

Best Practices Guide

Quest[®] NetVault[®]: Backup with the NetApp[®] AltaVault[™] System as an nVTL Backup Target

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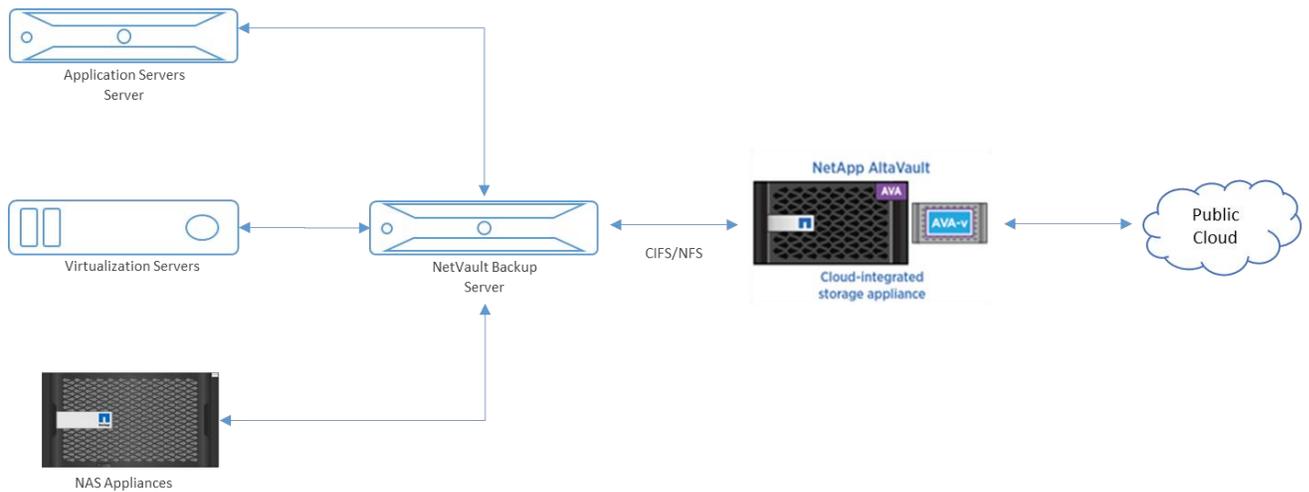
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1 Executive summary

As enterprises around the world experience transformation or evolution data management footprint size and complexity continues to be at the forefront of the operational challenges they face every day. Data volume growth rates, the “always-on” availability requirements and the cost of ownership to operate today’s businesses continues to drive the need for innovation. Purpose built secondary backup technologies have evolved to include private, public and hybrid cloud solutions which continue to increase in popularity driven by both adoption of cloud use as well as by the cost benefits realized when using the cloud architectural and subscription based models.

The potential simplification of archival practices that leverage the cloud versus traditional methods is driving change and fueling adoption and demand. At the forefront of this trend are hybrid cloud solutions that allow both on premise and cloud data management without sacrificing cost, flexibility or recovery.

NetVault: Backup configured to use the NetApp AltaVault products offer customers the ability to store and archive data on premise without impacting existing workflows with the added benefit of a secure and reliable cloud tier. Operations can continue to use local cache at local transfer rates while older data is compressed, deduplicated, encrypted and archived to the cloud autonomously and recalled based on demand.



This white paper provides information about how to set up the NetApp AltaVault system as a backup target for Quest NetVault Backup.

For additional information, see the NetVault: Backup and NetApp AltaVault documentation:

<https://support.quest.com/netvault-backup>

<http://mysupport.netapp.com/documentation/productlibrary/index.html?productID=62032>

NOTE: The NetApp AltaVault system and NetVault build versions and screenshots used for this paper may vary slightly, depending on the version of the NetApp AltaVault System and NetVault Software version used.

2 Installing and configuring NetVault: Backup for use with the NetApp AltaVault Cloud Appliance.

2.1 Prerequisites

2.1.1 NetVault software prerequisites

The instructions in this document apply to NetVault Backup version 9.2 and later. The screenshots used in this document may vary slightly, depending on the version NetVault Backup software version used.

The NetVault Backup and NetVault Backup Supported VTLs, Libraries, Tape and Optical Drives compatibility guides should be referenced to determine the latest version requirements for use.

<https://support.quest.com/netvault-backup>

2.1.2 NetApp AltaVault prerequisites

- Verify the NetApp AltaVault system is running the appropriate version of software as per the NetVault: Backup - Supported VTLs, Libraries, Tape and Optical Drives Compatibility Guide (<https://support.quest.com/netvault-backup/11.4/technical-documents>)
- Provision the NetApp AltaVault system for access
 - Configure Host, Management Interfaces and Data Interfaces (VIFs / VLANs Optional)
 - Verify that at least 1-2 data interfaces are configured for backup use
- Configure Cloud Storage Account(s)
- Configure NetWork Namespace for NetVault: Backup Access
 - SMB
 - Verify NetVault Services has full Read/Write Access to Share
 - NFS
 - Verify NetVault Services has full Read/Write Access to Export

2.1.3 Operating System Prerequisites

The NetVault Backup Server or Smart Clients which will Read/Write to the AltaVault namespace should be configured with the following settings:

- Windows (CIFS / SMB Performance and Tolerance) Recommended Registry Settings

```
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\lanmanworkstation\parameters]
"SESSTIMEOUT"=dword:00000e10
```

```
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\AFD\Parameters]
"DefaultSendWindow"=dword:00040000
"DefaultReceiveWindow"=dword:00040000
```

```
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters]
"GlobalMaxTcpWindowSize"=dword:00040000
"TcpWindowSize"=dword:00040000
"Tcp1323Opts"=dword:00000001
```

- Solaris

NFS networking parameters on Solaris operating systems should be configured to optimally send data to AltaVault through configured NFS mounts. In addition to tuning the rsize and wsize mount options appropriately, you should also tune nfs3_max_transfer_size and nfs3_bsize. nfs3_max_transfer_size and nfs3_bsize should be greater than or equal to the minimum of rsize and wsize. To set the values, edit the /etc/system file and change or add the following lines to the file:

```
nfs:nfs3_max_transfer_size= 1048576
nfs:nfs3_bsize= 1048576
```

Example:

```
root@nfsclient:~# echo "set nfs:nfs3_bsize=1048576" >> /etc/system
root@nfsclient:~# echo "set nfs:nfs3_max_transfer_size=1048576" >> /etc/system
root@nfsclient:~# reboot
```

A reboot of the system is required for the configuration changes to take effect.

- Linux

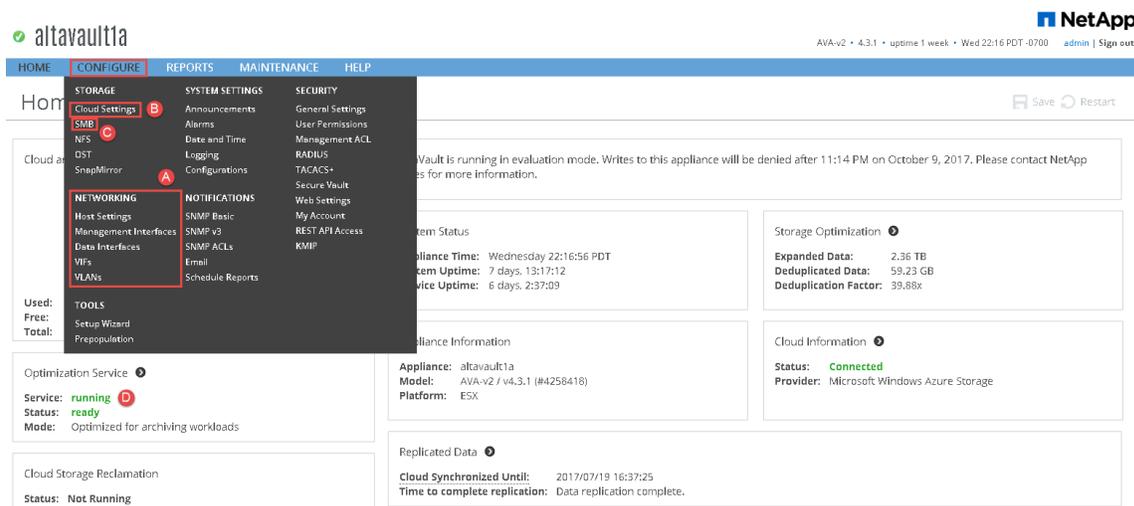
NFS network parameters on Linux vary depending on distribution but in general the rsize and wsize should be set to 1048600 and the timeo value to 1200.

Example of Linux Mount Options:

(hard,intr,nolock,nfsvers=3,tcp,timeo=1200,rsize=1048600,wsize=1048600,bg)

2.2 Configuring the NetApp AltaVault system

1. Verify that the following AltaVault Appliance subsystems have been properly configured for use.
 - A. Networking
 - B. Cloud Settings
 - C. SMB/NFS
 - D. Optimization Service Should be running and in a ready state



Refer to the NetApp AltaVault Administration Guide for details:

<http://mysupport.netapp.com/documentation/productlibrary/index.html?productID=62032>

3 Planning for the NetVault: Backup Native Virtual Tape Library (nVTL) Target(s)

3.1 Sizing Requirement and Media Grouping Guidelines

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 nVTL size and configuration for any given deduplication situation. One of the best practices is to size the nVTL to no more than 10x the physical available disk space or to assess how much data has to backup and the required retention periods for each set of data so as to not exceed either one of these two requirements. When creating the NetVault Virtual Tape Library (nVTL) the total drive count should be set to equal the number of simultaneous jobs or data streams desired.

For Example: Starting with a storage appliance with 2TB of physical disk space. Based on the 10x usage recommendation, one can create a VTL 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. Cutting the VTL down to 10TB would then be a more efficient use of space. Once 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. As a rule of thumb, 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 important to also never exceed the number of streams recommended by the appliance vendor's operating environment when creating nVTLs and respective virtual drives. Media size is the final consideration when creating an nVTL. 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 nVTL. 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 NVBU Media Manager process and can cause contention of resources. We recommend that the media size be made to accommodate for the media group retention policy such that when the retention period is expired for that group all items on the media should expire as well thus allowing for the reuse of the virtual media in question.

3.1.1 Sizing Requirements Calculation

Various factors such as total data footprint, change rate, backup frequency and data lifecycle policies will dictate how much physical space will be needed to accommodate the Virtual Tape Libraries within a AltaVault environment. In addition, if other container types are hosted these two must be factored into space requirement calculations. As a general rule the following can be used as a reference architecture to determine the basic capacity needed for a given virtual tape library container:

1. Determine Existing Data Set
2. Determine the change rate (Differential)
3. Determine the retention period
4. Calculate the data footprint during the retention period for existing data sets based on a 10-1 deduplication ratio
5. Calculate the data footprint during the retention period for change rate data sets based on a 10-1 deduplication ratio
6. Calculate the ratios within the retention period for each of the data sets
7. Determine the lowest ratio data set to be retired within the retention period and create media of size that closest matches this data footprint so that when a retention period is met the most amount of media is recycled to invoke data reclamation alignment and optimizing media consumption.

IMPORTANT: If other interfaces are being configured to host SMB/ NFS/OST/SnapMirror data ingest , these must also be factored into the planning and management of space.

The logical size of the VTL including media size and media count should be made such so as to accommodate the existing data footprint targeted for protection. The calculation for such should include the initial footprint, change rate and retention period. It should also take in account the size of both full and incremental data sets. Using the smallest iteration of the data sets to dictate the logical size of the VTL media affords users the ability to retire media in smaller increments which results in high levels of use and also provides the users the ability to conduct operations across smaller objects which results in higher levels of flexibility such as when a restore is needed during backup operations.

We can review a typical full weekly plus incremental daily example to demonstrate one method of conducting this calculation. In our example the total logical foot print for the customer environment is 20TB and with a 10% change within a weekly recovery point objective period for a complete weeks’ worth of protection we calculate that we will require 22TB of total logical media to retain the data footprint for the given environment for one week. In order to allow for disparities we also include a 10% increase to allow for flexibility in the deployment and use of the VTL which results in a 24.2TB total virtual media requirement for a single weekly retention period.

In the previous example at the end of the 5-week cycle the 1st week retires and frees up media to be reused or recycled which once processed will allow the AltaVault Appliance to reclaim the physical space associated with the virtual media. Since the smallest data set footprint resulting from the change rate is 2TB in each incremental iteration we create our media at 800GB increments and add as we grow. For this example the initial Virtual Tape Library would be created with 152 (121TB divided by 800GB) pieces of media at 800GB for each piece media.

20TB Total initial footprint with a 10% change rate

Week	Pre-Deduplication		
	Logical Size	Logical Full Metrics	10% Change Rate Logical Incremental Metrics
1	24.2TB	20TB	2TB
2	24.2TB	20TB	2TB
3	24.2TB	20TB	2TB
4	24.2TB	20TB	2TB
5	24.2TB	20TB	2TB
Total	121TB		

3.1.2 Media Retention and Grouping

Due to the nature of Virtual Tape Libraries media must be managed in order to insure that physical capacity is reclaimed in an orderly fashion to avoid running out of space and disrupting operations. Media must be grouped within the data management application, such as NetVault: Backup, in a way that full data sets are targeted to separate media as incremental data and they in turn are grouped by data sets that expire within the same period or that share the same recovery point objective. This ensures that media can be reused effectively so that when full all incremental data expire the logical space can be reconciled thus enabling the physical space to be reclaimed.

General guidelines and best practices for using a NetVault: Backup nVTL:

- 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 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.
- Pre-Labeling media and assigning a NetVault: Backup media Group Label will make the task of managing tape pools much easier. Tapes will be re-used properly within a tape pool and space reclamation can then be performed in an orderly fashion.

NetVault: Backup media selection algorithm is:

- Target media in a drive
- Target media in a slot
- Blank media
- Media marked for re-use.

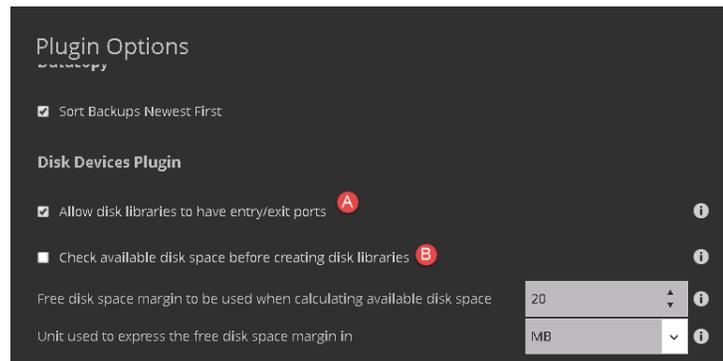
As you can see blank media would be used before media marked for re-use. If we do not re-use media, the AltaVault unit will never be able to recover the space. By re-using media NetVault: Backup overwrites the previous contents once the header has been updated and reuses available space which otherwise would not be reclaimable by the AltaVault reclamation cycle. Keeping spare media that is not grouped blank will keep the usage of the AltaVault 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 an AltaVault unit, media management become necessary to allow best use of the unit.

To alert administrators that a job has run out of media, NetVault: Backup Global Notification can be used to send an email to the sys-op detailing 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 will allow the job to complete. Setting up NetVault Backup a media utilization report to be sent to the sysop on a reoccurring basis to track the media usage is also recommended. This will allow the sys-op to pre-add media to help prevent the above scenario.

4 Creating the NetVault: Backup Native Virtual Tape Library (nVTL) Target(s)

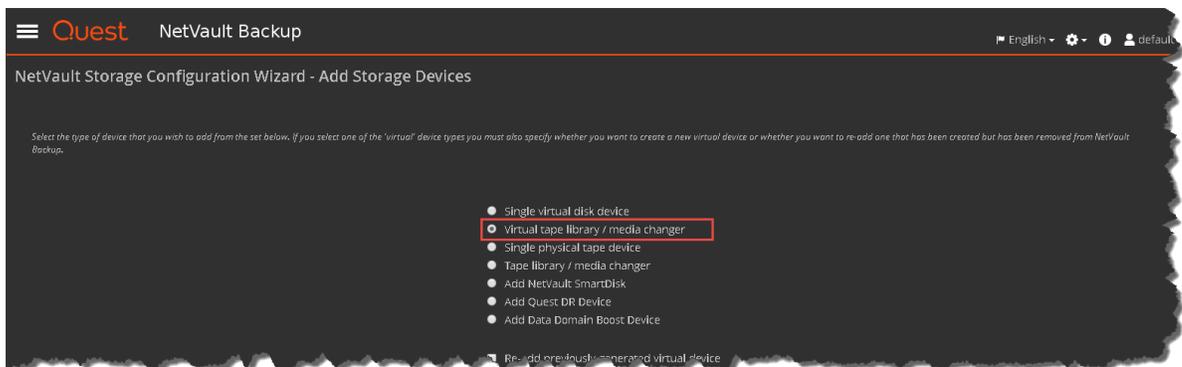
4.1 NetVault: Backup Options

1. In the **NetVault: Backup Server Settings / Configurator** select the Plugin Options.
2. Under the **Disk Devices Plugin**.
 - A. Select **Allow disk libraries to have entry/exit ports** option
 - B. Deselect **Check available disk space before creating libraries** option

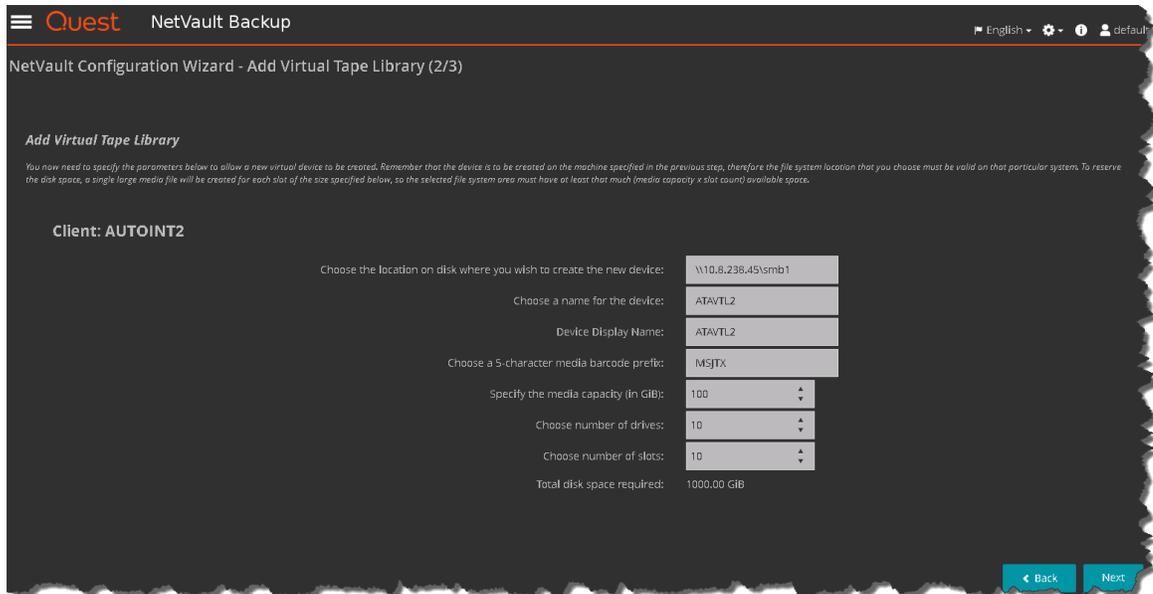


4.2 NetVault: Backup Native Virtual Tape Library Creation

1. In the NVBU WebUI, click **Manage Devices** on the toolbar to open the **Device Management** facilities.



2. Click on the **Add Device** Button, then click **Virtual Tape Library / Media Changer** and click on the **Next Button**.
3. Under **NetVault Configuration Wizard - Add Single Virtual Disk Device (1/3)** select the Backup Server or Smart Client that is hosting the Removable Storage Device and click on the **Next Button**.
4. In the **NetVault Configuration Wizard - Add Single Virtual Disk Device (2/3)** window, configure the following parameters:



- **Drive Location** – Enter the path for the removable storage device. Use the UNC Path to the SMB Share or the local NFS mount path. For Windows based systems it is recommended to use CIFS/UNC and for Linux based systems it is recommended to use NFS.
 - **Choose a name for the device** – Enter a unique name for the virtual standalone drive. NVBU assigns the name **NewLibrary** by default.
 - **Device display name** – Choose a display name if needed.
 - **Barcode Prefix** – NVBU generates a barcode prefix that is used for identification and assigned to the media used by the virtual library. It can be changed, if required. However, ensure that a unique code is assigned to each drive.
 - **Media Capacity** – Enter or select the media size in GiB. Media sizes between 20GB and 1TB are supported but given that larger media will require more processing and impacts reuse we recommend keeping these files between 20GB to 100GB and no larger than 500GB depending on reuse calculations.
 - **Choose number of drives** – Enter or select the number of virtual drives to create. Currently the maximum number of drives is 128.
 - **Choose number of slots** – Enter or select the number of virtual tapes.
5. Click on the **Next Button** to initiate the creation of the virtual tape device. Depending on the media size, this process may take a few minutes to complete. A message is displayed when the process completes.

NOTE: In the case that there is an error with access to the share please double check the permissions and verify that the NetVault: Backup Service and Processes have Administrator Level Full Read/Write Privileges.

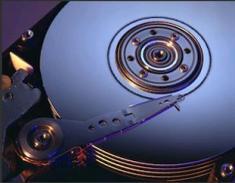
6. Select **Add More Devices or Create Backup Jobs** to finalize the creation of the virtual standalone drive on the removable storage device. Your device is now ready for use.

Quest NetVault Backup English default

NetVault Configuration Wizard - Add Virtual Tape Library (3/3)

NetVault Backup created and added the following virtual tape library.

Name:	\\10.8.238.45\smb1\ATAVTL2
Vendor:	NetVault
Product:	Virtual Library



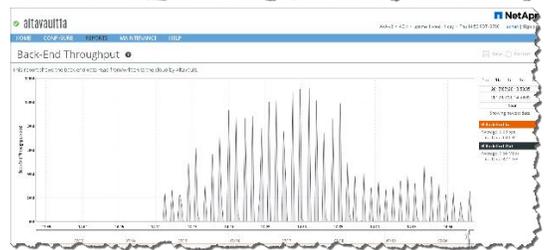
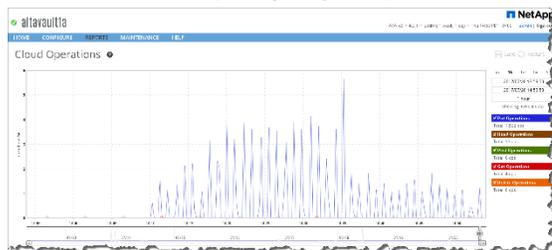
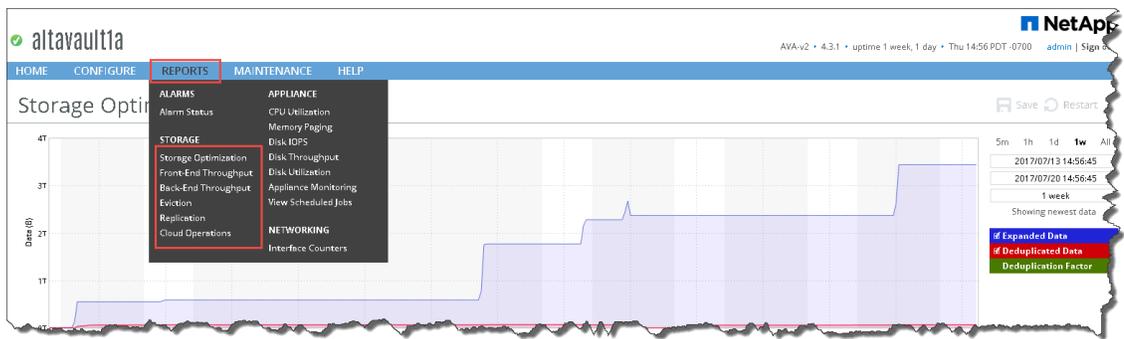
This device is now ready for use. Use the buttons below to either add further storage devices or move onto the next step.

5 Monitoring deduplication, compression, cloud operations and performance

During use the NetApp AltaVault Appliance can provide real-time as well as historical activity metrics such as Storage Optimization, Front End Throughput, Backup End Cloud Throughput as well as Cloud Operation Summary.

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 are completed, the ratios will increase. Backup jobs with a 12-week retention will increase in ratio, in most cases.

To access these features simply browse to the AltaVault WebUI REPORTS and select them under the STORAGE submenus:



6 Managing Media and Space

6.1 Adding media to the VTL container

To add media to an existing nVTL one must make sure tape library operations are halted, the nVTL library door is in an opened state and then the namespace which hosts the nVTL data files needs to be managed so as to create directories and files and use the `nvmakemedia` command to generate new media files.

1. Halt all backup and restore operations that use the target nVTL
2. Select the VTL and conduct an inventory update.
3. Navigate to the Tape Library Management menu for the given nVTL and select to Open Door. The Activity and Door Status will change from (Online;Closed) to (Door Open;Open).
4. Create the necessary directory and file changes in order to fulfill the media space requirements (use the `nvmakemedia` CLI command reference guide for details).
 - A. In the slots directory, create a subdirectory which is one number larger than the existing largest numbered virtual slot directory.
 - B. Copy the “.media” file from one of the virtual slot directories to the virtual slot directory created in the previous step.
 - C. Modify the “.media” file in the newly created virtual slot directory to include the barcode-prefix directory path of the new virtual media number.
 - D. Use the `nvmakemedia` command to create the media file.

Examples:

```
nvmakemedia 500G mediafiles d:\tst-vtl\1Y2NY006
```

```
nvmakemedia 500G mediafiles \\192.169.0.129\smb\1Y2NY006
```

```
nvmakemedia 500G mediafiles d:\altavault1.dev.lab\smb\1Y2NY006
```

Note: To use this utility on Windows-based systems, you must be logged in with Administrator privileges

This utility can only be used on systems that are not added to any domain or on systems that are added to the primary domain or a domain where there is a trust relationship with the primary domain.

5. At this time select the Close Door function, which will force an update to the inventory of the library contents. This will result in a refresh request by the NetVault Software, which in turn will update the new inventory status resulting in the newly added tapes appearing for use within NetVault: Backup.

6.2 Space reclamation guidelines

Space reclamation from virtual media space use of a NetVault: Backup nVTL hosted on the NetApp AltaVault Appliance has some specific requirements. Even though NetVault: Backup can locate and blank media that is marked for reuse, the NetApp AltaVault Appliance unit will not know that NetVault: Backup has marked the media for reuse and will not reclaim the space. This is due to the fact that NetVault: Backup will only update the data on the media and not scrub through and remove the media files themselves.

To ensure that the NetApp AltaVault Appliance can reclaim space, the marked for reuse media must be identified, blanked using the `nvmakemedia` utility removed and then re-added as a new file. Since the new file no longer has any content, the NetApp AltaVault Appliance can then reclaim the space of the respective files. In order to automate this a scheduled task or a NetVault: Backup job with a post/pre script can be run to build a list of the media, blank it, and use the `nvmakemedia` utility to recreate and relabel the media files.

Refer to Appendix A for an example script that can be modified for either type of installation.

7 Appendix A – Reclamation Script Examples

7.1 NetVault Backup Native Virtual Tape Library Physical Space Reclamation Script

7.1.1 Windows Platform Script:

```
@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)%\Quest Software\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%\nvopeneepport.exe" -libraryname "%library_name%"
"%nvutil%\nvopeneepport.exe" -libraryname "%library_name%"
choice /T 5 /C jn /N /D j >NUL:
"%nvutil%\nvcloseeepport.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%\nvopeneepport.exe" -libraryname "%library_name%"
echo Stage 4 - Completed
::
::
:: =====
:: Media is now unreachable for the library
:: in I/O Slot, now we cheat NetVault !
::

```

```

:: 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%\nvcloseeport.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

```

7.1.2 Linux /Unix Platform Bash Script:

```

#!/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/nvopeneepport -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
```