Dell™ DR Series Appliance Virtual Tape Library Best Practices

Topics covered:
- Dell DR VTL Container
- NetVault nVTL

A Dell Technical White Paper

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Introduction

Dell™ DR Series appliances are high-performance, disk-based backup-and-recovery appliances that deliver innovative features such as inline deduplication and compression, advanced data protection, and replication. Additionally, the management features, ease of deployment, and architecture that enables core backup data to remain on disk and online longer can help organizations reduce the complexity associated with backups.

For most common data types, Dell recommends using Rapid Data Access (RDA). RDA provides closely knit integration with Dell™ NetVault™ Backup (NetVault Backup) and the DR Series appliance. This lets NetVault Backup use the DR Series appliance as a target location for either source- or target-side deduplication, which lets you finely tune backups to individual environments and requirements. DR series appliances typically reduce the quantity of data stored as backups by a 15:1 ratio as a result of deduplication and compression.

When backing up data stored on a network-attached storage (NAS) device via Network Data Management Protocol (NDMP) RDA is not supported. For this use case, Dell recommends using either the DR native Virtual Tape Library (VTL Container), NetVault Backup's Virtual Tape Library (nVTL) or a Dell™ NetVault™ SmartDisk (NetVault SmartDisk) configured with the DR Series appliance. This document steps through the installation and configuration of a VTL for both the DR4000 and DR6000 Series appliances.

- DR Virtual tape libraries (VTL Containers) on a DR Series appliance are used to replace or as a complement to a physical tape library as the primary storage target. Using a combination of a DR Series appliance for a primary backup-storage target and existing tape infrastructure for secondary backups provides a reliable, high-performance solution to meet legal obligations or business requirements for offsite storage, archiving, and disaster recovery. DR VTL Containers provide the most ideal VTL solution for NetVault because the VTL is created, maintained, and provided by the DR itself. Also, data is sent directly from backups clients to the DR VTL Container. Unlike the nVTL solution which depends on 3rd party communication protocols like CIFS or NFS.

- NetVault Virtual tape libraries (nVTLs) written to a DR Series appliance are usually used to replace a tape drive or library as the primary storage target because the DR Series appliances can deliver full backups and restores more efficiently than traditional tape devices. Using a combination of a DR Series appliance for a primary backup-storage target and existing tape infrastructure for secondary backups provides a reliable, high-performance solution to meet legal obligations or business requirements for offsite storage, archiving, and disaster recovery. NetVault nVTL solutions should only be considered when DR VTL Containers will not meet customer needs.

- NetVault SmartDisk is a NetVault Backup technology that is occasionally considered for use in conjunction with the DR Series appliance. NetVault SmartDisk is a post-process, target-side deduplication technology that can be configured to perform deduplication while data is being written to disk. Because the DR Series appliance provides deduplication of the data coming into it, using both technologies generates a significant input/output (I/O) load with minimal storage savings. However, you can disable SmartDisk deduplication if you want to use the DR Series appliance to provide a disk-storage target for storing backups. In this case, replication from the DR Series appliance is not available and you might prefer to create and use a nVTL to retain use of replication. (Dell DR VTL Container technology does not currently support Replication of VTL data.)

This document is intended for technical sales, solution architects, backup administrators, system administrators, and IT managers who need to understand how to design and deploy a DR Series appliance with NetVault Backup and a VTL. Readers should have a working knowledge of the DR Series appliance and NetVault Backup, as well as related best practices for backup and disaster recovery operations.

Executive Summary

This document provides detailed information about setting up a Dell™ DR Series Disk Backup Appliance as a target for the DRs owns native Virtual Tape Library (VTL Container), and a NetVault Backup nVTL. The goal is to define the best technique users can deploy for backing up data to the DR Appliance. In these configurations, the VTL is configured for target-object storage use for data-protection operations.

Figure 1 illustrates baseline scenario of the DR Series appliance native VTL container and/or NetVault Backup nVTL.
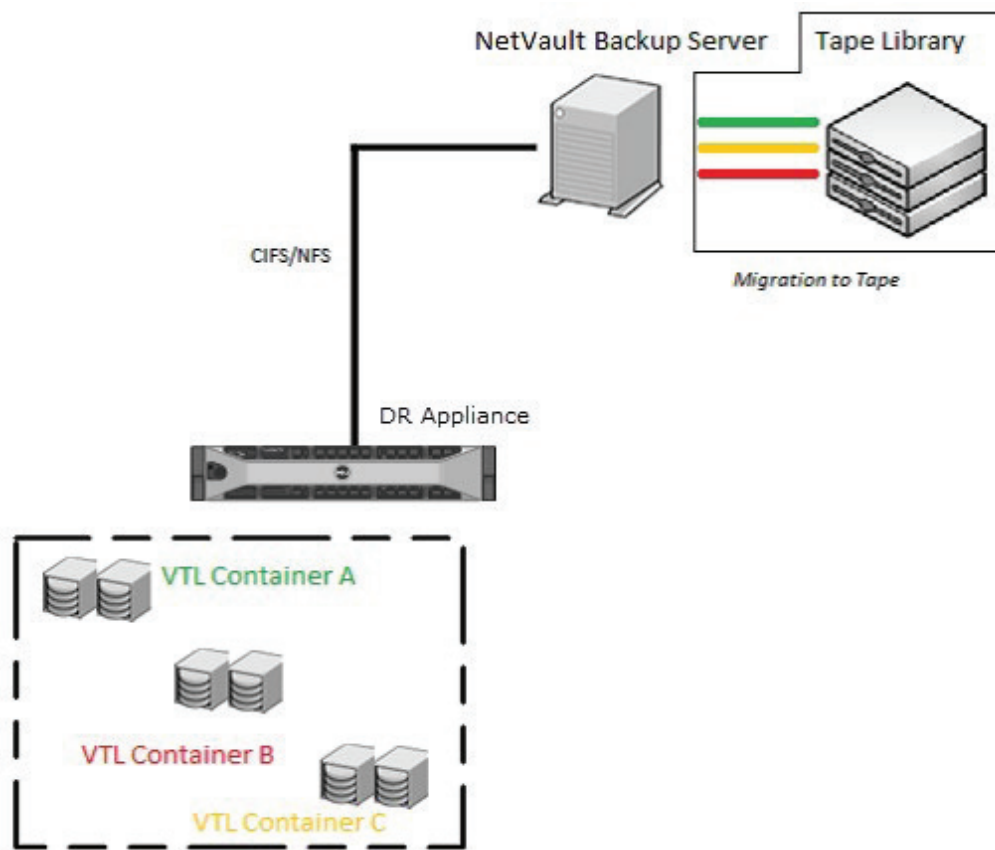
Figure 1: DR Series appliance and the DR Series appliance native VTL Container and/or NetVault Backup nVTL basline scenario

Notes:
The DR Series appliance build version and screen shots used for this document may vary slightly, depending on the version of the DR Series appliance operating system.For additional information, refer to the documentation for the DR4X00, DR6000, and NetVault Backup, and refer to the Dell NetVault Backup DR Series Backup Appliance Application Note

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Pros and Cons for each VTL Technique

While Virtual Tape Libraries can be implemented in my ways on the Dell DR Appliance and Dell NetVault Backup software solution some are better suited to deployment in differing environments. In the sections below specific features that impact the decision process regarding which VTL technique users should implement is clearly defined in a Pro vs Con format.

Dell DR VTL Container

Pro – Dell recommended VTL technology

Pro – Native VTL technology for the Dell DR Appliance

Pro – Much easier to Setup, Configure, and Maintain than nVTL technology

Pro – Supports backup of NetVault NDMP data

Pro – Supports inline data deduplication

Pro – Does not rely on 3rd party transfer technology like CIFS or NFS

Con – Does not currently support DR VTL Container Replication

Dell NetVault Backup nVTL

Pro - Support DR VTL Container Replication

Pro – Supports backup of NetVault NDMP data

Pro – Supports inline data deduplication

Con – More difficult to Setup, Configure, and Maintain than DR VTL
         Container technology

Con – Relies on 3rd party transfer technology like CIFS or NFS

Con – Requires the use of space reclamation scripts
         (later described in this document)

Technical setup and configuration DR VTL Container -- best practices

This section highlights key configuration and setup best practices to add the DR Series appliance for the use with native VTL container instance(s).

General setup and configuration DR VTL Container -- best practices

For additional details on the following prerequisites, refer to the manufacturer's documentation.

- Ensure that cabling is configured correctly.
- Configure interfaces, protocol, and addressing.
    - Configure the networking infrastructure to support jumbo frames (MTU=9000).
- Make sure that you have a preconfigured system to run as the NetVault Backup Server
- Make sure that you have a DR Series appliance preconfigured for use with the following attributes established:
    - Proper network connectivity with IP address or DNS name of DR Series appliance.
    - DR Series appliance(s) configured with the appropriate DR VTL container.
    - All authentication requirements fulfilled such as domain name, user name, and password for users set up on the DR Series appliance.

DR Series appliance setup and configuration -- best practices

- Create NetVault Backup Server users who have full read/write access to the container. This is a requirement for NetVault Backup to be able to manage the configuration items and respective objects created within the applicable container during backup, provide access during recovery, and perform deletion upon retirement.

DR VTL Container setup and configuration -- best practices

Due to various factors such as data-set size, data-set iteration or count, retention period, and change rate, it can be difficult to determine the best VTL size and configuration for any deduplication situation. One of the best practices is to size the VTL to no more than 10x the physical available disk space or to assess how much data the customer has to back up and the required retention periods for each set of data. Ensure that neither of these guidelines is exceeded when you create the virtual media for the VTL, and set the drive count to equal the number of desired simultaneous jobs or data streams without exceeding the maximum guidelines set forth by the vendor.

Example: Starting with a storage appliance with 2TB of physical disk space. Based on the 10x usage recommendation, you can create a DR VTL Container of 20TB of total storage. But given that the data backed up per week is 2TB and data retention is 4 weeks, the total amount of data stored at any given time would only be 8TB. Thus, reducing the DR VTL Container to 10TB would be a more efficient use of space.

After the overall size of the VTL is determined, the number of virtual drives to create and the granularity of the VTL is the next consideration. Most storage-appliance operating environments can effectively handle a set number of streams. Any read or write operation to and from a VTL virtual drive would denote a stream. Usually, the number of virtual drives to create in the VTL should reflect what is required to support simultaneous streams, or concurrent jobs. Creating an excessive number of drives does not yield any benefits and could lead to performance degradation. It is also important not to exceed the number of streams supported by the appliance vendor's operating environment when creating VTLs and virtual drives.

Media size is the final consideration. Unlike physical media, virtual media can be created to any size within the allowed range set by the appliance. So proper media size selection is important to ensure smooth operation of the VTL. Creating a small number of large media will extend the retention of expired data and prevent proper recycling within a media pool. Creating a large number of small media puts a strain on the NetVault Backup Media Manager process and can cause contention between resources. Dell recommends that the media size be made to accommodate for the media- group retention policy so that when the retention period is expired for that group, all items on the media expire as well, thus allowing for the reuse of the applicable virtual media.

Using and managing a DR VTL Container on a DR Series appliance

General guidelines and best practices for using a DR VTL Container on a DR Series appliance:

- Only create enough media to cope with one full cycle of backups and the relevant retention policies.

- Set the "Automatically label BLANK media" parameter to off (clear the check box) to prevent erroneous use of blank media and to ensure efficient use of available media within a tape pool. A tightly managed tape pool will ease the space-reclamation process.

- To simplify the management of tape pools, pre-label media and assign a NetVault Backup media group label. Tapes will be reused properly within a tape pool and space reclamation can be performed in an orderly fashion.

In our sample DR VTL Container, we can now look at grouping the data that is to be backed up to work with media groups as target sets. For example, if we have 2TB of data to back up, the backup is processed on a weekly Full Backup basis, and the retention is 4 weeks, we need 8TB of media. With media at 100GB each, 80 pieces of media can be added to the target media group. The main reason for using media groups is so we can force the DR Series appliance to reuse media before using blank media.

NetVault Backup's media selection algorithm is:

- Target media in a drive
- Target media in a slot
- Target blank media
- Target media marked for re-use

As you can see, blank media would be used before media marked for reuse. If we do not reuse media, the DR Series appliance will never be able to recover the space. By reusing media, NetVault Backup overwrites the previous contents after the header has been updated and reuses available space that otherwise would not be reclaimable by the clean cycle of the DR Series appliance. Keeping spare media that is not grouped blank will keep the usage of the DR Series appliance unit as low as possible.

Because the Automatically label BLANK media option is disabled, the backup may run out of media before it completes, especially if the data set is growing. This is the trade off when using a DR Series appliance; media management becomes necessary to ensure best use of the unit.
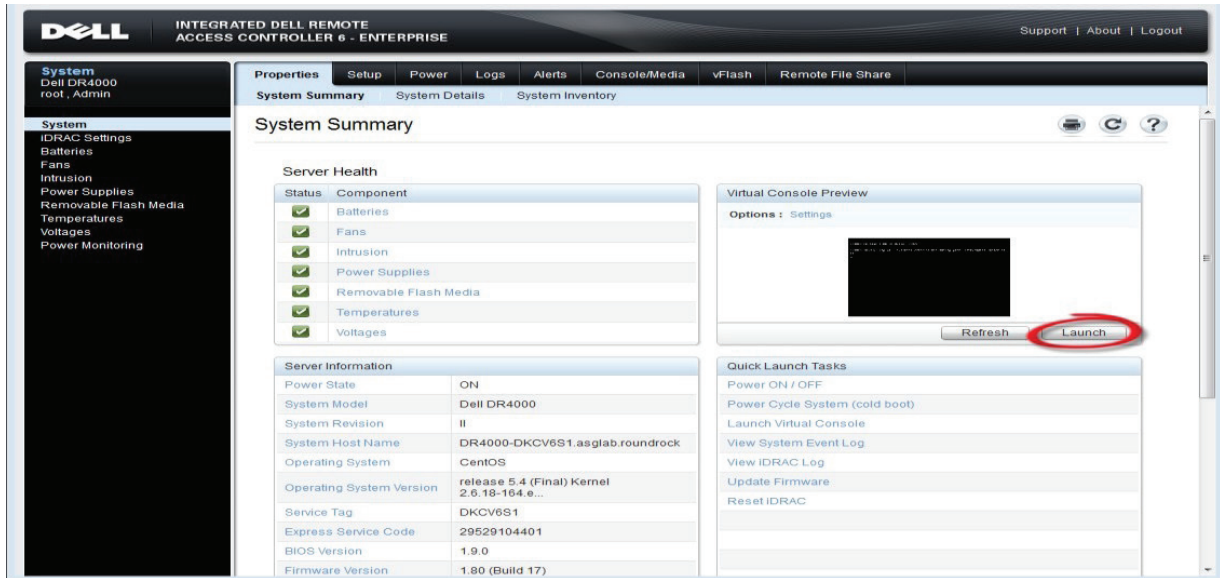
To alert administrators that a job has run out of media, you can use NetVault Backup's global notification to send an email to the system operator indicating that there is No Suitable Media to complete the job. The media request can then be placed on hold in the Device Management window. Blank media can be added to the relevant target media group, and the media request taken off hold. While this is not ideal, it does allow the job to finish.

You could also set up an automated media utilization report (job ID 13), and have it sent to the system operator on a reoccurring basis to track the media usage. This will allow the system operator to add media ahead of time to help prevent the preceding scenario.
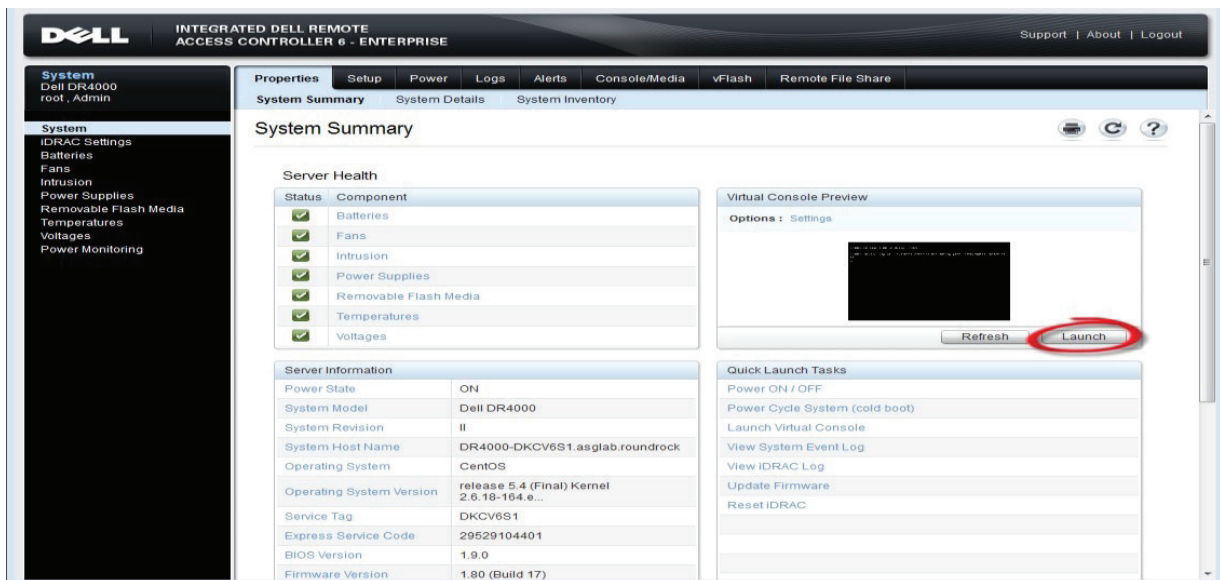
Installing and configuring the DR Series appliance

1. Rack and cable the DR Series appliance, and power it on.

2. Log on iDRAC using the default address 192.168.0.1, user name root, and password calvin.

3. Launch the virtual console.

4. After the virtual console is open, log on the system as user administrator with the password St0r@ge! (the "0" in the password is the numeral zero).

```
Ocarina release 1 (EAR-1.00.00) Build: 32850
Kernel 2.6.18-164.el5 on an x86_64

localhost login: administrator
Password:          St0r@ge!
```

5. Set the user-defined networking preferences.

```
Would you like to use DHCP (yes/no) ?

Please enter an IP address:

Please enter a subnet mask:

Please enter a default gateway address:

Please enter a DNS Suffix (example: abc.com):

Please enter primary DNS server IP address:

Would you like to define a secondary DNS server (yes/no) ?

Please enter secondary DNS server IP address:
```
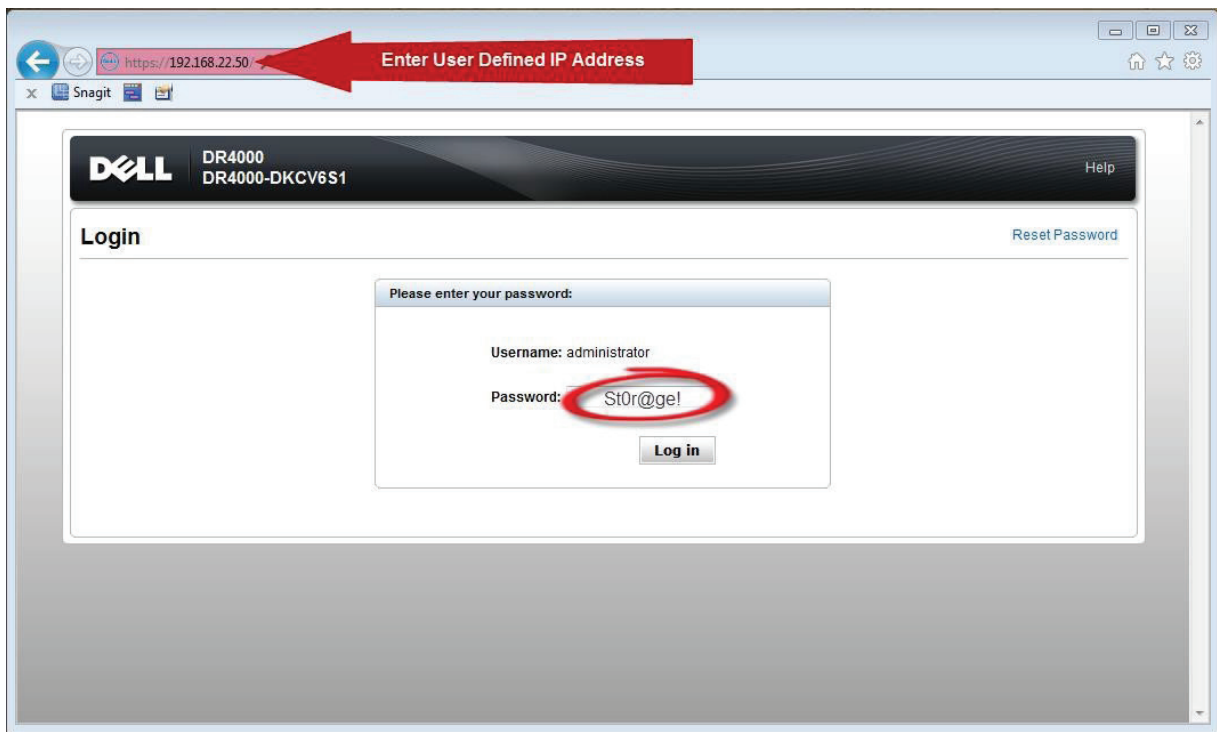
6. View the summary of preferences and confirm that it is correct.

```
==================================================================
                  Set Static IP Address

         IP Address              : 10.10.86.108

         Network Mask            : 255.255.255.128

         Default Gateway         : 10.10.86.126

         DNS Suffix              : idmdemo.local

         Primary DNS Server      : 10.10.86.101

         Secondary DNS Server    : 143.166.216.237

         Host Name               : DR4000-5

     Are the above settings correct (yes/no) ? _
```

7. Using the IP address that you just provided, log on the DR Series appliance administrator console as the user administrator with the password St0r@ge! (the "0" in the password is the numeral zero).

8. Join the DR Series appliance to Active Directory.

Note: If you do not want to add the DR Series appliance to Active Directory, refer to your user's guide for guest login instructions.

a. In the tree in the left pane, click Active Directory.

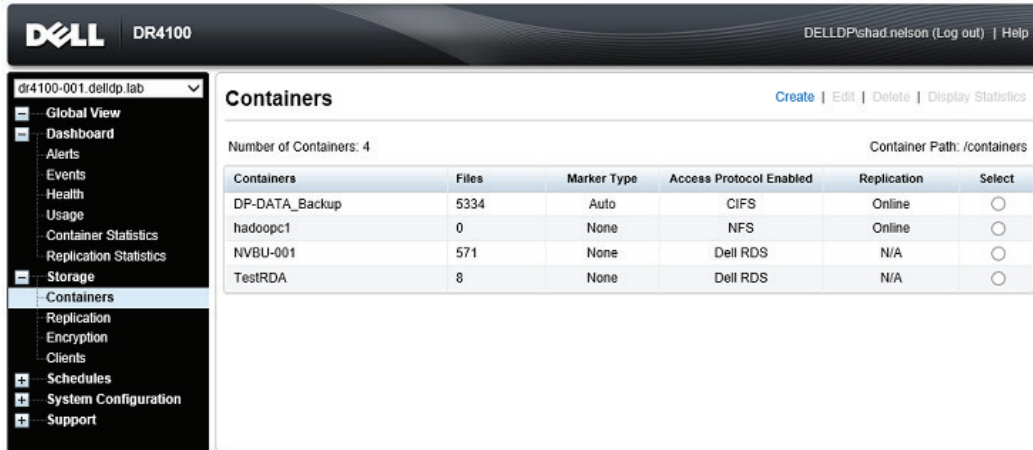b. Enter your Active Directory credentials.

Configuring the DR VTL Container

1. Create and mount the container.

   a. In the left pane, click Containers, and then click Create at the top of the page.

   b. Enter a Container Name, select the Virtual Tape Library check box.

b. Enter a Container Name, select the Virtual Tape Library check box. Click Next.

c. Select the Is OEM checkbox, define Tape Size, define NDMP, enter your NetVault Backup servers IP address in the Access Control field, define Marker type as Unix Dump. Click Next.

d. Click Create a New Container.

e. Select on the DR VTL Container that was just created. In the upper right corner click on Edit.

Edit Container: NVBU-VTL

f. In the edit screen define the number of Virtual Tapes you would like your VTL container to have. Click on Next.

Edit Container: NDMP-VTL-Container

f. Click on Modify this Container.

Technical setup and configuration nVTL -- best practices

This section highlights key configuration and setup best practices to add the DR Series appliance for the use with NetVault Backup nVTL instance(s).

General setup and configuration -- best practices

For additional details on the following prerequisites, refer to the manufacturer's documentation.

- Ensure that cabling is configured correctly.

- Configure interfaces, protocol, and addressing.

- Configure the networking infrastructure to support jumbo frames (MTU=9000).

- Make sure that you have a preconfigured system to run as the NetVault Backup Server and respective nVTLs.

- Make sure that you have a DR Series appliance preconfigured for use with the following attributes established:

  - Proper network connectivity with IP address or DNS name of DR Series appliance.

  - DR Series appliance(s) configured with the appropriate containers needed to host the NetVault Backup nVTL instance.

  - For each container defined, a network share exported via CIFS or NFS of appropriate permission and size.

  - All authentication requirements fulfilled such as domain name, user name, and password for users set up on the DR Series appliance to provide full access to the predefined containers and network share(s) for use as backup repositories. In the case of the NetVault Backup nVTL solution, this should include full access to the NetVault Backup Server and to all NetVault Backup SmartClients intended for use.

DR Series appliance setup and configuration -- best practices

- Create and configure each NetVault Backup nVTL instance to run within the domain of a single DR Series appliance storage container. This enables easier management of storage consumption.

- Create NetVault Backup Server users who have full read/write access to the container. This is a requirement for NetVault Backup to be able to manage the configuration items and respective objects created within the applicable container during backup, provide access during recovery, and perform deletion upon retirement.

NetVault Backup nVTL setup and configuration -- best practices

Due to various factors such as data-set size, data-set iteration or count, retention period, and change rate, it can be difficult to determine the best VTL size and configuration for any deduplication situation. One of the best practices is to size the VTL to no more than 10x the physical available disk space or to assess how much data the customer has to back up and the required retention periods for each set of data. Ensure that neither of these guidelines is exceeded when you create the virtual media for the VTL, and set the drive count to equal the number of desired simultaneous jobs or data streams without exceeding the maximum guidelines set forth by the vendor.

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Using and managing a NetVault Backup nVTL on a DR Series appliance

General guidelines and best practices for using a NetVault Backup VTL on a DR Series appliance:

- Only create enough media to cope with one full cycle of backups and the relevant retention policies.

- Set the Automatically label BLANK media parameter to off (clear the check box) to prevent erroneous use of blank media and to ensure efficient use of available media within a tape pool. A tightly managed tape pool will ease the space-reclamation process.

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3. Launch the virtual console.

4. After the virtual console is open, log on the system as user administrator with the password St0r@ge! (the "0" in the password is the numeral zero).

```
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Kernel 2.6.18-164.el5 on an x86_64

localhost login: administrator
Password:        St0r@ge!
_
```

5. Set the user-defined networking preferences.

```
Would you like to use DHCP (yes/no) ?

Please enter an IP address:

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Please enter a default gateway address:

Please enter a DNS Suffix (example: abc.com):

Please enter primary DNS server IP address:

Would you like to define a secondary DNS server (yes/no) ?

Please enter secondary DNS server IP address:
```
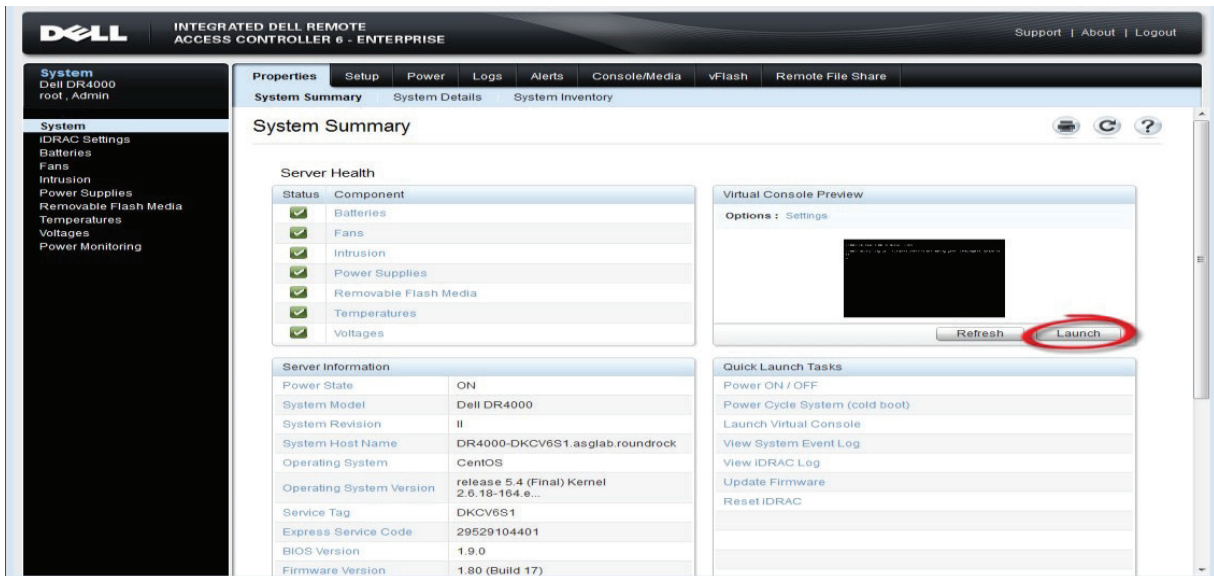
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             IP Address              : 10.10.86.108

             Network Mask            : 255.255.255.128

             Default Gateway         : 10.10.86.126

             DNS Suffix              : idmdemo.local

             Primary DNS Server      : 10.10.86.101

             Secondary DNS Server : 143.166.216.237

             Host Name               : DR4000-5

      Are the above settings correct (yes/no) ? _
```

7. Using the IP address that you just provided, log on the DR Series appliance administrator console as the user administrator with the password St0r@ge! (the "0" in the password is the numeral zero).

8. Join the DR Series appliance to Active Directory.

Note: If you do not want to add the DR Series appliance to Active Directory, refer to your user's guide for guest login instructions.

a. In the tree in the left pane, click Active Directory.

b. Enter your Active Directory credentials.

Configuring NetVault Backup nVTL

1. Create and mount the container.

   a. In the left pane, click Containers, and then click Create at the top of the page.

b. Enter a Container Name, select the Enable CIFS check box, select the preferred client access, and add clients as necessary.

For improved security, Dell recommends adding IP addresses for the following (not all environments will have all components):

- Backup console (NetVault Backup Server)
- NetVault Backup SmartClient (Media Server)
- Hyper-V® hosts (on-host proxy for Hyper-V® environments)
- Off-host proxies (for Hyper-V® environments)
- Backup proxies (for VMware vSphere® environments)

c. Click Create a New Container.

d. Confirm that the container was added.

e. Select the container that you just added, click Edit, and note the container path, which you will use later to target the DR Series appliance.

f. Click Cancel to exit.

Note: This section assumes that the you have already created the required CIFS, NFS, or CIFS/NFS container and assigned the applicable permissions described earlier in Installing and configuring the DR Series appliance. This section also assumes that the user is using Active Directory integration with the DR Series appliance.

2. Using a web browser, use the NetVault Backup WebUI to connect to the NetVault Backup Server.

3. In the Navigation pane, click Change Settings, and then click Server Settings.
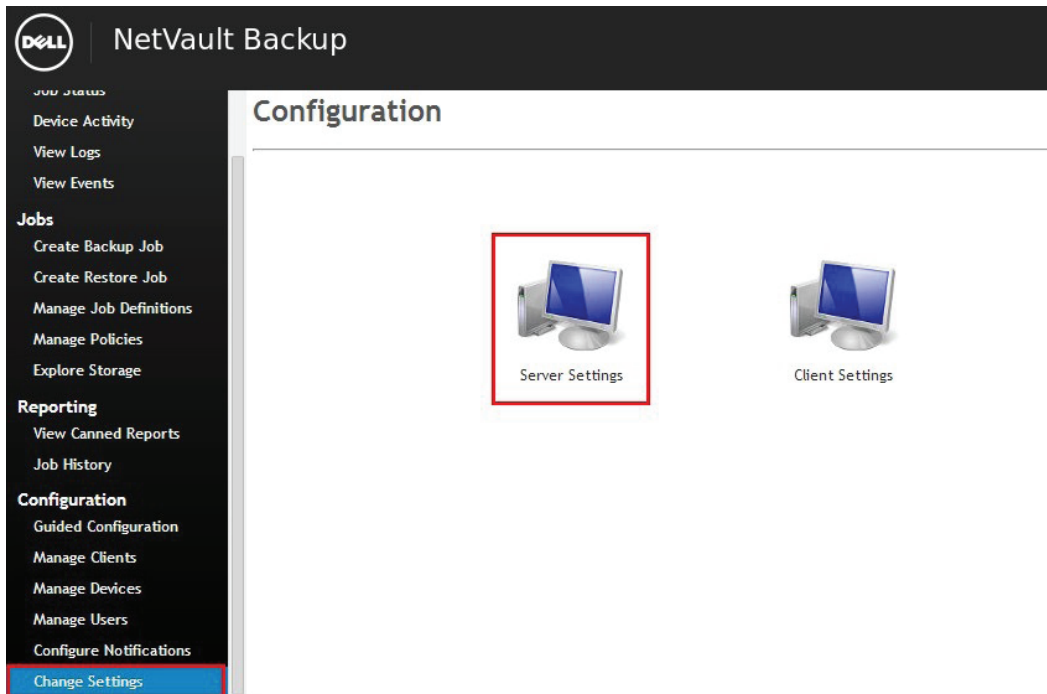
4. Click Plugin Options.
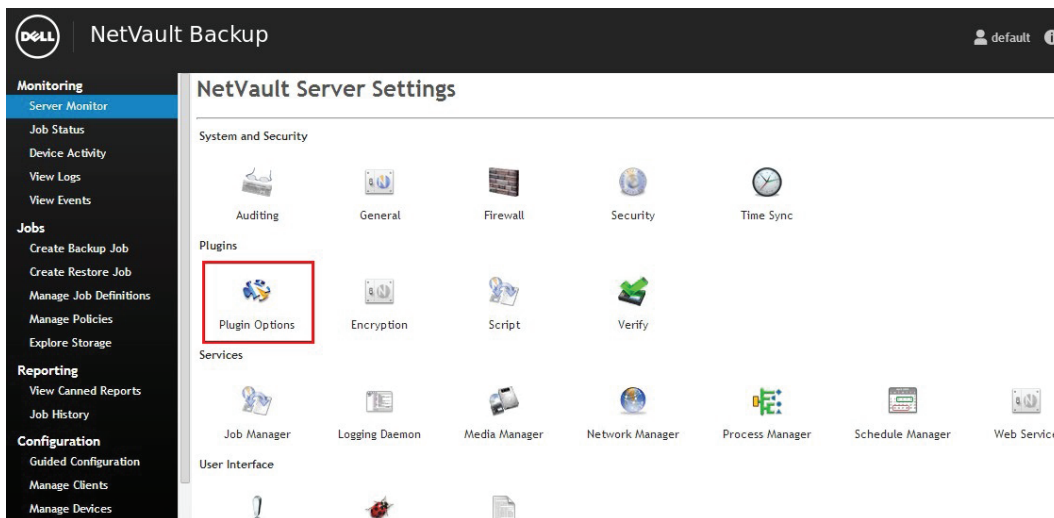
5. In the Plugin Options dialog, make sure that the Allow disk libraries to have entry/exit ports option is selected, clear the Check available disk space before creating disk libraries option, and click Apply to save the changes.
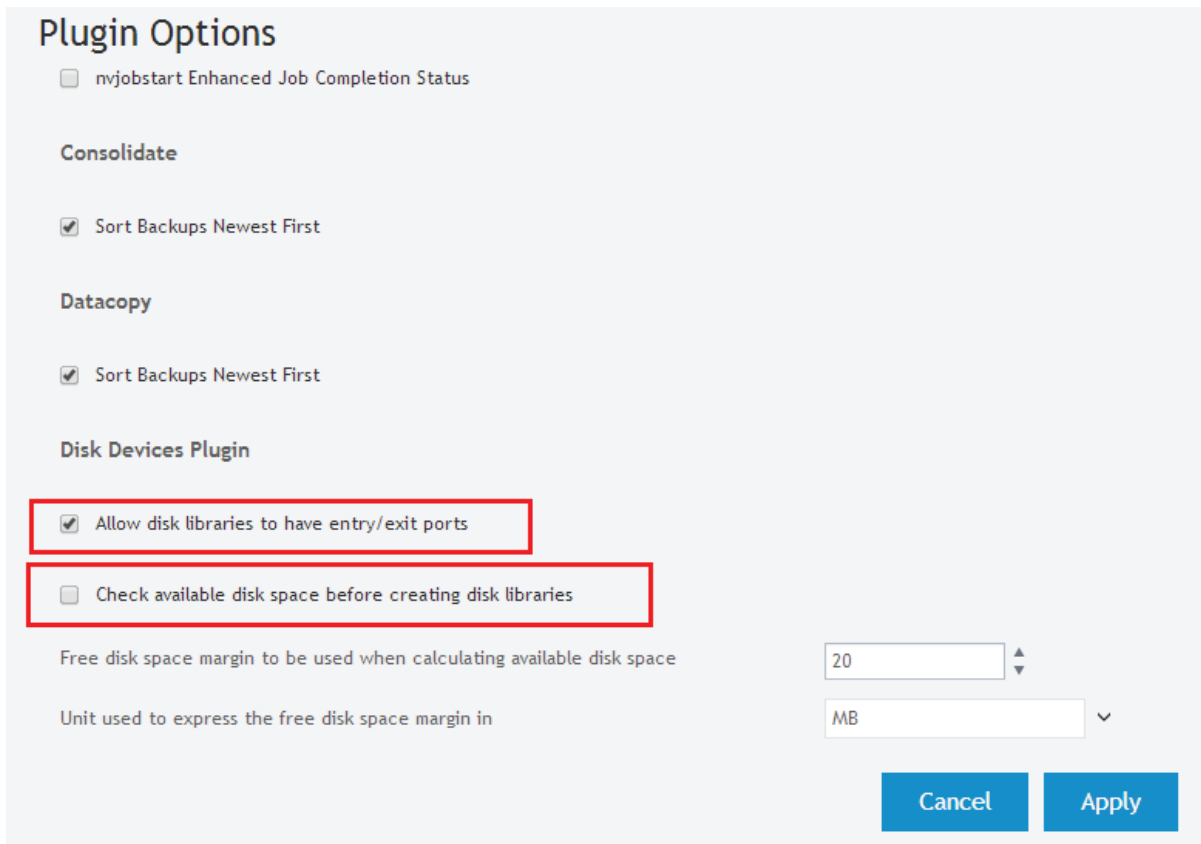
6. Click Media Manager.
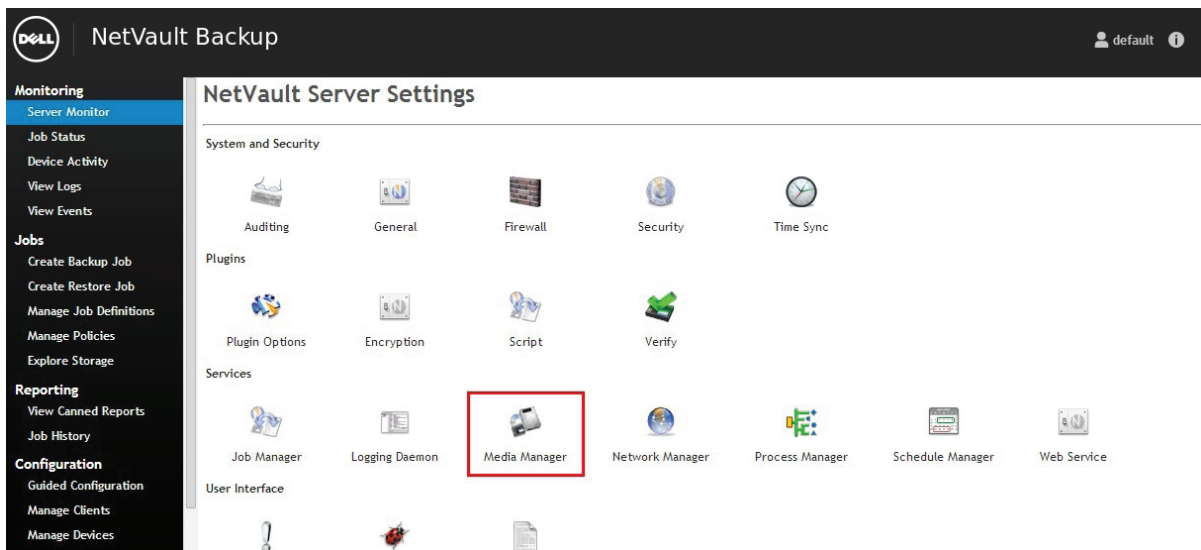
7. Clear the Use barcodes as labels check box, and click Apply.

Media Manager

General Settings

Minimum life for imported backups (days)   7

☐ Use barcodes as labels

Continuation Restore Request Priority Boost   5

Continuation Backup Request Priority Boost   5

Label Request Priority (1 = Highest, 0 = Background)   10

Blank Request Priority (1 = Highest, 0 = Background)   10

Bulk Label Callback Timeout (secs)   120

Bulk Blank Callback Timeout (secs)   120

Minimum interval between reporting online capacity (mins)   10

☑ Mark expired Read Only media as writable

[Cancel] [Apply]

NetVault Backup uses SmartClients to give you the freedom to attach storage wherever you like. By using SmartClients, both virtual and physical tape libraries can be easily distributed through the backup environment so that backup data does not have to pass over the network and through the NetVault Backup Server to be written to a tape-based device. You will need a license for each SmartClient that will have locally attached physical or virtual tape devices.

On the machine that the VTL will be attached to, you must make the NetVault Backup Process Manager Service (nvpmgr) use the login user name and password that you intend use to connect to the DR Series appliance. As this is the process that will control the connection mechanism, it needs to run as the same user that has access to the CIFS share on the DR Series appliance. This is configured via the services panel on the machine connecting to the VTL.

8. On the machine connecting to the VTL, type services.msc in either the Run command prompt or the Windows® search box.

9. In the Services window, locate NetVault Process Manager, and edit its Properties.
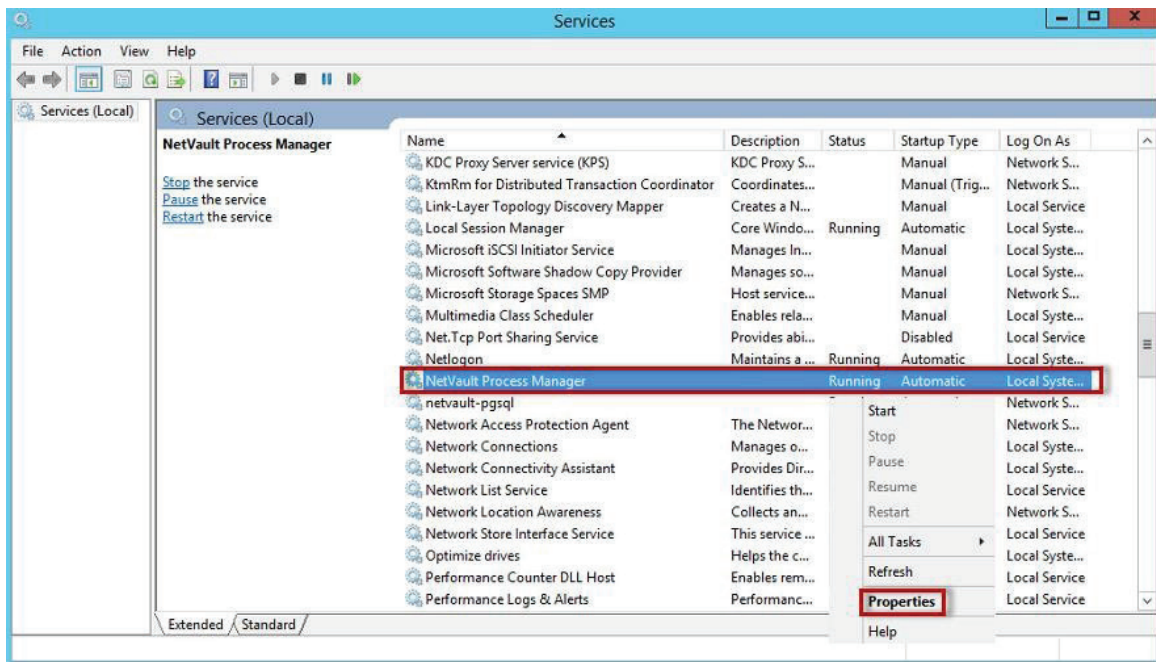
10. Click the Log On tab, select This account, enter a user name and password that has Administrative rights to the shared folder on the DR Series appliance (it should also have Administrative rights on the local machine and be able to run a process), and click OK to save your changes.
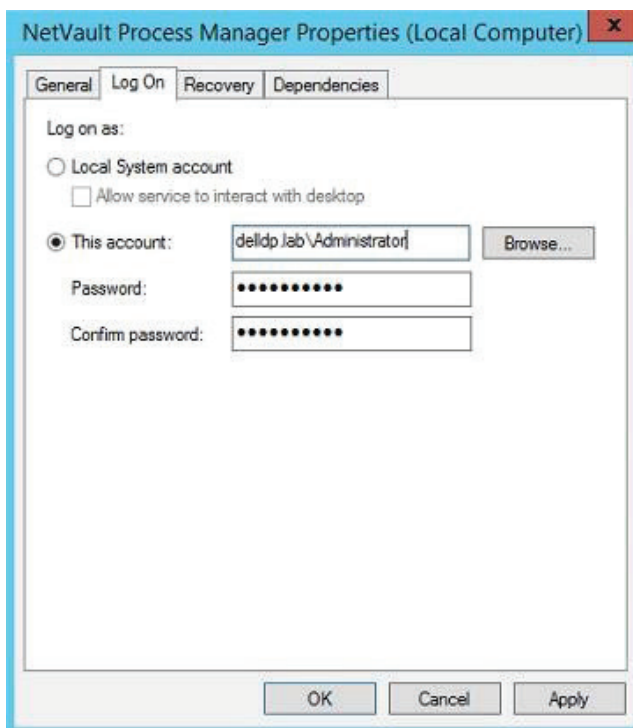
11. Stop and restart the NetVault Process Manager; after it has restarted, close the services console.

12. In the NetVault Backup WebUI, click Guided Configuration, and then click Add Storage Devices.
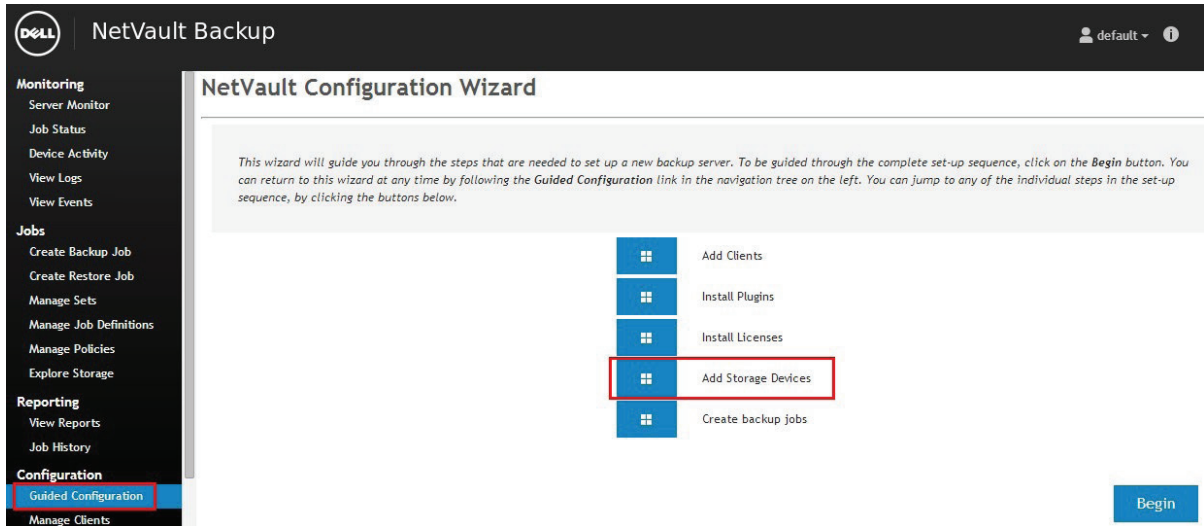
13. Select Virtual tape library/media changer, and click Next.

14. Select the machine that you want to attach the VTL to, and click Next.

> Remember that this can be any machine in the environment that is either the NetVault Backup Server or a SmartClient. To facilitate scaling, consider attaching multiple VTLs to multiple machines other than the NetVault Backup Server. This allows the clients to send data via any of the configured SmartClients to the attached VTL instead of moving data through the backup management server.
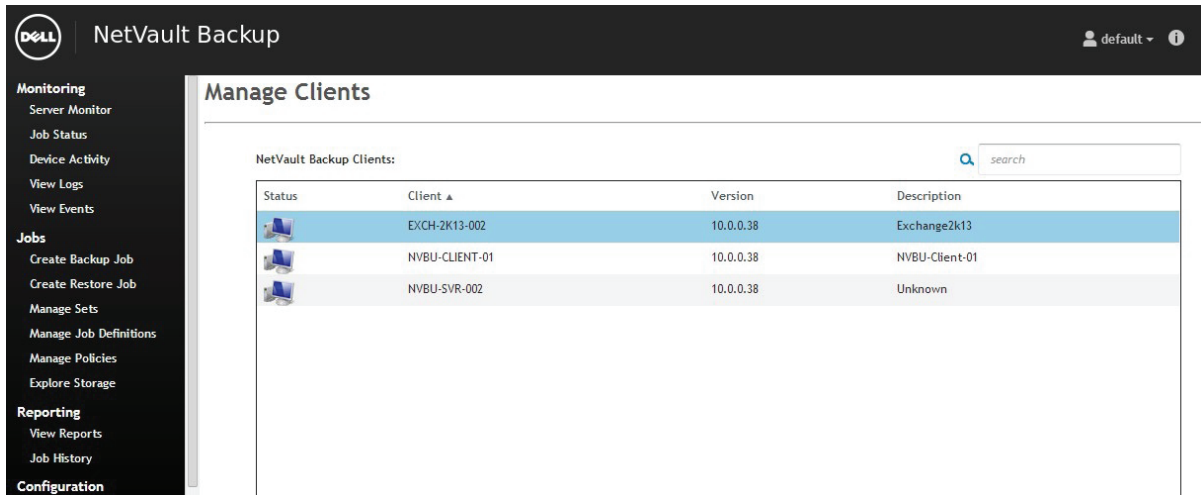
15. Enter the path for the container to hold the VTL that was created in step 9.e of the previous section, Installing and configuring the DR Series appliance.

> The path should look similar to the following:
> \\<IPaddressOrFQDN>\<containerName>\folder. The folder must be created and resident in the CIFS on the DR Series appliance; otherwise, NetVault Backup will be unable to create the VTL.

16. Complete the remaining fields with the device name, barcode prefix, and sizing requirements for the VTL, and then click Next.
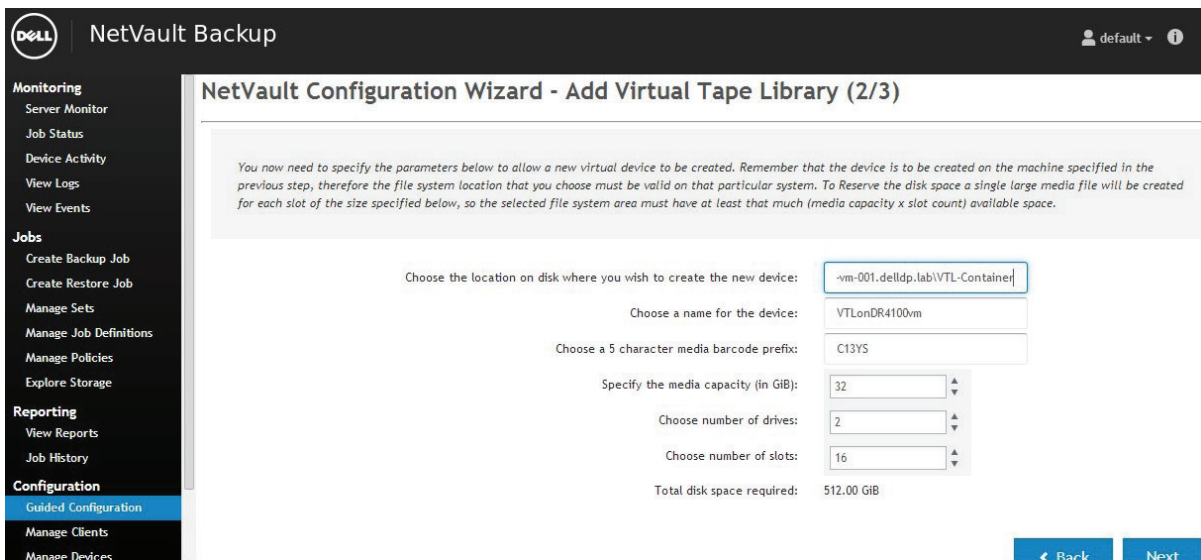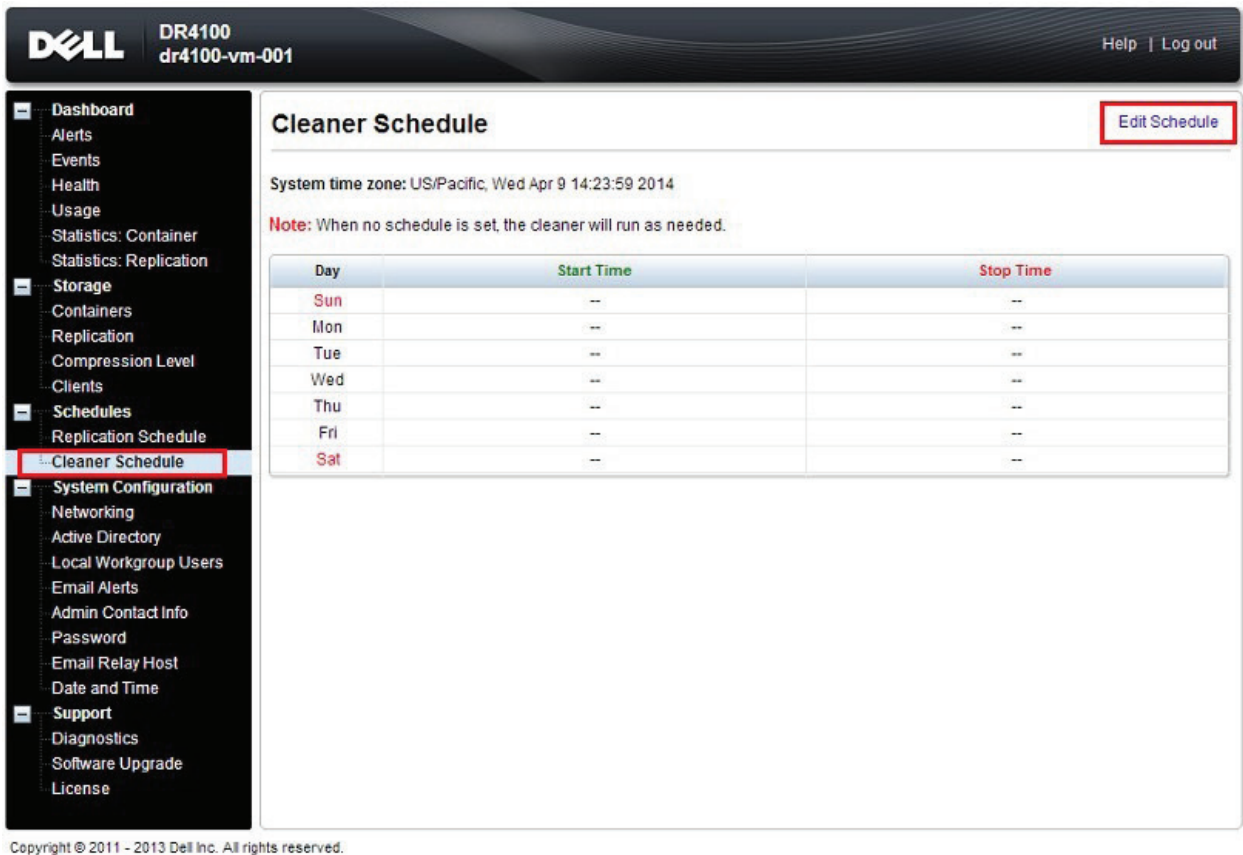
After the VTL is created, a confirmation screen appears and the VTL is ready for use as a backup destination.
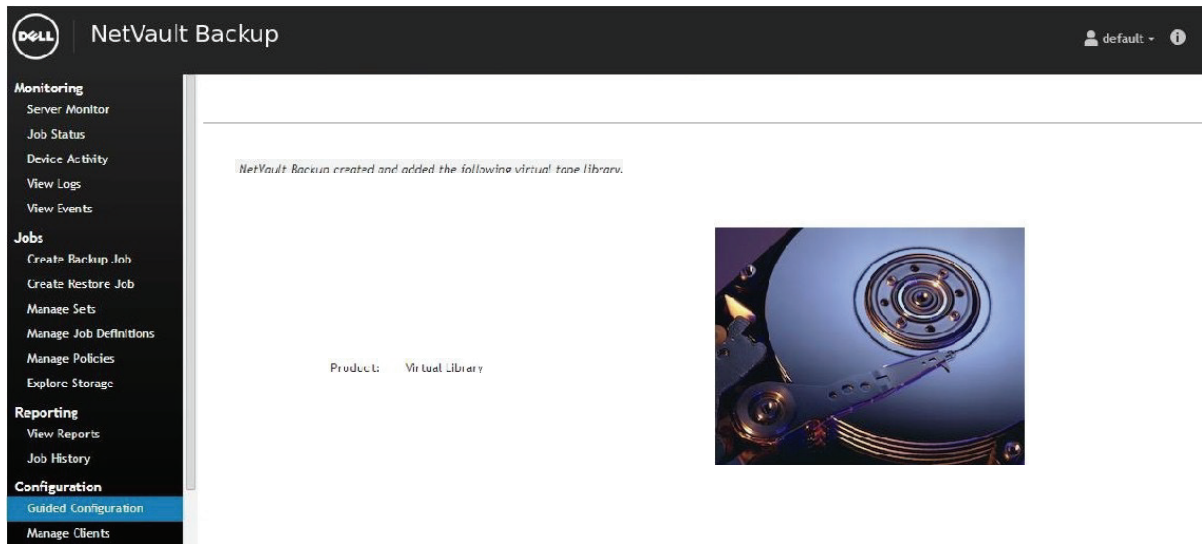
Setting up the cleaner for the DR Series appliance

After all the backup jobs are set up the DR Series appliance, the cleaner must be scheduled. The cleaner should run at least 6 hours per week when backups are not taking place, generally after a backup job has completed.

Performing scheduled disk-space reclamation operations is recommended as a method for recovering disk space from system containers in which files were deleted as a result of deduplication.

Monitoring deduplication, compression, and performance

After backup jobs have run, the DR Series appliance will track Capacity, Storage Savings, and Throughput on the dashboard. This information is valuable in understanding the benefits the DR Series appliance.

Note: Deduplication ratios increase over time; it is not uncommon to see a 2-4x reduction (25-50% total savings) on the initial backup. As additional full backup jobs complete, the ratios will increase. As mentioned earlier, backup jobs with 12-week retention will usually average a 15x ratio.
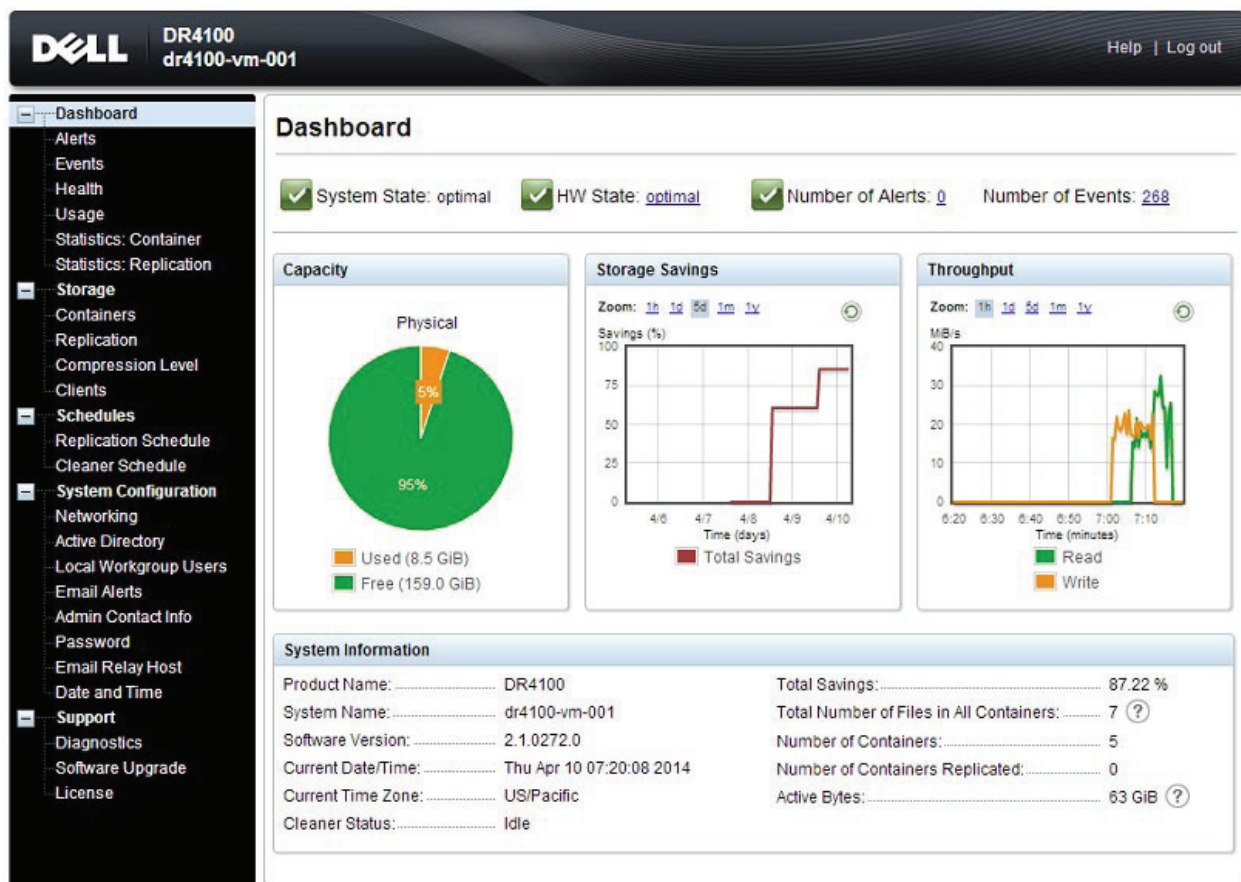
Understanding NetVault Backup VTL and cleaning cycles

The DR Series appliances are capable of running a cleaning cycle on a regular basis to recover data space that is no longer required by the deduplication process. Using a DR Series appliance as a NetVault Backup VTL repository will require periodic maintenance to achieve the best performance.

Space reclamation from the virtual media of a NetVault Backup VTL hosted on the DR Series appliance has some specific requirements. Even though NetVault Backup can locate and blank media that is marked for reuse, the DR Series appliance will not know that NetVault Backup has marked the media for reuse and will not reclaim the space on the next clean cycle. This is because the NetVault Backup only updates its database information on the media and does not scrub through and remove the old data.

To ensure that the clean cycle on the DR Series appliance can reclaim space, the marked-for-reuse media must be identified, blanked using the nvmakemedia utility, removed, and then added again as a new file. Because the new file no longer has any content, the clean cycle can reclaim the space. A script can be run to build a list of the media, blank it, and use the nvmakemedia utility to re-create the files. For a sample script that can be modified for either type of installation, see Error! Reference source not found..

Optional NetVault Backup configurations for optimum performance

To ensure optimum performance settings within NetVault Backup, complete the following steps.

1. In the Navigation pane of the NetVault Backup WebUI, click Manage Devices.
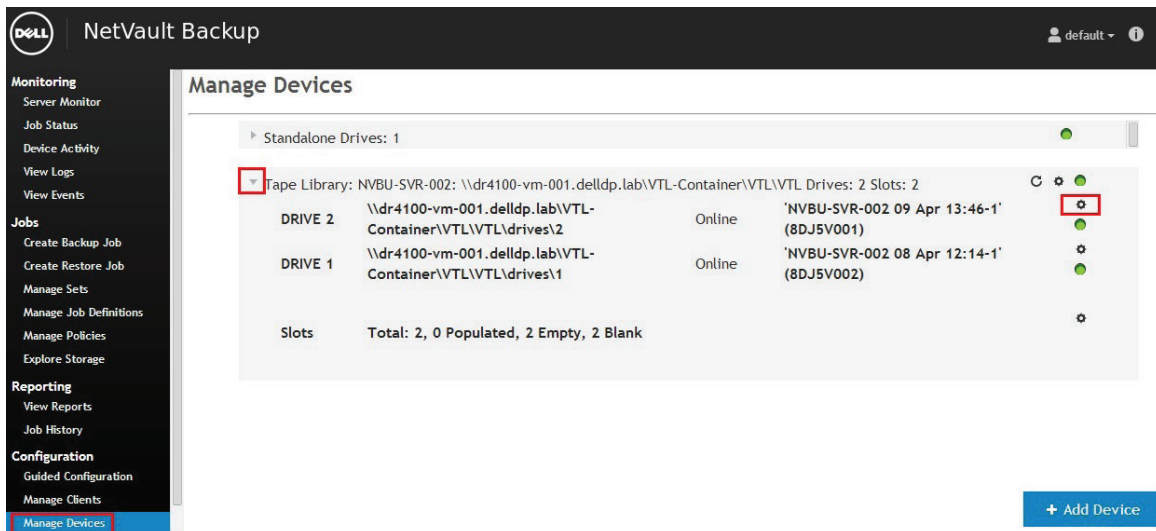
2. Click the arrow to the left of the device that you want to configure, and then click the icon to the right of the drive to change its settings.

3. At the bottom of the page, click Performance.
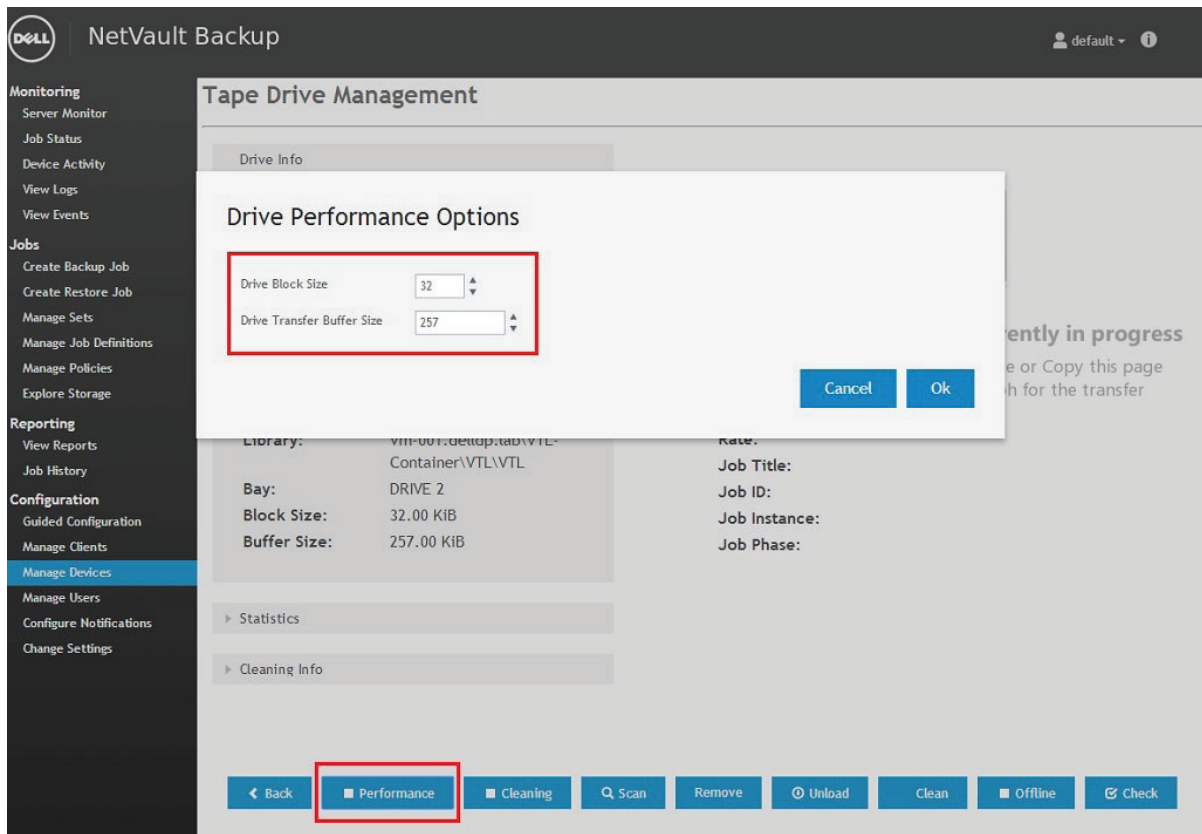
4. In the Drive Performance Options dialog, increase the Drive Block Size (the default is 32KB) and the Drive Transfer Buffer Size setting (the defaults is 257KB) to settings that your operating system can support, and click Ok.

> Important: The amount of memory assigned to transfer buffers (KB) is s often referred to as the shared memory setting. The shared memory is allocated in 32KB blocks with one additional byte. The optimum number is dependent on the drive model, but the minimum value to use is at least 4x the block size setting for the drive. Ensure that there is sufficient RAM (on Windows®) or Kernel Memory (on UNIX®). Use more shared memory if available and as required.

5. Click Back to return to the Manage Devices screen, and repeat the preceding steps for each drive as required.

Disk-space reclamation

The blanking of used media in NetVault Backup VTLs created on the DR Series appliance share will not reclaim physical disk space. To reclaim this space, you must use the nvmakemedia utility to create a clean, identical ".media" file, in name and size, to replace the old media file. Before this is done, all drives must be unloaded and the Open Door command must be issued via the NetVault Backup WebUI in the Manage Devices > Tape Library Management page. After all the applicable media have been cleaned, the Close Door option can issued. Verify that all media appear correctly on the Manage Devices page. The recovered space will be reflected after the next clean cycle completes. For more information on disk-space reclamation with a DR Series appliance, refer to the Dell NetVault Backup Command Line Interface Reference Guide at

http://documents.software.dell.com/NetVault%20Backup/10.0/Command%20Line%20Interface%20Re ference%20Guide/

Disk-space availability

Due to the nature of deduplication and various factors surrounding compression yield and disk-space utilization, you must avoid running out of physical disk space. Failing to do so will result in erroneous behaviour with the backup software.

Additional resources

- Dell online support resources:

  - Dell technical support site:
    http://support.dell.com/

  - Dell TechCenter is an online IT community where IT professionals connect with Dell customers and employees to share knowledge, best practices, and other information about Dell products and installations:
    http://delltechcenter.com/

- Dell DR Series appliance and NetVault Backup resources:

  - Dell DR Series appliance manuals/guides:
    http://support.dell.com/support/edocs/SYSTEMS/DR4000/en/index.htm

  - Dell DR Series appliance and NetVault Backup Application Notes:
    http://en.community.dell.com/techcenter/extras/m/white_papers/20332216.aspx

  - Dell NetVault Backup guides:
    https://support.software.dell.com/netvault-backup/release-notes-guides

  - Disk Reclamation Script:
    https://support.software.dell.com/netvault-backup/kb/80390

  - Dell NetVault Backup Command Line Interface Reference Guide:
    http://documents.software.dell.com/NetVault%20Backup/10.0/Command%20Line%20Interface%20Reference%20Guide/

Changing the NetVault Backup VTL storage location without data loss

This section details the process for changing the storage device path for a CIFS-mounted NetVault Backup VTL configured on a DR Series appliance. This process uses replication to synchronize the data prior to remapping the storage path.

1. On the first DR Series appliance with the existing NetVault Backup VTL container, use the replication utility to replicate the container to the secondary DR Series appliance.

   > For information on setting up replication, refer to your DR Series System Administrator's Guide. Dell recommends that you use the same name as the Source Container for the Target Container on the second appliance. This allows for a simple change of the name in the device path in the NetVault Backup "diskdevice" configuration file.

2. After replication is configured, click the Select button to the right of the replication task, and then click Start to begin the replication process immediately.

3. Click Display Statistics so you can see how long the replication will take to complete.

4. Select Time To Sync, and then click Apply Filter.
   This adds the amount of time remaining till replication is complete into the bar.

Statistics: Replication

Replication Filter

Container Filter:	○ All	● Name		○ Peer System	
		VTL-Container ▲		10.1.1.219 ▲	

Headers:
☑ Peer Status   ☑ Replication Status   ☑ Time To Sync   ☑ Progress %
☐ Replication Throughput   ☑ Network Throughput   ☑ Network Savings   ☐ Last Time In Sync
☐ Peer Container   ☐ Peer System

Reset   **Apply Filter**

Container	Network Throughput	Network Savings	Peer Status	Replication Status	Time to sync
VTL-Container	3933 KiB/s	70.87	Online	INSYNC	0:0:0:0

5. After replication is complete, delete the container-replication task.

6. Be sure that the container on the second appliance has CIFS permissions enabled (use Windows® Explorer to verify that the new container can be opened by the UNC path).

7. On the NetVault Backup Server, edit the diskdevices.cfg file located in C:\Program Files (x86)\Dell\NetVault Backup\config to change the library and drive paths to the second DR Series appliance container.

> See the following before and after screenshots.

Before:

```
20
21    [DiskDevices:FreeSpaceMargin]
22    Tab Name= Disk Devices Plugin
23    Tab Name Id= 102100049
24    Label= Free disk space margin to be used when calculating!navailable disk space
25    Label Id= 102100051
26    Type= Range
27    Range= 0,1000000
28    Width= 8
29    Multiplier= 1
30    Value= 20
31
32    [DiskDevices:FreeSpaceMarginUnit]
33    Tab Name= Disk Devices Plugin
34    Tab Name Id= 102100052
35    Label= Unit used to express the free disk space margin in
36    Label Id= 102100053
37    Type= Combo
38    Range= MB, GB
39    Width= 8
40    Value= MB
41
42    [libraries]
43    location=\\dr4100-vm-001.delldp.lab\VTL-Container\VTL\VTL
44
45
46    [drives]
47    location=\\dr4100-vm-001.delldp.lab\VTL-Container\VTL\VTL\drives\1
48    location=\\dr4100-vm-001.delldp.lab\VTL-Container\VTL\VTL\drives\2
49    location=\\10.1.1.220\LargeContainer\LargeContainer-vtl
50
51
```

After:

```
20
21    [DiskDevices:FreeSpaceMargin]
22    Tab Name= Disk Devices Plugin
23    Tab Name Id= 102100049
24    Label= Free disk space margin to be used when calculating!navailable disk space
25    Label Id= 102100051
26    Type= Range
27    Range= 0,1000000
28    Width= 8
29    Multiplier= 1
30    Value= 20
31
32    [DiskDevices:FreeSpaceMarginUnit]
33    Tab Name= Disk Devices Plugin
34    Tab Name Id= 102100052
35    Label= Unit used to express the free disk space margin in
36    Label Id= 102100053
37    Type= Combo
38    Range= MB, GB
39    Width= 8
40    Value= MB
41
42    [libraries]
43    location=\\dr4100-vm-002.delldp.lab\VTL-Container\VTL\VTL
44
45
46    [drives]
47    location=\\dr4100-vm-002.delldp.lab\VTL-Container\VTL\VTL\drives\1
48    location=\\dr4100-vm-002.delldp.lab\VTL-Container\VTL\VTL\drives\2
49    location=\\10.1.1.220\LargeContainer\LargeContainer-vtl
50
51
```

8. In the Navigation pane of the NetVault Backup WebUI, click Manage Devices, and then click Add Device.

9. Select Re-add previously generated virtual device, and select the machine with the VTL connected to it that you want to move the storage for.
The wizard will now scan through and find the modified VTL path to the new storage appliance.

10. Add the new VTL on the new DR Series appliance.

11. In the NetVault Backup WebUI, click Manage Devices, and remove the old VTL on the old DR Series appliance.

12. Verify that the savesets for a client are still correctly configured.

    a. Click Create Restore Job, and select a saveset.

    b. Click Media List to verify the location is online and accessible. You can even browse through a saveset to verify further that the data is still there.

Sample scripts for management of replication failover and reclamation of disk space

NetVault Backup nVTL physical space reclamation script

Windows® platform:

```
@echo off
:: =================================================================
:: The following parameters must be configured for the script example provided as follows:
:: vtlpath = This should be the UNC path of the root share used to host the nVTL instance.
:: media_prefix = This should be the prefix of the virtual media designated for processing
:: library_name = This should be the name of the library as it has been added to NetVault Backup
:: media_size = This is the size of the media to be recreated and must be compatibly for input to the
:: nvmakemedia command
:: =================================================================
set media_prefix=YN1D set library_name=VTL1 set media_size=1000000m
set vtlpath=\\10.8.224.22\vtl1\VTL1
set nvutil=%ProgramFiles(x86)%\Dell\NetVault Backup\util set logfile=%tmp%\logdd430-1clean.log
@echo. >> "%logfile%"
@echo. >> "%logfile%"
@echo ============================================================= >>"%logfile%"
@echo Start DD Media Start>> "%logfile%" date/t >> "%logfile%"
time/t >> "%logfile%"
@echo ============================================================= >>"%logfile%" echo Stage 1 - Completed
:: ===============================================
:: Look for all medias in the library with status "expired"
:: and only print lines with media infos
:: ==============================================="
"%nvutil%\nvreport.exe" -class "media" -include "%%reuse = yes" -include "%%librarystatus = Online"
-exclude "%%librarystatus = Unknown" -format "%%Label %%MediaGroup" -sort "%%Label" | find "%media_
prefix%" > "%tmp%\~media.txt
@echo =========================================
@echo Processing the following List if Media
@echo =========================================
type %tmp%\~media.txt
choice /T 5 /C jn /N /D j >NUL:
FOR /F "tokens=1,2 delims= " %%i IN (%tmp%\~media.txt) DO ( SET ML=%%i
SET GL=%%j
call :_clean %%i
)
echo Stage 2 - Completed goto :eof
::
::
:: *****************************************************
:: * *
:: * Main Routine for every found media *
:: * Eventually adapt Timeout *
:: * according to machine type *
*****************************************************
:_clean
@echo =========================================
@echo Clean Media with Label %ML%
@echo Clean Media with Label %ML% >> "%logfile%"
@echo =========================================
:: =========================================
```

```
:: Open and close I/O Port, to remove a
:: remaining media, wait 5 seconds
:: ============================================
@echo "%nvutil%\nvopeneeport.exe" -libraryname "%library_name%" "%nvutil%\nvopeneeport.exe" -libraryname
"%library_name%"
choice /T 5 /C jn /N /D j >NUL: "%nvutil%\nvcloseeeport.exe" -libraryname "%library_name%" choice /T 5
/C jn /N /D j >NUL:
echo Stage 3 - Completed
::
::
:: ============================================
:: Export expired media and open
:: I/O Port. Library cannot load media
:: into a drive anymore
:: ============================================== echo "%nvutil%\nvexportmedia.exe" -barcode %ML%
"%nvutil%\nvexportmedia.exe" -barcode %ML%
choice /T 5 /C jn /N /D j >NUL: "%nvutil%\nvopeneeport.exe" -libraryname "%library_name%" echo Stage 4
- Completed
::
::
:: ============================================
:: Media is now unreachable for the library
:: in I/O Slot, now we cheat NetVault Backup!
::
:: For security reasons: Rename old media first
:: After that, create new media with old name
:: Deletion in next step
:: ============================================
if exist "%vtlpath%\media\%ML%.disabled" erase "%vtlpath%\media\%ML%.disabled" ren "%vtlpath%\
media\%ML%" %ML%.disabled
"%nvutil%\nvmakemedia.exe" %media_size% mediafiles "%vtlpath%\media\%ML%" "%nvutil%\nvcloseeeport.exe"
-libraryname "%library_name%"
choice /T 5 /C jn /N /D j >NUL:
echo "%nvutil%\nvblankmedia.exe" -barcode %ML% -wait
"%nvutil%\nvblankmedia.exe" -barcode %ML% -wait
if %GL% == None ("%nvutil%\nvlabelmedia.exe" -barcode %ML% -newlabel %ML%) else ("%nvutil%\nvlabelmedia.
exe" - barcode %ML% -newlabel %ML% -newgroup %GL%)
if exist "%vtlpath%\media\%ML%.disabled" erase "%vtlpath%\media\%1.disabled"
choice /T 5 /C jn /N /D j >NUL:
echo Stage 5 - Completed goto :eof
echo Stage 6 - Completed
```

Linux® /UNIX® platform:

```bash
#!/bin/bash
# =================================================================
# The following parameters must be configured for the script example provided as follows:
# vtlpath = This should be the UNC path of the root share used to host the nVTL instance.
# media_prefix = This should be the prefix of the virtual media designated for processing
# library_name = This should be the name of the library as it has been added to NetVault Backup
# media_size = This is the size of the media to be recreated and must be compatibly for input to the
# nvmakemedia command
# =================================================================
nv_home=`head -n -1 /etc/.nv6_home`
nvutil=$nv_home/util media_size=50m media_prefix="YN1D"


vtlpath=/vtl2/VTL2 library_name=VTL2 logfile=/tmp/logddclean.log rm -rf /tmp/mediatmp
# ================================================
# Grab media info on tapes in the VTL
# ================================================
$nvutil/nvreport -class media -exclude "%Librarystatus = Unknown" -include "%reuse = yes" -format
"%label
%mediagroup %barcode" -sort "%label" | grep $media_prefix > /tmp/mediatmp echo "========================
============"
echo "Processing the following media list:"
echo "===================================" cat /tmp/mediatmp|awk '{print $1}'
read expired_media < /tmp/mediatmp
# ================================================
# Create an array and throw data into it
# Run commands against the data in the array
# ================================================
#Open file for reading exec 10</tmp/mediatmp let count=0
while read LINE <&10; do
barcodes[$count]=$(echo $LINE | awk '{print $3}') tempstring=${barcodes[$count]}
barcodes[$count]=${tempstring%" "} labels[$count]=$(echo $LINE | awk '{print $1}')
tempstring=${labels[$count]} labels[$count]=${tempstring%" "} groups[$count]=$(echo $LINE | awk '{print
$2}') tempstring=${groups[$count]} groups[$count]=${tempstring%" "} media_avail[$count]=$LINE
((count++)) done array_num_avail=0
while [ $count -gt 0 ]; do
echo "================================================"
echo "Cleaning Media with label ${labels[$array_num_avail]}" echo "Cleaning Media from group
${groups[$array_num_avail]}"
echo "Cleaning Media with barcode ${barcodes[$array_num_avail]}" echo "=================================
================="
sleep 1
echo $nvutil/nvexportmedia -barcode ${barcodes[$array_num_avail]}
$nvutil/nvexportmedia -barcode ${barcodes[$array_num_avail]}
echo "================================================" sleep 1
echo "Opening the Entry/Exit Port in $library_name"
$nvutil/nvopeneeport -libraryname $library_name
echo "================================================"
echo "Renaming media with barcode ${barcodes[$array_num_avail]} to ${barcodes[$array_num_avail]}.
disabled" echo mv $vtlpath/media/${barcodes[$array_num_avail]} $vtlpath/media/${barcodes[$array_num_
avail]}.disabled mv $vtlpath/media/${barcodes[$array_num_avail]} $vtlpath/media/${barcodes[$array_num_
avail]}.disabled
echo "================================================"
echo "Creating a new piece of media, this may take some time based on size of media"
echo $nvutil/nvmakemedia $media_size mediafiles $vtlpath/media/${labels[$array_num_avail]}
```

```
$nvutil/nvmakemedia $media_size mediafiles $vtlpath/media/${labels[$array_num_avail]}
wait
echo "closing the Entry/Exit Port in $library_name" echo $nvutil/nvcloseeeport -libraryname $library_
name
$nvutil/nvcloseeeport -libraryname $library_name wait
echo "Blanking media ${barcodes[$array_num_avail]} - ${labels[$array_num_avail]}"
echo $nvutil/nvblankmedia -barcode ${barcodes[$array_num_avail]}
$nvutil/nvblankmedia -barcode ${barcodes[$array_num_avail]}
# Wait a second before issuing label request to overcome VTL latency sleep 2
# Decide whether to relabel with tape name AND group or just name if [ ${groups[$array_num_avail]} =
"None" ]
then
echo $nvutil/nvlabelmedia -barcode ${barcodes[$array_num_avail]} -newlabelname "${labels[$array_num_
avail]}"
$nvutil/nvlabelmedia -barcode ${barcodes[$array_num_avail]} -newlabelname ${labels[$array_num_avail]}
else
echo $nvutil/nvlabelmedia -barcode ${barcodes[$array_num_avail]} -newlabelname ${labels[$array_num_
avail]} - newgroupname ${groups[$array_num_avail]}
$nvutil/nvlabelmedia -barcode ${barcodes[$array_num_avail]} -newlabelname "${labels[$array_num_avail]}"
- newgroupname "${groups[$array_num_avail]}"
echo "Removing the old media with barcode $vtlpath/media/${barcodes[$array_num_avail]}.disabled"
rm $vtlpath/media/${labels[$array_num_avail]}.disabled fi
let array_num_avail=array_num_avail+1
let count=count-1 done
# close file
exec 10>&-
# Clean up temporary rubbish left behind rm -rf /tmp/mediatmp
```

NetVault Backup nVTL ghost media scrub script

Windows® platform

```
@echo off
:: ==================================================================
:: Setup Vars
:: ==================================================================
set nvutil=%ProgramFiles(x86)%\Dell\NetVault Backup\util setlocal enabledelayedexpansion
set logfile=%tmp%\logdd430-1purge.log set "media_prefix="
:: ==================================================================
:: Capture Vars
:: ==================================================================
:input
CLS
set /p media_prefix=Enter the Media Label Prefix to Purge (enter . to exit): IF "%media_prefix%"=="." GOTO
:eof
IF "%media_prefix%"=="" GOTO input

:: ==================================================================
:: Begin Works
:: ==================================================================
echo Stage 1 - Begin: Setup Logging
@echo. > "%logfile%"
@echo. >> "%logfile%"
@echo ======================================================== >>"%logfile%"
@echo Start DD Media Start>> "%logfile%" date/t >> "%logfile%"
time/t >> "%logfile%"
@echo ======================================================== >>"%logfile%" echo Stage 1 - Completed:
Log file created
::
::
:: ===============================================
:: Look for all medias in the library with label prefix
:: and delete media from the Database
:: ==============================================="
echo Stage 2 - Begin: Capture Media to be processed for deletion
"%nvutil%\nvreport.exe" -class "media" -exclude "%%LIBRARYSTATUS = Online" -format "%%Label" -sort
"%%Label" |
find "%media_prefix%" > "%tmp%\~mediapurge.txt"
echo The following media will be processed for deletion:
type "%tmp%\~mediapurge.txt"
echo Stage 2 - Completed: Capture Media Media List has been defined
echo Stage 3 - Begin: Process all Media for Deletion from the Media Database
FOR /F "tokens=1 delims= " %%i IN (%tmp%\~mediapurge.txt) DO ( SET ML=%%i
call :_expire %%i
)
echo Stage 3 - Completed: Processed all Media for Deletion from the Media Database echo Stage 4 - Begin:
Clean up from works completed\
if exist "%tmp%\~mediapurge_old.txt" erase "%tmp%\~mediapurge_old.txt"
ren %tmp%\~mediapurge.txt ~mediapurge_old.txt
echo Stage 4 - Completed: Clean up complete goto :eof
:_expire
@echo ===============================================
@echo Delete Media with Label %ML%
@echo Delete Media with Label %ML% >> "%logfile%"
@echo =============================================== echo "%nvutil%\nvremovemedia.exe" -medialabel "%ML%"
"%nvutil%\nvremovemedia.exe" -medialabel "%ML%"
goto :eof
```

Linux®/UNIX® platform

```bash
#!/bin/bash
# !*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*
# Specify the beginning of the barcodes of the
# media you wish to work with here.
# !*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*
# !*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*
# Gather Input from user
# !*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*
echo -n "Enter Media Label Prefix to Purge: " read name
while read media_prefix
do

if [[ -z "${media_prefix}" ]]
then
echo "That was empty, try again." else
if [ $media_prefix = "." ]
then
echo "Exiting..." exit 0
fi
echo "Executing now...with $media_prefix" break
fi done
# End of the loop
nv_home=`head -n -1 /etc/.nv6_home` nvutil=$nv_home/util logfile=/tmp/logddclean.log
rm -rf /tmp/mediapurge
# ================================================
# Grab media info on tapes in the VTL
# ================================================
$nvutil/nvreport -class media -exclude "%Librarystatus = Online" -format "%label" -sort "%label" | grep
$media_prefix > /tmp/mediapurge
echo "===================================" echo "Processing the following media list:" echo "=========
===========================" cat /tmp/mediapurge|awk '{print $1}'
read expired_media < /tmp/mediapurge
# ================================================
# Create an array and throw data into it
# Run commands against the data in the array
# ================================================
#Open file for reading exec 10</tmp/mediapurge let count=0
while read LINE <&10; do
media[$count]=$(echo $LINE | awk '{print $1}') tempstring=${barcodes[$count]}
barcodes[$count]=${tempstring%" "} media_avail[$count]=$LINE
((count++))
done array_num_avail=0
while [ $count -gt 0 ]; do
echo "===================================================" echo "Purging Media with label ${media[$array_
num_avail]}" echo "===================================================" sleep 1
echo $nvutil/nvremovemedia -medialabel ${media[$array_num_avail]}
echo "==============================================="
$nvutil/nvremovemedia -medialabel ${media[$array_num_avail]}
wait sleep 2
let array_num_avail=array_num_avail+1 let count=count-1
done
# close file

exec 10>&-
# Clean up temporary rubbish left behind rm -rf /tmp/mediapurge
```

NetVault Backup nVTL bulk mark for reuse script

Windows® platform

```
@echo off
:: ===================================================================
:: Setup Vars
:: ===================================================================
set nvutil=%ProgramFiles(x86)%\Dell\NetVault Backup\util setlocal enabledelayedexpansion
set logfile=%tmp%\logdd430-1purge.log
set "media_prefix="
:: ===================================================================
:: Capture Vars
:: ===================================================================
:input
CLS
set /p media_prefix=Enter the Media Label Prefix to Purge (enter . to exit): IF "%media_prefix%"=="." GOTO
:eof
IF "%media_prefix%"=="" GOTO input
:: ===================================================================
:: Begin Works
:: ===================================================================
echo Stage 1 - Begin: Setup Logging
@echo. >> "%logfile%"
@echo. >> "%logfile%"
@echo ============================================================ >>"%logfile%"
@echo Start DD Media Start>> "%logfile%" date/t >> "%logfile%"
time/t >> "%logfile%"
@echo ============================================================ >>"%logfile%" echo Stage 1 - Completed:
Log file created
::
::
:: ==============================================
:: Look for all medias in the library with barcode prefix
:: and mark media for reuse - print lines with media infos
:: =============================================="
echo Stage 2 - Begin: Capture Media to be processed for reuse
"%nvutil%\nvreport.exe" -class "media" -format "%%Label %%MediaGroup" -sort "%%Label" | find "%media_
prefix%" > "%tmp%\~mediareuse.txt"
echo The following media will be processed for reuse:
type %tmp%\~mediareuse.txt
echo Stage 2 - Completed: Capture Media Media List has been defined
FOR /F "tokens=1,2 delims= " %%i IN (%tmp%\~mediareuse.txt) DO ( SET ML=%%i
SET GL=%%j
call :_expire %%i
)
echo Stage 3 - Completed goto :eof

:_expire
@echo =============================================
@echo Expire Media with Label %ML%
@echo Expire Media with Label %ML% >> "%logfile%"
@echo ============================================= "%nvutil%\nvreusemedia.exe" -barcode "%ML%"
goto :eof
```

Linux®/UNIX® platform

```bash
#!/bin/bash
# !*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*
# Specify the beginning of the barcodes of the
# media you wish to work with here.
# !*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*
# !*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*
# Gather Input from user
# !*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*!*
echo -n "Enter Media Label Prefix to Expire: " read name
while read media_prefix do
if [[ -z "${media_prefix}" ]]
then
echo "That was empty, try again." else
if [ $media_prefix = "." ]
then
echo "Exiting..." exit 0
fi
echo "Executing now...with $media_prefix" break
fi done
# End of the loop
nv_home=`head -n -1 /etc/.nv6_home` nvutil=$nv_home/util logfile=/tmp/logddclean.log
rm -rf /tmp/mediareuse
# =================================================
# Grab media info on tapes in the VTL
# =================================================
$nvutil/nvreport -class media -format "%label %mediagroup %barcode" -sort "%label" | grep $media_prefix >
/tmp/mediareuse
echo "====================================" echo "Processing the following media list:" echo "=========
===============================" cat /tmp/mediareuse|awk '{print $1}'
read expired_media < /tmp/mediareuse
# =================================================
# Create an array and throw data into it
# Run commands against the data in the array
# =================================================
#Open file for reading exec 10</tmp/mediareuse let count=0
while read LINE <&10; do

barcodes[$count]=$(echo $LINE | awk '{print $1}') tempstring=${barcodes[$count]}
barcodes[$count]=${tempstring%" "} media_avail[$count]=$LINE
((count++)) done array_num_avail=0

while [ $count -gt 0 ]; do
echo "================================================="
echo "Expring Media with label ${barcodes[$array_num_avail]}" echo "====================================
============="
sleep 1
echo $nvutil/nvreusemedia -barcode ${barcodes[$array_num_avail]}
echo "================================================="
$nvutil/nvreusemedia -barcode ${barcodes[$array_num_avail]}
wait sleep 2
let array_num_avail=array_num_avail+1 let count=count-1
done
# close file exec 10>&-
# Clean up temporary rubbish left behind rm -rf /tmp/mediareuse
```