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Published July 2012

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# **Preface**

As part of an effort to improve and enhance the performance and capabilities of its product lines, EMC periodically releases revisions of its hardware and software. Therefore, some functions described in this document may not be supported by all versions of the software or hardware currently in use. For the most up-to-date information on product features, refer to your product release notes.

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Note: Emphasizes content that is of exceptional importance or interest but does not relate to personal injury or business/data loss.

NOTICE Identifies content that warns of potential business or data loss.

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Note: Do not request a specific support representative unless one has already been assigned to your particular system problem.

#### Your comments

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Please send your opinion of this document to:

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# **Introduction**

This document describes how to configure and manage disk-usage limits (quotas) for users, groups, or trees within a file system, and users or groups within a tree on the EMC VNX system. It is part of the VNX documentation set and is intended for system administrators responsible for managing disk usage on the system.

#### Topics included are:

- System requirements on page 10
- Cautions on page 10
- User interface choices on page 11
- Related information on page 14

# System requirements

Table 1 on page 10 describes the EMC<sup>®</sup> VNX<sup>™</sup> series software, hardware, network, and storage configurations.

Table 1. System requirements for using quotas

Software	<ul> <li>EMC VNX series version 7.1.</li> <li>All Windows users and groups must have a UID and GID mapping. Configuring VNX User Mapping describes the procedure.</li> </ul>
Hardware	No specific hardware requirements.
Network	No specific network requirements.
Storage	No specific storage requirements.

#### **Cautions**

If any of this information is unclear, contact your EMC Customer Support Representative for assistance:

- Ideally, you should set up a quota policy before file systems go into a production environment, because changing a quota policy at a later date requires that you first turn off all quotas. Turning off quotas may impact system performance.
- Always calculate the effect of quota policy changes on your storage requirements prior to initiating a change. Contact an EMC Customer Support Representative before changing the quota-checking policy.
- Enable or disable quotas in a production environment during off-peak hours. Keep these considerations in mind:
  - For systems that use version 6.0.40 and earlier, enabling quotas may temporarily disrupt file system operations. CIFS clients are disconnected during these events. NFS clients receive a message that the server is not responding. When you turn quotas back on, the file system is frozen and temporarily inaccessible. The length of the interruption depends on the number of files and current load on the Data Mover. Other file systems and Data Mover configurations will also impact the length of the disruption.
  - For systems that use version 6.0.41 and later, when a file system is online and you
    enable quotas, system performance is impacted but file system operations are not
    disrupted.

- For systems that use version 6.0.40 and earlier, tree quotas must be empty before you can enable user and group quota trees. For systems that use version 6.0.41 and later, tree quotas can be empty before you can enable user and group quota trees. Removing (turning off) quotas from a quota tree requires that a directory be empty. Therefore, you must move, copy, or archive files to a temporary location that is not a quota tree, such as a regular directory, before turning off tree quotas. Turning off tree quotas deletes the quota-tree directory.
- Full file system backups will not include tree quotas contained in the original file system. To preserve these trees, the new file system must have tree quotas enabled before data is restored.
- You cannot run rquotad queries against Virtual Data Movers (VDMs).

### User interface choices

The system offers flexibility in managing networked storage based on your support environment and interface preferences. This document describes how to set and manage quotas by using the command line interface (CLI). Administrators can also perform tasks by using a Microsoft client, a UNIX client (quota viewing only), and the EMC Unisphere software.

Table 2 on page 11 summarizes the attributes of each user interface.

Table 3 on page 13 provides a list of quota support capabilities at the task level.

This document explains how to:

- Use the nas\_quotas command to edit quotas for mounted file systems
- List quotas/usage by users or groups at the file system or Data Mover level
- Set quotas for a directory, create a quota tree, and set quotas for users or groups at the quota-tree level

The nas\_quotas command also turns quotas on and off, and clears quotas. The nas\_quotas man page or the *VNX Command Line Interface Reference for File* explains the complete command syntax for nas\_quotas.

Note: If you prefer to create a script rather than open an edit session to change quota limits and set event flags, use the nas\_quotas command extensions. Appendix D provides examples.

Table 2. Quota interface options

Interface	Behavior	Refer to
CLI	The most comprehensive quota management is provided in the command line environment.	Chapter 4
	Cannot set Windows user or group explicit quotas by using a username or group name (UIDs and GIDs only).	

 Table 2. Quota interface options (continued)

Interface	Behavior	Refer to
Microsoft Windows clients	Extensive functionality through a GUI, with the following limitations:  Cannot specify quotas by group, only by user.  Cannot set limits on inodes.  Cannot set quotas by blocks, only by file size (bytes).  Cannot set up quota trees.  Allows you to modify only the soft quota value, not the grace period. To modify the soft quota value, edit the Set warning level to text box in the Quotas tab of the Disk Properties dialog box.  Note: The system issues a warning when the soft quota is reached.	Appendix A
UNIX client	Provides the ability to view quota reports by using command line commands. Provides no means of managing quotas. Quota value and grace period are not configurable.  The system does not notify the user when the grace period begins.	Appendix B
Unisphere software	<ul> <li>Can specify default or explicit soft storage, hard storage, and file count limits.</li> <li>Can specify default grace periods for users or groups at the file system or quota-tree levels, or for all file systems on a Data Mover.</li> <li>Can specify explicit grace periods for users or groups at the file system or quota-tree levels.</li> <li>Can specify soft storage, hard storage, and file count limits for trees in a file system, where the usage is the cumulative total of all users and groups in the tree.</li> <li>Can enable or disable user and group quotas at the file system or quota-tree levels.</li> <li>Can delete quota trees.</li> <li>Can enable or disable hard-quota enforcement.</li> <li>Can enable or disable log messaging when soft or hard quotas are reached.</li> </ul>	Unisphere software online help

Table 3. Quota tasks supported by platform

Task	CLI	Windows clients	UNIX	Unisphere software
Set explicit user quotas on file system	Υ	Y	N	Y
Set explicit group quotas on file system	Υ	N	N	Υ
Set policy by blocks	Υ	N	N	Υ
Set policy by file size	Υ	N	N	Y
Set soft quotas	Υ	Y	N	Υ
Set grace period	Υ	N	N	Υ
Set default limits	Υ	N	N	Υ
Set tree quotas	Υ	N	N	Υ
Use quota prototype	Υ	N	N	N
Turn quotas on or off	Υ	Y	N	Y
Clear quotas	Υ	N	N	N
Set quota policy	Υ	N	N	Y
View reports	Υ	Y	Y	Y
View user usage	Υ	Υ	Y	Y
View group usage	Υ	N	Y	Y
View inode usage	Υ	N	Υ	Υ
Enforce hard limits	Υ	Y	N	Y
(deny disk space)				
Set default user or group quotas within a quota tree	Υ	N	N	Υ
Set anonymous quotas	Υ	N	N	N

### **Related information**

Specific information related to the features and functionality described in this document is included in:

- VNX Glossary
- VNX Command Line Interface Reference for File
- Parameters Guide for VNX for File
- VNX Release Notes
- Configuring Events and Notifications on VNX for File
- Configuring VNX User Mapping
- Using VNX FileMover
- Using International Character Sets on VNX for File
- Online VNX man pages

#### EMC VNX documentation on the EMC Online Support website

The complete set of EMC VNX series customer publications is available on the EMC Online Support website. To search for technical documentation, go to <a href="http://Support.EMC.com">http://Support.EMC.com</a>. After logging in to the website, click the VNX Support by Product page to locate information for the specific feature required.

#### **VNX** wizards

Unisphere software provides wizards for performing setup and configuration tasks. The Unisphere online help provides more details on the wizards.

# Concepts

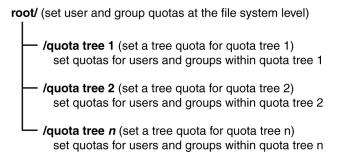
# Topics included are:

- Concepts overview on page 16
- Quota database files on page 16
- Quota records on page 17
- Online quota update tool on page 17

## Concepts overview

The system lets you control disk space consumption by limiting the total bytes of storage that you can used, the number of files (inodes) that you can create, or both. This is done by defining and enabling user or group quotas at the file system level. It is also possible to limit the total amount of data, in blocks or inodes, that you can store in a specific, new directory or subdirectory tree, by setting up tree quotas. Once you apply quotas to a tree, it is referred to as a quota tree. The system separately tracks usage for users, groups, and quota trees. Within a new quota tree you create, you can also set up user or group quotas and separately track usage and enforce limits at the quota-tree level.

The quotas structure includes:



CNS-000599

At the root or file system level, if hard-quota enforcement is set, quotas are tracked and enforced for all files present in this file system. This includes the usage of files in all quota trees present on this file system.

At the quota-tree level, if hard-quota enforcement is set, quotas are tracked and enforced for each tree on which tree quotas are enabled, and for the users or groups using the files present only in that quota tree.

### **Quota database files**

The VNX system maintains quota information in the file system's root directory. The limits are stored in files containing quota records for each user, group, and quota tree, and each user and group within a quota tree, as configured. There is also a tree-quota database directory in the root directory created by the system to store quota tree information. Other files reside in this directory used by the -edit and -report options of the nas\_quotas command. The quota database files are binary files and contain no user-editable text. They are maintained by the system and are in use when quotas are enabled. When quotas are cleared, the information in these files is permanently deleted.

Editing quotas on the system does not require that you first create an empty quotas file as is required in UNIX quota implementations. This file, when required, is created transparently.

### **Quota records**

Each quota record contains:

- Hard and soft quota limits set:
  - Absolute (hard) quota limit on disk usage allocated
  - Preferred (soft) quota limit on disk usage allocated
- Information measurement usage in relation to approaching soft quota limits:
  - Current disk usage
  - Preferred (soft) storage usage limit
  - Maximum number of allocated inodes
  - · Current file count
- Grace period limits set:
  - Time limit for excessive storage use
  - · Time limit for excessive file use

Note: Quota records are indexed by using UIDs. If a large user ID or group ID is in use on a file system, then the size of the quota file is correspondingly large. However, the file does not consume a lot of disk space because the file is mostly sparse and uses few file system blocks. You can verify this by using the disk usage (du) command.

#### Remote (NFS) quota daemon

A remote (NFS) quota daemon enables UNIX clients to communicate with the Data Mover to request user quota information. By default, the daemon starts automatically.

# Online quota update tool

Note: The online quota update tool is available for systems that use version 6.0.41 and later.

Once a tree, user, or group quota is enabled on a directory, in some instances, differences may occur between a reported quota usage and the actual quota usage that is displayed by using either the Unisphere software or the CLI. The online quota update tool lets you run a quota check on a tree or file system. The tool updates the tree, group, and user usage statistics, while keeping the directory tree and file system online, and keeping data access available. You can also run a quota check in the offline mode, if desired.

#### Concepts

You run the online quota update tool by using the CLI, and you need file system administrative privileges. If an error is encountered, an error message is generated. The status of the online quota check shows the percentage completed.

Note: The file system needs  $512\,\mathrm{MB}$  of free space to run a tree quota check.

# **Planning Considerations**

This section contains quota functionality information important to understand before using quotas on the system.

#### Topics included are:

- Quotas and VNX FileMover on page 20
- Define explicit quotas for users or groups on page 20
- Set quota policy on page 21
- Change the numbers of blocks and inodes on page 23
- Apply quotas on page 24
- Approach for enabling or defining quotas on page 28
- Set up event notification on page 31
- Notify users when their quotas are neared or reached on page 31
- Define grace periods for users or groups on page 32
- When to enable quotas and how to change them once enabled on page 32
- Use deny disk space flag to enforce hard limits or track usage on page 34
- When to disable and clear quotas on page 35
- Use soft and hard quotas on page 36
- Quota limit behavior summary on page 37
- Generate reports and view the current configuration on page 39
- Enable and customize pop-up messages on page 39

#### **Quotas and VNX FileMover**

The VNX FileMover feature supports file system quotas on the VNX system. *Using VNX FileMover* provides additional information.

### Define explicit quotas for users or groups

Applying explicit quotas lets you customize user or group quotas on a case-by-case basis for each individual user or group creating files or using space in the file system or quota tree. Explicit quotas supersede default quotas. Apply quotas on page 24 offers more details.

To simplify quota management, the system provides flexibility by offering three methods to choose from when you want to change explicit user or group quotas. The list that follows directs you to the procedures for using each method.

Perform these tasks to explicitly change user or group quotas:

- Change explicit quotas for individual users or groups on page 46
- Change explicit anonymous-user quotas on page 47
- Create and apply a quota prototype on page 48

After using the nas\_quotas command to edit the explicit limits in the quotas configuration file, save the edits and exit the edit session to log the new limits into the database. If quotas are currently turned on, the new limits immediately take effect (are tracked or enforced) without impact to the client environment. The nas\_quotas command also provides a variety of special extensions and options to create scripts to set certain quotas without invoking an edit session. Appendix A provides details and examples.

When a new or explicit user or group quota is created or modified, the quota will not appear in the quota list if:

- It has no disk usage
- You set hard and soft storage limits to 0
- You leave hard and soft file counts blank

In the CLI, limits are entitled "block" (not storage), and "inode" (not file count), but the same behavior applies.

Also, when using the Unisphere software to modify a user or group quota under the above conditions, upon clicking **Apply**, a non-manageable page appears. Click **Back** to return to the previous page in Unisphere.

# Set quota policy

When configuring quotas, first decide which quota policy to use. There are two types of quota policies:

 Blocks – (default) Calculates disk usage in terms of file system blocks (8 KB units) and the usage of all files including directories and symbolic links. With this policy, any operation resulting in allocation of blocks or removal of blocks such as creating, expanding, or deleting a directory; writing or deleting files; or creating or deleting symbolic links changes block usage.

Note: When using the blocks policy, the user can create a sparse file whose size is large (more than the limit), but that actually uses few blocks on the disk.

Filesize – Calculates disk usage only in terms of logical file sizes, ignoring directory sizes and symbolic links. Use this policy where file sizes are critical to quotas, such as where user usage is based on the size of the files created, and where sizes or their sum exceeding the limit is unacceptable. This policy is recommended in CIFS environments. With this policy, block usage depends solely on the number of bytes added to or removed from the file. Usage depends only on changes to a regular file. Directories and symbolic links are not considered.

When setting quota limits, be aware that multiple data streams use additional inodes. A file or directory with one alternate data stream will consume three inodes—one inode for the default stream, a second inode for the alternate stream, and a third inode for a container to hold the alternate stream. Each additional alternate data stream consumes another inode so that two streams on an object will use a total of four inodes, three streams will use five inodes, and so on.

#### Blocks policy example

Note: When calculating actual disk-space usage in blocks, remember that the system stores the block limits in increments of 8 KB. However, system administrators allocate blocks, and the nas\_quotas [-edit|-report] -config commands display disk usage in increments of 1 KB. The limits and usage are rounded up to the next 8 KB boundary. This behavior conforms with standard UNIX edquota and repquota tools.

Assume the system administrator sets quota blocks to 1000 and inodes to 500.

A user writes 10240-byte files. Each file uses two 8 KB blocks of disk space. The data that the system allows to be created is 968 KB. Thus, the maximum number of files that can be written before triggering the quota limit is 60. In addition to one file with an 8 KB block:

 60 files x 10240 bytes per file (with 2\*8 KB blocks) = 614,400 actual number of bytes written 60 files x 2 blocks per file = 120 blocks; 120 blocks x 8192 bytes per block = 983,040
actual disk space used, which is one file under the 1000-block limit of 1,024,000 bytes
(1000 blocks x 1024 bytes per block)

Using block policy can actually reduce the effective available disk space users can write to, depending on the number and size of their files.

#### Filesize policy example

System administrators set quota blocks to 1000 and inodes to 500. A user writes 10240-byte files. Each file still uses two 8 KB blocks of actual disk space. Usage is allowed to increase to 999 KB. Thus, the maximum number of files created before triggering the quota limit is now 99 files (10 KB) and one file of 9 KB.

The following example shows that when file sizes are relatively small, using the filesize policy permits a user to use more available disk space than using block policy:

- 99 files x 10240 bytes per file (that is, 10K) = 1,013,760 actual number of bytes written, which is one file under the 1000-block limit of 1,024,000 bytes (1000 blocks x 1024 bytes per block)
- 99 files x 2 blocks per file = 198 blocks; 198 blocks x 8192 bytes per block = 2,027,520 actual disk space used

#### Which policy to use for what environment: NFS, CIFS, or mixed

The optimal choice for quota policy depends on the type of clients in your storage environment:

- NFS Use either the block or filesize quota policy. If the use of default soft quotas is required, set the specific grace periods you need or keep the default grace period of 1 week.
- ◆ CIFS Set quota policy to filesize to ensure consistency between the system quotas report and the Windows Properties information. If you want soft quotas to behave like Windows warning limits, set the block and inode grace periods to "infinite". Set the grace period to -1 (minus one) if using the CLI, or leave it blank if using the Unisphere software. With an infinite grace period, a warning is generated when a soft quota is reached, but the user can stay over the limit without getting quota errors until the hard limit is reached.
- NFS and CIFS mixed The policy you choose and the grace period selection, whether a specific period or infinite, depends on which behavior is preferred, or the number of each type of client in your environment, or both. For example, the filesize policy works well for mixed CIFS and NFS environments, with behavior normal to both client types. If the grace period is set to either infinite -1 by using the CLI or to blank by using the Unisphere software, warnings are generated when soft quotas are reached, but neither NFS nor CIFS clients receive quota exceeded errors until the hard limit is passed.

Note: Ideally, you should set quota policy before file systems go into a production environment. Keep these considerations in mind:

- ♦ For systems that use version 6.0.40 and earlier, never change an active policy during peak production hours as this action requires that you first disable quotas (if they are enabled) to change the policy, and then re-enable them for the new policy to activate, which disrupts file system operation and is a time-consuming process.
- ♦ For systems that use version 6.0.41 and later, enabling or disabling quotas may impact system performance but does not disrupt file system operations. You can enable or disable quotas at any time, including during peak production hours, but enabling or disabling quotas during non-peak production hours avoids impacting system performance.

Change quota policy by changing a parameter in the system parameter file. You must follow the procedure exactly as described in Choose and set a quota policy on page 42. The *VNX Release Notes* provide updated information on choosing a quota policy.

# Change the numbers of blocks and inodes

You can change the number of blocks and inodes to reflect the numbers you impose for the specified user or group. These maximums apply:

- Maximum for storage (block) soft limits:
  - For systems that use version 6.0.40 and earlier: 4,194,303 MB
  - For systems that use version 6.0.41 and later: 268,435,456 MB
- Maximum for storage (block) hard limits:
  - For systems that use version 6.0.40 and earlier: 4,194,303 MB
  - For systems that use version 6.0.41 and later: 268,435,456 MB
- Maximum for file count (inode) soft limits: 4,294,967,293
- Maximum for file count (inode) hard limits: 4,294,967,293

Apply quotas on page 24 provides details about the user, group, or tree quota limit, which is 4 TB for systems that use version 6.0.40 and earlier, and 256 TB for systems that use version 6.0.41 and later.

After editing the limits, save them and quit the editor session. Another editor session automatically opens for the next user or group listed in the nas\_quotas command line. After the quota limits are edited and saved, other editor sessions open in a similar manner for each user or group.

Note: Grace periods for explicit users or groups are inherited from the default/behavioral quotas configuration setting.

## **Apply quotas**

This section explains your options for setting user, group, and tree quotas.

Note: Quotas are supported on component file systems, but not on the nested mountpoint file system (NMFS) root.

### Restrictions for applying and tracking user, group, and tree quotas

The amount of storage ("blocks") that the quotas feature can track for users, groups, or trees is:

- 4 TB for systems that use version 6.0.40 and earlier
- 256 TB for systems that use version 6.0.41 and later

Because storage quotas are specified in megabytes, this equates to a maximum of:

- 4,194,303 MB for systems that use version 6.0.40 and earlier for a user, group, or quota tree.
- 268,435,456 MB for systems that use version 6.0.41 and later for a user, group, or quota tree.

If the storage limit is exceeded, inconsistent usage reporting results, meaning that the sum of the file sizes as seen in the directory listing (that is, what is actually on disk) does not match with what is reported by the quotas feature. Inconsistent usage reporting does not result in data loss, corruption, or unavailability.

The Unisphere software and the CLI disallow storage amounts that equal or exceed 4 TB for systems that use version 6.0.40 and earlier, and that exceed 256 TB for systems that use version 6.0.41 and later. The system displays an error message if such entries are attempted.

For example, Table 4 on page 24 identifies when an error message does not appear if any of the specified limits are entered (in equivalent megabytes) by using the software interface or CLI.

Table 4. Storage limit values that do not result in errors

Quotas	Storage limits for version 6.0.40 and earlier	Storage limits for version 6.0.41 and later
Users at the file system level	3.9 TB	256 TB
Groups at the file system level	3.9 TB	256 TB

Table 4. Storage limit values that do not result in errors (continued)

Quotas	Storage limits for version 6.0.40 and earlier	Storage limits for version 6.0.41 and later
Quota tree	3.9 TB	256 TB
Users at the quota-tree level	3.9 TB	256 TB
Groups at the quota-tree level	3.9 TB	256 TB

However, Table 5 on page 25 identifies when an error message appears if any of the specified limits are entered (in equivalent megabytes) by using the software interface or CLI.

Table 5. Storage limit values that result in errors

Quotas	Storage limits for version 6.0.40 and earlier	Storage limits for version 6.0.41 and later
Users at the file system level	4 TB	256.1 TB
Groups at the file system level	4 TB	256.1 TB
Quota tree	4 TB	256.1 TB
Users at the quota-tree level	4 TB	256.1 TB
Groups at the quota-tree level	4 TB	256.1 TB

#### **Exceptions**

- Exception 1: After the data is entered, users, groups, or trees might consume more than the storage limit of data if the storage limit was created prior to defining and enabling the quotas. The system generates a server\_log message (that includes the user, group, or tree ID) when a user, group, or tree exceeds the storage limit.
- Exception 2: The Microsoft Management Console (MMC) quota-management feature allows administrators to enter storage quota values that exceed the storage limit. However, EMC cannot ensure consistent usage reporting (between quota reports and on-disk amounts) if the storage limit is exceeded.

To avoid inconsistent usage reporting problems in these special cases, configure user, group, or tree quotas by using the following guidelines:

- Set the storage quotas for users, groups, or trees to a value below the storage limit of 4 TB for systems that use version 6.0.40 and earlier, and below the storage limit of 256 TB for systems that use version 6.0.41 and later. Enforce the hard limits by using the deny disk-space option.
- Set the storage quotas for users, groups, or trees to a value below the storage limit, but do not enforce hard limits that deny disk space. In this way, the storage limit can be exceeded, but inconsistent usage does not result because the quota settings themselves will not surpass the 4 TB total for systems that use version 6.0.40 and earlier, or the 256 TB total for systems that use version 6.0.41 and later.

Full file system backups will not include tree quotas contained in the original file system. To preserve these trees, the new file system must have tree quotas enabled before data is restored.

### Apply user and group quotas

At both the file system level and the quota-tree level, the system lets you specify default limits that apply globally to all existing users or groups presently without quotas. This includes any user or group, without explicit quotas, subsequently added to the file system or quota tree. You can also customize user or group quotas on a case-by-case basis by:

- Setting explicit quotas for each user or group
- Creating files
- Using space in the file system or quota tree

Note: If you define both default and explicit quotas to users or groups, and later change the explicit quotas to zero, the default quotas you defined for the user or group still apply. Changes to the default quotas have no effect on users who have written to the file system. Those users inherited the default quotas set when they first wrote to the file system. If no default quotas were set, then no default quotas apply to those users.

If you assign a group quota, this does not set a quota for each user in the group. A group quota applies to the sum of storage consumed by files owned by the group.

If you assign quotas to a user at both the file system and quota-tree levels, the user's usage in the quota-tree level is counted against both.

When setting user and group quotas, consider the following:

- ◆ You cannot set limits to root user or root group. In other words, the following cannot be configured: UID=0 and GID=1, and GID=0.
- You can set the limits for anonymous users, that is, only UID = -2 (minus 2), by using the anon ID through the nas\_quotas command.
- Group ownership of files is based on a user's primary group unless setgid permissions are used. The default primary group for Windows users is the primary group in the Windows domain, unless you manually modify the cifs.acl.UseUnixGID parameter to specify primary groups in a UNIX name mapping method. The default group in the Windows Domain for all users is Domain Users. For users to belong to a unique group quota, you must use Windows Active Directory to change the default primary group from Domain Users to a unique group.

Note: The Unisphere software's File System Quotas ➤ Users and File System Quotas ➤ Group pages may not appear in a timely manner when a large number of users and groups are associated with a file system. Lists in excess of 10,000 users and groups may time out due to an out-of-memory condition.

### Apply tree quotas

Tree quotas apply to all data stored in the new directory hierarchy you create when enabling and defining quotas for a quota tree. With a quota tree enabled, you can change the limits for the tree and the changes immediately take effect without disrupting file system operations. You can use quota trees for:

- Setting storage limits on a project basis. For example, establishing quotas for a certain directory with multiple users or groups sharing and creating the files in it.
- Tracking directory usage by enabling tree quotas and setting limits to 0 (zero).

When establishing quota trees, note the following:

- Nested quota trees are not supported. That is, a tree quota applies to the specified directory
  and all of its subdirectories. You cannot specify a tree quota for the parent or child
  directory of another directory if it is already a quota tree.
- You cannot set default quotas that automatically apply to all the quota trees you create.
   You must set the quota explicitly for each new quota tree you create.
- For each new quota tree created, two inodes are consumed for internal use: one for the directory name and one for the database.
- Each file system has a limit of 8,191 quota trees.
- Quota trees are not permitted at the root (/) of the file system.
- You can enable user or group quotas only on a tree that is a quota tree, which is a tree to which quotas have been applied. For systems that use version 6.0.40 and earlier, the quota tree must be empty. For systems that use version 6.0.41 and later, the quota tree can be either empty or non-empty.
- Once quota-tree limits are reached, requests for more disk space by users or groups within the tree are automatically denied. You cannot disable the hard-quota limit behavior of denying disk space for the quota tree. This option only applies to the users or groups at the file system or quota-tree level.
- You can set different limits for the same user or group in separate quota trees and, as with quotas set at the file system level, you can separately track user or group usage at the quota-tree level.
- Disk usage per quota tree is computed for all files created in the tree's hierarchy. By default, usage includes directories and files owned by root users.
- Performing a full file system backup will not include tree quotas contained in the original file system. To preserve these trees, the new file system must have tree quotas enabled before data is restored.

### Include or exclude root users when tracking quota-tree disk usage

File systems are automatically updated to directory format MPD. You can use the countRootUsageInQuotaTree parameter to change the usage tracking so that it does not include root users. It only counts the files and directories of non-root users. It is important to make an appropriate decision about the value of this parameter to ensure an accurate tree-quota file count as this may be critical to the business environment. By default, this parameter is on when you create a new tree quota and all root users are included in the file count.

After you change the parameter to exclude root users, the new usage only applies to the new tree quotas that you create. The usage tracking for existing tree quotas remains the same and counts root users. For example, if you specify zero, and then create a new tree quota, the files and directories of root users are not counted, which is the expected behavior. But, for the existing tree quotas that were created with this value set to one, all root users continue to be included in the file count.

Note: For tree quotas created by using version 5.2.12 or earlier on file systems in MPD format, only non-root users are included in the file count. You cannot change this behavior, which prevails for those tree quotas upon upgrade, unless you delete the tree quotas, change the parameter (to include root), and then re-create the tree quotas.

Appendix E describes this procedure.

# Approach for enabling or defining quotas

To prepare the system for a production environment, including basic quota configuration tasks, do the following:

- 1. Create a file system.
- 2. Determine which quota policy best suits your environment and, as needed, change the system policy parameter to the desired setting.
- 3. Define default quotas for users or groups at the file system level. If you do not define default quotas, the system sets no disk-usage limits at all for users or groups. When you define default quotas for users or groups, the quotas automatically apply to all users or groups currently without quotas, and to all users or groups subsequently allowed access to the file system. Default quotas are also known as global quotas because they are globally applied to the users or groups at the file system level.

The default user or group limits that you set are inherited only when the user or group has no usage at all, and then the user or group creates a file for the first time. This means if you change the default values later, they will not apply to users who have created files and, therefore, inherited the previous default. Set default quotas in environments where you want the same set of limits applied to many users or groups without being concerned with the new IDs. An example environment is an ISP or a free email provider, where user IDs get created by the hundreds or thousands.

Note: You can also set default limits from a Microsoft Windows clients, but the Windows environment does not support a limit value of 0 (zero). Instead, it supports a special NoLimit value of -2 (minus two). NoLimit uses the quota entry for tracking purposes and prevents the user from inheriting limits when files are first created. If the limit is set to NoLimit from the Windows client, this value appears as -2 in the editor (using the nas\_quotas -edit command), while the word NoLimit appears in the report you generate (using the nas\_quotas -report command). If you use the CLI to set the limit to 0 (zero), this appears as NoLimit in the Windows client quotas administration dialog box, but the value is preserved as 0 if no changes are made.

- 4. Specify the grace period in which users can remain over the soft limit before it, in effect, becomes the hard limit. The default value is 1 week.
- 5. Specify the quotas event conditions upon which you want the system to write messages to the Data Mover system\_log. By default, the system does not write any quota-overage or quota-checking events to the system\_log.
- 6. Customize the pop-up messages Windows clients receive when their quotas are reached. By default, a standard message is sent.
- 7. Define explicit quotas for individual users or groups at the file system level if your environment requires this type of usage-control granularity. The explicit quotas you set for an individual user or group always supersede the default (global) quota definition you set.

Note: If you are uncertain about the quotas, grace periods, event conditions, and messages you want to set, proceed to step 8 and enable all types of quotas (users and groups at the file system level; tree quotas; and users and groups at the quota-tree level). When user, group, or tree quotas are already enabled, you can define or change quota parameters at any time without impacting the production environment, and the changes are immediate. The key is to avoid enabling quotas when the system is in production mode. When you enable quotas, quota limits are tracked and enforced. When you disable quotas, quota limits are not tracked and enforced. When you clear quotas, the quota limits are automatically turned off first (for users and groups), and then all quota database files are removed. The quota limit information is unrecoverable once the files are removed.

- 8. Enable user and group quotas at the file system level.
- 9. Enable tree quotas for each directory or subdirectory that you want to create in the file system. When you enable a tree quota, specify a directory path. The enabling process actually creates the directory first, and then enables tree quotas on it, making it a tree quota. However, the directory cannot already exist.
- 10. Define tree quotas for each tree quota enabled in the previous step to limit the total storage the tree can consume. By default, the system puts no limits on the amount of storage a tree can use. With tree quotas enabled, you can change tree quota settings at any time without impacting the production environment, and the changes immediately take effect.
- 11. For each quota tree, define default (globally applied) quotas for users or groups.
- 12. For each quota tree, define explicit quotas for individual users or groups if your environment requires this type of individual-usage-control granularity.

13. For each quota tree, enable user and group quotas at the quota-tree level. With these quotas enabled, you can define or change user or group quota settings at the quota-tree level at any time without impacting the production environment and the changes immediately take effect.

After the system enters the production environment, with all quota types enabled, the system begins to track usage and enforce limits, as configured, for each quota type. It computes usage whenever files, directories, or symbolic links are created by any user or group in the file system or quota-tree hierarchy.

Enabling quotas for users, groups, or both tells the system to track user or group disk usage. If the option is set, it will enforce quotas at the specified file system level or quota-tree level. Both default and explicit user or group quotas are enabled in this process. Enabling user or group quotas when a file system is online:

- Impacts client connectivity and is time-consuming for systems that use version 6.0.40 and earlier.
- Impacts system performance but does not disrupt file system operations for systems that use version 6.0.41 and later.

Use the -both option and enable quotas only during non-peak production hours, or preferably, before the system enters a production environment.

With user or group quotas enabled at the file system level or quota-tree level, you can change user or group quota parameters any time at that level and the changes take effect immediately, without impacting the production environment.

When enabling quotas, note that:

- You must enable quotas for quota-limit checking and enforcement to take effect. You need to turn them on one time only. Do not turn quotas on (or off and on) each time you change a limit, for example, by using the nas\_quotas -edit -config command or the Unisphere software. If quotas are on, any changes you make take effect immediately when you exit from the editor.
- When you turn on quotas, you must use the nas\_quotas command options to turn them
  off or clear them. Unmounting a file system or rebooting a Data Mover does not turn off
  or clear active quotas.
- After you enable quota enforcement, if you want to disable quota enforcement, do not turn off quotas. Rather, set the Deny Disk Space flag to No. This action disables quota enforcement, but allows usage tracking to continue for quota management and reporting purposes.

Note: To enable user or group quotas at the quota-tree level, for systems that use version 6.0.40 and earlier, the quota tree must be new and empty. For systems that use version 6.0.41 and later, the quota tree can be either new or existing. Enable quotas for a new directory tree on page 51 describes how to create or enable a new tree. Enable user or group quotas on a non-empty quota tree on page 52 describes how to enable quotas on an existing tree that is not empty. To see if user or group quotas are currently enabled, use the nas\_quotas -report -config command. View the user and group quota configuration on page 64 provides more details.

# Set up event notification

You can configure the system to send messages to the system log when certain quotas events occur, including:

- When user, group, or tree soft quotas are reached, exceeded, or crossed.
- When user, group, or tree hard quotas are reached, exceeded, or crossed.

The log messages capture the events as they occur at the file system or quota-tree levels, and you can enable or disable this messaging at each level. By default, no messages are sent to the system log when user or group quotas (soft or hard) are exceeded. Define default quotas for users or groups and change quota-management settings on page 43 explains how to configure the system to log these events by using the CLI. To do so by using the Unisphere software, select Storage > Storage Configuration > File Systems (File Storage tasks), and select Manage Quota Settings. Then follow the online help instructions. Configuring Events and Notifications on VNX for File also provides more information on how to set up user, group, or tree quota messages and how they are displayed.

## Notify users when their quotas are neared or reached

Pop-up messages notify Windows clients of certain conditions. You must enable Windows Messenger Service for Windows clients to receive pop-up messages.

Pop-up messages generally appear in this format:

```
popup message line 1
popup message line 2
...
popup message line n
Share: <name of the share>
File: <name of the file>
```

There are two types of pop-up messages:

 Warning – Messages tell Windows clients when disk space is running low, and when soft quotas for the user or group are exceeded.

The standard pop-up message for warnings:

```
File System is nearly full
Contact your administrator
Share: <name of the share>
```

• **Error** – Messages tell Windows clients there is no more disk space or hard quotas for the user or group have been reached.

The standard pop-up message for errors:

```
File System full
Contact your administrator
Share: <name of the share>
File: <name of the file>
```

#### When using pop-up messaging:

- By default, only pop-up messages for errors are enabled. Also, by default, only a standard
  message is sent. Enable and customize pop-up messages on page 39 describes how to
  enable pop-up messaging for warnings or customize the error or warning message that
  appears.
- Messages are sent to the connected machine name, not to a specific user. This can be an issue when, for instance, a machine is a terminal server, as the message is usually forwarded to all connected users.
- Clients using the Kerberos protocol do not receive messages when the system has an IP address for a name, rather than a machine name.
- A client can disable message reception by removing the default alias for the machine name in its configuration.
- Users get a pop-up message when they write data, which causes the quota to be reached or crossed. They only receive the message again if they go below their quota by deleting or moving files, and then cross the quota limit again.

## Define grace periods for users or groups

Grace periods provide clients with a specific amount of time to stay over the soft limit for block and inode usage before it becomes a hard limit. The default is 1 week. Grace periods let users respond to warnings by allowing time to clean up disk space and bring their usage back below the soft limit before the hard limit is enforced.

Using the CLI, a grace period of 0 (zero) results in the system using its default grace period of 1 week. Zero does not indicate that there is no grace period. A grace period of -1 (minus one) indicates an infinite grace period. Which policy to use for what environment: NFS, CIFS, or mixed on page 22 provides the grace periods to use for specific environments.

# When to enable quotas and how to change them once enabled

Enabling either user or group quotas tells the system to begin computing or tracking disk usage and to enforce limits for that quota type at the specified level. You can enable quotas even when quota limits are set to zero (0), the default value.

When you initially enable and define quotas for a new tree, it is referred to as a quota tree. With tree quotas enabled, you can define or change the tree's quotas at any time without impacting the production environment or system performance, and the changes take effect immediately.

After you create the quota tree, you can define and enable default or explicit quotas for users or groups at the quota-tree level, as described in Define default quotas for users or groups

and change quota-management settings on page 43 and Define explicit quotas for users or groups on page 20.

For systems that use version 6.0.40 and earlier, when you enable quotas, the system freezes the production file system so it is inaccessible. After the command completes, the file system becomes available once again. You must enable quotas to enforce limits, compute usage, and keep the database consistent.

For systems that use version 6.0.41 and later, enabling user and group quotas when a file system is online impacts system performance, but does not impact file system operations. You must enable quotas to enforce limits, compute usage, and keep the database consistent.

Once you have enabled a quota, it remains "on" until you disable or clear it. It is a one-time action. You do not need to disable and re-enable quotas each time you change a limit. In fact, doing so is not recommended. Keep in mind these considerations:

- For systems that use version 6.0.40 and earlier, enabling quotas may impact file system operations. CIFS clients are disconnected during these events. NFS clients receive a message that the server is not responding. Disabling or clearing quotas may impact system performance.
- For systems that use version 6.0.41 and later, enabling quotas when a file system is online may impact system performance but does not impact file system operations. Disabling or clearing quotas may impact system performance.

Enable quotas during off-peak production hours, or preferably, before the system goes into a production environment. Thereafter, as you monitor disk-usage trends and decide to define or change a quota, you can do so at anytime by simply changing the soft or hard limits. The change takes effect immediately, without impacting the production environment, because the quotas are already enabled.

The Data Mover stores quota information for each file system separately. However, when you are in a quotas edit session, the system displays the quota records of a single user or group on all file systems.

#### The quota-check process

Part of the quota-enabling process is a quota-check process that computes the disk usage of each user or group with files present on the file system. The quota check occurs in two situations only:

- When quotas are turned on (after being turned off)
- When a file system with quotas turned on is file checked (by running fsck), and then mounted

Quotas remain enabled when a file system is unmounted. So, the next time the file system is mounted, you do not have to enable quotas because they are still enabled.

The quota check involves scanning all the file system's inodes. This process may take a long time depending on the number of allocated inodes and users working on these files. When enabling user and group quotas you can save time by using the -both option, by

which the system turns quotas on and performs quota checks for users and groups in the same pass.

When quotas are on, quota usage is guaranteed to be consistent with the file system data at all times, even as new users are added to the file system. The system does not need to repeat quota checking after adding new users to the file system.

Quota records are logged. Even after a file system crash, there is no need for the system to perform a quota check. The data remains consistent. Avoid turning quotas off and on again unless you encounter a situation where the database is somehow corrupted, or the usage information is inconsistent.

For systems that use version 6.0.41 and later, you can start the quota check process by using the CLI and you can complete it without any data interruption. Start a tree or file system quota check on page 76 contains additional information.

Note: To see if user or group quotas are currently enabled or disabled, use the nas\_quotas -report -config command to view the current configuration. View the user and group quota configuration on page 64 describes the procedure. To see if tree quotas are enabled, use the nas\_quotas -list command.

## Use deny disk space flag to enforce hard limits or track usage

Suppose you have defined quotas, enabled them, and put your system into a production environment. To track disk usage for reporting and management purposes, without enforcing limits to deny disk space, you can use a yes/no toggle to deactivate quota enforcement for a quota type such as user or group quotas at the specified file system or quota-tree level.

If you type no, usage is counted but quota limits are not enforced. The user can exceed the quota limits. Use no if you want to keep track of usage while preventing users from getting quota-exceeded errors.

If you type the default setting of yes, quota usage is calculated and enforced. You can change this setting at any time without disrupting file system operations.

You can deny disk space at the file system level for user, group, or tree quotas. Table 6 on page 34 shows the behavior when hard-quota enforcement is "on" and quota types are enabled or disabled at various levels.

You may also deny disk space at the quota-tree level. After enabling deny disk space at the file system level, you can then enable or disable deny disk space at the quota-tree level. Within the quota-tree structure, there are two levels: user and group. Table 7 on page 35 is a summary of hard-quota enforcement behavior at the quota-tree level.

Table 6. File system hard-quota enforcement behavior summary

	File system		
Option	User	Group	Quota tree
Deny Disk Space enabled	Quotas enforced	Quotas enforced	Quotas enforced

# **Table 6. File system hard-quota enforcement behavior summary** (continued)

	File system		
Option	User	Group	Quota tree
Deny Disk Space disabled	Quotas not enforced	Quotas not enforced	Quotas not enforced

#### Table 7. Quota tree hard-quota enforcement behavior summary

	Quota tree	
Option	User	Group
Deny Disk Space enabled	Quotas enforced	Quotas enforced
Deny Disk Space disabled	Quotas not enforced	Quotas not enforced

# When to disable and clear quotas

This section describes considerations to keep in mind for when you want to disable or clear quotas.

#### Disable quotas

Disabling user or group quotas at the file system or quota-tree levels immediately stops disk-usage tracking and the hard quota-limit enforcement behavior of the quotas feature at that level. Existing quota information is retained in the quotas database files and is reused when turning quotas back on. When to disable and clear quotas on page 35 offers more details on disabling quotas.

EMC recommends performing this task during off-peak production hours.

Disabling quotas does not harm usage, as it is recomputed when quota limits are turned on again. Typically, disable quotas only when preparing to clear quotas completely, such as in a critical situation where quotas database files are corrupted.

Disabling tree quotas deletes the quota-tree directory itself. This action requires that the directory be empty. So, you must move, copy, or archive files to a temporary location that is not a quota tree, such as a regular directory, before disabling tree quotas.

Note: An alternate way to stop the enforcement of hard quotas for users or groups at the file system or quota-tree levels is to set the Enforce Hard Quota (deny disk space) option to no. Hard-quota enforcement is stopped immediately without disrupting file system operations for systems that use version 6.0.40 and earlier, or without impacting system performance when a file system is online for systems that use version 6.0.41 and later. Define default quotas for users or groups and change quota-management settings on page 43 describes the procedure.

#### Clear quotas

Clearing user or group quotas first turns off all quotas for the users or groups at the file system or quota-tree level, and then removes the quota database files, permanently resetting all the limits to 0 (zero). The database information is not recoverable. Use this option with caution and in extreme cases only, such as when the database is corrupted and you need to discard all previous settings and start again.

When clearing user and group quotas, save time by using the -both option, which makes the system turn quotas off for both users and groups in the same pass.

EMC recommends clearing quotas only during off-peak hours, when production activity on the system is at its lowest point.

Disable quotas for a quota tree on page 73 explains how to clear the tree quota database information by first disabling quotas for all trees in the file system.

# Use soft and hard quotas

The system supports both hard quotas and soft quotas in multi-protocol environments. Use soft quotas in addition to hard quotas to help optimize disk space management. Soft quotas are always set lower than hard quotas.

When users try to store files that exceed the hard quota limit, and the deny disk space flag is set to yes, the Data Mover returns an error and does not store the file. The behavior of soft quotas depends on the type of client. For example, Microsoft Windows CIFS users can receive a pop-up warning message when they exceed a soft quota. UNIX users never receive a message when they exceed a soft quota, only when they exceed the hard quota. In both cases, a server\_log message is generated. All users can exceed the soft quota for a configurable grace period before they are blocked from saving files.

Note: The following examples assume quota policy is set to filesize. Set quota policy on page 21 provides more information on choosing a quota policy. These examples demonstrate a 10 percent difference between soft and hard limits. The actual difference that you set depends on the usage trends of your environment and the reaction time required to provide support. Also, the size metric used in quota tracing is 1,024 bytes in filesize policy, and 8,192 bytes in blocks policy.

The system reports reveal which users have exceeded their soft quota limits or reached their hard quota.

#### Hard quota limit example

If you specify a hard quota limit of 10,240,000 blocks and 5,000 inodes, a user can then consume 10,240,000 bytes of disk space and create up to 5,000 files including directories and symbolic links.

Once the user reaches the specified hard quota limits, the system denies user requests to save or create additional files and generates an error message. To get space, the user

must delete files or request a higher quota limit. Hard quotas enable an equitable use of disk space.

# Soft quota limit example

If you specify the hard limit just discussed, and set a soft quota limit of 9,216,000 blocks and 4,500 inodes, you can configure the system to provide the user with a warning when the soft quota is reached, and to allow a grace period in which disk space use can continue. When the grace period ends, such requests are denied. Soft quotas provide time to react to potential disk space problems.

# **Quota limit behavior summary**

Table 8 on page 37 shows examples of various explicit storage (block) quota settings and the behavior that results. You can set these settings at the file system or quota-tree level, and the behavior applies to the users or groups at the specified level. In this example, n is any number within the valid storage-limit range.

Table 8. Explicit storage (block) limit settings and behavior

	Explicit storage (block) hard limits	Explicit storage (block) soft limits	Behavior
Quotas entered by using zeroes and by using either the CLI or the Unisphere software at the file system or quota-tree levels	0	0	If the users or groups usage is also 0, then the users or groups inherit the default (global) quotas set at the file system level.  If the users or groups usage is greater than 0 and then the users or groups explicit quotas are set to 0, the users or groups usage is unlimited until the users or groups quotas are reset. The users or groups inherit the global quotas set at the file system.
	n	0	No soft limit applies, and no grace period for block usage is set.
	0	n	No hard limit applies. Once the grace period expires, no usage is permitted until the users or groups storage usage is below the soft limit setting.
	n	n+1	Soft limit adjusts to equal the hard limit. If "Deny Disk Space" is disabled, storage usage is denied when the grace period expires.

Table 8. Explicit storage (block) limit settings and behavior (continued)

	Explicit storage (block) hard limits	Explicit storage (block) soft limits	Behavior
	support null (blank) quota eng from the blank entries is li		here software supports blank quota entries, tion.
Quotas entered by using the Unisphere software with blank fields or ze- roes at the file system or	0	blank	If the users or groups usage is also 0, then the users or groups inherit the default (global) quotas set at the file system level.
quota-tree levels			When a null entry (blank) is entered in the explicit users or groups storage soft limits field of the Unisphere software (or nolimit is entered in the CLI's nas_quotas command line, or -2 is entered in the nas_quotas configuration file), the words "NoLimit" appear in the soft-limit field of the CLI-based quota report.
	blank	0	If the users or groups usage is also 0, then the users or groups inherit the default (global) quotas set at the file system level.
			When a blank is entered in the explicit users or groups storage hard limits field of the Unisphere software (or nolimit is entered in the CLI's nas_quotas command line, or -2 is entered in the nas_quotas configuration file), the words "NoLimit" appear in the hard-limit field of the CLI-based quota report.
	blank	blank	If the users or groups usage is also 0, then the users or groups inherit the default (global) quotas set at the file system level.
			When a blank is entered in the explicit users or groups storage hard and storage soft limits field of the Unisphere software (or nolimit is entered for storage hard and soft limits in the CLI's nas_quotas command line, or -2 is entered for hard and soft storage limits in the nas_quotas configuration file), the words "NoLimit" appear in the hard-limit and soft-limit fields of the CLI-based quota report.

# Generate reports and view the current configuration

There are two ways to query quotas information without opening an edit session:

- Generate quotas reports
- View the configuration files

When comparing the number of objects visible in a file system with a quota report, be aware that multiple data streams use additional inodes. A file or directory with one alternate data stream will consume three inodes—one inode for the default stream, a second inode for the alternate stream, and a third inode for a container to hold the alternate stream. Each additional alternate data stream consumes another inode so that two streams on an object will use a total of four inodes, three streams will use five inodes, and so on.

## **Quotas reports**

The system offers a variety of quota reports that provide the current quotas status and disk-usage statistics. These reports include:

- Users or groups at the file system level, or all file systems on the Data Mover
- Quota trees
- Users or groups at the quota-tree level

Chapter 5 offers more details.

## **Configuration files**

View the user and group quota configuration on page 64 provides information on how to:

- View the enabled or disabled status of the various quota types at the Data Mover, file system, or quota-tree level.
- View the current quotas behavior management or behavior settings.
- Obtain tree IDs and quota-tree descriptions.

# Enable and customize pop-up messages

Pop-up messages inform Windows clients when they have reached their quota limits. The Windows Messenger Service must be enabled for Windows clients to receive pop-up messages. By default, pop-up messages are sent to the workstation. There are two types of pop-up messages:

• **Error** — Messages (enabled to pop-up by default) tell clients when hard quotas are reached or the system is out of disk space.

# **Planning Considerations**

**Warning** — Messages tell clients when their soft quotas are reached or disk space is getting low, giving them a grace period to react.

Note: To view the types of messages currently set to pop-up, use the following command syntax:

server\_param <servername> -f cifs -i sendMessage

Explanations are provided on how to enable or disable error messages, warning messages, or both. An explanation is provided on how to customize the message that Windows clients receive to include contact information or helpful instructions. Notify users when their quotas are neared or reached on page 31 details using pop-up messages.

# Configuring

# The tasks to configure quotas are:

- Choose and set a quota policy on page 42
- Define default quotas for users or groups and change quota-management settings on page 43
- Change explicit quotas for individual users or groups on page 46
- Change explicit anonymous-user quotas on page 47
- Create and apply a quota prototype on page 48
- Enable quotas for users or groups on page 50
- Enable quotas for a new directory tree on page 51
- Enable user or group quotas on a non-empty quota tree on page 52
- View or change quota-tree properties on page 53

# Choose and set a quota policy

You can change the quota-limit-checking policy from blocks (the default) to filesize, or the other way around, by setting a specific parameter in the system parameter file as described in this section.

Set quota policy on page 21 describes quota policies in depth.

Note: To match the way that Microsoft Windows Servers perform quota accounting, you should set the quota policy to filesize. When the policy is set to filesize, the amount used is in 1 KB increments. However, the limits are still set using the file system's 8 KB internal block size. That is, when you set a limit, the system rounds it up to the next 8 KB block limit. Because of this difference, the value displayed in the Quota Limit field of the Quota Entries window might be different from the administrator's settings. If you use or plan to use FileMover, *Using VNX FileMover* provides additional information.

1. To view the current parameter setting, use this command syntax:

```
$ server_param <movername> -facility quota -info policy
where:
```

<movername> = name of the Data Mover

- 2. Log in to the Control Station.
- 3. To change quota policy, use this command syntax:

```
$ server_param <movername> -facility quota -modify policy -value
<new_value>
```

#### where:

<movername> = name of the Data Mover

<new value> = blocks or filesize

## Example:

To change the quota policy on Data Mover 2 from blocks to filesize, type:

```
$ server_param server_2 -facility quota -modify policy -value filesize
```

To change the quota policy on Data Mover 2 from filesize to blocks, type:

```
$ server param server 2 -facility quota -modify policy -value blocks
```

## Output:

```
server 2 : done
```

Parameter and facility names are case-sensitive. *Parameters Guide for VNX for File* has more information about server parameters.

4. Reboot the Data Mover by using this command syntax:

```
$ server_cpu <movername> -reboot now
```

## where:

<movername> = name of the Data Mover

## Example:

To reboot Data Mover 2, type:

```
$ server cpu server 2 -reboot now
```

# Define default quotas for users or groups and change quota-management settings

Defining default quotas limits the number of files, the total bytes of storage used, or both, by users or groups.

Chapter 3 explains each of these quota configuring tasks.

Use this procedure to perform these tasks:

- Change the default hard and soft quotas for users or groups at the file system or quota-tree levels.
- Change the grace period in which users can exceed the soft limit for a given time before the soft limit becomes the hard limit.
- Change the event flags to specify the conditions upon which the system generates an event message to the system log. Configuring Events and Notifications on VNX for File provides more information on how to set up user, group, or tree quota messages and how they are displayed.
- Change the deny disk space flag to alter hard-quota enforcement behavior.

#### Action

 Quota-tree level — To set default, globally applied quotas for users or groups in a newly created quota tree in a file system, use this command syntax:

```
$ nas_quotas -edit -config -fs <fs_name> -path <pathname>
```

## where:

<fs name> = name of the file system in which the quota tree resides

<pathname> = name of the quota tree to which you want to apply default user or group quotas

 File system level only — To change default quotas for users or groups at the file system level only, use this command syntax:

```
$ nas_quotas -edit -config -fs <fs_name>
```

#### where:

<fs name> = name of the file system in which the quota tree resides

# Action

Data Mover level only — To change default quotas for users or groups at the Data Mover level (for users or groups
of all file systems mounted read/write on the Data Mover), use this command syntax:

```
$ nas_quotas -edit -config -mover <movername>
where:
<movername> = name of the Data Mover
```

The quotas will not apply to file systems subsequently mounted read/write on the Data Mover after command execution. You must reissue the command for the new file systems to change to default quotas.

Explicit quotas supersede default quotas. Apply quotas on page 24 offers more details.

## Example:

To set or change user or group quotas for quota tree /mktg-a/dir1 created (in the tree-enabling process) in file system ufs1, type:

```
$ nas_quotas -edit -config -fs ufs1 -path /mktg-a/dir1
```

The system opens an edit session as shown in the Output table that follows.

#### Output

```
1 Quota Tree Parameters:
2 fs ufs1
3 tree "/mktg-a/dir1"
   Block Grace: (1.0 weeks)
5
   Inode Grace: (1.0 weeks)
    * Default Quota Limits:
      User: block (soft = 0, hard = 0) inodes (soft = 0, hard = 0)
8
      Group: block (soft = 0, hard = 0) inodes (soft = 0, hard = 0)
9
   Deny disk space to users exceeding quotas: (no)
10
    * Generate Events when:
11
       Quota check starts:
                                    (no)
12
       Quota check ends:
                                    (no)
13
      User's soft quota crossed:
                                    (no)
      User's hard quota exceeded: (no)
14
```

#### Note

Numbers in the first column are line numbers that are used for explanation purposes only.

Lines 4–5: The length of time users can exceed their block (megabytes of storage) and inode (number of files, directories, or symbolic links) before the soft limit is enforced as a hard limit. Specify values in units of seconds, minutes, days, weeks, or months. The default is 1.0 week. Fractional values are acceptable. Examples: 5 weeks, 3.5 days, 2 months, and so on.

To allow an infinite grace period, set both block and inodes periods to -1 (minus one).

The grace period globally applies to all users or groups by default, and is also inherited by individual users or groups for whom explicit quotas are set.

- Lines 7–8: The default quotas that apply to all users or groups in the quota tree currently without quotas or subsequently
  added to the quota tree. Type a soft limit that is less than the hard limit:
  - Maximum for storage (block) soft limits:
    - For systems that use version 6.0.40 and earlier: 4,194,303 MB.
    - For systems that use version 6.0.41 and later: 268,435,456 MB.
  - Maximum for storage (block) hard limits:
    - For systems that use version 6.0.40 and earlier: 4,194,303 MB.
    - For systems that use version 6.0.41 and later: 268,435,456 MB.
  - Maximum for file count (inode) soft limits: 4,294,967,293.
  - Maximum for file count (inode) hard limits: 4,294,967,293.
- Line 9: Deny disk space to users who reach their hard quotas, and to users whose primary group reaches its hard quotas. Yes (default) means users are denied disk space when reaching the limits. No means users are allowed to go over the limits. This option is useful to track usage and eliminate quota error messages.
- Lines 11–14: Generates an event message to the system log when a particular condition occurs. Enable or disable various CIFS events. Valid values are yes and no.

# After you finish

Save the changes and exit the file. You must enable user or group quotas (turned on if they are off) at the file system level or quota-tree level, as applicable, for the default limits to be tracked and enforced. View the user and group quota configuration on page 64 describes how to check if quotas are on or off. To turn them on if they are off is described in Enable quotas for users or groups on page 50. Define grace periods for users or groups on page 32 also provides additional details.

# Change explicit quotas for individual users or groups

#### Action

Quota-tree level — To view or change explicit quotas for individual users or groups at the quota-tree level, use this
command syntax:

```
$ nas_quotas -edit -user -fs <fs_name> -path <pathname> id <id id...>
where:
```

<fs name> = name of the file system in which the quota tree resides

<pathname> = name of the quota tree to apply the explicit quotas

<id id...> = ID of each user (each ID separated by a space) for whom you are setting the quotas

File system level only — To change explicit quotas at the file system level only, use this command syntax:

```
$ nas_quotas -edit -user -fs <fs_name> id <id id...>
```

where:

<fs\_name> = name of the file system in which the quota tree resides

<id id...> = ID of each user (each ID separated by a space) for whom you are setting the quotas

• Groups — To change explicit quotas for groups, use this command syntax:

```
$ nas_quotas -edit -group -fs <fs_name> -path <pathname> id <id id...>
Where:
```

<fs name> = name of the file system in which the quota tree resides

<pathname> = name of the quota tree to apply the explicit quotas

<id id...> = ID of each group (each ID separated by a space) for which you are setting the quotas

When you set group quotas, the quotas apply to the user's primary group. If neither -user nor -group is specified in the command, the default is -user.

If NIS is enabled, the ID can be an NFS username or NFS group name. If NIS is not enabled, you must type the UID (for the user) or GID (for the group). For UID and GID mappings, check the local password file, the Usermapper files, or the Active Directory (if configured) where you can right-click the user for the ID. CIFS users can get UID mappings through the Usermapper feature. *Configuring VNX User Mapping* offers more details.

#### Example.

To edit quotas for user 32782 in quota tree /mktq-a/dir1 within file system ufs1, type:

```
$ nas_quotas -edit -user -fs ufs1 -path /mktg-a/dir1 32782
```

The system opens an edit session as shown in the Output table that follows.

#### Output

```
Userid: 32782
fs ufs1 tree */mktg-a/dir1*
blocks (soft = 5017600, hard = 5120000)
inodes (soft = 4950, hard = 5000)
```

#### Note

- The username is not displayed in the editor. Instead, the UID appears.
- The block and inode values appear in the editor session. A value of 0 (zero) indicates no limits are set. The values of the blocks (soft = <n>, hard = <n>) indicate that the user can allocate (<n>) 1 KB blocks. The values of inodes (soft = <n>, hard = <n>) indicate the user can create <n>-1 inodes (that is, files, directories, or links).
- If the block limit entry is not a multiple of 8, then the system assigns and displays a block limit that is the next higher multiple of 8.

# Change explicit anonymous-user quotas

Anonymous users are users who are root (that is, ID 0) on their own machine and are trying to access the file systems exported from NFS servers. These users are mapped to a specific user ID (-2 in our case) by the servers, and are not allowed to access as user 0, when they try to access the data. The system tracks the usage of such users and allows you to set quotas for them using the anon keyword in the command syntax.

# Action

Quota-tree level — To edit quotas for anonymous users at the quota-tree level, use this command syntax:

```
$ nas_quotas -edit -user -fs <fs_name> -path <pathname> anon
where:
```

<fs name> = name of the file system in which the quota tree exists

<pathname> = name of the quota tree to which you want to apply quotas for anonymous users

File system level — To edit anonymous user quotas at the file system level, use this command syntax:

```
$ nas_quotas -edit -user -fs <fs_name> anon
```

where:

<fs\_name> = name of the file system in which the quota tree exists

#### Example:

To edit quotas for anonymous users for quota tree /mktg-a/dir1 in file system ufs1, type:

```
$ nas_quotas -edit -user -fs ufs1 -path /mktg-a/dir1 anon
```

The system opens an edit session.

# Output Userid: anonymous fs ufs1 tree "/mktg-a/dir1" blocks (soft = 921600, hard = 1024000) inodes (soft = 2950, hard = 3000)

#### Note

Edit the anonymous user limits, and then save the limits and exit the editor.

# Create and apply a quota prototype

To simplify quota management and avoid having to edit explicit user, group, or tree quotas individually, create a prototype to define specific quotas. Then, apply the prototype to a set of users, groups, or trees, as shown in this section.

This procedure shows how to create a quota prototype for a user at the quota-tree level:

1. Generate a list of user IDs by using this command syntax:

```
$ nas_quotas -report [-user|-group|-tree] -fs <fs_name>
where:
<fs_name> = name of the file system to derive a list of users, groups, or trees
Example:
```

To generate a list of all users on file system ufs1, type:

```
$ nas_quotas -report -user -fs ufs1
```

- 2. From the list that appears, select the ID of the user, group, or tree whose quota limits you want to apply to other users, groups, or trees.
- 3. To create a prototype based on a user ID selected in step 2, and apply the quotas to other users in the quota tree, use this command syntax:

```
$ nas_quotas -edit -user -fs <fs_name> -path <pathname> -proto cproto_id>
<id id...>
where:
<fs_name> = name of the file system in which the quota tree exists
<pathname> = name of the quota tree accessed by the users
cproto_id> = ID of the user whose quota limits you want to apply to other users
<id id...> = ID of the users to whom you want to apply the prototype quotas
```

#### Example:

To apply the quota limits of prototype user 32780 to users 32782, 32783, and 1016377 of quota tree /mktg-a/dir1 on file system ufs1, type:

\$ nas\_quotas -edit -user -fs ufs1 -path /mktg-a/dir1 -proto 32780 32782 32783 1016377

The system applies the quota limits of the prototype user to each user whose ID you specified. If quotas are enabled, the new limits immediately take effect (are tracked and enforced).

The VNX Command Line Interface Reference for File and the nas\_quotas man page provide more details on nas\_quotas command syntax, usage, and options.

4. To create a prototype based on a group ID selected in step 2, and apply the quotas to other groups in the quota tree, use this command syntax:

```
$ nas_quotas -edit -group -fs <fs_name> -path <pathname> -proto <proto_id>
<id id...>
```

#### where:

<fs name> = name of the file system in which the quota tree exists

<pathname> = name of the quota tree accessed by the users

cproto id> = ID of the group whose quota limits you want to apply to other groups

<id id...> = ID of the groups to whom you want to apply the prototype quotas

# Example:

To apply the quota limits of prototype group 300 to groups 301, 302, and 303 of quota tree /marketing/dir1 on file system ufs1, type:

```
$ nas_quotas -edit -group -fs ufs1 -path /marketing/dir1 -proto 300 301 302 303
```

5. To create a prototype based on a tree ID selected in step 2, and apply the quotas to other quota trees, use this command syntax:

```
$ nas_quotas -edit -tree -fs <fs_name> -path <pathname> -proto <proto_id>
<id id...>
```

# where:

<fs name> = name of the file system in which the quota tree exists

<pathname> = name of the quota tree accessed by the users

<proto\_id> = ID of the tree whose quota limits you want to apply to other trees

<id id...> = ID of the trees to whom you want to apply the prototype quotas

## Example:

To apply the quota limits of prototype tree 1 to trees 2 and 3 of file system ufs1, type:

```
$ nas quotas -edit -tree -fs ufs1 -proto 1 2 3
```

6. To apply a prototype at the file system level, use this command syntax:

```
$ nas_quotas -edit -user -fs <fs_name> -proto <proto_id> <id id...>
where:
```

<fs name> = name of the file system in which the quota tree exists

```
cproto_id> = ID of the user whose quota limits you want to apply to other users <id\ id...> = ID of the users to whom you want to apply the prototype quotas
```

## Example:

To edit file system quotas on ufs1 for the specified user, 1000, type:

```
$ nas_quotas -edit -user -fs ufs1 1000
```

# **Enable quotas for users or groups**

Use this procedure to enable default and explicit quotas for users, groups, or both at either the file system or quota-tree levels.

#### Action

User quotas — To enable user quotas at the quota-tree level, use this command syntax:

```
$ nas_quotas -on -user -fs <fs_name> -path <pathname>
Where:
```

<fs name> = name of the file system within which the quota tree exists

<pathname> = name of the quota tree to enable the quotas

Group quotas — To enable group quotas, use this command syntax:

```
$ nas_quotas -on -group -fs <fs_name> -path <pathname>
```

## where:

<fs name> = name of the file system within which the quota tree exists

<pathname> = name of the quota tree on which to enable the group quotas

Both user and group quotas — To enable quotas for both users and groups at once (saving time because it enables
quotas for both users and groups in the same pass), use this command syntax:

```
$ nas_quotas -on -both -fs <fs_name> -path <pathname>
where:
```

<fs name> = name of the file system within which the quota tree exists

<pathname> = name of the quota tree on which to enable both user and group quotas

 One file system — To enable user, group, or both user and group quotas at the file system level, use this command syntax:

```
$ nas_quotas -on [-user|-group|-both] -fs <fs_name>
.
```

<fs name> = name of the file system within which the quota tree exists

#### Action

 All file systems — To enable user, group, or both quotas for all file systems on the Data Mover, use this command syntax:

```
$ nas_quotas -on [-user|-group|-both] -mover <movername>
where:
```

<movername> = name of the Data Mover

The nas\_quotas man page and the VNX Command Line Interface Reference for File provide more information.

#### Example

To enable user quota limits for quota tree /mktg-a/dir1 on file system ufs1, type:

```
$ nas_quotas -on -user -fs ufs1 -path /mktg-a/dir1
```

# Enable quotas for a new directory tree

Tree quotas limit the amount of storage a tree can use. You can define quotas for a new directory tree that you create in this tree-enabling process. After defining limits for a tree, it is referred to as a quota tree.

Note: For systems that use version 6.0.41 and later, you can also define user and group quotas for an existing quota tree that is not empty. Enable user or group quotas on a non-empty quota tree on page 52 contains further information.

Use this procedure to set quotas on the new directory tree:

- 1. Decide the name of the quota tree directory, for example, /mktg-a/dir1.
  - A high-level directory (/mktg-a) must exist. It is not created in the process. The last part of the tree (/dir1) must not exist, and is created in the process.
- 2. Turn on tree quotas for the directory by using this command syntax:

```
$ nas_quotas -on -tree -fs <fs_name> -path <pathname> -comment <'comment'>
where:
```

<fs\_name> = name of a mounted file system on which to create a quota tree

<pathname> = pathname of the quota tree directory you want to create

<'comment'> = description of the tree quota (optional), enclosed in single quotes ('')

In the example that follows, these conditions must exist to run the command successfully:

- The high-level directory /mktg-a must exist.
- The subdirectory /mktg-a/dir1 must not exist, and is created in the process.

Note: Apply quotas on page 24 explains more about restrictions on quota trees.

# Example:

To enable tree quotas on file system ufs1, on directory /mktg-a/dir1, type:

```
$ nas quotas -on -tree -fs ufs1 -path /mktg-a/dir1 -comment 'Customer Accounts'
```

Comment length is limited to 256 bytes (represented as 256 ASCII characters or a variable number of Unicode multibyte characters), and cannot include a single quote ('), double quote ("), or semi-colon (;). To remove a comment, type a space enclosed in single quotes ('').

## After you finish

After enabling quotas for a new directory tree you can set or change its limits at any time without impacting the production environment, and the changes immediately take effect when you save and exit the edit session. View the user and group quota configuration on page 64 describes the procedure to see if quotas are enabled on a tree.

View or change quota-tree properties on page 53 explains how to view/change tree quotas on a new, quotas-enabled tree. Define default quotas for users or groups and change quota-management settings on page 43 and Define explicit quotas for users or groups on page 20 define user or group quotas on a quota tree.

# Enable user or group quotas on a non-empty quota tree

Note: This procedure is valid for systems that use version 6.0.41 and later only.

You can enable user or group quotas for an existing quota tree that is not empty.

Note: You can also enable quotas for a new directory tree. Enable quotas for a new directory tree on page 51 contains further information.

Use this procedure to set quotas on an existing quota tree that is not empty:

1. Ensure that tree quotas are enabled on the quota tree where you want to enable user or group quotas. If tree quotas are not enabled, use this command syntax to enable them:

```
$ nas_quotas -on -tree -fs <fs_name> -path <pathname> -comment <'comment'>
where:
```

<fs name> = name of a mounted file system on which the quota tree resides

<pathname> = pathname of the existing quota-tree directory

<'comment'> = description of the tree quota (optional), enclosed in single quotes ('')

In the example that follows, these conditions must exist to run the command successfully:

- The high-level directory /mktg-a must exist. It is not created in the process.
- The subdirectory /mktg-a/dir1 must not exist, and is created in the process.

Note: Apply quotas on page 24 explains more about restrictions on quota trees.

# Example:

To enable tree quotas on file system ufs1, on directory /mktg-a/dir1, type:

```
$ nas_quotas -on -tree -fs ufs1 -path /mktg-a/dir1 -comment 'Customer Accounts'
```

Comment length is limited to 256 bytes (represented as 256 ACSII characters or a variable number of Unicode multibyte characters), and cannot include a single quote ('), double quote ("), or semi-colon (;). To remove a comment, type a space enclosed in single quotes ('').

2. Enable default and explicit quotas for users, groups, or both at either the file system or quota-tree levels. Enable quotas for users or groups on page 50 contains instructions.

# View or change quota-tree properties

Use this procedure to view or change quotas for a quota tree:

1. Get the tree ID by using this command syntax:

```
$ nas_quotas -list -tree -fs <fs_name>
where:
```

<fs\_name> = file system for which you want to generate a list of quota trees

## Example:

For a list of quota trees on file system ufs1, type:

```
$ nas_quotas -list -tree -fs ufs1
```

## Output:

2. Define or change the tree quota limits by using this command syntax:

```
$ nas_quotas -edit -tree -fs <fs_name> -block <hard:soft> -inode <hard:soft>
-comment <'comment'> <id>
where:
<fs_name> = file system name
```

<hard:soft>= hard and soft block (storage) limits (in KBs, rounded to the next 8 KB), and the hard and soft file count limits. The hard and soft limits are separated by a colon (:). You should always set soft limits lower than the hard limits. You can omit -block or -inode to set one or the other. Maximum block limit is 4,194,303 MB for systems that use version 6.0.40 and earlier, and 268,435,456 MB for systems that use version 6.0.41 and later. Maximum file count limit is 4,294,967,293 files.

<'comment'> = descriptive comment (optional), enclosed in single quotation marks

<id> = tree ID on which you want to define or change quota limits

# Example:

To define or change the block and inode quota limits on tree ID 1 within file system ufs1, type:

```
$ nas_quotas -edit -tree -fs usf1 -block 102400000:101376000 -inode 10000:9900 1
```

Optionally, you can use the comment option to change the comment describing the tree. Comment length is limited to 256 bytes (represented as 256 ACSII characters or a variable number of Unicode multibyte characters), and cannot include a single quote ('), double quote ('), or semi-colon (;). To remove a comment, type a space enclosed in single quotes ('). The nas\_quotas man page and the *VNX Command Line Interface Reference for File* explain more details about the nas\_quotas command.

## Output:

```
treeid : 1
fs ufs1 blocks (soft = 101376000, hard = 102400000) inodes (soft = 9900, hard = 10000)
```

3. After you view or change the limits for the tree, save the changes and exit the file. The changes take effect immediately without disrupting file system operations. For systems that use version 6.0.41 and later, system performance may be impacted. If the deny disk space option at the file system level is set to yes, hard quotas are enforced and users or groups in the tree are denied disk space when the hard limits for the tree are reached.

Note: You can now assign ownership or appropriate permissions to the new directory from NFS or CIFS clients.

# Managing

# The tasks to manage quotas are:

- Upgrade quota database limits for file systems on page 56
- View quota database upgrade information on page 58
- Generate a report of user or group usage at file system level on page
   59
- Generate a report of user or group usage at Data Mover level on page
   61
- Generate a report of quota-tree usage on page 62
- Generate a report of user or group usage at quota-tree level on page
   63
- View the user and group quota configuration on page 64
- View the quota-tree configuration on page 65
- Enable or disable pop-up messaging on page 66
- Set the maximum user ID on page 67
- Customize pop-up messages on page 68
- Disable quotas for users or groups on page 72
- Disable quotas for a quota tree on page 73
- Clear quotas on page 74
- Start a tree or file system quota check on page 76
- Stop a quota check on page 76
- View the status of a quota check on page 77
- Unmount a file system while a quota check is running on page 77
- Reboot a Data Mover while a quota check is running on page 77

# Upgrade quota database limits for file systems

This procedure is valid for systems that use version 6.0.41 or later.

Note: Before the upgrade process runs, the Control Station displays the estimated upgrade time of the file system whose quota database will be upgraded, and also displays a warning message to notify users that the file system will be unavailable during the upgrade process. If users are in interactive mode, a dialog box is displayed letting users choose whether they want to continue. If users are in non-interactive mode, immediately after the Control Station displays the estimated upgrade time message and warning message, the upgrade process starts. Because the file system will not be accessible during the upgrade, carefully read the estimated time message and schedule a time when the file system can be brought down.

#### Action

To upgrade quota database limits on file systems, use this command syntax:

```
$ nas_quotas -quotadb -upgrade [-Force] {-mover <movername>|-fs <fs_name>}
where:
```

<movername> = name of the Data Mover for which you want to update quota databases on all mounted file systems
<fs name> = name of the file system for which you want to update a quota database

If the -Force option is specified, you are in non-interactive mode while upgrading the quota database. If the -Force option is not specified, you are in interactive mode while upgrading the quota database and can choose to wait to perform an upgrade after receiving a yes/no prompt.

To upgrade all file systems on a Data Mover, in interactive mode, type:

```
$ nas_quotas -quotadb -upgrade -mover server_2
```

#### Output

Info 13421850365: The quota limit on ufs0 is at 4TB. The upgrade to 256 TB is estimated to take 5 seconds.

A total number of 1500 data blocks in the quota database will be converted at a speed of 300 blocks per second.

Info 13421850365: The quota limit on ufs1 is at 4TB. The upgrade to 256 TB is estimated to take 5 seconds.

A total number of 1500 data blocks in the quota database will be converted at a speed of 300 blocks per second.

Info 13421850365: The quota limit on ufs2 is at 4TB. The upgrade to 256 TB is estimated to take 5 seconds.

A total number of 1500 data blocks in the quota database will be converted at a speed of 300 blocks per second.

Info 13421850365: The quota limit on ufs3 is at 4TB. The upgrade to 256 TB is estimated to take 5 seconds.

A total number of 1500 data blocks in the quota database will be converted at a speed of 300 blocks per second.

Info 13421850366: The quota limit on ufs4 is at 256 TB

Warning 17716861297: The file systems specified in the list above will not be accessible during the quota database upgrade, and a file system's CIFS share and NFS export also will not be accessible during the upgrade. The file systems shown above are listed in the order that the quota database conversion is performed, one by one sequentially. The estimated time ( shown above ) needed to upgrade the quota database may change based on the file system's quota configuration and I/O performance when the conversion is running.

Do you really want to upgrade the file system quota database now[Y/N]: Y

Info 13421850367 : quota db upgraded on ufs0

Info 13421850367: quota db upgraded on ufsl

Info 13421850367 : quota db upgraded on ufs2

Error 13421850368: Timeout occurred when upgrading quota db on ufs3. The Quota db upgrade may still be in progress. Use the "-info" option to check status.

Info 13421850369: quota db already upgraded on ufs4

# View quota database upgrade information

This procedure is valid for systems that use version 6.0.41 or later.

#### Action

To view estimated times for how long a quota database upgrade will take, use this command syntax:

```
$ nas_quotas -quotadb -info {-mover <movername>|-fs <fs_name>}
```

#### where:

<movername> = name of the Data Mover for which you want to view quota database upgrade times for all mounted file systems

<fs name> = name of the file system for which you want to view quota database upgrade times

To view estimated times for how long a quota database upgrade will take for all file systems on a Data Mover, type:

\$ nas\_quotas -quotadb -info -mover server\_2

#### Output

Info 13421850365: The quota limit on ufs0 is at 4TB. The upgrade to 256 TB is estimated to take 5 seconds.

A total number of 1500 data blocks in the quota database will be converted at a speed of 300 blocks per second.

Info 13421850365: The quota limit on ufs1 is at 4TB. The upgrade to 256 TB is estimated to take 5 seconds.

A total number of 1500 data blocks in the quota database will be converted at a speed of 300 blocks per second.

Info 13421850365: The quota limit on ufs2 is at 4TB. The upgrade to 256 TB is estimated to take 5 seconds.

A total number of 1500 data blocks in the quota database will be converted at a speed of 300 blocks per second.

Info 13421850365: The quota limit on ufs3 is at 4TB. The upgrade to 256 TB is estimated to take 5 seconds.

A total number of 1500 data blocks in the quota database will be converted at a speed of 300 blocks per second.

Info 13421850366 : The quota limit on ufs4 is at 256  $\ensuremath{\mathtt{TB}}$ 

# Generate a report of user or group usage at file system level

#### Action

Users — To view a report of disk usage by user per file system, use this command syntax:

```
$ nas_quotas -report -user -fs <fs_name> <id id...>
```

#### where:

 $< fs_name > =$  name of the file system.

<id id ...> = IDs of the specific users. Separate each UID with a space.

• Groups — To view a group report, use this command syntax:

```
$ nas_quotas -report -group -fs <fs_name> <id id...>
```

#### where:

<fs name> = name of the file system.

 $\langle id \ id ... \rangle$  = IDs of the specific groups. Separate each GID with a space.

If you do not specify a user or group ID, the report lists all users or groups registered by using the -edit option, and all other users or groups with files present on the file system.

#### Example:

To view a usage report by users of file system ufs1, type:

```
$ nas quotas -report -user -fs ufsl
```

For CIFS users: Bytes Used are based on the user's total quota, which includes any and all shares on the file system.

## Output

Report for user quotas on filesystem ufs1 mounted on /ufs1 |User | Bytes Used (1K) | Files +----+---+----+----+-----+ | Used | Soft | Hard | Timeleft | Used | Soft | Hard | Timeleft | 0|NoLimit|NoLimit| | I#32768 I 2 | 0 1 |#32780 | 41613|9216000|10240000 | 2| 4900| 5000| |#32782 | 84796|9216000|10240000 | 30| 4900| 5000| +----+ |#32783 | 10240|9216000|10240000 | 2| 4900| 5000| +----+---+---+----+-----+ |#1016377| 0|9216000|10240000 | 1| 4900| 5000| +done

# Managing

Note: If a quota report conflicts with what is actually available on disk, it may imply the total amount of storage used by users, groups, or trees per file system exceeds 4 TB for systems that use version 6.0.40 and earlier, and 256 TB for systems that use version 6.0.41 and later. Another possibility is that the policy is set to blocks and sparse files are used.

# Generate a report of user or group usage at Data Mover level

## Action

 Users — To view a report of disk usage, by user, of all file systems mounted on a Data Mover, use this command syntax:

```
$ nas_quotas -report -mover <movername> <id id...>
```

#### where.

<movername> = name of the Data Mover for which you want to generate a report.

 $\langle id \ id ... \rangle$  = IDs of the specific users. Separate each ID with a space.

Groups — To generate a report of group usage by Data Mover, use this command syntax:

```
$ nas_quotas -report -mover <movername> <id id...>
```

#### where:

<movername> = name of the Data Mover for which you want to generate a report.

<id id...> = ID of the specific groups. Separate each ID with a space.

If you do not specify a user or group, the report lists all users or groups for all file systems on the Data Mover.

#### Example

To view a report of usage for user 32780 across all the file systems (in this example, ufs1 and ufs2) mounted on Data Mover server\_2, type:

#### Action

\$ nas\_quotas -report -mover server\_2 32780

## Output

done

Generate a report of user or group usage at Data Mover level

# Generate a report of quota-tree usage

## Action

To generate a report of tree usage within a file system, use this command syntax:

```
$ nas quotas -report -tree -fs <fs name> <id id...>
```

where:

<fs name> = name of the file system.

<id id...> = IDs of the specific trees. Separate each ID with a space.

If you do not specify a tree ID, the report lists all existing quota trees. To determine if tree quotas are enabled, and to view any comments associated with the quota trees, use the nas\_quotas -tree -list command.

#### Example:

To generate a report for tree ID 1 mounted on file system ufs1, type:

\$ nas\_quotas -report -tree -fs ufs1 1

## Output

```
Report for tree quotas
on filesystem ufs1 mounted on /ufs1
| Tree | Bytes Used (1K)
                  Files
+----+
| Used | Soft | Hard | Timeleft | Used | Soft | Hard | Timeleft |
 #1 |100622|101376000|102400000| | 36| 9900|10000| |
```

# Generate a report of user or group usage at quota-tree level

## Action

Users — To generate a report of user usage at the quota-tree level, use this command syntax:

```
$ nas_quotas -report -user -fs <fs_name> -path <pathname> <id id...>
```

#### where:

<fs name> = name of the file system

<pathname> = name of the quota tree within the file system

<id id...> = IDs of the specific users whose usage you want included in the report. Separate each ID with a space.

Groups — To generate a report of group usage, use this command syntax:

```
$ nas_quotas -report -group -fs <fs_name> -path <pathname> <id id...>
where:
```

<fs name> = name of the file system

<pathname> = name of the quota tree within the file system

<id id...> = IDs of the specific groups whose usage you want included in the report. Separate each ID with a space.

If you do not specify a user or group, the report lists all users or groups registered using the -edit option, and all other users or groups with files present in the quota tree.

# Example:

To generate a usage report for all quota tree /mktg-a/dir1 users in file system ufs1, type:

\$ nas\_quotas -report -user -fs ufs1 -path /mktg-a/dir1

Output									
Report fo		-	on tree	quota /mk	tg-a/di	rl on f	filesystem ufs1		
User		Bytes Used (1K)			Files				
	Used	Soft	Hard	Timeleft	Used	Soft	Hard Timeleft		
#32769 #32770 #32771 #32772 #32773 #32774 #32778 #32780 #32781 #32782 #32783 #32783		1945600   1945600   1945600   1945600   1945600   1945600   1945600   5017600   1945600   1945600   1945600	2048000  2048000  2048000  2048000  2048000  2048000  5120000  5120000  5120000  2048000		0   0   0   0   0   0   0   0   0   0	1950  1950  1950  1950  1950  1950  4950  4950  1950	2000   2000   2000   2000   2000   2000   5000   2000   5000   2000		

# View the user and group quota configuration

This report displays the:

- Active quota policy, user or group quota status (enabled or disabled).
- Grace periods for exceeding soft storage limits or file count limits.
- User or group default limits currently set.
- Hard-quota enforcement option setting (deny disk space enabled or disabled).
- Conditions that trigger event logging.

## Action

Quota-tree level — To view the user and group quota configuration at the quota-tree level, use this command syntax:

```
$ nas_quotas -report -config -fs <fs_name> -path <pathname>
where:
```

<fs name> = name of the file system in which the quota tree exists

<pathname> = name of the quota tree for which to view the user or group quota configuration

File system level — To view the user and group quota configuration at the file system level, use this command syntax:

```
$ nas_quotas -report -config -fs <fs_name>
```

where:

<fs name> = name of the file system in which the quota tree exists

```
Action
Example:
To view the quota configuration for quota tree /mktg-a/dir1 in file system ufs1, type:
$ nas_quotas -report -config -fs ufs1 -path /mktg-a/dir1
Output
| Quota parameters for quota tree /mktg-a/dir1 on filesystem ufs1:
| Quota Policy: blocks
| User Quota: ON
| Group Quota: ON
| Block grace period: (1.0 days)
| Inode grace period: (1.0 days)
 Default USER quota limits:
      Block Soft: ( 1945600), Block Hard: ( 2048000)
Inode Soft: ( 1950), Inode Hard: ( 2000)
  Default GROUP quota limits:
     Block Soft: ( 39000000), Block Hard: ( 40000000)
      Inode Soft: ( 39000), Inode Hard: ( 40000)
y Disk Space to users exceeding quotas: YES
  Deny Disk Space to users exceeding quotas:
  Log an event when ...
     Block hard limit reached/exceeded:
                                                        YES
     Block soft limit (warning level) crossed: YES
     Quota check starts:
                                                          NO
     Quota Check ends:
                                                          NO
done
```

# View the quota-tree configuration

For each directory tree in the file system, this report reveals the tree ID and any comment associated with the active tree quota.

```
Action

To view the quota configuration for a tree directory, use this command syntax:

$ nas_quotas -list -tree -fs <fs_name>
where:
<fs_name> = name of the file system for which you want to view active tree quotas

Example:
To view the tree quota configuration for file system ufs1, type:

$ nas_quotas -list -tree -fs ufs1
```

# Enable or disable pop-up messaging

To enable or disable pop-up messages:

- 1. Log in to the Control Station.
- 2. To enable or disable pop-up messaging to Windows clients, use this command syntax:

```
$ server_param <movername> -facility cifs -modify sendMessage -value
<new_value>
```

#### where:

<movername> = name of the Data Mover

<new\_value> = value for the specified parameter:

- 0 = Disable all pop-up messages.
- 1 = Enable only error pop-up messages.
- 2 = Enable only warning pop-up messages.
- 3 = Enable both warning and error pop-up messages.

# Example:

For server\_2, to enable both warning and error messages to be sent to Windows clients, type:

```
$ server param server 2 -facility cifs -modify sendMessage -value 3
```

Note: Parameter and facility names are case-sensitive. *Parameters Guide for VNX for File* provides additional information about the pop-up messaging parameter.

## Output:

```
server_2 : done
```

# Set the maximum user ID

Set the parameter to the highest UID you expect to support. If you need to increase the value later, you can change the parameter to a higher value.

To set the maximum user ID:

- 1. Log in to the Control Station.
- 2. To set the maximum user ID, use this command syntax:

```
$ server_param <movername> -facility quota -modify maxuid -value <new_value>
where:
```

<movername> = name of the Data Mover

<new\_value> = value for the specified maxuid parameter, where range = 0-4294967294 and the default value is 0

# Example:

For server\_3, type:

\$ server\_param server\_3 -facility quota -modify maxuid -value 20000

Note: Parameter and facility names are case-sensitive. *Parameters Guide for VNX for File* provides additional information about parameters.

# Output:

server\_3 : done

# Customize pop-up messages

Use this procedure to customize the message that Windows clients receive in a quota warning or error message:

- 1. Log in to the Control Station as root.
- 2. Edit the cifsmsg.txt file on the Data Mover by copying the file to the Control Station by using this command syntax:

```
# server_file <movername> -get cifsmsg.txt cifsmsg.txt
where:
```

<movername> = name of the Data Mover with the cifsmsg.txt file

## Example:

To copy the file from server\_2, type:

```
# server_file server_2 -get cifsmsg.txt cifsmsg.txt
```

Note: If this file does not exist, you must create it and type the information. If you do not create this file, the system uses default messages in the pop-up windows.

3. Open cifsmsg.txt with a text editor.

The cifsmsg.txt file typically appears as shown below. To add comments to this file, start the comment line with a pound sign (#). The comments are not included in the pop-up message:

```
$warning.QuotaExceeded=$warning.NoSpace
$warning.GroupQuotaExceeded=$warning.NoSpace
$warning.TreeQuotaExceeded=$warning.NoSpace
# Errors for status NoSpace, QuotaExceeded and GroupQuotaExceeded
# The default message for these errors is:
# "File System full"
# "Contact your administrator"
# The popup will be:
# | File System full
# | Contact your administrator |
# | Share: <name of the share> |
# | File: <name of the file> |
# or
# +----+
# | File System full
# | Contact your administrator |
# | Share: <name of the share> |
# +----+
$error.NoSpace=
File System full
Contact your administrator
$error.QuotaExceeded=$error.NoSpace
$error.GroupQuotaExceeded=$error.NoSpace
$error.TreeQuotaExceeded=$error.NoSpace
```

4. To change a warning message, customize warning messages by using this syntax:

Note: Use # at the beginning of a sentence if you want to add comments to this file.

```
$warning.<status>=
<popup message line 1>
<popup message line n>
```

#### where:

<status> = The condition upon which you want the message sent. Options are:

- NoSpace for when disk space is running low.
- QuotaExceeded for when user soft quotas are exceeded.
- GroupQuotaExceeded for when group soft quotas are exceeded.

<popup message line> = Any message to send (such as the nature of the condition, contact
information, and suggested action).

# Example:

To have the following pop-up message appear when user soft quotas are exceeded:

Your allotment of disk space is reaching capacity. Delete unwanted files now to make more space. Contact Tech Support @ ext. 1234 for assistance.

# Type:

```
$warning.QuotaExceeded=
Your allotment of disk space is reaching capacity.
Delete unwanted files now to add more space.
Contact Tech Support @ ext. 1234 for assistance.
.
```

Note: The last line must be a period (.).

## Default warning messages are:

```
NoSpace:"File System is nearly full"
QuotaExceeded:"File System is nearly full (UserQuotaExceeded)"
GroupQuotaExceeded:"File System is nearly full (GroupQuotasExceeded)"
```

All pop-up messages also contain the share name and filename.

To avoid repeating the same text for different messages, use the following syntax:

```
$warning.<status2>=$warning.<status1>
$error.<status2>=$warning.<status2>
$error.<status3>=$error.<status2>
```

5. To change an error message, customize error messages by using this syntax:

Note: Use # at the beginning of a sentence to add comments to this file.

```
$error.<status>=
<popup message line 1>
<popup message line n>
```

# where:

<status> = The condition upon which you want the message sent. Options are:

- NoSpace = When disk space is full.
- QuotaExceeded = When user hard quotas are exceeded.
- GroupQuotaExceeded = When group hard quotas are exceeded.

<popup message line> = Any message you want to send such as the nature of the condition,
contact information, and suggested action.

## Example:

To have the following pop-up message appear when the disk is full:

The file system is full. Delete unwanted files now (or move files to a backup drive) to create space. Contact Tech Support @ ext. 1234 for assistance.

## Type:

```
$error.NoSpace=
The file system is full. Delete unwanted files now
(or move files to a backup drive) to create space.
Contact Tech Support @ ext. 1234 for assistance.
```

Note: The last line must be a period (.).

# The default messages are:

```
NoSpace: "File System full"
QuotaExceeded: "User Quotas Exceeded"
GroupQuotaExceeded: "Group Quotas Exceeded\n"
```

All pop-up messages also contain the share name and filename.

To avoid repeating the same text for different messages, use the following syntax:

```
$warning.<status2>=$warning.<status1>
$error.<status2>=$warning.<status2>
$error.<status3>=$error.<status2>
```

6. Save and close the file, and then type:

```
$ server file server 2 -put cifsmsg.txt cifsmsg.txt
```

7. To implement the changes that you made to the cifsmsg.txt file, restart (stop and start) the CIFS service on the Data Mover (<x>) by using this command syntax:

```
$ server_setup server_<x> -P cifs -o stop
$ server_setup server <x> -P cifs -o start
```

If you also changed the parameter to enable or disable pop-up messaging, described in Enable or disable pop-up messaging on page 66, reboot the Data Mover instead of restarting CIFS to make all changes at once.

# Disable quotas for users or groups

Use this procedure to disable (turn off) quotas for users or groups, or both users and groups at once, at the file system or quota-tree levels.

## Action

User quotas — To disable quotas for all users at the quota-tree level, use this command syntax:

```
$ nas_quotas -off -user -fs <fs_name> -path <pathname>
```

where:

<fs\_name> = name of the file system in which the quota tree exists

<pathname> = quota tree for which you want to disable user quotas

Group quotas — To disable group quotas, use this command syntax:

```
$ nas_quotas -off -group -fs <fs_name> -path <pathname>
```

where:

<fs\_name> = name of the file system in which the quota tree exists

<pathname> = quota tree for which you want to disable group quotas

Both user and group quotas — To disable quotas for both users and groups at once, saving time because it disables
quotas for both users and groups in the same pass, use this command syntax:

```
$ nas_quotas -off -both -fs <fs_name> -path <pathname>
```

where:

<fs\_name> = name of the file system in which the quota tree exists

<pathname> = quota tree for which you want to disable both user and group quotas

 One file system — To disable user, group, or both user and group quotas at the file system level, use this command syntax:

```
$ nas_quotas -off [-user|-group|-both] -fs <fs_name>
```

where:

<fs\_name> = name of the file system in which the quota tree exists

The nas\_quotas man page and the VNX Command Line Interface Reference for File provide more information.

## Example:

To disable user quotas on file system ufs1, type:

```
$ nas_quotas -off -user -fs ufs1
```

#### Output

Done

# Disable quotas for a quota tree

Disabling (turning off) tree quotas deletes the quota-tree directory. This action requires the directory to be empty. Therefore, you must first move, copy, or archive files to a temporary location such as a regular directory before disabling quotas on the tree.

An alternative to disabling tree quotas, if you want to stop only tree quota enforcement and do not want to move files and delete the directory, is to set the Hard Quota Enforcement option to no at quota-tree levels, as applicable. This action leaves the tree quotas on for usage reporting only. Define default quotas for users or groups and change quota-management settings on page 43 describes the procedure.

To disable tree quotas and delete the quota-tree directory:

- 1. Create a temporary directory.
- 2. Move the contents of the quota-tree root (for example, /mktg-a/dir1) to a temporary directory.
- 3. Disable quotas for a quota-tree root by using this command syntax:

```
$ nas_quotas -off -tree -fs <fs_name> -path <pathname>
where:
```

<fs\_name> = file system on which tree quotas are currently enabled

<pathname> = pathname of the quota-tree root

## Example:

To disable tree quota limits for file system ufs1 and the quota-tree root /mktg-a/dir1, type:

```
$ nas_quotas -off -tree -fs ufs1 -path /mktg-a/dir1
```

The system deletes the quota tree.

# Clear quotas

Clearing a type of quota discards the information from the quotas database, resets the limits to 0 (zero), and removes the related quota files from the root directory.

# Clear user or group quotas

When you issue the command to clear user or group quotas at the file system or quota-tree levels, the system:

- Disables (turns off) the quotas for the users or groups.
- Discards the related information in the database.
- Resets the limits to 0 (zero).
- Removes the related quota files from the root directory.

Clearing user or group quotas may take considerable time and disrupt file system operations. Clear quotas only during off-peak production hours. When to disable and clear quotas on page 35 provides more information.

#### Action

User quotas — To clear the database information related to all users within a quota tree, use this command syntax:

```
$ nas_quotas -clear -user -fs <fs_name> -path <pathname>
```

#### where:

<fs name> = name of the file system in which the quota tree exists

<pathname> = quota-tree name for which to clear user quotas

Group quotas — To clear the database information related to all groups within a quota tree, use this command syntax:

```
$ nas_quotas -clear -group -fs <fs_name> -path <pathname>
```

#### where

<fs name> = name of the file system in which the quota tree exists

<pathname> = quota-tree name for which to clear group quotas

Both user and group quotas — To clear quotas for both users and groups at once, saving time because it clears
quotas for both users and groups in the same pass, use this command syntax:

```
$ nas_quotas -clear -both -fs <fs_name> -path <pathname>
```

#### where

<fs name> = name of the file system in which the quota tree exists

<pathname> = quota-tree name for which to clear user and group quotas

#### Action

 One file system — To clear user, group, or both user and group quotas at the file system level, instead of at the tree level, use this command syntax:

```
$ nas_quotas -clear [-user|-group|-both] -fs <fs_name>
where:
```

<fs name> = name of the file system in which the quota tree exists

The nas\_quotas man page and the VNX Command Line Interface Reference for File provide more command syntax information and options.



Clearing quotas permanently deletes the related quotas database files and the quota limits they contain. Do not clear quotas unless extreme conditions exist, such as corruption in the quota database files, and you need to start again.

#### Example:

To clear all user quotas on quota tree /mktg-a/dir1 in file system ufs1, type:

\$ nas\_quotas -clear -user -fs ufs1 -path /mktg-a/dir1

# Clear quota trees

Clearing the information in the quota-tree database files requires that you first disable quotas (turn off) for all quota trees in the file system. Disable quotas for a quota tree on page 73 describes the procedure to disable quota trees.

## Action

To clear the quota-tree database files related to all quota trees in a file system, use this command syntax:

```
$ nas quotas -clear -tree -fs <fs name>
```

#### where:

<fs name> = name of the file system in which the quota tree exists



Clearing quotas permanently deletes the related quotas database files and the quota limits they contain. Do not clear quotas unless extreme conditions exist (such as corruption in the quota database files) and you need to start again.

## Example:

To clear all quota-tree database file information related to quota trees that were in file system ufs1, type:

```
$ nas_quotas -clear -tree -fs ufs1
```

# Start a tree or file system quota check

This procedure is valid for systems that use version 6.0.41 and later.

#### Action

Tree quotas — To start a tree quota check, use this command syntax:

```
$ nas_quotas -check -start [-mode online|offline] -fs <fs_name> -tree
-path <pathname>
```

#### where:

<fs name> = name of the file system in which the quota tree exists

<pathname> = name of the quota tree on which you want start a quota check

File system — To start a file system quota check, use this command syntax:

```
$ nas_quotas -check -start [-mode online|offline] -fs <fs_name>
where:
```

<fs name> = name of the file system in which the quota tree exists

If you do not specify a mode, then online is assumed and the check is run with the file system remaining online.

## Example:

To start a tree quota check in quota tree /mktg-a/dir1 in file system ufs1 with the file system online, type:

```
$ nas_quotas -check -start -mode online -fs ufs1 -tree -path /mktg-a/dir1
```

## Output

Done

# Stop a quota check

This procedure is valid for systems that use version 6.0.41 and later.

#### Action

To stop a quota check, use this command syntax:

```
$ nas_quotas -check -stop -fs <fs_name> [-tree -path <pathname>]
```

#### where:

<fs name> = file system name where the quota check is running

<pathname> = name of the quota tree on which you want stop a quota check

# Example:

To stop a tree quota check on file system ufs1, type:

```
$ nas_quotas -check -stop -fs ufs1
```

Output	
Done	

# View the status of a quota check

This procedure is valid for systems that use version 6.0.41 and later.

```
Action

To view the status of a quota check, use this command syntax:

$ nas_quotas -check -status -fs <fs_name> -tree [-path <pathname>]

where:

<fs_name> = file system name where the quota check is running

<pathname> = name of the quota tree which is running a quota check

Example:

To view the status of a tree quota check in quota tree /mktg-a/dir1 in file system ufs1, type:

$ nas_quotas -check -status -fs ufs1 -tree -path /mktg-a/dir1

Output

Tree quota check on filesystem ufs1 and path /mktg-a/dir is running and is 60% complete.

Done
```

# Unmount a file system while a quota check is running

For systems that use version 6.0.41 and later, if you unmount a file system while a quota check is running, the database will contain usage statistics from before the quota check command was run. Once the file system is mounted again, you must restart the quota check to update the user, group, and tree usage statistics.

# Reboot a Data Mover while a quota check is running

For systems that use version 6.0.41 and later, if a Data Mover is rebooted while a quota check is running, the database will contain usage statistics from before the quota check command was run. Once the Data Mover is available again, you must restart the quota check to update the user, group, and tree usage statistics.

Managing

# **Troubleshooting**

As part of an effort to continuously improve and enhance the performance and capabilities of its product lines, EMC periodically releases new versions of its hardware and software. Therefore, some functions described in this document may not be supported by all versions of the software or hardware currently in use. For the most up-to-date information on product features, refer to your product release notes.

If a product does not function properly or does not function as described in this document, contact your EMC Customer Support Representative.

*Problem Resolution Roadmap for VNX* contains additional information about using the EMC Online Support website and resolving problems.

- EMC E-Lab Interoperability Navigator on page 80
- VNX user customized documentation on page 80
- Error messages on page 80
- EMC Training and Professional Services on page 81

# **EMC E-Lab Interoperability Navigator**

The EMC E-Lab™ Interoperability Navigator is a searchable, web-based application that provides access to EMC interoperability support matrices. It is available on the EMC Online Support website at <a href="http://Support.EMC.com">http://Support.EMC.com</a>. After logging in, locate the applicable Support by Product page, find **Tools**, and click **E-Lab Interoperability Navigator**.

# VNX user customized documentation

EMC provides the ability to create step-by-step planning, installation, and maintenance instructions tailored to your environment. To create VNX user customized documentation, go to: https://mydocs.emc.com/VNX.

# **Error messages**

All event, alert, and status messages provide detailed information and recommended actions to help you troubleshoot the situation.

To view message details, use any of these methods:

- Unisphere software:
  - Right-click an event, alert, or status message and select to view Event Details, Alert Details, or Status Details.
- CLI:
  - Type nas\_message -info <MessageID>, where <MessageID> is the message identification number.
- Celerra Error Messages Guide:
  - Use this guide to locate information about messages that are in the earlier-release message format.
- EMC Online Support website:
  - Use the text from the error message's brief description or the message's ID to search
    the Knowledgebase on the EMC Online Support website. After logging in to EMC
    Online Support, locate the applicable Support by Product page, and search for the
    error message.

# **EMC Training and Professional Services**

EMC Customer Education courses help you learn how EMC storage products work together within your environment to maximize your entire infrastructure investment. EMC Customer Education features online and hands-on training in state-of-the-art labs conveniently located throughout the world. EMC customer training courses are developed and delivered by EMC experts. Go to the EMC Online Support website at <a href="http://Support.EMC.com">http://Support.EMC.com</a> for course and registration information.

EMC Professional Services can help you implement your system efficiently. Consultants evaluate your business, IT processes, and technology, and recommend ways that you can leverage your information for the most benefit. From business plan to implementation, you get the experience and expertise that you need without straining your IT staff or hiring and training new personnel. Contact your EMC Customer Support Representative for more information.

Troubleshooting	

# Appendix A

# Managing Quotas on a Windows Client

- Overview on page 84
- Limitations on page 84
- Soft quota warnings on page 84
- Specify quota parameters on page 84
- View quotas on page 85
- Add new quota entries on page 85
- Modify user quotas on page 86
- Delete quota entries on page 86
- View the event log on page 87

# Overview

Windows environments provide some of the quota management capabilities that are available through the CLI. In the Windows environment, administrators can:

- View quotas
- Modify quotas
- Add new quota entries
- Delete quota entries

# Limitations

These limitations apply to the Windows platforms:

- Block policy is not recommended. Choose and set a quota policy on page 42 provides more details.
- You cannot set group quotas, quota trees, grace periods, and inode (file count) quotas from the Windows platform.
- Quota settings specified for users, or groups, or trees cannot exceed 4 TB for systems that
  use version 6.0.40 and earlier, or 256 TB for systems that use version 6.0.41 and later.
  Exceeding 4 TB or 256 TB may cause inconsistent usage to result. Apply quotas on page
  24 provides more details.

# Soft quota warnings

When a user violates a soft limit on the Windows platform, the system puts an entry in the:

- Server log
- Event log
- Quota Entries window

If the grace period is set to -1 (unlimited), the user can remain in a warning status indefinitely, as long as the hard quota is not reached.

# Specify quota parameters

- 1. On the Windows desktop, double-click My Computer.
- 2. Map the drive of interest by selecting **Tools** ➤ **Map Network Drive**.
- 3. Right-click the volume where you want to view quota information, and then select **Properties**.

 In the Disk Properties dialog box, modify the information in the Quota tab, and then click OK.

# View quotas

Usage is monitored by selecting the quota tab at the root of the file system only. Windows monitoring on a subdirectory in a file system is not supported.

To view a quota entry:

- 1. On the Windows desktop, double-click My Computer.
- 2. Map the drive of interest by selecting **Tools** ➤ **Map Network Drive**.
- 3. Right-click the volume where you want to view quota information, and then select **Properties**.
- 4. In the **Disk Properties** dialog box, click the **Quota** tab.
- 5. Click Quota Entries.

The Quota Entries window appears. Each row contains information for a volume user.

Note: If you specified values by using the blocks policy, instead of the filesize policy, the result displayed in the Windows Quota tab might be different from the settings that the administrator created.

# Add new quota entries

- 1. On the Windows desktop, double-click My Computer.
- 2. Map the drive of interest by selecting **Tools** ➤ **Map Network Drive**.
- 3. Right-click the volume where you want to add a quota entry, and then select **Properties**.
- 4. In the **Disk Properties** dialog box, click the **Quota** tab.
- 5. Click Quota Entries.
- 6. In the **Quota Entries** window, on the toolbar, select **Quota** ➤ **New Entry**.

The **Select Users** dialog box appears.

- 7. In the **Look in** list, select the name of the domain or workgroup from which you want to select users.
- 8. Click **Add**, and then click **OK**.

The **Add New Quota Entry** dialog box appears.

9. Select one of the following two options:

To allow unlimited disk space usage, select **Do not limit disk usage**.

To limit disk space usage, select **Limit disk space to**, and then specify the values for hard and soft limits.

10. To save your changes, click **OK**; to discard your changes, click **Cancel**.

# Modify user quotas

- 1. On the Windows desktop, double-click **My Computer**.
- 2. Map the drive of interest by selecting **Tools** ➤ **Map Network Drive**.
- 3. Right-click the volume where you want to view quota information, and then select **Properties**.
- 4. Click Quota.
- Click Quota Entries.
- 6. In the **Quota Entries** window, right-click the quota entry you want to modify, and then click **Properties**.

The **Quota Settings for** the selected user's dialog box appears.

7. Modify the information in the **General** tab.

Note: Do not specify a user quota value that exceeds 4 TB for systems that use version 6.0.40 and earlier, or 256 TB for systems that use version 6.0.41 and later. Doing so can cause inconsistent usage between what is shown in quota reports and what actually exists on disk. Apply quotas on page 24 provides more details.

8. To save your changes, click **OK**; to discard your changes, click **Cancel**.

# Delete quota entries

- 1. On the Windows desktop, double-click **My Computer**.
- 2. Map the drive of interest by selecting **Tools** ➤ **Map Network Drive**.
- 3. Right-click the volume where you want to delete a quota entry, and then select **Properties**.
- 4. In the Disk Properties dialog box, click Quota Entries.

- 5. In the **Quota Entries** window, select the entry you want to delete.
- 6. On the toolbar, select **Quota** ➤ **Delete Quota Entry**. A confirmation box appears.
- 7. Click **Yes**. If the user has any file on the system, the **Disk Quota** dialog box appears.
- 8. To complete the user deletion, click **Close**.

# View the event log

- From the taskbar, select Start ➤ Program ➤ Administrative Tools ➤ Event Viewer.
   The Event Viewer window opens with a list of events in the right pane.
- 2. Use the up or down arrows to scroll through the list of events.
- 3. To view an event's details, double-click a specific event in the right pane to open the **Event Properties** window.

Managing Quotas on a Windows Client	

# Appendix B

# Viewing Quotas from a UNIX Client

UNIX clients can view quota reports by using command line commands. They do not have the means to manage quotas on the VNX system.

- Identify users or groups on page 90
- rquotad support on page 90

# Identify users or groups

If NIS is enabled for the Data Mover, you can use UIDs or usernames to identify a user, or GIDs or group names to identify a group. If NIS is not enabled, use UIDs and GIDs only.

# rquotad support

The rquota daemon (rquotad) used by UNIX or NFS clients runs on the Data Mover and provides NFS clients with quota information about remotely mounted file systems. An NFS user with a VNX-resident file system mounted can access quota information for the file system by using the quota command.

Note: You cannot run rquotad queries against Virtual Data Movers (VDMs).

The quota command executes on the client and interrogates the system by using rquotad. Table 9 on page 90 describes variations of the quota command. To use the command, log in to the client system and type the indicated command at the prompt.

Table 9. Command syntax summary: Quota

Command	Function
quota	Displays file systems on which quotas have been exceeded.
quota -v	Displays verbose quota status for user or group quotas for all of the mounted file systems on which quotas are set. It will not support tree quotas.
	Note: No results are returned for file systems on which quotas are not set.
quota <username></username>	Displays quotas on mounted file systems for other users. This lists file systems on which the user exceeds the quota.
	Note: You must be logged in as superuser to use this command.
quota -v <username></username>	Displays verbose quota status for all file systems mounted by this user, where <username> can be either the UNIX username or the user's UID. You must be logged in as root to use this command.</username>
	Note: No results are returned for file systems on which quotas are not set.

The quota man page of the client UNIX operating system details more information about the quota command.

# Appendix C

Changing the NFS Client's View of Disk Space Usage

- Overview on page 92
- Change output view for non-root NFS clients on page 92

## Overview

When NFS clients use the UNIX system's df-k command to view the disk space usage of file systems shared from the VNX system, by default the output shows the free space available on the whole file system rather than just the free space available when user, group, or tree quotas are applied. This output can be misleading to the user, who may believe more space is available than is actually the case.

This section shows how to change the useQuotasInFsStat parameter to enable the df command to reflect quotas in the disk-space-usage statistics for file systems. When user or group quotas are in effect, the UID or GID of the client running the df command is used to fetch the quota limits for that user or group.

To view the current parameter setting, use this command syntax:

```
server param <servername> -f quota -i useQuotaInFsStat
```

Change output view for non-root NFS clients on page 92 explains how to change the current parameter setting.

Parameters Guide for VNX for File provides additional information about the parameter used to affect the statistics.

# Change output view for non-root NFS clients

To exclude or include quotas in the output of the UNIX system's df command statistics shown to non-root NFS clients, use the following procedure. *Parameters Guide for VNX for File* contains more information about system parameters.

- 1. Log in to the Control Station.
- 2. To include or exclude quotas in the disk-usage checks done by non-root users with the df -k command, use this command syntax:

```
$ server_param <movername> -facility <facility_name> -modify
useQuotasInFsStat -value <new_value>
```

<movername> = name of the Data Mover

<facility name> = name of the facility to which the parameter belongs

<new\_value> = value you want to set for the specified parameter. 0=exclude. 1=include

#### Examples:

To exclude quotas from being factored into disk-usage check reports run on Data Mover 2, type:

```
$ server_param server_2 -facility quota -modify useQuotasInFsStat -value 0
```

To include quotas in disk-usage check reports run on Data Mover 2, type:

\$ server\_param server\_2 -facility quota -modify useQuotasInFsStat -value 1

Note: Parameter and facility names are case-sensitive.

# Output:

server\_2 : done

Changing the NFS Client's View of Disk Space Usage	

# Appendix D

# Changing Quotas without Opening an Edit Session

- Overview on page 96
- Edit user quotas using command extensions on page 96
- Edit group quotas using command extensions on page 96
- Edit tree quotas using command extensions on page 97
- Edit file system quotas using command extensions on page 97

# Overview

This section shows how to use the CLI to manage quotas without opening an editor session by using extensions of the nas\_quotas command. This method is useful when creating scripts. The nas\_quotas man page and *VNX Command Line Interface Reference for File* provide more details.

Note: When using command extensions, you must specify the limits in kilobytes.

# Edit user quotas using command extensions

#### Action

To edit user quota limits without invoking an editor, use this command syntax:

```
$ nas_quotas -edit -user -fs <fs_name> -block <block_hard_limit>:
<block soft limit> -inode <inode hard limit>:<inode soft limit> <id>
```

#### Example:

To set quota limits on file system ufs1 for the user with ID 32780; set the block hard limit to 102400 KB; set the block soft limit to 51200 KB; set the inode or file count hard limit to 10000; and set the inode soft limit to 7500, type:

```
$ nas_quotas -edit -user -fs ufs1 -block 102400:51200 -inode 10000:7500 32780
```

# Edit group quotas using command extensions

#### Action

To edit group quota limits without invoking an editor, use this command syntax:

```
$ nas_quotas -edit -group -fs <fs_name> -block <block_hard_limit>:
<block_soft_limit> -inode <inode_hard_limit>:<inode_soft_limit> <id>
```

#### Example:

To set quota limits on file system ufs1 for group ID 32000 to a block hard limit of 1048576 KB (=1024 MB) and to a block soft limit of 524288 KB (=512 MB); set the inode or file count hard limit to 10000; and not change the inode soft limit, type:

```
$ nas_quotas -edit -group -fs ufs1 -block 1048576:524288 -inode 10000 32000
```

# Edit tree quotas using command extensions

#### Action

To edit tree quotas without invoking an editor, use this command syntax:

```
$ nas_quotas -edit -tree -fs <fs_name> -block <block_hard_limit>:
<block_soft_limit> -inode <inode_hard_limit>:<inode_soft_limit> <id>
```

#### Example:

To set a block hard limit for tree (ID=1) in file system ufs1 to 1048576 KB, and change no other limits, type:

\$ nas\_quotas -edit -tree -fs ufs1 -block 1048576 1

# Edit file system quotas using command extensions

#### Action

To edit file system quotas without invoking an editor, use this command syntax:

```
$ nas_quotas -edit -config -fs <fs_name> -option <options>
```

Example:

To set the default user block hard limit (DUBHL) for file system ufs1 to 100 MB, and set the Hard Limits Enforced (HLE) flag to True, type:

\$ nas\_quotas -edit -config -fs ufs1 -option DUBHL=102400,HLE=True

Note: You must separate multiple options by using commas (,).

# Appendix E

# Changing the Quota-Tree File Count for Root Users

- Overview on page 100
- Change the quota-tree file count on page 100

# Overview

For file systems with directory format MPD, use the countRootUsageInQuotaTree parameter in the slot\_param file to specify whether to include the files and directories of root users in the quota-tree file count, or to include just those of non-root users.

Note: Include or exclude root users when tracking quota-tree disk usage on page 28 details quota-tree file count behavior.

To view the current parameter setting, use this command syntax:

```
server_param <servername> -f quota -i countRootUsageInQuotaTree
```

Change the quota-tree file count on page 100 explains how to change the current parameter setting.

Parameters Guide for VNX for File provides additional information about the countRootUsageInQuotaTree parameter.

# Change the quota-tree file count

To change the parameter to exclude or include root users in the quota-tree file count:

- 1. Log in to the Control Station.
- 2. To exclude or include root users in the quota-tree file count, use this command syntax:

```
$ server_param <movername> -facility <facility_name> -modify
countRootUsageInQuotaTree -value <new_value>
where:
```

wriere.

<movername> = name of the Data Mover

<facility name> = name of the facility to which the parameter belongs

<new\_value> = value you want to set for the specified parameter. 0=exclude. 1=include

Note: Parameter and facility names are case-sensitive.

### Example:

To exclude root users from the quota-tree file count, type:

```
$ server_param server_2 -facility quota -modify countRootUsageInQuotaTree -value
0
```

To include root users in the quota-tree file count, type:

```
$ server_param server_2 -facility quota -modify countRootUsageInQuotaTree -value
1
```

# Output:

server\_2 : done

Changing the Quota-Tree File Count for Root Users	

#### В

#### blocks

Units of storage (8 KB each) that comprise a file system.

#### D

#### daemon

UNIX process that runs continuously in the background, but does nothing until it is activated by another process or triggered by a particular event.

## Н

#### hard quota

Configurable file system usage limit that, when reached, can cause the system to generate an event or message and immediately deny user requests that would require more disk space, such as creating or saving of files.

See also quota and soft quota.

ı

## inode

"On-disk" data structure that holds information about files in a file system. This information identifies the file type as being a file that includes VNX FileMover stub files, a directory, or a symbolic link.

#### Ν

#### notifications

Actions the Control Station takes in response to particular events. Some possible actions include sending an email message or an SNMP trap. There are two types of notifications: event notifications, which are notifications based on predefined system events such as a temperature being too high, and resource notifications, which are notifications based on user-specified resource usage limits or thresholds.

#### Р

## pop-up messages

Feature that warns or informs Microsoft Windows clients (connected to a specific machine name) when certain system events occur. Pop-up messages can be customized to provide specific instructions or contact information.

## Q

#### quota

Limit on the amount of allocated disk space and the number of files (inodes) that a user or group of users can create in a Production File System. Quotas control the amount of disk space or the number of files that a user or group of users can consume or both.

## quota policy

Parameter you set to tell the system to calculate disk usage either by blocks or by file size. (Default is by blocks.)

#### quota tree

Directory or subdirectory to which tree quotas are applied.

#### S

#### soft quota

Configurable file system usage limit that, when reached, can cause the system to generate an event, and send a warning message to Windows clients. The soft quota limit serves as a grace period providing reaction time so that reaching the hard quota can be avoided.

See also *quota* and *hard quota*.

## T

#### tree quota

Feature that lets you specify soft and hard quota limits on a directory tree. The usage is computed for all files created in the tree hierarchy.

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