Customer scenarios

NetApp Solutions

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Customer scenarios

Overview

Previous: Performance tuning.

This section describes customer scenarios and their architectures.

Next: Data lake to ONTAP NFS.

Data lake to ONTAP NFS

Previous: Customer scenarios.

This use case is based on the largest financial customer proof of concept (CPOC) that we have done. Historically, we used the NetApp In-Place Analytics Module (NIPAM) to move analytics data to NetApp ONTAP AI. However, because of recent enhancements and the improved performance of NetApp XCP as well as the unique NetApp data mover solution approach, we reran the data migration using NetApp XCP.

Customer challenges and requirements

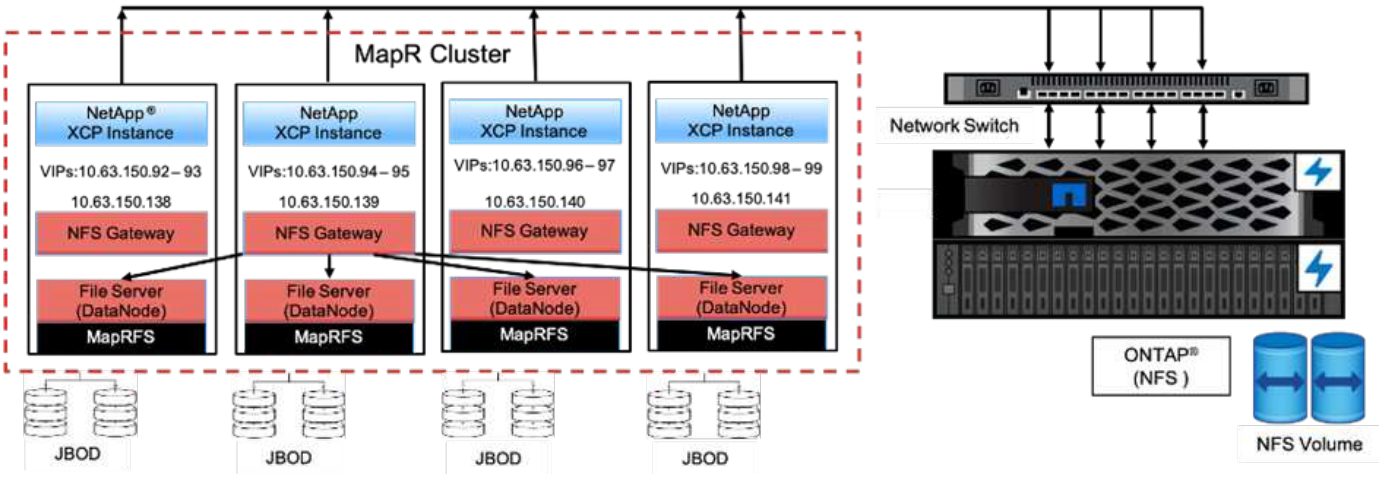
Customer challenges and requirements that are worth noting include the following:

- Customers have different types of data, including structured, unstructured, and semistructured data, logs, and machine-to-machine data in data lakes. AI systems require all these types of data to process for prediction operations. When data is in a data lake-native file system, it is difficult to process.
- The customer's AI architecture is not able to access data from Hadoop Distributed File System (HDFS) and Hadoop Compatible File System (HCFS), so the data is not available to AI operations. AI requires data in an understandable file system format such as NFS.
- Some special processes are required to move data from the data lake because of the large amount of data and high-throughput, and a cost-effective method is required to move the data to the AI system.

Data mover solution

In this solution, the MapR File System (MapR-FS) is created from local disks in the MapR cluster. The MapR NFS Gateway is configured on each data node with virtual IPs. The file server service stores and manages the MapR-FS data. NFS Gateway makes Map-FS data accessible from the NFS client through the virtual IP. An XCP instance is running on each MapR data node to transfer the data from the Map NFS Gateway to NetApp ONTAP NFS. Each XCP instance transfers a specific set of source folders to the destination location.

The following figure illustrates the NetApp data mover solution for MapR cluster using XCP.



For detailed customer use cases, recorded demos, and test results, see the Using XCP to Move Data from a Data Lake and High-Performance Computing to ONTAP NFS blog.

For detailed steps on moving MapR-FS data into ONTAP NFS by using NetApp XCP, see Appendix B in TR-4732: Big Data Analytics Data to Artificial Intelligence.

Next: High-performance computing to ONTAP NFS.

High-performance computing to ONTAP NFS

Previous: Data lake to ONTAP NFS.

This use case is based on requests from field organizations. Some NetApp customers have their data in a high-performance computing environment, which provides data analytics for training models and enables research organizations to gain insight and understanding of large amount of digital data. NetApp field engineers need a detailed procedure to extract the data from IBM's GPFS to NFS. We used NetApp XCP to migrate the data from GPFS to NFS so that GPUs can process the data. AI typically processes data from a network file system.

For more information about the high-performance computing to ONTAP NFS use case, a recorded demo, and test results, see the Using XCP to Move Data from a Data Lake and High-Performance Computing to ONTAP NFS blog.

For detailed steps on moving MapR-FS data into ONTAP NFS by using NetApp XCP, see Appendix A: GPFS to NFS—Detailed Steps in TR-4732: Big Data Analytics Data to Artificial Intelligence.

Next: Using the XCP Data Mover to migrate millions of small files to flexible storage.

Using the XCP Data Mover to migrate millions of small files to flexible storage

Previous: High-performance computing to ONTAP NFS.

This use case is based on the largest NetApp tourism industry customer for on-premises-to-cloud data migration. Because COVID-19 has reduced demand in the travel industry, customers want to save capital expenses on high-end storage in their on-premises environment for the demand pricing application. This customer has a tight SLA to migrate millions of small files to the cloud.

The following figure depicts data migration from on-premises to Azure NetApp Files for small files.

For more information, see the NetApp XCP Data Mover Solution: On Premises to Cloud blog.

Next: Using the XCP Data Mover to migrate large files.

Using the XCP Data Mover to migrate large files

Previous: Using the XCP Data Mover to migrate millions of small files to flexible storage.

This use case is based on a television network customer. The customer wanted to migrate Oracle Recovery Manager (RMAN) backup files to the cloud and run the Oracle E-Business Suite (EBS) application by using Azure NetApp Files with Pacemaker software. The customer also wanted to migrate their database backup files to on-demand cloud storage and transfer large files (in the range of 25GB to 50GB each) to Azure.

The following figure illustrates the data migration from on-premises to Azure NetApp Files for large files.

For more information, see the NetApp XCP Data Mover Solution: On Premises to Cloud blog.

Next: Duplicate files.

Duplicate files

Previous: Using the XCP Data Mover to migrate large files.

NetApp received a request to find duplicate files from a single volume or multiple volumes. NetApp provided the following solution.

For single volume, run the following commands:

```
[root@mastr-51 linux]# ./xcp -md5 -match 'type==f and nlinks==1 and size
!= 0' 10.63.150.213:/common_volume/nfsconnector_hw_cert/ | sort | uniq -cd
--check-chars=32
XCP 1.5; (c) 2020 NetApp, Inc.; Licensed to Calin Salagean [NetApp Inc]
until Mon Dec 31 00:00:00 2029

176,380 scanned, 138,116 matched, 138,115 summed, 10 giants, 61.1 GiB in
(763 MiB/s), 172 MiB out (2.57 MiB/s), 1m5s

Filtered: 38264 did not match
176,380 scanned, 138,116 matched, 138,116 summed, 10 giants, 62.1 GiB in
(918 MiB/s), 174 MiB out (2.51 MiB/s), 1m9s.
      3 00004964ca155eca1a71d0949c82e37e
nfsconnector_hw_cert/grid_01082017_174316/0/hadoopqe/accumulo/shell/pom.xm
l
      2 000103fbed06d8071410c59047738389
nfsconnector_hw_cert/usr_hdp/2.5.3.0-37/hive2/doc/examples/files/dim-
data.txt
      2 000131053a46d67557d27bb678d5d4a1
nfsconnector_hw_cert/grid_01082017_174316/0/log/cluster/mahout_1/artifacts
/classifier/20news_reduceddata/20news-bydate-test/alt.atheism/53265
```

For multiple volumes, run the following commands:

```
[root@mastr-51 linux]# cat multiplevolume_duplicate.sh
#! /usr/bin/bash

#user input
JUNCTION_PATHS='/nc_volume1 /nc_volume2 /nc_volume3 /oplogarchivevolume'
NFS_DATA_LIF='10.63.150.213'

#xcp operation
for i in $JUNCTION_PATHS
do
echo "start - $i" >> /tmp/duplicate_results
/usr/src/xcp/linux/xcp -md5 -match 'type==f and nlinks==1 and size != 0'
${NFS_DATA_LIF}:$i | sort | uniq -cd --check-chars=32 | tee -a
/tmp/duplicate_results
echo "end - $i" >> /tmp/duplicate_results
done

[root@mastr-51 linux]# nohup bash +x multiplevolume_duplicate.sh &
[root@mastr-51 linux]#  cat /tmp/duplicate_results
```

Next: Specific date-based scan and copy of data.

Specific date-based scan and copy of data

Previous: Duplicate files.

This solution is based on a customer who needs to copy data based on a specific date. Verify the following details:

```
Created a file in Y: and checked the scan command to list them.

c:\XCP>dir Y:\karthik_test
 Volume in drive Y is from
 Volume Serial Number is 80F1-E201

 Directory of Y:\karthik_test

05/26/2020  02:51 PM    <DIR>          .
05/26/2020  02:50 PM    <DIR>          ..
05/26/2020  02:51 PM             2,295 testfile.txt
               1 File(s)          2,295 bytes
               2 Dir(s)     658,747,392 bytes free

c:\XCP>

c:\XCP>xcp scan -match "strftime(ctime,'%Y-%m-%d')>'2020-05-01'" -fmt
"'{},{}'.format(iso(mtime),name)" Y:\
XCP SMB 1.6; (c) 2020 NetApp, Inc.; Licensed to Calin Salagean [NetApp
Inc] until Mon Dec 31 00:00:00 2029

It appears that you are not running XCP as Administrator. To avoid access
issues please run XCP as Administrator.

2020-05-26_14:51:13.132465,testfile.txt
2020-05-26_14:51:00.074216,karthik_test

xcp scan -match strftime(ctime,'%Y-%m-%d')>'2020-05-01' -fmt
'{},{}'.format(iso(mtime),name) Y:\ : PASSED
30,205 scanned, 2 matched, 0 errors
Total Time : 4s
STATUS : PASSED

Copy the files based on date (2020 YearMay month first date)  from Y:  to
Z:
c:\XCP>xcp copy -match "strftime(ctime,'%Y-%m-%d')>'2020-05-01'" Y:
Z:\dest_karthik
```

```
XCP SMB 1.6; (c) 2020 NetApp, Inc.; Licensed to Calin Salagean [NetApp
Inc] until Mon Dec 31 00:00:00 2029

It appears that you are not running XCP as Administrator. To avoid access
issues please run XCP as Administrator.

30,205 scanned, 3 matched, 0 copied, 0 errors, 5s
xcp copy -match strftime(ctime,'%Y-%m-%d')>'2020-05-01' Y: Z:\dest_karthik
: PASSED
30,205 scanned, 3 matched, 2 copied, 0 errors
Total Time : 6s
STATUS : PASSED

c:\XCP>

Check the destination Z:

c:\XCP>dir Z:\dest_karthik\karthik_test
 Volume in drive Z is to
 Volume Serial Number is 80F1-E202

 Directory of Z:\dest_karthik\karthik_test

05/26/2020  02:51 PM    <DIR>          .
05/26/2020  02:50 PM    <DIR>          ..
05/26/2020  02:51 PM             2,295 testfile.txt
               1 File(s)          2,295 bytes
               2 Dir(s)     659,316,736 bytes free

c:\XCP>
```

Next: Creating a CSV file from SMB/CIFS share.

Creating a CSV file from SMB/CIFS share

Previous: Specific date-based scan and copy of data.

The following command dumps data in the CSV format. You can sum up the size column to get the total size of the data.

```
xcp scan -match "((now-x.atime) / 3600) > 31*day" -fmt "'{}, {}, {},
{}'.format(relpath, name, strftime(x.atime, '%y-%m-%d-%H:%M:%S'),
humanize_size(size))" -preserve-atime  >file.csv
```

The output should look similar to this example:

```
erase\report_av_fp_cdot_crosstab.csvreport_av_fp_cdot_crosstab.csv20-01-
29-10:26:2449.6MiB
```

To scan up to the depth of three subdirectories and provide the result in sorting order, run the `xcp -du` command and dump the size at each directory level up to the depth of three subdirectories.

```
./xcp  scan -du -depth 3 NFS_Server_IP:/source_vol
```

To sort, dump the information to a CSV file and sort the information.

```
xcp scan -match “type == d” -depth 3 -fmt "'{}, {}, {}, {}'.format(name,
relpath, size)" NFS_Server_IP:/share > directory_report.csv
```

This is a custom report that uses the `-fmt` command. It scans all the directories and dumps the name of the directory, path, and size of directory into a CSV file. You can sort the size column from the spreadsheet application.

Next: Data migration from 7-Mode to ONTAP.

Data migration from 7-Mode to ONTAP

Previous: Creating a CSV file from SMB/CIFS share.

This section provides detailed steps for migrating data from NetApp Data ONTAP operating in 7-Mode to ONTAP.

Transitioning 7-Mode NFSv3 storage to ONTAP for NFS data

This section provides the step-by-step procedure in the following table for transitioning a source 7-Mode NFSv3 export to an ONTAP system.

NetApp assumes that the source 7-Mode NFSv3 volume is exported and mounted on the client system and that XCP is already installed on a Linux system.

1. Verify that the target ONTAP system is healthy.

```
CLUSTER::> cluster show
Node                  Health  Eligibility
--------------------- ------- ------------
CLUSTER-01            true    true
CLUSTER-02            true    true
2 entries were displayed.
CLUSTER::> node show
Node      Health Eligibility Uptime        Model       Owner    Location
--------- ------ ----------- ------------- ----------- --------
---------------
CLUSTER-01
          true   true        78 days 21:01 FAS8060              RTP
CLUSTER-02
          true   true        78 days 20:50 FAS8060              RTP
2 entries were displayed.
CLUSTER::> storage failover show
                              Takeover
Node           Partner        Possible State Description
-------------- -------------- --------
-------------------------------------
CLUSTER-01     CLUSTER-02     true     Connected to CLUSTER-02
CLUSTER-02     CLUSTER-01     true     Connected to CLUSTER-01
2 entries were displayed.
```

2. Verify that at least one nonroot aggregate exists on the target system. The aggregate is normal.

```
CLUSTER::> storage aggregate show
Aggregate     Size Available Used% State   #Vols  Nodes            RAID
Status
--------- -------- --------- ----- ------- ------ ----------------
------------
aggr0      368.4GB   17.85GB   95% online       1 CLUSTER-01
raid_dp,

normal
aggr0_CLUSTER_02_0
           368.4GB   17.85GB   95% online       1 CLUSTER-02
raid_dp,

normal
source      1.23TB    1.10TB   11% online       6 CLUSTER-01
raid_dp,

normal
3 entries were displayed.
```

If there is no data aggregate, create a new one using the `storage aggr create` command.

3. Create a storage virtual machine (SVM) on the target cluster system.

```
CLUSTER::> vserver create -vserver dest -rootvolume dest_root -aggregate
poc -rootvolume-security-style mixed
[Job 647] Job succeeded:
Vserver creation completed
Verify the security style and language settings of the source

Verify that the SVM was successfully created.
CLUSTER::> vserver show -vserver dest
                                    Vserver: dest
                                Vserver Type: data
                             Vserver Subtype: default
                                Vserver UUID: 91f6d786-0063-11e5-b114-
00a09853a969
                                 Root Volume: dest_root
                                   Aggregate: poc
                                  NIS Domain: -
                  Root Volume Security Style: mixed
                                 LDAP Client: -
               Default Volume Language Code: C.UTF-8
                             Snapshot Policy: default
                                     Comment:
                                Quota Policy: default
                 List of Aggregates Assigned: -
 Limit on Maximum Number of Volumes allowed: unlimited
                       Vserver Admin State: running
                  Vserver Operational State: running
   Vserver Operational State Stopped Reason: -
                          Allowed Protocols: nfs, cifs, fcp, iscsi, ndmp
                       Disallowed Protocols: -
            Is Vserver with Infinite Volume: false
                           QoS Policy Group: -
                                Config Lock: false
                               IPspace Name: Default
```

4. Remove the FCP, iSCSI, NDMP, and CIDS protocols from the target SVM.

```
CLUSTER::> vserver remove-protocols -vserver dest -protocols
fcp,iscsi,ndmp,cifs
```

Verify that NFS is the allowed protocol for this SVM.

```
CLUSTER::> vserver show -vserver dest -fields allowed-protocols
vserver allowed-protocols
------- -----------------
dest    nfs
```

5. Create a new read-write data volume on the destination SVM. Verify that the security style, language settings, and capacity requirements match the source volume.

```
CLUSTER::> vol create -vserver dest -volume dest_nfs -aggregate poc
-size 150g -type RW -state online -security-style mixed
[Job 648] Job succeeded: Successful
```

6. Create a data LIF to serve NFS client requests.

```
CLUSTER::> network interface create -vserver dest -lif dest_lif -address
10.61.73.115 -netmask 255.255.255.0 -role data -data-protocol nfs -home
-node CLUSTER-01 -home-port e0l
```

Verify that the LIF was successfully created.

```
CLUSTER::> network interface show -vserver dest
            Logical    Status     Network            Current
Current Is
Vserver     Interface  Admin/Oper Address/Mask       Node          Port
Home
----------- ---------- ---------- ------------------ -------------
------- ----
dest
            dest_lif
                         up/up    10.61.73.113/24    CLUSTER-01    e0i
true
```

7. Create a static route with the SVM, if required.

```
CLUSTER::> network route create -vserver dest -destination 0.0.0.0/0
-gateway 192.168.100.111
```

Verify that the route was successfully created.

```
CLUSTER::> network route show -vserver source
Vserver             Destination     Gateway         Metric
------------------- --------------- --------------- ------
dest
                    0.0.0.0/0       10.61.73.1      20
```

8. Mount the target NFS data volume in the SVM namespace.

```
CLUSTER::> volume mount -vserver dest -volume dest_nfs -junction-path
/dest_nfs -active true
```

Verify that the volume is successfully mounted.

```
CLUSTER::> volume show -vserver dest -fields junction-path
vserver volume   junction-path
------- -------- -------------
dest    dest_nfs /dest_nfs
dest    dest_root
                 /
2 entries were displayed.
```

You can also specify volume mount options (junction path) with the `volume create` command.

9. Start the NFS service on the target SVM.

```
CLUSTER::> vserver nfs start -vserver dest
```

Verify that the service is started and running.

```
CLUSTER::> vserver nfs status
The NFS server is running on Vserver "dest".
CLUSTER::> nfs show
Vserver: dest
        General Access:  true
                    v3:  enabled
                  v4.0:  disabled
                   4.1:  disabled
                   UDP:  enabled
                   TCP:  enabled
  Default Windows User:  -
 Default Windows Group:  -
```

10. Verify that the default NFS export policy was applied to the target SVM.

```
CLUSTER::> vserver export-policy show -vserver dest
Vserver          Policy Name
---------------  -------------------
dest             default
```

11. If required, create a new custom export policy for the target SVM.

```
CLUSTER::> vserver export-policy create -vserver dest -policyname
xcpexportpolicy
```

Verify that the new custom export policy was successfully created.

```
CLUSTER::> vserver export-policy show -vserver dest
Vserver          Policy Name
---------------  -------------------
dest             default
dest             xcpexportpolicy
2 entries were displayed.
```

12. Modify the export policy rules to allow access to NFS clients.

```
CLUSTER::> export-policy rule modify -vserver dest -ruleindex 1
-policyname xcpexportpolicy -clientmatch 0.0.0.0/0 -rorule any -rwrule
any -anon 0
Verify the policy rules have modified
CLUSTER::> export-policy rule show -instance
                                    Vserver: dest
                                Policy Name: xcpexportpolicy
                                 Rule Index: 1
                            Access Protocol: nfs3
Client Match Hostname, IP Address, Netgroup, or Domain: 0.0.0.0/0
                             RO Access Rule: none
                             RW Access Rule: none
User ID To Which Anonymous Users Are Mapped: 65534
                   Superuser Security Types: none
               Honor SetUID Bits in SETATTR: true
                  Allow Creation of Devices: true
```

13. Verify that the client is allowed access to the volume.

```
CLUSTER::> export-policy check-access -vserver dest -volume dest_nfs
-client-ip 10.61.82.215 -authentication-method none -protocol nfs3
-access-type read-write
                                          Policy    Policy       Rule
Path                          Policy      Owner     Owner Type  Index
Access
----------------------------- ---------- --------- ---------- ------
----------
/                             xcpexportpolicy
                                          dest_root volume          1
read
/dest_nfs                     xcpexportpolicy
                                          dest_nfs  volume          1
read-write
2 entries were displayed.
```

14. Connect to the Linux NFS server. Create a mount point for the NFS exported volume.

```
[root@localhost /]# cd /mnt
[root@localhost mnt]# mkdir dest
```

15. Mount the target NFSv3 exported volume at this mount point.

> The NFSv3 volumes should be exported but not necessarily mounted by the NFS server. If they can be mounted, the XCP Linux host client mounts these volumes.

```
[root@localhost mnt]# mount -t nfs 10.61.73.115:/dest_nfs /mnt/dest
```

Verify that the mount point was successfully created.

```
[root@ localhost /]# mount | grep nfs
10.61.73.115:/dest_nfs on /mnt/dest type nfs
(rw,relatime,vers=3,rsize=65536,wsize=65536,namlen=255,hard,proto=tcp,ti
meo=600,retrans=2,sec=sys,mountaddr=10.61.82.215,mountvers=3,mountport=4
046,mountproto=udp,local_lock=none,addr=10.61.73.115)
```

16. Create a test file on the NFS exported mount point to enable read-write access.

```
[root@localhost dest]# touch test.txt
Verify the file is created
[root@localhost dest]# ls -l
total 0
-rw-r--r-- 1 root bin 0 Jun  2 03:16 test.txt
```

After the read-write test is complete, delete the file from the target NFS mount point.

17. Connect to the Linux client system in which XCP is installed. Browse to the XCP install path.

```
[root@localhost ~]# cd /linux/
[root@localhost linux]#
```

18. Query the source 7-Mode NFSv3 exports by running the `xcp show` command on the XCP Linux client host system.

```
[root@localhost]#./xcp show 10.61.82.215
== NFS Exports ==
Mounts  Errors  Server
      4       0  10.61.82.215
     Space    Files      Space    Files
      Free     Free       Used     Used Export
  23.7 GiB  778,134    356 KiB       96 10.61.82.215:/vol/nfsvol1
  17.5 GiB  622,463   1.46 GiB      117 10.61.82.215:/vol/nfsvol
   328 GiB    10.8M   2.86 GiB    7,904 10.61.82.215:/vol/vol0/home
   328 GiB    10.8M   2.86 GiB    7,904 10.61.82.215:/vol/vol0
== Attributes of NFS Exports ==
drwxr-xr-x --- root wheel 4KiB 4KiB 2d21h 10.61.82.215:/vol/nfsvol1
drwxr-xr-x --- root wheel 4KiB 4KiB 2d21h 10.61.82.215:/vol/nfsvol
drwxrwxrwx --t root wheel 4KiB 4KiB 9d22h 10.61.82.215:/vol/vol0/home
drwxr-xr-x --- root wheel 4KiB 4KiB  4d0h 10.61.82.215:/vol/vol0
3.89 KiB in (5.70 KiB/s), 7.96 KiB out (11.7 KiB/s), 0s.
```

19. Scan the source NFSv3 exported paths and print the statistics of their file structure.

    NetApp recommends putting the source NFSv3 exports in read-only mode during xcp `scan`, `copy`, and `sync` operations.

```
[root@localhost /]# ./xcp scan 10.61.82.215:/vol/nfsvol
nfsvol
nfsvol/n5000-uk9.5.2.1.N1.1.bin
nfsvol/821_q_image.tgz
nfsvol/822RC2_q_image.tgz
nfsvol/NX5010_12_node_RCF_v1.3.txt
nfsvol/n5000-uk9-kickstart.5.2.1.N1.1.bin
nfsvol/NetApp_CN1610_1.1.0.5.stk
nfsvol/glibc-common-2.7-2.x86_64.rpm
nfsvol/glibc-2.7-2.x86_64.rpm
nfsvol/rhel-server-5.6-x86_64-dvd.iso.filepart
nfsvol/xcp
nfsvol/xcp_source
nfsvol/catalog
23 scanned, 7.79 KiB in (5.52 KiB/s), 1.51 KiB out (1.07 KiB/s), 1s.
```

20. Copy the source 7-Mode NFSv3 exports to NFSv3 exports on the target ONTAP system.

```
[root@localhost /]# ./xcp copy 10.61.82.215:/vol/nfsvol
10.61.73.115:/dest_nfs
 44 scanned, 39 copied, 264 MiB in (51.9 MiB/s), 262 MiB out (51.5
MiB/s), 5s
 44 scanned, 39 copied, 481 MiB in (43.3 MiB/s), 479 MiB out (43.4
MiB/s), 10s
 44 scanned, 40 copied, 748 MiB in (51.2 MiB/s), 747 MiB out (51.3
MiB/s), 16s
 44 scanned, 40 copied, 1.00 GiB in (55.9 MiB/s), 1.00 GiB out (55.9
MiB/s), 21s
 44 scanned, 40 copied, 1.21 GiB in (42.8 MiB/s), 1.21 GiB out (42.8
MiB/s), 26s
Sending statistics...
44 scanned, 43 copied, 1.46 GiB in (47.6 MiB/s), 1.45 GiB out (47.6
MiB/s), 31s.
```

21. After the copy is finished, verify that the source and destination NFSv3 exports have identical data. Run the `xcp verify` command.

```
[root@localhost /]# ./xcp verify 10.61.82.215:/vol/nfsvol
10.61.73.115:/dest_nfs
44 scanned, 44 found, 28 compared, 27 same data, 2.41 GiB in (98.4
MiB/s), 6.25 MiB out (255 KiB/s), 26s
44 scanned, 44 found, 30 compared, 29 same data, 2.88 GiB in (96.4
MiB/s), 7.46 MiB out (249 KiB/s), 31s
44 scanned, 100% found (43 have data), 43 compared, 100% verified (data,
attrs, mods), 2.90 GiB in (92.6 MiB/s), 7.53 MiB out (240 KiB/s), 32s.
```

If `xcp verify` finds differences between the source and destination data, then the error `no such file or directory` is reported in the summary. To fix that issue, run the `xcp sync` command to copy the source changes to the destination.

22. Before and during the cutover, run `verify` again. If the source has new or updated data, then perform incremental updates. Run the `xcp sync` command.

```
For this operation, the previous copy index name or number is required.
[root@localhost /]# ./xcp sync -id 3
Index: {source: '10.61.82.215:/vol/nfsvol', target:
'10.61.73.115:/dest_nfs1'}
64 reviewed, 64 checked at source, 6 changes, 6 modifications, 51.7 KiB
in (62.5 KiB/s), 22.7 KiB out (27.5 KiB/s), 0s.
xcp: sync '3': Starting search pass for 1 modified directory...
xcp: sync '3': Found 6 indexed files in the 1 changed directory
xcp: sync '3': Rereading the 1 modified directory to find what's new...
xcp: sync '3': Deep scanning the 1 directory that changed...
11 scanned, 11 copied, 12.6KiB in (6.19KiBps), 9.50 KiB out (4.66KiBps),
2s.
```

23. To resume a previously interrupted copy operation, run the `xcp resume` command.

```
[root@localhost /]# ./xcp resume -id 4
Index: {source: '10.61.82.215:/vol/nfsvol', target:
'10.61.73.115:/dest_nfs7'}
xcp: resume '4': WARNING: Incomplete index.
xcp: resume '4': Found 18 completed directories and 1 in progress
106 reviewed, 24.2 KiB in (30.3 KiB/s), 7.23 KiB out (9.06 KiB/s), 0s.
xcp: resume '4': Starting second pass for the in-progress directory...
xcp: resume '4': Found 3 indexed directories and 0 indexed files in the
1 in-progress directory
xcp: resume '4': In progress dirs: unindexed 1, indexed 0
xcp: resume '4': Resuming the 1 in-progress directory...
 20 scanned, 7 copied, 205 MiB in (39.6 MiB/s), 205 MiB out (39.6
MiB/s), 5s
 20 scanned, 14 copied, 425 MiB in (42.1 MiB/s), 423 MiB out (41.8
MiB/s), 11s
 20 scanned, 14 copied, 540 MiB in (23.0 MiB/s), 538 MiB out (23.0
MiB/s), 16s
 20 scanned, 14 copied, 721 MiB in (35.6 MiB/s), 720 MiB out (35.6
MiB/s), 21s
 20 scanned, 15 copied, 835 MiB in (22.7 MiB/s), 833 MiB out (22.7
MiB/s), 26s
 20 scanned, 16 copied, 1007 MiB in (34.3 MiB/s), 1005 MiB out (34.3
MiB/s), 31s
 20 scanned, 17 copied, 1.15 GiB in (33.9 MiB/s), 1.15 GiB out (33.9
MiB/s), 36s
 20 scanned, 17 copied, 1.27 GiB in (25.5 MiB/s), 1.27 GiB out (25.5
MiB/s), 41s
 20 scanned, 17 copied, 1.45 GiB in (36.1 MiB/s), 1.45 GiB out (36.1
MiB/s), 46s
 20 scanned, 17 copied, 1.69 GiB in (48.7 MiB/s), 1.69 GiB out (48.7
MiB/s), 51s
Sending statistics...
20 scanned, 20 copied, 21 indexed, 1.77 GiB in (33.5 MiB/s), 1.77 GiB
out (33.4 MiB/s), 54s.
```

After `resume` finishes copying files, run `verify` again so that the source and destination storage have identical data.

24. The NFSv3 client host needs to unmount the source NFSv3 exports provisioned from the 7-Mode storage and mounts the target NFSv3 exports from ONTAP. Cutover requires an outage.

Transitioning 7-Mode volume Snapshot copies to ONTAP

This section covers the procedure for transitioning a source 7-Mode volume NetApp Snapshot copy to ONTAP.

NetApp assumes that the source 7-Mode volume is exported and mounted on the client system and that XCP is already installed on a Linux system. A Snapshot copy is a point-in-time image of a volume that records incremental changes since the last Snapshot copy. Use the `-snap` option with a 7-Mode system as the source.

Warning: Keep the base Snapshot copy. Do not delete the base Snapshot copy after the baseline copy is complete. The base Snapshot copy is required for further sync operations.

1. Verify that the target ONTAP system is healthy.

```
CLUSTER::> cluster show
Node                  Health  Eligibility
--------------------- ------- ------------
CLUSTER-01            true    true
CLUSTER-02            true    true
2 entries were displayed.
CLUSTER::> node show
Node      Health Eligibility Uptime        Model       Owner    Location
--------- ------ ----------- ------------- ----------- --------
---------------
CLUSTER-01
          true   true        78 days 21:01 FAS8060              RTP
CLUSTER-02
          true   true        78 days 20:50 FAS8060              RTP
2 entries were displayed.
CLUSTER::> storage failover show
                              Takeover
Node           Partner        Possible State Description
-------------- -------------- --------
-----------------------------------
CLUSTER-01     CLUSTER-02     true     Connected to CLUSTER-02
CLUSTER-02     CLUSTER-01     true     Connected to CLUSTER-01
2 entries were displayed.
```

2. Verify that at least one nonroot aggregate exists on the target system. The aggregate is normal.

```
CLUSTER::> storage aggregate show
Aggregate     Size Available Used% State   #Vols  Nodes            RAID
Status
--------- -------- --------- ----- ------- ------ ----------------
------------
aggr0      368.4GB   17.85GB   95% online       1 CLUSTER-01
raid_dp,

normal
aggr0_CLUSTER_02_0
           368.4GB   17.85GB   95% online       1 CLUSTER-02
raid_dp,

normal
source      1.23TB    1.10TB   11% online       6 CLUSTER-01
raid_dp,

normal
3 entries were displayed.
```

If there is no data aggregate, create a new one using the `storage aggr create` command.

3. Create an SVM on the target cluster system.

```
CLUSTER::> vserver create -vserver dest -rootvolume dest_root -aggregate
poc -rootvolume-security-style mixed
[Job 647] Job succeeded:
Vserver creation completed
Verify the security style and language settings of the source

Verify that the SVM was successfully created.
CLUSTER::> vserver show -vserver dest
                                    Vserver: dest
                                Vserver Type: data
                             Vserver Subtype: default
                                Vserver UUID: 91f6d786-0063-11e5-b114-
00a09853a969
                                 Root Volume: dest_root
                                   Aggregate: poc
                                  NIS Domain: -
                  Root Volume Security Style: mixed
                                 LDAP Client: -
               Default Volume Language Code: C.UTF-8
                             Snapshot Policy: default
                                     Comment:
                                Quota Policy: default
                 List of Aggregates Assigned: -
 Limit on Maximum Number of Volumes allowed: unlimited
                       Vserver Admin State: running
                  Vserver Operational State: running
   Vserver Operational State Stopped Reason: -
                          Allowed Protocols: nfs, cifs, fcp, iscsi, ndmp
                       Disallowed Protocols: -
            Is Vserver with Infinite Volume: false
                             QoS Policy Group: -
                                  Config Lock: false
                                 IPspace Name: Default
```

4. Remove the FCP, iSCSI, NDMP, and CIFS protocols from the target SVM.

```
CLUSTER::> vserver remove-protocols -vserver dest -protocols
fcp,iscsi,ndmp,cifs
Verify that NFS is the allowed protocol for this SVM.
CLUSTER::> vserver show -vserver dest -fields allowed-protocols
vserver allowed-protocols
------- -----------------
dest    nfs
```

5. Create a new read-write data volume on the destination SVM. Verify that the security style, language settings, and capacity requirements match the source volume.

```
CLUSTER::> vol create -vserver dest -volume dest_nfs -aggregate poc
-size 150g -type RW -state online -security-style mixed
[Job 648] Job succeeded: Successful
```

6. Create a data LIF to serve NFS client requests.

```
CLUSTER::> network interface create -vserver dest -lif dest_lif -address
10.61.73.115 -netmask 255.255.255.0 -role data -data-protocol nfs -home
-node CLUSTER-01 -home-port e0l
```

Verify that the LIF was successfully created.

```
CLUSTER::> network interface show -vserver dest
            Logical    Status     Network            Current
Current Is
Vserver     Interface  Admin/Oper Address/Mask       Node          Port
Home
----------- ---------- ---------- ------------------ -------------
------- ----
dest
            dest_lif
                         up/up    10.61.73.113/24    CLUSTER-01    e0i
true
```

7. If required, create a static route with the SVM.

```
CLUSTER::> network route create -vserver dest -destination 0.0.0.0/0
-gateway 192.168.100.111
```

Verify that the route was successfully created.

```
CLUSTER::> network route show -vserver source
Vserver             Destination     Gateway         Metric
------------------- --------------- --------------- ------
dest
                    0.0.0.0/0       10.61.73.1      20
```

8. Mount the target NFS data volume in the SVM namespace.

```
CLUSTER::> volume mount -vserver dest -volume dest_nfs -junction-path
/dest_nfs -active true
```

Verify that the volume was successfully mounted.

```
CLUSTER::> volume show -vserver dest -fields junction-path
vserver volume   junction-path
------- -------- -------------
dest    dest_nfs /dest_nfs
dest    dest_root
                 /
2 entries were displayed.
```

You can also specify the volume mount options (junction path) with the `volume create` command.

9. Start the NFS service on the target SVM.

```
CLUSTER::> vserver nfs start -vserver dest
```

Verify that the service is started and running.

```
CLUSTER::> vserver nfs status
The NFS server is running on Vserver "dest".
CLUSTER::> nfs show
Vserver: dest
        General Access:  true
                    v3:  enabled
                  v4.0:  disabled
                   4.1:  disabled
                   UDP:  enabled
                   TCP:  enabled
  Default Windows User:  -
 Default Windows Group:  -
```

10. Verify that the default NFS export policy is applied to the target SVM.

```
CLUSTER::> vserver export-policy show -vserver dest
Vserver          Policy Name
---------------  -------------------
dest             default
```

11. If required, create a new custom export policy for the target SVM.

```
CLUSTER::> vserver export-policy create -vserver dest -policyname
xcpexportpolicy
```

Verify that the new custom export policy was successfully created.

```
CLUSTER::> vserver export-policy show -vserver dest
Vserver          Policy Name
---------------  -------------------
dest             default
dest             xcpexportpolicy
2 entries were displayed.
```

12. Modify the export policy rules to allow access to NFS clients on the target system.

```
CLUSTER::> export-policy rule modify -vserver dest -ruleindex 1
-policyname xcpexportpolicy -clientmatch 0.0.0.0/0 -rorule any -rwrule
any -anon 0
Verify the policy rules have modified
CLUSTER::> export-policy rule show -instance
                                    Vserver: dest
                                Policy Name: xcpexportpolicy
                                 Rule Index: 1
                            Access Protocol: nfs3
Client Match Hostname, IP Address, Netgroup, or Domain: 0.0.0.0/0
                             RO Access Rule: none
                             RW Access Rule: none
User ID To Which Anonymous Users Are Mapped: 65534
                   Superuser Security Types: none
               Honor SetUID Bits in SETATTR: true
                  Allow Creation of Devices: true
```

13. Verify that the client has access to the target volume.

```
CLUSTER::> export-policy check-access -vserver dest -volume dest_nfs
-client-ip 10.61.82.215 -authentication-method none -protocol nfs3
-access-type read-write
                                          Policy    Policy       Rule
Path                          Policy      Owner     Owner Type  Index
Access
----------------------------- ---------- --------- ---------- ------
----------
/                             xcpexportpolicy
                                          dest_root volume          1
read
/dest_nfs                     xcpexportpolicy
                                          dest_nfs  volume          1
read-write
2 entries were displayed.
```

14. Connect to the Linux NFS server. Create a mount point for the NFS exported volume.

```
[root@localhost /]# cd /mnt
[root@localhost mnt]# mkdir dest
```

15. Mount the target NFSv3 exported volume at this mount point.

> The NFSv3 volumes should be exported but not necessarily mounted by the NFS server. If they can be mounted, the XCP Linux host client mounts these volumes.

```
[root@localhost mnt]# mount -t nfs 10.61.73.115:/dest_nfs /mnt/dest
```

Verify that the mount point was successfully created.

```
[root@ localhost /]# mount | grep nfs
10.61.73.115:/dest_nfs on /mnt/dest type nfs
```

16. Create a test file on the NFS exported mount point to enable read-write access.

```
[root@localhost dest]# touch test.txt
Verify the file is created
[root@localhost dest]# ls -l
total 0
-rw-r--r-- 1 root bin 0 Jun  2 03:16 test.txt
```

After the read-write test is complete, delete the file from the target NFS mount point.

17. Connect to the Linux client system in which XCP is installed. Browse to the XCP install path.

```
[root@localhost ~]# cd /linux/
[root@localhost linux]#
```

18. Query the source 7-Mode NFSv3 exports by running the `xcp show` command on the XCP Linux client host system.

```
[root@localhost]#./xcp show 10.61.82.215
== NFS Exports ==
Mounts  Errors  Server
      4       0  10.61.82.215
     Space    Files      Space    Files
      Free     Free       Used     Used Export
  23.7 GiB  778,134    356 KiB       96 10.61.82.215:/vol/nfsvol1
  17.5 GiB  622,463   1.46 GiB      117 10.61.82.215:/vol/nfsvol
   328 GiB    10.8M   2.86 GiB    7,904 10.61.82.215:/vol/vol0/home
   328 GiB    10.8M   2.86 GiB    7,904 10.61.82.215:/vol/vol0
== Attributes of NFS Exports ==
drwxr-xr-x --- root wheel 4KiB 4KiB 2d21h 10.61.82.215:/vol/nfsvol1
drwxr-xr-x --- root wheel 4KiB 4KiB 2d21h 10.61.82.215:/vol/nfsvol
drwxrwxrwx --t root wheel 4KiB 4KiB 9d22h 10.61.82.215:/vol/vol0/home
drwxr-xr-x --- root wheel 4KiB 4KiB  4d0h 10.61.82.215:/vol/vol0
3.89 KiB in (5.70 KiB/s), 7.96 KiB out (11.7 KiB/s), 0s.
```

19. Scan the source NFSv3 exported paths and print the statistics of their file structure.

    NetApp recommends putting the source NFSv3 exports in read-only mode during `xcp scan`, `copy`, and `sync` operations. In `sync` operation, you must pass the `-snap` option with a corresponding value.

```
[root@localhost /]# ./xcp scan 10.61.82.215:/vol/nfsvol/.snapshot/snap1
nfsvol
nfsvol/n5000-uk9.5.2.1.N1.1.bin
nfsvol/821_q_image.tgz
nfsvol/822RC2_q_image.tgz
nfsvol/NX5010_12_node_RCF_v1.3.txt
nfsvol/n5000-uk9-kickstart.5.2.1.N1.1.bin
nfsvol/catalog
23 scanned, 7.79 KiB in (5.52 KiB/s), 1.51 KiB out (1.07 KiB/s), 1s.
[root@scspr1202780001 vol_acl4]# ./xcp  sync -id 7msnap1  -snap
10.236.66.199:/vol/nfsvol/.snapshot/snap10
(show scan and sync)
```

20. Copy the source 7-Mode NFSv3 snapshot (base) to NFSv3 exports on the target ONTAP system.

```
[root@localhost /]# /xcp copy 10.61.82.215:/vol/nfsvol/.snapshot/snap1
10.61.73.115:/dest_nfs
 44 scanned, 39 copied, 264 MiB in (51.9 MiB/s), 262 MiB out (51.5
MiB/s), 5s
 44 scanned, 39 copied, 481 MiB in (43.3 MiB/s), 479 MiB out (43.4
MiB/s), 10s
 44 scanned, 40 copied, 748 MiB in (51.2 MiB/s), 747 MiB out (51.3
MiB/s), 16s
 44 scanned, 40 copied, 1.00 GiB in (55.9 MiB/s), 1.00 GiB out (55.9
MiB/s), 21s
 44 scanned, 40 copied, 1.21 GiB in (42.8 MiB/s), 1.21 GiB out (42.8
MiB/s), 26s
Sending statistics...
44 scanned, 43 copied, 1.46 GiB in (47.6 MiB/s), 1.45 GiB out (47.6
MiB/s), 31s.
```

Keep this base snapshot for further sync operations.

21. After copy is complete, verify that the source and destination NFSv3 exports have identical data. Run the `xcp verify` command.

```
[root@localhost /]# ./xcp verify 10.61.82.215:/vol/nfsvol
10.61.73.115:/dest_nfs
44 scanned, 44 found, 28 compared, 27 same data, 2.41 GiB in (98.4
MiB/s), 6.25 MiB out (255 KiB/s), 26s
44 scanned, 44 found, 30 compared, 29 same data, 2.88 GiB in (96.4
MiB/s), 7.46 MiB out (249 KiB/s), 31s
44 scanned, 100% found (43 have data), 43 compared, 100% verified (data,
attrs, mods), 2.90 GiB in (92.6 MiB/s), 7.53 MiB out (240 KiB/s), 32s.
```

If `verify` finds differences between the source and destination data, then the error `no such file or directory `is reported in the summary. To fix that issue, run the `xcp sync` command to copy the source changes to the destination.

22. Before and during the cutover, run `verify` again. If the source has new or updated data, then perform incremental updates. If there are incremental changes, create a new Snapshot copy for these changes and pass that snapshot path with the `-snap` option for sync operations.

    Run the `xcp sync` command with the `-snap` option and snapshot path.

```
 [root@localhost /]# ./xcp sync -id 3
Index: {source: '10.61.82.215:/vol/nfsvol/.snapshot/snap1', target:
'10.61.73.115:/dest_nfs1'}
64 reviewed, 64 checked at source, 6 changes, 6 modifications, 51.7 KiB
in (62.5
KiB/s), 22.7 KiB out (27.5 KiB/s), 0s.
xcp: sync '3': Starting search pass for 1 modified directory...
xcp: sync '3': Found 6 indexed files in the 1 changed directory
xcp: sync '3': Rereading the 1 modified directory to find what's new...
xcp: sync '3': Deep scanning the 1 directory that changed...
11 scanned, 11 copied, 12.6 KiB in (6.19 KiB/s), 9.50 KiB out (4.66
KiB/s), 2s..
```

    For this operation, the base snapshot is required.

23. To resume a previously interrupted copy operation, run the `xcp resume` command.

```
[root@scspr1202780001 534h_dest_vol]# ./xcp resume -id 3
XCP <version>; (c) 2020 NetApp, Inc.; Licensed to xxxxx [NetApp Inc]
until Mon Dec 31 00:00:00 2029
xcp: Index: {source: '10.61.82.215:/vol/nfsvol',/.snapshot/snap1,
target: 10.237.160.55:/dest_vol}
xcp: resume '7msnap_res1': Reviewing the incomplete index...
xcp: diff '7msnap_res1': Found 143 completed directories and 230 in
progress
39,688 reviewed, 1.28 MiB in (1.84 MiB/s), 13.3 KiB out (19.1 KiB/s),
0s.
xcp: resume '7msnap_res1': Starting second pass for the in-progress
directories...
xcp: resume '7msnap_res1': Resuming the in-progress directories...
xcp: resume '7msnap_res1': Resumed command: copy {-newid:
u'7msnap_res1'}
xcp: resume '7msnap_res1': Current options: {-id: '7msnap_res1'}
xcp: resume '7msnap_res1': Merged options: {-id: '7msnap_res1', -newid:
u'7msnap_res1'}
xcp: resume '7msnap_res1': Values marked with a * include operations
before resume
 68,848 scanned*, 54,651 copied*, 39,688 indexed*, 35.6 MiB in (7.04
MiB/s), 28.1 MiB out (5.57 MiB/s), 5s
```

24. The NFSv3 client host must unmount the source NFSv3 exports provisioned from the 7-Mode storage and mount the target NFSv3 exports from ONTAP. This cutover requires an outage.

Migrating ACLv4 from NetApp 7-Mode to a NetApp storage system

This section covers the step-by-step procedure for transitioning a source NFSv4 export to an ONTAP system.

> NetApp assumes that the source NFSv4 volume is exported and mounted on the client system and that XCP is already installed on a Linux system. The source should be a NetApp 7-Mode system that support ACLs. ACL migration is supported from NetApp to NetApp only. To copy files with a special character in the name, make sure the source and destination support UTF- 8 encoded language.

Prerequisites for migrating a source NFSv4 export to ONTAP

Before you migrate a source NFSv4 export to ONTAP, the following prerequisites must be met:

- The destination system must have NFSv4 configured.
- The NFSv4 source and target must be mounted on the XCP host. Select NFS v4.0 to match the source and target storage and verify that the ACLs are enabled on the source and target system.
- XCP requires the source/target path to be mounted on the XCP host for ACL processing.In the following example, `vol1(10.63.5.56:/vol1)` is mounted on the `/mnt/vol1` path:

```
 [root@localhost ~]# df -h
Filesystem                                                 Size  Used
Avail Use% Mounted on
10.63.5.56:/vol1                                           973M  4.2M
969M   1% /mnt/vol1
[root@localhost ~]# ./xcp scan -l -acl4 10.63.5.56:/vol1/
XCP <version>; (c) 2020 NetApp, Inc.; Licensed to XXX [NetApp Inc] until
Sun Mar 31 00:00:00 2029
drwxr-xr-x --- root root 4KiB 4KiB 23h42m vol1
rw-r--r-- --- root root    4    0 23h42m vol1/DIR1/FILE
drwxr-xr-x --- root root 4KiB 4KiB 23h42m vol1/DIR1/DIR11
drwxr-xr-x --- root root 4KiB 4KiB 23h42m vol1/DIR1
rw-r--r-- --- root root    4    0 23h42m vol1/DIR1/DIR11/FILE
drwxr-xr-x --- root root 4KiB 4KiB 23h42m vol1/DIR1/DIR11/DIR2
rw-r--r-- --- root root    4    0 23h42m vol1/DIR1/DIR11/DIR2/FILE
drwxr-xr-x --- root root 4KiB 4KiB 17m43s vol1/DIR1/DIR11/DIR2/DIR22
8 scanned, 8 getacls, 1 v3perm, 7 acls, 3.80 KiB in (3.86 KiB/s), 1.21 KiB
out (1.23 KiB/s), 0s.
```

Subdirectories options

The two options to work with subdirectories are as follows:

- For XCP to work on a subdirectory (`/vol1/DIR1/DIR11`), mount the complete path (`10.63.5.56:/vol1/DIR1/DIR11`) on the XCP host.

  If the complete path is not mounted, XCP reports the following error:

```
[root@localhost ~]# ./xcp scan -l -acl4 10.63.5.56:/vol1/DIR1/DIR11
XCP <version>; (c) 2020 NetApp, Inc.; Licensed to XXX [NetApp Inc] until
Sun Mar 31 00:00:00 2029
xcp: ERROR: For xcp to process ACLs, please mount
10.63.5.56:/vol1/DIR1/DIR11 using the OS nfs4 client.
```

- Use the subdirectory syntax (`mount: subdirectory/qtree/.snapshot`), as shown in the example below:

```
[root@localhost ~]# ./xcp scan -l -acl4 10.63.5.56:/vol1:/DIR1/DIR11
XCP <version>; (c) 2020 NetApp, Inc.; Licensed to XXX [NetApp Inc] until
Sun Mar 31 00:00:00 2029
drwxr-xr-x --- root root 4KiB 4KiB 23h51m DIR11
rw-r--r-- --- root root    4    0 23h51m DIR11/DIR2/FILE
drwxr-xr-x --- root root 4KiB 4KiB  26m9s DIR11/DIR2/DIR22
rw-r--r-- --- root root    4    0 23h51m DIR11/FILE
drwxr-xr-x --- root root 4KiB 4KiB 23h51m DIR11/DIR2
5 scanned, 5 getacls, 5 acls, 2.04 KiB in (3.22 KiB/s), 540 out (850/s),
0s.
```

Complete the following steps to migrate ACLv4 from NetApp 7-Mode to a NetApp storage system.

1. Verify that the target ONTAP system is healthy.

```
CLUSTER::> cluster show
Node                  Health  Eligibility
--------------------- ------- ------------
CLUSTER-01            true    true
CLUSTER-02            true    true
2 entries were displayed.
CLUSTER::> node show
Node      Health Eligibility Uptime        Model       Owner    Location
--------- ------ ----------- ------------- ----------- --------
---------------
CLUSTER-01
          true   true        78 days 21:01 FAS8060              RTP
CLUSTER-02
          true   true        78 days 20:50 FAS8060              RTP
2 entries were displayed.
CLUSTER::> storage failover show
                              Takeover
Node           Partner        Possible State Description
-------------- -------------- --------
-------------------------------------
CLUSTER-01     CLUSTER-02     true     Connected to CLUSTER-02
CLUSTER-02     CLUSTER-01     true     Connected to CLUSTER-01
2 entries were displayed.
```

2. Verify that at least one nonroot aggregate exists on the target system. The aggregate is normal.

```
CLUSTER::> storage aggregate show
Aggregate     Size Available Used% State   #Vols  Nodes            RAID
Status
--------- -------- --------- ----- ------- ------ ----------------
------------
aggr0      368.4GB   17.85GB   95% online       1 CLUSTER-01
raid_dp,

normal
aggr0_CLUSTER_02_0
           368.4GB   17.85GB   95% online       1 CLUSTER-02
raid_dp,

normal
source      1.23TB    1.10TB   11% online       6 CLUSTER-01
raid_dp,

normal
3 entries were displayed.
```

If there is no data aggregate, create a new one using the `storage aggr create` command.

3. Create an SVM on the target cluster system.

```
CLUSTER::> vserver create -vserver dest -rootvolume dest_root -aggregate
poc -rootvolume-security-style mixed
[Job 647] Job succeeded:
Vserver creation completed
Verify the security style and language settings of the source
```

Verify that the SVM was successfully created.

```
CLUSTER::> vserver show -vserver dest
                                    Vserver: dest
                                Vserver Type: data
                             Vserver Subtype: default
                                Vserver UUID: 91f6d786-0063-11e5-b114-
00a09853a969
                                Root Volume: dest_root
                                  Aggregate: poc
                                 NIS Domain: -
                  Root Volume Security Style: mixed
                                 LDAP Client: -
               Default Volume Language Code: C.UTF-8
                             Snapshot Policy: default
                                     Comment:
                                Quota Policy: default
                 List of Aggregates Assigned: -
 Limit on Maximum Number of Volumes allowed: unlimited
                         Vserver Admin State: running
                   Vserver Operational State: running
   Vserver Operational State Stopped Reason: -
                           Allowed Protocols: nfs, cifs, fcp, iscsi, ndmp
                        Disallowed Protocols: -
            Is Vserver with Infinite Volume: false
                           QoS Policy Group: -
                                Config Lock: false
                               IPspace Name: Default
```

4. Remove the FCP, iSCSI, NDMP, and CIFS protocols from the target SVM.

```
CLUSTER::> vserver remove-protocols -vserver dest -protocols
fcp,iscsi,ndmp,cifs
```

Verify that NFS is the allowed protocol for this SVM.

```
CLUSTER::> vserver show -vserver dest -fields allowed-protocols
vserver allowed-protocols
------- -----------------
dest    nfs
```

5. Create a new read-write data volume on the destination SVM. Verify that the security style, language settings, and capacity requirements match the source volume.

```
CLUSTER::> vol create -vserver dest -volume dest_nfs -aggregate poc
-size 150g -type RW -state online -security-style mixed
[Job 648] Job succeeded: Successful
```

6. Create a data LIF to serve NFS client requests.

```
CLUSTER::> network interface create -vserver dest -lif dest_lif -address
10.61.73.115 -netmask 255.255.255.0 -role data -data-protocol nfs -home
-node CLUSTER-01 -home-port e0l
```

Verify that the LIF was successfully created.

```
CLUSTER::> network interface show -vserver dest
            Logical    Status     Network            Current
Current Is
Vserver     Interface  Admin/Oper Address/Mask       Node          Port
Home
----------- ---------- ---------- ------------------ -------------
------- ----
dest
            dest_lif
                         up/up    10.61.73.113/24    CLUSTER-01    e0i
true
```

7. If required, create a static route with the SVM.

```
CLUSTER::> network route create -vserver dest -destination 0.0.0.0/0
-gateway 192.168.100.111
```

Verify that the route was successfully created.

```
CLUSTER::> network route show -vserver source
Vserver             Destination     Gateway         Metric
------------------- --------------- --------------- ------
dest
                    0.0.0.0/0       10.61.73.1      20
```

8. Mount the target NFS data volume in the SVM namespace.

```
CLUSTER::> volume mount -vserver dest -volume dest_nfs -junction-path
/dest_nfs -active true
```

Verify that the volume was successfully mounted.

```
CLUSTER::> volume show -vserver dest -fields junction-path
vserver volume   junction-path
------- -------- -------------
dest    dest_nfs /dest_nfs
dest    dest_root
                 /
2 entries were displayed.
```

You can also specify the volume mount options (junction path) with the `volume create` command.

9. Start the NFS service on the target SVM.

```
CLUSTER::> vserver nfs start -vserver dest
```

Verify that the service is started and running.

```
CLUSTER::> vserver nfs status
The NFS server is running on Vserver "dest".
CLUSTER::> nfs show
Vserver: dest
        General Access:  true
                    v3:  enabled
                  v4.0:  enabled
                   4.1:  disabled
                   UDP:  enabled
                   TCP:  enabled
  Default Windows User:  -
 Default Windows Group:  -
```

10. Check that the default NFS export policy is applied to the target SVM.

```
CLUSTER::> vserver export-policy show -vserver dest
Vserver          Policy Name
---------------  -------------------
dest             default
```

11. If required, create a new custom export policy for the target SVM.

```
CLUSTER::> vserver export-policy create -vserver dest -policyname
xcpexportpolicy
```

Verify that the new custom export policy was successfully created.

```
CLUSTER::> vserver export-policy show -vserver dest
Vserver          Policy Name
---------------  -------------------
dest             default
dest             xcpexportpolicy
2 entries were displayed.
```

12. Modify the export policy rules to allow access to NFS clients.

```
CLUSTER::> export-policy rule modify -vserver dest -ruleindex 1
-policyname xcpexportpolicy -clientmatch 0.0.0.0/0 -rorule any -rwrule
any -anon 0
```

Verify that the policy rules have been modified.

```
CLUSTER::> export-policy rule show -instance
                                  Vserver: dest
                              Policy Name: xcpexportpolicy
                               Rule Index: 1
                          Access Protocol: nfs3
Client Match Hostname, IP Address, Netgroup, or Domain: 0.0.0.0/0
                           RO Access Rule: none
                           RW Access Rule: none
User ID To Which Anonymous Users Are Mapped: 65534
                  Superuser Security Types: none
              Honor SetUID Bits in SETATTR: true
                  Allow Creation of Devices: true
```

13. Verify that the client is allowed access to the volume.

```
CLUSTER::> export-policy check-access -vserver dest -volume dest_nfs
-client-ip 10.61.82.215 -authentication-method none -protocol nfs3
-access-type read-write
                                          Policy    Policy       Rule
Path                          Policy      Owner     Owner Type  Index
Access
----------------------------- ---------- --------- ---------- ------
----------
/                             xcpexportpolicy
                                          dest_root volume          1
read
/dest_nfs                     xcpexportpolicy
                                          dest_nfs  volume          1
read-write
2 entries were displayed.
```

14. Connect to the Linux NFS server. Create a mount point for the NFS exported volume.

```
[root@localhost /]# cd /mnt
[root@localhost mnt]# mkdir dest
```

15. Mount the target NFSv4 exported volume at this mount point.

> The NFSv4 volumes should be exported but not necessarily mounted by the NFS server. If they can be mounted, the XCP Linux host client mounts these volumes.

```
[root@localhost mnt]# mount -t nfs4 10.63.5.56:/vol1 /mnt/vol1
```

Verify that the mount point was successfully created.

```
[root@localhost mnt]# mount | grep nfs
10.63.5.56:/vol1 on /mnt/vol1 type nfs4
(rw,relatime,vers=4.0,rsize=65536,wsize=65536,namlen=255,hard,proto=tcp,
timeo=600,
retrans=2,sec=sys,clientaddr=10.234.152.84,local_lock=none,addr=10.63.5.
56)
```

16. Create a test file on the NFS exported mount point to enable read-write access.

```
[root@localhost dest]# touch test.txt
```

Verify the file is created.

```
[root@localhost dest]# ls -l
total 0
-rw-r--r-- 1 root bin 0 Jun  2 03:16 test.txt
```

> After the read-write test is complete, delete the file from the target NFS mount point.

17. Connect to the Linux client system in which XCP is installed. Browse to the XCP install path.

```
[root@localhost ~]# cd /linux/
[root@localhost linux]#
```

18. Query the source NFSv4 exports by running the `xcp show` command on the XCP Linux client host system.

```
root@localhost]# ./xcp show 10.63.5.56
XCP <version>; (c) 2020 NetApp, Inc.; Licensed to xxx [NetApp Inc] until
Mon Dec 31 00:00:00 2029
getting pmap dump from 10.63.5.56 port 111...
getting export list from 10.63.5.56...
sending 6 mounts and 24 nfs requests to 10.63.5.56...
== RPC Services ==
'10.63.5.56': UDP rpc services: MNT v1/2/3, NFS v3, NLM v4, PMAP v2/3/4,
STATUS v1
'10.63.5.56': TCP rpc services: MNT v1/2/3, NFS v3/4, NLM v4, PMAP
v2/3/4, STATUS v1
== NFS Exports ==
 Mounts  Errors  Server
      6       0  10.63.5.56
     Space    Files      Space    Files
      Free     Free       Used     Used Export
  94.7 MiB   19,883    324 KiB      107 10.63.5.56:/
   971 MiB   31,023   2.19 MiB       99 10.63.5.56:/vol2
   970 MiB   31,024   2.83 MiB       98 10.63.5.56:/vol1
  9.33 GiB  310,697    172 MiB      590 10.63.5.56:/vol_005
  43.3 GiB    1.10M   4.17 GiB    1.00M 10.63.5.56:/vol3
  36.4 GiB    1.10M   11.1 GiB    1.00M 10.63.5.56:/vol4
== Attributes of NFS Exports ==
drwxr-xr-x --- root root 4KiB 4KiB 6d2h 10.63.5.56:/
drwxr-xr-x --- root root 4KiB 4KiB 3d2h 10.63.5.56:/vol2
drwxr-xr-x --- root root 4KiB 4KiB 3d2h 10.63.5.56:/vol1
drwxr-xr-x --- root root 4KiB 4KiB 9d2h 10.63.5.56:/vol_005
drwxr-xr-x --- root root 4KiB 4KiB 9d4h 10.63.5.56:/vol3
drwxr-xr-x --- root root 4KiB 4KiB 9d4h 10.63.5.56:/vol4
6.09 KiB in (9.19 KiB/s), 12.2 KiB out (18.3 KiB/s), 0s.
```

19. Scan the source NFSv4 exported paths and print the statistics of their file structure.

    NetApp recommends putting the source NFSv4 exports in read-only mode during `xcp scan`, `copy`, and `sync` operations.

```
[root@localhost]# ./xcp scan -acl4 10.63.5.56:/vol1
XCP <version>; (c) 2020 NetApp, Inc.; Licensed to xxx [NetApp Inc] until
Mon Dec 31 00:00:00 2029
vol1
vol1/test/f1
vol1/test
3 scanned, 3 getacls, 3 v3perms, 1.59 KiB in (1.72 KiB/s), 696 out
(753/s), 0s.
```

20. Copy source NFSv4 exports to NFSv4 exports on the target ONTAP system.

```
[root@localhost]# ./xcp copy -acl4 -newid id1 10.63.5.56:/vol1
10.63.5.56:/vol2
XCP <version>; (c) 2020 NetApp, Inc.; Licensed to xxx [NetApp Inc] until
Mon Dec 31 00:00:00 2029
3 scanned, 2 copied, 3 indexed, 3 getacls, 3 v3perms, 1 setacl, 14.7 KiB
in (11.7 KiB/s), 61 KiB out (48.4 KiB/s), 1s..
```

21. After `copy` is complete, verify that the source and destination NFSv4 exports have identical data. Run the `xcp verify` command.

```
[root@localhost]# ./xcp verify -acl4 -noid 10.63.5.56:/vol1
10.63.5.56:/vol2
XCP <version>; (c) 2020 NetApp, Inc.; Licensed to xxx [NetApp Inc] until
Mon Dec 31 00:00:00 2029
3 scanned, 100% found (0 have data), 100% verified (data, attrs, mods,
acls), 6 getacls, 6 v3perms, 2.90 KiB in (4.16 KiB/s), 2.94 KiB out
(4.22 KiB/s), 0s.
```

If `verify` finds differences between the source and destination data, then the error `no such file or directory` is reported in the summary. To fix that issue, run the `xcp sync` command to copy the source changes to the destination.

22. Before and during the cutover, run `verify` again. If the source has new or updated data, then perform incremental updates. Run the `xcp sync` command.

```
[root@ root@localhost]# ./xcp sync -id id1
XCP <version>; (c) 2020 NetApp, Inc.; Licensed to xxx [NetApp Inc] until
Mon Dec 31 00:00:00 2029
xcp: Index: {source: 10.63.5.56:/vol1, target: 10.63.5.56:/vol2}
3 reviewed, 3 checked at source, no changes, 3 reindexed, 25.6 KiB in
(32.3 KiB/s), 23.3 KiB out (29.5 KiB/s), 0s.
```

For this operation, the previous copy index name or number is required.

23. To resume a previously interrupted `copy` operation, run the `xcp resume` command.

```
[root@localhost]# ./xcp resume -id id1
XCP <version>; (c) 2020 NetApp, Inc.; Licensed to xxx [NetApp Inc] until
Mon Dec 31 00:00:00 2029
xcp: Index: {source: 10.63.5.56:/vol3, target: 10.63.5.56:/vol4}
xcp: resume 'id1': Reviewing the incomplete index...
xcp: diff 'id1': Found 0 completed directories and 8 in progress
39,899 reviewed, 1.64 MiB in (1.03 MiB/s), 14.6 KiB out (9.23 KiB/s),
1s.
xcp: resume 'id1': Starting second pass for the in-progress
directories...
xcp: resume 'id1': Resuming the in-progress directories...
xcp: resume 'id1': Resumed command: copy {-acl4: True}
xcp: resume 'id1': Current options: {-id: 'id1'}
xcp: resume 'id1': Merged options: {-acl4: True, -id: 'id1'}
xcp: resume 'id1': Values marked with a * include operations before
resume
 86,404 scanned, 39,912 copied, 39,899 indexed, 13.0 MiB in (2.60
MiB/s), 78.4 KiB out (15.6 KiB/s), 5s 86,404 scanned, 39,912 copied,
39,899 indexed, 13.0 MiB in (0/s), 78.4 KiB out (0/s), 10s
1.00M scanned, 100% found (1M have data), 1M compared, 100% verified
(data, attrs, mods, acls), 2.00M getacls, 202 v3perms, 1.00M same acls,
2.56 GiB in (2.76 MiB/s), 485 MiB out (524 KiB/s), 15m48s.
```

After `resume` finishes copying files, run `verify` again so that the source and destination storage have identical data.

Transitioning 7-Mode SMB storage to ONTAP for CIFS data

This section covers the step-by-step procedure for transitioning a source 7-Mode SMB share to an ONTAP system.

NetApp assumes that the 7-Mode and ONTAP systems are SMB licensed. The destination SVM is created, the source and destination SMB shares are exported, and XCP is installed and licensed.

1. Scan the SMB shares for the files and directories.

```
C:\xcp>xcp scan -stats \\10.61.77.189\performance_SMB_home_dirs
XCP SMB 1.6; (c) 2020 NetApp, Inc.; Licensed to xxxx xxxx[NetApp Inc]
until Mon Dec 31 00:00:00 2029
== Maximum Values ==
Size Depth Namelen Dirsize
15.6MiB 2 8 200
== Average Values ==
Size Depth Namelen Dirsize
540KiB 2 7 81
== Top File Extensions ==
.txt .tmp
5601 2200
== Number of files ==
empty <8KiB 8-64KiB 64KiB-1MiB 1-10MiB 10-100MiB >100MiB
46 6301 700 302 200 252
== Space used ==
empty <8KiB 8-64KiB 64KiB-1MiB 1-10MiB 10-100MiB >100MiB
0 6.80MiB 8.04MiB 120MiB 251MiB 3.64GiB 0
== Directory entries ==
empty 1-10 10-100 100-1K 1K-10K >10k
18 1 77 1
== Depth ==
0-5 6-10 11-15 16-20 21-100 >100
7898
== Modified ==
>1 year >1 month 1-31 days 1-24 hrs <1 hour <15 mins future
2167 56 322 5353
== Created ==
>1 year >1 month 1-31 days 1-24 hrs <1 hour <15 mins future
2171 54 373 5300
Total count: 7898
Directories: 97
Regular files: 7801
Symbolic links:
Junctions:
Special files:
Total space for regular files: 4.02GiB
Total space for directories: 0
Total space used: 4.02GiB
7,898 scanned, 0 errors, 0s
```

2. Copy the files (with or without ACL) from the source to the destination SMB share. The following example shows a copy with ACL.

```
C:\xcp>xcp copy -acl -fallback-user "DOMAIN\gabi" -fallback-group
"DOMAIN\Group" \\10.61.77.189\performance_SMB_home_dirs
\\10.61.77.56\performance_SMB_home_dirs
XCP SMB 1.6; (c) 2020 NetApp, Inc.; Licensed to xxxx xxxx[NetApp Inc]
until Mon Dec 31 00:00:00 2029
7,898 scanned, 0 errors, 0 skipped, 184 copied, 96.1MiB (19.2MiB/s), 5s
7,898 scanned, 0 errors, 0 skipped, 333 copied, 519MiB (84.7MiB/s), 10s
7,898 scanned, 0 errors, 0 skipped, 366 copied, 969MiB (89.9MiB/s), 15s
7,898 scanned, 0 errors, 0 skipped, 422 copied, 1.43GiB (99.8MiB/s), 20s
7,898 scanned, 0 errors, 0 skipped, 1,100 copied, 1.69GiB (52.9MiB/s),
25s
7,898 scanned, 0 errors, 0 skipped, 1,834 copied, 1.94GiB (50.4MiB/s),
30s
7,898 scanned, 0 errors, 0 skipped, 1,906 copied, 2.43GiB (100MiB/s),
35s
7,898 scanned, 0 errors, 0 skipped, 2,937 copied, 2.61GiB (36.6MiB/s),
40s
7,898 scanned, 0 errors, 0 skipped, 2,969 copied, 3.09GiB (100.0MiB/s),
45s
7,898 scanned, 0 errors, 0 skipped, 3,001 copied, 3.58GiB (100.0MiB/s),
50s
7,898 scanned, 0 errors, 0 skipped, 3,298 copied, 4.01GiB (88.0MiB/s),
55s
7,898 scanned, 0 errors, 0 skipped, 5,614 copied, 4.01GiB (679KiB/s),
1m0s
7,898 scanned, 0 errors, 0 skipped, 7,879 copied, 4.02GiB (445KiB/s),
1m5s
7,898 scanned, 0 errors, 0 skipped, 7,897 copied, 4.02GiB (63.2MiB/s),
1m5s
```

If there is no data aggregate, create a new one using the storage `aggr create` command.

3. Sync the files on the source and destination.

```
C:\xcp>xcp sync -acl -fallback-user "DOMAIN\gabi" -fallback-group
"DOMAIN\Group" \\10.61.77.189\performance_SMB_home_dirs
\\10.61.77.56\performance_SMB_home_dirs
XCP SMB 1.6; (c) 2020 NetApp, Inc.; Licensed to xxxx xxxx[NetApp Inc]
until Mon Dec 31 00:00:00 2029
10,796 scanned, 4,002 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 5s
15,796 scanned, 8,038 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 10s
15,796 scanned, 8,505 compared, 0 errors, 0 skipped, 0 copied, 0
```

```
removed, 15s
15,796 scanned, 8,707 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 20s
15,796 scanned, 8,730 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 25s
15,796 scanned, 8,749 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 30s
15,796 scanned, 8,765 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 35s
15,796 scanned, 8,786 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 40s
15,796 scanned, 8,956 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 45s
8 XCP v1.6 User Guide © 2020 NetApp, Inc. All rights reserved.
Step Description
15,796 scanned, 9,320 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 50s
15,796 scanned, 9,339 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 55s
15,796 scanned, 9,363 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 1m0s
15,796 scanned, 10,019 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 1m5s
15,796 scanned, 10,042 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 1m10s
15,796 scanned, 10,059 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 1m15s
15,796 scanned, 10,075 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 1m20s
15,796 scanned, 10,091 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 1m25s
15,796 scanned, 10,108 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 1m30s
15,796 scanned, 10,929 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 1m35s
15,796 scanned, 12,443 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 1m40s
15,796 scanned, 13,963 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 1m45s
15,796 scanned, 15,488 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 1m50s
15,796 scanned, 15,796 compared, 0 errors, 0 skipped, 0 copied, 0
removed, 1m51s
```

4. Verify that the files were copied correctly.

```
C:\xcp> xcp verify \\10.61.77.189\performance_SMB_home_dirs
\\10.61.77.56\performance_SMB_home_dir
XCP SMB 1.6; (c) 2020 NetApp, Inc.; Licensed to xxxx xxxx[NetApp Inc]
until Mon Dec 31 00:00:00 2029
8 compared, 8 same, 0 different, 0 missing, 5s
24 compared, 24 same, 0 different, 0 missing, 10s
41 compared, 41 same, 0 different, 0 missing, 15s
63 compared, 63 same, 0 different, 0 missing, 20s
86 compared, 86 same, 0 different, 0 missing, 25s
423 compared, 423 same, 0 different, 0 missing, 30s
691 compared, 691 same, 0 different, 0 missing, 35s
1,226 compared, 1,226 same, 0 different, 0 missing, 40s
1,524 compared, 1,524 same, 0 different, 0 missing, 45s
1,547 compared, 1,547 same, 0 different, 0 missing, 50s
1,564 compared, 1,564 same, 0 different, 0 missing, 55s
2,026 compared, 2,026 same, 0 different, 0 missing, 1m0s
2,045 compared, 2,045 same, 0 different, 0 missing, 1m5s
2,061 compared, 2,061 same, 0 different, 0 missing, 1m10s
2,081 compared, 2,081 same, 0 different, 0 missing, 1m15s
2,098 compared, 2,098 same, 0 different, 0 missing, 1m20s
2,116 compared, 2,116 same, 0 different, 0 missing, 1m25s
3,232 compared, 3,232 same, 0 different, 0 missing, 1m30s
4,817 compared, 4,817 same, 0 different, 0 missing, 1m35s
6,267 compared, 6,267 same, 0 different, 0 missing, 1m40s
7,844 compared, 7,844 same, 0 different, 0 missing, 1m45s
7,898 compared, 7,898 same, 0 different, 0 missing, 1m45s,cifs
```

Next: CIFS data migration with ACLs From a source storage box to ONTAP.

CIFS data migration with ACLs from a source storage box to ONTAP

Previous: Data migration from 7-Mode to ONTAP.

This section covers the step-by-step procedure for migrating CIFS data with security information from a source to a target ONTAP system.

1. Verify that the target ONTAP system is healthy.

```
C1_sti96-vsim-ucs540m_cluster::> cluster show
Node                  Health  Eligibility
--------------------- ------- ------------
sti96-vsim-ucs540m    true    true
sti96-vsim-ucs540n    true    true
2 entries were displayed.
C1_sti96-vsim-ucs540m_cluster::> node show
Node      Health Eligibility Uptime        Model       Owner    Location
--------- ------ ----------- ------------- ----------- --------
---------------
sti96-vsim-ucs540m
          true   true        15 days 21:17 SIMBOX      ahammed  sti
sti96-vsim-ucs540n
          true   true        15 days 21:17 SIMBOX      ahammed  sti
2 entries were displayed.
cluster::>  storage failover show
                              Takeover
Node           Partner        Possible State Description
-------------- -------------- --------
-------------------------------------
sti96-vsim-ucs540m
               sti96-vsim-    true     Connected to sti96-vsim-ucs540n
               ucs540n
sti96-vsim-ucs540n
               sti96-vsim-    true     Connected to sti96-vsim-ucs540m
               ucs540m
2 entries were displayed.
C1_sti96-vsim-ucs540m_cluster::>
```

2. Verify that at least one nonroot aggregate exists on the target system. The aggregate is normal.

```
cluster::*> storage aggregate show
Aggregate     Size Available Used% State   #Vols  Nodes            RAID
Status
--------- -------- --------- ----- ------- ------ ----------------
------------
aggr0_sti96_vsim_ucs540o
            7.58GB   373.3MB   95% online       1 sti96-vsim-
raid_dp,
                                                  ucs540o
normal
aggr0_sti96_vsim_ucs540p
            7.58GB   373.3MB   95% online       1 sti96-vsim-
raid_dp,
                                                  ucs540p
normal
aggr_001   103.7GB   93.63GB   10% online       1 sti96-vsim-
raid_dp,
                                                  ucs540p
normal
sti96_vsim_ucs540o_aggr1
           23.93GB   23.83GB    0% online       1 sti96-vsim-
raid_dp,
                                                  ucs540o
normal
sti96_vsim_ucs540p_aggr1
           23.93GB   23.93GB    0% online       0 sti96-vsim-
raid_dp,
                                                  ucs540p
normal
5 entries were displayed.
```

If there is no data aggregate, create a new one using the `storage aggr create` command.

3. Create an SVM on the target cluster system.

```
cluster::*> vserver create -vserver vs1 -rootvolume root_vs1 -aggregate
sti96_vsim_ucs540o_aggr1 -rootvolume-security-style mixed

Verify that the SVM was successfully created.
C2_sti96-vsim-ucs540o_cluster::*>  vserver show -vserver vs1
                                    Vserver: vs1
                                Vserver Type: data
                             Vserver Subtype: default
                                Vserver UUID: f8bc54be-d91b-11e9-b99c-
005056a7e57e
                                Root Volume: root_vs1
                                  Aggregate: sti96_vsim_ucs540o_aggr1
                                 NIS Domain: NSQA-RTP-NIS1
                  Root Volume Security Style: mixed
                                 LDAP Client: esisconfig
               Default Volume Language Code: C.UTF-8
                             Snapshot Policy: default
                               Data Services: data-nfs, data-cifs,
                                              data-flexcache, data-iscsi
                                    Comment: vs1
                                Quota Policy: default
                 List of Aggregates Assigned: -
 Limit on Maximum Number of Volumes allowed: unlimited
                        Vserver Admin State: running
                  Vserver Operational State: running
   Vserver Operational State Stopped Reason: -
                          Allowed Protocols: nfs, cifs, fcp, iscsi, ndmp
                       Disallowed Protocols: -
            Is Vserver with Infinite Volume: false
                           QoS Policy Group: -
                        Caching Policy Name: -
                                 Config Lock: false
             Volume Delete Retention Period: 0
                                IPspace Name: Default
                           Foreground Process: -
                  Is Msid Preserved for DR: false
Force start required to start Destination in muliple IDP fan-out case:
false
                    Logical Space Reporting: false
                  Logical Space Enforcement: false
```

4. Create a new read-write data volume on the destination SVM. Verify that the security style, language settings, and capacity requirements match the source volume.

```
CLUSTER CLUSTER::> vol create -vserver vs1 -volume dest_vol -aggregate
aggr_001 -size 150g type RW -state online -security-style ntfs
```

5. Create a data LIF to serve SMB client requests.

```
CLUSTER::> network interface create -vserver vs1 -lif sti96-vsim-
ucs540o_data1  -address 10.237.165.87 -netmask 255.255.240.0 -role data
-data-protocol nfs,cifs -home-node sti96-vsim-ucs540o  -home-port e0d
```

Verify that the LIF was successfully created.

```
cluster::*>  network interface show -vserver vs1
            Logical    Status     Network            Current
Current Is
Vserver     Interface  Admin/Oper Address/Mask       Node          Port
Home
----------- ---------- ---------- ------------------ -------------
------- ----
vs1
            sti96-vsim-ucs540o_data1
                         up/up    10.237.165.87/20   sti96-vsim-ucs540o
                                                                  e0d
true
```

6. If required, create a static route with the SVM.

```
Network route create -vserver dest -destination 0.0.0.0/0 -gateway
10.237.160.1
```

Verify that the route was successfully created.

```
cluster::*>  network route show -vserver vs1
Vserver             Destination     Gateway         Metric
------------------- --------------- --------------- ------
vs1
                    0.0.0.0/0       10.237.160.1    20
                    ::/0            fd20:8b1e:b255:9155::1
                                                    20
2 entries were displayed.
```

7. Mount the target data volume in the SVM namespace.

```
CLUSTER::> volume mount -vserver vs1 -volume dest_vol  -junction-path
/dest_vol -active true
```

Verify that the volume is successfully mounted.

```
cluster::*> volume show -vserver vs1  -fields junction-path
vserver volume   junction-path
------- -------- -------------
vs1     dest_vol /dest_vol
vs1     root_vs1 /
2 entries were displayed.
Note: You can also specify the volume mount options (junction path) with
the volume create command.
```

8. Start the CIFs service on the target SVM.

```
cluster::*> vserver cifs start -vserver vs1
Warning: The admin status of the CIFS server for Vserver "vs1" is
already "up".
```

Verify that the service is started and running.

```
cluster::*>
Verify the service is started and running
C2_sti96-vsim-ucs540o_cluster::*> cifs show
            Server          Status    Domain/Workgroup Authentication
Vserver     Name            Admin     Name             Style
----------- --------------- --------- ---------------- --------------
vs1         D60AB15C2AFC4D6 up        CTL              domain
```

9. Verify that the default export policy is applied to the target SVM.

```
CLUSTER::> vserver export-policy show -vserver dest
Vserver          Policy Name
---------------  -------------------
dest             default
```

If required, create a new custom export policy for the target SVM.

```
CLUSTER::> vserver export-policy create -vserver vs1 -policyname
xcpexport
```

10. Modify the export policy rules to allow access to CIFs clients.

```
CLUSTER::> export-policy rule modify -vserver dest -ruleindex 1
-policyname xcpexportpolicy -clientmatch 0.0.0.0/0 -rorule any -rwrule
any -anon 0
```

Verify that the policy rules are modified.

```
cluster::*> export-policy rule show -instance
                                    Vserver: vs1
                                Policy Name: default
                                 Rule Index: 1
                            Access Protocol: any
List of Client Match Hostnames, IP Addresses, Netgroups, or Domains:
0.0.0.0/0
                             RO Access Rule: any
                             RW Access Rule: any
User ID To Which Anonymous Users Are Mapped: 65534
                   Superuser Security Types: any
               Honor SetUID Bits in SETATTR: true
                  Allow Creation of Devices: true
                NTFS Unix Security Options: fail
         Vserver NTFS Unix Security Options: use_export_policy
                     Change Ownership Mode: restricted
              Vserver Change Ownership Mode: use_export_policy
                                Policy ID: 12884901889
                                  Vserver: vs1
                               Policy Name: default
                                Rule Index: 2
                            Access Protocol: any
List of Client Match Hostnames, IP Addresses, Netgroups, or Domains:
0:0:0:0:0:0:0:0/0
                             RO Access Rule: any
                             RW Access Rule: any
User ID To Which Anonymous Users Are Mapped: 65534
                   Superuser Security Types: none
               Honor SetUID Bits in SETATTR: true
                  Allow Creation of Devices: true
                NTFS Unix Security Options: fail
         Vserver NTFS Unix Security Options: use_export_policy
                     Change Ownership Mode: restricted
              Vserver Change Ownership Mode: use_export_policy
                                Policy ID: 12884901889
2 entries were displayed.
```

11. Verify that the client is allowed access to the volume.

```
cluster::*> export-policy check-access -vserver vs1 -volume dest_vol
-client-ip 10.234.17.81 -authentication-method none -protocol cifs
-access-type read-write
                                          Policy    Policy       Rule
Path                          Policy      Owner     Owner Type  Index
Access
----------------------------- ---------- --------- ---------- ------
----------
/                             default     root_vs1  volume          1
read
/dest_vol                     default     dest_vol  volume          1
read-write
2 entries were displayed.
```

12. Connect to the Windows client system where XCP is installed. Browse to the XCP install path.

```
C:\WRSHDNT>dir c:\netapp\xcp
dir c:\netapp\xcp
 Volume in drive C has no label.
 Volume Serial Number is 5C04-C0C7
 Directory of c:\netapp\xcp
09/18/2019  09:30 AM    <DIR>          .
09/18/2019  09:30 AM    <DIR>          ..
06/25/2019  06:27 AM               304 license
09/18/2019  09:30 AM    <DIR>          Logs
09/29/2019  08:45 PM        12,143,105 xcp.exe
               2 File(s)     12,143,409 bytes
               3 Dir(s)  29,219,549,184 bytes free
```

13. Query the source node SMB exports by running the `xcp show` command on the XCP Windows client host system.

```
C:\WRSHDNT>c:\netapp\xcp\xcp show \\10.237.165.71
c:\netapp\xcp\xcp show \\10.237.165.71
XCP SMB 1.6; (c) 2020 NetApp, Inc.; Licensed to XXX [NetApp Inc] until
Mon Dec 31 00:00:00 2029
 Shares   Errors   Server
      6        0            10.237.165.71
== SMB Shares ==
 Space   Space   Current
 Free    Used    Connections Share Path                   Folder Path
 9.50GiB 4.57MiB 1           \\10.237.165.71\source_share C:\source_vol
 94.3MiB 716KiB  0           \\10.237.165.71\ROOTSHARE    C:\
 0       0       N/A         \\10.237.165.71\ipc$         N/A
 94.3MiB 716KiB  0           \\10.237.165.71\c$           C:\
== Attributes of SMB Shares ==
 Share                              Types
Remark
 source_share                       DISKTREE
 test share                         DISKTREE
 test_sh                            DISKTREE
 ROOTSHARE                          DISKTREE             \"Share mapped
to top of Vserver global namespace, created bydeux_init \"
 ipc$                               PRINTQ,SPECIAL,IPC,DEVICE
 c$                                 SPECIAL
== Permissions of SMB Shares ==
 Share                              Entity
Type
 source_share                       Everyone
Allow/Full Control
ROOTSHARE                          Everyone
Allow/Full Control
 ipc$                               Everyone
Allow/Full Control
 c$                                 Administrators
Allow/Full Control/
```

14. Run the `help` command for copy.

```
C:\WRSHDNT>c:\netapp\xcp\xcp help copy
c:\netapp\xcp\xcp help copy
XCP SMB 1.6; (c) 2020 NetApp, Inc.; Licensed to XXX [NetApp Inc] until
Mon Dec 31 00:00:00 2029
usage: xcp copy [-h] [-v] [-parallel <n>] [-match <filter>] [-preserve-
atime]
                [-acl] [-fallback-user FALLBACK_USER]
                [-fallback-group FALLBACK_GROUP] [-root]
                source target
positional arguments:
  source
  target
optional arguments:
  -h, --help            show this help message and exit
  -v                    increase debug verbosity
  -parallel <n>         number of concurrent processes (default: <cpu-
count>)
  -match <filter>       only process files and directories that match
the
                        filter (see `xcp help -match` for details)
  -preserve-atime       restore last accessed date on source
  -acl                  copy security information
  -fallback-user FALLBACK_USER
                        the name of the user on the target machine to
receive
                        the permissions of local (non-domain) source
machine
                        users (eg. domain\administrator)
  -fallback-group FALLBACK_GROUP
                        the name of the group on the target machine to
receive
                        the permissions of local (non-domain) source
machine
                        groups (eg. domain\administrators)
  -root                 copy acl for root directorytxt
```

15. On the target ONTAP system, get the list of local user and local group names that you need to provide as values for the `fallback-user` and `fallback-group` arguments path.

```
cluster::*> local-user show
  (vserver cifs users-and-groups local-user show)
Vserver      User Name                   Full Name
Description
------------ --------------------------- --------------------
-------------
vs1          D60AB15C2AFC4D6\Administrator
                                                                Built-in
administrator account
C2_sti96-vsim-ucs540o_cluster::*>  local-group show
  (vserver cifs users-and-groups local-group show)
Vserver        Group Name                        Description
-------------- --------------------------------
----------------------------
vs1            BUILTIN\Administrators            Built-in Administrators
group
vs1            BUILTIN\Backup Operators          Backup Operators group
vs1            BUILTIN\Guests                    Built-in Guests Group
vs1            BUILTIN\Power Users               Restricted
administrative privileges
vs1            BUILTIN\Users                     All users
5 entries were displayed
```

16. To migrate the CIFs data with ACLs from the source to target, run the `xcp copy` command with the `-acl` and `-fallback-user/group` options.

    For the `fallback-user/group` options, specify any user or group that can be found in Active Directory or local user/group to target system.

```
C:\WRSHDNT>c:\netapp\xcp\xcp copy -acl -fallback-user
D60AB15C2AFC4D6\Administrator -fallback-group BUILTIN\Users
\\10.237.165.79\source_share \\10.237.165.89\dest_share
c:\netapp\xcp\xcp copy -acl -fallback-user D60AB15C2AFC4D6\Administrator
-fallback-group BUILTIN\Users  \\10.237.165.79\source_share
\\10.237.165.89\dest_share
XCP SMB 1.6; (c) 2020 NetApp, Inc.; Licensed to XXX [NetApp Inc] until
Mon Dec 31 00:00:00 2029
753 scanned, 0 errors, 0 skipped, 0 copied, 0 (0/s), 8s
753 scanned, 0 errors, 0 skipped, 0 copied, 0 (0/s), 13s
753 scanned, 0 errors, 0 skipped, 0 copied, 0 (0/s), 18s
ERROR failed to obtain fallback security principal "BUILTIN\Users".
Please check if the principal with the name "BUILTIN\Users" exists on
"D60AB15C2AFC4D6".
ERROR failed to obtain fallback security principal
"D60AB15C2AFC4D6\Administrator". Please check if the principal with the
name "D60AB15C2AFC4D6\Administrator" exists on "D60AB15C2AFC4D6".
ERROR failed to obtain fallback security principal "BUILTIN\Users".
Please check if the principal with the name "BUILTIN\Users" exists on
"D60AB15C2AFC4D6".
ERROR failed to obtain fallback security principal "BUILTIN\Users".
Please check if the principal with the name "BUILTIN\Users" exists on
"D60AB15C2AFC4D6".
ERROR failed to obtain fallback security principal "BUILTIN\Users".
Please check if the principal with the name "BUILTIN\Users" exists on
"D60AB15C2AFC4D6".
753 scanned, 0 errors, 0 skipped, 0 copied, 0 (0/s), 23s
ERROR failed to obtain fallback security principal
"D60AB15C2AFC4D6\Administrator". Please check if the principal with the
name "D60AB15C2AFC4D6\Administrator" exists on "D60AB15C2AFC4D6".
ERROR failed to obtain fallback security principal
"D60AB15C2AFC4D6\Administrator". Please check if the principal with the
name "D60AB15C2AFC4D6\Administrator" exists on "D60AB15C2AFC4D6".
ERROR failed to obtain fallback security principal
"D60AB15C2AFC4D6\Administrator". Please check if the principal with the
name "D60AB15C2AFC4D6\Administrator" exists on "D60AB15C2AFC4D6".
753 scanned, 0 errors, 0 skipped, 0 copied, 0 (0/s), 28s
753 scanned, 0 errors, 0 skipped, 249 copied, 24.0KiB (4.82KiB/s), 33s
753 scanned, 0 errors, 0 skipped, 744 copied, 54.4KiB (6.07KiB/s), 38s
753 scanned, 0 errors, 0 skipped, 746 copied, 54.5KiB (20/s), 43s
753 scanned, 0 errors, 0 skipped, 752 copied, 54.7KiB (1.23KiB/s), 44s
C:\WRSHDNT>
```

17. If `xcp copy` results in the error message `ERROR failed to obtain fallback security principal`, add the destination box in the hosts file (`C:\Windows\System32\drivers\etc\hosts`).

Use the following format for the NetApp storage destination box entry.

```
<data vserver data interface ip> 1 or more white spaces <cifs server
name>
```

```
cluster::*> cifs show
            Server          Status    Domain/Workgroup Authentication
Vserver     Name            Admin     Name             Style
----------- --------------- --------- ---------------- --------------
vs1         D60AB15C2AFC4D6 up        CTL              domain
C2_sti96-vsim-ucs540o_cluster::*> network interface show
            Logical    Status     Network            Current
Current Is
Cluster
            sti96-vsim-ucs540p_clus1
                         up/up    192.168.148.136/24 sti96-vsim-ucs540p
                                                              e0a
true
            sti96-vsim-ucs540p_clus2
                         up/up    192.168.148.137/24 sti96-vsim-ucs540p
                                                              e0b
true
vs1
            sti96-vsim-ucs540o_data1
                         up/up    10.237.165.87/20   sti96-vsim-ucs540o
                                                              e0d
true
            sti96-vsim-ucs540o_data1_inet6
                         up/up    fd20:8b1e:b255:9155::583/64
                                                     sti96-vsim-ucs540o
                                                              e0d
true
            sti96-vsim-ucs540o_data2
                         up/up    10.237.165.88/20   sti96-vsim-ucs540o
                                                              e0e
true
10.237.165.87  D60AB15C2AFC4D6  -> destination box entry to be added in
hosts file.
```

18. If you still get the error message `ERROR failed to obtain fallback security principal` after adding the destination box entry in the hosts files, then the user/group does not exist in the target system.

```
C:\WRSHDNT>c:\netapp\xcp\xcp copy -acl -fallback-user
D60AB15C2AFC4D6\unknown_user -fallback-group BUILTIN\Users
\\10.237.165.79\source_share \\10.237.165.89\dest_share
c:\netapp\xcp\xcp copy -acl -fallback-user D60AB15C2AFC4D6\unknown_user
-fallback-group BUILTIN\Users  \\10.237.165.79\source_share
\\10.237.165.89\dest_share
XCP SMB 1.6; (c) 2020 NetApp, Inc.; Licensed to XXX [NetApp Inc] until
Mon Dec 31 00:00:00 2029
ERROR failed to obtain fallback security principal
"D60AB15C2AFC4D6\unknown_user". Please check if the principal with the
name "D60AB15C2AFC4D6\unknown_user" exists on "D60AB15C2AFC4D6".
ERROR failed to obtain fallback security principal
"D60AB15C2AFC4D6\unknown_user". Please check if the principal with the
name "D60AB15C2AFC4D6\unknown_user" exists on "D60AB15C2AFC4D6".
ERROR failed to obtain fallback security principal
"D60AB15C2AFC4D6\unknown_user". Please check if the principal with the
name "D60AB15C2AFC4D6\unknown_user" exists on "D60AB15C2AFC4D6".
ERROR failed to obtain fallback security principal
"D60AB15C2AFC4D6\unknown_user". Please check if the principal with the
name "D60AB15C2AFC4D6\unknown_user" exists on "D60AB15C2AFC4D6".
753 scanned, 0 errors, 0 skipped, 0 copied, 0 (0/s), 5s
753 scanned, 0 errors, 0 skipped, 0 copied, 0 (0/s), 10s
753 scanned, 0 errors, 0 skipped, 0 copied, 0 (0/s), 15s
753 scanned, 0 errors, 0 skipped, 284 copied, 27.6KiB (5.54KiB/s), 20s
753 scanned, 0 errors, 0 skipped, 752 copied, 54.7KiB (2.44KiB/s), 22s
C:\WRSHDNT>
```

19. Use `xcp copy` to migrate CIFs data with ACLs (with or without the root folder).

    Without the root folder, run the following commands:

```
C:\WRSHDNT>c:\netapp\xcp\xcp copy -acl -fallback-user
D60AB15C2AFC4D6\Administrator -fallback-group BUILTIN\Users
\\10.237.165.79\source_share \\10.237.165.89\dest_share
c:\netapp\xcp\xcp copy -acl -fallback-user
D60AB15C2AFC4D6\Administrator -fallback-group BUILTIN\Users
\\10.237.165.79\source_share \\10.237.165.89\dest_share
XCP SMB 1.6; (c) 2020 NetApp, Inc.; Licensed to XXX [NetApp Inc] until
Mon Dec 31 00:00:00 2029
753 scanned, 0 errors, 0 skipped, 0 copied, 0 (0/s), 5s
753 scanned, 0 errors, 0 skipped, 0 copied, 0 (0/s), 10s
753 scanned, 0 errors, 0 skipped, 0 copied, 0 (0/s), 15s
753 scanned, 0 errors, 0 skipped, 210 copied, 20.4KiB (4.08KiB/s), 20s
753 scanned, 0 errors, 0 skipped, 752 copied, 54.7KiB (2.38KiB/s), 22s
C:\WRSHDNT>
```

With the root folder, run the following commands:

```
C:\WRSHDNT>c:\netapp\xcp\xcp copy -acl -root  -fallback-user
D60AB15C2AFC4D6\Administrator -fallback-group BUILTIN\Users
\\10.237.165.79\source_share \\10.237.165.89\dest_share
c:\netapp\xcp\xcp copy -acl -root  -fallback-user
D60AB15C2AFC4D6\Administrator -fallback-group BUILTIN\Users
\\10.237.165.79\source_share \\10.237.165.89\dest_share
XCP SMB 1.6; (c) 2020 NetApp, Inc.; Licensed to XXX [NetApp Inc] until
Mon Dec 31 00:00:00 2029
753 scanned, 0 errors, 0 skipped, 0 copied, 0 (0/s), 5s
753 scanned, 0 errors, 0 skipped, 0 copied, 0 (0/s), 10s
753 scanned, 0 errors, 0 skipped, 0 copied, 0 (0/s), 15s
753 scanned, 0 errors, 0 skipped, 243 copied, 23.6KiB (4.73KiB/s), 20s
753 scanned, 0 errors, 0 skipped, 752 copied, 54.7KiB (6.21KiB/s), 25s
753 scanned, 0 errors, 0 skipped, 752 copied, 54.7KiB (0/s), 30s
753 scanned, 0 errors, 0 skipped, 752 copied, 54.7KiB (0/s), 35s
753 scanned, 0 errors, 0 skipped, 752 copied, 54.7KiB (0/s), 40s
753 scanned, 0 errors, 0 skipped, 752 copied, 54.7KiB (0/s), 45s
753 scanned, 0 errors, 0 skipped, 752 copied, 54.7KiB (0/s), 50s
753 scanned, 0 errors, 0 skipped, 752 copied, 54.7KiB (0/s), 55s
753 scanned, 0 errors, 0 skipped, 752 copied, 54.7KiB (0/s), 1m0s
753 scanned, 0 errors, 0 skipped, 752 copied, 54.7KiB (0/s), 1m5s
753 scanned, 0 errors, 0 skipped, 752 copied, 54.7KiB (817/s), 1m8s
C:\WRSHDNT>
```

Next: Best practice guidelines and recommendations.

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