Hitachi Solution for the SAP HANA Platform in a Scale-up Configuration using Hitachi Advanced Server DS220 G2 with Intel Xeon Scalable 8368 or 8380 Processors

Reference Architecture Guide

Feedback

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Revision history

Changes	Date
Add support for RHEL 9.2.	May 2024
Add support for SLES 15 SP5 and RHEL 8.8.	January 2024
Add support for SLES 15 SP4 and RHEL 8.6.	January 2023

Reference Architecture Guide

Use this scale-up environment for Hitachi Solution for the SAP HANA Platform to transform your business to boost innovation, growth, and profits. This solution uses Hitachi Advanced Server DS220 G2 and the following:

- Internal server storage in an appliance configuration.

- External storage subsystem following the Tailored Data-center integration (TDI) approach to implement SAP HANA.

This SAP HANA infrastructure uses the following components:

- Hardware

  - One Hitachi Advanced Server DS220 G2 with internal drives.

  - (Optional) An external storage subsystem, such as Hitachi Virtual Storage Platform G350 or Virtual Storage Platform F350.

- Software

  - The software is preconfigured with SAP HANA to provide a converged solution for applications using SAP HANA.

The validation of this environment was done for both of the following:

- Internal drives in an appliance configuration

- External storage with Hitachi Virtual Storage Platform G350 for TDI

Your needs might require other storage options. Contact your Hitachi Vantara account representative for details and implementation services.

The following figure shows the topology of this solution using internal drives on Hitachi Advanced Server DS220 G2.

LAN/WAN (Ethernet Switch)

Hitachi Advanced Server DS220 G2

───── 1 GbE Management Network
───── 25 GbE Client Network
───── Additional 25 GbE Network

Intel E810-XXVDA2 2-port 25 GbE Network Adapter
Note: Broadcom QS-3916 Type B MegaRAID (4G DDR) storage controller card
on riser slot 5 inside of DS220 G2 Chassis
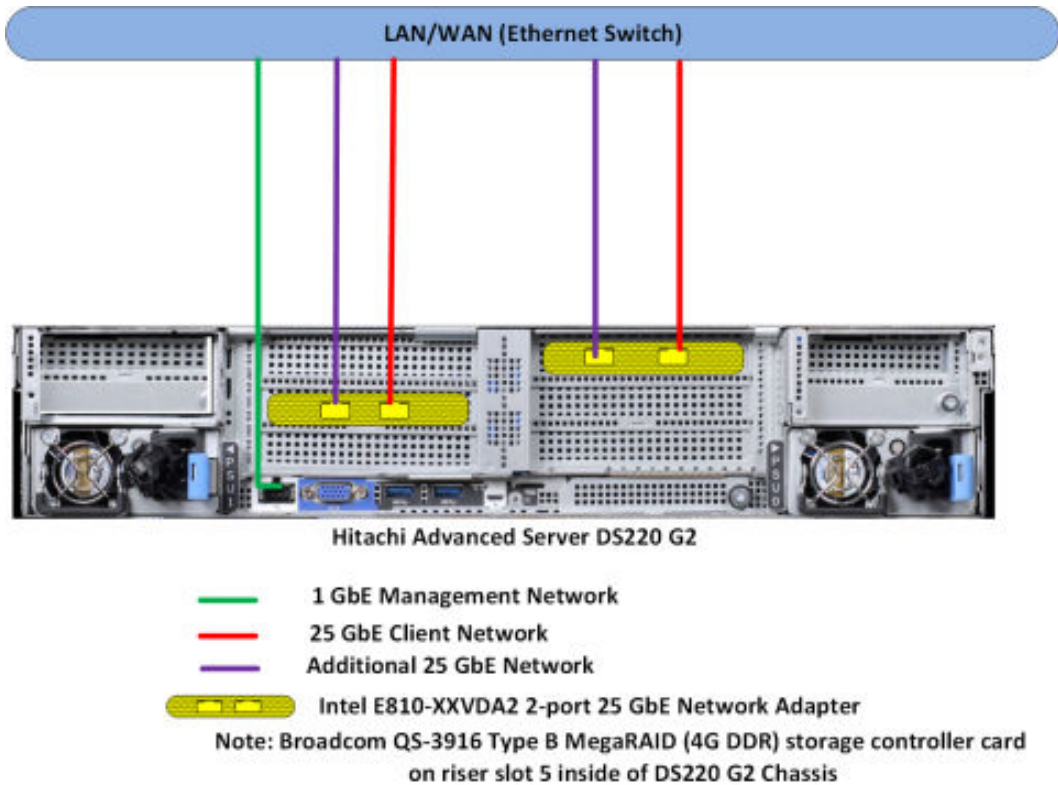
The following figure shows the topology of this solution using an external storage subsystem, such as Hitachi Virtual Storage Platform F350 or Virtual Storage Platform G350.

LAN/WAN (Ethernet Switch)

Hitachi Advanced Server DS220 G2

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Hitachi Virtual Storage Platform G350

───── 1 GbE Management Network
───── 25 GbE Client Network
───── Additional 25 GbE Network
───── 16/32 Gbps Fibre Channel Connection

Intel E810-XXVDA2 2-port 25 GbE Network Adapter
Emulex LPE 35002-M2 32 Gbps PCIe HBA
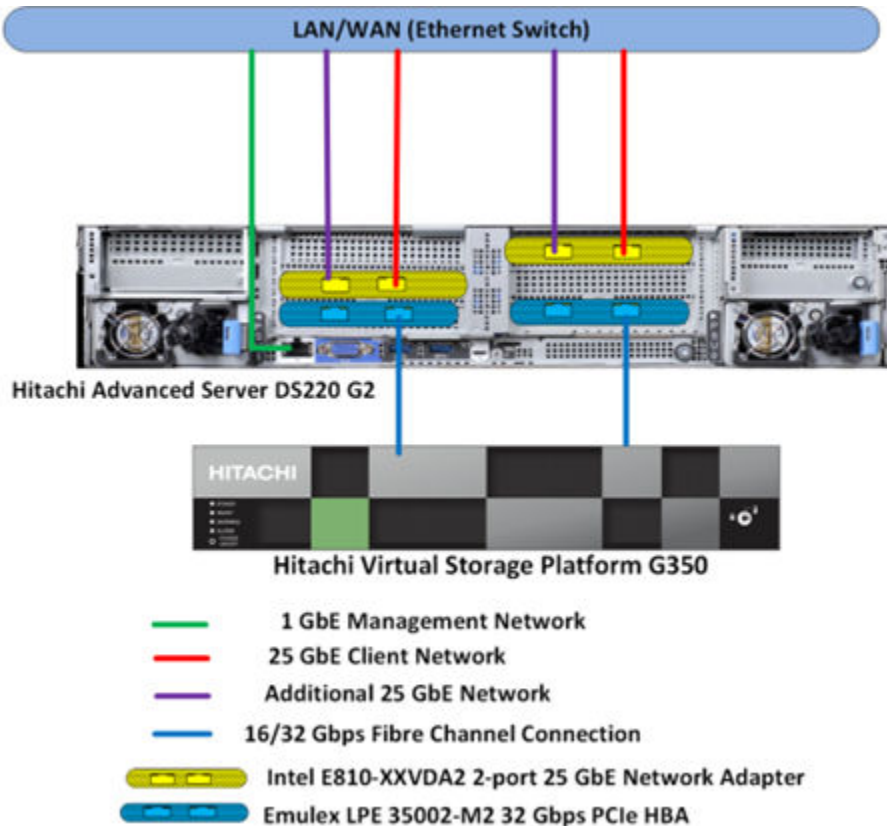
Hitachi Solution for the SAP HANA Platform is a preconfigured converged system for any business workload running on SAP HANA. It is ready to plug in to your network to host business data, deliver data-driven insights throughout your business, and predict real-time outcomes.

This system supports the configurations listed in the following table.

Number of Sockets	RAM Size	Storage
2 Intel 3rd Gen Intel® Xeon Scalable Processors: ▪ 8368 (38 core, 270W, 2.4GHz) ▪ 8380 (40 core, 270W, 2.3GHz)	512 GB with 16 × 32 GB DDR4 RDIMM 1024 GB with one of the following: ▪ 32 × 32 GB DDR4 RDIMM ▪ 16 × 64 GB DDR4 RDIMM 2048 GB with one of the following: ▪ 32 × 64 GB DDR4 RDIMM ▪ 16 × 128 GB DDR4 RDIMM 4096 GB with 32 × 128 GB DDR4 RDIMM	Internal storage option: ▪ Internal drives on Hitachi Advanced Server DS220 G2 External storage option: ▪ Storage subsystem, such as Hitachi Virtual Storage Platform G350 or VSP F350

This technical paper assumes that you are familiar with the following:

▪ Storage area network (SAN)-based storage systems

▪ General storage concepts

▪ Common IT storage practices

▪ SAP HANA

> 📄 **Note:** Testing of this configuration was in a lab environment. Many things affect production environments beyond prediction or duplication in a lab environment. Follow the recommended practice of conducting proof-of-concept testing for acceptable results in a non-production, isolated test environment that otherwise matches your production environment before your production implementation of this solution.

Key solution elements

The following are the key hardware and software components used in this reference architecture. For detailed component information, see Product Descriptions (on page 19).

> 📄 **Note:** Do not change the layout of any of the components in this environment without consulting your Hitachi Vantara account representative. Changing this layout might require manual configuration of the network or using different components.

Hardware elements

The following table lists the hardware used to deploy the specific scale-up configuration of Hitachi Solution for the SAP HANA Platform for the different sized solutions.

Hitachi Advanced Server DS220 G2 has added storage drives, a RAID card, and an HBA card, based on whether you are implementing this solution with internal storage or an external storage subsystem.

Hardware	Quantity	Configuration	Role	Implementation Type
Hitachi Advanced Server DS220 G2	1	▪ CPU – 2 Intel 3rd Gen Intel® Xeon Scalable Processors: • 8368 (38 core, 270W, 2.4GHz) • 8380 (40 core, 270W, 2.3GHz) ▪ RAM per SAP HANA node. Refer to the supported configuration ▪ 2 heatsinks, CPU 0/1 ▪ 2 × USB 3.0 ports ▪ KVM connector (VGA, COM)	SAP HANA server	All implementations
Intel PCIe network cards	2	▪ Intel E810-XXVDA2 2-port 10/25 GbE network cards	For SAP HANA client network.	All implementations
	2	▪ Cisco SFP+ 3M twinaxial cables		
Hitachi Virtual Storage Platform G350 or VSP F350	1	▪ CTL: 1 pair ▪ 16/32 Gbps 4-port CHB: 1 pair ▪ MPU: 1 pair	Block storage when using an external storage sub-system.	External storage only

Hardware	Quantity	Configuration	Role	Implementation Type
		▪ Cache: 128 GB ▪ SSDs: • 9 × 1.9 TB for sizes of 1024 GB or less • 13 × 1.9 TB for sizes of 2048 GB • 17 × 1.9 TB for size of 4096 GB		
Broadcom Emulex LPE 35002 PCIe HBA card	2	▪ 2-port LPE35002-M2 16/32 Gbps	Required on the Hitachi Advanced Server DS220 G2 when using external storage.	
RAID controller card	1	▪ Broadcom QS-3916 Type B MegaRAID (4G DDR) storage controller card	Required on the Hitachi Advanced Server DS220 G2, when using internal storage.	Internal storage only
Storage drives	5	▪ 1.92 TB Intel S4510 SATA SSD	For up to 1024 GB RAM.	Internal storage only
	9		For 2048 GB RAM.	
	11		For 4096 GB RAM.	
	1		Spare drive	
Cisco Nexus 92348 switch	1	▪ 48 × 1 GbE ports	Optional switch for management network.	All implementations (optional)

Hardware	Quantity	Configuration	Role	Implementation Type
Cisco Nexus 93180YC-FX	2	▪ 48 × 10/25 GbE ports	Optional switches for the client network or additional backup network.	All implementations (optional)
Minkels Global Solutions Rack	1	▪ 1 standard rack	Optional rack for mounting servers.	All implementations
PDUs	6	▪ Vertical PDUs	Optional PDUs for the solution.	All implementations

Software elements

The following table describes the software products used to deploy this solution.

Software	
Operating system	SUSE Linux Enterprise Server for SAP Applications
	Red Hat Enterprise Linux for SAP Solutions
Database	SAP HANA

Solution design

The detailed design for the scale-up configuration of Hitachi Solution for the SAP HANA Platform for this solution includes the following:

- Hitachi Advanced Server DS220 G2 configuration (on page 9)
  - 2 × 2-port Emulex LPE35002-M2 16/32 Gbps PCIe HBA card
    - Port 0 of Emulex LPE35002-M2 on Riser1_PCIe_Slot3
    - Port 0 of Emulex LPE35002-M2 on Riser2_PCIe_Slot3
- Network Architecture
- Storage Architecture Configuration (on page 11)
- SAP HANA Configuration

Hitachi Advanced Server DS220 G2 configuration

The following figure shows the back view of Hitachi Advanced Server DS220 G2 when using internal drives and external storage.
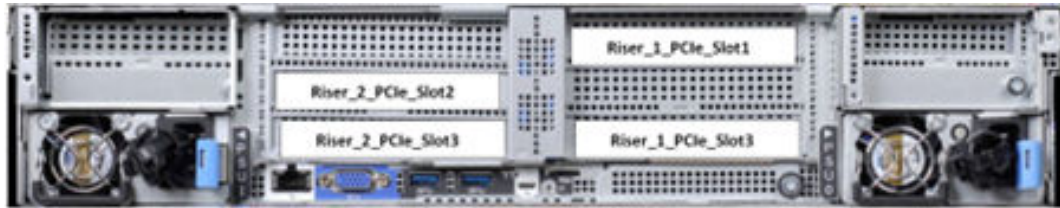
Hitachi Advanced Server DS220 G2 (Back)

The following figure shows the front and back view of DS220 G2 when using internal drives.

Hitachi Advanced Server DS220 G2 (Front)

Hitachi Advanced Server DS220 G2 with internal drives (Back)
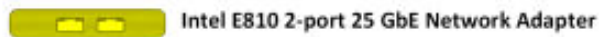
 Intel E810 2-port 25 GbE Network Adapter

The following figure shows the front and back view of DS220 G2 when using external storage.

Hitachi Advanced Server DS220 G2 (Front)

Hitachi Advanced Server DS220 G2 (Back)

Intel E810 2-port 25 GbE Network Adapter

Emulex LPE 35002-M2 32 Gbps PCIe HBA
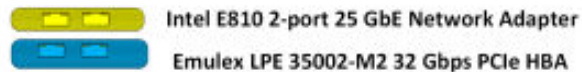
This solution uses a single Hitachi Advanced Server DS220 G2 with the following components:

- 2 × 2-port 10/25 GbE Intel E810-XXVDA2 PCIe card on Riser1_PCIe_SLOT1 and Riser2_PCIe_SLOT2

- Components for the internal storage option:

  - One Broadcom QS-3916 Type B MegaRAID (4G DDR) storage controller card on Riser SLOT5 inside of the DS220 G2 chassis.

  - 5 × 1.92 TB Intel S4510 SATA SSD drives on the front bay, supporting less than or equal to 1024 GB RAM per SAP HANA node

  - 9 × 1.92 TB Intel S4510 SATA SSD on the front bay, supporting 2048 GB RAM per SAP HANA node

  - 11 × 1.92 TB Intel S4510 SATA SSD on the front bay, supporting greater than 4096 GB RAM per SAP HANA node

  - 1 × 1.92 TB Intel S4510 SATA SSD drive used as a spare drive

- Components for the external storage option:

  - 2 × 2-port Emulex LPE35002-M2 16/32 Gbps PCIe HBA card:

    - Port 0 of Emulex LPE35002-M2 on Riser1_PCIe_Slot3

    - Port 0 of Emulex LPE35002-M2 on Riser2_PCIe_Slot3

Network architecture configuration

Connect the 1 GbE management port on Hitachi Advanced Server DS220 G2 to a Cisco Nexus 92348, or to any other external 1 GbE switch for management connectivity.

Refer to the following table to make the following 25 GbE network connections for the client network setup of the SAP HANA node as an uplink network:

- Connect the following to the Cisco Nexus 93180YC-FX switches or to any other external switches:

    - Port 1 of Intel E810-XXVDA2 2-port 10/25 GbE Network Adapter on Riser1_PCIe_Slot1

    - Port 1 of dual port Intel E810-XXVDA2 2-port 10/25 GbE Network Adapter on Riser1_PCIe_Slot2

- Bond the corresponding two ports *eth9901* and *eth9902* as bond0 at the operating system level using active-active network bond mode with the following options:

```
mode= 802.3ad miimon=100 xmit_hash_policy=layer3+4 updelay=5000
lacp_rate=fast
```

This acts as the client network for the SAP HANA node.

- If additional 25 GbE network connections are needed, connect Port 1 of both 10/25 GbE Intel E810-XXVDA2 PCIe cards to the Cisco Nexus 93180YC-FX switches, or to any other external switches.

PCIe Network Card	Port	Network Description
Riser1_PCIe_Slot1	1	Client network for the SAP HANA node.
	2	Free for use as an additional network for backup, SAP HANA system replication, or other purposes.
Riser2_PCIe_Slot2	1	Client network for the SAP HANA node.
	2	Free for use as an additional network for backup, SAP HANA system replication, or other purposes.

> 📄 **Note:** The management network and the client network can be on the same network switch or a separate network switch, depending on the network environment.

Storage architecture configuration

This section describes the two storage configuration options for this environment:

- Internal storage (on page 12)

- External storage (on page 13)

Internal storage

The following storage components are required to set up a scale-up configuration for SAP HANA using internal storage with Hitachi Advanced Server DS220 G2:

- One Broadcom QS-3916 Type B MegaRAID (4G DDR) storage controller card

- 5 × 1.92 TB Intel S4510 SATA SSD drives configured as RAID 5 (4D+1P), supporting up to 1024 GB RAM per SAP HANA node.

- 9 × 1.92 TB Intel S4510 SATA SSD drives configured as RAID 5 (8D+1P), supporting 2048 GB RAM per SAP HANA node.

- 11 × 1.92 TB Intel S4510 SATA SSD drives configured as RAID 5 (10D+1P), supporting 4096 GB RAM per SAP HANA node.

- 1 × 1.92 TB Intel S4510 SATA SSD drive used as a spare drive.

Depending on the I/O and capacity requirements, storage sizing and configuration vary for the following components:

- Operating system volume (OS)

- SAP HANA shared volume (*/hana/shared*)

- SAP HANA log volume (*/hana/log*)

- SAP HANA data volume (*/hana/data*)

The following table lists the storage configurations for different memory sizes.

Configuration		Supported SAP HANA Memory Size		
		Up to 1024 GB	**2048 GB**	**4096 GB**
Parity Group		1 × RAID 5 (4D +1P) using 5 × 1.92 TB Intel SATA SSD	1 × RAID 5 (8D +1P) using 9 × 1.92 TB Intel SATA SSD	1 × RAID 5 (10D +1P) using 11 × 1.92 TB Intel SATA SSD
Virtual Drives	Operating System	100 GB		
	HANA Shared	1536 GB	3072 GB	4096 GB
	Log	600 GB		
	Data	4915 GB	9216 GB	12288 GB
Spare drive		1 × 1.92 TB Intel SATA SSD		

External storage

> **Note:** You can use a different storage architecture to implement this reference architecture. Hitachi Virtual Storage Platform G350 and Virtual Storage Platform F350 were used as external storage for validation testing of this environment. Contact your Hitachi Vantara account representative for details and implementation services to configure an environment using external storage.

The following storage components are required to implement a scale-up SAP HANA system with Hitachi Advanced Server DS220 G2 using external storage:

- 2 × 2-port Emulex LPE35002-M2 16/32 Gbps PCIe HBA card

- Small form-factor drive tray (DBS)

- Spare drives

The following are mandatory for the external storage option with direct connection between Hitachi Virtual Storage Platform and the Emulex HBA on Hitachi Advanced Server DS220 G2:

- Use System Mode 847 on the storage system.

- Enable Host Mode Option 02, Host Mode Option 94, and Host Mode Option 109 for the corresponding storage port connected with the server.

  - Host Mode Option 109 — This option fixes a SAN boot issue, when the system cannot find the Boot LUN after a restart.

  - Host Mode Option 94 — This option is mandatory for direct connection between the Hitachi Virtual Storage Platform and the Emulex LPE35002 HBA. If this mode is not set, then SAN storage cannot be identified from the Emulex HBA.

  - Host Mode Option 02 (Optional) — This option is recommended when the system uses test-unit-ready (TUR) for path_checker in the */etc/multipath.conf* file. This mode is typically used for fencing technology.

- Host Group ID must be 00 for SAN boot.

An example configuration for port properties with Hitachi Virtual Storage Platform is listed in the following table.

For this setting	Use this value
Port Security	Disabled
Port Speed	16 Gbps
Fabric	OFF
Connection Type	P-to-P

The SAP HANA node requires the following storage layout:

- Operating system volume

- SAP HANA shared volume for the SAP HANA binaries and other configuration files

- SAP HANA log volume

- SAP HANA data volume

This reference architecture uses a dynamic provisioning pool design for the storage layout. This ensures maximum utilization and optimization at a lower cost.

For the storage layout, use two dynamic provisioning pools with the specific parity groups as listed in the following table.

Dynamic Provisioning Pool Name	Purpose	Parity Group RAID Level and Disks
OS_SH_Data_Pool	Operating system LUN SAP HANA shared LUN Data LUN	RAID 10 (2D+2D) on 1.92 TB SSD drives
Log_Pool	Log LUN	RAID 10 (2D+2D) on 1.92 TB SSD drives

The example layout in the following table uses a dynamic provisioning pool layout on Hitachi Virtual Storage Platform G350 or Virtual Storage Platform F350 for an SAP HANA TDI solution.

	512 GB	1024 GB	2048 GB	4096 GB
OS_SH_Data_Pool	1 × RAID 10 (2D+2D) 4 × 1.92 TB SSD 4 × 878 GB LDEV		2 × RAID 10 (2D+2D) 8 × 1.92 TB SSD 8 × 878 GB LDEV	3 × RAID 10 (2D+2D) 12 × 1.92 TB SSD 12 × 878 GB LDEV
Log_Pool	1 × RAID 10 (2D+2D) 4 × 1.92 TB SSD 4 × 878 GB LDEV			

The following table lists the LUN path assignment used when validating this environment.

LUN ID	LDEV ID	LDEV Name
0000	00:02:00	HANA_OS
0001	00:02:01	HANA_SH

LUN ID	LDEV ID	LDEV Name
0002	00:02:02	HANA_LOG_1
0003	00:02:03	HANA_LOG_2
0004	00:02:04	HANA_LOG_3
0005	00:02:05	HANA_LOG_4
0006	00:02:06	HANA_DATA_1
0007	00:02:07	HANA_DATA_2
0008	00:02:08	HANA_DATA_3
0009	00:02:09	HANA_DATA_4

SAP HANA configuration

This section describes how to configure SAP HANA for this solution.

File system

These volumes use the following file systems for implementation of this solution either with internal drives or with an external storage subsystem:

- BTRFS File system
  - Operating system volume (SLES only)
- XFS File system
  - Operating system volume (RHEL Only)
  - SAP HANA shared volume
  - Data volume
  - Log volume

Device-Mapper Multipath

If you implement this solution using internal storage on Hitachi Advanced Server DS220 G2, then deactivate Device-Mapper Multipath.

If you implement this solution using external storage, then activate Device-Mapper Multipath.

SAP HANA software installation

After you configure the file system for the SAP HANA data volume and log volume, install the latest SAP HANA 2.0 SPS stack on the server.

Install the following SAP HANA software components on the server:

- SAP HANA database server

- SAP HANA client

- SAP Host agent

Engineering validation

The test methodology for validating the appliance configuration using Hitachi Advanced Server DS220 G2 with Intel S4510 SATA SSD drives and SAP HANA TDI enterprise storage configuration with Hitachi Virtual Storage Platform F350 (VSP F350) or VSP G350 used the following:

- For the appliance or TDI solution, SAP HANA Hardware and Cloud Measurement Tool (HCMT) revision hcmt-056_0 was tested on the following volumes for SLES 15 SP2:

  - Data volume

  - Log volume

- For the appliance or TDI solution, SAP HANA Hardware and Cloud Measurement Tool (HCMT) revision hcmt-057_0 was tested on the following volumes for RHEL 8.2:

  - Data volume

  - Log volume

- For the appliance or TDI solution, SAP HANA Hardware and Cloud Measurement Tool (HCMT) revision hcmt-060_0 was tested on the following volumes for SLES 15 SP3 and RHEL 8.4:

  - Data volume

  - Log volume

- For the appliance or TDI solution, SAP HANA Hardware and Cloud Measurement Tool (HCMT) revision hcmt-065_0 was tested on the following volumes for SLES 15 SP4 and RHEL 8.6:

  - Data volume

  - Log volume

- For the appliance or TDI solution, SAP HANA Hardware and Cloud Measurement Tool (HCMT) revision hcmt-074_0 was tested on the following volumes for SLES 15 SP5 and RHEL 8.8:

  - Data volume

  - Log volume

- For the appliance or TDI solution, SAP HANA Hardware and Cloud Measurement Tool (HCMT) revision hcmt-076_0 was tested on the following volumes for RHEL 9.2:

  - Data volume

  - Log volume

Sample global.ini file

This section provides the *global.ini* file used for the following operating systems.

SUSE Enterprise Linux Server for SAP Applications

This is a sample *global.ini* file that was configured and used for validating the environment as an appliance solution or TDI solution with SUSE Linux Enterprise Server for SAP Applications 15 SP2, 15 SP3, and 15 SP4.

```
[communication]
tcp_backlog = 2048 sslMinProtocolVersion=tls12

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

[multidb]
mode = multidb
database_isolation = low
singletenant = yes

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

[system_replication_communication]
enable_ssl=off

[ldap]
sslMinProtocolVersion=tls12
```

Red Hat Enterprise Linux Server for SAP Applications

This is a sample *global.ini* file that was configured and used for validating the environment as an appliance solution or TDI solution with Red Hat Linux Enterprise Server for SAP Applications 8.8 and 9.2.

```
[communication]
tcp_backlog = 2048
sslMinProtocolVersion=tls12

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

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

[multidb]
mode = multidb
database_isolation = low
singletenant = yes
[persistence]
basepath_datavolumes = /hana/data/HIT
basepath_logvolumes = /hana/log/HIT

[ldap]
sslMinProtocolVersion=tls12
```

This is a sample *global.ini* file that was configured and used for validating the environment as an appliance solution or TDI solution with Red Hat Linux Enterprise Server for SAP Applications 8.2, 8.4, and 8.6.

```
[communication] tcp_backlog = 2048

[fileio] max_parallel_io_requests[data] = 64
max_submit_batch_size[data] = 64
size_kernel_io_queue[data] = 512 async_read_submit[data] = on
```

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```
async_write_submit_blocks[data] = all min_submit_batch_size[data] = 16
async_write_submit_active[data] = auto max_parallel_io_requests[log] = 64
max_submit_batch_size[log] = 64
size_kernel_io_queue[log] = 512 sync_read_submit[log] = on
async_write_submit_blocks[log] = all min_submit_batch_size[log] = 16
async_write_submit_active[log] = auto

[multidb] mode = multidb
database_isolation = low singletenant = yes

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

Product descriptions

These products are used in this reference architecture.

Hitachi Advanced Server DS220 G2

With a combination of two Intel Xeon Scalable processors and high storage capacity in a 2U rack-space package, Hitachi Advanced Server DS220 G2 delivers the storage and I/O to meet the needs of converged solutions and high-performance applications in the data center.

The Intel Xeon Scalable processor family is optimized to address the growing demands on today's IT infrastructure. The server provides 32 slots for high-speed DDR4 memory, allowing up to 4 TB memory capacity with RDIMM population (128 GB × 32) or 8TB (512 GB × 16) with Intel Optane Persistent Memory population.

DS220 G2 comes in three storage configurations to allow for end user flexibility. The first configuration supports 24 2.5-inch non-volatile memory express (NVMe) drives, the second supports 24 2.5-inch serial-attached SCSI (SAS), serial-ATA (SATA) and up to 8 NVMe drives, and the third supports 12 3.5-inch SAS or SATA and up to 8 NVMe drives. All the configurations support hot-pluggable, front-side-accessible drives as well as 2 optional 2.5-inch rear mounted drives. The DS220 G2 delivers high I/O performance and high capacity for demanding applications and solutions.

Hitachi Virtual Storage Platform F Series family

Use Hitachi Virtual Storage Platform F series family storage for a flash-powered cloud platform for your mission critical applications. This storage meets demanding performance and uptime business needs. Extremely scalable, its 4.8 million random read IOPS allows you to consolidate more applications for more cost savings.

Hitachi Virtual Storage Platform F series family delivers superior all-flash performance for business-critical applications, with continuous data availability.

Hitachi Virtual Storage Platform G series family

The Hitachi Virtual Storage Platform G series family enables the seamless automation of the data center. It has a broad range of efficiency technologies that deliver maximum value while making ongoing costs more predictable. You can focus on strategic projects and consolidating more workloads while using a wide range of media choices.

The benefits start with Hitachi Storage Virtualization Operating System RF. This includes an all new enhanced software stack that offers up to three times greater performance than our previous midrange models, even as data scales to petabytes.

Hitachi Virtual Storage Platform G series offers support for containers to accelerate cloud-native application development. Provision storage in seconds, and provide persistent data availability, all the while being orchestrated by industry leading container platforms. Move these workloads into an enterprise production environment seamlessly, saving money while reducing support and management costs.

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. For more information, see https://www.sap.com/products/hana.html.

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) Operating System

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

Hitachi Vantara