Use NetApp Cloud Tiering

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NetApp
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Manage data tiering for your clusters in NetApp Cloud Tiering

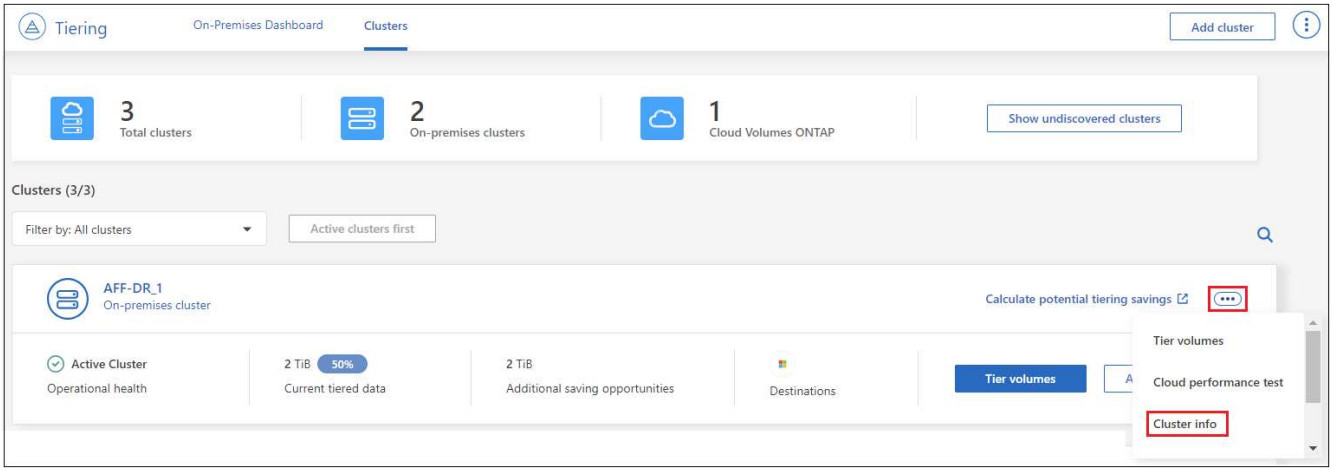
Now that you've set up data tiering from your on-premises ONTAP clusters, you can tier data from additional volumes, change a volume's tiering policy, discover additional clusters, and more by using NetApp Cloud Tiering.

Review tiering info for a cluster

Check the data in the cloud tier, on disks, or the amount of hot and cold data on the cluster's disks. Or, you might want to see the amount of hot and cold data on the cluster's disks. Cloud Tiering provides this information for each cluster.

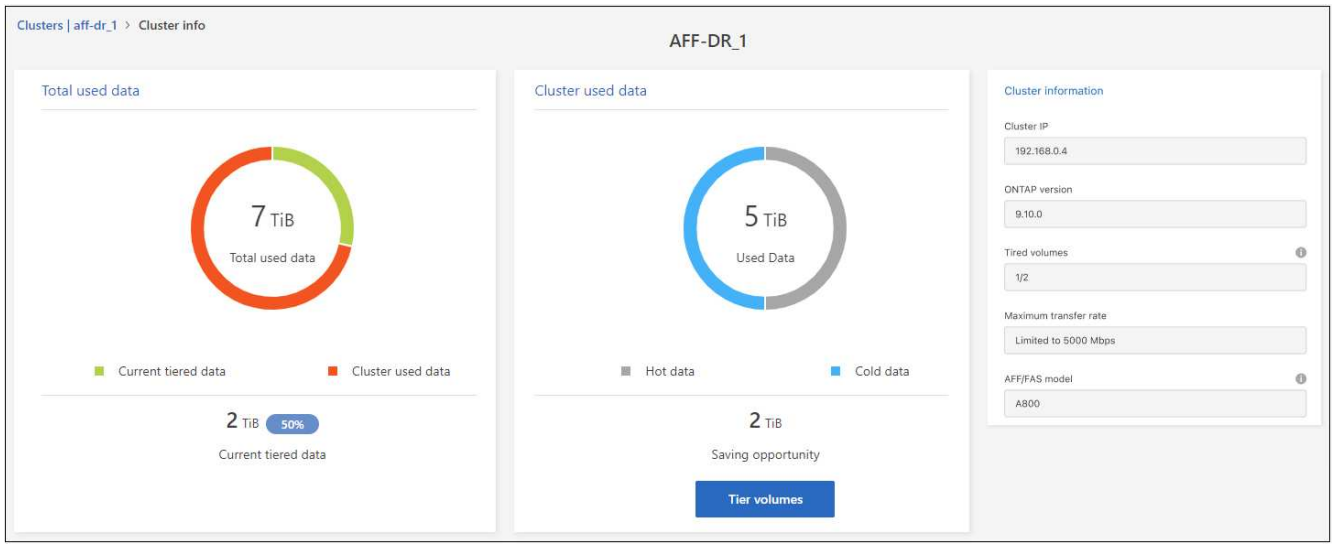
Steps

1. From the left navigation menu, select **Mobility > Cloud Tiering**.
2. From the **Clusters** page, select the menu icon ••• for a cluster and select **Cluster info**.



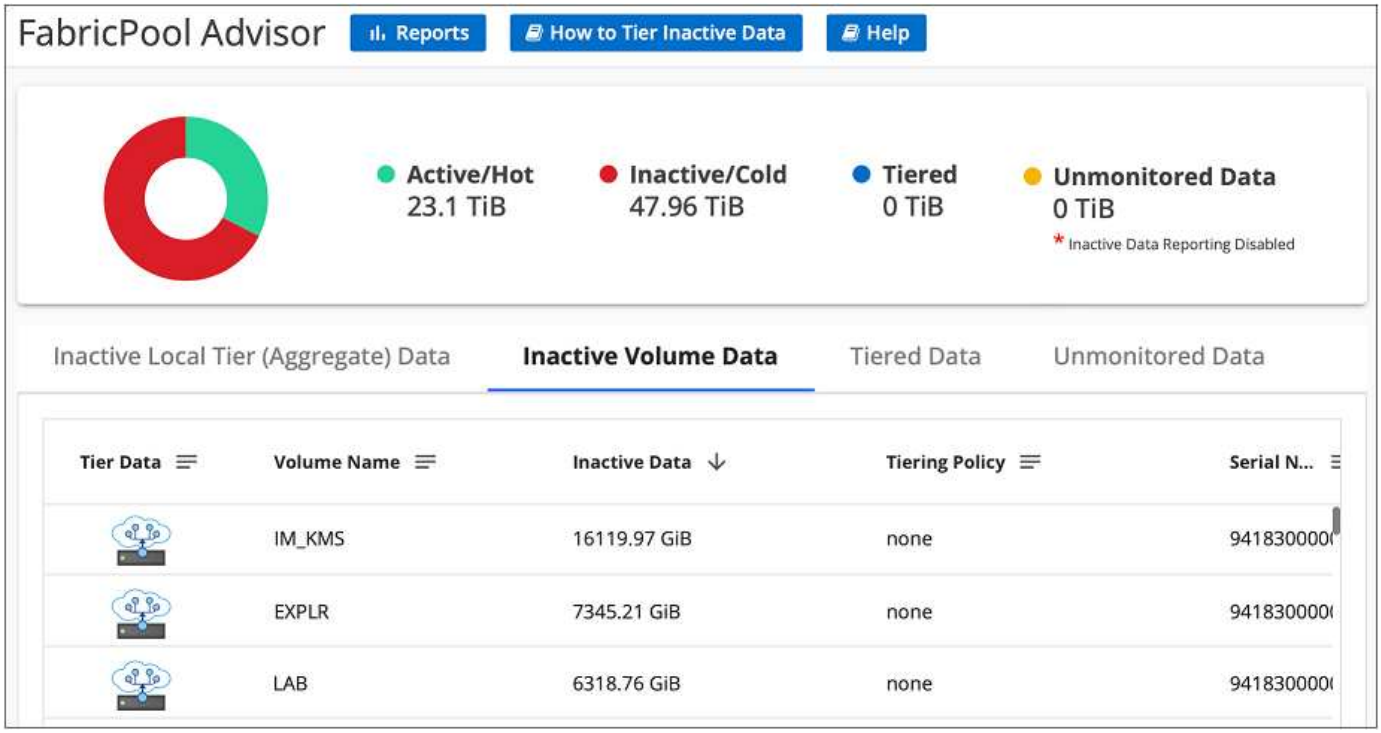
3. Review details about the cluster.

   Here's an example:



Note that the display is different for Cloud Volumes ONTAP systems. While Cloud Volumes ONTAP volumes can have data tiered to the cloud, they do not use the Cloud Tiering service. Learn how to tier inactive data from Cloud Volumes ONTAP systems to low-cost object storage.

You can also view tiering information for a cluster from Active IQ Digital Advisor (also known as Digital Advisor) if you're familiar with this NetApp product. Select **Cloud Recommendations** from the left navigation pane.



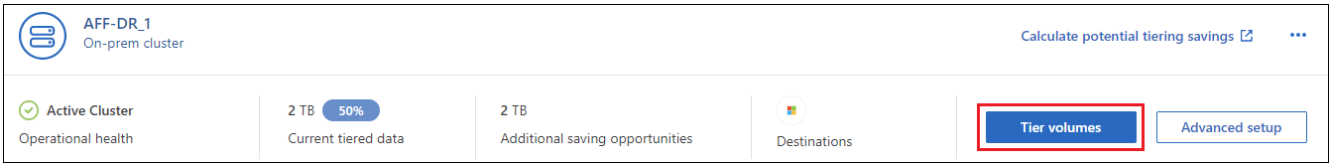
Tier data from additional volumes

Set up data tiering for additional volumes at any time—for example, after creating a new volume.

You don't need to configure the object storage because it was already configured when you initially set up tiering for the cluster. ONTAP tiers inactive data from any additional volumes to the same object store.

Steps

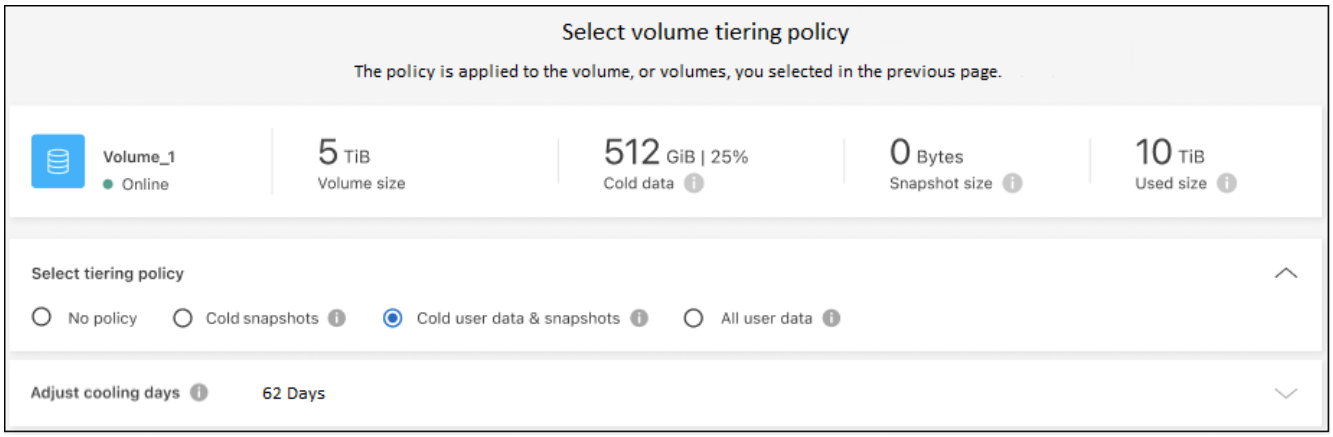
1. From the left navigation menu, select **Mobility > Cloud Tiering**.
2. From the **Clusters** page, select **Tier volumes** for the cluster.



3. On the *Tier Volumes* page, select the volumes that you want to configure tiering for and launch the Tiering Policy page:
   - To select all volumes, check the box in the title row () and select **Configure volumes**.
   - To select multiple volumes, check the box for each volume () and select **Configure volumes**.
   - To select a single volume, select the row (or  icon) for the volume.

4. In the *Tiering Policy* dialog, select a tiering policy, optionally adjust the cooling days for the selected volumes, and select **Apply**.

   Learn more about volume tiering policies and cooling days.



Result

ONTAP starts tiering the selected volumes' data to the cloud.

Change a volume's tiering policy

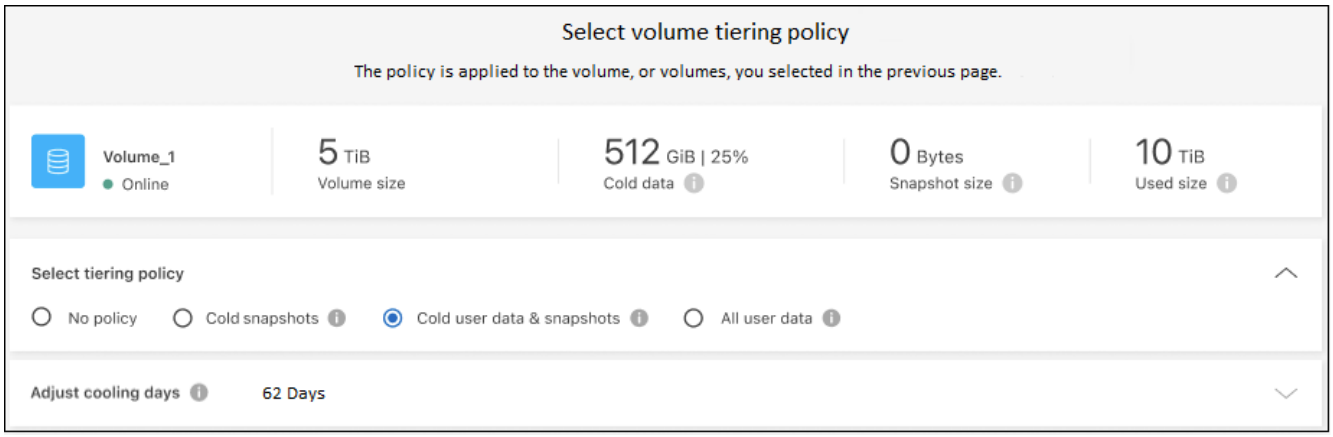
Changing the tiering policy for a volume changes how ONTAP tiers cold data to object storage. The change starts from the moment that you change the policy. It changes only the subsequent tiering behavior for the volume—it does not retroactively move data to the cloud tier.

Steps

1. From the left navigation menu, select **Mobility > CloudTiering**.

2. From the **Clusters** page, select **Tier volumes** for the cluster.
3. Click the row for a volume, select a tiering policy, optionally adjust the cooling days, and select **Apply**.

   Learn more about volume tiering policies and cooling days.



If you see options to "Retrieve Tiered Data", see Migrate data from the cloud tier back to the performance tier for details.

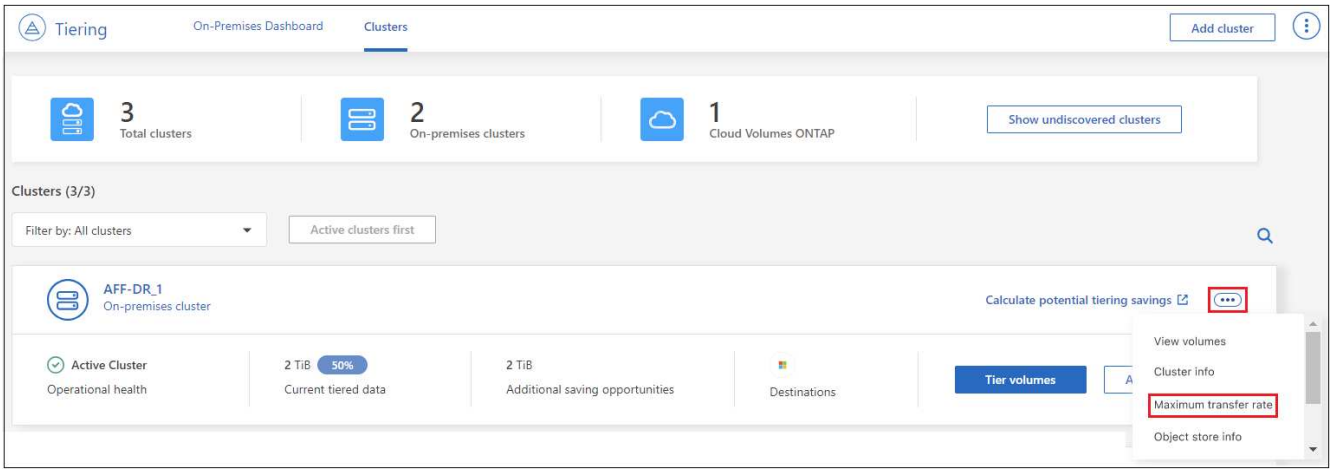
Result

ONTAP changes the tiering policy and begins tiering data based on the new policy.

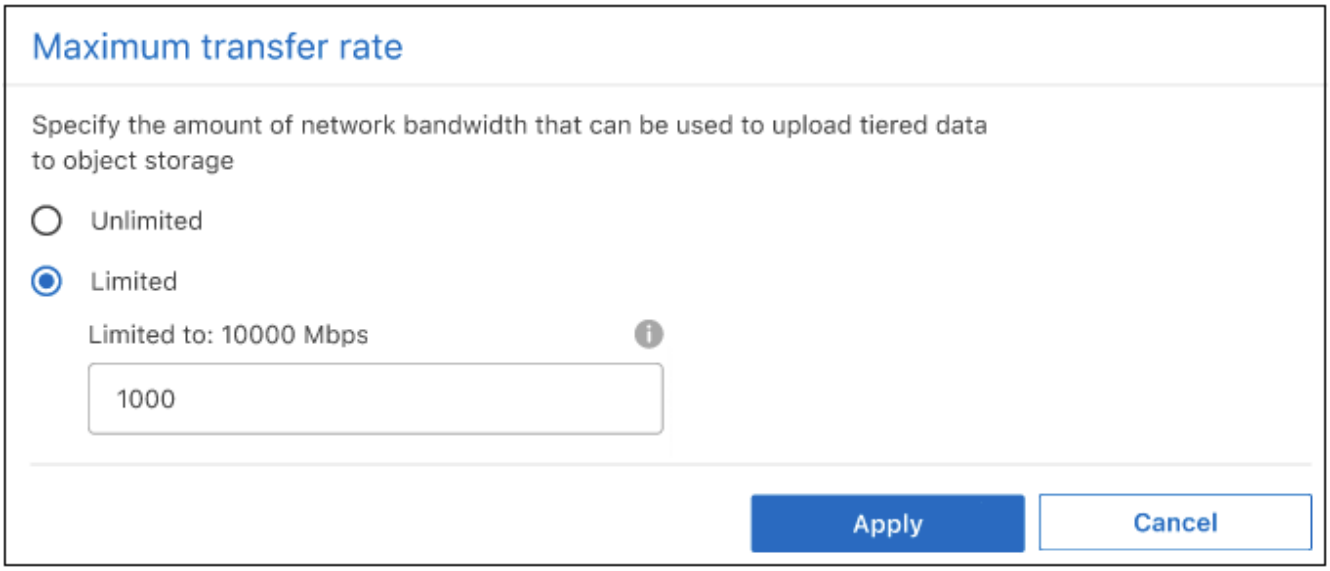
Change the network bandwidth available to upload inactive data to object storage

When you activate Cloud Tiering for a cluster, by default, ONTAP can use an unlimited amount of bandwidth to transfer the inactive data from volumes in system to object storage. If tiering traffic affects user workloads, throttle the network bandwidth used during the transfer. You can choose a value between 1 and 10,000 Mbps as the maximum transfer rate.

1. From the left navigation menu, select **Mobility > Tiering**.
2. From the **Clusters** page, select the menu icon ••• for a cluster and select **Maximum transfer rate**.



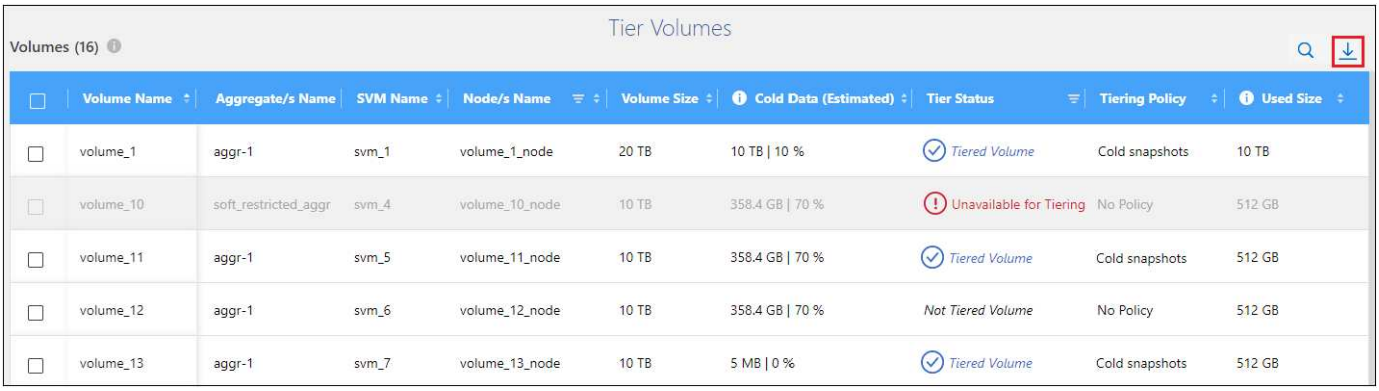
3. In the *Maximum transfer rate* page, select the **Limited** radio button and enter the maximum bandwidth that can be used, or select **Unlimited** to indicate that there is no limit. Then select **Apply**.



This setting does not affect the bandwidth allocated to any other clusters that are tiering data.

Download a tiering report for your volumes

Download a report of the Tier Volumes page so you can review the tiering status of all the volumes on the clusters you are managing. Just select the button. Cloud Tiering generates a .CSV file that you can review and send to other groups as needed. The .CSV file includes up to 10,000 rows of data.



Volume Name	Aggregate/s Name	SVM Name	Node/s Name	Volume Size	Cold Data (Estimated)	Tier Status	Tiering Policy	Used Size
volume_1	aggr-1	svm_1	volume_1_node	20 TB	10 TB | 10 %	Tiered Volume	Cold snapshots	10 TB
volume_10	soft_restricted_aggr	svm_4	volume_10_node	10 TB	358.4 GB | 70 %	Unavailable for Tiering	No Policy	512 GB
volume_11	aggr-1	svm_5	volume_11_node	10 TB	358.4 GB | 70 %	Tiered Volume	Cold snapshots	512 GB
volume_12	aggr-1	svm_6	volume_12_node	10 TB	358.4 GB | 70 %	Not Tiered Volume	No Policy	512 GB
volume_13	aggr-1	svm_7	volume_13_node	10 TB	5 MB | 0 %	Tiered Volume	Cold snapshots	512 GB

Migrate data from the cloud tier back to the performance tier

Tiered data that is accessed from the cloud may be "re-heated" and moved back to the performance tier. However, if you want to proactively promote data to the performance tier from the cloud tier, you can do this in the *Tiering Policy* dialog. This capability is available when using ONTAP 9.8 and greater.

You can do this if you want to stop using tiering on a volume, or if you decide to keep all user data on the performance tier, but keep Snapshot copies on the cloud tier.

There are two options:

Option	Description	Affect on Tiering Policy
Bring back all data	Retrieves all volume data and Snapshot copies tiered in the cloud and promotes them to the performance tier.	Tiering policy is changed to "No policy".

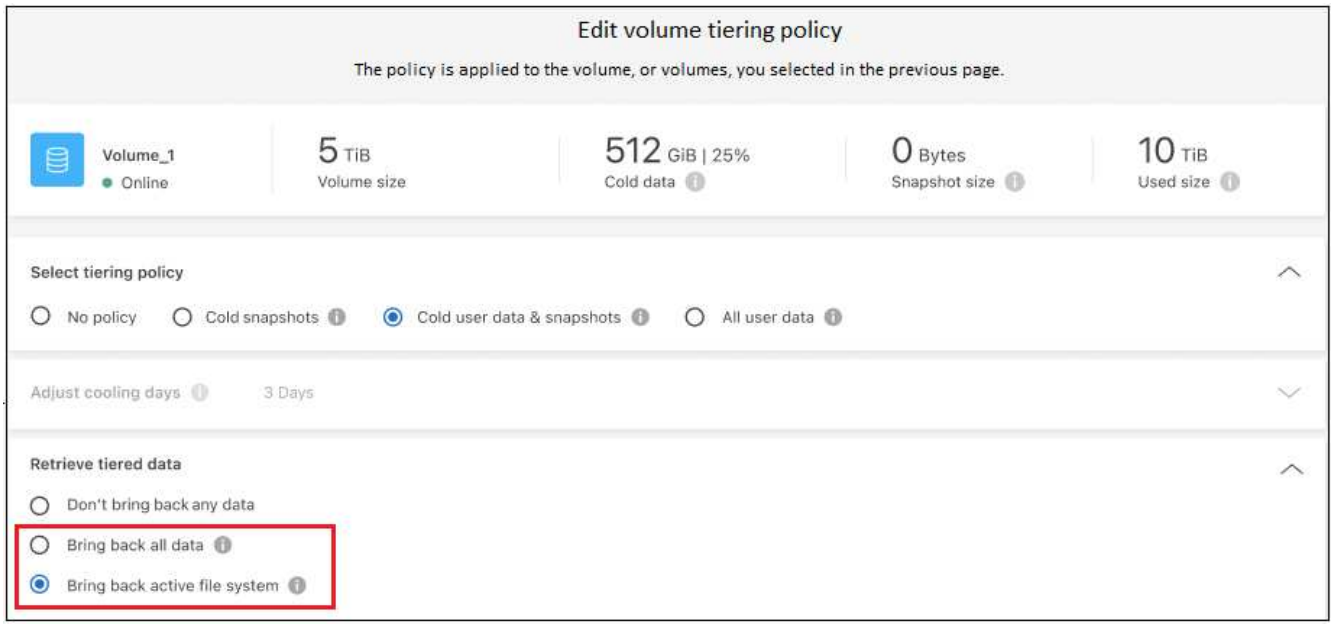
Option	Description	Affect on Tiering Policy
Bring back active file system	Retrieves only active file system data tiered in the cloud and promotes it to the performance tier (Snapshot copies remain in the cloud).	Tiering policy is changed to "Cold snapshots".

You may be charged by your cloud provider based on that amount of data transferred off the cloud.

Steps

Ensure the performance tier has enough space for data moved back from the cloud.

1. From the left navigation menu, select **Mobility > Cloud Tiering**.
2. From the **Clusters** page, select **Tier volumes** for the cluster.
3. Click the icon for the volume, choose the retrieval option you want to use, and select **Apply**.



Result

The tiering policy is changed and the tiered data starts to be migrated back to the performance tier. Depending on the amount of data in the cloud, the transfer process could take some time.

Manage tiering settings on aggregates

Each aggregate in your on-premises ONTAP systems has two settings that you can adjust: the tiering fullness threshold and whether inactive data reporting is enabled.

Tiering fullness threshold

Setting the threshold to a lower number reduces the amount of data required to be stored on the performance tier before tiering takes place. This might be useful for large aggregates that contain little active data.

Setting the threshold to a higher number increases the amount of data required to be stored on the

performance tier before tiering takes place. This might be useful for solutions designed to tier only when aggregates are near maximum capacity.

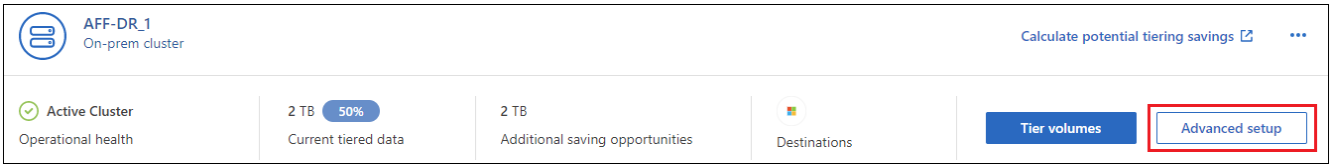
Inactive data reporting

Inactive data reporting (IDR) uses a 31-day cooling period to determine which data is considered inactive. The amount of cold data that is tiered is dependent on the tiering policies set on volumes. This amount might be different than the amount of cold data detected by IDR using a 31-day cooling period.

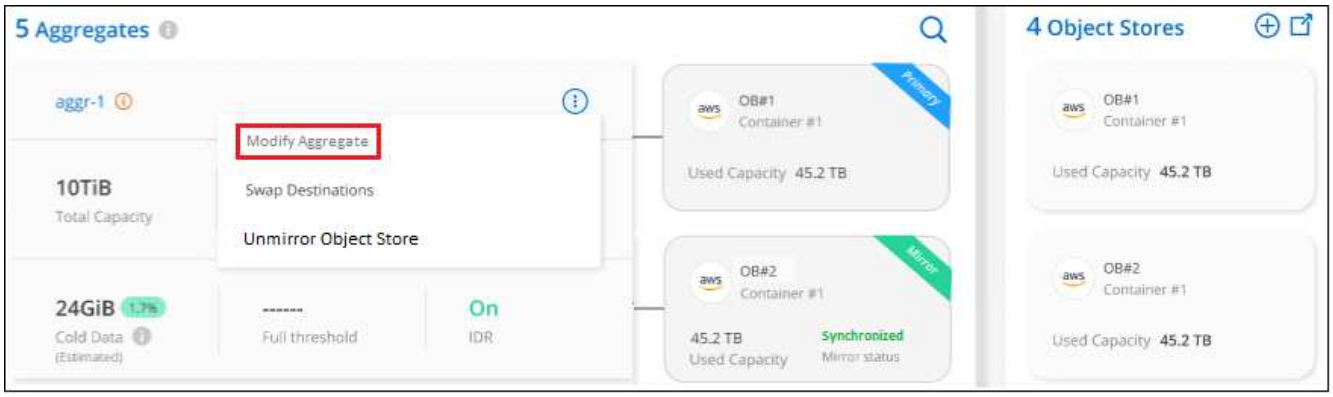
It's best to keep IDR enabled because it helps to identify your inactive data and savings opportunities. IDR must remain enabled if data tiering is enabled on an aggregate.

Steps

1. From the **Clusters** page, select **Advanced setup** for the selected cluster.



2. From the Advanced Setup page, select the menu icon for the aggregate and select **Modify Aggregate**.



3. In the dialog that is displayed, modify the fullness threshold and choose whether to enable or disable inactive data reporting.

4. Click **Apply**.

Fix operational health

If failures occur, Cloud Tiering displays a "Failed" operational health status on the Cluster Dashboard. The health reflects the status of the ONTAP system and the NetApp Console.

Steps

1. Identify any clusters that have an operational health of "Failed."
2. Hover over the informational "i" icon see the failure reason.
3. Correct the issue:
   a. Verify that the ONTAP cluster is operational and that it has an inbound and outbound connection to your object storage provider.
   b. Verify that the Console has outbound connections to the Cloud Tiering service, to the object store, and to the ONTAP clusters that it discovers.

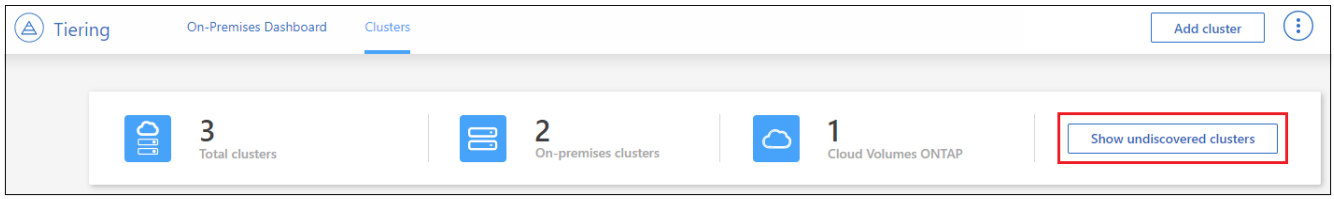
Discover additional clusters from Cloud Tiering

You can add your undiscovered on-premises ONTAP clusters to the Console from the Tiering *Cluster* page so that you can enable tiering for the cluster.

Note that buttons also appear on the Tiering *On-Prem dashboard* page for you to discover additional clusters.

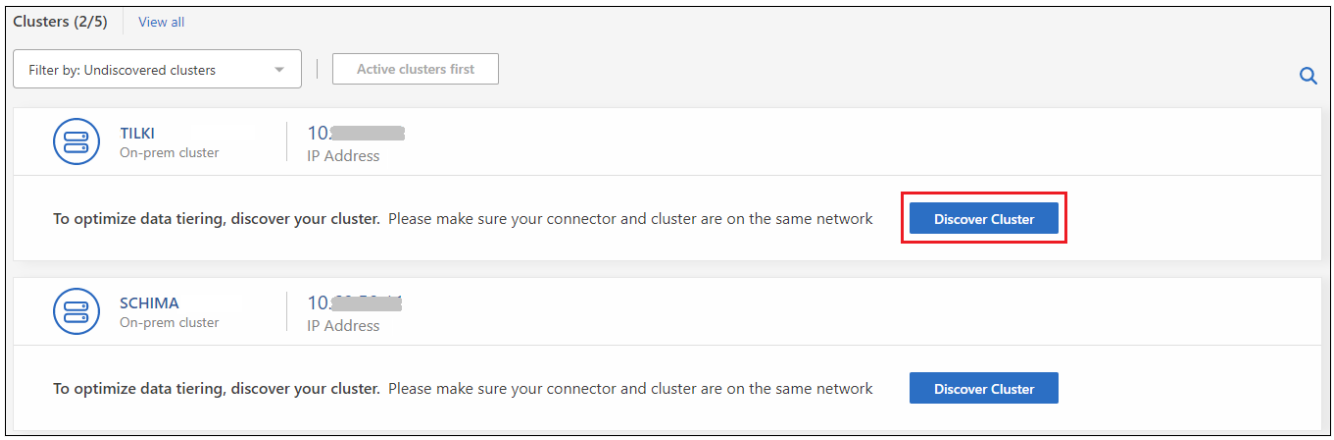
Steps

1. From Cloud Tiering, select the **Clusters** tab.
2. To see any undiscovered clusters, select **Show undiscovered clusters**.



If your NSS credentials are saved in the Console, the clusters in your account are displayed in the list.

If your NSS credentials are not saved, you are first prompted to add your credentials before you can see the undiscovered clusters.



3. Click **Discover Cluster** for the cluster that you want to manage through the Console and implement data

tiering.

4. In the *Cluster Details* page, enter the password for the admin user account and select **Discover**.

   Note that the cluster management IP address is populated based on information from your NSS account.

5. In the *Details & Credentials* page the cluster name is added as the System Name, so select **Go**.

Result

The Console discovers the cluster and adds it to the Systems page using the cluster name as the system name.

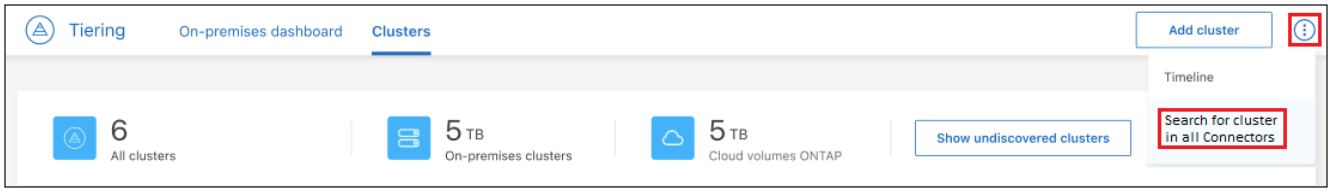
You can enable the Tiering service or other services for this cluster in the right panel.

Search for a cluster across all Console agents

If you are using multiple agents to manage all the storage in your environment, some clusters on which you want to implement tiering may be in another agent. If you are not sure which agent is managing a certain cluster, you can search across all agents using Cloud Tiering.

Steps

1. In the Cloud Tiering menu bar, select the action menu and select **Search for cluster in all agents**.



2. In the displayed Search dialog, enter the name of the cluster and select **Search**.

   Cloud Tiering displays the name of the agent if it is able to find the cluster.

3. Switch to the agent and configure tiering for the cluster.

Manage object storage used for data tiering in NetApp Cloud Tiering

After you've configured your on-premises ONTAP clusters to tier data to a particular object storage, you can perform additional object storage tasks using NetApp Cloud Tiering. You can add new object storage, mirror your tiered data to a secondary object storage, swap the primary and mirror object storage, remove a mirrored object store from an aggregate, and more.

View object stores configured for a cluster

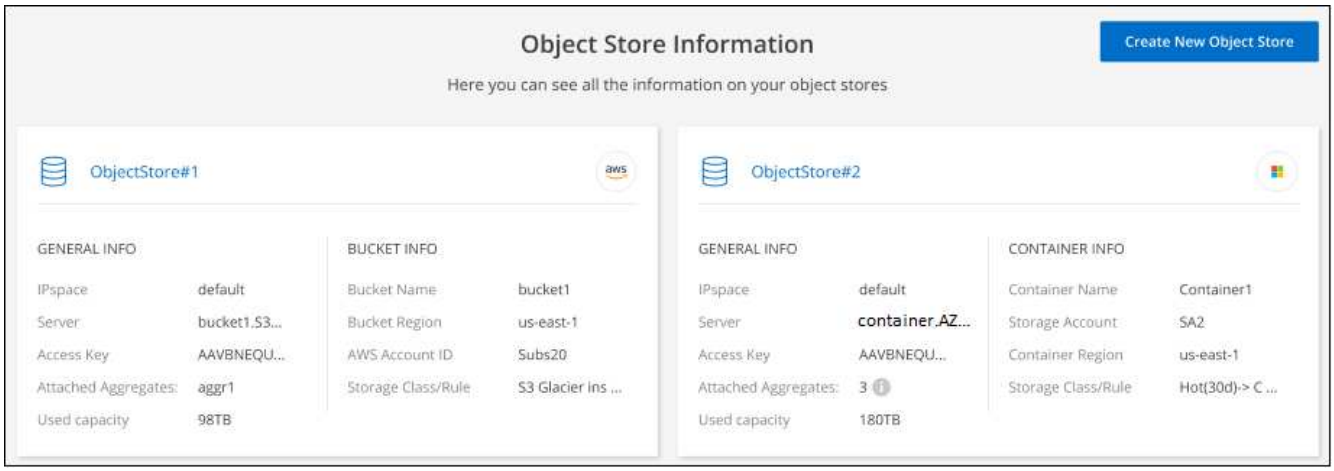
You can view all the object stores that have been configured for each cluster and to which aggregates they are attached.

Steps

1. From the **Clusters** page, select the menu icon for a cluster and select **Object Store Info**.

2. Review details about the object stores.

   This example shows both an Amazon S3 and Azure Blob object store attached to different aggregates on a cluster.

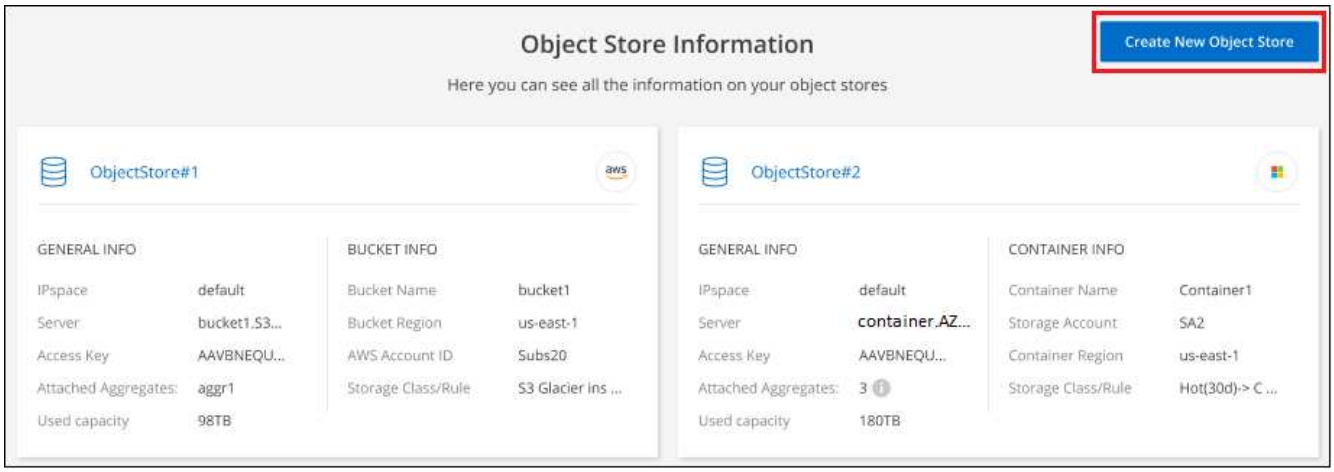


Add a new object store

You can add a new object store for aggregates in your cluster. After you create it, you can attach it to an aggregate.

Steps

1. From the **Clusters** page, select the menu icon for a cluster and select **Object Store Info**.
2. From the Object Store Information page, select **Create New Object Store**.



   The object store wizard starts. The example below shows how to create an object store in Amazon S3.

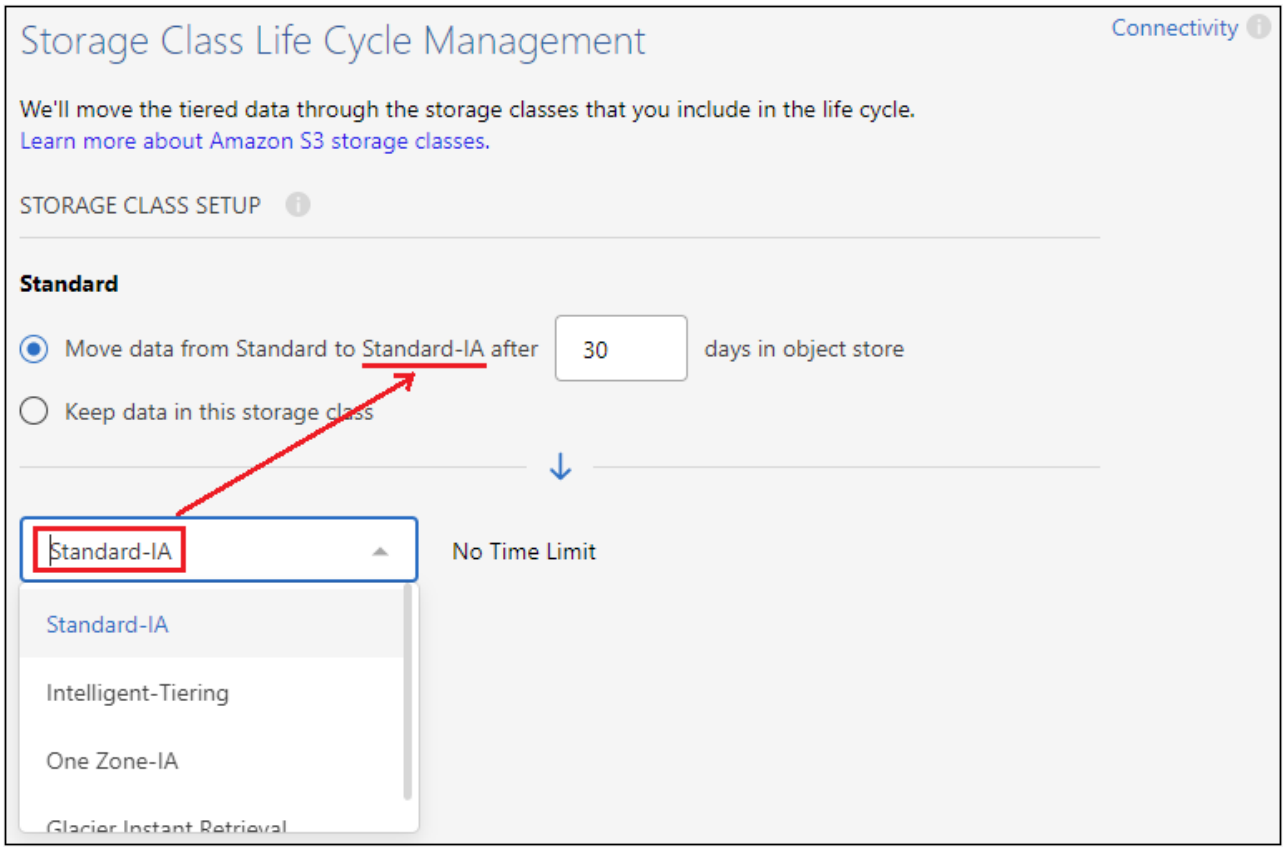
3. **Define Object Storage Name**: Enter a name for this object storage. It must be unique from any other object storage you may be using with aggregates on this cluster.
4. **Select Provider**: Select the provider, for example **Amazon Web Services**, and select **Continue**.
5. Complete the steps on the **Create Object Storage** pages:
   a. **S3 Bucket**: Add a new S3 bucket or select an existing S3 bucket that starts with the prefix *fabric-pool*. Then enter the AWS Account ID that provides access to the bucket, select the bucket region, and select **Continue**.

The *fabric-pool* prefix is required because the IAM policy for the Console agent enables the instance to perform S3 actions on buckets named with that exact prefix. For example, you could name the S3 bucket *fabric-pool-AFF1*, where AFF1 is the name of the cluster.

b. **Storage Class Lifecycle**: Cloud Tiering manages the lifecycle transitions of your tiered data. Data starts in the *Standard* class, but you can create a rule to apply a different storage class to the data after a certain number of days.

   Select the S3 storage class that you want to transition the tiered data to and the number of days before the data is assigned to that class, and select **Continue**. For example, the screenshot below shows that tiered data is assigned to the *Standard-IA* class from the *Standard* class after 45 days in object storage.

   If you choose **Keep data in this storage class**, then the data remains in the *Standard* storage class and no rules are applied. See supported storage classes.



   Note that the lifecycle rule is applied to all objects in the selected bucket.

c. **Credentials**: Enter the access key ID and secret key for an IAM user who has the required S3 permissions, and select **Continue**.

   The IAM user must be in the same AWS account as the bucket that you selected or created on the **S3 Bucket** page. See the required permissions in the section about activating tiering.

d. **Cluster Network**: Select the IPspace that ONTAP should use to connect to object storage, and select **Continue**.

   Selecting the correct IPspace ensures that Cloud Tiering can set up a connection from ONTAP to your cloud provider's object storage.

The object store is created.

Now you can attach the object store to an aggregate in your cluster.

Attach a second object store to an aggregate for mirroring

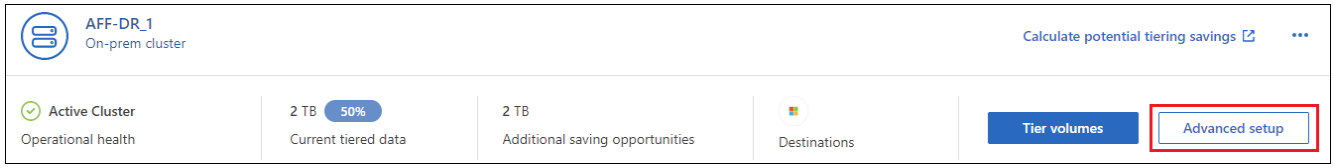
You can attach a second object store to an aggregate to create a FabricPool mirror to synchronously tier data to two object stores. You must have one object store already attached to the aggregate. Learn more about FabricPool mirrors.

When you use a MetroCluster configuration, it's a best practice to use object stores in the public cloud that are in different availability zones. Learn more about MetroCluster requirements in the ONTAP documentation. Within a MetroCluster, it is not recommended to use unmirrored aggregates, doing so will give you an error message.

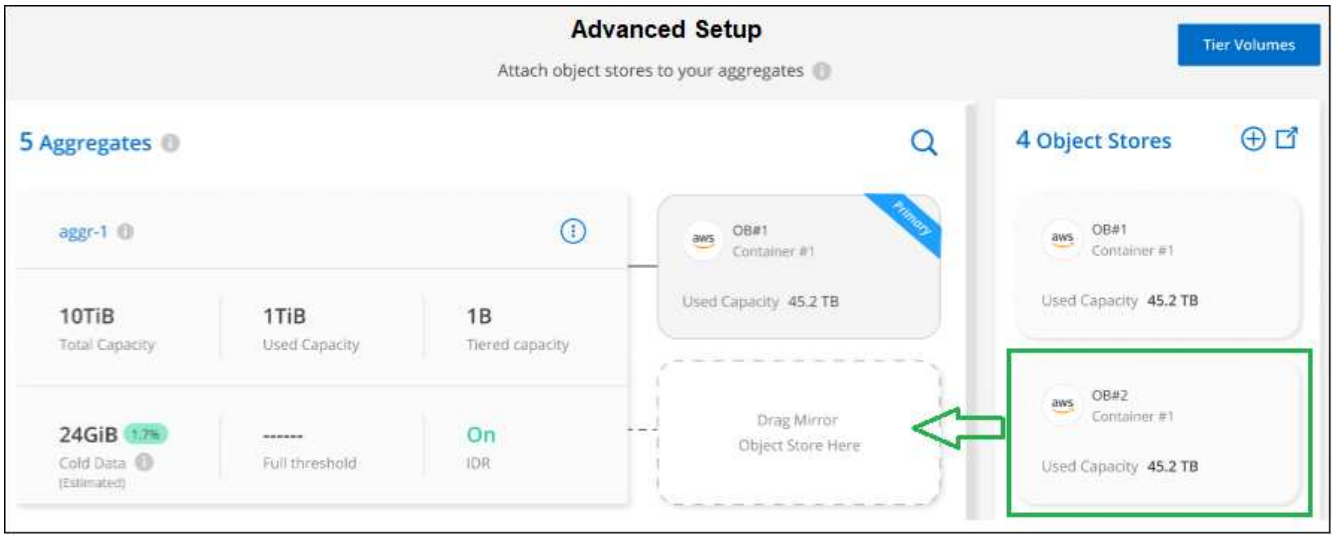
When you use StorageGRID as your object store in a MetroCluster configuration, both ONTAP systems can perform FabricPool tiering to a single StorageGRID system. Each ONTAP system must tier data to different buckets.

Steps

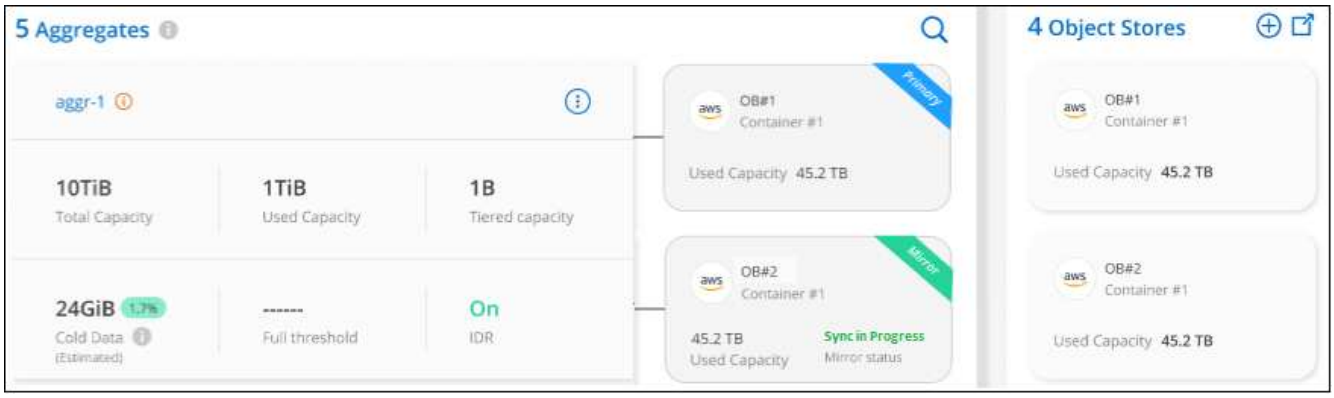
1. From the **Clusters** page, select **Advanced setup** for the selected cluster.



2. From the Advanced Setup page, drag the object store you want to use to the location for the mirror object store.



3. In the Attach Object Store dialog, select **Attach** and the second object store is attached to the aggregate.



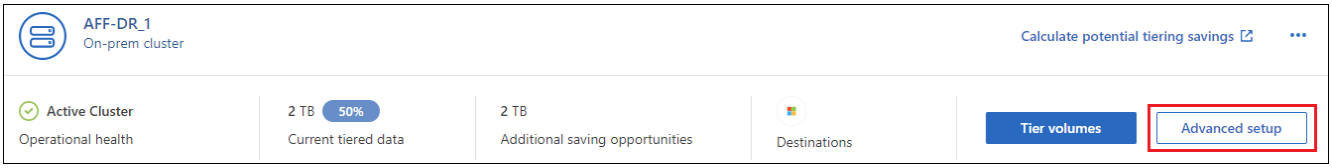
The Mirror status will appear as "Sync in progress" while the 2 object stores are synchronizing. The status will change to "Synchronized" when synchronization is complete.

Swap the primary and mirror object store

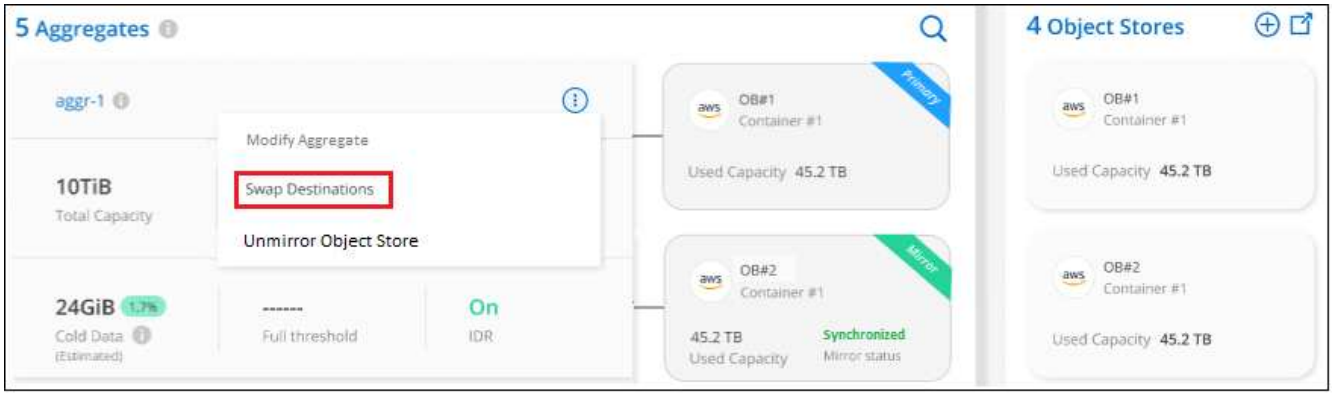
You can swap the primary and mirror object store for an aggregate. The object store mirror becomes the primary, and the original primary becomes the mirror.

Steps

1. From the **Clusters** page, select **Advanced setup** for the selected cluster.



2. From the Advanced Setup page, select the menu icon for the aggregate and select **Swap Destinations**.



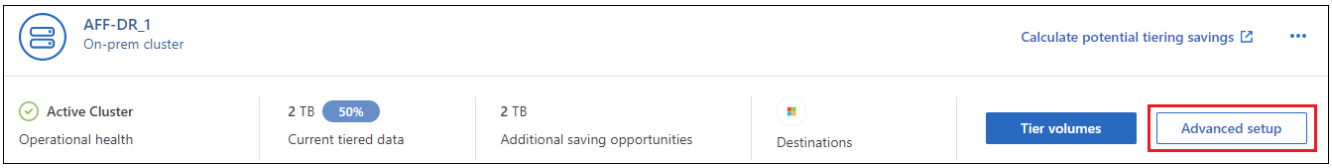
3. Approve the action in the dialog box and the primary and mirror objects stores are swapped.

Remove a mirror object store from an aggregate

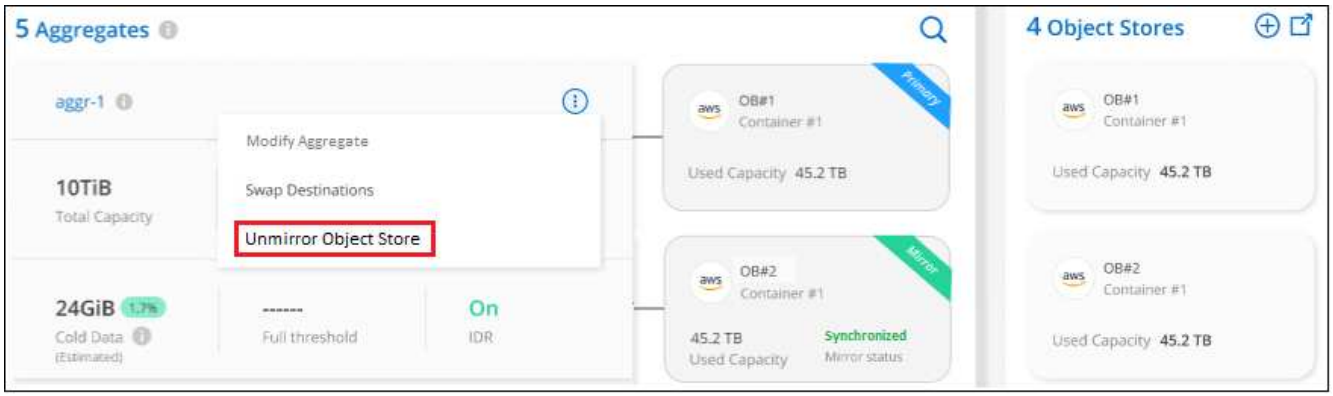
You can remove a FabricPool mirror if you no longer need to replicate to an additional object store.

Steps

1. From the **Clusters** page, select **Advanced setup** for the selected cluster.



2. From the Advanced Setup page, select the menu icon for the aggregate and select **Unmirror Object Store**.



The mirror object store is removed from the aggregate and the tiered data is no longer replicated.

When removing the mirror object store from a MetroCluster configuration, you'll be prompted whether you want to remove the primary object store as well. You can choose to keep the primary object store attached to the aggregate, or to remove it.

Migrate your tiered data to a different cloud provider

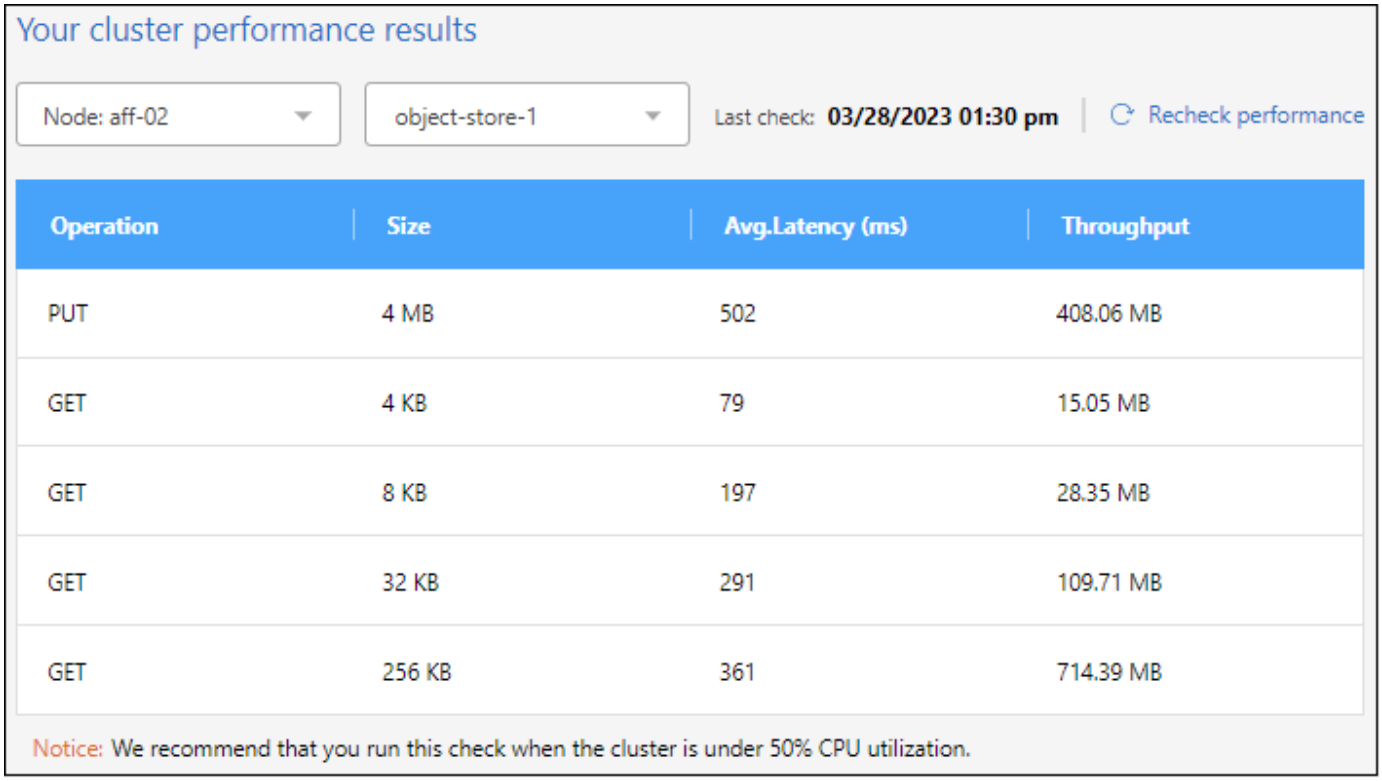
Cloud Tiering enables you to easily migrate your tiered data to a different cloud provider. For example, if you want to move from Amazon S3 to Azure Blob, you can follow the steps listed above in this order:

1. Add an Azure Blob object store.
2. Attach this new object store as the mirror to the existing aggregate.
3. Swap the primary and mirror object stores.
4. Unmirror the Amazon S3 object store.

Measure network latency and throughput performance in NetApp Cloud Tiering

Run a Cloud Performance Test to measure network latency and throughput performance from an ONTAP cluster to an object store before and after setting up data tiering in NetApp Cloud Tiering. The test also identifies any failures that occurred.

Here are sample performance results:



Before you get started

It's best to run this check when the cluster is under 50% CPU utilization.

Steps for a cluster that hasn't been set up for tiering

1. From the left navigation menu, select **Mobility > Cloud Tiering**.
2. From the **Clusters** page, select the menu icon for a cluster and select **Cloud Performance Test**.
3. Review the details and select **Continue**.
4. Follow the prompts to provide the required information.

   The information that you need to provide is the same as if you were setting up tiering on the cluster.

5. Optionally continue to the Tier Volumes wizard to complete the setup.

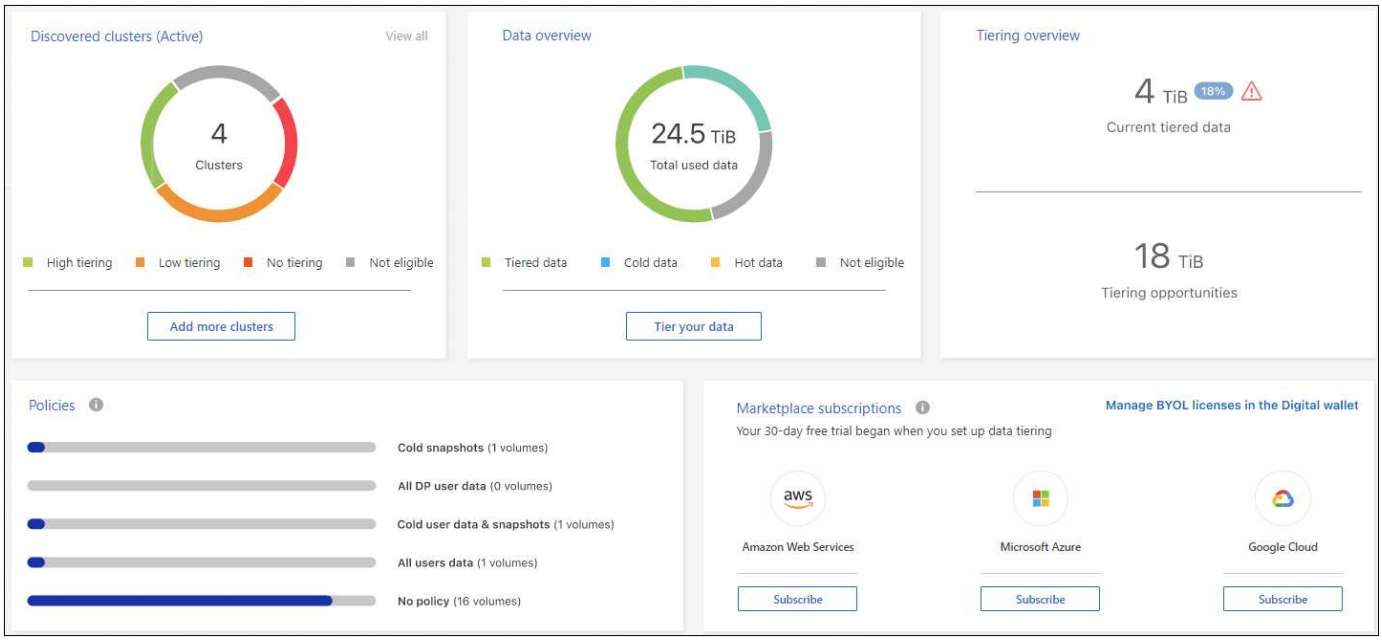
Steps for a cluster that has been set up for tiering

1. From the left navigation menu, select **Mobility > Cloud Tiering**.
2. From the **Clusters** page, select the menu icon for a cluster and select **Cloud Performance Test**.
3. Select a node from the drop-down list.
4. View the results or recheck the performance.

Get an overview of data tiering from your clusters in NetApp Cloud Tiering

NetApp Cloud Tiering provides an aggregated view of data tiering from each of your on-premises clusters. This overview provides a clear picture of your environment and enables you to take proper actions.

Select **Cloud Tiering > On-Premises Dashboard** to view the following details about your environment.



Discovered clusters

The number of on-premises clusters that Cloud Tiering has discovered. The chart provides an overview of the tiering status for these clusters.

- High tiering - Clusters that are tiering over 20% of their cold data
- Low tiering - Clusters that are tiering less than 20% of their cold data
- No tiering - Clusters that aren't tiering any data
- Not eligible - Clusters that don't support data tiering

Data overview

The amount of data that is being used by all discovered clusters. he chart shows how much data is being tiered for these clusters.

- Tiered data - Total cold data being tiered to the cloud
- Cold data - Total cold data that is not being tiered
- Hot data - Total hot data that is active being used
- Not eligible - Total data that is not being tiered because the cluster or volume doesn't support data tiering

Tiering overview

The amount of data that is currently being tiered, and the amount of cold data that could potentially be tiered.

Policies

The number of times that each tiering policy has been applied to a volume.

Marketplace subscriptions

The number of clusters associated with each type of Marketplace Subscription and an indication about your subscription status.

Monitor the status of tiering alerts from NetApp Cloud Tiering

You can view the status of tiering alerts from NetApp Cloud Tiering in the NetApp Console Notification Center.

The Notification Center tracks the progress of tiering incidents so you can verify whether they have been resolved or not. You can display the notifications by selecting the () in the Console menu bar.

At this time, there is one tiering event that will appear as a notification:

Tier additional data from cluster <name> to object storage to save storage space

This notification is a "Recommendation" to improve system efficiency and reduce storage costs. It indicates that a cluster is tiering less than 20% of its cold data - including clusters that are tiering no data. It provides a link to the Cloud Tiering total cost of ownership and savings calculator to help you calculate your cost savings.

The NetApp Console does not send an email for this notification.

Learn more about the Notification Center.

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