Integrated Data Protection with Cohesity DataPlatform and HPE Nimble Storage

Bringing Together Simplified VM Backup Using Native Integration with HPE Nimble Storage

ABSTRACT

The Cohesity DataPlatform and HPE Nimble Storage integrated data protection solution stands out as a better way to back up data and applications with rich features and benefits. What’s more, you’ll be able to archive the backups to any public cloud or tape storage for long-term retention and replicate them to a different location for disaster recovery.
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1 Introduction to HPE Nimble Storage Integration

Cohesity and HPE have partnered to provide native integration of Cohesity DataPlatform software with HPE Nimble Storage for virtualized environments. With this integration, you can protect applications running on an HPE Nimble Storage array using array-based snapshots. This results in more efficient backup and recovery as well as enhanced application performance.

Cohesity and HPE have certified fit-for-purpose HPE ProLiant™ and HPE Apollo server configurations to run Cohesity DataPlatform and DataProtect, backed by HPE interoperability assurance. This best-of-breed solution combines the web-scale simplicity and efficiency of Cohesity software with the power and density of HPE Apollo and HPE ProLiant servers. As a result, customers can more efficiently and effectively manage unstructured data growth, acquire new insights, and reduce costs and complexity with a single, integrated solution.

This solution guide highlights our Cohesity DataPlatform integration with HPE™ Nimble™ storage for backup and replication. With this integration, your VMware vSphere® compute resources are spared, and the snapshots are offloaded to HPE Nimble Storage to make the solution efficient and robust.

Use cases covered for this solution include:

- Cohesity DataPlatform being the backup target. The hardware appliance can be on Cohesity models or HPE-qualified server models.
- HPE Nimble Storage is the primary storage source.
- VMware virtual machines are hosted on HPE Nimble Storage via the iSCSI and FC protocols.
- Using HPE Nimble Storage array snapshots during virtual machine backups.
- Backup performance comparison between HPE Nimble Storage snapshot integration and VMware snapshot.

1.1 Intended Audience

The target audience for this document includes storage and virtualization administrators, consulting data center architects, field engineers, and administrators who are designing, implementing, and maintaining application backups using Cohesity DataPlatform and HPE Nimble Storage. A working knowledge of VMware vSphere, servers, storage, backups, networks, and data center design is assumed but is not a prerequisite to read and understand this document.
2 Cohesity DataPlatform-HPE Nimble Storage Solution Overview

The hardware and software used in Cohesity’s integrated solution with HPE Nimble Storage arrays includes an HPE Nimble Storage array, Cohesity DataPlatform running on HPE ProLiant servers, and VMware vCenter.

Table 1: Cohesity-Nimble Storage Solution Components

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>MODEL/VERSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cohesity Hardware</td>
<td>▪ HPE ProLiant and Apollo Servers</td>
</tr>
<tr>
<td></td>
<td>▪ Cohesity Hyperconverged Nodes: C6000, C4000</td>
</tr>
<tr>
<td>Cohesity DataPlatform</td>
<td>6.4.1</td>
</tr>
<tr>
<td>Storage Array</td>
<td>HPE Nimble Storage</td>
</tr>
<tr>
<td>NimbleOS</td>
<td>5.0</td>
</tr>
<tr>
<td>Hypervisor</td>
<td>VMware vCenter and ESXi</td>
</tr>
<tr>
<td>Protocol</td>
<td>iSCSI/FC</td>
</tr>
</tbody>
</table>

Figure 1 below illustrates the solution. The production VMs run on HPE servers and the datastores are provisioned from the HPE Nimble Storage array. For the local environment, the connections between the ESXi hosts and the HPE Nimble Storage arrays use iSCSI or FC. In our solution, Cohesity DataPlatform is installed on HPE ProLiant servers, which then take production VM backups using HPE Nimble Storage snapshots.

In Cohesity DataPlatform, Protection Policies define the parameters that determine:

- How often to take backups.
- When to tier cold data to lower-cost cloud storage.
- Whether to replicate off-premises or to the cloud for redundancy.
- Whether to archive to cloud, S3-compatible storage, or tape, for long-term retention and disaster recovery.
2.1 Cohesity DataPlatform Overview

Cohesity DataPlatform consolidates secondary data and applications, including backups, files, objects, test/dev, and analytics, on a single, software-defined platform. Built on web-scale architecture, Cohesity DataPlatform is a scale-out solution based on a unique distributed file system, SpanFS™.

While most organizations initially use Cohesity DataPlatform to overcome mass data fragmentation by simplifying data protection, its flexible architecture allows easy expansion to additional use cases such as NAS and object storage workloads, further increasing operational simplicity and improved TCO (Total Cost of Ownership). Cohesity DataPlatform works on-premises (on qualified Cisco, HPE, Dell or Cohesity C-Series platforms), in the public cloud, as well as in remote and branch offices on hypervisors of your choice, such as VMware and Hyper-V™.

2.2 HPE Servers for Cohesity DataPlatform

Cohesity’s software can be installed on select HPE servers. The combination of a small footprint, energy efficiency, and flexible options makes HPE servers an optimal platform for Cohesity’s software-defined platform. For more details, refer HPE ProLiant and Apollo Servers.
2.3 HPE Nimble Storage All Flash Array

HPE Nimble Storage arrays are engineered for high performance (using flash) and lowered costs (using dense, capacity-optimized disks). HPE Nimble Storage All Flash Arrays combine a flash-efficient architecture with HPE InfoSight predictive analytics to achieve fast, reliable access to data and 99.9999% guaranteed availability. Radically simple to deploy and use, the arrays are cloud-ready, providing data mobility to the cloud through HPE Cloud Volumes.

HPE Nimble Storage arrays provide:

- Accelerated performance for higher throughput (I/Os per second) and sub-millisecond latencies.
- Higher storage efficiency to reduce the storage footprint by 30-75%.
- Non-disruptive scaling to fit changing application needs through increased performance or capacity, or both.
- Maximized data and storage availability with integrated data protection and disaster recovery.
- Simplified storage management and reduced day-to-day operational overhead.

2.4 Cohesity DataPlatform and HPE Nimble Storage Integration — Features & Benefits

Cohesity DataPlatform’s integration with HPE Nimble Storage can protect applications running on HPE Nimble Storage using array-based snapshots. This results in more efficient backups as well as enhanced application performance.

Table 2: Features and Benefits of Cohesity DataPlatform Integration with HPE Nimble Storage Arrays

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced VM Stun</td>
<td>The VM stun that takes place during VM snapshot creation, deletion and delta commit is completely avoided in Cohesity DataPlatform’s integration with HPE Nimble Storage.</td>
</tr>
<tr>
<td>Reduced VM backup time with Cohesity MegaFile</td>
<td>To avoid bottlenecks when a VM is assigned to a single node, the MegaFile feature splits each virtual disk in the VM into parts, ‘MegaFile chunks,’ and distributes them to all nodes in the cluster. As a result, as the number of nodes in a Cohesity cluster grows, the time to ingest decreases dramatically.</td>
</tr>
<tr>
<td>Reduced VM snapshot lifespan with HPE Nimble Storage Integration</td>
<td>The VM snapshot hold time is reduced and the snapshot is offloaded to a HPE Nimble Storage array, where the host resources are less utilized.</td>
</tr>
</tbody>
</table>
## FEATURES

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple data protection</td>
<td>Simplify backup environments by eliminating the need for media servers and master servers.</td>
</tr>
<tr>
<td>Application-consistent protection</td>
<td>Cohesity DataPlatform can perform application-consistent backups to ensure the database can recover faster and avoid data corruption. The system provides ‘always-on’ availability.</td>
</tr>
<tr>
<td>Distributed platform</td>
<td>You can scale out capacity and linear performance simply by adding nodes to the cluster. Eliminate the need for forklift upgrades and data migrations.</td>
</tr>
<tr>
<td>Native cloud integration</td>
<td>Integrate with AWS, Microsoft Azure, and/or Google Cloud Platform (GCP) for long-term data retention, data tiering, and disaster recovery.</td>
</tr>
<tr>
<td>Copy data management</td>
<td>Ability to spin up clone database copies from backups for test and dev environments. Cohesity DataPlatform acts as an NFS target for Oracle data files, control files, and redo logs.</td>
</tr>
<tr>
<td>Lower TCO (Total Cost of Ownership)</td>
<td>Our solution consolidates backup software licenses, media and catalogue servers, and backup targets. What’s more, global deduplication, compression, and snapshots dramatically reduce physical storage usage. Pay-as-you-grow expandability that reduces the need to over-provision.</td>
</tr>
</tbody>
</table>

### 2.4.1 Reduced VM Backup Time with Cohesity MegaFile

When backing up VMs, the main challenge is VM stun times and application I/O timeouts, which are caused by long VM snapshot lifespans.

The longer your backup operations (that is, VM snapshot lifespans) are, the greater your VM stun times, especially during the VM snapshot commit (delete) phase, which can cause application I/O timeouts. Given that the backup copy operation is a function of the total data that is read and then copied, the VM snapshot lifespan grows with size of the data being backed up, as illustrated in Figure 2 below.
Cohesity DataPlatform natively alleviates the VM snapshot lifespan with the MegaFile feature. The MegaFile feature reduces the time to ingest a single large VMDK by splitting it into several smaller parts (MegaFile chunks) and distributing them to all nodes of the cluster, where they are ingested in parallel.

For example, if you have a 4-node cluster and a 2 TB VMDK, then it will be split into four MegaFile chunks, each of which is 512 GB. In this example, we reduce the backup time by 4x, as illustrated in Figure 3 below. If you have an 8-node cluster and a 2 TB VMDK, then it is split into eight MegaFile chunks, each of which is 256 GB, and the ingest time is reduced by a factor of 8. As a result, as the number of nodes in a Cohesity cluster grows, the time to ingest decreases dramatically, which reduces the VM snapshot lifespan.
2.4.2 Reduced VM Snapshot Lifespan with HPE Nimble Storage Integration

While the time savings with Cohesity MegaFile are dramatic, they are still a function of the total size of the data and the number of nodes in your Cohesity cluster. To nearly eliminate the VM stun times, our integrated solution offloads the backup copy operation from a VM snapshot to a storage array snapshot. Instead of reading the data from the VM snapshot and keeping it open, with our integration, we create the VM snapshot and then create a corresponding storage array snapshot of the underlying datastore on which the VM is hosted. We then delete the VM snapshot as soon as the storage array snapshot is successfully created and copy the VM data from the storage array snapshot using the Cohesity MegaFile feature, thereby reducing the backup time still further.

![Figure 4: VM Snapshot Lifespan when Reading from HPE Nimble Storage Array Snapshot](image)

When we use the storage array snapshot instead of the VM snapshot, the VM snapshot lifespan is no longer a function of the size of the data. Therefore, our integration with the storage array snapshot results in much shorter, consistent VM snapshot lifespans, regardless of the size of the VM or size of the cluster. For example, the VM snapshot lifespan for a VM with 1 TB and another with 10 TB is the same when using the Cohesity DataPlatform-HPE Nimble Storage integration.

With our integration, we have almost completely eliminated VM stun time issues and also reduced the time necessary for backup with the MegaFile feature, by ingesting data in parallel.
2.4.3 Test Results Illustrate Multiplied Reduction of VM-based Snapshot Lifespan

To demonstrate this effect, we tested with 40 VMs of varying sizes on a HPE Nimble Storage datastore and repeated the backup operation with and without storage array snapshot integration. As you can see below, the blue bars representing the VM snapshot lifespan with integration are constant, regardless of VM size, unlike the red bars that represent the VM snapshot lifespan without integration.

Figure 5: VM Snapshot Lifespan Comparison - With and Without HPE Nimble Storage Array Snapshot Integration
3 Use Cohesity DataPlatform to Protect VMs on HPE Nimble Storage

Cohesity DataPlatform can protect the virtual machines on HPE Nimble Storage volumes by integrating HPE Nimble Storage snapshots. This integrated approach minimizes performance degradation on the production systems, improves storage efficiency, decreases management complexity, and reduces overall costs.

To start protecting your virtual machines:

1. [Register Hypervisor on Cohesity DataPlatform](#).
2. [Register the HPE Nimble Storage array as a Source on Cohesity DataPlatform](#).
3. [Choose a Cohesity Protection Policy](#).
4. [Create a Cohesity Protection Group](#).

Figure 6: Four Steps to Protect VMs on HPE Nimble Storage
Figure 7 below illustrates the high-level backup process after the integration of Cohesity DataPlatform and HPE Nimble storage.

Figure 7: Cohesity’s VM Backup Process with HPE Nimble Storage Integration

3.1 Register Hypervisor on Cohesity DataPlatform

To register VMware vCenter on Cohesity DataPlatform:

1. Log in to Cohesity DataPlatform. and navigate to Data Protection > Sources.
2. In the Sources page, click plus (+) and select Hypervisor.

3. In the Register Hypervisor Source page, enter:
   a. Under Select Hypervisor Source Type, select VMware vCenter.
   b. Hostname or IP Address. Enter the management hostname or IP address of your vCenter.
   c. Username.
   d. Password.
   e. Then click Register.

Your VMware vCenter is now registered as a Source with Cohesity DataPlatform, and is available to add to a Protection Group after you choose a Protection Policy.
3.2 Register HPE Nimble Storage Array on Cohesity DataPlatform

To register HPE Nimble Storage on Cohesity DataPlatform:

1. Log in to Cohesity DataPlatform and navigate to Data Protection > Sources.
2. In the Sources page, click plus (+) and select Storage Array.

3. In the Register Storage Array page, enter:
   a. Source Type. Select Nimble.
   b. Management Host or IP Address. Enter the management hostname or IP address of your HPE Nimble Storage array.
   c. Username.
   d. Password.
   e. Then click Register.
Your HPE Nimble Storage array is now registered as a Source with Cohesity DataPlatform, and is available to add to a Protection Group after you choose a Protection Policy.

### 3.3 Choose a Protection Policy

In Cohesity DataPlatform, Protection Groups use Protection Policies. Protection Policies reflect business needs, such as backup and archival frequency and retention requirements, while a Protection Group defines operational requirements, such as the source objects to protect, the Protection Policy to use, the Storage Domain to use, and more. This process of combining business needs (Protection Policy) with the objects to protect and the associated operational requirements (Protection Group) provides rich flexibility to customers.

Cohesity DataPlatform includes three standard policies: Gold, Silver, and Bronze. For their default settings, see Manage Policies in the online Help. If the default settings of the standard policies do not meet your needs, you can create a customized Policy. See Create or Edit a Standard Policy in the online Help.

### 3.4 Create a Protection Group

Protection Groups combine operational requirements — such as the objects to protect, indexing, alerts, exclusions, inclusions, and more. — with the business requirements that are defined in a Protection Policy. Multiple Protection Groups can use the same Protection Policy, but each Protection Group can have only one Policy.
To create a Protection Group:

1. Log in to Cohesity DataPlatform and navigate to Data Protection > Protection.

2. Click the plus (+) and select Virtual Server to protect the virtual machines that are on the datastore hosted by your HPE Nimble Storage.
3. Select the virtual server Source that you registered earlier. Select the objects to protect and click **Save Selection**.
4. Under **Protection Group**, select **New Group** or **Existing Group** and enter the **Group Name**. Under **Policy**, select an existing Policy. (If none of the existing Policies meet your needs, scroll to the bottom of the list and select **Create Policy**. See [Create or Edit a Standard Policy](#) in the online Help.)

5. Under **Storage Domain**, select a **Storage Domain**.
6. Expand **Additional Settings** to enable **Leverage Storage Snapshots for Data Protection**, and select **Storage Array**.

![Additional Settings](image)

7. Click **Protect**.

Your new Protection Group is now active and running.
4 Use Cohesity DataPlatform to Recover VMs on HPE Nimble Storage

Cohesity DataPlatform with HPE Nimble Storage integration can restore an entire VM almost instantly. In fact, with this solution, you can recover *multiple* VMs instantly. Restoring a VM is as important as backing one up. Equally important questions are:

- Where should the VM be restored?
- When should the restore start?
- How long will it take?
- Should the VM be restored to a specific point in time?

Some of these questions can be answered by the company’s Recovery Point Objective (RPO), and their Recovery Time Objective (RTO). Figure 8 explains the recovery procedures of a VM.

Figure 8: Cohesity’s VM Recovery Process

4.1 Recover VMs

Cohesity DataPlatform provides the ability to recover Protected Objects (such as VMs) from a snapshot created earlier by a Protection Group.
To recover a VM:

1. Log in to Cohesity DataPlatform and navigate to Data Protection > Recoveries.

2. On the Recovery page, click Recover and select VMs.

3. Enter the search query for the Objects you want to recover. You can search by Server or Protection Group Name.

   NOTE: Cohesity DataPlatform supports wildcard characters and search filters.
4. Select the objects to recover. Click **Continue**.

![Recover VMs](image)

5. Set Recovery options.
   a. *(Optional)* Change the default **Task Name**.
   b. *(Optional)* To select a specific Recovery Point, click the **pencil** under **Recover As**. By default, the most recent snapshot of the VM is selected.
   c. Select the (original or new) **Recovery Location**.
      - If you select a new location, you can select **Rename Recovered VMs** and **Add Prefix** and/or **Add Suffix**.
   d. Select Networking Options.
      - **Keep original**. For each recovered VM, keep the original virtual Network Interface Cards (vNICs) and attach them to the original network connections. (This option is only supported when VMs are recovered back to their original location.)
      - **Start Connected**. For each recovered VM, connect to the original or new network when the VM reboots. If this option is not selected, the VMs are not connected to any network on reboot.
      - **Detach network**. For each recovered VM, the vNIC is removed from the VM.
   e. Under **Additional Options**, you can choose to **Leave recovered VMs powered off** and, if you choose to, **Continue recovery even if errors occur when recovering VMs**.
   f. Under **Cohesity network interface**, select **Auto Select**.
   g. Finally, click **Finish** to trigger the recovery.
## Recover VMs

### Task Name

Recover-VMs_Jan_3__2020__7-19pm

### Selected Objects

<table>
<thead>
<tr>
<th>VM</th>
<th>OS</th>
<th>Storage Domain</th>
<th>Protection Group Name</th>
</tr>
</thead>
</table>

### Recover As

<table>
<thead>
<tr>
<th>VM</th>
<th>OS</th>
<th>Storage Domain</th>
<th>Protection Group Name</th>
</tr>
</thead>
</table>

### Recovery Location

- Recover back to original location
- Recover to a new location
- Rename Recovered VMs

### Networking Options

- Keep original
  - Start Connected

- Detach network

### Additional Options

- Leave recovered VMs powered off
- Continue recovery even if errors occur when recovering VMs

### Cohesity network interface

- Auto Select
- Interface Group

### Finish

- Save and add more
- Cancel
5 Use CloudArchive for Long-Term Retention

The exponential growth of data volumes and the resulting IT management demands have prompted businesses to seek more cost-effective, reliable data storage and protection solutions. What’s more, most organizations have a requirement for periodic off-site storage of full backup sets (for example, one per month for 12 months, and one per year for seven years). This was historically accomplished with tapes. Now, Cohesity DataPlatform provides a policy-based method to archive to public clouds (AWS, Azure, GCP), to any S3-compatible storage, tape, and/or to any NFS mount point. Cohesity CloudArchive offers a complete, self-contained copy of your backup, containing backup data, backup metadata, indexing data, and deduplication fingerprints.

Backup administrators can take advantage of Cohesity CloudArchive to address long-term data retention requirements. The archived data is efficiently transferred and stored by sending only deduplicated, compressed, incremental backups, thereby reducing network and storage utilization.

Figure 9: Leverage the Public Cloud for Long-term Retention

CloudArchive is very flexible. You can use it with AWS, Azure, GCP, NAS, and S3-Compatible cloud object storage.
6 Maintain Business Continuity with Disaster Recovery

Cohesity DataPlatform provides two mechanisms for protecting your data from disruptions and disasters.

- **Replication.** A simple way to store and then get your data back in the event of major business disruptions such as natural disasters and IT failures.
- **CloudArchive.** Archives your data in the cloud for later use with Cloud Recover (to original cluster) and CloudRetrieve (to a new cluster).

6.1 Replicate Backups to Other Cohesity Clusters

A Cohesity cluster can replicate your backup snapshots to another Cohesity cluster in the same data center, in another data center, or in the public cloud.

To enable replication, within a **Protection Policy**, you can configure the settings for replicating protected objects to remote clusters. You can schedule recurring replication, which further improves your data resiliency. You can select a replication target and replication frequency and define the retention time. You can also add new remote replication targets and sources, allowing you to complete entire workflows without leaving the page you are on.
To apply replication to your Protection Policy:

1. Navigate to Data Protection > Policies.
2. Click the plus (+) to create a new Policy, or edit an existing Policy.
3. Click the Replication icon to open your replication options.

For more, see Replication in the online Help.

6.2 Access Your Cloud-stored Data

Once the data is archived using Cohesity’s CloudArchive feature, backup administrators can also take advantage of the Cloud Recover and CloudRetrieve features:

- **Cloud Recover** to source cluster: Recover entire objects to your original cluster.
- **CloudRetrieve** to new cluster: Retrieve your previously archived data onto an entirely new cluster as a cost-effective alternative for disaster recovery, geo-redundancy, and business continuity.
Figure 11: Cloud Recover to Original cluster & CloudRetrieve to New Cluster

To learn more about CloudArchive, see the *CloudArchive & CloudRetrieve Deployment & Recovery Guide* for **AWS**, **Azure**, **GCP**, **NAS**, and **S3-Compatible** cloud object storage.
7 Reduce TCO with Policy-based Cloud Tier

The performance, availability, and cost requirements of storing and accessing your data can change based on your business needs. Cohesity Cloud Tier allows you to move data to lower-cost storage for infrequently accessed data, reducing operating expenses and helping you meet compliance and access frequency requirements. Cohesity DataPlatform can automatically move data between different tiers.

Data can be down-tiered from your Cohesity cluster to External Targets such as public cloud infrastructure providers (AWS, Azure, or Google Cloud Platform) or any S3-compatible External Target, using a threshold that you define in the Protection Policy. Similarly, hot data in External Targets can be up-tiered back to the Cohesity cluster.

Figure 12: Cohesity Cloud Tier Manages Data Tiering with a Policy-defined Threshold

The tiering of cold data to the External Target is based on a policy with two factors: tiering threshold and data policy (that is, the age of the data, or length of time since it was last accessed). Tiering happens only if utilization exceeds the tiering threshold and there are data blocks that meet the data policy.

- **Tiering threshold**: The percentage of space utilization that is set to trigger the tiering of cold data.
- **Data policy**: Specifies the duration of time that the data must be inactive for it to be eligible for tiering.

The tiering threshold and data policy can be set on the Cohesity cluster, or on an individual Storage Domain, or both. When set on the cluster, all Storage Domains inherit the setting. When set on an individual Storage Domain, it is not applied to any other Storage Domains.
When the threshold is set on both the cluster and a Storage Domain, the Storage Domain settings take precedence. This allows you to set a global threshold for your cluster and a different threshold for specific Storage Domains, giving you greater flexibility.

When these configured thresholds are breached, data is tiered to the cloud. When tiered data becomes hot data, data is seamlessly tiered from the cloud back to the Cohesity cluster without user intervention.

Following the paradigm upheld throughout by Cohesity DataPlatform, all tiered data is compressed, deduplicated, and encrypted.

For more, see the Cohesity Cloud Tier Architecture Reference.
8 Your Feedback

Was this document helpful? Send us your feedback!

9 About the Author

Karthick Radhakrishnan is a Technical Marketing Engineer at Cohesity. In his role, Karthick focuses on Cohesity and OEM hardware platforms, DataPlatform networking, and DataPlatform Virtual Edition (VE).

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10 Document Version History

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<tr>
<td>1.0</td>
<td>Jan 2020</td>
<td>First full release</td>
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ABOUT COHESITY

Cohesity ushers in a new era in data management that solves a critical challenge facing businesses today: mass data fragmentation. The vast majority of enterprise data — backups, archives, file shares, object stores, and data used for test/dev and analytics — sits in fragmented infrastructure silos that makes it hard to protect, expensive to manage, and difficult to analyze. Cohesity consolidates silos onto one web-scale platform, spanning on-premises, cloud, and the edge, and uniquely empowers organizations to run apps on that platform — making it easier than ever to back up and extract insights from data. Cohesity is a 2019 CNBC Disruptor and was named a Technology Pioneer by the World Economic Forum.

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