

IBM TotalStorage Network Attached Storage

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IBM TotalStorage NAS Gateway 500 Systems Management Features

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Overview

The IBM® TotalStorage Network Attached Storage (NAS) Gateway 500 includes a number of features to help simplify systems management. This paper will explore these features and describe how they can be used.

The IBM TotalStorage NAS Gateway 500 is a software and hardware solution that is designed to offer file-serving capability from SAN-attached storage subsystems to clients on an Ethernet network. It supports Network File System (NFS), Common Internet File System (CIFS), Hypertext Transfer Protocol (HTTP), and File Transfer Protocol (FTP) protocols. The NAS Gateway 500 supports the attachment of different models of the IBM TotalStorage Enterprise Storage Server® (ESS), IBM FAStT Storage Server, IBM TotalStorage SAN Integration Server, and IBM TotalStorage SAN Volume Controller.

The hardware and software components are built with successful IBM technologies; these building blocks help provide a solid foundation for a robust NAS solution. The hardware component of this solution is based on IBM's pSeries® line of servers. The NAS Gateway 500 system software component is built on IBM's AIX® 5.2 operating system and includes the integration of a number of additional software products designed to provide rich functionality for backup/recovery, SAN management, network management, storage resource management, and more - all in one package.

A general theme across the NAS Gateway 500 product, including the systems management features, is simplification. Customers demand solutions that are simple to set up and simple to manage and the NAS Gateway 500 was designed and engineered to meet these demands.

The NAS Gateway 500 is available as a single-node or a dual-node high availability clustered solution. For many products, manually configuring two nodes into a valid and working cluster can be a daunting and sometimes impossible task. To address the initial setup of a single-node or an optional dual-node cluster, the NAS Gateway 500 includes a set of initial configuration wizards to help greatly simplify tasks such as configuring networking, file storage, and users so the system or cluster is up and sharing files with a minimal amount of time and effort. Using a web-browser, the administrator simply connects to the system using the IP address conveniently displayed on the operator panel of the NAS Gateway 500 and begins the process which will guide them step-by-step through a series of configuration wizards. The initial configuration wizards are a key component of the NAS Gateway 500 system's management capability as they can help simplify the initial setup and reduce the frustrations and complexities in configuring a dual-node cluster.

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Once the NAS Gateway 500 system or cluster is configured and serving files, a customer may want to delegate the additional configuration and administration tasks. The NAS Gateway 500 introduces a special NAS administrator user that is intended to

be used for these tasks. The NAS administrator user operates in a purposefully restricted and simplified environment – helping reduce the number and complexity of facilities available from the underlying operating system or applications and introducing new facilities designed to help abstract, consolidate, automate and ultimately simplify the tasks to be performed. The NAS administrator functionality is a key component of the NAS Gateway 500 systems management capability as it is designed to help greatly simplify the day-to-day management tasks.

The NAS Gateway 500 provides multiple user interfaces to help satisfy the requirements of all types of administrators.

- Since a building block of the NAS Gateway 500 is AIX®, IBM's variant of UNIX®, a familiar UNIX-like command line interface (CLI) is offered for NAS administrators who prefer working at a command prompt. The CLI provides a relatively small command set that can be mastered by administrators new to UNIX and is an easy transition for those administrators with existing UNIX or AIX skills.
- Another user interface available is the NAS System Management Interface Tool (SMIT). The NAS Gateway 500 SMIT interface is a specialized implementation of the AIX SMIT tool to help organize and simplify management tasks. This SMIT tool provides a menu interface from which tasks can be selected and dialogs are presented to collect values from which ultimately a command is formed and issued. This helps eliminate the need to remember or to look up command syntax and offers the ability in many cases to select values from a list or prompts to further simplify this activity. The SMIT interface provides administrators who prefer a command prompt or simplified menu interfaces an additional convenience when issuing commands.
- Also available is the Web-based System Manager (WebSM). WebSM is a Java-based client which offers a familiar web browser-like interface to the NAS Gateway 500. WebSM provides a navigation tree, icons, and a typical "point and click" interface for those administrators who prefer a graphical user interface. From the WebSM interface many of the wizards used during initial configuration can be launched as well to further assist with management tasks.

These user interfaces are a key component of the NAS Gateway 500 systems management capability as they offer various methodologies for accomplishing simplified tasks to suit the needs of different types of administrators.

“The NAS Gateway 500 provides multiple user interfaces to help satisfy the requirements of all types of administrators.”

Another dimension of systems management is the integration with upper level management products. For example, the NAS Gateway 500 is designed to provide the infrastructure for management with Simple Network Management Protocol (SNMP). This includes the convenience of a local SNMP manager application as well as support for a number of Management Information Base (MIB) modules. The SNMP agent provided in the NAS Gateway 500 is designed to allow interoperability with network managers such as IBM Tivoli® NetView or HP OpenView.

Command Line Interface

The NAS Gateway 500 includes a command line interface designed to provide an efficient way to perform system management tasks. A NAS administrator can simply **telnet** into the system to be managed and will be presented with a command prompt. The commands available at the command prompt are a relatively small set of UNIX-like commands.

The NAS administrator is provided a command set and execution environment that effectively limits the functionality that can be performed to only those tasks required for day-to-day operations of the NAS Gateway 500 without having to master the complexities inherent in the underlying AIX-based operating system. In fact, simplified commands have been implemented that are designed to consolidate numerous individual tasks that would typically have to be performed manually and require understanding the command syntax and executing the tasks in the proper sequence.

An example is creating a storage volume for shared data. Using configured storage disks in an external storage subsystem the administrator can create a volume to be shared with a simple command as shown in this telnet session:

A screenshot of a telnet session window titled "Command Prompt telnet". The window has a black background with white text. At the bottom, a command prompt "\$" is followed by the command "mkvol myvol hdisk5" and a cursor. The window includes standard window controls (minimize, maximize, close) in the top right corner and scroll bars on the right side.

When contrasted with the individual tasks necessary on AIX to create volume groups, logical volumes, file systems, and so on, a single command automates these tasks and makes volume creation a simple activity. Similar simplifications have been implemented for exporting directories, configuring the applications for backup/recovery, SAN management, network management, storage resource management, etc.

“The end result is a powerful command set that new administrators can easily learn and experienced UNIX or AIX administrators can quickly apply for simplified NAS systems management.”

There are also commands designed to operate on both nodes when the NAS Gateway 500 is used in a high availability cluster solution, which helps avoid having to manually coordinate system changes across the nodes in the cluster. There are also a set of familiar commands that have been reused or modified from the AIX operating system.

The end result is a powerful command set that new administrators can easily learn and experienced UNIX or AIX administrators can quickly apply for simplified NAS systems management.

SMIT

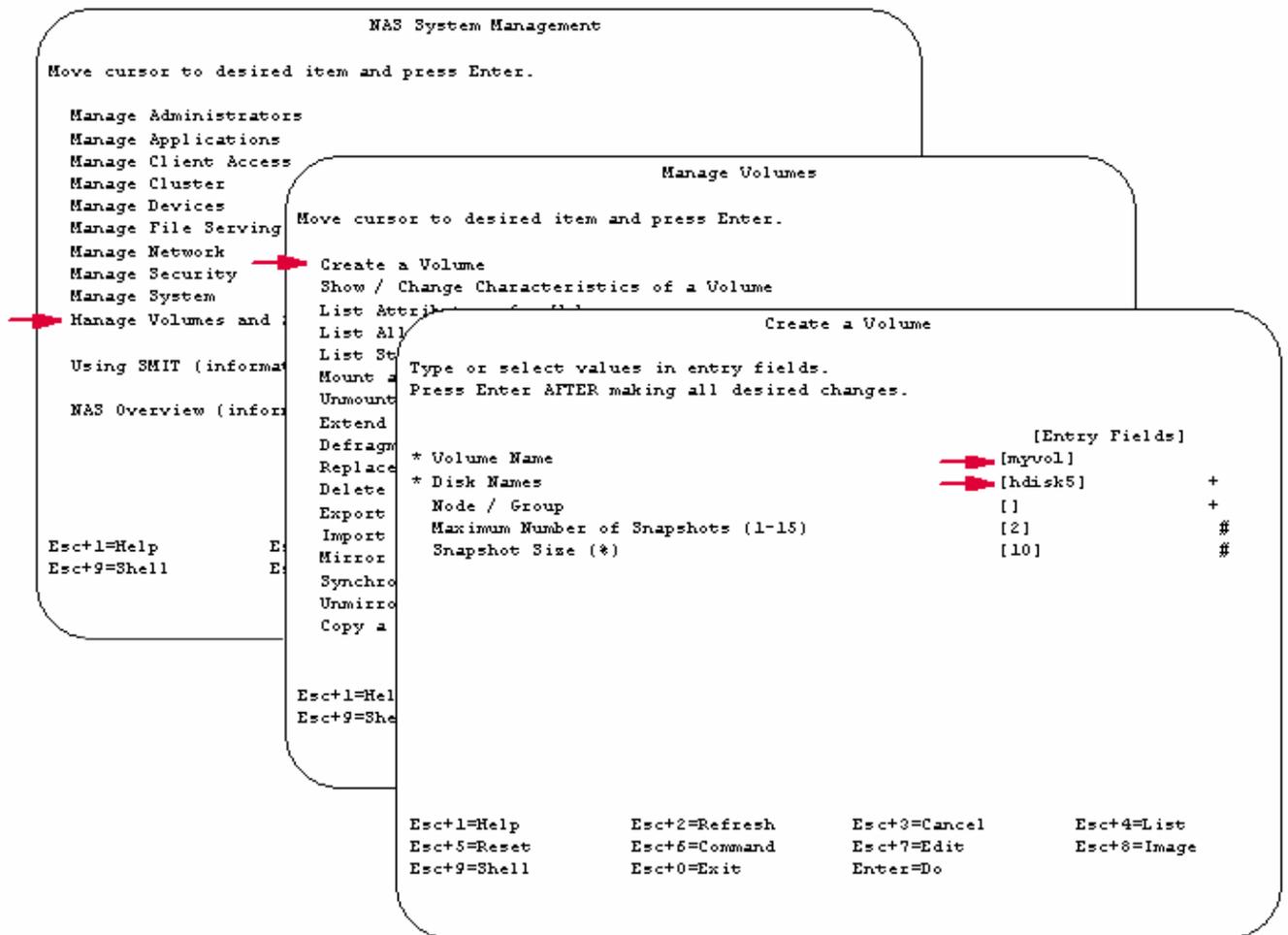
The NAS Gateway 500 SMIT interface is a high level interface that is built upon the command line interface to assist with the construction and ultimately issuance of commands. A NAS administrator can **telnet** into the system to be managed and at the command prompt invoke the SMIT interface with the **smit** command. The SMIT interface begins with the "NAS System Management" menu from which the various high-level objects that comprise the NAS Gateway 500 can be managed. The "NAS System Management" menu also includes "Using SMIT" which is an online tutorial covering the SMIT interface and a "NAS Overview" which describes the various high-level objects and their organization to help make it easier to identify where to perform tasks within the user interface. From this "NAS System Management" menu, administrators can select:

Manage Administrators	for managing NAS administrators including adding and listing those administrators who will be responsible for the day-to-day operations of the NAS Gateway 500
Manage Applications	for managing the integrated software applications on the NAS Gateway 500 including backup/recovery, SAN management, network management, and storage resource management
Manage Client Access	for managing the file access users who will be accessing the files served by the NAS Gateway 500 including local definitions of users and groups of users as well as configuration and management for users defined in directory services including Network Information System (NIS/NIS+) and Lightweight Directory Access Protocol (LDAP)
Manage Cluster	for managing the cluster including starting, stopping, and monitoring the status of the cluster when the NAS Gateway 500 is used in a high-availability cluster
Manage Devices	for managing devices such as the storage disks that are in an external storage subsystem that is attached to the NAS Gateway 500
Manage File Serving	for managing the various protocols from which files are served by the NAS Gateway 500 including NFS, CIFS, FTP, and HTTP
Manage Network	for managing the network that is used by clients to access files served by the NAS Gateway 500 and by NAS administrators who perform management tasks on the NAS Gateway 500
Manage Security	for managing security aspects of the NAS Gateway 500 including securing NFS and NIS operations
Manage System	for managing the system including backup/recovery, date and time settings, boot and shutdown configuration, problem determination facilities, and obtaining various system information about the NAS Gateway 500 such as command history, CPU, file system, I/O, memory, network, NFS, software levels, and so on
Manage Volumes and Snapshots	for managing the storage volumes containing the files served by the NAS Gateway 500 and the "snapshots" of these storage volumes

The remainder of the SMIT interface consists of additional menus and selections to guide administrators through the task to be performed. In most cases, a dialogue is presented where values are typically entered or selected from a list or prompts to construct and execute a command. This is simpler than manually typing the actual command at the command prompt and avoids having to memorize any command syntax; the selection lists or prompts further simplify this activity by offering a set of relevant values from which to pick.

An example of using the SMIT interface to create a storage volume will illustrate how easy it is to use for system management. Starting with the main "NAS System Management" menu, navigate to "Manage Volumes and Snapshots" and press enter, select "Manage Volumes" (not shown), select "Create a Volume", then at the "Create a Volume" dialogue enter the name 'myvol' , press F4 to see a list of available disks, select disk 'hdisk5' and press enter. Note that there are other parameters that

can be supplied as well, but in no case is command syntax knowledge necessary. If the administrator wishes to see the actual command syntax that is being used, they can see the resulting command that will be issued by pressing F6.



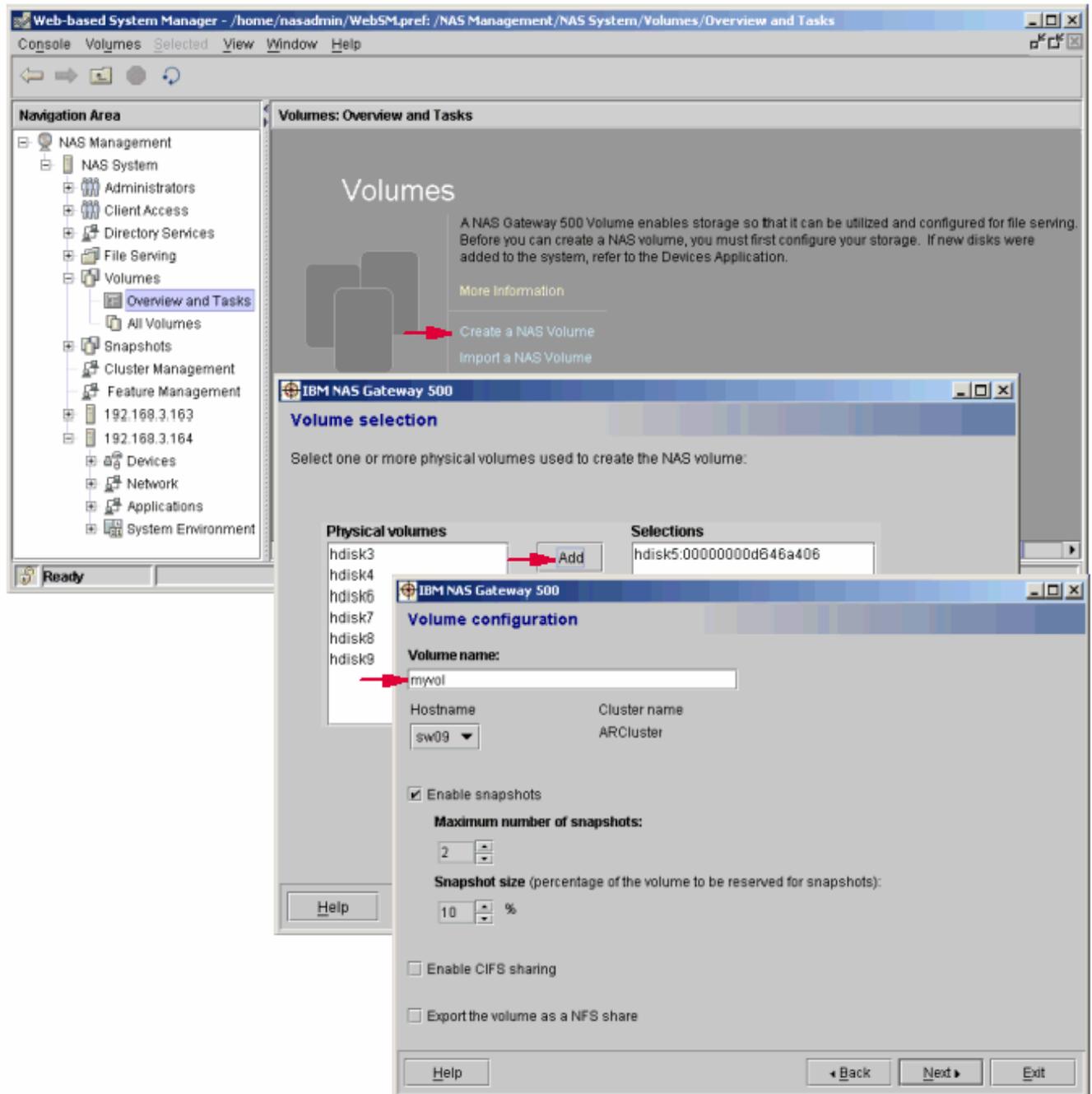
In addition to the simple menu navigation described above, SMIT also provides "fastpaths" so that one can go from the command prompt directly to a specific portion of the SMIT interface. For example, at the command prompt the administrator could enter **smit vols** to go directly to the "Manage Volumes" menu shown above; alternatively they might enter **smit mkvol** to go directly to the "Create a Volume" dialogue shown above. Notice that **mkvol** is also the name of the command that one might use at the command prompt and that many of the SMIT fastpaths for commands are the same as the name of the command, which makes them easy to learn and remember.

“The SMIT interface with menus, prompts, selection lists and fastpaths can help further simplify system management tasks for administrators...”

The SMIT interface with menus, prompts, selection lists, and fastpaths can help further simplify system management tasks for administrators who prefer to utilize these mechanisms.

WebSM

The NAS Gateway 500 WebSM interface is another higher level interface that is built upon the command line interface. A NAS administrator can simply start the WebSM client on an administrative machine and identify one or more NAS Gateway 500 systems to be managed. The WebSM interface is a graphical interface with a familiar web browser-like appearance.



Similar to the high-level objects described above for the SMIT interface, WebSM offers the high-level objects in the navigation area on the left side of the interface and the list of the relevant objects or tasks that can be performed in the display area on the right side of the interface.

From the "NAS Management" window, many tasks can be accomplished with ease using this "point and click" interface. Like the SMIT interface, no command syntax knowledge is necessary and selection lists are available in many cases to provide relevant values from which to pick. Wizards, like those used during the initial configuration of the NAS Gateway 500, are also available to guide you through tasks to be performed.

An example will illustrate how creation of a NAS volume can be performed easily using the WebSM interface. Starting at the "NAS Management" window, clicking on "Overview and Tasks" for "Volumes" presents information about volumes and associated tasks in the display area. Clicking on "Create a NAS Volume" launches the NAS Volume wizard. In the first step of the wizard, click on 'hdisk5', click the 'Add' button, and click 'Next'. In the second step, enter the name 'myvol' and click 'Next' to begin the NAS volume creation. As shown in the example, other parameters can be specified in the wizard including the capability of sharing this NAS volume via the NFS and CIFS protocols.

“WebSM, with a navigation tree, icons, wizards and “point-and-click” simplicity, helps make system management tasks for the NAS Gateway 500 easy to perform...”

Another feature of the WebSM interface is the ability to manage multiple systems from a single console. For example, when two NAS Gateway 500 systems are configured as a dual-node cluster for high availability, they can both be managed from a single WebSM console. Management tasks that are unique to a given node, such as those relative to network interfaces, can be performed individually on each node by selecting the appropriate high level object for the specific node in the navigation area.

Note that the WebSM interface, although similar to a web browser interface, requires a client that is installed on a separate administrative machine. Typically this WebSM client is already installed on an administrative machine in the customer environment as part of the initial configuration of the NAS Gateway 500, however installing this WebSM client on additional machines is easy since the WebSM client can be downloaded with a web browser directly from the NAS Gateway 500.

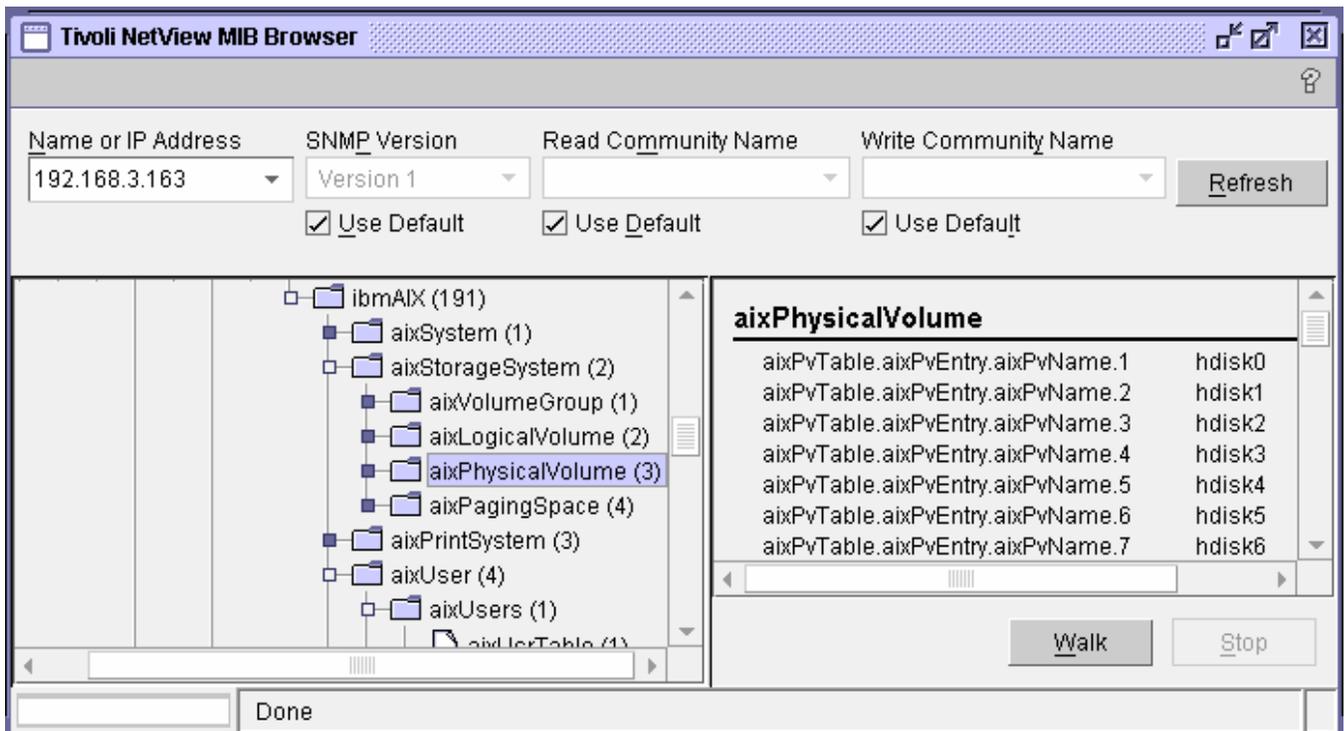
WebSM, with a navigation tree, icons, wizards, and "point and click" simplicity, helps make system management tasks for the NAS Gateway 500 easy to perform for administrators who favor or are experienced with a straightforward graphical user interface like those found in Microsoft® Windows® or increasingly common web browser-based user interfaces.

Upper Integration with Systems Management Products

The NAS Gateway 500 is pre-loaded with agents designed to allow it to be integrated with a number of upper level systems management products. These agents have been pre-installed and configured leaving only minimal customer-specific configuration (customer unique IP addresses, servers, and so on) to be performed. With the inclusion of these agents, the NAS Gateway 500 is designed to be ready for integration in multiple management environments.

For network management, an SNMP agent is provided that is designed to support a number of standard MIBs to provide information about host resources, IP, and other networking characteristics and can be configured to send traps relative to various conditions such as file system usage and CPU usage. A local SNMP manager application is also included to help provide an easy way to view MIB content. When integrated with network management products such as Tivoli® NetView, various characteristics of the NAS Gateway 500 can be viewed using facilities such as the Tivoli NetView MIB Browser. The

following illustrates use of the MIB Browser to obtain the list of the disks (hdisk0 – hdisk6 identified as physical volumes) for a NAS Gateway 500 system.



For managing the storage utilized by the NAS Gateway 500, an agent is included allowing integration with the Tivoli storage resource management product, TSRM. Using TSRM, a number of reports can be produced to help monitor and plan for storage usage by the NAS Gateway 500 and its storage policy functionality can help with quotas and constraints on storage usage.

For managing the NAS Gateway 500 as an element of the client's SAN environment, an agent is included allowing integration with the Tivoli SAN Manager product. The Tivoli SAN Manager is designed to discover the components of the SAN and then provide multiple views to assist with SAN management. It is designed to offer continuous monitoring and can help detect and surface events that may require attention by an administrator.

Whether considering management of a customer network, SAN, or storage resources, the NAS Gateway 500 is designed to be delivered ready to participate.

Summary

This paper has described a number of the system management features of the NAS Gateway 500 product. It provided general background information including IBM technology building blocks, file serving protocols supported, the inclusion of pre-loaded software applications to help ease integration, optional clustering support to help support high availability, powerful and time-saving initial configuration wizards, and other specialized facilities provided for the NAS administrator. This paper also demonstrated the emphasis on simplification to make the NAS Gateway 500 easy to configure and use.

The user interfaces were also introduced. The CLI is a valuable interface for administrators who prefer entering commands at the command prompt to accomplish administration tasks and specialized commands have been provided for the NAS administrator. The specialized SMIT interface is helpful for those administrators who prefer to have menu selections available or receive simple prompts to accomplish administrative tasks and includes an online tutorial on using the SMIT interface, an overview of the NAS objects to navigate the SMIT interface, and fastpaths to help make the most efficient use of the SMIT interface. The specialized WebSM interface is provided for administrators who prefer a "point and click" graphical user interface and will be familiar anyone who has used a common web browser-based interface. The WebSM wizards step the administrator through completion of tasks and the WebSM interface offers the convenience of managing multiple systems from a single console. The NAS Gateway 500 provides these various user interfaces with differing characteristics for different types of administrators to help make the system management tasks easy to perform regardless of the preferences of the individual NAS administrators.

“The system management features are designed to help simplify the configuration and day-to-day management of the NAS Gateway 500 so customers can easily exercise the primary function of this NAS product – serving files to clients.”

This paper also described the inclusion of various agents and facilities for integration with upper level management products. SNMP infrastructure is provided to allow for integration with a number of network managers such as Tivoli NetView and HP OpenView. Pre-installed agents provide for storage resource management with Tivoli Storage Resource Manager as well as SAN management with Tivoli SAN Manager. Additionally, infrastructure is provided for integration with the Tivoli Storage Manager for backup/recovery of the NAS Gateway 500. The NAS Gateway 500 provides these facilities to help offer integration with many existing management products.

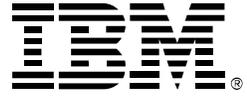
The NAS Gateway 500 is an overall solution designed to help remove complexity and is loaded with functionality to help make deployment easy. The system management features are designed to help simplify the configuration and day-to-day management of the NAS Gateway 500 so customers can easily exercise the primary function of this NAS product – serving files to clients.

References

Visit www.ibm.com/totalstorage/nas for more product information, publications, and the latest technical tips for the NAS Gateway 500.

Visit www.ibm.com/tivoli/solutions/storage for more information about managing the NAS Gateway 500 with Tivoli products.

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