COHESITY

Version 1.0

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Protect SAP HANA with Cohesity

Cohesity Solution for Backup and Restore of SAP HANA Databases with Best Practices

ABSTRACT

Get an overview of Cohesity Database Protection features, general workflows, and options along with the best practices for SAP HANA.

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SAP HANA Protection using Cohesity Plugin

SAP HANA administrators contend with the challenges of Increasing backup duration, rapid data growth, increased storage costs, and the lack of flexibility and storage management tools in SAP HANA Studio.

In addition to these challenges, today's tenant database protection must encompass more than getting a clean copy. It must include factors like security, storage efficiency, minimized impact on production systems, automation, and scaling.

Cohesity protection for SAP HANA provides a solution to these challenges. It reduces the complexity of database backups and restores secure, streamlined workflows. You can protect and manage your workloads and execute available protection and recovery workflows with a single pane of glass with a few steps. Cohesity SAP HANA Plugin provides flexible deployment options to make SAP HANA backups and restores simple and secure.

This guide focuses on SAP HANA tenant database protection using the Cohesity SAP HANA Plugin. This guide is specific to SAP HANA x86-64. The SAP HANA Plugin is currently available on Power platform from 6.8 and upwards.

This guide provides you an overview of features and options along with their related recommendations and best practices.

Cohesity SAP HANA Certification

Cohesity DataProtect is SAP-certified under the following versions.

SAP® Certified
Integration with SAP Applications

Cohesity SAP Agent Version	SAP Database
Cohesity DataProtect 7.1	Cohesity DataProtect 7.1 on Power

Use Cases

You can use this workflow for SAP HANA protection:

- If you are looking for automated backup protection.
- If you are looking for protection for your HANA environment using an on-prem Cohesity cluster.
- If you want a simple, specific restore or a Point in Time restore.
- If you want a simple UI-based tenant database restore to an alternate host.
- If you want to meet your backup SLA.

- If you want faster and more secure backups and restore performance using RPC.
- If you want to move away from script creation and management.
- If you want automated storage configuration and management.
- If you want to reduce storage space and cost for your backups.
- If you are looking for centralized monitoring and reporting.
- If you are looking for immutable, ransomware-proof backups.

Technical Considerations

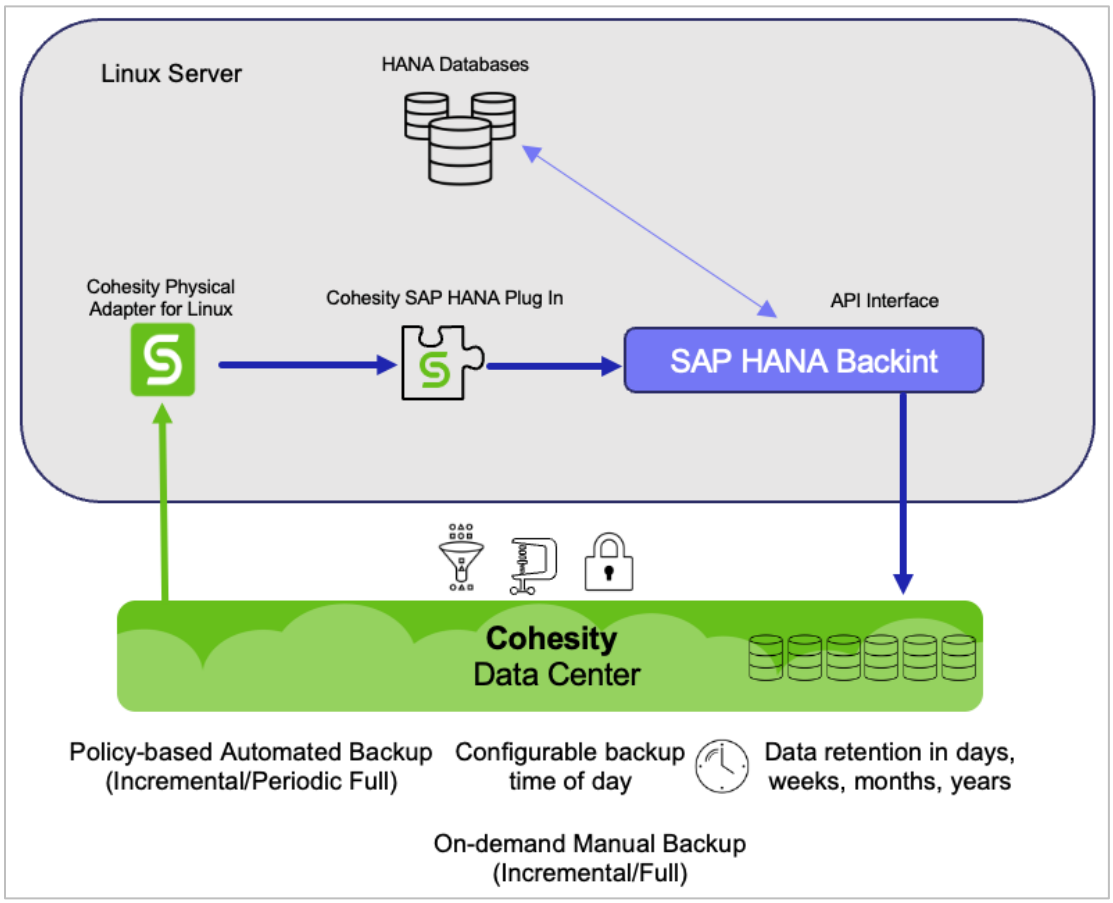
Consider the following technical aspects before you make major decisions about your solution.

- No SSH is needed; no NFS mounts are needed.
- gRPC, and secure gRPC protocols are used for faster backups and restores.
- Backup and restores are balanced based on mounts and concurrency, as defined in the job. (no scripts to change)
- Backup and restore methods perform automatic discovery of the Cohesity VIPs [node IPs in case of CE] and update the Cohesity BACKInt parameter file.
- You can perform point-in-time restores of a tenant even though SAP HANA performs its automatic log backup.
- The first backup is always a FULL backup. After a Full backup, the incremental backup goes faster.
- Ensure third-party agents are removed or uninstalled.
- You can protect multiple tenant databases using a single Protection Group.
- For other considerations, please refer to Plan and Prepare for SAP HANA Protection Considerations. Please ensure that you are familiar with the different options available.

How Cohesity Works with SAP HANA Databases

Cohesity's Linux Adapter and SAP HANA Plugin natively integrate with databases to provide backup and recovery solutions for deployments.

Figure 1: How Cohesity works with SAP HANA Databases



The SAP HANA database API is called Backint. Backint for SAP HANA is an API that enables Cohesity to connect to the SAP HANA databases directly. Backups are transferred via pipe from the SAP HANA database to Cohesity SAP HANA Plugin, which runs on the SAP HANA database server and then sends the backups to the Cohesity cluster.

Backup types for SAP HANA tenants' databases are Full and Differential. Log backups are performed independently by HANA. Log backups are captured along with a backup to provide a point-in-time restore. Cohesity provides the option to perform a full and incremental backup. The first backup is always full, and successive backups can either be full or incremental based business requirements.

NOTE: You must install the Cohesity Linux Physical Adapter and the SAP HANA Plugin on each database host you want to protect.

Cohesity SAP HANA Plugin Benefits

1. Best-in-class global space efficiency for your HANA backups.
2. SAP HANA backups and restores are optimized for performance for Cohesity.
3. Scale-out architecture - HANA backup and restores are load-balanced across Cohesity cluster nodes, giving redundancy, and protecting against backup failure.
4. Simplification—Cohesity automates SAP HANA backups [Full/Inc] and restores [specific/pit], which can be conducted through one simple graphical interface for all workflows.
5. Flexibility - Cohesity UI offers flexibility with options in the SAP HANA backup and restore workflows.
6. Ease of Use - All backup and restore workflows can be used out of the box.
7. Optimization - Cohesity database solution uses optimized backup and restore parameters in workflows.
8. Immutability - Cohesity backups cannot be modified or tampered with and are secured from accidental loss or deletion.
9. Security - We support key-based authentication methods.
   gRPC and RPC are secure transport types.

Cohesity Features

The SAP HANA Plugin supports SAP HANA databases with a range of features.

Backup and Restore Features for SAP HANA

You can find SAP HANA Backup and Restore features at SAP HANA Protection.

Table 1: Backup and Restore Features of SAP HANA

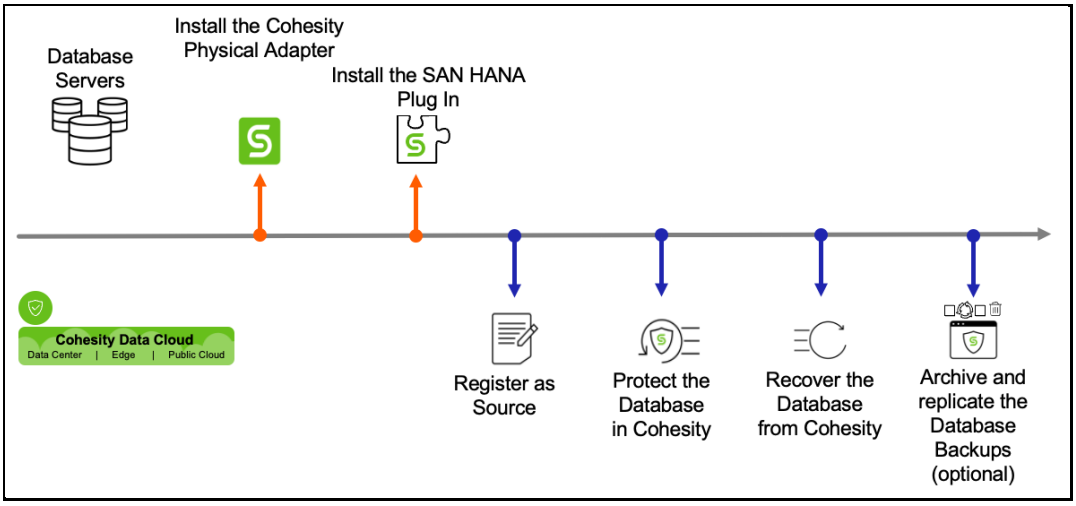
Feature	Linux
Full Backup	Yes
Incremental Backup	
Log Backup	
Restore Snapshot Same Host	

Feature	Linux
Restore Point in Time Same Host	
Restore Point in Time Alternate Host	

Deployment Steps

Install the Cohesity Physical Adapter for Linux and the SAP HANA Plugin on each database host you want to protect.

Figure 2: The Adapter and Connector Installation



Once you complete the installation of both the components on the database host, you are ready to register the database as a source.

Physical Adapter Installation

Downloading and installing the Linux Physical Adapter and the SAP HANA Plugin on a server allows you to register SAP HANA as a source with the Cohesity cluster.

Before you register your SAP HANA deployment as a source with Cohesity and protect SAP HANA databases, ensure the following prerequisites:

- Supported SAP HANA Versions
- Port Requirements
- Considerations
- User Store

Download and Install the Linux Physical Adapter

The RPM installer is available and recommended. If you choose to use the Script Installer, follow the steps:

Table 2: Steps to install the Cohesity Physical Adapter for Linux.

Feature	Linux
Download the Agent Installer	From the download agent window, select the **Script Installer** and download it to the server you want to protect.
Navigate to the downloaded directory	As the root user (required) with local system privileges on that server, change the directory to the location of the installer package.
Make the installer executable	Make the installer executable, for example: `chmod +x cohesity_agent_X.X_linux_x64_installer`

Install the agent	`sudo /cohesity_agent_6.6.0d_u2_linux_x64_installer --install`
	Or even easier use the rpm:
	`rpm -ivh el-cohesity-agent-6.8.1_u6-1.x86_64.rpm`

Location	• `Installation directory:/home/<username>/cohesityagent or /root/cohesityagent` • `Log file: /home/cohesityagent/cohesityagent/log`

More details about the Cohesity adapter install are found in Download and Install the linux Agent and Linux Agent installer options.

Field Notes

- Like all packages, dependencies need to exist on the Linux server. For a complete list of dependencies, see Install and Manage the Agent on Linux Servers.
- If you plan to run volume-based backups on a Linux physical server, then you are using block-based technology. This technology requires enough free space at least equal to the: (Initial disk size + Churn rate *Backup window time). For more information on this calculation and some how-to's, see Free Space Requirement for Volume-based Backup.

Install the SAP HANA Plugin

Operation	Install User	Install Command Syntax
SAP HANA Database Plugin Install	sid<adm>	./<hana_connector_installer -- -i -d <install_location> -s <SID> -k <key> -w uda

Download the Database Plugin for SAP HANA from the Cohesity Download portal.

Table 3: Steps to install the Cohesity SAP HANA Plugin

Feature	Linux
Download the Plugin Installer	From the download agent window, download it to the server you want to protect.
Navigate to the downloaded directory	As the root user (required) with local system privileges on that server, change the directory to the location of the installer package.
Make the installer executable	Make the SAP HANA Plugin installer file executable Change the owner of the SAP HANA Plugin installer file to <SID>adm user. Login as <SID>adm then install the SAP HANA Plugin.
Install the agent	Install the connector (no certificate in place -> -C 11113 with certificate -C 11117=default)

Feature	Linux
	e.g. `./cohesity_secure_connector_service_6.8.1_u5_sap_hana_installer -- -i -d /hana/shared/P20 -s P20 -k BACKUP_KEY -w uda -C 11113`
Location	The SAP HANA Plugin MUST run under the <SID>adm account; No need to change anything on the permissions.

The SAP HANA Plugin is available as a data source agent on the Cohesity Download portal. Download the respective data source agent for the Cohesity SAP HANA BACKINT plugin and copy the data source agent to the SAP HANA host.

Adapter Upgrade and Uninstall

The Cohesity Physical Adapter for Linux and the SAP Hana Plugin have additional commands to upgrade and uninstall. Please see: Uninstall the SAP HANA Plugin.

Cohesity Database Source Registration

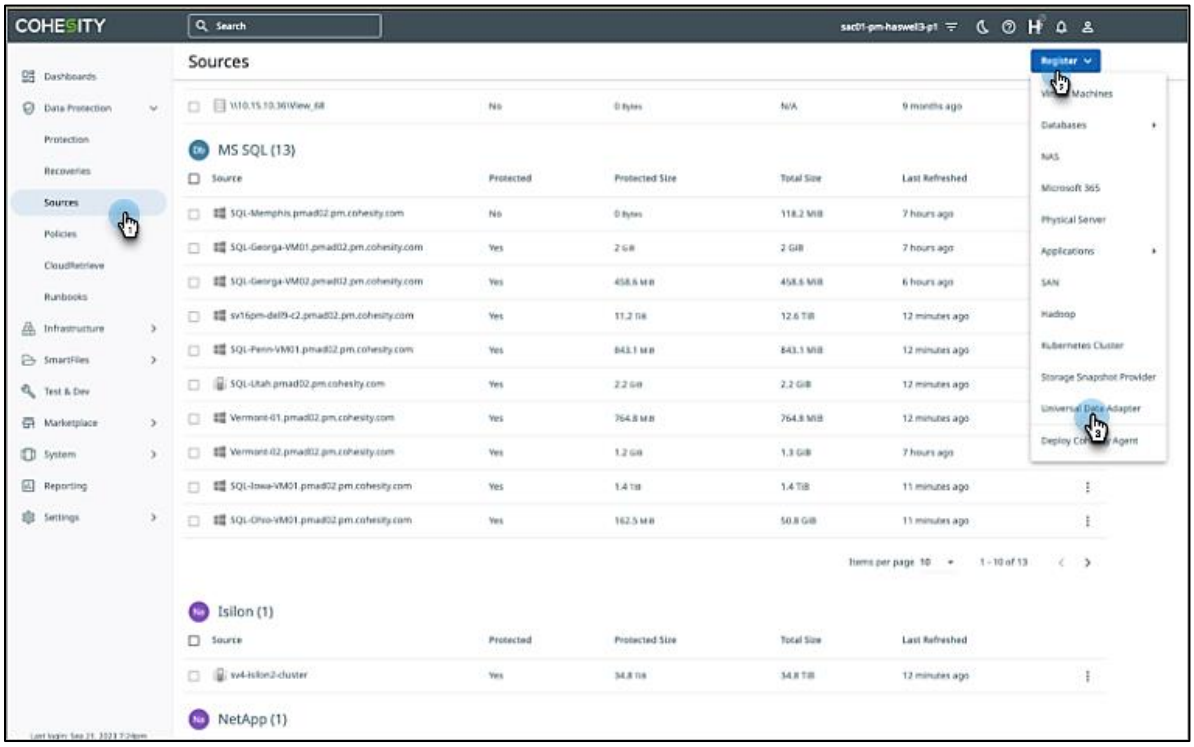
After you install the Cohesity Adapter and the SAP HANA Plugin, you need to first register your database as a source on Cohesity, as shown in the screenshots below.

Register the Database as a Source

To protect your tenant databases with Cohesity, register it as a Cohesity source. Once it's registered in Cohesity, you can add it to a Protection Group and configure the settings for your databases.

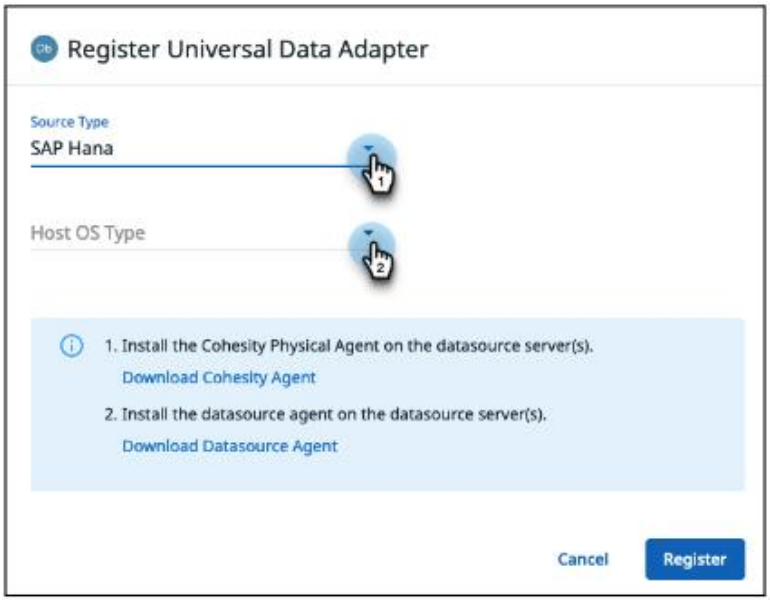
To register your database as a Source in Cohesity:

1. Navigate to **Sources** > **Register** > **Universal Data Adapter**.

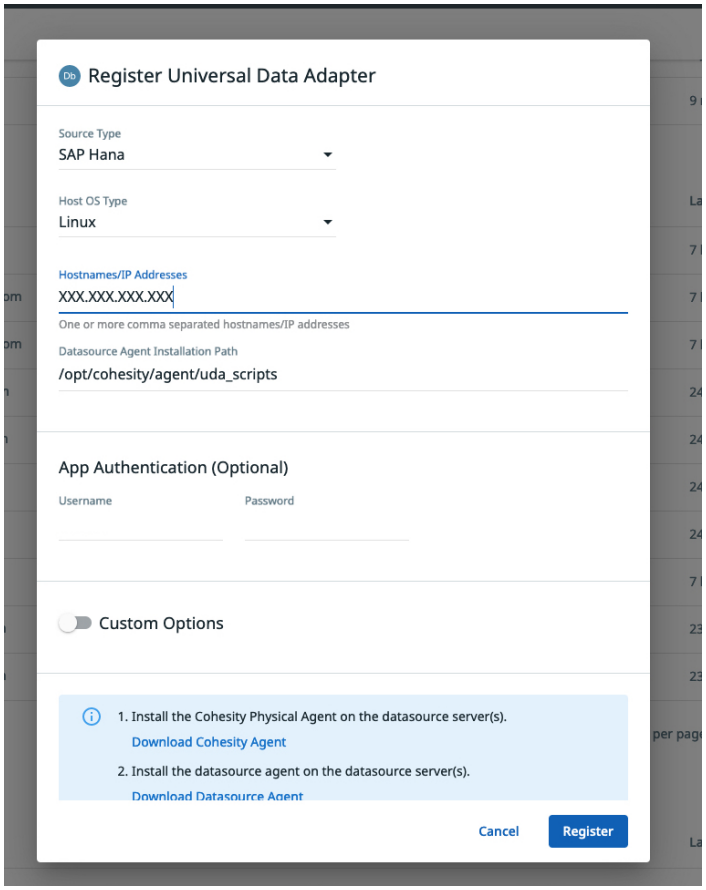


The **Register Universal Data Adapter** form will guide you through the types of databases and their host operating systems it supports.

2. In the **Register Universal Data Adapter** form, choose SAP HANA from the **Source Type** drop-down list. Then, choose Linux from the **Host OS Type** drop-down list, the type of OS the host is running.



3. A completed form will automatically expand with more options.
4. Complete all the fields in the form, then click **Register**.



Complete the form options as follows:

a. **Source Type:** Select the database type.
b. **Host OS Type:** A dynamic list of OS types based on the **Source Type**.
c. **Hostname / IP Addresses**. The name or IP address of the host.
d. **Installation Path:** Default Path on the host.
e. **App Authentication:** This is not applicable to SAP HANA.
f. **Custom Options:**

- Ignore the **Mounts View** option. It is not applicable for SAP HANA source registration.
- Optional. In the **Source Registration Options field**, enter the following source registration arguments based on your requirements.

The parameters are optional. If you do not explicitly specify the values, then the values you had provided while installing the SAP HANA database agent are applied.

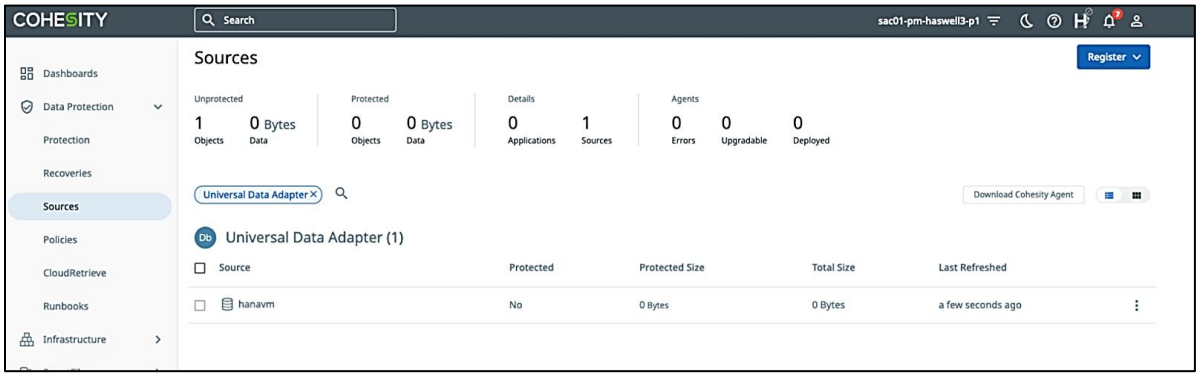
Table 4: Parameters and Description

Parameter	Description
`--sourcename`	A unique name to identify the SAP HANA source. Using this argument, you can override the unique name that you provided while installing the SAP HANA database agent. For more information, see Plan and Prepare for SAP HANA Protection. For example: `--sourcename=QFT` **Note:** This gives you better visibility. Most SAP admins are familiar with the SID name and not the hostname. Using the source name causes the name to appear in the **Source** selection list and not the hostname.
--controlnodes	***Optional***. The hostname or IP address of the node(s) you have identified to run the SAP HANA database agent. Using this argument, you can override the control node(s) that you provided while installing the SAP HANA database agent. For more information, see Plan and Prepare for SAP HANA Protection. **Note:** Ensure that these are the node(s) that you identified to run the SAP HANA database agent. For example: `--controlnodes=10.2.20.19`

More information about registering your SAP HANA host can be found at Register and Manage the SAP HANA Source.

Complete your source registration by clicking **Register.**

Successful Registration



You can update, refresh, and unregister your database source from the **Sources** page.

To protect your newly registered Source, you'll create a Cohesity Protection Group for it in the next chapter.

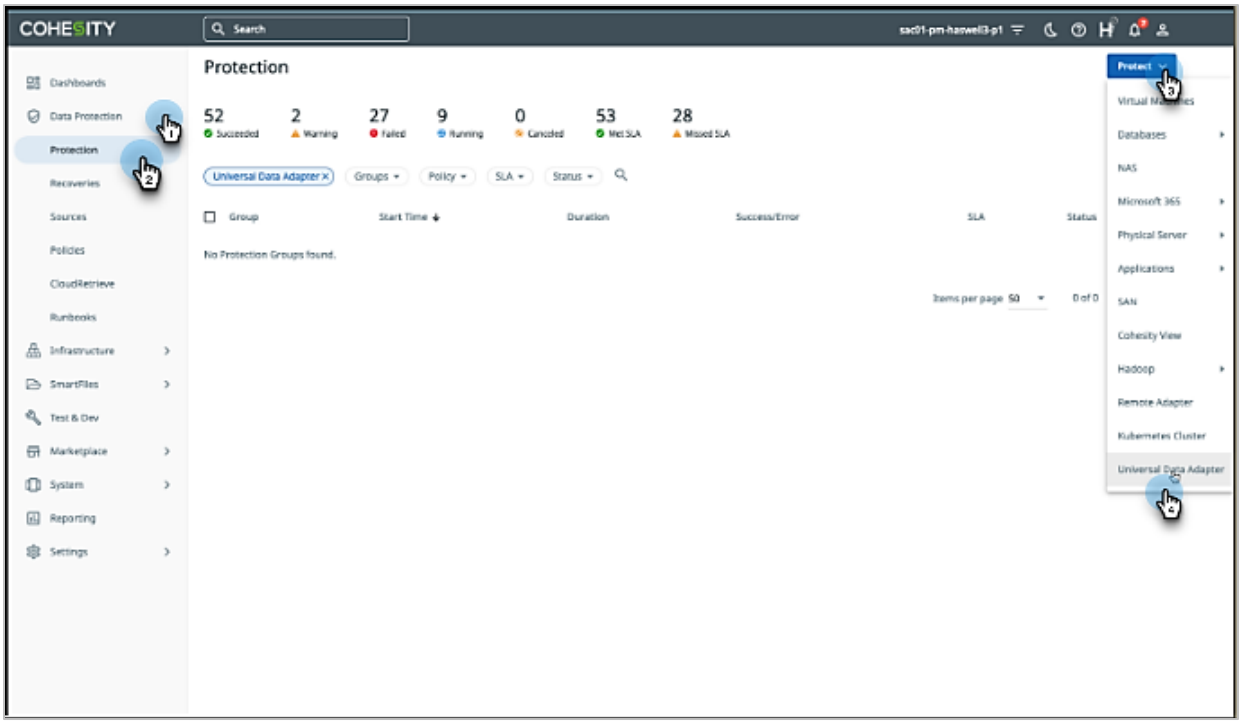
SAP HANA Tenant Database Protection

After registering the SAP HANA host as a source on Cohesity, you can start configuring your backups.

Create a Protection Group

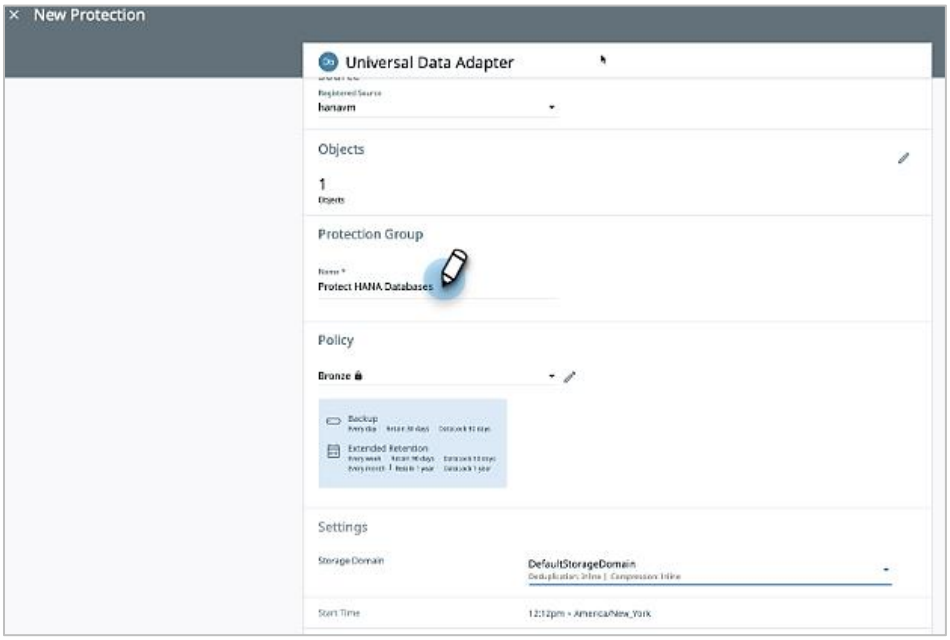
To create a protection group:

1. Log in to Cohesity and navigate to **Data Protection** > **Protection**. Then click **Protect** and select Databases > **Universal Data Adapter**.



2. In the **New Protection** form, under **Source**, select the Source you registered earlier.

   New Protection Group Form



3. In this form, enter a unique Protection Group **Name.**

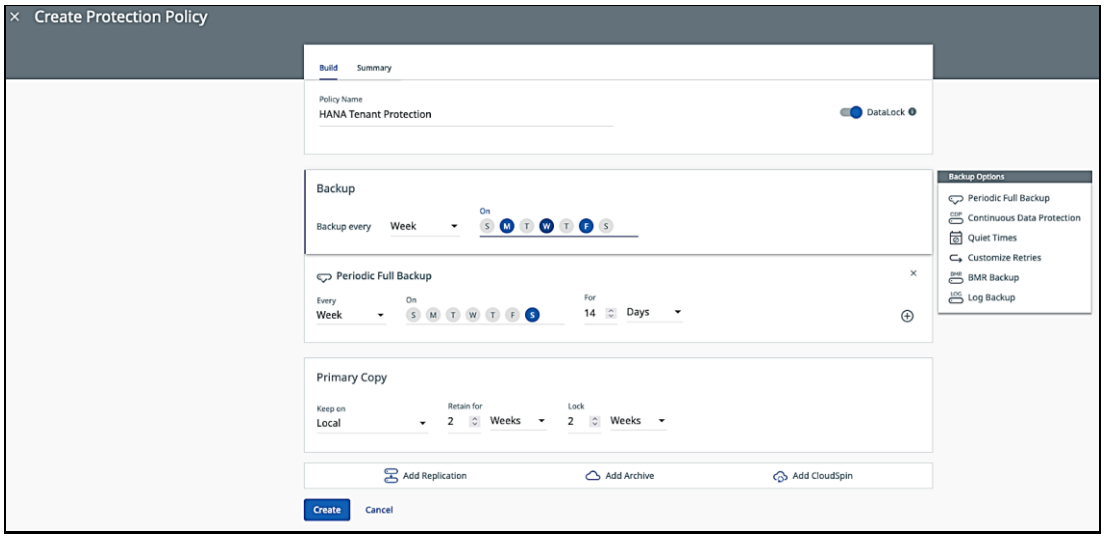
> **TIP**: Give your Protection Group a descriptive name that identifies the kind of data being protected and how it is managed. This will help you identify and manage your backups as your environment grows. Use descriptors such as production (PROD), critical, infrastructure (INFRA), financial, sales, primary, secondary, and employees (EMP). For example:
>
> | | |
> |---|---|
> | Production_Sales | DataCenter_Dallas_Production |
> | Critical_Infrastructure | Production_ReplicatedTo_DRsite |
> | Archive_LongRetention | Development_User_Data |

4. Continue by selecting a **Policy.**

   You can use the default standard policies or create your own custom policies. Policies save time because they save your effort in entering settings repetitively.

   A policy is a reusable set of settings that define how and when objects are protected, replicated, or archived. You select which policy to use when configuring a Protection Group.

Create a Protection Policy Page



IMPORTANT: The Policy defaults to an SAP HANA Incremental backup. You must add a Periodic Full Backup. In this example, a FULL backup is scheduled for every Saturday, followed by Incremental backups on M, W, and F. Without the Full backup, you cannot restore the tenant database. The Policy should not contain a log backup.

Retention for Backups

DBAs maintain a combination of backups for *restoring* a tenant database to any point in time. A good combination of backups consists of FULL, Incremental, DIFFERENTIAL, and LOG backups.

IMPORTANT: Cohesity recommends you take a periodic FULL Backup.

Database restores must begin with a FULL tenant database backup; you can apply a DIFFERENTIAL to the FULL; and finally, apply LOG backups in sequence to complete the database restore.

IMPORTANT: SAP HANA manages its own log backups outside of Cohesity. It is not necessary to schedule Log backups for SAP HANA in Cohesity because Cohesity keeps track of the SAP HANA logs and uses them during a restore.

When you apply backups during the tenant database restore process, you are sequentially adding the captured changes to the database:

FULL+DIFF+Log1+Log2+Log3 = Restored tenant database.

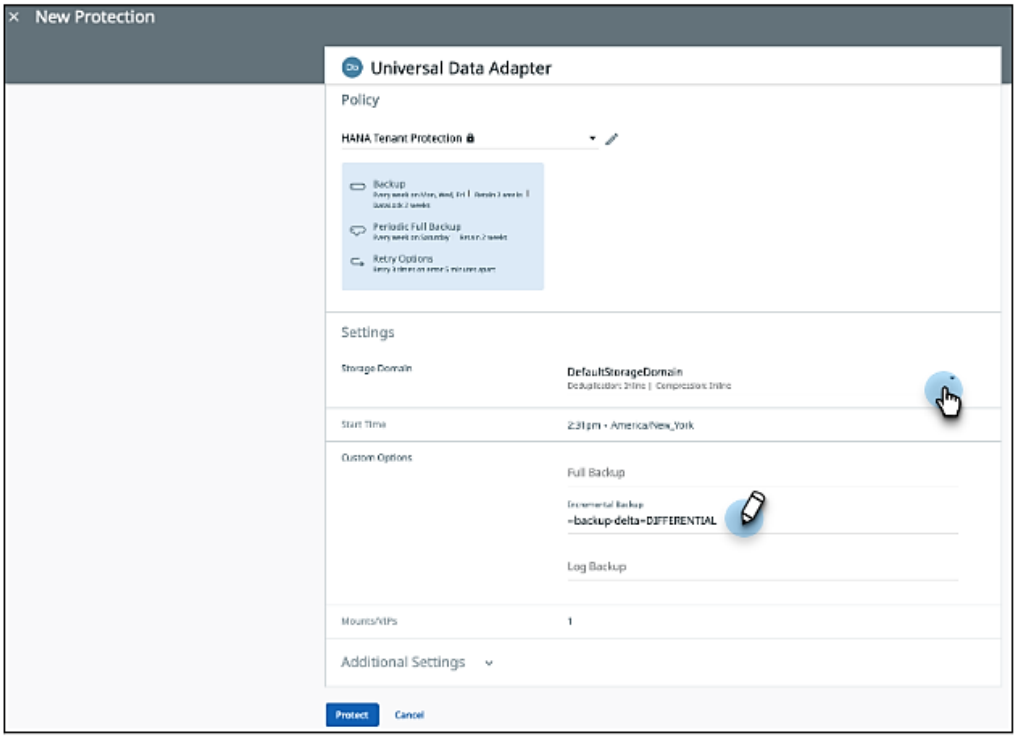
IMPORTANT: Tenant database backups, their differentials, and their logs depend on a FULL backup to perform a tenant database restore. SAP HANA tenant databases require that to restore a tenant database. You must start with a FULL backup and then apply its transaction logs. This means your backup retention policy must keep a FULL back up along with its LOG backups to successfully restore a tenant database.

Simply put, a tenant database restore requires a FULL backup to seed the database, then DIFFERENTIAL and/or LOG backups are applied to roll the database forward to the specified point in time. We recommend retaining two sets of FULL backups with their DIFFERENTIAL.

Once you set the Policy for a Protection Group, Cohesity manages all the tenant databases assigned to that Protection Group the same way.

For more information about Policy features, see Create or Edit a Standard Policy in the online Help.

Continue defining the **New Protection Group** by selecting the remaining settings.



- **Storage Domain:** For maximum space savings and security, choose a Storage Domain with compression, deduplication, and encryption enabled. For details, see Create or Edit Storage Domains in the online Help.
- **Start Time**: Take the default.
- **Custom Options**:
  - Do not enter any arguments in the Full Backup and Incremental Backup fields if you plan to perform full backup or incremental backup, respectively.
  - Enter the Backup Arguments in the Full Backup and Incremental Backup fields based on your requirements.
    For example, You may have additional user-store-key(s) other than the key used to create the tenant database. In the **Custom** field, you can use the specify a valid user-store-key.
  - If you want Differential backups, use the argument, --backup-delta=DIFFERENTIAL in the Incremental Backup field.

IMPORTANT: We recommend using Differential backups. Restore performance is better when you use Differential backups.

Table 5: Custom Settings

Use Case	Sample Arguments
Create a full backup of the SAP HANA cluster by overriding the user store key.	In the **Full Backup** field, specify the following argument: `--user-store-key=H00_KEY` Use this when you have a different key than the one you used to create the tenant.
Create an incremental backup of the SAP HANA cluster by overriding the user store key.	In the **Incremental Backup** field, specify the following argument: `--user-store-key=H00_KEY` Use this when you have a different key than the one you used to create the tenant.
Create a differential backup of the SAP HANA cluster.	In the **Incremental Backup** field, specify the following argument: `--backup-delta=DIFFERENTIAL` Use this to specify taking Differential backups.

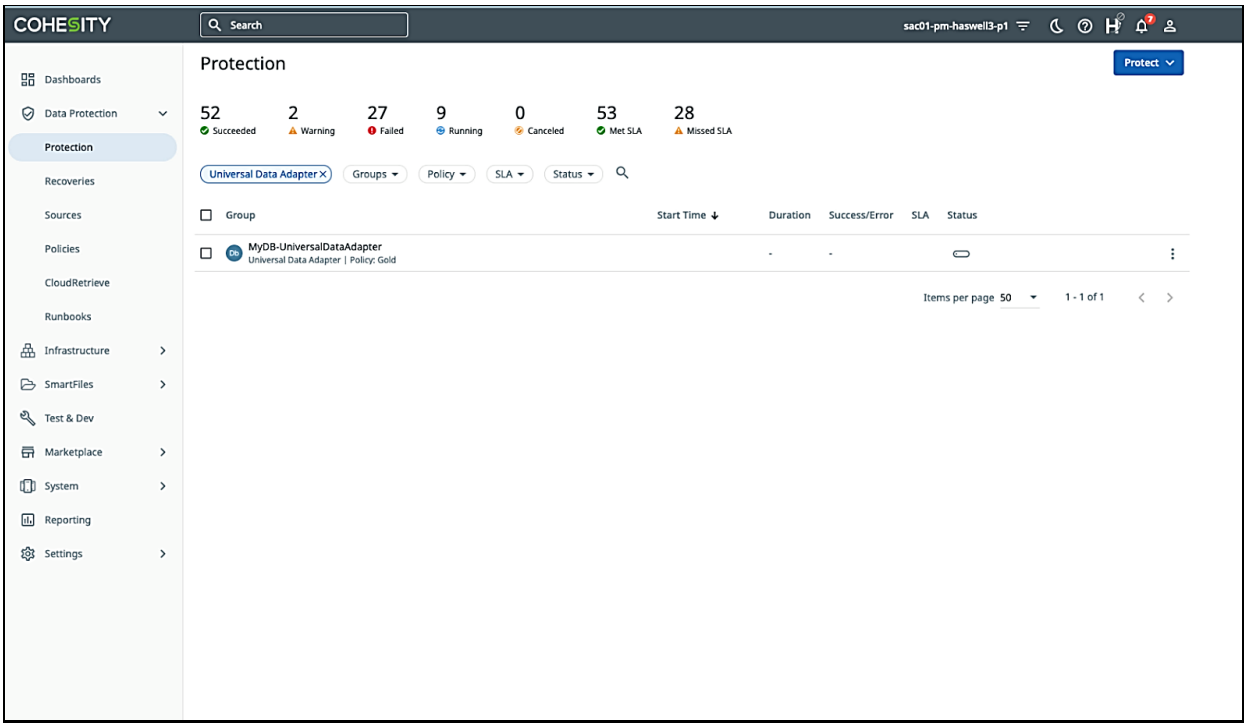
- **Mounts/VIPS:** Enter the number of VIPs on your Cohesity cluster.
- **Concurrency:** Enter two times the number of VIPS. We recommend you use a multi-stream approach, which dramatically shortens the backup time compared to a single stream. You may want to experiment with the number of streams in your backup to determine the optimal performance gain for a multi-stream approach.

IMPORTANT: You can balance performance between the number of VIPs and backup streams using **Concurrency**.

For versions prior to SAP HANA 2.0 SP05, SAP HANA supports multi-streaming for databases larger than 128 GB. As of SAP HANA 2.0 SP05, this threshold is now configurable via the SAP HANA parameter parallel_data_backup_backint_data_threshold, which specifies the minimum database backup size in GB for multistreaming to be enabled. See Configure Multistreaming with Third-Party Backup Tools.

After you have completed the settings, if you need to change any additional settings on the New Universal Data Adapter Protection Group page, scroll down and click Edit on the right.

Your new Protection Group is now active and running and appears on the **Protection** page.



Now that you have created a Protection Group for your tenant databases, you may change the Protection Policy and settings. This way, Cohesity manages all your tenant databases in this Protection Group alike.

For example, keep your tenant backups for a longer period and increase the retention setting in the Policy assigned to this Protection Group.

> **IMPORTANT**: A policy change is not retroactive to previous backup runs but only applies to the next runs.

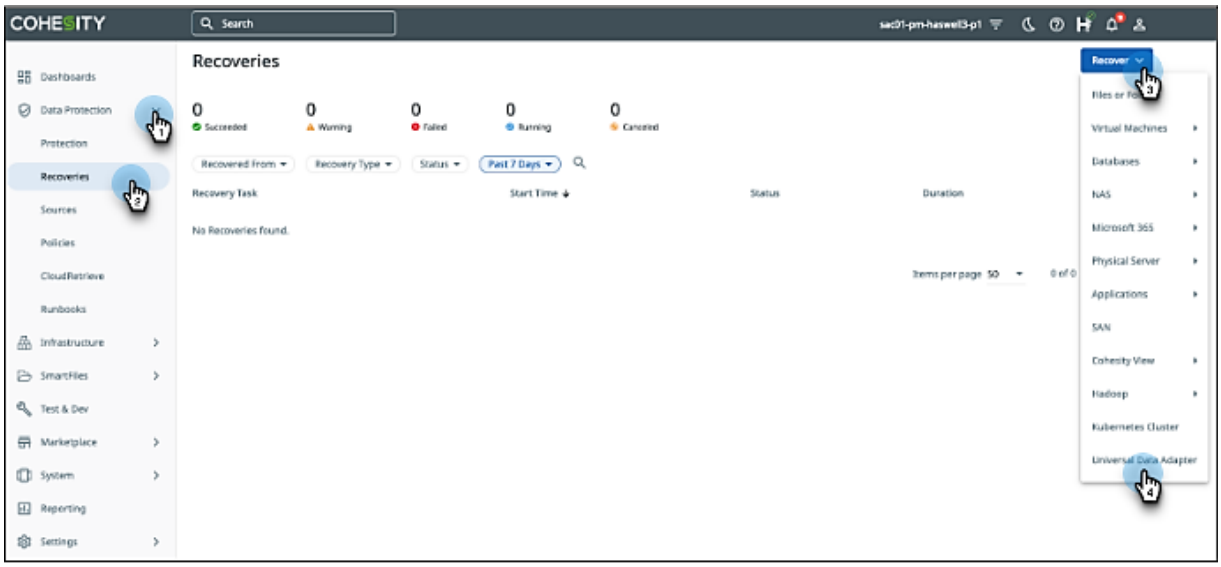
SAP HANA Database Restore

Cohesity provides the ability to restore individual tenant databases. You can restore the databases to their original location or an alternate location.

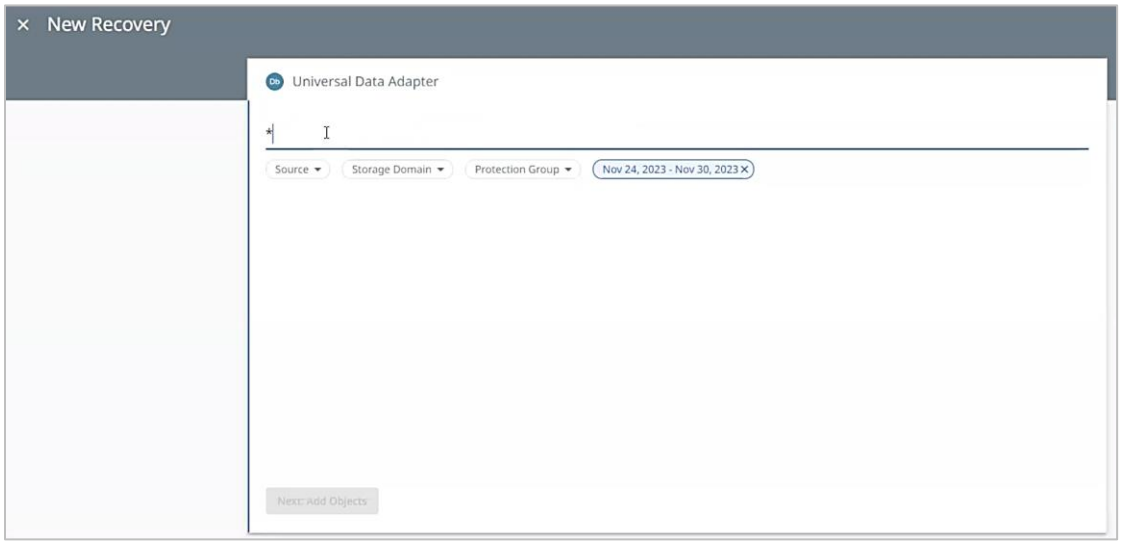
Restore Specific Backup

To restore the database:

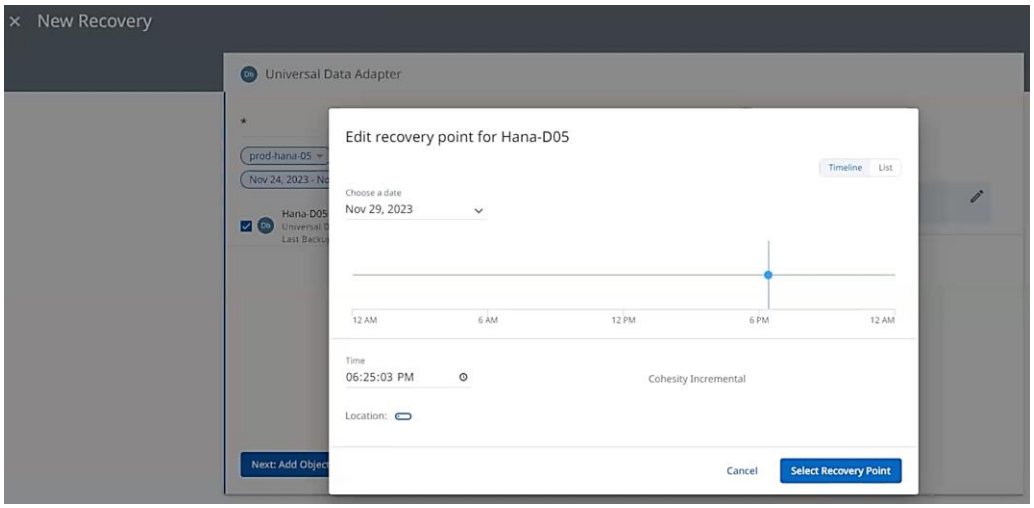
1. Log in to Cohesity, navigate to **Data Protection** > **Recoveries** and click **Recover** > **Universal Data Adapter**.



2. Search for a backup. You can start with the wildcard "*****" to get a general listing.



3. Using the **Edit Recovery Point** form, choose a recovery point and click **Select Recovery Point**. FULL, Incremental, and DIFFERENTIAL snapshots are shown as blue dots.



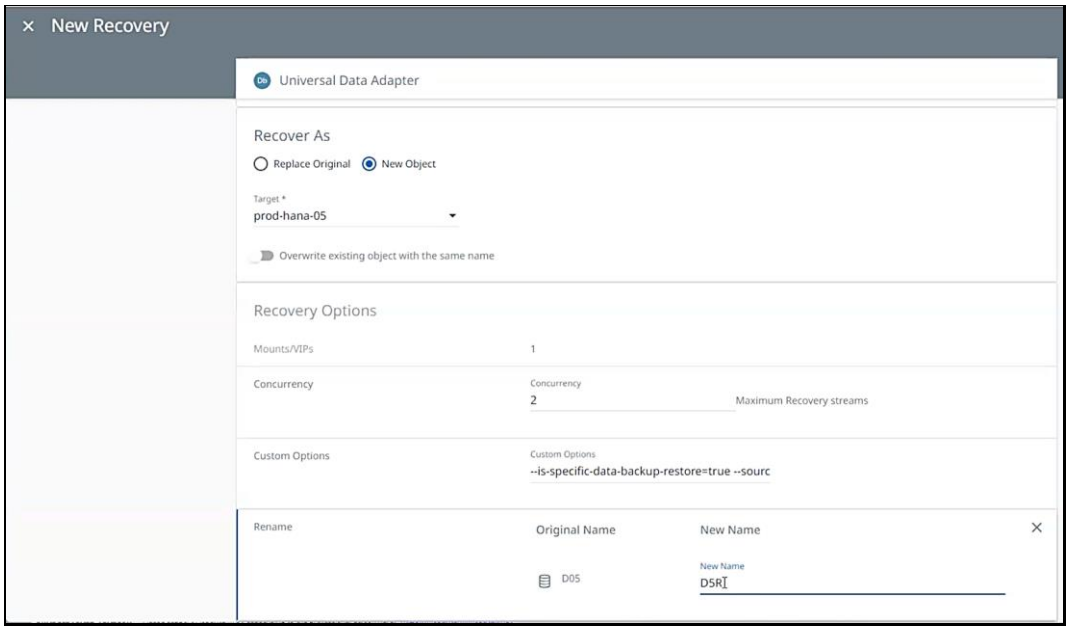
4. **Select a Recovery Point:** Use the slider to choose a valid date.
   - The timeline shows 24 hours with valid backups.
   - Each blue dot on the timeline represents FULL, Incremental, or DIFFERENTIAL backup points.
   - Blue dots can sometimes be clumped together if the backups are taken frequently.
   - The green line represents valid log ranges.
   - Gaps in the green line represent breaks in the log chain.
   - The slider will snap back to the latest valid time when positioned in an invalid range.

IMPORTANT: By default, the SAP HANA restore assumes that you want to perform a point-in-time recovery (green line). If you choose a specific recovery point (blue dot) for your restore, you must use two options in the **Custom Option** field:

```
--source-sid=<sid>
```

The usage is illustrated below. For more information, please see SAP HANA Recovery Arguments.

5. Select the recovery point and complete the recovery options.



6. **Recover As**: Select **New Object** to restore to an alternate server.

> **IMPORTANT**: If you choose to restore to a New Object, SAP HANA requires that you create the empty object on the target server before initiating a restore.

7. **Mount/VIPs:** Equal to the number of VIPs on the Cohesity cluster.
8. **Concurrency:** Enter two times the number of VIPs for best performance.

SAP HANA Troubleshooting

Table 6: Adapter Logs

Component	Path to the log file (Linux)
Cohesity SAP HANA Plugin logs	`/var/log/cohesity/uda`
Cohesity Linux Physical Adapter logs	`/var/log/cohesity`
BackInt Logs	`/<Install_dir>/cohesity_backint_plugin` The location for the backint logs can be configured in the HANA param file.

SAP HANA Best Practices and Tuning

Cohesity provides pre-configured parameters for optimal performance. Tuning parameters should be done with the help of support.

Table 7: Parameter File

Parameter File	Default Location
cohesity_param_file_data_SYSTEMDB_HAN	`/<Install_dir>/cohesity_backint_plugin`

Table 8: Tuning Parameters

Parameter	Default Setting	Tunable	Supported	Linux Redhat / Suse	Description
Port number	11117, 11113	Yes	11117, 11113, 11111	Linux/AIX	Port number on Cohesity cluster nodes to which BACKINT executable connects. Port 11117 for secure connection (certificate config path should be a valid path) otherwise port 11113 for unsecured connection (certificate config path should be an empty string).
view_name		**Yes,** for RA **No** for UDA		Linux/AIX	Name of the view on which backup data resides. (**Note**: View Name should not contain the View Path or Cluster Name/IP).
Io_Thread_Count	10	Yes	Keep this same as the number of nodes for optimal perf	Linux	Number of IO threads for reading/writing data on the view. Increasing this number beyond the number of nodes in the cluster won't have much performance gain.
Max_outstanding_io	128	Yes	1-128	Linux/AIX	Number of pending IO on a bridge. The range is 1-128.

Parameter	Default Setting	Tunable	Supported	Linux Redhat / Suse	Description
Max_io_size_bytes	4194304	Yes	1048576-4194304	Linux/AIX	Maximum size of each IO in bytes. The range is 1048576-4194304 bytes.
Max_cached_io	128	Yes	1-128	Linux/AIX	Maximum number of IO cached/prefetched. The range is 1-128.
rpc_timeout_mseccs	120000	No	-	Linux	Timeout in milliseconds for RPC request.
certificate_config_path	“”			Linux/AIX	The path to which the certificate is generated and deployed, from the Cohesity Dashboard to SAP HANA Node.
inquire_period_days	180	No		Linux/AIX	Number of days for which inquired information is returned.
log_dir		Yes	Any dir which sid<adm> has permission	Linux/AIX	Location on SAP nodes where the Cohesity Secure Connector Service will create debug logs. Default: `usr/sap/HAN/Cohesity/cohesity_backint_plugin/cohesity_backint_logs"`
Metafiles_read concurrency	100	No		Linux/AIX	To tune, metadata read performance for inquiry and restore.
max_backup_streams	1	Yes	1-32	Linux/AIX	Maximum number of pipes that will be backed up parallelly at any time by Cohesity Secure Connector Service during the backup.

Parameter	Default Setting	Tunable	Supported	Linux Redhat / Suse	Description
					For optimal performance, `max_backup_streams = parallel_data_backup_backint_channels = number of VIPs`.
max_restore_streams	1	Yes	1-32	Linux/AIX	Maximum number of pipes that will be restored parallelly at any time by Cohesity Secure Connector Service during the restore. The number of restore streams should always be the same as the backup stream used for the backup.
enable_dedupe_write	True	No		Linux/AIX	Boolean value (true/false), specifying whether source side dedupe is enabled during backup/write or not.
audit_pipe_latency	True	No		Linux	Boolean value (true/false), whether to audit io latency for pipe during backup/restore.
Qos_principall_priority	kHigh	No		Linux/AIX	Qos Principal priority type.

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About the Authors

Scott Lorenz is a Staff Solutions Engineer at Cohesity. In his role, Scott focuses on business-critical databases, applications, cloud storage, and enterprise data protection. Scott has over 26 years' experience as an enterprise DBA.

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- Roland Kastner is a Solutions Architect.
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Document Version History

VERSION	DATE	DOCUMENT HISTORY
1.0	Mar 2024	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 42 of the Fortune 100.

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