

BEST PRACTICES GUIDE

Nimble Storage VSS Provider with the Symantec NetBackup Snapshot Client



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Introduction

Nimble Storage snapshots are based on highly efficient *redirect-on-write* technology and take advantage of universal compression, ensuring that snapshots consume minimal storage space. The ability to take and store months of frequent application consistent snapshots drastically reduces the overhead incurred with traditional backup data movement as data is no longer read from storage by an application server, transported over a network to a backup server, and subsequently written to backup storage. The net result is faster backup and recovery.

Symantec NetBackup is a full featured enterprise-class data protection solution. Beginning with Nimble OS version 2.2.0, NetBackup 7.6 and higher is easily configured to manage Nimble Storage snapshots when Microsoft VSS (Volume Shadow Copy Service) backups are used for data protection. Specifically, when the NetBackup Snapshot Client is configured to use VSS as the snapshot method, Nimble Storage is able to fulfill the role of VSS hardware provider. A NetBackup client running a supported version of Microsoft Windows with one or more Nimble Storage volumes can take advantage of the following NetBackup Snapshot Client features:

- Snapshot, where a Nimble VSS hardware snapshot is used as a point in time read only copy of client data to be backed up to a NetBackup storage unit.
- Instant Recovery, where one or more Nimble VSS hardware snapshots are retained on the storage array by NetBackup for recovery from disk.
- Off-host backup, where the data transfer path from array based snapshots to a NetBackup storage unit bypasses the NetBackup client being protected and instead uses an alternate client.

Note that this feature set is available with both fiber channel and iSCSI connection methods.

Audience

NetBackup administrators, storage architects, and Nimble Storage administrators are encouraged to read this document. The recommendations presented set out to assist in deploying a supported, successful, and reliable solution.

Overview

The tangible value derived from each supported NetBackup Snapshot Client feature will vary from one deployment to the next. However, it is possible to provide a high level view describing the benefits of each feature.

Snapshot: Nimble Storage VSS hardware snapshots differ from Microsoft Windows operating system VSS snapshots. One important difference is that being a hardware provider, Nimble Storage VSS offloads the task of creating and maintaining a shadow copy from the host operating system. Another important difference is that Nimble Storage VSS snapshots employ highly efficient *redirect-on-write* technology, instead of the *copy-on-write* technology used by Windows operating system VSS. These benefits equate to reduced resource usage on the Windows host. In this use case the array based

snapshot acts as a point in time, read only, disk based copy of the NetBackup client volume. The snapshot is not retained by NetBackup after the backup has completed, but is instead deleted.

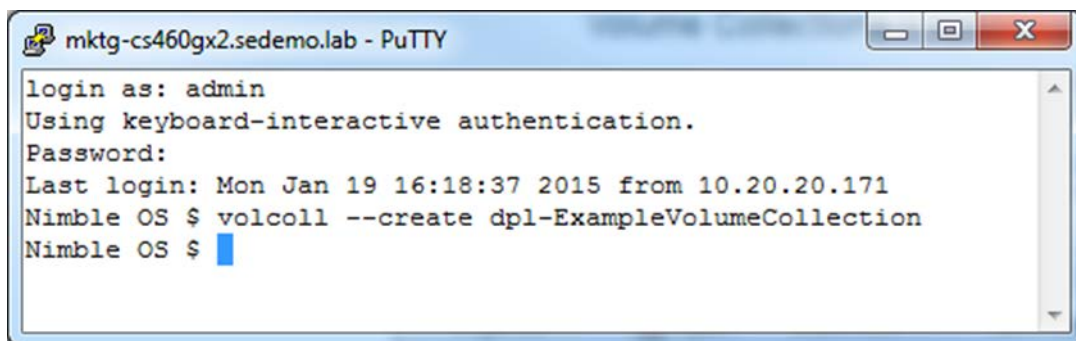
Instant Recovery: With Nimble Storage snapshots, only changes to the source volume cause a snapshot to occupy file system space. Universal compression ensures that snapshots consume minimal space. Retaining a larger number of snapshots on a Nimble Storage array provides an ability to recover from a greater number of recovery points on disk local to the array. Equally important, the ability to retain a larger number of snapshots on the array may also reduce the need to frequently copy retained snapshot data to a NetBackup storage unit. This benefit reduces the requirement to read snapshot data from the array, transfer the data through a NetBackup client or media server, and write the data out to external media. Based on NetBackup policy schedule settings, the ability to perform snapshot only backups or snapshots with a second copy written to a NetBackup storage unit are easily configured. Multiple schedules can be used to implement a strategy where a large number of snapshot backups are retained on a Nimble Storage array, and a reduced number of snapshots are copied to a NetBackup storage unit.

Off-host backup: When backup copies on external media are required, the ability to mount Nimble VSS snapshots onto an alternate NetBackup client removes the original NetBackup client from the data transfer path. The benefits provided by this feature include reduced NetBackup client resource utilization, and possible reduced LAN bandwidth consumption between a given NetBackup client and NetBackup media server.

Combining the benefits of these NetBackup Snapshot Client features increases the overall value of the solution. A single NetBackup policy configured for use with the Snapshot Client can easily take advantage of Nimble VSS snapshots, Instant Recovery where Nimble VSS snapshots are retained on the array, and off-host backup where the NetBackup client is not burdened when creating copies of snapshots on NetBackup storage units.

Configuration Best Practices

In all supported NetBackup Snapshot Client use cases, client volumes residing on Nimble Storage arrays must be a member of a volume collection. Creating a volume collection can be accomplished by means of the Nimble Storage command line or graphical user interfaces. The command line interface is preferred as it facilitates the creation of a volume collection without requiring a volume collection schedule.



```
mktg-cs460gx2.sedemo.lab - PuTTY
login as: admin
Using keyboard-interactive authentication.
Password:
Last login: Mon Jan 19 16:18:37 2015 from 10.20.20.171
Nimble OS $ volcoll --create dpl-ExampleVolumeCollection
Nimble OS $
```

Figure 1: Nimble Storage Command Line User Interface

The command used to create a volume collection is `volcoll --create VolumeCollectionName`, where “VolumeCollectionName” is the name of the volume collection.

When creating or editing a volume collection using the graphical user interface, at least one schedule is required. In this use case, the NetBackup scheduler accommodates all scheduling requirements. For this reason, the command line interface should be used for volume collection creation instead of the graphical user interface.

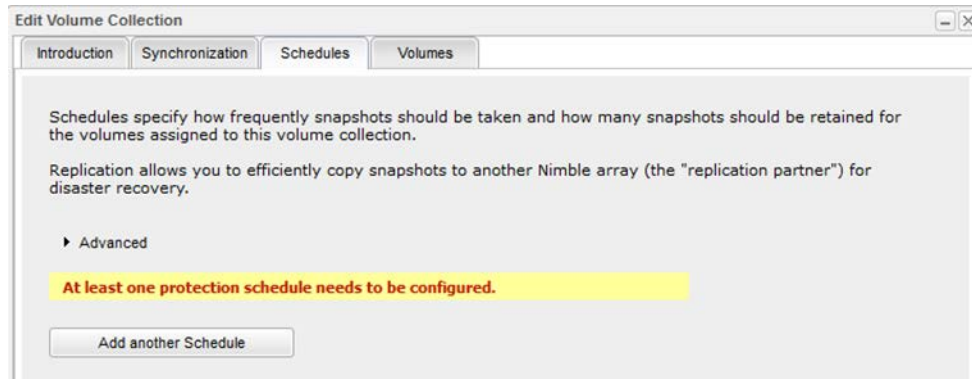


Figure 2: Edit Volume Collection - Schedules

By default the volume collection will have a synchronization value equal to “None”. Note that the synchronization types of “Microsoft VSS” and “VMware vCenter” are not compatible for use in conjunction with NetBackup. The graphical user interface can be used to view this property on the “Synchronization” tab when editing the volume collection. Clicking the “Cancel” button will allow exiting the dialog window without creating a protection schedule.

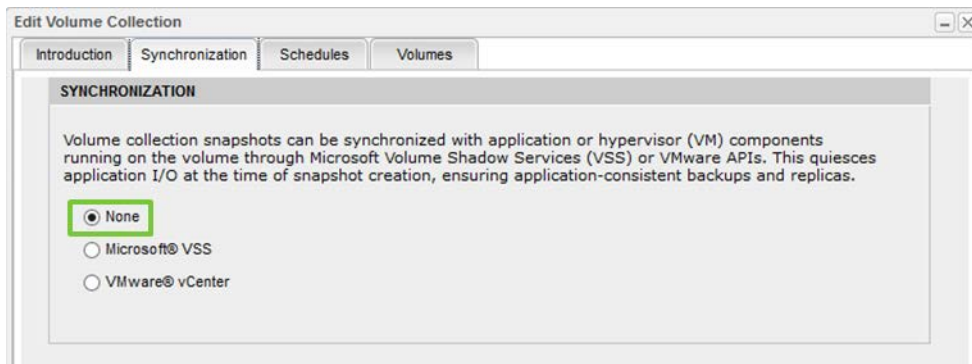


Figure 3: Edit Volume Collection - Synchronization

After creating a volume collection using the command line user interface, add the desired client volume or volumes to the volume collection. This action is performed at the volume level. When editing a volume, select the “Protection” tab and then click the “Join volume collection” radio button. Use the pull-down menu to select the correct volume collection.

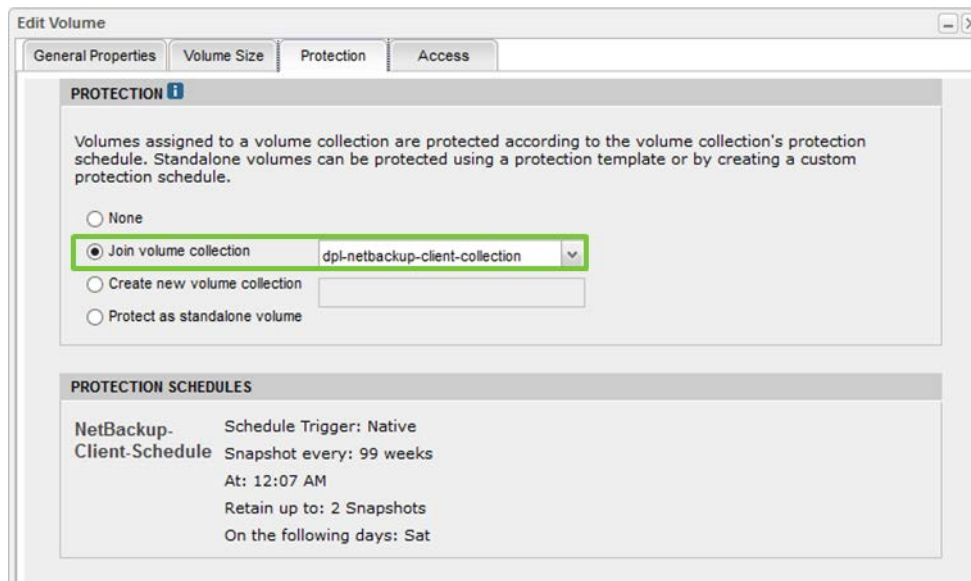


Figure 4: Edit Volume - Protection Tab

Note that there may be cases where multiple client volumes are added to the same volume collection. An example case would be a NetBackup Snapshot Client policy where the policy type was equal to “MS-Windows” and the backup selections included the drive letters of two or more Nimble Storage volumes.

The client volumes also require access configuration, where the initiator group associated with the NetBackup client is granted access to the volume and volume snapshots.

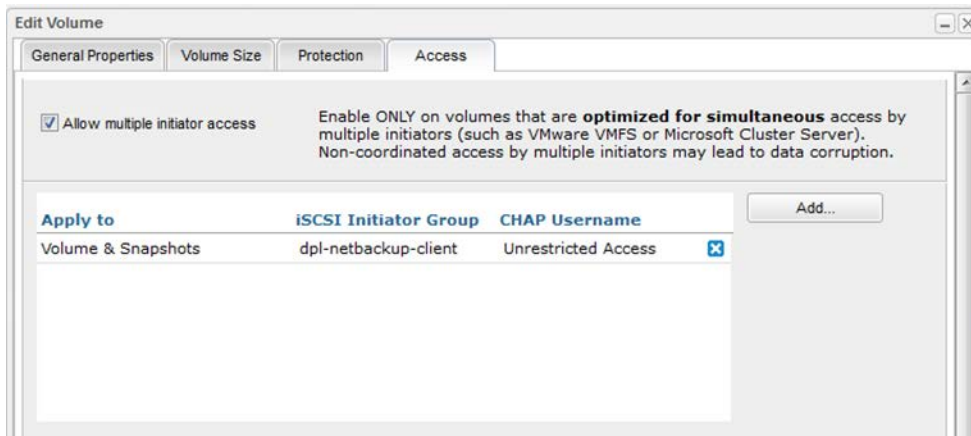


Figure 5: Edit Volume – Access Tab (iSCSI)

Additionally, the Nimble Windows Toolkit (NWT) should be installed. Provided in a single installation package, NWT includes a number of valuable tools enabling setup management, connection management, and connection services for a Windows environment. NWT should be installed on NetBackup Windows clients that connect to Nimble Storage volumes. NWT should also be installed on NetBackup Windows media server hosts that will be used to perform off-host backups.

Perform Snapshot Backups

The Nimble Storage volume configured within NetBackup for Snapshot Client backups using the VSS hardware snapshot method must be connected to the host machine. When using iSCSI, the Nimble Connection Manager can be used to easily connect the correct volume or volumes.

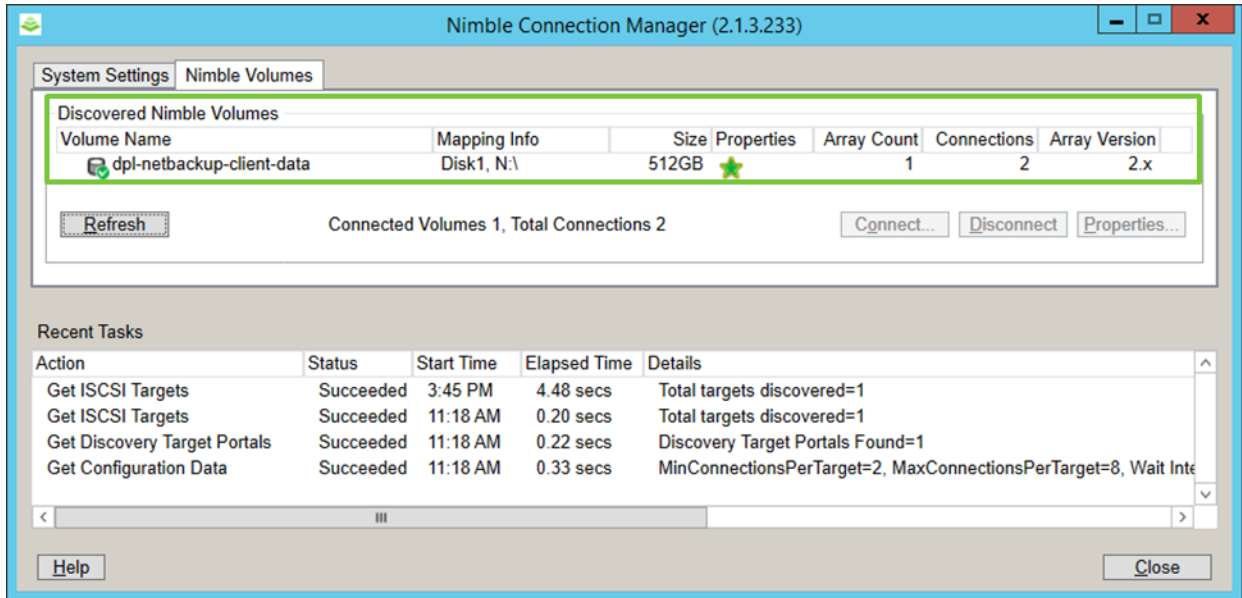


Figure 6: Nimble Connection Manager

Shown in figure 6 above is the Nimble Connection Manager. The Nimble Volumes tab indicates that the Nimble volume named “dpl-netbackup-client-data” has been connected and is mapped as drive letter “N:\”.

When connecting a Nimble volume using the Nimble Connection Manager the user is prompted with the “Connect to Target” dialog. The option to “Connect on startup” is selected by default.

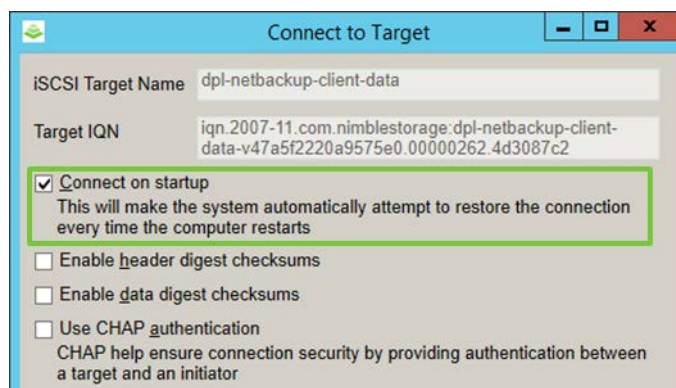


Figure 7: Connect To Target

Accepting the default value “Connect on startup” is recommended as it will make the system automatically attempt to restore the connection every time the computer restarts.

When using fibre channel to connect volumes, please reference the “Nimble Storage Best Practices for Microsoft Windows on Fibre Channel” document, available on the Nimble Storage InfoSight web portal.

Within NetBackup, policy attributes should be configured to perform snapshot backups. In the “Snapshot Client and Replication Director” portion of the user interface, click the “Perform snapshot backups” checkbox.

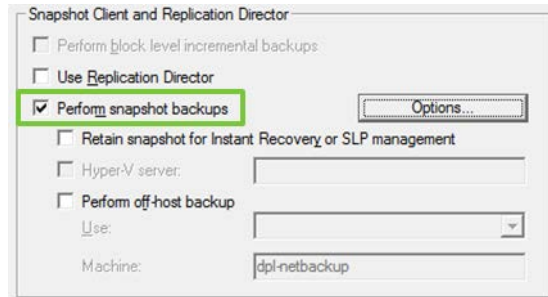


Figure 8: Snapshot Client and Replication Director

Clicking the “Options” button will open a “Snapshot Options” window where the snapshot method and additional parameters can be specified. The “Snapshot method” pull-down menu should be set to “VSS”. The “Provider Type” parameter should be set to a value of “3” to select the Nimble Storage VSS hardware provider.

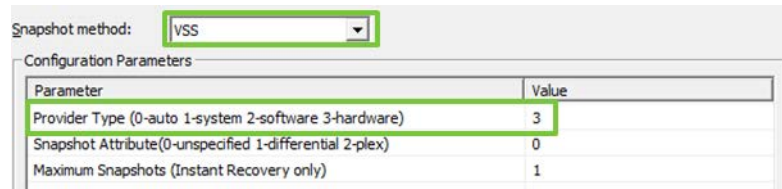


Figure 9: Snapshot Options – Provider Type

Policy “Clients” should be configured to include the name of the NetBackup client that has one or more connected Nimble Storage volumes.

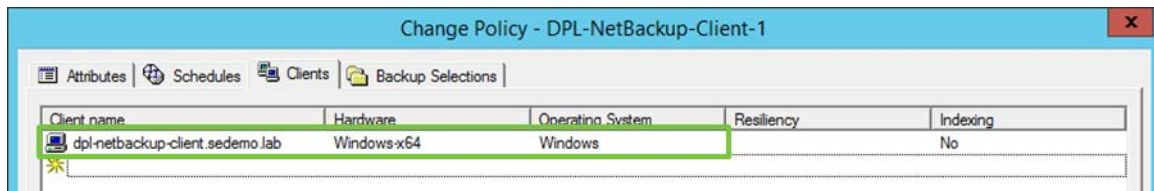


Figure 10: Policy Clients

Policy “Backup Selections” should be configured to include the drive letter of connected Nimble Storage volumes.

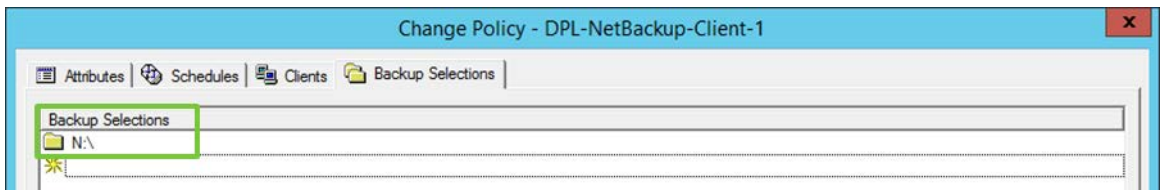


Figure 11: Policy Backup Selections

When the NetBackup policy executes it will create two jobs. These jobs will be visible within the NetBackup activity monitor. The first job will have a type equal to “Snapshot”. After the snapshot is taken, the job will stay in a running state and will spawn a second job. The second job will have a type equal to “Backup”. The backup job will have a “Parent Job ID” equal to the “Job ID” of the snapshot job. The backup job is the job that copies data from the snapshot to a NetBackup storage unit. After the backup job completes, the snapshot job will complete.

Job ID	Parent Job ID	Type	Job State	State De...	Status	Job Policy	Job Schedule
575	574	Backup	Active			DPL-NetBackup-Client-1	Example_Schedule
574	574	Snapshot	Active			DPL-NetBackup-Client-1	-

Figure 12: NetBackup Activity Monitor

On the Nimble Storage array hosting the volume or volumes being protected by the NetBackup Snapshot Client, the snapshot that coincides with the NetBackup job type equal to “Snapshot” will be viewable from within the Nimble Storage user interface, and it will be in an online state. Note that this snapshot will only exist for the duration of the NetBackup snapshot job. After the NetBackup backup job completes, the NetBackup snapshot job will delete the Nimble snapshot and post completion status.

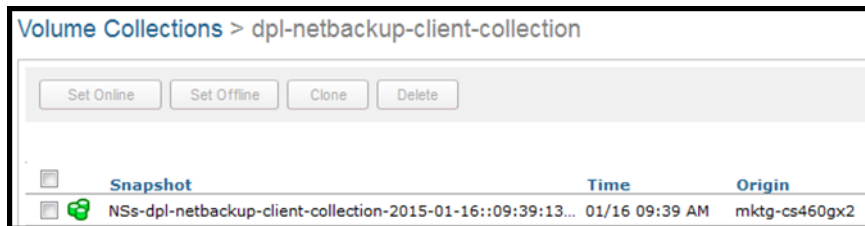


Figure 13: Nimble Volume Collection Snapshot

In summary, the “Snapshot Backup” uses the Nimble Storage VSS hardware provider to create a point in time, read only copy of client data. The resulting snapshot of the production volume is online, and the data within the snapshot is read by the NetBackup client, transferred to a NetBackup media server, and then written to a NetBackup storage unit. When the backup is complete, the Nimble Storage snapshot is deleted. Recovery requests will be fulfilled from a NetBackup storage unit.

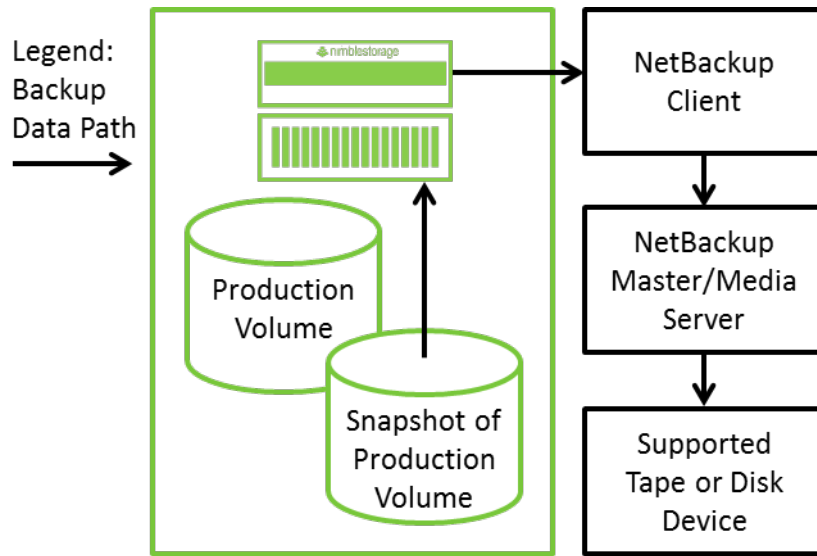


Figure 14: Snapshot Backup – Backup Data Path

Retain Snapshot for Instant Recovery

Building on snapshot backups, the “Instant Recovery” capability of the NetBackup Snapshot Client adds the ability to both retain and recover from array based snapshots.

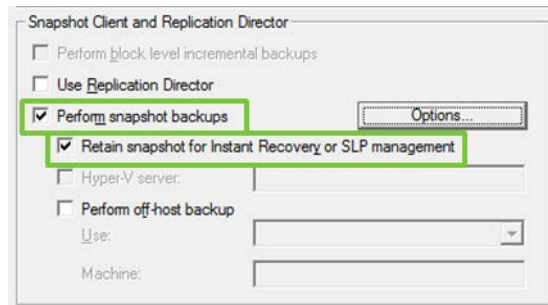


Figure 15: Snapshot Client and Replication Director

Within NetBackup, policy attributes should be configured to perform snapshot backups and to also retain snapshots for Instant Recovery. In the “Snapshot Client and Replication Director” portion of the user interface, click the “Perform snapshot backups” and the “Retain snapshot for Instant Recovery or SLP management” checkboxes. Clicking the “Options” button will open a “Snapshot Options” window where the snapshot method and additional parameters can be specified. The “Snapshot method” pull-down menu should be set to “VSS”. The “Provider Type” parameter should be set to a value of “3” to select the Nimble Storage VSS hardware provider. Applicable to Instant Recovery is the “Maximum Snapshots (Instant Recovery Only)” parameter. The value entered for this parameter represents the maximum number of snapshots that will be retained at one time for the protected volume or volumes on the Nimble Storage Array.

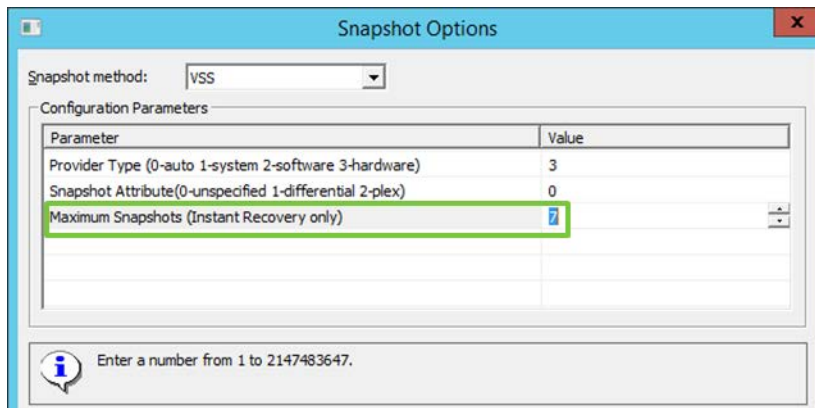


Figure 16: Snapshot Options – Instant Recovery

In the example depicted in figure 16 the “Maximum Snapshots (Instant Recovery Only)” parameter has been set to a value equal to 7. In this example, after the first 7 snapshots are taken, the next snapshot causes the oldest snapshot to be deleted.

NetBackup Snapshot Client backups are triggered for execution by one or more policy schedules. NetBackup policy schedules can be configured to use calendar or frequency based scheduling. Different schedules are easily created to accommodate snapshot only backups, as well as snapshot backups that also create a copy of the snapshot on a NetBackup storage unit.

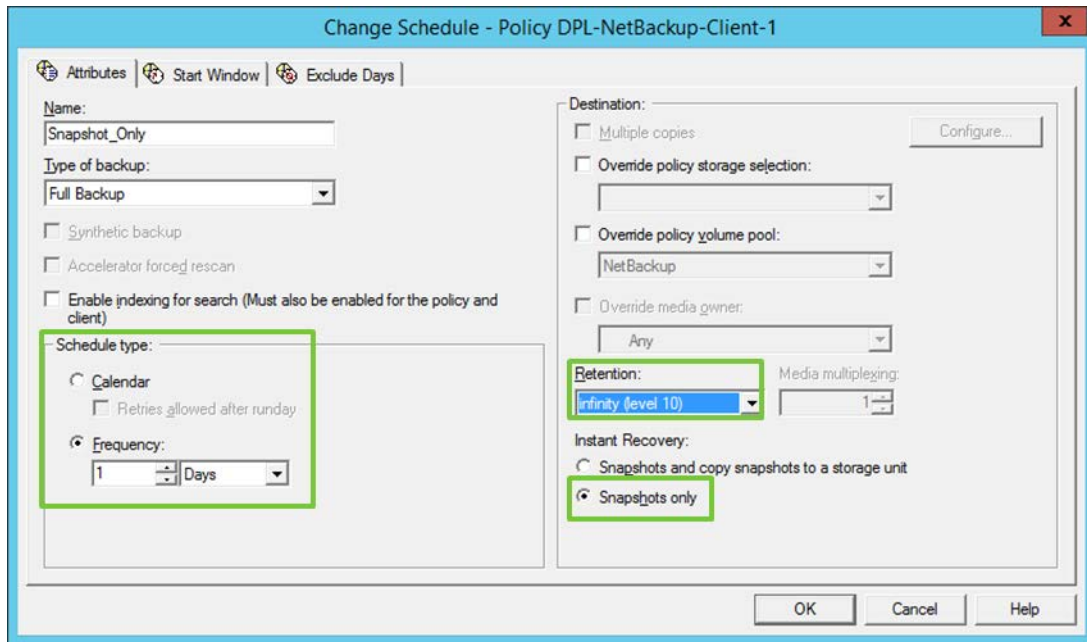


Figure 17: NetBackup Schedule – Snapshots Only

The example schedule depicted in figure 17 above uses frequency based scheduling. The example schedule will trigger job execution once every day. The Instant Recovery section of the schedule is configured to perform snapshot only backups.

Note: It is important to understand that the retention period used with snapshot only backups should be configured to use an infinite retention period. The reason for this is because the desired behavior is to retain the number of snapshots based on the snapshot options for instant recovery as detailed earlier in figure 16. The examples provided include a “Maximum Snapshots” parameter value equal to 7. The frequency of scheduled job execution is once per day. The example will retain the last 7 daily snapshots. When 7 snapshots have been taken, the oldest snapshot will automatically be deleted when a new snapshot is triggered the following day. Inadvertently setting the schedule retention period to a value of 1 hour (for example) would negatively impact the desired behavior, and snapshots would be expired and deleted after 1 hour versus rolling over after 7 days.

When the NetBackup policy executes it will create a single job. The job will be visible within the NetBackup activity monitor. The job will have a type equal to “Snapshot”.

dpl-netbackup: 1 Jobs (0 Queued 1 Active 0 Waiting for Retry 0 Suspended 0 Incomplete 0 Done)							1 Selected
Job ID	Parent Job ID	Type	Job State	State De...	Status	Job Policy	Job Schedule
862	862	Snapshot	Active			DPL-NetBackup-Client-1	Snapshot_Only

Figure 18: NetBackup Activity Monitor

On the Nimble Storage array hosting the volume or volumes being protected by the NetBackup Snapshot Client, the snapshots that correlate to NetBackup “Snapshot” jobs will be viewable from within the Nimble user interface. These snapshots are managed by NetBackup and will be deleted and replaced with new snapshots under the control of NetBackup.

Volume Collections > dpl-abc			
<input type="button" value="Set Online"/> <input type="button" value="Set Offline"/> <input type="button" value="Clone"/> <input type="button" value="Delete"/>			
<input type="checkbox"/>	Snapshot	Time	Origin
<input type="checkbox"/>	NSs-dpl-abc-2015-01-20::16:07:35.481	01/20 04:07 PM	mktg-cs460gx2
<input type="checkbox"/>	NSs-dpl-abc-2015-01-20::16:03:16.822	01/20 04:03 PM	mktg-cs460gx2
<input type="checkbox"/>	NSs-dpl-abc-2015-01-20::15:58:55.399	01/20 03:58 PM	mktg-cs460gx2
<input type="checkbox"/>	NSs-dpl-abc-2015-01-20::15:58:03.086	01/20 03:58 PM	mktg-cs460gx2
<input type="checkbox"/>	NSs-dpl-abc-2015-01-20::15:56:50.742	01/20 03:56 PM	mktg-cs460gx2
<input type="checkbox"/>	NSs-dpl-abc-2015-01-20::15:55:56.492	01/20 03:55 PM	mktg-cs460gx2
<input type="checkbox"/>	NSs-dpl-abc-2015-01-20::15:11:49.662	01/20 03:11 PM	mktg-cs460gx2

Figure 19: Nimble Volume Collection Snapshots

In summary, the “Instant Recovery Backup” uses the Nimble Storage VSS hardware provider to create point in time, read only snapshots of client data. One or more snapshots of the production volume are retained on the Nimble Storage array. NetBackup catalogs the contents of the backup. NetBackup manages snapshot creation, retention, expiration, and deletion. Recovery requests for data contained within a snapshot will be fulfilled by NetBackup from an array based snapshot.

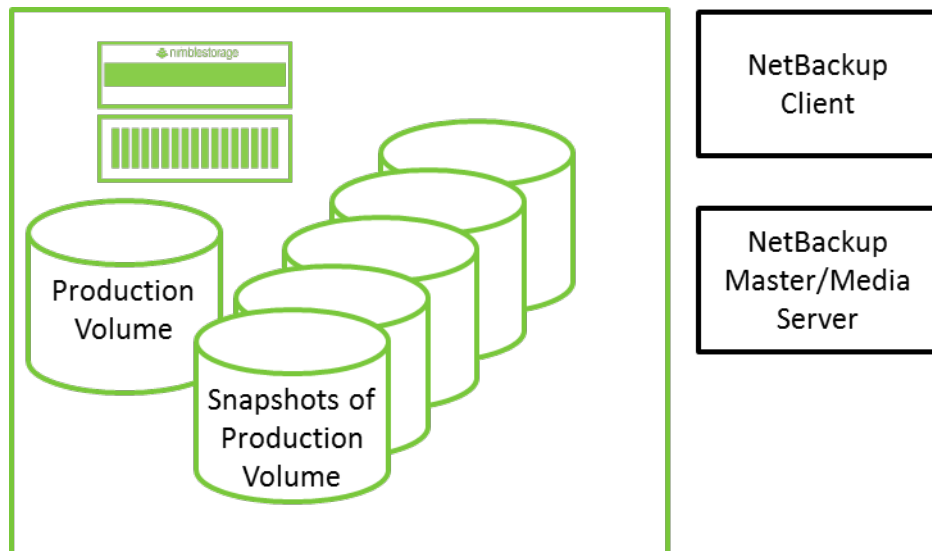


Figure 20: Instant Recovery Backup – No Data Movement

Nimble Storage snapshots are efficient and invoke no data movement when created. Users are encouraged to use the NetBackup Snapshot Client to create and retain snapshots using a strategy that aligns with recovery point objectives.

Instant Recovery snapshot backups that also create a copy of the snapshot backup on a NetBackup storage unit are easily configured. This solution enables the ability to meet requirements dictating the creation of backup copies on external media such as disk or tape. Note that unlike snapshots on Nimble Storage arrays, the creation of snapshot backup copies on NetBackup storage units may be expensive in terms of time, data movement, resource utilization, and the use of disk or tape media.

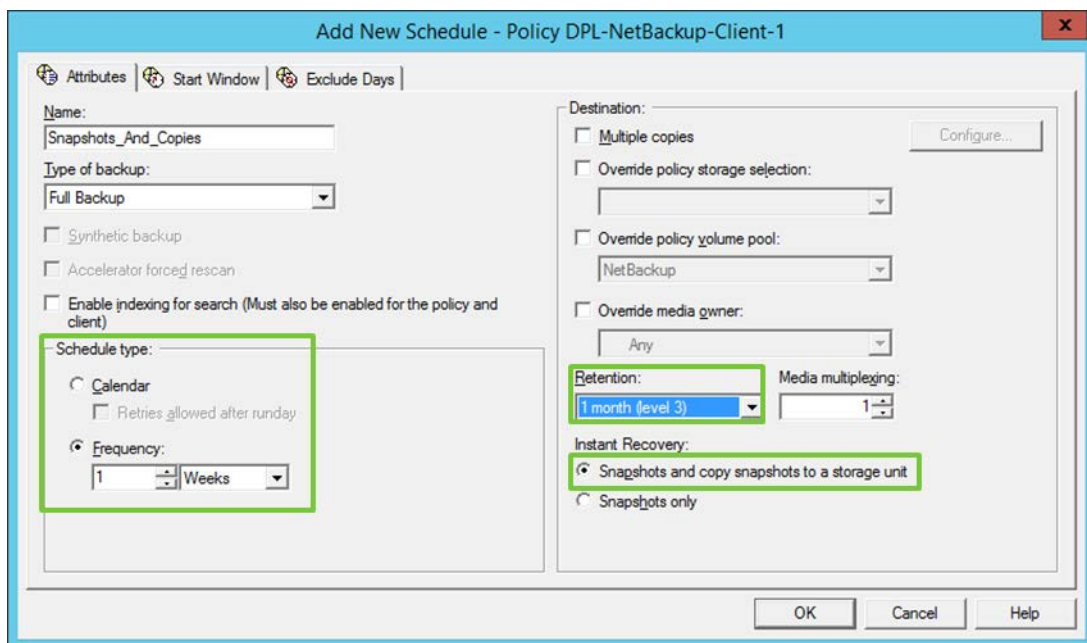


Figure 21: NetBackup Schedule – Snapshots & Copies

An additional policy schedule can be added to create both snapshot backups, and copies of the snapshot backups that are written to a NetBackup storage unit. The example schedule depicted in figure 21 above is frequency based. The schedule is set to trigger snapshot backups infrequently, once every week. The retention period has been set to accommodate the desired retention duration on a NetBackup storage unit. The Instant Recovery section of the policy has been configured such that “Snapshots and copy snapshots to a storage unit” has been selected.

When the NetBackup policy executes it will create two jobs. These jobs will be visible within the NetBackup activity monitor. The first job will have a type equal to “Snapshot”. After the snapshot is taken, the job will stay in a running state and will spawn a second job. The second job will have a type equal to “Backup”. The backup job will have a “Parent Job ID” equal to the “Job ID” of the snapshot job. The backup job is the job that copies data from the snapshot to a NetBackup storage unit. After the backup job completes, the snapshot job will complete.

dpl-netbackup: 2 Jobs (0 Queued 2 Active 0 Waiting for Retry 0 Suspended 0 Incomplete 0 Done)							
Job ID	Parent Job ID	Type	Job State	State De...	Status	Job Policy	Job Schedule
872	871	Backup	Active			DPL-NetBackup-Client-1	Snapshots_And_Copies
871	871	Snapshot	Active			DPL-NetBackup-Client-1	-

Figure 22: NetBackup Activity Monitor

On the Nimble Storage array hosting the volume or volumes being protected by the NetBackup Snapshot Client, the snapshot that coincides with the NetBackup job type equal to “Snapshot” will be viewable from within the Nimble Storage user interface, and it will be in an online state. This snapshot is managed by NetBackup and will be deleted and replaced with a new snapshot under the control of NetBackup.

Perform Off-host Backup

An additional feature of the NetBackup Snapshot Client is the ability to perform off-host backups. When performing off-host backups, the data transfer path bypasses the NetBackup client. A Nimble Storage snapshot is mounted by an alternate client, typically a NetBackup media server, and data is copied to a NetBackup storage unit. The off-host backup feature can be used with snapshot backups, or when creating copies of Instant Recovery snapshots on a NetBackup storage unit.

Note that the Nimble Windows Toolkit must be installed on the host designated to perform the off-host backup operation. This is true in cases where the Nimble Storage volume being protected is connected via iSCSI or fibre channel. Reference the “Nimble Storage Windows Integration Guide” available on the Nimble Storage InfoSight web portal for detailed information. In particular, the chapter titled, “Nimble VSS Services” subsection “VSS and Third Party Backup Applications” contains information specific to configuring off-host backups with third party backup applications.

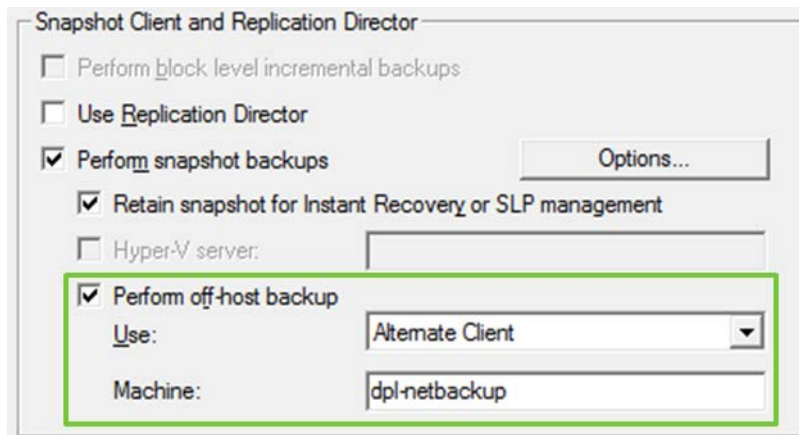


Figure 23: Snapshot Client and Replication Director

Within NetBackup, policy attributes should be configured to enable the off-host backup feature. In the “Snapshot Client and Replication Director” portion of the user interface, click the “Perform off-host backup” checkbox. From the “Use” pull-down menu, select “Alternate Client”. In the “Machine” field, type the name of a NetBackup client that will be used to mount snapshots and transfer data to a NetBackup storage unit. In most cases this will be a NetBackup Windows media server.

All Nimble Storage client volumes that will be used with the off-host backup feature should be configured to grant “Snapshots Only” initiator access to the NetBackup alternate client specified in the NetBackup policy. The “Allow multiple initiator access” checkbox should also be selected.

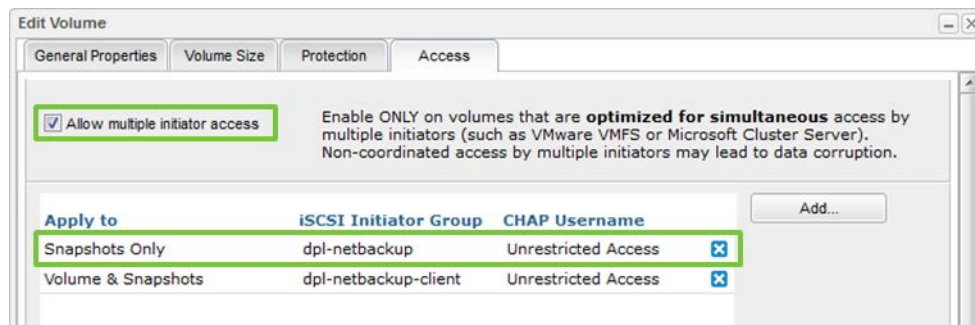


Figure 24: Edit Volume – Access

In the example depicted in figure 24 above, the initiator group associated with the NetBackup alternate client host has been granted “Snapshots Only” access to the Nimble Storage volume. This access privilege allows the NetBackup alternate client to mount Nimble Storage snapshot backups so that they can be copied to a NetBackup storage unit.

In summary, the NetBackup Snapshot Client off-host feature removes the NetBackup client from the backup data path. Instead, the alternate client mounts snapshots and copies the data to a NetBackup storage unit. This reduces resource utilization on the client.

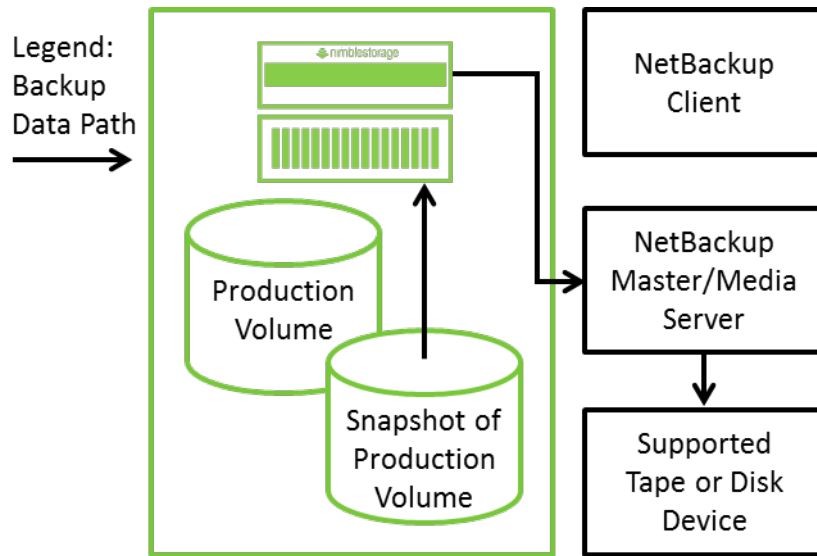


Figure 25: Off-host Backup – Backup Data Path

Recovery

Recovery can be commenced from the NetBackup Administrative console by clicking the “File” menu and selecting the “Backup, Archive, and Restore” menu item.

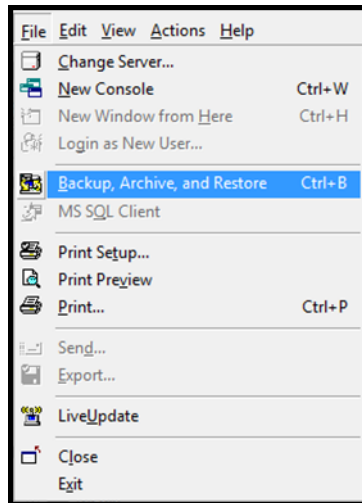


Figure 26: Launching the Recovery Interface

When the “Backup, Archive, and Restore” window appears it may be necessary to configure NetBackup to define the server to use for restore requests, the source client that was backed up, the destination client for restores, as well as the policy type that was used to perform backups. Optionally, a date and time range can also be used to narrow search criteria. From the File menu, select the “Specify NetBackup Machines and Policy Type” menu item.

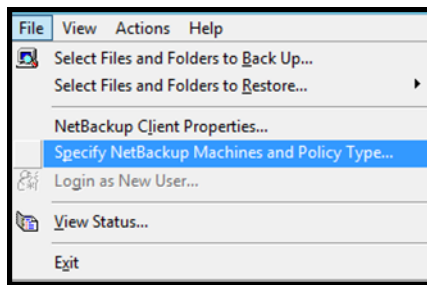


Figure 27: Backup Archive and Restore – File Menu

If necessary, populate the “Specify NetBackup Machines and Policy Type” dialog window to recover the backups of a specific source client, destination client, and policy type. Click the “OK” button after the correct values have been selected or added to the dialog window.

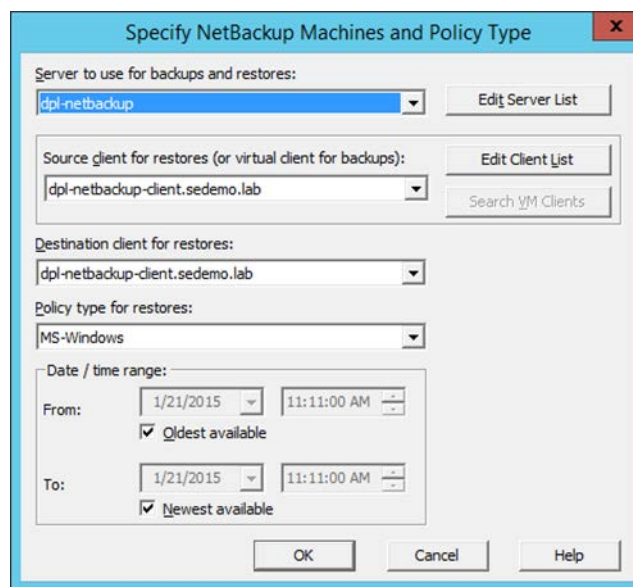


Figure 28: Specify NetBackup Machines and Policy Type

From the “Select for Restore” pull-down menu select the “Restore from Normal Backup” menu item. Select the drive, folders, or files to recover and then select the “Restore” menu item from the “Actions” pull-down menu.

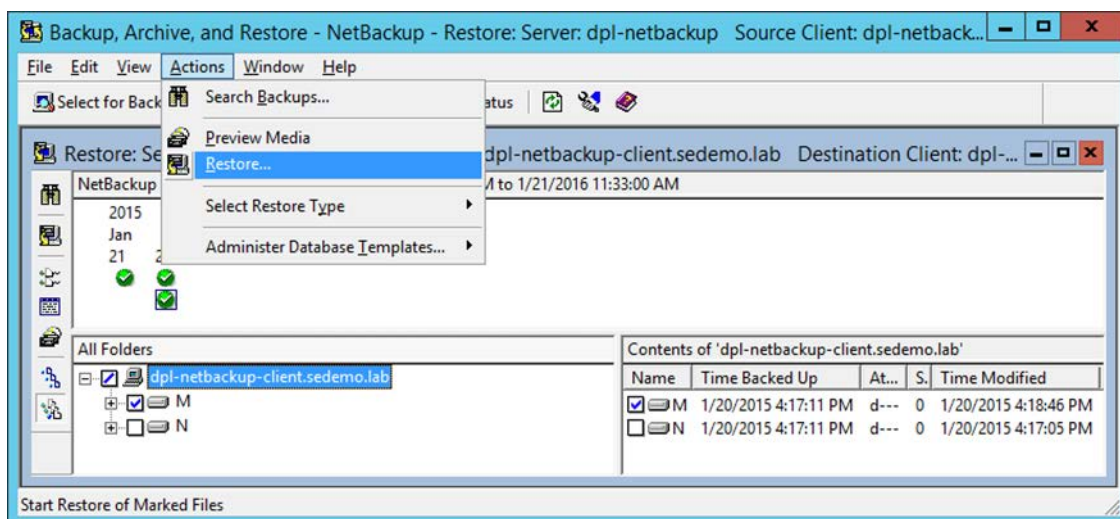


Figure 29: Actions – Restore

Accept or modify the parameters of the “Restore Marked Files” dialog window and then click the “Start Restore” button to initiate the restore request. The restore job can be monitored from within “Backup, Archive, and Restore” via a pop-up window or it can be viewed within the NetBackup activity monitor.

Summary

Nimble Storage snapshot technology combined with the NetBackup Snapshot Client creates a compelling solution for supported Microsoft VSS backup types. Storing many hourly or daily snapshots on the Nimble Storage array and managing them with the NetBackup Microsoft VSS requestor simplifies data protection administration, enables rapid recovery from array based snapshots, and provides the ability to make external backup copies on NetBackup storage units.



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