# Dell PowerVault MD3200 and MD3220 Storage Arrays With Microsoft Windows Server Failover Clusters

# Hardware Installation and Troubleshooting Guide

# Notes, Cautions, and Warnings

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

**CAUTION: A CAUTION indicates potential damage to hardware or loss of data if instructions are not followed.**

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

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# Contents

# 1

# Introduction

This document addresses the configuration of your Dell PowerVault MD3200 and MD3220 storage arrays for use with Microsoft Windows Server Failover Clustering. It provides information and specific configuration tasks that enable you to deploy the shared storage for your cluster.

The document is intended for experienced IT professionals who configure the cluster solution and for trained service technicians who perform upgrade and maintenance procedures. This document also addresses readers who are new to clustering.

## Overview

A Dell failover cluster combines specific hardware and software components to provide enhanced availability for applications and services that run on the cluster. A failover cluster is designed to reduce the possibility of any single point of failure within the system that can cause the clustered applications or services to become unavailable.

**NOTE:** It is recommended that you use redundant components like system and storage power supplies, connections between the nodes and the storage array(s), and connections to client systems or other servers in a multi-tier enterprise application architecture in your cluster.

## Additional Information

- For more information on deploying your cluster with Windows Server 2008 operating systems, see the *Dell Failover Clusters with Microsoft Windows Server 2008 Installation and Troubleshooting Guide* at **support.dell.com/manuals**.

**NOTE:** Throughout this document, Windows Server 2008 refers to Windows Server 2008 x64 Enterprise Edition or Windows Server 2008 R2 x64 Enterprise Edition.

- For a list of recommended operating systems, hardware components, and driver or firmware versions for your failover cluster, see the *Dell Cluster Configuration Support Matrices* at **dell.com/ha**.

# Cluster Solution With PowerVault MD3200 and MD3220 Storage Arrays

The cluster solution implements a two-node clustering technology based on the Microsoft Failover Clustering software incorporated within the Windows Server 2008 operating systems. This cluster solution provides the following features:

- 6 Gbps Serial Attached SCSI (SAS) technology
- High availability of system services and resources to network clients
- Redundant paths to the shared storage
- Failure recovery for applications and services
- Flexible maintenance capabilities—allowing you to repair, maintain, or upgrade a cluster node without taking the entire cluster offline

# Cluster Hardware Requirements

Your cluster requires the following hardware components:

- Systems (nodes)
- Storage and storage management software

Table 1-1 describes the hardware requirements for your cluster nodes.

**Table 1-1. Cluster Node Requirements**

| Component | Minimum Requirement |
|---|---|
| Processor | At least one processor for each cluster node. |
| RAM | At least 1 GB RAM installed on each cluster node. |
| Cluster Nodes | A minimum of two identical Dell PowerEdge systems are required.<br>The maximum number of nodes supported is four. |
| Host Bus Adapter (HBA) | One or two Dell 6 Gbps SAS HBA for each cluster node. |

**Table 1-1. Cluster Node Requirements *(continued)***

| Component | Minimum Requirement |
|---|---|
| NICs | At least two NICs: one NIC for the public network and another NIC for the private network.<br>**NOTE:** It is recommended that the NICs on each public network are identical and that the NICs on each private network are identical. |
| Internal Disk Controller | One controller connected to internal disks for each node. Use any supported RAID controller or disk controller.<br>Two physical disks are required for mirroring (RAID 1) and at least three are required for disk striping with parity (RAID 5).<br>**NOTE:** It is strongly recommended that you use hardware-based RAID or software-based disk-fault tolerance for the internal drives. |

# Cluster Storage

Table 1-2 provides the configuration requirements for the shared storage system.

**Table 1-2. Cluster Storage Requirements**

| Hardware Components | Minimum Requirement |
|---|---|
| Supported storage systems | One PowerVault MD3200 or MD3220 RAID enclosure.<br>Up to seven PowerVault MD1200 or MD1220 expansion enclosures with a maximum of 96 disks. |
| Power and cooling requirements | Two integrated hot-pluggable power supply/cooling fan modules. |
| Physical disks | At least two physical disks in the PowerVault MD3200 or MD3220 RAID enclosure. |
| Cables | Two SAS cables per cluster node.<br>Two SAS cables for each additional PowerVault MD1200 or MD1220 expansion enclosure. |

**NOTE:** You can configure RAID 0 or independent disks, however such a configuration is not recommended for a high-availability system as it does not offer data redundancy if a disk failure occurs.

## Cluster Storage Management Software

The following sections describe various cluster storage management software that you can install and configure on your cluster.

### Dell PowerVault Modular Disk Storage Manager

The Modular Disk Storage Manager (MDSM) runs on the management station or any host attached to the array to centrally manage the PowerVault MD3200 or MD3220 RAID enclosure. You can use the PowerVault MDSM to perform tasks such as creating or managing RAID arrays, binding virtual disks, and downloading firmware.

MDSM is a graphical user interface (GUI) with wizard-guided tools and a task-based structure. MDSM is designed to:

- Reduce the complexity of installation, configuration, management, and performing diagnostic tasks for the storage arrays.
- Contain an event monitoring service that is used to send alerts when a critical problem with the storage array occurs.
- Provide a command line interface (CLI) to run commands from an operating system prompt.

### Dell PowerVault Modular Disk Storage Manager Agent

The MDSM Agent resides on each cluster node and collects server-based topology data that can be managed by the MDSM.

### Multi-Path Software

Multi-path software (also referred to as the failover driver) is a software resident on each cluster node that provides management of the redundant data path between the server and the RAID enclosure. For the multi-path software to correctly manage a redundant path, the configuration must provide for redundant HBAs and cabling.

The multi-path software identifies the existence of multiple paths to a virtual disk and establishes a preferred path to that disk. If any component in the preferred path fails, the multi-path software automatically re-routes I/O requests to the alternate path so that the storage array continues to operate without interruption.

#### Advanced Features

Advanced features for the PowerVault MD3200 and MD3220 RAID enclosures include:

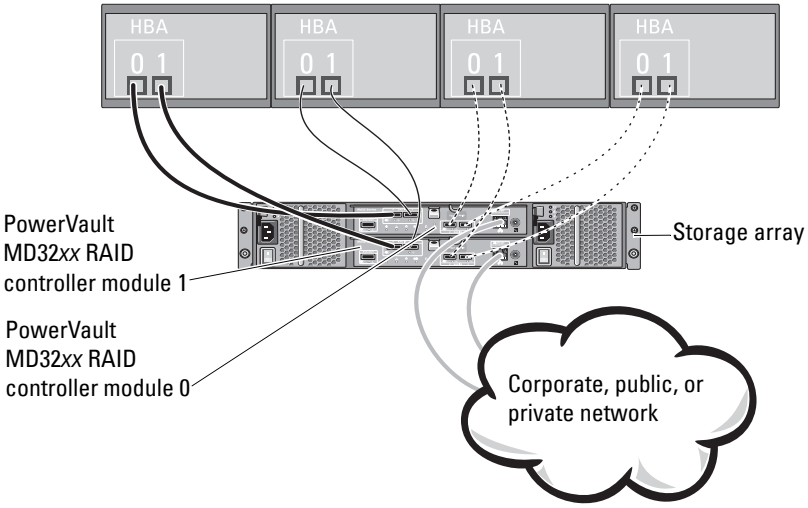
- Snapshot Virtual Disk—Captures point-in-time images of a virtual disk for backup, testing, or data processing without affecting the contents of the source virtual disk.
- Virtual Disk Copy—Generates a full copy of data from the source virtual disk to the target virtual disk in a storage array. You can use Virtual Disk Copy to back up data, copy data from disk groups that use smaller-capacity physical disks to disk groups using greater capacity physical disks, or restore snapshot virtual disk data to the source virtual disk.

  **NOTE:** For instructions on deploying the correct Virtual Disk options in the cluster environment, see "Using Advanced (Premium) PowerVault Modular Disk Storage Manager Features" on page 49.

## Supported Dell Cluster Configurations

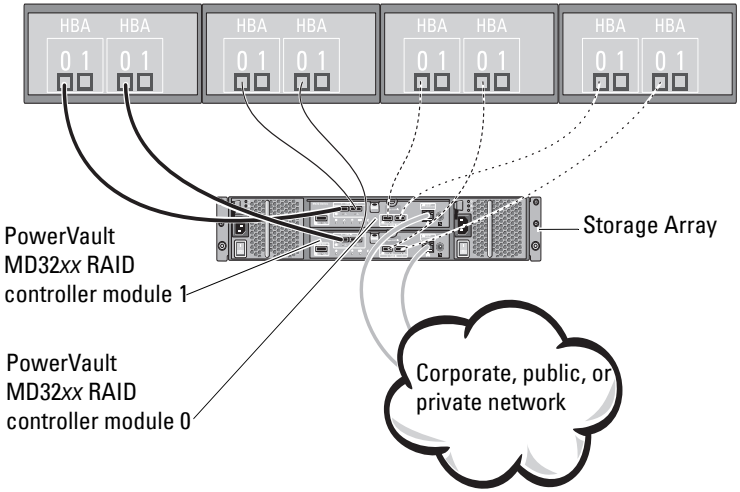
Figure 1-1 and Figure 1-2 illustrate the various supported configurations for your cluster with PowerVault MD3200 or MD3220 RAID enclosure.

**Figure 1-1. Cluster Configuration With Single Dell 6.0-Gbps SAS HBA**




**NOTE:** The configuration can have up to 4 nodes. The nodes can be one cluster, two different clusters, or one cluster and standalone server(s).

**Figure 1-2. Cluster Configuration With Dual Dell 6.0-Gbps SAS HBAs**




**NOTE:** The configuration can have up to 4 nodes. The nodes can be one cluster, two different clusters, or one cluster and standalone system(s).

# Other Documents You May Need

**CAUTION: For important safety and regulatory information, see the safety information that shipped with your system. Warranty information may be included within this document or as a separate document.**

**NOTE:** Always read the updates included—included as release notes or readme files—first, because they often supersede information in other documents.

**NOTE:** All documentation, unless indicated otherwise, is available at **support.dell.com/manuals**.

- The *Rack Installation Guide* included with your rack solution describes how to install your system into a rack.
- The *Getting Started Guide* included with you Dell system provides an overview of initially setting up your system.
- The *Dell Failover Clusters with Microsoft Windows Server 2008 Installation and Troubleshooting Guide* provides more information on deploying your cluster with the specific variant of the Windows Server operating system.
- The *Dell Cluster Configuration Support Matrices* at **dell.com/ha** provides a list of recommended operating systems, hardware components, and driver or firmware versions for your failover cluster.
- The *Users Guide* for your PowerEdge system describes system features and technical specifications, the system setup program (if applicable), software support, and the system configuration utility.
- The *Installation and Troubleshooting Guide* for your PowerEdge system describes how to troubleshoot the system and install or replace system components.
- The *Dell PowerVault MD3200 and MD 3220 Getting Started Guide* provides an overview of setting up and cabling your storage array.
- The Dell 6.0-Gbps SAS Host Bus Adapter documentation includes information on the SAS HBA.
- The *Dell PowerVault MD3200 and MD3220 Storage Arrays Deployment Guide* provides installation and configuration instructions to configure the storage system for initial use.
- The *Dell PowerVault MD3200 and MD3220 RAID Enclosures Owner's Manual* provides instructions for using the array management software to configure RAID systems.

- Operating system documentation describes how to install (if necessary), configure, and use the operating system software.
- The Dell PowerVault tape library documentation provides information for installing, troubleshooting, and upgrading the tape library.
- The *PowerVault Modular Disk Storage Manager CLI Guide* provides information about using the command line interface (CLI).
- The *Dell PowerVault MD3200 Series* resource media provides documentation for configuration and management tools, as well as the full documentation set included here.
- The *Dell PowerVault Modular Disk Systems Support Matrix* provides information on supported software and hardware for PowerVault storage systems.
- Documentation for any components you purchased separately provides information to configure and install these options.
- Release notes or readme files may be included to provide last-minute updates to the system documentation or advanced technical reference material intended for experienced users or technicians.

# 2

# Cabling Your Cluster Hardware

The following sections help you connect the power, network and storage cables to your cluster. After you have connected the hardware components, the subsequent sections in this document provide instructions to configure your cluster.

## Cabling the Mouse, Keyboard, and Monitor

When installing a cluster configuration in a rack, you must include a switch box to connect the mouse, keyboard, and monitor to the nodes. For instructions on cabling each node's connections to the switch box, see the documentation included with your rack.

## Cabling the Power Supplies

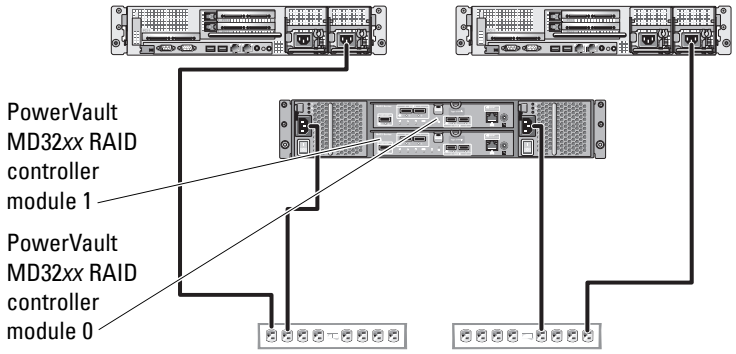
To ensure that the specific power requirements are met, see the documentation for each component in your cluster solution.

It is recommended to follow the guidelines below to protect your cluster solution from power-related failures:

- For nodes with multiple power supplies, plug each power supply into a separate AC circuit.
- Use uninterruptible power supplies (UPS).
- For some environments, consider having backup generators and power from separate electrical substations.

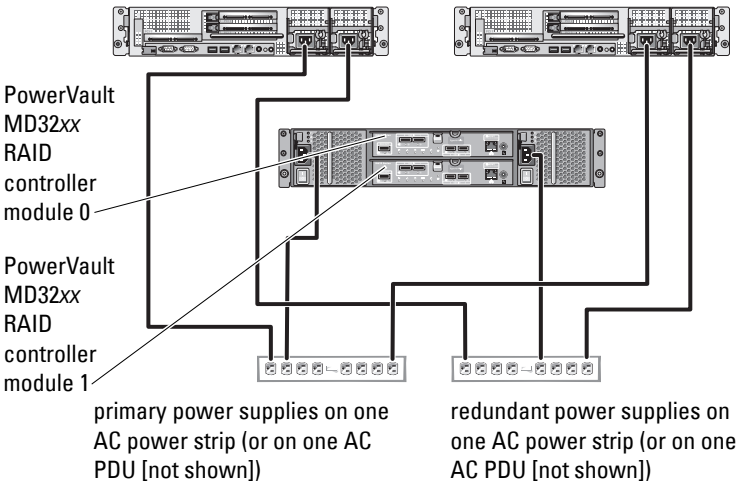
Figure 2-1 and Figure 2-2 illustrate recommended methods of power cabling for a cluster solution consisting of two Dell PowerEdge systems and one storage system. To ensure redundancy, the primary power supplies of all the components are grouped onto one or two circuits and the redundant power supplies are grouped onto a different circuit.

**Figure 2-1. Power Cabling Example With One Power Supply in the PowerEdge Systems**




**NOTE:** This illustration is intended only to demonstrate the power distribution of the components.

**Figure 2-2. Power Cabling Example With Two Power Supplies in the PowerEdge Systems**




**NOTE:** This illustration is intended only to demonstrate the power distribution of the components.

# Cabling Your Public and Private Networks

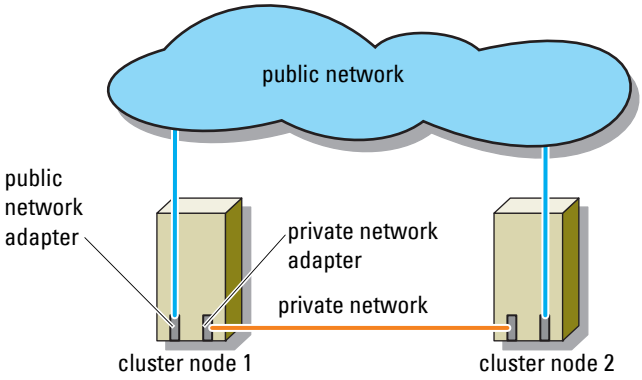
The network adapters in the cluster nodes provide at least two network connections for each node. The network connections are described in Table 2-1.

**Table 2-1. Network Connections**

| Network Connection | Description |
|---|---|
| Public Network | All connections to the client LAN. |
| | At least one public network must be configured for mixed mode (public mode and private mode) for private network failover. |
| Private Network | A dedicated connection for sharing cluster health and status information between the cluster nodes. |
| | Network adapters connected to the LAN can also provide redundancy at the communications level in case the cluster interconnect fails. |
| | For more information on private network redundancy, see your Microsoft Failover Clustering documentation. |

Figure 2-3 shows an example of network adapter cabling in which dedicated network adapters in each node are connected to the public network and the remaining network adapters are connected to each other (for the private network).

**Figure 2-3. Example of Network Cabling Connection**




## Cabling Your Public Network

Any network adapter supported by a system running Transmission Control Protocol/Internet Protocol (TCP/IP) may be used to connect to the public network segments. You can install additional network adapters to support additional public network segments or to provide redundancy in the event of a faulty primary network adapter or switch port.

## Cabling Your Private Network

The private network connection to the cluster nodes is provided by a second or subsequent network adapter that is installed in each node. This network is used for intra-cluster communications.

Table 2-2 lists the required hardware components and connection method for two possible private network configurations.

**Table 2-2. Private Network Hardware Components and Connections**

| Method | Hardware Components | Connection |
|---|---|---|
| Network switch | Gigabit or 10 Gigabit Ethernet network adapters and switches | Depending on the hardware, connect the CAT5e or CAT6 cables, the multimode optical cables with Local Connectors (LCs), or the twin-ax cables from the network adapters in the nodes to a switch. |
| Point-to-Point (two-node cluster only) | Copper Gigabit or 10 Gigabit Ethernet network adapters with RJ-45 connectors | Connect a standard CAT5e or CAT6 Ethernet cable between the network adapters in both nodes. |
| | Copper 10 Gigabit Ethernet network adapters with SFP+ connectors | Connect a twin-ax cable between the network adapters in both nodes. |
| | Optical Gigabit or 10 Gigabit Ethernet network adapters with LC connectors | Connect a multi-mode optical cable between the network adapters in both nodes. |

## Using Dual-Port Network Adapters for Your Private Network

You can configure your cluster to use the public network as a failover for private network communications. However, if dual-port network adapters are used, do not use two ports simultaneously to support both the public and private networks.

## NIC Teaming

NIC teaming combines two or more NICs to provide load balancing and/or fault tolerance. Your cluster supports NIC teaming only in a public network. NIC teaming is not supported in a private network.

Use the same brand of NICs in a team. Do not mix brands of teaming drivers.

## Cabling the Storage Systems

This section provides information for connecting your cluster to a storage system.

You can either use a SAS connection for in-band storage management or use an Ethernet connection for out-of-band storage management. For out-of-band storage management, cable the Ethernet ports on the storage array to the public network.

**NOTE:** It is recommended that you configure your PowerVault MD3200 and MD3220 to use both in-band and out-of-band management paths. Establishing all management connections to a RAID enclosure provides additional paths in the case of a management connection failure.

**NOTE:** For more details on the storage hardware description, see the *Dell PowerVault MD3200 and MD3220 RAID Enclosure Hardware Owner's Manual* at **support.dell.com/manuals**.

### Cabling the Cluster in Configuration With a Single Dell 6.0-Gbps SAS HBA

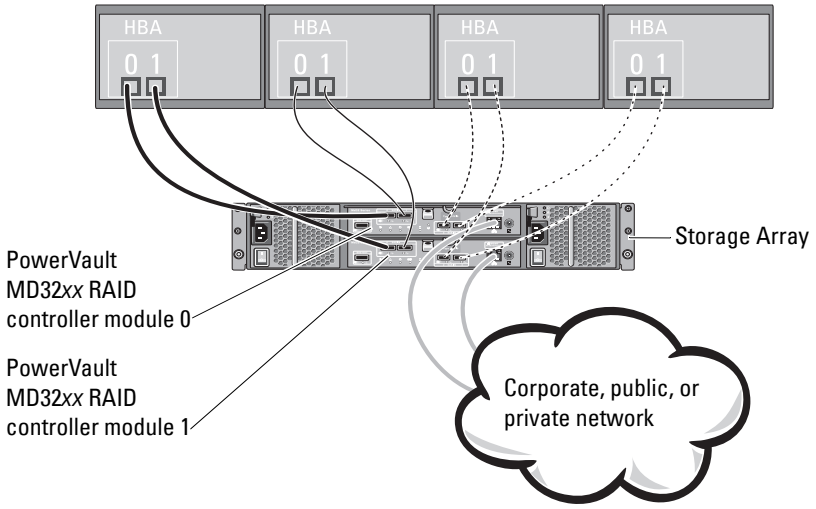
Each cluster node attaches to the storage system using one Dell 6.0-Gbps SAS HBA and two SAS cables. In this configuration, there are redundant storage paths from the cluster node to the storage system. If a component fails in the storage path such as the port, the cable, or the storage controller, the multi-path software automatically reroutes the I/O requests to the alternate path so that the storage array continues to operate without interruption.

To cable the cluster:

1. Connect cluster node 1 to the storage system.
   a. Install a SAS cable from the cluster node 1 HBA port 0 to the RAID controller module 0 port In-0.
   b. Install a SAS cable from the cluster node 1 HBA port 1 to the RAID controller module 1 port In-0.
2. Connect cluster node 2 to the storage system.
   a. Install a SAS cable from the cluster node 2 HBA port 0 to the RAID controller module 0 port In-1.
   b. Install a SAS cable from the cluster node 2 HBA port 1 to the RAID controller module 1 port In-1.
3. If applicable, connect node 3 to the storage system. Node 3 can be either cluster node 3 of the only cluster in the configuration, cluster node 1 of the second cluster, or a standalone server.
   a. Install a SAS cable from the node 3 HBA port 0 to the RAID controller module 0 port In-2.
   b. Install a SAS cable from the node 3 HBA port 1 to the RAID controller module 1 port In-2.
4. If applicable, connect node 4 to the storage system. Node 4 can be either cluster node 4 of the only cluster in the configuration, cluster node 2 of the second cluster, or a standalone server.
   a. Install a SAS cable from the node 4 HBA port 0 to the RAID controller module 0 port In-3.
   b. Install a SAS cable from the node 4 HBA port 1 to the RAID controller module 1 port In-3.

**NOTE:** If the HBA on the active node fails, Microsoft Failover Clustering moves the cluster group to the standby node and accesses the data through the standby node.

**Figure 2-4. Cluster Configuration With Single Dell 6.0-Gbps SAS HBA**



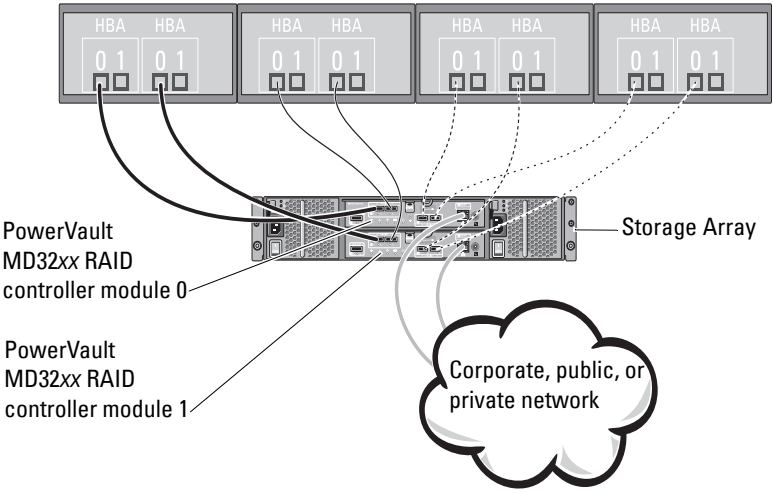
### Cabling the Cluster in Configuration With Dual Dell 6.0-Gbps SAS HBAs

Each cluster node attaches to the storage system using two Dell 6.0-Gbps SAS HBAs and two SAS cables. In this configuration, there are redundant storage paths from the cluster node to the storage system. If a component fails in the storage path such as the HBA, the cable, or the storage controller, the multi-path software automatically reroutes the I/O requests to the alternate path so that the storage array continues to operate without interruption.

To cable the cluster:

1. Connect cluster node 1 to the storage system.
   a. Install a SAS cable from the cluster node 1 HBA 1 port 0 to the RAID controller module 0 port In-0.
   b. Install a SAS cable from the cluster node 1 HBA 2 port 0 to the RAID controller module 1 port In-0.
2. Connect cluster node 2 to the storage system.
   a. Install a SAS cable from the cluster node 2 HBA 1 port 0 to the RAID controller module 0 port In-1.
   b. Install a SAS cable from the cluster node 2 HBA 2 port 0 to the RAID controller module 1 port In-1.
3. If applicable, connect node 3 to the storage system. Node 3 can be either cluster node 3 of the only cluster in the configuration, cluster node 1 of the second cluster, or a standalone server.
   a. Install a SAS cable from the node 3 HBA 1 port 0 to the RAID controller module 0 port In-2.
   b. Install a SAS cable from the node 3 HBA 2 port 0 to the RAID controller module 1 port In-2.
4. If applicable, connect node 4 to the storage system. Node 4 can be either cluster node 4 of the only cluster in the configuration, cluster node 2 of the second cluster, or a standalone server.
   a. Install a SAS cable from the node 4 HBA 1 port 0 to the RAID controller module 0 port In-3.
   b. Install a SAS cable from the node 4 HBA 2 port 0 to the RAID controller module 1 port In-3.

**Figure 2-5. Cluster Configuration With Dual Dell 6.0-Gbps SAS HBAs**



# 3

# Preparing Your Systems for Clustering

**WARNING: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

## Cluster Configuration Overview

1. Ensure that your site can handle the cluster's power requirements.

   Contact your sales representative for information about your region's power requirements.

2. Install the servers, the shared storage array(s), and the interconnect switches (for example: in an equipment rack), and ensure that all these components are powered on.

   **NOTE:** For more information on step 3 through step 7, and step 10 through step 12, see "Preparing your systems for clustering" section of the *Dell Failover Clusters with Microsoft Windows Server 2008 Installation and Troubleshooting Guide* at **support.dell.com/manuals**.

3. Deploy the operating system (including any relevant service pack and hotfixes), network adapter drivers, and storage adapter drivers (including Multipath I/O drivers(MPIO)) on each of the servers that will become cluster nodes. Depending on the deployment method that is used, it may be necessary to provide a network connection to successfully complete this step.

   **NOTE:** You can record the Cluster configuration and the Cluster Data Form to help in planning and deployment of your cluster. For more information, see "Cluster Data Form" on page 59.

4 Establish the physical network topology and the TCP/IP settings for the network adapters on each server node to provide access to the cluster public and private networks.

5 Configure each server node as a member server in the same Windows® Active Directory Domain.

**NOTE:** You can configure the cluster nodes as Domain Controllers. For more information, see "Selecting a Domain Model" section of the *Dell Failover Clusters with Microsoft Windows Server 2008 Installation and Troubleshooting Guide* at **support.dell.com/manuals**.

6 Establish the physical storage topology and any required storage network settings to provide connectivity between the storage array and the servers that will be configured as cluster nodes. Configure the storage system(s) as described in your storage system documentation.

7 Use storage array management tools to create at least one logical unit number (LUN). The LUN is used as a witness disk for the failover cluster with Windows Server 2008. Ensure that this LUN is presented to the servers that will be configured as cluster nodes.

**NOTE:** It is highly recommended that you configure the LUN on a single node, for security reasons, as mentioned in step 8 when you are setting up the cluster. Later, you can configure the LUN as mentioned in step 9 so that other cluster nodes can access it.

8 Select one of the systems and form a new failover cluster by configuring the cluster name, cluster management IP, and quorum resource.

**NOTE:** Run the **Cluster Validation Wizard** to ensure that your system is ready to form the cluster.

9 Join the remaining node(s) to the failover cluster.

10 Configure roles for cluster networks.

11 Test the failover capabilities of your new cluster.

**NOTE:** You can also use the **Cluster Validation Wizard**.

12 Configure highly-available applications and services on your failover cluster. Depending on your configuration, this may also require providing additional LUNs to the cluster or creating new cluster resource groups. Test the failover capabilities of the new resources.

13 Configure client systems to access the highly available applications and services that are hosted on your failover cluster.

## Installing the Operating System

Ensure that the Windows Server operating system installed on each cluster node in your failover cluster has the same release, edition, service pack, and processor architecture.

For example, all nodes in your cluster may be configured with Windows Server 2008 R2, Enterprise x64 Edition. If the operating system varies among nodes, it is not possible to configure a failover cluster successfully. It is recommended to establish server roles prior to configuring a failover cluster, depending on the operating system configured on your cluster.

For a list of Dell PowerEdge Servers, HBAs, and the recommended list of operating system variants, specific driver and firmware revisions, see the *Dell Cluster Configuration Support Matrices* at **dell.com/ha**.

To establish communication between the cluster nodes and the shared PowerVault MD3200 or MD3220 storage array and to make the shared disks in the storage array available to the cluster:

1. Ensure that your cluster meets the requirements as described in "Before You Begin" on page 31.
2. Reserve static IP addresses for the following cluster resources and components:
   - Public network, if DHCP is not being used
   - Private network
   - Cluster virtual servers, if DHCP is not being used

   **NOTE:** For more information, see **Assigning Static IP Addresses to Your Cluster Resources and Components** section of the *Dell Failover Clusters with Microsoft Windows Server 2008 Installation and Troubleshooting Guide* at **support.dell.com/manuals**.
3. Configure the internal disks in your cluster nodes.

   **NOTE:** For more information, see the "Configuring the Internal Drives in Your Cluster Nodes" section of the *Dell Failover Clusters with Microsoft Windows Server 2008 Installation and Troubleshooting Guide* at **support.dell.com/manuals**.
4. Install and configure the Windows operating system on both the cluster nodes. Each cluster node must have its own licensed copy of the Windows operating system and Certificate of Authenticity (COA) attached.

**NOTE:** For more information, see the "Installing and Configuring the Windows Operating System" section of the *Dell Failover Clusters with Microsoft Windows Server 2008 Installation and Troubleshooting Guide* at **support.dell.com/manuals**.

5 Install and configure the storage management software.

**NOTE:** For more information, see the documentation included with your Dell PowerVault MDSM software, or at **support.dell.com/manuals**.

6 Configure the shared storage system(s).

**NOTE:** For more information, see the "Installing and Configuring the Shared Storage System" section of the *Dell Failover Clusters with Microsoft Windows Server 2008 Installation and Troubleshooting Guide* at **support.dell.com/manuals**.

7 Configure the Microsoft Failover Clustering.

**NOTE:** For more information, see the "Installing and Configuring a Failover Cluster" section of the *Dell Failover Clusters with Microsoft Windows Server 2008 Installation and Troubleshooting Guide* at **support.dell.com/manuals**.

8 Verify cluster functionality. Ensure that:

- The cluster components communicate with each other.
- Microsoft Failover Clustering is started.

**NOTE:** For more information, see the "Verifying Cluster Functionality" section of the *Dell Failover Clusters with Microsoft Windows Server 2008 Installation and Troubleshooting Guide* at **support.dell.com/manuals.**

9 Verify cluster resource availability. Use the Failover Cluster Manager to check the running state of each resource group.

**NOTE:** For more information, see the "Verifying Cluster Resource Availability" section of the *Dell Failover Clusters with Microsoft Windows Server 2008 Installation and Troubleshooting Guide* at **support.dell.com/manuals**.

## Additional Information

- For a list of Dell PowerEdge Servers, HBAs, recommended list of operating system variants, and specific driver and firmware revisions, see the *Dell Cluster Configuration Support Matrices* at **dell.com/ha**.

- For a general overview of cluster configuration tasks and more detailed information about deploying your cluster see the *Dell Failover Clusters with Microsoft Windows Server 2008 Installation and Troubleshooting Guide* at **support.dell.com/manuals**.

# Installing the Dell 6.0-Gbps SAS HBAs Drivers

For systems with dual Dell 6.0-Gbps SAS HBAs, Dell recommends installing the cards on separate Peripheral Component Interconnect (PCI) buses. Placing the cards on separate buses improves availability and performance.

## Installing the Dell 6.0-Gbps SAS HBAs Drivers

The *Dell PowerVault MD3200 Series* resource media contains the driver for your Dell 6.0-Gb SAS HBAs. The root of the media contains a **readme.txt** file covering changes to the software, updates, fixes, patches, and other important data. The **readme.txt** file also specifies requirements for accessing documentation, information regarding versions of the software on the media, and system requirements for running the software.

# Installing and Configuring the Storage Management Software

To install and configure the PowerVault MD3200 or MD3220 RAID enclosure in your cluster:

1. Ensure that the PowerVault MD3200 or MD3220 RAID enclosure has the latest firmware and Non-Volatile Static Random Access Memory (NVSRAM). For more information, see your PowerVault MD3200 or MD3220 RAID enclosure document.
2. Install the host software (multi-path software and the PowerVault MDSM Agent) on each cluster node, and the PowerVault MDSM software on the management station.
3. If you have third-party applications that use the Microsoft Volume Shadow-copy Service (VSS) or Virtual Disk Service (VDS) Application Programming Interface (API), install the VDS_VSS package located in the windows \VDS_VSS directory on the PowerVault MD3200 and MD3220 Resource media. Separate versions for 32-bit and 64-bit operating systems are provided. The VSS and VDS provider will engage only if it is needed.

   For more information, see your PowerVault MDSM documentation.

**NOTE:** The cluster node can be used as a management station.

You can manage a storage array in two ways:

- Out-of-band management
- In-band management

For out-of-band management, data is separate from commands and events. Data travels through the host-to-controller SAS interface cables, while commands and events travel through the Ethernet cables.

When you use out-of-band management, you must set the network configuration for each RAID controller module including its IP address, subnet mask, and gateway. If you are using a DHCP server, you can enable automatic network configuration, but if you are not using a DHCP server, you must enter the network configuration manually.

For in-band management, commands, events, and data travel through the host-to-controller SAS interface cables. Unlike out-of-band management, commands and events are mixed with data.

**NOTE:** It is recommended to use both in-band and out-of-band management.

### Adding Storage Arrays to the Failover Cluster

The Storage Manager screen is divided into two primary windows:

- Enterprise Management Window (EMW)—The EMW provides high level management of the storage arrays. You can launch the Array Management Window from the EMW.
- Array Management Window (AMW)—The AMW provides management functions for a single storage array. You can launch more than one AMW at the same time to manage different storage arrays.

Before using the PowerVault MD3200 or MD3220 storage array for the first time, you must complete a number of initial configuration tasks from any system (host or management station) on which you have installed the MDSM software. For out-of-band management, you must set the network configuration for each RAID controller module, including its Internet Protocol (IP) address, subnetwork mask (subnet mask), and gateway.

**NOTE:** You can set the network configuration using a DHCP server.

1. Start MDSM.
2. Click **Start**→ **Programs**→ **Dell**→ **MD Storage Manager**.
3. Click **Modular Disk Storage Manager Client**.
4. In the **Enterprise Management Window** (EMW), go to **Setup**.
5. Click **Add Storage Array** and start the automatic discovery of systems.

   **NOTE:** Only storage arrays configured with IP address on the same subnet as the management stations will be detected.

   **NOTE:** It may take several minutes for the discovery process to complete. Closing the **Automatic Discovery** status window stops the discovery process.
6. After discovery is complete, a confirmation screen appears. Click **Close** to close the screen.

# Installing and Configuring the Shared Storage System

This section provides information for installing and configuring the shared storage systems.

## Setting Up Your Storage Array

A list of initial setup tasks is available on the **Setup** tab in the AMW. The list of initial setup tasks shows you how to set up a storage array. If you use the steps outlined in the Initial Setup Tasks area, you can ensure that the basic steps to set up the storage array are completed.

Use the Initial Setup Tasks list the first time that you set up a storage array to perform these tasks:

- Locate the storage array—Find the physical location of the storage array on your network by turning on the unit identify LEDs. The storage array can be identified with a label.
- Give a new name to the storage array—Use a unique name that identifies each storage array.
- Set a storage array password—Configure the storage array with a password to protect it from unauthorized access. MDSM prompts for the password when an attempt is made to change the storage array configuration, such as when a virtual disk is created or deleted.
- Configure the storage array—Create disk groups, virtual disks, and hot spare physical disks by using the Automatic configuration method or the Manual configuration method. For more information, see the *PowerVault Modular Disk Storage Manager online help* topics.
- Map Virtual Disks—Map virtual disks to hosts or host groups.
- Save Configuration—Save the configuration parameters in a file that you can use to restore the configuration, or reuse the configuration on another storage array. For more information, see the *PowerVault Modular Disk Storage Manager online help* topics.

After you complete the basic steps for configuring the storage array, you can perform these optional tasks:

- Manually Define Hosts—Define the hosts and the host port identifiers that are connected to the storage array. Use this option only if the host is not automatically recognized and shown in the **Mappings** tab.
- Configure Ethernet Management Ports—Configure the network parameters for the Ethernet management ports on the RAID controller modules if you are managing the storage array by using the out-of-band management connections.
- View and enable premium features—Your MDSM may include premium features. View the premium features that are available and the premium features that are already started. You can start available premium features that are currently stopped.

### Configuring Host Access

If the host context agent is running on the host, the hosts and the host ports connected to the storage array are automatically detected by Dell PowerVault MDSM and appear on the Mappings tab in the Array Management Window (AMW).

### Creating a Host Group

A host group is a logical entity of two or more hosts that share access to specific virtual disks on the storage array.

To create host groups:

1. In the **Array Management Window**, select the **Mappings** tab.
2. In the **Topology** pane, select the storage array or the **Default Group**.
3. Perform one of the following actions:
   - Select **Mappings→ Define→ Host Group**.
   - Right-click the storage array or the **Default Group**, and select **Define→ Host Group** from the pop-up menu.
4. Type the name of the new host group in **Enter new host group name**.
5. Select the appropriate hosts in the **Select hosts to add** area.
6. Click **Add**.
7. Click **OK**.

The host group is added to the storage array.

### Creating Disk Groups and Virtual Disks

A minimum of one virtual disk is required for an active/passive configuration; at least two virtual disks are required for an active/active configuration. In some cases, the virtual disks may have been bound when the system was shipped. However, it is important that you install the management software and verify that the desired virtual disk configuration exists.

**NOTE:** Before you can create virtual disks, you must first organize the physical disks into disk groups and configure host access. You can then create virtual disks within a disk group.

To create a virtual disk, use one of the following methods:

- Automatic Configuration
- Manual Configuration

To create disk groups using automatic configuration:

1. Start the **Create Disk Group Wizard** and perform one of these actions:
   - To create a disk group from unconfigured capacity in the storage array: On the **Logical** tab, select an **Unconfigured Capacity** node and select **Disk Group→ Create**. Alternatively, you can right-click the **Unconfigured Capacity** node, and select **Create Disk Group** from the pop-up menu.
   - To create a disk group from unassigned physical disks in the storage array: On the **Physical** tab, select one or more unassigned physical disks of the same physical disk type, and select **Disk Group→ Create**. Alternatively, you can right-click the unassigned physical disks, and select **Create Disk Group** from the pop-up menu.
   - To create a secure disk group: On the **Physical** tab, select one or more unassigned security capable physical disks of the same physical disk type, and select **Disk Group→ Create**. Alternatively, you can right-click the unassigned security capable physical disks, and select **Create Disk Group** from the pop-up menu.

   The **Introduction (Create Disk Group)** window is displayed.
2. Click **Next**.

   The **Disk Group Name and Physical Disk Selection** window is displayed.
3. Type the up to 30-character name of the disk group in **Disk group name**.

4 Select the appropriate **Physical Disk selection choices**, you can select:

- **Automatic**, see step 6
- **Manual**, see step 9

5 Click **Next**.

6 For Automatic configuration, the **RAID Level and Capacity** window is displayed.

7 Select the appropriate RAID level in **Select RAID level**. You can select RAID levels 0, 1/10, 6, and 5.

Depending on your RAID level selection, the physical disks available for the selected RAID level is displayed in **Select Capacity** table.

8 In the **Select Capacity** table, select the relevant disk group capacity, and click **Finish**.

9 For Manual configuration, the **Manual Physical Disk Selection** window is displayed.

10 Select the appropriate RAID level in **Select RAID level**. You can select RAID levels 0, 1/10, 6, and 5.

Depending on your RAID level selection, the physical disks available for the selected RAID level is displayed in **Unselected physical disks** table.

11 In the **Unselected physical disks** table, select the appropriate physical disks and click **Add**.

**NOTE:** You can select multiple physical disks at the same time by holding <Ctrl> or <Shift> and selecting additional physical disks.

12 To view the capacity of the new disk group, click **Calculate Capacity**.

13 Click **Finish**.

A message is displayed confirming that the disk group is successfully created and that you should create at least one virtual disk before you can use the capacity of the new disk group.

To create virtual disks:

1. Choose one of these methods to start the **Create Virtual Disk Wizard**:
   - To create a virtual disk from unconfigured capacity in the storage array: On the **Logical** tab, select an **Unconfigured Capacity** node, and select **Virtual Disk→ Create**. Alternatively, you can right-click the **Unconfigured Capacity** node, and select **Create Virtual Disk** from the pop-up menu.
   - To create a virtual disk from free capacity on a disk group: On the **Logical** tab, select a **Free Capacity** node and select **Virtual Disk→ Create**. Alternatively, you can right-click the **Free Capacity** node, and select **Create Virtual Disk** from the pop-up menu.
   - To create a virtual disk from unassigned physical disks in the storage array: On the **Physical** tab, select one or more unassigned physical disks of the same physical disk type, and select **Virtual Disk→ Create**. Alternatively, you can right-click the unassigned physical disks, and select **Create Virtual Disk** from the pop-up menu.
   - To create a secure virtual disk: On the **Physical** tab, select one or more unassigned security capable physical disks of the same physical disk type, and select **Virtual Disk→ Create**. Alternatively, you can right-click the unassigned security capable physical disks, and select **Create Virtual Disk** from the pop-up menu.

   If you chose an **Unconfigured Capacity** node or unassigned physical disks to create a virtual disk, the **Disk Group Required** dialog appears. Click **Yes** and create a disk group by using the **Create Disk Group Wizard**. The **Create Virtual Disk Wizard** appears after you create the disk group. If you chose a **Free Capacity** node, the The **Introduction (Create Virtual Disk)** window is displayed.
2. Click **Next**.

   The **Specify Capacity /Name** window is displayed.
3. Select the appropriate unit for memory in **Units** and enter the capacity of the virtual disk in the **New virtual disk capacity** field.
4. Enter an up to 30 character name for the virtual disk in the **Virtual disk name** field.
5. In **Advanced virtual disk parameters**, you can select:

- **Use recommended settings**
- **Customize settings**

6 Click **Next**.

7 In the **Customize Advanced Virtual Disk Parameters** window, select the appropriate Virtual Disk I/O characteristics type. You can select:

- **File system (typical)**
- **Database**
- **Multimedia**
- **Custom**

**NOTE:** If you select Custom, you must select an appropriate segment size.

8 Select the appropriate **Preferred RAID controller module**.

It is recommended that you create at least one virtual disk for each application. If multiple NTFS volumes are created on a single virtual disk using Windows Disk Management, the volumes failover together, rather individually from node-to-node.

**NOTE:** It is recommended that you use a RAID level other than RAID 0 (which is commonly called striping). RAID 0 configurations provide very high performance, but do not provide the level of availability required for the quorum resource. See the documentation for your storage system for more information about setting up RAID levels for the system.

For more information on how to create Disk Groups and Virtual Disks, see your PowerVault MDSM documentation.

### Creating Host-to-Virtual Disk Mappings

To create host-to-virtual disk mappings to assign virtual disks to the host groups containing cluster node, follow the steps:

1 In the AMW, select the **Mappings** tab.

2 In the **Topology** pane, select:

- **Default Group**
- **Undefined mappings node**
- **Individual defined mapping**
- **Host group**

- **Host**

3 In the toolbar, select **Mappings→ Define→ Additional Mapping**.

The **Define Additional Mapping** window is displayed.

4 In **Host group or host**, select the appropriate host group.

5 In **Logical unit number**, select a LUN. The supported LUNs are 0 through 255.

6 Select the virtual disk to be mapped in the **Virtual Disk** area. The **Virtual Disk** area lists the names and capacity of the virtual disks that are available for mapping based on the selected host group or selected host.

7 Click **Add**.

**NOTE:** The Add button is inactive until a host group or host, LUN, and virtual disk are selected.

8 To define additional mappings, repeat step 4 through step 7.

**NOTE:** After a virtual disk has been mapped once, it is no longer available in the Virtual Disk area.

9 Click **Close**.

The mappings are saved. The Topology pane and the Defined Mappings pane in the **Mappings** tab are updated to reflect the mappings.

# Troubleshooting Tools

The Dell PowerVault MDSM establishes communication with each managed array and determines the current array status. When a problem occurs on a storage array, the MDSM provides several ways to troubleshoot the problem:

## Event Log

You can use the **Event Log Viewer** to view a detailed list of events that occur in a storage array. The event log is stored on reserved areas on the storage array disks. It records configuration events and storage array component failures.

**WARNING: Use this option only under the guidance of your Technical Support representative.**

The event log stores approximately 8000 events before it replaces an event with a new event. If you want to keep the events, you may save them, and clear them from the event log.

The event log window shows two types of event views:

- Summary view—Shows an event summary in a table form.
- Detail view—Shows details about a selected event.

To view the event log:

a In the **AMW**, select **Advanced→ Troubleshooting→ View Event Log**.

The **Event Log** is displayed. By default, the summary view is displayed.

b To view the details of each selected log entry, select **View details**.

A detail pane is added to the event log that contains detailed information about the log item. You can view the details about a single log entry at a time.

c To save the event log, click **Save As**.

The **Save Events** dialog is displayed, navigate to the relevant folder, enter the relevant file name, and click **Save**.

d To erase all log entries from the event log, click **Clear All**.

e To exit the event log, click **Close**.

For more information, see the *PowerVault Modular Disk Storage Manager online help* topics.

### Recovery Guru

The Recovery Guru is a component of MDSM that diagnoses critical events on the storage array and recommends step-by-step recovery procedures for problem resolution.

To display the Recovery Guru, perform one of these actions:

a Click **Recovery Guru**.

b In the **Support** tab, click the **Recover from Failure** link.

c In the **Status** pane on the **Summary** tab, click the **Storage Array Needs Attention** link.

You can detect a problem using the following indicators:

- Non-Optimal status icons
- Alert notification messages that are sent to the appropriate destinations
- Hardware indicator lights

The status icons return to Optimal status as problems are resolved.

### Storage Array Profile

The storage array profile provides a description of all of the components and properties of the storage array. The storage array profile also provides the option to save the storage array profile information to a text file. You might want to use the storage array profile as an aid during recovery or as an overview of the current configuration of the storage array. Create a new copy of the storage array profile if your configuration changes.

1. To open the storage array profile, in the AMW, perform one of the following actions:
   - Select **Storage Array→ View→ Profile**.
   - Select the **Summary** tab, and click **Storage Array Profile** in the **Status** area.
   - Select the **Support** tab, and click **View Storage Array Profile**.

The **Storage Array Profile** window is displayed. The **Storage Array Profile** window contains several tabs, and the title of each tab corresponds to the subject of the information contained.

2. Perform one of these actions in the **Storage Array Profile** window:
   - View detailed information – Go to step 3.
   - Search the storage array profile – Go to step 4.
   - Save the storage array profile – Go to step 5.
   - Close the storage array profile – Go to step 6.
3. Select one of the tabs, and use the horizontal scroll bar and the vertical scroll bar to view the storage array profile information. You can use the other steps in this procedure to search the storage array profile, to save the storage array profile, or to close the storage array profile.

4 To search the storage array profile, perform these steps:

a Click **Search**.

b Type the term that you want to search for in the **Find** text box.

If the term is located on the current tab, the term is highlighted in the storage array profile information.

**NOTE:** The search is limited to the current tab. If you want to search for the term in other tabs, select the tab and click the **Find** button again.

c Click the **Find** button again to search for additional occurrences of the term.

5 To save the storage array profile, perform these steps:

a Click **Save As**.

b To save all sections of the storage array profile, select **All sections**.

c To save information from particular sections of the storage array profile, **Select sections**, and select the check boxes corresponding to the sections that you want to save.

d Select an appropriate directory.

e In **File Name**, type the file name of your choice. To associate the file with a particular software application that will open it, specify a file extension, such as .txt.

**NOTE:** The file is saved as ASCII text.

f Click **Save**.

6 To exit the storage array profile, click **Close**.

## Status Icons

Status icons identify the health status conditions of the storage array. For every non-optimal status icon, use the Recovery Guru to detect and troubleshoot the problem. The health status conditions are described below:

- Optimal—Every component in the managed array is in the desired working condition.
- Needs Attention—A problem exists with the managed array that requires intervention to correct it.

- Fixing—A Needs Attention condition has been corrected and the managed array is currently changing to an **Optimal** status.
- Unresponsive—The storage management station cannot communicate with the array, one controller, or both controllers in the storage array. Wait at least five minutes for the storage array to return to an **Optimal** status following a recovery procedure.
- Unsupported—The node is not supported by this version of MDSM.
- Software Unsupported—The storage array is running a level of software that is no longer supported by MDSM.

### Windows Operating System and Dynamic Volumes

For more information on various Windows Server storage options that can be used with your failover cluster, see the *Dell Failover Clusters with Microsoft Windows Server 2008 Installation and Troubleshooting Guide* at **support.dell.com/manuals**.

### Configuring the RAID Level for the Shared Storage Subsystem

You must configure the virtual disks in your shared storage subsystem into disk groups or virtual disks using the Dell PowerVault MDSM software. All virtual disks, especially if they are used for the quorum resource, should be bound and incorporate the appropriate RAID level to ensure high availability. For more information on the quorum resource, see "Quorum Resource".

**NOTE:** It is recommended that you use a RAID level other than RAID 0 (which is commonly called striping). RAID 0 configurations provide very high performance, but do not provide the level of availability required for the quorum resource. For more information about setting up RAID levels for the system, see the documentation for your storage system.

### Assigning Drive Letters and Mount Points

A mount point is a drive attached to an empty folder on an NTFS volume. A mount point functions the same as a normal drive but is assigned a label or name instead of a drive letter. Using mount points, a cluster can support more shared disks than the number of available drive letters.

The cluster installation procedure does not automatically add the mount point into the disks managed by the cluster. To add the mount point to the cluster, create a physical disk resource in the cluster resource group for each

mount point. Ensure that the new physical disk resource is in the same cluster resource group and is dependent on the root disk (i.e., the disk from which the mount point is attached).

**NOTE:** When mounting a drive to an NTFS volume, do not create mount points from the quorum resource or between the clustered disks and the local disks. Mount points must be in the same cluster resource group and must be dependent on the root disk.

### Naming and Formatting Drives on the Shared Storage System

Each virtual disk being created in the PowerVault MDSM becomes a physical disk in Windows Disk Management. For each physical disk, perform the following:

- Write the disk signature
- Create the partition
- Assign the drive letter
- Format the partition with NTFS

**NOTE:** The drive letters are manually assigned from the second node, the shared disks are simultaneously accessible from both nodes. To ensure file system integrity and prevent possible data loss before you install the Microsoft Failover Clustering, prevent any I/O activity to the shared drives by performing the following procedure on one node at a time and ensuring that the other node is shutdown.

The number of drive letters required by individual servers in a cluster may vary. It is recommended that the shared drives be named in reverse alphabetical order beginning with the letter *z*. To assign drive letters and format drives on the shared storage system, perform the following steps:

1. Turn off node 2 and open **Disk Management** on node 1.
2. Allow Windows to enter a signature on all new physical or logical drives.

   **NOTE:** Do not upgrade or convert your disks to dynamic disks.
3. Locate the icon for the first unnamed, unformatted drive on the shared storage system.
4. Right-click the icon and select **Create** from the submenu. If the unformatted drives are not visible, verify the following:
   - The latest version of the Dell 6.0-Gbps SAS HBA adapter driver is installed.

- The storage system is properly cabled to the servers.

5 In the dialog box, create a partition the size of the entire drive (the default) and then click **OK**.

**NOTE:** A virtual disk that is mapped or assigned from the storage system to a cluster node(s) is represented as a physical disk within the Windows operating system on each node. Microsoft Failover Clustering allows only one node to access a given physical disk resource at a time. Therefore, if a disk is partitioned and contains multiple NTFS volumes, concurrent access to different volumes is only possible from the cluster node controlling the physical disk resource. If two NTFS volumes need to be controlled by different nodes, these volumes must reside on separate disks.

6 Click **Yes** to confirm the partition.

7 With the mouse pointer on the same icon, right-click and select **Change Drive Letter and Path** from the submenu.

8 Assign a drive letter to an NTFS volume or create a mount point.

To assign a drive letter to an NTFS volume:

a Click **Edit** and select the letter you want to assign to the drive (for example, z).

b Click **OK**.

c Go to step 9.

To create a mount point:

a Click **Add**.

b Click **Mount** in the following empty NTFS folder.

c Type the path to an empty folder on an NTFS volume, or click **Browse** to locate it.

d Click **OK**.

e Go to step 9.

9 Click **Yes** to confirm the changes.

10 Right-click the drive icon again and select **Format** from the submenu.

11 Under **Volume Label**, enter a descriptive name for the new volume; for example, Disk_Z or Email_Data.

12 In the dialog box, change the file system to **NTFS**, select **Quick Format**, and click the **Start** button.

**NOTE:** The NTFS file system format is required for shared-disk resources under Microsoft Failover Clustering.

13 Click **OK** if you see a warning.

14 Click **OK** to acknowledge that the format is complete.

15 Click **Close** to close the dialog box.

16 Repeat step 3 through step 15 for each remaining drive.

17 Close **Disk Management**.

18 Turn off node 1.

19 Turn on node 2.

20 On node 2, open **Disk Management**.

21 Ensure that the drive letters for node 2 are correct and re-assign the drive letters, if necessary. To re-assign the drive the drive letters, repeat step 7 through step 9.

22 Set the client system's public network segment(s) to **All communications**.

This setting provides a redundant path for the cluster-to-cluster communication in the event the private network fails.

## Using Advanced (Premium) PowerVault Modular Disk Storage Manager Features

PowerVault MDSM includes the following advanced features:

- Snapshot Virtual Disk
- Virtual Disk Copy

To install and enable these premium features, you must purchase a feature key file for each feature and then specify the storage array that hosts them. For instructions about this process, see the *Premium Feature Activation* card that shipped along with your Dell PowerVault MD3200 or MD3220 storage arrays.

These premium features increase the high availability for your cluster solution. It is essential that you follow the instructions below to ensure proper cluster operations.

### Snapshot Virtual Disk

Snapshot Virtual Disk captures point-in-time images of a virtual disk for backup, testing, or data processing without affecting the contents of the source virtual disk. You can use either Simple Path or Advanced Path to create a snapshot for your cluster disk. The Snapshot Virtual Disk can be mapped to the primary node (the node owning the source disk) or the secondary node (the node not owning the source disk) for backup, testing, or data processing.

**NOTE:** Avoid mapping the Snapshot Virtual Disk to more than one node in the cluster at any point of time. The Snapshot Virtual Disk is not managed by Microsoft Failover Clustering, so mapping the Snapshot Virtual Disk to the host group or both nodes in the cluster may allow both nodes to access data concurrently and thus cause data corruption.

You can use a Microsoft Volume Shadow-copy Service (VSS) application to create and map snapshots. If you are using MDSM instead, you must turn on the Maintenance Mode of the cluster source disk, and map the Snapshot Virtual Disk to the primary cluster node by following the procedures below:

1. Turn on Maintenance mode on the source cluster disk using the Failover Cluster Management console.
   a. Click **Start→ Administrative Tools→ Failover Cluster Management** console.
   b. Right-click the disk for which you want to turn on the maintenance mode.
   c. Click **More Actions→ Turn On Maintenance Mode for this disk**.
   d. Ensure that the status of the disk is listed as **Online (Maintenance)** in the **Microsoft Management Console (MMC)**.

   **NOTE:** In Windows Server 2008 failover clustering you cannot turn on the maintenance mode for the witness disk.

   **NOTE:** The snapshot volume is in reserved state and thus inaccessible if the maintenance mode for the cluster source disk is not turned on.
2. If the snapshot is not created, use the **PowerVault Modular Disk Storage Manager** to create the snapshot of the source disk.
3. Use the **Host-to-Virtual Disk Mapping** in the **PowerVault Modular Disk Storage Manager** to assign the Snapshot Virtual Disk created in step 2, to the primary node.

4 Re-scan the disk and use **Windows Disk Management** to detect the Snapshot Virtual Disk. Assign a drive letter and start accessing the drive.

**NOTE:** The disks may be re-scanned several times for the Snapshot Virtual Disk to be detected by Windows Disk Management. If the Snapshot Virtual Disk is not detected, wait for a few minutes and re-scan the disks. Repeat the process until the Snapshot Virtual Disk is detected; do not reboot the server.

5 Turn off **Maintenance mode** on source cluster disk using **Failover Cluster Management console**.

If you need to map the Snapshot Virtual Disk to the secondary node (the node not owning the source disk), you must map the Snapshot Virtual Disk to the primary node first, to ensure that the snapshot is assigned a new disk signature. Then, use the PowerVault MDSM to unmap the Snapshot Virtual Disk from the primary node, map it to the secondary node, and start accessing it.

**NOTE:** Attempts to map the Snapshot Virtual Disk to the secondary node, prior to obtaining the signature from the primary node, may cause the operating system to misidentify the Snapshot Virtual Disk as an existing system volume and that may result in data loss or inaccessible Snapshot Virtual Disk.

**NOTE:** For a cluster configuration with multiple Snapshot Virtual Disks, each virtual disk must be mapped to the node owning the associated source disk first. The primary node for a Snapshot Virtual Disk may not be the primary node for another Snapshot Virtual Disk.

#### Virtual Disk Copy

Virtual Disk Copy generates a full copy of data from the source virtual disk to the target virtual disk in a storage array. You can use Virtual Disk Copy to back up data, copy data from disk groups that use smaller-capacity physical disks to disk groups using greater-capacity physical disks, or restore Snapshot Virtual Disk data to the source virtual disk.

To create a Virtual Disk Copy of a Microsoft Failover Clustering shared disk:

1 Create a Snapshot Virtual Disk using the cluster shared disk as a source disk.

2 Do not map that Snapshot Virtual Disk to any cluster node. Then, use the newly created Snapshot Virtual Disk as the source disk for the Virtual Disk Copy.

If the cluster shared disk fails and you need to restore it from the target virtual disk, use Failover Cluster Manager to change the status of the cluster group containing the failed disk to offline, and then use one of the following methods:

1. Use Virtual Disk Copy to transfer the data from the target virtual disk to the cluster shared disk.
2. Unassign the cluster shared disk from the host group and then map the target virtual disk to the host group.

## Installing and Configuring a Failover Cluster

You can configure the operating system services on your failover cluster, after you have established the private and public networks and have assigned the shared disks from the storage array to the cluster nodes.

The procedures for configuring the failover cluster are different, depending on the Windows Server operating system you use.

For more information on deploying your cluster with Windows Server 2008 operating systems, see the *Dell Failover Clusters with Microsoft Windows Server 2008 Installation and Troubleshooting Guide* at **support.dell.com/manuals**.

# A

# Troubleshooting

Table A-1 describes general cluster problems you may encounter and the probable causes and solutions for each problem.

**Table A-1. General Cluster Troubleshooting**

| Problem | Probable Cause | Corrective Action |
|---|---|---|
| The nodes cannot access the storage system, or the cluster software is not functioning. | The storage system is not cabled properly to the nodes or the cabling between the storage components is incorrect. | Ensure that the cables are connected properly from the node to the storage system. For more information, see "Cabling Your Cluster Hardware" on page 17. |
| | One of the cables is faulty. | Replace the faulty cable. |
| | Host Group or Host-to-Virtual Disk Mappings is not created correctly. | Verify the following:<br>• Host Group is created and the cluster nodes are added to the Host Group.<br>• Host-to-Virtual Disk Mapping is created and the virtual disks are assigned to the Host Group containing the cluster nodes. |

**Table A-1. General Cluster Troubleshooting *(continued)***

| Problem | Probable Cause | Corrective Action |
|---|---|---|
| One of the nodes takes a long time to join the cluster.<br>OR<br>One of the nodes fail to join the cluster. | The node-to-node network has failed due to a cabling or hardware failure. Long delays in node-to-node communications may be normal. | Check the network cabling. Ensure that the node-to-node interconnection and the public network are connected to the correct NICs. Verify that the nodes can communicate with each other by running the ping command from each node to the other node. Try both the host name and IP address when using the ping command. |
| | One or more nodes may have the Internet Connection Firewall enabled, blocking Remote Procedure Call (RPC) communications between the nodes. | Configure the Internet Connection Firewall to allow communications that are required by the Microsoft Failover Clustering and the clustered applications or services. For more information, see Microsoft Knowledge Base article **KB**883398 at **support.microsoft.com**. |

**Table A-1. General Cluster Troubleshooting *(continued)***

| Problem | Probable Cause | Corrective Action |
|---|---|---|
| Attempts to connect to a cluster using Failover Cluster Manager fail. | The Cluster Service has not been started. A cluster has not been formed on the system. The system has just been booted and services are still starting. | Verify that Failover Cluster Manager is running and that a cluster has been formed. |
| | The cluster network name is not responding on the network because the Internet Connection Firewall is enabled on one or more nodes. | Configure the Internet Connection Firewall to allow communications that are required by Microsoft Failover Clustering and the clustered applications or services. For more information, see Microsoft Knowledge Base article **KB**883398 at **support.microsoft.com**. |
| You are prompted to configure one network instead of two during Microsoft Failover Clustering configuration. | The TCP/IP configuration is incorrect. | The node-to-node network and public network must be assigned static IP addresses on different subnets. For information about assigning the network IPs, see the "Assigning Static IP Addresses to Your Cluster Resources and Components" section of the *Dell Failover Clusters with Microsoft Windows Server 2008 Installation and Troubleshooting Guide* located at **support.dell.com/manuals**. |
| | The private (point-to-point) network is disconnected. | Ensure that all systems are turned on so that the NICs in the private network are available. |

**Table A-1. General Cluster Troubleshooting *(continued)***

| Problem | Probable Cause | Corrective Action |
|---|---|---|
| Unable to add a node to the cluster. | The new node cannot access the shared disks. | Ensure that the new cluster node can enumerate the cluster disks using Windows Disk Administration. If the disks do not appear in Disk Administration, check the following:<br>• Check all cable connections<br>• Check the Access Control settings on the attached storage systems |
| | One or more nodes may have the Internet Connection Firewall enabled, blocking RPC communications between the nodes | Configure the Internet Connection Firewall to allow communications that are required by the Microsoft Failover Clustering and the clustered applications or services. For more information see the Microsoft Knowledge Base article **KB**883398 at **support.microsoft.com**. |
| Public network clients cannot access the applications or services that are provided by the cluster. | One or more nodes may have the Internet Connection Firewall enabled, blocking RPC communications between the nodes. | Configure the Internet Connection Firewall to allow communications that are required by the Microsoft Failover Clustering and the clustered applications or services.<br>For more information, see the Microsoft Knowledge Base article KB883398 at **support.microsoft.com**. |

**Table A-1. General Cluster Troubleshooting *(continued)***

| Problem | Probable Cause | Corrective Action |
|---|---|---|
| **Virtual Disk Copy** operation fails. | The **Virtual Disk Copy** operation uses the cluster disk as the source disk. | To perform a **Virtual Disk Copy** operation on the cluster share disk, create a snapshot of the disk, and then perform a **Virtual Disk Copy** of the snapshot virtual disk. |
| Unable to assign the drive letter to the snapshot virtual disk.<br>Unable to access the snapshot virtual disk.<br>System Error Log displays a warning with event 59 from **partmgr** stating that the snapshot virtual disk is a redundant path of a cluster disk. | The snapshot virtual disk has been erroneously mapped to the node that does not own the source disk. | Unmap the snapshot virtual disk from the node not owning the source disk, then assign it to the node that owns the source disk. For more information, see "Using Advanced (Premium) PowerVault Modular Disk Storage Manager Features" on page 49. |

# B

# Cluster Data Form

You can attach the following form in a convenient location near each cluster node or rack to record information about the cluster. Use the form when you call for technical support.

**Table B-1. Cluster Data Form**

| Cluster Information | Cluster Solution |
|---|---|
| Cluster name and IP address | |
| Server type | |
| Installer | |
| Date installed | |
| Applications | |
| Location | |
| Notes | |

**Table B-2. Node Data Form**

| Node Name | Service Tag Number | Public IP Address | Private IP Address |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

**Table B-3. Additional Networks Data Form**

| Additional Networks |
| --- |
| |
| |

**Table B-4. Dell PowerVault MD3200 or MD3220 Data Form**

| Dell PowerVault MD3200 or MD3220 Name | Service Tag | IP Address | Number of Disks, Virtual Disk Information |
| --- | --- | --- | --- |
| | | | |
| | | | |