Manage FabricPool

ONTAP 9

NetApp
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Table of Contents

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Manage FabricPool overview

To help you with your storage tiering needs, ONTAP enables you to display how much data in a volume is inactive, add or move volumes to FabricPool, monitor the space utilization for FabricPool, or modify a volume's tiering policy or tiering minimum cooling period.

Determine how much data in a volume is inactive by using inactive data reporting

Seeing how much data in a volume is inactive enables you to make good use of storage tiers. Information in inactive data reporting helps you decide which aggregate to use for FabricPool, whether to move a volume in to or out of FabricPool, or whether to modify the tiering policy of a volume.

What you'll need

You must be running ONTAP 9.4 or later to use the inactive data reporting functionality.

About this task

- Inactive data reporting is not supported on some aggregates.

  You cannot enable inactive data reporting when FabricPool cannot be enabled, including the following instances:

  - Root aggregates
  - MetroCluster aggregates running ONTAP versions earlier than 9.7
  - Flash Pool (hybrid aggregates, or SnapLock aggregates)
- Inactive data reporting is enabled by default on all SSD aggregates in ONTAP 9.6.
- Inactive data reporting is enabled by default on FabricPool aggregate in ONTAP 9.4 and ONTAP 9.5.
- You can enable inactive data reporting on non-FabricPool aggregates using the ONTAP CLI, including HDD aggregates, beginning with ONTAP 9.6.

Steps

1. If the aggregate for which you want to see inactive data reporting is not used in FabricPool, enable inactive data reporting for the aggregate by using the `storage aggregate modify` command with the `-is-inactive-data-reporting-enabled true` parameter.

   ```
   cluster1::> storage aggregate modify -aggregate aggr1 -is-inactive-data
   -reporting-enabled true
   ```

   You need to explicitly enable the inactive data reporting functionality on an aggregate that is not used for FabricPool.

You cannot and do not need to enable inactive data reporting on a FabricPool-enabled aggregate because the aggregate already comes with inactive data reporting. The `-is-inactive-data-reporting -enabled` parameter does not work on FabricPool-enabled aggregates.

The `-fields is-inactive-data-reporting-enabled` parameter of the `storage aggregate show` command shows whether inactive data reporting is enabled on an aggregate.

2. To display how much data is inactive on a volume, use the `volume show` command with the `-fields performance-tier-inactive-user-data,performance-tier-inactive-user-data-percent` parameter.

```
cluster1::> volume show -fields performance-tier-inactive-user-
data,performance-tier-inactive-user-data-percent

vserver volume performance-tier-inactive-user-data performance-tier-
inactive-user-data-percent
------- ------ ----------------------------------
---------------------------------------
vsim1   vol0   0B                                 0%
vs1     vs1rv1 0B                                 0%
vs1     vv1    10.34MB                            0%
vs1     vv2    10.38MB                            0%
4 entries were displayed.
```

   - The `performance-tier-inactive-user-data` field displays how much user data stored in the aggregate is inactive.
   - The `performance-tier-inactive-user-data-percent` field displays what percent of the data is inactive across the active file system and Snapshot copies.
   - For an aggregate that is not used for FabricPool, it takes 31 days after you enable inactive data reporting for ONTAP to display inactive data for the entire volume, regardless of whether a tiering policy has been set or what the tiering policy is.

     Until the period is reached, the output shows "-" for the amount of inactive data instead of a value.

   - On a volume that is part of FabricPool, what ONTAP reports as inactive depends on the tiering policy that is set on a volume.
     - For the `auto` tiering policy, ONTAP reports the inactive amount of the entire volume for the period specified by the `-tiering-minimum-cooling-days` parameter in the advanced privilege level of the `volume create` or `volume modify` command.

       If no value is set for `-tiering-minimum-cooling-days`, then ONTAP uses the default value (31 days).

     - For the `snapshot-only` tiering policy, ONTAP reports the amount of the active file system that is inactive for at least 31 days.
     - For the `none` tiering policy, ONTAP reports the amount of the entire volume that is inactive for at least 31 days.

- For the `all` tiering policy, inactive data reporting is not supported.

Add or move volumes to FabricPool as needed

Create a volume for FabricPool

You can add volumes to FabricPool by creating new volumes directly in the FabricPool-enabled aggregate or by moving existing volumes from another aggregate to the FabricPool-enabled aggregate.

When you create a volume for FabricPool, you have the option to specify a tiering policy. If no tiering policy is specified, the created volume uses the default `snapshot-only` tiering policy. For a volume with the `snapshot-only` or `auto` tiering policy, you can also specify the tiering minimum cooling period.

What you'll need

- Setting a volume to use the `auto` tiering policy or specifying the tiering minimum cooling period requires ONTAP 9.4 or later.
- Using FlexGroup volumes requires ONTAP 9.5 or later.
- Setting a volume to use the `all` tiering policy requires ONTAP 9.6 or later.
- Setting a volume to use the `-cloud-retrieval-policy` parameter requires ONTAP 9.8 or later.

Steps

1. Create a new volume for FabricPool by using the `volume create` command.
   - The `-tiering-policy` optional parameter enables you to specify the tiering policy for the volume.

     You can specify one of the following tiering policies:

     - `snapshot-only` (default)
     - `auto`
     - `all`
     - `backup` (deprecated)
     - `none`

       Types of FabricPool tiering policies
   - The `-cloud-retrieval-policy` optional parameter enables cluster administrators with the advanced privilege level to override the default cloud migration or retrieval behavior controlled by the tiering policy.

     You can specify one of the following cloud retrieval policies:

     - `default`

       The tiering policy determines what data is pulled back, so there is no change to cloud data retrieval with `default` cloud-retrieval-policy. This means the behavior is the same as in pre-ONTAP 9.8 releases:

- If the tiering policy is `none` or `snapshot-only`, then "default" means that any client-driven data read is pulled from the cloud tier to performance tier.
- If the tiering policy is `auto`, then any client-driven random read is pulled but not sequential reads.
- If the tiering policy is `all` then no client-driven data is pulled from the cloud tier.

- `on-read`

  All client-driven data reads are pulled from the cloud tier to performance tier.

- `never`

  No client-driven data is pulled from the cloud tier to performance tier

- `promote`
  - For tiering policy `none`, all cloud data is pulled from the cloud tier to the performance tier
  - For tiering policy `snapshot-only`, all active filesystem data is pulled from the cloud tier to the performance tier.

◦ The `-tiering-minimum-cooling-days` optional parameter in the advanced privilege level enables you to specify the tiering minimum cooling period for a volume that uses the `snapshot-only` or `auto` tiering policy.

Beginning with ONTAP 9.8, you can specify a value between 2 and 183 for the tiering minimum cooling days. If you are using a version of ONTAP earlier than 9.8, you can specify a value between 2 and 63 for the tiering minimum cooling days.

Example of creating a volume for FabricPool

The following example creates a volume called "myvol1" in the "myFabricPool" FabricPool-enabled aggregate. The tiering policy is set to `auto` and the tiering minimum cooling period is set to 45 days:

```
cluster1::*> volume create -vserver myVS -aggregate myFabricPool
-volume myvol1 -tiering-policy auto -tiering-minimum-cooling-days 45
```

Related information

FlexGroup volumes management

Move a volume to FabricPool

When you move a volume to FabricPool, you have the option to specify or change the tiering policy for the volume with the move. Beginning with ONTAP 9.8, when you move a non-FabricPool volume with inactive data reporting enabled, FabricPool uses a heat map to read tierable blocks, and moves cold data to the capacity tier on the FabricPool destination.

What you'll need

You must understand how changing the tiering policy might affect how long it takes for data to become cold and be moved to the cloud tier.

What happens to the tiering policy when you move a volume

About this task

If a non-FabricPool volume has inactive data reporting enabled, when you move a volume with tiering-policy `auto` or `snapshot-only` to a FabricPool, FabricPool reads the temperature tierable blocks from a heat map file and uses that temperature to move the cold data directly to the capacity tier on the FabricPool destination.

You should not use the `-tiering-policy` option on volume move if you are using ONTAP 9.8 and you want FabricPools to use inactive data reporting information to move data directly to the capacity tier. Using this option causes FabricPools to ignore the temperature data and instead follow the move behavior of releases prior to ONTAP 9.8.

Step

1. Use the `volume move start` command to move a volume to FabricPool.

   The `-tiering-policy` optional parameter enables you to specify the tiering policy for the volume.

   You can specify one of the following tiering policies:

   - `snapshot-only` (default)
   - `auto`
   - `all`
   - `none`
     Types of FabricPool tiering policies

Example of moving a volume to FabricPool

The following example moves a volume named “myvol2” of the "vs1" SVM to the "dest_FabricPool" FabricPool-enabled aggregate. The volume is explicitly set to use the `none` tiering policy:

```
cluster1::> volume move start -vserver vs1 -volume myvol2
-destination-aggregate dest_FabricPool -tiering-policy none
```

Object tagging using user-created custom tags

Object tagging using user-created custom tags overview

Beginning with ONTAP 9.8, FabricPool supports object tagging using user-created custom tags to enable you to classify and sort objects for easier management. If you are a user with the admin privilege level, you can create new object tags, and modify, delete, and view existing tags.

Assign a new tag during volume creation

You can create a new object tag when you want to assign one or more tags to new objects that are tiered from a new volume you create.

About this task

- A maximum of 4 tags per volume is allowed
- Each object tag must be a key-value pair separated by an equal sign ("")
- Multiple tags must be separated by a comma ("")
- Each tag value can contain a maximum of 127 characters
- Each tag key must start with either an alphabetic character or an underscore.

  Keys must contain only alphanumeric characters and underscores, and the maximum number of characters allowed is 127.

Step

1. Use the `volume create` command with the `-tiering-object-tags` option to create a new volume with the specified tags. You can specify multiple tags in comma-separated pairs:

```
volume create [ -vserver <vserver name> ] -volume <volume_name> -tiering
-object-tags <key1=value1> [
    ,<key2=value2>,<key3=value3>,<key4=value4> ]
```

The following example creates a volume named fp_volume1 with three object tags.

```
vol create -volume fp_volume1 -vserver vs0 -tiering-object-tags
project=fabricpool,type=abc,content=data
```

Modify an existing tag

You can change the name of a tag, replace tags on existing objects in the object store, or add a different tag to new objects that you plan to add later.

About this task

Using the `volume modify` command with the `-tiering-object-tags` option replaces existing tags with the new value you provide.

Step

1. Use the `volume modify` command with the `-tiering-object-tags` option to modify an existing tag.

```
volume modify [ -vserver <vserver name> ] -volume <volume_name> -tiering
-object-tags <key1=value1> [ ,<key2=value2>,
<key3=value3>,<key4=value4> ]
```

The following example changes the name of the existing tag type=abc to type=xyz.

```
vol create -volume fp_volume1 -vserver vs0 -tiering-object-tags
project=fabricpool,type=xyz,content=data
```

Delete a tag

You can delete object tags when you no longer want them set on a volume or on objects in the object store.

Step

1. Use the `volume modify` command with the `-tiering-object-tags` option followed by an empty value (`""`) to delete an existing tag.

   The following example deletes the existing tags on fp_volume1.

   ```
   vol modify -volume fp_volume1 -vserver vs0 -tiering-object-tags ""
   ```

View existing tags on a volume

You can view the existing tags on a volume to see what tags are available before appending new tags to the list.

Step

1. Use the `volume show` command with the `-tiering-object-tags` option to view existing tags on a volume.

   ```
   volume show [ -vserver <vserver name> ] -volume <volume_name> -fields
   -tiering-object-tags
   ```

Check object tagging status on FabricPool volumes

You can check if tagging is complete on one or more FabricPool volumes.

Step

1. Use the `vol show` command with the `-fieldsneeds-object-retagging` option to see if tagging is in progress, if it has completed, or if tagging is not set.

   ```
   vol show -fields needs-object-retagging  [ -instance | -volume <volume
   name>]
   ```

   One of the following values is displayed:

   - `true` — the object tagging scanner has not yet to run or needs to run again for this volume
   - `false` — the object tagging scanner has completed tagging for this volume
   - `<->` — the object tagging scanner is not applicable for this volume. This happens for volumes that are not residing on FabricPools.

Monitor the space utilization for FabricPool

You need to know how much data is stored in the performance and cloud tiers for FabricPool. That information helps you determine whether you need to change the tiering policy of a volume, increase the FabricPool licensed usage limit, or increase the storage space of the cloud tier.

Steps

1. Monitor the space utilization for FabricPool-enabled aggregates by using one of the following commands to display the information:

If you want to display…	Then use this command:
The used size of the cloud tier in an aggregate	`storage aggregate show` with the `-instance` parameter
Details of space utilization within an aggregate, including the object store's referenced capacity	`storage aggregate show-space` with the `-instance` parameter
Space utilization of the object stores that are attached to the aggregates, including how much license space is being used	`storage aggregate object-store show-space`
A list of volumes in an aggregate and the footprints of their data and metadata	`volume show-footprint`

   In addition to using CLI commands, you can use Active IQ Unified Manager (formerly OnCommand Unified Manager), along with FabricPool Advisor, which is supported on ONTAP 9.4 and later clusters, or System Manager to monitor the space utilization.

   The following example shows ways of displaying space utilization and related information for FabricPool:

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

                          Aggregate: MyFabricPool
                                                                      ...
                                                 Aggregate Display Name:
MyFabricPool
                                                                      ...
                          Total Object Store Logical Referenced
Capacity: -
                          Object Store Logical Referenced Capacity
Percentage: -
                                                                      ...
                                                          Object Store
Size: -
                          Object Store Space Saved by Storage
Efficiency: -
                          Object Store Space Saved by Storage Efficiency
Percentage: -
                                                    Total Logical Used
Size: -
                                                    Logical Used
Percentage: -
                                              Logical Unreferenced
Capacity: -
                                            Logical Unreferenced
Percentage: -
```

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

                           Aggregate: MyFabricPool
                           ...
                           Composite: true
                           Capacity Tier Used Size:
                           ...
```

```
cluster1::> volume show-footprint

Vserver : vs1
Volume : rootvol

Feature                          Used       Used%
-------------------------------- ---------- -----
Volume Footprint                 KB          %
Volume Guarantee                 MB          %
Flexible Volume Metadata         KB          %
Delayed Frees                    KB          %
Total Footprint                  MB          %

Vserver : vs1
Volume : vol

Feature                          Used       Used%
-------------------------------- ---------- -----
Volume Footprint                 KB          %
Footprint in Performance Tier    KB          %
Footprint in Amazon01            KB          %
Flexible Volume Metadata         MB          %
Delayed Frees                    KB          %
Total Footprint                  MB          %
...
```

2. Take one of the following actions as needed:

If you want to…	Then…
Change the tiering policy of a volume	Follow the procedure in Managing storage tiering by modifying a volume's tiering policy or tiering minimum cooling period.
Increase the FabricPool licensed usage limit	Contact your NetApp or partner sales representative. NetApp Support
Increase the storage space of the cloud tier	Contact the provider of the object store that you use for the cloud tier.

Manage storage tiering by modifying a volume's tiering policy or tiering minimum cooling period

You can change the tiering policy of a volume to control whether data is moved to the cloud tier when it becomes inactive (*cold*). For a volume with the `snapshot-only` or `auto` tiering policy, you can also specify the tiering minimum cooling period that user data must remain inactive before it is moved to the cloud tier.

What you'll need

Changing a volume to the `auto` tiering policy or modifying the tiering minimum cooling period requires ONTAP 9.4 or later.

About this task

Changing the tiering policy of a volume changes only the subsequent tiering behavior for the volume. It does not retroactively move data to the cloud tier.

Changing the tiering policy might affect how long it takes for data to become cold and be moved to the cloud tier.

What happens when you modify the tiering policy of a volume in FabricPool

Steps

1. Modify the tiering policy for an existing volume by using the `volume modify` command with the `-tiering-policy` parameter:

   You can specify one of the following tiering policies:

   - `snapshot-only` (default)
   - `auto`
   - `all`
   - `none`

     Types of FabricPool tiering policies

2. If the volume uses the `snapshot-only` or `auto` tiering policy and you want to modify the tiering minimum cooling period, use the `volume modify` command with the `-tiering-minimum-cooling-days` optional parameter in the advanced privilege level.

   You can specify a value between 2 and 183 for the tiering minimum cooling days. If you are using a version of ONTAP earlier than 9.8, you can specify a value between 2 and 63 for the tiering minimum cooling days.

Example of modifying the tiering policy and the tiering minimum cooling period of a volume

The following example changes the tiering policy of the volume "myvol" in the SVM "vs1" to `auto` and the tiering minimum cooling period to 45 days:

```
cluster1::> volume modify -vserver vs1 -volume myvol
-tiering-policy auto -tiering-minimum-cooling-days 45
```

Archive volumes with FabricPool (video)

This video shows a quick overview of using System Manager to archive a volume to a cloud tier with FabricPool.

NetApp video: Archiving volumes with FabricPool (backup + volume move)

Related information

NetApp TechComm TV: FabricPool playlist

Use cloud migration controls to override a volume's default tiering policy

You can change a volume's default tiering policy for controlling user data retrieval from the cloud tier to performance tier by using the `-cloud-retrieval-policy` option introduced in ONTAP 9.8.

What you'll need

- Modifying a volume using the `-cloud-retrieval-policy` option requires ONTAP 9.8 or later.
- You must have the advanced privilege level to perform this operation.
- You should understand the behavior of tiering policies with `-cloud-retrieval-policy`.

  How tiering policies work with cloud migration

Step

1. Modify the tiering policy behavior for an existing volume by using the `volume modify` command with the `-cloud-retrieval-policy` option:

```
 volume create -volume <volume_name> -vserver <vserver_name> - tiering-
policy <policy_name> -cloud-retrieval-policy
```

```
vol modify -volume fp_volume4 -vserver vs0 -cloud-retrieval-policy
promote
```

Promote data to the performance tier

Promote data to the performance tier overview

Beginning with ONTAP 9.8, if you are a cluster administrator at the advanced privilege level, you can proactively promote data to the performance tier from the cloud tier using a combination of the `tiering-policy` and the `cloud-retrieval-policy` setting.

About this task

You might do this if you want to stop using FabricPool on a volume, or if you have a `snapshot-only` tiering policy and you want to bring restored Snapshot copy data back to the performance tier.

Promote all data from a FabricPool volume to the performance tier

You can proactively retrieve all data on a FabricPool volume in the Cloud and promote it to the performance tier.

Step

1. Use the `volume modify` command to set `tiering-policy` to `none` and `cloud-retrieval-policy` to `promote`.

```
volume modify -vserver <vserver-name> -volume <volume-name> -tiering
-policy none -cloud-retrieval-policy promote
```

Promote file system data to the performance tier

You can proactively retrieve active file system data from a restored Snapshot copy in the cloud tier and promote it to the performance tier.

Step

1. Use the `volume modify` command to set `tiering-policy` to `snapshot-only` and `cloud-retrieval-policy` to `promote`.

```
volume modify -vserver <vserver-name> -volume <volume-name> -tiering
-policy snapshot-only cloud-retrieval-policy promote
```

Check the status of a performance tier promotion

You can check the status of performance tier promotion to determine when the operation is complete.

Step

1. Use the volume `object-store` command with the `tiering` option to check the status of the performance tier promotion.

```
volume object-store tiering show [ -instance | -fields <fieldname>, ...
] [ -vserver <vserver name> ] *Vserver
[[-volume] <volume name>] *Volume [ -node <nodename> ] *Node Name [ -vol
-dsid <integer> ] *Volume DSID
[ -aggregate <aggregate name> ] *Aggregate Name
```

```
volume object-store tiering show v1 -instance

                                  Vserver: vs1
                                   Volume: v1
                                Node Name: node1
                              Volume DSID: 1023
                            Aggregate Name: a1
                                    State: ready
                       Previous Run Status: completed
                  Aborted Exception Status: -
                Time Scanner Last Finished: Mon Jan 13 20:27:30 2020
                  Scanner Percent Complete: -
                       Scanner Current VBN: -
                          Scanner Max VBNs: -
      Time Waiting Scan will be scheduled: -
                            Tiering Policy: snapshot-only
     Estimated Space Needed for Promotion: -
                          Time Scan Started: -
  Estimated Time Remaining for scan to complete: -
                     Cloud Retrieve Policy: promote
```

Trigger scheduled migration and tiering

You can trigger a tiering scan request at any time when you prefer not to wait for the default tiering scan.

Step

1. Use the `volume object-store` command with the `trigger` option to request migration and tiering.

```
volume object-store tiering trigger [ -vserver <vserver name> ] *VServer
Name [-volume] <volume name> *Volume Name
```