVault Compatibility Matrix* at support.dell.com for up to date PowerVault device drivers and firmware supported on Microsoft Windows® 2003 x64.

Using DPM with Tape Drives and Libraries

Refer to the "Configuring Tape Libraries" section of *Deploying System Center Data Protection Manager 2007* to add the tape drives and libraries to DPM.

Refer to the "Managing Tape Libraries" section of *DPM 2007 Operations Guide* for detailed information on how to manage tape libraries and stand-alone tape drives that are attached to the Microsoft System Center Data Protection Manager (DPM) 2007 server, including routine maintenance tasks.

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Other Documents and Resources

Refer to the *PowerVault Data Protection Solution Quick Reference Guide* available at support.dell.com to locate the following documents and resources.

Microsoft Information

- *Planning a System Center Data Protection Manager 2007 Deployment*
- *Deploying System Center Data Protection Manager 2007*
- *Microsoft System Center Data Protection Manager 2007 Operations Guide*
- *System Center Data Protection Manager 2007 Administrator Console Help*

Dell Hardware Information

- *Dell PowerVault Systems Hardware Owner's Manual*
- *Dell PowerVault Data Protection Solution Support Matrix*
- *Dell PowerEdge™ Expandable Raid Controller 5/i and 5/E User's Guide*
- *Dell PowerEdge Expandable Raid Controller 6/i and 6/E User's Guide*
- *Dell PowerVault MD1000 Storage Enclosure Hardware Owner's Manual*
- *Dell PowerVault MD1000 Getting Started Guide*

Dell Software Information

- *Dell PowerVault Data Protection Solution Support Matrix*
- *Dell OpenManage Server Administrator User's Guide*
- *Dell Systems Console and Agent CD*
- *Dell Systems Documentation CD*

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