COHESITY

Version 2.2

July 2024

Use Cohesity for Your IBM Spectrum Protect Storage Pools

Leverage Cohesity's Web-scale Architecture for IBM Spectrum Protect Storage Pools

ABSTRACT

Cohesity's web-scale architecture provides the ideal platform to use as a repository for IBM Spectrum Protect storage pools. Learn how to implement IBM Spectrum Protect backups using Cohesity platform and take advantage of Cohesity as a globally deduplicated and compressed, encrypted, web-scale storage target to maximize your storage efficiency and reduce TCO.

Table of Contents

Introduction to Using Cohesity with IBM Spectrum Protect 4
Benefits of Cohesity as IBM Spectrum Protect Storage Pools 6
Cohesity for IBM Spectrum Protect Workflow Overview 7
Use Cohesity NFS View on IBM Linux/AIX Server 9
Create Cohesity NFS View for IBM Storage Pools 9
Create and Mount Directories in IBM to Mount the Cohesity NFS View 11
Use Cohesity SMB View on IBM Windows Server 13
Create Cohesity SMB View for IBM Storage Pools 13
Optimize SMB Performance 16
Map Cohesity SMB Share on Your IBM Spectrum Protect Server 16
Create IBM Storage Pool 17
Create Directory-container Storage Pool 17
Create Sequential-access Storage Pool 18
Appendix A: Choose Optimal QoS Policy for Your IBM Storage Pools 21
Appendix B: Identify Cohesity Node VIPs 22
Appendix C: Disable DIRECTIO for Sequential-access Storage Pools 23
Appendix D: IBM Spectrum Protect Resources 24
Your Feedback 25
Document Version History 25

Figures

Figure 1: Use Cohesity as an IBM Spectrum Protect Storage Pool 4
Figure 2: Benefits of Using Cohesity as an IBM Spectrum Protect Storage Pools 6
Figure 3: Configure Cohesity's Solution for IBM Spectrum Protect 7
Figure 4: Choose Protocol & IBM Storage Pool Type 8
Figure 5: Throughput With & Without Direct I/O for Backup & Restore to 4-node Cluster 23

Tables

Table 1: QoS Policies and I/O Workload Type 21

Introduction to Using Cohesity with IBM Spectrum Protect

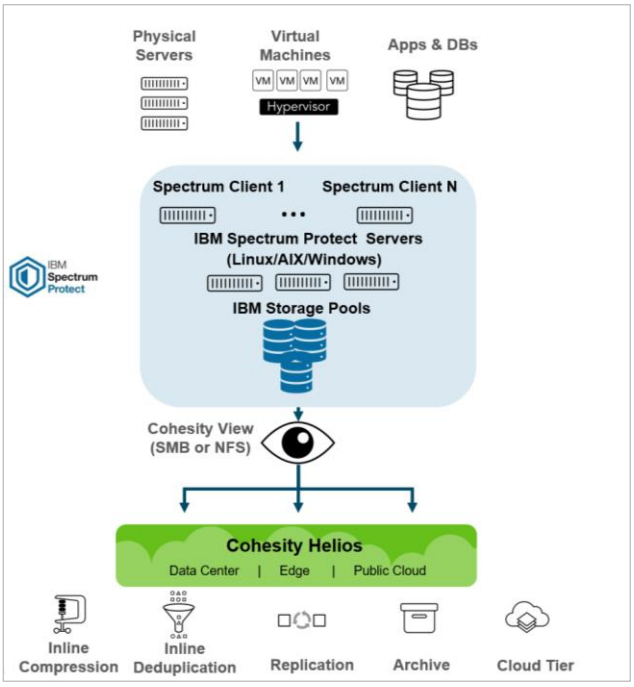
IBM Spectrum Protect is a data protection platform that gives enterprises a single point of control and administration for backup and recovery. It enables backups and recovery for virtual, physical, and cloud environments of all sizes.

Being storage-agnostic, IBM Spectrum Protect supports a wide range of storage pool types that offer various benefits. When IBM customers use Cohesity as the storage pool for their backups, they benefit immediately from Cohesity's many features:

- **Web-scale**. Capacity grows with your business.
- **Performance**. Improved backup and restore times.
- **Storage efficiency**. Extremely high storage efficiency with global, variable-length deduplication and compression.
- **Lower-cost Cloud Storage**. Store your protected data in any of the major cloud vendors (AWS, Azure, and GCP), any S3-compatible storage, or on NAS.
- **Security**. Your data is always secure, encrypted both at rest and in flight.
- **Resilience**. Highly resilient, fault-tolerant architecture.

Together, these features provide a complete, reliable web-scale data protection solution.

Figure 1: Use Cohesity as an IBM Spectrum Protect Storage Pool



In our solution, Cohesity's SMB and NFS Views are used as storage pools for IBM Spectrum Protect. IBM Spectrum Protect allows you to choose between two storage pool types — directory-container or

sequential-access — and you can use NFS or SMB to connect either storage pool type to the Cohesity View.

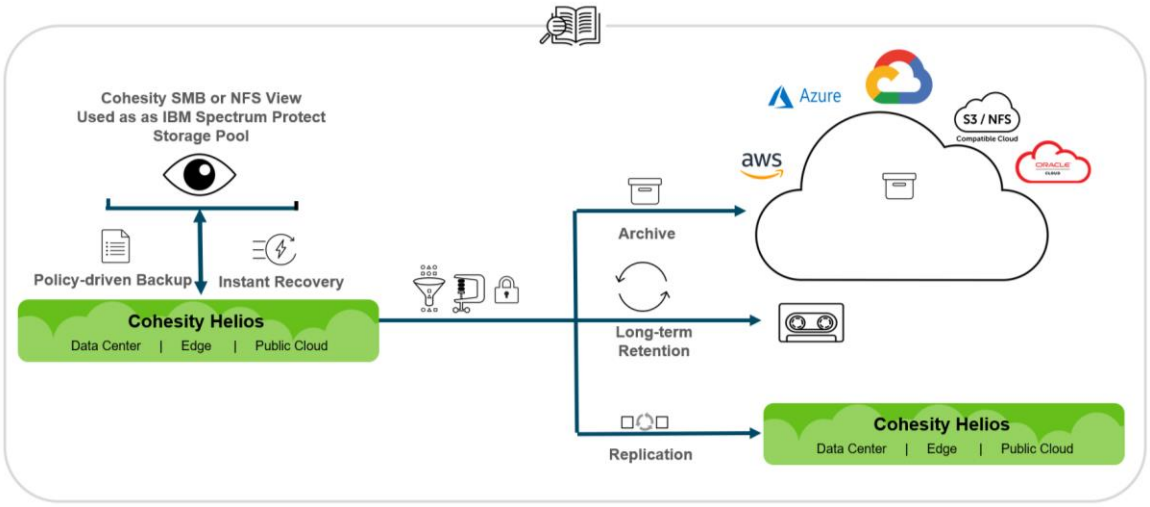
While this guide describes how to configure and use Cohesity as an efficient storage target for IBM Spectrum Protect, once you deploy this solution, you will also be in a position to use Cohesity to consolidate all your data-management silos, and simplify data center operations.

Benefits of Cohesity as IBM Spectrum Protect Storage Pools

Once you start using Cohesity for your IBM Spectrum Protect storage pools, you can immediately take advantage of Cohesity's powerful features, including:

- Inline deduplication and compression.
- Single namespace.
- Policy-based data replication from one cluster to another cluster for disaster recovery.
- CloudArchive and CloudRetrieve your data for long-term retention and disaster recovery in AWS, Azure, GCP, NAS, and S3-Compatible storages
- Use Cloud Tier to reduce TCO.

Figure 2: Benefits of Using Cohesity as an IBM Spectrum Protect Storage Pools



These features make Cohesity an excellent choice as an IBM Spectrum Protect storage pool. Cohesity's scale-out architecture increases parallelism among backup tasks and processes, reduces the time to run backups, and allows you to configure as many SMB shares or NFS mounts as you have nodes in the Cohesity cluster.

What's more, Cohesity cluster nodes have a shared-nothing topology and there are no single points of failure or inherent bottlenecks. As a result, both performance and capacity can scale linearly as more nodes are added to the cluster.

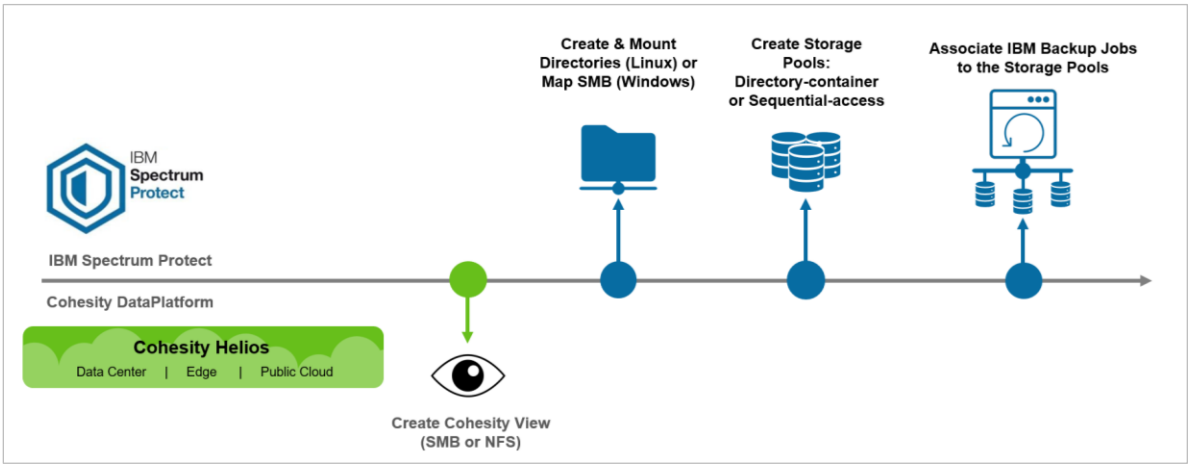
Cohesity for IBM Spectrum Protect Workflow Overview

To leverage Cohesity as scale-out target storage for IBM Spectrum Protect, you need to provision a Cohesity View and present it to IBM Spectrum Protect as NFS or SMB storage.

To use a Cohesity View as a storage pool for IBM Spectrum Protect, you need to complete a few tasks:

1. Create a Cohesity NFS View (for Linux/AIX) or SMB View (for Windows).
2. Access the Cohesity View via:
   - **NFS**. Create and mount directories on your IBM Linux/AIX server.
   - **SMB**. Map the SMB View to your IBM Windows server.
3. Create an IBM Spectrum Protect storage pool and configure type (directory-container or sequential-access).
4. Associate your IBM Spectrum Protect backup jobs to the storage pool you just created.

Figure 3: Configure Cohesity's Solution for IBM Spectrum Protect

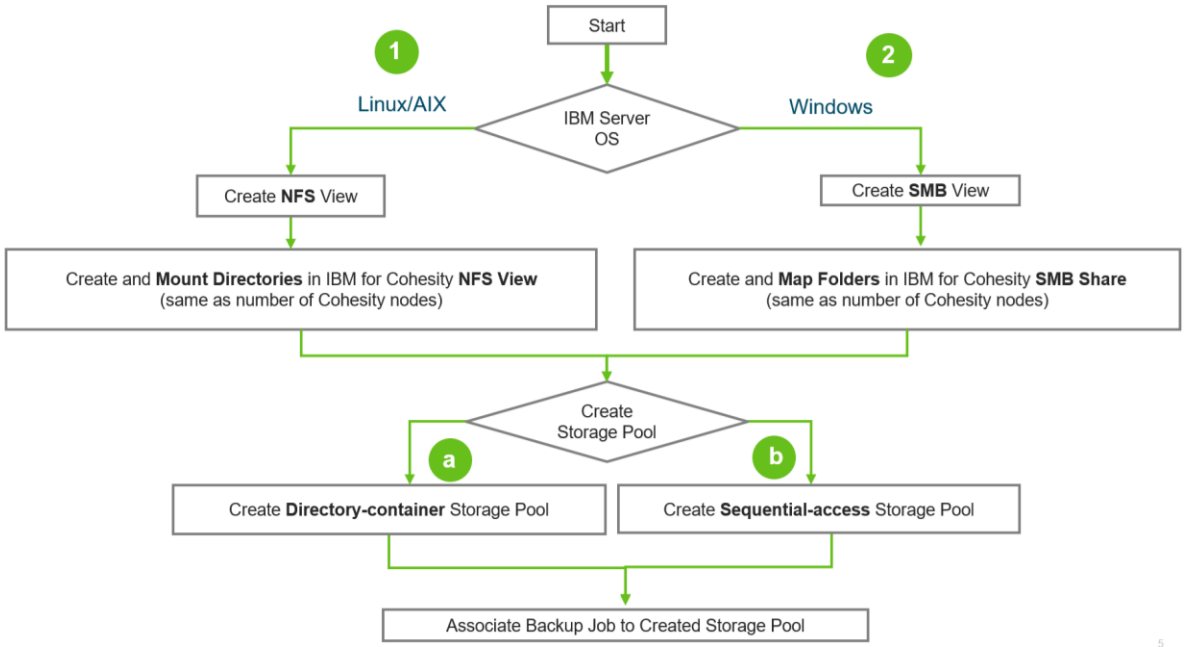


As you implement this solution, you will have to make two choices:

- **Protocol**. Will you be using SMB or NFS to connect IBM Spectrum Protect to Cohesity?
- **IBM Storage Pool Type**. Will you be creating a *directory-container* or *sequential-access* IBM storage pool?

Use the decision tree in Figure 4 below to find the steps that apply to your environment.

Figure 4: Choose Protocol & IBM Storage Pool Type



- **Protocol**. The OS that your IBM Spectrum Protect servers are running determines the connection protocol. For:
  - Linux/AIX servers, create a Cohesity NFS View.
  - Windows servers, create a Cohesity SMB View.
- **IBM Storage Pool Type**. You can create directory-container or sequential-access storage pools in IBM. For maximum:
  - Storage efficiency, create directory-container storage pools.
  - Data throughput, create sequential-access storage pools.

For maximum throughput, configure IBM Spectrum Protect to make use of all the nodes in the Cohesity cluster. Cohesity uses floating/virtual IPs (VIPs) to provide the highest possible availability and load balancing. Always mount Cohesity Views (shares/mount points) using VIPs for each node in the cluster. In the event of a node failure, the VIP on that node automatically moves to another Cohesity node, staying available to serve requests. When the node failure is resolved, the VIP moves back automatically.

NOTE: If your network gear supports LACP, we recommend that you configure your Cohesity network data ports to use it. Although not required, it can provide additional network throughput to and from the Cohesity cluster, as well as among the nodes of the cluster. To take advantage of this, both the network switches as well as the Cohesity cluster need to be configured for LACP.

For instructions, see the *Cohesity Networking Quick Start Guide.*

Use Cohesity NFS View on IBM Linux/AIX Server

If your IBM Spectrum Protect servers are running on Linux or AIX, you can connect to the Cohesity View via the NFS protocol.

To use Cohesity to store backups when your IBM Spectrum Protect is running on IBM Linux/AIX server backups:

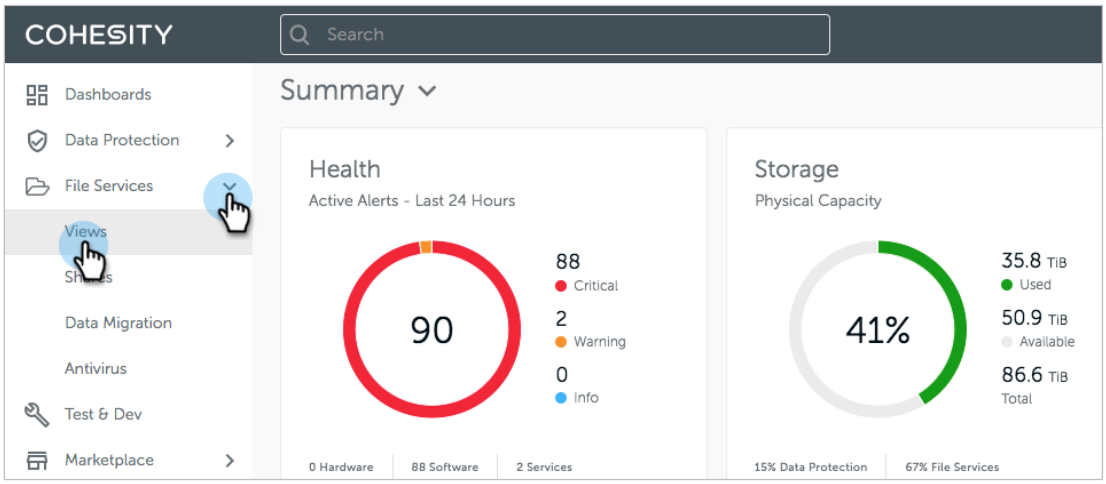
1. Create an NFS View on Cohesity platform, select the optimal QoS policy, and add the View whitelist.
2. Create mount directories in IBM to mount the Cohesity NFS View.
3. In IBM, create a:
   - Directory-container storage pool (for optimal storage efficiency).
   - Sequential-access storage pool (for optimal throughput).
4. Associate your IBM backup jobs to the storage pool you just created.

For this solution, we recommend enabling inline deduplication and inline compression on the Cohesity Storage Domain in which you will be creating your Cohesity Views. To enable them, or to create a new Storage Domain, see Create or Edit Storage Domains in the online Help.

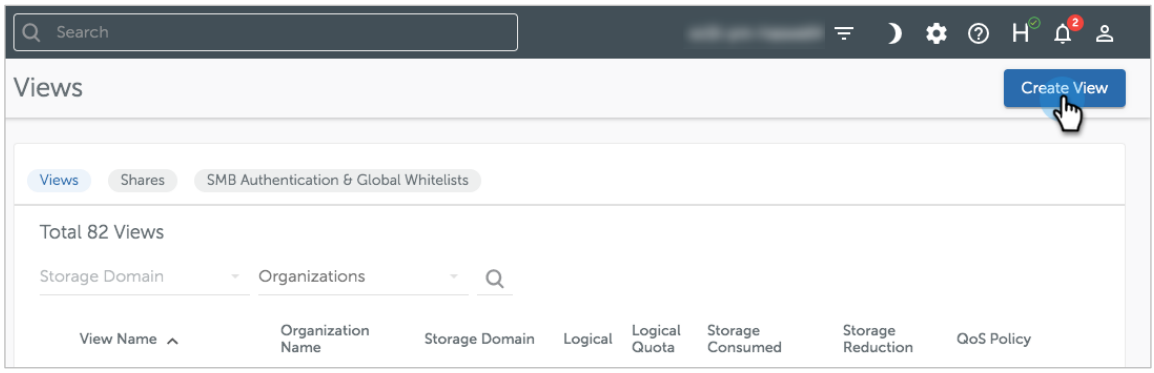
Create Cohesity NFS View for IBM Storage Pools

To create an NFS View for IBM Spectrum Protect running on Linux or AIX servers:

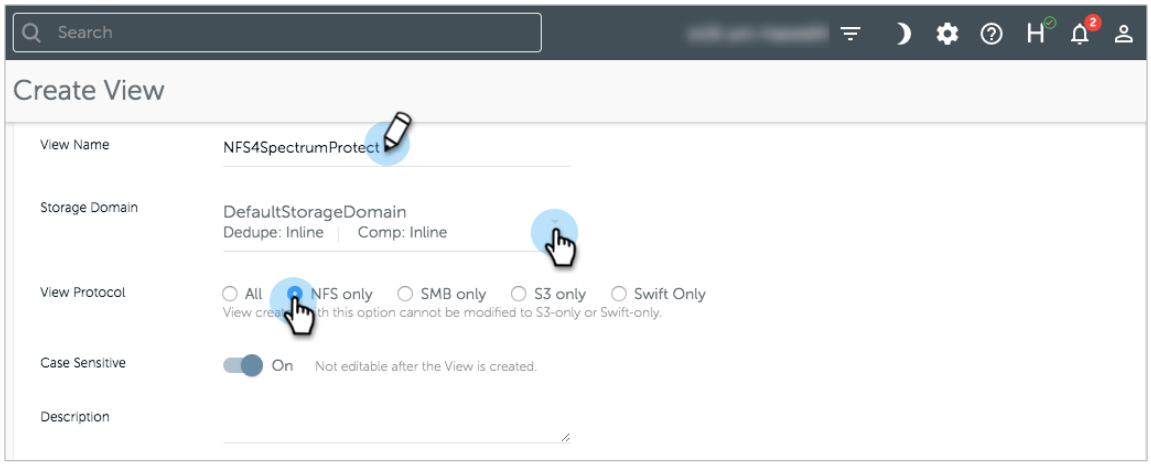
1. Log in to Cohesity platform and navigate to **File Services > Views**.



2. On the **Views** page, click **Create View**,

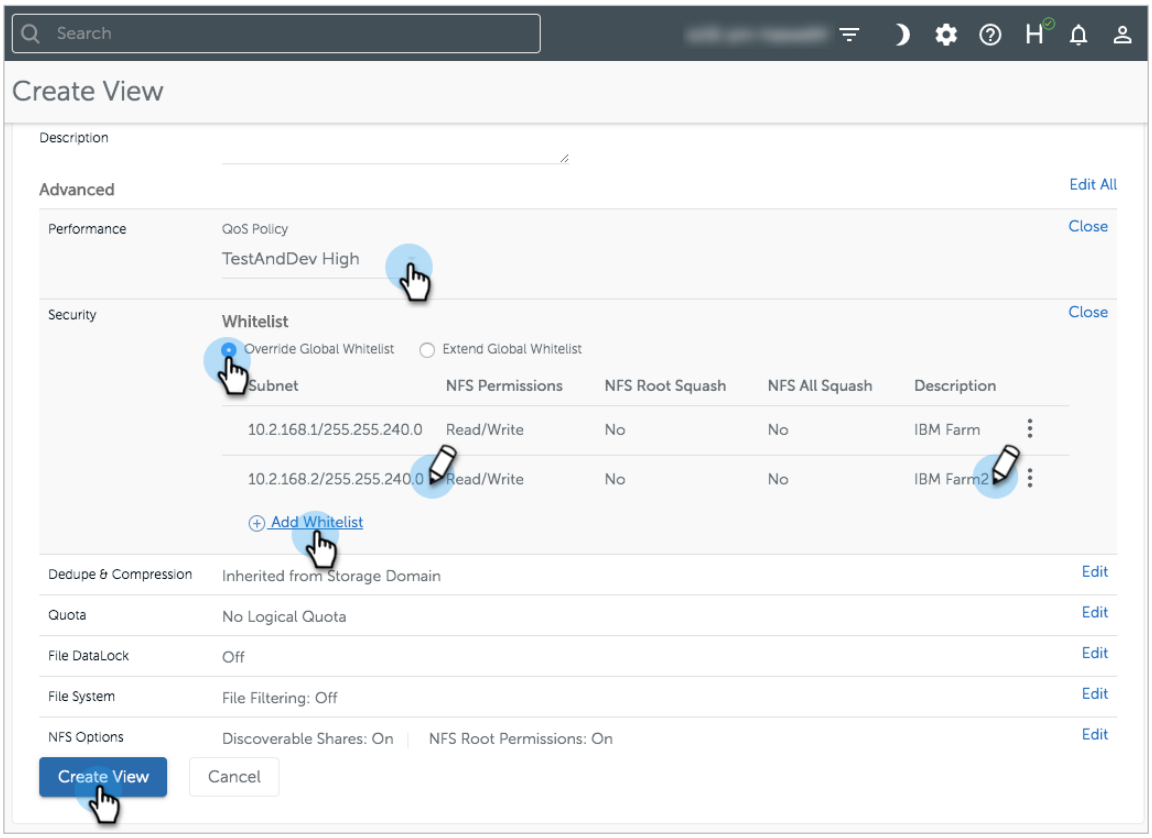


3. In the **Create View** form, enter the **View Name** and choose the **Storage Domain**. Under **View Protocol**, select **NFS only**.



NOTE: For IBM storage pools, Cohesity recommends using the *TestAndDev High* or *Backup Target SSD* QoS policy in the Cohesity NFS View. For details, see Appendix A: Choose Optimal QoS Policy for Your IBM Storage Pools.

4. In the same form, under **Advanced > Performance**, select the optimal **QoS Policy**. Under **Advanced > Security > Whitelist**, click **Override Global Whitelist.** Click **Add Whitelist** and enter the **Subnet IP** (including the Subnet Mask, as in ***<Subnet_IP>/<Subnet_Mask>***), and a **Description** for *each* of your IBM Spectrum Protect servers. Finally, click **Create View** at the bottom of the form.



NOTES:

- For IBM storage pools, Cohesity recommends using the *TestAndDev High* or *Backup Target SSD* QoS policy in the Cohesity NFS View. For details, see Appendix A: Choose Optimal QoS Policy for Your IBM Storage Pools.
- If you add more IBM Spectrum Protect servers in the future, ensure that they are added to the share whitelist in this View.

5. Now that you have created the NFS View on Cohesity, you can create and mount directories in IBM to mount the NFS View in the next section.

Create and Mount Directories in IBM to Mount the Cohesity NFS View

Next, on your IBM Spectrum Protect server, create an equal number of mount directories as you have nodes in the Cohesity cluster. In this example, we have a four-node Cohesity cluster with four VIPs. To get the node VIPs, see Appendix B: Identify Cohesity Node VIPs.

To mount the Cohesity NFS View on the IBM Spectrum Protect server:

1. Create the mount points. To create the mount directories on IBM Spectrum Protect, issue the following commands in your Linux/AIX shell:

```
$ sudo mkdir </tsminst1/Cohesity/FilePool1_1>
$ sudo mkdir </tsminst1/Cohesity/FilePool1_2>
$ sudo mkdir </tsminst1/Cohesity/FilePool1_3>
$ sudo mkdir </tsminst1/Cohesity/FilePool1_4>
```

2. Use these mount options in async, the recommended NFS mount type, to mount the Cohesity NFS View:

OS	ASYNC
Linux	noatime,vers=3,proto=tcp,rsize=1048576,wsize=1048576,hard,intr,nolock
AIX	noatime,vers=3,proto=tcp,rsize=524288,wsize=524288,hard,intr,llock

NOTE: The NFS sync (Linux) and dio (AIX) mount options can affect write performance to the Cohesity cluster and are *not* recommended.

3. Add the new NFS mount points to the fstab file for persistent mounts across reboots of the server. The added entries will look something like this example:

```
vip1.fqdn:/<NFS4SpectrumProtect> </tsminst1/Cohesity/FilePool1_1> nfs
noatime,vers=3,pro-to=tcp,rsize=1048576,wsize=1048576,hard,intr,nolock 0 0
vip2.fqd:/<NFS4SpectrumProtect> </tsminst1/Cohesity/FilePool1_2> nfs
noatime,vers=3,pro-to=tcp,rsize=1048576,wsize=1048576,hard,intr,nolock 0 0
vip3.fqd:/<NFS4SpectrumProtect> </tsminst1/Cohesity/FilePool1_3> nfs
noatime,vers=3,pro-to=tcp,rsize=1048576,wsize=1048576,hard,intr,nolock 0 0
vip4.fqd:/<NFS4SpectrumProtect> </tsminst1/Cohesity/FilePool1_4> nfs
noatime,vers=3,pro-to=tcp,rsize=1048576,wsize=1048576,hard,intr,nolock 0 0
```

4. Enter the mount command at the system prompt.

```
$ sudo mount -a
```

Now you are ready to create the IBM storage pools that will use Cohesity as target storage.

Use Cohesity SMB View on IBM Windows Server

If your IBM Spectrum Protect servers are running on Windows, you can connect to the Cohesity View via the SMB protocol. To use Cohesity to store backups when your IBM Spectrum Protect is running on Windows servers:

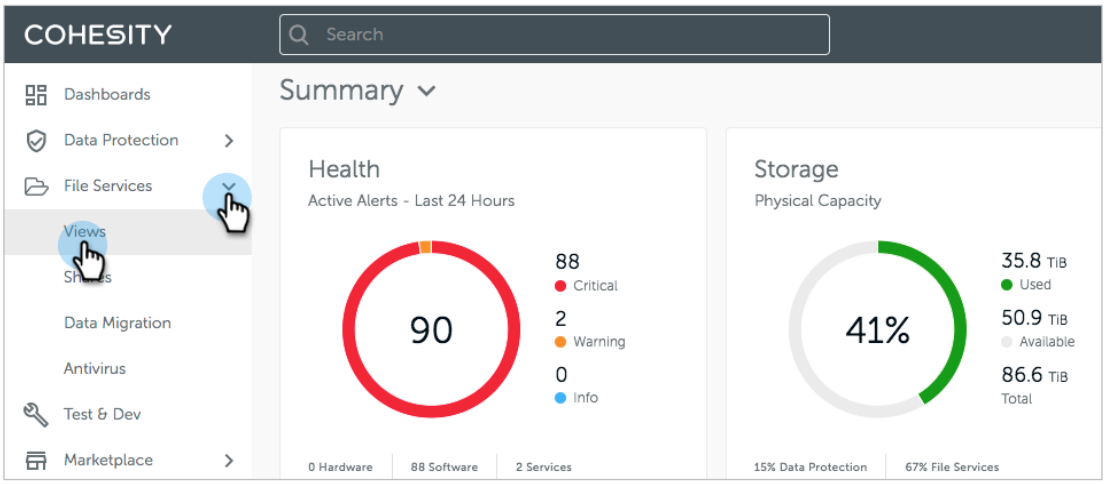
1. Create an SMB View on Cohesity platform, select the optimal QoS policy, and add the View whitelist.
2. Optimize Cohesity platform settings for SMB.
3. Create folders in IBM to access the Cohesity SMB share.
4. In IBM, create a:
   - Directory-container storage pool (for optimal storage efficiency).
   - Sequential-access storage pool (for optimal throughput).
5. Associate your IBM backup jobs to the storage pool you just created.

For this solution, we recommend enabling inline deduplication and inline compression on the Cohesity Storage Domain in which you will be creating your Cohesity Views. To enable them, or to create a new Storage Domain, see Create or Edit Storage Domains in the online Help.

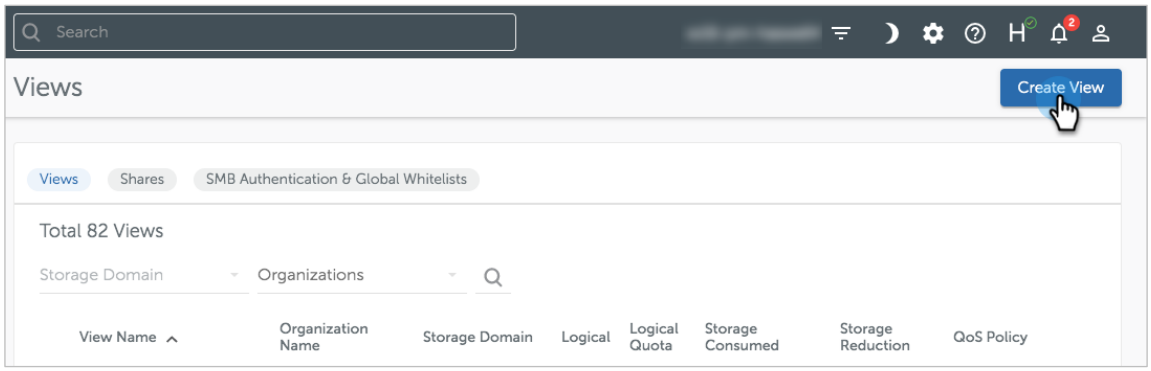
Create Cohesity SMB View for IBM Storage Pools

To create an SMB View for IBM Spectrum Protect running on Windows servers:

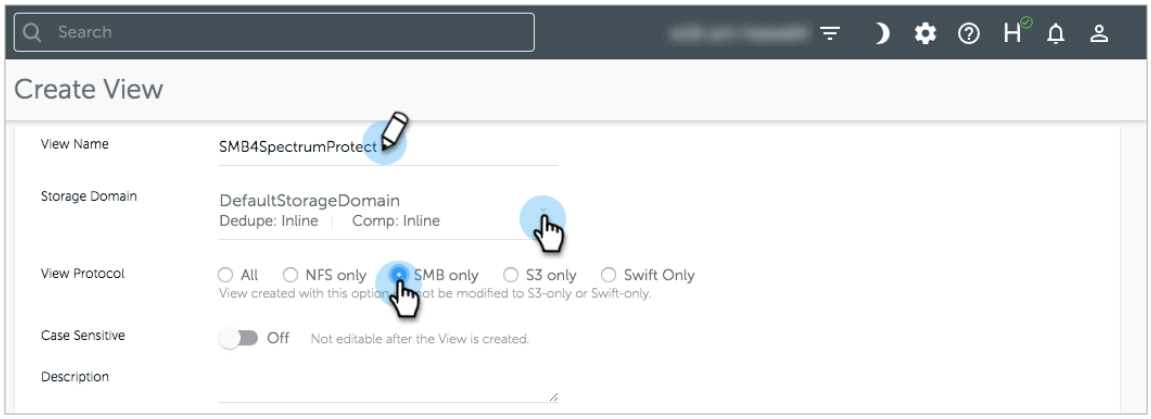
1. Log in to Cohesity platform and navigate to **File Services > Views**.



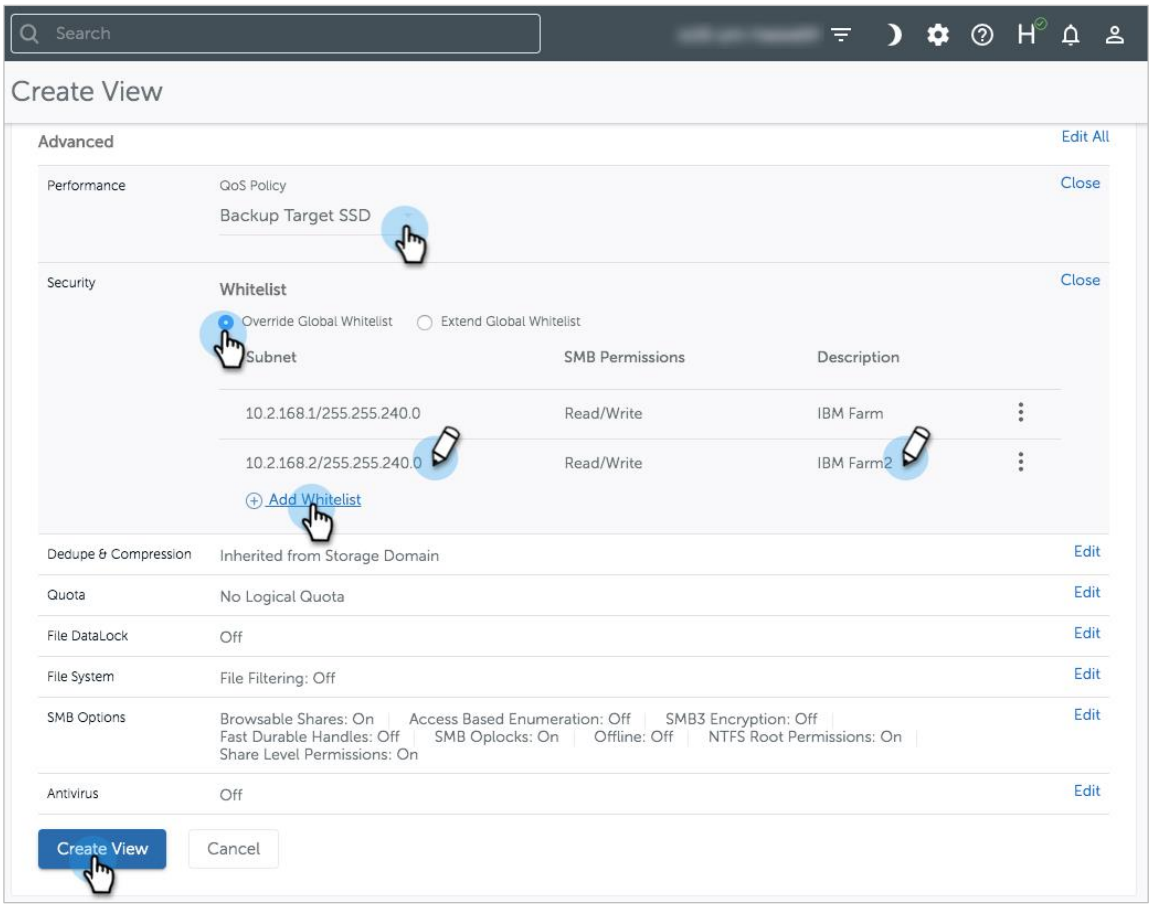
2. On the **Views** page, click **Create View**.



3. In the **Create View** form, enter the **View Name** and choose the **Storage Domain**. Under **View Protocol**, select **SMB only**.



4. In the same form, under **Advanced > Performance**, select the optimal **QoS Policy**. Under **Advanced > Security > Whitelist**, click **Override Global Whitelist**. Click Add Whitelist and enter the **Subnet IP** (including the Subnet Mask, as in ***<Subnet_IP>/<Subnet_Mask>***), and a **Description** for *each* of your IBM Spectrum Protect servers. Finally, click **Create View** at the bottom of the form.



NOTES:

- For IBM storage pools, Cohesity recommends using the *TestAndDev High* or *Backup Target SSD* QoS policy in the Cohesity SMB View. For details, see Appendix A: Choose Optimal QoS Policy for Your IBM Storage Pools.
- If you add more IBM Spectrum Protect servers in the future, ensure that they are added to the share whitelist in this View.

Now that you have created the Cohesity SMB View, verify that the SMB share (which has the same name as the View) is accessible by the IBM Spectrum Protect server and proxies using the ***<vip>*****<View_Name>*** format.

TIP: Should you encounter access issues, which appear most commonly as '*Access Denied*' and '*Can't open for writing*' error messages in IBM, the most likely cause is an issue with the IP whitelist or Active Directory permissions. To troubleshoot these issues, use Cohesity filer audit logging on the Cohesity View, which will indicate the cause. For instructions, see Enable File Services Audit Logs in the online Help.

Optimize SMB Performance

We recommend that you tune your Cohesity system settings to optimize SMB performance. To do so:

1. See Recommended settings when using Cohesity as a filer in the Cohesity Support portal for more detail.
2. Contact Cohesity Support to help you change the settings.

We also strongly recommend that you set the following registry on you IBM Spectrum Protect Windows servers:

- **DisableBandwidthThrottling** (set it to ***1***) - The default is 0. By default, the SMB redirector throttles throughput across high-latency network connections, in some cases to avoid network-related timeouts. Setting this registry value to *1* disables the throttling, enabling higher file transfer throughput over high-latency network connections.

```
HKLM\System\CurrentControlSet\Services\LanmanWorkstation\Parameters\DisableBandwidthThrottling
```

- **RequireSecuritySignature** (set it to ***0***) - The default is 0, disabling SMB Signing. Changing this value to *1* enables SMB signing for all SMB communication. SMB signing can increase CPU cost and network round trips. Therefore, if SMB signing is not required, ensure that this registry value is *0* on all clients and servers.

```
HKLM\System\CurrentControlSet\Services\LanmanWorkstation\Parameters\RequireSecuritySignature
```

Map Cohesity SMB Share on Your IBM Spectrum Protect Server

Next, on your IBM Spectrum Protect server, create an equal number of folders as you have nodes in the Cohesity cluster. In our example, we have a four-node Cohesity cluster with four VIPs.

For example, if you have a four-node cluster and the SMB share is ‘SMB4SprectrumProtect,’ create four mappings using each node’s unique VIP address and that same share name:

<vip01>\SMB4SprectrumProtect

<vip02>\SMB4SprectrumProtect

<vip03>\SMB4SprectrumProtect

<vip04>\SMB4SprectrumProtect

To get the node VIPs, see Appendix B: Identify Cohesity Node VIPs.

Now you are ready to create the IBM storage pools that will use Cohesity as target storage.

Create IBM Storage Pool

In IBM Spectrum Protect, storage pools are the logical groups used for storing backups, archives, or space-managed files. There are several types of storage pools, but the Cohesity solution for IBM only involves the two that support the NFS and SMB protocols:

- Directory-container storage pools.
- Sequential-access storage pools.

For more information on IBM storage pools, see Storage pool types in the IBM documentation.

Based on our testing, for maximum:

- **Storage efficiency**, use directory-container storage pools.
- **Throughput performance**, use sequential-access storage pools.

To start, you need to create a new *device class* that:

1. Points to the mounted NFS or shared SMB file systems from the Cohesity cluster.
2. Creates the storage pool.
3. Verifies the device class configuration by querying it.

Create Directory-container Storage Pool

Directory-container storage pools (introduced with IBM Spectrum Protect 7.1.3) have several advantages over the traditional storage pools. For this solution, we recommend directory-container storage pool(s) because of the dramatic space savings you can realize with deduplication between multiple IBM Spectrum Protect instances.

If storage efficiency is your priority, start by creating a directory-container storage pool with compression enabled. (If it's throughput, create a sequential-access storage pool instead.)

To create a directory-container storage pool:

1. On the IBM Spectrum Protect server, enter following command to open the IBM Spectrum Protect Administrator's CLI:

```
$ dsmadmc
```

2. Define the storage pool type as 'directory' with compression enabled.

```
Protect: IBMSPSRV>def stgpool contpool1 stgtype=directory compression=yes
```

3. Associate the mount directories with the directory-container storage pool you just created. For Linux/AIX servers, provide the NFS mount path to the Cohesity View. For Windows servers, provide the SMB share path.

```
Protect: IBMSPSRV>def stgpooldirectory contpool1
'</tsminst1/Cohesity/Container1_1>,</tsminst1/Cohesity/Container1_2>,/<tsmins
t1/Cohesity/Container1_3>,</tsminst1/Cohesity/Container1_4>'
```

4. List the created directory-container storage pool to verify.

```
Protect: IBMSPSRV>q stgpooldir stgpool=contpool1

Storage Pool Name             Directory                                 
      Access
------------------            --------------------------------          -----
-------
CONTPOOL1                     /tsminst1/Cohesity/Container1_1
      Read/Write
CONTPOOL1                     /tsminst1/Cohesity/Container1_2
      Read/Write
CONTPOOL1                     /tsminst1/Cohesity/Container1_3
      Read/Write
CONTPOOL1                     /tsminst1/Cohesity/Container1_4
      Read/Write
```

That's it! Now that you have created your directory-container storage pool, you can associate it with your IBM backup jobs to use Cohesity as your storage target.

Create Sequential-access Storage Pool

If backup speed is a higher priority than storage efficiency, consider using sequential-access instead. On the metric of backup throughput, sequential-access storage pools appear to have a performance advantage over directory-container storage pools.

To create a sequential-access storage pool:

1. Start by preparing your IBM server: Add the DIRECTIO NO command to the dsmserv.opt file. You can simply add this to the very bottom of the dsmserv.opt file.

Then be sure to restart the IBM Spectrum Protect instance for the change to take effect.

dsmserv.opt (Example Only)

```
$ cat dsmserv.opt

COMMmethod TCPIP
TCPport 1500
DEVCONFIG devconf.dat
VOLUMEHISTORY volhist.dat
...
DIRECTIO NO
```

For details on the performance improvement, see Appendix C: Disable Sync & DIRECTIO for Sequential-access Storage Pools below.

2. Log in to the IBM Spectrum Protect Administrator's CLI to verify that the DIRECTIO option is set.

```
$ dsmadmc

Protect: IBMSPSRV>q option directio
Server Option           Option Setting
------------------      --------------------
          DIRECTIO                      No
```

3. On the IBM command line, enter:

```
$ dsmadmc
IBM Spectrum Protect
Command Line Administrative Interface - Version X, Release X, Level X.X
(c) Copyright by IBM Corporation and other(s) 1990, 2020. All Rights
Reserved.

Enter your user id: admin
Enter your password: [Password]

Session established with server IBMSPSRV: Linux/x86_64
Server Version X, Release X, Level X.XXX
Server date/time: MM/DD/YY HH:MM:SS Last access: MM/DD/YY HH:MM:SS

Protect: IBMSPSRV>
```

4. To create the device class, enter:

```
Protect: IBMSPSRV>def devclass <fileclass1> devtype=file mountlimit=<XXX>
maxcapacity=<XX>g
directory='</tsminst1/Cohesity/FilePool1_1,/tsminst1/Cohesity/FilePool1_2,/ts
minst1/Co
hesity/FilePool1_3,/tsminst1/Cohesity/FilePool1_4>'
```

NOTE: For Windows servers, replace the Cohesity node paths in the above command with the appropriate SMB share paths.

5. To create the storage pool using the device class, enter:

```
Protect: IBMSPSRV>def stgpool <filepool1> <fileclass1> maxscratch=<XXXXXXX>
```

6. To verify the storage class, enter:

```
Protect: IBMSPSRV>q devclass <FILECLASS1>
…
Device Access Strategy: Sequential
…
                     Device Type: FILE
…
Directory: </tsminst1/Cohesity/FilePool1_1,/tsminst1/Cohesity/File-
Pool1_1,/tsminst1/Cohesity/FilePool1_1,/tsminst1/Cohesity/FilePool1_>
```

NOTE: For Windows servers, replace the Cohesity node paths in the above command with the appropriate SMB share paths.

You've done it! Now that you have created your sequential-access storage pool, you can associate it with your IBM backup jobs to use Cohesity as your storage target.

Appendix A: Choose Optimal QoS Policy for Your IBM Storage Pools

Each Cohesity View is assigned a Quality of Service (QoS) policy that determines the priority of I/O (when contention occurs) and to which storage media it is written. There are two basic QoS principles, *TestAndDev* and *Backup Target*, each of which has variants by priority and storage media type.

Table 1: QoS Policies and I/O Workload Type

QOS POLICY	OPTIMIZED FOR I/O WORKLOAD TYPE	PRIORITY	STORAGE MEDIA
TestAndDev	• Random reads & writes. • Use for NFS or SMB Cohesity Views.	High	SSD
		Low	
Backup Target	• Sequential reads & writes. • Use for backups using Cohesity.	SSD	HDD
		High	
		Low	

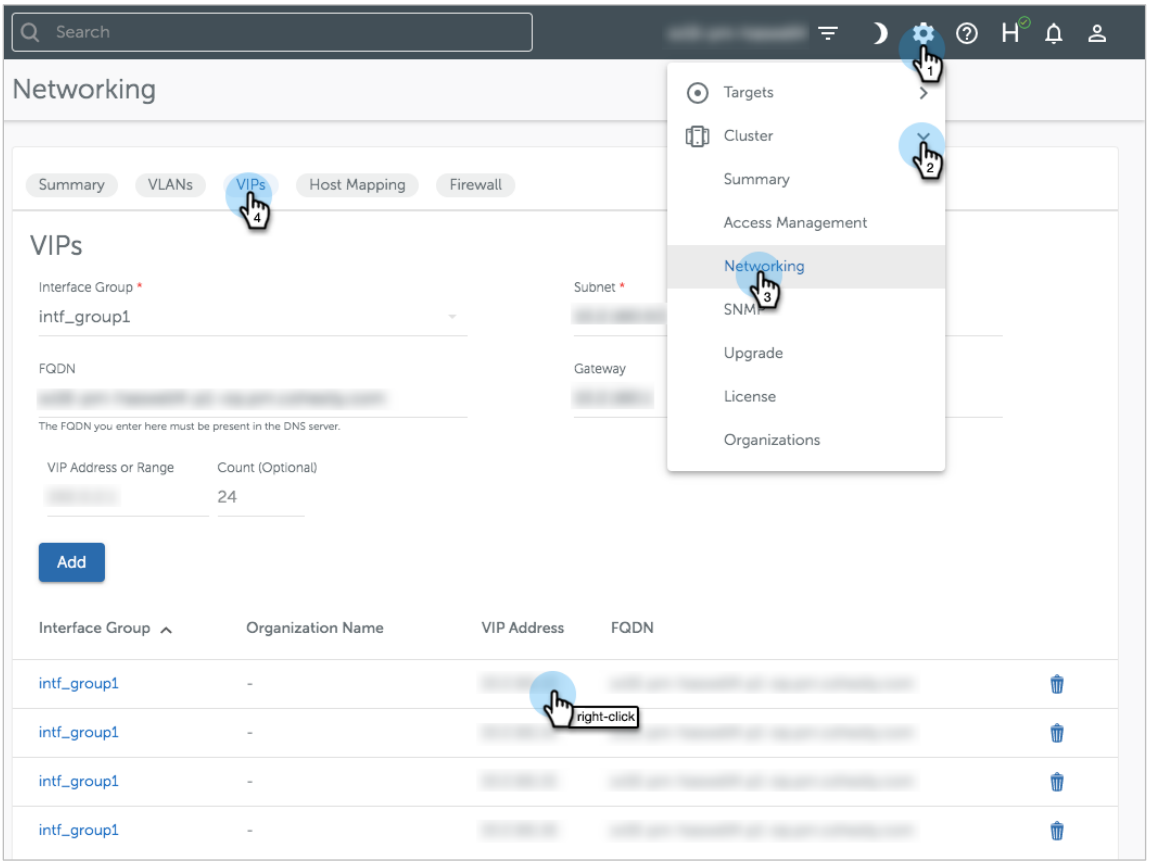
For IBM storage pools, Cohesity recommends using the *TestAndDev High* or *Backup Target SSD* QoS policy in the Cohesity View.

Appendix B: Identify Cohesity Node VIPs

When you use Cohesity for your IBM Spectrum Protect storage pools, it is important to use the unique VIP for each node in the Cohesity cluster.

To find the VIP of each of your Cohesity nodes:

Log in to Cohesity platform, navigate to **Settings > Cluster > Networking**, and click the **VIPs** tab. Find the IP address of each node next to **Interface Group** ID and **right-click > Copy** it from there.



Appendix C: Disable DIRECTIO for Sequential-access Storage Pools

If you use sequential-access storage pools, be sure to:

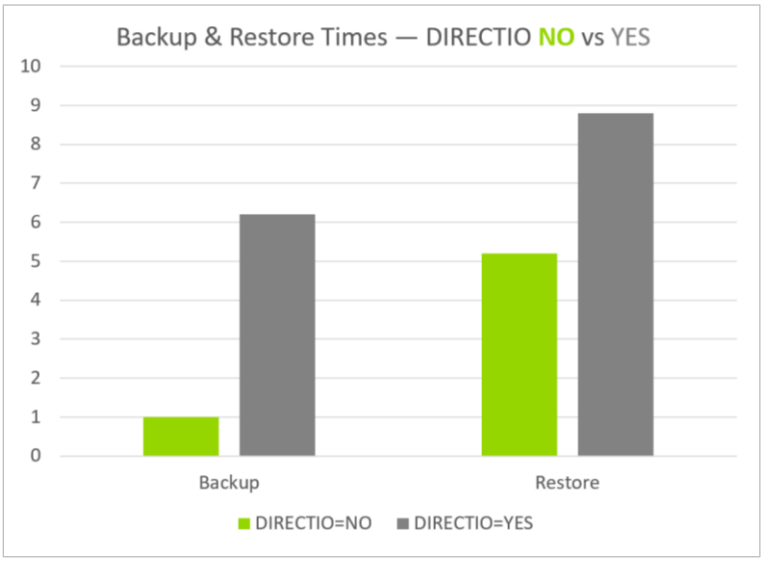
- Set DIRECTIO to NO.
- Mount the Cohesity NFS View *without* the sync option.

Leaving these two settings enabled will significantly affect write performance to the Cohesity cluster.

Figure 5 below illustrates the relative performance difference (for both backup and restore operations) when NFSv3 shares are mounted with and without sync and DIRECTIO.

- **NFS Mount Option=Sync** and **DIRECTIO=YES**: IBM Spectrum Protect writes directly to Cohesity without buffering, which ends up being very inefficient and causes significant latency and thus lower throughput.
- **NFS Mount Option=Async** and **DIRECTIO=NO**: IBM Spectrum Protect writes directly to Cohesity with buffering, resulting in lower latency and higher throughput.

Figure 5: Throughput With & Without Direct I/O for Backup & Restore to 4-node Cluster



Appendix D: IBM Spectrum Protect Resources

Learn more about IBM Spectrum Protect from these IBM articles:

- IBM Spectrum Protect Overview in the IBM Knowledge Center.
- Storage pool types in the IBM Knowledge Center.
- Tivoli Storage Manager Deduplication FAQ in IBM developerWorks.
- Considerations for using the NFS V3 protocol for an IBM Spectrum Protect storage pool in the IBM Support portal.

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Document Version History

VERSION	DATE	DOCUMENT HISTORY
2.2	July 2024	Republishing
2.1	Sep 2021	Rebranding update
2.0	July 2020	Major update
1.0	Dec 2017	First release

ABOUT COHESITY

Cohesity is a leader in AI-powered data security and management. Aided by an extensive ecosystem of partners, Cohesity makes it easier to protect, manage, and get value from data – across the data center, edge, and cloud. Cohesity helps organizations defend against cybersecurity threats with comprehensive data security and management capabilities, including immutable backup snapshots, AI-based threat detection, monitoring for malicious behavior, and rapid recovery at scale. Cohesity solutions are delivered as a service, self-managed, or provided by a Cohesity-powered partner. Cohesity is headquartered in San Jose, CA, and is trusted by the world's largest enterprises, including six of the Fortune 10 and 44 of the Fortune 100.

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