



Technical Report

# Quota Use Guide for NetApp Storage Systems

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## Abstract

This guide provides practical guidelines for implementing quotas on NetApp® storage. Two methods are described for quota implementation. The first method employs native Data ONTAP® quotas. The advantage of native quota management is the ability to manage quotas across a multiprotocol environment. Usage can be tracked irrespective of whether a UNIX® user or a Windows® user manipulates data.

Quota management utilizing NTP Software Quota and File Sentinel (QFS) for NAS, NetApp Edition and Northern Storage Suite will also be presented. NTP Software QFS for NAS and Northern Storage Suite partner applications have several distinct advantages for quota management. These applications can track and enforce quota usage on any folder; the folder does not need to be a qtree or the root of a volume. Additionally, these applications can place and enforce quotas on Windows groups and individual files.

The goal of this guide is to provide adequate underlying information on how quotas work in a typical environment to enable storage administrators to confidently set up quotas in their own environment.

## TABLE OF CONTENTS

<b>1</b>	<b>Introduction</b>	<b>4</b>
<b>2</b>	<b>Environment</b>	<b>4</b>
2.1	Windows Active Directory Environment	5
2.2	NIS Environment	5
2.3	Usermap.cfg	6
2.4	Multiprotocol Considerations	6
<b>3</b>	<b>Quota File</b>	<b>8</b>
3.1	Quota File Description	8
3.2	Quota File Special Directives	9
3.3	Valid Entries for Quota File Fields	9
<b>4</b>	<b>Quota Use Cases</b>	<b>12</b>
4.1	Quota Use Case: Quota Management with User and Qtree Quotas	12
4.2	Quota Use Case: Quota Management with Mixed Qtrees	16
4.3	Quota Use Case: Quota Management in Multiprotocol Environments	18
<b>5</b>	<b>Quota Management in a Windows Environment Using NTP Software QFS for NAS, NetApp Edition</b>	<b>21</b>
<b>6</b>	<b>Quota Management in a Windows Environment Using Northern Parklife NSS</b>	<b>22</b>
<b>7</b>	<b>Quota Management Tools</b>	<b>22</b>
7.1	System Manager	22
7.2	OnCommand Unified Manager	26
<b>8</b>	<b>Comparison of Native and Partner Quota Solution</b>	<b>27</b>
<b>9</b>	<b>Summary and Conclusion</b>	<b>27</b>
	<b>References</b>	<b>28</b>
	<b>Appendix</b>	<b>28</b>
	Quota File Allowable Suffixes	28
	<b>Version History</b>	<b>28</b>

## LIST OF TABLES

Table 1)	User quota type	10
Table 2)	Group quota type	10
Table 3)	Qtree quota type	11

Table 4) Quota file with user and qtree quotas.....	13
Table 5) User quota is exceeded on qtree_ntfs.....	14
Table 6) Qtree quota is exceeded on qtree_ntfs. ....	14
Table 7) Quota file with quota mapping.....	17
Table 8) Quota file without quota mapping.....	17
Table 9) Quota file with quota mapping and UNIX groups. ....	19
Table 10) Native and partner quota solutions.....	27

## LIST OF FIGURES

Figure 1) Windows Active Directory environment.....	5
Figure 2) NIS environment. ....	5
Figure 3) Usermap.cfg.....	6
Figure 4) Enable or disable quota. ....	23
Figure 5) Quota usage report. ....	26

## 1 Introduction

Storage administrators need a method to define and limit the amount of storage that is used by individuals. This is needed because storage administrators have found that if storage is available, it will be used. Financial prudence directs the company's need to control the use of storage and its rate of growth.

Additionally, with virtualized network-attached storage, it is possible that a volume can be subdivided into qtrees for departmental or organizational usage. Each qtree is used by a different group, each with its own storage requirements. We need a methodology for limiting the amount of space within the volume that this subdivided area can use.

Native Data ONTAP quota management allows us to apply quotas to users in a multiprotocol environment. Quotas can be applied to individual users, or a default user quota can be established that applies to all users utilizing space within the volume or qtree. Quotas can also be applied to UNIX groups in the same manner as it is with users.

Native Data ONTAP quota management allows storage administrators to place quotas on the qtree itself. This limits the amount of space within a volume that can be utilized by a qtree. Quotas can also be placed on the number of files within a qtree.

To provide additional quota management flexibility, NetApp has partnered with NTP Software and Northern Parklife, leading providers of quota and file management software. NTP Software QFS for NAS and Northern NSS, NetApp Edition bring additional quota management features to NetApp quota management.

NTP Software QFS and Northern NSS are policy-based quota and file management systems that give administrators the ability to place default space limits, analogous to Data ONTAP qtree quotas, on a share, folder, or file. The quota can be placed on a share or on the absolute path of the volume root, the qtree, or any subdirectory within the volume root or qtree. The quota is not limited to the volume or qtree level. In addition, quotas allow the storage administrator to create policies that apply across multiple storage systems or even to storage systems and Windows Server<sup>®</sup> instances alike.

Similarly, to default space limits, NTP Software QFS provides the ability to place user quotas at any level within the volume using either the share or the absolute path. When applying quotas with NTP Software QFS, Windows groups may be used in the quota policies.

This guide takes you through the quota setup from native Data ONTAP and provides an overview of NTP Software QFS for NAS and Northern NSS, NetApp Edition. In addition, various scenarios are presented followed by the configuration that accomplishes the goals of each scenario.

## 2 Environment

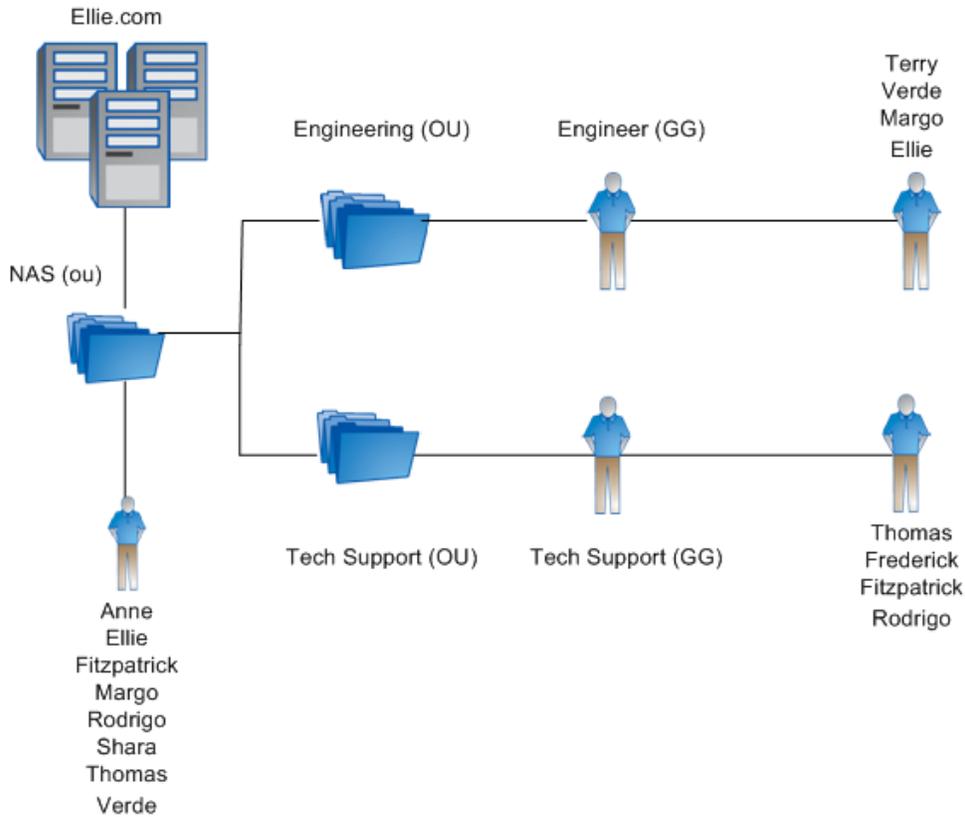
Native Data ONTAP quota management functions in a multiprotocol environment. With Data ONTAP multiprotocol features, a single set of data can be accessed through both NFS and CIFS. Therefore, native Data ONTAP quotas must be able to track disk and file usage when accessed either by CIFS or by NFS and when the data is protected by Windows file security or UNIX file security.

For details on multiprotocol access and different security styles, refer to [TR-3490: NetApp Storage System Multiprotocol Use Guide](#).

This paper demonstrates quota management when data is accessed both as a user's Windows identity and as a user's UNIX identity. A mixed UNIX and Windows test environment is set up as follows.

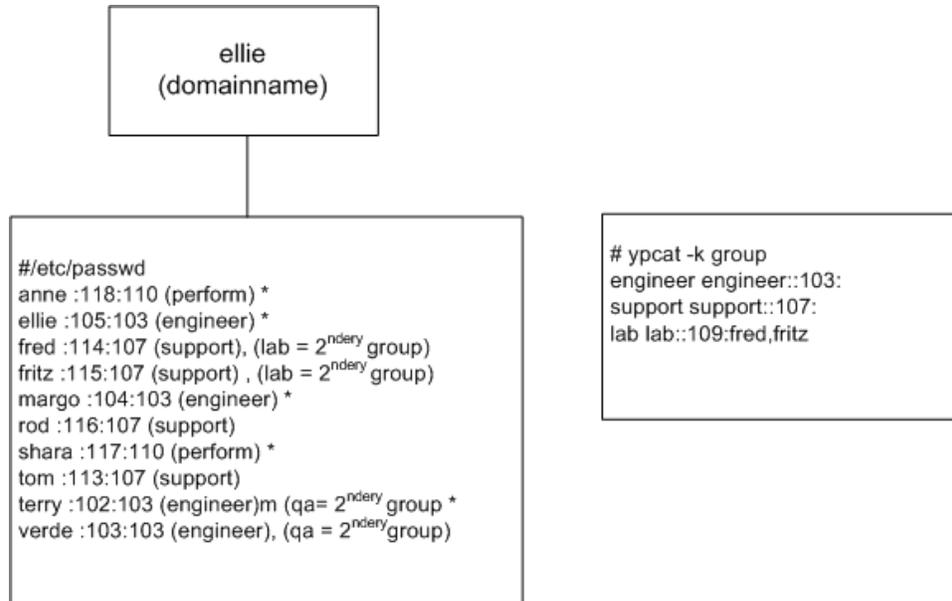
## 2.1 Windows Active Directory Environment

Figure 1) Windows Active Directory environment.



## 2.2 NIS Environment

Figure 2) NIS environment.



## 2.3 Usermap.cfg

Figure 3) Usermap.cfg.

```
# Eddie
ellie\fitzpatrick == fritz
ellie\frederick == fred
ellie\thomas == tom
ellie\rodrigo => root
```

**Note:** User names not listed in usermap.cfg have direct mappings and do not need to have entries in the mapping file. For example, Windows user Anne corresponds to UNIX user anne.

## 2.4 Multiprotocol Considerations

Data ONTAP has native multiprotocol support. With the appropriate permissions, data can be accessed by users from UNIX hosts using NFS or from Windows hosts using CIFS. NetApp quota management must consider multiprotocol access when calculating user space and file usage.

Following is a brief overview of multiprotocol access on NetApp storage systems and how it relates to quota management.

UNIX, NTFS, and mixed qtree styles are supported on NetApp storage systems.

- UNIX qtree style indicates that the file security style of the qtree is UNIX based.
- NTFS qtree style indicates that the file security style of the qtree is Windows based.
- Mixed qtree style indicates that either UNIX or NTFS file security style could be the effective security style within the qtree.

When we refer to security style, we do not refer to the type of client used to access the data. Data in all three qtree styles can be accessed from both Windows and UNIX hosts, provided the appropriate user mapping is in place and provided the file access permissions allow it.

Security style refers to the style of file permissions and the type of authorization needed to access the directories and files within a qtree/volume.

For the UNIX security style, authorization to access directories and files is based on access allowed to the user's UNIX UID and GID, with access rules following the UNIX style of file permissions (rwxrwxrwx).

For the Windows security style, authorization to access folders and files is based on access allowed to the user's Windows user name and Windows group memberships, with access rules based on NTFS permissions.

Multiprotocol access depends on user mapping between a user's UNIX identity and Windows identity to properly evaluate the user's rights to perform file and folder operations within volumes and qtrees.

The following access logic is followed:

UNIX qtrees:

- A UNIX style qtree is can only be accessed with a user's UNIX identity.
- If a user is accessing data from a UNIX or Linux<sup>®</sup> host, the user's UID and GID are used to determine access rights.
- If a user is accessing data in a UNIX qtree from a Windows machine, Data ONTAP first maps the Windows user name to its corresponding UNIX UID. If there is no corresponding UNIX user, the

Windows user is mapped to the default UNIX user. The default user is designated with the following storage system option:

```
options wafl.default_unix_user pcuser
```

The designated default user can be any valid UNIX user designated by the storage administrator, but the default user must exist in the storage system's /etc/passwd file, the NIS database, or the LDAP database.

If the default user is set to null, a Windows user that does not map to a UNIX user is not allowed access to qtrees or volumes with UNIX style security.

NTFS qtrees:

- An NTFS style qtree must be accessed as a user's Windows identity.
- Data ONTAP maps the user's Windows identity to the user's UNIX identity when access is requested to data with NTFS style security.
- If a user is accessing data from a Windows host, the user's Windows user name and Windows groups are used to determine NTFS access rights.
- If a user is accessing data in an NTFS qtree from a UNIX host, Data ONTAP grants access based on the user's mapped Windows user. By default, if there is no corresponding Windows user, access is denied to the NTFS qtree from a UNIX host.

`wafl.default_nt_user` is a storage system option that can be used that allows mapping of Windows users with no corresponding UNIX account to a generic Windows account. The default for this option is null.

To enable access from a default user, add a valid Windows account to this option:

```
wafl.default_nt_user corp\ntuser
```

Mixed qtrees:

- For mixed-style qtrees, access is based on the effective security style on the qtree, folders, and files within the qtree.
- A mixed qtree can either have UNIX or NTFS style security in place.
- Particular folders or files within a mixed volume or qtree can have a security style that differs from that of the root of the volume or qtree (but both security styles do not apply at the same time to any particular folder or file).

Consider the following qtree and a folder that was created within the qtree:

- `eddie:/vol/vol1/qtree_mixed`
- `eddie:/vol/vol1/qtree_mixed/ntfs_folder`

The root of `qtree_mixed` has UNIX style security (uses UID and GID to determine access rights).

However, a Windows administrator created the folder `ntfs_folder` by mapping a Windows machine. The Windows administrator specified that this folder should not inherit parent permissions. Instead, the administrator gave the folder its own specific NTFS permissions.

The addition of specific NTFS permissions changed the security style of this folder and all data subsequently placed within this folder to NTFS security style.

When considering which identity (UNIX or Windows) should be used for quota management, the type of host used to access data in the volumes is *not* what decides which identity is used. Instead, quotas are calculated based on the security style of the volume, qtree, and folder and/or file being accessed.

- Quota calculation of UNIX qtrees is always allocated to the user's UID or GID.
- Quota calculation of NTFS qtrees is always allocated to the user's Windows SID.
- Quota calculation of mixed qtrees is dependent on which security style is in effect within the area of the qtree where data is being modified or added.

From the preceding section, we see that quota management for mixed qtrees can be problematic where quota mapping is not enabled, because some areas within the volume or qtree can have NTFS style security, while other areas can have UNIX style security. For appropriate quota management, quotas applied to mixed qtrees should be within a quota mapping directive. The quota mapping directive is discussed in section, 3.2, “Quota File Special Directives.”

For more information on multiprotocol considerations, refer to [TR-3014: Multiprotocol Data Access: NFS, CIFS, and HTTP](#).

### 3 Quota File

The heart of native Data ONTAP quota management is the quota configuration file, `/etc/quotas`. The quota file describes disk quotas that go into effect when quotas are enabled.

All quotas are established on a per-volume basis. That is, a quota rule is not enforced across volumes or across storage systems. Each volume must have its own set of quota entries in the quota file.

A quota limits:

- The amount of disk space and/or the number of files that a particular user or group can consume at a volume or qtree level. A user can be a Windows user or a UNIX or Linux user. A group can be a UNIX or Linux group. NetApp quotas do not support the use of Windows groups.
- The total space and/or files used within a qtree.

User and group quotas do not apply to root or to the Windows administrator account. If the storage system option that tells the storage system to map Windows administrators to root is enabled, all Windows administrators are exempt from user and group quotas.

Qtree quotas apply even to root and the Windows administrator accounts. If a qtree quota is exceeded, even root and Windows administrators cannot add space or files to that qtree until data is deleted (or the quota is changed and the `quota resize volume_name` command is issued).

#### 3.1 Quota File Description

The `/etc/quotas` file has the basic composition as follows:

# Quota Target	type	disk	files	thold	sdisk	sfile
# -----		-----	-----	-----	-----	-----

- **Quota target.** The specific entity within the quota type to be acted on. For example, if the type is user, the quota target is a specific user.
- **Type.** Type of entity to which the quota rule applies. Supported types are Windows or UNIX users, UNIX group, or qtree.
- **Disk.** The hard space limit that applies to the quota target.
- **Files.** The hard limit on the number of files that are allowed for this quota target.
- **Thold.** The space warning threshold. If an attempt to allocate space for the quota target would exceed the threshold, a warning message is logged on the storage system console, and an SNMP trap is generated.
- **Sdisk.** The soft disk limit, which is analogous to the disk limit except that the limit is not enforced. Instead, a warning message is logged on the storage system, and an SNMP trap is generated. When the quota target’s usage falls below the `sdisk` limit, another message is logged, and an SNMP trap is generated.
- **Sfile.** Analogous to `sdisk`, except it acts on the number of files generated rather than on space usage.

For a list of suffixes that can be used in the `disk`, `files`, `thold`, `sdisk`, and `sfile` fields, see “Quota File Allowable Suffixes.”

## 3.2 Quota File Special Directives

Two special modifiers, which can be used in the quota file, provide additional quota management functionality.

- **QUOTA\_TARGET\_DOMAIN**

The domain directive can be used to change a UNIX style user name in the quota target field to a Windows style user quota target. It will prefix the domain and a backslash (\) to subsequent UNIX style user names. It will continue to do this until another domain directive is encountered or the end of the quota file is reached.

For example, the following quota entry:

```
QUOTA_TARGET_DOMAIN corp
jim user 200M
QUOTA_TARGET_DOMAIN
```

Translates to:

```
corp\jim user 200M
```

- **QUOTA\_PERFORM\_USER\_MAPPING [ ON | OFF ]**

This directive, when **ON**, will use the storage system's user name mapping support to map a UNIX user quota target to the corresponding Windows account name. It will consider them together when calculating user quotas. The reverse is also true. A Windows user name will be mapped to its corresponding UNIX identity, and both will be used when calculating user quotas. The setting, once turned on, remains in effect until the **OFF** directive is used.

For example, the following quota entry:

```
QUOTA_PERFORM_USER_MAPPING ON
corp\sam user 50M
jim user 200M
QUOTA_PERFORM_USER_MAPPING OFF
```

Translates to:

```
corp\sam, sam user 50M
corp\jim, jim user 200M
```

## 3.3 Valid Entries for Quota File Fields

Let us consider valid quota file entries for the three quota types supported by Data ONTAP. The three supported quota types are user, UNIX group, and qtree.

It is possible and, in fact, quite likely that a quota file contains multiple quota rules that can affect a user's ability to use space or add files within a volume or qtree. For instance, a user could have a specific user quota and could also be bound by a qtree quota placed on the qtree to which the user is copying or modifying data.

With Data ONTAP quota management, all quota policies must be met. All applicable entries within the quota file are considered when a decision is made whether to allow a user to add data or files to a volume or qtree.

### User Quota Type

The sample `/etc/quotas` file in Table 1 contains exemplar entries for the user quota type. Use default user entries to optimize quota management and to simplify `/etc/quotas` file configuration. Use specific user quotas for the small subset of people who have space needs that differ from the default user quotas.

Table 1) User quota type.

Quota Target	Type	Disk	Files	Threshold	Sdisk	Sfile
Specific user quotas on a volume						
anne	user@/vol/vol1	800M	50K	700M	-	-
UNIX user anne is hard limited on /vol/vol1 to 800MB of space usage and 50,000 files within the volume. A threshold warning will be sent when anne's space usage reaches 700MB.						
Specific user quotas on a qtree						
ellie\frederick , 105	user@/vol/vol1/export	600M	500M	-	-	-
Windows user frederick from the ellie domain and UNIX user UID 105 are cumulatively limited to 600MB of space on the export qtree. If either of them uses space that causes their combined usage to exceed 500MB, they will receive a threshold warning at 500MB. They have no file limit. The user type allows comma-delimited lists, which denotes that the quota is applied cumulatively to listed users.						
Default user quotas on the volume and on a qtree						
*	user@/vol/vol1	500M	30k	400M	-	-
*	user@/vol/vol1/export	300M	10k	200M	-	-
The default quota on vol1 for all users not specifically listed in this file is 500MB for space and 30,000 files. They receive a threshold warning at 400MB. The default quota for the export qtree is set similarly. When rules are applied at the volume level and at the qtree level, both sets of rules must be met. If a user writes 500MB of data at the root of vol1, that user will not be able to write any data to the export qtree, which is contained within vol1 and is considered in vol1's quota calculations.						

## Group Quota Type

The sample /etc/quotas file in Table 2 contains exemplar entries for the group quota type. The group type is used for UNIX groups only. Windows groups are not supported. Quotas are calculated for a UNIX user's primary group only.

Table 2) Group quota type.

Quota Target	Type	Disk	Files	Threshold	Sdisk	Sfile
Specific group quotas on a volume						
engineer	group@/vol/engr	1g	-	-	-	75k
The UNIX engineering group has a hard space limit of 1GB in the engr volume. There is no warning threshold. There is no hard limit on the number of files; however, there is a soft file limit of 75k. A warning will be issued after this file number is exceeded.						
Specific group quotas on a qtree						
105	group@/vol/engr/test	-	-	-	1g	75k
UNIX GID of 105 has soft limits of 1GB and 75,000 files on the test qtree. The limits indicate that warnings will be issued, but members of the group will be able to surpass the limits. Unlike user type, group type does not allow a comma-delimited list of groups in order to set cumulative usage of space by more than one group.						
Default group quotas on the volume and on a qtree						
*	group@/vol/engr	800M	-	-	-	-
*	group@/vol/engr/lab	600M	-	-	-	-
Every other UNIX group that is not specifically listed earlier is limited to 800M on volume engr. Similar default limits apply to groups at the lab qtree level.						

## Qtree Quota Type

The following sample `/etc/quotas` file in Table 3 contains exemplar entries for the qtree quota type. For optimal quota management, use default qtree quotas. If specific qtree space requirements differ from the default qtree quota, a specific qtree quota may be set.

Table 3) Qtree quota type.

Quota Target	Type	Disk	Files	Threshold	Sdisk	Sfile
Specific qtree quotas on a volume						
<code>/vol/vol1/export</code>	<code>tree@/vol/vol1</code>	20G	2m	15G	-	1500k
The qtree export can use a total of 20GB data and/or 2 million files, whichever comes first, with a space warning at 15g and a file warning issued when the files reach 1.5 million.						
Default qtree quotas						
*	<code>tree@/vol/vol1</code>	10G	1m	7G	-	500k
All other qtrees inside vol1 are subject to the default limit of 10GB and 1 million files. Warnings are issued at 7G space usage and when 500,000 files are written.						
Qtree quotas are a useful way to make sure that users (or applications that use qtrees for storage) do not take up an undue amount of a volume's space.						

## Summary of Effective Quota Limits When More than One Limit Affects Data Modification Within a Managed Qtree or Volume

Often quotas can be configured such that more than one rule applies to space and file usage within a qtree or volume. How does Data ONTAP apply quota rules when this is the case?

Data ONTAP applies all applicable quota rules before data modification or file addition is allowed within the qtree or volume. All rules must allow the space usage or file addition before it is permitted. When applying the rules, the most restrictive rule applies, or, put another way, the limit that is reached first is the one that is applied to restrict space and file usage.

Following are the general rules for application of quota policy when multiple limits apply to the data modification or file addition operation:

- With a user quota and a group quota that apply to the user at the qtree level, the limit reached first is the effective limit. For instance, if user1 belongs to groupA, and the quota limit for groupA is reached, user1 will not be able to write to this qtree even if user1 has not exceeded the limit.
- For a user quota and a group quota that apply to the user at the volume level, the limit reached first is the effective limit.
- With a user quota and a qtree quota on a qtree, the limit reached first is the effective limit. For instance, if user1 attempts to copy data to a qtree where the qtree limit has not been reached but user1's user limit is reached, the copy will fail.
- For a volume-level user or group quota and a qtree-level user or group quota, the limit reached first is the effective limit. For instance, if user1 has used space in `/vol/vol1/qtree` but has not exceeded user1's limit at this qtree level, user1 will be able to copy more data into `/vol/vol1/qtree` unless the total space consumed in vol1 exceeds the user's volume limits. Volume limits apply to the qtrees as well as to the root of the volume. Even if the qtrees have individual users and group quotas applied at the qtree level, usage within the qtrees counts as volume usage. Therefore, setting user and group quotas at the volume level should be done carefully.
- For a volume-level user or group quota and a qtree quota, the limit reached first is the effective limit. For instance, if a user or group has not fully utilized the user or group quota but the qtree quota for a particular qtree has been reached, the users and group members will be able to write to other qtrees

and to the root of the volume, but they will not be able to write to the qtree whose quota has been exceeded.

- For a user, group, or qtree quota where there are file and space limits, the limit reached first is the effective limit. For instance, if a quota has a limit of 100 files and 20GB of space and a user wants to copy into this space a million files that are each 4 bytes in size, the copy would fail. The user can copy 100 files and no more, regardless of how little of the 20GB space quota was used.

## 4 Quota Use Cases

This section discusses three use cases. The mixed Windows and UNIX environment is described in section 2. For each case, a scenario is first presented. This is followed by the quota file used in that use case. After the quota file, the effects of the application of quota rules are demonstrated by a series of tests. We see how the rules are applied as data and how files are added to the managed qtrees.

### 4.1 Quota Use Case: Quota Management with User and Qtree Quotas

The following holds true in quota management with user and qtree quotas:

- Some users access data from both a Windows host and a UNIX host.
- One qtree is UNIX security style, with data being accessed as a user's UNIX identity.
- One qtree is NTFS security style; therefore, data is accessed as a user's Windows identity.
- Default user quotas are utilized at the individual qtree level.
- Specific user quotas are required for some users.
- Qtrees quotas are employed as a means of limiting the amount of total space within a volume that any one qtree can utilize.

#### User Access and Quota Management in This Scenario

With this scenario, we demonstrate quota management in a typical environment. We have a multipurpose storage system. Some data is primarily accessed from UNIX hosts and is administered by UNIX administrators. Some data is primarily accessed from Windows hosts and is administered by Windows administrators.

To conveniently create separate zones of security, the volume is divided into qtrees. We discuss two of the qtrees: a UNIX qtree and an NTFS qtree. Regardless of the user's host operating system, any data access of the UNIX qtree is only done through a user's UNIX identity. Similarly, any data access of the NTFS qtree is only done through a user's Windows identity.

We set up a quota configuration in which quotas are applied at the qtree level. Each qtree has its own separate default user quota. Additionally, for each qtree, there are specific users who need more space than is given to the default user. Those users have specific quotas set up at the qtree level.

Finally, without a qtree quota, a single qtree can take up additional total volume space than what is desired. To limit each qtree to a specific amount of the volume space, we configure qtree quotas.

All applicable quota rules are examined before a user is allowed to use space or files within a volume. All rules must be met before the operation is allowed.

After our quotas are initialized, we demonstrate:

- The effect of exceeding a default user quota
- The effect of exceeding a specific user quota
- The effect of a user exceeding a qtree quota, even if the user has not exceeded that user's individual quota
- The effect of exceeding a cumulative specific user quota (a quota target with multiple comma-delimited users)

## Quota File with User and Qtree Quotas

Following is the quota file used in this study, along with additional notes regarding some of the configuration parameters in the quota file as seen in Table 4.

- Users listed on the same line with a comma separator are all considered to be the same target. Their cumulative usage is considered when calculating quotas.
- All the three users listed within the domain directive have the specified domain name prepended to their user names. This directive is a convenient way to list users who belong to a domain that differs from the storage system's domain.
- When using the domain directive, users must be listed one per line. Multiple comma-delimited user quota targets cannot be used in the domain directive.
- When using the domain directive, the Windows form of a user name must be used (if it differs from the UNIX name).

Table 4) Quota file with user and qtree quotas.

Quota Target		Disk	Files	Threshold	Sdisk	Sfile
Default qtree quotas						
*	tree@/vol/vol3	1000M	30k	800m	-	25k
Specific qtree quotas						
/vol/vol3/qtree_unix	tree@/vol/vol3	2g	50k	1500m	-	40k
/vol/vol3/qtree_ntfs	tree@/vol/vol3	1500m	40k	1000m	-	35k
Default user quotas on qtrees						
*	user@/vol/vol3/qtree_unix	550M	-	500m		
*	user@/vol/vol3/qtree_ntfs	550M	-	500m		
Specific UNIX user quotas on qtrees						
fred, fritz	user@/vol/vol3/qtree_unix	700M	-	550m		
tom	user@/vol/vol3/qtree_unix	700M	-	550m		
anne	user@/vol/vol3/qtree_unix	700M	-	550m		
Specific Windows domain user quotas on qtrees						
<b>QUOTA_TARGET_DOMAIN ellie</b>						
fitzpatrick	user@/vol/vol3/qtree_ntfs	700M	-	550m		
fredrick	user@/vol/vol3/qtree_ntfs	700M	-	550m		
shara	user@/vol/vol3/qtree_ntfs	700M	-	550m		
<b>QUOTA_TARGET_DOMAIN</b>						

After quotas are initialized with the `quota on` command, the initial entries from the quota report are as follows.

Type	ID	Vol	Tree	Used	Limit	Used	Limit	Quota
tree	2	vol3	qtree_unix	0	2097152	1	51200	/vol/vol3/qtree_unix
tree	1	vol3	qtree_ntfs	0	1536000	1	40960	/vol/vol3/qtree_ntfs
tree	*	vol3	-	0	1024000	0	30720	*
user	*	vol3	qtree_unix	0	563200	0	-	*
user	*	vol3	qtree_ntfs	0	563200	0	-	*

## User Quota Is Exceeded on Qtree\_ntfs

In the quota file, Anne is not configured to have a specific quota for qtree\_ntfs. She is subjected to the default quota of 550MB. Over a period of time, Anne has copied 501MB of data into qtree\_ntfs.

From Windows XP, she now attempts to copy a 167MB file into qtree\_ntfs. The copy fails, and the following message is recorded on the storage system console:

```
"Disk quota exceeded on volume vol3 for Windows user ID: S-1-5-21-2677708712-1729956257-2544577925-2617"
```

The quota report in Table 5 shows that, after the failure, Anne's quota usage is still 501MB. The addition of 167MB would have exceeded her 550MB quota; therefore, it was not allowed.

Table 5) User quota is exceeded on qtree\_ntfs.

Type	ID	Vol	Tree	Used	Limit	Used	Limit	Quota
tree	2	vol3	qtree_unix	0	2097152	1	51200	/vol/vol3/qtree_unix
tree	1	vol3	qtree_ntfs	500328	1536000	4	40960	/vol/vol2/qtree_ntfs
tree	*	vol3	-	0	1024000	0	30720	*
user	*	vol3	qtree_unix	0	563200	0	-	*
user	*	vol3	qtree_ntfs	0	563200	0	-	*
user	\anne	vol3	qtree_ntfs	500328	563200	3	-	*

## Qtree Quota Is Exceeded on qtree\_ntfs

Other users continue to copy data to qtree\_ntfs until the qtree contains approximately 1500MB of data. As seen in the preceding qtree report, the exact qtree limit on qtree\_ntfs is 1536MB.

Shara, from the Windows XP host, attempts to copy dfm.exe, a 167MB file, into qtree\_ntfs. Shara finds, however, that this copy fails even though she would not exceed her user quota.

It fails because the qtree limits are exceeded. No one, not even root or a Windows administrator, can add more data into this qtree until files are deleted or the quota is changed in the quota file and a `quota resize vol3` command is issued.

The following message is recorded on the storage system's console, which indicates that the failure is due to qtree quota limits:

```
[Waf1.quota.qtree.exceeded:notice]: tid 1: tree quota exceeded on volume vol3
```

The quota report in Table 6 records space usage and shows that Shara has space remaining in her quota limits to add 167MB to qtree\_ntfs, but that qtree\_ntfs has only 36MB left before the quota limit is reached.

Table 6) Qtree quota is exceeded on qtree\_ntfs.

Type	ID	Vol	Tree	Used	Limit	Used	Limit	Quota
tree	2	vol3	qtree_unix	0	2097152	1	51200	/vol/vol3/qtree_unix
tree	1	vol3	qtree_ntfs	1500984	1536000	10	40960	/vol/vol2/qtree_ntfs
tree	*	vol3	-	0	1024000	0	30720	*
user	*	vol3	qtree_unix	0	563200	0	-	*
user	*	vol3	qtree_ntfs	0	563200	0	-	*
user	\anne	vol3	qtree_ntfs	500328	563200	3	-	*
user	\fitzpat	vol3	qtree_ntfs	166776	716800	1	-	fitzpatrick
user	\frederi	vol3	qtree_ntfs	667104	716800	4	-	frederick

Type	ID	Vol	Tree	Used	Limit	Used	Limit	Quota
user	\shara	vol3	qtree_ntfs	166776	716800	1	-	shara

Other observations in this quota report:

- Fitzpatrick, Frederick, and Shara all have specific 700MB quotas assigned to them. Anne is assigned the default quota, as indicated by the asterisk in the Quota column.
- Without the use of the quota mapping directive, space usage in a qtree of NTFS security style is allocated to a user's Windows identity, which is designated by a backslash preceding the user name (\shara) in the ID column of the quota report.

## Quota Management for a Quota Target Containing More than One User

Our quota file contains one quota entry in which multiple users are defined in the quota target:

fred,fritz	user@/vol/vol3/qtree_unix	700M	-	550m
------------	---------------------------	------	---	------

A comma-delimited list of users is considered one target. The listed users have a cumulative limit of 700MB. It does not matter which one of the two users adds data to `qtree_unix`. The two users' space usage is considered together.

A quota entry such as this is useful when a group of people share a single task or project and the storage administrator wants to limit the space consumed by data from a particular project.

Fred and Fritz each copy 333MB of data into `qtree_unix`. Following are the quota report entries recording their space usage. Note that their space usage is recorded together, not individually.

Type	ID	Vol	Tree	Used	Limit	Used	Limit	Quota
tree	2	vol3	qtree_unix	667104	2097152	5	51200	/vol/vol3/qtree_unix
tree	1	vol3	qtree_ntfs	1500984	1536000	10	40960	/vol/vol3/qtree_ntfs
tree	*	vol3	-	0	1024000	0	30720	*
user	*	vol3	qtree_unix	0	563200	0	-	*
user	*	vol3	qtree_ntfs	0	563200	0	-	*
user	\anne	vol3	qtree_ntfs	500328	563200	3	-	*
user	\fitzpat	vol3	qtree_ntfs	166776	716800	1	-	fitzpatrick
user	\frederi	vol3	qtree_ntfs	667104	716800	4	-	frederick
user	\shara	vol3	qtree_ntfs	166776	716800	1	-	shara
user	fred	vol3	qtree_unix	667104	716800	4	-	fred
	fritz							fritz

Other observations in the quota report are:

- Space usage in a qtree with UNIX security style is allocated to a user's UNIX identity.
- In a quota report, a UNIX user designation is not preceded by a backslash (fred or fritz) in the ID column of the quota report.

## Summary of Results

Data ONTAP quota management tracks usage on the basis of UNIX and/or Windows users, UNIX groups, and qtrees.

Within the quota configuration file, we can specify quotas on qtrees, which limit the amount of total volume space that the qtree can consume. This prohibits data that resides in one qtree from consuming all the available space within a volume.

Default user quotas can be configured at the qtree level or the volume level. When default user quotas are configured at the qtree level, a user's space and/or file usage is tracked within that qtree and is independent of quota tracking within other qtrees.

Specific user quotas can also be configured at the qtree or volume level. This allows the storage administrator to allocate more or less space and/or file usage to particular users than what is allocated to the default user.

When UNIX or NTFS qtrees are configured, quota mapping is not necessary. This is because a UNIX qtree can only be accessed by a user's UNIX identity, and NTFS qtrees can only be accessed as a user's Windows identity.

All applicable quota rules are all applied before a decision is made whether to permit the operation. A user may not add data to a qtree whose quota is reached, even if the user still has quota space available.

A user may not add data to a qtree if that user's quota is reached, even if the qtree quota has not been reached.

For quota targets that contain multiple comma-delimited users, the quota is applied to the cumulative usage of the listed users.

## 4.2 Quota Use Case: Quota Management with Mixed Qtrees

The demonstration of quota management with and without the quota mapping directive is shown here.

- The data resides in mixed qtrees.
- The typical user accesses data from both Windows hosts and UNIX hosts.

### User Access and Quota Management in This Scenario

In this scenario, we demonstrate quota management calculations with and without the quota mapping directive. Referring to the discussion on multiprotocol access in section 2.4, "Multiprotocol Considerations," where file access is granted based on the security style of the qtree and folders within the qtree, not on which type of host is used to access the data. Therefore, in this scenario, we need to use quota mapping, not because users access the data from both types of hosts, but because the qtree is mixed, with areas where data has Windows security and areas where data has UNIX security.

Mixed qtrees present a challenge for quota management. The security style of a mixed qtree is not fixed, and the security style of folders within the qtree can differ from those of the root of the qtree.

The quota mapping directive is used to make sure that space usage for a person is tracked accurately, regardless of security styles within the qtree.

The root of qtree\_mixed has UNIX security style. File access at the root will be granted to the user's UNIX identity.

A subfolder, ntfs\_folder, has NTFS security style. File access within this subfolder will be granted to the user's Windows identity.

We have a user, Shara, who needs to copy data to the root level of qtree mixed. She also needs to copy data to ntfs\_folder.

### Quota File with Quota Mapping

To track cumulative usage in this qtree, we use the quota mapping directive. All users have a default quota of 200MB. Shara has a specific quota of 450MB. The quota management configuration is shown in the quota file as seen in Table 7.

Table 7) Quota file with quota mapping.

Quota Target		Disk	Files	Threshold	Sdisk	Sfile
Specific qtree quotas						
/vol/vol1/qtree_mixed	tree	1000M	40	850M		
<b>QUOTA_PERFORM_USER_MAPPING ON</b>						
Default user quotas on qtree						
*	user@/vol/vol1/qtree_mixed	200M	-			
Specific UNIX user quotas on qtree						
ellie\shara	user@/vol/vol1/qtree_mixed	450M				
<b>QUOTA_PERFORM_USER_MAPPING OFF</b>						

To demonstrate quota management in the following configuration, Shara copies a 167MB file to the root of `qtree_mixed` and then copies the same 167MB file to `ntfs_folder`. Since the quota mapping directive is used, cumulative usage is tracked for UNIX user `shara` and Windows user `\shara`. Following is the resultant quota report.

Type	ID	Vol	Tree	Used	Limit	Used	Limit	Quota
tree	3	vol1	qtree_mixed	333552	1024000	3	40	/vol/vol1/qtree_mixed
user	\shara shara	vol1	qtree_mixed	333552	460800	2	-	ellie\shara

### Quota File Without Quota Mapping

To illustrate the effect of removing the quota mapping directive, the quota configuration file was modified to the configuration seen in Table 8. The only change to the file is the removal of the mapping directive.

Table 8) Quota file without quota mapping.

Quota Target		Disk	Files	Threshold	Sdisk	Sfile
Specific qtree quotas						
/vol/vol1/qtree_mixed	tree	1000M	40	850M		
<b>QUOTA_PERFORM_USER_MAPPING ON</b>						
Default user quotas on qtree						
*	user@/vol/vol1/qtree_mixed	200M	-			
Specific UNIX user quotas on qtree						
ellie\shara	user@/vol/vol1/qtree_mixed	450M				

Quota usage was recalculated with the new configuration file by turning quotas off and then back on for `vol1`. The recalculated quota report now shows separate calculations for data copied into the UNIX security area of the `qtree` and the data copied into the Windows security area of the `qtree`.

Type	ID	Vol	Tree	Used	Limit	Used	Limit	Quota
tree	3	vol1	qtree_mixed	333552	1024000	3	40	/vol/vol1/qtree_mixed
user	\shara shara	vol1	qtree_mixed	333552	460800	2	-	ellie\shara

As observed from the quota report, without the quota mapping directive, UNIX user shara and Windows user \shara are considered to be separate users and are tracked separately. Moreover, \shara has a quota of 450MB, but the UNIX user, shara, is subjected to the default user limit of 200MB. This would probably not be the desired result in most environments.

## Summary of Results

Quota management on mixed qtrees is not as straightforward as quota management on NTFS or UNIX qtrees. Mixed qtrees may have portions of the qtree that are of UNIX security style and portions of the qtree that are of Windows security style. If user mapping is not enabled in the quota file, quota tracking will be done separately for the user's UNIX identity and for a user's Windows identity. This can lead to inconsistent quota management.

To provide consistent quota management on mixed qtrees, configure quota mapping in the quota file. This will lead to Data ONTAP tracking the user's combined usage—Windows identity and UNIX identity together.

NetApp recommends that the use of mixed qtrees be minimized. Instead, choose the UNIX or NTFS qtree style. Users can access data from either UNIX or Windows hosts if user mapping is consistently applied (if the appropriate file access permissions are present).

The security style, NTFS or UNIX, is chosen based on which set of administrators will be administering the qtrees. Choose UNIX qtree style if UNIX administrators will administer the export file and file permissions. Choose NTFS qtree style if Windows administrators will administer the shares and NTFS permissions.

However, if it is necessary to have qtrees where both UNIX and Windows administrators administer security, mixed qtrees can be employed. Quota management on these qtrees should utilize the mapping directive for consistent quota tracking.

### 4.3 Quota Use Case: Quota Management in Multiprotocol Environments

The following holds true in quota management for multiprotocol environments:

- The typical user accesses data from both Windows and UNIX clients.
- UNIX groups are used for quota management on selected qtrees.
- In this case study, storage administrators occasionally find a need to change the security style of qtrees from UNIX or NTFS to mixed.
- If the security style was changed to mixed, we would not be able to predict how quota usage would be allocated; it could be allocated to a UNIX identity, or it could be allocated to a Windows identity. This uncertainty necessitates that the quota file maps UNIX and Windows users so that all user usage is tracked cumulatively.

### User Access and Quota Management in This Scenario

In this scenario, we use the quota mapping feature to make sure that space usage of a user's Windows identity and UNIX identity is tracked cumulatively.

Additionally, we have a UNIX qtree where we use UNIX groups for quota management. Our tests illustrate:

- The effect of exceeding a group quota
- The effect of space usage on a group quota when that group is a user's secondary group
- The calculation of space usage using the cumulative usage of a person's UNIX and Windows identities
- The effect of exceeding a qtree quota

## Quota File with Quota Mapping and UNIX Groups

The following quota file is used in this study illustrated in Table 9. Observations noted in the quota file are:

- Default user and specific user quotas are contained within the quota mapping directive. All user usage is tracked cumulatively for the user's UNIX and Windows identities.
- Fred, fritz, tom, and rod belong to support as their primary UNIX group.
- Fred and fritz belong to lab group as a secondary group.

Table 9) Quota file with quota mapping and UNIX groups.

Quota Target		Disk	Files	Threshold	Sdisk	Sfile
Default qtree quotas						
*	tree@/vol/vol2	500M	40			
Specific qtree quotas						
/vol/vol2/qtree_unix	tree	2g	50			
/vol/vol2/qtree_ntfs	tree	900M	30			
<b>Quota_Perform_User_Mapping on</b>						
Default user quotas on qtree						
*	user@/vol/vol2/qtree_unix	550M				
*	user@/vol/vol2/qtree_ntfs	550M				
Specific user quotas on qtree						
ellie\frederick	user@/vol/vol2/qtree_unix	700M				
<b>Quota_Perform_User_Mapping off</b>						
UNIX group quota						
support	group@/vol/vol2/qtree_unix	800M				
lab	group@/vol/vol2/qtree_unix	550M				

After quotas are initialized with the `quota on` command, the initial quota report is recorded as shown here:

Type	ID	Vol	Tree	Used	Limit	Used	Limit	Quota
tree	2	vol2	qtree_unix	0	2097152	1	50	/vol/vol2/qtree_unix
tree	3	vol2	qtree_ntfs	0	921600	1	30	/vol/vol2/qtree_ntfs
user	*	vol2	qtree_unix	0	563200	0	-	*
user	*	vol2	qtree_ntfs	0	563200	0	-	*
group	support	vol2	qtree_unix	0	819200	0	-	support
group	lab	vol2	qtree_unix	0	563200	0	-	lab

## Group Quota Exceeded on qtree\_unix

Fred and Fritz each copy 333MB into qtree\_unix. Their space usage is tracked through both the user quota management and the group user management.

The group support used 667MB toward a quota limit of 800MB. When Fred attempts to copy another 167MB file into qtree\_unix, it fails. Fred's user quota is not exceeded, but the group quota is exceeded, and the operation is not permitted.

We can identify that the quota for the group support (with a GID of 107) is exceeded, and the following message is displayed on the storage system's console:

```
"[waf1.quota.groupQtrees.exceeded:notice]: gid 107 tid 2: disk quota exceeded on volume vol2."
```

The resultant quota report is as follows:

Type	ID	Vol	Tree	Used	Limit	Used	Limit	Quota
tree	2	vol2	qtree_unix	667104	2097152	6	50	/vol/vol2/qtree_unix
tree	3	vol2	qtree_ntfs	0	921600	1	30	/vol/vol2/qtree_ntfs
user	*	vol2	qtree_unix	0	563200	0	-	*
user	*	vol2	qtree_ntfs	0	563200	0	-	*
user	\frederick	vol2	qtree_unix	485636	716800	3	-	ellie\frederick
user	\fritz	vol2	qtree_unix	333552	563200	2	-	*
user	\fritzpatrick	vol2	qtree_unix	0	563200	0	-	*
group	support	vol2	qtree_unix	819188	819200	5	-	support
group	lab	vol2	qtree_unix	0	563200	0	-	lab

No further copies to /vol/vol2/qtree\_unix are possible by users whose UNIX identity has support as a primary group until group members delete some files or a storage administrator increases the quota for this group. If the quota size is increased, the command `quota resize vol2` must be issued.

There is no space usage recorded for group lab, even though Fred and Fritz are members of this group as a secondary group. Data ONTAP quota management does not track a user's secondary group usage.

### Quota Management with Quota Mapping

Users continue to copy data to qtree\_ntfs. After a while, users report that they can no longer copy data to qtree\_ntfs. The storage administrator wants to verify storage usage and issues the quota report command. The administrator determines that the qtree quota is exceeded on qtree\_ntfs.

We also see from the output that all user quota tracking is by each user's combined UNIX identity and Windows identity.

Even if the storage administrator changes the qtree style for these qtrees, accurate quota tracking will not be hindered.

The resultant quota report is as follows:

Type	ID	Vol	Tree	Used	Limit	Used	Limit	Quota
tree	2	vol2	qtree_unix	819188	2097152	6	50	/vol/vol2/qtree_unix
tree	3	vol2	qtree_ntfs	921584	921600	7	30	/vol/vol2/qtree_ntfs
user	\fredri fred	vol2	qtree_ntfs	500328	563200	3	-	*
user	\anne anne	vol2	qtree_ntfs	421256	563200	3	-	*
user	fritz \fritzpatri ck	vol2	qtree_unix	333552	563200	2	-	*
user	\fredri fred	vol2	qtree_unix	485636	716800	3	-	ellie\frederick
group	support	vol2	qtree_unix	819188	819200	5	-	support
group	lab	vol2	qtree_unix	0	563200	0	-	lab

Quota management for multiprotocol environments can be accomplished with native Data ONTAP. With the use of user mapping in the `/etc/quotas` file, space and file usage is tracked cumulatively for the user's Windows identity and UNIX identity. It does not matter if the security style of the qtree or volume is UNIX or Windows. Nor does it matter if the user is accessing data from a Windows machine or a UNIX machine; space and file usage is properly tracked for this individual.

Also, UNIX groups can be used for quota management, where a UNIX group can be allocated a certain amount of space that the group as a whole can use within a qtree or a volume. A user's primary UNIX group is the only group tracked. If a UNIX user belongs to secondary groups, that user's space and file usage is not tracked for the secondary groups.

As seen in this case, all quota rules are considered before a user is allowed to write data or files to a tracked object (qtree or volume). After looking at all applicable rules and determining that no rule that applies is violated, a user can write data to the qtree or volume.

For an environment where both UNIX and Windows security styles are used, Data ONTAP quota management provides the ideal method for tracking space and file usage.

## 5 Quota Management in a Windows Environment Using NTP Software QFS for NAS, NetApp Edition

NTP Software QFS for NAS, NetApp Edition is a real-time, policy-based quota and file management solution for Windows environments. NTP Software QFS uses the NetApp file policy functionality for both file policy screening and quota management. NTP Software QFS does not use native Data ONTAP quota management. This allows QFS to bring additional functionality to quota management on NetApp storage systems.

NTP Software QFS for NAS, NetApp Edition gives administrators the ability to manage and control disk space consumption and block or take other action if a user attempts to put unwanted files on storage resources. It has the flexibility to set policies per share, directory, user, or group on storage systems and vFiler® storage. NTP Software QFS is not limited to volume-level or qtree-level policies. Subfolders within a volume or qtree can be the target of a file policy.

Additionally, with NTP Software QFS, global policies can be created where policies apply to multiple storage systems across the enterprise. For instance, if multiple storage systems are used for home directories, a global policy may be implemented that limits each user to the same amount of space for

that user's home directory regardless of which storage system holds the home directory. Each policy can communicate with users through e-mail and pop-ups.

Newer versions of NTP QFS can also manage quotas for NFS users. In addition to Windows users, QFS policies can be applied to Windows groups. This is a significant benefit in environments that are Windows only.

The effective policy is determined with the following logic.

If you have two or more disk quota policies, placing limits on the same user (or group), QFS will enforce the least restrictive quota limit first. For added control, disk quota policies and file removal policies include a check box that can be checked during configuration that allows you to always enforce that policy in the case of a conflict when multiple policies apply to a file or folder.

NTP Software QFS has many configurable parameters that allow for flexibility, such as the ability allow a grace period after a quota limit is reached. It also supports an overdraft once the quota limit has been reached.

## 6 Quota Management in a Windows Environment Using Northern Parklife NSS

Northern Storage Suite is designed to assure high-performance NAS quotas, a cached fast access list of file sizes that makes sure of zero impact on NAS performance, and quota usage that is tracked in real time. Also, the fpolicy channel registration can be dynamically trimmed to optimize the load and the number of events flowing from the NetApp storage system; only events for the volumes where quotas are applied are asked and obtained.

Quotas can be applied on all levels of file structure, without the need of qtree creation, even if the compatibility with NetApp qtrees is guaranteed.

The table-oriented approach for NSS quotas gives the solution very high flexibility; each quota on a specific folder can be set independently from the others. Automatic quota creations are provided by special autoquotas.

NSS provides a very powerful set of APIs to interact with the quota server service by external programs, making integration with the existing customized management software very easy. The QSCOMAPI DLLs are compatible with the most common languages: VBscript, Visual Basic, C++, C#, Windows PowerShell™. Command line tools to import/export/set/delete quotas are also available.

The Active Directory® integration is provided by a complete set of predefined LDAP queries and is customizable. It can be used to retrieve additional information such as user SMTP addresses or group quotas based on a Active Directory attribute value (office or department), or it can simply display useful data such as the user's phone.

Quotas can be exported on a database on scheduled time and displayed in the Storage Reporter module.

## 7 Quota Management Tools

### 7.1 System Manager

System Manager provides setup and management capabilities for storage system components such as disks, volumes, aggregates, and quotas in a Microsoft® Windows environment. The following options are available in System Manager for managing quotas:

- Activate/deactivate quota
- Create quota rule

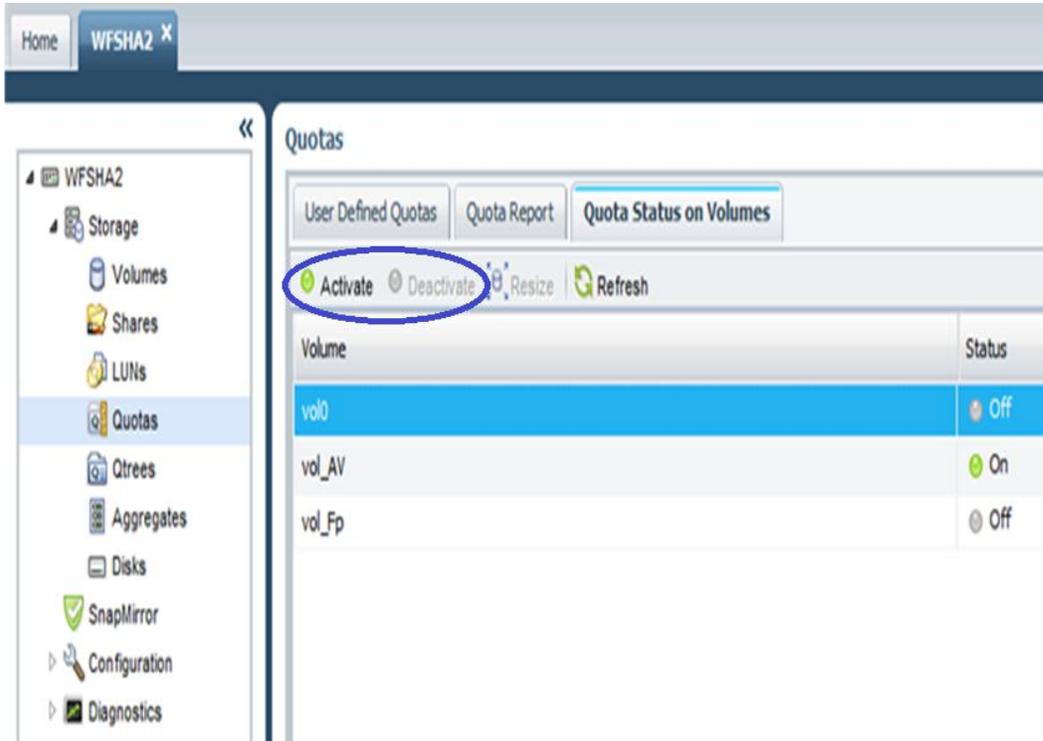
- Edit quota rule
- Report quota usage

All quota management options are available under the Storage > Quotas module in System Manager.

## Enable/Disable Quota

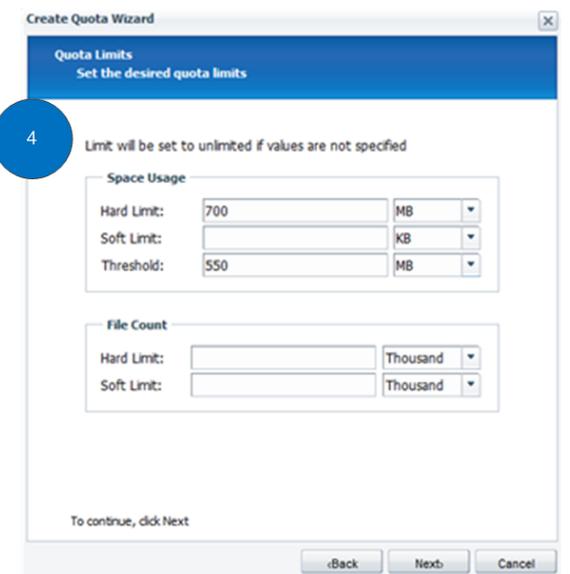
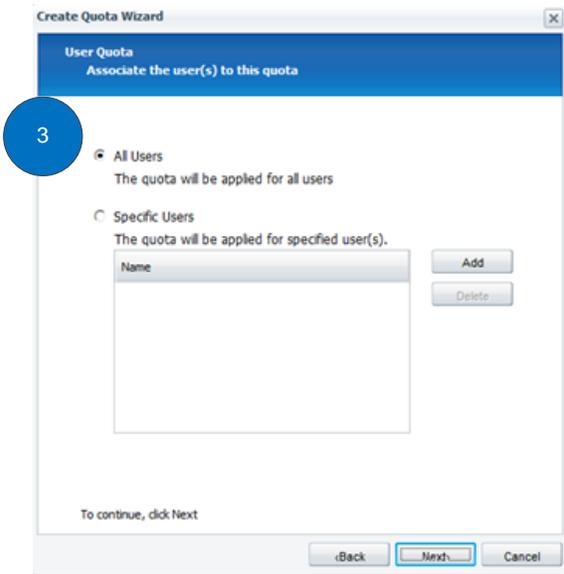
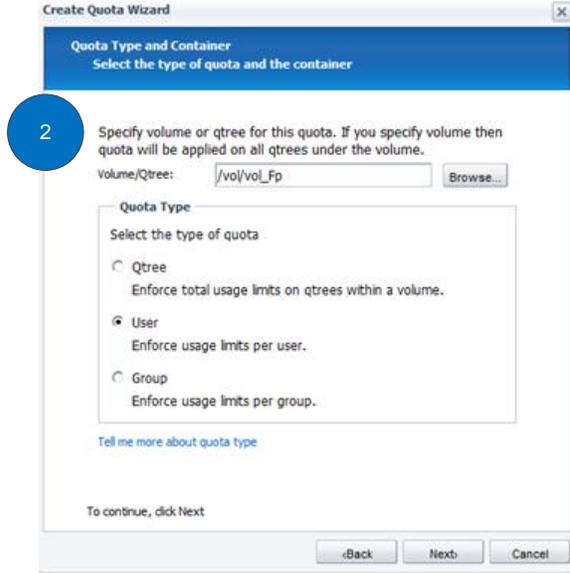
Quota activate or quota deactivate, for specified volumes, is available under the Quota Status on Volumes tab. If a new rule is added or modified, the `quota deactivate` and `quota activate` commands must be run to reflect the new rule. Figure 4 illustrates how to enable or disable the quota:

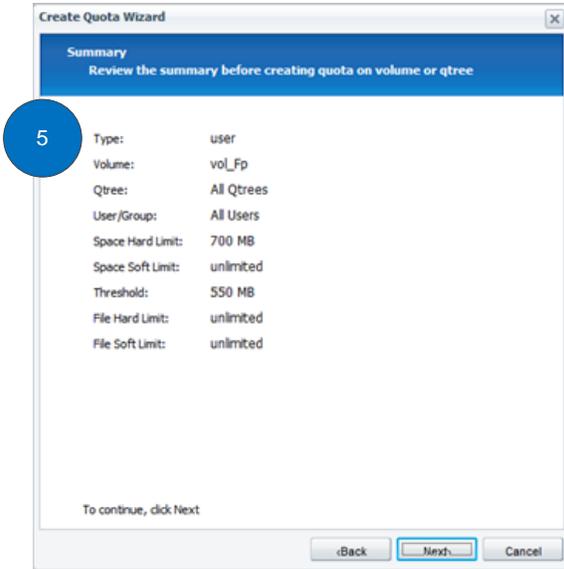
Figure 4) Enable or disable quota.



## Create Quota Rule

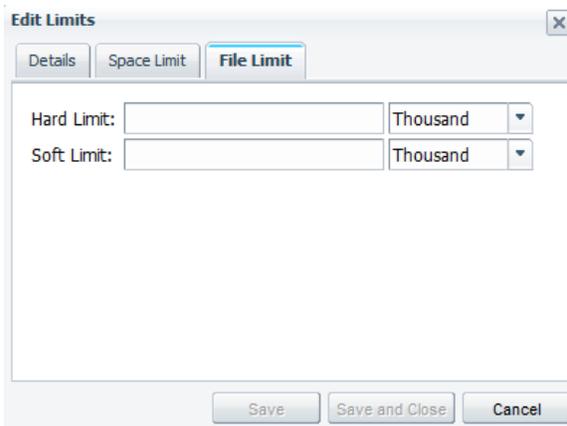
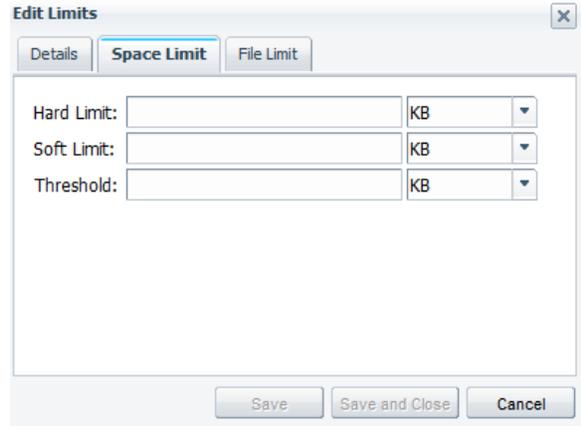
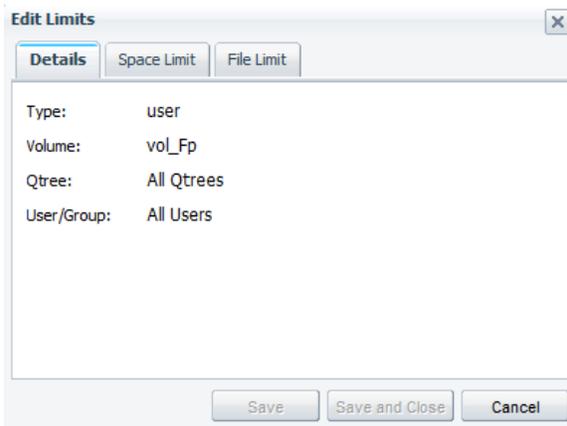
To create a new quota, select Quotas > Create. The wizard will guide you to create either a user, group, or qtree quota. Different options are presented based on the type of quota. The following example shows how to create a user quota for `all users` on `/vol/Vol_FP` with 700MB as hard quota and 550MB as threshold.





## Edit Quota Limit

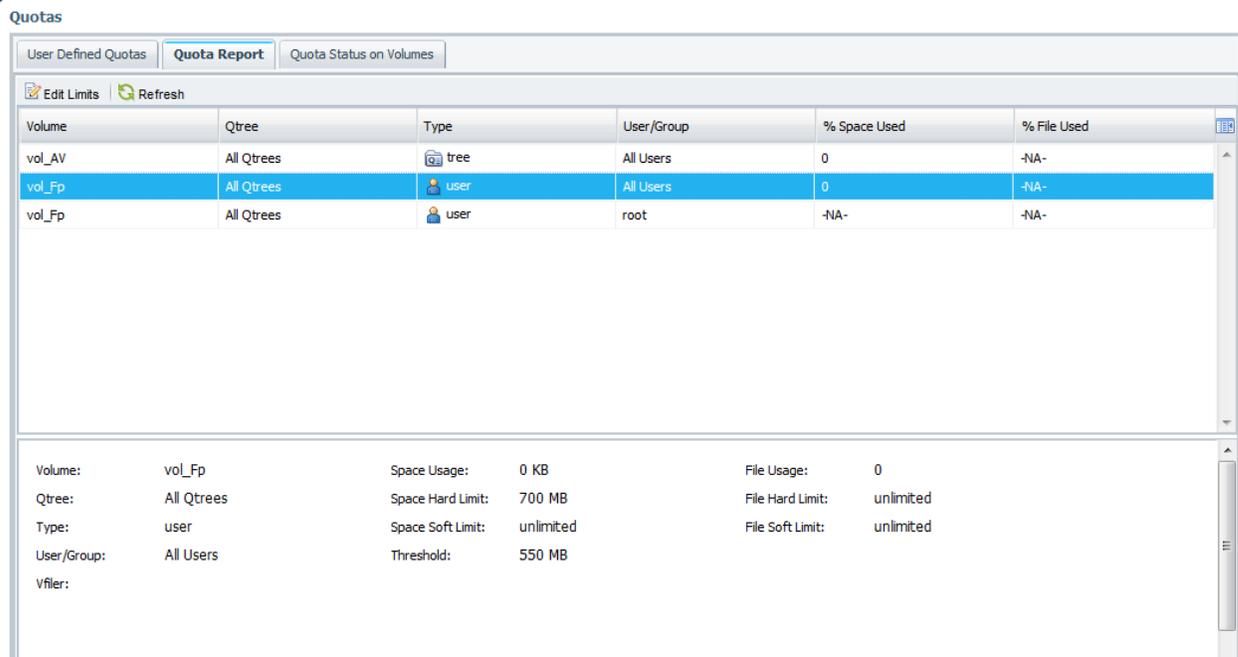
To edit existing quota limits, select a quota rule and click Edit Limits. The following window will open with the existing information. Space usage and file count parameters can be changed using this option.



## Quota Usage Report

System Manager can also be used to report quota usage. The Quota Report pane as seen in Figure 5 shows selected quota rule details such as quota limits, current usage, and so on. For detailed reports, the SRM feature in OnCommand® Unified Manager can be used.

Figure 5) Quota usage report.



Volume	Qtree	Type	User/Group	% Space Used	% File Used
vol_AV	All Qtrees	tree	All Users	0	-NA-
vol_Fp	All Qtrees	user	All Users	0	-NA-
vol_Fp	All Qtrees	user	root	-NA-	-NA-

Volume:	vol_Fp	Space Usage:	0 KB	File Usage:	0
Qtree:	All Qtrees	Space Hard Limit:	700 MB	File Hard Limit:	unlimited
Type:	user	Space Soft Limit:	unlimited	File Soft Limit:	unlimited
User/Group:	All Users	Threshold:	550 MB		
Vfiler:					

## 7.2 OnCommand Unified Manager

OnCommand Unified Manager provides the ability to manage existing user and group quotas and view report information across all storage systems from one centralized location.

The quota management and reporting functionality is enabled with the core license and is accessed through the Quotas tab. If SRM is licensed, quota management and reporting functionality is accessed through the SRM tab.

The prerequisites for monitoring and managing user quotas are:

- The storage systems on which you want to monitor user quotas must have Data ONTAP 6.3 or later installed.
- The storage systems on which you want to manage user quotas must have Data ONTAP 6.4 or later installed.
- You must configure the storage system's root login name and root password in OnCommand Unified Manager for the storage systems that you want to monitor and manage. Configure the login name and password for the storage system on the Edit Appliance Settings page in the following manner:

```
Appliance Tab .. appliance_name .. Tools .. Edit
```

- You must configure the /etc/quotas file and enable quotas for every volume to be managed and monitored by OnCommand Unified Manager prior to using OnCommand Unified Manager for quota management and monitoring.

For more information on OnCommand Unified Manager, consult the OnCommand Unified Manager Information Library at <http://www.netapp.com/us/products/management-software/oncommand/> or log in to the [NetApp Support site](#).

## 8 Comparison of Native and Partner Quota Solution

Table 10 provides an overview of different quota management features offered by native, partner (NTP), and Windows Server 2008.

Table 10) Native and partner quota solutions.

Quota	NetApp	NetApp + Partner	Windows Server 2008
User/group quota	✓	✓	✓
Multilevel directory quota	x	✓	✓
Reporting	✓	✓	✓
Notifications/triggers	✓ <sup>1</sup>	✓	✓
Quota templates/policies	x	✓	✓
Performance overhead <sup>2</sup>	x	✓	x

## 9 Summary and Conclusion

Data ONTAP provides native quota management, which can be used to control space and file usage at the volume and qtree levels.

Space and file usage can be managed by Windows and UNIX user and UNIX group. If the quota mapping directive is used within the `/etc/quotas` configuration file, combined usage for a user's UNIX identity and Windows identity can be tracked. This allows accurate quota management even if a user is accessing data that is in a mixed qtree where some portions of the data may have NTFS effective security style and some portions of the data may have UNIX effective security style.

Since qtrees are often used as departmental and project boundaries, it is beneficial to be able to limit a qtree to a certain amount of space within the volume. This is accomplished with qtree quotas. This prevents particular qtrees from taking more space within the volume than what is desired.

NTP Software Quota and File Sentinel for NAS, NetApp Edition provides some significant benefits for space quota management within qtrees and volumes that have an NTFS effective security style. QFS allows quota management at the volume, qtree, and folder levels. The quota management level is not limited to the volume and qtree level as it is in Data ONTAP quota management. Additionally, Windows groups can be used as the entity on which to place quota management. This is a significant benefit for Windows environments.

With QFS, a global policy can be implemented that allows storage administrators to implement a single policy, which is inherited by all storage systems under the global policy, and will be enforced on each of those storage systems.

Northern Storage Suite is designed to assure high-performance NAS quotas: a cached fast access list of file sizes makes sure of zero impact on NAS performance, and quota usage is tracked in real time. A dedicated physical network is not mandatory. Also, the `fpolicy` channel registration can be dynamically trimmed to optimize the load and the number of events flowing from the NetApp storage system; only events for the volumes where quotas are applied are asked and obtained.

---

<sup>1</sup> Requires Operations Manager File SRM.

<sup>2</sup> The performance overhead in the partner solution is because of FPolicy notifications to the external server.

Quotas can be applied on all levels of file structure, without the need to create qtrees, even if they are compatible with NetApp qtrees.

The table-oriented approach for NSS quotas gives the solution a very high flexibility: each quota on a specific folder can be set independently from the others. Automatic quota creations are provided by special autoquotas.

## References

- Data ONTAP Documentation Storage Management User Guide  
<https://support.netapp.com/documentation/productlibrary/index.html?productID=30094>
- TR-3490: NetApp Storage System Multiprotocol Use Guide  
<https://fieldportal.netapp.com/viewcontent.asp?qv=1&docid=18128>
- TR-3014: Multiprotocol Data Access:NFS, CIFS, and HTTP  
<http://www.netapp.com/library/tr/3014.pdf>
- OnCommand Unified Manager Information Library  
<http://www.netapp.com/us/products/management-software/oncommand/>
- NTP Software Quota & File Sentinel Quick Start and Evaluation Guide  
<http://www.ntpsoftware.com>
- NORTHERN Parklife, Inc  
<http://www.northern.net/>
- System Manager 2.0 Online Help

## Appendix

### Quota File Allowable Suffixes

Allowable suffixes for disk, files, thold, sdisk, and sfile are:

- K (or k): kilobytes for space usage and kilofiles for file usage.
- M (or m): megabytes for space usage and megafiles for file usage.
- G (or g): gigabytes for space usage and gigafiles for file usage.
- No suffix indicates bytes for space usage and number of files for file usage.

## Version History

Version	Date	Document Version History
Version	October 2005	Creation
Version 1.0	March 2011	Revised
Version 2.0	August 2012	Revised and updated with latest content

Refer to the [Interoperability Matrix Tool](#) (IMT) on the NetApp Support site to validate that the exact product and feature versions described in this document are supported for your specific environment. The NetApp IMT defines the product components and versions that can be used to construct configurations that are supported by NetApp. Specific results depend on each customer's installation in accordance with published specifications.

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