How security styles affect data access

ONTAP 9

NetApp
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What the security styles and their effects are

There are four different security styles: UNIX, NTFS, mixed, and unified. Each security style has a different effect on how permissions are handled for data. You must understand the different effects to ensure that you select the appropriate security style for your purposes.

It is important to understand that security styles do not determine what client types can or cannot access data. Security styles only determine the type of permissions ONTAP uses to control data access and what client type can modify these permissions.

For example, if a volume uses UNIX security style, SMB clients can still access data (provided that they properly authenticate and authorize) due to the multiprotocol nature of ONTAP. However, ONTAP uses UNIX permissions that only UNIX clients can modify using native tools.

Security style	Clients that can modify permissions	Permissions that clients can use	Resulting effective security style	Clients that can access files
UNIX	NFS	NFSv3 mode bits	UNIX	NFS and SMB
		NFSv4.x ACLs	UNIX	
NTFS	SMB	NTFS ACLs	NTFS	
Mixed	NFS or SMB	NFSv3 mode bits	UNIX	
		NFSv4.x ACLs	UNIX	
NTFS ACLs	NTFS	Unified	NFS or SMB	
NFSv3 mode bits	UNIX			
NFSv4.1 ACLs	UNIX	NTFS ACLs	NTFS	
Unified (For infinite volumes only, in ONTAP 9.4 and earlier releases.)	NFS or SMB	NFSv3 mode bits	Unix	
		NFSv4.1 ACLs		NTFS ACLs

FlexVol volumes support UNIX, NTFS, and mixed security styles. When the security style is mixed or unified, the effective permissions depend on the client type that last modified the permissions because users set the security style on an individual basis. If the last client that modified permissions was an NFSv3 client, the permissions are UNIX NFSv3 mode bits. If the last client was an NFSv4 client, the permissions are NFSv4 ACLs. If the last client was an SMB client, the permissions are Windows NTFS ACLs.

The unified security style is only available with infinite volumes, which are no longer supported in ONTAP 9.5 and later releases. For more information, see FlexGroup volumes management overview.

Beginning with ONTAP 9.2, the `show-effective-permissions` parameter to the `vserver security file-directory` command enables you to display effective permissions granted to a Windows or UNIX user on the specified file or folder path. In addition, the optional parameter `-share-name` enables you to display the effective share permission.

ONTAP initially sets some default file permissions. By default, the effective security style on all data in UNIX, mixed, and unified security style volumes is UNIX and the effective permissions type is UNIX mode bits (0755 unless specified otherwise) until configured by a client as allowed by the default security style. By default, the effective security style on all data in NTFS security style volumes is NTFS and has an ACL allowing full control to everyone.

Where and when to set security styles

Security styles can be set on FlexVol volumes (both root or data volumes) and qtrees. Security styles can be set manually at the time of creation, inherited automatically, or changed at a later time.

Decide which security style to use on SVMs

To help you decide which security style to use on a volume, you should consider two factors. The primary factor is the type of administrator that manages the file system. The secondary factor is the type of user or service that accesses the data on the volume.

When you configure the security style on a volume, you should consider the needs of your environment to ensure that you select the best security style and avoid issues with managing permissions. The following considerations can help you decide:

Security style	Choose if…
UNIX	• The file system is managed by a UNIX administrator. • The majority of users are NFS clients. • An application accessing the data uses a UNIX user as the service account.
NTFS	• The file system is managed by a Windows administrator. • The majority of users are SMB clients. • An application accessing the data uses a Windows user as the service account.
Mixed	The file system is managed by both UNIX and Windows administrators and users consist of both NFS and SMB clients.

How security style inheritance works

If you do not specify the security style when creating a new FlexVol volume or a qtree, it inherits its security style in different ways.

Security styles are inherited in the following manner:

- A FlexVol volume inherits the security style of the root volume of its containing SVM.
- A qtree inherits the security style of its containing FlexVol volume.
- A file or directory inherits the security style of its containing FlexVol volume or qtree.

How ONTAP preserves UNIX permissions

When files in a FlexVol volume that currently have UNIX permissions are edited and saved by Windows applications, ONTAP can preserve the UNIX permissions.

When applications on Windows clients edit and save files, they read the security properties of the file, create a new temporary file, apply those properties to the temporary file, and then give the temporary file the original file name.

When Windows clients perform a query for the security properties, they receive a constructed ACL that exactly represents the UNIX permissions. The sole purpose of this constructed ACL is to preserve the file's UNIX permissions as files are updated by Windows applications to ensure that the resulting files have the same UNIX permissions. ONTAP does not set any NTFS ACLs using the constructed ACL.

Manage UNIX permissions using the Windows Security tab

If you want to manipulate UNIX permissions of files or folders in mixed security-style volumes or qtrees on SVMs, you can use the Security tab on Windows clients. Alternatively, you can use applications that can query and set Windows ACLs.

- Modifying UNIX permissions

  You can use the Windows Security tab to view and change UNIX permissions for a mixed security-style volume or qtree. If you use the main Windows Security tab to change UNIX permissions, you must first remove the existing ACE you want to edit (this sets the mode bits to 0) before you make your changes. Alternatively, you can use the Advanced editor to change permissions.

  If mode permissions are used, you can directly change the mode permissions for the listed UID, GID, and others (everyone else with an account on the computer). For example, if the displayed UID has r-x permissions, you can change the UID permissions to rwx.

- Changing UNIX permissions to NTFS permissions

  You can use the Windows Security tab to replace UNIX security objects with Windows security objects on a mixed security-style volume or qtree where the files and folders have a UNIX effective security style.

  You must first remove all listed UNIX permission entries before you can replace them with the desired Windows User and Group objects. You can then configure NTFS-based ACLs on the Windows User and Group objects. By removing all UNIX security objects and adding only Windows Users and Groups to a file or folder in a mixed security-style volume or qtree, you change the effective security style on the file or

folder from UNIX to NTFS.

When changing permissions on a folder, the default Windows behavior is to propagate these changes to all subfolders and files. Therefore, you must change the propagation choice to the desired setting if you do not want to propagate a change in security style to all child folders, subfolders, and files.

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