



# **Use FlexClone volumes to create efficient copies of your FlexVol volumes**

## **ONTAP 9**

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# Use FlexClone volumes to create efficient copies of your FlexVol volumes

## Use FlexClone volumes to create efficient copies of your FlexVol volumes overview

FlexClone volumes are writable, point-in-time copies of a parent FlexVol volume. FlexClone volumes are space-efficient because they share the same data blocks with their parent FlexVol volumes for common data. The Snapshot copy used to create a FlexClone volume is also shared with the parent volume.

You can clone an existing FlexClone volume to create another FlexClone volume. You can also create a clone of a FlexVol volume containing LUNs and LUN clones.

You can also split a FlexClone volume from its parent volume. Beginning with ONTAP 9.4, for non-guaranteed volumes on AFF systems, the split operation for FlexClone volumes shares the physical blocks and does not copy the data. Therefore, splitting of FlexClone volumes on AFF systems is faster than the FlexClone splitting operation in other FAS systems in ONTAP 9.4 and later releases.

You can create two types of FlexClone volumes: read-write FlexClone volumes and data protection FlexClone volumes. While you can create a read-write FlexClone volume of a regular FlexVol volume, you must use only a SnapVault secondary volume to create a data protection FlexClone volume.

## Create a FlexClone volume

You can create a data protection FlexClone volume from a SnapMirror destination volume or from a parent FlexVol volume that is a SnapVault secondary volume. Beginning with ONTAP 9.7, you can create a FlexClone volume from a FlexGroup volume. After you create a FlexClone volume, you cannot delete the parent volume while the FlexClone volume exists.

### Before you begin

- The FlexClone license must be installed on the cluster.
- The volume that you want to clone must be online.

## Create a FlexClone volume of a FlexVol or FlexGroup

### Step

1. Create a FlexClone volume:

```
volume clone create
```



While creating a read-write FlexClone volume from the read-write parent volume, you do not need to specify the base Snapshot copy. ONTAP creates a Snapshot copy if you do not name any specific Snapshot copy that is to be used as the base Snapshot copy for the clone. You must specify the base Snapshot copy for creating a FlexClone volume when the parent volume is a data protection volume.

## Example

- The following command creates a read-write FlexClone volume `vol1_clone` from the parent volume `vol1`:

```
volume clone create -vserver vs0 -flexclone vol1_clone -type RW -parent-volume vol1
```

- The following command creates a data protection FlexClone volume `vol_dp_clone` from the parent volume `dp_vol` by using the base Snapshot copy `snap1`:

```
volume clone create -vserver vs1 -flexclone vol_dp_clone -type DP -parent -volume dp_vol -parent-snapshot snap1
```

## Create a FlexClone of any SnapLock type

Beginning with ONTAP 9.13.1, you can specify one of three SnapLock types, `compliance`, `enterprise`, `non-snaplock`, when creating a FlexClone of a RW volume. By default, a FlexClone volume is created with the same SnapLock type as the parent volume. However, you can override the default by using the `snaplock-type` option during FlexClone volume creation.

Using the `non-snaplock` parameter with the `snaplock-type` option, you can create a non-SnapLock type FlexClone volume from a SnapLock parent volume to provide a faster method of bringing data back online when necessary.

Learn more about [SnapLock](#).

### Before you begin

You should be aware of the following FlexClone volume limitations when they have a different SnapLock type than the parent volume.

- Only RW-type clones are supported. DP-type clones with a SnapLock type different from the parent volume are not supported.
- Volumes with LUNs cannot be cloned using the `snaplock-type` option set to a value other than 'non-snaplock' because SnapLock volumes do not support LUNs.
- A volume on a MetroCluster mirrored aggregate cannot be cloned with a Compliance SnapLock type because SnapLock Compliance volumes are not supported on MetroCluster mirrored aggregates.
- SnapLock Compliance volumes with Legal-Hold cannot be cloned with a different SnapLock type. Legal-Hold is only supported on SnapLock Compliance volumes.
- SVM DR does not support SnapLock volumes. Attempting to create a SnapLock clone from a volume in an SVM that is part of an SVM DR relationship will fail.
- FabricPool best practices recommend that clones retain the same tiering policy as the parent. However, a SnapLock Compliance clone of a FabricPool-enabled volume cannot have the same tiering policy as the parent. The tiering policy must be set to `none`. Attempting to create a SnapLock Compliance clone from a parent with a tiering policy other than `none` will fail.

### Steps

1. Create a FlexClone volume with a SnapLock type: 

```
volume clone create -vserver svm_name -flexclone flexclone_name -type RW [ -snaplock-type {non-snaplock|compliance|enterprise} ]
```

Example:

```
> volume clone create -vserver vs0 -flexclone vol1_clone -type RW  
-snaplock-type enterprise -parent-volume vol1
```

## Split a FlexClone volume from its parent volume

You can split a FlexClone volume from its parent to make the clone a normal FlexVol volume.

The clone splitting operation takes place in the background. Data is accessible on the clone and the parent during the split. Beginning with ONTAP 9.4, space efficiency is preserved. The split process only updates metadata and requires minimal IO. No data blocks are copied.

### About this task

- New Snapshot copies of the FlexClone volume cannot be created during the split operation.
- A FlexClone volume cannot be split from the parent volume if it belongs to a data protection relationship or is part of a load-sharing mirror.
- If you take the FlexClone volume offline while splitting is in progress, the split operation is suspended; when you bring the FlexClone volume back online, the splitting operation resumes.
- After the split, both the parent FlexVol volume and the clone require the full space allocation determined by their volume guarantees.
- After a FlexClone volume is split from its parent the two cannot be rejoined.
- Beginning with ONTAP 9.4, for non-guaranteed volumes on AFF systems, the split operation for FlexClone volumes shares the physical blocks and does not copy the data. Therefore, splitting of FlexClone volumes on AFF systems is faster than the FlexClone splitting operation in other FAS systems in ONTAP 9.4 and later. The improved FlexClone splitting operation on AFF systems has the following benefits:
  - Storage efficiency is preserved after splitting the clone from the parent.
  - Existing Snapshot copies are not deleted.
  - The operation is faster.
  - The FlexClone volume can be split from any point in the clone hierarchy.

### Before you begin

- You must be a cluster administrator.
- The FlexClone volume must be online when the split operation begins.
- The parent volume must be online for the split to succeed.

### Steps

1. Determine the amount of free space required to complete the split operation:

```
volume clone show -estimate -vserver vs0 -flexclone vol1_clone -type RW  
-parent-volume vol1
```

The following example provides information about the free space required to split FlexClone volume “clone1” from its parent volume “vol1”:

```
cluster1::> volume clone show -estimate -vserver vs1 -flexclone clone1  
-parent-volume volume1
```

		Split
Vserver	FlexClone	Estimate
-----	-----	-----
vs1	clone1	40.73MB

2. Verify that the aggregate containing the FlexClone volume and its parent has sufficient space:

- Determine the amount of free space in the aggregate that contains the FlexClone volume and its parent:

```
storage aggregate show
```

- If the containing aggregate does not have enough free space available, add storage to the aggregate:

```
storage aggregate add-disks
```

3. Start the split operation:

```
volume clone split start -vserver vs1 -flexclone clone1
```

The following example shows how you can initiate the process to split FlexClone volume “clone1” from its parent volume “vol1”:

```
cluster1::> volume clone split start -vserver vs1 -flexclone clone1
```

```
Warning: Are you sure you want to split clone volume clone1 in Vserver  
vs1 ?
```

```
{y|n}: y
```

```
[Job 1617] Job is queued: Split clone1.
```

4. Monitor the status of the FlexClone split operation:

```
volume clone split show -vserver vs1 -flexclone clone1
```

The following example shows the status of the FlexClone split operation on an AFF system:

```
cluster1::> volume clone split show -vserver vs1 -flexclone clone1
```

		Inodes				
Blocks		-----				
-----						
Vserver	FlexClone	Processed	Total	Scanned	Updated	% Inode
% Block						
Complete	Complete					
vs1	clone1	0	0	411247	153600	0
37						

5. Verify that the split volume is no longer a FlexClone volume:

```
volume show -volume volume_name -fields clone-volume
```

The value of the `clone-volume` option is “false” for a volume that is not a FlexClone volume.

The following example shows how you can verify whether volume “clone1” that is split from its parent is not a FlexClone volume.

```
cluster1::> volume show -volume clone1 -fields clone-volume
vserver volume **clone-volume**
----- **-----**
vs1      clone1 **false**
```

## Determine the space used by a FlexClone volume

You can determine the space used by a FlexClone volume based on its nominal size and the amount of space it shares with the parent FlexVol volume. When a FlexClone volume is created, it shares all of its data with its parent volume. Therefore, although the nominal size of the FlexVol volume is the same as its parent’s size, it uses very little free space from the aggregate.

### About this task

The free space used by a newly-created FlexClone volume is approximately 0.5 percent of its nominal size. This space is used to store the FlexClone volume’s metadata.

New data written to either the parent or the FlexClone volume is not shared between the volumes. The increase in the amount of new data that gets written to the FlexClone volume leads to an increase in the space the FlexClone volume requires from its containing aggregate.

### Step

1. Determine the actual physical space used by the FlexClone volume using the `volume show` command.

The following example shows the total physical space used by the FlexClone volume:

```
cluster1::> volume show -vserver vs01 -volume clone_vol1 -fields
size,used,available,
percent-used,physical-used,physical-used-percent
vserver      volume      size  available  used   percent-used  physical-
used         physical-used-percent
-----
vs01         clone_vol1   20MB   18.45MB   564KB   7%            196KB
1%
```

## Considerations for creating a FlexClone volume from a SnapMirror source or destination volume

You can create a FlexClone volume from the source or destination volume in an existing volume SnapMirror relationship. However, doing so could prevent future SnapMirror replication operations from completing successfully.

Replication might not work because when you create the FlexClone volume, you might lock a Snapshot copy that is used by SnapMirror. If this happens, SnapMirror stops replicating to the destination volume until the FlexClone volume is destroyed or is split from its parent. You have two options for addressing this issue:

- If you require the FlexClone volume on a temporary basis and can accommodate a temporary stoppage of the SnapMirror replication, you can create the FlexClone volume and either delete it or split it from its parent when possible.

The SnapMirror replication continues normally when the FlexClone volume is deleted or is split from its parent.

- If a temporary stoppage of the SnapMirror replication is not acceptable, you can create a Snapshot copy in the SnapMirror source volume, and then use that Snapshot copy to create the FlexClone volume. (If you are creating the FlexClone volume from the destination volume, you must wait until that Snapshot copy replicates to the SnapMirror destination volume.)

This method of creating a Snapshot copy in the SnapMirror source volume allows you to create the clone without locking a Snapshot copy that is in use by SnapMirror.



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