

Using Dell PowerVault NAS Software to Manage Storage in Linux Environments

Despite the rapid adoption of the Linux® operating system by enterprises, software to manage storage in Linux environments remains scarce. The Dell™ PowerVault™ network attached storage (NAS) systems support Linux clients using the Network File System (NFS) file sharing protocol. Using Dell PowerVault NAS Manager and Dell OpenManage™ software, administrators can more easily configure and manage storage for Linux clients on the NAS systems.

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Since the early 1990s, the adoption of the Linux® operating system (OS) by enterprises has grown tremendously. Motivated by the savings and flexibility of open software, enterprises have used Linux-based servers for applications such as file-and-print serving, Web serving, and data management. Linux software can easily be deployed on high-volume systems, and most commercially available distributions of the Linux OS are packaged with other open source software, making Linux environments functional and cost-effective.

The increase in Linux use has been matched in recent years by a general proliferation in the amount of data that organizations must store and manage. This proliferation of data has prompted the need for improved methods of data access and data management that can increase data availability and general efficiency.

Organizations need storage consolidation, centralization, and scalability

In traditional storage architectures, storage capacity is distributed and locally attached to different servers and clients. As the amount of data that needs to be accessed grows, replicating data to the individual servers and

clients becomes inefficient and expensive. Storage space on individual servers often goes underutilized, and data is sometimes replicated multiple times. A lack of adequate software tools to centrally manage distributed storage environments results in overly complex, staff-intensive management. Organizations cannot realistically manage multiple terabytes of data using traditional distributed storage methods.

As storage needs increase, more and more vendors of SCSI and Fibre Channel products are providing storage solutions for enterprises that require access to large amounts of data and sharing of data among Linux clients. To improve manageability and reduce total cost of ownership (TCO), organizations need a solution that includes the following features:

- **Storage consolidation:** Pools storage so that storage capacity can be automatically allocated where needed, permitting better utilization of storage resources
- **Centralization:** Reduces IT complexity and the need for staffing by simplifying management of storage resources

- **Scalability:** Creates an infrastructure with the capacity to handle increasing amounts of data storage

PowerVault NAS helps consolidate storage

One storage consolidation approach that provides generally high performance is the storage area network (SAN). However, SAN management frameworks currently have limited support for Linux servers. In many cases, a Dell™ PowerVault™ network attached storage (NAS) solution is a better fit.

Dell NAS systems offer a hardware-based storage consolidation solution that includes software to manage large amounts of data in a Linux environment. NAS systems use standard network technologies to provide shared disk and tape storage and tape backup to clients and servers across a local area network (LAN) or wide area network (WAN). NAS systems connect directly to an existing network infrastructure.

NAS systems can effectively handle large amounts of data, but perhaps more importantly, they allow file sharing among multiple users so that data need not be replicated. Eliminating the need to replicate data increases overall storage capacity. Using NAS, administrators can share files between existing clients on a heterogeneous network and can easily introduce Linux clients. By integrating support for a variety of network file access protocols, NAS systems consolidate storage and provide a single resource for file serving.

Dell PowerVault 770N and 775N systems contain up to two Intel® Pentium® III Xeon™ processors and support on-board Gigabit Ethernet¹ port(s), which make them well suited for high-performance file sharing applications. In addition, the PowerVault 220S SCSI enclosure works with the PowerVault 770N and 775N to provide additional external storage. The Dell PowerVault 220S is an external SCSI disk array enclosure that supports multiple storage environments and RAID configurations, providing up to 2 TB of storage on up to 14 hot-swappable hard disk drives. PowerVault NAS systems are built on the Microsoft® Windows® Powered OS using the Server Appliance Kit (SAK) 2.5.

NAS supports Linux through NFS

Linux clients support a wide variety of protocols for network file access, including Network File System (NFS), Common Internet File System (CIFS), Apple® AppleTalk®, and Novell® NetWare® file systems. NFS is the preferred network file protocol for Linux, because it is well integrated into the Linux file system and user authentication scheme.

The PowerVault 770N and 775N systems include the Microsoft Services for UNIX package, which supports NFS protocol use in the following ways:

- **NFS versions 2 and 3:** Support NFS file locking specified by the Network Lock Manager (NLM) protocol.
- **Simple sharing:** Provides for sharing of directories and the ability to set NFS access permissions. NFS access permissions can be set to read or read/write, and can be used to control root access to individual computers or groups of computers.
- **Access control and authentication:** Integrates UNIX® access control mechanisms. The credentials and permissions of both local users and domain users are honored. UNIX user IDs and group IDs presented using the NFS protocol are mapped to a corresponding Windows security credential.

Although the Linux operating system's NFS client integrates support for NFS versions 2 and 3, use of version 3 can significantly improve performance. Version 3 handles up to 32 KB of data per request, which can speed up the writing of file requests from clients. In NFS version 3, operations return additional attribute information as appropriate, helping to reduce the total number of operations between the client and the server. In addition, NFS version 3 features safe asynchronous writes, which allows an NFS server to respond with the status of a write operation on the server before the data is actually committed to the disk. Safe asynchronous writes let clients use a local copy to retry the write if the write fails.

Web-based NAS software centralizes management

Administrators configure and manage the PowerVault NAS systems using the Dell PowerVault NAS Manager software, a Web-based user interface that is the primary tool for configuring NAS systems. The NAS systems offer three ways to connect to the NAS Manager software: from a client system on the same network; from a client system connected directly to the PowerVault 770N or 775N using a serial cable; or from a keyboard, monitor, and mouse attached to the NAS system.

The NAS Manager is used to create and manage shares (see Figures 1 and 2), users, snapshots, and disk quotas as well as to configure network properties and IP addresses. The NAS Manager allows administrators to manage disks by listing the available disks in the system, rescanning for a disk, creating a hot spare, forcing a disk online, and viewing disk properties. Administrators also can create, delete, expand, reconfigure, repair, and

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¹ Gigabit Ethernet indicates compliance with IEEE® 802.3ab and does not connote speeds of 1 Gbps.

view the properties of a volume by using the NAS Manager.

For more advanced features, such as online expansion and disk conversion from basic to dynamic, administrators can use the Dell OpenManage™ Array Manager application. Array Manager is accessed through Dell PowerVault NAS Manager on Windows clients. Non-Windows clients require a keyboard, monitor, and mouse attached to the NAS system to access the Array Manager software.

Array Manager allows administrators to configure the storage devices and logical volumes contained in a system, and presents this storage information in a graphical environment. When a storage configuration includes one or more PowerVault 220S SCSI enclosures, Array Manager displays the properties of enclosure fans, power supplies, and temperature probes. Array Manager also notifies administrators of enclosure status changes through events displayed in the logs section on the NAS Manager screen and recorded in the SAK event log.

Dell OpenManage Server Administrator software enables administrators to monitor and manage properties such as fans, power supplies, and temperature probes for PowerVault NAS systems and individual Dell PowerEdge™ servers. OpenManage can be launched through NAS Manager from any client and provides storage management information in an integrated graphical view. The Storage Management service included in Server Administrator enables administrators to view the logical and physical information about local and remote storage attached to the NAS system.

NAS systems help provide efficient data storage for Linux environments

PowerVault NAS systems offer a consolidated storage solution in which multiple Linux clients can share the same storage. The PowerVault 770N or 775N system storage resources can be viewed, configured, and manipulated through the NAS Manager, simplifying and centralizing storage management. Such centralization

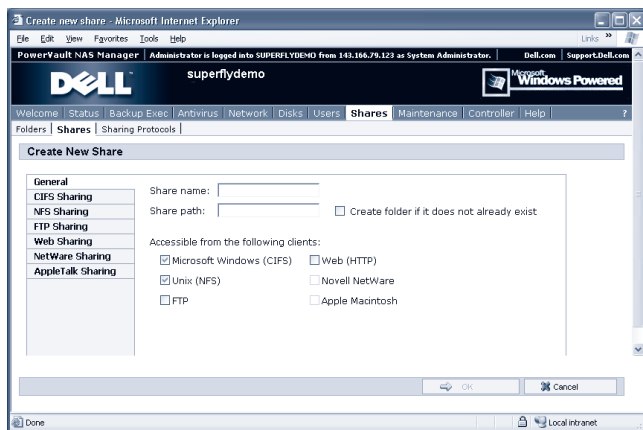


Figure 1. Creating an NFS file share

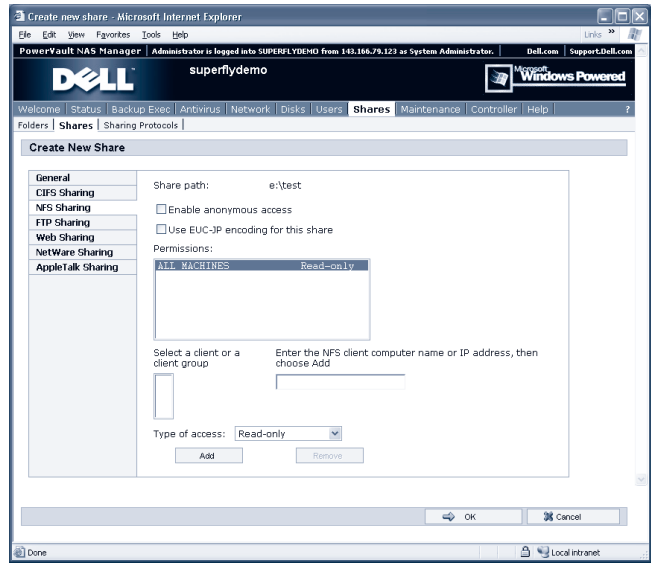


Figure 2. Setting permissions for the file share

allows for better storage consolidation and more efficient management, enabling organizations to easily scale their storage infrastructures to meet increasing demands for shared data storage in Linux environments.

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