



Manage file locks

ONTAP 9

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Manage file locks

Learn about file locking between protocols for ONTAP NFS SVMs

File locking is a method used by client applications to prevent a user from accessing a file previously opened by another user. How ONTAP locks files depends on the protocol of the client.

If the client is an NFS client, locks are advisory; if the client is an SMB client, locks are mandatory.

Because of differences between the NFS and SMB file locks, an NFS client might fail to access a file previously opened by an SMB application.

The following occurs when an NFS client attempts to access a file locked by an SMB application:

- In mixed or NTFS volumes, file manipulation operations such as `rm`, `rmdir`, and `mv` can cause the NFS application to fail.
- NFS read and write operations are denied by SMB deny-read and deny-write open modes, respectively.
- NFS write operations fail when the written range of the file is locked with an exclusive SMB bytelock.

In UNIX security-style volumes, NFS unlink and rename operations ignore SMB lock state and allow access to the file. All other NFS operations on UNIX security-style volumes honor SMB lock state.

Learn about read-only bits for ONTAP NFS SVMs

The read-only bit is set on a file-by-file basis to reflect whether a file is writable (disabled) or read-only (enabled).

SMB clients that use Windows can set a per-file read-only bit. NFS clients do not set a per-file read-only bit because NFS clients do not have any protocol operations that use a per-file read-only bit.

ONTAP can set a read-only bit on a file when an SMB client that uses Windows creates that file. ONTAP can also set a read-only bit when a file is shared between NFS clients and SMB clients. Some software, when used by NFS clients and SMB clients, requires the read-only bit to be enabled.

For ONTAP to keep the appropriate read and write permissions on a file shared between NFS clients and SMB clients, it treats the read-only bit according to the following rules:

- NFS treats any file with the read-only bit enabled as if it has no write permission bits enabled.
- If an NFS client disables all write permission bits and at least one of those bits had previously been enabled, ONTAP enables the read-only bit for that file.
- If an NFS client enables any write permission bit, ONTAP disables the read-only bit for that file.
- If the read-only bit for a file is enabled and an NFS client attempts to discover permissions for the file, the permission bits for the file are not sent to the NFS client; instead, ONTAP sends the permission bits to the NFS client with the write permission bits masked.
- If the read-only bit for a file is enabled and an SMB client disables the read-only bit, ONTAP enables the owner's write permission bit for the file.

- Files with the read-only bit enabled are writable only by root.

The read-only bit interacts with the ACL and Unix mode bits in the following ways:

When the read-only bit is set on a file:

- No changes are made to the ACL for that file. NFS clients will see the same ACL as before the read-only bit was set.
- Any Unix mode bits that allow write access for the file are ignored.
- Both NFS and SMB clients can read the file, but they cannot modify it.
- ACLs and UNIX mode bits are ignored in favor of the read-only bit. This means that even if the ACL allows write access, the read-only bit prevents modifications.

When the read-only bit is not set on a file:

- ONTAP determines access based on the ACL and UNIX mode bits.
 - If either the ACL or the UNIX mode bits deny write access, then NFS and SMB clients cannot modify the file.
 - If neither the ACL nor UNIX mode bits deny write access, then NFS and SMB clients can modify the file.



Changes to file permissions take effect immediately on SMB clients, but might not take effect immediately on NFS clients if the NFS client enables attribute caching.

Learn how ONTAP NFS and Windows differ on handling locks on share path components

Unlike Windows, ONTAP does not lock each component of the path to an open file while the file is open. This behavior also affects SMB share paths.

Because ONTAP does not lock each component of the path, it is possible to rename a path component above the open file or share, which can cause problems for certain applications, or can cause the share path in the SMB configuration to be invalid. This can cause the share to be inaccessible.

To avoid issues caused by renaming path components, you can apply Windows Access Control List (ACL) security settings that prevent users or applications from renaming critical directories.

Learn more about [How to prevent directories from being renamed while clients are accessing them](#).

Display information about locks for ONTAP NFS SVMs

You can display information about the current file locks, including what types of locks are held and what the lock state is, details about byte-range locks, sharelock modes, delegation locks, and opportunistic locks, and whether locks are opened with durable or persistent handles.

About this task

The client IP address cannot be displayed for locks established through NFSv4 or NFSv4.1.

By default, the command displays information about all locks. You can use command parameters to display information about locks for a specific storage virtual machine (SVM) or to filter the command's output by other criteria.

The `vserver locks show` command displays information about four types of locks:

- Byte-range locks, which lock only a portion of a file.
- Share locks, which lock open files.
- Opportunistic locks, which control client-side caching over SMB.
- Delegations, which control client-side caching over NFSv4.x.

By specifying optional parameters, you can determine important information about each lock type. Learn more about `vserver locks show` in the [ONTAP command reference](#).

Step

1. Display information about locks by using the `vserver locks show` command.

Examples

The following example displays summary information for an NFSv4 lock on a file with the path `/vol1/file1`. The sharelock access mode is `write-deny_none`, and the lock was granted with write delegation:

```
cluster1::> vserver locks show

Vserver: vs0
Volume  Object Path          LIF      Protocol  Lock Type  Client
-----  -----
-----  -----
vol1    /vol1/file1          lif1     nfsv4    share-level -
                  Sharelock Mode: write-deny_none
                                         delegation -
                                         Delegation Type: write
```

The following example displays detailed oplock and sharelock information about the SMB lock on a file with the path `/data2/data2_2/intro.pptx`. A durable handle is granted on the file with a share lock access mode of `write-deny_none` to a client with an IP address of 10.3.1.3. A lease oplock is granted with a batch oplock level:

```
cluster1::> vserver locks show -instance -path /data2/data2_2/intro.pptx

Vserver: vs1
          Volume: data2_2
Logical Interface: lif2
          Object Path: /data2/data2_2/intro.pptx
          Lock UUID: 553cf484-7030-4998-88d3-1125adbba0b7
          Lock Protocol: cifs
          Lock Type: share-level
Node Holding Lock State: node3
```

```
        Lock State: granted
Bytelock Starting Offset: -
    Number of Bytes Locked: -
    Bytelock is Mandatory: -
    Bytelock is Exclusive: -
    Bytelock is Superlock: -
        Bytelock is Soft: -
        Oplock Level: -
Shared Lock Access Mode: write-deny_none
    Shared Lock is Soft: false
        Delegation Type: -
        Client Address: 10.3.1.3
        SMB Open Type: durable
    SMB Connect State: connected
SMB Expiration Time (Secs): -
    SMB Open Group ID:
78a90c59d45ae211998100059a3c7a00a007f70da0f8ffffcd445b0300000000
```

```
        Vserver: vs1
        Volume: data2_2
Logical Interface: lif2
    Object Path: /data2/data2_2/test.pptx
    Lock UUID: 302fd7b1-f7bf-47ae-9981-f0dc6a224f9
    Lock Protocol: cifs
    Lock Type: op-lock
Node Holding Lock State: node3
    Lock State: granted
Bytelock Starting Offset: -
    Number of Bytes Locked: -
    Bytelock is Mandatory: -
    Bytelock is Exclusive: -
    Bytelock is Superlock: -
        Bytelock is Soft: -
        Oplock Level: batch
Shared Lock Access Mode: -
    Shared Lock is Soft: -
        Delegation Type: -
        Client Address: 10.3.1.3
        SMB Open Type: -
    SMB Connect State: connected
SMB Expiration Time (Secs): -
    SMB Open Group ID:
78a90c59d45ae211998100059a3c7a00a007f70da0f8ffffcd445b0300000000
```

Breaking file locks for ONTAP NFS SVMs

When file locks are preventing client access to files, you can display information about currently held locks, and then break specific locks. Examples of scenarios in which you might need to break locks include debugging applications.

About this task

The `vserver locks break` command is available only at the advanced privilege level and higher. Learn more about `vserver locks break` in the [ONTAP command reference](#).

Steps

1. To find the information you need to break a lock, use the `vserver locks show` command.

Learn more about `vserver locks show` in the [ONTAP command reference](#).

2. Set the privilege level to advanced:

```
set -privilege advanced
```

3. Perform one of the following actions:

If you want to break a lock by specifying...	Enter the command...
The SVM name, volume name, LIF name, and file path	<code>vserver locks break -vserver vserver_name -volume volume_name -path path -lif lif</code>
The lock ID	<code>vserver locks break -lockid UUID</code>

4. Return to the admin privilege level:

```
set -privilege admin
```

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