Small and medium businesses, remote offices, and departments and workgroups must cope with the same IT pressures as large enterprises, but with smaller budgets and fewer dedicated staff members. Internet SCSI (iSCSI)-based storage arrays such as the Dell™ PowerVault™ MD3000i offer a cost-effective way for these organizations to consolidate storage while providing powerful, easy-to-use management tools.

Understanding storage in small and medium businesses

Many SMBs, remote offices, and enterprise departments and workgroups have been relying principally on direct attach storage (DAS)—a simple and logical first step when expanding both easy to manage and cost-effective. Internet SCSI (iSCSI)-based storage is designed to meet these requirements. By providing an entry point into storage area network (SAN) systems that allows these organizations to use standard, cost-effective Ethernet components rather than investing in a Fibre Channel infrastructure, iSCSI is well suited for their needs.

Past installments of this series have explored the basics of iSCSI, its advantages in enterprise environments, and how it can be deployed using Dell PowerVault and Dell/EMC storage,¹ as well as how data center administrators can combine iSCSI and virtualization to enhance efficiency and utilization.² This third installment focuses on how SMBs, remote offices, and enterprise departments and workgroups can use iSCSI to consolidate and simplify their storage environment, and how the Dell PowerVault MD3000i can help meet the needs of these organizations.

capacity beyond servers’ internal storage. However, this approach carries a number of disadvantages: it can only handle a limited number of attached hosts, can quickly become unwieldy to manage, and can require investment in additional disk- or tape-based storage systems as capacity requirements rise, resulting in overall poor capacity utilization.

Consolidating to a networked storage environment such as a SAN can help avoid these disadvantages, enabling many hosts to share resources and simplifying management. Organizations that find themselves working with multiple storage silos not optimized for their needs, having trouble scaling to accommodate data growth, or relying on burdensome backup and data protection processes based on multiple DAS systems are excellent candidates for storage consolidation. The same is true for remote offices and enterprise departments and workgroups that have been struggling to manage decentralized storage in different locations.

For these types of organizations, storage that is simple, capable, and cost-effective is key to success. In the past, they may have considered implementing a traditional Fibre Channel–based SAN to help increase utilization and simplify expansion. Fibre Channel does offer significant performance advantages in some environments, particularly those running applications with sequential I/O such as streaming media and decision support software. However, a Fibre Channel infrastructure also requires an investment in both hardware and training that may place it beyond the reach of organizations with limited resources.

An iSCSI-based SAN, in contrast, can provide the same advantages as a Fibre Channel–based SAN (including reduced total cost of ownership, increased capacity utilization, minimized backups, and simple manageability), but at a reduced acquisition cost. And iSCSI can provide high levels of performance comparable to Fibre Channel for many real-world applications common to SMBs, such as those with random I/O like Microsoft® Exchange and Microsoft SQL Server™ software. It offers comparable security to Fibre Channel when configured properly by logically or physically separating the iSCSI network. And its use of standard Ethernet components rather than specialized hardware makes iSCSI easy to manage for organizations with limited IT staff resources (see Figure 1).

iSCSI also offers a high degree of flexibility, enabling administrators to integrate it into many different types of environments. The iSCSI protocol itself is widely supported by many common operating systems, applications, and other platforms, including Microsoft Windows® and Linux® as well as Microsoft Exchange, Microsoft SQL Server, Microsoft Cluster Service, Oracle® Real Application Clusters (RAC), and VMware® virtualization software.

Consolidating through iSCSI-based storage can help simplify storage management while meeting the needs of SMBs and similar organizations in multiple ways. For SMBs implementing their first SAN, it can help them simplify management, reduce hardware and energy costs, and take advantage of common storage platforms for multiple applications without requiring a Fibre Channel implementation. For remote offices, departments, and workgroups in large enterprises, iSCSI can serve as a cost-effective second-tier SAN. In either case, it offers distinct advantages over both traditional DAS and Fibre Channel–based SANs, particularly for organizations constrained by limited staff and budget resources.

Introducing the Dell PowerVault MD3000i

By offering easy deployment, straightforward management tools, and powerful functionality in a cost-effective iSCSI-based storage system, the Dell PowerVault MD3000i is designed to meet the needs of SMBs, remote offices, and enterprise departments and workgroups looking to consolidate and simplify their storage environment. It is particularly well suited for those upgrading from DAS systems and implementing a SAN for the first time.

As an iSCSI-based storage system, the PowerVault MD3000i offers the benefits of consolidated SAN storage through a standard Ethernet infrastructure, without requiring the investment in hardware and expertise typically required when implementing a Fibre Channel–based infrastructure. Its advantages include the following:

Figure 1. Simplified storage through consolidation to an iSCSI-based SAN

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2 Support may vary by iSCSI array depending on vendor tests and certifications.
• **Simplified deployment and management:** The PowerVault MD3000i is designed for easy deployment, and includes task-based Dell Modular Disk Storage Manager software to help administrators deploy and manage their storage.

• **High performance and availability:** The PowerVault MD3000i is designed to provide up to 400 MB/sec of throughput and includes dual active/active controllers, each with dual Gigabit Ethernet ports to avoid single points of failure.

• **Advanced data protection:** By supporting advanced functionality such as snapshot and virtual disk copy operations as add-on premium features, the PowerVault MD3000i can provide powerful, easy-to-manage data protection.

• **Easy scalability:** As data continues to grow, organizations can expand with up to 45 additional hard drives by attaching PowerVault MD1000 expansion enclosures.

• **Flexible configuration:** The PowerVault MD3000i supports 32- and 64-bit versions of Microsoft Windows Server® 2003 and Red Hat® Enterprise Linux 4 as well as Novell® SUSE® Linux Enterprise Server 9, and can be utilized in many different ways, including as part of server virtualization deployments, e-mail or database systems, and disaster recovery systems.

• **Cost-effective consolidation:** The PowerVault MD3000i is designed specifically for iSCSI, allowing organizations to utilize their existing Ethernet infrastructure to consolidate up to 16 fully redundant hosts.

Figure 2 summarizes key features of the PowerVault MD3000i. Dell plans to expand both the feature set and OS support in the future, including support for Serial ATA (SATA) hard drives; the Microsoft Windows Server 2008 (code-named “Longhorn”), Red Hat Enterprise Linux 5, and Novell SUSE Linux Enterprise Server 10 operating systems; and the VMware ESX Server virtualization platform.

**Simple, powerful management**

Administrators can take advantage of multiple management tools with the PowerVault MD3000i, including the Dell Modular Disk Storage Manager graphical user interface (GUI), a command-line interface (CLI), Dell OpenManage™ IT Assistant, and the snapshot and copy functionality of Microsoft Volume Shadow Copy Service (VSS) and Microsoft Virtual Disk Service (VDS). Dell Modular Disk Storage Manager is designed for ease of use while offering powerful management functionality typically found in large enterprise systems. The CLI provides advanced functionality and scripting support. Integration with Dell OpenManage IT Assistant enables administrators to perform device discovery and monitoring through Simple Network Management Protocol (SNMP) as well as management tasks by launching Dell Modular Disk Storage Manager.

The primary GUI tool, Dell Modular Disk Storage Manager, integrates a task-based interface that administrators can use to view array status and other information and easily manage storage configurations and other settings (see Figure 3). Administrators can use these tools to...
perform deployment tasks such as configuring host access, creating virtual disks and mapping them to hosts, and creating snapshots and virtual disk copies (if enabled); topology management tasks such as moving and renaming hosts and host ports and changing the host type; array-level tasks such as renaming an array and setting or changing passwords; iSCSI-specific tasks such as configuring Challenge Handshake Authentication Protocol (CHAP) and entering permissions for iSCSI initiators; and troubleshooting and support tasks such as viewing system event logs and downloading firmware.

Dell Modular Disk Storage Manager also includes the Recovery Guru feature designed to simplify troubleshooting. When problems arise, the Recovery Guru can provide a high-level description of the problem, additional information that helps identify the problem and where it resides, and step-by-step instructions to help administrators resolve the problem (see Figure 4). For administrators with many different responsibilities and limited time, this feature can be key to rapid problem resolution.

**High availability and advanced data protection**

Avoiding downtime and ensuring data availability are critical for many organizations, and SMBs are no exception. The PowerVault MD3000i is designed for high availability: by networking the hosts to the storage using iSCSI over standard Dell PowerConnect™ Gigabit Ethernet switches, administrators can create fully redundant paths for up to 16 hosts (see Figure 5). The redundant active/active controllers, automated I/O path protection with host-based multipath failover drivers, and automatic drive failure detection and rebuild functionality using global hot spare drives help ensure data availability even following a component failure. Redundant cooling and power systems offer an additional layer of protection.

Backup and recovery processes are also critical, helping protect against data loss following a system failure or disaster. For SMBs, making these processes as simple and efficient as possible for IT staff is often a key goal.

Organizations can easily add virtual disk snapshot and copy functionality to Dell Modular Disk Storage Manager through premium features that support Microsoft VSS and VDS.

The VSS-based features of the PowerVault MD3000i are designed to allow organizations to create consistent, repeatable backup jobs, helping eliminate the need for manual coordination of applications, snapshots, and backup software—a task that can easily become burdensome for organizations with a limited IT staff. Integrating the PowerVault MD3000i with VSS-enabled applications enables administrators to easily create snapshots of data at a particular point in time, transport snapshots to a backup server, and perform other related tasks.

The VDS-based features are designed to provide consistent, simple administration for.
basic disk configuration tasks across heterogeneous storage platforms through a GUI or CLI. Administrators can use VDS to gain host access to the storage array, create RAID groups and virtual disks, and perform basic status monitoring.

**Versatile support for different needs**
The PowerVault MD3000i can provide iSCSI-based storage in a variety of environments, and can serve as a key part of virtualized data centers, e-mail or database systems, and disaster recovery systems. Figure 6, for example, shows an SMB deployment in which the file and print, billing, and Microsoft SQL Server systems run as virtual machines (VMs) on one server using the VMware ESX Server platform, with another server dedicated to Microsoft Exchange. Connecting these servers to the storage using iSCSI over Dell PowerConnect switches enables the PowerVault MD3000i to provide storage for all of these systems.

Figure 7 shows an example SMB deployment with the PowerVault MD3000i as part of a Microsoft Exchange e-mail system that also utilizes host-based mirroring to a remote site. In this environment, two attached PowerVault MD1000 expansion enclosures store the source data and snapshots of the source data. One Microsoft Exchange server stores backup data on a PowerVault TL4000 tape library for long-term archiving, while another uses host-based mirroring to replicate data to a remote site for disaster recovery. (Although host-based mirroring is typically slower than array-based mirroring, it is also typically more cost-effective, making it suitable for small deployments with limited budgets.)

**Building capable, cost-effective iSCSI-based SANs**
Although SMBs, remote offices, and enterprise departments and workgroups can benefit significantly from networked storage, limited staff and budget resources have often placed traditional Fibre Channel–based SANs out of reach. For these organizations, iSCSI may be the answer. By enabling networked storage over standard Ethernet components, iSCSI can offer advantages such as simplified management, efficient utilization, and easy scalability without requiring the investment in hardware and expertise typically required with Fibre Channel.

Designed with the needs of these organizations in mind—particularly those upgrading from DAS and implementing their first SAN—the Dell PowerVault MD3000i provides a simple, capable, cost-effective storage platform for iSCSI-based environments that can scale to meet data growth requirements. Its Dell Modular Disk Storage Manager tool combines an easy-to-use task-based interface with powerful functionality typically reserved for large enterprises, while features such as redundant controllers and optional integration with Microsoft VSS and VDS help protect against hardware failures and data loss. For SMBs and similar organizations, deploying iSCSI-based SANs with PowerVault MD3000i storage arrays can provide a cost-effective way to help ease management tasks, reduce ongoing hardware and energy costs, and build a flexible, consolidated storage environment.

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