

EMC Disk Library with NetApp Filers

Applied Technology

Abstract

This white paper describes how an EMC® Disk Library (EDL) may be configured for use with NetApp filers.

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Executive summary

EMC® Disk Library (EDL) replaces tape libraries in many situations and offers better backup and restore times. Restore times are especially better due to the elimination of tape physical motion times. EDL also offers higher availability due to use of RAID. Many different backup applications on several platforms have been qualified for use with EDL. EDL has also been qualified for NDMP backup with EMC Celerra®.

Introduction

You must configure a NetApp filer so that it sees the EDL virtual devices (tape libraries and tape drives) before configuring your NDMP backup software to use the EDL. Once the filer sees the EDL devices, you can follow the standard practices that you use to back up to a real NDMP tape library. This paper provides an overview of NDMP, explains how to configure EDL with NetApp Filers, and describes considerations when NetApp filers are backed up to EDL.

Audience

This white paper is intended for anyone desiring to understand how EDL can be used for NDMP backup of NetApp filers. The reader should have a basic systems-engineering level understanding of networks and storage fundamentals.

NDMP overview

The Network Data Management Protocol (NDMP) was co-developed by Intelliguard (which was purchased by Legato) and NetApp as a standard to simplify backing up filers. In the beginning, filers were backed up by attaching a local tape drive and running an internal backup program from a command line. Most often this command was **tar** or **dump**, since early filers were based on variants of the UNIX operating system. This was fine at first, but as companies deployed more and more filers, it became apparent that manually mounting tapes to back up each filer was cumbersome, and restoring the filer was even more cumbersome. There was no centralized method to scan for the file you wanted, and each filer had to be consulted.

NDMP was developed for several reasons:

- To automate filer backup by allowing the use of tape libraries and giving backup software the ability to start backups and restores from a centralized location
- To take backup traffic off the network (you could back up a filer by backing up a CIFS share or NFS mount point, but network bandwidth was consumed)
- To back up both CIFS and NFS attributes, which would not be possible with regular network backup

In general, the goals are accomplished through a few mechanisms:

- Backups and restores are controlled via a network protocol. Backup software vendors offer NDMP options that implement this protocol.
- The filer is connected directly – perhaps via SAN or SCSI – to a tape library or tape drive.
- Filers contain a *passthru* SCSI driver for tape library devices. This driver gives the backup software the ability to send any SCSI command desired to the library device. These commands inventory the library and move tapes.
- Filers also have tape drivers for standalone tape drives and tape drives within libraries.
- Filer vendors have enhanced their native backup utilities to back up and restore both CIFS and NFS attributes, so that restores work properly when files are made available via both network protocols.

The backup software issues appropriate NDMP commands to cause the library to be inventoried, to move a tape into a drive, and to start the requested backup or restore. While a backup is executing, the filer still usually runs a variant of **tar** or **dump**, and it also sends a list of the files to the backup server as it backs them up. Backup software incorporates the files into its *database* (or *catalog*), and makes them available to peruse when restoring. As a result, individual files may be selected for restore.

The steps to configure a NetApp filer to use a virtual tape library on an EDL are described as follows. They are no different than if you were using a backup server rather than a NetApp filer, but are listed for clarity.

Zone EDL to the filer

The NetApp filer is a *SAN client* to the EDL. Each fibre port on the filer used for NDMP backup to EDL must first be zoned to an EDL front-end (target) port so that the filer can “see” the EDL.

It is easy to distinguish a NetApp filer port from other devices plugged in to the switch, because the Name Server lists the device as a name similar to “Netapp FC adapter 9a”, as shown in Figure 1. (Although the example in Figure 1 is from a Brocade switch, other switches provide similar reports.)

http://192.168.24.37 - Wayne_DS_4100B : Name Server Table. - Microsoft Internet Explorer

Name Server

Auto Refresh Auto-Refresh Interval: 15 seconds Number of Devices: 12

All Devices

Domain	Port #	Port ID	Port Type	Device Port WWN	Device Node WWN	Device Name	FDMI Host I
112	4	700400	N	21:00:00:e0:8b:84:8c:ea	20:00:00:e0:8b:84:8c:ea	QLA2462 FW:v4.00.18 DVR:v9.1.2.16 (w...	
112	7	700700	N	21:01:00:e0:8b:32:b7:cb	20:01:00:e0:8b:32:b7:cb	QLA2342 FW:v3.03.19 DVR:v9.1.2.11 (w...	
112	1	700100	N	21:01:00:e0:8b:29:aa:ac	20:01:00:e0:8b:29:aa:ac	QLA2342 FW:v3.03.19 DVR:v9.1.2.11 (w...	
112	9	700900	N	21:03:00:0d:77:ee:67:d3	20:03:00:0d:77:ee:67:d3	EMC CLARiiON DL DEV v1.0	
112	0	700000	N	21:01:00:e0:8b:30:4c:1c	20:01:00:e0:8b:30:4c:1c	QLA2342 FW:v3.03.19 DVR:v9.1.2.11 (w...	
112	10	700a00	N	21:03:00:e0:8b:71:75:3e	20:03:00:e0:8b:71:75:3e	QLA2344 FW:v3.03.19 DVR:v9.1.2.11 (w...	
112	3	700301	NL	21:00:00:e0:8b:12:2a:04	20:00:00:e0:8b:12:2a:04	QLA2342 FW:v3.03.19 DVR:v9.1.2.11 (w...	
112	12	700c00	N	50:06:01:61:39:20:02:b1	50:06:01:60:b9:20:02:b1	DGC LUNZ 0219	
112	5	700500	N	21:01:00:e0:8b:a4:8c:ea	20:01:00:e0:8b:a4:8c:ea	QLA2462 FW:v4.00.18 DVR:v9.1.2.16 (w...	
112	11	700b00	N	20:00:00:e0:8b:07:a5:a8	20:00:00:e0:8b:07:a5:a8	Netapp FC adapter 9a	
112	6	700600	N	21:00:00:e0:8b:12:b7:cb	20:00:00:e0:8b:12:b7:cb	QLA2342 FW:v3.03.19 DVR:v9.1.2.11 (w...	
112	2	700201	NL	21:00:00:e0:8b:12:12:04	20:00:00:e0:8b:12:12:04	QLA2342 FW:v3.03.19 DVR:v9.1.2.11 (w...	

Detail View Accessible Devices Refresh Print Close

Name Server table refreshed on Fri Jun 29 2007 17:19:01 GMT+00:00 AD: ADO User: admin Role: Admin

Applet com.brocade.web.zoning.NameServerApplet_S5 started Internet

Figure 1. Switch Name Server showing a NetApp filer fibre port

Create a virtual tape library

When you attach a physical tape library to your EDL, you need to create a virtual tape library that has the same type of tape drives as the physical library. Otherwise, you can use any tape library and drive combination that is supported by your NetApp filer and NDMP backup software. Consult NetApp and the vendor of your backup software.

Create a SAN client

“SAN Client” is EDL’s representation for the WWPN of the NetApp filer. You need to enter a name for the SAN client that refers to the filer. For example, in Figure 2, the SAN client name is the same as the filer port’s name.

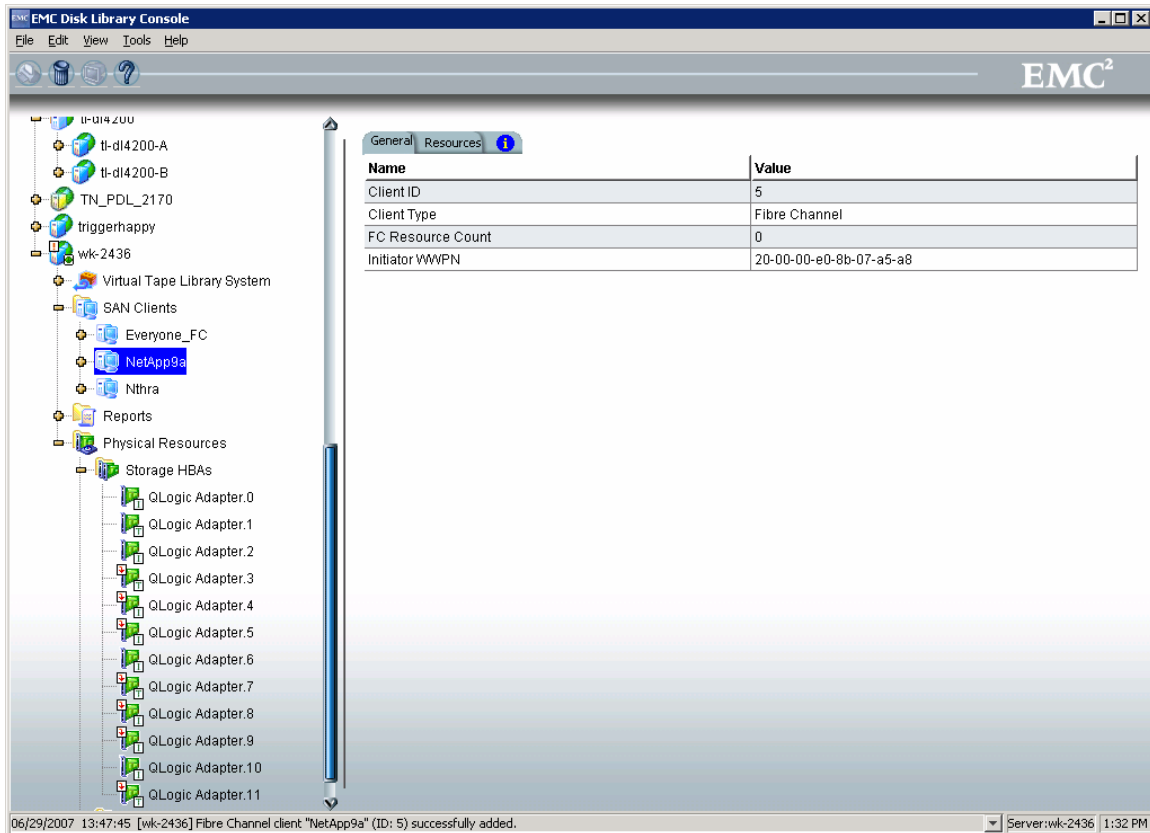


Figure 2. NetApp filer as a SAN client

Assign the virtual tape library to the filer (SAN client)

You must assign the virtual tape library that you created to the filer’s SAN client. Once this is done, the filer will be able to see the virtual tape library devices (the library device itself and its virtual tape drives) after rebooting the filer or bouncing the switch port as described next.

Bounce the switch port

There is no way to tell a NetApp filer to scan its Fibre Channel ports for new tape devices. It automatically scans when it detects a fibre state change. It is important to note that assigning a virtual tape library to the filer SAN client in EDL does *not* cause a state change. Therefore, short of rebooting the filer (which is usually not a good idea), the filer can be instructed to scan for new devices by disabling and then re-

enabling the switch port connected to the filer. Do this through the switch GUI or telnet connection – or simply unplug the fibre cable and plug it back in.

Note: Wait a minute after disabling (unplugging) the switch port so that the filer truly disables the port.

Verify filer devices

Log in to the filer with administrative rights (root user) and run the command **sysconfig -m** to get a list of tape library robotic devices connected to the filer, and run the command **sysconfig -t** to get a list of the tape drives. For example, in a Spectralogic library, the tape drives are displayed with the following command:

```
sysconfig -t
```

```
Tape drive (SW_TOP:2.0L1)  Sony SDX-500C
rst01 - rewind device,      format is: AIT-1 25 GB
nrst01 - no rewind device,  format is: AIT-1 25 GB
urst01 - unload/reload device, format is: AIT-1 25 GB
rst0m - rewind device,      format is: AIT-1 50 GB comp
nrst0m - no rewind device,  format is: AIT-1 50 GB comp
urst0m - unload/reload device, format is: AIT-1 50 GB comp
rst0h - rewind device,      format is: AIT-2 50 GB
nrst0h - no rewind device,  format is: AIT-2 50 GB
urst0h - unload/reload device, format is: AIT-2 50 GB
rst0a - rewind device,      format is: AIT-2 100 GB comp
nrst0a - no rewind device,  format is: AIT-2 100 GB comp
urst0a - unload/reload device, format is: AIT-2 100 GB comp

Tape drive (SW_TOP:2.0L2)  Sony SDX-500C
rst11 - rewind device,      format is: AIT-1 25 GB
nrst11 - no rewind device,  format is: AIT-1 25 GB
urst11 - unload/reload device, format is: AIT-1 25 GB
rst1m - rewind device,      format is: AIT-1 50 GB comp
nrst1m - no rewind device,  format is: AIT-1 50 GB comp
urst1m - unload/reload device, format is: AIT-1 50 GB comp
rst1h - rewind device,      format is: AIT-2 50 GB
nrst1h - no rewind device,  format is: AIT-2 50 GB
urst1h - unload/reload device, format is: AIT-2 50 GB
rst1a - rewind device,      format is: AIT-2 100 GB comp
nrst1a - no rewind device,  format is: AIT-2 100 GB comp
urst1a - unload/reload device, format is: AIT-2 100 GB comp
```

And the library device is displayed by the following command:

```
sysconfig -m
```

```
Medium changer (SW_TOP:2.0)  SPECTRA GATOR
mc0 - medium changer device
```

Note that you may have set up a virtual library with virtual tape drives that are not “qualified” by NetApp. In this case, the filer will discover the drives but will not allow them to be used. For example, LTO-3 tape drives may not appear in the list of qualified tape drives for older NetApp filers. There are several possible alternatives:

- Do not use the new tape emulation type. Create a different virtual tape library in your EDL that contains older qualified tape drives.

-
- Obtain a patch from NetApp in which the desired tape drive is qualified.
 - Configure the NetApp filer, specifying that the desired tape drive type emulates a qualified drive type. The instructions for this procedure can be found in the NetApp document entitled *Data ONTAP Data Protection Guide* for your revision of Data ONTAP. See the section “Using nonqualified tape drives.”

Configure NDMP backup software

Follow the instructions provided by your NDMP backup software vendor to configure the software for use with EDL as a destination of NDMP backups. EDL virtual libraries work the same way as real tape libraries for NDMP backups.

Conclusion

This paper shows how EMC Disk Library virtual libraries may be used as NDMP tape libraries to back up NetApp filers.

References

- *EMC Disk Library Administrator's Guide*
- *EMC Disk Library Release Notes*
- *Data ONTAP Data Protection Guide*.
- *Veritas NetBackup for NDMP Administrator's Guide*