

Data Protection for SAP® Applications on FlashStack™ with Commvault® on Cisco UCS® S3260 Storage Server



This document provides an introduction to the Commvault® Data Platform deployment on the Cisco UCS® S3260 Storage Server to protect and recover SAP® applications relying on SAP® HANA running on FlashStack™ converged infrastructure.

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Introduction

This FlashStack solution™ is a partnership between Cisco® and Pure Storage. It uses best-in-class storage, server, and network components as the foundation for variety of enterprise workloads, enabling efficient architectural designs that can be quickly and confidently deployed. It is a preengineered solution to deliver a standardized data center infrastructure, to serve diverse applications with increased efficiency and reduced risk. To reduce risk further, Cisco® and Pure Storage® have brought in Commvault® to deliver data protection and recovery.

This document describes the integration and use of the Commvault Data Platform deployed with the Cisco UCS S3260 Storage Server. The Commvault solution provides data protection for mission-critical SAP applications such as SAP S/4 HANA hosted on FlashStack™ and integrates directly with the Pure Storage® FlashArray//m series to incorporate automated snapshot management to accelerate data protection and recovery operations. The solution's modern automated approach to snapshot management adds application-consistent controls with data protection, recovery, and copy management functions for a complete data management of the SAP® HANA infrastructure.

Purpose of this document

This document describes at a high level the installation and configuration steps for deploying Commvault on the Cisco UCS S3260 Storage Server to build an integrated data protection solution for SAP® applications running on the SAP® HANA database platform on FlashStack converged infrastructure. It provides Commvault configuration guidelines and best practices for SAP® HANA in particular.

This is not a detailed step-by-step guide, and not every task is documented. This document focuses on the steps that are relevant to the specific use case discussed. It assumes that the reader has a basic knowledge of FlashStack, Cisco Unified Computing System™ (Cisco UCS), and VMware vSphere as well as the configuration of Cisco UCS and the installation and configuration of Microsoft Windows and Linux operating systems, SAP HANA, and Commvault.

Reference documents

Please refer to the Cisco® Validated Design document [FlashStack for SAP HANA TDI](#) published in February 2017 for a deeper understanding of FlashStack converged infrastructure design principles and configuration. The present document builds on this design, incorporating the Commvault Data Protection solution for SAP applications running on FlashStack with Commvault.

The configuration guidelines and best practices documented here are in line with [Commvault's SAP HANA Best Practices Guide](#), which serves as a reference for implementation of backup and recovery operations on FlashStack converged infrastructure. Please refer to the Cisco Validated Design document [FlashStack Virtual Server Infrastructure with Commvault for Data Protection](#) published in March 2017 for a deeper understanding of the Commvault reference architecture deployment on the Cisco UCS S3260 Storage Server.

Test environment

This section introduces the technologies used in the solution described in this document.

Table 1 lists the hardware and software versions used in the test environment described in this document.

Table 1. Test environment details

Layer	Device	Image
Compute	Cisco UCS 6332-16UP Fabric Interconnect pair	Release 3.1(2b)
	Cisco UCS C460 M4 Server (4 nodes)	Release 3.1(2b)

Layer	Device	Image
Network	Cisco UCS Virtual Interface Card (VIC) 1385 (1 per C460 M4 node)	Release 3.1(2b)
	Cisco UCS S3260 Storage Server	Release 3.1(2b)
	Cisco Nexus® 9372PX-E Switch pair	Release 7.0(3)I2(4)
Storage	Cisco MDS 9148S 16G Multilayer Fabric Switch pair	Release 7.3(0)DY(1)
Software	Pure Storage FlashArray //m50 R2	Release 4.8.11
	Cisco UCS Manager	Release 3.1(2b)
	VMware vSphere ESXi	Release 6.5.0
	VMware vCenter	Release 6.5.0
	Commvault Data Platform	Release V11 SP8

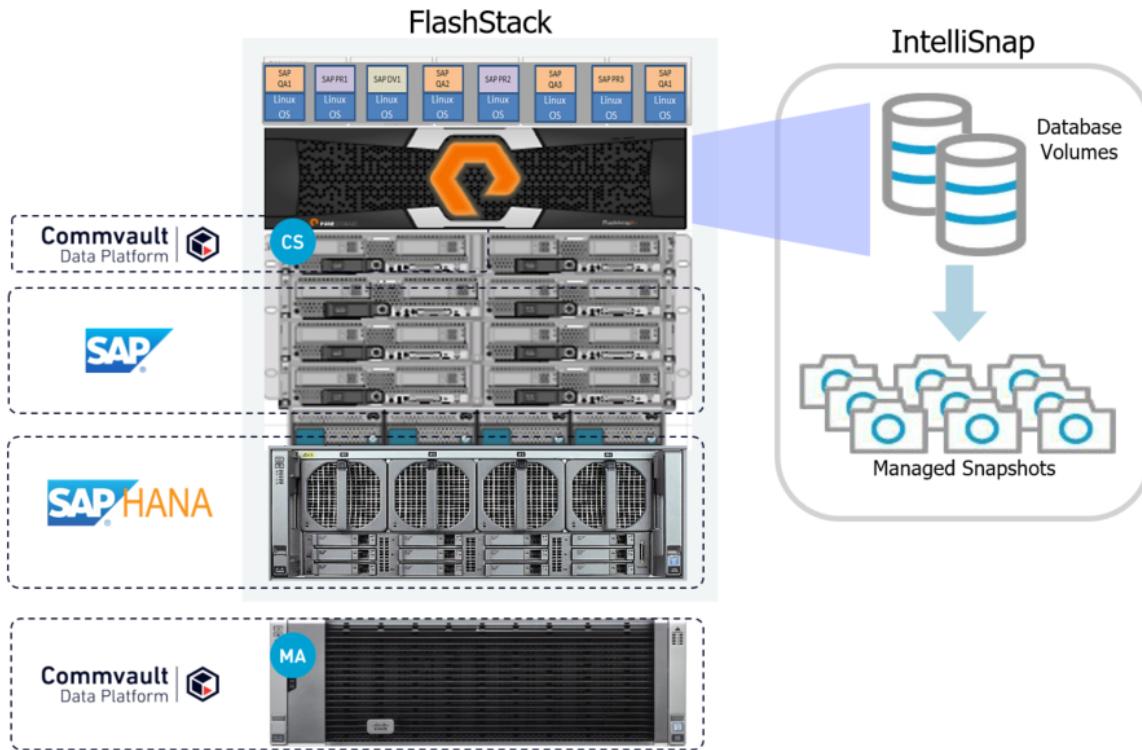
Solution overview

This solution provides modern data protection and recovery of SAP applications on FlashStack converged infrastructure through the Commvault Data Platform. The Commvault components are hosted on Cisco UCS servers based on the predefined reference architectures. The Commvault Data Platform can be extended across heterogeneous data center environments comprising converged, traditional, and cloud infrastructures.

Modern data centers have a variety of configurations for SAP HANA environments. The deployment scenario discussed in this document covers the protection and recovery of a SAP HANA database in a single data center on FlashStack converged infrastructure through the Commvault Data Platform (Figure 1).

This document focuses on protection of the SAP HANA database. The SAP application components can be protected using the Commvault File System iDataAgent, but this process will not be covered. Commvault IntelliSnap® technology integrates with Pure Storage snapshots to provide rapid lightweight protection copies on arrays. These integrated snapshots are then offloaded to secondary storage on the Cisco UCS S3260 Storage Server, providing an off-array retention copy for recovery purposes.

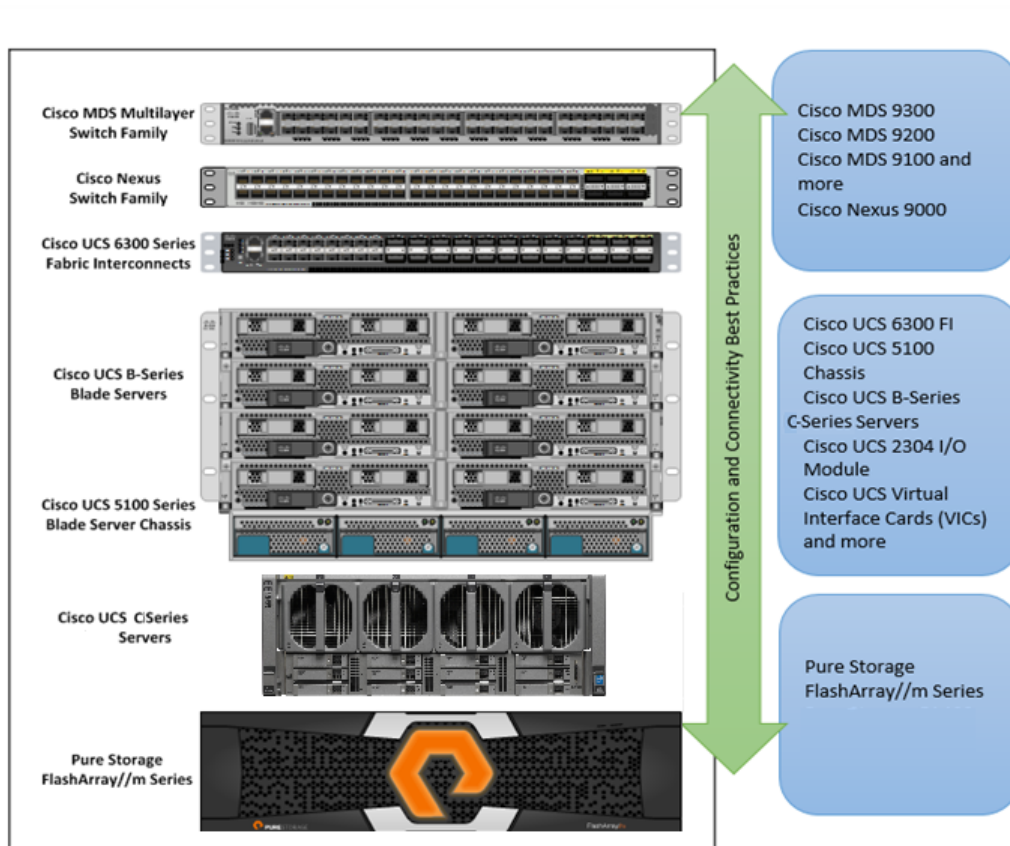
Figure 1. High-level solution overview



FlashStack converged infrastructure

The FlashStack converged infrastructure is a flexible, all-flash converged infrastructure solution that combines the latest compute, network, and storage hardware into a single, integrated architecture that provides the performance and reliability that business-critical applications demand. The hardware foundation of FlashStack converged infrastructure includes Pure Storage FlashArrays, Cisco UCS managed servers, Cisco Nexus Ethernet switches, and Cisco MDS 9000 Family Fibre Channel switches (Figure 2).

Figure 2. FlashStack system components



As shown in Figure 1, these components are connected and configured according to best practices of both Cisco and Pure Storage and provide an excellent platform for running a variety of enterprise workloads with confidence. FlashStack can scale up for greater performance and capacity (by adding compute, network, and storage resources individually as needed), and it can scale out for environments that require multiple consistent deployments. FlashStack architecture can maintain consistency at scale. Each of the component platforms shown (Cisco UCS, Cisco Nexus, Cisco MDS, Cisco UCS fabric interconnects, and Pure Storage) offers platform and resource options to scale the infrastructure up or down.

Cisco Unified Computing System

Cisco UCS is a state-of-the-art data center platform that unites computing, network, storage access, and virtualization resources into a single cohesive system.

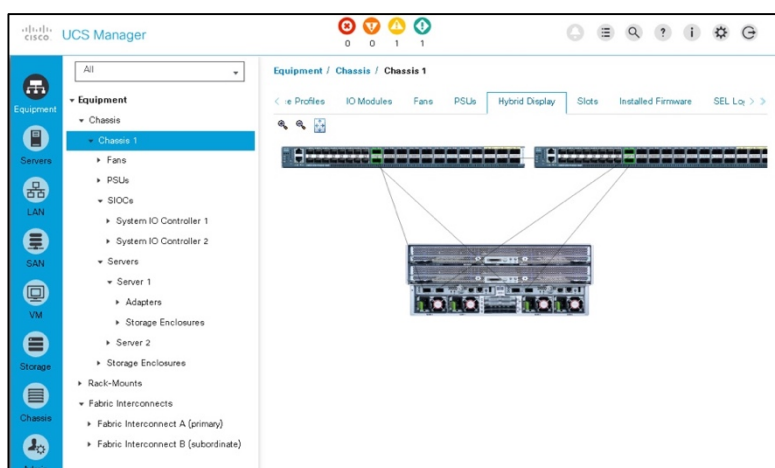
Cisco UCS consists of these main resources:

- **Computing:** The system is based on an entirely new class of computing system that incorporates rack-mount and blade servers using Intel® Xeon® processor CPUs. The Cisco UCS servers offer patented Cisco Extended Memory Technology to support applications with large data sets and allow more virtual machines per server.
- **Network:** The system is integrated onto a low-latency, lossless, 10- or 40-Gbps unified network fabric. This network foundation consolidates LANs, SANs, and high-performance computing (HPC) networks, which are separate networks

today. The unified fabric lowers costs by reducing the number of network adapters, switches, and cables, and by decreasing the power and cooling requirements.

- **Virtualization:** The system unleashes the full potential of virtualization by enhancing the scalability, performance, and operational control of virtual environments. Cisco security, policy enforcement, and diagnostic features are now extended into virtualized environments to better support changing business and IT requirements.
- **Storage access:** The system provides consolidated access to both SAN storage and network-attached storage (NAS) over the unified fabric. By unifying the storage access layer, Cisco UCS can access storage over Ethernet (with Network File System [NFS] or Small Computer System Interface over IP [iSCSI]), Fibre Channel, and Fibre Channel over Ethernet (FCoE). This approach provides customers with choice for storage access and investment protection. In addition, server administrators can pre-assign storage-access policies for system connectivity to storage resources, simplifying storage connectivity and management for increased productivity.

Figure 3. Cisco UCS Manager



Cisco UCS consists of the following components:

- [Cisco UCS Manager](#) provides unified, embedded management of all software and hardware components in the Cisco Unified Computing System (Figure 3).
- [Cisco UCS 6000 Series Fabric Interconnects](#) are line-rate, low-latency, lossless, 10-Gbps Ethernet and FCoE interconnect switches that provide the management and communication backbone for Cisco UCS.
- [Cisco UCS 5100 Series Blade Server Chassis](#) supports up to eight blade servers and up to two fabric extenders in a 6-rack-unit (6RU) enclosure.
- [Cisco UCS B-Series Blade Servers](#) are Intel-based blade servers that increase performance, efficiency, versatility, and productivity.
- [Cisco UCS C-Series Rack Servers](#) deliver unified computing in an industry-standard form factor to reduce total cost of ownership (TCO) and increase agility.
- [Cisco UCS S-Series Storage Servers](#) deliver unified computing in an industry-standard form factor to address data-intensive workloads with reduced TCO and increased agility.

- [Cisco UCS adapters](#) with wire-once architecture offer a range of options to converge the fabric, optimize virtualization, and simplify management.

Cisco UCS is designed to deliver:

- Reduced TCO and increased business agility
- Increased IT staff productivity through just-in-time provisioning and mobility support
- A cohesive, integrated system that unifies the technology in the data center
- Industry standards supported by a partner ecosystem of industry leaders
- Unified, embedded management for easy-to-scale infrastructure

Cisco UCS S3260 Storage Server

The Cisco UCS S3260 Storage Server (Figure 4) is a modular, high-density, high-availability dual-node rack server well suited for service providers, enterprises, and industry-specific environments. It addresses the need for dense, cost-effective storage for the ever-growing amounts of data. Designed for a new class of cloud-scale applications, it is simple to deploy and excellent for big data applications, software-defined storage environments such as Ceph and other unstructured data repositories, media streaming, and content distribution.

Figure 4. Cisco UCS S3260 Storage Server



Extending the capabilities of the Cisco UCS C3000 platform, the Cisco UCS S3260 helps you achieve the highest levels of data availability. With dual-node capability that is based on the Intel Xeon processor E5-2600 v4 series, it offers up to 600 terabytes (TB) of local storage in a compact 4-rack-unit (4RU) form factor. All hard-disk drives (HDDs) can be asymmetrically split between the dual nodes and are individually hot-swappable. The drives can be built in an enterprise-class Redundant Array of Independent Disks (RAID) redundant design or used in pass-through mode.

This high-density rack server easily fits in a standard 32-inch-depth rack, such as the Cisco R42610 Rack.

Cisco UCS S-Series Storage Servers can be deployed as standalone servers or as part of a Cisco UCS managed environment to take advantage of Cisco's standards-based unified computing innovations that help reduce customers' Total Cost of Ownership (TCO) and increase their business agility.

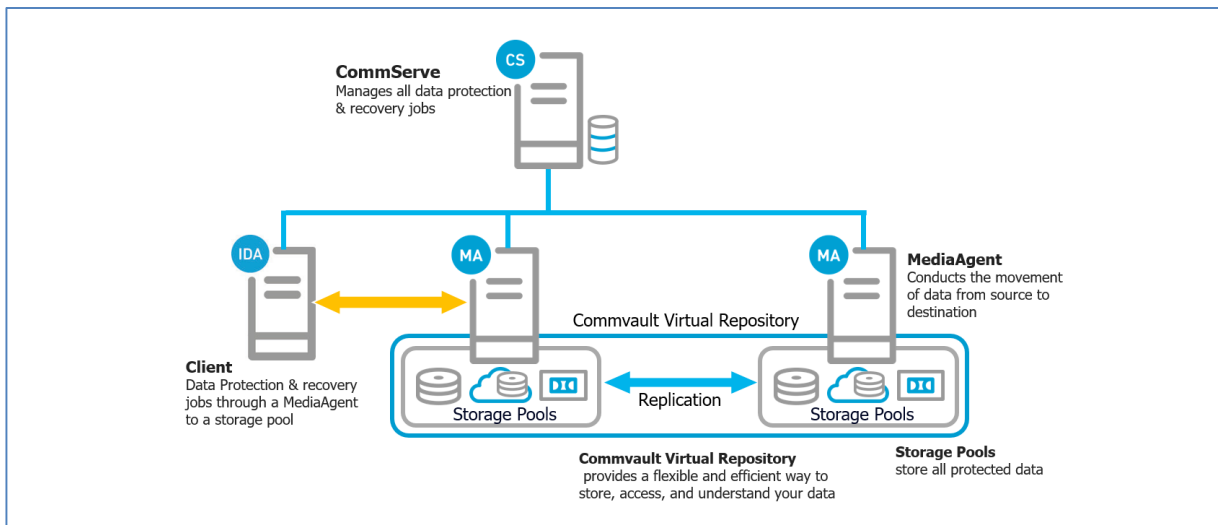
The Cisco UCS S3260 uses a modular server architecture that, using Cisco's blade technology expertise, allows you to upgrade the computing or network nodes in the system without the need to migrate data from one system to another. It delivers:

- Dual server nodes
- Up to 36 computing cores per server node
- Up to 60 drives, mixing a large form factor (LFF) with up to 28 solid-state disk (SSD) drives plus 2 SSD SATA boot drives per server node
- Up to 512 GB of memory per server node (1 TB total)
- Support for 12-Gbps serial-attached SCSI (SAS) drives
- A system I/O controller with a Cisco UCS Virtual Interface Card (VIC) 1300 platform embedded chip supporting dual-port 40-Gbps connectivity
- High reliability, availability, and serviceability (RAS) features with tool-free server nodes, system I/O controller, easy-to-use latching lid, and hot-swappable and hot-pluggable components

Commvault Data Platform

The Commvault Data Platform is a single platform for automated global protection, retention, and recovery. Commvault enterprise data protection and recovery software automates global data protection, speeds recovery, reduces costs, and simplifies operations. Commvault integrates application awareness with hardware snapshots, indexing, global deduplication, replication, search, and reporting. The Commvault Data Platform converges all the needs of a modern data management solution in one place to seamlessly integrate protection, management, and access in one solution.

A comprehensive data protection and management strategy offers seamless and efficient backup, archiving, storage, and recovery of data in your enterprise from any operating system, database, and application. To protect and manage data in your environment, the Commvault software must be distributed to systems that you want to protect. The CommServe, MediaAgent and protected systems constitute a CommCell environment while each protected system is referred to as a client.



The CommServe server is the command and control center of the CommCell architecture. It coordinates and executes all CommCell operations, maintaining Microsoft SQL Server databases that contain all configuration, security, and operational history for the CommCell environment. There can be only one CommServe host in a CommCell environment. The CommServe software can be installed in physical, virtual, and clustered environments.

The MediaAgent is the data transmission manager providing high performance data movement and manages the data storage pools. When installed on a client system it also manages the Commvault IntelliSnap snapshot integration with the underlying Pure Storage FlashArray//m of the FlashStack converged infrastructure. In this configuration the MediaAgent is deployed to the SAP HANA systems & to the Cisco UCS S3260 Storage Server for backup and recovery operations.

The Client is any system within a CommCell environment to be protected. iDataAgents are software modules that are installed on computers to access and protect data. The backup and recovery system uses agents to interface with file systems, applications, and databases to facilitate the protection of data on production systems. By default a filesystem iDataAgent is installed when adding the Commvault software to a system. If the client hosts specific applications or databases the installation of additional iDataAgents are required.

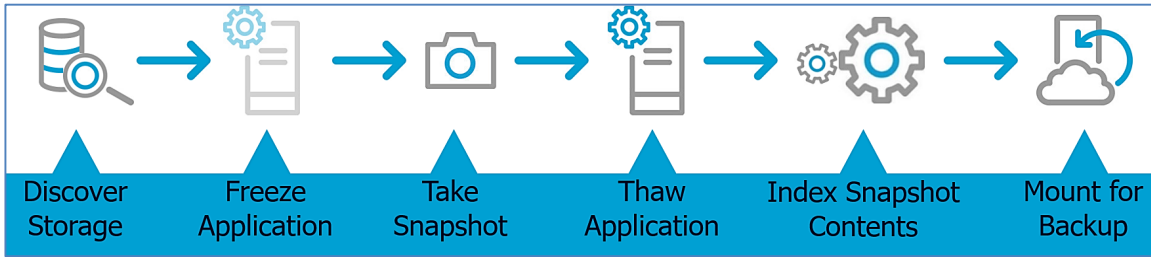
These three Commvault components combined result in the most comprehensive and flexible data protection solution on the market today.

IntelliSnap Technology

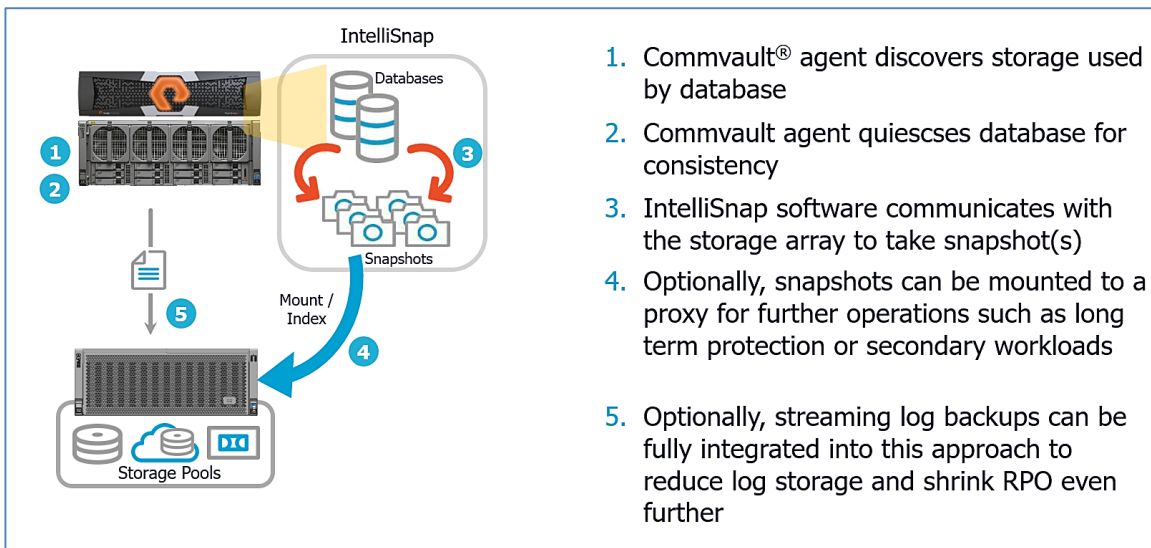
IntelliSnap technology integrates with leading storage arrays, such as Pure Storage, to provide consistent point-in time recovery copies integrated into the data protection process. Unlike many other hardware-based copy management approaches, IntelliSnap extends beyond just creating or deleting snapshots. Snapshot contents are indexed to enable simple, granular object recovery and snapshots can for example be mounted to allow for the creation of a backup copy to a cloud library. Snapshots are integrated into virtual machine, database and application protection schemes, enabling granular, partial, and point-in-time recoveries from snapshot based backups.

The snapshot creation process is outlined below.

Logically there are 6 phases:



In the Cisco Flashstack environment the snapshots will be created on the Pure Storage FlashArray//m and the accompanying HANA transaction log backups are streamed to the UCS S3260 Storage server.



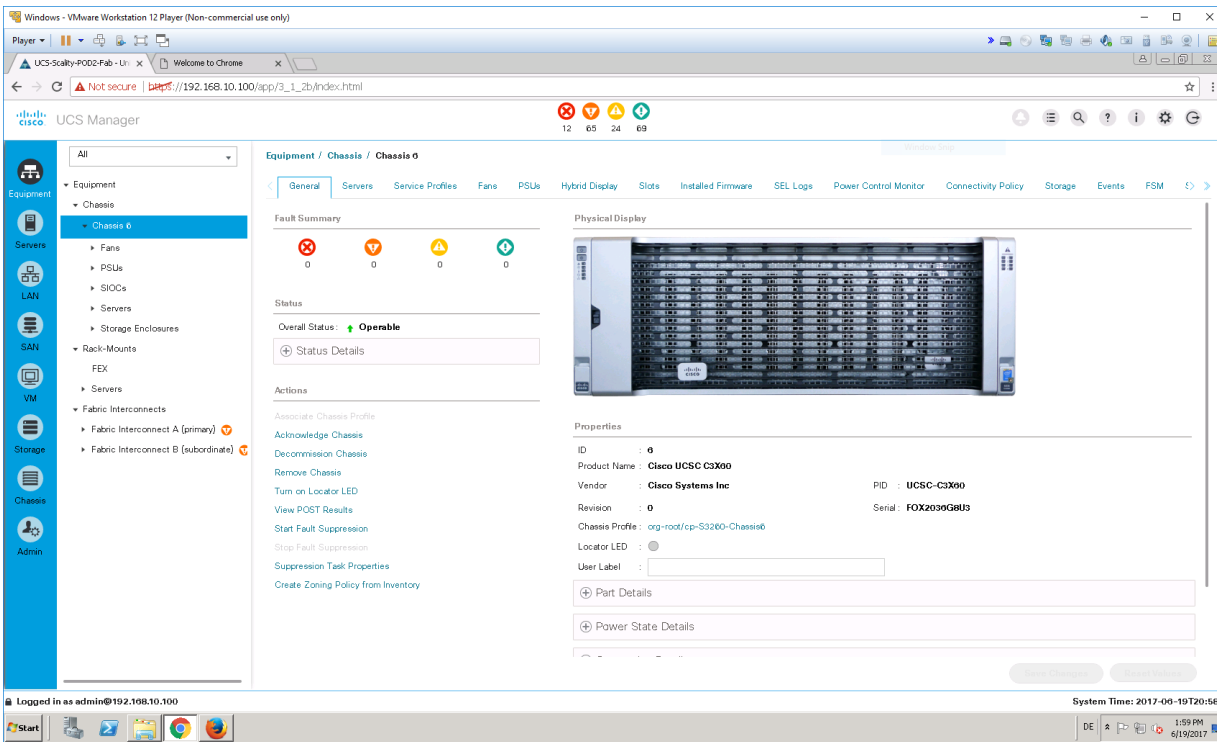
Configuration Guidelines

Cisco UCS

This Whitepaper covers the use of UCS Managed S3260 Storage Server to install Commvault.

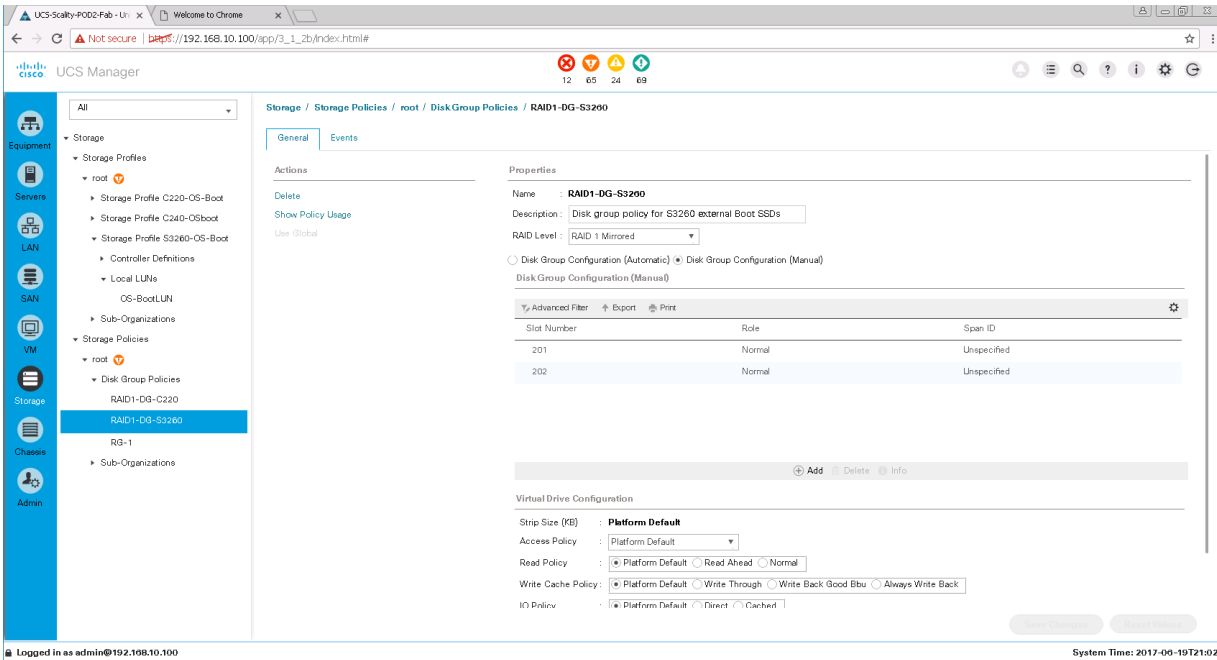
The basic steps to connect a UCS S3260 to a UCS domain is described in the S3260 Installation Guide.

Note: The design and configuration principles can be used for unmanaged installations. The Cisco Integrated Management Controller is to use for the storage and network configuration as well as the operating system installation.

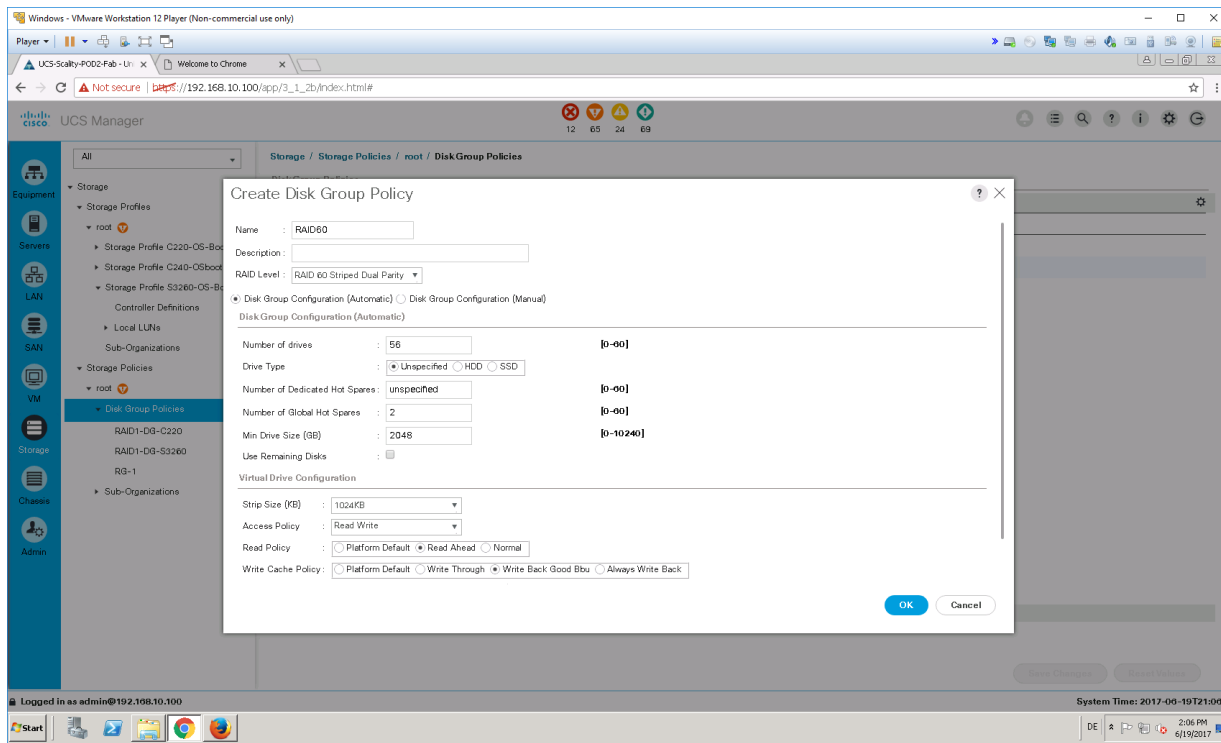


A RAID-Group with the two SSD's in the back of the chassis is used to install the operating system.

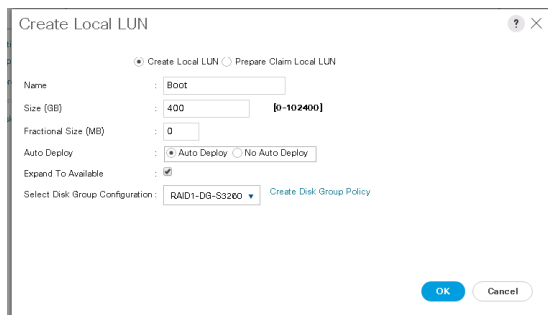
Go to Storage Area -> Storage Policy -> Disk Group Policy. For Server-1 RAID-Level "RAID 1 Mirrored" and the Slot Number 201 and 202 must be selected. For Server-2 the Slot number 203 and 204 must be selected.



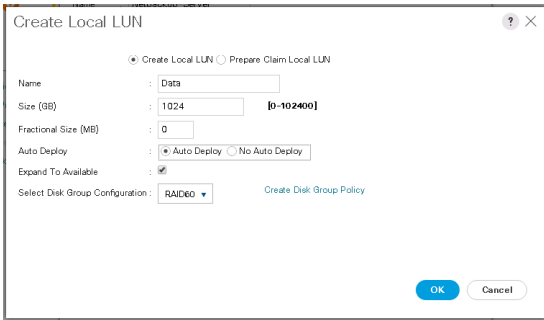
All Top-Loaded drives are used in one Disk Group Policy with the RAID-Level “RAID 6 Striped Dual Parity” for 14 disks or “RAID 60 Striped Dual Parity” for 28, 42, or 56 disks as capacity drives.



The LUNs for OS and the Commvault MediaAgent area are to configure in Storage -> Storage Profiles. For the OS a LUN using all available space on the rear drives is used. It is not required to know the exact size by selecting “Expand To Available”; the system will allocate the available space on the selected Disk Group.

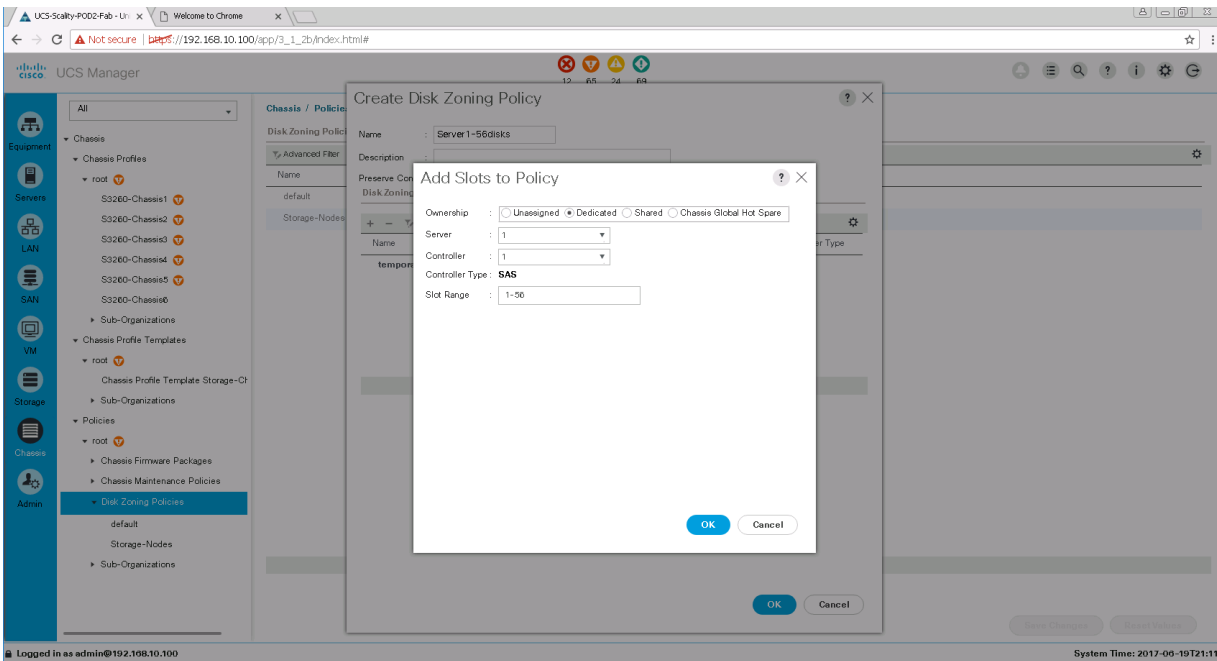


For the Commvault MediaAgent one LUN using all available space on the RAID6/60 Disk Group is used.



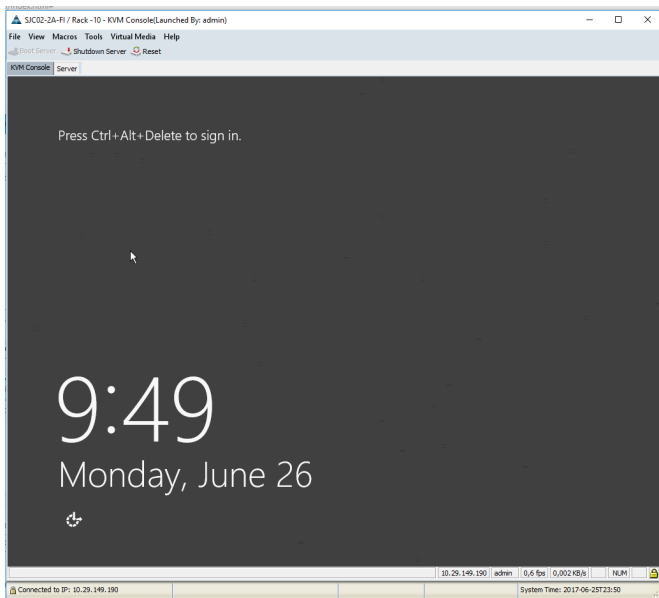
A performance consideration can be to separate the backed up data from the Commvault Index cache and Deduplication database as these can be IO intensive as well. Consult with your Cisco / Commvault representative for advice on this topic.

A unique point to Cisco UCS S3260 is the option to manage the top loaded drives in a very flexible way. This is done under Chassis -> Policies -> Disk Zoning Policy. Here all available disks are zoned to Server-1 in a dedicated mode.



A Service Profile with the created Storage Profile, at least one vNIC into the Backup network and a boot policy for the local drive is required for the Commvault Server.

Finally, the Operating system of choice is to install with basic settings. We have used Microsoft Windows Server 2012 R2.



Commvault Data Platform Installation

Use the Commvault Installation package to setup the CommCell environment for protecting SAP HANA. This package includes software for the Commvault CommServe, Admin Console, MediaAgent, CommCell Console, Web Server, Web Console, SAP HANA iDataAgent, Workflow Engine and Analytics. The CommCell environment installation will proceed in the following order:

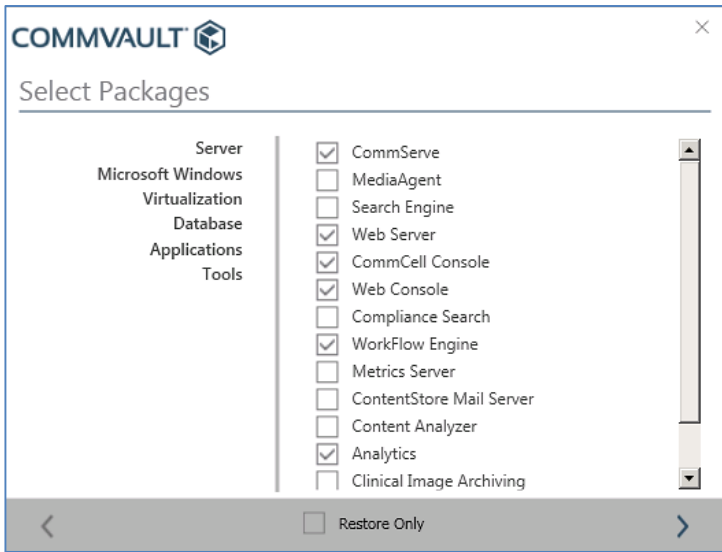
1. Install CommServer software
2. Install MediaAgent software
3. Configure Commvault Data Platform
 - a. Create Storage Pool
 - b. Configure Storage Array
 - c. Create Storage Policies
4. Install & configure SAP HANA Protection

CommServe

This procedure assumes the physical server or virtual machine hosting the CommServe has an internet connection. If an internet connection is not available, the complete installation source must be downloaded first. For SAP HANA data protection the CommServe and CommCell Console must be selected for minimum requirements.

Commvault recommends adding the optional components for web based management, workflow support and data analytics (Web Server, Web Console, WorkFlow Engine, and Analytics).

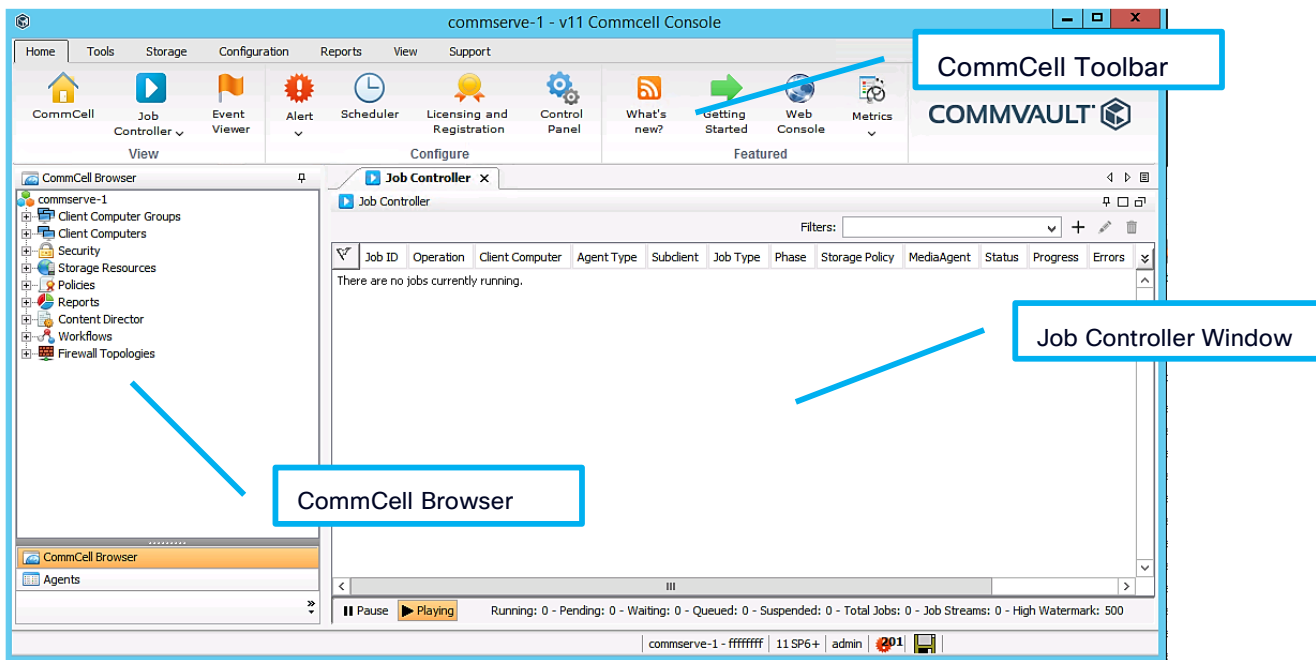
Note: Pre-installation steps: Install the IIS role, Multi-Path I/O feature and .NET Framework 3.5 feature through server manager. Disable User Access Control to prevent pop-ups and disable hardening until CommServe installation is complete.



CommCell Console Overview

The CommCell Console is the graphical user interface used for advanced management of the CommCell environment, with more detail and options available than in the Admin Console. The CommCell Console is made up of the following elements:

- **CommCell Toolbar:** An easy to navigate "ribbon" used to access global configuration elements in the CommCell environment.
- **CommCell Browser:** The main navigation window which contains a hierarchical structure of all components within the CommCell environment.
- **Job Controller Window:** Management screen for all active and recent jobs in the CommCell environment.

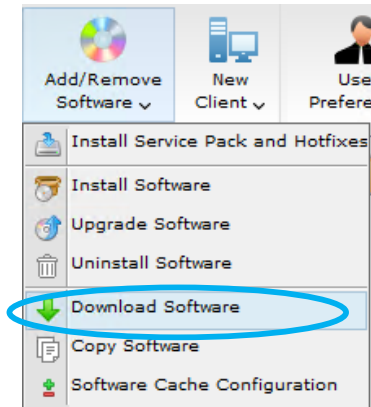


Software Cache Setup

The CommServe software cache stores the Commvault software media needed to perform remote installations and upgrades from the CommCell Console. By default, software is downloaded from the Internet to the CommServe software cache directory via FTP through the CommCell Console. If Internet connectivity is not available, the CommServe cache can be populated manually using the installation media.

Procedure

1. From the CommCell Console ribbon, on the Tools tab, click **Add/Remove Software**, then select from the dropdown menu.



2. In the Download and Sync Cache Options dialog box, ensure the **Latest Service Pack** option is selected, then click OK. A Download Software job will initiate to obtain the packages. Wait for the job to complete before attempting any remote agent installations.

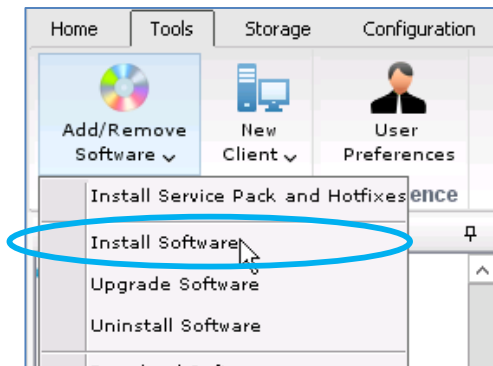
Note: By default only packages for Microsoft Windows are downloaded. Linux and Unix packages are available but must be selected using the Advanced button.

MediaAgent

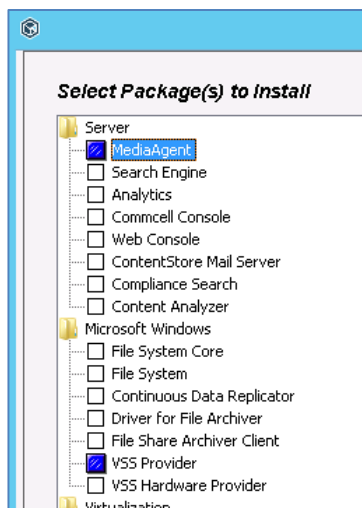
The following procedures are for remote installation for the Commvault MediaAgent Server on the Cisco UCS S3260 Storage Server. For local installation of the installation package, please refer to [Installations Using the Installation Package](#).

Note: Pre-installation steps: Disable User Access Control to prevent pop-ups and disable hardening until MediaAgent installation is complete. Initialize storage configured for the MediaAgent in Disk Management Console.

1. From the CommCell console ribbon, on the Tools tab, click Add/Remove Software, then select Install Software from the dropdown menu.



2. The Install Wizard will appear, accept the default settings and click **Next**.
3. On Select how to discover the computers for installing the software page, click **Next**.
4. On Select the computer's operating system page, select Windows, click **Next**.
5. On the Enter the host names of the computers page, enter the **hostname** or **IP address** of the S3260 server that will host the MediaAgent role, click **Next**.
6. On the Enter Account Information page, enter credentials for a user with local administrator privileges on the S3260 and click **Next**.
7. On the Select Package(s) to install page, select **MediaAgent** package > click **Next**.



8. Go through the remaining wizard windows and click Finish.

Note: The installer will automatically select dependent components. When selecting the MediaAgent, the “VSS Provider” is selected by default. On the next screen “File System Core” and “File System” options will be selected because these components are dependent for the MediaAgent package.

Configure Commvault Data Platform

Storage pools and snapshot management for the FlashArray//m need to be configured before data protection and recovery operations can take place. The full details of the policies configured in this design are shown in the Appendix: Commvault Configuration Details.

Configuring Storage Pool

Storage Pools provide a scalable and easy to manage storage target. Multiple cross-platform MediaAgents can share a storage pool. Storage capacity can be scaled on demand by adding more storage paths.

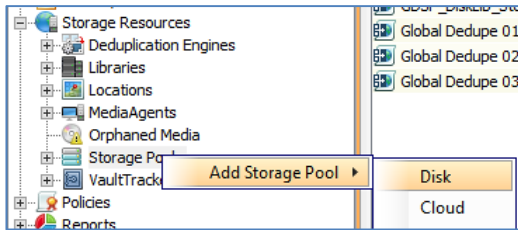
When configuring a storage pool, depending on the selection of disk, tape or cloud, the following entities are created:

- Disk Storage Pool, a Global Deduplication policy and a dependent storage policy, and the associated disk storage
- Cloud Storage Pool, a Global Deduplication policy and a dependent storage policy, and the associated cloud storage
- Tape Storage Pool and a Global Secondary Copy Policy

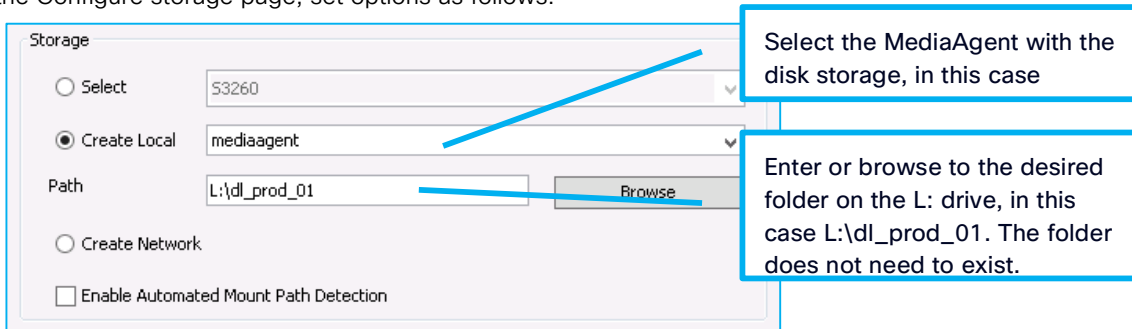
Procedure

The following procedure is for the Disk Storage Pool with Global Deduplication policy.

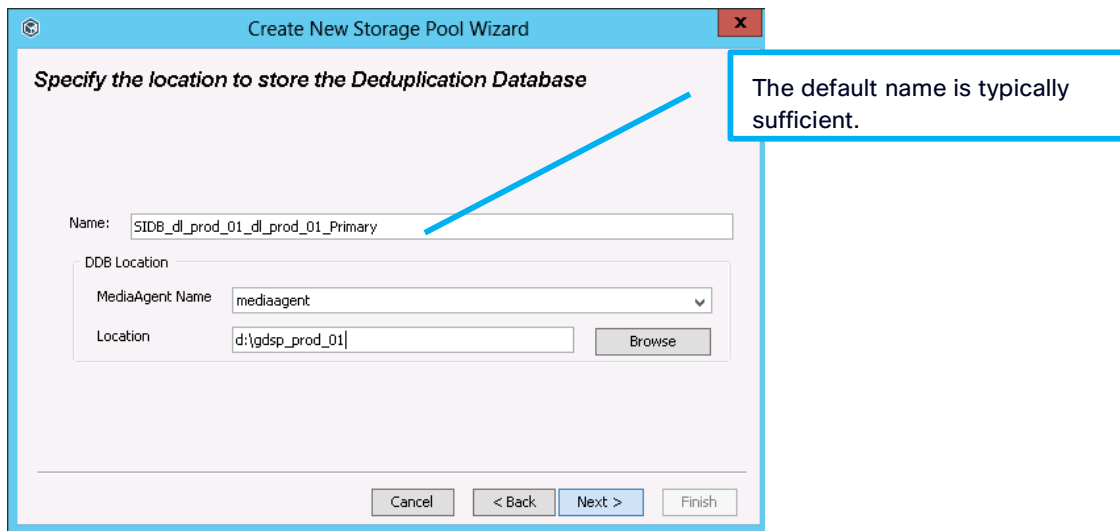
1. From the CommCell Browser, expand to **Storage Resources > Storage Pools**.
2. Right-click the Storage Pools and click Disk. The Create New Storage Pool Wizard opens



3. On the Enter the Storage Pool Name page, enter the **Storage Pool Name**. For this example the storage pool name is `gdsp_prod_01`.
4. On the Configure storage page, set options as follows:



5. On the Specify the location to store the Deduplication Database page, select the MediaAgent, select the Location of the deduplication database, and click Next.

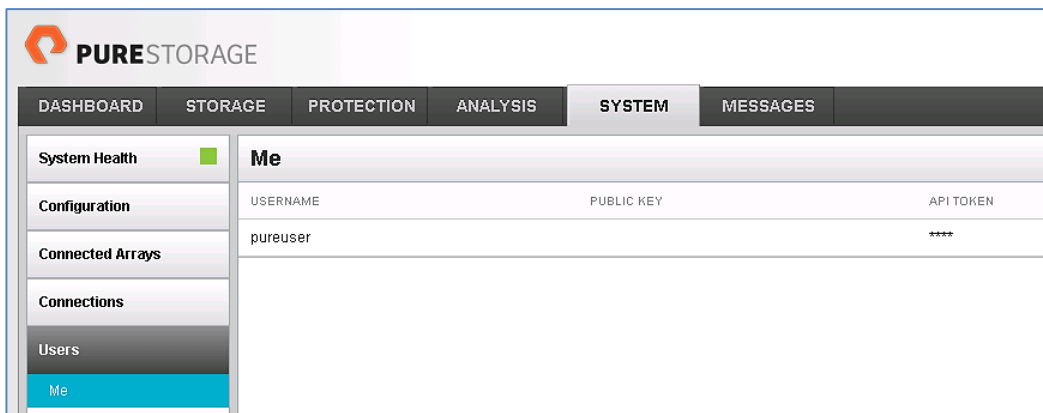


6. Click **Finish** to create the Disk Storage Pool.

Configure Storage Array for IntelliSnap

The Array Management tool in the CommCell Console records the configuration details for all arrays that will be utilized with IntelliSnap technology. This configuration is performed only one time per array, and all clients will inherit this configuration. IntelliSnap software will automatically detect the array on each client at the time of execution to ensure maximum flexibility in the configuration. In order to use Commvault IntelliSnap for Snapshot based SAP HANA Database backups the Pure storage array needs to be configured in Commvault.

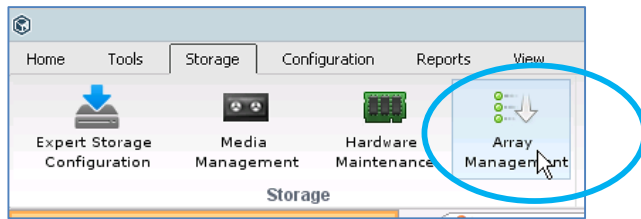
As a preliminary step, a user and API token need to be created on the Pure storage array. This needs to be done via the Pure array’s web interface.



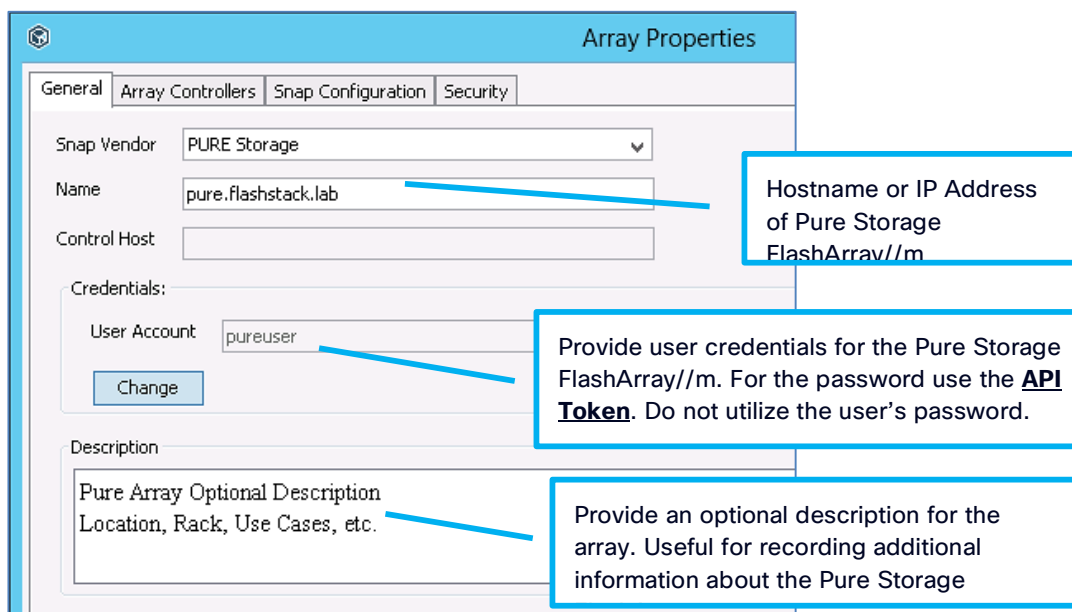
The API token is to be used as password when setting up the Pure FlashArray in Commvault. To perform the actual configuration of the array, login to the Commvault CommCell and start Array Management from the Storage tab:

Procedure

1. From the CommCell Console ribbon, on the Storage tab, click **Array Management**.



2. The Array Management menu will appear. Click **Add**.
3. The Array Properties menu will appear. Set options as follows to configure the FlashArray//M:



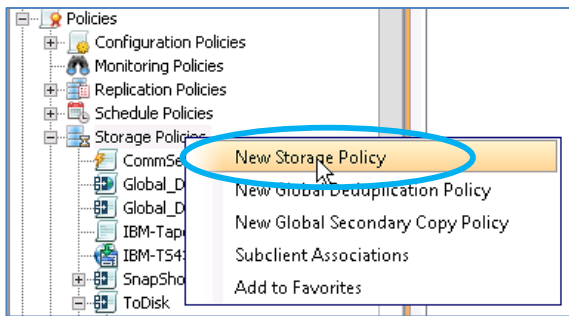
4. Click **OK** to save the Pure Storage array configurations and click **OK** again to exit the Array Management screen. The array is now configured in Commvault.

Create Storage Policies

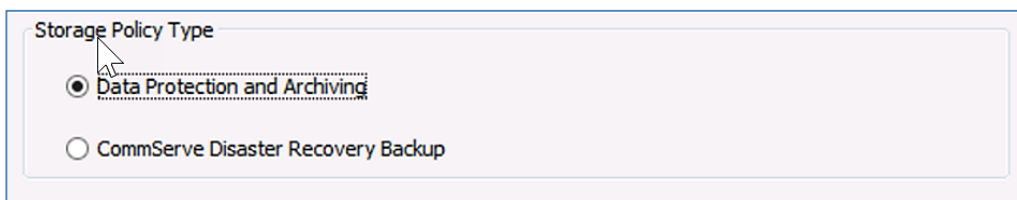
Commvault uses a policy-driven approach to data management with a single index for all data. Storage policies act as a channel for backup and restore operations. Its chief function is to map data from its original location to physical media and define retention. This procedure will create a storage policy called “plan_gold_db_01” using global deduplication, with backup to disk for 30-day retention and snapshot management capabilities retaining the latest 24 snapshots.

Create Storage Policy

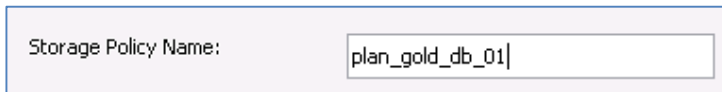
1. From CommCell Browser, expand Policies > right-click Storage Policies > click New Storage Policy.



2. The Create Storage Policy Wizard will open. Select the default Storage Policy type of **Data Protection and Archiving**. Click **Next** to continue:



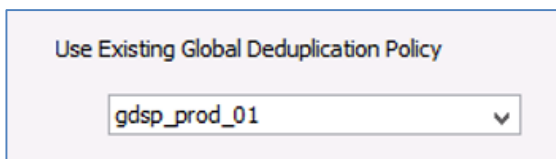
3. Enter the **Storage Policy Name**, in this case “plan_gold_db_01”, and click **Next**.



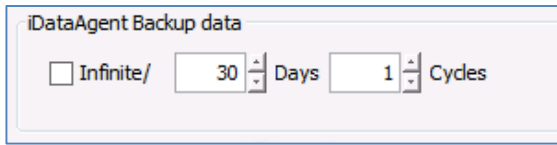
4. On the global deduplication policy page, click **Yes** and select **Enable Client Side Deduplication**. Click **Next**.



5. On the global deduplication policy selection page, select the **Global Deduplication Policy** created from the storage pool, in this case “gdsp_prod_01”. Click **Next**.



6. Enter the **Retention Information**, in this case 30 days and 1 cycle. Click **Next**.



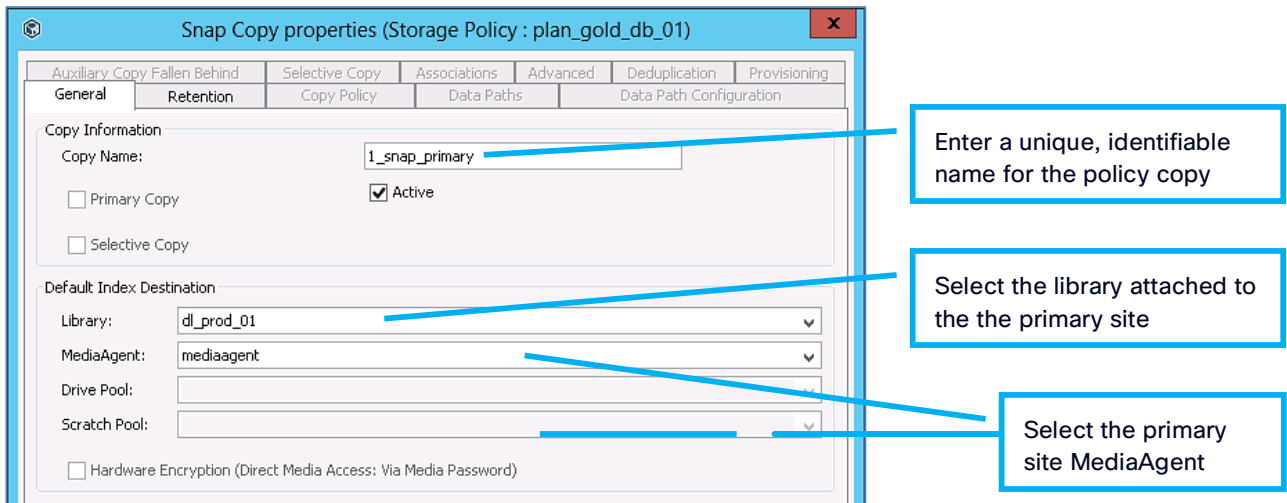
7. Click **Finish** to close Create Storage Policy Wizard.

Note: In the example above the retention is set to 30 days, but the policy can be tailored to whatever the recovery SLA dictates. Most deployments will have multiple storage policies to service different SLAs for different data.

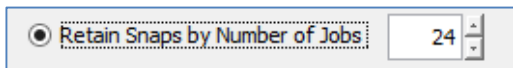
Create Snapshot Copy (IntelliSnap® Technology)

IntelliSnap software operations require a snapshot copy to house the indexing information and define the retention on the snapshots. Any currently defined storage or newly created data protection Storage Policy supports the addition of a snapshot copy.

1. Right-Click on the plan_gold_vm_01 **Storage Policy**, select **All Tasks**, and then click on **Create New Snapshot Copy**.
2. The Snap Copy Properties dialog opens for the newly created Snapshot Copy in the Storage Policy.



3. Select the “Retention” Tab.
4. To store snapshots solely based on the number of jobs under retention, regardless of time passed, select the “Retain Snaps by Number of Jobs” setting:



5. To store snapshots based on days, set the amount of days under the Basic Retention Rule for All Backups, and set the Cycles to 0:

Basic Retention Rule for All Backups

Infinite

Retain for Days Cycles

Note: Extended snapshot retention configurations can be enabled from this screen also. In the below configuration the last snapshot from every 2 hour period is kept for one day, the last snapshot each day is retained for 7 days, and finally the last snapshot of the week is retained for 14 days.

The CommCell is now configured and ready to install and configure client systems for data protection.

SAP HANA iDataAgent

The Commvault SAP HANA iDataAgent supports both streaming and snapshot-based protection for SAP HANA databases. Switching between the two methods is simple and can be performed almost any time when requirements or SLAs change. The main benefit as the snapshot method is that even large database can be recovered in minutes versus hours. The SAP HANA agent supports scale-up, scale-out and tailored data center integration (TDI) configurations. This paper focusses on the TDI category. The agent helps to increase efficiency and automation via automatic deployment, advanced graphical configuration capabilities, auto-discovery of HANA multi-tenant configurations and by eliminating the need for custom scripting. DevOps and SAP Landscape Management scenarios are supported via automated creation of SAP HANA database copies. The agent is certified by SAP according to the Backint for HANA standard.

Installation

The SAP HANA needs to be installed on all servers running SAP HANA. Below are the steps to setup SAP on HANA agent for protection.

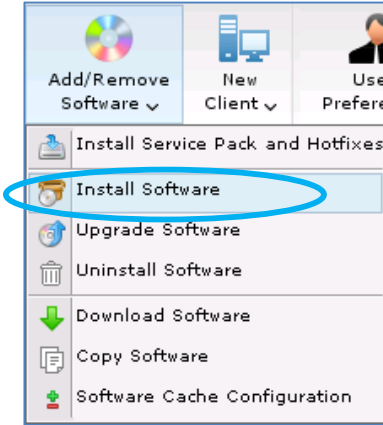
1. Install SAP HANA iDataAgent software on the SAP HANA nodes
2. Configure SAP HANA client
3. Create Pseudo Client for HANA instance
4. Create & configure subclient that identify what, how and to where to backup your data to.

Note: Refer to the [Commvault SAP HANA Best Practices Guide](#) for details on the installation. SAP HANA agent must be deployed to all SAP HANA nodes before configuring the Pseudo Client for SAP HANA.

In the screenshots below the SAP HANA Agent software was installed on the host CISHANA1 and a pseudo client was created for the COM instance. The pseudo client is linked to the host on the details tab. Multiple instances can run on a server and you can therefore have multiple pseudo clients linked to the same SAP HANA agent. In this example there is another instance called CIS running on the same server.

Note: To enable Commvault's IntelliSnap technology the MediaAgent package will be installed in addition to the SAP HANA agent.

In order to push the Commvault Client Agent software to a target system, login to the CommCell Console and choose “Install Software” from the Tools menu and provide all requested information. When asked for the SAPHANAEXE directory, enter **/usr/sap/<SID>/SYS/global/hdb/opt**. The installer will then create a symbolic link to the Commvault executable “Backint”.



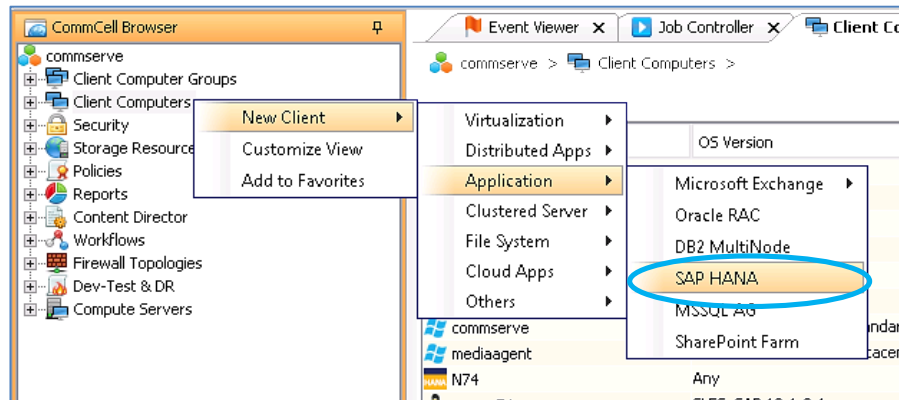
Configure SAP HANA Agent

The only steps that have to be performed manually are the creation of a Commvault parameter file (“param”) with the respective symbolic link and the adjustments of SAP HANA instance parameters so that HANA can use the backint interface for sending backups to Commvault. Please refer to [Commvault SAP HANA Best Practices Guide](#) for content of the parameter file.

```
c0madm@cishana1:/usr/sap/C0M/SYS/global/hdb/opt> ll
total 0
lrwxrwxrwx 1 c0madm sapsys 33 Aug 21 02:03 hdbbackint -> /opt/commvault/iDataAgent/backint
drwxr-x-- 2 c0madm sapsys 26 Aug 21 02:03 hdbconfig
c0madm@cishana1:/usr/sap/C0M/SYS/global/hdb/opt> ll hdbconfig
total 0
lrwxrwxrwx 1 c0madm sapsys 31 Aug 21 02:03 param -> /opt/commvault/iDataAgent/param
```

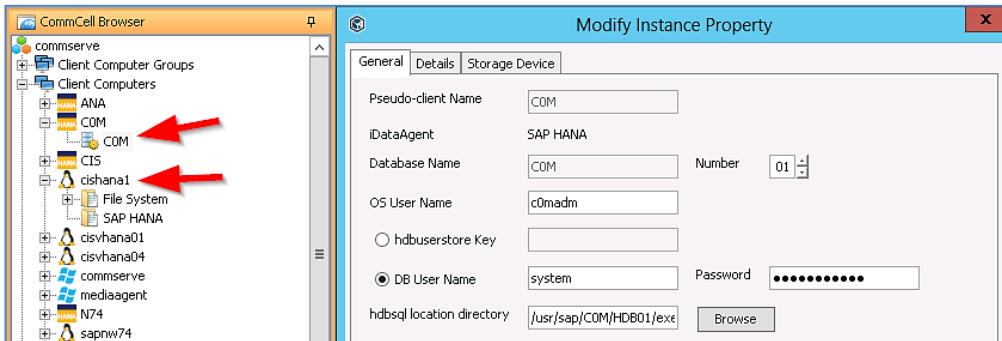
Create Pseudo Client for HANA instance

From the Commvault GUI, a pseudo client for the SAP HANA instance must be created.

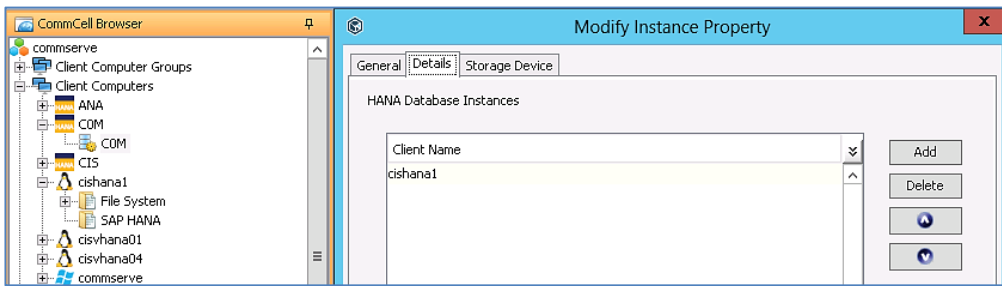


Note: Follow the wizard to configure the pseudo client and enter instance credentials and selecting the SAP HANA nodes associate with the pseudo client.

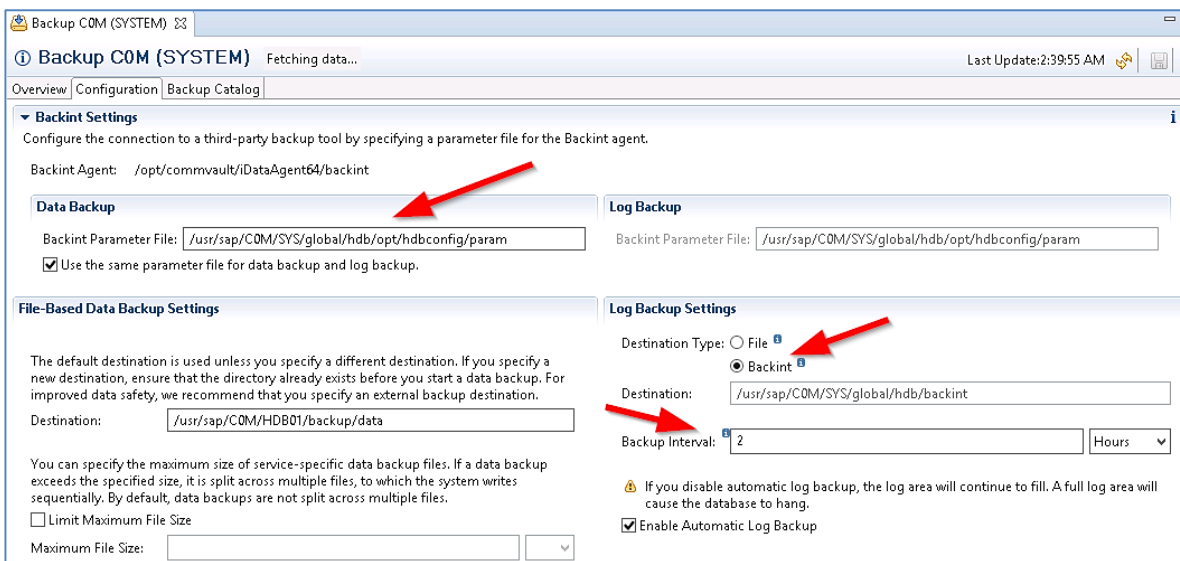
Instance credentials can be verified or modified under the Modify Instance Property General Tab. You need to enter SID, instance number, DB user and how authentication needs to take place.



The Details tab will identify linked SAP HANA nodes to the instance. All nodes belonging to this HANA instance need to be entered.



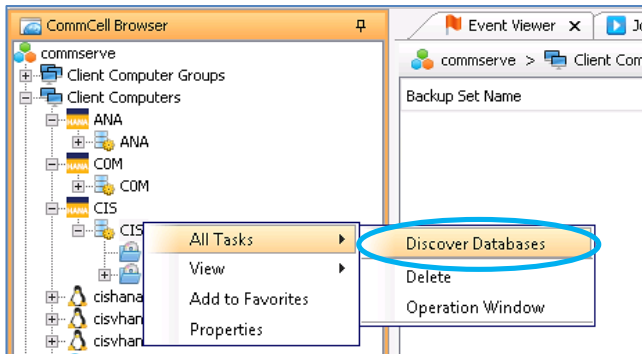
The pseudo client is configured and all data backups will go to Commvault, but log file backups will still go to file by default. Log Backup Settings in SAP HANA Studio must be modified to enable automatic log backups and specify appropriate backup interval.



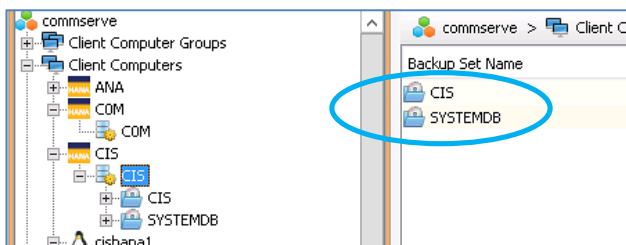
For SAP HANA 2 Multi-Tenant Database Container (MDC) configurations it is important to also set the relevant SAP HANA parameter to backup the HANA recovery catalogue to Commvault. This used to be the SAP default behavior but it has been changed to false in HANA 2.

[] backup		
backint_response_timeout	600	
catalog_backup_parameter_file		● /usr/sap/CIS/SYS/global/hdb/opt/hdbconfig/param
catalog_backup_using_backint	false	● true
data_backup_buffer_size	512	
data_backup_max_chunk_size	0	
data_backup_parameter_file		● /usr/sap/CIS/SYS/global/hdb/opt/hdbconfig/param
data_backup_savepoint_lock_timeout	7200	
enable_accumulated_catalog_backup	true	
es_data_backup_buffer_size	8	
log_backup_buffer_size	128	
log_backup_interval_mode	immediate	
log_backup_parameter_file		● /usr/sap/CIS/SYS/global/hdb/opt/hdbconfig/param
log_backup_using_backint	false	● true

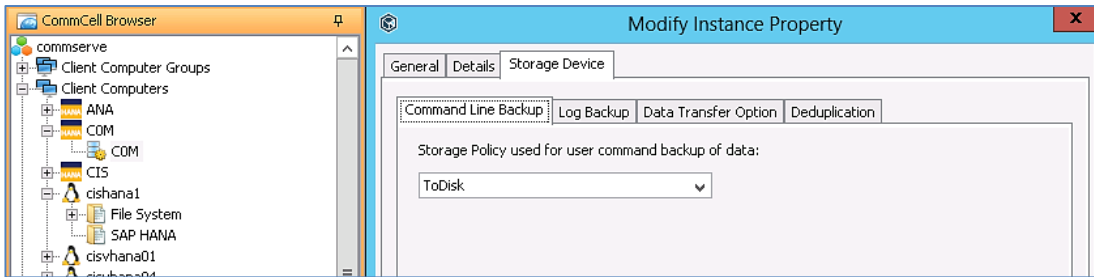
For SAP HANA Multi-Tenant Database Container instances the tenant databases can be discovered automatically:



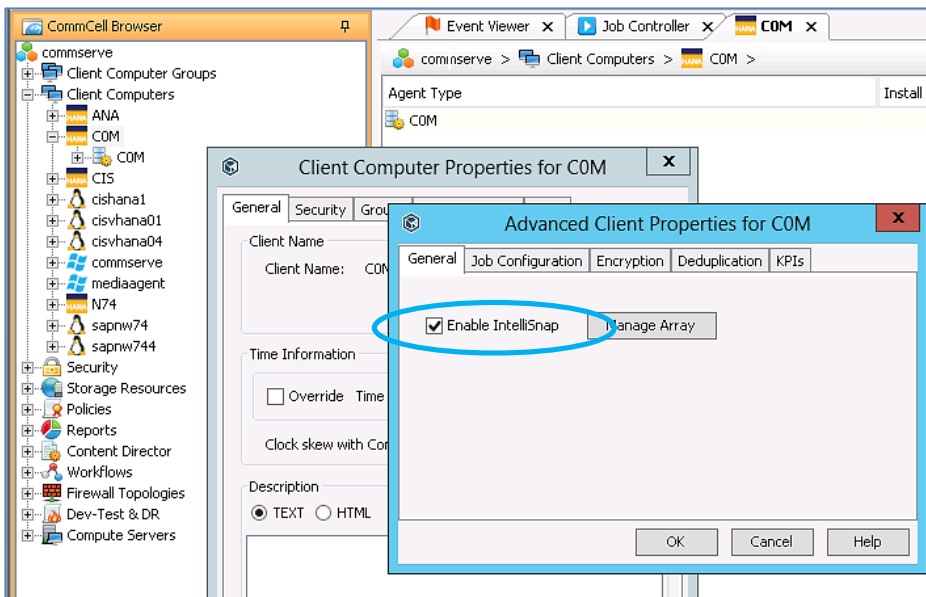
Automatic discovery identified CIS and SYSTEM tenant databases from the CIS instance.



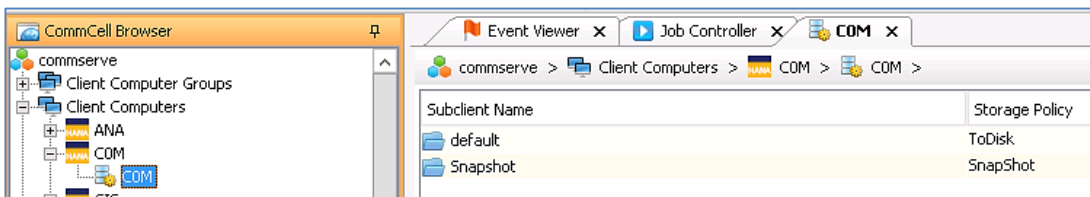
For each tenant database, subclients can be defined individually giving you a granular level of control over your backups. A Default Storage Policy is linked to the Client as well for data and log backups:



To enable Commvault IntelliSnap for snapshot integration with Pure Storage FlashArray//M, modify the the Psuedo Client properties. This is under the Advanced Client Properties for pseudo client C0M.



Multiple subclients can be created in each instance. Each subclient can be associated to different storage policy giving the ability to specify different storage targets, snapshots or streaming backups for the protected dataset. In a SAP HANA MDC instance you can specify subclients for each Tenant database individually.



Note: Commvault IntelliSnap support for multi-tenant with one Tenant database is currently planned for Version 11 SP10.

Performing Backups

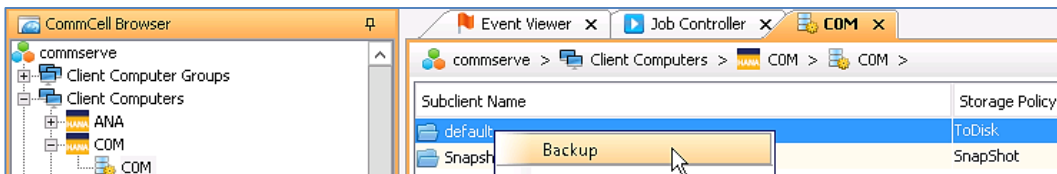
Streaming Data Transfer

Streaming backups to disk or to tape can be created using various tools:

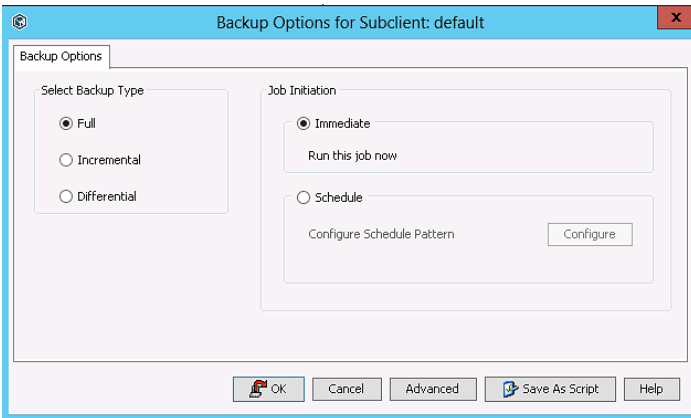
- The Commvault CommCell Console.
- The SAP HANA Studio.
- SAP HANA hdbsql command line utility.
- The SAP HANA Cockpit.

Let's focus on the first two.

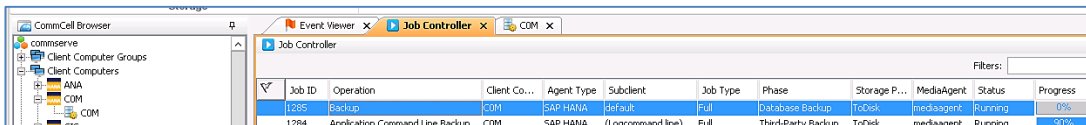
When creating a full backup from the CommCell Console you need to drill down to the subclient level of the instance that you want to backup. Then right-click the subclient and click backup.



Then choose the backup of backup to create and when and click OK.



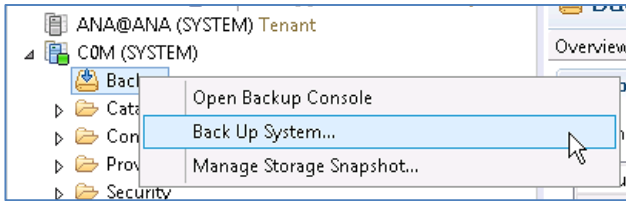
The backup job can then be monitored in the Job Controller window.



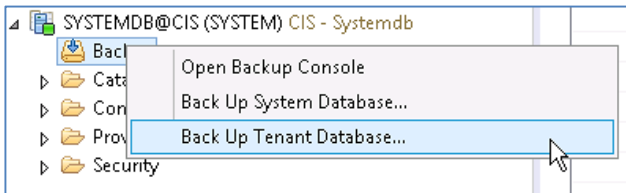
The same can be achieved by using the SAP HANA Studio. Note that on a SAP HANA MDC instance you have to login to the System DB for all backup and restore operations. The System DB needs to be up and running for successfully tenant backup and restore jobs. Also make sure that the SAP HANA instance parameters for backups via the backint interface are set as specified in the [Commvault SAP HANA Best Practices Guide](#).

Once logged into the Instance in SAP HANA Studio you start a backup operation by right clicking the backup item in the instance list:

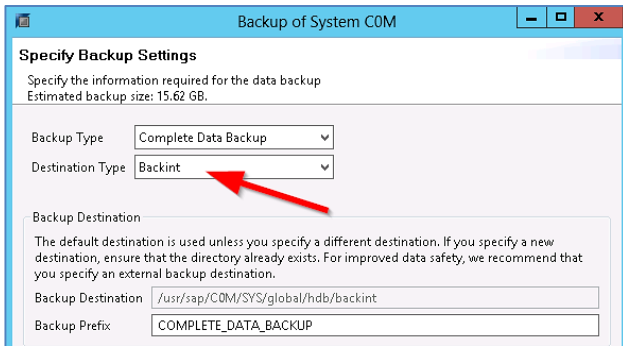
Single Container HANA:



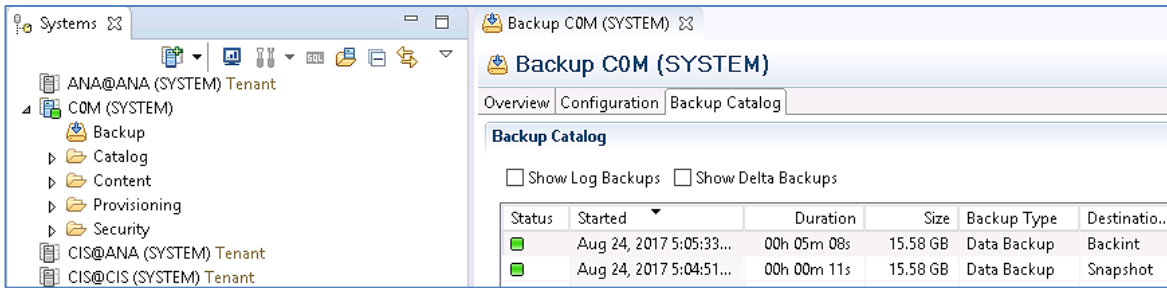
Multi-Tenant HANA:



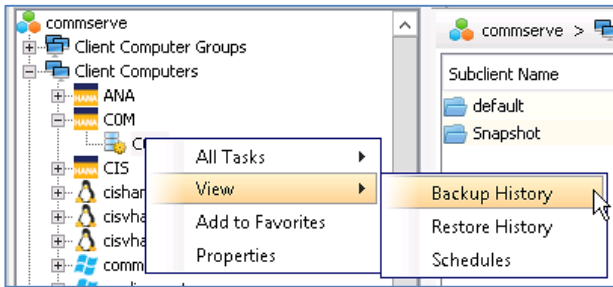
On the next screen make sure to select Backint:



After that click 'Next' and then click 'Finish' to start the backup. It's that easy. All backups pushed to Commvault via the Backint interface will be registered in the HANA backup catalogue as well which can be viewed via the HANA Studio:



The same information can be viewed in the Commvault CommCell Console's backup history.



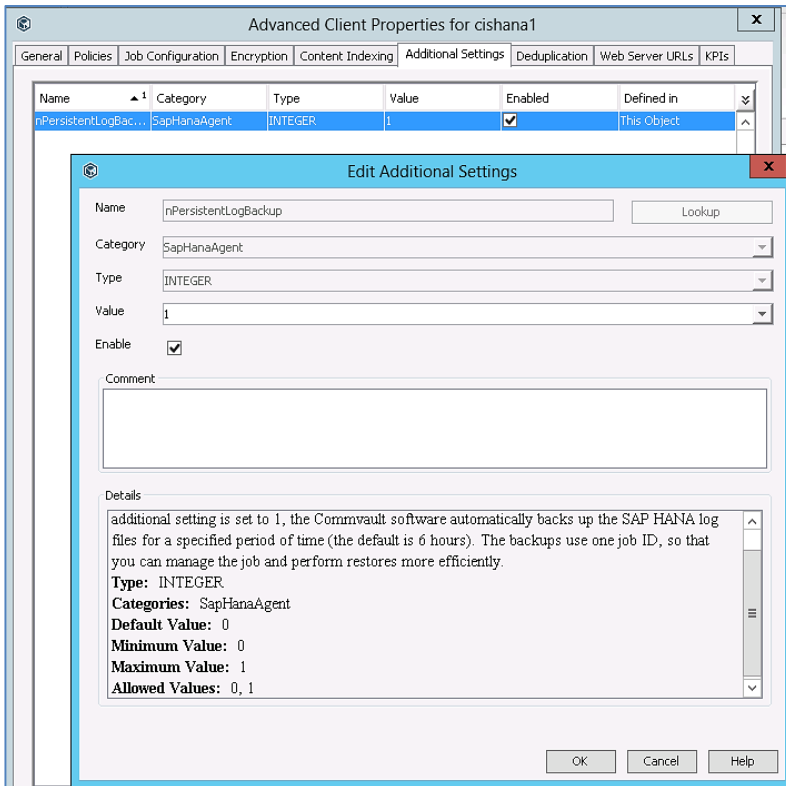
Backup Job History

Job ID	Status	Operation Type	Subclient	Storage Policy	Job Type
1071	Green	Application Command Line Backup	(Logcommand line)	ToDisk	Full
1070	Green	Application Command Line Backup	(Logcommand line)	ToDisk	Full
1055	Green	Application Command Line Backup	(command line)	ToDisk	Full
1054	Green	Snap Backup	Snapshot	SnapShot	Full
1053	Green	Application Command Line Backup	(Logcommand line)	ToDisk	Full
1051	Green	Application Command Line Backup	(Logcommand line)	ToDisk	Full
1052	Green	Application Command Line Backup	(Logcommand line)	ToDisk	Full
1050	Green	Application Command Line Backup	(Logcommand line)	ToDisk	Full
850	Green	Application Command Line Backup	(Logcommand line)	ToDisk	Full
849	Green	Application Command Line Backup	(Logcommand line)	ToDisk	Full
833	Green	Application Command Line Backup	(command line)	ToDisk	Full
832	Green	Snap Backup	Snapshot	SnapShot	Full

Note: The Operation Type column will indicate the type of back shown in the Backup Job History.

As an additional feature Commvault supports so called persistent log backups. This feature avoid transaction log backups getting started very frequently thereby cluttering the job history in Commvault with hundreds if not thousands of jobs a day. With Commvault persistent HANA log backups, one job is started for each SAP HANA Service belonging to a SAP HANA instance which by default remains active for 6 hours and captures all transaction logs that are submitted for backup from the HANA instance. This significantly reduces the overhead on the Commvault side while enhancing scalability at the same time.

Note that this is set on the server agent level and not the Pseudo Client created for the HANA instance.

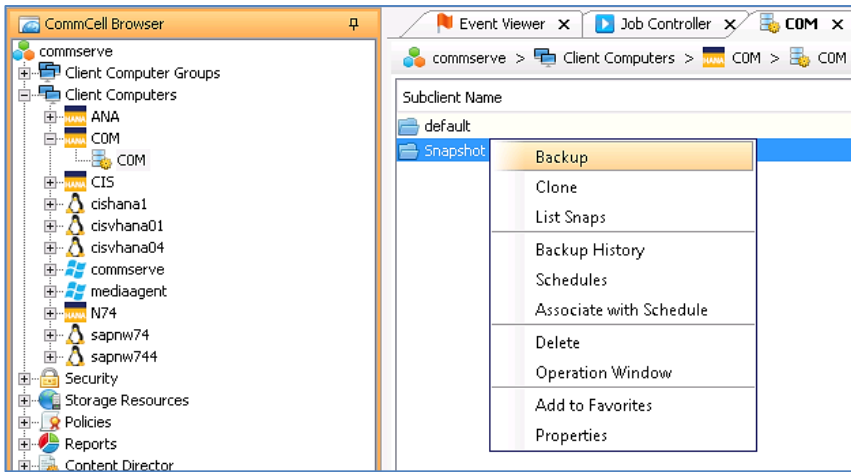


5873	Application Command Line Backup	CIS	SAP HANA	(Logcommand line)	Full	Third-Party Backup	ToDisk	mediaagent	Running	0%
5872	Application Command Line Backup	CIS	SAP HANA	(Logcommand line)	Full	Third-Party Backup	ToDisk	mediaagent	Running	0%
5870	Application Command Line Backup	CIS	SAP HANA	(Logcommand line)	Full	Third-Party Backup	ToDisk	mediaagent	Running	0%

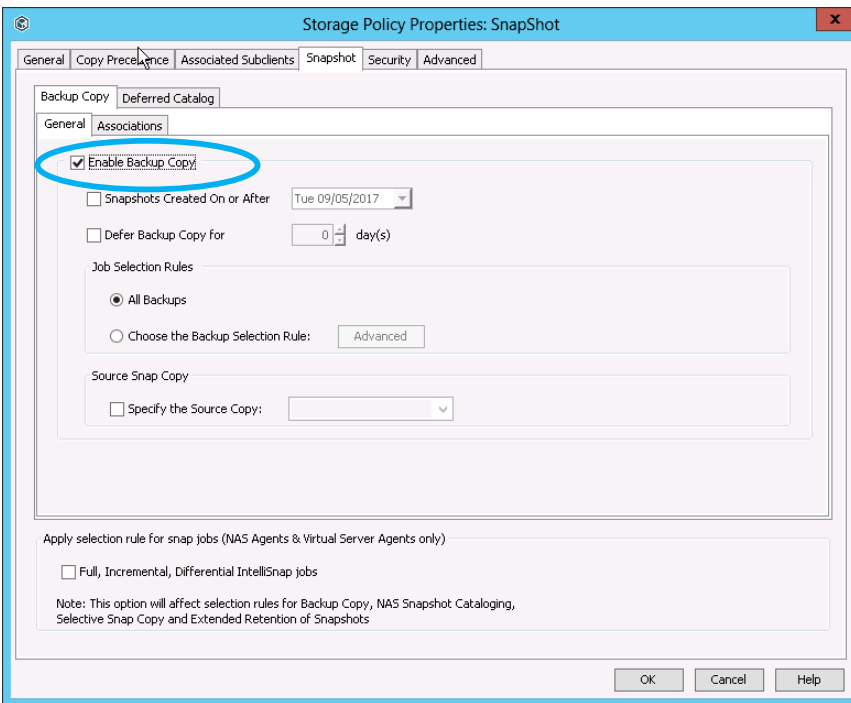
Snapshot

For snapshot-based backups you have to use the Commvault CommCell Console—both for running/scheduling backup and for restores.

Once IntelliSnap has been enabled in the advanced properties of Pseudo Client the backup procedure is the same as for streaming backups but you have to select a subclient that is configured for Commvault IntelliSnap (see IntelliSnap tab) as outlined earlier in this document.



SAP HANA Snapshots can selectively be copied to storage pools using the Commvault backup copy function in a storage policy. To enable snapshot copies to storage pools, Enable Backup Copy must be enabled under storage policy properties.



Performing Restores

Streaming Data Transfer

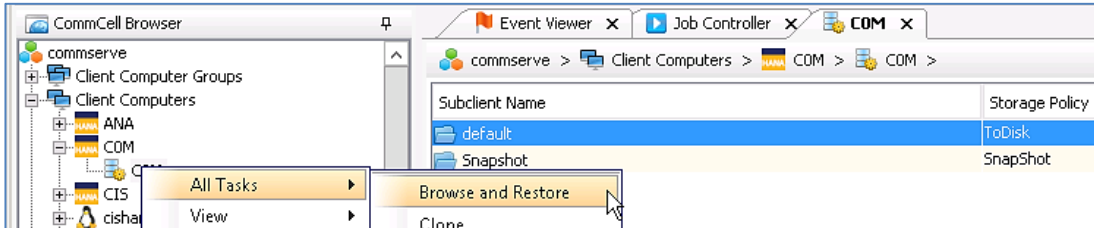
Restoring streaming backups from disk or tape can be performed using the same tools as were used for their creation:

- The Commvault CommCell Console.
- The SAP HANA Studio.

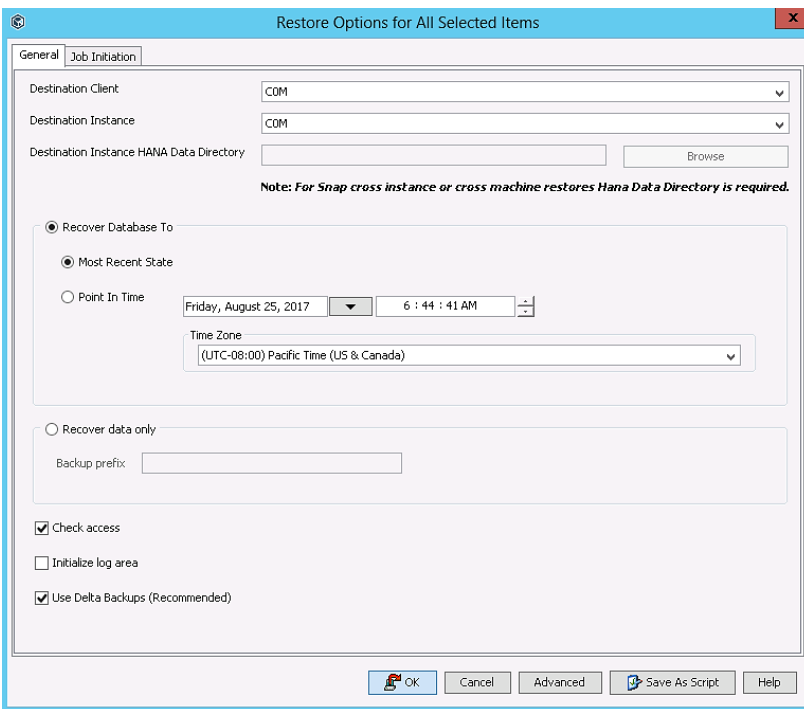
- SAP HANA hdbsql command line utility.
- The SAP HANA Cockpit.

Let's focus on the first two.

To start the actual restore via the Commvault CommCell Console, right click the instance and select "Browse and Restore".



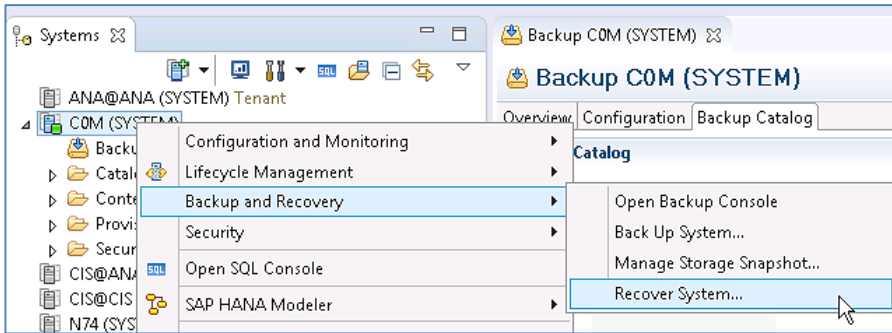
The wizard will prompt you for a time range and more specific information but the most important screen is the one below. Here you can specify the destination client, full or Point-In-Time recovery and whether or not to clear the logs for restore.



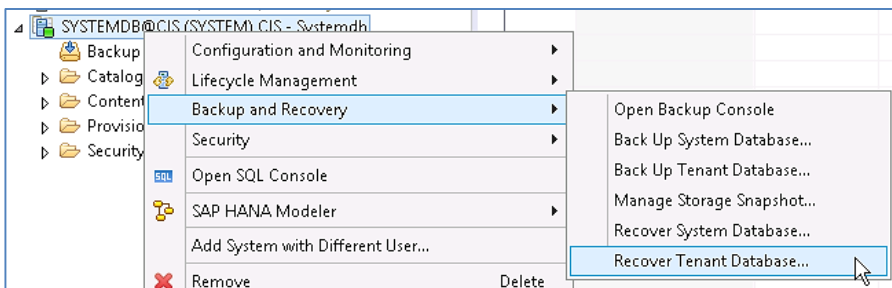
When you click 'OK', Commvault will shut down the HANA database, perform the restore, do the recovery and re-open the database, all-in-one hands-free operation.

From the HANA studio the same objective can be achieved. Once logged into the SAP HANA instance click on "Recover System".

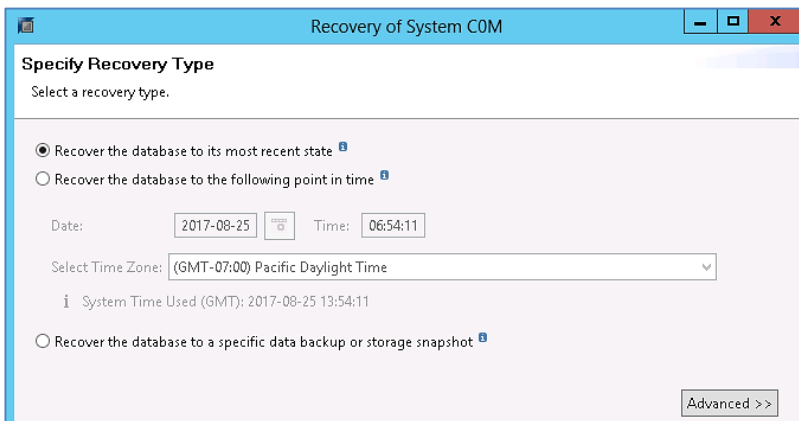
Single Container HANA Instance:



Multi-Tenant HANA Instance:



The HANA studio will shut down the database and present you with the following screen where you can choose the type of recovery that is to be made:



Further along in the wizard you'll be presented with a list of available backups for restore. Note that they appear as unavailable until you select the one you want to restore and click the "Check Availability" button.

Select a Backup
Select a backup to recover the SAP HANA database

Selected Point in Time
Database will be recovered to its most recent state.

Backups
The overview shows backups that were recorded in the backup catalog as successful. The backup at the top is estimated to have the shortest recovery time.

Start Time	Location	Backup Prefix	Available
2017-08-18 21:00:21	/usr/sap/PD1/SYS/global/h...	480875_COMPLETE_DATA_BACKUP	●
2017-08-11 21:00:13	/usr/sap/PD1/SYS/global/h...	479210_COMPLETE_DATA_BACKUP	◇
2017-08-04 21:00:23	/usr/sap/PD1/SYS/global/h...	477689_COMPLETE_DATA_BACKUP	◇
2017-08-04 15:20:39	/usr/sap/PD1/SYS/global/h...	477640_COMPLETE_DATA_BACKUP	◇

Refresh Show More

Details of Selected Item

Start Time: 2017-08-18 21:00:21 Destination Type: BACKINT Source System: PD1@PD1
Size: 1.72 GB Backup ID: 1503104421894 External Backup ID: SAP_268121482_480875
Backup Name: /usr/sap/PD1/SYS/global/hdb/backup/DB_PD1/480875_COMPLETE_DATA_BACKUP
Alternative Location:

Check Availability

Go through the remaining screens and click finish to start the restore.

Snapshot

Restoring from HANA snapshots uses the same procedure as described for streaming backups but note that this is only available through Commvault Console. It is three step process where one selects a snapshot backup job, goes through a dialog and then start the restore.

Commvault can execute the restore in two ways. The first being that the snapshot is temporarily mounted and the data is then copied onto the active target filesystem. The second is the so called Hardware Revert option which is available for in-place restores (to the same HANA system) based on Pure Storage functions. Hardware revert is the fastest restore option as no data needs to be transferred.

The Hardware Revert option can be enabled in the advanced restore options window:

Advanced Restore Options

General Startup Copy Precedence Data Path Encryption Job Retry Alert

Use hardware revert capability if available

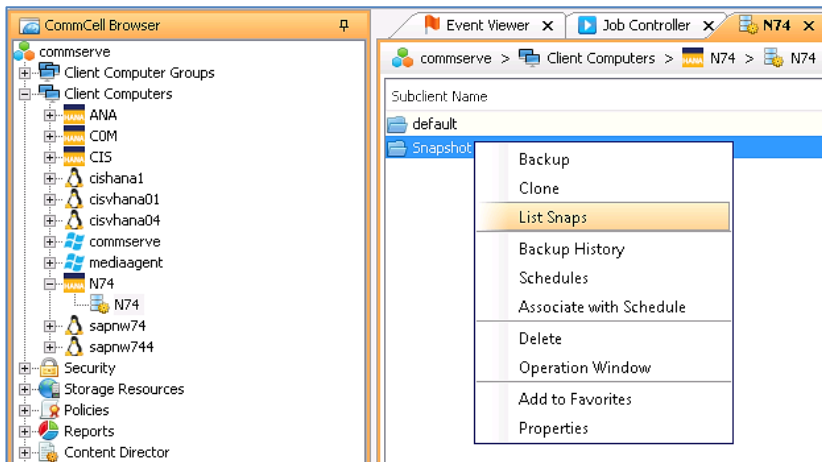
Warning

Selecting revert will overwrite the entire disk. All existing data will be lost
Do you really want to continue?

Yes No

OK Cancel Help

Note that you all times have access to the Snapshots that where created through the Commvault CommCell console. If you right click the Snapshot enabled subclient of a HANA database you can select “List Snaps”. You’ll be presented with a list of snapshots that you can manually mount, unmount or restore. Note that if you choose restore that this is not an application aware operation and you have to perform pre and post restore activities manually.



Summary

Protecting Cisco UCS FlashStack using Commvault can meet every requirement and is simple and easy. Backup and restores can be initiated from a single GUI and the complexity of the underlying system can be hidden from daily operators. The seamless integration with the Pure Storage FlashArray//m using Commvault’s IntelliSnap technology and the Cisco UCS S3260 Storage Server make this a best in class solution allowing for secondary site backups, VM archiving, and multiple options for restoration and again, all within a single management interface.

More Information

For additional information, see the following:

- [SAP on FlashStack CVD](#)
- [Cisco UCS S3260 Storage Server](#)
- [Cisco UCS 6000 Series Fabric Interconnects](#)
- [Cisco UCS Manager](#)
- [Cisco white paper–Achieve Optimal Network Throughput on the Cisco UCS S3260 Storage Server](#)
- [FlashStack VSI with Commvault for Data Protection CVD](#)
- [Commvault SAP on HANA agent](#)
- [Commvault SAP HANA Best Practices Guide](#)
- [Commvault Software Offline Installation](#)

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