



# **Manage file locks**

ONTAP 9

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# Manage file locks

## About file locking between protocols

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 byte lock.
- Unlink

- For NTFS filesystems, SMB and CIFS delete operations are supported.

The file will be removed after the last close.

- NFS unlink operations are not supported.

It is not supported because NTFS and SMB semantics are required, and the Last Delete-On-Close operation is not supported for NFS.

- For UNIX filesystems, unlink operation is supported.

It is supported because NFS and UNIX semantics are required.

- Rename

- For NTFS filesystems, if the destination file is opened from SMB or CIFS, the destination file can be renamed.

- NFS rename is not supported.

It is not supported because NTFS and SMB semantics are required.

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.

## How ONTAP treats read-only bits

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.



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.

## How ONTAP differs from Windows 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 security settings that prevent users or applications from renaming critical directories.

## Display information about locks

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. See the man page for the command for more information.

### 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-f0dcb6a224f9
        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

```

## Break locks

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. The man page for the command contains detailed information.

### Steps

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

The man page for the command contains detailed information.

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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