NetApp

Get started with XCP

XCP

NetApp
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XCP v1.8 Documentation

Welcome to the XCP Information Library. Here you will find documentation for XCP v1.8 software including how to install, configure, and use XCP.

Documentation for earlier releases of XCP are available on the NetApp Support Site.

XCP v1.8.1 Release Notes

The XCP v1.8.1 Release Notes describe new features, upgrade notes, fixed issues, known limitations, and known issues.

You are required to sign on to the NetApp Support Site to access the Release Notes.

Get started with XCP

NetApp XCP allows for scalable and high-performance data migrations.

Learn about XCP

NetApp XCP is a client-based software for any-to-NetApp and NetApp-to-NetApp data migrations and file analytics. XCP is designed to scale and achieve greater performance by utilizing all the available system resources to manage high-volume datasets and high-performance migrations. XCP helps you get complete visibility into the file system with the option to generate customer reports. Thanks to the matching and formatting capabilities, you can customize the reports to match any reporting needs.

Use XCP for NFS or SMB systems as one of the following solutions:

- Migration solution
- File Analytics solution

XCP is command-line software available in a single package supporting NFS and SMB protocols. XCP is available as a Linux binary for NFS datasets and is available as a Windows executable for SMB datasets.

XCP File Analytics is host-based software that detects file shares, runs scans on the file system, and provides a dashboard for file analytics. XCP File Analytics works for both NetApp and third-party systems and runs on Linux or Windows hosts to provide analytics for NFS and SMB exported file systems. The binary for the file analytics GUI is included in the single package supporting NFS and SMB protocols.

The XCP CLI is robust. For more information, download *XCP Reference* on the XCP site.

XCP workflow
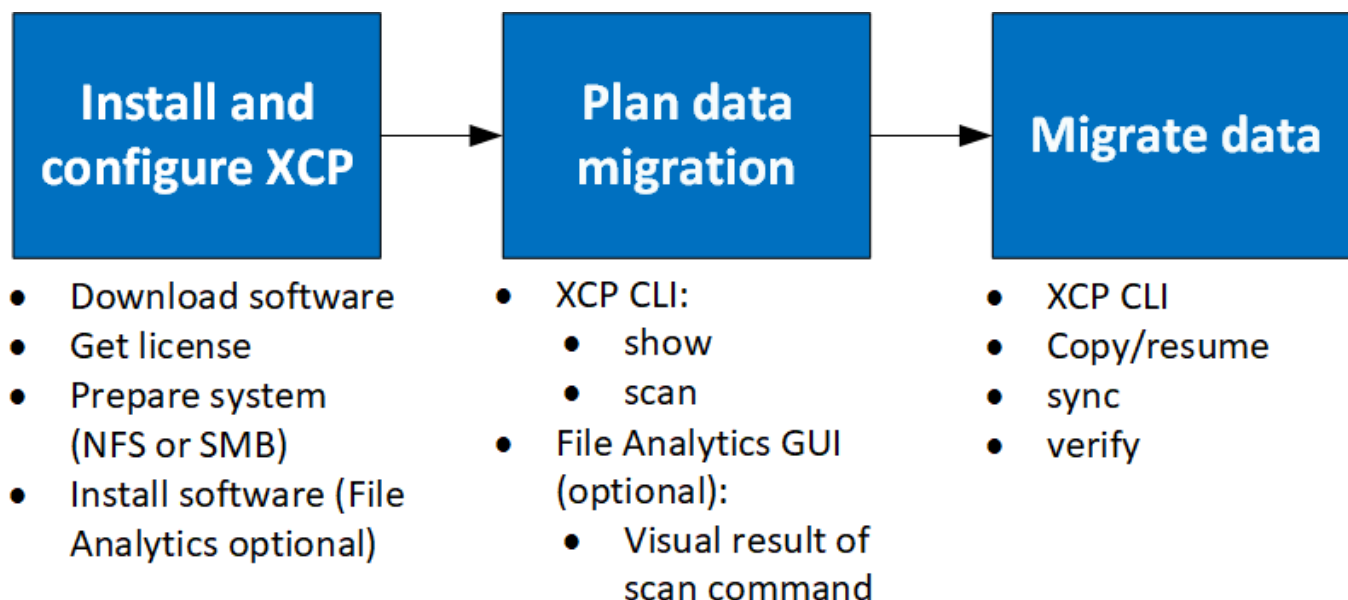
XCP NFS add-on features

The XCP NFS add-on features support the use of POSIX and HDFS connectors,

enhance security, and support the use of scale-out architecture to speed up data migrations.

NFSv4 support

When you only enable NFSv4 on the source, destination, and catalog volumes in the data center, you can use the POSIX path instead of the export path to migrate your data. To use the POSIX path, you must first mount the source, destination, and catalog volumes on the host system running XCP and then use the POSIX file path to provide the source and destination to XCP. See Configure the POSIX connector.

> (i)
> - NFSv4 support is limited to the POSIX path and the `copy` operation, the `sync` operation is not supported.
> - The POSIX connector might be slower when compared to the XCP NFSv3 TCP socket client engine.

POSIX connectors

XCP 1.8 supports the use of POSIX connectors to provide source, destination, and catalog paths for data migration. The POSIX connector (file://) gives XCP the capability to access any Linux-mounted file system, such as NFSv4, XFS, and Veritas. For non-root users, the system administrator can mount the file system to give any non-root user the capability to access the file system by using a POSIX connector with the file:// prefix.

You can benefit from using POSIX connectors when you do not have enough permissions to mount the file or when the support available in the data centers is limited to NFSv4. In such cases, any root user can mount the source and destination and then access the path by using a POSIX connector. When you are using POSIX connectors, you can only run the `xcp copy` operation.

XCP security

The XCP security feature gives you the capability to perform a migration as a non-root user on a Linux host machine. In earlier XCP versions, as a root user on the Linux machine, you perform a migration with all the permissions for the source, destination, and catalog volumes, and the mount is completed by the XCP operations.

When you are preforming data migrations, it is common to turn off security and let an administrator copy everything as fast as possible. For ongoing transitions in production environments where XCP has been in use for several years, it is not secure to run as an administrator (or root). Therefore, removing the requirement to run XCP as the root user gives you the capability to use XCP in secure environments. When a regular non-root user runs XCP operations, the non-root user has the same access rights and limits as the user.

In this secure environment, a root user can mount the source, destination, and catalog volume on the host machine and provide the necessary permissions for the destination and catalog volumes for a non-root user to write the data. This gives the non-root user the capability to perform a migration by using the XCP POSIX connector feature.

XCP scale-out

Until now, data migration using XCP was limited to a single host with higher RAM and CPU. To speed up the migration, memory and cores on the single host were increased, but it could still take a significant time to copy petabytes of data. XCP scaled-out architecture gives you the capability to use multiple hosts to perform a data migration. With this feature, you can use multiple Linux hosts to distribute your workload and decrease the

migration time.

You can benefit from multinode scale-out in any environment where the performance of a single system is not sufficient. To overcome the performance limits of a single node, you can use a single `copy` (or `scan -md5`) command to run workers on multiple Linux systems or Hadoop cluster nodes. Currently, XCP scale-out is only supported for `copy` command operations.

Hadoop Distributed File System connectors

XCP supports migrating data from a Hadoop Distributed File System (HDFS) file system to a NetApp file system and vice versa. In a Hadoop environment with security enabled, a non-root user on a Hadoop cluster can perform the migration to a NetApp NFSv4 exported file system. The HDFS connector (hdfs://) gives XCP the capability to access any HDFS file system that is available with different vendors. A non-root user can use XCP to perform migrations by using HDFS or POSIX connectors.

You can include HDFS clusters in an XCP scale-out configuration because they use multiple high end Linux machines. This minimizes the requirement for additional XCP worker nodes. For the data migration, you have the choice to reuse the HDFS cluster nodes or to go with separate hosts.

> ⓘ HDFS connectors are qualified and supported for MapR and Cloudera clusters but can only perform a baseline `copy` operation.

Unsupported features

The following features are not supported on XCP NFS:

Feature Name	Description
IPv6	Does not support IP version 6 (IPv6)
NFSv4 access control lists (ACLs) (third-party)	Does not support third-party to NetApp NFSv4 ACLs
POSIX connector	• The `sync` command does not support the POSIX connector • You should not use the `copy` command when the source is active
Hadoop Distributed File System (HDFS) connector	• The `sync` command does not support the HDFS connector • The HDFS file system does not support symbolic links (symlinks), hard links, or special files • You should not use the `copy` command when the source is active
ACLs	When the source is a non-NetApp system, XCP does not copy ACLs.
Linux	XCP is no longer supported on earlier distributions of Linux that were supported by XCP 1.6.3.

The following features are not supported on XCP SMB:

Feature Name	Description
NFS symbolic link (symlink)	NFS symlink is not supported in XCP SMB
ACL option for scan	ACLs not supported for scan option
IPv6	Does not support IP version 6 (IPv6)
NTFS Alternate Data Streams	XCP does not currently support Alternate Data Streams
XCP Filters	The XCP SMB exclude option currently excludes directories based on their pattern in the filter and traverses the filesystem of those directories.
Active source support	XCP does not support the use of a baseline or an incremental Snapshot copy followed by live source migration for an incremental sync.

The following common features are not available for XCP NFS and SMB:

- **XCP multiple instances on same host**: When running multiple instances of XCP on the same host you might get unpredictable results.

- **Time to complete migration**: XCP upfront does not provide the time to complete the migration or the time to complete any command used for migration. If you are doing final cutover confirm that data churn on the source volume is low.

- **Running copy again on an uncleaned target**: XCP baseline copy will fail when there is partial data on the destination target. For a successful XCP baseline copy and XCP verify, the destination must be clean.

- **Live destination**: XCP does not support modifying data on the destination volume during a migration or during an incremental sync.

- **Non-root user for File Analytics**: XCP does not support installations and configurations performed by a non-root user or a sudo user.

Supported configurations

All the XCP supported configurations such as hosts, ONTAP versions, and supported browsers, are listed in the Interoperability Matrix Tool (IMT).

Ports used by XCP

The following ports are used by XCP.

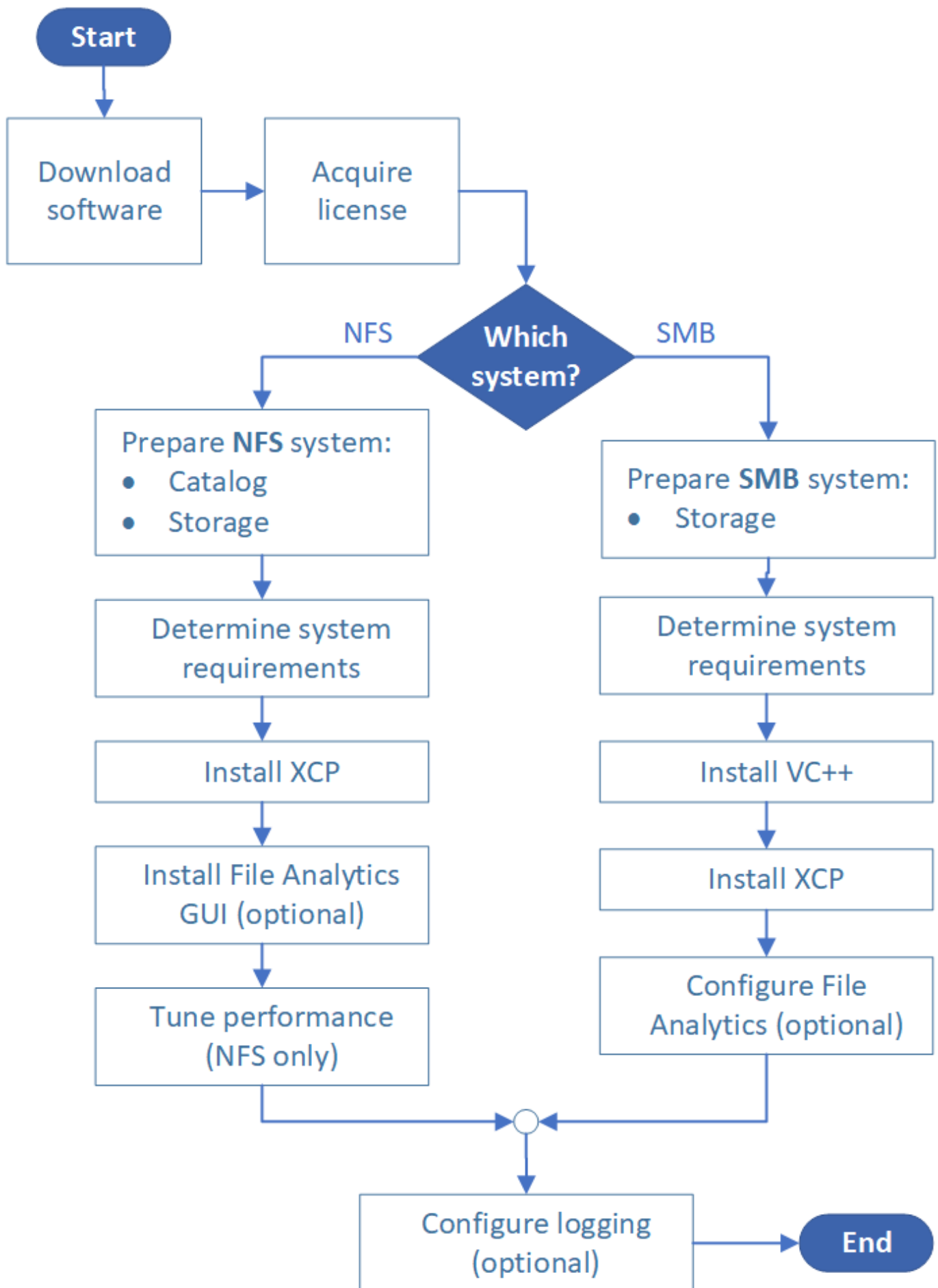| Service	Port
CIFS	445 TCP/UDP
HTTP (httpd)	80
HTTPS	443
NFS	111 TCP/UDP and 2049 TCP/UDP
Postgresql	5432

Service	Port
XCP (as a service for File Analytics)	5030
HDFS	7222

Install XCP

Install XCP.

Install and configure workflow

This document provides an easy workflow for installing and setting up XCP on NFS and SMB systems.

Download XCP

Download XCP from the NetApp support site and obtain a license from the XCP site.

You can download XCP from the NetApp Support site.

License XCP

NetApp offers a free 90-day XCP license. You can obtain the license file from the XCP site. The licensing portal offers different licensing options. After 90 days you can renew the license for another 90 days using the same portal.

The XCP license is available as an offline or online license. If you want to send migration statistics use an online license. The online license requires an internet connection. The offline license does not require an internet connection.

Prepare your system

If you are using XCP NFS on a Linux system, you must prepare catalog and storage.

If you are using XCP SMB on a Microsoft Windows system, you must prepare storage.

Prepare Linux for XCP NFS

XCP NFS uses Linux client host systems to generate parallel I/O streams and fully use available network and storage performance.

You can configure your setup for a root and a non-root user and then, depending on your setup, you can select either user.

Configure catalog

XCP saves operation reports and metadata in an NFSv3-accessible catalog directory or on any POSIX path with the required permissions.

- Provisioning the catalog is a one-time pre-installation activity.
- Approximately 1 GB of space is indexed for every 10 million objects (directories plus files and hard links); each copy that can be resumed or synched and each offline-searchable scan requires an index.
- To support performance, at least ten disks or SSDs are required in the aggregate containing the export directory.

> (i) You must store XCP catalogs separately. They must not be located on either the source or the destination NFS export directory. XCP maintains the metadata, which are the reports in the catalog location specified during the initial setup. Before you run any operation using XCP, you must specify and update the location for storing the reports.

Configure storage

XCP NFS transitions and migrations have the following source and target storage requirements:

- Source and target servers must have the NFSv3 or NFS v4.0 protocol service enabled

  ◦ For NFSv4 ACL migration, you must enable NFSv4 protocol service and NFSv4 ACL on the destination server

- Source and target volumes must be exported with `root` access to the XCP Linux client host

- For NFSv4 ACL migration, NFSv4 requires that you use the encoding language UTF-8 for volumes that require ACL migration.

> ⓘ
> - To prevent administrators accidentally modifying the source volume, you should configure the source volume for the NFSv3 and NFSv4 export directories as read-only.
> - In ONTAP, you can use the diagnostic `-atime-update` option to preserve atime. This feature is only available in ONTAP and is helpful if you want to preserve atime in source objects while running XCP.

Root user

A root user on a Linux machine has the permissions to mount the source, destination, and catalog volumes.

Non-root user

A non-root user has the following permissions on a mounted volume:

- Read permission access to the source volume
- Read/write permission access to the mounted destination volume
- Read/write permission access to the catalog volume

Prepare Windows for XCP SMB

XCP SMB uses Windows client host systems to generate parallel I/O streams and fully use available network and storage performance.

Configure storage

XCP SMB transitions and migrations have the following user login requirements:

- XCP host system: An XCP host user must have administrator privilege (the user must be part of "BUILTIN\Administrators" group on the XCP SMB host system).

- Add the migration or XCP host user to the audit and security log policy for Active Directory. To locate the 'Manage Auditing and Security Log' Policy on Windows 10, follow these steps:

  Steps

  1. Open the **Group Policy Editor** dialog box.
  2. Go to **Computer Configuration > Windows Settings > Security Settings > Local Policies > User Rights Assignment**.
  3. Select **Mange auditing and security log**.
  4. To add an XCP host user, select **Add User or Group**.

     For more information, see: Manage auditing and security log.

- Target storage system: XCP host user must have read and write access.
- Source storage system:
    ◦ If the user is part of the "Backup Operators" group in the source storage system, the members of this group can read files while bypassing the security rules, regardless of any permissions that protect those files.
    ◦ If the user is not part of "Backup Operators" group in source system, the user must have read access.

> (i) Write permission is required in the source storage system for supporting the XCP option – `preserve-atime`.

Configure a Windows client

- Add the destination storage box and the source storage box to the host file:
    1. Navigate to the following location: `(C:\Windows\System32\drivers\etc\hosts)`
    2. Insert the following host entries to the file in the following format:

    ```
    <Source data vserver data interface ip> <Source cifs server name>
    <Destination data vserver data interface ip> <Destination cifs server name>
    ```

    Example

    ```
    # Copyright (c) 1993-2009 Microsoft Corp.
    #
    # This is a sample HOSTS file used by Microsoft TCP/IP for Windows.
    #
    # This file contains the mappings of IP addresses to host names. Each
    # entry should be kept on an individual line. The IP address should
    # be placed in the first column followed by the corresponding host name.
    # The IP address and the host name should be separated by at least one
    # space.
    #
    # Additionally, comments (such as these) may be inserted on individual
    # lines or following the machine name denoted by a '#' symbol.
    #
    # For example:
    #
    #      XXX.XX.XX.XX          rhino.acme.com              # source server
    #        XX.XX.XX            x.acme.com                  # x client host

    # localhost name resolution is handled within DNS itself.
    #        127.0.0.1           localhost
    #        ::1                 localhost
        xx.xxx.xxx.xxx          00906A52DFE247F
        xx.xxx.xxx.xxx  42D1BBE1219CE63
    ```

Install XCP NFS

If you want to upgrade XCP, delete the current installation and replace it with a new installation of the latest version.
This section details the system requirements and the procedures for the initial setup of XCP on a Linux client and the INI file configuration.

System Requirements

Item	Requirement
System	64-bit Intel or AMD server, minimum 4 cores and 32 GB RAM
Operating System & Software	RHEL8. See the IMT for supported operating systems
Special Requirements	Network connectivity and root level access to source and destination NFSv3 exports No other active applications
Storage	20 MB of disk space for the XCP binary and at least 50 MB of disk space for the logs that are stored in the /opt/NetApp/xFiles/xcp/ directory
Supported Protocol Version	NFSv3 and NFSv4 (POSIX and ACL)
Supported browser (File Analytics only)	XCP File Analytics supports Google Chrome version 76 and later. See the IMT matrix for all the supported versions of the browser

> ⓘ The recommended configuration for live source migration is 8 cores and 64 GB RAM.

Install XCP NFS for a root user

You can use the following procedure to install XCP for a root user.

Steps

1. Log in to the Linux machine as the root user and download and install the license:

```
[root@scspr1980872003 ~]# ls -l
total 36188
-rw-r--r--  1 root root 37043983 Oct  5 09:36 NETAPP_XCP_<version>.tgz
-rw-------. 1 root root     1994 Sep  4  2019 license
```

2. To extract the tool, untar XCP:

```
[root@scspr1980872003 ~]# tar -xvf NETAPP_XCP_<version>.tgz
[root@scspr1980872003 ~]# ls
NETAPP_XCP_<version>.tgz license xcp
[root@scspr1980872003 ~]# cd xcp/linux/
[root@scspr1980872003 linux]# ls
xcp
```

3. Verify that the `/opt/NetApp/xFiles/xcp` path is available on the system from a previous version of XCP.

   If `/opt/NetApp/xFiles/xcp` is available, activate the license by using the `xcp activate` command and proceed with data migration.

   If `/opt/NetApp/xFiles/xcp` is not available, when you run the `xcp activate` command is run for the first time, the system creates the XCP host configuration directory in `/opt/NetApp/xFiles/xcp`.

   The `xcp activate` command fails because the license is not installed:

```
[root@scspr1980872003 linux]# ./xcp activate
(c) yyyy NetApp, Inc.
xcp: Host config file not found. Creating sample at
'/opt/NetApp/xFiles/xcp/xcp.ini'

xcp: ERROR: License file /opt/NetApp/xFiles/xcp/license not found.
Register for a license at https://xcp.netapp.com
```

4. Copy the license to `/opt/NetApp/xFiles/xcp/`:

```
[root@scspr1980872003 linux]# cp ~/license /opt/NetApp/xFiles/xcp/
```

5. Verify that the license file was copied to `/opt/NetApp/xFiles/xcp/`:

```
[root@ scspr1980872003 ~]# ls -altr /opt/NetApp/xFiles/xcp/
total 44
drwxr-xr-x 3 root root    17 Oct  1 06:07 ..
-rw-r--r-- 1 root root   304 Oct  1 06:07 license
drwxr-xr-x 2 root root     6 Oct  1 10:16 xcpfalogs
drwxr-xr-x 2 root root    21 Oct  1 10:16 xcplogs
-rw-r--r-- 1 root root   110 Oct  5 00:48 xcp.ini
drwxr-xr-x 4 root root    83 Oct  5 00:48 .
[root@scspr1978802001 ~]#
```

6. Activate XCP:

```
[root@scspr1980872003 linux]# ./xcp activate
XCP <version>; (c) yyyy NetApp, Inc.;
XCP activated
```

Install XCP for a non-root user

You can use the following procedure to install XCP for a non-root user.

Steps

1. Log in to the Linux machine as the non-root user and download and install the license:

```
[user1@scspr2474004001 ~]$ ls -l
total 36640
-rwxr-xr-x 1 user1 user1      352 Sep 20 01:56 license
-rw-r--r-- 1 user1 user1 37512339 Sep 20 01:56
NETAPP_XCP_Nightly_dev.tgz
[user1@scspr2474004001 ~]$
```

2. To extract the tool, untar XCP:

```
[user1@scspr2474004001 ~]$ tar -xvf NETAPP_XCP_Nightly_dev.tar
[user1@scspr2474004001 ~]$ cd xcp/linux/
[user1@scspr2474004001 linux]$ ls
xcp
[user1@scspr2474004001 linux]$
```

3. Verify that the `/home/user1/NetApp/xFiles/xcp` path is available on the system from a previous version of XCP.

   If the `/home/user1/NetApp/xFiles/xcp` path is available, activate the license by using the `xcp activate` command and proceeding with data migration.

   If `/home/user1/NetApp/xFiles/xcp` is not available, when you run the `xcp activate` command for the first time, the system creates the XCP host configuration directory in `/home/user1/NetApp/xFiles/xcp`.

   The `xcp activate` command fails because the license is not installed:

```
[user1@scspr2474004001 linux]$ /home/user1/xcp/linux/xcp activate
(c) yyyy NetApp, Inc.
xcp: Host config file not found. Creating sample at
'/home/user1/NetApp/xFiles/xcp/xcp.ini'

xcp: ERROR: License file /home/user1/NetApp/xFiles/xcp/license not
found.
Register for a license at https://xcp.netapp.com
[user1@scspr2474004001 linux]$
```

4. Copy the license to `/home/user1/NetApp/xFiles/xcp/`:

```
[user1@scspr2474004001 linux]$ cp ~/license
/home/user1/NetApp/xFiles/xcp/
[user1@scspr2474004001 linux]$
```

5. Verify that the license file was copied to `/home/user1/NetApp/xFiles/xcp/`:

```
[user1@scspr2474004001 xcp]$ ls -ltr
total 8
drwxrwxr-x 2 user1 user1  21 Sep 20 02:04 xcplogs
-rw-rw-r-- 1 user1 user1  71 Sep 20 02:04 xcp.ini
-rwxr-xr-x 1 user1 user1 352 Sep 20 02:10 license
[user1@scspr2474004001 xcp]$
```

6. Activate XCP:

```
[user1@scspr2474004001 linux]$ ./xcp activate
(c) yyyy NetApp, Inc.

XCP activated

[user1@scspr2474004001 linux]$
```

Install XCP SMB

This section details the system requirements and the procedure for VC++ redistributable installation and the initial setup of XCP on a Windows client.

ⓘ There is no option to upgrade; reinstall XCP to replace any existing version.

System Requirements

Item	Requirement
System	64-bit Intel or AMD server, minimum 4 cores and 32 GB RAM
Operating System & Software	Windows 2012 R2 or above. For supported Microsoft OS versions, see the Interoperability Matrix Tool. Visual C++ 2017 redistributable must be installed on the XCP host.
Special Requirements	The source storage system, XCP host, and the target ONTAP system must be part of same Active Directory domain
Storage	20 MB of disk space for the XCP binary and at least 50 MB of disk space for the logs that are stored in the C:\NetApp\XCP directory
Supported Protocol Version	All SMB protocol versions
Supported browser (File Analytics only)	XCP File Analytics supports Google Chrome version 76 and later. See the IMT matrix for all the supported versions of the browser

XCP SMB Microsoft VC++ Redistributable installation

Follow these steps for the VC++ redistributable installation.

Steps

1. Click VC++ 2017 redistributable to download the executable to your default downloads folder.

2. To start the installation, double click the installer. Accept the terms and conditions and select **Install**.

3. When the installation is complete, restart the Windows client.

XCP SMB Initial Setup Procedure

Follow these steps to perform the initial setup of XCP SMB.

Steps

1. Download the license and the XCP SMB binary `NETAPP_XCP_<version>.tgz` on a Windows client.

2. Extract the `NETAPP_XCP_<version>.tgz` file.

3. Copy the `xcp.exe` file to your Windows C: drive, this binary is available inside `NETAPP_XCP_1.8\NETAPP_XCP_1.8\xcp\windows` after you extract the `tgz` file.

4. Verify that the `C:\NetApp\XCP` path is available on the system from a previous version of XCP.
   If `C:\NetApp\XCP` is available, activate XCP by using the `xcp.exe activate` command and proceed with data migration.

   If `C:\NetApp\XCP` is not available, the system creates the XCP host configuration directory and files it at `C:\NetApp\XCP` when you run the `xcp.exe activate` command for the first time. The `xcp.exe activate` command fails and creates an error message asking for a new license.

```
C:\>xcp.exe activate
(c) yyyy NetApp, Inc.

License file C:\NetApp\XCP\license not found.
Register for a license at https://xcp.netapp.com
```

5. Copy the license to the newly created folder `C:\NetApp\XCP`:

```
C:\>copy license c:\NetApp\XCP
        1 file(s) copied.
```

6. Activate XCP:

```
C:\>xcp.exe activate
XCP SMB; (c) yyyy NetApp, Inc.;

XCP activated

C:\>
```

Install File Analytics for NFS

Install or upgrade File Analytics for NFS.

For system requirements for NFS, see Install XCP NFS.
The `configure.sh` script installs and enables default configurations of HTTPD and PostgreSQL available for Linux server. You can change or update to a more recent version as needed and to adhere to security guidelines.

Before you begin

- You cannot run the XCP application and XCP as service simultaneously on the same host. If any XCP operations are running, complete the operations before you start configuration.

- Your Linux machine must be connected to the Yum repository server or the internet.

- If a firewall is configured on the Linux machine, you must change the firewall settings to enable the ports used by XCP, the XCP service, and the services used by XCP File Analytics. For more information, go to Ports used by XCP.

Steps

1. Go to your XCP folder and run the `./configure.sh` script.
   The script takes three to ten minutes to configure the Linux machine and complete the following tasks:

   a. Download PostgreSQL packages

   b. Install the PostgreSQL server

   c. Install the HTTPD

d. Use the open SSL to create a self-signed certificate (`server.key and server.crt`)

e. Create the XCP File Analytics database

2. Select `option 1 Configure client system` from the XCP configuration menu.

3. For a new install, update the password for the administrator and database users.
   For an upgrade, you are prompted to stop the XCP service. When done, select `option 0`.

4. Start the XCP service.
   Use the following command to check if the XCP service is running:
   service xcp status

5. Launch File Analytics in the browser: **https://<ip address of linux>/xcp**.

Install File Analytics for SMB

Install or upgrade File Analytics for SMB.

For system requirements for SMB, see Install XCP SMB.

Before you begin

- You must configure XCP File Analytics for NFS on a Linux machine to use the XCP SMB service.
- Make sure the XCP service is running on your Linux machine, before you begin configuring XCP File Analytics on a Windows machine.

Fresh install of File Analytics for SMB

To perform a fresh install of File Analytics for SMB, complete the following steps.

Steps

1. Copy the `xcp.exe` file to your Windows `C:` drive, this binary is available inside `/xcp/windows` after you untar the tgz.

2. Download the XCP license file from the XCP site.

3. Create the folder `C:\\NetApp\XCP` and copy the XCP license to this location.

4. Activate the XCP license using the following command at the command prompt: `xcp.exe activate`

5. Copy the `server.key` and `server.crt` files from `/opt/NetApp/xFiles/xcp/` (in the Linux box where XCP File Analytics is already configured) to `C:\NetApp\XCP`
   Optional - If you have a CA certificate, place the certificate in this location with the same name and extensions.

6. In the Windows CLI command prompt, run `xcp configure`.

7. When prompted, provide the IP address of the Linux machine where the XCP File Analytics server is configured.

8. When prompted, provide the password for the database that was entered during the XCP Linux File Analytics configuration.

9. Go to the Linux machine and run `./configure.sh`.

10. Select `option 4 (Update XCP windows agent IP)` on the main menu and provide the IP address for the Windows machine.

11. Go to your Windows machine and run `xcp listen`, now XCP File Analytics for SMB is configured. Keep the window in an open state to continuously run the service.

12. Launch File Analytics on the Google Chrome browser and refresh the page: `https://<ip address of linux>/xcp`

13. Select `OK` when the dialog box displays.
    A new tab will open. Please enable pop ups on the browser if it is blocked. Accept the privacy policy for the URL and the following message displays: `SMB agent is ready to use. Please refresh the analytics page`

14. Return to the original tab where the XCP File Analytics GUI is hosted and refresh the page.
    This will display the SMB agent under the Agents card.

Upgrade of File Analytics for SMB

To upgrade the existing File Analytics for SMB, complete the following steps.

1. Before you run File Analytics make sure the Linux server where File Analytics is running is also upgraded and the service is running.

2. In Windows, stop the existing XCP service by entering `CTRL-C` on the command line.

3. Replace `xcp.exe` with latest binary.

4. Go to the Linux machine and run `./configure.sh`.

5. Select `option 4 (Update XCP windows agent IP)` on the main menu and provide the IP address for the Windows machine.

6. Go to your Windows machine and run `xcp listen`, now XCP File Analytics for SMB is configured. Keep the window in an open state to continuously run the service.

7. Launch File Analytics on the Google Chrome browser and refresh the page: `https://<ip address of linux>/xcp`

8. Select `OK` when the dialog box displays.
   A new tab will open. Please enable pop ups on the browser if it is blocked. Accept the privacy policy for the URL and the following message displays: `SMB agent is ready to use. Please refresh the analytics page`

9. Return to the original tab where the XCP File Analytics GUI is hosted and refresh the page.
   This will display the SMB agent under the Agents card.

Configure XCP

Configure the INI file

Steps to configure the INI file for XCP.

Configure the INI file for a root user

You can use the following procedure to configure the INI file for an XCP NFS root user.

Steps

1. Add the catalog location for the XCP server in the host configuration file by using the `vi` editor:

   > ⓘ Catalog location should be exported before modifying the details in the `xcp.ini` XCP configuration file. Catalog location (NFSv3) should be mountable by the XCP Linux host but not necessarily be mounted.

   ```
   [root@localhost /]# vi /opt/NetApp/xFiles/xcp/xcp.ini
   ```

2. Verify that the XCP Linux client host configuration file entries for the catalog were modified:

   ```
   [root@localhost /]# cat /opt/NetApp/xFiles/xcp/xcp.ini
   # Sample xcp config
   [xcp]
   catalog = 10.61.82.210:/vol/xcpvol/
   ```

Configure the INI file for a non-root user

As a non-root user, you do not have permission to mount the NFS file system. A root user is required to first mount the catalog volume and then, as a non-root user running XCP, if you have read/write permission to the catalog volume, you can access the mounted catalog volume by using a POSIX connector. After the volume is mounted, you can add catalog the path:

```
(t/10.237.170.53_catalog_vol - This is the path where catalog volume is
mounted)as follows.

[user1@scspr2474004001 xcp]$ ls -ltr
total 8
drwxrwxr-x 2 user1 user1  21 Sep 20 02:04 xcplogs
-rw-rw-r-- 1 user1 user1  71 Sep 20 02:04 xcp.ini
-rwxr-xr-x 1 user1 user1 352 Sep 20 02:10 license
[user1@scspr2474004001 xcp]$ cat /home/user1/NetApp/xFiles/xcp/xcp.ini

Sample xcp config [xcp]
catalog = file:///t/10.237.170.53_catalog_vol
```

Performance tuning

For XCP NFS, after planning the migration by using the `show` and `scan` commands, you can migrate data.

ⓘ When you are performing data migration as a non-root user, a root user can perform the following step.

For the optimal performance and reliability, NetApp recommends setting the following Linux kernel TCP performance parameters in `/etc/sysctl.conf` on the XCP Linux client host. Run `sysctl -p` or the `reboot` command to commit the changes:

```
net.core.rmem_default = 1342177
net.core.rmem_max = 16777216
net.core.rmem_max = 16777216
net.core.wmem_default = 1342177
net.core.wmem_max = 16777216
net.ipv4.tcp_rmem = 4096 1342177 16777216
net.ipv4.tcp_wmem = 4096 1342177 16777216
net.core.netdev_max_backlog = 300000
net.ipv4.tcp_fin_timeout = 10
```

ⓘ For a non-root user, the setting must be performed by a root user.

Environment variable

Optional environment variable configuration for XCP NFS systems.

ⓘ A non-root user can also use the following variables.

The environment variable XCP_CONFIG_DIR overrides the default location, `/opt/NetApp/xFiles/xcp`. If set, the value should be an OS filesystem path, possibly to a mounted NFS directory. When a custom configuration directory is set, the log file is named `xcp.hostname.log` instead of the default, `xcp.log`.

```
[root@localhost /]# export XCP_CONFIG_DIR ='/tmp/xcp_config_dir_path'
```

The environment variable XCP_LOG_DIR overrides the default location that stores the XCP log in the configuration directory. If set, the value should be an OS filesystem path, possibly to a mounted NFS directory. When a custom log directory is set, the log file is named `xcp.hostname.log` instead of the default, `xcp.log`.

```
[root@localhost /]# export XCP_LOG_DIR='/tmp/xcp_log_dir_path'
```

The environment variable XCP_CATALOG_PATH overrides the setting in xcp.ini. If set, the value should be in the xcp path format, `server:export[:subdirectory]`.

```
[root@localhost /]# export XCP_CATALOG_PATH='10.61.82.210:/vol/xcpvol/'
```

> ℹ️ For a non-root user, you must replace `XCP_CATALOG_PATH` from the exported path with the POSIX path.

Configure the POSIX connector

XCP NFS now supports the use of POSIX connectors to provide source and destination paths for data migration.

Supported features

The following features are supported for POSIX connectors:

- For POSIX file systems that support nanosecond `atime`, `mtime`, and `ctime`, the `scan` command gets the full values (seconds and nanoseconds) and the `copy` command sets them
- POSIX connectors are more secure than XCP with NFSv3 TCP sockets. See Configure security

Path Syntax

The path syntax for a POSIX connector is `file://<mounted path on linux>`.

Set up a POSIX connector

To set up a POSIX connector, you must perform the following tasks:

- Mount a source and a destination volume
- Verify that the destination path has the necessary permission to write the data

A destination and a catalog are mounted in the following example:

```
root@scspr2395903001 ~]# findmnt -t nfs4
TARGET SOURCE FSTYPE OPTIONS
/t/10.237.170.39_src_vol 10.237.170.39:/source_vol nfs4
rw,relatime,vers=4.0,rsize=65536,wsize=65536,namlen=255,hard,proto=t
cp,timeo=600,retrans=2,sec=sys,clien
/t/10.237.170.53_dest_vol 10.237.170.53:/dest_vol nfs4
rw,relatime,vers=4.0,rsize=65536,wsize=65536,namlen=255,hard,proto=t
cp,timeo=600,retrans=2,sec=sys,clien
/t/10.237.170.53_catalog_vol 10.237.170.53:/xcp_catalog nfs4
rw,relatime,vers=4.0,rsize=65536,wsize=65536,namlen=255,hard,proto=t
cp,timeo=600,retrans=2,sec=sys,clien
[root@scspr2395903001 ~]#
```

POSIX connectors access a source and destination volume by using the POSIX syntax `file://`. In the above example, the source path is `file:///t/10.237.170.39_src_vol` and the destination path is `file://` `/t/10.237.170.53_dest_vol`.

You can manage the sample configuration of an XCP catalog shared by non-root users by creating a Linux group for XCP users. For non-root users, the following the permissions are required for Linux group users to perform migrations.

In the following sample output, `demo` is the non-root user and `/mnt/xcp-catalog` is the path where catalog volume is mounted:

```
sudo groupadd -g 7711 xcp_users
sudo usermod -G xcp_users -a demo
sudo chown -R :xcp_users /mnt/xcp-catalog
sudo chmod -R g+w /mnt/xcp-catalog
```

The XCP catalog does not store data but it does store scan and copy file names, directory names, and other metadata. Therefore, it is recommended that you configure the catalog file system permissions for allowed users to give them the capability to secure the stored metadata.

Ownership (UID and GID)

When you are set up as a regular user, by default, a `copy` command to a POSIX or NFS3 destination does not attempt to set the ownership (user ID (UID) and group ID (GID)). Setting the ownership is typically performed by an administrator. When user A copies files from user B, user A expects to own the destination. However, this is not the case when a root user copies the files. When a root user copies the files, the `-chown` option changes the behavior so that a non-root `copy` command with `-chown` attempts to set the UID and GID.

Increase the maximum number of open file descriptors

For optimal performance and reliability, you can increase the maximum number of open file descriptors for the XCP user on all nodes.

Steps

1. Open the file by using the following command:
   ```
   vi /etc/security/limits.conf
   ```

2. Add the following line to the file:
   ```
   <username> - nofile 999999
   ```

Example

```
root - nofile 999999
```

See Red Hat solutions for more information.

Configure the HDFS connector

For XCP NFS, the Hadoop Distributed File System (HDFS) connector (hdfs://) gives XCP the capability to access any HDFS file system that is available with different vendors.

Supported features

The `copy` command operation from HDFS to NFS is supported for HDFS connectors.

Path Syntax

The path syntax for a HDFS connector is `hdfs://[user@host:port]/full-path`.

> ⓘ If you do not specify a user, host, and port, XCP calls `hdfsConnect` with the host set to `default` and the port set to `0`.

Set up a HDFS connector

To run the HDFS `copy` command, you must set the HDFS client on the Linux system, and based on the Hadoop vendor, follow the setup configuration available on the internet. For example, you can set the client for a MapR cluster by using https://docs.datafabric.hpe.com/60/AdvancedInstallation/SettingUptheClient- redhat.html.

After you complete the HFDS client setup, you must complete the configuration on the client. To use the HDFS paths with XCP commands, you must have the following environment variables:

- NHDFS_LIBHDFS_PATH
- NHDFS_LIBJVM_PATH

In the following examples, the settings work with MapR and java-1.8.0-openjdk-devel on CentOS:

```
export JAVA_HOME=$(dirname $(dirname $(readlink $(readlink $
(which javac)))))
export NHDFS_LIBJVM_PATH=`find $JAVA_HOME -name "libjvm.so"` export
NHDFS_LIBHDFS_PATH=/opt/mapr/lib/libMapRClient.so
```

```
[demo@mapr0 ~]$ hadoop fs -ls Found 3 items
drwxr-xr-x - demo mapr 0 2021-01-14 00:02 d1
drwxr-xr-x - demo mapr 0 2021-01-14 00:02 d2
drwxr-xr-x - demo mapr 0 2021-01-14 00:02 d3
```

Configure multinode scale-out

For XCP NFS, you can overcome the performance limits of a single node by using a single `copy` (or `scan -md5`) command to run workers on multiple Linux systems or cluster nodes.

Supported features

Multinode scale-out is helpful in any environment where the performance of a single system is not sufficient, for example, in the following scenarios:

- When it takes months for a single node to copy petabytes of data

- When high latency connections to cloud object stores slows down an individual node

- In large HDFS cluster farms where you run a very large number of I/O operations

Path syntax

The path syntax for multinode scale-out is `--nodes worker1,worker2,worker3`.

Set up multinode scale-out

Consider a setup with four Linux hosts with similar CPU and RAM configurations. You can use all four hosts for migration because XCP can coordinate the copy operations across all the host nodes. To make use of these nodes in a scale-out environment, you must identify one of the four nodes as the master node and other nodes as worker nodes. For example, for a Linux four-node setup, name the nodes as "master", "worker1", "worker2", and "worker3" and then set up the configuration on the master node:

1. Copy XCP in the home directory.

2. Install and activate the XCP license.

3. Modify the `xcp.ini` file and add the catalog path.

4. Set passwordless Secure Shell (SSH) from the master node to the worker nodes:

    a. Generate the key on the master node:

        ssh-keygen -b 2048 -t rsa -f / root/.ssh/id_rsa -q -N ''

    b. Copy the key to all the worker nodes:

        ssh-copy-id -i /root/.ssh/ id_rsa.pub root@worker1

The XCP master node uses SSH to run workers on other nodes. You must configure the worker nodes to enable passwordless SSH access for the user running XCP on the master node. For example, to enable a user demonstration on a master node to use node "worker1" as an XCP worker node, you must copy XCP binary from the master node to all the worker nodes in the home directory.

MaxStartups

When you start up multiple XCP workers simultaneously, to avoid errors, you should increase the `sshd` `MaxStartups` parameter on each worker node as shown in the following example:

```
echo "MaxStartups 100" | sudo tee -a /etc/ssh/sshd_config sudo systemctl
restart sshd
```

The "nodes.ini" file

When XCP runs a worker on a cluster node, the worker process inherits the environment variables from the main XCP process on the master node. To customize a particular node environment, you must set the variables in the `nodes.ini` file in the configuration directory only on the master node (worker nodes do not have a configuration directory or catalog). For example, for an ubuntu server mars that has its `libjvm.so` in a different location to the master node, such as wave (which is CentOS), it requires a configuration directory to allow a worker on mars to use the HDFS connector. This setup is shown in the following example:

```
[schay@wave ~]$ cat /opt/NetApp/xFiles/xcp/nodes.ini [mars]
NHDFS_LIBJVM_PATH=/usr/lib/jvm/java-8-openjdk-amd64/jre/lib/
amd64/server/libjvm.so
```

If you are using a multisession with POSIX and HDFS file paths, you must mount the file system and the source and destination exported file system on the master node and all worker nodes.

When XCP runs on a worker node, the worker node has no local configuration (no license, log files, or catalog). XCP binary only is required on the system in your home directory. For example, to run the `copy` command, the master node and all worker nodes need access to the source and destination. For `xcp copy --nodes linux1,linux2 hdfs:///user/demo/test file:///mnt/ontap`, the `linux1` and `linux2` hosts must have the HDFS client software configured and the NFS export mounted on /mnt/ontap, and, as mentioned previously, a copy of the XCP binary in the home directory.

Combine POSIX and HDFS connectors, multinode scale-out, and security features

You can use the POSIX and HDFS connectors, multinode scale-out, and security features in combination. For example, the following `copy` and `verify` commands combine POSIX and HDFS connectors with the security and scale-out features:

- `copy` command example:

```
./xcp copy hdfs:///user/demo/d1 file:///mnt/nfs-server0/d3
./xcp copy -match "'USER1 in name'" file:///mnt/nfs-server0/d3
hdfs:///user/demo/d1
./xcp copy —node worker1,worker2,worker3 hdfs:///user/demo/d1
file:///mnt/nfs-server0/d3
```

- `verify` command example:

```
./xcp verify hdfs:///user/demo/d2 file:///mnt/nfs-server0/d3
```

Plan data migration

You can plan your migration using the CLI or the File Analytics GUI.

Use the following commands to plan your migration:

- Show
- Scan

Use File Analytics to visualize the statistics for exports and shares.

Plan NFS data migration

Plan your NFS data migrations.

Show

The `show` command queries the RPC services and NFS exports of one or more storage servers. The command lists the available services and exports with the used and free capacity of each export, followed by the root attributes of each export.
Example:

- `xcp show <NFS file server IP/FQDN>`

- `xcp show nfs_server01.netapp.com`

Run `xcp help show` for more details.

Scan

The `scan` command recursively scans the entire source NFSv3 exported paths and prints the statistics of file structure at the end of the scan. NetApp recommends putting the source NFS export mounts in read-only mode during the scan operation.
Example:

- `xcp scan NFS [server:/export path | file://<NFS mounted path> | hdfs://<hdfs mounted path> ]`

- `xcp scan nfs_server01.netapp.com:/export1`

- `xcp scan file:///mnt/nfs-source`

- `xcp scan hdfs:///demo/user1`

Run `xcp help scan` for more details.

Optionally, use File Analytics to view the results graphically.

Plan SMB data migration

Plan your SMB data migrations.

Show

The `show` command shows all SMB shares available on the server with the permissions and space available. Example:

- `xcp show \\<SMB file server IP/FQDN>`

- `xcp show smb_server01.netapp.com`

Run `xcp help show` for more details.

Scan

The `scan` command recursively scans the entire SMB share and lists all the files at the end of the scan.

> ⓘ During the scan operation, you can use the `-preserve-atime` flag with the `scan` command to preserve access time at the source .

Example :

- `xcp scan \\SMB server\share1`

- `xcp scan smb_server01.netapp.com:/share1`

Run `xcp help scan` for more details.

Optionally, use File Analytics to view the results graphically.

Plan using File Analytics

Plan your data migration using File Analytics.

> ⓘ XCP is a CLI, whereas File Analytics has a GUI.

Overview

XCP File Analytics uses the XCP scan API to collect data from NFS or SMB hosts. This data is then displayed on XCP File Analytics GUI. There are three main components involved in XCP File Analytics:

- XCP service
- File Analytics database
- File Analytics GUI to manage and view data

The deployment method for XCP File Analytics components depends on the solution required:

- Deploying XCP File Analytics solutions for NFS file systems:
  - You can deploy the File Analytics GUI, database, and XCP service in the same Linux host.
- Deploying XCP File Analytics solutions for SMB file systems:
  You must deploy the File Analytics GUI and database in a Linux host and deploy the XCP service on a Windows host.

Access File Analytics

File Analytics provides a graphical view of scan results.

XCP File Analytics GUI provides a dashboard with graphs for visualizing File Analytics.
The XCP File Analytics GUI is enabled when you configure XCP on a Linux machine.

> ⓘ   To check the supported browsers for accessing File Analytics, see the NetApp IMT.

Steps

1. Use the link `https://<IP address of linux machine>/xcp` to access the File Analytics GUI.
   When prompted, accept the security certificate:

   a. Select Advanced below the privacy statement.

   b. Select the proceed to `<IP address of linux machine>` link.

2. Log in to the GUI using the username "admin" and the password you set during configuration
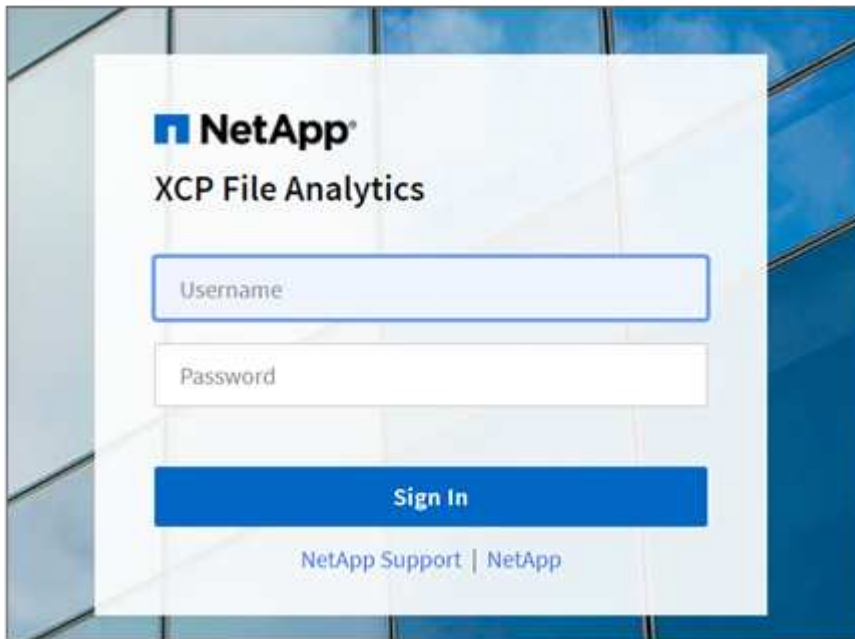
3. On login, you can see that the NFS agent is added: a green tick is present showing minimal system
   configuration of the Linux system and XCP version.

4. If you have configured an SMB agent, you can see the SMB agent added in the same agent card.
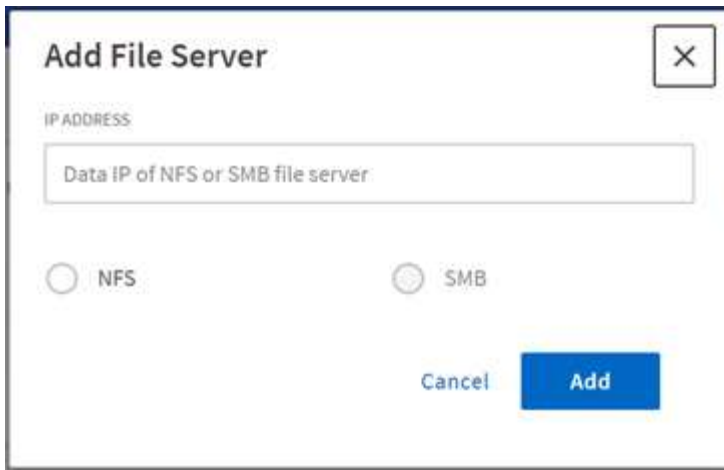
Add file servers

You can configure NFS and SMB exported file systems in the XCP File Analytics GUI.

This enables XCP File Analytics to scan and analyze data on the file system. Use the following steps to add
NFS or SMB file servers.

Step

1. To add file servers, select **Add File Server**.

Add the file server IP address, select the NFS or SMB option and click **Add**.

> (i)   If an SMB agent is not visible in the GUI, you will not be able to add SMB server.

After adding the file server, XCP displays:

- Total file shares available
- File shares with analytics data
  (The initial count is "0", this updates when you run a successful scan)
- Total space utilization – the sum of space utilized by all the exports
- The data for file shares and space utilization is real-time data direct from the NFS/SMB server. Collecting and processing the data takes several seconds.

> (i)   Space available versus space used in File Analytics is calculated from each exported file system available over NFS. For example, if the volumes consist of qtrees and the exports are created over a qtree, the overall space is the cumulative space of the volume size and the qtree size.

Run a scan

When the NFS/SMB files system is added to the XCP File Analytics GUI, you can start a file system scan to analyze and represent the data.

Steps
1. Select the arrow on the added file server card to view the file shares on the file server.
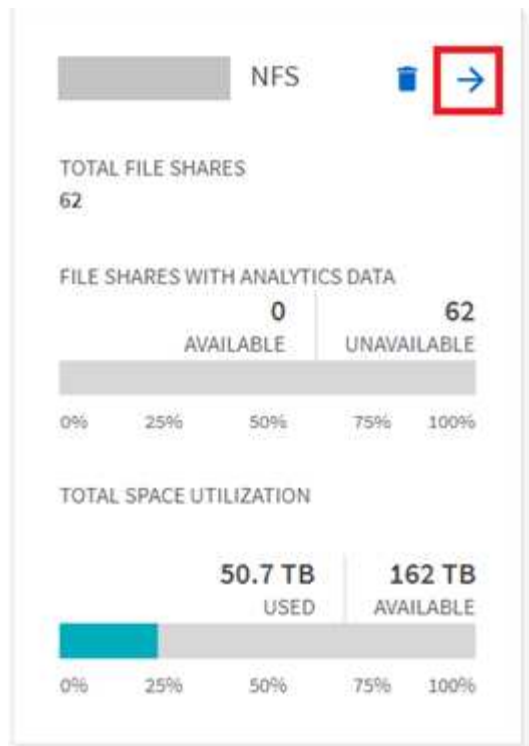
2. From the list of file shares, select the name of the file share to scan.

3. Select **Scan** to start the scan.

   XCP displays a progress bar for the scan.

4. When the scan is complete the **stat view** and **file distribution** tabs are enabled to allow you to view graphs.
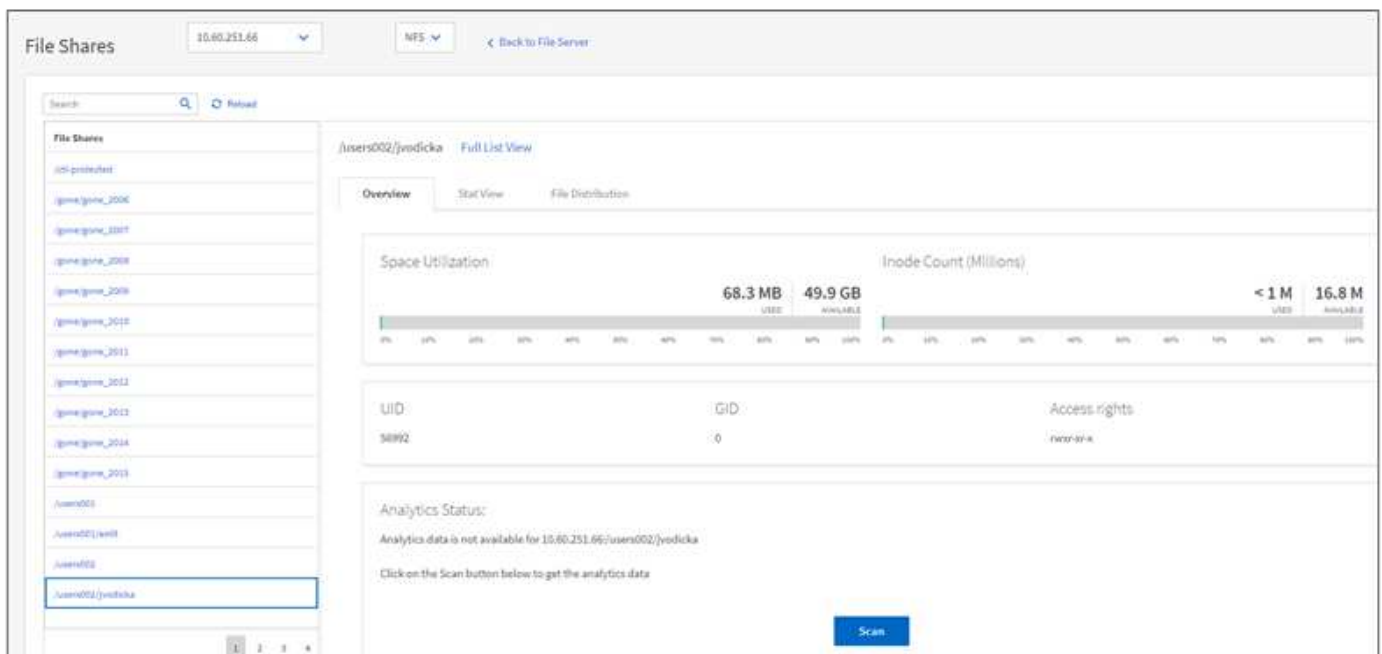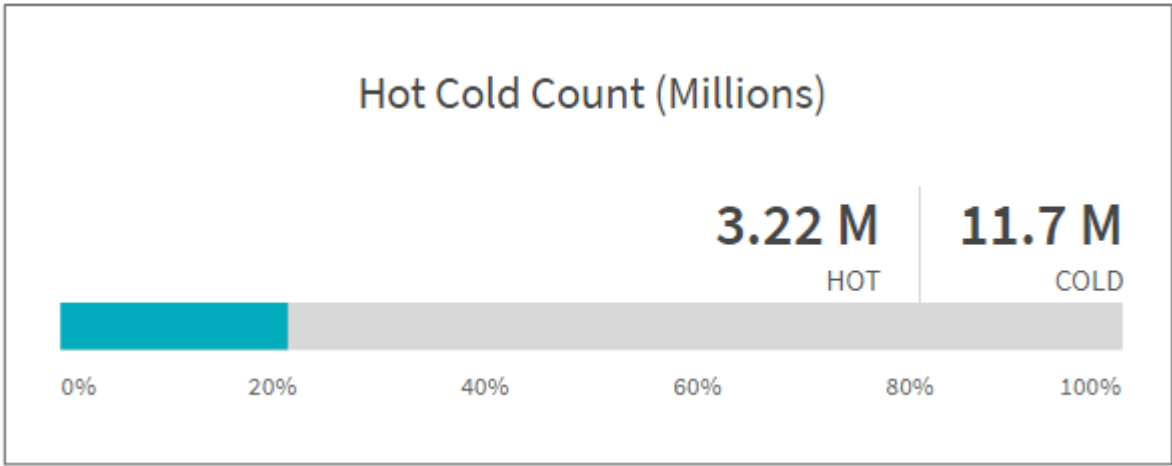

Learn about graphs

The File Analytics GUI dashboard displays multiple graphs for visualizing File Analytics.

Hot Cold Count Graph

XCP File Analytics categorizes files not accessed for 90 days as cold data. Files accessed in the last 90 days are hot data. Criteria to define hot and cold data is based on access time only.

The Hot Cold Count graph displays the number of inodes (in millions) that are hot or cold in XCP NFS. In XCP SMB, this graph denotes the number of files that are hot or cold.
The colored bar represents the hot data and shows the percentage of files accessed within 90 days.

Hot Cold Size Graph
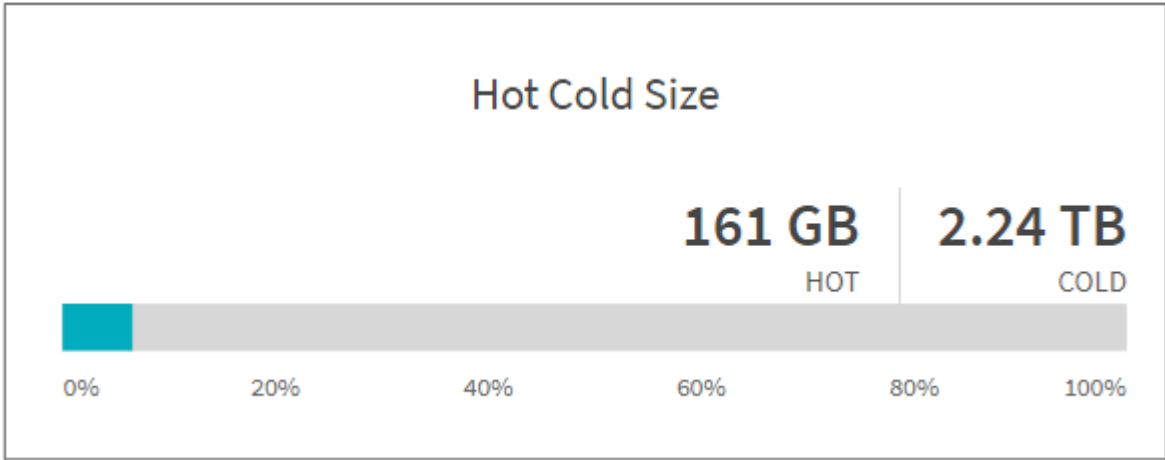
The Hot Cold Size graph displays the percentage of files that are hot and cold and the total size of the files in each category. The colored bar represents the hot data and the uncolored part represents the cold data. Criteria to define hot and cold data is based on access time only.

Entries in Directory Graph

Entries In Directory

Depth	Count	
10-100	443506	▇▇▇
100-1K	19818		
1K-10K	1050		
1-10	2362671	▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇
>10K	21		
empty	479797	▇▇▇
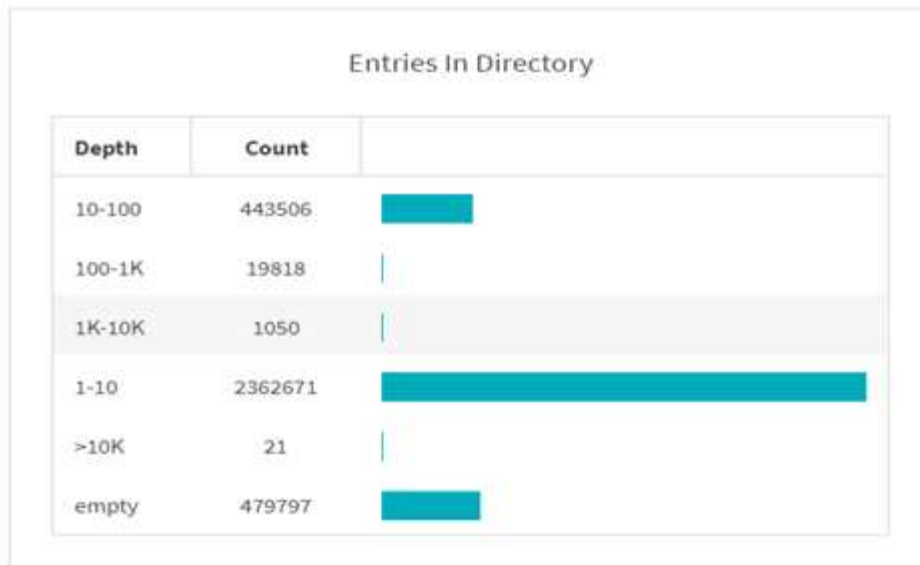
The Entries in Directories graph displays the number of entries in directories. The Depth column contains different directory sizes and the Count column indicates the number of entries in each directory depth.
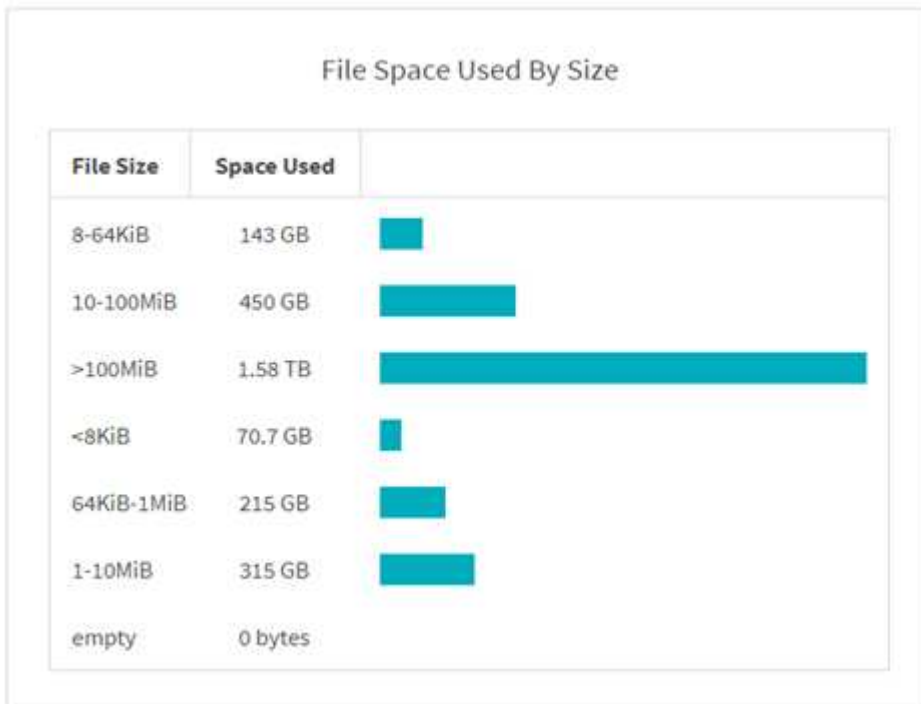
File Distribution by Size Graph

File Distribution By Size

File Size	Count	
8-64KiB	5998834	▇▇▇▇▇
10-100MiB	17069		
>100MiB	3589		
<8KiB	16046580	▇▇▇▇▇▇▇▇▇▇▇▇
64KiB-1MiB	1034391	▇
1-10MiB	109732		
empty	467594	▇

The File Distribution by Size graph displays the number of files that are under the given file sizes. The File Size column contains the categories of file size and the Count column indicates the distribution of the number of files.

Directory Depth Graph

Directory Depth

Depth	Count	
6-10	18121522	
0-5	1911157	
>100	145	
16-20	888382	
21-100	196239	
11-15	6597542	

The Directory Depth graph represents the distribution of the number of directories in various directory depth ranges. The Depth column contains various directory depths and the Count column contains the count of each directory depth in the file share.

File Space Used by Size Graph

File Space Used By Size

File Size	Space Used	
8-64KiB	143 GB	
10-100MiB	450 GB	
>100MiB	1.58 TB	
<8KiB	70.7 GB	
64KiB-1MiB	215 GB	
1-10MiB	315 GB	
empty	0 bytes	

The File Space Used by Size graph displays the number of files in different file-size ranges. The File Size column contains different file size ranges and the Space Used column indicates the space used by each file size range.
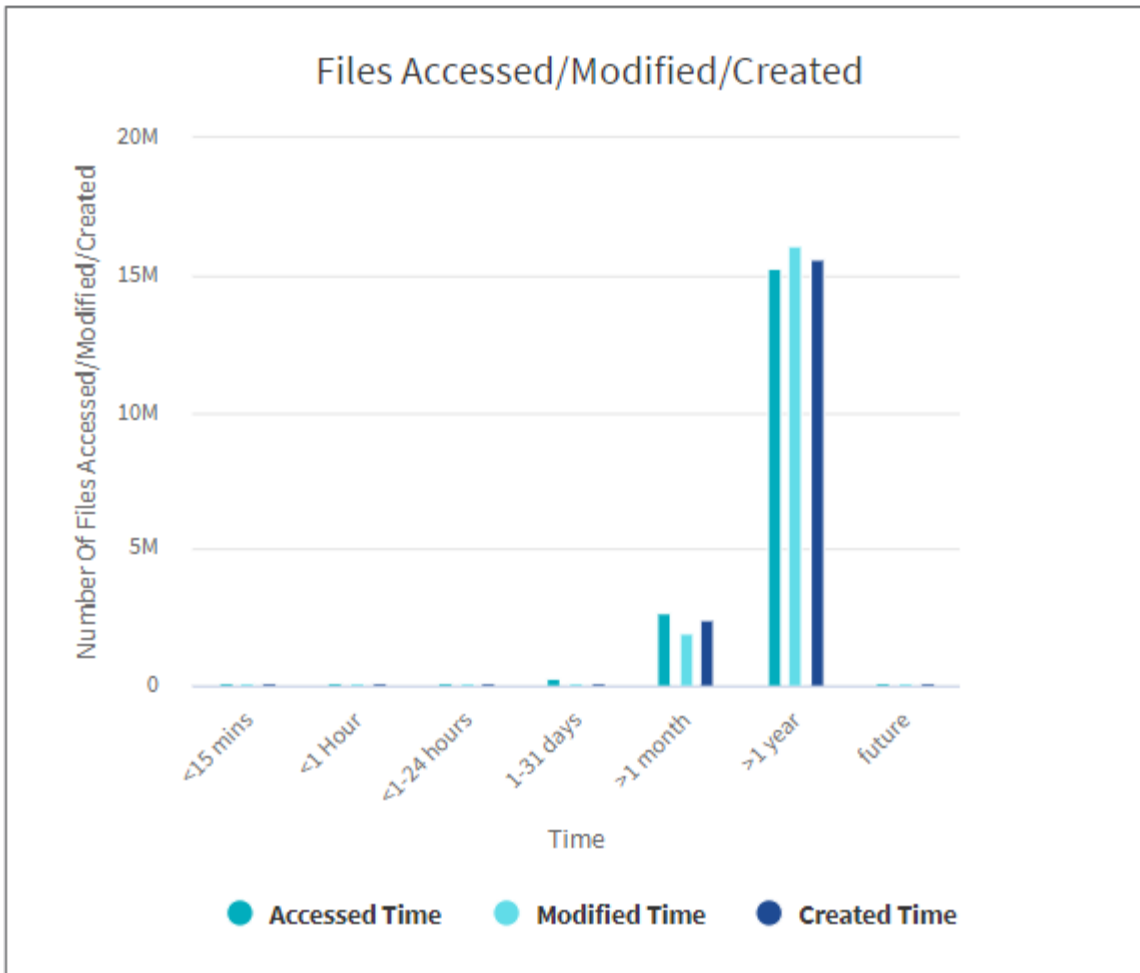
Space Occupied by Users Graph

The Space Occupied by Users graph displays the space used by users. The Username column contains the names of users (UID when usernames cannot be retrieved) and the Space Used column indicates the space used by each username.

Files Accessed/Modified/Created Graph

Files Accessed/Modified/Created

The Files Accessed/Modified/Created graph displays the count of files changed overtime. The X-axis represents the period of time within which changes were made and the y- axis represents the number of files changed.

> (i) To get the access time (atime) graph in SMB scans, check the box for preserving atime before running a scan.

File Distribution by Extension Graphic

File Distribution By Extension

File Extension	Count
other	8090085
.thpl	1552622
.log	957205
.svn-base	604269
.cdefs	550241

The File Distribution by Extension graph represents the count of the different file extensions in a file share. The

size of the divisions representing the extensions is based on the number of files with each extension.

File Distribution by Type Graph
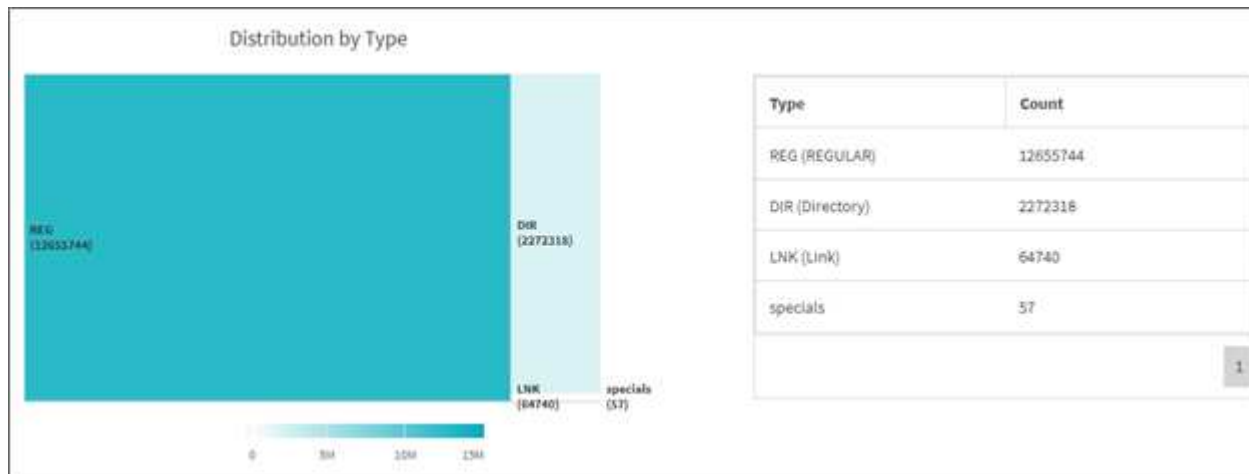
The Distribution by Type graph represents the count of the following types of files:

- REG: Regular files
- LNK: Files with links
- Specials: Files with device files and character files.
- DIR: Files with directories
- Junction: Available in SMB only

Filters

XCP provides filter options that can be used in XCP operations.

XCP uses filters for `-match` and `-exclude` options for NFS and SMB.

For NFS, run `xcp help info` and refer to the FILTERS section to see how to use `-match` and `-exclude` filters.

For SMB, run `xcp help -match` and `xcp help -exclude` to get more details on `match` and `exclude` filters.

If you want to use filters in XCP commands, run `xcp help <command>` to see if they are supported options.

Logging for NFS and SMB (optional)

Logging for XCP NFS and SMB.

XCP supports configuring multiple optional features by using the `xcpLogConfig.json` JSON configuration file. To enable only specific features, manually create the `xcpLogConfig.json` configuration file. You can use the `xcpLogConfig.json` configuration file to enable:

- event log messages
- syslog client for XCP

- custom XCP logging

Event log messages and the syslog client are disabled in the default configuration. Configuration is common for both NFS and SMB.

Config JSON file location	NFS	SMB
Config file default location	/opt/NetApp/xFiles/xcp/	C:\NetApp\XCP\ConfigFile
Custom location requires the `XCP_CONFIG_DIR` environment variable	Error! Reference source not found.	N/A

The JSON configuration file options are case sensitive. These options are the same for XCP NFS and XCP SMB.

Sub options name	JSON data type	Default	Description
logConfig			Option to customize XCP logging.
"level"	String	INFO	Log message severity filter level. XCP log messages support five severity levels in order of decreasing severity: CRITICAL, ERROR, WARNING, INFO, DEBUG (NetApp strongly recommends using INFO or DEBUG)
"maxBytes"	Integer	52428800	Size of each rotating log file. Max supported rotation files are 10.
"name"	String	xcp.log	Option to set custom log file name.
eventlog			Option to configure event log message.
"isEnabled"	Boolean	false	This boolean option is used to enable event messaging. Setting it to `false` will not generate any event messages and no event logs will be published to event log file.
"level"	String	INFO	Event message severity filter level. Event messaging support five severity levels in order of decreasing severity: CRITICAL, ERROR, WARNING, INFO, DEBUG
syslog			Option to configure syslog messaging.
"isEnabled"	Boolean	false	This boolean option is used to enable syslog client in XCP.
"level"	String	INFO	Message severity filter level. XCP event log messages support five severity levels in order of decreasing severity: CRITICAL, ERROR, WARNING, INFO, DEBUG
"serverIp"	String	None	Remote syslog server IP addresses or hostname.

Sub options name	JSON data type	Default	Description
"port"	Integer	514	Remote syslog receiver port. Syslog receivers accepting syslog datagrams on a different port can be configured with port option UDP port 514 but you can also configure to the desired port.

"sanitize"	Boolean	false	A common option for XCP support; setting its value to true hides sensitive information (IP and username) in the messages going to support (logging, events, syslog, and so on).
			For example, with the `sanitize` option as `false`:
			`* 2020-07-17 03:10:23,779 - INFO - 12806 xcp xcp Paths: ['10.234.104.251:/cat_vol']`
			`* 2020-07-17 03:10:23,778 - INFO - 12806 xcp xcp User Name: root`
			With the `sanitize` option as `true`:
			`* 2020-07-17 03:13:51,596 - INFO - 12859 xcp xcp Paths: ['IP: XX.XX.XX.XX:/cat_vol']`
			`* 2020-07-17 03:13:51,595 - INFO - 12859 xcp xcp User Name: * * *`

Create the JSON configuration file

If you want to enable event log messages, the syslog client, or customer logging, complete the following steps.

Steps

1. Open any text editor, such as notepad or vi.
2. Create a new file with the following JSON template.

```
{
  "logConfig": {
    "level": "INFO",
    "maxBytes": 52428800,
    "name": "xcp.log"
  },
  "eventlog": {
    "isEnabled": false,
    "level": "INFO"
  },
  "syslog": {
    "isEnabled": false,
    "level": "INFO",
    "serverIp": "10.234.219.87",
    "port": 514
  },
  "sanitize": false
}
```

3. For any features that you want to enable, change the `isEnabled` value to `true`.

4. Name the file `xcpLogConfig.json` and save it to the file location mentioned in **Error! Reference source not found.**

Default configuration	Example json configuration file

<pre>{
  "logConfig": {
    "level": "INFO",
    "maxBytes": 52428800,
    "name": "xcp.log"
  },
  "sanitize": false
}</pre>
	<pre>{
	  "logConfig": {
	    "level": "INFO",
	    "maxBytes": 52428800,
	    "name": "xcp.log"
	  },
	  "eventlog": {
	    "isEnabled": false,
	    "level": "INFO"
	  },
	  "syslog": {
	    "isEnabled": false,
	    "level": "INFO",
	    "serverIp": "10.234.219.87",
	    "port": 514
	  },
	  "sanitize": false
	}</pre>

Migrate data

Migrate NFS data

After planning the migration with the `show` and `scan` commands, you can migrate data.

Copy

The `copy` command scans and copies the entire source directory structure to a destination NFSv3 export. The `copy` command requires having source and destination paths as variables. The scanned and copied files, throughput/speed, and elapsed time details are displayed at the end of the copy operation.

Example:

```
xcp copy -newid <id> src_server:/src_export dst_server:/dst_export
```

POSIX path example:

```
xcp copy -newid <id> file:///mnt/source file:///mnt/dest
```

HDFS path example:

```
xcp copy -newid <id> hdfs:///demo/user file:///mnt/dest
```

See `xcp help copy` for more details.

Resume

The `resume` command restarts a previously interrupted copy operation by specifying the catalog index name or number. The catalog index name or number of the previous copy operation is stored on the `<catalog path>:/catalog/indexes` directory.

Example:

```
xcp resume [options] -id <id used for copy>
```

See `xcp help resume` for more details.

Sync

The `sync` command scans for changes and modifications performed on a source NFS directory using a catalog index tag name or the number of a previous copy operation. Source incremental changes are copied and applied to the target directory. The old catalog index numbers are replaced with a new one after the sync operation.

Example:

```
xcp sync [options] -id <id used for copy>
```

See `xcp help sync` for more details.

Verify

The `verify` command uses a full byte-by-byte data comparison between source and target directories after the copy operation without using a catalog index number. The command checks for modification times and other file or directory attributes, including permissions. The command also reads the files on both sides and compares the data.

Example:

```
xcp verify src_server:/src_export dst_server:/dst_export
```

POSIX path example:

```
xcp verify file:///mnt/source file:///mnt/dest
```

HDFS path example:

```
xcp verify hdfs:///user/demo1/data file:///user/demo1/dest
```

See `xcp help verify` for more details.

Migrate SMB data

After planning the migration with the `show` and `scan` commands, you can migrate data.

Copy

The `copy` command scans and copies the entire source directory structure to a destination SMB share. The `copy` command requires having source and destination paths as variables. The scanned and copied files, throughput/speed, and elapsed time details are printed to the console once every five seconds.

> (i) During the copy operation, you can use the `-preserve-atime` flag with the `copy` command to preserve access time at the source.

Example:

```
C:\xcp>xcp copy \\<source SMB share> \\<destination SMB share>
```

See `xcp help copy` for more details.

Sync

The `sync` command scans for changes and modifications in the source and target shares in parallel, and applies the appropriate actions (remove, modify, rename, and so on) to the target to make sure that the target is identical to the source.

The sync command compares data content, time stamps, file attributes, ownership, and security information.

> ⓘ During the sync operation, you can use the `-preserve-atime` flag with the `sync` command to preserve access time at the source.

Example:

```
C:\xcp>xcp sync \\<source SMB share> \\<destination SMB share>
```

See `xcp help sync` for more details.

Verify

The `verify` command reads both source and target shares and compares them, providing information about what is different. You can use the command on any source and destination, regardless of the tool used to perform the copy or sync.

> ⓘ • During the verify operation, you can use the `-preserve-atime` flag with the `verify` command to preserve access time at the source.
>
> • During the verify operation, you can use the `-noatime` flag with the `verify` command to exclude access time differences.

Example:

```
C:\xcp>xcp verify \\<source SMB share> \\<destination SMB share>
```

See `xcp help verify` for more details.

Additional NFS features

XCP includes some additional NFS features that make it easy to change the ownership and permissions of files and directories for any NFS share or POSIX path. You can use the XCP `chown` and `chmod` commands to recursively change all of the files and directories for a given NFS share or POSIX path. This increases the performance of millions of files.

About this task

Before changing the ownership of the files, you must configure the new owner. Otherwise, the command will fail. The XCP `chown` and `chmod` commands work similar to the Linux `chown` and `chmod` commands.

Chmod

The `chmod` command scans and changes the file permission of all files in the chosen directory structure. The `chmod` command requires a mode or reference and NFS share or POSIX path as variables. XCP `chmod` recursively changes the permissions for a given path. You can use the `chmod` command to display the total files scanned and the permissions that have been changed in the output.

Example:

```
xcp chmod -mode 777 NFS [server:/export path | file://<NFS mounted path>]
xcp chmod -mode 707 nfs_server01.netapp.com:/export1
xcp chmod -reference nfs_server01.netapp.com:/export/dir1/file.txt
nfs_server02.netapp.com: export1
xcp chmod -match "fnm('file.txt')" -mode 111 file:///mnt/nfs_mount_point/
xcp chmod -exclude "fnm('file.txt')" -mode 111 file:///demo/user1/
```

Run the `xcp help chmod` command for more information.

Chown

The `chown` command scans and changes the ownership of all files in the chosen directory structure. The `chown` command requires a NFS share or POSIX path as variables. XCP `chown` recursively change the ownership for a given path.

Example

```
xcp chown -user user1 NFS [server:/export path | file://<NFS mounted path>
xcp chown -user user1 nfs_server01.netapp.com:/export1
xcp chown -user user1 -group group1 nfs_server01.netapp.com:/export1/dir1/
xcp chown  -reference nfs_server01.netapp.com:/export/dir1/file.txt
nfs_server02.netapp.com:/export1
xcp chown -match "fnm('file.txt')" -user user1
file:///mnt/nfs_mount_point/
xcp chown -exclude "fnm('file.txt')" -user user1 -group group1
xcp chown -user-from user1 -user user2 file:///mnt/nfs_mount_point/
xcp chown -group-from group1 -group group2
nfs_server01.netapp.com:/export1/
```

Run the `xcp help chown` command for more information.

Troubleshoot

Troubleshoot XCP NFS errors

Review the solutions to troubleshoot your issue.

XCP issue	Solution
`xcp: ERROR:` must run as root	Execute XCP commands as root user
`xcp: ERROR:` License file `/opt/NetApp/xFiles/xcp/license` not found.	Download the license from the XCP site, copy it to `/opt/NetApp/xFiles/xcp/`, and activate it by running the `xcp activate` command.
`xcp: ERROR:` This license has expired	Renew or obtain the new XCP license from the XCP site.
`xcp: ERROR:` License unreadable	License file might be corrupted. Obtain the new XCP license from the XCP site.
`xcp: ERROR:` XCP not activated, run 'activate' first	Run the `xcp activate` command
This copy is not licensed	Obtain the appropriate XCP license file. Copy the XCP license to the `/opt/NetApp/xFiles/xcp/` directory on the XCP server. Run the `xcp activate` command to activate the license.
`xcp: ERROR:` Failed to activate license: Server unreachable	You are trying to activate the online license and your host system is not connected to the internet. Make sure your system is connected to the internet.
`xcp: ERROR:` Failed to activate license: Server xcp.netapp.com unreachable `xcp: HINT:` Configure DNS on this host or return to the license page to request a private license Expected error: Failed to activate license: Server xcp.netapp.com unreachable	Make sure xcp.netapp.com is reachable from your host or request for the offline license

`xcp: ERROR:` Catalog inaccessible: Cannot mount `nfs_server:/export[:subdirectory]`	Open the editor on the XCP Linux client host and update the configuration file with the proper catalog location. The XCP configuration file is located at `/opt/NetApp/xFiles/xcp/xcp.ini`. Sample entries of configuration file:
	
	`[root@scspr1949387001 ~]# cat /opt/NetApp/xFiles/xcp/xcp.ini`
	`[xcp]`
	`catalog = 10.235.128.153:/catalog`

`nfs3 error 2:` no such file or directory	Operation did not find the source file(s) on the target NFS export. Run the `xcp sync` command to copy the incremental updates from source to destination

XCP issue	Solution
`xcp: ERROR:` Empty or invalid index	Previous copy operation was interrupted before the index file was created. Rerun the same command with the new index and when the command is executing, verify that the keyword "indexed" is displayed in the stats.
`xcp: ERROR:` compare batches: child process failed `(exit code -9): recv <type 'exceptions.EOFError'>`	Follow the instructions in the following KB article: Cannot allocate memory when synching NFS data
`xcp: ERROR:` For xcp to process ACLs, please mount `<path>` using the OS nfs4 client	Mount the source and target on the XCP host using NFSv4, for example, `mount -o vers=4.0 10.10.10.10:/source_vol /mnt/source`
The XCP `verify` command fails during a migration. The STATUS shows as FAILED. (Live)	The XCP `verify` command was run when the source was live. Run the XCP `verify` command after the final cutover.
The XCP `verify` command fails after a cutover. (Live)	The XCP cutover sync operation might not have copied all the data. Rerun the XCP `sync` command followed by the `verify` command after the final cutover. If the problem persists, contact technical support.
The XCP `sync` command fails (this applies to all sync failures during migrations). (Live)	XCP is not able to read the data, this might be due to an XCP issue. Check the XCP STATUS message after the command operation completes. Rerun the `sync` command. If the sync operation fails again, contact technical support.
The XCP `copy`, `resume`, and `sync` commands fail due to insufficient memory. XCP crashes and the XCP status shows as FAILED. (Live)	There is low available memory on the host or there has been a huge incremental change. Follow the instructions in the following KB article: Cannot allocate memory when synching NFS data
`mnt3 error 13: permission denied`	As a non-root user, you do not have the correct permissions to access the file system. Check if you can access the file system and perform read write operations.
`xcp: batch 1: ERROR: [Errno 13] Permission denied:`	As a non-root user, you do not have the correct permissions to access the file system. Check if you can access the file system and perform read write operations.
`mxcp: ERROR: OSMounter 'file:///t/ 10.234.115.215_src_vol/DIR': [Errno 2] No such file or directory`	The path `/t/10.234.115.215_src_vol/ DIR` is not mounted on the Linux file system. Check if the path exists.
`ERROR: run sync {-id: 'xcp_index_1624263869.3734858'}: sync not yet available for hdfs/ posix/s3fs sources and targets -workaround is copy with a match filter for recent mods`	The `sync` command is not supported in XCP for the POSIX and HDFS connectors.

XCP issue	Solution
The `xcp verify` command fails with different mod time	You can identify the file and manually copy the file to the destination.
`Non dir object copy/sync can not be resumed; try copy again.` `For more details please refer XCP user guide.`	Because you cannot resume a single file, it is recommended to run the `xcp copy` command again for the file. Any change in the file leads to a complete copy of the file. As a result, performance is not affected.
`Non dir object can not be synced; try copy again.` `For more details please refer XCP user guide.`	Because you cannot sync a single file, it is recommended to run the `xcp copy` command again for the file. Any change in the file leads to a complete copy of the file. As a result, performance is not affected.
`xcp: ERROR: batch 4: Could not connect to node:`	Verify that the node given in the —`nodes` parameter is reachable. Try connecting by using Secure Shell (SSH) from the master node
`[Error 13] permission denied`	Check if you have permission to write on the destination volume.
`xcp: ERROR: batch 2: child process failed (exit code -6): recv <type 'exceptions.EOFError'>:`	Increase your system memory and rerun the test.

Troubleshoot XCP SMB Errors

Review the solutions to troubleshoot your issue.

Issue	Solution
`xcp: ERROR`: This license has expired	Renew or obtain the new XCP license from the XCP site.
This copy is not licensed	Obtain the appropriate XCP license file. Copy the XCP license to the `c:\netapp\xcp` folder on the XCP host. Run the `xcp activate` command to activate the license
`xcp: ERROR`: XCP not activated, run 'activate' first	Download the XCP license from the XCP site. Copy the file on the XCP Linux client host at `c:\netapp\xcp` on the XCP host. Run the `xcp activate` command to activate the license.
`xcp: ERROR`: License file C:\NetApp\XCP\license not found	Register for the XCP license on the XCP site. Download and copy the license file to `C:\NetApp\XCP\` on the XCP Windows client host.
xcp scan Error: The network name cannot be found	Rerun the command with correct share name

Issue	Solution
xcp copy Error: ERROR failed to obtain fallback security principal Error message logged in xcp.log file: `pywintypes.error: (1722, 'LookupAccountName', 'The RPC server is unavailable.')`	Add the destination box in the hosts file (`C:\Windows\System32\drivers\etc\hosts`). Netapp storage destination box entry must be in the below format: `<data vserver data interface ip>` 1 or more white spaces `<cifs server name>`
`xcp copy:` ERROR failed to obtain fallback security principal (Post adding destination box entry in the hosts files) Error messaged logged in xcp.log file: `'No mapping between account names and security IDs was done'`	The fallback user/group does not exist at the target system (destination box) or active directory. Rerun the command with correct fallback user/group options
`xcp copy:` ERROR failed to obtain fallback security principal (Post adding destination box entry in the hosts files) Error messaged logged in xcp.log file: `pywintypes.error: (87, 'LookupAccountName', 'The parameter is incorrect.')`	Incorrect parameter for fallback user/group option. Rerun the command with the correct syntax for fallback user/group options
`xcp copy` with acl migration Erorr message logged in xcp.log file: `pywintypes.error: (1314, 'GetNamedSecurityInfo', 'A required privilege is not held by the client.')`	A user is facing an issue related to security descriptors because with the privileges that the migrations user owns, XCP can only get owner, group, and DACL, but, it cannot get SACL. Add your migration user to "Manage Audit and Security Log" policy in your Active Directory. Reference: Manage auditing and security log

Troubleshoot XCP File Analytics errors

Review the solutions to troubleshoot your issue.

Issue	Solution
PostgreSQL service failed	Run configure again and select the installation option. If the previous installation was successful, you can select the repair option. If you are still getting the error, try manual steps as follows: 1. Restart the PostgreSQL service: `sudo systemctl restart postgresql.service` 2. Check the service status: `sudo systemctl status postgresql.service	grep Active`
HTTPD service failed	Run configure again and select the installation option. If the previous installation was successful, you can select the repair option. If you are still getting the error, try manual steps as follows: 1. Restart the HTTPD services: `sudo systemctl restart httpd` 2. Check the HTTPD service status: `sudo systemctl status httpd	grep Active`
Not able to open login page after successful install	Verify that your system is can ping the Linux machine where XCP File Analytics is installed and HTTPD is running. If the services are not running, run `configure` and choose the repair option. Verify that you are using a supported browser version. See the IMT.

Issue	Solution
User login failed	• Verify that you are using a supported browser version. See the IMT. • Verify that the user is "admin" and the password is correct. • Verify that the XCP service is running by issuing `xcp service status`. • Verify that port 5030 is open on Linux. Open the application at **https:// \<linux ip\> :5030/api/xcp**, and confirm that the messagereads msg: `Missing Authorization Header`. • Check whether the `xcp.ini` file is present in the `/opt/NetApp/xFiles/xcp/` location. To reset the `xcp.ini` file, run the configuration script and select the **Repair** option. Next, select the menu option to **rebuild xcp.ini file**. • Manually run the `xcp --listen` command on the CLI and try logging in. If you do not receive a request on the server, re-check the installation and the ports used for communication with the server. After you verify that the installation is correct, run the `service xcp start` command to restart the service.
XCP GUI is not showing updated pages	Clear the cache and try again
XCP service is not starting	To run the `xcp` service, use the `sudo systemctl start xcp` command. Alternatively, run the configuration script and select the **Repair** option to start the services that are stopped.
Failed to scan file share	File share/volume might not be readable. Check manually whether the file share is accessible/readable by running the `xcp show` command. Also, check if the `xcp.ini` file is deleted. If it is deleted, rebuild the `xcp.ini` file by using the configure.sh script repair option.
Could not load file servers	Try a page refresh. If the problem persists, manually run the `xcp show` command on the prompt and check whether you can scan the file server. If successful, raise a ticket with NetApp customer support. If unsuccessful, check if the file server is active by performing a manual check. Check whether the `xcp.ini` file and license files are in the correct location. To reset the `xcp.ini` file, run the configuration script and select the **Repair** option. Next, select the menu option to **rebuild xcp.ini file.** Check the `xcpfalogs` logs to see if the license needs renewal.
XCP File Analytics page is not displayed after system reboot	XCP services might be down. Run the configuration script and select the option to **Repair**. This will restart all the services that are stopped.

Issue	Solution
The total space for an exported file system on a given file server might show more space compared to the allocated physical storage.	This can happen when there are qtree level exports inside the volume. For example, if the volume size that is exported as `/vol1` is 10 GB and there is a qtree inside the volume `/vol1/qtree1`, then the `xcp show` command will show the `vol1` size as `10 GB` and the `qtree1` size as `10 GB`. XCP File Analytics sums the space of both exports and gives the total space, in this case, `20 GB`. It does not understand that `qtree1` is a logical space.

Get more information

You can get help and find more information through various resources, documentation, and forums.

- XCP Documentation – including Release Notes and Reference materials for this release and previous releases
- NetApp TechCommTV– NetApp XCP videos
- NetApp XCP – including links to get a license
- NetApp resources for XCP – including links to Technical Reports and Knowledgebase Articles
- NetApp Community – forums