HITACHI

Reference Architecture Guide

Hitachi Data Protection Suite for SAP HANA with Hitachi Virtual Storage Platform One

Powered by Commvault

MK-SL-500-00

Hitachi Vantara

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Table of Contents

Notices and Disclaimer 4

About This Document 5

Introduction 5
Intended Audience 5
Value Proposition 5
Document Revisions 5
Comments 5

Reference Architecture guide 6

Solution Overview 8

Key Solution Elements 8
Hardware elements 9
Software elements 10
System and hardware requirements 11
Server 1 with CommServe, Web Server, Web Console, Workflow Engine Installed 11
Server 2 with MediaAgent Installed 11
Hitachi VSP One Block Storage for Disk library 11

Solution Design 12

Storage Configuration 16

SAP HANA External Disk Storage 16
HDPS Storage 16
HDPS Disk Library 17

Network Configuration 20

SAP HANA Network Configuration 20
HDPS Network Configuration 20

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Defining RTO and RPO for SAP HANA 21

Protecting SAP HANA Database 22

SAP HANA configuration parameters 22
Sample global.ini 23

Solution verification 25

Product descriptions 26

Hitachi Integrated Solutions for SAP HANA 26
Hitachi Advanced Server HA800 Series 26
Hitachi Virtual Storage Platform One Block 26
Hitachi Virtual Storage Platform One Object Storage 27
Hitachi Virtual Storage Platform One File 27
Hitachi Data Protection Suite 27
SAP HANA 28
Operating system options for SAP HANA 28

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About This Document

Introduction

This document describes the Reference Architecture for Hitachi Data Protection Suite (HDPS) powered by Commvault for SAP HANA with Hitachi Virtual Storage Platform (VSP) One.

Intended Audience

This document is intended for:

- System Administrators
- Infrastructure Architects
- Solution Architects
- Backup Architects
- Data center Engineers
- SAP Architects
- Database Architects
- Network Engineers
- Pre-Sales Solution Architects
- Storage Professionals
- IT Professionals
- Project Managers
- Service Delivery Managers

Value Proposition

Hitachi Data Protection Suite powered by Commvault for SAP HANA with VSP One provides a scalable, SAP-aware data protection architecture for mission-critical SAP HANA workloads. It helps organizations simplify backup and recovery operations, improve recovery readiness, and strengthen cyber resilience across production and non-production environments.

The reference architecture combines high-performance protection and recovery with policy-driven data tiering, immutable retention, disaster recovery, and SAP HANA cloning capabilities. This enables organizations to align data protection services with business-defined RPOs, RTOs, compliance requirements, and long-term growth objectives.

Document Revisions

Revision Number	Date	Details
v1.0	September 2026	Initial release

Comments

Send any comments on this document to Docs-Feedback@hitachivantara.com. Include the document title, including the revision level, and refer to specific sections and paragraphs whenever possible. All comments become the property of Hitachi Vantara LLC.

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Reference Architecture guide

Enterprises need to simplify protection of block, file, and object data across edge, core, and cloud while sustaining near-continuous data availability and defending against ransomware and other threats. This reference architecture translates *Hitachi's modern data protection principles* to a validated design for SAP HANA using Hitachi Data Protection Suite (HDPS) powered by Commvault and the Virtual Storage Platform One (VSP One) portfolio.

HDPS provides a single SAP-aware data protection platform that centralizes backup, snapshot, and recovery for SAP HANA appliance, Tailored Data Center Integration (TDI), and virtualized deployments across on-premises and cloud environments using Backint for SAP HANA and IntelliSnap. By combining high-performance VSP One Block for primary and performance-tier copies with cost-efficient VSP One File or VSP One Object, VSP One SDS Cloud, and offsite targets, the solution delivers a unified VSP One fabric that simplifies design, scaling, and automation while lowering long-term storage total cost of ownership (TCO) and preserving access to historical data for analytics and compliance.

Integrated scale-out MediaAgents, immutable block snapshots, S3 Object Lock, and HDPS recovery workflows provide high-throughput backup, rapid restore, and streamlined disaster recovery capabilities. Support for 1-Touch host rebuild and SAP HANA database cloning helps accelerate QA, test, and project refresh activities. These capabilities enable enterprises to consistently meet stringent recovery time objectives (RTOs), recovery point objectives (RPOs), and cyber resilience requirements for mission-critical SAP HANA workloads.

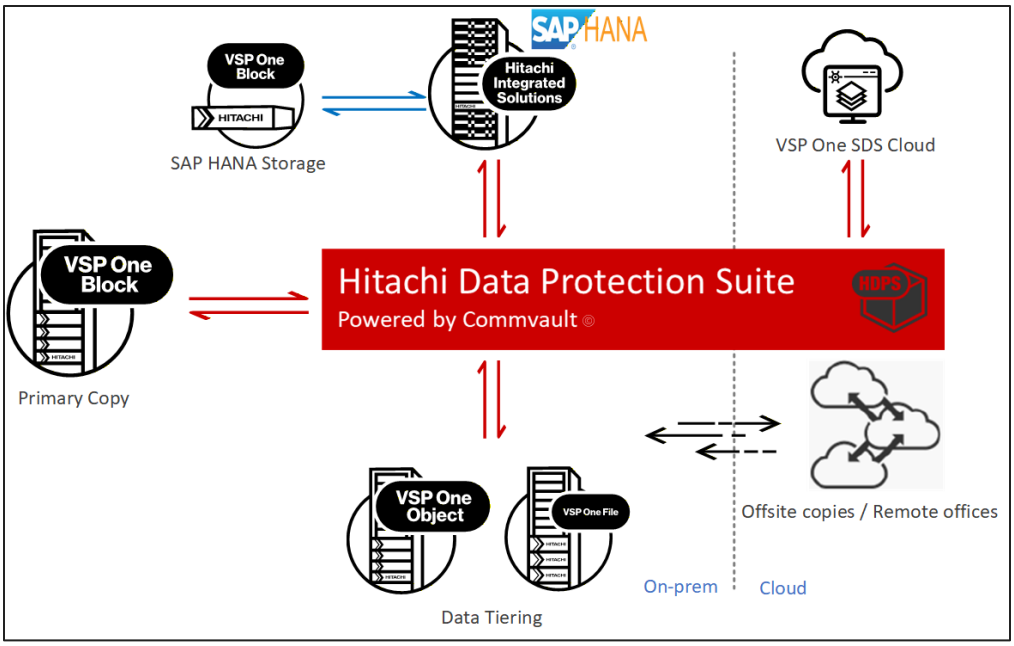
In addition to integrating natively with other VSP storages, the solution can be deployed alongside Hitachi Integrated Solutions for SAP HANA and used in combination with Hitachi Global-Active Device (GAD) for active active storage configurations, extending protection and availability across sites and clouds.

Use this document to understand the reference architecture for SAP HANA archival, backup, recovery, disaster recovery, and cloning using HDPS powered by Commvault features such as SAP Backint integration, IntelliSnap snapshots, 1-Touch host recovery, and policy-based data tiering.

This technical paper assumes familiarity with:

- Storage Area Network (SAN) based storage systems
- General storage and backup concepts
- General network knowledge
- SAP HANA and the underlying operating system platform
- Common IT best practices

The following illustration shows the high-level design of the architecture.



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Note: These procedures were developed in a lab environment. Many factors affect production environments beyond prediction or duplication in a lab environment. Follow recommended practice by conducting proof-of-concept testing for acceptable results before implementing this solution in your production environment. Test the implementation in a non-production, isolated test environment that otherwise matches your production environment.

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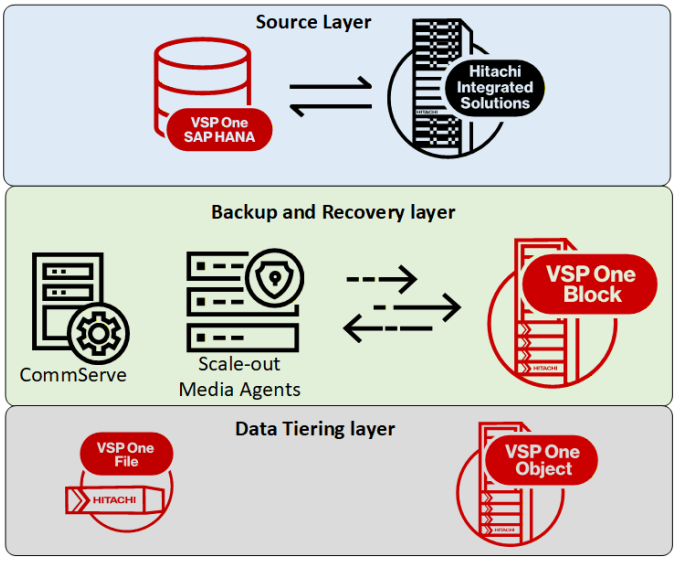
Solution Overview

The reference architecture delivers a multitier SAP HANA data protection design built on VSP One Block for primary SAP HANA storage and high-performance backup, combined with VSP One Object and HDPS archiving to VSP One File for scale-out, long-term and immutable retention options. HDPS provides unified backup management, catalog, and policy-driven data movement across these tiers, using Backint for SAP HANA and Commvault IntelliSnap for application-consistent protection while scale-out MediaAgents deliver high-throughput backup and recovery for large HANA systems. In addition, the solution supports advanced capabilities such as disaster recovery, 1-Touch host rebuild, and instant SAP HANA cloning from snapshot or backup copies to accelerate QA, testing, and project system refreshes within the same operational framework.

The high-level logical design consists of the following layers:



- **Source layer –** SAP HANA databases deployed on *Hitachi Integrated Solutions for SAP* using VSP One Block as external storage.
- **Backup and recovery layer –** HDPS components (CommServe and scale-out MediaAgents) running on dedicated Hitachi Advanced servers and writing streaming, deduplicated, and IntelliSnap-based backups to VSP One Block storage as the performance tier.
- **Data tiering layer –** VSP One File and VSP One Object providing NAS and S3-compatible object storage tiers for auxiliary copies and long-term retention, including support for immutable copies and scale-out capacity expansion.

Key Solution Elements

This HDPS for SAP HANA with VSP One solution using Backint for HANA and IntelliSnap uses the following components:

- Hitachi Integrated Solutions for SAP (HANA Appliance, TDI, and virtual)
- Hitachi VSP One Block for HANA TDI
- Hitachi VSP One Block for HDPS as primary storage
- Hitachi VSP One Object storage or VSP One File Storage
- Hitachi Advanced servers for HDPS components
- Hitachi Data Protection Suite, powered by Commvault
- Cisco Switches for Application and Backup Networks
- Brocade Fibre Switches for Fibre connection

The key hardware and software components used in this reference architecture are described in the following tables. For detailed component information, see Product descriptions.

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Hardware elements

The following table lists the hardware configuration that was used for the solution testing in the Hitachi engineering lab.

Hardware	Quantity	Configuration	Role
BullSequana SH20	1	• 2CPUs – Intel Xeon Platinum 8490H • 2TB Memory for SAP HANA • 8× Micron_7450_MTFDKBZ3T8TFR 3.4 TB NVMe SSD • 2× ConnectX-6 Lx (25 GbE) Ethernet	SAP HANA Appliance Server
BullSequana SH20	2	• 2CPUs – Intel Xeon Platinum 8490H • 2TB Memory for SAP HANA • 2× Emulex LPe35000 Series 32 Gbps 2P HBA • 2× ConnectX-6 Lx (25 GbE) Ethernet	SAP HANA TDI (Source and Target)
Hitachi Advanced Server HA820 G3	1	• 2CPUs – Intel Xeon Platinum 8490H • 1TB Memory for SAP HANA • 2× HPE SN1610E 32Gb 2p FC HBA 32 Gbps 2P HBA • 2× Intel(R) E810-XXVDA2 Dual port (25 GbE) Ethernet	VMware ESXi (virtual HANA servers)
Hitachi Advanced Server HA810 G3	1	• 2CPUs – Intel Xeon Platinum 8490H • 1TB Memory • HPE NS204i-u Gen11 Boot Controller with 2 × NVMe Boot disks • 2× VR000480KXLXF – 480 GB NVMe SSD • 1× Intel(R) Eth E810-XXVDA2 Dual port (25 GbE)	HDPS (CommServe Server)
Hitachi Advanced Server HA820 G3	2	• 2CPUs – Intel(R) Xeon(R) Gold 6430 • 256GB Memory • 1× HPE SN1610E 32Gbps 2p FC HBA 32Gbps HBA • 1× Broadcom P225p NetXtreme-E Dual-port (25GbE) Ethernet card	HDPS (MediaAgents)
Bull Sequana SH20	1	• 2CPUs – Intel Xeon Platinum 8490H • 1TB Memory • 2× Emulex LPe35000 Series 32Gbps 2P HBA • 2× ConnectX-6 Lx (25GbE) Ethernet	HDPS (MediaAgents)

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Hitachi VSP One Block 26	1	• CTL: 1 pair • 32Gbps 4-port CHB: 3 pairs • MPU: 1 pair • Cache: 768GB • NVMe SSDs: 24× 1.92TB	SAP HANA TDI
Hitachi VSP E1090	1	• CTL: 1 pair • 32Gbps 4-port CHB: 4 pair • MPU: 1 pair • Cache: 1024GB • NVMe SSDs: 48× 1.9TB	HDPS (Performance Target)

Hitachi VSP One Object	1	• 8 Nodes (3 + 5 nodes)
		• 3 management nodes and 5 worker nodes
		• Management nodes: 384 GB RAM Worker node: 768GB RAM
		• 2× 25 GbE SFP28 per node
		• Management node: 2× 1.92TB NVMe M.2
		• Worker nodes: 2× 1.92TB NVMe M.2 drive
		  • 1× 7.68TB or 15TB NVMe drive U.2 (Metadata)
		  • 1× 1.92TB NVMe drive U.2 (RabbitMQ)
			HDPS Data Tiering

Cisco 93180YC - FX3	4	25GbE switch (Application & Backup network)	Optional
Cisco 92348	1	1GbE switch (Out-of-band network)	Optional
Brocade G620	1	32/64Gbps Fibre switch	Optional

Software elements

The following table lists the software used in this solution.

Software	
Operating systems for HANA	SUSE Linux Enterprise Server (SLES) for SAP Applications 15 SP7
	Red Hat Enterprise Linux (RHEL) for SAP 9.6
Operating systems for HDPS	Windows Server 2022 DC (CommServe)
	Red Hat Enterprise Linux 9.6 (MediaAgents)
Database	SAP HANA 2.0 SPS08
DB Management	SAP HANA Studio and sql commands
Dataset	BW-like dataset for testing

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Hypervisor	VMware vSphere 8.0 U2
Object storage	Hitachi VSP One Object - O14 3.3.0.176
Data Protection	Hitachi Data Protection Suite powered by Commvault 11.42.60
Agent	HDPS Agent for SAP HANA
Storage Management	Command Control Interface (RAID Manager 01-87-03/03)
Storage Snapshots	Hitachi Thin Image Advanced (HTIA)

System and hardware requirements

For SAP HANA data protection, HDPS powered by Commvault is deployed in a server-and-storage (distributed) configuration with a dedicated CommServe server and one or more scale-out MediaAgents attached to VSP One Block as performance tiers. This design follows *System and Hardware Requirements - Server and Storage (Distributed) Configuration* guidelines, providing sufficient CPU, memory, and I/O bandwidth for high-throughput Backint and IntelliSnap operations, and allowing additional MediaAgents to be added as database size and change rates grow.

In the recommended HDPS configuration, server and storage components are distributed across two or more systems.

Server 1 with CommServe, Web Server, Web Console, Workflow Engine Installed

- Windows Server operating systems or Linux operating systems, such as RHEL and Rocky Linux
- 8 CPU cores
- 32 GB RAM
- 500 GB for SQL database (SSD disk is recommended)

Server 2 with MediaAgent Installed

- Windows Server operating systems or Linux operating systems, such as Red Hat and Ubuntu
- 8 CPU cores
- 16 GB RAM
- 1.5 TB of working space for Deduplication Database (DDB), index cache, and job results (SSD disk is recommended)
- Dual port HBA with SAN attached volumes for Disk library

Hitachi VSP One Block Storage for Disk library

- CTL: 1 pair
- 32Gbps 4-port CHB: 3 pairs
- MPU: 1 pair
- Cache: 768GB
- NVMe SSDs: 24× 1.92TB

Note: For SAP HANA, this reference architecture uses a distributed HDPS deployment with a dedicated CommServe and a scale-out set of MediaAgents sized according to Commvault capacity and performance guidelines. At least two MediaAgents are recommended for SAP HANA workloads, with additional nodes added when MediaAgent CPU/RAM utilization or active stream counts approach their documented limits (80–90% CPU or RAM sustained over a week during backup window), or when DDB and storage I/O metrics indicate sustained pressure, ensuring backup windows, RTO/RPO, and growth targets can be met over the planning horizon.

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Solution Design

The following detailed design for HDPS powered by Commvault for SAP HANA with VSP One using IntelliSnap and SAP Backint methods :

- The SAP HANA appliance, TDI, and virtualized HANA systems are connected to VSP One Block in the source zone.
- Application users access SAP HANA over a 25 GbE application network, while a separate 25 GbE backup network connects the HANA hosts to the HDPS infrastructure to isolate backup traffic from production workloads.
- Hitachi Data Protection Suite (CommServe and scale-out MediaAgents on Hitachi Advanced Servers) forms the backup and recovery layer, receiving SAP Backint streaming backups from HANA and coordinating IntelliSnap storage snapshots on VSP One Block.
- Within the HDPS zone, VSP One Block is also used as the performance tier for primary backup copies and deduplicated disk libraries, attached to the MediaAgents via FC (fibre channel) to deliver high-throughput backup and restore.
- An auxiliary copy workflow sends backup data from the performance tier down to the data tiering layer, where VSP One Object and optionally VSP One File act as a scale-out repository for long-term, cost-efficient retention and archive.
- Management and hardware out-of-band (OOB) access (for example, iLO/BMC and array management ports) are carried on a separate 1 GbE OOB network, providing isolated control-plane connectivity to servers and storage platforms.

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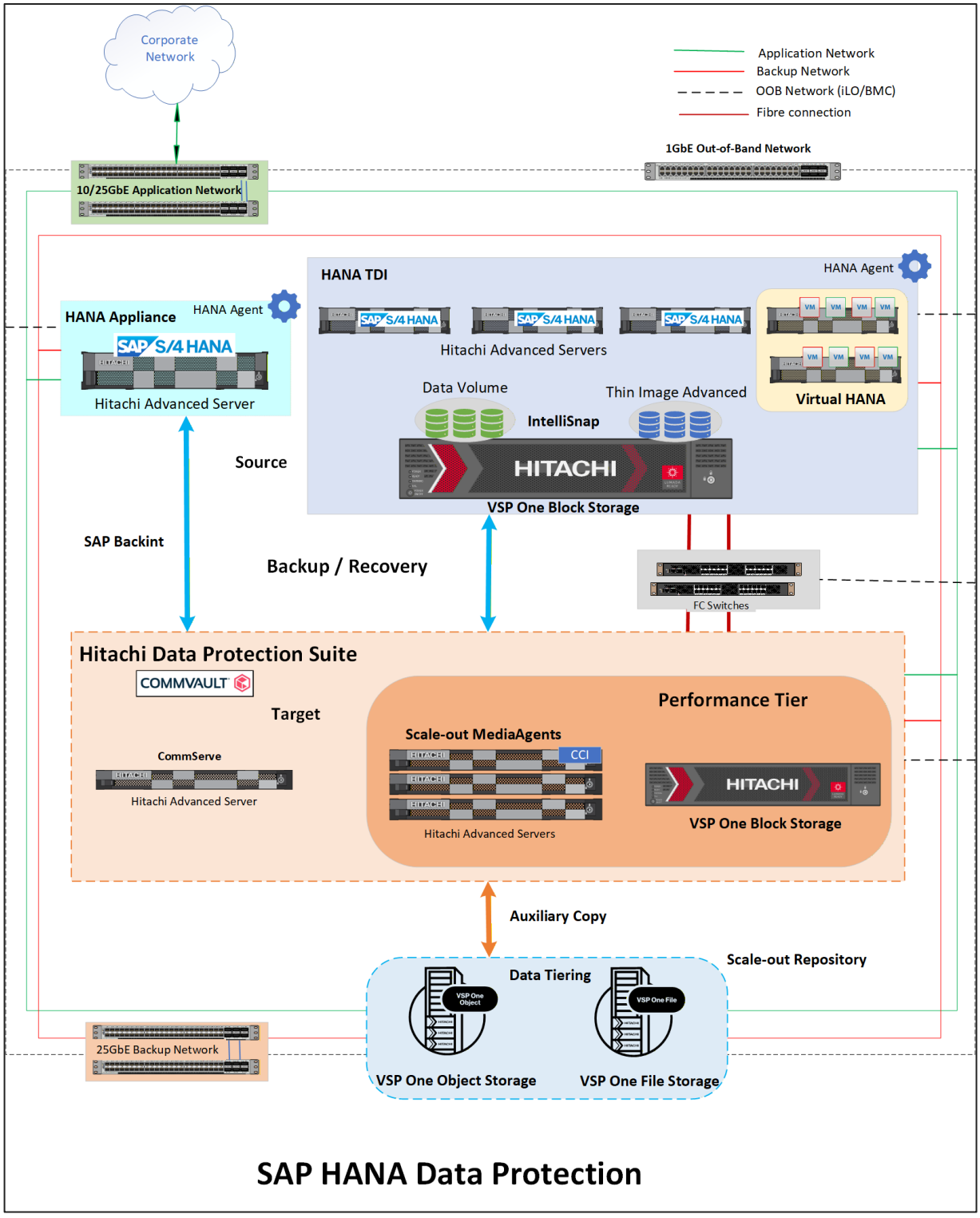

SAP HANA Data Protection

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The following is a list of SAP HANA and HDPS components and the configuration information for database backup and restore:

- **SAP HANA deployment**
  - SAP HANA 2.0 SPS 08 installed on SLES 15 SP7 and RHEL 9.6 for appliance, TDI, and virtualized HANA systems.
  - BW-like dataset of approx. 2.26 TB loaded on HANA appliance and TDI hosts to validate backup, restore, and performance.
- **HDPS server and storage (distributed) configuration**
  - One dedicated CommServe server (Windows Server 2022) running CommServe, Web Server, Web Console, and Workflow Engine. See *Windows CommServe: Getting Started with CommServe Server in a Windows Environment*
  - Three dedicated MediaAgents on Hitachi Advanced Servers running RHEL 9.6, attached via 32 Gbps FC to VSP One Block storage system for the HDPS performance tier and via 25 GbE with LACP bonding backup network to the SAP HANA hosts. See *MediaAgent Installations*
- **Backup methods and SAP HANA integration**
  - SAP HANA Agent installed on each HANA host and global.ini configured to enable Backint for HANA use HDPS for data, log, and catalog backups, creating the default parameter file for the HANA instance. See *Getting Started with SAP HANA Agent*
  - IntelliSnap components installed on HANA TDI hosts with data volumes reside on VSP One Block, enabling application consistent snapshots of HANA data volumes while log backups continue via Backint.
- **Storage integration for IntelliSnap and Secondary Volumes (SVOLs)**
  - Hitachi Command Control Interface (CCI) configured on the MediaAgents to communicate with VSP One Block storage systems, orchestrating Hitachi Thin Image Advanced (HTIA) snapshots for IntelliSnap jobs.
  - Ransomware protection is disabled by default. As part of the lab validation, HDPS ransomware protection was enabled on the mount paths for all SAN-attached disk libraries used by the MediaAgents. This protects backup data from unauthorized modification or deletion.
  - With IntelliSnap, HTIA creates application-consistent snapshots of SAP HANA data volumes on VSP One Block by pairing P-VOLs (primary volumes) with Thin Image Advanced S-VOLs (secondary volumes) in the storage system. HDPS then mounts these snapshot S-VOLs on a proxy MediaAgent, recreates the volume and file-system layout, and runs a backup-copy job that streams data from the snapshot to the HDPS performance tier, giving a hardware speed recovery point and traditional backup on separate media. The same HTIA snapshots or their cloned volumes, can be presented to alternate HANA hosts to support rapid database restore and out-of-place HANA cloning for QA, testing, development and other non-production environments.
- **Storage libraries and auxiliary copies**
  - Disk libraries and deduplication databases (DDB) created on NVMe pools on VSP One Block to host primary backup copies.
  - S3-compatible cloud libraries configured against VSP One Object for long-term, immutable retention, and optionally NAS libraries or archive targets defined on VSP One File for file-based tiering and archive workloads.
  - Auxiliary copy policies move backup data from the performance tier to VSP One Object or VSP One File based on aging or capacity thresholds, providing cost-optimized retention and a second, logically isolated copy for DR and cyber-resilience. See *Additional Copies of Backup Data*.
- **Operations and tools**
  - SAP HANA Studio or Cockpit and hdbsql CLI tool used for backup and recovery verification. Commvault Command Center and CommCell Console used for centralized policy management, monitoring, reporting, and automation workflows.

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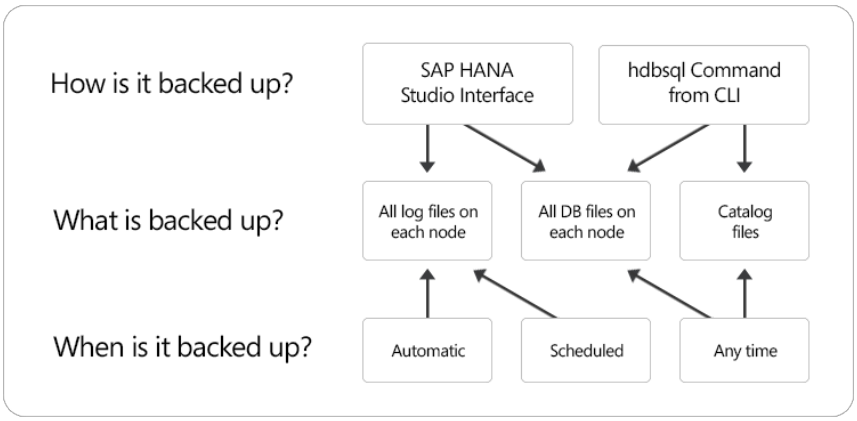
The following figure displays the components of HANA database that can be backed up using the backup tools. You can also automate or schedule backups.



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Storage Configuration

This section describes the storage configuration for the solution, covering both SAP HANA TDI dedicated VSP One Block primary storage and a separate VSP One Block for the backup performance and retention tiers used by HDPS. It describes the provisioning of VSP One Block for HANA data, log, and shared volumes, along with the allocation of additional VSP One Block, VSP One Object, and optionally VSP One File resources for HDPS disk libraries, deduplication databases, and long-term backup retention.

SAP HANA External Disk Storage

The following storage components are required to implement a scale-up SAP HANA TDI system with VSP One Block:

- 2× 32 Gbps 2p Fibre Channel PCIe HBA cards
  - Each port from both HBA cards will be zoned through redundant FC switches
- Enable Host mode options 2, 94 and 109 for the corresponding storage port connected with the server.
- One Hitachi VSP One Block storage system for a number of supported HANA TDI systems.
  - A single Dynamic Drive Protection (DDP) pool provides the required capacity and throughput for the VSP One Block.
  - Pool0 is used to create Data Reduction Shared (DRS) volumes (for OS, Data, Shared and Log).
  - Enable capacity saving to leverage the benefits of storage space savings across the pool of virtual capacity.
  - The first volume must be for the boot lun.
  - The following table lists the LUN path assignments used when validating this environment.

Storage Pool	LUN_ID	LUNs	Usage	Storage
DDP_pool(0)	0	OS_Boot	Operating System	VSP One Block
	1	HANA Shared	HANA Shared volume	VSP One Block
	2	LOG LUN1	HANA Log volume	VSP One Block
	3	LOG LUN2	HANA Log volume	VSP One Block
	4	LOG LUN3	HANA Log volume	VSP One Block
	5	LOG LUN4	HANA Log volume	VSP One Block
	6	DATA LUN1	HANA Data volume	VSP One Block
	7	DATA LUN2	HANA Data volume	VSP One Block
	8	DATA LUN3	HANA Data volume	VSP One Block
	9	DATA LUN4	HANA Data volume	VSP One Block

HDPS Storage

The CommServe server does not require external storage, the operating system and SQL Server databases should use local RAID volumes. The following storage components are needed for scale-out MediaAgents with VSP One Block storage system:

- Each MediaAgent requires minimum 1× 32 Gbps 2p Fibre Channel PCIe HBA card
  - Both ports of HBA cards will be zoned through redundant FC switches
  - Use native multipathing with round-robin path selector for assigned LUNs
- Enable Host Mode Option (HMO) 68 (for Page Reclamation function with a Linux host) for the corresponding storage ports connected with all MediaAgents.
- Each MediaAgent will have an index cache and ddb file systems. They can be on local RAID volume or can exist on high-performance SAN.
- Each MediaAgent ddb XFS file system must be an LVM volume
- One Hitachi VSP One Block storage system for all three MediaAgents for high-performance backup.
  - One dynamic drive protection pool (DDP Pool) is used to provide storage and throughput for VSP One Block supported storage sizes.
  - Pool0 is used to create Data Reduction Shared (DRS) volumes (for OS and Backup Data).
  - Enable compression and deduplication on the volumes to reduce storage consumption and improve capacity efficiency across the virtual storage pool.

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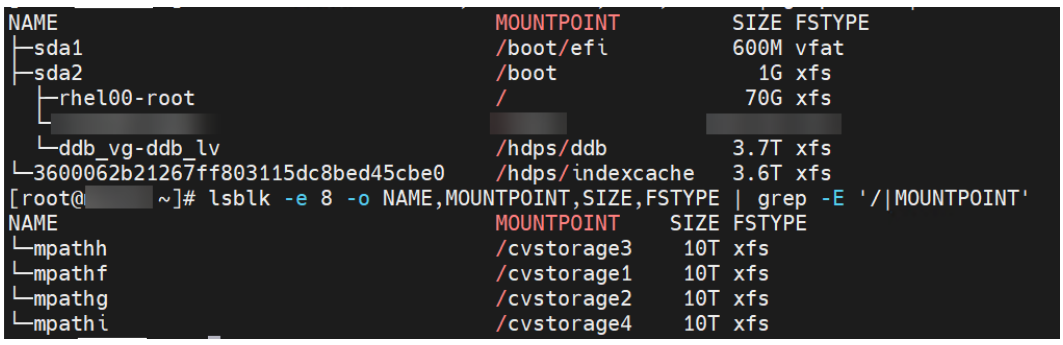
- The first volume must be boot LUN for each MediaAgent.
- The following table lists the LUN path assignments used when validating this environment.

Storage Pool	Server	LUN_ID	LUNs	Usage	Storage
Pool (0)	MediaAgent-1	0	RHEL OS	Operating System	VSP One Block
		1	DATA 1	HDPS Volume 1	VSP One Block
		2	DATA 2	HDPS Volume 2	VSP One Block
		3	DATA 3	HDPS Volume 3	VSP One Block
		4	DATA 4	HDPS Volume 4	VSP One Block
		5	DDB 1	Deduplication	VSP One Block
		6	INDEX 1	Index Cache	VSP One Block
	MediaAgent-2	7	RHEL OS	Operating System	VSP One Block
		8	DATA 1	HDPS Volume 5	VSP One Block
		9	DATA 2	HDPS Volume 6	VSP One Block
		10	DATA 3	HDPS Volume 7	VSP One Block
		11	DATA 4	HDPS Volume 8	VSP One Block
		12	DDB 2	Deduplication	VSP One Block
		13	INDEX 2	Index Cache	VSP One Block
	MediaAgent-3	14	RHEL OS	Operating System	VSP One Block
		15	DATA 1	HDPS Volume 9	VSP One Block
		16	DATA 2	HDPS Volume 10	VSP One Block
		17	DATA 3	HDPS Volume 11	VSP One Block
		18	DATA 4	HDPS Volume 12	VSP One Block
		19	DDB 3	Deduplication	VSP One Block
		20	INDEX 3	Index Cache	VSP One Block

- Long-term copies are written to VSP One Object as an S3 cloud storage library, and optionally to VSP One File as NAS disk libraries, where policy-based retention, immutability, and scale-out capacity provide a durable, cyber-resilient repository for SAP HANA backup data.

HDPS Disk Library

1. For RHEL based MediaAgents, use XFS based file system with default options for all volumes.
2. Index cache file system will be non-LVM, but ddb must be configured on LVM based file system.
3. When multiple SAN LUNs are presented to a MediaAgent, each LUN should be formatted with an XFS file system and mounted on a unique mount point for each MediaAgents. See below image.



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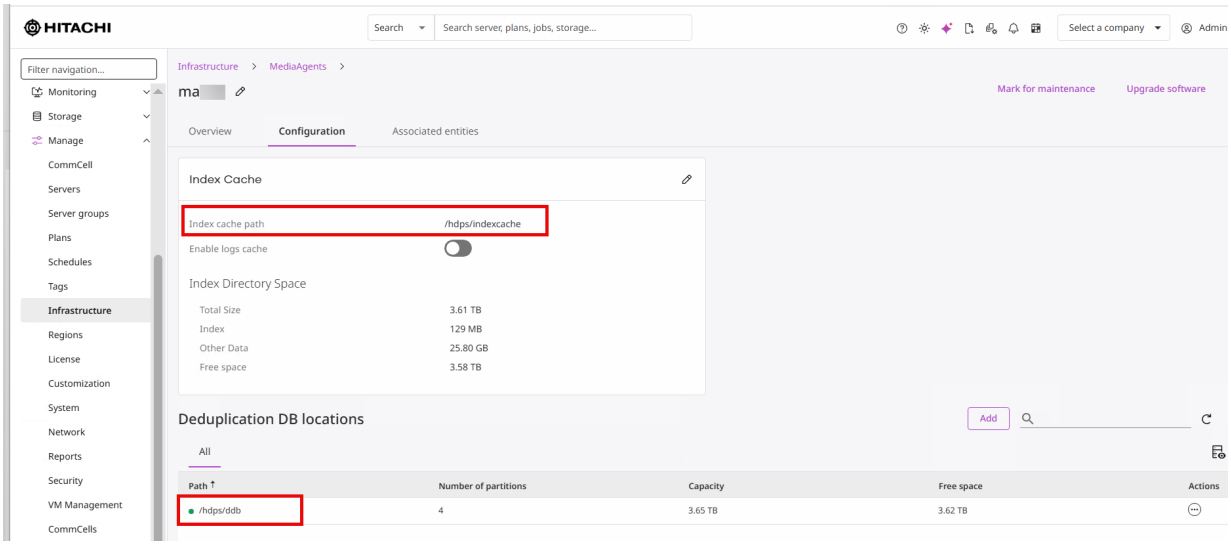
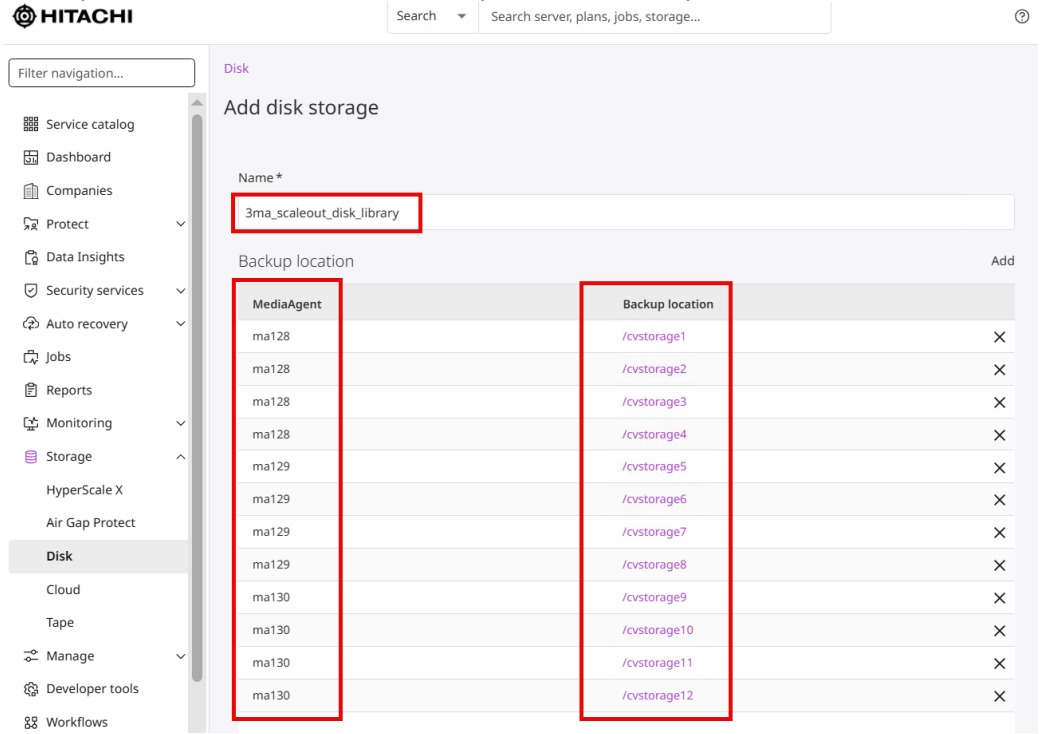
4. Enable Ransomware Protection for each MediaAgent. See Ransomware Protection for Disk Libraries on a Linux MediaAgent

5. Use Command Center to add mount path of indexcache and ddb in each MediaAgent configuration.



6. Create a disk library for all three MediaAgents, enable deduplication, and add the mount path from each MediaAgent to the library. All the mount paths from all MediaAgents are added onto a single disk library in HDPS to avoid conflict between MediaAgents and drive utilization, ensuring optimal performance. Distributing the load across multiple mount paths can reduce contention and improve read/write speeds. See Disk Libraries - Getting Started



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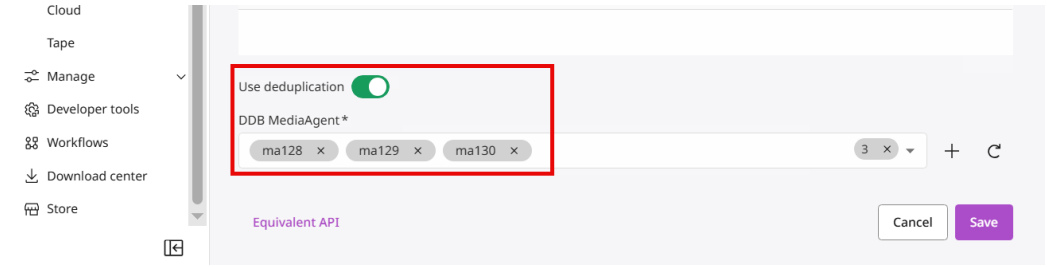
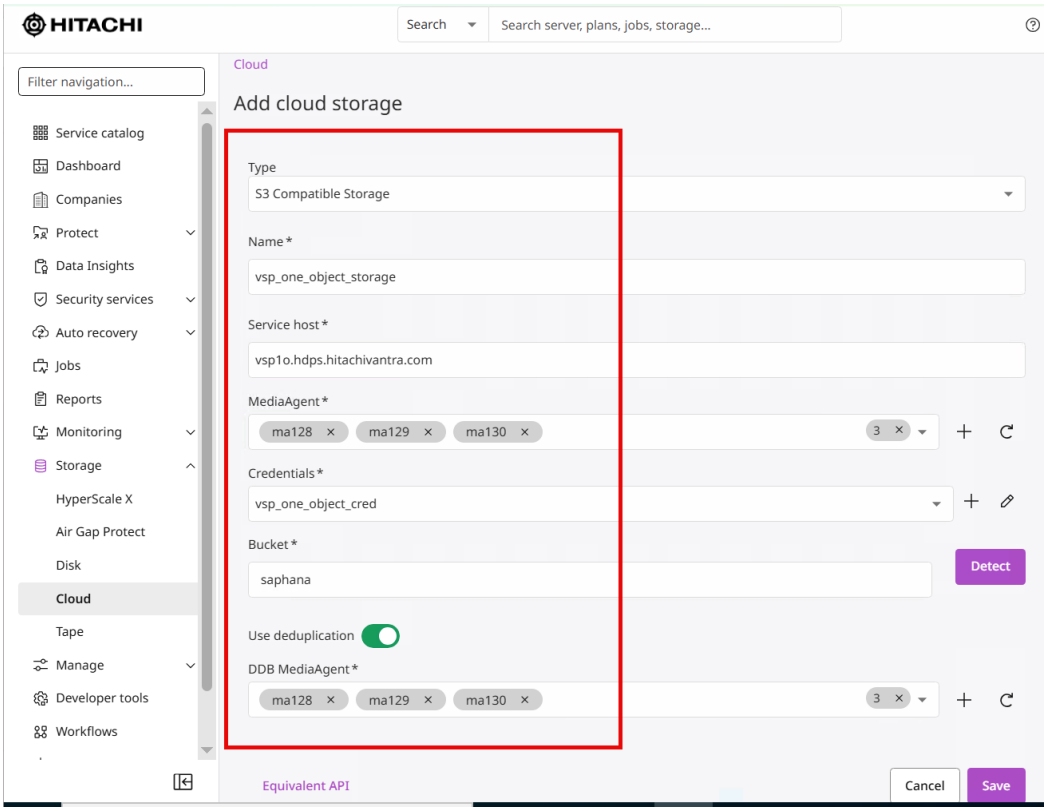


7. Create and associate a Plan or Storage Policy for the Disk library.

8. For long-term retention, add VSP One Object as S3 Compatible Cloud storage and create auxiliary copy policy for this. All data stored in VSP One Block will be copied to VSP One Object at certain intervals.



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Network Configuration

The solution uses separate networks for SAP HANA client traffic, backup, and management to meet SAP and HDPS best practice guidelines for throughput, resilience, and security.

SAP HANA Network Configuration

SAP HANA nodes connect to SAP application servers and end-user clients over a redundant 10/25 GbE client network, sized following SAP guidance (minimum 10 GbE) and typically implemented on a leaf-spine fabric for low latency and high availability. For data protection, each HANA host uses dual 32 Gbps Fibre Channel paths through redundant FC switches to VSP One Block for primary database I/O and storage-integrated snapshots, and a separate redundant 10/25 GbE backup network to carry HDPS backup and restore traffic to the MediaAgents, keeping data protection traffic isolated from application client traffic.

HDPS Network Configuration

CommServe connectivity

The CommServe server uses two Ethernet networks, a 1 GbE out-of-band (OOB) management interface BMC/iLO, and a 1/10 GbE in-band management interface for communication with MediaAgents, SAP HANA clients, and the Commvault web console. A dedicated backup VLAN is not required on the CommServe, because it does not carry bulk data traffic.

MediaAgent connectivity

Each MediaAgent is provisioned with four types of connectivity:

- 1 GbE OOB interface for hardware and OS management through BMC/iLO.
- 1/10 GbE in-band OS/management interface (for CommServe control traffic, patching, monitoring, and access to infrastructure services such as DNS/NTP).
- 10/25 GbE interfaces on a dedicated redundant backup network used for all SAP HANA backup and restore streams, auxiliary copy traffic, and communication with VSP One File/Object S3 or NAS endpoints.
- Dual-port 32 Gbps HBAs zoned to VSP One Block storage over redundant FC fabrics for access to SAP HANA data volumes (for IntelliSnap proxy mounts) and HDPS disk libraries.
- This separation ensures that heavy backup traffic does not contend with management or application networks, while FC provides predictable low-latency access to block storage.

VSP One Object and VSP One File connectivity

VSP One Object nodes provide S3 access over 25 GbE or 25/100 GbE data interfaces, with separate 10Base-T ports for management. Data interfaces are attached to the same backup network or core aggregation domain used by the MediaAgents, so auxiliary copies from the HDPS performance tier to object storage use high-bandwidth links without crossing the SAP application VLAN. VSP One File (NAS) exports are presented on 10/25 GbE data interfaces into this backup network as NFS/SMB targets for archive or tiering workloads, with separate 1GbE OOB/management interfaces similar to the block and object platforms.

VSP One Block network connectivity

The VSP One Block for SAP HANA presents FC LUNs only to the SAP HANA TDI/vHANA hosts, while another VSP One Block for HDPS presents FC LUNs only to the three MediaAgents that host HDPS disk libraries and DDB volumes. Each MediaAgent is equipped with dual-port 32 Gbps HBAs and is zoned to the VSP One Block for HDPS through redundant FC switches, consuming a total of six FC ports on the array for backup workloads and providing full path redundancy. Both VSP One Block systems use 1 GbE out-of-band management interfaces connected to the common OOB network for array administration and monitoring.

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Defining RTO and RPO for SAP HANA

Recovery point objectives (RPO) and recovery time objectives (RTO) for SAP HANA are defined in line with SAP disaster-recovery guidance and HDPS backup best practices and then mapped to what is realistically achievable for large databases with HDPS, storage snapshots, and disk-based backup copies.

- RPO - The maximum acceptable time between the last recoverable SAP HANA backup (data + logs) and a failure, any changes after that point may be lost.
- RTO - The maximum acceptable time from the start of a failure until the SAP HANA system is fully restored, recovered, and available to users, including restore and HANA restart.

Recommended design

- For production SAP HANA systems protected with HDPS using Backint plus frequent log backups and storage snapshots on VSP One Block, the reference architecture targets **RPO between 15 and 60 minutes**, driven by log-backup frequency and, where required, more frequent snapshot or incremental data backups.
- With Thin Image Advanced or IntelliSnap snapshots stored on VSP One Block and integrated with HDPS restores, **RTO for most recent recovery points is designed to be in the range of minutes to well under 1 hour**, even for multi-terabyte databases, because recovery is typically achieved by presenting the snapshot S-VOL to the same HANA host and performing roll-forward from logs.
- For older recovery points restored from HDPS disk libraries, VSP One Object, or VSP One File, the recovery time objective (RTO) is primarily influenced by database size and the available restore throughput. This reference architecture uses a planning target of **1 to 4 hours for SAP HANA databases up to 10 TB** and **several hours for databases larger than 10 TB,** subject to MediaAgent, network, storage, and backup-copy performance.

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Protecting SAP HANA Database

There are three main protection methods for SAP HANA Database in the latest HDPS-based architecture:

- Backint for HANA backup, which is the preferred and SAP-certified method for centralized backup and recovery of HANA databases.
- Storage snapshot protection, using HDPS IntelliSnap with supported storage systems such as Hitachi VSP One Block for application-consistent snapshot backups.
- Hybrid protection with backup copy and data tiering**,** where backups created through Backint or snapshots are copied to secondary storage such as VSP One Object or VSP One File for long-term retention, DR, and compliance.

SAP HANA configuration parameters

HDPS automatically update `global.ini` and create the `param` file and `hdbbackint` link. This integrates SAP HANA with HDPS for data, log, and catalog backups.

Use the below recommended HANA parameters in `global.ini` for high-throughput:

Parameter	Value
`parallel_data_backup_backint_channels`	`4 or 8`
`data_backup_buffer_size`	`2048`
`backint_response_timeout`	`1800`
`catalog_backup_using_backint`	`true`
`log_backup_using_backint`	`true`
`catalog_backup_parameter_file`	`/usr/sap/<SID>/SYS/global/hdb/opt/hdbconfig/param`
`tcp_backlog`	`2048`

By default, SAP HANA uses one channel for data backups. If required, you can configure SAP HANA to use additional channels. When multiple channels are used, SAP HANA distributes the data equally across the available channels. All the parts of a multi-streamed backup are approximately the same size. To stream data backups to multiple channels, you can change the value. The maximum number of channels permitted is 32 for each service.

The number of multi-streaming channels applies to all data backups larger than 128GB. Data backups smaller than 128GB always use only one channel.

To create multi-streamed data backups, configure HDPS to use multiple channels with good performance. Whatever number of channels is configured in SAP HANA, the same number of channels or streams should be configured in HDPS.

Each additional channel requires an IO buffer of 512MB. Make sure that increasing the number of channels does not have a negative impact on memory consumption. See *SAP HANA Backup | SAP Help Portal*

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Sample global.ini

This is a sample `global.ini` file that was configured and used for validating the SAP HANA backup in appliance, TDI deployments with SLES for SAP Applications 15 SP7, and RHEL for SAP 9.6.

```
[backup]
parallel_data_backup_backint_channels = 8
data_backup_buffer_size = 2048
parallel_data_backup_file_channels = 4
parallel_data_backup_backint_size_threshold = 32
data_backup_parameter_file = /usr/sap/HIT/SYS/global/hdb/opt/hdbconfig/param
log_backup_parameter_file = /usr/sap/HIT/SYS/global/hdb/opt/hdbconfig/param
log_backup_using_backint = true
catalog_backup_parameter_file = /usr/sap/HIT/SYS/global/hdb/opt/hdbconfig/param
catalog_backup_using_backint = true
backint_response_timeout = 1800

[communication]
tcp_backlog = 2048

[database_initial_encryption]
backup_encryption = off
persistence_encryption = off
log_encryption = on

[fileio]
async_read_submit[log] = on
async_write_submit_active[log] = on
async_write_submit_blocks[log] = all
min_submit_batch_size[log] = 16
max_submit_batch_size[log] = 64
max_parallel_io_requests[log] = 128
size_kernel_io_queue[log] = 512
async_read_submit[data] = on
async_write_submit_active[data] = on
async_write_submit_blocks[data] = all
min_submit_batch_size[data] = 16
max_submit_batch_size[data] = 64
max_parallel_io_requests[data] = 128
size_kernel_io_queue[data] = 512

[multidb]
mode = multidb
database_isolation = low
```

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```
singletenant = yes


[persistence]
basepath_datavolumes = /hana/data/HIT
basepath_logvolumes = /hana/log/HIT
```

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Solution verification

The test cases in the table below have been validated for this solution.

Test Case	Test Description	Objectives
TC-1	HANA Appliance Backup	Use SAP Backint to take backup through all three MediaAgents and measure performance of each MediaAgent.
TC-2	HANA TDI Backup (Backint)	Use Backint for SAP HANA to take backup through all three MediaAgents and measure performance of each MediaAgent.
TC-3	HANA TDI Backup (IntelliSnap)	Use HDPS IntelliSnap (storage snapshot) backup using Hitachi Thin Image Advanced.
TC-4	HANA Appliance Recovery	Restore HANA Data and OS to another server.
TC-5	Virtual HANA backup and recovery	Backup and restore of Virtual HANA running in VMware virtualization.
TC-6	HANA TDI Recovery using IntelliSnap	Restore an SAP HANA TDI system from a snapshot to the same host and a different host.
TC-7	HANA TDI Recovery using Backint	Restore an SAP HANA TDI database using Backint to the original host and a different host.
TC-8	HANA DB Cloning (IntelliSnap)	Clone HANA DB and restore to different server using IntelliSnap.
TC-9	Ransomware Protection	Enable Ransomware protection on all MediaAgents, Immutable Snapshot copy, and S3 immutable buckets.

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Product descriptions

Hitachi Integrated Solutions for SAP HANA

Hitachi Integrated Solutions for SAP HANA is a pre-tested, SAP-certified converged infrastructure solution built on over 20 years of Hitachi Vantara's SAP partnership, designed to accelerate SAP HANA and SAP S/4HANA deployments across scale-up, scale-out, and virtualized environments. The solution supports both Appliance and Tailored Data Center Integration (TDI) configurations, giving enterprises the flexibility to standardize pre-configured hardware or customize deployments using SAP-certified components. Hitachi Advanced Server HA840 G3 (4-socket, Intel 4th Gen Xeon Scalable Processors) powers large-scale scale-out TDI deployments, while Hitachi Advanced Server HA820 G3 (2-socket, Intel Xeon Emerald Rapids) supports scale-up and VMware vSphere-based virtualized TDI configurations. Hitachi Virtual Storage Platform (VSP E1090, VSP One Block series) serves as the SAP HANA certified enterprise storage backend, with Fibre Channel and iSCSI connectivity and dynamic provisioning pool storage design validated using SAP HANA Hardware and Cloud Measurement Tool (HCMT). The Hitachi Data Protection Suite (HDPS) powered by Commvault integrates with SAP HANA through IntelliSnap for accelerated backup, recovery, and auxiliary copy operations. Hitachi Vantara hv-playbooks-sap provides Ansible-based automation for SAP HANA environments, helping standardize server provisioning, storage mapping, and lifecycle tasks for repeatable deployments. A single pane of glass management through Hitachi Ops Center streamlines monitoring and configuration across the full solution stack, backed by Hitachi's 100% Data Availability Guarantee. In short, Hitachi Integrated Solutions for SAP HANA combines certified server, storage, and data protection into a unified, AI-ready foundation that reduces deployment risk, lowers operational cost, and accelerates SAP digital transformation. See Hitachi Solutions for SAP | Hitachi Vantara for more information.

Hitachi Advanced Server HA800 Series

The Hitachi Advanced Server HA800 Series is a family of general-purpose, dual-processor (2P) rack servers designed to deliver high performance, density, and reliability for a broad range of enterprise workloads, including general compute, database management, virtual desktop infrastructure (VDI), SAP HANA TDI, and AI/ML applications. The series offers both Intel and AMD processor variants across 1U and 2U form factors, providing deployment flexibility from space-constrained to high-capacity environments. The HA810 G6 (1U/2P) is powered by Intel Xeon 6 Scalable Processors with up to 86 cores, up to 4 TB of DDR5 memory at 6400 MT/s, up to 10 SFF NVMe drives, and PCIe Gen5 expansion — with optional Closed-loop Liquid Cooling for high TDP processor support. The HA820 G6 (2U/2P) extends the same Intel Xeon 6 platform with greater I/O expandability and storage density for multi-workload environments. For AMD-based deployments, the HA815 G3 (1U) and HA825 G3 (2U) are powered by 4th Generation AMD EPYC 9004 Processors, supporting up to 6 TB of memory per server and certified with FIPS 140-3 and TPM 2.0 for security-sensitive workloads. All models feature redundant hot-plug drives, fans, and power supplies, iLO 7 management with Silicon Root of Trust for hardware-rooted security, UEFI secure boot, and are certified for Red Hat Enterprise Linux and SUSE Linux Enterprise Server. In short, the Hitachi Advanced Server HA800 Series combines compute density, security, and workload versatility to serve as the trusted server foundation across Hitachi Integrated Solutions, SAP, and VSP One deployments. See Hitachi Advanced Server HA800 Series | Hitachi Vantara for more information.

Hitachi Virtual Storage Platform One Block

Hitachi Virtual Storage Platform One Block simplifies data management while enabling enterprises to reliability and sustainability meet initiatives to fuel growth and innovation. Dynamic Carbon Reduction optimizes energy usage by switching CPUs to ECO mode during low activity. Adaptive Data Reduction (ADR) is always on, enhancing efficiency and reducing the overall CO2 footprint. Thin Image Advanced (TIA) integrates with major snapshot ecosystems, supporting business continuity and defending against threats. CyberArk Privileged Access Manager plugins enhance block storage system security by prioritizing data confidentiality, ensuring compliance, and actively defending against security threats.

Hitachi Virtual Storage Platform One Block includes the following dedicated models:

- VSP One Block 24 – 256 GB Cache + SW Advanced Data Reduction (ADR) + 24 cores
- VSP One Block 26 – 768 GB Cache + 2x Compression Accelerator Module (CAM) + 24 cores
- VSP One Block 28 – 1 TB Cache + 4x CAM + 64 cores

All models support Fibre Channel, iSCSI, and NVMe TCP connectivity. The new capabilities reduce complexity: data reduction is always on, Dynamic Drive Protection removes complicated RAID setup, and Dynamic Carbon Reduction

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delivers real-world reduction in power consumption. In addition, the models are FIPS compliant. In short, Hitachi Virtual Storage Platform One Block combines simplicity, sustainability, and robust security features to optimize system management, energy efficiency, and data protection. See VSP One Block | Storage Software & Data Management Solutions | Data Infrastructure Management | Hitachi Vantara for more information.

Hitachi Virtual Storage Platform One Object Storage

Hitachi Virtual Storage Platform One Object (VSP One Object) is the next generation of Hitachi Content Platform (HCP) for Cloud Scale and is part of the Virtual Storage Platform One family. It unifies access to block, file, and object storage across a single data plane, delivering scalable S3-native storage designed for AI/ML, data lakes, backup repositories, and long-term retention workloads. VSP One Object is the industry's first on-premises object storage to support native Amazon S3 Tables, with an embedded SQL engine enabling direct BI analytics on Apache Iceberg-format data without complex data movement. PII Discovery automatically identifies and governs sensitive data across stored objects to simplify compliance. Security is enforced through FIPS 140-2 certified encryption, mTLS in transit, S3 Object Lock, external KMS support, and LDAP/Active Directory integration for role-based access control, validated by Cohasset Associates for SEC, FINRA, CFTC, and MiFID II mandates. All configurations ship as an 8-node cluster (scalable to 32 nodes) with 25GbE connectivity, Erasure Coding for data redundancy, and asynchronous replication for disaster recovery. In short, VSP One Object combines intelligent data services, enterprise-grade security, and a scalable S3-native architecture to serve as the data foundation for modern AI and compliance-driven enterprise workloads.

See VSP One Object | Hitachi Vantara for more information.

Hitachi Virtual Storage Platform One File

Hitachi Virtual Storage Platform One File (VSP One File) is the next-generation modernized Hitachi NAS solution, part of the Virtual Storage Platform One family, purpose-built to simplify unstructured data management across edge, core, and hybrid cloud environments. Built on Hitachi's Storage Virtualization Operating System (SVOS) and a shared Ops Center control plane, it delivers consistent file performance and unified management across traditional infrastructure, software-defined, and cloud settings. A new, intuitive HTML5 UI reduces setup time by up to 50%, while real-time analytics and per-client drilldown monitoring are included as standard features. VSP One File scales to 16 PB in a single namespace supporting up to 130 billion files, with NFS 4.1, SMB, iSCSI, FTP, and S3 (cloud tiering) protocol support. Security capabilities include multi-factor authentication, CyberArk Privileged Access Manager vaulting, immutable snapshots, DoS attack protection, extensive RBAC, and ransomware detection through partner integrations — all backed by Hitachi's 100% Data Availability Guarantee. Hitachi Virtual Storage Platform One File includes the following dedicated models:

- **VSP One File 32** – 10GbE connectivity | Up to 20 nodes | 90 GB/s aggregate bandwidth — ideal for cost-sensitive or hybrid flash deployments
- **VSP One File 34** – 10/25GbE connectivity | Up to 40 nodes | 280 GB/s aggregate bandwidth — optimized for all-flash, best price/performance
- **VSP One File 38** – 10/25/100GbE connectivity | Up to 80 nodes | 800 GB/s aggregate bandwidth — built for maximum file performance and high-density workloads

See VSP One File | Hitachi Vantara for more information.

Hitachi Data Protection Suite

Hitachi Data Protection Suite (HDPS), powered by Commvault, is a comprehensive cyber resilience and data protection solution that combines Hitachi Vantara's enterprise storage expertise with Commvault's industry-leading backup and recovery capabilities to safeguard enterprise data across on-premises, edge, and hybrid cloud environments. IntelliSnap integrates directly with VSP One Block, File, and Object storage to enable accelerated snapshot-based backups and rapid recovery, while immutable backup copies on VSP One Object with S3 Object Lock provide multi-layered ransomware protection. AI-driven anomaly detection, honeypot-based threat monitoring, anti-virus scanning of backup data, and secure Active Directory protection ensure threats are identified and neutralized before recovery is initiated. Hitachi Data Fortress provides a hardware-root-of-trust secured Isolated Recovery Environment (IRE) with hardware encryption and immutable long-term snapshots, enabling clean data recovery even when production systems are

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quarantined. HDPS delivers what is considered the world's fastest fully automated ransomware recovery, restoring and re-protecting 1,500 virtual machines in just 70 minutes. A unified single-pane-of-glass interface streamlines data resilience operations and storage management across the entire environment, with native cloud mobility extending protection to AWS, Azure, and Google Cloud for disaster recovery and storage tiering. In short, HDPS aligns with the NIST Cybersecurity Framework to assess, protect, detect, respond, and recover, making it a complete end-to-end cyber resilience platform for modern enterprises. See Hitachi Data Protection Suite | Hitachi Vantara for more information.

SAP HANA

SAP HANA converges database and application platform capabilities in-memory to transform transactions, analytics, text analysis, predictive and spatial processing so businesses can operate in real-time. This combines database, data processing, and application platform capabilities in a single in-memory platform. Also, the platform provides libraries for predictive, planning, text processing, spatial, and business analytics, all on the same architecture. This architecture comes from leading hardware partners of SAP, including Hitachi Vantara. By eliminating the divide between transactions and analytics, SAP HANA allows you to answer any business question anywhere in real time. As an SAP customer, you can download more information, including the following:

- SAP HANA Master Guide
  This is the central starting point for the technical implementation of SAP HANA. Use this guide for basic concepts and for planning.
- SAP HANA Server Installation and Update Guide
  This guide provides an overview of how to install and update an SAP HANA system with the SAP HANA lifecycle management tools.
- SAP HANA Administration Guide
  This guide explains how to configure, manage, maintain, and optimize your SAP HANA installation using SAP HANA administration tools.

SAP HANA hardware directory provides information about SAP HANA appliances certified by SAP hardware partners.

Operating system options for SAP HANA

SUSE Linux Enterprise Server for SAP Applications and Red Hat Enterprise Linux for SAP HANA are available operating systems when running SAP HANA.

- SUSE Linux Enterprise Server (SLES) for SAP Applications Compete more effectively through improved uptime, better efficiency, and accelerated innovation using SUSE Linux Enterprise Server for SAP Applications. This is a versatile server operating system for efficiently deploying highly available enterprise-class IT services in mixed IT environments with performance and reduced risk. SUSE Linux Enterprise Server was the first Linux operating system to be certified for use with SAP HANA. It remains the operating system of choice for most SAP HANA customers.
- Red Hat Enterprise Linux (RHEL) for SAP HANA Using the stability and flexibility of Red Hat Enterprise Linux for SAP HANA, reallocate your resources towards meeting the next challenges instead of maintaining the status quo. Deliver meaningful business results by providing exceptional reliability and military-grade security. Use Enterprise Linux to tailor your infrastructure as markets shift and technologies evolve. Changing the configuration settings is only supported along the guidelines of SAP and the operating system distributor and may otherwise cause significant performance problems. The following SAP Notes for SUSE Linux Enterprise Server and Red Hat Enterprise Linux are a good starting point for information on this topic:
- 1944799 - SAP HANA Guidelines for SLES Operating System Installation
- 2009879 - SAP HANA Guidelines for Red Hat Enterprise Linux (RHEL)

For more details, see "Updating and Patching the Operating System" by searching in the "View SAP HANA document" from Technical Information and Best Practices.

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