# NetApp

# Use FlexClone files and FlexClone LUNs to create efficient copies of files and LUNs

ONTAP 9

NetApp
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# Use FlexClone files and FlexClone LUNs to create efficient copies of files and LUNs

## Use FlexClone files and FlexClone LUNs to create efficient copies of files and LUNs overview

FlexClone files and FlexClone LUNs are writable, space-efficient clones of parent files and parent LUNs, and help in efficient utilization of the physical aggregate space. FlexClone files and FlexClone LUNs are supported only for FlexVol volumes.

FlexClone files and FlexClone LUNs utilize 0.4 percent of their size to store the metadata. Clones share the data blocks of their parent files and parent LUNs and occupy negligible storage space until clients write new data either to the parent file or LUN, or to the clone.

Clients can perform all file and LUN operations on both the parent and the clone entities.

You can use multiple methods to delete FlexClone files and FlexClone LUNs.

## Create a FlexClone file or FlexClone LUN

You can create space-efficient and time-efficient clones of files and LUNs present in FlexVol volumes or FlexClone volumes by using the `volume file clone create` command.

**What you'll need**

- The FlexClone license must be installed on the cluster.
- If multiple block ranges are used for sub-LUN cloning or sub-file cloning, the block numbers must not overlap.
- If you are creating a sub-LUN or sub-file on volumes with adaptive compression enabled, the block ranges must not be misaligned.

  This means that the source start block number and destination start block number must either be even aligned or odd aligned.

**About this task**

Depending on the privileges assigned by the cluster administrator, an SVM administrator can create FlexClone files and FlexClone LUNs.

You can specify the autodelete setting for FlexClone files and FlexClone LUNs when you create and modify clones. By default, the autodelete setting is disabled.

You can overwrite an existing FlexClone file or FlexClone LUN when you create a clone by using the `volume file clone create` command with the `-overwrite-destination` parameter.

When the node reaches its maximum split load, the node temporarily stops accepting requests to create FlexClone files and FlexClone LUNs and issues an `EBUSY` error message. When the split load for the node falls below the maximum, the node accepts requests to create FlexClone files and FlexClone LUNs again. You should wait until the node has capacity to create the clones before trying the create request again.

**Steps**

1. Create a FlexClone file or FlexClone LUN by using the `volume file clone create` command.

   The following example shows how you can create a FlexClone file file1_clone of the parent file file1_source in the volume vol1:

   ```
   cluster1::> volume file clone create -vserver vs0 -volume vol1 -source
   -path /file1_source -destination-path /file1_clone
   ```

   For more information about using this command, see the man pages.

**Related information**

ONTAP 9 Commands

# View node capacity for creating and deleting FlexClone files and FlexClone LUNs

You can view whether a node has capacity to receive new requests to create and delete FlexClone files and FlexClone LUNs by viewing the split load for the node. If the maximum split load is reached, no new requests are accepted until the split load falls below the maximum.

**About this task**

When the node reaches its maximum split load, an `EBUSY` error message is issued in response to create and delete requests. When the split load for the node falls below the maximum, the node accepts requests to create and delete FlexClone files and FlexClone LUNs again.

A node can accept new requests when the Allowable Split Load field displays capacity, and the create request fits in the available capacity.

**Step**

1. View how much capacity a node has to create and delete FlexClone files and FlexClone LUNs by using the `volume file clone split load show` command.

   In the following example, the split load is displayed for all of the nodes in cluster1. All nodes in the cluster have capacity to create and delete FlexClone files and FlexClone LUNs as indicated by the Allowable Split Load field:

   ```
   cluster1::> volume file clone split load show
   Node        Max          Current     Token         Allowable
               Split Load Split Load Reserved Load Split Load
   ---------- ---------- ---------- ------------- ----------
   node1          15.97TB          0B         100MB     15.97TB
   node2          15.97TB          0B         100MB     15.97TB
   2 entries were displayed.
   ```

# View the space savings due to FlexClone files and FlexClone LUNs

You can view the percentage of disk space saved by block sharing within a volume containing FlexClone files and LUNs.

**Step**

1. To view the space saving achieved due to FlexClone files and FlexClone LUNs, enter the following command:

   ```
   df -s volname
   ```

   `volname` is the name of the FlexVol volume.

   > (i) If you run the `df -s` command on a deduplication-enabled FlexVol volume, you can view the space saved by both deduplication and FlexClone files and LUNs.

**Example**

The following example shows the space saving on a FlexClone volume test1:

```
systemA> df -s test1

Filesystem          used    saved    %saved Vserver
/vol/test1/         4828    5744      54%  vs1
```

# Methods to delete FlexClone files and FlexClone LUNs

You can use multiple methods to delete FlexClone files and FlexClone LUNs. Understanding what methods are available helps you plan how to manage clones.

You can use the following methods to delete FlexClone files and FlexClone LUNs:

- You can configure a FlexVol volume to automatically delete clones with autodelete enabled when the free space in a FlexVol volume decreases below a particular threshold.
- You can configure clients to delete clones by using the NetApp Manageability SDK.
- You can use clients to delete clones by using the NAS and SAN protocols.

  The slower deletion method is enabled by default because this method does not use the NetApp Manageability SDK. However, you can configure the system to use the faster deletion method when you delete FlexClone files by using the `volume file clone deletion` commands.

# How a FlexVol volume can reclaim free space with autodelete setting

## How a FlexVol volume can reclaim free space with autodelete setting overview

You can enable the autodelete setting of a FlexVol volume to automatically delete FlexClone files and FlexClone LUNs. By enabling autodelete, you can reclaim a target amount of free space in the volume when a volume is nearly full.

You can configure a volume to automatically start deleting FlexClone files and FlexClone LUNs when the free space in the volume decreases below a particular threshold value, and automatically stop deleting clones when a target amount of free space in the volume is reclaimed. Although, you cannot specify the threshold value that starts the automatic deletion of clones, you can specify whether a clone is eligible for deletion, and you can specify the target amount of free space for a volume.

A volume automatically deletes FlexClone files and FlexClone LUNs when the free space in the volume decreases below a particular threshold and when *both* of the following requirements are met:

- The autodelete capability is enabled for the volume that contains the FlexClone files and FlexClone LUNs.

  You can enable the autodelete capability for a FlexVol volume by using the `volume snapshot autodelete modify` command. You must set the `-trigger` parameter to `volume` or `snap_reserve` for a volume to automatically delete FlexClone files and FlexClone LUNs.

- The autodelete capability is enabled for the FlexClone files and FlexClone LUNs.

  You can enable autodelete for a FlexClone file or FlexClone LUN by using the `file clone create` command with the `-autodelete` parameter. As a result, you can preserve certain FlexClone files and FlexClone LUNs by disabling autodelete for the clones and ensuring that other volume settings do not override the clone setting.

## Configure a FlexVol volume to automatically delete FlexClone files and FlexClone LUNs

You can enable a FlexVol volume to automatically delete FlexClone files and FlexClone LUNs with autodelete enabled when the free space in the volume decreases below a particular threshold.

**What you'll need**
- The FlexVol volume must contain FlexClone files and FlexClone LUNs, and be online.
- The FlexVol volume must not be a read-only volume.

**Steps**
1. Enable automatic deletion of FlexClone files and FlexClone LUNs in the FlexVol volume by using the `volume snapshot autodelete modify` command.

   ◦ For the `-trigger` parameter, you can specify `volume` or `snap_reserve`.

   ◦ For the `-destroy-list` parameter, you must always specify `lun_clone,file_clone` regardless of whether you want to delete only one type of clone. The following example shows how you can enable volume vol1 to trigger the automatic deletion of FlexClone files and FlexClone LUNs for space reclamation until 25% of the volume consists of free space:

```
cluster1::> volume snapshot autodelete modify -vserver vs1 -volume
vol1 -enabled true -commitment disrupt -trigger volume -target-free
-space 25 -destroy-list lun_clone,file_clone

Volume modify successful on volume:vol1
```

(i) While enabling FlexVol volumes for automatic deletion, if you set the value of the
-commitment parameter to destroy, all the FlexClone files and FlexClone LUNs with
the -autodelete parameter set to true might be deleted when the free space in the
volume decreases below the specified threshold value. However, FlexClone files and
FlexClone LUNs with the -autodelete parameter set to false will not be deleted.

2. Verify that automatic deletion of FlexClone files and FlexClone LUNs is enabled in the FlexVol volume by
   using the volume snapshot autodelete show command.

   The following example shows that volume vol1 is enabled for automatic deletion of FlexClone files and
   FlexClone LUNs:

```
cluster1::> volume snapshot autodelete show -vserver vs1 -volume vol1

        Vserver Name: vs1
         Volume Name: vol1
         Enabled: true
           Commitment: disrupt
        Defer Delete: user_created
        Delete Order: oldest_first
  Defer Delete Prefix: (not specified)
    Target Free Space: 25%
              Trigger: volume
      *Destroy List: lun_clone,file_clone*
 Is Constituent Volume: false
```

3. Ensure that autodelete is enabled for the FlexClone files and FlexClone LUNs in the volume that you want
   to delete by performing the following steps:

   a. Enable automatic deletion of a particular FlexClone file or FlexClone LUN by using the volume file
      clone autodelete command.

      You can force a specific FlexClone file or FlexClone LUN to be automatically deleted by using the
      volume file clone autodelete command with the -force parameter.

      The following example shows that automatic deletion of the FlexClone LUN lun1_clone contained in
      volume vol1 is enabled:

```
cluster1::> volume file clone autodelete -vserver vs1 -clone-path
/vol/vol1/lun1_clone -enabled true
```

You can enable autodelete when you create FlexClone files and FlexClone LUNs.

b. Verify that the FlexClone file or FlexClone LUN is enabled for automatic deletion by using the `volume file clone show-autodelete` command.

The following example shows that the FlexClone LUN lun1_clone is enabled for automatic deletion:

```
cluster1::> volume file clone show-autodelete -vserver vs1 -clone
-path vol/vol1/lun1_clone
Vserver Name: vs1
Clone Path: vol/vol1/lun1_clone
**Autodelete Enabled: true**
```

For more information about using the commands, see the respective man pages.

## Prevent a specific FlexClone file or FlexClone LUN from being automatically deleted

If you configure a FlexVol volume to automatically delete FlexClone files and FlexClone LUNs, any clone that fits the criteria you specify might be deleted. If you have specific FlexClone files or FlexClone LUNs that you want to preserve, you can exclude them from the automatic FlexClone deletion process.

### What you'll need
A FlexClone license must be installed.

### About this task
When you create a FlexClone file or FlexClone LUN, by default the autodelete setting for the clone is disabled. FlexClone files and FlexClone LUNs with autodelete disabled are preserved when you configure a FlexVol volume to automatically delete clones to reclaim space on the volume.

> ⓘ  If you set the `commitment` level on the volume to `try` or `disrupt`, you can individually preserve specific FlexClone files or FlexClone LUNs by disabling autodelete for those clones. However, if you set the `commitment` level on the volume to `destroy` and the destroy lists include `lun_clone,file_clone`, the volume setting overrides the clone setting, and all FlexClone files and FlexClone LUNs can be deleted regardless of the autodelete setting for the clones.

### Steps

1. Prevent a specific FlexClone file or FlexClone LUN from being automatically deleted by using the `volume file clone autodelete` command.

The following example shows how you can disable autodelete for FlexClone LUN lun1_clone contained in vol1:

```
cluster1::> volume file clone autodelete -vserver vs1 -volume vol1
-clone-path lun1_clone -enable false
```

A FlexClone file or FlexClone LUN with autodelete disabled cannot be deleted automatically to reclaim space on the volume.

2. Verify that autodelete is disabled for the FlexClone file or FlexClone LUN by using the `volume file clone show-autodelete` command.

The following example shows that autodelete is false for the FlexClone LUN lun1_clone:

```
cluster1::> volume file clone show-autodelete -vserver vs1 -clone-path
vol/vol1/lun1_clone
                                                    Vserver
Name: vs1
                                                    Clone Path:
vol/vol1/lun1_clone
                                                    Autodelete
Enabled: false
```

## Commands for configuring deletion of FlexClone files

When clients delete FlexClone files without using the NetApp Manageability SDK, you can use the `volume file clone deletion` commands to enable faster deletion of FlexClone files from a FlexVol volume. Extensions for and minimum size of FlexClone files are used to enable faster deletion.

You can use the `volume file clone deletion` commands to specify a list of supported extensions and a minimum size requirement for FlexClone files in a volume. The faster deletion method is used only for FlexClone files that meet the requirements. For FlexClone files that do not meet the requirements, the slower deletion method is used.

When clients delete FlexClone files and FlexClone LUNs from a volume by using the NetApp Manageability SDK, the extension and size requirements do not apply because the faster deletion method is always used.

| To… | Use this command… |
|---|---|
| Add an extension to the supported list of extensions for the volume | `volume file clone deletion add-extension` |
| Change the minimum size of FlexClone files that can be deleted from the volume by using the faster deletion method | `volume file clone deletion modify` |

| To… | Use this command… |
|---|---|
| Remove an extension from the supported list of extensions for the volume | `volume file clone deletion remove-extension` |
| View the supported list of extensions and the minimum size of FlexClone files that clients can delete from the volume by using the faster deletion method | `volume file clone deletion show` |

For detailed information about these commands, see the appropriate man page.