How quotas work with users and groups

ONTAP 9

NetApp
February 20, 2026

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Overview of how quotas work with users and groups

You can specify a user or group as the target of a quota. There are several implementation differences to consider when defining a quota.

A few of the differences you need to be aware of include the following:

- User or group
- UNIX or Windows
- Special users and groups
- Are multiple IDs included

There are also different ways to specify IDs for users based on your environment.

Specify UNIX users for quotas

You can specify a UNIX user for a quota in one of several different formats.

The three formats available when specifying a UNIX user for a quota include the following:

- The user name (such as jsmith).

> ⓘ You cannot use a UNIX user name to specify a quota if that name includes a backslash (\) or an @ sign. This is because ONTAP treats names containing these characters as Windows names.

- The user ID or UID (such as 20).
- The path of a file or directory owned by that user, so that the file's UID matches the user.

> ⓘ If you specify a file or directory name, you must select a file or directory that will last as long as the user account remains on the system.
>
> Specifying a file or directory name for the UID does not cause ONTAP to apply a quota to that file or directory.

Specify Windows users for quotas

You can specify a Windows user for a quota in one of several different formats.

The three formats available when specifying a Windows user for a quota include the following:

- The Windows name in pre-Windows 2000 format.
- The security ID (SID) as displayed by Windows in text form, such as `S-1-5-32-544`.
- The name of a file or directory that has an ACL owned by that user's SID.

If you specify a file or directory name, you must select a file or directory that will last as long as the user account remains on the system.

For ONTAP to obtain the SID from the ACL, the ACL must be valid.

If the file or directory exists in a UNIX-style qtree, or if the storage system uses UNIX mode for user authentication, ONTAP applies the user quota to the user whose **UID**, not SID, matches that of the file or directory.

Specifying a file or directory name to identify a user for a quota does not cause ONTAP to apply a quota to that file or directory.

How default user and group quotas create derived quotas

When you create default user or group quotas, corresponding derived user or group quotas are automatically created for every user or group that owns files at the same level.

Derived user and group quotas are created in the following ways:

- A default user quota on a FlexVol volume creates derived user quotas for every user that owns a file anywhere on the volume.
- A default user quota on a qtree creates derived user quotas for every user that owns a file in the qtree.
- A default group quota on a FlexVol volume creates derived group quotas for every group that owns a file anywhere on the volume.
- A default group quota on a qtree creates derived group quotas for every group that owns a file in the qtree.

If a user or group does not own files at the level of a default user or group quota, derived quotas are not created for the user or group. For example, if a default user quota is created for qtree proj1 and the user jsmith owns files on a different qtree, no derived user quota is created for jsmith.

The derived quotas have the same settings as the default quotas, including limits and user mapping. For example, if a default user quota has a 50-MB disk limit and has user mapping turned on, any resulting derived quotas also have a 50-MB disk limit and user mapping turned on.

However, no limits exist in derived quotas for three special users and groups. If the following users and groups own files at the level of a default user or group quota, a derived quota is created with the same user-mapping setting as the default user or group quota, but it is only a tracking quota (with no limits):

- UNIX root user (UID 0)
- UNIX root group (GID 0)
- Windows BUILTIN\Administrators group

  Since quotas for Windows groups are tracked as user quotas, a derived quota for this group is a user quota that is derived from a default user quota, not a default group quota.

Example of derived user quotas

If you have volume where three users—root, jsmith, and bob—own files, and you create a default user quota on the volume, ONTAP automatically creates three derived user quotas. Therefore, after you reinitialize quotas on the volume, four new quotas appear in the quota report:

```
cluster1::> volume quota report
  Vserver: vs1
                                     ----Disk----  ----Files-----   Quota
Volume   Tree      Type    ID        Used  Limit    Used   Limit
Specifier
-------  --------  ------  -------  -----  -----  ------  ------
---------
vol1               user    *           0B   50MB       0       -   *
vol1               user    root        5B      -       1       -
vol1               user    jsmith     30B   50MB      10       -   *
vol1               user    bob        40B   50MB      15       -   *
4 entries were displayed.
```

The first new line is the default user quota that you created, which is identifiable by the asterisk (*) as the ID. The other new lines are the derived user quotas. The derived quotas for jsmith and bob have the same 50-MB disk limit as the default quota. The derived quota for the root user is a tracking quota without limits.

How quotas are applied to the root user

The root user (UID=0) on UNIX clients is subject to tree quotas, but not to user or group quotas. This allows the root user to take actions on behalf of other users that would otherwise be prevented by a quota.

When the root user carries out a file or directory ownership change or other operation (such as the UNIX `chown` command) on behalf of a user with less privileges, ONTAP checks the quotas based on the new owner but does not report errors or stop the operation, even if the hard quota restrictions of the new owner are exceeded. This can be useful when an administrative action, such as recovering lost data, results in temporarily exceeding quotas.

After the ownership transfer is carried out, however, a client system will report a disk space error if the user attempts to allocate more disk space while the quota is still exceeded.

Related information

- How quotas are applied
- How quotas are applied to users with multiple IDs

How quotas work with special Windows groups

There are several special Windows groups that process quotas differently than other Windows groups. You should understand how quotas are applied for these special groups.

ONTAP does not support group quotas based on Windows group IDs. If you specify a Windows group ID as the quota target, the quota is considered to be a user quota.

Everyone

When the quota target is the Everyone group, a file with an ACL showing the owner is Everyone is counted under the SID for Everyone.

BUILTIN\Administrators

When the quota target is the BUILTIN\Administrators group, the entry is considered to be a user quota and is used for tracking only. You cannot impose restrictions on BUILTIN\Administrators. If a member of BUILTIN\Administrators creates a file, the file is owned by BUILTIN\Administrators and is counted under the SID for BUILTIN\Administrators (not the user's personal SID).

How quotas are applied to users with multiple IDs

A user can be represented by multiple IDs. You can define a single user quota for such a user by specifying a list of IDs as the quota target. A file owned by any of these IDs is subject to the restriction of the user quota.

Suppose a user has the UNIX UID `20` and the Windows IDs `corp\john_smith` and `engineering\jsmith`. For this user, you can specify a quota where the quota target is a list of the UID and Windows IDs. When this user writes to the storage system, the specified quota applies, regardless of whether the write originates from UID `20`, `corp\john_smith`, or `engineering\jsmith`.

Note that separate quota rules are considered separate targets, even if the IDs belong to the same user. For example, for the same user you can specify one quota that limits UID `20` to 1GB of disk space and another quota that limits corp\john_smith to 2GB of disk space, even though both IDs represent the same user. ONTAP applies quotas to UID `20` and `corp\john_smith` separately. In this case, no limits are applied to `engineering\jsmith`, even though limits are applied to the other IDs used by the same user.

Related information

- How quotas are applied
- How quotas are applied to the root user

How ONTAP determines user IDs in a mixed environment

If you have users accessing your ONTAP storage from both Windows and UNIX clients, both Windows and UNIX security are used to determine file ownership. Several factors determine whether ONTAP uses a UNIX or Windows ID when applying user quotas.

If the security style of the qtree or FlexVol volume that contains the file is only NTFS or only UNIX, then the security style determines the type of ID used when applying user quotas. For qtrees with the mixed security style, the type of ID used is determined by whether the file has an ACL.

The following table summarizes what type of ID is used.

Security Style	ACL	No ACL
UNIX	UNIX ID	UNIX ID
Mixed	Windows ID	UNIX ID
NTFS	Windows ID	Windows ID

How quotas work with multiple users

When you place multiple users in the same quota target, the limits defined by the quota are not applied to each individual user. Rather, the quota limits are shared among all users in the quota target.

Unlike with commands for managing objects, such as volumes and qtrees, you cannot rename a quota target, including a multi-user quota. This means that after a multi-user quota is defined, you cannot modify the users in the quota target, and you cannot add users to a target or remove users from a target. If you want to add or remove a user from a multi-user quota, then the quota containing that user must be deleted and a new quota rule with the set of users in the target defined.

If you combine separate user quotas into one multi-user quota, you can activate the change by resizing quotas. However, if you want to remove users from a quota target with multiple users, or add users to a target that already has multiple users, you must reinitialize quotas before the change takes effect.

Example of more than one user in a quota rule

In the following example, there are two users listed in the quota entry. The two users can use up to 80MB of space combined. If one uses 75MB, then the other one can use only 5MB.

```
cluster1::> volume quota policy rule create -vserver vs0 -volume vol1
-policy-name default -type user -target "jsmith,chen" -qtree "" -disk
-limit 80m

cluster1::> volume quota policy rule show -vserver vs0 -volume vol1

Vserver: vs0               Policy: default           Volume: vol1
                                                    Soft             Soft
                              User          Disk     Disk    Files    Files
Type    Target         Qtree  Mapping      Limit    Limit   Limit    Limit
Threshold
-----  --------       ------- -------  --------  -------  ------  -------
---------
user   "jsmith,chen"  ""      off           80MB        -       -        -
-
```

UNIX and Windows name linking for quotas

In a mixed environment, users can log in as either Windows users or UNIX users. You can configure quotas to recognize that a user's UNIX id and Windows ID represent the same user.

Quotas for Windows user name are mapped to a UNIX user name, or vice versa, when both of the following conditions are met:

- The `user-mapping` parameter is set to "on" in the quota rule for the user.

- The user names have been mapped with the `vserver name-mapping` commands.

When a UNIX and Windows name are mapped together, they are treated as the same person for determining quota usage.

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