Manage reserved capacity

SANtricity software

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Manage reserved capacity

How reserved capacity works in SANtricity software

Reserved capacity is automatically created when copy service operations, such as snapshots or asynchronous mirroring operations, are provided for your volumes.

The purpose of reserved capacity is to store data changes on these volumes, should something go wrong. Like volumes, reserved capacity is created from pools or volume groups.

Copy service objects that use reserved capacity

Reserved capacity is the underlying storage mechanism used by these copy service objects:

- Snapshot groups
- Read/Write snapshot volumes
- Consistency group member volumes
- Mirrored pair volumes

When creating or expanding these copy service objects, you must create new reserved capacity from either a pool or volume group. Reserved capacity is typically 40 percent of the base volume for snapshot operations and 20 percent of the base volume for asynchronous mirroring operations. Reserved capacity, however, varies depending on the number of changes to the original data.

Thin volumes and reserved capacity

For a thin volume, if the maximum reported capacity of 256 TiB has been reached, you cannot increase its capacity. Make sure the thin volume's reserved capacity is set to a size larger than the maximum reported capacity. (A thin volume is always thinly-provisioned, which means that the capacity is allocated as the data is being written to the volume.)

If you create reserved capacity using a thin volume in a pool, review the following actions and results on reserved capacity:

- If a thin volume's reserved capacity fails, the thin volume itself will not automatically transition to the Failed state. However, because all I/O operations on a thin volume require access to the reserved capacity volume, I/O operations will always result in a Check Condition being returned to the requesting host. If the underlying problem with the reserved capacity volume can be resolved, the reserved capacity volume is returned to an Optimal state and the thin volume will become functional again.
- If you use an existing thin volume to complete an asynchronous mirrored pair, that thin volume is re-initialized with a new reserved capacity volume. Only provisioned blocks on the primary side are transferred during the initial synchronization process.

Capacity alerts

The copy service object has a configurable capacity warning and alert threshold, as well as a configurable response when reserved capacity is full.

When the reserved capacity of a copy service object volume is nearing the fill point, an alert is issued to the user. By default, this alert is issued when the reserved capacity volume is 75 percent full; however, you can

adjust this alert point up or down as needed. If you receive this alert, you can increase the capacity of the reserved capacity volume at that time. Each copy service object can be configured independently in this regard.

Orphaned reserved capacity volumes

An orphaned reserved capacity volume is a volume that is no longer storing data for copy service operations because its associated copy service object was deleted. When the copy service object was deleted, its reserved capacity volume should have been deleted as well. However, the reserved capacity volume failed to delete.

Because orphaned reserved capacity volumes are not accessed by any host, they are candidates for reclamation. Manually delete the orphaned reserved capacity volume so you can use its capacity for other operations.

System Manager alerts you of orphaned reserved capacity volumes with a "Reclaim unused capacity" message in the Notifications area on the Home page. You can click **Reclaim unused capacity** to display the Reclaim Unused Capacity dialog box, where you can delete the orphaned reserved capacity volume.

Characteristics of reserved capacity

- Capacity allocated to reserved capacity needs to be considered during the volume creation to retain sufficient free capacity.
- Reserved capacity can be smaller than the base volume (the minimum size is 8 MiB).
- Some space is consumed by metadata, but it is very little (192 KiB), so it does not need to be taken into account when determining the size of reserved capacity volume.
- Reserved capacity is not directly readable or writeable from a host.
- Reserved capacity exists for each read/write snapshot volume, snapshot group, consistency group member volume, and mirrored pair volume.

Increase reserved capacity in SANtricity System Manager

You can increase reserved capacity, which is the physically allocated capacity used for any copy service operation on a storage object.

For snapshot operations, it is typically 40 percent of the base volume; for asynchronous mirroring operations, it is typically 20 percent of the base volume. Typically, you increase reserved capacity when you receive a warning that the storage object's reserved capacity is becoming full.

Before you begin

- The volume in the pool or volume group must have an Optimal status and must not be in any state of modification.
- Free capacity must exist in the pool or volume group that you want to use to increase capacity.

  If no free capacity exists on any pool or volume group, you can add unassigned capacity in the form of unused drives to a pool or volume group.

About this task

You can increase reserved capacity only in increments of 8 GiB for the following storage objects:

- Snapshot group

- Snapshot volume

- Consistency group member volume

- Mirrored pair volume

Use a high percentage if you believe the primary volume will undergo many changes or if the lifespan of a particular copy service operation will be very long.

> ⓘ You cannot increase reserved capacity for a snapshot volume that is read-only. Only snapshot volumes that are read-write require reserved capacity.

Steps

1. Select **Storage › Pools & Volume Groups**.

2. Select the **Reserved Capacity** tab.

3. Select the storage object for which you want to increase reserved capacity, and then click **Increase Capacity**.

   The Increase Reserved Capacity dialog box appears.

4. Use the spinner box to adjust the capacity percentage.

   If free capacity does not exist on the pool or volume group that contains the storage object you selected, and the storage array has Unassigned Capacity, you can create a new pool or volume group. You can then retry this operation using the new free capacity on that pool or volume group.

5. Click **Increase**.

Results

System Manager performs the following actions:

- Increases the reserved capacity for the storage object.

- Displays the newly-added reserved capacity.

Decrease reserved capacity in SANtricity System Manager

You use the Decrease Capacity option to decrease the reserved capacity for the following storage objects: snapshot group, snapshot volume, and consistency group member volume. You can decrease reserved capacity only by the amount(s) you used to increase it.

Before you begin

- The storage object must contain more than one reserved capacity volume.

- The storage object must not be a mirrored pair volume.

- If the storage object is a snapshot volume, then it must be a disabled snapshot volume.

- If the storage object is a snapshot group, then it must not contain any associated snapshot images.

About this task

Review the following guidelines:

- You can remove reserved capacity volumes only in the reverse order that they were added.
- You cannot decrease the reserved capacity for a snapshot volume that is read-only because it does not have any associated reserved capacity. Only snapshot volumes that are read-write require reserved capacity.

Steps

1. Select **Storage › Pools & Volume Groups**.

2. Click the **Reserved Capacity** tab.

3. Select the storage object for which you want to decrease reserved capacity, and then click **Decrease Capacity**.

   The Decrease Reserved Capacity dialog box appears.

4. Select the capacity amount by which you want to decrease reserved capacity, and then click **Decrease**.

Results

System Manager performs the following actions:

- Updates the capacity for the storage object.
- Displays the newly updated reserved capacity for the storage object.
- When you decrease capacity for a snapshot volume, System Manager automatically transitions the snapshot volume to a Disabled state. Disabled means that the snapshot volume is not currently associated with a snapshot image, and therefore, cannot be assigned to a host for I/O.

Change the reserved capacity settings for a snapshot group in SANtricity System Manager

You can change the settings for a snapshot group to change its name, auto-delete settings, the maximum number of allowed snapshot images, the percentage point at which SANtricity System Manager sends a reserved capacity alert notification, or the policy to use when the reserved capacity reaches its maximum defined percentage.

During the creation of a snapshot group, reserved capacity is created to store the data for all the snapshot images contained in the group.

Steps

1. Select **Storage › Pools & Volume Groups**.

2. Click the **Reserved Capacity** tab.

3. Select the snapshot group that you want to edit, and then click **View/Edit Settings**.

   The Snapshot Group Settings dialog box appears.

4. Change the settings for the snapshot group as appropriate.

Field details

Setting	Description
Snapshot group settings	
Name	The name of the snapshot group. Specifying a name for the snapshot group is required.
Auto-deletion	A setting that keeps the total number of snapshot images in the group at or below a user-defined maximum. When this option is enabled, System Manager automatically deletes the oldest snapshot image in the group any time a new snapshot is created, to comply with the maximum number of snapshot images allowed for the group.
Snapshot image limit	A configurable value that specifies the maximum number of snapshot images allowed for a snapshot group.
Snapshot schedule	If Yes, a schedule is set for automatically creating snapshots.
Reserved capacity settings	
Alert me when…	Use the spinner box to adjust the percentage point at which System Manager sends an alert notification when the reserved capacity for a snapshot group is nearing full. When the reserved capacity for the snapshot group exceeds the specified threshold, System Manager sends an alert, allowing you time to increase reserved capacity or to delete unnecessary objects.
Policy for full reserved capacity	You can choose one of the following policies: • **Purge oldest snapshot image** — System Manager automatically purges the oldest snapshot image in the snapshot group, which releases the snapshot image reserved capacity for reuse within the group. • **Reject writes to base volume** — When the reserved capacity reaches its maximum defined percentage, System Manager rejects any I/O write request to the base volume that triggered the reserved capacity access.
Associated objects	
Base volume	The name of the base volume used for the group. A base volume is the source from which a snapshot image is created. It can be a thick or thin volume and is typically assigned to a host. The base volume can reside in either a volume group or disk pool.

Setting	Description
Snapshot images	The number of images created from this group. A snapshot image is a logical copy of volume data, captured at a particular point-in-time. Like a restore point, snapshot images allow you to roll back to a known good data set. Although the host can access the snapshot image, it cannot directly read or write to it.

5. Click **Save** to apply your changes to the snapshot group settings.

Change the reserved capacity settings for a snapshot volume in SANtricity System Manager

You can change the settings for a snapshot volume to adjust the percentage point at which the system sends an alert notification when the reserved capacity for a snapshot volume is nearing full.

Steps

1. Select **Storage › Pools & Volume Groups**.
2. Click the **Reserved Capacity** tab.
3. Select the snapshot volume that you want to edit, and then click **View/Edit Settings**.

   The Snapshot Volume Reserved Capacity Settings dialog box appears.

4. Change the reserved capacity settings for the snapshot volume as appropriate.

   Field details

Setting	Description
Alert me when…	Use the spinner box to adjust the percentage point at which the system sends an alert notification when the reserved capacity for a member volume is nearing full. When the reserved capacity for the snapshot volume exceeds the specified threshold, the system sends an alert, allowing you time to increase reserved capacity or to delete unnecessary objects.

5. Click **Save** to apply your changes to the snapshot volume reserved capacity settings.

Change the reserved capacity settings for a consistency group member volume in SANtricity System Manager

You can change the settings for a consistency group member volume to adjust the percentage point at which SANtricity System Manager sends an alert notification when the reserved capacity for a member volume is nearing full and to change the policy to use

when the reserved capacity reaches its maximum defined percentage.

About this task

Changing the reserved capacity settings for an individual member volume also changes the reserved capacity settings for all member volumes associated with a consistency group.

Steps

1. Select **Storage › Pools & Volume Groups**.

2. Click the **Reserved Capacity** tab.

3. Select the consistency group member volume that you want to edit, and then click **View/Edit Settings**.

   The Member Volume Reserved Capacity Settings dialog box appears.

4. Change the reserved capacity settings for the member volume as appropriate.

   Field details

Setting	Description
Alert me when…	Use the spinner box to adjust the percentage point at which System Manager sends an alert notification when the reserved capacity for a member volume is nearing full. When the reserved capacity for the member volume exceeds the specified threshold, System Manager sends an alert, allowing you time to increase reserved capacity or to delete unnecessary objects. ⓘ Changing the Alert setting for one member volume will change it for *all* member volumes that belong to the same consistency group.
Policy for full reserved capacity	You can choose one of the following policies: • **Purge oldest snapshot image** — System Manager automatically purges the oldest snapshot image in the consistency group, which releases the member's reserved capacity for reuse within the group. • **Reject writes to base volume** — When the reserved capacity reaches its maximum defined percentage, System Manager rejects any I/O write request to the base volume that triggered the reserved capacity access.

5. Click **Save** to apply your changes.

Results

System Manager changes the reserved capacity settings for the member volume, as well as the reserved capacity settings for all member volumes in the consistency group.

Change the reserved capacity settings for a mirrored pair volume in SANtricity System Manager

You can change the settings for a mirrored pair volume to adjust the percentage point at which SANtricity System Manager sends an alert notification when the reserved capacity for a mirrored pair volume is nearing full.

Steps

1. Select **Storage › Pools & Volume Groups**.

2. Select the **Reserved Capacity** tab.

3. Select the mirrored pair volume that you want to edit, and then click **View/Edit Settings**.

   The Mirrored Pair Volume Reserved Capacity Settings dialog box appears.

4. Change the reserved capacity settings for the mirrored pair volume as appropriate.

   Field details

Setting	Description
Alert me when…	Use the spinner box to adjust the percentage point at which System Manager sends an alert notification when the reserved capacity for a mirrored pair is nearing full. When the reserved capacity for the mirrored pair exceeds the specified threshold, System Manager sends an alert, allowing you time to increase reserved capacity. ⓘ Changing the Alert setting for one mirrored pair changes the Alert setting for all mirrored pairs that belong to the same mirror consistency group.

5. Click **Save** to apply your changes.

Cancel a pending snapshot image in SANtricity System Manager

You can cancel a pending snapshot image before it completes. Snapshots occur asynchronously, and the status of the snapshot is pending until the snapshot is complete. The snapshot image completes as soon as the synchronization operation is complete.

About this task

A snapshot image is in a Pending state due to the following concurrent conditions:

- The base volume for a snapshot group or one or more member volumes of a consistency group that contains this snapshot image is a member of an asynchronous mirror group.

- The volume or volumes are currently in an asynchronous mirroring synchronizing operation.

Steps

1. Select **Storage › Pools & Volume Groups**.

2. Click the **Reserved Capacity** tab.

3. Select the snapshot group for which you want to cancel a pending snapshot image, and then click **Uncommon Tasks › Cancel pending snapshot image**.

4. Click **Yes** to confirm that you want to cancel the pending snapshot image.

Delete a snapshot group in SANtricity System Manager

You delete a snapshot group when you want to permanently delete its data and remove it from the system. Deleting a snapshot group reclaims reserved capacity for reuse in the pool or volume group.

About this task

When a snapshot group is deleted, all snapshot images in the group also are deleted.

Steps

1. Select **Storage › Pools & Volume Groups**.

2. Click the **Reserved Capacity** tab.

3. Select the snapshot group that you want to delete, and then click **Uncommon Tasks › Delete snapshot group**.

   The Confirm Delete Snapshot Group dialog box appears.

4. Type `delete` to confirm.

Results

System Manager performs the following actions:

- Deletes all snapshot images associated with the snapshot group.
- Disables any snapshot volumes associated with the snapshot group's images.
- Deletes the reserved capacity that exists for the snapshot group.