DELL Technologies

MODULE 6 DATA PROTECTION WITH SNAPSHOTS

PARTICIPANT GUIDE

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Snapshots Overview

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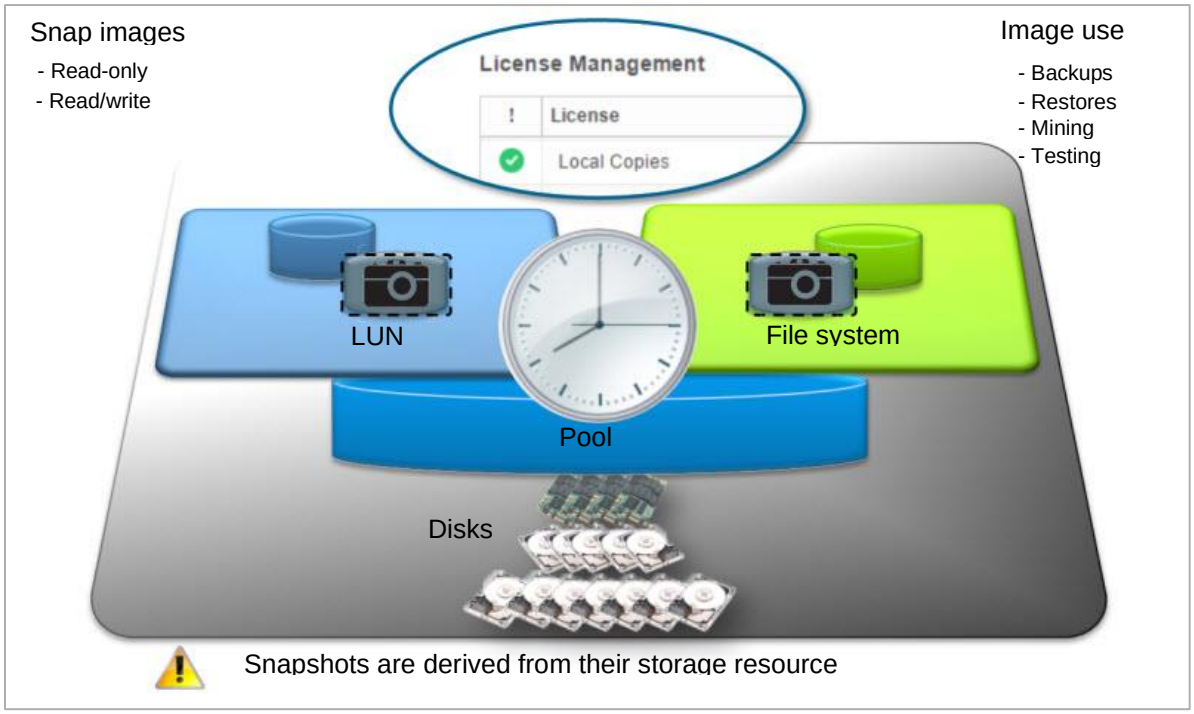
Snapshots Overview



The Snapshots feature is enabled with the Local Copies license which enables space efficient point-in-time snapshots of storage resources for block, file, and VMware "data" vVols. The snap images can be read-only or read/write and used in various ways. They provide an effective form of local data protection. If data is mistakenly deleted or corrupted, the production data can be restored from a snapshot to a known point-in-time data state. Hosts access snapshot images for data backup operations, data mining operations, application testing, or decision analysis tasks. The upcoming slides detail the feature architecture, capabilities, benefits, and specifics of its operations and uses.

Caution: Snapshots are not full copies of the original data. Dell Technologies recommends that you do not rely on snapshots for mirrors, disaster recovery, or high-availability tools. Snapshots of storage resources are partially derived from the real-time data in the relevant storage resource. If the primary storage becomes inaccessible, snapshots can also become inaccessible (not readable).

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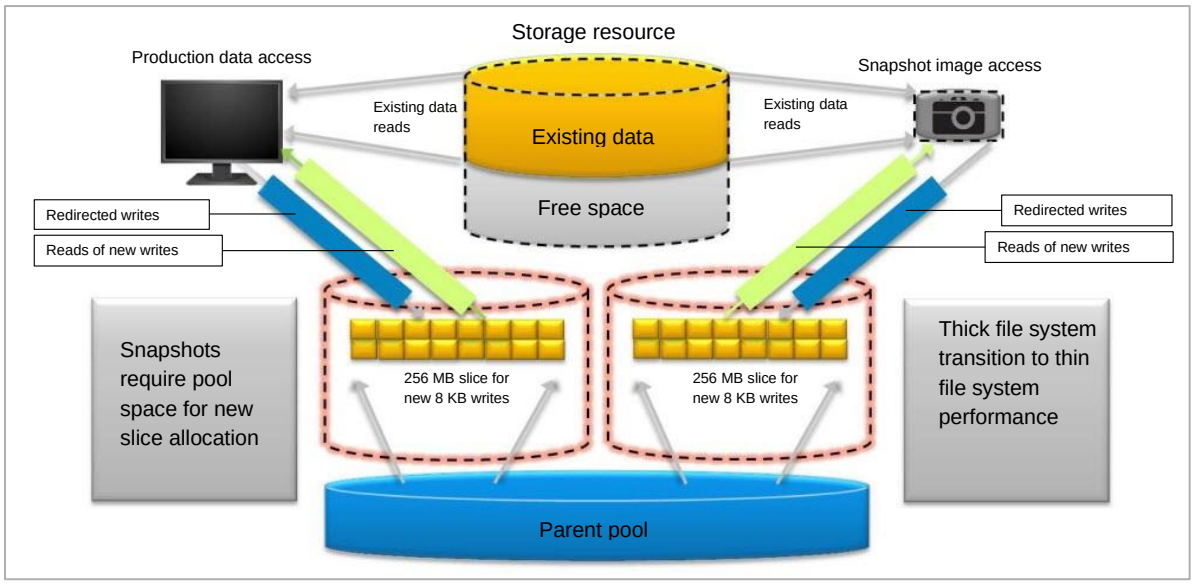
Snapshot Redirect on Write Architecture



Snapshots of storage resources [block LUNs, file systems, and VMware datastores] are architected using Redirect on Write technology. This architecture avoids a performance penalty that Copy on First Write technology has when existing data is changed.

With Redirect on Write technology, when a snapshot is taken, the existing data on the storage resource remains in place. The snapshot provides a point-in-time view of the data. Production data access also uses this view to read existing data.

Another benefit of Redirect on Write is that no storage resource is required to create a snapshot. With Copy on First Write technology, a storage resource must be reserved to hold original data that changed to preserve the point-in-time view.

With Redirect on Write technology, when writes are made to the storage resource, those writes are redirected. A new location is allocated as needed from the parent pool in 256 MB slices. New writes are stored in 8 KB chunks on the newly allocated slice. Reads of the new writes are serviced from this new location as well.

If the snapshot is writable, any writes are handled in a similar manner. Slice space is allocated from the parent pool, and the writes are redirected in 8 KB chunks to the new space. Reads of newly written data are also serviced from the new space.

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Storage space is needed in the pool to support snapshots as slices are allocated for redirected writes.

Because of the on-demand slice allocation from the pool, snapped thick file systems transition to thin file system performance characteristics.

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Combined (LUN and File System) Snapshot Capabilities

The table defines various combined snapshot capabilities for each of the Dell Unity XT models. These combined limits have an interaction between each other. For example, if a model 380 system had 20 LUNs and 20 file systems, each LUN and file system could not have 256 user snapshots. The number of user snapshots would exceed the maximum of 8000 for the system.

Dell Unity XT Models	VSA	380/380F	480/480F	680/680F	880/880F
Max snapshots per LUN	164	256	256	256	256
Max snapshots per file system	31	256	256	256	256
Max snapshots source LUNs per system	64	1000	1500	2000	6000
Max source LUNs in Consistency Group	50	75	75	75	75
Max Consistency Groups per system	64	1000	1500	2000	6000
Max user snapshots	128	8000	14000	20000	30000
Max user visible fs + snaps per system	64	1000	1250	2000	2500
Hierarchical snap level - LUN and file system	10	10	10	10	10

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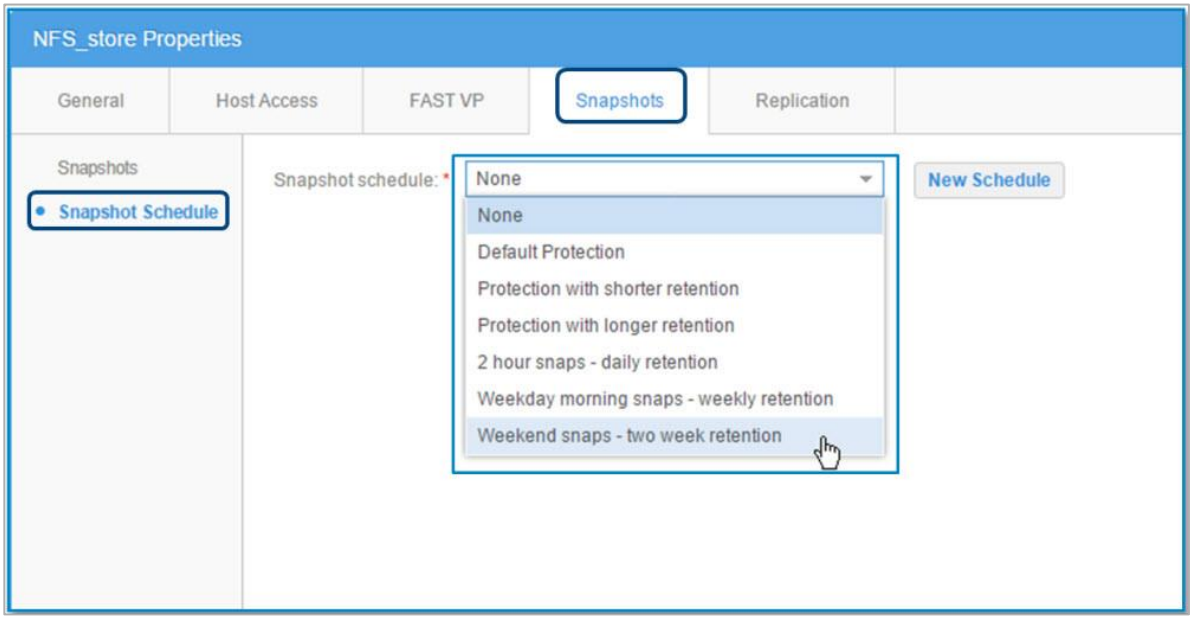
Apply a Snapshot Schedule



To apply a Snapshot schedule to a storage resource, open the **Snapshots** tab on the **Properties** page of the resource. Then, click the **Snapshot Schedule** option. From the **Snapshot Schedule** drop-down list, select a schedule to apply to the resource.

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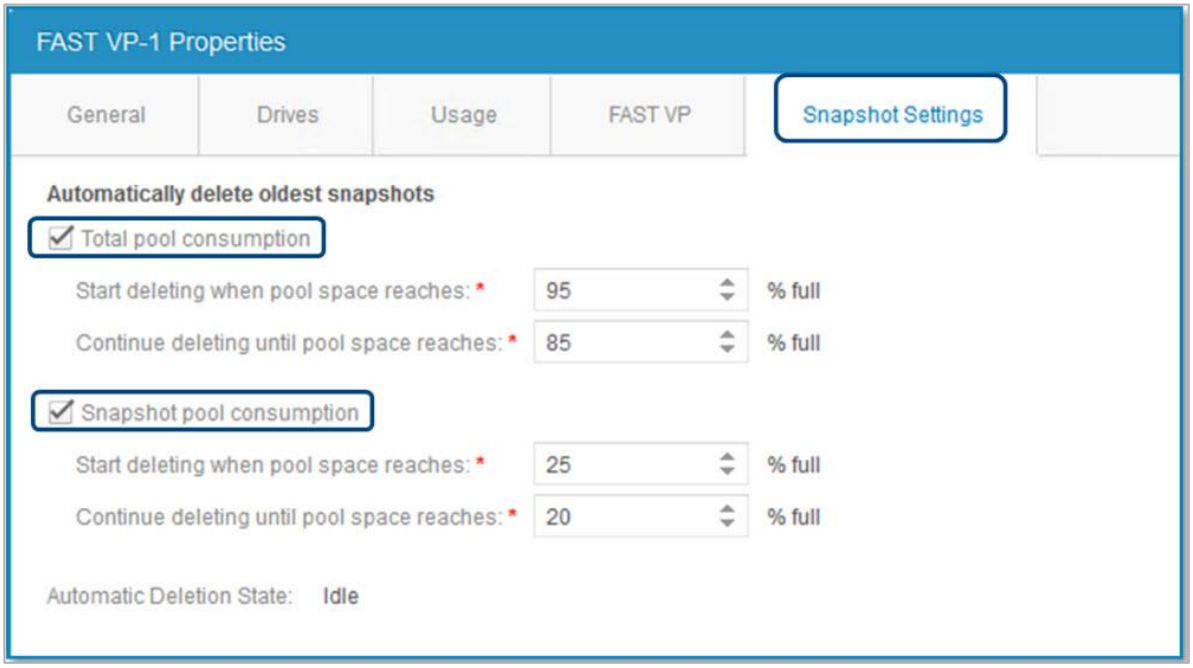
Snapshot Settings for a Pool



Snapshots consume space from the parent storage pool that the storage resource uses. To prevent the pool from running out of space due to snapshots, there are two options for automatically deleting the oldest snapshots. These options can be set from the **Properties** page of the pool and selecting the **Snapshot Settings** tab. One option triggers the automatic deletion that is based on the total pool space consumed. Another option triggers the automatic deletion that is based on the total snapshot space consumed. Either option can be used singularly, or they can both be used in combination. Both options allow the configuration of a space threshold value to start the deletion and a space threshold value for stopping the automatic deletion. When a pool is created, the **Total pool consumption** option is set by default. The option cannot be changed during pool creation but can be modified after the pool is created. If both options are cleared, this setting disables the automatic deletion of the oldest snapshots based on space that is used. Automatic snapshot deletion is still configurable based on snapshot retention values.

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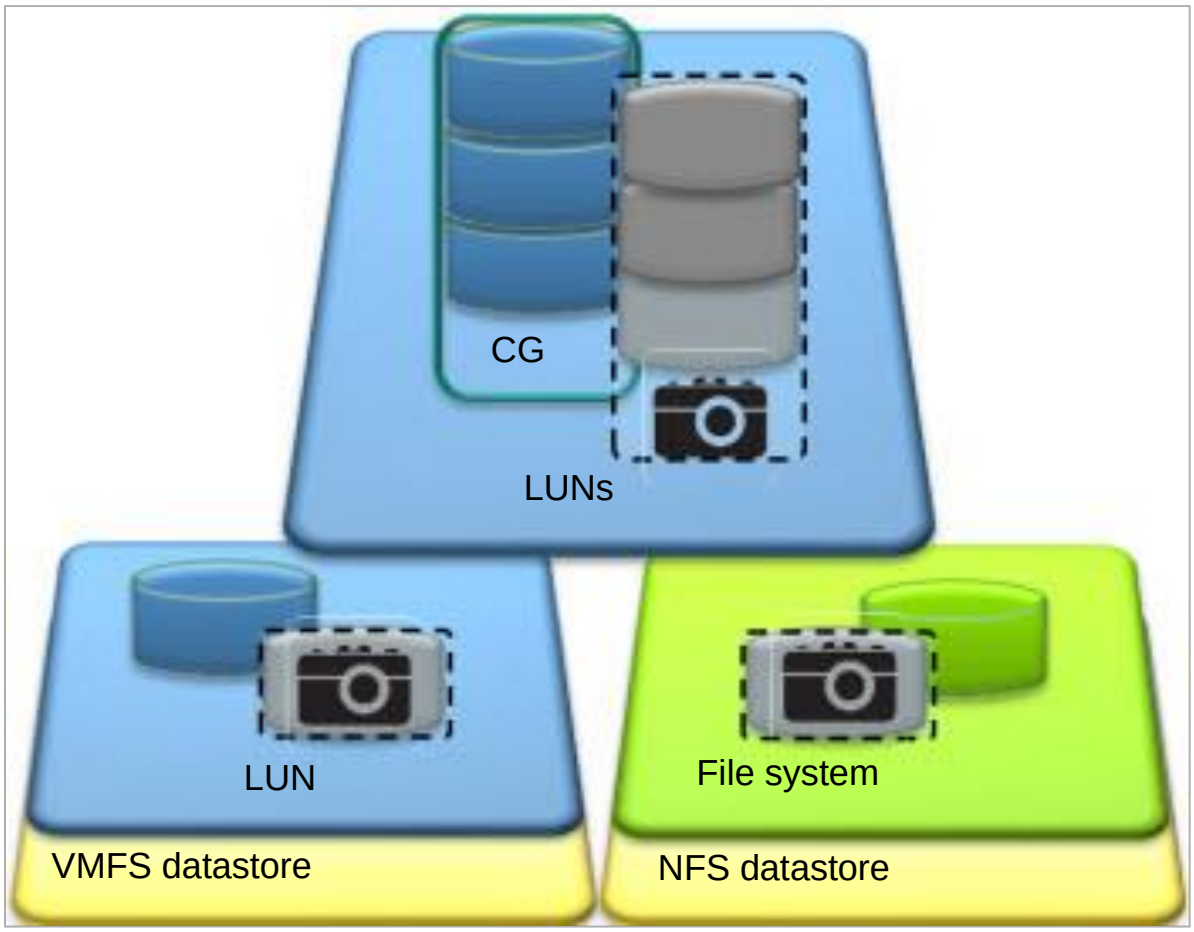
Creating Snapshots



Snapshots are created on storage resources for block, file, and VMware. All are created in a similar manner. For block, the snapshot is created on a LUN or a group of LUNs within a Consistency Group. For file, the snapshot is configured on a file system. For VMware, the storage resource is either going to be a LUN for a VMFS datastore or a file system for an NFS datastore. When each of these storage resources are created, the system provides a wizard for their creation. Each wizard provides an option to automatically create snapshots on the storage resource. Each resource snapshot creation is nearly identical to the other resources. For storage resources already created, snapshots can be manually created for them from their Properties page. As with the wizard, the snapshot creation from the storage resource Properties page is nearly identical to the other resources.

More details on the snapshot creation within the block storage LUN creation wizard and the file storage file system creation wizard are shown in separate topics. Each

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topic also details the creation of manual snapshots from the LUN and file system properties pages.

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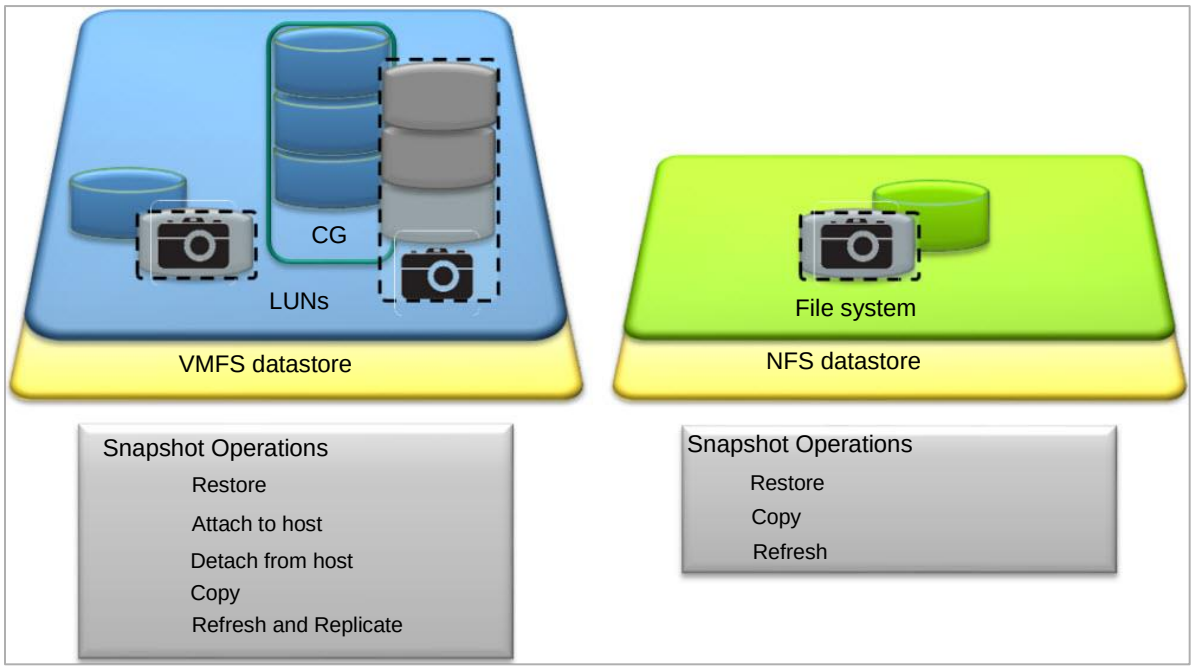
Snapshot Operations



The operations that can be performed on a snapshot differ based on the type of storage resource the snapshot is on. Operations on LUN-based snapshots are Restore, Attach to host, Detach from host, Copy, Refresh, and Replicate. Operations on file system-based snapshots are Restore, Refresh, and Copy.

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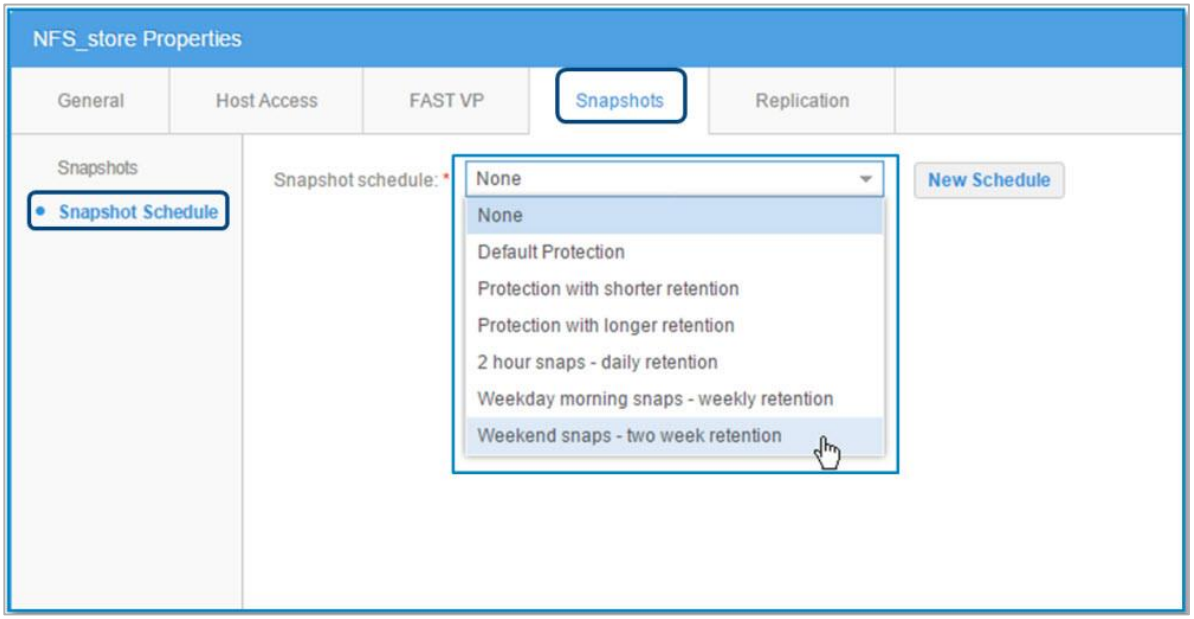
Snapshot Schedules

To apply a Snapshot schedule to a storage resource, go to the **Snapshots** tab on the **Properties** page of the resource. From there, select the **Snapshot Schedule** option. From the **Snapshot schedule** drop-down list, select a schedule to apply to the resource.

Apply a Snapshot Schedule



Note: Snapshot schedules are not supported on vVols.

Schedules and UTC Time

- Internally, Unity systems use the UTC time zone for time and scheduling.
  - The operating system, logs, schedules, and other features all use UTC.
- When you connect to Unisphere, the times that are displayed are adjusted by Unisphere to the time zone of the browser.
- When changing time on the system, or the timing on a feature, it is stored internally in UTC format.
- By default, Unity systems do not consider Daylight Savings Time (DST).
  - Also known as Daylight Time and Summer Time.

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– Daylight Savings Time is not observed by the entire world.

Snapshots and Time Zones

When you create a schedule, the time to take the snapshot is stored internally in UTC time.

UTC time does not consider Daylight Savings Time.

Because snapshot schedules are stored internally in UTC time, the time that a snapshot is taken is not adjusted when Daylight Savings Time begins or ends.

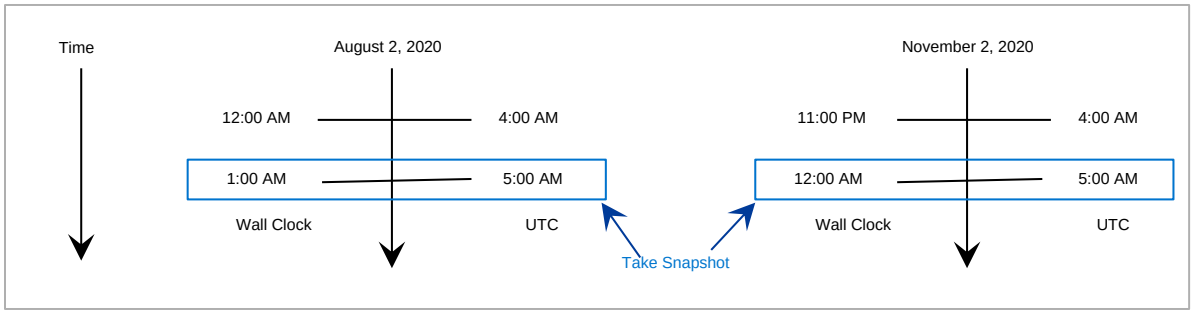
Example: On August 2, 2020 a user in Massachusetts (US) creates a snapshot schedule to create snapshots at 1:00 AM local time.

- Massachusetts is UTC -4 hours at this time of year.
- The snapshot schedule stores the time as 5:00 AM UTC.
- From this point forward, all snapshots will occur at 5:00 AM UTC.

Daylight Saving Time ends Sunday, November 7 at 2:00 AM.

- "Wall clock" time is adjusted backwards 1 hour at this point.

Snapshots still occur at 5:00 AM UTC.



- The timing of snapshots “shifts” 1 hour (wall clock time).
- The direction of the shift depends on whether DST is beginning or ending.

To continue having snapshots taken at 1:00 AM local time, the operator must edit the schedule.

Beginning with Dell EMC Unity OE 5.1, users can enable Time Zone support.

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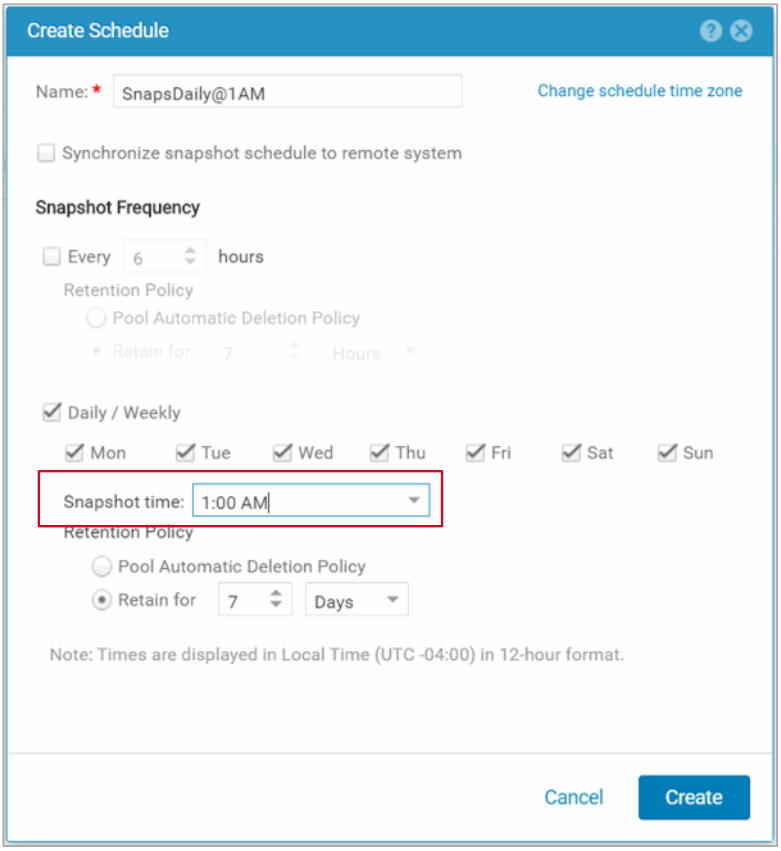
- Newly created schedules adjust automatically if the local time zone implements Daylight Saving Time.
- **NOTE:** Schedules that were created before upgrading to OE 5.1 must be edited one time to update the snapshot time.

Schedule Before Enabling Time Zone Support

Before enabling Schedule Time Zone support, the schedule appears as shown.



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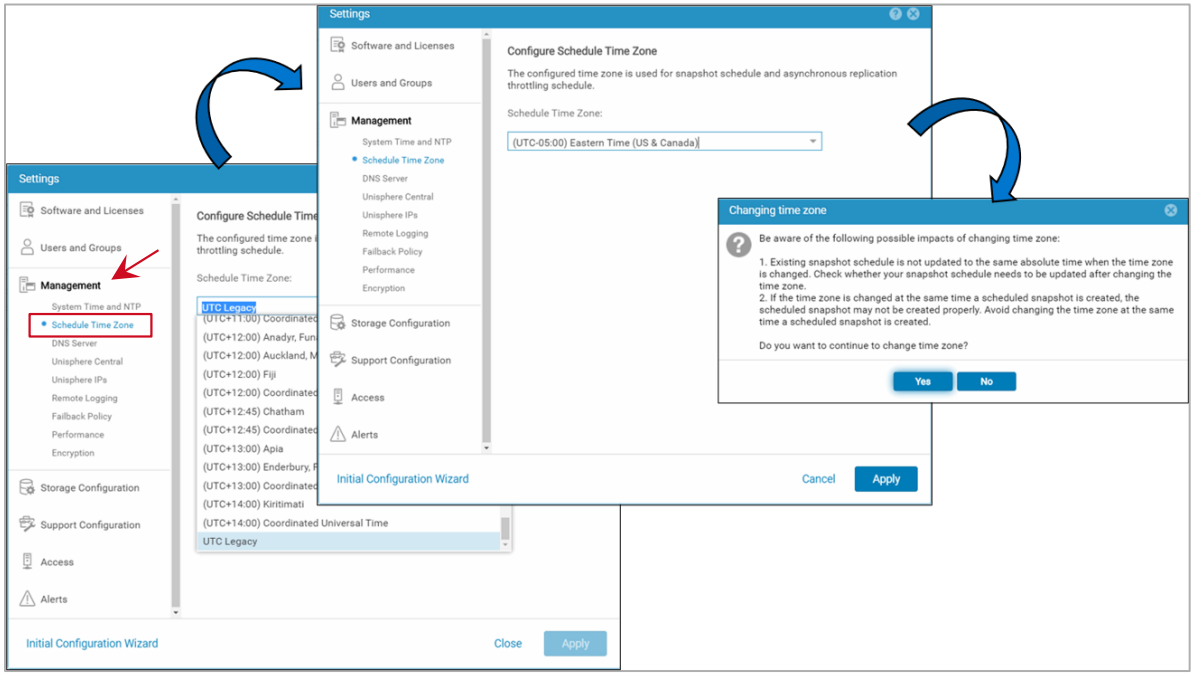
Enabling Time Zone Support



Beginning with Dell EMC Unity XT OE 5.1, the system supports a time zone option to correct timing issues for snapshot schedules and asynchronous replication throttling.

The setting applies to system defined and user created snapshot schedules. The setting is not a system setting, and does not apply to other features such as logs or FAST VP.

After upgrading to version 5.1, the schedule time zone is set to UTC Legacy. No changes are made to schedules when upgrading.

If the user enables the time zone settings, the internal snapshot schedule is NOT updated to the same absolute time. The user must check to see whether the snapshot schedule must be updated after enabling time zone support.

To enable the feature, choose **System Settings > Management > Schedule Time Zone**.

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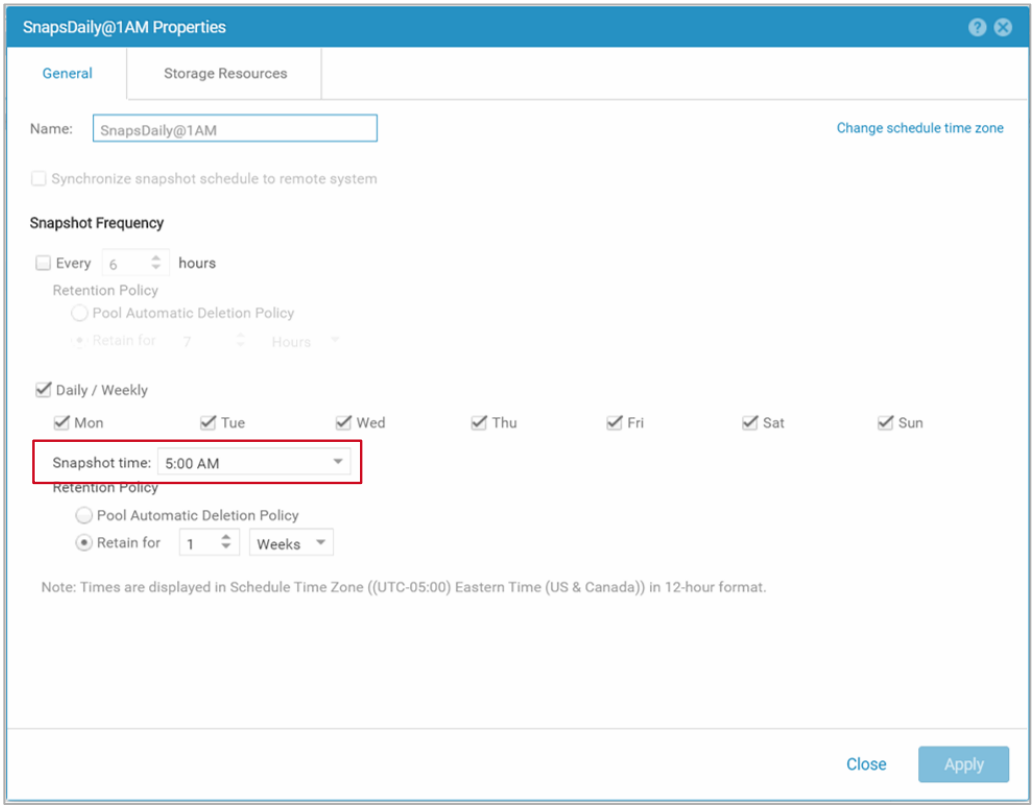
Schedule After Time Zone Support Enabled



When Schedule Time Zone is enabled, the system updates the schedule with the value that had been stored internally, in UTC time. The user must check the schedule, and edit it if necessary.

In the example shown, the schedule must be edited to return the **snapshot time** to its previous value, 1:00 AM.

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LUNs and Consistency Groups Snapshots

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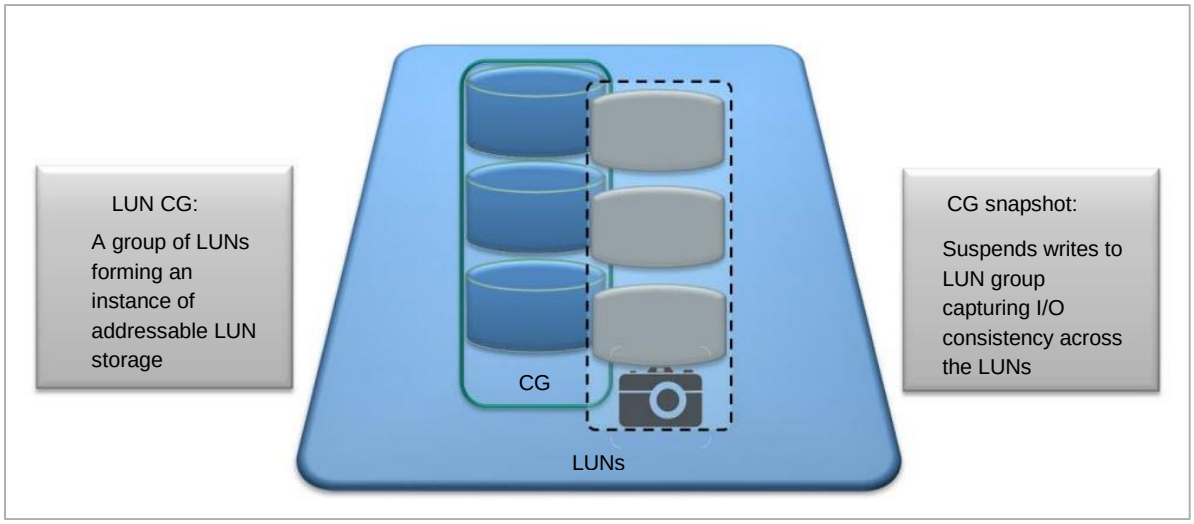
LUN Consistency Group Snapshots



A LUN Consistency Group (CG) is a grouping of multiple LUNs to form a single instance of LUN storage. They are primarily designed for host applications that access multiple LUNs, such as a database application. Snapshots provide a mechanism for capturing a snapshot of the multiple LUNs within a consistency group. When a Consistency Group snapshot is taken, the system completes any outstanding I/O to the group of LUNs. Then writes to the LUNs are suspended until the snap operation completes. The snapshot therefore captures a write-order consistent image of the group of LUNs.

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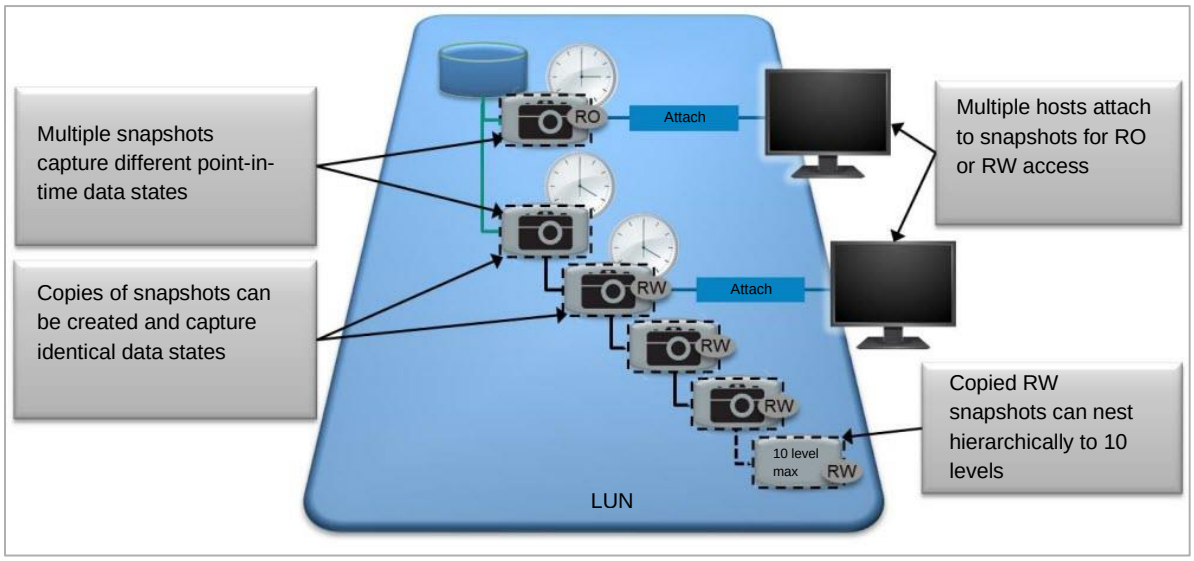
Multiple LUN Snapshots



With Dell Unity XT Snapshots, it is possible to create multiple snapshots of a LUN to capture multiple point-in-time data states. In this example, the three o'clock and the four o'clock snapshots are two different "child" snapshots of a common parent. They capture two different data states of a common storage resource.

It is also possible to copy a snapshot. In this example, the four o'clock snapshot is copied. Other than having a unique name, the copy is indistinguishable from the source snapshot and both capture identical data states.

Multiple hosts can be attached to any specific LUN snapshot or multiple snapshots within the tree. When a host is attached to a snapshot for access to its data, the attach can be defined for read-only access or read/write access. In the example, a host attaches to the three o'clock snapshot for read-only access and the snapshot remains unmodified from its original snapped data state. A different host is attached to the four o'clock snapshot copy for read/write access. By default, the system creates a copy of the snapshot to preserve its original data state. The user can optionally not create the snapshot copy. When the snap is read/write attached, its data state is marked as modified from its source.

It is also possible to nest copied read/write attached snapshots that form a hierarchy of snapshots to a maximum of 10 levels deep.

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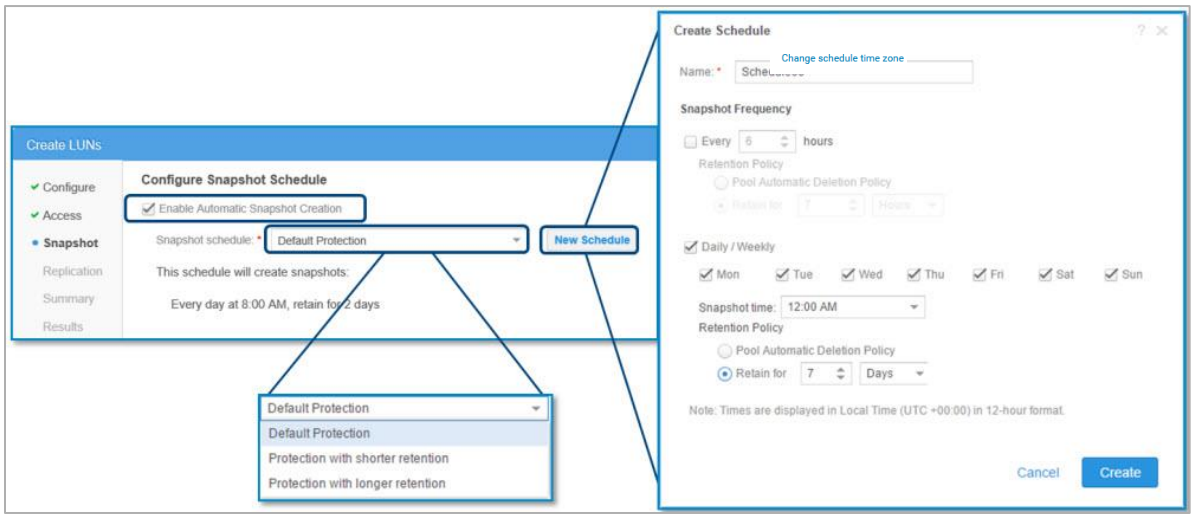
Creating LUN Snapshots - Create LUNs Wizard



LUN snapshots can easily be created in several ways. Within the wizard to **Create LUNs**, there is an option to automatically create snapshots for the LUN based on a schedule. The wizard contains a drop-down list selection that has three different system defined schedules to select from to create the LUN snapshots. There is also a snapshot retention value that is associated with each of the three schedules. A customized schedule can also be created for use. The scheduler has the granularity to configure a snapshot frequency by the hour, day, or week. A snapshot retention policy can also be defined.

Note: Configuration fields that are annotated with a red asterisk are required.

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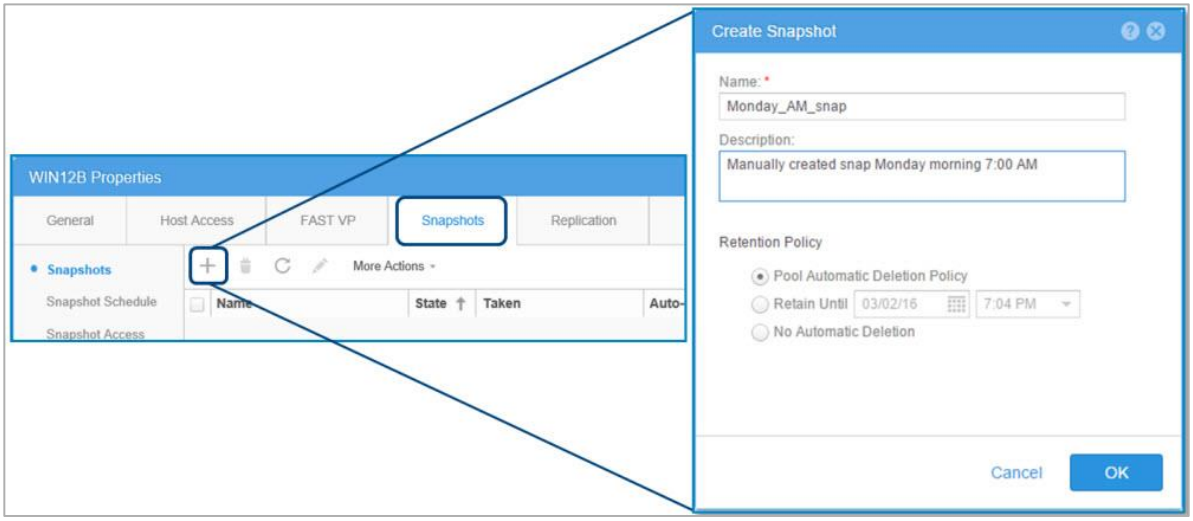
Creating LUN Snapshots - LUN Properties



For existing LUNs, snapshots are easily created from the LUN **Properties** page by selecting the **Snapshots** tab. To create a snapshot of the LUN, select the **+** icon. The snapshot must be configured with a name; by default the system provides a name having a year, month, day, hour, minute, second format. Customized names can also be configured. A **Description** field for the snapshot can be annotated as an option. One of three **Retention Policies** must be configured. The default retention configuration is the **Pool Automatic Deletion Policy**. It automatically deletes the snapshot if pool space reaches a specified capacity threshold that is defined on the pool. A customized retention time can alternately be selected and configured for snapshot deletion on a specified calendar day and time. The other alternative is to select the **No Automatic Deletion** option if the snapshot must be kept for an undetermined amount of time.

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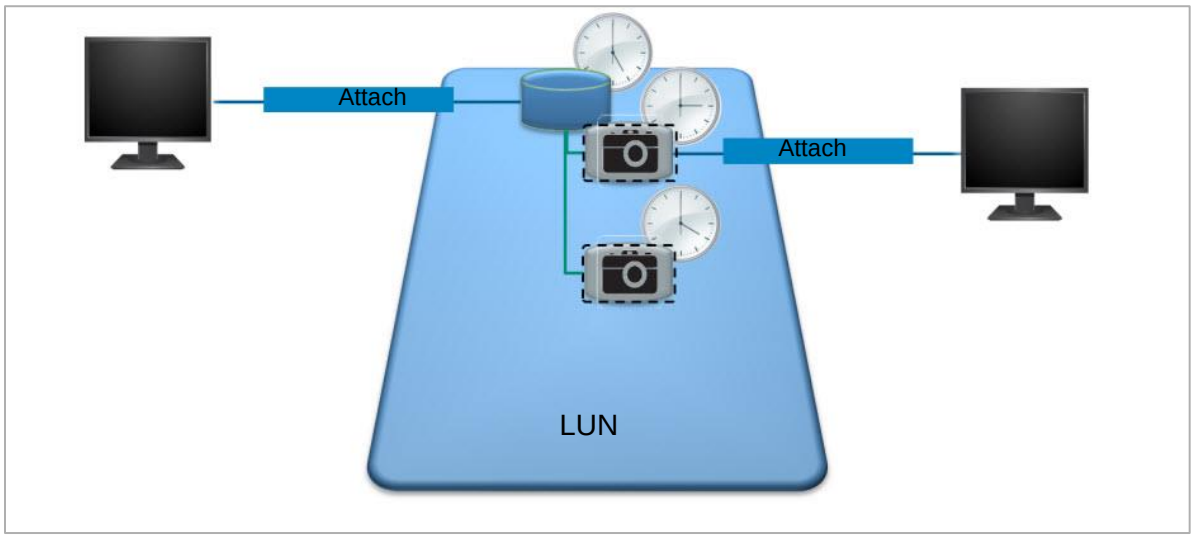
LUN Snapshot Restore - Process

Initial State

LUN Snapshot Restore Process – 1 of 4

The Snapshot Restore operation rolls back the storage resource to the point-in-time data state that the snapshot captures. In this restore example, a LUN is at a five o'clock data state. It is restored from a snapshot with a four o'clock data state.



Detach Hosts Quiesce I/O Disconnect Hosts

LUN Snapshot Restore Process – 2 of 4

Before performing a restore operation, detach any host attached to the LUN snapshot been restored. Also ensure that all hosts have completed all read and write operations to the LUN you want to restore. Finally, disconnect any host accessing the LUN. This action may require disabling the host connection on the host-side.

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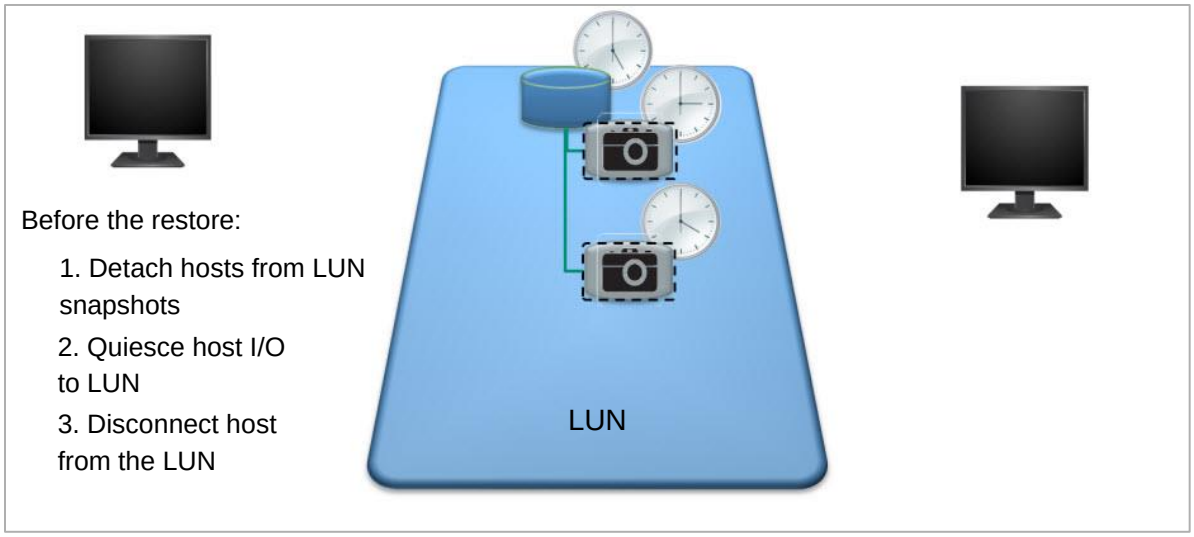
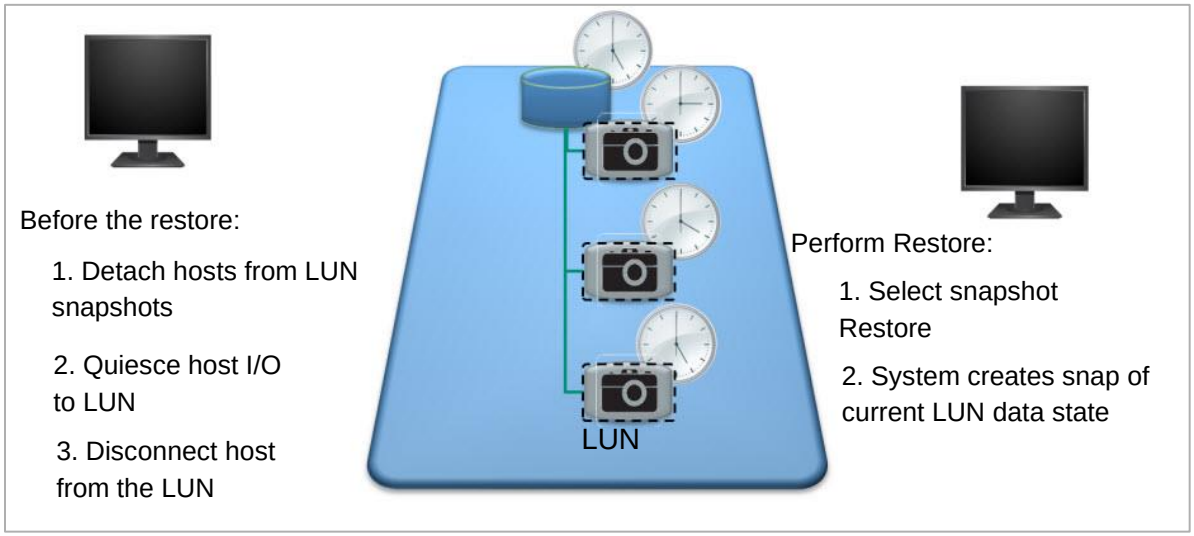


Start Restore

LUN Snapshot Restore Process – 3 of 4

Now the restore operation can be performed. From the four o'clock snapshot, select the **Restore** operation. The system automatically creates a snapshot of the current five o'clock data state of the LUN. This snapshot captures the current data state of the LUN before the restoration operation begins.



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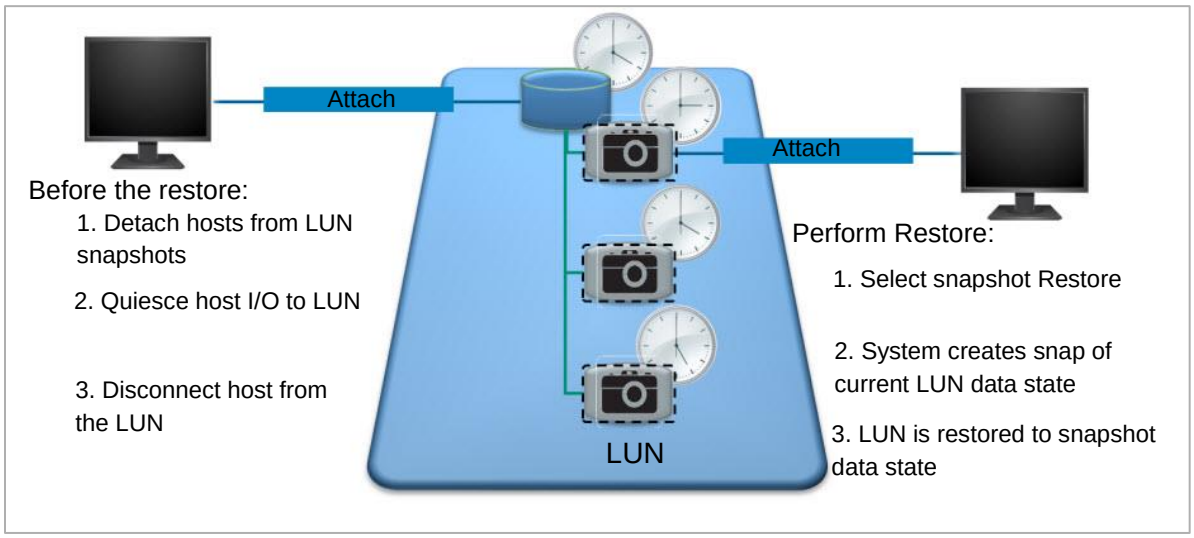
Reconnect Hosts

LUN Snapshot Restore Process – 4 of 4

The LUN is restored to the four o'clock data state of the snapshot. The hosts can now be reconnected to the resources they were connected to before the restore operation and resume normal operations.



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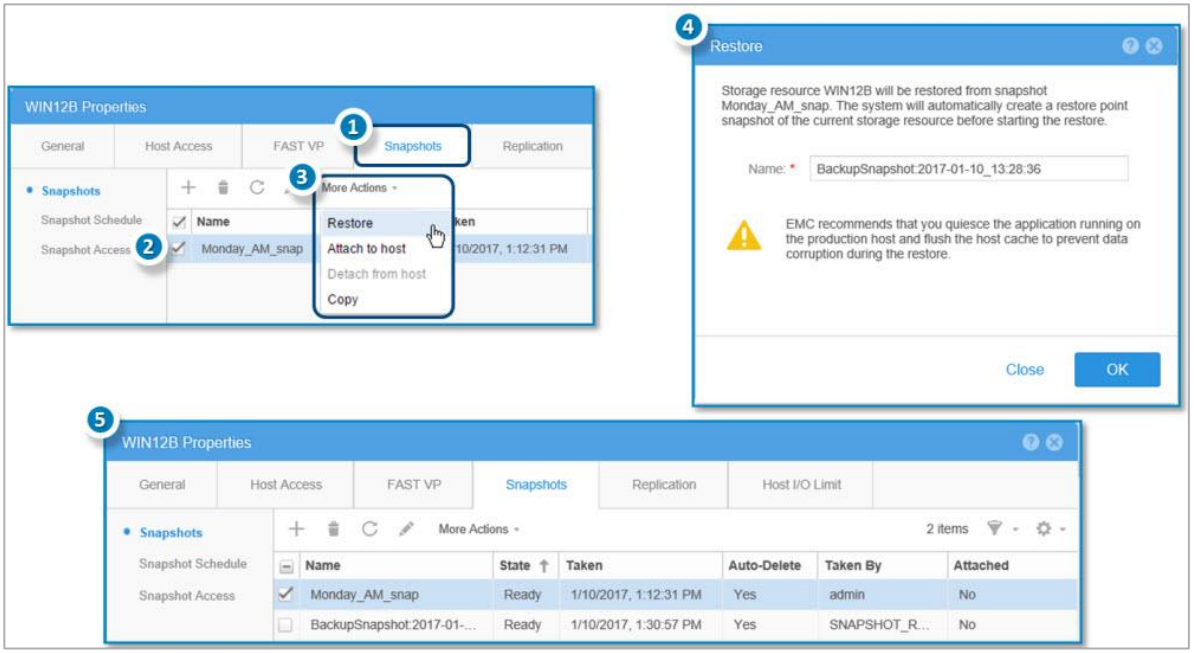
LUN Snapshot Restore - Operation



To restore a LUN from a snapshot, access the **Properties** page for the LUN.

On the **Properties** page:

1. Go to the **Snapshots** tab.
2. Check the box for the snapshot you want to restore from.
3. On the **More Actions** dropdown menu, click **Restore**.
4. The **Restore** window opens. Click **OK**.
5. The restore completes. The restore point snapshot is listed on the **Snapshots** tab.

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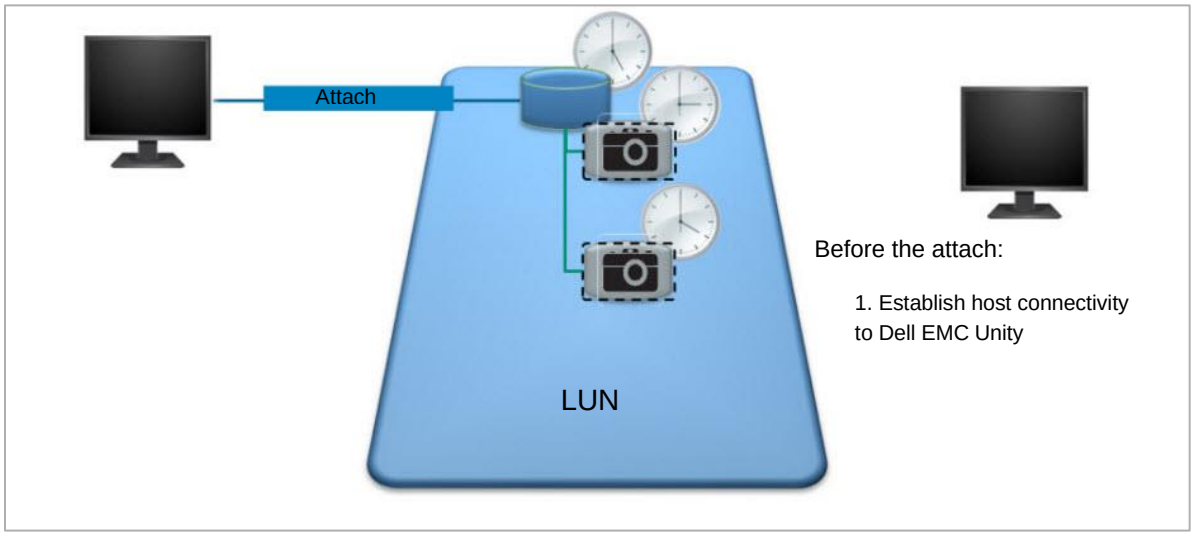
Attach LUN Snapshot to Host - Process

Establish Host Connectivity to Unity

The Snapshot Attach to host operation attaches a connected host to a LUN snapshot. In this attach example, a secondary host is going to attach to the three o'clock snapshot of the LUN. Prior to performing an Attach to host operation, the host being attached must have connectivity to the storage array and registered on the storage system. Now the attach operation can be performed.



Select Snapshot Select Access Type Select Hosts

The first step is to select a snapshot to attach to. The next step is to select an Access Type, either read-only or read/write. Then the host or hosts are selected to be attached.

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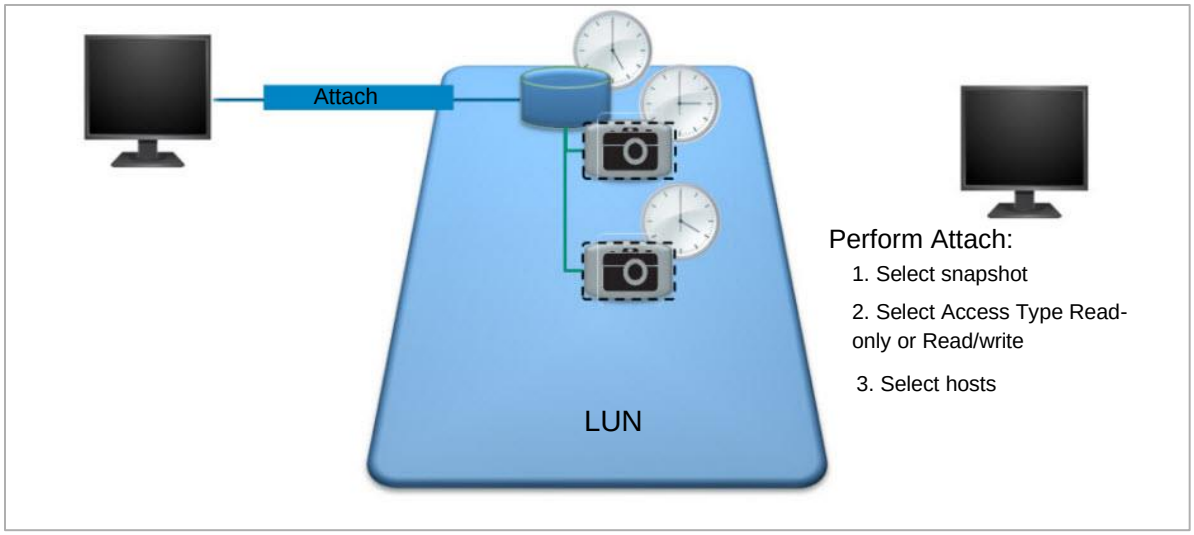
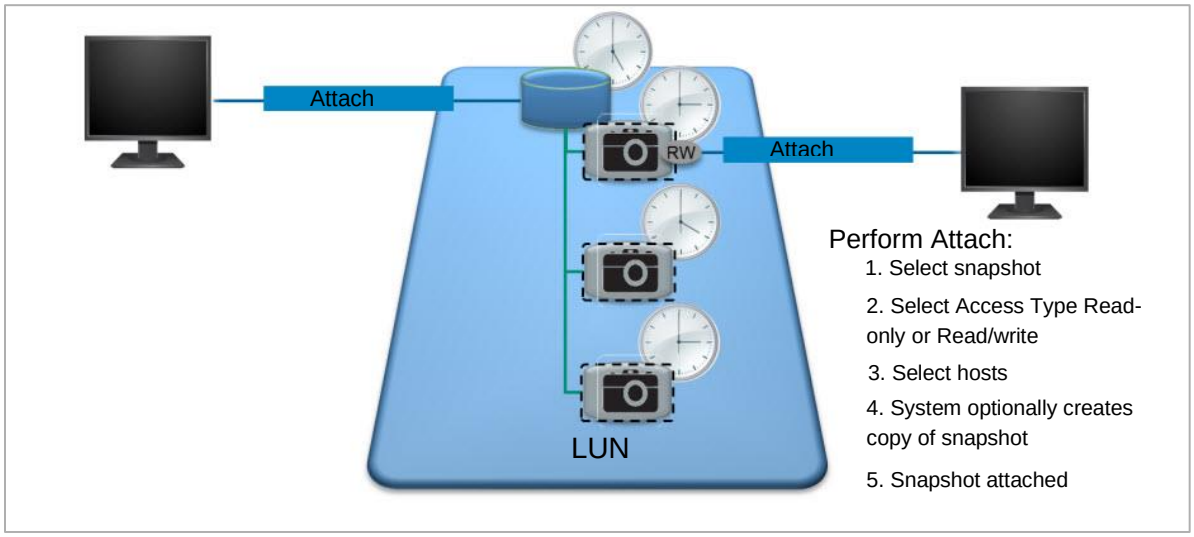


Data State of Snapshot Preserved Host attached

Next, the system optionally creates a copy of the snapshot if a read/write Access Type was selected. The snapshot copy preserves the data state of the snapshot before the attach. Finally, the selected host is attached to the snapshot with the Access Type selected.



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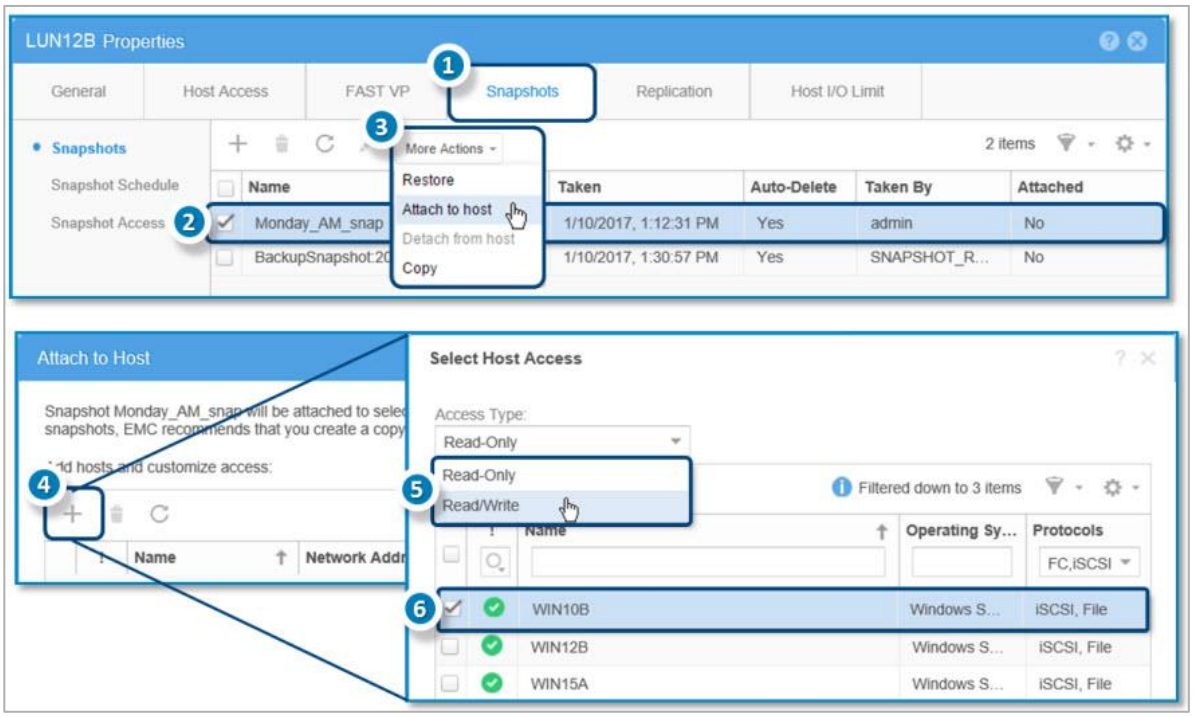
Attach LUN Snapshot to Host - Operation

LUN Snapshot Attach to Host Operation



To attach a host to a snapshot of a LUN, access the **Properties** page for the LUN.

On the **Properties** page:

1. Go to the **Snapshots** tab.
2. Check the box for the snapshot that you want to attach to a host. In this example, the **Monday_AM_snap** is selected.
3. On the **More Actions** dropdown menu, click **Attach to host**.
4. The **Attach to Host** window opens. Click the plus sign **+** icon to add hosts and configure access to the snap.
5. Choose the **Access Type** which can be read-only or read/write. In this example the access type is **Read/Write**.
6. Check the box next to the name of the host or hosts to be attached to the snapshot. In this example **WIN10B** is selected for access.

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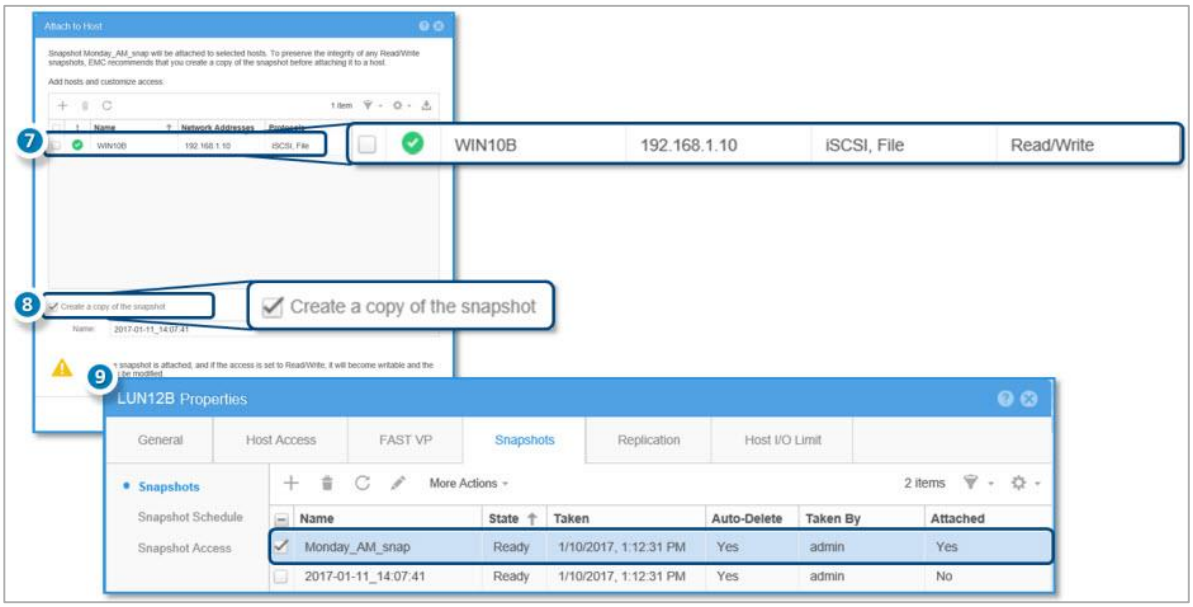
LUN Snapshot Attach to Host Operation Continued



The attach configuration is displayed.

7. In this example, the **WIN10B** host is attached to the **Monday_AM_snap** with **Read/Write** access.
8. By default, the system optionally creates a copy of the snapshot being attached with read/write access to preserve its original point-in-time data state.
9. The snapshot is attached to the host and its attach status is displayed.

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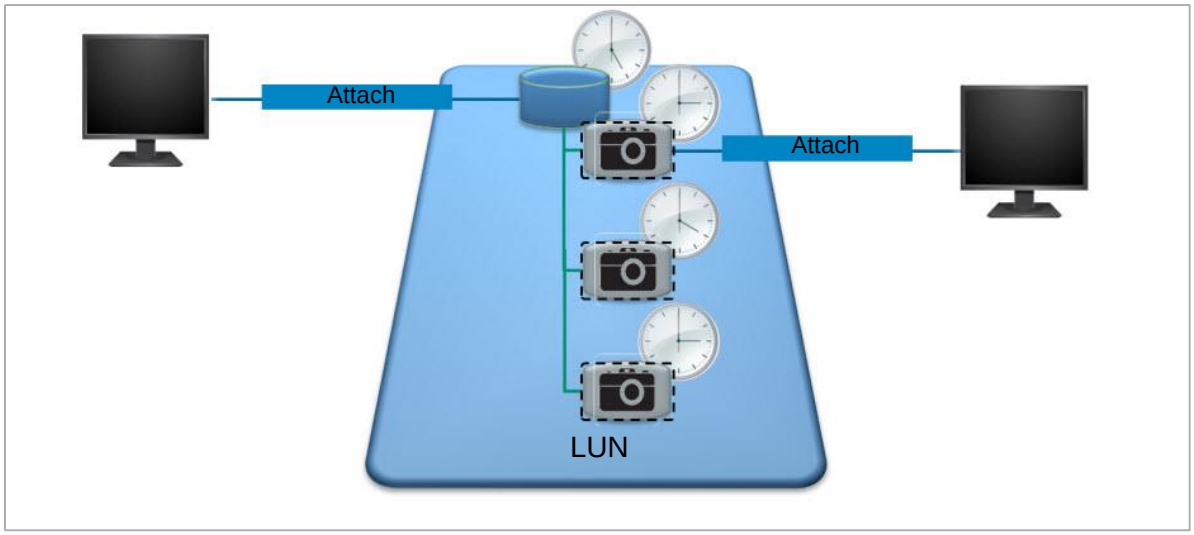
Detach LUN Snapshot from Host - Process

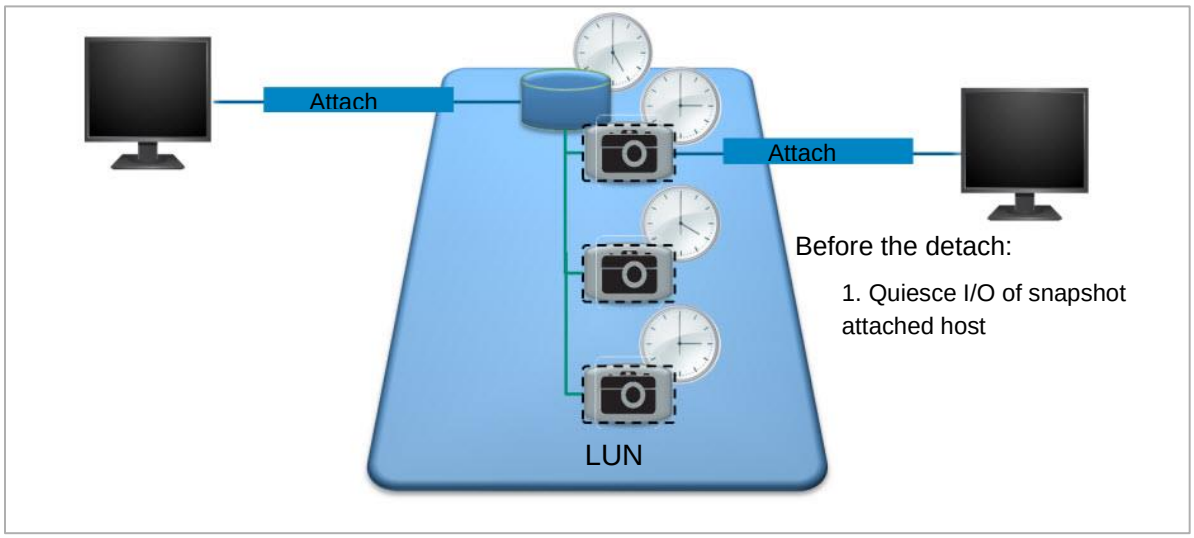
LUN Snapshot - Detach from Host Process – 1

The Snapshot Detach operation detaches a connected host from a LUN snapshot. In this detach example, a secondary host is going to detach from the three o'clock snapshot of the LUN.



LUN Snapshot - Detach from Host Process – 2

Before performing a detach operation, allow any outstanding read/write operations of the snapshot attached host to complete.



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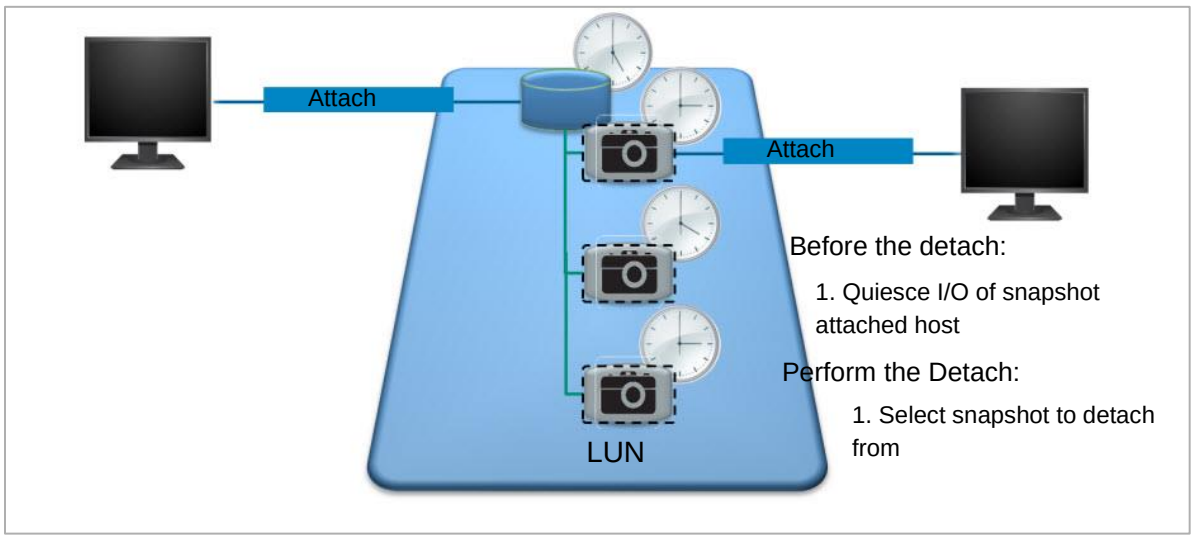
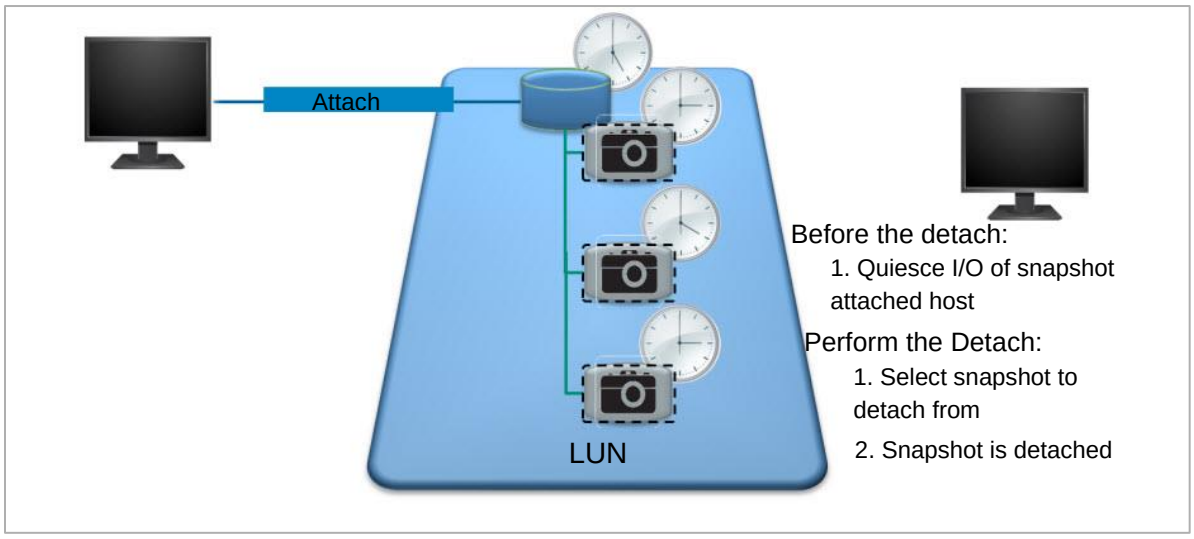
LUN Snapshot - Detach from Host Process – 3

Now the detach operation can be performed. From the three o'clock snapshot, select the **Detach from host** operation.



LUN Snapshot - Detach from Host Process – 4

The secondary host is detached from the three o'clock snapshot of the LUN.



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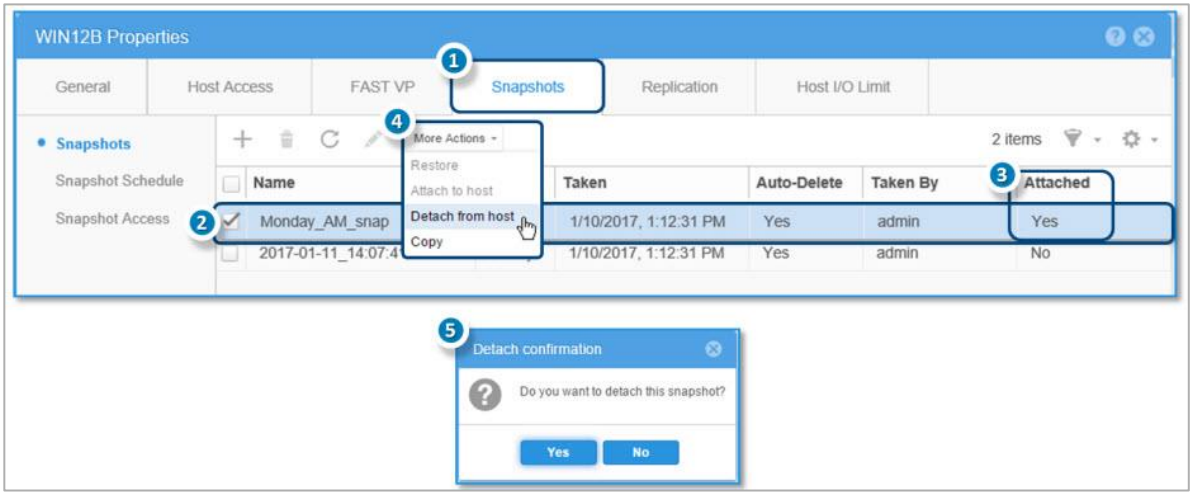
Detach LUN Snapshot from Host - Operation



To detach a host from a snapshot, first access the **Properties** page of the storage resource.

From the **Properties** page:

1. Go to the **Snapshots** tab.
2. Check the box next to the snapshot to detach from.
3. The action for **Attach to host** and **Detach from host** are mutually exclusive operations. The **Detach from host** operation is only available for snapshots that are attached.
4. On the **More Actions** drop-down list, select **Detach from host**.
5. On the **Detach Confirmation** window, click **Yes.**

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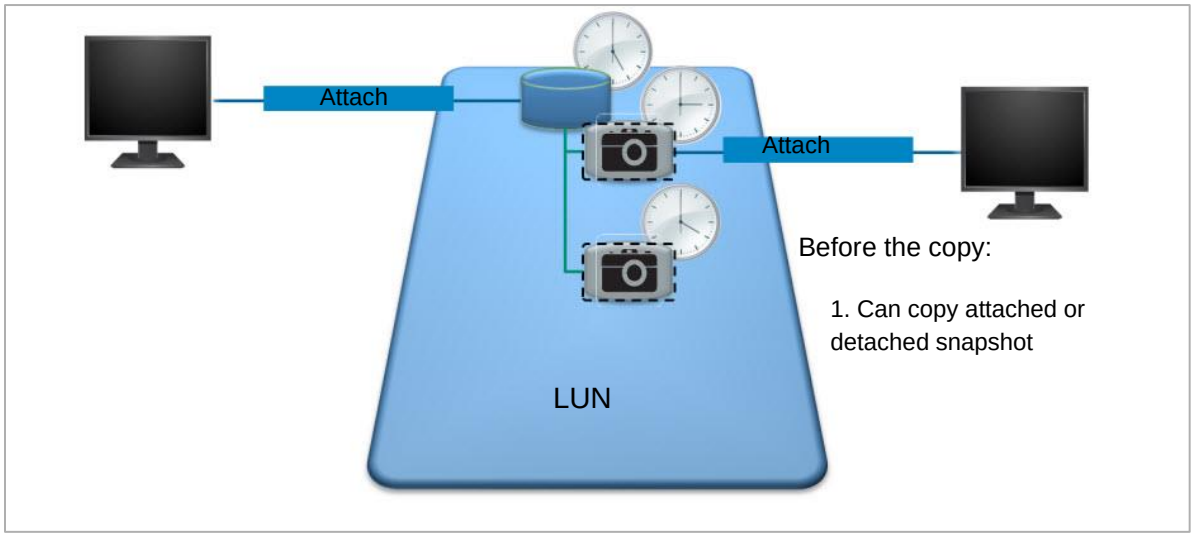
LUN Snapshot Copy - Process

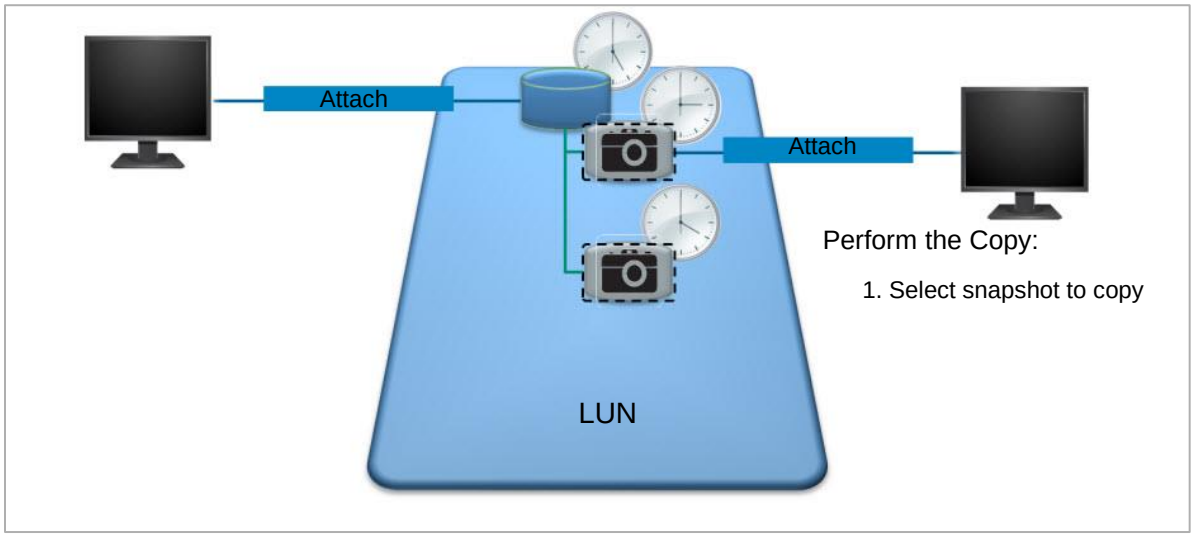
Copy of Snapshot Created

The Snapshot Copy operation makes a copy of an existing snapshot that is either attached or detached from a host. In this example, a copy of an existing four o'clock snapshot is being made.



Select Snapshot to Copy

Select the snapshot to copy.



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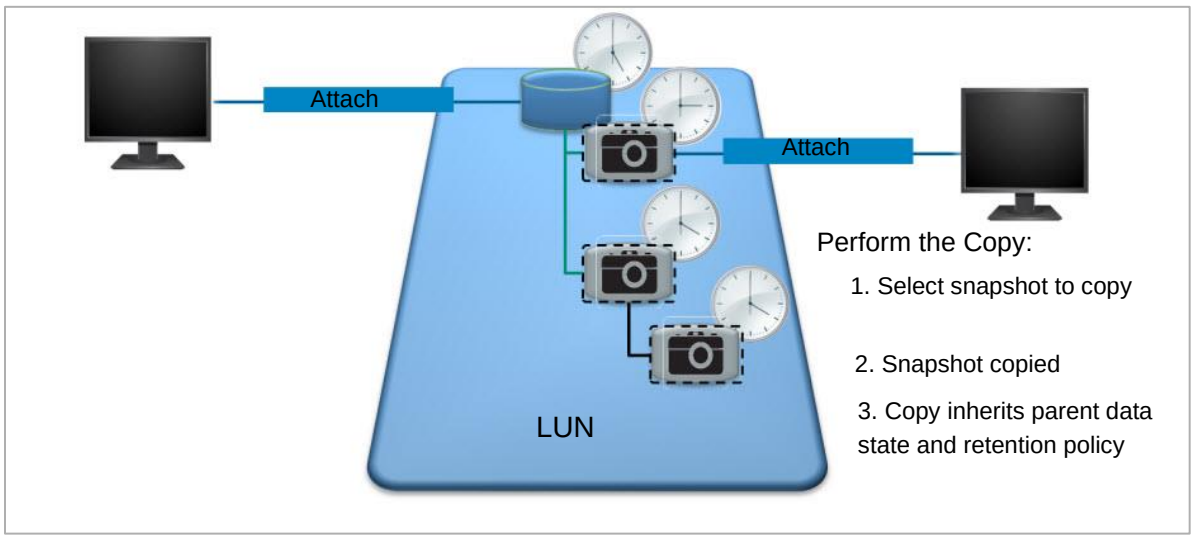
Snapshot Copied

A copy of the selected snapshot is made. The copy inherits the parent snapshot data state of four o'clock and its retention policy.



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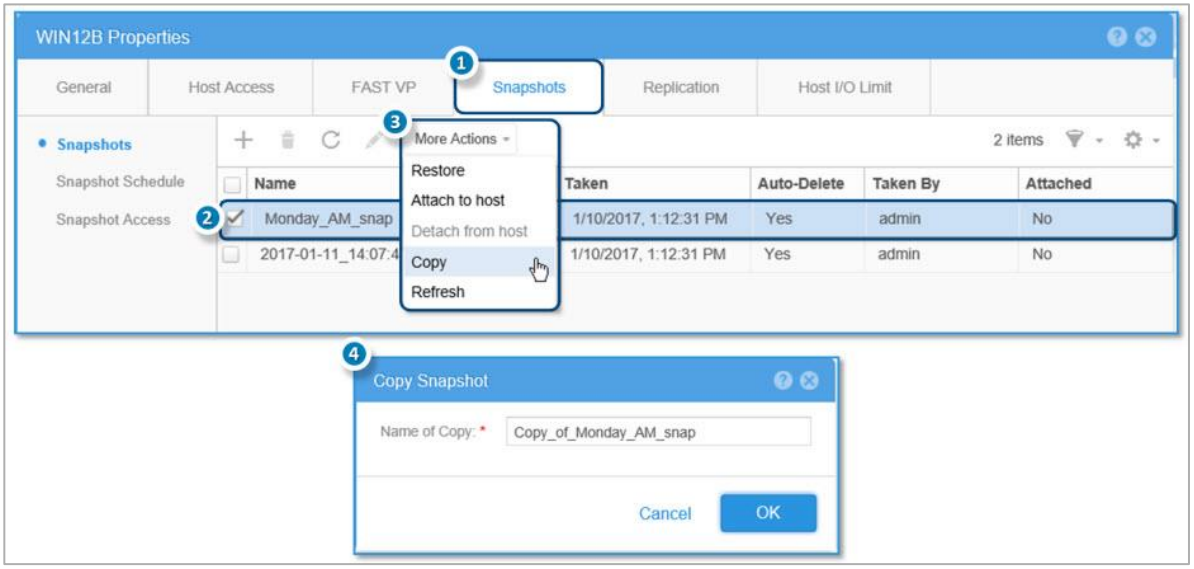
LUN Snapshot Copy - Operation



To copy a snapshot of a LUN, first access the **Properties** page of the LUN.

From the **Properties** page:

1. Go to the **Snapshots** tab.
2. Check the box next to the snapshot to copy.
3. On the **More Actions** drop-down list, select **Copy**.
4. On the **Copy Snapshot** window, the system provides a unique name for the snapshot copy that is based on the time of creation, or a customized name can be assigned. Click **OK** to create the copy.

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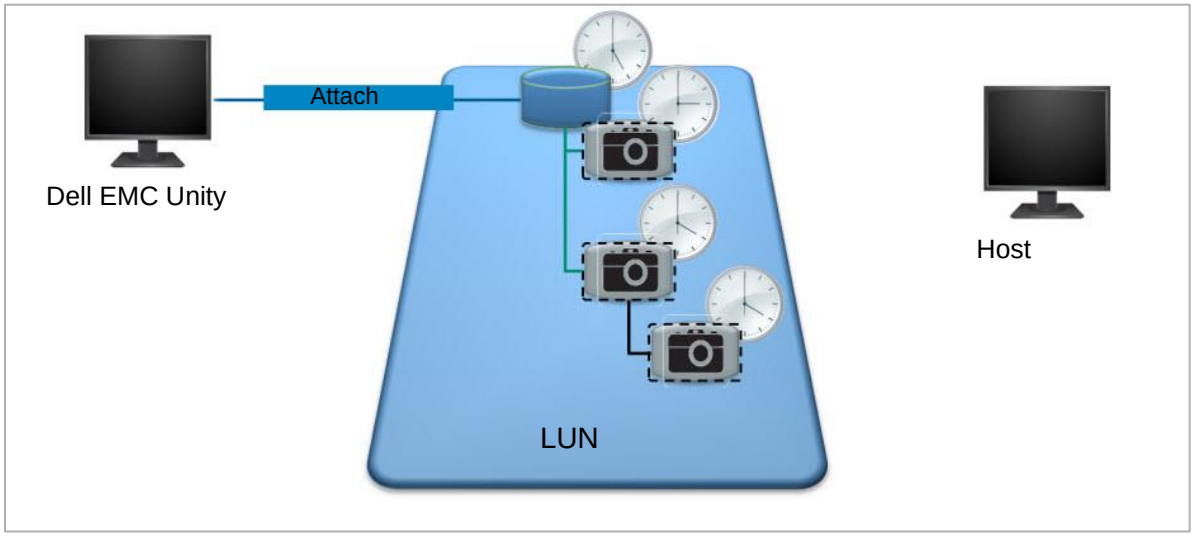
Accessing a LUN Snapshot

Establish Host Connectivity to Unity
Register Host

The process of accessing a LUN snapshot requires performing tasks on the storage system and on the host that accesses the snapshot. The host must have connectivity to the storage, either using Fibre Channel or iSCSI, and be registered. In this example, a secondary host accesses the three o'clock LUN snapshot.



Select LUN Snapshot

Next, from the Snapshots tab, a snapshot is selected and the snapshot operation Attach to host is performed.

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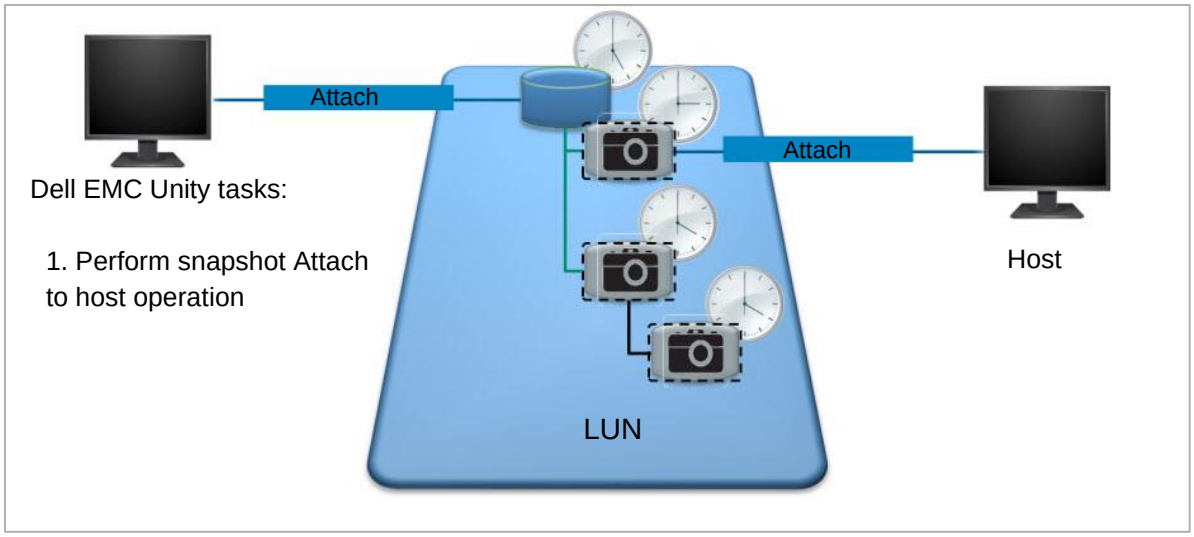
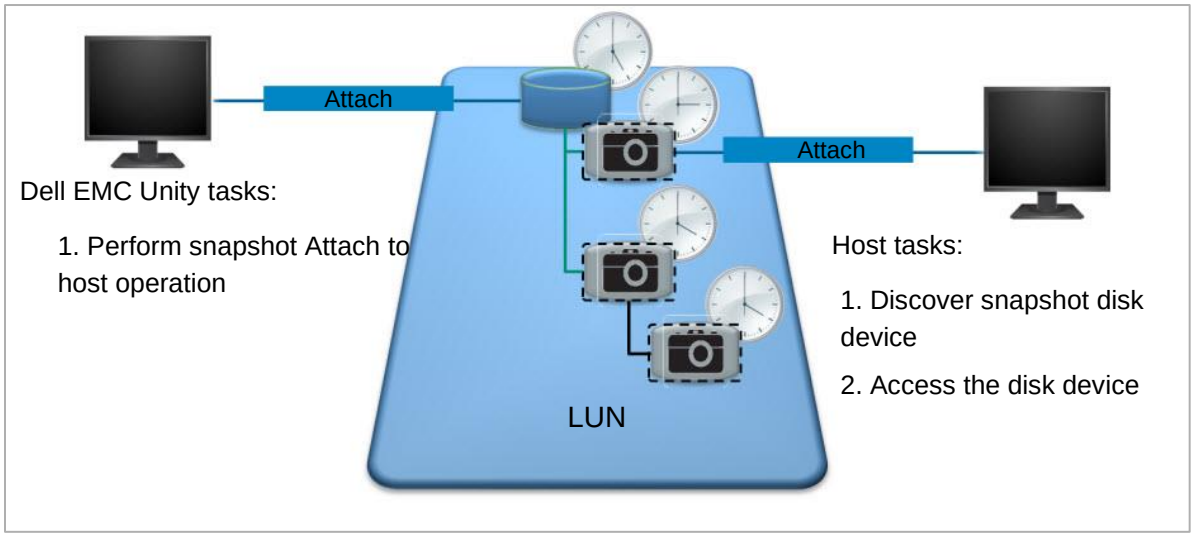


Discover Disk Device Access Snapshot

Now tasks from the host must be completed. The host must discover the disk device that the snapshot presents to it. After the discovery, the host can access the snapshot as a disk device.



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Activity: LUN Snapshots

Virtual lab for facilitated sessions:

- Create a snapshot of a LUN.
- Create a snapshot schedule.
- Attach a host to access the LUN snapshot.
- Perform a snapshot restore operation.

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File System Snapshots

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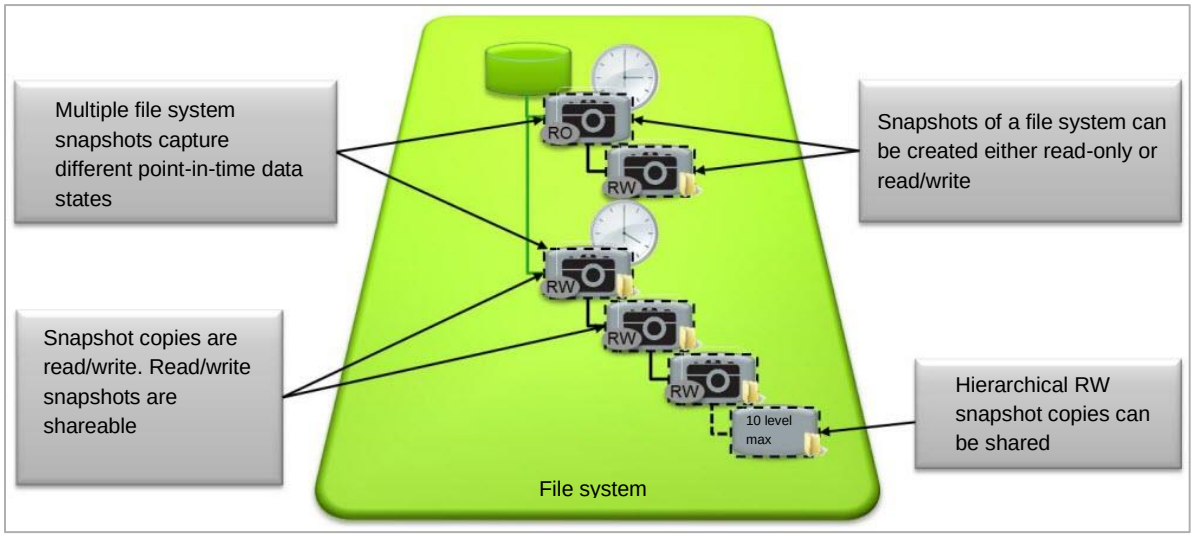
Multiple File System Snapshots



As with LUN snapshots, it is possible to create multiple snapshots of a file system to capture multiple point-in-time data states. The three o'clock and the four o'clock snapshots in this example are two different "child" snapshots of the same file system parent. They capture two different point-in-time data states of the file system. Snapshots of a file system can be created either as read-only or read/write and are accessed in different manners which are covered in other topics. Copies of snapshots are always created as read/write snapshots. The read/write snapshots can be shared by creating an NFS or SMB share to them. When shared, they are marked as modified to indicate that their data state is different from the parent resource. It is also possible to nest copied and shared snapshots that form a hierarchy of snapshots to a maximum of 10 levels deep.

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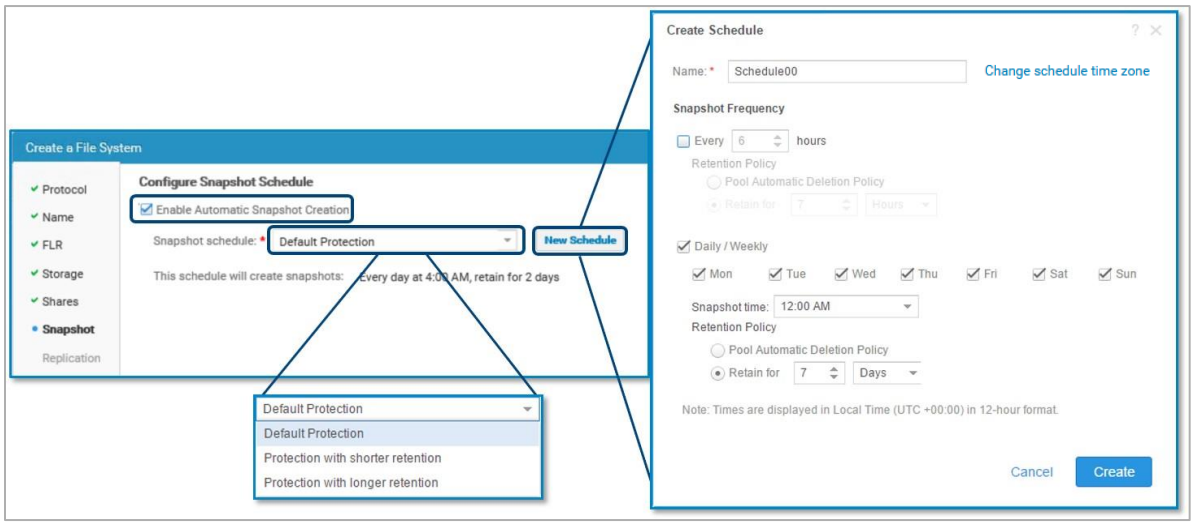
Creating File System Snapshots - Create File System Wizard



File system snapshots can easily be created in several ways. Within the wizard to **Create a File System**, there is an option to automatically create snapshots for the file system based on a schedule. File system snapshots that are created with a schedule are read-only. The wizard contains a drop-down list selection that has three different system defined schedules to select from to create the file system snapshots. Each schedule includes a snapshot retention value. A customized schedule can also be created for use. The scheduler includes the granularity to configure a snapshot frequency by the hour, day, or week. A snapshot retention policy can also be defined. Configuration fields that are annotated with a red asterisk are required.

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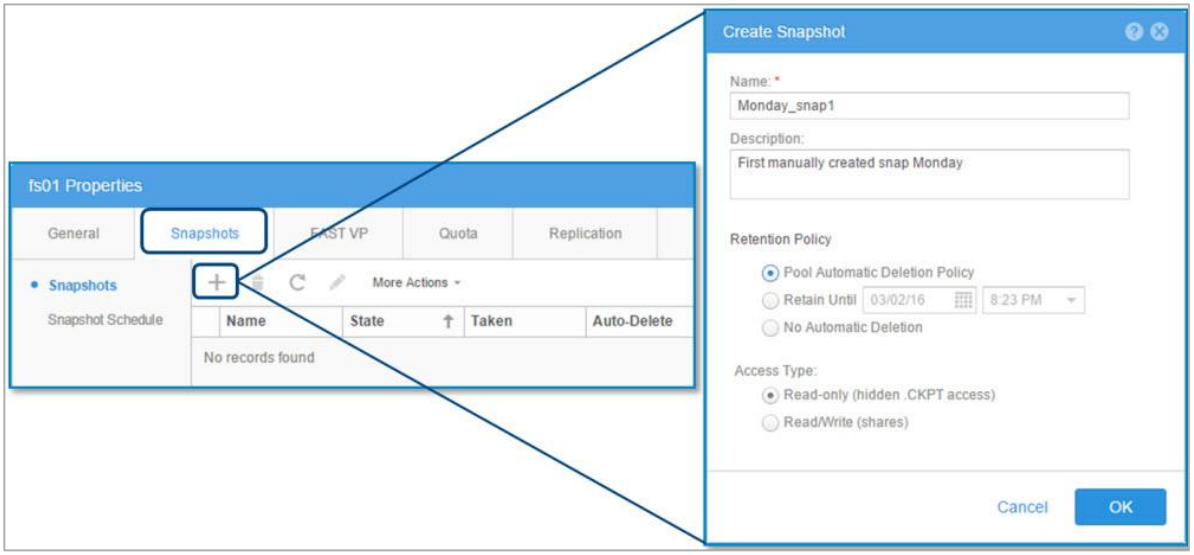
Creating File System Snapshots - File System Properties



Snapshots of existing file systems are easily created from the file system **Properties** page by selecting the **Snapshots** tab. A manually created file system snapshot can be read-only or read/write. To create a snapshot of the file system, select the **+** icon. The snapshot must be configured with a **Name**. By default the system provides a name that is based on the creation time in a year, month, day, hour, minute, second format. Customized names can also be configured. A **Description** field for the snapshot can optionally be configured. One of three **Retention Policies** must be configured. The default retention configuration is the **Pool Automatic Deletion Policy.** That policy automatically deletes the snapshot if pool space reaches a specified capacity threshold defined on the pool. A customized **Retention Time** can alternately be selected and configured for snapshot deletion on a specified calendar day and time within a year of creation. The other alternative is to select the **No Automatic Deletion** option if the snapshot must be kept for an undetermined amount of time. The **Access Type** section requires configuration by selecting one of the two options for the snapshot; read-only or read/write.

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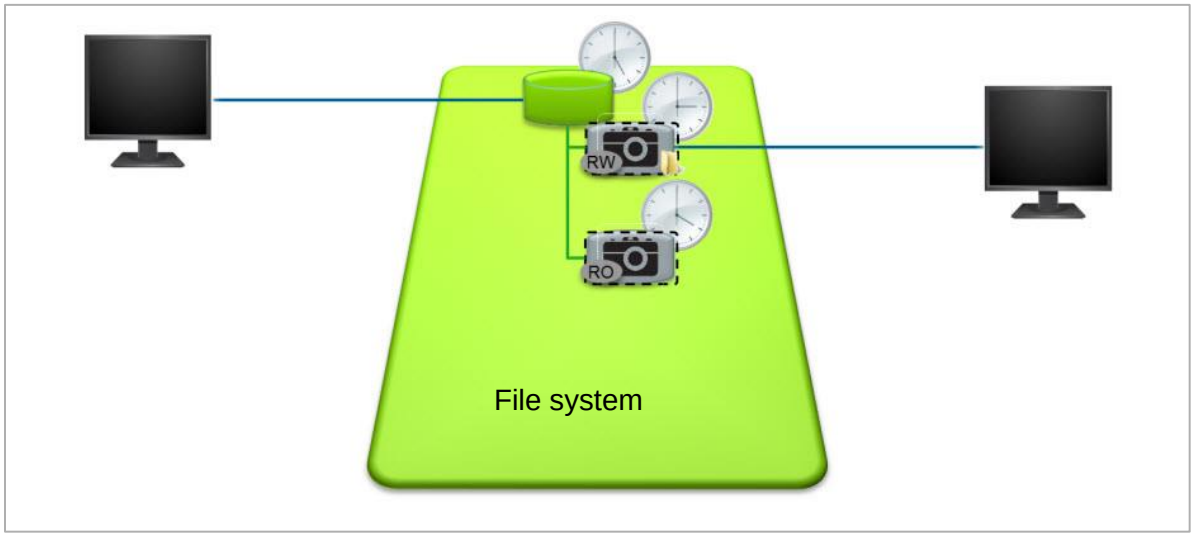
File System Snapshot Restore - Process

Initial State

The Snapshot Restore operation for a file system is similar to the restore operation of a LUN. It rolls back the file system to a point-in-time data state that a read-only or read/write snapshot captures. This example restores a file system from a snapshot. The file system is at a five o'clock data state and is restored from a read-only snapshot with a four o'clock data state.



Disconnect Clients
Quiesce I/O

Before performing a restore operation, disconnect the client connected to the File system snapshot been restored. Also quiesce I/O to the file system being restored. Clients can remain connected to the file system but should close any opened files.

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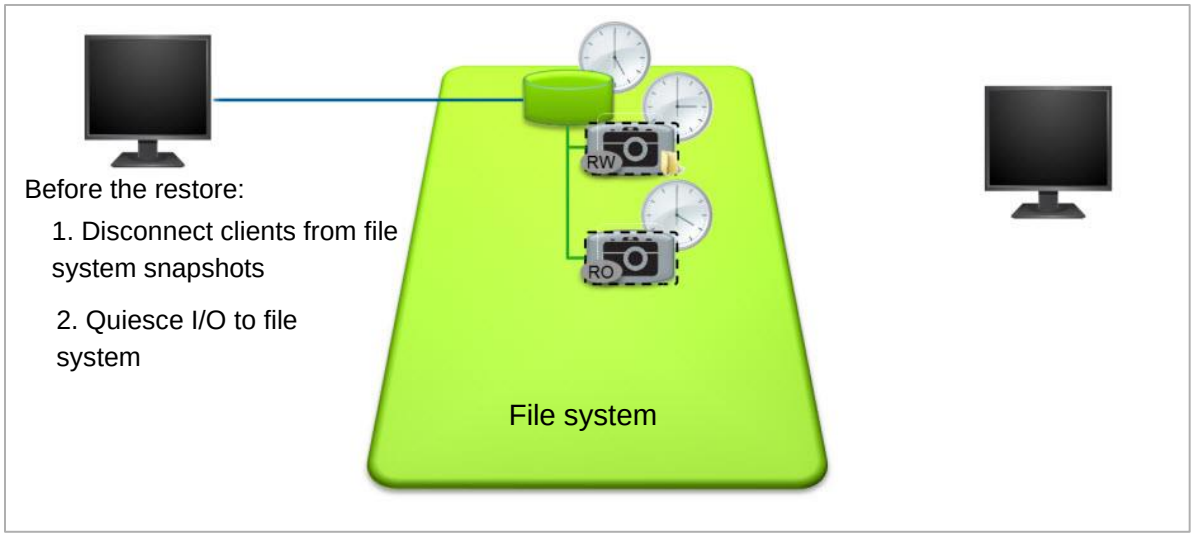
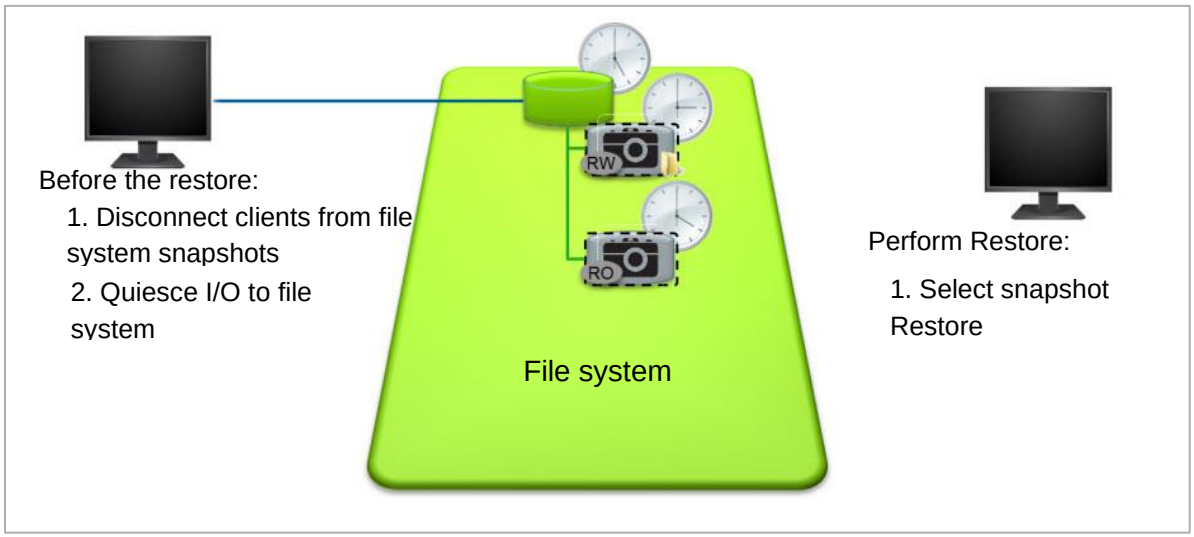


Restore from Snap

Now the Restore operation can be performed. From the four o'clock snapshot, select the Restore operation.



Current Data State Snapped

The system automatically creates a snapshot of the current five o'clock data state of the file system. It captures the current data state of the file system before the restoration operation begins.

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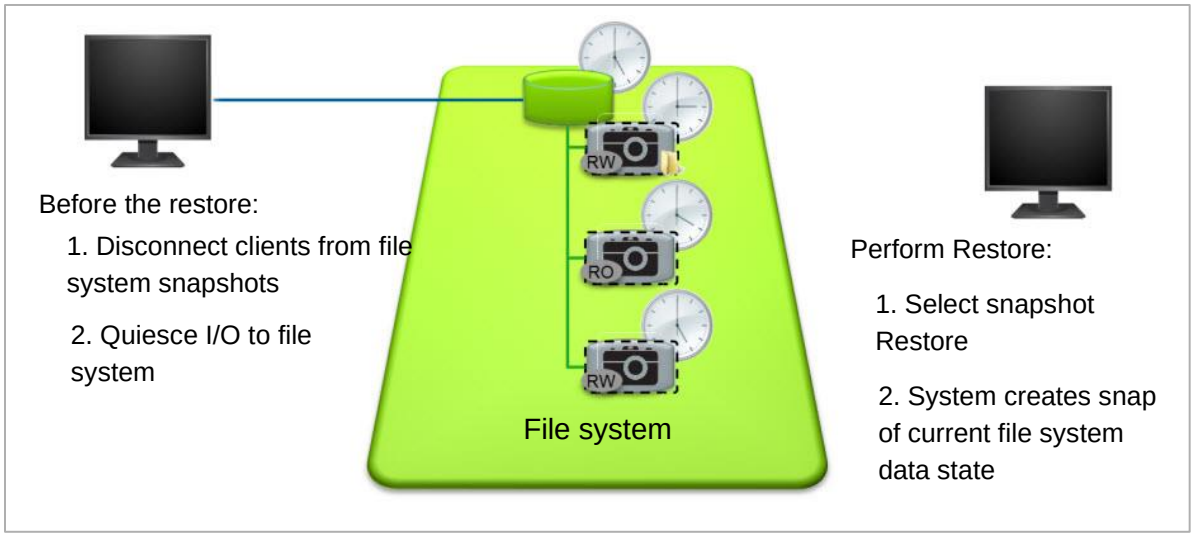
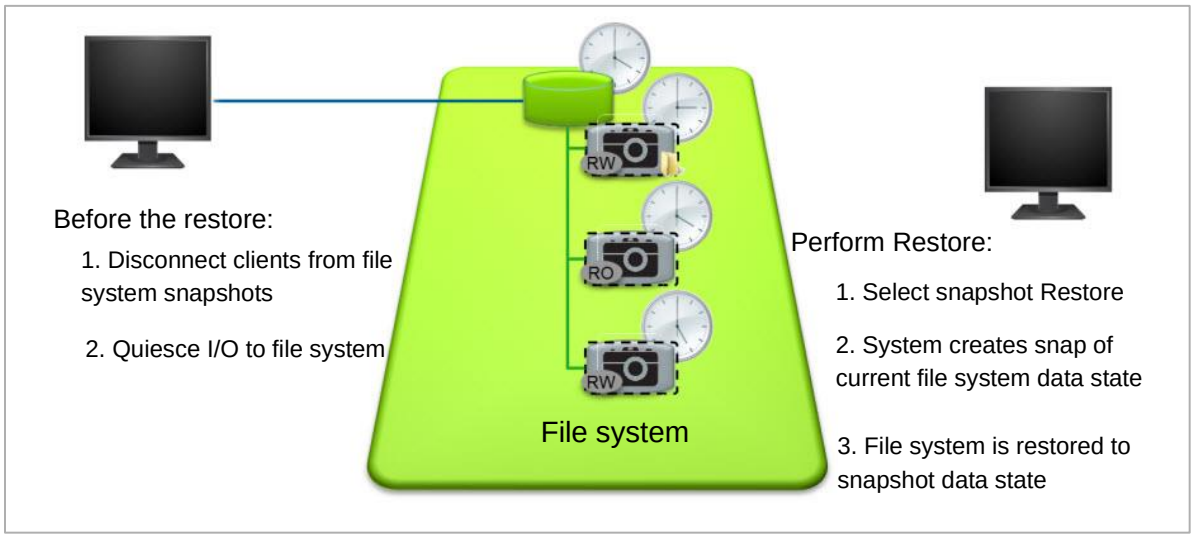


Connections and I/O Resumed

The file system is restored to the four o'clock data state of the snapshot. The connections and I/O to the resources can now be resumed for normal operations.



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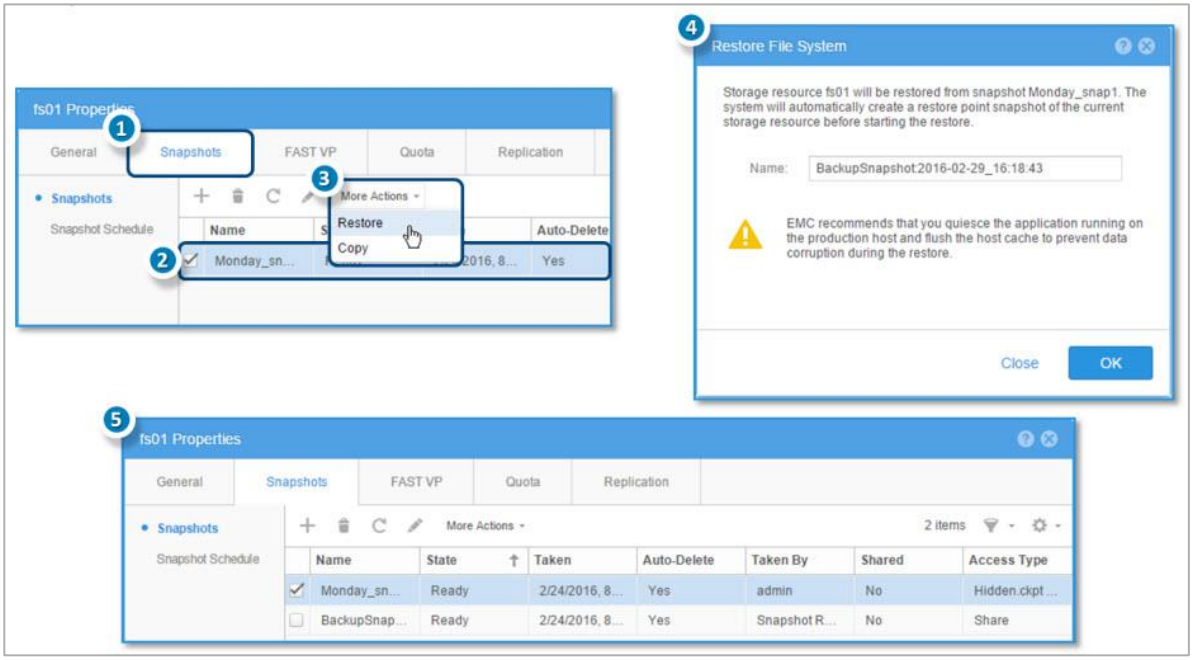
File System Snapshot Restore - Operation



To restore a file system from a snapshot, access the **Properties** page for the snapshot.

1. Go to the Snapshots tab.
2. Check the box for the snapshot you want to restore from.
3. On the More Actions dropdown menu, click Restore.
4. The Restore window opens. The system creates a restore point snapshot of the current data state of the file system before the restoration operation. Click OK.
5. Once complete, the new restore point snapshot is listed.

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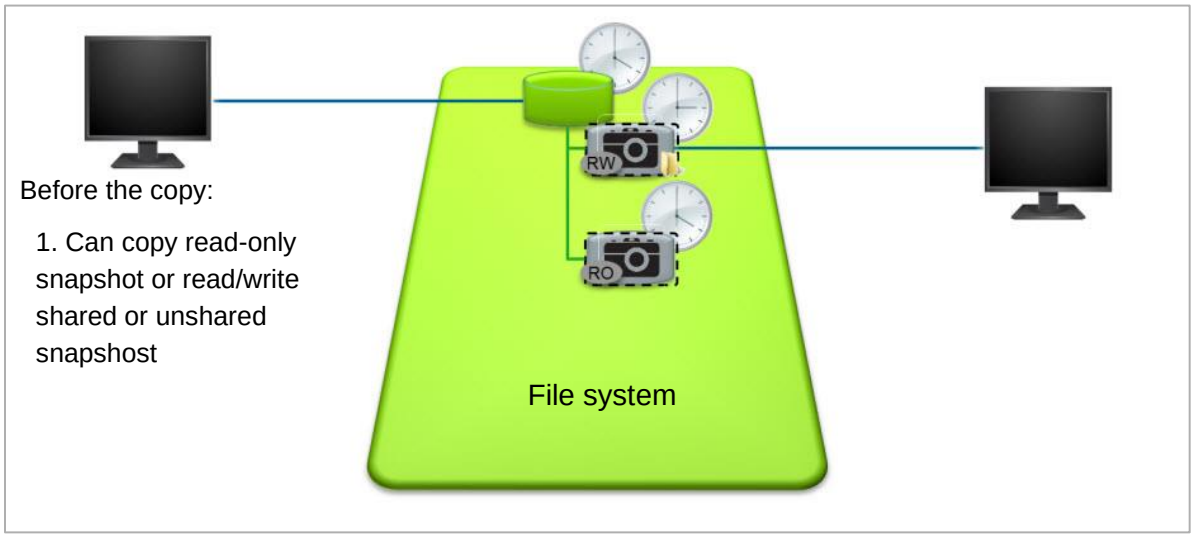
File System Snapshot Copy - Process

Initial State

The Snapshot Copy operation makes a copy of an existing file system snapshot that is either read-only or read/write shared or unshared. In this example, a copy of an existing four o'clock read-only snapshot is being made.



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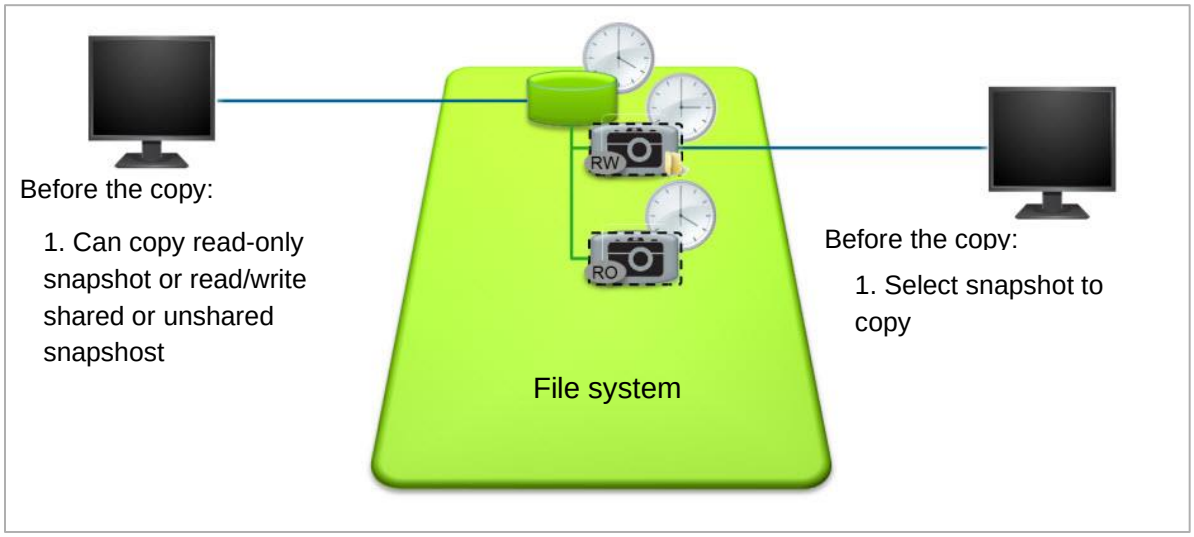
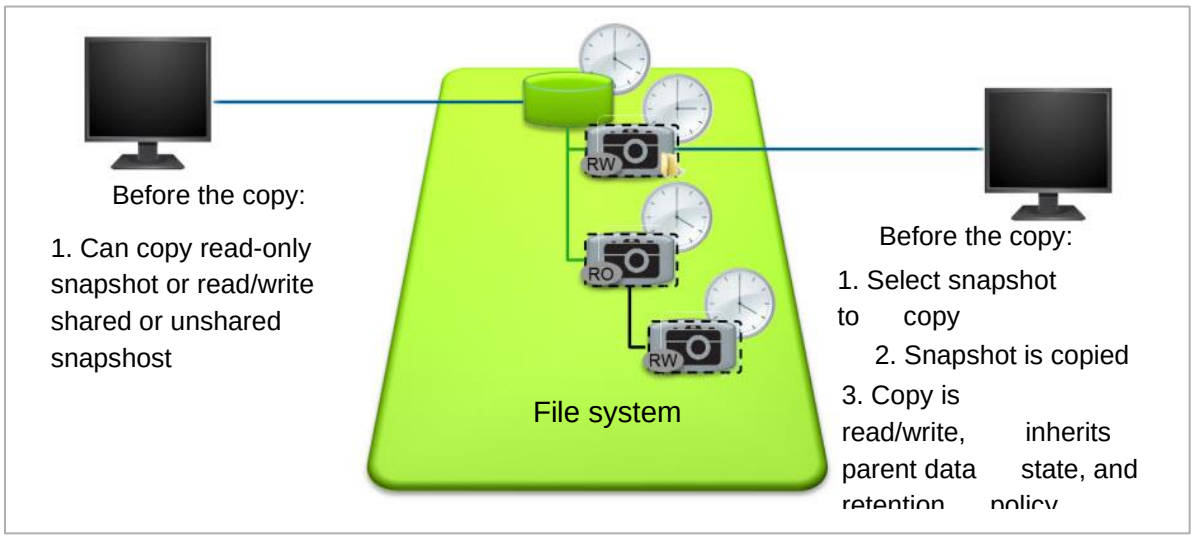
Select Snapshot to Copy

Select the snapshot to copy.



Copy Created

The snapshot copy is created and is read/write. It also inherits the parent snapshot data state of four o'clock and its retention policy.



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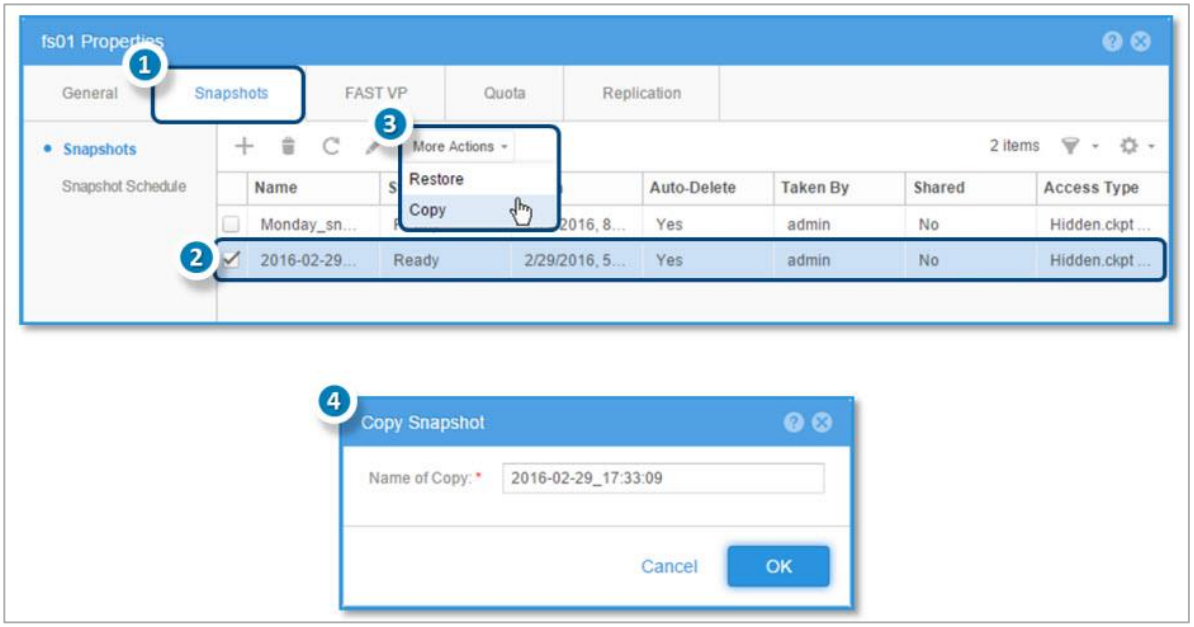
File System Snapshot Copy - Operation



To copy a snapshot of a file system, first access the Properties page of that file system.

1. Go to the Snapshots tab.
2. Check the box next to the snapshot to copy.
3. On the More Actions drop-down list, select Copy.
4. On the Copy Snapshot window, the system provides a unique name for the snapshot copy that is based on the time of creation, or a customized name can be assigned. Click OK to create the copy.

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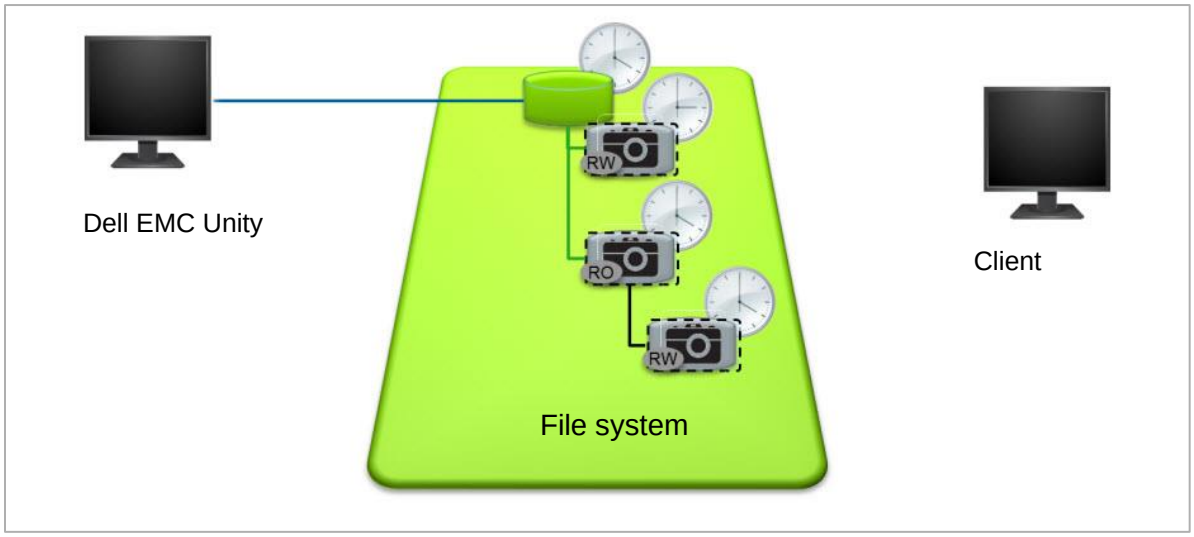
Accessing a File System Read/Write Snapshot

Initial State

The process of accessing a file system read/write snapshot requires performing tasks on the storage system and on the client that accesses the snapshot. In this example, a client accesses the three o'clock read/write file system snapshot.



Configure Share to Snapshot

On the storage system, an NFS and or SMB share must be configured on the read/write snapshot of the file system. This task is completed from their respective pages.

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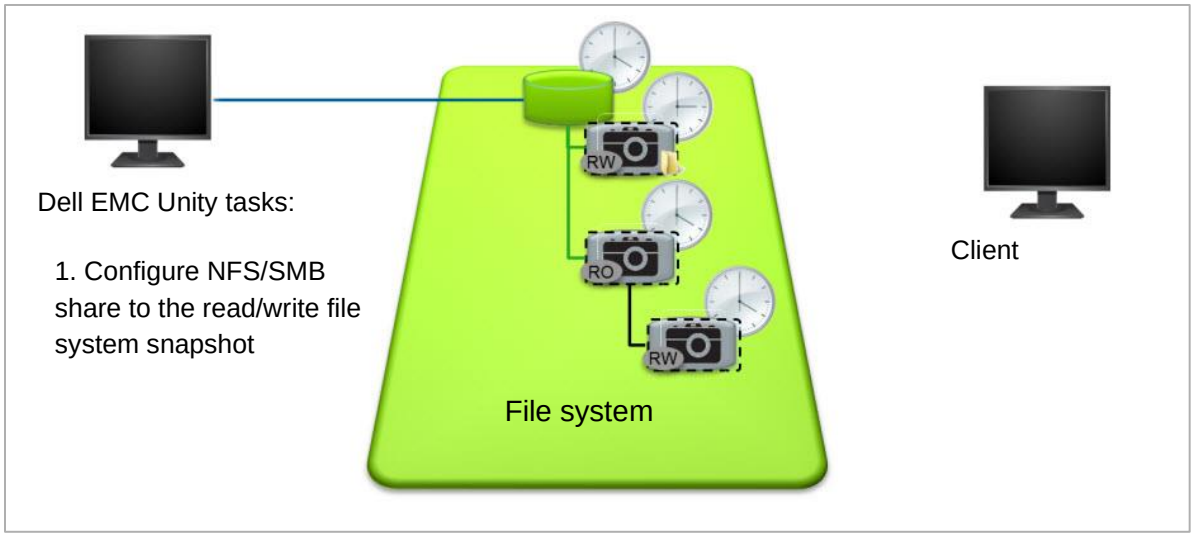
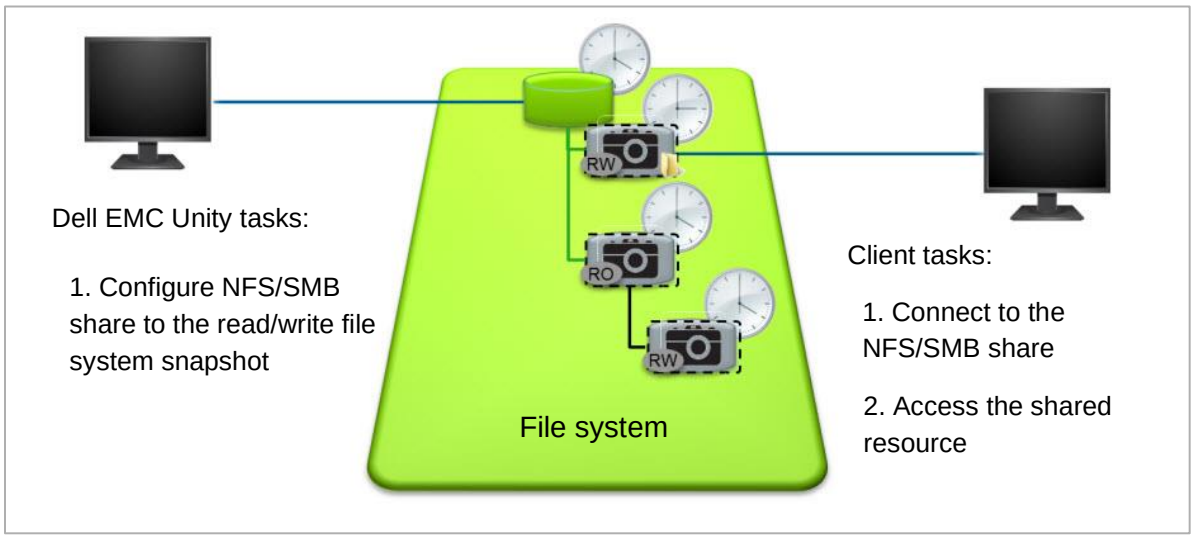


Connect and Access Share

Now tasks from the client must be completed. The client must be connected to the NFS/SMB share of the snapshot. After connection to the share, the client can access the snapshot resource.



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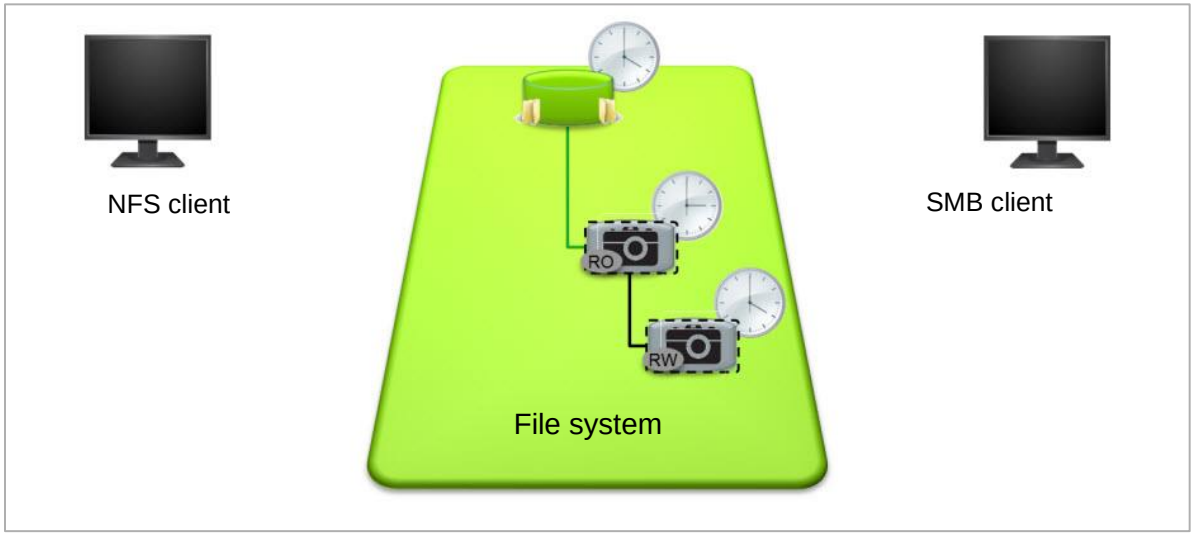
Accessing a File System Read-Only Snapshot

Initial State

The process of accessing a file system read-only snapshot is different than accessing a read/write snapshot. The read-only file system snapshot is exposed to the client through a checkpoint virtual file system (CVFS) mechanism that Snapshots provide. The read-only snapshot access does not require performing any tasks on the storage system. All the tasks are performed on the client through its access directly to the file system. The tasks for NFS clients are slightly different than the tasks for SMB clients. The example shows NFS and SMB access of a read-only snapshot.



Connect NFS Client to NFS Share

The first task for an NFS client is to connect to an NFS share on the file system.

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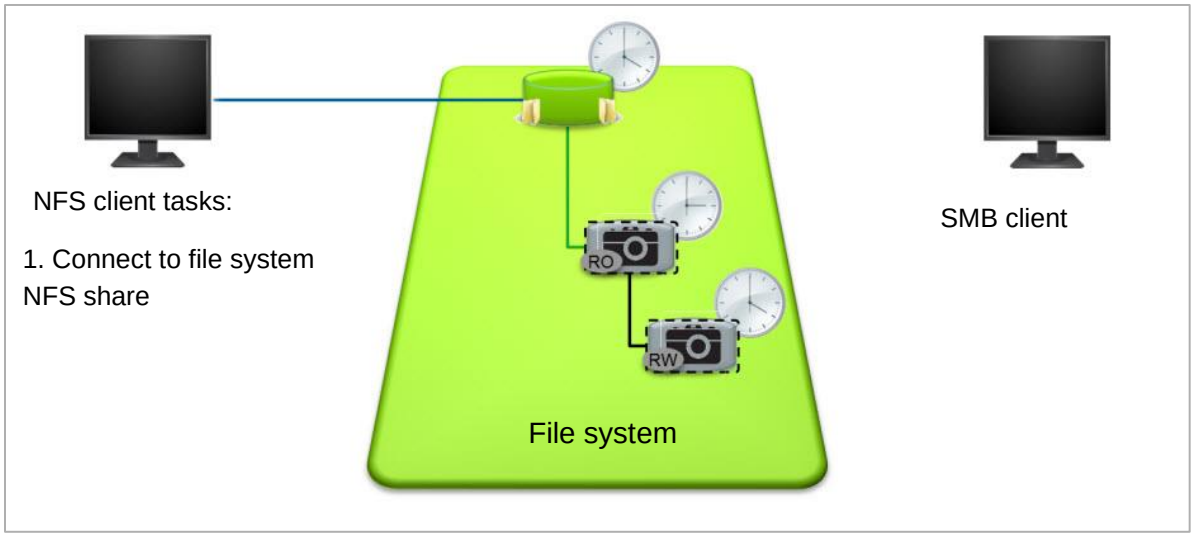
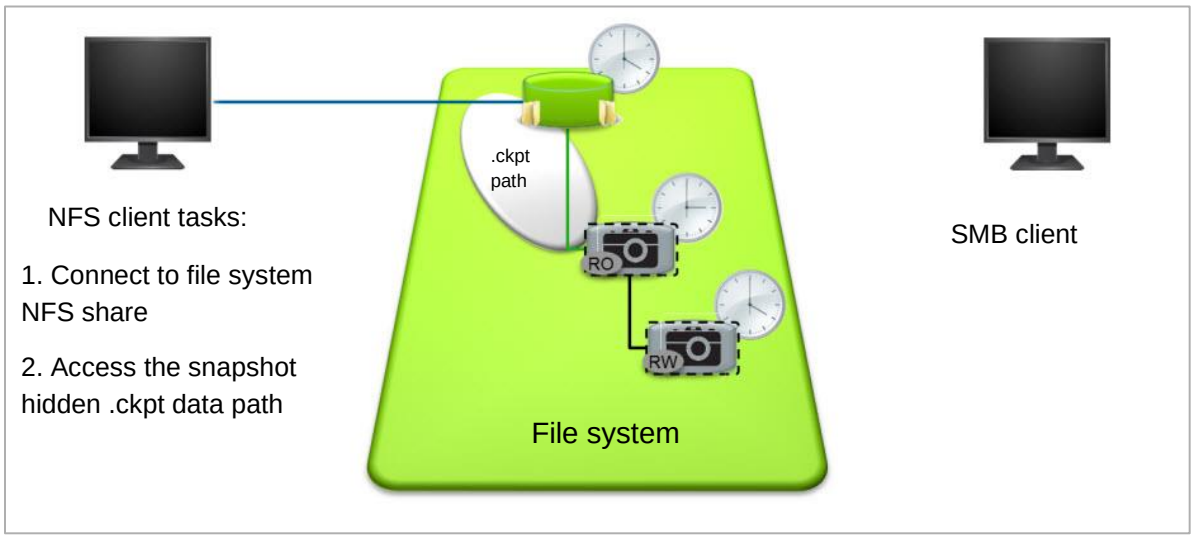


Access Snapshot

Access to the read-only snapshot is established by accessing the snapshot's hidden .ckpt data path. This path will redirect the client to the point-in-time view that the read-only snapshot captures.



Connect SMB Client to SMB Share

Similarly, the first task for an SMB client is to connect to an SMB share on the file system.

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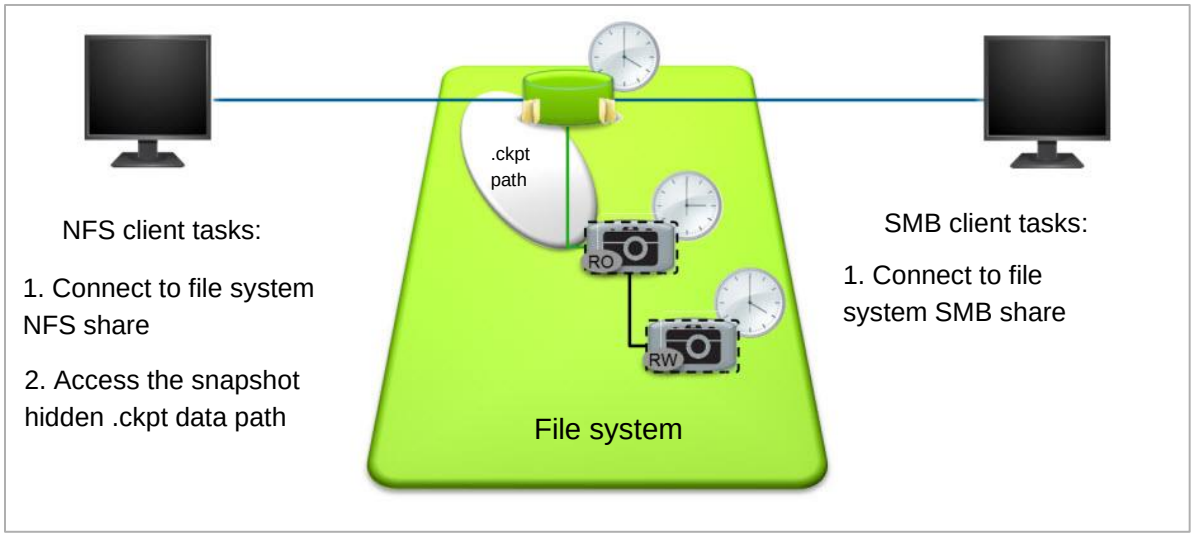
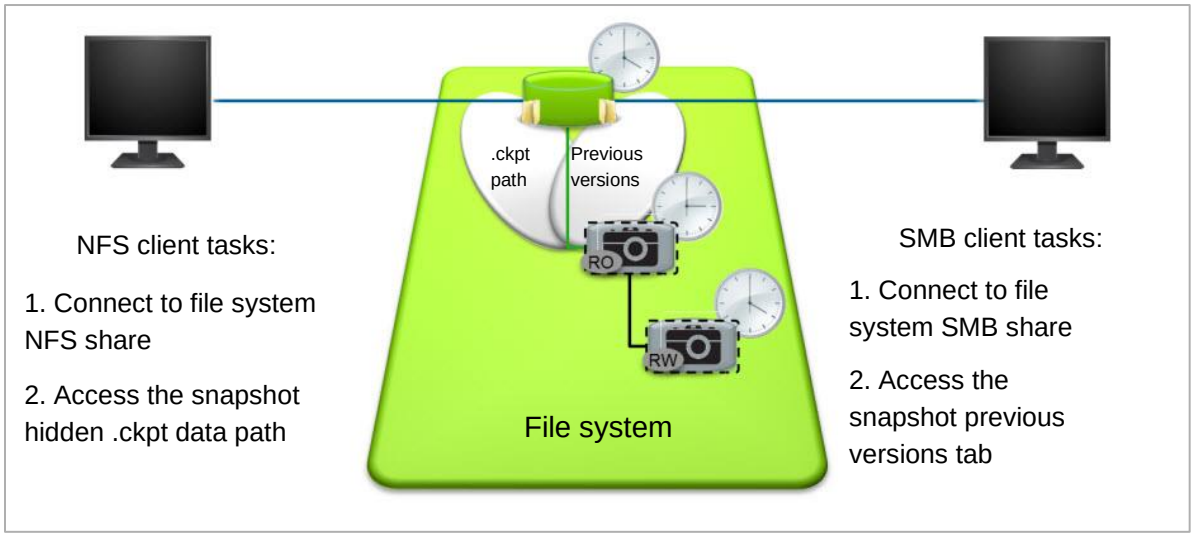


SMB Previous Versions Tab

Access to the read-only snapshot is established by the SMB client accessing the **Previous Versions** tab of the SMB share. It redirects the client to the point-in-time view that the read-only snapshot captures.



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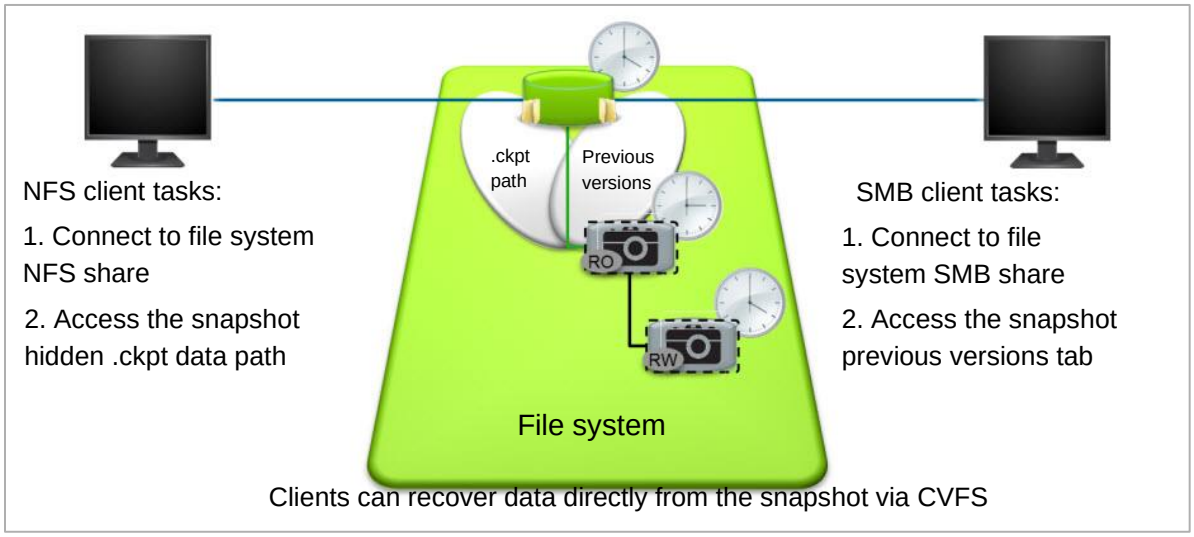
Through CVFS

The read-only snapshot is exposed to the clients through the CVFS mechanism. Therefore the clients can directly recover data from the snapshot without any administrator intervention. For example, if a user either corrupted or deleted a file by mistake, that user could directly access the read-only snapshot. Then from the snapshot the user can get an earlier version of the file and copy it to the file system for recovery.



Clients can recover data directly from the snapshot via CVFS

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Activity: File System Snapshots

Virtual lab for facilitated sessions:

- Enable a snapshot schedule during file system creation
- Create snapshots of an existing file system
- Configure access to a read/write snapshot and perform write operations to it
- Access read-only snapshots from an SMB Windows client and from an NFS Linux client

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Native vVol Snapshots

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Native vVol Snapshots - Overview

Dell Unity XT storage systems support creating snapshots of “data” (.vmdk) vVols in Unisphere, Unisphere CLI, or REST API.

- Snapshots that are created in Unisphere are not listed in vSphere.
- You cannot create snapshots for “Config” or “Swap” vVols.
- You can also create snapshots in vSphere, using the VMware VASA Provider.

vVol snapshot restoration is also supported using Unisphere, Unisphere CLI, and REST API.

- Snapshots that are created in vSphere using the VASA Provider can be restored using vSphere, Unisphere, Unisphere CLI, or REST API.
- Snapshots that are created using Unisphere, Unisphere CLI, or REST API cannot be restored using vSphere.
- Virtual Machines should be powered off before issuing a restore operation.

Snapshot schedules are not supported on vVols.

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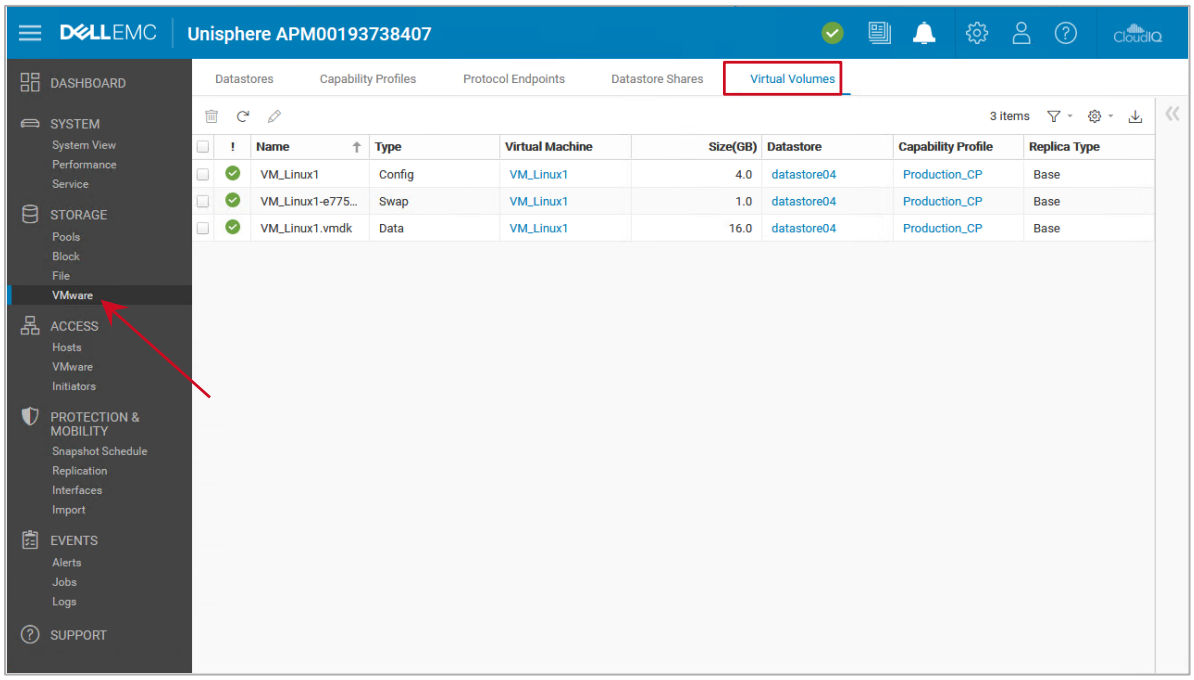
Creating a vVol Snapshot in Unisphere

Creating a vVol Snapshot in Unisphere

View Virtual Volumes

Click **VMware**, and choose the **Virtual Volumes** tab.



Open vVol Properties

From Unisphere, you can create snapshots only for "data" vVols. Check the box to select a data vVol. Then click the pencil icon to edit the selected virtual volume.

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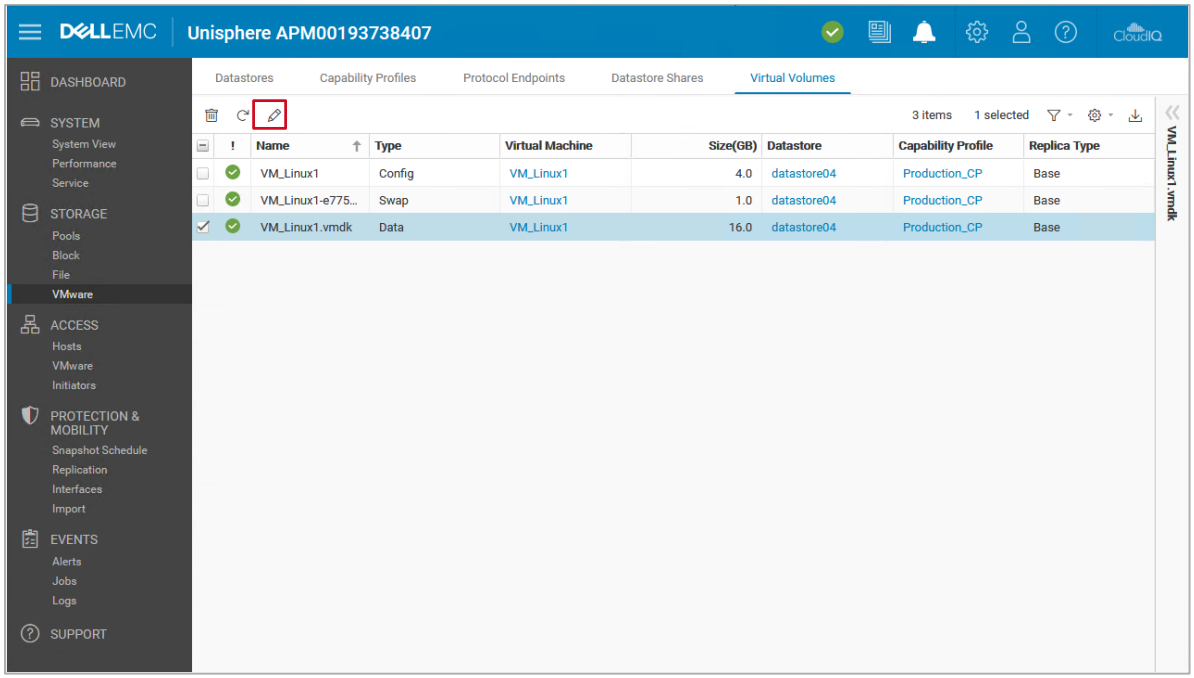
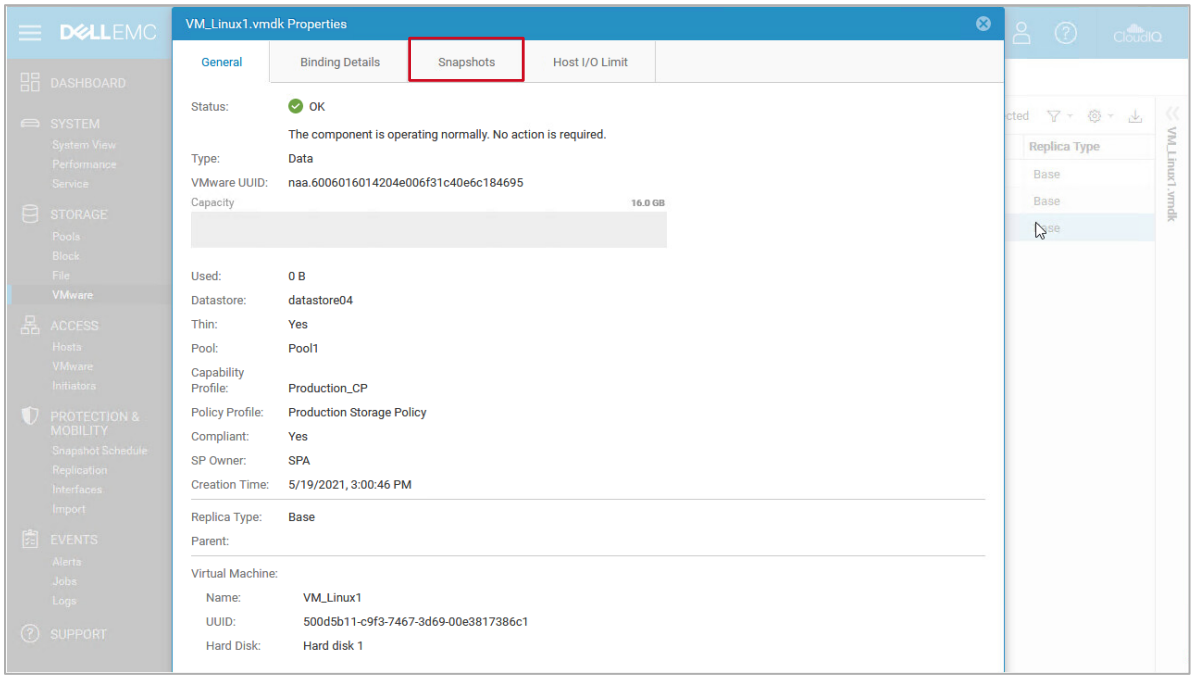


Select Snapshots

Go to the **Snapshots** tab.



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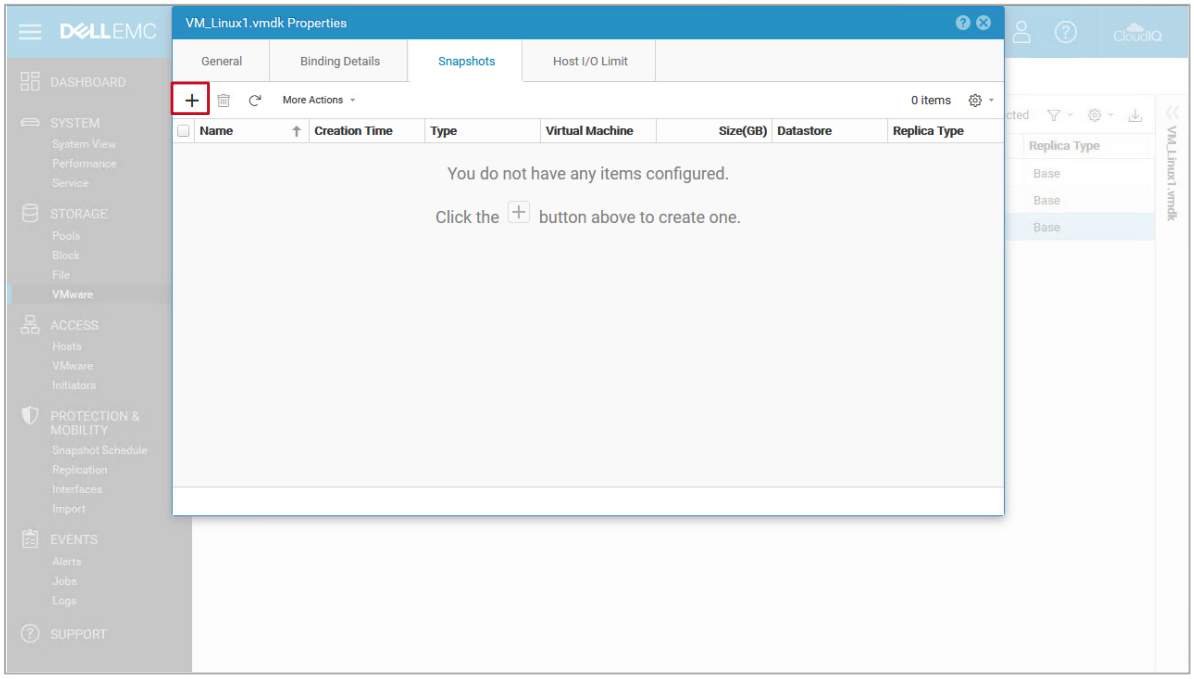
Create Snapshot

Initially, no snapshots exist for the vVol. Click the plus sign **+** to create a snapshot.

Note: vVol snapshots cannot be scheduled.



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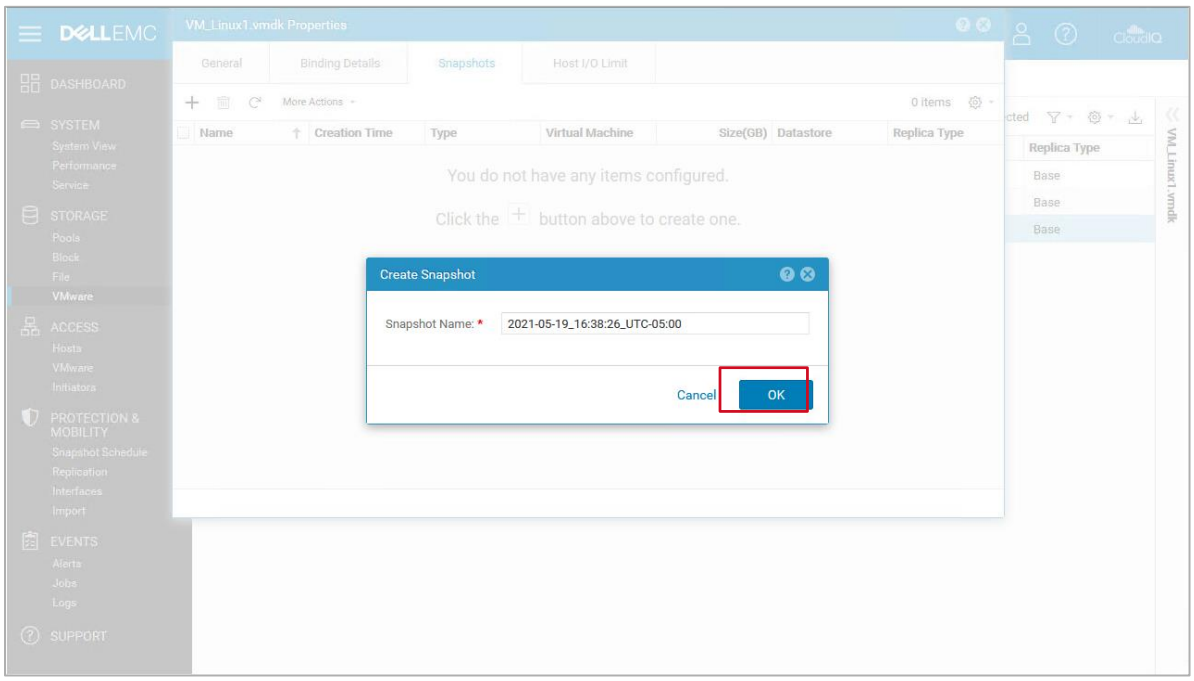
Define Snapshot Name

The system automatically generates a name for the snapshot. You can accept the name, or enter a different name for the snapshot. Click **OK** to create the snapshot.



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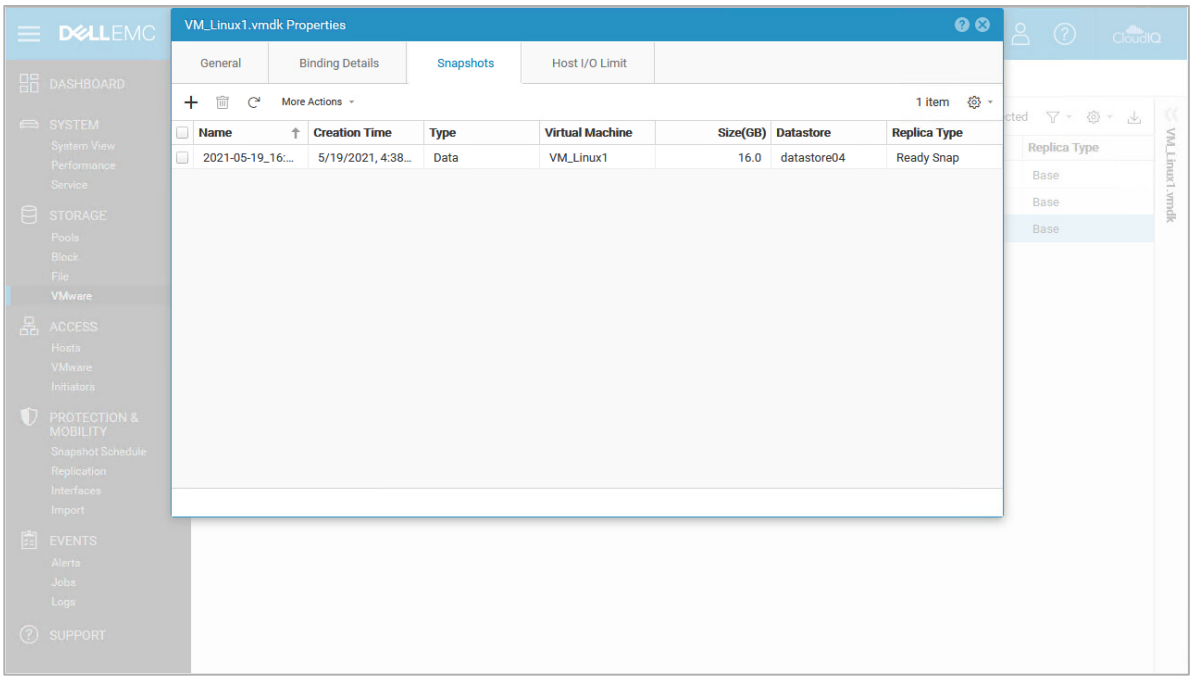
View Listed Snapshots

The new snapshot is shown on the **Snapshots** tab.



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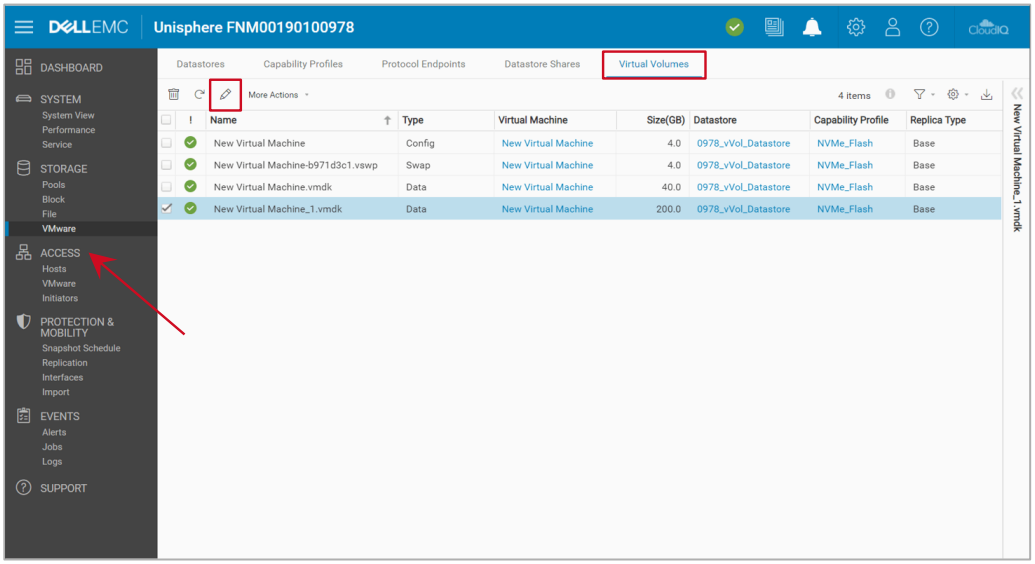
Restore a vVol from a Snapshot in Unisphere

Open vVol Properties



To restore a data vVol from a snapshot in Unisphere:

1. Click **VMware**, and choose the **Virtual Volumes** tab.
2. Check the box for the data vVol, then click the pencil icon to view **Properties**.

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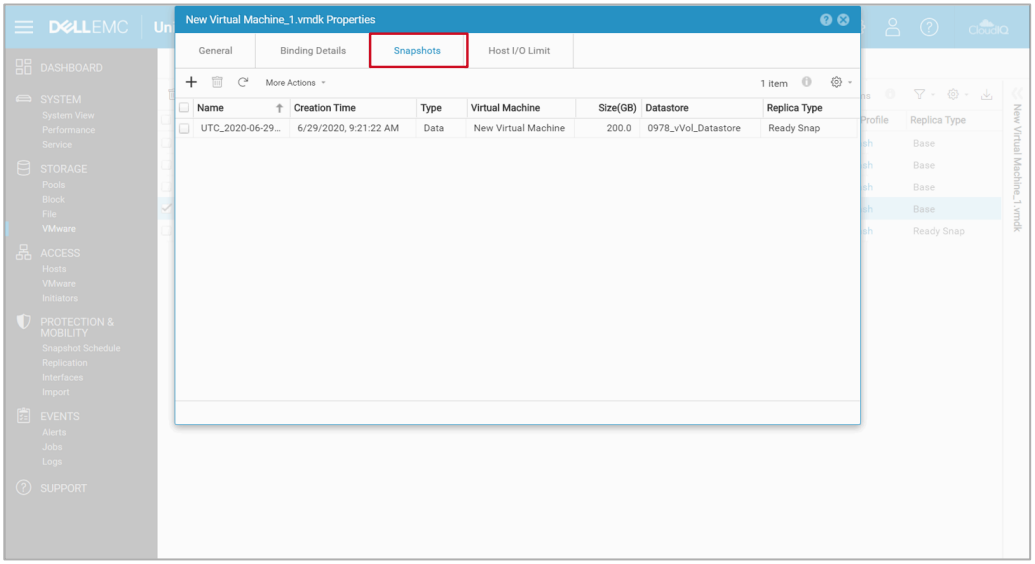
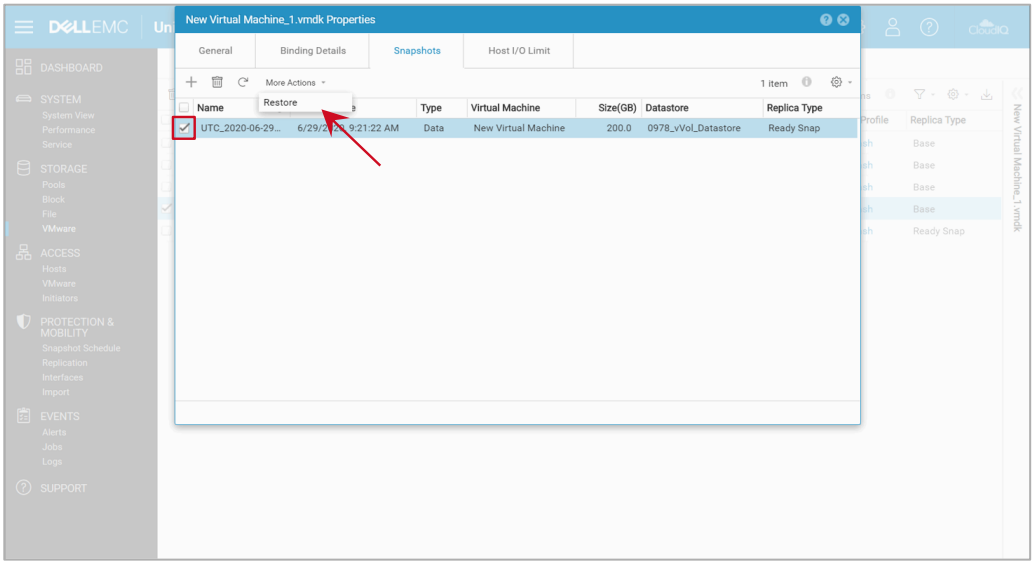
Select Snapshots



3. Select the **Snapshots** tab to view available snapshots for the data vVol.

Restore Snapshot



4. Check the box to select the wanted snapshot. From the **More Actions** drop-down menu, select **Restore**.

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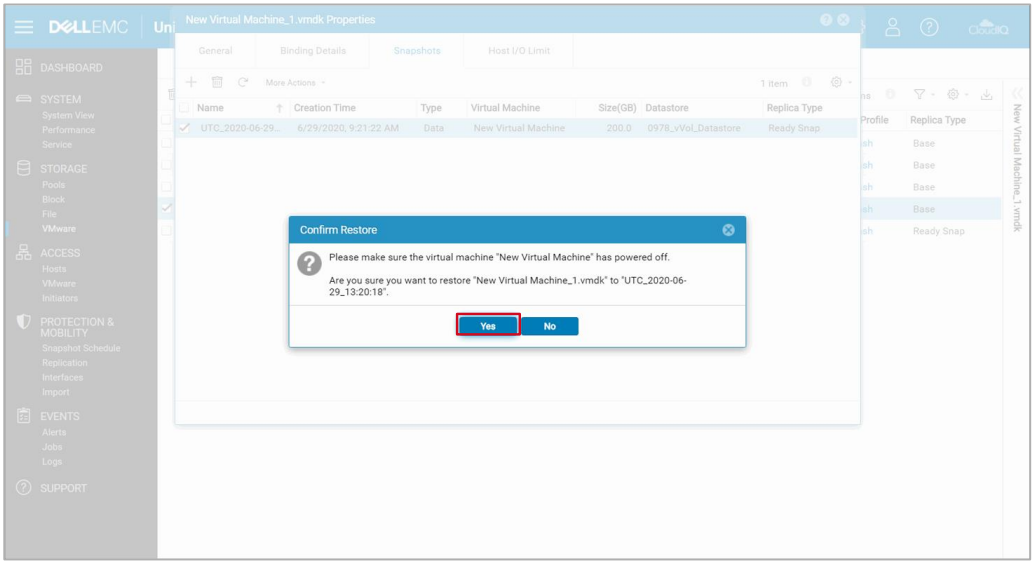
Confirm Operation



5. Verify that the virtual machine is powered off, and click **Yes** to restore the vVol from the snapshot.

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Data Protection with Snapshots Key Points

1. **Snapshots Overview**
   a. The Dell Unity XT Snapshots feature enables space efficient point-in-time copies of storage resources for block, file, and VMware "data" vVols.
      - The snap images can be read-only or read/write and used in various ways.
      - The production data can be restored from a snapshot to a known point-in-time data state.
   b. Snapshots of storage resources (LUNs, file systems, and VMware datastores) are architected using Redirect on Write technology.
   c. Snapshots can be scheduled at the time the storage resource is created, or manually created from the resource properties page.
   d. Snapshot operations include **Restore**, **Attach to host**, **Detach from host**, and **Copy**, depending on the source storage resource.
2. **LUNs and Consistency Groups Snapshots**
   a. Dell EMC XT Snapshots provide a mechanism for capturing a snapshot of the multiple LUNs within a consistency group.
      - The operation captures a write-order consistent image of the group of LUNs.
      - Multiple hosts can be attached to any specific LUN snapshot or multiple snapshots within the tree.
   b. Dell Unity XT system operations on LUN-based snapshots are **Restore**, **Attach to host**, **Detach from host**, and **Copy**.

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- The **Restore** operation rolls back the LUN or Consistency Group LUN members to the point-in-time data state captured in the snapshot.
- The Snapshot **Attach to host** operation grants a host a defined access level to a LUN snapshot.
- The Snapshot **Dettach from host** operation revokes the host access to the LUN snapshot.
- The **Copy** operation makes a replica of an existing LUN snapshot which inherits the parent snapshot data state and retention policy.

3. **File System Snapshots**
   a. Dell Unity XT Snapshots provide a mechanism for capturing a snapshot of file systems.
      - Multiple snapshots of a file system capture different point-in-time data states.
      - Snapshots of file systems can be scheduled or manually created.
   b. Snapshots of a file system can be created either as read-only or read/write, and are accessed in different manners.
      - Read/write snapshots of a file system can be shared by creating an NFS or SMB share.
      - The read-only file system snapshot is exposed to the client through a checkpoint virtual file system (CVFS) mechanism that Snapshots provides.
   c. Dell Unity XT system operations on file system-based snapshots are **Restore** and **Copy**.
      - The **Restore** operation rolls back the file system to the point-in-time data state captured in the read-only or read/write snapshot.
      - The **Copy** operation makes a replica of an existing file system snapshot that is either read-only or read/write shared or unshared.

4. **Native vVol Snapshots**
   a. Dell Unity XT storage systems support creating snapshots of “data” (.vmdk) vVols in Unisphere, Unisphere CLI, or REST API.
      - Snapshots of "Config" and "Swap" vVols are not supported.
      - Snapshot schedules are not supported on vVols.

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b. Dell EMC XT vVol snapshot restore operations are supported using Unisphere, Unisphere CLI, and REST API, or the vCenter Server.
   - vVol snapshots created in the vSphere environment can be restored using either vCenter Server or the Dell Unity XT management interfaces.
   - vVol snapshots created using the Dell EMC Unity XT management interfaces cannot be restored using vCenter Server.

For more information, see the **Dell EMC Unity Family Configuring and managing LUNs**, **Dell EMC Unity: NAS Capabilities** and **Dell EMC Unity Family Configuring vVols** on the Dell EMC Unity Family Technical Documentation portal at Dell Technologies site.

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