Manage the use of local tiers (aggregates)

ONTAP 9

NetApp
February 01, 2023

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After you have created local tiers (aggregates), you can manage how they are used.

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Rename a local tier (aggregate)

You can rename a local tier (aggregate). The method you follow depends on the interface you use—System Manager or the CLI:

System Manager

Use System Manager to rename a local tier (aggregate)

Beginning with ONTAP 9.10.1, you can modify the name of a local tier (aggregate).

Steps

1. In System Manager, click **Storage > Tiers**.
2. Click ⋮ next to the name of the local tier.
3. Select **Rename**.
4. Specify a new name for the local tier.

CLI

Use the CLI to rename a local tier (aggregate)

Step

1. Using the CLI, rename the local tier (aggregate):

   ```
   storage aggregate rename -aggregate aggr-name -newname aggr-new-name
   ```

   The following example renames an aggregate named "aggr5" as "sales-aggr":

   ```
   > storage aggregate rename -aggregate aggr5 -newname sales-aggr
   ```

Set media cost of a local tier (aggregate)

Beginning with ONTAP 9.11.1, you can use System Manager to set the media cost of a local tier (aggregate).

Steps

1. In System Manager, click **Storage > Tiers**, then click **Set Media Cost** in the desired local tier (aggregate) tiles.
2. Select **active and inactive tiers** to enable comparison.
3. Enter a currency type and amount.

When you enter or change the media cost, the change is made in all media types.

Determine drive and RAID group information for a local tier (aggregate)

Some local tier (aggregate) administration tasks require that you know what types of drives compose the local tier, their size, checksum, and status, whether they are shared with other local tiers, and the size and composition of the RAID groups.

Step

1. Show the drives for the aggregate, by RAID group:

   ```
   storage aggregate show-status aggr_name
   ```

   The drives are displayed for each RAID group in the aggregate.

   You can see the RAID type of the drive (data, parity, dparity) in the `Position` column. If the `Position` column displays `shared`, then the drive is shared: if it is an HDD, it is a partitioned disk; if it is an SSD, it is part of a storage pool.

Example: A Flash Pool aggregate using an SSD storage pool and data partitions

```
cluster1::> storage aggregate show-status nodeA_fp_1

Owner Node: cluster1-a
 Aggregate: nodeA_fp_1 (online, mixed_raid_type, hybrid) (block checksums)
  Plex: /nodeA_fp_1/plex0 (online, normal, active, pool0)
   RAID Group /nodeA_fp_1/plex0/rg0 (normal, block checksums, raid_dp)

                                      Usable Physical
     Position Disk          Pool Type     RPM    Size      Size Status
     -------- ----------    ---- ----- ------ -------- -------- -------
     shared   2.0.1          0   SAS    10000  472.9GB  547.1GB (normal)
     shared   2.0.3          0   SAS    10000  472.9GB  547.1GB (normal)
     shared   2.0.5          0   SAS    10000  472.9GB  547.1GB (normal)
     shared   2.0.7          0   SAS    10000  472.9GB  547.1GB (normal)
     shared   2.0.9          0   SAS    10000  472.9GB  547.1GB (normal)
     shared   2.0.11         0   SAS    10000  472.9GB  547.1GB (normal)

   RAID Group /nodeA_flashpool_1/plex0/rg1
   (normal, block checksums, raid4) (Storage Pool: SmallSP)

                                      Usable Physical
     Position Disk          Pool Type     RPM    Size      Size Status
     -------- ----------    ---- ----- ------ -------- -------- -------
     shared   2.0.13         0   SSD       -    186.2GB  745.2GB (normal)
     shared   2.0.12         0   SSD       -    186.2GB  745.2GB (normal)

8 entries were displayed.
```

Assign local tiers (aggregates) to storage VMs (SVMs)

If you assign one or more local tiers (aggregates) to a storage virtual machine (storage VM or SVM, formerly known as Vserver), then you can use only those local tiers to contain volumes for that storage VM (SVM).

What you'll need

The storage VM and the local tiers you want to assign to that storage VM must already exist.

About this task

Assigning local tiers to your storage VMs helps you keep your storage VMs isolated from each other; this is especially important in a multi-tenancy environment.

Steps

1. Check the list of local tiers (aggregates) already assigned to the SVM:

   ```
   vserver show -fields aggr-list
   ```

   The aggregates currently assigned to the SVM are displayed. If there are no aggregates assigned, "-" is displayed.

2. Add or remove assigned aggregates, depending on your requirements:

If you want to…	Use this command…
Assign additional aggregates	`vserver add-aggregates`
Unassign aggregates	`vserver remove-aggregates`

   The listed aggregates are assigned to or removed from the SVM. If the SVM already has volumes that use an aggregate that is not assigned to the SVM, a warning message is displayed, but the command is completed successfully. Any aggregates that were already assigned to the SVM and that were not named in the command are unaffected.

Example

In the following example, the aggregates aggr1 and aggr2 are assigned to SVM svm1:

```
vserver add-aggregates -vserver svm1 -aggregates aggr1,aggr2
```

Determine which volumes reside on a local tier (aggregate)

You might need to determine which volumes reside on a local tier (aggregate) before performing operations on the local tier, such as relocating it or taking it offline.

Steps

1. To display the volumes that reside on an aggregate, enter

   ```
   volume show -aggregate aggregate_name
   ```

   All volumes that reside on the specified aggregate are displayed.

Determine and control a volume's space usage in a local tier (aggregate)

You can determine which FlexVol volumes are using the most space in a local tier (aggregate) and specifically which features within the volume.

The `volume show-footprint` command provides information about a volume's footprint, or its space usage within the containing aggregate.

The `volume show-footprint` command shows details about the space usage of each volume in an aggregate, including offline volumes. This command bridges the gap between the output of the `volume show-space` and `aggregate show-space` commands. All percentages are calculated as a percent of aggregate size.

The following example shows the `volume show-footprint` command output for a volume called testvol:

```
cluster1::> volume show-footprint testvol

      Vserver : thevs
      Volume  : testvol

      Feature                                    Used     Used%
      -------------------------------         ----------   -----
      Volume Data Footprint                       120.6MB      4%
      Volume Guarantee                             1.88GB     71%
      Flexible Volume Metadata                    11.38MB      0%
      Delayed Frees                                1.36MB      0%
      Total Footprint                              2.01GB     76%
```

The following table explains some of the key rows of the output of the `volume show-footprint` command and what you can do to try to decrease space usage by that feature:

Row/feature name	Description/contents of row	Some ways to decrease
`Volume Data Footprint`	The total amount of space used in the containing aggregate by a volume's data in the active file system and the space used by the volume's Snapshot copies. This row does not include reserved space.	• Deleting data from the volume. • Deleting Snapshot copies from the volume.
`Volume Guarantee`	The amount of space reserved by the volume in the aggregate for future writes. The amount of space reserved depends on the guarantee type of the volume.	Changing the type of guarantee for the volume to `none`.
`Flexible Volume Metadata`	The total amount of space used in the aggregate by the volume's metadata files.	No direct method to control.

`Delayed Frees`	Blocks that ONTAP used for performance and cannot be immediately freed. For SnapMirror destinations, this row has a value of `0` and is not displayed.	No direct method to control.
`File Operation Metadata`	The total amount of space reserved for file operation metadata.	No direct method to control.
`Total Footprint`	The total amount of space that the volume uses in the aggregate. It is the sum of all of the rows.	Any of the methods used to decrease space used by a volume.

Related information

[NetApp Technical Report 3483: Thin Provisioning in a NetApp SAN or IP SAN Enterprise Environment](#)

Determine space usage in a local tier (aggregate)

You can view how much space is used by all of the volumes in one or more local tiers (aggregates) so that you can take actions to free more space.

You can view space usage by all volumes in one or more aggregates with the `aggregate show-space` command. This helps you see which volumes are consuming the most space in their containing aggregates so that you can take actions to free more space.

The used space in an aggregate is directly affected by the space used in the FlexVol volumes it contains. Measures that you take to increase space in a volume also affect space in the aggregate.

The following rows are included in the `aggregate show-space` command output:

- **Volume Footprints**

  The total of all volume footprints within the aggregate. It includes all of the space that is used or reserved by all data and metadata of all volumes in the containing aggregate.

- **Aggregate Metadata**

  The total file system metadata required by the aggregate, such as allocation bitmaps and inode files.

- **Snapshot Reserve**

  The amount of space reserved for aggregate Snapshot copies, based on volume size. It is considered used space and is not available to volume or aggregate data or metadata.

- **Snapshot Reserve Unusable**

  The amount of space originally allocated for aggregate Snapshot reserve that is unavailable for aggregate Snapshot copies because it is being used by volumes associated with the aggregate. Can occur only for aggregates with a non-zero aggregate Snapshot reserve.

- **Total Used**

The sum of all space used or reserved in the aggregate by volumes, metadata, or Snapshot copies.

• **Total Physical Used**

The amount of space being used for data now (rather than being reserved for future use). Includes space used by aggregate Snapshot copies.

The following example shows the `aggregate show-space` command output for an aggregate whose Snapshot reserve is 5%. If the Snapshot reserve was 0, the row would not be displayed.

```
cluster1::> storage aggregate show-space

                    Aggregate : wqa_gx106_aggr1

    Feature                                      Used       Used%
    -------------------------------          ----------     ------
    Volume Footprints                           101.0MB        0%
    Aggregate Metadata                            300KB        0%
    Snapshot Reserve                             5.98GB        5%

    Total Used                                   6.07GB        5%
    Total Physical Used                         34.82KB        0%
```

Relocate ownership of a local tier (aggregate) within an HA pair

You can change the ownership of local tiers (aggregates) among the nodes in an HA pair without interrupting service from the local tiers.

Both nodes in an HA pair are physically connected to each other's disks or array LUNs. Each disk or array LUN is owned by one of the nodes.

Ownership of all disks or array LUNs within a local tier (aggregate) changes temporarily from one node to the other when a takeover occurs. However, local tiers relocation operations can also permanently change the ownership (for example, if done for load balancing). The ownership changes without any data-copy processes or physical movement of the disks or array LUNs.

About this task

• Because volume count limits are validated programmatically during local tier relocation operations, it is not necessary to check for this manually.

If the volume count exceeds the supported limit, the local tier relocation operation fails with a relevant error message.

• You should not initiate local tier relocation when system-level operations are in progress on either the source or the destination node; likewise, you should not start these operations during the local tier relocation.

These operations can include the following:

◦ Takeover

◦ Giveback

◦ Shutdown

◦ Another local tier relocation operation

◦ Disk ownership changes

◦ Local tier or volume configuration operations

◦ Storage controller replacement

◦ ONTAP upgrade

◦ ONTAP revert

- If you have a MetroCluster configuration, you should not initiate local tier relocation while disaster recovery operations (*switchover*, *healing*, or *switchback*) are in progress.

- If you have a MetroCluster configuration and initiate local tier relocation on a switched-over local tier, the operation might fail because it exceeds the DR partner's volume limit count.

- You should not initiate local tier relocation on aggregates that are corrupt or undergoing maintenance.

- Before initiating the local tier relocation, you should save any core dumps on the source and destination nodes.

Steps

1. View the aggregates on the node to confirm which aggregates to move and ensure they are online and in good condition:

   ```
   storage aggregate show -node source-node
   ```

   The following command shows six aggregates on the four nodes in the cluster. All aggregates are online. Node1 and Node3 form an HA pair and Node2 and Node4 form an HA pair.

   ```
   cluster::> storage aggregate show
   Aggregate      Size Available Used% State    #Vols  Nodes  RAID Status
   ---------  -------- --------- ----- -------  ------ ------ -----------
   aggr_0     239.0GB   11.13GB   95% online        1 node1  raid_dp,
                                                                 normal
   aggr_1     239.0GB   11.13GB   95% online        1 node1  raid_dp,
                                                                 normal
   aggr_2     239.0GB   11.13GB   95% online        1 node2  raid_dp,
                                                                 normal
   aggr_3     239.0GB   11.13GB   95% online        1 node2  raid_dp,
                                                                 normal
   aggr_4     239.0GB   238.9GB    0% online        5 node3  raid_dp,
                                                                 normal
   aggr_5     239.0GB   239.0GB    0% online        4 node4  raid_dp,
                                                                 normal
   6 entries were displayed.
   ```

2. Issue the command to start the aggregate relocation:

```
storage aggregate relocation start -aggregate-list aggregate-1, aggregate-2…
-node source-node -destination destination-node
```

The following command moves the aggregates aggr_1 and aggr_2 from Node1 to Node3. Node3 is Node1's HA partner. The aggregates can be moved only within the HA pair.

```
cluster::> storage aggregate relocation start -aggregate-list aggr_1,
aggr_2 -node node1 -destination node3
Run the storage aggregate relocation show command to check relocation
status.
node1::storage aggregate>
```

3. Monitor the progress of the aggregate relocation with the `storage aggregate relocation show` command:

```
storage aggregate relocation show -node source-node
```

The following command shows the progress of the aggregates that are being moved to Node3:

```
cluster::> storage aggregate relocation show -node node1
Source Aggregate    Destination    Relocation Status
------ -----------  -------------  ------------------------
node1
       aggr_1       node3          In progress, module: wafl
       aggr_2       node3          Not attempted yet
2 entries were displayed.
node1::storage aggregate>
```

When the relocation is complete, the output of this command shows each aggregate with a relocation status of "Done".

Delete a local tier (aggregate)

You can delete a local tier (aggregate) if there are no volumes on the local tier.

The `storage aggregate delete` command deletes a storage aggregate. The command fails if there are volumes present on the aggregate. If the aggregate has an object store attached to it, then in addition to deleting the aggregate, the command deletes the objects in the object store as well. No changes are made to the object store configuration as part of this command.

The following example deletes an aggregate named "aggr1":

```
> storage aggregate delete -aggregate aggr1
```

Commands for aggregate relocation

There are specific ONTAP commands for relocating aggregate ownership within an HA pair.

If you want to…	Use this command…
Start the aggregate relocation process	`storage aggregate relocation start`
Monitor the aggregate relocation process	`storage aggregate relocation show`

Related information

ONTAP 9 Commands

Commands for managing aggregates

You use the `storage aggregate` command to manage your aggregates.

If you want to…	Use this command…
Display the size of the cache for all Flash Pool aggregates	`storage aggregate show -fields hybrid-cache-size-total -hybrid-cache-size-total >0`
Display disk information and status for an aggregate	`storage aggregate show-status`
Display spare disks by node	`storage aggregate show-spare-disks`
Display the root aggregates in the cluster	`storage aggregate show -has-mroot true`
Display basic information and status for aggregates	`storage aggregate show`
Display the type of storage used in an aggregate	`storage aggregate show -fields storage-type`
Bring an aggregate online	`storage aggregate online`
Delete an aggregate	`storage aggregate delete`
Put an aggregate into the restricted state	`storage aggregate restrict`
Rename an aggregate	`storage aggregate rename`
Take an aggregate offline	`storage aggregate offline`

If you want to…	Use this command…
Change the RAID type for an aggregate	`storage aggregate modify -raidtype`

Related information

ONTAP 9 Commands