NetApp

Data protection methods in SAN environments

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Data protection methods in SAN environments overview

You can protect your data by making copies of it so that it is available for restoration in the event of accidental deletion, application crashes, data corruption, or disaster. Depending on your data protection and backup needs, ONTAP offers a variety of methods that enable you to protect your data.

SnapMirror Business Continuity (SM-BC)

Beginning with general availability in ONTAP 9.9.1, provides Zero Recovery Time Objective (Zero RTO) or Transparent Application Failover (TAF) to enable automatic failover of business-critical applications in SAN environments. SM-BC requires the installation of ONTAP Mediator 1.2 in a configuration with either two AFF clusters or two All SAN Array (ASA) clusters.

NetApp Documentation: SnapMirror Business Continuity

Snapshot copy

Enables you to manually or automatically create, schedule, and maintain multiple backups of your LUNs. Snapshot copies use only a minimal amount of additional volume space and do not have a performance cost. If your LUN data is accidentally modified or deleted, that data can easily and quickly be restored from one of the latest Snapshot copies.

FlexClone LUNs (FlexClone license required)

Provides point-in-time, writable copies of another LUN in an active volume or in a Snapshot copy. A clone and its parent can be modified independently without affecting each other.

SnapRestore (license required)

Enables you to perform fast, space-efficient, on-request data recovery from Snapshot copies on an entire volume. You can use SnapRestore to restore a LUN to an earlier preserved state without rebooting the storage system.

Data protection mirror copies (SnapMirror license required)

Provides asynchronous disaster recovery by enabling you to periodically create Snapshot copies of data on your volume; copy those Snapshot copies over a local or wide area network to a partner volume, usually on another cluster; and retain those Snapshot copies. The mirror copy on the partner volume provides quick availability and restoration of data from the time of the last Snapshot copy, if the data on the source volume is corrupted or lost.

SnapVault backups (SnapMirror license required)

Provides storage efficient and long-term retention of backups. SnapVault relationships enable you to back up selected Snapshot copies of volumes to a destination volume and retain the backups.

If you conduct tape backups and archival operations, you can perform them on the data that is already backed up on the SnapVault secondary volume.

SnapDrive for Windows or UNIX (SnapDrive license required)

Configures access to LUNs, manages LUNs, and manages storage system Snapshot copies directly from a Windows or UNIX hosts.

Native tape backup and recovery

Support for most existing tape drives are included in ONTAP, as well as a method for tape vendors to dynamically add support for new devices. ONTAP also supports the Remote Magnetic Tape (RMT) protocol, enabling backup and recovery to any capable system.

Related information

NetApp Documentation: SnapDrive for UNIX

NetApp Documentation: SnapDrive for Windows (current releases)

Data protection using tape backup

Effect of moving or copying a LUN on Snapshot copies

Effect of moving or copying a LUN on Snapshot copies overview

Snapshot copies are created at the volume level. If you copy or move a LUN to a different volume, the Snapshot copy policy of the destination volume is applied to the copied or moved volume. If Snapshot copies are not eestablished for the destination volume, Snapshot copies will not be created of the moved or copied LUN.

Restore a single LUN from a Snapshot copy

You can restore a single LUN from a Snapshot copy without restoring the entire volume that contains the single LUN. You can restore the LUN in place or to a new path in the volume. The operation restores only the single LUN without impacting other files or LUNs in the volume. You can also restore files with streams.

What you'll need

- You must have enough space on your volume to complete the restore operation:

  ◦ If you are restoring a space-reserved LUN where the fractional reserve is 0%, you require one times the size of the restored LUN.

  ◦ If you are restoring a space-reserved LUN where the fractional reserve is 100%, you require two times the size of the restored LUN.

  ◦ If you are restoring a non-space-reserved LUN, you only require the actual space used for the restored LUN.

- A Snapshot copy of the destination LUN must have been created.

  If the restore operation fails, the destination LUN might be truncated. In such cases, you can use the Snapshot copy to prevent data loss.

- A Snapshot copy of the source LUN must have been created.

In rare cases, the LUN restore can fail, leaving the source LUN unusable. If this occurs, you can use the Snapshot copy to return the LUN to the state just before the restore attempt.

- The destination LUN and source LUN must have the same OS type.

  If your destination LUN has a different OS type from your source LUN, your host can lose data access to the destination LUN after the restore operation.

Steps

1. From the host, stop all host access to the LUN.

2. Unmount the LUN on its host so that the host cannot access the LUN.

3. Unmap the LUN:

   ```
   lun mapping delete -vserver vserver_name -volume volume_name -lun lun_name
   -igroup igroup_name
   ```

4. Determine the Snapshot copy you want to restore your LUN to:

   ```
   volume snapshot show -vserver vserver_name -volume volume_name
   ```

5. Create a Snapshot copy of the LUN prior to restoring the LUN:

   ```
   volume snapshot create -vserver vserver_name -volume volume_name -snapshot
   snapshot_name
   ```

6. Restore the specified LUN in a volume:

   ```
   volume snapshot restore-file -vserver vserver_name -volume volume_name
   -snapshot snapshot_name -path lun_path
   ```

7. Follow the steps on the screen.

8. If necessary, bring the LUN online:

   ```
   lun modify -vserver vserver_name -path lun_path -state online
   ```

9. If necessary, remap the LUN:

   ```
   lun mapping create -vserver vserver_name -volume volume_name -lun lun_name
   -igroup igroup_name
   ```

10. From the host, remount the LUN.

11. From the host, restart access to the LUN.

Restore all LUNs in a volume from a Snapshot copy

You can use `volume snapshot restore` command to restore all the LUNs in a specified volume from a Snapshot copy.

Steps

1. From the host, stop all host access to the LUNs.

Using SnapRestore without stopping all host access to LUNs in the volume can cause data corruption and system errors.

2. Unmount the LUNs on that host so that the host cannot access the LUNs.

3. Unmap your LUNs:

   ```
   lun mapping delete -vserver vserver_name -volume volume_name -lun lun_name
   -igroup igroup_name
   ```

4. Determine the Snapshot copy to which you want to restore your volume:

   ```
   volume snapshot show -vserver vserver_name -volume volume_name
   ```

5. Change your privilege setting to advanced:

   ```
   set -privilege advanced
   ```

6. Restore your data:

   ```
   volume snapshot restore -vserver vserver_name -volume volume_name -snapshot
   snapshot_name
   ```

7. Follow the instructions on the screen.

8. Remap your LUNs:

   ```
   lun mapping create -vserver vserver_name -volume volume_name -lun lun_name
   -igroup igroup_name
   ```

9. Verify that your LUNs are online:

   ```
   lun show -vserver vserver_name -path lun_path -fields state
   ```

10. If your LUNs are not online, bring them online:

    ```
    lun modify -vserver vserver_name -path lun_path -state online
    ```

11. Change your privilege setting to admin:

    ```
    set -privilege admin
    ```

12. From the host, remount your LUNs.

13. From the host, restart access to your LUNs.

Delete one or more existing Snapshot copies from a volume

You can manually delete one or more existing Snapshot copies from the volume. You might want to do this if you need more space on your volume.

Steps

1. Use the `volume snapshot show` command to verify which Snapshot copies you want to delete.

```
cluster::> volume snapshot show -vserver vs3 -volume vol3

                                          ---Blocks---
Vserver  Volume  Snapshot                Size   Total% Used%
-------- ------- ----------------------- -----  ------ -----
vs3      vol3
                 snap1.2013-05-01_0015   100KB   0%    38%
                 snap1.2013-05-08_0015   76KB    0%    32%
                 snap2.2013-05-09_0010   76KB    0%    32%
                 snap2.2013-05-10_0010   76KB    0%    32%
                 snap3.2013-05-10_1005   72KB    0%    31%
                 snap3.2013-05-10_1105   72KB    0%    31%
                 snap3.2013-05-10_1205   72KB    0%    31%
                 snap3.2013-05-10_1305   72KB    0%    31%
                 snap3.2013-05-10_1405   72KB    0%    31%
                 snap3.2013-05-10_1505   72KB    0%    31%
10 entries were displayed.
```

2. Use the `volume snapshot delete` command to delete Snapshot copies.

If you want to…	Enter this command…
Delete a single Snapshot copy	`volume snapshot delete -vserver` *svm_name* `-volume` *vol_name* `-snapshot` *snapshot_name*
Delete multiple Snapshot copies	`volume snapshot delete -vserver` *svm_name* `-volume` *vol_name* `-snapshot` *snapshot_name1*[,*snapshot_name2*,…]
Delete all Snapshot copies	`volume snapshot delete -vserver` *svm_name* `-volume` *vol_name* `-snapshot *`

The following example deletes all Snapshot copies on the volume vol3.

```
cluster::> volume snapshot delete -vserver vs3 -volume vol3 *

10 entries were acted on.
```

Use FlexClone LUNs to protect your data

Use FlexClone LUNs to protect your data overview

A FlexClone LUN is a point-in-time, writeable copy of another LUN in an active volume or in a Snapshot copy. The clone and its parent can be modified independently without affecting each other.

A FlexClone LUN shares space initially with its parent LUN. By default, the FlexClone LUN inherits the space-reserved attribute of the parent LUN. For example, if the parent LUN is non-space-reserved, the FlexClone LUN is also non-space-reserved by default. However, you can create a non-space-reserved FlexClone LUN from a parent that is a space-reserved LUN.

When you clone a LUN, block sharing occurs in the background and you cannot create a volume Snapshot copy until the block sharing is finished.

You must configure the volume to enable the FlexClone LUN automatic deletion function with the `volume snapshot autodelete modify` command. Otherwise, if you want FlexClone LUNs to be deleted automatically but the volume is not configured for FlexClone auto delete, none of the FlexClone LUNs are deleted.

When you create a FlexClone LUN, the FlexClone LUN automatic deletion function is disabled by default. You must manually enable it on every FlexClone LUN before that FlexClone LUN can be automatically deleted. If you are using semi-thick volume provisioning and you want the "best effort" write guarantee provided by this option, you must make *all* FlexClone LUNs available for automatic deletion.

> (i) When you create a FlexClone LUN from a Snapshot copy, the LUN is automatically split from the Snapshot copy by using a space-efficient background process so that the LUN does not continue to depend on the Snapshot copy or consume any additional space. If this background split has not been completed and this Snapshot copy is automatically deleted, that FlexClone LUN is deleted even if you have disabled the FlexClone auto delete function for that FlexClone LUN. After the background split is complete, the FlexClone LUN is not deleted even if that Snapshot copy is deleted.

Related information

Logical storage management

Reasons for using FlexClone LUNs

You can use FlexClone LUNs to create multiple read/write copies of a LUN.

You might want to do this for the following reasons:

- You need to create a temporary copy of a LUN for testing purposes.
- You need to make a copy of your data available to additional users without giving them access to the production data.
- You want to create a clone of a database for manipulation and projection operations, while preserving the original data in an unaltered form.
- You want to access a specific subset of a LUN's data (a specific logical volume or file system in a volume group, or a specific file or set of files in a file system) and copy it to the original LUN, without restoring the rest of the data in the original LUN. This works on operating systems that support mounting a LUN and a clone of the LUN at the same time. SnapDrive for UNIX supports this with the `snap connect` command.
- You need multiple SAN boot hosts with the same operating system.

How a FlexVol volume can reclaim free space with autodelete setting

You can enable the autodelete setting of a FlexVol volume to automatically delete FlexClone files and FlexClone LUNs. By enabling autodelete, you can reclaim a target amount of free space in the volume when a volume is nearly full.

You can configure a volume to automatically start deleting FlexClone files and FlexClone LUNs when the free space in the volume decreases below a particular threshold value, and automatically stop deleting clones when a target amount of free space in the volume is reclaimed. Although, you cannot specify the threshold value that starts the automatic deletion of clones, you can specify whether a clone is eligible for deletion, and you can specify the target amount of free space for a volume.

A volume automatically deletes FlexClone files and FlexClone LUNs when the free space in the volume decreases below a particular threshold and when *both* of the following requirements are met:

- The autodelete capability is enabled for the volume that contains the FlexClone files and FlexClone LUNs.

  You can enable the autodelete capability for a FlexVol volume by using the `volume snapshot autodelete modify` command. You must set the `-trigger` parameter to `volume` or `snap_reserve` for a volume to automatically delete FlexClone files and FlexClone LUNs.

- The autodelete capability is enabled for the FlexClone files and FlexClone LUNs.

  You can enable autodelete for a FlexClone file or FlexClone LUN by using the `file clone create` command with the `-autodelete` parameter. As a result, you can preserve certain FlexClone files and FlexClone LUNs by disabling autodelete for the clones and ensuring that other volume settings do not override the clone setting.

Configure a FlexVol volume to automatically delete FlexClone files and FlexClone LUNs

You can enable a FlexVol volume to automatically delete FlexClone files and FlexClone LUNs with autodelete enabled when the free space in the volume decreases below a particular threshold.

What you'll need
- The FlexVol volume must contain FlexClone files and FlexClone LUNs and be online.
- The FlexVol volume must not be a read-only volume.

Steps
1. Enable automatic deletion of FlexClone files and FlexClone LUNs in the FlexVol volume by using the `volume snapshot autodelete modify` command.

   ◦ For the `-trigger` parameter, you can specify `volume` or `snap_reserve`.

   ◦ For the `-destroy-list` parameter, you must always specify `lun_clone,file_clone` regardless of whether you want to delete only one type of clone.
   The following example shows how you can enable volume vol1 to trigger the automatic deletion of FlexClone files and FlexClone LUNs for space reclamation until 25% of the volume consists of free space:

```
cluster1::> volume snapshot autodelete modify -vserver vs1 -volume
vol1 -enabled true -commitment disrupt -trigger volume -target-free
-space 25 -destroy-list lun_clone,file_clone

Volume modify successful on volume:vol1
```

> (i) While enabling FlexVol volumes for automatic deletion, if you set the value of the
> -commitment parameter to destroy, all the FlexClone files and FlexClone LUNs with
> the -autodelete parameter set to true might be deleted when the free space in the
> volume decreases below the specified threshold value. However, FlexClone files and
> FlexClone LUNs with the -autodelete parameter set to false will not be deleted.

2. Verify that automatic deletion of FlexClone files and FlexClone LUNs is enabled in the FlexVol volume by
   using the volume snapshot autodelete show command.

   The following example shows that volume vol1 is enabled for automatic deletion of FlexClone files and
   FlexClone LUNs:

```
cluster1::> volume snapshot autodelete show -vserver vs1 -volume vol1

            Vserver Name: vs1
             Volume Name: vol1
              Enabled: true
               Commitment: disrupt
            Defer Delete: user_created
            Delete Order: oldest_first
   Defer Delete Prefix: (not specified)*
      Target Free Space: 25%
                 Trigger: volume
        Destroy List: lun_clone,file_clone
 Is Constituent Volume: false
```

3. Ensure that autodelete is enabled for the FlexClone files and FlexClone LUNs in the volume that you want
   to delete by performing the following steps:

   a. Enable automatic deletion of a particular FlexClone file or FlexClone LUN by using the volume file
      clone autodelete command.

      You can force a specific FlexClone file or FlexClone LUN to be automatically deleted by using the
      volume file clone autodelete command with the -force parameter.

      The following example shows that automatic deletion of the FlexClone LUN lun1_clone contained in
      volume vol1 is enabled:

```
cluster1::> volume file clone autodelete -vserver vs1 -clone-path
/vol/vol1/lun1_clone -enabled true
```

You can enable autodelete when you create FlexClone files and FlexClone LUNs.

b. Verify that the FlexClone file or FlexClone LUN is enabled for automatic deletion by using the `volume
   file clone show-autodelete` command.

The following example shows that the FlexClone LUN lun1_clone is enabled for automatic deletion:

```
cluster1::> volume file clone show-autodelete -vserver vs1 -clone
-path vol/vol1/lun1_clone
                                                        Vserver
Name: vs1
                                                        Clone
Path: vol/vol1/lun1_clone

**Autodelete Enabled: true**
```

For more information about using the commands, see the respective man pages.

Clone LUNs from an active volume

You can create copies of your LUNs by cloning the LUNs in the active volume. These
FlexClone LUNs are readable and writeable copies of the original LUNs in the active
volume.

What you'll need

A FlexClone license must be installed.

About this task

A space-reserved FlexClone LUN requires as much space as the space-reserved parent LUN. If the FlexClone
LUN is not space-reserved, you must ensure that the volume has enough space to accommodate changes to
the FlexClone LUN.

Steps

1. You must have verified that the LUNs are not mapped to an igroup or are written to before making the
   clone.

2. Use the `lun show` command to verify that the LUN exists.

   ```
   lun show -vserver vs1
   ```

```
Vserver   Path                State      Mapped     Type      Size
--------  ------------------  ---------  ---------  --------  -------
vs1       /vol/vol1/lun1      online     unmapped   windows   47.07MB
```

3. Use the `volume file clone create` command to create the FlexClone LUN.

```
volume file clone create -vserver vs1 -volume vol1 -source-path lun1
-destination-path/lun1_clone
```

If you need the FlexClone LUN to be available for automatic deletion, you include `-autodelete true`. If you are creating this FlexClone LUN in a volume using semi-thick provisioning, you must enable automatic deletion for all FlexClone LUNs.

4. Use the `lun show` command to verify that you created a LUN.

```
lun show -vserver vs1
```

```
Vserver   Path                     State     Mapped    Type      Size
--------  -----------------------  --------  --------  --------  ------
vs1       /vol/volX/lun1           online    unmapped  windows   47.07MB
vs1       /vol/volX/lun1_clone     online    unmapped  windows   47.07MB
```

Create FlexClone LUNs from a Snapshot copy in a volume

You can use a Snapshot copy in your volume to create FlexClone copies of your LUNs. FlexClone copies of LUNs are both readable and writeable.

What you'll need

A FlexClone license must be installed.

About this task

The FlexClone LUN inherits the space reservations attribute of the parent LUN. A space-reserved FlexClone LUN requires as much space as the space-reserved parent LUN. If the FlexClone LUN is not space-reserved, the volume must have enough space to accommodate changes to the clone.

Steps

1. Verify that the LUN is not mapped or being written to.

2. Create a Snapshot copy of the volume that contains the LUNs:

```
volume snapshot create -vserver vserver_name -volume volume_name -snapshot
snapshot_name
```

You must create a Snapshot copy (the backing Snapshot copy) of the LUN you want to clone.

3. Create the FlexClone LUN from the Snapshot copy:

```
file clone create -vserver vserver_name -volume volume_name -source-path
```

source_path -snapshot-name *snapshot_name* -destination-path *destination_path*

If you need the FlexClone LUN to be available for automatic deletion, you include `-autodelete true`. If you are creating this FlexClone LUN in a volume using semi-thick provisioning, you must enable automatic deletion for all FlexClone LUNs.

4. Verify that the FlexClone LUN is correct:

```
lun show -vserver vserver_name
```

```
Vserver Path                           State    Mapped    Type     Size
------- ---------------------          -------- --------- -------- -------
vs1      /vol/vol1/lun1_clone          online   unmapped  windows  47.07MB
vs1      /vol/vol1/lun1_snap_clone online unmapped windows  47.07MB
```

Prevent a specific FlexClone file or FlexClone LUN from being automatically deleted

If you configure a FlexVol volume to automatically delete FlexClone files and FlexClone LUNs, any clone that fits the criteria you specify might be deleted. If you have specific FlexClone files or FlexClone LUNs that you want to preserve, you can exclude them from the automatic FlexClone deletion process.

What you'll need

A FlexClone license must be installed.

About this task

When you create a FlexClone file or FlexClone LUN, by default the autodelete setting for the clone is disabled. FlexClone files and FlexClone LUNs with autodelete disabled are preserved when you configure a FlexVol volume to automatically delete clones to reclaim space on the volume.

> ⓘ If you set the `commitment` level on the volume to `try` or `disrupt`, you can individually preserve specific FlexClone files or FlexClone LUNs by disabling autodelete for those clones. However, if you set the `commitment` level on the volume to `destroy` and the destroy lists include `lun_clone,file_clone`, the volume setting overrides the clone setting, and all FlexClone files and FlexClone LUNs can be deleted regardless of the autodelete setting for the clones.

Steps

1. Prevent a specific FlexClone file or FlexClone LUN from being automatically deleted by using the `volume file clone autodelete` command.

   The following example shows how you can disable autodelete for FlexClone LUN lun1_clone contained in vol1:

   ```
   cluster1::> volume file clone autodelete -vserver vs1 -volume vol1
   -clone-path lun1_clone -enable false
   ```

A FlexClone file or FlexClone LUN with autodelete disabled cannot be deleted automatically to reclaim space on the volume.

2. Verify that autodelete is disabled for the FlexClone file or FlexClone LUN by using the `volume file clone show-autodelete` command.

The following example shows that autodelete is false for the FlexClone LUN lun1_clone:

```
cluster1::> volume file clone show-autodelete -vserver vs1 -clone-path
vol/vol1/lun1_clone
                                                        Vserver
Name: vs1
                                                        Clone Path:
vol/vol1/lun1_clone
                                                        Autodelete
Enabled: false
```

Configure and use SnapVault backups in a SAN environment

Configure and use SnapVault backups in a SAN environment overview

SnapVault configuration and use in a SAN environment is very similar to configuration and use in a NAS environment, but restoring LUNs in a SAN environment requires some special procedures.

SnapVault backups contain a set of read-only copies of a source volume. In a SAN environment you always back up entire volumes to the SnapVault secondary volume, not individual LUNs.

The procedure for creating and initializing the SnapVault relationship between a primary volume containing LUNs and a secondary volume acting as a SnapVault backup is identical to the procedure used with FlexVol volumes used for file protocols. This procedure is described in detail in Data Protection.

It is important to ensure that LUNs being backed up are in a consistent state before the Snapshot copies are created and copied to the SnapVault secondary volume. Automating the Snapshot copy creation with SnapCenter ensures that backed up LUNs are complete and usable by the original application.

There are three basic choices for restoring LUNs from a SnapVault secondary volume:

- You can map a LUN directly from the SnapVault secondary volume and connect a host to the LUN to access the contents of the LUN.

  The LUN is read-only and you can map only from the most recent Snapshot copy in the SnapVault backup. Persistent reservations and other LUN metadata are lost. If desired, you can use a copy program on the host to copy the LUN contents back to the original LUN if it is still accessible.

  The LUN has a different serial number from the source LUN.

- You can clone any Snapshot copy in the SnapVault secondary volume to a new read-write volume.

You can then map any of the LUNs in the volume and connect a host to the LUN to access the contents of the LUN. If desired, you can use a copy program on the host to copy the LUN contents back to the original LUN if it is still accessible.

- You can restore the entire volume containing the LUN from any Snapshot copy in the SnapVault secondary volume.

  Restoring the entire volume replaces all of the LUNs, and any files, in the volume. Any new LUNs created since the Snapshot copy was created are lost.

  The LUNs retain their mapping, serial numbers, UUIDs, and persistent reservations.

Access a read-only LUN copy from a SnapVault backup

You can access a read-only copy of a LUN from the latest Snapshot copy in a SnapVault backup. The LUN ID, path, and serial number are different from the source LUN and must first be mapped. Persistent reservations, LUN mappings, and igroups are not replicated to the SnapVault secondary volume.

What you'll need
- The SnapVault relationship must be initialized and the latest Snapshot copy in the SnapVault secondary volume must contain the desired LUN.
- The storage virtual machine (SVM) containing the SnapVault backup must have one or more LIFs with the desired SAN protocol accessible from the host used to access the LUN copy.
- If you plan to access LUN copies directly from the SnapVault secondary volume, you must create your igroups on the SnapVault SVM in advance.

  You can access a LUN directly from the SnapVault secondary volume without having to first restore or clone the volume containing the LUN.

About this task

If a new Snapshot copy is added to the SnapVault secondary volume while you have a LUN mapped from a previous Snapshot copy, the contents of the mapped LUN changes. The LUN is still mapped with the same identifiers, but the data is taken from the new Snapshot copy. If the LUN size changes, some hosts automatically detect the size change; Windows hosts require a disk rescan to pick up any size change.

Steps
1. Run the `lun show` command to list the available LUNs in the SnapVault secondary volume.

   In this example, you can see both the original LUNs in the primary volume srcvolA and the copies in the SnapVault secondary volume dstvolB:

```
cluster::> lun show

Vserver    Path                State   Mapped    Type         Size
--------   ------------------  ------  -------   --------     -------
vserverA   /vol/srcvolA/lun_A  online  mapped    windows  300.0GB
vserverA   /vol/srcvolA/lun_B  online  mapped    windows  300.0GB
vserverA   /vol/srcvolA/lun_C  online  mapped    windows  300.0GB
vserverB   /vol/dstvolB/lun_A  online  unmapped windows  300.0GB
vserverB   /vol/dstvolB/lun_B  online  unmapped windows  300.0GB
vserverB   /vol/dstvolB/lun_C  online  unmapped windows  300.0GB


6 entries were displayed.
```

2. If the igroup for the desired host does not already exist on the SVM containing the SnapVault secondary volume, run the `igroup create` command to create an igroup.

   This command creates an igroup for a Windows host that uses the iSCSI protocol:

   ```
   cluster::> igroup create -vserver vserverB -igroup temp_igroup
     -protocol iscsi -ostype windows
     -initiator iqn.1991-05.com.microsoft:hostA
   ```

3. Run the `lun mapping create` command to map the desired LUN copy to the igroup.

   ```
   cluster::> lun mapping create -vserver vserverB -path /vol/dstvolB/lun_A
     -igroup temp_igroup
   ```

4. Connect the host to the LUN and access the contents of the LUN as desired.

Restore a single LUN from a SnapVault backup

You can restore a single LUN to a new location or to the original location. You can restore from any Snapshot copy in the SnapVault secondary volume. To restore the LUN to the original location, you first restore it to a new location and then copy it.

What you'll need

- The SnapVault relationship must be initialized and the SnapVault secondary volume must contain an appropriate Snapshot copy to restore.
- The storage virtual machine (SVM) containing the SnapVault secondary volume must have one or more LIFs with the desired SAN protocol that are accessible from the host used to access the LUN copy.
- The igroups must already exist on the SnapVault SVM.

About this task

The process includes creating a read-write volume clone from a Snapshot copy in the SnapVault secondary

volume. You can use the LUN directly from the clone, or you can optionally copy the LUN contents back to the original LUN location.

The LUN in the clone has a different path and serial number from the original LUN. Persistent reservations are not retained.

Steps

1. Run the `snapmirror show` command to verify the secondary volume that contains the SnapVault backup.

```
cluster::> snapmirror show

Source           Dest      Mirror  Relation  Total                  Last
Path       Type  Path      State   Status    Progress  Healthy Updated
--------   ----  --------- ------- --------- --------- ------- -------
vserverA:srcvolA
           XDP   vserverB:dstvolB
                           Snapmirrored
                                   Idle      -                  true     -
```

2. Run the `volume snapshot show` command to identify the Snapshot copy that you want to restore the LUN from.

```
cluster::> volume snapshot show

Vserver  Volume  Snapshot               State Size    Total% Used%
-------- ------- ---------------------- ----- ------ ------ -----
vserverB
         dstvolB
                 snap2.2013-02-10_0010  valid  124KB     0%    0%
                 snap1.2013-02-10_0015 valid  112KB     0%    0%
                 snap2.2013-02-11_0010  valid  164KB     0%    0%
```

3. Run the `volume clone create` command to create a read-write clone from the desired Snapshot copy.

   The volume clone is created in the same aggregate as the SnapVault backup. There must be enough space in the aggregate to store the clone.

```
cluster::> volume clone create -vserver vserverB
  -flexclone dstvolB_clone -type RW -parent-volume dstvolB
  -parent-snapshot daily.2013-02-10_0010
[Job 108] Job succeeded: Successful
```

4. Run the `lun show` command to list the LUNs in the volume clone.

```
cluster::> lun show -vserver vserverB -volume dstvolB_clone


Vserver    Path                           State    Mapped    Type
---------  -----------------------------  -------  --------  --------
vserverB   /vol/dstvolB_clone/lun_A       online   unmapped  windows
vserverB   /vol/dstvolB_clone/lun_B       online   unmapped  windows
vserverB   /vol/dstvolB_clone/lun_C       online   unmapped  windows


3 entries were displayed.
```

5. If the igroup for the desired host does not already exist on the SVM containing the SnapVault backup, run the `igroup create` command to create an igroup.

   This example creates an igroup for a Windows host that uses the iSCSI protocol:

   ```
   cluster::> igroup create -vserver vserverB -igroup temp_igroup
      -protocol iscsi -ostype windows
      -initiator iqn.1991-05.com.microsoft:hostA
   ```

6. Run the `lun mapping create` command to map the desired LUN copy to the igroup.

   ```
   cluster::> lun mapping create -vserver vserverB
      -path /vol/dstvolB_clone/lun_C -igroup temp_igroup
   ```

7. Connect the host to the LUN and access the contents of the LUN, as desired.

   The LUN is read-write and can be used in place of the original LUN. Because the LUN serial number is different, the host interprets it as a different LUN from the original.

8. Use a copy program on the host to copy the LUN contents back to the original LUN.

Restore all LUNs in a volume from a SnapVault backup

If one or more LUNs in a volume need to be restored from a SnapVault backup, you can restore the entire volume. Restoring the volume affects all LUNs in the volume.

What you'll need

The SnapVault relationship must be initialized and the SnapVault secondary volume must contain an appropriate Snapshot copy to restore.

About this task

Restoring an entire volume returns the volume to the state it was in when the Snapshot copy was made. If a LUN was added to the volume after the Snapshot copy, that LUN is removed during the restore process.

After restoring the volume, the LUNs remain mapped to the igroups they were mapped to just before the restore. The LUN mapping might be different from the mapping at the time of the Snapshot copy. Persistent

reservations on the LUNs from host clusters are retained.

Steps

1. Stop I/O to all LUNs in the volume.

2. Run the `snapmirror show` command to verify the secondary volume that contains the SnapVault secondary volume.

```
cluster::> snapmirror show

Source          Dest      Mirror  Relation  Total              Last
Path      Type  Path      State   Status    Progress  Healthy Updated
--------  ----  --------- ------- --------- --------- ------- -------
vserverA:srcvolA
          XDP   vserverB:dstvolB
                          Snapmirrored
                                  Idle      -         true    -
```

3. Run the `volume snapshot show` command to identify the Snapshot copy that you want to restore from.

```
cluster::> volume snapshot show

Vserver   Volume  Snapshot                State Size   Total% Used%
--------  ------- --------------------- ----- ------ ------ -----
vserverB
          dstvolB
                  snap2.2013-02-10_0010  valid  124KB      0%     0%
                  snap1.2013-02-10_0015 valid   112KB      0%     0%
                  snap2.2013-02-11_0010  valid  164KB      0%     0%
```

4. Run the `snapmirror restore` command and specify the `-source-snapshot` option to specify the Snapshot copy to use.

   The destination you specify for the restore is the original volume you are restoring to.

```
cluster::> snapmirror restore -destination-path vserverA:srcvolA
  -source-path vserverB:dstvolB -source-snapshot daily.2013-02-10_0010

Warning: All data newer than Snapshot copy hourly.2013-02-11_1205 on
volume vserverA:src_volA will be deleted.
Do you want to continue? {y|n}: y
[Job 98] Job is queued: snapmirror restore from source
"vserverB:dstvolB" for the snapshot daily.2013-02-10_0010.
```

5. If you are sharing LUNs across a host cluster, restore the persistent reservations on the LUNs from the

affected hosts.

Restoring a volume from a SnapVault backup

In the following example, the LUN named lun_D was added to the volume after the Snapshot copy was created. After restoring the entire volume from the Snapshot copy, lun_D no longer appears.

In the `lun show` command output, you can see the LUNs in the primary volume srcvolA and the read-only copies of those LUNs in the SnapVault secondary volume dstvolB. There is no copy of lun_D in the SnapVault backup.

```
cluster::> lun show
Vserver    Path                    State    Mapped   Type          Size
---------  ------------------      -------  -------- --------      -------
vserverA   /vol/srcvolA/lun_A  online   mapped   windows   300.0GB
vserverA   /vol/srcvolA/lun_B  online   mapped   windows   300.0GB
vserverA   /vol/srcvolA/lun_C  online   mapped   windows   300.0GB
vserverA   /vol/srcvolA/lun_D  online   mapped   windows   250.0GB
vserverB   /vol/dstvolB/lun_A  online   unmapped windows   300.0GB
vserverB   /vol/dstvolB/lun_B  online   unmapped windows   300.0GB
vserverB   /vol/dstvolB/lun_C  online   unmapped windows   300.0GB

7 entries were displayed.

cluster::>snapmirror restore -destination-path vserverA:srcvolA
   -source-path vserverB:dstvolB
   -source-snapshot daily.2013-02-10_0010

Warning: All data newer than Snapshot copy hourly.2013-02-11_1205
on volume vserverA:src_volA will be deleted.
Do you want to continue? {y|n}: y
[Job 98] Job is queued: snapmirror restore from source
"vserverB:dstvolB" for the snapshot daily.2013-02-10_0010.

cluster::> lun show
Vserver    Path                    State    Mapped   Type          Size
---------  ------------------      -------  -------- --------      -------
vserverA   /vol/srcvolA/lun_A  online   mapped   windows   300.0GB
vserverA   /vol/srcvolA/lun_B  online   mapped   windows   300.0GB
vserverA   /vol/srcvolA/lun_C  online   mapped   windows   300.0GB
vserverB   /vol/dstvolB/lun_A  online   unmapped windows   300.0GB
vserverB   /vol/dstvolB/lun_B  online   unmapped windows   300.0GB
vserverB   /vol/dstvolB/lun_C  online   unmapped windows   300.0GB

6 entries were displayed.
```

After the volume is restored from the SnapVault secondary volume, the source volume no longer contains

lun_D. You do not need to remap the LUNs in the source volume after the restore because they are still mapped.

How you can connect a host backup system to the primary storage system

You can back up SAN systems to tape through a separate backup host to avoid performance degradation on the application host.

It is imperative that you keep SAN and NAS data separated for backup purposes. The figure below shows the recommended physical configuration for a host backup system to the primary storage system. You must configure volumes as SAN-only. LUNs can be confined to a single volume or the LUNs can be spread across multiple volumes or storage systems.

Volumes on a host can consist of a single LUN mapped from the storage system or multiple LUNs using a volume manager, such as VxVM on HP-UX systems.

Back up a LUN through a host backup system

You can use a cloned LUN from a Snapshot copy as source data for the host backup system.

What you'll need

A production LUN must exist and be mapped to an igroup that includes the WWPN or initiator node name of the application server. The LUN must also be formatted and accessible to the host

Steps

1. Save the contents of the host file system buffers to disk.

   You can use the command provided by your host operating system, or you can use SnapDrive for Windows or SnapDrive for UNIX. You can also opt to make this step part of your SAN backup pre-processing script.

2. Use the `volume snapshot create` command to create a Snapshot copy of the production LUN.

   ```
   volume snapshot create -vserver vs0 -volume vol3 -snapshot vol3_snapshot
   -comment "Single snapshot" -foreground false
   ```

3. Use the `volume file clone create` command to create a clone of the production LUN.

   ```
   volume file clone create -vserver vs3 -volume vol3 -source-path lun1 -snapshot
   -name snap_vol3 -destination-path lun1_backup
   ```

4. Use the `lun igroup create` command to create an igroup that includes the WWPN of the backup server.

   ```
   lun igroup create -vserver vs3 -igroup igroup3 -protocol fc -ostype windows
   -initiator 10:00:00:00:c9:73:5b:91
   ```

5. Use the `lun mapping create` command to map the LUN clone you created in Step 3 to the backup host.

   ```
   lun mapping create -vserver vs3 -volume vol3 -lun lun1_backup -igroup igroup3
   ```

   You can opt to make this step part of your SAN backup application's post-processing script.

6. From the host, discover the new LUN and make the file system available to the host.

   You can opt to make this step part of your SAN backup application's post-processing script.

7. Back up the data in the LUN clone from the backup host to tape by using your SAN backup application.

8. Use the `lun modify` command to take the LUN clone offline.

   ```
   lun modify -vserver vs3 -path /vol/vol3/lun1_backup -state offline
   ```

9. Use the `lun delete` to remove the LUN clone.

   ```
   lun delete -vserver vs3 -volume vol3 -lun lun1_backup
   ```

10. Use the `volume snapshot delete` command to remove the Snapshot copy.

    ```
    volume snapshot delete -vserver vs3 -volume vol3 -snapshot vol3_snapshot
    ```