Use FlexClone volumes to create efficient copies of your FlexVol volumes

ONTAP 9

NetApp
September 30, 2022

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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. After you create a FlexClone volume, you cannot delete the parent volume while the FlexClone volume exists.

What you'll need

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

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
```

Split a FlexClone volume from its parent volume

If you want a read-write FlexClone volume to have its own disk space rather than using that of its parent volume, you can split the FlexClone volume from its parent volume. Because this operation creates a copy of the data that is currently shared between the parent volume and the FlexClone volume, the operation can take some time to complete.

About this task

Splitting a FlexClone volume from its parent volume consumes free space from the containing aggregate. If you do not have sufficient privileges to view the space available in your aggregate, you must contact your storage administrator to verify that there is sufficient space in the aggregate for the split operation to finish.

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. 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.

Steps

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

   ```
   volume clone show -estimate -vserver vserver_name -flexclone clone_volume_name
   -parent-volume parent_vol_name
   ```

   The following example provides information about the free space required to split a 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:
   a. Determine the amount of free space in the aggregate that contains the FlexClone volume and its parent:

      `storage aggregate show`

   b. 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 vserver_name -flexclone clone_volume_name`

   The following example shows how you can initiate the process to split the 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 vserver_name -flexclone clone_volume_name`

   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 the 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.